APPENDICES

ENERGY ENGINEERING ANALYSIS PROGRAM

ENERGY SAVINGS OPPORTUNITY SURVEY

FORT HUACHUCA, ARIZONA 1994

VOLUME II

PREPARED FOR

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

PREPARED BY

KELLER & GANNON
ENGINEERS • ARCHITECTS
1453 MISSION STREET, SAN FRANCISCO, CA 94103

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APPENDIX E

Building Envelope Retrofit Calculations

APPENDIX E
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Insulation Retrofit Evaluations for Selected Buildings

Insulation is considered for selected buildings. Energy savings are evaluated using energy simulations employing the Carrier HAP program. Weather data is only available for large cities. El Paso, Texas was selected as the closest city with a somewhat similar climate; results are adjusted based on Fort Huachuca and El Paso meteorological data.

Buildings included in this analysis and insulation retrofits considered for each are:

Building 15544 Instruction Building

The 'Butler' type building is built on a concrete slab with metal wall panels insulated with 1-inch of fiberglass and gypsum board interior. The roof has the same construction, with suspended acoustical ceiling tiles.

HVAC is provided by a multizone air handling unit fitted with hot and chilled water coils. Chilled water is provided by a package air cooled reciprocating chiller; hot water is provided by a natural gas fired hot water boiler.

Insulation projects evaluated for this building include:

- Retrofit wall Insulation to achieve an insulating value of R-11, to be accomplished by installing blow-in insulation from the building interior.
- Retrofit roof Insulation to achieve an insulating value of R-30, to be accomplished by adding an R-30 layer of fiberglass insulation below the existing roof deck.
- Apply a coating of LO/MIT-1 to roof exterior surface.

Building 20200 Residential Duplex

The building is constructed on a concrete slab. Walls are wood stud with stucco exterior and gypsum board interior. Originally, walls were insulated with a loose mineral wool which has now settled, removing insulation from the top portions of the walls. Roof construction is on 2"x10" joists with R-11 Batt insulation between; built-up roofing above and gypsum board ceiling, both fixed directly to the joists. Roof insulation is deteriorated due to previous leakage; it is assumed that removal is required prior to the addition of new R-30 fiberglass batts.

Heating is provided by a warm air furnace and cooling is provided by a roof top evaporative cooler. Each of the two units has the same equipment.

Insulation projects evaluated for this building include:

- Retrofit wall Insulation to achieve an insulating value of R-11, to be accomplished by installing blow-in insulation from the building exterior, only about 1/2 the wall cavities need to be filled; cost estimates are adjusted accordingly.
- Retrofit roof Insulation to achieve an insulating value of R-30, to be accomplished by adding R-30 fiberglass batts between ceiling joists when the building requires re-roofing.
- Apply a coating of LO/MIT-1 to roof exterior surface.

Building 43083 Visitor's Quarters

The Visitor's Quarters is a three-floor, hotel-like building. Walls are constructed of concrete masonry units (CMU), floors are concrete decks and the roof/ceiling is composed of a built-up roof over concrete deck, air space and gypsum-board ceiling. Certain walls of one floor have been insulated on the interior surface with rigid boards on furring strips with a new surface covering.

HVAC is provided in each room via two-pipe fan-coil units on thermostatic controls. Either chilled or hot water is provided to the fan-coil units depending on the season. Hallways and central areas are provided HVAC via air handling units fitted with chilled and hot water coils. The building is split into two service areas, each handled by separate hot water boilers and air cooled reciprocating chillers.

Insulation projects evaluated for this building include:

- Retrofit wall Insulation to achieve an insulating value of R-11, to be accomplished by installing rigid fiberglass board insulation between furring strips on interior walls, with new gypsum board covering, prime and finish coatings.
- Retrofit roof Insulation to achieve an insulating value of R-30, to be accomplished by adding rigid insulation boards to roof surface when reroofing is required.
- Apply a coating of LO/MIT-1 to roof exterior surface.

Building 51005 Guest House

The Guest House is similar to the Visitor's Quarters in construction, three-floors with CMU walls, concrete decks and built-up roof. This study investigates only the proposed application of LO/MIT 1 to the roof, thus, only the top floor is used in computer simulations of annual energy use.

HVAC is provided to this building similarly to that of the Visitors Quarters described above. Rooms are fitted with individual, thermostatically controlled fan-coil units.

Insulation projects evaluated for this building include:

- Apply a coating of LO/MIT-1 to roof exterior surface.

Building 56301 Communications Equipment Facility

Building 56301 is a communications equipment facility. The 30,000 square foot, single floor, building heating, ventilating and air conditioning (HVAC) system is comprised of three rooftop-mounted multi-zone air handling units. Each unit is fitted with both hot and chilled water coils. Hot water is supplied by a hot water boiler and chilled water is provided by an air cooled reciprocating chiller.

Insulation projects evaluated for this building include:

- Apply a coating of LO/MIT-1 to roof exterior surface.

Building 61701 Barnes Field House

Barnes Field House is a multiple purpose physical fitness and recreation facility. The facility includes a gymnasium, weight rooms, racquetball courts, swimming pool, locker rooms, showers and administrative office spaces. The building has been modified and added-on to several times, thus construction methods and materials differ throughout the facility.

The gymnasium, swimming pool, locker rooms and offices were all constructed at about the same time. The building is constructed over a concrete slab, walls are CMU and poured concrete. The built-up roofs cover rigid insulation on metal decks, ceiling surfaces are cork-board in the pool and acoustic tiles in the gymnasium. Locker room and office area roof systems are similar with plastered ceilings on metal lath. A recent addition of racquet ball courts consists of construction that includes R-11 insulation in the walls and R-19 insulation below the metal roof deck.

The locker rooms, swimming pool and gymnasium are provided heating and ventilation via fan-coil units fitted with hot water coils. Units are capable of providing 100% outside air. Cooling is provided by separate evaporative coolers. The office areas are provided hot water convectors for heating and evaporative coolers for cooling. Hot water is provided by natural gas fired hot water boilers. The new racquetball courts and renovated courts adjacent to the gymnasium are each served by rooftop packaged air conditioners.

Insulation projects evaluated for this building include:

- Retrofit wall Insulation to achieve an insulating value of R-11,
  - Gymnasium: Install rigid insulation with new interior coverings fixed to furring strips; apply 3/4-inch plywood to a height of 8-feet above the gymnasium floor and 5/8-inch

gypsum wallboard above.
  - Swimming Pool: Install rigid insulation with new interior coverings fixed to furring strips; metal wall panels to a height of 8-feet above the floor and 5/8-inch gypsum wallboard above.
  - Offices & Locker Rooms: Install R-11 fiberglass batt insulation on interior walls, affix new wall covering, 1/2-inch gypsum wallboard, on furring strips. Use water resistant gypsum wallboard in locker rooms.
  - Racquet Ball Courts in Old Part of Building: Install exterior insulation system consisting of polystyrene rigid board insulation and stucco hard-coat.
- Retrofit roof Insulation to achieve an insulating value of R-30, to be accomplished by adding rigid insulation boards to roof surface when reroofing is required.
- Apply a coating of LO/MIT-1 to roof exterior surface.

Building 70525 NCO Club

The NCO club is a metal frame building built on a concrete slab. Exterior walls consist of prefabricated metal wall panels with about 1-inch of fiberglass insulation on walls away from the building entry and rear patio areas. Building wall construction along the building entry side and rear patio areas consist of glass-curtain walls and interior/exterior brick faced walls. Roof construction is prefabricated type metal panels with 1-inch of fiberglass insulation above a suspended ceiling. R-30 fiberglass batt insulation was being added to the entire roof during field investigations.

The building is heated by a multizone natural gas fired air handling unit. Cooling is provided by stationary media evaporative coolers connected, for the most part, to the same ductwork as the heating system.

Insulation projects evaluated for this building include:

- Retrofit wall Insulation to achieve an insulating value of R-11, to be accomplished by installing blow-in insulation from the building interior, on walls that do not include facia brick on both sides.
- Apply a coating of LO/MIT-1 to roof exterior surface.

Building 90312 Warehouse

This building is built on a concrete slab. Wall construction is CMU with built-up roof over a metal roof deck. Heating is provided by natural gas fired radiant heaters; no cooling is provided for the warehouse. Several small offices are constructed inside the building. Each office is constructed as a separate building in a building. One office, of older construction, is composed of wood studwalls with R-11 batt insulation and gypsum wallboard covering. Ceilings are plywood fixed to wood rafters. The other small office was recently constructed and consists of prefabricated panel walls and a ceiling suspended from a metal deck; neither walls or ceiling is insulated.

Heating and cooling are provided to interior offices by window-type heat pump units.

Insulation projects evaluated for this building include only the small interior offices. The warehouse is heated with natural gas fired radiant heaters; additional insulation will not reduce heating energy requirements.

- Retrofit wall Insulation to achieve an insulating value of R-11, to be installed in older offices, accomplished by installing blow-in insulation from the office space interior.
- Retrofit roof Insulation to achieve an insulating value of R-30, to be accomplished to both types of office space by adding an R-30 layer of fiberglass insulation above the existing ceiling/roof decks.

Building 91114 Aircraft Hangar, Shops and Offices

The Aircraft hangar is constructed on a concrete slab. The central portion of the building is occupied by the high-bay hangar. The hangar is flanked on each side by two-floor office/shop wings. Construction consists

of CMU walls with structural steel framing. Wall panels on the exterior office/shop wings have about a 2-inch thick layer of fiberglass insulation which has deteriorated. Roof construction is built-up roofing over a thin layer of rigid insulation. The upper floors of the office/shop wings have suspended ceilings.

The hangar is heated by natural gas fired radiant heaters and is not cooled. Office/shop wings are heated with a combination of fan-coil units fitted with steam heating coils and by steam convectors. Cooling is provided to selected areas of the two-floor office/shop wings by evaporative coolers. The Avionics shop located on the second floor of the East office/shop wing is cooled by a package rooftop air conditioner.

Insulation projects evaluated for this building include:

- Retrofit wall Insulation to achieve an insulating value of R-11,
  to be accomplished by installing rigid fiberglass board insulation between furring strips on interior walls, with new gypsum board covering, prime and finish coatings.
- Retrofit roof Insulation to achieve an insulating value of R-30,
  to be accomplished by adding rigid insulation boards to roof surface when reroofing is required.
- Apply a coating of LO/MIT-1 to roof exterior surface.

Summary of Building Envelope Retrofit Evaluations

Building Number	Insulation Retrofit			Energy Savings		Energy Cost Savings					
	Lo-E Roof	Roof Insul	Wall Insul	Electric (kWH/Year)	Gas (Million BTU/Yr)	Electric ($/Year)	Gas ($/Year)	LCC Savings ($)	Investment ($)	Payback (Years)	SIR
15544	•	•	•	27,827	442	$1,750	$1,556	$43,080	$24,210	7.32	1.78
20200	-	•	-	4,029	64	$253	$226	$6,245	$4,147	8.65	1.51
43083	•	•	-	124,909	1,228	$7,857	$4,318	$155,623	$58,567	4.81	2.66
51005	•	-	-	(14,401)	928	($906)	$3,264	$35,364	$16,822	7.13	2.10
56301	•	-	-	149,852	567	$9,426	$1,994	$141,556	$6,437	0.56	21.99
61701	-	-	-	No projects are listed because none resulted in an SIR > 1.0							
70525	-	-	-	No projects are listed because none resulted in an SIR > 1.0							
90312A	-	-	-	No projects are listed because none resulted in an SIR > 1.0							
90312B	-	-	-	No projects are listed because none resulted in an SIR > 1.0							
91114	•	-	-	5,460	(16)	$343	($57)	$3,321	$1,498	5.23	2.22
Totals	•	•	•	**297,676**	**3,214**	**$18,724**	**$11,301**	**$385,191**	**$111,681**	**3.72**	**3.45**

Note that only those insulation projects are listed above for which Life Cycle Cost Analyses resulted in an SIR above 1.0. Insulation retrofits recommended for each building are indicated by "·" symbols, above.

Baseline HVAC Energy Use

Building Number	Building (SF)	Electric kWH/Year	Gas Therms/Yr	SF Wall Insulation	SF Roof Insulation	LO/MIT-1 Coating SF
15544	12,800	340,893	9,636	7,680	12,800	12,800
20200	1,565	5,509	411	1,193	3,130	3,130
43083	89,946	778,117	66,982	32,546	29,982	29,982
51005	78,400	1,069,343	67,096	Not Considered		78,400
56301	30,000	415,473	32,087	Not Considered		30,000
61701	49,288	196,340	6,612	Various types/amounts, see estimates		
70525	36,478	121,671	1,228	5,627	NA	36,478
90312A	350	4,086	0	624	350	NA
90312B	240	3,784	0	NA	240	NA
91114	21,758	163,200	9,596	6,466	6,979	6,979

Energy Costs and Adjustment Factors

Electric Usage Cost & Taxes, **including demand charges:**

$0.0629 per kWH 12.02 Uniform Present Worth, N=15

Natural Gas Cost, Rate CG-40 for Air Conditioning Service, incl Taxes:

$3.5163 per Mil BTU's 14.17 Uniform Present Worth, N=15

Adjustment for Tuscon vs. Fort Huachuca Energy Use:

Location	Heating DD/Year	Cooling DD/Year
Simulations @ El Paso, Texas	2,678	2,098
Actual Site Fort Huachuca	2,551	1,595
Adjustment Factors:	0.953	0.760

HVAC Energy Use with Low-E Roof Coating Only

Adjusted Values (See above)

Building Number	Building (SF)	Electric kWH/Year	Gas Therms/Yr	Savings kWH/Year	Savings Therms/Yr	Elec Saved ($/Year)	Gas Saved ($/Year)	Constr. Cost ($)	Invest-ment ($)	LCCA Saved ($)	SIR
15544	12,800	313,786	7,988	20,608	1,570	$1,296	$552	$2,452	$2,747	$23,403	8.52
20200	1,565	5,509	468	0	(109)	$0	($38)	Not Evaluated because no energy is saved			
43083	89,946	674,041	62,533	79,124	4,238	$4,977	$1,490	$5,744	$6,433	$80,938	12.58
51005	78,400	1,088,286	57,351	(14,401)	9,283	($906)	$3,264	$15,020	$16,822	$35,364	2.10
56301	30,000	218,364	26,133	149,852	5,672	$9,426	$1,994	$5,747	$6,437	$141,556	21.99
61701	49,288	180,855	7,084	11,772	(450)	$740	($158)	$8,638	$9,674	$6,660	0.69
70525	36,478	121,673	1,415	(2)	(178)	($0)	($63)	$5,824	$6,523	($889)	(0.14)
91114	21,758	156,018	9,766	5,460	(162)	$343	($57)	$1,337	$1,498	$3,321	2.22

HVAC Energy Use with Added Roof Insulation Only

Adjusted Values (See above)

Building Number	Building (SF)	Electric kWH/Year	Gas Therms/Yr	Savings kWH/Year	Savings Therms/Yr	Elec Saved ($/Year)	Gas Saved ($/Year)	Constr. Cost ($)	Invest-ment ($)	LCCA Saved ($)	SIR
15544	12,800	322,156	7,268	14,245	2,256	$896	$793	$10,676	$11,957	$22,009	1.84
20200	1,565	2,859	74	4,029	642	$253	$226	$3,703	$4,147	$6,245	1.51
43083	89,946	627,107	54,947	114,805	11,464	$7,221	$4,031	$46,548	$52,134	$143,921	2.76
61701	49,288	177,012	5,550	14,694	1,012	$924	$356	$45,402	$50,850	$16,150	0.32
90312A	350	4,034	0	40	0	$2	$0	$292	$327	$30	0.09
90312B	240	3,742	0	32	0	$2	$0	$200	$224	$24	0.11
91114	21,758	158,508	9,318	3,567	265	$224	$93	$7,712	$8,638	$4,016	0.46

HVAC Energy Use with Added Wall Insulation Only — Adjusted Values (See above)

Building Number	Building (SF)	Electric kWH/Year	Gas Therms/Yr	Savings kWH/Year	Savings Therms/Yr	Elec Saved ($/Year)	Gas Saved ($/Year)	Constr. Cost ($)	Invest-ment ($)	LCCA Saved ($)	SIR
15544	12,800	330,180	8,024	8,145	1,536	$512	$540	$8,488	$9,506	$13,809	1.45
20200	1,565	5,158	319	534	175	$34	$62	$1,053	$1,180	$1,277	1.08
43083	89,946	663,705	56,680	86,981	9,813	$5,471	$3,451	$126,835	$142,055	$114,659	0.81
61701	49,288	145,929	4,173	38,325	2,323	$2,411	$817	$219,425	$245,756	$40,552	0.17
70525	36,478	121,664	799	5	409	$0	$144	$6,219	$6,965	$2,040	0.29
90312A	350	4,021	0	49	0	$3	$0	$690	$772	$37	0.05
91114	21,758	148,436	8,602	11,224	947	$706	$333	$25,199	$28,223	$13,204	0.47

HVAC Energy Use with Added Roof Insulation and Low-E Roof Coating Only — Adjusted Values (See above)

Building Number	Building (SF)	Electric kWH/Year	Gas Therms/Yr	Savings kWH/Year	Savings Therms/Yr	Elec Saved ($/Year)	Gas Saved ($/Year)	Constr. Cost ($)	Invest-ment ($)	LCCA Saved ($)	SIR
43083	89,946	613,816	54,091	124,909	12,280	$7,857	$4,318	$52,292	$58,567	$155,623	2.66

HVAC Energy Use with Added Wall & Roof Insulation and Low-E Roof Coating — Adjusted Values (See above)

Building Number	Building (SF)	Electric kWH/Year	Gas Therms/Yr	Savings kWH/Year	Savings Therms/Yr	Elec Saved ($/Year)	Gas Saved ($/Year)	Constr. Cost ($)	Invest-ment ($)	LCCA Saved ($)	SIR
15544	12,800	304,291	4,992	27,827	4,424	$1,750	$1,556	$21,616	$24,210	$43,080	1.78

HVAC Energy Use with Added Wall & Roof Insulation — Adjusted Values (See above)

Building Number	Building (SF)	Electric kWH/Year	Gas Therms/Yr	Savings kWH/Year	Savings Therms/Yr	Elec Saved ($/Year)	Gas Saved ($/Year)	Constr. Cost ($)	Invest-ment ($)	LCCA Saved ($)	SIR
20200	1,565	2,508	48	2,282	345	$144	$121	$4,756	$5,327	$3,446	0.65

Note: Analysis shows that while roof and wall insulation retrofits are economically justified when evaluated separately, that when evaluated together, they are not economically justified. Recommend roof insulation only because it has the higher SIR.

CONSTRUCTION COST ESTIMATE					Date Prepared: January 1995		Sheet 1 Of 11
Project: ECIP Facility Energy Improvements					Project No.	Basis for Estimate: Code A (no design competed)	
Location: Fort Huachuca, Arizona							
Engineer-Architect: Keller & Gannon							
Drawing No.: Building 15544 Insulation Retrofits			Estimator: BIH			Checked By: RCL	
Line Item	Quantity No. Units	Quantity Unit Meas.	Labor & Equipment Per Unit	Labor & Equipment Total	Material Per Unit	Material Total	Total Cost
Wall Insulation: Blow-In Insulation to Achieve R-11							
(Costs based on April 1994 Insulation project by DEH, Fort Huachuca)							
Blow-In Wall Insulation, drilling & patching, fiberglass to R-11	7,680	SF	$0.74	$5,683	$0.05	$384	$6,067
Subtotal				$5,683		$384	$6,067
Arizona Transaction Privilege Tax	3.75%	%		-		$14	$14
Subtotal							$6,082
Contractor OH & Profit	25.0%	%					$1,520
Subtotal							$7,602
Bond	1.5%	%					$114
Subtotal							$7,716
Estimating Contingency	10.0%	%					$772
Total Probable Construction Cost							$8,488
Roof Insulation: Fiberglass Batts to Underside of Roof to Achieve R-30							
(Costs based on April 1994 Insulation project by DEH, Fort Huachuca and on Means 1994)							
Fiberglass Batt Insulation, R-30 Batts above drop-ceiling	12,800	SF	$0.11	$1,408	$0.47	$6,016	$7,424
Subtotal				$1,408		$6,016	$7,424
Arizona Transaction Privilege Tax	3.75%	%		-		$226	$226
Subtotal							$7,650
Contractor OH & Profit	25.0%	%					$1,912
Subtotal							$9,562
Bond	1.5%	%					$143
Subtotal							$9,705
Estimating Contingency	10.0%	%					$971
Total Probable Construction Cost							$10,676
LO/MIT 1 Roof Coating: Apply to Top of Roof (Costs based on 600 SF/Gal coverage, 25% contractor discount from $50/Gal and Means 1994 labor costs for spray painting, adjusted for the location.)							
Apply LO/MIT 1 Coating to Roof Surface	12,800	SF	$0.05	$634	$0.06	$800	$1,434
Subtotal				$634		$800	$1,434
Arizona Transaction Privilege Tax	3.75%	%		-		$30	$30
Subtotal							$1,464
Contractor OH & Profit	25.0%	%					$366
Subtotal							$1,830
Bond	1.5%	%					$27
Subtotal							$1,858
Estimating Contingency	10.0%	%					$186
Total Probable Construction Cost							$2,044
Subtotal							$2,229
Estimating Contingency	10.0%	%					$223
Total Probable Construction Cost							$2,452

CONSTRUCTION COST ESTIMATE	Date Prepared January 1995	Sheet 2 Of 11

Project	Project No.	Basis for Estimate
ECIP Facility Energy Improvements		Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		

Drawing No.	Estimator	Checked By
Building 20200 Insulation Retrofits	BIH	RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Wall Insulation: Blow-In Insulation to Achieve R-11 (Costs are based on April 1994 Insulation Project by DEH, Fort Huachuca, assumes 1/2 material cost & 2/3 installation cost due to settling of existing mineral wool type insulation; for both duplex units)							
Blow-In Wall Insulation, drilling & patching, fiberglass to R-11	1,193	SF	$0.61	$724	$0.025	$30	$753
Subtotal				$724		$30	$753
Arizona Transaction Privilege Tax	3.75%	%		-		$1	$1
Subtotal							$755
Contractor OH & Profit	25.0%	%					$189
Subtotal							$943
Bond	1.5%	%					$14
Subtotal							$957
Estimating Contingency	10.0%	%					$96
Total Probable Construction Cost							$1,053
Roof Insulation: Fiberglass Batts in Ceiling Joist Spaces to Achieve R-30 (Costs based on April 1994 Insulation project by DEH, Fort Huachuca and on Means 1994, assumes work is performed when re-roofing is required, quanties adjusted for both duplex units in building)							
Fiberglass Batt Insulation, R-30 Batts above drop-ceiling	3,130	SF	$0.11	$344	$0.47	$1,471	$1,815
Remove existing deteriorated fiberglass batt insulation during reroofing	3,130	SF	$0.25	$783	$0.00	$0	$783
Subtotal				$1,127		$1,471	$2,598
Arizona Transaction Privilege Tax	3.75%	%		-		$55	$55
Subtotal							$2,653
Contractor OH & Profit	25.0%	%					$663
Subtotal							$3,316
Bond	1.5%	%					$50
Subtotal							$3,366
Estimating Contingency	10.0%	%					$337
Total Probable Construction Cost							$3,703

CONSTRUCTION COST ESTIMATE	Date Prepared January 1995	Sheet 3 Of 11
Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: Building 43083 Insulation Retrofits	Estimator: BIH	Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Wall Insulation: Interior Rigid Fiberglass Board & New Surface to Achieve R-11 (Costs based on Means 1994, adjusted for Fort Huachuca's location)							
Rigid Fiberglass Board for R-11	32,546	SF	$0.20	$6,406	$1.50	$48,975	$55,381
Furring Strips 1"x2", 16" O.C.	24,410	LF	$0.32	$7,780	$0.16	$3,801	$11,581
Gypsum Board, Taped & Finished, 1/2"	32,546	SF	$0.34	$10,943	$0.19	$6,158	$17,100
Paint, Spray, Base plus Finish Coats	32,546	SF	$0.08	$2,688	$0.06	$1,851	$4,539
Subtotal				$27,816		$60,785	$88,601
Arizona Transaction Privilege Tax	3.75%	%		-		$2,279	$2,279
Subtotal							$90,881
Contractor OH & Profit	25.0%	%					$22,720
Subtotal							$113,601
Bond	1.5%	%					$1,704
Subtotal							$115,305
Estimating Contingency	10.0%	%					$11,530
Total Probable Construction Cost							$126,835
Roof Insulation: Rigid Board Insulation to Roof Surface to Achieve R-30 (Costs based on Means 1994, adjusted for Fort Huachuca's location, performed as part or reroofing)							
Rigid Polyisocyanurate 2#/CF, 3-1/2" R-25	29,982	SF	$0.14	$4,275	$0.93	$28,027	$32,302
Subtotal				$4,275		$28,027	$32,302
Arizona Transaction Privilege Tax	3.75%	%		-		$1,051	$1,051
Subtotal							$33,353
Contractor OH & Profit	25.0%	%					$8,338
Subtotal							$41,691
Bond	1.5%	%					$625
Subtotal							$42,316
Estimating Contingency	10.0%	%					$4,232
Total Probable Construction Cost							$46,548
LO/MIT 1 Roof Coating: Apply to Top of Roof (Costs based on 600 SF/Gal coverage, 25% contractor discount from $50/Gal and Means 1994 labor costs for spray painting, adjusted for the location.)							
Apply LO/MIT 1 Coating to Roof Surface	29,982	SF	$0.05	$1,486	$0.06	$1,874	$3,359
Subtotal				$1,486		$1,874	$3,359
Arizona Transaction Privilege Tax	3.75%	%		-		$70	$70
Subtotal							$3,430
Contractor OH & Profit	25.0%	%					$857
Subtotal							$4,287
Bond	1.5%	%					$64
Subtotal							$4,352
Estimating Contingency	10.0%	%					$435
Total Probable Construction Cost							$4,787
Subtotal							$5,222
Estimating Contingency	10.0%	%					$522
Total Probable Construction Cost							$5,744

CONSTRUCTION COST ESTIMATE	Date Prepared	Sheet	Of
	January 1995	4	11

Project	Project No.	Basis for Estimate
ECIP Facility Energy Improvements		Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		

Drawing No.	Estimator	Checked By
Building 51005 Insulation Retrofits	BIH	RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
LO/MIT 1 Roof Coating: Apply to Top of Roof (Costs based on 600 SF/Gal coverage, 25% contractor discount from $50/Gal and Means 1994 labor costs for spray painting, adjusted for the locati							
Apply LO/MIT 1 Coating to Roof Surface	78,400	SF	$0.05	$3,885	$0.06	$4,900	$8,785
Subtotal				$3,885		$4,900	$8,785
Arizona Transaction Privilege Tax	3.75%	%		-		$184	$184
Subtotal							$8,969
Contractor OH & Profit	25.0%	%					$2,242
Subtotal							$11,211
Bond	1.5%	%					$168
Subtotal							$11,379
Estimating Contingency	10.0%	%					$1,138
Total Probable Construction Cost							$12,517
Subtotal							$13,655
Estimating Contingency	10.0%	%					$1,365
Total Probable Construction Cost							$15,020

CONSTRUCTION COST ESTIMATE	Date Prepared	Sheet Of
	January 1995	5 11

Project	Project No.	Basis for Estimate
ECIP Facility Energy Improvements		Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		

Drawing No.	Estimator	Checked By
Building 56301 Low-E Roof Coating	BIH	RCL

Line Item	Quantity		Labor		Material		
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
LO/MIT 1 Roof Coating: Apply to Top of Roof (Costs based on 600 SF/Gal coverage, 25% contractor discount from $50/Gal and Means 1994 labor costs for spray painting, adjusted for the location.)							
Apply LO/MIT 1 Coating to Roof Surface	30,000	SF	$0.05	$1,487	$0.06	$1,875	$3,362
Subtotal				$1,487		$1,875	$3,362
Arizona Transaction Privilege Tax	3.75%	%		-		$70	$70
Subtotal							$3,432
Contractor OH & Profit	25.0%	%					$858
Subtotal							$4,290
Bond	1.5%	%					$64
Subtotal							$4,354
Estimating Contingency	10.0%	%					$435
Total Probable Construction Cost							$4,790
Subtotal							$5,225
Estimating Contingency	10.0%	%					$522
Total Probable Construction Cost							$5,747

CONSTRUCTION COST ESTIMATE	Date Prepared January 1995	Sheet 6 Of 11
Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: Building 61701 Wall Insulation Retrofits	Estimator: BIH	Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Wall Insulation: Interior Rigid Fiberglass Board & New Surface to Achieve R-11							
(Costs based on April 1994 Insulation project by DEH, Fort Huachuca and on Means 1994)							
Racquetball Courts loacated Adjacent to Gymnasium							
Rigid Extruded Polystyrene Board	4,395	SF	$0.14	$623	$0.99	$4,359	$4,982
Stucco on metal lath, masonry	488	SY	$25.48	$12,442	$1.39	$679	$13,122
Gymnasium							
Rigid Fiberglass Board for R-11	16,399	SF	$0.22	$3,550	$2.84	$46,549	$50,100
Furring Strips 1"x2", 16" O.C.	12,299	LF	$0.32	$3,920	$0.16	$1,915	$5,835
Gypsum Board, Taped & Finished, 5/8"	13,319	SF	$0.34	$4,478	$0.23	$3,024	$7,502
Plywood, 3/4"	3,080	SF	$1.10	$3,403	$3.19	$9,834	$13,237
Swimming Pool							
Rigid Fiberglass Board for R-11	5,754	SF	$0.22	$1,246	$2.84	$16,333	$17,579
Furring Strips 1"x2", 16" O.C.	4,316	LF	$0.32	$1,375	$0.16	$672	$2,047
Prefinished Prefabricated Wall Panels	5,754	SF	$1.03	$5,948	$3.71	$21,319	$27,267
Offices							
Rigid Fiberglass Board for R-11	1,706	SF	$0.22	$369	$2.84	$4,843	$5,212
Furring Strips 1"x2", 16" O.C.	1,280	LF	$0.32	$408	$0.16	$199	$607
Gypsum Board, Taped & Finished, 1/2"	1,706	SF	$0.34	$574	$0.19	$323	$896
Locker Rooms							
Rigid Fiberglass Board for R-11	360	SF	$0.22	$78	$2.84	$1,022	$1,100
Furring Strips 1"x2", 16" O.C.	270	LF	$0.32	$86	$0.16	$42	$128
Gypsum Board, Taped & Finished, 5/8"	360	SF	$0.34	$121	$0.23	$82	$203
All areas not using prefinished materials							
Paint, Spray, Base plus Finish Coats	22,860	SF	$0.08	$1,888	$0.06	$1,300	$3,188
Subtotal				$40,510		$112,495	$153,005
Arizona Transaction Privilege Tax	3.75%	%		-		$4,219	$4,219
Subtotal							$157,223
Contractor OH & Profit	25.0%	%					$39,306
Subtotal							$196,529
Bond	1.5%	%					$2,948
Subtotal							$199,477
Estimating Contingency	10.0%	%					$19,948
Total Probable Construction Cost							$219,425

CONSTRUCTION COST ESTIMATE	Date Prepared July 1994	Sheet 7 Of 11

Project	Project No.	Basis for Estimate
ECIP Facility Energy Improvements		Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: Building 61701 Roof Insulation Retrofits	Estimator: BIH	Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Roof Insulation: Rigid Board Insulation to Roof Surface to Achieve R-30 (Costs based on Means 1994, adjusted for Fort Huachuca's location, performed as part or reroofing, existing roof has R-13 rigid board, add R-17)							
Rigid Polyisocyanurate 2#/CF, 2-1/2" R-17	41,086	SF	$0.09	$3,861	$0.67	$27,634	$31,495
Subtotal				$3,861		$27,634	$31,495
Arizona Transaction Privilege Tax	3.75%	%		-		$1,036	$1,036
Subtotal							$32,532
Contractor OH & Profit	25.0%	%					$8,133
Subtotal							$40,665
Bond	1.5%	%					$610
Subtotal							$41,275
Estimating Contingency	10.0%	%					$4,127
Total Probable Construction Cost							$45,402
LO/MIT 1 Roof Coating: Apply to Top of Roof (Costs based on 600 SF/Gal coverage, 25% contractor discount from $50/Gal and Means 1994 labor costs for spray painting, adjusted for the location.)							
Apply LO/MIT 1 Coating to Roof Surface	45,086	SF	$0.05	$2,234	$0.06	$2,818	$5,052
Subtotal				$2,234		$2,818	$5,052
Arizona Transaction Privilege Tax	3.75%	%		-		$106	$106
Subtotal							$5,158
Contractor OH & Profit	25.0%	%					$1,289
Subtotal							$6,447
Bond	1.5%	%					$97
Subtotal							$6,544
Estimating Contingency	10.0%	%					$654
Total Probable Construction Cost							$7,198
Subtotal							$7,852
Estimating Contingency	10.0%	%					$785
Total Probable Construction Cost							$8,638

CONSTRUCTION COST ESTIMATE	Date Prepared January 1995	Sheet 8 Of 11
Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: Building 70525 Insulation Retrofits	Estimator: BIH	Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Wall Insulation: Blow-In Insulation to Achieve R-11 (Costs based on April 1994 Insulation project by DEH, Fort Huachuca)							
Blow-In Wall Insulation, drilling & patching, fiberglass to R-11	5,627	SF	$0.74	$4,164	$0.05	$281	$4,445
Subtotal				$4,164		$281	$4,445
Arizona Transaction Privilege Tax	3.75%	%		-		$11	$11
Subtotal							$4,456
Contractor OH & Profit	25.0%	%					$1,114
Subtotal							$5,570
Bond	1.5%	%					$84
Subtotal							$5,653
Estimating Contingency	10.0%	%					$565
Total Probable Construction Cost							$6,219
LO/MIT 1 Roof Coating: Apply to Top of Roof (Costs based on 600 SF/Gal coverage, 25% contractor discount from $50/Gal & Means '94 labor costs for spray painting, adjusted for the location.)							
Apply LO/MIT 1 Coating to Roof Surface	36,478	SF	$0.05	$1,807	$0.06	$2,280	$4,087
Subtotal				$1,807		$2,280	$4,087
Arizona Transaction Privilege Tax	3.75%	%		-		$85	$85
Subtotal							$4,173
Contractor OH & Profit	25.0%	%					$1,043
Subtotal							$5,216
Bond	1.5%	%					$78
Subtotal							$5,294
Estimating Contingency	10.0%	%					$529
Total Probable Construction Cost							$5,824

CONSTRUCTION COST ESTIMATE

Date Prepared	Sheet	Of
January 1995	9	11

Project	Project No.	Basis for Estimate
ECIP Facility Energy Improvements		Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: Building 90312A Insulation Retrofits	Estimator: BIH	Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Wall Insulation: Blow-In Insulation to Achieve R-11							
(Costs based on April 1994 Insulation project by DEH, Fort Huachuca)							
Blow-In Wall Insulation, drilling & patching, fiberglass to R-11	624	SF	$0.74	$462	$0.05	$31	$493
Subtotal				$462		$31	$493
Arizona Transaction Privilege Tax	3.75%	%		-		$1	$1
Subtotal							$494
Contractor OH & Profit	25.0%	%					$124
Subtotal							$618
Bond	1.5%	%					$9
Subtotal							$627
Estimating Contingency	10.0%	%					$63
Total Probable Construction Cost							$690
Roof Insulation: Fiberglass Batts above Roof/Ceiling to Achieve R-30							
(Costs based on April 1994 Insulation project by DEH, Fort Huachuca and on Means 1994)							
Fiberglass Batt Insulation, R-30 Batts above drop-ceiling	350	SF	$0.11	$39	$0.47	$165	$203
Subtotal				$39		$165	$203
Arizona Transaction Privilege Tax	3.75%	%		-		$6	$6
Subtotal							$209
Contractor OH & Profit	25.0%	%					$52
Subtotal							$261
Bond	1.5%	%					$4
Subtotal							$265
Estimating Contingency	10.0%	%					$27
Total Probable Construction Cost							$292

CONSTRUCTION COST ESTIMATE	Date Prepared	Sheet	Of
	January 1995	10	11

Project	Project No.	Basis for Estimate
ECIP Facility Energy Improvements		
Location: Fort Huachuca, Arizona		Code A (no design competed)
Engineer-Architect: Keller & Gannon		

Drawing No.	Estimator	Checked By
Building 90312B Insulation Retrofits	BIH	RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Roof Insulation: Fiberglass Batts above Roof/Ceiling to Achieve R-30 (Costs based on April 1994 Insulation project by DEH, Fort Huachuca and on Means 1994)							
Fiberglass Batt Insulation, R-30 Batts above drop-ceiling	240	SF	$0.11	$26	$0.47	$113	$139
Subtotal				$26		$113	$139
Arizona Transaction Privilege Tax	3.75%	%		-		$4	$4
Subtotal							$143
Contractor OH & Profit	25.0%	%					$36
Subtotal							$179
Bond	1.5%	%					$3
Subtotal							$182
Estimating Contingency	10.0%	%					$18
Total Probable Construction Cost							$200

CONSTRUCTION COST ESTIMATE

Date Prepared: January 1995 | Sheet 11 Of 11

Project: ECIP Facility Energy Improvements | Project No. | Basis for Estimate: Code A (no design competed)

Location: Fort Huachuca, Arizona

Engineer-Architect: Keller & Gannon

Drawing No.: Building 91114 Insulation Retrofits | Estimator: BIH | Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Wall Insulation: Interior Rigid Fiberglass Board & New Surface to Achieve R-11							
(Costs based on Means 1994, adjusted for Fort Huachuca's location)							
Rigid Fiberglass Board for R-11	6,466	SF	$0.20	$1,273	$1.50	$9,730	$11,003
Furring Strips 1"x2", 16" O.C.	4,850	LF	$0.32	$1,546	$0.16	$755	$2,301
Gypsum Board, Taped & Finished, 1/2"	6,466	SF	$0.34	$2,174	$0.19	$1,223	$3,397
Paint, Spray, Base plus Finish Coats	6,466	SF	$0.08	$534	$0.06	$368	$902
Subtotal				$5,526		$12,076	$17,603
Arizona Transaction Privilege Tax	3.75%	%		-		$453	$453
Subtotal							$18,055
Contractor OH & Profit	25.0%	%					$4,514
Subtotal							$22,569
Bond	1.5%	%					$339
Subtotal							$22,908
Estimating Contingency	10.0%	%					$2,291
Total Probable Construction Cost							$25,199
Roof Insulation: Rigid Board Insulation to Roof Surface to Achieve R-30							
(Costs based on Means 1994, adjusted for Fort Huachuca's location, performed as part or reroofing)							
Rigid Polyisocyanurate 2#/CF, 2-1/2" R-17	6,979	SF	$0.09	$656	$0.67	$4,694	$5,350
Subtotal				$656		$4,694	$5,350
Arizona Transaction Privilege Tax	3.75%	%		-		$176	$176
Subtotal							$5,526
Contractor OH & Profit	25.0%	%					$1,382
Subtotal							$6,908
Bond	1.5%	%					$104
Subtotal							$7,011
Estimating Contingency	10.0%	%					$701
Total Probable Construction Cost							$7,712
LO/MIT 1 Roof Coating: Apply to Top of Roof (Costs based on 600 SF/Gal coverage, 25% contractor discount from $50/Gal and Means 1994 labor costs for spray painting, adjusted for the location.)							
Apply LO/MIT 1 Coating to Roof Surface	6,979	SF	$0.05	$346	$0.06	$436	$782
Subtotal				$346		$436	$782
Arizona Transaction Privilege Tax	3.75%	%		-		$16	$16
Subtotal							$798
Contractor OH & Profit	25.0%	%					$200
Subtotal							$998
Bond	1.5%	%					$15
Subtotal							$1,013
Estimating Contingency	10.0%	%					$101
Total Probable Construction Cost							$1,114
Subtotal							$1,216
Estimating Contingency	10.0%	%					$122
Total Probable Construction Cost							$1,337

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion: Building **15544**: Roof & Wall Insulation, plus Low-E Roof Coating Preparer: KELLER & GANNON
Analysis Date January 1995 Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$21,616		
B. SIOH	$1,297		
C. Design Cost	$1,297		
D. Total Cost (1A + 1B + 1C)	$24,210		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
Investment (1D-1E-1F)			$24,210

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)	Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$18.43	95.0	$1,750	12.02	$21,039
B. Dist		0	$0		$0
C. LPG		0	$0		$0
D. Natural Gas	$3.52	442.4	$1,556	14.17	$22,042
E. Demand Saved	Included above		$0	12.02	$0
F. Total		537.3	$3,306		$43,080

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		10.74	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$0	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Years Economic Li	$3,306	
5. Simple Payback (1G/4):	7.32	Years
6. Total Net Discounted Savings (2F5 + 3C):	$43,080	
7. Savings to Investment Ratio (SIR) 6/1G:	1.78	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Building **20200**: Roof Insulation | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$3,703		
B. SIOH	$222		
C. Design Cost	$222		
D. Total Cost (1A + 1B + 1C)	$4,147		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$4,147

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$18.43	13.8		$253	12.02	$3,046
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$3.52	64.2		$226	14.17	$3,199
E. Demand Saved	Included above		kW	$0	12.02	$0
F. Total		78.0		$479		$6,245

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		10.74	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$0	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Years Economic Life))	$479	
5. Simple Payback (1G/4):	8.65	Years
6. Total Net Discounted Savings (2F5 + 3C):	$6,245	
7. Savings to Investment Ratio (SIR) 6/1G:	1.51	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion: Building **43083**: Roof Insulation and Low-E Roof Coat Preparer: KELLER & GANNON
Analysis Date: January 1995 Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$52,292		
B. SIOH	$3,138		
C. Design Cost	$3,138		
D. Total Cost (1A + 1B + 1C)	$58,567		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$58,567

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$18.43	426		$7,857	12.02	$94,439
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$3.52	1,228		$4,318	14.17	$61,185
E. Demand Saved	Included above		kW	$0	12.02	$0
F. Total		1,654		$12,175		$155,623

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		10.74	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$0	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Years Economic Life))	$12,175	
5. Simple Payback (1G/4):	4.81	Years
6. Total Net Discounted Savings (2F5 + 3C):	$155,623	
7. Savings to Investment Ratio (SIR) 6/1G:	2.66	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Building **51005**: Low-E Roof Coat		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15	Years

1. Investment Costs			
A. Construction Costs	$15,020		
B. SIOH	$901		
C. Design Cost	$901		
D. Total Cost (1A + 1B + 1C)	$16,822		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$16,822

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$18.43	(49.2)		($906)	12.02	($10,888)
B. Dist		0.0		$0		$0
C. LPG		0.0		$0		$0
D. Natural Gas	$3.52	928.3		$3,264	14.17	$46,253
E. Demand Saved	Included above		kW	$0	12.02	$0
F. Total		879.1		$2,358		$35,364

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		10.74	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$0	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Years Economic Life))	$2,358	
5. Simple Payback (1G/4):	7.13	Years
6. Total Net Discounted Savings (2F5 + 3C):	$35,364	
7. Savings to Investment Ratio (SIR) 6/1G:	2.10	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Building **91114**: Low-E Roof Coat | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$5,747		
B. SIOH	$345		
C. Design Cost	$345		
D. Total Cost (1A + 1B + 1C)	$6,437		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$6,437

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$18.43	511.4		$9,426	12.02	$113,297
B. Dist		0.0		$0		$0
C. LPG		0.0		$0		$0
D. Natural Gas	$3.52	567.2		$1,994	14.17	$28,260
E. Demand Saved	Included above		kW	$0	12.02	$0
F. Total		1,078.6		$11,420		$141,556

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		10.74	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4) $0

4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Years Economic Life))	$11,420	
5. Simple Payback (1G/4):	0.56	Years
6. Total Net Discounted Savings (2F5 + 3C):	$141,556	
7. Savings to Investment Ratio (SIR) 6/1G:	21.99	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Building **91114**: Low-E Roof Coat		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15	Years

1. Investment Costs			
A. Construction Costs	$1,337		
B. SIOH	$80		
C. Design Cost	$80		
D. Total Cost (1A + 1B + 1C)	$1,498		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$1,498

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$18.43	18.6		$343	12.02	$4,128
B. Dist		0.0		$0		$0
C. LPG		0.0		$0		$0
D. Natural Gas	$3.52	(16.2)		($57)	14.17	($807)
E. Demand Saved	Included above		kW	$0	12.02	$0
F. Total		2.4		$286		$3,321

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		10.74	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$0	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Years Economic Life))	$286	
5. Simple Payback (1G/4):	5.23	Years
6. Total Net Discounted Savings (2F5 + 3C):	$3,321	
7. Savings to Investment Ratio (SIR) 6/1G:	2.22	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Total Project | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$99,715		
B. SIOH	$5,983		
C. Design Cost	$5,983		
D. Total Cost (1A + 1B + 1C)	$111,681		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$111,681

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$18.43	1,016.0		$18,724	12.02	$225,060
B. Dist		0.0		$0		$0
C. LPG		0.0		$0		$0
D. Natural Gas	$3.52	3,213.8		$11,301	14.17	$160,131
E. Demand Saved	Included above		kW	$0	12.02	$0
F. Total		4,229.8		$30,025		$385,191

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		10.74	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$0	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Years Economic Life))	$30,025	
5. Simple Payback (1G/4):	3.72	Years
6. Total Net Discounted Savings (2F5 + 3C):	$385,191	
7. Savings to Investment Ratio (SIR) 6/1G:	3.45	

LO/MIT-I T.M.

RADIANT BARRIER COATING

For Energy Conservation and Light Reflection

LO/MIT-I is a silver colored, non-thickness dependent, low emissivity coating. Its superb ability to reflect both heat (infrared radiation) and light make it an excellent, low cost substitute for metallic foils or metallized plastic films. High temperature tolerance, excellent adhesion and the ability to produce uniformly low emissivities on a wide variety of substrates make LO/MIT-I unique in the field of high technology coatings.

OPTICAL CHARACTERISTICS
Laboratory application of LO/MIT-I on glass substrates has lowered emissivity from .86 to .22 and increased spectral reflectivity from 7.3% to 85%. LO/MIT-I can be applied to a wide variety of substrates and normally will create a surface emissivity of .21-.26, and a spectral reflectivity of 81%-85%, depending on the substrate used. The chart on the rear of this bulletin shows optical properties on specific materials.

CONSTITUENTS
Aromatic hydrocarbons, aliphatic ketones, proprietary pigments and binders.

SOLVENT
Solsolv 301 or xylene.

VISCOSITY
29 seconds #1 Zahn's cup.

HARDNESS
Extremely strong 3H hardness after 24 hour room temperature cure. Hardness increases with age.

DEGRADATION & OUTGASSING
Unaffected by UV or elevated temperatures. Thermally tolerant to 1000° F (538°C). No outgassing when correctly cured.

COVERAGE
400-800 square feet/gallon, depending on surface and application method.

CLEAN UP
Clean application equipment with Solsolv 301 or Xylene. Use Isopropyl Alcohol for operator clean up and removal from clothing.

MIXING
Coating supplied ready for use. No thinning is required or suggested. Shake well before using. If possible, agitate during application.

SURFACE PREPARATION
Normally, adhesion is the only factor that will be affected by surface preparation. Optical properties will remain constant except on surfaces that are very porous such as brick and cement. To improve optical properties on porous substrates, appropriate fillers and primers may be used to increase surface smoothness. This will also increase coverage. On metallic substrates, such as cold rolled or galvanized steel, that may be subject to possible corrosion or oxidation, appropriate primers should be used before applying LO/MIT-I. Where a surface is already primed or painted, apply a test patch of LO/MIT-I to ascertain that the prepared surface is compatible with the solvents used in LO/MIT-I. Plastics may require surface treatment to increase adhesion and should be tested for compatibility with LO/MIT-I. Most building materials, such as wood, plasterboard, paper faced insulation batts, fibrous ceiling tiles and painted metal roof decking require no surface preparation except that they be clean and dust free. Masonry surfaces should be allowed to cure for one month prior to the application of LO/MIT-I.

Any surface preparation questions not answered in this section should be referred to our Technical Services Department.

APPLICATION
Air Atomization: Use DeVilbiss pressure gun #JGA-502-704-FX; gun pressure of 30 psi (2.11 kg/cm²); tank pressure of 4-6 psi (.14-.42 kg/cm²). Remote paint supply pots should be equipped with an air driven agitator to keep coating thoroughly mixed during application.-OR-DeVilbiss suction gun #JGA-502-43-FF, gun pressure of 25 psi (1.76 kg/cm²). Needle adjustment = ½ open. Hold spray gun 8-14" from work. Spraying at the lower pressure (25-30 psi) indicated will lessen overspray and effect better coverage. Use 2 horsepower or larger compressor.

Airless and Electrostatic: Test airless and electrostatic equipment for compatability with LO/MIT-I before using. Remote paint supply pots should be equipped with an air driven agitator to keep coating thoroughly mixed during application.

Portable Compression Sprayer: The SOLEC Model LS-1 portable compression sprayer is a low cost, self-contained coating application device for the field application of LO/MIT-I to roof decks, cinder block walls, attics, or new construction where power is unavailable. Ask for Bulletin LS-1.

Brush and Roller: LO/MIT-I may also be applied using a solvent resistant paintbrush or roller. However, coverage may be substantially reduced.

Note: Good ventilation is necessary for operator safety and drying and curing of the applied coating.

DRYING AND CURE
Coating will skin dry within one minute after application. Drying to touch will generally occur within 15 minutes to one hour depending on ambient temperature and humidity. Curing can be accelerated by application of heat up to 500°F (260°C) for 4 to 30 minutes. Experimentation will determine the best curing procedures for your particular environment.

STORAGE
Keep at room temperature in tightly sealed container. Keep out of direct sunlight to avoid pressure increase in container. Full containers will remain usable for 1 year from date of manufacture.

CAUTION
Contains flammable solvents. Do not expose to elevated heat or open flames. Use with adequate ventilation and avoid excessive breathing of vapor or spray mist. Avoid contact with eyes. OSHA regulations, Sections 1915.24—Painting, 1915.25—Flammable Liquids and 1915.82—Respiratory Protection give additional helpful safety suggestions.

FIRST AID
Remove from skin using isopropyl alcohol and warm soapy water. In case of contact with eyes, flush with clean water for at least 15 minutes and get medical attention. If swallowed, get immediate medical attention. If headache, dizziness or nausea result from excessive inhalation of vapors, remove to fresh air and administer oxygen if necessary.

SOLAR ENERGY CORPORATION, BOX 3065, PRINCETON, NJ 08543-3065, U.S.A.

PACKAGING
Steel containers. Quarts, gallons, 5 gallon tight head pails. Weights including containers: Quart (.95 liters) = 2.5 lbs. (1.13 kilos), Gallons (3.79 liters) = 8.2 lbs. (4.24 kilos), 5 gallons (18.93 liters) = 42.5 lbs. (21.66 kilos).

ORDERING AND PRICING INFORMATION
Contact factory at 609-883-7700 for name of your local distributor, pricing and availability. F.O.B. Ewing, N.J. Shipping and packaging extra. Available for export.
Terms: Net 30 days for D&B rated firms.

U.S. GOVERNMENT PURCHASERS:
LO/MIT-I is available through GSA: Contract #TFTC-88-CK-NIIS-01 effective 7/1/89–Section Heading: 80 Brushes, Paint, Sealers & Adhesives. GSA, Proc. Div. (9FTP10-C-M) GSA Center, Auburn, WA 98001.

TECHNICAL SERVICES DEPARTMENT
Contact factory at 609-883-7700, 9-5 pm, EST
or fax 609-497-0182, 24 hours a day.

ACCESSORIES & ADDITIONAL PRODUCTS
LS-1, Modified Compression Sprayer, a low cost, self-contained, coating application device.
SOLKOTE HI/SORB-II, spray applied selective coating.
SOLKLEAN 101, Production metal cleaner.
SOLKLEAN 201, Water based aluminum conversion coating.
SOLSOLV 301, Low cost replacement solvent for Xylene.
ISOPROPYL ALCOHOL, For clean-up of LO/MIT-I coatings.

IMPORTANT NOTICE TO PURCHASER
This bulletin is an introductory summary of LO/MIT-I Radiant Barrier Coating. The information provided is based upon typical installation conditions and tests we believe to be reliable. However, due to a wide variety of possible use conditions, SOLEC does not guarantee that typical values expressed will necessarily be obtained. The following is made in lieu of warranties, expressed or implied, including merchantability.

Seller's only obligation shall be to replace such quantity of the product proved to be defective. Seller shall not be liable for any injury, loss or damage, direct or consequential, arising out of the use of or inability to use the product. Before using, user shall determine the suitability of the product for their intended use, and user assumes all risk and liability whatsoever in connection therewith.

No statement or recommendation shall have any force or effect unless in an agreement signed by officers of seller and user.

RESEARCH FACILITIES
The Solar Energy Corporation maintains a complete laboratory for the analysis of optical coatings. Our low cost services for the analysis of optical surfaces are used by many large manufacturers. Please contact us for prices.

LO/MIT/NOTES
The Solar Energy Corporation maintains a continuing research program in spray applied optical surfaces. Pertinent data is published in the form of bulletins called LO/MIT/NOTES. These bulletins are available, free to our customers and other interested parties. Please write us to have your name placed on our mailing list.

OPTICAL PROPERTIES OF SELECTED SUBSTRATES

Substrate	Emissivity Before LO/MIT Applied	Emissivity After LO/MIT Applied	Diffuse Reflectivity Before LO/MIT Applied	Diffuse Reflectivity After LO/MIT Applied
brick (red clay)	.92	.36	36%	71%
cement block	.93	.37	32	66
glass (soda lime)	.86	.22	7.3	85
galvanized steel (bright)	.03	.25	77	84
galvanized steel (dull paint lock)	.57	.26	15	82
paper (kraft)	.80	.24	48	81
plasterboard	.90	.21	55	85
plywood	.72	.22	46	81
poly carbonate (clear)	.84	.22	8.6	84
polypropylene (opaque)	.90	.23	8.1	84
steel, cold rolled, primed	.87	.25	22	83
steel, cold rolled, unprimed	.10	.23	57	84
steel, 316 stainless	.19	.23	59	84

LO/MIT-I Application Ideas

Aircraft
LO/MIT-I is extremely lightweight (less than .05 oz./ft²). It may be effectively used as a heat shield on many aircraft components including wiring harnesses, cowlings, fire walls and electronic components. It is also an excellent coating for balloon fabrics.

Automotive
LO/MIT-I may be used as a low cost, lightweight heat shield on many automotive components including wiring harnesses, battery boxes, exhaust systems, air conditioning ducts, fire walls, intake manifolds, fuel pumps, rubber hoses, shock absorber boots, floor pans, electronic and plastic components.

Building and Construction
LO/MIT-I is a low cost substitute for metallic or metallized plastic foils. Wherever these products are used for energy conservation in new or retrofit construction, spray application of LO/MIT-I will generally prove to be as effective at half the cost. In many instances, where it may be impractical to staple or tack reflective radiant barriers, LO/MIT-I may be easily spray applied.

Daylighting
Since LO/MIT-I exhibits a high diffuse reflectivity on many building materials, it may be effectively used to enhance daylighting and lower illumination costs.

Energy Conservation
The use of LO/MIT-I on ceiling and wall surfaces can result in substantial heating and cooling energy savings. (See Radiant Barriers, Building and Construction, Metal Buildings.) Also, in factory buildings and warehouses, the application of LO/MIT-I to interior ceiling surfaces may raise winter radiant temperatures and increase ceiling reflectivity, thereby lowering both heating and lighting costs.

Metal Buildings
LO/MIT-I, when applied to the exterior of metal buildings, has been shown to lessen building skin temperatures in excess of 30°F (16°C) in 95°F (35°C) ambient environments. This can lead to substantial decreases in heating and air conditioning costs.

Ovens, Process Piping, Power Generation Equipment
LO/MIT-I when applied to the exterior surfaces of boilers, ovens or high temperature process piping can effectively block thermal radiation and may lead to substantial efficiency increases.

Plastics
Whenever plastics are subjected to elevated temperatures, surface application of LO/MIT-I may lessen degradation due to adverse thermal environments. In many cases, lower cost and lower weight plastics may be used when they are coated with LO/MIT-I.

Radiant Barriers
Recent tests by the Florida Solar Energy Center (FSEC) indicate that the role of radiant heat transfer, particularly in hot, sunny climates, may be much more important than recently recognized. In these climates, heat gain prevention is often more critical to the energy performance of a building than stopping heat loss. Application of LO/MIT-I to the undersides of roofs and cavity wall surfaces creates an extremely effective radiant barrier that may lead to substantial energy savings at lower installed per square foot costs than aluminum foil or metallized plastic films.

Reflectors
LO/MIT-I exhibits excellent diffuse reflectivity on many substrates. It may be used as a low cost reflective surface in lighting fixtures, control panels and many other applications where reflectivity is needed.

Roof Coating
LO/MIT-I will lower roof skin temperatures 20-40°F. It is unaffected by UV radiation and highly reflective to infrared. It will greatly extend roof life and may be brushed, rolled or spray applied to bitumen, PVC, rubber, asphalt, tar and gravel, foam, shingle, tile, steel and most other roofing surfaces. It is hydrophobic and tends to be self-cleaning. Field testing in Southern climates has shown energy savings from 15% to in excess of 30% when LO/MIT-I is used as a reflective roof coating.

Selective Surfaces
High emissivity surfaces such as glass or cement, when coated with LO/MIT-I, exhibit low emissivities of .22-.30. By overcoating the LO/MIT-I surface with SOLKOTE Hi/Sorb-II spray applied selective coating, a semi-selective surface exhibiting emissivities of .42-.50 and absorptivities of 95 to 97% may be achieved. At an installed cost of 12 to 17 cents per square foot, substantial cost savings can be achieved over the use of selective metal foils.

APPENDIX F

HVAC Controls Retrofit Calculations

APPENDIX F
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Carrier HAP Baseline and Control Retrofit Simulation Summaries F-8

Building 56301 Communications Equipment Facility - HVAC Controls Retrofit

Building 56301 is a communications equipment facility. The 30,000 square foot, single floor, building heating, ventilating and air conditioning (HVAC) system is comprised of three rooftop-mounted multi-zone air handling units. Each unit is fitted with both hot and chilled water coils. Hot water is supplied by a hot water boiler and chilled water is provided by an air cooled reciprocating chiller.

Existing Controls

Existing HVAC controls in the building are a combination of electronic and pneumatic. Each HVAC zone is provided with a thermostat. One zone from each air handling unit is provided with a set-back thermostat. The thermostats are used to control supply air temperature to each zone. Set-back thermostats are used for temperature control during scheduled unoccupied periods.

For energy savings, existing controls provide for 100% outside air whenever the outside temperature is less than 62 °F. Heating is prevented whenever the outside air temperature exceeds 60 °F. Design temperature setpoints are as follows:

Summer Indoor Temperature:	77 °F
Winter Indoor Temperature:	68 °F
Cooling Economizer active below:	62 °F
No Cooling below:	65 °F
No Heating above:	60 °F

HVAC Control System Retrofits Evaluated

Three HVAC control system modifications are evaluated:

1. Integrated dry-bulb temperature control,
2. Supply air temperature reset control based on outside air temperature, and
3. Supply air temperature reset control based on the zone with the greatest demand.

Integrated Dry-Bulb Temperature Control

This type of control compares outdoor and return air dry-bulb temperatures to determine the economizer damper position. The economizer control strategy is illustrated in Figure F-1, below. Operation of the control is discussed below, proceeding from right to left in the diagram.

- When the outdoor temperature is greater than the return air temperature, the economizer dampers are closed. The system receives normal outdoor ventilation air. This is region A in Figure F-1.
- When the outdoor temperature is less than the return air temperature, the economizer dampers are fully open. Supply air is 100% outdoor air. Economizer dampers are held in this position as long as mechanical cooling is still required. This is region B in Figure F-1.
- As the outdoor air temperature drops, a point will be reached where use of 100% outdoor air eliminates the need for mechanical cooling. Beginning at this point, the economizer dampers modulate so that the mixture of outdoor and return air streams produces air at a temperature sufficient to eliminate mechanical cooling. This is region C in Figure F-1.
- At cooler temperatures, economizer dampers finally modulate closed and the system returns to normal ventilation levels. No mechanical cooling is required. This is region D in Figure F-1.

Finally, in some cases, upper and lower cutoff temperatures will be specified. When the outdoor air dry-bulb temperature is greater than the upper cutoff temperature, or lower than the lower cutoff temperature, economizer operation will be automatically disabled.

Supply Air Temperature Reset Based on Outside Air Temperature

For this type of control, supply air temperature is reset based on an outdoor air temperature schedule. For this control the maximum and minimum supply air temperatures and their corresponding outdoor air temperatures must be known.

For example, the design supply temperature is 57°F at a corresponding outdoor temperature (OAT) of 95°F, and is 67°F at a corresponding OAT of 55°F. Above 95°F OAT, the supply temperature is held constant at 57°F. Below 55°F OAT, the supply temperature is held constant at 67°F. Between 95°F and 55°F, the supply temperature varies as a linear function of outdoor temperature.

Supply Air Temperature Reset Based on Greatest Zone Demand

For this type of control, supply air temperature is reset based on zone loads. The system supply temperature is determined by computing the required supply air temperatures for each zone served by the system. For cooling operation, the coldest supply temperature among the zones is used as the supply temperature for the system. For heating operation, the warmest supply temperature is used as the supply temperature for the system. This models the use of a discriminating controller for resetting supply air temperature.

Energy Saving Calculations

Energy consumption for HVAC is estimated using the Carrier HAP computerized building energy simulation model. The building input data includes fifty-four spaces, three air handling units with a total of sixteen zones and a central heating and cooling plant. Central plant inputs include an air cooled reciprocating chiller and a hot water boiler.

Three simulations are conducted, a baseline run and one for each of the control system strategies evaluated. Both the control system retrofit simulations include integrated dry-bulb temperature controls and supply air temperature reset control. One run is with supply air temperature control based on outside air temperature; the other simulation includes supply air temperature reset based on the zone with the greatest demand.

The energy use simulation uses El Paso, Texas weather data, the city for which data is available that has weather the most similar to that of Fort Huachuca. Energy consumption results from simulations are adjusted based on heating and cooling degree-days for each location.

Results of computer simulations and energy saving calculations are provided in tabular form. Selected input data and outputs from each simulation are appended.

Control Modifications

While the control system modifications appear to be significant, actual equipment changes are minimal. Existing sensors and actuators are reused as much as possible, a new control unit is installed on each air handler, and additional sensors are installed as required. Controls are rewired at each air handling unit.

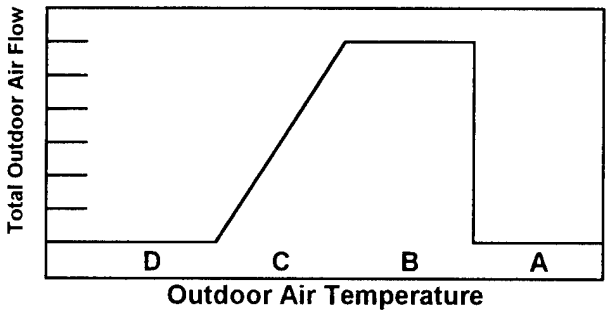

Figure F-1. Integrated Dry-Bulb Temperature Control

Summary of HVAC Control Retrofit Evaluations

Energy Costs and Adjustment Factors

Electric Usage Cost & Taxes, **including demand charges:**

$0.0629 per kWH 12.02 Uniform Present Worth, N=15

Natural Gas Cost, including Taxes:

$4.5080 per Mil BTU 14.17 Uniform Present Worth, N=15

Adjustment for El Paso, Texas vs. Fort Huachuca Energy Use:

Location	Heating DD/Year	Cooling DD/Year
Simulations @ El Paso, Texas	2,678	2,098
Actual Site Fort Huachuca	2,551	1,595
Adjustment Factors:	0.953	0.760

Economizer Control Description Note: Both Supply Air Reset Options include Integrated Dry-Bulb Control	Electric kWH/Year	Gas Therms/Yr	Savings kWH/Year	Savings Therms/Yr	Elec Saved ($/Year)	Gas Saved ($/Year)	Constr. Cost ($)	Invest-ment ($)	LCCA Saved ($)	SIR
Baseline	415,473	32,087	-	-	-	-	-	-	-	-
Supply Reset - Outside Air Temperature	382,501	28,726	25,067	3,202	$1,577	$1,443	$14,775	$16,548	$39,403	2.38
Supply Reset - Greatest Zone Demand	385,988	30,504	22,416	1,508	$1,410	$680	$21,374	$23,939	$26,580	1.11

Recommended Control Retrofit: Integrated Dry-Bulb Temperature Control with Supply Air Temperature Reset (Economizer Control) Based on Outside Air Temperature

CONSTRUCTION COST ESTIMATE					Date Prepared: January 1995		Sheet 1 Of 1
Project: ECIP Facility Energy Improvements					Project No.	Basis for Estimate: Code A (no design competed)	
Location: Fort Huachuca, Arizona							
Engineer-Architect: Keller & Gannon							
Drawing No.: Building 56301 HVAC Control Retrofits			Estimator: BIH			Checked By: RCL	
Line Item	Quantity No. Units	Unit Meas.	Labor & Equipment Per Unit	Labor & Equipment Total	Material Per Unit	Material Total	Total Cost
Integrated Dry-Bulb Economizer Control with Supply Air Reset Based on Outside Air Temperature							
Return Air Temperature Sensor, installed	3	EA	$181.33	$544	$90.67	$272	$816
DDC Controller, 16 Point, installed	3	EA	$1,600	$4,800	$800	$2,400	$7,200
Damper Motor, modulating type	6	EA	$13.68	$82	$280.00	$1,680	$1,762
Rewire, connect and test instrumentation	16	MH	$27.35	$438	$12.50	$200	$638
Subtotal				$5,864		$4,552	$10,416
Arizona Transaction Privilege Tax	3.75%	%		-		$171	$171
Subtotal							$10,586
Contractor OH & Profit	25.0%	%					$2,647
Subtotal							$13,233
Bond	1.5%	%					$198
Subtotal							$13,431
Estimating Contingency	10.0%	%					$1,343
Total Probable Construction Cost							$14,775
Integrated Dry-Bulb Economizer Control with Supply Air Temperature Reset Based on Greatest Zone Demand or Outdoor Air Temperature							
Supply Air Temperature Sensor, installed, including wiring	16	EA	$181.33	$2,901	$90.67	$1,451	$4,352
Return Air Temperature Sensor, installed	3	EA	$181.33	$544	$90.67	$272	$816
DDC Controller, 16 Point, installed	3	EA	$1,600	$4,800	$800	$2,400	$7,200
Damper Motor, modulating type	6	EA	$13.68	$82	$280.00	$1,680	$1,762
Rewire, connect and test instrumentation	24	MH	$27.35	$656	$12.50	$300	$956
Subtotal				$8,984		$6,103	$15,086
Arizona Transaction Privilege Tax	3.75%	%		-		$229	$229
Subtotal							$15,315
Contractor OH & Profit	25.0%	%					$3,829
Subtotal							$19,144
Bond	1.5%	%					$287
Subtotal							$19,431
Estimating Contingency	10.0%	%					$1,943
Total Probable Construction Cost							$21,374

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion Building 56301: Integrated Dry-Bulb Temperature Control Preparer: KELLER & GANNON
Supply Air Temperature Reset Based on Outside Air Temperature
Analysis Date: January 1995 Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$14,775		
B. SIOH	$886		
C. Design Cost	$886		
D. Total Cost (1A + 1B + 1C)	$16,548		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$16,548

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.*	$18.43	85.6		$1,577	12.02	$18,952
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	320		$1,443	14.17	$20,451
E. Demand Savings		$0	kW	$0	12.02	$0
F. Total		406		$3,020		$39,403

* includes demand charges

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$0	
4. First Year Dollar Savings (2F3 + 3A +)3Bd1/Economic Life)):	$3,020	
5. Simple Payback (1G/4):	5.48	Years
6. Total Net Discounted Savings (2F5 + 3C):	$39,403	
7. Savings to Investment Ratio (SIR) 6/1G:	2.38	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion Building **56301**: Integrated Dry-Bulb Temperature Control Preparer: KELLER & GANNON
Supply Air Temperature Reset Based on Zone with Greatest Demand
Analysis Date: January 1995 Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$21,374		
B. SIOH	$1,282		
C. Design Cost	$1,282		
D. Total Cost (1A + 1B + 1C)	$23,939		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$23,939

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.*	$18.43	76.5		$1,410	12.02	$16,948
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	151		$680	14.17	$9,632
E. Demand Savings		$0	kW	$0	12.02	$0
F. Total		227		$2,090		$26,580

* includes demand charges

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$0	
4. First Year Dollar Savings (2F3 + 3A +)3Bd1/Economic Life)):	$2,090	
5. Simple Payback (1G/4):	11.46	Years
6. Total Net Discounted Savings (2F5 + 3C):	$26,580	
7. Savings to Investment Ratio (SIR) 6/1G:	1.11	

BASELINE CONTROL SCHEME

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 53601 (Base Controls) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

****

TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2638266	89.949
Heating Loads	1956687	66.711

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	701371	23.913	701371	23.913
Cooling Plants	589881	20.111	589881	20.111
Absorption Chillers	0	0.000	0	0.000
Heating Plants	3210553	109.461	3210553	109.461
Pumps	124531	4.246	124531	4.246
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	4626336	157.731	4626336	157.731
Lights	293065	9.992	293065	9.992
Electric Equipment	64345	2.194	64345	2.194
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	357409	12.186	357409	12.186
>>> GRAND TOTAL	4983745	169.916	4983745	169.916

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 29331 sqft
  Conditioned floor area.....: 29331 sqft

ANNUAL ENERGY COSTS

Building: 53601 (Base Controls) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

****

TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	415473 kWh	25676	0.875	55.1 %
Natural Gas	32087 Therm	14465	0.493	31.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		40141	1.369	86.1 %
Electric	104751 kWh	6474	0.221	13.9 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		6474	0.221	13.9 %
>>> GRAND TOTAL		46615	1.589	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 29331 sqft
  Conditioned floor area.....: 29331 sqft

INTEGRATED DB CONTROL WITH SA RESET BASED ON OAT

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 53601 (Controls 2) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

****

TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2114624	72.096
Heating Loads	1627038	55.472

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *----->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	701486	23.917	701486	23.917
Cooling Plants	477606	16.284	477606	16.284
Absorption Chillers	0	0.000	0	0.000
Heating Plants	2874256	97.995	2874256	97.995
Pumps	124381	4.241	124381	4.241
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	4177730	142.436	4177730	142.436
Lights	293065	9.992	293065	9.992
Electric Equipment	64345	2.194	64345	2.194
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	357409	12.186	357409	12.186
>>> GRAND TOTAL	4535139	154.621	4535139	154.621

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 29331 sqft
  Conditioned floor area.....: 29331 sqft

ANNUAL ENERGY COSTS

Building: 53601 (Controls 2) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs -----> ($)	($/sqft)*	% of Total
Electric	382501 kWh	23639	0.806	54.9 %
Natural Gas	28726 Therm	12950	0.442	30.1 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		36588	1.247	85.0 %
Electric	104751 kWh	6474	0.221	15.0 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		6474	0.221	15.0 %
>>> GRAND TOTAL		43062	1.468	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 29331 sqft
Conditioned floor area.....: 29331 sqft

INTEGRATED DB CONTROL WITH SA RESET BASED ON ZONE WITH GREATEST DEMAND

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 53601 (Controls 3) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

****

TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2174608	74.141
Heating Loads	1753336	59.778

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	701463	23.916	701463	23.916
Cooling Plants	489427	16.687	489427	16.687
Absorption Chillers	0	0.000	0	0.000
Heating Plants	3052163	104.061	3052163	104.061
Pumps	124381	4.241	124381	4.241
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	4367434	148.904	4367434	148.904
Lights	293065	9.992	293065	9.992
Electric Equipment	64345	2.194	64345	2.194
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	357409	12.186	357409	12.186
>>> GRAND TOTAL	4724843	161.089	4724843	161.089

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 29331 sqft
  Conditioned floor area.....: 29331 sqft

ANNUAL ENERGY COSTS

Building: 53601 (Controls 3) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

****

TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	385988 kWh	23854	0.813	54.1 %
Natural Gas	30504 Therm	13751	0.469	31.2 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		37605	1.282	85.3 %
Electric	104751 kWh	6474	0.221	14.7 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		6474	0.221	14.7 %
>>> GRAND TOTAL		44079	1.503	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 29331 sqft
Conditioned floor area.....: 29331 sqft

APPENDIX G

Lighting Data and Energy Calculations

APPENDIX G
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LIGHTING ENERGY CALCULATION METHODOLOGY

Lighting Energy Use

Lighting energy use for buildings investigated in conjunction this study is determined based on a combination of field observations, design data and on experience in similar projects.

Electric power usage for present and proposed fixture retrofits is determined similarly. Fixture electric loads (kW) are determined and then multiplied by the operating hours per year.

Operating hours per year are determined based on the building schedule and on the function of the room in which the fixture is located. Room and building schedules are determined by interviewing occupants. A demand/diversity factor is applied to scheduled room usage.

Lighting energy use calculations are explained in detail below; tabular summaries of calculations to determine present lighting energy use appear as Tables G-1 through G-15. Room/building schedules and demand factors are provided on Table G-16 and existing lighting fixture electric demands are summarized on Table G-17.

Lighting Energy Calculations

Label	Contents / Calculation Explanation
TASK_CODE	Room function: See legends on Tables G-1 through G-15. (Field Data)
TYPE_CODE	Fixture Type: Refer to legends on Tables G-1 through G-15. (Field Data)
LAMP_TYPE	Lamp types: Incandescent, Fluorescent, MV Mercury Vapor (Catalog Data) Refer to Table G-17 for existing lamp/fixture types and electric demands
LAMPS/FXTR	Lamps per fixture (Field Data)
WATTS/FXTR	Watts per fixture (Refer to Table G-17) (Catalog Data)
NO_FXTR	Number of fixtures in room/area (Field Data)
KW	WATTS/FXTR * NO_FXTR/1000 = Room Connected Lighting load (kW)
HR/WK	Operating hours per week (Refer to Table G-16) (Field Data)
DEMAND	Demand factor (Refer to Table G-16)
KWH/Y	KW * HR/WK * 52 * DEMAND = Annual Room Lighting Power Use (kWh/year)

Table G-1. Building 15544 Instruction Building - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
103	4	R	F40T12	40	4	172	16	86	10' 0"	1	2.752	55	7,871
104	C	R	F40T12	40	4	172	22	58	10' 0"	0.75	3.784	55	8,117
105	C	R	F40T12	40	4	172	34	100	10' 0"	0.75	5.848	55	12,544
106	6	S	F40T12	40	4	172	21	98	10' 0"	1	3.612	55	10,330
107	1	S	F40T12	40	2	86	6	12	10' 0"	1	0.516	168	4,508
107	6	S	F40T12	40	4	172	38	98	10' 0"	1	6.536	55	18,693
111	Ex	Ex	I	10	2	20	3	98.2		1	0.06	168	524
111	6	S	F40T12	40	4	172	31	98.2	10' 0"	1	5.332	55	15,250
113	6	S	F40T12	40	4	172	28	98.2	10' 0"	1	4.816	55	13,774
114	C	R	F40T12	40	4	172	21	98		0.75	3.612	55	7,748
103A	4	R	F40T12	40	4	172	4	57	8' 0"	1	0.688	55	1,968
											37.556		101,325

Lighting Legend

Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exit Signs
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 101,325

TOTAL LIGHTING DEMAND (kW) - 37.6

BUILDING AREA (SQ.FT) - 12,990

LIGHTING POWER DENSITY(W/SQ.FT) - 2.9

Table G-2. Building 20200 Residential Duplex (West Unit Only) - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
Bathroom	8.1	SW	I	60	2	120	1	10	8' 0"	1	0.120	60	374
Bedroom	9	S	F T12	20	1	12	1	20	8' 0"	0.5	0.012	84	26
Bedroom	9	Desk	I	60	1	60	1	20	8' 0"	0.5	0.060	84	131
Bedroom(master)	9	P	CF	26	1	26	1	12	8' 0"	0.5	0.026	84	57
Bedroom(master)	9	Table	I	60	1	60	1			0.5	0.060	84	131
Corridor	1	SW	I	75	1	75	1	20	8' 0"	0.25	0.075	84	82
Dining	3	P	I	100	3	300	1	20	8' 0"	0.25	0.300	84	328
Entry	1	SW	I	60	1	60	1	10	8' 0"	0.25	0.060	84	66
Extr.Entry	1	SW	I	75	1	75	1			0.25	0.075	84	82
Extr.Storage	12	SW	I	75	1	75	1			1	0.075	10	39
Furnace	Mech Rm	SW	I	75	1	75	1	N/A	N/A	1	0.075	5	20
Kitchen	2	SW	F20T12	20	1	12	1	35	8' 0"	0.25	0.012	84	13
Kitchen	2	S	F40T12	40	2	86	1	35	8' 0"	0.25	0.086	84	94
Living Room	17	Desk	I	60	1	60	1	10	8' 0"	0.5	0.060	84	131
Living Room	17	P	I	100	1	100	1			0.5	0.100	84	218
											1.196		1,791.3

Lighting Legend

Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exit Signs
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

1/2 OF DUPLEX LIGHTING CONSUMPTION (kWH/Yr) - 1,791

1/2 OF DUPLEX LIGHTING DEMAND (kW) - 1.2

1/2 OF DUPLEX BUILDING AREA (SQ.FT) - 1,904

LIGHTING POWER DENSITY(W/SQ.FT) - 0.6

Table G-3. Building 22422 Directorate of Engineering Housing - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
101	4	S	F40T12	40	2	86	4	82	8' 6"	0.8	0.344	60	859
102	4	S	F40T12	40	2	86	4	36.8	8' 6"	0.8	0.344	60	859
103	4	S	F40T12	40	2	86	2	26.8	8' 6"	0.8	0.172	60	429
104	4	S	F40T12	40	2	86	2	36	8' 6"	0.8	0.172	60	429
107	4	S	F40T12	40	2	86	4	26	8' 6"	0.8	0.344	60	859
108	4	S	F40T12	40	2	86	8	17	8' 6"	0.8	0.688	60	1,717
109	4	S	F40T12	40	2	86	2	36	8' 6"	0.8	0.172	60	429
110	4	S	F40T12	40	2	86	2	36	8' 6"	0.8	0.172	60	429
111	4	S	F40T12	40	2	86	15	22.8	8' 6"	0.8	1.290	60	3,220
112	4	S	F40T12	40	2	86	2	38.2	8' 6"	0.8	0.172	60	429
113	4	S	F40T12	40	2	86	2	38.2	8' 6"	0.8	0.172	60	429
114	4	S	F40T12	40	2	86	2	74.2	8' 6"	0.8	0.172	60	429
115	4	S	F40T12	40	2	86	2	25	8' 6"	0.8	0.172	60	429
116	4	S	F40T12	40	2	86	10	38.2	8' 6"	0.8	0.860	60	2,147
201	4	S	F40T12	40	2	86	4	38	9' 0"	0.8	0.344	60	859
202	4	S	F40T12	40	2	86	4	55	9' 0"	0.8	0.344	60	859
203	4	S	F40T12	40	2	86	8	56	9' 0"	0.8	0.688	60	1,717
204	4	S	F40T12	40	2	86	2	50	9' 0"	0.8	0.172	60	429
205	4	S	F40T12	40	2	86	28	27	9' 0"	0.8	2.408	60	6,010
206	4	S	F40T12	40	2	86	2	50	9' 0"	0.8	0.172	60	429
207	4	S	F40T12	40	2	86	2	48	9' 0"	0.8	0.172	60	429
208	4	S	F40T12	40	2	86	4	36	9' 0"	0.8	0.344	60	859
209	4	S	F40T12	40	2	86	2	35	9' 0"	0.8	0.172	60	429
210	4	S	F40T12	40	2	86	2	36	9' 0"	0.8	0.172	60	429
211	4	S	F40T12	40	3	100	3	45	9' 0"	0.8	0.300	60	749
212	4	S	F32T8	32	2	71	4	38	9' 0"	0.8	0.284	60	709
108A	4	S	F40T12	40	2	86	4	52		0.8	0.344	60	859
Basement	8	SW	F40T12	40	1	50	1	-	7' 0"	0.8	0.050	40	78
Basement	8	SW	F40T12	40	1	50	1	-	7' 0"	0.8	0.050	40	78
Basement	12	P	F40T12	40	2	86	1	-	8' 6"	1.0	0.086	10	45
Basement	1	R	F40T12	40	2	86	2	-	6' 6"	1.0	0.172	168	1,503
Basement	8	R	F40T12	40	2	86	2	-	7' 0"	0.8	0.172	40	268
Basement	8	R	F40T12	40	2	86	2	-	7' 0"	0.8	0.172	40	268
Basement	8	D	I	60	1	60	1	-	7' 0"	0.8	0.060	40	94
Basement	8	D	I	60	1	60	1	-	7' 0"	0.8	0.060	40	94
PS1	4	S	F40T12	40	2	86	5	62		0.8	0.430	60	1,073
											12.414		31,361

Table G-3. Building 22422 Directorate of Engineering Housing - Present Lighting Energy Use

Lighting Legend	
Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exit Signs
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) -	**31,361**
TOTAL LIGHTING DEMAND (kW) -	**12.4**
BUILDING AREA (SQ.FT) -	**12,474**
LIGHTING POWER DENSITY(W/SQ.FT) -	**1.00**

Table G-4. Byuilding 43002 Officer's Club - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
1 A	3	D	I	75	1	75	10	20	8' 6"	0.5	0.750	60	1,170
1 A	3	Stage Par SW	I	500	1	500	4	20	15' 4"	0.5	2.000	60	3,120
1 A	3	R	I	60	1	60	4	20	15' 4"	0.5	0.240	60	374
1 A	Ex	Ex	I	10	2	20	3		8' 6"	1	0.060	168	524
1 A	3	Chandelier	I	15	12	180	9	20	15' 4"	0.5	1.620	60	2,527
1 B	3	D	I	250	1	250	6	15	8' 6"	0.5	1.500	60	2,340
1 C	12	R	I	60	1	60	4	15	8' 6"	0.25	0.240	20	62
1 D	4	P	F40T12	40	2	86	2	30		0.8	0.172	60	429
1 D	4	P	F40T12	40	4	172	4	30		0.8	0.688	60	1,717
1 E	12	S	F40T12	40	2	86	2	30	7' 6"	0.25	0.172	20	45
1 F/G	4	S	F40T12	40	2	86	3	25	7' 6"	0.8	0.258	60	644
1 H	12	S	F40T12	40	2	86	3	32	8' 6"	0.25	0.258	20	67
1st Floor	3	R	F40T12	40	1	50	9	5.45	8' 0"	0.5	0.450	60	702
1st Floor	1	S	F40T12	40	2	86	8	6	8' 0"	1	0.688	120	4,293
1st Floor	8	S	F40T12	40	1	50	3	21	8' 0"	1	0.150	60	468
1st Floor	4	S	F40T12	40	2	86	2	93	8' 0"	0.8	0.172	60	429
1st Floor	12	S	F40T12	40	2	86	1	34	8' 0"	0.25	0.086	20	22
1st Floor	2	S	F40T12	40	2	86	5	65	8' 0"	1	0.430	60	1,342
1st Floor	8	S	F40T12	40	2	86	2	13	8' 0"	1	0.172	60	537
1st Floor	8	S	F40T12	40	2	86	2	14	8' 0"	1	0.172	60	537
1st Floor	4	S	F40T12	40	2	86	1	34	8' 0"	0.8	0.086	60	215
1st Floor	4	S	F40T12	40	2	86	1	34	8' 0"	0.8	0.086	60	215
1st Floor	4	S	F40T12	40	2	86	2	40	8' 0"	0.8	0.172	60	429
1st Floor	4	S	F40T12	40	2	86	2	23	8' 0"	0.8	0.172	60	429
1st Floor	2	S	F40T12	40	4	172	8	65	8' 0"	1	1.376	60	4,293
1st Floor	2	S	F40T12	40	4	172	4	65	8' 0"	1	0.688	60	2,147
1st Floor	Ex	Ex	I	10	2	20	2			1	0.040	168	349
1st Floor	8	S	F20T12	20	1	12	16	21	8' 0"	1	0.192	60	599
1st Floor	3	R	I	40	1	40	37	4	8' 0"	0.5	1.480	60	2,309
1st Floor	3	SW	I	40	1	40	8	4		0.5	0.320	60	499
1st Floor	3	R	I	40	1	40	16	9.1	8' 0"	0.5	0.640	60	998
1st Floor	3	SW	I	40	1	40	5	9.1		0.5	0.200	60	312
1st Floor	14	R	I	100	1	100	20	9	8' 0"	0.8	2.000	60	4,992
2 Balcony A	12	S	F40T12	40	2	86	8	35	7' 6"	0.25	0.688	20	179
2 Balcony B	12	S	F40T12	40	2	86	8	35	7' 6"	0.25	0.688	20	179
2 C	4	S	F40T12	40	2	86	6	25	8' 6"	0.8	0.516	60	1,288
2 C	Ex	Ex	I	10	2	20	2			1	0.040	168	349
2 D	4	S	F40T12	40	2	86	2	20	8' 6"	0.8	0.172	60	429
2 E	1	S	F40T12	40	2	86	1	30	7' 6"	1	0.086	120	537
2 F	1	S	F40T12	40	2	86	1	30	7' 6"	1	0.086	120	537
Basement	3	S	F Circ.	32	1	32	8	10	8' 0"	0.5	0.256	60	399
Basement	1	S	F40T12	40	2	86	1	35	8' 0"	1	0.086	120	537
Basement	12	S	F40T12	40	2	86	2	10	8' 0"	0.25	0.172	20	45
Basement	12	R	F40T12	40	4	172	2	10	7' 0"	0.25	0.344	20	89
Basement	Ex	Ex	I	10	2	20	1			1	0.020	168	175
Basement	15	S	I	60	1	60		44		0.8	0.000	60	-

Table G-4. Byuilding 43002 Officer's Club - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
Basement	12	S	I	100	1	100	3	10	8' 0"	0.25	0.300	20	78
Basement	1	D	I	75	1	250	4	6	8' 0"	1	1.000	120	6,240
Basement	15	P	F40T12	40	2	86	2	44	8' 6"	0.8	0.172	60	429
											22.356		50,627

Lighting Legend

Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exit Signs
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 50,627

TOTAL LIGHTING DEMAND (kW) - 22.4

BUILDING AREA (SQ.FT) - 31,430

LIGHTING POWER DENSITY(W/SQ.FT) - 0.7

Table G-5. Building 53301 Communications Equipment Facility - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
103	4	R	F34T12	34	2	72	113	40	9' 0"	1	8.136	80	33,846
103	Ex	Ex	I	10	2	20	2	-	-	1	0.040	168	349
104	4	R	F34T12	34	3	100	3	92	9' 0"	1	0.300	80	1,248
105	4	R	F34T12	34	3	100	3	90	9' 0"	1	0.300	80	1,248
107	4	R	F34T12	34	3	100	3	85	9' 0"	1	0.300	80	1,248
109	12	R	F34T12	34	2	72	5	-	8' 0"	0.5	0.360	80	749
114	12	P	F34T12	34	1	43	1	-	-	0.5	0.043	80	89
115	8	S	F34T12	34	1	43	3	25	8' 0"	1	0.129	80	537
115	8	SW	F34T12	34	1	43	3	25	8' 0"	1	0.129	80	537
117	4	R	F34T12	34	2	72	6	37	9' 0"	1	0.432	80	1,797
119	4	R	F34T12	34	2	72	29	45	9' 0"	1	2.088	80	8,686
120	4	R	F34T12	34	2	72	13	60	9' 0"	1	0.936	80	3,894
121	4	R	F34T12	34	3	100	2	65	9' 0"	1	0.200	80	832
124	4	R	F34T12	34	2	72	31	36	9' 0"	1	2.232	80	9,285
124	4	R	F34T12	34	3	100	3	50	9' 0"	1	0.300	80	1,248
126	4	R	F34T12	34	3	100	2	55	9' 0"	1	0.200	80	832
127	4	R	F34T12	34	2	72	2	58	9' 0"	1	0.144	80	599
128	4	R	F34T12	34	2	72	8	42	9' 0"	1	0.576	80	2,396
129	4	R	F34T12	34	3	100	2	53	9' 0"	1	0.200	80	832
202	4	S	F34T12	34	4	144	122	28.2	8' 0"	1	17.568	80	73,083
202	Ex	Ex	I	10	2	20	4	-	-	1	0.080	168	699
203	8	R	F34T12	34	1	43	6	35	8' 0"	1	0.258	80	1,073
203	1	S	F34T12	34	1	43	10	10.2	8' 0"	1	0.430	168	3,756
203	4	S	F34T12	34	4	144	3	57	8' 0"	1	0.432	80	1,797
204	4	S	F34T12	34	4	144	3	57	8' 0"	1	0.432	80	1,797
206	4	S	F34T12	34	4	144	3	34	8' 0"	1	0.432	80	1,797
211	1	R	F34T12	34	1	43	5	5.27	8' 0"	1	0.215	168	1,878
214	8	R	F34T12	34	1	43	6	35	8' 0"	1	0.258	80	1,073
214	10	S	F34T12	34	1	43	1	11.9	8' 0"	0.5	0.043	80	89
214	14	R	F34T12	34	3	100	3	50	8' 0"	1	0.300	80	1,248
217	4	R	F34T12	34	3	100	69	36.7	8' 0"	1	6.900	80	28,704
217	Ex	Ex	I	10	2	20	2	-	-	1	0.040	168	349
218	4	R	F34T12	34	3	100	4	49	8' 0"	1	0.400	80	1,664
220	4	R	F34T12	34	3	100	8	67.2	8' 0"	1	0.800	80	3,328
221	4	R	F34T12	34	3	100	4	50	8' 0"	1	0.400	80	1,664
222	4	R	F34T12	34	3	100	4	49	8' 0"	1	0.400	80	1,664
223	4	R	F34T12	34	3	100	4	50	8' 0"	1	0.400	80	1,664
224	4	R	F34T12	34	3	100	4	50.2	8' 0"	1	0.400	80	1,664
225	4	R	F34T12	34	3	100	4	50.1	8' 0"	1	0.400	80	1,664
ENTRY	1	R	F34T12	34	1	43	11	12	9' 0"	1	0.473	168	4,132
ENTRY	Ex	Ex	I	10	2	20	3	-	-	1	0.060	168	524
ENTRY	1	R	LPS	180	1	220	3	N/A	9' 0"	1	0.660	168	5,766
STAIR	1	SW	F34T12	34	1	43	7	10	N/A	1	0.301	168	2,630
STAIR	1	R	F34T12	34	1	43	10	5.14	8' 0"	1	0.430	168	3,756
STAIR	1	SW	F34T12	34	1	43	7	10	N/A	1	0.301	168	2,630
STAIR	1	R	F34T12	34	1	43	10	5.14	8' 0"	1	0.430	168	3,756

Table G-5. Building 53301 Communications Equipment Facility - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
STAIR	Ex	Ex	I	10	2	20	2	-	-	1	0.040	168	349
STAIR	Ex	Ex	I	10	2	20	2	-	-	1	0.040	168	349
											50.37		224,802

Lighting Legend

Task Code	
1	Corridors
2	Kitchens
3	Dining
4	Offices-General
5	Conference
6	Offices-Drafting
7	Laundry
8	Toilets
9	Sleeping Quarters
10	Supply Rooms
11	Repair Shops
12	Storage Room
13	Retail Store
14	Break Room
15	Work Out Room
16	Raquetball
17	Living Room
C	Classroom

Fixture Type

R - Recessed
S - Surface
P - Pendant
Ex - Exit Signs
SW - Surface Wall Mounted
D - Downlight

Lamp Type

I - Incandescent
F - Fluorescent
LPS - Low Pressure Sodium
HPS - High Pressure Sodium
MV - Mercury Vapor

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 224,802

TOTAL LIGHTING DEMAND (kW) - 50.4

BUILDING AREA (SQ.FT) - 40,000

LIGHTING POWER DENSITY(W/SQ.FT) - 1.3

Table G-6. Building 56301 Communications Equipment Facility - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
107	4	R	F34T12	40	3	100	7		8' 6"	1	0.700	72	2,621
108	4	R	F34T12	40	3	100	6	70	8' 6"	1	0.600	72	2,246
109	4	R	F34T12	40	3	100	8	70	8' 6"	1	0.800	72	2,995
109	4	R	F34T12	40	3	100	6	60	8' 6"	1	0.600	72	2,246
113	4	R	F34T12	40	3	100	18	35	8' 6"	1	1.800	72	6,739
114	4	R	F34T12	40	2	72	4	50	8' 6"	1	0.288	72	1,078
115	4	R	F34T12	40	2	72	20	45	8' 6"	1	1.440	72	5,391
116	4	R	F34T12	40	2	72	4	50	8' 6"	1	0.288	72	1,078
117	4	R	F34T12	40	2	72	3	50	8' 6"	1	0.216	72	809
118	4	R	F34T12	40	2	72	16	40	8' 6"	1	1.152	72	4,313
119	4	R	F34T12	40	2	72	2	45	8' 6"	1	0.144	72	539
120	4	R	F34T12	40	2	72	4	45	8' 6"	1	0.288	72	1,078
121	4	R	F34T12	40	2	72	24	40	8' 6"	1	1.728	72	6,470
122	4	R	F34T12	40	2	72	2	-	8' 6"	1	0.144	72	539
126	4	R	F34T12	40	3	100	18	40	8' 6"	1	1.800	72	6,739
128	4	R	F34T12	40	3	100	2	45	8' 6"	1	0.200	72	749
129	4	R	F34T12	40	3	100	2	45	8' 6"	1	0.200	72	749
130, Lab	4	R	F34T12	40	2	72	12	50	10' 0"	1	0.864	72	3,235
130	4	R	F34T12	40	2	72	2	45	10' 0"	1	0.144	72	539
133	4	R	F34T12	40	3	100	3	40	8' 6"	1	0.300	72	1,123
134	4	R	F34T12	40	3	100	21	35	8' 6"	1	2.100	72	7,862
135	4	R	F34T12	40	3	100	2	40	8' 6"	1	0.200	72	749
136	4	R	F34T12	40	3	100	2	-	8' 6"	1	0.200	72	749
137	4	R	F34T12	40	3	100	24	40	8' 6"	1	2.400	72	8,986
138	4	R	F34T12	40	3	100	20	40	8' 6"	1	2.000	72	7,488
139	4	R	F34T12	40	3	100	2	-	8' 6"	1	0.200	72	749
140	4	R	F34T12	40	3	100	10	37	8' 6"	1	1.000	72	3,744
140	4	R	F40T12U	40	3	100	1	-	8' 6"	1	0.100	72	374
141	4	R	F34T12	40	3	100	5	-	8' 6"	1	0.500	72	1,872
143 {1}	4	R	F34T12	40	3	100	12	-	8' 6"	1	1.200	72	4,493
144 {1}	4	R	F34T12	40	3	100	9	-	8' 6"	1	0.900	72	3,370
145 {1}	4	R	F34T12	40	3	100	12	-	8' 6"	1	1.200	72	4,493
147	8	S	F34T12	40	2	72	3	20	8' 6"	1	0.216	72	809
148	8	S	F34T12	40	2	72	2	-	8' 6"	1	0.144	72	539
152	5	R	F34T12	40	3	100	5	-	8' 6"	1	0.500	72	1,872
154	4	R	F34T12	40	3	100	11	40	8' 6"	1	1.100	72	4,118
154	4	R	F40T12U	40	2	72	1	40	8' 6"	1	0.072	72	270
113C	4	R	F34T12	40	3	100	6	35	8' 6"	1	0.600	72	2,246
153A	4	R	F34T12	40	2	72	8	40	8' 6"	1	0.576	72	2,157
Conr	1	R	F34T12	40	2	72	3	-	8' 6"	1	0.216	168	1,887
Conr	1	R	F34T12	40	2	72	5	5 to 20	8' 6"	1	0.360	168	3,145
Conr 1	1	R	F34T12	40	2	72	10	-	8' 6"	1	0.720	168	6,290

Table G-6. Building 56301 Communications Equipment Facility - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
Conr Cross	1	R	F34T12	40	2	72	2	15	8' 6"	1	0.144	168	1,258
Exit Signs	Ex	Ex	I	10	2	20	10	-		1	0.200	168	1,747
											30.544		122,544

Lighting Legend

Task Code	
1	Corridors
2	Kitchens
3	Dining
4	Offices-General
5	Conference
6	Offices-Drafting
7	Laundry
8	Toilets
9	Sleeping Quarters
10	Supply Rooms
11	Repair Shops
12	Storage Room
13	Retail Store
14	Break Room
15	Work Out Room
16	Raquetball
17	Living Room
C	Classroom

Fixture Type
R - Recessed
S - Surface
P - Pendant
Ex - Exit Signs
SW - Surface Wall Mounted
D - Downlight

Lamp Type
I - Incandescent
F - Fluorescent
LPS - Low Pressure Sodium
HPS - High Pressure Sodium
MV - Mercury Vapor

{1} - NO ACCESS SKIF RESTRICTED AREA
Lighting count from Reflected Ceiling Plan

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 122,544

TOTAL LIGHTING DEMAND (kW) - 30.5

BUILDING AREA (SQ.FT) - 30,000

LIGHTING POWER DENSITY(W/SQ.FT) - 1.02

Table G-7. Building 57428 Communications Equipment Facility - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
102	12	S	F40T12	40	2	86	2	34	8' 0"	0.5	0.172	80	358
105	6	S	F40T12	40	3	100	12	34	8' 0"	1	1.200	80	4,992
106	10	S	I	40	1	40	1	6.9	8' 0"	0.5	0.040	80	83
107	4	S	F40T12	40	3	100	18	42.6	8' 0"	1	1.800	80	7,488
108	12	S	F40T12	40	3	100	4	28.7	8' 0"	0.5	0.400	80	832
109	10	S	F40T12	40	3	100	6	69	8' 0"	0.5	0.600	80	1,248
112	8	S	F40T12	40	1	50	4	34	8' 0"	1	0.200	80	832
112	1	S	F40T12	40	2	86	2	7.62	8' 0"	1	0.172	168	1,503
112	1	S	F40T12	40	2	86	2	7.5	8' 0"	1	0.172	168	1,503
112	1	S	F40T12	40	2	86	6	7.62	8' 0"	1	0.516	168	4,508
112	1	S	F40T12	40	2	86	3	7.62	8' 0"	1	0.258	168	2,254
112	1	S	F40T12	40	2	86	2	7.6	8' 0"	1	0.172	168	1,503
114	4	S	F40T12	40	3	100	4	54.2	8' 0"	1	0.400	80	1,664
115	4	S	F40T12	40	3	100	4	64.9	8' 0"	1	0.400	80	1,664
117	8	S	F40T12	40	1	50	1	30	8' 0"	1	0.050	80	208
118	6	S	F40T12	40	3	100	6	90	8' 0"	1	0.600	80	2,496
120	6	S	F40T12	40	3	100	6	90.7	8' 0"	1	0.600	80	2,496
123	6	S	F40T12	40	3	100	16	64.2	8' 0"	1	1.600	80	6,656
126	10		F40T12	40	3	100	6	64	8' 0"	0.5	0.600	80	1,248
127	1		F40T12	40	1	50	1	14	8' 0"	1	0.050	168	437
127	10		F40T12	40	3	100	6	64	8' 0"	0.5	0.600	80	1,248
130	4		F40T12	40	4	172	31	71	9' 5"	1	5.332	80	22,181
131	4		F40T12	40	4	172	12	69	9' 5"	1	2.064	80	8,586
202	4		F40T12	40	3	100	4	64.5	8' 0"	1	0.400	80	1,664
203	4		F40T12	40	3	100	4	64.5	8' 0"	1	0.400	80	1,664
204	4		F40T12	40	3	100	6	34	8' 0"	1	0.600	80	2,496
207	5		F40T12	40	3	100	5	60	8' 0"	1	0.500	80	2,080
208	4		F40T12	40	3	100	5	100.2	8' 0"	1	0.500	80	2,080
209	4		F40T12	40	3	100	4	64	8' 0"	1	0.400	80	1,664
210	1		F40T12	40	2	86	2	27.8	8' 0"	1	0.172	168	1,503
217	4		F40T12	40	3	100	18	45.5	8' 0"	1	1.800	80	7,488
-	Ex		I	10	2	20	15	-	-	1	0.300	168	2,621
216A	4		F40T12	40	3	100	4	64	8' 0"	1	0.400	80	1,664
216B	4		F40T12	40	3	100	4	64	8' 0"	1	0.400	80	1,664
											23.870		102,574

Table G-7. Building 57428 Communications Equipment Facility - Present Lighting Energy Use

Lighting Legend

	Task Code	Fixture Type
1	Corridors	R - Recessed
2	Kitchens	S - Surface
3	Dining	P - Pendant
4	Offices-General	Ex - Exit Signs
5	Conference	SW - Surface Wall Mounted
6	Offices-Drafting	D - Downlight
7	Laundry	
8	Toilets	Lamp Type
9	Sleeping Quarters	I - Incandescent
10	Supply Rooms	F - Fluorescent
11	Repair Shops	LPS - Low Pressure Sodium
12	Storage Room	HPS - High Pressure Sodium
13	Retail Store	MV - Mercury Vapor
14	Break Room	
15	Work Out Room	
16	Raquetball	
17	Living Room	
C	Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 102,574

TOTAL LIGHTING DEMAND (kW) - 23.9

BUILDING AREA (SQ.FT) - 18,998

LIGHTING POWER DENSITY(W/SQ.FT) - 1.3

Table G-8. Building 61701 Barnes Field House - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
Area	4	S	F40T12	40	1	50	12	30	8' 0"	1	0.600	40	1,248
Corridor	1	S	F40T12	40	2	86	4	20.5	10' 0"	1	0.344	100	1,789
Corridor	1	S	F40T12	40	2	86	2	40	8' 0"	1	0.172	100	894
Corridor	1	S	F40T12	40	2	86	1	340	8' 0"	1	0.086	100	447
Corridor	1	S	F40T12	40	2	86	3	40	9' 0"	1	0.258	100	1,342
Corridor	1	P	F40T12	40	2	86	2	7	9' 0"	1	0.172	100	894
Corridor	1	S	F40T12	40	2	86	9	16	9' 0"	1	0.774	100	4,025
Corridor	Ex	Ex	I	10	2	20	5	-	-	1	0.100	168	874
Corridor	Ex	Ex	I	10	2	20	1	-	-	1	0.020	168	175
Gym	14	P	MV	400	1	454	48	20.6	30' 0"	1	21.792	40	45,327
Locker Rooms	8	SW	F20T12	20	1	12	6	26	8' 0"	1	0.072	40	150
Locker Rooms	8	SW	F40T12	40	1	50	6	26	8' 0"	1	0.300	40	624
Locker Rooms	8	S	F40T12	40	2	86	90	26	8' 0"	1	7.740	40	16,099
Locker Rooms	8	R	I	60	1	60	32	26	8' 0"	1	1.920	40	3,994
Main Corridor	1	S	F40T12	40	2	86	9	4.8	8' 0"	1	0.774	100	4,025
Main Corridor	Ex	Ex	I	10	2	20	1	-	-	1	0.020	168	175
Main Entry	1	R	F40T12	40	3	100	6	40	8' 0"	1	0.600	100	3,120
Office	4	S	F40T12	40	2	86	12	26.4	9' 0"	1	1.032	40	2,147
Office	4	S	F40T12	40	2	86	2	42	9' 0"	1	0.172	40	358
Office	4	S	F40T12	40	2	86	3	34	9' 0"	1	0.258	40	537
Pool	15	S	F40T12	40	2	86	12	26	25' 0"	1	1.032	40	2,147
Pool	15	R	F40T12	40	3	100	16	26	25' 0"	1	1.600	40	3,328
Pool	Ex	Ex	I	10	2	20	1	-	-	1	0.020	168	175
Pool Lobby	1	S	F40T12	40	2	86	9	15	8' 0"	1	0.774	100	4,025
Pool Lobby	Ex	Ex	I	10	2	20	1	-	-	1	0.020	168	175
Pool Office	4	S	F40T12	40	2	86	2	30	8' 0"	1	0.172	40	358
Racquetball Court	16	S	MV	250	1	285	12	15.8	20' 0"	0.75	3.420	40	5,335
Racquetball Court	16	S	MV	250	1	285	12	15.8	20' 0"	0.75	3.420	40	5,335
Racquetball Court	15	R	MV	400	1	454	6	45	17' 6"	1	2.724	40	5,666
Racquetball Lobby	1	S	F40T12	40	3	100	14	26	17' 6"	1	1.400	100	7,280
Sports Admin.	12	R	F40T12	40	4	172	1	40	8' 0"	1	0.172	40	358
Sports Admin.	12	P	F96T12	96	4	316	1	40	8' 0"	1	0.316	40	657
Sports Admin.	12	S	I	100	1	100	1	40	8' 0"	1	0.100	40	208
Supplies	10	S	F40T12	40	2	86	4	42	9' 0"	1	0.344	10	179
Toilet	8	S	F40T12	40	2	86	3	34	9' 0"	1	0.258	40	537
Toilet	8	S	F40T12	40	2	86	3	36	9' 0"	1	0.258	40	537
Workout	15	S	LPS	90	1	125	16	6.7	30' 0"	1	2.000	40	4,160
Workout	15	S	LPS	90	1	125	16	40	30' 0"	1	2.000	40	4,160
Workout	15	P	MV	250	1	285	9	3.8	18' 0"	1	2.565	40	5,335
											59.801		138,195

Table G-8. Building 61701 Barnes Field House - Present Lighting Energy Use

Lighting Legend	
Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exit Signs
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) -	**138,195**
TOTAL LIGHTING DEMAND (kW) -	**59.8**
BUILDING AREA (SQ.FT) -	**52,158**
LIGHTING POWER DENSITY(W/SQ.FT) -	**1.1**

Table G-9. Building 62704 Instruction Building - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
	C	S	F40T12	40	4	172	18	63.8	9' 0"	0.75	3.096	60	7,245
W2	C	S	F40T12	40	4	172	14	70	9' 0"	0.75	2.408	60	5,635
W3	C	S	F40T12	40	4	172	18	70	9' 0"	0.75	3.096	60	7,245
W4	1	S	F40T12	40	3	100	12	64	9' 0"	1	1.200	60	3,744
W4	C	S	F40T12	40	4	172	14	70	9' 0"	0.75	2.408	60	5,635
W4	1	S	F40T12	40	4	172	2	8.6	9' 0"	1	0.344	60	1,073
W5	C	S	F40T12	40	4	172	14	70	9' 0"	0.75	2.408	60	5,635
W6	C	S	F40T12	40	4	172	14	70	9' 0"	0.75	2.408	60	5,635
W7	C	S	F40T12	40	4	172	14	70	9' 0"	0.75	2.408	60	5,635
W8	C	S	F40T12	40	4	172	14	71	9' 0"	0.75	2.408	60	5,635
W9	C	S	F40T12	40	4	172	14	70	9' 0"	0.75	2.408	60	5,635
W10	C	S	F40T12	40	4	172	14	70	9' 0"	0.75	2.408	60	5,635
W11	1	S	F40T12	40	2	86	10	20	9' 0"	1	0.860	60	2,683
W11	C	S	F40T12	40	4	172	14	70	9' 0"	0.75	2.408	60	5,635
-	1	S	F40T12	40	2	86	6	9.6	9' 0"	1	0.516	60	1,610
-	8	S	F40T12	40	2	86	7	98	9' 0"	0.75	0.602	60	1,409
-	8	S	F40T12	40	2	86	4	18	9' 0"	0.75	0.344	60	805
-	Ex	Ex	I	10	2	20	17	-	-	1	0.340	168	2,970
											32.070		79,496

Lighting Legend

Task Code	
1	Corridors
2	Kitchens
3	Dining
4	Offices-General
5	Conference
6	Offices-Drafting
7	Laundry
8	Toilets
9	Sleeping Quarters
10	Supply Rooms
11	Repair Shops
12	Storage Room
13	Retail Store
14	Break Room
15	Work Out Room
16	Raquetball
17	Living Room
C	Classroom

Fixture Type
R - Recessed
S - Surface
P - Pendant
Ex - Exit Signs
SW - Surface Wall Mounted
D - Downlight

Lamp Type
I - Incandescent
F - Fluorescent
LPS - Low Pressure Sodium
HPS - High Pressure Sodium
MV - Mercury Vapor

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 79,496

TOTAL LIGHTING DEMAND (kW) - 32.1

BUILDING AREA (SQ.FT) - 18,733

LIGHTING POWER DENSITY(W/SQ.FT) - 1.71

Table G-10. Building 70525 NCO Club - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
Bar	3	R	F40T12	40	4	172	6	25	11' 6"	0.5	1.032	120	3,220
Bar	3	P	I	5	6	30	3	25	11' 6"	0.5	0.090	120	281
Corridor	1	S	F40T12	40	2	86	5	30	10' 0"	1	0.430	120	2,683
Corridor	1	S	F40T12	40	2	86	4	42	10' 0"	1	0.344	120	2,147
Dining	3	R	F40T12	40	4	172	5	12	11' 6"	0.5	0.860	120	2,683
Dining	3	P	I	5	12	60	7	12	11' 6"	0.5	0.420	120	1,310
Dining	Ex	Ex	I	10	2	20	1	12	11' 6"	1	0.020	168	175
Dining	3	P-Decorative	F/I	40/10	2/12	206	36	8.29	10' 0"	0.5	7.416	120	23,138
Dining	3	P-Decorative	I	10	12	60	6	38	10' 0"	0.5	0.360	120	1,123
Dining	3	Ex	I	10	2	20	3	-	-	0.5	0.060	120	187
Dishwash	12	S	F40T12	40	2	86	1	50	8' 0"	0.5	0.086	120	268
Dishwash	2	S	F40T12	40	4	172	8	45	10' 0"	0.75	1.376	120	6,440
Dishwash	2	S	F40T12	40	4	172	1	10	10' 0"	0.75	0.172	120	805
Dishwash	12	S	I	100	1	100	2	50	10' 0"	0.5	0.200	120	624
Kitchen	2	S	F40T12	40	4	172	30	44	10' 0"	0.75	5.160	120	24,149
Kitchen	Ex	Ex	I	10	2	20	1	-	-	1	0.020	168	175
Kitchen	2	S	F96T12	96	2	158	2	36	12' 0"	0.75	0.316	120	1,479
Kitchen	Ex	Ex	I	10	2	20	2	-	-	1	0.040	168	349
Kitchen	2	P-Decorative	I	100	4	400	7	14	10' 0"	0.75	2.800	120	13,104
Office	4	S	F40T12	40	2	86	2	36	10' 0"	0.5	0.172	120	537
Offices	4	S	F40T12	40	2	86	5	36.8	10' 0"	0.5	0.430	120	1,342
Offices	8	S	F40T12	40	2	86	2	34	10' 0"	0.75	0.172	120	805
Offices	6	S	F40T12	40	2	86	10	86.6	10' 0"	0.5	0.860	120	2,683
Serving	3	S	F40T12	40	4	172	2	40	11' 6"	0.5	0.344	120	1,073
Supply	10	S	F40T12	40	2	86	1	34	10' 0"	0.5	0.086	120	268
Toilet	8	S	F40T12	40	2	86	2	34	10' 0"	0.75	0.172	120	805
Toilet	8	P	I	40	2	80	2	14	10' 0"	0.75	0.160	120	749
Toilet	8	P	I	40	2	80	2	14	10' 0"	0.75	0.160	120	749
Whse	12	P	F40T12	40	2	86	4	10	16' 0"	0.5	0.344	120	1,073
Whse	12	S	F40T12	40	2	86	1	10	7' 6"	0.5	0.086	120	268
Whse	4	S	F40T12	40	3	100	2	10	7' 6"	0.5	0.200	120	624
											24.388		95,316

Table G-10. Building 70525 NCO Club - Present Lighting Energy Use

Lighting Legend	
Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exit Signs
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) -	**95,316**
TOTAL LIGHTING DEMAND (kW) -	**24.4**
BUILDING AREA (SQ.FT) -	**22,464**
LIGHTING POWER DENSITY(W/SQ.FT) -	**1.1**

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
101	1	R	F40T12	40	2	86	2	15	8' 6"	1.00	0.172	168	1,503
101	Ex	Exit	I	10	2	20	1	-	-	1.00	0.020	168	175
102	1	R	F40T12	40	2	86	2	15	8' 6"	1.00	0.172	168	1,503
102	Ex	Exit	I	10	2	20	1	-	-	1.00	0.020	168	175
103	14	S	F40T12	40	2	86	4	30.6	8' 0"	1.00	0.344	100	1,789
104	14	R	F40T12	40	2	86	3	15	8' 6"	1.00	0.258	100	1,342
105	1	R	F40T12	40	2	86	2	15	8' 6"	1.00	0.172	168	1,503
105	Ex	Exit	I	10	2	20	1	-	-	1.00	0.020	168	175
107	1	R	F40T12	40	2	86	1	15	8' 6"	1.00	0.086	168	751
107	Ex	Exit	I	10	2	20	1	-	-	1.00	0.020	168	175
108	1	R	F40T12	40	2	86	4	15	8' 6"	1.00	0.344	168	3,005
108	Ex	Exit	I	10	2	20	2	-	-	1.00	0.040	168	349
109	7	S	F40T12	40	2	86	2	53	8' 6"	1.00	0.172	100	894
110	4	R	F40T12	40	2	86	1	15	8' 6"	0.80	0.086	60	215
111	8	S	F40T12	40	2	86	1	66	7' 3"	0.8	0.086	168	601
112	Janitor	S	F40T12	40	1	50	1	55	7' 3"	1.00	0.050	10	26
113	Elec	S	F40T12	40	2	86	1	58	7' 3"	1.00	0.086	20	89
114	Phone	S	F40T12	40	2	86	1	20	8' 6"	1.00	0.086	10	45
115	Mech	S	F40T12	40	2	86	2	58	7' 3"	1.00	0.172	20	179
116	Ex	Exit	I	10	2	20	2	-	-	1.00	0.040	168	349
116	1	R	F40T12	40	2	86	6	15	8' 6"	1.00	0.516	168	4,508
116	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
117	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
117	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
117	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
119	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
119	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
119	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
120	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
120	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
120	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
121	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
122	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
122	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
122	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
123	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
123	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
123	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
124	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
125	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
125	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
125	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
126	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
126	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
126	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
127	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
128	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
128	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
128	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
130	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
130	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
130	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
130	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
131	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
131	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
131	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
132	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
132	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
132	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
133	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
134	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
134	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
134	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
135	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
135	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
135	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
136	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
137	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
137	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
137	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
138	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
138	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
138	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
139	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
140	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
140	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
140	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
141	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
141	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
141	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
142	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
143	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
143	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
143	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
144	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
144	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
144	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
145	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
146	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
146	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
146	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
147	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
147	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
147	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
148	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
148	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
148	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
148	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
150	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
150	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
150	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
151	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
151	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
151	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
151	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
153	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
153	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
153	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
154	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
155	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
155	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
155	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
156	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
156	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
156	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
157	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
158	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
158	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
158	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
159	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
159	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
159	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
160	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
160	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
160	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
160	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
162	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
162	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
162	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
163	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
164	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
164	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
164	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
165	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
165	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
165	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
166	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
167	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
167	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
167	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
168	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
168	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
168	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
169	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
170	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
170	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
170	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
171	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
171	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
171	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
172	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
173	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
173	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
173	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
174	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
174	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
174	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
175	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
176	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
176	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
176	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
177	Ex	Exit	I	10	2	20	2	-	-	1.00	0.040	168	349
177	1	R	F40T12	40	2	86	5	15	8' 6"	1.00	0.430	168	3,756
200	1	R	F40T12	40	2	86	8	15	8' 6"	1.00	0.688	168	6,010
200	1	R	F40T12	40	2	86	1	15	8' 6"	1.00	0.086	168	751
201	4	R	F40T12	40	2	86	2	45	8' 6"	0.80	0.172	60	429
202	Phone	R	F40T12	40	2	86	1	25	8' 6"	1.00	0.086	10	45
203	14	R	F40T12	40	2	86	4	30	8' 6"	1.00	0.344	100	1,789

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
204	4	R	F40T12	40	2	86	1	50	8' 6"	0.80	0.086	60	215
205	7	R	F40T12	40	2	86	3	40	8' 6"	1	0.258	168	2,254
206	8	R	F40T12	40	2	86	1	45	8' 6"	1.00	0.086	168	751
206.1	8	R	F40T12	40	2	86	1	45	8' 6"	1.00	0.086	168	751
207	Janitor	S	I	60	1	60	1	28	8' 6"	1.00	0.060	10	31
208	4	R	F40T12	40	2	86	4	35	8' 6"	0.80	0.344	60	859
208	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
208	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
208	14	S	F40T12	40	2	86	6	20	8' 0"	1.00	0.516	100	2,683
208	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
210	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
210	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
210	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
210	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
212	Ex	Exit	I	10	2	20	2	-	-	1.00	0.040	168	349
212	1	R	F40T12	40	2	86	6	15	8' 6"	1.00	0.516	168	4,508
213	Ex	Exit	I	10	2	20	2	-	-	1.00	0.040	168	349
213	1	R	F40T12	40	2	86	5	15	8' 6"	1.00	0.430	168	3,756
214	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
214	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
214	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
215	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
216	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
216	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
216	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
218	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
219	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
219	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
219	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
219.1	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
219.1	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
219.1	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
220	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
220	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
220	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
221	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
222	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
222	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
222	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
223	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
223	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
223	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
224	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
225	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
225	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
225	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
226	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
226	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
226	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
227	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
228	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
228	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
228	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
229	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
229	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
229	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
230	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
231	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
231	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
231	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
232	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
232	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
232	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
233	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
234	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
234	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
234	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
235	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
235	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
235	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
236	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
237	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
237	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
237	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
238	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
238	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
238	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
239	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
240	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
240	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
240	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
241	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
241	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
241	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
242	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
243	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
243	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
243	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
244	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
244	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
244	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
245	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
246	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
246	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
246	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
247	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
247	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
247	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
248	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
249	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
249	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
249	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
250	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
250	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
250	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
251	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
252	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
252	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
252	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
253	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
253	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
253	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
254	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
255	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
255	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
255	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
256	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
256	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
256	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
257	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
258	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
258	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
258	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
259	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
259	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
259	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
260	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
261	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
261	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
261	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
263	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
264	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
264	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
264	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
264.1	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
264.1	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
264.1	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
265	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
265	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
265	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
266	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
267	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
267	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
267	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
268	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
268	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
268	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
269	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
270	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
270	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
270	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
271	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
271	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
271	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
272	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
273	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
273	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
273	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
300	1	R	F40T12	40	2	86	1	15	8' 6"	1.00	0.086	168	751
300	8	R	F40T12	40	2	86	8	15	8' 6"	1.00	0.688	168	6,010
301	4	R	F40T12	40	2	86	2	45	8' 6"	0.80	0.172	60	429
302	Phone	R	F40T12	40	2	86	1	25	8' 6"	1.00	0.086	10	45
303	5	S	F40T12	40	2	86	4	11.2	8' 0"	0.80	0.344	40	572
303	14	R	F40T12	40	2	86	4	30	8' 6"	1.00	0.344	100	1,789
304	4	R	F40T12	40	2	86	1	50	8' 6"	0.80	0.086	60	215
305	7	R	F40T12	40	2	86	3	40	8' 6"	1	0.258	168	2,254
305	7	S	F40T12	40	2	86	3	45	8' 0"	1	0.258	168	2,254
306	8	R	F40T12	40	2	86	1	45	8' 6"	1.00	0.086	168	751

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Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
306.1	8	R	F40T12	40	2	86	1	45	8' 6"	1.00	0.086	168	751
307	8.1	S	F40T12	40	1	50	1	40	8' 0"	0.50	0.050	84	109
307	Janitor	S	I	60	1	60	1	28	8' 6"	1.00	0.060	10	31
308	4	R	F40T12	40	2	86	4	35	8' 6"	0.80	0.344	60	859
308	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
308	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
308	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
310	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
310	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
310	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
310	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
312	Ex	Exit	I	10	2	20	2	-	-	1.00	0.040	168	349
312	1	R	F40T12	40	2	86	6	15	8' 6"	1.00	0.516	168	4,508
313	Ex	Exit	I	10	2	20	2	-	-	1.00	0.040	168	349
313	1	R	F40T12	40	2	86	5	15	8' 6"	1.00	0.430	168	3,756
314	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
314	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
314	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
315	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
316	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
316	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
316	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
318	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
319	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
319	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
319	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
319.1	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
319.1	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
319.1	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
320	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
320	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
320	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
321	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
322	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
322	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
322	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
323	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
323	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
323	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
324	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
325	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
325	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376

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Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
325	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
326	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
326	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
326	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
327	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
328	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
328	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
328	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
329	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
329	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
329	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
330	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
331	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
331	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
331	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
332	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
332	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
332	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
333	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
334	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
334	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
334	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
335	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
335	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
335	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
336	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
337	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
337	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
337	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
338	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
338	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
338	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
339	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
340	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
340	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
340	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
341	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
341	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
341	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
342	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
343	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
343	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
343	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
344	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
344	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
344	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
345	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
346	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
346	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
346	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
347	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
347	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
347	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
348	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
349	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
349	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
349	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
350	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
350	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
350	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
351	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
352	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
352	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
352	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
353	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
353	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
353	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
354	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
355	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
355	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
355	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
356	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
356	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
356	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
357	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
358	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
358	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
358	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
359	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
359	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
359	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
360	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
361	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
361	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
361	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
363	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
364	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
364	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
364	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
364.1	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
364.1	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
364.1	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
365	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
365	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
365	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
366	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
367	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
367	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
367	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
368	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
368	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
368	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
369	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
370	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
370	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
370	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
371	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
371	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
371	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
372	8.1	S	F40T12	40	2	86	1	75	8' 0"	0.50	0.086	84	188
373	9	SW	F40T12	40	2	86	1	34-36	8' 0"	0.50	0.086	84	188
373	9	Table	I	60	1	86	2	34-36	8' 0"	0.50	0.172	84	376
373	1/9	SW	F30T12	30	2	74	1	34-36	8' 0"	0.50	0.074	84	162
Entry	Extr	S	F40T12	40	2	86	5	-	-	1	0.430	168	3,756
OR	1	S	F40T12	40	3	100	1	50	8' 6"	1.00	0.100	168	874
OR	Ex	Ex	I	10	2	20	1	-	-	1.00	0.020	168	175
OR	4	R	F40T12	40	3	100	8	70	8' 6"	0.80	0.800	60	1,997
OR	4	S	F40T12	40	3	100	9	45	8' 6"	0.80	0.900	60	2,246
OR	4	S	F40T12	40	3	100	3	85	8' 0"	0.80	0.300	60	749
OR	4	S	F40T12	40	3	100	3	85	8' 0"	0.80	0.300	60	749
OR	4	S	F40T12	40	3	100	3	45	8' 0"	0.80	0.300	60	749
OR	4	S	F40T12	40	3	100	3	45	8' 0"	0.80	0.300	60	749
OR	5	S	F40T12	40	3	100	12	60	8' 6"	0.80	1.200	40	1,997
OR	5	S	F40T12	40	3	100	4	43	8' 6"	0.80	0.400	40	666
OR	8.1	S	F20T12	20	1	12	1	35	6' 0"	0.50	0.012	84	26
OR	8.1	S	F20T12	20	1	12	1	35	6' 0"	0.50	0.012	84	26

Table G-11. Building 80305 Barracks - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (kW)	Fixture (Hr/Wk)	kWH/Yr
OR	8.1	R	F20T12	20	1	12	1	35	8' 6"	0.50	0.012	84	26
OR	8.1	R	F20T12	20	1	12	1	35	8' 6"	0.50	0.012	84	26
OR	12	S	F40T12	40	3	100	1	35	8' 6"	1.00	0.100	10	52
Stairs A	1	SW	F40T12	40	2	86	6	9.5		1.00	0.516	168	4,508
Stairs B	1	SW	F40T12	40	2	86	6	9.5		1.00	0.516	168	4,508
Stairs C	1	SW	F40T12	40	2	86	6	9.5		1.00	0.516	168	4,508
Vestibles	1	S	F40T12	40	2	86	4	75	7' 6"	1.00	0.344	168	3,005
											64.834		**207,718**

Lighting Legend

Task Code	
1	Corridors
2	Kitchens
3	Dining
4	Offices-General
5	Conference
6	Offices-Drafting
7	Laundry
8	Toilets
9	Sleeping Quarters
10	Supply Rooms
11	Repair Shops
12	Storage Room
13	Retail Store
14	Break Room
15	Work Out Room
16	Raquetball
17	Living Room
C	Classroom

Fixture Type

R - Recessed
S - Surface
P - Pendant
Ex - Exit Signs
SW - Surface Wall Mounted
D - Downlight

Lamp Type

I - Incandescent
F - Fluorescent
LPS - Low Pressure Sodium
HPS - High Pressure Sodium
MV - Mercury Vapor

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 207,718

TOTAL LIGHTING DEMAND (kW) - 64.8

BUILDING AREA (SQ.FT) - 50,680

LIGHTING POWER DENSITY(W/SQ.FT) - 1.3

Table G-12. Building 80505 TTA Instruction Building - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
102	C	R	F32T8	32	2	71	9	33	9' 0"	0.75	0.639	60	1,495
103	4	R	F32T8	32	2	71	27	42	9' 0"	0.75	1.917	60	4,486
104	C	R	F32T8	32	2	71	9	33	9' 0"	0.75	0.639	60	1,495
106	C	R	F32T8	32	2	71	9	33	9' 0"	0.75	0.639	60	1,495
108	C	R	F32T8	32	2	71	9	33	9' 0"	0.75	0.639	60	1,495
110	C	R	F32T8	32	2	71	9	33	9' 0"	0.75	0.639	60	1,495
117	11	P	HPS	400	1	454	14	N/A	34' 0"	0.75	6.356	60	14,873
118	1	R	F32T8	32	1	37	5	22	9' 0"	1	0.185	60	577
125	8	SW	F32T8	32	1	37	3	40	9' 0"	0.8	0.111	60	277
125	8	S	F32T8	32	1	37	3	40	9' 0"	0.8	0.111	60	277
129	8	SW	F32T8	32	1	37	3	40	9' 0"	0.8	0.111	60	277
129	8	S	F32T8	32	1	37	2	40	9' 0"	0.8	0.074	60	185
131	4	R	F32T8	32	2	71	21	45 to 60	9' 0"	0.75	1.491	60	3,489
139	14	R	F32T8	32	1	37	4	48	9' 0"	1	0.148	60	462
142	C	R	F32T8	32	2	71	8	48	9' 0"	0.75	0.568	60	1,329
143	14	R	F32T8	32	1	37	4	48	9' 0"	1	0.148	60	462
145	4	R	F32T8	32	1	37	18	58	9' 0"	0.75	0.666	60	1,558
146	C	R	F32T8	32	2	71	48	35	9' 0"	0.75	3.408	60	7,975
148	C	R	F32T8	32	2	71	8	40	9' 0"	0.75	0.568	60	1,329
151	4	R	F32T8	32	2	71	12	65	9' 0"	0.75	0.852	60	1,994
152	C	R	F32T8	32	2	71	8	42	9' 0"	0.75	0.568	60	1,329
154	12	S	F32T8	32	1	37	2	60	9' 0"	1	0.074	20	77
155	11	S	F32T8	32	2	71	15	67	10' 0"	0.75	1.065	60	2,492
156	12	S	F32T8	32	1	37	2	60	9' 0"	1	0.074	20	77
158	12	S	F32T8	32	1	37	2	60	9' 0"	1	0.074	20	77
159	11	P	HPS	400	1	454	18	70	34' 0"	0.75	8.172	60	19,122
159	Ex	Ex	LED	1.8	1	1.8	3	-	-	1	0.005	168	47
171	8	SW	F32T8	32	1	37	3	40	9' 0"	0.8	0.111	60	277
171	8	S	F32T8	32	1	37	3	40	9' 0"	0.8	0.111	60	277
175	8	SW	F32T8	32	1	37	3	42	9' 0"	0.8	0.111	60	277
175	8	S	F32T8	32	1	37	3	40	9' 0"	0.8	0.111	60	277
176	4	R	F32T8	32	2	71	16	43	9' 0"	0.75	1.136	60	2,658
177	12	R	F32T8	32	2	71	4	55	9' 0"	1	0.284	20	295
179	4	R	F32T8	32	2	71	6	52	9' 0"	0.75	0.426	60	997
181	4	R	F32T8	32	2	71	9	53	9' 0"	0.75	0.639	60	1,495
204	C	R	F32T8	32	2	71	20	30	9' 0"	0.75	1.420	60	3,323
210	C	R	F32T8	32	2	71	30	42	9' 0"	0.75	2.130	60	4,984
212	C	R	F32T8	32	2	71	12	38	9' 0"	0.75	0.852	60	1,994
213	Mech Rm	P	F32T8	32	2	71	8	30	30' 0"	1	0.568	10	295
225	8	S	F32T8	32	1	37	6	35	9' 0"	0.8	0.222	60	554
229	8	S	F32T8	32	1	37	6	35	9' 0"	0.8	0.222	60	554
231	4	S	F32T8	32	2	71	5	58	9' 0"	0.75	0.355	60	831
233	14	S	F32T8	32	1	37	6	46	9' 0"	1	0.222	60	693
234	C	R	F32T8	32	2	71	12	35	9' 0"	0.75	0.852	60	1,994
236	C	R	F32T8	32	2	71	12	37	9' 0"	0.75	0.852	60	1,994
237	14	S	F32T8	32	1	37	8	42	9' 0"	1	0.296	60	924

Table G-12. Building 80505 TTA Instruction Building - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
245	4	S	F32T8	32	2	71	18	64	9' 0"	0.75	1.278	60	2,991
248	C	R	F32T8	32	2	71	12	35	9' 0"	0.75	0.852	60	1,994
249	Mech Rm	P	F32T8	32	2	71	8	30	30' 0"	1	0.568	10	295
250	12	S	F32T8	32	1	37	4	16	9' 0"	1	0.148	20	154
271	8	S	F32T8	32	1	37	6	35	9' 0"	0.8	0.222	60	554
275	8	S	F32T8	32	1	37	6	35	9' 0"	0.8	0.222	60	554
278	4	R	F32T8	32	2	71	12	63	9' 0"	0.75	0.852	60	1,994
280	C	R	F32T8	32	2	71	48	35	9' 0"	0.75	3.408	60	7,975
1 Center Entrance	1	SW	F	13	2	32	10	17	9' Top Floor	1	0.320	60	998
1 Center Entrance	1	D	F	13	2	32	2	17	9' Top Floor	1	0.064	60	200
1 E/W N	1	SW	F	13	2	32	10	6.0	9' 0"	1	0.320	60	998
1 E/W N	1	R	F32T8	32	2	71	1	6.0	9' 0"	1	0.071	60	222
1 E/W N	Ex	Ex	LED	1.8	1	1.8	1	-	-	1	0.002	168	16
1 E/W N/W	1	SW	F	13	2	32	9	5.6	9' 0"	1	0.288	60	899
1 E/W N/W	Ex	Ex	LED	1.8	1	1.8	1	-	-	1	0.002	168	16
1 E/W SOUTH	1	SW	F	13	2	32	22	4	9' 0"	1	0.704	60	2,196
1 E/W SOUTH	1	D	F	13	2	32	2	4	9' 0"	1	0.064	60	200
1 E/W SOUTH	Ex	Ex	LED	1.8	1	1.8	1	-	-	1	0.002	168	16
1 MECH	Mech Rm	P	F32T8	32	2	71	6	-	-	1	0.426	10	222
1 N/S CENTER	1	S	F32T8	32	1	37	3	14	8' 6"	1	0.111	60	346
1 N/S WEST	1	SW	F	13	2	32	10	6.3	9' 0"	1	0.320	60	998
1 N/S WEST	Ex	Ex	LED	1.8	1	1.8	3	-	-	1	0.005	168	47
1 N/S EAST	1	SW	F	13	2	32	10	5 to 9	9' 0"	1	0.320	60	998
1 N/S EAST	1	D	F	13	2	32	3	5 to 9	9' 0"	1	0.096	60	300
1 N/S EAST	1	Ex	LED	1.8	1	1.8	4	-	-	1	0.007	60	22
118 C	C	R	F32T8	32	2	71	16	32	9' 0"	0.75	1.136	60	2,658
118A	C	R	F34T12	34	2	72	24	35	9' 0"	0.75	1.728	60	4,044
118B	12	R	F32T8	32	2	71	3	35	9' 0"	1	0.213	20	222
136+118D	Elec	S	F32T8	32	1	37	4	45	9' 0"	0.75	0.148	60	346
162A	11	R	F32T8	32	2	71	13	43	9' 0"	0.75	0.923	60	2,160
162B	4	R	F32T8	32	2	71	8	45	9' 0"	0.75	0.568	60	1,329
2 E-W N	1	SW	F	13	2	32	12	5.9	9' 0"	1	0.384	60	1,198
2 E-W S	1	SW	F	13	2	32	12	5.9	9' 0"	1	0.384	60	1,198
2 E-W S	Ex	Ex	LED	1.8	1	1.8	1	-	-	1	0.002	168	16
2 E-W SE	1	SW	F	13	2	32	8	5.9	9' 0"	1	0.256	60	799
2 E-W SE	Ex	Ex	LED	1.8	1	1.8	1	-	-	1	0.002	168	16
2 E-W SW	1	SW	F	13	2	32	10	5.9	9' 0"	1	0.320	60	998
2 E-W SW	Ex	Ex	LED	1.8	1	1.8	1	-	-	1	0.002	168	16
2 ENT	1	SW	F	13	2	32	9	11.4	9' 0"	1	0.288	60	899
2 N-S E	1	SW	F	13	2	32	10	5.8	9' 0"	1	0.320	60	998
2 N-S E	1	R	F32T8	32	2	71	1	200	9' 0"	1	0.071	60	222
2 N-S E	Ex	Ex	LED	1.8	1	1.8	3	-	-	1	0.005	168	47
2 N-S W	1	SW	F	13	2	32	10	5.9	9' 0"	1	0.320	60	998
203-5	4	S	F32T8	32	2	71	27	58	9' 0"	0.75	1.917	60	4,486
242 + 276	C	R	F32T8	32	2	71	16	42	9' 0"	0.75	1.136	60	2,658
244 + 246	C	R	F32T8	32	2	71	16	50	9' 0"	0.75	1.136	60	2,658

Table G-12. Building 80505 TTA Instruction Building - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
277 + 281	4	S	F32T8	32	2	71	18	66	9' 0"	0.75	1.278	60	2,991
Stair	1	S	F32T8	32	1	37	2	-	-	1	0.074	60	231
											8.463		21,757

Lighting Legend

Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exit Signs
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 21,757

TOTAL LIGHTING DEMAND (kW) - 8.5

BUILDING AREA (SQ.FT) - 7,200

LIGHTING POWER DENSITY(W/SQ.FT) - 1.2

Table G-13. Building 90312 Warehouse - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
Office	4	R	F40T12	40	4	172	8	50	7' 3"	0.8	1.376	40	2,290
Office	4	S	F40T12	40	4	172	6	41	8' 0"	0.8	1.032	40	1,717
Warehouse	12	P	LPS	180	1	220	39	15	16' 6"	1	8.580	40	17,846
Office	4	P	F40T12	40	4	172	8	36.4	12' 0"	0.8	1.376	40	2,290
Warehouse	12	P	F96T12	96	2	158	18	36.4	9' 0"	1	2.844	40	5,916
Toilet	8	S	F40T12	40	2	86	3	36	8' 0"	1	0.258	40	537
Toilet	8	S	F40T12	40	2	86	3	36.2	8' 0"	1	0.258	40	537
Office	4	S	F40T12	40	4	172	8	24.3	8' 0"	0.8	1.376	40	2,290
Office	4	S	F40T12	40	4	172	10	24.6	8' 0"	0.8	1.720	40	2,862
Warehouse	12	P	LPS	180	1	220	27	10.6	16' 0"	1	5.940	40	12,355
											24.760		48,639

Lighting Legend

Task Code	
1	Corridors
2	Kitchens
3	Dining
4	Offices-General
5	Conference
6	Offices-Drafting
7	Laundry
8	Toilets
9	Sleeping Quarters
10	Supply Rooms
11	Repair Shops
12	Storage Room
13	Retail Store
14	Break Room
15	Work Out Room
16	Raquetball
17	Living Room
C	Classroom

Fixture Type

R - Recessed
S - Surface
P - Pendant
Ex - Exit Signs
SW - Surface Wall Mounted
D - Downlight

Lamp Type

I - Incandescent
F - Fluorescent
LPS - Low Pressure Sodium
HPS - High Pressure Sodium
MV - Mercury Vapor

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 48,639

TOTAL LIGHTING DEMAND (kW) - 24.8

BUILDING AREA (SQ.FT) - 36,920

LIGHTING POWER DENSITY(W/SQ.FT) - 0.7

Table G-14. Buildings 90506, 90507 and 90508 DRMO: Warehouses and Offices - Present Lighting Energy Use

Bldg No	Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
90506		**NO LIGHTING**	**SKY LIGHTS ONLY**											
90507	Office	4	R	F40T12	40	2	86	9	41	8' 0"	0.8	0.774	40	1,288
90507	Toilet	8	S	F40T12	40	2	86	2	57	8' 0"	1	0.172	40	358
90507	Toilet	8	S	F40T12	40	2	86	2	55	8' 0"	1	0.172	40	358
90507	Office	4	R	F40T12	40	2	86	4	85	8' 0"	0.8	0.344	40	572
90507	Office	4	S	F40T12	40	4	172	1	160	8' 0"	0.8	0.172	40	286
90507	Warehouse	12	P	LPS	180	1	220	15	11.4	12' 0"	1	3.300	40	6,864
90507	Office	4	R	F40T12	40	4	172	5	170	7' 6"	0.8	0.860	40	1,431
												5.794		11,157

Lighting Legend

Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exterior
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 11,157

TOTAL LIGHTING DEMAND (kW) - 5.8

BUILDING AREA (SQ.FT) - 4,800

LIGHTING POWER DENSITY(W/SQ.FT) - 1.2

Table G-14. Buildings 90506, 90507 and 90508 DRMO: Warehouses and Offices - Present Lighting Energy Use

Bldg No	Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
90508	508	12	S	F40T12	40	2	86	10	10.9	16' 0"	1	0.86	40	1,789
												0.86		1,789

Lighting Legend

Task Code	Fixture Type
1 Corridors	R - Recessed
2 Kitchens	S - Surface
3 Dining	P - Pendant
4 Offices-General	Ex - Exit Signs
5 Conference	SW - Surface Wall Mounted
6 Offices-Drafting	D - Downlight
7 Laundry	
8 Toilets	Lamp Type
9 Sleeping Quarters	I - Incandescent
10 Supply Rooms	F - Fluorescent
11 Repair Shops	LPS - Low Pressure Sodium
12 Storage Room	HPS - High Pressure Sodium
13 Retail Store	MV - Mercury Vapor
14 Break Room	
15 Work Out Room	
16 Raquetball	
17 Living Room	
C Classroom	

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 1,789

TOTAL LIGHTING DEMAND (kW) - 0.86

BUILDING AREA (SQ.FT) - 8,640

LIGHTING POWER DENSITY(W/SQ.FT) - 0.1

Table G-15. Building 91114 Hangar - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
1st E Battery Shop	11	P	F40T12	40	2	86	9	50	9' 3"	1	0.774	80	3,220
1st E Battery Shop	11	S	F40T12	40	4	172	1	-	-	1	0.172	80	716
1st E Battery Shop	Ex	Ex	I	10	2	20	1	-	-	1	0.020	168	175
1st E Office	4	P	F40T12	40	2	86	9	50	9' 3"	0.8	0.774	80	2,576
1st E Shop	11	P	F40T12HO	60	2	145	24	39	13' 0"	1	3.480	80	14,477
1st E Stairs	1	S	F40T12	40	2	86	2	50	13' 0"	1	0.172	80	716
1st E Stairs	Ex	Ex	I	10	2	20	1	50	13' 0"	1	0.020	168	175
1st E Tools	12		F40T12HO	60	2	145	16	45	13' 0"	0.5	2.320	80	4,826
1st Hangar	11	SW	HPS	400	1	457	20	133, door open		1	9.140	80	38,022
1st Hangar	11	P	LPS	180	1	220	36	133, door open	36' 0"	1	7.920	80	32,947
1st Hangar	Ex	Ex	I	10	2	20	2	133, door open	36' 0"	1	0.040	168	349
1st W Inst. Shop	11	P	F40T12	40	2	86	9	50	9' 3"	1	0.774	80	3,220
1st W Mech. Shop	11	P	F40T12	40	2	86	18	54	9' 3"	1	1.548	80	6,440
1st W QC Library	12	P	F40T12	40	2	86	3	50	9' 3"	0.5	0.258	80	537
1st W QC Office	4	P	F40T12	40	2	86	9	42	9' 3"	0.8	0.774	80	2,576
1st W Seat Shop	11	P	F40T12	40	2	86	9	50	9' 3"	1	0.774	80	3,220
1st W Stairs	1	S	F40T12	40	2	86	2	14	9' 3"	1	0.172	80	716
1st W Stairs	Ex	Ex	I	10	2	20	1	-	-	1	0.020	168	175
1st W Stairs	1	P	F40T12	40	2	86	2	45	11' 6"	1	0.172	80	716
1st W Toilet	8	P	F40T12	40	2	86	1	N/A	10' 6"	1	0.086	80	358
1st W Toilet	8	P	F40T12	40	2	86	2	50	10' 6"	1	0.172	80	716
1st W Toilet	1	P	F40T12	40	2	86	1	N/A	10' 6"	1	0.086	80	358
1st W Weld. Shop	11	P	F40T12	40	2	86	11	38	9' 3"	1	0.946	80	3,935
2nd E Acet	4	P	F40T12	40	2	86	6	63	10' 0"	0.8	0.516	80	1,717
2nd E Admin	4	P	F40T12	40	2	86	6	44	10' 0"	0.8	0.516	80	1,717
2nd E Chief	4	P	F40T12	40	2	86	9	55	10' 0"	0.8	0.774	80	2,576
2nd E GM	4	P	F40T12	40	2	86	6	36	10' 0"	0.8	0.516	80	1,717
2nd E Key Punch	4	P	F40T12	40	2	86	6	44	10' 0"	0.8	0.516	80	1,717
2nd E Office	6	P	F40T12	40	2	86	6	43	10' 0"	0.8	0.516	80	1,717
2nd E Office	6	P	F40T12	40	2	86	3	46	10' 0"	0.8	0.258	80	859
2nd E OP Mgr	4	P	F40T12	40	2	86	6	62	12' 0"	0.8	0.516	80	1,717
2nd E PLT	4	P	F40T12	40	2	86	6	63	10' 0"	0.8	0.516	80	1,717
2nd E QC	4	P	F40T12	40	2	86	6	36	10' 0"	0.8	0.516	80	1,717
2nd E Supply Admin	4	S	F40T12	40	2	86	6	42	10' 0"	0.8	0.516	80	1,717
2nd E Supply Spec	10	P	F40T12	40	2	86	2	15	10' 0"	0.75	0.172	80	537
2nd E Toilet	8	P	F40T12	40	2	86	2	70	9' 0"	1	0.172	80	716
2nd E Toilet	8	P	F40T12	40	2	86	2	71	9' 0"	1	0.172	80	716
2nd W Corridor	1	S	F40T12	40	2	86	5	15	9' 6"	1	0.430	80	1,789
2nd W Elec. Repair	11	P	F40T12	40	2	86	7	70	8' 0"	1	0.602	80	2,504
2nd W Elec. Repair	11	S	F40T12	40	2	86	2	70	9' 6"	1	0.172	80	716
2nd W Elec. Repair	4	S	F40T12	40	2	86	10	55	9' 6"	0.8	0.860	80	2,862
2nd W Elec. Repair	11	S	F40T12HO	60	2	145	2	75	8' 0"	1	0.290	80	1,206

Table G-15. Building 91114 Hangar - Present Lighting Energy Use

Room No	Task Code	Type Code	Lamp Type	Watts/ Lamp	Lamp/ Fixture	Watts/ Fixture	No of Fixtures	Measured Light (FC)	Ceiling Height (ft)	Demand Factor	Demand (KW)	Fixture (Hr/Wk)	kWH/Yr
2nd W Elec. Repair	11	P	F40T12HO	60	2	145	6	75	9' 6"	1	0.870	80	3,619
2nd W Elec. Repair	12	P	F40T12	40	2	86	10	55	8' 3"	0.5	0.860	80	1,789
2nd W Storage	12	P	F40T12	40	2	86	19	35	11' 0"	0.5	1.634	80	3,399
											42.524		159,903

Lighting Legend

Task Code	
1	Corridors
2	Kitchens
3	Dining
4	Offices-General
5	Conference
6	Offices-Drafting
7	Laundry
8	Toilets
9	Sleeping Quarters
10	Supply Rooms
11	Repair Shops
12	Storage Room
13	Retail Store
14	Break Room
15	Work Out Room
16	Raquetball
17	Living Room
C	Classroom

Fixture Type
R - Recessed
S - Surface
P - Pendant
Ex - Exterior
SW - Surface Wall Mounted
D - Downlight

Lamp Type
I - Incandescent
F - Fluorescent
LPS - Low Pressure Sodium
HPS - High Pressure Sodium
MV - Mercury Vapor

TOTAL LIGHTING CONSUMPTION (kWH/Yr) - 159,903

TOTAL LIGHTING DEMAND (kW) - 42.5

BUILDING AREA (SQ.FT) - 35,973

LIGHTING POWER DENSITY(W/SQ.FT) - 1.2

Table G-16. Lighting Energy Use Factors

Task Code	Description	Demand Factors per Building															
		15544	20200	22422	43002	53301	56301	57428	61701	62704	70525	80305	80505	90312	90507	90508	91114
1	Corridors	1.0	0.25	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-	-	1.0
2	Kitchens	-	0.25	-	1.0	-	-	-	-	-	0.75	0.75	-	-	-	-	-
3	Dining	-	0.25	-	0.5	-	-	-	-	-	0.5	0.75	-	-	-	-	-
4	Offices-General	1.0	-	0.80	0.80	1.0	1.0	1.0	1.0	-	0.5	0.80	0.75	0.80	0.80	-	0.80
5	Conference	-	-	-	-	-	1.0	1.0	-	-	-	0.80	-	-	-	-	-
6	Offices-Drafting	1.0	-	-	-	-	-	1.0	-	-	0.5	0.80	-	-	-	-	0.80
7	Laundry	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-
8	Toilets / Bathroom	-	-	0.75	1.0	1.0	1.0	1.0	1.0	0.8	0.75	1.0	0.80	1.0	1.0	-	1.0
8.1	Bathroom - Quarters	-	1.0	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-
9	Sleeping Quarters	-	0.5	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-
10	Supply Rooms	-	-	-	-	0.5	-	0.5	1.0	-	0.5	1.0	-	-	-	-	0.75
11	Repair Shops	-	-	-	-	-	-	-	-	-	-	1.0	0.75	-	-	-	1.0
12	Storage Room	-	1.0	1.0	0.3	0.5	-	0.5	1.0	-	0.5	1.0	1.0	1.0	1.0	1.0	0.5
13	Retail Store	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-
14	Break Room/Gym	-	-	-	0.80	1.0	-	-	1.0	-	-	1.0	1.0	-	-	-	-
15	Work Out Room	-	-	-	0.80	-	-	-	1.0	-	-	1.0	-	-	-	-	-
16	Raquetball	-	-	-	-	-	-	-	0.75	-	-	-	-	-	-	-	-
17	Living Room	-	0.5	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-
C	Classroom	0.75	-	-	-	-	-	-	-	0.75	-	-	0.75	-	-	-	-
Elec Rm	Electric Room	-	-	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-
Ex	Exit Light	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Janitor	Janitor's Closet	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-
Mech Rm	Mechanical Room	-	1.0	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-
Phone Rm	Phone Room	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-

Table G-16. Lighting Energy Use Factors

Task Code	Description	Scheduled Hours/Week per Building															
		15544	20200	22422	43002	53301	56301	57428	61701	62704	70525	80305	80505	90312	90507	90508	91114
1	Corridors	168	84	168	120	168	168	168	100	60	120	168	60	40	-	-	80
2	Kitchens	-	84	-	60	-	-	-	-	-	120	60	-	-	-	-	-
3	Dining	-	84	-	60	-	-	-	-	-	120	45	-	-	-	-	-
4	Offices-General	55	-	60	60	80	72	80	40	-	120	60	60	40	40	-	80
5	Conference	-	-	-	-	-	72	80	-	-	-	40	-	-	-	-	-
6	Offices-Drafting	55	-	-	-	-	-	80	-	-	120	60	-	-	-	-	80
7	Laundry	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-
8	Toilets / Bathroom	-	-	40	60	80	72	80	40	60	120	168	60	40	40	-	80
8.1	Bathroom - Quarters	-	60	-	-	-	-	-	-	-	-	84	-	-	-	-	-
9	Sleeping Quarters	-	84	-	-	-	-	-	-	-	-	84	-	-	-	-	-
10	Supply Rooms	-	-	-	-	80	-	80	10	-	120	10	-	-	-	-	80
11	Repair Shops	-	-	-	-	-	-	-	-	-	-	60	60	-	-	-	80
12	Storage Room	-	10	10	20	80	-	80	40	-	120	10	20	40	40	40	80
13	Retail Store	-	-	-	-	-	-	-	-	-	-	80	-	-	-	-	-
14	Break Room/Gym	-	-	-	60	80	-	-	40	-	-	100	60	-	-	-	-
15	Work Out Room	-	-	-	60	-	-	-	40	-	-	100	-	-	-	-	-
16	Raquetball	-	-	-	-	-	-	-	40	-	-	-	-	-	-	-	-
17	Living Room	-	84	-	-	-	-	-	-	-	-	84	-	-	-	-	-
C	Classroom	55	-	-	-	-	-	-	-	60	-	-	60	-	-	-	-
Elec Rm	Electric Room	-	-	-	-	-	-	-	-	-	-	10	10	-	-	-	-
Ex	Exit Light	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168
Janitor	Janitor's Closet	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-
Mech Rm	Mechanical Room	-	5	-	-	-	-	-	-	-	-	20	10	-	-	-	-
Phone Rm	Phone Room	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-

Table G-17. Existing Lighting Fixture Electric Demands

Fixture Type Description	Watts per Fixture
Exit I-10W - 2 Lamps per Fixture	20.0
Exit LED	1.8
F13 Mini-Tube Downlight - 2 Lamps per Fixture	32.0
F13 Mini-Tube Wall-Mounted - 2 Lamps per Fixture	32.0
F20T12 - 1 Lamp per Fixture	12.0
F30T12 - 2 Lamps per Fixture	74.0
F32T8 - 1 Lamp per Fixture (Non-electronic Ballast)	37.0
F32T8 - 2 Lamps per Fixture (Non-electronic Ballast)	71.0
F34T12 - 1 Lamps per Fixture	43.0
F34T12 - 2 Lamps per Fixture	72.0
F34T12 - 3 Lamps per Fixture	100.0
F34T12 - 4 Lamps per Fixture	144.0
F40T12 - 1 Lamp per Fixture	50.0
F40T12 - 2 Lamps per Fixture	86.0
F40T12 - 3 Lamps per Fixture	100.0
F40T12 - 4 Lamps per Fixture	172.0
F40T12 - Wall Surface-Mount Fixture 1 Lamp	50.0
F40T12HO - 2 Lamps per Fixture	145.0
F40T12U - 2 Lamps per Fixture	72.0
F40T12U - 3 Lamps per Fixture	100.0
F96T12 - 2 Lamps per Fixture	158.0
F96T12 - 4 Lamps per Fixture	316.0
FC12T9 - 32W Circline	43.0
HPS 400W - 1 Lamp per Fixture	457.0
I-100W - Ceiling-Mount Fixture 1 Lamp per Fixture	100.00
I-100W - Pendant, decorative	100.00
I-12x5W - Pendant, decorative	60.00
I-40W - Wall Surface-Mount Fixture - 1 Lamp per Fixture	40.00
I-4x100W - Pendant, decorative	400.00
I-4x40W - Pendant, decorative	160.00
I-5x40W - Pendant, decorative	200.00
I-5x5W - Pendant, decorative	25.00
I-60W - Ceiling-Mount Fixture 1 Lamp per Fixture	60.00
I-60W - Desk Lamp	60.00
I-60W Par Downlight Fixture	60.00
I-60W - Wall Surface-Mount Fixture	60.00
I-75W - Desk Lamp	75.00
I-75W Par Downlight Fixture	75.00
LPS 180W - 1 Lamp per Fixture	220.00
LPS 55W - 1 Lamp per Fixture	80.00
LPS 90W - 1 Lamp per Fixture	125.00
MV 250W - Pendant-Mount	285.00
MV 400W - Pendant-Mount	454.00

APPENDIX H

Lighting Retrofit Calculations

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Lighting Retrofit Calculations

Two types of energy saving retrofits are evaluated for study buildings:

- Lighting fixture modifications
- Lighting controls modifications

Specific measures evaluated for both types of retrofits include:

Lighting Fixture and Control Retrofits Evaluated

Proj.	Description	Type
A	Exit Fixture LED Retrofit	Fixture
B1	Install Electronic Ballasts - 2 Lamp F30T12 Fixtures, **or**	Fixture
B2	Install Electronic Ballasts and T8 Lamps - 2 Lamp F30T12 Fixtures	Fixture
C1	Install Electronic Ballasts - 1 Lamp F32T8 Fixtures	Fixture
C2	Install Electronic Ballasts - 2 Lamp F32T8 Fixtures	Fixture
D1	Install Electronic Ballasts and T8 Lamps - 1 Lamp F34T12 & F40T12 Fixtures	Fixture
D2	Install Electronic Ballasts and T8 Lamps - 2 Lamp F34T12 & F40T12 Fixtures	Fixture
D3	Install Electronic Ballasts and T8 Lamps - 3 Lamp F34T12 & F40T12 Fixtures	Fixture
D4	Install Electronic Ballasts and T8 Lamps - 4 Lamp F34T12 & F40T12 Fixtures	Fixture
D5	Install Reflector and Delamp 4 Lamp Fixtures to 3 Lamps with Electronic Ballasts and T8 Lamps	Fixture
E1	Install Electronic Ballasts - 2 Lamp F48T12HO Fixtures	Fixture
E2	Install Electronic Ballasts and T8 Lamps - 2 Lamp F40T12U Fixtures	Fixture
E3	Install Electronic Ballasts and T8 Lamps - 3 Lamp F40T12U Fixtures	Fixture
F1	Install Electronic Ballasts and T8 Lamps - 2 Lamp F96T12 Fixtures	Fixture
F2	Install Electronic Ballasts and T8 Lamps - 4 Lamp F96T12 Fixtures	Fixture
G1	Install DTT 13W Compact Fluorescent Lamps for Downlight Incandescents	Fixture
G2	Install TRI 20W Compact Fluorescent Lamps to Replace Incandescents	Fixture
G3	Install TT 7W Compact Fluorescent Lamps to Replace Incandescents	Fixture
G4	Install DTT 13W Compact Fluorescent Lamps for Ceiling Incandescents	Fixture
G5	Install TRI 23W Compact Fluorescent Lamps to Replace Incandescents	Fixture
H1	Install 17W Compact Fluorescent Lamps for Incandescent Table Lamps	Fixture
J1	Install 150W HPS Lamps and Ballasts to Replace 250W MV Lamps	Fixture
J2	Install 200W HPS Lamps and Ballasts to Replace 400W MV Lamps	Fixture
K1	Install Ceiling Mounted PIR Occupancy Sensors to Control Lights	Control
K2	Install Ceiling Mounted Ultrasonic Occupancy Sensors to Control Lights	Control
K3	Install Wall Switch Type PIR Occupancy Sensors to Control Lights	Control

Results of economic evaluations are summarized on Table H-1. Calculations for each project appear on Tables H-2 through H-27. Detailed cost estimates, Life Cycle Cost Analysis summary sheets and catalog data for selected components are appended.

