

#### CANADA'S GREEN PLAN LE PLAN VERT DU CANADA

# GREEN ON THE GRAND FINAL MONITORING REPORT

#### PREPARED FOR:

The CANMET Energy Technology Centre (CETC)
Energy Technology Branch, Energy Sector
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#### NOTE

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## **EXECUTIVE SUMMARY**

The Green on the Grand office building is the first C2000 project in Canada. The two-storey, 2,180 m² (22,000 ft²) office building is located in Kitchener, Ontario. The building design addresses the four key requirements of a C-2000 building: energy-efficiency, minimal environmental impact, occupant health and comfort, and functional performance. Green on the Grand was designed to consume half the energy and water of an efficient new building (built to the ASHRAE 90.1 standard). With respect to environmental impact, no CFCs and minimal HCFCs were to be used to produce any of the building materials or operate any of the equipment. Construction waste was reduced by 75% through a combination of reducing material requirements, re-using waste materials on site and recycling as much as possible.

Green on the Grand was able to realise major energy and HVAC capital cost savings from a highly insulated and airtight building shell. The heating load dropped by 66%. The use of spectrally selective glazings and a reduced peak electrical load allowed the installation of a chiller less than half the size that would otherwise have been required.

Green on the Grand achieved a monitored energy cost savings of 28% relative to ASHRAE 90.1. The greatest cost savings were achieved in lighting energy. A combination of energy-efficient lighting design, daylighting controls and occupancy sensors reduced the lighting electricity use by 82% for one tenant relative to ASHRAE 90.1 lighting requirements. This was achieved by a 55% reduction in lighting density and a 60% reduction in light outure because of daylighting and occupancy sensors. The average lighting savings for the building relative to ASHRAE 90.1 is estimated to be 60%.

The primary reason for the lower than expected energy savings was due to the poor seasonal performance of the boiler/absorption chiller. The boiler had a seasonal efficiency of 48% and the chiller had a seasonal COP of 0.51: both significantly below the manufacturer's steady-state ratings. Efficiency curves for off-rating point and part load performances are required to allow designers to properly assess and select equipment.

Displacement ventilation performs well, effectively removing pollutants and providing fresh air to the space. A C-2000 building provides a comfortable and pleasing environment for the occupants. Over 75% of the tenants were satisfied with the general environment, lighting and quality of the fresh air. Areas of low satisfaction were high noise transfer and temperature variations, particularly in the swing seasons.

Connected receptacle capacity is approximately equivalent to the 8.1 W/m² suggested in ASHRAE 90.1. However, the monitored operating schedule has a much higher loads at night and on weekends than the default in ASHRAE 90.1. The receptacle load is approximately 50% during the night and on weekends compared to daytime operation.



Green on the Grand: Canada's First C2000 Building

## RÉSUMÉ

L'édifice à bureaux Green on the Grand est le premier projet C-2000 réalisé au Canada. Cet édifice de deux étages et de 2 180 m² (22 000 pi²) est situé à Kitchener (Ontario). Par sa conception, l'édifice répond aux quatre exigences fondamentales imposées aux bâtiments C-2000 : efficacité énergétique, impacts environnementaux minimes, santé et confort des occupants et fonctionnalité. Green on the Grand a été conçu de manière à ne consommer que la moitié de l'énergie et de l'eau que demanderait un bâtiment neuf à bon rendement énergétique (construit selon la norme ASHRAE 90.1). Sous l'aspect environnemental, aucun CFC ne devait entrer dans la production des matériaux de construction ni être utilisé dans l'exploitation de l'équipement; toutefois, une quantité minime de HCFC était tolérée. Les déchets de construction ont été coupés de 75 % par une combinaison de différentes mesures : réduction des quantités de matériaux utilisées, réutilisation des matériaux de rebut du chantier et leur recyclage dans toute la mesure du possible.

L'isolation et l'étanchéité à l'air poussées de l'enveloppe de l'édifice ont permis de réaliser d'importantes économies d'énergie et d'immobilisations en installations CVCA. La charge de chauffage a été diminuée de 66 %. L'utilisation de vitrages à sélection spectrale et la réduction de la charge électrique de pointe ont permis l'installation d'un refroidisseur plus de moitié moins puissant que ce qui aurait été nécessaire dans un bâtiment simplement à bon rendement énergétique.

Green on the Grand a enregistré des économies d'énergie mesurées de 28 % par rapport à un bâtiment conforme à la norme ASHRAE 90.1. Les principales économies ont été réalisées sur l'éclairage. Une combinaison de luminaires à haut rendement énergétique, de commandes d'éclairage réagissant à la lumière naturelle et de détecteurs de présence ont permis de réduire, pour un locataire donné, de 82 % la consommation de courant pour l'éclairage par rapport aux exigences de la norme ASHRAE 90.1. Ces résultats sont imputables à une diminution de 55 % de la densité de puissance d'éclairage et à une réduction de 60 % de la puissance consommée grâce à l'emploi de l'éclairage naturel et des détecteurs de présence. Les économies d'éclairage moyennes de l'ensemble des locataires sont évaluées à 60 % par rapport aux exigences de l'ASHRAE 90.1.

Les économies d'énergie inférieures aux attentes sont reliées au faible rendement saisonnier de la chaudière-refroidisseur à absorption. La chaudière avait un rendement saisonnier de 48 % et le refroidisseur, un COP saisonnier de 0,51 : deux valeurs nettement inférieures aux rendements nominaux en régime permanent indiqués par le fabricant. Des courbes de rendement pour les températures autres que le point normalisé d'essai et pour des périodes

de fonctionnement à charge partielle sont nécessaires aux concepteurs pour l'évaluation et pour le choix éclairé du matériel.

La ventilation de renouvellement fonctionne bien, éliminant efficacement les polluants et fournissant de l'air frais aux locaux. Un bâtiment C-2000 offre à ses occupants un environnement confortable et agréable. Plus de 75 % des occupants sont satisfaits de l'environnement en général, de l'éclairage et de la qualité de l'air. Les sources d'insatisfaction sont une importante transmission du bruit et des fluctuations de température, en particulier pendant les transitions saisonnières.

La puissance raccordée aux prises est à peu près équivalente à la valeur de 8,1 W/m2 recommandée par la norme ASHRAE 90.1. Toutefois, l'horaire de service mesuré des installations présente une charge de nuit et de fin de semaine nettement supérieure à la valeur implicite de la norme ASHRAE. La charge raccordée aux prises pendant la nuit et la fin de semaine est d'environ 50 % de celle de jour.

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## 1. INTRODUCTION

The Green on the Grand office building is the first C2000 project in Canada. The two-storey, 2,180 m² (22,000 ft²) office building is located in Kitchener, Ontario. The building design addresses the four key requirements of a C-2000 building: energy-efficiency, minimal environmental impact, occupant health and comfort, and functional performance. Green on the Grand was designed to consume half the energy and water of an efficient new building (built to the ASHRAE 90.1 standard). With respect to environmental impact, no CFCs and minimal HCFCs were to be used to produce any of the building materials or operate any of the equipment. Construction waste was reduced by 75% through a combination of reducing material requirements, re-using waste materials on site and recycling as much as possible. All of these reductions were achieved in a building that offers a superior indoor environment, an attractive and functional layout, and a long lifetime.

The building uses many new and innovative systems to achieve these energy efficient and environmental benefits, including

- a structural skeleton of engineered-wood products,
- wall, ceiling and foundation insulation 2 to 3 times the levels required by ASHRAE 90.1.
- high-performance windows with fibreglass frame, triple glazing, low-e coating, warm edge spacers, and argon gas fill,
- a spectrally selective glazing for high visible light transmission and low solar heat gains.
- · radiant, hydronic heating and cooling ceiling panels,
- gas-fired combination boiler/absorption chiller,
- storm water retention pond that also acts as a cooling tower for the chiller.
- displacement ventilation system,
- sensible and latent heat recovery for ventilation air,
- daylighting system incorporating an electric light dimming system, and occupancy sensors,
- ultra low-flush toilets and urinals. Infrared eyes on faucets, showers and urinals,

A detailed description of the building design is documented in the CANMET report <u>Green on the Grand: C-2000 Office Building Final Report</u> [Enermodal, 1996].

Green on the Grand was constructed in 1995 and five tenants moved in during 1996. This report documents the construction process and the monitored performance of the building for 1997.

## 2. BUILDING DESCRIPTION

## 2.1 Design Features

Green on the Grand is a two-storey, 2180 m<sup>2</sup> (22,000 ft<sup>2</sup>) speculative office building in Kitchener, Ontario. The floor plans are shown in Figure 2.1. The structural support system is made entirely from engineered wood products. A mixture of fixed and awning type punched windows represent 30% of each building façade. Cathedral ceilings are featured in the second floor interior. The interior of the second floor is daylit by eight dormer windows: two facing in each of the four cardinal directions.

The building shell is insulated to between two and three times the values required by ASHRAE 90.1. The details of the wall construction are shown in Figure 2.2. The windows are tripled glazed in an insulated fibreglass frame. The glazing system has two low ecoatings, two argon gas fills and an outside lite of spectrally selective glass to achieve high visible transmission and low SHGC.

Ensuring an airtight building was a primary goal for the design and construction phases. The design included a sealed polyethylene AB/VB on the warm side of the cellulose insulation. The barrier was sealed to window frames, door frames, floor headers, ring joists, and all other discontinuities in the building. A power/communication cabling raceway was installed inside the interior wall to ensure the integrity of the AB/VB when changes in wiring were required.

Heating and cooling is provided by a water-based radiant system. A separate energy recovery ventilation system provides fresh air with simultaneous dehumidification in summer. The radiant panels are mounted on the ceiling. The low heating and cooling loads meant that the panels had to cover only 30% of the ceiling area. In the winter, the panels are operated at about 35°C (95°F) and in the summer at about 13°C (55°F). Dehumidifying the ventilation air to below the radiator dew point prevents condensation on the radiant panels. Fan coils are located in the entranceways to provide heating and cooling in these high heat loss/gain areas. Hot and chilled water for the system is supplied by a gas-fired heater/absorption-chiller.

A pond in front of the building serves as the cooling tower. During cooling operation, pond water is circulated through a filter system, and the chiller's condenser. Water is returned to the pond by pouring it over landscaping rocks at the perimeter of the pond. A fountain in the middle of pond also increases evaporative cooling. Make-up water comes from rainfall collected off the roof. An ozonator is used as part of the disinfection system.

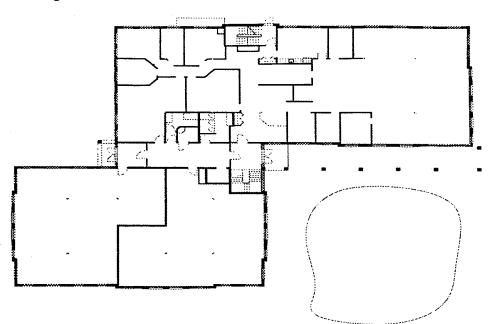


Figure 2.1: Green on the Grand First and Second Floor Plans

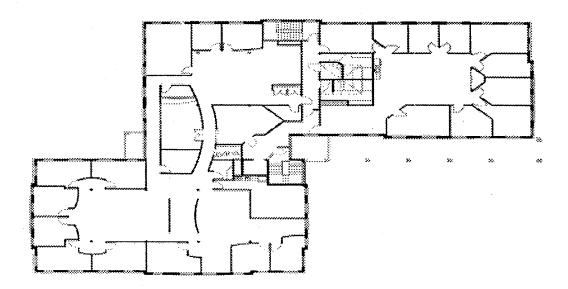
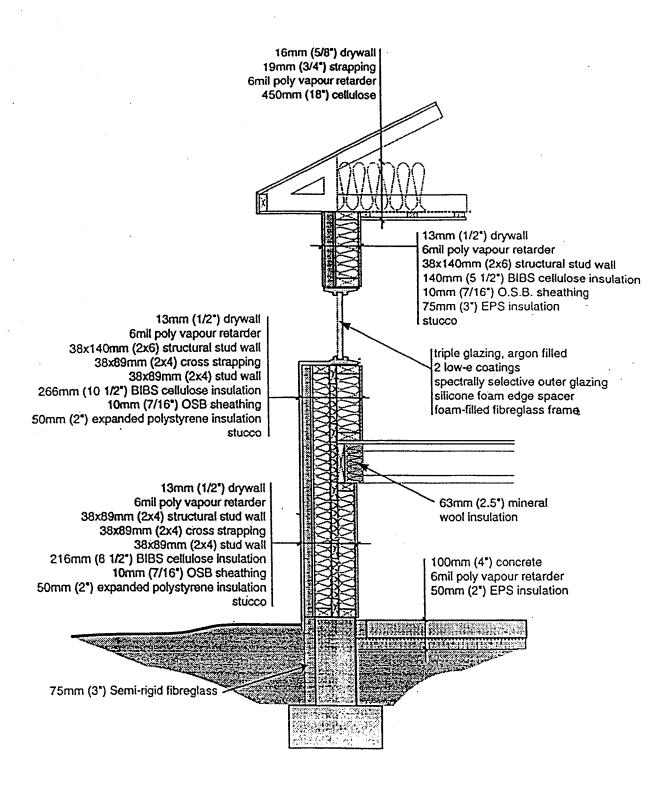


Figure 2.2: Wall Cross-Section



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The ventilation system is the only air-based system in the building (see Figure 2.3). The two-speed ventilation system is designed to provide a continuous flow of constant temperature air to the building (14°C). The heat recovery units and a heating/cooling coil can be continuously modulated to maintain the desired temperature and humidity of the air. Ventilation distribution is by displacement ventilation; fresh air enters the space near floor level at a low velocity and stale air is exhausted at the ceiling.

The fan and pump power is minimal for Green on the Grand because of the use of radiators and the use of high-efficiency pumps, fans and motors. During normal operation, the building was designed for a fan and pump power of 3.4 kW or 1.5 W/m<sup>2</sup>, rising to 6.7 kW (3.1 W/m<sup>2</sup>) under peak heating or cooling loads.

Lighting is provided through energy-efficient T8 fluorescent lamps with electronic ballasts. All perimeter offices and the central areas on the second story use a light dimming system. All areas including offices, stairwells, and hallways, have occupancy sensors to turn lights on only when people are present.

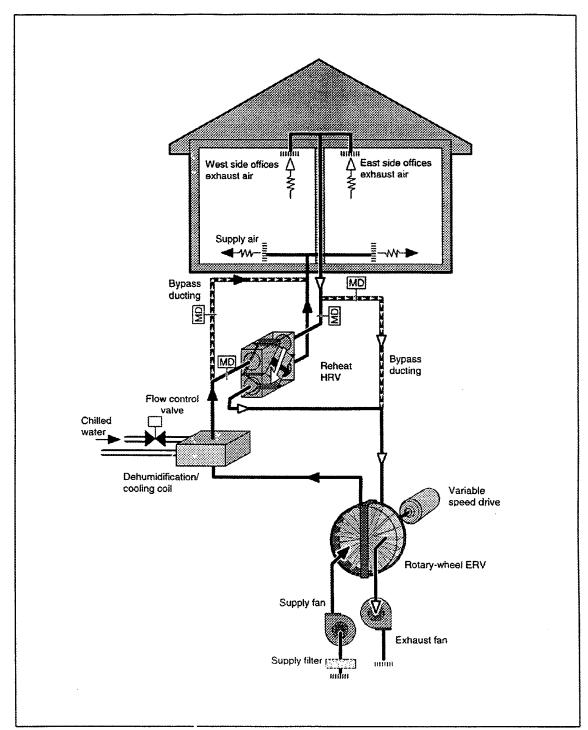


Figure 2.3: Air Handling System Schematic

#### 2.2 Construction Process

Building construction began in the spring of 1995 and the first tenants moved in in early 1996. The building was fully leased and occupied by November 1996. Almost all of the construction went as per the design. As with any building, when everyday realities of construction occur, some modifications to the design are inevitable. There were many reasons for modifications:

- changes were required by the plans examiners,
- originally specified items were too costly or required unrealistically long lead times,
- · site conditions would not allow the specifications to be met,
- shortcomings in the original design, and
- workmanship was not always able to match the level of quality requested.

## 2.2.1 Building Shell

The building shell was built essentially as designed. Wall, foundation and slab-on-grade insulation levels were all as per the specifications. Inspections during construction confirmed that the insulation was well installed with no gaps or voids. Some minor areas were not insulated to the levels of the initial design. For example, no insulation break was installed between the floor-slab and the foundation wall. Mineral wool insulation was not installed at the second floor ring joist because of the difficulty in cutting around the I-beam floor joists. In some areas, it was not possible to install the cellulose insulation including multi-post corners, very narrow cavities and the two vertical wall sections under the end dormer windows. In these locations, blown urethane was used to overcome insulating and air-sealing difficulties. The sloped sections of roof called for RSI-10.6 mineral wool batt insulation which would have required three batts to be installed. It was only possible to install two batts with a reasonable labour effort and still maintain an airgap above the insulation. This resulted in an RSI-7.0 in the sloped ceiling sections.

The specification called for a continuous, sealed polyethylene air barrier/vapour barrier (AB/VB) immediately behind the drywall for all exterior walls and ceilings. During construction, it became obvious that even trades claiming to have R-2000 training were not familiar with the installation and sealing requirements for an AB/VB in a commercial building. Meetings with contractors prior to commencement of the work laid out the requirement for how joints, window frames, doorframes and other discontinuities were to be sealed. Almost daily supervision of the trades was required during installation of the AB/VB to ensure proper installation and to resolve difficulties as they occurred.

