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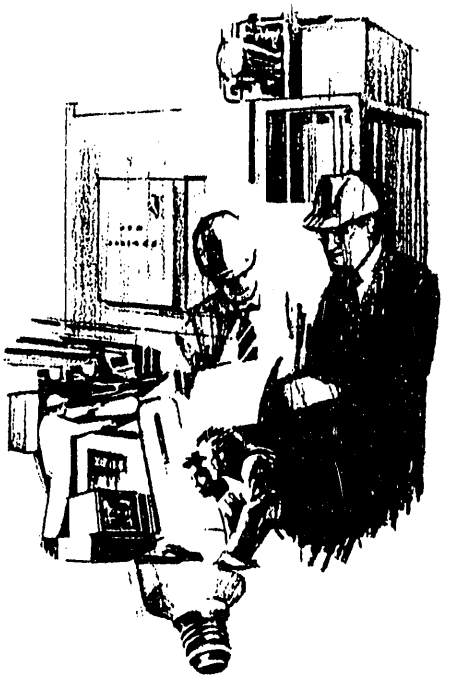
Energy Use Baselining Study for the National Naval Medical Center



April 1992

Prepared for the U.S. Department of Energy
Federal Energy Management Program
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
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PNL--8058

DE92 011673

ENERGY USE BASELINING STUDY FOR THE NATIONAL NAVAL MEDICAL CENTER

G. B. Parker
M. A. Halverson

April 1992

Prepared for
the U.S. Department of Energy
Federal Energy Management Program
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Richland, Washington 99352

PREFACE

The Naval Facilities Engineering Command (NAVFACENGCOM) has directed that Chesapeake Division Naval Facilities Engineering Command (CHESDIV) and the other engineering field divisions develop and implement a Shared Energy Savings (SES) program. CHESDIV has selected several possible sites and is working to implement the program. CHESDIV is also developing the contracts for the proposed projects that require an energy usage baseline for current energy consumption be developed for the SES project sites.

CHESDIV is managing the development of this project and has entered into an interagency agreement with the U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP). The goal of DOE/FEMP is to facilitate energy efficiency improvements at federal facilities. This is accomplished by a balanced program of technology development, facility assessment, and use of cost-sharing procurement mechanisms. Technology development focuses upon the tools and procedures used to identify and evaluate efficiency improvements, such as the ASEAM simulation model and the Federal Life Cycle Costing procedures. For facility assessment, FEMP provides metering equipment and trained analysts to federal agencies that exhibit a commitment to improve energy use efficiency. To assist in procurement of energy efficiency measures, FEMP helps federal agencies devise and implement shared energy savings and utility demand side management projects.

Pacific Northwest Laboratory (PNL)[a] supports the FEMP mission as the lead laboratory for energy systems modernization. Under this charter, the Laboratory and its contractors work with federal facility energy managers to assess energy efficiency improvements at federal facilities nationwide. PNL subcontracted with SBW Consulting, Inc. to assist in this project.

(a) Pacific Northwest Laboratory is operated by Battelle Memorial Institute for the U.S. Department of Energy under Contract DE-AC06-76RLO 1830.

EXECUTIVE SUMMARY

This report provides an energy consumption profile for fourteen buildings at the National Naval Medical Center (NNMC) in Bethesda, Maryland. Recommendations are also made for viable energy efficiency projects funded with assistance from the servicing utility (Potomic Electric Power Company) in the form of rebates and incentives available in their Demand Side Management (DSM) program and through Shared Energy Savings (SES) projects. This report also provides estimates of costs and potential energy savings of the recommended projects.

The majority of the data collection summaries and analysis results are presented in the Technical Appendix to this report, which follows Section 4.0. This appendix will be useful in the design, contracting, and execution of any energy efficiency project. The buildings evaluated are identified below.

NNMC Buildings Selected for Energy Efficiency Project Evaluation

Building No.	Building Use	Building Area, ft²
1	Dental Clinic	244,846
2	Personnel Support and Service	105,104
4	Administration 1	16,534
6	Administration 2	19,908
7	Medical/Old Hospital	83,844
8	Hospital	100,235
9	Service Block of Replacement Hospital	582,479
10	Nursing Tower of Replacement Hospital	328,000
12	Medical Hold	52,601
14	Facilities Management Building	27,720
16	Central Plant	47,744
50	Bachelor Enlisted Quarters	47,557
54	Medical Warehouse/Parking	330,040
55	South Parking Garage	386,107

The project recommendations are based upon an analysis of utility billing and central plant records, energy audit data, short-duration individual building electrical profile data, National Climate Center weather data from the Washington National Airport, and knowledge of other shared energy savings projects.

Selected buildings were metered to estimate their individual usage (both base [non-work period] and peak load) for periods ranging from 2 to 9 days. The results of the metering are summarized below.

Summary of Building Metering

Building	Ave. Base Evening or Weekend Load, kW	Peak Workday Load, kW
4	40	110
6	60	90
10	300	450
12	40	90
14	12	60
50	25	60
55B	100	50(a)

(a) Usage higher at night.

There is a significant non-work period baseload compared with the work-day peak load in Buildings 4, 6, 10 and 12, indicating that either lights are left on during non-working hours or that there is a significant plug load from equipment left on. A detailed equipment usage schedule audit was not performed. For Buildings 10 and 12, the activities in those building related to 24-hour operation may explain this observation.

From these metered data and historical energy consumption data, three primary energy savings project opportunities were identified: 1) replacement of incandescent and fluorescent fixtures with energy-efficient fixtures; 2) installation of lighting controls; and 3) incorporation of a thermal energy storage system with the existing chilled water production and distribution systems to reduce electrical consumption during periods of peak demand. Although the site is space-limited for a thermal energy storage system sized to serve the entire complex, a smaller system could be designed to serve a percentage of the load and still be life-cycle cost-effective.

These three projects are particularly cost-effective because of the availability of the servicing electric utility rebates and financial incentives for these technologies.

An additional opportunity exists for the use of gas-driven prime movers for chillers to meet additional demand as it occurs. This opportunity may or may not be attractive, depending upon the future need to replace existing chillers and the future demand requirements. This option needs to be thoroughly evaluated to assess cost-effectiveness.

The estimated capital or per unit cost and savings for each measure in the buildings surveyed are shown below.[a] The costs do not include any utility rebate. Approximately 90% of the incandescent replacements, fluorescent upgrades and lighting controls would be in Buildings 1-10 (the hospital facilities).

Energy Efficiency Project Opportunities

Measure	Cost, $	Savings, $/yr	Cost/unit
Replace Incandescents	7,600	4,600	$0.0203/kWh
Upgrade Fluorescents	1,040,000	440,000	$0.0245/kWh
Lighting Controls			
Switching	15/fixture	20%	-
Occupancy	60/room	30%	-
Dimming	50/fixture	40%	
Thermal Energy Storage	NA	NA	$800-$1800/kW
Gas Chillers	NA	NA	$700-$800/ton

NA = Not Available.

The servicing electric utility, PEPCO, was contacted and presently offers attractive incentives (rebates) for both the lighting retrofit and the thermal energy storage project that will further improve project economics. It is likely that the utility will be open to discussing a "custom" program for the NNMC, given the significant load savings available from a single customer. Such a program, combined with SES where applicable, would allow the

(a) Source for lighting retrofit values: Fort Lewis Electric Energy Baseline and Efficiency Resource Assessment. PNL-7763. Pacific Northwest Laboratory, Richland, Washington. October 1991.

NNMC to design significant cost-effective energy savings projects. Also, utility incentives will offset some of the additional costs associated with implementing an SES project at a site of the complexity of NNMC. These additional costs and complexities include the relatively tight space constraints that exist for the siting of a sizeable thermal energy storage facility, as well as the unique lighting requirements for medical clinics and customer service facilities. PEPCO's current "standard" incentive programs for the Maryland service territory are summarized below:

Program	Incentive
Commercial Lighting	A variety of direct rebates for controls, ballast, lamp, and fixture replacements. Rebates ranging from $6 to $60 are available and current custom programs
Thermal Energy Storage	Feasibility study plus $250/kW for first 500 kW plus $200/kW for any additional load deferred qualify for up to a $300/kW rebate.
Curtailable Load	Special incentive rates proportional to the amount of load curtailed.

The monitoring and data collection undertaken in this study provided a "snapshot" of current and historical energy usage at the facility. The information provided a knowledge base to recommend viable energy conservation project opportunities.

Successful energy efficiency improvement projects linked with an SES solicitation require fair and simple methods to assess and share the risks and savings associated with the project. This includes determination of a projected baseline of how the system or building would use energy in lieu of the energy efficiency project. For projects at the central plant, this would include detailed flow, temperature and electrical consumption measurements. For lighting retrofit and control projects, "before and after" end-use metering of a representative sample, combined with engineering calculations, is generally sufficient.

The actual baseline development for SES contracting will need to be specific to the particular project and agreed upon between NAVFAC and the SES

contractor. It is our recommendation that the material in this report (particularly the attachments) be provided to SES proposers to aid in the development and evaluation of specific projects.

CONTENTS

1.0 INTRODUCTION

This report provides an energy consumption evaluation of fourteen buildings and the central energy plant at the National Naval Medical Center (NNMC) in Bethesda, Maryland. Recommendations are also made for implementing energy efficiency projects funded with assistance from the servicing utility (Potomic Electric Power Company) in the form of rebates and incentives available in their Demand Side Management (DSM) program and through Shared Energy Savings (SES) projects. This report also provides estimates of costs and potential energy and dollar savings of the recommended projects.

The recommendations are based upon an analysis of utility billing and central plant records, energy audit data, short-duration individual building electrical profile data, National Climate Center weather data from the Washington National Airport, and knowledge of other shared energy savings projects. Preliminary findings were discussed with NNMC and NAVFAC staff to obtain their insights as well. Because the analyses were conducted using historical data combined with selected short-term electrical energy usage monitoring data, guidelines are given for more comprehensive data collection to support SES and/or utility DSM project development.

The majority of the data collection summaries and results are presented in the Technical Appendix at the end of this report. This appendix will be useful in the design, contracting, and execution of any energy efficiency project. The attachments in the appendix are organized according to the specific investigations undertaken for this project. Supporting data were entered into electronic spreadsheets that will also be useful for project development and subsequent analysis.

The attachments in the Technical Appendix include:

Attachment 1: Sources of Collected Data
Attachment 2: Electric Utility Substation Usage
Attachment 3: Electric Utility Tariff Data Summary
Attachment 4: Electric Cost Component Data Summary
Attachment 5: Steam and Chilled Water Production Data Summary
Attachment 6: Electrical Measurements for Selected Buildings

Attachment 7: Major Connected Loads for Selected Buildings

Attachment 8: Field Notes

Attachment 9: PEPCO Incentives and FEMP Federal Site/Utility Program

Section 2.0 of this report provides a summary of the data and findings of this study. In Section 3.0, the energy efficiency and SES project opportunities are reviewed. Section 4.0 is a discussion of more comprehensive energy use baselining that will be most effective to quantify energy efficiency and SES project performance. The Technical Appendix concludes this report.

2.0 DATA SUMMARY AND FINDINGS

A summary of the data, analysis results and their impact on energy and energy savings projects is presented in this section. Detailed discussions of the data summaries and analyses are found in the Technical Appendix at the end of this report.

The Navy identified fourteen buildings for evaluation. These are identified in Table 2.1. These buildings are provided with chilled water and steam from Building 16, the central heating and cooling plant. Electricity is provided to these buildings through a single substation that also serves other buildings at the facility.

The data collection effort began with a summary and review of purchased utility costs for NNMC during fiscal year (FY) 1989. The utility costs are summarized in Table 2.2. Because of the significant costs, the analyses and subsequent projects identified focused upon energy savings in the electrical loads and steam (fuel oil) usage.

TABLE 2.1. NNMC Buildings Selected for Energy Efficiency Project Evaluation

Building No.	Building Use	Building Area, ft²
1	Dental Clinic	244,846
2	Personnel Support and Service	105,104
4	Administration 1	16,534
6	Administration 2	19,908
7	Medical/Old Hospital	83,844
8	Hospital	100,235
9	Service Block of Replacement Hospital	582,479
10	Nursing Tower of Replacement Hospital	328,000
12	Medical Hold	52,601
14	Facilities Management Building	27,720
16	Central Plant	47,744
50	Bachelor Enlisted Quarters	47,557
54	Medical Warehouse/Parking	330,040
55	South Parking Garage	386,107

TABLE 2.2. Purchased Utility Costs in FY 1989

Utility	Cost, $	%
Electricity	4,947,068	56.4
Fuel Oil	2,089,032	23.8
Natural Gas	12,871	0.1
Water	739,349	8.4
Sewage Disposal	980,614	11.2
Total	8,768,934	100.0

2.1 ELECTRIC UTILITY SUBSTATION USAGE (Attachment 2, Technical Appendix)

2.1.1 Data Summary

The electric utility usage for both the Jones Bridge and Wisconsin Avenue substations for October 1984 through September 1990 was examined. The average daily electrical consumption for the past 15 months was examined in relation to the outdoor temperature.

2.1.2 Findings

- Total electrical consumption is about 100,000 MWh per year, with about 17% of the consumption going to the Jones Bridge substation.
- Electrical consumption has been increasing at a rate of about 2.5% per year, primarily due to additions of new buildings.
- Monthly consumption ranges from 6,000 to 7,000 MWh for October to May, rising to 10,000 MWh in July and decreasing to 8,000 MWh in August and September.

2.1.3 Impact

Baseline NNMC electrical energy usage is about 83,000 MWh and is increasing at a faster rate than the Uniformed Services University of Health Sciences buildings (<0.5%/year). The site is summer-peaking with large electrical cooling loads year-round and therefore shows a significant opportunity for peak shifting or clipping.

2.2 ELECTRIC UTILITY TARIFF ASSESSMENT (Attachment 3, Technical Appendix)

2.2.1 Data Summary

Billing records for each substation from May 1988 through April 1989 were examined. The various components of the billing record were disaggregated and examined.

2.2.2 Findings

- The electric utility tariff assessment primarily provides information that will be useful in evaluation of cost savings for various SES projects.

2.2.3 Impact

The site has significant on-peak demand costs. The design of SES and energy efficiency projects should take into consideration the potential for peak demand reductions during different billing periods to maximize the energy savings.

2.3 ELECTRIC USAGE COMPONENT DATA SUMMARY (Attachment 4, Technical Appendix)

2.3.1 Data Summary

Electric demand and consumption were examined in relationship to outdoor temperature.

2.3.2 Findings

- Electric demand and consumption were found to be directly related to outdoor temperature. As the temperature increases, both demand and consumption increase.
- Electric demand ranged from 10,000 kW in the winter to 17,000 kW in the summer months.

2.3.3 Impact

These findings provide additional confirmation that significant electrical cooling loads are driving both consumption (kWh) and demand (kW).

2.4 STEAM AND CHILLED WATER PRODUCTION (Attachment 5, Technical Appendix)

2.4.1 Data Summary

Central plant records for July 1988 through September 1990 were evaluated to estimate the electrical usage of the chillers and to ascertain the relationship between building heating and cooling loads and outdoor temperature.

2.4.2 Findings

- Steam usage varies from 20 million pounds per month in warm months to 74 million pounds per month in cold months.
- Chilled water usage varies from 13 million Btu in cold months to 50 million Btu in warm months.
- Onsite temperature measurements are typically 4 to 6°F above measurements from Washington National Airport for the months of January through April.
- Steam usage is very temperature dependent, with lower temperatures leading to high steam usage. The straight-line relationship in the data suggests that the steam plant and the distribution system are operating with a high level of efficiency with few losses and relatively high combustion efficiency--particularly at the lower temperatures.
- Chillers consume from 40 MWh per day in winter to 130 MWh per day in the summer.
- Chilled water usage is also temperature dependent, with higher temperatures leading to higher chilled water usage. The chilled water production follows the outdoor temperature increase directly, but increases even faster at higher temperatures. The reason for this is likely twofold: as outdoor temperature increases, the coefficient of performance (efficiency) of the chiller drops while cooling requirements increase *combined* with a change in efficiency as the balance point (the temperature at which cooling is required to maintain a set inside temperature) changes with the season and building loads. This relationship in the chiller data suggests that the chillers and the distribution system are operating within expected levels of efficiency with few losses.
- The remaining base electrical load of the NNMC is about 160 to 180 MWh per day.

2.4.3 Impact

Significant amounts of steam and chilled water are used throughout the year. Chiller electrical loads are a major portion of the electrical demand. Depending upon the utility incentives, the site may be good candidate for thermal energy storage. High efficiency lighting retrofits will also reduce the chiller electrical loads by reducing the cooling demand in buildings.

2.5 ELECTRICAL MEASUREMENTS FOR SELECTED BUILDINGS (Attachment 6, Technical Appendix)

2.5.1 Data Summary

Selected buildings were metered at the electrical service entrance for periods ranging from 2 to 9 days. Plots of the electrical usage were examined.

2.5.2 Findings

The results of this analysis are primarily the plots and charts that show the electrical load for each building. The data are summarized below in Table 2.3.

2.5.3 Impact

There is a significant non-work period baseload compared to the workday peak load in Buildings 4, 6, 10 and 12, indicating that either lights are left on during non-working hours or there is a significant plug load from equipment

TABLE 2.3. Summary of Building Metering

Building	Ave. Base Evening or Weekend Load, kW	Peak Workday Load, kW
4	40	110
6	60	90
10	300	450
12	40	90
14	12	60
50	25	60
55B	100	50(a)

(a) Usage higher at night.

left on. A detailed equipment usage schedule audit was not performed. For Buildings 10 and 12, the activities in those building related to 24-hour operation may explain this observation.

Given the significant baseload consumption, there is significant potential for both load (and corresponding consumption) reduction in all buildings metered.

2.6 MAJOR CONNECTED ELECTRICAL LOADS FOR SELECTED BUILDINGS (Attachment 7, Technical Appendix)

2.6.1 Data Summary

The connected loads of electrical equipment were estimated at selected buildings based on construction documents and limited surveys.

2.6.2 Findings

The results of the connected load analysis and the lighting and HVAC notes used are included in Attachment 7. For Buildings 1-10 (the largest users), lighting and HVAC loads are nearly equal and constitute approximately 90% of the connected electrical load and therefore about 90% of the demand (kW) and usage (kWh) for the buildings.

2.6.3 Impact

Lighting retrofits will likely have a significant impact on energy usage and demand, and are included in the serving utilities DSM incentive programs. Lighting retrofits will also reduce air conditioning load (10 to 15% reduction).

3.0 ENERGY EFFICIENCY AND SHARED ENERGY SAVINGS PROJECTS IDENTIFICATION

This section reviews the analysis products in the Technical Appendix attachments and identifies potential shared energy savings project opportunities. The most viable project opportunities include:

1. Lighting Efficiency Retrofits
2. Lighting Controls
3. Thermal Energy Storage
4. Gas Engine-Driven Chillers

Recommendations are given for viable energy efficiency projects and institute shared energy savings solicitations in these areas. The servicing utility, Potomic Electric Power Company (PEPCO), was contacted. PEPCO's current incentive programs are summarized below. These programs are described in greater detail in Attachment 9.

Program	Incentive
Commercial Lighting	A variety of direct rebates for controls, ballast, lamp, and fixture replacements. Rebates ranging from $6 to $60 are available and current custom programs qualify for up to a $300/kW rebate.
Thermal Energy Storage	Feasibility study plus $250/kW for first 500 kW plus $200/kW for any additional load deferred.
Curtailable Load	Special incentive rates proportional to the amount of load curtailed.

These standard programs, available to all PEPCO customers in Maryland, should be the starting point for development of a custom energy efficiency program for the NNMC. Therefore, also included in Attachment 9 is a description of a Federal Agency Energy Efficiency Model Program that outlines a process developed by DOE/FEMP to implement cost-shared energy efficiency programs between federal agencies and their servicing utilities. It is likely that the utility will be open to discussing such a "custom" program with the NNMC, given the significant load savings available from a single customer.

Such a program, combined with SES where applicable, would allow the NNMC to design significant cost-effective energy savings projects.

3.1 LIGHTING EFFICIENCY RETROFITS

The lighting systems employed in most of the NNMC buildings are primarily old-technology fluorescent and in good condition. Overall approximately 70% of the lighting capacity at the selected buildings is fluorescent, with less than 10% incandescent. The remaining lighting is mercury, sodium and halide. There are cost-effective efficiency improvements using new-technology fluorescent fixtures, and other improvements--particularly at the parking garages and Buildings 9 and 10.

The exterior lighting of the parking lot fixtures is predominantly mercury-vapor, and these could be cost-effectively upgraded to sodium fixtures This would also be accompanied by a controls upgrade indicated below.

Buildings 9 and 10 have a significant number of incandescent lamps in recessed fixtures. These lamps should be replaced with compact fluorescent lamps to reduce frequency of replacement and energy consumption.

The estimated costs and savings for a lighting retrofit are given below.[(a)] Note that while the majority of the lighting is already fluorescent, there are opportunities for greatly improving fluorescent fixture performance with new technologies. As noted above, significant incentives are available from the utility for lighting retrofits (see Attachment 8).

Measure	Cost, $	Savings, $/yr	Cost/Unit
Replace Incandescents	7,600	4,600	$0.0203/kWh
Upgrade Fluorescents	1,040,000	440,000	$0.0245/kWh

The estimated costs were calculated assuming that individual incandescent fixtures are 75 watt bulbs, and an 18 watt compact fluorescent can

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(a) Fort Lewis Electric Energy Baseline and Efficiency Resource Assessment. PNL-7763. Pacific Northwest Laboratory, Richland, Washington. October 1991.

replace the incandescent for an installed cost of about $16.00. The compact fluorescent will use about 18 watts, saving 75% of the energy. Based on an energy cost of $0.05/kWh and an annual usage of 3500 hours, the dollar savings are $14.00 per bulb. This is a capital investment of $7600 and a reduction of about 26,000 watts in the lighting load. For 3500 hours usage, approximately 91,000 kWh and 25 kW are saved over the course of the year. Estimated demand charges are $7/kW.

Assuming that the fluorescent fixtures are standard 2 x 4 fixtures, upgrades will cost approximately $40 per fixture and these fixtures can save about 50% of the energy usage. For the estimated 26,000 fixtures in the buildings surveyed (about 10% of the square footage of the NNMC), the capital cost is 1,040,000, with energy savings of 1,750,000 kWh and 500 Kw per year.

3.2 LIGHTING CONTROLS

The staff at NNMC has an effective program to turn off the interior lights during unoccupied periods. However, the hallway lights in Building 1 to 10 are left on 24 hours a day although they are seldom needed. The use of occupancy/motion detector on approximately 75% of these lights would be viable to cut electrical consumption and extend lamp life. These detectors would need to be set to keep the lights on for approximately one-half (½) hour after motion is detected to keep from having the hallway lights come on and off excessively during the occupied periods.

Buildings 9 and 10 could benefit from daylighting controls (effective with fluorescent fixtures) to automatically dim the downlights in the large interior sunspace and along perimeter offices. These controls would dim or extinguish particular fixtures in the daylight areas to maintain adequate lighting levels. Occupancy controls should also be included in individual offices where appropriate. This technology would save energy during hours of peak electrical demand. The lighting controls for the parking garages appear to operate irregularly. The combination of time clocks and solar sensors currently used is the correct approach, but apparently the mechanical time clocks or other aspects of the control system are not operating correctly.

Consequently, we would recommend the replacement of the control system in conjunction with an upgrade the fixture efficiencies in the parking garages.

All control systems will save both kW and kWh if properly installed and operated. PEPCO offers incentives for installing lighting controls. The basic idea is to turn off lights when they are not needed and turning off lights cannot help but save energy.

Estimating the cost and potential savings of a lighting control system is difficult without a detailed survey of the lighting system in each building. If, as in the parking garage, adequate controls are already installed, the cost to reactivate the control system is minimal. If controls must be installed, as in Buildings 9 and 10, the cost is primarily a function of the number of points of control. An estimate of the energy savings from controls is given below.

Measure	Cost, $	Savings	Cost/kWh
Lighting Controls			
Switching	$15/fixture	20%	NA
Occupancy	$60/room	30%	NA
Dimming	$50/fixture	40%	NA

NA = not available

3.3 THERMAL ENERGY STORAGE SYSTEMS

During the summer months the majority of electrical costs are for peak demand charges and on-peak energy consumption. Examination of data shows that approximately 40% of these charges are due to the operation of the central plant chillers. Consequently, methods to shift chiller electrical consumption to other times of the day (off-peak) will reduce overall electrical energy cost. Integrating the system with the large and constant chilled water production of the central plant will ensure higher thermal storage utilization.

This would involve the construction of a thermal energy storage plant to store chilled water or ice generated during the off-peak hours of the day. This stored water or ice could then be used during the peak periods to offset the use of electric chillers. Such a system would also allow the chillers to

be operated at higher efficiencies by providing more constant loads for the chillers to meet. Furthermore, the system will provide additional cooling capacity to meet peak demands that may occur in the future.

Thermal storage capital costs are about $800 to $1300 per kW shifted for large systems (Buildings 1, 9 and 10) and about $1300 to $1800 per kW shifted for smaller systems (Buildings 2, 3, 5 and 7). Buildings 4, 6 and 8 show somewhat lower costs for small systems, with capital costs ranging from $800 to $1400 per kW shifted. Note that thermal storage systems will not reduce electrical consumption. Shifting the cooling load from the peak to offpeak hours does not appreciably change the total electrical consumption. Estimated costs are given below.

Measure	Peak kW savings	Estimated Cost
Thermal Energy Storage	8,000 to 10,000	$800/kW to $1800/kW

An assessment of thermal energy storage was done for the National Naval Medical Center by Morrison & Associates in the summer of 1990. This assessment was only a preliminary assessment of the potential and should not be taken as a detailed analysis. Equipment was sized for individual buildings rather than for a single central thermal storage plant. This idea may be viable for the NNMC due to the lack of sufficient space for a large central plant. The results of the Morrison & Associates thermal storage calculation are listed below in Table 3.1.

TABLE 3.1 Thermal Energy Storage Savings for Selected Buildings

Building	kW Shifted	Capital, $	Annual Savings, $	Simple Payback, yr
1	2024	2.0-2.6M	170,000	12.2
2	448	0.6-0.8M	41,000	17.0
3&5	425	0.5-0.7M	38,000	12.5
4&6	496	0.4-0.6M	43,000	9.8
7	305	0.4-0.5M	30,000	12.6
8	482	0.5-0.7M	43,000	11.3
9	3457	2.9-4.0M	310,000	9.2
10	1470	1.4-1.9M	136,000	10.0
Total	9107	8.7-11.8M	811,000	10.7

Capital includes credit for utility rebate of $250/kW for the first 500 kW and $200/kW for any kW above 500 kW that is shifted to off-peak. The low end of the capital cost range does not include a new chiller necessary to achieve extra cooling capacity. Savings and kW shifted are calculated with a simple design week calculation and not with a complete annual energy analysis. Simple payback in the table is based on the *low* range of the capital costs.

A detailed economic evaluation of thermal storage at NNMC that includes the current (or negotiated) utility incentives was not undertaken, however PEPCO will pay part of the costs for such an assessment. As noted above, PEPCO presently offers attractive incentives (rebates) that will further improve project economics. This will offset some of the additional costs and complexities associated with implementing a thermal storage SES project at a site of the complexity of NNMC. These additional costs and complexities include the relatively tight space constraints that exist for the siting of a sizeable thermal energy storage facility, and the unique lighting requirements for medical clinics and customer service facilities. Nonetheless, these issues do not appear to be insurmountable.

3.4 GAS ENGINE-DRIVEN CHILLERS

This is an alternative strategy to reduce the electrical charges stemming from the electric chiller operation. It may be possible to retrofit the existing chillers with natural gas engines, although this may present significant integration and warranty liabilities. A better approach would be the installation of gas prime movers for new additions to chiller capacity. If such a system is instituted it would probably be cost effective to also integrate a heat recovery system to offset boiler plant energy requirements.

A recent study in the Washington, D.C., region performed for the Pentagon Building by Washington Gas & Light estimated that the cost of gas chillers would be about $700 to $800 per installed ton. Natural gas has recently been brought onto the site at NNMC and the gas utility may offer an incentive program for use of gas fired equipment. The estimated cost for a gas-driven chiller system is given below.

Measure	Estimated kW savings	Estimated Cost
Gas Chillers	As needed to meet new load	$700/ton - $800/ton

As pointed out above, this option is probably only attractive if there is a need for additional cooling capability or if there is a need to replace an existing chiller at the site. This option should not be considered "peak shaving" as much as a "maintenance of current peak." Gas chillers will also reduce electrical consumption in direct proportion to the number of hours that chiller is operated.

4.0 COMPREHENSIVE ENERGY USAGE BASELINING

The monitoring and data collection undertaken in this study provided a "snapshot" of current energy usage at the Bethesda facility. The information provided a knowledge base to recommend viable energy conservation project opportunities.

Successful energy efficiency improvement projects linked with an SES solicitation require fair and simple methods to assess and share the risks and savings associated with the project. This includes determination of a projected baseline of how the system or building would use energy in lieu of the energy efficiency project.

The actual baseline development for SES contracting will need to be specific to the particular project and agreed upon between NAVFAC and the SES contractor. It is our recommendation that the material in this report (particularly the attachments) be provided to SES proposers to aid in the development and evaluation of specific projects.

4.1 LIGHTING AND CONTROLS RETROFITS

For lighting retrofit and control projects, "before and after" end-use metering of a representative sample of buildings, combined with engineering calculations, is generally sufficient.

4.2 CENTRAL PLANT

For any SES central plant modification projects the best approach to determination of savings will be the direct measurement of energy flows. For the thermal energy storage system it will be necessary to accurately measure the time and quantities of chilled water delivered to and extracted from storage. A value can be placed on these energy flows by comparison with the existing chilled water system energy costs to meet equivalent demands. The instrumentation would include flow metering, temperature measurements for heat balance and for outside temperature, and electrical consumption of the entire

central plant. These measurements are typically made for the proper operation of the system so no additional measurement burden is imposed to develop energy use baselines and savings levels.

To determine the economic performance of the thermal energy storage facility, it will be necessary to measure the quantities of chilled water provided to and from the system. The procedure would be to calculate the energy costs to charge the system, and subtract this from the energy costs that would have occurred had the chillers been used to deliver cooling when the thermal storage system is discharged. This would principally be driven by the time of day utility tariff, with a minor adjustment for differences in the chiller coefficient of performance.

4.3 GAS ENGINE-DRIVEN CHILLERS

In the case of gas engine-driven chillers (gas prime movers), it is necessary to measure the energy input to the systems as well as the system outputs. This includes gas delivery and chilled water flow metering, temperatures and electrical consumption data. Once again, these measurements are typically integrated with the control and maintenance systems. Provisions to ensure that the systems are operated for a minimum number of hours during the year is likely required to protect the SES contractor from conditions where NNMC unilaterally ceases or reduces site activities.

Technical Appendix

TECHNICAL APPENDIX

Most of the data presented in the attachments to this document were summarized using electronic spreadsheet programs. These spreadsheets include "named graphs" for many of the figures included in the attachment. The tables were produced using the ALLWAYS® LOTUS 123 add-in program. Other plots were produced using the GRAPHWRITER® program.

The spreadsheets are labeled and include formulas for many of the entries so that supplemental data can be added with ease and modifications to meet specific requirements are possible. These files are available from CHESDIV.

Attachment 1: Sources of Collected Data

ATTACHMENT 1: SOURCES OF COLLECTED DATA

Information of various types were obtained by PNL and NNMC staff during the period of May 1989 through January 1991. At the outset PNL staff conducted the following site data collection efforts:

1. A coordination meeting was held with NNMC and Chesapeake NAVFACENGCOM staff to discuss the objectives and coordinate the site survey.

2. The construction documents for the eighteen buildings selected for study were reviewed and copies of critical drawings were obtained. Each building was visited subsequently to confirm some of this information.

3. Historical energy consumption measurements pertaining to the electric meters at NNMC were obtained in either electronic or tabular form.

4. The energy consumption meters at NNMC were inventoried to identify the type, frequency of data collection, location, and metered loads.

5. Central plant logs were reviewed and data for an arbitrarily selected summer and winter week were obtained.

6. Electric load profile data provided by PEPCO for the Wisconsin Ave. substation were reviewed.

7. A wrap up meeting with NNMC and Chesapeake NAVFACENGCOM staff was held to discuss preliminary observations and progress.

After these data were reviewed and analyzed recommendations for further site data collection were developed. Many were rejected due to cost constraints and the following supplemental data collection activities occurred:

1. Additional PEPCO billing data, and central plant records were obtained and selected data assembled into electronic spreadsheets for analysis. These data appear in Attachments 2 through 5.

2. Local Climatological Data summaries for National airport were obtained for the period October 1989 through December 1990 for comparison with on-site temperatures reported in the central plant records, and to compare the weather conditions during this period with historical averages. These data appear in Attachments 4 and 45

3. Time series (hourly) electrical consumption measurements for each of the electrical mains for buildings 1-8, 9-10, 12, 14, 50, 54, and 55 were made by NNMC staff using PNL Dranetz 808 power analyzers. These data are summarized in Attachment 6.

4. Construction documents were reviewed and selected surveys were conducted to estimate the electrical capacities of major connected loads. These data are summarized in Attachment 7.

5. Lighting surveys were conducted for each of the buildings indicated above to determine the installed capacities by type and to estimate the lighting levels during occupied and unoccupied periods. This involved a walk-through inspection of the buildings during both periods, selected measurement of lighting footcandle levels, and detailed review of construction documents. These data and other field notes are summarized in Attachment 8.

Attachment 2: Electric Utility Substation Usage

ATTACHMENT 2: ELECTRIC UTILITY SUBSTATION USAGE

The total electrical consumption for the facility is metered by PEPCO at two substations known as Jones Bridge and Wisconsin Ave. The total consumption is approximately 100,000 MWh/year, with the Jones Bridge substation constituting approximately 17% of this total. The Jones Bridge substation principally services the Uniformed Services University of Health Sciences (USUHS) buildings that are not part of this evaluation.

Historical data by month from Oct 1984 through September 1990 are presented and displayed graphically and in tables following the figures. These data indicate that with the exception of fiscal year 1986, electrical use is increasing at a rate averaging 2.5% per year while USUHS loads increased at an average annual rate of less than 0.5%. This is in part due to the additions of new buildings to NNMC over the years and additional electronic equipment utilization. This trend introduces uncertainties for whole facility electrical use baselining as it is difficult to predict, but impossible to ignore.

The attachment also includes a folded plot that compares monthly Wisconsin Ave. feeder measurements over the past six years. The plot shows similar profiles for periods of interest. Electrical consumption is typically between 6,000 and 7,000 MWh for October through May, rising to 10,000 MWh in July and then decreasing back to 8,000 MWh in August and September. This shows a clear seasonal dependence, with significantly higher loads during the summer months, when electrical rates are highest.

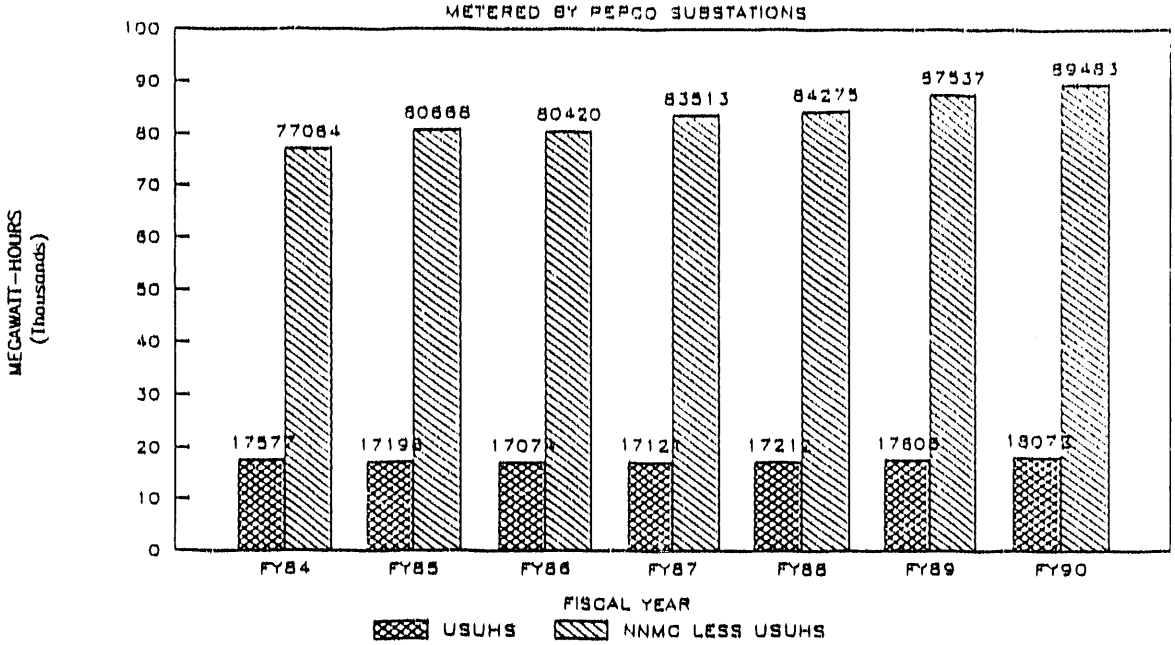
Also included in the attachment is a plot depicting the relationship of average daily electrical consumption to outdoor temperature for the most recent 15 months. The month and year are located to correspond to the averages during the respective billing periods. This plot shows a clear relationship between electrical usage and outdoor temperature. Once the temperature climbs above 50 or 60°F, the electrical usage starts to rise significantly.

TOTALIZED NNMC ELECTRICITY FROM PEPCO UTILITY FEEDERS
MEGAWATT-HOURS PER FISCAL YEAR BY MONTH

		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP		FY
JB84		2543	1439	1339	1485	1371	1312	1275	1437	1328	1346	1374	1329		17577
WA84		3267	6578	5737	5927	5527	5300	5481	7188	7620	8311	8571	7556		77064
TOTAL		5810	8017	7075	7412	6898	6612	6756	8625	8948	9657	9945	8885		94641
JB85		1309	1510	1386	1579	1440	1462	1375	1423	1371	1499	1396	1448		17198
WA85		6238	6573	5670	6167	5594	5870	6233	6778	7050	8543	8180	7773		80668
TOTAL		7547	8083	7056	7746	7034	7332	7608	8201	8420	10043	9576	9221		97866
JB86		1581	1230	1587	1494	1517	1040	1103	1227	1546	1620	1619	1511		17074
WA86		6763	5862	6497	5832	5934	5577	5640	6847	8022	9383	6208	7853		80420
TOTAL		8343	7093	8085	7326	7451	6617	6743	8074	9568	11002	7827	9364		97494
JB 87		1324	1201	1657	1394	1534	1102	1235	1313	1483	1682	1574	1622		17121
WA87		6770	5784	6543	5431	5883	5614	5780	7052	8652	9121	8555	8329		83513
TOTAL		8094	6985	8200	6825	7417	6716	7014	8365	10135	10803	10129	9951		100634
JB88		1369	1396	1586	1471	1510	1367	1355	1346	1510	1419	1378	1506		17212
WA88		6223	5755	6897	6349	6625	6162	6122	6684	8237	8844	8512	7864		84275
TOTAL		7592	7151	8482	7820	8135	7529	7477	8030	9747	10263	9890	9370		101486
JB89		1390	1563	1501	1499	1446	1394	1401	1548	1420	1472	1506	1468		17608
WA89		6503	7056	6366	6338	6096	6111	6328	7582	8495	9858	8264	8541		87537
TOTAL		7893	8619	7867	7836	7543	7505	7729	9130	9915	11330	9770	10009		105145
JB90		1417	1629	1468	1702	1511	1404	1547	1482	1473	1561	1390	1487		18072
WA90		6786	7561	6690	7720	6715	6449	7311	7171	7842	9346	8080	7813		89483
TOTAL		8203	9189	8158	9422	8226	7853	8858	8653	9314	10907	9470	9300		107555

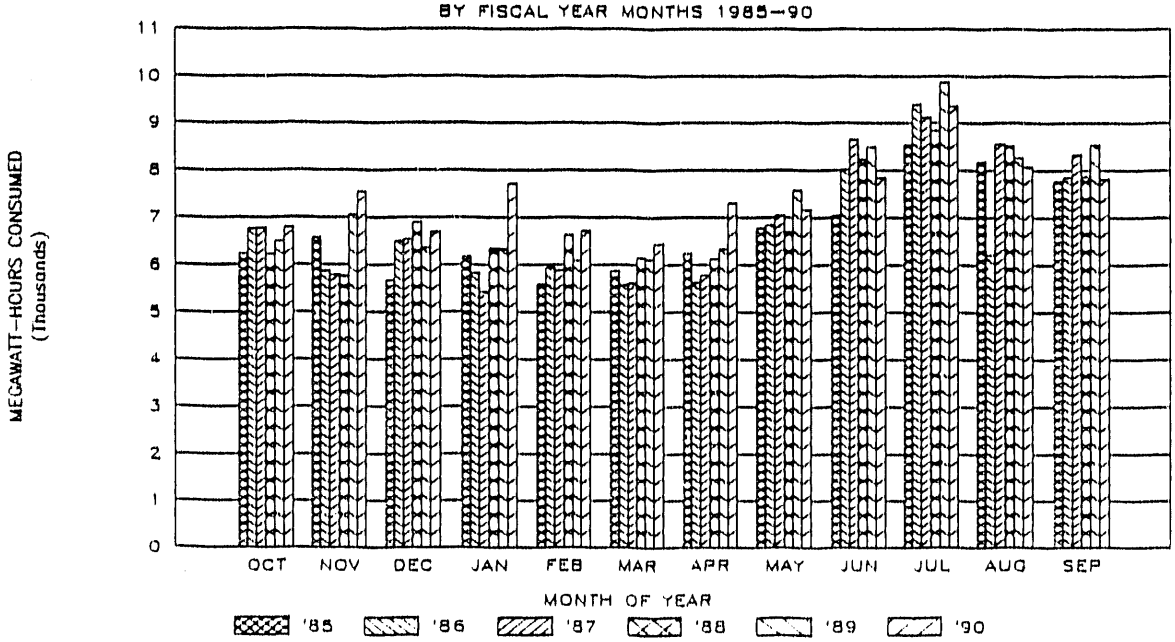
NNMC ELECTRICITY CONSUMPTION

METERED BY PEPCO SUBSTATIONS



NNMC LESS USUHS ELECTRICAL USE

BY FISCAL YEAR MONTHS 1985–90



ANNUAL PEPCO ELECTRIC FEEDER TOTALS - MWH

FEEDER	FY84	FY85	FY86	FY87	FY88	FY89	FY90
USUHS	17,577	17,198	17,074	17,121	17,212	17,608	18,072
NNMC	77,064	80,668	80,420	83,513	84,275	87,537	89,483
TOTAL	94,641	97,866	97,493	100,634	101,486	105,145	107,555

ANNUAL PEPCO ELECTRIC FEEDER AVERAGES - MW

FEEDER	FY84	FY85	FY86	FY87	FY88	FY89	FY90
USUHS	2.01	1.96	1.95	1.95	1.96	2.01	2.06
NNMC	8.80	9.21	9.18	9.53	9.62	9.99	10.21
TOTAL	10.80	11.17	11.13	11.49	11.59	12.00	12.28

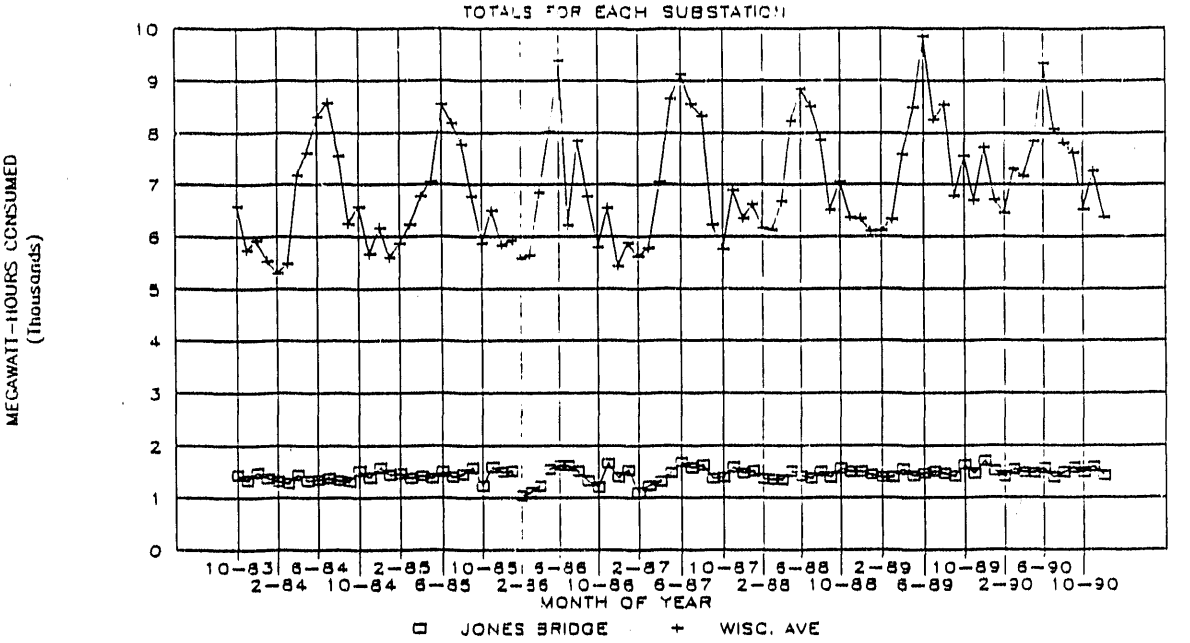
ANNUAL CHANGE IN ELECTRIC FEEDER AVERAGE - KW

FEEDER	FY84	FY85	FY86	FY87	FY88	FY89	FY90
USUHS		-43.28	-14.19	5.38	10.33	45.22	53.06
NNMC		411.47	-28.38	353.13	86.96	372.42	222.11
TOTAL		368.20	-42.57	358.50	97.28	417.64	275.17

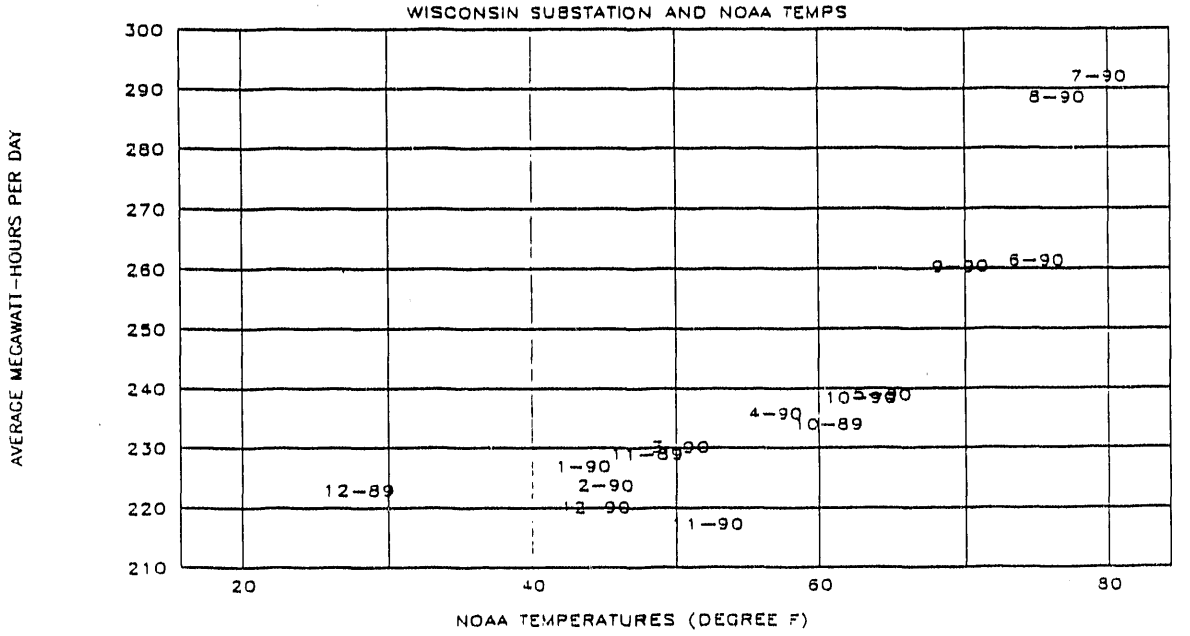
ANNUAL CHANGE IN ELECTRIC FEEDER AVERAGES - %

FEEDER	FY84	FY85	FY86	FY87	FY88	FY89	FY90
USUHS		-2.2%	-0.7%	0.3%	0.5%	2.3%	2.6%
NNMC		4.7%	-0.3%	3.8%	0.9%	3.9%	2.2%
TOTAL		3.4%	-0.4%	3.2%	0.8%	3.6%	2.3%

MONTHLY ELECTRICAL USE FROM NNMC BILLS



DAILY ELECTRIC USE VERSUS TEMPERATURE



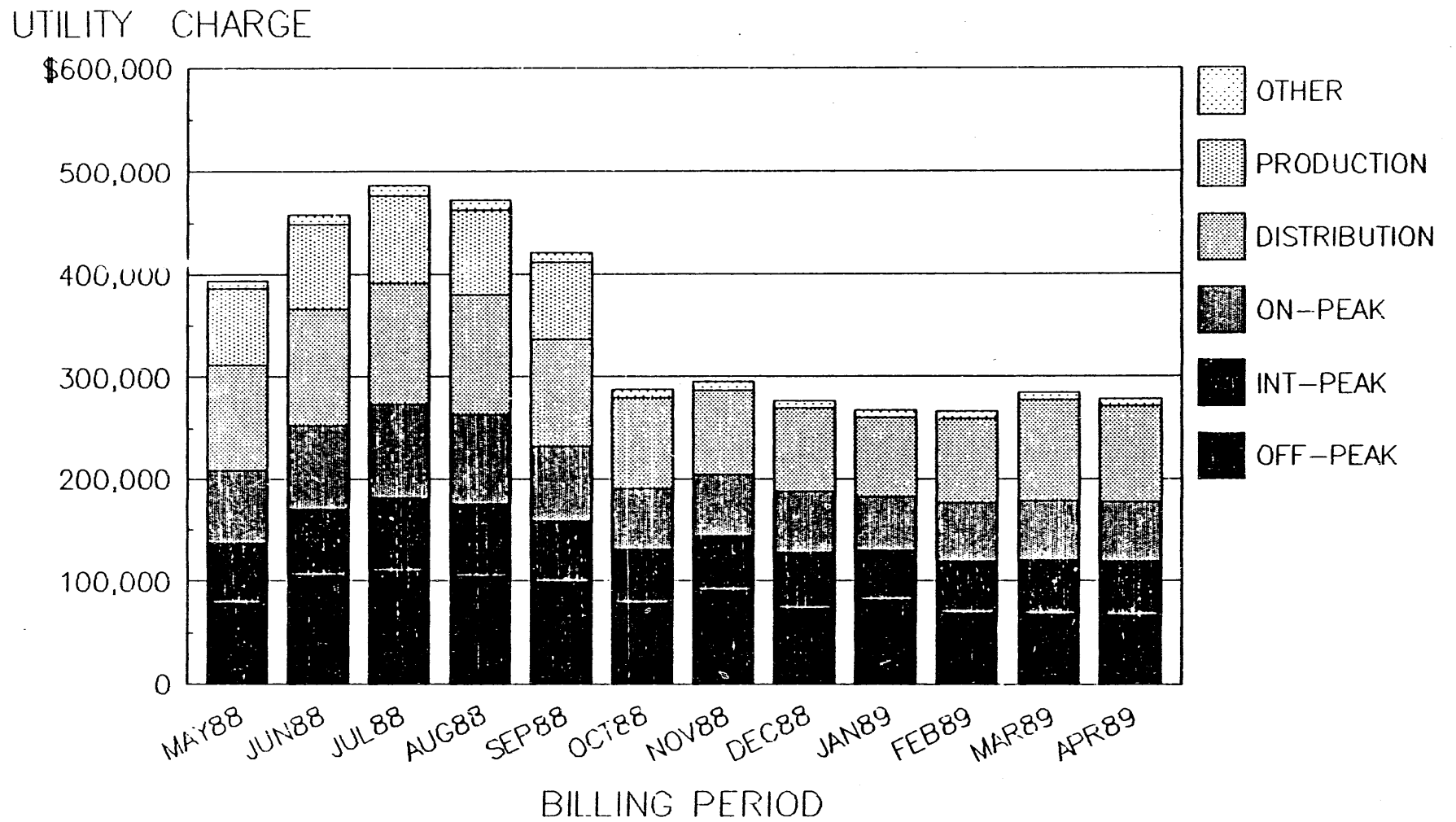
Attachment 3: Electric Utility Tariff Data Summary

ATTACHMENT 3: ELECTRIC UTILITY TARIFF DATA SUMMARY

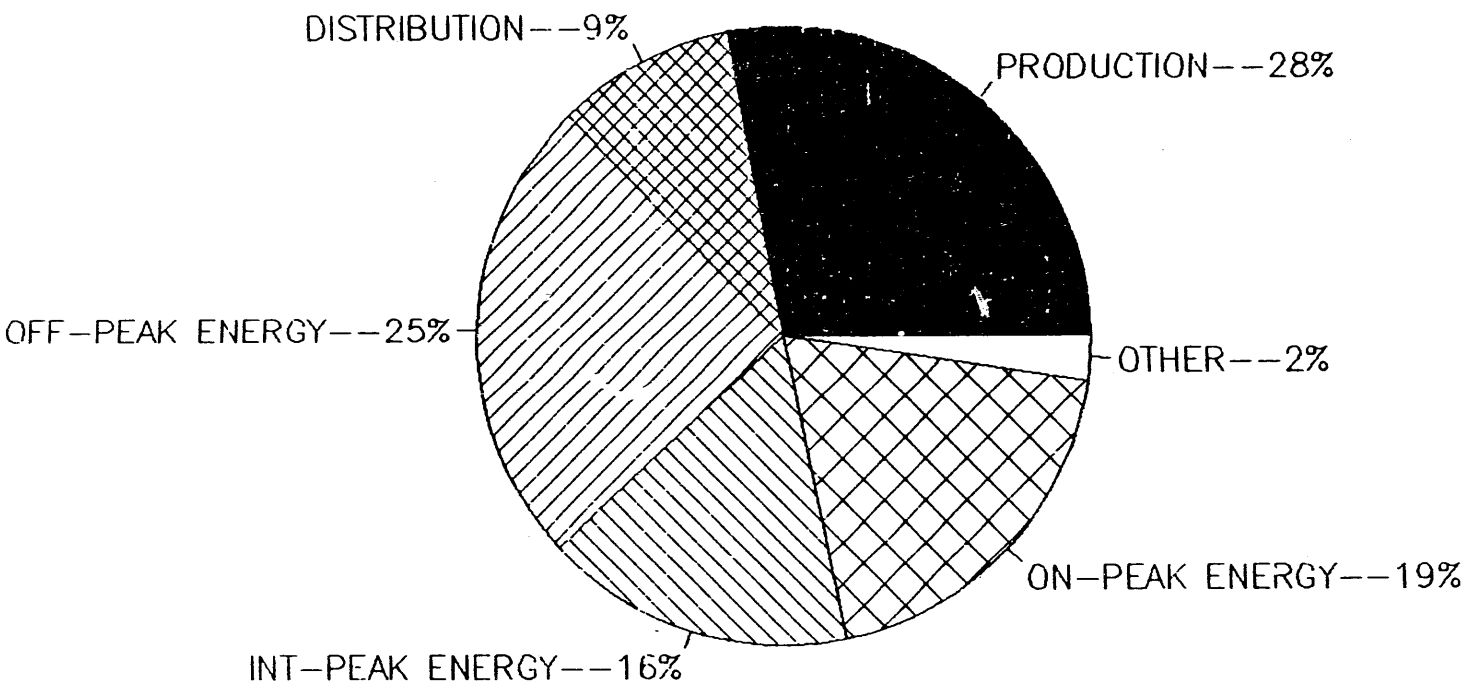
Billing records for the period May 1988 through April 1989 are given in this attachment for each of the substations feeders. The contribution of each component of the utility bill to the total is tabulated and graphed. It is important to appreciate the value of peak demand reductions and energy savings during different billing periods when devising SES projects. Since the PEPCO tariff changed effective June 1, 1989, the last three figures in this attachment compares what the bills will be like in the coming year if the consumption is identical to the prior year.