Fixture Retrofit Evaluations

Lighting fixture modifications are considered. Most existing fluorescent fixtures use 40-watt T12 fluorescent lamps and standard ballasts. (Some energy saving 34-watt lamps and energy saving ballasts are installed, as are some F32T8 lamps, but they do not predominate.) Room-by-room calculations of fixture modifications evaluated for study buildings appear as Tables H-2 through H-27.

Retrofit A proposes to replace existing incandescent lamps in exit signs with light emitting diode (LED) lamp kits.

Retrofits B, C, D, E and F are one-for-one lamp and/or ballast replacements in existing fixtures. Retrofitting existing one-lamp fluorescent fixtures with electronic ballasts and 32-watt T8 lamps will reduce fixture input power by about 19 watts if standard core and coil ballasts are installed.

Project D5 involves installing a reflector and delamping existing 4-lamp fluorescent fixtures to three F32T8 lamps with electronic ballast.

Retrofits G and H are evaluated for replacing existing incandescent lamps in various fixtures with compact fluorescent lamps and ballasts. Although the retrofits are evaluated assuming the use of fluorescent retrofit lamps with standard screw-in bases, products are available for installation into standard screw-in bases which, when screwed-in, deform the existing base such that, thereafter, they are useable only for compatible compact fluorescent lamps. Costs are roughly equivalent.

Retrofits J involve the replacement of existing mercury vapor lamps with high pressure sodium lamps and ballasts.

Pricing shown on the attached unit cost estimates are taken, in large part, from the February 1994 issue of "Defense General Supply Center - Energy Efficient Lighting Catalog". Components are available at prices listed in this document to DoD agencies; it is assumed that contractor pricing would be similar.

Energy use for the existing fixtures is calculated in Appendix G. Energy savings and economic analysis calculations for proposed fixture retrofits use the following procedures:

Lighting Retrofit Evaluation Calculations

Label	Contents / Calculation Explanation
RET_TYP	Retrofit type (See schedule above)
KW_SVD	(E_KW) — (S_KW) = Demand savings (kW) from lighting retrofit Difference in "Watts per Fixture" values in Tables H-28 and H-29 (See note below)
KWH_SV	KW_SVD * HR/WK * 52 * Demand Factor = = Electric savings from retrofit Usage Schedule (HR/WK) and Demand Schedule are provided in Appendix G.
DEM_$/Y	KW_SVD * $127.84 per kW-Year = = Annual electric demand cost savings (TEP power demand charge including Taxes)
USE_$/Y	KWH_SVD * $0.04835 = Annual electric power cost savings (TEP power use charge including Taxes)
PWR_LCC$	[DEM_$/Y + USE_$/Y] * 12.02 = Life cycle savings, Life of 15 years; Uniform Present Value (UPV) factor
O&M_$/Y	[Table H-28 $/1000 LAMP-Hr - Table H-29 $/1000 LAMP-Hr] * HR/WK * 52 * * No. FXTRS * NO. LAMPS / 1000 = Annual O&M savings (additional cost) for lamp replacements; refer to Tables H-28 and H-29
O&M_LCC$	(O&M_$/Y * 11.94) = Life cycle O&M cost for Life of 15 years; Uniform Present Value (UPV)
TOT_$/Y	(DEM_$/Y + USE_$/Y + O&M_$/Y) = Total annual cost savings
TOT_LCC$	(O&M_LCC$ + PWR_LCC$) = Total life cycle cost savings
CONST$	Retrofit Unit Cost * NO. FIXTURES = Construction cost from retrofit unit cost estimates, attached
SIOH	CONST$ * 0.120 = SIOH and design at 6% each of construction cost
REBATE	REBATE = Tucson Electric Power rebates for lighting lamp and/or fluorescent electronic ballast and HPS fixture retrofits (See schedule in Appendix B)
INVE$T	CONST$ + SI0H — REBATE = Total investment per ECIP guidance
SIR	(TOT_LCC$) / (INVE$T) = Savings-to-investment ratio
PAYBCK	(INVE$T) / (TOT_$/Y) = Payback period (years)

Note: Parameters shown above for existing and retrofit (savings) cases are indicated by prefixes: "E_" and "S_", respectively, corresponding to labels used above to explain lighting energy use calculations. Refer to Tables H-28 and H-29 for existing and proposed retrofit energy use and O&M costs.

Controls Retrofits

Lighting control retrofits evaluated involve installing occupancy sensor switching in offices, conference rooms, bathrooms and other areas where lights are normally turned on for periods when no one is present. Two types of occupancy sensors are considered. A wall switch type passive infrared (PIR) sensor is evaluated as Retrofit K3. This is the least expensive control retrofit investigated and simply replaces a small office's toggle switch. For larger offices and open areas, ceiling mounted sensors are evaluated. Ceiling mounted switches are more expensive since a relay and additional wiring are required.

Retrofit K1 proposes ceiling-mounted PIR sensors for rooms with more than 6 fixtures, it is assumed that up to 12 fixtures may be controlled by each sensor installation. Retrofit K2 evaluates ceiling-mounted ultrasonic occupancy sensors for bathrooms and toilets where PIR sensors cannot "see" over partitions.

Detailed evaluations appear as Tables H-25 through H-27.

Energy savings of at least 25% have been achieved in many similar retrofits according to Arizona Public Service Company. This savings level is assumed for these evaluations. This figure may be low for many offices observed during field investigations conducted for the study. In several buildings, many offices and other rooms were observed to be unoccupied at least 50% of the time (with lights left on). Manufacturers of occupancy sensor switches report savings of between 35% and 75% depending on the application.

Energy and cost savings are determined using the same formulae as are shown above for lighting energy use calculations. The operating hours per week are simply factored down.

Table H-1. Summary of Lighting and Controls Retrofit Evaluations

Lighting ECO Number	Description	Number Retrofit Units	Demand Saved (kW)	Energy Saved (kWH/Year)	Total LCC Cost Saved ($)	ECO Investment ($)	SIR	Payback (Years)
A	Exit Fixture LED Retrofit	108	1.97	17,171	$11,025	$5,438	2.03	5.94
B1	Install Electronic Ballasts - 2 Lamp F30T12 Fixtures, or	124	1.61	3,521	$4,523	$4,437	1.02	11.79
B2	Install Electronic Ballasts and T8 Lamps - 2 Lamp F30T12 Fixtures	124	3.72	8,124	$11,682	$5,502	2.12	5.66
C1	Install Electronic Ballasts - 1 Lamp F32T8 Fixtures	111	0.67	1,674	$1,996	$4,346	0.46	26.17
C2	Install Electronic Ballasts - 2 Lamp F32T8 Fixtures	553	6.08	13,718	$17,320	$22,059	0.79	15.31
D1	Install Electronic Ballasts and T8 Lamps - 1 Lamp F34T12 & F40T12 Fixtures	120	1.72	9,066	$6,286	$5,217	1.20	9.99
D2	Install Electronic Ballasts and T8 Lamps - 2 Lamp F34T12 & F40T12 Fixtures	1,401	30.03	107,700	$108,164	$67,229	1.61	7.47
D3	Install Electronic Ballasts and T8 Lamps - 3 Lamp F34T12 & F40T12 Fixtures	575	4.03	14,974	$14,570	$40,998	0.36	33.83
D4	Install Electronic Ballasts and T8 Lamps - 4 Lamp F34T12 & F40T12 Fixtures, or	671	29.88	85,882	$95,385	$68,095	1.40	8.58
D5	Install Reflector and Delamp 4 Lamp Fixtures to 3 Lamps with Electronic Ballasts and T8	671	49.34	144,543	$165,753	$43,531	3.81	3.16
E1	Install Electronic Ballasts - 2 Lamp F48T12HO Fixtures	48	1.58	5,491	$5,625	$2,107	2.67	4.50
E2	Install Electronic Ballasts and T8 Lamps - 2 Lamp F40T12U Fixtures	1	0.01	41	$49	$70	0.70	17.06
E3	Install Electronic Ballasts and T8 Lamps - 3 Lamp F40T12U Fixtures	1	0.01	45	$56	$105	0.54	22.30
F1	Install Electronic Ballasts and T8 Lamps - 2 Lamp F96T12 Fixtures	20	0.80	1,872	$1,932	$1,822	1.06	11.35

Table H-1. Summary of Lighting and Controls Retrofit Evaluations

Lighting ECO Number	Description	Number Retrofit Units	Demand Saved (kW)	Energy Saved (kWH/Year)	Total LCC Cost Saved ($)	ECO Investment ($)	SIR	Payback (Years)
F2	Install Electronic Ballasts and T8 Lamps - 4 Lamp F96T12 Fixtures	1	0.08	166	$187	$182	1.03	11.73
G1	Install DTT 13W Compact Flourescent Lamps for Downlight Incandescents	2	0.09	139	$306	$37	8.36	1.44
G2	Install TRI 20W Compact Flourescent Lamps to Replace Incandescents	24	2.37	4,547	$9,598	$62	153.60	0.08
G3	Install TT 7W Compact Flourescent Lamps to Replace Incandescents	71	2.36	4,488	$9,175	$1,166	7.87	1.52
G4	Install DTT 13W Compact Flourescent Lamps for Ceiling Incandescents	45	2.06	3,786	$7,117	$876	8.12	1.48
G5	Install TRI 23W Compact Flourescent Lamps to Replace Incandescents	28	2.31	4,965	$5,386	$894	6.02	2.00
H1	Install 17W Compact Fluorescent Lamps for Incandescent Table Lamps	249	10.71	23,384	$41,911	$4,876	8.60	1.40
J1	Install 150W HPS Lamps and Ballasts to Replace 250W MV Lamps	33	3.20	5,448	$8,724	$6,568	1.33	9.05
J2	Install 200W HPS Lamps and Ballasts to Replace 400W MV Lamps	54	11.29	23,475	$32,880	$8,387	3.92	3.06
K1	Install Ceiling Mounted PIR Occupancy Sensors to Control Lights	239	0.00	162,912	$114,686	$79,611	1.44	8.33
K2	Install Ceiling Mounted Ultrasonic Occupancy Sensors to Control Lights	124	0.00	15,450	$11,200	$41,682	0.27	44.68
K3	Install Wall Switch Type PIR Occupancy Sensors to Control Lights	162	0.00	35,138	$25,393	$17,829	1.42	8.43
Total Successful Lighting Fixture and Controls Retrofits		**3,400**	**123.62**	**562,417**	**$565,829**	**$251,336**	**2.25**	**5.34**

Note: Several of the above retrofits are evaluated for the same fixtures and are, thus, mutually exclusive. The option with the higher SIR is recommended.

Table H-2. Lighting Retrofit A: Exit Light LED Retrofit

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
15544	111	3	0.055	477	$27	$151	$25	$306
43002	1 A	3	0.055	477	$27	$151	$25	$306
43002	1st Floor	2	0.036	318	$18	$101	$17	$204
43002	2 C	2	0.036	318	$18	$101	$17	$204
43002	Basement	1	0.018	159	$9	$50	$8	$102
53301	103	2	0.036	318	$18	$101	$17	$204
53301	202	4	0.073	636	$36	$201	$34	$408
53301	217	2	0.036	318	$18	$101	$17	$204
53301	ENTRY	3	0.055	477	$27	$151	$25	$306
53301	STAIR	2	0.036	318	$18	$101	$17	$204
53301	STAIR	2	0.036	318	$18	$101	$17	$204
56301	Exit Signs	10	0.182	1,590	$90	$503	$85	$1,021
57428	-	15	0.273	2,385	$135	$755	$127	$1,531
61701	Corridor	1	0.018	159	$9	$50	$8	$102
61701	Corridor	5	0.091	795	$45	$252	$42	$510
61701	Main Corridor	1	0.018	159	$9	$50	$8	$102
61701	Pool	1	0.018	159	$9	$50	$8	$102
61701	Pool Lobby	1	0.018	159	$9	$50	$8	$102
62704	-	17	0.309	2,703	$153	$856	$144	$1,735
70525	Dining	1	0.018	159	$9	$50	$8	$102
70525	Dining	3	0.055	477	$27	$151	$25	$306
70525	Kitchen	1	0.018	159	$9	$50	$8	$102
70525	Kitchen	2	0.036	318	$18	$101	$17	$204
80305	101	1	0.018	159	$9	$50	$8	$102
80305	102	1	0.018	159	$9	$50	$8	$102
80305	105	1	0.018	159	$9	$50	$8	$102
80305	107	1	0.018	159	$9	$50	$8	$102
80305	108	2	0.036	318	$18	$101	$17	$204
80305	116	2	0.036	318	$18	$101	$17	$204
80305	177	2	0.036	318	$18	$101	$17	$204
80305	212	2	0.036	318	$18	$101	$17	$204
80305	213	2	0.036	318	$18	$101	$17	$204
80305	312	2	0.036	318	$18	$101	$17	$204
80305	313	2	0.036	318	$18	$101	$17	$204
80305	OR	1	0.018	159	$9	$50	$8	$102
91114	1st E Battery Shop	1	0.018	159	$9	$50	$8	$102
91114	1st E Stairs	1	0.018	159	$9	$50	$8	$102
91114	1st Hangar	2	0.036	318	$18	$101	$17	$204
91114	1st W Stairs	1	0.018	159	$9	$50	$8	$102
Totals for Retrofit Type A:		**108**	**1.966**	**17,171**	**$972**	**$5,438**	**$916**	**$11,025**
					SIR	**2.03**	**Payback**	**5.94**

Table H-3. Lighting Retrofit B1, F30T12, 2 Lamp Fixtures: Replace Existing Ballasts with Electronic Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	117	1	0.013	28	$4	$36	$3	$36
80305	119	1	0.013	28	$4	$36	$3	$36
80305	120	1	0.013	28	$4	$36	$3	$36
80305	122	1	0.013	28	$4	$36	$3	$36
80305	123	1	0.013	28	$4	$36	$3	$36
80305	125	1	0.013	28	$4	$36	$3	$36
80305	126	1	0.013	28	$4	$36	$3	$36
80305	128	1	0.013	28	$4	$36	$3	$36
80305	130	1	0.013	28	$4	$36	$3	$36
80305	131	1	0.013	28	$4	$36	$3	$36
80305	132	1	0.013	28	$4	$36	$3	$36
80305	134	1	0.013	28	$4	$36	$3	$36
80305	135	1	0.013	28	$4	$36	$3	$36
80305	137	1	0.013	28	$4	$36	$3	$36
80305	138	1	0.013	28	$4	$36	$3	$36
80305	140	1	0.013	28	$4	$36	$3	$36
80305	141	1	0.013	28	$4	$36	$3	$36
80305	143	1	0.013	28	$4	$36	$3	$36
80305	144	1	0.013	28	$4	$36	$3	$36
80305	146	1	0.013	28	$4	$36	$3	$36
80305	147	1	0.013	28	$4	$36	$3	$36
80305	148	1	0.013	28	$4	$36	$3	$36
80305	150	1	0.013	28	$4	$36	$3	$36
80305	151	1	0.013	28	$4	$36	$3	$36
80305	153	1	0.013	28	$4	$36	$3	$36
80305	155	1	0.013	28	$4	$36	$3	$36
80305	156	1	0.013	28	$4	$36	$3	$36
80305	158	1	0.013	28	$4	$36	$3	$36
80305	159	1	0.013	28	$4	$36	$3	$36
80305	160	1	0.013	28	$4	$36	$3	$36
80305	162	1	0.013	28	$4	$36	$3	$36
80305	164	1	0.013	28	$4	$36	$3	$36
80305	165	1	0.013	28	$4	$36	$3	$36
80305	167	1	0.013	28	$4	$36	$3	$36
80305	168	1	0.013	28	$4	$36	$3	$36
80305	170	1	0.013	28	$4	$36	$3	$36
80305	171	1	0.013	28	$4	$36	$3	$36
80305	173	1	0.013	28	$4	$36	$3	$36
80305	174	1	0.013	28	$4	$36	$3	$36
80305	176	1	0.013	28	$4	$36	$3	$36
80305	208	1	0.013	28	$4	$36	$3	$36
80305	210	1	0.013	28	$4	$36	$3	$36
80305	214	1	0.013	28	$4	$36	$3	$36
80305	216	1	0.013	28	$4	$36	$3	$36
80305	219	1	0.013	28	$4	$36	$3	$36
80305	219.1	1	0.013	28	$4	$36	$3	$36
80305	220	1	0.013	28	$4	$36	$3	$36
80305	222	1	0.013	28	$4	$36	$3	$36
80305	223	1	0.013	28	$4	$36	$3	$36
80305	225	1	0.013	28	$4	$36	$3	$36
80305	226	1	0.013	28	$4	$36	$3	$36
80305	228	1	0.013	28	$4	$36	$3	$36
80305	229	1	0.013	28	$4	$36	$3	$36
80305	231	1	0.013	28	$4	$36	$3	$36
80305	232	1	0.013	28	$4	$36	$3	$36
80305	234	1	0.013	28	$4	$36	$3	$36
80305	235	1	0.013	28	$4	$36	$3	$36
80305	237	1	0.013	28	$4	$36	$3	$36
80305	238	1	0.013	28	$4	$36	$3	$36
80305	240	1	0.013	28	$4	$36	$3	$36
80305	241	1	0.013	28	$4	$36	$3	$36
80305	243	1	0.013	28	$4	$36	$3	$36
80305	244	1	0.013	28	$4	$36	$3	$36

Table H-3. Lighting Retrofit B1, F30T12, 2 Lamp Fixtures: Replace Existing Ballasts with Electronic Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	246	1	0.013	28	$4	$36	$3	$36
80305	247	1	0.013	28	$4	$36	$3	$36
80305	249	1	0.013	28	$4	$36	$3	$36
80305	250	1	0.013	28	$4	$36	$3	$36
80305	252	1	0.013	28	$4	$36	$3	$36
80305	253	1	0.013	28	$4	$36	$3	$36
80305	255	1	0.013	28	$4	$36	$3	$36
80305	256	1	0.013	28	$4	$36	$3	$36
80305	258	1	0.013	28	$4	$36	$3	$36
80305	259	1	0.013	28	$4	$36	$3	$36
80305	261	1	0.013	28	$4	$36	$3	$36
80305	264	1	0.013	28	$4	$36	$3	$36
80305	264.1	1	0.013	28	$4	$36	$3	$36
80305	265	1	0.013	28	$4	$36	$3	$36
80305	267	1	0.013	28	$4	$36	$3	$36
80305	268	1	0.013	28	$4	$36	$3	$36
80305	270	1	0.013	28	$4	$36	$3	$36
80305	271	1	0.013	28	$4	$36	$3	$36
80305	273	1	0.013	28	$4	$36	$3	$36
80305	308	1	0.013	28	$4	$36	$3	$36
80305	310	1	0.013	28	$4	$36	$3	$36
80305	314	1	0.013	28	$4	$36	$3	$36
80305	316	1	0.013	28	$4	$36	$3	$36
80305	319	1	0.013	28	$4	$36	$3	$36
80305	319.1	1	0.013	28	$4	$36	$3	$36
80305	320	1	0.013	28	$4	$36	$3	$36
80305	322	1	0.013	28	$4	$36	$3	$36
80305	323	1	0.013	28	$4	$36	$3	$36
80305	325	1	0.013	28	$4	$36	$3	$36
80305	326	1	0.013	28	$4	$36	$3	$36
80305	328	1	0.013	28	$4	$36	$3	$36
80305	329	1	0.013	28	$4	$36	$3	$36
80305	331	1	0.013	28	$4	$36	$3	$36
80305	332	1	0.013	28	$4	$36	$3	$36
80305	334	1	0.013	28	$4	$36	$3	$36
80305	335	1	0.013	28	$4	$36	$3	$36
80305	337	1	0.013	28	$4	$36	$3	$36
80305	338	1	0.013	28	$4	$36	$3	$36
80305	340	1	0.013	28	$4	$36	$3	$36
80305	341	1	0.013	28	$4	$36	$3	$36
80305	343	1	0.013	28	$4	$36	$3	$36
80305	344	1	0.013	28	$4	$36	$3	$36
80305	346	1	0.013	28	$4	$36	$3	$36
80305	347	1	0.013	28	$4	$36	$3	$36
80305	349	1	0.013	28	$4	$36	$3	$36
80305	350	1	0.013	28	$4	$36	$3	$36
80305	352	1	0.013	28	$4	$36	$3	$36
80305	353	1	0.013	28	$4	$36	$3	$36
80305	355	1	0.013	28	$4	$36	$3	$36
80305	356	1	0.013	28	$4	$36	$3	$36
80305	358	1	0.013	28	$4	$36	$3	$36
80305	359	1	0.013	28	$4	$36	$3	$36
80305	361	1	0.013	28	$4	$36	$3	$36
80305	364	1	0.013	28	$4	$36	$3	$36
80305	364.1	1	0.013	28	$4	$36	$3	$36
80305	365	1	0.013	28	$4	$36	$3	$36
80305	367	1	0.013	28	$4	$36	$3	$36
80305	368	1	0.013	28	$4	$36	$3	$36
80305	370	1	0.013	28	$4	$36	$3	$36
80305	371	1	0.013	28	$4	$36	$3	$36
80305	373	1	0.013	28	$4	$36	$3	$36
Totals for Retrofit Typ		**124**	**1.612**	**3,521**	**$496**	**$4,437**	**$376**	**$4,523**
					SIR	**1.02**	**Payback**	**11.79**

Table H-4. Lighting Retrofit B2 F30T12, 2 Lamp Fixtures: Replace Existing Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	117	1	0.030	66	$10	$44	$8	$94
80305	119	1	0.030	66	$10	$44	$8	$94
80305	120	1	0.030	66	$10	$44	$8	$94
80305	122	1	0.030	66	$10	$44	$8	$94
80305	123	1	0.030	66	$10	$44	$8	$94
80305	125	1	0.030	66	$10	$44	$8	$94
80305	126	1	0.030	66	$10	$44	$8	$94
80305	128	1	0.030	66	$10	$44	$8	$94
80305	130	1	0.030	66	$10	$44	$8	$94
80305	131	1	0.030	66	$10	$44	$8	$94
80305	132	1	0.030	66	$10	$44	$8	$94
80305	134	1	0.030	66	$10	$44	$8	$94
80305	135	1	0.030	66	$10	$44	$8	$94
80305	137	1	0.030	66	$10	$44	$8	$94
80305	138	1	0.030	66	$10	$44	$8	$94
80305	140	1	0.030	66	$10	$44	$8	$94
80305	141	1	0.030	66	$10	$44	$8	$94
80305	143	1	0.030	66	$10	$44	$8	$94
80305	144	1	0.030	66	$10	$44	$8	$94
80305	146	1	0.030	66	$10	$44	$8	$94
80305	147	1	0.030	66	$10	$44	$8	$94
80305	148	1	0.030	66	$10	$44	$8	$94
80305	150	1	0.030	66	$10	$44	$8	$94
80305	151	1	0.030	66	$10	$44	$8	$94
80305	153	1	0.030	66	$10	$44	$8	$94
80305	155	1	0.030	66	$10	$44	$8	$94
80305	156	1	0.030	66	$10	$44	$8	$94
80305	158	1	0.030	66	$10	$44	$8	$94
80305	159	1	0.030	66	$10	$44	$8	$94
80305	160	1	0.030	66	$10	$44	$8	$94
80305	162	1	0.030	66	$10	$44	$8	$94
80305	164	1	0.030	66	$10	$44	$8	$94
80305	165	1	0.030	66	$10	$44	$8	$94
80305	167	1	0.030	66	$10	$44	$8	$94
80305	168	1	0.030	66	$10	$44	$8	$94
80305	170	1	0.030	66	$10	$44	$8	$94
80305	171	1	0.030	66	$10	$44	$8	$94
80305	173	1	0.030	66	$10	$44	$8	$94
80305	174	1	0.030	66	$10	$44	$8	$94
80305	176	1	0.030	66	$10	$44	$8	$94
80305	208	1	0.030	66	$10	$44	$8	$94
80305	210	1	0.030	66	$10	$44	$8	$94
80305	214	1	0.030	66	$10	$44	$8	$94
80305	216	1	0.030	66	$10	$44	$8	$94
80305	219	1	0.030	66	$10	$44	$8	$94
80305	219.1	1	0.030	66	$10	$44	$8	$94
80305	220	1	0.030	66	$10	$44	$8	$94
80305	222	1	0.030	66	$10	$44	$8	$94
80305	223	1	0.030	66	$10	$44	$8	$94
80305	225	1	0.030	66	$10	$44	$8	$94
80305	226	1	0.030	66	$10	$44	$8	$94
80305	228	1	0.030	66	$10	$44	$8	$94
80305	229	1	0.030	66	$10	$44	$8	$94
80305	231	1	0.030	66	$10	$44	$8	$94
80305	232	1	0.030	66	$10	$44	$8	$94
80305	234	1	0.030	66	$10	$44	$8	$94
80305	235	1	0.030	66	$10	$44	$8	$94
80305	237	1	0.030	66	$10	$44	$8	$94
80305	238	1	0.030	66	$10	$44	$8	$94
80305	240	1	0.030	66	$10	$44	$8	$94
80305	241	1	0.030	66	$10	$44	$8	$94
80305	243	1	0.030	66	$10	$44	$8	$94
80305	244	1	0.030	66	$10	$44	$8	$94

Table H-4. Lighting Retrofit B2 F30T12, 2 Lamp Fixtures: Replace Existing Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	246	1	0.030	66	$10	$44	$8	$94
80305	247	1	0.030	66	$10	$44	$8	$94
80305	249	1	0.030	66	$10	$44	$8	$94
80305	250	1	0.030	66	$10	$44	$8	$94
80305	252	1	0.030	66	$10	$44	$8	$94
80305	253	1	0.030	66	$10	$44	$8	$94
80305	255	1	0.030	66	$10	$44	$8	$94
80305	256	1	0.030	66	$10	$44	$8	$94
80305	258	1	0.030	66	$10	$44	$8	$94
80305	259	1	0.030	66	$10	$44	$8	$94
80305	261	1	0.030	66	$10	$44	$8	$94
80305	264	1	0.030	66	$10	$44	$8	$94
80305	264.1	1	0.030	66	$10	$44	$8	$94
80305	265	1	0.030	66	$10	$44	$8	$94
80305	267	1	0.030	66	$10	$44	$8	$94
80305	268	1	0.030	66	$10	$44	$8	$94
80305	270	1	0.030	66	$10	$44	$8	$94
80305	271	1	0.030	66	$10	$44	$8	$94
80305	273	1	0.030	66	$10	$44	$8	$94
80305	308	1	0.030	66	$10	$44	$8	$94
80305	310	1	0.030	66	$10	$44	$8	$94
80305	314	1	0.030	66	$10	$44	$8	$94
80305	316	1	0.030	66	$10	$44	$8	$94
80305	319	1	0.030	66	$10	$44	$8	$94
80305	319.1	1	0.030	66	$10	$44	$8	$94
80305	320	1	0.030	66	$10	$44	$8	$94
80305	322	1	0.030	66	$10	$44	$8	$94
80305	323	1	0.030	66	$10	$44	$8	$94
80305	325	1	0.030	66	$10	$44	$8	$94
80305	326	1	0.030	66	$10	$44	$8	$94
80305	328	1	0.030	66	$10	$44	$8	$94
80305	329	1	0.030	66	$10	$44	$8	$94
80305	331	1	0.030	66	$10	$44	$8	$94
80305	332	1	0.030	66	$10	$44	$8	$94
80305	334	1	0.030	66	$10	$44	$8	$94
80305	335	1	0.030	66	$10	$44	$8	$94
80305	337	1	0.030	66	$10	$44	$8	$94
80305	338	1	0.030	66	$10	$44	$8	$94
80305	340	1	0.030	66	$10	$44	$8	$94
80305	341	1	0.030	66	$10	$44	$8	$94
80305	343	1	0.030	66	$10	$44	$8	$94
80305	344	1	0.030	66	$10	$44	$8	$94
80305	346	1	0.030	66	$10	$44	$8	$94
80305	347	1	0.030	66	$10	$44	$8	$94
80305	349	1	0.030	66	$10	$44	$8	$94
80305	350	1	0.030	66	$10	$44	$8	$94
80305	352	1	0.030	66	$10	$44	$8	$94
80305	353	1	0.030	66	$10	$44	$8	$94
80305	355	1	0.030	66	$10	$44	$8	$94
80305	356	1	0.030	66	$10	$44	$8	$94
80305	358	1	0.030	66	$10	$44	$8	$94
80305	359	1	0.030	66	$10	$44	$8	$94
80305	361	1	0.030	66	$10	$44	$8	$94
80305	364	1	0.030	66	$10	$44	$8	$94
80305	364.1	1	0.030	66	$10	$44	$8	$94
80305	365	1	0.030	66	$10	$44	$8	$94
80305	367	1	0.030	66	$10	$44	$8	$94
80305	368	1	0.030	66	$10	$44	$8	$94
80305	370	1	0.030	66	$10	$44	$8	$94
80305	371	1	0.030	66	$10	$44	$8	$94
80305	373	1	0.030	66	$10	$44	$8	$94
Totals for Retrofit Typ		**124**	**3.720**	**8,124**	**$1,240**	**$5,502**	**$973**	**$11,682**
					SIR	**2.12**	**Payback**	**5.66**

Table H-5. Lighting Retrofit C1 F32T8, 1 Lamp Fixtures: Replace Ballasts with Electronic Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80505	118	5	0.030	94	$40	$196	$8	$100
80505	125	3	0.018	45	$24	$117	$4	$54
80505	125	3	0.018	45	$24	$117	$4	$54
80505	129	2	0.012	30	$16	$78	$3	$36
80505	129	3	0.018	45	$24	$117	$4	$54
80505	139	4	0.024	75	$32	$157	$7	$80
80505	143	4	0.024	75	$32	$157	$7	$80
80505	145	18	0.108	253	$144	$705	$26	$313
80505	154	2	0.012	12	$16	$78	$2	$26
80505	156	2	0.012	12	$16	$78	$2	$26
80505	158	2	0.012	12	$16	$78	$2	$26
80505	171	3	0.018	45	$24	$117	$4	$54
80505	171	3	0.018	45	$24	$117	$4	$54
80505	175	3	0.018	45	$24	$117	$4	$54
80505	175	3	0.018	45	$24	$117	$4	$54
80505	225	6	0.036	90	$48	$235	$9	$108
80505	229	6	0.036	90	$48	$235	$9	$108
80505	233	6	0.036	112	$48	$235	$10	$121
80505	237	8	0.048	150	$64	$313	$13	$161
80505	250	4	0.024	25	$32	$157	$4	$51
80505	271	6	0.036	90	$48	$235	$9	$108
80505	275	6	0.036	90	$48	$235	$9	$108
80505	1 N/S CENTER	3	0.018	56	$24	$117	$5	$60
80505	136+118D	4	0.024	56	$32	$157	$6	$70
80505	Stair	2	0.012	37	$16	$78	$3	$40
Totals for Retrofit Type C1:		**111**	**0.666**	**1,674**	**$888**	**$4,346**	**$166**	**$1,996**
					SIR	**0.46**	**Payback**	**26.17**

Table H-6. Lighting Retrofit C2 F32T8, 2 Lamp Fixtures: Replace Ballasts with Electronic Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
22422	212	4	0.044	110	$32	$160	$11	$131
80505	102	9	0.099	232	$72	$359	$24	$287
80505	103	27	0.297	695	$216	$1,077	$72	$860
80505	104	9	0.099	232	$72	$359	$24	$287
80505	106	9	0.099	232	$72	$359	$24	$287
80505	108	9	0.099	232	$72	$359	$24	$287
80505	110	9	0.099	232	$72	$359	$24	$287
80505	131	21	0.231	541	$168	$838	$56	$669
80505	142	8	0.088	206	$64	$319	$21	$255
80505	146	48	0.528	1,236	$384	$1,915	$127	$1,529
80505	148	8	0.088	206	$64	$319	$21	$255
80505	151	12	0.132	309	$96	$479	$32	$382
80505	152	8	0.088	206	$64	$319	$21	$255
80505	155	15	0.165	386	$120	$598	$40	$478
80505	176	16	0.176	412	$128	$638	$42	$510
80505	177	4	0.044	46	$32	$160	$8	$94
80505	179	6	0.066	154	$48	$239	$16	$191
80505	181	9	0.099	232	$72	$359	$24	$287
80505	204	20	0.220	515	$160	$798	$53	$637
80505	210	30	0.330	772	$240	$1,197	$80	$956
80505	212	12	0.132	309	$96	$479	$32	$382
80505	213	8	0.088	46	$64	$319	$13	$162
80505	231	5	0.055	129	$40	$199	$13	$159
80505	234	12	0.132	309	$96	$479	$32	$382
80505	236	12	0.132	309	$96	$479	$32	$382
80505	245	18	0.198	463	$144	$718	$48	$574
80505	248	12	0.132	309	$96	$479	$32	$382
80505	249	8	0.088	46	$64	$319	$13	$162
80505	278	12	0.132	309	$96	$479	$32	$382
80505	280	48	0.528	1,236	$384	$1,915	$127	$1,529
80505	1 E/W N	1	0.011	34	$8	$40	$3	$37
80505	1 MECH	6	0.066	34	$48	$239	$10	$121
80505	118 C	16	0.176	412	$128	$638	$42	$510
80505	118B	3	0.033	34	$24	$120	$6	$71
80505	162A	13	0.143	335	$104	$519	$34	$414
80505	162B	8	0.088	206	$64	$319	$21	$255
80505	2 N-S E	1	0.011	34	$8	$40	$3	$37
80505	203-5	27	0.297	695	$216	$1,077	$72	$860
80505	242 + 276	16	0.176	412	$128	$638	$42	$510
80505	244 + 246	16	0.176	412	$128	$638	$42	$510
80505	277 + 281	18	0.198	463	$144	$718	$48	$574
Totals for Retrofit Type		**553**	**6.083**	**13,718**	**$4,424**	**$22,059**	**$1,441**	**$17,320**
					SIR	**0.79**	**Payback**	**15.31**

Table H-7. Lighting Retrofit D1 F34T12 and F40T12, 1 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
22422	Basement	1	0.019	30	$9	$43	$4	$46
22422	Basement	1	0.019	30	$9	$43	$7	$85
43002	1st Floor	9	0.171	267	$81	$391	$28	$342
43002	1st Floor	3	0.057	178	$27	$130	$14	$171
53301	114	1	0.012	25	$9	$43	$6	$73
53301	115	3	0.036	150	$27	$130	$13	$157
53301	115	3	0.036	150	$27	$130	$13	$157
53301	203	10	0.120	1,048	$90	$435	$39	$474
53301	203	6	0.072	300	$54	$261	$21	$252
53301	211	5	0.060	524	$45	$217	$21	$254
53301	214	6	0.072	300	$54	$261	$21	$252
53301	214	1	0.012	25	$9	$43	$8	$101
53301	ENTRY	11	0.132	1,153	$99	$478	$46	$555
53301	STAIR	7	0.084	734	$63	$304	$27	$331
53301	STAIR	7	0.084	734	$63	$304	$27	$331
53301	STAIR	10	0.120	1,048	$90	$435	$45	$540
53301	STAIR	10	0.120	1,048	$90	$435	$40	$477
57428	112	4	0.076	316	$36	$174	$25	$300
57428	117	1	0.019	79	$9	$43	$9	$106
57428	127	1	0.019	166	$9	$43	$14	$163
61701	Area	12	0.228	474	$108	$522	$48	$578
61701	Locker Rooms	6	0.114	237	$54	$261	$27	$328
80305	112	1	0.019	10	$9	$43	$7	$89
80305	307	1	0.019	41	$9	$43	$10	$121
Totals for Retrofit Type D1:		120	1.720	9,066	$1,080	$5,217	$522	$6,286
					SIR	1.20	Payback	9.99

Table H-8. Lighting Retrofit D2 F34T12 and F40T12, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
15544	107	6	0.150	1,310	$60	$288	$82	$987
20200	Kitchen	1	0.025	27	$10	$48	$4	$54
22422	101	4	0.100	250	$40	$192	$25	$298
22422	102	4	0.100	250	$40	$192	$25	$298
22422	103	2	0.050	125	$20	$96	$12	$149
22422	104	2	0.050	125	$20	$96	$12	$149
22422	107	4	0.100	250	$40	$192	$25	$298
22422	108	8	0.200	499	$80	$384	$50	$595
22422	109	2	0.050	125	$20	$96	$12	$149
22422	110	2	0.050	125	$20	$96	$12	$149
22422	111	15	0.375	936	$150	$720	$93	$1,116
22422	112	2	0.050	125	$20	$96	$12	$149
22422	113	2	0.050	125	$20	$96	$12	$149
22422	114	2	0.050	125	$20	$96	$12	$149
22422	115	2	0.050	125	$20	$96	$12	$149
22422	116	10	0.250	624	$100	$480	$62	$744
22422	201	4	0.100	250	$40	$192	$25	$298
22422	202	4	0.100	250	$40	$192	$25	$298
22422	203	8	0.200	499	$80	$384	$50	$595
22422	204	2	0.050	125	$20	$96	$12	$149
22422	205	28	0.700	1,747	$280	$1,344	$173	$2,083
22422	206	2	0.050	125	$20	$96	$12	$149
22422	207	2	0.050	125	$20	$96	$12	$149
22422	208	4	0.100	250	$40	$192	$25	$298
22422	209	2	0.050	125	$20	$96	$12	$149
22422	210	2	0.050	125	$20	$96	$12	$149
22422	108A	4	0.100	250	$40	$192	$25	$298
22422	Basement	2	0.050	437	$20	$96	$27	$329
22422	Basement	2	0.050	78	$20	$96	$10	$122
22422	Basement	2	0.050	78	$20	$96	$10	$122
22422	Basement	1	0.025	13	$10	$48	$4	$46
22422	PS1	5	0.125	312	$50	$240	$31	$372
43002	1 D	2	0.050	125	$20	$96	$12	$149
43002	1 E	2	0.050	13	$20	$96	$7	$84
43002	1 F/G	3	0.075	187	$30	$144	$19	$223
43002	1 H	3	0.075	20	$30	$144	$11	$126
43002	1st Floor	8	0.200	1,248	$80	$384	$86	$1,028
43002	1st Floor	5	0.125	390	$50	$240	$35	$417
43002	1st Floor	1	0.025	62	$10	$48	$6	$74
43002	1st Floor	1	0.025	62	$10	$48	$6	$74
43002	1st Floor	2	0.050	125	$20	$96	$12	$149
43002	1st Floor	2	0.050	125	$20	$96	$12	$149
43002	1st Floor	2	0.050	125	$20	$96	$12	$149
43002	1st Floor	2	0.050	156	$20	$96	$14	$167
43002	1st Floor	2	0.050	156	$20	$96	$14	$167
43002	1st Floor	1	0.025	7	$10	$48	$4	$42
43002	2 Balcony A	8	0.200	52	$80	$384	$28	$337
43002	2 Balcony B	8	0.200	52	$80	$384	$28	$337
43002	2 C	6	0.150	374	$60	$288	$37	$446
43002	2 D	2	0.050	125	$20	$96	$12	$149
43002	2 E	1	0.025	156	$10	$48	$11	$128
43002	2 F	1	0.025	156	$10	$48	$11	$128
43002	Basement	1	0.025	156	$10	$48	$11	$128
43002	Basement	2	0.050	13	$20	$96	$7	$84
43002	Basement	2	0.050	125	$20	$96	$12	$149
53301	103	113	1.243	5,171	$1,130	$5,422	$405	$4,870
53301	109	5	0.055	114	$50	$240	$12	$149
53301	117	6	0.066	275	$60	$288	$22	$259
53301	119	29	0.319	1,327	$290	$1,392	$104	$1,250
53301	120	13	0.143	595	$130	$624	$47	$560
53301	124	31	0.341	1,419	$310	$1,488	$111	$1,336
53301	127	2	0.022	92	$20	$96	$7	$86
53301	128	8	0.088	366	$80	$384	$29	$345

Table H-8. Lighting Retrofit D2 F34T12 and F40T12, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
56301	114	4	0.044	165	$40	$192	$13	$162
56301	115	20	0.220	824	$200	$960	$67	$810
56301	116	4	0.044	165	$40	$192	$13	$162
56301	117	3	0.033	124	$30	$144	$10	$121
56301	118	16	0.176	659	$160	$768	$54	$648
56301	119	2	0.022	82	$20	$96	$7	$81
56301	120	4	0.044	165	$40	$192	$13	$162
56301	121	24	0.264	988	$240	$1,152	$81	$972
56301	122	2	0.022	82	$20	$96	$7	$81
56301	130	2	0.022	82	$20	$96	$7	$81
56301	147	3	0.033	124	$30	$144	$10	$121
56301	148	2	0.022	82	$20	$96	$7	$81
56301	130, Lab	12	0.132	494	$120	$576	$40	$486
56301	153A	8	0.088	329	$80	$384	$27	$324
56301	Conr	3	0.033	288	$30	$144	$18	$216
56301	Conr	5	0.055	480	$50	$240	$30	$360
56301	Conr 1	10	0.110	961	$100	$480	$60	$719
56301	Conr Cross	2	0.022	192	$20	$96	$12	$144
57428	102	2	0.050	104	$20	$96	$11	$136
57428	112	2	0.050	437	$20	$96	$27	$329
57428	112	2	0.050	437	$20	$96	$27	$329
57428	112	2	0.050	437	$20	$96	$27	$329
57428	112	3	0.075	655	$30	$144	$41	$494
57428	112	6	0.150	1,310	$60	$288	$82	$987
57428	210	2	0.050	437	$20	$96	$27	$329
61701	Corridor	1	0.025	130	$10	$48	$9	$113
61701	Corridor	2	0.050	260	$20	$96	$19	$227
61701	Corridor	2	0.050	260	$20	$96	$19	$227
61701	Corridor	3	0.075	390	$30	$144	$28	$340
61701	Corridor	4	0.100	520	$40	$192	$38	$454
61701	Corridor	9	0.225	1,170	$90	$432	$85	$1,021
61701	Locker Rooms	90	2.250	4,680	$900	$4,319	$512	$6,159
61701	Main Corridor	9	0.225	1,170	$90	$432	$85	$1,021
61701	Office	2	0.050	104	$20	$96	$11	$137
61701	Office	3	0.075	156	$30	$144	$17	$205
61701	Office	12	0.300	624	$120	$576	$68	$821
61701	Pool	12	0.300	624	$120	$576	$68	$821
61701	Pool Lobby	9	0.225	1,170	$90	$432	$85	$1,021
61701	Pool Office	2	0.050	104	$20	$96	$11	$137
61701	Supplies	4	0.100	52	$40	$192	$15	$184
61701	Toilet	3	0.075	156	$30	$144	$17	$205
61701	Toilet	3	0.075	156	$30	$144	$17	$205
62704	-	6	0.150	468	$60	$288	$42	$501
62704	-	4	0.100	234	$40	$192	$24	$288
62704	-	7	0.175	410	$70	$336	$42	$505
62704	W11	10	0.250	780	$100	$480	$69	$834
70525	Corridor	4	0.100	624	$40	$192	$43	$514
70525	Corridor	5	0.125	780	$50	$240	$53	$642
70525	Dishwash	1	0.025	78	$10	$48	$7	$83
70525	Office	2	0.050	156	$20	$96	$14	$166
70525	Offices	5	0.125	390	$50	$240	$35	$416
70525	Offices	10	0.250	780	$100	$480	$69	$832
70525	Offices	2	0.050	234	$20	$96	$18	$212
70525	Supply	1	0.025	78	$10	$48	$7	$83
70525	Toilet	2	0.050	234	$20	$96	$18	$212
70525	Whse	1	0.025	78	$10	$48	$7	$83
70525	Whse	4	0.100	312	$40	$192	$28	$333
80305	101	2	0.050	437	$20	$96	$27	$329
80305	102	2	0.050	437	$20	$96	$27	$329
80305	103	4	0.100	520	$40	$192	$38	$454
80305	104	3	0.075	390	$30	$144	$28	$340
80305	105	2	0.050	437	$20	$96	$27	$329
80305	107	1	0.025	218	$10	$48	$14	$165

Table H-8. Lighting Retrofit D2 F34T12 and F40T12, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	108	4	0.100	874	$40	$192	$55	$658
80305	109	2	0.050	260	$20	$96	$19	$227
80305	110	1	0.025	62	$10	$48	$6	$74
80305	111	1	0.025	175	$10	$48	$12	$139
80305	113	1	0.025	26	$10	$48	$4	$53
80305	114	1	0.025	13	$10	$48	$4	$46
80305	115	2	0.050	52	$20	$96	$9	$107
80305	116	6	0.150	1,310	$60	$288	$82	$987
80305	116	1	0.025	55	$10	$48	$6	$70
80305	117	1	0.025	55	$10	$48	$6	$70
80305	119	1	0.025	55	$10	$48	$6	$70
80305	120	1	0.025	55	$10	$48	$6	$70
80305	121	1	0.025	55	$10	$48	$6	$70
80305	122	1	0.025	55	$10	$48	$6	$70
80305	123	1	0.025	55	$10	$48	$6	$70
80305	124	1	0.025	55	$10	$48	$6	$70
80305	125	1	0.025	55	$10	$48	$6	$70
80305	126	1	0.025	55	$10	$48	$6	$70
80305	127	1	0.025	55	$10	$48	$6	$70
80305	128	1	0.025	55	$10	$48	$6	$70
80305	130	1	0.025	55	$10	$48	$6	$70
80305	130	1	0.025	55	$10	$48	$6	$70
80305	131	1	0.025	55	$10	$48	$6	$70
80305	132	1	0.025	55	$10	$48	$6	$70
80305	133	1	0.025	55	$10	$48	$6	$70
80305	134	1	0.025	55	$10	$48	$6	$70
80305	135	1	0.025	55	$10	$48	$6	$70
80305	136	1	0.025	55	$10	$48	$6	$70
80305	137	1	0.025	55	$10	$48	$6	$70
80305	138	1	0.025	55	$10	$48	$6	$70
80305	139	1	0.025	55	$10	$48	$6	$70
80305	140	1	0.025	55	$10	$48	$6	$70
80305	141	1	0.025	55	$10	$48	$6	$70
80305	142	1	0.025	55	$10	$48	$6	$70
80305	143	1	0.025	55	$10	$48	$6	$70
80305	144	1	0.025	55	$10	$48	$6	$70
80305	145	1	0.025	55	$10	$48	$6	$70
80305	146	1	0.025	55	$10	$48	$6	$70
80305	147	1	0.025	55	$10	$48	$6	$70
80305	148	1	0.025	55	$10	$48	$6	$70
80305	148	1	0.025	55	$10	$48	$6	$70
80305	150	1	0.025	55	$10	$48	$6	$70
80305	151	1	0.025	55	$10	$48	$6	$70
80305	151	1	0.025	55	$10	$48	$6	$70
80305	153	1	0.025	55	$10	$48	$6	$70
80305	154	1	0.025	55	$10	$48	$6	$70
80305	155	1	0.025	55	$10	$48	$6	$70
80305	156	1	0.025	55	$10	$48	$6	$70
80305	157	1	0.025	55	$10	$48	$6	$70
80305	158	1	0.025	55	$10	$48	$6	$70
80305	159	1	0.025	55	$10	$48	$6	$70
80305	160	1	0.025	55	$10	$48	$6	$70
80305	160	1	0.025	55	$10	$48	$6	$70
80305	162	1	0.025	55	$10	$48	$6	$70
80305	163	1	0.025	55	$10	$48	$6	$70
80305	164	1	0.025	55	$10	$48	$6	$70
80305	165	1	0.025	55	$10	$48	$6	$70
80305	166	1	0.025	55	$10	$48	$6	$70
80305	167	1	0.025	55	$10	$48	$6	$70
80305	168	1	0.025	55	$10	$48	$6	$70
80305	169	1	0.025	55	$10	$48	$6	$70
80305	170	1	0.025	55	$10	$48	$6	$70
80305	171	1	0.025	55	$10	$48	$6	$70

Table H-8. Lighting Retrofit D2 F34T12 and F40T12, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	172	1	0.025	55	$10	$48	$6	$70
80305	173	1	0.025	55	$10	$48	$6	$70
80305	174	1	0.025	55	$10	$48	$6	$70
80305	175	1	0.025	55	$10	$48	$6	$70
80305	176	1	0.025	55	$10	$48	$6	$70
80305	177	5	0.125	1,092	$50	$240	$68	$823
80305	200	1	0.025	218	$10	$48	$14	$165
80305	200	8	0.200	1,747	$80	$384	$109	$1,316
80305	201	2	0.050	125	$20	$96	$12	$149
80305	202	1	0.025	13	$10	$48	$4	$46
80305	203	4	0.100	520	$40	$192	$38	$454
80305	204	1	0.025	62	$10	$48	$6	$74
80305	205	3	0.075	655	$30	$144	$41	$494
80305	206	1	0.025	218	$10	$48	$14	$165
80305	206.1	1	0.025	218	$10	$48	$14	$165
80305	208	4	0.100	250	$40	$192	$25	$298
80305	208	1	0.025	55	$10	$48	$6	$70
80305	208	6	0.150	780	$60	$288	$57	$681
80305	210	1	0.025	55	$10	$48	$6	$70
80305	210	1	0.025	55	$10	$48	$6	$70
80305	212	6	0.150	1,310	$60	$288	$82	$987
80305	213	5	0.125	1,092	$50	$240	$68	$823
80305	214	1	0.025	55	$10	$48	$6	$70
80305	215	1	0.025	55	$10	$48	$6	$70
80305	216	1	0.025	55	$10	$48	$6	$70
80305	218	1	0.025	55	$10	$48	$6	$70
80305	219	1	0.025	55	$10	$48	$6	$70
80305	219.1	1	0.025	55	$10	$48	$6	$70
80305	220	1	0.025	55	$10	$48	$6	$70
80305	221	1	0.025	55	$10	$48	$6	$70
80305	222	1	0.025	55	$10	$48	$6	$70
80305	223	1	0.025	55	$10	$48	$6	$70
80305	224	1	0.025	55	$10	$48	$6	$70
80305	225	1	0.025	55	$10	$48	$6	$70
80305	226	1	0.025	55	$10	$48	$6	$70
80305	227	1	0.025	55	$10	$48	$6	$70
80305	228	1	0.025	55	$10	$48	$6	$70
80305	229	1	0.025	55	$10	$48	$6	$70
80305	230	1	0.025	55	$10	$48	$6	$70
80305	231	1	0.025	55	$10	$48	$6	$70
80305	232	1	0.025	55	$10	$48	$6	$70
80305	233	1	0.025	55	$10	$48	$6	$70
80305	234	1	0.025	55	$10	$48	$6	$70
80305	235	1	0.025	55	$10	$48	$6	$70
80305	236	1	0.025	55	$10	$48	$6	$70
80305	237	1	0.025	55	$10	$48	$6	$70
80305	238	1	0.025	55	$10	$48	$6	$70
80305	239	1	0.025	55	$10	$48	$6	$70
80305	240	1	0.025	55	$10	$48	$6	$70
80305	241	1	0.025	55	$10	$48	$6	$70
80305	242	1	0.025	55	$10	$48	$6	$70
80305	243	1	0.025	55	$10	$48	$6	$70
80305	244	1	0.025	55	$10	$48	$6	$70
80305	245	1	0.025	55	$10	$48	$6	$70
80305	246	1	0.025	55	$10	$48	$6	$70
80305	247	1	0.025	55	$10	$48	$6	$70
80305	248	1	0.025	55	$10	$48	$6	$70
80305	249	1	0.025	55	$10	$48	$6	$70
80305	250	1	0.025	55	$10	$48	$6	$70
80305	251	1	0.025	55	$10	$48	$6	$70
80305	252	1	0.025	55	$10	$48	$6	$70
80305	253	1	0.025	55	$10	$48	$6	$70
80305	254	1	0.025	55	$10	$48	$6	$70

Table H-8. Lighting Retrofit D2 F34T12 and F40T12, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	255	1	0.025	55	$10	$48	$6	$70
80305	256	1	0.025	55	$10	$48	$6	$70
80305	257	1	0.025	55	$10	$48	$6	$70
80305	258	1	0.025	55	$10	$48	$6	$70
80305	259	1	0.025	55	$10	$48	$6	$70
80305	260	1	0.025	55	$10	$48	$6	$70
80305	261	1	0.025	55	$10	$48	$6	$70
80305	263	1	0.025	55	$10	$48	$6	$70
80305	264	1	0.025	55	$10	$48	$6	$70
80305	264.1	1	0.025	55	$10	$48	$6	$70
80305	265	1	0.025	55	$10	$48	$6	$70
80305	266	1	0.025	55	$10	$48	$6	$70
80305	267	1	0.025	55	$10	$48	$6	$70
80305	268	1	0.025	55	$10	$48	$6	$70
80305	269	1	0.025	55	$10	$48	$6	$70
80305	270	1	0.025	55	$10	$48	$6	$70
80305	271	1	0.025	55	$10	$48	$6	$70
80305	272	1	0.025	55	$10	$48	$6	$70
80305	273	1	0.025	55	$10	$48	$6	$70
80305	300	1	0.025	218	$10	$48	$14	$165
80305	300	8	0.200	1,747	$80	$384	$109	$1,316
80305	301	2	0.050	125	$20	$96	$12	$149
80305	302	1	0.025	13	$10	$48	$4	$46
80305	303	4	0.100	166	$40	$192	$21	$250
80305	303	4	0.100	520	$40	$192	$38	$454
80305	304	1	0.025	62	$10	$48	$6	$74
80305	305	3	0.075	655	$30	$144	$41	$494
80305	305	3	0.075	655	$30	$144	$41	$494
80305	306	1	0.025	218	$10	$48	$14	$165
80305	306.1	1	0.025	218	$10	$48	$14	$165
80305	308	4	0.100	250	$40	$192	$25	$298
80305	308	1	0.025	55	$10	$48	$6	$70
80305	310	1	0.025	55	$10	$48	$6	$70
80305	310	1	0.025	55	$10	$48	$6	$70
80305	312	6	0.150	1,310	$60	$288	$82	$987
80305	313	5	0.125	1,092	$50	$240	$68	$823
80305	314	1	0.025	55	$10	$48	$6	$70
80305	315	1	0.025	55	$10	$48	$6	$70
80305	316	1	0.025	55	$10	$48	$6	$70
80305	318	1	0.025	55	$10	$48	$6	$70
80305	319	1	0.025	55	$10	$48	$6	$70
80305	319.1	1	0.025	55	$10	$48	$6	$70
80305	320	1	0.025	55	$10	$48	$6	$70
80305	321	1	0.025	55	$10	$48	$6	$70
80305	322	1	0.025	55	$10	$48	$6	$70
80305	323	1	0.025	55	$10	$48	$6	$70
80305	324	1	0.025	55	$10	$48	$6	$70
80305	325	1	0.025	55	$10	$48	$6	$70
80305	326	1	0.025	55	$10	$48	$6	$70
80305	327	1	0.025	55	$10	$48	$6	$70
80305	328	1	0.025	55	$10	$48	$6	$70
80305	329	1	0.025	55	$10	$48	$6	$70
80305	330	1	0.025	55	$10	$48	$6	$70
80305	331	1	0.025	55	$10	$48	$6	$70
80305	332	1	0.025	55	$10	$48	$6	$70
80305	333	1	0.025	55	$10	$48	$6	$70
80305	334	1	0.025	55	$10	$48	$6	$70
80305	335	1	0.025	55	$10	$48	$6	$70
80305	336	1	0.025	55	$10	$48	$6	$70
80305	337	1	0.025	55	$10	$48	$6	$70
80305	338	1	0.025	55	$10	$48	$6	$70
80305	339	1	0.025	55	$10	$48	$6	$70
80305	340	1	0.025	55	$10	$48	$6	$70

Table H-8. Lighting Retrofit D2 F34T12 and F40T12, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	341	1	0.025	55	$10	$48	$6	$70
80305	342	1	0.025	55	$10	$48	$6	$70
80305	343	1	0.025	55	$10	$48	$6	$70
80305	344	1	0.025	55	$10	$48	$6	$70
80305	345	1	0.025	55	$10	$48	$6	$70
80305	346	1	0.025	55	$10	$48	$6	$70
80305	347	1	0.025	55	$10	$48	$6	$70
80305	348	1	0.025	55	$10	$48	$6	$70
80305	349	1	0.025	55	$10	$48	$6	$70
80305	350	1	0.025	55	$10	$48	$6	$70
80305	351	1	0.025	55	$10	$48	$6	$70
80305	352	1	0.025	55	$10	$48	$6	$70
80305	353	1	0.025	55	$10	$48	$6	$70
80305	354	1	0.025	55	$10	$48	$6	$70
80305	355	1	0.025	55	$10	$48	$6	$70
80305	356	1	0.025	55	$10	$48	$6	$70
80305	357	1	0.025	55	$10	$48	$6	$70
80305	358	1	0.025	55	$10	$48	$6	$70
80305	359	1	0.025	55	$10	$48	$6	$70
80305	360	1	0.025	55	$10	$48	$6	$70
80305	361	1	0.025	55	$10	$48	$6	$70
80305	363	1	0.025	55	$10	$48	$6	$70
80305	364	1	0.025	55	$10	$48	$6	$70
80305	364.1	1	0.025	55	$10	$48	$6	$70
80305	365	1	0.025	55	$10	$48	$6	$70
80305	366	1	0.025	55	$10	$48	$6	$70
80305	367	1	0.025	55	$10	$48	$6	$70
80305	368	1	0.025	55	$10	$48	$6	$70
80305	369	1	0.025	55	$10	$48	$6	$70
80305	370	1	0.025	55	$10	$48	$6	$70
80305	371	1	0.025	55	$10	$48	$6	$70
80305	372	1	0.025	55	$10	$48	$6	$70
80305	373	1	0.025	55	$10	$48	$6	$70
80305	Entry	5	0.125	1,092	$50	$240	$68	$823
80305	Stairs A	6	0.150	1,310	$60	$288	$82	$987
80305	Stairs B	6	0.150	1,310	$60	$288	$82	$987
80305	Stairs C	6	0.150	1,310	$60	$288	$82	$987
80305	Vestibles	4	0.100	874	$40	$192	$55	$658
80505	118A	24	0.264	618	$240	$1,152	$63	$758
90312	Toilet	3	0.075	156	$30	$144	$17	$205
90312	Toilet	3	0.075	156	$30	$144	$17	$205
90507	Office	4	0.100	166	$40	$192	$21	$250
90507	Office	9	0.225	374	$90	$432	$47	$562
90507	Toilet	2	0.050	104	$20	$96	$11	$137
90507	Toilet	2	0.050	104	$20	$96	$11	$137
90508	508	10	0.250	65	$100	$480	$35	$421
91114	1st E Battery Shop	9	0.225	936	$90	$432	$74	$886
91114	1st E Office	9	0.225	749	$90	$432	$65	$777
91114	1st E Stairs	2	0.050	208	$20	$96	$16	$197
91114	1st W Inst. Shop	9	0.225	936	$90	$432	$74	$886
91114	1st W Mech. Shop	18	0.450	1,872	$180	$864	$147	$1,772
91114	1st W QC Library	3	0.075	156	$30	$144	$17	$205
91114	1st W QC Office	9	0.225	749	$90	$432	$65	$777
91114	1st W Seat Shop	9	0.225	936	$90	$432	$74	$886
91114	1st W Stairs	2	0.050	208	$20	$96	$16	$197
91114	1st W Stairs	2	0.050	208	$20	$96	$16	$197
91114	1st W Toilet	1	0.025	104	$10	$48	$8	$98
91114	1st W Toilet	1	0.025	104	$10	$48	$8	$98
91114	1st W Toilet	2	0.050	208	$20	$96	$16	$197
91114	1st W Weld. Shop	11	0.275	1,144	$110	$528	$90	$1,083
91114	2nd E Acet	6	0.150	499	$60	$288	$43	$518
91114	2nd E Admin	6	0.150	499	$60	$288	$43	$518
91114	2nd E Chief	9	0.225	749	$90	$432	$65	$777

Table H-8. Lighting Retrofit D2 F34T12 and F40T12, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
91114	2nd E GM	6	0.150	499	$60	$288	$43	$518
91114	2nd E Key Punch	6	0.150	499	$60	$288	$43	$518
91114	2nd E Office	3	0.075	250	$30	$144	$22	$259
91114	2nd E Office	6	0.150	499	$60	$288	$43	$518
91114	2nd E OP Mgr	6	0.150	499	$60	$288	$43	$518
91114	2nd E PLT	6	0.150	499	$60	$288	$43	$518
91114	2nd E QC	6	0.150	499	$60	$288	$43	$518
91114	2nd E Supply Admin	6	0.150	499	$60	$288	$43	$518
91114	2nd E Supply Spec	2	0.050	156	$20	$96	$14	$167
91114	2nd E Toilet	2	0.050	208	$20	$96	$16	$197
91114	2nd E Toilet	2	0.050	208	$20	$96	$16	$197
91114	2nd W Corridor	5	0.125	520	$50	$240	$41	$492
91114	2nd W Elec. Repair	10	0.250	832	$100	$480	$72	$864
91114	2nd W Elec. Repair	2	0.050	208	$20	$96	$16	$197
91114	2nd W Elec. Repair	7	0.175	728	$70	$336	$57	$689
91114	2nd W Elec. Repair	10	0.250	520	$100	$480	$57	$682
91114	2nd W Storage	19	0.475	988	$190	$912	$108	$1,297
Totals for Retrofit Type D2:		**1401**	**30.027**	**107,700**	**$14,010**	**$67,229**	**$8,998**	**$108,164**
					SIR	**1.61**	**Payback**	**7.47**

Table H-9. Lighting Retrofit D3 F34T12 and F40T12, 3 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
22422	211	3	0.021	52	$33	$214	$5	$61
53301	104	3	0.021	87	$33	$214	$7	$81
53301	105	3	0.021	87	$33	$214	$7	$81
53301	107	3	0.021	87	$33	$214	$7	$81
53301	121	2	0.014	58	$22	$143	$5	$54
53301	124	3	0.021	87	$33	$214	$7	$81
53301	126	2	0.014	58	$22	$143	$5	$54
53301	129	2	0.014	58	$22	$143	$5	$54
53301	214	3	0.021	87	$33	$214	$7	$81
53301	217	69	0.483	2,009	$759	$4,920	$155	$1,869
53301	218	4	0.028	116	$44	$285	$9	$108
53301	220	8	0.056	233	$88	$570	$18	$217
53301	221	4	0.028	116	$44	$285	$9	$108
53301	222	4	0.028	116	$44	$285	$9	$108
53301	223	4	0.028	116	$44	$285	$9	$108
53301	224	4	0.028	116	$44	$285	$9	$108
53301	225	4	0.028	116	$44	$285	$9	$108
56301	107	7	0.049	183	$77	$499	$15	$178
56301	108	6	0.042	157	$66	$428	$13	$153
56301	109	6	0.042	157	$66	$428	$13	$153
56301	109	8	0.056	210	$88	$570	$17	$204
56301	113	18	0.126	472	$198	$1,283	$38	$458
56301	126	18	0.126	472	$198	$1,283	$38	$458
56301	128	2	0.014	52	$22	$143	$4	$51
56301	129	2	0.014	52	$22	$143	$4	$51
56301	133	3	0.021	79	$33	$214	$6	$76
56301	134	21	0.147	550	$231	$1,497	$44	$534
56301	135	2	0.014	52	$22	$143	$4	$51
56301	136	2	0.014	52	$22	$143	$4	$51
56301	137	24	0.168	629	$264	$1,711	$51	$611
56301	138	20	0.140	524	$220	$1,426	$42	$509
56301	139	2	0.014	52	$22	$143	$4	$51
56301	140	10	0.070	262	$110	$713	$21	$255
56301	141	5	0.035	131	$55	$357	$11	$127
56301	152	5	0.035	131	$55	$357	$11	$127
56301	154	11	0.077	288	$121	$784	$23	$280
56301	113C	6	0.042	157	$66	$428	$13	$153
56301	143 {1}	12	0.084	314	$132	$856	$25	$305
56301	144 {1}	9	0.063	236	$99	$642	$19	$229
56301	145 {1}	12	0.084	314	$132	$856	$25	$305
57428	105	12	0.084	349	$132	$856	$27	$325
57428	107	18	0.126	524	$198	$1,283	$41	$488
57428	108	4	0.028	58	$44	$285	$6	$74
57428	109	6	0.042	87	$66	$428	$9	$112
57428	114	4	0.028	116	$44	$285	$9	$108
57428	115	4	0.028	116	$44	$285	$9	$108
57428	118	6	0.042	175	$66	$428	$14	$163
57428	120	6	0.042	175	$66	$428	$14	$163
57428	123	16	0.112	466	$176	$1,141	$36	$433
57428	126	6	0.042	87	$66	$428	$9	$112
57428	127	6	0.042	87	$66	$428	$9	$112
57428	202	4	0.028	116	$44	$285	$9	$108
57428	203	4	0.028	116	$44	$285	$9	$108
57428	204	6	0.042	175	$66	$428	$14	$163
57428	207	5	0.035	146	$55	$357	$11	$135
57428	208	5	0.035	146	$55	$357	$11	$135
57428	209	4	0.028	116	$44	$285	$9	$108
57428	217	18	0.126	524	$198	$1,283	$41	$488
57428	216A	4	0.028	116	$44	$285	$9	$108
57428	216B	4	0.028	116	$44	$285	$9	$108
61701	Main Entry	6	0.042	218	$66	$428	$16	$187
61701	Pool	16	0.112	233	$176	$1,141	$25	$303
61701	Racquetball Lobby	14	0.098	510	$154	$998	$36	$436

Table H-9. Lighting Retrofit D3 F34T12 and F40T12, 3 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
62704	W4	12	0.084	262	$132	$856	$23	$276
70525	Whse	2	0.014	44	$22	$143	$4	$45
80305	OR	1	0.007	61	$11	$71	$4	$45
80305	OR	3	0.021	52	$33	$214	$5	$61
80305	OR	3	0.021	52	$33	$214	$5	$61
80305	OR	3	0.021	52	$33	$214	$5	$61
80305	OR	3	0.021	52	$33	$214	$5	$61
80305	OR	8	0.056	140	$88	$570	$14	$164
80305	OR	9	0.063	157	$99	$642	$15	$184
80305	OR	4	0.028	47	$44	$285	$6	$69
80305	OR	12	0.084	140	$132	$856	$17	$207
80305	OR	1	0.007	4	$11	$71	$1	$13
Totals for Retrofit Type D3:		**575**	**4.025**	**14,974**	**$6,325**	**$40,998**	**$1,212**	**$14,570**
					SIR	**0.36**	**Payback**	**33.83**

Table H-10. Lighting Retrofit D4 F34T12 and F40T12, 4 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
15544	103	16	0.800	2,288	$320	$1,624	$212	$2,550
15544	104	22	1.100	2,360	$440	$2,233	$254	$3,050
15544	105	34	1.700	3,647	$680	$3,450	$392	$4,713
15544	106	21	1.050	3,003	$420	$2,131	$278	$3,347
15544	107	38	1.900	5,434	$760	$3,856	$504	$6,057
15544	111	31	1.550	4,433	$620	$3,146	$411	$4,941
15544	113	28	1.400	4,004	$560	$2,842	$371	$4,463
15544	114	21	1.050	2,252	$420	$2,131	$242	$2,911
15544	103A	4	0.200	572	$80	$406	$53	$638
43002	1 D	4	0.200	499	$80	$406	$50	$595
43002	1st Floor	4	0.200	624	$80	$406	$56	$668
43002	1st Floor	8	0.400	1,248	$160	$812	$111	$1,335
43002	Basement	2	0.100	26	$40	$203	$14	$168
53301	202	122	2.684	11,165	$2,440	$12,381	$875	$10,516
53301	203	3	0.066	275	$60	$304	$22	$259
53301	204	3	0.066	275	$60	$304	$22	$259
53301	206	3	0.066	275	$60	$304	$22	$259
57428	130	31	1.550	6,448	$620	$3,146	$508	$6,105
57428	131	12	0.600	2,496	$240	$1,218	$197	$2,363
61701	Sports Admin.	1	0.050	104	$20	$101	$11	$137
62704	W10	14	0.700	1,638	$280	$1,421	$168	$2,019
62704	W11	14	0.700	1,638	$280	$1,421	$168	$2,019
62704	W2	14	0.700	1,638	$280	$1,421	$168	$2,019
62704	W3	18	0.900	2,106	$360	$1,827	$216	$2,596
62704	W4	2	0.100	312	$40	$203	$28	$334
62704	W4	14	0.700	1,638	$280	$1,421	$168	$2,019
62704	W5	14	0.700	1,638	$280	$1,421	$168	$2,019
62704	W6	14	0.700	1,638	$280	$1,421	$168	$2,019
62704	W7	14	0.700	1,638	$280	$1,421	$168	$2,019
62704	W8	14	0.700	1,638	$280	$1,421	$168	$2,019
62704	W9	14	0.700	1,638	$280	$1,421	$168	$2,019
62704		18	0.900	2,106	$360	$1,827	$216	$2,596
70525	Bar	6	0.300	936	$120	$609	$83	$998
70525	Dining	5	0.250	780	$100	$507	$69	$832
70525	Dishwash	1	0.050	234	$20	$101	$18	$212
70525	Dishwash	8	0.400	1,872	$160	$812	$141	$1,693
70525	Kitchen	30	1.500	7,020	$600	$3,045	$528	$6,349
70525	Serving	2	0.100	312	$40	$203	$28	$333
90312	Office	6	0.300	499	$120	$609	$62	$749
90312	Office	8	0.400	666	$160	$812	$83	$998
90312	Office	8	0.400	666	$160	$812	$83	$998
90312	Office	8	0.400	666	$160	$812	$83	$998
90312	Office	10	0.500	832	$200	$1,015	$104	$1,248
90507	Office	1	0.050	83	$20	$101	$10	$125
90507	Office	5	0.250	416	$100	$507	$52	$624
91114	1st E Battery Shop	1	0.050	208	$20	$101	$16	$197
Totals for Retrofit Type D4:		**671**	**29.882**	**85,882**	**$13,420**	**$68,095**	**$7,935**	**$95,385**
					SIR	**1.40**	**Payback**	**8.58**

Table H-11. Lighting Retrofit D5 F34T12 and F40T12, 4 Lamp Fixtures: Delamp to 3 F32T8 Lamps and Electronic Ballass with Reflectors

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
15544	103	16	1.264	3,615	$304	$1,038	$346	$4,160
15544	104	22	1.738	3,728	$418	$1,427	$416	$4,997
15544	105	34	2.686	5,761	$646	$2,206	$643	$7,723
15544	106	21	1.659	4,745	$399	$1,362	$454	$5,460
15544	107	38	3.002	8,586	$722	$2,465	$822	$9,879
15544	111	31	2.449	7,004	$589	$2,011	$671	$8,060
15544	113	28	2.212	6,326	$532	$1,817	$606	$7,280
15544	114	21	1.659	3,559	$399	$1,362	$397	$4,770
15544	103A	4	0.316	904	$76	$260	$87	$1,040
43002	1 D	4	0.316	789	$76	$260	$81	$976
43002	1st Floor	4	0.316	986	$76	$260	$91	$1,090
43002	1st Floor	8	0.632	1,972	$152	$519	$181	$2,181
43002	Basement	2	0.158	41	$38	$130	$23	$272
53301	202	122	6.222	25,884	$2,318	$7,915	$2,155	$25,896
53301	203	3	0.153	636	$57	$195	$53	$637
53301	204	3	0.153	636	$57	$195	$53	$637
53301	206	3	0.153	636	$57	$195	$53	$637
57428	130	31	2.449	10,188	$589	$2,011	$833	$10,012
57428	131	12	0.948	3,944	$228	$779	$323	$3,876
61701	Sports Admin.	1	0.079	164	$19	$65	$18	$222
62704	W10	14	1.106	2,588	$266	$908	$276	$3,315
62704	W11	14	1.106	2,588	$266	$908	$276	$3,315
62704	W2	14	1.106	2,588	$266	$908	$276	$3,315
62704	W3	18	1.422	3,327	$342	$1,168	$355	$4,262
62704	W4	2	0.158	493	$38	$130	$45	$545
62704	W4	14	1.106	2,588	$266	$908	$276	$3,315
62704	W5	14	1.106	2,588	$266	$908	$276	$3,315
62704	W6	14	1.106	2,588	$266	$908	$276	$3,315
62704	W7	14	1.106	2,588	$266	$908	$276	$3,315
62704	W8	14	1.106	2,588	$266	$908	$276	$3,315
62704	W9	14	1.106	2,588	$266	$908	$276	$3,315
62704		18	1.422	3,327	$342	$1,168	$355	$4,262
70525	Bar	6	0.474	1,479	$114	$389	$140	$1,683
70525	Dining	5	0.395	1,232	$95	$324	$117	$1,403
70525	Dishwash	1	0.079	370	$19	$65	$29	$352
70525	Dishwash	8	0.632	2,958	$152	$519	$234	$2,817
70525	Kitchen	30	2.370	11,092	$570	$1,946	$879	$10,565
70525	Serving	2	0.158	493	$38	$130	$47	$561
90312	Office	6	0.474	789	$114	$389	$101	$1,219
90312	Office	8	0.632	1,052	$152	$519	$135	$1,625
90312	Office	8	0.632	1,052	$152	$519	$135	$1,625
90312	Office	8	0.632	1,052	$152	$519	$135	$1,625
90312	Office	10	0.790	1,315	$190	$649	$169	$2,031
90507	Office	1	0.079	131	$19	$65	$17	$203
90507	Office	5	0.395	657	$95	$324	$84	$1,015
91114	1st E Battery Shop	1	0.079	329	$19	$65	$27	$323
Totals for Retrofit Type D4:		671	49.341	144,543	$12,749	$43,531	$13,793	#######
					SIR	3.81	Payback	3.16

Table H-12. Lighting Retrofit E1 F48T12HO, 2 Lamp Fixtures: Replace Existing Ballasts with Electronic Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
91114	2nd W Elec. Repair	2	0.066	275	$8	$88	$22	$261
91114	2nd W Elec. Repair	6	0.198	824	$24	$263	$65	$783
91114	1st E Shop	24	0.792	3,295	$96	$1,053	$261	$3,132
91114	Tst E Tools	16	0.528	1,098	$64	$702	$121	$1,450
Totals for Retrofit Type E1:		**48**	**1.584**	**5,491**	**$192**	**$2,107**	**$468**	**$5,625**
					SIR	**2.67**	**Payback**	**4.50**

Table H-13 Lighting Retrofit E2 F40T12U, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
56301	154	1	0.011	41	$10	$70	$4	$49
Totals for Retrofit Type E2:		**1**	**0.011**	**41**	**$10**	**$70**	**$4**	**$49**
					SIR	**0.70**	**Payback**	**17.06**

Table H-14 Lighting Retrofit E3 F40T12U, 3 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
56301	140	1	0.012	45	$11	$105	$5	$56
Totals for Retrofit Type E3:		**1**	**0.012**	**45**	**$11**	**$105**	**$5**	**$56**
					SIR	**0.54**	**Payback**	**22.30**

Table H-15 Lighting Retrofit F1 F96T12, 2 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
70525	Kitchen	2	0.080	374	$20	$182	$20	$244
90312	Warehouse	18	0.720	1,498	$180	$1,640	$140	$1,688
Totals for Retrofit Type F1:		**20**	**0.800**	**1,872**	**$200**	**$1,822**	**$161**	**$1,932**
					SIR	**1.06**	**Payback**	**11.35**

Table H-16 Lighting Retrofit F2 F96T12, 4 Lamp Fixtures: Replace Lamps and Ballasts

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
61701	Sports Admin.	1	0.080	166	$20	$182	$16	$187
Totals for Retrofit Type F2:		**1**	**0.080**	**166**	**$20**	**$182**	**$16**	**$187**
					SIR	**1.03**	**Payback**	**11.73**

Table H-17 Lighting Retrofit G1 Incandescent 60W Downlight: Replace Lamp with Compact Fluorescent Lamp

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
22422	Basement	1	0.045	70	$5	$18	$13	$153
22422	Basement	1	0.045	70	$5	$18	$13	$153
Totals for Retrofit Type G1:		**2**	**0.089**	**139**	**$10**	**$37**	**$26**	**$306**
					SIR	**8.36**	**Payback**	**1.44**

Table H-18. Lighting Retrofit G2 Incandescent 75W Downlight: Replace Lamp with Compact Fluorescent Lamp

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
20200	Corridor	1	0.055	60	$5	$9	$24	$291
20200	Extr.Entry	1	0.055	60	$5	$9	$24	$291
20200	Extr.Storage	1	0.055	29	$5	$9	$10	$122
20200	Furnace	1	0.055	14	$5	$9	$9	$103
43002	1 A	10	0.550	858	$5	$9	$214	$2,569
43002	1 B	6	1.380	2,153	$5	$9	$342	$4,107
43002	Basement	4	0.220	1,373	$5	$9	$177	$2,116
Totals for Retrofit Type G2:		**24**	**2.370**	**4,547**	**$35**	**$62**	**$800**	**$9,598**
					SIR	**153.60**	**Payback**	**0.08**

Table H-19. Lighting Retrofit G3 Incand. 40W Ceiling or Wall-Mount Fixture: Replacement Compact Fluorescent

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
43002	1st Floor	5	0.158	246	$15	$78	$47	$561
43002	1st Floor	8	0.252	393	$24	$124	$75	$898
43002	1st Floor	16	0.504	786	$48	$249	$150	$1,795
43002	1st Floor	37	1.166	1,818	$111	$575	$346	$4,151
57428	106	1	0.032	66	$3	$16	$11	$133
70525	Toilet	2	0.126	590	$12	$62	$68	$818
70525	Toilet	2	0.126	590	$12	$62	$68	$818
Totals for Retrofit Type G3:		**71**	**2.363**	**4,488**	**$225**	**$1,166**	**$765**	**$9,175**
					SIR	**7.87**	**Payback**	**1.52**

Table H-20. Lighting Retrofit G4 Incand. 60W Ceiling or Wall-Mount Fixture: Replacement Compact Fluorescent

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
20200	Bathroom	1	0.089	279	$10	$38	$34	$411
20200	Entry	1	0.045	49	$5	$19	$15	$175
43002	1 A	4	0.179	279	$20	$76	$55	$661
43002	1 C	4	0.179	46	$20	$76	$31	$376
43002	Basement	1	0.045	112	$5	$19	$16	$189
61701	Locker Rooms	32	1.430	2,975	$160	$610	$427	$5,121
80305	207	1	0.045	23	$5	$19	$8	$92
80305	307	1	0.045	23	$5	$19	$8	$92
Totals for Retrofit Type G4:		**45**	**2.056**	**3,786**	**$230**	**$876**	**$593**	**$7,117**
					SIR	**8.12**	**Payback**	**1.48**

Table H-21. Lighting Retrofit G5 Incandescent 100W Ceiling Fixture: Replace Lamp with Compact Fluorescent

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
20200	Dining	1	0.231	252	$15	$89	$55	$664
20200	Living Room	1	0.077	168	$5	$30	$23	$270
43002	1st Floor	20	1.540	3,844	$100	$596	$272	$3,281
43002	Basement	3	0.231	60	$15	$89	$39	$474
61701	Sports Admin.	1	0.077	160	$5	$30	$27	$320
70525	Dishwash	2	0.154	480	$10	$60	$31	$378
Totals for Retrofit Type G5:		**28**	**2.310**	**4,965**	**$150**	**$894**	**$448**	**$5,386**
					SIR	**6.02**	**Payback**	**2.00**

Table H-22. Lighting Retrofit H1 Incandescent 60W and 75W Table Lamps: Replacement Compact Fluorescents

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
20200	Bedroom(master)	1	0.043	94	$5	$20	$14	$168
80305	117	2	0.086	188	$10	$39	$28	$337
80305	119	2	0.086	188	$10	$39	$28	$337
80305	120	2	0.086	188	$10	$39	$28	$337
80305	122	2	0.086	188	$10	$39	$28	$337
80305	123	2	0.086	188	$10	$39	$28	$337
80305	125	2	0.086	188	$10	$39	$28	$337
80305	126	2	0.086	188	$10	$39	$28	$337
80305	128	2	0.086	188	$10	$39	$28	$337
80305	130	2	0.086	188	$10	$39	$28	$337
80305	131	2	0.086	188	$10	$39	$28	$337
80305	132	2	0.086	188	$10	$39	$28	$337
80305	134	2	0.086	188	$10	$39	$28	$337
80305	135	2	0.086	188	$10	$39	$28	$337
80305	137	2	0.086	188	$10	$39	$28	$337
80305	138	2	0.086	188	$10	$39	$28	$337
80305	140	2	0.086	188	$10	$39	$28	$337
80305	141	2	0.086	188	$10	$39	$28	$337
80305	143	2	0.086	188	$10	$39	$28	$337
80305	144	2	0.086	188	$10	$39	$28	$337
80305	146	2	0.086	188	$10	$39	$28	$337
80305	147	2	0.086	188	$10	$39	$28	$337
80305	148	2	0.086	188	$10	$39	$28	$337
80305	150	2	0.086	188	$10	$39	$28	$337
80305	151	2	0.086	188	$10	$39	$28	$337
80305	153	2	0.086	188	$10	$39	$28	$337
80305	155	2	0.086	188	$10	$39	$28	$337
80305	156	2	0.086	188	$10	$39	$28	$337
80305	158	2	0.086	188	$10	$39	$28	$337
80305	159	2	0.086	188	$10	$39	$28	$337
80305	160	2	0.086	188	$10	$39	$28	$337
80305	162	2	0.086	188	$10	$39	$28	$337
80305	164	2	0.086	188	$10	$39	$28	$337
80305	165	2	0.086	188	$10	$39	$28	$337
80305	167	2	0.086	188	$10	$39	$28	$337
80305	168	2	0.086	188	$10	$39	$28	$337
80305	170	2	0.086	188	$10	$39	$28	$337
80305	171	2	0.086	188	$10	$39	$28	$337
80305	173	2	-0.086	188	$10	$39	$28	$337
80305	174	2	0.086	188	$10	$39	$28	$337
80305	176	2	0.086	188	$10	$39	$28	$337
80305	208	2	0.086	188	$10	$39	$28	$337
80305	210	2	0.086	188	$10	$39	$28	$337
80305	214	2	0.086	188	$10	$39	$28	$337
80305	216	2	0.086	188	$10	$39	$28	$337
80305	219	2	0.086	188	$10	$39	$28	$337
80305	219.1	2	0.086	188	$10	$39	$28	$337
80305	220	2	0.086	188	$10	$39	$28	$337
80305	222	2	0.086	188	$10	$39	$28	$337
80305	223	2	0.086	188	$10	$39	$28	$337
80305	225	2	0.086	188	$10	$39	$28	$337
80305	226	2	0.086	188	$10	$39	$28	$337
80305	228	2	0.086	188	$10	$39	$28	$337
80305	229	2	0.086	188	$10	$39	$28	$337
80305	231	2	0.086	188	$10	$39	$28	$337
80305	232	2	0.086	188	$10	$39	$28	$337
80305	234	2	0.086	188	$10	$39	$28	$337
80305	235	2	0.086	188	$10	$39	$28	$337
80305	237	2	0.086	188	$10	$39	$28	$337
80305	238	2	0.086	188	$10	$39	$28	$337

Table H-22. Lighting Retrofit H1 Incandescent 60W and 75W Table Lamps: Replacement Compact Fluorescents

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	240	2	0.086	188	$10	$39	$28	$337
80305	241	2	0.086	188	$10	$39	$28	$337
80305	243	2	0.086	188	$10	$39	$28	$337
80305	244	2	0.086	188	$10	$39	$28	$337
80305	246	2	0.086	188	$10	$39	$28	$337
80305	247	2	0.086	188	$10	$39	$28	$337
80305	249	2	0.086	188	$10	$39	$28	$337
80305	250	2	0.086	188	$10	$39	$28	$337
80305	252	2	0.086	188	$10	$39	$28	$337
80305	253	2	0.086	188	$10	$39	$28	$337
80305	255	2	0.086	188	$10	$39	$28	$337
80305	256	2	0.086	188	$10	$39	$28	$337
80305	258	2	0.086	188	$10	$39	$28	$337
80305	259	2	0.086	188	$10	$39	$28	$337
80305	261	2	0.086	188	$10	$39	$28	$337
80305	264	2	0.086	188	$10	$39	$28	$337
80305	264.1	2	0.086	188	$10	$39	$28	$337
80305	265	2	0.086	188	$10	$39	$28	$337
80305	267	2	0.086	188	$10	$39	$28	$337
80305	268	2	0.086	188	$10	$39	$28	$337
80305	270	2	0.086	188	$10	$39	$28	$337
80305	271	2	0.086	188	$10	$39	$28	$337
80305	273	2	0.086	188	$10	$39	$28	$337
80305	308	2	0.086	188	$10	$39	$28	$337
80305	310	2	0.086	188	$10	$39	$28	$337
80305	314	2	0.086	188	$10	$39	$28	$337
80305	316	2	0.086	188	$10	$39	$28	$337
80305	319	2	0.086	188	$10	$39	$28	$337
80305	319.1	2	0.086	188	$10	$39	$28	$337
80305	320	2	0.086	188	$10	$39	$28	$337
80305	322	2	0.086	188	$10	$39	$28	$337
80305	323	2	0.086	188	$10	$39	$28	$337
80305	325	2	0.086	188	$10	$39	$28	$337
80305	326	2	0.086	188	$10	$39	$28	$337
80305	328	2	0.086	188	$10	$39	$28	$337
80305	329	2	0.086	188	$10	$39	$28	$337
80305	331	2	0.086	188	$10	$39	$28	$337
80305	332	2	0.086	188	$10	$39	$28	$337
80305	334	2	0.086	188	$10	$39	$28	$337
80305	335	2	0.086	188	$10	$39	$28	$337
80305	337	2	0.086	188	$10	$39	$28	$337
80305	338	2	0.086	188	$10	$39	$28	$337
80305	340	2	0.086	188	$10	$39	$28	$337
80305	341	2	0.086	188	$10	$39	$28	$337
80305	343	2	0.086	188	$10	$39	$28	$337
80305	344	2	0.086	188	$10	$39	$28	$337
80305	346	2	0.086	188	$10	$39	$28	$337
80305	347	2	0.086	188	$10	$39	$28	$337
80305	349	2	0.086	188	$10	$39	$28	$337
80305	350	2	0.086	188	$10	$39	$28	$337
80305	352	2	0.086	188	$10	$39	$28	$337
80305	353	2	0.086	188	$10	$39	$28	$337
80305	355	2	0.086	188	$10	$39	$28	$337
80305	356	2	0.086	188	$10	$39	$28	$337
80305	358	2	0.086	188	$10	$39	$28	$337
80305	359	2	0.086	188	$10	$39	$28	$337
80305	361	2	0.086	188	$10	$39	$28	$337
80305	364	2	0.086	188	$10	$39	$28	$337
80305	364.1	2	0.086	188	$10	$39	$28	$337
80305	365	2	0.086	188	$10	$39	$28	$337

Table H-22. Lighting Retrofit H1 Incandescent 60W and 75W Table Lamps: Replacement Compact Fluorescents

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
80305	367	2	0.086	188	$10	$39	$28	$337
80305	368	2	0.086	188	$10	$39	$28	$337
80305	370	2	0.086	188	$10	$39	$28	$337
80305	371	2	0.086	188	$10	$39	$28	$337
80305	373	2	0.086	188	$10	$39	$28	$337
Totals for Retrofit Type H1:		249	10.707	23,384	$1,245	$4,876	$3,493	$41,911
					SIR	8.60	Payback	1.40

Table H-23. Lighting Retrofit J1 250W MV Pendant-Mount Fixture: Replace Lamp & Ballast with HPS

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
61701	Workout	9	0.873	1,816	$87	$1,791	$214	$2,571
61701	Racquetball Court	12	1.164	1,816	$116	$2,388	$256	$3,076
61701	Racquetball Court	12	1.164	1,816	$116	$2,388	$256	$3,076
Totals for Retrofit Type J1:		33	3.201	5,448	$320	$6,568	$726	$8,724
					SIR	1.33	Payback	9.05

Table H-24. Lighting Retrofit J2 400W MV Pendant-Mount Fixture: Replace Lamp & Ballast with HPS

Bldg No	Room No	No of Fixtures	ECO Savings (kW)	ECO Savings (kWH/Yr)	ECO Rebate ($)	ECO Investment ($)	ECO Total Savings ($/Year)	ECO LCC Savings ($)
61701	Gym	48	10.032	20,867	$1,003	$7,455	$2,432	$29,226
61701	Racquetball Court	6	1.254	2,608	$125	$932	$304	$3,653
Totals for Retrofit Type J2:		54	11.286	23,475	$1,129	$8,387	$2,736	$32,880
					SIR	3.92	Payback	3.06

Table H-25. Lighting Controls Retrofit K1: Ceiling Mounted PIR Occupancy Sensors

Bldg No	Room No	Number Sensors Required	Energy Saved (kWH/Year)	Annual Cost Saved ($/Year)	Total LCC Cost Saved ($)	ECO Construction Cost ($)	ECO Rebate ($)	ECO Investment ($)
15544	103	2	1,968	$110.31	$1,325	$608	$16	$665
15544	104	2	2,029	$118.97	$1,428	$608	$16	$665
15544	105	6	3,136	$183.86	$2,207	$1,824	$48	$1,995
15544	106	2	2,583	$144.78	$1,739	$608	$16	$665
15544	107	4	4,673	$261.98	$3,146	$1,216	$32	$1,330
15544	111	3	3,812	$213.72	$2,567	$912	$24	$998
15544	113	3	3,443	$193.04	$2,318	$912	$24	$998
15544	114	2	1,937	$113.56	$1,363	$608	$16	$665
22422	101	1	215	$12.72	$153	$304	$4	$337
22422	108	1	429	$25.45	$306	$304	$8	$333
22422	111	2	805	$47.72	$573	$608	$16	$665
22422	116	1	537	$31.81	$382	$304	$8	$333
22422	201	1	215	$12.72	$153	$304	$4	$337
22422	202	1	215	$12.72	$153	$304	$4	$337
22422	203	1	429	$25.45	$306	$304	$8	$333
22422	205	3	1,503	$89.07	$1,069	$912	$24	$998
22422	212	1	177	$10.99	$132	$304	$4	$337
43002	1st Floor	1	107	$6.36	$76	$304	$4	$337
43002	1st Floor	2	287	$100.48	$1,201	$608	$16	$665
53301	103	10	8,461	$497.49	$5,973	$3,041	$80	$3,326
53301	104	1	312	$18.38	$221	$304	$4	$337
53301	105	1	312	$18.38	$221	$304	$4	$337
53301	107	1	312	$18.38	$221	$304	$4	$337
53301	117	1	449	$26.42	$317	$304	$8	$333
53301	119	3	2,172	$127.67	$1,533	$912	$24	$998
53301	120	2	973	$57.23	$687	$608	$16	$665
53301	121	1	208	$12.25	$147	$304	$4	$337
53301	124	3	2,321	$136.48	$1,639	$912	$24	$998
53301	126	1	208	$12.25	$147	$304	$4	$337
53301	128	1	599	$35.22	$423	$304	$8	$333
53301	129	1	208	$12.25	$147	$304	$4	$337
53301	202	11	18,271	$1,051.62	$12,627	$3,345	$88	$3,658
53301	217	6	7,176	$422.77	$5,076	$1,824	$48	$1,995
53301	220	1	832	$49.02	$588	$304	$8	$333
56301	107	1	655	$38.6	$463	$304	$8	$333
56301	109	1	749	$44.12	$530	$304	$8	$333
56301	113	2	1,685	$99.26	$1,192	$608	$16	$665
56301	115	2	1,348	$79.25	$951	$608	$16	$665
56301	118	2	1,078	$63.4	$761	$608	$16	$665
56301	121	2	1,617	$95.09	$1,142	$608	$16	$665
56301	126	2	1,685	$99.26	$1,192	$608	$16	$665
56301	134	2	1,966	$115.8	$1,390	$608	$16	$665
56301	137	2	2,246	$132.35	$1,589	$608	$16	$665
56301	138	2	1,872	$110.29	$1,324	$608	$16	$665
56301	140	1	936	$55.14	$662	$304	$8	$333
56301	141	1	468	$27.57	$331	$304	$4	$337
56301	154	1	1,030	$60.66	$728	$304	$8	$333
56301	130, Lab	1	809	$47.55	$571	$304	$8	$333
56301	143	1	1,123	$66.17	$794	$304	$8	$333
56301	144	1	842	$49.63	$596	$304	$8	$333
56301	145	1	1,123	$66.17	$794	$304	$8	$333
56301	153A	1	539	$31.7	$381	$304	$8	$333
57428	105	1	1,248	$73.53	$883	$304	$8	$333
57428	107	2	1,872	$110.29	$1,324	$608	$16	$665
57428	114	1	416	$24.51	$294	$304	$4	$337
57428	115	1	416	$24.51	$294	$304	$4	$337
57428	123	2	1,664	$98.03	$1,177	$608	$16	$665
57428	130	3	5,545	$310.86	$3,733	$912	$24	$998
57428	131	1	2,147	$120.33	$1,445	$304	$8	$333
57428	202	1	416	$24.51	$294	$304	$4	$337
57428	209	1	416	$24.51	$294	$304	$4	$337
57428	217	2	1,872	$110.29	$1,324	$608	$16	$665
61701	Area	1	312	$17.6	$211	$304	$8	$333
61701	Gym	4	6,115	$301.59	$3,625	$1,216	$32	$1,330

Table H-25. Lighting Controls Retrofit K1: Ceiling Mounted PIR Occupancy Sensors

Bldg No	Room No	Number Sensors Required	Energy Saved (kWH/Year)	Annual Cost Saved ($/Year)	Total LCC Cost Saved ($)	ECO Construction Cost ($)	ECO Rebate ($)	ECO Investment ($)
61701	Office	1	537	$30.64	$368	$304	$8	$333
62704	W10	2	1,409	$82.59	$992	$608	$16	$665
62704	W11	2	1,409	$82.59	$992	$608	$16	$665
62704	W2	2	1,409	$82.59	$992	$608	$16	$665
62704	W3	2	1,811	$106.19	$1,275	$608	$16	$665
62704	W4	2	1,409	$82.59	$992	$608	$16	$665
62704	W5	2	1,409	$82.59	$992	$608	$16	$665
62704	W6	2	1,409	$82.59	$992	$608	$16	$665
62704	W7	2	1,409	$82.59	$992	$608	$16	$665
62704	W8	2	1,409	$82.59	$992	$608	$16	$665
62704	W9	2	1,409	$82.59	$992	$608	$16	$665
62704		2	1,811	$106.19	$1,275	$608	$16	$665
70525	Offices	1	671	$44.16	$530	$304	$8	$333
70525	Whse	1	156	$10.84	$130	$304	$4	$337
80305	OR	1	187	$11.52	$138	$304	$4	$337
80305	OR	1	187	$11.52	$138	$304	$4	$337
80305	OR	1	499	$30.73	$369	$304	$8	$333
80305	OR	1	562	$34.57	$415	$304	$8	$333
80505	102	2	374	$23.52	$282	$608	$8	$673
80505	103	3	1,121	$70.57	$847	$912	$24	$998
80505	104	2	374	$23.52	$282	$608	$8	$673
80505	106	2	374	$23.52	$282	$608	$8	$673
80505	108	2	374	$23.52	$282	$608	$8	$673
80505	110	2	374	$23.52	$282	$608	$8	$673
80505	131	2	872	$48.53	$583	$608	$16	$665
80505	142	2	332	$18.49	$222	$608	$8	$673
80505	145	2	390	$25.65	$308	$608	$16	$665
80505	146	6	1,994	$110.93	$1,332	$1,824	$48	$1,995
80505	151	1	498	$27.73	$333	$304	$8	$333
80505	176	2	665	$36.98	$444	$608	$16	$665
80505	179	1	249	$13.87	$167	$304	$8	$333
80505	181	1	374	$18.76	$225	$304	$8	$333
80505	210	5	1,246	$87.5	$1,050	$1,520	$40	$1,663
80505	212	1	498	$35.	$420	$304	$8	$333
80505	213	1	74	$10.84	$130	$304	$8	$333
80505	231	1	208	$14.58	$175	$304	$4	$337
80505	234	2	498	$35.	$420	$608	$16	$665
80505	236	2	498	$35.	$420	$608	$16	$665
80505	237	1	231	$12.98	$156	$304	$8	$333
80505	245	2	748	$52.5	$630	$608	$16	$665
80505	248	1	498	$33.18	$398	$304	$8	$333
80505	249	1	74	$9.63	$115	$304	$8	$333
80505	278	1	498	$33.18	$398	$304	$8	$333
80505	280	6	1,994	$118.19	$1,419	$1,824	$48	$1,995
80505	118 C	2	665	$33.34	$401	$608	$16	$665
80505	162B	1	332	$17.28	$208	$304	$8	$333
80505	203-5	3	1,121	$56.27	$676	$912	$24	$998
80505	242 + 276	2	665	$34.55	$415	$608	$16	$665
80505	244 + 246	2	665	$39.4	$473	$608	$16	$665
80505	277 + 281	2	748	$37.51	$451	$608	$16	$665
90312	Office	1	572	$33.19	$399	$304	$8	$333
90312	Office	1	572	$33.19	$399	$304	$8	$333
90312	Office	1	572	$33.19	$399	$304	$8	$333
90312	Office	1	716	$41.49	$498	$304	$8	$333
90312	Warehouse	2	1,479	$85.55	$1,027	$608	$16	$665
90507	Office	1	322	$19.09	$229	$304	$8	$333
91114	1st E Office	1	644	$38.17	$458	$304	$8	$333
91114	1st E Tools	2	932	$45.05	$542	$608	$16	$665
91114	1st W QC Office	1	644	$38.17	$458	$304	$8	$333
91114	2nd E Chief	1	644	$38.17	$458	$304	$8	$333
91114	2nd W Elec. Repair	1	716	$42.42	$509	$304	$8	$333
91114	2nd W Storage	2	850	$55.94	$671	$608	$16	$665
Totals for ECO K1		239	162,912	$9,552	$114,686	$72,674	$1,784	$79,611
					SIR 1.44		Payback 8.33	

Table H-26. Lighting Controls Retrofit K2: Ceiling Mounted Ultrasonic Occupancy Sensors

Bldg No	Room No	Number Sensors Required	Energy Saved (kWH/Year)	Annual Cost Saved ($/Year)	Total LCC Cost Saved ($)	ECO Construction Cost ($)	ECO Rebate ($)	ECO Investment ($)
20200	Bathroom	1	24	$2.35	$28	$304	$4	$337
22422	Basement	1	67	$4.03	$48	$304	$4	$337
22422	Basement	1	67	$4.03	$48	$304	$4	$337
22422	Basement	1	20	$1.15	$14	$304	$4	$337
22422	Basement	1	20	$1.15	$14	$304	$4	$337
22422	Basement	1	6	$1.78	$21	$304	$4	$337
22422	Basement	1	6	$1.78	$21	$304	$4	$337
43002	1st Floor	1	134	$7.66	$92	$304	$4	$337
43002	1st Floor	1	134	$7.66	$92	$304	$4	$337
43002	1st Floor	1	117	$6.6	$79	$304	$4	$337
43002	1st Floor	1	150	$7.25	$87	$304	$8	$333
53301	115	1	134	$7.74	$93	$304	$4	$337
53301	115	1	134	$7.74	$93	$304	$4	$337
53301	203	1	268	$15.49	$186	$304	$8	$333
53301	214	1	268	$15.49	$186	$304	$8	$333
56301	147	1	202	$11.89	$143	$304	$4	$337
56301	148	1	135	$7.92	$95	$304	$4	$337
57428	112	1	208	$11.73	$141	$304	$4	$337
57428	117	1	52	$2.93	$35	$304	$4	$337
61701	Locker Rooms	1	4,025	$229.79	$2,759	$304	$8	$333
61701	Locker Rooms	1	156	$8.8	$106	$304	$8	$333
61701	Locker Rooms	1	255	$31.37	$376	$304	$8	$333
61701	Locker Rooms	1	37	$1.82	$22	$304	$8	$333
61701	Toilet	1	134	$7.66	$92	$304	$4	$337
61701	Toilet	1	134	$7.66	$92	$304	$4	$337
62704	-	1	201	$12.08	$145	$304	$4	$337
62704	-	1	352	$21.13	$254	$304	$8	$333
70525	Offices	1	201	$12.08	$145	$304	$4	$337
70525	Toilet	1	201	$12.08	$145	$304	$4	$337
70525	Toilet	1	40	$2.81	$34	$304	$4	$337
70525	Toilet	1	40	$2.14	$26	$304	$4	$337
80305	111	1	150	$8.91	$107	$304	$4	$337
80305	116	1	47	$3.09	$37	$304	$4	$337
80305	121	1	47	$3.09	$37	$304	$4	$337
80305	124	1	47	$3.09	$37	$304	$4	$337
80305	127	1	47	$3.09	$37	$304	$4	$337
80305	130	1	47	$3.09	$37	$304	$4	$337
80305	133	1	47	$3.09	$37	$304	$4	$337
80305	136	1	47	$3.09	$37	$304	$4	$337
80305	139	1	47	$3.09	$37	$304	$4	$337
80305	142	1	47	$3.09	$37	$304	$4	$337
80305	145	1	47	$3.09	$37	$304	$4	$337
80305	148	1	47	$3.09	$37	$304	$4	$337
80305	151	1	47	$3.09	$37	$304	$4	$337
80305	154	1	47	$3.09	$37	$304	$4	$337
80305	157	1	47	$3.09	$37	$304	$4	$337
80305	160	1	47	$3.09	$37	$304	$4	$337
80305	163	1	47	$3.09	$37	$304	$4	$337
80305	166	1	47	$3.09	$37	$304	$4	$337
80305	169	1	47	$3.09	$37	$304	$4	$337
80305	172	1	47	$3.09	$37	$304	$4	$337
80305	175	1	47	$3.09	$37	$304	$4	$337
80305	206	1	188	$10.72	$129	$304	$4	$337
80305	206.1	1	188	$10.72	$129	$304	$4	$337
80305	210	1	47	$3.09	$37	$304	$4	$337
80305	215	1	47	$3.09	$37	$304	$4	$337
80305	218	1	47	$3.09	$37	$304	$4	$337
80305	221	1	47	$3.09	$37	$304	$4	$337
80305	224	1	47	$3.09	$37	$304	$4	$337
80305	227	1	47	$3.09	$37	$304	$4	$337
80305	230	1	47	$3.09	$37	$304	$4	$337
80305	233	1	47	$3.09	$37	$304	$4	$337
80305	236	1	47	$3.09	$37	$304	$4	$337
80305	239	1	47	$3.09	$37	$304	$4	$337

Table H-26. Lighting Controls Retrofit K2: Ceiling Mounted Ultrasonic Occupancy Sensors

Bldg No	Room No	Number Sensors Required	Energy Saved (kWH/Year)	Annual Cost Saved ($/Year)	Total LCC Cost Saved ($)	ECO Construction Cost ($)	ECO Rebate ($)	ECO Investment ($)
80305	242	1	47	$3.09	$37	$304	$4	$337
80305	245	1	47	$3.09	$37	$304	$4	$337
80305	248	1	47	$3.09	$37	$304	$4	$337
80305	251	1	47	$3.09	$37	$304	$4	$337
80305	254	1	47	$3.09	$37	$304	$4	$337
80305	257	1	47	$3.09	$37	$304	$4	$337
80305	260	1	47	$3.09	$37	$304	$4	$337
80305	263	1	47	$3.09	$37	$304	$4	$337
80305	266	1	47	$3.09	$37	$304	$4	$337
80305	269	1	47	$3.09	$37	$304	$4	$337
80305	272	1	47	$3.09	$37	$304	$4	$337
80305	300	1	1,503	$85.79	$1,030	$304	$8	$333
80305	306	1	188	$10.72	$129	$304	$4	$337
80305	306.1	1	188	$10.72	$129	$304	$4	$337
80305	307	1	27	$1.76	$21	$304	$4	$337
80305	310	1	47	$3.09	$37	$304	$4	$337
80305	315	1	47	$3.09	$37	$304	$4	$337
80305	318	1	47	$3.09	$37	$304	$4	$337
80305	321	1	47	$3.09	$37	$304	$4	$337
80305	324	1	47	$3.09	$37	$304	$4	$337
80305	327	1	47	$3.09	$37	$304	$4	$337
80305	330	1	47	$3.09	$37	$304	$4	$337
80305	333	1	47	$3.09	$37	$304	$4	$337
80305	336	1	47	$3.09	$37	$304	$4	$337
80305	339	1	47	$3.09	$37	$304	$4	$337
80305	342	1	47	$3.09	$37	$304	$4	$337
80305	345	1	47	$3.09	$37	$304	$4	$337
80305	348	1	47	$3.09	$37	$304	$4	$337
80305	351	1	47	$3.09	$37	$304	$4	$337
80305	354	1	47	$3.09	$37	$304	$4	$337
80305	357	1	47	$3.09	$37	$304	$4	$337
80305	360	1	47	$3.09	$37	$304	$4	$337
80305	363	1	47	$3.09	$37	$304	$4	$337
80305	366	1	47	$3.09	$37	$304	$4	$337
80305	369	1	47	$3.09	$37	$304	$4	$337
80305	372	1	47	$3.09	$37	$304	$4	$337
80305	OR	1	7	$.32	$4	$304	$4	$337
80305	OR	1	7	$.32	$4	$304	$4	$337
80305	OR	1	7	$.32	$4	$304	$4	$337
80305	OR	1	7	$.32	$4	$304	$4	$337
80505	125	1	69	$3.46	$42	$304	$4	$337
80505	125	1	69	$3.8	$46	$304	$4	$337
80505	129	1	46	$2.99	$36	$304	$4	$337
80505	129	1	69	$4.03	$48	$304	$4	$337
80505	171	1	69	$5.26	$63	$304	$4	$337
80505	171	1	69	$5.26	$63	$304	$4	$337
80505	175	1	69	$3.46	$42	$304	$4	$337
80505	175	1	69	$4.03	$48	$304	$4	$337
80505	225	1	139	$8.06	$97	$304	$8	$333
80505	229	1	139	$8.06	$97	$304	$8	$333
80505	271	1	139	$7.61	$91	$304	$8	$333
80505	275	1	139	$7.61	$91	$304	$8	$333
90312	Toilet	1	134	$7.66	$92	$304	$4	$337
90312	Toilet	1	134	$7.66	$92	$304	$4	$337
90507	Toilet	1	89	$5.11	$61	$304	$4	$337
90507	Toilet	1	89	$5.11	$61	$304	$4	$337
91114	1st W Toilet	1	89	$5.11	$61	$304	$4	$337
91114	1st W Toilet	1	179	$10.21	$123	$304	$4	$337
91114	2nd E Toilet	1	179	$10.21	$123	$304	$4	$337
91114	2nd E Toilet	1	179	$10.21	$123	$304	$4	$337
Totals		**124**	**15,450**	**$933**	**$11,200**	**$37,705**	**$548**	**$41,682**
					SIR .27		**Payback 44.68**	

Table H-27. Lighting Controls Retrofit K3: Wall Switch PIR Occupancy Sensor

Bldg No	Room No	Number Sensors Required	Energy Saved (kWH/Year)	Annual Cost Saved ($/Year)	Total LCC Cost Saved ($)	ECO Construction Cost ($)	ECO Rebate ($)	ECO Investment ($)
15544	103A	1	492	$27.58	$331	$102	$4	$111
20200	Extr.Storage	1	3	$.78	$9	$102	$4	$111
20200	Furnace	1	1	$.39	$5	$102	$4	$111
22422	102	1	215	$12.72	$153	$102	$4	$111
22422	103	1	107	$6.36	$76	$102	$4	$111
22422	104	1	107	$6.36	$76	$102	$4	$111
22422	107	1	215	$12.72	$153	$102	$4	$111
22422	109	1	107	$6.36	$76	$102	$4	$111
22422	110	1	107	$6.36	$76	$102	$4	$111
22422	112	1	107	$6.36	$76	$102	$4	$111
22422	113	1	107	$6.36	$76	$102	$4	$111
22422	114	1	107	$6.36	$76	$102	$4	$111
22422	115	1	107	$6.36	$76	$102	$4	$111
22422	204	1	107	$6.36	$76	$102	$4	$111
22422	206	1	107	$6.36	$76	$102	$4	$111
22422	207	1	107	$6.36	$76	$102	$4	$111
22422	208	1	215	$12.72	$153	$102	$4	$111
22422	209	1	107	$6.36	$76	$102	$4	$111
22422	210	1	107	$6.36	$76	$102	$4	$111
22422	211	1	187	$11.52	$138	$102	$4	$111
22422	108A	1	215	$12.72	$153	$102	$4	$111
22422	Basement	1	11	$.64	$8	$102	$4	$111
22422	PS1	1	268	$15.91	$191	$102	$4	$111
43002	1 C	1	4	$6.86	$82	$102	$4	$111
43002	1 E	1	11	$.93	$11	$102	$4	$111
43002	1 F/G	1	161	$9.54	$115	$102	$4	$111
43002	1 H	1	17	$1.4	$17	$102	$4	$111
43002	1st Floor	1	54	$3.18	$38	$102	$4	$111
43002	1st Floor	1	54	$3.18	$38	$102	$4	$111
43002	1st Floor	1	107	$6.36	$76	$102	$4	$111
43002	1st Floor	1	107	$6.36	$76	$102	$4	$111
43002	1st Floor	1	6	$.47	$6	$102	$4	$111
43002	2 Balcony A	1	45	$3.73	$45	$102	$8	$107
43002	2 Balcony B	1	45	$3.73	$45	$102	$8	$107
43002	2 C	1	322	$19.09	$229	$102	$8	$107
43002	2 D	1	107	$6.36	$76	$102	$4	$111
43002	Basement	1	22	$1.77	$21	$102	$4	$111
43002	Basement	1	11	$.93	$11	$102	$4	$111
43002	Basement	1	4	$3.31	$40	$102	$4	$111
53301	109	1	187	$12.96	$155	$102	$4	$111
53301	114	1	22	$1.5	$18	$102	$4	$111
53301	124	1	312	$18.38	$221	$102	$4	$111
53301	127	1	150	$8.81	$106	$102	$4	$111
53301	203	1	449	$25.86	$311	$102	$4	$111
53301	204	1	449	$25.86	$311	$102	$4	$111
53301	206	1	449	$25.86	$311	$102	$4	$111
53301	214	1	312	$18.38	$221	$102	$4	$111
53301	214	1	22	$1.5	$18	$102	$4	$111
53301	218	1	416	$24.51	$294	$102	$4	$111
53301	221	1	416	$24.51	$294	$102	$4	$111
53301	222	1	416	$24.51	$294	$102	$4	$111
53301	223	1	416	$24.51	$294	$102	$4	$111
53301	224	1	416	$24.51	$294	$102	$4	$111
53301	225	1	416	$24.51	$294	$102	$4	$111
56301	108	1	562	$33.09	$397	$102	$8	$107
56301	109	1	562	$33.09	$397	$102	$8	$107
56301	114	1	270	$15.85	$190	$102	$4	$111
56301	116	1	270	$15.85	$190	$102	$4	$111
56301	117	1	202	$11.89	$143	$102	$4	$111
56301	119	1	135	$7.92	$95	$102	$4	$111
56301	120	1	270	$15.85	$190	$102	$4	$111
56301	122	1	135	$7.92	$95	$102	$4	$111
56301	128	1	187	$11.03	$132	$102	$4	$111
56301	129	1	187	$11.03	$132	$102	$4	$111

Table H-27. Lighting Controls Retrofit K3: Wall Switch PIR Occupancy Sensor

Bldg No	Room No	Number Sensors Required	Energy Saved (kWH/Year)	Annual Cost Saved ($/Year)	Total LCC Cost Saved ($)	ECO Construction Cost ($)	ECO Rebate ($)	ECO Investment ($)
56301	130	1	135	$7.92	$95	$102	$4	$111
56301	133	1	281	$16.54	$199	$102	$4	$111
56301	135	1	187	$11.03	$132	$102	$4	$111
56301	136	1	187	$11.03	$132	$102	$4	$111
56301	139	1	187	$11.03	$132	$102	$4	$111
56301	140	1	94	$6.75	$81	$102	$4	$111
56301	152	1	468	$27.57	$331	$102	$4	$111
56301	154	1	67	$4.8	$58	$102	$4	$111
56301	113C	1	562	$33.09	$397	$102	$8	$107
57428	102	1	89	$5.89	$71	$102	$4	$111
57428	106	1	4	$.43	$5	$102	$4	$111
57428	108	1	208	$14.45	$173	$102	$4	$111
57428	109	1	312	$21.68	$260	$102	$8	$107
57428	118	1	624	$36.76	$441	$102	$8	$107
57428	120	1	624	$36.76	$441	$102	$8	$107
57428	126	1	312	$21.68	$260	$102	$8	$107
57428	127	1	312	$21.68	$260	$102	$8	$107
57428	203	1	416	$24.51	$294	$102	$4	$111
57428	204	1	624	$36.76	$441	$102	$8	$107
57428	207	1	520	$30.64	$368	$102	$4	$111
57428	208	1	520	$30.64	$368	$102	$4	$111
57428	216A	1	416	$24.51	$294	$102	$4	$111
57428	216B	1	416	$24.51	$294	$102	$4	$111
61701	Office	1	89	$5.11	$61	$102	$4	$111
61701	Office	1	134	$7.66	$92	$102	$4	$111
61701	Pool Office	1	89	$5.11	$61	$102	$4	$111
61701	Sports Admin.	1	164	$9.41	$113	$102	$4	$111
61701	Sports Admin.	1	89	$5.01	$60	$102	$4	$111
61701	Sports Admin.	1	12	$3.16	$38	$102	$4	$111
61701	Supplies	1	45	$2.55	$31	$102	$4	$111
70525	Dishwash	1	67	$4.42	$53	$102	$4	$111
70525	Dishwash	1	36	$4.83	$58	$102	$4	$111
70525	Office	1	134	$8.83	$106	$102	$4	$111
70525	Offices	1	335	$22.08	$265	$102	$4	$111
70525	Supply	1	67	$4.42	$53	$102	$4	$111
70525	Whse	1	67	$4.42	$53	$102	$4	$111
70525	Whse	1	268	$17.67	$212	$102	$4	$111
80305	103	1	447	$25.53	$307	$102	$4	$111
80305	104	1	335	$19.15	$230	$102	$4	$111
80305	109	1	224	$12.77	$153	$102	$4	$111
80305	110	1	54	$3.18	$38	$102	$4	$111
80305	112	1	7	$.37	$4	$102	$4	$111
80305	113	1	22	$1.28	$15	$102	$4	$111
80305	114	1	11	$.64	$8	$102	$4	$111
80305	115	1	45	$2.55	$31	$102	$4	$111
80305	201	1	107	$6.36	$76	$102	$4	$111
80305	202	1	11	$.64	$8	$102	$4	$111
80305	203	1	447	$25.53	$307	$102	$4	$111
80305	204	1	54	$3.18	$38	$102	$4	$111
80305	205	1	563	$32.17	$386	$102	$4	$111
80305	207	1	2	$.2	$2	$102	$4	$111
80305	208	1	215	$12.72	$153	$102	$4	$111
80305	208	1	671	$38.3	$460	$102	$8	$107
80305	301	1	107	$6.36	$76	$102	$4	$111
80305	302	1	11	$.64	$8	$102	$4	$111
80305	303	1	143	$8.48	$102	$102	$4	$111
80305	303	1	447	$25.53	$307	$102	$4	$111
80305	304	1	54	$3.18	$38	$102	$4	$111
80305	305	1	563	$32.17	$386	$102	$4	$111
80305	305	1	563	$32.17	$386	$102	$4	$111
80305	307	1	2	$.69	$8	$102	$4	$111
80305	308	1	215	$12.72	$153	$102	$4	$111
80305	OR	1	187	$11.52	$138	$102	$4	$111
80305	OR	1	187	$11.52	$138	$102	$4	$111

Table H-27. Lighting Controls Retrofit K3: Wall Switch PIR Occupancy Sensor

Bldg No	Room No	Number Sensors Required	Energy Saved (kWH/Year)	Annual Cost Saved ($/Year)	Total LCC Cost Saved ($)	ECO Construction Cost ($)	ECO Rebate ($)	ECO Investment ($)
80305	OR	1	166	$10.24	$123	$102	$4	$111
80305	OR	1	499	$30.73	$369	$102	$8	$107
80305	OR	1	13	$.77	$9	$102	$4	$111
80505	139	1	115	$5.73	$69	$102	$4	$111
80505	143	1	115	$6.49	$78	$102	$4	$111
80505	148	1	332	$22.12	$265	$102	$8	$107
80505	152	1	332	$19.7	$236	$102	$8	$107
80505	154	1	19	$1.38	$17	$102	$4	$111
80505	156	1	19	$1.38	$17	$102	$4	$111
80505	158	1	19	$1.38	$17	$102	$4	$111
80505	177	1	74	$8.66	$104	$102	$4	$111
80505	233	1	173	$8.83	$106	$102	$8	$107
80505	250	1	38	$2.16	$26	$102	$4	$111
80505	1 MECH	1	55	$3.13	$38	$102	$8	$107
80505	118B	1	55	$4.04	$48	$102	$4	$111
80505	136+118D	1	87	$4.49	$54	$102	$4	$111
90312	Office	1	429	$24.89	$299	$102	$8	$107
90507	Office	1	72	$4.15	$50	$102	$4	$111
90507	Office	1	358	$20.75	$249	$102	$4	$111
90507	Office	1	143	$8.48	$102	$102	$4	$111
90508	508	1	447	$25.53	$307	$102	$8	$107
91114	1st W QC Library	1	134	$8.83	$106	$102	$4	$111
91114	2nd E Acet	1	429	$25.45	$306	$102	$8	$107
91114	2nd E Admin	1	429	$25.45	$306	$102	$8	$107
91114	2nd E GM	1	429	$25.45	$306	$102	$8	$107
91114	2nd E Key Punch	1	429	$25.45	$306	$102	$8	$107
91114	2nd E Office	1	215	$12.72	$153	$102	$4	$111
91114	2nd E Office	1	429	$25.45	$306	$102	$8	$107
91114	2nd E OP Mgr	1	429	$25.45	$306	$102	$8	$107
91114	2nd E PLT	1	429	$25.45	$306	$102	$8	$107
91114	2nd E QC	1	429	$25.45	$306	$102	$8	$107
91114	2nd E Supply Admin	1	429	$25.45	$306	$102	$8	$107
91114	2nd E Supply Spec	1	134	$8.05	$97	$102	$4	$111
91114	2nd W Elec. Repair	1	447	$29.44	$353	$102	$8	$107
Totals		**162**	**35,138**	**$2,115**	**$25,393**	**$16,605**	**$768**	**$17,829**
					SIR 1.42		**Payback 8.43**	