Continuity of the AB/VB was accomplished as per the specifications for most areas. Creative solutions at problem locations such as the ring joist, the chimney, ceiling tierods, light fixtures, and other discontinuities were required

## 2.2.2 Mechanical Systems

The heating/cooling system was a combination of a packaged boiler/chiller and custom design work to connect this unit to terminal equipment. The ventilation system was a custom designed and fabricated air handling unit. A building automation system controlled the operation of the systems. Because of the custom design of the air handler and the necessity of ordering the boiler and chiller from Japan, there was a long lead time to get this equipment.

The design specifications called for high-efficiency equipment. It turned out to be difficult to get high-efficiency pump motors. Incentive programs and other means to encourage development of high-efficiency motors have been directed at base-mounted motors. Pumps are generally face-mounted. To adapt a base-mounted motor to a pump is expensive. The contractor was encouraged to supply high efficiency motors wherever possible.

During commissioning it was found that the condenser pump was not providing sufficient water flow. A larger pump needed to be installed increasing the power draw.

On average, the pumps as installed at Green on the Grand operate at about 57% efficiency and the motors at about 72% efficiency for a combined efficiency of about 41%.

It took over one year to commission the building automation system. The controls contractor had difficulty understanding the HVAC system operation and adapting their controls to non-standard applications.

## 2.2.3 Lighting Systems

The window size and design were selected to minimize energy use and maximize daylighting performance. The glazing system incorporates an outside lite of spectrally selective glass to achieve high visible transmission and low SHGC. Windows covering 30% of the wall area were sized to provide adequate daylighting for the perimeter offices. The interior of the second floor is daylit by the eight dormer windows; two facing each of the four cardinal directions.

Green on the Grand was built as a speculative office building for multiple tenant occupancy. Each tenant had his or her own interior designer. Energy-efficiency guidelines were prepared to achieve adequate lighting with a lighting power density of 9.3 W/m² and tenants were encouraged to comply. Table 2.1 summarises the design of the tenant spaces. The average installed lighting density is 12 W/m². Although higher than design guidelines, this still represents a 35% reduction of the ASHRAE 90.1 requirement of 18.5 W/m².

All spaces have efficient light fixtures with T8 lamps and electronic dimmable ballasts. Most tenants have suspended indirect/direct light fixtures to provide uniform light without glare. Two tenants use ceiling-mounted parabolic fixtures. Occupancy sensors control all electric lights - one in each room. All lighting in perimeter offices (except a few on the north side) and the second floor interior are controlled by a modulating dimming system. One sensor was used for each bank of offices with the same window orientation within the same tenant space.

**Table 2.1: Tenant Lighting Design** 

Tenant	Typical Lighting Fixture	Installed Lighting Density (W/m²)	Average Nighttime Light Level (Lux)	Window Shading Treatment	Typical Daylighting Blockage by Shades (%)
Α	Suspended Indirect/Direct	8.2	350	White Venetian	15 %
В	Suspended Indirect/Direct	12.0	400	Fabric roller blind	20 %
С	T-bar	11.4	600	Dark Venetian	40 %
D	Suspended Indirect/Direct	13.8	600	Fabric Roller blind	30 %
E	T-bar	14.4	900	Vertical fabric Venetian	75 %

There are some significant differences in the lighting and daylighting design of the spaces. Tenants A and B are on the second floor so they benefit from daylighting of interior spaces. In Tenant A space, fixture choices and spacing were based on achieving 350 lux illumination. Although Tenant B has the same overhead fluorescent fixture load as Tenant A, they supplemented this lighting with fluorescent task lighting, halogen spot lighting and incandescent accent lighting. Tenant B has fabric blinds, which allow some daylight in, but reduce the glare from beam radiation. Both of these tenants tend to position the blinds off the window for maximum daylight admittance.

Tenant E has the highest installed lighting density; almost twice the value installed by Tenant A. The light levels varied throughout the space with readings as high as 1400 lux. This tenant opted for recessed parabolic fixtures in a T-bar ceiling. In addition, they used compact fluorescents for accent lighting. They have vertical blinds on the windows that are almost always closed.

## 3. EXPECTED PERFORMANCE

## 3.1 Energy Usage

Computer simulations were performed to assess the energy efficiency of the building design. Three simulations were performed: the reference building (ASHRAE 90.1), the proposed C-2000 building, and the as-built C-2000 building. The simulations use the same building dimensions, schedules, occupancy, control settings and weather conditions. The only differences are the changes in the building shell and mechanical systems.

The results of the simulations (using Toronto airport weather data) are summarized in Table 3.1. Gas consumption has been converted to an equivalent kilowatt-hour value. The as-built Green on the Grand design represented a 42% reduction in annual energy cost relative to a similar building designed to the ASHRAE 90.1 standard. The energy savings is less because the Green on the Grand cooling system is natural gas fired at a lower COP than an electric chiller in the ASHRAE 90.1 reference.

Table 3.1: Predicted Annual Energy Consumption (ekWh)

Component		ASHRAE 90.1	As-Designed	As-Built
Space Heating	(gas)	140,598	52,122	47,397
Cooling	(gas)	n/a	42,486	62,652
	(electric)	28,689	n/a	n/a
Water Heating	(gas)	6,941	4,021	4,021
Lighting	- tenant	87,691	28,719	37,266
	- common	9,743	3,191	4,141
	- exterior	2,474	1,237	2,924
Receptacles	- tenant	38,394	38,394	38,394
Pumps & Fans	- fans	31,098	8,529	11,242
	- pumps	n/a	7,208	17,280
	- misc. load	16,072	8,837	6,696
Total Energy Use	- ekWh	361,700	194,744	232,013
	- ekWh/m²	165	89	106
Total Cost	(\$)	\$18,385	\$8,025	\$10,656
	% Savings		57%	42%

- Based on ASHRAE 90.1 Default Schedules

<sup>\*</sup> Building floor area 2190m²

## 3.2 Water Consumption

The estimated values for annual water consumption are shown in Table 3.2. Annual purchased water consumption is estimated at 9.5 cubic metres per person: a 72% reduction over conventional office buildings. With two exceptions, the water conserving technologies were installed as per the initial design. The first change was a water softener was added to building because of the extremely hard water in the Kitchener area. Only the hot water was softened at Green on the Grand, as opposed to conventional practice of softening hot and cold water. Water softeners use a considerable amount of water during their backwash cycle. The second change was the city boulevard property and a small sitting area were sodded with conventional grass. An automatic water system irrigates these areas a few hours a week. The water for this irrigation comes from an on-site well. This well also provides make-up water for the cooling pond. Estimates of well water are included in Table 3.2.

Table 3.2: Estimated Annual Water Use (m³/person)

Function	Typical Office Building	Green on the Grand (from city/from well)	% Savings in Purchased Water
Toilets/Urinals	10	4.5 / 0	55 %
Sinks/Washing	5	2.5 / 0	50 %
Showers	2	1/0	50 %
Cooling Tower	10	0/2	100 %
Landscaping	2	0 /1	100 %
Water Softening	4.5	1.5 / 0	67%
Total	33.5	9.5 / 3	72 %

# 4. MONITORING SYSTEM

## 4.1 Monitoring Schematics

Monitoring was provided by both a computer-based data logging system and by manual reading of utility meters and meters installed in conjunction with the monitoring system. The objective of the monitoring was to determine measurements of:

- ambient conditions.
- indoor comfort conditions,
- representative office comfort conditions,
- individual tenant electrical loads.
- · ventilation effectiveness,
- ventilation system efficiency,
- · daylighting system efficiency, and
- heater/chiller performance.

These requirements were the basis for producing the instrumentation selection criteria and requirements for locations where instruments would be installed. Appendix A shows the instrumentation for each of the major systems measured.

Five instruments were installed to measure weather parameters. These were:

- solar radiation,
- · windspeed,
- · ambient temperature,
- · rainfall, and
- relative humidity.

Four space temperatures, one relative humidity and one tenant electricity consumption, were used to characterize the indoor conditions in the building.

To gain a better understanding of the comfort conditions for the individual employee, a representative office was instrumented. The measurements included:

- room temperature.
- room relative humidity,
- room mean radiant temperature,
- · lighting level at desk height,
- lighting power
- ventilation air supply temperature, and
- CO<sub>2</sub> level.

#### 4.2 Boiler/Chiller Instrumentation

A natural gas boiler/chiller is the heating and cooling plant. The plant delivers heating or cooling through a two pipe system, but not both simultaneously. The building side of the system has primary and secondary loops. The primary loop is maintained at approximately 50°C in heating mode and 5°C in cooling mode as dictated by the boiler/chiller controls. The secondary loop is maintained at 35°C and 13°C in winter and summer as dictated by the heating or cooling requirements. The building automation system bleeds water from the primary loop to the secondary loop as required to maintain the building loop at the proper delivery temperature.

#### Monitoring was set up to measure:

- runtime in each operating mode (heating, cooling, high-fire, low-fire),
- heat delivered to the space by the primary loop from the boiler,
- cooling delivered to the space by the primary loop connected directly to the evaporator,
- heat rejected to the pond by the condenser water loop, and
- electricity consumed

#### 4.3 Air Handler Instrumentation

Possibly the most complex piece of equipment in the entire project is the air handler. It contains:

- a rotary energy recovery wheel,
- a heating and cooling/dehumidification coil,
- · a fixed plate heat exchanger,
- two speed ventilation supply and exhaust fans, and
- fully modulating controls to operate all of this equipment together based on outdoor conditions, building conditions, season, and time of day.

Monitoring was also complex due to the nature of the information required. Supply and exhaust airflows were calculated based on a correlation between heat wheel pressure drop and air flow.

To understand the performance of the air handler, the following parameters were measured:

- total electricity consumed,
- maximum temperature rise (drop) available across the entire unit,
- temperature rise (drop) in the supply air,
- supply air relative humidity,

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- outdoor air temperature,
- exhaust air temperature,
- exhaust air relative humidity,
- exhaust air CO<sub>2</sub>,
- supply side airflow, and
- exhaust side airflow,

Individual component performance was also measured based on:

- rotary wheel speed,
- supply air temperature rise across the rotary wheel,
- supply air humidity rise (drop) across the rotary wheel,
- water flow rate through the heating/cooling coil, and
- water temperature rise (drop) across the heating/cooling coil.

## 4.4 Short-Term Performance Testing

Building air tightness is an all too often overlooked factor in commercial construction. The airtightness of the envelope was tested using a standard residential blower door on Saturday November 2, 1996. It was a mild sunny day and the winds were calm. The building was sealed according to CGSB 149.10 blower door testing requirements. The air handler was turned off and all intentional openings sealed. In the case of Green on the Grand, this meant that the supply air and exhaust air dampers for the air handler were tightly closed, the flue for the boiler/chiller was sealed and the mechanical room supply air duct was sealed. All tenants in the building co-operated by ensuring all operable windows were locked in the closed position, all perimeter office doors within the suites were open and all suite doors leading to common areas were open. The residential type blower door was installed in the single door leading out the back of the building. Eleven readings were taken in the range 70 to 25 Pascals pressure difference across the building shell. To double-check the calibration additional readings were taken when the flow orifice was changed.

Other short-term measurements performed included

- boiler combustion efficiency,
- CO<sub>2</sub> concentration (as an indicator of ventilation effectiveness),
- Light level (as an indicator of suitability of lighting and daylighting), and
- Vertical temperature distribution (as an indicator of temperature stratification).

## 4.5 Completeness of Monitored Data

Monthly manual readings of electricity, natural gas and water consumption began in March 1996 and continued for two years to March 1998. The 1997 year is considered the most representative of long-term building performance because the building was fully occupied and most of the building systems were commissioned.

The installation of the detailed monitoring system began in early 1997. The first usable data was collected in the Spring of 1997 and focussed on the boiler/chiller. The monitoring system was fully installed and commissioned by September 1997 and data collection continued until March of 1998. Over this period, the monitoring system underwent some changes. The initial monitoring system included a roof-mounted anemometer for measuring wind speed. On several occasions the data acquisition board (DAQ) became damaged and had to be repaired. It was determined that the damage coincided with lightning storms. To solve this problem, the roof-mounted anemometer was disconnected and the DAQ was replaced with a more robust model. The new DAQ equipment had lower voltage measurement thresholds than the original equipment and voltage dividers had to be installed on some of the sensors to drop their output range to match the new DAQ equipment.

Early data analysis revealed that relative humidity sensors in the air handler did not agree with each other. During periods when the cooling coil was inactive, the humidity content of the air before and after the coil was measured to be significantly different. The humidity sensors were found to be prone to drift and sometimes reported relative humidity values that were less than 0%. The "to building" supply air humidity sensor was replaced; however the replacement was prone to drift. Additional temperature sensors were added on November 25, 1997. The additional sensors allowed for the accurate assessment of sensible performance, without relying on the relative humidity sensors.

#### 4.6 Weather Data

The 1997 weather file for the Toronto International Airport was obtained from Environment Canada. This was compared to the average weather data contained in a Canadian Weather for Energy Calculations (CWEC) weather file.

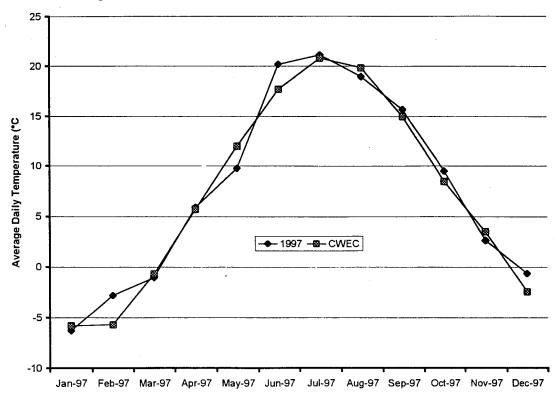
Table 4.1 shows that the two weather files are similar: there was a 3% decrease in heating degree-days and a 6% increase in cooling degree-days during 1997.

Table 4.1: 1997 and CWEC Degree-Days

HDD (Base 18°C)		CDD(Base 18°C)	
1997	3,969	245	
CWEC	4,089	232	

The yearly average temperature for 1997 was 0.3°C warmer than the CWEC file. Figure 4.1 shows slightly warmer temperatures for the months of June, February and December 1997 than the CWEC average year. Figure 4.2 shows the horizontal solar radiation for 1997 and the CWEC weather file. Again the 1997 values are very close to the CWEC values. It is concluded that 1997 weather is typical of long-term weather. As a result, CWEC data was used for modelling to directly compare monitored performance to predicted performance.

Figure 4.1: 1997 and CWEC Monthly Average Temperature



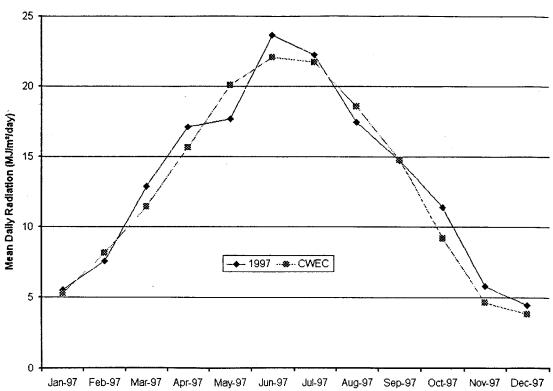


Figure 4.2: 1997 and CWEC Global Horizontal Solar Radiation

## 5. PERFORMANCE RESULTS

## 5.1 Building and Equipment Operation

The first tenants took occupancy in early 1996. The building was fully leased and occupied by November 1996. As with any new system, there were some initial "teething" problems to overcome. Several months were required to completely commission the building automation system (BAS). The BAS was primarily used to provide control of the multiple functions within the air handler, control of building water loop temperature for the radiant panels, and scheduling of equipment operation.

Initially the coil in the air handler was not able to cool ventilation air sufficiently to avoid condensation on the radiant panels. Loop temperatures had to be raised reducing cooling capacity and allowing temperatures in some areas to rise to uncomfortable levels. The coil was found to have low water flow due to unacceptably high piping losses and reversed piping connections so that the water flow was not in a counterflow pattern. Moving a pump and reconstruction of some piping connections increased water flow. Reversing the piping connections rectified the flow pattern problem. After the changes, the air temperature exiting the coil could be maintained at 12°C (54°F) and the system operated as designed.

Some operational changes were required to provide consistent comfort throughout the building under variable conditions. For short periods during the swing months some tenants needed heating, whereas at different times other tenants required cooling. To resolve this problem, the system was manually switched from heating in the morning to cooling in the afternoon (a relay is being added to perform this function automatically in the swing months). Additionally, two interior meeting rooms tended to overheat when occupied. This concern was resolved by separating the heating/cooling and ventilation functions. Small booster fans installed behind the supply air grilles in the two meeting rooms increased cooling capacity using additional conditioned ventilation air during occupied periods. Also, the delivered air temperature for the ventilation system was lowered to 12°C (54°F). A computer room also overheated and it was necessary to install a small dedicated air conditioner.

The ASHRAE 90.1 standard defines a typical office as requiring the building HVAC system to be run the equivalent of 92 hours a week with equipment turned off and temperatures set back during unoccupied hours. The lighting (and internal electric loads) are assumed to be on the equivalent of 53 hours per week. With five tenants with different schedules, Green on the Grand was occupied about 120 hours a week. Tenants demanded full ventilation capacity from 5 a.m. to 1 a.m. and low speed

ventilation the remaining 4 hours. Temperature setback was not feasible, and occupants tended not to turn off computers and photocopiers over-night.