NNMC ELECTRICAL COST ELEMENTS

PEPCO BILLING FOR WISCONSIN FEED

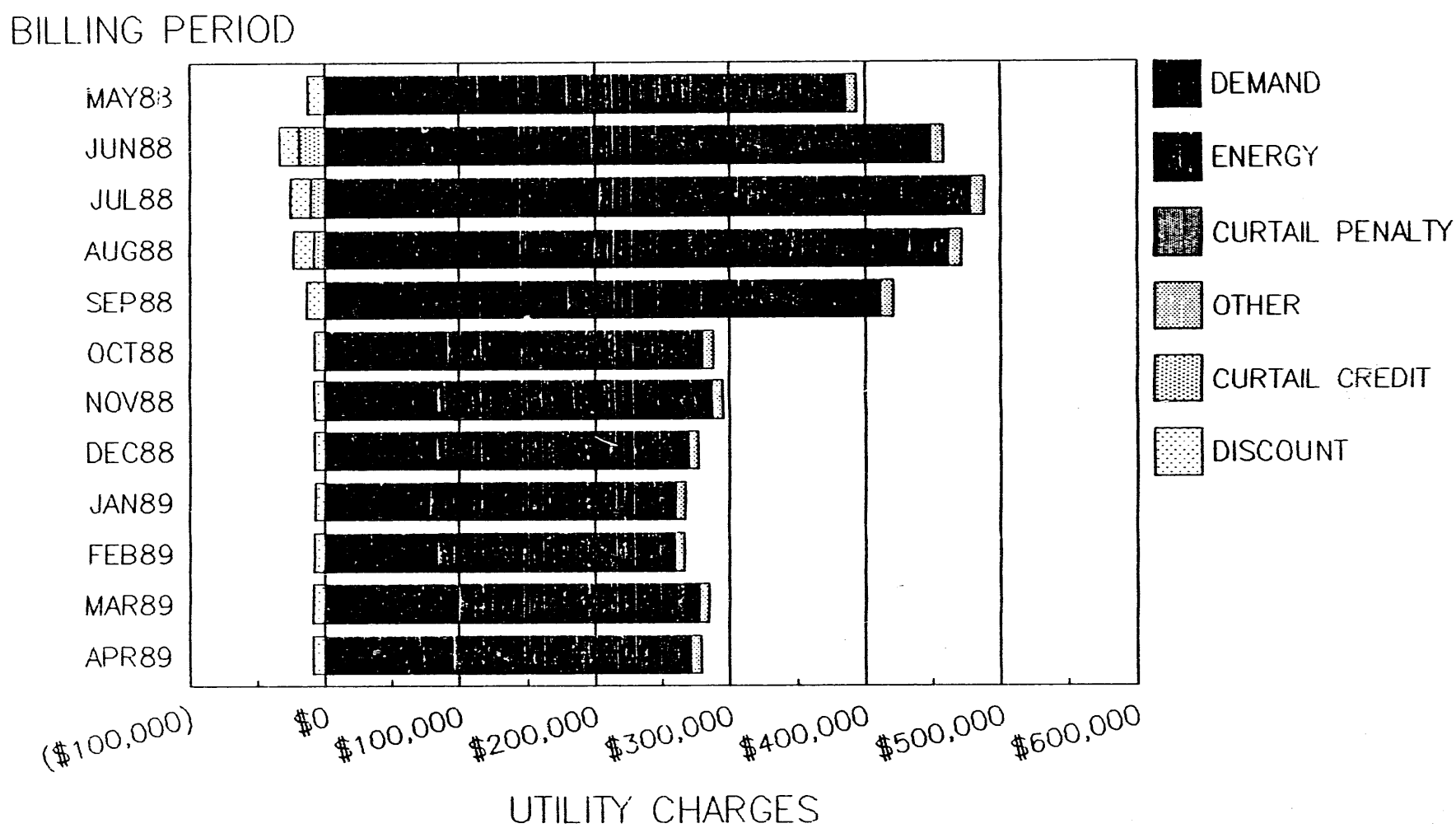


NNMC ELECTRIC BILL MAY88–APR89 CHARGES
FOR WISCONSIN FEED TOTAL OF $4,026,649

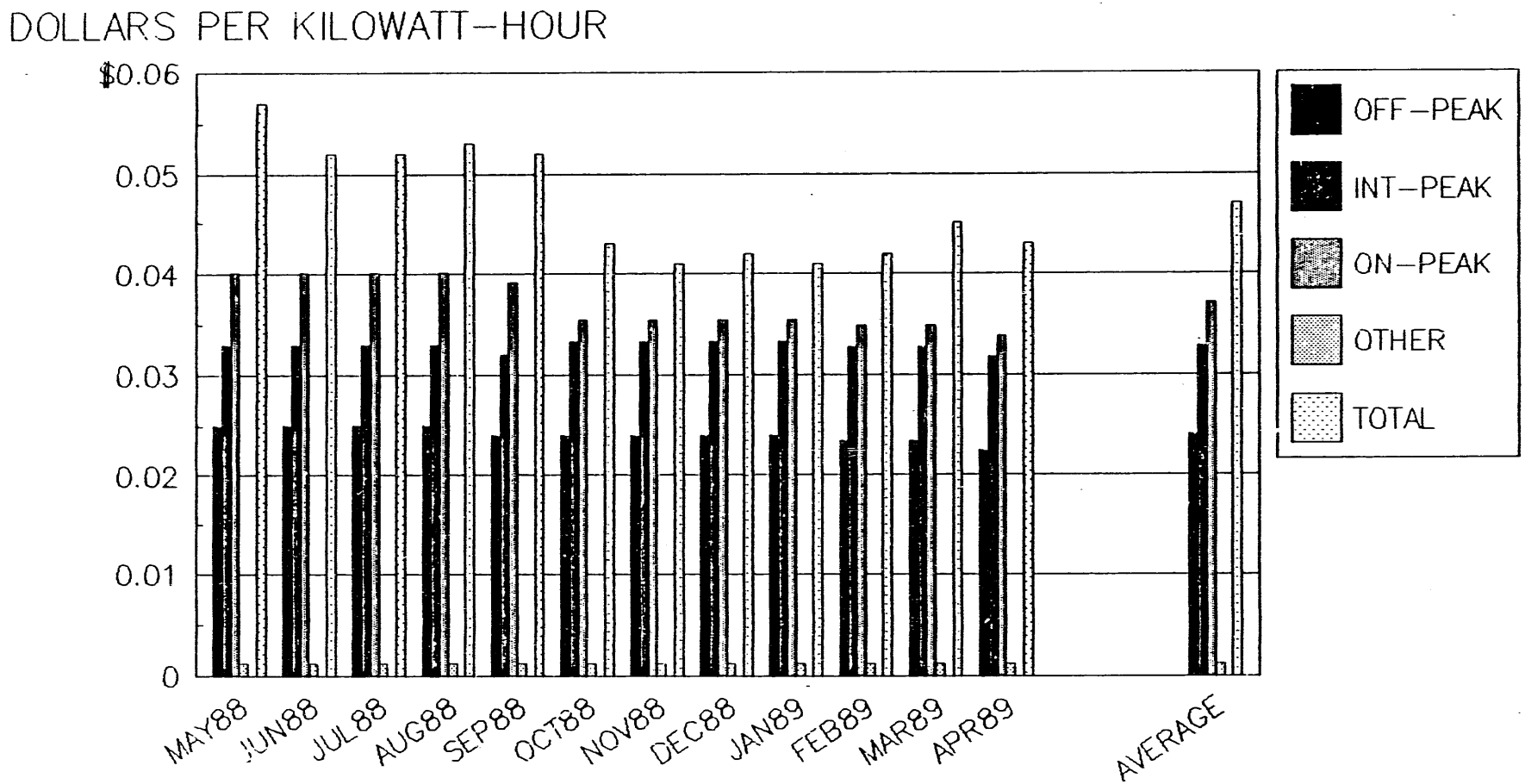


CURTAILMENT AND DISCOUNT ADJUSTMENTS NOT SHOWN

NNMC PEPCO BILLING COMPONENTS
FOR WISCONSIN STREET FEEDER



NNMC PEPCO ELECTRIC ENERGY RATES
INCLUDING FUEL RATE RIDER ADJUSTMENTS



OTHER INCLUDES MD ENVIRONMENTAL SURCHARGE AND MONTGOMERY COUNTY ENERGY TAXES

TOTAL IS CALCULATED BY DIVIDING THE MONTHLY BILL BY THE TOTAL KILOWATT-HOURS CONSUMED IN THE MONTH, THUS INCLUDING DEMAND AND OTHER COSTS

NNMC ELECTRIC BILLING DATA FROM PEPCO
CONSUMPTION DATA
WISCONSIN STREET SUBSTATION

BILLING PERIOD	MAXIMUM DEMAND KW	ON-PEAK KW	CURTAIL CREDIT KW	CURTAIL PENALTY KW	OFF-PEAK KWH	INT-PEAK KWH	ON-PEAK KWH	TOTAL KWH
MAY88	13946	13946	0		3,158,189	1,726,805	1,798,638	6,683,632
JUN88	15395.4	15309.2	2309.2		4,206,463	1,957,961	2,049,603	8,214,027
JUL88	15851.4	15851.4	1241.9	109.5	4,356,975	2,168,502	2,318,574	8,844,051
AUG88	15598.1	15481.5	981.5		4,176,430	2,138,958	2,196,614	8,512,002
SEP88	14057.5	14022			4,127,930	1,835,604	1,900,955	7,864,489
OCT88	12086.2				3,254,818	1,574,070	1,673,970	6,502,858
NOV88	11169				3,772,633	1,607,288	1,675,754	7,055,675
DEC88	11062.6				3,069,357	1,612,893	1,683,317	6,365,567
JAN89	10413.9				3,413,588	1,427,578	1,496,123	6,337,289
FEB89	11123.4				2,959,182	1,527,030	1,610,037	6,096,249
MAR89	13180.8				2,899,957	1,589,131	1,670,909	6,159,997
APR89	12633.5				2,991,995	1,629,525	1,706,550	6,328,070
TOTAL					42,387,517	20,795,345	21,781,044	84,963,906
AVERAGE	13043.15	14922.02	1133.15	109.5	3,532,293	1,732,945	1,815,087	7,080,326

NNMC ELECTRIC BILLING DATA FROM PEPCO
RATE DATA
WISCONSIN STREET SUBSTATION

BILLING PERIOD	MAXIMUM DEMAND PER KW	ON-PEAK DEMAND PER KW	CURTAIL CREDIT PER KW	CURTAIL PENALTY PER KW	OFF-PEAK PER KWH	INT-PEAK PER KWH	ON-PEAK PER KWH	OTHER PER KWH
MAY88	7.4500	5.3000			0.0251	0.0330	0.0401	0.001138
JUN88	7.4500	5.3000	8.2947		0.0251	0.0330	0.0401	0.001138
JUL88	7.4500	5.3000	8.2947	16.5894	0.0251	0.0330	0.0401	0.001167
AUG88	7.4500	5.3000	8.2947		0.0251	0.0330	0.0401	0.001167
SEP88	7.4500	5.3000			0.0241	0.0320	0.0391	0.001167
OCT88	7.4500				0.0241	0.0333	0.0354	0.001167
NOV88	7.4500				0.0241	0.0333	0.0354	0.001167
DEC88	7.4500				0.0241	0.0333	0.0354	0.001167
JAN89	7.4500				0.0241	0.0333	0.0354	0.001167
FEB89	7.5000				0.0235	0.0328	0.0349	0.001167
MAR89	7.5000				0.0235	0.0328	0.0349	0.001167
APR89	7.5000				0.0225	0.0318	0.0339	0.001167
TOTAL								
AVERAGE	7.4625	5.3000	8.2947	16.5894	0.0242	0.0329	0.0371	0.0012

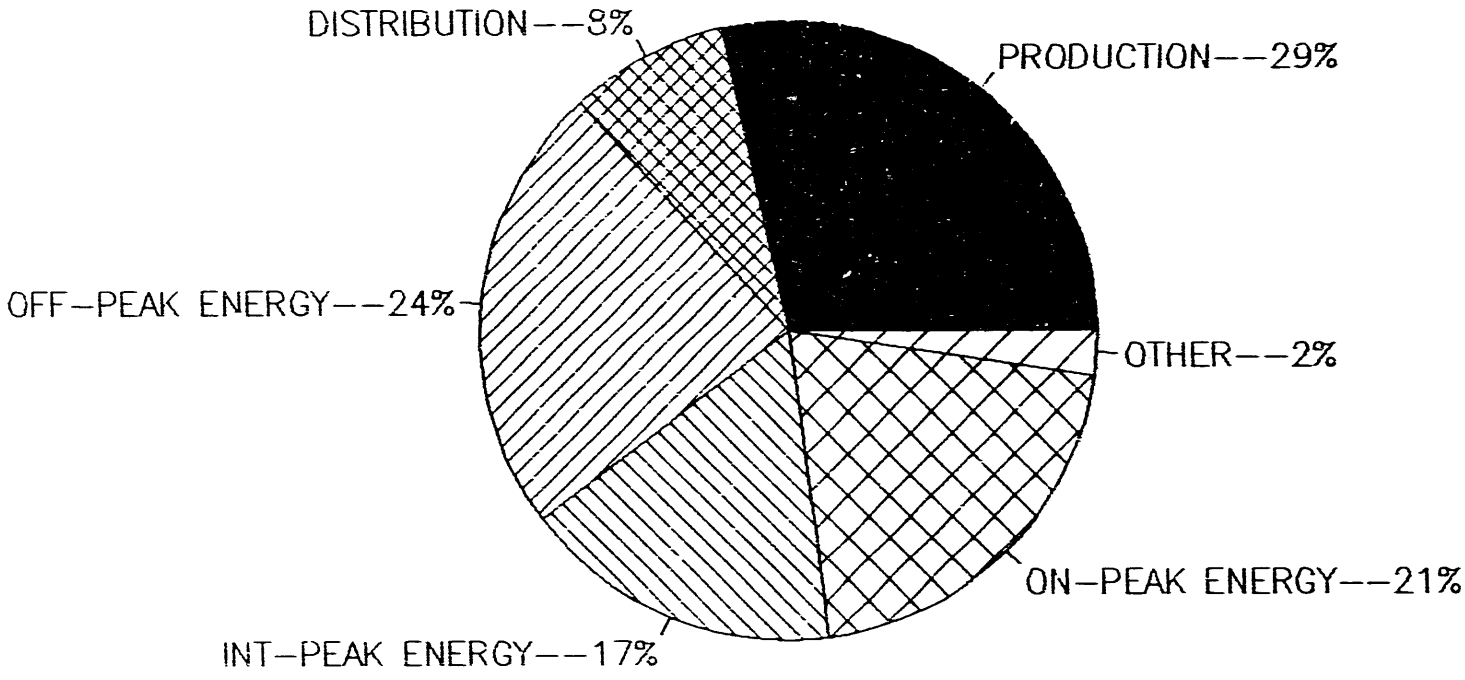
NNMC ELECTRIC BILLING DATA FROM PEPCO
COST DATA
WISCONSIN STREET SUBSTATION

BILLING PERIOD	DISTRIBUTION COST	PRODUCTION COST	OFF-PEAK COST	INT-PEAK COST	ON-PEAK COST	OTHER COST
MAY88	$103,897.70	$73,913.80	$79,300.23	$57,035.33	$72,147.44	$7,605.40
JUN88	$114,695.73	$81,138.76	$105,621.76	$64,670.28	$82,185.89	$9,346.92
JUL88	$118,092.93	$84,012.42	$109,401.03	$71,624.32	$92,944.57	$10,321.55
AUG88	$116,205.85	$82,051.95	$104,867.65	$70,648.50	$88,066.24	$9,934.03
SEP88	$104,728.38	$74,316.60	$99,393.12	$58,736.03	$74,279.79	$9,178.36
OCT88	$90,042.19		$78,402.71	$52,460.92	$59,240.91	$7,589.25
NOV88	$83,209.45		$90,875.94	$53,568.01	$59,303.83	$8,234.01
DEC88	$82,416.37		$73,935.29	$53,754.82	$59,570.56	$7,429.01
JAN89	$77,583.56		$82,227.19	$47,578.60	$52,968.57	$7,396.01
FEB89	$83,425.50		$69,557.64	$50,095.29	$56,178.51	$7,114.71
MAR89	$98,856.00		$68,165.52	$52,132.56	$58,294.77	$7,189.08
APR89	$94,751.25		$67,276.20	$51,795.11	$57,792.66	$7,385.25
TOTAL	$1,167,904.91	$395,433.53	$1,029,024.28	$684,099.77	$812,973.74	$98,723.58
AVERAGE	$97,325.41	$79,086.71	$85,752.02	$57,008.31	$67,747.81	$8,226.96

NNMC ELECTRIC BILLING DATA FROM PEPCO
COST DATA ADJUSTMENTS
WISCONSIN STREET SUBSTATION

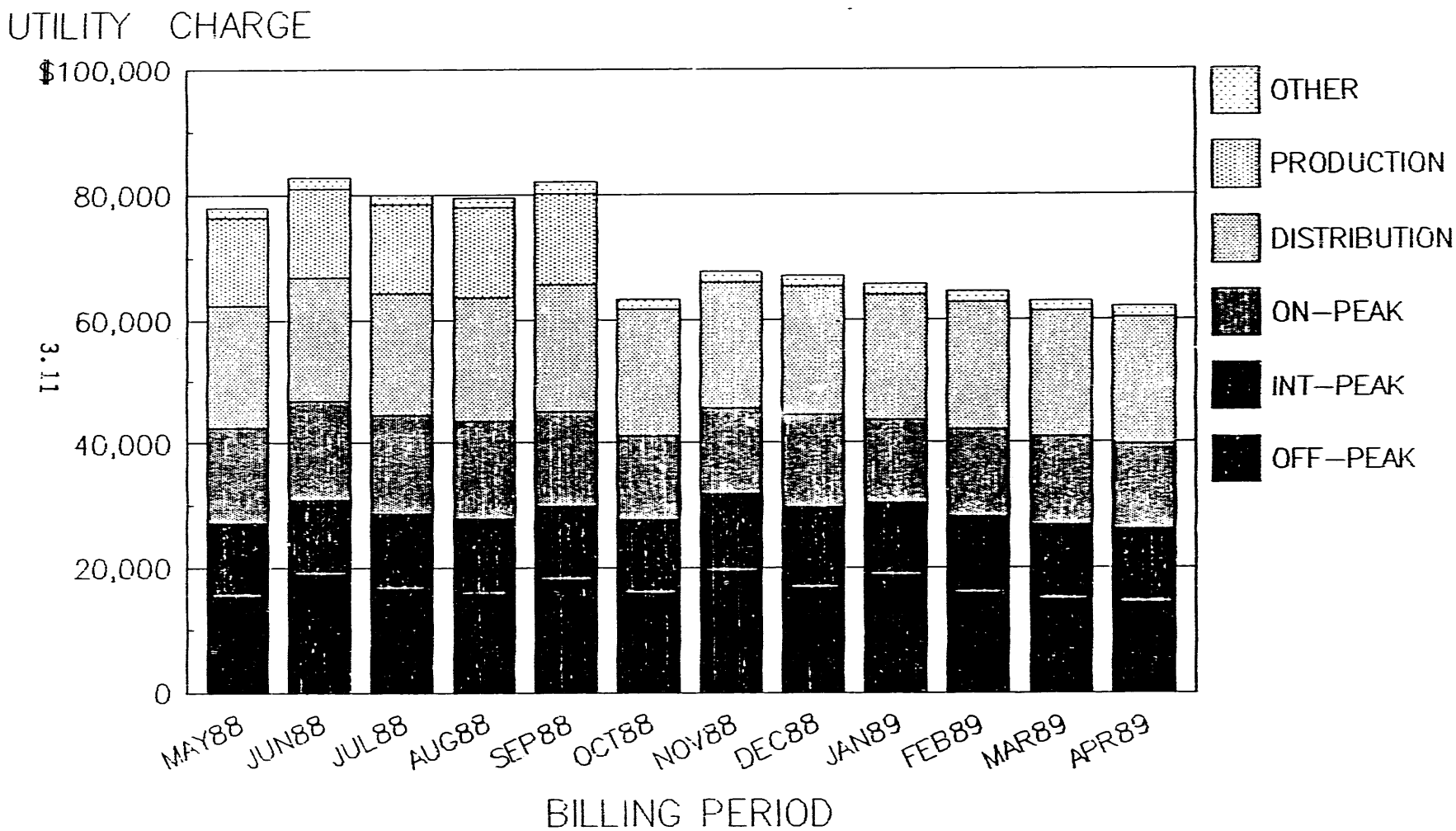
BILLING PERIOD	DISCOUNT	CURTAIL CREDIT	CURTAIL PENALTY	TOTAL COST
MAY88	$12,835.10			$381,064.80
JUN88	$14,452.37	$19,154.12		$424,052.85
JUL88	$15,229.72	$10,301.19	$1,816.54	$462,682.45
AUG88	$14,839.88	$8,141.25		$448,793.09
SEP88	$13,353.80			$407,278.48
OCT88	$8,038.30			$279,697.68
NOV88	$7,871.37			$287,319.87
DEC88	$7,640.83			$269,465.22
JAN89	$7,200.83			$260,553.10
FEB89	$7,559.83			$258,811.82
MAR89	$8,412.93			$276,225.00
APR89	$8,295.11			$270,705.36
TOTAL	$125,730.07	$37,596.56	$1,816.54	$4,026,649.72
AVERAGE	$10,477.51	$12,532.19	$1,816.54	$335,554.14

NNMC ELECTRIC BILL JUN88–MAY89 CHARGES
FOR USUHS FEED TOTAL OF $829,253.27



NNMC ELECTRICAL COST ELEMENTS

PEPCO BILLING FOR USUHS FEED



3.11

NNMC ELECTRIC BILLING DATA FROM PEPCO
CONSUMPTION DATA
JONES BRIDGE SUBSTATION

BILLING PERIOD	MAXIMUM DEMAND KW	ON-PEAK KW	CURTAIL CREDIT KW	CURTAIL PENALTY KW	OFF-PEAK KWH	INT-PEAK KWH	ON-PEAK KWH	TOTAL KWH
MAY88	2675.5	2626.6	0		612,089	356,918	377,429	1,346,436
JUN88	2695.7	2655.4	0		754,736	363,766	391,546	1,510,048
JUL88	2652.5	2652.5	0	0	663,626	361,716	393,265	1,418,607
AUG88	2695.7	2695.7	0		626,625	362,787	388,557	1,377,969
SEP88	2754.7	2754.7			755,529	365,173	385,271	1,505,973
OCT88	2737.4				658,747	351,146	380,008	1,389,901
NOV88	2723				806,232	368,495	388,159	1,562,886
DEC88	2780.6				698,081	386,682	416,336	1,501,099
JAN89	2728.8				784,061	343,760	370,921	1,498,742
FEB89	2750.4				677,794	370,344	398,192	1,446,330
MAR89	2723				629,590	367,053	397,628	1,394,271
APR89	2753.3				637,556	367,898	398,575	1,404,029
TOTAL					8,304,666	4,365,738	4,685,887	17,356,291
AVERAGE	2722.55	2676.98	0	0	692,056	363,812	390,491	1,446,358

NNMC ELECTRIC BILLING DATA FROM PEPCO
COST DATA
JONES BRIDGE SUBSTATION

BILLING PERIOD	DISTRIBUTION COST	PRODUCTION COST	OFF-PEAK COST	INT-PEAK COST	ON-PEAK COST	OTHER COST
MAY88	$19,932.48	$13,920.98	$15,369.19	$11,788.79	$15,299.93	$1,532.16
JUN88	$20,082.97	$14,073.62	$18,950.97	$12,014.97	$15,864.60	$1,718.33
JUL88	$19,761.13	$14,058.25	$16,663.25	$11,947.27	$15,933.36	$1,655.62
AUG88	$20,082.97	$14,287.21	$15,734.18	$11,982.63	$15,745.05	$1,608.19
SEP88	$20,522.51	$14,599.91	$18,191.78	$11,684.88	$15,216.32	$1,757.58
OCT88	$20,393.63		$15,868.03	$11,702.07	$13,605.20	$1,622.08
NOV88	$20,286.35		$19,420.68	$12,281.27	$13,892.67	$1,824.00
DEC88	$20,715.47		$16,815.51	$12,887.42	$14,886.42	$1,751.89
JAN89	$20,329.56		$18,886.62	$11,456.90	$13,284.71	$1,749.14
FEB89	$20,628.00		$15,932.02	$12,149.40	$14,047.87	$1,687.97
MAR89	$20,422.50		$14,798.95	$12,041.43	$14,028.26	$1,627.22
APR89	$20,649.75		$14,335.70	$11,693.78	$13,654.52	$1,638.59
	$243,807.32	$70,939.97	$200,966.88	$143,630.81	$175,458.91	$20,172.77
AVERAGE	$20,317.28	$14,187.99	$16,747.24	$11,969.23	$14,621.58	$1,681.06

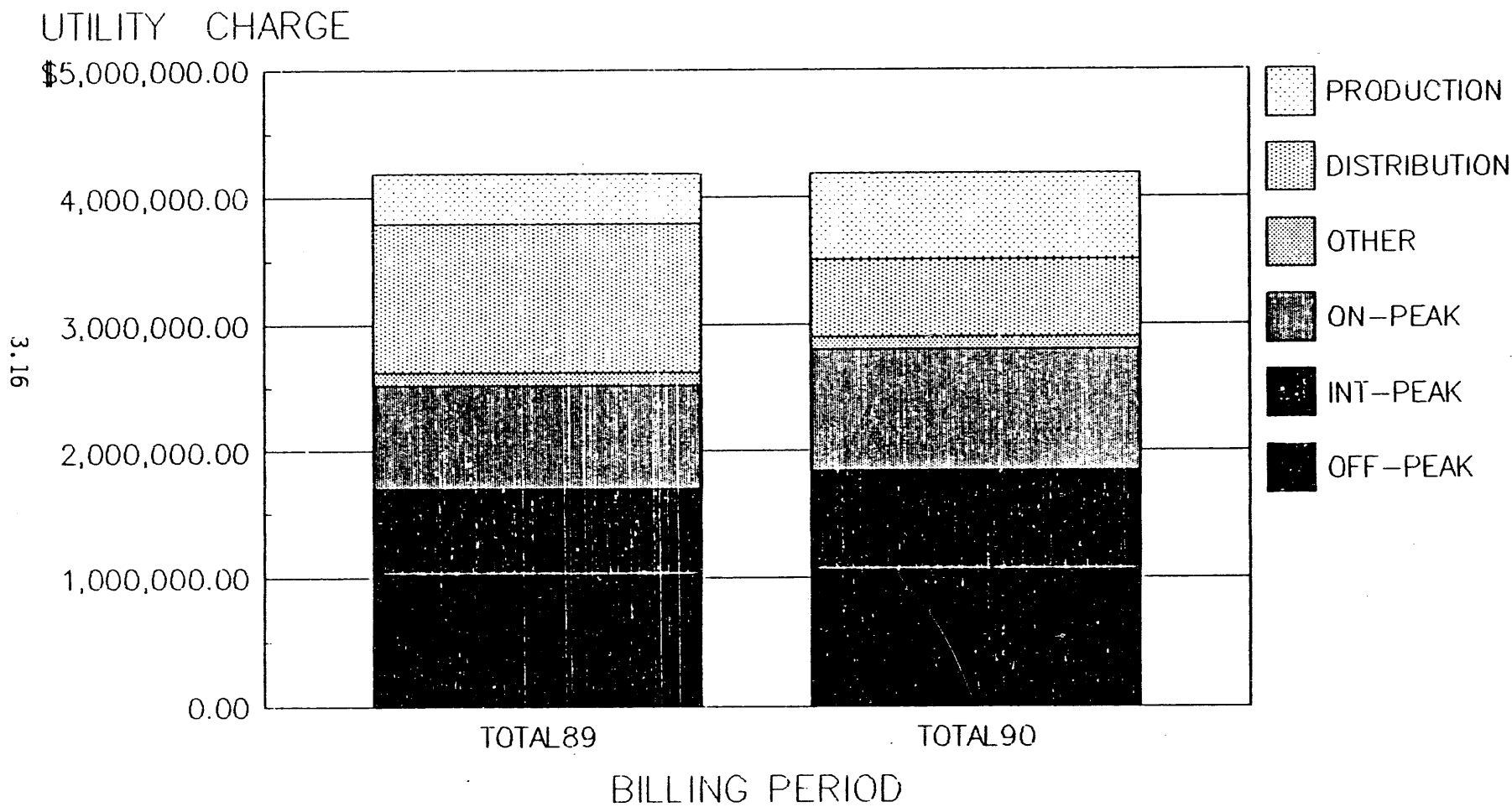
NNMC ELECTRIC BILLING DATA FROM PEPCO
RATE DATA
JONES BRIDGE SUBSTATION

BILLING PERIOD	MAXIMUM DEMAND PER KW	ON-PEAK DEMAND PER KW	CURTAIL CREDIT PER KW	CURTAIL PENALTY PER KW	OFF-PEAK PER KWH	INT-PEAK PER KWH	ON-PEAK PER KWH	OTHER PER KWH
MAY88	7.4500	5.3000			0.0251	0.0330	0.0405	0.001138
JUN88	7.4500	5.3000	ERR		0.0251	0.0330	0.0405	0.001138
JUL88	7.4500	5.3000	ERR	ERR	0.0251	0.0330	0.0405	0.001167
AUG88	7.4500	5.3000	ERR		0.0251	0.0330	0.0405	0.001167
SEP88	7.4500	5.3000			0.0241	0.0320	0.0395	0.001167
OCT88	7.4500				0.0241	0.0333	0.0358	0.001167
NOV88	7.4500				0.0241	0.0333	0.0358	0.001167
DEC88	7.4500				0.0241	0.0333	0.0358	0.001167
JAN89	7.4500				0.0241	0.0333	0.0358	0.001167
FEB89	7.5000				0.0235	0.0328	0.0353	0.001167
MAR89	7.5000				0.0235	0.0328	0.0353	0.001167
APR89	7.5000				0.0225	0.0318	0.0343	0.001167
TOTAL								
AVERAGE	7.4625	5.3000	ERR	ERR	0.0242	0.0329	0.0375	0.0012

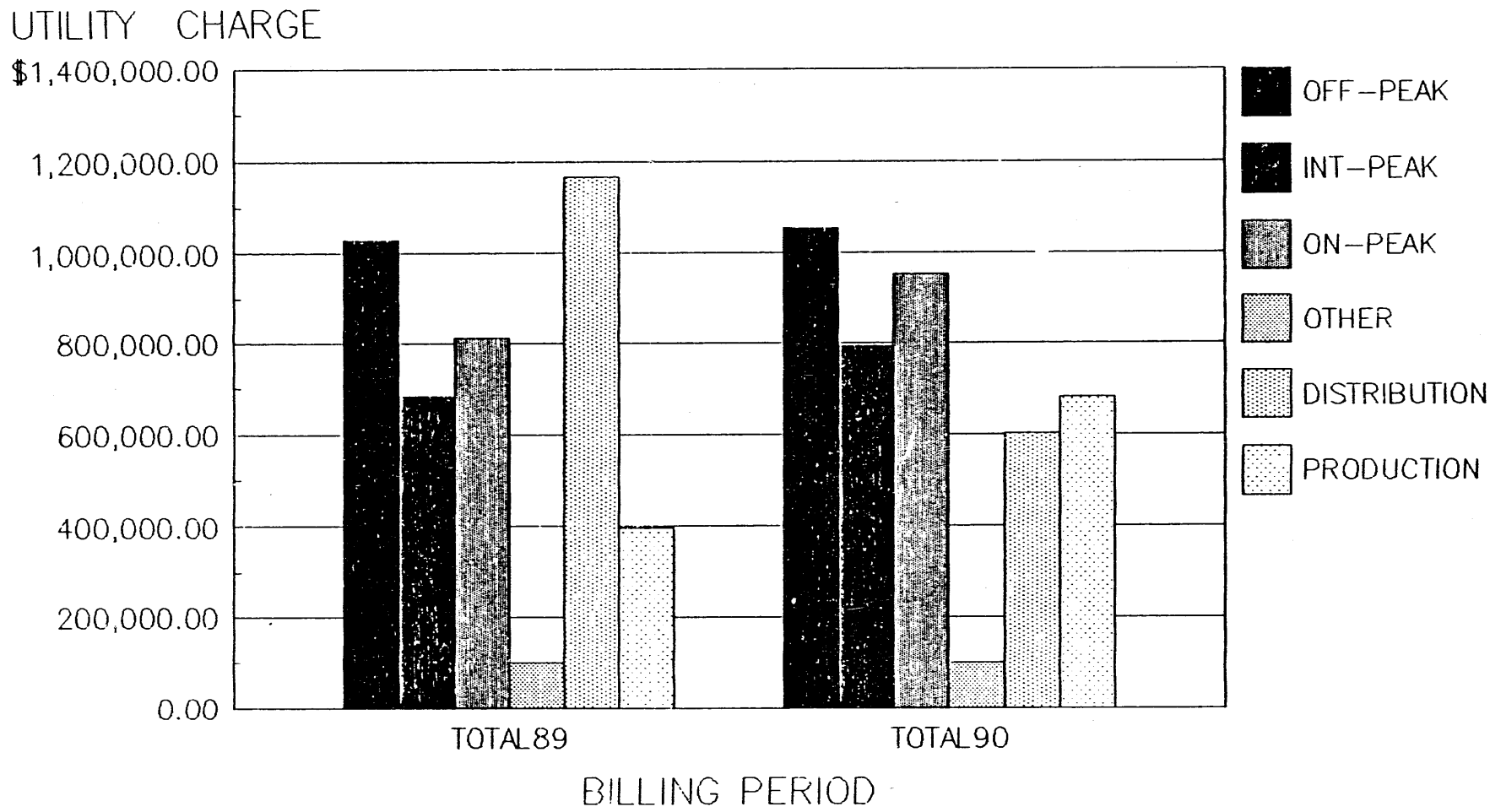
NNMC ELECTRIC BILLING DATA FROM PEPCO
COST DATA ADJUSTMENTS
JONES BRIDGE SUBSTATION

BILLING PERIOD	DISCOUNT	CURTAIL CREDIT	CURTAIL PENALTY	TOTAL COST
MAY88	$2,510.24			$75,333.29
JUN88	$2,585.41	$0.00		$80,120.05
JUL88	$2,542.86	$0.00	$0.00	$77,476.02
AUG88	$2,555.70	$0.00		$76,884.53
SEP88	$2,628.43			$79,344.55
OCT88	$1,802.67			$61,388.34
NOV88	$1,859.46			$65,845.51
DEC88	$1,887.36			$65,169.35
JAN89	$1,822.17			$63,884.76
FEB89	$1,856.00			$62,589.26
MAR89	$1,828.84			$61,089.52
APR89	$1,843.95			$60,128.39
TOTAL	$25,723.09	$0.00	$0.00	$829,253.57
AVERAGE	$2,143.59	$0.00	$0.00	$69,104.46

NNMC ELECTRICAL COST COMPARISON
OF ACTUAL 88-89 VERSUS NEW PEPCO RATES



NNMC ELECTRICAL COST COMPARISON
OF ACTUAL 88-89 VERSUS NEW PEPCO RATES



ELECTRICAL COST COMPARISON
FOR THE NATIONAL NAVAL MEDICAL CENTER

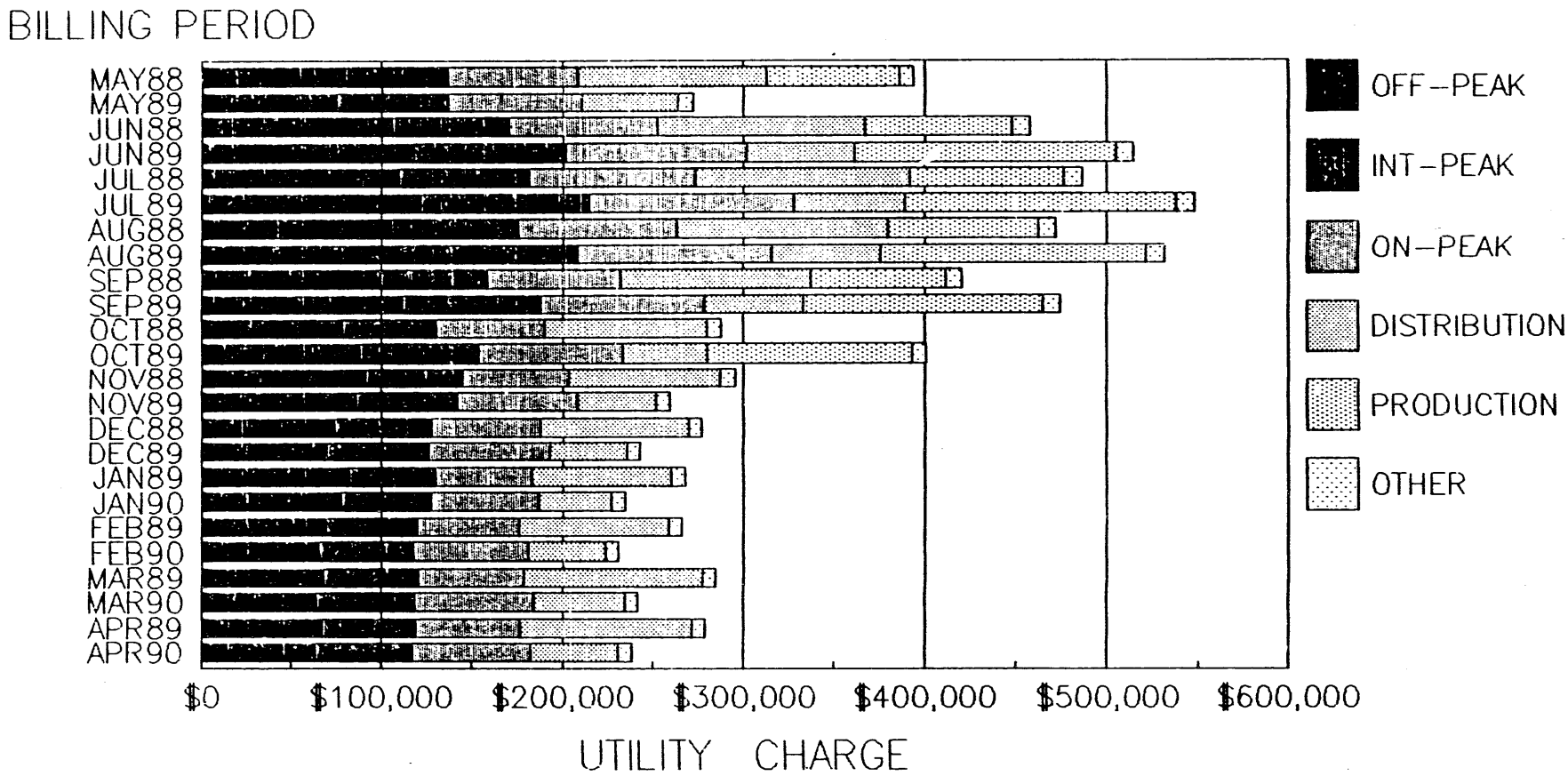


FIGURE 3: NNMC ELECTRIC UTILITY CHARGES COMPARISON OF COST USING 1988-89 CONSUMPTION AND ACTUAL AND PROJECTED RATE STRUCTURES

Attachment 4: Electric Usage Component Data Summary

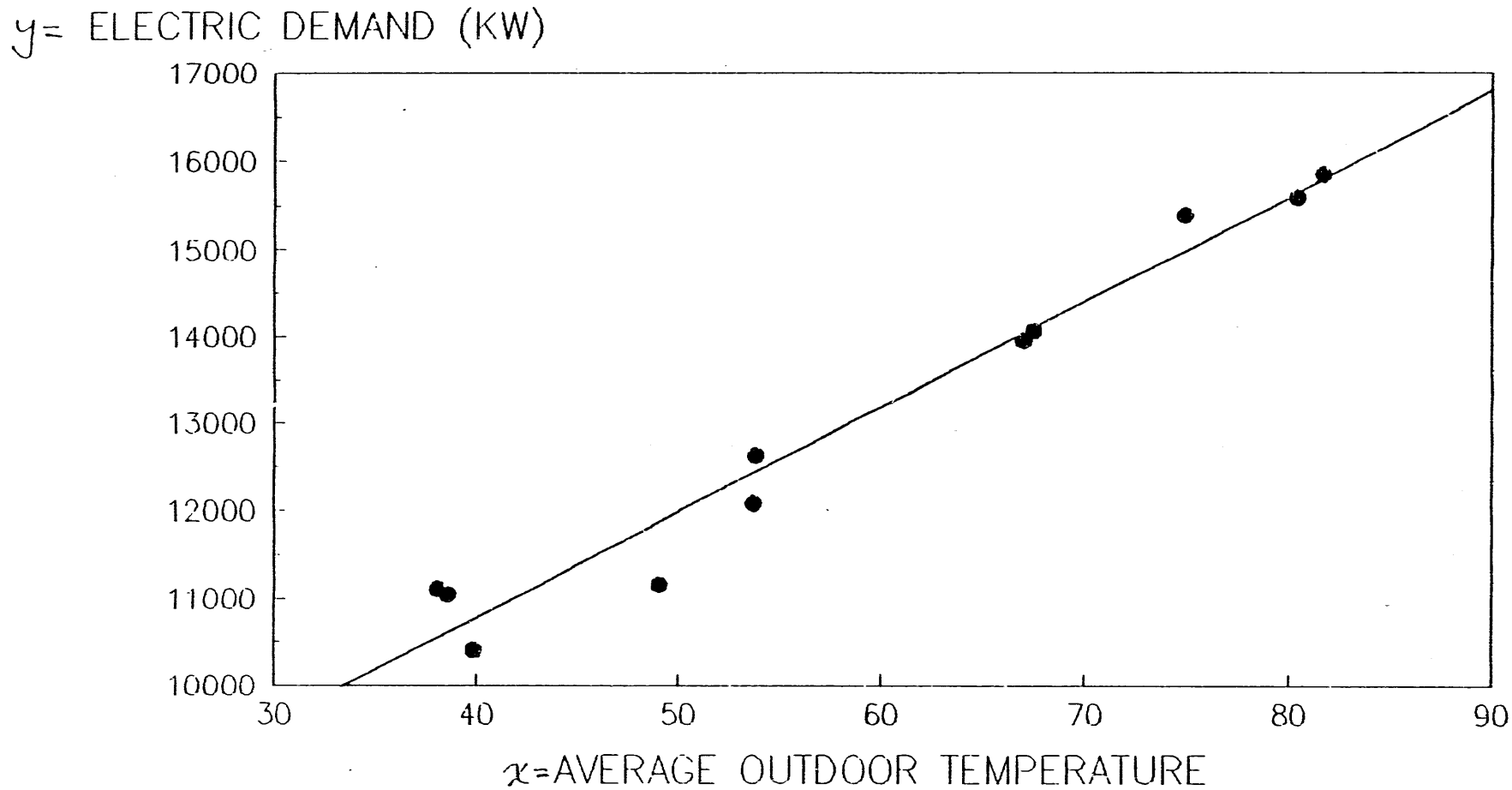
ATTACHMENT 4: ELECTRIC USAGE COMPONENT DATA SUMMARY

The relationship of electrical demand and consumption to outdoor temperature was analyzed. The demand and on peak energy both increase as the average outdoor temperature increases. The relationship between the demand and consumption and the average outdoor temperature is directly proportional and nearly a straight line. Those months where the electrical demand or energy usage do not fall on this straight line are due to months when absorption chillers are used to meet cooling requirements and unusual process loads such as research equipment are used heavily.

A set of plots of monthly electrical demand and on-peak, off-peak, and intermediate billing period consumption levels were also produced. These plots again reveal that electrical demand and on-peak electrical consumption are strongly related to outdoor temperature, due to the fact that high cooling requirements occur during warmer periods.

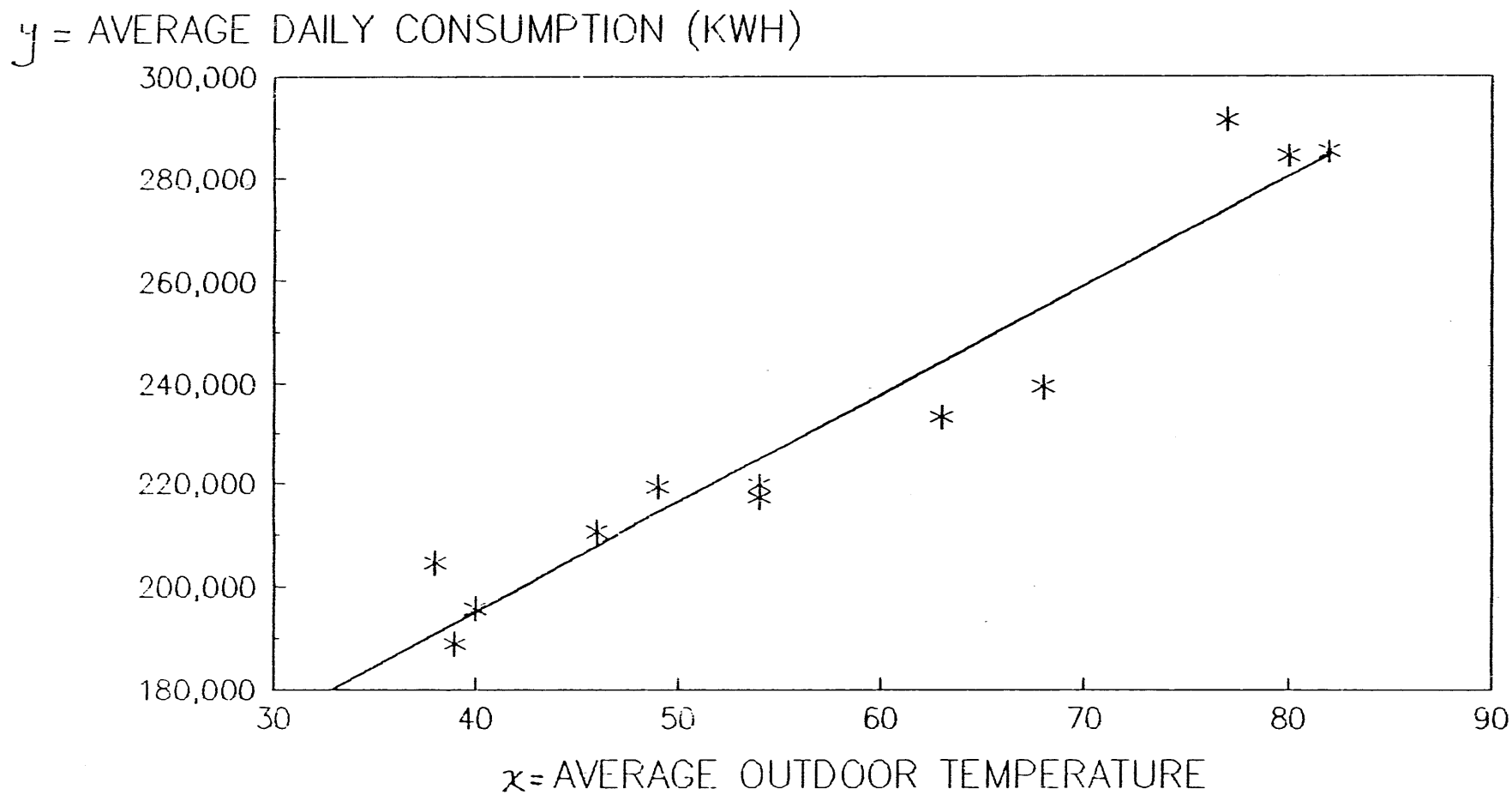
The balance of material in this attachment are 15-minute kilowatt hour plots supplied by PEPCO for typical working and non-working days within each of four seasons. These plots reveal that baseline non-working day consumption levels are almost constant for the Wisconsin Ave. substation at about 7.5 megawatts (the values of kWh per 15 minute interval must be multiplied by 4 to derive kW demands) in the winter and increase to about 12 MW in the summer. On working days these baseload levels typically increase to approximately 10 and 16 megawatts respectively.

NNMC ELECTRIC DEMAND
VERSUS AVERAGE TEMPERATURE
EXCLUDING MARCH 1989

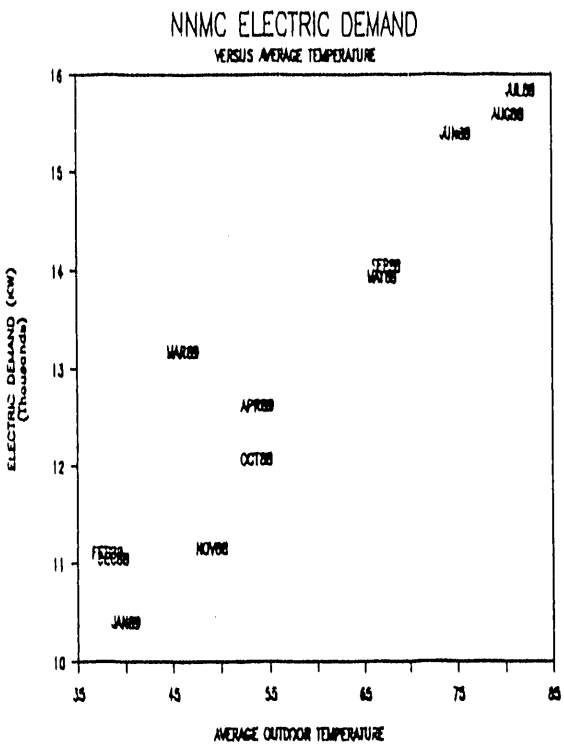


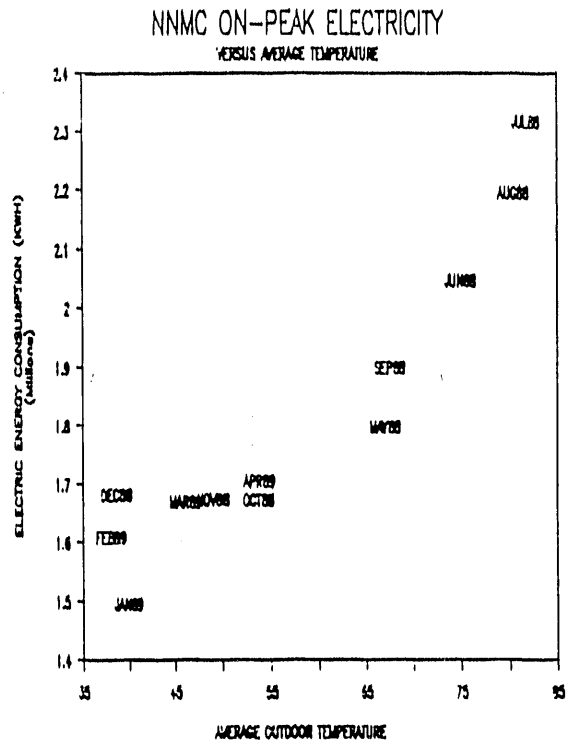
A LINEAR CURVE IS FIT TO THESE DATA
R-SQUARE IS .967, EQUATION FORM IS: $y = A + Bx$
WITH A=5991.5 AND B=120.112

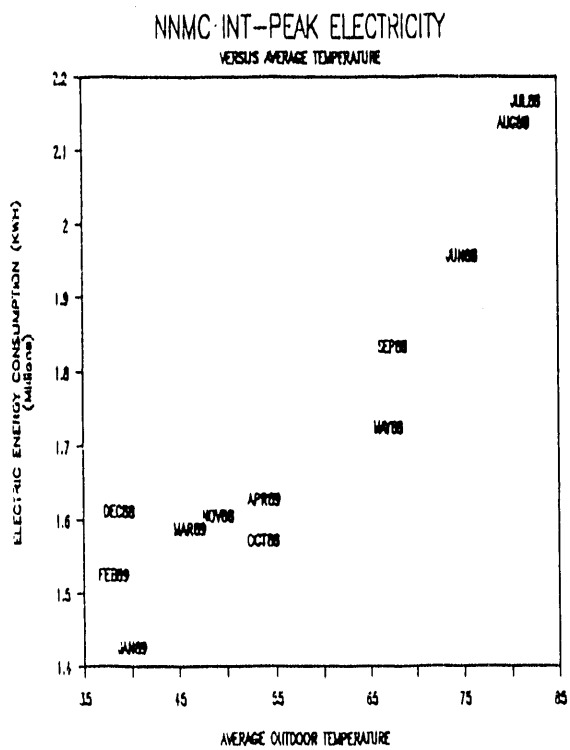
MONTHLY NNMC ELECTRIC CONSUMPTION
VERSUS AVERAGE OUTDOOR TEMPERATURE

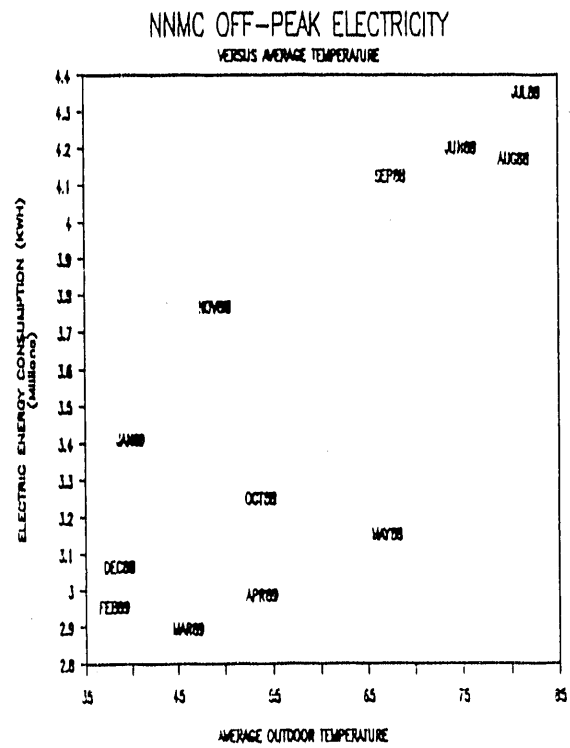


A LINEAR CURVE IS FIT TO THESE DATA
R-SQUARE IS .928, EQUATION FORM IS: $y = A + Bx$
WITH A=109866.77 AND B=2132.91


NNMC ELECTRIC DEMAND
VERSUS AVERAGE TEMPERATURE
ELECTRIC DEMAND (KW)
(Thousands)
AVERAGE OUTDOOR TEMPERATURE


NNMC ON-PEAK ELECTRICITY
VERSUS AVERAGE TEMPERATURE
ELECTRIC ENERGY CONSUMPTION (KWH)
(Millions)
AVERAGE OUTDOOR TEMPERATURE

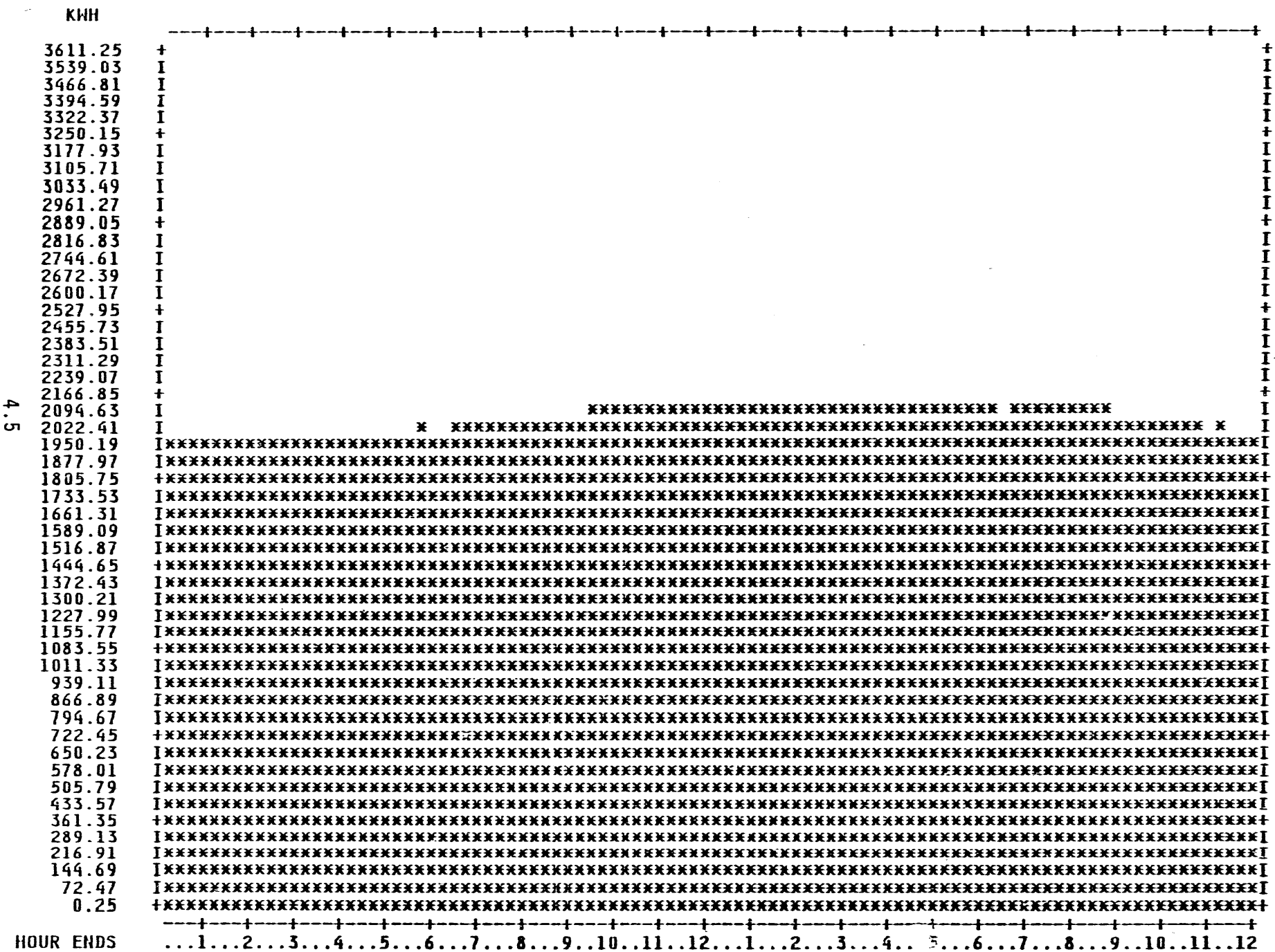

NNMC INT-PEAK ELECTRICITY
VERSUS AVERAGE TEMPERATURE
ELECTRIC ENERGY CONSUMPTION (KWH)
(Millions)
AVERAGE OUTDOOR TEMPERATURE


NNMC OFF-PEAK ELECTRICITY
VERSUS AVERAGE TEMPERATURE
ELECTRIC ENERGY CONSUMPTION (KWH)
(Millions)
AVERAGE OUTDOOR TEMPERATURE

MULT = 2.5338

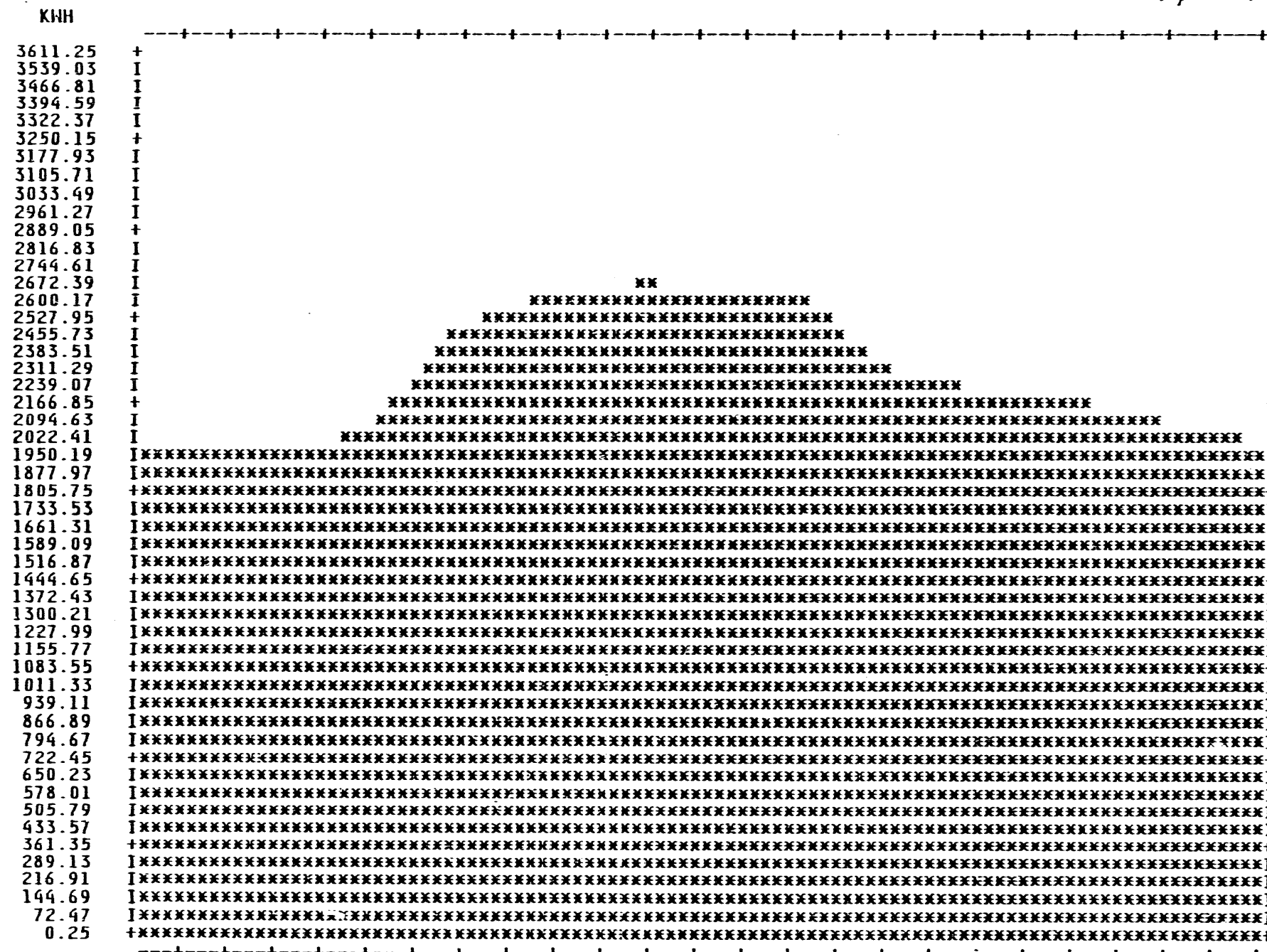
PLOT OF KILOWATT HOURS VERSUS TIME - 15 MINUTE INTERVALS

2730147002 4-202 NAVAL MEDICAL CTR FROM 880330 TO 880428 PLOT FOR DATE 880409 Saturday April 9, 1988