Table H-28. Energy Use and Operating Costs for Existing Fixtures

Existing Fixture Type Description	Watts per Fixture	Lamp Life (Hours)	Lamp Cost ($ Each)	Labor (Hr/Lamp)	Cost/1,000 Lamp-Hrs	Proposed Lighting Fixture Retrofits
Exit I-10W - 2 Lamps per Fixture	20.0	131,400	$2.45	0.083	$0.032	A: LED Retrofit Kit
Exit LED	1.8	220,000	$31.50	NA	NA	NA
F13 Mini-Tube Downlight - 2 Lamps per Fixture	32.0	10,000	$2.38	NA	NA	NA
F13 Mini-Tube Wall-Mounted - 2 Lamps per Fixture	32.0	10,000	$2.38	NA	NA	NA
F20T12 - 1 Lamp per Fixture	12.0	9,000	$1.18	NA	NA	NA
F30T12 - 2 Lamps per Fixture	74.0	NA	NA	NA	NA	B1: Electronic Ballast, or
F30T12 - 2 Lamps per Fixture	74.0	18,000	$3.70	0.150	$0.382	B2: Electronic Ballast & T8 Lamps
F32T8 - 1 Lamp per Fixture (Non-electronic Ballast)	37.0	20,000	$2.65	NA	NA	C1: Electronic Ballast
F32T8 - 2 Lamps per Fixture (Non-electronic Ballast)	71.0	20,000	$2.65	0.150	$0.291	C2: Electronic Ballast
F34T12 - 1 Lamps per Fixture	43.0	20,000	$2.75	0.167	$0.314	D1: Ballast & T8 Lamps
F34T12 - 2 Lamps per Fixture	72.0	20,000	$2.75	0.150	$0.296	D2: Ballast & T8 Lamps
F34T12 - 3 Lamps per Fixture	100.0	20,000	$2.75	0.135	$0.280	D3: Ballast & T8 Lamps
F34T12 - 4 Lamps per Fixture	144.0	20,000	$2.75	0.122	$0.267	D4: Ballast & T8 Lamps
F40T12 - 1 Lamp per Fixture	50.0	20,000	$2.75	0.167	$0.314	D1: Ballast & T8 Lamps
F40T12 - 2 Lamps per Fixture	86.0	20,000	$2.75	0.150	$0.296	D2: Ballast & T8 Lamps
F40T12 - 3 Lamps per Fixture	100.0	20,000	$2.75	0.135	$0.280	D3: Ballast & T8 Lamps
F40T12 - 4 Lamps per Fixture	172.0	20,000	$2.75	0.122	$0.267	D4: Ballast & T8 Lamps & D5: Delamping & Reflector
F40T12 - Wall Surface-Mount Fixture 1 Lamp	50.0	20,000	$2.75	0.167	$0.314	D1: Ballast & T8 Lamps
F40T12HO - 2 Lamps per Fixture	145.0	12,000	$5.51	0.150	$0.724	E1: Replace Ballast
F40T12U - 2 Lamps per Fixture	72.0	12,000	$5.62	0.135	$0.706	E2: Replace T8U Lamps & Ballasts
F40T12U - 3 Lamps per Fixture	100.0	12,000	$5.62	0.122	$0.683	E3: Replace T8U Lamps & Ballasts
F96T12 - 2 Lamps per Fixture	158.0	12,000	$3.63	0.169	$0.600	F1: Ballasts & T8 Lamps
F96T12 - 4 Lamps per Fixture	316.0	12,000	$3.63	0.152	$0.570	F2: Ballasts & T8 Lamps
FC12T9 - 32W Circline	43.0	12,000	$2.51	0.167	$0.504	NA
HPS 400W - 1 Lamp per Fixture	457.0	24,000	$22.86	0.300	$1.217	NA
I-100W - Ceiling-Mount Fixture 1 Lamp per Fixture	100.0	750	$0.51	0.083	$3.021	G5: Compact Fluorescent
I-100W - Pendant, decorative	100.0	750	$0.51	NA	NA	NA
I-12x5W - Pendant, decorative	60.0	NA	NA	NA	NA	NA - decorative
I-40W - Wall Surface-Mount Fixture - 1 Lamp per Fixture	40.0	1,500	$0.30	0.083	$1.370	G3: Compact Fluorescent
I-4x100W - Pendant, decorative	400.0	750	$0.51	NA	NA	NA - decorative
I-4x40W - Pendant, decorative	160.0	1,500	$0.30	NA	NA	NA - decorative
I-5x40W - Pendant, decorative	200.0	1,500	$0.30	NA	NA	NA - decorative
I-5x5W - Pendant, decorative	25.0	NA	NA	NA	NA	NA - decorative
I-60W - Ceiling-Mount Fixture 1 Lamp per Fixture	60.0	1,000	$0.51	0.083	$2.265	G4: Compact Fluorescent
I-60W - Desk Lamp	60.0	1,000	$0.51	0.083	$2.265	H1: Replace Lamp with Compact Fluorescent
I-60W Par Downlight Fixture	60.0	2,000	$3.16	0.083	$2.458	G1: Compact Fluorescent
I-60W - Wall Surface-Mount Fixture	60.0	1,000	$0.51	0.083	$2.265	G4: Compact Fluorescent
I-75W - Desk Lamp	75.0	750	$0.71	0.083	$3.287	H1: Replace Lamp with Compact Fluorescent
I-75W Par Downlight Fixture	75.0	2,000	$6.21	0.083	$3.983	G2: Compact Fluorescent
LPS 180W - 1 Lamp per Fixture	220.0	33,000	$56.24	NA	NA	NA
LPS 55W - 1 Lamp per Fixture	80.0	8,000	$30.59	NA	NA	NA
LPS 90W - 1 Lamp per Fixture	125.0	13,500	$33.98	NA	NA	NA
MV 250W - Pendant-Mount	285.0	24,000	$31.62	0.300	$1.582	J1: Replace with HPS Lamp & Ballast
MV 400W - Pendant-Mount	454.0	24,000	$50.34	0.300	$2.362	J2: Replace with HPS Lamp & Ballast

Table H-29. Energy Use and Operating Costs for Proposed Lighting Fixture Retrofits

Retrofit Type	Retrofit Description	Watts per Fixture	Lamp Life (Hours)	Lamp Cost ($ Each)	Labor (Hr/Lamp)	Cost/1,000 Lamp-Hrs
A	A: LED Retrofit Kit	1.8	220,000	$31.50	1.000	$0.239
B1	B1: Electronic Ballast, or	61.0	NA	NA	NA	NA
B2	B2: Electronic Ballast & T8 Lamps	44.0	20,000	$2.54	0.150	$0.286
C1	C1: Electronic Ballast	31.0	NA	NA	NA	NA
C2	C2: Electronic Ballast	60.0	NA	NA	NA	NA
D1	D1: Ballast & T8 Lamps	31.0	20,000	$2.83	0.167	$0.318
D2	D2: Ballast & T8 Lamps	61.0	20,000	$2.83	0.150	$0.300
D3	D3: Ballast & T8 Lamps	93.0	20,000	$2.83	0.135	$0.284
D4	D4: Ballast & T8 Lamps	122.0	20,000	$2.83	0.122	$0.271
D5	D5: Reflector, Delamp to 3 F32T8s & Ballast	93.0	20,000	$2.83	0.135	$0.284
E1	E1: Replace Ballast	112.0	NA	NA	NA	NA
E2	E2: Replace T8U Lamps & Ballasts	61.0	20,000	$9.34	0.135	$0.610
E3	E3: Replace T8U Lamps & Ballasts	88.0	20,000	$9.34	0.122	$0.596
F1	F1: Ballasts & T8 Lamps	118.0	15,000	$10.28	0.169	$0.924
F2	F2: Ballasts & T8 Lamps	236.0	15,000	$10.28	0.152	$0.900
G1	G1: Compact Flourescent	15.3	10,000	$5.19	0.083	$0.695
G2	G2: Compact Fluorescent	20.0	10,000	$5.19	0.083	$0.695
G3	G3: Compact Fluorescent	8.5	10,000	$2.49	0.083	$0.425
G4	G4: Compact Flourescent	15.3	10,000	$5.88	0.083	$0.764
G5	G5: Compact Fluorescent	23.0	10,000	$18.07	0.083	$1.983
H1	H1: Replace Lamp with Compact Fluorescent	17.0	10,000	$11.76	0.083	$1.352
J1	J1: Replace with HPS Lamp & Ballast	188.0	24,000	$12.91	0.300	$0.802
J2	J2: Replace with HPS Lamp & Ballast	245.0	24,000	$16.44	0.300	$0.949

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Total Successful Lighting Fixture Retrofits & Control Projects — Preparer: KELLER & GANNON

Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$256,870		
B. SIOH	$15,412		
C. Design Cost	$15,412		
D. Total Cost (1A+1B+1C)	$287,695		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$36,359	
G. Total Investment (1D-1E-1F)			$251,336

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	1,920		$27,193	12.02	$326,858
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	123.6	kW	$15,804	12.02	$189,959
F. Total		1,920		$42,996		$516,817

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$4,105		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$49,012

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$49,012	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$47,101	
5. Simple Payback (1G/4):	5.34	Years
6. Total Net Discounted Savings (2F5+3C):	$565,829	
7. Savings to Investment Ratio (SIR) (6/1G):	2.25	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit A - LED Exit Signs		Preparer: KELLER & GANNON

Analysis Date: January 1995 Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$5,723		
B. SIOH	$343		
C. Design Cost	$343		
D. Total Cost (1A+1B+1C)	$6,410		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$972	
G. Total Investment (1D-1E-1F)			$5,438

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	59		$830	12.02	$9,979
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	2.0	kW	$251	12.02	$3,020
F. Total		59		$1,082		$13,000

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($165)		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			($1,975)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	($1,975)	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$916	
5. Simple Payback (1G/4):	5.94	Years
6. Total Net Discounted Savings (2F5+3C):	$11,025	
7. Savings to Investment Ratio (SIR) (6/1G):	2.03	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion: Fixture Retrofit B1 - Electronic Ballasts for 2 Lamp F30T12s Preparer: KELLER & GANNON

Analysis Date: January 1995 Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$4,404		
B. SIOH	$264		
C. Design Cost	$264		
D. Total Cost (1A+1B+1C)	$4,933		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$496	
G. Total Investment (1D-1E-1F)			$4,437

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	12		$170	12.02	$2,046
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	1.6	kW	$206	12.02	$2,477
F. Total		12		$376		$4,523

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4) $0

4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$376	
5. Simple Payback (1G/4):	11.79	Years
6. Total Net Discounted Savings (2F5+3C):	$4,523	
7. Savings to Investment Ratio (SIR) (6/1G):	1.02	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Fixture Retrofit B2 - Electronic Ballasts & T8 Lamps for 2 Lamp F30T12 Fixtures | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$6,020		
B. SIOH	$361		
C. Design Cost	$361		
D. Total Cost (1A+1B+1C)	$6,742		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$1,240	
G. Total Investment (1D-1E-1F)			$5,502

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	28		$393	12.02	$4,722
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	3.7	kW	$476	12.02	$5,716
F. Total		28		$868		$10,438

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$104		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$1,244

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$1,244	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$973	
5. Simple Payback (1G/4):	5.66	Years
6. Total Net Discounted Savings (2F5+3C):	$11,682	
7. Savings to Investment Ratio (SIR) (6/1G):	2.12	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Fixture Retrofit C1 - Electronic Ballasts for 1 Lamp F32T8 Fixtures — Preparer: KELLER & GANNON
Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$4,673		
B. SIOH	$280		
C. Design Cost	$280		
D. Total Cost (1A+1B+1C)	$5,234		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$888	
G. Total Investment (1D-1E-1F)			$4,346

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	6		$81	12.02	$973
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	0.7	kW	$85	12.02	$1,023
F. Total		6		$166		$1,996

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$0	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$166	
5. Simple Payback (1G/4):	26.17	Years
6. Total Net Discounted Savings (2F5+3C):	$1,996	
7. Savings to Investment Ratio (SIR) (6/1G):	0.46	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit C2 - Electronic Ballasts for 2 Lamp F32T8 Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15	Years

1. Investment Costs			
A. Construction Costs	$23,645		
B. SIOH	$1,419		
C. Design Cost	$1,419		
D. Total Cost (1A+1B+1C)	$26,483		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$4,424	
G. Total Investment (1D-1E-1F)			$22,059

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	47		$663	12.02	$7,972
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	6.1	kW	$778	12.02	$9,347
F. Total		47		$1,441		$17,320

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$0	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$1,441	
5. Simple Payback (1G/4):	15.31	Years
6. Total Net Discounted Savings (2F5+3C):	$17,320	
7. Savings to Investment Ratio (SIR) (6/1G):	0.79	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit D1 - Electronic Ballasts and T8 Lamps for 1 Lamp F34T12 & F40T12 Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs			
A. Construction Costs	$5,623		
B. SIOH	$337		
C. Design Cost	$337		
D. Total Cost (1A+1B+1C)	$6,297		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$1,080	
G. Total Investment (1D-1E-1F)			$5,217

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	31		$438	12.02	$5,269
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	1.7	kW	$220	12.02	$2,643
F. Total		31		$658		$7,912

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($136)		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			($1,626)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	($1,626)	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$522	
5. Simple Payback (1G/4):	9.99	Years
6. Total Net Discounted Savings (2F5+3C):	$6,286	
7. Savings to Investment Ratio (SIR) (6/1G):	1.20	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit D2 - Electronic Ballasts and T8 Lamps for 2 Lamp F34T12 & F40T12 Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs			
A. Construction Costs	$72,535		
B. SIOH	$4,352		
C. Design Cost	$4,352		
D. Total Cost (1A+1B+1C)	$81,239		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$14,010	
G. Total Investment (1D-1E-1F)			$67,229

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	368		$5,207	12.02	$62,592
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	30.0	kW	$3,839	12.02	$46,141
F. Total		368		$9,046		$108,733

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($48)		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			($569)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)		($569)	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):		$8,998	
5. Simple Payback (1G/4):		7.47	Years
6. Total Net Discounted Savings (2F5+3C):		$108,164	
7. Savings to Investment Ratio (SIR) (6/1G):		1.61	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit D3 - Electronic Ballasts and T8 Lamps for 3 Lamp F34T12 & F40T12 Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs			
A. Construction Costs	$42,253		
B. SIOH	$2,535		
C. Design Cost	$2,535		
D. Total Cost (1A+1B+1C)	$47,323		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$6,325	
G. Total Investment (1D-1E-1F)			$40,998

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	51		$724	12.02	$8,703
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	4.0	kW	$515	12.02	$6,185
F. Total		51		$1,239		$14,887

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($27)		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			($318)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	($318)	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$1,212	
5. Simple Payback (1G/4):	33.83	Years
6. Total Net Discounted Savings (2F5+3C):	$14,570	
7. Savings to Investment Ratio (SIR) (6/1G):	0.36	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit D4 - Electronic Ballasts and T8 Lamps for 4 Lamp F34T12 & F40T12 Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs

A. Construction Costs	$72,782		
B. SIOH	$4,367		
C. Design Cost	$4,367		
D. Total Cost (1A+1B+1C)	$81,515		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$13,420	
G. Total Investment (1D-1E-1F)			$68,095

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	293		$4,152	12.02	$49,912
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	29.9	kW	$3,820	12.02	$45,918
F. Total		293		$7,972		$95,829

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($37)		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			($445)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	($445)	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$7,935	
5. Simple Payback (1G/4):	8.58	Years
6. Total Net Discounted Savings (2F5+3C):	$95,385	
7. Savings to Investment Ratio (SIR) (6/1G):	1.40	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Fixture Retrofit D5 - Reflector and Delamp 4 Lamp F34T12 & F40T12 Fixtures to 3 x F32T8 Lamps and Electronic Ballast — Preparer: KELLER & GANNON
Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$50,250		
B. SIOH	$3,015		
C. Design Cost	$3,015		
D. Total Cost (1A+1B+1C)	$56,280		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$12,749	
G. Total Investment (1D-1E-1F)			$43,531

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	493		$6,989	12.02	$84,004
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	49.3	kW	$6,308	12.02	$75,819
F. Total		493		$13,296		$159,823

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$497		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$5,930

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$5,930	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$13,793	
5. Simple Payback (1G/4):	3.16	Years
6. Total Net Discounted Savings (2F5+3C):	$165,753	
7. Savings to Investment Ratio (SIR) (6/1G):	3.81	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit E1 - Electronic Ballasts for 2 Lamp F48T12HO Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs			
A. Construction Costs	$2,052		
B. SIOH	$123		
C. Design Cost	$123		
D. Total Cost (1A+1B+1C)	$2,299		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$192	
G. Total Investment (1D-1E-1F)			$2,107

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	19		$265	12.02	$3,191
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	1.6	kW	$202	12.02	$2,434
F. Total		19		$468		$5,625

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$0		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$0

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$0	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$468	
5. Simple Payback (1G/4):	4.50	Years
6. Total Net Discounted Savings (2F5+3C):	$5,625	
7. Savings to Investment Ratio (SIR) (6/1G):	2.67	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Fixture Retrofit E2 - Electronic Ballasts and T8 Lamps for 2 Lamp F40T12U Fixtures | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$72		
B. SIOH	$4		
C. Design Cost	$4		
D. Total Cost (1A + 1B + 1C)	$80		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$10	
G. Total Investment (1D-1E-1F)			$70

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	0.14		$2	12.02	$24
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	0.011	kW	$1	12.02	$17
F. Total		0.141		$3		$41

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$1		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$9

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4) $9

4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$4	
5. Simple Payback (1G/4):	17.06	Years
6. Total Net Discounted Savings (2F5 + 3C):	$49	
7. Savings to Investment Ratio (SIR) (6/1G):	0.70	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit E3 - Electronic Ballasts and T8 Lamps for 3 Lamp F40T12U Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs			
A. Construction Costs	$103		
B. SIOH	$6		
C. Design Cost	$6		
D. Total Cost (1A+1B+1C)	$116		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$11	
G. Total Investment (1D-1E-1F)			$105

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	0.153		$2	12.02	$26
B. Dist		0		$0		$0
C. LPG		0		$0		$0
D. Natural Gas	$4.51	0		$0	14.17	
E. Demand Saved	$127.84	0.0120	kW	$2	12.02	$18
F. Total		0.153		$4		$45

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$1		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$12

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$12	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$5	
5. Simple Payback (1G/4):	22.30	Years
6. Total Net Discounted Savings (2F5+3C):	$56	
7. Savings to Investment Ratio (SIR) (6/1G):	0.54	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Fixture Retrofit F1 - Electronic Ballasts and T8 Lamps for 2 Lamp F96T12 Fixtures — Preparer: KELLER & GANNON
Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$1,805		
B. SIOH	$108		
C. Design Cost	$108		
D. Total Cost (1A+1B+1C)	$2,022		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$200	
G. Total Investment (1D-1E-1F)			$1,822

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	6.39		$91	12.02	$1,088
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	0.80	kW	$102	12.02	$1,229
F. Total		6.39		$193		$2,317

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($32)		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			($385)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	($385)	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$161	
5. Simple Payback (1G/4):	11.35	Years
6. Total Net Discounted Savings (2F5+3C):	$1,932	
7. Savings to Investment Ratio (SIR) (6/1G):	1.06	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit F2 - Electronic Ballasts and T8 Lamps for 4 Lamp F96T12 Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs			
A. Construction Costs	$181		
B. SIOH	$11		
C. Design Cost	$11		
D. Total Cost (1A+1B+1C)	$202		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$20	
G. Total Investment (1D-1E-1F)			$182

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	0.57		$8	12.02	$97
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	0.08	kW	$10	12.02	$123
F. Total		0.57		$18		$220

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($3)		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			($33)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	($33)	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$16	
5. Simple Payback (1G/4):	11.73	Years
6. Total Net Discounted Savings (2F5+3C):	$187	
7. Savings to Investment Ratio (SIR) (6/1G):	1.03	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Fixture Retrofit G1 - Compact Fluorescent DTT 13W for Downlight Incandescent Lamp Fixtures | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs

A. Construction Costs	$42		
B. SIOH	$2		
C. Design Cost	$2		
D. Total Cost (1A+1B+1C)	$47		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$10	
G. Total Investment (1D-1E-1F)			$37

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	0.48		$7	12.02	$81
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	0.09	kW	$11	12.02	$137
F. Total		0.48		$18		$218

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$7		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$88

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4) $88

4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$26	
5. Simple Payback (1G/4):	1.44	Years
6. Total Net Discounted Savings (2F5+3C):	$306	
7. Savings to Investment Ratio (SIR) (6/1G):	8.36	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Fixture Retrofit G2 - Compact Fluorescent TRI 20W for Incandescent Lamp Fixtures | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$87		
B. SIOH	$5		
C. Design Cost	$5		
D. Total Cost (1A+1B+1C)	$97		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$35	
G. Total Investment (1D-1E-1F)			$62

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	15.52		$220	12.02	$2,642
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	2.37	kW	$303	12.02	$3,642
F. Total		15.52		$523		$6,284

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$278		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$3,313

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4) $3,313

4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$800	
5. Simple Payback (1G/4):	0.08	Years
6. Total Net Discounted Savings (2F5+3C):	$9,598	
7. Savings to Investment Ratio (SIR) (6/1G):	153.60	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Fixture Retrofit G3 - Compact Fluorescent TT 7W for Incandescent Lamp Fixtures — Preparer: KELLER & GANNON
Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$1,242		
B. SIOH	$75		
C. Design Cost	$75		
D. Total Cost (1A+1B+1C)	$1,391		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$225	
G. Total Investment (1D-1E-1F)			$1,166

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	15.32		$217	12.02	$2,608
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	2.36	kW	$302	12.02	$3,630
F. Total		15.32		$519		$6,239

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$246		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$2,936

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$2,936	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$765	
5. Simple Payback (1G/4):	1.52	Years
6. Total Net Discounted Savings (2F5+3C):	$9,175	
7. Savings to Investment Ratio (SIR) (6/1G):	7.87	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit G4 - Compact Fluorescent DTT 13W for Ceiling Mounted Incandescent Lamp Fixtures		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs			
A. Construction Costs	$988		
B. SIOH	$59		
C. Design Cost	$59		
D. Total Cost (1A+1B+1C)	$1,106		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$230	
G. Total Investment (1D-1E-1F)			$876

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	12.92		$183	12.02	$2,201
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	2.06	kW	$263	12.02	$3,160
F. Total		12.92		$446		$5,360

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$147		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$1,757

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$1,757	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$593	
5. Simple Payback (1G/4):	1.48	Years
6. Total Net Discounted Savings (2F5+3C):	$7,117	
7. Savings to Investment Ratio (SIR) (6/1G):	8.12	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Fixture Retrofit G5 - Compact Fluorescent TRI 23W for Incandescent Lamp Fixtures — Preparer: KELLER & GANNON
Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs

A. Construction Costs	$932		
B. SIOH	$56		
C. Design Cost	$56		
D. Total Cost (1A+1B+1C)	$1,044		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$150	
G. Total Investment (1D-1E-1F)			$894

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	16.95		$240	12.02	$2,885
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	2.31	kW	$295	12.02	$3,550
F. Total		16.95		$535		$6,435

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($88)		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			($1,049)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	($1,049)	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$448	
5. Simple Payback (1G/4):	2.00	Years
6. Total Net Discounted Savings (2F5+3C):	$5,386	
7. Savings to Investment Ratio (SIR) (6/1G):	6.02	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location:	Fort Huachuca, Arizona	Region No. 4	Project No.
Project Title:	ECIP Facility Energy Improvements		Fiscal Year FY96
Discrete Portion:	Fixture Retrofit H1 - Compact Fluorescent 17W for Incandescent Table Lamps		Preparer: KELLER & GANNON
Analysis Date:	January 1995	Economic Life: 15 Years	

1. Investment Costs			
A. Construction Costs	$5,465		
B. SIOH	$328		
C. Design Cost	$328		
D. Total Cost (1A+1B+1C)	$6,121		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$1,245	
G. Total Investment (1D-1E-1F)			$4,876

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	79.81		$1,131	12.02	$13,590
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	10.71	kW	$1,369	12.02	$16,453
F. Total		79.81		$2,499		$30,043

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$994		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$11,868

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$11,868	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$3,493	
5. Simple Payback (1G/4):	1.40	Years
6. Total Net Discounted Savings (2F5+3C):	$41,911	
7. Savings to Investment Ratio (SIR) (6/1G):	8.60	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Fixture Retrofit J1 - 150W High Pressure Sodium Lamp and Ballast Retrofit in 250W MV Lamp Fixtures — Preparer: KELLER & GANNON
Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$6,150		
B. SIOH	$369		
C. Design Cost	$369		
D. Total Cost (1A+1B+1C)	$6,888		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$320	
G. Total Investment (1D-1E-1F)			$6,568

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	18.59		$263	12.02	$3,166
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	3.20	kW	$409	12.02	$4,919
F. Total		18.59		$673		$8,085

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$54		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$639

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4) $639

4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$726	
5. Simple Payback (1G/4):	9.05	Years
6. Total Net Discounted Savings (2F5+3C):	$8,724	
7. Savings to Investment Ratio (SIR) (6/1G):	1.33	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Fixture Retrofit J2 - 200W High Pressure Sodium Lamp and Ballast Retrofit in 400W MV Lamp Fixtures | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$8,496		
B. SIOH	$510		
C. Design Cost	$510		
D. Total Cost (1A+1B+1C)	$9,516		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$1,129	
G. Total Investment (1D-1E-1F)			$8,387

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	80.12		$1,135	12.02	$13,643
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	11.29	kW	$1,443	12.02	$17,342
F. Total		80.12		$2,578		$30,985

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$159		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$1,894

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$1,894	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$2,736	
5. Simple Payback (1G/4):	3.06	Years
6. Total Net Discounted Savings (2F5+3C):	$32,880	
7. Savings to Investment Ratio (SIR) (6/1G):	3.92	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona | Region No. 4 | Project No.
Project Title: ECIP Facility Energy Improvements | Fiscal Year FY96
Discrete Portion: Controls Retrofit K1 - Ceiling Mounted Passive Infrared Occupancy Sensors to Control Lighting | Preparer: KELLER & GANNON
Analysis Date: January 1995 | Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$72,674		
B. SIOH	$4,360		
C. Design Cost	$4,360		
D. Total Cost (1A+1B+1C)	$81,395		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$1,784	
G. Total Investment (1D-1E-1F)			$79,611

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	556		$7,877	12.02	$94,679
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	0	kW	$0	12.02	$0
F. Total		556		$7,877		$94,679

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$1,676		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$20,007

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$20,007	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$9,552	
5. Simple Payback (1G/4):	8.33	Years
6. Total Net Discounted Savings (2F5+3C):	$114,686	
7. Savings to Investment Ratio (SIR) (6/1G):	1.44	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Controls Retrofit K2 - Ceiling Mounted Ultrasonic Occupancy Sensors to Control Lighting in Toilets and Bathrooms — Preparer: KELLER & GANNON
Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$37,705		
B. SIOH	$2,262		
C. Design Cost	$2,262		
D. Total Cost (1A + 1B + 1C)	$42,230		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$548	
G. Total Investment (1D-1E-1F)			$41,682

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	52.7		$747	12.02	$8,979
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	0	kW	$0	12.02	$0
F. Total		52.7		$747		$8,979

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$186		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$2,221

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4) $2,221

4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$933	
5. Simple Payback (1G/4):	44.68	Years
6. Total Net Discounted Savings (2F5 + 3C):	$11,200	
7. Savings to Investment Ratio (SIR) (6/1G):	0.27	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona — Region No. 4 — Project No.
Project Title: ECIP Facility Energy Improvements — Fiscal Year FY96
Discrete Portion: Controls Retrofit K3 - Wall Switch Type Passive Infrared Type Occupancy Sensors to Control Lighting in Relatively Small Rooms — Preparer: KELLER & GANNON
Analysis Date: January 1995 — Economic Life: 15 Years

1. Investment Costs			
A. Construction Costs	$16,605		
B. SIOH	$996		
C. Design Cost	$996		
D. Total Cost (1A+1B+1C)	$18,597		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$768	
G. Total Investment (1D-1E-1F)			$17,829

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec.	$14.17	119.9		$1,699	12.02	$20,421
B. Dist		0.00		$0		$0
C. LPG		0.00		$0		$0
D. Natural Gas	$4.51	0.00		$0	14.17	
E. Demand Saved	$127.84	0	kW	$0	12.02	$0
F. Total		119.9		$1,699		$20,421

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$416		
(1) Discount Factor (Table A)		11.94	
(2) Discounted Savings/Cost (3A x 3A1)			$4,972

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2+3Bd4)	$4,972	
4. First Year Dollar Savings (3F3 + 3A + (3Bd1/Economic Life)):	$2,115	
5. Simple Payback (1G/4):	8.43	Years
6. Total Net Discounted Savings (2F5+3C):	$25,393	
7. Savings to Investment Ratio (SIR) (6/1G):	1.42	

CONSTRUCTION COST ESTIMATE

Date Prepared: January 1995 | Sheet: 1 of 9

Project: ECIP Facility Energy Improvements | Project No.:

Location: Fort Huachuca, Arizona

Basis for Estimate: Code A (no design competed)

Engineer-Architect: Keller & Gannon

Drawing No.: **Lighting ECO Unit Costs** | Estimator: **BIH** | Checked By: **RCL**

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
A. Exit Light LED Retrofit							
LED Retrofit Kit: 120V=6240-01-381-1957; or LED Retrofit Kit: 277V=6240-01-381-2061	1	EA	$5.29	$5.29	$31.50	$31.50	$36.79
Arizona Transaction Privilege Tax	3.75%	%		-		$1.18	$1.18
Subtotal							$37.97
Contractor OH & Profit	25.0%	%					$9.49
Subtotal							$47.46
Bond	1.5%	%					$0.71
Subtotal							$48.17
Estimating Contingency	10.0%	%					$4.82
Total Probable Construction Cost	**Not including $9.00 rebate per fixture**						**$52.99**
B1. F30T12, 2 Lamp Fixtures: Replace Existing Ballasts with Electronic Ballasts							
Electronic Ballast:120V=6250-01-377-6272; or Electronic Ballast: 277V=6250-378-8760	1	EA	$4.70	$4.70	$20.00	$20.00	$24.70
Arizona Transaction Privilege Tax	3.75%	%		-		$0.75	$0.75
Subtotal							$25.45
Contractor OH & Profit	25.0%	%					$6.36
Subtotal							$31.81
Bond	1.5%	%					$0.48
Subtotal							$32.29
Estimating Contingency	10.0%	%					$3.23
Total Probable Construction Cost	**Not including $4.00 rebate per fixture**						**$35.52**
B2. F30T12, 2 Lamp Fixtures: Replace Existing Lamps and Ballasts							
Electronic Ballast:120V=6250-01-377-6272; or Electronic Ballast:277V=6250-01-378-8760 or Equal	1	EA	$5.29	$5.29	$20.00	$20.00	$25.29
Lamps: F25T8 Philips 32298-2	2	EA	Included		$4.22	$8.43	$8.43
Subtotal				$5.29		$28.43	$33.72
Arizona Transaction Privilege Tax	3.75%	%		-		$1.07	$1.07
Subtotal							$34.78
Contractor OH & Profit	25.0%	%					$8.70
Subtotal							$43.48
Bond	1.5%	%					$0.65
Subtotal							$44.13
Estimating Contingency	10.0%	%					$4.41
Total Probable Construction Cost	**Not including $10.00 rebate per fixture**						**$48.54**

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

CONSTRUCTION COST ESTIMATE

Date Prepared: January 1995 | Sheet: 2 of 9

Project: ECIP Facility Energy Improvements | Project No.: | Basis for Estimate: Code A (no design competed)

Location: Fort Huachuca, Arizona

Engineer-Architect: Keller & Gannon

Drawing No.: **Lighting ECO Unit Costs** | Estimator: **BIH** | Checked By: **RCL**

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
C1. F32T8, 1 Lamp Fixtures: Replace Ballast with Electronic Ballast							
Electronic Ballast: 277V=6250-01-353-7722	1	EA	$4.23	$4.23	$25.00	$25.00	$29.23
Subtotal				$4.23		$25.00	$29.23
Arizona Transaction Privilege Tax	3.75%	%		-		$0.94	$0.94
Subtotal							$30.17
Contractor OH & Profit	25.0%	%					$7.54
Subtotal							$37.71
Bond	1.5%	%					$0.57
Subtotal							$38.28
Estimating Contingency	10.0%	%					$3.83
Total Probable Construction Cost	**Not including $8.00 rebate per fixture**						**$42.10**
C2. F32T8, 2 Lamp Fixtures: Replace Ballast with Electronic Ballast							
Electronic Ballast: 277V=6250-01-379-3041	1	EA	$4.70	$4.70	$25.00	$25.00	$29.70
Subtotal				$4.70		$25.00	$29.70
Arizona Transaction Privilege Tax	3.75%	%		-		$0.94	$0.94
Subtotal							$30.64
Contractor OH & Profit	25.0%	%					$7.66
Subtotal							$38.30
Bond	1.5%	%					$0.57
Subtotal							$38.87
Estimating Contingency	10.0%	%					$3.89
Total Probable Construction Cost	**Not including $8.00 rebate per fixture**						**$42.76**
D1. F34T12 & F40T12, 1 Lamp Fixtures: Replace Lamps and Ballasts							
Electronic Ballast: 6250-01-353-7722	1	EA	$4.70	$4.70	$25.00	$25.00	$29.70
F32T8 Lamp: 6240-01-344-9943 or 9508	1	EA	Included		$2.83	$2.83	$2.83
Subtotal				$4.70		$27.83	$32.53
Arizona Transaction Privilege Tax	3.75%	%		-		$1.04	$1.04
Subtotal							$33.57
Contractor OH & Profit	25.0%	%					$8.39
Subtotal							$41.97
Bond	1.5%	%					$0.63
Subtotal							$42.60
Estimating Contingency	10.0%	%					$4.26
Total Probable Construction Cost	**Not including $9.00 rebate per fixture**						**$46.86**

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

CONSTRUCTION COST ESTIMATE			Date Prepared: January 1995		Sheet: 3	of: 9
Project: ECIP Facility Energy Improvements			Project No.		Basis for Estimate: Code A (no design competed)	
Location: Fort Huachuca, Arizona						
Engineer-Architect: Keller & Gannon						
Drawing No.: **Lighting ECO Unit Costs**		Estimator: **BIH**			Checked By: **RCL**	

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
D2. F34T12 & F40T12, 2 Lamp Fixtures: Replace Lamps and Ballasts							
Electronic Ballast:120V=6250-01-379-1917; or Electronic Ballast:277V=6250-01-379-3041	1	EA	$5.29	$5.29	$25.00	$25.00	$30.29
F32T8 Lamp: 6240-01-344-9943 or 9508	2	EA	Included		$2.83	$5.66	$5.66
Subtotal				$5.29		$30.66	$35.95
Arizona Transaction Privilege Tax	3.75%	%		-		$1.15	$1.15
Subtotal							$37.10
Contractor OH & Profit	25.0%	%					$9.27
Subtotal							$46.37
Bond	1.5%	%					$0.70
Subtotal							$47.07
Estimating Contingency	10.0%	%					$4.71
Total Probable Construction Cost	**Not including $10.00 rebate per fixture**						**$51.77**
D3. F34T12 & F40T12, 3 Lamp Fixtures: Replace Lamps and Ballasts							
Electronic Ballast:120V=6250-01-364-2997; or Electronic Ballast:277V=6250-01-364-2998	1	EA	$6.04	$6.04	$36.44	$36.44	$42.48
F32T8 Lamp: 6240-01-344-9943 or 9508	3	EA	Included		$2.83	$8.49	$8.49
Subtotal				$6.04		$44.93	$50.97
Arizona Transaction Privilege Tax	3.75%	%		-		$1.68	$1.68
Subtotal							$52.65
Contractor OH & Profit	25.0%	%					$13.16
Subtotal							$65.82
Bond	1.5%	%					$0.99
Subtotal							$66.80
Estimating Contingency	10.0%	%					$6.68
Total Probable Construction Cost	**Not including $11.00 rebate per fixture**						**$73.48**
D4. F34T12 & F40T12, 4 Lamp Fixtures: Replace Lamps and Ballasts							
or Electronic Ballast: 277V=6250-01-379-3041	2	EA	$7.05	$14.10	$25.00	$50.00	$64.10
F32T8 Lamp: 6240-01-344-9943 or 9508	4	EA	Included		$2.83	$11.32	$11.32
Subtotal				$14.10		$61.32	$75.42
Arizona Transaction Privilege Tax	3.75%	%		-		$2.30	$2.30
Subtotal							$77.72
Contractor OH & Profit	25.0%	%					$19.43
Subtotal							$97.15
Bond	1.5%	%					$1.46
Subtotal							$98.61
Estimating Contingency	10.0%	%					$9.86
Total Probable Construction Cost	**Not including $20.00 rebate per fixture**						**$108.47**

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

CONSTRUCTION COST ESTIMATE			Date Prepared: January 1995	Sheet: 4	of: 9
Project: ECIP Facility Energy Improvements			Project No.	Basis for Estimate	
Location: Fort Huachuca, Arizona				Code A (no design competed)	
Engineer-Architect: Keller & Gannon					
Drawing No.: **Lighting ECO Unit Costs**		Estimator: **BIH**		Checked By: **RCL**	

Line Item	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
D5. F34T12 & F40T12, 4 Lamp Fixtures: Delamp to 3 Lamps and Ballasts							
Electronic Ballast:120V=6250-01-364-2997; or 277V=6250-01-364-2998	1	EA	$7.05	$7.05	$36.44	$36.44	$43.49
F32T8 Lamp: 6240-01-344-9943 or 9508	3	EA	Included		$2.83	$8.49	$8.49
Reflector Retrofit for Delamping: R302-348T8 SSB 2'x4' for 3xF32T8	1	EA	$4.23	$4.23	$49.00	$49.00	$53.23
Subtotal				$7.05		$44.93	$51.98
Arizona Transaction Privilege Tax	3.75%	%		-		$1.68	$1.68
Subtotal							$53.66
Contractor OH & Profit	25.0%	%					$13.41
Subtotal							$67.07
Bond	1.5%	%					$1.01
Subtotal							$68.08
Estimating Contingency	10.0%	%					$6.81
Total Probable Construction Cost	**Not including $19.00 rebate per fixture**						**$74.89**
E1. F48T12HO, 2 Lamp Fixtures: Replace Existing Ballasts with Electronic Ballasts							
or Electronic Ballast: 277V=6250-01-383-4540	1	EA	$4.70	$4.70	$25.00	$25.00	$29.70
Subtotal				$4.70		$25.00	$29.70
Arizona Transaction Privilege Tax	3.75%	%		-		$0.94	$0.94
Subtotal							$30.64
Contractor OH & Profit	25.0%	%					$7.66
Subtotal							$38.30
Bond	1.5%	%					$0.57
Subtotal							$38.87
Estimating Contingency	10.0%	%					$3.89
Total Probable Construction Cost	**Not including $4.00 rebate per fixture**						**$42.76**
E2. F40T12U, 2 Lamp Fixtures: Replace Lamps and Ballasts							
or Electronic Ballast: 277V=6250-01-379-3041	1	EA	$6.04	$6.04	$25.00	$25.00	$31.04
F31T8U Lamp: 6240-01-353-7707	2	EA	Included		$9.34	$18.68	$18.68
Subtotal				$6.04		$43.68	$49.72
Arizona Transaction Privilege Tax	3.75%	%		-		$1.64	$1.64
Subtotal							$51.36
Contractor OH & Profit	25.0%	%					$12.84
Subtotal							$64.20
Bond	1.5%	%					$0.96
Subtotal							$65.16
Estimating Contingency	10.0%	%					$6.52
Total Probable Construction Cost	**Not including $10.00 rebate per fixture**						**$71.68**

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

CONSTRUCTION COST ESTIMATE					Date Prepared: January 1995		Sheet: 5 of 9
Project: ECIP Facility Energy Improvements					Project No.		Basis for Estimate
Location: Fort Huachuca, Arizona							Code A (no design competed)
Engineer-Architect: Keller & Gannon							
Drawing No.: **Lighting ECO Unit Costs**			Estimator: **BIH**			Checked By: **RCL**	
Line Item	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
E3. F40T12U, 3 Lamp Fixtures: Replace Lamps and Ballasts							
Electr Ballast:120/277V=6250-01-364-2997/8	1	EA	$7.05	$7.05	$36.44	$36.44	$43.49
F31T8U Lamp: 6240-01-353-7707	3	EA	Included		$9.34	$28.02	$28.02
Subtotal				$7.05		$64.46	$71.51
Arizona Transaction Privilege Tax	3.75%	%		-		$2.42	$2.42
Subtotal							$73.92
Contractor OH & Profit	25.0%	%					$18.48
Subtotal							$92.40
Bond	1.5%	%					$1.39
Subtotal							$93.79
Estimating Contingency	10.0%	%					$9.38
Total Probable Construction Cost	**Not including $11.00 rebate per fixture**						**$103.17**
F1. F96T12, 2 Lamp Fixtures: Replace Lamps and Ballasts							
Electronic Ballast:120V=6250-01-377-7376; or:277V=6250-01-381-4453	1	EA	$7.05	$7.05	$35.00	$35.00	$42.05
F96T8 Lamp: 120V=6240-01-382-0105; or: 277V=6240-01-382-0108	2	EA	Included		$10.28	$20.55	$20.55
Subtotal				$7.05		$55.55	$62.60
Arizona Transaction Privilege Tax	3.75%	%		-		$2.08	$2.08
Subtotal							$64.68
Contractor OH & Profit	25.0%	%					$16.17
Subtotal							$80.85
Bond	1.5%	%					$1.21
Subtotal							$82.07
Estimating Contingency	10.0%	%					$8.21
Total Probable Construction Cost	**Not including $10.00 rebate per fixture**						**$90.27**
F2. F96T12, 4 Lamp Fixtures: Replace Lamps and Ballasts							
Electronic Ballast: Same as above	2	EA	$7.05	$14.10	$35.00	$70.00	$84.10
F96T8 Lamp: Same as above	4	EA	Included		$10.28	$41.10	$41.10
Subtotal				$14.10		$111.10	$125.20
Arizona Transaction Privilege Tax	3.75%	%		-		$4.17	$4.17
Subtotal							$129.37
Contractor OH & Profit	25.0%	%					$32.34
Subtotal							$161.71
Bond	1.5%	%					$2.43
Subtotal							$164.14
Estimating Contingency	10.0%	%					$16.41
Total Probable Construction Cost	**Not including $20.00 rebate per fixture**						**$180.55**

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

CONSTRUCTION COST ESTIMATE	Date Prepared: January 1995	Sheet: 6 of 9
Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: **Lighting ECO Unit Costs**	Estimator: **BIH**	Checked By: **RCL**

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
G1. Incandescent 60W Downlight: Replace Lamp with Compact Fluorescent Lamp							
Adaptor Base: 6250-01-381-6840	1	EA	$1.76	$1.76	$5.79	$5.79	$7.55
DTT 13W, 2700K CRI 82 Compact Fluorescent Lamp: 6240-01-345-2252	1	EA	$1.76	$1.76	$5.19	$5.19	$6.95
Subtotal				$3.53		$10.98	$14.50
Arizona Transaction Privilege Tax	3.75%	%		-		$0.41	$0.41
Subtotal			**Not an ECIP Project**				$14.91
Contractor OH & Profit	25.0%	%	Replacements are Screw-In, **or**				$3.73
Subtotal			Fixture modifying "Permatwist"				$18.64
Bond	1.5%	%	fittings are available at similar cost				$0.28
Subtotal			for ECIP Projects				$18.92
Estimating Contingency	10.0%	%					$1.89
Total Probable Construction Cost	**Not including $5.00 rebate per fixture**						**$20.81**
G2. Incandescent 75W Downlight: Replace Lamp with Compact Fluorescent Lamp							
TRI 20W, 2700K CRI 82 Compact Fluor. Lamp / Adaptor: 6240-01-345-2252	1	EA	$3.53	$3.53	$5.19	$5.19	$8.72
Subtotal				$3.53		$5.19	$8.72
Arizona Transaction Privilege Tax	3.75%	%		-		$0.19	$0.19
Subtotal			**Not an ECIP Project**				$8.91
Contractor OH & Profit	25.0%	%	Replacements are Screw-In, **or**				$2.23
Subtotal			Fixture modifying "Permatwist"				$11.14
Bond	1.5%	%	fittings are available at similar cost				$0.17
Subtotal			for ECIP Projects				$11.30
Estimating Contingency	10.0%	%					$1.13
Total Probable Construction Cost	**Not including $5.00 rebate per fixture**						**$12.43**
G3. Incand. 40W Ceiling or Wall-Mount Fixture: Replacement Compact Fluorescent							
Adaptor Base: 6250-01-381-7189	1	EA	$1.76	$1.76	$5.55	$5.55	$7.32
TT 7W, 4100K CRI 85 Compact Fluorescent Lamp: 6240-01-352-0434	1	EA	$1.76	$1.76	$2.49	$2.49	$4.25
Subtotal				$3.53		$8.04	$11.57
Arizona Transaction Privilege Tax	3.75%	%		-		$0.30	$0.30
Subtotal			**Not an ECIP Project**				$11.87
Contractor OH & Profit	25.0%	%	Replacements are Screw-In, **or**				$2.97
Subtotal			Fixture modifying "Permatwist"				$14.84
Bond	1.5%	%	fittings are available at similar cost				$0.22
Subtotal			for ECIP Projects				$15.06
Estimating Contingency	10.0%	%					$1.51
Total Probable Construction Cost	**Not including $3.00 rebate per fixture**						**$16.57**

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

CONSTRUCTION COST ESTIMATE					Date Prepared: January 1995		Sheet: 7 of 9
Project: ECIP Facility Energy Improvements					Project No.	Basis for Estimate	
Location: Fort Huachuca, Arizona						Code A (no design competed)	
Engineer-Architect: Keller & Gannon							
Drawing No.: **Lighting ECO Unit Costs**			Estimator: **BIH**			Checked By: **RCL**	
Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
G4. Incand. 60W Ceiling or Wall-Mount Fixture: Replacement Compact Fluorescent							
Adaptor Base: 6250-01-381-6840	1	EA	$1.76	$1.76	$5.55	$5.55	$7.32
DTT 13W, 3500K CRI 82 Compact Fluorescent Lamp: 6240-01-352-0438	1	EA	$1.76	$1.76	$5.88	$5.88	$7.64
Subtotal				$3.53		$11.43	$14.96
Arizona Transaction Privilege Tax	3.75%	%		-		$0.43	$0.43
Subtotal			**Not an ECIP Project**				$15.39
Contractor OH & Profit	25.0%	%	Replacements are Screw-In, **or**				$3.85
Subtotal			Fixture modifying "Permatwist"				$19.23
Bond	1.5%	%	fittings are available at similar cost				$0.29
Subtotal			for ECIP Projects				$19.52
Estimating Contingency	10.0%	%					$1.95
Total Probable Construction Cost	**Not including $5.00 rebate per fixture**						**$21.47**
G5. Incandescent 100W Ceiling Fixture: Replace Lamp with Compact Fluorescent							
TRI 23W, 2700K CRI 82 Compact Fluor. Lamp / Adaptor: 6240-01-367-5734	1	EA	$3.53	$3.53	$18.07	$18.07	$21.59
Subtotal				$3.53		$18.07	$21.59
Arizona Transaction Privilege Tax	3.75%	%		-		$0.68	$0.68
Subtotal			**Not an ECIP Project**				$22.27
Contractor OH & Profit	25.0%	%	Replacements are Screw-In, **or**				$5.57
Subtotal			Fixture modifying "Permatwist"				$27.84
Bond	1.5%	%	fittings are available at similar cost				$0.42
Subtotal			for ECIP Projects				$28.26
Estimating Contingency	10.0%	%					$2.83
Total Probable Construction Cost	**Not including $5.00 rebate per fixture**						**$31.08**
H1. Incandescent 60W & 75W Table Lamps: Replacement Compact Fluorescents							
17W Compact Fluorescent Covered Lamp: 6240-01-368-6966	1	EA	$3.53	$3.53	$11.76	$11.76	$15.29
Subtotal				$3.53		$11.76	$15.29
Arizona Transaction Privilege Tax	3.75%	%		-		$0.44	$0.44
Subtotal			**Not an ECIP Project**				$15.73
Contractor OH & Profit	25.0%	%	Replacements are Screw-In, **or**				$3.93
Subtotal			Fixture modifying "Permatwist"				$19.66
Bond	1.5%	%	fittings are available at similar cost				$0.29
Subtotal			for ECIP Projects				$19.95
Estimating Contingency	10.0%	%					$2.00
Total Probable Construction Cost	**Not including $5.00 rebate per fixture**						**$21.95**

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

CONSTRUCTION COST ESTIMATE			Date Prepared: January 1995		Sheet: 8	of: 9
Project: ECIP Facility Energy Improvements			Project No.		Basis for Estimate: Code A (no design competed)	
Location: Fort Huachuca, Arizona						
Engineer-Architect: Keller & Gannon						
Drawing No.: **Lighting ECO Unit Costs**		Estimator: **BIH**		Checked By: **RCL**		

Line Item	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
J1. 250W MV Pendant-Mount Fixture: Replace Lamp & Ballast with HPS							
Ballast, 150W S-55: 6250-01-352-8004	1	EA	$19.04	$19.04	$91.34	$91.34	$110.38
HPS Lamp 150W ANSI S-55 B-17 Coated: 6240-01-142-8452	1	EA	$6.35	$6.35	$12.91	$12.91	$19.26
Subtotal				$25.38		$104.25	$129.63
Arizona Transaction Privilege Tax	3.75%	%		-		$3.91	$3.91
Subtotal							$133.54
Contractor OH & Profit	25.0%	%					$33.38
Subtotal							$166.92
Bond	1.5%	%					$2.50
Subtotal							$169.43
Estimating Contingency	10.0%	%					$16.94
Total Probable Construction Cost	**Less $100 rebate per kW saved.**						**$186.37**
J2. 400W MV Pendant-Mount Fixture: Replace Lamp & Ballast with HPS							
Ballast, 200W S-66: 6250-01-348-5325	1	EA	$19.46	$19.46	$67.35	$67.35	$86.81
HPS Lamp 200W ANSI S-66 ED-18 Coated: 6240-01-178-9113	1	EA	$6.35	$6.35	$16.44	$16.44	$22.79
Subtotal				$25.80		$83.79	$109.59
Arizona Transaction Privilege Tax	3.75%	%		-		$3.14	$3.14
Subtotal							$112.74
Contractor OH & Profit	25.0%	%					$28.18
Subtotal							$140.92
Bond	1.5%	%					$2.11
Subtotal							$143.03
Estimating Contingency	10.0%	%					$14.30
Total Probable Construction Cost	**Less $100 rebate per kW saved.**						**$157.34**
K1. Occupancy Sensor Control: Ceiling Mounted PIR Sensor							
Occupancy Sensor: PIR or Ultra Sonic	1	EA	$24.17	$24.17	$86.00	$86.00	$110.17
Sensor Transformer Pack	1	EA	$16.92	$16.92	$30.00	$30.00	$46.92
Wiremold Raceway & 3/C #18 Wire	25	LF	$1.58	$39.57	$0.65	$16.25	$55.82
Subtotal				$39.57		$132.25	$212.92
Arizona Transaction Privilege Tax	3.75%	%		-		$4.96	$4.96
Subtotal							$217.88
Contractor OH & Profit	25.0%	%					$54.47
Subtotal							$272.35
Bond	1.5%	%					$4.09
Subtotal							$276.43
Estimating Contingency	10.0%	%					$27.64
Total Probable Construction Cost (not including rebates)	**For 2 to 4 Fixtures**			**$4.00**	**rebate per sensor**		**$304.07**
	For 5+ Fixtures			**$8.00**	**rebate per sensor**		

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

CONSTRUCTION COST ESTIMATE					Date Prepared: January 1995		Sheet: 9 of 9
Project: ECIP Facility Energy Improvements					Project No.		Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona							
Engineer-Architect: Keller & Gannon							
Drawing No.: **Lighting ECO Unit Costs**			Estimator: **BIH**			Checked By: **RCL**	
Line Item	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
K2. Occupancy Sensor Control: Ceiling Mounted Ultra Sonic Sensor							
Occupancy Sensor: PIR or Ultra Sonic	1	EA	$24.17	$24.17	$86.00	$86.00	$110.17
Sensor Transformer Pack	1	EA	$16.92	$16.92	$30.00	$30.00	$46.92
Wiremold Raceway & 3/C #18 Wire	25	LF	$1.58	$39.57	$0.65	$16.25	$55.82
Subtotal				$39.57		$132.25	$212.92
Arizona Transaction Privilege Tax	3.75%	%		-		$4.96	$4.96
Subtotal							$217.88
Contractor OH & Profit	25.0%	%					$54.47
Subtotal							$272.35
Bond	1.5%	%					$4.09
Subtotal							$276.43
Estimating Contingency	10.0%	%					$27.64
Total Probable Construction Cost (not including rebates)	**For 2 to 4 Fixtures**			**$4.00**	**rebate per sensor**		**$304.07**
	For 5+ Fixtures			**$8.00**	**rebate per sensor**		
K3. Occupancy Sensor Control: Automatic Wall Switch PIR Sensor							
Occupancy Sensor: PIR or Ultra Sonic	1	EA	$7.04	$7.04	$64.00	$64.00	$71.04
Subtotal				$7.04		$64.00	$71.04
Arizona Transaction Privilege Tax	3.75%	%		-		$2.40	$2.40
Subtotal							$73.44
Contractor OH & Profit	25.0%	%					$18.36
Subtotal							$91.80
Bond	1.5%	%					$1.38
Subtotal							$93.18
Estimating Contingency	10.0%	%					$9.32
Total Probable Construction Cost (not including rebates)	**For 2 to 4 Fixtures**			**$4.00**	**rebate per sensor**		**$102.50**
	For 5+ Fixtures			**$8.00**	**rebate per sensor**		

Note: Labor costs are based on a prime contractor rate of $21.15/hour including burden for electricians.

APPENDIX I

Harmonic Distortion Monitoring Data

APPENDIX I
Table of Contents

Building 22320 Main Service Data I-1

Building 41402 Lighting Panel Data I-13

Building 57305 Main Service Data I-18

Building 80505 Main Service 1 Data I-76

Building 80505 Main Service 2 Data I-84

22320 ITE May 09 1994 (Mon)
INSTANTANEOUS POWER 9:00:00 AM

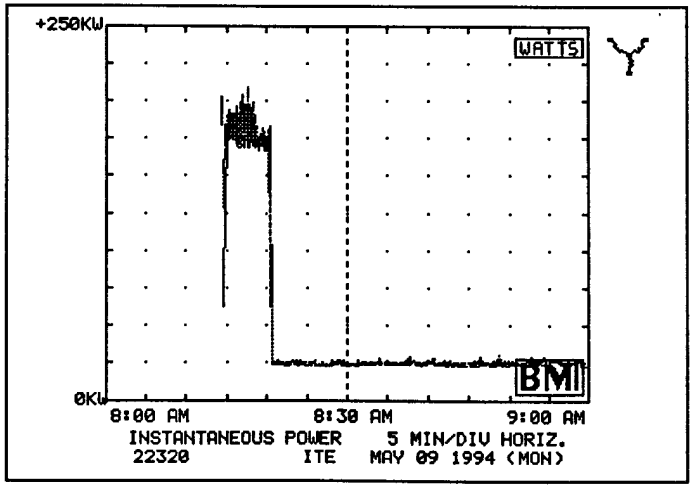
FROM: 8:00 AM May 09 1994 (Mon)
To: 9:00 AM May 09 1994 (Mon)

Total:
MAX: 210.4 kW, 8:17 AM
MIN: 22.1 kW, 8:47 AM

Phase A-N:
MAX: 59.9 kW, 8:17 AM
MIN: 0.0 kW, 8:14 AM

Phase B-N:
MAX: 76.6 kW, 8:16 AM
MIN: 0.0 kW, 8:14 AM

Phase C-N:
MAX: 84.3 kW, 8:17 AM
MIN: 8.0 kW, 8:59 AM



22320 ITE May 09 1994 (Mon)
VOLTAGE THD 9:01:27 AM

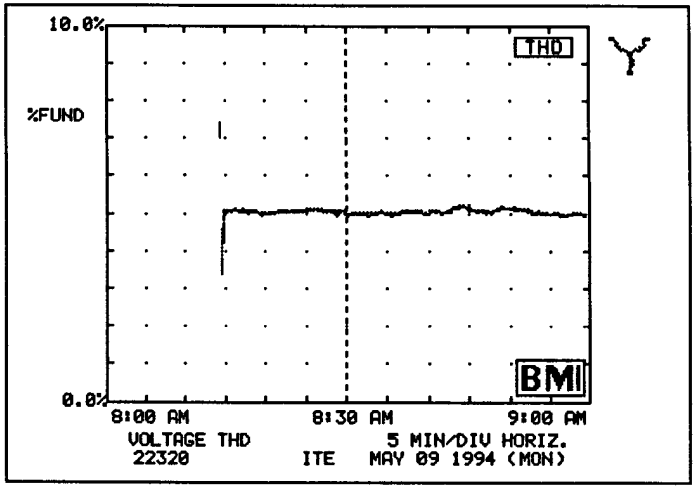
FROM: 8:00 AM May 09 1994 (Mon)
To: 9:00 AM May 09 1994 (Mon)

Average:
MAX: 5.2% THD, 8:44 AM
MIN: 3.4% THD, 8:14 AM

Phase A-N:
MAX: 5.4% THD, 8:44 AM
MIN: 0.0% THD, 8:14 AM

Phase B-N:
MAX: 5.2% THD, 8:43 AM
MIN: 4.9% THD, 8:28 AM

Phase C-N:
MAX: 5.2% THD, 8:44 AM
MIN: 4.9% THD, 8:56 AM



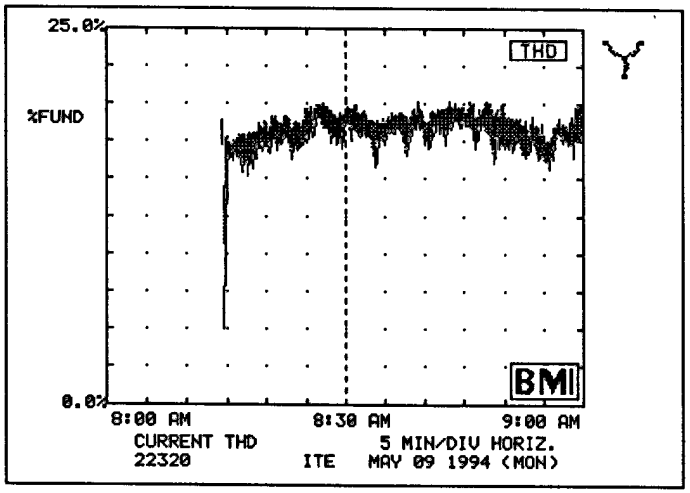
22320 ITE May 09 1994 (Mon)

CURRENT THD 9:01:39 AM

FROM: 8:00 AM May 09 1994 (Mon)
To: 9:00 AM May 09 1994 (Mon)

Average:

	MAX:	20.3% THD;	8:42 AM
	MIN:	5.0% THD;	8:14 AM
Phase A:			
	MAX:	20.5% THD;	8:44 AM
	MIN:	0.0% THD;	8:14 AM
Phase B:			
	MAX:	25.2% THD;	8:35 AM
	MIN:	0.0% THD;	8:14 AM
Phase C:			
	MAX:	17.3% THD;	8:26 AM
	MIN:	11.4% THD;	8:55 AM



22320 ITE May 09 1994 (Mon)

BMI SUMMARY 9:13:02 AM

FROM: 8:14 AM May 09 1994 (Mon)
To: 9:13 AM May 09 1994 (Mon)

Demand:

Phase	Average	Unit
TOTAL	40.79	kW
TOTAL	0.91	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	39.16	kWh
TOTAL	14.60	kVARh
TOTAL	32.22	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	0.0	118.6	119.5	V
B-N	118.6	119.1	119.7	V
C-N	119.8	120.4	120.9	V
N-G	0.0	0.2	0.5	V
TOTAL	79.9	119.4	120.0	V
Unb	0.6	1.0	100.0	%
Current:				
A	0.0	110.2	575.0	A
B	0.0	128.7	661.0	A
C	73.9	136.4	740.2	A
N	21.0	45.4	581.4	A
TOTAL	0.207	0.375	1.886	kA
Unb	0.8	12.7	200.0	%
Power:				
A-N	0.000	11.00	59.89	kW
B-N	0.000	14.80	76.59	kW
C-N	7.973	15.00	84.35	kW
TOTAL	22.10	40.79	210.4	kW
Volt-Amps:				
A-N	0.000	13.10	68.31	kVA
B-N	0.000	15.33	78.60	kVA
C-N	8.911	16.43	88.90	kVA
TOTAL	24.79	44.86	225.3	kVA
VA Reactive:				
A-N	0.000	6.711	31.62	kVAR
B-N	0.000	2.322	11.77	kVAR
C-N	3.415	6.151	27.38	kVAR
TOTAL	8.489	15.18	68.29	kVAR
Power Factor:				
A-N	0.79	0.84	1.00	PF
B-N	0.94	0.96	1.00	PF
C-N	0.89	0.91	0.95	PF
TOTAL	0.89	0.91	0.95	PF

Displacement Factor:				
A-N	0.81	0.85	1.00	dPF
B-N	0.96	0.99	1.00	dPF
C-N	0.90	0.92	0.95	dPF
TOTAL	0.92	0.94	0.98	dPF
Current Leads:				
A	-36.0	-31.3	0.0	
B	-15.4	-8.9	0.0	
C	-25.9	-22.8	-17.5	
Voltage Sequence:				
Pos	81.6	100.0	100.0	%
Zero	0.0	0.2	40.8	%
Neg	0.6	0.8	41.0	%
Current Sequence:				
Pos	57.7	98.1	99.6	%
Zero	0.3	6.6	57.7	%
Neg	6.3	17.5	57.7	%
Voltage THD:				
A-N	0.0	5.1	5.4	%
B-N	4.8	5.0	5.2	%
C-N	4.8	5.0	5.2	%
TOTAL	3.4	5.0	5.2	%
Current THD:				
A	0.0	18.0	20.6	%
B	0.0	21.7	25.2	%
C	11.4	15.4	17.3	%
N	14.8	173.0	999.9	%
TOTAL	5.0	18.4	20.3	%
Derate transformer to:				
TOTAL	90.6	92.5	100.0	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	0.0	19.3	87.6	K
B	0.0	20.1	90.6	K
C	8.0	14.4	70.0	K
TOTAL	10.3	17.9	81.6	K
3rd Harmonic Volts:				
A-N	0.0	0.7	0.8	%
B-N	0.2	0.5	0.5	%
C-N	0.0	0.1	0.4	%
TOTAL	0.2	0.4	0.5	%
5th Harmonic Volts:				
A-N	0.0	4.9	5.1	%
B-N	4.5	4.7	4.9	%
C-N	4.6	4.8	5.0	%
TOTAL	3.2	4.8	5.0	%
7th Harmonic Volts:				
A-N	0.0	1.0	1.2	%
B-N	1.2	1.4	1.5	%
C-N	1.3	1.4	1.6	%
TOTAL	0.9	1.3	1.4	%
9th Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.3	0.3	0.3	%
C-N	0.1	0.1	0.1	%
TOTAL	0.1	0.1	0.2	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	1.326	2.448	12.63	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.2	Hz

22320 ITE May 09 1994 (Mon)

INSTANTANEOUS POWER 10:00:00 AM

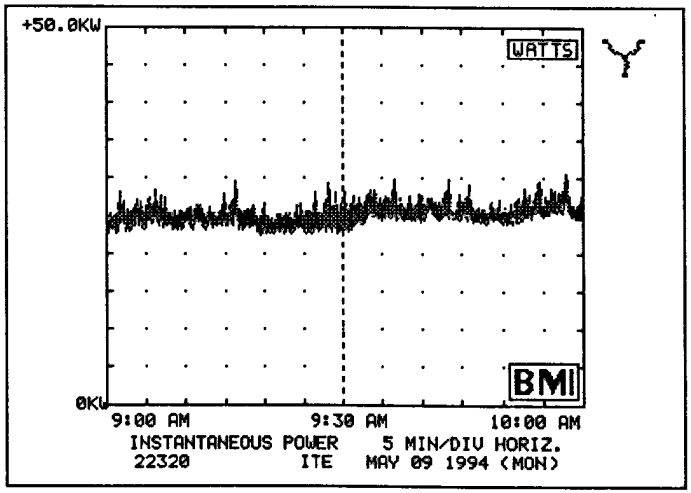
FROM: 9:00 AM May 09 1994 (Mon)
To: 10:00 AM May 09 1994 (Mon)

Total:
MAX: 30.7 kW, 9:57 AM
MIN: 22.6 kW, 9:19 AM

Phase A-N:
MAX: 11.4 kW, 9:36 AM
MIN: 6.2 kW, 9:20 AM

Phase B-N:
MAX: 11.5 kW, 9:11 AM
MIN: 8.3 kW, 9:25 AM

Phase C-N:
MAX: 13.2 kW, 9:28 AM
MIN: 8.0 kW, 9:19 AM



22320 ITE May 09 1994 (Mon)

VOLTAGE THD 10:01:26 AM

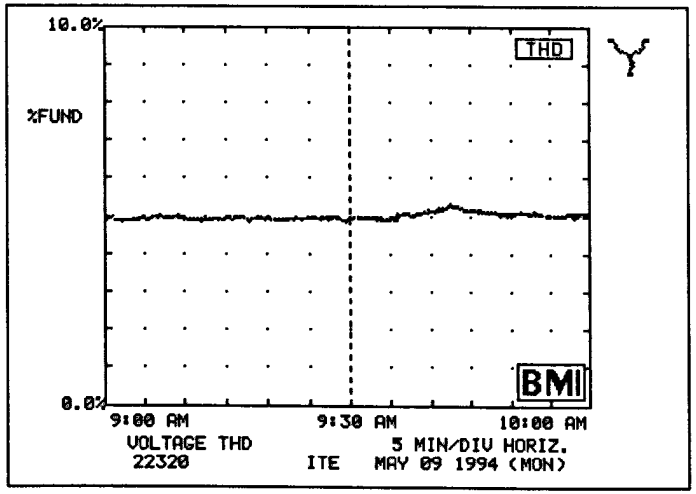
FROM: 9:00 AM May 09 1994 (Mon)
To: 10:00 AM May 09 1994 (Mon)

Average:
MAX: 5.3% THD, 9:42 AM
MIN: 4.8% THD, 9:29 AM

Phase A-N:
MAX: 5.4% THD, 9:42 AM
MIN: 4.9% THD, 9:29 AM

Phase B-N:
MAX: 5.3% THD, 9:42 AM
MIN: 4.8% THD, 9:29 AM

Phase C-N:
MAX: 5.3% THD, 9:42 AM
MIN: 4.8% THD, 9:17 AM



22320 ITE May 09 1994 (Mon)

CURRENT THD 10:01:38 AM

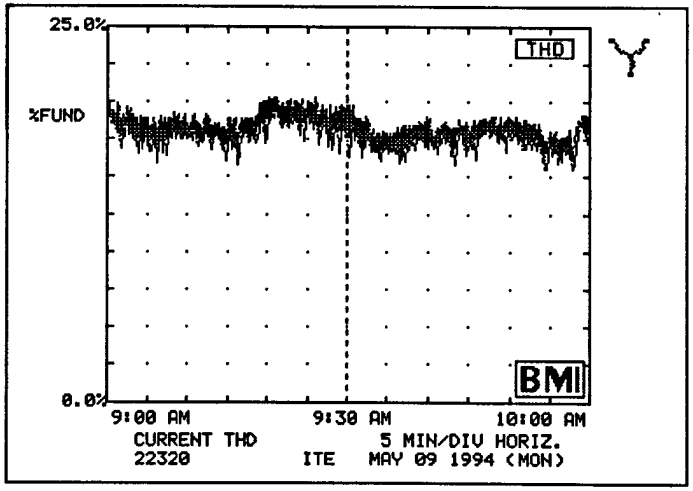
FROM: 9:00 AM May 09 1994 (Mon)
To: 10:00 AM May 09 1994 (Mon)

Average:
MAX: 20.4% THD; 9:21 AM
MIN: 15.6% THD; 9:54 AM

Phase A:
MAX: 21.3% THD; 9:25 AM
MIN: 11.2% THD; 9:36 AM

Phase B:
MAX: 23.4% THD; 9:24 AM
MIN: 16.7% THD; 9:11 AM

Phase C:
MAX: 18.1% THD; 9:58 AM
MIN: 11.2% THD; 9:28 AM



22320 ITE May 09 1994 (Mon)

BMI SUMMARY 10:13:04 AM

FROM: 9:13 AM May 09 1994 (Mon)
To: 10:13 AM May 09 1994 (Mon)

Demand:

Phase	Average	Unit
TOTAL	25.52	kW
TOTAL	0.91	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	25.54	kWh
TOTAL	9.594	kVARh
TOTAL	21.06	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	118.1	119.0	119.7	V
B-N	118.6	119.4	120.2	V
C-N	119.8	120.7	121.4	V
N-G	0.0	0.2	0.5	V
TOTAL	118.8	119.7	120.4	V
Unb	0.6	0.8	1.0	%
Current:				
A	63.1	74.9	104.7	A
B	71.6	78.1	99.4	A
C	74.2	81.2	115.4	A
N	18.8	28.4	44.1	A
TOTAL	210.2	234.2	276.3	A
Unb	0.2	7.4	29.8	%
Power:				
A-N	6.191	7.678	11.39	kW
B-N	8.279	8.984	11.51	kW
C-N	8.003	8.859	13.16	kW
TOTAL	22.57	25.52	30.72	kW
Volt-Amps:				
A-N	7.481	8.920	12.43	kVA
B-N	8.580	9.325	11.87	kVA
C-N	8.918	9.793	13.82	kVA
TOTAL	25.07	28.04	33.15	kVA
VA Reactive:				
A-N	3.765	4.271	4.980	kVAR
B-N	0.867	1.476	2.151	kVAR
C-N	3.417	3.839	4.390	kVAR
TOTAL	8.642	9.586	10.96	kVAR
Power Factor:				
A-N	0.81	0.86	0.92	PF
B-N	0.95	0.96	0.98	PF
C-N	0.87	0.90	0.95	PF
TOTAL	0.89	0.91	0.93	PF

Displacement Factor:				
A-N	0.82	0.87	0.93	dPF
B-N	0.97	0.99	1.00	dPF
C-N	0.89	0.92	0.95	dPF
TOTAL	0.92	0.94	0.96	dPF
Current Leads:				
A	-35.0	-29.3	-22.3	
B	-13.3	-9.3	-5.1	
C	-27.2	-23.5	-17.4	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.3	%
Neg	0.6	0.7	0.8	%
Current Sequence:				
Pos	96.3	98.7	99.4	%
Zero	0.6	8.1	14.3	%
Neg	2.6	13.6	26.1	%
Voltage THD:				
A-N	4.9	5.1	5.4	%
B-N	4.8	5.0	5.3	%
C-N	4.8	5.0	5.3	%
TOTAL	4.8	5.0	5.3	%
Current THD:				
A	11.2	17.0	21.3	%
B	17.0	21.4	23.4	%
C	11.2	16.0	18.6	%
N	56.4	124.9	999.9	%
TOTAL	15.6	18.1	20.4	%
Derate transformer to:				
TOTAL	91.2	92.8	95.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	9.8	12.4	14.3	K
B	11.8	12.8	13.8	K
C	7.3	8.9	10.0	K
TOTAL	10.3	11.4	12.2	K
3rd Harmonic Volts:				
A-N	0.6	0.7	0.8	%
B-N	0.4	0.4	0.5	%
C-N	0.0	0.1	0.2	%
TOTAL	0.4	0.4	0.4	%
5th Harmonic Volts:				
A-N	4.7	4.9	5.2	%
B-N	4.5	4.7	5.0	%
C-N	4.6	4.8	5.1	%
TOTAL	4.6	4.8	5.1	%
7th Harmonic Volts:				
A-N	0.9	1.1	1.2	%
B-N	1.2	1.4	1.6	%
C-N	1.4	1.5	1.6	%
TOTAL	1.2	1.3	1.5	%
9th Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.3	0.3	0.3	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.2	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	1.354	1.531	1.843	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

22320 ITE May 09 1994 (Mon)

INSTANTANEOUS POWER 11:00:01 AM

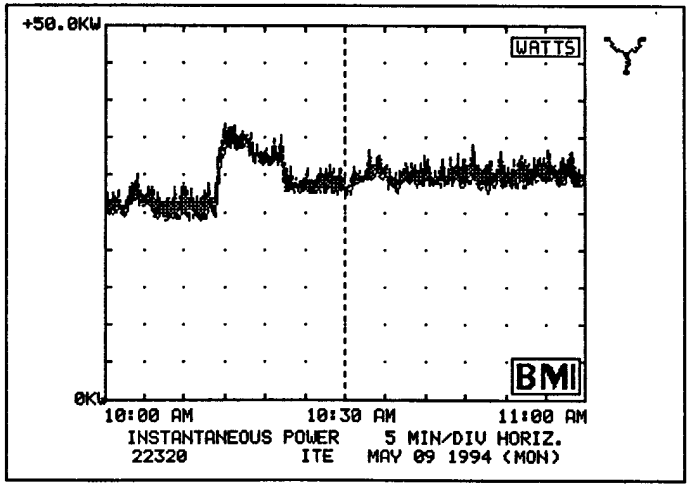
FROM: 10:00 AM May 09 1994 (Mon)
To: 11:00 AM May 09 1994 (Mon)

Total:
MAX: 37.0 kW, 10:14 AM
MIN: 23.9 kW, 10:07 AM

Phase A-N:
MAX: 13.5 kW, 10:14 AM
MIN: 7.2 kW, 10:12 AM

Phase B-N:
MAX: 13.1 kW, 10:16 AM
MIN: 8.3 kW, 10:06 AM

Phase C-N:
MAX: 12.8 kW, 10:15 AM
MIN: 8.1 kW, 10:10 AM



22320 ITE May 09 1994 (Mon)

VOLTAGE THD 11:01:28 AM

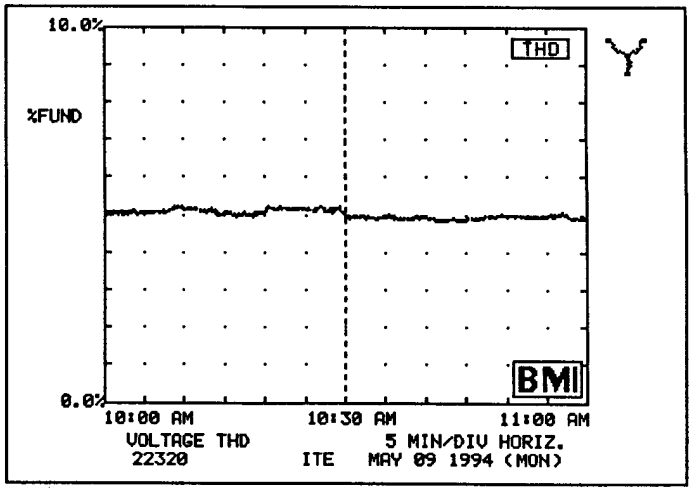
FROM: 10:00 AM May 09 1994 (Mon)
To: 11:00 AM May 09 1994 (Mon)

Average:
MAX: 5.3% THD, 10:20 AM
MIN: 4.8% THD, 10:42 AM

Phase A-N:
MAX: 5.4% THD, 10:26 AM
MIN: 4.9% THD, 10:42 AM

Phase B-N:
MAX: 5.2% THD, 10:00 AM
MIN: 4.7% THD, 10:44 AM

Phase C-N:
MAX: 5.2% THD, 10:08 AM
MIN: 4.8% THD, 10:44 AM



22320 ITE May 09 1994 (Mon)

CURRENT THD 11:01:40 AM

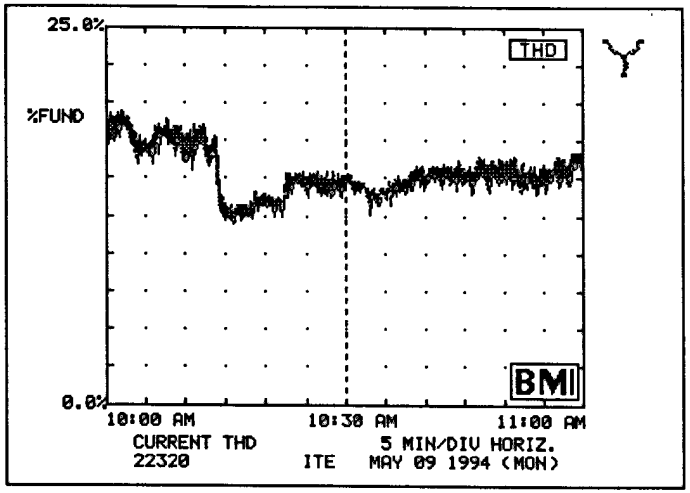
FROM: 10:00 AM May 09 1994 (Mon)
To: 11:00 AM May 09 1994 (Mon)

Average:
MAX: 19.4% THD, 10:01 AM
MIN: 12.1% THD, 10:15 AM

Phase A:
MAX: 18.0% THD, 10:08 AM
MIN: 9.2% THD, 10:17 AM

Phase B:
MAX: 22.9% THD, 10:07 AM
MIN: 12.2% THD, 10:35 AM

Phase C:
MAX: 19.1% THD, 10:59 AM
MIN: 11.0% THD, 10:15 AM



22320 ITE May 09 1994 (Mon)

BMI SUMMARY 11:13:02 AM

FROM: 10:13 AM May 09 1994 (Mon)
To: 11:13 AM May 09 1994 (Mon)

Demand:

Phase	Average	Unit
TOTAL	30.31	kW
TOTAL	0.93	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	30.31	kWh
TOTAL	10.41	kVARh
TOTAL	24.16	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	118.2	118.9	119.7	V
B-N	118.7	119.3	120.2	V
C-N	120.2	120.7	121.5	V
N-G	0.0	0.2	0.5	V
TOTAL	119.1	119.6	120.4	V
Unb	0.7	0.9	1.1	%
Current:				
A	74.2	93.3	121.9	A
B	74.0	93.1	113.7	A
C	75.4	85.3	108.8	A
N	19.7	28.0	39.9	A
TOTAL	226.9	271.7	324.2	A
Unb	0.2	7.7	19.0	%
Power:				
A-N	7.384	10.27	13.52	kW
B-N	8.538	10.60	13.12	kW
C-N	8.243	9.438	12.78	kW
TOTAL	24.48	30.31	36.98	kW
Volt-Amps:				
A-N	8.867	11.10	14.52	kVA
B-N	8.889	11.10	13.59	kVA
C-N	9.135	10.29	13.18	kVA
TOTAL	27.31	32.49	38.87	kVA
VA Reactive:				
A-N	3.380	3.918	5.389	kVAR
B-N	1.486	2.788	3.797	kVAR
C-N	2.552	4.700	4.322	kVAR
TOTAL	9.606	10.41	11.94	kVAR
Power Factor:				
A-N	0.83	0.93	0.95	PF
B-N	0.94	0.95	0.97	PF
C-N	0.89	0.92	0.97	PF
TOTAL	0.90	0.93	0.95	PF

Displacement Factor:				
A-N	0.84	0.93	0.96	dPF
B-N	0.95	0.97	0.99	dPF
C-N	0.90	0.93	0.98	dPF
TOTAL	0.93	0.95	0.96	dPF
Current Leads:				
A	-32.6	-20.9	-16.2	
B	-18.4	-14.8	-9.9	
C	-26.0	-21.6	-12.5	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.3	%
Neg	0.7	0.8	1.0	%
Current Sequence:				
Pos	98.5	99.6	99.9	%
Zero	0.7	7.2	13.0	%
Neg	0.1	4.9	15.7	%
Voltage THD:				
A-N	4.8	5.1	5.4	%
B-N	4.7	4.9	5.2	%
C-N	4.8	5.0	5.2	%
TOTAL	4.8	5.0	5.3	%
Current THD:				
A	9.2	13.3	16.4	%
B	12.2	16.1	22.1	%
C	11.0	16.0	19.6	%
N	50.4	116.8	999.9	%
TOTAL	12.1	15.2	17.8	%
Derate transformer to:				
TOTAL	92.5	95.2	96.7	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	10.4	12.8	14.2	k
B	12.1	13.2	14.1	k
C	8.8	9.1	10.0	k
TOTAL	10.6	11.7	12.2	k
3rd Harmonic Volts:				
A-N	0.6	0.7	0.8	%
B-N	0.3	0.4	0.5	%
C-N	0.0	0.1	0.2	%
TOTAL	0.3	0.4	0.5	%
5th Harmonic Volts:				
A-N	4.7	4.9	5.2	%
B-N	4.5	4.7	4.9	%
C-N	4.5	4.8	5.0	%
TOTAL	4.6	4.8	5.0	%
7th Harmonic Volts:				
A-N	0.8	1.0	1.2	%
B-N	1.1	1.3	1.5	%
C-N	1.2	1.4	1.6	%
TOTAL	1.0	1.2	1.4	%
9th Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.3	0.3	0.3	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.2	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	1.469	1.819	2.219	$/Hr
Frequency:				
TOTAL	59.9	60.0	60.0	Hz

22320 ITE May 09 1994 (Mon)

VOLTAGE THD 12:00:01 PM

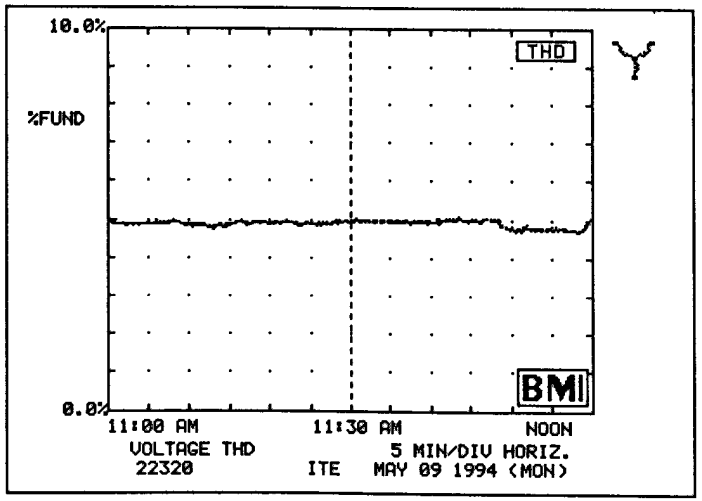
FROM: 11:00 AM May 09 1994 (Mon)
To: NOON May 09 1994 (Mon)

Average:
MAX: 5.1% THD, 11:43 AM
MIN: 4.7% THD, 11:50 AM

Phase A-N:
MAX: 5.2% THD, 11:43 AM
MIN: 4.8% THD, 11:51 AM

Phase B-N:
MAX: 5.0% THD, 11:47 AM
MIN: 4.7% THD, 11:50 AM

Phase C-N:
MAX: 5.1% THD, 11:43 AM
MIN: 4.6% THD, 11:50 AM



CURRENT THD 12:00:04 PM

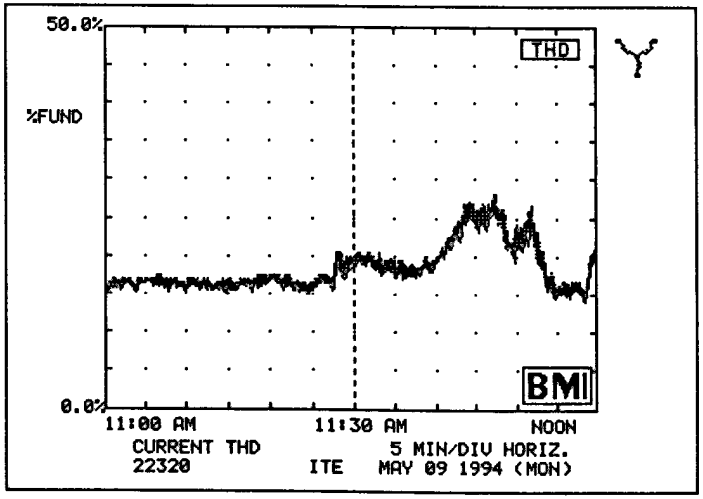
FROM: 11:00 AM May 09 1994 (Mon)
To: NOON May 09 1994 (Mon)

Average:
MAX: 28.3% THD, 11:47 AM
MIN: 14.1% THD, 11:58 AM

Phase A:
MAX: 26.5% THD, 11:43 AM
MIN: 10.2% THD, 11:24 AM

Phase B:
MAX: 38.5% THD, 11:51 AM
MIN: 14.2% THD, 11:23 AM

Phase C:
MAX: 23.0% THD, 11:47 AM
MIN: 7.7% THD, 11:55 AM



22320 ITE May 09 1994 (Mon)

BMI SUMMARY 12:13:03 PM

FROM: 11:13 AM May 09 1994 (Mon)
TO: 12:13 PM May 09 1994 (Mon)

Demand:

Phase	Average	Unit
TOTAL	26.19	kW
TOTAL	0.90	PF

Phase	Min	Avg	Max	Unit
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.3	%
Neg	0.7	0.8	1.0	%
Current Sequence:				
Pos	92.5	98.7	99.9	%
Zero	0.3	6.4	13.1	%
Neg	0.2	12.8	36.7	%
Voltage THD:				
A-N	4.8	5.0	5.2	%
B-N	4.7	4.9	5.0	%
C-N	4.6	4.9	5.1	%
TOTAL	4.7	4.9	5.1	%
Current THD:				
A	10.2	18.0	26.5	%
B	14.2	22.9	38.5	%
C	7.7	18.2	43.0	%
N	57.2	190.3	959.9	%
TOTAL	14.1	19.7	28.3	%
Derate transformer to:				
TOTAL	87.9	92.9	96.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	3.9	11.5	14.2	K
B	4.4	11.8	14.3	K
C	4.7	9.0	10.7	K
TOTAL	4.4	10.8	12.7	K
3rd Harmonic Volts:				
A-N	0.6	0.7	0.8	%
B-N	0.3	0.4	0.5	%
C-N	0.0	0.1	0.2	%
TOTAL	0.4	0.4	0.5	%
5th Harmonic Volts:				
A-N	4.6	4.9	5.1	%
B-N	4.4	4.7	4.8	%
C-N	4.4	4.8	4.9	%
TOTAL	4.5	4.8	4.9	%
7th Harmonic Volts:				
A-N	0.6	0.8	1.2	%
B-N	0.9	1.2	1.5	%
C-N	1.0	1.2	1.6	%
TOTAL	0.8	1.1	1.4	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.2	%
B-N	0.3	0.3	0.4	%
C-N	0.0	0.1	0.2	%
TOTAL	0.1	0.1	0.2	%

22320 ITE May 09 1994 (Mon)
VOLTAGE THD 1:00:01 PM

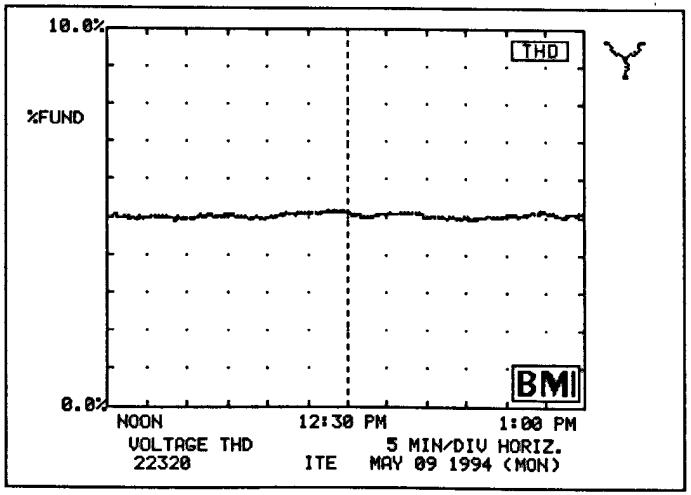
FROM: NOON May 09 1994 (Mon)
To: 1:00 PM May 09 1994 (Mon)

Average:
MAX: 5.2% THD, 12:28 PM
MIN: 4.9% THD, 12:08 PM

Phase A-N:
MAX: 5.3% THD, 12:28 PM
MIN: 5.0% THD, 12:08 PM

Phase B-N:
MAX: 5.2% THD, 12:54 PM
MIN: 4.8% THD, 12:08 PM

Phase C-N:
MAX: 5.2% THD, 12:28 PM
MIN: 4.9% THD, 12:08 PM



22320 ITE May 09 1994 (Mon)
CURRENT THD 1:00:04 PM

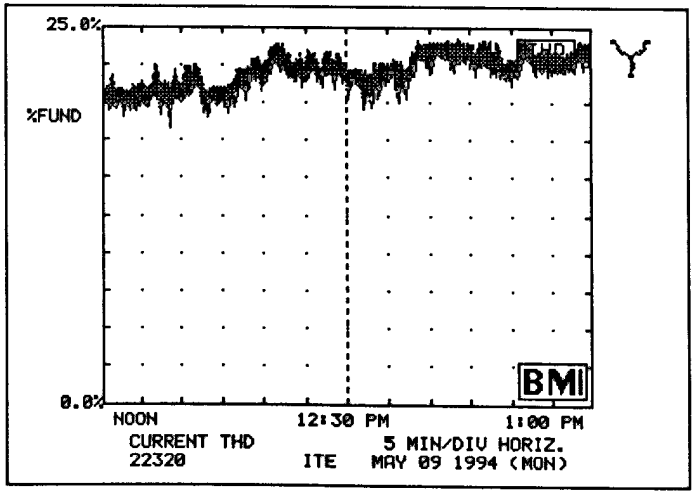
FROM: NOON May 09 1994 (Mon)
To: 1:00 PM May 09 1994 (Mon)

Average:
MAX: 24.4% THD, 12:43 PM
MIN: 18.4% THD, 12:08 PM

Phase A:
MAX: 23.0% THD, 12:58 PM
MIN: 15.3% THD, 12:32 PM

Phase B:
MAX: 28.8% THD, 12:23 PM
MIN: 18.4% THD, 12:08 PM

Phase C:
MAX: 22.5% THD, 12:21 PM
MIN: 16.6% THD, 12:37 PM



41402 ITE May 09 1994 (Mon)

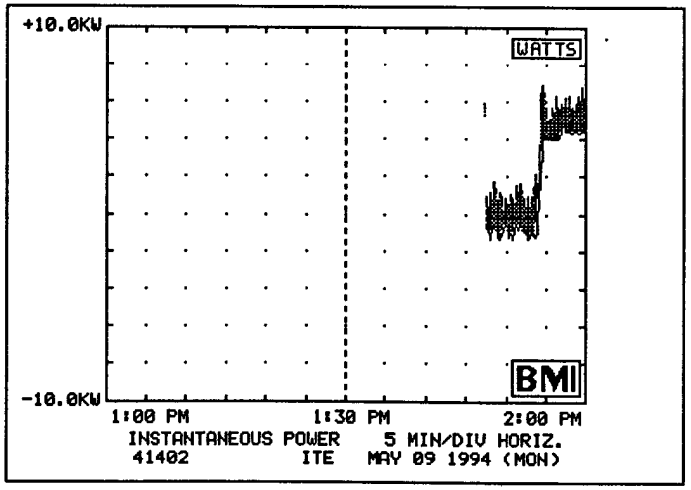
INSTANTANEOUS POWER 2:00:59 PM

FROM: 1:00 PM May 09 1994 (Mon)
To: 2:00 PM May 09 1994 (Mon)

Total:
MAX: 7.0 kW; 1:54 PM
MIN: -1.3 kW; 1:49 PM

Phase A-N:
MAX: 3.7 kW; 1:57 PM
MIN: 1.3 kW; 1:50 PM

Phase B-N:
MAX: 5.0 kW; 1:56 PM
MIN: -3.0 kW; 1:47 PM



41402 ITE May 09 1994 (Mon)

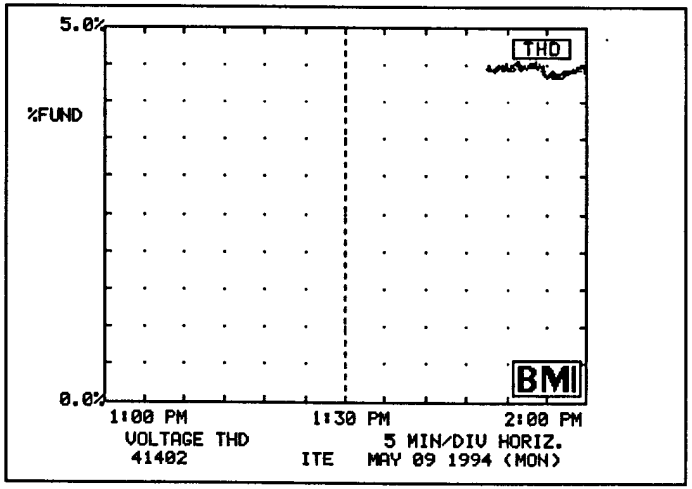
VOLTAGE THD 2:02:00 PM

FROM: 1:00 PM May 09 1994 (Mon)
To: 2:00 PM May 09 1994 (Mon)

Average:
MAX: 4.6% THD; 1:51 PM
MIN: 4.3% THD; 1:56 PM

Phase A-N:
MAX: 4.7% THD; 1:51 PM
MIN: 4.4% THD; 1:56 PM

Phase B-N:
MAX: 4.5% THD; 1:53 PM
MIN: 4.3% THD; 1:54 PM



41402 ITE May 09 1994 (Mon)

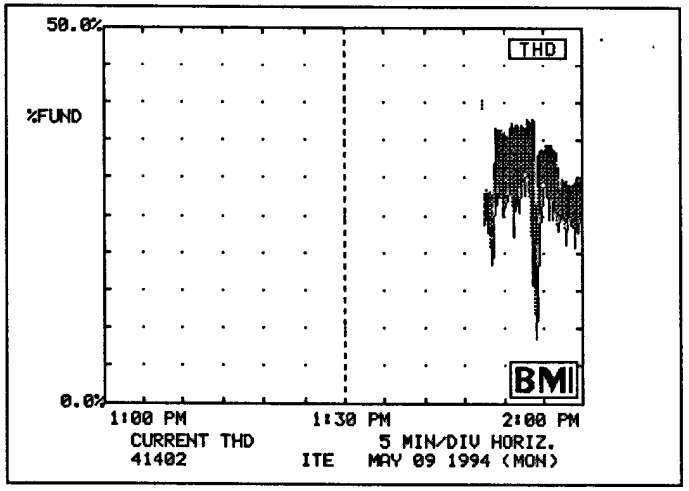
CURRENT THD 2:02:12 PM

FROM: 1:00 PM May 09 1994 (Mon)
To: 2:00 PM May 09 1994 (Mon)

Average:
MAX: 37.9% THD; 1:52 PM
MIN: 8.6% THD; 1:53 PM

Phase A:
MAX: 31.7% THD; 1:53 PM
MIN: 10.2% THD; 1:57 PM

Phase B:
MAX: 44.5% THD; 1:52 PM
MIN: 0.0% THD; 1:53 PM



41402 ITE May 09 1994 (Mon)

BMI SUMMARY 2:57:01 PM

FROM: 1:57 PM May 09 1994 (Mon)
To: 2:57 PM May 09 1994 (Mon)

Demand:

Phase	Average	Unit
TOTAL	4.947	kW
TOTAL	0.91	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	4.880	kWh
TOTAL	845.7	VARh
TOTAL	3.183	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	117.9	118.8	119.1	V
B-N	118.7	119.2	119.5	V
N-G	0.0	0.2	0.4	V
TOTAL	118.6	119.0	119.3	V
Unb	0.0	0.2	0.6	%
Current:				
A	13.1	18.6	56.6	A
B	23.4	46.3	49.1	A
N	25.8	30.9	58.0	A
TOTAL	36.8	45.5	81.9	A
Unb	0.1	19.5	51.2	%
Power:				
A-N	1.386	1.994	6.271	kW
B-N	2.564	2.953	5.662	kW
TOTAL	3.973	4.947	9.015	kW
Volt-Amps:				
A-N	1.563	2.212	6.668	kVA
B-N	2.783	3.205	5.839	kVA
TOTAL	4.375	5.417	9.686	kVA
VA Reactive:				
A-N	-0.238	0.758	1.905	kVAR
B-N	31.5	100.0	846.4	VAR
TOTAL	0.594	0.857	2.007	kVAR
Power Factor:				
A-N	0.84	0.90	0.99	PF
B-N	0.89	0.92	0.98	PF
TOTAL	0.88	0.91	0.97	PF

Displacement Factor:				
A-N	0.86	0.93	1.00	dPF
B-N	0.90	1.00	1.00	dPF
TOTAL	0.97	0.99	1.00	dPF
Current Leads:				
A	-31.1	-21.1	4.8	
B	-12.0	-1.9	-0.5	
Voltage THD:				
A-N	4.4	4.6	4.7	%
B-N	4.2	4.4	4.5	%
TOTAL	4.3	4.5	4.6	%
Current THD:				
A	7.9	23.9	35.7	%
B	19.4	40.2	46.4	%
N	24.0	42.3	52.1	%
TOTAL	16.7	32.0	40.2	%
Derate transformer to:				
TOTAL	88.7	91.4	97.0	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	1.2	1.7	2.4	k
B	2.6	3.4	4.6	k
TOTAL	2.0	2.5	3.1	k
3rd Harmonic Volts:				
A-N	0.6	0.7	0.8	%
B-N	0.3	0.4	0.4	%
TOTAL	0.5	0.5	0.6	%
5th Harmonic Volts:				
A-N	4.2	4.4	4.5	%
B-N	4.0	4.1	4.3	%
TOTAL	4.1	4.3	4.4	%
7th Harmonic Volts:				
A-N	1.0	1.1	1.2	%
B-N	1.1	1.4	1.5	%
TOTAL	1.2	1.3	1.3	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.3	0.3	0.3	%
TOTAL	0.2	0.2	0.2	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	0.238	0.297	0.541	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

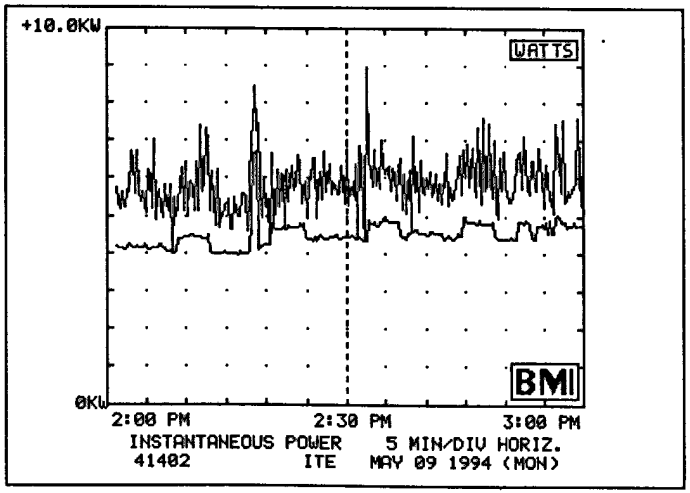
41402 ITE May 09 1994 (Mon)
INSTANTANEOUS POWER 3:00:01 PM

FROM: 2:00 PM May 09 1994 (Mon)
To: 3:00 PM May 09 1994 (Mon)

Total:
MAX: 9.0 kW, 2:32 PM
MIN: 4.0 kW, 2:16 PM

Phase A-N:
MAX: 6.3 kW, 2:32 PM
MIN: 1.4 kW, 2:07 PM

Phase B-N:
MAX: 5.7 kW, 2:18 PM
MIN: 2.6 kW, 2:57 PM



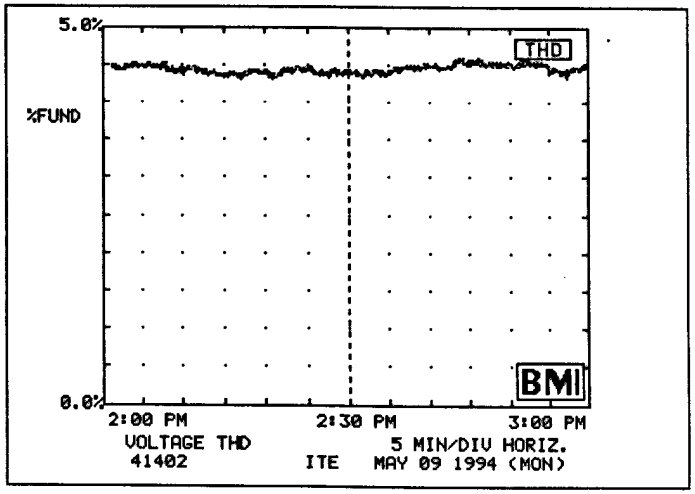
41402 ITE May 09 1994 (Mon)
VOLTAGE THD 3:01:27 PM

FROM: 2:00 PM May 09 1994 (Mon)
To: 3:00 PM May 09 1994 (Mon)

Average:
MAX: 4.6% THD, 2:43 PM
MIN: 4.3% THD, 2:16 PM

Phase A-N:
MAX: 4.7% THD, 2:43 PM
MIN: 4.4% THD, 2:21 PM

Phase B-N:
MAX: 4.5% THD, 2:43 PM
MIN: 4.2% THD, 2:16 PM



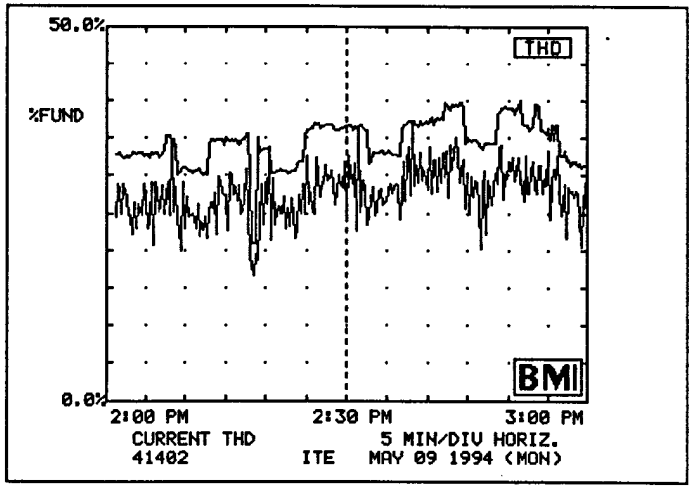
41402 ITE May 09 1994 (Mon)
CURRENT THD 3:01:37 PM

FROM: 2:00 PM May 09 1994 (Mon)
To: 3:00 PM May 09 1994 (Mon)

Average:
MAX: 40.2% THD, 2:51 PM
MIN: 16.7% THD, 2:18 PM

Phase A:
MAX: 35.7% THD, 2:51 PM
MIN: 7.9% THD, 2:12 PM

Phase B:
MAX: 46.4% THD, 2:26 PM
MIN: 19.4% THD, 2:18 PM



57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 10:00:00 AM

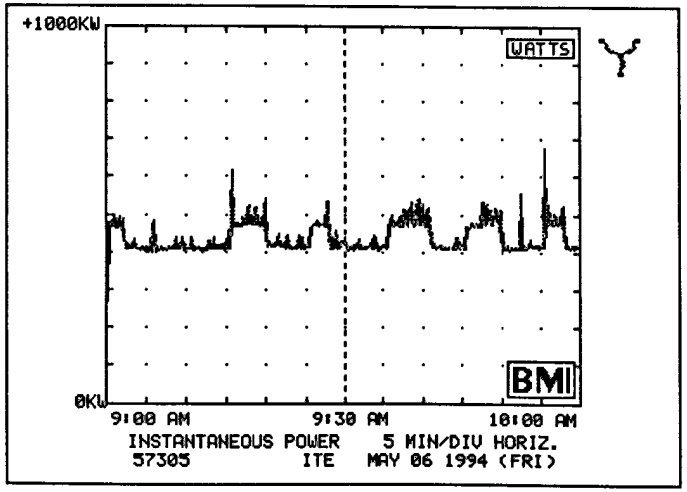
FROM: 9:00 AM May 06 1994 (Fri)
To: 10:00 AM May 06 1994 (Fri)

Total:
MAX: 679.4 kW, 9:55 AM
MIN: 267.2 kW, 9:00 AM

Phase A-N:
MAX: 228.9 kW, 9:55 AM
MIN: 90.1 kW, 9:00 AM

Phase B-N:
MAX: 232.1 kW, 9:55 AM
MIN: 85.9 kW, 9:00 AM

Phase C-N:
MAX: 218.4 kW, 9:55 AM
MIN: 91.1 kW, 9:00 AM



VOLTAGE THD 10:01:27 AM

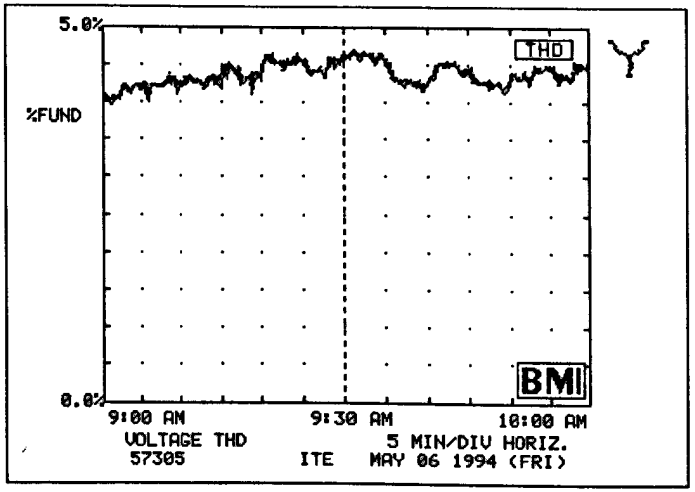
FROM: 9:00 AM May 06 1994 (Fri)
To: 10:00 AM May 06 1994 (Fri)

Average:
MAX: 4.7% THD, 9:31 AM
MIN: 4.0% THD, 9:00 AM

Phase A-N:
MAX: 4.7% THD, 9:31 AM
MIN: 3.8% THD, 9:00 AM

Phase B-N:
MAX: 4.7% THD, 9:31 AM
MIN: 4.1% THD, 9:00 AM

Phase C-N:
MAX: 4.7% THD, 9:31 AM
MIN: 4.0% THD, 9:00 AM



57305 ITE May 06 1994 (Fri)

CURRENT THD 10:01:39 AM

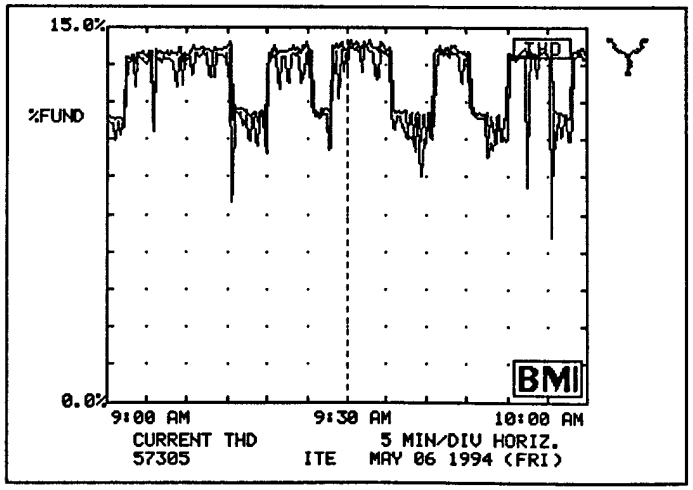
FROM: 9:00 AM May 06 1994 (Fri)
To: 10:00 AM May 06 1994 (Fri)

Average:
MAX: 14.6% THD; 9:32 AM
MIN: 6.6% THD; 9:55 AM

Phase A:
MAX: 13.6% THD; 9:34 AM
MIN: 5.7% THD; 9:55 AM

Phase B:
MAX: 16.5% THD; 9:15 AM
MIN: 7.7% THD; 9:55 AM

Phase C:
MAX: 13.8% THD; 9:30 AM
MIN: 6.3% THD; 9:55 AM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 10:03:45 AM

FROM: 9:03 AM May 06 1994 (Fri)
To: 10:03 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	441.5	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	434.4	kWh
TOTAL	83.44	kVARh
TOTAL	288.5	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	271.4	276.8	278.3	V
B-N	273.7	279.3	281.0	V
C-N	270.6	276.3	277.7	V
N-G	0.0	0.2	0.4	V
TOTAL	271.9	277.5	279.0	V
Unb	0.6	0.7	0.7	%
Current:				
A	0.499	0.553	1.119	kA
B	0.458	0.512	1.050	kA
C	0.518	0.573	1.112	kA
N	92.0	100.3	179.8	A
TOTAL	1.478	1.638	3.280	kA
Unb	4.0	6.3	8.3	%
Power:				
A-N	134.9	148.2	228.9	kW
B-N	126.5	141.4	232.1	kW
C-N	139.5	152.3	218.4	kW
TOTAL	401.4	441.5	679.4	kW
Volt-Amps:				
A-N	137.9	153.1	303.6	kVA
B-N	127.7	142.9	287.3	kVA
C-N	143.0	158.3	300.8	kVA
TOTAL	409.1	454.3	891.8	kVA
VA Reactive:				
A-N	23.03	35.07	186.8	kVAR
B-N	-1.242	10.67	145.1	kVAR
C-N	26.31	39.74	191.4	kVAR
TOTAL	53.52	85.48	523.2	kVAR
Power Factor:				
A-N	0.75	0.97	0.98	PF
B-N	0.81	0.99	0.99	PF
C-N	0.73	0.96	0.98	PF
TOTAL	0.76	0.97	0.98	PF

Displacement Factor:				
A-N	0.77	0.97	0.99	dPF
B-N	0.84	1.00	1.00	dPF
C-N	0.75	0.97	0.98	dPF
TOTAL	0.64	0.98	0.99	dPF
Current Leads:				
A	-39.9	-13.0	-9.5	
B	-32.6	-3.9	0.5	
C	-41.1	-14.4	-10.5	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.7	0.7	0.8	%
Current Sequence:				
Pos	99.4	99.6	99.7	%
Zero	5.9	6.4	6.6	%
Neg	4.3	6.9	9.1	%
Voltage THD:				
A-N	3.9	4.4	4.7	%
B-N	4.1	4.4	4.7	%
C-N	4.1	4.4	4.7	%
TOTAL	4.0	4.4	4.7	%
Current THD:				
A	5.7	12.8	13.6	%
B	7.7	14.8	16.6	%
C	6.3	12.2	13.8	%
N	18.7	34.0	37.1	%
TOTAL	6.6	13.0	14.6	%
Derate transformer to:				
TOTAL	96.1	96.9	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	46.8	56.7	64.2	K
B	48.8	55.6	62.9	K
C	48.4	54.4	64.2	K
TOTAL	50.5	55.6	62.3	K
3rd Harmonic Volts:				
A-N	0.0	0.1	0.2	%
B-N	0.2	0.3	0.5	%
C-N	0.2	0.3	0.5	%
TOTAL	0.2	0.2	0.4	%
5th Harmonic Volts:				
A-N	3.4	3.9	4.2	%
B-N	3.7	4.0	4.2	%
C-N	3.7	4.1	4.3	%
TOTAL	3.6	4.0	4.2	%
7th Harmonic Volts:				
A-N	1.7	2.0	2.2	%
B-N	1.7	1.9	2.1	%
C-N	1.6	1.7	1.9	%
TOTAL	1.7	1.9	2.0	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.0	0.1	0.2	%
C-N	0.2	0.3	0.3	%
TOTAL	0.1	0.2	0.2	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	24.09	26.49	40.76	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.2	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 11:00:02 AM

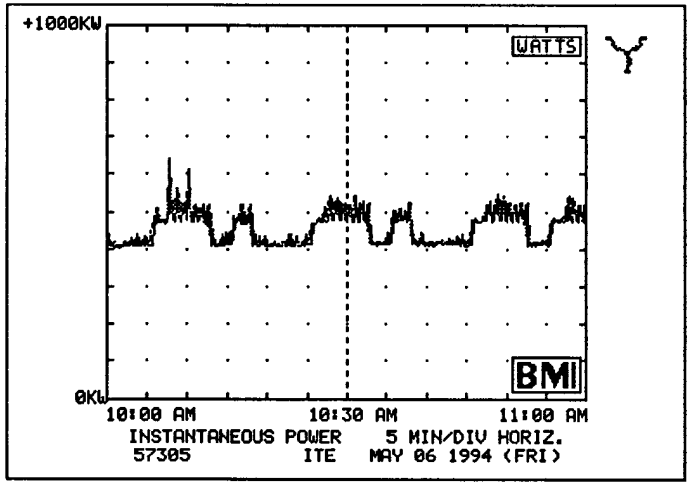
FROM: 10:00 AM May 06 1994 (Fri)
To: 11:00 AM May 06 1994 (Fri)

Total:
MAX: 646.5 kW, 10:07 AM
MIN: 403.9 kW, 10:01 AM

Phase A-N:
MAX: 212.5 kW, 10:07 AM
MIN: 135.2 kW, 10:00 AM

Phase B-N:
MAX: 222.9 kW, 10:07 AM
MIN: 127.7 kW, 10:01 AM

Phase C-N:
MAX: 211.2 kW, 10:07 AM
MIN: 139.9 kW, 10:01 AM



57305 ITE May 06 1994 (Fri)

VOLTAGE THD 11:01:29 AM

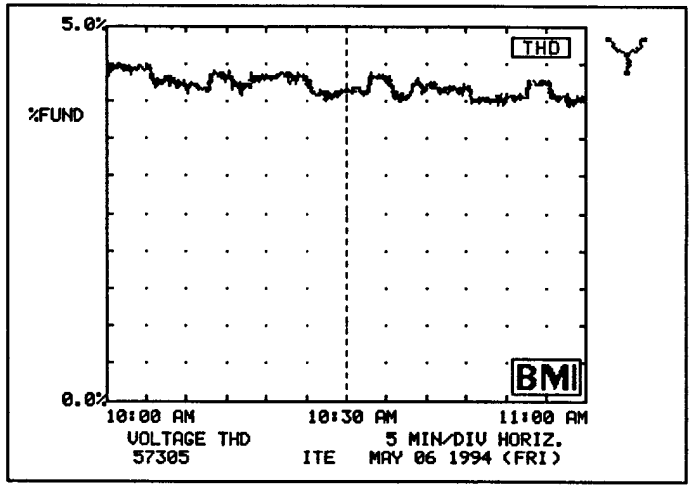
FROM: 10:00 AM May 06 1994 (Fri)
To: 11:00 AM May 06 1994 (Fri)

Average:
MAX: 4.5% THD, 10:01 AM
MIN: 4.0% THD, 10:57 AM

Phase A-N:
MAX: 4.5% THD, 10:00 AM
MIN: 3.9% THD, 10:49 AM

Phase B-N:
MAX: 4.6% THD, 10:00 AM
MIN: 4.0% THD, 10:58 AM

Phase C-N:
MAX: 4.6% THD, 10:01 AM
MIN: 4.0% THD, 10:57 AM



57305 ITE May 06 1994 (Fri)

CURRENT THD 11:01:41 AM

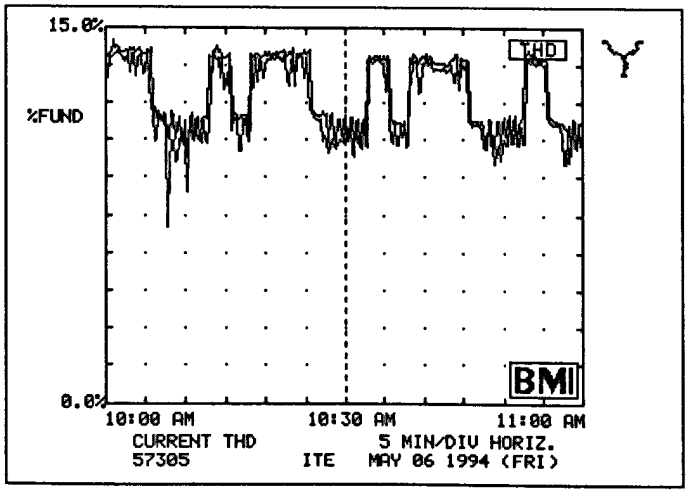
FROM: 10:00 AM May 06 1994 (Fri)
To: 11:00 AM May 06 1994 (Fri)

Average:
MAX: 14.5% THD, 10:00 AM
MIN: 7.1% THD, 10:07 AM

Phase A:
MAX: 13.4% THD, 10:00 AM
MIN: 6.6% THD, 10:07 AM

Phase B:
MAX: 16.6% THD, 10:00 AM
MIN: 8.0% THD, 10:07 AM

Phase C:
MAX: 13.6% THD, 10:00 AM
MIN: 6.7% THD, 10:07 AM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 11:03:47 AM

FROM: 10:03 AM May 06 1994 (Fri)
To: 11:03 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	460.0	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	460.0	kWh
TOTAL	97.99	kVARh
TOTAL	313.8	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	272.8	275.9	277.6	V
B-N	274.8	278.3	280.1	V
C-N	271.8	275.3	277.0	V
N-G	0.0	0.2	0.4	V
TOTAL	273.1	276.5	278.2	V
Unb	0.6	0.7	0.8	%
Current:				
A	504.5	582.4	940.1	A
B	462.4	536.6	906.0	A
C	524.2	597.5	974.6	A
N	92.7	104.5	155.8	A
TOTAL	1.500	1.716	2.820	kA
Unb	3.6	6.3	8.4	%
Power:				
A-N	136.5	155.1	212.5	kW
B-N	127.8	147.3	222.9	kW
C-N	140.7	157.6	211.2	kW
TOTAL	407.7	460.0	646.5	kW
Volt-Amps:				
A-N	139.4	160.7	256.5	kVA
B-N	129.0	149.3	249.0	kVA
C-N	144.5	164.5	264.7	kVA
TOTAL	415.4	474.5	770.2	kVA
VA Reactive:				
A-N	23.20	39.04	139.7	kVAR
B-N	0.132	14.93	104.7	kVAR
C-N	27.16	44.03	154.7	kVAR
TOTAL	54.41	97.99	399.2	kVAR
Power Factor:				
A-N	0.83	0.97	0.98	PF
B-N	0.90	0.99	0.99	PF
C-N	0.80	0.96	0.98	PF
TOTAL	0.84	0.97	0.98	PF

Displacement Factor:				
A-N	0.84	0.97	0.99	dPF
B-N	0.90	0.99	1.00	dPF
C-N	0.81	0.96	0.98	dPF
TOTAL	0.86	0.98	0.99	dPF
Current Leads:				
A	-33.4	-13.9	-9.4	
B	-25.3	-5.4	-0.1	
C	-36.1	-15.4	-10.7	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.6	0.7	0.8	%
Current Sequence:				
Pos	99.3	99.6	99.7	%
Zero	5.9	6.4	6.7	%
Neg	4.1	6.3	9.6	%
Voltage THD:				
A-N	3.9	4.2	4.5	%
B-N	4.0	4.2	4.5	%
C-N	4.0	4.2	4.5	%
TOTAL	4.0	4.2	4.5	%
Current THD:				
A	6.6	11.1	13.2	%
B	8.0	14.1	16.4	%
C	6.7	11.5	13.4	%
N	21.4	33.0	37.7	%
TOTAL	7.1	12.2	14.3	%
Derate transformer to:				
TOTAL	96.3	97.3	99.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	48.2	55.0	64.8	k
B	50.8	54.2	63.5	k
C	48.5	51.4	59.4	k
TOTAL	50.3	53.6	62.6	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.3	0.4	%
C-N	0.2	0.2	0.3	%
TOTAL	0.2	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.5	3.8	4.0	%
B-N	3.6	3.8	4.1	%
C-N	3.6	3.9	4.1	%
TOTAL	3.6	3.8	4.1	%
7th Harmonic Volts:				
A-N	1.6	1.8	2.0	%
B-N	1.6	1.8	1.9	%
C-N	1.5	1.6	1.8	%
TOTAL	1.6	1.7	1.9	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.0	0.1	0.1	%
C-N	0.1	0.2	0.3	%
TOTAL	0.1	0.1	0.2	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	24.46	27.60	38.79	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER NOON

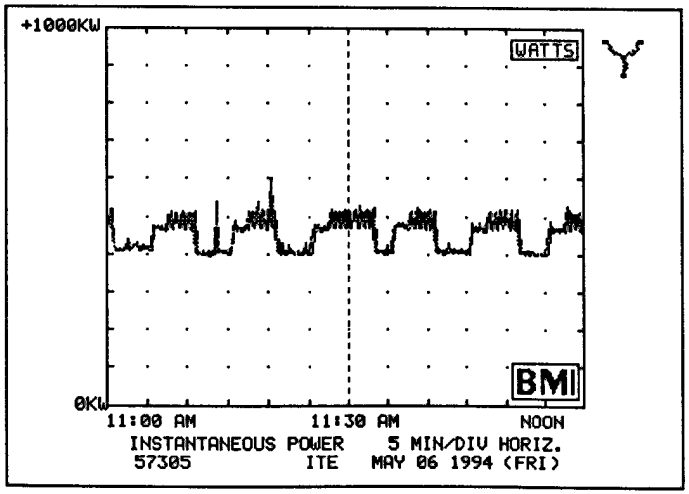
FROM: 11:00 AM May 06 1994 (Fri)
To: NOON May 06 1994 (Fri)

Total:
MAX: 603.5 kW, 11:20 AM
MIN: 396.7 kW, 11:12 AM

Phase A-N:
MAX: 199.9 kW, 11:20 AM
MIN: 133.6 kW, 11:24 AM

Phase B-N:
MAX: 204.2 kW, 11:20 AM
MIN: 125.9 kW, 11:54 AM

Phase C-N:
MAX: 199.4 kW, 11:20 AM
MIN: 136.9 kW, 11:12 AM



57305 ITE May 06 1994 (Fri)

VOLTAGE THD 12:01:27 PM

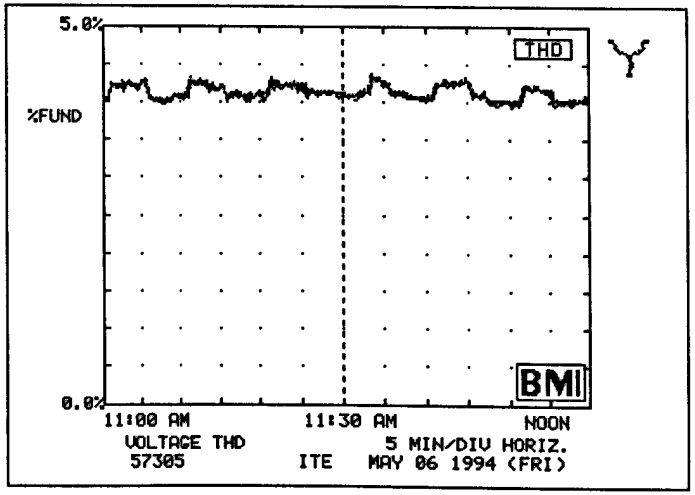
FROM: 11:00 AM May 06 1994 (Fri)
To: NOON May 06 1994 (Fri)

Average:
MAX: 4.4% THD, 11:33 AM
MIN: 3.9% THD, 11:59 AM

Phase A-N:
MAX: 4.3% THD, 11:33 AM
MIN: 3.9% THD, 11:59 AM

Phase B-N:
MAX: 4.5% THD, 11:33 AM
MIN: 4.0% THD, 11:59 AM

Phase C-N:
MAX: 4.4% THD, 11:33 AM
MIN: 3.9% THD, 11:59 AM



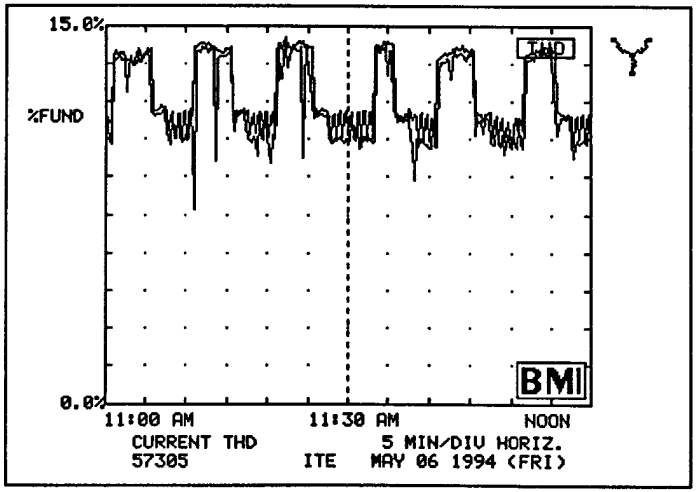
57305 ITE May 06 1994 (Fri)
CURRENT THD 12:01:39 PM
FROM: 11:00 AM May 06 1994 (Fri)
To: NOON May 06 1994 (Fri)

Average:
MAX: 14.6% THD; 11:22 AM
MIN: 7.7% THD; 11:10 AM

Phase A:
MAX: 13.2% THD; 11:34 AM
MIN: 7.1% THD; 11:10 AM

Phase B:
MAX: 17.8% THD; 11:22 AM
MIN: 8.8% THD; 11:10 AM

Phase C:
MAX: 13.8% THD; 11:22 AM
MIN: 7.2% THD; 11:10 AM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 12:03:45 PM

FROM: 11:03 AM May 06 1994 (Fri)
To: 12:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	457.9	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	458.3	kWh
TOTAL	105.3	kVARh
TOTAL	319.4	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-T	273.6	276.2	277.5	V
B-T	275.8	278.6	279.8	V
C-T	272.5	275.5	276.8	V
N-G	0.0	0.2	0.5	V
TOTAL	274.0	276.7	278.0	V
Unb	0.6	0.7	0.7	%
Current:				
A	493.0	580.6	851.8	A
B	455.6	538.4	806.4	A
C	509.5	593.5	875.9	A
N	92.4	105.0	143.7	A
TOTAL	1.460	1.712	2.534	kA
Unb	3.1	5.7	7.7	%
Power:				
A-T	133.6	154.5	199.9	kW
B-T	125.9	147.7	204.2	kW
C-T	136.9	155.8	199.4	kW
TOTAL	396.7	457.9	603.5	kW
Volt-Amps:				
A-T	136.4	160.3	233.1	kVA
B-T	127.2	149.9	222.4	kVA
C-T	140.7	163.5	238.8	kVA
TOTAL	404.7	473.7	694.2	kVA
VA Reactive:				
A-T	22.62	40.45	117.9	kVAR
B-T	-0.309	17.77	86.89	kVAR
C-T	27.92	47.04	133.4	kVAR
TOTAL	55.18	105.3	338.2	kVAR
Power Factor:				
A-T	0.85	0.96	0.98	PF
B-T	0.92	0.99	0.99	PF
C-T	0.82	0.95	0.98	PF
TOTAL	0.86	0.97	0.98	PF

Displacement Factor:				
A-T	0.86	0.97	0.99	dPF
B-T	0.92	0.99	1.00	dPF
C-T	0.83	0.96	0.98	dPF
TOTAL	0.78	0.97	0.99	dPF
Current Leads:				
A	-30.3	-14.4	-9.3	
B	-22.5	-6.5	0.1	
C	-33.4	-16.6	-11.3	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.7	0.7	0.8	%
Current Sequence:				
Pos	99.4	99.6	99.7	%
Zero	5.8	6.4	6.7	%
Neg	4.0	5.9	8.6	%
Voltage THD:				
A-T	3.9	4.1	4.3	%
B-T	4.0	4.2	4.5	%
C-T	3.9	4.2	4.4	%
TOTAL	3.9	4.2	4.4	%
Current THD:				
A	7.1	11.0	13.2	%
B	9.8	14.0	17.0	%
C	7.2	11.5	13.8	%
N	23.8	32.4	37.6	%
TOTAL	7.7	12.2	14.6	%

Derate transformer to:
TOTAL 96.1 97.2 98.8 %
(Eddy current loss set to: 10.0%)

I*T Product:				
A	44.0	58.4	71.1	k
B	42.3	56.4	68.4	k
C	39.1	54.3	63.5	k
TOTAL	41.8	56.4	67.7	k
3rd Harmonic Volts:				
A-T	0.0	0.1	0.1	%
B-T	0.2	0.3	0.3	%
C-T	0.2	0.2	0.3	%
TOTAL	0.2	0.2	0.2	%
5th Harmonic Volts:				
A-T	3.5	3.7	3.9	%
B-T	3.6	3.8	4.0	%
C-T	3.6	3.8	4.0	%
TOTAL	3.6	3.7	4.0	%
7th Harmonic Volts:				
A-T	1.6	1.8	2.0	%
B-T	1.8	1.8	2.0	%
C-T	1.5	1.6	1.8	%
TOTAL	1.6	1.7	1.9	%
9th Harmonic Volts:				
A-T	0.1	0.1	0.2	%
B-T	0.0	0.1	0.1	%
C-T	0.2	0.2	0.3	%
TOTAL	0.1	0.1	0.2	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	23.80	27.48	36.21	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 1:00:02 PM

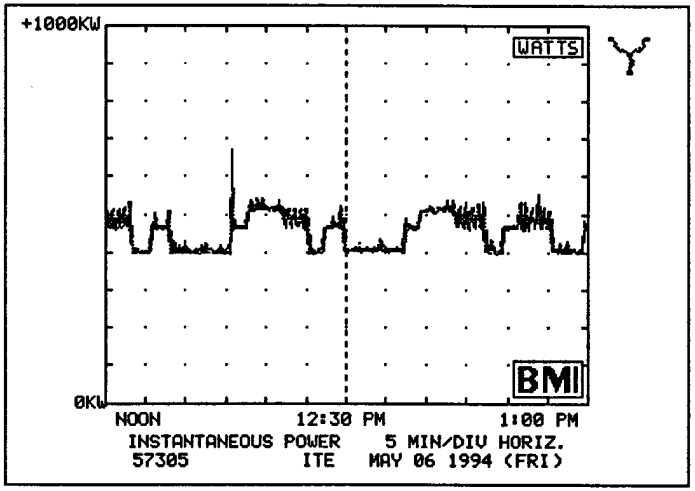
FROM: NOON May 06 1994 (Fri)
To: 1:00 PM May 06 1994 (Fri)

Total:
MAX: 673.2 kW, 12:15 PM
MIN: 395.5 kW, 12:48 PM

Phase A-N:
MAX: 221.2 kW, 12:15 PM
MIN: 133.7 kW, 12:48 PM

Phase B-N:
MAX: 232.0 kW, 12:15 PM
MIN: 123.5 kW, 12:25 PM

Phase C-N:
MAX: 220.0 kW, 12:15 PM
MIN: 136.5 kW, 12:15 PM



VOLTAGE THD 1:01:27 PM

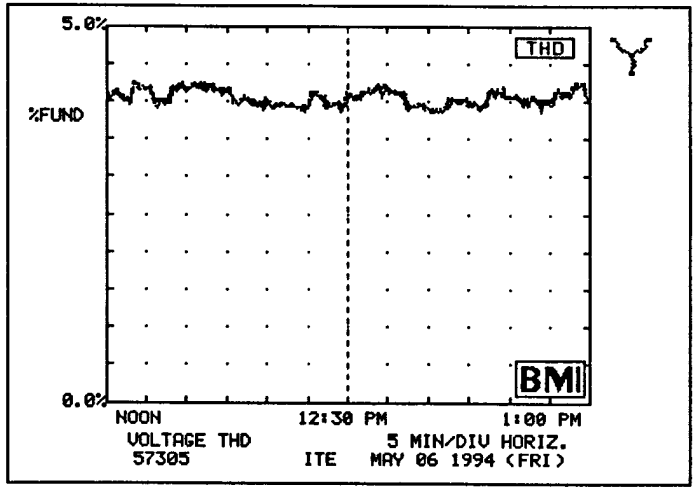
FROM: NOON May 06 1994 (Fri)
To: 1:00 PM May 06 1994 (Fri)

Average:
MAX: 4.3% THD, 12:58 PM
MIN: 3.9% THD, 12:40 PM

Phase A-N:
MAX: 4.3% THD, 12:59 PM
MIN: 3.8% THD, 12:40 PM

Phase B-N:
MAX: 4.3% THD, 12:10 PM
MIN: 3.9% THD, 12:40 PM

Phase C-N:
MAX: 4.3% THD, 12:10 PM
MIN: 3.8% THD, 12:53 PM



CURRENT THD 1:01:39 PM

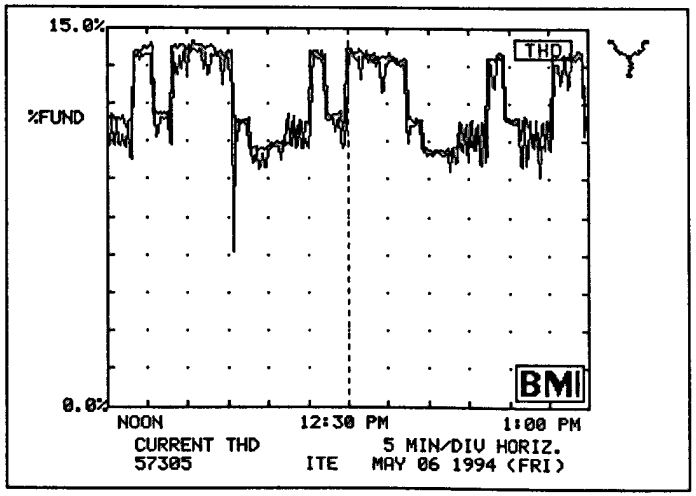
FROM: NOON May 06 1994 (Fri)
To: 1:00 PM May 06 1994 (Fri)

Average:
MAX: 14.5% THD, 12:10 PM
MIN: 6.2% THD, 12:15 PM

Phase A:
MAX: 13.1% THD, 12:29 PM
MIN: 5.5% THD, 12:15 PM

Phase B:
MAX: 16.9% THD, 12:10 PM
MIN: 7.1% THD, 12:15 PM

Phase C:
MAX: 13.7% THD, 12:05 PM
MIN: 5.9% THD, 12:15 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 1:03:47 PM

FROM: 12:03 PM May 06 1994 (Fri)
To: 1:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	455.7	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	455.7	kWh
TOTAL	102.0	kVARh
TOTAL	315.2	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	270.7	275.9	277.3	V
B-N	272.7	278.3	279.8	V
C-N	269.6	275.1	276.5	V
N-G	0.0	0.2	0.4	V
TOTAL	271.0	276.4	277.9	V
Unb	0.6	0.7	0.8	%
Current:				
A	0.494	0.580	1.116	kA
B	0.447	0.532	1.047	kA
C	0.509	0.593	1.138	kA
N	93.7	105.9	176.3	A
TOTAL	1.455	1.705	3.300	kA
Unb	3.9	6.3	8.5	%
Power:				
A-N	133.7	154.1	221.2	kW
B-N	123.5	145.9	232.0	kW
C-N	136.5	155.7	220.0	kW
TOTAL	395.5	455.7	673.2	kW
Volt-Amps:				
A-N	136.6	159.9	302.0	kVA
B-N	124.8	148.1	285.4	kVA
C-N	140.4	163.1	306.8	kVA
TOTAL	403.4	471.0	894.3	kVA
VA Reactive:				
A-N	22.80	39.74	179.5	kVAR
B-N	6.693	16.66	142.5	kVAR
C-N	27.15	45.61	190.0	kVAR
TOTAL	54.44	102.0	511.9	kVAR
Power Factor:				
A-N	0.73	0.97	0.98	PF
B-N	0.81	0.99	0.99	PF
C-N	0.72	0.96	0.98	PF
TOTAL	0.75	0.97	0.98	PF

Displacement Factor:				
A-N	0.77	0.97	0.99	dPF
B-N	0.85	0.99	1.00	dPF
C-N	0.75	0.96	0.98	dPF
TOTAL	0.82	0.98	0.99	dPF
Current Leads:				
A	-39.2	-14.2	-9.4	
B	-32.1	-6.1	-0.3	
C	-41.5	-16.1	-11.0	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.7	0.7	0.8	%
Current Sequence:				
Pos	99.4	99.6	99.7	%
Zero	5.9	6.5	6.9	%
Neg	3.7	6.0	8.3	%
Voltage THD:				
A-N	3.8	4.0	4.3	%
B-N	3.9	4.1	4.3	%
C-N	3.8	4.1	4.3	%
TOTAL	3.8	4.1	4.3	%
Current THD:				
A	5.5	11.0	13.1	%
B	7.1	14.0	16.9	%
C	5.9	11.4	13.7	%
N	18.4	31.6	36.3	%
TOTAL	6.2	12.1	14.5	%
Derate transformer to:				
TOTAL	96.1	97.2	99.3	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	55.1	59.5	66.2	k
B	52.9	56.5	63.4	k
C	51.0	54.9	60.4	k
TOTAL	54.0	56.9	62.7	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.3	0.3	%
C-N	0.2	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.4	3.6	3.8	%
B-N	3.5	3.7	3.9	%
C-N	3.5	3.7	3.9	%
TOTAL	3.5	3.7	3.9	%
7th Harmonic Volts:				
A-N	1.6	1.8	2.0	%
B-N	1.6	1.8	2.0	%
C-N	1.5	1.6	1.8	%
TOTAL	1.6	1.7	1.9	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.0	0.1	0.1	%
C-N	0.2	0.2	0.3	%
TOTAL	0.1	0.1	0.2	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	23.73	27.34	40.39	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 2:00:01 PM

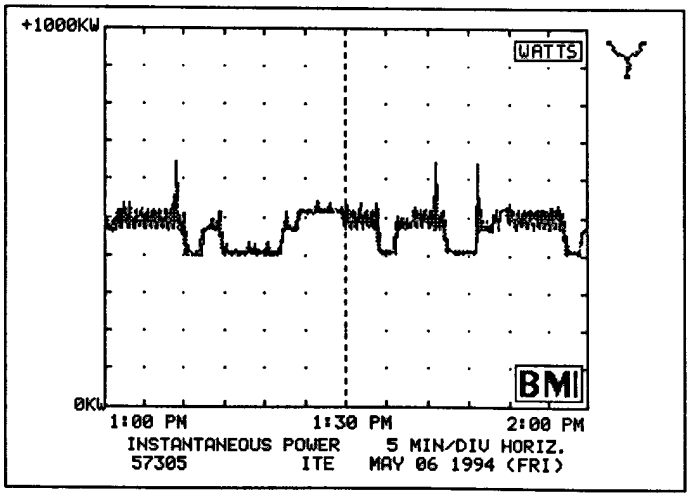
FROM: 1:00 PM May 06 1994 (Fri)
To: 2:00 PM May 06 1994 (Fri)

Total:
MAX: 648.8 kW; 1:08 PM
MIN: 398.2 kW; 1:20 PM

Phase A-N:
MAX: 213.3 kW; 1:08 PM
MIN: 134.7 kW; 1:15 PM

Phase B-N:
MAX: 221.5 kW; 1:40 PM
MIN: 124.8 kW; 1:10 PM

Phase C-N:
MAX: 217.7 kW; 1:45 PM
MIN: 138.2 kW; 1:20 PM



57305 ITE May 06 1994 (Fri)

VOLTAGE THD 2:01:28 PM

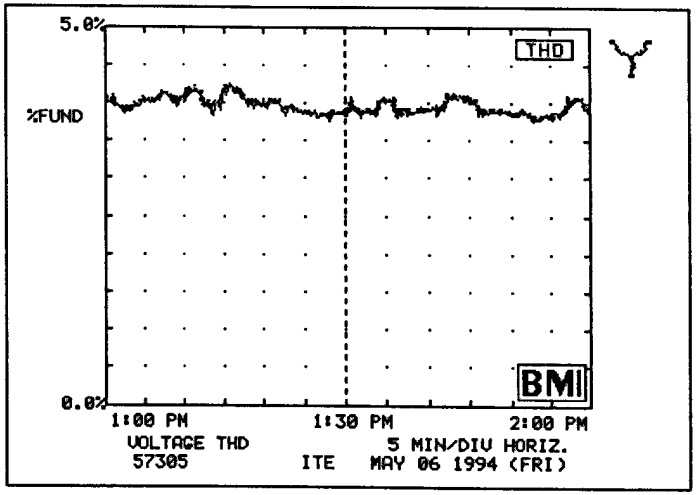
FROM: 1:00 PM May 06 1994 (Fri)
To: 2:00 PM May 06 1994 (Fri)