## 5.2 Building Envelope

The goal was to have an airtight building envelope. There are several standards that define building airtightness. The R-2000 airtightness standard for residential construction requires an airtightness level of less than 1.5 air changes per hour at 50 Pascals ( $ACH_{50}$ ). The value measured at Green on the Grand is half this value at 0.7  $ACH_{50}$ .

Commercial building air tightness is typically expressed in terms of flow per unit area at a 75 Pascal pressure difference. The Standard of the National Architectural Metal Manufacturers for curtain walls calls for the leakage to not be more than 0.3 L/s/m² at a pressure difference of 75 Pa (L/s/m²<sub>75</sub>). The C-2000 requirements are 3 times more stringent than these requirements at 0.1 L/s/m²<sub>75</sub>. The measured value at Green on the Grand is five times this value at 0.5 L/s/m²<sub>75</sub>. The values quoted in the two standards are based on sample wall sections placed in a test chamber. These tests do not account for the air leakage around building junctions or interfaces (e.g., wall/window, wall/floor): - usually the areas of highest air leakage. Full-building air-leakage test results on conventional buildings are required before a comment can be made on the acceptability of the Green on the Grand value.

## 5.3 Total Building Energy Use

The annual energy consumption for 1997 is presented in Table 5.1. The simulations presented in Section 3 were re-done using the actual building operation schedules (for HVAC operation and receptacle loads) instead of the default ASHRAE 90.1 schedules. With the more representative operating schedules, the building was expected to achieve a 36% energy savings relative to an ASHRAE 90.1 building.

The actual monitored savings were slightly less than predicted at 28% of ASHRAE 90.1, primarily because of higher gas use for space heating and cooling. Nevertheless, the annual energy bill is only \$8.20 per square metre (76 cents per square foot): typically half that of existing office buildings. The energy intensity is 196 ekWh/m² with natural gas as the cooling energy source. The energy intensity would have been under 150 ekWh/m² if the cooling had been provided by electricity.

Table 5.1: Simulated and Monitored Annual Energy Consumption (ekWh) – based on Actual Operating Schedules

Component		ASHRAE	As-	
		90.1	Operated	
		(simulated)	(simulated)	Monitored
Space Heating	(gas)	184,128	64,113	78,807
Cooling	(gas)	n/a	71,918	160,900
	(electric)	45,129	n/a	n/a
Water Heating	(gas)	6,941	4,021	4,119
Lighting	- tenant	87,691	37,266	36,557
	- common	9,743	4,141	4,870
	- exterior	2,474	2,924	1,533
Receptacles	- tenant	84,626	76,789	83,303
Pumps & Fans	- fans	43,369	20,586	25,765
	- pumps	n/a	31,588	25,787
	- misc. load	16,072	8,386	8,305
Total Energy Use	- ekWh	480,173	321,732	429,946
·	- kWh/m²	219	147	196
Total Cost	(\$)	\$24,740	\$15,867	\$17,860
,	% Savings		36%	28%

Monitoring shows that space heating is 23% higher than the "As-Operated" simulation. The primary reason for this is that the boiler seasonal efficiency is well below the manufacturers rated steady-state value of 83% (see Section 5.4.1).

Cooling gas use was the largest component of excessive energy consumption when compared to the "As-Operated" building. Some of the added consumption can be attributed to additional internal gains such as the receptacle loads. However, monitoring of the chiller showed that it was operating at a seasonal COP well below expectations (see Section 5.4.2). The manufacturer's specifications are a steady-state COP of 0.9 to 0.95. Short term testing of the system shows that actual COP including cycling losses, varied between 0.41 and 0.61. Several factors appear to be contributing to the lower than

expected performance. These include higher than design condenser (pond) water temperatures due to the additional heat rejected, lower than design evaporator temperatures possibly due to control calibration, and a large number of short firing cycles. The poor performance in both heating and cooling indicate that the equipment may suffer from poor part-load performance.

Receptacle loads were an area of significant additional energy consumption over the initial design values (see Section 3). Monitoring showed that receptacle loads remain significantly above the ASHRAE default schedule at night. Network servers, personal computers, fax machines, printers, photocopiers, refrigerators, water coolers, and other electrical equipment do not get turned off at night resulting in significant energy consumption when little was expected.

Building lighting energy use was approximately the amount expected according to the "As-Operated" simulation. The energy-efficient lighting systems and occupancy/daylighting controls appear to be effective in reducing electricity use.

## 5.4 Heating/Cooling System Performance

#### 5.4.1 Boiler Performance

The packaged boiler-chiller, was properly sized for the cooling load but oversized for heating in high-fire. In low-fire mode, the boiler output is reduced to 40% of the rated 360 MBH (106 kW) - enough to heat the building.

Monitoring of the system began immediately upon installation. The gas meter was read on a monthly basis. After the first few months, it was clear that gas use was higher than expected. Investigations began into the potential causes. Numerous checks were made to determine the cause of the problem.

Steady-state (or thermal) boiler efficiency was determined from measurements of flow rate and water temperature rise. A flue gas analysis was used to measure combustion efficiency. Combustion efficiency was found to be approximately 83%. The heat delivered to the water under steady-state conditions (thermal efficiency) was measured at 77% (i.e., jacket losses of approximately 6%). The manufacturer quotes a slightly higher thermal efficiency of 83%.

The measured flue temperature during the "off" cycle was over 50°C. This suggests that a significant amount of heat is stored in the casing of the boiler and lost up the flue during the off cycle. An event counter showed that the boiler had an average of 64 eight-minute "ON" cycles daily.

Figure 5.1 shows the gas energy consumed, the heat delivered, and the monthly thermal efficiency for the months of October 1997 through March 1998. It shows increased efficiency as the heat delivered to the building increases. The monthly thermal efficiency, however, peaks at approximately 55% and averages 48% over the heating season: well below the steady-state value of 77%. Thus, there appears to be significant heat stored in the piping and casing that is either lost up the flue or to the mechanical room during off cycles.

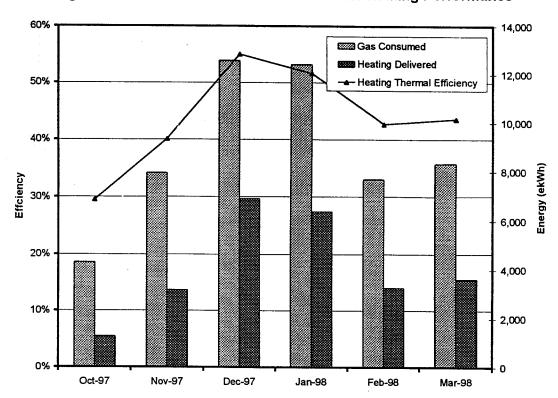


Figure 5.1: Green on the Grand Boiler/Chiller Heating Performance

Figure 5.2 shows the monthly thermal efficiency of the boiler and the average cycle time for the months of October 1997 through March 1998. As the average cycle time increases so does the boiler efficiency. What is notable is that all the average cycle times are below 10 minutes. This would indicate that, even in low-fire, the boiler is oversized for the building.

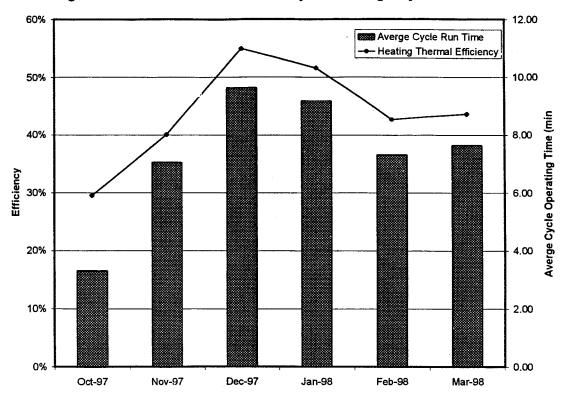


Figure 5.2: Boiler Thermal Efficiency vs. Average Cycle Run Time

#### 5.4.2 Chiller Performance

The manufacturer's specification for the chiller is a COP of 0.95 at a cooling water inlet temperature of 29.4°C and a chilled water outlet temperature of 7°C. These temperatures represent the optimum operating point of the chiller because they strike a balance between a high COP and low wear and tear on the unit. Higher COPs are possible, but the chiller becomes too efficient and can crystalize the unit. Thawing the water system represents expensive maintenance. As was the case when in heating mode, the boiler/chiller gas consumption was higher than expected.

#### **Effect of Cooling and Chilled Water Temperatures**

The monitored operating data indicates that the chiller doesn't always operate at the ideal temperatures specified by the manufacturer. Figure 5.3 summarizes the relationship between the COP and the cooling water inlet temperature according to the manufacturer's specifications. Curves are plotted for chilled water outlet temperatures of 5, 7 and 9°C. The ideal operating temperature is indicated by the 'star' symbol. The COP at the ideal operating temperatures is 0.95. The COP drops to 0.86 for a chilled water outlet temperature of 7°C and a cooling water inlet temperature of 32°C. The COP drops further to 0.80 for a chilled water outlet temperature of 5°C and a cooling water inlet

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temperature of 32°C. A curve fitted through the data points for a chilled water outlet temperature of 5°C is extrapolated for cooling water inlet temperatures up to 38°C.

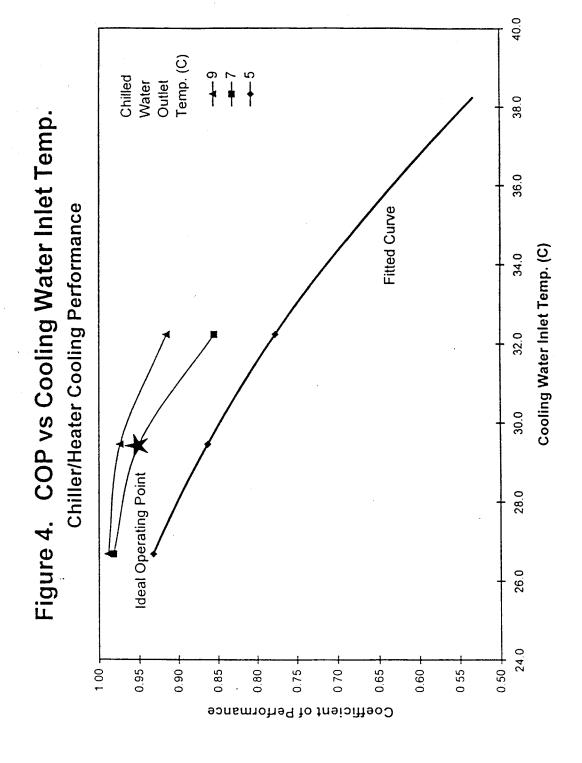
Figure 5.4 shows that the performance of the chiller over a typical day. The chilled water outlet temperature ranges between roughly 9°C and 3°C with an average of 5°C while the chiller is operating. On this particular day, the pond temperature was at or below 29°C so that the cooling water temperature could be maintained at 29°C. Cooling water temperatures in the mid to high 30s were, however, recorded during prolonged hot spells in June and July. Ironically, the higher pond temperatures are a result of the poorer than expected chiller performance (and higher than expected cooling loads). At an average chilled water outlet temperature of 5°C and an average cooling water inlet temperature of 34°C, a steady-state COP of 0.7 is expected.

#### **Effect of Chiller Cycle Times**

The manufacturer's COP values are for steady-state operating conditions. As shown in Figure 5.4, however, the chiller does not run continuously but cycles over a 10 to 20 minute period. Every time a cycle starts, the chiller must heat up the absorbant to the temperature necessary to drive the water vapour out of the lithium bromide solution. The time required to do this is indicated by the lag between the initial firing of the chiller and the peak in the chilled water outlet temperature. This reduces the COP because energy is being put in to run the chiller, but no energy is being removed because there is no cooling. At the other end of the cycle, the COP is reduced because the low-fire burner is on and energy is input to run the chiller, but only a small amount of cooling is provided. As the cycle times get shorter, the inefficiencies on either end of the cycle have a large impact on cycle efficiency and the COP for the cycle is reduced.

The actual COP including cycling losses ranged from 0.41 to 0.61 with an average of 0.51.

Figure 5.3: COP vs. Cooling Water Temp.
Chiller/Heater Cooling Performance



Flow Rate (L/min) 300 250 200 50 8 20 1:45 PM CHILLER CYCLE TIME 1:30 PM 1:15 PM CHILLED WATER INLET TEMP 1:00 PM COOLING WATER OUTLET TEMP CHILLED WATER OUTLET TEMP COOLING WATER INLETEMP CHICLED WATER FLOW RATE 12:45 PM OUTDOOR TEMP.: 25 C OUTDOOR R.H.: 70% CLOUD COVER: OVERCAST 12:30 PM CHILLER HI-FIRE ON/OFF 12:15 PM 12:00 PM 40 35 30 25 20 15 10 Temperature (Deg C)

Figure 5.4: Typical Chiller/Heater Cooling Performance

Figure 3. Typical Chiller/Heater Cooling Performance

### 5.4.3 Cooling Pond

A landscape pond in front of the building serves as the cooling tower for the chiller. The pond water is circulated through the chiller condenser and then returned to the pond. Heat rejection from the pond is primarily through evaporation. Make-up water is provided by rainfall collected off the roof. The pond has a surface area of 120 square metres and a maximum depth (when full) of just under one metre.

Because of the lower than expected COP of the chiller, almost twice as much heat had to be rejected by the pond. On hot sunny days, this caused the pond to become too warm for proper chiller operation (above 35°C). Two modifications were made to overcome this problem. First, a spray fountain was added to the pond to increase evaporative heat loss. Second, if the pond temperature went above 32°C, make-up water from the well (or city mains) was added. Because of the higher rate of heat rejection (and evaporation), much of this make-up water was needed to fill the pond anyway. The impact on water consumption is discussed in Section 5.9.

The purpose of the ozonator is to treat the water to prevent growth of algae. Ozonators have been successfully used in many swimming pools. In this application, the ozonator was not completely effective and chemicals (chlorine) were required. There was concern that the high iron content in the well water might be absorbing the ozone. For the 1997 cooling season, softened and iron-filtered water (from the city) provided much of the make-up water.

### 5.5 Ventilation System Performance

### 5.5.1 Heat Recovery

The ventilation system supplies 13°C fresh air to the building throughout the heating season. As described in Section 2.2.2, two heat recovery systems are used. Fresh air passes through the energy recovery wheel, then a heating coil and finally a conventional plate heat exchanger. The energy recovery wheel is capable of recovering both sensible and latent heat energy from the exhausted air, however, due to unreliable humidity measurements, only the sensible performance is measured.

Figure 5.5 shows the sensible heat supplied to the ventilation air by the heating coil (heat supplied by boiler), plate heat exchanger and rotary wheel heat exchanger. This represents the heat energy required to raise the ventilation air to 13°C from the outdoor air temperature. The boiler only supplied an average of 6% of the required heating energy. The remaining 94% of the ventilation heat was recovered from the exhaust air.

Figure 5.6 shows that the sensible effectiveness of the heat wheel is approximately 70% at maximum speed. The wheel speed varies in order to deliver a constant delivered air temperature or to avoid frost forming on the heat exchanger. Whenever the wheel speed is below 100%, there is enough recovered heat to meet the desired delivered air temperature of 13°C or there is a concern that moisture from the exhaust air stream will freeze on the wheel.

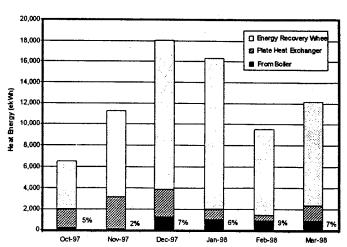


Figure 5.5: Heat Supplied to Ventilation Air

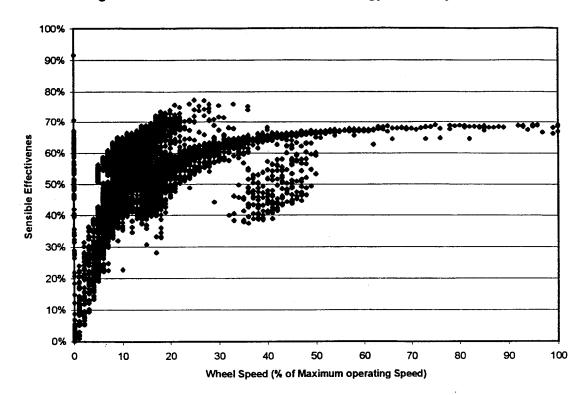


Figure 5.6: Sensible Performance of Energy Recovery Wheel

### 5.5.2 Fans

High efficiency fans and motors deliver air to the building at a rate of 1600 L/s in high-speed and 1100 L/s in low-speed operation. On average, the system consumed 2.1 Watts of electricity for each L/s of flow rate.

### 5.6 Occupant Comfort and Satisfaction

### 5.6.1 Occupant Comfort

The radiant heating/cooling and displacement ventilation systems were selected to improve thermal comfort and indoor air quality. Some people, however, expressed concern over possible cold drafts, inadequate air mixing, and temperature stratification. Several measurements were made to assess occupant health and comfort.

Figures 5.7 and 5.8 show air and panel temperatures on a typical January day. Figure 5.7 shows the air temperature stratification in a typical office for two time periods: heat off and heat on. With the heat off, the floor temperature is 20°C (68°F) and the ceiling temperature is 23.5°C (74°F); a stratification of 1.5°C per metre (0.8°F per foot). This level of temperature stratification is not significantly more than with other heating system types. When hot water is circulated through the panel, it rises to 35°C (95°F) and the air

temperature at the ceiling level rises, but the air temperatures at the occupied heights remain almost unchanged. It would seem that radiant heating does not adversely affect temperature stratification.