PLOT OF KILOWATT HOURS VERSUS TIME - 15 MINUTE INTERVALS

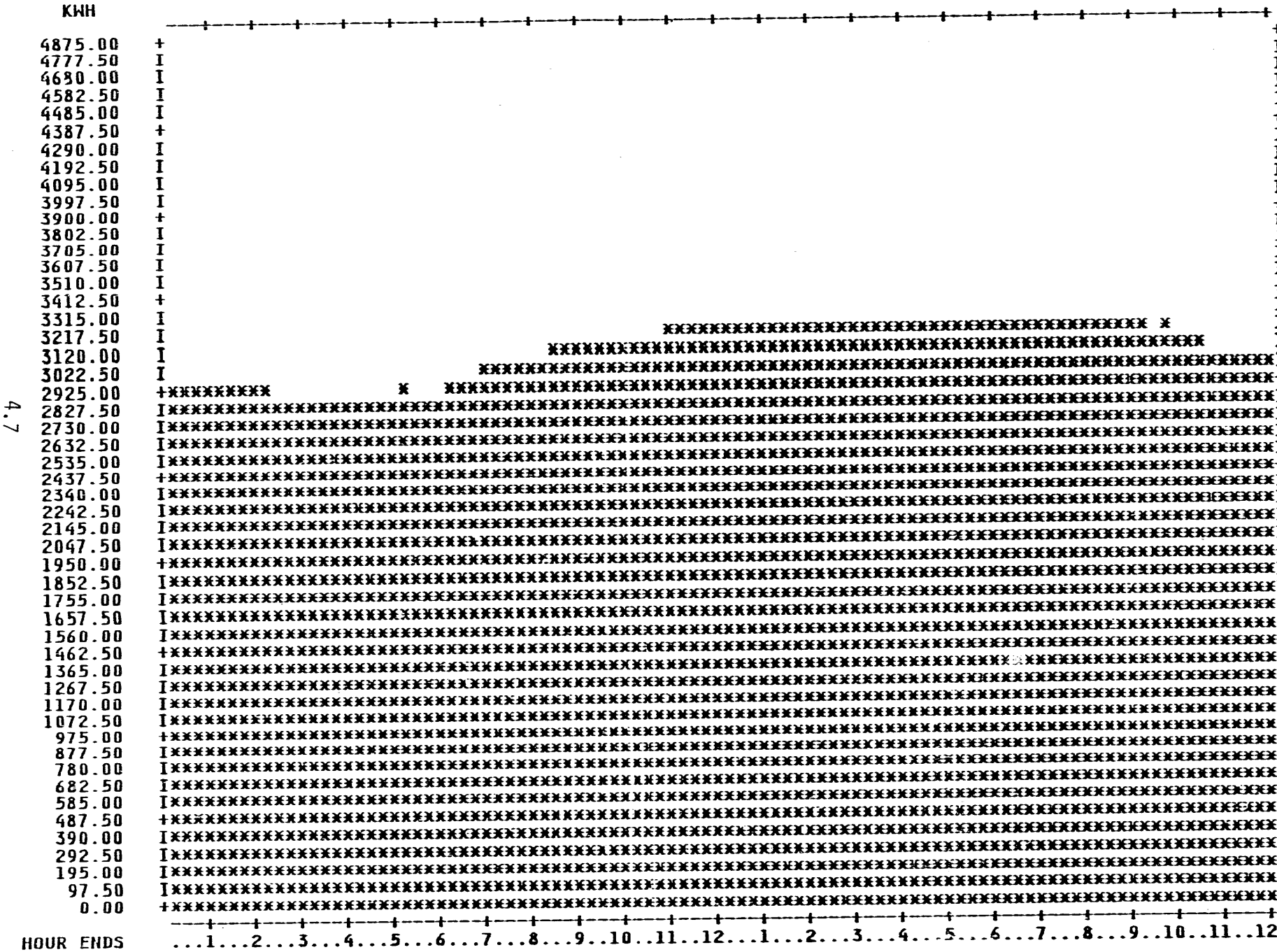
2730147002 4-202 NAVAL MEDICAL CTR FROM 880330 TO 880428 PLOT FOR DATE 880408 Friday April 8, 1988



PLOT OF KILOWATT HOURS VERSUS TIME - 15 MINUTE INTERVALS

2730147002 4-202 NAVAL MEDICAL CTR FROM 880728 TO 880826 PLOT FOR DATE 880731

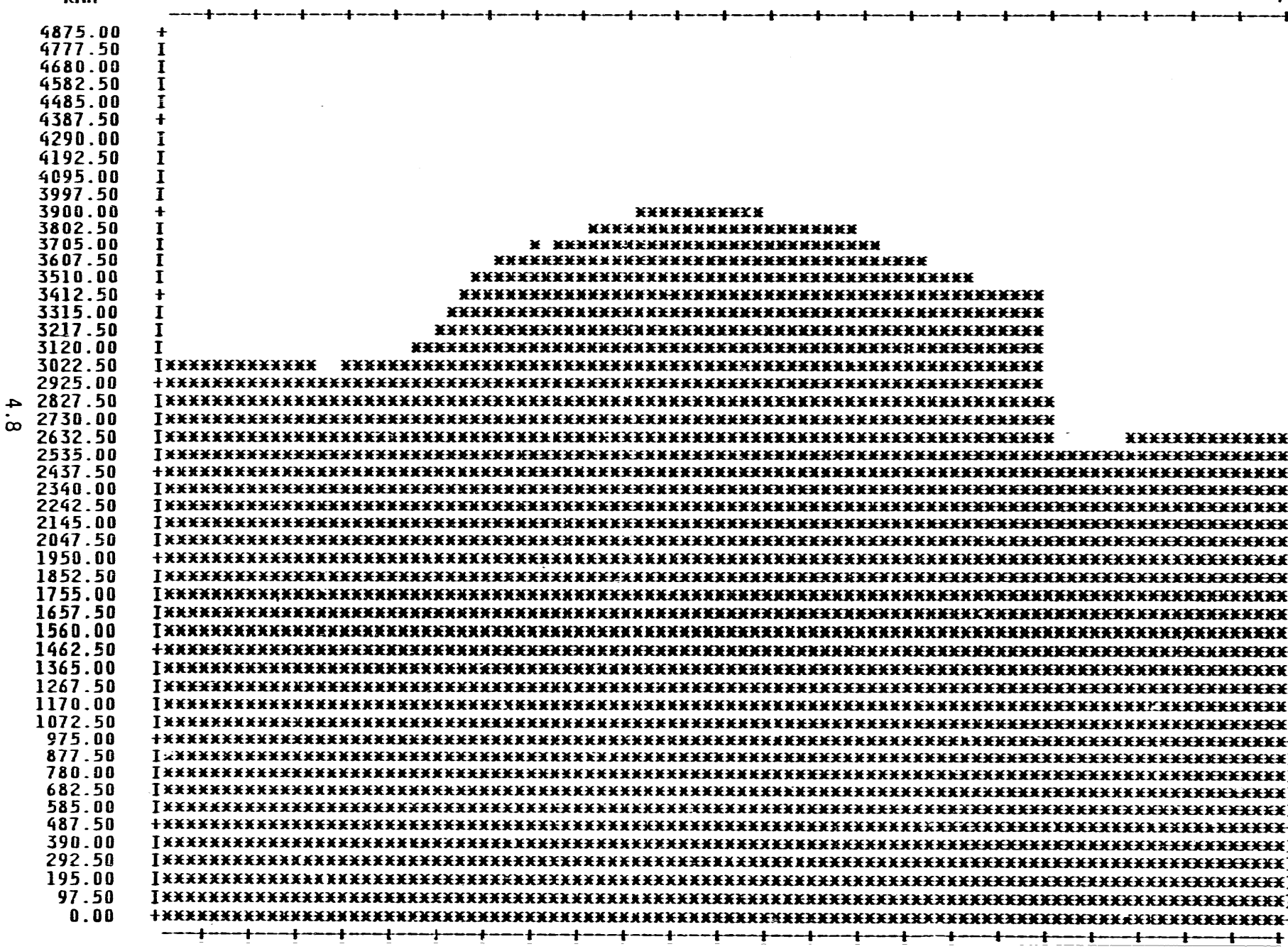
Sunday July 31



PLOT OF KILOWATT HOURS VERSUS TIME - 15 MINUTE INTERVALS

2730147002 4-202 NAVAL MEDICAL CTR FROM 880728 TO 880826 PLOT FOR DATE 880801

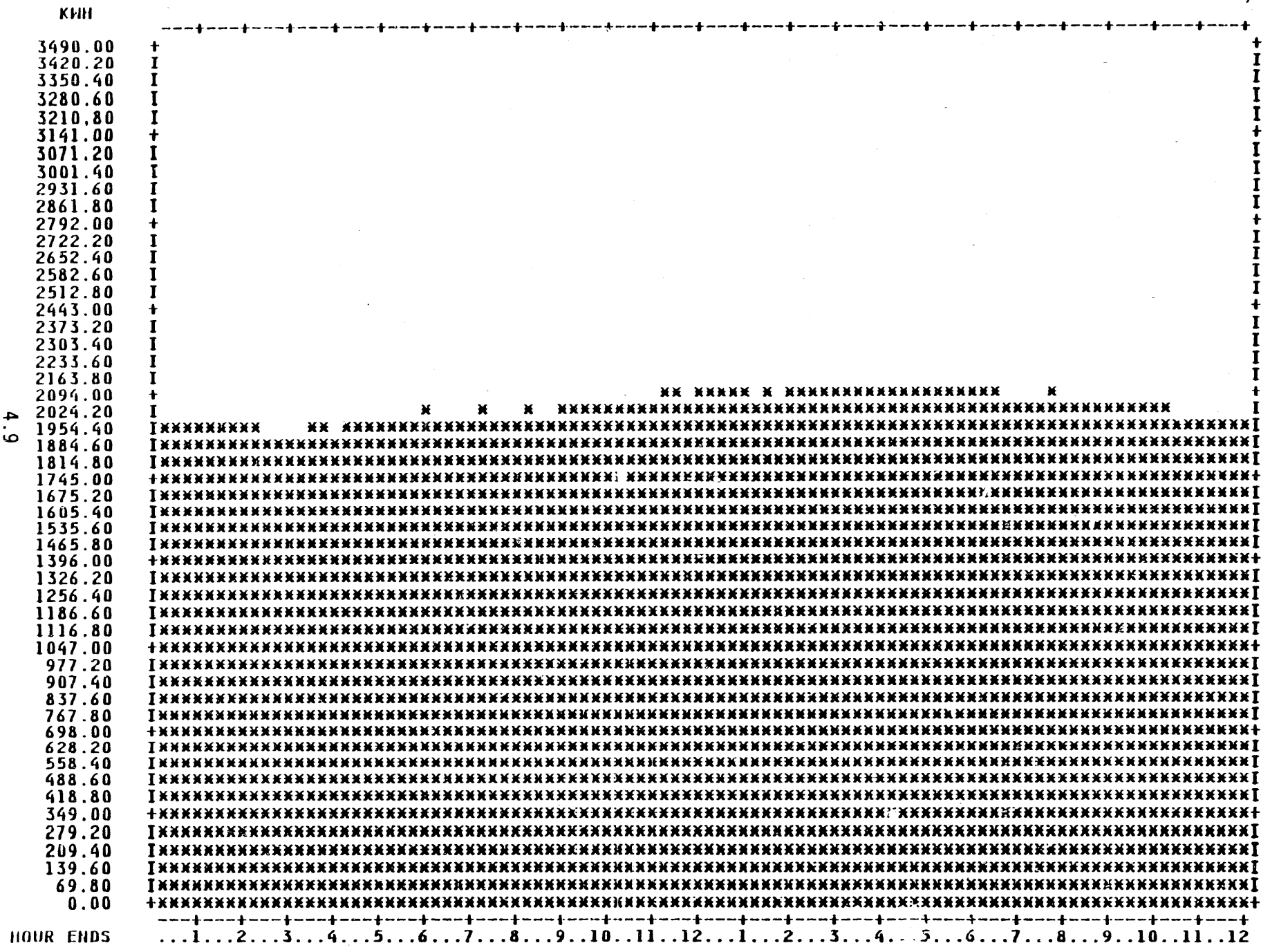
Monday August 1, 1988



PLOT OF KILOWATT HOURS VERSUS TIME - 15 MINUTE INTERVALS

2730147002 4-202 NAVAL MEDICAL CTR FROM 881026 TO 881128 PLOT FOR DATE 881030

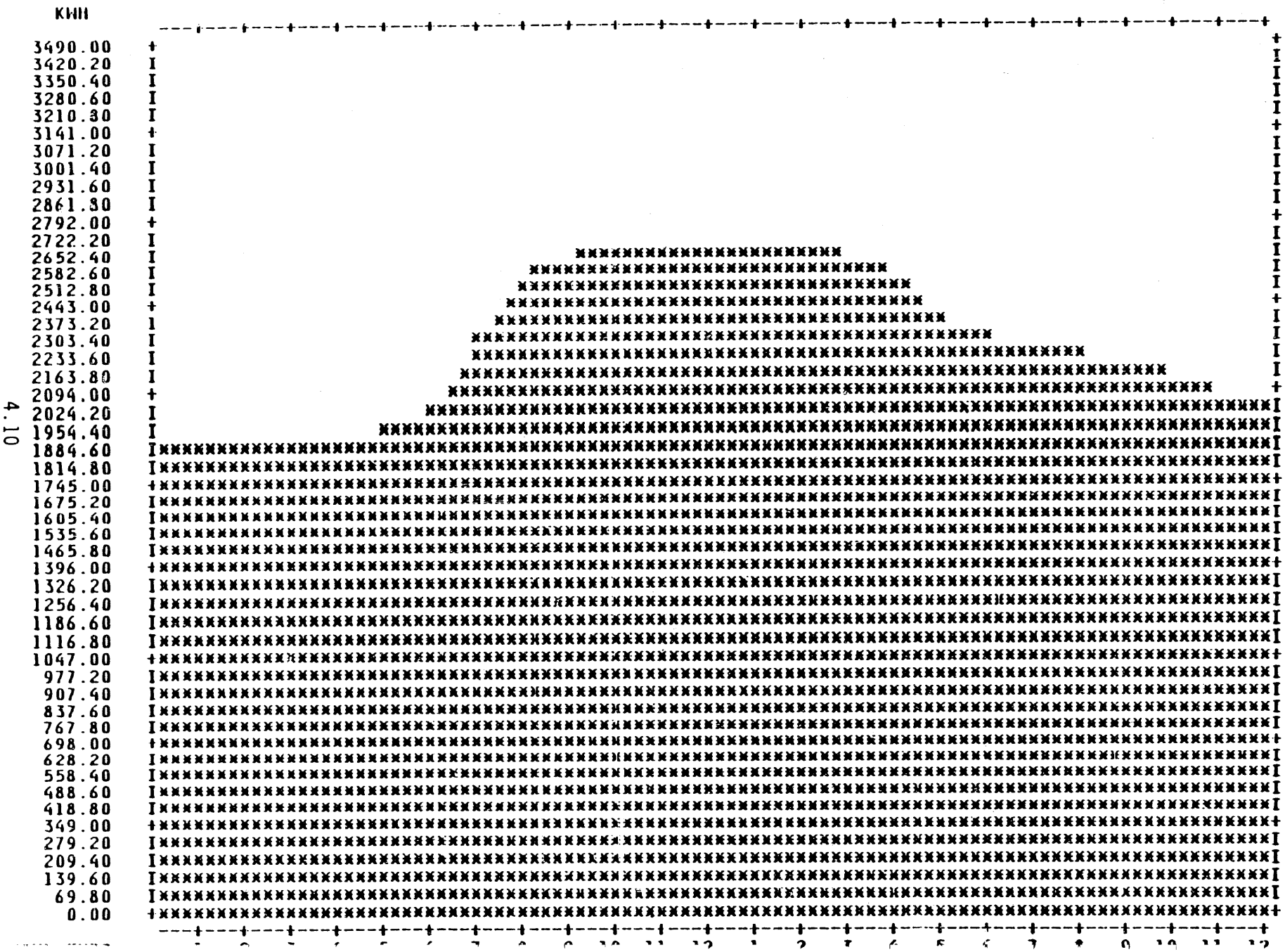
Sunday October 30, 1988



PLOT OF KILOHATT HOURS VERSUS TIME - 15 MINUTE INTERVALS

2/30147002 4-202 NAVAL MEDICAL CTR FROM 881026 TO 881128 PLOT FOR DATE 881031

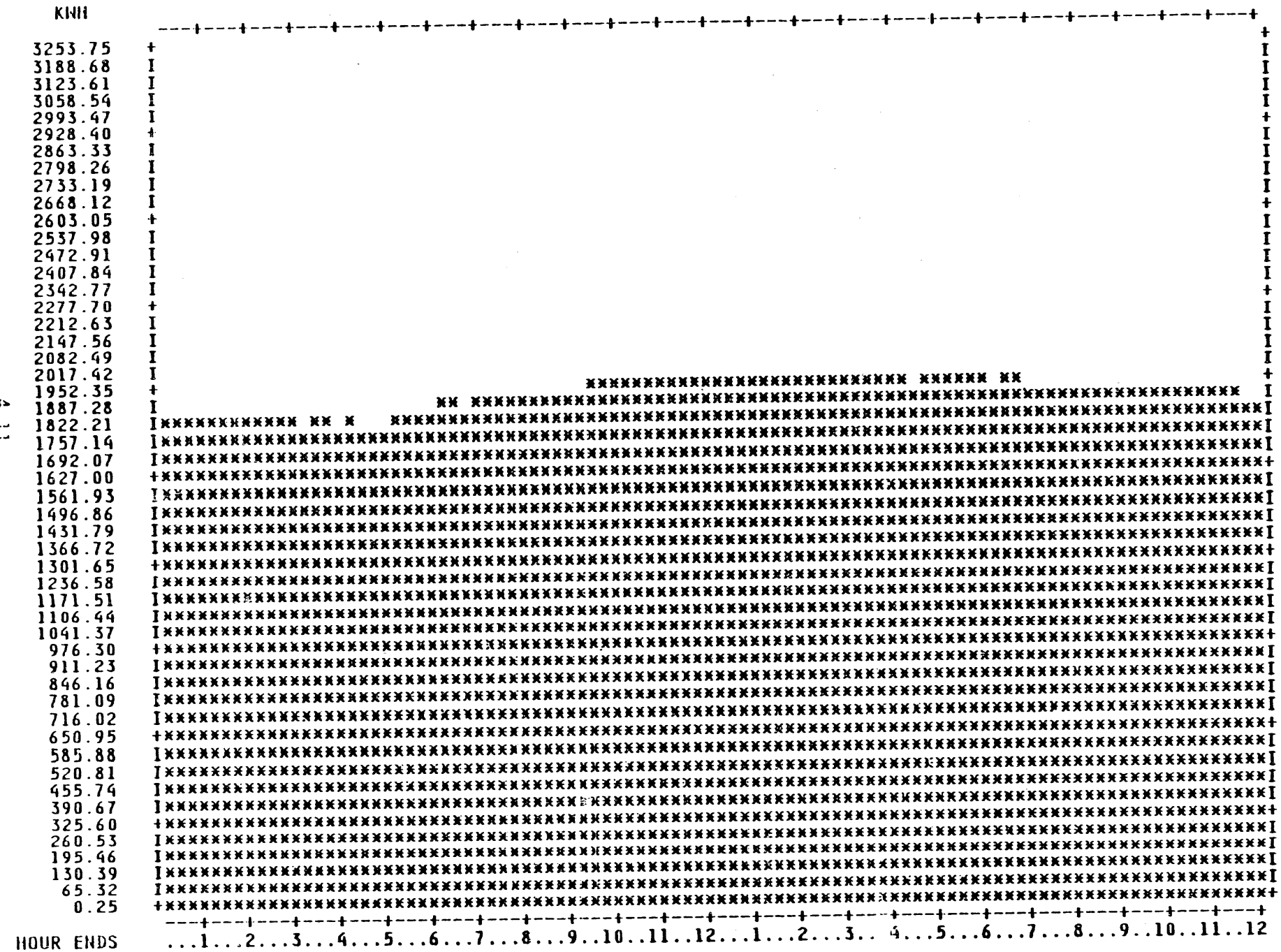
Monday Oct 31, 1988



PLOT OF KILOWATT HOURS VERSUS TIME - 15 MINUTE INTERVALS

2730147002 4-202 NAVAL MEDICAL CTR FROM 881229 TO 890130 PLOT FOR DATE 890106

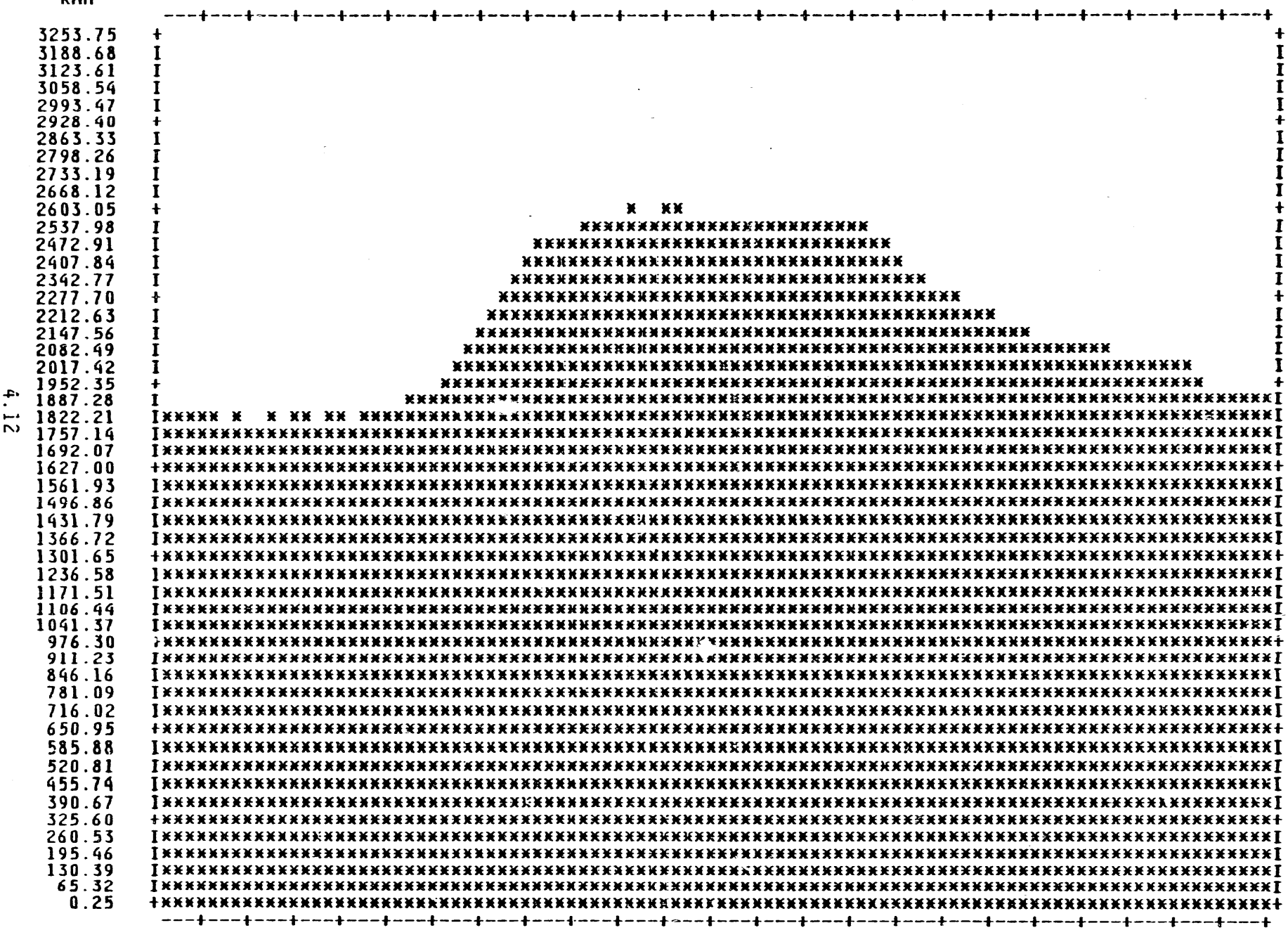
Sunday January 8, 1989



Sunday Monday
January 9, 1989

PLOT OF KILOWATT HOURS VERSUS TIME - 15 MINUTE INTERVALS

2730147002 4-202 NAVAL MEDICAL CTR FROM 881229 TO 890130 PLOT FOR DATE 890109



Attachment 5: Steam and Chilled Water Production Data Summary

ATTACHMENT 5: STEAM AND CHILLED WATER PRODUCTION DATA SUMMARY

The central plant at NNMC provides steam and chilled water to most of the buildings at the facility, including the USUHS complex. The central plant records for the period July 1988 through September 1990 were evaluated to estimate the electrical usage of the chillers, and to understand the sensitivity of the building heating and cooling loads to outside air temperature.

A plot of the steam and chilled water delivery for each month during this period reveals the strong seasonal dependence of these loads and the baseline energy use levels. Monthly steam production varies from a low of approximately 20 million pounds per month to a high in excess of 74 million pounds, with a peak production of approximately 2.6 million pounds per day. Monthly chilled water production varies from a base level of approximately 13 million kBtu to a high of over 50 million kBtu. When chilled water usage is high, steam usage is low. Similarly, when steam usage is high, the chilled water usage is low.

The relationship between steam and chilled water production and outdoor temperature was explored by obtaining weather data collected on-site by NNMC staff and at Washington National Airport by the National Oceanographic and Atmospheric Administration. The monthly average temperature data were compared graphically with the historical average conditions. This analysis revealed that December of 1989 was significantly (11°F) colder than the average and the months following were significantly warmer. The plot also reveals that on-site temperature measurements during the months of January through April 1990 range from 4 to 6°F above the Washington National Airport measurements while temperatures in other months are within 2°F. This may be due to the placement of the NNMC temperature sensor on the power plant wall adjacent to the power transformers. It is also possible that the wintertime temperatures at NNMC are higher than at Washington National Airport due to the density of buildings and unique microclimate effects.

Plots of monthly chilled water and steam production versus the NOAA temperature data reveal the strong relationship of these loads to outdoor temperature. Chilled water usage begins to rise as soon as the outside temperature rises above 50 or 60°F. Steam usage decreases as the temperature

rises. The relationships are not exact and there is a significant amount of scatter, indicating that other factors influence consumption levels.

The electrical consumption of the chillers was estimated from the monthly ton-hours of chilled water production. This analysis revealed that the chillers consume from 40 MWh/day in the winter to a high of approximately 130 MWh/day in the summer. This quantity was subtracted from the PEPCO metered average daily electrical consumption to render an estimate of the other electrical loads. These loads are estimated to lie in the range of 160 to 180 MWh/day. The variation is in part due to the number of days in the utility billing period. Assumed values were used prior to June 1989.

Plots of monthly chilled water production and fuel oil consumption as a function of average outdoor air temperature were prepared and analyzed to develop statistical curve fits. The fuel oil consumption levels are directly related to the outdoor temperature, with more fuel oil being consumed in the colder months. The chilled water production follows the outdoor temperature increase directly, but increases even faster at higher temperatures. The reason for this is likely twofold: as outdoor temperatures increase the coefficient of performance (efficiency) of the chiller drops while cooling requirements increase *combined* with a change in efficiency as the balance point (the temperature at which cooling is required to maintain a set inside temperature) changes with the season and building loads.

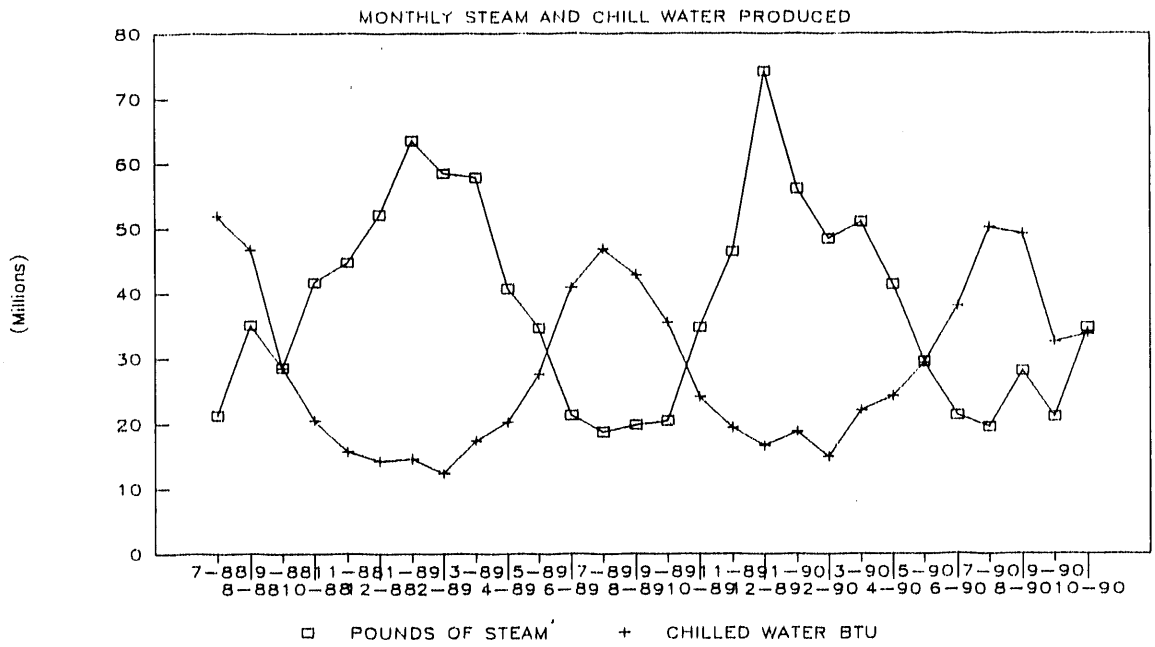
NNMC CENTRAL PLANT RECORDS
MONTHLY STEAM AND CHILLED WATER PRODUCTION DATA

MONTH	STEAM PRODUCED		OIL	CHILLED WATER		EQUIVALENT BRITISH THERMAL UNITS		
	PK-DAY POUNDS	TOTAL POUNDS	CONSUMED GALLON	PK-DAY TON-HR	TOTAL TON-HR	ELEC MMBTU	CHILL WATER MMBTU	STEAM MMBTU
7-88	792,540	21,264,000	158,687	164,148	4,325,093	30,185	51,901	20,605
8-88	765,776	35,066,400	261,690	152,529	3,890,201	29,052	46,682	33,979
9-88	764,388	28,608,756	213,498	131,277	2,380,163	26,841	28,562	27,722
10-88	1,609,509	41,618,964	310,589	66,876	1,706,595	22,195	20,479	40,329
11-88	1,958,400	44,705,934	333,626	65,884	1,306,084	24,081	15,673	43,320
12-88	2,172,600	52,076,014	388,627	44,190	1,190,020	21,725	14,280	50,462
1-89	2,660,976	63,493,015	473,828	40,185	1,217,352	21,631	14,608	61,525
2-89	2,662,812	58,515,360	436,682	54,490	1,033,656	20,806	12,404	56,701
3-89	2,100,384	57,867,915	431,850	85,610	1,453,353	20,857	17,440	56,074
4-89	1,995,732	40,694,685	303,692	64,860	1,690,939	21,598	20,291	39,433
5-89	1,262,556	34,622,676	246,074	97,755	2,303,968	25,877	27,648	33,549
6-89	1,136,433	21,291,460	158,891	155,534	3,404,722	28,993	40,857	20,631
7-89	829,260	18,806,250	137,072	176,295	3,899,106	33,646	46,789	18,223
8-89	1,315,000	19,799,016	154,318	154,879	3,567,346	28,205	42,808	19,185
9-89	1,294,380	20,478,540	154,322	110,108	2,962,095	29,150	35,545	19,844
10-89	1,656,072	34,719,473	249,780	59,365	2,012,494	23,162	24,150	33,643
11-89	1,853,136	46,412,499	335,836	51,817	1,618,974	25,804	19,428	44,974
12-89	2,374,560	74,238,507	558,604	50,493	1,389,222	22,834	16,671	71,937
1-90	2,569,941	56,185,782	404,214	45,796	1,570,357	26,347	18,844	54,444
2-90	2,660,184	48,442,452	355,150	45,796	1,250,977	22,917	15,012	46,941
3-90	2,591,259	51,007,701	362,013	93,627	1,842,927	22,009	22,115	49,426
4-90	1,714,824	41,351,310	302,497	92,137	2,019,191	24,951	24,230	40,069
5-90	1,490,322	29,515,332	223,263	118,496	2,447,093	24,476	29,365	28,600
6-90	873,936	21,311,064	165,716	142,048	3,165,195	26,763	37,982	20,650
7-90	897,192	19,569,924	148,934	152,880	4,180,162	31,898	50,162	18,963
8-90	1,061,208	28,115,892	224,389	162,680	4,093,324	27,578	49,120	27,244
9-90	918,612	21,096,864	160,432	150,554	2,709,796	26,666	32,518	20,443

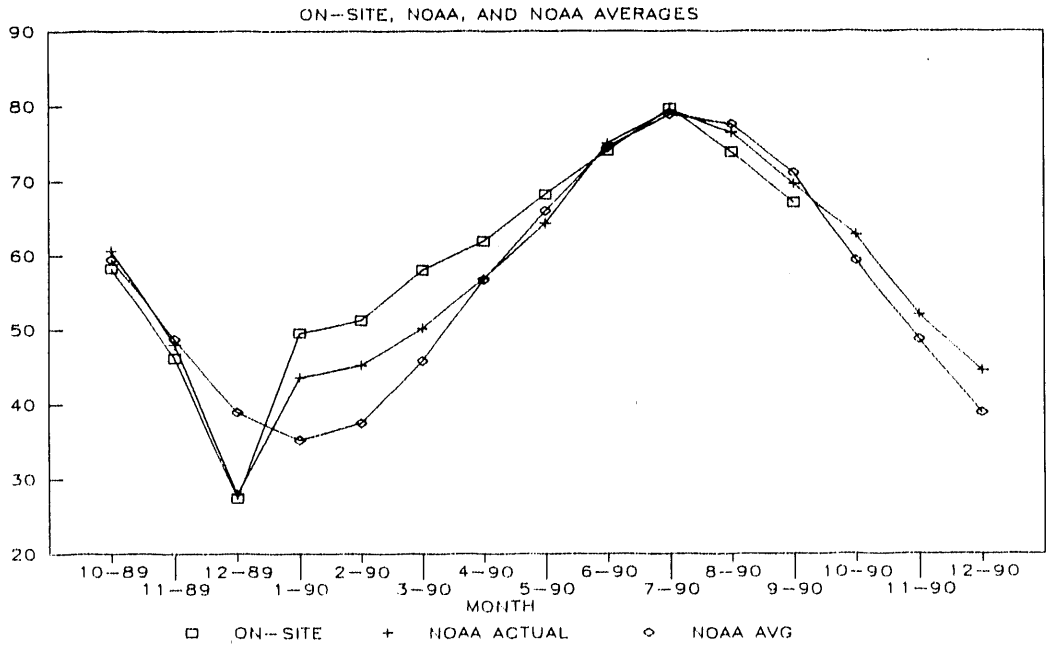
NNMC CLIMATE DATA
ACTUAL ON-SITE, NOAA, AND NORMALS

MONTH	ONSITE TEMP DEGREE	NOAA TEMP DEGREE	DELTA TEMP DEGREE	NOAA NORMAL DEGREE	NOAA DELTA DEGREE	NOAA DEW POINT	NOAA SUN MINUTES
7-88	81.7						
8-88	80.4						
9-88	67.5						
10-88	53.7						
11-88	49.0						
12-88	38.6						
1-89	39.9						
2-89	38.1						
3-89	46.1						
4-89	53.8						
5-89	62.6						
6-89	77.3						
7-89	78.4						
8-89	76.4						
9-89	61.8						
10-89	58.2	60.6	-2.4	59.4	1.2	50.5	12,303
11-89	46.2	48.0	-1.8	48.7	-0.7	35.3	9,846
12-89	27.4	27.9	-0.5	38.9	-11.0	16.8	6,878
1-90	49.5	43.6	5.9	35.2	8.4	31.9	6,828
2-90	51.2	45.2	6.0	37.5	7.7	32.2	8,260
3-90	58.0	50.2	7.8	45.8	4.4	36.2	11,478
4-90	61.9	56.8	5.1	56.7	0.1	43.3	12,633
5-90	68.2	64.3	3.9	66.0	-1.7	51.7	10,630
6-90	74.0	75.0	-1.0	74.5	0.5	62.3	16,388
7-90	79.7	79.4	0.3	78.9	0.5	67.9	13,849
8-90	73.9	76.5	-2.6	77.6	-1.1	66.3	11,099
9-90	67.1	69.6	-2.5	71.1	-1.5	58.6	12,353

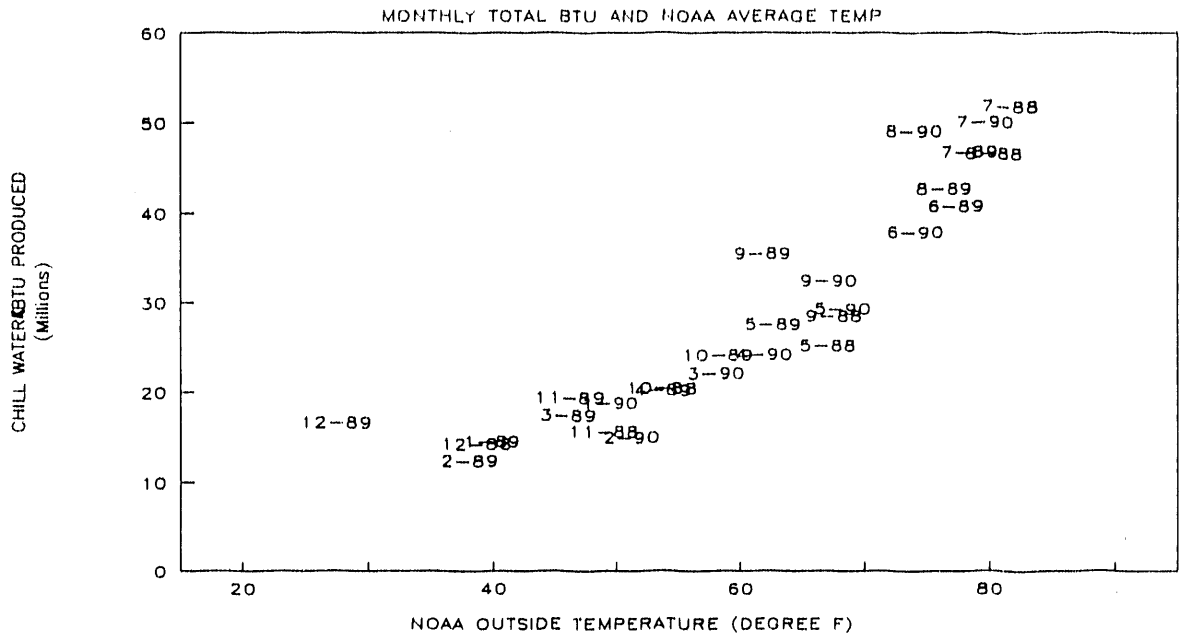
NNMC CENTRAL PLANT ENERGY DELIVERY



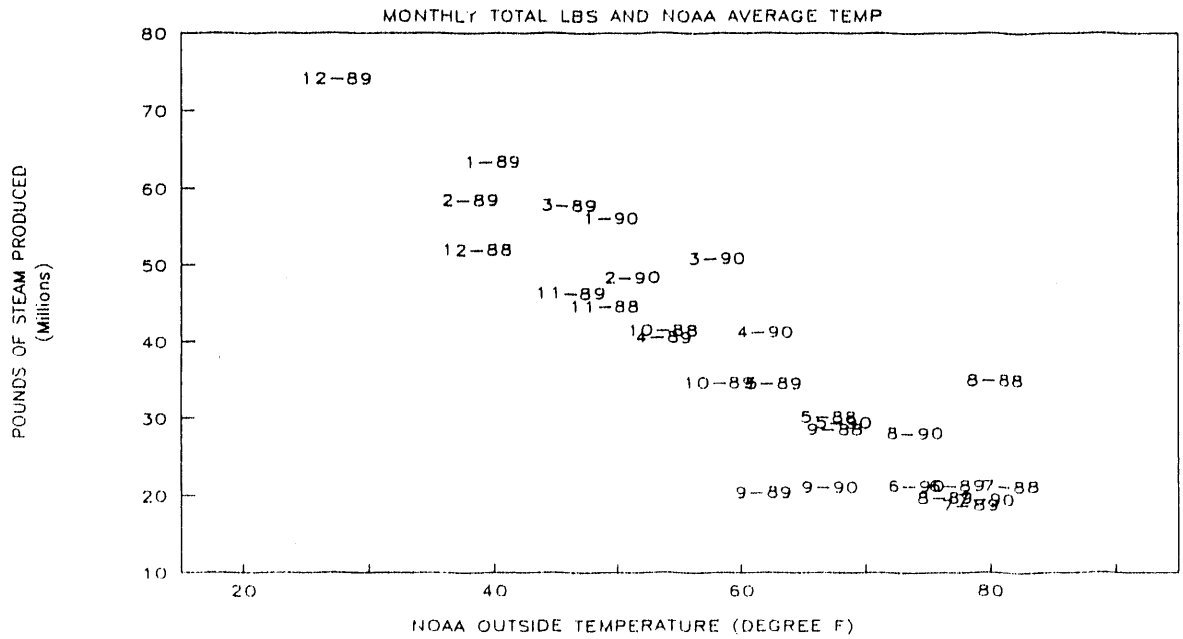
MONTHLY AVERAGE TEMPERATURES FOR NNMC



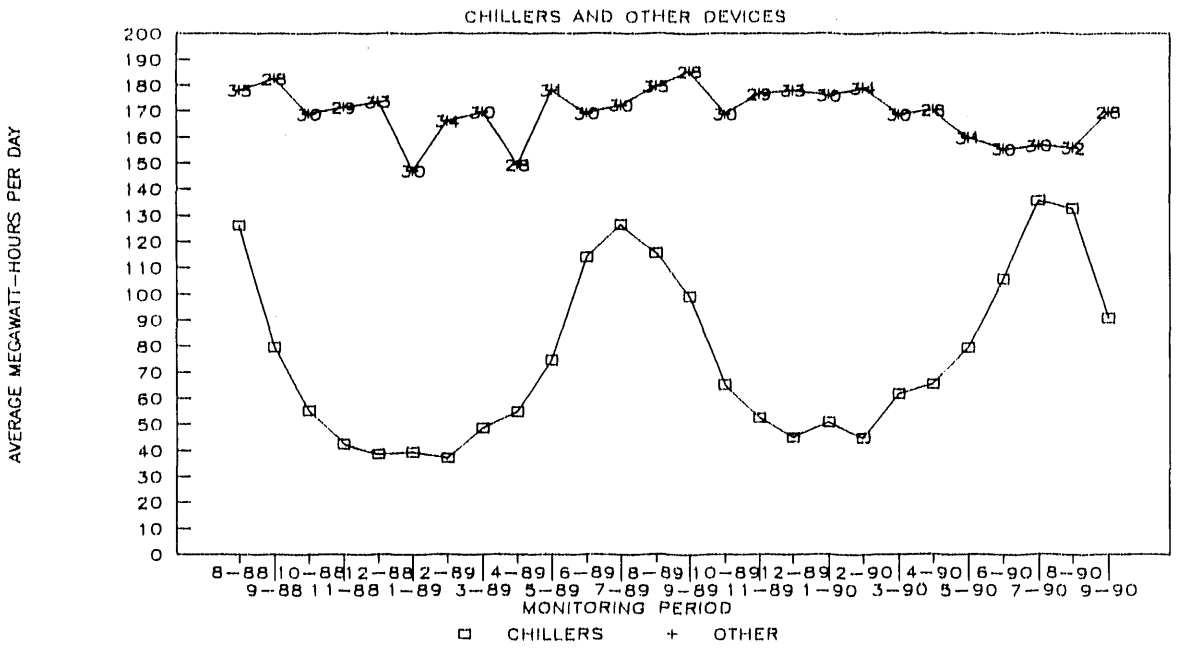
NNMC CHILL WATER USE VERSUS TEMPERATURE



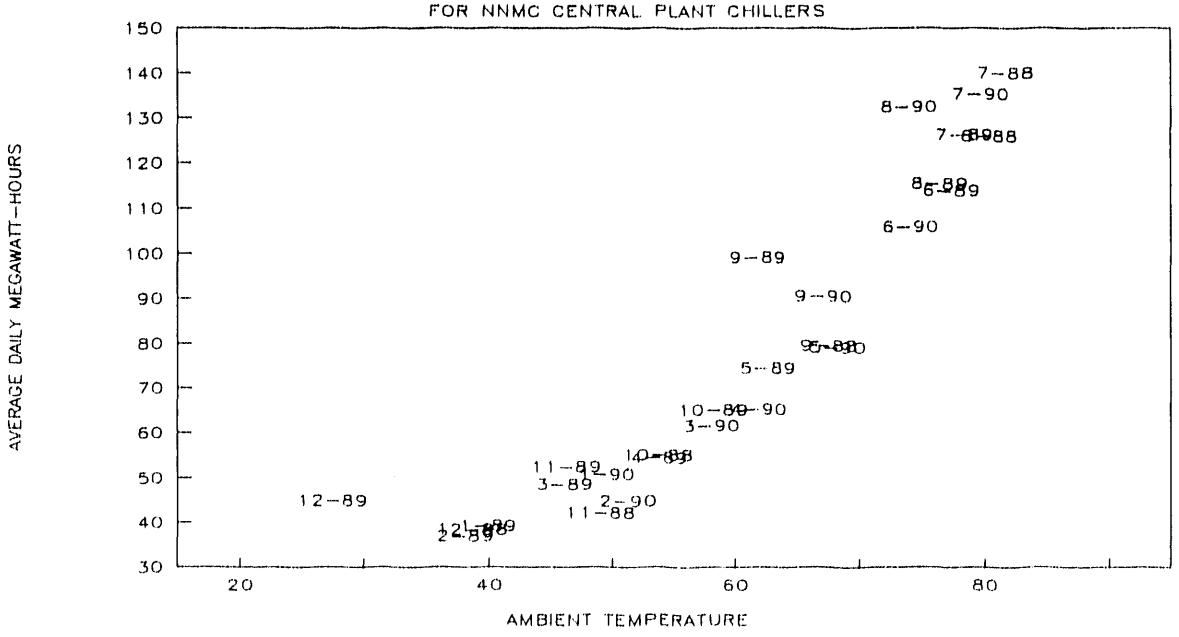
NNMC STEAM PRODUCED VERSUS TEMPERATURE



NNMC ELECTRICAL USE SHARE ESTIMATES



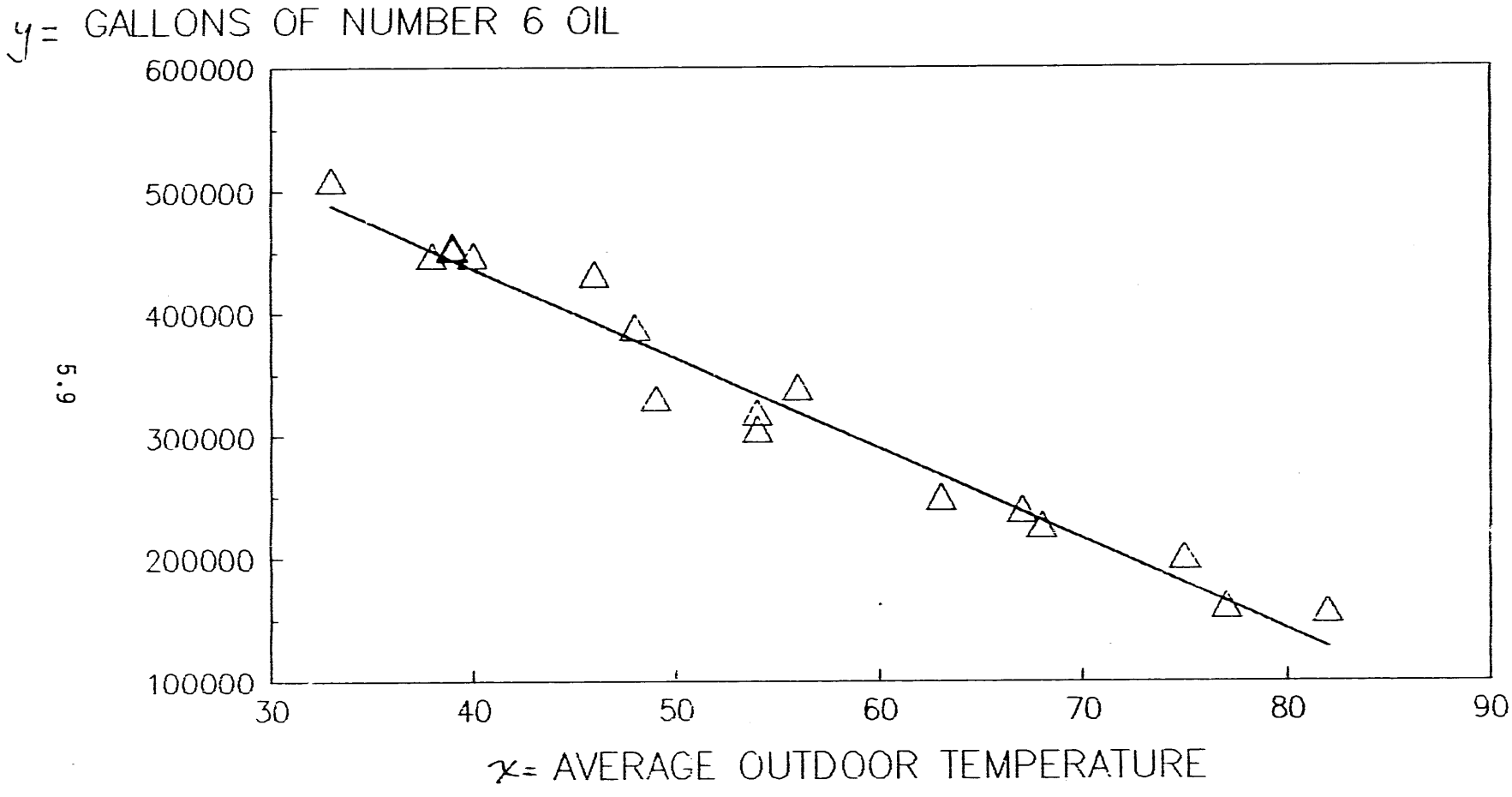
ESTIMATED CHILLER ELECTRICITY VS TEMP



NNMC CENTRAL PLANT PRODUCTION DATA

MONTH	STEAM POUNDS	CHILLER TON-HRS	OIL USE GALLONS	AVG TEMP DEGREE F	MONTH
JAN88	68820403	903077	506095	33	JAN88
FEB88	60618951	978143	449344	39	FEB88
MAR88	51679510	1302720	384958	48	MAR88
APR88	44705934	1427323	335527	56	APR88
MAY88	30283758	2101071	236345	67	MAY88
JUN88	26973118	2936993	197427	75	JUN88
JUL88	21264000	4325093	153487	82	JUL88
AUG88	35066400	3890201	264874	80	AUG88
SEP88	28608756	2380163	223459	68	SEP88
OCT88	41618964	1706595	315306	54	OCT88
NOV88	45151718	1306084	326982	49	NOV88
DEC88	64361909	1190020	451676	39	DEC88
JAN89	63493015	1217352	444566	40	JAN89
FEB89	58515360	1033656	444131	38	FEB89
MAR89	57867915	1453353	428586	46	MAR89
APR89	40694685	1690939	301682	54	APR89
MAY89	34622676	2303968	246064	63	MAY89
JUN89	21291460	3404722	158042	77	JUN89

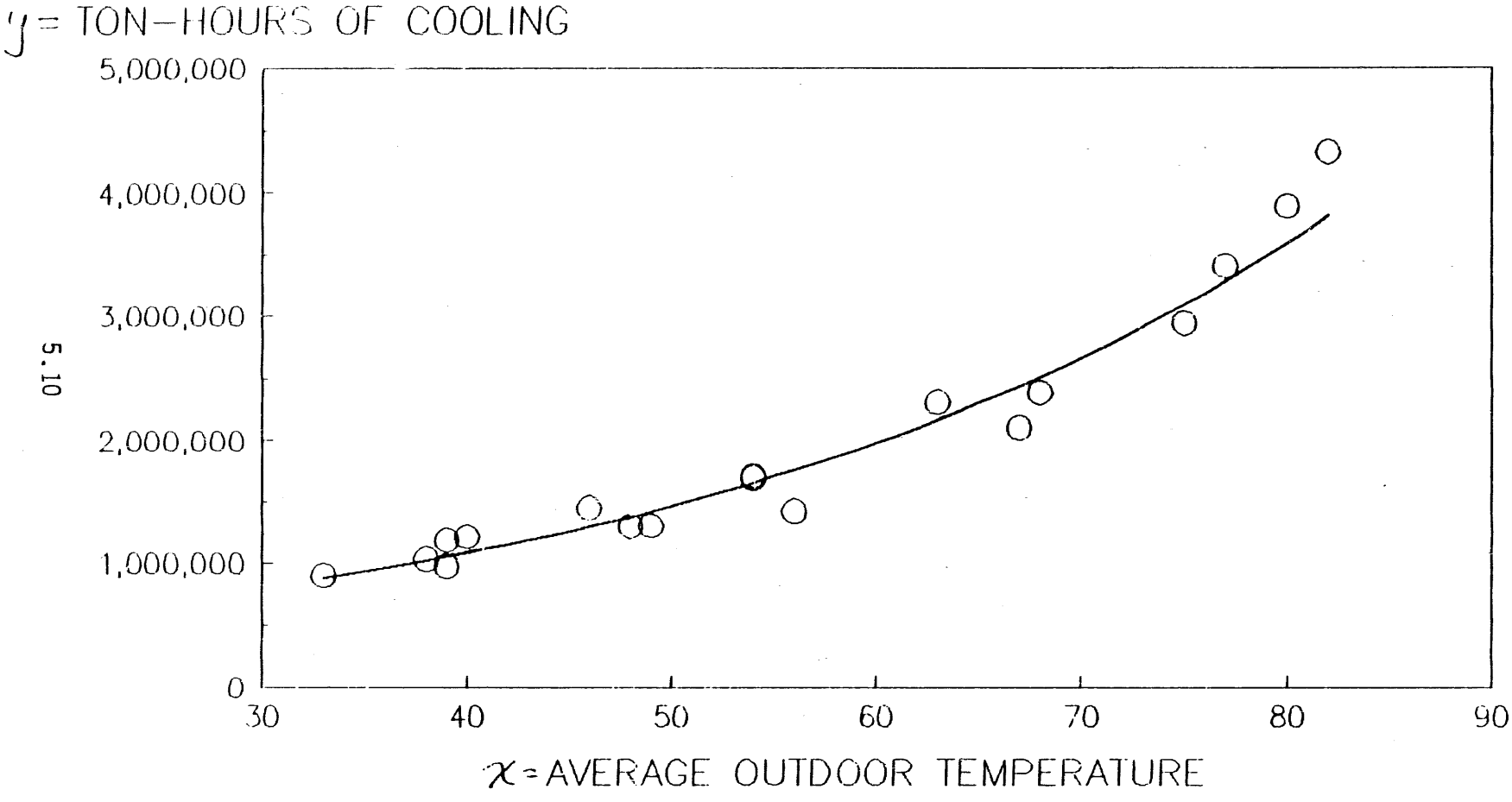
MONTHLY NNMC FUEL OIL CONSUMPTION
VERSUS AVERAGE OUTDOOR TEMPERATURE
EXCLUDING AUGUST 1988



5.9

A LINEAR CURVE IS FIT TO THESE DATA
R-SQUARE IS .966, EQUATION FORM IS: $y = A + Bx$
WITH A=731326 AND B=-7358.69

MONTHLY NNMC CHILLER PRODUCTION
VERSUS AVERAGE OUTDOOR TEMPERATURE



AN EXPONENTIAL CURVE IS FIT TO THESE DATA
R-SQUARE IS .961, EQUATION FORM IS: $y = Ae^{Bx}$
WITH A=331420.00 AND B=.02981

Attachment 6: Electrical Measurements for Selected Buildings

ATTACHMENT 6: ELECTRICAL MEASUREMENTS FOR SELECTED BUILDINGS

The electrical consumption profiles of selected buildings were developed from hourly time series measurement of the building service entrances for periods ranging from 2 to 9 days. There were some problems getting the equipment installed and operating properly, but these were resolved for all but one of the assigned buildings.

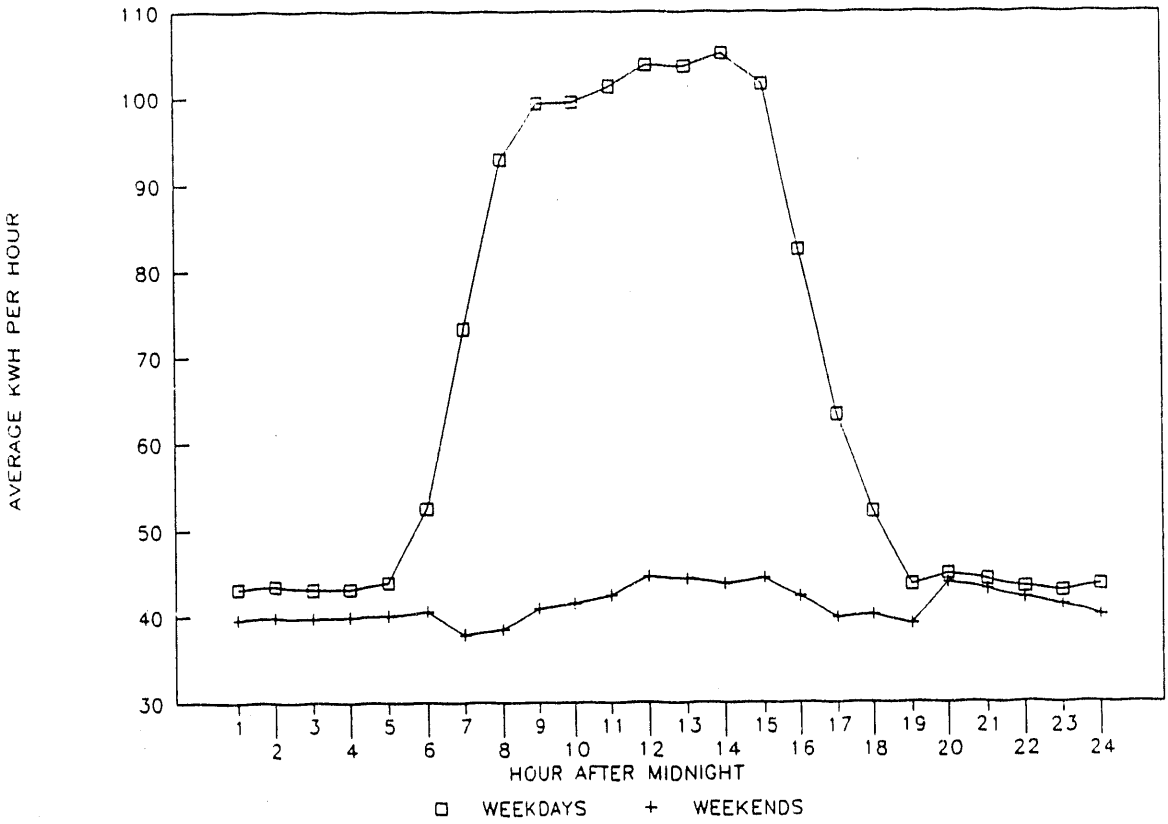
This attachment provides a set of tables and figures for each of the buildings. Note that Buildings 3 and 4 provide power collectively to Buildings 1-8. The line plot for each building indicates the average daily electrical consumption profile for weekdays and weekends. The area plot displays the time series data upon which these averages are based.