Average:
MAX: 4.3% THD; 1:15 PM
MIN: 3.8% THD; 1:52 PM

Phase A-N:
MAX: 4.3% THD; 1:15 PM
MIN: 3.8% THD; 1:52 PM

Phase B-N:
MAX: 4.3% THD; 1:15 PM
MIN: 3.8% THD; 1:52 PM

Phase C-N:
MAX: 4.2% THD; 1:15 PM
MIN: 3.7% THD; 1:52 PM



57305 ITE May 06 1994 (Fri)

CURRENT THD 2:01:40 PM

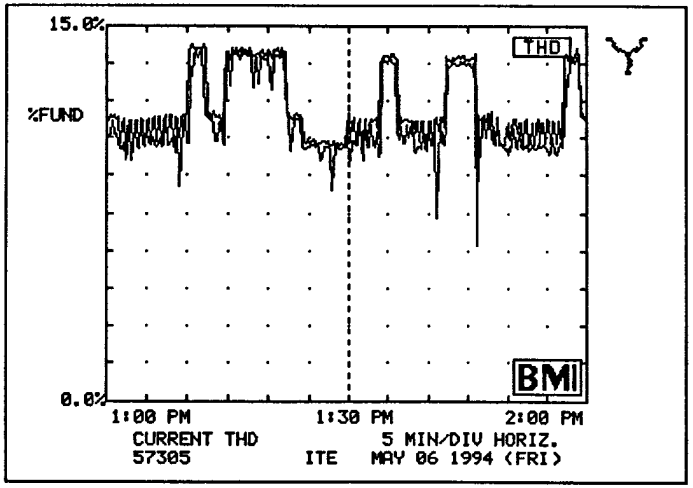
FROM: 1:00 PM May 06 1994 (Fri)
To: 2:00 PM May 06 1994 (Fri)

Average:
MAX: 14.3% THD; 1:11 PM
MIN: 6.3% THD; 1:45 PM

Phase A:
MAX: 13.1% THD; 1:15 PM
MIN: 5.6% THD; 1:45 PM

Phase B:
MAX: 16.8% THD; 1:10 PM
MIN: 7.2% THD; 1:45 PM

Phase C:
MAX: 13.3% THD; 1:11 PM
MIN: 5.9% THD; 1:45 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 2:03:46 PM

FROM: 1:03 PM May 06 1994 (Fri)
To: 2:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	469.7	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	470.1	kWh
TOTAL	111.3	kVARh
TOTAL	330.5	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	271.3	275.8	277.1	V
B-N	274.5	278.3	279.7	V
C-N	271.2	275.0	276.3	V
N-G	0.0	0.3	0.5	V
TOTAL	272.4	276.4	277.7	V
Unb	0.6	0.7	0.8	%
Current:				
A	0.497	0.599	1.022	kA
B	448.5	548.4	909.6	A
C	0.515	0.614	1.058	kA
N	93.6	108.7	165.6	A
TOTAL	1.466	1.761	2.990	kA
Unb	3.9	6.6	8.8	%
Power:				
A-N	134.5	158.7	213.3	kW
B-N	124.0	150.2	221.5	kW
C-N	138.2	160.8	217.7	kW
TOTAL	398.2	469.7	648.8	kW
Volt-Amps:				
A-N	137.6	165.1	277.4	kVA
B-N	125.3	152.6	249.7	kVA
C-N	142.0	168.8	287.1	kVA
TOTAL	406.2	486.5	814.1	kVA
VA Reactive:				
A-N	22.37	43.05	190.9	kVAR
B-N	0.051	19.12	151.3	kVAR
C-N	27.78	49.03	198.8	kVAR
TOTAL	55.54	111.2	541.1	kVAR
Power Factor:				
A-N	0.77	0.96	0.98	PF
B-N	0.86	0.98	0.99	PF
C-N	0.76	0.95	0.98	PF
TOTAL	0.79	0.97	0.98	PF

Displacement Factor:				
A-N	0.76	0.96	0.99	dPF
B-N	0.83	0.99	1.00	dPF
C-N	0.74	0.96	0.98	dPF
TOTAL	0.75	0.97	0.99	dPF
Current Leads:				
A	-40.5	-14.9	-9.2	
B	-33.5	-6.9	-0.0	
C	-42.1	-16.7	-11.2	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.7	0.8	0.8	%
Current Sequence:				
Pos	99.4	99.6	99.7	%
Zero	5.8	6.5	7.0	%
Neg	4.1	6.1	8.6	%
Voltage THD:				
A-N	3.8	4.0	4.3	%
B-N	3.8	4.1	4.3	%
C-N	3.7	3.9	4.2	%
TOTAL	3.8	4.0	4.3	%
Current THD:				
A	5.6	10.6	13.1	%
B	7.2	13.5	16.8	%
C	5.9	10.9	13.4	%
N	18.5	30.9	42.3	%
TOTAL	6.3	11.7	14.3	%
Derate transformer to:				
TOTAL	96.1	97.4	99.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	51.9	61.5	73.6	k
B	48.4	56.3	66.9	k
C	47.8	54.7	66.8	k
TOTAL	49.4	57.5	69.1	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.3	%
B-N	0.2	0.3	0.6	%
C-N	0.1	0.2	0.3	%
TOTAL	0.2	0.2	0.3	%
5th Harmonic Volts:				
A-N	3.4	3.5	3.8	%
B-N	3.4	3.6	3.9	%
C-N	3.4	3.6	3.8	%
TOTAL	3.4	3.6	3.8	%
7th Harmonic Volts:				
A-N	1.6	1.7	1.9	%
B-N	1.6	1.8	1.9	%
C-N	1.7	1.8	1.9	%
TOTAL	1.6	1.7	1.9	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.0	0.0	0.1	%
C-N	0.2	0.2	0.3	%
TOTAL	0.1	0.1	0.2	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	23.89	28.18	38.93	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 3:00:00 PM

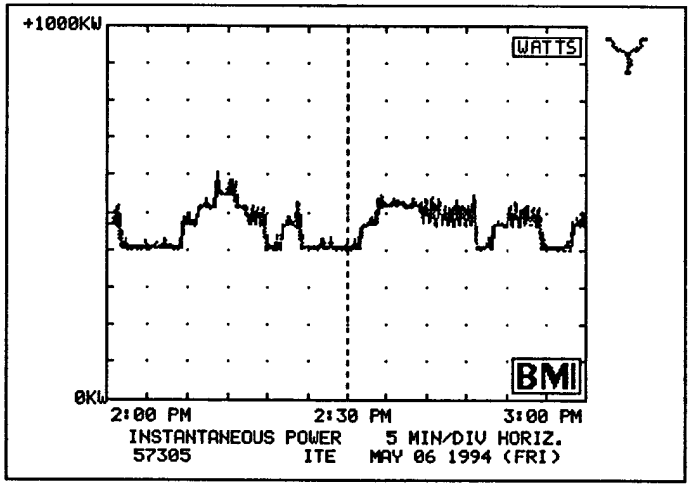
FROM: 2:00 PM May 06 1994 (Fri)
To: 3:00 PM May 06 1994 (Fri)

Total:
MAX: 609.1 kW, 2:13 PM
MIN: 397.9 kW, 2:28 PM

Phase A-N:
MAX: 207.0 kW, 2:13 PM
MIN: 133.8 kW, 2:57 PM

Phase B-N:
MAX: 199.6 kW, 2:13 PM
MIN: 125.3 kW, 2:28 PM

Phase C-N:
MAX: 202.5 kW, 2:13 PM
MIN: 138.5 kW, 2:28 PM



VOLTAGE THD 3:01:26 PM

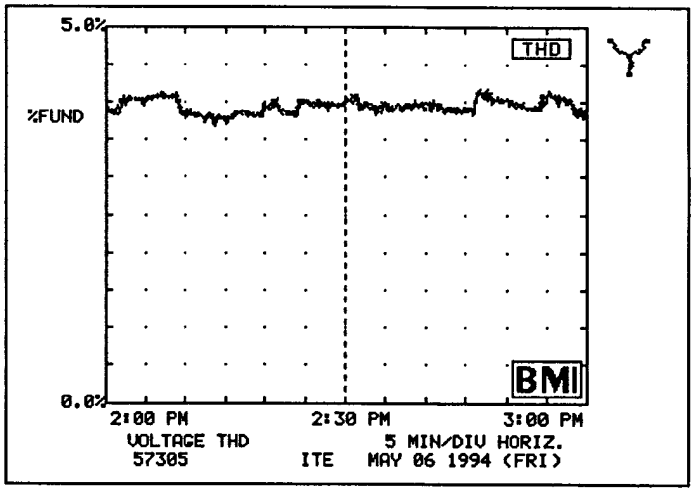
FROM: 2:00 PM May 06 1994 (Fri)
To: 3:00 PM May 06 1994 (Fri)

Average:
MAX: 4.2% THD, 2:47 PM
MIN: 3.7% THD, 2:13 PM

Phase A-N:
MAX: 4.2% THD, 2:47 PM
MIN: 3.7% THD, 2:13 PM

Phase B-N:
MAX: 4.3% THD, 2:46 PM
MIN: 3.8% THD, 2:13 PM

Phase C-N:
MAX: 4.2% THD, 2:47 PM
MIN: 3.7% THD, 2:13 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 3:03:45 PM

FROM: 2:03 PM May 06 1994 (Fri)
To: 3:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	468.7	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	468.7	kWh
TOTAL	109.9	kVARh
TOTAL	328.6	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	274.3	276.1	277.3	V
B-N	276.5	278.3	279.8	V
C-N	273.3	275.2	276.4	V
N-G	0.0	0.2	0.4	V
TOTAL	274.7	276.6	277.8	V
Unb	0.6	0.7	0.8	%
Current:				
A	494.3	594.4	806.2	A
B	453.4	548.2	747.6	A
C	515.6	612.6	807.9	A
N	92.55	106.4	134.8	A
TOTAL	1.465	1.755	2.362	kA
Unb	4.1	6.4	8.8	%
Power:				
A-N	133.8	157.8	207.0	kW
B-N	125.3	150.3	199.6	kW
C-N	138.5	160.6	202.5	kW
TOTAL	397.9	468.7	609.1	kW
Volt-Amps:				
A-N	136.8	164.1	221.2	kVA
B-N	126.5	152.6	206.9	kVA
C-N	142.2	168.6	221.0	kVA
TOTAL	405.7	485.3	649.0	kVA
VA Reactive:				
A-N	22.91	42.58	127.9	kVAR
B-N	-0.131	18.52	92.79	kVAR
C-N	27.84	48.80	143.1	kVAR
TOTAL	54.65	109.9	363.8	kVAR
Power Factor:				
A-N	0.93	0.96	0.98	PF
B-N	0.96	0.99	0.99	PF
C-N	0.91	0.95	0.98	PF
TOTAL	0.94	0.97	0.98	PF

Displacement Factor:				
A-N	0.86	0.97	0.99	dPF
B-N	0.93	0.99	1.00	dPF
C-N	0.84	0.96	0.98	dPF
TOTAL	0.80	0.97	0.99	dPF
Current Leads:				
A	-30.3	-14.8	-9.3	
B	-22.3	-6.6	0.1	
C	-32.9	-16.6	-11.0	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.7	0.8	0.8	%
Current Sequence:				
Pos	99.4	99.6	99.7	%
Zero	5.8	6.4	6.7	%
Neg	3.8	6.3	9.0	%
Voltage THD:				
A-N	3.7	3.9	4.2	%
B-N	3.8	4.0	4.3	%
C-N	3.7	3.9	4.2	%
TOTAL	3.7	4.0	4.2	%
Current THD:				
A	6.4	10.7	13.1	%
B	7.7	13.7	16.7	%
C	6.4	11.0	13.4	%
N	21.7	31.8	36.9	%
TOTAL	6.8	11.8	14.4	%
Derate transformer to:				
TOTAL	96.1	97.3	99.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	50.3	60.8	64.7	k
B	42.5	55.9	59.0	k
C	45.7	54.6	58.2	k
TOTAL	46.3	57.1	60.2	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.2	0.3	%
C-N	0.2	0.2	0.3	%
TOTAL	0.2	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.3	3.5	3.7	%
B-N	3.4	3.6	3.8	%
C-N	3.4	3.6	3.8	%
TOTAL	3.3	3.6	3.8	%
7th Harmonic Volts:				
A-N	1.5	1.7	1.9	%
B-N	1.6	1.7	1.9	%
C-N	1.4	1.5	1.6	%
TOTAL	1.5	1.6	1.8	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.0	0.1	0.1	%
C-N	0.2	0.2	0.3	%
TOTAL	0.1	0.1	0.2	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	23.88	28.12	36.55	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 4:00:01 PM

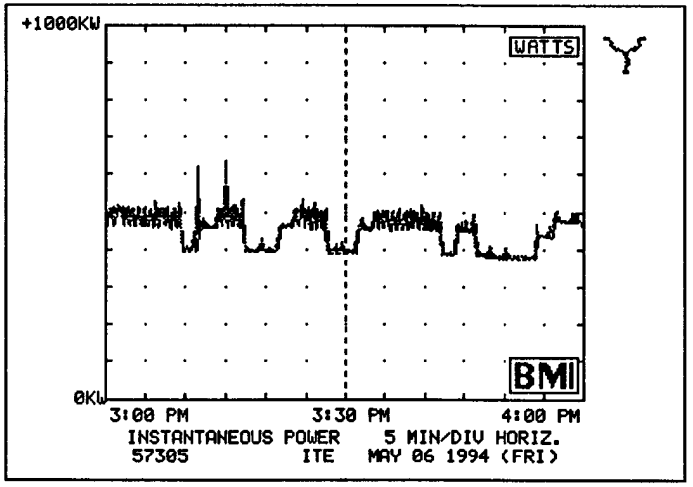
FROM: 3:00 PM May 06 1994 (Fri)
To: 4:00 PM May 06 1994 (Fri)

Total:
MAX: 641.5 kW, 3:14 PM
MIN: 374.3 kW, 3:51 PM

Phase A-N:
MAX: 212.3 kW, 3:14 PM
MIN: 125.9 kW, 3:52 PM

Phase B-N:
MAX: 219.1 kW, 3:14 PM
MIN: 117.0 kW, 3:51 PM

Phase C-N:
MAX: 210.1 kW, 3:14 PM
MIN: 130.5 kW, 3:52 PM



VOLTAGE THD 4:01:28 PM

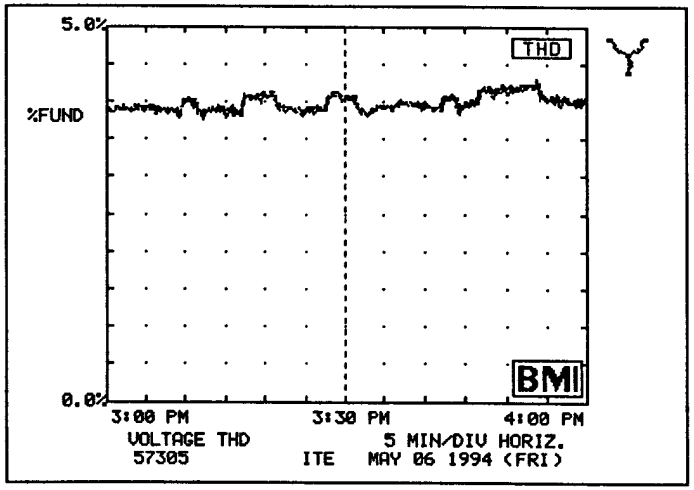
FROM: 3:00 PM May 06 1994 (Fri)
To: 4:00 PM May 06 1994 (Fri)

Average:
MAX: 4.3% THD, 3:53 PM
MIN: 3.8% THD, 3:12 PM

Phase A-N:
MAX: 4.3% THD, 3:53 PM
MIN: 3.7% THD, 3:12 PM

Phase B-N:
MAX: 4.4% THD, 3:53 PM
MIN: 3.9% THD, 3:12 PM

Phase C-N:
MAX: 4.2% THD, 3:53 PM
MIN: 3.7% THD, 3:12 PM



57305 ITE May 06 1994 (Fri)

CURRENT THD 4:01:40 PM

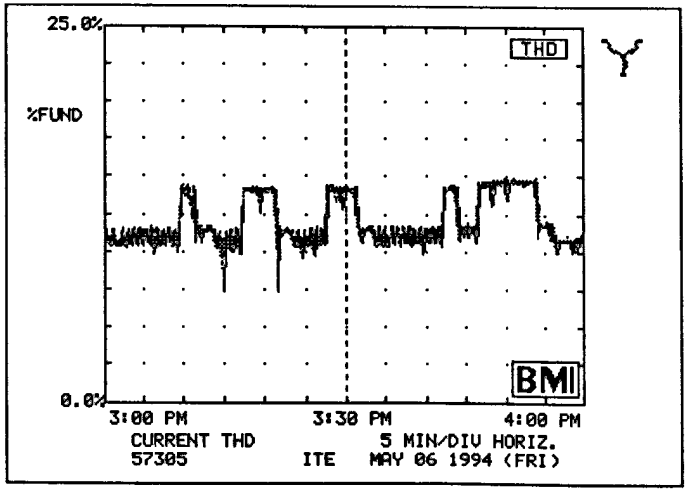
FROM: 3:00 PM May 06 1994 (Fri)
To: 4:00 PM May 06 1994 (Fri)

Average:
MAX: 15.0% THD; 3:49 PM
MIN: 7.4% THD; 3:14 PM

Phase A:
MAX: 13.3% THD; 3:51 PM
MIN: 6.5% THD; 3:21 PM

Phase B:
MAX: 17.8% THD; 3:51 PM
MIN: 8.5% THD; 3:14 PM

Phase C:
MAX: 14.1% THD; 3:49 PM
MIN: 6.9% THD; 3:21 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 4:03:46 PM

FROM: 3:03 PM May 06 1994 (Fri)
To: 4:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	449.6	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	450.0	kWh
TOTAL	108.8	kVARh
TOTAL	318.2	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	272.4	276.4	277.9	V
B-N	274.5	278.9	280.7	V
C-N	271.1	275.9	277.2	V
N-G	0.0	0.2	0.5	V
TOTAL	272.7	276.9	278.6	V
Unb	0.6	0.7	0.8	%
Current:				
A	465.1	575.6	924.5	A
B	422.4	525.5	883.4	A
C	484.3	585.7	952.5	A
N	89.1	104.6	151.3	A
TOTAL	1.376	1.685	2.760	kA
Unb	4.0	6.8	8.7	%
Power:				
A-N	125.9	152.7	212.3	kW
B-N	117.0	143.4	219.1	kW
C-N	130.5	153.6	210.1	kW
TOTAL	374.3	449.6	641.5	kW
Volt-Amps:				
A-N	129.1	159.1	251.8	kVA
B-N	118.4	145.9	242.5	kVA
C-N	134.2	161.3	258.3	kVA
TOTAL	382.6	466.3	752.6	kVA
VA Reactive:				
A-N	23.19	42.26	151.1	kVAR
B-N	1.015	19.47	116.6	kVAR
C-N	25.98	46.94	153.1	kVAR
TOTAL	53.11	108.7	420.7	kVAR
Power Factor:				
A-N	0.84	0.96	0.98	PF
B-N	0.90	0.98	0.99	PF
C-N	0.81	0.95	0.98	PF
TOTAL	0.85	0.97	0.98	PF

Displacement Factor:				
A-N	0.80	0.96	0.99	dPF
B-N	0.86	0.99	1.00	dPF
C-N	0.79	0.96	0.98	dPF
TOTAL	0.89	0.97	1.00	dPF
Current Leads:				
A	-36.9	-15.2	-9.8	
B	-30.6	-7.3	-0.5	
C	-38.1	-16.7	-11.1	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.7	0.8	0.8	%
Current Sequence:				
Pos	99.4	99.6	99.7	%
Zero	6.0	6.5	6.9	%
Neg	3.9	5.8	8.3	%
Voltage THD:				
A-N	3.7	4.0	4.3	%
B-N	3.9	4.1	4.4	%
C-N	3.7	4.0	4.2	%
TOTAL	3.8	4.0	4.3	%
Current THD:				
A	6.5	10.7	13.3	%
B	8.2	14.3	17.8	%
C	6.2	11.4	14.1	%
N	21.2	32.0	38.2	%
TOTAL	7.4	12.1	15.0	%
Derate transformer to:				
TOTAL	95.6	97.1	98.9	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	39.0	60.7	86.7	k
B	31.9	58.4	80.9	k
C	34.3	57.6	76.4	k
TOTAL	35.3	58.9	81.3	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.2	0.3	%
C-N	0.2	0.2	0.3	%
TOTAL	0.2	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.4	3.6	3.8	%
B-N	3.5	3.7	4.0	%
C-N	3.4	3.6	3.9	%
TOTAL	3.4	3.6	3.9	%
7th Harmonic Volts:				
A-N	1.6	1.7	1.9	%
B-N	1.6	1.7	1.9	%
C-N	1.5	1.5	1.6	%
TOTAL	1.5	1.6	1.8	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.3	%
B-N	0.0	0.1	0.1	%
C-N	0.2	0.3	0.4	%
TOTAL	0.1	0.2	0.2	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	22.46	26.98	38.49	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 5:00:00 PM

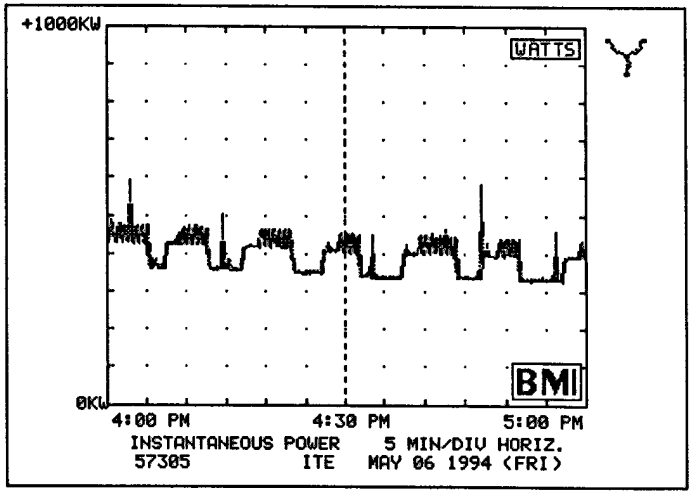
FROM: 4:00 PM May 06 1994 (Fri)
To: 5:00 PM May 06 1994 (Fri)

Total:
MAX: 596.3 kW; 4:02 PM
MIN: 326.6 kW; 4:53 PM

Phase A-N:
MAX: 198.8 kW; 4:02 PM
MIN: 112.7 kW; 4:57 PM

Phase B-N:
MAX: 199.1 kW; 4:02 PM
MIN: 99.2 kW; 4:53 PM

Phase C-N:
MAX: 198.4 kW; 4:02 PM
MIN: 113.0 kW; 4:54 PM



VOLTAGE THD 5:01:27 PM

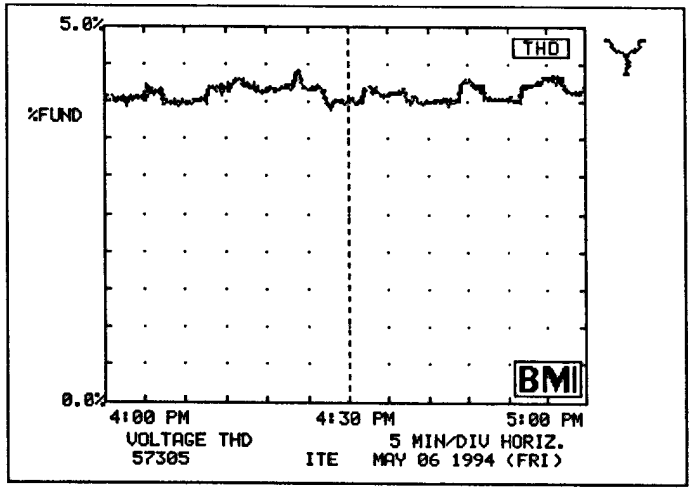
FROM: 4:00 PM May 06 1994 (Fri)
To: 5:00 PM May 06 1994 (Fri)

Average:
MAX: 4.4% THD; 4:23 PM
MIN: 3.9% THD; 4:27 PM

Phase A-N:
MAX: 4.4% THD; 4:23 PM
MIN: 3.9% THD; 4:27 PM

Phase B-N:
MAX: 4.6% THD; 4:23 PM
MIN: 4.0% THD; 4:27 PM

Phase C-N:
MAX: 4.4% THD; 4:23 PM
MIN: 3.8% THD; 4:27 PM



57305 ITE May 06 1994 (Fri)

CURRENT THD 5:01:39 PM

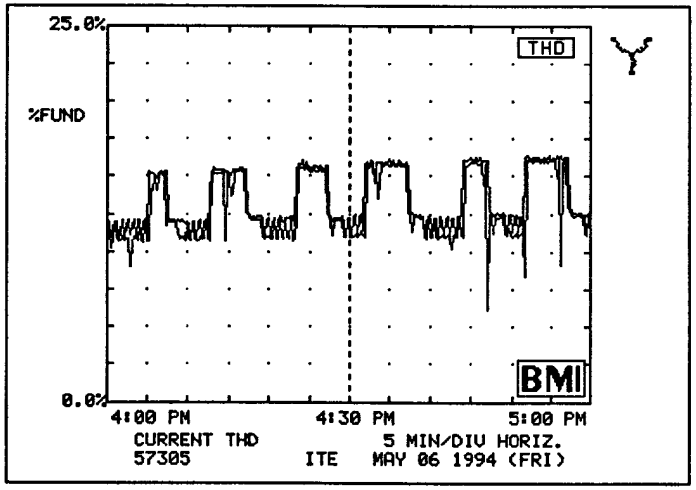
FROM: 4:00 PM May 06 1994 (Fri)
To: 5:00 PM May 06 1994 (Fri)

Average:
MAX: 16.5% THD, 4:54 PM
MIN: 6.2% THD, 4:47 PM

Phase A:
MAX: 13.7% THD, 4:24 PM
MIN: 5.1% THD, 4:47 PM

Phase B:
MAX: 20.2% THD, 4:51 PM
MIN: 7.4% THD, 4:47 PM

Phase C:
MAX: 15.9% THD, 4:54 PM
MIN: 6.0% THD, 4:47 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 5:03:45 PM

FROM: 4:03 PM May 06 1994 (Fri)
To: 5:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	392.4	kW
TOTAL	0.96	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	392.4	kWh
TOTAL	99.41	kVARh
TOTAL	281.3	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	272.1	277.4	279.2	V
B-N	274.6	279.9	281.7	V
C-N	271.4	276.8	278.6	V
N-G	0.0	0.2	0.5	V
TOTAL	272.7	278.0	279.8	V
Unb	0.6	0.7	0.7	%
Current:				
A	0.414	0.512	1.022	kA
B	357.8	448.1	923.3	A
C	0.419	0.511	1.026	kA
N	85.4	104.6	173.0	A
TOTAL	1.191	1.471	2.971	kA
Unb	0.1	8.7	11.4	%
Power:				
A-N	112.4	136.1	196.0	kW
B-N	98.90	122.5	197.6	kW
C-N	112.6	133.8	192.3	kW
TOTAL	323.9	392.4	585.9	kW
Volt-Amps:				
A-N	115.4	142.1	278.1	kVA
B-N	100.5	125.4	253.6	kVA
C-N	116.3	141.3	278.3	kVA
TOTAL	332.2	408.7	810.0	kVA
VA Reactive:				
A-N	21.07	38.35	187.6	kVAR
B-N	2.375	18.84	157.8	kVAR
C-N	24.75	42.22	195.5	kVAR
TOTAL	50.91	99.41	536.1	kVAR
Power Factor:				
A-N	0.70	0.96	0.98	PF
B-N	0.78	0.98	0.99	PF
C-N	0.69	0.95	0.97	PF
TOTAL	0.72	0.96	0.98	PF

Displacement Factor:				
A-N	0.73	0.96	0.98	dPF
B-N	0.79	0.99	1.00	dPF
C-N	0.70	0.95	0.98	dPF
TOTAL	0.70	0.97	0.99	dPF
Current Leads:				
A	-43.3	-15.4	-10.0	
B	-37.5	-8.2	-1.3	
C	-45.7	-17.2	-11.4	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.7	0.7	0.8	%
Current Sequence:				
Pos	99.4	99.6	99.7	%
Zero	6.3	7.5	8.8	%
Neg	2.9	5.4	8.1	%
Voltage THD:				
A-N	3.9	4.1	4.4	%
B-N	4.0	4.3	4.6	%
C-N	3.8	4.1	4.4	%
TOTAL	3.9	4.1	4.4	%
Current THD:				
A	5.1	11.1	13.7	%
B	7.4	16.3	20.2	%
C	6.0	12.9	15.6	%
N	15.7	28.1	34.2	%
TOTAL	6.2	13.4	16.5	%
Derate transformer to:				
TOTAL	93.8	96.0	99.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	50.3	63.3	78.9	K
B	49.4	65.6	84.9	K
C	52.0	68.3	90.4	K
TOTAL	50.5	65.7	84.8	K
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.3	0.4	%
C-N	0.2	0.2	0.3	%
TOTAL	0.2	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.5	3.6	3.9	%
B-N	3.6	3.8	4.1	%
C-N	3.5	3.7	4.0	%
TOTAL	3.5	3.7	4.0	%
7th Harmonic Volts:				
A-N	1.6	1.7	2.0	%
B-N	1.7	1.8	2.0	%
C-N	1.4	1.5	1.7	%
TOTAL	1.5	1.7	1.9	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.0	0.1	0.2	%
C-N	0.2	0.3	0.4	%
TOTAL	0.2	0.2	0.3	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	19.44	23.54	35.15	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 6:00:00 PM

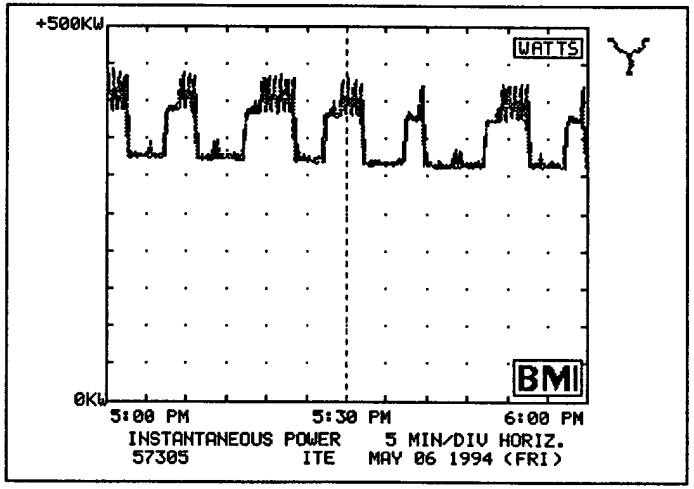
FROM: 5:00 PM May 06 1994 (Fri)
To: 6:00 PM May 06 1994 (Fri)

Total:
MAX: 444.9 kW, 5:00 PM
MIN: 311.7 kW, 5:45 PM

Phase A-N:
MAX: 155.5 kW, 5:00 PM
MIN: 108.8 kW, 5:40 PM

Phase B-N:
MAX: 141.7 kW, 5:00 PM
MIN: 95.0 kW, 5:42 PM

Phase C-N:
MAX: 148.9 kW, 5:21 PM
MIN: 107.3 kW, 5:53 PM



VOLTAGE THD 6:01:26 PM

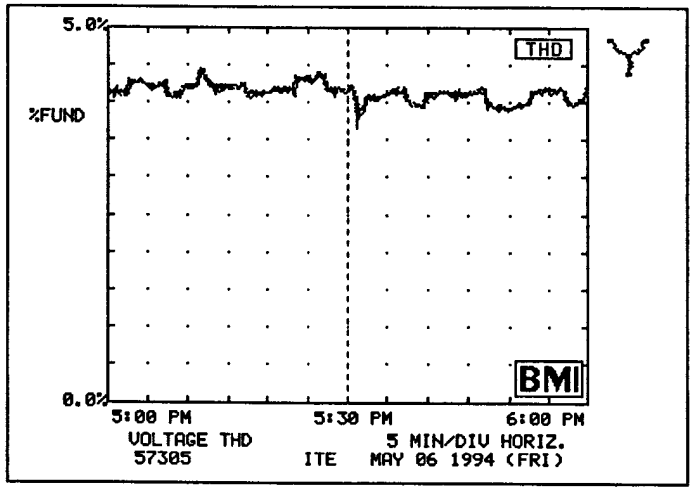
FROM: 5:00 PM May 06 1994 (Fri)
To: 6:00 PM May 06 1994 (Fri)

Average:
MAX: 4.5% THD, 5:11 PM
MIN: 3.7% THD, 5:31 PM

Phase A-N:
MAX: 4.4% THD, 5:11 PM
MIN: 3.4% THD, 5:31 PM

Phase B-N:
MAX: 4.7% THD, 5:11 PM
MIN: 3.9% THD, 5:31 PM

Phase C-N:
MAX: 4.4% THD, 5:11 PM
MIN: 3.7% THD, 5:31 PM



57305 ITE May 06 1994 (Fri)

CURRENT THD 6:01:38 PM

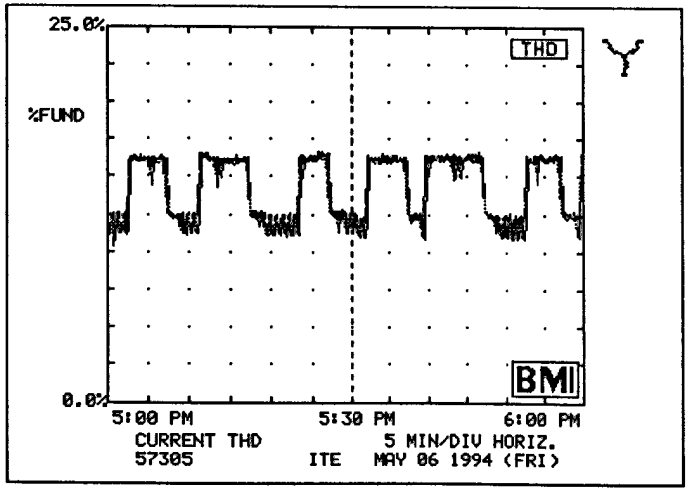
FROM: 5:00 PM May 06 1994 (Fri)
To: 6:00 PM May 06 1994 (Fri)

Average:
MAX: 16.8% THD; 5:25 PM
MIN: 10.4% THD; 5:00 PM

Phase A:
MAX: 13.9% THD; 5:11 PM
MIN: 8.3% THD; 5:00 PM

Phase B:
MAX: 20.6% THD; 5:26 PM
MIN: 12.8% THD; 5:00 PM

Phase C:
MAX: 16.3% THD; 5:46 PM
MIN: 10.3% THD; 5:00 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 6:03:45 PM

FROM: 5:03 PM May 06 1994 (Fri)
To: 6:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	352.7	kW
TOTAL	0.96	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	352.7	kWh
TOTAL	83.53	kVARh
TOTAL	247.9	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.5	277.5	279.3	V
B-N	278.0	280.1	281.9	V
C-N	274.9	276.9	278.7	V
N-G	0.0	0.2	0.5	V
TOTAL	276.1	278.1	280.0	V
Unb	0.6	0.7	0.8	%
Current:				
A	402.1	459.0	577.0	A
B	345.0	400.6	513.4	A
C	401.4	458.8	574.3	A
N	81.6	94.1	112.1	A
TOTAL	1.150	1.318	1.663	kA
Unb	6.8	8.9	11.3	%
Power:				
A-N	108.8	122.4	151.8	kW
B-N	94.96	109.6	139.6	kW
C-N	107.3	120.7	148.9	kW
TOTAL	311.7	352.7	439.4	kW
Volt-Amps:				
A-N	111.5	127.3	160.3	kVA
B-N	96.52	112.2	143.9	kVA
C-N	111.1	127.0	159.1	kVA
TOTAL	319.7	366.5	462.8	kVA
VA Reactive:				
A-N	20.60	32.50	57.89	kVAR
B-N	2.674	15.10	41.18	kVAR
C-N	23.47	35.94	62.54	kVAR
TOTAL	48.29	83.54	161.6	kVAR
Power Factor:				
A-N	0.93	0.96	0.98	PF
B-N	0.95	0.98	0.99	PF
C-N	0.91	0.95	0.97	PF
TOTAL	0.93	0.96	0.98	PF

Displacement Factor:				
A-N	0.93	0.97	0.98	dPF
B-N	0.95	0.99	1.00	dPF
C-N	0.91	0.96	0.98	dPF
TOTAL	0.93	0.97	0.99	dPF
Current Leads:				
A	-22.1	-14.5	-10.6	
B	-17.9	-7.3	-1.6	
C	-24.5	-16.2	-11.8	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.1	0.1	%
Neg	0.7	0.7	0.8	%
Current Sequence:				
Pos	99.4	99.5	99.7	%
Zero	6.7	7.6	8.4	%
Neg	3.1	5.6	7.7	%
Voltage THD:				
A-N	3.4	4.0	4.4	%
B-N	3.9	4.4	4.7	%
C-N	3.7	4.1	4.4	%
TOTAL	3.7	4.2	4.5	%
Current THD:				
A	8.5	11.7	13.9	%
B	13.2	17.7	20.6	%
C	10.6	14.1	16.4	%
N	20.6	26.8	32.6	%
TOTAL	10.9	14.5	16.8	%
Derate transformer to:				
TOTAL	93.3	95.0	97.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	57.2	62.4	67.5	k
B	65.2	68.8	73.7	k
C	68.1	72.3	77.6	k
TOTAL	64.2	67.8	71.9	k
3rd Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.2	0.3	0.4	%
C-N	0.1	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	2.9	3.6	3.9	%
B-N	3.4	3.9	4.1	%
C-N	3.3	3.7	4.0	%
TOTAL	3.2	3.7	4.0	%
7th Harmonic Volts:				
A-N	1.6	1.8	2.0	%
B-N	1.8	2.0	2.1	%
C-N	1.5	1.5	1.7	%
TOTAL	1.6	1.8	2.0	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.3	%
B-N	0.1	0.1	0.2	%
C-N	0.3	0.4	0.5	%
TOTAL	0.2	0.2	0.3	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	18.70	21.16	26.36	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 7:00:01 PM

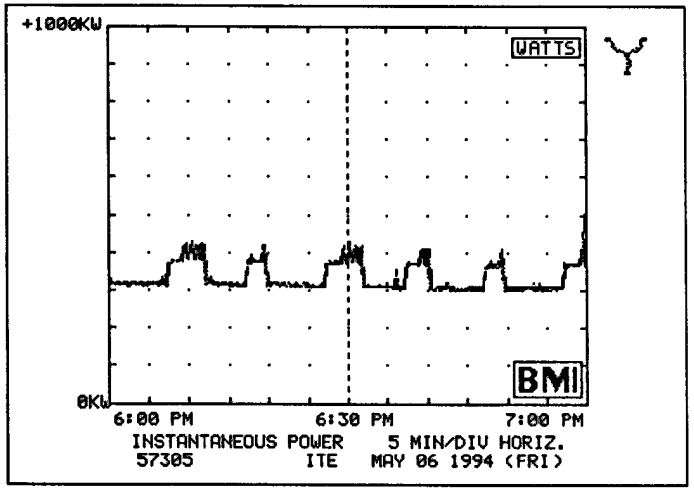
FROM: 6:00 PM May 06 1994 (Fri)
To: 7:00 PM May 06 1994 (Fri)

Total:
MAX: 505.7 kW; 6:59 PM
MIN: 301.0 kW; 6:43 PM

Phase A-N:
MAX: 169.4 kW; 6:59 PM
MIN: 105.1 kW; 6:44 PM

Phase B-N:
MAX: 171.2 kW; 6:59 PM
MIN: 91.4 kW; 6:43 PM

Phase C-N:
MAX: 165.0 kW; 6:59 PM
MIN: 103.5 kW; 6:50 PM



VOLTAGE THD 7:01:28 PM

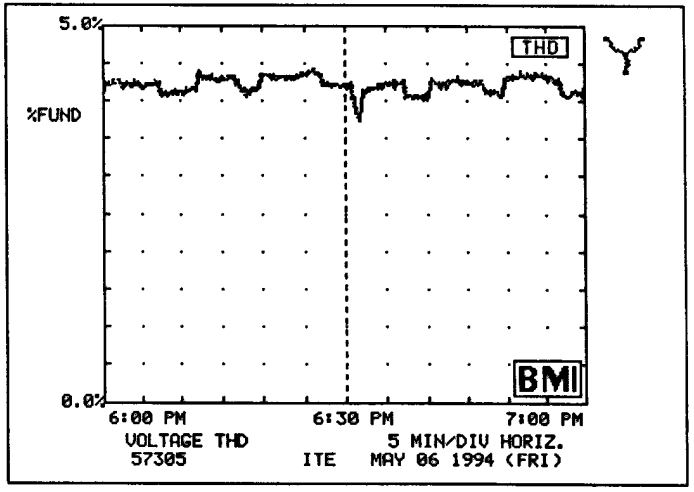
FROM: 6:00 PM May 06 1994 (Fri)
To: 7:00 PM May 06 1994 (Fri)

Average:
MAX: 4.5% THD; 6:26 PM
MIN: 3.8% THD; 6:31 PM

Phase A-N:
MAX: 4.3% THD; 6:26 PM
MIN: 3.6% THD; 6:31 PM

Phase B-N:
MAX: 4.7% THD; 6:26 PM
MIN: 4.0% THD; 6:31 PM

Phase C-N:
MAX: 4.4% THD; 6:26 PM
MIN: 3.7% THD; 6:31 PM



57305 ITE May 06 1994 (Fri)

CURRENT THD 7:01:40 PM

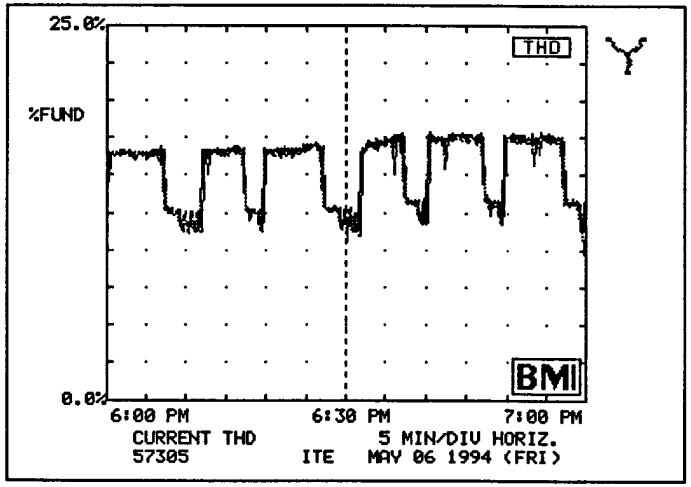
FROM: 6:00 PM May 06 1994 (Fri)
To: 7:00 PM May 06 1994 (Fri)

Average:
MAX: 18.0% THD; 6:40 PM
MIN: 9.8% THD; 6:59 PM

Phase A:
MAX: 14.6% THD; 6:40 PM
MIN: 7.8% THD; 6:59 PM

Phase B:
MAX: 22.0% THD; 6:40 PM
MIN: 12.0% THD; 6:59 PM

Phase C:
MAX: 17.6% THD; 6:55 PM
MIN: 9.5% THD; 6:59 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 7:03:46 PM

FROM: 6:03 PM May 06 1994 (Fri)
To: 7:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	337.5	kW
TOTAL	0.96	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	337.8	kWh
TOTAL	80.70	kVARh
TOTAL	237.9	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	274.4	277.8	279.2	V
B-N	277.0	280.6	281.9	V
C-N	273.8	277.4	278.8	V
N-G	0.0	0.2	0.5	V
TOTAL	275.1	278.6	280.0	V
Unb	0.6	0.7	0.8	%
Current:				
A	389.9	442.2	761.9	A
B	332.1	381.8	707.5	A
C	387.3	438.5	775.2	A
N	89.4	96.7	135.5	A
TOTAL	1.112	1.262	2.245	kA
Unb	5.4	9.4	11.7	%
Power:				
A-N	105.1	117.8	169.4	kW
B-N	91.39	104.5	171.2	kW
C-N	103.5	115.2	165.0	kW
TOTAL	301.0	337.5	505.7	kW
Volt-Amps:				
A-N	108.3	122.8	209.2	kVA
B-N	93.21	107.1	196.1	kVA
C-N	107.5	121.6	212.3	kVA
TOTAL	309.9	351.6	617.6	kVA
VA Reactive:				
A-N	21.06	31.72	93.10	kVAR
B-N	2.867	13.97	70.50	kVAR
C-N	23.19	34.93	100.0	kVAR
TOTAL	48.26	80.63	263.6	kVAR
Power Factor:				
A-N	0.81	0.96	0.98	PF
B-N	0.87	0.98	0.99	PF
C-N	0.78	0.95	0.97	PF
TOTAL	0.82	0.96	0.98	PF

Displacement Factor:				
A-N	0.85	0.97	0.98	dPF
B-N	0.90	0.99	1.00	dPF
C-N	0.82	0.96	0.98	dPF
TOTAL	0.90	0.97	0.99	dPF
Current Leads:				
A	-31.7	-14.7	-11.0	
B	-25.9	-7.0	-1.7	
C	-34.8	-16.5	-12.2	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.7	0.7	0.8	%
Current Sequence:				
Pos	99.3	99.5	99.7	%
Zero	6.9	8.2	9.0	%
Neg	3.5	5.7	7.7	%
Voltage THD:				
A-N	3.6	4.1	4.3	%
B-N	4.0	4.5	4.7	%
C-N	3.7	4.2	4.4	%
TOTAL	3.8	4.2	4.5	%
Current THD:				
A	7.8	12.3	14.6	%
B	12.0	18.9	22.0	%
C	9.5	15.1	17.6	%
N	17.2	24.2	27.4	%
TOTAL	9.8	15.4	18.0	%
Derate transformer to:				
TOTAL	91.4	93.8	97.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	57.7	67.2	87.5	k
B	65.9	74.8	102.4	k
C	68.6	75.3	93.2	k
TOTAL	64.9	72.4	94.4	k
3rd Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.2	0.3	0.4	%
C-N	0.2	0.2	0.3	%
TOTAL	0.2	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.2	3.6	3.7	%
B-N	3.5	3.9	4.1	%
C-N	3.4	3.7	3.9	%
TOTAL	3.4	3.7	3.9	%
7th Harmonic Volts:				
A-N	1.6	1.9	2.1	%
B-N	1.7	2.0	2.2	%
C-N	1.4	1.6	1.8	%
TOTAL	1.5	1.9	2.1	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.3	%
B-N	0.1	0.2	0.2	%
C-N	0.3	0.4	0.5	%
TOTAL	0.2	0.3	0.3	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	18.06	20.25	30.34	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 8:00:00 PM

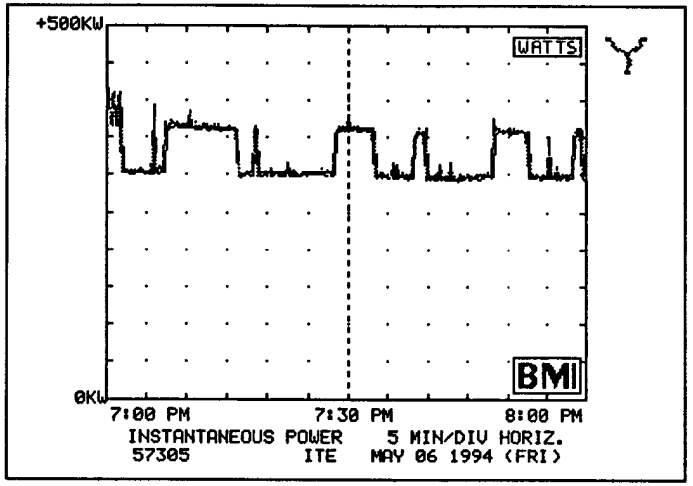
FROM: 7:00 PM May 06 1994 (Fri)
To: 8:00 PM May 06 1994 (Fri)

Total:
MAX: 416.6 kW; 7:00 PM
MIN: 293.7 kW; 7:43 PM

Phase A-N:
MAX: 144.6 kW; 7:00 PM
MIN: 102.8 kW; 7:43 PM

Phase B-N:
MAX: 132.7 kW; 7:00 PM
MIN: 89.4 kW; 7:43 PM

Phase C-N:
MAX: 139.3 kW; 7:00 PM
MIN: 101.2 kW; 7:42 PM



VOLTAGE THD 8:01:26 PM

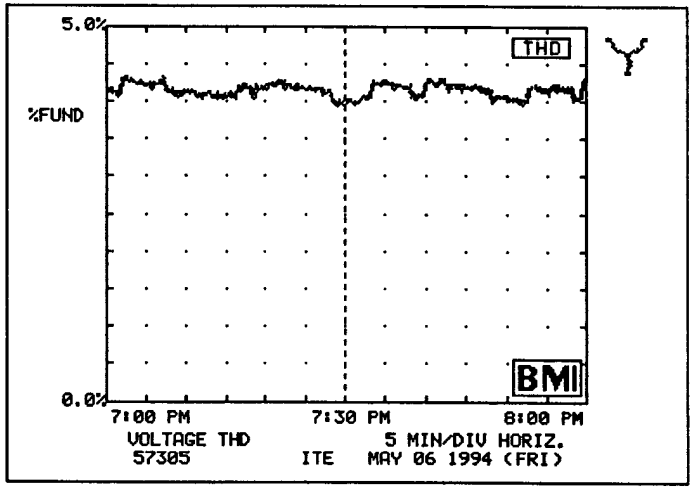
FROM: 7:00 PM May 06 1994 (Fri)
To: 8:00 PM May 06 1994 (Fri)

Average:
MAX: 4.4% THD; 7:06 PM
MIN: 4.0% THD; 7:28 PM

Phase A-N:
MAX: 4.3% THD; 7:41 PM
MIN: 3.9% THD; 7:51 PM

Phase B-N:
MAX: 4.6% THD; 7:06 PM
MIN: 4.2% THD; 7:29 PM

Phase C-N:
MAX: 4.3% THD; 7:06 PM
MIN: 3.8% THD; 7:29 PM



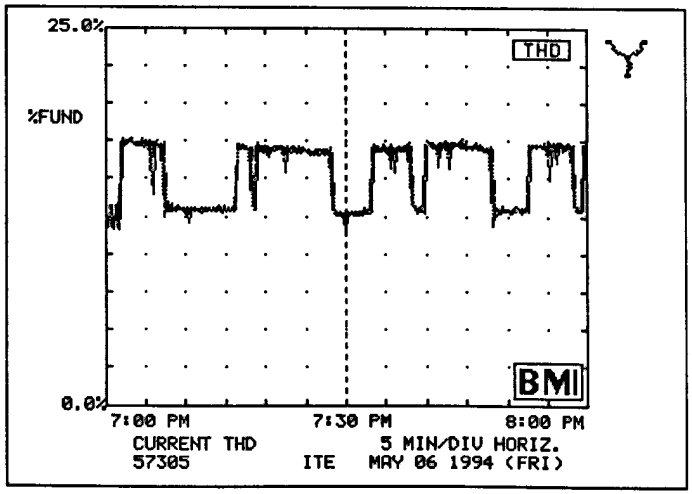
57305 ITE May 06 1994 (Fri)

CURRENT THD 8:01:39 PM

FROM: 7:00 PM May 06 1994 (Fri)
To: 8:00 PM May 06 1994 (Fri)

Average:

	MAX:	17.8% THD,	7:44 PM
	MIN:	11.5% THD,	7:29 PM
Phase A:			
	MAX:	14.4% THD,	7:04 PM
	MIN:	8.8% THD,	7:29 PM
Phase B:			
	MAX:	21.9% THD,	7:44 PM
	MIN:	14.1% THD,	7:01 PM
Phase C:			
	MAX:	17.3% THD,	7:06 PM
	MIN:	11.4% THD,	7:29 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 8:03:45 PM

FROM: 7:03 PM May 06 1994 (Fri)
To: 8:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	323.7	kW
TOTAL	0.96	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	323.7	kWh
TOTAL	76.09	kVARh
TOTAL	226.9	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.5	276.7	278.0	V
B-N	278.6	280.0	281.1	V
C-N	275.3	276.6	277.8	V
N-G	0.0	0.2	0.5	V
TOTAL	276.5	277.8	278.9	V
Unb	0.7	0.8	0.9	%
Current:				
A	381.9	426.0	552.7	A
B	325.8	367.4	470.9	A
C	378.0	420.7	567.4	A
N	89.0	95.4	107.8	A
TOTAL	1.086	1.214	1.591	kA
Unb	7.1	9.3	11.2	%
Power:				
A-N	102.8	113.2	135.7	kW
B-N	89.41	100.3	123.6	kW
C-N	100.9	110.2	138.6	kW
TOTAL	293.7	323.7	395.4	kW
Volt-Amps:				
A-N	105.7	117.9	152.7	kVA
B-N	91.07	102.8	131.6	kVA
C-N	104.8	116.3	156.6	kVA
TOTAL	301.9	337.0	440.9	kVA
VA Reactive:				
A-N	20.53	29.90	54.40	kVAR
B-N	2.341	12.96	38.54	kVAR
C-N	22.96	33.23	58.85	kVAR
TOTAL	47.45	76.09	151.8	kVAR
Power Factor:				
A-N	0.88	0.96	0.98	PF
B-N	0.92	0.98	0.98	PF
C-N	0.86	0.95	0.97	PF
TOTAL	0.89	0.96	0.97	PF

Displacement Factor:				
A-N	0.93	0.97	0.98	dPF
B-N	0.95	0.99	1.00	dPF
C-N	0.90	0.96	0.98	dPF
TOTAL	0.93	0.97	0.99	dPF
Current Leads:				
A	-22.0	-14.5	-10.9	
B	-17.7	-6.8	-1.4	
C	-25.2	-16.4	-12.6	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.7	0.8	0.9	%
Current Sequence:				
Pos	99.3	99.5	99.7	%
Zero	7.5	8.4	8.8	%
Neg	2.8	5.5	7.9	%
Voltage THD:				
A-N	3.9	4.1	4.3	%
B-N	4.2	4.4	4.6	%
C-N	3.8	4.1	4.3	%
TOTAL	4.0	4.2	4.4	%
Current THD:				
A	8.8	12.5	14.4	%
B	14.3	18.2	22.0	%
C	11.4	15.3	17.4	%
N	18.4	22.0	24.9	%
TOTAL	11.5	15.6	17.9	%
Derate transformer to:				
TOTAL	91.6	93.4	96.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	62.8	66.4	79.5	k
B	73.2	77.5	91.5	k
C	64.9	68.9	91.5	k
TOTAL	67.2	70.9	87.5	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.3	0.4	%
C-N	0.2	0.2	0.3	%
TOTAL	0.2	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.5	3.7	3.9	%
B-N	3.8	4.0	4.1	%
C-N	3.5	3.7	3.9	%
TOTAL	3.6	3.8	4.0	%
7th Harmonic Volts:				
A-N	1.4	1.6	1.9	%
B-N	1.6	1.7	2.0	%
C-N	1.2	1.4	1.6	%
TOTAL	1.4	1.6	1.8	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.3	0.4	0.4	%
TOTAL	0.2	0.2	0.3	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	17.62	19.42	23.73	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 9:00:00 PM

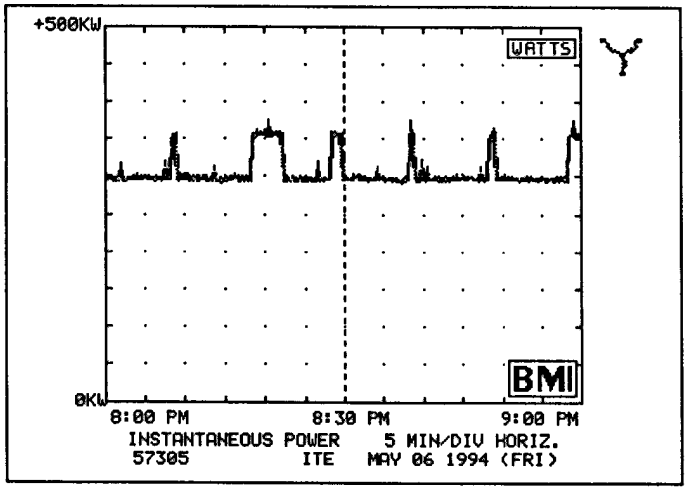
FROM: 8:00 PM May 06 1994 (Fri)
To: 9:00 PM May 06 1994 (Fri)

Total:
MAX: 378.2 kW, 8:58 PM
MIN: 293.3 kW, 8:14 PM

Phase A-N:
MAX: 133.6 kW, 8:58 PM
MIN: 102.5 kW, 8:13 PM

Phase B-N:
MAX: 120.4 kW, 8:58 PM
MIN: 89.3 kW, 8:37 PM

Phase C-N:
MAX: 126.1 kW, 8:38 PM
MIN: 100.8 kW, 8:14 PM



VOLTAGE THD 9:01:27 PM

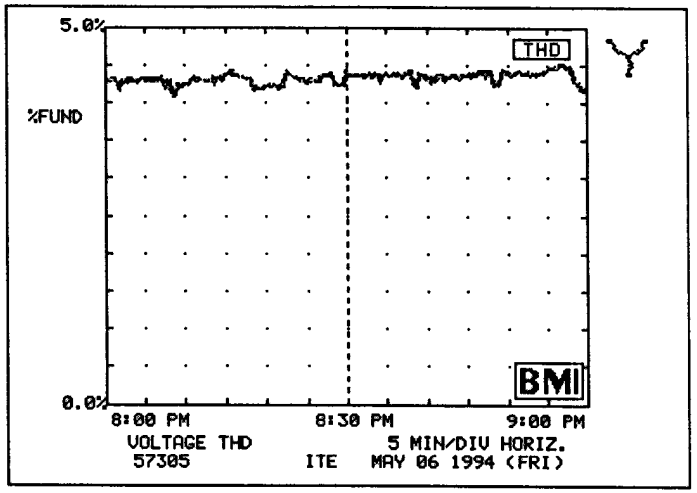
FROM: 8:00 PM May 06 1994 (Fri)
To: 9:00 PM May 06 1994 (Fri)

Average:
MAX: 4.6% THD, 8:56 PM
MIN: 4.1% THD, 8:08 PM

Phase A-N:
MAX: 4.5% THD, 8:56 PM
MIN: 4.0% THD, 8:08 PM

Phase B-N:
MAX: 4.8% THD, 8:56 PM
MIN: 4.3% THD, 8:08 PM

Phase C-N:
MAX: 4.4% THD, 8:56 PM
MIN: 4.0% THD, 8:08 PM



57305 ITE May 06 1994 (Fri)

CURRENT THD 9:01:39 PM

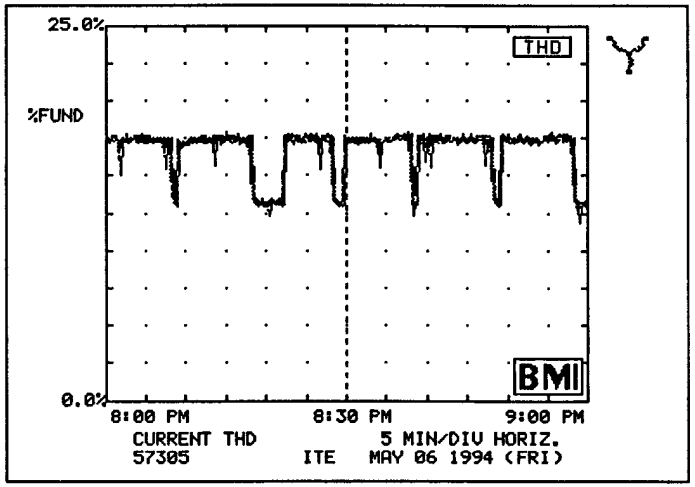
FROM: 8:00 PM May 06 1994 (Fri)
To: 9:00 PM May 06 1994 (Fri)

Average:
MAX: 18.0% THD; 8:14 PM
MIN: 11.8% THD; 8:58 PM

Phase A:
MAX: 14.6% THD; 8:55 PM
MIN: 9.0% THD; 8:58 PM

Phase B:
MAX: 22.1% THD; 8:56 PM
MIN: 14.7% THD; 8:58 PM

Phase C:
MAX: 17.5% THD; 8:14 PM
MIN: 11.8% THD; 8:58 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 9:03:45 PM

FROM: 8:03 PM May 06 1994 (Fri)
To: 9:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	308.4	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	308.6	kWh
TOTAL	63.59	kVARh
TOTAL	208.6	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	276.1	277.6	278.7	V
B-N	279.4	280.3	281.9	V
C-N	276.1	277.5	278.4	V
N-G	0.0	0.2	0.5	V
TOTAL	277.2	278.7	279.7	V
Unb	0.8	0.8	0.9	%
Current:				
A	380.1	402.0	522.3	A
B	323.8	345.3	455.7	A
C	377.7	399.8	500.7	A
N	90.5	93.2	106.0	A
TOTAL	1.084	1.147	1.479	kA
Unb	7.5	9.8	11.2	%
Power:				
A-N	102.5	107.7	133.6	kW
B-N	89.33	94.89	120.4	kW
C-N	100.8	105.8	126.1	kW
TOTAL	293.3	308.4	378.2	kW
Volt-Amps:				
A-N	105.5	111.6	144.7	kVA
B-N	91.04	96.99	127.6	kVA
C-N	104.7	110.9	138.5	kVA
TOTAL	301.8	319.5	410.8	kVA
VA Reactive:				
A-N	21.06	25.94	55.26	kVAR
B-N	2.517	8.686	39.67	kVAR
C-N	23.38	29.94	60.11	kVAR
TOTAL	49.58	63.57	155.3	kVAR
Power Factor:				
A-N	0.92	0.97	0.97	PF
B-N	0.94	0.98	0.98	PF
C-N	0.90	0.96	0.97	PF
TOTAL	0.92	0.97	0.97	PF

Displacement Factor:				
A-N	0.92	0.97	0.98	dPF
B-N	0.95	0.99	1.00	dPF
C-N	0.90	0.96	0.97	dPF
TOTAL	0.93	0.98	0.99	dPF
Current Leads:				
A	-22.6	-13.4	-11.4	
B	-18.5	-4.9	-1.5	
C	-26.0	-15.1	-12.9	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.8	0.8	0.9	%
Current Sequence:				
Pos	99.3	99.4	99.7	%
Zero	7.7	8.6	8.9	%
Neg	2.5	6.2	7.8	%
Voltage THD:				
A-N	4.0	4.2	4.5	%
B-N	4.3	4.6	4.8	%
C-N	4.0	4.2	4.4	%
TOTAL	4.1	4.4	4.6	%
Current THD:				
A	9.0	13.5	14.6	%
B	14.7	20.6	22.1	%
C	11.8	16.3	17.4	%
N	19.5	22.5	23.2	%
TOTAL	11.8	16.8	18.0	%
Derate transformer to:				
TOTAL	91.5	92.5	96.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	60.1	66.8	71.5	k
B	74.1	77.4	82.7	k
C	66.3	69.4	73.8	k
TOTAL	67.5	71.2	75.2	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.3	0.4	%
C-N	0.2	0.2	0.3	%
TOTAL	0.2	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.6	3.9	4.0	%
B-N	3.9	4.1	4.3	%
C-N	3.7	3.9	4.1	%
TOTAL	3.7	4.0	4.2	%
7th Harmonic Volts:				
A-N	1.5	1.7	1.8	%
B-N	1.7	1.8	1.9	%
C-N	1.3	1.4	1.5	%
TOTAL	1.5	1.6	1.7	%
9th Harmonic Volts:				
A-N	0.2	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.3	0.4	0.4	%
TOTAL	0.2	0.2	0.3	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	17.60	18.50	22.69	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 10:00:02 PM

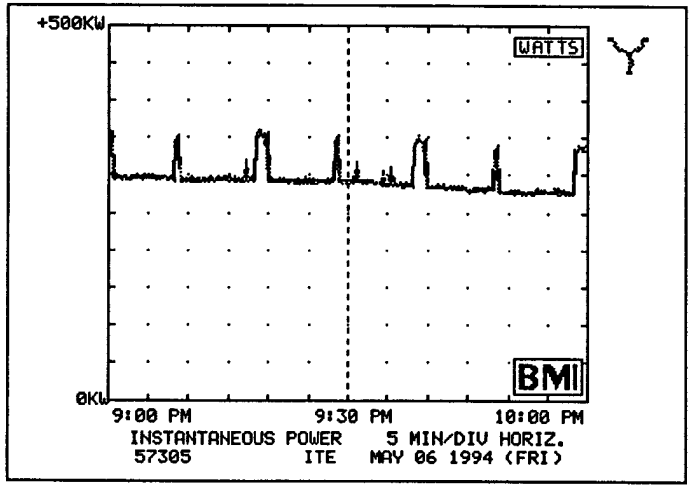
FROM: 9:00 PM May 06 1994 (Fri)
To: 10:00 PM May 06 1994 (Fri)

Total:
MAX: 362.2 kW, 9:18 PM
MIN: 274.5 kW, 9:57 PM

Phase A-N:
MAX: 127.6 kW, 9:18 PM
MIN: 93.0 kW, 9:57 PM

Phase B-N:
MAX: 114.4 kW, 9:38 PM
MIN: 87.0 kW, 9:57 PM

Phase C-N:
MAX: 121.4 kW, 9:18 PM
MIN: 94.3 kW, 9:52 PM



VOLTAGE THD 10:01:26 PM

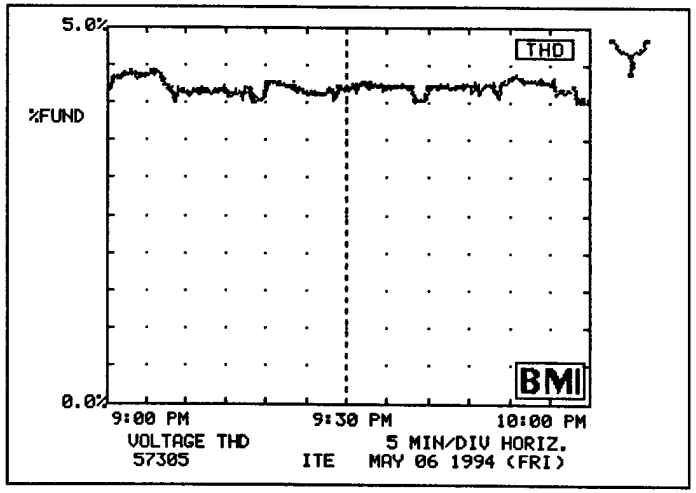
FROM: 9:00 PM May 06 1994 (Fri)
To: 10:00 PM May 06 1994 (Fri)

Average:
MAX: 4.5% THD, 9:02 PM
MIN: 4.0% THD, 9:18 PM

Phase A-N:
MAX: 4.4% THD, 9:02 PM
MIN: 3.9% THD, 9:18 PM

Phase B-N:
MAX: 4.7% THD, 9:02 PM
MIN: 4.2% THD, 9:08 PM

Phase C-N:
MAX: 4.3% THD, 9:05 PM
MIN: 3.9% THD, 9:18 PM



57305 ITE May 06 1994 (Fri)

CURRENT THD 10:01:39 PM

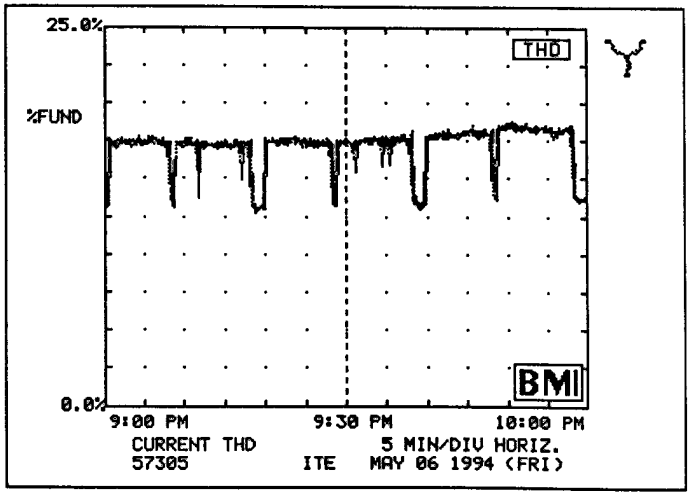
FROM: 9:00 PM May 06 1994 (Fri)
To: 10:00 PM May 06 1994 (Fri)

Average:
MAX: 18.9% THD, 9:50 PM
MIN: 12.8% THD, 9:18 PM

Phase A:
MAX: 16.1% THD, 9:50 PM
MIN: 10.2% THD, 9:18 PM

Phase B:
MAX: 22.1% THD, 9:04 PM
MIN: 15.4% THD, 9:39 PM

Phase C:
MAX: 18.6% THD, 9:50 PM
MIN: 12.6% THD, 9:18 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 10:03:47 PM

FROM: 9:03 PM May 06 1994 (Fri)
To: 10:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	296.9	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	296.9	kWh
TOTAL	58.49	kVARh
TOTAL	198.4	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.7	276.8	278.2	V
B-N	278.7	280.0	281.4	V
C-N	275.5	276.6	278.0	V
N-G	0.0	0.2	0.5	V
TOTAL	276.7	277.8	279.2	V
Unb	0.7	0.8	0.8	%
Current:				
A	346.7	383.4	490.7	A
B	313.8	337.4	424.9	A
C	353.7	385.0	476.9	A
N	56.0	78.6	106.6	A
TOTAL	1.017	1.106	1.387	kA
Unb	4.6	8.5	11.7	%
Power:				
A-N	92.98	102.4	127.6	kW
B-N	86.37	92.49	114.4	kW
C-N	94.31	102.0	121.4	kW
TOTAL	274.5	296.9	362.2	kW
Volt-Amps:				
A-N	96.18	106.1	135.4	kVA
B-N	88.04	94.47	118.4	kVA
C-N	97.87	106.5	131.5	kVA
TOTAL	283.0	307.1	384.0	kVA
VA Reactive:				
A-N	19.66	24.32	56.63	kVAR
B-N	2.709	8.005	33.43	kVAR
C-N	20.99	26.17	60.22	kVAR
TOTAL	45.84	58.49	150.3	kVAR
Power Factor:				
A-N	0.93	0.97	0.98	PF
B-N	0.96	0.98	0.98	PF
C-N	0.92	0.96	0.97	PF
TOTAL	0.94	0.97	0.97	PF

Displacement Factor:				
A-N	0.90	0.97	0.98	dPF
B-N	0.96	0.99	1.00	dPF
C-N	0.89	0.97	0.98	dPF
TOTAL	0.87	0.98	0.99	dPF
Current Leads:				
A	-25.5	-13.2	-11.0	
B	-16.9	-4.7	-1.7	
C	-27.0	-14.2	-12.1	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.8	0.8	0.9	%
Current Sequence:				
Pos	99.3	99.5	99.7	%
Zero	5.7	7.5	9.2	%
Neg	3.5	6.2	7.6	%
Voltage THD:				
A-N	3.9	4.1	4.4	%
B-N	4.2	4.4	4.7	%
C-N	3.6	4.1	4.3	%
TOTAL	4.0	4.2	4.5	%
Current THD:				
A	10.2	14.3	16.1	%
B	15.4	20.5	22.1	%
C	12.6	16.8	18.6	%
N	17.8	23.1	28.3	%
TOTAL	12.8	17.2	18.9	%
Derate transformer to:				
TOTAL	91.3	92.4	95.4	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	51.3	67.0	73.0	k
B	58.2	75.3	80.2	k
C	50.6	68.9	72.6	k
TOTAL	53.4	70.4	75.2	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.3	0.3	%
C-N	0.1	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.5	3.7	4.0	%
B-N	3.8	4.0	4.2	%
C-N	3.6	3.8	4.0	%
TOTAL	3.6	3.8	4.1	%
7th Harmonic Volts:				
A-N	1.5	1.6	1.8	%
B-N	1.6	1.8	1.9	%
C-N	1.2	1.3	1.4	%
TOTAL	1.4	1.6	1.7	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.3	0.4	0.4	%
TOTAL	0.2	0.2	0.3	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	16.47	17.81	21.73	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 11:00:00 PM

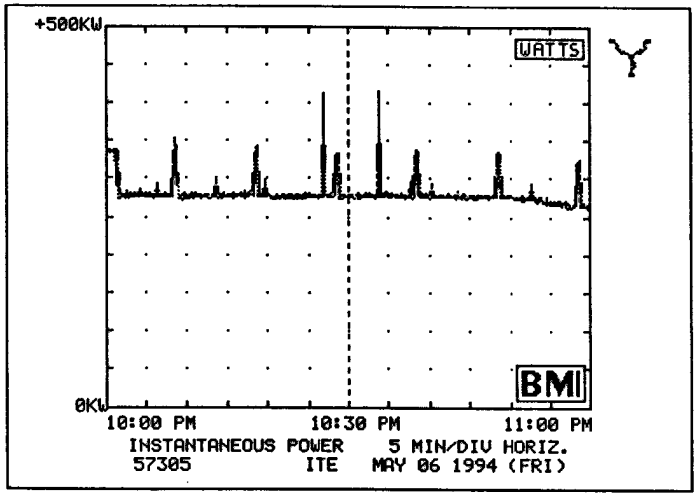
FROM: 10:00 PM May 06 1994 (Fri)
To: 11:00 PM May 06 1994 (Fri)

Total:
MAX: 418.5 kW, 10:33 PM
MIN: 261.7 kW, 10:59 PM

Phase A-N:
MAX: 135.3 kW, 10:33 PM
MIN: 89.8 kW, 10:59 PM

Phase B-N:
MAX: 145.7 kW, 10:33 PM
MIN: 81.4 kW, 10:59 PM

Phase C-N:
MAX: 137.5 kW, 10:33 PM
MIN: 90.5 kW, 10:59 PM



VOLTAGE THD 11:01:26 PM

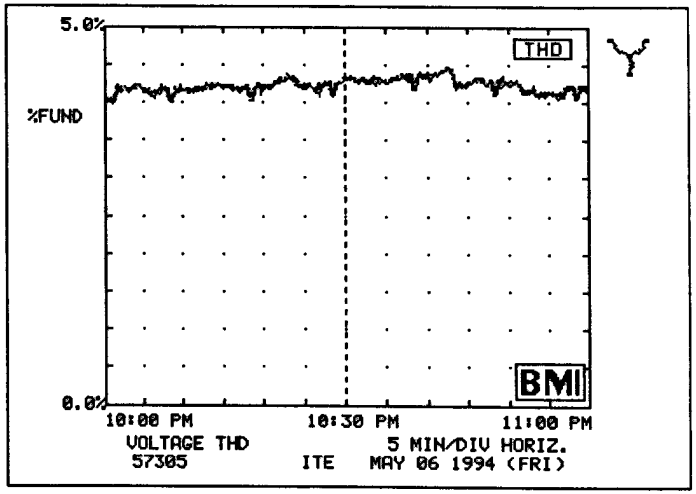
FROM: 10:00 PM May 06 1994 (Fri)
To: 11:00 PM May 06 1994 (Fri)

Average:
MAX: 4.5% THD, 10:42 PM
MIN: 4.0% THD, 10:00 PM

Phase A-N:
MAX: 4.4% THD, 10:42 PM
MIN: 3.9% THD, 10:08 PM

Phase B-N:
MAX: 4.7% THD, 10:42 PM
MIN: 4.2% THD, 10:00 PM

Phase C-N:
MAX: 4.4% THD, 10:42 PM
MIN: 3.9% THD, 10:00 PM



57305 ITE May 06 1994 (Fri)

CURRENT THD 11:01:38 PM

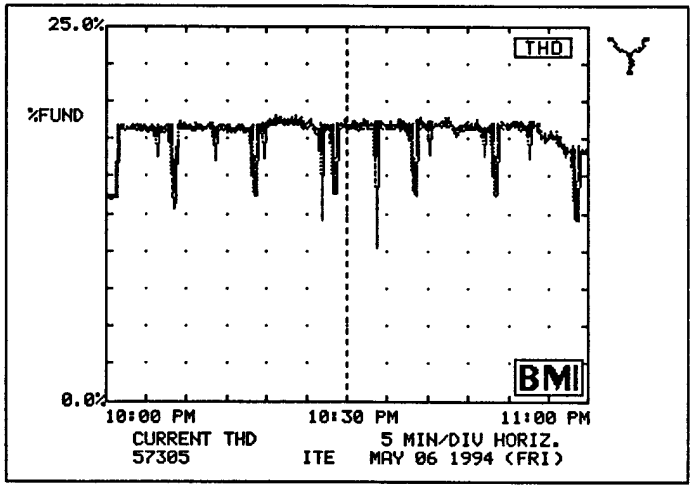
FROM: 10:00 PM May 06 1994 (Fri)
To: 11:00 PM May 06 1994 (Fri)

Average:
MAX: 19.1% THD, 10:20 PM
MIN: 10.2% THD, 10:33 PM

Phase A:
MAX: 16.7% THD, 10:39 PM
MIN: 9.1% THD, 10:33 PM

Phase B:
MAX: 22.2% THD, 10:23 PM
MIN: 11.8% THD, 10:33 PM

Phase C:
MAX: 18.6% THD, 10:24 PM
MIN: 9.7% THD, 10:33 PM



57305 ITE May 06 1994 (Fri)

BMI SUMMARY 11:03:45 PM

FROM: 10:03 PM May 06 1994 (Fri)
To: 11:03 PM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	279.7	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	279.8	kWh
TOTAL	53.90	kVARh
TOTAL	185.8	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.3	277.9	279.5	V
B-N	278.1	280.8	282.4	V
C-N	274.7	277.7	279.2	V
N-G	0.0	0.2	0.5	V
TOTAL	276.0	278.8	280.3	V
Unb	0.7	0.7	0.8	%
Current:				
A	335.9	355.7	647.2	A
B	295.3	321.2	613.8	A
C	337.1	361.0	672.5	A
N	57.1	62.4	106.4	A
TOTAL	0.968	1.038	1.934	kA
Unb	4.6	7.2	9.3	%
Power:				
A-N	89.63	95.06	135.3	kW
B-N	81.21	88.37	145.7	kW
C-N	90.44	96.25	137.5	kW
TOTAL	261.3	279.7	418.5	kW
Volt-Amps:				
A-N	93.05	98.83	178.3	kVA
B-N	82.61	90.18	170.8	kVA
C-N	93.32	100.2	184.9	kVA
TOTAL	269.0	289.3	534.0	kVA
VA Reactive:				
A-N	20.76	23.39	99.56	kVAR
B-N	3.714	7.142	73.61	kVAR
C-N	19.19	23.36	105.0	kVAR
TOTAL	45.51	53.86	278.2	kVAR
Power Factor:				
A-N	0.76	0.96	0.97	PF
B-N	0.85	0.98	0.99	PF
C-N	0.74	0.96	0.97	PF
TOTAL	0.78	0.97	0.97	PF

Displacement Factor:				
A-N	0.80	0.97	0.98	dPF
B-N	0.88	1.00	1.00	dPF
C-N	0.78	0.97	0.98	dPF
TOTAL	0.85	0.98	0.99	dPF
Current Leads:				
A	-37.3	-13.8	-12.5	
B	-28.4	-4.5	-2.5	
C	-38.5	-13.6	-11.8	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.7	0.7	0.8	%
Current Sequence:				
Pos	99.5	99.6	99.7	%
Zero	6.0	6.4	6.6	%
Neg	3.5	6.6	8.4	%
Voltage THD:				
A-N	3.9	4.1	4.4	%
B-N	4.2	4.5	4.7	%
C-N	3.9	4.2	4.4	%
TOTAL	4.0	4.3	4.5	%
Current THD:				
A	9.1	15.8	16.7	%
B	11.8	20.8	22.2	%
C	9.7	17.4	18.6	%
N	13.6	23.4	25.8	%
TOTAL	10.2	18.0	19.1	%
Derate transformer to:				
TOTAL	91.0	92.0	97.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	57.3	66.5	85.0	K
B	55.4	69.8	96.6	K
C	56.2	67.1	88.2	K
TOTAL	56.2	67.8	89.9	K
3rd Harmonic Volts:				
A-N	0.0	0.1	0.2	%
B-N	0.2	0.3	0.3	%
C-N	0.1	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.5	3.7	3.9	%
B-N	3.8	4.0	4.2	%
C-N	3.6	3.8	4.0	%
TOTAL	3.6	3.8	4.0	%
7th Harmonic Volts:				
A-N	1.6	1.8	2.0	%
B-N	1.7	2.0	2.2	%
C-N	1.4	1.5	1.6	%
TOTAL	1.5	1.7	1.9	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.2	0.3	0.4	%
TOTAL	0.1	0.2	0.3	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	15.68	16.78	25.11	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 07 1994 (Sat)

INSTANTANEOUS POWER 12:00:01 AM

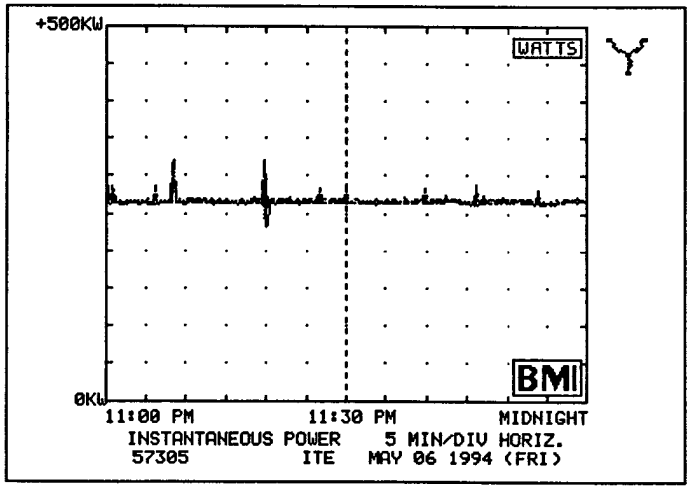
FROM: 11:00 PM May 06 1994 (Fri)
To: MIDNIGHT May 06 1994 (Fri)

Total:
MAX: 323.5 kW, 11:19 PM
MIN: 233.0 kW, 11:19 PM

Phase A-N:
MAX: 111.3 kW, 11:08 PM
MIN: 79.9 kW, 11:19 PM

Phase B-N:
MAX: 104.0 kW, 11:19 PM
MIN: 72.1 kW, 11:19 PM

Phase C-N:
MAX: 108.6 kW, 11:19 PM
MIN: 80.9 kW, 11:19 PM



57305 ITE May 07 1994 (Sat)

VOLTAGE THD 12:01:28 AM

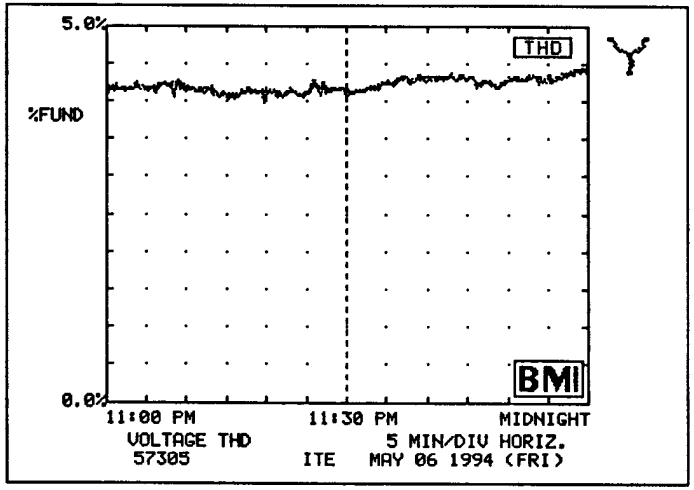
FROM: 11:00 PM May 06 1994 (Fri)
To: MIDNIGHT May 06 1994 (Fri)

Average:
MAX: 4.5% THD, 11:59 PM
MIN: 4.0% THD, 11:19 PM

Phase A-N:
MAX: 4.3% THD, 11:59 PM
MIN: 3.8% THD, 11:19 PM

Phase B-N:
MAX: 4.7% THD, 11:59 PM
MIN: 4.2% THD, 11:19 PM

Phase C-N:
MAX: 4.4% THD, 11:59 PM
MIN: 3.9% THD, 11:19 PM



57305 ITE May 07 1994 (Sat)

CURRENT THD 12:01:40 AM

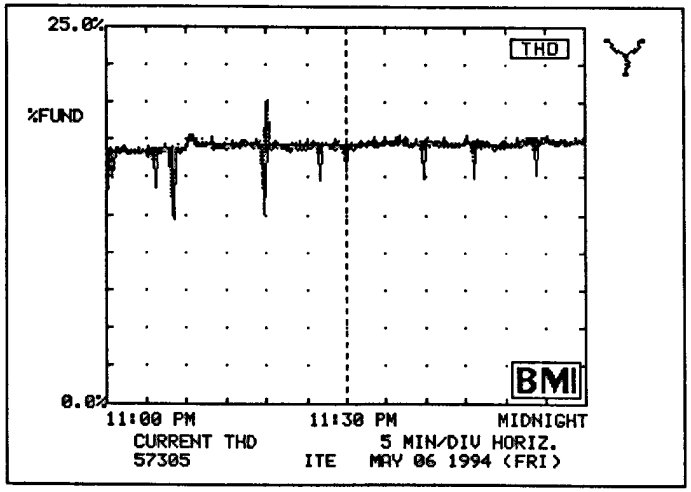
FROM: 11:00 PM May 06 1994 (Fri)
To: MIDNIGHT May 06 1994 (Fri)

Average:
MAX: 20.2% THD, 11:19 PM
MIN: 12.2% THD, 11:08 PM

Phase A:
MAX: 18.5% THD, 11:19 PM
MIN: 11.3% THD, 11:19 PM

Phase B:
MAX: 23.2% THD, 11:19 PM
MIN: 13.7% THD, 11:08 PM

Phase C:
MAX: 19.1% THD, 11:19 PM
MIN: 11.6% THD, 11:08 PM



57305 ITE May 07 1994 (Sat)

BMI SUMMARY 12:03:46 AM

FROM: 11:03 PM May 06 1994 (Fri)
To: 12:03 AM May 07 1994 (Sat)

Demand:

Phase	Average	Unit
TOTAL	267.3	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	267.6	kWh
TOTAL	49.67	kVARh
TOTAL	176.2	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.0	277.4	278.2	V
B-N	277.4	280.1	280.8	V
C-N	274.4	277.2	278.0	V
N-G	0.0	0.2	0.5	V
TOTAL	275.6	278.2	279.0	V
Unb	0.6	0.7	0.7	%
Current:				
A	300.2	342.2	641.3	A
B	263.1	303.3	606.7	A
C	302.5	345.7	662.2	A
N	51.5	58.5	104.2	A
TOTAL	0.867	0.991	1.910	kA
Unb	4.7	8.2	9.4	%
Power:				
A-N	79.90	91.32	132.3	kW
B-N	72.06	83.44	142.0	kW
C-N	80.93	92.58	133.7	kW
TOTAL	233.0	267.3	408.0	kW
Volt-Amps:				
A-N	83.29	94.94	176.3	kVA
B-N	73.68	84.94	168.3	kVA
C-N	83.84	95.82	181.7	kVA
TOTAL	241.1	275.7	526.3	kVA
VA Reactive:				
A-N	19.45	22.50	102.0	kVAR
B-N	4.267	6.308	76.26	kVAR
C-N	17.08	20.82	108.0	kVAR
TOTAL	42.02	49.63	286.2	kVAR
Power Factor:				
A-N	0.75	0.96	0.97	PF
B-N	0.84	0.98	0.99	PF
C-N	0.74	0.97	0.97	PF
TOTAL	0.78	0.97	0.97	PF

Displacement Factor:				
A-N	0.78	0.97	0.98	dPF
B-N	0.87	1.00	1.00	dPF
C-N	0.77	0.98	0.98	dPF
TOTAL	0.84	0.98	0.99	dPF
Current Leads:				
A	-38.6	-13.9	-12.8	
B	-29.4	-4.3	-2.9	
C	-39.7	-12.7	-11.8	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.6	0.7	0.8	%
Current Sequence:				
Pos	99.5	99.6	99.7	%
Zero	5.9	6.3	6.5	%
Neg	3.8	7.0	8.2	%
Voltage THD:				
A-N	3.8	4.1	4.3	%
B-N	4.2	4.5	4.7	%
C-N	3.9	4.2	4.4	%
TOTAL	4.0	4.2	4.5	%
Current THD:				
A	8.9	15.9	18.5	%
B	9.8	19.7	23.2	%
C	8.8	16.2	19.1	%
N	13.5	24.1	28.0	%
TOTAL	9.2	17.2	20.2	%
Derate transformer to:				
TOTAL	90.2	92.5	97.8	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	54.9	58.9	65.8	k
B	54.4	60.0	74.4	k
C	55.3	63.2	74.3	k
TOTAL	55.9	60.7	71.5	k
3rd Harmonic Volts:				
A-N	0.1	0.2	0.6	%
B-N	0.1	0.2	0.3	%
C-N	0.1	0.1	0.4	%
TOTAL	0.1	0.2	0.4	%
5th Harmonic Volts:				
A-N	3.4	3.6	3.8	%
B-N	3.7	3.9	4.1	%
C-N	3.6	3.8	4.1	%
TOTAL	3.6	3.8	4.0	%
7th Harmonic Volts:				
A-N	1.7	1.9	2.0	%
B-N	2.0	2.1	2.2	%
C-N	1.4	1.5	1.6	%
TOTAL	1.7	1.8	1.9	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.2	0.3	0.4	%
TOTAL	0.1	0.2	0.3	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	13.98	16.04	24.48	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 07 1994 (Sat)

INSTANTANEOUS POWER 1:00:00 AM

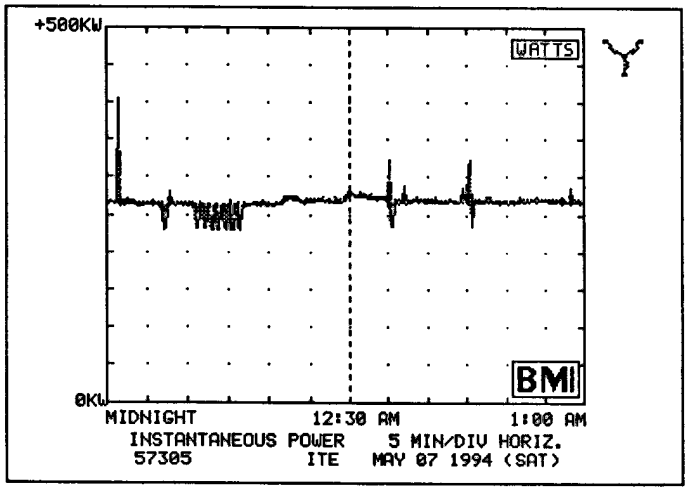
FROM: MIDNIGHT May 06 1994 (Fri)
To: 1:00 AM May 07 1994 (Sat)

Total:
MAX: 408.0 kW, 12:01 AM
MIN: 229.2 kW, 12:12 AM

Phase A-N:
MAX: 132.3 kW, 12:01 AM
MIN: 78.2 kW, 12:14 AM

Phase B-N:
MAX: 142.0 kW, 12:01 AM
MIN: 70.4 kW, 12:12 AM

Phase C-N:
MAX: 133.7 kW, 12:01 AM
MIN: 80.3 kW, 12:06 AM



VOLTAGE THD 1:01:27 AM

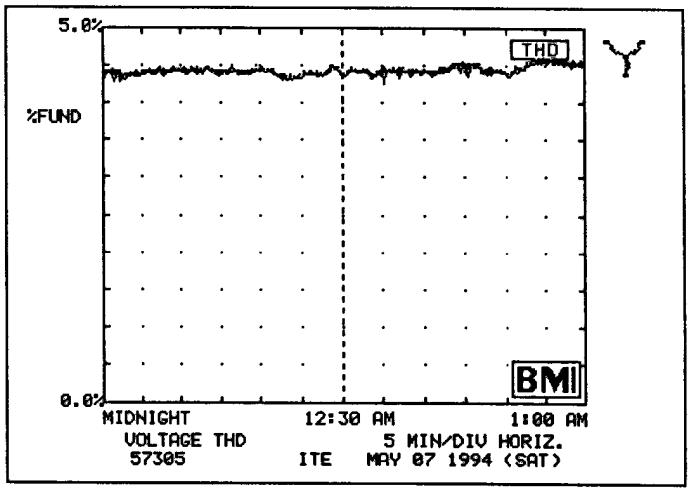
FROM: MIDNIGHT May 06 1994 (Fri)
To: 1:00 AM May 07 1994 (Sat)

Average:
MAX: 4.6% THD, 12:53 AM
MIN: 4.3% THD, 12:35 AM

Phase A-N:
MAX: 4.5% THD, 12:53 AM
MIN: 4.1% THD, 12:35 AM

Phase B-N:
MAX: 4.8% THD, 12:53 AM
MIN: 4.4% THD, 12:02 AM

Phase C-N:
MAX: 4.6% THD, 12:53 AM
MIN: 4.2% THD, 12:01 AM



57305 ITE May 07 1994 (Sat)

CURRENT THD 1:01:39 AM

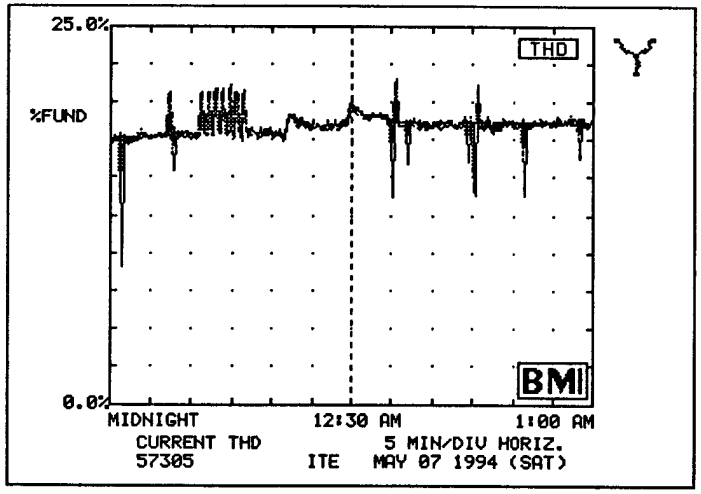
FROM: MIDNIGHT May 06 1994 (Fri)
To: 1:00 AM May 07 1994 (Sat)

Average:
MAX: 21.6% THD, 12:35 AM
MIN: 9.2% THD, 12:01 AM

Phase A:
MAX: 19.3% THD, 12:35 AM
MIN: 8.9% THD, 12:01 AM

Phase B:
MAX: 25.1% THD, 12:35 AM
MIN: 9.8% THD, 12:01 AM

Phase C:
MAX: 20.5% THD, 12:35 AM
MIN: 8.8% THD, 12:01 AM



57305 ITE May 07 1994 (Sat)

BMI SUMMARY 1:03:45 AM

FROM: 12:03 AM May 07 1994 (Sat)
To: 1:03 AM May 07 1994 (Sat)

Demand:

Phase	Average	Unit
TOTAL	267.4	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	267.4	kWh
TOTAL	50.89	kVARh
TOTAL	177.1	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	277.6	278.3	279.1	V
B-N	280.0	280.8	281.4	V
C-N	277.3	278.1	278.9	V
N-G	0.0	0.2	0.5	V
TOTAL	278.3	279.1	279.8	V
Unb	0.6	0.6	0.7	%
Current:				
A	293.9	340.2	431.7	A
B	257.0	304.5	387.7	A
C	299.8	346.5	428.9	A
N	52.3	59.9	73.2	A
TOTAL	0.852	0.991	1.246	kA
Unb	6.5	7.8	10.1	%
Power:				
A-N	78.20	90.84	110.9	kW
B-N	70.40	83.63	104.6	kW
C-N	80.28	92.75	110.3	kW
TOTAL	229.2	267.4	324.6	kW
Volt-Amps:				
A-N	81.73	94.68	119.9	kVA
B-N	72.18	85.52	108.6	kVA
C-N	83.37	96.38	119.1	kVA
TOTAL	237.6	276.6	346.9	kVA
VA Reactive:				
A-N	19.14	23.10	55.98	kVAR
B-N	3.364	5.948	56.56	kVAR
C-N	16.73	21.84	58.98	kVAR
TOTAL	39.23	50.89	151.5	kVAR
Power Factor:				
A-N	0.92	0.96	0.97	PF
B-N	0.96	0.98	0.98	PF
C-N	0.92	0.96	0.97	PF
TOTAL	0.93	0.97	0.97	PF

Displacement Factor:				
A-N	0.88	0.97	0.97	dPF
B-N	0.95	1.00	1.00	dPF
C-N	0.88	0.97	0.98	dPF
TOTAL	0.84	0.98	0.99	dPF
Current Leads:				
A	-27.8	-14.3	-12.9	
B	-19.0	-4.1	-2.6	
C	-28.8	-13.3	-11.8	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.6	0.6	0.7	%
Current Sequence:				
Pos	99.4	99.5	99.7	%
Zero	6.1	6.4	6.6	%
Neg	4.9	7.4	8.9	%
Voltage THD:				
A-N	4.1	4.3	4.5	%
B-N	4.4	4.7	4.8	%
C-N	4.3	4.5	4.6	%
TOTAL	4.3	4.5	4.7	%
Current THD:				
A	12.0	16.7	19.3	%
B	15.8	21.4	25.1	%
C	13.5	17.7	20.5	%
N	18.2	24.4	27.8	%
TOTAL	13.8	18.6	21.6	%
Derate transformer to:				
TOTAL	88.5	91.1	94.7	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	48.6	61.2	72.5	k
B	57.0	70.5	86.4	k
C	56.3	70.6	83.8	k
TOTAL	54.0	67.4	80.9	k
3rd Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.1	0.1	0.2	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.6	3.8	3.9	%
B-N	3.9	4.1	4.2	%
C-N	3.9	4.1	4.2	%
TOTAL	3.8	4.0	4.1	%
7th Harmonic Volts:				
A-N	1.8	2.0	2.1	%
B-N	2.0	2.2	2.3	%
C-N	1.5	1.6	1.7	%
TOTAL	1.8	1.9	2.0	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.2	0.3	0.3	%
TOTAL	0.2	0.2	0.2	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	13.75	16.05	19.48	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 07 1994 (Sat)

INSTANTANEOUS POWER 2:00:01 AM

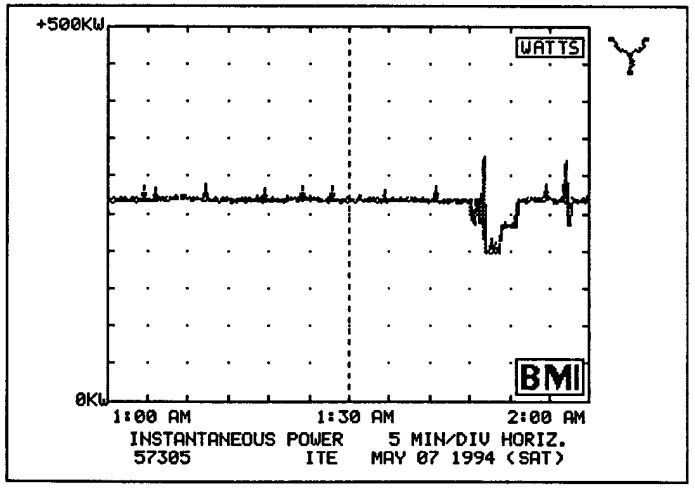
FROM: 1:00 AM May 07 1994 (Sat)
To: 2:00 AM May 07 1994 (Sat)

Total:
MAX: 326.5 kW, 1:46 AM
MIN: 196.8 kW, 1:48 AM

Phase A-N:
MAX: 111.1 kW, 1:46 AM
MIN: 67.1 kW, 1:48 AM

Phase B-N:
MAX: 105.3 kW, 1:46 AM
MIN: 58.7 kW, 1:48 AM

Phase C-N:
MAX: 110.1 kW, 1:46 AM
MIN: 71.0 kW, 1:48 AM



57305 ITE May 07 1994 (Sat)

VOLTAGE THD 2:01:28 AM

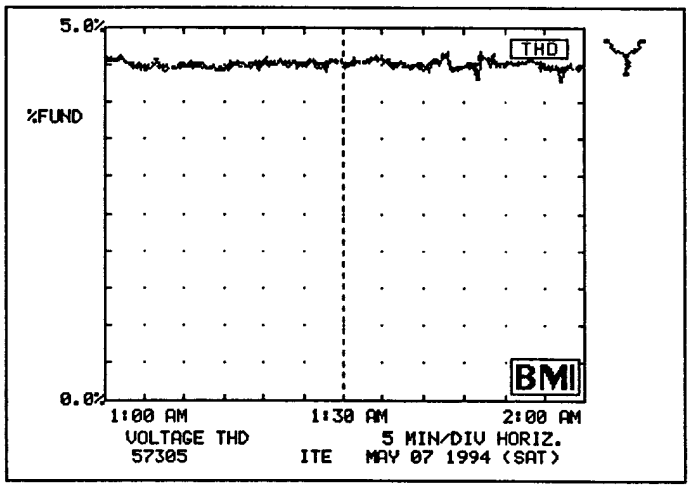
FROM: 1:00 AM May 07 1994 (Sat)
To: 2:00 AM May 07 1994 (Sat)

Average:
MAX: 4.7% THD, 1:46 AM
MIN: 4.3% THD, 1:56 AM

Phase A-N:
MAX: 4.5% THD, 1:42 AM
MIN: 4.1% THD, 1:56 AM

Phase B-N:
MAX: 4.9% THD, 1:46 AM
MIN: 4.5% THD, 1:56 AM

Phase C-N:
MAX: 4.7% THD, 1:46 AM
MIN: 4.3% THD, 1:56 AM



CURRENT THD 2:01:40 AM

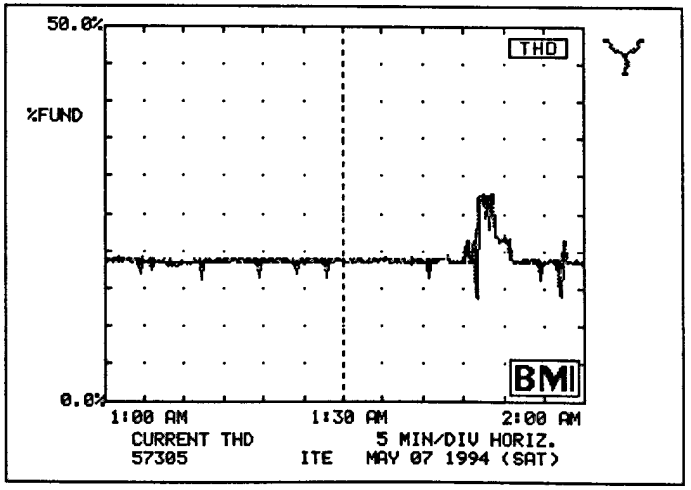
FROM: 1:00 AM May 07 1994 (Sat)
To: 2:00 AM May 07 1994 (Sat)

Average:
MAX: 27.9% THD, 1:48 AM
MIN: 13.8% THD, 1:46 AM

Phase A:
MAX: 25.7% THD, 1:48 AM
MIN: 12.3% THD, 1:46 AM

Phase B:
MAX: 32.4% THD, 1:47 AM
MIN: 15.7% THD, 1:46 AM

Phase C:
MAX: 25.5% THD, 1:47 AM
MIN: 13.4% THD, 1:46 AM



57305 ITE May 07 1994 (Sat)

BMI SUMMARY 2:03:46 AM

FROM: 1:03 AM May 07 1994 (Sat)
To: 2:03 AM May 07 1994 (Sat)

Demand:

Phase	Average	Unit
TOTAL	265.8	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	266.0	kWh
TOTAL	50.12	kVARh
TOTAL	175.7	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	277.4	278.7	279.5	V
B-N	279.6	281.0	281.7	V
C-N	277.2	278.5	279.2	V
N-G	0.0	0.2	0.5	V
TOTAL	278.1	279.4	280.2	V
Unb	0.5	0.6	0.6	%
Current:				
A	247.7	338.4	431.6	A
B	221.5	302.0	390.3	A
C	261.5	344.8	429.9	A
N	47.3	60.1	72.8	A
TOTAL	0.731	0.985	1.252	kA
Unb	6.4	8.0	9.8	%
Power:				
A-N	67.13	90.38	111.1	kW
B-N	58.66	83.08	105.3	kW
C-N	70.96	92.36	110.1	kW
TOTAL	196.8	265.8	326.5	kW
Volt-Amps:				
A-N	69.08	94.33	119.8	kVA
B-N	62.30	84.89	109.1	kVA
C-N	72.86	96.02	119.2	kVA
TOTAL	204.3	275.2	348.1	kVA
VA Reactive:				
A-N	4.013	23.05	43.88	kVAR
B-N	-11.788	5.559	25.91	kVAR
C-N	0.728	21.47	44.08	kVAR
TOTAL	-6.260	50.07	113.7	kVAR
Power Factor:				
A-N	0.88	0.96	0.97	PF
B-N	0.94	0.98	0.98	PF
C-N	0.89	0.96	0.98	PF
TOTAL	0.90	0.97	0.97	PF

Displacement Factor:				
A-N	0.93	0.97	1.00	dPF
B-N	0.97	1.00	1.00	dPF
C-N	0.93	0.97	1.00	dPF
TOTAL	0.94	0.98	1.00	dPF
Current Leads:				
A	-21.9	-14.3	-3.4	
B	-14.2	-3.7	11.2	
C	-22.1	-13.0	-0.6	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.6	0.6	0.6	%
Current Sequence:				
Pos	99.1	99.5	99.7	%
Zero	6.2	6.5	6.8	%
Neg	5.0	7.7	11.6	%
Voltage THD:				
A-N	4.1	4.4	4.5	%
B-N	4.5	4.7	4.9	%
C-N	4.3	4.5	4.7	%
TOTAL	4.3	4.5	4.7	%
Current THD:				
A	12.3	17.2	25.7	%
B	15.7	22.0	32.4	%
C	13.4	18.0	25.5	%
N	18.6	24.5	34.2	%
TOTAL	13.8	19.1	27.9	%
Derate transformer to:				
TOTAL	83.3	90.6	94.7	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	55.6	62.7	67.0	k
B	63.2	71.4	76.3	k
C	65.1	71.2	74.7	k
TOTAL	61.3	68.5	72.7	k
3rd Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.1	0.1	0.2	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.6	3.8	3.9	%
B-N	3.8	4.1	4.2	%
C-N	3.9	4.1	4.3	%
TOTAL	3.8	4.0	4.1	%
7th Harmonic Volts:				
A-N	2.0	2.1	2.2	%
B-N	2.2	2.3	2.4	%
C-N	1.6	1.7	1.8	%
TOTAL	1.9	2.0	2.1	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.1	0.2	0.2	%
TOTAL	0.1	0.2	0.2	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	11.81	15.95	19.59	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 07 1994 (Sat)

INSTANTANEOUS POWER 3:00:00 AM

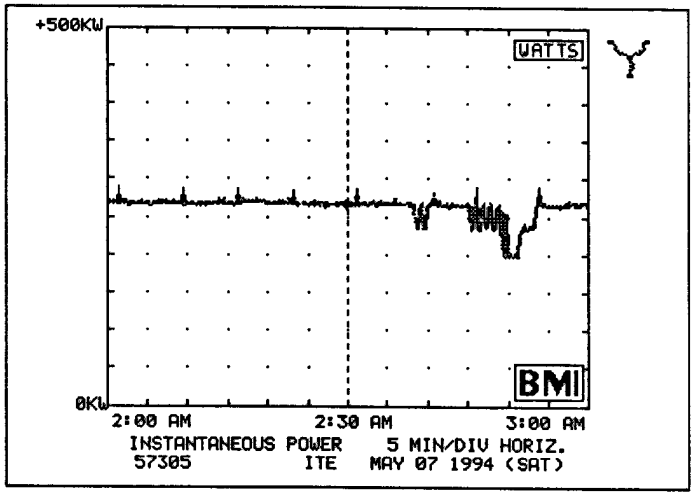
FROM: 2:00 AM May 07 1994 (Sat)
To: 3:00 AM May 07 1994 (Sat)

Total:
MAX: 289.7 kW, 2:53 AM
MIN: 197.2 kW, 2:50 AM

Phase A-N:
MAX: 98.8 kW, 2:01 AM
MIN: 66.9 kW, 2:51 AM

Phase B-N:
MAX: 92.2 kW, 2:45 AM
MIN: 59.1 kW, 2:51 AM

Phase C-N:
MAX: 99.5 kW, 2:53 AM
MIN: 71.1 kW, 2:50 AM



VOLTAGE THD 3:01:27 AM

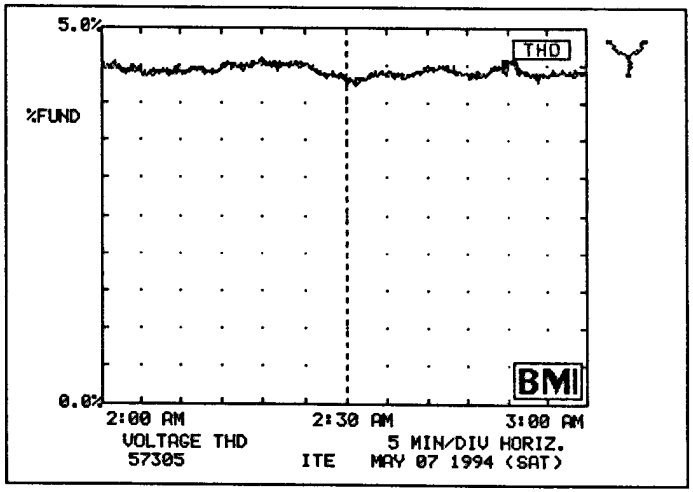
FROM: 2:00 AM May 07 1994 (Sat)
To: 3:00 AM May 07 1994 (Sat)

Average:
MAX: 4.6% THD, 2:19 AM
MIN: 4.2% THD, 2:30 AM

Phase A-N:
MAX: 4.5% THD, 2:19 AM
MIN: 4.1% THD, 2:30 AM

Phase B-N:
MAX: 4.8% THD, 2:19 AM
MIN: 4.4% THD, 2:30 AM

Phase C-N:
MAX: 4.6% THD, 2:50 AM
MIN: 4.3% THD, 2:30 AM



57305 ITE May 07 1994 (Sat)

CURRENT THD 3:01:39 AM

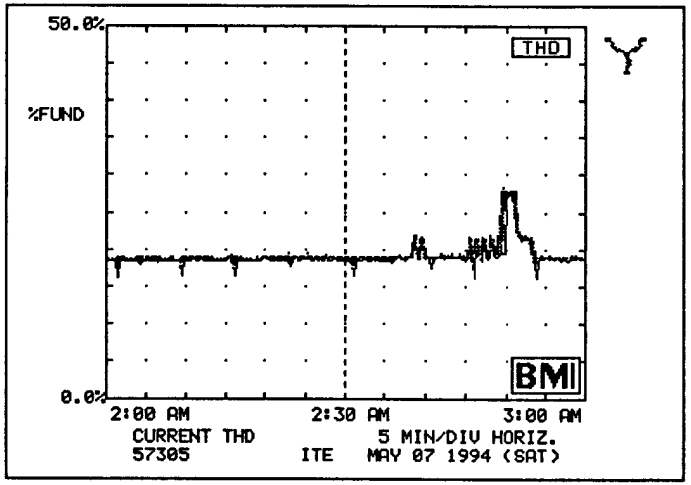
FROM: 2:00 AM May 07 1994 (Sat)
To: 3:00 AM May 07 1994 (Sat)

Average:
MAX: 28.5% THD, 2:49 AM
MIN: 16.2% THD, 2:01 AM

Phase A:
MAX: 26.2% THD, 2:49 AM
MIN: 14.4% THD, 2:09 AM

Phase B:
MAX: 33.2% THD, 2:49 AM
MIN: 18.7% THD, 2:53 AM

Phase C:
MAX: 26.1% THD, 2:49 AM
MIN: 15.5% THD, 2:01 AM



57305 ITE May 07 1994 (Sat)

BMI SUMMARY 3:03:45 AM

FROM: 2:03 AM May 07 1994 (Sat)
To: 3:03 AM May 07 1994 (Sat)

Demand:

Phase	Average	Unit
TOTAL	263.5	kW
TOTAL	0.97	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	263.5	kWh
TOTAL	48.95	kVARh
TOTAL	173.4	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	277.5	278.4	279.2	V
B-N	279.6	280.7	281.6	V
C-N	277.3	278.2	279.1	V
N-G	0.0	0.2	0.5	V
TOTAL	278.1	279.1	279.9	V
Unb	0.5	0.6	0.6	%
Current:				
A	246.9	335.4	380.0	A
B	223.6	299.9	339.0	A
C	262.1	342.5	381.9	A
N	47.4	59.6	66.1	A
TOTAL	0.733	0.978	1.098	kA
Unb	6.9	8.0	9.7	%
Power:				
A-N	66.85	89.46	98.78	kW
B-N	59.09	82.38	92.23	kW
C-N	71.10	91.66	99.52	kW
TOTAL	197.2	263.5	289.7	kW
Volt-Amps:				
A-N	68.90	93.36	105.5	kVA
B-N	62.93	84.18	94.99	kVA
C-N	73.12	95.28	106.0	kVA
TOTAL	205.1	272.8	305.6	kVA
VA Reactive:				
A-N	3.551	22.63	35.95	kVAR
B-N	-12.189	5.169	18.71	kVAR
C-N	0.512	21.15	34.66	kVAR
TOTAL	-7.039	48.95	89.33	kVAR
Power Factor:				
A-N	0.93	0.96	0.97	PF
B-N	0.94	0.98	0.98	PF
C-N	0.93	0.96	0.97	PF
TOTAL	0.94	0.97	0.97	PF

Displacement Factor:				
A-N	0.94	0.97	1.00	dPF
B-N	0.98	1.00	1.00	dPF
C-N	0.94	0.97	1.00	dPF
TOTAL	0.96	0.98	1.00	dPF
Current Leads:				
A	-20.1	-14.2	-3.0	
B	-11.6	-3.5	11.5	
C	-19.5	-13.0	-0.4	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.1	99.5	99.6	%
Zero	6.3	6.5	6.8	%
Neg	5.9	7.8	11.7	%
Voltage THD:				
A-N	4.1	4.3	4.5	%
B-N	4.4	4.7	4.8	%
C-N	4.3	4.4	4.6	%
TOTAL	4.2	4.5	4.6	%
Current THD:				
A	14.4	17.4	26.2	%
B	18.7	22.2	33.2	%
C	15.5	18.2	26.1	%
N	20.8	24.8	34.7	%
TOTAL	16.2	19.3	28.5	%
Derate transformer to:				
TOTAL	82.4	90.3	92.8	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	58.1	64.5	68.0	k
B	65.8	72.7	77.0	k
C	66.3	71.7	75.3	k
TOTAL	63.6	69.6	73.3	k
3rd Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.1	0.1	0.2	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.4	3.7	3.8	%
B-N	3.7	3.9	4.1	%
C-N	3.8	4.0	4.2	%
TOTAL	3.7	3.9	4.0	%
7th Harmonic Volts:				
A-N	2.0	2.1	2.2	%
B-N	2.2	2.3	2.4	%
C-N	1.6	1.7	1.8	%
TOTAL	2.0	2.1	2.2	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.1	%
B-N	0.2	0.2	0.2	%
C-N	0.2	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	11.83	15.81	17.38	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 07 1994 (Sat)

INSTANTANEOUS POWER 4:00:02 AM

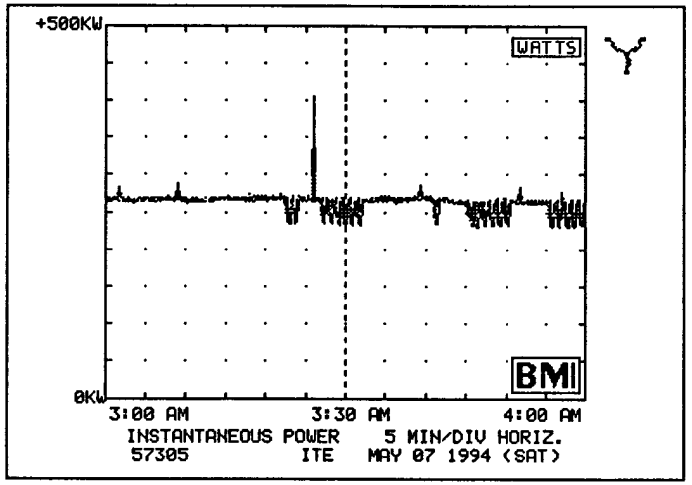
FROM: 3:00 AM May 07 1994 (Sat)
To: 4:00 AM May 07 1994 (Sat)

Total:
MAX: 406.8 kW, 3:25 AM
MIN: 229.3 kW, 3:46 AM

Phase A-N:
MAX: 130.9 kW, 3:25 AM
MIN: 78.0 kW, 3:46 AM

Phase B-N:
MAX: 141.2 kW, 3:25 AM
MIN: 71.1 kW, 3:46 AM

Phase C-N:
MAX: 134.7 kW, 3:25 AM
MIN: 80.2 kW, 3:46 AM



VOLTAGE THD 4:01:29 AM

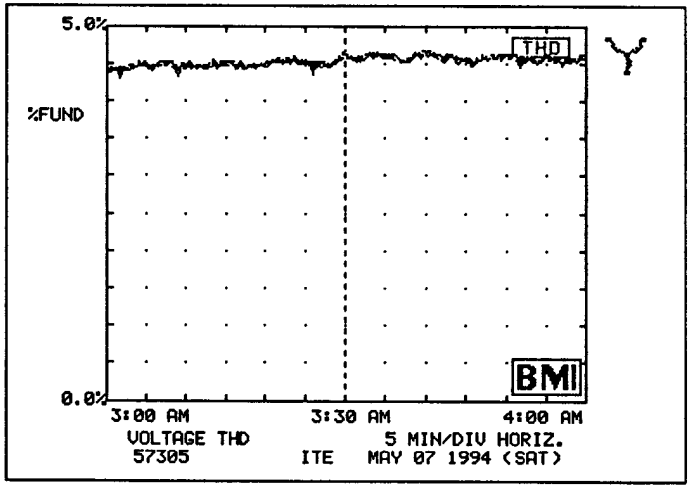
FROM: 3:00 AM May 07 1994 (Sat)
To: 4:00 AM May 07 1994 (Sat)

Average:
MAX: 4.7% THD, 3:39 AM
MIN: 4.3% THD, 3:01 AM

Phase A-N:
MAX: 4.5% THD, 3:39 AM
MIN: 4.1% THD, 3:01 AM

Phase B-N:
MAX: 4.9% THD, 3:39 AM
MIN: 4.5% THD, 3:08 AM

Phase C-N:
MAX: 4.7% THD, 3:39 AM
MIN: 4.3% THD, 3:01 AM



57305 ITE May 07 1994 (Sat)

CURRENT THD 4:01:41 AM

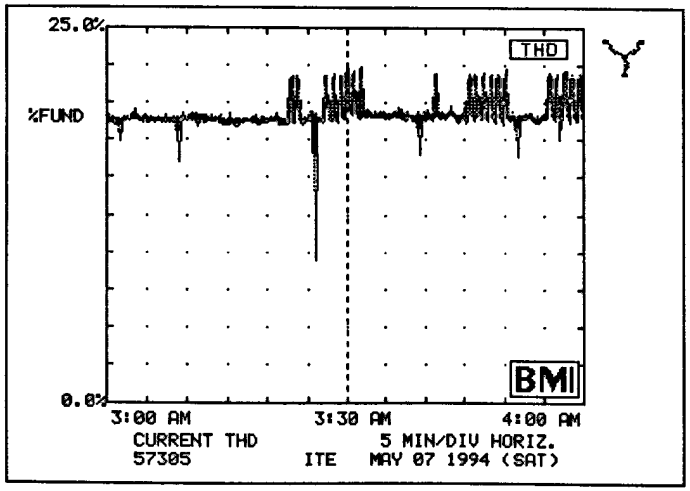
FROM: 3:00 AM May 07 1994 (Sat)
To: 4:00 AM May 07 1994 (Sat)

Average:
MAX: 22.5% THD, 3:31 AM
MIN: 9.5% THD, 3:25 AM

Phase A:
MAX: 20.5% THD, 3:50 AM
MIN: 9.0% THD, 3:25 AM

Phase B:
MAX: 26.1% THD, 3:31 AM
MIN: 10.4% THD, 3:25 AM

Phase C:
MAX: 21.0% THD, 3:31 AM
MIN: 9.0% THD, 3:25 AM



57305 ITE May 07 1994 (Sat)

BMI SUMMARY 4:03:47 AM

FROM: 3:03 AM May 07 1994 (Sat)
To: 4:03 AM May 07 1994 (Sat)

Demand:

Phase	Average	Unit
TOTAL	260.8	kW
TOTAL	0.96	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	260.8	kWh
TOTAL	49.44	kVARh
TOTAL	172.5	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.6	278.9	280.1	V
B-N	277.6	281.2	282.5	V
C-N	275.1	278.8	279.9	V
N-G	0.0	0.2	0.5	V
TOTAL	276.1	279.6	280.8	V
Unb	0.5	0.6	0.6	%
Current:				
A	243.6	331.7	642.0	A
B	222.7	296.3	601.9	A
C	261.9	339.4	666.2	A
N	44.6	58.9	106.5	A
TOTAL	0.729	0.967	1.910	kA
Unb	5.5	8.1	9.6	%
Power:				
A-N	65.76	88.46	130.9	kW
B-N	58.81	81.43	141.2	kW
C-N	70.96	90.92	134.7	kW
TOTAL	195.9	260.8	406.8	kW
Volt-Amps:				
A-N	67.80	92.53	176.9	kVA
B-N	62.51	83.31	167.1	kVA
C-N	72.86	94.62	183.3	kVA
TOTAL	203.5	270.5	527.3	kVA
VA Reactive:				
A-N	4.060	22.93	107.4	kVAR
B-N	-12.261	5.283	78.53	kVAR
C-N	0.942	21.23	113.0	kVAR
TOTAL	-5.949	49.44	298.9	kVAR
Power Factor:				
A-N	0.74	0.96	0.97	PF
B-N	0.84	0.98	0.98	PF
C-N	0.74	0.96	0.98	PF
TOTAL	0.77	0.96	0.97	PF

Displacement Factor:				
A-N	0.77	0.97	1.00	dPF
B-N	0.87	1.00	1.00	dPF
C-N	0.76	0.97	1.00	dPF
TOTAL	0.82	0.98	1.00	dPF
Current Leads:				
A	-39.9	-14.5	-3.5	
B	-29.7	-3.6	11.5	
C	-40.5	-13.1	-0.8	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.1	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.1	99.5	99.6	%
Zero	6.0	6.4	6.6	%
Neg	6.0	8.0	12.0	%
Voltage THD:				
A-N	4.2	4.4	4.7	%
B-N	4.5	4.8	5.1	%
C-N	4.4	4.6	4.9	%
TOTAL	4.4	4.6	4.9	%
Current THD:				
A	9.0	17.9	26.7	%
B	10.4	22.7	32.8	%
C	9.0	18.5	25.8	%
N	13.7	25.5	36.5	%
TOTAL	9.5	19.7	28.4	%
Derate transformer to:				
TOTAL	82.6	90.0	97.3	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	56.6	64.0	74.3	k
B	63.0	71.4	86.5	k
C	65.0	71.8	81.2	k
TOTAL	61.5	69.1	80.7	k
3rd Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.1	0.1	0.2	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.6	3.7	4.0	%
B-N	3.8	4.0	4.3	%
C-N	3.9	4.1	4.4	%
TOTAL	3.8	4.0	4.2	%
7th Harmonic Volts:				
A-N	2.1	2.2	2.4	%
B-N	2.3	2.4	2.6	%
C-N	1.7	1.8	2.0	%
TOTAL	2.0	2.1	2.3	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.3	%
C-N	0.2	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	11.76	15.65	24.41	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

57305 ITE May 07 1994 (Sat)

INSTANTANEOUS POWER 5:00:00 AM

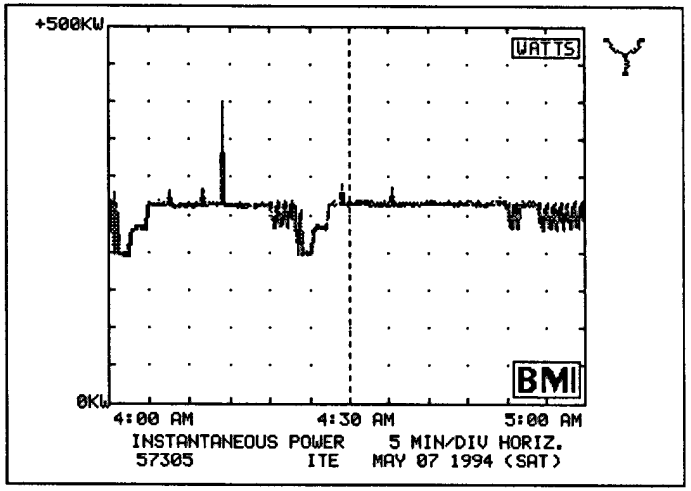
FROM: 4:00 AM May 07 1994 (Sat)
To: 5:00 AM May 07 1994 (Sat)

Total:
MAX: 402.5 kW, 4:13 AM
MIN: 195.9 kW, 4:02 AM

Phase A-N:
MAX: 129.5 kW, 4:13 AM
MIN: 65.8 kW, 4:02 AM

Phase B-N:
MAX: 139.5 kW, 4:13 AM
MIN: 58.5 kW, 4:23 AM

Phase C-N:
MAX: 133.5 kW, 4:13 AM
MIN: 71.0 kW, 4:01 AM



VOLTAGE THD 5:01:27 AM

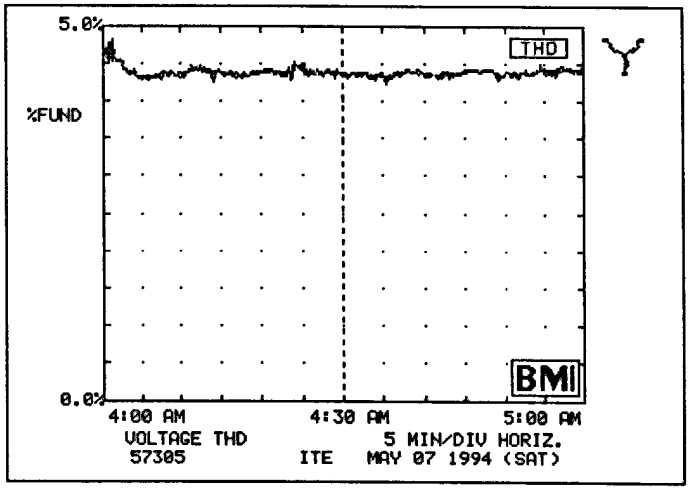
FROM: 4:00 AM May 07 1994 (Sat)
To: 5:00 AM May 07 1994 (Sat)

Average:
MAX: 4.9% THD, 4:01 AM
MIN: 4.3% THD, 4:35 AM

Phase A-N:
MAX: 4.7% THD, 4:01 AM
MIN: 4.1% THD, 4:35 AM

Phase B-N:
MAX: 5.1% THD, 4:01 AM
MIN: 4.5% THD, 4:35 AM

Phase C-N:
MAX: 4.9% THD, 4:01 AM
MIN: 4.3% THD, 4:13 AM



57305 ITE May 07 1994 (Sat)

CURRENT THD 5:01:39 AM

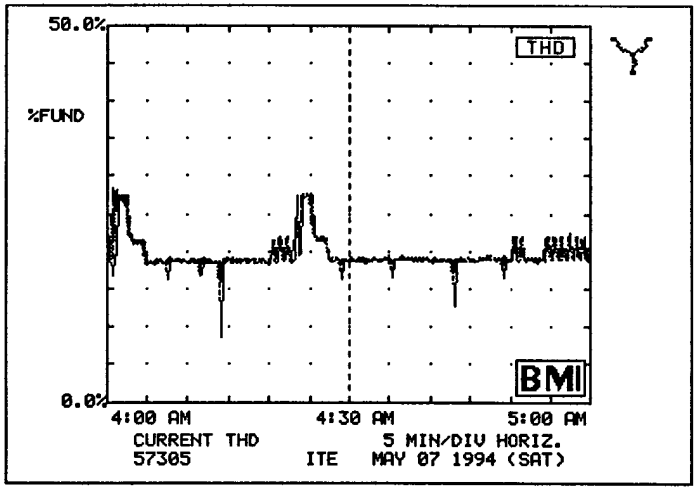
FROM: 4:00 AM May 07 1994 (Sat)
To: 5:00 AM May 07 1994 (Sat)

Average:
MAX: 28.4% THD, 4:00 AM
MIN: 8.4% THD, 4:13 AM

Phase A:
MAX: 26.7% THD, 4:00 AM
MIN: 8.0% THD, 4:13 AM

Phase B:
MAX: 32.8% THD, 4:00 AM
MIN: 9.4% THD, 4:13 AM

Phase C:
MAX: 25.8% THD, 4:00 AM
MIN: 7.9% THD, 4:13 AM



80505 ITE May 03 1994 (Tue)

INSTANTANEOUS POWER 7:00:00 PM

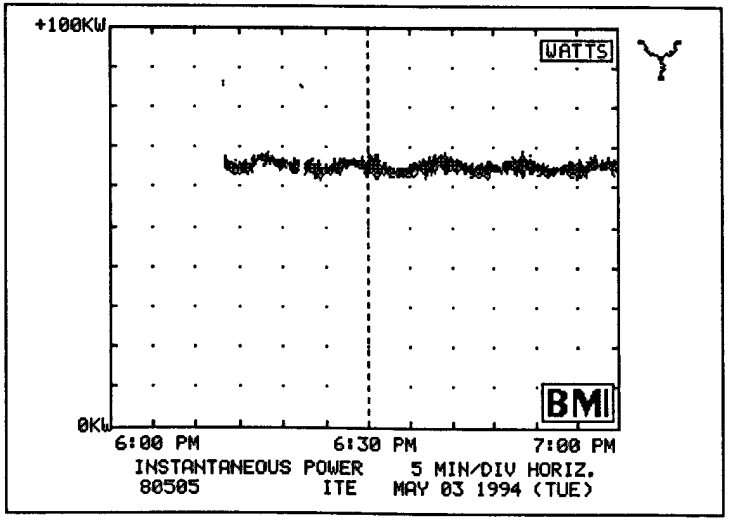
FROM: 6:00 PM May 03 1994 (Tue)
To: 7:00 PM May 03 1994 (Tue)

Total:
MAX: 69.3 kW, 6:48 PM
MIN: 62.0 kW, 6:24 PM

Phase A-N:
MAX: 25.9 kW, 6:48 PM
MIN: 23.3 kW, 6:42 PM

Phase B-N:
MAX: 19.9 kW, 6:48 PM
MIN: 17.3 kW, 6:24 PM

Phase C-N:
MAX: 24.2 kW, 6:17 PM
MIN: 21.3 kW, 6:54 PM



VOLTAGE THD 7:01:26 PM

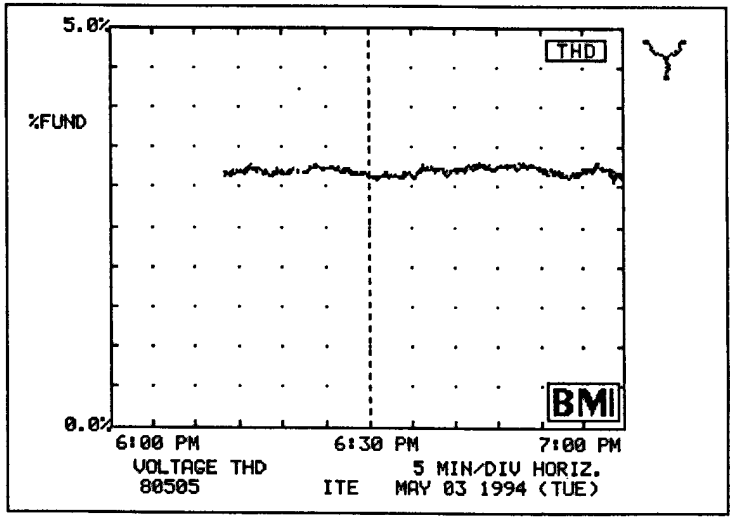
FROM: 6:00 PM May 03 1994 (Tue)
To: 7:00 PM May 03 1994 (Tue)

Average:
MAX: 3.3% THD, 6:56 PM
MIN: 3.1% THD, 6:58 PM

Phase A-N:
MAX: 3.2% THD, 6:56 PM
MIN: 3.0% THD, 6:58 PM

Phase B-N:
MAX: 3.6% THD, 6:47 PM
MIN: 3.3% THD, 6:58 PM

Phase C-N:
MAX: 3.3% THD, 6:42 PM
MIN: 3.0% THD, 6:58 PM



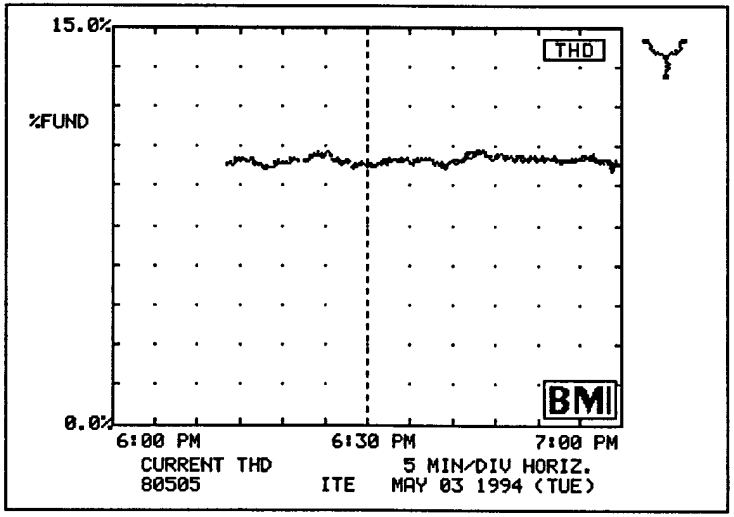
80505 ITE May 03 1994 (Tue)

CURRENT THD 7:01:40 PM

FROM: 6:00 PM May 03 1994 (Tue)
To: 7:00 PM May 03 1994 (Tue)

Average:

	MAX:	10.4% THD;	6:43 PM
	MIN:	9.6% THD;	6:58 PM
Phase A:			
	MAX:	9.6% THD;	6:43 PM
	MIN:	8.7% THD;	6:17 PM
Phase B:			
	MAX:	11.7% THD;	6:42 PM
	MIN:	10.7% THD;	6:58 PM
Phase C:			
	MAX:	9.9% THD;	6:42 PM
	MIN:	9.2% THD;	6:17 PM



BMI SUMMARY 7:22:01 PM

FROM: 6:22 PM May 03 1994 (Tue)
To: 7:22 PM May 03 1994 (Tue)

Demand:

Phase	Average	Unit
TOTAL	65.44	kW
TOTAL	0.64	PF

INSTANTANEOUS POWER 8:00:02 PM

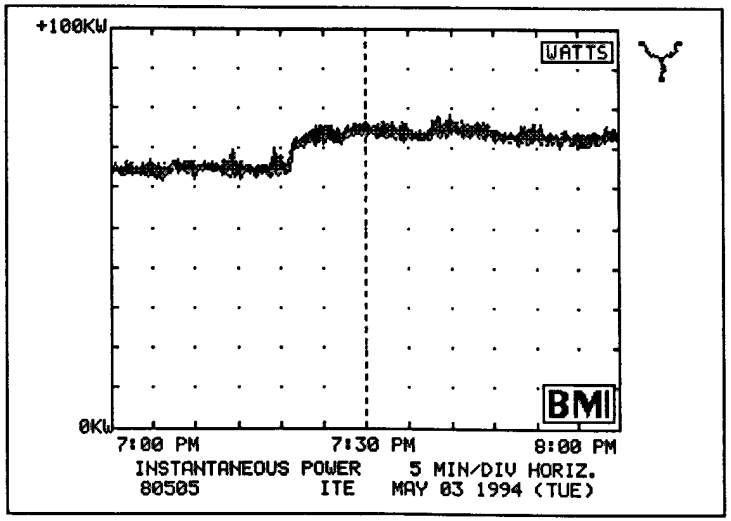
FROM: 7:00 PM May 03 1994 (Tue)
To: 8:00 PM May 03 1994 (Tue)

Total:
MAX: 78.8 kW, 7:39 PM
MIN: 62.2 kW, 7:05 PM

Phase A-N:
MAX: 29.1 kW, 7:39 PM
MIN: 23.1 kW, 7:09 PM

Phase B-N:
MAX: 22.8 kW, 7:39 PM
MIN: 17.6 kW, 7:05 PM

Phase C-N:
MAX: 27.3 kW, 7:37 PM
MIN: 21.1 kW, 7:05 PM



VOLTAGE THD 8:01:30 PM

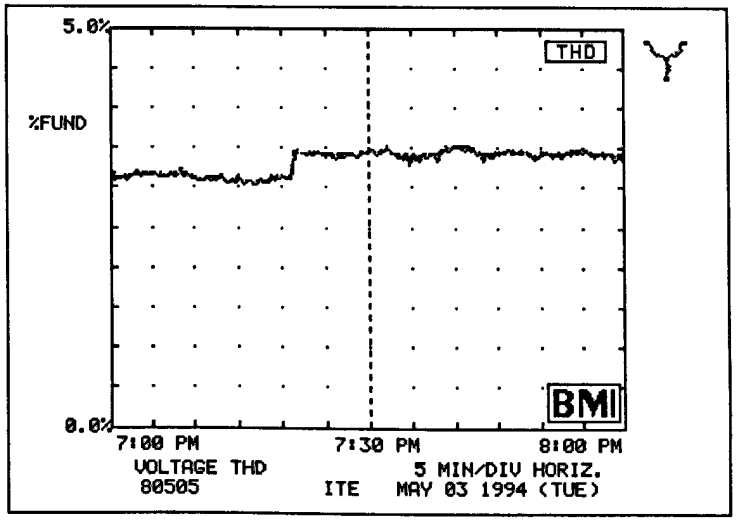
FROM: 7:00 PM May 03 1994 (Tue)
To: 8:00 PM May 03 1994 (Tue)