Figure 5.8 shows the air temperature distribution at various points in the room. The temperature plots show the effect of displacement ventilation. The cool air entering the room affects the air temperature horizontally for approximately one metre, but has almost no effect on the vertical distribution of air temperature. Directly in front of the fresh air vent, the air temperature is 16°C, four degrees cooler than in the middle of the room. Thus, it appears that the ventilation air is travelling horizontally and then slowly rising towards the ceiling exhaust. Carbon dioxide measurements in a typical office confirm this phenomena. The carbon dioxide measurement at the floor level is 350 ppm (outdoor air value). The CO<sub>2</sub> concentration gradually increases with height to a maximum of 800 ppm at the ceiling. A measurement of CO<sub>2</sub> concentration on the opposite side of the room at 1.2 metres height was only 450 ppm, far below the recommended maximum CO<sub>2</sub> values (800 to 1000ppm).

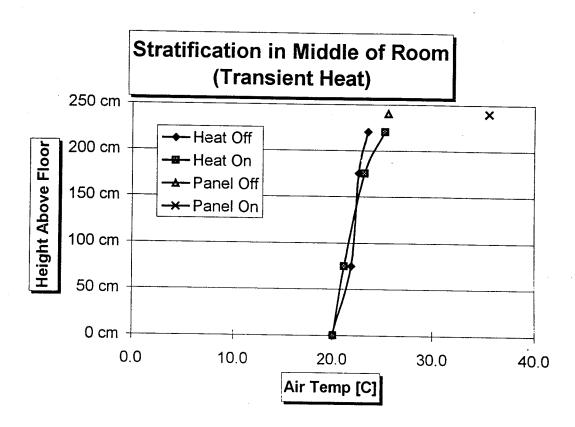


Figure 5.7: Typical Office Room Stratification

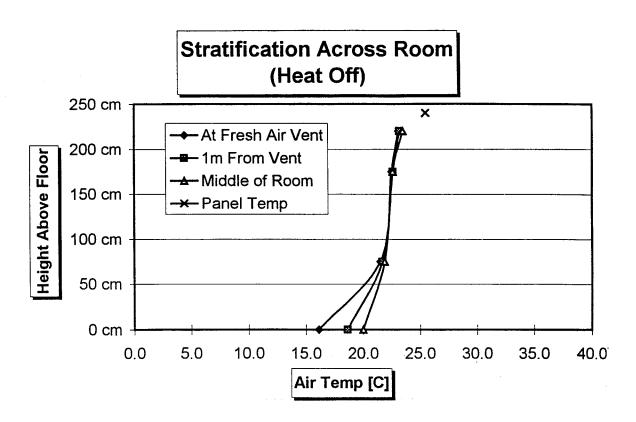


Figure 5.8: Horizontal and Vertical Room Temperature Distribution

Temperature data was also logged for a representative office. The mean radiant and room air temperature as well as the radiant panel surface temperature were measured throughout the monitoring period. Typical forced air systems, while controlling the room air temperature, do not control mean radiant temperatures well. Thus, during cooling operation, the air temperature is kept cool, while mean radiant temperatures can be warm. Conversely, during heating operation, the mean radiant temperature is often much cooler than the air temperature giving the perception of drafts from windows. The results of this is that occupants often set the thermostat either higher or lower than the desired room temperature in order to maintain comfort conditions in the space.

The combination of radiant heating/cooling and the excellent envelope characteristics of Green on the Grand maintain the mean radiant temperature and the room air temperature to within 1°C of each other. Average air and mean radiant temperature for the representative office was 22°C during both heating and cooling seasons. In other words, the warm radiant panels compensate for the cool windows and exterior walls to maintain a constant mean radiant temperature in the winter (and vice-versa in summer).

### 5.6.2 Occupant Satisfaction

An occupant survey was performed using the questions and methodology defined in the IEA Task 21 POE survey requirements [Atif et al, 1997]. The tenants were asked 27 questions about their satisfaction with the work place. Approximately 70% of the tenants completed the survey. Table 5.2 summarizes the results of the survey, listed in order of tenant satisfaction. Over 80% of the tenants were satisfied with the general environment and lighting in their office. General office noise and concern with temperature were the areas of least satisfaction. The low satisfaction with the temperature may have been partly a result of conducting the survey during the swing months (end of March 1998). The dissatisfaction with noise levels is likely a result of the hard surfaces of the radiant panels and the linoleum flooring and the lack of masking noise from an air heating system.

Satisfied Indifferent Dissatisfied General Environment 82 11 Liahtina 81 4 15 Lots of Space 78 15 6 77 Window Size 12 10 Odour 75 17 8 View 61 26 12 Privacy 53 35 12 Ventilation 50 4 46 Noise Level 49 2 49 Temperature 33 6 61

Table 5.2: Tenant Satisfaction with Green on the Grand

### 5.7 Lighting and Daylighting System Performance

### 5.7.1 Operational Performance

The daylighting system and occupancy sensors operated reliably over the monitoring period. Tenants raised no objections to lights being controlled by occupancy sensors. The daylight sensors provided an additional benefit beyond daylight savings. In several offices, the tenant found the light level too high. By adjusting the dip switches on the daylight sensor, the lights could be permanently dimmed to the desired light level. There was some problem with a single daylight sensor controlling numerous rooms with different lighting requirements. For example, if the blinds in the room with the sensor were open, the lights would dim. The tenant in an adjacent office might need to control

glare by closing the blinds and would not have enough light. The solution would have been to have additional sensors where conflicting use patterns could cause a problem (albeit at a higher cost).

Table 5.3 lists the average daily electricity use for lighting and receptacles (plug loads) on a per unit floor area basis. The total electricity use for all tenants and the lighting/receptacle breakdown for Tenant A is from monitored data. The tenant breakdowns for Tenants B through E are estimated from the installed lighting capacity and their operation of the window shades.

When performing computer simulations according to ASHRAE 90.1, the lighting density must be 18.5 W/m² (or less) and it is assumed that the lights are on full for the equivalent of 53 hours per week. This corresponds to annual lighting use of 51 kWh per square metre of floor area. Tenant A uses only 9.4 kWh/m² - an 82% reduction. Lighting energy accounts for 30% of Tenant A's electricity use. This reduction is made up of two parts: installed lighting capacity that is only 45% of ASHRAE 90.1, and fewer operating hours at full output. Assuming that the ASHRAE lighting schedule is similar to Tenant A's schedule, the use of occupancy sensors and daylighting controls reduces lighting energy use to only 40% of ASHRAE 90.1 full load electricity use.

It is difficult to estimate the split in savings between occupancy sensors and the daylighting system. Figure 5.9 shows the light level and lighting energy use for the monitored office on a typical fall day. The office tenant arrived at 8 AM and left at about 5 PM. The lighting power is at the maximum early in the morning and late in the afternoon and provides approximately 350 lux. As the sun comes up, the light level increases to 500 lux and the lighting power decreases. For this day, daylighting provided an additional 150 lux and reduced lighting energy by 23%. The split in light levels between daylight and electric lights was determined by measuring the lighting output of the lamps verses the electricity use. The control allows the lights to dim to about 20% of their peak illumination, however, at the minimum setting the light consumes 35% of the peak electricity use.

Table 5.3: Tenant Annual Electricity Use (values in italics are estimates)

Tenant	Lighting Energy	Receptacle	Total Tenant
	(kWh per m²)	Energy	Electrical Energy
		(kWh per m²)	(kWh per m <sup>2</sup> )
Α	9.4	22.2	31.6
В	18.2	43.7	61.9
С	22.0	34.9	56.9
D	20.9	66.8	87.7
E	27.8	62.4	90.2

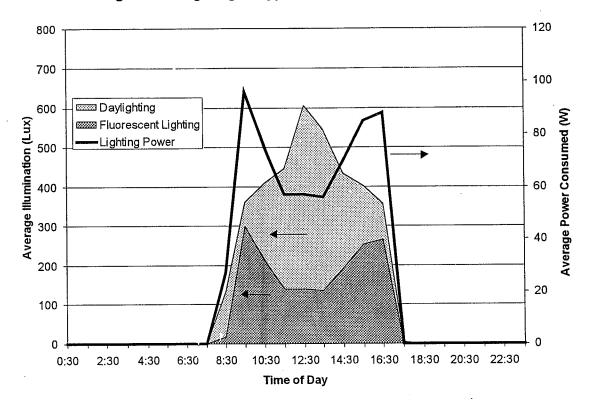


Figure 5.9: Lighting in Typical Office - Tues. Jan 13, 1998

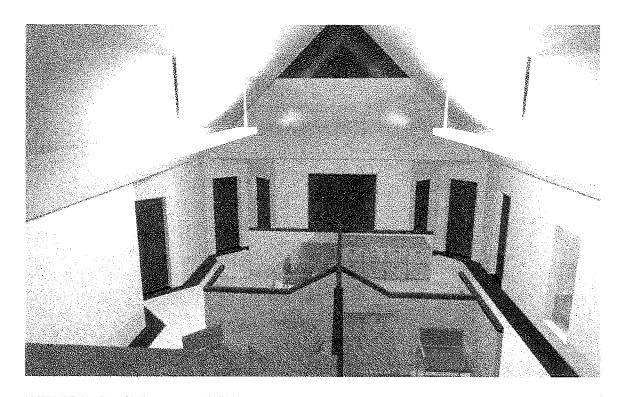
### 5.7.2 Daylight Simulations

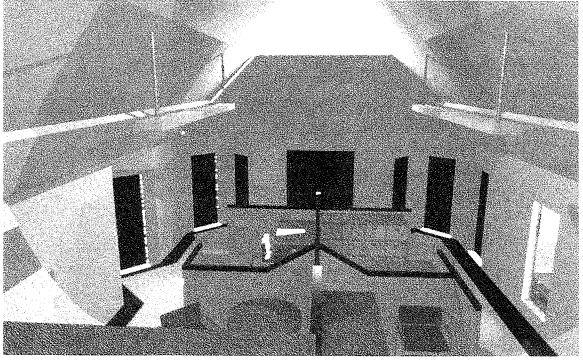
Computer simulation using the ADELINE 1.0 computer program was performed to study the daylight distribution and the daylight-linked lighting system performance in two office spaces on the second floor of the building. Figure 5.11 shows the ADELINE output for the interior office space on the second floor under daytime and nighttime conditions. Figure 5.10 is a photograph of the same space. The computer rendering is very similar to the photograph of the actual space indicating its value as a design tool. The on-site measured illuminance and electric lighting energy consumption were compared with simulation results and the energy savings potential of replacing electric lighting with daylighting was evaluated. The accuracy of the ADELINE computer program in simulating the energy savings from the use of daylight-linked control system was studied in a related report [Galasiu and Atif, 1997].

Figure 5.10: Photograph of Second Floor Interior Office



Figure 5.11: ADELINE Renderings of the Second Floor Interior Office (Night & Day)





### 5.8 Other Electrical Loads

Receptacle loads were an area of significant additional energy consumption. The connected receptacle capacity is very close to the 8.1 W/m² suggested in ASHRAE 90.1 as typical for offices and the 8.9 W/m² that Komor [1997] monitored in other office buildings. The increase in energy use is because the receptacle loads remain significantly above the ASHRAE default schedule at night. Network servers, personal computers, fax machines, printers, photocopiers, refrigerators, water coolers, and so on do not get turned off at night resulting in significant energy consumption when little was expected.

Figures 5.12 and 5.13 compare normalized receptacle and lighting loads for Tenant A against the ASHRAE schedule (the solid line) for weekdays and weekends respectively. The monitored results are hourly values averaged over a six month period. Figure 5.12 shows that lighting follows the ASHRAE schedule reasonably well on weekdays, though the evening hours run slightly longer. The long dashes show the night-time receptacle loads are 50% of the daytime values rather than zero. Figure 5.13 shows that weekend electricity use is significantly higher for both lighting and receptacles.

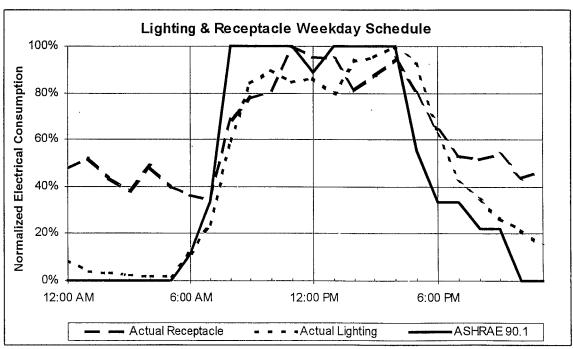


Figure 5.12: Tenant Weekday Electricity Use (Normalized to Peak Value)

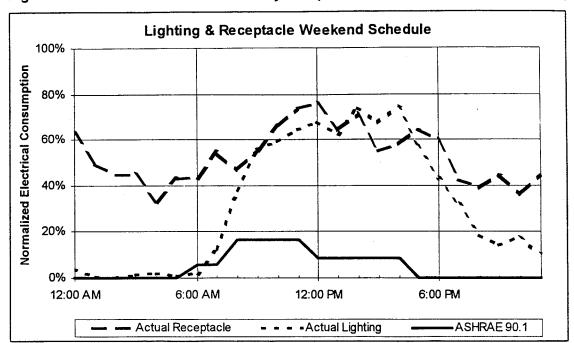


Figure 5.13: Tenant Weekend Electricity Use (Normalized to Peak Weekday Value)

### 5.9 Water Consumption

Over the two-year monitoring period, annual purchased water consumption was 9 m³ per person or 25 litres per person per day (based on an occupancy of 75 people). This value is very close to the predicted value of 9.5 m³ per person (see Section 3.2). Well water consumption was an additional 9 m³ per person: much higher than the predicted value of 3 m³ per person.

There is a definite seasonal trend in purchased water usage. Winter water consumption is only 15 litres per person per day, whereas summer water use rises to 44 litres per person per day. The winter value is indicative of water consumption related to people: toilets, sinks, drinking etc.

The increase in the summer water usage is for the cooling pond and landscape watering. Water usage associated with the cooling pond (city and well water) is 13 m<sup>3</sup> per person per year of which half is from the city. Future modifications call for installing an iron filter on the well water supply so that all pond water can come from the well.

### 6. CONCLUSIONS

Green on the Grand was able to realise major energy and HVAC capital cost savings from a highly insulated and airtight building shell. The heating load dropped by 66%. The use of spectrally selective glazings and a reduced peak electrical load (45 kW monitored vs. 100 kW ASHRAE 90.1) allowed the installation of a chiller less than half the size that would otherwise have been required.

Green on the Grand achieved a monitored energy cost savings of 28% relative to ASHRAE 90.1. The greatest savings were achieved with the lighting system. A combination of energy-efficient lighting design, daylighting controls and occupancy sensors reduced the lighting electricity use by 82% for one tenant relative to ASHRAE 90.1 lighting requirements. This reduction was achieved by a 55% reduction in lighting density and a 60 % reduction in light ouput because of daylighting and occupancy sensors. The average lighting savings for the building relative to ASHRAE 90.1 is estimated to be 60%.

The lower than expected energy savings was a result of the poor seasonal performance of the boiler/absorption chiller. The boiler had a seasonal efficiency of 48% and the chiller had a seasonal COP of 0.51: both significantly below the manufacturer's steady-state ratings. Efficiency curves for off-rating point and part load performances are required to allow designers to properly assess and select equipment.

Displacement ventilation performs well, effectively removing pollutants and providing fresh air to the space. The building provides a comfortable and pleasing environment for the occupants, although noise transfer was an area of low satisfaction.

Connected receptacle capacity is approximately equivalent to the 8.1 W/m² required by ASHRAE 90.1 but the operating schedule needs to have a much higher load at night and on weekends. The receptacle load is approximately 50% during the night and on weekends compared to daytime operation.

### 7. REFERENCES

ASHRAE/IES 90.1-1989 – ASHRAE Standard – Energy Efficient Design of New Buildings Except New Low-Rise Residential Buildings.

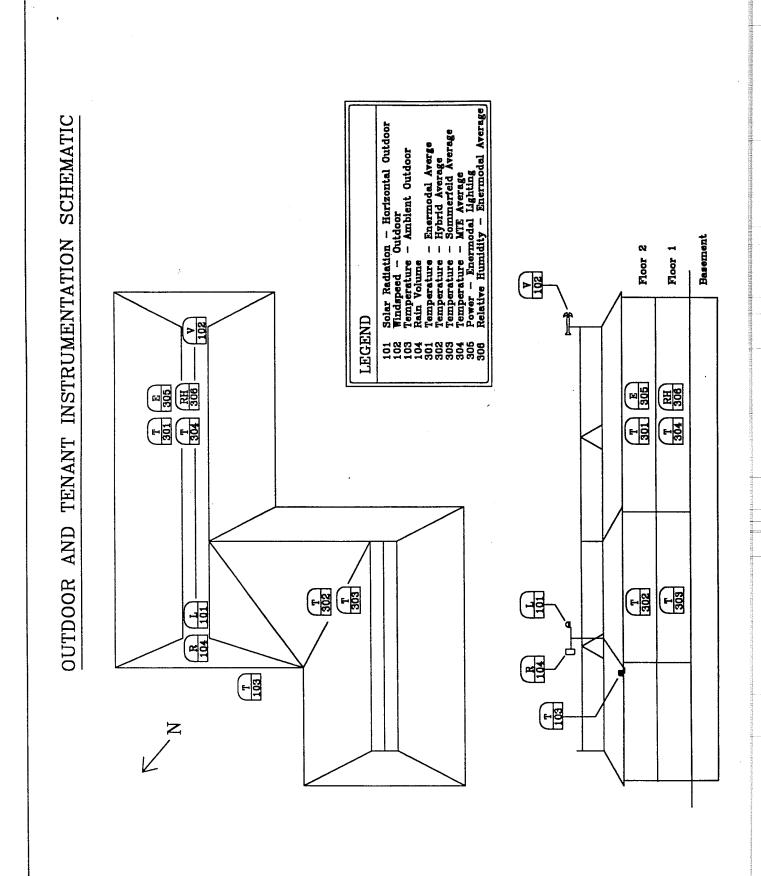
Atif, M., Love, J., and Littlefair, P., 1997. Daylighting Monitoring Protocols and Procedures for Buildings, report of IEA Task 21: Daylighting in Buildings.