Three tables are provided on a single page for each building with sufficient data. The top table indicates the average weekday hourly values for electric power, power factor, KVAR, average voltage, and amperage for each electrical phase. The next table provides the same information for average weekends. The bottom table indicates the average loads for each of the days the building was monitored. If p.m. or a.m. is indicated only a partial day of data predominating during that period was acquired.

For Building 55 only partial data are available due to a problem with the configuration of the instrumentation at that site. Apparently the power meter was configured to only record values when power levels exceeded 70% of the peak. Consequently we do not know the minimum power levels for this building.

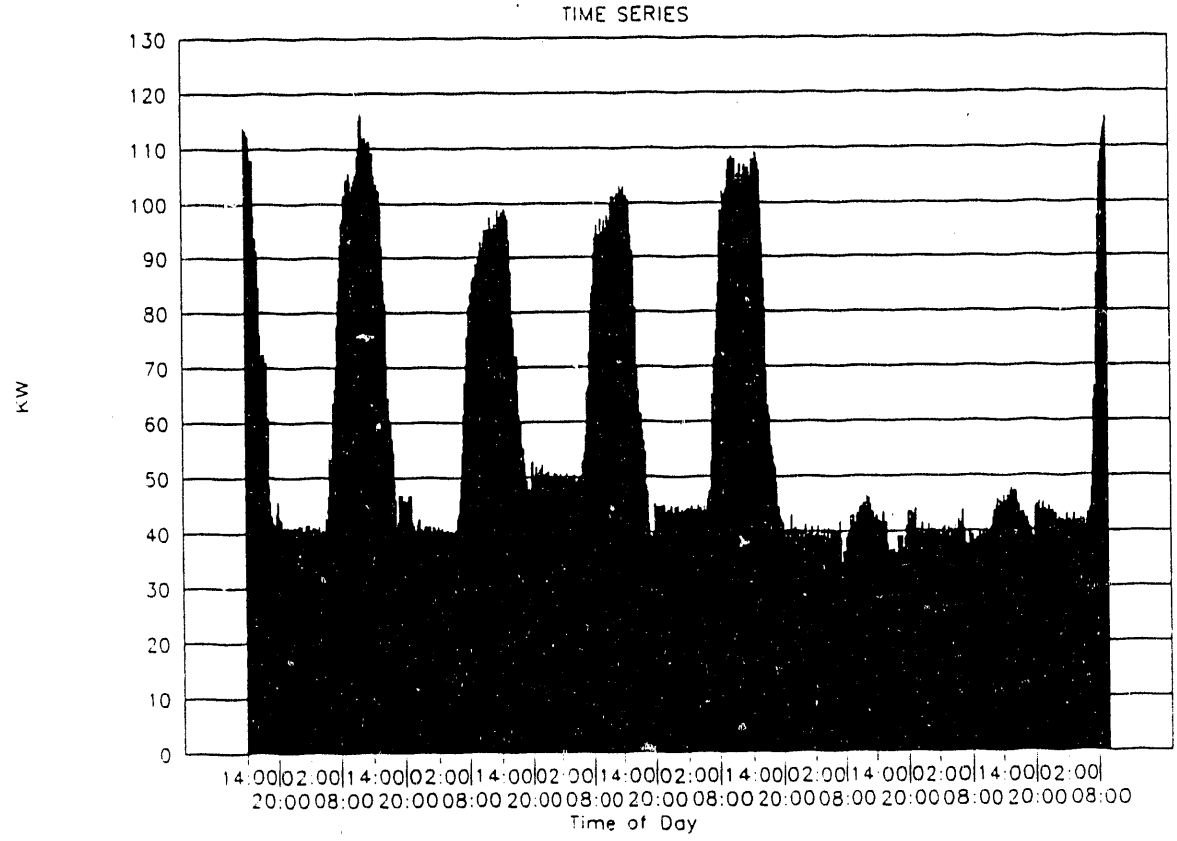
NNMC Building 3 Electrical Load

AVERAGE DAILY PROFILES



NNMC Building 3 Electrical Load

TIME SERIES



NNMC BUILDING 3 ELECTRICAL LOAD AVERAGE WEEKDAY PROFILE

TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	43.17	0.87	24.78	123.08	158.18	113.13	132.69
2	43.49	0.87	24.96	122.81	159.27	115.96	132.58
3	43.06	0.87	24.66	122.61	161.91	120.18	135.88
4	43.15	0.87	24.6	122.33	158.75	114.9	131.14
5	43.9	0.87	24.44	122.58	163.49	123.12	137.7
6	52.5	0.9	25.15	122.58	177.87	159.36	165.19
7	73.27	0.95	24.91	122.91	221.79	214.3	223.06
8	92.92	0.95	29.08	122.93	287.35	262.48	269.41
9	99.39	0.95	31.21	122.94	299.17	270.84	280.17
10	99.51	0.95	31.47	123.14	297.92	266.93	278.5
11	101.3	0.95	32.07	123.38	296.67	271.11	285.83
12	103.68	0.95	32.05	123.07	320.35	277.37	296.85
13	103.67	0.96	31.13	122.88	320.44	273.76	295.98
14	105.09	0.96	31.97	123.04	329.39	278.38	294.85
15	101.58	0.95	32.24	123.19	299.76	277.5	281.7
16	82.46	0.95	27.44	123.02	231.84	229.22	223.88
17	63.37	0.94	23.85	122.80	182.1	193.6	160.71
18	52.17	0.92	22.52	122.96	157.71	153.71	136.31
19	43.64	0.88	22.84	123.04	150.07	127.94	128.44
20	44.94	0.87	25.3	123.08	163.17	116.62	137.48
21	44.24	0.87	25.27	123.22	161.67	115.27	134.65
22	43.33	0.87	24.91	122.78	157.48	111.93	135.46
23	42.97	0.87	24.66	122.96	158.41	112.6	133.77
24	43.61	0.87	25.09	122.99	158.88	115.66	134.33

NNMC BUILDING 3 ELECTRICAL LOAD AVERAGE WEEKEND PROFILE

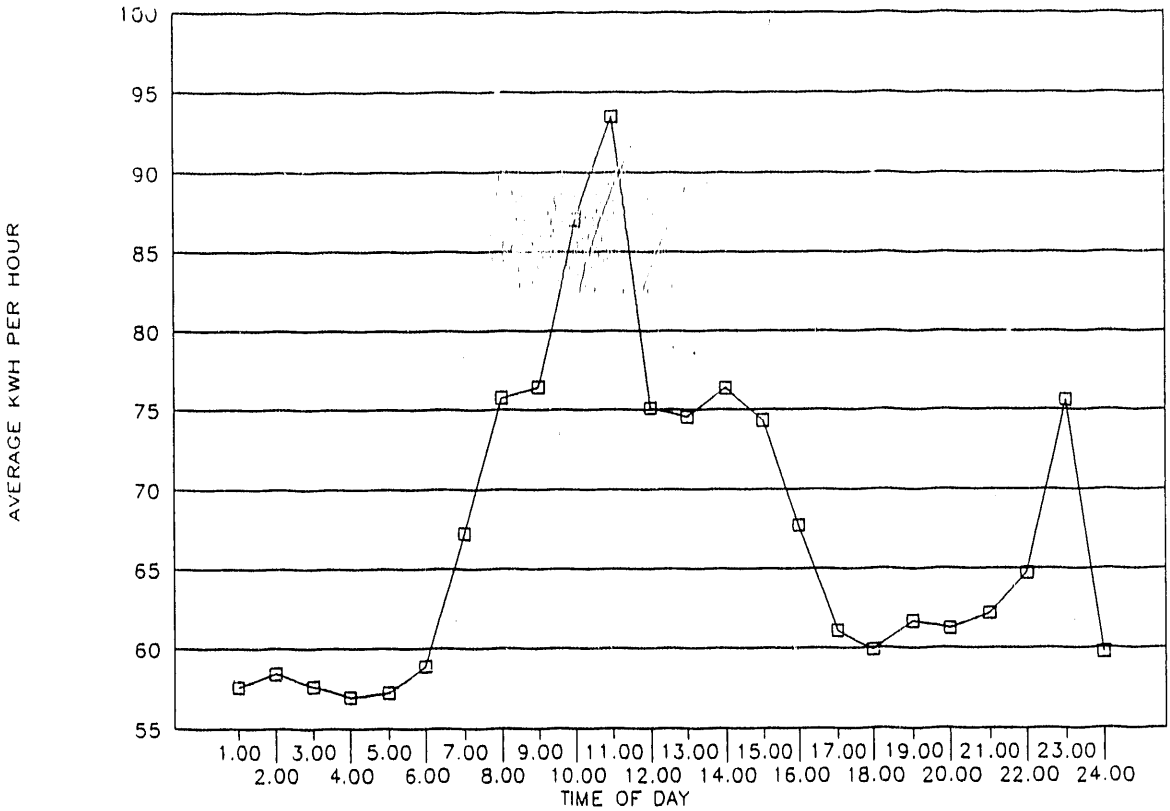
TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	39.66	0.87	22.87	122.64	143.21	109.34	120.95
2	39.81	0.87	22.83	122.75	141.07	109.6	119.36
3	39.71	0.86	23.16	122.94	144.27	111.64	120.81
4	39.93	0.87	22.89	123.00	141.79	110.12	120.84
5	40.07	0.87	22.98	123.07	146.54	111.64	123.37
6	40.55	0.87	23.09	122.57	144.86	115.72	120.4
7	37.9	0.89	19.65	122.53	130.7	123.14	100.95
8	38.5	0.89	19.57	122.57	131.8	125.65	93.03
9	40.85	0.9	19.77	122.77	139.94	129.04	98.28
10	41.45	0.9	19.77	123.03	146.99	125.81	98.89
11	42.44	0.91	19.78	123.20	149.89	130.57	99.96
12	44.56	0.91	20.44	122.62	156.45	146.47	102.05
13	44.32	0.91	20.5	122.78	155.72	135.06	96.57
14	43.79	0.91	20.41	123.13	155.49	140.67	99.31
15	44.45	0.91	20.53	122.94	147.42	138.34	102.48
16	42.26	0.9	20.09	122.88	135.49	141.51	105.77
17	39.84	0.89	19.74	123.17	127.11	129.55	96.04
18	40.15	0.89	20.24	123.29	131.01	132.81	93.29
19	39.09	0.89	20.29	122.89	131.51	133.65	96.91
20	43.93	0.88	24.15	123.17	150.06	132.76	123.47
21	43.08	0.87	23.82	123.34	150.32	130.45	123.11
22	42.03	0.87	23.36	122.83	151.55	125.56	121.04
23	41.29	0.87	23.24	123.15	148.56	122.14	120.64
24	40.04	0.86	23.36	122.97	149.02	112.31	123.97

NNMC BUILDING 3 ELECTRICAL LOAD AVERAGE DAILY LOADS

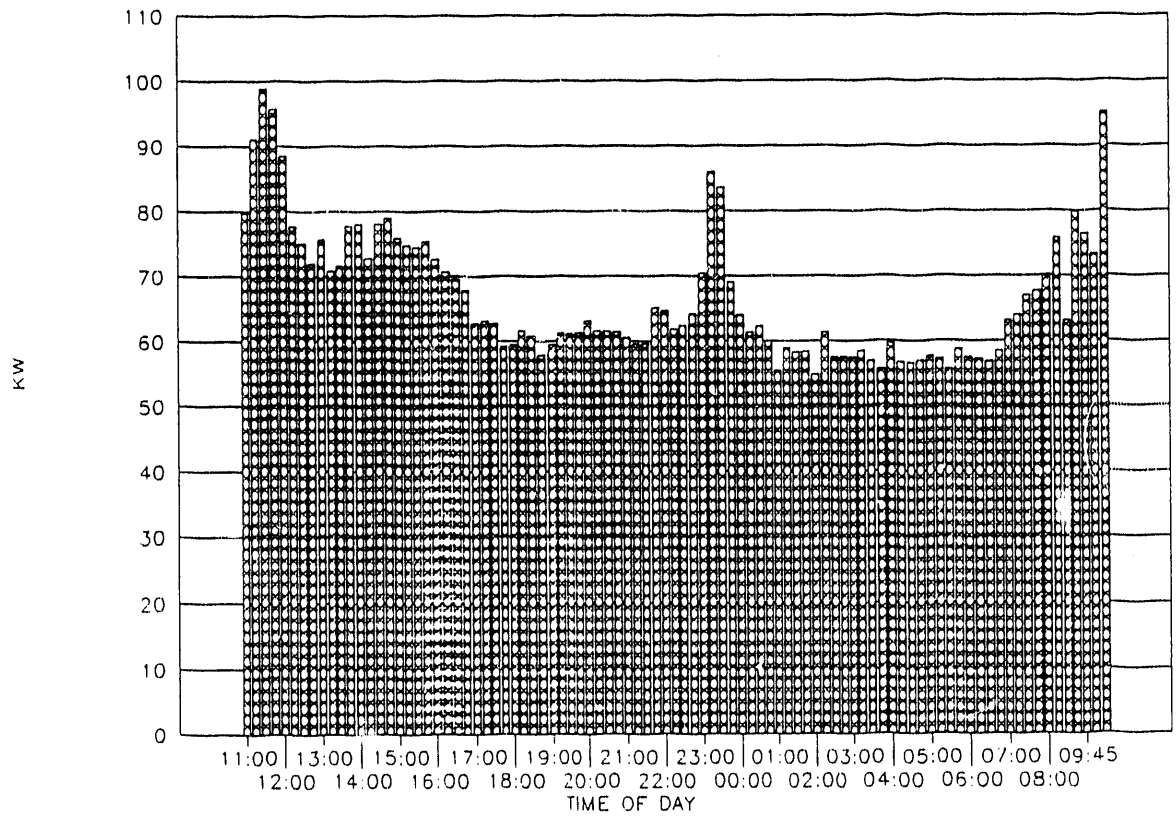
DAY	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
MONDAY PM	64.04	0.9	26.93	122.77	204.7	177.58	177.73
TUESDAY	67.59	0.9	27.82	122.90	222.91	181.04	199.28
WEDNESDAY	64.54	0.91	26.87	122.96	205.48	176.93	186.12
THURSDAY	67.78	0.91	27.08	122.99	220.09	182.3	195.38
FRIDAY	67.55	0.91	26.19	123.04	211.4	189.25	199.97
SATURDAY	40.57	0.88	21.55	123.11	144.37	119.78	109.78
SUNDAY	41.91	0.89	21.49	122.74	143.2	132.19	108.68
MONDAY AM	57.39	0.9	24.43	122.61	192.21	168.04	163.16

NNMC BUILDING 4 ELECTRICAL LOAD

AVERAGE WEEKDAY PROFILE



NNMC BUILDING 4 ELECTRICAL LOAD

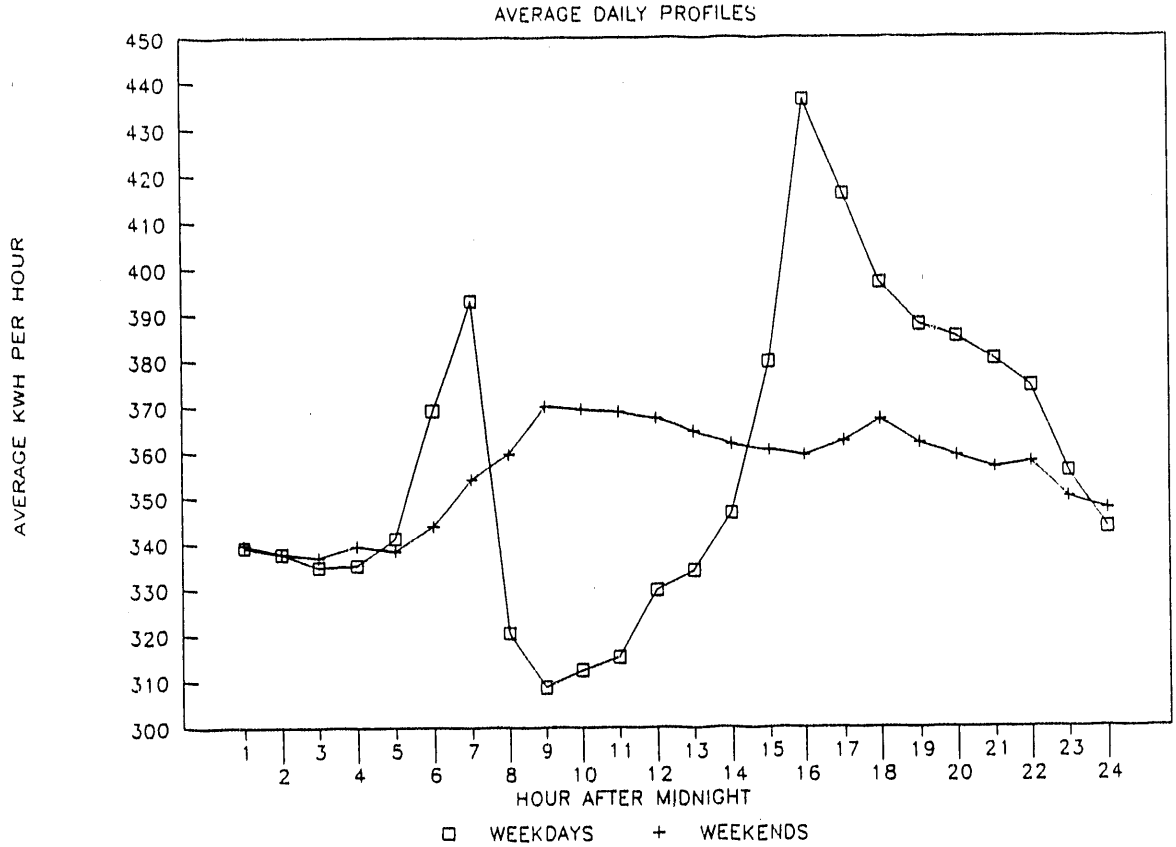


NNMC BUILDING 4 ELECTRICAL LOAD AVERAGE WEEKDAY PROFILE

TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1.00	57.61	0.72	54.71	282.09	87.15	96.31	100.14
2.00	58.42	0.73	55.07	282.48	86.80	95.38	98.05
3.00	57.64	0.73	53.94	281.81	86.55	94.34	95.91
4.00	56.96	0.73	53.72	280.65	86.44	93.97	96.33
5.00	57.23	0.72	54.75	283.04	88.24	94.61	100.37
6.00	58.90	0.74	53.86	281.45	91.92	97.02	102.94
7.00	67.21	0.78	54.35	282.84	99.36	110.50	116.70
8.00	75.76	0.80	56.82	282.53	101.90	121.70	127.90
9.00	76.45	0.80	57.98	283.90	100.10	116.50	118.43
10.00	86.99	0.82	59.10	283.85	108.95	120.65	123.95
11.00	93.49	0.84	59.63	283.16	114.30	127.42	137.67
12.00	75.09	0.78	59.22	283.96	98.12	109.82	118.32
13.00	74.54	0.78	59.25	283.70	98.98	111.37	121.05
14.00	76.38	0.80	57.75	283.15	103.08	114.35	124.67
15.00	74.32	0.78	58.66	283.77	101.80	111.12	115.17
16.00	67.70	0.77	56.47	282.96	95.17	103.51	105.47
17.00	61.11	0.74	55.10	281.70	90.98	99.10	102.61
18.00	59.90	0.74	54.46	282.07	88.05	96.17	99.98
19.00	61.68	0.75	54.80	281.61	89.31	97.21	101.12
20.00	61.23	0.74	54.83	283.18	89.51	96.76	99.74
21.00	62.19	0.74	55.60	284.16	90.57	101.57	101.06
22.00	64.73	0.77	53.08	280.97	95.13	106.65	108.74
23.00	75.64	0.81	54.46	282.00	103.28	112.79	118.30
24.00	59.75	0.73	55.90	282.86	87.72	97.72	101.66

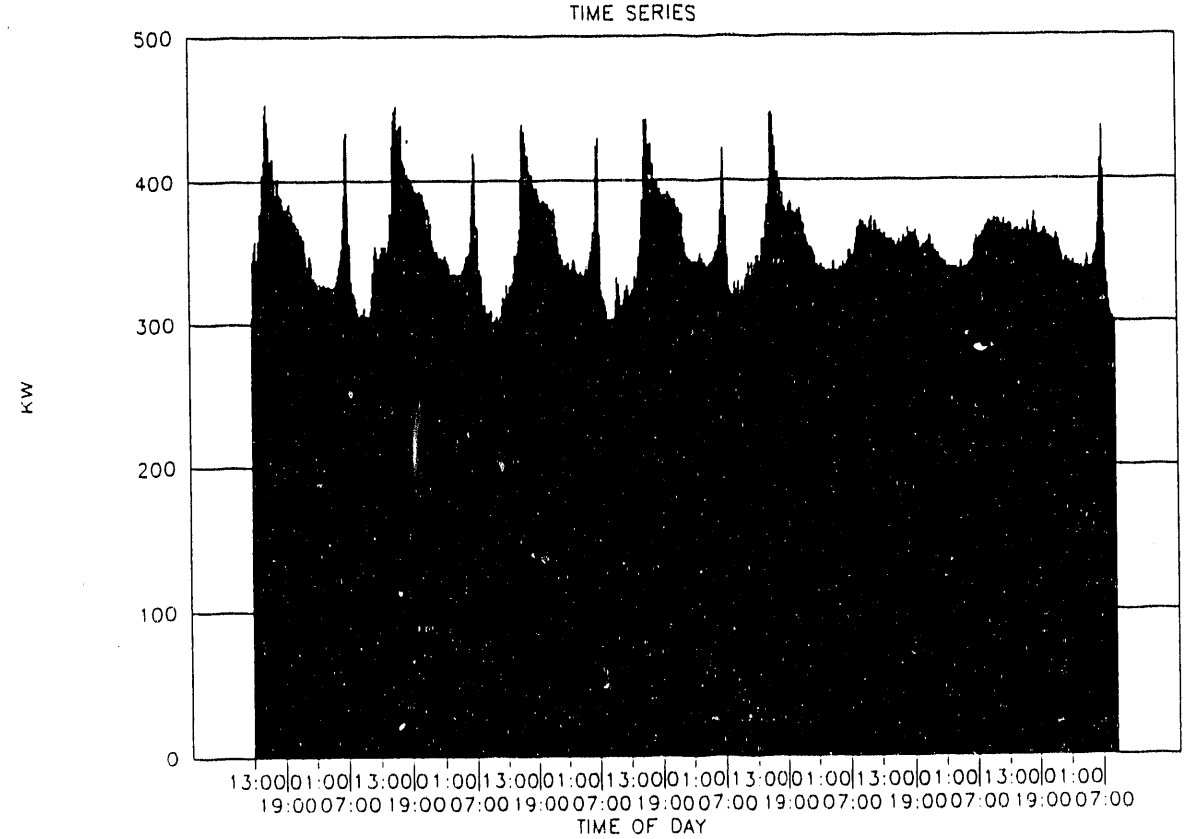
NNMC BUILDING 10 ELECTRIC LOADS

AVERAGE DAILY PROFILES



NNMC BUILDING 10 ELECTRIC LOADS

TIME SERIES



NNMC BUILDING 10 ELECTRIC LOADS AVERAGE WEEKDAY PROFILE

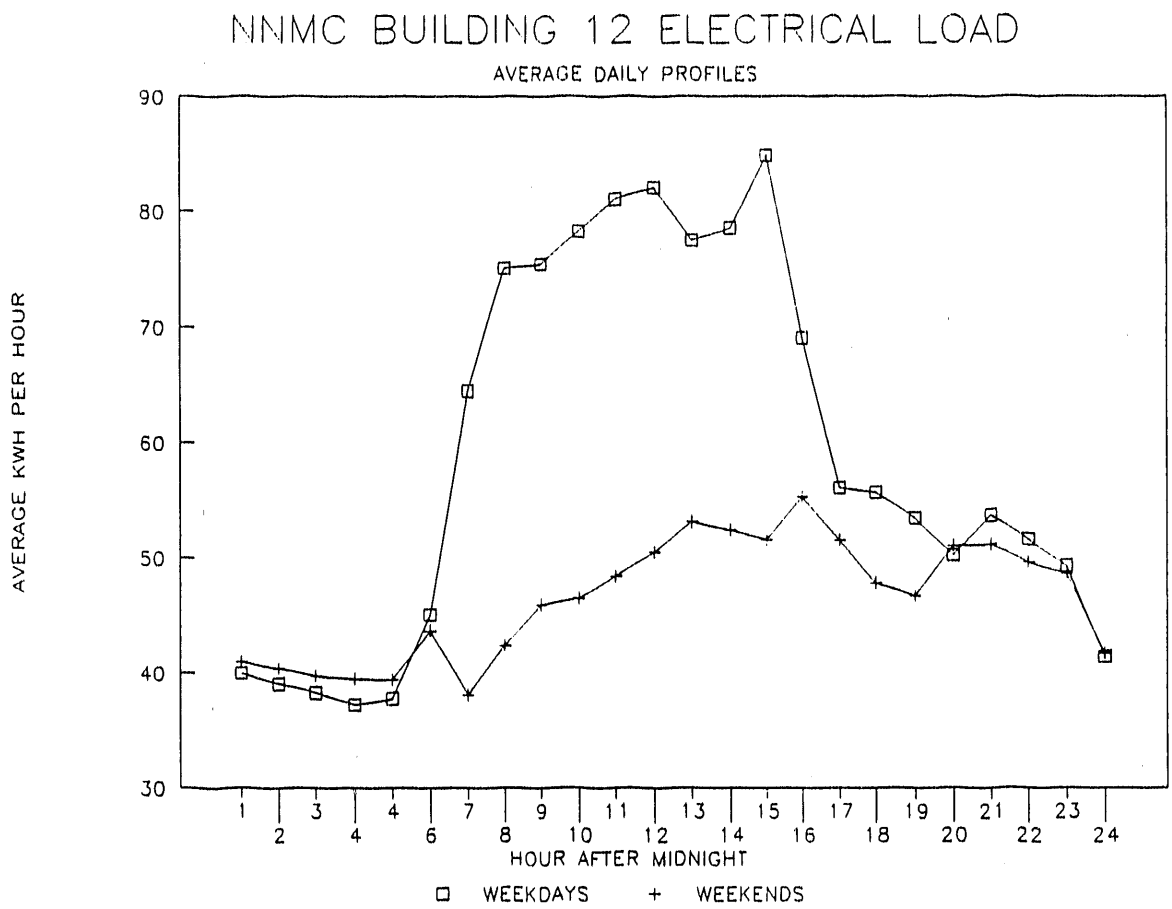
TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	339.08	0.82	240.10	281.64	661.34	656.73	158.06
2	337.60	0.81	241.23	281.34	665.24	656.18	158.30
3	334.73	0.81	238.78	281.27	649.73	645.76	163.61
4	335.29	0.81	239.61	281.77	659.20	647.58	160.77
5	341.02	0.81	242.85	282.14	681.88	662.82	154.31
6	369.11	0.83	249.07	281.76	741.37	725.39	153.79
7	393.00	0.88	218.01	280.63	615.29	750.47	214.37
8	320.39	0.99	52.97	281.28	462.13	635.77	238.29
9	308.72	0.99	43.99	281.52	474.07	547.71	246.46
10	312.44	0.99	44.52	281.62	492.68	544.71	246.07
11	315.22	0.99	44.92	280.88	483.30	545.86	241.74
12	329.80	0.99	46.99	280.71	541.58	614.94	236.01
13	334.18	0.99	51.14	281.22	545.53	619.15	235.36
14	346.45	0.98	58.12	281.09	588.86	649.90	239.07
15	379.68	0.92	152.08	281.52	683.64	723.71	236.26
16	436.28	0.85	272.10	282.22	814.73	808.35	210.64
17	416.05	0.85	261.65	281.90	800.10	774.64	162.84
18	396.86	0.85	249.12	281.06	772.23	746.63	151.02
19	387.73	0.84	248.44	281.41	750.84	722.51	153.48
20	385.01	0.84	246.67	281.61	750.88	726.46	150.69
21	380.20	0.84	246.14	281.31	743.05	725.72	152.04
22	374.21	0.84	245.58	281.49	727.32	712.88	150.93
23	355.71	0.83	240.82	281.68	685.75	678.73	153.79
24	343.23	0.82	240.90	281.72	664.45	660.59	157.01

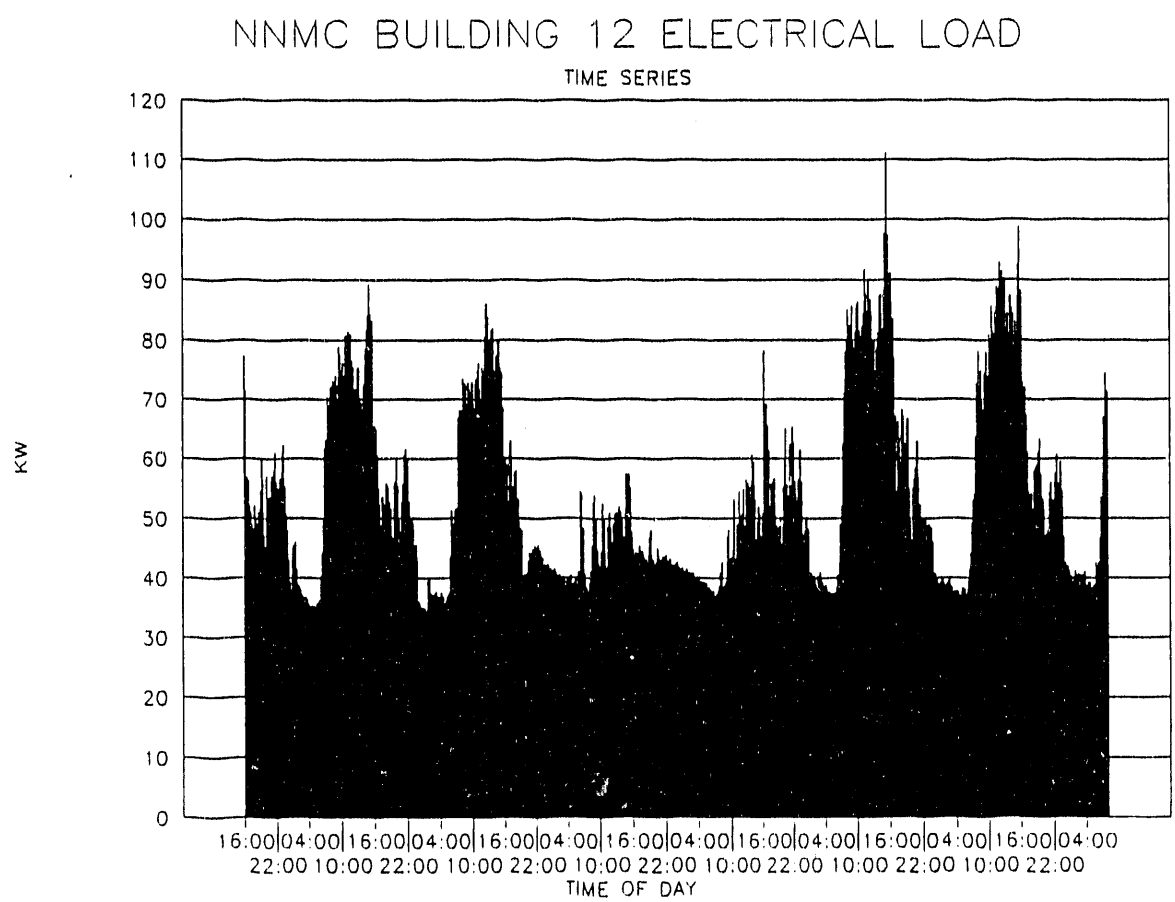
NNMC BUILDING 10 ELECTRIC LOADS AVERAGE WEEKDAY PROFILE

TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	339.62	0.82	238.16	282.45	658.69	660.11	155.89
2	337.72	0.81	244.50	283.04	661.19	658.80	154.77
3	336.84	0.81	241.69	282.11	660.19	655.94	157.02
4	339.36	0.81	241.26	282.81	664.79	650.87	157.62
5	338.20	0.81	241.55	282.69	662.27	658.87	153.36
6	343.64	0.82	237.66	281.19	660.75	655.54	160.71
7	353.97	0.83	237.87	280.41	692.41	680.41	149.85
8	359.54	0.82	252.11	282.99	718.80	698.34	143.55
9	369.99	0.83	252.22	282.29	744.91	723.60	144.17
10	369.31	0.82	252.97	281.58	742.49	713.54	145.50
11	368.76	0.83	248.99	281.44	727.37	704.34	150.55
12	367.32	0.83	246.84	280.81	725.94	706.27	147.62
13	364.52	0.83	247.36	281.31	722.80	702.22	147.40
14	361.57	0.83	244.14	280.80	708.60	689.16	149.81
15	360.31	0.83	245.66	280.52	715.71	695.94	148.61
16	359.26	0.83	239.10	281.03	701.40	686.30	152.04
17	362.35	0.83	243.46	281.75	718.17	698.72	148.42
18	367.10	0.84	240.68	280.90	720.24	695.16	149.25
19	361.89	0.84	236.12	281.80	698.67	683.94	152.79
20	359.19	0.83	236.64	281.21	694.50	678.15	153.55
21	356.51	0.83	238.40	282.34	693.12	674.19	151.92
22	357.75	0.83	235.73	281.42	697.10	676.15	155.61
23	349.97	0.83	238.60	282.36	676.96	672.00	152.06
24	347.29	0.82	241.27	281.36	674.77	671.86	155.04

NNMC BUILDING 10 ELECTRIC LOADS AVERAGE DAILY LOADS

DAY	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	378.49	0.87	210.92	281.37	710.56	719.31	172.25
2	358.71	0.88	185.18	281.87	666.13	671.96	192.79
3	354.04	0.88	180.98	281.40	639.02	668.25	190.03
4	355.71	0.88	182.64	281.22	648.47	679.12	187.84
5	360.21	0.88	183.43	281.35	656.44	674.68	188.83
6	353.64	0.83	241.90	281.56	698.68	675.18	154.44
7	357.36	0.83	243.34	281.82	696.47	690.69	148.65
8	345.83	0.85	209.18	281.55	633.96	667.68	175.89


NNMC BUILDING 12 ELECTRICAL LOAD
AVERAGE DAILY PROFILES
AVERAGE KWH PER HOUR
90
80
70
60
50
40
30
1 2 3 4 4 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
HOUR AFTER MIDNIGHT
WEEKDAYS
WEEKENDS


NNMC BUILDING 12 ELECTRICAL LOAD
TIME SERIES
KW
120
110
100
90
80
70
60
50
40
30
20
10
0
16:00 04:00 16:00 04:00 16:00 04:00 16:00 04:00 16:00 04:00 16:00 04:00 16:00 04:00
22:00 10:00 22:00 10:00 22:00 10:00 22:00 10:00 22:00 10:00 22:00 10:00 22:00
TIME OF DAY

NNMC BUILDING 12 ELECTRICAL LOAD AVERAGE WEEKDAY PROFILE

TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	39.94	0.89	20.65	123.15	117.64	113.81	138.14
2	39.01	0.88	20.52	123.10	113.46	109.93	136.79
3	38.25	0.88	20.64	123.03	111.29	108.63	132.18
4	37.24	0.88	20.52	122.78	110.52	104.03	135.95
4	37.75	0.88	20.75	123.11	110.20	106.29	131.08
6	45.10	0.91	20.76	122.75	129.79	130.19	152.25
7	64.45	0.95	21.68	122.59	186.55	196.55	198.22
8	75.03	0.95	23.98	123.20	212.24	215.18	210.01
9	75.39	0.95	24.60	123.21	213.54	217.59	222.04
10	78.24	0.95	24.63	123.08	213.82	220.42	226.51
11	81.05	0.95	25.76	122.65	227.29	238.57	231.72
12	82.07	0.95	26.32	123.00	232.19	240.96	246.16
13	77.48	0.95	25.44	122.69	213.21	216.46	227.44
14	78.56	0.95	25.97	122.85	218.38	224.37	234.20
15	84.82	0.95	28.40	122.98	233.57	233.63	253.70
16	69.01	0.94	24.86	123.05	181.78	197.69	204.60
17	56.07	0.92	23.86	123.24	148.73	160.90	177.27
18	55.69	0.92	24.11	123.08	153.51	153.04	182.37
19	53.47	0.91	23.42	123.12	149.34	149.44	176.03
20	50.22	0.91	22.40	122.93	143.00	141.62	168.58
21	53.73	0.92	22.46	123.21	150.53	155.03	173.84
22	51.63	0.91	23.03	122.91	142.24	152.40	169.52
23	49.33	0.91	21.82	122.94	133.79	146.92	161.93
24	41.42	0.89	21.48	123.07	116.50	119.41	139.37

NNMC BUILDING 12 ELECTRICAL LOAD AVERAGE WEEKDAY PROFILE

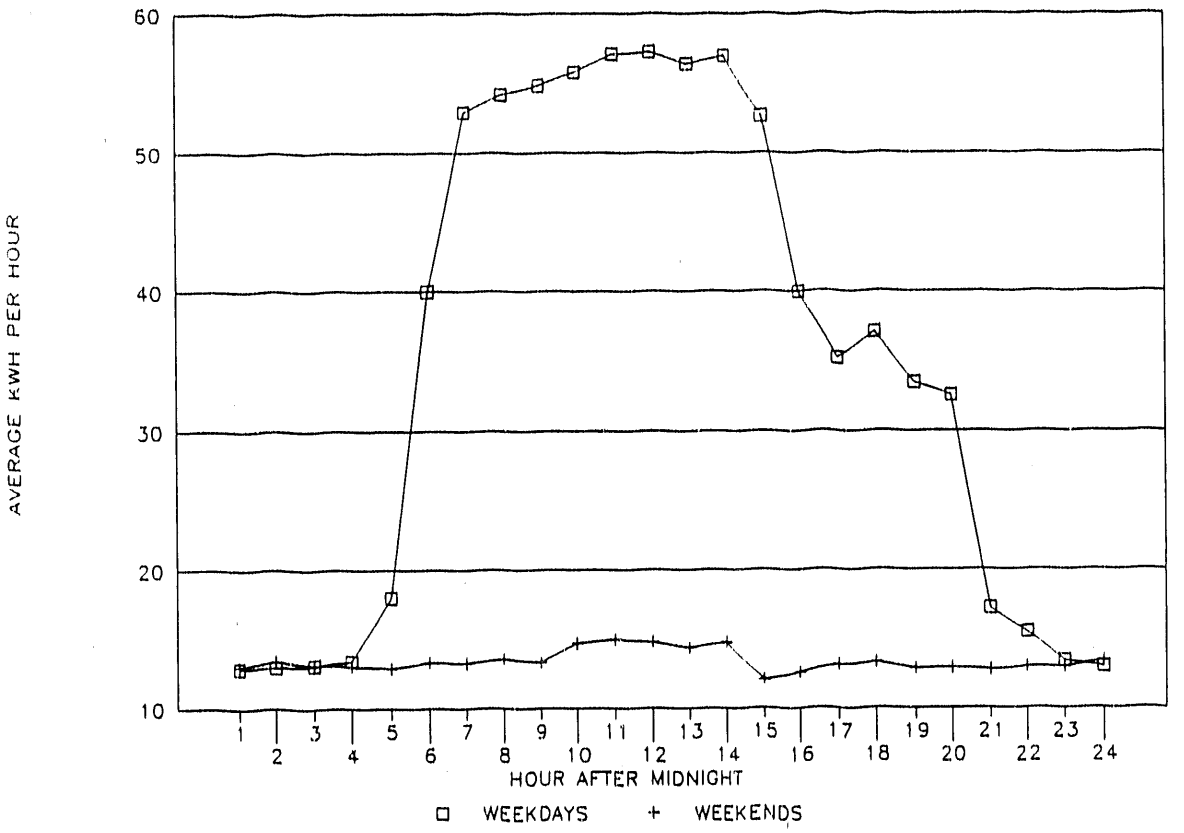
TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	40.94	0.89	20.69	123.16	118.76	115.52	138.02
2	40.36	0.89	20.26	122.76	115.52	114.76	132.77
3	39.71	0.89	20.07	122.59	114.68	112.34	135.66
4	39.47	0.89	20.36	122.67	118.02	108.82	137.39
4	39.38	0.89	20.44	122.73	112.66	112.37	140.69
6	43.64	0.89	21.74	122.98	123.46	114.85	150.70
7	38.04	0.88	20.39	122.86	110.03	103.68	138.66
8	42.37	0.89	21.51	122.79	122.15	120.29	149.62
9	45.96	0.90	22.11	122.59	145.91	119.98	156.72
10	46.48	0.90	22.58	122.84	135.57	129.20	148.65
11	48.42	0.91	21.99	123.11	115.96	154.67	166.49
12	50.53	0.91	23.36	122.95	124.10	156.34	167.54
13	53.11	0.91	23.82	123.28	138.49	156.32	169.25
14	52.43	0.91	24.28	123.33	130.36	146.72	164.22
15	51.57	0.91	23.03	123.11	148.31	149.64	170.70
16	55.29	0.91	24.80	123.31	150.64	176.67	187.49
17	51.52	0.91	23.50	123.60	136.20	153.17	175.80
18	47.82	0.90	22.84	123.39	131.11	133.41	153.65
19	46.68	0.89	23.42	123.30	139.06	137.29	144.64
20	51.06	0.91	22.84	122.87	143.20	146.87	166.21
21	51.18	0.91	23.24	123.60	147.02	152.66	167.89
22	49.65	0.90	23.44	123.60	140.19	142.65	154.20
23	48.66	0.90	22.59	123.39	135.32	134.37	154.47
24	41.72	0.89	20.79	123.31	122.62	119.59	143.14

NNMC BUILDING 12 ELECTRICAL LOAD AVERAGE DAILY LOADS

DAY	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
WED PM	59.73	0.93	22.73	122.80	163.29	166.61	194.98
THURSDAY	57.17	0.93	22.00	122.73	157.71	164.25	177.69
FRIDAY	55.04	0.92	22.18	123.12	160.78	154.27	171.71
SATURDAY	44.45	0.90	21.43	123.32	121.93	127.49	151.49
SUNDAY	48.55	0.90	23.08	122.86	138.02	140.20	158.06
MONDAY	62.85	0.92	25.10	123.05	178.02	180.05	193.60
TUESDAY	60.94	0.92	24.05	122.98	166.60	178.23	191.68
WED AM	43.48	0.89	21.71	123.48	120.54	126.79	151.02

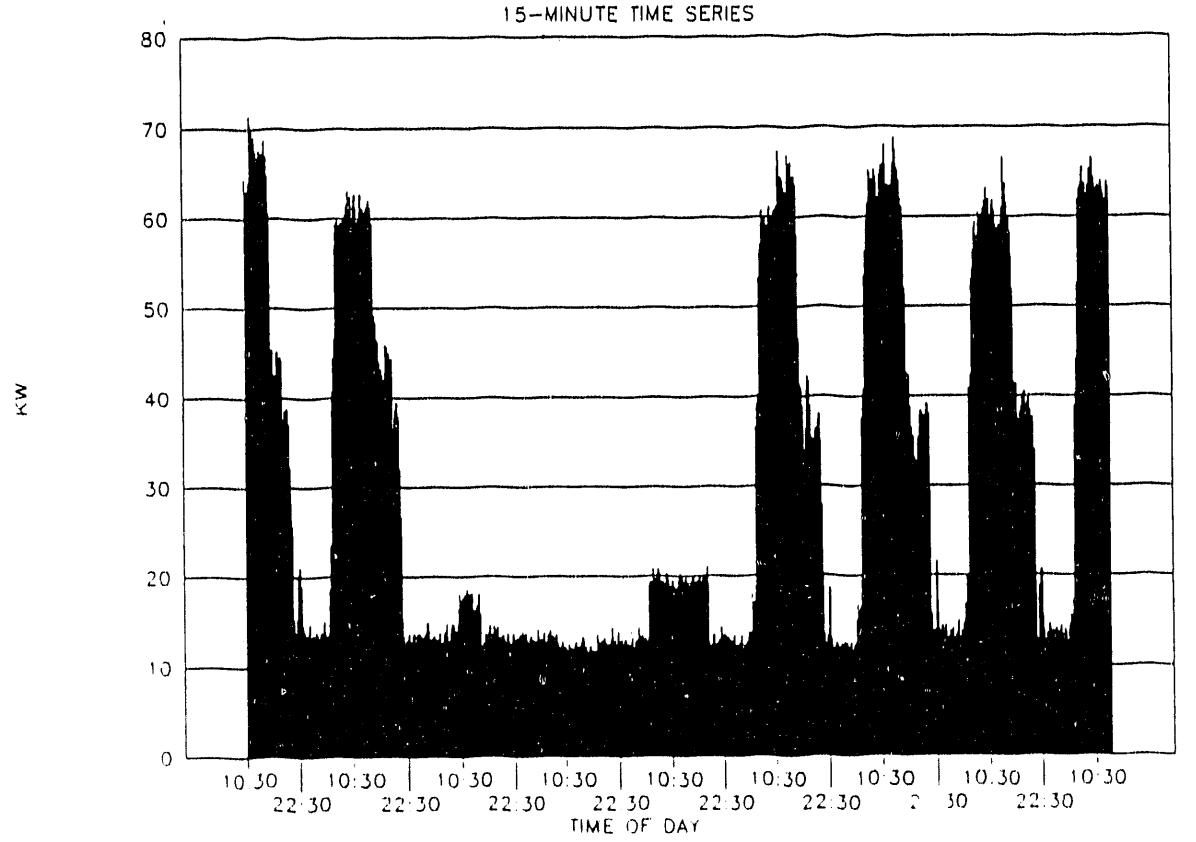
NNMC BUILDING 14 ELECTRICAL LOAD

AVERAGE DAILY PROFILES



NNMC BUILDING 14 ELECTRICAL LOAD

15-MINUTE TIME SERIES



NNMC BUILDING 14 ELECTRICAL — AVERAGE WEEKDAY PROFILE

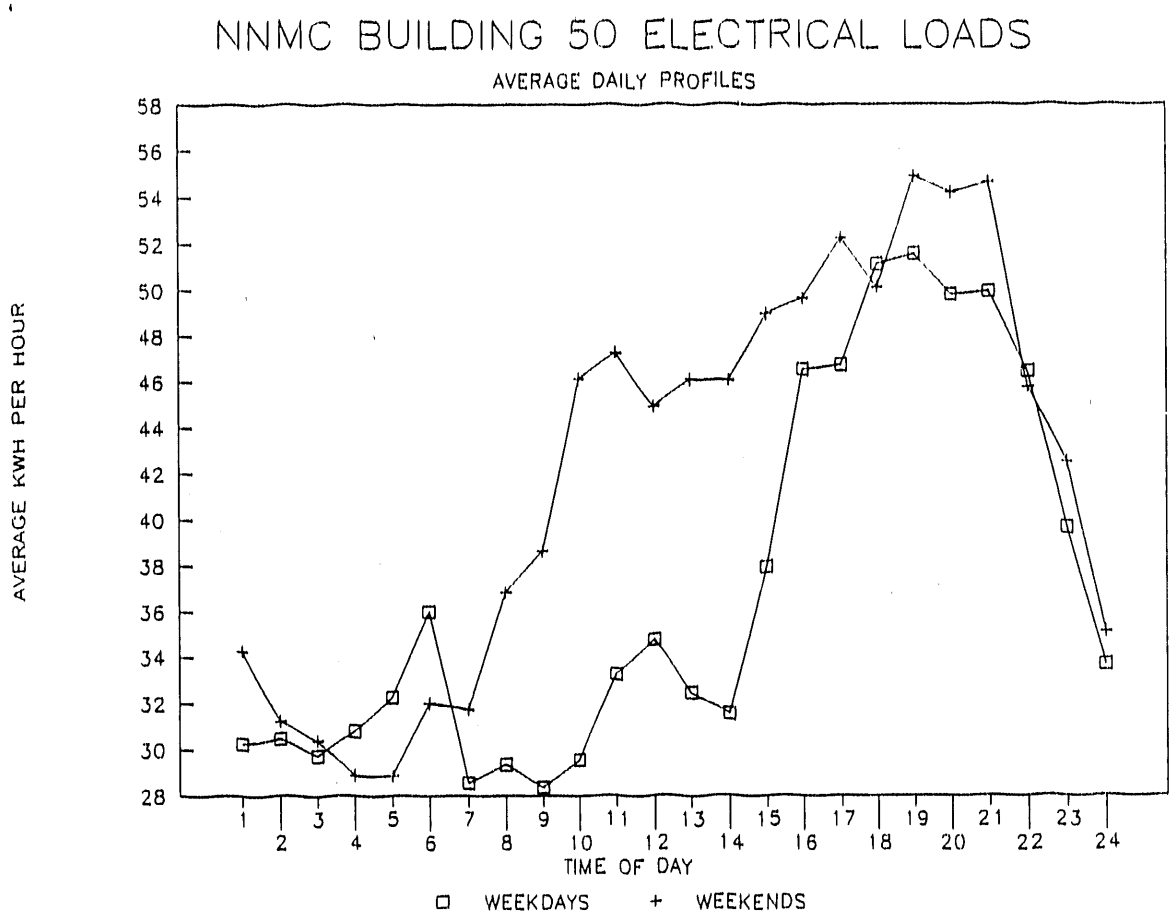
TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	12.88	0.83	8.76	124.42	29.04	46.70	51.31
2	12.98	0.83	8.84	124.55	28.20	47.92	50.81
3	13.12	0.82	8.98	124.34	29.65	49.36	51.54
4	13.42	0.83	9.19	124.15	29.83	51.76	51.01
5	18.01	0.75	16.20	124.08	55.24	83.53	78.14
6	39.99	0.88	17.45	123.71	92.94	147.30	139.33
7	52.98	0.90	18.49	123.54	128.73	171.17	166.82
8	54.20	0.90	18.84	123.72	134.40	168.51	170.13
9	54.90	0.90	19.04	123.47	138.54	173.16	171.64
10	55.84	0.90	19.21	123.36	138.18	174.25	171.86
11	57.14	0.91	19.78	123.45	141.77	178.51	180.23
12	57.24	0.91	20.48	123.48	144.29	175.66	183.56
13	56.44	0.90	20.97	123.39	146.62	174.79	182.34
14	56.98	0.89	21.05	123.74	144.29	171.65	176.91
15	52.67	0.89	20.39	123.60	128.71	161.95	163.00
16	39.98	0.87	19.31	123.47	91.53	130.24	135.89
17	35.22	0.86	18.82	123.40	85.44	119.47	123.37
18	37.05	0.87	18.31	124.10	85.61	123.44	126.74
19	33.45	0.95	8.68	124.63	63.89	106.34	105.97
20	32.55	0.95	7.94	124.22	62.97	102.11	100.60
21	17.22	0.86	8.88	124.58	34.75	56.35	57.91
22	15.47	0.85	9.11	124.49	33.19	59.63	53.24
23	13.41	0.83	8.93	124.46	29.85	48.47	51.56
24	12.96	0.83	8.84	124.29	30.14	46.90	50.09

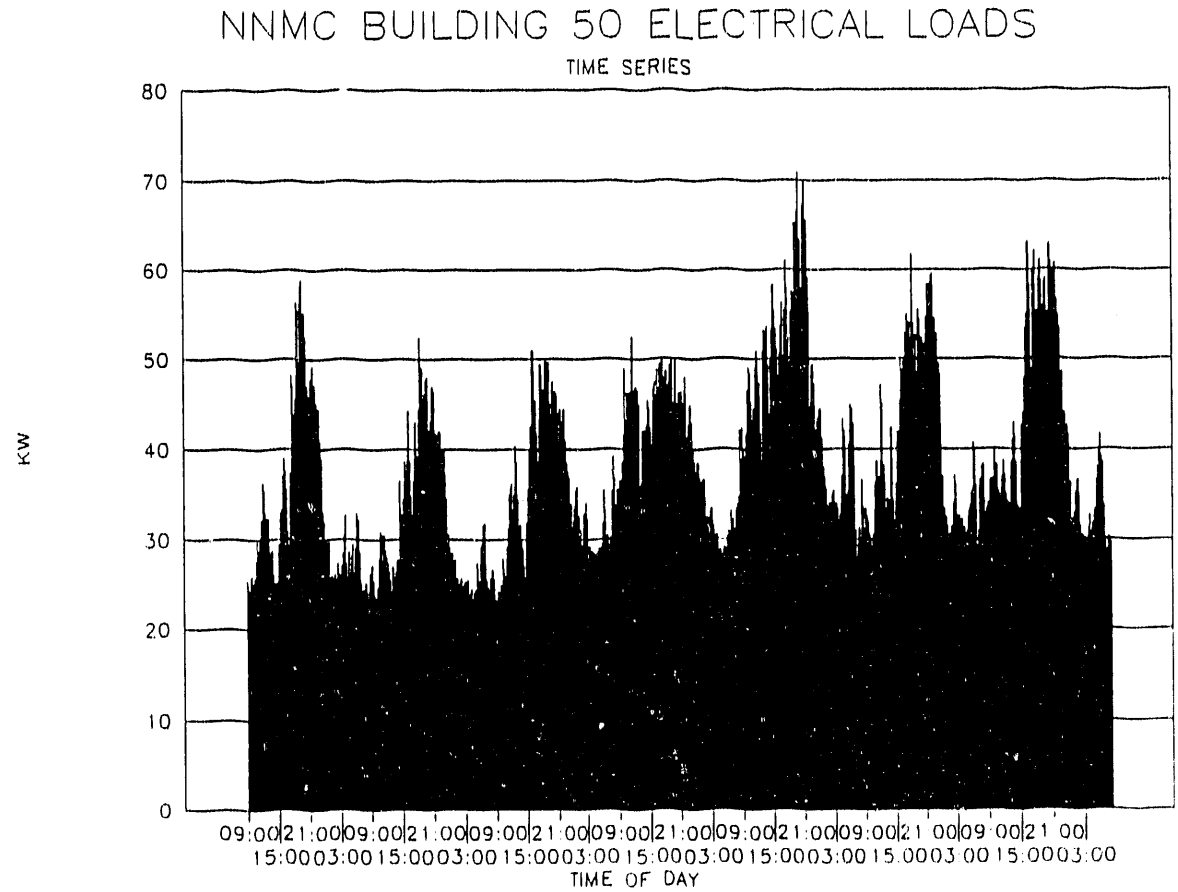
NNMC BUILDING 14 ELECTRICAL — AVERAGE WEEKEND PROFILE

TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
	13.02	0.83	8.67	124.44	32.51	46.71	47.70
2.00	13.43	0.82	9.21	124.46	32.44	51.48	47.17
	13.14	0.82	9.01	124.67	35.56	44.46	48.79
4.00	13.05	0.83	8.85	124.59	33.30	46.42	47.16
	12.90	0.83	8.50	124.46	31.98	46.41	49.36
6.00	13.33	0.82	9.15	124.21	32.97	54.54	48.97
	13.27	0.82	9.18	124.21	35.36	46.10	48.81
8.00	13.58	0.84	8.74	123.99	36.76	44.36	50.93
	13.31	0.85	8.12	124.42	33.54	42.07	50.98
10.00	14.69	0.86	8.55	124.46	38.11	47.27	54.14
	15.00	0.86	8.65	124.26	37.33	49.16	50.59
12.00	14.78	0.85	8.98	124.43	37.78	50.63	52.61
	14.37	0.84	8.97	124.46	35.04	49.17	50.79
14.00	14.78	0.84	9.41	124.30	34.82	54.89	49.85
	12.03	0.82	8.47	124.24	29.04	47.55	45.54
16.00	12.59	0.81	9.04	124.02	29.72	48.13	47.14
	13.16	0.82	9.14	124.30	29.20	52.04	45.70
18.00	13.29	0.81	9.45	124.53	31.88	51.38	48.07
	12.86	0.82	8.85	124.67	29.76	47.98	47.97
20.00	12.88	0.82	8.83	124.77	27.49	51.16	47.35
	12.76	0.83	8.70	124.48	28.60	48.95	47.05
22.00	12.99	0.82	9.03	124.75	31.67	49.69	48.11
	12.97	0.82	9.09	124.53	31.20	47.43	47.25
24.00	13.42	0.82	9.24	124.45	33.24	51.42	48.45

NNMC BUILDING 14 ELECTRICAL — DAILY AVERAGES

DAY	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
THURSDAY	46.24	0.91	19.56	123.59	111.20	146.58	147.51
FRIDAY	38.38	0.88	17.85	123.71	93.72	125.99	125.95
SATURDAY	14.20	0.84	9.01	124.36	35.85	49.67	51.50
SUNDAY	12.61	0.82	8.81	124.48	29.93	47.78	46.05
MONDAY	16.68	0.70	18.52	124.38	55.26	73.02	74.23
TUESDAY	38.15	0.91	12.33	123.95	85.23	120.40	119.58
WEDNESDAY	38.63	0.91	12.55	123.92	89.02	120.46	124.34
THURSDAY	38.12	0.92	12.20	123.95	85.50	122.50	120.31
FRIDAY	40.61	0.91	12.91	123.87	96.02	124.49	131.90


NNMC BUILDING 50 ELECTRICAL LOADS
AVERAGE DAILY PROFILES
AVERAGE KWH PER HOUR
58
56
54
52
50
48
46
44
42
40
38
36
34
32
30
28
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
TIME OF DAY
□ WEEKDAYS + WEEKENDS


NNMC BUILDING 50 ELECTRICAL LOADS
TIME SERIES
KW
80
70
60
50
40
30
20
10
0
09:00 21:00 09:00 21:00 09:00 21:00 09:00 21:00 09:00 21:00 09:00 21:00 09:00 21:00 09:00 21:00
15:00 03:00 15:00 03:00 15:00 03:00 15:00 03:00 15:00 03:00 15:00 03:00 15:00 03:00 15:00 03:00
TIME OF DAY