Average:
MAX: 3.6% THD, 7:40 PM
MIN: 3.0% THD, 7:15 PM

Phase A-N:
MAX: 3.5% THD, 7:40 PM
MIN: 2.9% THD, 7:15 PM

Phase B-N:
MAX: 3.7% THD, 7:39 PM
MIN: 3.2% THD, 7:16 PM

Phase C-N:
MAX: 3.5% THD, 7:40 PM
MIN: 3.0% THD, 7:16 PM



80505 ITE May 03 1994 (Tue)

CURRENT THD 8:01:41 PM

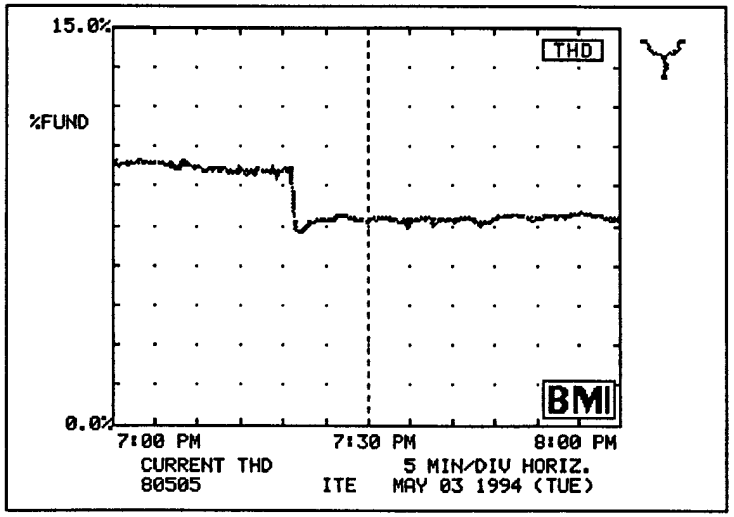
FROM: 7:00 PM May 03 1994 (Tue)
To: 8:00 PM May 03 1994 (Tue)

Average:
MAX: 10.1% THD; 7:03 PM
MIN: 7.3% THD; 7:21 PM

Phase A:
MAX: 9.3% THD; 7:00 PM
MIN: 6.7% THD; 7:22 PM

Phase B:
MAX: 11.4% THD; 7:08 PM
MIN: 7.9% THD; 7:21 PM

Phase C:
MAX: 9.7% THD; 7:05 PM
MIN: 7.2% THD; 7:21 PM



BMI SUMMARY 8:22:02 PM

FROM: 7:22 PM May 03 1994 (Tue)
To: 8:22 PM May 03 1994 (Tue)

Demand:

Phase	Average	Unit
TOTAL	73.73	kW
TOTAL	0.69	PF

INSTANTANEOUS POWER 9:00:00 PM

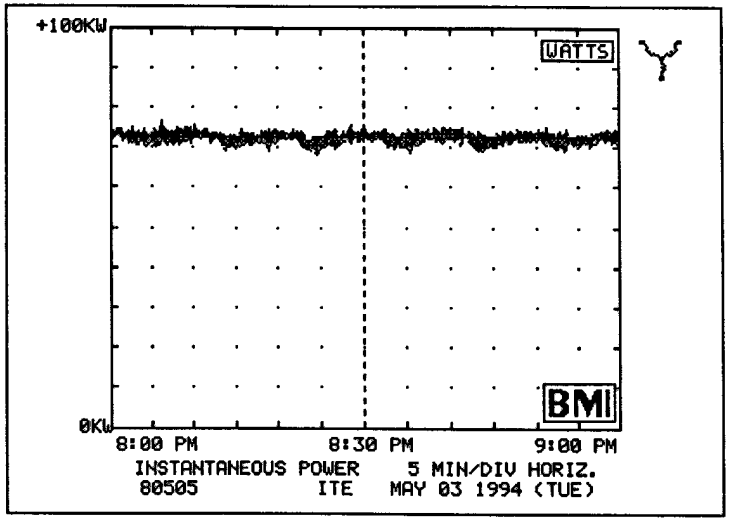
FROM: 8:00 PM May 03 1994 (Tue)
To: 9:00 PM May 03 1994 (Tue)

Total:
MAX: 77.2 kW, 8:05 PM
MIN: 68.7 kW, 8:24 PM

Phase A-N:
MAX: 29.2 kW, 8:05 PM
MIN: 25.5 kW, 8:24 PM

Phase B-N:
MAX: 22.4 kW, 8:53 PM
MIN: 20.1 kW, 8:24 PM

Phase C-N:
MAX: 26.1 kW, 8:05 PM
MIN: 23.2 kW, 8:24 PM



VOLTAGE THD 9:01:27 PM

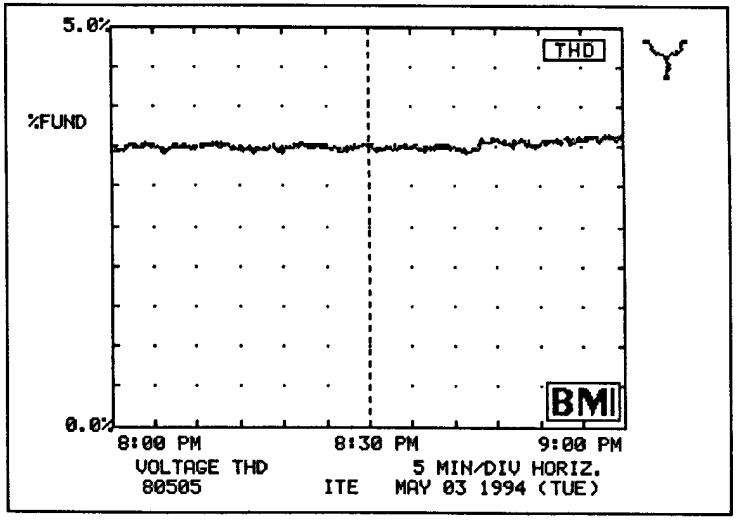
FROM: 8:00 PM May 03 1994 (Tue)
To: 9:00 PM May 03 1994 (Tue)

Average:
MAX: 3.7% THD, 8:58 PM
MIN: 3.4% THD, 8:06 PM

Phase A-N:
MAX: 3.6% THD, 8:58 PM
MIN: 3.3% THD, 8:16 PM

Phase B-N:
MAX: 3.8% THD, 8:59 PM
MIN: 3.6% THD, 8:41 PM

Phase C-N:
MAX: 3.7% THD, 8:57 PM
MIN: 3.4% THD, 8:06 PM



80505 ITE May 03 1994 (Tue)

CURRENT THD 9:01:39 PM

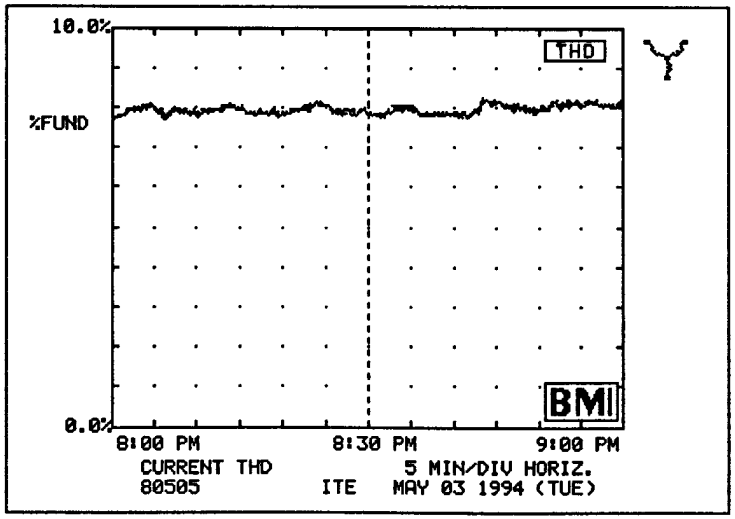
FROM: 8:00 PM May 03 1994 (Tue)
To: 9:00 PM May 03 1994 (Tue)

Average:
MAX: 8.3% THD; 8:43 PM
MIN: 7.7% THD; 8:06 PM

Phase A:
MAX: 7.7% THD; 8:43 PM
MIN: 7.1% THD; 8:06 PM

Phase B:
MAX: 8.9% THD; 8:43 PM
MIN: 8.2% THD; 8:31 PM

Phase C:
MAX: 8.4% THD; 8:56 PM
MIN: 7.8% THD; 8:06 PM



BMI SUMMARY 9:22:04 PM

FROM: 8:22 PM May 03 1994 (Tue)
To: 9:22 PM May 03 1994 (Tue)

Demand:

Phase	Average	Unit
TOTAL	72.86	kW
TOTAL	0.69	PF

INSTANTANEOUS POWER 10:00:00 PM

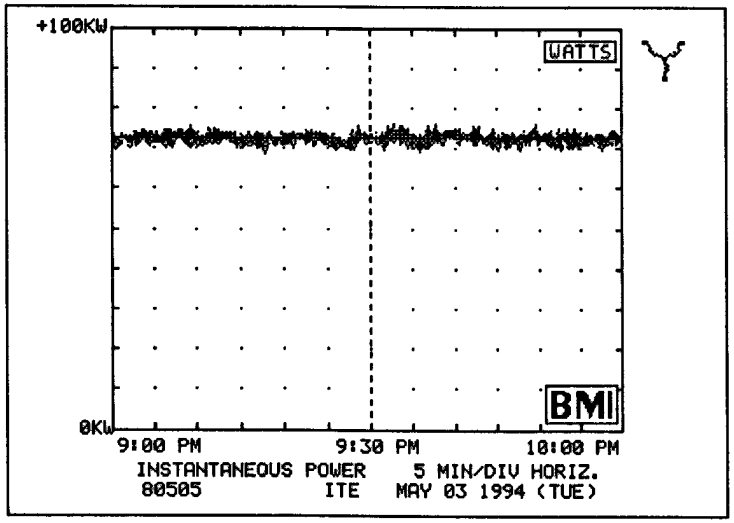
FROM: 9:00 PM May 03 1994 (Tue)
To: 10:00 PM May 03 1994 (Tue)

Total:
MAX: 76.4 kW, 9:49 PM
MIN: 69.2 kW, 9:17 PM

Phase A-N:
MAX: 29.0 kW, 9:36 PM
MIN: 25.6 kW, 9:35 PM

Phase B-N:
MAX: 22.7 kW, 9:36 PM
MIN: 20.0 kW, 9:17 PM

Phase C-N:
MAX: 26.6 kW, 9:37 PM
MIN: 23.3 kW, 9:16 PM



VOLTAGE THD 10:01:27 PM

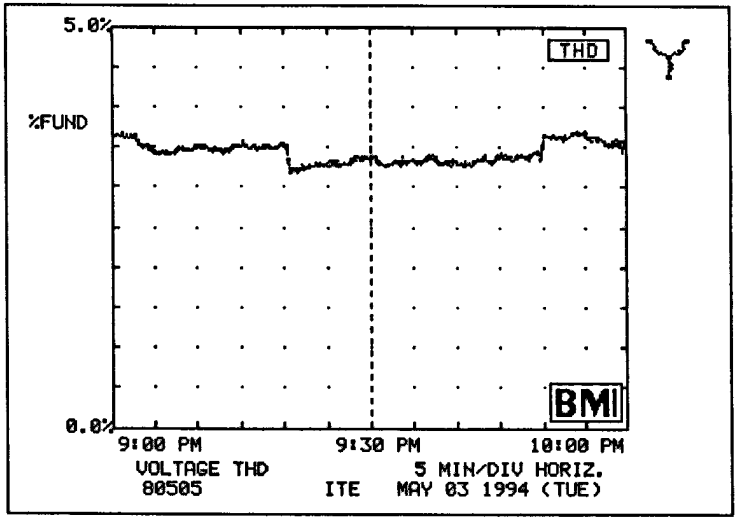
FROM: 9:00 PM May 03 1994 (Tue)
To: 10:00 PM May 03 1994 (Tue)

Average:
MAX: 3.7% THD, 9:53 PM
MIN: 3.2% THD, 9:20 PM

Phase A-N:
MAX: 3.6% THD, 9:01 PM
MIN: 3.1% THD, 9:20 PM

Phase B-N:
MAX: 3.9% THD, 9:53 PM
MIN: 3.3% THD, 9:20 PM

Phase C-N:
MAX: 3.8% THD, 9:55 PM
MIN: 3.2% THD, 9:21 PM



80505 ITE May 03 1994 (Tue)

CURRENT THD 10:01:39 PM

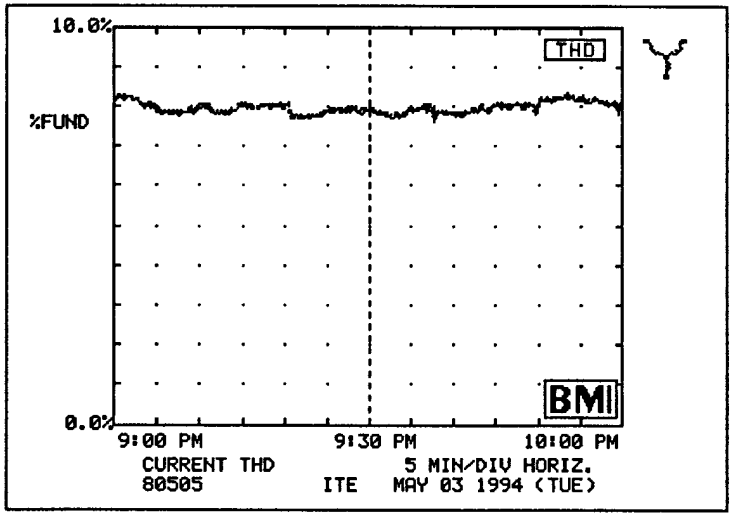
FROM: 9:00 PM May 03 1994 (Tue)
To: 10:00 PM May 03 1994 (Tue)

Average:
MAX: 8.4% THD, 9:53 PM
MIN: 7.7% THD, 9:37 PM

Phase A:
MAX: 7.8% THD, 9:53 PM
MIN: 7.0% THD, 9:37 PM

Phase B:
MAX: 9.0% THD, 9:53 PM
MIN: 8.2% THD, 9:21 PM

Phase C:
MAX: 8.5% THD, 9:55 PM
MIN: 7.7% THD, 9:37 PM



80505 ITE May 03 1994 (Tue)

BMI SUMMARY 10:22:03 PM

FROM: 9:22 PM May 03 1994 (Tue)
To: 10:22 PM May 03 1994 (Tue)

Demand:

Phase	Average	Unit
TOTAL	73.08	kW
TOTAL	0.68	PF

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 1:00:01 PM

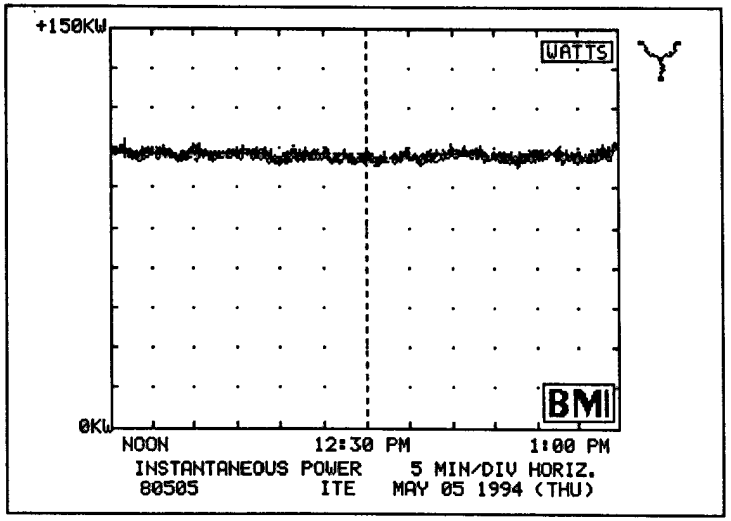
FROM: NOON May 05 1994 (Thu)
To: 1:00 PM May 05 1994 (Thu)

Total:
MAX: 108.4 kW, 12:01 PM
MIN: 98.5 kW, 12:47 PM

Phase A-N:
MAX: 40.2 kW, 12:59 PM
MIN: 37.1 kW, 12:56 PM

Phase B-N:
MAX: 35.7 kW, 12:01 PM
MIN: 31.5 kW, 12:47 PM

Phase C-N:
MAX: 33.6 kW, 12:43 PM
MIN: 29.2 kW, 12:36 PM



80505 ITE May 05 1994 (Thu)

VOLTAGE THD 1:01:28 PM

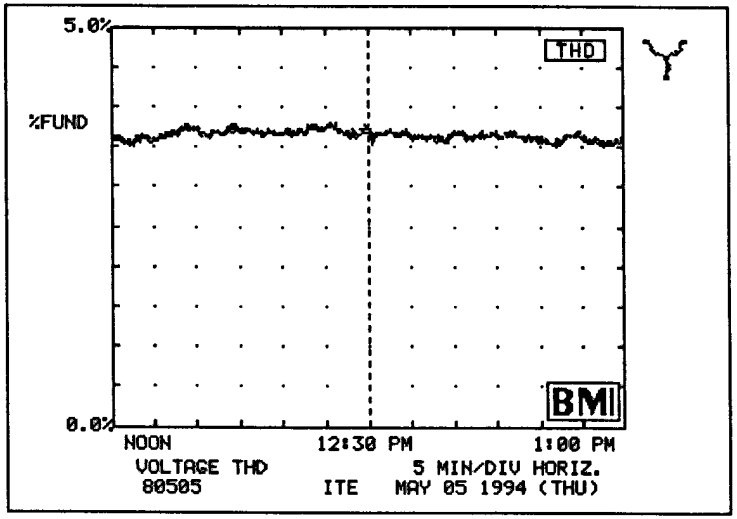
FROM: NOON May 05 1994 (Thu)
To: 1:00 PM May 05 1994 (Thu)

Average:
MAX: 3.8% THD, 12:25 PM
MIN: 3.5% THD, 12:02 PM

Phase A-N:
MAX: 3.9% THD, 12:14 PM
MIN: 3.5% THD, 12:02 PM

Phase B-N:
MAX: 3.9% THD, 12:25 PM
MIN: 3.6% THD, 12:02 PM

Phase C-N:
MAX: 3.7% THD, 12:26 PM
MIN: 3.4% THD, 12:51 PM



80505 ITE May 05 1994 (Thu)

CURRENT THD 1:01:40 PM

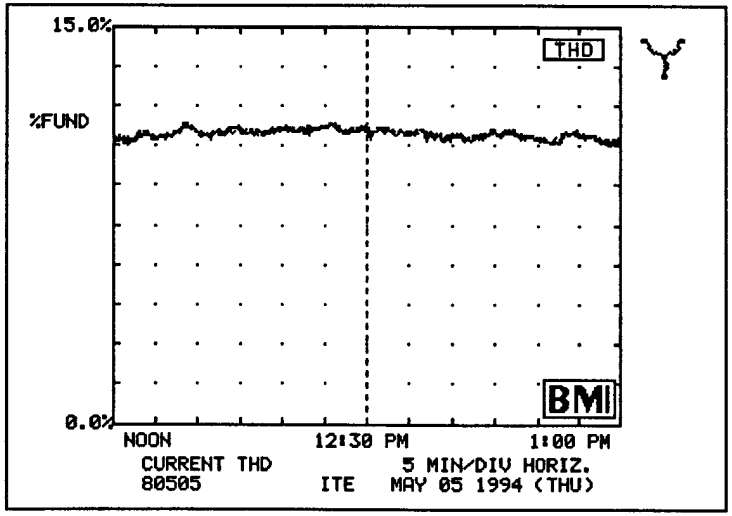
FROM: NOON May 05 1994 (Thu)
To: 1:00 PM May 05 1994 (Thu)

Average:
MAX: 11.5% THD; 12:25 PM
MIN: 10.6% THD; 12:01 PM

Phase A:
MAX: 10.0% THD; 12:08 PM
MIN: 9.2% THD; 12:01 PM

Phase B:
MAX: 11.4% THD; 12:08 PM
MIN: 10.5% THD; 12:04 PM

Phase C:
MAX: 13.1% THD; 12:25 PM
MIN: 11.8% THD; 12:51 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 1:03:46 PM

FROM: 12:01 PM May 05 1994 (Thu)
To: 1:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	102.9	kW
TOTAL	0.71	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	102.3	kWh
TOTAL	99.52	kVARh
TOTAL	137.0	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.3	276.5	277.4	V
B-N	277.8	279.3	280.1	V
C-N	274.9	276.0	276.9	V
N-G	0.0	0.3	0.5	V
TOTAL	276.0	277.2	278.1	V
Unb	0.6	0.7	0.8	%
Current:				
A	183.2	190.1	196.7	A
B	168.6	173.2	178.6	A
C	149.9	156.4	165.2	A
N	17.6	19.8	22.9	A
TOTAL	504.6	519.8	537.9	A
Unb	7.7	10.0	11.8	%
Power:				
A-N	37.05	38.60	40.22	kW
B-N	31.48	33.04	35.66	kW
C-N	29.22	31.25	33.65	kW
TOTAL	98.53	102.9	108.4	kW
Volt-Amps:				
A-N	50.54	52.57	54.48	kVA
B-N	46.94	48.36	49.97	kVA
C-N	41.33	43.18	45.54	kVA
TOTAL	139.6	144.1	149.4	kVA
VA Reactive:				
A-N	34.06	35.54	37.25	kVAR
B-N	33.64	35.09	36.24	kVAR
C-N	28.47	29.46	30.35	kVAR
TOTAL	96.76	100.1	103.0	kVAR
Power Factor:				
A-N	0.72	0.73	0.75	PF
B-N	0.66	0.68	0.72	PF
C-N	0.71	0.72	0.75	PF
TOTAL	0.70	0.71	0.74	PF

Displacement Factor:				
A-N	0.72	0.73	0.75	dPF
B-N	0.67	0.68	0.71	dPF
C-N	0.71	0.73	0.75	dPF
TOTAL	0.70	0.72	0.74	dPF
Current Leads:				
A	-43.8	-42.8	-41.3	
B	-48.1	-46.9	-44.8	
C	-44.9	-43.5	-41.8	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.6	0.7	0.8	%
Current Sequence:				
Pos	99.5	99.6	99.8	%
Zero	3.0	3.5	4.0	%
Neg	5.6	8.0	9.3	%
Voltage THD:				
A-N	3.5	3.7	3.9	%
B-N	[illegible]	[illegible]	[illegible]	%
C-N	[illegible]	[illegible]	[illegible]	%
TOTAL	3.5	3.7	3.8	%
Current THD:				
A	9.2	9.6	10.0	%
B	10.8	11.0	11.4	%
C	11.8	12.4	14.1	%
N	45.0	54.0	63.8	%
TOTAL	10.6	11.0	11.5	%
Derate transformer to:				
TOTAL	98.7	98.8	98.9	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.9	5.3	5.9	K
B	4.7	5.1	5.8	K
C	5.0	5.4	6.0	K
TOTAL	5.0	5.3	5.7	K
3rd Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.3	0.3	0.4	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	[illegible]	[illegible]	[illegible]	%
B-N	[illegible]	[illegible]	[illegible]	%
C-N	[illegible]	[illegible]	[illegible]	%
TOTAL	3.3	3.4	3.5	%
7th Harmonic Volts:				
A-N	1.3	1.4	1.6	%
B-N	1.3	1.4	1.6	%
C-N	1.0	1.1	1.2	%
TOTAL	1.2	1.3	1.4	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.1	0.2	%
C-N	0.1	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	5.912	6.173	6.503	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)
INSTANTANEOUS POWER 2:00:01 PM

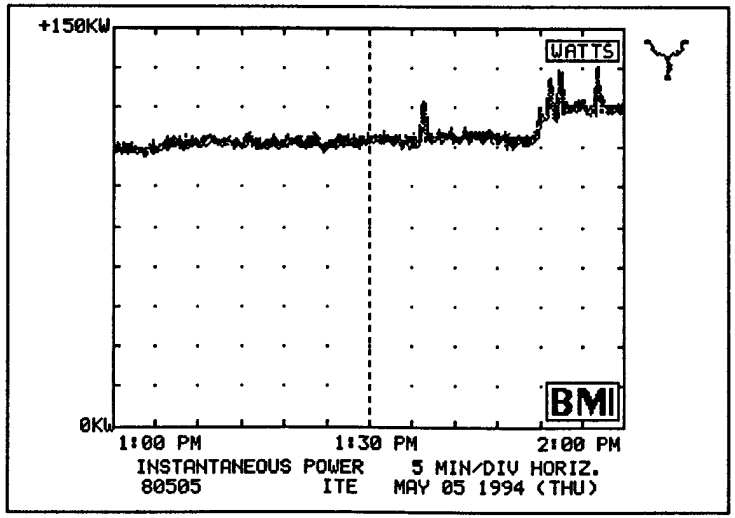
FROM: 1:00 PM May 05 1994 (Thu)
To: 2:00 PM May 05 1994 (Thu)

Total:
MAX: 136.8 kW, 1:56 PM
MIN: 101.6 kW, 1:03 PM

Phase A-N:
MAX: 51.2 kW, 1:56 PM
MIN: 38.0 kW, 1:00 PM

Phase B-N:
MAX: 43.0 kW, 1:56 PM
MIN: 32.8 kW, 1:46 PM

Phase C-N:
MAX: 42.6 kW, 1:56 PM
MIN: 30.3 kW, 1:03 PM



80505 ITE May 05 1994 (Thu)
VOLTAGE THD 2:01:28 PM

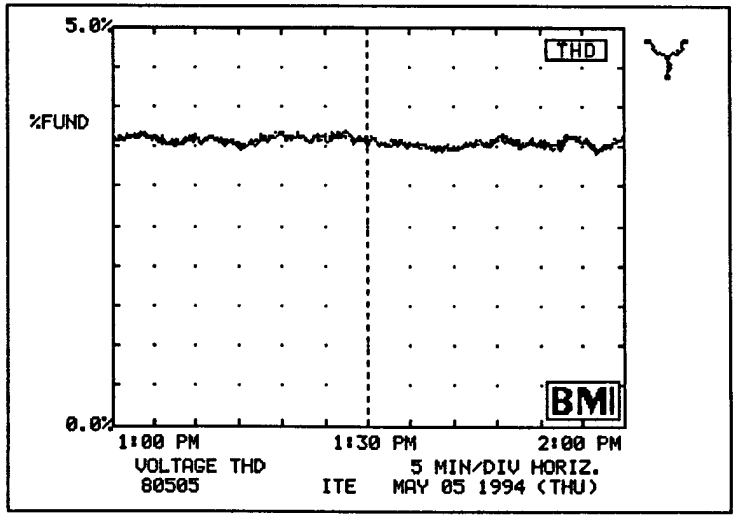
FROM: 1:00 PM May 05 1994 (Thu)
To: 2:00 PM May 05 1994 (Thu)

Average:
MAX: 3.7% THD, 1:27 PM
MIN: 3.4% THD, 1:56 PM

Phase A-N:
MAX: 3.8% THD, 1:27 PM
MIN: 3.5% THD, 1:56 PM

Phase B-N:
MAX: 3.8% THD, 1:19 PM
MIN: 3.4% THD, 1:56 PM

Phase C-N:
MAX: 3.6% THD, 1:27 PM
MIN: 3.3% THD, 1:56 PM



80505 ITE May 05 1994 (Thu)

CURRENT THD 2:01:40 PM

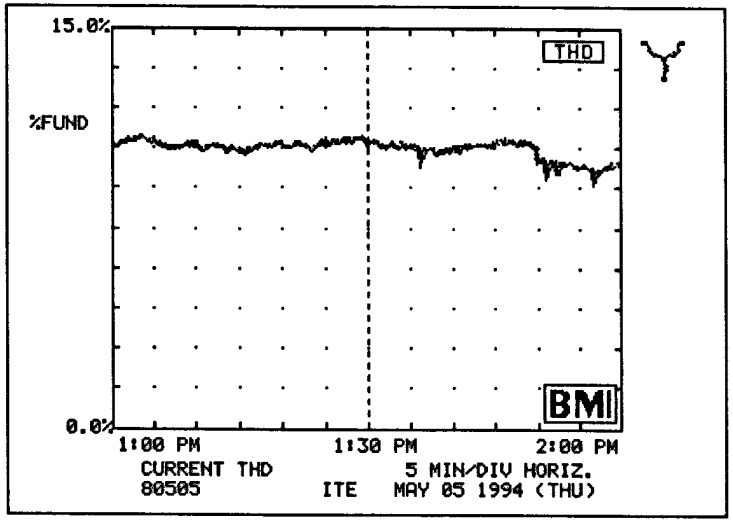
FROM: 1:00 PM May 05 1994 (Thu)
To: 2:00 PM May 05 1994 (Thu)

Average:
MAX: 11.1% THD; 1:03 PM
MIN: 9.1% THD; 1:56 PM

Phase A:
MAX: 9.8% THD; 1:03 PM
MIN: 7.8% THD; 1:56 PM

Phase B:
MAX: 11.9% THD; 1:47 PM
MIN: 9.8% THD; 1:56 PM

Phase C:
MAX: 12.5% THD; 1:27 PM
MIN: 9.9% THD; 1:56 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 2:03:47 PM

FROM: 1:01 PM May 05 1994 (Thu)
To: 2:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	110.5	kW
TOTAL	0.74	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	110.5	kWh
TOTAL	99.30	kVARh
TOTAL	140.9	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	273.9	275.3	276.2	V
B-N	276.5	277.9	278.7	V
C-N	273.4	274.8	275.6	V
N-G	0.0	0.3	0.5	V
TOTAL	274.6	276.0	276.8	V
Unb	0.6	0.7	0.7	%
Current:				
A	188.1	198.6	234.1	A
B	170.1	178.9	206.8	A
C	152.6	162.4	194.4	A
N	20.9	23.7	28.2	A
TOTAL	513.9	539.8	635.2	A
Unb	8.7	10.7	12.6	%
Power:				
A-N	38.06	41.48	51.24	kW
B-N	32.81	35.52	42.98	kW
C-N	30.30	33.48	42.60	kW
TOTAL	101.6	110.5	136.8	kW
Volt-Amps:				
A-N	51.94	54.66	64.36	kVA
B-N	47.22	49.70	57.35	kVA
C-N	41.94	44.63	53.33	kVA
TOTAL	142.3	149.0	175.0	kVA
VA Reactive:				
A-N	33.90	35.48	39.50	kVAR
B-N	34.19	34.53	38.52	kVAR
C-N	27.79	29.21	32.60	kVAR
TOTAL	95.41	99.23	110.6	kVAR
Power Factor:				
A-N	0.73	0.76	0.80	PF
B-N	0.69	0.71	0.75	PF
C-N	0.72	0.75	0.80	PF
TOTAL	0.71	0.74	0.78	PF

Displacement Factor:				
A-N	0.73	0.76	0.79	dPF
B-N	0.69	0.71	0.75	dPF
C-N	0.72	0.75	0.80	dPF
TOTAL	0.71	0.75	0.79	dPF
Current Leads:				
A	-42.8	-40.7	-37.4	
B	-46.2	-44.4	-41.6	
C	-43.6	-41.3	-37.0	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.6	0.7	0.7	%
Current Sequence:				
Pos	99.4	99.6	99.7	%
Zero	3.3	4.0	5.0	%
Neg	5.9	8.0	9.4	%
Voltage THD:				
A-N	3.5	3.6	3.8	%
B-N	3.4	3.7	3.8	%
C-N	3.3	3.5	3.6	%
TOTAL	3.4	3.6	3.7	%
Current THD:				
A	7.8	9.0	9.8	%
B	9.8	11.0	11.9	%
C	9.9	11.6	12.5	%
N	44.7	56.9	71.1	%
TOTAL	9.1	10.5	11.1	%
Derate transformer to:				
TOTAL	98.7	98.9	99.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.8	5.2	6.1	K
B	4.7	5.2	5.9	K
C	4.9	5.4	6.1	K
TOTAL	4.9	5.3	5.8	K
3rd Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.3	0.3	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.3	3.4	3.5	%
B-N	3.2	3.4	3.5	%
C-N	3.1	3.3	3.4	%
TOTAL	3.2	3.4	3.5	%
7th Harmonic Volts:				
A-N	1.3	1.4	1.5	%
B-N	1.2	1.4	1.5	%
C-N	1.0	1.1	1.2	%
TOTAL	1.2	1.3	1.4	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.2	%
B-N	0.1	0.1	0.2	%
C-N	0.1	0.1	0.2	%
TOTAL	0.1	0.1	0.2	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	6.098	6.628	8.210	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 3:00:02 PM

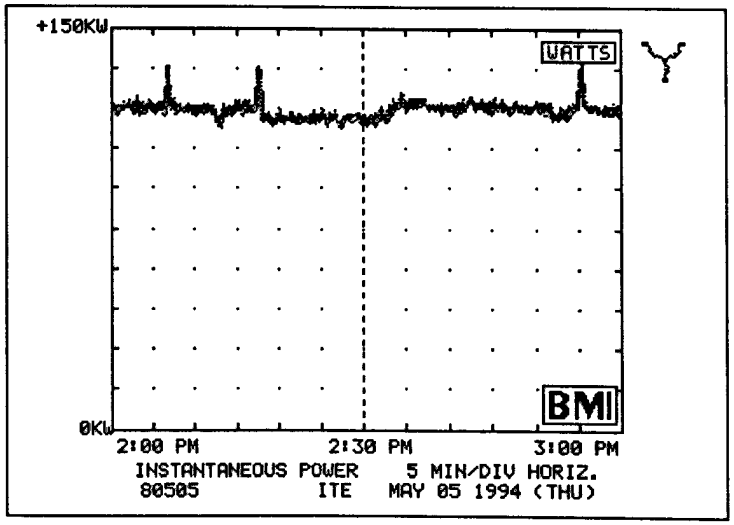
FROM: 2:00 PM May 05 1994 (Thu)
To: 3:00 PM May 05 1994 (Thu)

Total:
MAX: 138.8 kW, 2:55 PM
MIN: 113.2 kW, 2:12 PM

Phase A-N:
MAX: 51.9 kW, 2:55 PM
MIN: 42.2 kW, 2:12 PM

Phase B-N:
MAX: 44.2 kW, 2:55 PM
MIN: 35.5 kW, 2:25 PM

Phase C-N:
MAX: 42.6 kW, 2:55 PM
MIN: 34.8 kW, 2:27 PM



VOLTAGE THD 3:01:29 PM

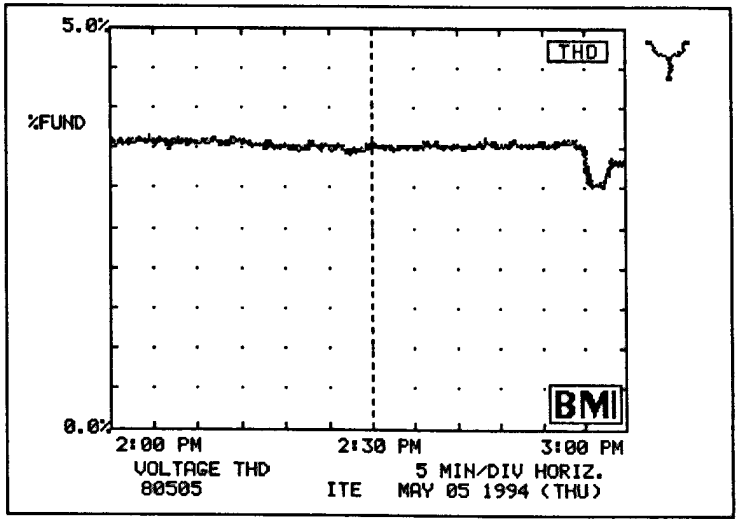
FROM: 2:00 PM May 05 1994 (Thu)
To: 3:00 PM May 05 1994 (Thu)

Average:
MAX: 3.7% THD, 2:04 PM
MIN: 3.0% THD, 2:57 PM

Phase A-N:
MAX: 3.7% THD, 2:04 PM
MIN: 3.0% THD, 2:57 PM

Phase B-N:
MAX: 3.7% THD, 2:43 PM
MIN: 3.1% THD, 2:57 PM

Phase C-N:
MAX: 3.6% THD, 2:04 PM
MIN: 2.9% THD, 2:55 PM



80505 ITE May 05 1994 (Thu)

CURRENT THD 3:01:39 PM

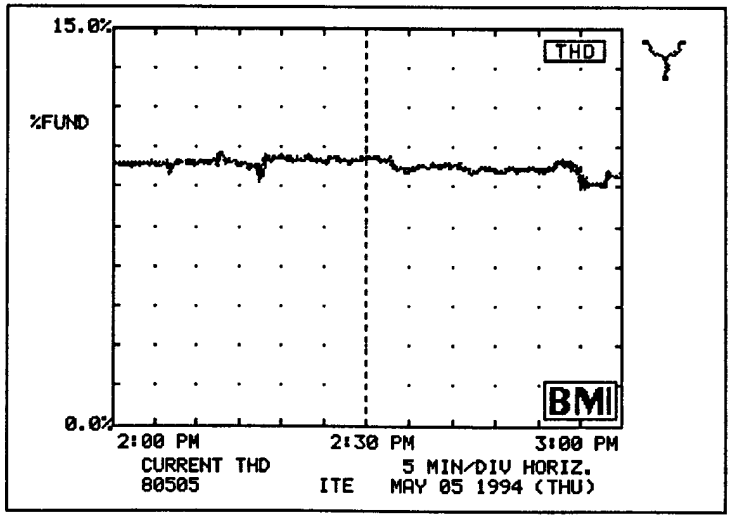
FROM: 2:00 PM May 05 1994 (Thu)
To: 3:00 PM May 05 1994 (Thu)

Average:
MAX: 10.3% THD; 2:12 PM
MIN: 9.0% THD; 2:55 PM

Phase A:
MAX: 8.7% THD; 2:12 PM
MIN: 7.5% THD; 2:55 PM

Phase B:
MAX: 11.4% THD; 2:25 PM
MIN: 9.5% THD; 2:55 PM

Phase C:
MAX: 11.3% THD; 2:52 PM
MIN: 9.8% THD; 2:57 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 3:03:47 PM

FROM: 2:01 PM May 05 1994 (Thu)
To: 3:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	120.1	kW
TOTAL	0.76	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	120.1	kWh
TOTAL	102.4	kVARh
TOTAL	148.5	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	272.9	275.3	277.9	V
B-N	275.5	277.9	280.2	V
C-N	272.4	274.8	277.4	V
N-G	0.0	0.3	0.5	V
TOTAL	273.6	276.0	278.5	V
Unb	0.6	0.7	0.7	%
Current:				
A	200.6	211.1	239.6	A
B	178.6	187.8	211.6	A
C	166.7	174.7	196.9	A
N	20.5	22.8	28.4	A
TOTAL	547.9	573.6	647.4	A
Unb	8.4	10.4	11.9	%
Power:				
A-N	42.22	44.90	51.95	kW
B-N	35.55	38.08	44.22	kW
C-N	34.77	37.14	42.64	kW
TOTAL	113.2	120.1	138.8	kW
Volt-Amps:				
A-N	55.14	58.12	66.52	kVA
B-N	49.65	52.17	59.19	kVA
C-N	45.74	48.01	54.51	kVA
TOTAL	151.0	158.3	180.1	kVA
VA Reactive:				
A-N	35.11	36.82	42.27	kVAR
B-N	33.90	35.43	39.62	kVAR
C-N	28.69	30.18	34.17	kVAR
TOTAL	98.15	102.4	116.0	kVAR
Power Factor:				
A-N	0.75	0.77	0.80	PF
B-N	0.71	0.73	0.76	PF
C-N	0.76	0.77	0.80	PF
TOTAL	0.74	0.76	0.78	PF

Displacement Factor:				
A-N	0.75	0.77	0.79	dPF
B-N	0.71	0.73	0.76	dPF
C-N	0.76	0.77	0.80	dPF
TOTAL	0.75	0.76	0.78	dPF
Current Leads:				
A	-41.5	-39.5	-37.6	
B	-44.5	-43.1	-40.9	
C	-40.7	-39.3	-37.2	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.6	0.7	0.7	%
Current Sequence:				
Pos	99.5	99.6	99.7	%
Zero	3.1	3.6	4.5	%
Neg	6.2	7.8	8.9	%
Voltage THD:				
A-N	3.0	3.6	3.7	%
B-N	3.1	3.6	3.7	%
C-N	3.9	3.4	3.6	%
TOTAL	3.0	3.5	3.7	%
Current THD:				
A	7.5	8.3	8.7	%
B	9.5	10.7	11.4	%
C	9.8	10.7	11.3	%
N	44.2	62.5	71.0	%
TOTAL	9.0	9.9	10.3	%
Derate transformer to:				
TOTAL	98.8	99.0	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.6	5.2	5.9	K
B	4.9	5.4	6.0	K
C	5.0	5.4	6.1	K
TOTAL	4.9	5.4	5.8	K
3rd Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.1	0.2	0.2	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	2.9	3.3	3.5	%
B-N	2.9	3.3	3.5	%
C-N	2.8	3.2	3.4	%
TOTAL	2.9	3.3	3.4	%
7th Harmonic Volts:				
A-N	0.9	1.3	1.5	%
B-N	0.9	1.3	1.4	%
C-N	0.7	1.0	1.2	%
TOTAL	0.8	1.2	1.3	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.1	0.1	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	6.793	7.208	8.329	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 4:00:01 PM

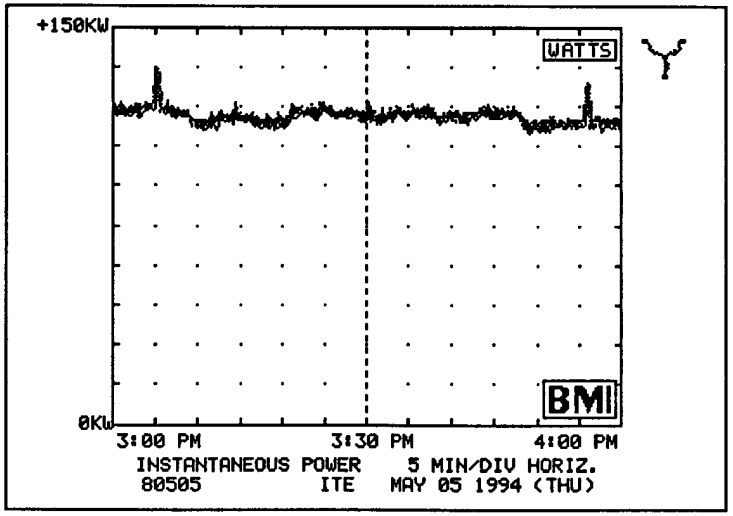
FROM: 3:00 PM May 05 1994 (Thu)
To: 4:00 PM May 05 1994 (Thu)

Total:
MAX: 135.3 kW; 3:04 PM
MIN: 110.6 kW; 3:49 PM

Phase A-N:
MAX: 50.6 kW; 3:04 PM
MIN: 40.3 kW; 3:59 PM

Phase B-N:
MAX: 43.8 kW; 3:04 PM
MIN: 36.6 kW; 3:57 PM

Phase C-N:
MAX: 40.9 kW; 3:04 PM
MIN: 33.3 kW; 3:12 PM



VOLTAGE THD 4:01:28 PM

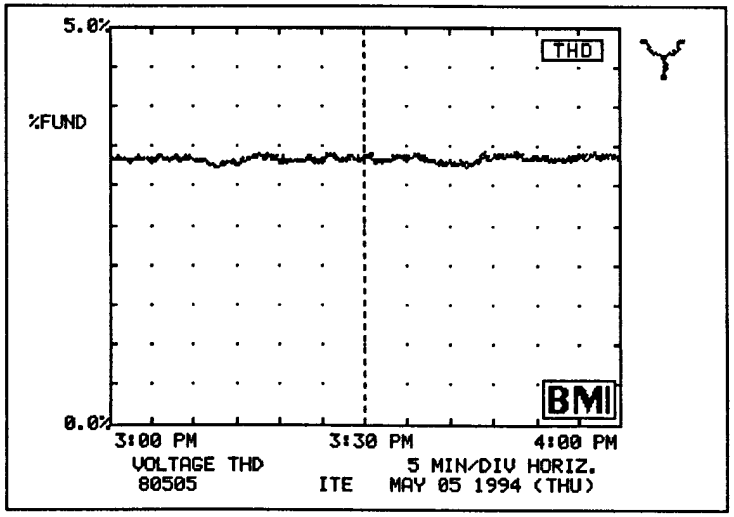
FROM: 3:00 PM May 05 1994 (Thu)
To: 4:00 PM May 05 1994 (Thu)

Averase:
MAX: 3.5% THD; 3:43 PM
MIN: 3.2% THD; 3:12 PM

Phase A-N:
MAX: 3.5% THD; 3:47 PM
MIN: 3.3% THD; 3:12 PM

Phase B-N:
MAX: 3.5% THD; 3:43 PM
MIN: 3.3% THD; 3:12 PM

Phase C-N:
MAX: 3.3% THD; 3:47 PM
MIN: 3.1% THD; 3:12 PM



80505 ITE May 05 1994 (Thu)

CURRENT THD 4:01:40 PM

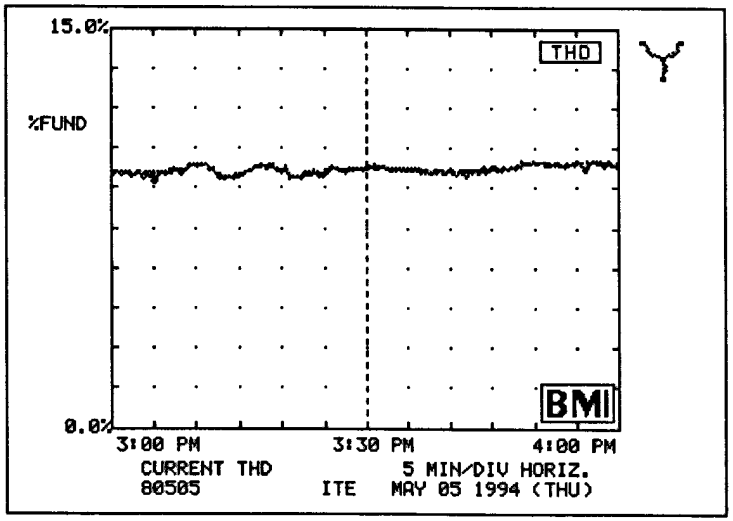
FROM: 3:00 PM May 05 1994 (Thu)
To: 4:00 PM May 05 1994 (Thu)

Average:
MAX: 10.1% THD; 3:56 PM
MIN: 9.2% THD; 3:04 PM

Phase A:
MAX: 9.0% THD; 3:58 PM
MIN: 7.9% THD; 3:04 PM

Phase B:
MAX: 10.5% THD; 3:59 PM
MIN: 9.1% THD; 3:22 PM

Phase C:
MAX: 11.5% THD; 3:17 PM
MIN: 10.2% THD; 3:59 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 4:03:46 PM

FROM: 3:01 PM May 05 1994 (Thu)
To: 4:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	117.0	kW
TOTAL	0.75	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	117.1	kWh
TOTAL	103.7	kVARh
TOTAL	148.0	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	274.8	276.1	277.2	V
B-N	277.2	278.5	279.7	V
C-N	274.2	275.6	276.8	V
N-G	0.0	0.3	0.5	V
TOTAL	275.4	276.7	277.9	V
Unb	0.6	0.6	0.7	%
Current:				
A	196.2	205.3	233.8	A
B	182.6	189.6	210.4	A
C	161.9	171.1	191.0	A
N	19.9	25.0	28.5	A
TOTAL	544.3	566.1	635.0	A
Unb	7.1	9.4	12.0	%
Power:				
A-N	40.28	42.74	50.57	kW
B-N	36.58	38.63	43.80	kW
C-N	33.27	35.63	40.93	kW
TOTAL	110.6	117.0	135.3	kW
Volt-Amps:				
A-N	54.13	56.68	64.37	kVA
B-N	50.69	52.81	58.49	kVA
C-N	44.46	47.16	52.47	kVA
TOTAL	150.1	156.7	175.2	kVA
VA Reactive:				
A-N	35.17	37.14	40.54	kVAR
B-N	34.20	35.83	38.84	kVAR
C-N	29.11	30.65	33.36	kVAR
TOTAL	99.47	103.6	112.4	kVAR
Power Factor:				
A-N	0.73	0.75	0.79	PF
B-N	0.71	0.73	0.76	PF
C-N	0.73	0.76	0.78	PF
TOTAL	0.73	0.75	0.77	PF

Displacement Factor:				
A-N	0.73	0.75	0.78	dPF
B-N	0.72	0.73	0.75	dPF
C-N	0.74	0.76	0.78	dPF
TOTAL	0.73	0.75	0.77	dPF
Current Leads:				
A	-42.9	-41.2	-38.5	
B	-44.3	-43.0	-41.1	
C	-42.3	-40.9	-38.7	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.6	0.7	0.7	%
Current Sequence:				
Pos	99.5	99.7	99.8	%
Zero	2.9	4.0	4.7	%
Neg	4.5	6.6	9.1	%
Voltage THD:				
A-N	3.3	3.4	3.5	%
B-N	3.3	3.4	3.5	%
C-N	3.1	3.3	3.4	%
TOTAL	3.2	3.4	3.5	%
Current THD:				
A	7.9	8.5	9.0	%
B	9.1	10.0	10.5	%
C	10.1	10.8	11.5	%
N	41.7	46.3	66.6	%
TOTAL	9.2	9.8	10.1	%
Derate transformer to:				
TOTAL	98.9	99.1	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	5.0	5.4	6.1	K
B	4.6	5.1	5.9	K
C	5.1	5.4	6.1	K
TOTAL	5.0	5.3	5.9	K
3rd Harmonic Volts:				
A-N	0.0	0.0	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.2	0.4	0.4	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.1	3.2	3.4	%
B-N	3.1	3.2	3.4	%
C-N	3.0	3.1	3.2	%
TOTAL	3.1	3.2	3.3	%
7th Harmonic Volts:				
A-N	1.1	1.2	1.3	%
B-N	1.1	1.2	1.3	%
C-N	0.8	0.9	1.0	%
TOTAL	1.0	1.1	1.2	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.1	0.1	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	6.637	7.020	8.117	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 5:00:01 PM

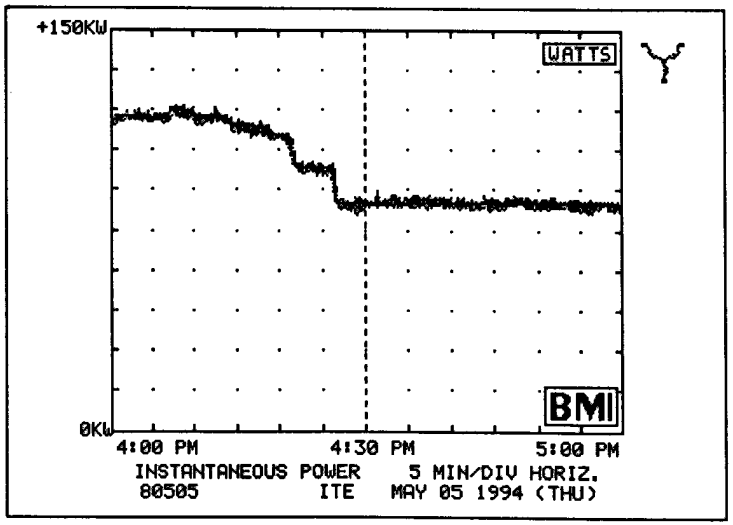
FROM: 4:00 PM May 05 1994 (Thu)
To: 5:00 PM May 05 1994 (Thu)

Total:
MAX: 122.5 kW, 4:08 PM
MIN: 81.2 kW, 4:29 PM

Phase A-N:
MAX: 44.5 kW, 4:12 PM
MIN: 27.6 kW, 4:55 PM

Phase B-N:
MAX: 40.2 kW, 4:08 PM
MIN: 25.6 kW, 4:56 PM

Phase C-N:
MAX: 38.5 kW, 4:07 PM
MIN: 27.9 kW, 4:29 PM



80505 ITE May 05 1994 (Thu)

VOLTAGE THD 5:01:28 PM

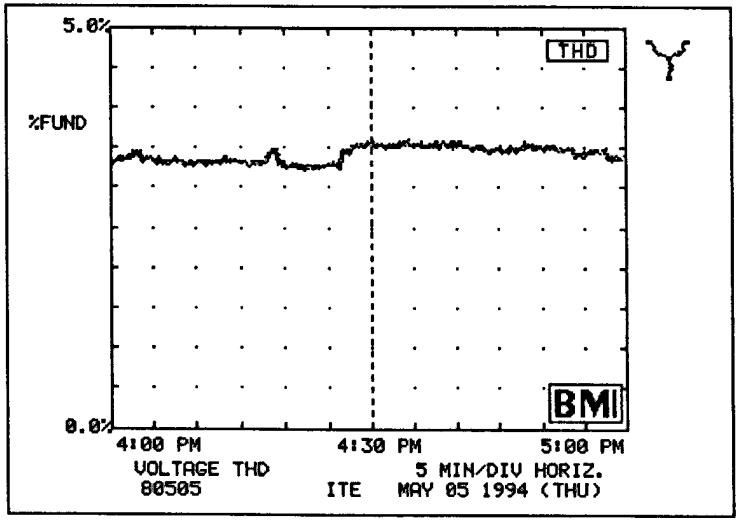
FROM: 4:00 PM May 05 1994 (Thu)
To: 5:00 PM May 05 1994 (Thu)

Average:
MAX: 3.6% THD, 4:29 PM
MIN: 3.2% THD, 4:22 PM

Phase A-N:
MAX: 3.6% THD, 4:34 PM
MIN: 3.2% THD, 4:22 PM

Phase B-N:
MAX: 3.7% THD, 4:40 PM
MIN: 3.3% THD, 4:22 PM

Phase C-N:
MAX: 3.5% THD, 4:29 PM
MIN: 3.1% THD, 4:22 PM



80505 ITE May 05 1994 (Thu)

CURRENT THD 5:01:40 PM

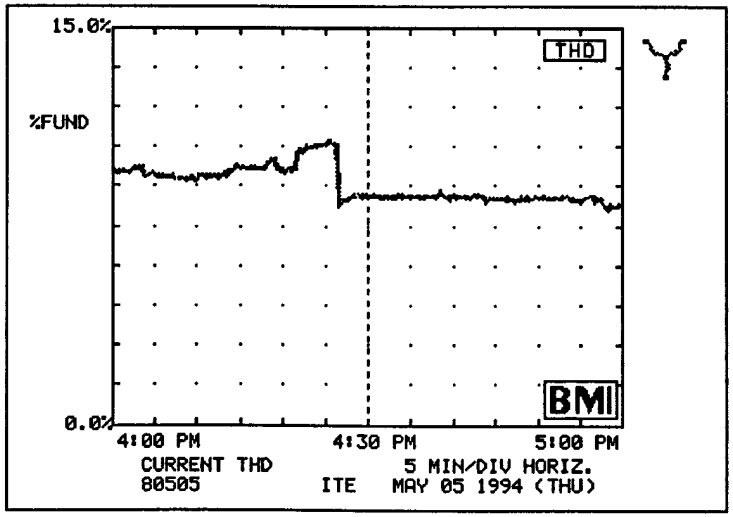
FROM: 4:00 PM May 05 1994 (Thu)
To: 5:00 PM May 05 1994 (Thu)

Average:
MAX: 10.8% THD; 4:25 PM
MIN: 8.1% THD; 4:58 PM

Phase A:
MAX: 10.1% THD; 4:26 PM
MIN: 7.6% THD; 4:58 PM

Phase B:
MAX: 11.5% THD; 4:25 PM
MIN: 9.0% THD; 4:58 PM

Phase C:
MAX: 10.9% THD; 4:21 PM
MIN: 7.7% THD; 4:57 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 5:03:48 PM

FROM: 4:01 PM May 05 1994 (Thu)
To: 5:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	96.02	kW
TOTAL	0.70	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	96.06	kWh
TOTAL	96.40	kVARh
TOTAL	131.6	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.7	277.1	278.1	V
B-N	276.1	279.5	280.6	V
C-N	275.4	276.6	277.6	V
N-G	0.0	0.3	0.5	V
TOTAL	276.4	277.7	278.7	V
Unb	0.6	0.6	0.7	%
Current:				
A	144.2	175.7	210.0	A
B	131.1	159.8	195.7	A
C	129.4	155.0	181.0	A
N	8.9	13.7	23.0	A
TOTAL	404.9	490.5	585.2	A
Unb	4.1	7.4	10.2	%
Power:				
A-N	26.23	33.84	44.48	kW
B-N	23.33	30.45	40.23	kW
C-N	26.33	31.73	38.53	kW
TOTAL	76.49	96.02	122.5	kW
Volt-Amps:				
A-N	39.99	48.67	58.14	kVA
B-N	36.70	44.66	54.62	kVA
C-N	35.84	42.88	49.99	kVA
TOTAL	112.6	136.2	162.2	kVA
VA Reactive:				
A-N	29.96	34.79	38.50	kVAR
B-N	27.68	32.48	37.32	kVAR
C-N	24.28	28.72	32.03	kVAR
TOTAL	81.98	95.99	107.3	kVAR
Power Factor:				
A-N	0.64	0.69	0.77	PF
B-N	0.65	0.68	0.74	PF
C-N	0.71	0.74	0.77	PF
TOTAL	0.67	0.70	0.76	PF

Displacement Factor:				
A-N	0.64	0.69	0.77	dPF
B-N	0.65	0.68	0.74	dPF
C-N	0.72	0.74	0.77	dPF
TOTAL	0.67	0.71	0.76	dPF
Current Leads:				
A	-50.5	-46.4	-40.0	
B	-49.6	-47.3	-42.5	
C	-44.2	-42.4	-39.6	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.6	0.7	0.7	%
Current Sequence:				
Pos	99.6	99.8	99.9	%
Zero	1.3	2.1	3.8	%
Neg	4.7	6.4	8.8	%
Voltage THD:				
A-N	3.2	3.4	3.6	%
B-N	3.1	3.5	3.9	%
C-N	3.1	3.3	3.5	%
TOTAL	3.2	3.4	3.6	%
Current THD:				
A	7.6	8.3	10.1	%
B	9.0	9.9	11.5	%
C	7.7	9.0	10.9	%
N	47.0	60.2	91.2	%
TOTAL	8.1	9.1	10.8	%
Derate transformer to:				
TOTAL	98.6	99.0	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.3	5.0	6.0	k
B	4.1	4.8	5.8	k
C	4.0	4.8	5.8	k
TOTAL	4.3	4.9	5.6	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.2	0.3	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.0	3.2	3.4	%
B-N	3.1	3.3	3.4	%
C-N	2.9	3.1	3.3	%
TOTAL	3.0	3.2	3.4	%
7th Harmonic Volts:				
A-N	1.2	1.3	1.5	%
B-N	1.2	1.4	1.6	%
C-N	1.0	1.1	1.2	%
TOTAL	1.1	1.3	1.4	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.1	0.1	0.2	%
C-N	0.0	0.1	0.2	%
TOTAL	0.1	0.1	0.2	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	4.589	5.761	7.352	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 6:00:00 PM

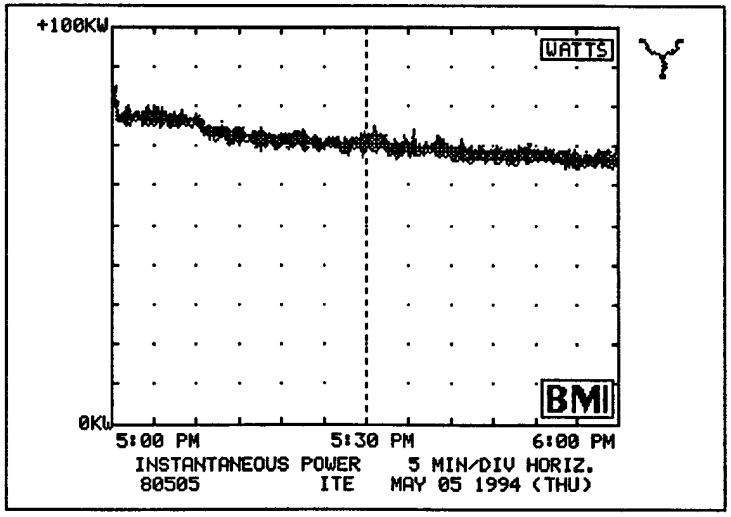
FROM: 5:00 PM May 05 1994 (Thu)
To: 6:00 PM May 05 1994 (Thu)

Total:
MAX: 85.3 kW, 5:00 PM
MIN: 64.6 kW, 5:54 PM

Phase A-N:
MAX: 29.5 kW, 5:00 PM
MIN: 23.9 kW, 5:55 PM

Phase B-N:
MAX: 27.0 kW, 5:00 PM
MIN: 17.9 kW, 5:59 PM

Phase C-N:
MAX: 28.9 kW, 5:00 PM
MIN: 22.3 kW, 5:53 PM



VOLTAGE THD 6:01:26 PM

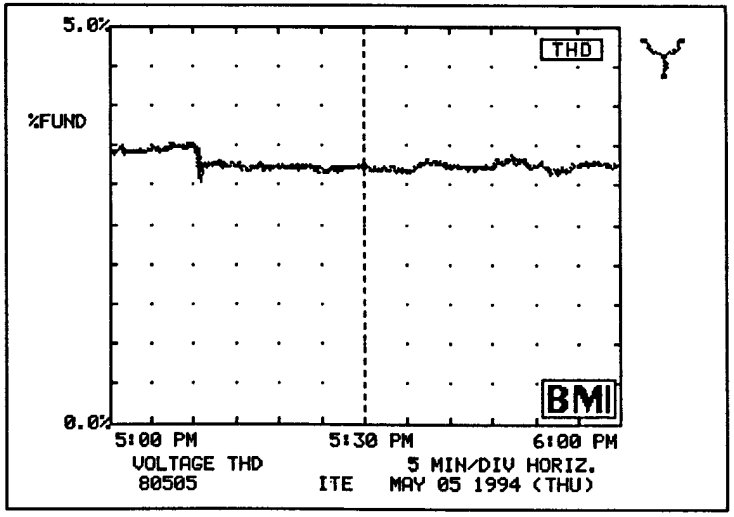
FROM: 5:00 PM May 05 1994 (Thu)
To: 6:00 PM May 05 1994 (Thu)

Average:
MAX: 3.6% THD, 5:07 PM
MIN: 3.0% THD, 5:10 PM

Phase A-N:
MAX: 3.5% THD, 5:07 PM
MIN: 2.8% THD, 5:10 PM

Phase B-N:
MAX: 3.7% THD, 5:09 PM
MIN: 3.3% THD, 5:10 PM

Phase C-N:
MAX: 3.5% THD, 5:07 PM
MIN: 3.0% THD, 5:25 PM



CURRENT THD 6:01:39 PM

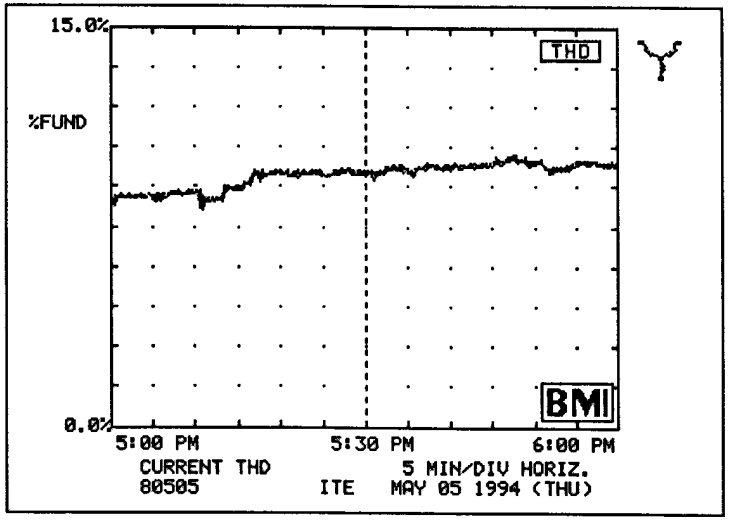
FROM: 5:00 PM May 05 1994 (Thu)
To: 6:00 PM May 05 1994 (Thu)

Average:
MAX: 10.2% THD; 5:47 PM
MIN: 8.2% THD; 5:10 PM

Phase A:
MAX: 9.3% THD; 5:47 PM
MIN: 7.7% THD; 5:10 PM

Phase B:
MAX: 11.8% THD; 5:47 PM
MIN: 9.1% THD; 5:00 PM

Phase C:
MAX: 9.8% THD; 5:50 PM
MIN: 7.5% THD; 5:10 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 6:03:47 PM

FROM: 5:01 PM May 05 1994 (Thu)
To: 6:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	70.93	kW
TOTAL	0.66	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	71.08	kWh
TOTAL	80.74	kVARh
TOTAL	105.2	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.4	276.6	278.2	V
B-N	277.9	279.2	280.8	V
C-N	274.9	276.2	277.9	V
N-G	0.0	0.3	0.5	V
TOTAL	276.1	277.3	278.9	V
Unb	0.6	0.7	0.7	%
Current:				
A	135.3	141.9	149.7	A
B	114.0	122.3	136.1	A
C	117.4	124.8	135.8	A
N	4.4	6.7	11.3	A
TOTAL	368.5	389.0	418.4	A
Unb	5.7	9.5	12.0	%
Power:				
A-N	23.89	25.57	27.79	kW
B-N	17.78	20.74	25.64	kW
C-N	22.32	24.61	28.13	kW
TOTAL	64.61	70.93	80.55	kW
Volt-Amps:				
A-N	37.39	39.26	41.55	kVA
B-N	31.79	34.13	38.11	kVA
C-N	32.38	34.47	37.67	kVA
TOTAL	102.0	107.9	116.5	kVA
VA Reactive:				
A-N	28.51	29.71	31.27	kVAR
B-N	25.97	26.93	28.69	kVAR
C-N	23.23	24.04	25.13	kVAR
TOTAL	78.17	80.69	84.40	kVAR
Power Factor:				
A-N	0.62	0.65	0.68	PF
B-N	0.55	0.61	0.67	PF
C-N	0.68	0.71	0.75	PF
TOTAL	0.62	0.66	0.70	PF

Displacement Factor:				
A-N	0.63	0.65	0.67	dPF
B-N	0.56	0.61	0.67	dPF
C-N	0.69	0.71	0.75	dPF
TOTAL	0.63	0.66	0.70	dPF
Current Leads:				
A	-51.0	-49.5	-47.9	
B	-56.1	-52.7	-48.1	
C	-46.6	-44.5	-41.6	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.6	0.7	0.7	%
Current Sequence:				
Pos	99.4	99.6	99.8	%
Zero	0.4	1.6	2.0	%
Neg	5.6	8.7	11.1	%
Voltage THD:				
A-N	2.8	3.2	3.5	%
B-N	3.3	3.5	3.7	%
C-N	3.0	3.2	3.5	%
TOTAL	3.0	3.3	3.6	%
Current THD:				
A	7.7	8.7	9.3	%
B	9.2	10.8	11.8	%
C	7.5	9.1	9.8	%
N	35.9	78.3	999.9	%
TOTAL	8.2	9.5	10.2	%
Derate transformer to:				
TOTAL	98.5	98.8	99.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.1	4.6	5.3	k
B	3.8	4.5	5.1	k
C	3.9	4.4	5.2	k
TOTAL	4.1	4.5	4.8	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.2	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	2.5	2.9	3.2	%
B-N	2.9	3.2	3.4	%
C-N	2.8	2.9	3.2	%
TOTAL	2.7	3.0	3.2	%
7th Harmonic Volts:				
A-N	1.1	1.3	1.5	%
B-N	1.4	1.5	1.7	%
C-N	1.1	1.1	1.3	%
TOTAL	1.2	1.3	1.5	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.1	0.1	0.2	%
C-N	0.1	0.1	0.2	%
TOTAL	0.1	0.1	0.2	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	3.877	4.256	4.833	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 7:00:01 PM

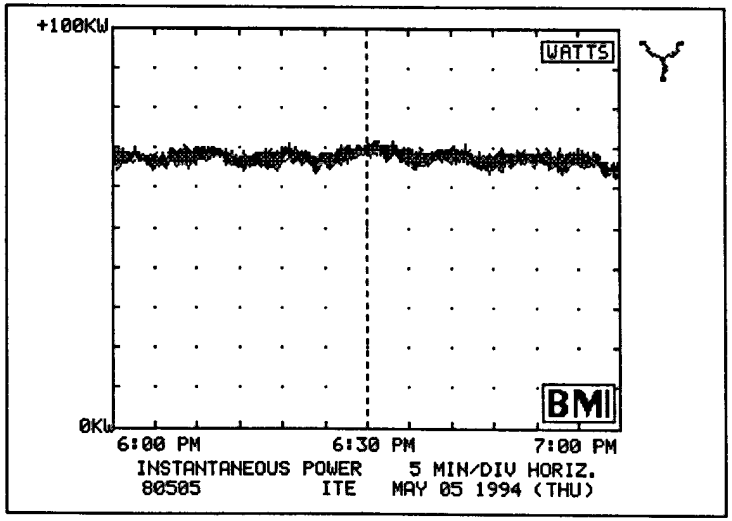
FROM: 6:00 PM May 05 1994 (Thu)
To: 7:00 PM May 05 1994 (Thu)

Total:
MAX: 72.1 kW, 6:32 PM
MIN: 63.1 kW, 6:59 PM

Phase A-N:
MAX: 26.8 kW, 6:32 PM
MIN: 23.6 kW, 6:44 PM

Phase B-N:
MAX: 20.4 kW, 6:32 PM
MIN: 17.3 kW, 6:58 PM

Phase C-N:
MAX: 25.5 kW, 6:09 PM
MIN: 22.0 kW, 6:59 PM



VOLTAGE THD 7:01:27 PM

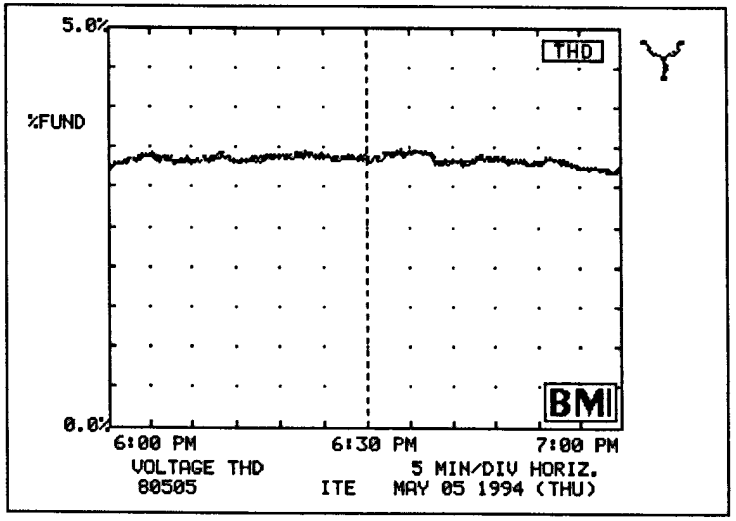
FROM: 6:00 PM May 05 1994 (Thu)
To: 7:00 PM May 05 1994 (Thu)

Average:
MAX: 3.5% THD, 6:33 PM
MIN: 3.2% THD, 6:58 PM

Phase A-N:
MAX: 3.4% THD, 6:33 PM
MIN: 3.1% THD, 6:58 PM

Phase B-N:
MAX: 3.7% THD, 6:33 PM
MIN: 3.4% THD, 6:58 PM

Phase C-N:
MAX: 3.4% THD, 6:33 PM
MIN: 3.1% THD, 6:58 PM



80505 ITE May 05 1994 (Thu)

CURRENT THD 7:01:39 PM

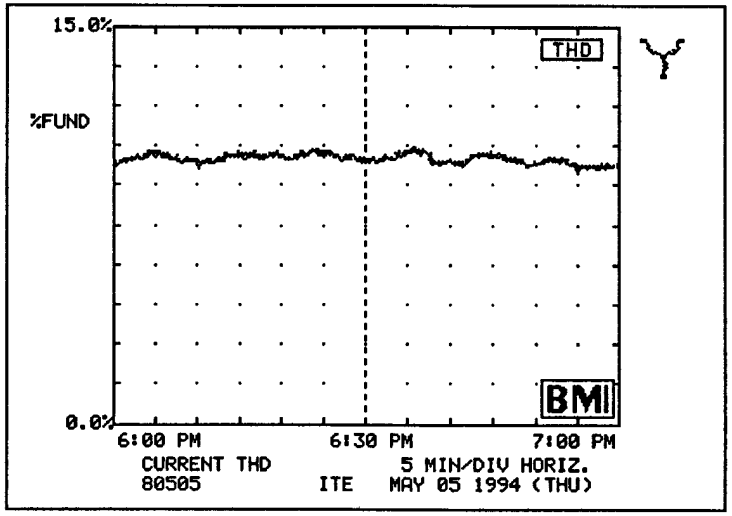
FROM: 6:00 PM May 05 1994 (Thu)
To: 7:00 PM May 05 1994 (Thu)

Average:
MAX: 10.5% THD; 6:35 PM
MIN: 9.5% THD; 6:55 PM

Phase A:
MAX: 9.5% THD; 6:35 PM
MIN: 8.4% THD; 6:55 PM

Phase B:
MAX: 11.9% THD; 6:35 PM
MIN: 10.8% THD; 6:57 PM

Phase C:
MAX: 10.2% THD; 6:35 PM
MIN: 9.2% THD; 6:55 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 7:03:48 PM

FROM: 6:01 PM May 05 1994 (Thu)
To: 7:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	67.94	kW
TOTAL	0.64	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	67.96	kWh
TOTAL	81.03	kVARh
TOTAL	103.9	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.7	276.9	277.6	V
B-N	276.7	277.7	278.4	V
C-N	275.4	276.6	277.3	V
N-G	0.0	0.3	0.5	V
TOTAL	276.6	277.7	278.5	V
Unb	0.7	0.7	0.8	%
Current:				
A	134.3	141.6	149.3	A
B	111.9	118.6	123.5	A
C	114.7	122.4	127.9	A
N	6.0	6.6	7.2	A
TOTAL	361.0	382.6	398.1	A
Unb	9.1	11.0	13.4	%
Power:				
A-N	23.58	25.32	26.82	kW
B-N	17.32	18.97	20.44	kW
C-N	22.01	23.65	25.47	kW
TOTAL	63.12	67.94	72.10	kW
Volt-Amps:				
A-N	37.07	39.21	41.40	kVA
B-N	31.20	33.18	34.59	kVA
C-N	31.61	33.84	35.43	kVA
TOTAL	99.89	106.2	110.7	kVA
VA Reactive:				
A-N	28.25	29.86	31.33	kVAR
B-N	25.60	27.06	28.13	kVAR
C-N	22.62	24.09	24.91	kVAR
TOTAL	76.81	81.01	83.34	kVAR
Power Factor:				
A-N	0.62	0.65	0.67	PF
B-N	0.54	0.57	0.60	PF
C-N	0.68	0.70	0.73	PF
TOTAL	0.62	0.64	0.66	PF

Displacement Factor:				
A-N	0.63	0.64	0.66	dPF
B-N	0.55	0.57	0.59	dPF
C-N	0.68	0.70	0.73	dPF
TOTAL	0.63	0.65	0.67	dPF
Current Leads:				
A	-51.1	-49.9	-48.6	
B	-56.4	-55.2	-53.7	
C	-46.8	-45.7	-43.1	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.7	0.7	0.8	%
Current Sequence:				
Pos	99.2	99.5	99.6	%
Zero	2.0	2.0	2.1	%
Neg	8.3	10.0	12.3	%
Voltage THD:				
A-N	3.1	3.3	3.4	%
B-N	3.4	3.6	3.7	%
C-N	3.1	3.2	3.4	%
TOTAL	3.2	3.4	3.5	%
Current THD:				
A	8.4	9.1	9.5	%
B	10.8	11.4	11.9	%
C	9.2	9.8	10.2	%
N	34.4	38.6	44.6	%
TOTAL	9.5	10.1	10.5	%
Derate transformer to:				
TOTAL	98.5	98.6	98.8	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.0	4.6	5.1	K
B	4.0	4.5	5.1	K
C	3.8	4.4	4.9	K
TOTAL	4.1	4.5	5.0	K
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.2	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	2.8	3.0	3.1	%
B-N	3.1	3.2	3.4	%
C-N	2.8	3.0	3.1	%
TOTAL	2.9	3.1	3.2	%
7th Harmonic Volts:				
A-N	1.2	1.4	1.5	%
B-N	1.4	1.6	1.7	%
C-N	1.1	1.2	1.4	%
TOTAL	1.3	1.4	1.5	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.1	0.1	0.2	%
C-N	0.1	0.1	0.2	%
TOTAL	0.1	0.1	0.2	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	3.787	4.076	4.326	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 8:00:00 PM

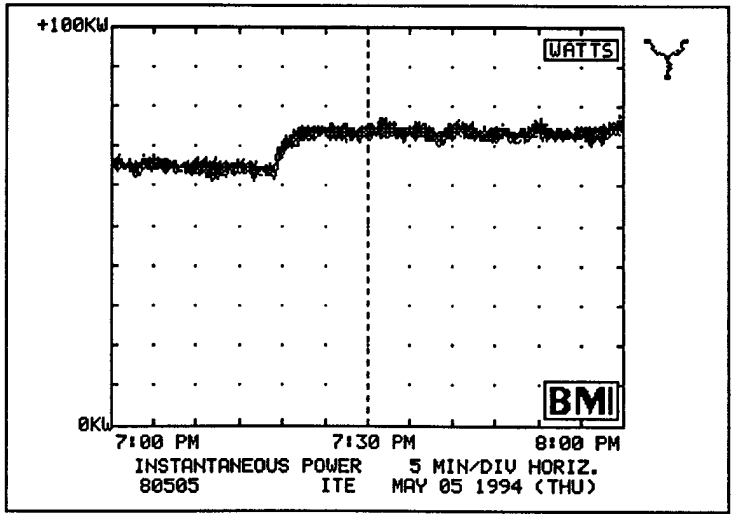
FROM: 7:00 PM May 05 1994 (Thu)
To: 8:00 PM May 05 1994 (Thu)

Total:
MAX: 78.6 kW, 7:59 PM
MIN: 61.5 kW, 7:11 PM

Phase A-N:
MAX: 29.3 kW, 7:59 PM
MIN: 22.7 kW, 7:11 PM

Phase B-N:
MAX: 22.0 kW, 7:31 PM
MIN: 17.1 kW, 7:18 PM

Phase C-N:
MAX: 27.9 kW, 7:59 PM
MIN: 21.1 kW, 7:16 PM



VOLTAGE THD 8:01:27 PM

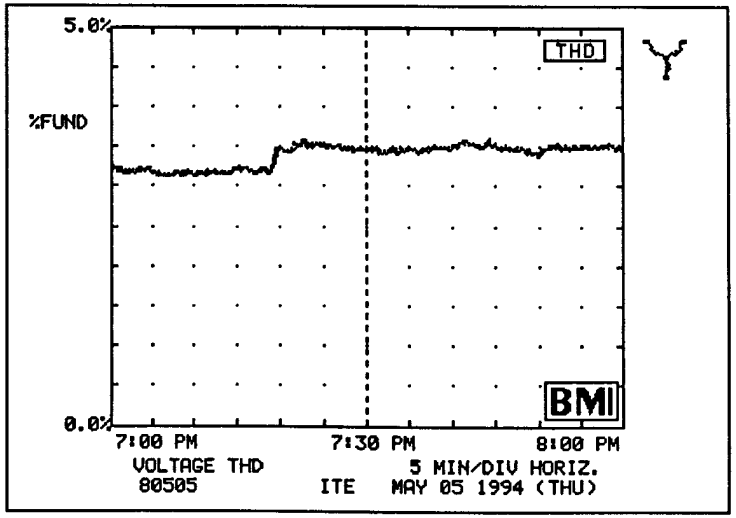
FROM: 7:00 PM May 05 1994 (Thu)
To: 8:00 PM May 05 1994 (Thu)

Average:
MAX: 3.6% THD, 7:44 PM
MIN: 3.1% THD, 7:11 PM

Phase A-N:
MAX: 3.6% THD, 7:22 PM
MIN: 3.0% THD, 7:06 PM

Phase B-N:
MAX: 3.8% THD, 7:44 PM
MIN: 3.3% THD, 7:06 PM

Phase C-N:
MAX: 3.5% THD, 7:44 PM
MIN: 3.0% THD, 7:05 PM



CURRENT THD 8:01:39 PM

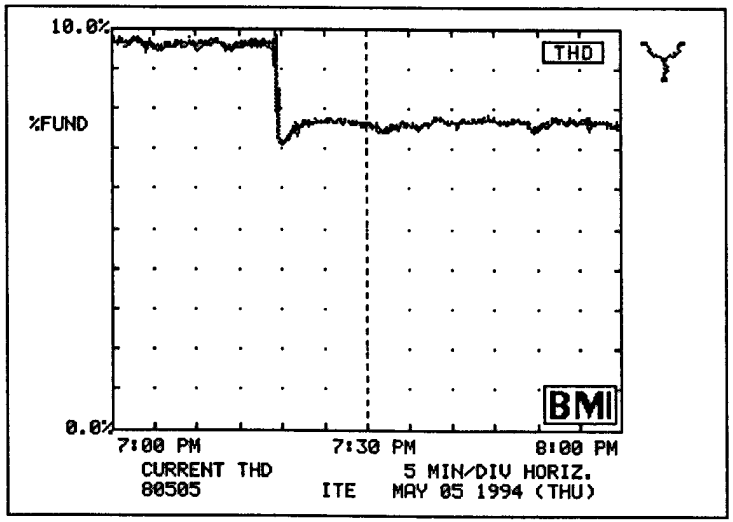
FROM: 7:00 PM May 05 1994 (Thu)
To: 8:00 PM May 05 1994 (Thu)

Average:
MAX: 10.0% THD; 7:19 PM
MIN: 7.1% THD; 7:19 PM

Phase A:
MAX: 9.1% THD; 7:19 PM
MIN: 6.5% THD; 7:19 PM

Phase B:
MAX: 11.3% THD; 7:02 PM
MIN: 8.0% THD; 7:19 PM

Phase C:
MAX: 9.8% THD; 7:19 PM
MIN: 7.0% THD; 7:19 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 8:03:47 PM

FROM: 7:01 PM May 05 1994 (Thu)
To: 8:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	71.18	kW
TOTAL	0.68	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	71.13	kWh
TOTAL	76.18	kVARh
TOTAL	101.3	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	274.9	275.8	276.4	V
B-N	277.8	279.0	279.7	V
C-N	274.6	275.6	276.3	V
N-G	0.0	0.3	0.5	V
TOTAL	275.8	276.8	277.4	V
Unb	0.7	0.8	0.9	%
Current:				
A	130.7	140.2	151.1	A
B	110.3	115.9	123.6	A
C	111.7	121.8	130.2	A
N	5.8	10.6	16.6	A
TOTAL	354.0	377.9	400.2	A
Unb	9.7	11.3	13.3	%
Power:				
A-N	22.74	26.49	29.26	kW
B-N	17.10	20.01	22.03	kW
C-N	21.13	24.68	27.92	kW
TOTAL	61.47	71.18	78.62	kW
Volt-Amps:				
A-N	36.04	38.67	41.68	kVA
B-N	30.74	32.34	34.47	kVA
C-N	30.72	33.56	35.92	kVA
TOTAL	97.79	104.6	110.8	kVA
VA Reactive:				
A-N	27.09	28.14	30.59	kVAR
B-N	24.23	25.32	27.38	kVAR
C-N	21.89	22.68	24.90	kVAR
TOTAL	73.93	76.14	82.85	kVAR
Power Factor:				
A-N	0.63	0.68	0.72	PF
B-N	0.55	0.62	0.67	PF
C-N	0.68	0.73	0.78	PF
TOTAL	0.63	0.68	0.71	PF

Displacement Factor:				
A-N	0.63	0.68	0.71	dPF
B-N	0.56	0.62	0.66	dPF
C-N	0.69	0.73	0.77	dPF
TOTAL	0.63	0.68	0.72	dPF
Current Leads:				
A	-50.7	-47.0	-44.6	
B	-56.1	-52.0	-49.0	
C	-46.3	-42.8	-39.3	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.7	0.8	0.9	%
Current Sequence:				
Pos	99.2	99.5	99.6	%
Zero	1.9	2.5	3.1	%
Neg	8.5	10.0	12.6	%
Voltage THD:				
A-N	3.0	3.4	3.6	%
B-N	3.3	3.6	3.8	%
C-N	3.0	3.3	3.5	%
TOTAL	3.1	3.4	3.6	%
Current THD:				
A	6.5	7.5	9.1	%
B	8.0	9.7	11.4	%
C	3.0	3.1	3.8	%
N	35.6	84.9	157.7	%
TOTAL	7.1	8.3	10.0	%
Derate transformer to:				
TOTAL	98.7	99.0	99.3	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	3.8	4.7	5.5	K
B	3.8	4.4	5.4	K
C	3.8	4.6	5.4	K
TOTAL	3.9	4.6	5.1	K
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.1	0.2	0.3	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	2.8	3.1	3.3	%
B-N	3.0	3.4	3.5	%
C-N	2.8	3.0	3.2	%
TOTAL	2.9	3.1	3.3	%
7th Harmonic Volts:				
A-N	1.2	1.3	1.4	%
B-N	1.4	1.5	1.6	%
C-N	1.1	1.2	1.3	%
TOTAL	1.2	1.3	1.4	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.1	0.1	0.1	%
C-N	0.1	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	3.688	4.271	4.717	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 9:00:01 PM

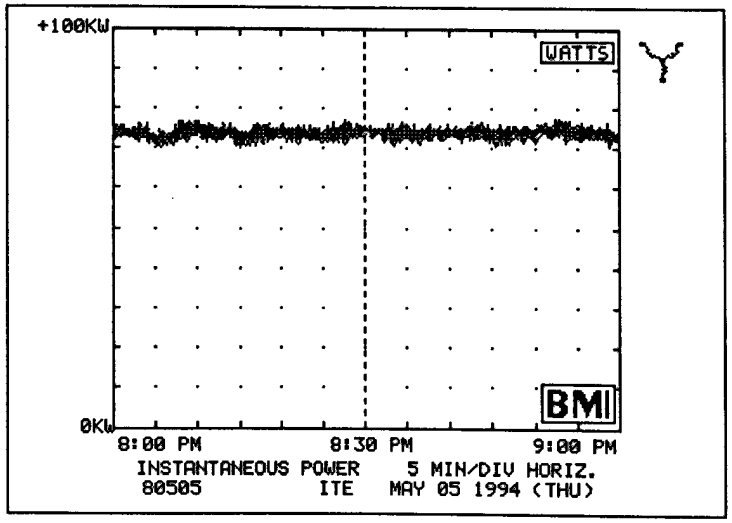
FROM: 8:00 PM May 05 1994 (Thu)
To: 9:00 PM May 05 1994 (Thu)

Total:
MAX: 78.2 kW, 8:52 PM
MIN: 70.6 kW, 8:05 PM

Phase A-N:
MAX: 29.0 kW, 8:52 PM
MIN: 26.1 kW, 8:05 PM

Phase B-N:
MAX: 22.2 kW, 8:58 PM
MIN: 19.8 kW, 8:45 PM

Phase C-N:
MAX: 27.5 kW, 8:52 PM
MIN: 24.2 kW, 8:17 PM



VOLTAGE THD 9:01:27 PM

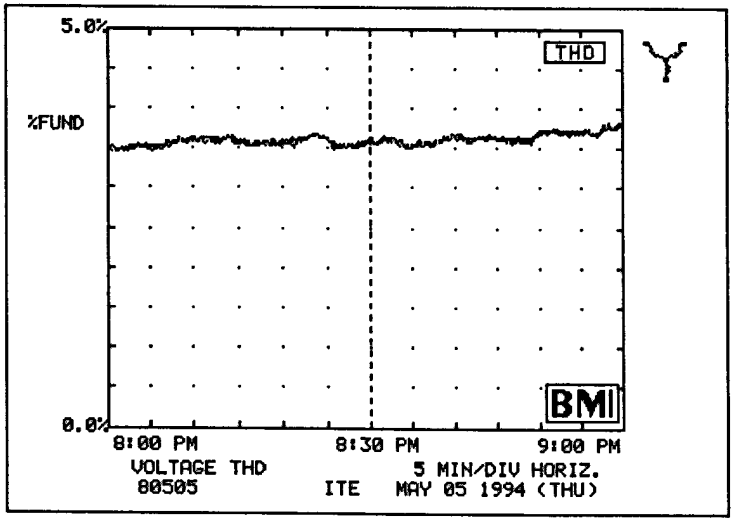
FROM: 8:00 PM May 05 1994 (Thu)
To: 9:00 PM May 05 1994 (Thu)

Average:
MAX: 3.8% THD, 8:59 PM
MIN: 3.5% THD, 8:02 PM

Phase A-N:
MAX: 3.8% THD, 8:59 PM
MIN: 3.4% THD, 8:01 PM

Phase B-N:
MAX: 4.1% THD, 8:59 PM
MIN: 3.7% THD, 8:02 PM

Phase C-N:
MAX: 3.7% THD, 8:58 PM
MIN: 3.3% THD, 8:02 PM



80505 ITE May 05 1994 (Thu)
CURRENT THD 9:01:40 PM

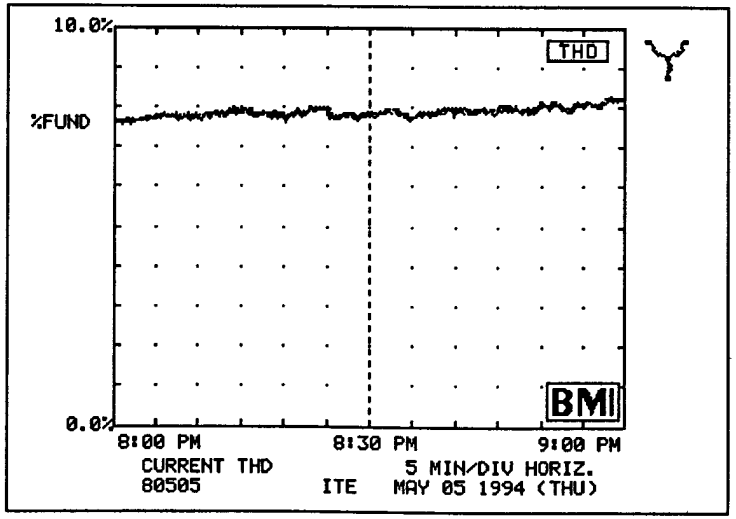
FROM: 8:00 PM May 05 1994 (Thu)
To: 9:00 PM May 05 1994 (Thu)

Average:
MAX: 8.3% THD; 8:59 PM
MIN: 7.6% THD; 8:01 PM

Phase A:
MAX: 7.7% THD; 8:57 PM
MIN: 6.9% THD; 8:19 PM

Phase B:
MAX: 9.3% THD; 8:59 PM
MIN: 8.3% THD; 8:00 PM

Phase C:
MAX: 8.3% THD; 8:58 PM
MIN: 7.4% THD; 8:01 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 9:03:48 PM

FROM: 8:01 PM May 05 1994 (Thu)
To: 9:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	74.22	kW
TOTAL	0.69	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.26	kWh
TOTAL	77.55	kVARh
TOTAL	104.0	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.8	277.0	278.4	V
B-N	279.3	280.6	281.8	V
C-N	275.7	276.9	278.2	V
N-G	0.0	0.3	0.5	V
TOTAL	276.9	278.2	279.4	V
Unb	0.8	0.9	0.9	%
Current:				
A	137.4	143.8	150.8	A
B	112.6	118.3	123.6	A
C	119.5	124.8	131.2	A
N	11.1	12.4	13.2	A
TOTAL	371.3	386.9	403.6	A
Unb	9.5	11.5	12.9	%
Power:				
A-N	26.10	27.66	29.03	kW
B-N	19.79	20.86	22.16	kW
C-N	24.23	25.71	27.50	kW
TOTAL	70.62	74.22	78.18	kW
Volt-Amps:				
A-N	37.93	39.83	41.87	kVA
B-N	31.49	33.18	34.79	kVA
C-N	33.02	34.57	36.44	kVA
TOTAL	102.9	107.6	112.5	kVA
VA Reactive:				
A-N	27.25	28.67	30.26	kVAR
B-N	24.41	25.76	27.01	kVAR
C-N	22.28	23.08	24.45	kVAR
TOTAL	74.13	77.51	80.75	kVAR
Power Factor:				
A-N	0.66	0.69	0.72	PF
B-N	0.60	0.63	0.65	PF
C-N	0.72	0.74	0.76	PF
TOTAL	0.67	0.69	0.71	PF

Displacement Factor:				
A-N	0.67	0.69	0.71	dPF
B-N	0.61	0.63	0.65	dPF
C-N	0.72	0.74	0.76	dPF
TOTAL	0.67	0.69	0.71	dPF
Current Leads:				
A	-48.3	-46.2	-44.7	
B	-52.4	-51.3	-49.7	
C	-43.6	-42.1	-40.6	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.8	0.9	0.9	%
Current Sequence:				
Pos	99.3	99.5	99.6	%
Zero	2.2	2.7	3.0	%
Neg	8.3	10.0	11.2	%
Voltage THD:				
A-N	3.4	3.6	3.8	%
B-N	3.7	3.8	4.1	%
C-N	3.3	3.5	3.7	%
TOTAL	3.5	3.6	3.8	%
Current THD:				
A	6.9	7.3	7.7	%
B	8.4	8.8	9.4	%
C	7.4	7.8	8.3	%
N	94.6	105.3	135.2	%
TOTAL	7.6	7.9	8.3	%
Derate transformer to:				
TOTAL	99.0	99.1	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.6	5.1	5.7	k
B	4.2	4.7	5.4	k
C	4.4	4.9	5.4	k
TOTAL	4.5	4.9	5.3	k
3rd Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.2	0.2	0.2	%
C-N	0.1	0.2	0.2	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.2	3.3	3.5	%
B-N	3.3	3.4	3.5	%
C-N	3.1	3.3	3.5	%
TOTAL	3.2	3.3	3.5	%
7th Harmonic Volts:				
A-N	1.2	1.3	1.5	%
B-N	1.5	1.6	1.8	%
C-N	1.2	1.3	1.4	%
TOTAL	1.3	1.4	1.5	%
9th Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.1	0.1	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	4.237	4.453	4.691	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 10:00:02 PM

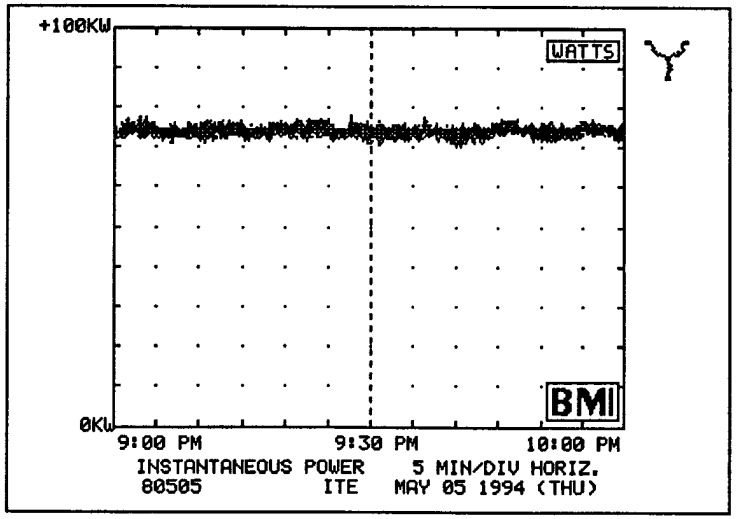
FROM: 9:00 PM May 05 1994 (Thu)
To: 10:00 PM May 05 1994 (Thu)

Total:
MAX: 78.3 kW, 9:27 PM
MIN: 70.7 kW, 9:40 PM

Phase A-N:
MAX: 29.7 kW, 9:27 PM
MIN: 26.3 kW, 9:17 PM

Phase B-N:
MAX: 22.7 kW, 9:27 PM
MIN: 19.7 kW, 9:22 PM

Phase C-N:
MAX: 27.4 kW, 9:45 PM
MIN: 24.4 kW, 9:40 PM



VOLTAGE THD 10:01:28 PM

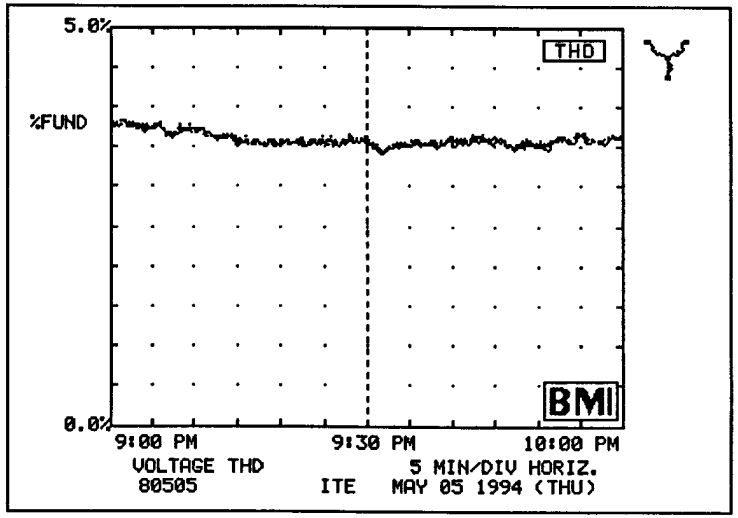
FROM: 9:00 PM May 05 1994 (Thu)
To: 10:00 PM May 05 1994 (Thu)

Average:
MAX: 3.9% THD, 9:01 PM
MIN: 3.4% THD, 9:31 PM

Phase A-N:
MAX: 3.8% THD, 9:01 PM
MIN: 3.3% THD, 9:31 PM

Phase B-N:
MAX: 4.1% THD, 9:01 PM
MIN: 3.6% THD, 9:31 PM

Phase C-N:
MAX: 3.7% THD, 9:01 PM
MIN: 3.3% THD, 9:31 PM



80505 ITE May 05 1994 (Thu)

CURRENT THD 10:01:40 PM

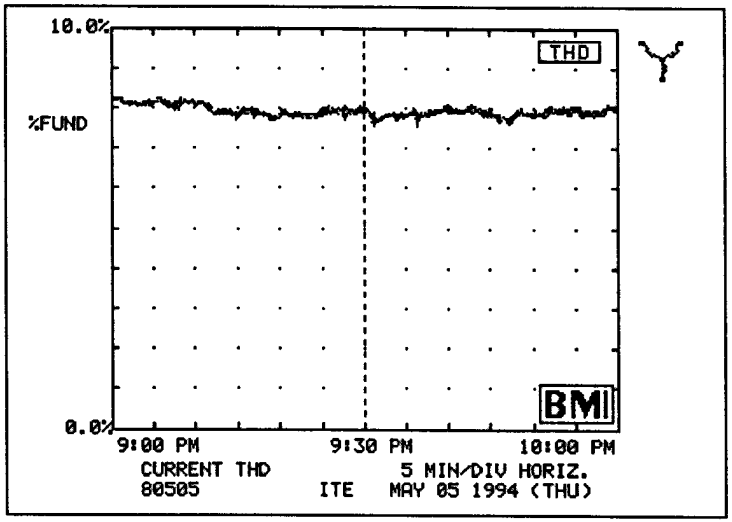
FROM: 9:00 PM May 05 1994 (Thu)
To: 10:00 PM May 05 1994 (Thu)

Average:
MAX: 8.3% THD; 9:00 PM
MIN: 7.6% THD; 9:36 PM

Phase A:
MAX: 7.7% THD; 9:05 PM
MIN: 6.8% THD; 9:31 PM

Phase B:
MAX: 9.3% THD; 9:01 PM
MIN: 8.1% THD; 9:36 PM

Phase C:
MAX: 8.3% THD; 9:05 PM
MIN: 7.3% THD; 9:45 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 10:03:49 PM

FROM: 9:01 PM May 05 1994 (Thu)
To: 10:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	74.48	kW
TOTAL	0.69	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.52	kWh
TOTAL	78.63	kVARh
TOTAL	105.1	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	276.7	277.7	278.5	V
B-N	280.1	280.9	281.8	V
C-N	276.8	277.7	278.4	V
N-G	0.0	0.2	0.5	V
TOTAL	277.9	278.8	279.5	V
Unb	0.7	0.8	0.9	%
Current:				
A	139.4	144.2	150.1	A
B	114.0	118.7	126.3	A
C	121.4	126.5	131.0	A
N	11.2	12.4	13.2	A
TOTAL	375.9	389.4	401.8	A
Unb	9.7	11.1	12.4	%
Power:				
A-N	26.26	27.54	29.70	kW
B-N	19.67	20.97	22.70	kW
C-N	24.40	25.96	27.41	kW
TOTAL	70.50	74.48	78.32	kW
Volt-Amps:				
A-N	38.72	40.04	41.79	kVA
B-N	31.95	33.34	35.47	kVA
C-N	33.72	35.12	36.38	kVA
TOTAL	104.7	108.5	112.2	kVA
VA Reactive:				
A-N	28.06	29.07	30.30	kVAR
B-N	24.90	25.87	27.21	kVAR
C-N	22.96	23.62	25.37	kVAR
TOTAL	77.00	78.57	80.82	kVAR
Power Factor:				
A-N	0.67	0.69	0.72	PF
B-N	0.60	0.63	0.65	PF
C-N	0.72	0.74	0.75	PF
TOTAL	0.67	0.69	0.71	PF

Displacement Factor:				
A-N	0.67	0.69	0.72	dPF
B-N	0.61	0.63	0.66	dPF
C-N	0.73	0.74	0.76	dPF
TOTAL	0.67	0.69	0.71	dPF
Current Leads:				
A	-48.2	-46.8	-43.8	
B	-52.6	-51.2	-48.5	
C	-43.5	-42.5	-40.9	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.7	0.8	0.9	%
Current Sequence:				
Pos	99.4	99.5	99.6	%
Zero	2.2	2.7	2.9	%
Neg	7.9	9.7	10.8	%
Voltage THD:				
A-N	3.3	3.5	3.8	%
B-N	3.6	3.8	4.1	%
C-N	3.3	3.5	3.7	%
TOTAL	3.4	3.6	3.9	%
Current THD:				
A	6.8	7.3	7.7	%
B	8.1	8.8	9.3	%
C	7.3	7.8	8.3	%
N	94.7	105.5	136.3	%
TOTAL	7.6	8.0	8.3	%
Derate transformer to:				
TOTAL	99.0	99.1	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.2	4.7	5.4	k
B	4.0	4.4	5.2	k
C	4.0	4.6	5.5	k
TOTAL	4.2	4.6	5.1	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.2	%
B-N	0.1	0.2	0.3	%
C-N	0.1	0.2	0.2	%
TOTAL	0.1	0.2	0.2	%
5th Harmonic Volts:				
A-N	3.0	3.2	3.5	%
B-N	3.3	3.4	3.7	%
C-N	3.1	3.3	3.4	%
TOTAL	3.1	3.3	3.5	%
7th Harmonic Volts:				
A-N	1.3	1.4	1.5	%
B-N	1.6	1.7	1.8	%
C-N	1.2	1.3	1.4	%
TOTAL	1.4	1.5	1.6	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.0	0.1	0.1	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	4.230	4.469	4.699	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.1	Hz

80505 ITE May 05 1994 (Thu)

INSTANTANEOUS POWER 11:00:01 PM

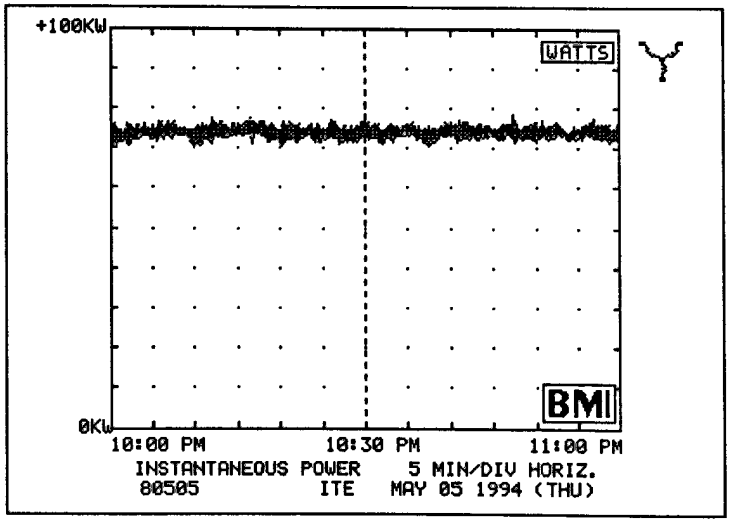
FROM: 10:00 PM May 05 1994 (Thu)
To: 11:00 PM May 05 1994 (Thu)

Total:
MAX: 79.0 kW, 10:47 PM
MIN: 70.5 kW, 10:00 PM

Phase A-N:
MAX: 29.8 kW, 10:47 PM
MIN: 26.0 kW, 10:37 PM

Phase B-N:
MAX: 22.8 kW, 10:05 PM
MIN: 19.7 kW, 10:00 PM

Phase C-N:
MAX: 27.6 kW, 10:50 PM
MIN: 24.5 kW, 10:00 PM



VOLTAGE THD 11:01:28 PM

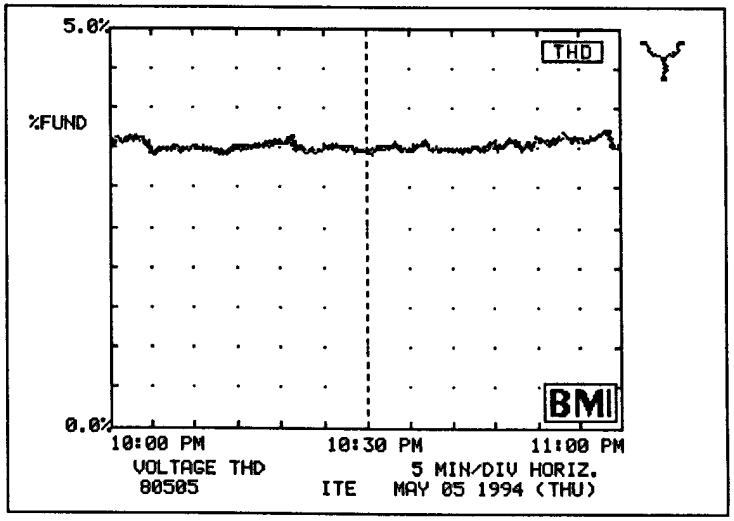
FROM: 10:00 PM May 05 1994 (Thu)
To: 11:00 PM May 05 1994 (Thu)

Average:
MAX: 3.8% THD, 10:58 PM
MIN: 3.4% THD, 10:12 PM

Phase A-N:
MAX: 3.6% THD, 10:58 PM
MIN: 3.2% THD, 10:12 PM

Phase B-N:
MAX: 3.9% THD, 10:58 PM
MIN: 3.6% THD, 10:30 PM

Phase C-N:
MAX: 3.8% THD, 10:58 PM
MIN: 3.3% THD, 10:05 PM



80505 ITE May 05 1994 (Thu)

CURRENT THD 11:01:40 PM

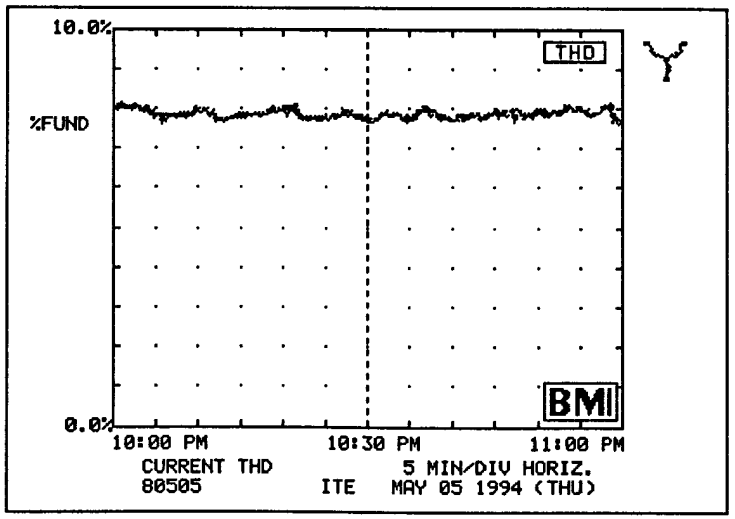
FROM: 10:00 PM May 05 1994 (Thu)
To: 11:00 PM May 05 1994 (Thu)

Average:
MAX: 8.2% THD, 10:00 PM
MIN: 7.7% THD, 10:05 PM

Phase A:
MAX: 7.5% THD, 10:00 PM
MIN: 6.9% THD, 10:30 PM

Phase B:
MAX: 9.2% THD, 10:02 PM
MIN: 8.3% THD, 10:47 PM

Phase C:
MAX: 8.1% THD, 10:21 PM
MIN: 7.4% THD, 10:34 PM



80505 ITE May 05 1994 (Thu)

BMI SUMMARY 11:03:48 PM

FROM: 10:01 PM May 05 1994 (Thu)
To: 11:01 PM May 05 1994 (Thu)

Demand:

Phase	Average	Unit
TOTAL	74.51	kW
TOTAL	0.69	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.53	kWh
TOTAL	78.62	kVARh
TOTAL	105.1	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	276.6	277.9	278.7	V
B-N	279.2	280.8	281.6	V
C-N	276.6	277.9	278.7	V
N-G	0.0	0.4	0.5	V
TOTAL	277.5	278.5	279.6	V
Unb	0.6	0.7	0.8	%
Current:				
A	139.5	144.4	150.2	A
B	113.6	117.8	125.5	A
C	122.6	127.4	131.6	A
N	11.4	12.5	13.5	A
TOTAL	377.8	389.4	403.7	A
Unb	8.0	11.2	12.7	%
Power:				
A-N	25.96	27.43	29.76	kW
B-N	19.71	20.87	22.83	kW
C-N	24.24	26.22	27.63	kW
TOTAL	70.92	74.51	78.98	kW
Volt-Amps:				
A-N	38.64	40.11	41.80	kVA
B-N	31.89	33.06	35.20	kVA
C-N	34.02	35.38	36.59	kVA
TOTAL	105.1	108.6	112.6	kVA
VA Reactive:				
A-N	27.95	29.28	30.52	kVAR
B-N	24.69	25.60	27.10	kVAR
C-N	22.89	23.73	25.24	kVAR
TOTAL	76.10	78.61	80.42	kVAR
Power Factor:				
A-N	0.66	0.68	0.72	PF
B-N	0.61	0.63	0.66	PF
C-N	0.72	0.74	0.76	PF
TOTAL	0.67	0.69	0.70	PF

Displacement Factor:				
A-N	0.66	0.68	0.71	dPF
B-N	0.61	0.63	0.67	dPF
C-N	0.73	0.74	0.76	dPF
TOTAL	0.67	0.69	0.71	dPF
Current Leads:				
A	-48.4	-47.1	-44.5	
B	-52.2	-51.0	-48.0	
C	-43.2	-42.3	-40.9	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.6	0.7	0.8	%
Current Sequence:				
Pos	99.3	99.5	99.8	%
Zero	2.3	2.7	2.9	%
Neg	6.5	9.9	11.4	%
Voltage THD:				
A-N	3.2	3.4	3.6	%
B-N	3.6	3.8	3.9	%
C-N	3.3	3.5	3.8	%
TOTAL	3.4	3.5	3.8	%
Current THD:				
A	6.8	7.1	7.4	%
B	8.3	8.8	9.2	%
C	7.4	7.8	8.1	%
N	94.1	104.4	131.3	%
TOTAL	7.6	7.9	8.2	%
Derate transformer to:				
TOTAL	99.0	99.1	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.1	4.9	5.6	K
B	4.0	4.4	5.1	K
C	4.2	5.1	6.1	K
TOTAL	4.2	4.8	5.4	K
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.2	0.2	0.2	%
C-N	0.1	0.1	0.2	%
TOTAL	0.1	0.1	0.2	%
5th Harmonic Volts:				
A-N	2.9	3.0	3.2	%
B-N	3.2	3.3	3.5	%
C-N	3.1	3.2	3.4	%
TOTAL	3.1	3.2	3.4	%
7th Harmonic Volts:				
A-N	1.4	1.5	1.6	%
B-N	1.7	1.8	1.9	%
C-N	1.3	1.4	1.4	%
TOTAL	1.4	1.5	1.6	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.0	0.0	0.1	%
C-N	0.0	0.1	0.1	%
TOTAL	0.0	0.1	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	4.255	4.471	4.739	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER MIDNIGHT

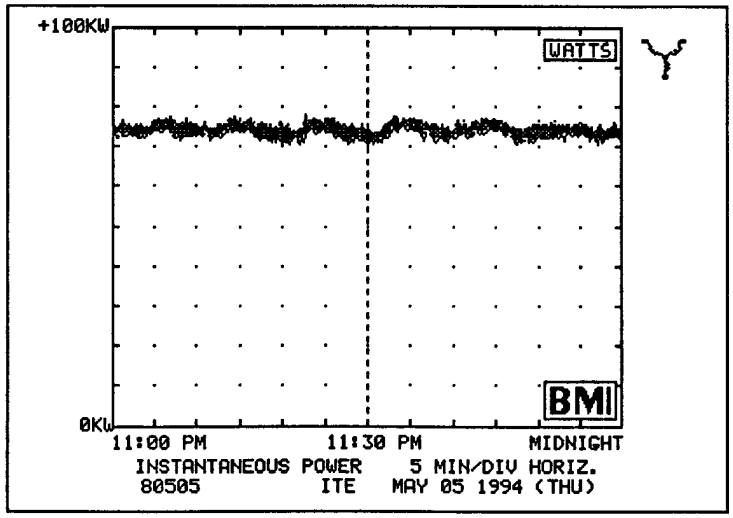
FROM: 11:00 PM May 05 1994 (Thu)
To: MIDNIGHT May 05 1994 (Thu)

Total:
MAX: 78.3 kW, 11:22 PM
MIN: 70.5 kW, 11:19 PM

Phase A-N:
MAX: 29.1 kW, 11:22 PM
MIN: 25.8 kW, 11:57 PM

Phase B-N:
MAX: 22.1 kW, 11:25 PM
MIN: 19.6 kW, 11:19 PM

Phase C-N:
MAX: 28.0 kW, 11:33 PM
MIN: 24.8 kW, 11:19 PM



VOLTAGE THD 12:01:26 AM

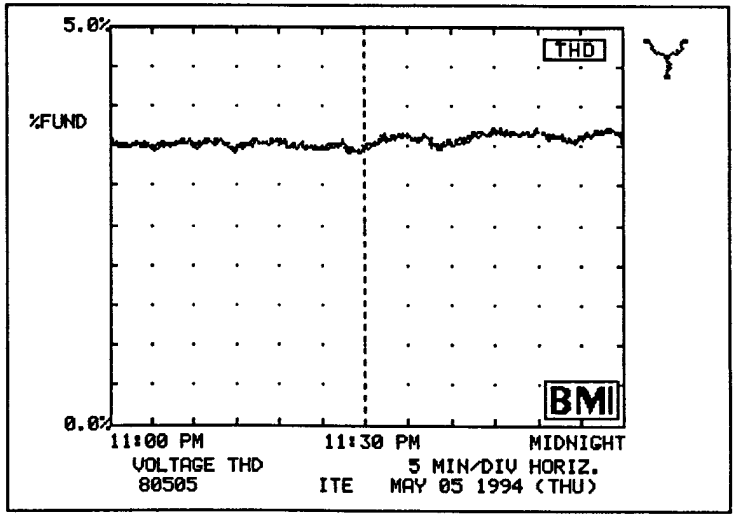
FROM: 11:00 PM May 05 1994 (Thu)
To: MIDNIGHT May 05 1994 (Thu)

Average:
MAX: 3.8% THD, 11:58 PM
MIN: 3.4% THD, 11:14 PM

Phase A-N:
MAX: 3.6% THD, 11:44 PM
MIN: 3.2% THD, 11:14 PM

Phase B-N:
MAX: 3.9% THD, 11:58 PM
MIN: 3.6% THD, 11:28 PM

Phase C-N:
MAX: 3.8% THD, 11:58 PM
MIN: 3.4% THD, 11:29 PM



80505 ITE May 06 1994 (Fri)

CURRENT THD 12:01:38 AM

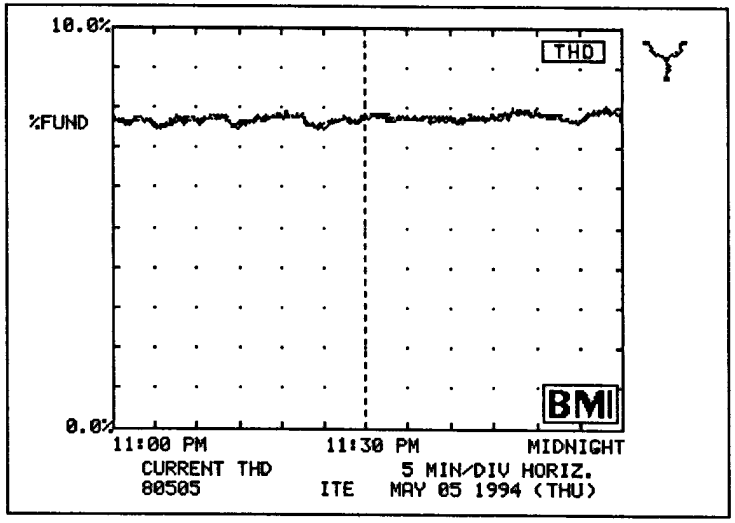
FROM: 11:00 PM May 05 1994 (Thu)
To: MIDNIGHT May 05 1994 (Thu)

Average:
MAX: 8.1% THD, 11:57 PM
MIN: 7.5% THD, 11:05 PM

Phase A:
MAX: 7.3% THD, 11:57 PM
MIN: 6.7% THD, 11:14 PM

Phase B:
MAX: 9.2% THD, 11:57 PM
MIN: 8.3% THD, 11:14 PM

Phase C:
MAX: 8.0% THD, 11:57 PM
MIN: 7.3% THD, 11:05 PM



80505 ITE May 06 1994 (Fri)

BMI SUMMARY 12:03:47 AM

FROM: 11:01 PM May 05 1994 (Thu)
To: 12:01 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	74.58	kW
TOTAL	0.69	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.58	kWh
TOTAL	77.45	kVARh
TOTAL	104.1	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	276.4	277.2	277.9	V
B-N	279.0	279.8	280.3	V
C-N	276.3	277.2	277.8	V
N-G	0.0	0.3	0.5	V
TOTAL	277.3	278.1	278.7	V
Unb	0.6	0.6	0.7	%
Current:				
A	137.7	143.7	149.8	A
B	112.1	116.4	121.3	A
C	122.3	127.6	133.5	A
N	11.2	12.5	13.3	A
TOTAL	373.5	387.6	403.9	A
Unb	9.9	11.2	12.3	%
Power:				
A-N	25.80	27.29	29.09	kW
B-N	19.57	20.84	22.08	kW
C-N	24.76	26.44	28.05	kW
TOTAL	70.50	74.58	78.31	kW
Volt-Amps:				
A-N	38.18	39.84	41.57	kVA
B-N	31.38	32.56	33.96	kVA
C-N	33.89	35.36	37.04	kVA
TOTAL	103.8	107.8	112.4	kVA
VA Reactive:				
A-N	28.03	29.03	30.33	kVAR
B-N	24.12	24.98	25.82	kVAR
C-N	22.79	23.46	25.09	kVAR
TOTAL	75.09	77.46	80.12	kVAR
Power Factor:				
A-N	0.66	0.69	0.71	PF
B-N	0.61	0.64	0.66	PF
C-N	0.73	0.75	0.76	PF
TOTAL	0.67	0.69	0.71	PF

Displacement Factor:				
A-N	0.67	0.68	0.70	dPF
B-N	0.62	0.64	0.67	dPF
C-N	0.73	0.75	0.76	dPF
TOTAL	0.68	0.70	0.71	dPF
Current Leads:				
A	-48.2	-47.0	-45.7	
B	-51.6	-50.4	-48.3	
C	-42.8	-41.7	-40.8	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.6	0.6	0.7	%
Current Sequence:				
Pos	99.4	99.5	99.7	%
Zero	2.3	2.8	2.9	%
Neg	7.5	10.1	11.0	%
Voltage THD:				
A-N	3.2	3.4	3.6	%
B-N	3.6	3.8	3.9	%
C-N	3.4	3.6	3.8	%
TOTAL	3.4	3.6	3.8	%
Current THD:				
A	6.7	7.0	7.3	%
B	8.3	8.7	9.2	%
C	7.3	7.6	8.0	%
N	94.1	103.5	131.9	%
TOTAL	7.5	7.8	8.1	%
Derate transformer to:				
TOTAL	99.0	99.1	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.3	5.1	5.9	k
B	4.2	4.6	5.3	k
C	5.0	5.6	6.5	k
TOTAL	4.6	5.1	5.8	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.0	0.1	0.2	%
TOTAL	0.1	0.1	0.2	%
5th Harmonic Volts:				
A-N	2.9	3.1	3.2	%
B-N	3.1	3.3	3.5	%
C-N	3.2	3.3	3.5	%
TOTAL	3.1	3.2	3.4	%
7th Harmonic Volts:				
A-N	1.4	1.5	1.6	%
B-N	1.7	1.8	1.9	%
C-N	1.3	1.4	1.5	%
TOTAL	1.5	1.5	1.6	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.0	0.0	0.0	%
C-N	0.0	0.0	0.1	%
TOTAL	0.0	0.0	0.1	%
Capacity (NONE A):		N/A		
Cost/Hour:				
TOTAL	4.230	4.475	4.699	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 1:00:01 AM

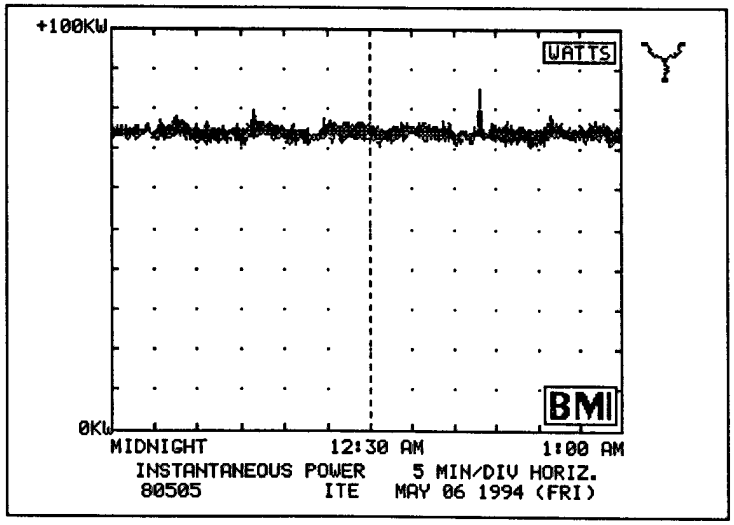
FROM: MIDNIGHT May 05 1994 (Thu)
To: 1:00 AM May 06 1994 (Fri)

Total:
MAX: 85.6 kW, 12:43 AM
MIN: 71.1 kW, 12:49 AM

Phase A-N:
MAX: 31.4 kW, 12:43 AM
MIN: 25.8 kW, 12:50 AM

Phase B-N:
MAX: 24.4 kW, 12:43 AM
MIN: 19.7 kW, 12:45 AM

Phase C-N:
MAX: 29.8 kW, 12:43 AM
MIN: 25.2 kW, 12:21 AM



VOLTAGE THD 1:01:28 AM

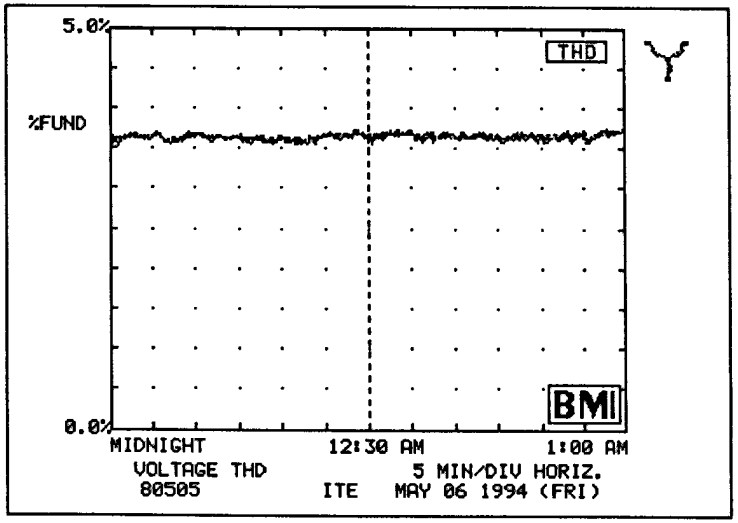
FROM: MIDNIGHT May 05 1994 (Thu)
To: 1:00 AM May 06 1994 (Fri)

Average:
MAX: 3.8% THD, 12:59 AM
MIN: 3.6% THD, MIDNIGHT

Phase A-N:
MAX: 3.6% THD, 12:59 AM
MIN: 3.4% THD, MIDNIGHT

Phase B-N:
MAX: 3.9% THD, 12:59 AM
MIN: 3.7% THD, 12:21 AM

Phase C-N:
MAX: 3.8% THD, 12:59 AM
MIN: 3.6% THD, MIDNIGHT



80505 ITE May 06 1994 (Fri)

CURRENT THD 1:01:40 AM

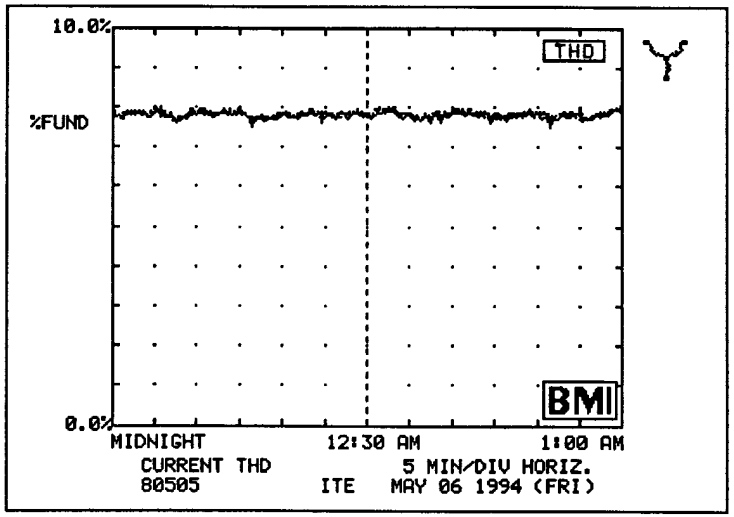
FROM: MIDNIGHT May 05 1994 (Thu)
To: 1:00 AM May 06 1994 (Fri)

Average:
MAX: 8.1% THD, 12:59 AM
MIN: 7.6% THD, 12:16 AM

Phase A:
MAX: 7.3% THD, 12:59 AM
MIN: 6.7% THD, 12:16 AM

Phase B:
MAX: 9.3% THD, 12:59 AM
MIN: 8.2% THD, 12:51 AM

Phase C:
MAX: 7.9% THD, 12:10 AM
MIN: 7.3% THD, 12:16 AM



80505 ITE May 06 1994 (Fri)

BMI SUMMARY 1:03:46 AM

FROM: 12:01 AM May 06 1994 (Fri)
To: 1:01 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	74.51	kW
TOTAL	0.69	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.57	kWh
TOTAL	78.13	kVARh
TOTAL	104.7	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	277.1	277.8	278.3	V
B-N	279.4	280.1	280.6	V
C-N	277.0	277.7	278.2	V
N-G	0.0	0.2	0.5	V
TOTAL	277.8	278.5	279.0	V
Unb	0.5	0.6	0.6	%
Current:				
A	138.9	144.2	160.0	A
B	112.1	116.3	131.2	A
C	123.1	128.0	141.9	A
N	11.2	12.5	13.3	A
TOTAL	376.7	388.4	433.0	A
Unb	9.9	11.4	14.2	%
Power:				
A-N	25.78	27.27	31.41	kW
B-N	19.65	20.72	24.36	kW
C-N	25.10	26.51	29.84	kW
TOTAL	71.14	74.51	85.61	kW
Volt-Amps:				
A-N	38.54	40.05	44.43	kVA
B-N	31.41	32.57	36.75	kVA
C-N	34.17	35.53	39.38	kVA
TOTAL	104.9	108.2	120.6	kVA
VA Reactive:				
A-N	28.40	29.34	31.37	kVAR
B-N	24.37	25.08	27.54	kVAR
C-N	23.12	23.64	25.62	kVAR
TOTAL	76.24	78.06	84.53	kVAR
Power Factor:				
A-N	0.66	0.68	0.72	PF
B-N	0.61	0.64	0.66	PF
C-N	0.73	0.75	0.78	PF
TOTAL	0.67	0.69	0.71	PF

Displacement Factor:				
A-N	0.66	0.68	0.71	dPF
B-N	0.62	0.63	0.66	dPF
C-N	0.73	0.74	0.77	dPF
TOTAL	0.68	0.69	0.72	dPF
Current Leads:				
A	-48.5	-47.3	-44.9	
B	-51.6	-50.7	-48.7	
C	-42.7	-41.9	-39.6	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.1	99.4	99.6	%
Zero	2.3	2.8	2.9	%
Neg	9.1	10.3	12.9	%
Voltage THD:				
A-N	3.4	3.5	3.6	%
B-N	3.7	3.8	3.9	%
C-N	3.6	3.7	3.8	%
TOTAL	3.6	3.7	3.8	%
Current THD:				
A	6.7	7.1	7.3	%
B	8.2	8.9	9.4	%
C	7.4	7.6	7.9	%
N	88.8	103.5	131.3	%
TOTAL	7.6	7.9	8.1	%
Derate transformer to:				
TOTAL	99.0	99.1	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.4	4.8	5.7	K
B	4.3	4.9	5.6	K
C	4.5	5.3	6.3	K
TOTAL	4.6	5.0	5.5	K
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%
5th Harmonic Volts:				
A-N	3.0	3.1	3.2	%
B-N	3.2	3.4	3.4	%
C-N	3.2	3.4	3.5	%
TOTAL	3.2	3.3	3.4	%
7th Harmonic Volts:				
A-N	1.5	1.6	1.7	%
B-N	1.8	1.8	2.0	%
C-N	1.4	1.4	1.5	%
TOTAL	1.6	1.6	1.7	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.0	0.0	0.0	%
C-N	0.0	0.0	0.1	%
TOTAL	0.0	0.0	0.1	%

Capacity (NONE A): N/A

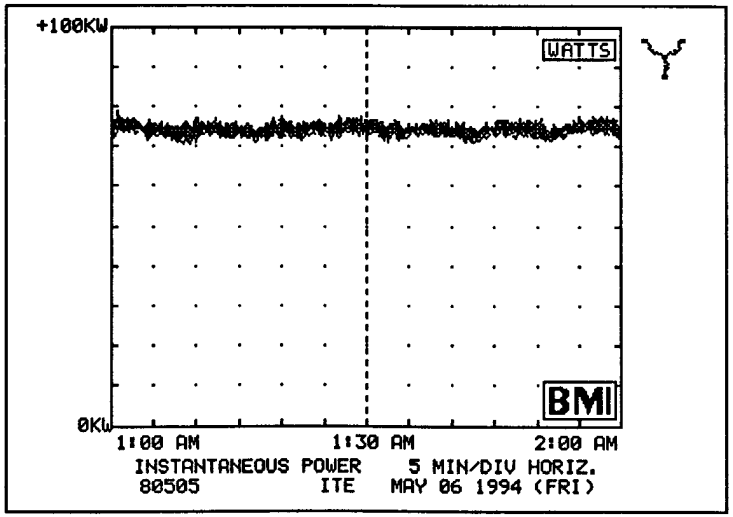
Cost/Hour:				
TOTAL	4.268	4.470	5.137	$/Hr
Frequency:				
TOTAL	59.9	60.0	60.0	Hz

80505 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 2:00:02 AM

FROM: 1:00 AM May 06 1994 (Fri)
To: 2:00 AM May 06 1994 (Fri)

Total:			
	MAX:	79.4 kW,	1:00 AM
	MIN:	70.9 kW,	1:08 AM
Phase A-N:			
	MAX:	29.6 kW,	1:00 AM
	MIN:	25.7 kW,	1:08 AM
Phase B-N:			
	MAX:	22.7 kW,	1:00 AM
	MIN:	19.5 kW,	1:08 AM
Phase C-N:			
	MAX:	28.9 kW,	1:26 AM
	MIN:	25.2 kW,	1:41 AM

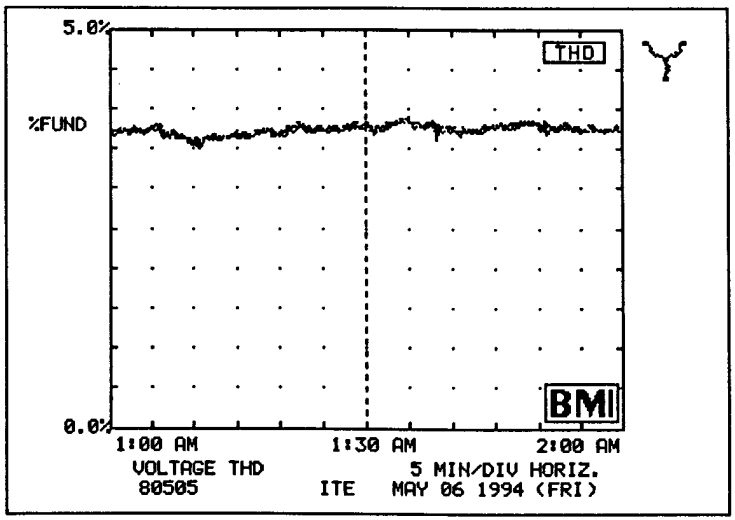


80505 ITE May 06 1994 (Fri)

VOLTAGE THD 2:01:27 AM

FROM: 1:00 AM May 06 1994 (Fri)
To: 2:00 AM May 06 1994 (Fri)

Average:			
	MAX:	3.9% THD,	1:34 AM
	MIN:	3.5% THD,	1:10 AM
Phase A-N:			
	MAX:	3.7% THD,	1:34 AM
	MIN:	3.3% THD,	1:10 AM
Phase B-N:			
	MAX:	4.1% THD,	1:34 AM
	MIN:	3.7% THD,	1:10 AM
Phase C-N:			
	MAX:	4.0% THD,	1:34 AM
	MIN:	3.6% THD,	1:10 AM



CURRENT THD 2:01:39 AM

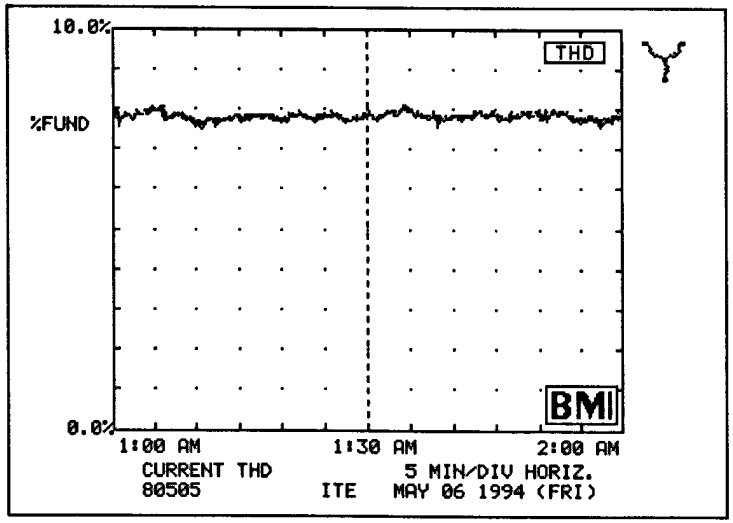
FROM: 1:00 AM May 06 1994 (Fri)
To: 2:00 AM May 06 1994 (Fri)

Average:
MAX: 8.1% THD; 1:34 AM
MIN: 7.6% THD; 1:10 AM

Phase A:
MAX: 7.3% THD; 1:34 AM
MIN: 6.8% THD; 1:10 AM

Phase B:
MAX: 9.3% THD; 1:34 AM
MIN: 8.3% THD; 1:00 AM

Phase C:
MAX: 7.9% THD; 1:05 AM
MIN: 7.3% THD; 1:58 AM



80505 ITE May 06 1994 (Fri)

BMI SUMMARY 2:03:47 AM

FROM: 1:01 AM May 06 1994 (Fri)
To: 2:01 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	74.72	kW
TOTAL	0.69	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.73	kWh
TOTAL	78.13	kVARh
TOTAL	104.8	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	276.7	277.7	278.5	V
B-N	279.0	280.0	280.9	V
C-N	276.6	277.7	278.5	V
N-G	0.0	0.2	0.5	V
TOTAL	277.4	278.5	279.3	V
Unb	0.5	0.6	0.6	%
Current:				
A	139.0	144.4	151.9	A
B	110.8	116.3	121.6	A
C	123.7	128.5	135.2	A
N	11.3	12.5	13.3	A
TOTAL	375.2	389.2	402.7	A
Unb	10.0	11.3	13.5	%
Power:				
A-N	25.70	27.28	28.96	kW
B-N	19.46	20.80	22.05	kW
C-N	25.20	26.64	28.91	kW
TOTAL	70.92	74.72	78.19	kW
Volt-Amps:				
A-N	38.58	40.09	42.19	kVA
B-N	30.39	32.58	34.00	kVA
C-N	34.31	35.67	37.54	kVA
TOTAL	104.3	108.3	112.1	kVA
VA Reactive:				
A-N	28.30	29.38	31.06	kVAR
B-N	23.74	25.02	26.30	kVAR
C-N	22.83	23.70	24.94	kVAR
TOTAL	74.87	78.11	80.63	kVAR
Power Factor:				
A-N	0.66	0.68	0.71	PF
B-N	0.61	0.64	0.66	PF
C-N	0.73	0.75	0.77	PF
TOTAL	0.67	0.69	0.71	PF

Displacement Factor:				
A-N	0.66	0.68	0.70	dPF
B-N	0.62	0.64	0.66	dPF
C-N	0.73	0.75	0.77	dPF
TOTAL	0.68	0.69	0.71	dPF
Current Leads:				
A	-48.8	-47.3	-45.5	
B	-51.7	-50.5	-49.0	
C	-42.9	-41.8	-39.7	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.2	99.4	99.6	%
Zero	2.3	2.8	3.0	%
Neg	9.1	10.3	12.7	%
Voltage THD:				
A-N	3.3	3.6	3.7	%
B-N	3.7	3.9	4.1	%
C-N	3.6	3.8	4.0	%
TOTAL	3.5	3.8	3.9	%
Current THD:				
A	6.8	7.1	7.3	%
B	8.5	9.0	9.3	%
C	7.3	7.6	7.9	%
N	93.9	103.1	133.9	%
TOTAL	7.6	7.9	8.1	%
Derate transformer to:				
TOTAL	99.0	99.1	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.3	4.8	5.4	K
B	4.6	5.0	5.7	K
C	4.6	5.1	6.0	K
TOTAL	4.6	5.0	5.4	K
3rd Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%
5th Harmonic Volts:				
A-N	2.9	3.2	3.3	%
B-N	3.2	3.4	3.6	%
C-N	3.3	3.5	3.9	%
TOTAL	3.1	3.4	3.5	%
7th Harmonic Volts:				
A-N	1.6	1.7	1.8	%
B-N	1.8	1.9	2.0	%
C-N	1.4	1.5	1.6	%
TOTAL	1.6	1.7	1.8	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.0	0.0	0.1	%
C-N	0.0	0.0	0.1	%
TOTAL	0.0	0.0	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	4.255	4.483	4.691	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 3:00:00 AM