Enermodal, 1996. Green on the Grand: C-2000 Office Building Final Report. Report prepared for CANMET, Natural Resources Canada.

Galasiu, A. and Atif, M., 1998. Daylighting Performance of Canada's First C2000 Office Building: Computer Simulation of a Continuous Dimming Lighting Control System, report prepared for Natural Resources Canada by National Research Council of Canada, Report No. A-3578.1.

Komor, Paul, 1997. Space Cooling Demands From Office Plug Loads. ASHRAE Journal, December 1997.

# Appendix A. Monitoring System Schematics



WINDOW

WINDOW

MINDOW

WINDOW

CEILING RADIANT PANELS

Temperature – Room Average Temperature – Ventilation Air Supply Temperature – Radiant Panel Surface Temperature – Mean Radiant Relative Humidity – Room Average Light – Deak Lavel Power – Room Light Fixture

203

LEGEND

OFFICE SPACE

LIGHT FIXTURE

OFFICE SPACE

DESK

207

REPRESENTATIVE OFFICE INSTRUMENTATION SCHEMATIC

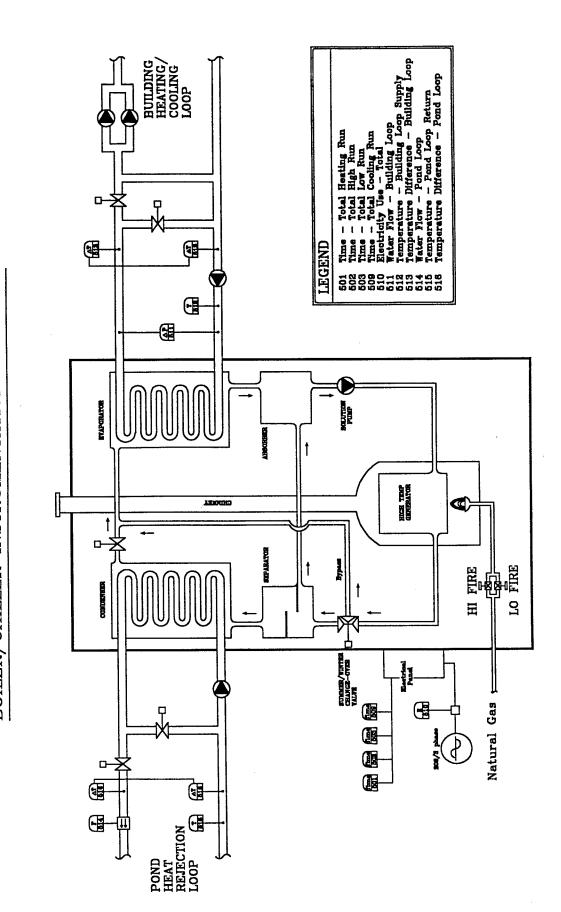
SUPPLY CLOSET

201

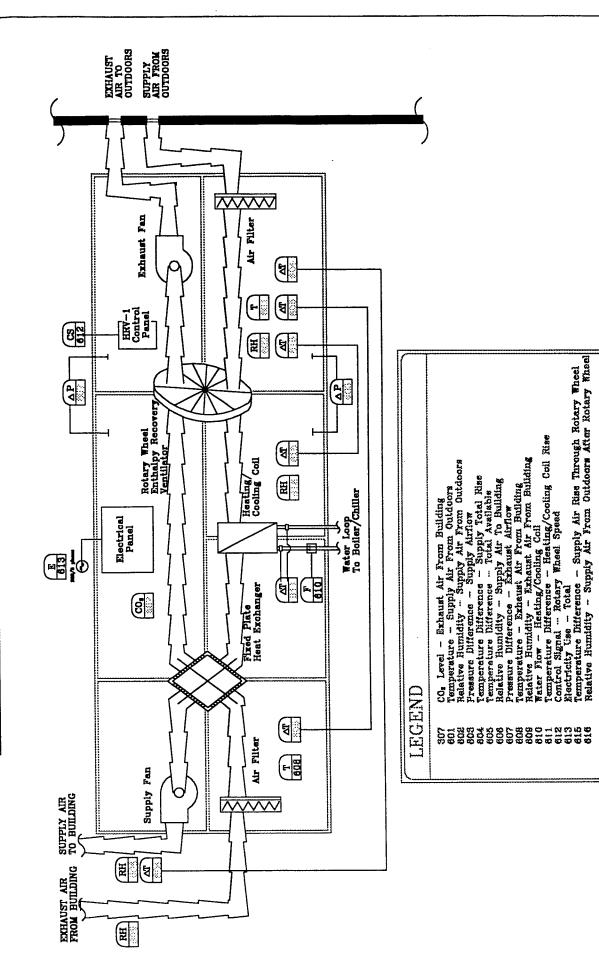
206

# EMR-OFF.DWG



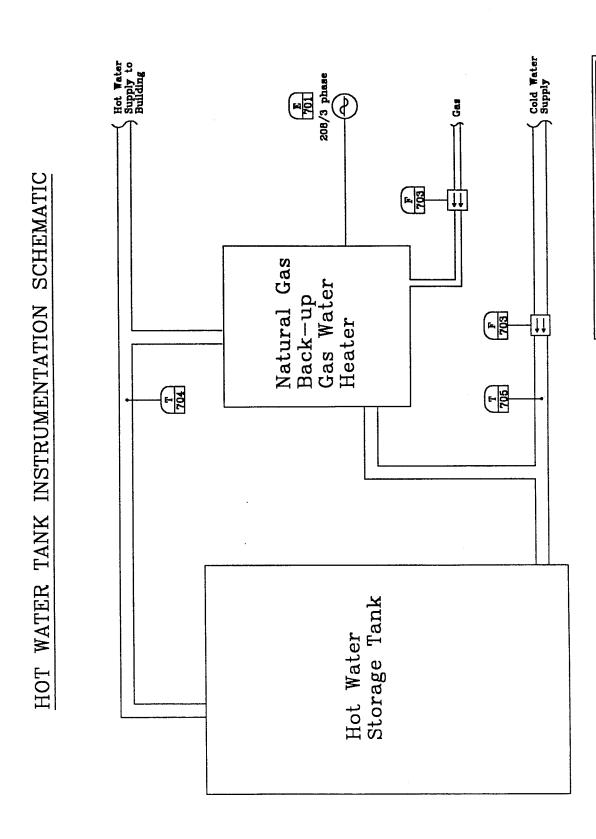


BOILER/CHILLER INSTRUMENTATION SCHEMATIC



SCHEMATIC

AIR HANDLING SYSTEM INSTRUMENTATION



701 Total Electricity Use - Water Heater 702 Total Gas Use - Water Heater 703 Total Hot Water Use 704 Temperature - Hot Water Average 705 Temperature - Mains Water Average

LEGEND

## **Appendix B. Monthly Utility Consumption**

Green on the Grand Monthly Summery			~	Aonthly l	Jtility Go	nsumpti	ion - Tots	Monthly Utility Consumption - Total Building				1996
	Total		Tenant Suite Electri	e Electricity (	ielty Use (kWh)		Common	Elevator	Total	Total	Total City	Well
Month	Bullding Elec. (KWh)	Tenant 1	Tenant 2	Tenant 3	Tenant 4	Tenant 5	EIBC. USB (KWh)	KUNTIMB (hrs)	Gas (m²)	Gas (oKWh)		(m <sup>2</sup> )
April 96	11718.0	648.0	3590.0	755.0	3865.0	0.0	2712.0	0.0	900.5	9319.7	28.3	0.0
96 veW	12237.7	614.5	3358.0	774.1	4041.9	0.0	3437.4	0.0	384.7	3981.5	41.0	0.0
Se enil	15709.7	856.6	3517.2	711.7	4245.5	0.0	6284.5	0.0	2170.6	22465.4	26.9	0.0
Se, shill.	17310.8	590.1	3293.5	860.5	3860.0	0.0	8572.0	0.0	2757.6	28540.1	28.9	0.0
August 96	17900.9	498.1	3121.4	849.8	3841.9	0.0	9481.7	0.0	5279.1	54636.5	65.4	0.0
September 96	17088.8	517.5	3279.4	1005.0	3531.6	0.0	8556.6	0:0	3814.8	39482.2	72.5	0.0
October.96	15791.4	602.4	3498.9	1039.5	4404.1	739.9	5517.0		1053.4	10902.2		
November 96	14788.1	6.069	3301.9	932.8	3979.7	1104.4	4621.9		1462.8	15138.9	61.6	
December, 96	12642.0	682.0	3130.0	833.0	3113.0	945.0	3841.0		2262.5	23416.4	39.5	
Sum	135187.4	5700.2	30090.2	7761.5	34882.6	2789.2	53024.0	0.0	20086.0	207882.8	364.2	0.0
Ψ.α	15020.8	633.4	3343.4	862.4	3875.8	309.9	5891.6	0.0	2231.8	23098.1	45.5	0.0
gi W	11718.0	498.1	3121.4	711.7	3113.0	0.0	2712.0	0.0	384.7	3981.5	26.9	0.0
Max	17900.9	856.6	3590.0	1039.5	4404.1	1104.4	9481.7	0.0	5279.1	54636.5	72.5	0.0
ekWh/m²	69.0	21.2	48.2	26.0	68.2	11.6	104.4			7.06	0.2	0.0

Page 1 of 3

Green on the Grand Monthly Summary	<b></b>			<b>Monthly</b>	Utility Co	nsumpt	Monthly Utility Consumption - Total Building	al Building				1997
			Tenant Suite Electri	e Electricity (	city Use (kWh)		Common	Elevator	Tetal	Tetal	Total City	Wei
Month	Building Elec. (KWh)	Tenant 1	Tenant 2	Tanant 3	Tenant 4	Tenant 5	LIGC. USB (KWh)		Gas (m.)	Banding • Gas (eKWh)	maler (m²)	
January,97	13837.3	792.8	3283.2	957.2	3821.5	1030.5	3903.2		2168.0	22437.7	31.3	
February,97	13248.0	522.0	3081.0	1212.0	3464.0	1093.0	3649.0		1356.4	14038.1	35.1	
March,97	15092.6	595.6	3218.5	1192.4	5044.1	1288.7	4739.7		1379.4	14276.7	33.0	
April,97	15744.0	665.0	3112.0	1093.0	3527.5	1476.0	5339.0	2.5	1042.1	10785.0	105.7	1200.3
Mav,97	14938.1	704.3	3038.0	939.7	3417.3	206.7	5133.4	1.3	1215.2	12577.3	36.7	0.0
June,97	16926.0	0.669	3040.0	992.0	3705.0	1236.0	6943.0	4.1	3919.1	40561.0	300.3	0.0
July,97	18786.0	681.0	3247.8	1102.6	4208.8	1039.5	8672.8	1.2	3508.4	36310.5	111.0	81.6
August,97	17803.7	638.4	3022.5	922.3	3728.2	1003.1	7932.1	1.1	2735.0	28306.1	88.8	91.9
September,97	17138.6	780.7	3205.0	947.1	3892.5	1113.2	7400.0	6.0	1704.1	17636.6	29.9	10.9
October,97	16740.0	887.2	3548.8	1064.3	4174.7	1256.2	5693.7	6.0	992.8	10274.9	31.5	0.0
November,97	15913.3	800.0	3315.6	924.4	3702.2	1092.2	5944.4	6.0	1349.8	13969.7	25.9	0.0
December,97	15257.8	736.3	3538.8	805.0	3450.7	1108.3	5603.3	2.0	1728.2	17886.5	56.9	0.0
Sum	191425.4	8502.3	38651.1	12152.1	46136.4	13646.5	70953.5	12.2	23098.4	239060.2	886.2	1384.7
Avg	15952.1	708.5	3220.9	1012.7	3844.7	1137.2	5912.8	<b>7</b> :	1924.9	19921.7	73.8	153.9
Min	13248.0	522.0	3022.5	805.0	3417.3	7.606	3649.0	0.9	992.8	10274.9	25.9	0.0
Max	18786.0	887.2	3548.8	1212.0	5044.1	1476.0	8672.8	2.5	3919.1	40561.0	300.3	1200.3
ekWh/m²	83.5	31.6	61.9	87.7	90.2	56.9	139.7			104.3	0.4	9.0

Green on the Grand	Monthly Commony

Green on the Grand Monthly Summary				<b>Monthly</b> L	<b>Utility Co</b>	nsumpt	ion - Tota	Utility Consumption - Total Building				1998
	Total		Tenant Suite Electric	e Electricity l	ity Use (kWh)	,	Common	Elevator		Teta	Tetal City	Well
Month	Bullding Elec. (KWh)	Tenant 1	Tenant 2	Tenant 3	Tenant 4	Tenant 5	LIBC. USB (KWh)	Kuntime (hrs)	Gas (m.)	Gas (okwh)	Maler (m)	מבופר (m²)
January,98	15870.0	904.0	3693.0	924.0	3970.0	1147.0	4941.0	9.0	1614.1	16705.0	33.0	0.0
February,98	14982.0	843.0	4479.0	952.0	3885.0	1170.0	4536.0	0.7	1265.8	13100.3	33.9	0.0
March,98	15016.4	954.8	2431.4	895.9	3777.9	1341.3	4453.7	1.3	1068.0	11053.7	40.7	1.6
Sum	45868.4	2701.8	10603.4	2771.9	11632.9	3658.3	13930.7	2.6	3947.9	40869.0	107.6	1.6
Ava	15289.5	9006	3534.5	924.0	3877.6	1219.4	4643.6	6.0	1316.0	13619.7	36.9	9.0
E.W.	14982.0	843.0	2431.4	895.9	3777.9	1147.0	4453.7	9.0	1068.0	11053.7	33.0	0.0
Мах	15870.0	954.8	4479.0	952.0	3970.0	1341.3	4941.0	1.3	1614.1	16705.0	40.7	1.6
ekWh/m²	20.0	10.0	17.0	20.0	22.7	15.2	27.4			17.8	0.0	0.0

# Appendix C. Monthly Monitoring Reports

1998	Meek Thu
January 1998	
	Average Lighting Power (W)
	Maximum Light Level (lex)
	Average Light Level (fex)
Representative Office	Average msolation (W/m²)
presenta	Carbon Dioxide (ppm)
itions - Re	Relative Humidity (3)
fort Condi	Average Ventilation Temp. (*C)
Indoor Com	Radiant Panel Temp. ("C)
三	Office MRT (*C)
	Avgerage Office Temp. (°C)
Grand	Outdoor Ambient Temp. (*C)
Green on the Gran Daily Symmery	Date