NNMC BUILDING 50 ELECTRICAL LOADS AVERAGE WEEKDAY LOADS

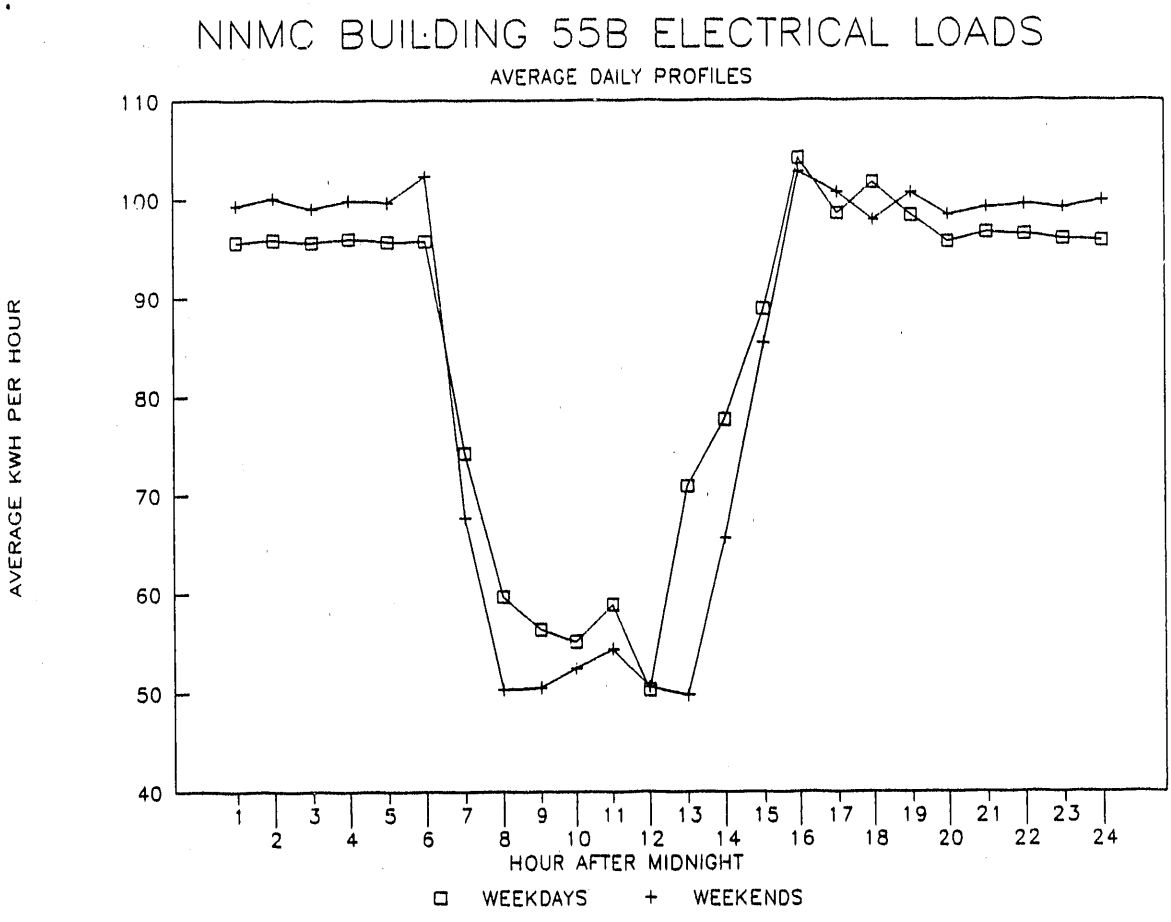
TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	30.25	0.83	20.62	123.23	71.14	113.15	117.15
2	30.46	0.83	21.00	123.16	74.38	115.89	114.54
3	29.75	0.82	20.59	123.06	68.35	113.59	113.05
4	30.80	0.83	20.57	122.88	76.73	111.56	114.09
5	32.26	0.85	20.32	123.13	72.57	120.85	122.27
6	35.99	0.88	19.80	122.92	74.50	117.83	133.17
7	28.56	0.84	18.74	123.09	65.15	102.19	110.87
8	29.36	0.84	19.00	123.39	69.34	104.85	109.94
9	28.38	0.85	17.93	123.40	67.84	97.16	108.72
10	29.56	0.85	18.56	123.33	73.20	111.55	108.61
11	33.25	0.86	19.44	123.15	82.53	115.68	118.12
12	34.77	0.86	20.12	123.34	81.35	124.17	117.07
13	32.47	0.86	19.64	123.00	76.89	116.13	111.86
14	31.55	0.85	19.48	123.21	73.07	109.33	112.51
15	37.94	0.86	22.48	123.29	95.38	150.12	129.27
16	46.52	0.88	24.56	123.19	119.65	170.70	137.21
17	46.71	0.88	25.03	123.23	121.36	170.25	144.06
18	51.13	0.89	25.78	123.13	131.84	186.62	152.85
19	51.57	0.89	25.76	123.00	130.64	183.20	162.02
20	49.81	0.89	25.11	123.02	125.27	174.72	154.65
21	49.91	0.89	24.98	123.21	118.96	178.03	162.52
22	46.44	0.89	24.40	122.89	99.99	162.84	154.12
23	39.65	0.87	22.11	123.07	95.35	137.10	131.64
24	33.68	0.84	21.95	123.20	76.67	127.27	121.74

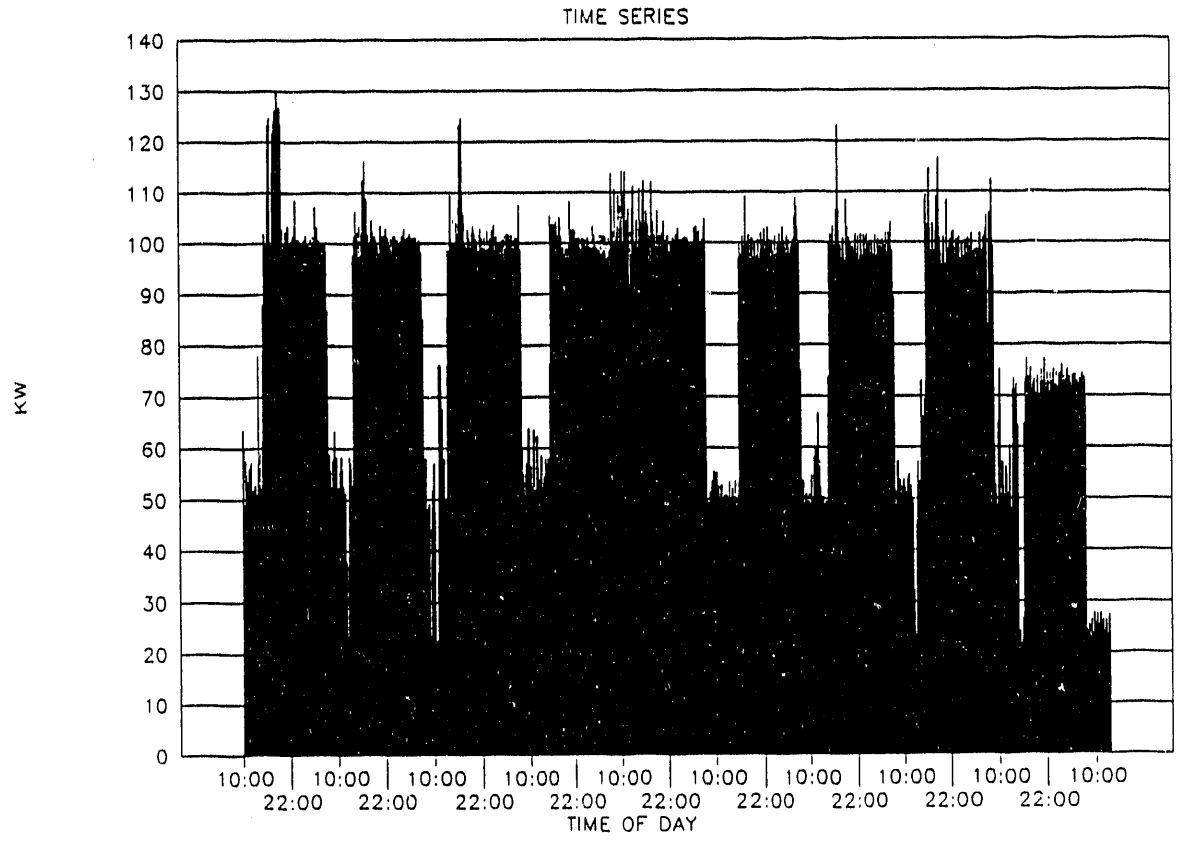
NNMC BUILDING 50 ELECTRICAL LOADS AVERAGE WEEKDAY LOADS

TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	34.26	0.86	20.63	123.10	79.56	122.91	119.50
2	31.21	0.84	19.71	122.76	74.14	120.48	116.86
3	30.39	0.84	19.71	122.78	65.59	107.66	117.97
4	28.86	0.83	19.11	122.63	63.24	106.82	112.60
5	28.87	0.83	19.11	123.12	66.76	105.26	113.62
6	32.02	0.85	19.57	123.02	75.83	118.26	120.34
7	31.74	0.84	20.16	122.91	67.82	125.30	119.19
8	36.82	0.87	21.16	122.85	89.17	148.00	122.86
9	38.63	0.88	21.21	122.52	99.48	147.05	121.25
10	46.11	0.89	23.40	123.04	116.42	172.04	124.32
11	47.24	0.89	23.46	123.02	123.33	170.84	130.56
12	44.92	0.88	24.08	123.12	114.05	172.21	141.36
13	46.11	0.88	24.84	123.42	112.63	168.42	138.14
14	46.03	0.88	24.62	123.08	110.34	172.42	146.52
15	48.96	0.87	27.01	123.14	122.94	184.70	147.47
16	49.65	0.87	27.43	123.37	140.47	185.27	148.35
17	52.26	0.87	28.78	123.50	144.60	189.19	150.31
18	50.12	0.86	29.23	123.33	136.79	191.14	157.71
19	54.92	0.88	29.45	123.11	149.17	209.00	163.72
20	54.22	0.88	28.81	122.78	134.11	185.49	168.34
21	54.65	0.88	29.06	123.56	149.00	187.97	164.45
22	45.74	0.86	26.92	123.46	113.37	155.90	154.41
23	42.49	0.85	26.03	123.28	108.93	155.67	136.15
24	35.08	0.85	21.28	123.45	84.00	122.63	127.72

NNMC BUILDING 50 ELECTRICAL LOADS AVERAGE DAILY LOADS

DAY	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
MONDAY PM	37.45	0.90	17.71	123.09	84.55	129.94	123.35
TUESDAY	32.48	0.89	16.64	123.00	69.35	114.14	115.97
WEDNESDAY	33.53	0.87	18.29	123.40	75.88	118.05	116.50
THRUSDAY	39.54	0.86	22.75	123.36	96.18	141.42	132.77
FRIDAY	44.74	0.87	25.15	122.83	115.63	168.97	139.21
SATURDAY	41.90	0.85	25.62	123.12	103.97	157.22	138.73
SUNDAY	41.86	0.83	27.36	123.00	110.96	155.29	142.22
MONDAY AM	33.54	0.81	24.42	123.47	91.16	118.41	128.50


NNMC BUILDING 55B ELECTRICAL LOADS
AVERAGE DAILY PROFILES
AVERAGE KWH PER HOUR
110
100
90
80
70
60
50
40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
HOUR AFTER MIDNIGHT
WEEKDAYS
WEEKENDS


NNMC BUILDING 55B ELECTRICAL LOADS
TIME SERIES
KW
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
10:00 22:00
TIME OF DAY

NNMC BUILDING 55B ELECTRICAL LOADS AVERAGE WEEKDAY PROFILE

TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	95.66	0.91	44.84	285.12	108.37	123.66	137.50
2	95.88	0.90	45.36	285.41	108.92	125.39	138.34
3	95.63	0.90	45.64	285.65	108.59	125.41	138.15
4	96.02	0.90	45.64	285.33	108.76	124.64	137.98
5	95.69	0.90	45.47	284.90	108.30	125.46	138.09
6	95.74	0.91	45.08	284.94	106.46	126.23	138.40
7	74.24	0.83	43.92	284.76	81.22	98.07	105.91
8	59.65	0.77	44.45	285.48	76.00	93.37	99.19
9	56.35	0.76	43.91	285.13	73.82	90.72	95.94
10	55.17	0.76	43.32	285.34	73.12	90.17	95.24
11	58.85	0.77	45.91	285.02	73.68	91.06	96.44
12	50.30	0.75	40.38	285.03	65.95	81.91	87.45
13	70.90	0.83	43.70	285.07	89.32	108.68	115.36
14	77.70	0.84	45.38	285.66	89.99	108.78	116.86
15	88.89	0.87	44.60	284.97	103.53	122.13	134.29
16	104.18	0.91	47.31	285.97	117.50	138.93	150.27
17	98.63	0.91	45.53	285.03	107.96	126.30	139.59
18	101.71	0.91	47.02	285.45	110.17	130.11	142.45
19	98.38	0.91	45.78	285.39	110.25	126.48	141.80
20	95.71	0.91	44.93	285.31	110.19	128.19	141.35
21	96.66	0.91	45.49	285.56	108.73	124.42	138.05
22	96.47	0.90	45.65	285.59	109.35	126.07	139.20
23	96.04	0.90	45.75	285.97	108.99	124.56	137.96
24	95.84	0.90	45.55	285.73	109.04	124.88	138.18

NNMC BUILDING 55B ELECTRICAL LOADS AVERAGE WEEKEND PROFILE

TIME	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	99.37	0.90	49.18	286.70	113.67	130.89	142.91
2	100.10	0.90	49.54	285.72	114.45	131.52	144.20
3	99.07	0.90	48.67	285.79	113.89	131.91	143.51
4	99.90	0.90	49.44	286.21	115.11	131.89	144.25
5	99.70	0.90	48.97	286.12	112.75	128.19	142.41
6	102.38	0.90	49.15	285.36	112.52	131.76	143.60
7	67.62	0.79	48.25	285.62	85.82	102.24	109.68
8	50.34	0.73	47.44	285.67	68.37	81.74	88.97
9	50.57	0.73	47.80	285.63	69.49	82.70	89.51
10	52.48	0.74	47.78	285.58	80.54	95.34	102.00
11	54.41	0.74	49.07	285.91	75.40	89.04	95.90
12	50.63	0.73	47.66	285.58	68.62	82.83	89.59
13	49.82	0.73	46.12	284.46	68.69	82.49	88.99
14	65.59	0.79	47.00	285.69	85.16	99.29	109.48
15	85.48	0.85	47.94	285.82	101.03	118.40	129.94
16	102.79	0.90	48.51	285.36	122.51	143.54	151.72
17	100.76	0.90	49.11	285.79	111.55	129.52	143.11
18	97.92	0.90	47.06	285.52	111.30	129.14	142.60
19	100.65	0.90	48.70	286.04	112.12	131.46	144.32
20	98.41	0.90	48.35	285.63	111.81	129.36	142.30
21	99.22	0.90	48.05	285.54	114.45	131.90	143.11
22	99.49	0.90	47.47	284.96	113.47	129.57	142.56
23	99.21	0.90	48.05	285.47	113.69	130.96	142.20
24	99.93	0.90	49.43	285.67	114.02	130.16	142.99

NNMC BUILDING 55B ELECTRICAL LOADS AVERAGE DAILY LOADS

DAY	KW	PF	KVAR	VOLTS	Amp-A	Amp-B	Amp-C
1	88.44	0.85	50.37	286.52	102.00	120.81	130.52
2	87.63	0.86	48.20	285.64	103.38	121.47	132.13
3	89.00	0.86	47.81	285.32	103.37	119.50	131.88
4	86.67	0.85	48.63	285.24	102.42	119.66	130.16
5	101.86	0.91	47.51	283.83	116.37	135.33	146.78
6	82.72	0.84	48.29	285.85	98.99	115.49	125.74
7	86.10	0.85	48.27	285.47	101.88	118.34	129.25
8	84.59	0.85	47.51	285.66	100.09	116.48	127.87
9	75.23	0.88	37.40	285.45	84.61	101.42	111.84
10	51.61	0.83	25.98	285.47	54.59	71.62	78.08

Attachment 7: Major Electrical Connected Loads for Selected Buildings

ATTACHMENT 7: MAJOR CONNECTED ELECTRICAL LOADS FOR SELECTED BUILDINGS

The capacities of major electrical equipment for the selected buildings were developed from construction documents and limited building surveys. The results of this analysis are indicated in a table disaggregating HVAC, lighting, and miscellaneous equipment into major categories. A total connected load for each of these end-uses and for the entire building is estimated as well. These data will be useful to disaggregate the individual building electrical loads for those buildings subjected to shared energy savings projects.

Note that for Buildings 1-10 (the largest users) lighting and HVAC loads are nearly equal and constitute approximately 90% of the connected load. These values do not include the many small and medium capacity electrical devices in the buildings such as desk lamps, medical equipment, and desktop computers.

ELECTRICAL CONSUMPTION ESTIMATES
ANNUAL MWH

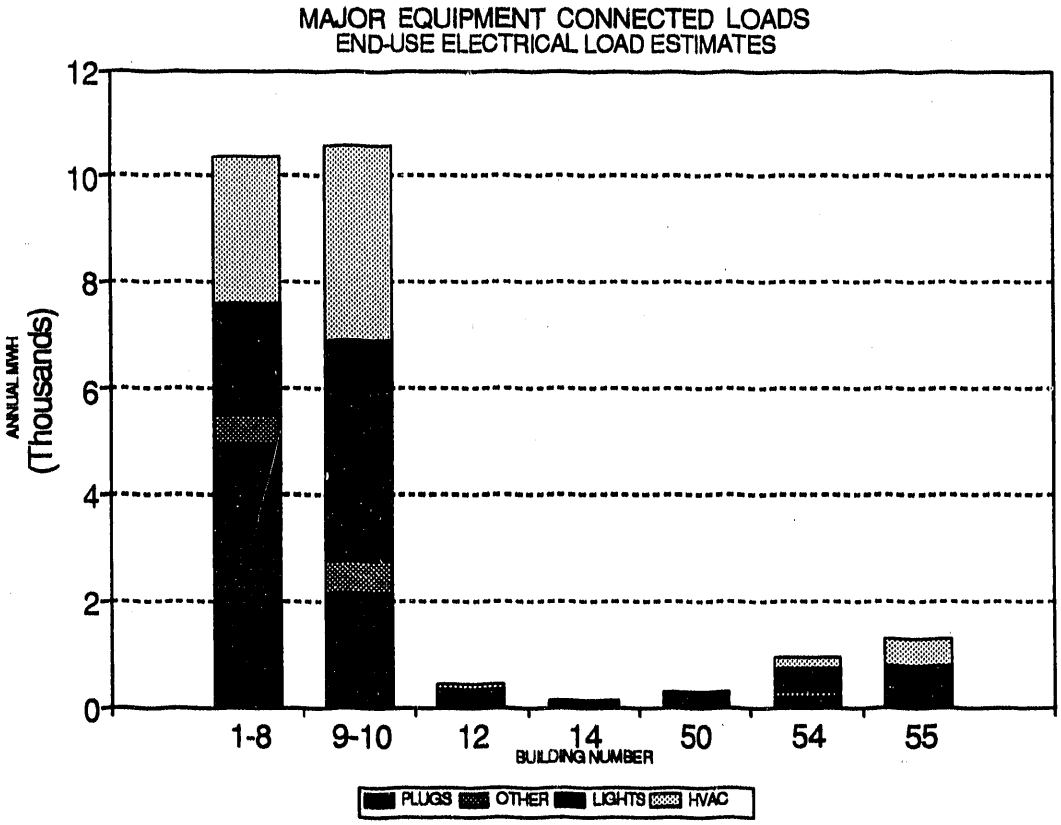
BUILDING	1-8	9-10	12	14	50	54	55
AIR HANDLING UNITS	1464	182	0	77	3	34	86
RETURN FANS	644	934	0	0	0	31	67
EXHAUST FANS	103	816	83	3	5	17	155
SUPPLY FANS	129	1146	0	0	0	78	102
PUMPS	405	582	0	0	0	27	90
UNIT HEATERS	9	18	32	0	0	0	0
TOTAL HVAC	2753	3678	115	81	8	188	500
FLUORESCENT LIGHTS	1810	3197	122	79	62	175	50
INCANDESCENT LIGHTS	84	441	0	0	23	30	6
HALLIDE	42	454	0	0	0	0	0
MERCURY	196	57	0	0	0	0	283
SODIUM	0	0	0	0	0	261	24
OTHER LIGHTS	0	68	0	0	0	20	13
	0	0	0	0	0	0	0
TOTAL LIGHTING	2131	4217	122	79	85	486	376
ELEVATORS	472	267	0	0	0	88	88
KITCHEN EQUIPMENT	86	323	0	0	0	0	0
TOTAL MAJOR EQUIPMEN	558	591	0	0	0	88	88

END-USE LOAD ESTIMATES BY CATEGORY

BUILDING	1-8	9-10	12	14	50	54	55
PLUGS	4939	2125	234	25	232	193	309
LIGHTS	2131	4217	122	79	85	486	376
OTHER	540	591	0	0	0	88	88
HVAC	2696	3678	115	81	8	188	500
ESTIMATED TOTAL	10381	10611	471	184	325	955	1273

MAJOR EQUIPMENT CONNECTED LOADS
ESTIMATED KW

BUILDING	1-8	9-10	12	14	50	54	55	Total	Share
AIR HANDLING UNITS	310	39		17	1	7	19	392	15.2%
RETURN FANS	104	304				5	11	424	16.5%
EXHAUST FANS	22	179	19	1	1	4	34	260	10.1%
SUPPLY FANS	21	989				15	19	1044	40.5%
PUMPS	65	356				4	15	440	17.1%
UNIT HEATERS	2	4	7					14	0.5%
TOTAL HVAC	524	1872	27	17	2	36	98	2575	
FLUORESCENT LIGHTS	496	949	27	33	14	44	11	1574	71.8%
INCANDESCENT LIGHTS	29	159			6	11	2	207	9.4%
HALLIDE	15	163						178	8.1%
MERCURY	53	16					67	135	6.2%
SODIUM						62	6	67	3.1%
OTHER LIGHTS		20				6	4	30	1.4%
TOTAL LIGHTING	592	1307	27	33	20	123	90	2191	
ELEVATORS	416	244				80	80	820	77.2%
KITCHEN EQUIPMENT	50	192						242	22.8%
TOTAL MISC EQUIPMENT	466	436				80	80	1062	
GRAND TOTALS	1582	3614	53	50	22	238	268	5828	


MAJOR EQUIPMENT CONNECTED LOADS
END-USE ELECTRICAL LOAD ESTIMATES
ANNUAL MWH
(Thousands)
12
10
8
6
4
2
0
1-8
9-10
12
14
50
54
55
BUILDING NUMBER
PLUGS
OTHER
LIGHTS
HVAC

Attachment 8: Field Notes

ATTACHMENT 8: FIELD NOTES

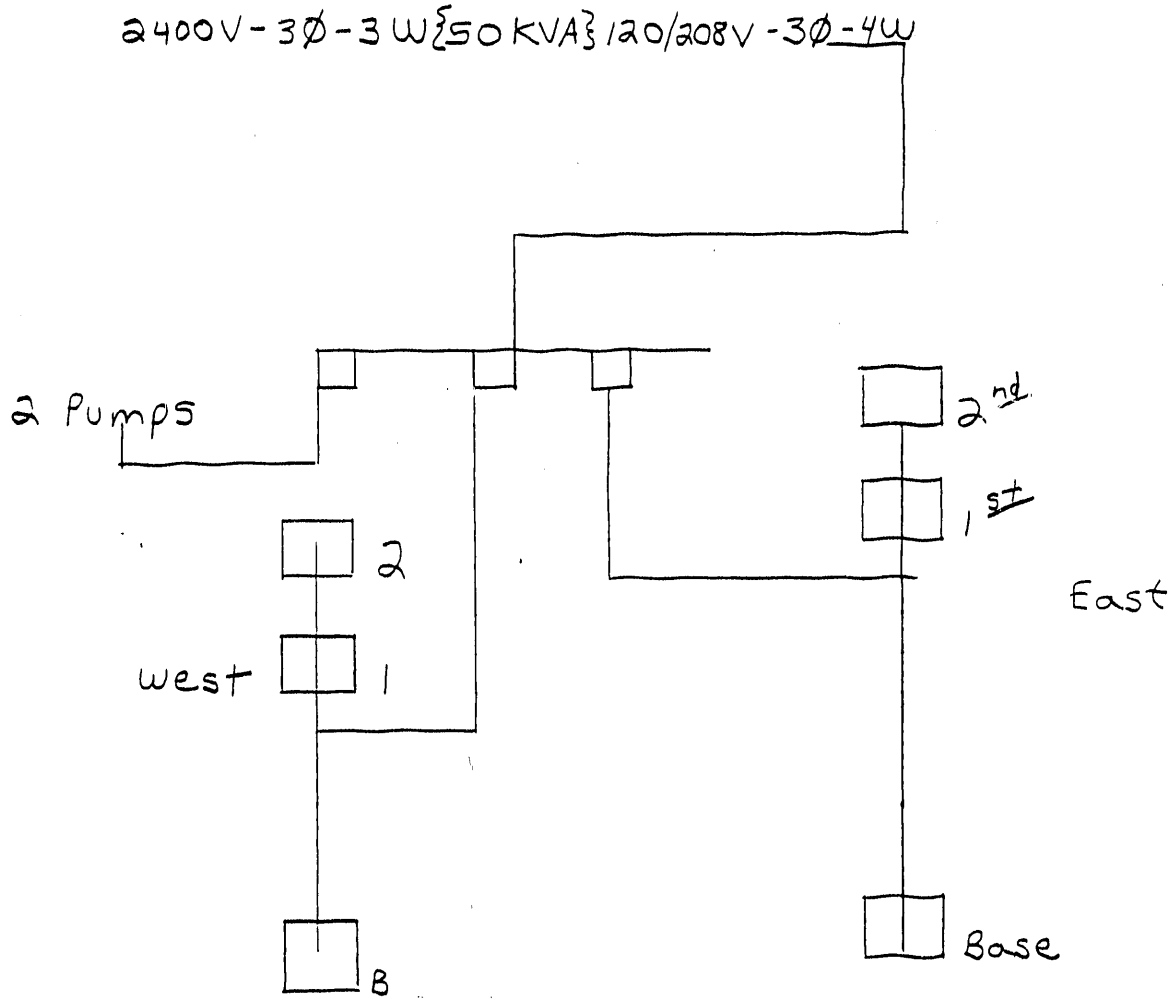
This attachment contains copies of the original field notes made by PNL staff members.

Battelle
Pacific Northwest Laboratories

ENGINEERING WORKSHEET

Prepared By: Richman, Wahlstrom	Date: 8/2/91	Project: NNMC

Title/Subject: Electrical Service Diagram (Medical Holding Facility, NNMC



DOE RL Richland WA
U.S. GPO: 1991—593-806
54-1007-114 (1/

BUILDING TITLE: MEDICAL HOLDING FACILITY
BUILDING NUMBER: ~~12~~ NNMC 12

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS
BLDG 12

BUILDING SITE DESCRIPTION
FRONT ENTRANCE FACES NORTH TOWARDS HOSPITAL (#10)
BACK TERRAIN SLOPES DOWN TOWARDS GAS PUMPS & PARKING

BUILDING USE SUMMARY
MEDICAL HOLD

BUILDING CONSTRUCTION SUMMARY
1940's WOOD CONSTRUCTION W/MASON PANELS ADDED, LIGHTING UPGRADED, PORCH ONLY WINDOWS REPLACED

HVAC SYSTEM SUMMARY
2 PIPE FAN COIL AND CONVECTION UNITS

MAJOR ENERGY USING EQUIPMENT SUMMARY
LIGHTS, HVAC PUMPS

PREPARED BY: E. RICHMAN DATE: 7-11-89 BUILDING NUMBER: 12

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

ELECTRIC METERED

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

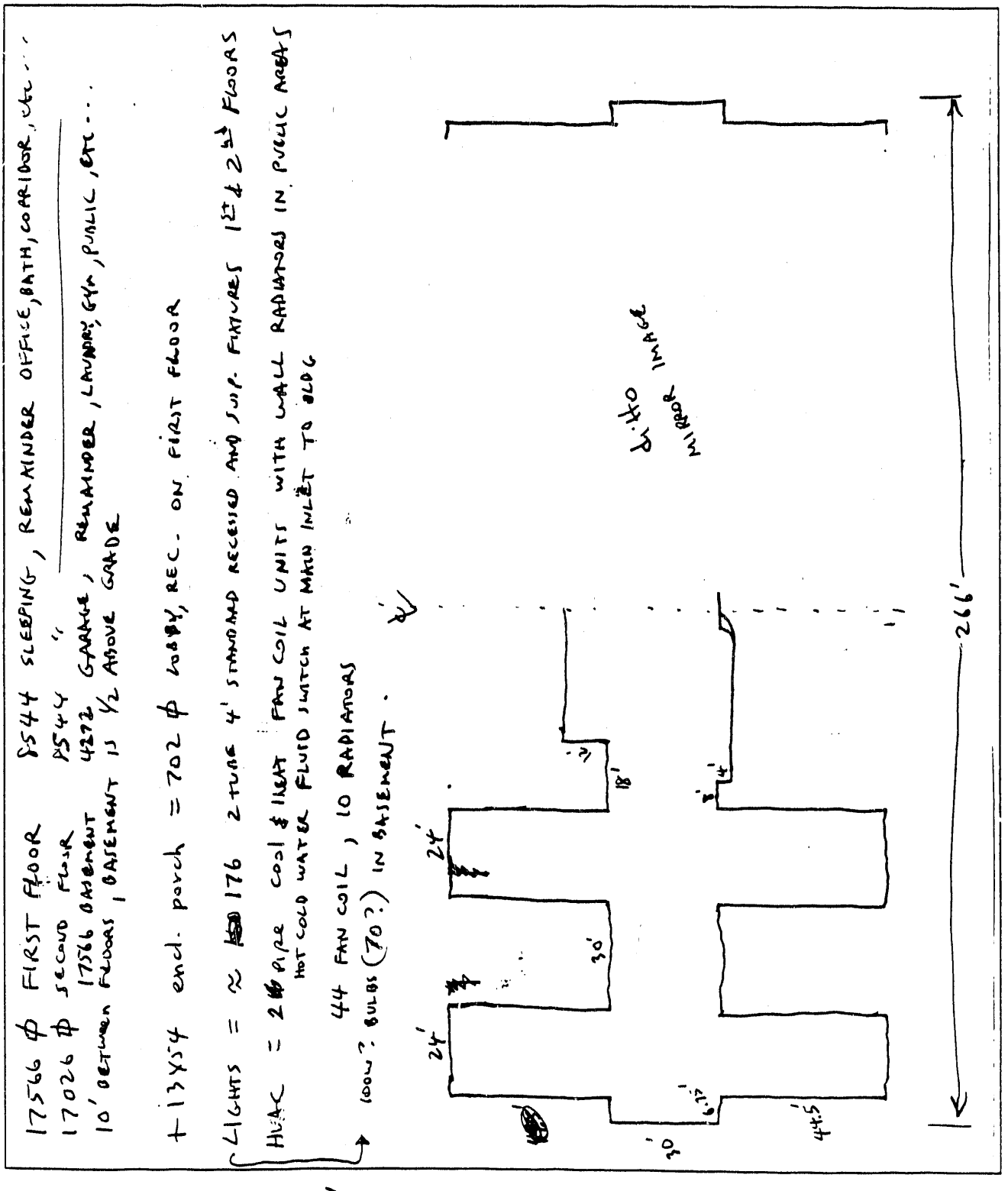
NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

LIGHT RETROFITS

PREPARED BY: E. RICHMAN DATE: _____ BUILDING NUMBER: 12

SITE DESCRIPTION – PLAN VIEW



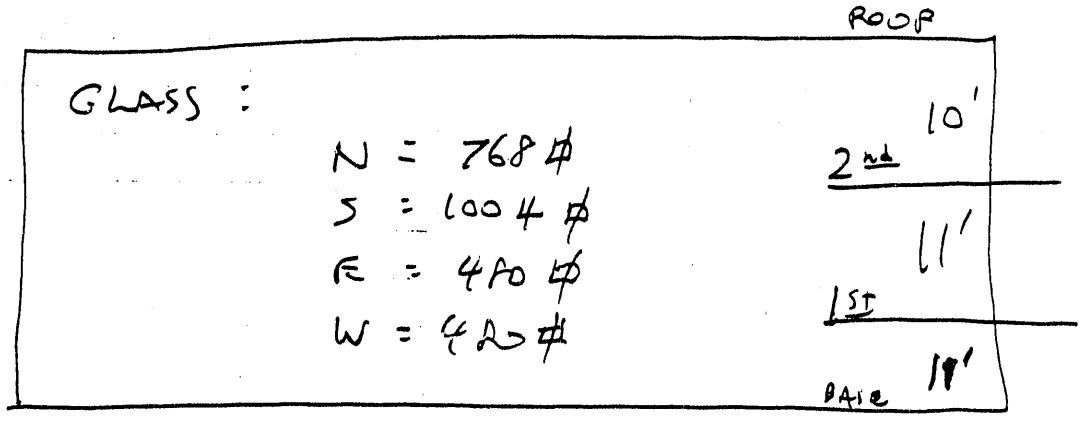
TRUE NORTH ARROW: →

SCALE: □ = 10' × 10'

8.5

PREPARED BY: _____ DATE: _____ BUILDING NUMBER: 12

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE



VERTICAL ARROW:

SCALE:

8.6

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 12

5/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC 12 This page covers: Before condition ___ After X Date: 7-11-89

Building location: BETHESDA (city) MD (state) (zip code)

Project/program ID: ___ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | (1921-1945) | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: GRPH Total floor area: 52158 (ft²) Year of latest renovation: 1983

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial	GRPH - GROUP HOUSING	

Floor area of latest additions: ALL (ft²) ___ (ft²) ___ (ft²) Number of stories:

Year completed: 1983 ___ ___ 3 INCL. BASEMENT

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	43375 / 433750	43375 / 433750	___ / ___	2 1/2
Below grade:	8783 / 87830	8783 / 87830	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	

Roof pitch: ___ (in./in.) Exposed roof area: 17566 (ft²) Roof insulated at: ceiling level X roof level ___

Average roof estimated U-value (Btu/h-ft²-F) .109 Ground-coupled floor area: 17566 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) .14 Common walls: Ø (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls:	1	Doors:	1
Below grade walls:	3	Roof:	2
Atrium walls:	1	Floor:	1,2

(If code '0' is used, describe below.)

W/ PRECAST CONC. PANELS

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft²)

Wall/glazing information

Primary glazing type: 80% (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

WOOD (circle those that apply) (Single) Double Triple (Clear) Tinted Reflective Other Fixed (Operable)

Secondary glazing: 20% (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

METAL (circle those that apply) Single (Double) Triple Clear Tinted Reflective Other Fixed Operable

Orientation	East	South	West	North
Above grade gross wall area (ft²)	1968	7980	1968	5320
Glazing area (ft²)	480	1004	480	768
Shading by overhangs (y or n)	N	N	N	N
Shading by fins (y or n)	N	N	N	N
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house 100 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ~~20~~ (%) | Other ___ (%)

Description of variances: ___

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC 12 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC MED. HOLD	ALL		

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F)		Unoccupied Setpoint (F)	
				heating	cooling	heating	cooling
1 HALL/BATH	111	17504	10'				
2 SLEEPING	700	17088	11'				
3 GARAGE	603	4272	11'				
4 PUBLIC FAC.	105/106	13294	11'				

Description of variances: _____

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

Tenant/Zone No.: 1
Hour open
Hour closed — OPEN 24 HOUR
Occupant-hrs

Tenant/Zone No.: 2
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 3
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 4
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol

EBER Nonresidential Energy Performance Monitoring
BUILDING CORE DATA FORM — *page 3*

Building ID: NNMC "12" This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Tenant/Zone No.:	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
_____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy:
SCHEDULE HOURS ARE ESTIMATED

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	TPFC/TPIU	3	TOP FLOOR				S/CH
S2	TPIU	3	GROUND FLOORS				S/CH
S3							
S4							
S5							
S6							

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above	
OFF SITE BS	OL				S1	S2
CC/CA	E/[illegible]S				S1	S2

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF/IFH	80/FIX.	246/	M	

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual), 2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, oh-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR-water-cooled reciprocating chiller, CAS-air-cooled screw chiller, CWS-water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 12 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: TOTAL ESTIMATED LIGHTING WATTS
INCAN. 7000
FLOUR. 29,160

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW
HVAC PUMPS (2)		HVAC	E	5 hp EA

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters
PEPCO	E		1 (#272)

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		

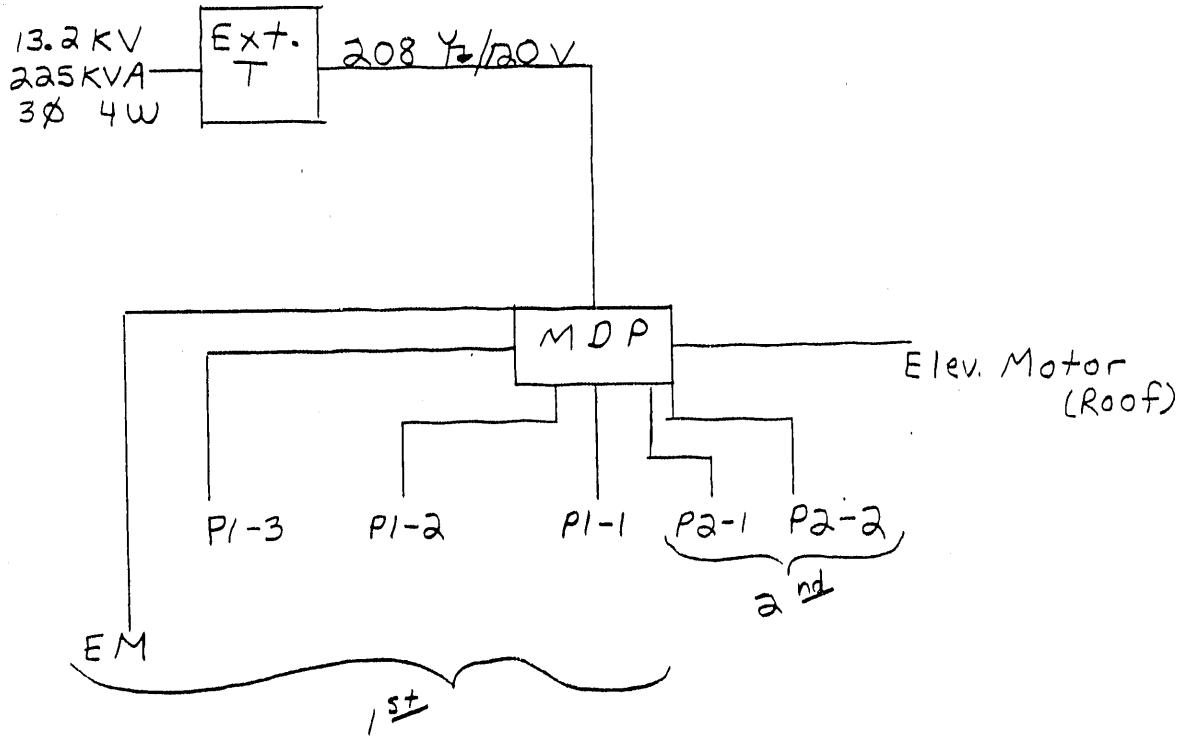
Description of variances: _____

Battelle
Pacific Northwest Laboratories

ENGINEERING WORKSHEET

Prepared By: Richman, Wahlstrom	Date: 8/2/91	Project: NNMC

Title/Subject: Electrical Service Diagram (Public Works office/shops, NNMC 14)



DOE RL Richland WA
U.S. GPO: 1991—593-806
54-1007-114 (1/83)

BUILDING TITLE: PUBLIC WORKS OFFICE/SHOPS
BUILDING NUMBER: NNMC 14

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS

BLDG # 14

BUILDING SITE DESCRIPTION

FRONT FACES ~~BLDG #14~~ SUBSTATION PAD
BETWEEN BUILDINGS 54 & 55 (WEST)
BACK SLOPES DOWN

BUILDING USE SUMMARY

TOP FLOOR - OFFICES & COMPUTER ROOM
BASEMENT - MAINT. SHOPS, STORAGE

BUILDING CONSTRUCTION SUMMARY

CONCRETE/BLOCK W/ DBL WINDOWS

HVAC SYSTEM SUMMARY

TWO PIPE FAN COIL & CONVECTION (TOP FLOOR)
~~WEST~~ EXHAUST VENTILATION ONLY IN SHOPS

MAJOR ENERGY USING EQUIPMENT SUMMARY

SHOP EQUIP, COMPUTER

PREPARED BY: E. RICHMAN DATE: 7-11-84 BUILDING NUMBER: 14

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

NOT METERED

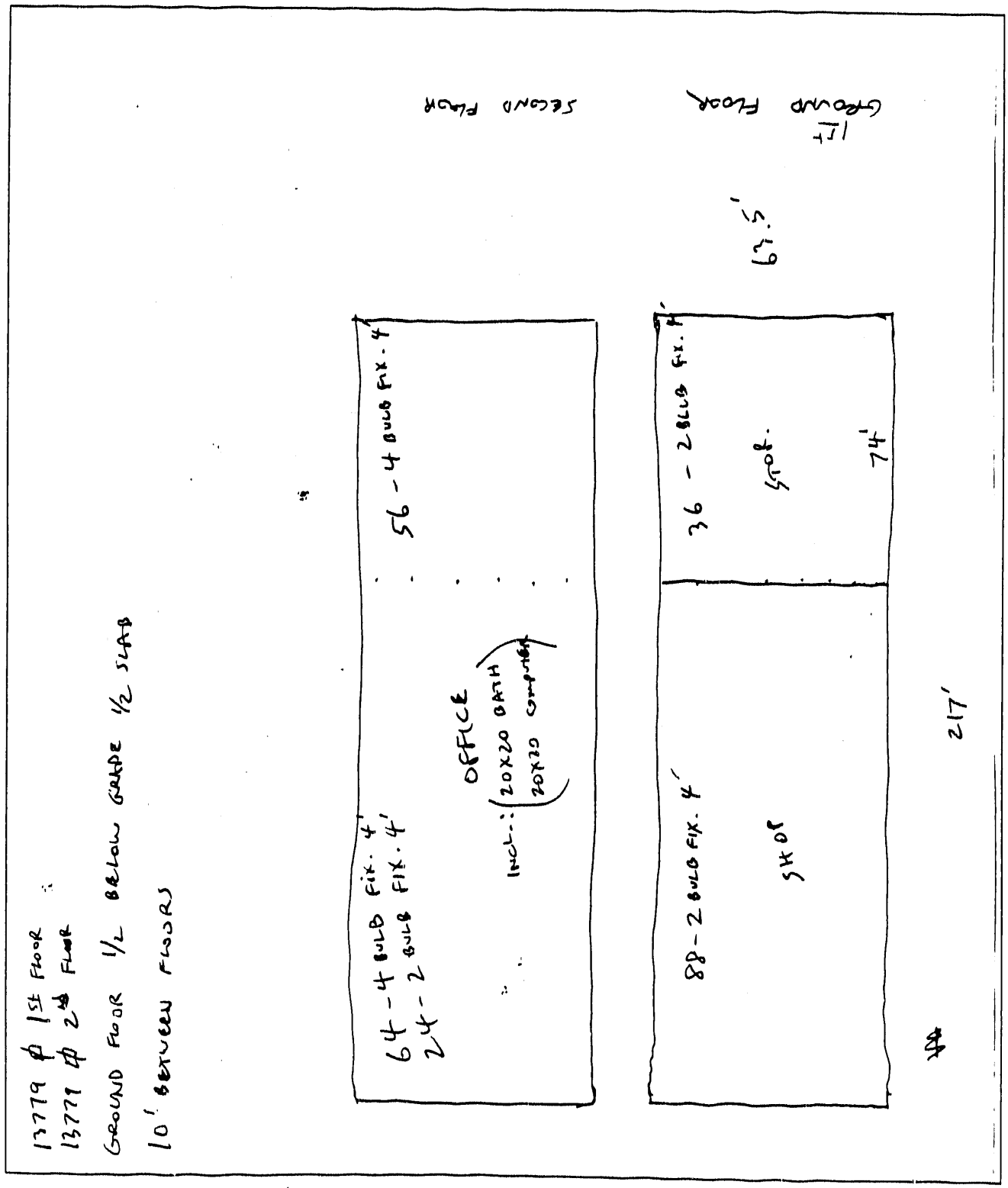
QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 64

SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW: ↓ SCALE: □ = 10'x10'

8.14

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 1

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

1/2 SLAB ON GRADE
1/2 " below "

GLASS:

N = 171 ϕ	E = 441 ϕ		13'
S = 147 ϕ	W = 355 ϕ	1st	
E = 144 ϕ	N = 12 ϕ		
W = ϕ ~~223~~ ϕ	S = ϕ		10'
		Bottom	

VERTICAL ARROW:

SCALE:
8.15

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 14

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC 14 This page covers: Before condition __ After X Date: 7-10-89

Building location: BETHESDA (city) MD (state) (zip code)

Project/program ID: _____ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | (1921-1945) | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: LOFF Total floor area: 27558 (ft²) Year of latest renovation: 1978

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: _____ (ft²) _____ (ft²) _____ (ft²) Number of stories:

Year completed: _____ _____ _____

VENT. ONLY

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	13779 / 179133	13779 / 179133	13779 / 137790	1 1/2
Below grade:	/	/	/	
Atrium:	/	/	/	

Roof pitch: FLAT (in./in.) Exposed roof area: 13779 (ft²) Roof insulated at: ceiling level ✓ roof level __

Average roof estimated U-value (Btu/h-ft²-F) _____ Ground-coupled floor area: 13779 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) .09 Common walls: _____ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls:	2	Doors:	1
Below grade walls:	3	Roof:	3
Atrium walls:	1	Floor:	1/2

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-all doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft²)

Wall/glazing information

Primary glazing type: 88 (% of total glazing) Est. U-value _____ (Btu/h-ft²-F)

(circle those that apply) Single (Double) Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: 12 (% of totoal glazing) Est. U-value _____ (Btu/h-ft²-F)

(circle those that apply) (Single) Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation			
	East	South	West	North
Above grade gross wall area (ft²)	585	952	2170	952
Glazing area (ft²)	4340	147	355	183
Shading by overhangs (y or n)	N	N	N	N
Shading by fins (y or n)	N	N	N	N
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: (In-house (100%)) | Contr., cont. __ (%) | Contr., as needed __ (%) | Owner/tenant __ (%) | Other __ (%)

Description of variances: _____

6/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 2

Building ID: NNMC14 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	PUBLIC WORKS	ALL		

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

	Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
OFFICE	1	300	13779	10'				
SHOP	2	504	9017	10'				
STOR.	3	203	4762	10'				

Description of variances: _____

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

Tenant/Zone No.: 1
Hour open
Hour closed
Occupant-hrs

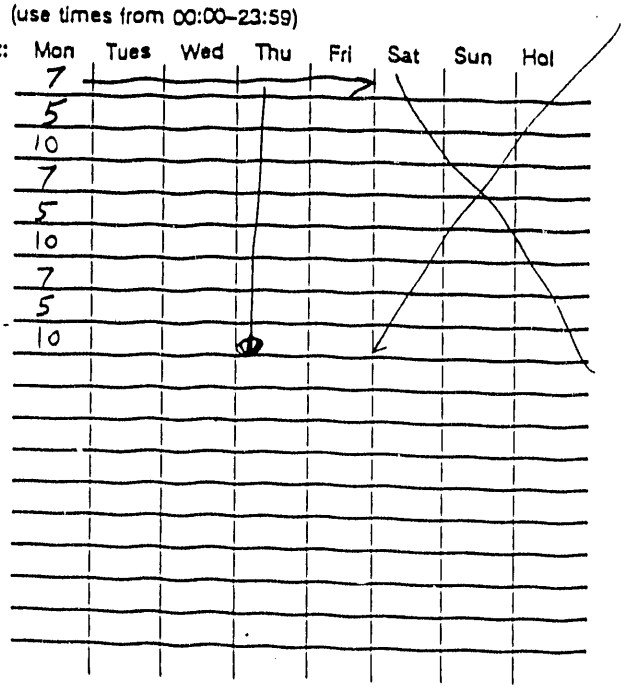
Tenant/Zone No.: 2
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 3
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs



EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC 14 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd)

(use times from 00:00–23:59)

		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy: [redacted] SCHEDULE HOURS ARE ESTIMATED

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	TPFC/TPIU	3	TOP FLR (1)				S/CH
S2							
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p+s-packaged + secondary

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
OFF SITE	BS	OL			S1
	CC/CA	E[redacted]S			S1

Fuel Codes

e-electricity, g-natural gas, oh-distillate fuel oil (#1 or 2), on-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
1,2,3	IF/IFH		268	M	

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: UNMC 14 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On . Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: TOTAL ESTIMATED LIGHTING WATTS FLOOR, 31,040

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games) , SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters
[redacted]	[redacted]		[redacted]

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		

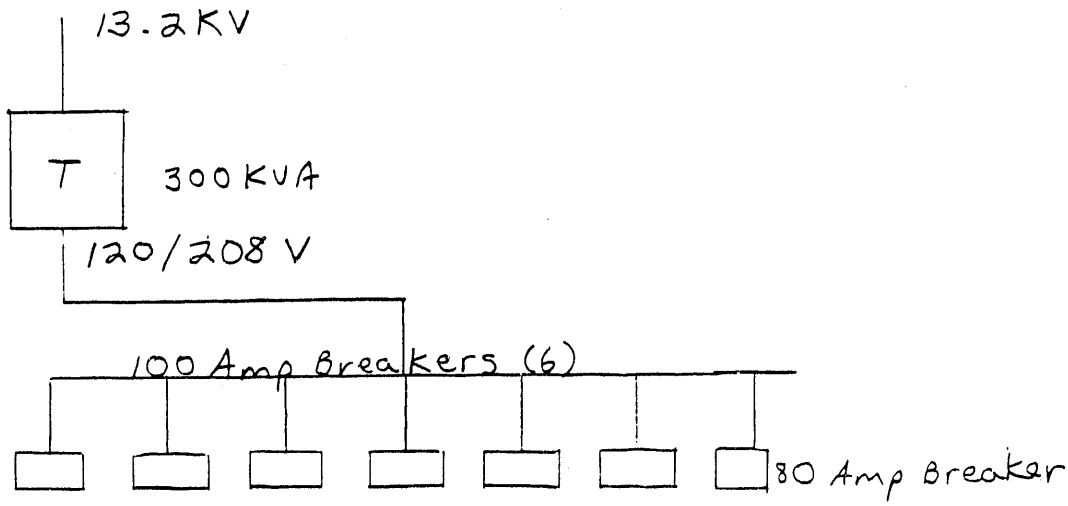
Description of variances: _____

Battelle
Pacific Northwest Laboratories

ENGINEERING WORKSHEET

Prepared By: Richman, Wahlstrom | Date: 8/2/91 | Project: NNMC

Title/Subject: Electrical Service Diagram (BEQ. Barracks, NNMC 50)



DOE RL Richland WA
☆ U.S. GPO: 1991—593-806
34-1007.114 (1-8)

BUILDING TITLE: BEQ. BARRACKS
BUILDING NUMBER: NNMC 50

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS
BLDG # 50

BUILDING SITE DESCRIPTION

BUILDING USE SUMMARY
HOUSING

BUILDING CONSTRUCTION SUMMARY
CONCRETE BLOCK

HVAC SYSTEM SUMMARY
2 PIPE FAN COIL

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-11-84 BUILDING NUMBER: ~~50~~ 50

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

ELEC METERED

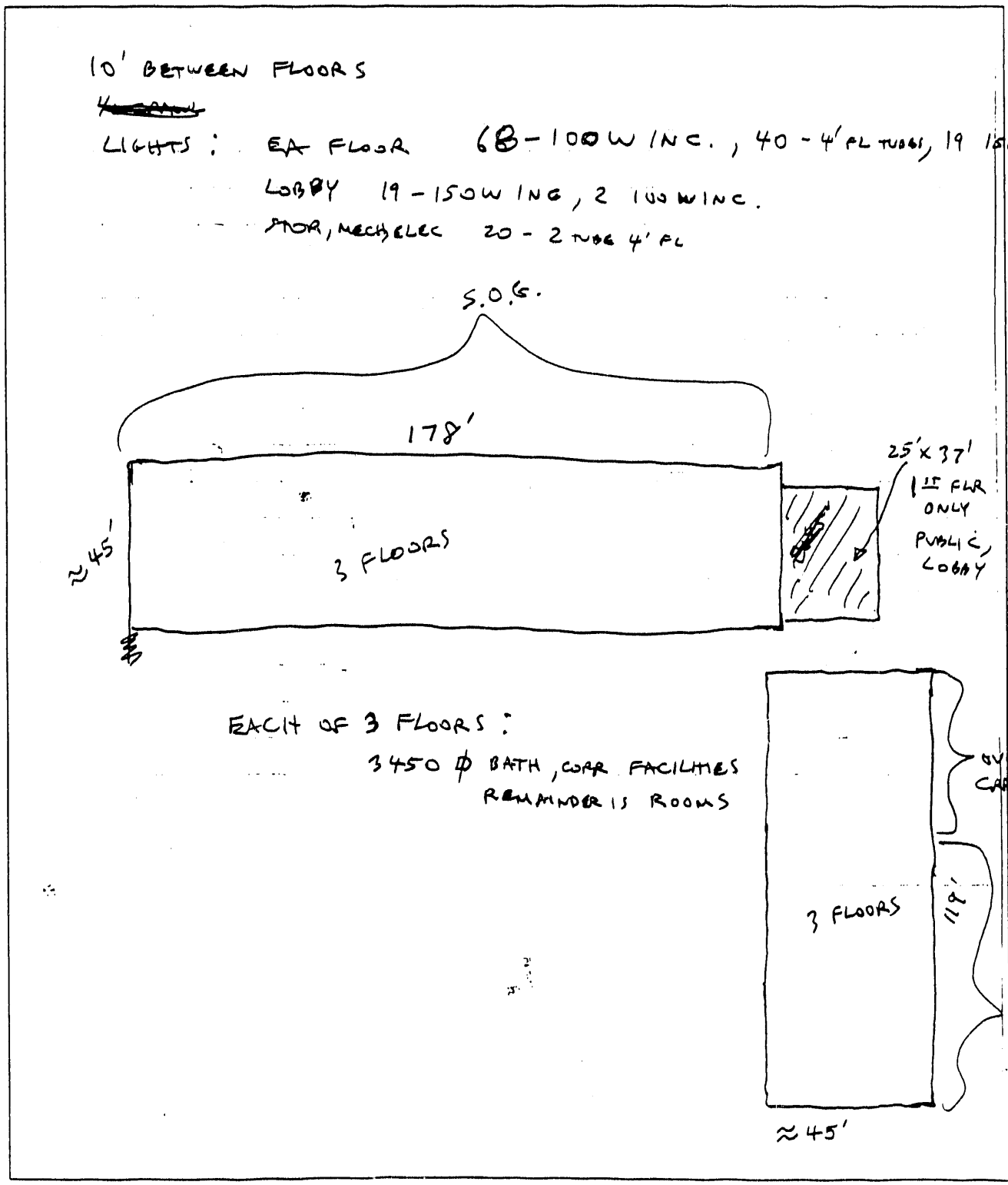
QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 50

SITE DESCRIPTION – PLAN VIEW

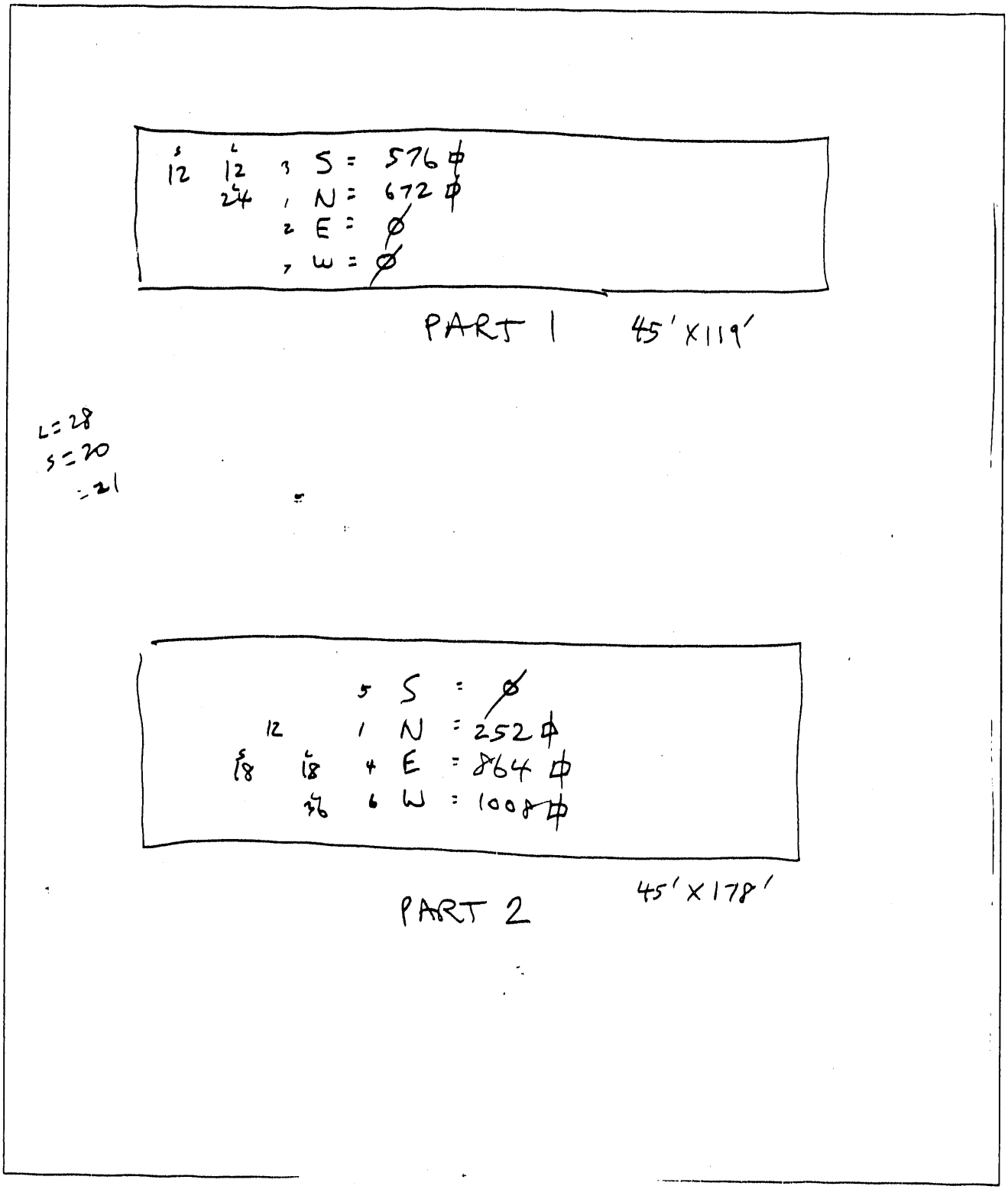


TRUE NORTH ARROW: → SCALE: □ = 10'×10'

8.23

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 56

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE



VERTICAL ARROW:

SCALE:

8.24

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 50

5/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 1*

Building ID: NNMC 50 This page covers: Before condition ___ After ___ Date: _____

Building location: BETHESDA (city) MD (state) _____ (zip code)

Project/program ID: _____ Prepared by: E. RICHMAN

1. General Data and Building Envelope

44,260

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | [illegible] | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: GRPH Total floor area: [illegible] (ft^2) Year of latest renovation: _____

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft^2)	LOFF - Large Office Building (≥ 10,000 ft^2)	INDS - Conditioned Industrial	GRPH - GROUP HOUSING	

Floor area of latest additions: _____ (ft^2) _____ (ft^2) _____ (ft^2) Number of stories:

Year completed: _____ _____ _____ _____

Floor area and volume:	Heated (ft^2/m^3)	Cooled (ft^2/m^3)	Unconditioned (ft^2/m^3)	Stories above ground:
Above grade:	41,020 / 410200	41,020 / 410,200	/	
Below grade:	[illegible] /	/	3240 / 32400	
Atrium:	/	/	/	

Roof pitch: FLAT (in./in.) Exposed roof area: 41,020 (ft^2) Roof insulated at: ceiling level ✓ roof level ___

Average roof estimated U-value (Btu/h-ft^2-F) _____ Ground-coupled floor area: _____ (ft^2)

Average estimated opaque wall U-value (Btu/h-ft^2-F) .09 Common walls: _____ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls:	2	Doors:	1
Below grade walls:	3	Roof:	___
Atrium walls:	1	Floor:	___

(If code '0' is used, describe below.)