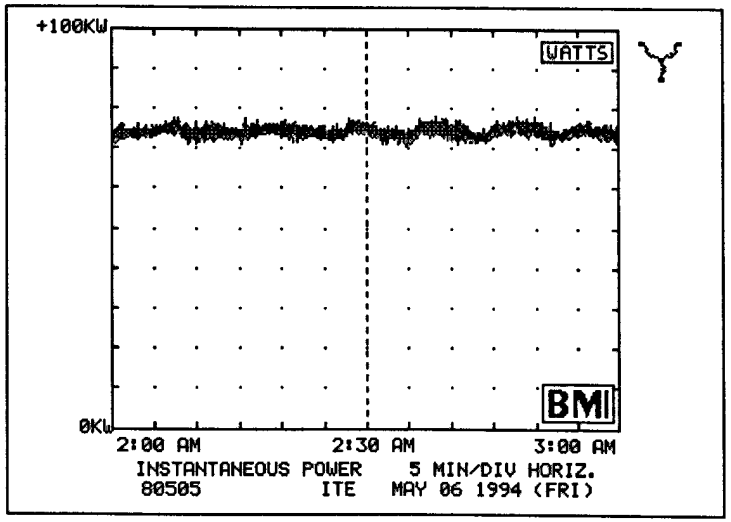
FROM: 2:00 AM May 06 1994 (Fri)
To: 3:00 AM May 06 1994 (Fri)

Total:
MAX: 78.4 kW, 2:47 AM
MIN: 71.2 kW, 2:34 AM

Phase A-N:
MAX: 28.8 kW, 2:47 AM
MIN: 25.9 kW, 2:08 AM

Phase B-N:
MAX: 22.0 kW, 2:36 AM
MIN: 19.6 kW, 2:40 AM

Phase C-N:
MAX: 28.7 kW, 2:16 AM
MIN: 25.2 kW, 2:15 AM



VOLTAGE THD 3:01:27 AM

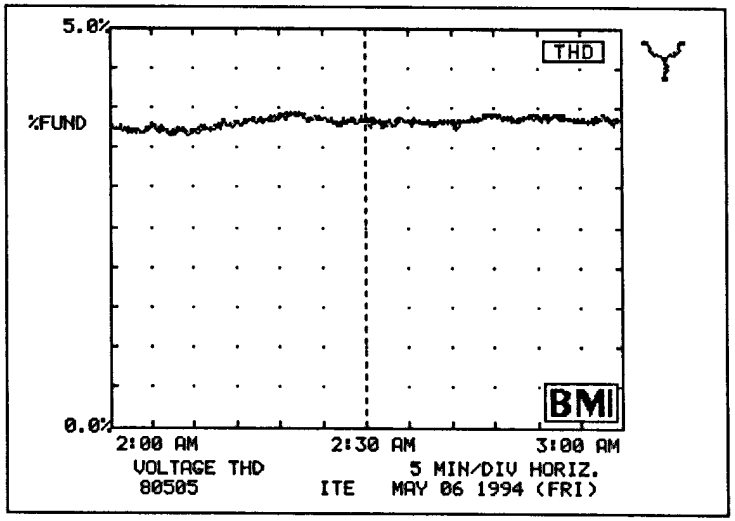
FROM: 2:00 AM May 06 1994 (Fri)
To: 3:00 AM May 06 1994 (Fri)

Average:
MAX: 4.0% THD, 2:20 AM
MIN: 3.7% THD, 2:07 AM

Phase A-N:
MAX: 3.8% THD, 2:21 AM
MIN: 3.4% THD, 2:07 AM

Phase B-N:
MAX: 4.1% THD, 2:20 AM
MIN: 3.8% THD, 2:07 AM

Phase C-N:
MAX: 4.0% THD, 2:44 AM
MIN: 3.7% THD, 2:07 AM



80505 ITE May 06 1994 (Fri)

CURRENT THD 3:01:39 AM

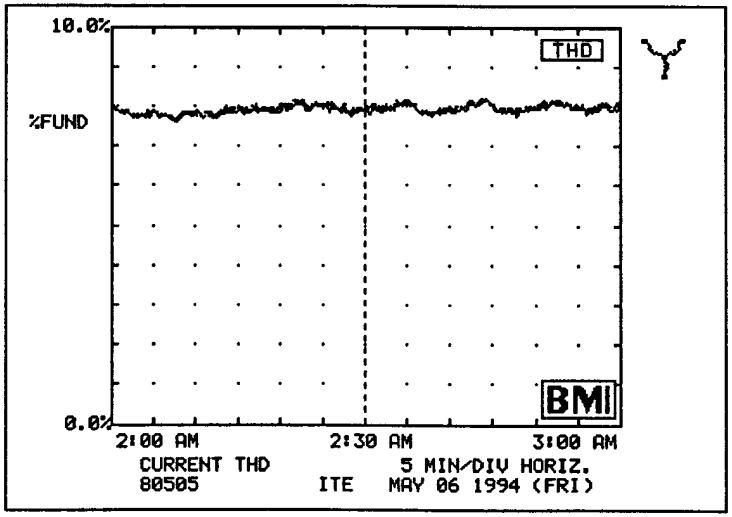
FROM: 2:00 AM May 06 1994 (Fri)
To: 3:00 AM May 06 1994 (Fri)

Average:
MAX: 8.3% THD; 2:43 AM
MIN: 7.6% THD; 2:07 AM

Phase A:
MAX: 7.4% THD; 2:44 AM
MIN: 6.8% THD; 2:07 AM

Phase B:
MAX: 9.4% THD; 2:44 AM
MIN: 8.7% THD; 2:07 AM

Phase C:
MAX: 8.0% THD; 2:22 AM
MIN: 7.4% THD; 2:07 AM



80505 ITE May 06 1994 (Fri)

BMI SUMMARY 3:03:45 AM

FROM: 2:01 AM May 06 1994 (Fri)
To: 3:01 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	74.72	kW
TOTAL	0.69	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.76	kWh
TOTAL	78.38	kVARh
TOTAL	105.0	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	277.2	278.0	278.5	V
B-N	279.4	280.4	280.9	V
C-N	277.2	278.0	278.4	V
N-G	0.0	0.2	0.4	V
TOTAL	278.0	278.8	279.3	V
Unb	0.5	0.6	0.6	%
Current:				
A	139.6	144.5	150.4	A
B	111.5	116.5	121.5	A
C	123.5	128.4	134.0	A
N	11.4	12.7	13.5	A
TOTAL	376.4	389.4	404.7	A
Unb	10.1	11.3	13.4	%
Power:				
A-N	25.94	27.35	28.81	kW
B-N	19.59	20.77	22.04	kW
C-N	25.23	26.60	28.05	kW
TOTAL	71.19	74.72	78.37	kW
Volt-Amps:				
A-N	38.79	40.17	41.83	kVA
B-N	31.17	32.66	34.09	kVA
C-N	34.32	35.69	37.47	kVA
TOTAL	104.7	108.5	112.8	kVA
VA Reactive:				
A-N	28.65	29.44	30.98	kVAR
B-N	24.09	25.15	26.12	kVAR
C-N	23.13	23.76	24.91	kVAR
TOTAL	76.09	78.35	80.83	kVAR
Power Factor:				
A-N	0.66	0.68	0.70	PF
B-N	0.61	0.64	0.66	PF
C-N	0.73	0.75	0.77	PF
TOTAL	0.67	0.69	0.71	PF

Displacement Factor:				
A-N	0.66	0.68	0.69	dPF
B-N	0.62	0.63	0.65	dPF
C-N	0.73	0.74	0.76	dPF
TOTAL	0.67	0.69	0.71	dPF
Current Leads:				
A	-48.6	-47.3	-46.2	
B	-51.9	-50.7	-49.2	
C	-43.0	-41.9	-40.5	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.3	99.4	99.5	%
Zero	2.4	2.8	3.0	%
Neg	9.3	10.3	11.8	%
Voltage THD:				
A-N	3.4	3.6	3.8	%
B-N	3.8	4.0	4.1	%
C-N	3.5	3.9	4.0	%
TOTAL	3.7	3.9	4.0	%
Current THD:				
A	6.8	7.2	7.4	%
B	8.7	9.1	9.4	%
C	7.4	7.7	8.0	%
N	92.5	102.0	127.2	%
TOTAL	7.6	8.0	8.3	%
Derate transformer to:				
TOTAL	99.0	99.0	99.1	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.4	4.8	5.5	K
B	4.6	5.1	5.7	K
C	4.6	5.2	5.8	K
TOTAL	4.6	5.0	5.6	K
3rd Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.1	%
5th Harmonic Volts:				
A-N	3.0	3.2	3.3	%
B-N	3.3	3.5	3.6	%
C-N	3.4	3.6	3.7	%
TOTAL	3.3	3.4	3.5	%
7th Harmonic Volts:				
A-N	1.6	1.7	1.8	%
B-N	1.9	2.0	2.1	%
C-N	1.5	1.6	1.6	%
TOTAL	1.7	1.8	1.8	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.0	0.0	0.1	%
C-N	0.0	0.0	0.1	%
TOTAL	0.0	0.1	0.1	%

Capacity (NONE A): N/A

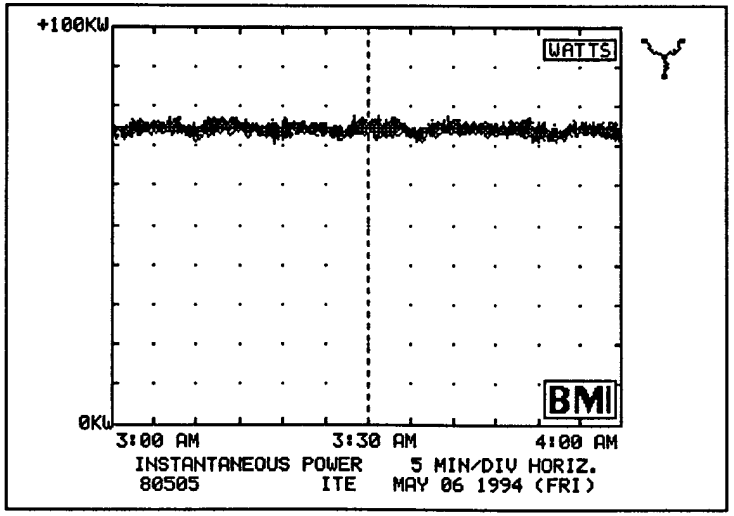
Cost/Hour:				
TOTAL	4.271	4.483	4.702	$/Hr
Frequency:				
TOTAL	59.9	60.0	60.0	Hz

80505 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 4:00:02 AM

FROM: 3:00 AM May 06 1994 (Fri)
To: 4:00 AM May 06 1994 (Fri)

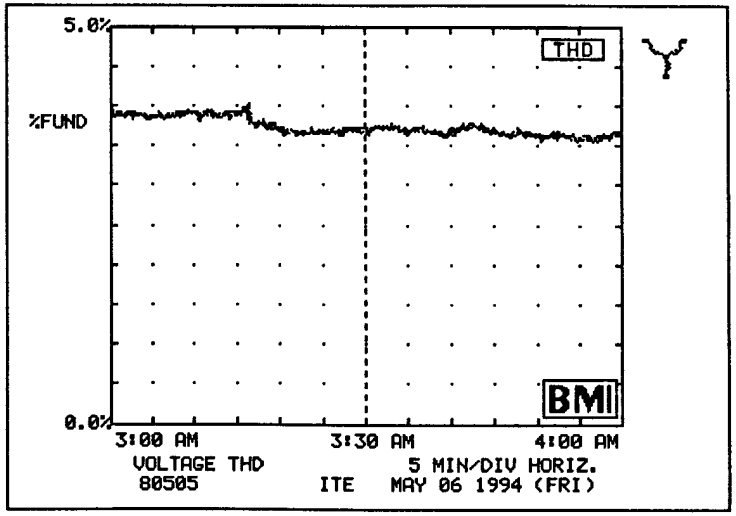
Total:			
	MAX:	78.1 kW,	3:28 AM
	MIN:	71.2 kW,	3:18 AM
Phase A-N:			
	MAX:	28.7 kW,	3:28 AM
	MIN:	25.8 kW,	3:18 AM
Phase B-N:			
	MAX:	22.2 kW,	3:33 AM
	MIN:	19.6 kW,	3:49 AM
Phase C-N:			
	MAX:	28.2 kW,	3:48 AM
	MIN:	25.3 kW,	3:36 AM



VOLTAGE THD 4:01:28 AM

FROM: 3:00 AM May 06 1994 (Fri)
To: 4:00 AM May 06 1994 (Fri)

Average:			
	MAX:	4.0% THD,	3:16 AM
	MIN:	3.6% THD,	3:50 AM
Phase A-N:			
	MAX:	3.9% THD,	3:16 AM
	MIN:	3.4% THD,	3:50 AM
Phase B-N:			
	MAX:	4.2% THD,	3:16 AM
	MIN:	3.7% THD,	3:50 AM
Phase C-N:			
	MAX:	4.1% THD,	3:16 AM
	MIN:	3.6% THD,	3:50 AM



80505 ITE May 06 1994 (Fri)

CURRENT THD 4:01:40 AM

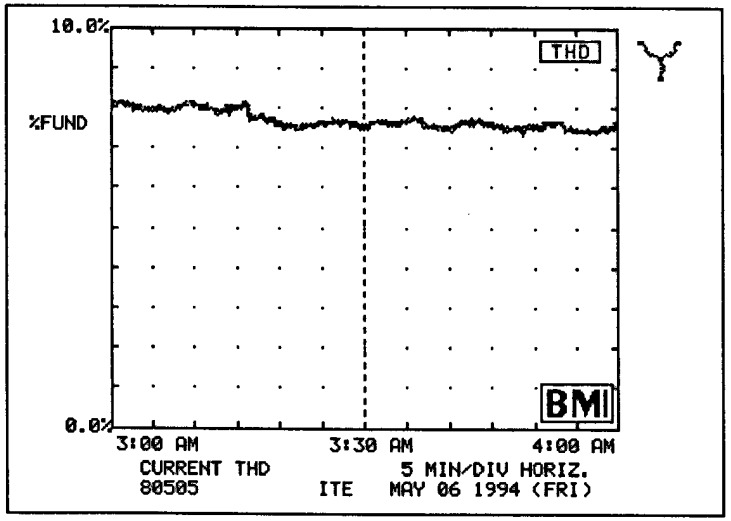
FROM: 3:00 AM May 06 1994 (Fri)
To: 4:00 AM May 06 1994 (Fri)

Average:
MAX: 8.2% THD; 3:00 AM
MIN: 7.4% THD; 3:48 AM

Phase A:
MAX: 7.4% THD; 3:00 AM
MIN: 6.5% THD; 3:48 AM

Phase B:
MAX: 9.5% THD; 3:08 AM
MIN: 8.4% THD; 3:58 AM

Phase C:
MAX: 8.0% THD; 3:15 AM
MIN: 7.0% THD; 3:48 AM



80505 ITE May 06 1994 (Fri)

BMI SUMMARY 4:03:48 AM

FROM: 3:01 AM May 06 1994 (Fri)
To: 4:01 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	74.65	kW
TOTAL	0.70	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.69	kWh
TOTAL	76.66	kVARh
TOTAL	103.5	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.9	276.9	278.6	V
B-N	278.3	279.3	281.1	V
C-N	275.9	276.9	278.6	V
N-G	0.0	0.2	0.5	V
TOTAL	276.7	277.7	279.4	V
Unb	0.5	0.6	0.6	%
Current:				
A	137.7	143.1	149.6	A
B	110.6	115.5	120.9	A
C	122.5	127.4	132.5	A
N	11.3	12.6	13.4	A
TOTAL	372.8	386.0	401.2	A
Unb	9.8	11.2	13.3	%
Power:				
A-N	25.81	27.29	28.67	kW
B-N	19.63	20.82	22.23	kW
C-N	25.33	26.54	28.24	kW
TOTAL	71.24	74.65	78.06	kW
Volt-Amps:				
A-N	38.07	39.64	41.61	kVA
B-N	30.87	32.25	33.92	kVA
C-N	33.83	35.28	36.86	kVA
TOTAL	103.4	107.2	111.9	kVA
VA Reactive:				
A-N	27.55	28.77	30.39	kVAR
B-N	23.52	24.59	25.98	kVAR
C-N	22.39	23.23	24.52	kVAR
TOTAL	73.64	76.58	80.29	kVAR
Power Factor:				
A-N	0.66	0.69	0.71	PF
B-N	0.62	0.65	0.67	PF
C-N	0.73	0.75	0.78	PF
TOTAL	0.67	0.70	0.71	PF

Displacement Factor:				
A-N	0.67	0.69	0.70	dPF
B-N	0.62	0.64	0.66	dPF
C-N	0.73	0.75	0.77	dPF
TOTAL	0.68	0.70	0.72	dPF
Current Leads:				
A	-48.2	-46.7	-45.5	
B	-51.4	-50.0	-48.6	
C	-43.0	-41.4	-39.2	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.2	99.4	99.6	%
Zero	2.4	2.8	3.0	%
Neg	8.7	10.2	12.6	%
Voltage THD:				
A-N	3.4	3.5	3.9	%
B-N	3.7	3.8	4.2	%
C-N	3.6	3.8	4.1	%
TOTAL	3.6	3.8	4.0	%
Current THD:				
A	6.5	6.9	7.4	%
B	8.4	8.8	9.5	%
C	7.0	7.5	8.0	%
N	91.1	101.4	125.3	%
TOTAL	7.4	7.7	8.2	%
Derate transformer to:				
TOTAL	99.0	99.1	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.2	4.8	5.5	k
B	4.4	5.0	5.6	k
C	4.4	5.1	5.8	k
TOTAL	4.5	5.0	5.5	k
3rd Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.2	%
5th Harmonic Volts:				
A-N	3.0	3.1	3.4	%
B-N	3.3	3.4	3.6	%
C-N	3.3	3.5	3.8	%
TOTAL	3.2	3.3	3.6	%
7th Harmonic Volts:				
A-N	1.6	1.7	1.8	%
B-N	1.9	2.0	2.1	%
C-N	1.4	1.5	1.6	%
TOTAL	1.6	1.7	1.9	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.0	0.0	0.1	%
C-N	0.0	0.0	0.1	%
TOTAL	0.0	0.1	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	4.274	4.479	4.684	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 5:00:00 AM

FROM: 4:00 AM May 06 1994 (Fri)
To: 5:00 AM May 06 1994 (Fri)

Total:

	MAX:	80.7 kW,	4:54 AM
	MIN:	70.6 kW,	4:17 AM

Phase A-N:

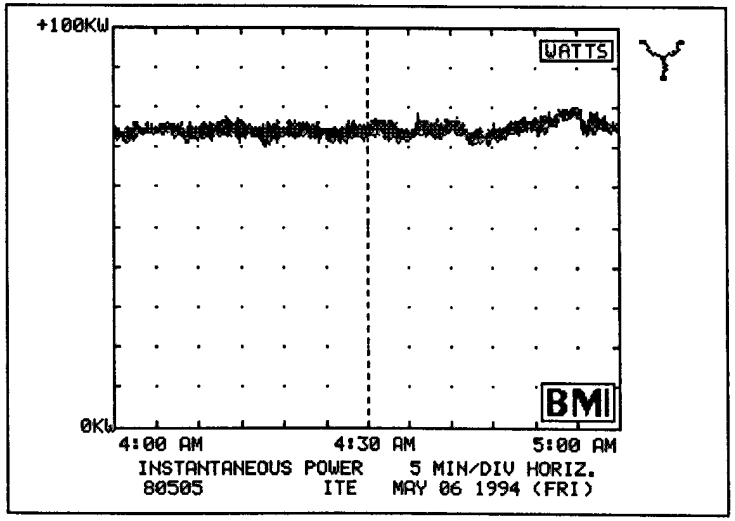
	MAX:	29.5 kW,	4:35 AM
	MIN:	25.6 kW,	4:17 AM

Phase B-N:

	MAX:	23.6 kW,	4:54 AM
	MIN:	19.5 kW,	4:14 AM

Phase C-N:

	MAX:	28.8 kW,	4:56 AM
	MIN:	25.0 kW,	4:44 AM



VOLTAGE THD 5:01:27 AM

FROM: 4:00 AM May 06 1994 (Fri)
To: 5:00 AM May 06 1994 (Fri)

Average:

	MAX:	3.8% THD,	4:56 AM
	MIN:	3.5% THD,	4:50 AM

Phase A-N:

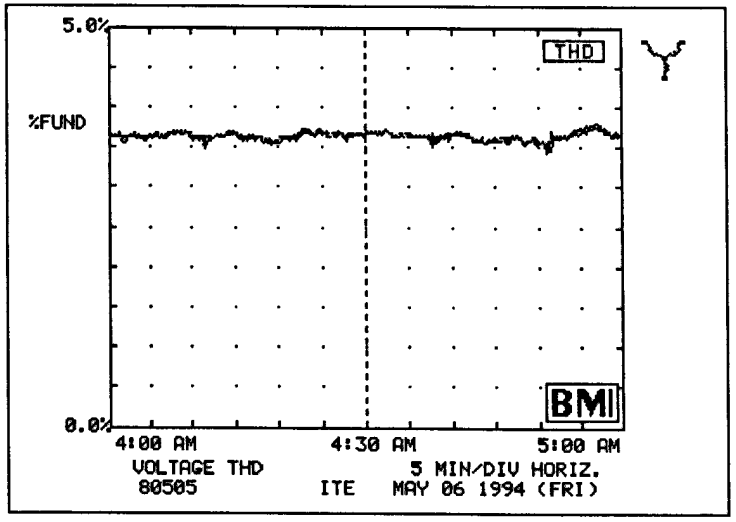
	MAX:	3.6% THD,	4:56 AM
	MIN:	3.3% THD,	4:50 AM

Phase B-N:

	MAX:	4.0% THD,	4:56 AM
	MIN:	3.6% THD,	4:50 AM

Phase C-N:

	MAX:	3.8% THD,	4:55 AM
	MIN:	3.5% THD,	4:50 AM



80505 ITE May 06 1994 (Fri)

CURRENT THD 5:01:39 AM

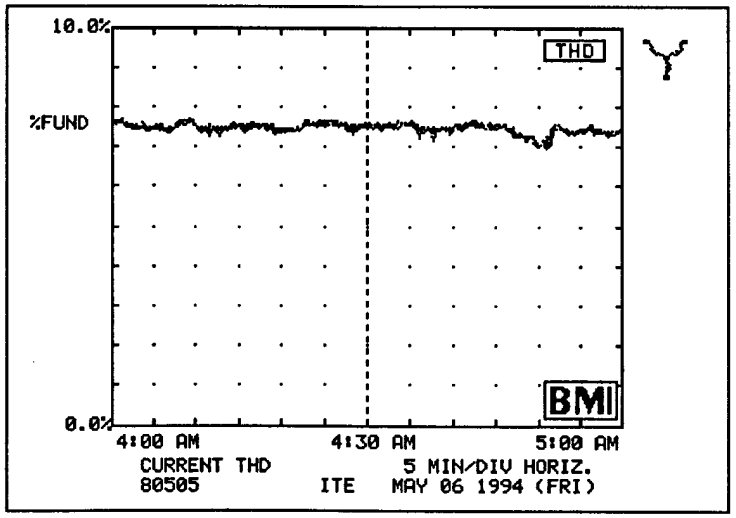
FROM: 4:00 AM May 06 1994 (Fri)
To: 5:00 AM May 06 1994 (Fri)

Average:
MAX: 7.8% THD; 4:01 AM
MIN: 7.0% THD; 4:50 AM

Phase A:
MAX: 7.1% THD; 4:52 AM
MIN: 6.4% THD; 4:37 AM

Phase B:
MAX: 9.0% THD; 4:09 AM
MIN: 7.6% THD; 4:51 AM

Phase C:
MAX: 7.6% THD; 4:24 AM
MIN: 6.7% THD; 4:49 AM



80505 ITE May 06 1994 (Fri)

BMI SUMMARY 5:03:45 AM

FROM: 4:01 AM May 06 1994 (Fri)
To: 5:01 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	74.97	kW
TOTAL	0.70	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	74.99	kWh
TOTAL	75.36	kVARh
TOTAL	102.5	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	274.8	276.3	277.3	V
B-N	277.3	278.6	279.7	V
C-N	274.8	276.2	277.4	V
N-G	0.0	0.2	0.4	V
TOTAL	275.6	277.0	278.1	V
Unb	0.5	0.6	0.6	%
Current:				
A	136.0	142.3	150.6	A
B	110.0	115.1	124.9	A
C	121.2	127.1	133.2	A
N	10.7	12.4	13.3	A
TOTAL	369.4	384.5	403.1	A
Unb	8.7	11.1	12.8	%
Power:				
A-N	25.62	27.30	29.49	kW
B-N	19.47	21.01	23.57	kW
C-N	24.99	26.67	28.75	kW
TOTAL	70.63	74.97	80.72	kW
Volt-Amps:				
A-N	37.47	39.31	41.73	kVA
B-N	30.64	32.07	34.89	kVA
C-N	33.45	35.11	36.91	kVA
TOTAL	102.2	106.5	112.0	kVA
VA Reactive:				
A-N	26.41	28.31	30.12	kVAR
B-N	22.29	24.19	25.94	kVAR
C-N	21.46	22.83	23.84	kVAR
TOTAL	70.29	75.34	78.51	kVAR
Power Factor:				
A-N	0.67	0.69	0.73	PF
B-N	0.63	0.65	0.71	PF
C-N	0.74	0.76	0.79	PF
TOTAL	0.69	0.70	0.74	PF

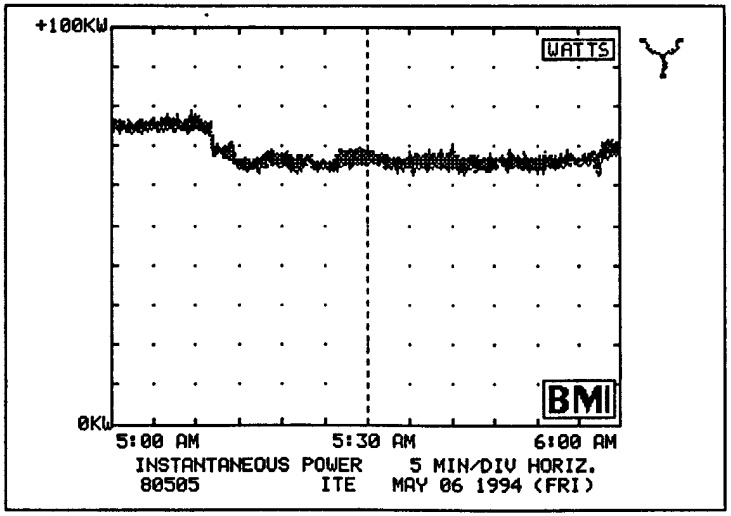
Displacement Factor:				
A-N	0.67	0.69	0.72	dPF
B-N	0.63	0.65	0.70	dPF
C-N	0.74	0.76	0.79	dPF
TOTAL	0.69	0.71	0.74	dPF
Current Leads:				
A	-47.6	-46.2	-43.8	
B	-50.6	-49.3	-45.3	
C	-42.1	-40.7	-37.8	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.2	99.5	99.6	%
Zero	1.7	2.7	3.0	%
Neg	8.4	10.1	12.3	%
Voltage THD:				
A-N	3.3	3.5	3.6	%
B-N	3.6	3.8	4.0	%
C-N	3.5	3.7	3.8	%
TOTAL	3.5	3.7	3.8	%
Current THD:				
A	6.4	6.8	7.1	%
B	7.5	8.5	9.0	%
C	6.7	7.2	7.6	%
N	91.6	112.1	243.2	%
TOTAL	7.0	7.5	7.8	%
Derate transformer to:				
TOTAL	99.1	99.2	99.3	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.0	4.7	5.4	K
B	4.3	4.9	6.0	K
C	4.4	5.3	6.3	K
TOTAL	4.4	5.0	5.8	K
3rd Harmonic Volts:				
A-N	0.1	0.2	0.2	%
B-N	0.1	0.2	0.2	%
C-N	0.0	0.1	0.1	%
TOTAL	0.1	0.1	0.2	%
5th Harmonic Volts:				
A-N	2.9	3.1	3.2	%
B-N	3.2	3.3	3.5	%
C-N	3.2	3.4	3.6	%
TOTAL	3.1	3.3	3.4	%
7th Harmonic Volts:				
A-N	1.4	1.6	1.7	%
B-N	1.7	1.9	2.0	%
C-N	1.4	1.4	1.5	%
TOTAL	1.5	1.6	1.7	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.0	0.0	0.1	%
C-N	0.0	0.0	0.1	%
TOTAL	0.0	0.1	0.1	%
Capacity (NONE A):	N/A			
Cost/Hour:				
TOTAL	4.238	4.498	4.843	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

80505 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 6:00:02 AM

FROM: 5:00 AM May 06 1994 (Fri)
To: 6:00 AM May 06 1994 (Fri)

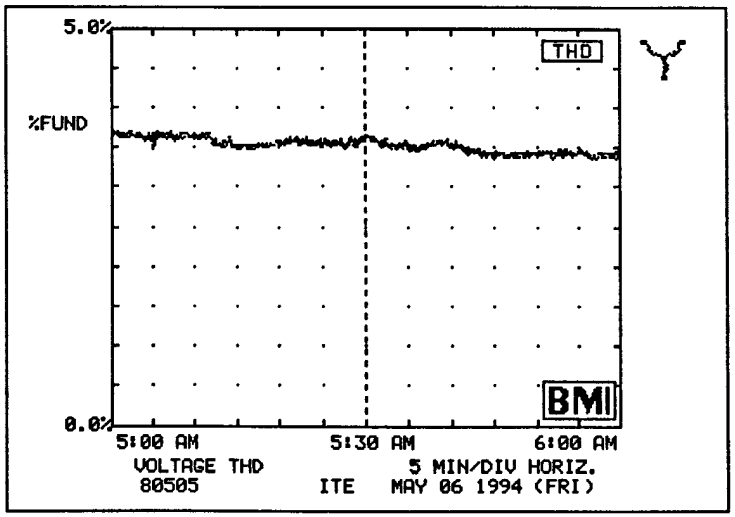
Total:			
	MAX:	79.4 kW,	5:09 AM
	MIN:	63.0 kW,	5:57 AM
Phase A-N:			
	MAX:	28.8 kW,	5:09 AM
	MIN:	22.6 kW,	5:57 AM
Phase B-N:			
	MAX:	22.7 kW,	5:09 AM
	MIN:	17.5 kW,	5:57 AM
Phase C-N:			
	MAX:	28.5 kW,	5:07 AM
	MIN:	21.9 kW,	5:35 AM



VOLTAGE THD 6:01:26 AM

FROM: 5:00 AM May 06 1994 (Fri)
To: 6:00 AM May 06 1994 (Fri)

Average:			
	MAX:	3.7% THD,	5:00 AM
	MIN:	3.4% THD,	5:44 AM
Phase A-N:			
	MAX:	3.5% THD,	5:06 AM
	MIN:	3.2% THD,	5:56 AM
Phase B-N:			
	MAX:	3.9% THD,	5:05 AM
	MIN:	3.6% THD,	5:44 AM
Phase C-N:			
	MAX:	3.8% THD,	5:00 AM
	MIN:	3.3% THD,	5:44 AM



80505 ITE May 06 1994 (Fri)

CURRENT THD 6:01:39 AM

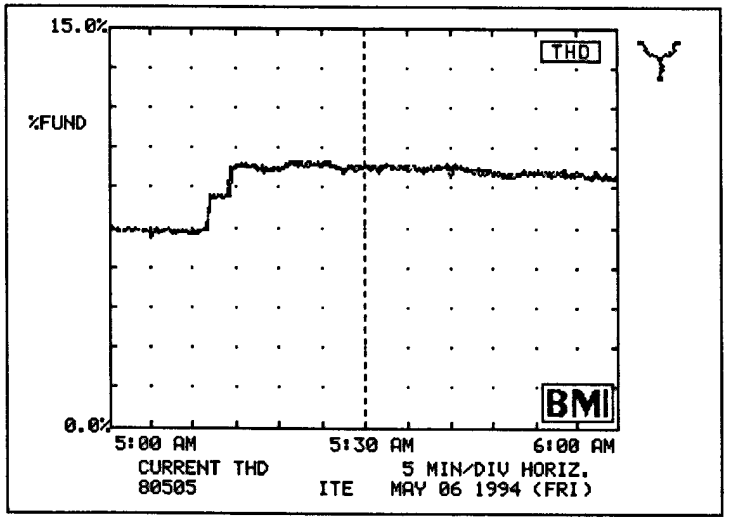
FROM: 5:00 AM May 06 1994 (Fri)
To: 6:00 AM May 06 1994 (Fri)

Average:
MAX: 10.1% THD; 5:21 AM
MIN: 7.1% THD; 5:04 AM

Phase A:
MAX: 9.4% THD; 5:21 AM
MIN: 6.6% THD; 5:04 AM

Phase B:
MAX: 11.3% THD; 5:40 AM
MIN: 7.9% THD; 5:04 AM

Phase C:
MAX: 9.7% THD; 5:21 AM
MIN: 6.8% THD; 5:07 AM



80505 ITE May 06 1994 (Fri)

BMI SUMMARY 6:03:47 AM

FROM: 5:01 AM May 06 1994 (Fri)
To: 6:01 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	68.33	kW
TOTAL	0.65	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	68.49	kWh
TOTAL	78.39	kVARh
TOTAL	101.9	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	275.7	277.0	277.8	V
B-N	278.0	279.3	279.9	V
C-N	275.7	276.9	277.6	V
N-G	0.0	0.2	0.5	V
TOTAL	276.5	277.8	278.4	V
Unb	0.5	0.5	0.6	%
Current:				
A	132.7	138.2	160.6	A
B	109.7	115.3	136.0	A
C	115.9	122.6	142.2	A
N	4.6	6.2	12.3	A
TOTAL	361.0	376.1	438.8	A
Unb	8.5	10.3	12.9	%
Power:				
A-N	22.58	24.75	29.59	kW
B-N	17.50	19.30	23.52	kW
C-N	21.94	24.28	28.49	kW
TOTAL	63.00	68.33	81.53	kW
Volt-Amps:				
A-N	36.77	38.29	44.40	kVA
B-N	30.59	32.20	37.91	kVA
C-N	32.11	33.95	39.31	kVA
TOTAL	100.1	104.4	121.6	kVA
VA Reactive:				
A-N	27.87	29.14	33.16	kVAR
B-N	24.15	25.64	29.66	kVAR
C-N	22.45	23.62	27.19	kVAR
TOTAL	75.06	78.40	89.92	kVAR
Power Factor:				
A-N	0.61	0.65	0.71	PF
B-N	0.56	0.60	0.67	PF
C-N	0.68	0.71	0.77	PF
TOTAL	0.63	0.65	0.71	PF

Displacement Factor:				
A-N	0.62	0.64	0.70	dPF
B-N	0.57	0.60	0.67	dPF
C-N	0.69	0.71	0.76	dPF
TOTAL	0.63	0.66	0.72	dPF
Current Leads:				
A	-51.9	-49.9	-45.4	
B	-55.4	-53.3	-48.1	
C	-46.6	-44.4	-40.1	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.2	99.5	99.7	%
Zero	1.5	1.7	2.5	%
Neg	7.7	9.6	12.7	%
Voltage THD:				
A-N	3.2	3.4	3.5	%
B-N	3.6	3.8	3.9	%
C-N	3.3	3.5	3.7	%
TOTAL	3.4	3.5	3.7	%
Current THD:				
A	6.6	8.6	9.4	%
B	7.9	10.4	11.4	%
C	6.8	8.9	9.7	%
N	50.1	78.0	175.4	%
TOTAL	7.1	9.3	10.1	%
Derate transformer to:				
TOTAL	98.6	98.8	99.2	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.1	4.6	5.4	K
B	4.0	4.5	6.1	K
C	4.0	4.6	6.4	K
TOTAL	4.1	4.6	5.9	K
3rd Harmonic Volts:				
A-N	0.0	0.1	0.2	%
B-N	0.1	0.1	0.2	%
C-N	0.0	0.1	0.2	%
TOTAL	0.1	0.1	0.2	%
5th Harmonic Volts:				
A-N	2.7	2.9	3.2	%
B-N	3.1	3.2	3.4	%
C-N	3.0	3.2	3.4	%
TOTAL	2.9	3.1	3.3	%
7th Harmonic Volts:				
A-N	1.5	1.7	1.9	%
B-N	1.8	1.9	2.1	%
C-N	1.3	1.5	1.6	%
TOTAL	1.5	1.7	1.9	%
9th Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.0	0.0	0.1	%
C-N	0.0	0.0	0.1	%
TOTAL	0.0	0.0	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	3.780	4.100	4.892	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.1	Hz

80505 ITE May 06 1994 (Fri)

INSTANTANEOUS POWER 7:00:00 AM

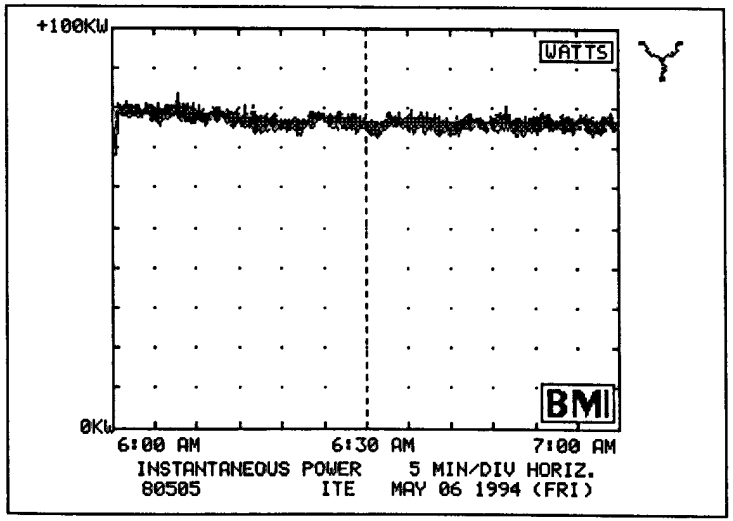
FROM: 6:00 AM May 06 1994 (Fri)
To: 7:00 AM May 06 1994 (Fri)

Total:
MAX: 83.9 kW, 6:07 AM
MIN: 68.4 kW, 6:00 AM

Phase A-N:
MAX: 31.0 kW, 6:07 AM
MIN: 24.9 kW, 6:00 AM

Phase B-N:
MAX: 24.7 kW, 6:07 AM
MIN: 19.1 kW, 6:00 AM

Phase C-N:
MAX: 28.6 kW, 6:06 AM
MIN: 24.3 kW, 6:00 AM



80505 ITE May 06 1994 (Fri)

VOLTAGE THD 7:01:26 AM

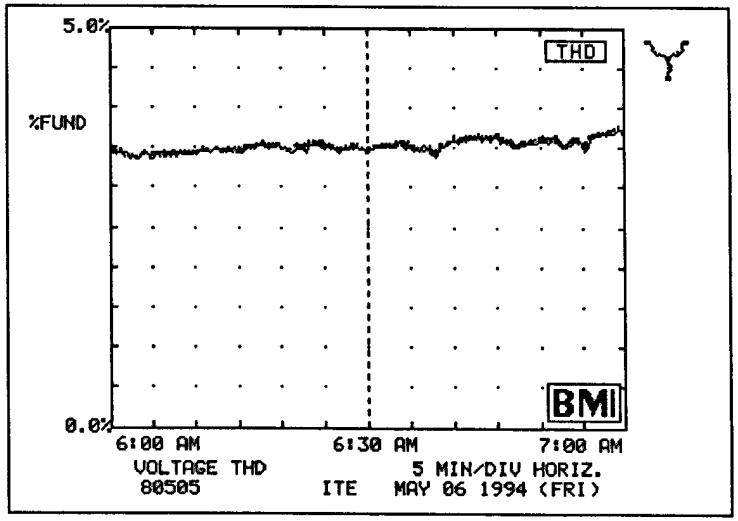
FROM: 6:00 AM May 06 1994 (Fri)
To: 7:00 AM May 06 1994 (Fri)

Average:
MAX: 3.8% THD, 6:59 AM
MIN: 3.4% THD, 6:02 AM

Phase A-N:
MAX: 3.6% THD, 6:59 AM
MIN: 3.2% THD, 6:04 AM

Phase B-N:
MAX: 4.0% THD, 6:59 AM
MIN: 3.6% THD, 6:03 AM

Phase C-N:
MAX: 3.8% THD, 6:59 AM
MIN: 3.3% THD, 6:02 AM



80505 ITE May 06 1994 (Fri)

CURRENT THD 7:01:39 AM

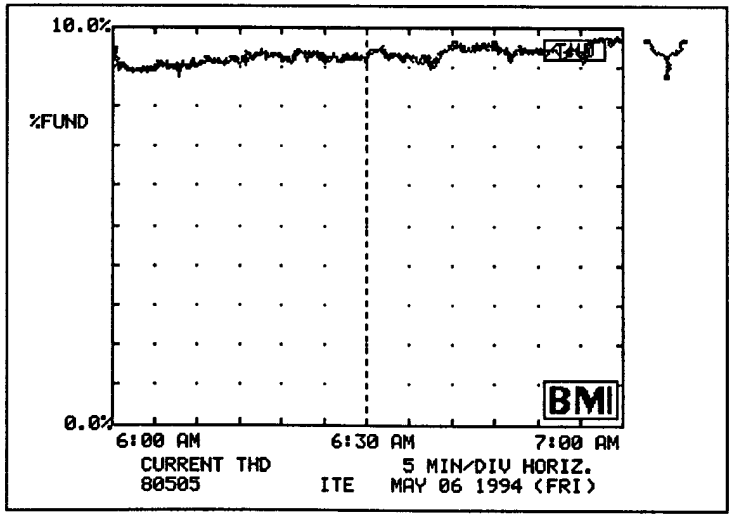
FROM: 6:00 AM May 06 1994 (Fri)
To: 7:00 AM May 06 1994 (Fri)

Average:
MAX: 9.9% THD; 6:59 AM
MIN: 8.8% THD; 6:07 AM

Phase A:
MAX: 9.2% THD; 6:59 AM
MIN: 8.2% THD; 6:07 AM

Phase B:
MAX: 10.8% THD; 6:56 AM
MIN: 9.4% THD; 6:07 AM

Phase C:
MAX: 9.7% THD; 6:58 AM
MIN: 8.6% THD; 6:06 AM



80505 ITE May 06 1994 (Fri)

BMI SUMMARY 7:03:45 AM

FROM: 6:01 AM May 06 1994 (Fri)
To: 7:01 AM May 06 1994 (Fri)

Demand:

Phase	Average	Unit
TOTAL	77.20	kW
TOTAL	0.66	PF

Power Consumption:

Phase	Accumulated	Unit
TOTAL	77.27	kWh
TOTAL	87.35	kVARh
TOTAL	114.0	kQh

Phase	Min	Avg	Max	Unit
Voltage:				
A-N	274.5	275.9	276.6	V
B-N	277.1	278.2	278.8	V
C-N	274.6	275.9	276.6	V
N-G	0.0	0.2	0.5	V
TOTAL	275.4	276.7	277.3	V
Unb	0.5	0.6	0.6	%
Current:				
A	148.1	153.8	162.1	A
B	127.3	131.7	141.2	A
C	132.8	137.3	142.5	A
N	5.2	5.7	6.4	A
TOTAL	408.3	422.7	444.8	A
Unb	8.1	9.1	10.4	%
Power:				
A-N	26.26	27.87	31.01	kW
B-N	21.11	22.45	24.65	kW
C-N	25.46	26.88	28.64	kW
TOTAL	72.96	77.20	83.95	kW
Volt-Amps:				
A-N	40.82	42.42	44.77	kVA
B-N	35.43	36.63	39.27	kVA
C-N	36.59	37.87	39.40	kVA
TOTAL	112.9	116.9	123.1	kVA
VA Reactive:				
A-N	30.96	31.91	33.12	kVAR
B-N	28.02	28.82	30.32	kVAR
C-N	25.83	26.56	27.52	kVAR
TOTAL	85.42	87.29	89.84	kVAR
Power Factor:				
A-N	0.63	0.66	0.69	PF
B-N	0.59	0.61	0.64	PF
C-N	0.69	0.71	0.73	PF
TOTAL	0.64	0.66	0.68	PF

Displacement Factor:				
A-N	0.64	0.66	0.69	dPF
B-N	0.60	0.61	0.63	dPF
C-N	0.70	0.71	0.72	dPF
TOTAL	0.65	0.67	0.69	dPF
Current Leads:				
A	-50.4	-49.1	-46.6	
B	-53.3	-52.3	-50.8	
C	-46.0	-44.8	-43.5	
Voltage Sequence:				
Pos	100.0	100.0	100.0	%
Zero	0.0	0.0	0.0	%
Neg	0.5	0.6	0.6	%
Current Sequence:				
Pos	99.5	99.6	99.8	%
Zero	1.6	1.6	1.7	%
Neg	6.8	8.2	9.5	%
Voltage THD:				
A-N	3.2	3.4	3.6	%
B-N	3.6	3.8	4.0	%
C-N	3.3	3.5	3.8	%
TOTAL	3.4	3.6	3.8	%
Current THD:				
A	8.2	8.7	9.2	%
B	9.4	10.3	10.8	%
C	8.6	9.1	9.7	%
N	49.3	54.3	58.7	%
TOTAL	8.8	9.4	9.9	%
Derate transformer to:				
TOTAL	98.7	98.8	99.0	%
(Eddy current loss set to: 10.0%)				
I*T Product:				
A	4.4	4.7	5.2	k
B	4.2	4.6	5.1	k
C	4.1	4.5	5.1	k
TOTAL	4.3	4.6	5.0	k
3rd Harmonic Volts:				
A-N	0.0	0.1	0.1	%
B-N	0.1	0.2	0.2	%
C-N	0.1	0.2	0.2	%
TOTAL	0.1	0.1	0.2	%
5th Harmonic Volts:				
A-N	2.8	3.0	3.4	%
B-N	3.1	3.4	3.7	%
C-N	3.0	3.3	3.6	%
TOTAL	3.0	3.2	3.5	%
7th Harmonic Volts:				
A-N	1.3	1.5	1.7	%
B-N	1.5	1.7	1.9	%
C-N	1.1	1.3	1.5	%
TOTAL	1.3	1.5	1.7	%
9th Harmonic Volts:				
A-N	0.1	0.1	0.2	%
B-N	0.0	0.1	0.1	%
C-N	0.0	0.1	0.1	%
TOTAL	0.0	0.1	0.1	%

Capacity (NONE A): N/A

Cost/Hour:				
TOTAL	4.378	4.632	5.037	$/Hr
Frequency:				
TOTAL	60.0	60.0	60.0	Hz

APPENDIX J

Backup Data to Cogeneration Analyses

APPENDIX J

Alternatives 1A and 1B Design Bases J-1

Alternatives 2 and 3 Considerations J-2

Alternative 2 Design Basis J-3

Alternative 3 Design Basis J-3

Alternatives 1A and 1B Absorption Chiller Selection J-4

Figure J-1 Fort Huachuca Electrical Demand, March 1993 to March 1994
Maximum kW Demands per Day J-5

Figure J-2 Fort Huachuca Historical Electrical Demand for 1984 to 1994
Maximum Monthly Demands J-5

Solar Turbine Generators and Waste Heat Recovery Boiler Performance Data J-6

Life Cycle Cost Evaluation, Alternatives 1A and 1B J-6

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Cogeneration at Fort Huachuca, Arizona

Alternatives to be Evaluated:

1. Cogeneration facility to serve existing central boiler/chiller plants in Buildings 81504 (North Plant) and 62701 (South Plant), including the expansion of the South Plant currently under construction. The South and North Central Plants are about 1,700 feet apart and already have interconnecting piping installed. The following alternatives are considered:
    a. Separate qualified facilities (QF) under PURPA.
    b. Combined QF under PURPA, tied together with interconnecting hot water (or steam) and chilled water piping.

2. Cogeneration facility with ample capacity to supply electric power required for both Fort Huachuca and the city of Sierra Vista.

3. Cogeneration facility to serve Fort Huachuca only:
    a. Qualified under the Public Utility Regulatory Act (PURPA) of 1978.
    b. As an Exempt Wholesale Generator (EWG) per the Energy Policy Act of 1992.

Alternatives 1A & 1B Design Bases

The system concepts consist of Natural Gas Turbine-Generator Sets, Waste Heat Recovery Steam Boilers, Two-Stage Steam Absorption Chillers for cooling and Steam-to-Hot Water Heat Exchangers for heating. The absorption chiller and waste heat recovery boiler components are sized to match the cooling and heating loads, while the turbine-generator sets are sized as large as possible to fit within PURPA guidelines.

South Central Plant Capacities (Building 62701):

Cooling:	1,500	Tons total design load, including future building expansions
	(400)	Tons available from cold water storage system at peak conditions
	1,100	Tons required capacity to satisfy cooling load
Heating:	11,124	kBTUH total design load, including future building expansions

North Central Plant Capacities (Building 81504):

Cooling:	1,370	Tons total design load; 3,500 Ton-Hours cold water storage available
	(400)	Tons from cold water storage system at peak conditions (assume 8 Hrs use)
	970	Tons required capacity to satisfy cooling load
Heating:	9,545	kBTUH total design heating load (based on 2 HW Boilers of 8,400 kBTUH capacity sized for 88% of total load each.)

Design basis performance is as follows, assuming no diversity of loads:

Alternative 1A1:	1,100	Tons Cooling	11,124	kBTUH Heating
Alternative 1A2:	970	Tons Cooling	9,545	kBTUH Heating
Alternative 1B:	2,070	Tons Cooling	20,669	kBTUH Heating

PURPA requires that useful thermal energy recovered from exhaust must be greater than 5% of the total energy input.

Additionally, PURPA requires electricity generated plus 50% of the useful thermal energy recovered must be equal to or greater than 42.5% of the fuel energy input.

Alternatives 2 & 3 Considerations

Electrical Demands for Fort Huachuca

Based on records made available by Tuscon Electric Power Company, the peak electric power demand for 1993 is listed at 20,148 kW; baseload demand exceeded 90% of the time is 8,745 kW based on recorded hourly demands for the period between 1 March 1993 and 31 March 1994.

Electrical demand for March 1993 through March 1994 is plotted on Figure J-1. Electrical demand values for the last 10 years are shown on Figure J-2. The peak electrical demand is clearly rising year-to-year. The rate of increase is fairly constant, at about 300 kW per year. The difference between base and peak loads has remained essentially constant.

Current and future construction activities for Base Relocation and Closure (BRAC) have been projected to increase electrical demand by about 7 MW. However, with about half the new construction completed now, only about 1.5 MW of the increased load has been realized. This may be explained by older building demolitions and relocation of equipment as new buildings are completed and occupied.

Energy conservation measures currently under construction and several projects which have recently received funding will result in significant additional load reduction.

Feasibility evaluation of a power generation facility for Fort Huachuca must commence with a load study, considering current loads and all planned construction. For the purposes of this effort, a planning horizon of the year 2000 is selected. It is further assumed that the above considerations will increase electrical demand at the historical rate of about 300 kW per year. Thus, the projected electrical load for Fort Huachuca in the year 2000 is:

	Base kW	Peak kW	
Existing Loads	8,745	20,148	
Load Growth	2,100	2,100	(7 years at 300 kW/Year)
Projected Load	10,845	22,248	

Electrical Demands for the City of Sierra Vista

The city of Sierra Vista is supplied power from Sulfur Springs Valley Electrical Cooperative, Inc. (SSVEC). Limited data made available from SSVEC is as follows:

Electrical Demand:	20 to 25 MW
Monthly kWH's:	12 to 14 million
Load Factor:	60%

Sierra Vista is a rapidly growing city. Housing and commercial construction proceeds at a rapid pace. Load growth projections are not available, however, based on observation, the growth is expected to exceed that of Fort Huachuca. For the purposes of this evaluations, a future load of about 30,000 kW is assumed. Thus, the electric demands to be used in evaluations for Sierra Vista are:

	Base kW	Peak kW
Existing Loads	15,000	25,000
Load Growth	5,000	5,000
Projected Load	20,000	30,000

Alternative 2 Design Basis

Cogeneration alternative 2 requires a facility with ample capacity to serve both Fort Huachuca and the city of Sierra Vista. Plant siting is anticipated to be west of the TEP Company Main Fort Huachuca Substation. Refer to Alternatives 1A and 1B calculations for central plant absorption chiller selections and building hot water heating loads. Plant generating capacity is the sum of projected loads for Fort Huachuca and for Sierra Vista:

Projected Load	Base kW	Peak kW
Fort Huachuca	10,845	22,248
Sierra Vista	20,000	30,000
Total Projected Load	30,845	52,248

The facility is conceived to be a combined cycle turbine/generator plant.

Alternative 3 Design Basis

Alternative 3 is conceived as a cogeneration facility to serve Fort Huachuca only. The only thermal loads available at Fort Huachuca are addressed under Alternatives 1A and 1B. The Alternative 3A cogeneration facility configurations, qualified under PURPA, are addressed as Alternatives 1A1, 1A2 and 1B.

Power generation as an Exempt Wholesale Generator (EWG), without cogeneration, is sized based on load projections addressed above for Alternative 2:

	Base kW	Peak kW	
Existing Loads	8,745	20,148	
Load Growth	2,100	2,100	(7 years at 300 kW/Year)
Projected Load	10,845	22,248	

The facility is assumed to be a combined cycle turbine-generator plant.

Natural Gas Transmission Piping Capacity

Southwest Gas Corporation was contacted concerning the adequacy of existing high pressure transmission pipelines to serve possible power generating facilities being investigated.

Alternative 1 cogeneration plant sizes should be able to be served by existing transmission piping. A dedicated 4-inch diameter high pressure pipeline is required between the regulating station and the plant site. The probable site for the Alternative 1 facilities is about 3,000 feet away from the regulating station.

Alternatives 2 and 3 sized cogeneration facilities cannot be served from the existing 4-inch diameter high pressure transmission pipelines. A new, dedicated high pressure pipeline is required from a point about 4.5 miles from possible Alternative 2 and 3 sites.

Costs to install gas transmission piping to each of the alternative generating plants are included in construction cost estimates. While these costs are provided for evaluation purposes in this study, the installation of these pipelines could be borne by the gas company under their Incremental Cost Method.

When using the Incremental Cost Method, the gas company will determine if their investment in such a pipeline could be amortized within a 2 to 4 year period. Gas customers benefiting from such an arrangement would be forced to agree to "Minimum Burn" clauses in supply contracts.

An alternative is to install the pipeline at the project's expense and turn it over to the gas company for operations and maintenance at plant acceptance. Possible rate adjustments could be negotiated with this latter approach.

Alternatives 1A & 1B Absorption Chiller Selection

Based on York, Paraflow Two Stage Steam Absorption Chillers 250 thru 1500 Tons Capacity, Models YPC-ST-14G thru YPC-ST-22G)

Absorption Chiller Selection Calculations		Alternative Number 1A1	1A2	1B	
Number of Chillers Required:	Assume	1	1	2	
Cooling Load (Tons):		1,100	970	2,070	
Leaving Chilled Water Temperature (°F):		44	44	44	44
Entering Condenser Water Temperature (°F):		85	85	85	85
Condenser Water Temperature Rise (°F):		12	12	12	12
% rated capacity at 125 psig steam:		103%	103%	103%	
Rated capacities must equal or exceed (Tons):		1,068	942	1,005	1,005
Chiller Selection: **YPC-ST-**		**20G**	**20G**	**20G**	**20G**
Leaving Condenser Water Temperature (°F):		97	97	97	97
Actual Capacity per LWT & CWT (Tons):		950	950	950	950
Energy Consumption Rates (Actual/Nominal):		0.97	0.97	0.97	0.97
Nominal Condenser Water Flow Rate (gpm):		4,460	4,460	4,460	4,460
Actual Condenser Water Flow Rate (gpm):		4,088	3,605	3,847	3,847
Condenser Water Pressure Drop (Feet of Water):		25	17	22	22
Verify Condenser Water Temperature Rise (°F):		11.97	11.97	11.97	11.97
Nominal Chilled Water Flow Rate (gpm):		2,400	2,400	2,400	2,400
Actual Chilled Water Flow Rate (gpm):		2,640	2,328	2,484	2,484
Chilled Water Pressure Drop (Feet of Water):		28.00	28.00	28.00	28.00
Verify Chilled Water Temperature Drop (°F):		10.00	10.00	10.00	10.00
Nominal Input Energy (Pounds Steam/Ton-Hour):		9.41	9.41	9.41	9.41
Actual Input Energy (Pounds Steam/Hour):		10,039	8,853	9,446	9,446

Waste Heat Boiler Selection Calculations	Alternative Number 1A1	1A2	1B
Absorption Chiller Steam Requirements, 125 psig (Lb/Hr):	10,039	8,853	18,892
Steam Heating Value @ 125 psig Saturated, h_{fg} (BTU/Lb):		868.00	
Chiller Steam Heat Required from Waste Heat Boiler (kBTUH):	8,714	7,684	16,399
Heating Requirements for Existing Plants (kBTUH)	11,124	9,545	20,669
Minimum Steam Needed from Waste Heat Boiler (kBTUH):	**11,124**	**9,545**	**20,669**
Minimum Steam Needed from Waste Heat Boiler (Lb/Hr):	**12,816**	**10,997**	**23,813**

Figure J - 1. Fort Huachuca Electrical Demand March '93 to March '94

Maximum kW Demands per Day

Note reductions each weekend

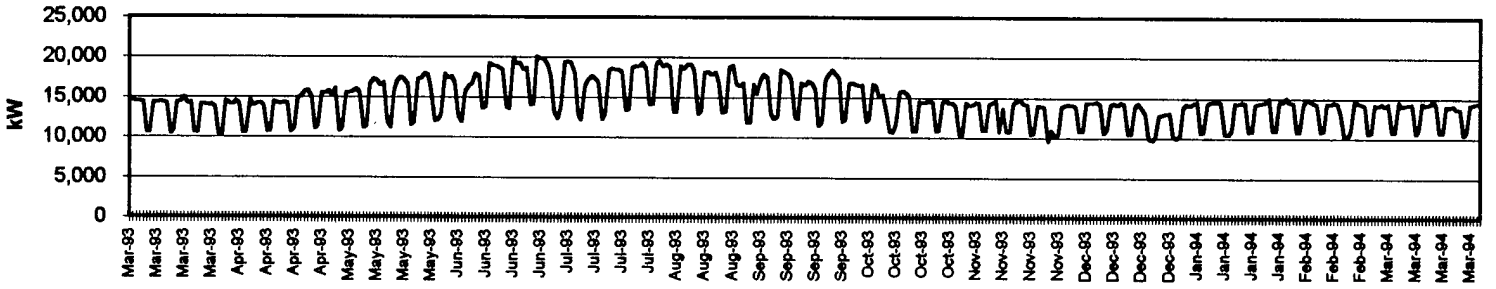
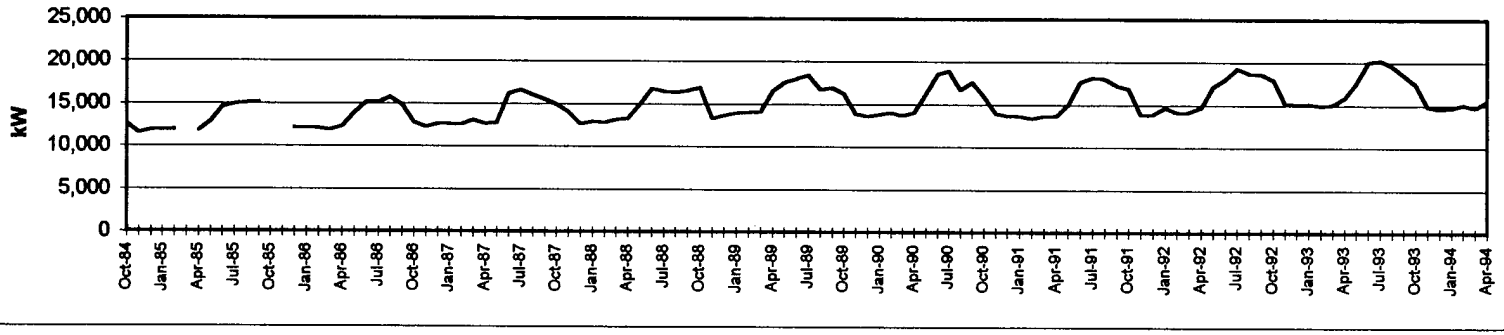


Figure J-2. Fort Huachuca Historical Electrical Demand for 1984 to 1994

Maximum Monthly kW Demands



Solar Turbine/Generators (T/G) and Waste Heat Recovery Boiler Performance Data

	1A1 & 1A2			1B		
Performance:	**Saturn 20**	**Centaur 40**	**Centaur 50**	**Centaur 60**	**Mars 90**	**Mars 100**
Stack Temperature (°F):	310	322	367	311	316	370
Steam Output 150 psig (Lb/Hr):	7,435	18,418	20,790	24,097	40,450	42,125
Steam Output 125 psig (Lb/Hr):	7,600	18,700	23,100	24,400	41,100	46,250
Exhaust Temperature (°F):	915	644	956	906	878	937
Fuel Input (Million BTUH):	15.8	42.2	49.8	54.3	95.9	106.1
Electrical Output (kW):	1,097	3,312	3,914	4,727	8,562	9,739
Air Mass Flow (1,000 Lb/Hr):	50.8	146	145	168	298	305.3
Net System Efficiency (%):	70.2%	70.4%	70.0%	74.1%	72.6%	71.0%

Steam Requirements:	**Tons Clng**	**Lb/Hr Stm**	**Million BTUH Htg**	**Lb/Hr Stm**	**Select Unit**
Alternative 1A1	1,100	10,039	11.12	**12,816**	Centaur 40
Alternative 1A2	970	8,853	9.55	**10,997**	Centaur 40
Alternative 1B	2,070	18,892	20.67	**23,813**	Centaur 60

Heating and Cooling requirements are assumed not to be coincident at peak loading; design basis steam requirements are indicated in **bold** type above.
York YPC-ST-20G, 2-Stage Absorption Chillers will operate at 9.70 Lb/Ton-Hr x 0.97 efficiency factor.

Steam requirements are calculated above assuming 125 psig, h_{f-g} is 868.0 BTU/Lb steam, from product performance data provided by Solar Turbines, Inc..

Alternatives 1: T/G Sizing (Preliminary for PURPA Compliance based on 42.5% Requirement

Heating Degree-Days @ TM 5-785 (Degree-Days/Year):	2,551	
Cooling Degree-Days @ HQ TRADOC FY93 (Degree-Days/Year):	1,595	
Design Heating Temperature Difference (°F):	42	°F
Design Cooling Load Temperature Difference based on a typical bldg (°F):	15.14	°F

Description	**Alternative Number**	**1A1**	**1A2**	**1B**
Maximum Heating Load (kBTUH):		11,124	9,545	20,669
Maximum Cooling Load (kBTUH):		18,000	16,440	34,440
Annual Heating Energy Required (Million BTU/Year):		16,216	13,915	30,130
Annual Cooling Energy Required (Million BTU/Year):		45,511	41,567	87,078
Total Annual Energy Recovery (Million BTU/Year):		61,727	55,481	117,208

Note: The above calculation does not include effects of the thermal storage system because the maximum, or block, cooling loads are used to calculate annual energy use.

Turbine/Generator Heat Rate (Fuel BTU/kWH):	12,742	12,742	11,487

Life Cycle Cost Evaluation Energy Costs, Performance and Discount Factors:

NG Cost for Existing Boilers, including Tax ($/Therm):	$0.4508	CG-35
NG Cost for PURPA QF Turbine/Generators, including Tax ($/Therm):	$0.2758	CG-60
Existing Boiler Efficiency assumed:	75%	
Present Power Demand Cost, including Taxes ($/kW-Year):	$127.84	
Present Power Usage Cost, including Taxes ($/kWH):	$0.0484	
Present Power Cost, Continuous Demand & Usage ($/kWH):	$0.0629	
Existing Centrifugal Chiller Performance assumed (Ton/kW):	1.7267	
Turbine/Generator Cogeneration On-Line Factor:	90%	
UPW Factor, N=20 Years, 3.1% Discount Rate (Natural Gas):	18.58	
UPW Factor, N=20 Years, 3.1% Discount Rate (Electricity):	15.08	
UPW Factor, N=20 Years, 3.1% Discount Rate, (Non-Energy):	14.88	

Alternative Number	1A1	1A2	1B
Avoided Cost of Boiler Heating Fuels ($1,000/Year):	$97	$84	$181
Avoided Cost of Electric Demand Charges @ T/G Set ($1,000/Year):	$381	$381	$544
Avoided Cost of Electric Use @ T/G Set ($1,000/Year):	$1,263	$1,263	$1,802
Avoided Cost of Chiller Electric Use @ $0.0590/kWH ($1,000/Year):	$138	$126	$264
Avoided Cost of Chiller & Boiler Maintenance ($1,000/Year):	$80	$80	$160
T/G Operation & Maintenance Cost $0.004/kWH ($1,000/Year):	($104)	($104)	($149)
WHRB & Chiller O&M (1% per Year of Equip. Cost) ($1,000/Year):	($5.0)	($4.6)	($9.5)
T/G Cogeneration Fuel Cost, including Tax ($1,000/Year):	($918)	($918)	($1,181)
Net Annual Cost Savings ($1,000/Year):	$932	$907	$1,612
Simple Payback (Years):	10.39	10.50	8.58
Savings to Investment Ratio based on the above UPW Factors:	1.16	1.13	1.51

PURPA requirements for qualifying facilities (QF) are: Useful thermal energy recovered from exhaust must be greater than 5% of the total energy input, and the electricity generated plus 50% of the useful thermal energy recovered must be equal to or greater than 42.5% of the fuel energy input.

Checks of PURPA Requirements	Min 5% Useful Thermal Energy:	19%	17%	27%
	Min 42.5% Overall > (Pwr Gen + 1/2 Thermal) ÷ NG:	36%	34%	43%

Conclusion:
Alternatives 1A1 and 1A2 do not meet PURPA QF requirements with the T/G set operating at full load. Alternative 1B, a cogeneration plant serving both central plants, meets PURPA QF requirements and appears to have favorable economics.

Alternative 1C Reciprocating Engine Generator and Absorption Chillers

The Alternative 1B - sized cogeneration facility, utilizing a gas fired turbine-generator set is redeveloped for reciprocating engine-generator sets.

Use of reciprocating engine-generators with absorption chillers requires reengineering of the system from that proposed in Alternative 1B. Reciprocating engines offer heat recovery potential from both jacket cooling water and from the engine exhaust. Jacket water heat recovery is usually low temperature (below about 250°F) while exhaust heat recovery can be at higher temperatures.

As developed for Alternatives 1A1, 1A2 and 1B, cooling and heating requirements a cogeneration facility must satisfy are:

Alternative Number	1A1	1A2	1B
Cooling Load at Existing Plants (Tons)	1,100	970	2,070
Heating Requirements for Existing Plants (kBTUH)	11,124	9,545	20,669

Chilled water can be provided from single and two-stage absorption chillers. Two stage absorption chillers require high pressure steam, single stage absorption chillers require only about 15 psig steam. Single stage absorption chillers require about twice the steam as 2-stage absorption chillers.

York previously offered an YPC-HR series of heat recovery absorption chillers that provided both hot water and chilled water when coupled directly to an internal combustion engine's exhaust and jacket cooling water. Unfortunately, this line has been discontinued. A cogeneration system providing chilled and hot water from a gas engine-generator set now requires separate heat recovery boilers and absorption chillers.

After discussing system requirements with several engine-generator set manufacturers, it appears that the best gas fired engine-generator set choice for reliability and cost is the Waukesha Model VHP7100GSI in continuous duty.

Three configurations for this engine-generator set are evaluated. The first (Alternative 1C1) employs low pressure steam production in ebullient cooled engines. Heat recovery boilers are installed to generate 15 psig steam for use in single stage absorption chillers (3 each, Carrier Models 16JB068). See Figure J-3.

The second configuration (Alternative 1C2) uses the same engine-generator set with high pressure steam production to feed 2-stage steam absorption chillers (2 each, York Models YPC-ST-20G). See Figure J-4.

The third configuration (Alternative 1C3) is a combination of the first two. High pressure steam is generated fro exhaust gasses and low pressure steam is generated from jacket cooling water. The high pressure steam is used in a 2-stage absorption chiller (one York Model YPC-ST-21G) while the lower pressure steam from jacket cooling water is used in single stage absorption chillers (2 each, Carrier Models 16JB047). See Figure J-5.

Alternative Number	1C1	1C2	1C3
Model Number	**L7042GSI**	**VHP7100GSI**	**L7042GSI**
	Ebullient Cooled	Standard	Ebullient Cooled
RPM	**1,200**	**1,200**	**1,200**
Power Rating kW	1,100	1,100	1,100
BMEP	145	-	145
NG Fuel 100% Load kkBTUH	12.185	12.234	12.185
Exhaust LB/Hr	10,420	10,467	10,420
Exhaust Temp °F	1,160	1,161	1,160
Specific Heat (Assumed)	0.265	0.265	0.265
Interconnection Eff (Assumed)	97%	97%	97%
Jacket Water (kBTUH)	3,500	3,543	3,530
Heat Rate (Fuel BTU/kWH):	11,077	11,122	11,077

Alternative Number	1C1	1C2	1C3
Jacket CW Heat Available for 15 psig Steam (kBTUH):	3,500	not used	3,530
Jacket CW 15 psig Steam based on h_{f-g} (Lb/Hr):	3,704	not used	3,735
Equiv. Cooling from Jacket CW, 18.0 Lb / Ton-Hr (Tons):	206	not used	208
Exhaust Heat Recovery Steam Generated at 125 psig per h_{f-g} of 848 BTU / Lb (Lb / Hr):	not used	2,494	2,479
Exhaust Heat Recovery Steam Generated at 15 psig per h_{f-g} of 945 BTU / Lb (Lb / Hr):	2,448	not used	not used
Equivalent Cooling Available from Exhaust at 9.41 Lb / Ton-Hr (Tons):	not used	265	264
Equivalent Cooling Available from Exhaust at 18.00 Lb / Ton-Hr (Tons):	136	not used	not used
Total Cooling Available per Engine-Generator Set (Tons):	341.8	265.0	471.0

Recoverable Heat from Exhaust and/or Jacket Cooling Water by Waste Heat Boiler

Recoverable Heat in Exhaust & Jacket kBTUH	5,814	2,115	5,527
	incl Jacket	not incl Jacket	incl Jacket
	Vendor Performance		
From consideration of Absorption Chiller Selection (see below)			
Steam Pressure (psig):	15	125	15 &125
Peak Steam Needed kBTUH	35,211	16,516	see above
Number Units Needed	6.1	7.8	4.4
Rounded Up:	6.0	8.0	5.0
Recoverable Tons per E/G Unit	341.8	265.0	471.0

Life Cycle Cost Evaluation Energy Costs, Performance and Discount Factors:

NG Cost for Existing Boilers, including Tax ($/Therm):	$0.4508	CG-35
NG Cost for PURPA QF Turbine/Generators, including Tax ($/Therm):	$0.2758	CG-60
Existing Boiler Efficiency assumed:	75%	
Present Power Demand Cost, including Taxes ($/kW-Year):	$127.84	
Present Power Usage Cost, including Taxes ($/kWH):	$0.0484	
Present Power Cost, Continuous Demand & Usage ($/kWH):	$0.0629	
Existing Centrifugal Chiller Performance assumed (Ton/kW):	1.7267	
Turbine/Generator Cogeneration On-Line Factor:	90%	
UPW Factor, N=20 Years, 3.1% Discount Rate (Natural Gas):	18.58	
UPW Factor, N=20 Years, 3.1% Discount Rate (Electricity):	15.08	
UPW Factor, N=20 Years, 3.1% Discount Rate, (Non-Energy):	14.88	

Alternative Number	1C1	1C2	1C3
Avoided Cost of Boiler Heating Fuels ($1,000/Year):	$181	$181	$181
Revenue (Avoided Cost) of Demand @ Engine/Gen Set ($1,000/Year):	$423	$665	$334
Revenue (Avoided Cost) from Engine/Generator Set ($1,000/Year):	$1,401	$2,203	$1,105
Avoided Cost of Chiller Electric Use @ $0.0618/kWH ($1,000/Year):	$265	$265	$265
Avoided Cost of Chiller & Boiler Maintenance ($1,000/Year):	$160	$160	$160
Engine-Gen Operation & Maintenance Cost $0.006/kWH ($1,000/Yr):	($173.9)	($273.4)	($137.2)
HtRB & Chiller O&M (1% per Year of Equip. Cost) ($1,000/Year):	($15.6)	($28.4)	($18.5)
Engine/Generator Cogeneration Fuel Cost, including Tax ($1,000/Year):	($886)	($1,398)	($699)
Net Annual Cost Savings ($1,000/Year):	$1,355	$1,774	$1,190
Simple Payback (Years):	7.64	8.21	8.45
Savings to Investment Ratio based on the above UPW Factors:	1.74	1.55	1.60
Checks of PURPA Requirements Min 5% Useful Thermal Energy:	36%	23%	46%
Min 42.5% Overall > (Pwr Gen + 1/2 Thermal) ÷ NG:	49%	42%	54%

Assume the engine generators, absorption chillers and heat exchange equipment operate to follow the heating and cooling loads. Since the available records of energy use do not include all facilities that the North and South Central Plants were designed for, base future energy consumption on design heating and cooling requirements weighted by heating and cooling degree days per month.

Heating design load 20,669 kBTUH, Cooling design load is 2,870 Tons not including thermal storage which reduces unit capacities required to satisfy peak loads. Building design temperatures are as follows assuming that heating 97.5% and cooling 2.5% values are used:

	Inside	Outside	Delta T
Summer	75	92	15.1
Winter	70	28	42

CLTD, Calculated for a typical building, includes consideration of solar effects

Month	HDD	CDD	Heat kkBTU/Mo	Cool kkBTU/Mo
Jan	576	0	6,803	0
Feb	430	0	5,079	0
Mar	349	3	4,122	164
Apr	155	30	1,831	1,638
May	35	147	413	8,025
Jun	1	387	12	21,128
Jul	0	397	0	21,674
Aug	0	324	0	17,689
Sep	6	233	71	12,721
Oct	89	73	1,051	3,985
Nov	326	2	3,850	109
Dec	545	0	6,437	0
Total	2,512	1,596	29,670	87,133

7,261,062 Ton-Hours per Year Cooling Needed

Installation of multiple engine generator sets will allow operations at near optimum efficiency for all loads. For the purposes of analysis, assume average loading is 100% for the Engine-Generator.

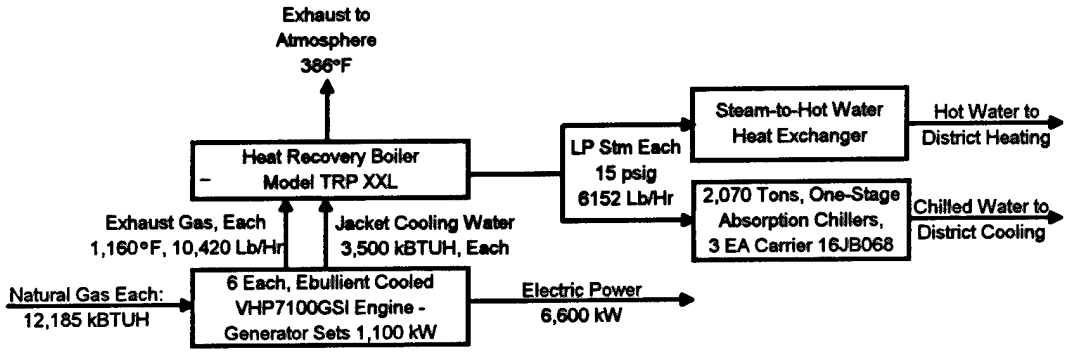
Alternative Number		1C1	1C2	1C3
Engine generator set fuel consumption to provide heating:				
	Equivalent Hours of Operation	5,103	14,030	5,368
	Million BTU/Year Fuel	62,185	171,639	65,414
	per Year Fuel Cost @ CG-60	$171,532	$473,450	$180,438
Engine generator set fuel consumption to provide cooling:				
	Equivalent Hours of Operation	21,245	27,395	15,415
	Million BTU/Year Fuel	258,870	335,155	187,829
	per Year Fuel Cost @ CG-60	$714,067	$924,491	$518,107

Alternative 1C1: Single Stage Absorption Chiller Selection & Performance Calculations

Carrier Model16JB (70 to 815 Tons) Hermetic Absorption Chiller

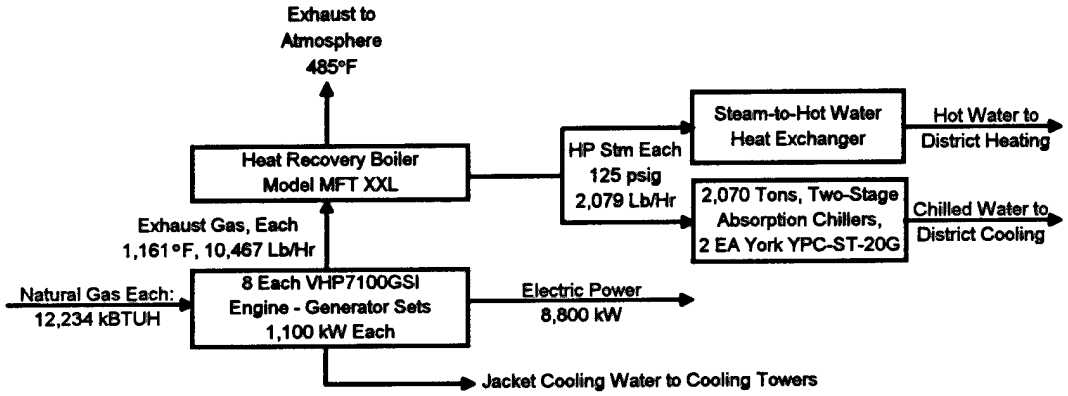
Capacity Required (Tons):	2,070	
Number of Units Needed:	3	
Unit Capacity Needed (Tons):	690	
Unit Capacity (Nominal):	618	
Entering Chilled Water Temp ECHWT (°F):	54	
Leaving Chilled Water Temp LCHWT (°F):	44	
Chilled Water Quantity/Unit (GPM):	1,657	
Available Steam Pressure (psig):	15	
Steam Pressure at Unit (psig):	12	
Pressure Drop Through Valve (psig):	3	
Entering Condenser Water Temp ECWT (°F):	85	
Absorber-Condenser Fouling Factor:	0.0005	
Evaporator Fouling Factor:	0.0005	
Selection		
Unit Tentative Selection:	**Unit 16JB068 from Nominal Capacity Data (Table)**	
Condenser Water Required (GPM):	2,228	interpolated from selection data table, page 16
Pressure Drops		
3 Pass Evaporator ΔP (Ft):	off chart	
2 Pass Evaporator ΔP (Ft):	55.0	
1 Pass Evaporator ΔP (Ft):	10.0	
Absorber-Condenser ΔP (Ft):	30.0	
Steam Rate & Steam Consumption		
Base Steam Rate Adjustment Factor	1.00	
Adjusted Steam Rate (Lb / Ton-Hr):	18.00	1,670 Tons
Steam Consumption (Lb / Hr):	12,420	per unit (total 3 units)
Condensing Water Temperature Rise		
Temperature Rise (°F):	18.0	
Steam Control Valve Size	6A	
Cost (Equipment) based on conversation with Manufacturer's representative:	$300	per Ton of Refrigeration
Total Material Cost for Chillers, ($ Each):	$185,400	Each
Labor Cost to Install, Means 157-110-0500 adjusted for sub OH&P and location:	$84,402	Each
Condenser Water Cooling Tower (Tons)	9,278	for three Absorption Chiller units

Figure J-3. Cogeneration Alternative 1C1:
Ebullient Cooled Engine Generator with Heat Recovery and Single Stage Absorption Chilling



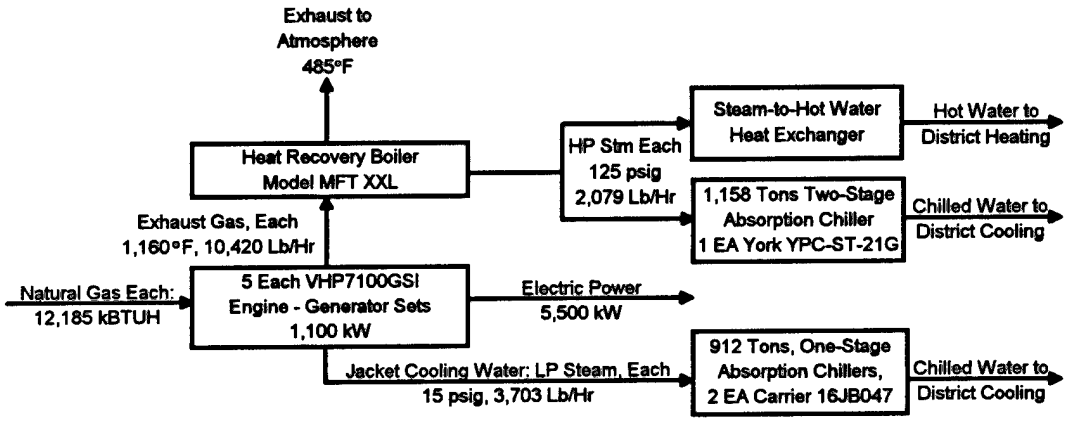
Natural Gas Consumed (Million BTU per Year):	321,055	Construction Cost:	$9.24	Million	
Electric Power Generated (kWH per Year):	28,983,255	SIR: 1.74	Payback:	7.64	years

Figure J-4. Cogeneration Alternative 1C2:
Gas Engine Generator with Exhaust Heat Recovery and Two Stage Absorption Chilling



Natural Gas Consumed (Million BTU per Year):	506,794	Construction Cost:	$13.00	Million	
Electric Power Generated (kWH per Year):	45,567,566	SIR: 1.55	Payback:	8.21	years

Figure J-5. Cogeneration Alternative 1C3:
Ebullient Cooled Engine Generator with Exhaust and Jacket Heat Recovery, One & Two Stage Absorption Chilling



Natural Gas Consumed (Million BTU per Year):	253,243	Construction Cost:	$8.98	Million	
Electric Power Generated (kWH per Year):	22,861,476	SIR: 1.60	Payback:	8.45	years

Table J-1
Summary of Life Cycle Cost Analyses of Cogeneration Serving Central Heating/Cooling Plants

Description of Cash Flow / Economic Measure	Gas Turbine-Generators and Absorption Chillers			Gas Engine-Generators and Absorption Chillers		
	South Plant Alternative 1A1	North Plant Alternative 1A2	Both Plants Alternative 1B	Both Plants Alternative 1C1	Both Plants Alternative 1C2	Both Plants Alternative 1C3
Generating Capacity (kW):	3,312	3,312	4,727	6,600	8,800	5,500
Construction Cost:	$8,645,204	$8,497,338	$12,340,365	$9,237,615	$12,999,342	$8,981,949
Investment:	**$9,682,629**	**$9,517,018**	**$13,821,209**	**$10,346,129**	**$14,559,263**	**$10,059,783**
Investment per kW	$2,923	$2,873	$2,924	$1,568	$1,654	$1,829
Energy Costs and Avoided Costs:						
Avoided Cost of Boiler Heating Fuels ($/Year):	$97,467	$83,636	$181,102	$181,102	$181,102	$181,102
Avoided Cost of Electric Demand Charges @ T/G Set ($/Year):	$381,065	$381,065	$543,870	$422,970	$664,995	$333,631
Avoided Cost of Electric Use @ T/G Set ($/Year):	$1,262,506	$1,262,506	$1,801,892	$1,401,340	$2,203,192	$1,105,352
Avoided Cost of Chiller Electric Use @ $0.0590/kWH ($/Year):	$138,156	$126,183	$264,339	$264,505	$264,505	$264,505
Cogeneration Fuel Cost, including Tax ($/Year):	($917,733)	($917,733)	($1,180,874)	($885,599)	($1,397,941)	($698,545)
Total Energy Costs and Avoided Costs ($/Year):	**$961,462**	**$935,657**	**$1,610,329**	**$1,384,319**	**$1,915,853**	**$1,186,046**
Annual Operation & Maintenance ($/Year):						
Avoided Cost of Chiller & Boiler Maintenance ($/Year):	$80,000	$80,000	$160,000	$160,000	$160,000	$160,000
Gen Set Operation & Maintenance Cost $0.004/kWH ($/Year):	($104,447)	($104,447)	($149,071)	($173,900)	($273,405)	($137,169)
Heat Recovery Boiler & Chiller O&M (1% Equip Cost, ($/Year):	($5,012)	($4,612)	($9,533)	($15,631)	($28,370)	($18,483)
Total Annual Operations & Maintenance Costs	**($29,459)**	**($29,059)**	**$1,396**	**($29,531)**	**($141,775)**	**$4,348**
Economic Evaluation Measures:						
Simple Payback Period (Years):	10.39	10.50	8.58	7.64	8.21	8.45
Total Net Discounted Savings ($):	$11,189,562	$10,757,971	$20,805,335	$17,970,366	$22,522,513	$16,139,226
Savings to Investment Ratio:	1.16	1.13	1.51	1.74	1.55	1.60

Alternatives Investigated Include:

Alternative 1A1	Gas Turbine-Generator Cogeneration Facility serving Fort Huachuca's South Central Heating/Cooling Plant.
Alternative 1A2	Gas Turbine-Generator Cogeneration Facility serving Fort Huachuca's North Central Heating/Cooling Plant.
Alternative 1B	Gas Turbine-Generator Cogeneration Facility serving both South & North Central Heating/Cooling Plants.
Alternative 1C1	Gas Engine-Generator Cogeneration Facility serving both Central Heating/Cooling Plants: Ebullient Cooled, Single-Stage Absorption Chilling.
Alternative 1C2	Gas Engine-Generator Cogeneration Facility serving both Central Heating/Cooling Plants: Two-Stage Absorption Chilling.
Alternative 1C3	Gas Engine-Generator Cogeneration Facility serving both Central Heating/Cooling Plants: Ebullient Cooled, Single & Two-Stage Absorption Chilling.

Cogeneration Alternatives 2 & 3 Energy Calculations

Cogeneration Alternatives 2 & 3 Generating Capacities

Description	Fort Huachuca in 1993	Alternative No. 2	Alternative No. 3
Peak Electrical Demand (kW):	20,148	52,248	22,248
Base Electrical Demand (kW):	8,745	30,845	10,845

Averages of loads and durations for Fort Huachuca from 1 March 1993 through 31 April 1994, based on data provided by TEP:

Power Generation & Standby Requirements: Cogeneration Alternatives 2 & 3

Scheduled Outages: 1.3% **Unscheduled Outages: 0.4%**

TEP kWH/Year = standby power requirements from TEP for scheduled and unscheduled downtime.

Fort Huachuca 1993 kW	% Time	Alt 2 kW	Alt 2 On-Line kWH/Year	Alt 2 TEP kWH/Year	Alt 3 kW	Alt 3 On-Line kWH/Year	Alt 3 TEP kWH/Year
8,000	0.14%	28,217	333,066	5,720	10,100	119,217	2,047
9,000	28.78%	30,161	74,761,303	1,283,914	11,100	27,514,229	472,516
10,000	8.36%	32,104	23,115,744	396,978	12,100	8,712,249	149,620
11,000	22.76%	34,048	66,744,161	1,146,232	13,100	25,680,038	441,016
12,000	4.80%	35,991	14,868,961	255,352	14,100	5,825,085	100,037
13,000	10.69%	37,935	34,925,893	599,800	15,100	13,902,299	238,751
14,000	10.13%	39,878	34,796,204	597,573	16,100	14,048,210	241,257
15,000	7.39%	41,822	26,619,056	457,143	17,100	10,883,933	186,915
17,000	5.00%	45,709	19,672,076	337,839	19,100	8,220,220	141,170
18,500	1.61%	48,624	6,754,834	116,004	20,600	2,861,741	49,146
19,500	0.34%	50,568	1,469,244	25,232	21,600	627,589	10,778
Totals	**100%**		**304,060,541**	**5,221,787**		**118,394,811**	**2,033,255**
Averages		**35,306**	**including standby**		**13,747**	**including standby**	

Natural Gas Fuel Requirements for Cogeneration Alternatives 2 & 3

Alternative 2 - Vendor Response from Solar Turbines:

Peak Load: 4 x Mars 100 Gas Turbine/Generator Sets, with 29.6 MW
Duct Fired Heat Recovery Steam Turbine/Generator Set 24.1 MW
Internal Plant Load allowance (1.5 MW)
Production: 52.2 MW 8,870 BTU/kWH Heat Rate

Base Load: 3 x Mars 100 Gas Turbine/Generator Sets, with 22.2 MW
Heat Recovery Steam Turbine/Generator Set (Not Fired), incl losses 8.6 MW
Production: 30.8 MW 8,203 BTU/kWH Heat Rate

Alternative 3 - Vendor Response from Solar Turbines:

Peak Load: 2 x Mars 100 Gas Turbine/Generator Sets, with 14.8 MW
Duct Fired Heat Recovery Steam Turbine/Generator Set 7.9 MW
Internal Plant Load allowance (0.5 MW)
Production: 22.2 MW 8,008 BTU/kWH Heat Rate

Base Load: 1 x Mars 100 Gas Turbine/Generator Set, with 7.9 MW
Duct Fired Heat Recovery Steam Turbine/Generator Set, incl. losses 2.9 MW
Production: 10.8 MW 8,292 BTU/kWH Heat Rate

Cogeneration Alternatives 2 & 3 Natural Gas Consumption

Demand kW			Heat Rates (BTU/kWH)		Fuel Use (Million BTU/Year)	
Alt 2	Alt 3	% Time	Alt 2	Alt 3	Alt 2	Alt 3
28,217	10,100	0.14%	8,123	8,309	2,705	991
30,161	11,100	28.78%	8,183	8,285	611,777	227,942
32,104	12,100	8.36%	8,244	8,260	190,558	71,960
34,048	13,100	22.76%	8,304	8,235	554,259	211,467
35,991	14,100	4.80%	8,365	8,210	124,376	47,823
37,935	15,100	10.69%	8,425	8,185	294,264	113,789
39,878	16,100	10.13%	8,486	8,160	295,279	114,633
41,822	17,100	7.39%	8,547	8,135	227,501	88,541
45,709	19,100	5.00%	8,668	8,085	170,511	66,462
48,624	20,600	1.61%	8,759	8,048	59,163	23,031
50,568	21,600	0.34%	8,819	8,023	12,957	5,035
Totals	**Totals**	100.00%			2,543,350	971,674

Cogeneration Alternatives 2 & 3 Life Cycle Cost Analyses

Life Cycle Cost Evaluation Energy Costs, Performance and Discount Factors:

Natural Gas Cost for Existing Boilers, including Tax ($/Therm):	$0.4508	CG-35
Natural Gas Cost for PURPA QF Turbine/Generators, including Tax ($/Therm):	$0.2758	CG-90
Existing Boiler Efficiency assumed:	75%	
Present Power Demand Cost, including Taxes ($/kW-Year):	$127.84	
Present Power Usage Cost, including Taxes ($/kWH):	$0.0484	
Present Power Cost, Continuous Demand & Usage ($/kWH):	$0.0629	
Sierra Vista Sales - comparable cost to similar generators, adjusted ($/kWH):	$0.0550	See Note
Existing Centrifugal Chiller Performance assumed (Ton/kW):	1.7267	
Turbine/Generator Cogeneration On-Line Factor:	98%	
UPW Factor, N=20 Years, 3.1% Discount Rate (Natural Gas):	18.58	
UPW Factor, N=20 Years, 3.1% Discount Rate (Electricity):	15.08	
UPW Factor, N=20 Years, 3.1% Discount Rate, (Non-Energy):	14.88	

Annual Energy Avoided Costs, Revenues and Expenses

Power Sales Revenue

	Alternative 2	Alternative 3
Avoided cost of purchased power from TEP for Fort Huachuca, present rates:	$7,447,034	$7,447,034
Revenue expected from sales to Sierra Vista Municipal Power Authority (See note):	$10,211,615	$0
Total Power Sales Revenue	$17,658,649	$7,447,034

Note: The Sierra Vista Power Authority is not yet formed; it is assumed that it will be for this project. The Sulfur Springs Valley Electrical Cooperative presently provides power to Sierra Vista customers.
Rates are: $14.53 per kW-Mo Demand, and $0.026 per kWH Use: **Commercial**
$0.116 per kWH Use: **Residential**
Assuming an even split between commercial and residential: $0.0810 per kWH

This, however, is a retail rate, not available to a Power Wholesaler. A more reasonable rate is based on that charged by U.S. Generating Company, an independendent power producer, into the power grid of $0.0350 per kWH. Added to this charge is the cost of wheeling, at an additional $0.020 per kWH, for a total charge of about: $0.0550 per kWH.

Standby Power Rates

TEP's Standby $/kW-Month = $\frac{\$15.56 \times kW\ Contracted \times Unscheduled\ Maintenance\ Hrs\ per\ Year}{8{,}760\ Hrs\ per\ Year - Hrs\ per\ Year\ Scheduled\ Maintenance}$

From IEEE/ANSI Std 493-1990, Appendix L Diesel and Gas-Turbine Generating Units Reliability Survey:

Average Number Forced Outages per Year per Unit:	4.5	(Unscheduled Outages)
Average Duration of Forced Downtime per Occurrence per Unit:	7.2	Hours
Average Number Maintenance Events per Year:	5.5	(Scheduled Outages)
Average Duration of Maintenance Events:	21	Hours

Alternative 2 (4 T/G Units)
Standby Charge (Calculated) = .014992 x $15.56 = $0.23328 per kW-Month

Alternative 3 (2 T/G Units)
Standby Charge (Calculated) = .007397 x $15.56 = $0.11510 per kW-Month

For the first year, TEP requires a factor of 0.18, thus first year charges are:
0.1800 x $15.56 = $2.80080 per kW-Month

Standby Power Consumption is charged at a rate of: $0.0219 per kWH

Standby Power Demand Requirements and Costs

		Cogeneration Alternative 2			Cogeneration Alternative 3		
	Ft. Huachuca	Demand	First Year	Subsequent	Demand	First Year	Subsequent
Month	'93 Max kW	Max kW	($/Year)	($/Year)	Max kW	($/Year)	($/Year)
April	16,077	46,543	$130,357	$10,857	18,123	$50,758	$4,228
May	17,994	52,092	$145,901	$12,152	20,284	$56,811	$4,732
June	20,148	58,328	$163,366	$13,607	22,712	$63,611	$5,298
July	19,485	56,409	$157,990	$13,159	21,964	$61,518	$5,124
August	19,527	56,531	$158,331	$13,187	22,012	$61,651	$5,135
September	18,477	53,491	$149,817	$12,478	20,828	$58,336	$4,859
October	16,605	48,071	$134,638	$11,214	18,718	$52,425	$4,367
November	14,766	42,747	$119,727	$9,972	16,645	$46,619	$3,883
December	14,505	41,992	$117,611	$9,796	16,351	$45,795	$3,814
January	14,952	43,286	$121,235	$10,098	16,855	$47,206	$3,932
February	15,054	43,581	$122,062	$10,167	16,970	$47,528	$3,959
March	14,634	42,365	$118,657	$9,883	16,496	$46,202	$3,848
Average	12,196	35,306			13,747		
Totals			**$1,639,691**	**$136,570**		**$638,462**	**$53,177**

Standby Power Usage Costs

Based on the above rates and standby power calculations:

Alternative 2: $114,357 per year for standby power consumption
Alternative 3: $44,528 per year for standby power consumption

Annual Cost of Natural Gas Fuels

Based on the above estimates and pricing:

Alternative 2: $7,015,578
Alternative 3: $2,680,266

Operation and Maintenance Costs

Operation and Maintenance for combined cycle gas turbine/generator are expensed at a cost of about:
$0.004 per kWH generated, according to design/builders of these types of packaged power plants.
Based on the estimated power generated for each option, annual non-energy operation and maintenance costs are:

	Alternative 2	Alternative 3
Operation and Maintenance Costs ($/Year)	$1,237,129	$481,712

Annual Cash Flow Summary	**Alternative 2**	**Alternative 3**
Total Power Sales Revenue	$17,658,649	$7,447,034
Standby Power Connection Charges (Cost after first year):	($136,570)	($53,177)
Standby Power Usage (Cost)	($114,357)	($44,528)
Natural Gas Fuel (Cost):	($7,015,578)	($2,680,266)
Operation and Maintenance Costs	($1,237,129)	($481,712)
Total Annual Cash Flow	**$9,155,015**	**$4,187,349**

Cogeneration Alternatives 2 & 3 with Excess Power Sales to Grid

The alternatives evaluated from the calculations above generate power to match loads of Fort Huachuca and Sierra Vista. The following scenario evaluates these alternatives based on running the power plants at rated capacities and selling excess power generated to the grid.

Power Sales Revenue	**Alternative 2**	**Alternative 3**
Power Generated: At rated capacities, Alternative 2 and 3 (kW):	52,248	22,248
On-Line Factor (assume same as above):	98%	98%
Total Power Generated per Year: (kWH/Year):	449,965,001	191,602,001
Total Power Generated to match design electric loads (kWH/Year):	-304,060,541	-118,394,811
Net Power Generated Available for Sales to Grid (kWH/Year):	145,904,460	73,207,190
Value of Power (assumed same as to Sierra Vista, less wheeling credit, $/kWH):	$0.035	$0.035
Annual Additional Power Sales Revenue ($/Year)	$5,106,656	$2,562,252

Standby power connection charges and standby power usage costs will remain the same as the above alternatives.

Natural Gas Fuel Costs	**Alternative 2**	**Alternative 3**
Natural gas usage will change to correspond to the higher generating rate (kW):	52,248	22,248
Heat Rate at rated capacity (BTU/kWH):	8,870	8,008
On-Line Factor (assume same as above):	98%	98%
Annual Fuel Consumption (Million BTU/Year):	3,991,190	1,534,349
Fuel Cost ($/Million BTU):	$2.758	$2.758
Annual Natural Gas Fuel Cost ($/Year):	**$11,009,297**	**$4,232,348**

Operation and Maintenance Costs	**Alternative 2**	**Alternative 3**
Assume the same rate as the above alternatives ($/kWH):	$0.004	$0.004
Total power generated (kWH/Year)	449,965,001	191,602,001
Annual Operation & Maintenance Costs ($/Year):	**$1,799,860**	**$766,408**

Annual Cash Flow Summary	**Excess Power Sales**	
	Alternative 2	**Alternative 3**
Power Avoided Cost to Fort Huachuca:	$7,447,034	$7,447,034
Power Sales to Sierra Vista:	$10,211,615	$0
Power Sales to Grid:	$5,106,656	$2,562,252
Standby Power Connection Charges (Cost after first year):	($136,570)	($53,177)
Standby Power Usage (Cost)	($114,357)	($44,528)
Natural Gas Fuel (Cost):	($11,009,297)	($4,232,348)
Operation and Maintenance Costs	($1,799,860)	($766,408)
Total Annual Cash Flow	**$9,705,221**	**$4,912,824**

Table J-2.
Summary of Life Cycle Cost Analyses of Power Generation Serving Fort Huachuca and Sierra Vista

Description of Cash Flow / Economic Measure	Alternative 2	Alternative 3	Alt 2 Max	Alt 3 Max
Generating Capacity (kW):	52,248	22,248	52,248	22,248
Construction Cost:	$50,549,415	$34,120,962	$50,549,415	$34,120,962
Investment:	**$56,615,344**	**$38,215,478**	**$56,615,344**	**$38,215,478**
Investment per kW	$1,084	$1,718	$1,084	$1,718
Power Sales Revenues:				
Fort Huachuca ($/Year):	$7,447,034	$7,447,034	$7,447,034	$7,447,034
Sierra Vista ($/Year):	$10,211,615	$0	$10,211,615	$0
Power Grid ($/Year):	$0	$0	$5,106,656	$2,562,252
Total Power Sales ($/Year):	**$17,658,649**	**$7,447,034**	**$22,765,305**	**$10,009,285**
Standby Power Costs (to provide service to Sierra Vista and Fort Huachuca during plant outages)				
Standby Service ($/Year):	($136,570)	($53,177)	($136,570)	($53,177)
Standby Power Use ($/Year):	($114,357)	($44,528)	($114,357)	($44,528)
Total Standby Cost ($/Year)	**($250,927)**	**($97,706)**	**($250,927)**	**($97,706)**
Standby Service Costs 1st Year:	($1,503,122)	($585,284)	($1,503,122)	($585,284)
Annual Operation & Maintenance ($/Year):	**($1,237,129)**	**($481,712)**	**($1,799,860)**	**($766,408)**
Economic Evaluation Measures:				
Simple Payback Period (Years):	6.24	9.19	5.88	7.83
Total Net Discounted Savings ($)	$112,307,533	$53,298,768	$106,739,162	$58,863,574
Savings to Investment Ratio:	1.98	1.39	1.89	1.54

Alternatives investigated include:

Alternative 2 Facility serving Fort Huachuca and Sierra Vista. Power generation matching load.
Alternative 3 Facility serving Fort Huachuca only. Power generation matching load.
Alternative 2 Max Facility serving Fort Huachuca and Sierra Vista. Power generation at maximum capacity.
Alternative 3 Max Facility serving Fort Huachuca only. Power generation at maximum capacity.

CONSTRUCTION COST ESTIMATE	Date Prepared January 1995	Sheet 1 Of 3

Project	Project No.	Basis for Estimate
ECIP Facility Energy Improvements		
Location: Fort Huachuca, Arizona		Code A (no design competed)
Engineer-Architect: Keller & Gannon		
Drawing No.: Cogeneration Alternatives 1A1, 1A2 & 1B	Estimator: BIH	Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Cogeneration Alternative 1A1							
T/G Set, Switchgear & WHRB @ $1,000/kW from Solar	3,312	kW	$333	$1,104,000	$667	$2,208,000	$3,312,000
Absorption Chiller @ $800/Ton Installed	1,100	Tons	$400	$440,000	$400	$440,000	$880,000
Cooling Tower for Chiller 2,000 Tons	1	EA	$85,640	$85,640	$42,820	$42,820	$128,460
Cooling Tower Basin	1	EA	$10,000	$10,000	$5,000	$5,000	$15,000
Steam-to-Hot Water Heat Exchanger	1	EA	$26,667	$26,667	$13,333	$13,333	$40,000
Pipe, 2-1/2-inch, Schedule 80, Welded	3,000	LF	$4.04	$12,123	$3.59	$10,778	$22,902
Trenching, Backfill & Compact 2' x 3' Deep	3,000	LF	$1.38	$4,132	$0	$0	$4,132
Pipe Bedding & Compaction 2' Wide	3,000	LF	$0.82	$2,455	$0.41	$1,240	$3,695
Subtotal			-	$1,685,017	-	$2,721,171	$4,406,188
Miscellaneous Mechanical & Fit-up	15%		-	$252,753	-	$408,176	$660,928
Miscellaneous Electrical and Wiring	5%		-	$84,251	-	$136,059	$220,309
Electrical Switchgear & Aerial Feeder	1	JOB	-	$80,000	-	$190,000	$270,000
Building for Components	10,000	SF	$30	$300,000	$20	$200,000	$500,000
Subtotal				$2,402,020		$3,655,406	$6,057,426
Arizona Transaction Privilege Tax	3.75%	%		-		$137,078	$137,078
Subtotal							$6,194,504
Contractor OH & Profit	25.0%	%					$1,548,626
Subtotal							$7,743,130
Bond	1.5%	%					$116,147
Subtotal							$7,859,276
Estimating Contingency	10.0%	%					$785,928
Total Probable Construction Cost							$8,645,204

Note: One-half the Natural Gas transmission line costs are expensed each for Alternatives 1A1 and 1A2.

CONSTRUCTION COST ESTIMATE	Date Prepared January 1995	Sheet 2 Of 3
Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: **Cogeneration Alternatives 1A1, 1A2 & 1B**	Estimator: BIH	Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Cogeneration Alternative 1A2							
T/G Set, Switchgear & WHRB @ $1,000/kW from Solar	3,312	kW	$333	$1,104,000	$667	$2,208,000	$3,312,000
Absorption Chiller @ $800/Ton Installed	970	Tons	$400	$388,000	$400	$388,000	$776,000
Cooling Tower for Chiller 2,000 Tons	1	EA	$85,640	$85,640	$42,820	$42,820	$128,460
Cooling Tower Basin	1	EA	$10,000	$10,000	$5,000	$5,000	$15,000
Steam-to-Hot Water Heat Exchanger	1	EA	$26,667	$26,667	$13,333	$13,333	$40,000
Pipe, 2-1/2-inch, Schedule 80, Welded	3,000	LF	$4.04	$12,123	$3.59	$10,778	$22,902
Trenching, Backfill & Compact 2' x 3' Deep	3,000	LF	$1.38	$4,132	$0	$0	$4,132
Pipe Bedding & Compaction 2' Wide	3,000	LF	$0.82	$2,455	$0.41	$1,240	$3,695
Subtotal			-	$1,633,017	-	$2,669,171	$4,302,188
Miscellaneous Mechanical & Fit-up	15%		-	$252,753	-	$408,176	$660,928
Miscellaneous Electrical and Wiring	5%		-	$84,251	-	$136,059	$220,309
Electrical Switchgear & Aerial Feeder	1	JOB	-	$80,000	-	$190,000	$270,000
Building for Components	10,000	SF	$30	$300,000	$20	$200,000	$500,000
Subtotal				$2,350,020		$3,603,406	$5,953,426
Arizona Transaction Privilege Tax	3.75%	%		-		$135,128	$135,128
Subtotal							$6,088,554
Contractor OH & Profit	25.0%	%					$1,522,138
Subtotal							$7,610,692
Bond	1.5%	%					$114,160
Subtotal							$7,724,852
Estimating Contingency	10.0%	%					$772,485
Total Probable Construction Cost							$8,497,338

Note: One-half the Natural Gas transmission line costs are expensed each for Alternatives 1A1 and 1A2.

CONSTRUCTION COST ESTIMATE	Date Prepared: January 1995	Sheet 3 Of 3
Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: **Cogeneration Alternatives 1A1, 1A2 & 1B**	Estimator: **BIH**	Checked By: **RCL**

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Cogeneration Alternative 1B							
T/G Set, Switchgear & WHRB @ $1,000/kW from Solar	4,727	kW	$333	$1,575,667	$667	$3,151,333	$4,727,000
Absorption Chiller @ $800/Ton Installed	2,070	Tons	$400	$828,000	$400	$828,000	$1,656,000
Cooling Tower for Chiller 4,000 Tons	1	EA	$154,981	$154,981	$77,491	$77,491	$232,472
Cooling Tower Basin	1	EA	$23,333	$23,333	$11,667	$11,667	$35,000
Pipe, 2-1/2-inch, Schedule 80, Welded	3,000	LF	$8.08	$24,247	$7.19	$21,557	$45,803
Trenching, Backfill & Compact 2' x 3' Deep	3,000	LF	$2.75	$8,263	$0	$0	$8,263
Pipe Bedding & Compaction 2' Wide	3,000	LF	$0.82	$2,455	$0.41	$1,240	$3,695
Steam-to-Hot Water Heat Exchanger	1	EA	$26,667	$26,667	$13,333	$13,333	$40,000
Subtotal			-	$2,643,613	-	$4,104,621	$6,748,234
Miscellaneous Mechanical & Fit-up	15%		-	$252,753	-	$408,176	$660,928
Miscellaneous Electrical and Wiring	5%		-	$84,251	-	$136,059	$220,309
Electrical Switchgear & Aerial Feeder	1	JOB	-	$80,000	-	$190,000	$270,000
Building for Components	15,000	SF	$30	$450,000	$20	$300,000	$750,000
Subtotal				$3,510,616		$5,138,855	$8,649,471
Arizona Transaction Privilege Tax	3.75%	%		-		$192,707	$192,707
Subtotal							$8,842,178
Contractor OH & Profit	25.0%	%					$2,210,545
Subtotal							$11,052,723
Bond	1.5%	%					$165,791
Subtotal							$11,218,514
Estimating Contingency	10.0%	%					$1,121,851
Total Probable Construction Cost							$12,340,365

CONSTRUCTION COST ESTIMATE	Date Prepared: January 1995	Sheet 1 Of 3
Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: **Cogeneration Alternatives 1C**	Estimator: **BIH**	Checked By: **RCL**

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Cogeneration Alternative 1C1 -	**Ebullient Cooled Gas Engine Generators, Exhaust Heat Recovery Boilers, 1-Stage Absorption Chillers**						
Engine Gen-Set, Waukesha VHP7100GSI, Continuous Duty, Ebullient Cooled1,200 RPM, 1,100 kW	6	EA	$15,000	$90,000	$450,000	$2,700,000	$2,790,000
Heat Recov. Boiler, 1 per Engine-Gen Set	6	EA	$8,155	$48,929	$45,000	$270,000	$318,929
Excess Steam Condenser	6	EA	$778	$4,668	$5,901	$35,404	$40,072
Condensate Receiver Tank	1	EA	$1,200	$1,200	$3,500	$3,500	$4,700
Condenser CW Pumps 700 GPM, 50 Ft	7	EA	$1,250	$8,752	$4,034	$28,241	$36,993
Cooling Tower for Engines 1,750 Tons	1	EA	$9,077	$9,077	$73,004	$73,004	$82,081
Absorption Chiller: Carrier 16JB068	3	EA	$84,402	$253,206	$185,400	$556,200	$809,406
Generator Switchgear for Multiple Unit Installation, Including Synchronization	1	EA	$50,000	$50,000	$350,000	$350,000	$400,000
Cooling Tower for Chiller 5,050 Tons	1	EA	$26,193	$26,193	$210,668	$210,668	$236,861
Steam-to-Hot Water Heat Exchanger	1	EA	$26,667	$26,667	$13,333	$13,333	$40,000
Gas Pipe, 2-1/2-inch, Schedule 80, Welded	3,000	LF	$8.08	$24,247	$7.19	$21,557	$45,803
Trenching, Backfill & Compact 2' x 3' Deep	3,000	LF	$2.75	$8,263	$0	$0	$8,263
Pipe Bedding & Compaction 2' Wide	3,000	LF	$0.82	$2,455	$0.41	$1,240	$3,695
Subtotal			-	$553,657	-	$4,263,146	$4,816,804
Miscellaneous Mechanical & Fit-up	15%		-	$83,049	-	$639,472	$722,521
Miscellaneous Electrical and Wiring	5%		-	$27,683	-	$213,157	$240,840
Electrical Switchgear & Aerial Feeder	1	JOB	-	$80,000	-	$190,000	$270,000
Building for Components	5,200	SF	$40	$208,000	$30	$156,000	$364,000
Subtotal				$952,389		$5,461,776	$6,414,164
Arizona Transaction Privilege Tax	3.75%	%		-		$204,817	$204,817
Subtotal							$6,618,981
Contractor OH & Profit	25.0%	%					$1,654,745
Subtotal							$8,273,726
Bond	1.5%	%					$124,106
Subtotal							$8,397,832
Estimating Contingency	10.0%	%					$839,783
Total Probable Construction Cost							$9,237,615

CONSTRUCTION COST ESTIMATE	Date Prepared: January 1995	Sheet 2 Of 3

Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		

Drawing No.: Cogeneration Alternatives 1C	Estimator: BIH	Checked By: RCL

Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Cogeneration Alternative 1C2 - Gas Engine Generator, Heat Recovery Boilers, 2-Stage Absorption Chiller							
Engine Gen-Set, Waukesha VHP7100GSI, Continuous Duty, 1,200 RPM, 1,100 kW	8	EA	$15,000	$120,000	$500,000	$4,000,000	$4,120,000
Heat Recov. Boiler, 1 per Engine-Gen Set	8	EA	$8,155	$65,239	$30,500	$244,000	$309,239
Deaerator Sized for 8 Ht Recovery Boilers	1	EA	$12,816	$12,816	$47,933	$47,933	$60,748
Absorption Chiller: 2 x York YPC-ST-20G	2,070	Tons	$150	$310,500	$650	$1,345,500	$1,656,000
Generator Switchgear for Multiple Unit Installation, Including Synchronization	1	EA	$60,000	$60,000	$440,000	$440,000	$500,000
Steam-to-Hot Water Heat Exchanger	1	EA	$26,667	$26,667	$13,333	$13,333	$40,000
Cooling Tower for Chiller 4,000 Tons	1	EA	$20,747	$20,747	$166,866	$166,866	$187,613
Pipe, 4-inch, Schedule 80, Welded	3,000	LF	$10.79	$32,375	$13.02	$39,072	$71,447
Trenching, Backfill & Compact 2' x 3' Deep	3,000	LF	$2.75	$8,263	$0	$0	$8,263
Pipe Bedding & Compaction 2' Wide	3,000	LF	$0.82	$2,455	$0.41	$1,240	$3,695
Subtotal			-	$659,063	-	$6,297,943	$6,957,006
Miscellaneous Mechanical & Fit-up	15%		-	$98,859	-	$944,691	$1,043,551
Miscellaneous Electrical and Wiring	5%		-	$32,953	-	$314,897	$347,850
Electrical Switchgear & Aerial Feeder	1	JOB	-	$80,000	-	$190,000	$270,000
Building for Components	5,700	SF	$40	$228,000	$30	$171,000	$399,000
Subtotal				$1,098,875		$7,918,531	$9,017,407
Arizona Transaction Privilege Tax	3.75%	%		-		$296,945	$296,945
Subtotal							$9,314,352
Contractor OH & Profit	25.0%	%					$2,328,588
Subtotal							$11,642,939
Bond	1.5%	%					$174,644
Subtotal							$11,817,584
Estimating Contingency	10.0%	%					$1,181,758
Total Probable Construction Cost							$12,999,342

CONSTRUCTION COST ESTIMATE	Date Prepared: January 1995	Sheet: 3 Of 3
Project: ECIP Facility Energy Improvements	Project No.	Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona		
Engineer-Architect: Keller & Gannon		
Drawing No.: **Cogeneration Alternatives 1C**	Estimator: **BIH**	Checked By: **RCL**

Line Item	Quantity		Labor		Material		Total
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Cost
Cogeneration Alternative 1C3 - Ebullient Cooled Gas Engine Generators, Exhaust Heat Recovery Boilers, 1-Stage & 2-Stage Absorption Chillers							
Engine Gen-Set, Waukesha VHP7100GSI, Continuous Duty, Ebullient Cooled1,200 RPM, 1,100 kW	5	EA	$15,000	$75,000	$450,000	$2,250,000	$2,325,000
Heat Recov. Boiler, 1 per Engine-Gen Set	5	EA	$8,155	$40,774	$30,500	$152,500	$193,274
Deaerator Sized for 5 Ht Recovery Boilers	1	EA	$9,667	$9,667	$36,154	$36,154	$45,821
Excess Steam Condenser	5	EA	$778	$3,890	$5,901	$29,503	$33,393
Condensate Receiver Tank	1	EA	$1,200	$1,200	$3,500	$3,500	$4,700
Condenser CW Pumps 700 GPM, 50 Ft	5	EA	$1,250	$6,252	$4,034	$20,172	$26,424
Cooling Tower for Engines 1,450 Tons	1	EA	$7,521	$7,521	$60,489	$60,489	$68,010
Absorption Chiller: 2 x Carrier 16JB047	912	Tons	$137	$124,549	$300	$273,589	$398,138
Absorption Chiller: York YPC-ST-21G	1,158	Tons	$150	$173,706	$650	$752,724	$926,430
Generator Switchgear for Multiple Unit Installation, Including Synchronization	1	EA	$45,000	$45,000	$300,000	$300,000	$345,000
Cooling Tower for Chillers 4,400 Tons	1	EA	$22,822	$22,822	$183,552	$183,552	$206,374
Steam-to-Hot Water Heat Exchanger	1	EA	$26,667	$26,667	$13,333	$13,333	$40,000
Gas Pipe, 2-1/2-inch, Schedule 80, Welded	3,000	LF	$8.08	$24,247	$7.19	$21,557	$45,803
Trenching, Backfill & Compact 2' x 3' Deep	3,000	LF	$2.75	$8,263	$0	$0	$8,263
Pipe Bedding & Compaction 2' Wide	3,000	LF	$0.82	$2,455	$0.41	$1,240	$3,695
Subtotal			-	$572,012	-	$4,098,313	$4,670,325
Miscellaneous Mechanical & Fit-up	15%		-	$85,802	-	$614,747	$700,549
Miscellaneous Electrical and Wiring	5%		-	$28,601	-	$204,916	$233,516
Electrical Switchgear & Aerial Feeder	1	JOB	-	$80,000	-	$190,000	$270,000
Building for Components	5,200	SF	$40	$208,000	$30	$156,000	$364,000
Subtotal				$974,414		$5,263,976	$6,238,390
Arizona Transaction Privilege Tax	3.75%	%		-		$197,399	$197,399
Subtotal							$6,435,790
Contractor OH & Profit	25.0%	%					$1,608,947
Subtotal							$8,044,737
Bond	1.5%	%					$120,671
Subtotal							$8,165,408
Estimating Contingency	10.0%	%					$816,541
Total Probable Construction Cost							$8,981,949

CONSTRUCTION COST ESTIMATE					Date Prepared: January 1995		Sheet 1 Of 1
Project: ECIP Facility Energy Improvements					Project No.		Basis for Estimate: Code A (no design competed)
Location: Fort Huachuca, Arizona							
Engineer-Architect: Keller & Gannon							
Drawing No.: Cogeneration Alternatives 2 &3			Estimator: BIH			Checked By: RCL	
Line Item	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Cogeneration Alternative 2 - Combined Cycle Gas T/G Plant for Fort Huachuca & Sierra Vista							
T/G Set, Switchgear, WHRB & Steam T/G Set, Installed from Solar, Complete	52,248	kW	-	$13,666,667	-	$27,333,333	$41,000,000
Arizona Transaction Privilege Tax	3.75%	%		-		$1,025,000	$1,025,000
Subtotal							$42,025,000
Estimating Contingency	10.0%	%					$4,202,500
Subtotal T/G Sets							**$46,227,500**
Electrical Switchgear & Aerial Feeder	1	JOB	-	$600,000	-	$1,200,000	$1,800,000
Pipe, 6-inch, Schedule 80, Welded	23,760	LF	$17.60	$418,112	$29.19	$693,590	$1,111,702
Trenching, Backfill & Compact 2' x 4' Deep	23,760	LF	$3.55	$84,416	$0	$0	$84,416
Pipe Bedding & Compaction 2' Wide	23,760	LF	$0.82	$19,444	$0.41	$9,819	$29,263
Subtotal				$1,121,973		$1,903,409	$3,025,381
Arizona Transaction Privilege Tax	3.75%	%		-		$71,378	$71,378
Subtotal							$3,096,759
Contractor OH & Profit	25.0%	%					$774,190
Subtotal							$3,870,949
Bond	1.5%	%					$58,064
Subtotal							$3,929,013
Estimating Contingency	10.0%	%					$392,901
Subtotal, Switchgear & Feeder							$4,321,915
Total Probable Construction Cost							$50,549,415
Cogeneration Alternative 3 - Combined Cycle Gas T/G Plant for Fort Huachuca Only							
T/G Set, Switchgear, WHRB & Steam T/G Set, Installed from Solar, Complete	22,248	kW	-	$9,666,667	-	$19,333,333	$29,000,000
Arizona Transaction Privilege Tax	3.75%	%		-		$725,000	$725,000
Subtotal							$29,725,000
Estimating Contingency	10.0%	%					$2,972,500
Subtotal T/G Sets							**$32,697,500**
Electrical Switchgear & Underground Feeder	1	JOB	-	$100,000	-	$250,000	$350,000
Pipe, 4-inch, Schedule 80, Welded	23,760	LF	$10.79	$256,414	$13.02	$309,448	$565,862
Trenching, Backfill & Compact 2' x 3' Deep	23,760	LF	$2.75	$65,446	$0	$0	$65,446
Pipe Bedding & Compaction 2' Wide	23,760	LF	$0.82	$19,444	$0.41	$9,819	$29,263
Subtotal				$441,305		$569,267	$1,010,571
Arizona Transaction Privilege Tax	3.75%	%		-		$9,375	$9,375
Subtotal							$1,019,946
Contractor OH & Profit	25.0%	%					$254,987
Subtotal							$1,274,933
Bond	1.5%	%					$19,124
Subtotal							$1,294,057
Estimating Contingency	10.0%	%					$129,406
Subtotal, Swichgear & Feeder							$1,423,462
Total Probable Construction Cost							$34,120,962

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion Cogeneration Alternative 1A1 Preparer: KELLER & GANNON
Separate **Cogeneration** Facility for **South Central Plant**
Analysis Date: January 1995 Economic Life: 20 Years

1. Investment Costs			
A. Construction Costs	$8,645,204		
B. SIOH	$518,712		
C. Design Cost	$518,712		
D. Total Cost (1A + 1B + 1C)	$9,682,629		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$9,682,629

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Use	$14.17	89,120		$1,262,506	15.08	$19,038,589
B. Elec. Dem&Use	$18.43	7,496		$138,156	15.08	$2,083,399
C. NG T/G Fuel	$2.758	(332,705)		($917,733)	18.58	($17,051,478)
D. Natural Gas	$4.508	21,621		$97,467	18.58	$1,810,930
E. Demand Saved	$127.84	2,981	kW	$381,065	15.08	$5,746,467
F. Total		(236,089)		$961,462		$11,627,908

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($29,459)		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			($438,346)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	($438,346)	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Economic Life)):	$932,003	
5. Simple Payback (1G/4):	10.39	Years
6. Total Net Discounted Savings (2F5 + 3C):	$11,189,562	
7. Savings to Investment Ratio (SIR) (6/1G):	1.16	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion Cogeneration Alternative 1A2 Preparer: KELLER & GANNON
Separate **Cogeneration** Facility for **North Central Plant**
Analysis Date: January 1995 Economic Life: 20 Years

1. Investment Costs			
A. Construction Costs	$8,497,338		
B. SIOH	$509,840		
C. Design Cost	$509,840		
D. Total Cost (1A + 1B + 1C)	$9,517,018		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$9,517,018

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Use	$14.17	89,120		$1,262,506	15.08	$19,038,589
B. Elec. Dem&Use	$18.43	6,847		$126,183	15.08	$1,902,838
C. NG T/G Fuel	$2.758	(332,705)		($917,733)	18.58	($17,051,478)
D. Natural Gas	$4.508	18,553		$83,636	18.58	$1,553,951
E. Demand Saved	$127.84	2,981	kW	$381,065	15.08	$5,746,467
F. Total		(236,738)		$935,657		$11,190,368

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($29,059)		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			($432,397)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	($432,397)	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Economic Life)):	$906,598	
5. Simple Payback (1G/4):	10.50	Years
6. Total Net Discounted Savings (2F5 + 3C):	$10,757,971	
7. Savings to Investment Ratio (SIR) (6/1G):	1.13	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion Cogeneration Alternative 1B Preparer: KELLER & GANNON
Combined **Cogeneration** Facility for **South & North Central Plants**
Analysis Date: January 1995 Economic Life: 20 Years

1. Investment Costs			
A. Construction Costs	$12,340,365		
B. SIOH	$740,422		
C. Design Cost	$740,422		
D. Total Cost (1A + 1B + 1C)	$13,821,209		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$13,821,209

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Use	$14.17	127,195		$1,801,892	15.08	$27,172,528
B. Elec. Dem&Use	$18.43	14,343		$264,339	15.08	$3,986,236
C. NG T/G Fuel	$2.758	(428,101)		($1,180,874)	18.58	($21,940,645)
D. Natural Gas	$4.508	40,174		$181,102	18.58	$3,364,882
E. Demand Saved	$127.84	4,254	kW	$543,870	15.08	$8,201,555
F. Total		(286,563)		$1,610,329		$20,784,555

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$1,396		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			$20,779

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	$20,779	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Economic Life)):	$1,611,725	
5. Simple Payback (1G/4):	8.58	Years
6. Total Net Discounted Savings (2F5 + 3C):	$20,805,335	
7. Savings to Investment Ratio (SIR) (6/1G):	1.51	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion Cogeneration Alternative 1C1 Preparer: KELLER & GANNON
Gas Engine-Generator Cogeneration (6,600kW) with Single Stage Absorption Chillers
Analysis Date: January 1995 Economic Life: 20 Years

1. Investment Costs

A. Construction Costs	$9,237,615		
B. SIOH	$554,257		
C. Design Cost	$554,257		
D. Total Cost (1A + 1B + 1C)	$10,346,129		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$10,346,129

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Use	$14.17	98,920		$1,401,340	15.08	$21,132,213
B. Elec. Dem&Use	$18.43	14,352		$264,505	15.08	$3,988,736
C. NG T/G Fuel	$2.758	(321,055)		($885,599)	18.58	($16,454,434)
D. Natural Gas	$4.508	40,174		$181,102	18.58	$3,364,882
E. Demand Saved	$127.84	3,309	kW	$422,970	15.08	$6,378,391
F. Total		(207,783)		$1,384,319		$18,409,787

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($29,531)		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			($439,421)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	($439,421)	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Economic Life)):	$1,354,788	
5. Simple Payback (1G/4):	7.64	Years
6. Total Net Discounted Savings (2F5 + 3C):	$17,970,366	
7. Savings to Investment Ratio (SIR) (6/1G):	1.74	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion Cogeneration Alternative 1C2 Preparer: KELLER & GANNON
Gas Engine-Generator Cogeneration (8,800kW) with Two-Stage Absorption Chillers
Analysis Date: January 1995 Economic Life: 20 Years

1. Investment Costs			
A. Construction Costs	$12,999,342		
B. SIOH	$779,961		
C. Design Cost	$779,961		
D. Total Cost (1A + 1B + 1C)	$14,559,263		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$14,559,263

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Use	$14.17	155,522		$2,203,192	15.08	$33,224,133
B. Elec. Dem&Use	$18.43	14,352		$264,505	15.08	$3,988,736
C. NG T/G Fuel	$2.758	(506,794)		($1,397,941)	18.58	($25,973,745)
D. Natural Gas	$4.508	40,174		$181,102	18.58	$3,364,882
E. Demand Saved	$127.84	5,202	kW	$664,995	15.08	$10,028,127
F. Total		(336,920)		$1,915,853		$24,632,132

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($141,775)		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			($2,109,619)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	($2,109,619)	
4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Economic Life)):	$1,774,078	
5. Simple Payback (1G/4):	8.21	Years
6. Total Net Discounted Savings (2F5 + 3C):	$22,522,513	
7. Savings to Investment Ratio (SIR) (6/1G):	1.55	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion Cogeneration Alternative 1C3 Preparer: KELLER & GANNON
Gas Engine-Generator Cogeneration (5,500kW) with One & Two-Stage Absorption Chillers
Analysis Date: January 1995 Economic Life: 20 Years

1. Investment Costs

A. Construction Costs	$8,981,949		
B. SIOH	$538,917		
C. Design Cost	$538,917		
D. Total Cost (1A + 1B + 1C)	$10,059,783		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$10,059,783

2. Energy Savings (+)/Cost(-):

Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Use	$14.17	78,026		$1,105,352	15.08	$16,668,714
B. Elec. Dem&Use	$18.43	14,352		$264,505	15.08	$3,988,736
C. NG T/G Fuel	$2.758	(253,243)		($698,545)	18.58	($12,978,965)
D. Natural Gas	$4.508	40,174		$181,102	18.58	$3,364,882
E. Demand Saved	$127.84	2,610	kW	$333,631	15.08	$5,031,162
F. Total		(160,864)		$1,186,046		$16,074,527

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	$4,348		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			$64,698

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a.				
b.				
c.				
d. Total				

C Total Non Energy Discounted Savings (3A2 + 3Bd4) $64,698

4. First Year Dollar Savings (2F3 + 3A + (3Bd1/Economic Life)):	$1,190,394	
5. Simple Payback (1G/4):	8.45	Years
6. Total Net Discounted Savings (2F5 + 3C):	$16,139,226	
7. Savings to Investment Ratio (SIR) (6/1G):	1.60	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion: **Cogeneration Alternative 2:** Facility Serving Fort Huachuca and Sierra Vista. Power generation matching load. Preparer: KELLER & GANNON
Analysis Date January 1995 Economic Life: 20 Years

1. Investment Costs			
A. Construction Costs	$50,549,415		
B. SIOH	$3,032,965		
C. Design Cost	$3,032,965		
D. Total Cost (1A + 1B + 1C)	$56,615,344		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$56,615,344

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Ft H.	$18.43	404,081		$7,447,034	15.08	$112,301,267
B. Elec. S.V.	$16.11	633,677		$10,211,615	15.08	$153,991,156
C. Standby PWR	$2.80	(48,786)	kW	($136,570)	15.08	($2,059,473)
D. Stanby Use	$6.42	(17,822)		($114,357)	15.08	($1,724,506)
E. Natural Gas	$2.76	(2,543,350)		($7,015,578)	18.58	($130,349,430)
F. Demand Saved				$0		
G. Total		988,972		$10,392,144		$132,159,014

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($1,237,129)		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			($18,408,484)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a. Stanby 1st Ye	($1,503,122)	1	0.96	($1,442,997)
b.				
c.				
d. Total	($1,503,122)			($1,442,997)

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	($19,851,481)	
4. First Year Dollar Savings ((2F3 + 3A = (3Bd1/Economic Life):	$9,079,859	
5. Simple Payback (1G/4):	6.24	Years
6. Total Net Discounted Savings (2F5 + 3C):	$112,307,533	
7. Savings to Investment Ratio (SIR) 6/1G:	1.98	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion: **Cogeneration Alternative 3:** Facility Serving Fort Huachuca Only. Power generation matching load. Preparer: KELLER & GANNON
Analysis Date: January 1995 Economic Life: 20 Years

1. Investment Costs			
A. Construction Costs	$34,120,962		
B. SIOH	$2,047,258		
C. Design Cost	$2,047,258		
D. Total Cost (1A + 1B + 1C)	$38,215,478		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$38,215,478

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Ft H.	$18.43	404,081		$7,447,034	15.08	$112,301,267
B. Standby PWR	$2.80	(18,996)	kW	($53,177)	15.08	($801,916)
C. Stanby Use	$6.42	(6,939)		($44,528)	15.08	($671,486)
D. Natural Gas	$2.76	(971,674)		($2,680,266)	18.58	($49,799,345)
E. Demand Saved				$0		
F. Total		385,085		$4,669,062		$61,028,520

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($481,712)		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			($7,167,878)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a. Stanby 1st Yea	($585,284)	1	0.96	($561,873)
b.				
c.				
d. Total	($585,284)			($561,873)

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	($7,729,751)	
4. First Year Dollar Savings ((2F3 + 3A = (3Bd1/Economic Life):	$4,158,085	
5. Simple Payback (1G/4):	9.19	Years
6. Total Net Discounted Savings (2F5 + 3C):	$53,298,768	
7. Savings to Investment Ratio (SIR) 6/1G:	1.39	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion: **Cogeneration Alternative 2:** Facility Serving Fort Huachuca and Sierra Vista. Power generation at maximum capacity. Preparer: KELLER & GANNON
Analysis Date: January 1995 Economic Life: 20 Years

1. Investment Costs			
A. Construction Costs	$50,549,415		
B. SIOH	$3,032,965		
C. Design Cost	$3,032,965		
D. Total Cost (1A+1B+1C)	$56,615,344		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$56,615,344

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Ft H.	$18.43	404,081		$7,447,034	15.08	$112,301,267
B. Elec. S.V.	$16.11	633,677		$10,211,615	15.08	$153,991,156
C. Elec. Grid	$10.25	497,972		$5,106,656	15.08	$77,008,374
D. Standby PWR	$2.80	(48,786)	kW	($136,570)	15.08	($2,059,473)
E. Stanby Use	$6.42	(17,822)		($114,357)	15.08	($1,724,506)
F. Natural Gas	$2.76	(3,991,190)		($11,009,297)	18.58	($204,552,743)
G. Demand Saved				$0		
H. Total		1,486,944		$11,505,081		$134,964,075

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($1,799,860)		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			($26,781,917)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a. Stanby 1st Yea	($1,503,122)	1	0.96	($1,442,997)
b.				
c.				
d. Total	($1,503,122)			($1,442,997)

C Total Non Energy Discounted Savings (3A2+3Bd4)	($28,224,914)	
4. First Year Dollar Savings ((2F3 + 3A = (3Bd1/Economic Life):	$9,630,065	
5. Simple Payback (1G/4):	5.88	Years
6. Total Net Discounted Savings (2F5+3C):	$106,739,162	
7. Savings to Investment Ratio (SIR) 6/1G:	1.89	

Life Cycle Cost Analysis Summary
Energy Conservation Investment Program (ECIP)

Location: Fort Huachuca, Arizona Region No. 4 Project No.
Project Title: ECIP Facility Energy Improvements Fiscal Year FY96
Discrete Portion: **Cogeneration Alternative 3:** Facility Serving Fort Huachuca Only. Power generation at maximum capacity. Preparer: KELLER & GANNON
Analysis Date January 1995 Economic Life: 20 Years

1. Investment Costs			
A. Construction Costs	$34,120,962		
B. SIOH	$2,047,258		
C. Design Cost	$2,047,258		
D. Total Cost (1A + 1B + 1C)	$38,215,478		
E. Salvage Value of Existing Equipment		$0	
F. Public Utility Company Rebate		$0	
G. Total Investment (1D-1E-1F)			$38,215,478

2. Energy Savings (+)/Cost(-):
Date of NISTIR 85-3273 Used for Discount Factors: October 1994

Energy Source	Cost $/MBTU	Saving MBTU/Yr(2)		Annual $ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. Ft H.	$18.43	404,081		$7,447,034	15.08	$112,301,267
B. Elec. Grid	$10.25	249,856		$2,562,252	15.08	$38,638,755
C. Standby PWR	$2.80	(18,996)	kW	($53,177)	15.08	($801,916)
D. Stanby Use	$6.42	(6,939)		($44,528)	15.08	($671,486)
E. Natural Gas	$2.76	(1,534,349)		($4,232,348)	18.58	($78,637,022)
F. Demand Saved				$0		
G. Total		634,941		$5,679,232		$70,829,597

3. Non Energy Savings (+) or Cost (-):

A. Annual Recurring (+/-)	($766,408)		
(1) Discount Factor (Table A)		14.88	
(2) Discounted Savings/Cost (3A x 3A1)			($11,404,151)

B. Non Recurring Savings (+) or Cost (-)

Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Discounted Savings(+)Cost(-)(4)
a. Stanby 1st Ye	($585,284)	1	0.96	($561,873)
b.				
c.				
d. Total	($585,284)			($561,873)

C Total Non Energy Discounted Savings (3A2 + 3Bd4)	($11,966,024)	
4. First Year Dollar Savings ((2F3 + 3A = (3Bd1/Economic Life):	$4,883,560	
5. Simple Payback (1G/4):	7.83	Years
6. Total Net Discounted Savings (2F5 + 3C):	$58,863,574	
7. Savings to Investment Ratio (SIR) 6/1G:	1.54	

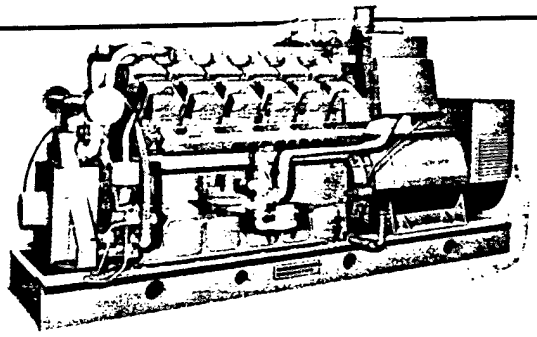
WAUKESHA

Gas Enginator® Generating System

7100GSI
765 to 1350 kW

BASIC SPECIFICATIONS

AIR CLEANERS - Dry panel type with rain shield and service indicators.
BARRING DEVICE
BEARINGS - Heavy duty, replaceable, precision type.
BREATHER - Closed system.
CONNECTING RODS - Forged steel, rifle drilled.
COOLING SYSTEM - Choice of mounted radiator with pusher fan, core guard and duct adaptor, heat exchanger with surge tank, or connection for remote radiator cooling.
CRANKCASE - Integral crankcase and cylinder frame.
CRANKSHAFT - Counterweighted, forged steel, hardened journals, dynamically balanced, with sealed viscous vibration damper.
CYLINDER HEADS - Interchangeable valve-in-head type. Two stellite faced intake and two stellite faced inconel exhaust valves per cylinder. Stellite intake and exhaust valve seat inserts.
CYLINDERS - 9.375" (238 mm) bore x 8.5" (216 mm) stroke. Removable wet cylinder liners. Number of cylinders - Twelve.
ENGINATOR® BASE - Engine, generator and radiator or heat exchanger are mounted and aligned on a welded steel, wide flange base, designed for solid mounting on an inertia block, with standard through–base holes for lifting.
ENGINE PROTECTION SHUTDOWN CONTACTS - For high water temperature, low oil pressure, high intake manifold temperature (standard engine mounted thermocouples with two thermocouple relays - shipped loose) and overspeed (electronic speed switch - shipped loose). Two engine mounted on/off pushbuttons are supplied, one on each side of the engine. Use all of the above in conjunction with a DC control panel for unit shutdown, (reference WPS Engomatic® controls).
Note: DC shutdown control panel is not supplied as standard.
EXHAUST SYSTEM - Water cooled exhaust manifold with single vertical exhaust at rear. Flexible stainless steel exhaust connection 8" (203 mm) long with 8" (203 mm) outlet flange.
FUEL SYSTEM - Dual natural gas carburetors and Fisher gas regulators, Model 99. 24 VDC gas solenoid valve (shipped loose). Gas pressure recommended 20-25 psi (1.4-1.8 kg/cm^2). Single fuel connection point.
GENERATOR - Waukesha, open, dripproof, direct connected, fan cooled, 2/3 pitch, A.C. revolving field type, single bearing generator with brushless exciter and damper windings. TIF and Deviation Factor within NEMA MG-1.22. Voltage 480/277, 3 phase, 4 wire, Wye 60 Hz and 400/231, 3 phase, 4 wire, Wye 50 Hz. Other voltages are available, consult factory. Insulation material NEMA Class F. Temperature rise within NEMA (105° C) for prime power duty, within NEMA (130° C) for continuous standby duty. All generators are rated at 0.8 Power Factor, are mounted on the engine flywheel housing and have multiple steel disc flexible coupling drive. All prime power gensets have 10% overload capacity.
GOVERNOR - Woodward Model EG3P electric actuator (mounted) and magnetic pickup (mounted). Requires a separate electric governor control, Woodward Model 2301A or similar, (not included).
IGNITION - Waukesha Custom Engine Control® (CEC) Ignition Module, high energy, solid state type, with coils and harness.
INSTRUMENT CONNECTIONS - Engine mounted junction box includes ungrounded type K thermocouples for jacket water temperature, and lube oil temperature. A single header block for lube oil pressure and intake manifold pressure is engine mounted. Instruments and panel are by others. Recommend optional Model 4000 remote engine instrument panel, especially for prime power installations.