	Dally Summary	ΓY											
Minimit   Mini			Avgerage	Office	Radiant	Average	Relative	Carbon	Average	Average	Maximina Linht	Average Inhttm	Day of
41         214         215         245         186         3         217         174         373         883         0           24         214         214         214         212         245         186         1         223         41         66         1         223         41         46         17         268         0           6.3         212         213         214         224         224         188         15         223         44         66         17         368         96         46         17         368         96         47         368         96         47         368         96         47         368         96         47         368         96         47         368         96         47         368         96         47         368         96         37         476	Date	Ambient Temn (*f:)	Office Temn ("C)		Panei Temo. ("C)	Ventilation Temp. (°C)	HUMMALLY CS)	Dioxida (mgq)		Level (fex)	Level Clax)	Power (W)	# 65 F
2.4         2.18         2.14         2.28         19.8         7         208         167         65.3         2.05         0           6.3         2.12         2.08         2.14         2.28         19.0         15         2.23         41         46         17.3         0           0.0         2.12         2.08         2.41         18.6         15         2.03         37         101         0           2.6         2.14         2.14         2.21         18.6         15         2.03         37         101         0           4.5         2.0         2.14         2.14         2.14         2.14         2.14         2.14         2.14         2.14         3.04         30         37         101         0           4.5         2.10         2.14         2.14         2.14         2.14         2.14         2.14         3.04         41         30         37         101         0         0         42         42         41         0         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30 </td <td>90</td> <td>10mp. 1 03</td> <td>21.4</td> <td>21.2</td> <td>24.5</td> <td>18.6</td> <td>3</td> <td>217</td> <td>174</td> <td>375</td> <td>883</td> <td>0</td> <td>Thu</td>	90	10mp. 1 03	21.4	21.2	24.5	18.6	3	217	174	375	883	0	Thu
6.3         2.12         2.08         2.23         18.0         15         2.23         44         46         1.23         0           0.8         2.12         2.10         2.41         18.8         15         2.21         34         372         45         101         0           0.6         2.12         2.10         2.24         18.8         15         369         34         352         453         96           4.5         2.17         2.20         2.24         18.1         2.4         415         2.2         307         365         96           0.1         2.1         2.24         18.1         1.4         368         40         367         369         97         458         96           0.1         2.1         2.24         18.1         2.4         416         2.2         207         369         367         369         367         368         367         368         367         368         361         368         361         368         361         368         361         368         361         361         361         361         361         361         361         361         361         361	00 101	7	2. t	21.4	22.8	19.8	7	268	167	633	2263	0	Fi
0.8         21.2         21.0         24.1         18.8         13         22.1         33         37         101         0           2.6         21.4         22.4         22.1         18.8         13         22.1         322         455         986         34         352         455         986           4.5         22.0         22.2         18.8         16.5         380         72         308         385         686           0.1         21.1         22.0         22.2         18.8         16         386         72         308         386         686 </td <td>-Jan-90</td> <td>t m</td> <td>21.5</td> <td>20.8</td> <td>22.3</td> <td>19.0</td> <td>15</td> <td>223</td> <td>4</td> <td>4</td> <td>128</td> <td>0</td> <td>Sat</td>	-Jan-90	t m	21.5	20.8	22.3	19.0	15	223	4	4	128	0	Sat
2.6         2.14         2.14         2.21         18.6         15         396         34         352         475         506           8.6         2.14         2.14         2.21         18.8         2.2         393         7.2         308         405         96           8.6         2.17         2.20         2.2.6         18.8         1.6         381         2.2         308         365         409         365         365         365         367         368         367         368         367         368         367         368         367         368         367         368         367         368         367         368         367         368         367         368         367         368         367         368         367         368         367         368         368         367         368         367         368         368         368         367         368         3	00 40 40	, α ; c	2 : 5	21.0	24.1	18.8	13	23	33	37	101	0	Sun
6.6         2.7.7         2.0.9         2.9.9         39.9         7.2         32.2         43.8         66.9           4.5         2.2.0         2.2.4         18.1         2.4         41.5         2.2         30.8         30.8         30.8         30.8         40.8         40.0         20.0         40.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40.0         20.0         40	-180-190	) ) (	i - C	21.4	22.1	18.6	15	366	<b>8</b>	352	425	96	Mon
45         220         224         191         24         415         22         308         305	0-Jan-90	0 <b>7</b>	7 1.7	200	23	18.8	23	393	72	322	438	98	Tue
0.7         2.17         2.20         2.26         1.6         961         2.2         297         306         88           0.1         2.14         2.17         2.20         1.6         1.6         961         2.0         2.0         7.4           0.1         2.14         2.17         2.20         1.6         1.6         4         2.6         1.6         90         1.7         306         1.7           6.8         2.1         2.13         2.26         1.8         1.6         4         2.24         2.17         2.4         1.6         9.6         2.1         2.0         2.1         2.2         2.1         2.24         2.1         2.4         1.6         3.6         2.1         2.6         1.6         3.6         2.1         2.6         1.6         3.6         2.1         2.0         2.1         2.2         2.1         2.2         2.1         2.2         2.1         2.2         2.4         1.6         3.6         3.0         4.0         5.0         6.1         6         4.0         2.1         2.2         6.1         6         3.6         4.0         3.0         1.0         6         6.1         6         4.0	3-Jan-90	o u	- 666	22.4	22.4	191	. 77 77	415	83	308	365	8	Wed
0.1         21.1         21.2         23.2         18.5         14         388         40         287         376         74           2.8         21.6         21.6         22.3         181         8         246         217         602         2150         0           5.8         21.6         22.3         22.6         181         6         461         170         300         1005         0           6.9         22.1         22.3         22.6         181         6         461         178         347         596         70           6.9         22.2         22.4         24.1         184         8         359         201         369         60         70           8.6         22.2         22.4         24.9         183         7         402         71         369         60         70           8.6         21.2         22.4         21.9         23.4         186         5         200         71         72           8.6         21.2         22.4         184         184         5         201         308         477         77           8.7         21.1         284         186<	7-Jan-98	4, 0	24.7	t (c	 	. c	16	361	8	297	366	8	The
4.3         1.1         8         246         217         602         2180         0           2.8         2.1.5         2.1.6         2.2.6         18.7         4         226         160         307         1005         0           5.8         2.1.5         2.2.3         2.2.3         18.1         4         222         160         307         1005         10           6.6         2.2.1         2.2.3         2.2.1         19.3         8         406         171         309         605         61           6.4         2.1.9         2.2.2         2.4.9         18.9         7         402         19.9         378         619         7           6.5         2.1.0         2.2.4         2.4.9         18.9         7         402         19.9         378         619         7           6.5         2.1.0         2.2.4         18.9         18.9         7         402         18.9         378         619         7           6.5         2.1.0         2.2.4         18.9         18.4         4         7         7         7           6.2         2.1.2         2.1.1         2.2.4         18.4         <	3-Jan-98	0.7	7.1.7	2. 7.	23.5	 	. <u>1</u>	368	4	287	376	74	Æ
2.8         1.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.1         2.2         1.1         2.2 <td>9-Jan-98</td> <td>- O</td> <td>4. 6</td> <td>- 6</td> <td>2.02</td> <td>19.1</td> <td>; œ</td> <td>246</td> <td>217</td> <td>602</td> <td>2150</td> <td>0</td> <td>Sat</td>	9-Jan-98	- O	4. 6	- 6	2.02	19.1	; œ	246	217	602	2150	0	Sat
5.8         27.1         27.2         40.2         17.2         30.2         60.5         61.2           .6.         27.2         27.2         27.2         27.4         18.2         6         40.6         71         30.5         60.5         61         77           .6.         27.2         27.2         27.2         18.2         6         40.6         71         30.5         44.4         75         77           .6.         27.2         27.2         18.4         3         22.2         20.4         41.7         40.2         41.7         40.2         41.7         75         77         77         77         77         77         77         77         77         77         77         77         77         70.2	)-Jan-98	-2.8	6.12 6. 14	2. 2. E. A.	2. 7. 8. 7. 8	18.7	. 4	232	160	300	1005	0	Sun
6.9         22.2         22.4         24.1         19.4         8         359         201         369         616         61           8.6         22.2         22.4         18.9         7         402         113         378         619         7.7           8.6         22.0         22.4         18.9         7         402         113         378         619         7.7           8.6         22.0         22.4         18.9         18.9         7         406         71         328         474         7.5           6.2         21.2         21.9         22.9         19.2         8         417         17         328         474         7.5           6.2         21.2         21.9         22.9         19.2         8         417         17         328         474         7.5           5.5         21.1         22.1         22.4         18.4         5         220         146         7.7         448         7.7         448         7.7         448         7.7         448         7.8         444         7.8         448         7.8         448         7.8         448         7.8         448         7.8	1-Jan-96	o J	5. 50	27.3	25.0	191	ဖ	461	126	347	596	76	Mon
-6.9         -2.2         -2.4 <th< td=""><td>2-Jan-98</td><td>ų o</td><td>22.1</td><td>5.7</td><td>5. 25.</td><td>10.1</td><td>ο α</td><td>359</td><td>201</td><td>369</td><td>605</td><td>61</td><td>Tue</td></th<>	2-Jan-98	ų o	22.1	5.7	5. 25.	10.1	ο α	359	201	369	605	61	Tue
4.6         21.3         2.6.2         2.7.2         2.6.2         2.7.2         2.6.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         2.7.2         4.	3-Jan-98	D. 1	7.77	t	. 076	280	. ~	402	193	378	619	೮	Wed
45         25         25         25         447         126         325         444         75           6.2         21         21,0         23,9         192         8         417         126         325         444         75           6.2         21         21,1         26,4         186         5         230         69         55         111         0           3.5         21,1         26,4         184         3         229         142         146         37         0           3.5         21,8         21,7         26,3         18,9         5         361         142         146         37           5.0         22,1         22,4         18,3         5         341         425         690         39           5.0         22,4         24,5         19,5         6         394         184         46         37         448         78           5.0         22,4         24,5         19,7         6         394         46         46         77         48         77           5.1         22,4         19,4         4         237         46         105         46         106	4-Jan-98	4. (	2 C	2.72	23.4	693	. α	406	7	335	477	72	捏
6.2         2.1.3         2.1.4         18.6         5         200         69         55         111         0           -3.9         2.1.1         2.1.1         2.1.4         18.6         5         220         142         146         347         0           -3.9         2.1.1         2.1.0         2.64         18.4         3         229         142         146         347         0           -5.5         2.1.8         2.1.7         2.43         18.7         5         361         425         66         56         66         56         66         56         66         56         66         56         66         56         66         56         66         56         67	5-Jan-98	р ц 0 с	27.0	2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2	23.0	19.2	· 00	417	126	325	444	75	Æ
-0.2         2.1         21.0         28.4         18.4         3         22.9         142         146         347         0           -3.5         21.8         21.7         24.3         18.9         5         361         190         356         551         67           -5.5         22.8         22.8         24.3         18.9         5         361         455         561         67           -5.0         22.3         22.4         24.5         19.5         6         394         18         35         48         78           -7.6         22.3         22.4         24.5         19.5         6         394         18         37         48         77           -2.8         22.4         22.5         24.9         19.5         6         394         18         37         48         77           -2.8         22.1         22.2         24.9         19.4         4         237         106         105         206         0           -6.7         22.2         25.5         19.4         4         237         46         47         106         105         206         106           -6.7 <t< td=""><td>5-Jan-98</td><td>ი დ ი დ</td><td>21.5 5.75</td><td>2 7 7</td><td>26.4</td><td>18.6</td><td>ស</td><td>230</td><td>69</td><td>55</td><td>111</td><td>0</td><td>Sat</td></t<>	5-Jan-98	ი დ ი დ	21.5 5.75	2 7 7	26.4	18.6	ស	230	69	55	111	0	Sat
-3.9         21.1         21.7         24.3         18.9         5         361         190         356         551         67           -5.5         22.8         22.8         24.3         19.7         5         342         351         425         690         39           -5.0         22.8         22.8         24.3         19.7         6         34         138         324         465         77           -7.6         22.4         22.5         24.9         19.5         6         394         138         324         462         77           -2.9         22.4         22.5         24.9         19.7         8         388         46         317         427         77           -2.8         22.4         22.5         24.9         19.4         3         238         46         317         427         76           -3.8         22.2         22.4         25.5         19.4         3         238         46         317         427         76           -3.1         22.5         25.5         19.4         3         239         48         46         346         560         71           -3.1	06-UBC-7	, c	1 C	. 5	26.4	18.4	ო	229	142	146	347	0	Sun
5.5         22.8         22.8         19.7         5         342         351         425         680         39           -5.0         22.8         22.8         24.5         19.5         5         371         161         327         448         78           -5.0         22.3         22.4         24.5         19.5         6         394         161         327         448         78           -2.9         22.4         22.5         24.9         19.5         6         394         46         37         448         78           -2.9         22.4         22.5         24.9         19.7         8         386         46         317         427         47         76           -2.9         22.1         22.2         22.3         19.4         4         237         106         105         76         7           -6.7         22.3         22.4         19.5         19.4         4         237         145         36         56         7         145         165         16         145         145         16         16         16         16         16         16         16         16         16         16 <td>8-Jan-98</td> <td>ა. თ. ო</td> <td>21.8</td> <td>2 7</td> <td>24.3</td> <td>18.9</td> <td>ဌ</td> <td>361</td> <td>190</td> <td>356</td> <td>551</td> <td>29</td> <td>Mon</td>	8-Jan-98	ა. თ. ო	21.8	2 7	24.3	18.9	ဌ	361	190	356	551	29	Mon
-5.0         22.3         22.4         24.5         19.5         5         37.1         161         327         448         78           -7.6         22.4         22.5         24.9         19.5         6         394         136         32.4         462         77           -2.9         22.4         22.5         24.9         19.7         8         386         46         317         427         76           -2.8         22.1         22.2         25.3         19.4         4         237         106         105         76           -3.8         22.3         22.4         25.7         19.4         3         238         46         105         76           -6.7         22.4         25.7         19.4         4         237         106         105         71           -6.7         22.4         25.5         19.5         7         419         142         356         476         1056         7           -6.7         22.2         22.6         19.5         19         4         23         49         356         476         76         7           -0.8         22.2         22.4         19.4	9-7411-90	י טעי	27.8	22.8	24.3	19.7	ß	342	351	425	680	සි	Tue
7.0         2.4         2.5         4.6         394         138         324         462         77           7.6         2.24         2.25         2.43         19.5         6         394         138         324         462         77           2.9         2.24         2.25         2.43         19.7         8         388         46         317         427         76           2.8         2.24         2.25         2.24         2.57         19.4         4         237         106         105         206         0           6.7         2.24         2.25         2.56         19.5         7         419         145         356         506         71           6.7         2.24         2.55         19.5         7         419         130         346         560         71           3.1         2.25         2.26         2.48         19.7         8         451         173         365         476         76           3.1         2.25         2.26         2.34         19.5         10         408         49         2.58         476         76           4.6         2.14         2.14	0-1an-90	, u	22.3	22.4	24.5	19.5	S	371	161	327	448	78	Wed
7.9         224         225         24.3         19.7         8         388         46         317         427         76           2.8         22.4         22.5         24.3         19.4         4         237         106         105         206         0           2.8         22.1         22.2         25.3         19.4         4         237         472         1056         0           6.7         22.3         22.4         25.5         19.4         3         238         237         472         1056         0           6.7         22.3         22.4         25.5         19.5         7         419         130         346         560         71           6.3         22.3         22.8         19.7         8         451         173         355         476         76           6.8         22.2         22.2         22.4         19.5         10         408         49         258         483         77           7.1         22.0         22.1         18.4         10         402         13         358         483         77           2.2         21.4         22.1         18.4         <	1-Jan-90		22.4	22.5	249	19.5	9	394	138	324	462	11	Th
2.3         22.1         22.2         25.3         19.4         4         237         106         105         206         0           -3.8         22.3         22.4         25.7         19.4         3         238         237         472         1056         0           -6.7         22.4         25.5         19.5         5         400         145         356         562         71           -3.6         22.3         22.5         25.0         19.5         7         419         130         346         560         71           -3.1         22.5         22.6         19.7         8         451         173         365         476         76           -0.8         22.2         22.4         19.7         8         451         173         365         476         76           -0.8         22.0         22.1         19.4         10         408         49         258         476         77           -2.2         21.4         21.4         25.2         18.9         4         236         169         173         250         7           -2.2         21.4         21.4         25.2         18.9	2-Jan-96	0.7-	22.4	22.5	24.3	19.7	80	388	46	317	427	92	Ē
2.2.0         2.2.1         2.2.2         2.2.4         2.5.7         194         3         238         237         472         1056         0           -3.8         22.3         22.4         25.5         19.5         5         400         145         356         562         71           -3.1         22.4         22.5         25.0         19.5         7         419         173         346         560         71           -3.1         22.2         22.6         24.8         19.7         8         451         173         355         476         76           -0.8         22.2         22.2         22.4         19.4         10         408         49         258         476         76           -1.6         22.0         22.1         22.6         19.4         10         402         133         358         483         77           -2.2         21.4         25.2         18.9         4         236         15         260         0           -2.9         21.4         25.2         18.4         3         21         22         31         48         35         461         3         31         48	9-Jan-90	6.7- 6.7	, ç	22.2	25.3	19.4	4	237	106	105	206	0	Sat
-5.0         22.5         25.5         19.5         5         400         145         356         56.2         71           -6.7         22.4         22.5         25.5         19.5         7         419         130         346         560         71           -3.6         22.3         22.6         24.8         19.7         8         451         173         355         476         76           -0.8         22.2         22.2         23.4         19.5         10         408         49         258         357         71           -1.6         22.0         22.1         22.6         19.4         10         402         133         358         483         77           -2.2         21.4         25.2         18.9         4         236         169         137         260         0           -2.2         21.4         25.2         18.9         4         236         169         137         260         0           -2.9         21.8         21.8         3         21.4         25.2         18.4         3         21.7         22.3         101         0           -2.9         21.8         22.8 <td>1-Jan-98</td> <td>-7.0 8 c</td> <td>72.1</td> <td>22.4</td> <td>25.7</td> <td>4.61</td> <td>· m</td> <td>238</td> <td>237</td> <td>472</td> <td>1056</td> <td>0</td> <td>Sun</td>	1-Jan-98	-7.0 8 c	72.1	22.4	25.7	4.61	· m	238	237	472	1056	0	Sun
-3.6         22.3         22.5         25.0         19.5         7         419         130         346         560         71           -3.6         22.3         22.6         24.8         19.7         8         451         173         355         476         76           -0.8         22.2         22.2         23.4         19.5         10         408         49         25.8         476         76           -1.6         22.0         22.1         22.6         19.4         10         402         133         358         483         77           -2.2         21.4         21.4         25.2         18.9         4         236         159         77           -2.2         21.4         25.2         18.9         4         236         159         17         260         0           -2.3         21.9         24.2         19.1         9         337         127         37         101         0           -3.4         22.8         22.8         26.4         19.8         29         461         351         37         101         0	5-Jan-98	6.6 6.7	22.3	22.5	25.5	19.5	ហ	400	145	356	299	71	Mon
-3.1         22.5         22.6         24.8         19.7         8         451         173         355         476         76           -0.8         22.2         22.4         19.5         10         408         49         258         357         71           -1.6         22.0         22.1         22.6         19.4         10         402         133         358         483         77           -2.2         21.4         21.4         25.2         18.9         4         236         169         137         260         0           -2.9         21.9         22.1         18.4         3         217         22         37         101         0           -9.4         21.1         20.8         22.1         18.4         3         217         22         37         101         0           8.6         22.8         22.8         461         3         461         633         2263         96	0-Jan-90	- 4 - 6	22.4	22.5	25.0	19.5		419	130	346	260	71	Tue
2.9         2.2         2.2         2.3         4 9         4 9         2.58         357         71           -0.8         2.2         2.2         2.3         19.4         10         402         133         3.58         483         77           -1.6         2.2         2.1         2.2         18.9         4         2.36         133         3.58         483         77           -2.2         2.1.4         2.1.4         2.5.2         18.9         4         2.36         169         137         260         0           -2.9         2.1.9         2.1.9         2.1.1         18.4         3         2.17         2.2         37         101         0           9.4         2.2.8         2.2.8         2.2.1         18.4         3         2.17         2.2         37         101         0           8.6         2.2.8         2.2.8         2.2.4         19.8         2.9         46.1         35.1         63.3         2.263         96	7-Jail-90		22.5	22.6	24.8	19.7	œ	451	173	355	476	92	Wed
-0.6         22.0         22.1         22.6         19.4         10         402         133         358         483         77           -1.6         22.0         22.1         22.6         19.4         10         4         236         169         137         260         0           -2.2         21.4         25.2         18.9         4         236         169         137         260         0           -2.9         21.9         24.2         19.1         9         337         127         311         688         48           -9.4         21.1         20.8         22.1         18.4         3         217         22         37         101         0           8.6         22.8         22.8         26.4         19.8         29         461         361         633         2263         96	0-1an-6	- ·	5.27	22.2	23.4	19.5	10	408	49	258	357	71	귶
-1.0 22.0 11.4 25.2 18.9 4 236 169 137 260 0 -2.2 21.4 21.4 25.2 18.9 4 236 169 137 260 0 -2.9 21.9 24.2 19.1 9 337 127 311 688 48 -3.4 21.1 20.8 22.1 18.4 3 217 22 37 101 0 8.6 22.8 22.8 26.4 19.8 29 461 351 633 2263 96	9-Jan-98	φ. γ. ω. φ.	22.5	22.4	20.6	19.4	10	402	133	358	483	14	Ē
-2.9 21.9 24.2 19.1 9 337 127 311 588 48 -9.4 21.1 20.8 22.1 18.4 3 217 22 37 101 0 8.6 22.8 26.4 19.8 29 461 361 633 2263 96	0-Jan-98	o c	21.4	21.4	25.2	18.9	4	236	169	137	260	0	Sat
-2.9 21.9 24.2 19.1 9 337 127 311 588 48 -9.4 21.1 20.8 22.1 18.4 3 217 22 37 101 0 8.6 22.8 22.8 26.4 19.8 29 461 351 633 2263 96	1-7all-90	7.7.											
2.4 21.1 20.8 22.1 18.4 3 217 22 37 101 0 8.6 22.8 26.4 19.8 29 461 361 633 2263 96	Eum Sum	ď	21.0	21.9	24.2	19.1	o	337	127	311	288	48	
8.6 22.8 22.8 26.4 19.8 29 461 351 633 2263 96	5 4 5 E	6.3- 4 0	21.1	20.8	22.1	18.4	က	217	22	37	101	•	
	Max M	t 98	22.8	22.8	26.4	19.8	29	461	361	633	2263	96	
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Green on the Grand Dally Summary	) Grand ry		Ē	Indoor Com	fort Condi	tions - Re	presenta	fort Conditions - Representative Office	<b></b>		<u>a</u>	February 1998
Date	Outdoor Ambient Temp. (*C)	Avgerage Office Temp. (°C)	Office MRT (75)	Radiant Panel Temp. (*C)	Average Ventilation Temp. (°C)	Relative Humidity (X)	Carbon Dioxide (ppm)	Average insolation [W/m²]	Average Light Level (fex)	Maximum Light Level (lex)	Average Lighting Power (W)	Day of Wesk
01-Feb-98	-1.4	22.0	22.0	25.2	19.0	3	234	350	720	1421	2	Sun
02-Feb-98	6.0	21.8	21.8	23.5	19.2	80	417	128	168	293	24	Mon
03-Feb-98	-4.2	21.9	21.9	23.2	19.3	7	373	216	302	487	88	Tue
04-Feb-98	-6.3	22.1	22.2	24.3	19.4	4	384	299	291	463	17	Wed
05-Feb-98	4.6	22.2	22.4	24.5	19.4	4	381	366	266	534	0	잼
06-Feb-98	-9.1	22.2	22.0	24.5	20.0	4	289	0				Ē
10-Feb-98	2.9	24.1	24.3	25.2	20.3	9	454	340	482	765	4	Tue
11-Feb-98	1.5	22.5	22.8	23.1	19.7	O	463	148	310	388	8	Wed
12-Feb-98	0.5	22.0	22.1	22.0	19.4	12	421	29	178	341	8	펀
13-Feb-98	-3.9	22.0	22.3	24.4	19.2	80	446	146	319	399	18	Ë
14-Feb-98	6.6-	22.1	22.1	27.1	18.8	೮	235	463	562	996	0	Sat
15-Feb-98	-6.0	21.7	21.9	28.6	18.7	၈	233	274	196	431	0	Sun
16-Feb-98	-2.2	22.3	22.5	25.6	19.3	5	419	260	382	501	88	Mon
17-Feb-98	8.0	22.4	22.5	23.7	19.6	10	360	37	309	350	8	Tue
18-Feb-98	6.0	22.4	22.5	22.9	19.7	12	387	90	267	364	75	Wed
19-Feb-98	1.0	22.3	22.4	23.4	19.8	4	400	94	66	267	19	표
20-Feb-98	0.8	22.0	22.0	22.6	19.7	13	359	122	81	246	თ	Æ
21-Feb-98	-0.3	21.6	21.7	25.3	19.1	∞	231	143	61	109	0	Sat
22-Feb-98	-0.1	21.6	21.7	26.2	19.0	7	229	117	• 4	92	0	Sun
23-Feb-98	0.4	22.6	22.8	24.8	19.6	ω	392	309	348	458	72	Mon
24-Feb-98	-0.7	22.6	22.8	23.9	19.8	œ	366	250	308	404	70	Tue
25-Feb-98	4.4	23.2	23.3	24.7	20.1	10	373	414	428	670	8	Wed
26-Feb-98	1.8	23.2	23.4	24.3	20.1	10	394	397	445	772	51	析
27-Feb-98	1.4	22.8	23.1	23.2	20.1	10	438	138	320	465	ಜ	F
28-Feb-98	2.7	21.9	22.0	23.7	19.4	12	247	256	374	1152	0	Sat
Sum						,						
Avg	-1.3	22.3	22.4	24.4	19.5	œ	358	216	303	514	38	
Min	6.6-	21.6	21.7	22.0	18.7	က	229	0	49	92	0	
Max	2.9	24.1	24.3	28.6	20.3	4	463	463	720	1421	90	