BASE MECH ROOM

BRICK

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft^2)

Wall/glazing information

Primary glazing type: ___ (% of total glazing) Est. U-value ___ (Btu/h-ft^2-F)

(circle those that apply) (Single) Double Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft^2-F)

(circle those that apply) (Single) Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation			
	East	South	West	North
Above grade gross wall area (ft^2)	6940	4920	6940	4920
Glazing area (ft^2)	864	572	1008	924
Shading by overhangs (y or n)	Y			
Shading by fins (y or n)	Y			
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house 100 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant 0 (%) | Other ___ (%)

Description of variances: _____

6/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC #50 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC QUARTERS	ALL		

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

	Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
CORRIDOR	1		10350	10'				
ROOMS	2		30670	10'				
MECH	3		3240	10'				

Description of variances: _____

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

Day of week: Mon | Tues | Wed | Thu | Fri | Sat | Sun | Hol

Tenant/Zone No.: 1
- Hour open
- Hour closed — 24 HOURS
- Occupant-hrs

Tenant/Zone No.: 2
- Hour open
- Hour closed
- Occupant-hrs

Tenant/Zone No.: 3
- Hour open
- Hour closed
- Occupant-hrs

Tenant/Zone No.: _____
- Hour open
- Hour closed
- Occupant-hrs

Tenant/Zone No.: _____
- Hour open
- Hour closed
- Occupant-hrs

Tenant/Zone No.: _____
- Hour open
- Hour closed
- Occupant-hrs

7/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 3*

Building ID: NNMC 50 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Tenant/Zone No.:	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
_____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy:

SCHEDULE HOURS ARE ESTIMATED

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	TPFC	3	[redacted] 1&2				S/CH
S2							
S3							
S4							
S5							
S6							

2-PIPE FAN COIL

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1
CC/CA	E/[redacted]S				S1

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
1,2	IF, II		140	M	
3	II		282	M	

HVAC Type Codes (see p 5)

Single supply duct types: SZAH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, WT
Air mixing types: MZS, PMZS, DCS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p+s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, ol-distillate fuel oil (# 1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 50 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: TOTAL ESTIMATED LIGHTING WATTS
INCAN. 12,700
FLOUR. 3,200

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters
PEPCO	E		1 (~~24~~)

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		

Description of variances: _____

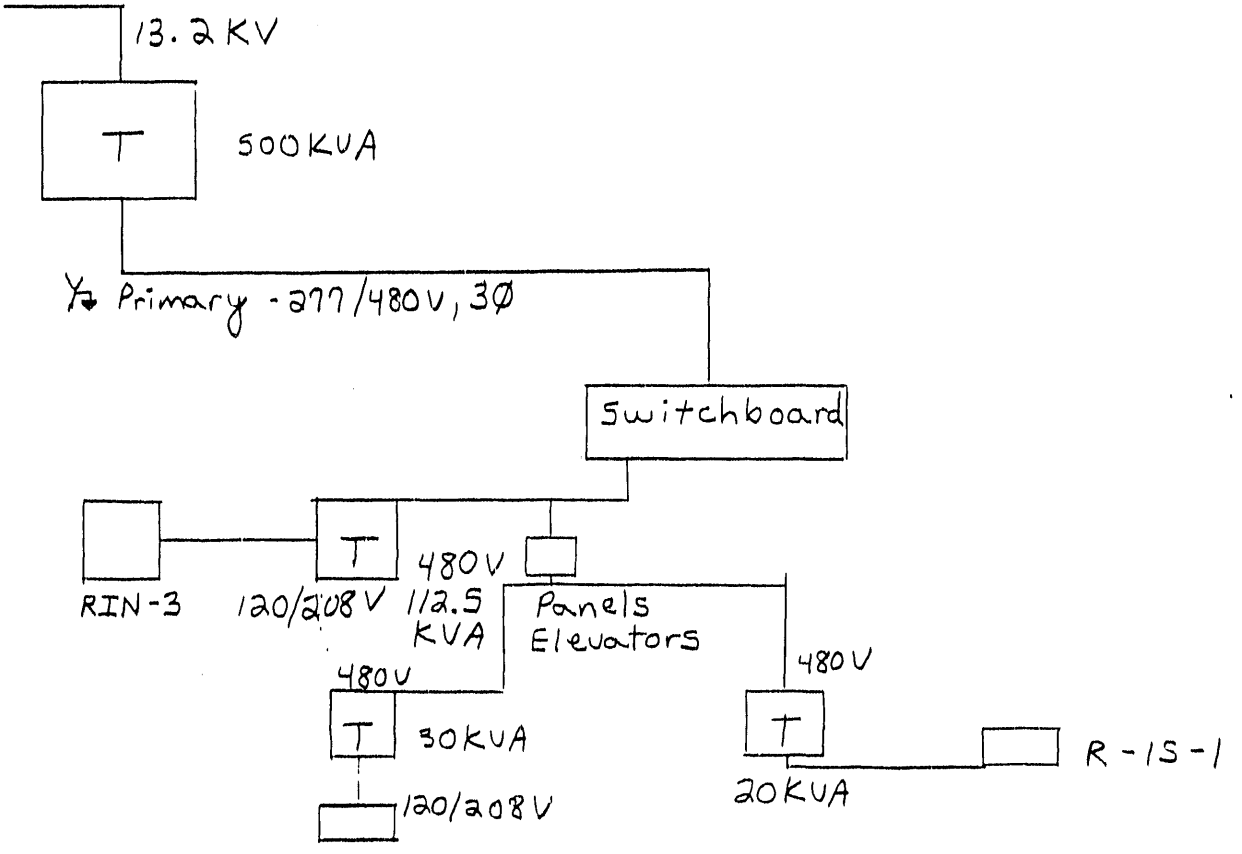
Battelle
Pacific Northwest Laboratories

Page 1 of 1

ENGINEERING WORKSHEET

Prepared By:	Date:	Project:
Richmond, Wahlstrom	3/21/91	NNMC

Title/Subject: Electrical Service Diagram (Parking Structure, NNMC 54)



DOE RL Richland WA ☆ U.S. GPO: 1991—593-808 54-1007-114 (1 83)

BUILDING TITLE: PARKING STRUCTURE
BUILDING NUMBER: NNMC 54

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS

BUILDING SITE DESCRIPTION

BUILDING USE SUMMARY
PARKING + STORAGE & SHOP

BUILDING CONSTRUCTION SUMMARY
CONCRETE

HVAC SYSTEM SUMMARY
SINGLE ZONE W/REHEAT IN SOME ZONES

MAJOR ENERGY USING EQUIPMENT SUMMARY
HVAC, ELEVATORS

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: 54

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

NONE

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

LIGHTING CONTROL

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 54

SITE DESCRIPTION – PLAN VIEW

BASEMENT FLOOR – WAREHOUSE / SHOP 367' X 122' 44,774 ϕ

MEZZ – OFFICE 54' X 196' 10,584 ϕ

2 PARKING – 367' X 122'

1 PARKING – 367' X 122'

4 PARKING – "

3 PARKING – "

IN PARKING :

323 ~~350~~ – 175W MERC. VAP.

24 – 2 BULB 4' FL.

20 – 1 BULB 4' FL

??

IN BASEMENT FLOOR

26 – 500W QUARTZ

15 – 400 W HPS

66 – 250 W HPS

186 – 2 BULB 4' FL

14 – 4 BULB 4' FL

30 – 150 W INC.

10 – 50 W INC.

IN MEZZ

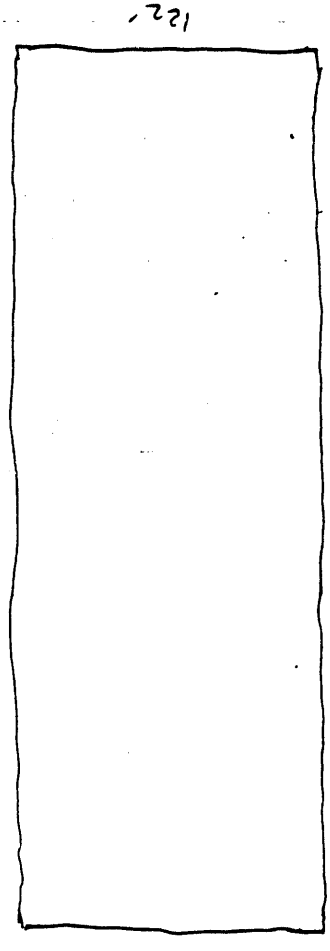
160 4 BULB 4' FL

5 2 BULB 4' FL

36 150 W INC.

29 100W MERC. VAP. EXTERIOR

3 150 W INC.



TRUE NORTH ARROW:

SCALE:

8.32

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

VERTICAL ARROW:

SCALE:

8.33

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 54

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC 54 This page covers: Before condition ___ After ___ Date: ___

Building location: BETHESDA (city) MD (state) (zip code)

Project/program ID: ___ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: WARE Total floor area: ~~55,358~~ 234,454 (ft²) Year of latest renovation: ___

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: ___ (ft²) ___ (ft²) ___ (ft²) Number of stories:

Year completed: ___ ___ ___ ___

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	~~55,358~~ / ~~1,001,320~~	~~55,358~~ / ~~1,001,320~~	179,096 / ~~179,096~~ 1,790,960	4
Below grade:	55,358 / 1,001,320	55,358 / 1,001,320	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: FLAT (in./in.) Exposed roof area: 44,774 (ft²) Roof insulated at: ceiling level ~~roof level~~

Average roof estimated U-value (Btu/h-ft²-F) ___ Ground-coupled floor area: 44,774 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) ___ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

ROOF OVER OPEN AIR GARAGE

Building shell construction codes

Above grade walls: 3 Doors: 1

Below grade walls: 3 Roof: 1

Atrium walls: ___ Floor: 2

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft²)

Wall/glazing information

Primary glazing type: ___ (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double? Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation			
	East	South	West	North
Above grade gross wall area (ft²)	~	~	~	~
Glazing area (ft²)	~	~	~	~
Shading by overhangs (y or n)	~	~	~	~
Shading by fins (y or n)	~	~	~	~
Photos attached showing facade (y or n)	~	~	~	~

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house 100 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: ___

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC 54 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC PARKING/SHOP	ALL		

Total floor area (ft^2): _____

Description of variances:- _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

	Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
PARKING	1	603	179,096	10'				
WARE/SHOP	2	202	44,774	20'				
OFFICE	3	300	10,584	10'			—	

Description of variances: CEILING HEIGHTS ESTIMATED

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

Day of week: Mon Tues Wed Thu Fri Sat Sun Hol

Tenant/Zone No.: 1 (crossed out)
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 2
Hour open: 7 (→)
Hour closed: 5
Occupant-hrs: 10

Tenant/Zone No.: 3
Hour open: 7 (→)
Hour closed: 5
Occupant-hrs: 10

Tenant/Zone No.: 1
Hour open
Hour closed: 24 HOURS
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC 54 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy:

SCHEDULE HOURS ESTIMATED

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH	2/3/4	WNRR/MBCR				CH/S
S2							
S3							
S4							
S5							
S6							

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				5
CC/CA	E/S				5

Description of variances:

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
~~MERC~~					
~~BOARD~~					
~~HRS~~					
~~EXT~~	~~EO~~	~~400~~		~~P?~~	
3/2/1	IF/IHID	918		M/P?	

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, FPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p+s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, o-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

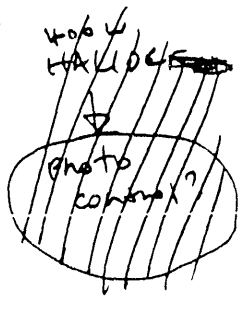
BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other



EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 54 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: TOTAL LIGHTING WATTS (ESTIMATED)
INCAN, 10,850
FLOUR, 43,120
HID 95,025

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW
ELEV.				

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			/__to__/		
			/__to__/		
			/__to__/		
			/__to__/		

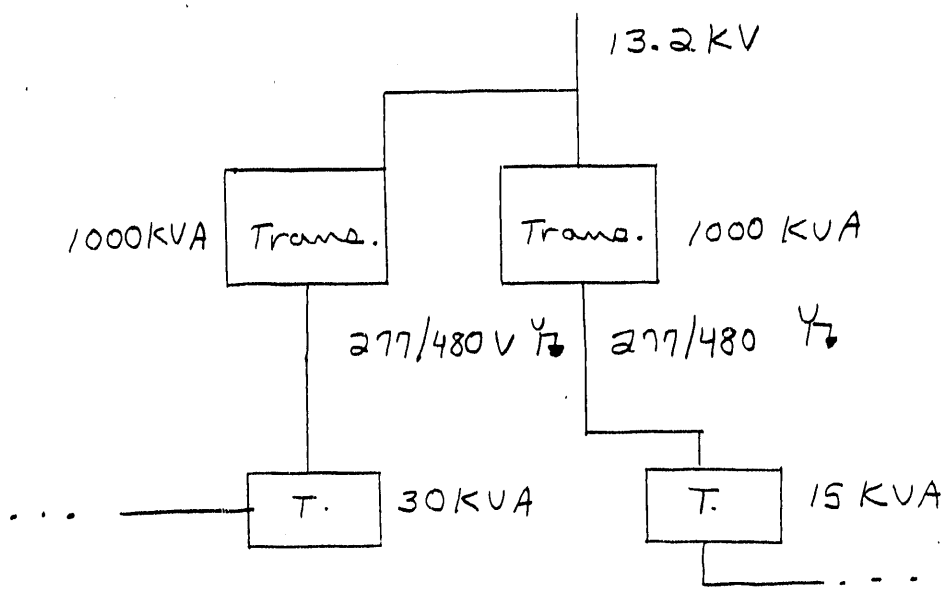
Description of variances: _____

Battelle
Pacific Northwest Laboratories

ENGINEERING WORKSHEET

Prepared By: Richman, Wahlstrom | Date: 8/2/91 | Project: NNMC

Title/Subject: Electrical Service Diagram (Parking, NNMC 55)



DOE RL Richland WA
☆ U.S. GPO: 1991—593-806
54-1007-1141

BUILDING TITLE: PARKING
BUILDING NUMBER: NNMC 55

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS
BLDG # 55

BUILDING SITE DESCRIPTION
~~PARKING WITH DAYCARE & FEW OFFICES~~

BUILDING USE SUMMARY
PARKING WITH DAYCARE & FEW OFFICES

BUILDING CONSTRUCTION SUMMARY
CONCRETE

HVAC SYSTEM SUMMARY
SINGLE ZONE W/SOME REHEAT

MAJOR ENERGY USING EQUIPMENT SUMMARY
HVAC, ELEVATORS

PREPARED BY: ERIC RICHMAN DATE: 7-14-94 BUILDING NUMBER: NNMC 55

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

[redacted] METERS NOT CURRENTLY READ (# 436 & 174)

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

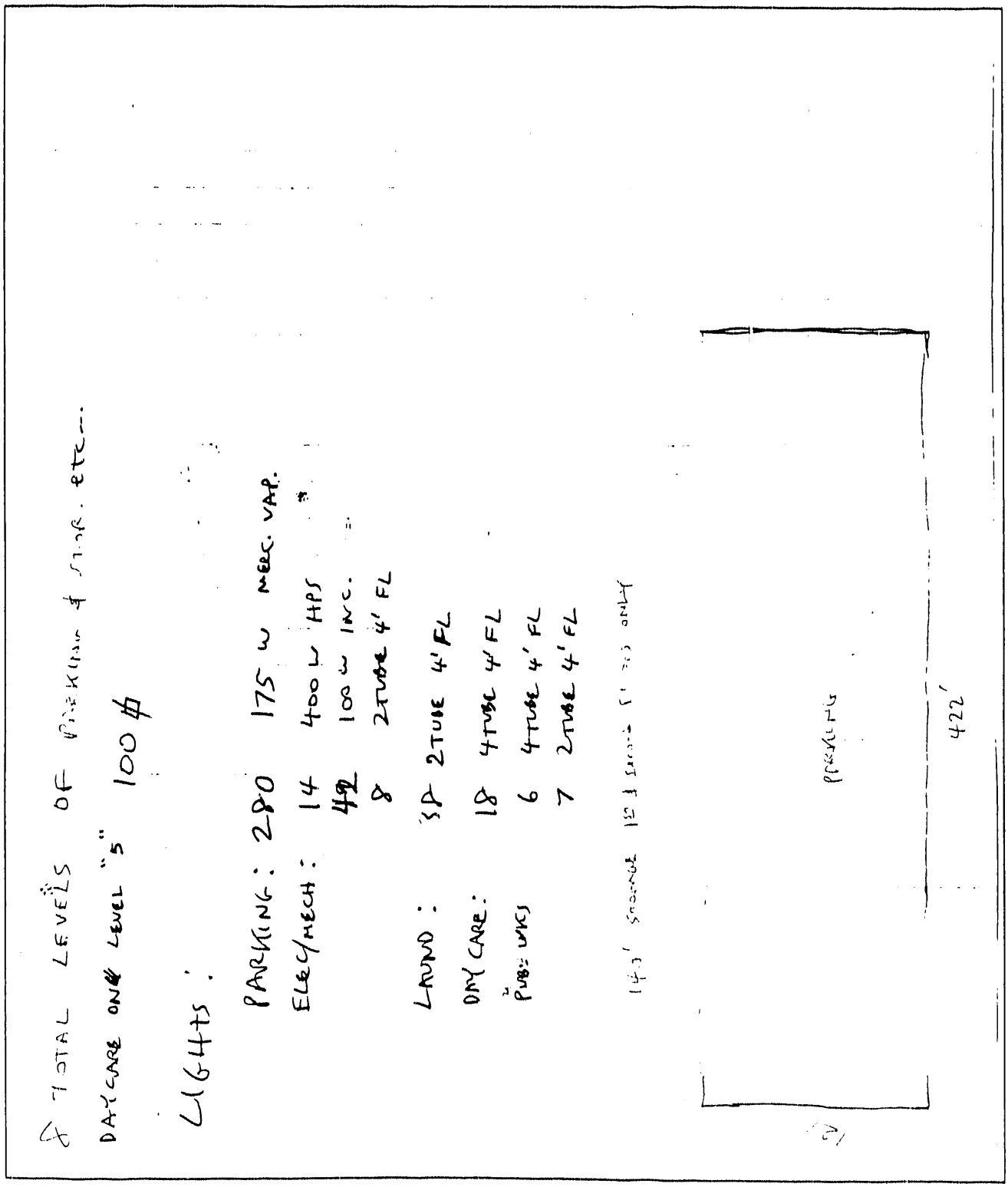
NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

LIGHTING CONTROLS

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 55

SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW: ↓ SCALE: □ = 20'x20'

8.41

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 5

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

VERTICAL ARROW:

SCALE:

8.42

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 55

5/8

EBER Nonresidential Energy Performance Monitoring
BUILDING CORE DATA FORM — page 1

Building ID: NNMC 55 This page covers: Before condition ___ After ___ Date: ___

Building location: BETHESDA (city) MD (state)

Project/program ID: ___ Prepared by: E. RICHMAN (zip code)

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: WARE Total floor area: ___ (ft²) Year of latest renovation: ___

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: ___ (ft²) ___ (ft²) ___ (ft²) Number of stories: 8

Year completed: ___ ___ ___

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	___/___	___/___	___/___	___
Below grade:	___/___	___/___	___/___	
Atrium:	___/___	___/___	___/___	___

Roof pitch: FLAT (in./in.) Exposed roof area: 51062 (ft²) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft²-F) ___ Ground-coupled floor area: ___ (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) ___ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 3 Doors: 1

Below grade walls: 3 Roof: 1

Atrium walls: ___ Floor: 2/1

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-all doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft²)

Wall/glazing information

Primary glazing type: ___ (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation			
	East	South	West	North
Above grade gross wall area (ft²)				
Glazing area (ft²)				
Shading by overhangs (y or n)				
Shading by fins (y or n)				
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house 100 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: ___

6/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 2

Building ID: NNMC 55 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	PARKING			
2	DAY CARE			

Total floor area (ft^2): _____

Description of variances:- _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

	Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
PARKING	1/1	603	408,396 –	10'				
DAYCARE	2/1	900	100 +	10'				

Description of variances: ESTIMATED VALUES

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

Day of week: Mon Tues Wed Thu Fri Sat Sun Hol

Tenant/Zone No.: 1/1
Hour open
Hour closed — 24 HOUR
Occupant-hrs

Tenant/Zone No.: 2/1
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: _____
Hour open
Hour closed
Occupant-hrs

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 3*

Building ID: NNMC 55 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Tenant/Zone No.:	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
_____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy:

SCHEDULE ESTIMATED

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH	2/3	DAYCARE				E/CH
S2							
S3							
S4							
S5							
S6							

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1
CC/CA	E/S				S1

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
1	IHID		294		
2	IF/II		488		

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p+s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, o1-distillate fuel oil (# 1 or 2), o2-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

8/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 4

Building ID: NNMC 55 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: TOTAL LIGHTING WATTS ESTIMATED
INCAND. 4200
FLOUR. 8080
HID - 54,600

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters
PEPCO	E		2 (#4436, 13

CURRENTLY NOT READ OR RECORDED BY NNMC

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			/__to__/		
			/__to__/		
			/__to__/		
			/__to__/		

Description of variances: _____

BUILDING TITLE: CENTRAL STEAM/CHILLER PLANT
BUILDING NUMBER: NNMC 16

CONTACT LISTING

DATE	NAME	PHONE
	JOHN HOWARD	
	BILL	

BUILDING ADDRESS
BLDG # 16

BUILDING SITE DESCRIPTION
SLOPING TOWARDS STONEY CREEK

BUILDING USE SUMMARY
STEAM & CHILLED WATER PRODUCTION

BUILDING CONSTRUCTION SUMMARY
CONCRETE

HVAC SYSTEM SUMMARY
FEW UNIT HEATERS
TPFC IN OFFICE AREA

MAJOR ENERGY USING EQUIPMENT SUMMARY
CHILLERS

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: NNMC 16

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

ELECTRIC NOT METERED

6 STEAM & 4 CHILLED WATER RECORDERS EXIST BUT THEIR ACCURACY IS IN QUESTION

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

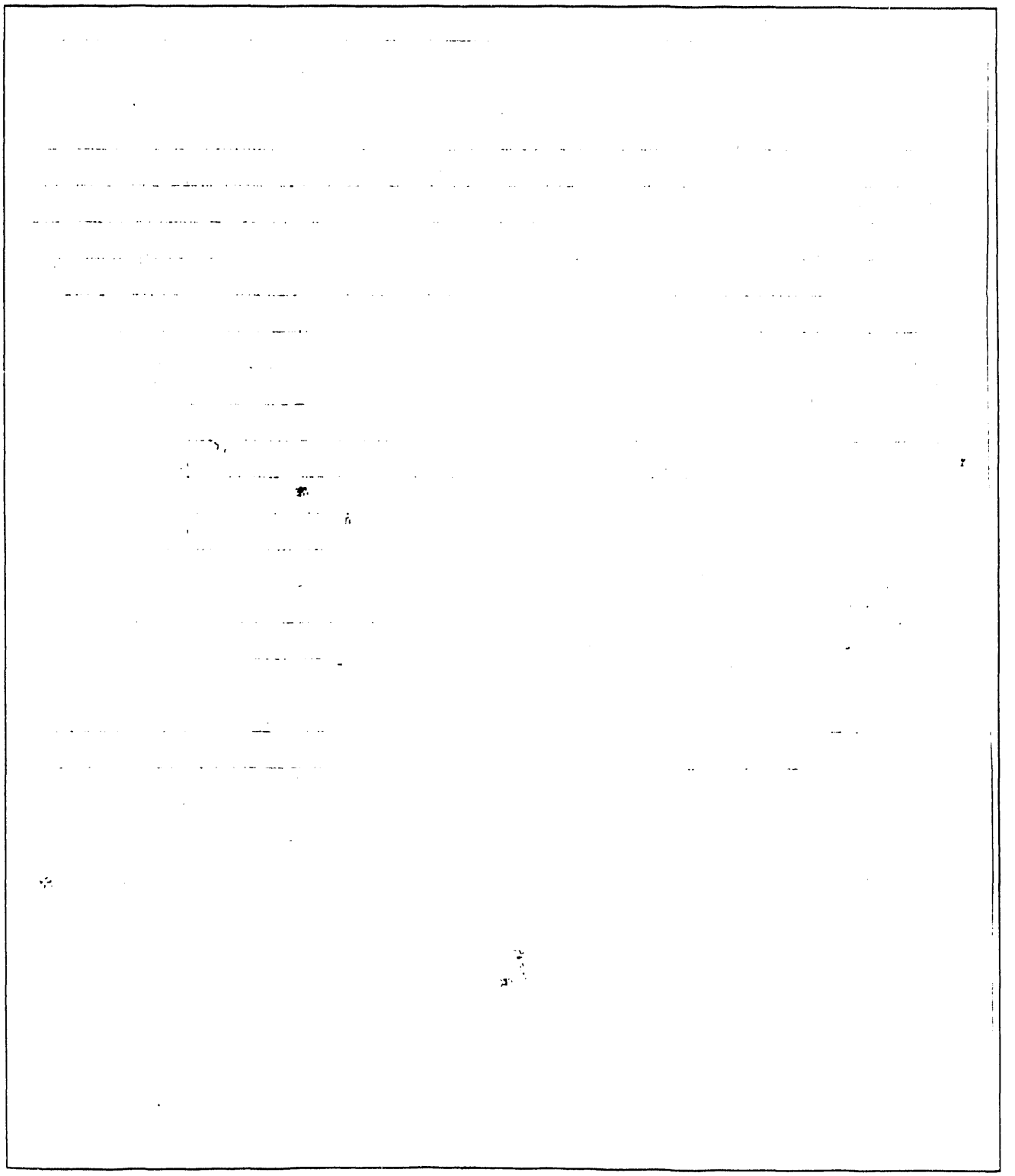
NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

NO BUILDING ENVELOPE CONS. OPPORTUNITIES APPEAR PRACTICAL

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 16

SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW:

SCALE:
8.49

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 16

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

VERTICAL ARROW:

SCALE:
8.50

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 16

5/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 1*

Building ID: NNMC 16 This page covers: Before condition ___ After ___ Date: ___

Building location: BETHESDA (city) MD (state)

Project/program ID: ___ Prepared by: E. RICHMAN (zip code)

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | (1921-1945) | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: OTHR Total floor area: ___ (ft^2) Year of latest renovation: ___

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft^2)	LOFF - Large Office Building (≥ 10,000 ft^2)	INDS - Conditioned Industrial		

Floor area of latest additions: ___ (ft^2) ___ (ft^2) ___ (ft^2) Number of stories:

Year completed: ___ ___ ___ ___

Floor area and volume:	Heated (ft^2/ft^3)	Cooled (ft^2/ft^3)	Unconditioned (ft^2/ft^3)	Stories above ground:
Above grade:	___/___	___/___	___/___	___
Below grade:	___/___	___/___	___/___	
Atrium:	___/___	___/___	___/___	___

Roof pitch: ___ (in./in.) Exposed roof area: ___ (ft^2) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft^2-F) ___ Ground-coupled floor area: ___ (ft^2)

Average estimated opaque wall U-value (Btu/h-ft^2-F) ___ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 3 Doors: 1

Below grade walls: 3 Roof: 1

Atrium walls: ___ Floor: 2

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft^2)

Wall/glazing information

Primary glazing type: ___ (% of total glazing) Est. U-value ___ (Btu/h-ft^2-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft^2-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation: East	South	West	North
Above grade gross wall area (ft^2)				
Glazing area (ft^2)				
Shading by overhangs (y or n)				
Shading by fins (y or n)				
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) ___

Maintenance: | In-house ___ (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%) |

Description of variances: ___

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC 16 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F)		Unoccupied Setpoint (F)	
				heating	cooling	heating	cooling

Description of variances: _____

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed				24 HOUR				
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open				OPERATION				
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

7/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC #6 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy:

MAJORITY OF LIGHTING IS HID & FLOUR.

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
OFFICE ONLY S1	UHT/FPFC						S/CH
S2							
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, FPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual), 2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p+s-packaged + secondary

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above

Fuel Codes

e-electricity, g-natural gas, oh-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Description of variances:

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR-water-cooled reciprocating chiller, CAS-air-cooled screw chiller, CWS-water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
HID & FLOUR					

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 16 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: _____

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOD-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters
NNMC	S		6
NNMC	CH		4

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		

Description of variances: _____

BUILDING TITLE: UNIFORMED UNIVERSITY "A"
BUILDING NUMBER: NNMC 70

CONTACT LISTING

DATE	NAME	PHONE
	JERRY HOOPINGARDNER.	

BUILDING ADDRESS
BLDG #70 ("A")

BUILDING SITE DESCRIPTION
EAST OF MAIN HOSPITAL AREA

BUILDING USE SUMMARY
MEDICAL UNIVERSITY FOR UNIFORMED PERSONNEL
INCLUDES REGULAR CLASSROOM AND LAB FACILITIES

BUILDING CONSTRUCTION SUMMARY
CONCRETE/MASONRY OVER UNDERGROUND PARKING AREA

HVAC SYSTEM SUMMARY
SINGLE ZONE W/SOME REHEAT

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: NNMC 70

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

metered w/ # 71, 72, 73

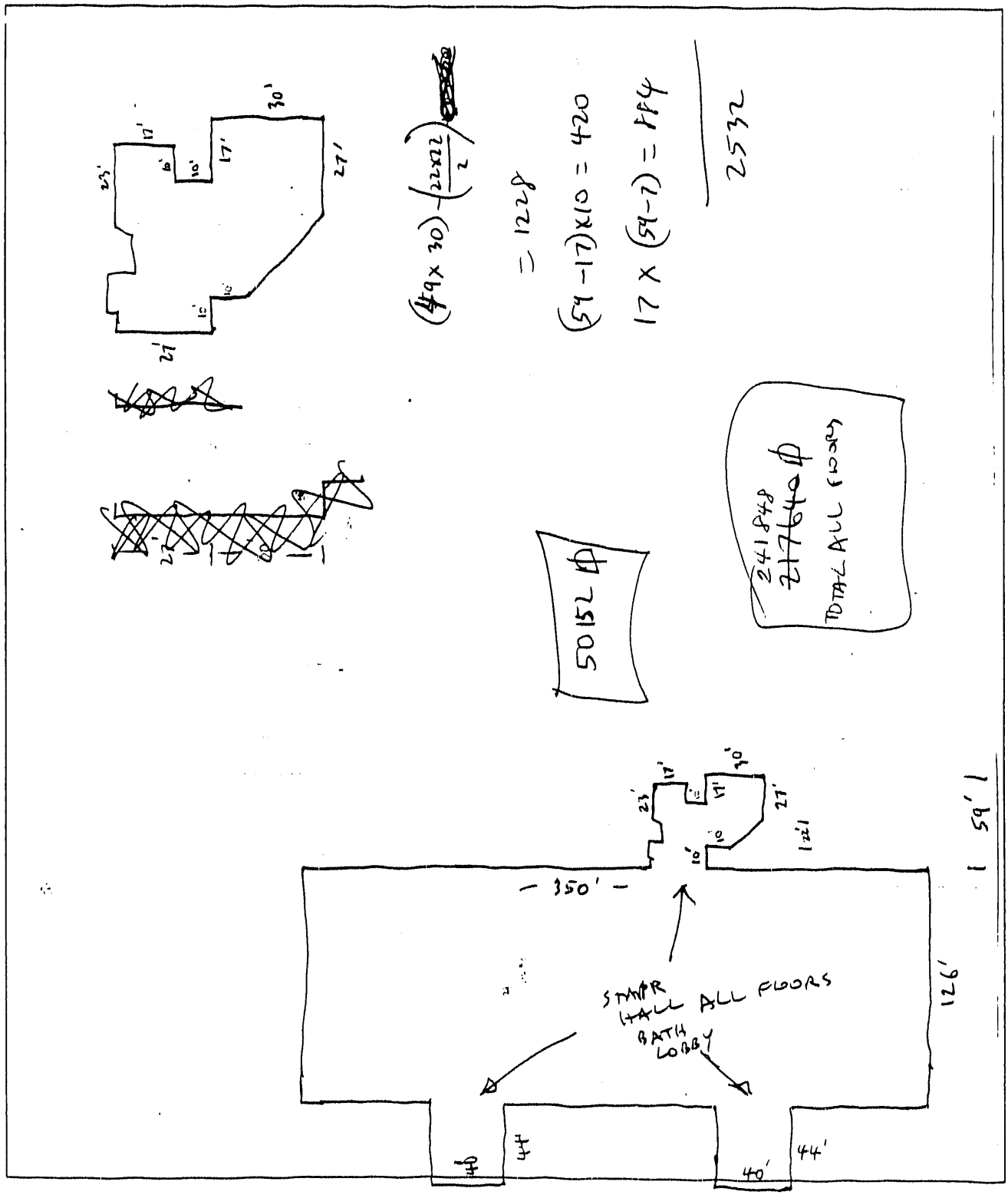
QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY: _____ DATE: _____ BUILDING NUMBER: 70

SITE DESCRIPTION – PLAN VIEW



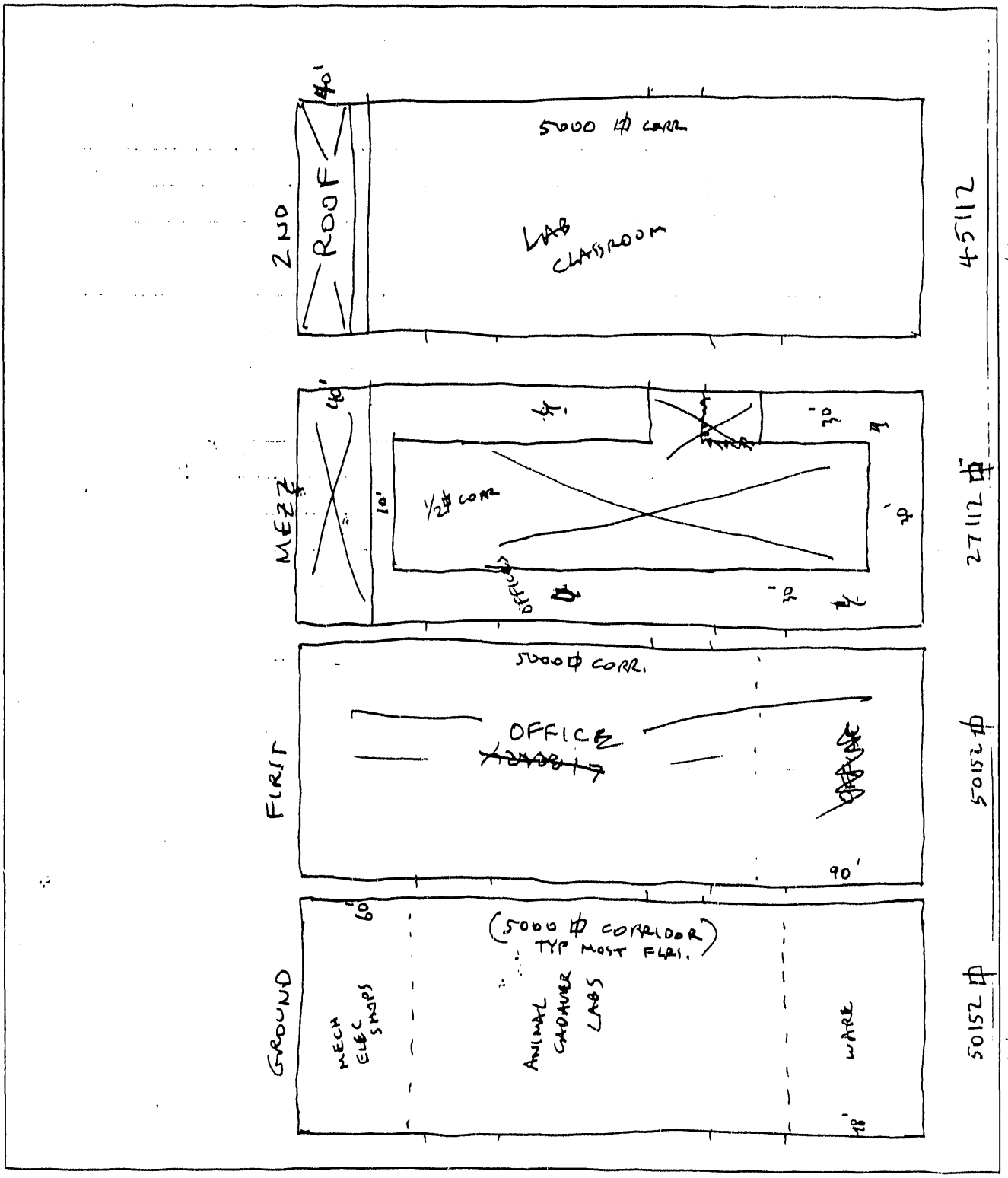
TRUE NORTH ARROW:

SCALE: □ = 20' x 20'

8.57

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 70

SITE DESCRIPTION - PLAN VIEW



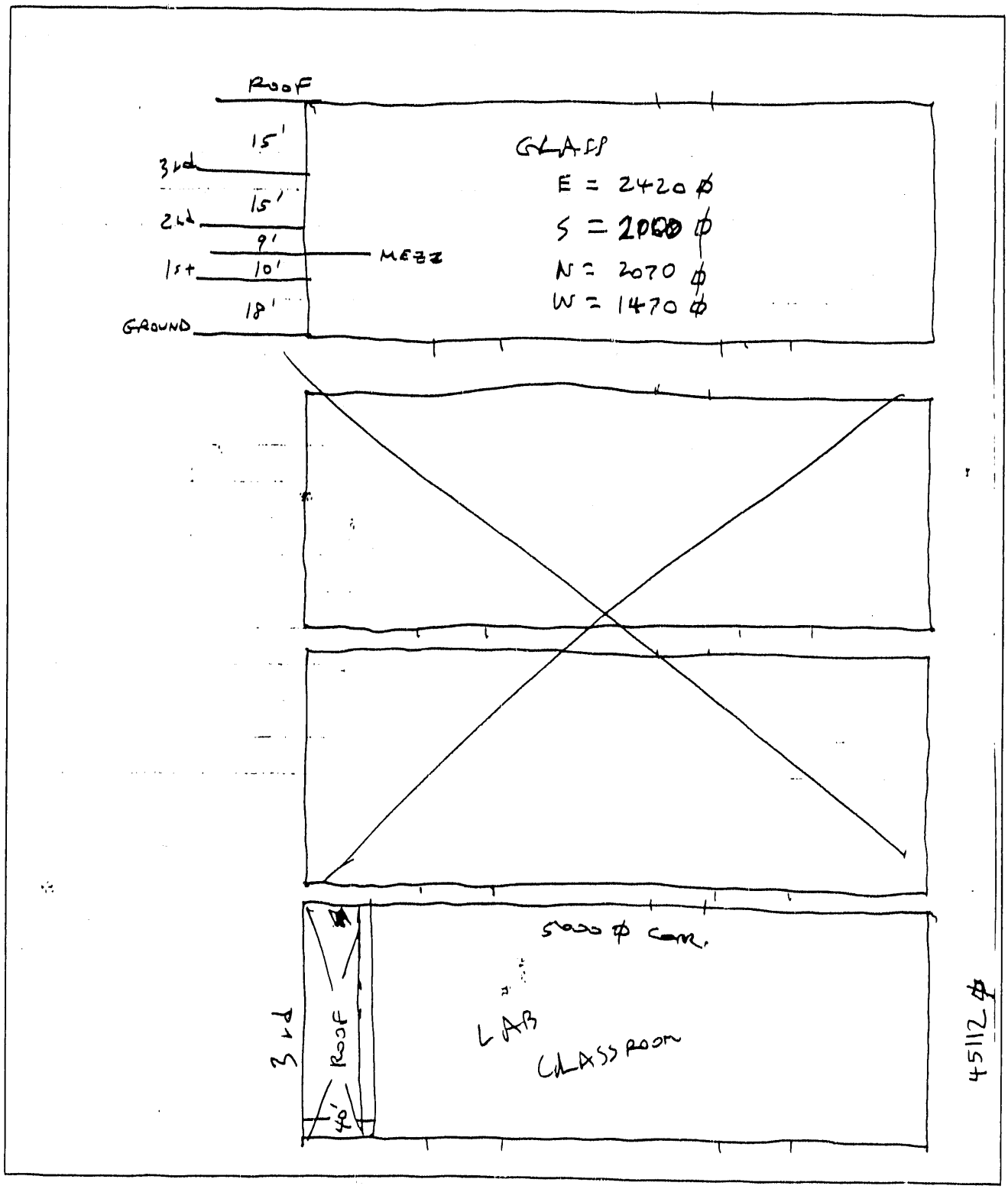
TRUE NORTH ARROW:

SCALE: ☐ = 20' x 20'

8.58

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 70

SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW:

SCALE:

8.59

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 70

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

VERTICAL ARROW:

SCALE:

8.60

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 70

7/10

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC 70 This page covers: Before condition ___ After ___ Date: ___

Building location: ~~NNMC~~ BETHESDA (city) MD (state) (zip code)

Project/program ID: ___ Prepared by: E. RICHMAN

1. General Data and Building Envelope

241848

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | (1974-1980) | 1981-present

BECA building type code: SECN Total floor area: ~~217640~~ (ft²) Year of latest renovation: ___

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: ___ (ft²) ___ (ft²) ___ (ft²) Number of stories:

Year completed: ___ ___ ___ ___

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	24848 / 3,569,108	24848 / 3,569,108	___ / ___	4
Below grade:	___ / ___	___ / ___	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: FLAT (in./in.) Exposed roof area: 56204 (ft²) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft²-F) ___ Ground-coupled floor area: 56204 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) ___ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 3 Doors: 1

Below grade walls: 3 Roof: 1

Atrium walls: ___ Floor: 1

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

METAL BRONZE (circle those that apply) Single (Double) Triple Clear (Tinted) Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Orientation	East	South	West	North	
Above grade gross wall area (ft²)	21890	8442	21890	8442	
Glazing area (ft²)	2420	2000	1470	2070	
Shading by overhangs (y or n)	Y	Y	Y	Y	INSET
Shading by fins (y or n)	Y	Y	Y	Y	INSET
Photos attached showing facade (y or n)	N	N	N	N	

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house (100) (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances:

MAINTAINED BY OWN CREWS

~~SEPARATE~~ SEPARATE FROM REST OF NNMC

8/10

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 2

Building ID: NNMC 70 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	UH UHS	ALL		

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

	Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
STAIR/CORR.	1	111	45,000	VAR.				
BATH	2	110	10,128	VAR.				
WARE	3	202	10,062	18'				
CADAVER/ANIMAL LABS	4	502	27,350	18'				
OFFICE	5	300	62,264	VAR.				
LAB/CLASSROOM	6	103/502	80,224	15'				
MECH ROOM	7	505	8660	18'				

Description of variances: ALL ESTIMATED VALUES

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: 1	Hour open	24 HOUR							
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: 2	Hour open	24 HOUR							
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: 3	Hour open	7	→	→	→	→	–	–	–
	Hour closed *	5							
	Occupant-hrs	10							
Tenant/Zone No.: 4	Hour open	7	→	→	→	→			
	Hour closed *	5							
	Occupant-hrs	10							
Tenant/Zone No.: 5	Hour open	7	→	→	→	→			
	Hour closed *	5							
	Occupant-hrs	10							
Tenant/Zone No.: 6	Hour open	7	→	→	→	→			
	Hour closed *	5							
	Occupant-hrs	10							

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC 70 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd)

(use times from 00:00–23:59)

Tenant/Zone No.: 7	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
	Hour open *	7	→	→	→	→	—	—	—
	Hour closed	5					—	—	—
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy:

* ALL ZONES AVAILABLE FOR USE 24 HOURS PER DAY.
SCHEDULE HOURS ARE ESTIMATES

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH	4	ALL				CH/S
S2							
S3							
S4							
S5							
S6							

HEAT RECOVERY ?

HVAC Type Codes (see p 5)

Single supply duct types: SZAH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, WT
Air mixing types: MZS, PMZS, DCS
Terminal unit types: TPFC, FPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both, 1-none (on/off manual), 2-timeclock, 3-thermostat 4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.) s-secondary unit served by primary system (below) p + s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, oh-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1
CC/CA	E/S				S1

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF		≈ 2900	M	

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-efficiency fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylighting dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 4

Building ID: NNMC 70 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: ESTIMATE TOTAL LIGHTING WATTS FLOUR = 390,000

IFH LIGHTING WAS TRIED BUT NOT WITH FAVORABLE RESULTS PER OCCUPANTS

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games) , SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			/__to__/		
			/__to__/		
			/__to__/		
			/__to__/		

Description of variances: _____

BUILDING TITLE: UNIFORMED UNIVERSITY "B"
BUILDING NUMBER: NNMC 71

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS
BLDG # 71

BUILDING SITE DESCRIPTION
SEE # 70

BUILDING USE SUMMARY
LABS AVAIL. 24 HOUR

BUILDING CONSTRUCTION SUMMARY
SEE # 70

HVAC SYSTEM SUMMARY
SEE # 70

MAJOR ENERGY USING EQUIPMENT SUMMARY
LARGE COMPUTER USE

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: 71

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

METERED WITH BLDG # 70, 72, 73

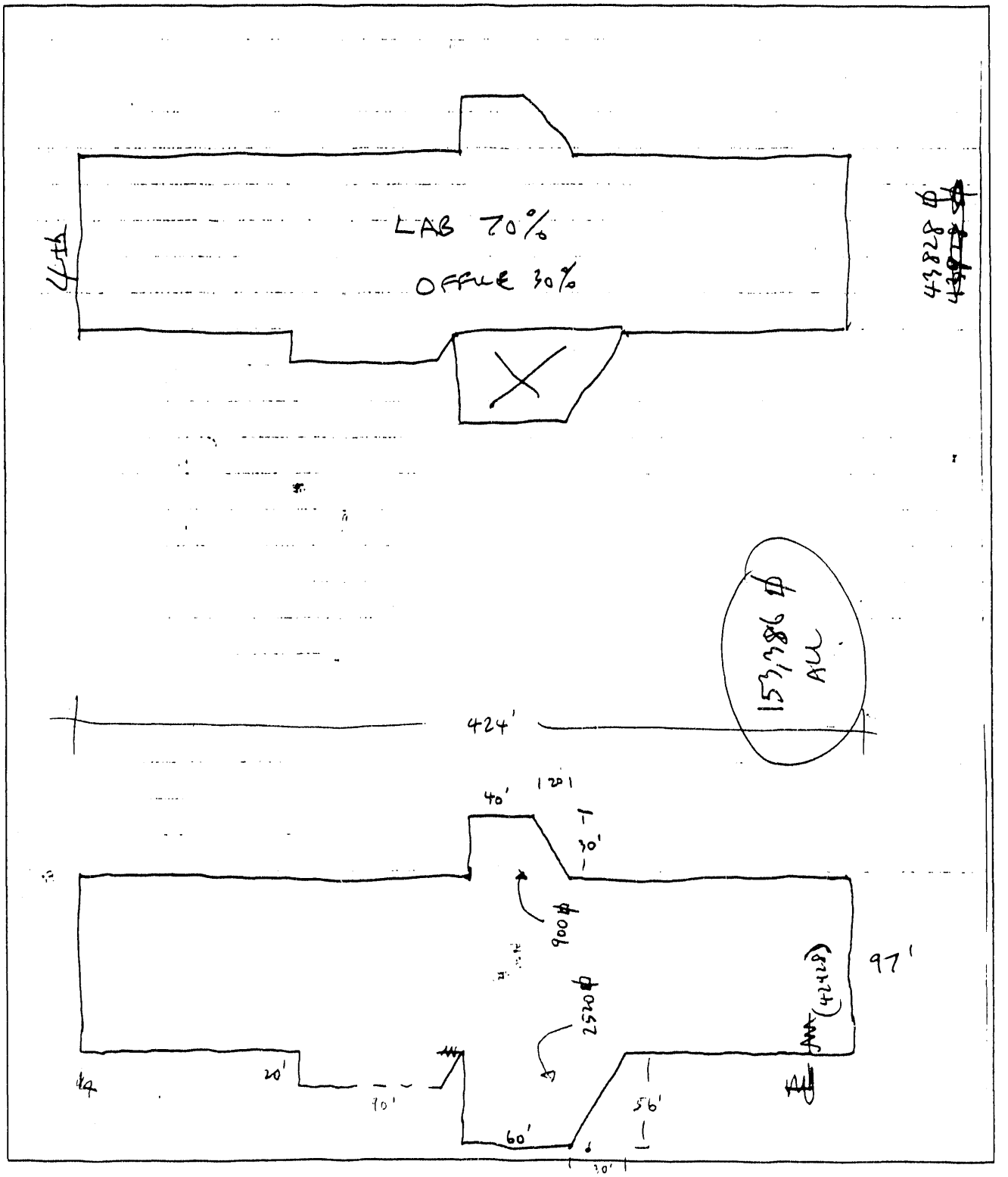
QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 71

SITE DESCRIPTION – PLAN VIEW



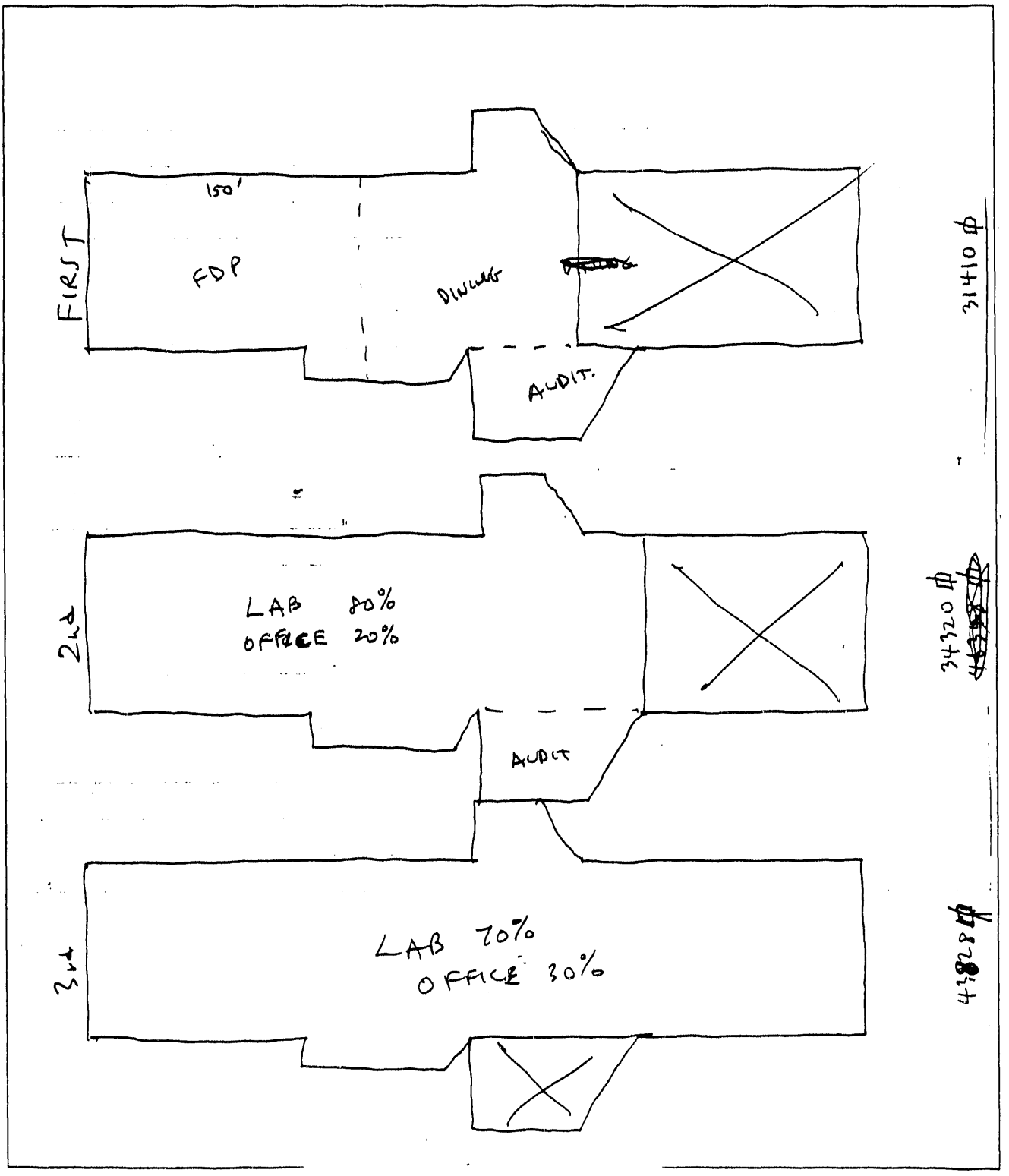
TRUE NORTH ARROW: ↑ SCALE: □ = 20'x20'

8.67

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 71

PLAN

SITE DESCRIPTION – ~~ELEVATION~~ FOR _____ ~~FACING FACADE~~



NORTH ~~VERTICAL~~ ARROW: ↑ SCALE: □ = 20' x 20'

8.68

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: MNMC 7

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

GLASS:

S = 4550 #
N = 3190 #
W = 300 #
E = 980 #

4th	15'
3rd	15'
2nd	19'
1st	19'

VERTICAL ARROW:

SCALE:
8.69

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 71

6/9

EBER Nonresidential Energy Performance Monitoring
BUILDING CORE DATA FORM — *page 1*

Building ID: NNMC 71 This page covers: Before condition ___ After ___ Date: ___

Building location: BETHESDA (city) MD (state) (zip code)

Project/program ID: ___ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before · 1901-1920 · 1921-1945 · 1946-1960 · 1961-1970 · 1971-1973 · **1974-1980** · 1981-present

BECA building type code: SECN Total floor area: 153386 (ft²) Year of latest renovation: ___

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: ___ (ft²) ___ (ft²) ___ (ft²) Number of stories:

Year completed: ___ ___ ___

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	153,386 / 2,563,710	153,386 / 2,563,710	___ / ___	4
Below grade:	___ / ___	___ / ___	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: FLAT (in./in.) Exposed roof area: 43828 (ft²) Roof insulated at: ceiling level X roof level ___

Average roof estimated U-value (Btu/h-ft²-F) ___ Ground-coupled floor area: ___ (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) ___ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 2/3 Doors: 1

Below grade walls: ___ Roof: 1

Atrium walls: ___ Floor: 1/2

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single **Double** Triple Clear **Tinted** Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Orientation	East	South	West	North	
Above grade gross wall area (ft²)	10,764	23,626	10,764	23,626	
Glazing area (ft²)	980	4550	300	3190	
Shading by overhangs (y or n)	Y	Y	Y	Y	INSET
Shading by fins (y or n)	Y	Y	Y	Y	INSET
Photos attached showing facade (y or n)	N	—	—	—	

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house 100 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: ___

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC 71 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	USUHS	ALL		

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

	Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
CORR.	1	111	12,197	VAR.				
LAB	2	502	79,934	VAR.				
OFFICE	3	300	29,845	VAR.				
FOOD PREP	4	400	14,550	19'				
DINING	5	102	14,340	19'				
AUDIT.	6	107	2,520	19'				

Description of variances: _____

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: 1	Hour open	7					—	—	—
	Hour closed	5							
	Occupant-hrs	10							
Tenant/Zone No.: 2	Hour open	7							
	Hour closed	5							
	Occupant-hrs	10							
Tenant/Zone No.: 3	Hour open	7							
	Hour closed	5							
	Occupant-hrs	10							
Tenant/Zone No.: 4	Hour open	7							
	Hour closed	9							
	Occupant-hrs	14							
Tenant/Zone No.: 5	Hour open	7							
	Hour closed	9							
	Occupant-hrs	14							
Tenant/Zone No.: 6	Hour open	7							
	Hour closed	5							
	Occupant-hrs	10			0			0	

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

8/9

Building ID: NNMC 7-1 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Tenant/Zone No.:	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.:	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy: ALL AREAS MAY BE AVAILABLE 24 HOURS

SCHEDULE HOURS ARE ESTIMATED.