Enginator® shown with options.

Turbocharged and Intercooled Gas Fueled Enginator®

SPECIFICATIONS

ENGINE: Waukesha L7042GSI, Four Cycle, Overhead Valve

Cylinders	V12
Piston Displacement	7040 cu. in. (115 L)
Bore and Stroke	9.375" x 8.5" (238 x 216 mm)
Compression Ratio	8:1
Jacket Water System Capacity	100 gal. (379 L)
Fuel LHV	900 Btu/ft^3, (33.5 J/cm^3)
Lube Oil Capacity	73 gal. (276 L)
Starting System	24V Electric

INTERCOOLER - Air to water.
JUNCTION BOXES - Separate AC, DC, and instrument/thermocouple junction boxes for engine wiring and external connections.
LUBRICATION - Full pressure, positive displacement pump. Full flow oil filter (shipped loose) and flexible connections (shipped loose). 50 or 60 Hz, 230 volt AC, single phase electric motor driven prelube pump with motor starter (other voltages can be specified). ***Note: External control logic required to start/stop prelube pump.***
OIL COOLER - Shell and tube type. (Mounted.)
OIL PAN - Cast alloy iron base type with removable doors.
PAINT - Oilfield Orange.
PISTONS - Heavy section contour ground, oil cooled, aluminum alloy, with ni-resist top ring groove insert and floating piston pin.
STARTING EQUIPMENT - Two 24 VDC electric starting motors, crank termination switch. (Shipped loose.)
TURBOCHARGERS - Dry type, wastegate controlled.
VOLTAGE REGULATOR - SCR static automatic type providing 1% regulation from no load to full load. Includes voltage adjustment rheostat and automatic subsynchronous speed protection. (Shipped loose.)
WATER CIRCULATING SYSTEM, AUXILIARY CIRCUIT - For oil cooler and/or intercooler. Pump is belt driven from crankshaft pulley.
WATER CIRCULATING SYSTEM, ENGINE JACKET - Belt driven water pump, 175 - 180° F (79 - 82° C) thermostatic temperature regulation full flow bypass. Water pump pulley diameter is 10" (254 mm) on units at 900 rpm or above.

PERFORMANCE DATA

HEAT EXCHANGER COOLING Intercooler Water: 85° F (29° C)	PRIME POWER*			STANDBY POWER	
	1200 rpm	900 rpm	1000 rpm	1200 rpm	1000 rpm
	60 Hz		50 Hz	60 Hz	50 Hz
kW Rating	**1100**	**825**	**920**	**1350**	**1125**
Fuel Consumption x 1000 Btu/h (kW)	12234 (3586)	8825 (2586)	9972 (2923)	14563 (4268)	11875 (3480)
Jacket Water x 1000 Btu/h (kW)	3543 (1038)	2594 (760)	2955 (866)	4125 (1209)	3434 (1006)
Intercooler x 1000 Btu/h (kW)	365 (107)	163 (48)	229 (67)	575 (169)	359 (105)
Lube Oil x 1000 Btu/h (kW)	356 (104)	291 (85)	314 (92)	389 (114)	344 (101)
Heat Radiated x 1000 Btu/h (kW)	854 (250)	742 (217)	761 (223)	813 (238)	708 (207)
Exhaust Heat** x 1000 Btu/h (kW)	3363 (986)	2220 (651)	2574 (754)	4055 (1188)	3192 (936)
Exhaust Flow lb/h (kg/h)	10467 (4748)	7550 (3425)	8537 (3872)	12607 (5719)	10286 (4666)
Exhaust Temperature °F (°C)	1181 (627)	1057 (569)	1090 (588)	1177 (636)	1121 (605)
Induction Air Flow scfm (m^3/min)	2297 (65)	1657 (47)	1874 (53)	2769 (78)	2259 (64)
WATER CONNECTION COOLING Intercooler Water: 130° F (54° C)					
kW Rating	**1050**	**785**	**875**	**1300**	**1075**
Fuel Consumption x 1000 Btu/h (kW)	11602 (3400)	8332 (2442)	9436 (2766)	13911 (4077)	11260 (3300)
Jacket Water x 1000 Btu/h (kW)	3499 (1025)	2527 (741)	2893 (848)	4117 (1207)	3382 (991)
Intercooler x 1000 Btu/h (kW)	228 (67)	89 (26)	120 (35)	401 (118)	212 (62)
Lube Oil x 1000 Btu/h (kW)	350 (103)	285 (84)	308 (90)	382 (112)	338 (99)
Heat Radiated x 1000 Btu/h (kW)	447 (131)	708 (207)	766 (224)	878 (257)	781 (229)
Exhaust Heat** x 1000 Btu/h (kW)	3495 (1024)	2045 (599)	2364 (693)	3697 (1084)	2879 (844)
Exhaust Flow lb/h (kg/h)	9927 (4503)	7129 (3234)	8078 (3664)	12044 (5463)	9750 (4423)
Exhaust Temperature °F (°C)	1125 (607)	1031 (555)	1058 (570)	1145 (618)	1096 (591)
Induction Air Flow scfm (m^3/min)	2179 (62)	1565 (44)	1773 (50)	2645 (75)	2141 (61)
RADIATOR COOLING - MOUNTED Intercooler Water: 130° F (54° C)					
kW Rating	**1000**	**765**	**840**	**1260**	**1050**
Fuel Consumption x 1000 Btu/h (kW)	11395 (3340)	8307 (2435)	9315 (2730)	13868 (4064)	11201 (3283)
Jacket Water x 1000 Btu/h (kW)	3444 (1009)	2520 (739)	2861 (839)	4106 (1203)	3366 (987)
Intercooler x 1000 Btu/h (kW)	215 (63)	88 (26)	115 (34)	397 (116)	209 (61)
Lube Oil x 1000 Btu/h (kW)	347 (102)	285 (84)	306 (90)	381 (112)	337 (99)
Heat Radiated x 1000 Btu/h (kW)	835 (245)	702 (206)	760 (223)	872 (255)	781 (229)
Exhaust Heat** x 1000 Btu/h (kW)	3040 (891)	2038 (597)	2331 (683)	3686 (1080)	2862 (839)
Exhaust Flow lb/h (kg/h)	9740 (4418)	7106 (3223)	7968 (3614)	12004 (5445)	9696 (4398)
Exhaust Temperature °F (°C)	1123 (606)	1030 (554)	1055 (568)	1145 (618)	1095 (591)
Induction Air Flow scfm (m^3/min)	2138 (61)	1560 (44)	1749 (50)	2637 (75)	2130 (60)
Radiator Air Flow scfm (m^3/min)	112000 (3172)	80000 (2266)	92000 (2605)	122000 (3455)	97000 (2747)

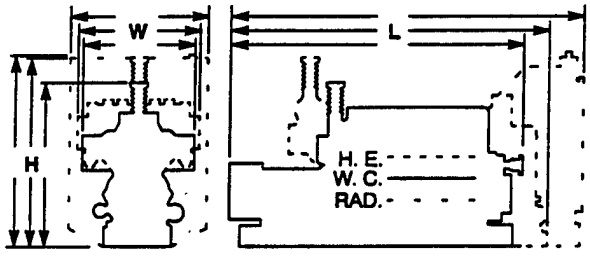
Typical heat balance data is shown. Consult factory for guaranteed data.

* **Prime Power Rating:** The highest load and speed which can be applied–24 hours a day, seven days a week–except for normal maintenance. The rating can include operation of the engine at up to 10% overload for two hours in each 24 hour period.

Standby Service Rating: In a system used as a backup or secondary source of electrical power, this rating is the output the system will produce continuously–24 hours a day–for the duration of the prime power source outage.

** Heat rejection based on cooling exhaust gas to 85° F (29° C)

Cooling Equipment	L in. (mm)	W in. (mm)	H in. (mm)	Avg. Wt. lb (Kg)
H. E.	218 (5540)	80 (2030)	108 (2740)	36,000 (16,330)
W. C.	201 (5110)	80 (2030)	108 (2740)	34,000 (15,425)
RAD.	238 (6050)	114 (2900)	138 (3500)	39,750 (18,030)



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Consult your local Waukesha Distributor for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

WAUKESHA POWER SYSTEMS | DRESSER

WAUKESHA ENGINE DIVISION
DRESSER INDUSTRIES, INC.
WAUKESHA, WISCONSIN 53188-4999

Bulletin 8010 1/93

Printed on Recycled Paper

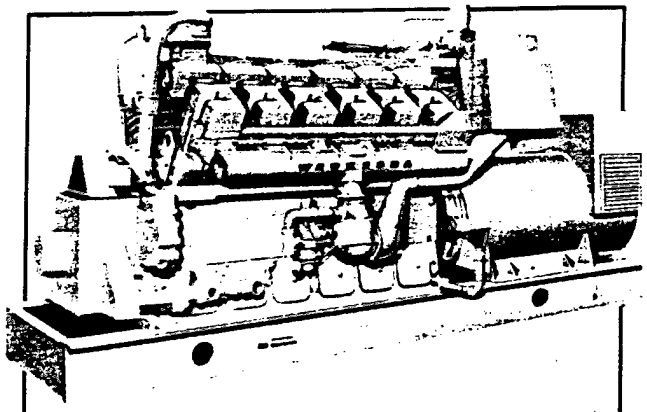
WAUKESHA

Gas Enginator® Generating System

7100GL
750 to 1210 kW

BASIC SPECIFICATIONS

AIR CLEANERS - Dry panel type with rain shield and service indicators.
BARRING DEVICE
BEARINGS - Heavy duty, replaceable, precision type.
BREATHER - Ejector type, extractor breather system.
CONNECTING RODS - Forged steel, rifle drilled.
COOLING SYSTEM - Choice of mounted radiator with pusher fan, core guard and duct adaptor, heat exchanger with surge tank, or connection for remote radiator cooling.
CRANKCASE - Integral crankcase and cylinder frame.
CRANKSHAFT - Counterweighted, forged steel, hardened journals, dynamically balanced, with sealed viscous vibration damper.
CYLINDER HEADS - Interchangeable valve-in-head type. Two stellite faced intake and two stellite faced inconel exhaust valves per cylinder. Stellite intake and exhaust valve seat inserts.
CYLINDERS - 9.375" (238 mm) bore x 8.5" (216 mm) stroke. Removable wet cylinder liners. Number of cylinders - Twelve.
ENGINATOR® BASE - Engine, generator and radiator or heat exchanger are mounted and aligned on a welded steel, wide flange base, designed for solid mounting on an inertia block, with standard through–base holes for lifting.
ENGINE PROTECTION SHUTDOWN CONTACTS - For high water temperature, low oil pressure, high intake manifold temperature (standard engine mounted thermocouples with two thermocouple relays - shipped loose) and overspeed (electronic speed switch - shipped loose). Two engine mounted on/off pushbuttons are supplied, one on each side of the engine. Use all of the above in conjunction with a DC control panel for unit shutdown, (reference WPS Engomatic® controls).
***Note:** DC shutdown control panel is not supplied as standard.*
EXHAUST SYSTEM - Water cooled exhaust manifold with single vertical exhaust at rear. Flexible stainless steel exhaust connection 8" (203 mm) long with 8" (203 mm) outlet flange.
FUEL SYSTEM - Dual natural gas, 4" (102 mm) duplex updraft carburetors and Fisher 99 2" (51 mm) gas regulators. 24 VDC gas solenoid valve (shipped loose). 35-50 psi (2.5-3.5 kg/cm^2) gas inlet pressure required. Prechamber fuel system and control logic.
GENERATOR - Waukesha, open, dripproof, direct connected, fan cooled, 2/3 pitch, A.C. revolving field type, single bearing generator with brushless exciter and damper windings. TIF and Deviation Factor within NEMA MG-1.22. Voltage 480/277, 3 phase, 4 wire, Wye 60 Hz and 400/231, 3 phase, 4 wire, Wye 50 Hz. Other voltages are available, consult factory. Insulation material NEMA Class F. Temperature rise within NEMA (105° C) for prime power duty, within NEMA (130° C) for continuous standby duty. All generators are rated at 0.8 Power Factor, are mounted on the engine flywheel housing and have multiple steel disc flexible coupling drive. All prime power gensets have 10% overload capacity.
GOVERNOR - Woodward Model EG3P electric actuator (mounted) and magnetic pickup (mounted). Requires a separate electric governor control, Woodward Model 2301A or similar, (not included).
IGNITION - Waukesha Custom Engine Control® (CEC) Ignition Module, high energy, solid state type, with coils and harness.
INSTRUMENT CONNECTIONS - Engine mounted junction box includes ungrounded type K thermocouples for jacket water temperature, lube oil temperature, and exhaust temperatures. A single header block for lube oil pressure and intake manifold pressure is engine mounted. Instruments and panel are by others. Recommend optional Model 4000 remote engine instrument panel, especially for prime power installations.



Enginator® shown with options.

Turbocharged and Intercooled
Lean Combustion Gas Fueled Enginator®

SPECIFICATIONS

ENGINE: Waukesha 7042GL, Four Cycle, Overhead Valve

Cylinders	V12
Piston Displacement	7040 cu. in. (115 L)
Bore and Stroke	9.375" x 8.5" (238 x 216 mm)
Compression Ratio	10.5:1
Jacket Water System Capacity	100 gal. (379 L)
Fuel LHV	900 Btu/ft^3 (33.5 J/cm^3)
Lube Oil Capacity	73 gal. (276 L)
Starting System	24V Electric

INTERCOOLER - Air to water.
JUNCTION BOXES - Separate AC, DC, and instrument/thermocouple junction boxes for engine wiring and external connections.
LUBRICATION - Full pressure, positive displacement pump. Full flow oil filter (shipped loose) and flexible connections (shipped loose). 50 or 60 Hz, 230 volt AC, single phase electric motor driven prelube pump with motor starter (other voltages can be specified). ***Note:** External control logic required to start/stop prelube pump.*
OIL COOLER - Shell and tube type. (Mounted.)
OIL PAN - Cast alloy iron base type with removable doors.
PAINT - Oilfield Orange.
PISTONS - Heavy section contour ground, oil cooled, aluminum alloy, with ni-resist top ring groove insert and floating piston pin.
STARTING EQUIPMENT - Two 24 VDC electric starting motors, crank termination switch. (Shipped loose.)
TURBOCHARGERS - Dry type, wastegate controlled.
VOLTAGE REGULATOR - SCR static automatic type providing 1% regulation from no load to full load. Includes voltage adjustment rheostat and automatic subsynchronous speed protection. (Shipped loose.)
WATER CIRCULATING SYSTEM, AUXILIARY CIRCUIT - For oil cooler and/or intercooler. Pump is belt driven from crankshaft pulley.
WATER CIRCULATING SYSTEM, ENGINE JACKET - Belt driven water pump, 175 - 180° F (79 - 82° C) thermostatic temperature regulation full flow bypass. Water pump pulley diameter is 10" (254 mm) on units at 900 rpm or above.

PERFORMANCE DATA

HEAT EXCHANGER COOLING Intercooler Water: 85° F (29° C)	PRIME POWER*			STANDBY POWER	
	1200 rpm	900 rpm	1000 rpm	1200 rpm	1000 rpm
	60 Hz		50 Hz	60 Hz	50 Hz
kW Rating	**1100**	**825**	**920**	**1210**	**1015**
Fuel Consumption x 1000 Btu/h (kW)	11390 (3338)	8060 (2362)	9339 (2737)	12290 (3602)	10196 (2988)
Jacket Water x 1000 Btu/h (kW)	2678 (785)	2020 (592)	2335 (684)	2840 (832)	2498 (732)
Intercooler x 1000 Btu/h (kW)	760 (223)	500 (147)	645 (189)	840 (246)	747 (219)
Lube Oil x 1000 Btu/h (kW)	450 (132)	360 (106)	413 (121)	460 (135)	433 (127)
Heat Radiated x 1000 Btu/h (kW)	443 (130)	346 (101)	455 (133)	421 (124)	429 (126)
Exhaust Heat** x 1000 Btu/h (kW)	3306 (969)	2019 (592)	2352 (689)	3600 (1055)	2626 (770)
Exhaust Flow lb/h (kg/h)	16596 (7528)	11740 (5325)	13420 (6087)	17910 (8124)	14851 (6736)
Exhaust Temperature °F (°C)	791 (422)	700 (371)	712 (378)	800 (427)	720 (382)
Induction Air Flow scfm (m^3/min)	3730 (106)	2640 (75)	3081 (87)	4030 (114)	3337 (95)
WATER CONNECTION COOLING Intercooler Water: 130° F (54° C)					
kW Rating	**1050**	**785**	**875**	**1155**	**965**
Fuel Consumption x 1000 Btu/h (kW)	10857 (3182)	7650 (2242)	8867 (2599)	11701 (3429)	9587 (2810)
Jacket Water x 1000 Btu/h (kW)	2682 (786)	2010 (589)	2301 (674)	2841 (833)	2433 (713)
Intercooler x 1000 Btu/h (kW)	555 (163)	360 (106)	463 (136)	614 (180)	544 (159)
Lube Oil x 1000 Btu/h (kW)	411 (120)	280 (82)	343 (101)	421 (123)	364 (107)
Heat Radiated x 1000 Btu/h (kW)	380 (111)	376 (110)	438 (128)	395 (116)	427 (125)
Exhaust Heat** x 1000 Btu/h (kW)	3246 (951)	1946 (570)	2337 (685)	3489 (1023)	2526 (740)
Exhaust Flow lb/h (kg/h)	15818 (7175)	11140 (5053)	12919 (5860)	17059 (7738)	13964 (6334)
Exhaust Temperature °F (°C)	810 (432)	710 (377)	730 (388)	810 (432)	730 (388)
Induction Air Flow scfm (m^3/min)	3562 (101)	2510 (71)	2908 (82)	3840 (109)	3147 (89)
RADIATOR COOLING - MOUNTED Intercooler Water: 130° F (54° C)					
kW Rating	**1025**	**750**	**845**	**1130**	**930**
Fuel Consumption x 1000 Btu/h (kW)	10790 (3162)	7570 (2219)	8750 (2564)	11640 (3411)	9460 (2773)
Jacket Water x 1000 Btu/h (kW)	2670 (783)	1993 (584)	2280 (668)	2830 (829)	2410 (706)
Intercooler x 1000 Btu/h (kW)	550 (161)	360 (106)	450 (132)	610 (179)	530 (155)
Lube Oil x 1000 Btu/h (kW)	410 (120)	278 (81)	340 (100)	420 (123)	360 (106)
Heat Radiated x 1000 Btu/h (kW)	360 (106)	378 (111)	427 (125)	1031 (302)	418 (122)
Exhaust Heat** x 1000 Btu/h (kW)	3226 (945)	1926 (564)	2306 (676)	2830 (829)	2493 (731)
Exhaust Flow lb/h (kg/h)	15720 (7131)	11024 (5000)	12750 (5783)	16970 (7698)	13780 (6251)
Exhaust Temperature °F (°C)	810 (432)	709 (376)	730 (388)	810 (432)	730 (388)
Induction Air Flow scfm (m^3/min)	3540 (100)	2484 (70)	2870 (81)	3820 (108)	3100 (88)
Radiator Air Flow scfm (m^3/min)	100000 (2832)	78000 (2209)	85000 (2407)	97000 (2747)	86000 (2436)

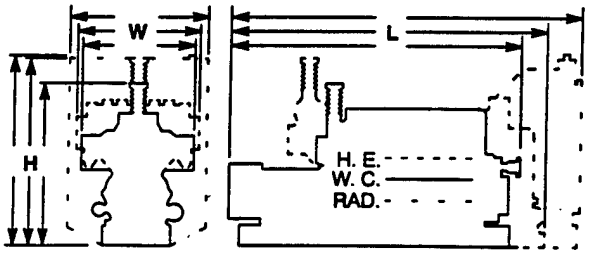
Typical heat balance data is shown. Consult factory for guaranteed data.

* **Prime Power Rating:** The highest load and speed which can be applied–24 hours a day, seven days a week–except for normal maintenance. The rating can include operation of the engine at up to 10% overload for two hours in each 24 hour period.

Standby Service Rating: In a system used as a backup or secondary source of electrical power, this rating is the output the system will produce continuously–24 hours a day–for the duration of the prime power source outage.

** Heat rejection based on cooling exhaust gas to 85° F (29° C)

Cooling Equipment	L in. (mm)	W in. (mm)	H in. (mm)	Avg. Wt. lb (Kg)
H. E.	216 (5490)	81 (2060)	103 (2620)	36,000 (16,300)
W. C.	197 (5000)	81 (2060)	103 (2620)	34,000 (15,400)
RAD.	238 (6050)	114 (2900)	128 (3505)	39,750 (18,000)



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Consult your local Waukesha Distributor for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

WAUKESHA POWER SYSTEMS | DRESSER

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WAUKESHA, WISCONSIN 53188-4999

Bulletin 8016 1/93

DATE REC'D: 1/3/95
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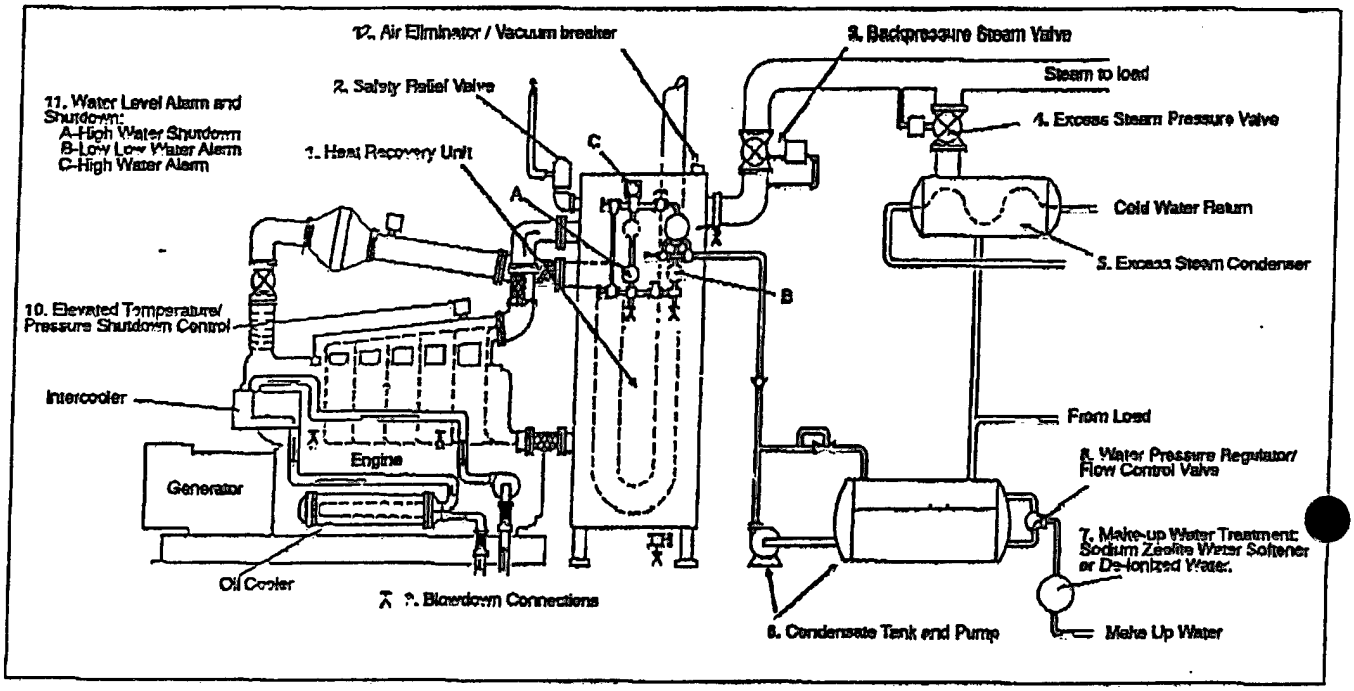
PROJECT No.:
ORIGINAL: Bill /FILE

ATT: Blair Hoit
From: Barry Hinesley - Sierra Pet

APPLICATION NOTES

No. 2

Information from the Application Engineers at Waukesha Engine Division/Waukesha Power Systems



EBULLIENT COOLING SYSTEMS

An ebullient engine cooling system is designed for use in the production of steam in heating domestic hot water or for low pressure plant load steam requirements. This type of cooling system is accomplished by natural convection—without the use of a jacket water pump. Convection, in this application, is defined as the transfer of heat by the circulation or movement of the heated parts of the liquid or gas.

The illustration shows a typical ebullient cooling system diagram, showing all the minimum components required for proper operation of this type of system.

Note: *This is a typical system diagram showing heat recovery from the jacket water and exhaust. Ebullient cooling can also be accomplished using the jacket water heat only, without exhaust heat recovery equipment, however the steam rate to load is substantially less with this system type.*

Water is circulated through the cooling system by means of gravity head into the bottom of the engine where the coolant absorbs the heat produced by the engine. This begins a process of the formation of tiny steam bubbles within the coolant. This formation of bubbles in the coolant lowers the density of the fluid causing the coolant to rise toward the top of the engine to the engine water outlet flange. The water temperature in this type of system is to be controlled at 250° F, maximum (15 PSIG) measured at the engine water outlet flange. The temperature difference between the inlet and outlet of the engine is normally 2°-3° F.

Coolant from the engine is then piped through an exhaust gas heat recovery unit where it absorbs the latent heat from the exhaust which is necessary to bring about the change of state of the coolant allowing it to flash to steam within a steam separator or heat recovery unit. The steam is then used for some process, condensed back to its liquid form, returned to the condensate tank, pumped back into the heat recovery unit and then by convection into the engine for the recirculation process to begin again.

MINIMUM SYSTEM COMPONENT REQUIREMENTS

1. Heat Recovery Unit: This device is designed to provide for recovery of the heat from the jacket water and the exhaust. This recovered heat is converted into low pressure steam at approximately 13-15 PSIG within the heat recovery unit.

2. Safety Relief Valve: A pop-type safety valve sized to relieve the full steam capacity of the system and set at a pressure slightly above, but very close to, the system pressure (approximately 1 PSIG above the excess steam valve setting).

3. Back Pressure Steam Valve: An engine protective and pressure/temperature control device which is an adjustable modulating type valve used to set and maintain the outlet temperature and pressure at the engine water outlet flange. It must be mounted directly after the heat recovery unit outlet (as close as possible) in the steam load supply pipe. There may be no steam load withdrawal before this valve. If the system pressure should fall to a level which is lower than the back pressure valve setting, then the valve will gradually begin to close to protect the engine from a sudden decrease in pressure which could result in an immediate flashing of the water to steam within the engine water jackets. The valve is to be designed as a failed closed device; that is, if the valve malfunctions it will go to a closed position to prevent damage to the engine.

Note: If multiple units are to be operated in parallel in a system a common header should be used among all of the heat recovery unit outlets using only one backpressure valve at the end of the steam header.

4. Excess Steam Valve: A control device, an adjustable valve to waste dump/relieve any excess steam pressure should there not be sufficient steam load. This valve must be set at a pressure 1-2 PSIG higher than the back pressure valve. It is located in the system before the steam condensing unit and will direct excess steam which is not required by the system process to the steam condensing unit.

5. Excess Steam Condenser (waste heat dump): The excess steam condenser converts any excess steam to water for recirculation in the system. It should have the capability to condense the entire quantity of steam produced by the heat recovery unit.

6. Condensate Tank and Pump: The condensate tank stores the returned condensate from the process load and/or from the excess steam condenser. The condensate pump is necessary to recirculate the condensate back into the engine jacket heat recovery loop.

7. Make-up Water Treatment Device: All systems must be equipped with water treatment equipment. The consequences of using untreated water can be catastrophic. Write for Waukesha Technical Data No. S-7610 for water treatment recommendations of engine cooling systems.

8. Water Pressure Regulator / Flow Control Valve: Water make-up systems require regulation of the pressure and flow to the condensate tank depending on steam system pressure requirements and water make-up pressure and flow rates.

9. Blowdown Connections: Every low point in the system should have blowdown valves for the removal of solids or soft sludge that accumulate due to water treatment processes. Surface blowdowns are also necessary for the removal of foaming agents and total dissolved solids. Blowdown intervals are determined by water analysis and treatment (Reference S-7610, Water Treatment Recommendations).

10. Engine Shutdown Device: An ebullient-cooled engine must be equipped with shutdown devices which operate automatically when system temperature or pressure gets to a critical point which could be harmful to the engine and system components. This device must be set to shut down the engine at a temperature/pressures lightly above the jacket water outlet limits. Waukesha suggests using a rate of change device--a linear rate limiter--set to sense the gradual changes in system operating pressure for engine shutdown limits. Consult Waukesha Application Engineering for recommendations.

11. Water Level Alarm and Shutdown Devices: Low water level or high water level cause damage to the system. A low water level alarm device should be supplied to warn against an impending condition of low water due to a lack of feedwater flow to the heat recovery unit. A high water level alarm warns against a high level due to system overfill when make-up water is not required.

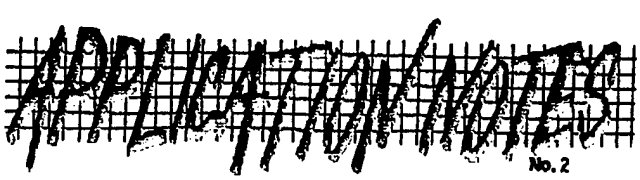
12. Air Eliminator / Vacuum Breaker: This device is designed for discharging air from the jacket water system and preventing any vacuum from occurring in the system. It should be thermostatically operated and provide for reliable air elimination.

John Peffer, Waukesha Power Systems

John Peffer, BSME, is an application engineer at Waukesha Power Systems with over 10 years experience. His specialty is cogeneration system design.

Waukesha DRESSER

WAUKESHA POWER SYSTEMS
DRESSER INDUSTRIES, INC.
WAUKESHA, WISCONSIN 53188



SPECIFICATIONS

MODEL — L7042GSI

Basic Model Specifications:

Type	4-Cycle, overhead valve
Aspiration	Turbocharged & Intercooled
Number of cylinders	V-12
Bore x Stroke - in. (mm)	9.375 x 8.5 (238 x 216)
Displacement - cu. in. (litres)	7040 (115)
Compression ratio - nat. gas std. ratio/HD-5 propane	8:1
Speed range - rpm continuous/intermittent duty	600-1200/600-1200
Piston speed - ft./min (m/min) - @ 1200 rpm	1700 (518)
Low idle - rpm	450
Flywheel housing - SAE No	00

Bearings - Main:

Number	7
Diameter x width - in. (mm) - (front)	6.25 x 4.125 (159 x 105)
Diameter x width - in. (mm) - (center)	6.25 x 4.125 (159 x 105)
Diameter x width - in. (mm) - (intermediate)	6.25 x 3.0 (159 x 76)
Diameter x width - in. (mm) - (rear)	6.25 x 4.125 (159 x 105)
Total main bearing projected area - sq. in. (sq. cm)	152.3 (982)

Bearings - Crankpin:

Diameter x width - in. (mm)	6.25 x 2.5 (159 x 64)
Total crankpin projected area - sq. in. (sq. cm)	187.5 (605)

Cooling System:

Jacket capacity, engine only - gal. (litres)	100 (379)
Maximum inlet head, jacket water pump - ft. (metres) of H_2O	50 (15)
Normal jacket water temperature out of engine - ° F (° C)	180 (82)
Jacket water inlet, hose ID - in. (mm), two connections	4 (102)
Jacket water outlet, hose ID - in. (mm)	5 (127)

Exhaust System:

Maximum permissible back pressure	*
Exhaust outlet, pipe flange - in. (mm)	8 (203)

Fuel System:

Natural gas pressure at regulator - PSI (kg/sq. cm)	22 - 25 (1.5 - 1.8)
Natural gas inlet, pipe size (2) - in. (mm)	2 (51)

Waukesha DRESSER	TITLE -- SPECIFICATIONS — MODEL L7042GSI	EN: 103053 DATE: 8/95	S 5585-2

SPECIFICATIONS

MODEL — L7042GSI (Continued)

Induction System:

Maximum permissible restriction - in. (mm) of H_2O 15 (381)

Lubrication System:

Lube oil sump capacity including filter - gal. (litres) 73 (276)

Normal lube oil pressure - PSI ± 5 (kgs/sq. cm ± 0.4)..... 45 (3)

Starting System:

Electric starting, voltage ..... 24 and 32

Air pressure starting - PSI (kgs/sq. cm) 120 (8)

Miscellaneous:

Heaviest engine part, cylinder block assembly - lb. (kg) 4630 (2100)

Heaviest engine part, top overhaul, cylinder head assembly - lb. (kg) .. 205 (93)

Recommended spacing between engines - in. (mm) 36 (914)

Recommended overhead clearance..... **

Weight, dry - lb. (kg) 18300 (8301)

* 12 in. (305 mm) H_2O at 1200 rpm, 180 BMEP. Reduce 1.0 in. (205 mm) H_2O for each 100 rpm reduction in rpm and for each 10 BMEP. Do not apply reduction beyond a minimum exhaust system back pressure of 4 in. (102 mm) H_2O).

** Sufficient height to permit use of a chain hoist for removal of heavier components.

Sheet 2 of 2

Waukesha DRESSER	TITLE: SPECIFICATIONS — MODEL L7042GSI	EN: 102033 DATE: 8/95	S 5585-2

HEAT BALANCE 3

HEAT REJECTION AND OPERATING DATA MODEL L7042GSI 85° F INTERCOOLER WATER TEMPERATURE STOICHIOMETRIC AIR/FUEL RATIO								
		ENGINE SPEED – RPM						
	BMEP (psi)	600	700	800	900	1000	1100	1200
HEAT TO RADIATION (BTU/HR x 1000)	180	539	581	622	629	635	674	713
	160	480	522	565	591	618	658	699
	145	444	487	530	565	600	643	686
	125	405	448	492	531	571	618	666
	100	370	411	453	492	530	582	634
	75	346	382	419	453	488	541	594
	50	331	357	384	416	448	497	545
TOTAL ENERGY IN EXHAUST (BTU/HR x 1000)	180	1765	2120	2475	2815	3150	3625	4095
	160	1489	1800	2110	2450	2790	3225	3660
	145	1314	1600	1885	2210	2535	2940	3350
	125	1114	1366	1620	1910	2200	2575	2945
	100	896	1106	1318	1555	1795	2120	2445
	75	698	859	1020	1202	1384	1650	1915
	50	493	593	693	818	944	1136	1327
EXHAUST TEMP. AFTER TURBINE +/– 50° F	180	1049	1080	1112	1117	1121	1149	1177
	160	987	1023	1059	1082	1104	1137	1169
	145	946	986	1026	1056	1087	1124	1160
	125	899	943	986	1023	1060	1102	1144
	100	850	896	943	982	1021	1068	1116
	75	813	857	901	940	978	1029	1079
	50	786	822	857	896	535	984	1033
INDUCTION AIR FLOW (SCFM)	180	1315	1545	1780	2020	2260	2530	2795
	160	1180	1385	1590	1805	2025	2265	2505
	145	1075	1265	1455	1650	1845	2065	2285
	125	945	1105	1270	1445	1615	1805	2000
	100	780	915	1050	1190	1325	1490	1650
	75	615	725	830	940	1045	1175	1305
	50	460	535	615	690	770	870	965
EXHAUST GAS FLOW (LBS/HR)	180	5990	7040	8095	9195	10300	11515	12735
	160	5365	6305	7250	8230	9215	10310	11405
	145	4905	5765	6620	7515	8410	9415	10420
	125	4295	5045	5795	6575	7355	8240	9120
	100	3550	4165	4780	5415	6055	6790	7525
	75	2815	3300	3780	4280	4775	5365	5955
	50	2095	2450	2800	3160	3520	3970	4415

NOTES:

1. All data are based on standard conditions of 100 kPa (29.54 inches Hg.) barometric pressure, 25° C (77° F) ambient and induction air temperature, 30% relative humidity (1 kPa/0.3 inches Hg. water vapor pressure) and 82° C (180° F) engine jacket water outlet temperature.
2. Data are average values at the standard conditions and will vary for individual engines and with operating and ambient conditions. An adequate reserve should be used for cooling system or heat recovery calculations. See also Cooling System Guidelines S6639–E.
3. For heat rejection changes due to ambient air temperature or engine jacket water outlet temperature different from standard (Note 1), refer to S–7613–1 and S–7613–2.
4. Exhaust flow, $ACFM = \frac{\text{Exh. Flow, lb/hr} \times (\text{Exh. Temp. °F} + 460)}{2250}$
5. Stoichiometric, Lambda = 1.0, air/fuel ratio.
6. Reference C–276–H.

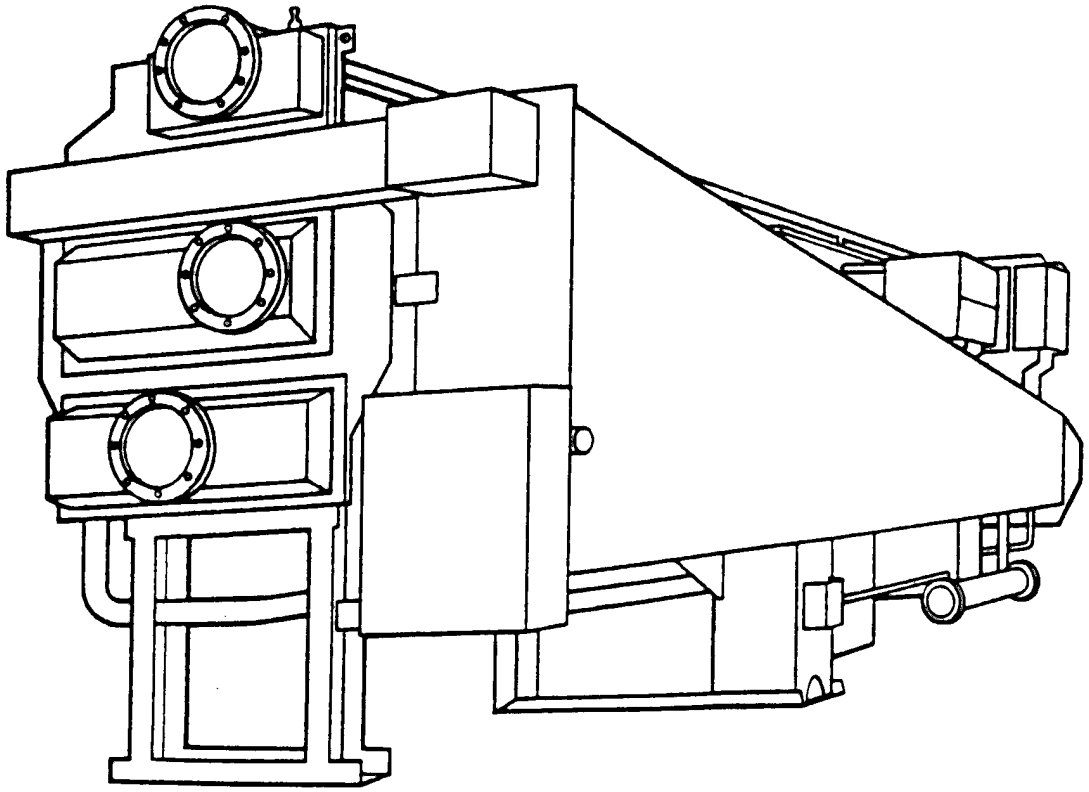
HEAT BALANCE 3

HEAT REJECTION AND OPERATING DATA MODEL L7042GSI 65° F INTERCOOLER WATER TEMPERATURE STOICHIOMETRIC AIR/FUEL RATIO								
		ENGINE SPEED – RPM						
	BMEP (psi)	600	700	800	900	1000	1100	1200
POWER (BHP)	180	960	1120	1280	1440	1600	1760	1920
	160	853	996	1138	1280	1422	1564	1707
	145	773	902	1031	1160	1289	1418	1547
	125	667	778	889	1000	1111	1222	1333
	100	533	622	711	800	889	978	1067
	75	400	467	533	600	667	733	800
	50	267	311	356	400	444	489	533
BRAKE SPECIFIC FUEL CONSUMPTION (BTU/BHP-HR)	180	7200	7250	7300	7365	7429	7543	7656
	160	7311	7360	7408	7471	7534	7652	7770
	145	7414	7462	7509	7570	7631	7754	7877
	125	7591	7636	7680	7738	7796	7927	8058
	100	7911	7951	7991	8044	8097	8242	8387
	75	8445	8476	8508	8553	8597	8766	8935
	50	9511	9528	9544	9571	9599	9815	10031
FUEL CONSUMPTION (BTU/HR x 1000)	180	6910	8130	9345	10615	11885	13295	14700
	160	6240	7335	8430	9570	10715	11990	13260
	145	5735	6740	7740	8790	9835	11010	12185
	125	5060	5945	6825	7745	8665	9705	10745
	100	4220	4950	5680	6440	7195	8070	8945
	75	3380	3960	4540	5135	5730	6440	7150
	50	2535	2965	3385	3830	4265	4810	5350
HEAT TO JACKET WATER (BTU/HR x 1000)	180	1905	2260	2610	3025	3435	3800	4160
	160	1755	2080	2405	2775	3140	3470	3800
	145	1640	1945	2250	2585	2920	3225	3530
	125	1489	1785	2045	2335	2625	2900	3170
	100	1300	1545	1785	2020	2255	2490	2720
	75	1111	1319	1530	1710	1890	2080	2275
	50	922	1096	1270	1394	1520	1670	1825
HEAT TO LUBE OIL (BTU/HR x 1000)	180	245	276	307	326	344	368	391
	160	227	256	285	306	326	348	371
	145	214	242	269	290	312	333	355
	125	196	222	248	270	293	314	334
	100	174	198	221	245	269	289	308
	75	152	173	194	220	246	264	282
	50	130	149	168	195	222	239	256
HEAT TO INTERCOOLER (BTU/HR x 1000)	180	83	125	167	264	360	475	589
	160	61	95	128	202	276	363	451
	145	47	75	103	162	220	291	361
	125	32	52	73	115	158	209	260
	100	18	31	43	70	96	130	163
	75	10	16	22	38	54	77	99
	50	8	8	9	20	31	50	68

YORK®

PARAFLOW™ TWO STAGE STEAM ABSORPTION CHILLER

250 THRU 1500 TONS



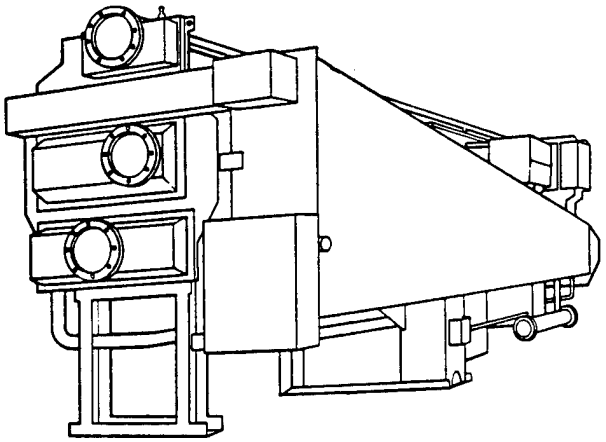
MODELS YPC-ST-14G THRU YPC-ST-22G

ENGINEERING GUIDE

Two Stage Steam Absorption Chiller

250 TO 1500 TONS

STEAM ABSORPTION CHILLERS



The YORK PARAFLOW Steam Chiller is the most efficient absorption chiller in the world. This two-stage steam chiller is an ideal replacement for an aging single-stage steam chiller because it consumes half of the amount of steam. It is also the most economical replacement for a steam-driven centrifugal unit or for use in industrial processes where high-pressure steam (43 to 128 psig) is available. The unit's remarkably low steam input of 9.7 lbs. per ton-hour equates to a COP of 1.23. The innovative two-stage absorption technology reduces the chiller's energy consumption and operating costs by up to 50 percent. As with all YORK units, this Steam Chiller is extremely compact. The YORK two-stage chiller fits in the same space as the single-stage chiller it replaces. It also utilizes the existing piping. The Steam Chiller has demonstrated high reliability and low operating costs. It is the ideal system to provide cooling for both new construction and renovated buildings.

How It Works

G-Series Machines

PARAFLOW's remarkably efficient two-stage absorption refrigeration cycle uses water as the refrigerant and lithium bromide as the absorbent. It is the strong affinity these two substances have for each other that makes the cycle work. The entire process occcurs in hermetic vessels in an almost complete vacuum.

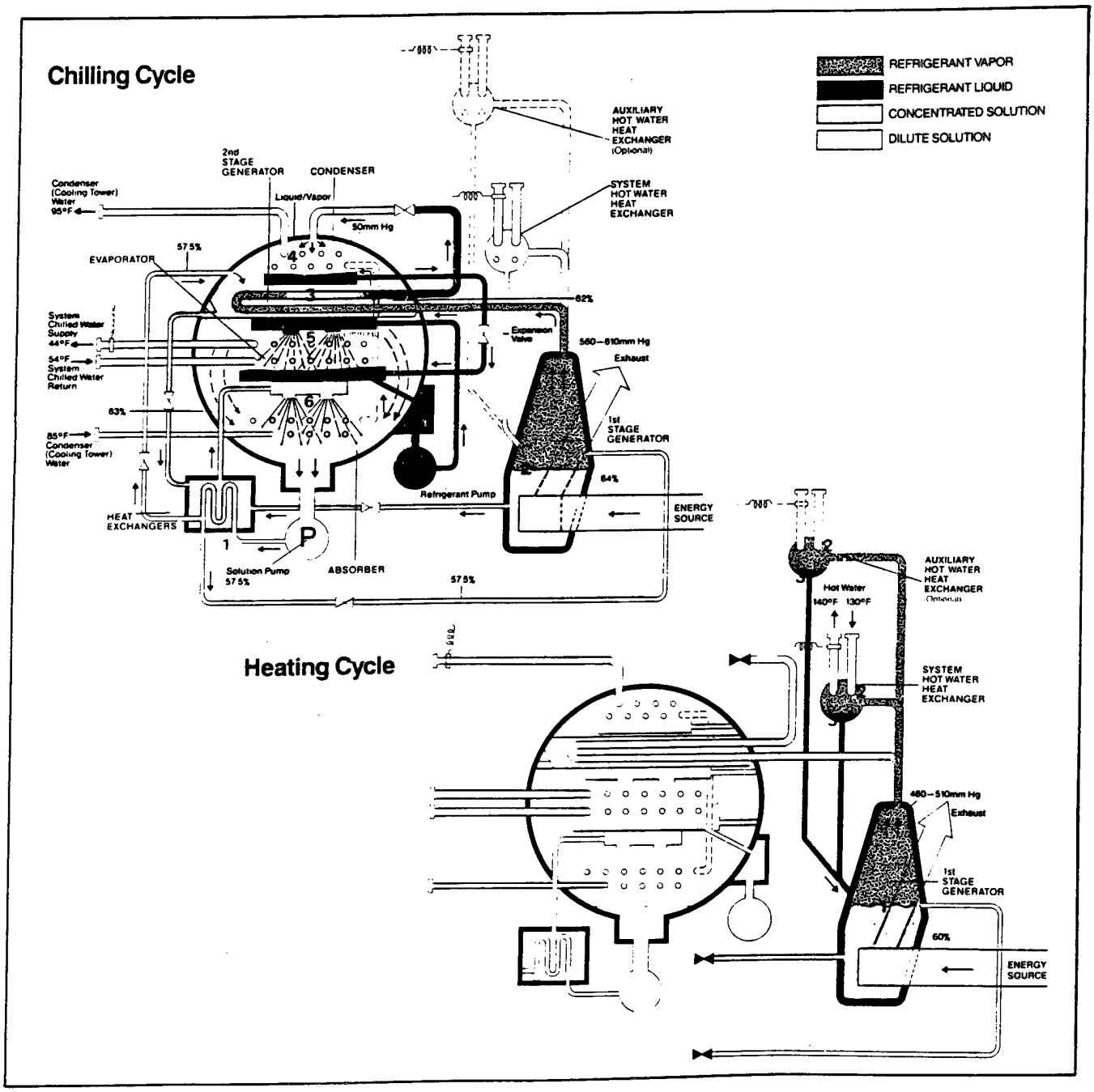
Heating Cycle

The 3 steps in the heating cycle are summarized in the bottom diagram. Paragraph numbers to the right refer to the steps in the process; corresponding numbers in the diagram show where each step takes place.

1. Dilute lithium bromide solution is heated by the energy source in the First-Stage Generator. This drives off refrigerant vapor and leaves concentrated solution.

2. The hot refrigerant vapor gives up its heat to the System Hot Water Heat Exchanger and/or the Auxiliary Hot Water Heat Exchanger and condenses to liquid as its heat is removed.

3. The condensed refrigerant liquid returns to the First-Stage Generator and the cycle begins again.



Chilling Cycle

The top diagram on the opposite page indicates the complete chilling cycle. The 6 steps in the chilling cycle are detailed below, with corresponding numbers in the diagram to show where each step takes place.

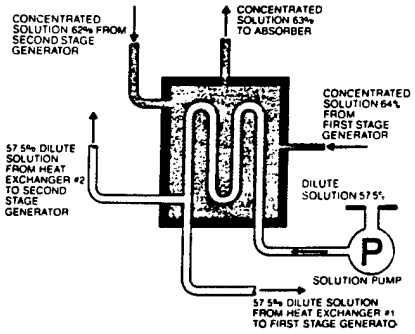
PARAFLOW's two-stage absorption chilling cycle is continuous; however, for the sake of clarity and simplicity, it is divided into six steps.

1. Solution Pump/Heat Exchangers

A dilute solution (57.5%) of lithium bromide and water descends from the Absorber to the Solution Pump. This flow of dilute solution is split into two streams and pumped through heat exchangers to the First-Stage Generator and to the Second-Stage Generator.

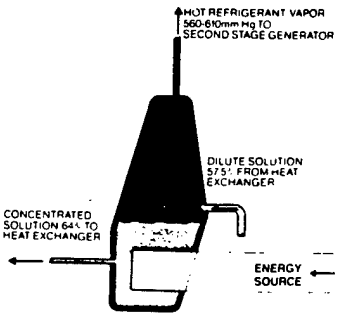
PARAFLOW's exclusive two-way split of solution flow virtually eliminates the possibility of crystallization (solidification) by allowing the unit to operate at much lower solution concentration and temperatures than series flow systems.

Note: There are two heat exchangers, but only one is shown for illustrative purposes.



2. First-Stage Generator

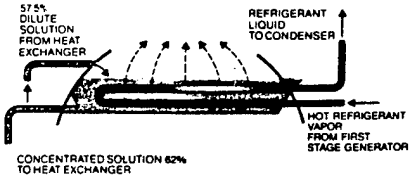
An energy source heats dilute lithium bromide solution (57.5%) coming from the Solution Pump/Heat Exchangers. This produces hot refrigerant vapor which is sent to the Second-Stage Generator, leaving a concentrated solution (64%) that is returned to the Heat Exchangers.



3. Second-Stage Generator

The energy source for the production of refrigerant vapor in the Second-Stage Generator is the hot refrigerant vapor produced by the First-Stage Generator.

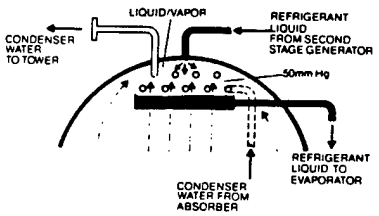
This is the heart of Hitachi's remarkably efficient two-stage absorption effect. The refrigerant vapor produced in the First-Stage Generator is increased by 40%—*at no additional expense of fuel.* The result is much higher efficiency than in conventional systems.



This additional refrigerant vapor (dotted arrows) is produced when dilute solution from the Heat Exchanger is heated by refrigerant vapor from the First-Stage Generator. The additional concentrated solution (light grey) that results is returned to the Heat Exchanger. The refrigerant vapor from the First-Stage Generator condenses into liquid (dark grey) giving up its heat, and continues to the Condenser.

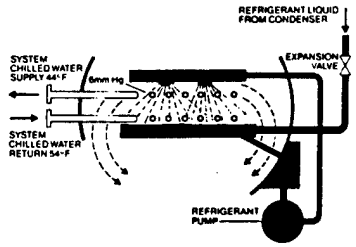
4. Condenser

Refrigerant from two sources — (1) liquid (dark grey) resulting from the condensing of vapor produced in the First-Stage Generator and (2) vapor (dotted arrows) produced by the Second-Stage Generator — enters the Condenser. The refrigerant vapor is condensed into liquid and the refrigerant liquid is cooled. The refrigerant liquids are combined and cooled by condenser water. The liquid then flows down to the Evaporator.



5. Evaporator

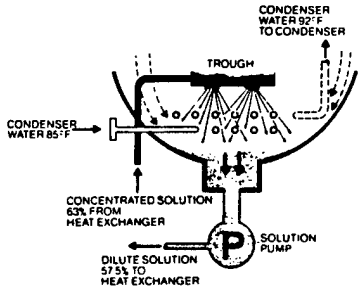
Refrigerant liquid from the Condenser passes through a metering valve and flows down to the Refrigerant Pump, where it is pumped up to the top of the Evaporator. Here the liquid is sprayed out as a fine mist over the Evaporator tubes. Due to the extreme vacuum (6mm Hg) in the Evaporator, some of t refrigerant liquid vaporizes, creating th refrigerant effect. (This vacuum is crea ted by hygroscopic action—the strong affinity lithium bromide has for water—the Absorber directly below.)



The refrigerant effect cools returning s tem chilled water in the Evaporator tubes. The refrigerant liquid/vapor pic up the heat of the returning chilled wat cooling it from 54°F to 44°F. The chillec water is then supplied back to the system.

6. Absorber

As refrigerant liquid/vapor descends tc the Absorber from the Evaporator, con centrated solution (63%) coming from the Heat Exchanger is sprayed out intc the flow of descending refrigerant. The hygroscopic action between lithium b mide and water—and the related changes in concentration and tempera ture—result in the creation of an extrem vacuum in the Evaporator directly above. The dissolving of the lithium bro mide in water gives off heat, which is re moved by condenser water entering from the Cooling Tower at 85°F and leaving for the Condenser at 92° (blac dotted lines). The resultant dilute lithium bromide solution collects in the bottom of the Absorber, where it flows down to the Solution Pump.



The chilling cycle is now completed anc begins again at Step 1.

Standard Features

Unsurpassed Performance Range

The unique design of the PARAFLOW steam machine makes it capable of high performance over an extremely wide range of steam pressures — from a low of 43 to a high of 128 psig.

Substantial Energy Cost Savings

The YORK unit is the most efficient steam chiller in the world. Its remarkably low 9.7 lbs. per ton-hour steam input equates to a COP of 1.23. Because of its high efficiency and reliability, this two-stage steam chiller is the most practical replacement for an aging conventional single-stage machine.

"U"-Tube Design for High Reliability and Efficiency

The PARAFLOW unit's high reliability and efficiency are significantly enhanced by the use of "U"-shaped 70/30 cupro-nickel tubes in the First-Stage Generator. This advanced feature reduces thermal stress, prolongs tube life and increases machine efficiency.

Built-in PARAFLOW Reliability

PARAFLOW units are precision-engineered and constructed for years of reliable, trouble-free performance. YORK's exclusive parallel-flow design allows PARAFLOW units to operate at much lower solution concentrations and temperatures than series flow systems, virtually eliminating crystallization (solidification) problems. This unique PARAFLOW design also results in higher cycle efficiency.

Advanced Spray Head Design

YORK's exclusive stainless steel Evaporator and Absorber spray heads provide an extremely uniform, soft, low-pressure mist. This extends tube life in the Evaporator and Absorber by substantially reducing erosion. It also improves cycle operating efficiency because the even spray distribution eliminates hot and cold spots in the Heat Exchangers, thus transferring heat more uniformly. And the self-cleaning spray heads virtually eliminate clogging.

Pump Isolation Valves Simplify Maintenance

PARAFLOW's exclusive suction and discharge isolation valves on the Solution and Refrigerant Pumps make routine inspection and maintenance quick and simple, with no loss of vacuum, no loss of solution, and no chance of contamination. The isolation valves also substantially reduce the time and effort required for pump service.

Highest Quality Pumps

Downtime and maintenance costs are significantly reduced because motor pump assemblies are hermetically sealed, self-lubricating and precision-fabricated from the highest quality materials available.

Highly Effective Inhibitors

The patented inhibitors used in the unit's lithium bromide solution are non-toxic lithium nitrates. These inhibitors were specially formulated for use in the PARAFLOW Steam Chiller to reduce corrosion and extend tube life in the First-Stage Generator. In addition, they are safe and environmentally acceptable.

Assured Quality Service

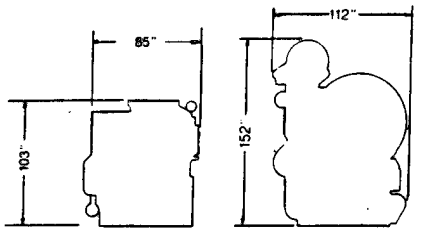
All PARAFLOW machines are serviced by YORK or its authorized service representatives, which are located throughout the U.S. YORK guarantees availability of spare parts. Extended service contracts are also available.

Simple Operation

Operation of the PARAFLOW unit does not require highly skilled or specially trained personnel.

Major Headspace Savings

Headroom is reduced up to 33% when compared with series two-stage steam-absorption units. The reason is YORK's exclusive Parallel-Flow system which enables the First Stage Generator to be placed beside instead of on top of the main shell of the unit. In this example a 600-ton Hitachi unit (right) is compared with an equivalent-capacity two-stage steam unit.



YORK PARAFLOW Two-Stage Steam Chiller

Two-Stage Series Flow Steam-Absorption Unit

Optional Features

Variable Outlet Conditions

Temperatures and flow rates for chilled water and condenser water can be varied from those listed in the standard specifications.

Spare Pumps

Spare refrigerant and solution pumps are available for applications in which continuous operation is critical, such as hospitals, computer rooms, and industrial facilities. This often eliminates the need for standby chillers.

Modified Tube Construction

A variety of tube thicknesses and materials is available to meet special requirements, such as for industrial processes.

Lead-Lag Operation

Controls for lead-lag operation are available for applications in which two or more machines are installed in a building.

High Pressure Water Circuits

For high-rise buildings where higher pressures are required, water circuits and headers can be specified for 200 psig working pressure, instead of the standard 150 psig.

Pump Motor Power Factor Correction

With this option, the power factor is increased by the addition of phase condensers to the power circuit. This is beneficial in applications where reactive power must be kept to a minimum.

High Efficiency Models

This energy saving option reduces steam consumption further to 9.3 lbs. per ton-hour at standard conditions.

Earthquake Switch

This optional switch will automatically stop the machine in the event of a tremor.

85°/100° Condenser Water

This option reduces water flow requirements and condenser water pipe size without loss of capacity.

Selection Data

250–1500-Ton Models

Product specifications are subject to change without notice and without obligation.

†All data based on 0.0005 fouling factor in all water circuits.

	MODEL YCP-ST		14G	14GL	15G	15GL	16G	16GL	17G	17GL	18G	19G	20G	21G	22G
SPECIFICATIONS	NOMINAL CAPACITIES (TONS)†		250	270	310	360	400	450	500	540	600	700	1000	1250	1500
	Steam Consumption Rate at Full Load		9.7 LBS. STEAM PER TON-HOUR											9.9 LBS./TON-HR.	
	Chilled Water	Temperature	ENTERING 54°F									LEAVING 44°F [2]			
		Flow Rate (GPM) [3]	600	648	744	864	960	1080	1200	1296	1440	1680	2400	3000	3600
		Pressure Drop (in. water)	37	43	31	45	26	36	18	23	25	38	46	37	43
	Condenser Water	Temperature	ENTERING 85°F [4]									LEAVING 95°F [5]			
		Flow Rate (GPM) [3]	1115	1205	1380	1610	1790	2010	2230	2410	2680	3120	4460	5580	6700
		Pressure Drop (in. water)	20	23	27	23	16	33	23	25	27	36	27	27	26
	Electrical Requirement	(KVA) [6]	12	12	12	12	12	19	19	19	19	25	30	38	45
		(KW)	7.0	7.0	7.0	7.0	7.0	10.5	10.5	10.5	10.5	11.0	16.0	18.0	20.0
DIMENSIONS AND WEIGHTS	CHILLED WATER PIPING (in.)		6	6	6	6	8	8	8	8	8	10	12	12	14
	CONDENSER WATER PIPING (in.)		8	8	8	8	10	10	10	10	12	12	14	16	16
	STEAM INLET PIPING (in.) [7]		2½	2½	2½	2½	3	3	4	4	5	5	5	6	6
	CONDENSATE OUTLET PIPING (in.)		¾	¾	¾	¾	¾	¾	1	1	1	1	1¼	1½	1½
	LENGTH (in.) [8]		174	174	178	170	178	216	216	255	255	295	358	319	370
	WIDTH (in.)		85	85	85	85	85	85	85	85	85	85	103	122	140
	HEIGHT (in.)		101	101	101	101	101	102	102	103	103	104	110	128	128
	RIGGING WEIGHT (lbs.)		19,000	19,500	21,000	21,000	23,000	24,000	25,000	30,000	32,000	42,000	62,000	92,000	100,000
	OPERATING WEIGHT (lbs.)		25,500	26,000	28,000	28,000	32,000	33,000	36,000	43,000	47,000	59,000	81,000	121,000	132,000

[1] Based on steam input pressure of 114.3 psig

[2] Minimum chilled water outlet temperature of 43°F available on request

[3] Flow quantity may be varied between 50% and 150% of standard rating on request.

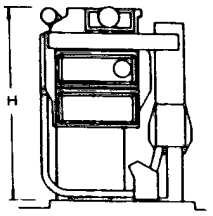
[4] Entering condenser water lower limit of 59°F available on request

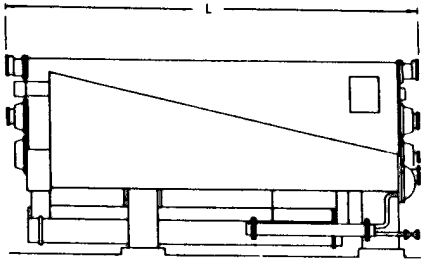
[5] Leaving condenser water temperature of 100°F available on request

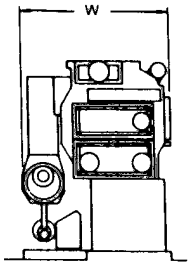
[6] 208V 3 Phase, 60Hz is standard. Average Power Factor 0.7. Other voltages available on request. KVA figures provided for circuit requirement only.

[7] Piping dimension may vary with inlet solution supply pressure

[8] **Tube pull space for main shell is approximately equal to L dimension either end. First stage generator tube pull space required on end opposite steam inlet.**





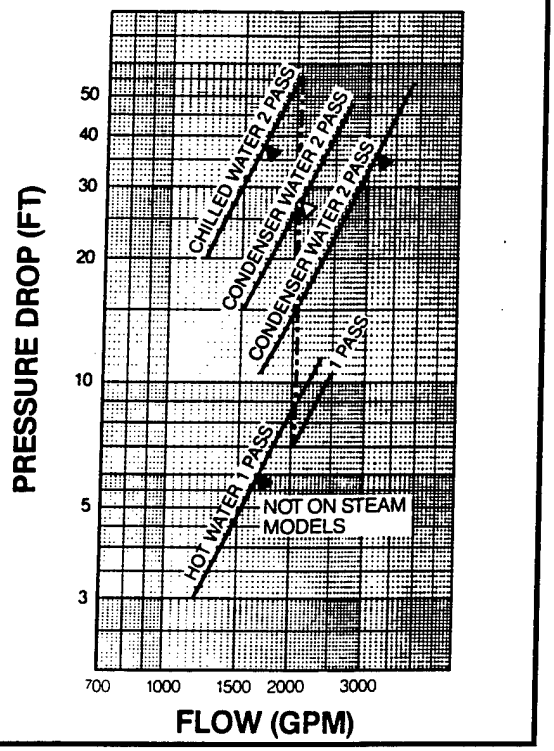


Rating Data

YPC-ST-19G

LEAVING COOLING WATER TEMP. (°F)		LEAVING CHILLED WATER TEMP. (°F)						
		42	43	44	46	48	50	52
87	RT	749	749	749	749	749	749	749
	ECR	1.06	1.04	1.03	1.02	1.01	1.00	0.98
89	RT	728	749	749	749	749	749	749
	ECR	1.04	1.05	1.04	1.03	1.02	1.01	1.00
91	RT	693	735	749	749	749	749	749
	ECR	1.00	1.04	1.05	1.04	1.03	1.02	1.01
93	RT	665	700	735	749	749	749	749
	ECR	0.97	1.01	1.04	1.05	1.04	1.03	1.02
95	RT	630	665	700	735	749	749	749
	ECR	0.93	0.97	1.00	1.04	1.05	1.04	1.03
97	RT	602	630	665	700	735	749	749
	ECR	0.90	0.93	0.97	1.01	1.05	1.06	1.05
99	RT	567	602	630	665	693	721	742
	ECR	0.87	0.91	0.94	0.98	1.01	1.04	1.06
100	RT	550	588	613	648	673	707	738
	ECR	0.86	0.90	0.93	0.97	0.99	1.03	1.06

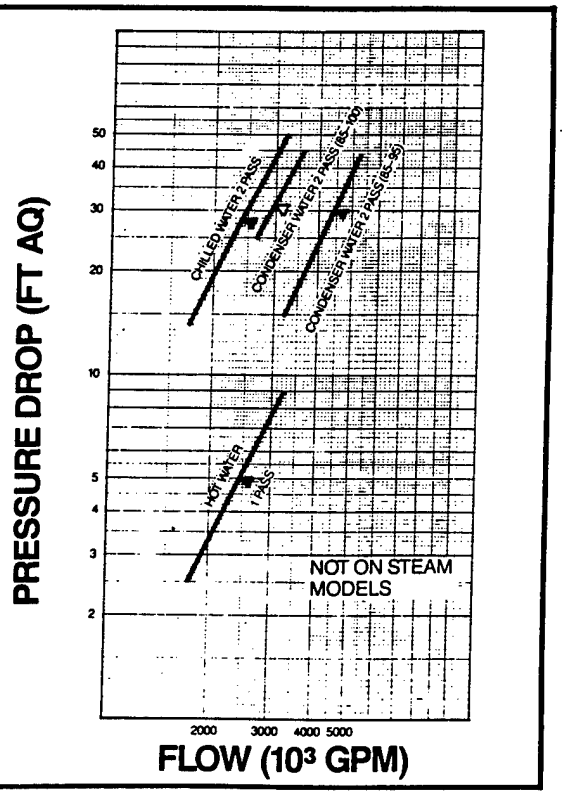
RATED CONDITIONS



YPC-ST-20G

LEAVING COOLING WATER TEMP. (°F)		LEAVING CHILLED WATER TEMP. (°F)						
		42	43	44	46	48	50	52
87	RT	1070	1070	1070	1070	1070	1070	1070
	ECR	1.06	1.04	1.03	1.02	1.01	1.00	0.98
89	RT	1040	1070	1070	1070	1070	1070	1070
	ECR	1.04	1.05	1.04	1.03	1.02	1.01	1.00
91	RT	990	1050	1070	1070	1070	1070	1070
	ECR	1.00	1.04	1.05	1.04	1.03	1.02	1.01
93	RT	950	1000	1050	1070	1070	1070	1070
	ECR	0.97	1.01	1.04	1.05	1.04	1.03	1.02
95	RT	900	950	1000	1050	1070	1070	1070
	ECR	0.93	0.97	1.00	1.04	1.05	1.04	1.03
97	RT	860	900	950	1000	1050	1070	1070
	ECR	0.90	0.93	0.97	1.01	1.05	1.06	1.05
99	RT	810	860	900	950	990	1030	1060
	ECR	0.87	0.91	0.94	0.98	1.01	1.04	1.06
100	RT	786	840	877	926	961	1010	1055
	ECR	0.86	0.90	0.93	0.97	0.99	1.03	1.06

RATED CONDITIONS



ECR: ENERGY CONSUMPTION RATE = $\frac{\text{ACTUAL}}{\text{NOMINAL}}$ RT: REFRIGERANT TONS

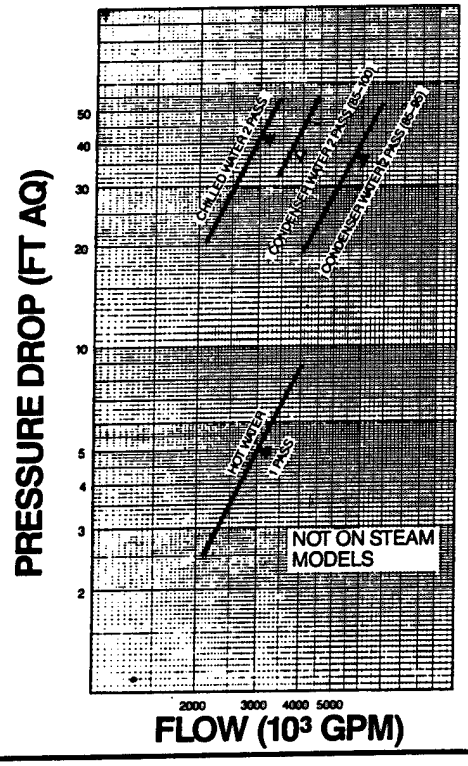
FOR NOMINAL CONSUMPTION RATE REFER TO SPECIFICATION AND DIMENSION

△ STANDARD CONDITIONS
▲ 85°-100° CONDENSER WATER

YPC-ST-21G

LEAVING COOLING WATER TEMP. (°F)		LEAVING CHILLED WATER TEMP. (°F)						
		42	43	44	46	48	50	52
87	RT	1125	1213	1313	1375	1438	1438	1438
	ECR	0.90	0.97	1.03	1.07	1.09	1.08	1.07
89	RT	1125	1213	1313	1375	1438	1438	1438
	ECR	0.91	0.97	1.03	1.07	1.09	1.08	1.08
91	RT	1125	1213	1313	q1375	1424	1438	1438
	ECR	0.92	0.98	1.04	1.08	1.09	1.09	1.08
93	RT	1125	1200	1268	1313	1404	1438	1438
	ECR	0.93	0.98	1.02	1.04	1.08	1.09	1.09
95	RT	1120	1188	1250	1298	1340	1381	1419
	ECR	0.93	0.97	1.00	1.04	1.05	1.06	1.09
97	RT	1038	1118	1178	1229	1276	1319	1369
	ECR	0.88	0.93	0.96	0.99	1.02	1.03	1.07
99	RT	963	1048	1104	1156	1206	1250	1296
	ECR	0.82	0.89	0.92	0.95	0.97	1.00	1.03
100	RT	928	1015	1069	1121	1173	1217	1260
	ECR	0.80	0.87	0.90	0.93	0.95	0.98	1.01

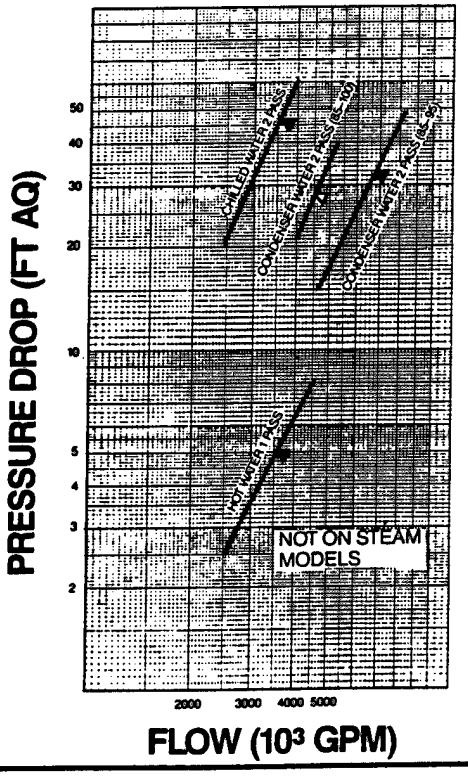
RATED CONDITIONS



YPC-ST-22G

LEAVING COOLING WATER TEMP. (°F)		LEAVING CHILLED WATER TEMP. (°F)						
		42	43	44	46	48	50	52
87	RT	1350	1455	1500	1500	1500	1500	1500
	ECR	0.90	0.97	0.98	0.97	0.95	0.94	0.93
89	RT	1350	1455	1500	1500	1500	1500	1500
	ECR	0.91	0.97	0.98	0.97	0.95	0.94	0.94
91	RT	1350	1455	1500	1500	1500	1500	15008
	ECR	0.92	0.98	0.99	0.98	0.96	0.95	0.94
93	RT	1350	1440	1500	1500	1500	1500	1500
	ECR	0.93	0.98	0.99	0.99	0.96	0.95	0.95
95	RT	1344	1425	1500	1500	1500	1500	1500
	ECR	0.93	0.97	1.00	1.00	0.98	0.96	0.96
97	RT	1245	1341	1413	1475	1500	1500	1500
	ECR	0.88	0.93	0.96	0.99	1.00	0.98	0.96
99	RT	1155	1257	1324	1388	1448	1500	1500
	ECR	0.82	0.89	0.92	0.95	0.97	1.00	1.00
100	RT	1113	1218	1282	1346	1409	1461	1500
	ECR	0.80	0.87	0.90	0.93	0.95	0.98	1.00

RATED CONDITIONS



ECR: ENERGY CONSUMPTION RATE = $\frac{\text{ACTUAL}}{\text{NOMINAL}}$ RT: REFRIGERANT TONS

FOR NOMINAL CONSUMPTION RATE REFER TO SPECIFICATION AND DIMENSION

▲ STANDARD CONDITIONS

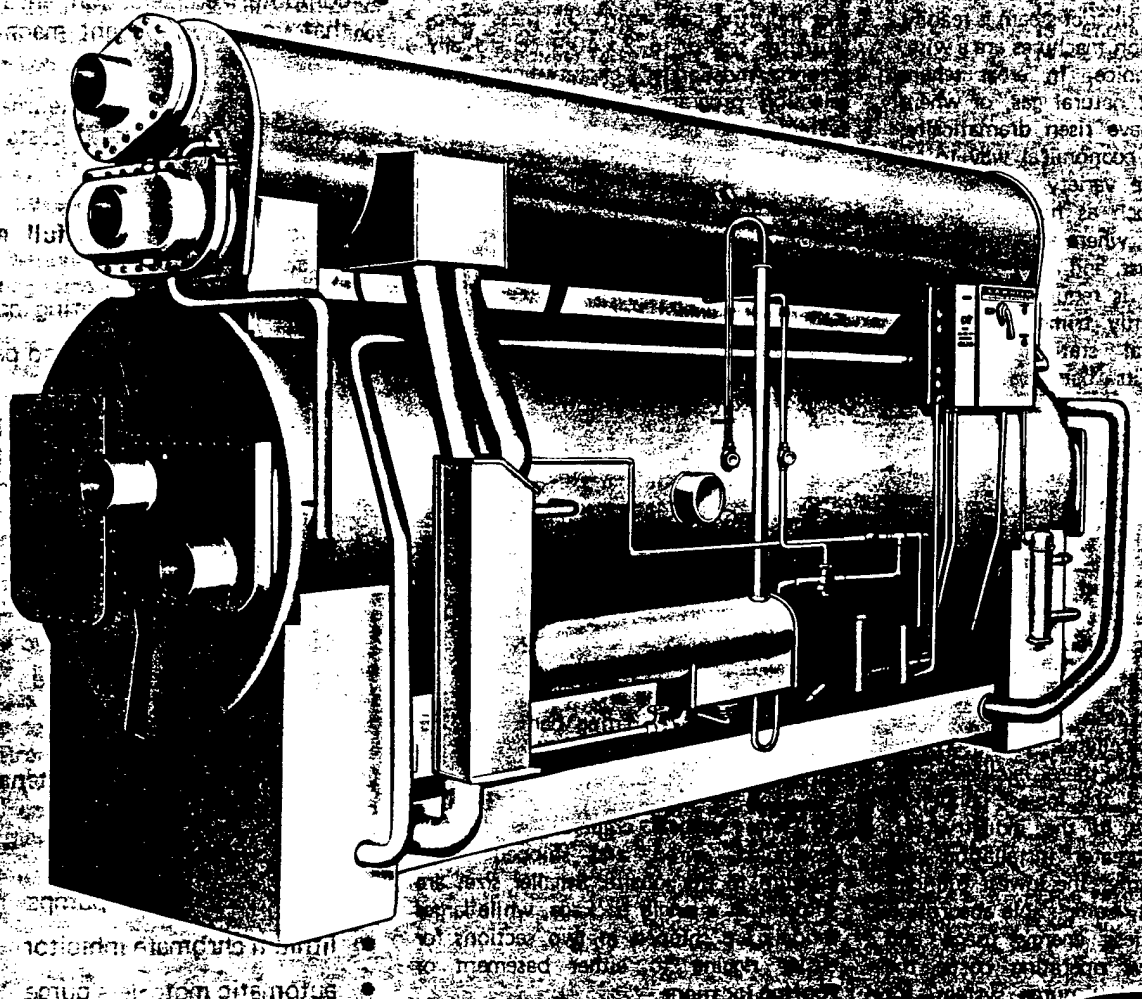
△ 85°-100° CONDENSER WATER

YORK APPLIED SYSTEMS

1

Carrier Hermetic Absorption Liquid Chillers

15 standard models for high-capacity cooling at low operating costs



© Carrier Corporation 1975

Look to Carrier for the standard of excellence in absorption refrigeration...the 16JB

Now, more than ever, absorption refrigeration is a viable alternative to costlier methods of central station refrigeration. Absorption offers first cost and operating cost savings that are too crucial to overlook in light of today's energy shortages and spiraling construction costs. In circumstances where your building has unused boiler capacity during the summer months, or where district steam is readily available, absorption machines are a wise, cost-conscious choice. In areas where there is low cost natural gas, or where electrical rates have risen dramatically, absorption is an economical way to air condition a wide variety of buildings. And in cases such as hospitals or industrial processes, where air conditioning is an absolute ***must,*** and a 100% standby generator system is required, first costs can be significantly trimmed by specifying a central station absorption machine with its comparatively low power consumption.

Absorption is a relatively quiet, vibration-free means of producing effective refrigeration. So when you consider what's available in absorption machines, consider the best — the incomparable → Carrier 16JB. Fifteen standard models use either low pressure steam or hot water to produce refrigeration economically in → the 70 to 815 ton range.

Carrier absorption machines set the standard for excellence in absorption refrigeration, with these exclusive features ***standard*** — the lowest condenser water flow rate in the industry, 3.0 gpm/ton, for greater installation and operating economy; the lowest full-load steam rate of any comparable absorption machine, for less energy usage and dramatically low operating costs; the automatic motorless purge system, for complete and continuous removal of noncondensables to an external storage chamber; U-bend generator tubes that float and adjust freely in response to rapid thermal changes, for a great reduction in tube bundle failures; a choice of either electronic or pneumatic centralized controls; and a rigorous standard of leak tightness that no other machine in the industry can approach, mass spectrometer tested to 2×10^{-5} cc std air/second. And Carrier's exclusive computer selection program provides a balanced system, accurately matching equipment to both full- and part-load conditions.

With the 16JB, excellence is the standard. Consider — 3-stage Cycle-Guard™ control, standard, automatically prevents overconcentration and crystallization; Extender™ valve control, standard, prevents overdilution and ensures a safe pump suction level. When you specify these chillers, you get economical, dependable operation with entering condenser water as low as 45 F; trouble-free leakproof hermetic pumps; and double-sump design for easier servicing.

The 16JB is backed by Carrier's direct national service organization, assuring you of complete support if or when it is needed. These dependable machines are the result of over a quarter-century of in-the-field servicing and factory research and development, dating back to 1945 when Carrier introduced the first high-capacity absorption equipment.

These rugged chillers are factory assembled, wired, and shipped under vacuum to the jobsite. Smaller sizes are shipped in a single package, while larger models are shipped in two sections for easier rigging to either basement or rooftop locations.

16JB — an all around performer

15 standard models . . . matched to ← your exact job requirements

- computerized selection ensures that you get the right machine for your application
- choose electronic or pneumatic controls for reduced costs at installation

Enjoy energy savings at full and part load

- accurately plan operating costs
- Carrier can supply full- and part-load computerized data
- 3-stage Cycle-Guard and Extender controls. . .reliability even at 45 F entering condenser water

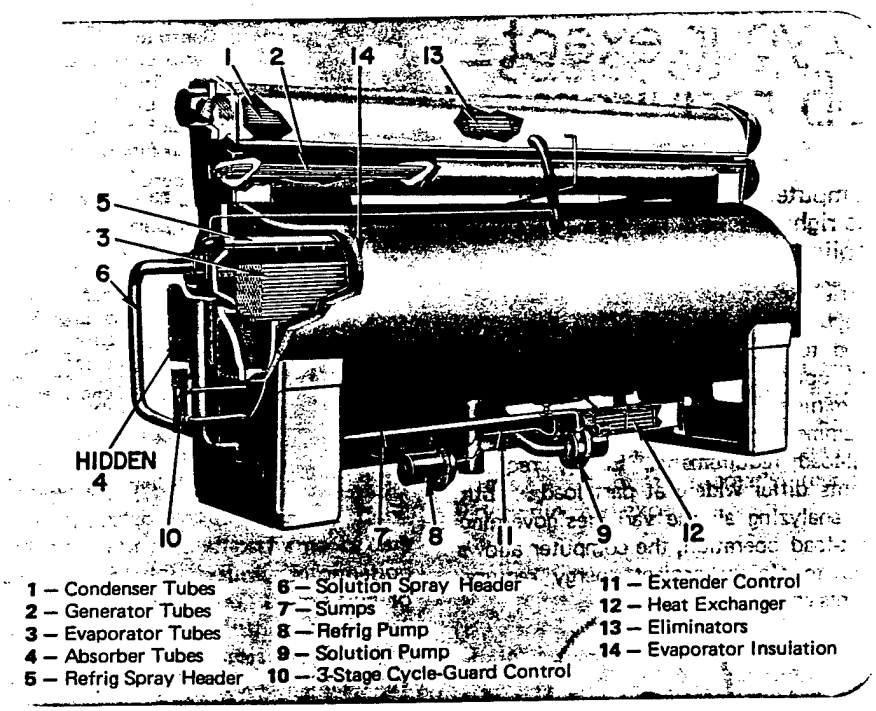
Easy servicing convenience

- double-sump design
- direct national service and maintenance

Designed with lower maintenance costs in mind

- U-bend generator tubes
- leakproof hermetic pumps
- lithium chromate inhibitor
- automatic motorless purge

The inside story on absorption excellence...

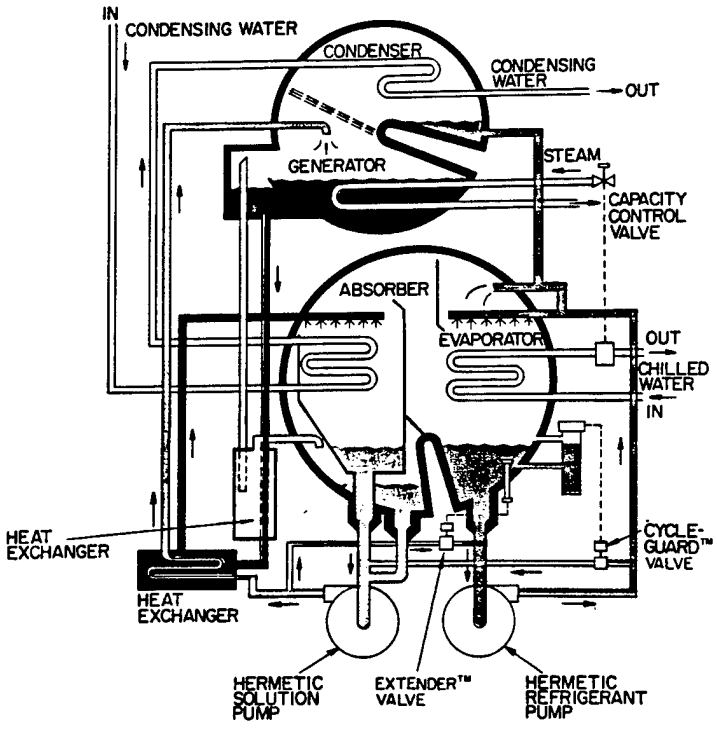


The Carrier absorption refrigeration cycle

Carrier absorption machines operate on the simple principle that under low absolute pressure, water will boil at a low temperature. The two-shell 16JB uses heat to efficiently produce refrigeration. The lower shell is divided into absorber and evaporator sections, while the upper shell consists of generator and condenser sections. The evaporator section contains the refrigerant, water. A coil, thru which the building cooling system water circulates, is inserted into the evaporator to establish a heat exchange.

The refrigerant gains heat from the cooling system water, and because of low pressure maintained in the evaporator, quickly reaches saturation temperature and vaporizes, cooling the system water. The remainder of the cycle deals with reclaiming this refrigerant.

The affinity of lithium bromide for water causes the refrigerant vapor to be absorbed by the strong solution in the absorber section. The diluted (weak) solution is pumped into the generator, where steam or hot water is used to drive the water out of the solution as a vapor. The vapor passes into the condenser and changes back to liquid, which returns to the evaporator to be reused. Meanwhile, the strong solution left in the generator flows back to the absorber. This cycle is continuous as long as the machine is in operation.



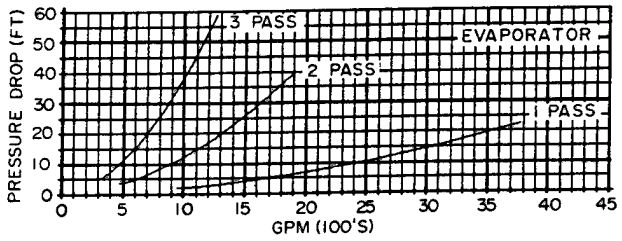
SELECTION DATA
CAPACITY (tons)

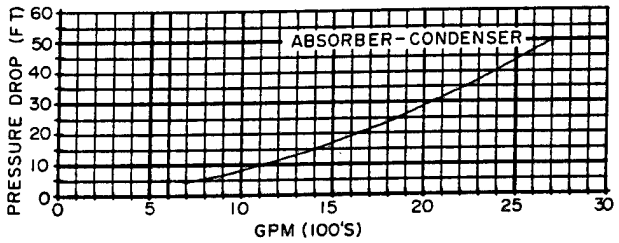
16JB047

ECWT (F)	STM (psig)	LEAVING CHILLED WATER TEMP (F) 42	43	44	45	46	48	50
80	8	451 / 515	462 / 527	473 / 538	484 / 548	495 / 558	511 / 574	528 / 590
	10	474 / 511	485 / 547	496 / 558	506 / 567	516 / 576	533 / 593	550 / 612
	12	496	506	516 / 549	525 / 558	533 / 593	550 / 612	566 / 631
	13		516	525	533 / 566	541 / 575	557 / 620	573 / 638
	14			532	541	550 / 584	564 / 627	580 / 646
85	8	387 / 446	398 / 457	409 / 469	420 / 481	431 / 493	450 / 511	469 / 528
	10	411 / 472	423 / 483	434 / 493	445 / 503	455 / 513	473 / 530	494 / 549
	12	435	445 / 479	455 / 488	465 / 520	475 / 530	493 / 548	510 / 567
	13	445	455	466 / 497	476 / 506	485 / 539	502 / 558	519 / 577
	14		465	475	484 / 514	493 / 524	510 / 567	528 / 587
90	8	309 / 354	319 / 366	328 / 377	342 / 394	356 / 411	378 / 437	400 / 462
	10	339 / 390	352 / 405	364 / 421	376 / 434	387 / 446	408 / 465	429 / 483
	12	369 / 399	380 / 438	391 / 449	400 / 457	409 / 464	430 / 482	450 / 501
	13	381 / 413	391 / 425	402 / 436	411 / 465	420 / 472	444 / 494	459 / 511
	14	393	403	413	422 / 452	430 / 480	455 / 505	468 / 520

Based on 1365 gpm cond water, 2-pass evap, 10 F temp rise
Based on 1638 gpm cond water, 2-pass evap, 10 F temp rise
Based on 1911 gpm cond water, 2-pass evap, 10 F temp rise

ECWT – Entering Condensing Water Temp **STM** – Steam





PHYSICAL DATA

NOMINAL TONS . . . .455 **STEAM RATE (lb/ton-hr)** 18.0
→ **WEIGHT (lb)** . . . . . Operating 30,850; Rigging 18,500 (Abs-Evap)
5,500 (Gen-Cond)
23,500 (one piece)

ELECTRICAL DATA (3-Ph, 60-Hz)

VOLTAGE	PUMP	BHP	FLA	LRA	MFA
208-240	Solution	3.7	16.0	70	50
	Refrig	2.0	16.0	70	
416-480	Solution	3.7	8.0	35	25
	Refrig	2.0	8.0	35	

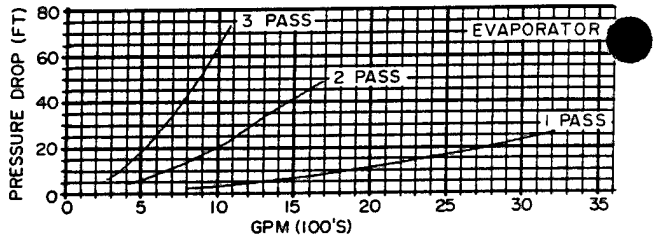
SELECTION DATA
CAPACITY (tons)

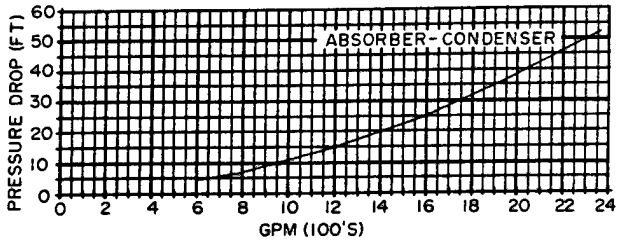
16JB054

ECWT (F)	STM (psig)	LEAVING CHILLED WATER TEMP (F) 42	43	44	45	46	48	50
80	8	484 / 551	495 / 564	505 / 577	516 / 589	527 / 602	549 / 628	572 / 61
	10	508 / 579	519 / 592	530 / 605	541 / 618	552 / 630	575 / 620	598
	12	531 / 572	542 / 584	553 / 628	564 / 608	576 / 621	598	622
	13	541	553 / 595	564 / 608	575 / 620	587 / 630	610	632
	14	552	563	574 / 618	586 / 628	597	621	
85	8	422 / 481	433 / 493	443 / 505	453 / 517	464 / 529	485 / 554	507 / 579
	10	446 / 508	457 / 521	467 / 533	478 / 545	489 / 558	510 / 583	532 / 604
	12	469 / 534	479 / 547	490 / 559	501 / 572	512 / 582	534 / 603	556 / 624
	13	480 / 516	490 / 528	501 / 571	512 / 581	523 / 592	545 / 613	568 / 634
	14	490	501 / 539	512 / 551	523 / 590	534 / 601	556 / 622	578 / 614
90	8	360 / 411	371 / 422	381 / 434	391 / 445	401 / 457	421 / 480	442 / 505
	10	385 / 438	395 / 450	405 / 461	415 / 473	426 / 485	446 / 509	467 / 534
	12	408 / 464	418 / 476	428 / 487	439 / 499	449 / 512	470 / 535	491 / 556
	13	418 / 450	428 / 488	439 / 500	449 / 512	460 / 524	481 / 545	502 / 566
	14	428	439 / 461	449 / 472	460 / 512	470 / 524	492 / 534	513 / 554 / 575

Based on 1470 gpm cond water, 2-pass evap, 10 F temp rise
Based on 1765 gpm cond water, 2-pass evap, 10 F temp rise
Based on 2060 gpm cond water, 2-pass evap, 10 F temp rise

ECWT – Entering Condensing Water Temp **STM** – Steam





PHYSICAL DATA

NOMINAL TONS . . . .490 **STEAM RATE (lb/ton-hr)** 18.3
→ **WEIGHT (lb)** . . . . . Operating 36,900; Rigging 21,500 (Abs-Evap)
7,000 (Gen-Cond)

ELECTRICAL DATA (3-Ph, 60-Hz)

VOLTAGE	PUMP	BHP	FLA	LRA	MFA
208-240	Solution	4.1	16.0	70	50
	Refrig	2.2	16.0	70	
416-480	Solution	4.1	8.0	35	25
	Refrig	2.2	8.0	35	

FLA – Nameplate Full Load Amps
LRA – Nameplate Locked Rotor Amps
MFA – Max Fuse Amps
BHP – Brake Horsepower

For ratings not listed, contact your Carrier representative.

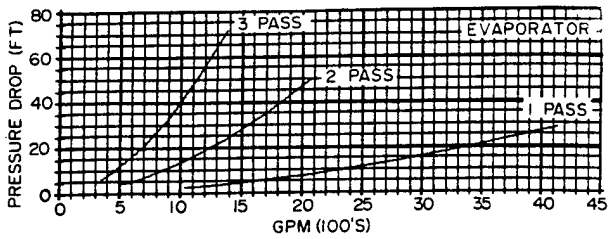
SELECTION DATA
CAPACITY (tons)

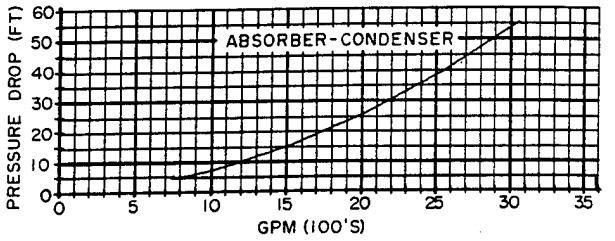
16JB068

ECWT (F)	STM (psig)	LEAVING CHILLED WATER TEMP (F) 42	43	44	45	46	48	50
80	8	610	624	637	651	665	694	722
		698	714	730	746	763	796	781
	10	641	655	669	683	697	726	755
		733	750	766	783	798	785	814
	12	669	683	698	712	727	756	786
		767	782	796	810	785	812	
	13	683	697	712	726	741	770	798
		738	794	808	785	797		
	14	696	711	725	740	754	784	809
		752	768	784	795	808		
85	8	532	545	558	572	585	612	640
		608	624	639	654	670	702	734
	10	563	576	589	603	617	644	672
		643	659	675	691	707	738	765
	12	591	605	618	632	646	674	703
		676	692	708	723	737	764	791
	13	605	618	632	646	660	688	717
		692	708	722	735	749	776	803
	14	618	632	645	659	674	702	730
		674	720	734	747	761	788	815
90	8	452	465	479	493	505	531	558
		520	534	548	563	578	608	639
	10	485	498	511	523	536	563	590
		554	569	584	599	614	645	676
	12	513	526	539	552	566	593	620
		587	602	617	632	648	678	704
	13	527	540	553	566	580	607	634
		602	617	633	648	664	690	716
	14	540	553	566	580	593	620	648
		617	633	648	662	675	702	728

Based on 1855 gpm cond water, 2-pass evap, 10 F temp rise
Based on 2225 gpm cond water, 2-pass evap, 10 F temp rise
Based on 2595 gpm cond water, 2-pass evap, 10 F temp rise

ECWT – Entering Condensing Water Temp **STM** – Steam





PHYSICAL DATA

NOMINAL TONS . . . .618 **STEAM RATE (lb/ton-hr)** 18.3

→ **WEIGHT (lb)** . . . . . Operating 45,890; Rigging 28,000 (Abs-Evap)
7,400 (Gen-Cond

ELECTRICAL DATA (3-Ph, 60-Hz)

VOLTAGE	PUMP	BHP	FLA	LRA	MFA
208-240	Solution	4.4	16.0	70	50
	Refrig	2.4	16.0	70	
416-480	Solution	4.4	8.0	35	25
	Refrig	2.4	8.0	35	

BHP – Brake Horsepower
FLA – Nameplate Full Load Amps
LRA – Nameplate Locked Rotor Amps
MFA – Max Fuse Amps

For ratings not listed, contact your Carrier representative.

Part-load energy requirements

At part load, energy requirements are influenced by several factors such as load, chilled water flow, leaving chilled water temperature, condenser water flow, entering condenser water temperature, available steam pressure and equipment components. Because of these variables, a single "Typical Part-Load Curve" (% Design Load vs % Energy Input) for a family of machines might have appreciable inaccuracies when applied to a specific set of conditions. Therefore, Carrier ***does not recommend*** the use of such curves in making owning-operating cost studies of a particular job.

Thru computer analysis, Carrier is able to provide accurate and detailed part-load energy requirements at any desired percent of full load for any specific 16JB machine selection, based on actual water flows and temperatures expected at the jobsite.

Energy savings can be significant if the machine is able to operate at lower condenser water temperatures. In actual operation, design conditions of load and wet-bulb temperature do not frequently occur. Therefore, during much of the operating season, this conservation of energy is possible. Carrier 16JB chillers operate trouble-free with uncontrolled entering condenser water temperature as low as 45 F. Thus, further savings are realized with Carrier machines thru elimination of a cooling tower bypass system, including an expensive bypass valve, piping, installation and subsequent maintenance.

C.H. BULL CO.
ENGINEERED PRODUCTS DIV.
233 UTAH AVENUE, SOUTH SAN FRANCISCO, CA 94080
· TELEPHONE (415) 871-8448 · FAX (415) 583-4007

DATE REC'D: 1-4-95
TIME REC'D: 3:50 PM
PROJECT No.:
ORIGINAL: BLH /FILE
COPY: TMR

FACSIMILE TRANSMISSION

TO: Blair Horst
DATE: 1/4/95
COMPANY: Keller & Gannon
FAX #: 415-864-3681
FROM: C. H. Bull
SHEET 1 OF 3
REFERENCE: Fort Huachuca

Confirming phone each of the following two sheets contains three approaches to the same problem, each somewhat larger in size, dollars and steam production.

We hope this will give you a "feel" for how many engines would be required to meet your power and refrigeration needs.

We will be glad to expand or modify following your review.

Maxim also makes the GTW, particularly designed for use with the high exhaust flow rates of gas turbines and we will be please to provide similar ~~[illegible]~~ analyses if they would assist in your evaluation —

Charles H Bull

Sheet 1 [illegible]

MAXIM HEAT RECOVERY BEAIRD INDUSTRIES, INC. SHREVEPORT, LA.

REF. KELLER & GANNON		DATE	1/8/95
MODEL	TRP	SIZE	12.
TUBE LENGTH	STD		

EXHAUST GAS DATA		LIQUID DATA	
TYPE FUEL	NATURAL GAS	TYPE LIQUID	
EXCESS AIR-PCT	20.	OPERATING PRESSURE-PSIG	15.
FLOWRATE-LB/HR	10420.	FLOWRATE	------
INLET TEMP.-F	1160.	INLET TEMP-F	250.
OUTLET TEMP-F	575.	OUTLET TEMP-F	250.
PRESS. DROP (WET)-IN.W.C.	6.3	PRESS. DROP	------
FOULING FACTOR	.003	FOULING FACTOR	.001

HEAT RECOVERY-BTU/HR
EXHAUST 1771969.
JACKET WATER 3499980.
STEAM PRODUCED-LB/HR 5577.
WHAT NEXT? 1 = ANOTHER RUN-MODIFY DATA
2 = ANOTHER RUN-NEW DATA
3 = RETURN TO APPLICATION MENU..

309.8 ton hrs
835188

MAXIM HEAT RECOVERY BEAIRD INDUSTRIES, INC. SHREVEPORT, LA.

REF. KELLER & GANNON		DATE	___/___/___
MODEL	TRP	SIZE	12.
TUBE LENGTH	XXL		

EXHAUST GAS DATA		LIQUID DATA	
TYPE FUEL	NATURAL GAS	TYPE LIQUID	
EXCESS AIR-PCT	20.	OPERATING PRESSURE-PSIG	15.
FLOWRATE-LB/HR	10420.	FLOWRATE	------
INLET TEMP.-F	1160.	INLET TEMP-F	250.
OUTLET TEMP-F	463.	OUTLET TEMP-F	250.
PRESS. DROP (WET)-IN.W.C.	6.0	PRESS. DROP	------
FOULING FACTOR	.003	FOULING FACTOR	.001

HEAT RECOVERY-BTU/HR
EXHAUST 2095401.
JACKET WATER 3499980.
STEAM PRODUCED-LB/HR 5919.
WHAT NEXT? 1 = ANOTHER RUN-MODIFY DATA
2 = ANOTHER RUN-NEW DATA
3 = RETURN TO APPLICATION MENU..

328.8 ton hr
938615

MAXIM HEAT RECOVERY BEAIRD INDUSTRIES, INC. SHREVEPORT, LA.

REF. KELLER & GANNON		DATE	___/___/___
MODEL	TRP	SIZE	14.
TUBE LENGTH	XXL		

EXHAUST GAS DATA		LIQUID DATA	
TYPE FUEL	NATURAL GAS	TYPE LIQUID	
EXCESS AIR-PCT	20.	OPERATING PRESSURE-PSIG	15.
FLOWRATE-LB/HR	10420.	FLOWRATE	------
INLET TEMP.-F	1160.	INLET TEMP-F	250.
OUTLET TEMP-F	386.	OUTLET TEMP-F	250.
PRESS. DROP (WET)-IN.W.C.	3.2	PRESS. DROP	------
FOULING FACTOR	.003	FOULING FACTOR	.001

HEAT RECOVERY-BTU/HR
EXHAUST 2314909.
JACKET WATER 3499980.
STEAM PRODUCED-LB/HR 6152.
WHAT NEXT? 1 = ANOTHER RUN-MODIFY DATA
2 = ANOTHER RUN-NEW DATA
3 - RETURN TO APPLICATION MENU..

341.8 Ton hrs
44852

Sheet 1 [illegible]

MAXIM HEAT RECOVERY BEAIRD INDUSTRIES, INC. SHREVEPORT, LA.

REF. KELLER & GANNON		DATE	1/8/95
MODEL	TRP	SIZE	12.
TUBE LENGTH	STD		

EXHAUST GAS DATA		LIQUID DATA	
TYPE FUEL	NATURAL GAS	TYPE LIQUID	
EXCESS AIR-PCT	20.	OPERATING PRESSURE-PSIG	15.
FLOWRATE-LB/HR	10420.	FLOWRATE	------
INLET TEMP.-F	1160.	INLET TEMP-F	250.
OUTLET TEMP-F	575.	OUTLET TEMP-F	250.
PRESS. DROP (WET)-IN.W.C.	6.3	PRESS. DROP	------
FOULING FACTOR	.003	FOULING FACTOR	.001

HEAT RECOVERY-BTU/HR
EXHAUST 1771969.
JACKET WATER 3499980.
STEAM PRODUCED-LB/HR 5577.
WHAT NEXT? 1 = ANOTHER RUN-MODIFY DATA
2 = ANOTHER RUN-NEW DATA
3 = RETURN TO APPLICATION MENU..

309.8 ton hrs
835188

MAXIM HEAT RECOVERY BEAIRD INDUSTRIES, INC. SHREVEPORT, LA.

REF. KELLER & GANNON		DATE	___/___/___
MODEL	TRP	SIZE	12.
TUBE LENGTH	XXL		

EXHAUST GAS DATA		LIQUID DATA	
TYPE FUEL	NATURAL GAS	TYPE LIQUID	
EXCESS AIR-PCT	20.	OPERATING PRESSURE-PSIG	15.
FLOWRATE-LB/HR	10420.	FLOWRATE	------
INLET TEMP.-F	1160.	INLET TEMP-F	250.
OUTLET TEMP-F	463.	OUTLET TEMP-F	250.
PRESS. DROP (WET)-IN.W.C.	6.0	PRESS. DROP	------
FOULING FACTOR	.003	FOULING FACTOR	.001

HEAT RECOVERY-BTU/HR
EXHAUST 2095401.
JACKET WATER 3499980.
STEAM PRODUCED-LB/HR 5919.
WHAT NEXT? 1 = ANOTHER RUN-MODIFY DATA
2 = ANOTHER RUN-NEW DATA
3 = RETURN TO APPLICATION MENU..

328.8 ton hr
938615

MAXIM HEAT RECOVERY BEAIRD INDUSTRIES, INC. SHREVEPORT, LA.

REF. KELLER & GANNON		DATE	___/___/___
MODEL	TRP	SIZE	14.
TUBE LENGTH	XXL		

EXHAUST GAS DATA		LIQUID DATA	
TYPE FUEL	NATURAL GAS	TYPE LIQUID	
EXCESS AIR-PCT	20.	OPERATING PRESSURE-PSIG	15.
FLOWRATE-LB/HR	10420.	FLOWRATE	------
INLET TEMP.-F	1160.	INLET TEMP-F	250.
OUTLET TEMP-F	386.	OUTLET TEMP-F	250.
PRESS. DROP (WET)-IN.W.C.	3.2	PRESS. DROP	
FOULING FACTOR	.003	FOULING FACTOR	.001

HEAT RECOVERY-BTU/HR
EXHAUST 2314909.
JACKET WATER 3499980.
STEAM PRODUCED-LB/HR 6152.
WHAT NEXT? 1 = ANOTHER RUN-MODIFY DATA
2 = ANOTHER RUN-NEW DATA
3 - RETURN TO APPLICATION MENU..

341.8 Ton hrs
44852

APPENDIX K

Carrier HAP Program Data

APPENDIX K
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CARRIER HAP SIMULATION FOR SELECTED BUILDING INSULATION RETROFIT ANALYSES (BASE CASE)

BASELINE WEATHER DATA.

DESIGN WEATHER PARAMETERS & MSHGs

Location: Fort Huachuca, Arizona 08-23-94

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DESIGN PARAMETERS

City Name	Fort Huachuca
Location	Arizona
Latitude	31.6 degrees
Longitude	110.3 degrees
Elevation	4664.0 ft
Summer Design Dry-Bulb	92.0 F
Summer Coincident Wet-Bulb	62.0 F
Summer Daily Range	25.0 F
Winter Design Dry-bulb	28.0 F
Atmospheric Clearness Number	1.05
Average Ground Reflectance	0.20
Soil Conductivity	0.800 BTU/hr/ft/F
Local Time Zone (GMT +/- N hours)	7.0 hours
Consider Daylight Savings Time....?	N
First Month for Daylight Savings	-
Last Month for Daylight Savings	-
Simulation Weather Data	El Paso (TRY)
Current data is	User Defined

DESIGN DAY MAXIMUM SOLAR HEAT GAINS (BTU/HR/SQFT)

Month	N	NNE	NE	ENE	E	ESE	SE	SSE	S
January	24.9	24.9	32.0	110.3	185.8	240.8	261.6	261.5	257.9
February	28.9	28.9	70.8	156.6	213.1	255.5	259.4	242.6	230.2
March	33.2	39.0	113.2	192.2	239.1	248.9	237.7	203.4	182.5
April	37.4	83.8	157.8	207.8	237.2	230.6	194.6	145.8	118.3
May	40.5	116.1	181.1	217.9	228.9	209.4	159.3	101.6	75.3
June	50.8	128.3	186.9	217.4	224.0	198.4	144.2	84.9	61.9
July	42.1	116.7	176.2	214.4	225.8	203.9	156.5	99.0	73.4
August	39.1	83.9	150.9	203.5	229.7	221.3	188.4	140.8	114.3
September	34.3	36.2	111.8	179.1	227.3	241.0	228.2	197.2	177.3
October	29.6	29.6	68.9	147.7	212.2	243.5	252.6	236.3	222.5
November	25.1	25.1	26.0	112.5	182.0	234.1	259.9	260.1	253.1
December	23.1	23.1	23.1	94.7	168.8	230.4	256.8	265.4	263.6

Month	SSW	SW	WSW	W	WNW	NW	NNW	HOR	Mult.
January	262.4	260.3	240.9	184.1	112.4	30.9	24.9	187.3	1.00
February	243.4	261.1	253.1	218.2	157.2	66.0	28.9	229.6	1.00
March	203.5	237.8	248.4	239.0	192.5	114.0	38.9	266.1	1.00
April	146.1	195.9	226.6	237.9	212.8	155.5	83.9	285.0	1.00
May	102.4	162.0	206.8	231.3	221.0	177.9	115.8	290.6	1.00
June	85.3	145.9	197.2	225.7	220.5	182.9	127.9	290.2	1.00
July	99.1	157.0	203.3	226.3	215.6	174.3	116.4	286.9	1.00
August	140.8	188.9	218.5	229.6	205.7	151.5	83.1	279.2	1.00
September	195.8	226.6	242.1	220.6	181.6	114.0	34.3	256.6	1.00
October	235.5	251.4	246.4	211.3	143.1	71.5	29.6	223.5	1.00
November	259.7	260.5	231.8	185.5	108.0	31.5	25.1	184.7	1.00
December	265.8	260.5	227.3	173.2	87.8	23.1	23.1	168.4	1.00

COOLING DESIGN TEMPERATURE PROFILES

Location: Fort Huachuca, Arizona

08-23-94

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(Format is Dry-Bulb/Wet-Bulb F)

Hr	January	February	March	April	May	June
0000	54.1/ 41.8	56.1/ 43.9	60.9/ 48.6	63.7/ 50.7	67.7/ 52.8	70.5/ 55.1
0100	52.8/ 41.2	54.8/ 43.3	59.7/ 48.1	62.4/ 50.2	66.4/ 52.3	69.2/ 54.6
0200	51.6/ 40.6	53.6/ 42.8	58.4/ 47.6	61.2/ 49.7	65.2/ 51.9	68.0/ 54.2
0300	50.6/ 40.1	52.6/ 42.3	57.4/ 47.2	60.2/ 49.3	64.2/ 51.5	67.0/ 53.8
0400	49.8/ 39.7	51.8/ 41.9	56.7/ 46.9	59.4/ 49.0	63.4/ 51.2	66.2/ 53.5
0500	49.6/ 39.6	51.6/ 41.8	56.4/ 46.7	59.2/ 48.9	63.2/ 51.1	66.0/ 53.5
0600	50.1/ 39.9	52.1/ 42.1	56.9/ 46.9	59.7/ 49.1	63.7/ 51.3	66.5/ 53.7
0700	51.3/ 40.4	53.3/ 42.6	58.2/ 47.5	60.9/ 49.6	64.9/ 51.7	67.8/ 54.1
0800	53.6/ 41.5	55.6/ 43.7	60.4/ 48.4	63.2/ 50.5	67.2/ 52.6	70.0/ 55.0
0900	56.8/ 43.0	58.8/ 45.1	63.7/ 49.8	66.4/ 51.8	70.4/ 53.8	73.2/ 56.1
1000	60.6/ 44.7	62.6/ 46.8	67.4/ 51.2	70.2/ 53.2	74.2/ 55.2	77.0/ 57.4
1100	64.8/ 46.6	66.8/ 48.5	71.7/ 52.9	74.4/ 54.8	78.4/ 56.7	81.2/ 58.8
1200	68.8/ 48.2	70.8/ 50.1	75.7/ 54.4	78.4/ 56.2	82.4/ 58.1	85.2/ 60.2
1300	71.8/ 49.5	73.8/ 51.3	78.7/ 55.4	81.4/ 57.2	85.4/ 59.1	88.2/ 61.1
1400	73.8/ 50.3	75.8/ 52.1	80.7/ 56.2	83.4/ 57.9	87.4/ 59.7	90.2/ 61.8
1500	74.6/ 50.6	76.6/ 52.4	81.4/ 56.4	84.2/ 58.2	88.2/ 60.0	91.0/ 62.0
1600	73.8/ 50.3	75.8/ 52.1	80.7/ 56.2	83.4/ 57.9	87.4/ 59.7	90.2/ 61.8
1700	72.1/ 49.6	74.1/ 51.4	78.9/ 55.5	81.7/ 57.3	85.7/ 59.2	88.5/ 61.2
1800	69.3/ 48.5	71.3/ 50.3	76.2/ 54.5	78.9/ 56.4	82.9/ 58.2	85.8/ 60.3
1900	66.1/ 47.2	68.1/ 49.1	72.9/ 53.3	75.7/ 55.2	79.7/ 57.1	82.5/ 59.3
2000	62.8/ 45.7	64.8/ 47.7	69.7/ 52.1	72.4/ 54.1	76.4/ 56.0	79.2/ 58.2
2100	60.1/ 44.5	62.1/ 46.6	66.9/ 51.0	69.7/ 53.0	73.7/ 55.0	76.5/ 57.2
2200	57.6/ 43.4	59.6/ 45.5	64.4/ 50.0	67.2/ 52.1	71.2/ 54.1	74.0/ 56.4
2300	55.6/ 42.5	57.6/ 44.6	62.4/ 49.2	65.2/ 51.3	69.2/ 53.4	72.0/ 55.7

Hr	July	August	September	October	November	December
0000	71.5/ 55.1	71.5/ 55.1	69.5/ 54.0	65.7/ 51.6	59.9/ 48.4	55.1/ 44.1
0100	70.2/ 54.7	70.2/ 54.7	68.2/ 53.5	64.4/ 51.1	58.7/ 47.9	53.8/ 43.6
0200	69.0/ 54.2	69.0/ 54.2	67.0/ 53.0	63.2/ 50.7	57.4/ 47.3	52.6/ 43.0
0300	68.0/ 53.8	68.0/ 53.8	66.0/ 52.7	62.2/ 50.3	56.4/ 46.9	51.6/ 42.6
0400	67.2/ 53.6	67.2/ 53.6	65.2/ 52.3	61.4/ 49.9	55.7/ 46.6	50.8/ 42.2
0500	67.0/ 53.5	67.0/ 53.5	65.0/ 52.3	61.2/ 49.9	55.4/ 46.5	50.6/ 42.1
0600	67.5/ 53.7	67.5/ 53.7	65.5/ 52.5	61.7/ 50.1	55.9/ 46.7	51.1/ 42.3
0700	68.8/ 54.1	68.8/ 54.1	66.8/ 53.0	62.9/ 50.5	57.2/ 47.2	52.3/ 42.9
0800	71.0/ 55.0	71.0/ 55.0	69.0/ 53.8	65.2/ 51.4	59.4/ 48.2	54.6/ 43.9
0900	74.2/ 56.1	74.2/ 56.1	72.2/ 55.0	68.4/ 52.7	62.7/ 49.5	57.8/ 45.3
1000	78.0/ 57.4	78.0/ 57.4	76.0/ 56.3	72.2/ 54.1	66.4/ 51.0	61.6/ 47.0
1100	82.2/ 58.8	82.2/ 58.8	80.2/ 57.8	76.4/ 55.6	70.7/ 52.7	65.8/ 48.7
1200	86.2/ 60.2	86.2/ 60.2	84.2/ 59.1	80.4/ 57.0	74.7/ 54.1	69.8/ 50.4
1300	89.2/ 61.1	89.2/ 61.1	87.2/ 60.1	83.4/ 58.1	77.7/ 55.2	72.8/ 51.5
1400	91.2/ 61.8	91.2/ 61.8	89.2/ 60.7	85.4/ 58.7	79.7/ 55.9	74.8/ 52.3
1500	92.0/ 62.0	92.0/ 62.0	90.0/ 61.0	86.2/ 59.0	80.4/ 56.2	75.6/ 52.6
1600	91.2/ 61.8	91.2/ 61.8	89.2/ 60.7	85.4/ 58.7	79.7/ 55.9	74.8/ 52.3
1700	89.5/ 61.2	89.5/ 61.2	87.5/ 60.2	83.7/ 58.2	77.9/ 55.3	73.1/ 51.6
1800	86.8/ 60.4	86.8/ 60.4	84.8/ 59.3	80.9/ 57.2	75.2/ 54.3	70.3/ 50.5
1900	83.5/ 59.3	83.5/ 59.3	81.5/ 58.2	77.7/ 56.1	71.9/ 53.1	67.1/ 49.3
2000	80.2/ 58.2	80.2/ 58.2	78.2/ 57.1	74.4/ 54.9	68.7/ 51.9	63.8/ 47.9
2100	77.5/ 57.2	77.5/ 57.2	75.5/ 56.1	71.7/ 53.9	65.9/ 50.8	61.1/ 46.8

2200	75.0/ 56.4	75.0/ 56.4	73.0/ 55.3	69.2/ 53.0	63.4/ 49.8	58.6/ 45.7
2300	73.0/ 55.7	73.0/ 55.7	71.0/ 54.5	67.2/ 52.2	61.4/ 49.0	56.6/ 44.8

SIMULATION WEATHER DATA SUMMARY

Data: El Paso, Texas (TRY) 08-23-94

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TABLE 1. SIMULATION WEATHER DATA DESIGN PARAMETERS

City	El Paso
Location	Texas
Type of Data	Typical Reference Year
Latitude	31.8 deg
Longitude	106.4 deg
Elevation	3918.0 ft
* Average Ground Reflectivity	0.20
Local Time Zone (GMT +/- N hours)	7.0 hours
* Daylight Savings Time Considered?	N

* = User-defined design parameters. All other values are fixed.

TABLE 2. DRY-BULB TEMPERATURE STATISTICS (F)

Month	Absolute Maximum	Average Maximum	Average	Average Minimum	Absolute Minimum
January	73.0	57.9	42.1	26.6	11.5
February	77.5	61.9	48.9	35.3	19.0
March	87.0	74.7	60.8	45.5	26.5
April	88.5	79.0	66.8	52.0	36.5
May	94.5	84.4	72.3	57.5	33.5
June	99.0	91.1	79.7	67.4	60.0
July	97.0	93.0	82.9	72.8	67.5
August	97.5	88.5	77.8	68.1	62.5
September	92.0	83.5	73.0	62.9	51.0
October	89.0	77.9	64.3	50.5	28.5
November	75.0	64.9	53.1	41.7	30.0
December	68.5	51.5	41.1	32.1	19.0

TABLE 3. DAILY TOTAL SOLAR RADIATION STATISTICS

	[---- Daily Total Solar ---] (BTU/sqft)			[-- Daily Clearness Number --] (Dimensionless)		
Month	Maximum	Average	Minimum	Maximum	Average	Minimum
January	1353.6	1056.8	668.2	0.685	0.588	0.343
February	1756.9	1231.1	689.6	0.712	0.554	0.344
March	2150.5	1641.5	1126.8	0.713	0.595	0.422
April	2407.8	1972.2	1116.2	0.706	0.610	0.359
May	2557.5	2237.0	1753.6	0.707	0.633	0.493
June	2583.5	2270.0	1033.5	0.708	0.623	0.283
July	2568.4	2154.8	1294.8	0.706	0.602	0.363
August	2302.9	2058.3	1204.8	0.694	0.617	0.381
September	2159.9	1828.2	936.8	0.703	0.626	0.298
October	1835.0	1490.0	895.5	0.698	0.622	0.417
November	1466.3	904.6	332.7	0.693	0.474	0.190
December	1166.8	782.3	309.3	0.679	0.470	0.188

Notes: * All solar data is daily total flux on a horizontal surface.
* Clearness number is (Daily Total Solar)/(Extraterrestrial Solar)
Values between 0.70 and 0.80 represent clear conditions.

BASE CASE HUACHUCA

WALL CONSTRUCTION TYPES

Prepared by: Keller & Gannon 08-24-94
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WALL TYPE 1: (CUSTOM WALL)

Description.....: 15544
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
1" batt insulation	1.00	0.5	0.20	3.21	0.0
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	1.66			4.78	4.0

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 2: (CUSTOM WALL)

Description.....: 20200 avg
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
Mineral wool (75%) air (25%)	1.25	0.5	0.20	4.01	0.1
1-in (25 mm) stucco	1.00	116.0	0.20	0.20	9.7
Outside surface resistance	-	-	-	0.33	-
Totals	2.88			5.79	12.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 3: (CUSTOM WALL)

Description.....: 61701 #1 Insulated
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
12 in hw conc. block	12.00	38.0	0.20	3.70	38.0
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
3/4-in (20 mm) stucco	0.75	116.0	0.20	0.15	7.3
Outside surface resistance	-	-	-	0.33	-
Totals	16.88			16.65	48.0

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 4: (CUSTOM WALL)

Description.....: 48083
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
8-in (203 mm) LW concrete block	8.00	38.0	0.20	2.02	25.3
Outside surface resistance	-	-	-	0.33	-
Totals	8.00			3.04	25.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 5: (CUSTOM WALL)

Description.....: 51005
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
8-in (203 mm) LW concrete block	8.00	38.0	0.20	2.02	25.3
Outside surface resistance	-	-	-	0.33	-
Totals	8.00			3.04	25.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WALL TYPE 6: (CUSTOM WALL)

Description.....: 61701 #1
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
12 in hw conc. block	12.00	38.0	0.20	3.70	38.0
Outside surface resistance	-	-	-	0.33	-
Totals	12.63			5.28	40.6

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 7: (CUSTOM WALL)

Description.....: 61701 #2
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
3/4-in (10 mm) plywood	0.75	34.0	0.29	0.93	2.1
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
12 in hw conc. block	12.00	38.0	0.20	3.70	38.0
Outside surface resistance	-	-	-	0.33	-
Totals	16.25			16.87	40.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WALL TYPE 8: (CUSTOM WALL)

Description.....: 61701 #3
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
12 in hw conc. block	12.00	38.0	0.20	3.70	38.0
Outside surface resistance	-	-	-	0.33	-
Totals	12.63			5.28	40.6

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 9: (CUSTOM WALL)

Description.....: 61701 #4
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
8-in (203 mm) LW concrete block	8.00	38.0	0.20	2.02	25.3
Outside surface resistance	-	-	-	0.33	-
Totals	8.00			3.04	25.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WALL TYPE 1: (CUSTOM WALL)

Description.....: 70525#1
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
8-in (203 mm) LW concrete block	8.00	38.0	0.20	2.02	25.3
Airspace	2.00	0.0	0.00	0.91	0.0
4-in (102 mm) face brick	1.75	125.0	0.22	0.19	18.2
Outside surface resistance	-	-	-	0.33	-
Totals	12.38			4.70	46.2

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 2: (CUSTOM WALL)

Description.....: 70525#2
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
4-in (102 mm) face brick	4.00	125.0	0.22	0.43	41.7
4-in (102 mm) face brick	4.00	125.0	0.22	0.43	41.7
Outside surface resistance	-	-	-	0.33	-
Totals	8.00			1.88	83.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 3: (CUSTOM WALL)

Description.....: 70525#3
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
4-in (102 mm) face brick	4.00	125.0	0.22	0.43	41.7
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	1.50	0.5	0.20	6.00	0.1
4-in (102 mm) LW concrete	4.00	40.0	0.20	3.33	13.3
4-in (102 mm) face brick	4.00	125.0	0.22	0.43	41.7
Outside surface resistance	-	-	-	0.33	-
Totals	14.13			11.78	99.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 4: (CUSTOM WALL)

Description.....: 70525#4
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	1.00	0.5	0.20	3.21	0.0
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	1.66			4.78	4.0

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WALL TYPE 5: (CUSTOM WALL)

Description.....: 90312A
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
Airspace	3.50	0.0	0.00	0.91	0.0
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
Inside surface resistance	-	-	-	0.69	-
Totals	4.75			3.41	5.2

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 6: (CUSTOM WALL)

Description.....: 90312B
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
Inside surface resistance	-	-	-	0.69	-
Totals	4.75			13.71	5.4

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 7: (CUSTOM WALL)

Description.....: 91114#1
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	8.00	0.1
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	2.03			9.02	1.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 8: (CUSTOM WALL)

Description.....: 91114#2 average U
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
8-in (203 mm) HW concrete	8.00	140.0	0.20	0.67	93.3
Outside surface resistance	-	-	-	0.33	-
Totals	8.00			1.68	93.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 9: (CUSTOM WALL)

Description.....: 91114#3
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	8.00	0.1
Airspace	1.50	0.0	0.00	0.91	0.0
Outside surface resistance	-	-	-	0.33	-
Totals	4.13			10.49	2.7

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WALL TYPE 10: (CUSTOM WALL)

Description.....: 91114#4
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	8.00	0.1
Airspace	0.00	0.0	0.00	0.91	0.0
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	2.03			9.93	1.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 1: (CUSTOM ROOF)

Description.....: 15544
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustical Tile	0.38	18.0	0.14	1.89	0.6
Airspace	36.00	0.0	0.00	0.91	0.0
1" batt insulation	1.00	2.0	0.22	7.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	37.41			10.82	2.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 2: (CUSTOM ROOF)

Description.....: 20200
Absorptivity.....: 0.600

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
Airspace	12.00	0.0	0.00	0.91	0.0
1/2-in (13 mm) plywood	0.50	34.0	0.29	0.62	1.4
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	13.50			3.44	6.2

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 3: (CUSTOM ROOF)

Description.....: 43083
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
Airspace	4.00	0.0	0.00	0.91	0.0
4-in (102 mm) LW concrete	2.50	40.0	0.20	2.08	8.3
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	7.50			4.90	13.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 4: (CUSTOM ROOF)

Description.....: 51005
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
4-in (102 mm) LW concrete block	3.00	38.0	0.20	1.14	9.5
Rigid Insulation	3.00	0.5	0.20	11.00	0.1
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	6.38			13.49	11.8

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 5: (CUSTOM ROOF)

Description.....: 61701 #1
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Airspace	0.00	0.0	0.00	0.91	0.0
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
R-13 (RSI-2.3) batt insulation	4.00	0.5	0.20	12.82	0.2
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	5.07			15.64	7.7

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 6: (CUSTOM ROOF)

Description.....: 61701 #2
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustic Ceiling Tile	0.75	0.0	0.00	1.89	0.0
Airspace	0.00	0.0	0.00	0.91	0.0
R-16 batt insulation	4.00	0.5	0.20	16.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.78			19.82	1.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 7: (CUSTOM ROOF)

Description.....: 61701 #3
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Low Density Particle Board	0.50	37.0	0.31	0.40	1.5
Airspace	0.00	0.0	0.00	0.91	0.0
R-16 batt insulation	4.00	0.5	0.20	16.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.53			18.33	3.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF CONSTRUCTION TYPES

Prepared by: Keller & Gannon
HAP v3.06

08-29-94

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ROOF TYPE 1: (CUSTOM ROOF)

Description.....: 70525
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustic Ceiling Tiles	0.75	18.0	0.20	1.89	1.1
Airspace	0.00	0.0	0.00	0.91	0.0
R-30 (RSI-5.3) batt insulation	9.50	0.5	0.20	30.45	0.4
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	10.28			34.27	2.9

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 3: (CUSTOM ROOF)

Description.....: 70525 (No Insulation)
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustic Ceiling Tiles	0.75	18.0	0.20	1.89	1.1
Airspace	0.00	0.0	0.00	0.91	0.0
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	0.78			3.82	2.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 2: (CUSTOM ROOF)

Description.....: 91114
Absorptivity.....: 0.600

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Accoustic Ceiling Tile	0.75	18.0	0.20	1.89	1.1
Airspace	24.00	0.0	0.00	0.91	0.0
2-in (50 mm) plywood	2.00	34.0	0.29	2.49	5.7
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	30.63			17.86	9.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WINDOW TYPE 1: (CUSTOM WINDOW)

Window Description.....:	20200 type A
Height.....:	3.42 ft
Width.....:	3.67 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	1
Pane 1 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.391

WINDOW TYPE 2: (CUSTOM WINDOW)

Window Description.....:	20200 type B
Height.....:	3.42 ft
Width.....:	3.67 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	1
Pane 1 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.391

WINDOW TYPE 3: (CUSTOM WINDOW)

Window Description.....:	20200 type C
Height.....:	3.42 ft
Width.....:	5.42 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	1
Pane 1 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.391

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WINDOW TYPE 4: (CUSTOM WINDOW)

Window Description.....:	20200 type D
Height.....:	2.42 ft
Width.....:	3.67 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	1
Pane 1 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.391

WINDOW TYPE 5: (CUSTOM WINDOW)

Window Description.....:	20200 type E
Height.....:	2.42 ft
Width.....:	5.42 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	1
Pane 1 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.391

WINDOW TYPE 6: (CUSTOM WINDOW)

Window Description.....:	20200 type F
Height.....:	7.45 ft
Width.....:	4.73 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	1
Pane 1 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.391

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WINDOW TYPE 7: (CUSTOM WINDOW)

Window Description.....:	43083
Height.....:	4.41 ft
Width.....:	5.47 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	2
Pane 1 Absorptivity....:	0.030
Pane 2 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.439

WINDOW TYPE 8: (CUSTOM WINDOW)

Window Description.....:	51005
Height.....:	3.00 ft
Width.....:	8.00 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	2
Pane 1 Absorptivity....:	0.030
Pane 2 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.439

WINDOW TYPE 9: (CUSTOM WINDOW)

Window Description.....:	61701 #1
Height.....:	2.50 ft
Width.....:	3.70 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	No Shades Used
Glass Transmissivity...:	0.500
Number of Pane(s).....:	1
Pane 1 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	1.196 BTU/hr/sqft/F
Overall Shade Coeff....:	0.552

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WINDOW TYPE 10: (CUSTOM WINDOW)

Window Description.....:	61701 #2
Height.....:	5.54 ft
Width.....:	4.31 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	No Shades Used
Glass Transmissivity...:	0.500
Number of Pane(s).....:	1
Pane 1 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	1.196 BTU/hr/sqft/F
Overall Shade Coeff....:	0.552

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WINDOW TYPE 1: (CUSTOM WINDOW)

Window Description.....:	70525#1
Height.....:	12.00 ft
Width.....:	10.00 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	2
Pane 1 Absorptivity....:	0.030
Pane 2 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.439

WINDOW TYPE 2: (CUSTOM WINDOW)

Window Description.....:	70525#2
Height.....:	18.00 ft
Width.....:	10.00 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	2
Pane 1 Absorptivity....:	0.030
Pane 2 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.439

WINDOW TYPE 3: (CUSTOM WINDOW)

Window Description.....:	70525#3
Height.....:	4.50 ft
Width.....:	10.00 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	2
Pane 1 Absorptivity....:	0.030
Pane 2 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.439

****

WINDOW TYPE 4: (CUSTOM WINDOW)

Window Description.....:	70525#4
Height.....:	3.50 ft
Width.....:	10.00 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	Drapes - Semi-Open Weave - Light
Glass Transmissivity...:	0.500
Number of Pane(s).....:	2
Pane 1 Absorptivity....:	0.030
Pane 2 Absorptivity....:	0.030
Center of Glass U-value:	1.230 BTU/hr/sqft/F
Overall U-value.....:	0.880 BTU/hr/sqft/F
Overall Shade Coeff....:	0.439

WINDOW TYPE 5: (CUSTOM WINDOW)

Window Description.....:	91114#1
Height.....:	5.25 ft
Width.....:	5.10 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	No Shades Used
Glass Transmissivity...:	0.500
Number of Pane(s).....:	2
Pane 1 Absorptivity....:	0.030
Pane 2 Absorptivity....:	0.030
Center of Glass U-value:	1.275 BTU/hr/sqft/F
Overall U-value.....:	1.234 BTU/hr/sqft/F
Overall Shade Coeff....:	0.598

WINDOW TYPE 6: (CUSTOM WINDOW)

Window Description.....:	91114#2
Height.....:	3.50 ft
Width.....:	5.10 ft
Frame Type.....:	Aluminum with thermal breaks
Interior Shade Type....:	No Shades Used
Glass Transmissivity...:	0.500
Number of Pane(s).....:	2
Pane 1 Absorptivity....:	0.030
Pane 2 Absorptivity....:	0.030
Center of Glass U-value:	1.275 BTU/hr/sqft/F
Overall U-value.....:	1.234 BTU/hr/sqft/F
Overall Shade Coeff....:	0.598

****

GENERAL
Name.....: 15544
Floor Area.....: 12800.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 2.90 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 512 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 15544
Task Lights.: 15544
People.....: CONTINUOUS
Equipment...: CONTINUOUS
Misc. Sens..: 15544
Misc. Latent: 15544

INFILTRATION
Cooling.....: 0.0 CFM
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 480.0 ft
Slab Floor Area.....: 12800.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	1280.0	1	1	0	-	1	0	-	N
E	2560.0	1	1	0	-	1	0	-	N
S	1280.0	1	1	0	-	1	0	-	N
W	2560.0	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	12800.0	1	1	0

No partition data for this space.

****

GENERAL
Name.....: 20200
Floor Area.....: 1565.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 0.60 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 4 People
Activity Level..: Medium Work
Sensible.....: 295.0 BTU/hr
Latent.....: 455.0 BTU/hr

OTHER LOADS
Equipment.....: 0.65 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 20200 LIGHTS
Task Lights.: 12 Hour Schedule
People.....: CONTINUOUS
Equipment...: CONTINUOUS
Misc. Sens..: 20200 LIGHTS
Misc. Latent: 20200 LIGHTS

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 156.0 ft
Slab Floor Area.....: 1565.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
	241.5	2	1	0	-	1	0	-	N
	110.0	2	1	4	-	3	1	-	N
E	73.5	2	4	1	-	5	1	-	N
S	239.4	2	2	2	-	1	0	-	N
W	172.0	2	1	4	-	6	3	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1565.0	2	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
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****

GENERAL
Name.....: 43083 top sun
Floor Area.....: 29982.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.50 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 190.0 sqft/per
Activity Level..: Sedentary Work
Sensible.....: 280.0 BTU/hr
Latent.....: 270.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 15544
Task Lights.: 12 Hour Schedule
People.....: CONTINUOUS
Equipment...: CONTINUOUS
Misc. Sens..: 12 Hour Schedule
Misc. Latent: 12 Hour Schedule

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.01 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Above Conditioned Space

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
NW	3640.6	4	7	18	-	1	0	-	N
SW	2964.8	4	7	15	-	1	0	-	N
SE	3640.6	4	7	14	-	1	0	-	N
NE	3084.7	4	7	14	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	29982.0	3	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon 08-24-94
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****

GENERAL
Name.....: 43083 bot. 2 flrs.
Floor Area.....: 59964.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.50 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 190.0 sqft/per
Activity Level..: Sedentary Work
Sensible.....: 280.0 BTU/hr
Latent.....: 270.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 15544
Task Lights.: 12 Hour Schedule
People.....: CONTINUOUS
Equipment...: CONTINUOUS
Misc. Sens..: 12 Hour Schedule
Misc. Latent: 12 Hour Schedule

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.01 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 1223.0 ft
Slab Floor Area.....: 29982.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
W	6479.6	4	7	36	-	1	0	-	N
SW	5276.8	4	7	29	-	1	0	-	N
SE	6358.8	4	7	28	-	1	0	-	N
NE	5490.2	4	7	28	-	1	0	-	N

No roof or door data for this space.

No partition data for this space.

****

GENERAL
Name.....: 51005 top floor
Floor Area.....: 78400.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? Y
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.50 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 317 People
Activity Level..: Sedentary Work
Sensible.....: 280.0 BTU/hr
Latent.....: 270.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 12 Hour Schedule
Task Lights.: 12 Hour Schedule
People.....: CONTINUOUS
Equipment...: CONTINUOUS
Misc. Sens..: 12 Hour Schedule
Misc. Latent: 12 Hour Schedule

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Above Conditioned Space

EXTERNAL SHADING	Type 1	Type 2	Type 3
Reveal Depth.....(in)	30.0	0.0	0.0
Overhang			
Projection From Building Surface.(in)	0.0	0.0	0.0
Height Above Window.....(in)	0.0	0.0	0.0
Extension Past RH Side Of Window.(in)	0.0	0.0	0.0
Extension Past LH Side Of Window.(in)	0.0	0.0	0.0
Right Fin			
Distance From Edge Of Window.....(in)	0.0	0.0	0.0
Projection From Building Surface.(in)	0.0	0.0	0.0
Height Above Window.....(in)	0.0	0.0	0.0
Left Fin			
Distance From Edge Of Window.....(in)	0.0	0.0	0.0
Projection From Building Surface.(in)	0.0	0.0	0.0
Height Above Window.....(in)	0.0	0.0	0.0

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	12276.0	5	8	100	1	1	0	0	N
W	3964.5	5	8	22	1	1	0	0	N
S	11414.6	5	8	38	1	1	0	0	N
E	3964.5	5	8	22	1	1	0	0	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	78400.0	4	1	0

No partition data for this space.

****

GENERAL
Name.....: 61701 gym a/c area
Floor Area.....: 4201.8 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.10 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 8 People
Activity Level..: Heavy Work
Sensible.....: 525.0 BTU/hr
Latent.....: 925.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 61701
Task Lights.: 61701
People.....: 61701
Equipment...: 61701
Misc. Sens..: 61701
Misc. Latent: 61701

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 272.8 ft
Slab Floor Area.....: 4201.8 sqft
Floor R-Value.....: 2.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
	1716.5	6	1	0	-	1	0	-	N
	1065.6	6	1	0	-	1	0	-	N
E	1612.8	8	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	4201.8	5	1	0

No partition data for this space.

****

GENERAL
Name.....: 61701 Gymnasium
Floor Area.....: 22678.2 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.10 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 537.6 sqft/per
Activity Level..: Heavy Work
Sensible.....: 525.0 BTU/hr
Latent.....: 925.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 61701
Task Lights.: 61701
People.....: 61701
Equipment...: 61701
Misc. Sens..: 61701
Misc. Latent: 61701

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 680.0 ft
Slab Floor Area.....: 22678.2 sqft
Floor R-Value.....: 2.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	5040.0	6	1	0	-	1	0	-	N
E	5299.2	8	1	0	-	1	0	-	N
S	1307.5	6	1	0	-	1	0	-	N
W	4752.0	6	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	22678.2	5	1	0

No partition data for this space.