Outdoor         Anblent         Office         MRT           O1-Mar-9B         Amblent         Office         MRT           O1-Mar-9B         3.8         21.6         21.6           O2-Mar-9B         1.0         22.4         22.5           O3-Mar-9B         0.8         22.2         22.2           O4-Mar-9B         -0.6         22.2         22.2           O5-Mar-9B         -0.6         22.3         22.5           O5-Mar-9B         -0.6         22.3         22.5           O5-Mar-9B         -0.6         22.3         22.5           O5-Mar-9B         -0.6         21.6         21.6           O5-Mar-9B         -0.7         21.7         21.7           10-Mar-9B         -11.2         21.8         22.3           15-Mar-9B         -5.1         22.1         22.1           15-Mar-9B         -7.5         22.0         22.1           15-Mar-9B         -7.5         22.0         22.1           15-Mar-9B         -7.5         22.2         22.4           15-Mar-9B         -7.5         22.3         22.4           15-Mar-9B         -1.4         21.4         21.4           22-	Radiant Panel 10mp. (°C) 24.5 24.2 22.7 22.6 22.7 22.6 22.6 22.6 22.6 22	Average Ventilation 19.1 19.5 19.6 19.6 19.6 19.6 19.0 19.0 19.3 18.7 18.8 19.0 19.0 19.0	Humidity  15 13 13 10 10 10 10 17 17 17 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	Carbon Dloxide (ppm) 235 413 377 422 417 434 247 230 365 353 367 239 239 239 239 239 239	Average Insolution (W/m²) (W/m	Average Light 126 126 337 201 208 252 552 552 557 544 444	Maximum Light Level (brx) 275 490 345 465 465 461 555 100 1104 11013 794 575	Average Lighting Pewer (W)  Pewer (W)  29  29  61  61  62  62  63  63  63  63  63  63  63  63	Mesk Mon Tue Sun Mon Tue Sun Mon Tue Sun Mon Tue Wed Thu Sun Mon Tue Wed Thu Fri Sun Tue Sun Fri Sun Hon Tue Tue Tue Tue
3.8 1.0 1.0 0.8 0.8 0.6 0.6 0.6 0.7 0.7 0.8 0.4 0.4 0.4 0.4 0.3 0.3 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	24.5 24.2 22.7 23.2 24.0 26.6 27.6 27.6 27.6 27.6 27.6 27.6 27.6	19.1 19.5 19.6 19.6 19.0 19.0 18.8 18.6 18.6 19.0	51 51 51 51 51 51 51 51 51 51 51 51 51 5	235 413 377 417 417 417 230 365 365 367 372 372 372 372 372 372 372 372 372 37	154 136 173 173 173 174 175 176 176 177 178 178 178 178 178 178 178 178 178	126 337 201 352 291 351 57 57 57 562 562 564 444	275 490 345 465 461 555 100 1104 1013 794 575	0 <b>8</b> 8 5 5 8 0 0 0 0 0 4 <b>6</b> 0 0 8	Sun Mon Wed Sun Thu The Fri Sun Thu Mon Thu
1.0 0.8 0.8 0.6 0.6 0.6 0.7 0.7 0.7 0.8 0.4 0.3 0.3 0.4 0.3 0.4 0.3 0.5 0.3 0.2 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	24.2 22.7 23.2 24.0 25.6 25.6 27.0 27.0 27.0 27.0 27.1 26.5 27.0 27.0 27.0 27.0 27.0 27.0 27.0	19.5 19.6 19.6 19.6 19.0 19.0 18.8 19.0 18.8 18.6 19.0	££ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	413 422 422 434 434 365 365 367 372 372 372 372 372 372 372 372 372 37	136 175 173 156 160 100 100 100 100 100 100 100 100 10	337 201 352 291 361 57 57 57 507 166	490 345 465 461 461 100 1104 1013 794 575 765	8 8 6 8 8 0 0 0 0 0 4 8 0 0 8	Mon The Wed Sun The The Sun Thu
0.8 22.2 -0.6 22.5 -0.6 22.2 -1.0 22.3 0.3 21.8 0.4 21.6 3.1 21.8 -1.2 21.8 -2.5 21.4 -7.5 22.3 -7.9 22.3 -7.9 22.3 0.2 22.3 0.3 22.3 0.2 22.3 -1.4 21.8 -3.3 21.4 -4.3 22.8 -2.9 22.9 -2.1 22.9 -2.1 22.9 -2.1 22.9 -2.2 22.1 -1.4 21.8 -3.3 22.9 -2.4 22.8 -2.5 22.9 -2.1 22.9 -2.2 22.1 -1.4 21.8 -3.3 22.9 -2.4 22.9	22.7 23.2 24.0 25.6 25.6 27.0 27.0 27.1 26.0 27.0 27.1 26.0 27.0 27.1 26.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27	19.6 19.8 19.6 19.2 19.2 19.3 18.7 18.8 19.0 18.6 19.5	61 01 00 00 7 7 7 7 8 8 8	377 4 4 7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 5 8 6 5 8 6 5 6 6 6 6 6 6 6 6 6 6 6 6	180 175 175 173 173 179 179 179 179 179 179 179 179 179 179	201 352 291 291 208 45 57 57 57 57 56 44 44	345 465 433 461 555 100 1104 1013 794 575 765	82 25 28 0 0 0 0 0 26 25 0 0 28	Tue Wed Thu Sat Mon Tue Thu Thu Sun Thu Thu Mon
0.6       22.5         0.6       22.2         1.0       22.3         0.4       21.8         0.4       21.8         0.4       21.6         3.1       21.7         9.6       21.6         -11.2       21.6         -1.2       21.6         -2.5       22.3         -7.5       22.3         -7.5       22.0         -7.9       22.3         0.3       22.3         0.3       22.3         0.3       22.3         0.3       22.3         3.3       21.4         -4.3       22.8         2.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22	22.6 23.2 24.0 25.6 23.5 26.0 27.0 27.0 27.1 26.5 27.1 26.5 27.1 26.5 27.1	19.8 19.6 19.0 19.0 19.0 18.8 19.0 19.6 19.6 19.6	01 0 0 0 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8	422 417 434 247 230 365 365 365 365 365 239	175 173 166 173 173 173 173 173 173 173 173 173 173	352 291 351 208 45 57 57 507 396 166	465 433 461 555 100 1104 1104 794 575 765	5 2 8 0 0 0 0 0 \$ \$ 0 0 S	Wed Thu San Sun Yue Wed Won The Tue Mon Thu Thu San Thu Thu Thu Thu Thu Thu Tue Mon Tue Tue
0.6       22.2         -1.0       22.3         0.3       21.8         0.4       21.6         3.1       21.7         9.6       21.6         -11.2       21.7         8.9       22.3         -5.1       22.1         -7.5       22.3         -7.9       22.5         -7.9       22.5         -7.9       22.3         0.3       22.3         0.2       22.3         0.3       22.3         0.4       21.8         -1.4       21.8         -3.3       21.4         -4.3       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4       22.9         12.4 <t< td=""><td>23.2 24.0 25.6 23.5 23.5 26.0 27.0 27.0 27.1 26.5 26.5 24.1</td><td>19.6 19.6 19.2 19.3 18.7 18.8 19.0 18.6 18.6 19.5</td><td>00 00 12 12 12 12 12 12 12 12 12 12 12 12 12</td><td>417 247 247 365 365 372 372 372 372 402</td><td>173 156 100 459 459 497 497</td><td>291 351 208 57 57 552 567 166 444</td><td>433 461 555 100 1129 1104 1013 794 575 287</td><td>2800000££008</td><td>Thu Sat Sun Mon Tue Thu Fri Sun Toe</td></t<>	23.2 24.0 25.6 23.5 23.5 26.0 27.0 27.0 27.1 26.5 26.5 24.1	19.6 19.6 19.2 19.3 18.7 18.8 19.0 18.6 18.6 19.5	00 00 12 12 12 12 12 12 12 12 12 12 12 12 12	417 247 247 365 365 372 372 372 372 402	173 156 100 459 459 497 497	291 351 208 57 57 552 567 166 444	433 461 555 100 1129 1104 1013 794 575 287	2800000££008	Thu Sat Sun Mon Tue Thu Fri Sun Toe
-1.0 22.3 0.4 0.4 21.8 0.4 21.6 21.6 21.6 21.6 21.6 21.6 21.6 21.6	24.0 25.6 23.5 23.5 27.0 27.1 27.1 26.5 26.5 26.5	19.6 19.2 19.3 18.7 18.8 19.0 18.6 18.6 19.5	0 0 7 <del>7</del> 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	434 247 230 365 367 372 372 372 239 402	156 234 79 100 459 430 282 602	351 208 57 57 552 507 166 444	461 555 100 1129 1104 1013 794 575 287	800000 <del>180</del> 00 8	Fri Sun Mon Tue Wed Thu Fri Sat Mon
0.3 21.8 0.4 21.6 3.1 21.7 9.6 -11.2 21.7 -1.2 21.8 -1.3 22.3 -2.5 22.3 -7.9 22.3 -7.9 22.3 0.3 22.3 0.2 22.3 0.3 22.3 0.4 22.3 2.3 22.3 2.4 22.9 2.4 22.9 2.4 22.9 2.5 2.1 2.6 2.1 2.7 2.9 2.8 2.3 2.1 4 2.9 2.1 2.1 4 2.9 2.9 2.1 4 2.9 2.9 2.9 2.1 4 2.9 2.9 2.1 4 2.9 2.9 2.9 2.9 2.1 4 2.9	25.6 23.5 26.0 27.0 27.1 27.1 27.1 27.1 27.1 27.1 27.1 27.1	19.2 19.0 19.3 18.7 18.8 19.0 18.6 18.6 18.7	0 r t r e 4 4 e e e	247 230 365 372 372 368 239 402	234 100 100 459 514 430 602	208 45 57 545 552 507 166 444	555 100 1104 1104 1013 794 575 287	0 0 0 0 0 \$ \$ 0 0 S	Sat Mon The Thu Fri Sat Mon
0.4 21.6 3.1 9.6 -11.2 -10.6 -11.2 -2.6 -2.1 -2.5 -7.9 -7.9 -7.9 -7.9 -7.9 -7.9 -7.9 -7.9	26.6 23.5 26.0 27.0 27.0 27.1 27.6 26.5 24.1	19.0 19.3 18.7 18.8 19.0 18.6 18.7 18.6	<b>Г</b>	230 365 365 372 372 234 402	79 100 514 514 430 282 602	45 57 545 552 507 396 166 444	100 129 1104 1013 794 575 287 765	000088008	Sun Mon The Thu Fri Sart Mon Tue
3.1 21.7 -9.6 -11.2 -8.9 21.8 -8.9 22.3 -5.1 22.1 -2.5 22.0 -7.9 22.5 -7.9 22.3 0.3 22.3 0.2 22.1 -1.4 21.8 -3.3 21.4 -4.3 22.9 2.4 22.9 2.4 22.9	23.5 26.0 27.6 27.0 26.5 27.1 28.1 26.5 24.1	19.3 18.7 18.8 19.0 18.6 18.6 18.6	<u>7</u>	365 363 372 358 234 239	100 459 514 497 282 602	57 545 552 507 396 166 444	129 1104 1013 794 575 287 765	0 0 0 A B 0 0 S	Mon Tue Wed Thu Fri Sat Sun Mon
9.6 -11.6 -11.2 -11.8 -11.2 -11.8 -11.2 -11.8 -11.4 -1	26.0 27.6 27.0 26.5 27.1 27.6 28.1 26.5 24.1	18.7 18.8 19.0 18.6 18.7 18.6		353 367 372 358 239 402	459 497 430 602	545 552 507 396 166 444	1104 1013 794 575 287 765	0 0 <b>%</b> & 0 0 %	Tue Wed Thu Fri Sat Sun Mon
-11.2 21.8 -8.9 22.3 -5.1 22.1 -7.5 22.0 -7.9 22.5 -3.1 22.9 0.3 22.9 0.2 22.1 -1.4 21.8 -3.3 21.4 -3.3 21.4 -4.3 22.8 -2.4 22.9 12.4 22.9	27.6 27.0 26.5 27.1 27.6 28.1 26.5 24.1	18.4 19.0 18.6 18.7 18.6	w 4 4 w w w	367 372 358 234 239	514 497 430 282 602	552 507 396 166 444	1013 794 575 287 765	o 18 18 0 0 18	Wed Thu Fri Sat Sun Mon
-8.9 22.3 -5.1 22.1 -2.5 21.4 -7.5 22.0 -7.9 22.5 -3.1 22.9 0.2 22.3 0.2 22.3 0.2 22.3 -3.3 22.4 -4.3 22.8 -5.4 22.9 12.4 22.9	27.0 26.5 27.1 27.6 28.1 26.5 24.1	18.8 19.0 18.6 18.7 18.6	44000	372 358 234 239	497 430 282 602	507 396 166	794 575 287 765	8	Thu Fri Sat Sun Mon Tue
5.1 -2.5 -7.5 -7.9 -	26.5 27.1 27.6 28.1 26.5 24.1	19.0 18.6 18.7 18.6	4 10 10 10	358 234 402	282 602 283	396 166 144	575 287 765	£ 0 0 8	Fri Sat Sun Mon Tue
2.5 21.4 -7.9 22.0 -7.9 22.5 -3.1 22.3 0.2 22.3 0.2 22.3 0.2 22.3 -1.4 21.8 -3.3 21.4 -4.3 22.8 -4.3 22.9 2.4 22.9 12.4 22.9	27.1 27.6 28.1 26.5 24.1	18.6 18.7 18.6 19.5	п п п	234 402	282	166 444	287 765	008	Sat Sun Mon Tue
-7.5 22.0 -7.9 22.5 -3.1 22.9 0.3 22.3 0.2 22.1 -1.4 21.8 -3.3 21.4 -3.3 21.4 -4.3 22.8 -4.3 22.9 2.4 22.9 12.4 22.9	27.6 28.1 26.5 24.1	18.7 18.6 19.5	<b>е</b> е	402	602	444	765	o 8	Sun Mon Tue
-7.9 22.5 -3.1 22.9 0.3 22.3 0.2 22.3 -1.4 21.8 -3.3 21.4 -4.3 21.4 -4.3 22.8 -5.4 22.9 12.4 22.9	28.1 26.5 24.1	18.6 19.5	က	402	700	0		8	Mon
-3.1 22.9 0.3 22.3 0.2 22.1 -1.4 21.8 -3.3 21.4 -4.3 22.8 -3.3 22.9 2.4 22.9 12.4 22.9	26.5	19.5		ç	3	673	986		Tue
0.3 22.3 0.2 22.1 -1.4 21.8 -3.3 21.4 -4.3 22.8 -3.3 22.9 2.4 22.9 12.4 22.9	24.1		4	473	551	594	994	98	
0.2 22.1 -1.4 21.8 -3.3 21.4 -4.3 22.8 -3.3 22.9 2.4 22.9 12.4 22.9	23.0	19.6	o.	434	53	158	220	8	Wed
-1.4 21.8 -3.3 21.4 -4.3 22.8 -3.3 22.9 2.4 22.9 12.4 22.9	0.54	19.6	1	417	53	113	196	4	ΤF
-3.3 21.4 -3.3 21.4 -4.3 22.8 -3.3 22.9 2.4 22.9 12.4 23.8	23.6	19.2	O	395	159	220	345	42	Ē
-3.3 21.4 -4.3 22.8 -3.3 22.9 2.4 22.9 12.4 23.8	24.7	18.9	5	259	159	536	810	0	Sat
-4.3 22.8 -3.3 22.9 2.4 22.9 12.4 23.8	24.1	18.8	ო	231	331	1016	2381	0	Sun
-3.3 22.9 2.4 22.9 12.4 23.8	25.3	19.6	4	387	592	383	171	32	Mon
2.4 22.9	23.8	19.6	ღ	375	631	384	582	ଷ	Tue
12.4 23.8	23.6	19.8	9	408	504	478	735	ଷ	Wed
	23.6	21.5	20	383	347	343	684	27	루
27-Mar-98 18.0 25.5 25.1	25.2	23.2	30	258	331	307	506	35	Fri
15.6 25.2	24.9	23.1	29	232	354	1011	2238	0	Sat
14.0	25.1	22.2	27	233	518	1040	1839	0	Sun
	25.5	23.9	34	. 526	389	975	2346	0	Mon
	26.1	24.6	34	262	344	189	434	0	Tue
Sum									
Avg 1.2 22.7 22.7	25.0	19.9	7	336	325	419	770	25	
Min -11.2 21.4 21.4	22.6	18.4	m	230	63	45	100	0	
Max 20.0 26.5 25.9	28.1	24.6	34	434	631	1040	2381	83	