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Sondy (see codes)	Fuel Code
S1	SZRH	4	ALL				S/CH
S2							
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, CZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, FPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual), 2-timeclock, 3-thermostat, 4-smart thermostat, 5-EMCS

Pkg/Sondy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	DL				S1
CC/CA	E/S				S1

Fuel Codes

e-electricity, g-natural gas, oil-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR-water-cooled reciprocating chiller, CAS-air-cooled screw chiller, CWS-water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF		≈ 2045		

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 4

Building ID: NNMC 71 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: ESTIMATED TOTAL LIGHTING WATTS

FLOOR. = 275,000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOC-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games) , SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			/__to__/		
			/__to__/		
			/__to__/		
			/__to__/		

Description of variances: _____

BUILDING TITLE: UNIFORMED UNIVERSITY "C"
BUILDING NUMBER: NNMC 72

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS

SEE 70

BUILDING SITE DESCRIPTION

SEE 70

BUILDING USE SUMMARY

SEE 70

BUILDING CONSTRUCTION SUMMARY

SEE 70

HVAC SYSTEM SUMMARY

SEE 70

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: NNMC

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

METERED WITH BLDG #: 70, 71, 73

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

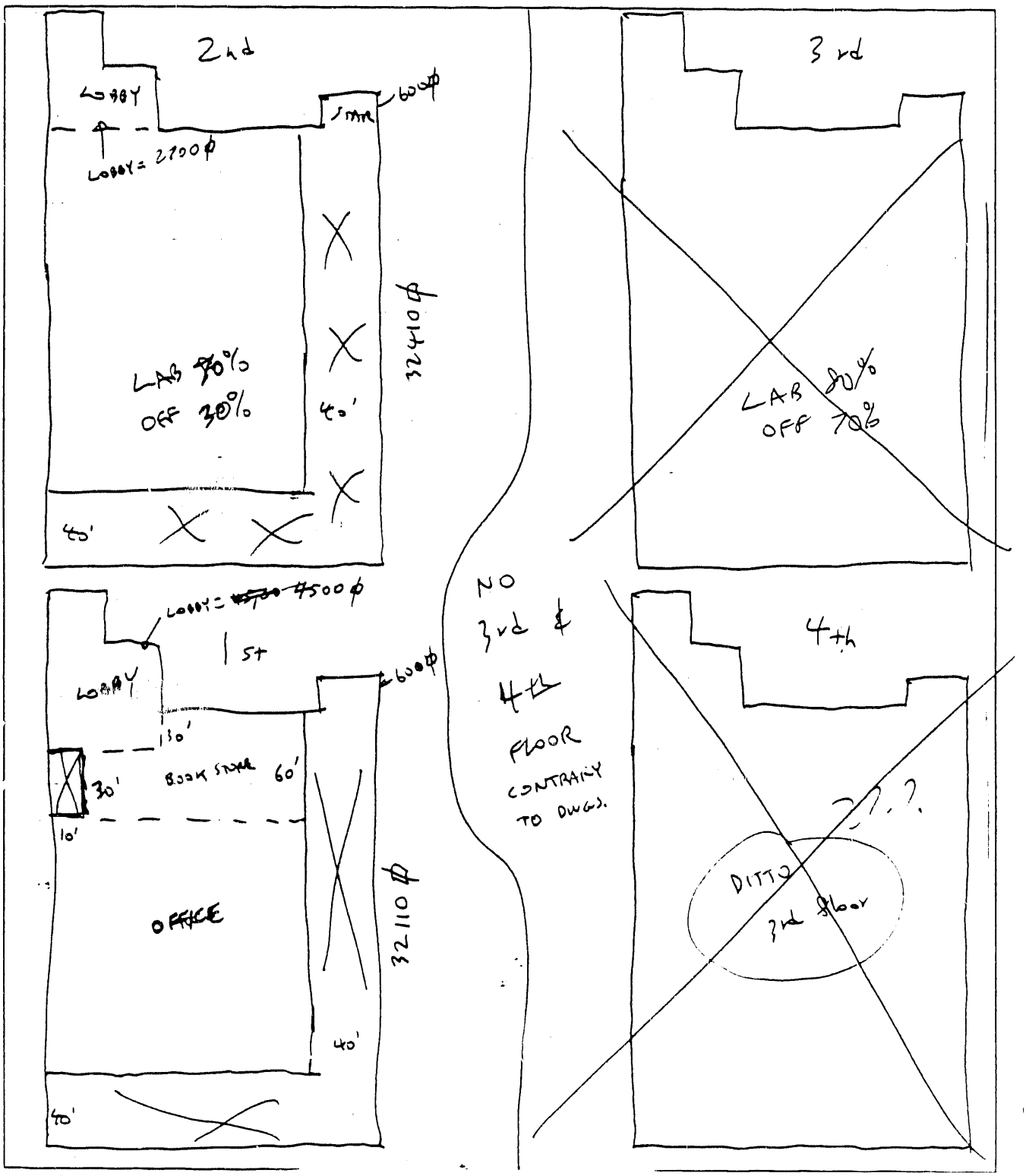
SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 72

COMMERCIAL BUILDING CHARACTERISTICS SURVEY FORM

PLAN

SITE DESCRIPTION – ~~ELEVATION~~ FOR _____ ~~FACING FACADE~~



N

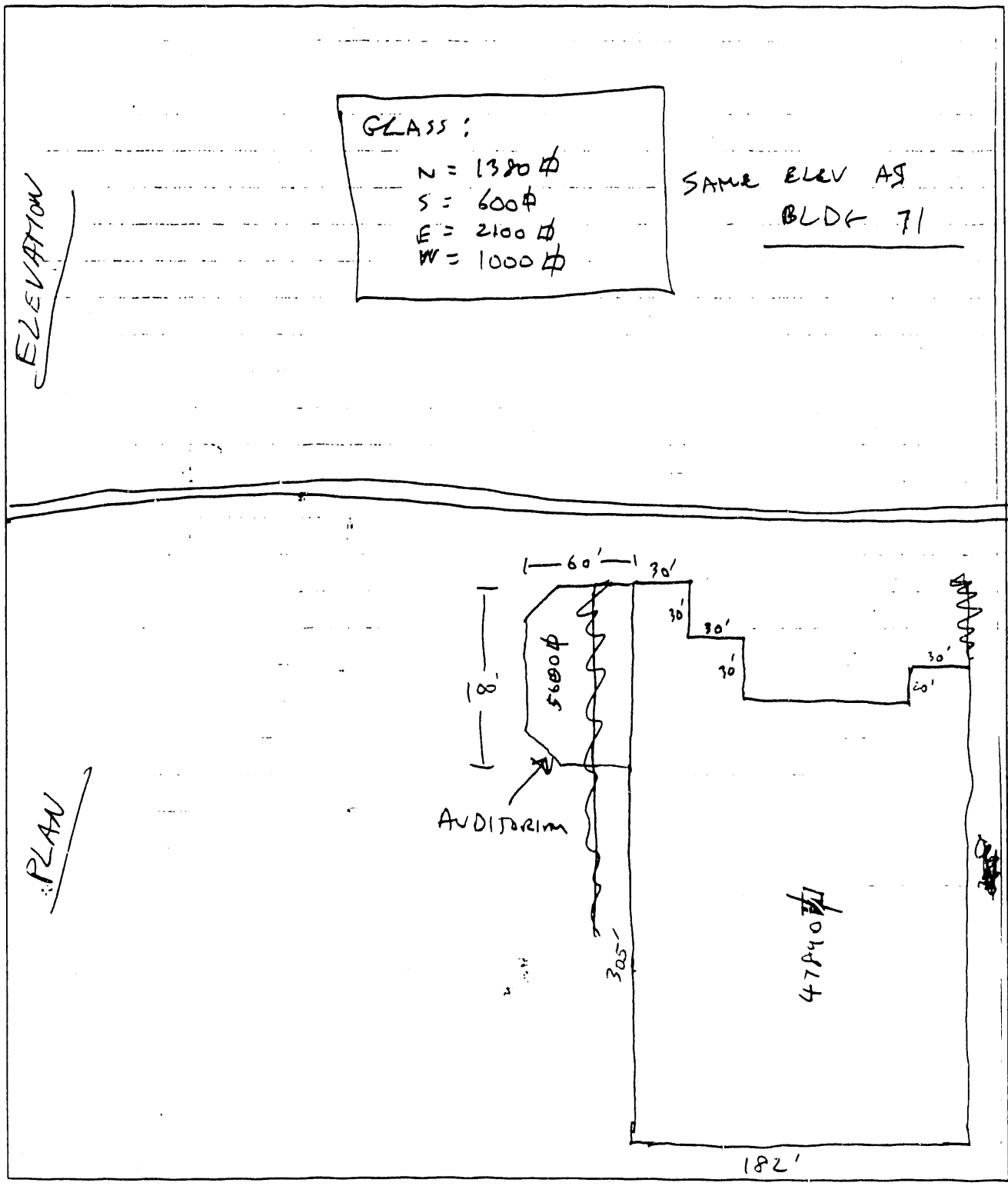
~~VERTICAL~~ ARROW: ↑

SCALE:

8.76

PREPARED BY: _____ DATE: _____ BUILDING NUMBER: NNMC 7

SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW: ↑ SCALE: □ = 20'x20'

8.77

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 72

5/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC 72 This page covers: Before condition ___ After ___ Date: ___

Building location: BETHESDA (city) MD (state) (zip code)

Project/program ID: ___ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: SECN Total floor area: ~~70,520~~ 70,520 (ft²) Year of latest renovation: ___

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: ___ (ft²) ___ (ft²) ___ (ft²) Number of stories:

Year completed: ___ ___ ___ ___

Floor area and volume:	Heated (ft²/ft³)	Cooled (ft²/ft³)	Unconditioned (ft²/ft³)	Stories above ground:
Above grade:	70520 / 1339880	70520 / 1339880	___ / ___	___
Below grade:	___ / ___	___ / ___	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: FLAT (in./in.) Exposed roof area: 53890 (ft²) Roof insulated at: ceiling level X roof level ___

Average roof estimated U-value (Btu/h-ft²-F) ___ Ground-coupled floor area: 53890 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) ___ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 2 Doors: 1

Below grade walls: ___ Roof: 1

Atrium walls: ___ Floor: 1/2

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation				
	East	South	West	North	
Above grade gross wall area (ft²)	10,070	8056	10,070	8056	
Glazing area (ft²)	2100	600	1000	1320	
Shading by overhangs (y or n)	Y				INSET
Shading by fins (y or n)	Y				INSET
Photos attached showing facade (y or n)					

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house 100 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: MAINTAINED BY OWN UNIVERSITY CREWS

6/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC 72 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	USUHS	ALL		

Total floor area (ft^2): _____

Description of variances:- _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
LAB 1	502	~~[illegible]~~					
OFFICE 2	300	~~[illegible]~~ 24340					
LOBBY 3	105	7200					
CORR/STAIR 4	111	6170					
BOOKSTORE 5	900	6420					

~~[illegible]~~ 24340 / 26,390

Description of variances: _____

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: 1	Hour open	7							
	Hour closed	5							
	Occupant-hrs	10							
Tenant/Zone No.: 2	Hour open	7							
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: 3	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: 4	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: 5	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC 72 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____ Hour open								
Hour closed								
Occupant-hrs								
Tenant/Zone No.: _____ Hour open								
Hour closed								
Occupant-hrs								

Description of variances and zones with variable occupancy: SCHEDULE ESTIMATED MAY BE USED UP TO 24 HR. PER DAY

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH	4	ALL				S/HC
S2							
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1
CC/CA	E/S				S1

Fuel Codes

e-electricity, g-natural gas, oi-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF		≈ 1573	M	

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 72 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: ESTIMATED TOTAL LIGHTING WATTS FLOUR = 212,000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, OPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		

Description of variances: _____

BUILDING TITLE: UNIFORMED UNIVERSITY "D"
BUILDING NUMBER: NNMC 73

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS

see 70

BUILDING SITE DESCRIPTION

see 70

BUILDING USE SUMMARY

see 70

BUILDING CONSTRUCTION SUMMARY

see 70

HVAC SYSTEM SUMMARY

see 70

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: 73

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

METERED WITH BLDG # 70, 71, 72

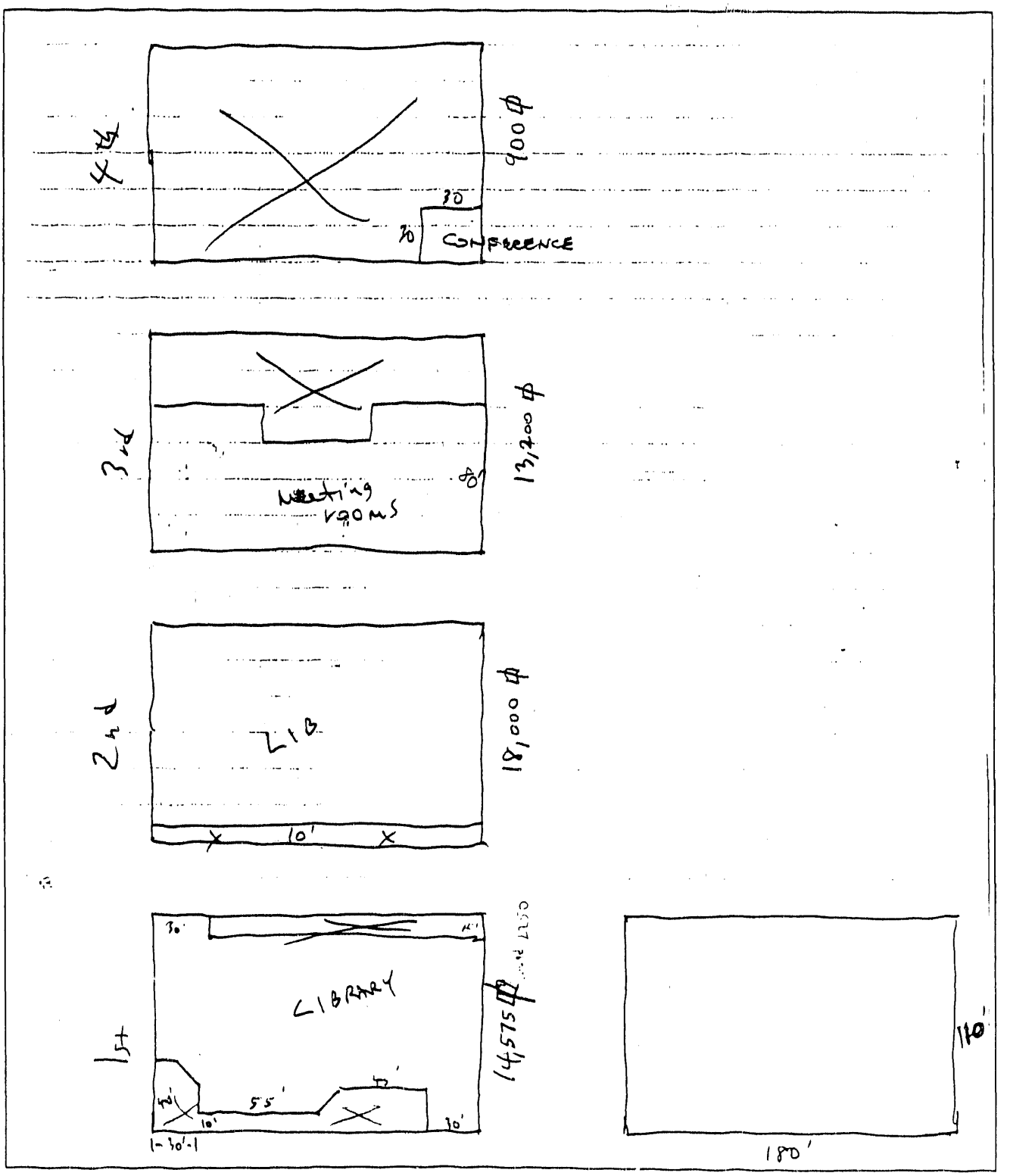
QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 73

SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW: ↑ SCALE: □ = 20' x 20'

8.84

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 7

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

GLASS:

N = 1750 ft
S = 1650 ft
E = Ø
W = 280 ft

same elev.
as 71 "B"

VERTICAL ARROW:

SCALE:
8.85

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 73

5/8

EBER Nonresidential Energy Performance Monitoring
BUILDING CORE DATA FORM — *page 1*

Building ID: NNMC 73 This page covers: Before condition ___ After ___ Date: _____

Building location: BETHESDA (city) MD (state) (zip code)

Project/program ID: _____ Prepared by: _____

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | (1974-1980) | 1981-present

BECA building type code: SECN Total floor area: 46675 (ft²) Year of latest renovation: _____

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: _____ (ft²) _____ (ft²) _____ (ft²) Number of stories:

Year completed: _____ _____ _____ _____

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	46,675 / 830,425	46,675 / 830,425	___ / ___	___
Below grade:	___ / ___	___ / ___	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: FLAT (in./in.) Exposed roof area: 19,500 (ft²) Roof insulated at: ceiling level X roof level ___

Average roof estimated U-value (Btu/h-ft²-F) _____ Ground-coupled floor area: 14575 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) _____ Common walls: _____ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls:	2	Doors:	1
Below grade walls:	1	Roof:	1
Atrium walls:	___	Floor:	1/2

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single (Double) Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation				
	East	South	West	North	
Above grade gross wall area (ft²)	6280	9990	6280	9990	
Glazing area (ft²)	Ø	1650	280	1750	
Shading by overhangs (y or n)	Y	Y	Y	Y	INSET
Shading by fins (y or n)	Y	Y	Y	Y	INSET
Photos attached showing facade (y or n)					

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house, 100 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: MAINTAINED BY OWN UNIVERSITY CREWS

6/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 2

Building ID: NNMC73 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	USUHS	ALL		

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

	Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
LIBRARY	1	900	32575					
MEETING	2	103	14100					

Description of variances: _____

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: 1	Hour open								
	Hour closed		24 HOUR POSSIBLE						
	Occupant-hrs								
Tenant/Zone No.: 2	Hour open								
	Hour closed		AS		USED				
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

7/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 3*

Building ID: NNMC 73 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy:

SCHEDULE HOURS ESTIMATED

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH	4	ALL				S/CH
S2							
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary equt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	DL				S1
CC/CA	S				S2

Fuel Codes

e-electricity, g-natural gas, oil-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR-water-cooled reciprocating chiller, CAS-air-cooled screw chiller, CWS-water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
~~ALL~~					
ALL	IFH		≈ 622		

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

8/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 73 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: ESTIMATED TOTAL LIGHTING WATTS FLOOR: 84000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		

Description of variances: _____

BUILDING TITLE: HOSPITAL/CLINIC
BUILDING NUMBER: NNMC 9

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS

BLDG #9

BUILDING SITE DESCRIPTION

SOUTH OF ORIGINAL HOSPITAL BLDG (#1)

BUILDING USE SUMMARY

DOCTORS OFFICES, EXAM ROOMS, LABS, OPERATING ROOMS, ETC..

BUILDING CONSTRUCTION SUMMARY

HVAC SYSTEM SUMMARY

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: NNMC

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

metered with BLDG # 10

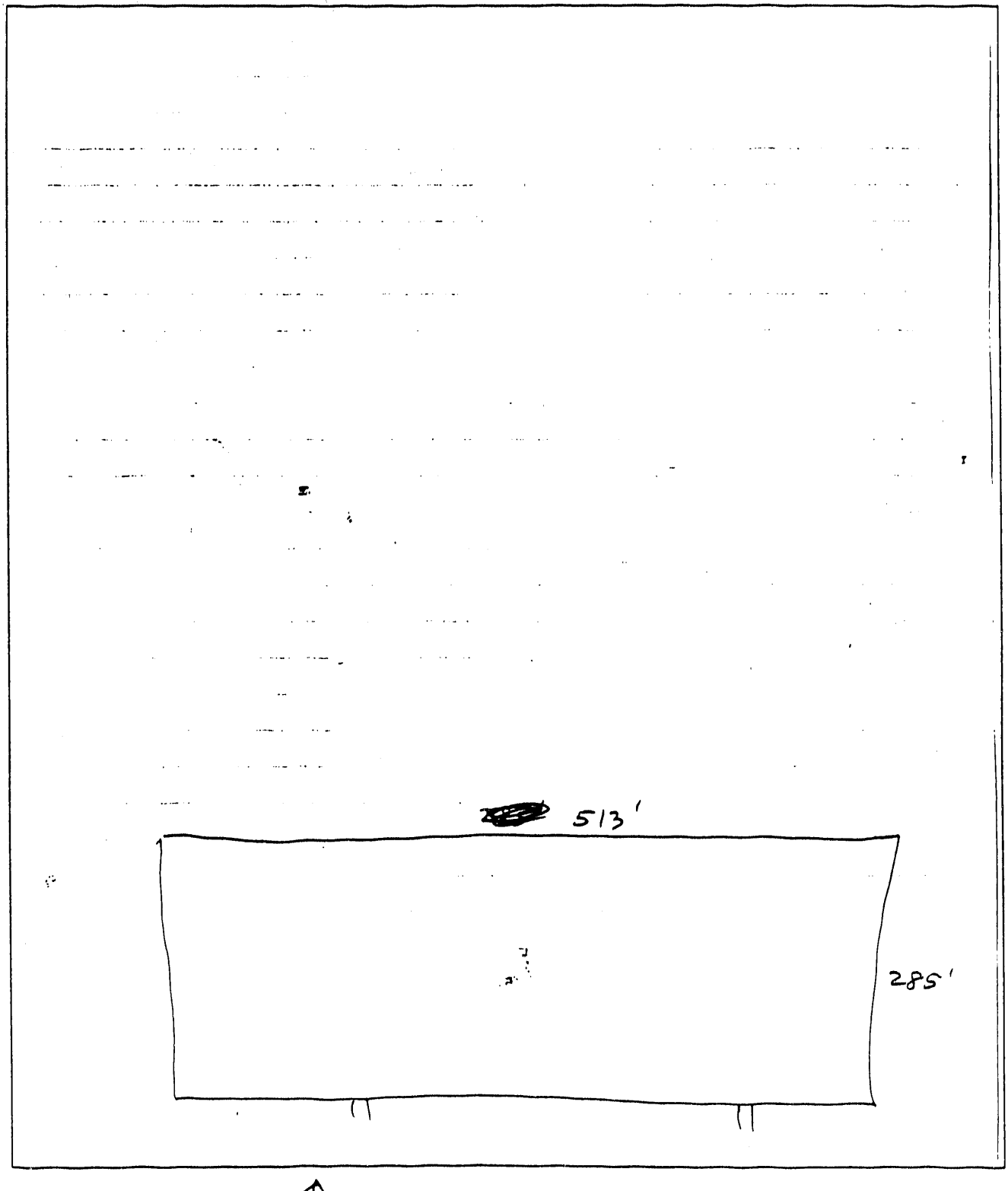
QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 9

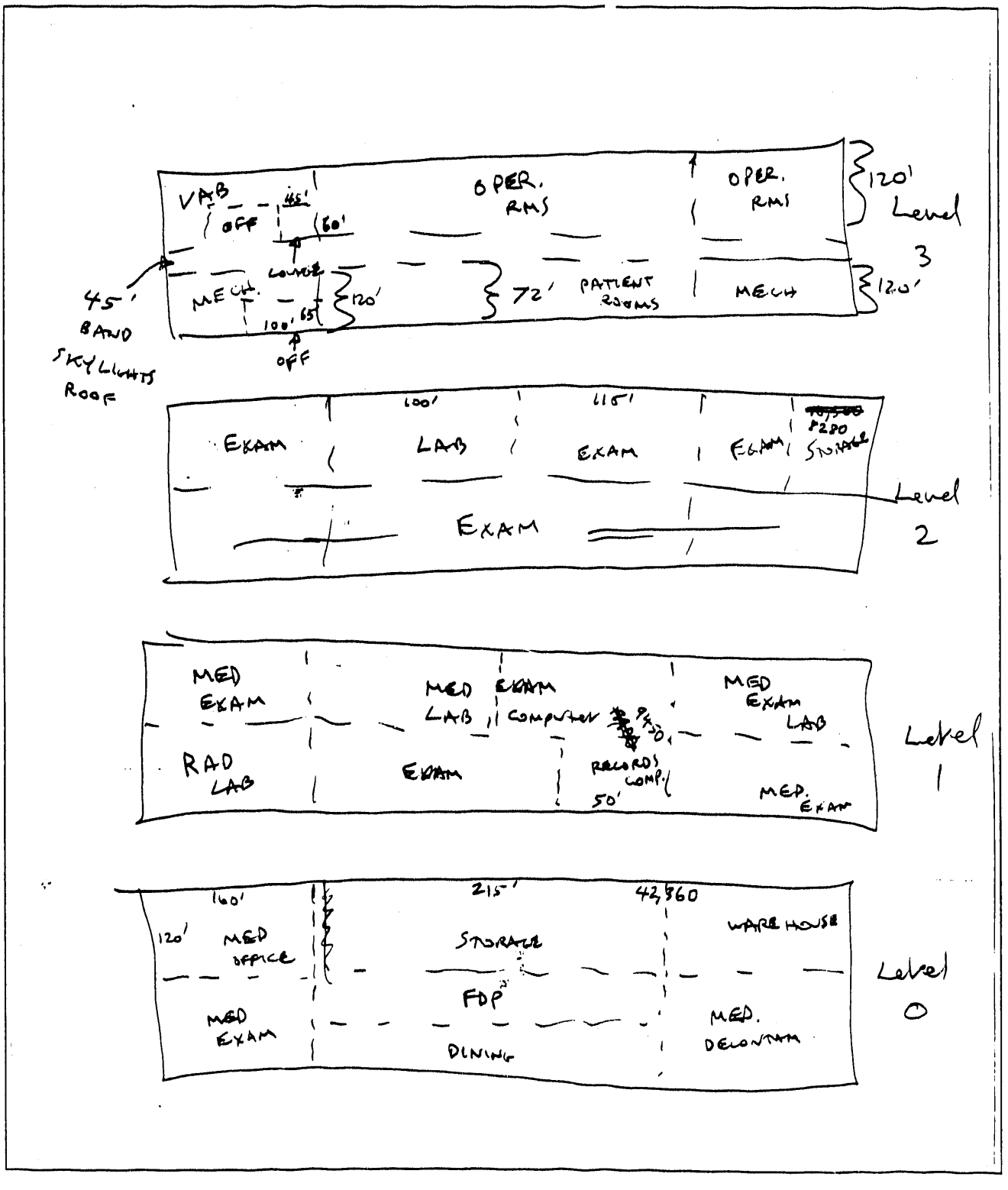
SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW: ↑ SCALE: 8.92

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC

SITE DESCRIPTION – PLAN VIEW

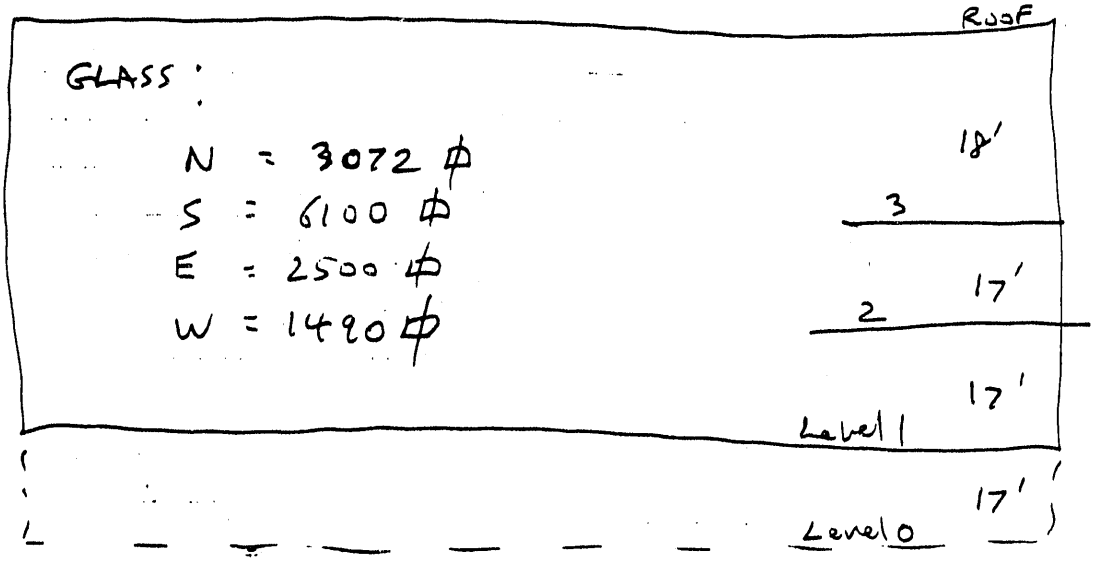


TRUE NORTH ARROW: SCALE:

8.93

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 9

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE



VERTICAL ARROW:

SCALE:

8.94

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 9

6/9

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC 9 This page covers: Before condition ___ After ___ Date: _____

Building location: BETHESDA (city) MD (state) _____ (zip code)

Project/program ID: _____ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: HOSP Total floor area: 584,820 (ft²) Year of latest renovation: _____

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: _____ (ft²) _____ (ft²) _____ (ft²) Number of stories:

Year completed: _____ _____ _____ _____

Floor area and volume:	Heated	Cooled	Unconditioned	Stories above ground:
Above grade:	438,615 m²/m³ / 22,807,980	438,615 m²/m³ / 22,807,980	___ / ___	3
Below grade:	146,205 / 2,485,485	146,205 / 2,485,485	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: flat (in./in.) Exposed roof area: 146,205 (ft²) Roof insulated at: ceiling level X roof level ___

Average roof estimated U-value (Btu/h-ft²-F) _____ Ground-coupled floor area: _____ (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) _____ Common walls: _____ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 4 Doors: 1

Below grade walls: 3 Roof: 3

Atrium walls: ___ Floor: 1

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single (Double) Triple (Clear) Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation			
	East	South	West	North
Above grade gross wall area (ft²)	14820	26,676	14,820	26,676
Glazing area (ft²)	2500	6100	1490	3072
Shading by overhangs (y or n)	N			
Shading by fins (y or n)	N			
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house 100 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: _____

7/9

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC 9 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC	ALL		

Total floor area (ft^2): _____

Description of variances:- _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
1 STORAGE	202	50,640	17'				
2 OFFICE/EXAM	300	~~384,090~~	17'				
3 OPER. RMS/LABS	502	63,600	VAR.				
4 FOOD PREP	400	12,900	17'				
5 DINING	102	12,900	17'				
6 COMPUTER ~~OFFICE~~	501	~~12,900~~	17'				
7 MECH/ELEC	505	~~12,900~~	18'				
8 PATIENT ROOMS	700	15,480	18'				

35,760 9450

Description of variances: _____

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

Tenant/Zone No.: 1
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 2
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 3
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 4
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 5
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 6
Hour open
Hour closed
Occupant-hrs

Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Hour open	7	→	→	→	→			
Hour closed	5							
Occupant-hrs	10							
Hour open	7							
Hour closed	5							
Occupant-hrs	10		↓					
Hour open	24 HOUR							
Hour closed								
Occupant-hrs								
Hour open								
Hour closed								
Occupant-hrs								
Hour open								
Hour closed								
Occupant-hrs								
Hour open								
Hour closed								
Occupant-hrs	8							

8/9

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 3*

Building ID: NNMC 9 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Day of week: Mon Tues Wed Thu Fri Sat Sun Hol

Tenant/Zone No.: 7 — Hour open: 24 HOUR

Hour closed

Occupant-hrs

Tenant/Zone No.: 8 — Hour open

Hour closed

Occupant-hrs

Description of variances and zones with variable occupancy: SCHEDULE HOURS ESTIMATED

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
~~S1~~	~~SZRH~~						
~~S2~~							
S1	SZRH ~~FPFU~~		ALL				S/CH
S2	TPIU		ALL				S/CH
~~S3~~							
~~S4~~							

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S2, S1
CC/CA	E/S				S2, S1

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF		7,800	M	

HVAC Type Codes (see p 5)

Single supply duct types: SZAH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (or/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, oi-distillate fuel oil (# 1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 4

Building ID: NNMC 9 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: LIGHTING SQFT VALUES FOR BLDG # 70 USED HERE
ESTIM. TOTAL LIGHT. WATTS. FLOUR. = 1,048,000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games) , SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		

Description of variances: _____

BUILDING TITLE: HOSPITAL
BUILDING NUMBER: NNMC 10

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS

BLDG # 10

BUILDING SITE DESCRIPTION

CONNECTED TO AND DIRECTLY SOUTH OF BLDG #9

BUILDING USE SUMMARY

HOSPITAL PATIENT ROOMS AND NURSE STATIONS

BUILDING CONSTRUCTION SUMMARY

HVAC SYSTEM SUMMARY

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: NNMC 10

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

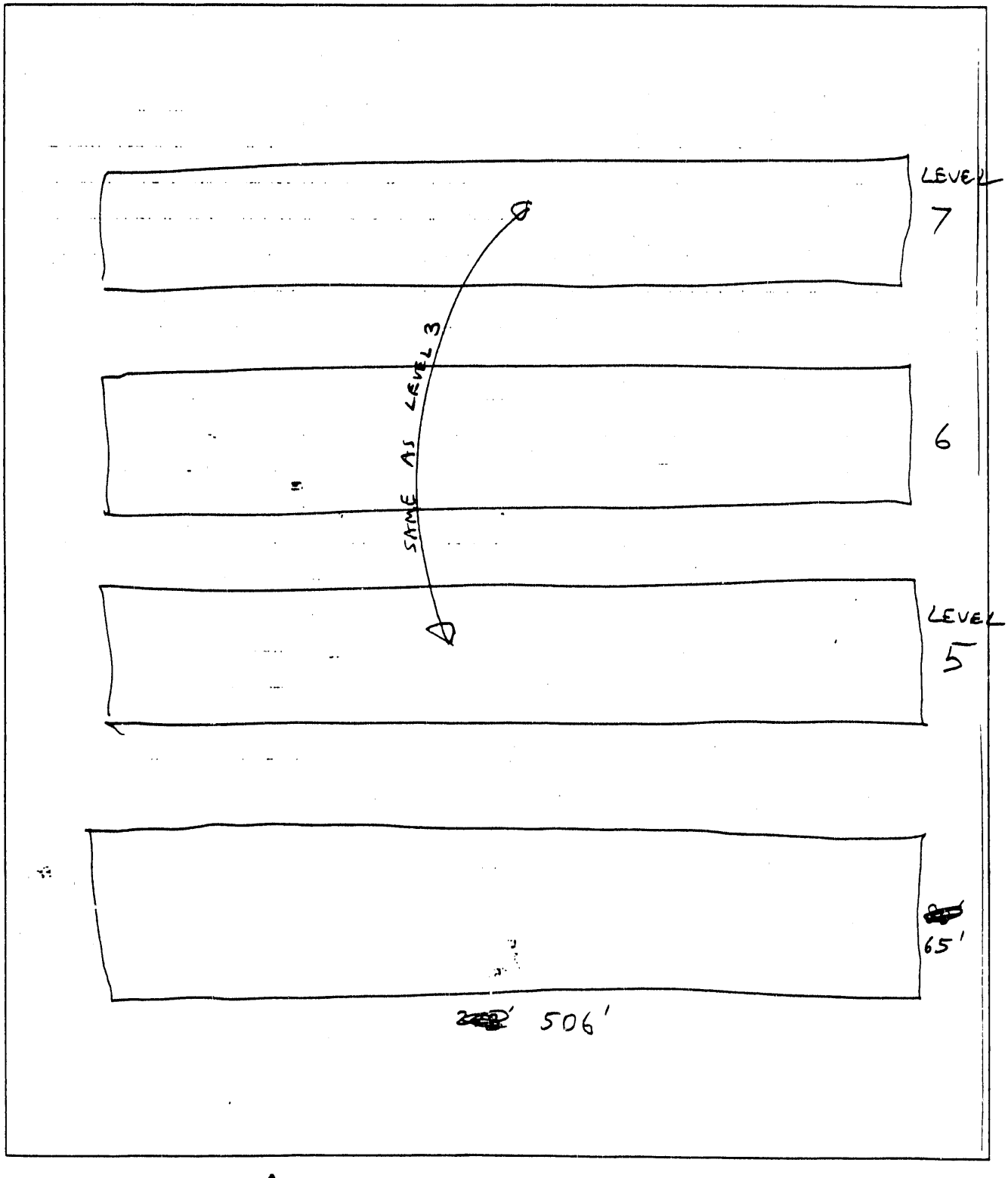
QUALITY AND SOURCE OF MEASURED ENERGY USE

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 10

SITE DESCRIPTION – PLAN VIEW



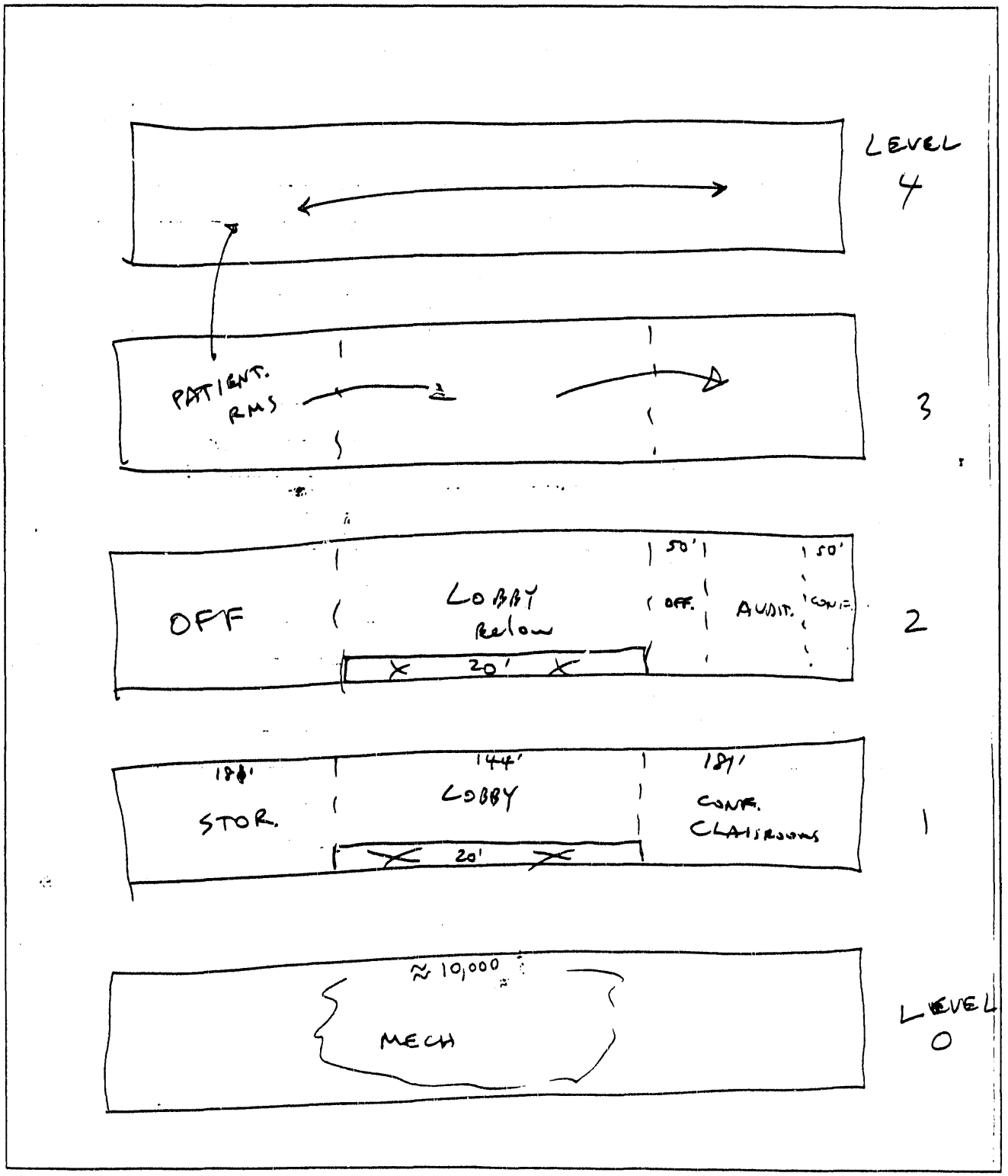
TRUE NORTH ARROW:

SCALE:

8.101

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 10

SITE DESCRIPTION – PLAN VIEW



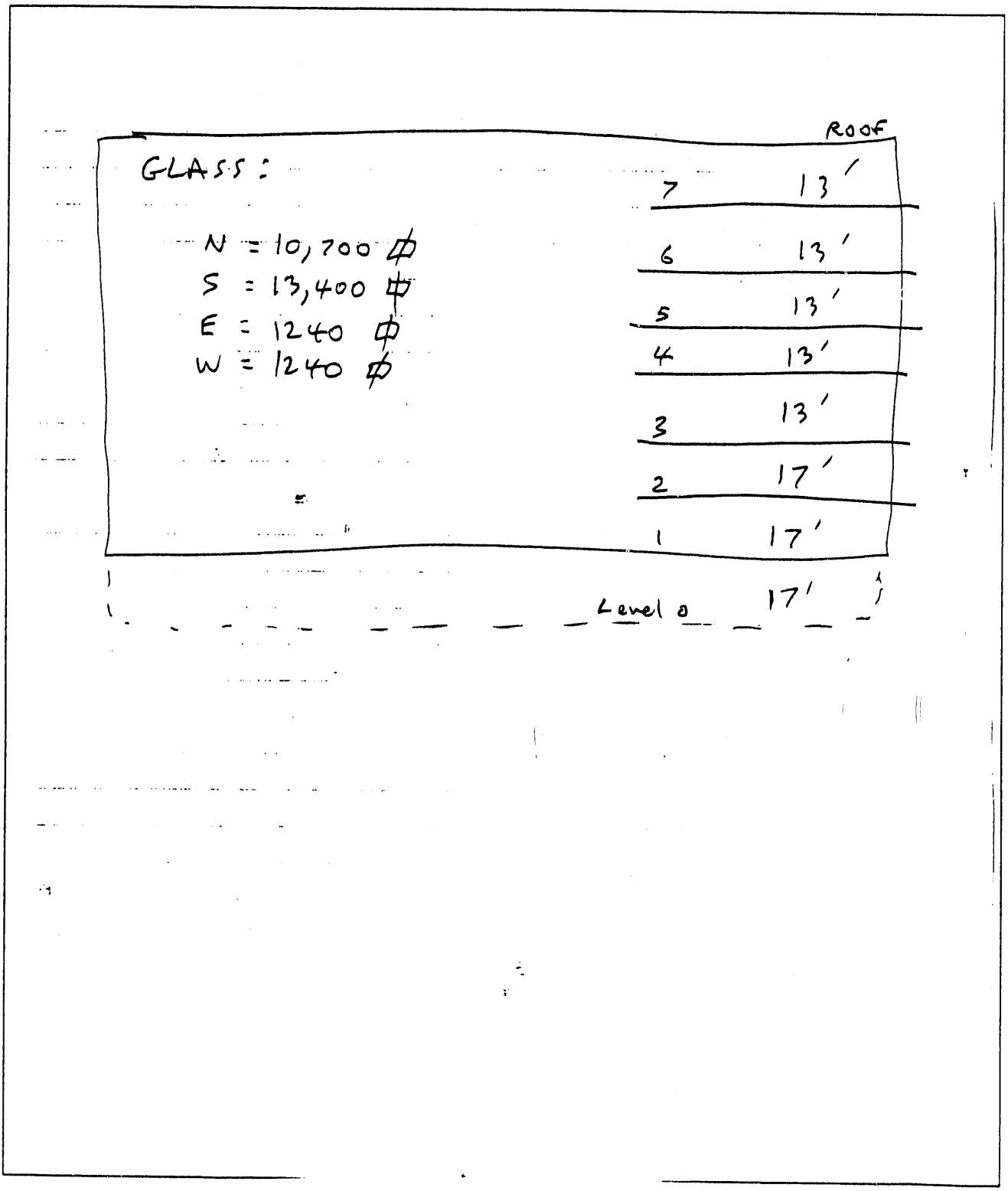
TRUE NORTH ARROW:

SCALE:

8.102

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NN MC

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE



VERTICAL ARROW:

SCALE:

8.103

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 10

6/9

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 1*

Building ID: NNMC 10 This page covers: Before condition ___ After ___ Date: _____

Building location: BETHESDA (city) MD (state) _____ (zip code)

Project/program ID: _____ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: HOSP Total floor area: 240,230 (ft^2) Year of latest renovation: _____

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft^2)	LOFF - Large Office Building (≥ 10,000 ft^2)	INDS - Conditioned Industrial		

Floor area of latest additions: _____ (ft^2) _____ (ft^2) _____ (ft^2) Number of stories:

Year completed: _____ _____ _____ _____

Floor area and volume:	Heated (ft^2/ft^3)	Cooled (ft^2/ft^3)	Unconditioned (ft^2/ft^3)	Stories above ground:
Above grade:	230,230 / 1117,260	230,230 / 1118,260	___ / ___	___
Below grade:	10,000 / 170,000	10,000 / 170,000	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: FLAT (in./in.) Exposed roof area: 32,990 (ft^2) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft^2-F) _____ Ground-coupled floor area: 32,990 (ft^2)

Average estimated opaque wall U-value (Btu/h-ft^2-F) _____ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls:	4	Doors:	1
Below grade walls:	1	Roof:	3
Atrium walls:	___	Floor:	1/2

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft^2)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft^2-F)

(circle those that apply) Single (Double) Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft^2-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation			
	East	South	West	North
Above grade gross wall area (ft^2)	6435	50,094	6435	50,095
Glazing area (ft^2)	1240	13,400	1240	10,700
Shading by overhangs (y or n)	N			
Shading by fins (y or n)	N			
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house (95) (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: _____

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EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 2

Building ID: NNMC 10 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC	ALL		

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

	Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
PATIENT RMS.	1	700	164,450	13'				
OFFICE	2	300	15,015	17'				
LOBBY	3	105	18,720 *	17' *				
STORAGE	4	202	11,765	17'				
MECH	5	505	≈10,000	17'				
CONF./CLASSROOMS	6	103	20,280	17'				

Description of variances: * 2 ~~FLOOR~~ STORY @ 9,360 X 17'

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

Day of week: Mon Tues Wed Thu Fri Sat Sun Hol

Tenant/Zone No.: 1
Hour open
Hour closed
Occupant-hrs

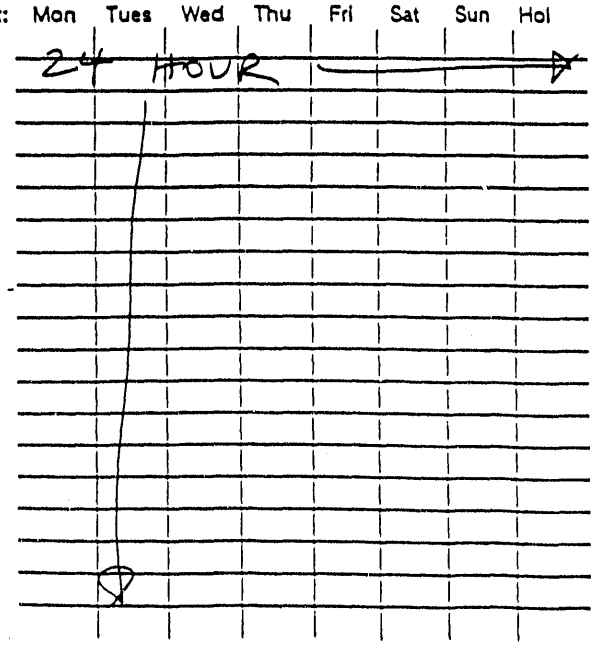
Tenant/Zone No.: 2
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 3
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 4
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 5
Hour open
Hour closed
Occupant-hrs

Tenant/Zone No.: 6
Hour open
Hour closed
Occupant-hrs



EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC 10 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd)

(use times from 00:00–23:59)

		Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____		Hour open								
		Hour closed								
		Occupant-hrs								
Tenant/Zone No.: _____		Hour open								
		Hour closed								
		Occupant-hrs								

Description of variances and zones with variable occupancy: HOURS ESTIMATED

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH		ALL				E/CH
S2							
S3							
S4							
S5							
S6							

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1
CC/CA	E/S				S1

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF		≈ 3200	M	

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, WT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, FPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, o-distillate fuel oil (# 1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 10 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: LIGHT DATA TAKEN ON SQFT BASIS FROM BLDG #70

ESTIM. TOTAL WATTS FLOUR. = 430,500

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			___/___to___/___		
			___/___to___/___		
			___/___to___/___		
			___/___to___/___		

Description of variances: _____

BUILDING TITLE: ORIGINAL HOSPITAL BUILDING
BUILDING NUMBER: NNMC1

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS
BLDG #1

BUILDING SITE DESCRIPTION
ORIGINAL NNMC SITE WITH VIEW TO WEST OF LAKE ELEANOR

BUILDING USE SUMMARY
ADMINISTRATION OFFICES & MEDICAL EXAM/OFFICE

BUILDING CONSTRUCTION SUMMARY
MASONRY

HVAC SYSTEM SUMMARY
SINGLE ZONE REHEAT AND RADIATOR UNITS

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: 1

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

METERED BY 2 METERS IN BASEMENT SUBSTATION

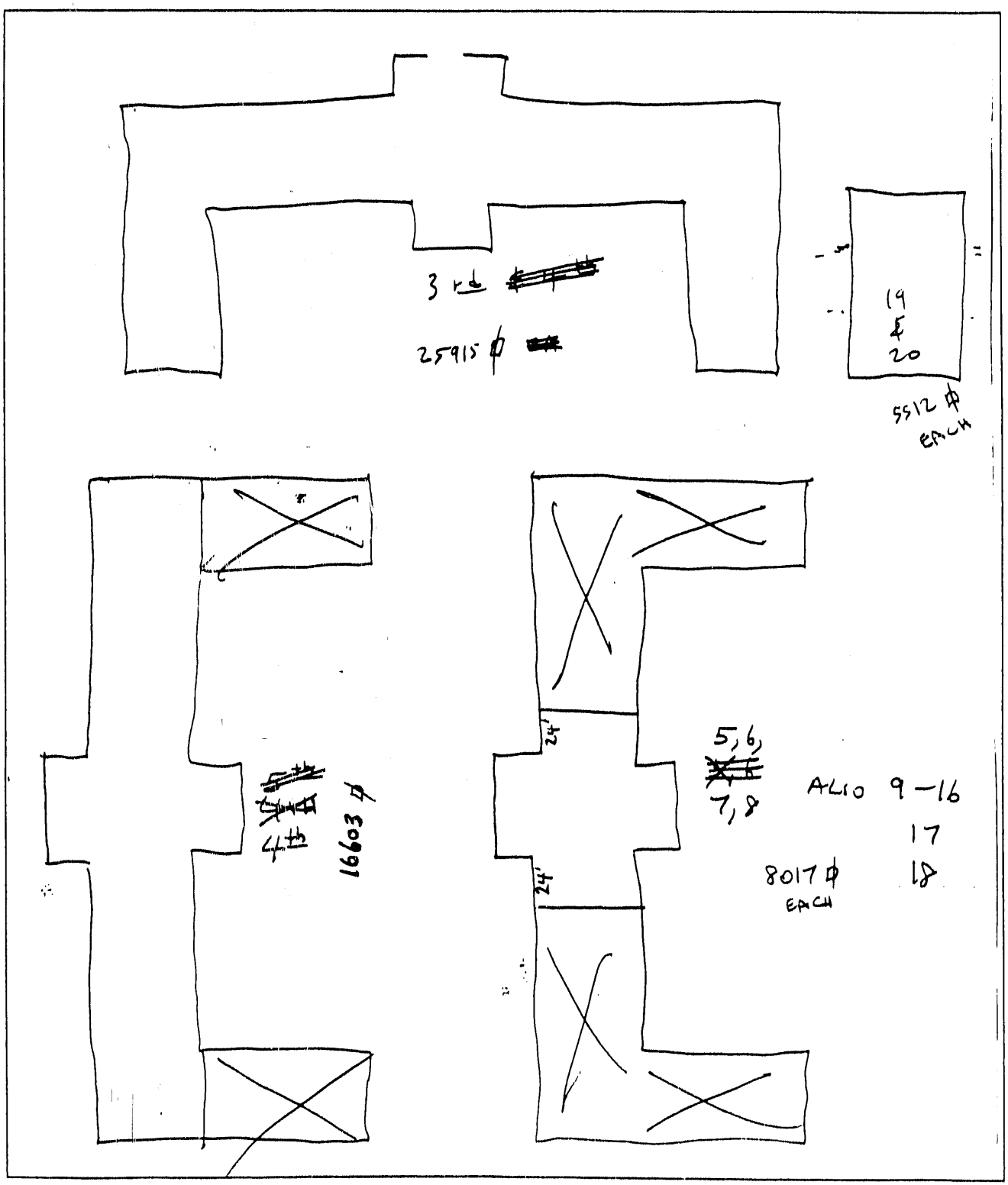
QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 1

SITE DESCRIPTION – PLAN VIEW



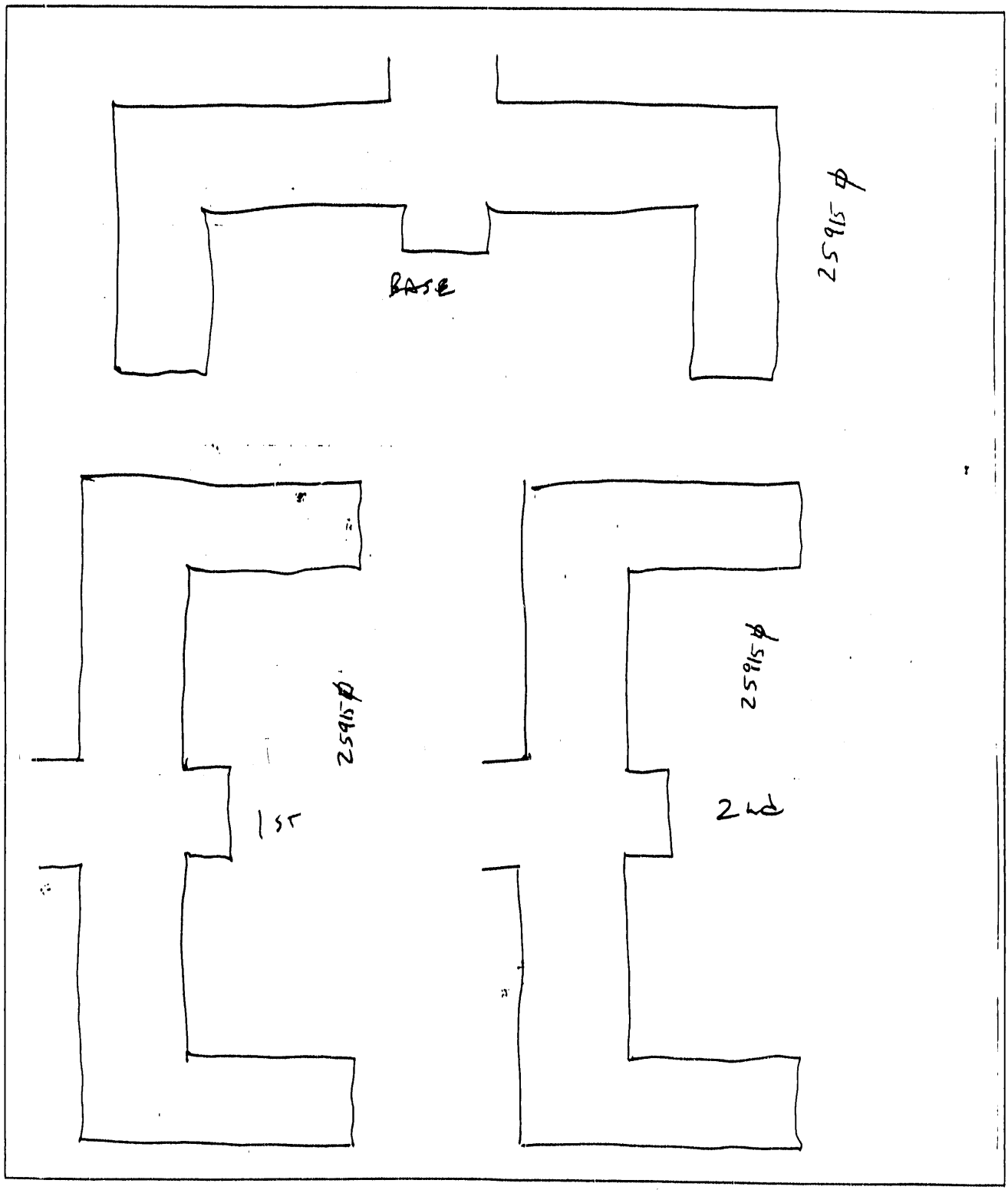
TRUE NORTH ARROW:

SCALE:

8.110

PREPARED BY:_____ DATE:_____ BUILDING NUMBER:_____

SITE DESCRIPTION – PLAN VIEW

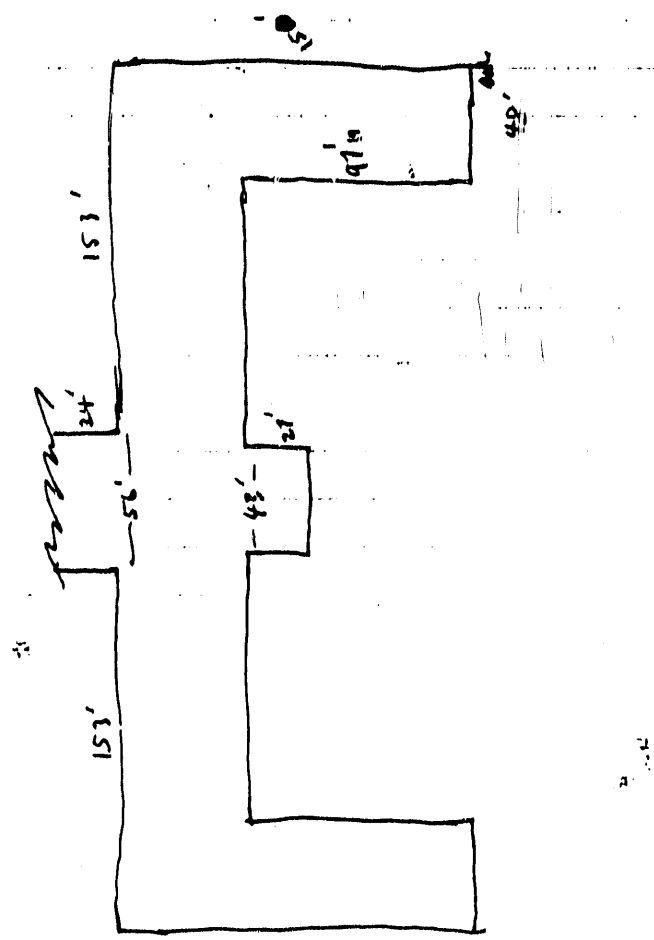


TRUE NORTH ARROW: SCALE:

8.111

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 1

SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW:

SCALE: □ 20'X20'

8.112

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NMMC

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

12 FT. FLOORS BASE → 4th

11 FT. FLOORS 5th → 17th

17' 18th

14' 19th

12' 20th

ELEVATIONS

SQ. FOOTAGES

W = 37,760 GLASS = 5446

E = 35,072 GLASS = 5204

N = 30,420 GLASS = 4657

S = 30,420 GLASS = 4657

VERTICAL ARROW:

SCALE:

8.113

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 1

7/10

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC | This page covers: Before condition ___ After ___ Date: _____

Building location: BETHESDA (city) MD (state) _____ (zip code)

Project/program ID: _____ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | (1921-1945) | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: _____ Total floor area: 243,525 (ft²) Year of latest renovation: 1980's

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: ALL (ft²) _____ (ft²) _____ (ft²) Number of stories: 20

Year completed: 1980's _____ _____

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	217,610 / 3,699,157	217,610 / 3,699,157	___ / ___	___
Below grade:	25,915 / 310,980	25,915 / 310,980	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: FLAT (in./in.) Exposed roof area: 25,915 (ft²) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft²-F) _____ Ground-coupled floor area: _____ (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) _____ Common walls: _____ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 2/3 Doors: 1

Below grade walls: 3 Roof: 1

Atrium walls: ___ Floor: ___

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft²)

Wall/glazing information

Primary glazing type: ___ (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single (Double) Triple Clear Tinted Reflective Other Fixed (Operable)

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Orientation	East	South	West	North
Above grade gross wall area (ft²)	35,072	30,420	37,760	30,420
Glazing area (ft²)	5204	4657	5446	4657
Shading by overhangs (y or n)	N			
Shading by fins (y or n)	N			
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house (100 %) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: _____

8/10

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 2

Building ID: NNMC 1 This page covers: Before condition ___ After ___ Date: _____

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft^2)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC			

Total floor area (ft^2): _____

Description of variances: _____

3. Building Zone Information (minimum zone size is 10% of tenant area)

24352

Tenant/ Zone No.	Use Code	Zonal Area (ft^2)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling
1	111	~~24,352~~	VAR.				
2	300	219,173	VAR.				