****

GENERAL
Name.....: 61701 Offices
Floor Area.....: 3206.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? Y
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.10 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 13 People
Activity Level..: Heavy Work
Sensible.....: 525.0 BTU/hr
Latent.....: 925.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 61701
Task Lights.: 61701
People.....: 61701
Equipment...: 61701
Misc. Sens..: 61701
Misc. Latent: 61701

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 167.2 ft
Slab Floor Area.....: 3206.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

EXTERNAL SHADING	Type 1	Type 2	Type 3
Reveal Depth.....(in)	0.0	0.0	0.0
Overhang			
Projection From Building Surface.(in)	38.0	0.0	0.0
Height Above Window.....(in)	12.0	0.0	0.0
Extension Past RH Side Of Window.(in)	0.0	0.0	0.0
Extension Past LH Side Of Window.(in)	0.0	0.0	0.0
Right Fin			
Distance From Edge Of Window.....(in)	0.0	0.0	0.0
Projection From Building Surface.(in)	0.0	0.0	0.0
Height Above Window.....(in)	0.0	0.0	0.0
Left Fin			
Distance From Edge Of Window.....(in)	0.0	0.0	0.0
Projection From Building Surface.(in)	0.0	0.0	0.0
Height Above Window.....(in)	0.0	0.0	0.0

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	336.0	9	1	0	0	1	0	0	N
W	1728.0	9	10	15	0	1	0	0	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	3206.0	5	1	0

No partition data for this space.

****

GENERAL
- Name.....: 61701 Pool
- Floor Area.....: 8120.0 sqft
- Building Weight.: 70.0 lb/sqft
- Windows Shaded..? N
- Partitions Used.? N

LIGHTING
- Overhead Fixture: Recessed
- Lamp Wattage....: 1.10 W/sqft
- Ballast Mult....: 1.00
- Task Lighting...: 0.00 W/sqft

PEOPLE
- Occupancy.....: 30 People
- Activity Level..: Medium Work
- Sensible.....: 295.0 BTU/hr
- Latent.....: 455.0 BTU/hr

OTHER LOADS
- Equipment.....: 0.00 W/sqft
- Misc. Sensible..: 0.0 BTU/hr
- Misc. Latent....: 0.0 BTU/hr

SCHEDULES
- Lighting....: 61701
- Task Lights.: 61701
- People.....: 61701
- Equipment...: 61701
- Misc. Sens..: 12 Hour Schedule
- Misc. Latent: 12 Hour Schedule

INFILTRATION
- Cooling.....: 0.00 CFM/sqft
- Heating.....: 0.00 CFM/sqft
- Typical.....: 0.00 CFM/sqft
- When Fan On.? N

FLOOR
- Type.....:Above Conditioned Space

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	982.4	6	9	23	-	1	0	-	N
E	892.0	6	1	0	-	1	0	-	N
S	2552.0	6	9	72	-	1	0	-	N
W	1540.0	6	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	8120.0	5	1	0

No partition data for this space.

****

GENERAL
Name.....: 61701 Locker Rooms
Floor Area.....: 2880.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.10 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 29 People
Activity Level..: Medium Work
Sensible.....: 295.0 BTU/hr
Latent.....: 455.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 61701
Task Lights.: 61701
People.....: 61701
Equipment...: 61701
Misc. Sens..: 61701
Misc. Latent: 61701

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 25.0 ft
Slab Floor Area.....: 2880.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 0.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
	360.0	8	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	2880.0	5	1	0

No partition data for this space.

****

GENERAL
- Name.....: 61701 Racquetball Cor.
- Floor Area.....: 1376.0 sqft
- Building Weight.: 70.0 lb/sqft
- Windows Shaded..? N
- Partitions Used.? N

LIGHTING
- Overhead Fixture: Recessed
- Lamp Wattage....: 1.10 W/sqft
- Ballast Mult....: 1.00
- Task Lighting...: 0.00 W/sqft

PEOPLE
- Occupancy.....: 8 People
- Activity Level..: Medium Work
- Sensible.....: 295.0 BTU/hr
- Latent.....: 455.0 BTU/hr

OTHER LOADS
- Equipment.....: 2.00 W/sqft
- Misc. Sensible..: 0.0 BTU/hr
- Misc. Latent....: 0.0 BTU/hr

SCHEDULES
- Lighting....: 61701
- Task Lights.: 61701
- People.....: 61701
- Equipment...: 61701
- Misc. Sens..: 61701
- Misc. Latent: 61701

INFILTRATION
- Cooling.....: 0.00 CFM/sqft
- Heating.....: 0.00 CFM/sqft
- Typical.....: 0.00 CFM/sqft
- When Fan On.? N

FLOOR
- Type.....:Slab On Grade
- Perimeter.....: 123.2 ft
- Slab Floor Area.....: 1376.0 sqft
- Floor R-Value.....: 0.50
- Insulation R-value....: 0.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	1628.0	7	1	0	-	1	0	-	N
W	140.0	7	1	0	-	1	0	-	N
S	312.0	7	1	0	-	1	0	-	N
E	322.0	7	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1376.0	6	1	0

No partition data for this space.

****

GENERAL
Name.....: 61701 Raquetball Courts
Floor Area.....: 2624.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.10 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 6 People
Activity Level..: Heavy Work
Sensible.....: 525.0 BTU/hr
Latent.....: 925.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 61701
Task Lights.: 61701
People.....: 61701
Equipment...: 61701
Misc. Sens..: 61701
Misc. Latent: 61701

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 137.6 ft
Slab Floor Area.....: 2624.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 0.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
	865.0	7	1	0	-	1	0	-	N
	1472.0	7	1	0	-	1	0	-	N
E	943.0	7	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	2624.0	7	1	0

No partition data for this space.

****

GENERAL
Name.....: 70525
Floor Area.....: 36478.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.10 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 150.0 sqft/per
Activity Level..: Seated at Rest
Sensible.....: 230.0 BTU/hr
Latent.....: 120.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 70525
Task Lights.: 70525
People.....: 70525
Equipment...: 70525
Misc. Sens..: 70525
Misc. Latent: 70525

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 718.0 ft
Slab Floor Area.....: 36478.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	850.0	4	1	0	-	1	0	-	N
N	1700.0	4	1	0	-	1	0	-	N
W	1020.0	4	1	0	-	1	0	-	N
W	2500.0	3	1	3	-	1	0	-	N
S	493.0	1	4	1	-	1	0	-	N
S	2057.0	4	1	0	-	1	0	-	N
E	3400.0	1	2	2	-	1	0	-	N
E	306.0	2	3	1	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	36478.0	1	1	0

No partition data for this space.

****

GENERAL

Name.....:	90312A	
Floor Area.....:	350.0	sqft
Building Weight.:	70.0	lb/sqft
Windows Shaded..?	N	
Partitions Used.?	Y	

LIGHTING

Overhead Fixture:	Recessed	
Lamp Wattage....:	1.20	W/sqft
Ballast Mult....:	1.00	
Task Lighting...:	0.00	W/sqft

PEOPLE

Occupancy.....:	3	People
Activity Level..:	Office Work	
Sensible.....:	245.0	BTU/hr
Latent.....:	205.0	BTU/hr

OTHER LOADS

Equipment.....:	1.00	W/sqft
Misc. Sensible..:	0.0	BTU/hr
Misc. Latent....:	0.0	BTU/hr

SCHEDULES

Lighting....:	90312
Task Lights.:	90312
People.....:	90312
Equipment...:	90312
Misc. Sens..:	90312
Misc. Latent:	90312

INFILTRATION

Cooling.....:	0.0	CFM
Heating.....:	0.00	CFM/sqft
Typical.....:	0.03	CFM/sqft
When Fan On.?	N	

FLOOR

Type.....:	Slab On Grade	
Perimeter.....:	78.0	ft
Slab Floor Area.....:	350.0	sqft
Floor R-Value.....:	0.50	
Insulation R-value....:	7.00	

No external wall or window data for this space.

No roof or door data for this space.

ARTITION LOADS	Type 1	Type 2
Type.....:	Partition	Ceiling
Area.....:	624.0 sqft	350.0 sqft
U-value.....:	0.294 BTU/hr/sqft/F	0.370 BTU/hr/sqft/F
Maximum Space Temp....:	87.0 F	87.0 F
Outside Air Temp @ Max:	94.0 F	94.0 F
Minimum Space Temp....:	35.0 F	35.0 F
Outside Air Temp @ Min:	28.0 F	28.0 F

****

GENERAL

Name.....:	90312B	
Floor Area.....:	240.0	sqft
Building Weight.:	70.0	lb/sqft
Windows Shaded..?	N	
Partitions Used.?	Y	

LIGHTING

Overhead Fixture:	Free-Hanging	
Lamp Wattage....:	1.20	W/sqft
Ballast Mult....:	1.00	
Task Lighting...:	0.00	W/sqft

PEOPLE

Occupancy.....:	120.0	sqft/per
Activity Level..:	Office Work	
Sensible.....:	245.0	BTU/hr
Latent.....:	205.0	BTU/hr

OTHER LOADS

Equipment.....:	1.00	W/sqft
Misc. Sensible..:	0.0	BTU/hr
Misc. Latent....:	0.0	BTU/hr

SCHEDULES

Lighting....:	90312
Task Lights.:	90312
People.....:	90312
Equipment...:	90312
Misc. Sens..:	90312
Misc. Latent:	90312

INFILTRATION

Cooling.....:	0.00	CFM/sqft
Heating.....:	0.00	CFM/sqft
Typical.....:	0.04	CFM/sqft
When Fan On.?	N	

FLOOR

Type.....:	Slab On Grade	
Perimeter.....:	64.0	ft
Slab Floor Area.....:	240.0	sqft
Floor R-Value.....:	0.50	
Insulation R-value....:	7.00	

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No external wall or window data for this space.

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No roof or door data for this space.

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PARTITION LOADS	Type 1	Type 2
Type.....:	Partition	Ceiling
Area.....:	512.0 sqft	240.0 sqft
U-value.....:	0.072 BTU/hr/sqft/F	0.370 BTU/hr/sqft/F
Maximum Space Temp....:	87.0 F	87.0 F
Outside Air Temp @ Max:	94.0 F	94.0 F
Minimum Space Temp....:	35.0 F	35.0 F
Outside Air Temp @ Min:	28.0 F	28.0 F

==========

GENERAL
Name.....: 91114A
Floor Area.....: 6158.4 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? Y

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.20 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 31 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 91114
Task Lights.: 91114
People.....: 91114
Equipment...: 91114
Misc. Sens..: 91114
Misc. Latent: 91114

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 291.3 ft
Slab Floor Area.....: 3079.2 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
	94.6	8	1	0	-	1	0	-	N
	94.6	8	1	0	-	1	0	-	N
W	600.0	8	6	0	-	1	0	-	N
W	1575.0	7	6	15	-	1	0	-	N
W	1925.0	9	5	17	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	3079.2	2	1	0

PARTITION LOADS	Type 1	Type 2
Type.....	Partition	Ceiling
Area.....	5461.1 sqft	0.0 sqft
U-value.....	0.595 BTU/hr/sqft/F	0.500 BTU/hr/sqft/F
Maximum Space Temp....:	82.0 F	75.0 F
Outside Air Temp @ Max:	94.0 F	55.0 F
Minimum Space Temp....:	38.0 F	75.0 F
Outside Air Temp @ Min:	28.0 F	54.0 F

****

GENERAL
- Name.....: 91114B
- Floor Area.....: 7800.0 sqft
- Building Weight.: 70.0 lb/sqft
- Windows Shaded..? N
- Partitions Used.? Y

LIGHTING
- Overhead Fixture: Recessed
- Lamp Wattage....: 1.20 W/sqft
- Ballast Mult....: 1.00
- Task Lighting...: 0.00 W/sqft

PEOPLE
- Occupancy.....: 100.0 sqft/per
- Activity Level..: Office Work
- Sensible.....: 245.0 BTU/hr
- Latent.....: 205.0 BTU/hr

OTHER LOADS
- Equipment.....: 1.00 W/sqft
- Misc. Sensible..: 0.0 BTU/hr
- Misc. Latent....: 0.0 BTU/hr

SCHEDULES
- Lighting....: 91114
- Task Lights.: 91114
- People.....: 91114
- Equipment...: 91114
- Misc. Sens..: 91114
- Misc. Latent: 91114

INFILTRATION
- Cooling.....: 0.00 CFM/sqft
- Heating.....: 0.00 CFM/sqft
- Typical.....: 0.00 CFM/sqft
- When Fan On.? N

FLOOR
- Type.....:Slab On Grade
- Perimeter.....: 355.3 ft
- Slab Floor Area.....: 3900.0 sqft
- Floor R-Value.....: 0.50
- Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	96.4	8	1	0	-	1	0	-	N
E	1260.0	7	6	11	-	1	0	-	N
E	1540.0	9	5	14	-	1	0	-	N
E	480.0	8	1	0	-	1	0	-	N
S	94.6	8	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	3900.0	2	1	0

PARTITION LOADS	Type 1	Type 2
Type.....	Partition	Ceiling
Area.....	4611.3 sqft	0.0 sqft
U-value.....	0.595 BTU/hr/sqft/F	0.500 BTU/hr/sqft/F
Maximum Space Temp....:	82.0 F	75.0 F
Outside Air Temp @ Max:	94.0 F	55.0 F
Minimum Space Temp....:	38.0 F	75.0 F
Outside Air Temp @ Min:	28.0 F	54.0 F

AIR SYSTEM INPUT DATA

Name: 15544 08-24-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 15544
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	65.0 F
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	110.0 F
Hot Deck Reset.....:	Greatest Demand
Minimum Reset Temperature.....:	90.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	10.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Fan kW.....:	9.9 kW
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: Bldg. 20200 Cooling 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: Bldg. 20200 Cooling
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	Y
Supply Air.....:	59.0 F
Coil Bypass Factor.....:	0.010
Fan Cycled for Cooling.....?	N
Supply Air Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	62.0 F
HEATING SYSTEM DATA	
Is Central Heating Used.....?	N
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	0 %
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Configuration.....:	Draw-Thru
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
DEHUMIDIFICATION	
Dehumidification System Used..?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	85.0	
Occupied Heating....(F):	72.0	
Unoccupied Heating..(F):	60.0	
Throttling Range....(F):	2.5	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Cooling.....			XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX		

AIR SYSTEM INPUT DATA

Name: Bldg. 20200 Heating 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page 1

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1. SYSTEM NAME AND TYPE

Name.....: Bldg. 20200 Heating
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	N
HEATING SYSTEM DATA	
Supply Air Temperature.....?	110.0 F
Fan Cycled for Heating.....?	N
Supply Air Reset.....:	Greatest Demand
Minimum Reset Temperature.....:	90.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	0 %
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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AIR SYSTEM INPUT DATA

Name: Bldg. 20200 Heating
Type: CONSTANT VOLUME - Single Zone CAV
Prepared by: Keller & Gannon

08-24-94
HAP v3.06
Page 1

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	85.0	
Occupied Heating....(F):	72.0	
Unoccupied Heating..(F):	60.0	
Throttling Range....(F):	2.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX					XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 43083 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page 1

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1. SYSTEM NAME AND TYPE

Name.....: 43083
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	Y
Supply Air.....:	55.0 F
Coil Bypass Factor.....:	0.100
Fan Cycled for Cooling.....?	N
Supply Air Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	65.0 F
HEATING SYSTEM DATA	
Is Central Heating Used.....?	Y
Fan Cycled for Heating.....?	N
Supply Air Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	100 %
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
DEHUMIDIFICATION	
Dehumidification System Used..?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

AIR SYSTEM INPUT DATA

Name: 43083 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	85.0	
Occupied Heating....(F):	72.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	4800.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX						XXX	XXX	XXX
Central Cooling.....					XXX	XXX	XXX	XXX	XXX			

AIR SYSTEM INPUT DATA

Name: 51005 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 51005
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	Y
Supply Air.....:	55.0 F
Coil Bypass Factor.....:	0.100
Fan Cycled for Cooling.....?	N
Supply Air Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	65.0 F
HEATING SYSTEM DATA	
Is Central Heating Used.....?	Y
Fan Cycled for Heating.....?	N
Supply Air Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	100 %
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
DEHUMIDIFICATION	
Dehumidification System Used..?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	85.0	
Occupied Heating....(F):	72.0	
Unoccupied Heating..(F):	60.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	4800.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX						XXX	XXX	XXX
Central Cooling.....					XXX	XXX	XXX	XXX	XXX			

AIR SYSTEM INPUT DATA

Name: Gym A/C Area Cooling 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: Gym A/C Area Cooling
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	Y
Supply Air.....:	55.0 F
Coil Bypass Factor.....:	0.100
Fan Cycled for Cooling.....?	N
Supply Air Reset.....:	Not Used
HEATING SYSTEM DATA	
Is Central Heating Used.....?	N
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	2 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	3.00 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
DEHUMIDIFICATION	
Dehumidification System Used..?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

==========

AIR SYSTEM INPUT DATA

Name: Gym A/C Area Cooling
Type: CONSTANT VOLUME - Single Zone CAV
Prepared by: Keller & Gannon

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HAP v3.06
Page

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: Gym A/C Area Heating 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: Gym A/C Area Heating
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	N
HEATING SYSTEM DATA	
Supply Air Temperature.....?	110.0 F
Fan Cycled for Heating.....?	N
Supply Air Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	2 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	3.00 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

==========

AIR SYSTEM INPUT DATA

Name: Gym A/C Area Heating
Type: CONSTANT VOLUME - Single Zone CAV
Prepared by: Keller & Gannon

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HAP v3.06
Page

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 61701 Lockers Cooling
Type: CONSTANT VOLUME - Single Zone CAV
Prepared by: Keller & Gannon

****

1. SYSTEM NAME AND TYPE

Name.....: 61701 Lockers Cooling
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	Y
Supply Air.....:	59.0 F
Coil Bypass Factor.....:	0.010
Fan Cycled for Cooling.....?	N
Supply Air Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	62.0 F
HEATING SYSTEM DATA	
Is Central Heating Used.....?	N
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
DEHUMIDIFICATION	
Dehumidification System Used..?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

AIR SYSTEM INPUT DATA

Name: 61701 Lockers Cooling
Type: CONSTANT VOLUME - Single Zone CAV
Prepared by: Keller & Gannon

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HAP v3.06
Page 1

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 61701 Lockers Heating 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 61701 Lockers Heating
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	N
HEATING SYSTEM DATA	
Supply Air Temperature.....?	110.0 F
Fan Cycled for Heating.....?	N
Supply Air Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	3.00 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

==========

AIR SYSTEM INPUT DATA

Name: 61701 Lockers Heating
Type: CONSTANT VOLUME - Single Zone CAV
Prepared by: Keller & Gannon

08-24-94
HAP v3.06
Page 2

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 61701 Gym Cooling 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 61701 Gym Cooling
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	Y
Supply Air.....:	59.0 F
Coil Bypass Factor.....:	0.010
Fan Cycled for Cooling.....?	N
Supply Air Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	62.0 F
HEATING SYSTEM DATA	
Is Central Heating Used.....?	N
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	0.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Blow-Thru
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
DEHUMIDIFICATION	
Dehumidification System Used..?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 61701 Gym Heating — 08-24-94
Type: CONSTANT VOLUME - Single Zone CAV — HAP v3.06
Prepared by: Keller & Gannon — Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 61701 Gym Heating
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	N
HEATING SYSTEM DATA	
Supply Air Temperature.....?	110.0 F
Fan Cycled for Heating.....?	N
Supply Air Reset.....:	Greatest Demand
Minimum Reset Temperature.....:	90.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	0.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Blow-Thru
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 61701 Pool
Type: CONSTANT VOLUME - Single Zone CAV
Prepared by: Keller & Gannon

****

1. SYSTEM NAME AND TYPE

Name.....: 61701 Pool
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	N
HEATING SYSTEM DATA	
Supply Air Temperature.....?	110.0 F
Fan Cycled for Heating.....?	N
Supply Air Reset.....:	Greatest Demand
Minimum Reset Temperature.....:	90.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	100 %
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Blow-Thru
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 61701 Offices Heating 08-24-94
Type: TERMINAL UNITS - Convective Htg and Clg HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 61701 Offices Heating
Type.....: TERMINAL UNITS - Convective Htg and Clg
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA
Is Cooling System Used.....? N
HEATING SYSTEM DATA
Is Heating System Used.....? Y
OUTDOOR VENTILATION DATA
Common Ventilation System Used? N
SAFETY FACTORS
Sensible Cooling Factor.....: 5 %
Latent Cooling Factor.....: 5 %
Heating Factor.....: 5 %

==========

3. ZONE DATA

ZONE 1 (All Zones the Same)
T-Stat Zone Setpoint.....(F): 75.0

==========

4. SCHEDULE DATA

==========

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

==========

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Terminal Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

==========

AIR SYSTEM INPUT DATA

Name: 61701 Racquetball
Type: CONSTANT VOLUME - Multizone
Prepared by: Keller & Gannon

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Page

****

1. SYSTEM NAME AND TYPE

Name.....:	61701 Racquetball
Type.....:	CONSTANT VOLUME - Multizone
Number of Zones.:	1

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	65.0 F
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	110.0 F
Hot Deck Reset.....:	Greatest Demand
Minimum Reset Temperature.....:	90.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....																								
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 70525 Heating
Type: CONSTANT VOLUME - Single Zone CAV
Prepared by: Keller & Gannon

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****

1. SYSTEM NAME AND TYPE

Name.....: 70525 Heating
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	Y
Supply Air.....:	21000.0 CFM
Coil Bypass Factor.....:	0.010
Fan Cycled for Cooling.....?	N
Supply Air Reset.....:	Not Used
HEATING SYSTEM DATA	
Is Central Heating Used.....?	Y
Fan Cycled for Heating.....?	N
Supply Air Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	Y
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	10 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	Y
% Roof Heat Gain to Plenum....:	70 %
% Wall Heat Gain to Plenum....:	0 %
% Lighting Heat Gain to Plenum:	30 %
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	3.00 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	None
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
DEHUMIDIFICATION	
Dehumidification System Used..?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %

Heating Factor.....: 5 %

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	75.0	
Unoccupied Heating..(F):	75.0	
Throttling Range....(F):	2.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	5385.0	
Direct Exhaust Fan kW.....(kW):	0.2	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....												

AIR SYSTEM INPUT DATA

Name: 90312A
Type: TERMINAL UNITS - WSHP
Prepared by: Keller & Gannon

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****

1. SYSTEM NAME AND TYPE

Name.....: 90312A
Type.....: TERMINAL UNITS - WSHP
Number of Zones.: 1

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Supply Air.....:	55.0 F
Fan Cycled for Cooling.....?	N
Coil Bypass Factor.....:	0.100
HEATING SYSTEM DATA	
Fan Cycled for Heating.....?	N
OUTDOOR VENTILATION DATA	
Common Ventilation System Used?	N
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Terminal Type.....:	Fan Coil	
Fan Total Static....(in.wg.):	0.00	
Fan Efficiency.....(%):	54	

****

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Terminal Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Terminal Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 90312B
Type: TERMINAL UNITS - WSHP
Prepared by: Keller & Gannon

****

1. SYSTEM NAME AND TYPE

Name.....: 90312B
Type.....: TERMINAL UNITS - WSHP
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Supply Air.....:	55.0 F
Fan Cycled for Cooling.....?	N
Coil Bypass Factor.....:	0.100
HEATING SYSTEM DATA	
Fan Cycled for Heating.....?	N
OUTDOOR VENTILATION DATA	
Common Ventilation System Used?	N
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person

==========

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Terminal Type.....:	Fan Coil	
Fan Total Static....(in.wg.):	0.00	
Fan Efficiency.....(%):	54	

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4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Terminal Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Terminal Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

****

1. SYSTEM NAME AND TYPE

Name.....: 91114A Heating
Type.....: TERMINAL UNITS - Convective Htg and Clg
Number of Zones.: 1

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Cooling System Used.....?	N
HEATING SYSTEM DATA	
Is Heating System Used.....?	Y
OUTDOOR VENTILATION DATA	
Common Ventilation System Used?	N
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

3. ZONE DATA

ZONE	1 (All Zones the Same)
T-Stat Zone Setpoint.....(F):	75.0

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Terminal Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

****

1. SYSTEM NAME AND TYPE

Name.....: 91114B Cooling
Type.....: CONSTANT VOLUME - Single Zone CAV
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Is Central Cooling Used.....?	Y
Supply Air.....:	59.0 F
Coil Bypass Factor.....:	0.010
Fan Cycled for Cooling.....?	N
Supply Air Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	62.0 F
HEATING SYSTEM DATA	
Is Central Heating Used.....?	N
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	0.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Configuration.....:	Draw-Thru
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Backward Inclined or Airfoil
Fan Total Static.....:	3.50 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
HUMIDIFICATION	
Humidification System Used....?	N
DEHUMIDIFICATION	
Dehumidification System Used..?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	Diffuser	
Reheat Coil.....?	N	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

****

1. SYSTEM NAME AND TYPE

Name.....: 91114B Heating
Type.....: TERMINAL UNITS - Convective Htg and Clg
Number of Zones.: 1

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA
Is Cooling System Used.....? N
HEATING SYSTEM DATA
Is Heating System Used.....? Y
OUTDOOR VENTILATION DATA
Common Ventilation System Used? N
SAFETY FACTORS
Sensible Cooling Factor.....: 5 %
Latent Cooling Factor.....: 5 %
Heating Factor.....: 5 %

==========

3. ZONE DATA

ZONE 1 (All Zones the Same)
T-Stat Zone Setpoint.....(F): 75.0

==========

4. SCHEDULE DATA

==========

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

==========

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Terminal Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 15544 cooling
Classification.....: Cooling
Type.....: Air-Cooled Chiller
Type of simulation model....: Computer-Generated
Type of chiller.....: A/C Reciprocating

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
3. 15544.....	(MZ)	1

AIR-COOLED RECIPROCATING CHILLER DATA

Estimated maximum cooling load...: 48.7 Tons
Chiller capacity at design.....: 60.0 Tons
Chiller input power at design....: 1.300 kW/Ton
Chiller configuration.....: Mult. Compressors / Ckt., Unloaded
Is chilled water reset used.....? N
Is hot gas bypass used.....? N
% load for minimum unloading.....: 20.0 %
Crankcase heater kW.....: 0.000 kW

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Efficiencies Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Chilled Water	5.6	40.00	60.0	80.0	4.00	2.0

PLANT INPUT DATA

Plant: 15544 heating
Prepared By: Keller & Gannon

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****

PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 15544 heating
Classification.....: Heating
Type.....: Hot Water Boiler

AIR SYSTEM SELECTIONS

Air System Name	Heating Coil Category Pre-Heat	Central	Terminal	Zone
3. 15544.....	-	1	-	-

HOT WATER BOILER DATA

Estimated maximum heating load...: 312.9 MBH
Gross output at design.....: 315.0 MBH
Energy input at design.....: 420.0 MBH
Overall efficiency at design.....: 75.0 %
Fuel or energy type.....: Nat. Gas
Combustion air blower kW.....: 0.250 kW

BOILER PART-LOAD PERFORMANCE DATA

% Load	Overall Eff. (%)	% Load	Overall Eff. (%)
90	75.0	40	75.0
80	75.0	30	75.0
70	75.0	20	75.0
60	75.0	10	75.0
50	75.0	0	75.0

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Hot Water	1.1	10.00	60.0	80.0	2.20	2.0

PLANT INPUT DATA

Plant: 20200 Heating 08-24-94
Prepared By: Keller & Gannon Page 1

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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 20200 Heating
Classification.....: Heating
Type.....: Direct-Fired Combustion

AIR SYSTEM SELECTIONS

Air System Name	Heating Coil Category Pre-Heat	Central	Terminal	Zone
21. Bldg. 20200 Heating.....	-	1	-	-

DIRECT-FIRED COMBUSTION HEATING DATA

Estimated maximum heating load...: NA
Type of heating.....: Nat. Gas
Gross heating capacity.....: 80000.0 MBH
Average efficiency.....: 80.0 %
Combustion air blower kW.....: 0.186 kW

PLANT INPUT DATA

Plant: 43083 Cooling
Prepared By: Keller & Gannon

****

PLANT NAME, CLASSIFICATION & TYPE

Plant name.....:	43083 Cooling
Classification.....:	Cooling
Type.....:	Air-Cooled Chiller
Type of simulation model....:	Computer-Generated
Type of chiller.....:	A/C Reciprocating

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
4. 43083.....	(SZ CAV)	1

AIR-COOLED RECIPROCATING CHILLER DATA

Estimated maximum cooling load...:	NA
Chiller capacity at design.....:	20.0 Tons
Chiller input power at design....:	1.200 kW/Ton
Chiller configuration.....:	One Compressor / Ckt., Cycled
Is chilled water reset used.....?	N
Is hot gas bypass used.....?	N
% load for minimum unloading.....:	20.0 %
Crankcase heater kW.....:	0.000 kW

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Efficiencies Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Chilled Water	10.0	80.00	85.0	90.0	0.95	2.0

PLANT INPUT DATA

Plant: 43083 Heating 08-24-94
Prepared By: Keller & Gannon Page 1

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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 43083 Heating
Classification.....: Heating
Type.....: Hot Water Boiler

AIR SYSTEM SELECTIONS

Air System Name	Heating Coil Category Pre-Heat	Central	Terminal	Zone
4. 43083.....	-	1	-	-

HOT WATER BOILER DATA

Estimated maximum heating load...: NA
Gross output at design.....: 2100.0 MBH
Energy input at design.....: 2800.0 MBH
Overall efficiency at design.....: 75.0 %
Fuel or energy type.....: Nat. Gas
Combustion air blower kW.....: 0.200 kW

BOILER PART-LOAD PERFORMANCE DATA

% Load	Overall Eff. (%)	% Load	Overall Eff. (%)
90	75.0	40	75.0
80	75.0	30	75.0
70	75.0	20	75.0
60	75.0	10	75.0
50	75.0	0	75.0

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Hot Water	20.0	40.00	85.0	90.0	2.07	2.0

****

PLANT NAME, CLASSIFICATION & TYPE

Plant name.....:	51005 Cooling
Classification.....:	Cooling
Type.....:	Air-Cooled Chiller
Type of simulation model....:	Computer-Generated
Type of chiller.....:	A/C Reciprocating

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
14. 51005 refl. coat.....	(SZ CAV)	1

AIR-COOLED RECIPROCATING CHILLER DATA

Estimated maximum cooling load...:	215.1 Tons
Chiller capacity at design.....:	225.0 Tons
Chiller input power at design....:	1.200 kW/Ton
Chiller configuration.....:	One Compressor / Ckt., Cycled
Is chilled water reset used.....?	N
Is hot gas bypass used.....?	N
% load for minimum unloading.....:	20.0 %
Crankcase heater kW.....:	0.000 kW

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Efficiencies Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Chilled Water	10.0	80.00	85.0	90.0	10.63	2.0

PLANT INPUT DATA

Plant: 51005 Heating
Prepared By: Keller & Gannon

08-24-94
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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 51005 Heating
Classification.....: Heating
Type.....: Direct-Fired Combustion

AIR SYSTEM SELECTIONS

Air System Name	Heating Coil Category Pre-Heat	Central	Terminal	Zone
14. 51005 refl. coat.....	-	1	-	-

DIRECT-FIRED COMBUSTION HEATING DATA

Estimated maximum heating load...: 3673.7 MBH
Type of heating.....: Nat. Gas
Gross heating capacity.....: 4000.0 MBH
Average efficiency.....: 80.0 %
Combustion air blower kW.....: 0.000 kW

PLANT INPUT DATA

Plant: 61701 A/C Area
Prepared By: Keller & Gannon

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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 61701 A/C Area
Classification.....: Cooling
Type.....: Air-Cooled DX
Type of simulation model....: Computer-Generated

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
15. Gym A/C Area Cooling.....	(SZ CAV)	1

AIR-COOLED DX COOLING DATA

COOLING DATA

Estimated maximum cooling load...:	7.5	Tons
Design OAT.....:	92.0	F
Gross cooling capacity.....:	20.0	Tons
Compressor power at design.....:	1.000	kW/Ton
Outdoor fan power at design.....:	0.000	kW/Ton
Crankcase heater kW.....:	0.000	kW
Cyclic degradation factor.....:	0.150	
Conventional minimum ambient.....:	55.0	F
Is low temperature control used..?	N	

PLANT INPUT DATA

Plant: 61701 Gym & Offices 08-24-94
Prepared By: Keller & Gannon Page 1

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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 61701 Gym & Offices
Classification.....: Heating
Type.....: Hot Water Boiler
Notes.....: Gym, Offices

AIR SYSTEM SELECTIONS

Air System Name	Heating Coil Category Pre-Heat	Central	Terminal	Zone
2. 61701 Gym Heating.....	-	1	-	-
6. 61701 Racquetball.....	-	1	-	-
10. 61701 Lockers Heating.....	-	1	-	-
11. 61701 Pool.....	-	1	-	-
12. 61701 Offices Heating.....	-	1	-	-
16. Gym A/C Area Heating.....	-	1	-	-

HOT WATER BOILER DATA

Estimated maximum heating load...: NA
Gross output at design.....: 530.0 MBH
Energy input at design.....: 706.7 MBH
Overall efficiency at design.....: 75.0 %
Fuel or energy type.....: Nat. Gas
Combustion air blower kW.....: 0.186 kW

BOILER PART-LOAD PERFORMANCE DATA

% Load	Overall Eff. (%)	% Load	Overall Eff. (%)
90	75.0	40	75.0
80	75.0	30	75.0
70	75.0	20	75.0
60	75.0	10	75.0
50	75.0	0	75.0

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Hot Water	20.0	25.00	85.0	90.0	0.33	2.0

PLANT INPUT DATA

Plant: 61701 Racquetball Courts
Prepared By: Keller & Gannon

****

PLANT NAME, CLASSIFICATION & TYPE

Plant name.....:	61701 Racquetball Courts
Classification.....:	Cooling
Type.....:	Air-Cooled DX
Type of simulation model....:	Computer-Generated

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
6. 61701 Racquetball.....	(MZ)	1

AIR-COOLED DX COOLING DATA

COOLING DATA

Estimated maximum cooling load...:	5.2	Tons
Design OAT.....:	92.0	F
Gross cooling capacity.....:	10.0	Tons
Compressor power at design.....:	1.000	kW/Ton
Outdoor fan power at design.....:	0.000	kW/Ton
Crankcase heater kW.....:	0.000	kW
Cyclic degradation factor.....:	0.150	
Conventional minimum ambient.....:	55.0	F
Is low temperature control used..?	N	

PLANT INPUT DATA

Plant: 70525 Heating
Prepared By: Keller & Gannon

08-29-94
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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 70525 Heating
Classification.....: Heating
Type.....: Direct-Fired Combustion

AIR SYSTEM SELECTIONS

Air System Name	Heating Coil Category Pre-Heat	Central	Terminal	Zone
1. 70525 Heating.....	-	1	-	-

DIRECT-FIRED COMBUSTION HEATING DATA

Estimated maximum heating load...: 460.0 MBH
Type of heating.....: Nat. Gas
Gross heating capacity.....: 910.0 MBH
Average efficiency.....: 65.0 %
Combustion air blower kW.....: 0.200 kW

PLANT INPUT DATA

Plant: 90312A
Prepared By: Keller & Gannon

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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....:	90312A
Classification.....:	Cooling & Heating
Type.....:	Air Source Heat Pump
Type of simulation model....:	Computer-Generated

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
2. 90312A.....	(WSHP)	1

AIR-SOURCE HEAT PUMP DATA

COOLING DATA		
Estimated maximum cooling load...:	NA	
Design OAT.....:	95.0	F
Gross cooling capacity.....:	1.0	Tons
Compressor power at design.....:	1.000	kW/Ton
Outdoor fan power at design.....:	1.000	kW/Ton
Crankcase heater kW.....:	1.000	kW
Cyclic degradation factor.....:	0.150	
Conventional minimum ambient.....:	55.0	F
Is low temperature control used..?	N	
HEATING DATA		
Estimated maximum heating load...:	NA	
Design OAT.....:	55.0	F
Gross heating capacity.....:	1.0	MBH
Heating input power at design....:	1.000	COP
Minimum ambient for heating.....:	15.0	F
AUXILIARY HEATING DATA		
Estimated maximum heating load...:	NA	
Type of auxiliary heating.....:	None	

PLANT INPUT DATA

Plant: 90312B
Prepared By: Keller & Gannon

08-29-94
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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 90312B
Classification.....: Cooling & Heating
Type.....: Air Source Heat Pump
Type of simulation model....: Computer-Generated

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
3. 90312B.....	(WSHP)	1

AIR-SOURCE HEAT PUMP DATA

COOLING DATA

Estimated maximum cooling load...:	NA
Design OAT.....:	95.0 F
Gross cooling capacity.....:	1.0 Tons
Compressor power at design.....:	1.000 kW/Ton
Outdoor fan power at design.....:	1.000 kW/Ton
Crankcase heater kW.....:	1.000 kW
Cyclic degradation factor.....:	0.150
Conventional minimum ambient.....:	55.0 F
Is low temperature control used..?	N

HEATING DATA

Estimated maximum heating load...:	NA
Design OAT.....:	55.0 F
Gross heating capacity.....:	1.0 MBH
Heating input power at design....:	1.000 COP
Minimum ambient for heating.....:	15.0 F

AUXILIARY HEATING DATA

Estimated maximum heating load...:	NA
Type of auxiliary heating.....:	None

PLANT INPUT DATA

Plant: 91114B Cooling
Prepared By: Keller & Gannon

****

PLANT NAME, CLASSIFICATION & TYPE

Plant name.....:	91114B Cooling
Classification.....:	Cooling
Type.....:	Air-Cooled DX
Type of simulation model....:	Computer-Generated

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
4. 91114B Cooling.....	(SZ CAV)	1

AIR-COOLED DX COOLING DATA

COOLING DATA

Estimated maximum cooling load...:	NA	
Design OAT.....:	95.0	F
Gross cooling capacity.....:	12.5	Tons
Compressor power at design.....:	1.000	kW/Ton
Outdoor fan power at design.....:	0.200	kW/Ton
Crankcase heater kW.....:	0.000	kW
Cyclic degradation factor.....:	0.150	
Conventional minimum ambient.....:	55.0	F
Is low temperature control used..?	N	

PLANT INPUT DATA

Plant: 91114A & B Heating 08-29-94
Prepared By: Keller & Gannon Page 1

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PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 91114A & B Heating
Classification.....: Heating
Type.....: Steam Boiler

AIR SYSTEM SELECTIONS

Air System Name	Heating Coil Category Pre-Heat	Central	Terminal	Zone
5. 91114A Heating.....	-	1	-	-
6. 91114B Heating.....	-	1	-	-

STEAM BOILER DATA

Estimated maximum heating load...: NA
Gross output at design.....: 750.0 MBH
Energy input at design.....: 1153.8 MBH
Overall efficiency at design.....: 65.0 %
Fuel or energy type.....: Nat. Gas
Combustion air blower kW.....: 0.000 kW

BOILER PART-LOAD PERFORMANCE DATA

% Load	Overall Eff. (%)	% Load	Overall Eff. (%)
90	65.0	40	65.0
80	65.0	30	65.0
70	65.0	20	65.0
60	65.0	10	65.0
50	65.0	0	65.0

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Steam	-	-	-	-	-	2.0

****

BUILDING NAME.....: 15544

PLANT SELECTION

Plant Name	Type	Quantity
2. 15544 cooling.....	(A/C CHILLER)	1
3. 15544 heating.....	(HW BOILER)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: Fort Huachuca
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

****

BUILDING NAME.....: 20200

PLANT SELECTION

Plant Name	Type	Quantity
17. 20200 Heating.....	(COMBUSTION)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: Fort Huachuca
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

****

BUILDING NAME.....: 43083

PLANT SELECTION

Plant Name	Type	Quantity
4. 43083 Cooling.....	(A/C CHILLER)	1
5. 43083 Heating.....	(HW BOILER)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: Fort Huachuca
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

****

BUILDING NAME.....: 51005

PLANT SELECTION

Plant Name	Type	Quantity
5. 51005 Heating.....	(COMBUSTION)	1
6. 51005 Cooling.....	(A/C CHILLER)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: Fort Huachuca
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

BUILDING INPUT DATA

Prepared by: Keller & Gannon 08-24-94
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BUILDING NAME.....: 61701

PLANT SELECTION

	Plant Name	Type	Quantity
9.	61701 Gym & Offices.....	(HW BOILER)	1
10.	61701 A/C Area.....	(A/C DX CLG)	1
11.	61701 Racquetball Courts.....	(A/C DX CLG)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: Fort Huachuca
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

****

MISCELLANEOUS DATA

Additional building floor area.....:	0.0 sqft
Source electric generating efficiency.....:	100.00 %

****

BUILDING NAME.....: 70525

PLANT SELECTION

	Plant Name	Type	Quantity
6.	70525 Heating.....	(COMBUSTION)	1
10.	70525 Cooling.....	(REMOTE CLG)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: Fort Huachuca
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: Fort Huachuca

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

****

BUILDING NAME.....: 90312A

PLANT SELECTION

Plant Name	Type	Quantity
2. 90312A.....	(ASHP)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: None
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

BUILDING NAME.....: 90312B

PLANT SELECTION

Plant Name	Type	Quantity
3. 90312B.....	(ASHP)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: None
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

****

BUILDING NAME.....: 91114

PLANT SELECTION

Plant Name	Type	Quantity
8. 91114B Cooling.....	(A/C DX CLG)	1
9. 91114A & B Heating.....	(STM BOILER)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: Fort Huachuca
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

CARRIER HAP SIMULATIONS

BASE CASE ENERGY USE

ANNUAL ENERGY COSTS

Building: 15544 08-22-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	340893 kWh	21067	1.646	55.0 %
Natural Gas	9636 Therm	4344	0.339	11.3 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		25411	1.985	66.3 %
Electric	209011 kWh	12917	1.009	33.7 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		12917	1.009	33.7 %
>>> GRAND TOTAL		38328	2.994	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 12800 sqft
Conditioned floor area.....: 12800 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 15544
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-22-94
HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2530837	197.722
Heating Loads	760068	59.380

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	295902	23.117	295902	23.117
Cooling Plants	679955	53.121	679955	53.121
Absorption Chillers	0	0.000	0	0.000
Heating Plants	965509	75.430	965509	75.430
Pumps	185313	14.478	185313	14.478
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	2126679	166.147	2126679	166.147
Lights	330566	25.825	330566	25.825
Electric Equipment	382581	29.889	382581	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	713146	55.715	713146	55.715
>>> GRAND TOTAL	2839826	221.861	2839826	221.861

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 12800 sqft
  Conditioned floor area.....: 12800 sqft

ANNUAL ENERGY COSTS

Building: 20200 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	5509 kWh	340	0.218	24.1 %
Natural Gas	411 Therm	185	0.118	13.1 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		526	0.336	37.2 %
Electric	14346 kWh	887	0.567	62.8 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		887	0.567	62.8 %
>>> GRAND TOTAL		1412	0.902	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 1565 sqft
  Conditioned floor area.....: 1565 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 20200 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	0	0.000
Heating Loads	32889	21.015

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	18796	12.010	18796	12.010
Cooling Plants	0	0.000	0	0.000
Absorption Chillers	0	0.000	0	0.000
Heating Plants	41111	26.269	41111	26.269
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	59907	38.279	59907	38.279
Lights	18544	11.849	18544	11.849
Electric Equipment	30405	19.428	30405	19.428
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	48949	31.277	48949	31.277
>>> GRAND TOTAL	108856	69.556	108856	69.556

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 1565 sqft
  Conditioned floor area.....: 1565 sqft

ANNUAL ENERGY COSTS

Building: 43083 08-22-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	778117 kWh	48088	0.535	32.3 %
Natural Gas	66982 Therm	30196	0.336	20.3 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		78283	0.870	52.6 %
Electric	1140066 kWh	70456	0.783	47.4 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		70456	0.783	47.4 %
>>> GRAND TOTAL		148739	1.654	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 89946 sqft
Conditioned floor area.....: 89946 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 43083 08-22-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	5519599	61.366
Heating Loads	6712699	74.630

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	2377893	26.437	2377893	26.437
Cooling Plants	227670	2.531	227670	2.531
Absorption Chillers	0	0.000	0	0.000
Heating Plants	6699851	74.487	6699851	74.487
Pumps	47739	0.531	47739	0.531
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	9353153	103.986	9353153	103.986
Lights	1201497	13.358	1201497	13.358
Electric Equipment	2688407	29.889	2688407	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	3889903	43.247	3889903	43.247
>>> GRAND TOTAL	13243056	147.233	13243056	147.233

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 89946 sqft
  Conditioned floor area.....: 89946 sqft

ANNUAL ENERGY COSTS

Building: 51005 w/out low e
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-22-94
HAP v3.06
Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	1069343 kWh	66085	0.843	39.3 %
Natural Gas	67096 Therm	30247	0.386	18.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		96332	1.229	57.4 %
Electric	1158948 kWh	71623	0.914	42.6 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		71623	0.914	42.6 %
>>> GRAND TOTAL		167955	2.142	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 78400 sqft
  Conditioned floor area.....: 78400 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 51005 w/out low e
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-22-94
HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	4778244	60.947
Heating Loads	5383307	68.665

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	1968489	25.108	1968489	25.108
Cooling Plants	1546877	19.731	1546877	19.731
Absorption Chillers	0	0.000	0	0.000
Heating Plants	6709649	85.582	6709649	85.582
Pumps	133232	1.699	133232	1.699
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	10358246	132.120	10358246	132.120
Lights	1611024	20.549	1611024	20.549
Electric Equipment	2343308	29.889	2343308	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	3954331	50.438	3954331	50.438
>>> GRAND TOTAL	14312577	182.558	14312577	182.558

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 78400 sqft
  Conditioned floor area.....: 78400 sqft

BASELINE CONTROL SCHEME

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 53601 (Base Controls) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2638266	89.949
Heating Loads	1956687	66.711

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	701371	23.913	701371	23.913
Cooling Plants	589881	20.111	589881	20.111
Absorption Chillers	0	0.000	0	0.000
Heating Plants	3210553	109.461	3210553	109.461
Pumps	124531	4.246	124531	4.246
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	4626336	157.731	4626336	157.731
Lights	293065	9.992	293065	9.992
Electric Equipment	64345	2.194	64345	2.194
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	357409	12.186	357409	12.186
>>> GRAND TOTAL	4983745	169.916	4983745	169.916

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 29331 sqft
  Conditioned floor area.....: 29331 sqft

ANNUAL ENERGY COSTS

Building: 53601 (Base Controls) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	415473 kWh	25676	0.875	55.1 %
Natural Gas	32087 Therm	14465	0.493	31.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		40141	1.369	86.1 %
Electric	104751 kWh	6474	0.221	13.9 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		6474	0.221	13.9 %
>>> GRAND TOTAL		46615	1.589	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 29331 sqft
  Conditioned floor area.....: 29331 sqft

ANNUAL ENERGY COSTS

Building: 61701 08-22-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	196340 kWh	12134	0.246	39.1 %
Natural Gas	6612 Therm	2981	0.060	9.6 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		15115	0.307	48.8 %
Electric	257069 kWh	15887	0.322	51.2 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		15887	0.322	51.2 %
>>> GRAND TOTAL		31001	0.629	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 49288 sqft
Conditioned floor area.....: 49288 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 61701 08-22-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	412713	8.374
Heating Loads	494265	10.028

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	557978	11.321	557978	11.321
Cooling Plants	102353	2.077	102353	2.077
Absorption Chillers	0	0.000	0	0.000
Heating Plants	661807	13.427	661807	13.427
Pumps	8987	0.182	8987	0.182
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1331125	27.007	1331125	27.007
Lights	521108	10.573	521108	10.573
Electric Equipment	356012	7.223	356012	7.223
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	877120	17.796	877120	17.796
>>> GRAND TOTAL	2208246	44.803	2208246	44.803

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 49288 sqft
  Conditioned floor area.....: 49288 sqft

ANNUAL ENERGY COSTS

Building: 70525 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	121671 kWh	5852	0.160	21.5 %
Natural Gas	1228 Therm	554	0.015	2.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0 Therm	0	0.000	0.0 %
>>> HVAC Subtotal		6406	0.176	23.6 %
Electric	431586 kWh	20759	0.569	76.4 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		20759	0.569	76.4 %
>>> GRAND TOTAL		27165	0.745	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 36478 sqft
Conditioned floor area.....: 36478 sqft

ANNUAL ENERGY COSTS

Building: 90312A
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	4086 kWh	197	0.562	67.0 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		197	0.562	67.0 %
Electric	2010 kWh	97	0.276	33.0 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		97	0.276	33.0 %
>>> GRAND TOTAL		293	0.838	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 350 sqft
  Conditioned floor area.....: 350 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 90312A
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	4273	12.209
Heating Loads	23203	66.295

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *----->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	0	0.000	0	0.000
Cooling Plants	2554	7.296	2554	7.296
Absorption Chillers	0	0.000	0	0.000
Heating Plants	11388	32.536	11388	32.536
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	13941	39.832	13941	39.832
Lights	3740	10.686	3740	10.686
Electric Equipment	3117	8.905	3117	8.905
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	6857	19.592	6857	19.592
>>> GRAND TOTAL	20798	59.424	20798	59.424

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 350 sqft
  Conditioned floor area.....: 350 sqft

ANNUAL ENERGY COSTS

Building: 90312B
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06
Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	3784 kWh	182	0.758	73.3 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		182	0.758	73.3 %
Electric	1378 kWh	66	0.276	26.7 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		66	0.276	26.7 %
>>> GRAND TOTAL		248	1.035	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 240 sqft
  Conditioned floor area.....: 240 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 90312B 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2758	11.490
Heating Loads	9676	40.316

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *----->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	0	0.000	0	0.000
Cooling Plants	1662	6.923	1662	6.923
Absorption Chillers	0	0.000	0	0.000
Heating Plants	11250	46.877	11250	46.877
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	12912	53.800	12912	53.800
Lights	2565	10.686	2565	10.686
Electric Equipment	2137	8.905	2137	8.905
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	4702	19.592	4702	19.592
>>> GRAND TOTAL	17614	73.391	17614	73.391

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 240 sqft
  Conditioned floor area.....: 240 sqft

ANNUAL ENERGY COSTS

Building: 91114 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1
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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	163200 kWh	7850	0.361	36.4 %
Natural Gas	9596 Therm	4326	0.199	20.1 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		12176	0.560	56.5 %
Electric	194777 kWh	9369	0.431	43.5 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		9369	0.431	43.5 %
>>> GRAND TOTAL		21544	0.990	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 21758 sqft
Conditioned floor area.....: 21758 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 91114 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	493586	22.685
Heating Loads	611496	28.104

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	414536	19.052	414536	19.052
Cooling Plants	142302	6.540	142302	6.540
Absorption Chillers	0	0.000	0	0.000
Heating Plants	959579	44.102	959579	44.102
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1516417	69.693	1516417	69.693
Lights	362497	16.660	362497	16.660
Electric Equipment	302081	13.883	302081	13.883
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	664579	30.544	664579	30.544
>>> GRAND TOTAL	2180995	100.237	2180995	100.237

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 21758 sqft
  Conditioned floor area.....: 21758 sqft

CARRIER HAP SIMULATIONS

LO/MIT-1 ROOF REFLECTIVE COATING APPLICATIONS ONLY

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ROOF TYPE 1: (CUSTOM ROOF)

Description.....: 15544
Absorptivity.....: 0.180

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustical Tile	0.38	18.0	0.14	1.89	0.6
Airspace	36.00	0.0	0.00	0.91	0.0
1" batt insulation	1.00	2.0	0.22	7.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	37.41			10.82	2.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 2: (CUSTOM ROOF)

Description.....: 20200
Absorptivity.....: 0.340

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
Airspace	12.00	0.0	0.00	0.91	0.0
1/2-in (13 mm) plywood	0.50	34.0	0.29	0.62	1.4
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	13.50			3.44	6.2

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 3: (CUSTOM ROOF)

Description.....: 43083
Absorptivity.....: 0.340

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
Airspace	4.00	0.0	0.00	0.91	0.0
4-in (102 mm) LW concrete	2.50	40.0	0.20	2.08	8.3
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	7.50			4.90	13.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 4: (CUSTOM ROOF)

Description.....: 51005
Absorptivity.....: 0.340

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
4-in (102 mm) LW concrete block	3.00	38.0	0.20	1.14	9.5
Rigid Insulation	3.00	0.5	0.20	11.00	0.1
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	6.38			13.49	11.8

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 5: (CUSTOM ROOF)

Description.....: 61701 #1
Absorptivity.....: 0.340

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Airspace	0.00	0.0	0.00	0.91	0.0
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
R-13 (RSI-2.3) batt insulation	4.00	0.5	0.20	12.82	0.2
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	5.07			15.64	7.7

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 6: (CUSTOM ROOF)

Description.....: 61701 #2
Absorptivity.....: 0.180

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustic Ceiling Tile	0.75	0.0	0.00	1.89	0.0
Airspace	0.00	0.0	0.00	0.91	0.0
R-16 batt insulation	4.00	0.5	0.20	16.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.78			19.82	1.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 7: (CUSTOM ROOF)

Description.....: 61701 #3
Absorptivity.....: 0.180

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Low Density Particle Board	0.50	37.0	0.31	0.40	1.5
Airspace	0.00	0.0	0.00	0.91	0.0
R-16 batt insulation	4.00	0.5	0.20	16.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.53			18.33	3.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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GENERAL
Name.....: 70525 (Low E/Insulated)
Floor Area.....: 36478.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.10 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 150.0 sqft/per
Activity Level..: Seated at Rest
Sensible.....: 230.0 BTU/hr
Latent.....: 120.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 70525
Task Lights.: 70525
People.....: 70525
Equipment...: 70525
Misc. Sens..: 70525
Misc. Latent: 70525

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 718.0 ft
Slab Floor Area.....: 36478.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
	850.0	4	1	0	-	1	0	-	N
	1700.0	4	1	0	-	1	0	-	N
W	1020.0	4	1	0	-	1	0	-	N
W	2500.0	3	1	3	-	1	0	-	N
S	493.0	1	4	1	-	1	0	-	N
S	2057.0	4	1	0	-	1	0	-	N
E	3400.0	1	2	2	-	1	0	-	N
E	306.0	2	3	1	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	36478.0	4	1	0

No partition data for this space.

ROOF TYPE 4: (CUSTOM ROOF)

Description.....: 70525 (Low E/Insulated)
Absorptivity.....: 0.180

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustic Ceiling Tiles	0.75	18.0	0.20	1.89	1.1
Airspace	0.00	0.0	0.00	0.91	0.0
R-30 (RSI-5.3) batt insulation	9.50	0.5	0.20	30.45	0.4
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	10.28			34.27	2.9

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF CONSTRUCTION TYPES

Prepared by: Keller & Gannon 08-29-94
HAP v3.06 Page 1

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ROOF TYPE 2: (CUSTOM ROOF)

Description.....: 91114
Absorptivity.....: 0.180 LOWE ROOF

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Accoustic Ceiling Tile	0.75	18.0	0.20	1.89	1.1
Airspace	24.00	0.0	0.00	0.91	0.0
2-in (50 mm) plywood	2.00	34.0	0.29	2.49	5.7
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	30.63			17.86	9.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ANNUAL ENERGY COSTS

Building: 15544 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	313786 kWh	19392	1.515	54.0 %
Natural Gas	7988 Therm	3601	0.281	10.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		22993	1.796	64.0 %
Electric	209011 kWh	12917	1.009	36.0 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		12917	1.009	36.0 %
>>> GRAND TOTAL		35910	2.805	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 12800 sqft
Conditioned floor area.....: 12800 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 15544 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2226006	173.907
Heating Loads	638963	49.919

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *----->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	295902	23.117	295902	23.117
Cooling Plants	587801	45.922	587801	45.922
Absorption Chillers	0	0.000	0	0.000
Heating Plants	800472	62.537	800472	62.537
Pumps	185313	14.478	185313	14.478
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1869488	146.054	1869488	146.054
Lights	330566	25.825	330566	25.825
Electric Equipment	382581	29.889	382581	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	713146	55.715	713146	55.715
>>> GRAND TOTAL	2582634	201.768	2582634	201.768

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 12800 sqft
  Conditioned floor area.....: 12800 sqft

ANNUAL ENERGY COSTS

Building: 20200 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1
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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	5509 kWh	340	0.218	23.7 %
Natural Gas	468 Therm	211	0.135	14.7 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		551	0.352	38.3 %
Electric	14346 kWh	887	0.567	61.7 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		887	0.567	61.7 %
>>> GRAND TOTAL		1438	0.919	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 1565 sqft
Conditioned floor area.....: 1565 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 20200 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	0	0.000
Heating Loads	37445	23.927

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	18796	12.010	18796	12.010
Cooling Plants	0	0.000	0	0.000
Absorption Chillers	0	0.000	0	0.000
Heating Plants	46807	29.908	46807	29.908
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	65603	41.919	65603	41.919
Lights	18544	11.849	18544	11.849
Electric Equipment	30405	19.428	30405	19.428
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	48949	31.277	48949	31.277
>>> GRAND TOTAL	114551	73.196	114551	73.196

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 1565 sqft
  Conditioned floor area.....: 1565 sqft

ANNUAL ENERGY COSTS

Building: 43083 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	674041 kWh	41656	0.463	29.7 %
Natural Gas	62533 Therm	28190	0.313	20.1 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		69846	0.777	49.8 %
Electric	1140066 kWh	70456	0.783	50.2 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		70456	0.783	50.2 %
>>> GRAND TOTAL		140302	1.560	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 89946 sqft
Conditioned floor area.....: 89946 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 43083 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	4821867	53.608
Heating Loads	5733854	63.748

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	2020438	22.463	2020438	22.463
Cooling Plants	230127	2.559	230127	2.559
Absorption Chillers	0	0.000	0	0.000
Heating Plants	6254815	69.540	6254815	69.540
Pumps	47739	0.531	47739	0.531
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	8553119	95.092	8553119	95.092
Lights	1201497	13.358	1201497	13.358
Electric Equipment	2688407	29.889	2688407	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	3889903	43.247	3889903	43.247
>>> GRAND TOTAL	12443022	138.339	12443022	138.339

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 89946 sqft
  Conditioned floor area.....: 89946 sqft

ANNUAL ENERGY COSTS

Building: 51005 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	1088286 kWh	67256	0.858	40.8 %
Natural Gas	57351 Therm	25854	0.330	15.7 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		93110	1.188	56.5 %
Electric	1158948 kWh	71623	0.914	43.5 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		71623	0.914	43.5 %
>>> GRAND TOTAL		164733	2.101	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 78400 sqft
Conditioned floor area.....: 78400 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 51005 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	5121062	65.320
Heating Loads	4588388	58.525

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	1652391	21.076	1652391	21.076
Cooling Plants	1743000	22.232	1743000	22.232
Absorption Chillers	0	0.000	0	0.000
Heating Plants	5735119	73.152	5735119	73.152
Pumps	317841	4.054	317841	4.054
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	9448351	120.515	9448351	120.515
Lights	1611024	20.549	1611024	20.549
Electric Equipment	2343308	29.889	2343308	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	3954331	50.438	3954331	50.438
>>> GRAND TOTAL	13402682	170.953	13402682	170.953

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 78400 sqft
  Conditioned floor area.....: 78400 sqft

LOW-E ROOF WITH BASELINE CONTROL SCHEME

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 53601 (Base Controls) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	1139773	38.860
Heating Loads	1456384	49.654

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	362472	12.358	362472	12.358
Cooling Plants	250969	8.557	250969	8.557
Absorption Chillers	0	0.000	0	0.000
Heating Plants	2614738	89.147	2614738	89.147
Pumps	130147	4.437	130147	4.437
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	3358326	114.499	3358326	114.499
Lights	293065	9.992	293065	9.992
Electric Equipment	64345	2.194	64345	2.194
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	357409	12.186	357409	12.186
>>> GRAND TOTAL	3715735	126.685	3715735	126.685

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 29331 sqft
  Conditioned floor area.....: 29331 sqft

ANNUAL ENERGY COSTS

Building: 53601 (Base Controls) 08-24-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon
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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	218364 kWh	13495	0.460	42.5 %
Natural Gas	26133 Therm	11781	0.402	37.1 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		25276	0.862	79.6 %
Electric	104751 kWh	6474	0.221	20.4 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		6474	0.221	20.4 %
>>> GRAND TOTAL		31749	1.082	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 29331 sqft
  Conditioned floor area.....: 29331 sqft

ANNUAL ENERGY COSTS

Building: 61701 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	180855 kWh	11177	0.227	36.9 %
Natural Gas	7084 Therm	3194	0.065	10.6 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		14370	0.292	47.5 %
Electric	257069 kWh	15887	0.322	52.5 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		15887	0.322	52.5 %
>>> GRAND TOTAL		30257	0.614	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 49288 sqft
Conditioned floor area.....: 49288 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 61701 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	318246	6.457
Heating Loads	529055	10.734

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	525983	10.672	525983	10.672
Cooling Plants	81438	1.652	81438	1.652
Absorption Chillers	0	0.000	0	0.000
Heating Plants	709049	14.386	709049	14.386
Pumps	9021	0.183	9021	0.183
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1325490	26.893	1325490	26.893
Lights	521108	10.573	521108	10.573
Electric Equipment	356012	7.223	356012	7.223
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	877120	17.796	877120	17.796
>>> GRAND TOTAL	2202611	44.689	2202611	44.689

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 49288 sqft
  Conditioned floor area.....: 49288 sqft

ANNUAL ENERGY COSTS

Building: 70525 (Low E/Insulation) 08-29-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	121673 kWh	5852	0.160	21.5 %
Natural Gas	1415 Therm	638	0.017	2.3 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0 Therm	0	0.000	0.0 %
>>> HVAC Subtotal		6490	0.178	23.8 %
Electric	431586 kWh	20759	0.569	76.2 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		20759	0.569	76.2 %
>>> GRAND TOTAL		27250	0.747	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 36478 sqft
  Conditioned floor area.....: 36478 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 70525 (Low E/Insulation) 08-29-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	0	0.000
Heating Loads	91986	2.522

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *----->		<---- Source Energy *---->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	415080	11.379	415080	11.379
Cooling Plants	0	0.000	0	0.000
Absorption Chillers	0	0.000	0	0.000
Heating Plants	141585	3.881	141585	3.881
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	556666	15.260	556666	15.260
Lights	771347	21.146	771347	21.146
Electric Equipment	701224	19.223	701224	19.223
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	1472571	40.369	1472571	40.369
>>> GRAND TOTAL	2029237	55.629	2029237	55.629

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 36478 sqft
  Conditioned floor area.....: 36478 sqft

ANNUAL ENERGY COSTS

Building: 91114 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	156018 kWh	7504	0.345	35.3 %
Natural Gas	9766 Therm	4402	0.202	20.7 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		11907	0.547	56.0 %
Electric	194777 kWh	9369	0.431	44.0 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		9369	0.431	44.0 %
>>> GRAND TOTAL		21276	0.978	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 21758 sqft
Conditioned floor area.....: 21758 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 91114 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	465850	21.410
Heating Loads	622333	28.602

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	396201	18.209	396201	18.209
Cooling Plants	136133	6.257	136133	6.257
Absorption Chillers	0	0.000	0	0.000
Heating Plants	976584	44.883	976584	44.883
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1508918	69.349	1508918	69.349
Lights	362497	16.660	362497	16.660
Electric Equipment	302081	13.883	302081	13.883
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	664579	30.544	664579	30.544
>>> GRAND TOTAL	2173496	99.892	2173496	99.892

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 21758 sqft
  Conditioned floor area.....: 21758 sqft

CARRIER HAP SIMULATIONS

ROOF INSULATION RETROFITS ONLY

****

ROOF TYPE 1: (CUSTOM ROOF)

Description.....: 15544
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustical Tile	0.38	18.0	0.14	1.89	0.6
R-30 (RSI-5.3) batt insulation	9.50	0.5	0.20	30.45	0.4
Airspace	36.00	0.0	0.00	0.91	0.0
1" batt insulation	1.00	2.0	0.22	7.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	46.91			41.27	2.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 2: (CUSTOM ROOF)

Description.....: 20200
Absorptivity.....: 0.600

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-30 (RSI-5.3) batt insulation	9.50	0.5	0.20	30.45	0.4
Airspace	2.50	0.0	0.00	0.91	0.0
1/2-in (13 mm) plywood	0.50	34.0	0.29	0.62	1.4
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	13.50			33.89	6.6

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 3: (CUSTOM ROOF)

Description.....: 43083
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-30 (RSI-5.3) batt insulation	9.50	0.5	0.20	30.45	0.4
Airspace	4.00	0.0	0.00	0.91	0.0
4-in (102 mm) LW concrete	2.50	40.0	0.20	2.08	8.3
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	17.00			35.35	13.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 4: (CUSTOM ROOF)

Description.....: 51005
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
4-in (102 mm) LW concrete block	3.00	38.0	0.20	1.14	9.5
Rigid Insulation	3.00	0.5	0.20	11.00	0.1
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	6.38			13.49	11.8

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 5: (CUSTOM ROOF)

Description.....: 61701 #1
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Airspace	0.00	0.0	0.00	0.91	0.0
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
R-13 (RSI-2.3) batt insulation	4.00	0.5	0.20	12.82	0.2
Rigid Polystyrene	4.42	1.0	0.00	17.00	0.4
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	9.48			32.64	8.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 6: (CUSTOM ROOF)

Description.....: 61701 #2
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustic Ceiling Tile	0.75	0.0	0.00	1.89	0.0
Airspace	0.00	0.0	0.00	0.91	0.0
R-16 batt insulation	4.00	0.5	0.20	16.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.78			19.82	1.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 7: (CUSTOM ROOF)

Description.....: 61701 #3
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Low Density Particle Board	0.50	37.0	0.31	0.40	1.5
Airspace	0.00	0.0	0.00	0.91	0.0
R-16 batt insulation	4.00	0.5	0.20	16.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.53			18.33	3.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 2: (CUSTOM ROOF) ROOF INSULATION

Description.....: 91114
Absorptivity.....: 0.600

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Accoustic Ceiling Tile	0.75	18.0	0.20	1.89	1.1
Airspace	24.00	0.0	0.00	0.91	0.0
2-in (50 mm) plywood	2.00	34.0	0.29	2.49	5.7
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
Rigid Polystyrene	4.42	1.0	0.20	17.00	0.4
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	35.04			34.86	9.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

****

GENERAL
Name.....: 90312A
Floor Area.....: 350.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? Y

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.20 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 3 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 90312
Task Lights.: 90312
People.....: 90312
Equipment...: 90312
Misc. Sens..: 90312
Misc. Latent: 90312

INFILTRATION
Cooling.....: 0.0 CFM
Heating.....: 0.00 CFM/sqft
Typical.....: 0.03 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 78.0 ft
Slab Floor Area.....: 350.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

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No external wall or window data for this space.

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No roof or door data for this space.

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ARTITION LOADS	Type 1	Type 2
Type.....:	Partition	Ceiling
Area.....:	624.0 sqft	350.0 sqft
U-value.....:	0.294 BTU/hr/sqft/F	0.031 BTU/hr/sqft/F
Maximum Space Temp....:	87.0 F	87.0 F
Outside Air Temp @ Max:	94.0 F	94.0 F
Minimum Space Temp....:	35.0 F	35.0 F
Outside Air Temp @ Min:	28.0 F	28.0 F

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GENERAL
Name.....: 90312B
Floor Area.....: 240.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? Y

LIGHTING
Overhead Fixture: Free-Hanging
Lamp Wattage....: 1.20 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 120.0 sqft/per
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 90312
Task Lights.: 90312
People.....: 90312
Equipment...: 90312
Misc. Sens..: 90312
Misc. Latent: 90312

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.04 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 64.0 ft
Slab Floor Area.....: 240.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

No roof or door data for this space.

PARTITION LOADS	Type 1	Type 2
Type.....	Partition	Ceiling
Area.....	512.0 sqft	240.0 sqft
U-value.....	0.072 BTU/hr/sqft/F	0.030 BTU/hr/sqft/F
Maximum Space Temp....:	87.0 F	87.0 F
Outside Air Temp @ Max:	94.0 F	94.0 F
Minimum Space Temp....:	35.0 F	35.0 F
Outside Air Temp @ Min:	28.0 F	28.0 F

ANNUAL ENERGY COSTS

Building: 15544 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	322156 kWh	19909	1.555	55.1 %
Natural Gas	7268 Therm	3276	0.256	9.1 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		23185	1.811	64.2 %
Electric	209011 kWh	12917	1.009	35.8 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		12917	1.009	35.8 %
>>> GRAND TOTAL		36102	2.820	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 12800 sqft
Conditioned floor area.....: 12800 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 15544 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2338166	182.669
Heating Loads	585952	45.778

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	295902	23.117	295902	23.117
Cooling Plants	616504	48.164	616504	48.164
Absorption Chillers	0	0.000	0	0.000
Heating Plants	728231	56.893	728231	56.893
Pumps	185313	14.478	185313	14.478
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1825950	142.652	1825950	142.652
Lights	330566	25.825	330566	25.825
Electric Equipment	382581	29.889	382581	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	713146	55.715	713146	55.715
>>> GRAND TOTAL	2539096	198.367	2539096	198.367

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 12800 sqft
  Conditioned floor area.....: 12800 sqft

ANNUAL ENERGY COSTS

Building: 20200 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	2859 kWh	177	0.113	16.1 %
Natural Gas	74 Therm	33	0.021	3.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		210	0.134	19.1 %
Electric	14346 kWh	887	0.567	80.9 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		887	0.567	80.9 %
>>> GRAND TOTAL		1096	0.701	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 1565 sqft
Conditioned floor area.....: 1565 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 20200 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	0	0.000
Heating Loads	5893	3.765

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *----->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	9756	6.234	9756	6.234
Cooling Plants	0	0.000	0	0.000
Absorption Chillers	0	0.000	0	0.000
Heating Plants	7366	4.707	7366	4.707
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	17122	10.941	17122	10.941
Lights	18544	11.849	18544	11.849
Electric Equipment	30405	19.428	30405	19.428
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	48949	31.277	48949	31.277
>>> GRAND TOTAL	66071	42.218	66071	42.218

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 1565 sqft
  Conditioned floor area.....: 1565 sqft

ANNUAL ENERGY COSTS

Building: 43083 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	627107 kWh	38755	0.431	28.9 %
Natural Gas	54947 Therm	24770	0.275	18.5 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		63525	0.706	47.4 %
Electric	1140066 kWh	70456	0.783	52.6 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		70456	0.783	52.6 %
>>> GRAND TOTAL		133981	1.490	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 89946 sqft
Conditioned floor area.....: 89946 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 43083 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	4597474	51.114
Heating Loads	4660386	51.813

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	1853228	20.604	1853228	20.604
Cooling Plants	237383	2.639	237383	2.639
Absorption Chillers	0	0.000	0	0.000
Heating Plants	5495993	61.103	5495993	61.103
Pumps	47739	0.531	47739	0.531
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	7634343	84.877	7634343	84.877
Lights	1201497	13.358	1201497	13.358
Electric Equipment	2688407	29.889	2688407	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	3889903	43.247	3889903	43.247
>>> GRAND TOTAL	11524246	128.124	11524246	128.124

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 89946 sqft
  Conditioned floor area.....: 89946 sqft

ANNUAL ENERGY COSTS

Building: 61701 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	177012 kWh	10939	0.222	37.3 %
Natural Gas	5550 Therm	2502	0.051	8.5 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		13441	0.273	45.8 %
Electric	257069 kWh	15887	0.322	54.2 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		15887	0.322	54.2 %
>>> GRAND TOTAL		29328	0.595	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 49288 sqft
Conditioned floor area.....: 49288 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 61701 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	394807	8.010
Heating Loads	415995	8.440

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	497239	10.088	497239	10.088
Cooling Plants	97243	1.973	97243	1.973
Absorption Chillers	0	0.000	0	0.000
Heating Plants	555479	11.270	555479	11.270
Pumps	8985	0.182	8985	0.182
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1158946	23.514	1158946	23.514
Lights	521108	10.573	521108	10.573
Electric Equipment	356012	7.223	356012	7.223
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	877120	17.796	877120	17.796
>>> GRAND TOTAL	2036066	41.310	2036066	41.310

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 49288 sqft
  Conditioned floor area.....: 49288 sqft

ANNUAL ENERGY COSTS

Building: 90312A
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06
Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	4034 kWh	194	0.554	66.7 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		194	0.554	66.7 %
Electric	2010 kWh	97	0.276	33.3 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		97	0.276	33.3 %
>>> GRAND TOTAL		291	0.831	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 350 sqft
  Conditioned floor area.....: 350 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 90312A 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	4009	11.454
Heating Loads	14807	42.305

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	0	0.000	0	0.000
Cooling Plants	2393	6.837	2393	6.837
Absorption Chillers	0	0.000	0	0.000
Heating Plants	11372	32.492	11372	32.492
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	13765	39.329	13765	39.329
Lights	3740	10.686	3740	10.686
Electric Equipment	3117	8.905	3117	8.905
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	6857	19.592	6857	19.592
>>> GRAND TOTAL	20622	58.920	20622	58.920

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 350 sqft
  Conditioned floor area.....: 350 sqft

ANNUAL ENERGY COSTS

Building: 90312B
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	3742 kWh	180	0.750	73.1 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		180	0.750	73.1 %
Electric	1378 kWh	66	0.276	26.9 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		66	0.276	26.9 %
>>> GRAND TOTAL		246	1.026	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 240 sqft
  Conditioned floor area.....: 240 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 90312B
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2927	12.198
Heating Loads	4032	16.799

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	0	0.000	0	0.000
Cooling Plants	1738	7.243	1738	7.243
Absorption Chillers	0	0.000	0	0.000
Heating Plants	11029	45.952	11029	45.952
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	12767	53.195	12767	53.195
Lights	2565	10.686	2565	10.686
Electric Equipment	2137	8.905	2137	8.905
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	4702	19.592	4702	19.592
>>> GRAND TOTAL	17469	72.787	17469	72.787

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 240 sqft
  Conditioned floor area.....: 240 sqft

ANNUAL ENERGY COSTS

Building: 91114
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs -----> ($)	($/sqft)*	% of Total
Electric	158508 kWh	7624	0.350	36.0 %
Natural Gas	9318 Therm	4201	0.193	19.8 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		11825	0.543	55.8 %
Electric	194777 kWh	9369	0.431	44.2 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		9369	0.431	44.2 %
>>> GRAND TOTAL		21194	0.974	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 21758 sqft
  Conditioned floor area.....: 21758 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 91114 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	480781	22.096
Heating Loads	593825	27.292

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	401174	18.438	401174	18.438
Cooling Plants	139655	6.418	139655	6.418
Absorption Chillers	0	0.000	0	0.000
Heating Plants	931849	42.827	931849	42.827
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1472678	67.683	1472678	67.683
Lights	362497	16.660	362497	16.660
Electric Equipment	302081	13.883	302081	13.883
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	664579	30.544	664579	30.544
>>> GRAND TOTAL	2137257	98.227	2137257	98.227

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 21758 sqft
  Conditioned floor area.....: 21758 sqft

CARRIER HAP SIMULATIONS

WALL INSULATION RETROFITS ONLY

****

WALL TYPE 1: (CUSTOM WALL)

Description.....: 15544
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.16			12.80	4.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 2: (CUSTOM WALL)

Description.....: 20200 avg
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
1-in (25 mm) stucco	1.00	116.0	0.20	0.20	9.7
Outside surface resistance	-	-	-	0.33	-
Totals	5.13			13.00	12.4

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WALL TYPE 3: (CUSTOM WALL)

Description.....: 61701 #1 Insulated
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
12 in hw conc. block	12.00	38.0	0.20	3.70	38.0
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
3/4-in (20 mm) stucco	0.75	116.0	0.20	0.15	7.3
Outside surface resistance	-	-	-	0.33	-
Totals	16.88			16.65	48.0

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 4: (CUSTOM WALL)

Description.....: 48083
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
8-in (203 mm) LW concrete block	8.00	38.0	0.20	2.02	25.3
Outside surface resistance	-	-	-	0.33	-
Totals	12.13			14.82	28.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

****

WALL TYPE 5: (CUSTOM WALL)

Description.....: 51005
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
8-in (203 mm) LW concrete block	8.00	38.0	0.20	2.02	25.3
Outside surface resistance	-	-	-	0.33	-
Totals	8.00			3.04	25.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 6: (CUSTOM WALL)

Description.....: 61701 #1
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
12 in hw conc. block	12.00	38.0	0.20	3.70	38.0
Outside surface resistance	-	-	-	0.33	-
Totals	16.13			16.50	40.8

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WALL TYPE 7: (CUSTOM WALL)

Description.....: 61701 #2
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
3/4-in (10 mm) plywood	0.75	34.0	0.29	0.93	2.1
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
12 in hw conc. block	12.00	38.0	0.20	3.70	38.0
Outside surface resistance	-	-	-	0.33	-
Totals	16.25			16.87	40.3

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 8: (CUSTOM WALL)

Description.....: 61701 #3
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
12 in hw conc. block	12.00	38.0	0.20	3.70	38.0
Outside surface resistance	-	-	-	0.33	-
Totals	16.13			16.50	40.8

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

****

WALL TYPE 9: (CUSTOM WALL)

Description.....: 61701 #4
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
8-in (203 mm) LW concrete block	8.00	38.0	0.20	2.02	25.3
Outside surface resistance	-	-	-	0.33	-
Totals	12.13			14.82	28.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

****

WALL TYPE 4: (CUSTOM WALL)

Description.....: 70525#4
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.16			12.80	4.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

SPACE DESCRIPTION

Prepared by: Keller & Gannon

08-29-94

HAP v3.06

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GENERAL

Name.....:	90312A w/wall insulation
Floor Area.....:	350.0 sqft
Building Weight.:	70.0 lb/sqft
Windows Shaded..?	N
Partitions Used.?	Y

LIGHTING

Overhead Fixture:	Recessed
Lamp Wattage....:	1.20 W/sqft
Ballast Mult....:	1.00
Task Lighting...:	0.00 W/sqft

PEOPLE

Occupancy.....:	3 People
Activity Level..:	Office Work
Sensible.....:	245.0 BTU/hr
Latent.....:	205.0 BTU/hr

OTHER LOADS

Equipment.....:	1.00 W/sqft
Misc. Sensible..:	0.0 BTU/hr
Misc. Latent....:	0.0 BTU/hr

SCHEDULES

Lighting....:	90312
Task Lights.:	90312
People.....:	90312
Equipment...:	90312
Misc. Sens..:	90312
Misc. Latent:	90312

INFILTRATION

Cooling.....:	0.0 CFM
Heating.....:	0.00 CFM/sqft
Typical.....:	0.03 CFM/sqft
When Fan On.?	N

FLOOR

Type.....:	Slab On Grade
Perimeter.....:	78.0 ft
Slab Floor Area.....:	350.0 sqft
Floor R-Value.....:	0.50
Insulation R-value....:	7.00

No external wall or window data for this space.

No roof or door data for this space.

PARTITION LOADS	Type 1	Type 2
Type.....:	Partition	Ceiling
Area.....:	624.0 sqft	350.0 sqft
U-value.....:	0.011 BTU/hr/sqft/F	0.370 BTU/hr/sqft/F
Maximum Space Temp....:	75.0 F	75.0 F
Outside Air Temp @ Max:	94.0 F	94.0 F
Minimum Space Temp....:	55.0 F	55.0 F
Outside Air Temp @ Min:	28.0 F	28.0 F

****

WALL TYPE 7: (CUSTOM WALL)

Description.....: 91114#1
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	8.00	0.1
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	6.41	0.1
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.03			15.43	1.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 8: (CUSTOM WALL)

Description.....: 91114#2 average U
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
8-in (203 mm) HW concrete	8.00	140.0	0.20	0.67	93.3
Outside surface resistance	-	-	-	0.33	-
Totals	12.13			13.46	96.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

****

WALL TYPE 9: (CUSTOM WALL)

Description.....: 91114#3
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	8.00	0.1
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	6.41	0.1
Airspace	1.50	0.0	0.00	0.91	0.0
Outside surface resistance	-	-	-	0.33	-
Totals	6.13			16.90	2.8

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

WALL TYPE 10: (CUSTOM WALL)

Description.....: 91114#4
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	8.00	0.1
R-11 (RSI-1.9) batt insulation	2.00	0.5	0.20	6.41	0.1
Airspace	0.00	0.0	0.00	0.91	0.0
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.03			16.34	1.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ANNUAL ENERGY COSTS

Building: 15544
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

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HAP v3.06
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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	330180 kWh	20405	1.594	55.2 %
Natural Gas	8024 Therm	3617	0.283	9.8 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		24022	1.877	65.0 %
Electric	209011 kWh	12917	1.009	35.0 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		12917	1.009	35.0 %
>>> GRAND TOTAL		36939	2.886	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 12800 sqft
  Conditioned floor area.....: 12800 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 15544
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2428523	189.728
Heating Loads	641549	50.121

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	295902	23.117	295902	23.117
Cooling Plants	643729	50.291	643729	50.291
Absorption Chillers	0	0.000	0	0.000
Heating Plants	803996	62.812	803996	62.812
Pumps	185313	14.478	185313	14.478
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1928940	150.698	1928940	150.698
Lights	330566	25.825	330566	25.825
Electric Equipment	382581	29.889	382581	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	713146	55.715	713146	55.715
>>> GRAND TOTAL	2642087	206.413	2642087	206.413

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 12800 sqft
  Conditioned floor area.....: 12800 sqft

ANNUAL ENERGY COSTS

Building: 20200 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	5158 kWh	319	0.204	23.2 %
Natural Gas	375 Therm	169	0.108	12.3 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		488	0.312	35.5 %
Electric	14346 kWh	887	0.567	64.5 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		887	0.567	64.5 %
>>> GRAND TOTAL		1374	0.878	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 1565 sqft
Conditioned floor area.....: 1565 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 20200
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	0	0.000
Heating Loads	29994	19.165

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	17598	11.245	17598	11.245
Cooling Plants	0	0.000	0	0.000
Absorption Chillers	0	0.000	0	0.000
Heating Plants	37493	23.957	37493	23.957
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	55090	35.202	55090	35.202
Lights	18544	11.849	18544	11.849
Electric Equipment	30405	19.428	30405	19.428
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	48949	31.277	48949	31.277
>>> GRAND TOTAL	104039	66.479	104039	66.479

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 1565 sqft
  Conditioned floor area.....: 1565 sqft

ANNUAL ENERGY COSTS

Building: 43083 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	663705 kWh	41017	0.456	29.9 %
Natural Gas	56680 Therm	25551	0.284	18.6 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		66568	0.740	48.6 %
Electric	1140066 kWh	70456	0.783	51.4 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		70456	0.783	51.4 %
>>> GRAND TOTAL		137025	1.523	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 89946 sqft
Conditioned floor area.....: 89946 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 43083
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

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HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	4715848	52.430
Heating Loads	4893895	54.409

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	1981255	22.027	1981255	22.027
Cooling Plants	234187	2.604	234187	2.604
Absorption Chillers	0	0.000	0	0.000
Heating Plants	5669405	63.031	5669405	63.031
Pumps	47739	0.531	47739	0.531
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	7932587	88.193	7932587	88.193
Lights	1201497	13.358	1201497	13.358
Electric Equipment	2688407	29.889	2688407	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	3889903	43.247	3889903	43.247
>>> GRAND TOTAL	11822490	131.440	11822490	131.440

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 89946 sqft
  Conditioned floor area.....: 89946 sqft

ANNUAL ENERGY COSTS

Building: 61701 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	145929 kWh	9018	0.183	33.7 %
Natural Gas	4173 Therm	1881	0.038	7.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		10900	0.221	40.7 %
Electric	257069 kWh	15887	0.322	59.3 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		15887	0.322	59.3 %
>>> GRAND TOTAL		26786	0.543	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 49288 sqft
  Conditioned floor area.....: 49288 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 61701
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	375479	7.618
Heating Loads	314713	6.385

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	396498	8.045	396498	8.045
Cooling Plants	92093	1.868	92093	1.868
Absorption Chillers	0	0.000	0	0.000
Heating Plants	417659	8.474	417659	8.474
Pumps	8945	0.181	8945	0.181
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	915195	18.568	915195	18.568
Lights	521108	10.573	521108	10.573
Electric Equipment	356012	7.223	356012	7.223
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	877120	17.796	877120	17.796
>>> GRAND TOTAL	1792315	36.364	1792315	36.364

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 49288 sqft
  Conditioned floor area.....: 49288 sqft

ANNUAL ENERGY COSTS

Building: 70525 (Wall Insulation)
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	121664 kWh	5852	0.160	21.7 %
Natural Gas	799 Therm	360	0.010	1.3 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0 Therm	0	0.000	0.0 %
>>> HVAC Subtotal		6212	0.170	23.0 %
Electric	431586 kWh	20759	0.569	77.0 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		20759	0.569	77.0 %
>>> GRAND TOTAL		26972	0.739	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 36478 sqft
  Conditioned floor area.....: 36478 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 70525 (Wall Insulation) 08-29-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	0	0.000
Heating Loads	51955	1.424

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	415080	11.379	415080	11.379
Cooling Plants	0	0.000	0	0.000
Absorption Chillers	0	0.000	0	0.000
Heating Plants	79970	2.192	79970	2.192
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	495050	13.571	495050	13.571
Lights	771347	21.146	771347	21.146
Electric Equipment	701224	19.223	701224	19.223
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	1472571	40.369	1472571	40.369
>>> GRAND TOTAL	1967621	53.940	1967621	53.940

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 36478 sqft
  Conditioned floor area.....: 36478 sqft

ANNUAL ENERGY COSTS

Building: 90312A
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06
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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	4021 kWh	193	0.553	66.7 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		193	0.553	66.7 %
Electric	2010 kWh	97	0.276	33.3 %
Natural Gas	0	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		97	0.276	33.3 %
>>> GRAND TOTAL		290	0.829	100.0 %

* Cost per unit floor area is based on the gross building floor area.
    Gross floor area.....: 350 sqft
    Conditioned floor area.....: 350 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 90312A
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	3988	11.394
Heating Loads	13291	37.975

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	0	0.000	0	0.000
Cooling Plants	2378	6.795	2378	6.795
Absorption Chillers	0	0.000	0	0.000
Heating Plants	11342	32.404	11342	32.404
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	13720	39.199	13720	39.199
Lights	3740	10.686	3740	10.686
Electric Equipment	3117	8.905	3117	8.905
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	6857	19.592	6857	19.592
>>> GRAND TOTAL	20577	58.791	20577	58.791

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 350 sqft
  Conditioned floor area.....: 350 sqft

ANNUAL ENERGY COSTS

Building: 91114 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	148436 kWh	7140	0.328	35.0 %
Natural Gas	8602 Therm	3878	0.178	19.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		11017	0.506	54.0 %
Electric	194777 kWh	9369	0.431	46.0 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		9369	0.431	46.0 %
>>> GRAND TOTAL		20386	0.937	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 21758 sqft
Conditioned floor area.....: 21758 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 91114 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	449118	20.641
Heating Loads	548143	25.192

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	373946	17.186	373946	17.186
Cooling Plants	132519	6.090	132519	6.090
Absorption Chillers	0	0.000	0	0.000
Heating Plants	860164	39.532	860164	39.532
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1366629	62.809	1366629	62.809
Lights	362497	16.660	362497	16.660
Electric Equipment	302081	13.883	302081	13.883
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	664579	30.544	664579	30.544
>>> GRAND TOTAL	2031207	93.353	2031207	93.353

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 21758 sqft
  Conditioned floor area.....: 21758 sqft

CARRIER HAP SIMULATIONS

COMBINATION OF RECOMMENDED INSULATION RETROFITS

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WALL TYPE 1: (CUSTOM WALL)

Description.....: 15544
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	4.16			12.80	4.1

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

****

ROOF TYPE 1: (CUSTOM ROOF)

Description.....: 15544
Absorptivity.....: 0.180

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustical Tile	0.38	18.0	0.14	1.89	0.6
R-30 (RSI-5.3) batt insulation	9.50	0.5	0.20	30.45	0.4
Airspace	26.50	0.0	0.00	0.91	0.0
1" batt insulation	1.00	2.0	0.22	7.00	0.2
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Outside surface resistance	-	-	-	0.33	-
Totals	37.41			41.27	2.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 3: (CUSTOM ROOF)

Description.....: 43083
Absorptivity.....: 0.340

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-30 (RSI-5.3) batt insulation	9.50	0.5	0.20	30.45	0.4
4-in (102 mm) LW concrete	2.50	40.0	0.20	2.08	8.3
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	13.00			34.44	13.5

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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WALL TYPE 2: (CUSTOM WALL)

Description.....: 20200 avg
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-11 (RSI-1.9) batt insulation	3.50	0.5	0.20	11.22	0.1
1-in (25 mm) stucco	1.00	116.0	0.20	0.20	9.7
Outside surface resistance	-	-	-	0.33	-
Totals	5.13			13.00	12.4

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

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ROOF TYPE 2: (CUSTOM ROOF)

Description.....: 20200
Absorptivity.....: 0.600

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-30 (RSI-5.3) batt insulation	9.50	0.5	0.20	30.45	0.4
Airspace	2.50	0.0	0.00	0.91	0.0
1/2-in (13 mm) plywood	0.50	34.0	0.29	0.62	1.4
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	13.50			33.89	6.6

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ANNUAL ENERGY COSTS

Building: 15544 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1
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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)*	% of Total
Electric	304291 kWh	18805	1.469	55.4 %
Natural Gas	4992 Therm	2250	0.176	6.6 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		21056	1.645	62.0 %
Electric	209011 kWh	12917	1.009	38.0 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		12917	1.009	38.0 %
>>> GRAND TOTAL		33973	2.654	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 12800 sqft
Conditioned floor area.....: 12800 sqft

COMBINED:
LOW-E ROOF COATING
WALL INSULATION
ROOF INSULATION

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 15544
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	2140008	167.188
Heating Loads	418640	32.706

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *---->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	295902	23.117	295902	23.117
Cooling Plants	556013	43.439	556013	43.439
Absorption Chillers	0	0.000	0	0.000
Heating Plants	500234	39.081	500234	39.081
Pumps	185313	14.478	185313	14.478
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	1537462	120.114	1537462	120.114
Lights	330566	25.825	330566	25.825
Electric Equipment	382581	29.889	382581	29.889
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	713146	55.715	713146	55.715
>>> GRAND TOTAL	2250608	175.829	2250608	175.829

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 12800 sqft
  Conditioned floor area.....: 12800 sqft

ANNUAL ENERGY COSTS

Building: 20200 w/roof&wall insulation 01-12-95
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy		<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	2508	kWh	155	0.099	14.6 %
Natural Gas	48	Therm	22	0.014	2.1 %
Fuel Oil	0		0	0.000	0.0 %
Propane	0		0	0.000	0.0 %
Remote Heating	0		0	0.000	0.0 %
Remote Cooling	0		0	0.000	0.0 %
>>> HVAC Subtotal			177	0.113	16.6 %
Electric	14346	kWh	887	0.567	83.4 %
Natural Gas	0	Therm	0	0.000	0.0 %
Fuel Oil	0		0	0.000	0.0 %
Propane	0		0	0.000	0.0 %
Remote Heating	0		0	0.000	0.0 %
>>> Non-HVAC Subtotal			887	0.567	83.4 %
>>> GRAND TOTAL			1063	0.680	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 1565 sqft
Conditioned floor area.....: 1565 sqft

ENERGY BUDGET BY SYSTEM COMPONENT

Building: 20200 w/roof&wall insulation
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

01-12-95
HAP v3.06

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TABLE 1. ANNUAL COIL LOADS

Component	(kBTU)	(kBTU/sqft)*
Cooling Loads	0	0.000
Heating Loads	3875	2.476

TABLE 2. ENERGY CONSUMPTION BY SYSTEM COMPONENT

	<----- Site Energy *----->		<---- Source Energy *--->	
Component	(kBTU)	(kBTU/sqft)*	(kBTU)	(kBTU/sqft)*
Air System Fans	8558	5.468	8558	5.468
Cooling Plants	0	0.000	0	0.000
Absorption Chillers	0	0.000	0	0.000
Heating Plants	4843	3.095	4843	3.095
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
>>> HVAC Total	13401	8.563	13401	8.563
Lights	18544	11.849	18544	11.849
Electric Equipment	30405	19.428	30405	19.428
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
>>> Non-HVAC Total	48949	31.277	48949	31.277
>>> GRAND TOTAL	62350	39.840	62350	39.840

* Site Energy is the actual energy consumed.
* Source Energy is the site energy divided by the electric generating efficiency of 100.0 %
* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 1565 sqft
  Conditioned floor area.....: 1565 sqft

ANNUAL ENERGY COSTS

Building: 43083 08-25-94
Weather: Fort Huachuca (El Paso TRY) HAP v3.06
Prepared by: Keller & Gannon Page 1 of 1

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TABLE 1. COSTS BY ENERGY CATEGORY

Component	Annual Energy	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Electric	613816 kWh	37934	0.422	28.6 %
Natural Gas	54091 Therm	24384	0.271	18.4 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
Remote Cooling	0	0	0.000	0.0 %
>>> HVAC Subtotal		62318	0.693	46.9 %
Electric	1140066 kWh	70456	0.783	53.1 %
Natural Gas	0 Therm	0	0.000	0.0 %
Fuel Oil	0	0	0.000	0.0 %
Propane	0	0	0.000	0.0 %
Remote Heating	0	0	0.000	0.0 %
>>> Non-HVAC Subtotal		70456	0.783	53.1 %
>>> GRAND TOTAL		132774	1.476	100.0 %

* Cost per unit floor area is based on the gross building floor area.
Gross floor area.....: 89946 sqft
Conditioned floor area.....: 89946 sqft

COMBINED.
LOW-E ROOF COATING
ROOF INSULATION

COMBINED ROOF
LOW-E AND ROOF INSULATION

ANNUAL COMPONENT COSTS

Building: 43083
Weather: Fort Huachuca (El Paso TRY)
Prepared by: Keller & Gannon

08-25-94
HAP v3.06

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TABLE 1. COSTS BY COMPONENT

Component	<---- Annual Costs ($)	($/sqft)* ----->	% of Total
Air System Fans	32738	0.364	24.7 %
Cooling Plants	4307	0.048	3.2 %
Absorption Chillers	0	0.000	0.0 %
Heating Plants	24408	0.271	18.4 %
Pumps	865	0.010	0.7 %
Cooling Towers	0	0.000	0.0 %
>>> HVAC Subtotal	62318	0.693	46.9 %
Lights	21762	0.242	16.4 %
Electric Equipment	48694	0.541	36.7 %
Miscellaneous Electric	0	0.000	0.0 %
Miscellaneous Fuel Use	0	0.000	0.0 %
>>> Non-HVAC Subtotal	70456	0.783	53.1 %
>>> GRAND TOTAL	132774	1.476	100.0 %

* Cost per unit floor area is based on the gross building floor area.
  Gross floor area.....: 89946 sqft
  Conditioned floor area.....: 89946 sqft

CARRIER HAP SIMULATIONS

INPUT DATA FOR BUILDING 56301

HVAC CONTROLS RETROFIT ANALYSES

****

GENERAL
Name.....: 56301 1 132
Floor Area.....: 159.2 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 25.4 ft
Slab Floor Area.....: 159.2 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	197.1	1	1	0	-	1	0	-	N
W	158.3	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	159.2	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
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****

GENERAL
Name.....: 56301 1 133
Floor Area.....: 150.8 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 13.3 ft
Slab Floor Area.....: 150.8 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	Qty	Shade	WINDOW Type	Qty	Shade	Any Doors?
N	186.6	1	1	3	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	Qty
HOR	-	150.8	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL

Name.....:	56301 1 131	
Floor Area.....:	100.8	sqft
Building Weight.:	70.0	lb/sqft
Windows Shaded..?	N	
Partitions Used.?	N	

LIGHTING

Overhead Fixture:	Recessed	
Lamp Wattage....:	1.02	W/sqft
Ballast Mult....:	1.00	
Task Lighting...:	0.00	W/sqft

PEOPLE

Occupancy.....:	2	People
Activity Level..:	Office Work	
Sensible.....:	245.0	BTU/hr
Latent.....:	205.0	BTU/hr

OTHER LOADS

Equipment.....:	1.00	W/sqft
Misc. Sensible..:	0.0	BTU/hr
Misc. Latent....:	0.0	BTU/hr

SCHEDULES

Lighting....:	56301
Task Lights.:	56301
People.....:	56301
Equipment...:	56301
Misc. Sens..:	56301
Misc. Latent:	56301

INFILTRATION

Cooling.....:	0.00	CFM/sqft
Heating.....:	0.00	CFM/sqft
Typical.....:	0.00	CFM/sqft
When Fan On.?	N	

FLOOR

Type.....:	Slab On Grade	
Perimeter.....:	12.1	ft
Slab Floor Area.....:	100.8	sqft
Floor R-Value.....:	0.50	
Insulation R-value....:	7.00	

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
W	169.0	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	100.2	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
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****

GENERAL
Name.....: 56301 1 130
Floor Area.....: 1030.6 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 5 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 27.4 ft
Slab Floor Area.....: 1030.6 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	133.0	1	1	2	-	1	0	-	N
W	250.6	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1030.6	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
HAP v3.06

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Page 1

****

GENERAL
Name.....: 56301 1 151
Floor Area.....: 83.5 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 83.5 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	83.5	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
HAP v3.06

****

GENERAL
Name.....: 56301 1 134
Floor Area.....: 2001.7 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 5 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 36.6 ft
Slab Floor Area.....: 2001.7 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	512.4	1	1	1	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	2001.7	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
HAP v3.06

08-29-94
Page 1

****

GENERAL
 Name.....: 56301 1 135
 Floor Area.....: 186.1 sqft
 Building Weight.: 70.0 lb/sqft
 Windows Shaded..? N
 Partitions Used.? N

LIGHTING
 Overhead Fixture: Recessed
 Lamp Wattage....: 1.02 W/sqft
 Ballast Mult....: 1.00
 Task Lighting...: 0.00 W/sqft

PEOPLE
 Occupancy.....: 2 People
 Activity Level..: Office Work
 Sensible.....: 245.0 BTU/hr
 Latent.....: 205.0 BTU/hr

OTHER LOADS
 Equipment.....: 1.00 W/sqft
 Misc. Sensible..: 0.0 BTU/hr
 Misc. Latent....: 0.0 BTU/hr

SCHEDULES
 Lighting....: 56301
 Task Lights.: 56301
 People.....: 56301
 Equipment...: 56301
 Misc. Sens..: 56301
 Misc. Latent: 56301

INFILTRATION
 Cooling.....: 0.00 CFM/sqft
 Heating.....: 0.00 CFM/sqft
 Typical.....: 0.00 CFM/sqft
 When Fan On.? N

FLOOR
 Type.....:Slab On Grade
 Perimeter.....: 16.5 ft
 Slab Floor Area.....: 186.1 sqft
 Floor R-Value.....: 0.50
 Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	230.3	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	186.1	1	1	0

No partition data for this space.

****

GENERAL
Name.....: 56301 1 150A
Floor Area.....: 803.5 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 6.3 ft
Slab Floor Area.....: 803.5 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
W	88.1	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	803.5	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 1 128
Floor Area.....: 160.5 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 11.8 ft
Slab Floor Area.....: 160.5 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
W	165.5	1	1	2	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	160.5	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 1 129
Floor Area.....: 184.4 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 13.6 ft
Slab Floor Area.....: 184.4 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	Qty	Shade	WINDOW Type	Qty	Shade	Any Doors?
W	190.1	1	1	3	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	Qty
HOR	-	184.4	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 1 126
Floor Area.....: 2293.5 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? Y

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 8 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 10.8 ft
Slab Floor Area.....: 2293.5 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
W	151.2	1	1	2	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	2293.5	1	1	0

PARTITION LOADS	Type 1	Type 2
Type.....	Partition	Ceiling
Area.....	341.5 sqft	0.0 sqft
U-value.....	0.080 BTU/hr/sqft/F	0.500 BTU/hr/sqft/F
Maximum Space Temp....:	75.0 F	75.0 F
Outside Air Temp @ Max:	55.0 F	55.0 F
Minimum Space Temp....:	75.0 F	75.0 F
Outside Air Temp @ Min:	54.0 F	54.0 F

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****

GENERAL
Name.....: 56301 1 127
Floor Area.....: 236.8 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 236.8 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	236.8	1	1	0

No partition data for this space.

****

GENERAL
Name.....: 56301 1 121
Floor Area.....: 1891.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? Y

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 5 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 20.9 ft
Slab Floor Area.....: 1891.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	292.6	1	1	5	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1891.0	1	1	0

PARTITION LOADS	Type 1	Type 2
Type.....	Partition	Ceiling
Area.....	668.8 sqft	0.0 sqft
U-value.....	0.080 BTU/hr/sqft/F	0.010 BTU/hr/sqft/F
Maximum Space Temp....:	75.0 F	75.0 F
Outside Air Temp @ Max:	55.0 F	55.0 F
Minimum Space Temp....:	74.0 F	74.0 F
Outside Air Temp @ Min:	54.0 F	54.0 F

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****

GENERAL
Name.....: 56301 1 123
Floor Area.....: 174.1 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 12.8 ft
Slab Floor Area.....: 174.1 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	179.5	1	1	3	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	174.1	1	1	0

No partition data for this space.

****

GENERAL
- Name.....: 56301 1 122
- Floor Area.....: 181.0 sqft
- Building Weight.: 70.0 lb/sqft
- Windows Shaded..? N
- Partitions Used.? N

LIGHTING
- Overhead Fixture: Recessed
- Lamp Wattage....: 1.02 W/sqft
- Ballast Mult....: 1.00
- Task Lighting...: 0.00 W/sqft

PEOPLE
- Occupancy.....: 2 People
- Activity Level..: Office Work
- Sensible.....: 245.0 BTU/hr
- Latent.....: 205.0 BTU/hr

OTHER LOADS
- Equipment.....: 1.00 W/sqft
- Misc. Sensible..: 0.0 BTU/hr
- Misc. Latent....: 0.0 BTU/hr

SCHEDULES
- Lighting....: 56301
- Task Lights.: 56301
- People.....: 56301
- Equipment...: 56301
- Misc. Sens..: 56301
- Misc. Latent: 56301

INFILTRATION
- Cooling.....: 0.00 CFM/sqft
- Heating.....: 0.00 CFM/sqft
- Typical.....: 0.00 CFM/sqft
- When Fan On.? N

FLOOR
- Type.....:Slab On Grade
- Perimeter.....: 13.3 ft
- Slab Floor Area.....: 181.0 sqft
- Floor R-Value.....: 0.50
- Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	186.6	1	1	3	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	181.0	1	1	0

No partition data for this space.

****

GENERAL
Name.....: 56301 2 136
Floor Area.....: 186.1 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 16.5 ft
Slab Floor Area.....: 186.1 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	186.1	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	186.1	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 2 137
Floor Area.....: 1953.8 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 5 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 42.9 ft
Slab Floor Area.....: 1953.8 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	600.6	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1953.8	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 2 152
Floor Area.....: 614.8 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 10 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 614.8 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	614.8	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 2 150B
Floor Area.....: 468.2 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 468.2 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	468.2	1	1	0

No partition data for this space.

****

GENERAL

Name.....:	56301 2 143	
Floor Area.....:	581.9	sqft
Building Weight.:	70.0	lb/sqft
Windows Shaded..?	N	
Partitions Used.?	N	

LIGHTING

Overhead Fixture:	Recessed	
Lamp Wattage....:	1.02	W/sqft
Ballast Mult....:	1.00	
Task Lighting...:	0.00	W/sqft

PEOPLE

Occupancy.....:	3	People
Activity Level..:	Office Work	
Sensible.....:	245.0	BTU/hr
Latent.....:	205.0	BTU/hr

OTHER LOADS

Equipment.....:	1.00	W/sqft
Misc. Sensible..:	0.0	BTU/hr
Misc. Latent....:	0.0	BTU/hr

SCHEDULES

Lighting....:	56301
Task Lights.:	56301
People.....:	56301
Equipment...:	56301
Misc. Sens..:	56301
Misc. Latent:	56301

INFILTRATION

Cooling.....:	0.00	CFM/sqft
Heating.....:	0.00	CFM/sqft
Typical.....:	0.00	CFM/sqft
When Fan On.?	N	

FLOOR

Type.....:	Slab On Grade	
Perimeter.....:	0.0	ft
Slab Floor Area.....:	581.9	sqft
Floor R-Value.....:	0.50	
Insulation R-value....:	7.00	

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	581.9	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 2 144
Floor Area.....: 581.9 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 3 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 581.9 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	581.9	1	1	0

No partition data for this space.

****

GENERAL
Name.....: 56301 2 145
Floor Area.....: 581.9 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 3 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 581.9 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

==========

No external wall or window data for this space.

==========

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	581.9	1	1	0

==========

No partition data for this space.

==========

****

GENERAL
Name.....: 56301 2 146
Floor Area.....: 245.9 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 245.9 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	245.9	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 2 111A
Floor Area.....: 406.3 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 406.3 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	406.3	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 2 118
Floor Area.....: 1591.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 6 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 12.1 ft
Slab Floor Area.....: 1591.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	169.4	1	1	3	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1591.0	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
 Name.....: 56301 2 120
 Floor Area.....: 232.2 sqft
 Building Weight.: 70.0 lb/sqft
 Windows Shaded..? N
 Partitions Used.? N

LIGHTING
 Overhead Fixture: Recessed
 Lamp Wattage....: 1.02 W/sqft
 Ballast Mult....: 1.00
 Task Lighting...: 0.00 W/sqft

PEOPLE
 Occupancy.....: 2 People
 Activity Level..: Office Work
 Sensible.....: 245.0 BTU/hr
 Latent.....: 205.0 BTU/hr

OTHER LOADS
 Equipment.....: 1.00 W/sqft
 Misc. Sensible..: 0.0 BTU/hr
 Misc. Latent....: 0.0 BTU/hr

SCHEDULES
 Lighting....: 56301
 Task Lights.: 56301
 People.....: 56301
 Equipment...: 56301
 Misc. Sens..: 56301
 Misc. Latent: 56301

INFILTRATION
 Cooling.....: 0.00 CFM/sqft
 Heating.....: 0.00 CFM/sqft
 Typical.....: 0.00 CFM/sqft
 When Fan On.? N

FLOOR
 Type.....:Slab On Grade
 Perimeter.....: 17.1 ft
 Slab Floor Area.....: 232.2 sqft
 Floor R-Value.....: 0.50
 Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	239.4	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	232.2	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 2 119
Floor Area.....: 170.7 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 12.6 ft
Slab Floor Area.....: 170.7 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	176.0	1	1	2	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	170.7	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 2 115
Floor Area.....: 1779.7 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 6 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 17.1 ft
Slab Floor Area.....: 1779.7 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	239.4	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1779.7	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 2 117
Floor Area.....: 163.9 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 12.1 ft
Slab Floor Area.....: 163.9 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	169.0	1	1	1	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	163.9	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 2 116
Floor Area.....: 218.5 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 16.1 ft
Slab Floor Area.....: 218.5 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	225.3	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	218.5	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 3 138
Floor Area.....: 1642.9 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 6 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 34.9 ft
Slab Floor Area.....: 1642.9 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	488.6	1	1	5	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1642.9	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 3 139
Floor Area.....: 216.8 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 17.6 ft
Slab Floor Area.....: 216.8 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	246.4	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	216.8	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 3 141
Floor Area.....: 260.2 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 21.1 ft
Slab Floor Area.....: 260.2 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	295.7	1	1	5	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	260.2	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 3 140
Floor Area.....: 1087.9 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 6 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 52.8 ft
Slab Floor Area.....: 1087.9 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
N	162.4	1	1	0	-	1	0	-	N
E	577.4	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1087.9	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 3 150C
Floor Area.....: 441.3 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 6.3 ft
Slab Floor Area.....: 441.3 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
E	88.1	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	441.3	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL

Name.....:	56301 3 148	
Floor Area.....:	216.2	sqft
Building Weight.:	70.0	lb/sqft
Windows Shaded..?	N	
Partitions Used.?	N	

LIGHTING

Overhead Fixture:	Recessed	
Lamp Wattage....:	1.02	W/sqft
Ballast Mult....:	1.00	
Task Lighting...:	0.00	W/sqft

PEOPLE

Occupancy.....:	0	People
Activity Level..:	Seated at Rest	
Sensible.....:	230.0	BTU/hr
Latent.....:	120.0	BTU/hr

OTHER LOADS

Equipment.....:	0.00	W/sqft
Misc. Sensible..:	0.0	BTU/hr
Misc. Latent....:	0.0	BTU/hr

SCHEDULES

Lighting....:	56301
Task Lights.:	56301
People.....:	56301
Equipment...:	56301
Misc. Sens..:	56301
Misc. Latent:	56301

INFILTRATION

Cooling.....:	0.00	CFM/sqft
Heating.....:	0.00	CFM/sqft
Typical.....:	0.00	CFM/sqft
When Fan On.?	N	

FLOOR

Type.....:	Slab On Grade	
Perimeter.....:	0.0	ft
Slab Floor Area.....:	216.2	sqft
Floor R-Value.....:	0.50	
Insulation R-value....:	7.00	

==========

No external wall or window data for this space.

==========

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	216.2	1	1	0

==========

No partition data for this space.

==========

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 3 149
Floor Area.....: 119.4 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Seated at Rest
Sensible.....: 230.0 BTU/hr
Latent.....: 120.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 119.4 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

==========

No external wall or window data for this space.

==========

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	119.4	1	1	0

==========

No partition data for this space.

==========

SPACE DESCRIPTION

Prepared by: Keller & Gannon
HAP v3.06

****

GENERAL
Name.....: 56301 3 147
Floor Area.....: 324.3 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Seated at Rest
Sensible.....: 230.0 BTU/hr
Latent.....: 120.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 324.3 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	324.3	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon

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****

GENERAL

Name.....:	56301 3 153	
Floor Area.....:	1026.4	sqft
Building Weight.:	70.0	lb/sqft
Windows Shaded..?	N	
Partitions Used.?	N	

LIGHTING

Overhead Fixture:	Recessed	
Lamp Wattage....:	1.02	W/sqft
Ballast Mult....:	1.00	
Task Lighting...:	0.00	W/sqft

PEOPLE

Occupancy.....:	6	People
Activity Level..:	Office Work	
Sensible.....:	245.0	BTU/hr
Latent.....:	205.0	BTU/hr

OTHER LOADS

Equipment.....:	0.00	W/sqft
Misc. Sensible..:	0.0	BTU/hr
Misc. Latent....:	0.0	BTU/hr

SCHEDULES

Lighting....:	56301
Task Lights.:	56301
People.....:	56301
Equipment...:	56301
Misc. Sens..:	56301
Misc. Latent:	56301

INFILTRATION

Cooling.....:	0.00	CFM/sqft
Heating.....:	0.00	CFM/sqft
Typical.....:	0.00	CFM/sqft
When Fan On.?	N	

FLOOR

Type.....:	Slab On Grade	
Perimeter.....:	0.0	ft
Slab Floor Area.....:	1026.4	sqft
Floor R-Value.....:	0.50	
Insulation R-value....:	7.00	

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1026.4	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
HAP v3.06

****

GENERAL
Name.....: 56301 3 154
Floor Area.....: 879.8 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 5 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 29.2 ft
Slab Floor Area.....: 879.8 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
E	408.2	1	1	3	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	879.8	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
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****

GENERAL
Name.....: 56301 3 111B
Floor Area.....: 426.8 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 426.8 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	426.8	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
HAP v3.06

****

GENERAL
Name.....: 56301 3 112
Floor Area.....: 1272.2 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 6 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 1272.2 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	1272.2	1	1	0

No partition data for this space.

SPACE DESCRIPTION

Prepared by: Keller & Gannon
HAP v3.06

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****

GENERAL
- Name.....: 56301 3 114
- Floor Area.....: 235.6 sqft
- Building Weight.: 70.0 lb/sqft
- Windows Shaded..? N
- Partitions Used.? N

LIGHTING
- Overhead Fixture: Recessed
- Lamp Wattage....: 1.02 W/sqft
- Ballast Mult....: 1.00
- Task Lighting...: 0.00 W/sqft

PEOPLE
- Occupancy.....: 2 People
- Activity Level..: Office Work
- Sensible.....: 245.0 BTU/hr
- Latent.....: 205.0 BTU/hr

OTHER LOADS
- Equipment.....: 1.00 W/sqft
- Misc. Sensible..: 0.0 BTU/hr
- Misc. Latent....: 0.0 BTU/hr

SCHEDULES
- Lighting....: 56301
- Task Lights.: 56301
- People.....: 56301
- Equipment...: 56301
- Misc. Sens..: 56301
- Misc. Latent: 56301

INFILTRATION
- Cooling.....: 0.00 CFM/sqft
- Heating.....: 0.00 CFM/sqft
- Typical.....: 0.00 CFM/sqft
- When Fan On.? N

FLOOR
- Type.....:Slab On Grade
- Perimeter.....: 17.4 ft
- Slab Floor Area.....: 235.6 sqft
- Floor R-Value.....: 0.50
- Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	242.9	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	235.6	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
- Name.....: 56301 3 113
- Floor Area.....: 269.7 sqft
- Building Weight.: 70.0 lb/sqft
- Windows Shaded..? N
- Partitions Used.? N

LIGHTING
- Overhead Fixture: Recessed
- Lamp Wattage....: 1.02 W/sqft
- Ballast Mult....: 1.00
- Task Lighting...: 0.00 W/sqft

PEOPLE
- Occupancy.....: 2 People
- Activity Level..: Office Work
- Sensible.....: 245.0 BTU/hr
- Latent.....: 205.0 BTU/hr

OTHER LOADS
- Equipment.....: 1.00 W/sqft
- Misc. Sensible..: 0.0 BTU/hr
- Misc. Latent....: 0.0 BTU/hr

SCHEDULES
- Lighting....: 56301
- Task Lights.: 56301
- People.....: 56301
- Equipment...: 56301
- Misc. Sens..: 56301
- Misc. Latent: 56301

INFILTRATION
- Cooling.....: 0.00 CFM/sqft
- Heating.....: 0.00 CFM/sqft
- Typical.....: 0.00 CFM/sqft
- When Fan On.? N

FLOOR
- Type.....:Slab On Grade
- Perimeter.....: 19.9 ft
- Slab Floor Area.....: 269.7 sqft
- Floor R-Value.....: 0.50
- Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	278.0	1	1	2	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	269.7	1	1	0

No partition data for this space.

****

GENERAL
Name.....: 56301 3 107
Floor Area.....: 380.6 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 380.6 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	380.6	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 3 102
Floor Area.....: 175.9 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 175.9 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	175.9	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 3 101
Floor Area.....: 170.7 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 12.6 ft
Slab Floor Area.....: 170.7 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	Qty	Shade	WINDOW Type	Qty	Shade	Any Doors?
S	176.0	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	Qty
HOR	-	170.7	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 3 103
Floor Area.....: 113.3 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 113.3 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

No external wall or window data for this space.

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	113.3	1	1	0

No partition data for this space.

****

GENERAL
Name.....: 56301 3 106
Floor Area.....: 123.0 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 0 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 0.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 0.0 ft
Slab Floor Area.....: 123.0 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

==========

No external wall or window data for this space.

==========

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	123.0	1	1	0

==========

No partition data for this space.

==========

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****

GENERAL
Name.....: 56301 3 104
Floor Area.....: 210.3 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 13.1 ft
Slab Floor Area.....: 210.3 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
S	183.0	1	1	3	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	210.3	1	1	0

No partition data for this space.

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****

GENERAL
Name.....: 56301 3 109
Floor Area.....: 108.7 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 16.3 ft
Slab Floor Area.....: 108.7 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
E	228.8	1	1	3	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	108.7	1	1	0

No partition data for this space.

SPACE DESCRIPTION

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****

GENERAL
Name.....: 56301 3 108
Floor Area.....: 194.7 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 17.6 ft
Slab Floor Area.....: 194.7 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
E	246.4	1	1	4	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	194.7	1	1	0

No partition data for this space.

****

GENERAL
Name.....: 56301 3 105
Floor Area.....: 222.5 sqft
Building Weight.: 70.0 lb/sqft
Windows Shaded..? N
Partitions Used.? N

LIGHTING
Overhead Fixture: Recessed
Lamp Wattage....: 1.02 W/sqft
Ballast Mult....: 1.00
Task Lighting...: 0.00 W/sqft

PEOPLE
Occupancy.....: 2 People
Activity Level..: Office Work
Sensible.....: 245.0 BTU/hr
Latent.....: 205.0 BTU/hr

OTHER LOADS
Equipment.....: 1.00 W/sqft
Misc. Sensible..: 0.0 BTU/hr
Misc. Latent....: 0.0 BTU/hr

SCHEDULES
Lighting....: 56301
Task Lights.: 56301
People.....: 56301
Equipment...: 56301
Misc. Sens..: 56301
Misc. Latent: 56301

INFILTRATION
Cooling.....: 0.00 CFM/sqft
Heating.....: 0.00 CFM/sqft
Typical.....: 0.00 CFM/sqft
When Fan On.? N

FLOOR
Type.....:Slab On Grade
Perimeter.....: 31.2 ft
Slab Floor Area.....: 222.5 sqft
Floor R-Value.....: 0.50
Insulation R-value....: 7.00

WALL Exp	Gross Area (sqft)	WALL Type	WINDOW Type	WINDOW Qty	WINDOW Shade	WINDOW Type	WINDOW Qty	WINDOW Shade	Any Doors?
E	281.7	1	1	2	-	1	0	-	N
S	154.8	1	1	0	-	1	0	-	N

ROOF Exp	Slope (deg)	Gross Area (sqft)	ROOF Type	SKYLIGHT Type	SKYLIGHT Qty
HOR	-	222.5	1	1	0

No partition data for this space.

****

WALL TYPE 1: (CUSTOM WALL)

Description.....: 56301
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
5/8-in (16 mm) gypsum board	0.63	50.0	0.26	0.56	2.6
R-14 (RSI-2.5) board insulation	1.50	2.0	0.22	10.42	0.3
8-in (203 mm) LW concrete block	8.00	38.0	0.20	2.02	25.3
Outside surface resistance	-	-	-	0.33	-
Totals	10.13			14.01	28.2

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

****

ROOF TYPE 1: (CUSTOM ROOF)

Description.....: 56301
Absorptivity.....: 0.900

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustic Ceiling Tiles	0.75	34.0	0.29	0.33	2.1
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Airspace	0.00	0.0	0.00	0.91	0.0
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	1.16			2.59	5.7

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

ROOF TYPE 2: (CUSTOM ROOF)

Description.....: 56301 w/ "Low-e" Coating
Absorptivity.....: 0.340

Layer Description	Thickness	Density	Spec.Ht	R-Val	Weight
Inside surface resistance	-	-	-	0.69	-
Acoustic Ceiling Tiles	0.75	34.0	0.29	0.33	2.1
22 gage steel deck	0.03	489.0	0.12	0.00	1.4
Airspace	0.00	0.0	0.00	0.91	0.0
Built-up roofing	0.38	70.0	0.35	0.33	2.2
Outside surface resistance	-	-	-	0.33	-
Totals	1.16			2.59	5.7

Thickness: in Density: lb/cuft Weight: lb/sqft
R-value : (hr-sqft-F)/BTU Specific Heat: BTU/lb/F

****

WINDOW TYPE 1: (CUSTOM WINDOW)

Window Description.....:	56301	
Height.....:	4.00	ft
Width.....:	4.00	ft
Frame Type.....:	Aluminum with thermal breaks	
Interior Shade Type....:	Drapes - Semi-Open Weave - Light	
Glass Transmissivity...:	0.500	
Number of Pane(s).....:	2	
Pane 1 Absorptivity....:	0.030	
Pane 2 Absorptivity....:	0.030	
Center of Glass U-value:	0.380	BTU/hr/sqft/F
Overall U-value.....:	0.434	BTU/hr/sqft/F
Overall Shade Coeff....:	0.426	

AIR SYSTEM INPUT DATA

Name: 53601 A
Type: CONSTANT VOLUME - Multizone
Prepared by: Keller & Gannon

08-25-94
HAP v3.06
Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 A
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 4

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Not Used
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 B — 08-25-94
Type: CONSTANT VOLUME - Multizone — HAP v3.06
Prepared by: Keller & Gannon — Page 1

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1. SYSTEM NAME AND TYPE

Name.....: 53601 B
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 6

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2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Not Used
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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3. ZONE DATA

ZONE	1	2	3	4
T-Stat Occupied Cooling....(F):	75.0	75.0	75.0	75.0
Unoccupied Cooling..(F):	75.0	75.0	75.0	75.0
Occupied Heating....(F):	70.0	70.0	70.0	70.0
Unoccupied Heating..(F):	70.0	70.0	70.0	70.0
Throttling Range....(F):	3.0	3.0	3.0	3.0
Zone Heating Unit Type.....:	None	None	None	None
Trip Temperature.....(F):	-	-	-	-
Design Supply Temperature(F):	-	-	-	-
Fan Total Static....(in.wg.):	-	-	-	-
Fan Efficiency.....(%):	-	-	-	-
Zone Terminal Type.....:	CAV MBox	CAV MBox	CAV MBox	CAV MBox
Reheat Coil.....?	N	N	N	N
Diversity Factor.....(%):	100	100	100	100
Direct Exhaust Airflow...(CFM):	1000.0	0.0	0.0	0.0
Direct Exhaust Fan kW.....(kW):	0.2	0.0	0.0	0.0

ZONE	5	6
T-Stat Occupied Cooling....(F):	75.0	75.0
Unoccupied Cooling..(F):	75.0	75.0
Occupied Heating....(F):	70.0	70.0
Unoccupied Heating..(F):	70.0	70.0
Throttling Range....(F):	3.0	3.0
Zone Heating Unit Type.....:	None	None
Trip Temperature.....(F):	-	-
Design Supply Temperature(F):	-	-
Fan Total Static....(in.wg.):	-	-
Fan Efficiency.....(%):	-	-
Zone Terminal Type.....:	CAV MBox	CAV MBox
Reheat Coil.....?	N	N
Diversity Factor.....(%):	100	100
Direct Exhaust Airflow...(CFM):	0.0	0.0
Direct Exhaust Fan kW.....(kW):	0.0	0.0

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 C 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 C
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 6

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Not Used
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	None
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	75.0	
Unoccupied Cooling..(F):	75.0	
Occupied Heating....(F):	70.0	
Unoccupied Heating..(F):	70.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weekday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sunday.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 AH-1 (Controls) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-1 (Controls)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 4

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Not Used
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Non-Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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AIR SYSTEM INPUT DATA

Name: 53601 AH-1 (Controls) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	77.0	
Unoccupied Cooling..(F):	90.0	
Occupied Heating....(F):	68.0	
Unoccupied Heating..(F):	65.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X						
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X						

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 AH-2 (Controls) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-2 (Controls)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 6

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Not Used
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Non-Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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3. ZONE DATA

ZONE	1	2	3	4
T-Stat Occupied Cooling....(F):	77.0	77.0	77.0	77.0
Unoccupied Cooling..(F):	90.0	90.0	90.0	90.0
Occupied Heating....(F):	68.0	68.0	68.0	68.0
Unoccupied Heating..(F):	65.0	65.0	65.0	65.0
Throttling Range....(F):	3.0	3.0	3.0	3.0
Zone Heating Unit Type.....:	None	None	None	None
Trip Temperature.....(F):	-	-	-	-
Design Supply Temperature(F):	-	-	-	-
Fan Total Static....(in.wg.):	-	-	-	-
Fan Efficiency.....(%):	-	-	-	-
Zone Terminal Type.....:	CAV MBox	CAV MBox	CAV MBox	CAV MBox
Reheat Coil.....?	N	N	N	N
Diversity Factor.....(%):	100	100	100	100
Direct Exhaust Airflow...(CFM):	1000.0	0.0	0.0	0.0
Direct Exhaust Fan kW.....(kW):	0.2	0.2	0.2	0.2

ZONE	5	6
T-Stat Occupied Cooling....(F):	77.0	77.0
Unoccupied Cooling..(F):	90.0	90.0
Occupied Heating....(F):	68.0	68.0
Unoccupied Heating..(F):	65.0	65.0
Throttling Range....(F):	3.0	3.0
Zone Heating Unit Type.....:	None	None
Trip Temperature.....(F):	-	-
Design Supply Temperature(F):	-	-
Fan Total Static....(in.wg.):	-	-
Fan Efficiency.....(%):	-	-
Zone Terminal Type.....:	CAV MBox	CAV MBox
Reheat Coil.....?	N	N
Diversity Factor.....(%):	100	100
Direct Exhaust Airflow...(CFM):	0.0	0.0
Direct Exhaust Fan kW.....(kW):	0.2	0.2

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X						
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X						

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 AH-3 (Controls) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-3 (Controls)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 6

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Not Used
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Not Used
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Non-Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	77.0	
Unoccupied Cooling..(F):	90.0	
Occupied Heating....(F):	68.0	
Unoccupied Heating..(F):	65.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X						
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X						

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 AH-1 (Controls 2) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-1 (Controls 2)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 4

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	60.0 F
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Greatest Demand
Minimum Reset Temperature.....:	85.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

==========

AIR SYSTEM INPUT DATA

Name: 53601 AH-1 (Controls 2) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	77.0	
Unoccupied Cooling..(F):	90.0	
Occupied Heating....(F):	68.0	
Unoccupied Heating..(F):	65.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X						
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X						

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 AH-2 (Controls 2) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-2 (Controls 2)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 6

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	60.0 F
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Greatest Demand
Minimum Reset Temperature.....:	86.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

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AIR SYSTEM INPUT DATA

Name: 53601 AH-2 (Controls 2)
Type: CONSTANT VOLUME - Multizone
Prepared by: Keller & Gannon

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Page

****

3. ZONE DATA

ZONE	1	2	3	4
T-Stat Occupied Cooling....(F):	77.0	77.0	77.0	77.0
Unoccupied Cooling..(F):	90.0	90.0	90.0	90.0
Occupied Heating....(F):	68.0	68.0	68.0	68.0
Unoccupied Heating..(F):	65.0	65.0	65.0	65.0
Throttling Range....(F):	3.0	3.0	3.0	3.0
Zone Heating Unit Type.....:	None	None	None	None
Trip Temperature.....(F):	-	-	-	-
Design Supply Temperature(F):	-	-	-	-
Fan Total Static....(in.wg.):	-	-	-	-
Fan Efficiency.....(%):	-	-	-	-
Zone Terminal Type.....:	CAV MBox	CAV MBox	CAV MBox	CAV MBox
Reheat Coil.....?	N	N	N	N
Diversity Factor.....(%):	100	100	100	100
Direct Exhaust Airflow...(CFM):	1000.0	0.0	0.0	0.0
Direct Exhaust Fan kW.....(kW):	0.2	0.2	0.2	0.2

ZONE	5	6
T-Stat Occupied Cooling....(F):	77.0	77.0
Unoccupied Cooling..(F):	90.0	90.0
Occupied Heating....(F):	68.0	68.0
Unoccupied Heating..(F):	65.0	65.0
Throttling Range....(F):	3.0	3.0
Zone Heating Unit Type.....:	None	None
Trip Temperature.....(F):	-	-
Design Supply Temperature(F):	-	-
Fan Total Static....(in.wg.):	-	-
Fan Efficiency.....(%):	-	-
Zone Terminal Type.....:	CAV MBox	CAV MBox
Reheat Coil.....?	N	N
Diversity Factor.....(%):	100	100
Direct Exhaust Airflow...(CFM):	0.0	0.0
Direct Exhaust Fan kW.....(kW):	0.2	0.2

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X						
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X						

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 AH-3 (Controls 2) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-3 (Controls 2)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 6

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Greatest Demand
Maximum Reset Temperature.....:	60.0 F
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Greatest Demand
Minimum Reset Temperature.....:	86.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %
Heating Factor.....:	5 %

==========

3. ZONE DATA

ZONE	1 (All Zones the Same)
T-Stat Occupied Cooling....(F):	77.0
Unoccupied Cooling..(F):	90.0
Occupied Heating....(F):	68.0
Unoccupied Heating..(F):	65.0
Throttling Range....(F):	3.0
Zone Heating Unit Type.....:	None
Trip Temperature.....(F):	-
Design Supply Temperature(F):	-
Fan Total Static....(in.wg.):	-
Fan Efficiency.....(%):	-
Zone Terminal Type.....:	CAV MBox
Reheat Coil.....?	N
Diversity Factor.....(%):	100
Direct Exhaust Airflow...(CFM):	0.0
Direct Exhaust Fan kW.....(kW):	0.0

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X						
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X						

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 AH-1 (Controls 3) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-1 (Controls 3)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 4

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Outdoor Air
Maximum Reset Temperature.....:	60.0 F
OA Temp For Min Supply.....:	92.0 F
OA Temp For Max Supply.....:	28.0 F
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Outdoor Air
Minimum Reset Temperature.....:	85.0 F
OA Temp For Min Supply.....:	62.0 F
OA Temp For Max Supply.....:	10.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %

Heating Factor.....: 5 %

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	77.0	
Unoccupied Cooling..(F):	90.0	
Occupied Heating....(F):	68.0	
Unoccupied Heating..(F):	65.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X						
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X						

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

AIR SYSTEM INPUT DATA

Name: 53601 AH-2 (Controls 3) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-2 (Controls 3)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 6

==========

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Outdoor Air
Maximum Reset Temperature.....:	60.0 F
OA Temp For Min Supply.....:	95.0 F
OA Temp For Max Supply.....:	30.0 F
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Outdoor Air
Minimum Reset Temperature.....:	86.0 F
OA Temp For Min Supply.....:	62.0 F
OA Temp For Max Supply.....:	10.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %

3. ZONE DATA

ZONE	1	2	3	4
T-Stat Occupied Cooling....(F):	77.0	77.0	77.0	77.0
Unoccupied Cooling..(F):	90.0	90.0	90.0	90.0
Occupied Heating....(F):	68.0	68.0	68.0	68.0
Unoccupied Heating..(F):	65.0	65.0	65.0	65.0
Throttling Range....(F):	3.0	3.0	3.0	3.0
Zone Heating Unit Type.....:	None	None	None	None
Trip Temperature.....(F):	-	-	-	-
Design Supply Temperature(F):	-	-	-	-
Fan Total Static....(in.wg.):	-	-	-	-
Fan Efficiency.....(%):	-	-	-	-
Zone Terminal Type.....:	CAV MBox	CAV MBox	CAV MBox	CAV MBox
Reheat Coil.....?	N	N	N	N
Diversity Factor.....(%):	100	100	100	100
Direct Exhaust Airflow...(CFM):	1000.0	0.0	0.0	0.0
Direct Exhaust Fan kW.....(kW):	0.2	0.2	0.2	0.2

ZONE	5	6
T-Stat Occupied Cooling....(F):	77.0	77.0
Unoccupied Cooling..(F):	90.0	90.0
Occupied Heating....(F):	68.0	68.0
Unoccupied Heating..(F):	65.0	65.0
Throttling Range....(F):	3.0	3.0
Zone Heating Unit Type.....:	None	None
Trip Temperature.....(F):	-	-
Design Supply Temperature(F):	-	-
Fan Total Static....(in.wg.):	-	-
Fan Efficiency.....(%):	-	-
Zone Terminal Type.....:	CAV MBox	CAV MBox
Reheat Coil.....?	N	N
Diversity Factor.....(%):	100	100
Direct Exhaust Airflow...(CFM):	0.0	0.0
Direct Exhaust Fan kW.....(kW):	0.2	0.2

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X	X	X				

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

1. SYSTEM NAME AND TYPE

Name.....: 53601 AH-3 (Controls 3)
Type.....: CONSTANT VOLUME - Multizone
Number of Zones.: 6

2. SYSTEM DESCRIPTION

COOLING SYSTEM DATA	
Cold Deck Temperature.....:	55.0 F
Coil Bypass Factor.....:	0.100
Cold Deck Reset.....:	Outdoor Air
Maximum Reset Temperature.....:	60.0 F
OA Temp For Min Supply.....:	95.0 F
OA Temp For Max Supply.....:	30.0 F
HEATING SYSTEM DATA	
Hot Deck Temperature.....:	89.0 F
Hot Deck Reset.....:	Outdoor Air
Minimum Reset Temperature.....:	86.0 F
OA Temp For Min Supply.....:	62.0 F
OA Temp For Max Supply.....:	10.0 F
OUTDOOR VENTILATION DATA	
Type of Control.....:	Constant Airflow Rate
Design Ventilation Airflow....:	15.0 CFM/person
Dampers Open During Unocc Per.:	N
Damper Leak Rate.....:	0 %
SUPPLY DUCT DATA	
Duct Heat Gain.....:	2 %
Duct Leakage Rate.....:	2 %
RETURN PLENUM DATA	
Is a Return Plenum Used.....?	N
SUPPLY FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	2.50 in.wg.
Fan Efficiency.....:	54 %
RETURN FAN DATA	
Fan Type.....:	Forward Curved
Fan Total Static.....:	1.00 in.wg.
Fan Efficiency.....:	54 %
OUTDOOR AIR ECONOMIZER	
Outdoor Economizer Type.....:	Integrated Dry-Bulb
OA Upper Cutoff Temp.....:	62.0 F
OA Lower Cutoff Temp.....:	32.0 F
PREHEAT COIL	
Preheat Coil Used.....?	N
PRECOOL COIL	
Precool Coil Used.....?	N
VENTILATION HEAT RECLAIM	
Reclaim Unit Type.....:	None
SAFETY FACTORS	
Sensible Cooling Factor.....:	5 %
Latent Cooling Factor.....:	5 %

Heating Factor.....: 5 %

AIR SYSTEM INPUT DATA

Name: 53601 AH-3 (Controls 3) 08-25-94
Type: CONSTANT VOLUME - Multizone HAP v3.06
Prepared by: Keller & Gannon Page 1

****

3. ZONE DATA

ZONE	1	(All Zones the Same)
T-Stat Occupied Cooling....(F):	77.0	
Unoccupied Cooling..(F):	90.0	
Occupied Heating....(F):	68.0	
Unoccupied Heating..(F):	65.0	
Throttling Range....(F):	3.0	
Zone Heating Unit Type.....:	None	
Trip Temperature.....(F):	-	
Design Supply Temperature(F):	-	
Fan Total Static....(in.wg.):	-	
Fan Efficiency.....(%):	-	
Zone Terminal Type.....:	CAV MBox	
Reheat Coil.....?	N	
Diversity Factor.....(%):	100	
Direct Exhaust Airflow...(CFM):	0.0	
Direct Exhaust Fan kW.....(kW):	0.0	

4. SCHEDULE DATA

HOURLY TSTAT SCHEDULES	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Design Day.....							X	X	X	X	X	X	X	X	X	X	X	X						
Weekday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Saturday.....							X	X	X	X	X	X	X	X	X	X	X	X						
Sunday.....							X	X	X	X	X	X	X	X	X	X	X	X						

Cooling Available During Unoccupied Period ? Y

MONTHLY SCHEDULES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Central Heating.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Central Cooling.....	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

PLANT INPUT DATA

Plant: 56301 Cooling (Controls 3) 08-25-94
Prepared By: Keller & Gannon Page 1

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PLANT NAME, CLASSIFICATION & TYPE

Plant name	56301 Cooling (Controls 3)
Classification	Cooling
Type	Air-Cooled Chiller
Type of simulation model	Computer-Generated
Type of chiller	A/C Reciprocating

AIR SYSTEM SELECTIONS

Air System Name	Type	Quantity
10. 53601 AH-1 (Controls 3)	(MZ)	1
11. 53601 AH-2 (Controls 3)	(MZ)	1
12. 53601 AH-3 (Controls 3)	(MZ)	1

AIR-COOLED RECIPROCATING CHILLER DATA

Estimated maximum cooling load	NA
Chiller capacity at design	64.0 Tons
Chiller input power at design	67.0 kW
Chiller configuration	Mult. Compressors / Ckt., Unloaded
Is chilled water reset used	N
Is hot gas bypass used	N
% load for minimum unloading	20.0 %
Crankcase heater kW	0.000 kW

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Efficiencies Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Chilled Water	5.9	55.00	60.0	90.0	5.00	2.0

PLANT NAME, CLASSIFICATION & TYPE

Plant name.....: 56301 Heating (Controls 3)
Classification.....: Heating
Type.....: Hot Water Boiler

AIR SYSTEM SELECTIONS

Air System Name	Heating Coil Category Pre-Heat	Central	Terminal	Zone
10. 53601 AH-1 (Controls 3).....	-	1	-	-
11. 53601 AH-2 (Controls 3).....	-	1	-	-
12. 53601 AH-3 (Controls 3).....	-	1	-	-

HOT WATER BOILER DATA

Estimated maximum heating load...: NA
Gross output at design.....: 668.0 MBH
Energy input at design.....: 1200.0 MBH
Overall efficiency at design.....: 55.7 %
Fuel or energy type.....: Nat. Gas
Combustion air blower kW.....: 0.200 kW

BOILER PART-LOAD PERFORMANCE DATA

% Load	Overall Eff. (%)	% Load	Overall Eff. (%)
90	55.0	40	55.0
80	55.0	30	55.0
70	55.0	20	55.0
60	55.0	10	55.0
50	55.0	0	55.0

PUMP AND PIPING SYSTEM DATA

Pump or Piping System	Delta-T (F)	Pump Head (ft wg)	Efficiencies Mech (%)	Elec (%)	Pump Power (kW)	Piping Gain/Loss (%)
Hot Water	12.1	52.00	60.0	90.0	2.00	2.0

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BUILDING NAME.....: 53601

PLANT SELECTION

	Plant Name	Type	Quantity
1.	56301 Cooling.....	(A/C CHILLER)	1
2.	56301 Heating.....	(HW BOILER)	1

MISCELLANEOUS ELECTRIC POWER USE

Reference Name	Max. Power Use (kW)	Schedule Name
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA
Empty...	0.0	NA

MISCELLANEOUS FUEL USE

Reference Name	Fuel Type	Fuel Units	Conversion kBTU/Units	Max. Use	Schedule Name
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA
Empty...	NG	THM	100.0000	0.0	NA

Fuel Types: NG=Nat.Gas FO=Fuel Oil PR=Propane RH=Rmt Htg

ELECTRIC RATE

Electric rate.....: Fort Huachuca
Average building power factor.: NA

FUEL RATES

Natural gas.....: Fort Huachuca
Fuel oil.....: None
Propane.....: None
Remote source heating.....: None
Remote source cooling.....: None

MISCELLANEOUS DATA

Additional building floor area.....: 0.0 sqft
Source electric generating efficiency.....: 100.00 %

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BASIC ELECTRIC RATE INFORMATION

ELECTRIC RATE INFORMATION:	Rate schedule name.....:	Fort Huachuca
	Currency symbol.....:	$
	Type of rate schedule.....:	Simple
	Flat rate.....:	0.06180 $/kWh

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BASIC FUEL RATE INFORMATION

FUEL RATE INFORMATION:	Rate schedule name.....:	Fort Huachuca
	Currency symbol.....:	$
	Units of measurement.....:	Therm
	Fuel conversion factor.....:	100.00000 kBTU/Therm
	Type of rate schedule.....:	Simple
	Flat rate.....:	0.45080 $/Therm