HALL STAIR OFFICE & CLASS EXAM

Description of variances: HALL ESTIMATED AT 10%
ZONE 2 IS MIXTURE OF VARIOUS HOSPITAL FACILITIES

ıne Schedule and Occupancy

(use times from 00:00–23:59)

Tenant/Zone No.		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
1	Hour open	7						7	
	Hour closed	6	→	→	→	→			
	Occupant-hrs	11							
2	Hour open								
	Hour closed								
	Occupant-hrs								
	Hour open								
	Hour closed								
	Occupant-hrs								
	Hour open								
	Hour closed								
	Occupant-hrs								
	Hour open								
	Hour closed								
	Occupant-hrs								
	Hour open								
	Hour closed							7	
	Occupant-hrs			7					

BASIC OFFICE HOURS PLUS SOME SHIFT HOURS?

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 3*

Building ID: NNMC This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

		Day of week: Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy: _____

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH	3	ALL				E/CH
S2	TPIU	3	ALL				E/CH
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZAH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual), 2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary equip.)
s-secondary unit served by primary system (below)
p+s-packaged + secondary

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1 S2
CC/CA	E/S				S1 S2

Fuel Codes

e-electricity, g-natural gas, oil-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, st-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF	≈ 3250		M	

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC1 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: ~~FLOOR~~ LIGHTING ESTIMATED BASED ON BLDG 70 DATA

ESTIM. TOTAL LIGHTING WATTS FLOOR. = 436,000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			/__to__/		
			/__to__/		
			/__to__/		
			/__to__/		

Description of variances: _____

BUILDING TITLE: HOSPITAL/CLINIC
BUILDING NUMBER: NNMC 2

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS

BLDG # 2

BUILDING SITE DESCRIPTION

DIRECTLY EAST OF ORIGINAL BLDG # 1

BUILDING USE SUMMARY

MEDICAL OFFICES, CLINICS, AND EXAM ROOMS
INCL. LARGE AUDITORIUM.

BUILDING CONSTRUCTION SUMMARY

BLOCK/CONCRETE
D&L WINDOWS

HVAC SYSTEM SUMMARY

SINGLE ZONE REHEAT WITH RADIATOR UNITS

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: NNMC

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

METERED WITH BLDGS 7, 8

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 1

SITE DESCRIPTION – PLAN VIEW

FOOTAGES

LEVEL	#
1 ~~BASE~~	41,056
2 X	36,128
3 ~~X~~	23,092
4 ~~X~~	13,280
	113,556

TRUE NORTH ARROW:

SCALE:

8.120

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 1

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

ELEV. Ø (ABOVE GRADE) GLASS Ø

N = 13,056 N = 686
S = ~~13,472~~ 13,104 S = 1040
E = 2500 E = ~~=~~ UNKNOWN ~~CLOSE~~ CLOSE TO Ø
W = 5060 W = 875

VERTICAL ARROW:

SCALE:
8.121

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 1

5/8

EBER Nonresidential Energy Performance Monitoring
BUILDING CORE DATA FORM — page 1

Building ID: NNMC 2 This page covers: Before condition ___ After ___ Date: ___

Building location: BETHESDA (city) MD (state) ___ (zip code)

Project/program ID: ___ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | (1921-1945) | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: ___ Total floor area: 113,556 (ft²) Year of latest renovation: 1980's

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers	
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other	
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers	
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial			

Floor area of latest additions: ALL (ft²) ___ (ft²) ___ (ft²) Number of stories: ___

Year completed: 1980's ___ ___ ___

Floor area and volume:	Heated (ft²/m²)	Cooled (ft²/m²)	Unconditioned (ft²/m²)	Stories above ground:
Above grade:	113,556 / 1,362,672	113,556 / 1,362,672	___ / ___	4
Below grade:	___ / ___	___ / ___	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	___

Roof pitch: FLAT (in./in.) Exposed roof area: ___ (ft²) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft²-F) ___ Ground-coupled floor area: ___ (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) ___ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 2 Doors: 1

Below grade walls: ___ Roof: 1

Atrium walls: ___ Floor: 1

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

metal (circle those that apply) Single (Double) Triple Clear Tinted Reflective Other Fixed (Operable)

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Orientation	East	South	West	North
Above grade gross wall area (ft²)	2500	13,104	5060	13,056
Glazing area (ft²)	(0)*	1040	875	686
Shading by overhangs (y or n)	N			
Shading by fins (y or n)	N			
Photos attached showing facade (y or n)				

* EST.

Floor plan sketch(es) attached (y or n) Y see as-built drawings

Maintenance: In-house (50 (%)) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: ___

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 2

Building ID: NNMC 2 This page covers: Before condition ___ After ___ Date: ___

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft²)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON	—		
1	NNMC	ALL		

Total floor area (ft²): ___

Description of variances: ___

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft²)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling

Description of variances: ___

4. Zone Schedule and Occupancy (use times from 00:00–23:59)

STANDARD OFFICE OR CLINIC HOURS WITH POSSIBLE 24 HOUR OPERATION

Tenant/Zone No.	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC 2 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Tenant/Zone No.:	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.:	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy: _____

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Sondy (see codes)	Fuel Code
S1	SZRH		ALL				S/CH
S2	TPIU		ALL				S/CH
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, FTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Sondy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	GL				S1, S2
cc/ca	E/S				S1, S2

Fuel Codes

e-electricity, g-natural gas, oi-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR-water-cooled reciprocating chiller, CAS-air-cooled screw chiller, CWS-water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF		≈1500	M	

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

8/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 2 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: LIGHTING EST. PER BLDG #70 DATA

EST. TOTAL LIGHT WATTS FLOOR = 204,000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			___/___ to ___/___		
			___/___ to ___/___		
			___/___ to ___/___		
			___/___ to ___/___		

Description of variances: _____

BUILDING TITLE: HOSPITAL/CLINIC
BUILDING NUMBER: NNMC 7

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS
BLDG # 7

BUILDING SITE DESCRIPTION
ATTACHED TO ORIGINAL BLDG # 2

BUILDING USE SUMMARY
MEDICAL OFFICE/CLINIC/LAB

BUILDING CONSTRUCTION SUMMARY
BLOCK MASONRY
DOUBLE WINDOWS

HVAC SYSTEM SUMMARY
SINGLE ZONE REHEAT W/RADIATOR UNITS AT PERIMETER

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: NNMC

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS
OK

QUALITY AND SOURCE OF MEASURED ENERGY USE
METERED WITH 2,8

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 7

SITE DESCRIPTION – PLAN VIEW

SEE AS-BUILT'S

GROUND = 31 232 ℄
1ST = 8448 ℄
39680 ℄

TRUE NORTH ARROW:

SCALE:
8.128

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 7

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

N (5/2 + 1 1/2) x 32 x 12 = 2688

E (5 + 5) x 32 x 12 = 3840

W (4) x 32 x 12 = 1536

VERTICAL ARROW:

SCALE:

8.129

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 7

5/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC 7 This page covers: Before condition ___ After ___ Date: _____

Building location: BETHESDA (city) MD (state) _____ (zip code)

Project/program ID: _____ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: HOSP Total floor area: 39,680 (ft²) Year of latest renovation: _____

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: _____ (ft²) _____ (ft²) _____ (ft²) Number of stories:

Year completed: _____ _____ _____ _____

Floor area and volume:	Heated (ft²/ft³)	Cooled (ft²/ft³)	Unconditioned (ft²/ft³)	Stories above ground:
Above grade:	39,680 / 476,160	39,680 / 476,160	___ / ___	2
Below grade:	___ / ___	___ / ___	___ / ___	
Atrium:	___ / ___	___ / ___	___ / ___	

Roof pitch: FLAT (in./in.) Exposed roof area: ~~39,680~~ 3123 (ft²) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft²-F) _____ Ground-coupled floor area: 31232 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) _____ Common walls: _____ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls:	2	Doors:	1
Below grade walls:	___	Roof:	1
Atrium walls:	___	Floor:	1

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single (Double) Triple Clear Tinted Reflective Other (Fixed) Operable

metal

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Orientation	East	South	West	North
Above grade gross wall area (ft²)	3840	-0-	1536	2688
Glazing area (ft²)				
Shading by overhangs (y or n)	N			
Shading by fins (y or n)	N			
Photos attached showing facade (y or n)				

UNKNOWN

Floor plan sketch(es) attached (y or n) N

Maintenance: In-house 100 (%) | Co tr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: _____

6/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 2

Building ID: NNMC 7 This page covers: Before condition ___ After ___ Date: ________

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft²)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC			

Total floor area (ft²): ________

Description of variances: ________

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft²)	Zonal Ceiling height (ft)	Occupied Setpoint (F)		Unoccupied Setpoint (F)	
				heating	cooling	heating	cooling

Description of variances: ________

4. Zone Schedule and Occupancy (use times from 00:00–23:59)

STANDARD OFFICE CLINIC LAB HOURS W/24 HOUR USE POSSIBLE

Tenant/Zone No.	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC-7 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____ Hour open								
Hour closed								
Occupant-hrs								
Tenant/Zone No.: _____ Hour open								
Hour closed								
Occupant-hrs								

Description of variances and zones with variable occupancy: _____

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH	3	ALL				E/CH
S2	TPIU	3	ALL				E/CH
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DCS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (or/of manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1, S2
CC/CA	E/S				S1, S2

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, od-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR-water-cooled reciprocating chiller, CAS-air-cooled screw chiller, CWS-water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IFL		≈530	M	

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

8/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 7 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: LIGHT VALUES EST. BASED ON BLDG 70

EST. TOTAL WATTS FLOUR. = 71,000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, OPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			/__to__/		
			/__to__/		
			/__to__/		
			/__to__/		

Description of variances: _____

BUILDING TITLE: HOSPITAL / CLINIC
BUILDING NUMBER: NNMC 8

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS
BLDG 8

BUILDING SITE DESCRIPTION
ATTACHED TO ORIGINAL BUILDING #2

BUILDING USE SUMMARY
MEDICAL OFFICE / CLINIC / LAB

BUILDING CONSTRUCTION SUMMARY
BLOCK MASONRY
DOUBLE WINDOWS

HVAC SYSTEM SUMMARY
SINGLE ZONE REHEAT WITH RADIATOR UNITS AT PERIMETER

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-84 BUILDING NUMBER: 8

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

metered with bldg 2,7

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 8

SITE DESCRIPTION – PLAN VIEW

SEE AS-BUILTS

(BASE)	25,600
1	25,600
2	7744
3	7744
4	7744
	74432

TRUE NORTH ARROW:

SCALE:

8.136

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 8

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

ELEV. ϕ

N $(3 + 1\frac{1}{2})12 \times 12 = 1728$

S $(5 + 5 + 1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2})12 \times 12 = 5568$

E $(5\frac{1}{2} + 5\frac{1}{2} + 5\frac{1}{2} + 5\frac{1}{2} + 5\frac{1}{2})12 \times 12 = 10560$

W $(5\frac{1}{2} + 5\frac{1}{8} + 5\frac{1}{2} + 5\frac{1}{2} + 5\frac{1}{2})12 \times 12 = 8688$

VERTICAL ARROW:

SCALE:

8.137

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 8

5/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 1*

Building ID: NNMC 8 This page covers: Before condition ___ After ___ Date: _____

Building location: BETHESDA (city) MD (state) _____ (zip code)

Project/program ID: _____ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | (1974-1980) | 1981-present

BECA building type code: HOSP Total floor area: 74432 (ft²) Year of latest renovation: _____

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: _____ (ft²) _____ (ft²) _____ (ft²) Number of stories:

Year completed: _____ _____ _____ _____

Floor area and volume:	Heated (m²/m³)	Cooled (m²/m³)	Unconditioned (m²/m³)	Stories above ground:
Above grade:	74432 / 893,184	74432 / 893,184	/	5
Below grade:	/	/	/	
Atrium:	/	/	/	

Roof pitch: FLAT (in./in.) Exposed roof area: 25,600 (ft²) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft²-F) _____ Ground-coupled floor area: 25,600 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) _____ Common walls: _____ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: 2 Doors: 1

Below grade walls: ___ Roof: 1

Atrium walls: ___ Floor: 1

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single (Double) Triple Clear (Tinted) Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Orientation	East	South	West	North
Above grade gross wall area (ft²)	10560	5568	8688	1728
Glazing area (ft²)				
Shading by overhangs (y or n)	N			
Shading by fins (y or n)	N			
Photos attached showing facade (y or n)				

— UNKNOWN

Floor plan sketch(es) attached (y or n) N

Maintenance: (In-house) 0 (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: _____

6/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC 8 This page covers: Before condition __ After __ Date: ______

2. Tenant Information

Tenancy breakdown (% of floor area): __ % leased/rented __ % owner-occupied __ % other

Tenant No.	Tenant Name	Area (ft²)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC	ALL		

Total floor area (ft²): ______

Description of variances: ______

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft²)	Zonal Ceiling height (ft)	Occupied Setpoint (F) heating	Occupied Setpoint (F) cooling	Unoccupied Setpoint (F) heating	Unoccupied Setpoint (F) cooling

Description of variances: ______

4. Zone Schedule and Occupancy (use times from 00:00–23:59)

STANDARD OFFICE CLINIC MEDICAL LAB HOURS W/ 24 HOUR USE POSSIBLE

Tenant/Zone No.	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: ___	Hour open								
	Hour closed								
	Occupant-hrs								

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 3*

Building ID: NNMC 8- ... This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____ Hour open								
Hour closed								
Occupant-hrs								
Tenant/Zone No.: _____ Hour open								
Hour closed								
Occupant-hrs								

Description of variances and zones with variable occupancy: _____

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Sondy (see codes)	Fuel Code
S1	SZRH	3	ALL				E/CH
S2	TPIU	3	ALL				E/CH
S3							
S4							
S5							
S6							

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual), 2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Sondy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p+s-packaged + secondary

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1, S2
CC/CA	E/S				S1, S2

Fuel Codes

e-electricity, g-natural gas, ol-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR-water-cooled reciprocating chiller, CAS-air-cooled screw chiller, CWS-water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF	≈ 1000		M	

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

8/8

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 8 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: LIGHT VALUES EST. BASED ON BLDG 70

EST. TOTAL LIGHT WATTS FLOUR. = 134000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		
			__/__ to __/__		

Description of variances: _____

BUILDING TITLE: HOSPITAL/CLINIC
BUILDING NUMBER: NNMC 4 & 6

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS
BLDG. # 4 & 6

BUILDING SITE DESCRIPTION
ATTACHED TO BUILDING 2 ON SOUTH SIDE

BUILDING USE SUMMARY
MEDICAL OFFICE AND CLINICS

BUILDING CONSTRUCTION SUMMARY
MASONRY
DOUBLE WINDOWS

HVAC SYSTEM SUMMARY
SINGLE ZONE REHEAT WITH RADIATOR UNITS

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE: 7-14-89 BUILDING NUMBER: 4 & 6

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

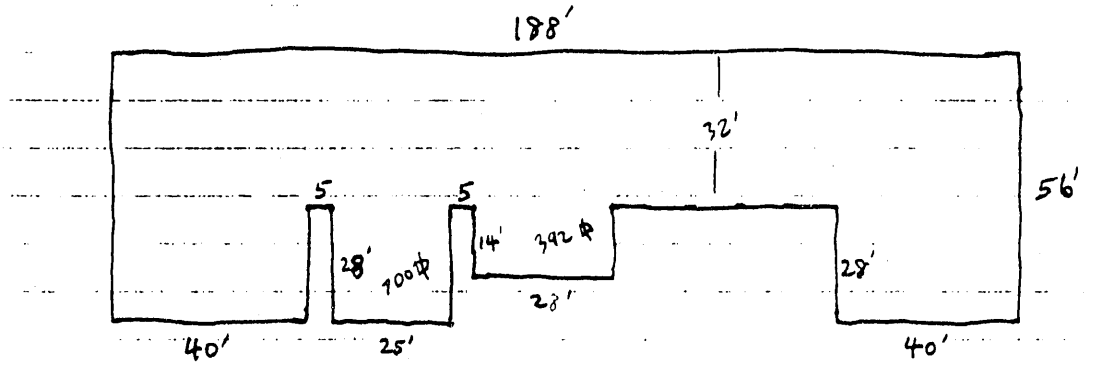
NOT METERED

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 4 & 6

SITE DESCRIPTION – PLAN VIEW



6016
2940
392
9348 ft

ACTUALLY ½ ABOVE GRADE

(BASE) = 8956 12'
1 = 9148 12'
2 = 8648 12'
3 = 8648 12'
35,600

GLASS

E 236 + 402 = 638
W 260 + 402 = 662

4032
504
672
5208

TRUE NORTH ARROW:

SCALE: □ = 10' x 10'

8.144

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 4 & 6

4/7

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 1

Building ID: NNMC 4&6 This page covers: Before condition ___ After ___ Date: ___

Building location: BETHESDA (city) MD (state) (zip code)

Project/program ID: ___ Prepared by: E. RICHMAN

1. General Data and Building Envelope

Age category: (circle one) 1900 or before | 1901-1920 | (1921-1945) | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: HOSP Total floor area: 35,600 (ft²) Year of latest renovation: 1980's

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: ALL (ft²) ___ (ft²) ___ (ft²) Number of stories: 4

Year completed: 1980's ___ ___

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	35,600 / 427200	35,600 / 427,200	/	3 1/2
Below grade:	—	—	/	
Atrium:	/	/	/	

Roof pitch: FLAT (in./in.) Exposed roof area: ~~35,600~~ 9348 (ft²) Roof insulated at: ceiling level X roof level ___

Average roof estimated U-value (Btu/h-ft²-F) ___ Ground-coupled floor area: 8956 (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) ___ Common walls: ___ (%)

Describe variances in roof, walls, and floor below.

9348

Building shell construction codes

Above grade walls: 2 Doors: 1

Below grade walls: ___ Roof: 1

Atrium walls: ___ Floor: 1

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none
Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors
Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed
Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: ___ (ft²)

Wall/glazing information

Primary glazing type: 100 (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single (Double) Triple Clear (Tinted) Reflective Other Fixed (Operable)

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Orientation	East	South	West	North
Above grade gross wall area (ft²)	5208	9024	5208	9024
Glazing area (ft²)	~~638~~ ~~236~~	1229	662	1631
Shading by overhangs (y or n)	N			
Shading by fins (y or n)	N			
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: In-house (00) (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%)

Description of variances: ___

5/7

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: NNMC 4 & 6 This page covers: Before condition ___ After ___ Date: ___

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft²)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			
1	NNMC	ALL		

Total floor area (ft²): ___

Description of variances: ___

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft²)	Zonal Ceiling height (ft)	Occupied Setpoint (F)		Unoccupied Setpoint (F)	
				heating	cooling	heating	cooling

Description of variances: ___

STANDARD CLINIC OFFICE HOURS WITH POSSIBLE 24 HOUR OPERATION

4. Zone Schedule and Occupancy (use times from 00:00–23:59)

Tenant/Zone No.	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
___	Hour open								
	Hour closed								
	Occupant-hrs								
___	Hour open								
	Hour closed								
	Occupant-hrs								
___	Hour open								
	Hour closed								
	Occupant-hrs								
___	Hour open								
	Hour closed								
	Occupant-hrs								
___	Hour open								
	Hour closed								
	Occupant-hrs								
___	Hour open								
	Hour closed								
	Occupant-hrs								

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — page 3

Building ID: NNMC 446 This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								
Tenant/Zone No.: _____	Hour open								
	Hour closed								
	Occupant-hrs								

Description of variances and zones with variable occupancy: _____

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Scndy (see codes)	Fuel Code
S1	SZRH		ALL				S/CH
S2	TPIU		ALL				E/CH
S3							
S4							
S5							
S6							

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above
BS	OL				S1, S2
C/CA	E/S				S1, S2

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF		≈ 475	M	

HVAC Type Codes (see p 5)

Single supply duct types: SZRH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Scndy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, oh-distillate fuel oil (# 1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: NNMC 4 & 6 This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: LIGHT VALUES EST. BASED ON BLDG # 70

EST. TOTAL LIGHT WATTS = 64,000

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cold generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			/__to__/		
			/__to__/		
			/__to__/		
			/__to__/		

Description of variances: _____

COMMERCIAL BUILDING CHARACTERISTICS SURVEY FORM Page_____of_____

BUILDING TITLE: UNIFORMED UNIVERSITY BELOW GRADE

BUILDING NUMBER: ~~USUHS~~ NNMC USUHS "G"

CONTACT LISTING

DATE	NAME	PHONE

BUILDING ADDRESS

USUHS "G"

BUILDING SITE DESCRIPTION

BELOW USUHS "A", "B", "C", "D"

BUILDING USE SUMMARY

MAJORITY PARKING WITH SMALL ANIMAL LAB

BUILDING CONSTRUCTION SUMMARY

CONCRETE

HVAC SYSTEM SUMMARY

NA

MAJOR ENERGY USING EQUIPMENT SUMMARY

PREPARED BY: E. RICHMAN DATE:_____ BUILDING NUMBER: ~~USUHS~~ "G"

SUMMARY OF AVAILABLE INFORMATION

QUALITY AND SOURCE OF CONSTRUCTION DOCUMENTS

OK

QUALITY AND SOURCE OF MEASURED ENERGY USE

METERED WITH BLDG # 70 – 73

QUALITY AND SOURCE OF PREVIOS ENERGY STUDIES

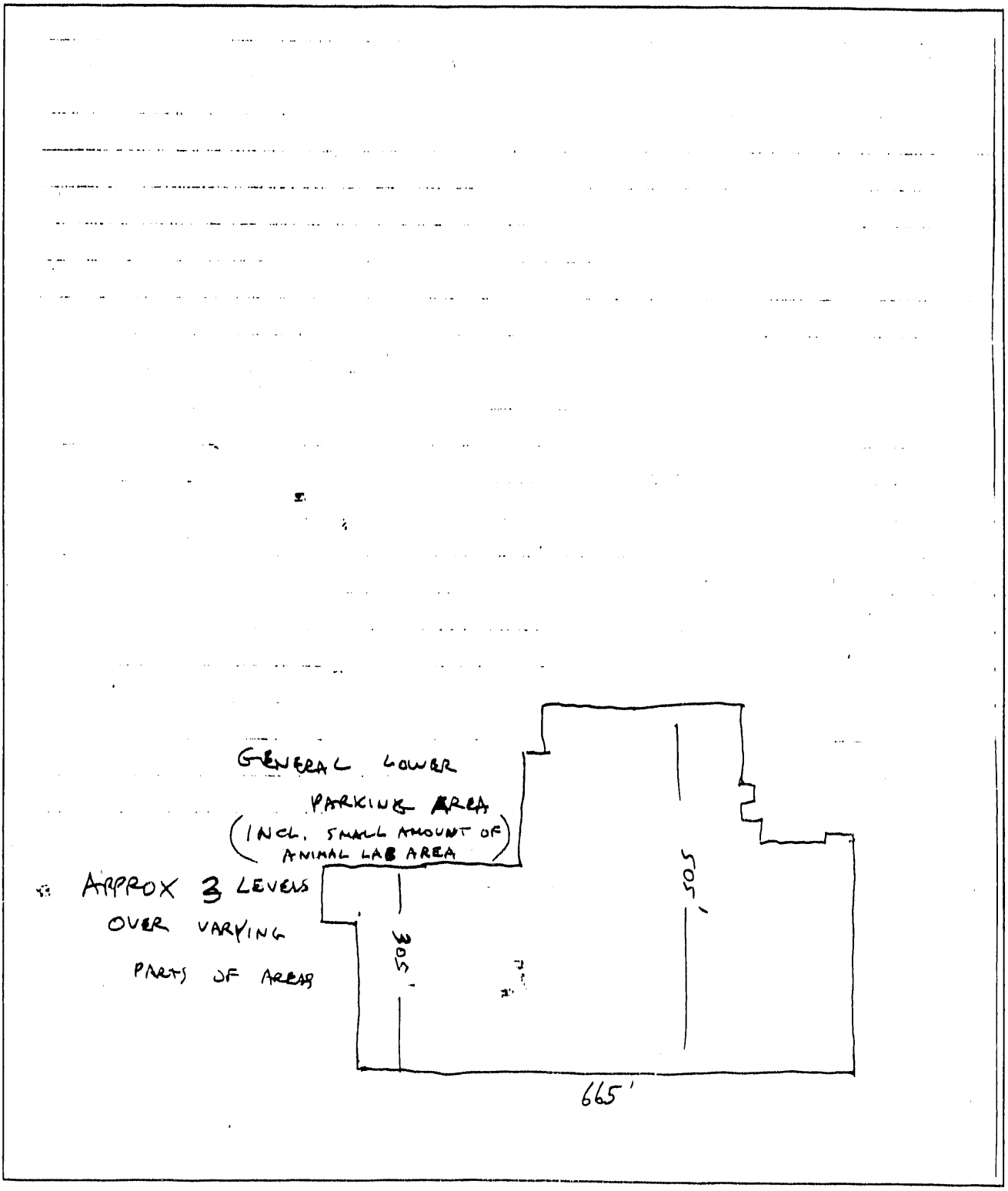
NA

SUMMARY OF POTENTIAL CONSERVATION OPPORTUNITIES

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: G

COMMERCIAL BUILDING CHARACTERISTICS SURVEY FORM Page_____of_____

SITE DESCRIPTION – PLAN VIEW



TRUE NORTH ARROW: SCALE:
8.151

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: NNMC 05 0445

SITE DESCRIPTION – ELEVATION FOR _____ FACING FACADE

VERTICAL ARROW:

SCALE:
8.152

PREPARED BY:_____ DATE:_____ BUILDING NUMBER: 6

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 1*

Building ID: NNMC VAHMS G This page covers: Before condition ___ After ___ Date: _____

Building location: BETHESDA (city) MD (state) _____ (zip code)

Project/program ID: _____ Prepared by: _____

1. General Data and Building Envelope

≈ 780,000

Age category: (circle one) 1900 or before | 1901-1920 | 1921-1945 | 1946-1960 | 1961-1970 | 1971-1973 | 1974-1980 | 1981-present

BECA building type code: _____ Total floor area: ~~22,000,000~~ (ft²) Year of latest renovation: _____

BECA Building Type Codes

ASEM - Assembly Buildings	AUTO - Auto Sales and Service	GROC - Grocery Stores	RETL - Retail Stores	SHCN - Shopping Centers
REST - Restaurants	SECN - Second. Schools & Colleges	HOTL - Hotels/Motels	WARE - Warehouses	OTHR - Other
ELEM - Elementary Schools	NURS - Nursing Homes	HOSP - Hospitals	CLIN - Clinics	CORR - Correction Centers
SOFF - Small Office Building (< 10,000 ft²)	LOFF - Large Office Building (≥ 10,000 ft²)	INDS - Conditioned Industrial		

Floor area of latest additions: _____ (ft²) _____ (ft²) _____ (ft²) Number of stories:

Year completed: _____ _____ _____ _____

Floor area and volume:	Heated (ft²/m³)	Cooled (ft²/m³)	Unconditioned (ft²/m³)	Stories above ground:
Above grade:	___/___	___/___	___/___	___
Below grade:	[illegible]/___	___/___	780,000/23,400,000	___
Atrium:	___/___	___/___	___/___	___

Roof pitch: _____ (in./in.) Exposed roof area: _____ (ft²) Roof insulated at: ceiling level ___ roof level ___

Average roof estimated U-value (Btu/h-ft²-F) _____ Ground-coupled floor area: _____ (ft²)

Average estimated opaque wall U-value (Btu/h-ft²-F) _____ Common walls: _____ (%)

Describe variances in roof, walls, and floor below.

Building shell construction codes

Above grade walls: ___ Doors: ___

Below grade walls: 3 Roof: ___

Atrium walls: ___ Floor: 2

(If code '0' is used, describe below.)

Walls: 0-other, 1-wood frame, 2-masonry, 3-concrete, 4-metal, 5-glass, 6-none

Doors: 0-other, 1-standard doors (including mixed wood, metal, or glass), 2-large roll-up, 3-air doors

Roof: 0-other, 1-concrete deck, 2-wood deck, 3-metal deck, 4-mixed

Floor: 0-other, 1-slab on grade, 2-slab below grade, 3-suspended with insulation, 4-suspended without insulation

For exterior doors type 2 or type 3 next to conditioned space, total area is: _____ (ft²)

Wall/glazing information

Primary glazing type: ___ (% of total glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

Secondary glazing: ___ (% of tototal glazing) Est. U-value ___ (Btu/h-ft²-F)

(circle those that apply) Single Double Triple Clear Tinted Reflective Other Fixed Operable

	Orientation			
	East	South	West	North
Above grade gross wall area (ft²)				
Glazing area (ft²)				
Shading by overhangs (y or n)				
Shading by fins (y or n)				
Photos attached showing facade (y or n)				

Floor plan sketch(es) attached (y or n) Y

Maintenance: | In-house ___ (%) | Contr., cont. ___ (%) | Contr., as needed ___ (%) | Owner/tenant ___ (%) | Other ___ (%) |

Description of variances: ___

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 2*

Building ID: USUHS "G" This page covers: Before condition ___ After ___ Date: ________

2. Tenant Information

Tenancy breakdown (% of floor area): ___ % leased/rented ___ % owner-occupied ___ % other

Tenant No.	Tenant Name	Area (ft²)	SIC code (see App. B)	Utilities paid by tenant (y or n)
0	COMMON			

Total floor area (ft²): ________

Description of variances: ________

3. Building Zone Information (minimum zone size is 10% of tenant area)

Tenant/ Zone No.	Use Code	Zonal Area (ft²)	Zonal Ceiling height (ft)	Occupied Setpoint (F)		Unoccupied Setpoint (F)	
				heating	cooling	heating	cooling

Description of variances: ________

4. Zone Schedule and Occupancy

(use times from 00:00–23:59)

Tenant/Zone No.	Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
________	Hour open								
	Hour closed								
	Occupant-hrs		24 HOUR						
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								
________	Hour open								
	Hour closed								
	Occupant-hrs								

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 3*

Building ID: USOHS "G" This page covers: Before condition ___ After ___ Date: _____

4. Zone Schedule and Occupancy (cont'd) (use times from 00:00–23:59)

Day of week:	Mon	Tues	Wed	Thu	Fri	Sat	Sun	Hol
Tenant/Zone No.: _____ Hour open								
Hour closed								
Occupant-hrs								
Tenant/Zone No.: _____ Hour open								
Hour closed								
Occupant-hrs								

Description of variances and zones with variable occupancy: _____

5. Systems Data

HVAC Systems (See page 5 of the forms for descriptions of the HVAC type codes.)

System ID No.	HVAC Type Code	Controls Code	Tenant/Zones Served	Cooling (kBtu/h)	Heating (kBtu/h)	Pkg/Sondy (see codes)	Fuel Code
S1							
S2							
S3							
S4							
S5							
S6							

Primary HVAC Systems Serving Secondary Units

System Code	Fuel Code	Input (kBtu/h)	Output (kBtu/h)	Pumps (kW)	Secondary Systems Served, ID Nos. Above

Description of variances: _____

Lighting

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.
ALL	IF				

HVAC Type Codes (see p 5)

Single supply duct types: SZAH, PSZ, HP, HPWS, SZCI, RHFS, VAVS, PIU, PVAVS, CBVAV, VVT
Air mixing types: MZS, PMZS, DDS
Terminal unit types: TPFC, EPFC, TPIU, FPIU, PTAC, WHP
Heating only types: EBB, IR, FPH, HVSYS, UHT, UVT, WS

Controls Codes

h-heating, c-cooling, b-both
1-none (on/off manual),
2-timeclock, 3-thermostat
4-smart thermostat, 5-EMCS

Pkg/Sondy Codes

p-packaged unit (unitary eqpt.)
s-secondary unit served by primary system (below)
p + s-packaged + secondary

Fuel Codes

e-electricity, g-natural gas, od-distillate fuel oil (#1 or 2), oh-other fuel oil, c-coal, w-wood, ch-chilled water from outside the building, s-steam from outside the building

Primary System Codes

BW-hot water boiler, BS-steam boiler, F-furnace, CC-centrifugal chiller, CA-absorption chiller, CAR-air-cooled reciprocating chiller, CWR- water-cooled reciprocating chiller, CAS- air-cooled screw chiller, CWS- water-cooled screw chiller, CT-cooling tower, EC-evaporative condenser, EV-evaporative cooler

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

EBER Nonresidential Energy Performance Monitoring

BUILDING CORE DATA FORM — *page 4*

Building ID: USUHS "G" This page covers: Before condition ___ After ___ Date: _____

5. Systems (cont'd)

Lighting (cont'd))

Tenant/ Zone Nos.	Lighting Code	Watts /Unit	No. of Units Total/Not working	Controls Code	Percent On Occ./Unocc.

Lighting Codes

Type	Interior	Exterior
Standard fluorescent	IF	EF
High-eff. fluorescent	IFH	EFH
Incandescent	II	EI
Neon	IN	EN
HID	IHID	EHID
Other	IO	EO

Control Codes

M-manual, T-timer, P-photocell/daylight dimming, O-other

Description of variances: LIGHTING IS PREDOMINANTLY 2-TUBE, 8' CEILING MOUNTED FIXTURES W/ WHITE PLASTIC COVERS

Other Major Energy Consuming Systems

System ID	Tenant/ Zone Nos.	Type Code	Fuel Code	Connected kW

Type Codes for Other Energy Systems

FOO-food preparation, REF-chillers, refrigerators, freezers, and other equipment for cool generation, DPT-significant computer or electric/electronic equipment (including video games), SAN-sanitation equipment such as in a laundry or kitchen, LAB-laboratory equipment, SHP-shop or manufacturing equipment, SPE-specialty equipment not covered by other categories, VNT-ventilation equipment not part of the HVAC supply system, such as return or exhaust fans and exhaust hoods, VTR-vertical transport such as elevators and escalators

Description of variances: _____

6. Monthly Energy and Fuel

Energy Utility or Supplier	Fuel Code	System ID Nos. of Supplied HVAC or Other Systems	Number of Meters

7. Energy Improvements Being Evaluated

Energy Imp. Code	Description	Tenant/Zone Nos. or System ID Nos. Affected	Installation Day or Period	Cost ($000's)	Savings ($000's)/yr
			/___to___/		
			/___to___/		
			/___to___/		
			/___to___/		

Description of variances: _____

'84	BLDG	M.C TYPE
70	50	S, CH
23	12	S, CH
56	11	S
	60	S, CH
	90	

BLDG 14 FAX

202-295-6461

STEAM FLOW METERS

WESTINGHOUSE

RB-3008 HT-IG

STEAM HEADERS

#2 BYPASS OLD TO NEW HOSPITAL

#3 OLD HOSP.

#1 NEW HOSP.

#5 BLDG 23, UNIV., BOWLIN

#6 BLDG 21

#7 BLDG 17, GROUNDS AREA

CHILL HEADERS

OLD HOSP.

NEW HOSP.

UNIV.

BLDG 21 NMRI

8.157

headers not { BLDG 60

NNMC

NOTES

— 2 ELEC. SERVICES (PEPCO) KWH & KW
MAIN BLDG
USUHS
SUBMETERING TO: (BLDGS)
~~[redacted]~~
9 (incl. 10) ???
14
54
70, 71, 72, 73 ???

— CBAS NOT OPERATING

— STRAM SUBMETERING: (BLDGS)
9
14
54
} ORIFACE PLATE UNKNOWNS

— CHILL H2O SUMM: (BLDGS)
9
14
54

— NRESA sees good possibilities in BLDG 9, 10 AHU's.

J. HOWARD OFF ON VAC JUN 2-18

EMCO METERS

[illegible]

11, 50, 125 [illegible] 23, 70-77

STEAM TRAPS & LEAKS FIXED

[illegible]

DRAWINGS

BOB NELSON?

[illegible]

DRAWINGS TO GET COPIES OF

SINGLE LINE for: steam
chilled water
ELEC
RISER FOR EACH BLDG
PIPE LAYOUT AT MAIN PLANTS

INFO TO GET OFF DRAWINGS:

HVAC CAPACITIES
HVAC SYSTEM FUNCTION/LAYOUT
counts of fan coils, etc...
LIGHT TYPE & COUNTS
FOOTAGES
FLOORS
CONSTRUCTION details

AT PLANT GET: 8.159

BOILER INFO
METER POINTS
METER READ DATA (SEASONAL MONTHLY DAILY TOTAL)
LOG DATA INCL. FUEL USE

PHONE #

DENNIS

ELECTRONIC:

- MONTHY CONSUMPTION BY SUBSTATION ALL YEARS
- ALL METERS ~~CONSUMPTION~~ CHECK DATES/YEARS DEMAND?
- DEMAND for substations?
  - off, ON, MID KWH NUMBERS?
  - AND COPY OF LAST 12 MONTHS BILLS
  - AND COPY OF DEMAND PAGES

JULY/AUGUST

DEC/JAN

MAR/APR

OCT/NOV

ELECTRONIC

- ✓ MONTHLY KWH CONSUMPTION BY SUBSTATION
  ALL YEARS
- ✓ MONTHLY KWH CONSUMPTION BY METER
  ALL YEARS
  FOR ALL ON-SITE METERS
- N/A MONTHLY KW ~~DEMAND~~ N/A BY SUBSTATION
  ALL YEARS
- ✓ MONTHLY KWH CONSUMPTION BY SUBSTATION
  for "off", "on", and "MID" PEAK
  ALL YEARS

PAPER

- ( ) LAST 12 MONTH ELECTRIC BILLS FOR BOTH SUBSTATIONS
- ✓ SELECTED PAGES FROM DEMAND REPORT
- ✓ PRINTOUT OF ALL SUB METERS

TO TRACK DOWN AND COMPLETE:

- HVAC SYSTEM TYPES
- COPY 12 MONTHLY BILLS...
- GET SIMPLE BLDG 2, 4, 6, 7, 8 DIAGRAMS
- GET CLASS 3's ON FIRST BLDGS # 1, 7, 8
- WALK BLDGS
- BOILER ~~[illegible]~~ MIN OUTPUT LEVELS BY MONTH (IF AVAIL.)
- CHECK STEAM METERS
- BOILER DAILY HI, LOW, AVE TEMPS (IF AVAIL.) (BASE USED FOR DD
- RECORD BOILER DATA
- BOILER LOG COPIES OF HOURLY READINGS FOR PROFILES (IF AVAIL.)
- GET COPY OF STEAM METERIN PROPOSAL

- RESOLVE ELEC. DIST. & METERING QUESTIONS
  - X — DO THE 8 meters ON BLDG 9 BASEMENT EQUIP. COVER ALL ENERGY TO BLDG # 9 & 10 ??
  - X — DO the 6 meters ON "SUB #2" EQUIP IN → 2, #8, 7
    BASE OF BLDG 2 & 2 meters on "SUB #1" → BLDG 1 & NECK
    EQUIP. IN BLDG 1 COVER ALL ENERGY
    TO THE #1 & #2 ~~SECTIONS~~ BLDG
    SECTIONS ?? How ABOUT 4 & 6 ??
  - WHAT DO METERS 436 & 134 ON THE → BLDG 55
    202. STATION PAD COVER (NOT AFRI) ??
    (# 7 & 8) ???
  - DO METERS 242, 258, & 261 COVER THE ENTIRE GROUP OF BLDGS BEHIND AND INCL. BLDG 17 ??
  - WHERE ARE BLDGS 54 & 55 POWERED FROM ???
  - DO METERS 246 & 265 COVER ALL BUILDINGS AT END OF GROUNDS ROAD ??

- GET USUHS PEPCO DEMAND FROM PEPCO

NNMC

DATA TO COLLECT

* DEMAND PROFILE INFO (DAILY PROFILES)
  FALL, SPRING, WINT., SUMM FOR BOTH STATIONS

* DEMAND PROFILES FOR SUB-METER, IF AVAIL.

WE KWH ONLY * MONTHLY ELEC. USE FOR PAST YEAR AT ALL POINTS

* CURRENT ELEC. RATES
AVE * COPY OF 1 OR 2 CURRENT BILLS

* DISTRIBUTION LAYOUT SHOWING TRANSFORMERS AND ASSOCIATED SERVICE AREAS
* BUILDINGS ASSOCIATED W/SUBMETERING

* CURRENT GAS RATES? COWEN ALSO? OIL RATE?
* DEMAND PROFILE INFO ON STEAM & CHILLED WATER (DAILY PROFILES) for seasons

WE FOR 86 → PRESENT * MONTHLY STEAM & CHILL USE AT MAIN PLANT ~~AND ANY POINTS~~

WE FOR 84 → PRESENT * MONTHLY ~~OR DAILY~~ ~~COAL~~/OIL USAGE BY PLANT ~~OTHERS~~
* " " " GAS " " " "
* STEAM & CHILL PIPING
* LOCATION OF PROPOSED STEAM & CHILL SUBMETERING

* LOCATION, HOOKUPS AND SIZE OF PROPOSED ADDITIONS TO LOADS
* BUILDING AUDIT OF 18 BUILDING
* LOCATION OF METERABLE POINTS ON EACH OF 18 BLDGS.

NNMC

TO VERIFY:

* CORRECT SQ. FOOTAGES
* CORRECT SINGLE LINE ELEC. FEED
  2 SUBSTATIONS
* SUBMETER TO BLDG. 9 WHICH INCLUDES 10 ALSO??
* UNITS ON STEAM & CHILL DATA
* LOCATION ASSOCIATED W/ SUBMETERS PRINTOUT

NNMC Lighting/HVAC Notes - EER 9/13/90

Bldg. 3 & 5

Most hallway and office lights off at night except main common hall. Since each "wing" tends to be an autonomous office area the last out apparently takes care of all the lights in their area. Relatively high office plugs in most areas. HVAC is mixed with some main air handlers and many window air conditioners

area	footcandles	comments
office	25 - 46	fair daylight
hall	8 - 10	much daylight
stairwell	35+	much overlit (reflectors installed in fixtures)

Bldg. 5 (second floor)

Newly remodeled but yet unoccupied patient exam and office space.

area	footcandles	comments
exam room/office	55 - 104	(without task lightson) Very overlit for routine exam and office functions. Light switches are set up to illuminate only 1/2 of lamps (55 fc).

Bldg. 2

Mall area in middle of 1-8 complex with food service, barber, post office, etc. Main cafeteria is closed on weekends.

area	footcandles	comments
ice cream store	33	(2 more footcandles than flavors)

Bldg. 1-8 (in general)

Spaces include primarily office and clinic type operations that operate a standard 8 hour workday. Some areas operate on weekends (mall area, dental clinic). All closed offices and clinics appeared to have lights off during weekends. Hallway and open area lights are run 24 hours per day. Hallways and most open areas are well populated during working hours but are virtually vacant on "off" hours. HVAC is primarily 24 hour constant volume with main steam/chilled water air handlers for interior zones and fan coil units at windows. Building 2 areas have simple hot water convectors at windows. Controls are said to be in good condition and < 5 years old.

area	footcandles	comments
library	7.7	poorly lit for reading
hall	13 - 20	mixed areas
library	30	small bldg. 1 library
hall	27	with daylight
hall	15	no daylight
office	50 - 90	

Watts per square foot were calculated in one area in the 1-8 complex and found to be **0.63** W/ft^2 for hall and **1.67** W/ft^2 for office. The 1-8 complex contains many varied office, hallway, and other spaces that make a representative watts per foot value impossible to measure.

Bldg. 9

Primarily an office, laboratory, and clinic area. Operation is primarily 8 hours on weekdays. Hall and atrium lights are on 24 hours per day. HVAC is 24 hour chilled water VAV with steam reheat at main air handlers and hot water reheat at individual rooms/areas. Timclocking office areas off on nights has been tried but found to be impractical. Areas that were turned off required a very long lead time to recover prompting numerous complaints. Certain non-essential areas (mall, open waiting) have hvac timeclocked off on weekends. These are primarily smaller interior spaces.

area	footcandles	comments
lab	86	

Patient/employee food service is a full scale operation operating most of every day. Posted employee food service hours are 0600 - 0800, 1100 - 1300, and 1700 - 1830.

Bldg. 10

Lower 2 floors are clinic and office operations with a large atrium space. Much daylighting is provided to this space but many overhead halide lights remain lit 24 hours per day. Upper five floors are primarily patient rooms and nurses stations. Floors 5 and 6 are mostly empty and some of the hall lights are down to night lights only. Night lights in hallways in most areas appear to be 1 of every four fixtures. Other floors and areas have 100 percent hall lights on. HVAC is 24 hour chilled water VAV with steam reheat at main air handlers and hot water reheat at individual rooms/areas.

area	footcandles	comments
atrium	20 - 23	much daylight
hall	10 - 30	6 foot wide hall

Bldg. 12

This building includes 3 tenants on the ground floor (printing and office areas) in addition to the barracks type operation. Several windows and doors were found open during cooling. HVAC is mixed window units and fan coil units.

area	footcandles	comments
hall (main)	6.5 - 15	older inefficient fixtures
office (exchange) (good clean fixtures)	70	with daylight

Bldg. 14

Lights are left on for cleaning crew (5 days a week) which stays until about 9 pm. (complete cleaning operations may not actually be needed every day - most could be done during regular working hours). One office has an occupancy sensor installed at the light switch. Unfortunately the office has two doors and the switch faces a hall. Consequently the room is lit up every time someone passes in the hall. HVAC consists of steam/chilled water VAV boxes with window convectors.

Bldg. 50

Lights are typical fluorescents in typical hotel type room setups. Exterior walkway lights are on 24 hours per day. HVAC is fan coil units with outside air intake for makeup air to exhaust fans.

area	footcandles	comments
lobby	10 - 30	

Bldg. 54

Parking light controls are set up to run on a photocell with a timeclock overide to eliminate cloudy condition operation. The Photocell appears to be defective as lights were on late in the morning and early in the evening. The timeclock appears to be permanently set to inter hours. Building includes office and warehousing activities. HVAC is VAV in conditioned areas.

area	footcandles	comments
warehouse	26	HID
office	40 - 48	clean fixtures
storage racks	16	between rows with lights
storage racks	2 - 7	between rows w/o lights (racks were recently moved and lights are now incorrectly placed)
hall	2 - 10	
office	48 - 50	cubicles w/task lights

Bldg. 55

Parking light controls are set up to run on a photocell with a timeclock overide to eliminate cloudy condition operation. The Photocell appears to be defective as lights were on late in the morning and early in the evening. The timeclock appears to be permanently set to winter hours. Building includes office and warehousing activities. Exterior lights are on most of day. HVAC is VAV in conditioned areas.

area	footcandles	comments
office	45 - 50	

NNMC Selected Building Lighting Summary - EER 9/13/90

BUILDING	LIGHT SOURCE	HALLWAY KW	OFFICE/OTHER KW
1-8	Hallide	0	14.5
1-8	Mercury	13.8	39.2
1-8	Fluorescent	78.4*1	417.4*1
1-8	Incandescent	0.8	27.9
	TOTAL	93.0	499.0
9,10	Mercury	1.4	14.2
9,10	Quartz	0	20.2
9,10	Halogen	0	163.3
9,10	Fluorescent	118.9	829.8
9,10	Incandescent	12.8	145.9
	TOTAL	133.1	1173.4
12	Fluorescent	4.2*2	22.3*2
	TOTAL	4.2	22.3
14	Fluorescent	NA*3	32.5
	TOTAL	-	32.5
16	NA	NA	NA
50	Fluorescent	1.9*2	9.9*2
50	Exterior Fluor.	2.6	(on 24 hr/day) 0
50	Incandescent	0	6.0
	TOTAL	4.5	15.9
54	Fluorescent	NA*3	44.4*4
54	Incandescent	NA*3	10.9
54	Quartz	NA*3	6.0
54	HPS	NA*3	59.5
54	Exterior HPS	NA*3	2.0
	TOTAL	-	122.8
55	Fluorescent	NA*3	11.4*5
55	Quartz	NA*3	4.0
55	HPS	NA*3	5.6
55	Mercury	NA*3	66.7
55	Incandescent	NA*3	2.3
	TOTAL	-	90.0

*1 Hallway lighting for buildings 1,2,4,6-8 was recorded separately and found to be approximately 15.7 percent of the total lighting. This value was used to calculate the hallway lighting in buildings 3 and 5 and added to the 1,2,4,6-8 numbers to get the total 1-8 lighting values shown.

*2 The 15.7 percent value was used here to estimate hallway lights.

*3 Mostly open office, shop, or parking with no appreciable hallway areas.

*4 2.9 kW of this is stairwell lighting that appears to be on 24 hours/day.

*5 4.4 kW of this is stairwell lighting that appears to be on 24 hours/day.

Attachment 9: PEPCO Incentives and FEMP Model Program

ATTACHMENT 9: PEPCO INCENTIVES AND FEMP MODEL PROGRAM

This attachment contains descriptions of the incentive plans offered by PEPCO for commercial lighting, thermal energy storage, and curtailable load programs. Also enclosed is a description of the Federal Energy Management Program's Proposed Federal Agency Energy Efficiency Model Program.

COMMERCIAL LIGHTING REBATE PROGRAM

PEPCO grants rebates for upgrading lighting systems to more energy efficient systems. The available options for potential rebates are shown below:

Equipment Installed	Rebate - Conditions
Daylighting Controls	$30 - per control installed
Occupancy Sensors	$60 - per sensor installed
Efficient Fluorescent Ballasts	$8-$12 - depending on type installed
Optical Reflectors	$20 - in combination with removal of lamps and ballasts
Exit Sign Conversions	$10 - replace incandescent with fluorescent
Compact Fluorescent Lamps	$6 - per incandescent replaced with compact fluorescent
Energy Efficient Fluorescent Lamps	$1-$2 - when replacing conventional fluorescent with high efficiency fluorescent lamps
Incandescent Fixture Replacements	$300 per kW reduced - when replacing with high efficiency fluorescent lamp
High Intensity Discharge Fixtures	$300 per kW reduced - when replacing incandescent, fluorescent, and less efficient HID mercury vapor lamps with metal halide and high pressure sodium
Custom Programs	$300 per kW reduced - on many items not listed above that meet program guidelines.

For projects that include two or more improvements to each lighting fixture, PEPCO will give a 10% greater rebate for that fixture.

To qualify for these rebates, complete the Commercial Lighting Program Application from PEPCO. Also, complete the Rebate Worksheet for intended improvements. Once these are completed, return them to PEPCO. PEPCO will

review the application and conduct an inspection of the existing lighting conditions if they deem necessary. Once approved, energy efficient equipment may be purchased.

After installation of the equipment, inform PEPCO of completion. Complete a Request for Payment form and return it to PEPCO. The quantity and price of each item should be clearly noted. PEPCO, at their discretion, may conduct an inspection of the completed project. After all items are satisfactory, PEPCO will mail out a rebate check.

THERMAL ENERGY STORAGE REBATE PROGRAM

PEPCO offers an attractive rebate program for commercial customers located in their service area. Essentially, the Thermal Energy Storage (TES) rebate program has three main components. TES will save money for the customer by reducing capital costs, reducing utility bills, along with improving the overall comfort of the occupants involved. The main components of the TES rebate program are outlined below:

1. PEPCO will fund 50% of the feasibility study up to $5,000 provided the analysis is performed by a professional engineer that is licensed in the appropriate jurisdiction (in this case, Washington, D.C., or Maryland). TES requirements for a feasibility study will be explained in more detail below.

2. Once the feasibility study determines that a TES system is both technically and economically feasible, PEPCO will grant approval to proceed with the envisioned system. PEPCO will pay $250 per kilowatt of peak load deferred (defined as load from June - October between the hours of 12:00 noon to 8:00 p.m.) for the first 500 kilowatts. Additionally, $200 per kilowatt of peak deferred load in excess of the first 500 kilowatts will be paid according to the terms of this rebate offer.

3. All applications and documentation will be reviewed by PEPCO for accuracy. After reviewing the information, PEPCO will send qualifying customers a Thermal Energy Storage Agreement stating the estimated rebate upon completion of the proposed project. If a customer is rejected for any reason, PEPCO will notify the party stating the reason for the rejection.

4. After the TES container has been installed, an arrangement will be made with PEPCO to inspect the system to determine the actual rebate amount. Half the rebate will be paid following the inspection of the system, with the balance being paid upon permanent hook-up of electricity for new facilities or system start-up for existing structures.

5. In the case of disputes regarding the program, customers may submit documentation to support their case, but the final decision regarding interpretations rests with PEPCO.

6. As directed by the public service commission in the jurisdictions served by PEPCO, this rebate program is subject to change at any time.

7. PEPCO does not warrant the design or installation of the chosen TES system.

As stated above, a more detailed description of the requirements for a TES feasibility study is needed at this point. First of all, an hourly simulation model must calculate a 24 hour chiller load profile showing the maximum peak. System sizing and peak kilowatt savings for the cooling plant, air handling systems, and the corresponding auxiliaries must also be analyzed.

Existing facilities should have the auxiliary equipment peak load (electric) based upon name-plate data. Additionally, all values should be converted to kilowatts using conversion factors provided by an energy management engineer at PEPCO.

Assumptions regarding operating conditions must be the same for the TES system and the base case scenario. Some examples would include humidity requirements, interior temperature, hours of equipment operation, etc. Also, the number of fan systems should be identical in the base case and TES simulations. Finally, the ratio of equipment capacity to load should be the same in both cases.

The appropriate PEPCO commercial time-of-use rate schedules will be incorporated in the life cycle cost analysis when it is performed.

If all of the above mentioned requirements are met for the TES feasibility study, a refund will be granted, regardless of whether or not the TES project proves to be feasible. Programs that would potentially qualify include eutectic salt, chilled water, and ice systems.

CURTAILABLE LOAD PROGRAM

PEPCO, has recently established a voluntary Load Curtailment Program. Since PEPCO must provide the generating capabilities for the largest (peak) demand required, curtailment during peak summer loads is advantageous to them to hold down this peak as much as possible. Through programs such as this, PEPCO is able to delay new construction of generation plants which in turn keep the customer's rates lower.

Participants in the program voluntarily reduce at least 100 kW of demand during peak weekdays (June - September or October, depending on customer jurisdiction) between the hours of 12:00 noon and 8:00 p.m. for no longer than 6 hours each time. Load reduction requests will be made 15 times or less during the curtailment season. The customer will receive a credit on their electric bill on a dollar per kW basis during the on-peak time. Payment will be made for the kW actually reduced, except for any kW that exceeds a mutually agreed upon level. The customer helps to determine this level by finding out potential kW reduction from the monthly on-peak demand and subtracting this value. The difference obtained is the Firm Service Level (FSL). If two or more curtailments are made in one month, the least amount of kW curtailed will be used in computing the credit for that month.

FEDERAL AGENCY ENERGY EFFICIENCY MODEL PROGRAM
in partnership with the
SERVICING UTILITY

Introduction

The Federal Energy Management Program of the U.S. Department of Energy [DOE-FEMP], through its lead laboratory, Pacific Northwest Laboratory [PNL], is supporting the design and implementation of a model program for federal customers in partnership with their servicing utility. This approach comprises identification and characterization of all cost-effective energy efficiency measures (or assets) on federal installations and subsequent "sale" of those efficiency assets to the servicing utility(s). The primary objectives of the model program are to:

- identify all electric and nonelectric life cycle cost-effective energy efficiency *projects* at one or more federal installations served by a common utility
- negotiate with the servicing utility to purchase the energy efficiency from its federal customers
- develop a schedule for each federal customer for project acquisition considering project *type, size, timing, capital requirements*, and *energy and dollar savings*
- design and implement a model DSM approach which the utility could propose to its regulatory agency for application to all its federal customers.

Background

Projects in this model program are any actions which support the installation's mission and result in a reduction in energy costs and/or energy demand and usage. Examples of projects include energy end-use technology retrofits, onsite generation, cogeneration, O&M, innovative scheduling and operations, fuel switching, and rate structure analysis and renegotiation.

A facility-wide, fuel-neutral approach to identifying and acquiring energy projects yields the greatest savings and greatest return on taxpayer investments. FEMP and PNL have developed and successfully applied this approach. Experience at over 25 federal installations indicates that the typical federal installation could invest from one to two times the installation's annual energy bill in cost-effective projects. Benefits are significantly increased when combined with creatively designed utility programs.

The FEMP Model Program Approach

Major constraints faced by federal installations in identifying and acquiring life cycle cost-effective energy projects are: 1) installations have poor access to capital for modernization; 2) are required to follow procurement procedures that can take a year or more to implement; and 3) are not organized around a systematic approach to managing all aspects of their energy portfolio. The model program will address each of these constraints. PNL provides direct support to the installations to:

1. Understand and characterize all requirements for energy services. Energy services are those benefits provided by energy systems such as lighting, space heating, refrigeration, and process heat.
2. Understand and characterize the life cycle cost-effective energy efficiency opportunities. These opportunities are assets that can be sold to utilities in need of additional energy capacity, to the federal government as a means to reduce annual energy expenditures, and potentially to private sector companies who will invest capital in return for a share of the energy cost savings.

3. Understand and characterize all potential sources of implementation funding for energy system modernization projects.

4. Understand, characterize and prioritize alternative energy projects.

5. Implement the selected projects.

The most promising approach for federal energy systems modernization is direct negotiation with the installation's electrical utility under a customized DSM program. The basic elements necessary for a DSM program to be successful in the federal sector are:

- The utility should target all cost-effective energy system modernization opportunities on the installation. Participation in the utility DSM program has a high transaction cost for the federal installation, and a relatively low transaction cost for the utility considering the size of large one-owner federal installations.

- The utility needs to *up-front finance 100%* of the site modernization activities.

- The utility needs to *fund a significant portion* (at least 50%) of the total installed cost of new technologies. The utility can afford to spend up to its long-run avoided cost to acquire energy efficiency.

- The utility needs to be able to *contract for the energy service company* for project implementation. Federal procurement rules make it difficult and time consuming for installations to hire their own contractors. An installation can however sole-sore with its electric utility.

Experience

Innovative utilities currently working with FEMP and PNL to design and implement this prototype program for their federal customers include Tacoma Public Utilities, Niagara Mohawk Power Company, Georgia Power Company, Pacific Gas and Electric, and Florida Power and Light.

The program being undertaken with Tacoma Public Utilities and Fort Lewis is the most mature. The first two activities above produced energy conservation supply curves for the Fort showing the amount of electric and non-electric energy savings that can be achieved at different prices for energy saved and from fuel switching. From these data, a proposal was prepared for approximately 43,000 kWh (~4 MW) of annual cost-effective electric energy savings which TPU presented to the Bonneville Power Administration (the regional power marketing agency who supplies power to TPU). This proposal identifies investment requirements at the Fort and the likely energy and dollar savings which will result from the investment. Approximately $10 million of investment in energy efficient end-use technology is cost-effective at Fort Lewis under this arrangement.

In the agreement with Fort Lewis, TPU will finance 100% of this investment and will procure the energy services contractor who will conduct the detailed audits and install the technologies. The Fort will sign off on all proposed retrofits and on the acceptance of the installed technology. The Fort will repay TPU 15% of the total installed cost of the technology through a separate sole-source contract with TPU, and make annual payments of 15% of the installed cost for each year the program is being implemented.

The result is that the Fort would see a significant, and immediate, reduction in its annual electric bill of between $500 thousand and $1 million depending on the final program design. Expectations are that agreements can be reached and an implementation plan prepared by the second quarter of FY 1992 and technologies will be installed starting the fourth quarter of FY 1992.

PNL-8058
UC-350

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