Green on the Grand	ie Grand erv				Indoor (	<b>Somfort</b>	Condition	• Comfort Conditions - Total Building	<b>I Buildin</b>				Septer	September 1997
Dally odillill	Outdoor		ant Suite Ter	Tenant Sulte Temperatures (°C)	9		Avg. Vent.	Avg. Vent.	Tenant Suite RH (X)	Ito RH (X)	Average	Average	Average	Day of
Date	Ambient Temn FE	Tenant 1	Tonant 1 Tonant 2 Tonant 3	Tenant 3	Tenant 4	Bullding Temp. (*C)	Supply Temp. (*C)	Exhaust Temp. ("C)	Tenant 1	Tenant 4	Separate Sep	EX <b>hans</b> t RH (X)	Exhaust. CO2 (ppm)	Week
20 525 02	135	24.3	21.2	21.5	21.7	21.4	16.9	20.8	45	52	99	47	376	Sat
24 Sep 97	? a	5.00	196	21.1	21.6	20.5	15.2	19.7	9	88	4	જ્	376	Sun
22 Sep-97	12.4	21.5	24.0	21.9	22.7	21.7	17.1	20.8	83	4	47	37	482	Mon
73 Sep-97	1.7	200	22.2	22.2	22.5	22.3	15.2	21.1	37	\$	8	4	471	Tue
24 Sep-97	) o	21.0	21.5	22.0	22.8	21.9	15.2	20.7	53	36	<b>€</b>	83	477	Wed
24-Sep-97		21.7	22.4	22.5	23.2	22.6	17.7	21.6	39	4	29	4	475	뢷
76-cep-07	). o	22.0	22.4	22.5	22.5	22.4	13.8	21.0	8	4	SS.	37	462	Έ
20-3ep-97	) m	8 02	20.8	21.8	21.7	21.2	15.5	20.3	31	39	94	32	407	Sat
21-3ep-97	0.5	23.3	21.0	21.9	21.9	21.4	18.4	21.0	4	47	24	42	402	Sun
20 Sep-37	. 4. 7. 4.	23.1	23.2	23.2	23.2	23.2	20.6	22.8	38	46	5	4	465	Mon
30-Sep-97	12.6	22.4	22.3	22.7	21.7	22.1	13.3	21.2	6	47	23	42	460	Tue
Sum									;	;	;	8	777	
Ανα	11.7	21.5	21.6	22.1	22.3	21.9	16.3	21.0	36	43	4	S.	1	
Min	. œ	20.0	19.6	21.1	21.6	20.6	13.3	19.7	53	36	<b>‡</b>	33	376	
Max	15.7	23.1	23.2	23.2	23.2	23.2	20.6	22.8	45	23	23	14	482	

Green on the Grand Dally Commery	e Grand				Indoor (	<b>Somfort</b>	Conditi	Comfort Conditions - Total Building	il Buildin				õ	October 1997
Dally outlines	Outdoor	Ten	ant Suite Te	Tenant Suite Temperatures (°C)	(3.)	Avgerage	Avg. Vent.	Avg. Vent.	Tenant Su	Tenant Suite RH (X)	Average	Average	Average	Day of
Date	Amblent Temp ("C)	Tonant 1	Tenant 2	Tenant 3	Tenant 4	Bullding Temp. ("C)	Supply Temp. ("C)	Exhaust Temp. (°C)	Tenant f	Tenant 4	Supply RH C3	EX <b>haust</b> RH (X)	EXNAUST. CO2 (ppm)	Week
01-Oct-97	5.6	20.7	21.0	22.2	22.5	21.6	13.8	20.3	56	35	35	31	480	Wed
02-Oct-97	7.3	20.8	20.8	21.8	23.1	21.6	12.7	20.5	3	32	23	32	493	로
03-Oct-97	15.6	23.2	22.2	22.4	23.3	22.7	13.9	21.9	4	<del>8</del>	92	4	481	Ē
04-Oct-97	17.8	21.3	20.2	21.1	21.3	20.8	13.3	20.2	<b>₽</b>	84	8	<del>ડ</del>	420	Sat
05-Oct-97	17.4	20.8	19.6	20.7	20.7	20.3	14.5	20.1	<b>₹</b>	20	71	<b>5</b>	424	Sun
06-Oct-97	19.0	21.3	20.5	21.3	21.1	20.9	14.1	20.4	42	64	74	4	505	Mon
07-Oct-97	16.5	21.4	20.7	21.8	21.0	21.0	13.2	20.3	<b>₹</b>	20	80	4	515	Tee
08-Oct-97	17.8	21.5	20.7	21.9	21.0	21.0	12.9	20.3	<b>₹</b>	51	8	4	538	Wed
09-Oct-97	18.6	21.9	21.1	22.1	21.0	21.3	13.6	20.5	47	25	87	20	514	귶
10-Oct-97	11.2	21.6	20.5	21.9	21.1	21.0	14.2	20.3	37	47	29	42	468	F
11-Oct-97	8.4	19.9	19.2	21.1	21.0	20.1	14.2	19.4	30	33	4	35	394	Sat
12-Oct-97	10.3	19.5	18.8	20.9	20.9	19.8	15.5	19.4	33	4	84	37	399	Sun
13-Oct-97	16.3	20.7	20.3	21.3	22.0	21.0	19.4	20.9	4	20	9	4	407	Mon
14-Oct-97	10.6	21.9	21.3	22.1	22.2	21.8	13.6	20.5	35	£4	55	4	483	Tue
15-Oct-97	6.7	20.4	20.4	22.0	22.2	21.2	15.9	20.4	28	32	88	31	491	Wed
16-Oct-97	. 89	21.0	21.2	22.4	23.1	21.9	16.8	20.9	27	33	37	30	473	The
17-Oct-97	5.7	21.0	21.5	22.6	23.4	22.1	15.9	20.8	24	9	8	88	472	Ē
18-Oct-97	. 4	20.2	20.1	22.6	22.7	21.2	15.8	20.3	23	30	34	27	421	Sat
19-Oct-97	6.4	19.3	19.1	22.5	22.3	20.5	16.0	19.8	52	3	36	78	417	Sun
20-Oct-97	9.9	20.4	20.4	22.6	22.7	21.4	13.7	20.5	24	23	28	27	465	Mon
21-0ct-97	3.9	21.3	21.3	22.8	22.9	22.0	11.9	20.9	19	<b>5</b> 8	102	23	462	Tue
22-Oct-97	0-	20.5	20.7	21.9	22.7	21.5	12.8	20.5	16	24	66	8	455	Wed
23-Oct-97	4.	21.5	21.1	21.7	22.9	21.8	12.8	21.0	4	23	92	18	483	<b>Z</b>
24-Oct-97	5.4	22.3	21.3	21.7	23.6	22.3	12.9	21.4	18	<b>7</b> 9	106	77	487	Œ
25-Oct-97	3.7	22.0	20.7	21.2	22.7	21.6	12.8	21.1	16	24	103	19	405	Sat
26-Oct-97	-0.4	21.3	19.8	20.4	22.1	20.9	12.7	20.6	4	23	5	17	403	Sun
27-Oct-97	0.5	21.8	20.7	21.4	23.0	21.7	12.9	21.3	14	23	101	8	488	Mon
28-Oct-97	2.5	22.3	21.8	23.1	23.3	22.5	12.9	21.9	13	22	<del>1</del> 0	17	481	Tue
29-Oct-97	6.2	22.4	22.0	23.3	23.7	22.7	12.9	21.9	18	52	107	21	482	Med
30-Oct-97	5.2	22.5	21.9	23.5	24.2	22.9	13.1	21.5	16	52	<del>5</del>	8	490	롣
31-Oct-97	9.4	22.3	21.9	23.6	24.0	22.9	13.5	22.0	28	32	107	29	483	Ē
Sum														
Avg	9.8	21.3	20.7	22.0	22.4	21.5	14.0	20.7	28	36	74	ည	464	
Min	₽.0	19.3	18.8	20.4	20.7	19.8	11.9	19.4	13	77	35	1	394	
Max	19.0	23.2	22.2	23.6	24.2	22.9	19.4	22.0	47	54	107	20	638	
Tuesday, 1	Tuesday, 17 November, 1998	<b>998</b>	skij is delijskiž žáký hermog je regelene,	تملقة تقرق وتجيؤة فمختمات قبو إسيريتين ناسيقد	e lle mente alle constante areas	omen den beschenbeben betreit geben geb	and the second of the second s	Stelling (Phys.) (Straight) Series in Straight (Series Series (Series Series Se						Page 2 of 7

	Green on the Grand Dally Summary	he Grand narv		•		Indoor (	omfort	Condition	Comfort Conditions - Total Building	N Buildin	<b>—</b>			Nove	November 1997
Ambient Light         Ambient Light         Tenant Light         Ambient Light         Tenant Light         Tena		Outdoor		ant Sulte Ter	mperatures (	<b>E</b>	Avgerage	Avg. Vent.	Avg. Vent.	Tenant Su	fte RH [X]	Average	Average	Average	Day of
98         218         215         224         223         123         129         218         34         39	Date	Ambient Temp. ("C)	Tanant 1	Tenant 2	Tenant 3	Tenant 4	Bulldling Temp. (°C)	Supply Temp. ("C)	Exhaust Temp. ("C)	Tonant 1	Tenant 4	Supply RH (X)	Exhaust RH (X)	Exhaust. CO2 (ppm)	Week
7.5         2.14         2.09         2.23         2.25         2.17         1.29         2.13         3.2         3.6         3.3         3.6         3.9         3.3         3.6         2.14         2.09         2.24         2.13         2.24         2.24         2.26         2.13         2.13         2.24         2.25         2.13         2.13         2.24         2.25         2.24         1.29         2.13         2.0         2.24         1.09         2.24         1.09         2.13         2.0         2.24         1.09         2.24         1.09         2.24         1.09         2.24         1.09         2.24         1.09         2.24         1.09         2.24         1.09         2.13         2.24         2.24         1.29         2.13         2.0         2.6         1.00         2.2         2.24         1.29         2.13         2.0         2.24         1.09         2.13         2.0         2.24         2.13         2.14         2.24         2.15         2.24         2.15         2.14         2.24         2.13         2.14         2.24         2.13         2.14         2.24         2.13         2.14         2.24         2.13         2.14         2.14         1.14	01-Nov-97	9.8	21.8	21.5	23.0	23.4	22.3	12.9	21.6	37	39		96	405	Sat
36         21.6         21.1         22.4         22.6         21.8         12.9         21.2         21.7         24         105         23.4         22.0         22.0         22.0         17.7         24         101         20         24         20.0         23.4         22.0         12.9         21.2         17.7         24         101         20         25         106         23.4         22.2         22.4         12.9         21.5         21.5         21.6         107         20         20         108         23         20         25         108         23         20         20         20         108         23         20         20         20         108         23         20         20         20         108         23         20         20         108         23         20         20         20         108         23         20         20         20         109         20 <t< td=""><td>02-Nov-97</td><td>7.5</td><td>21.4</td><td>20.9</td><td>22.3</td><td>22.5</td><td>21.7</td><td>12.9</td><td>21.3</td><td>32</td><td>36</td><td></td><td>33</td><td>388</td><td>Sun</td></t<>	02-Nov-97	7.5	21.4	20.9	22.3	22.5	21.7	12.9	21.3	32	36		33	388	Sun
23         218         213         220         231         220         129         212         17         24         101         20           45         220         213         224         224         128         213         20         26         109         20           56         210         216         222         234         224         129         215         20         26         109         23           60         217         216         228         237         224         129         216         20         26         107         20         108         23           37         216         219         229         218         129         213         17         24         102         20         20         26         107         20	03-Nov-97	3.6	21.6	21.1	22.4	22.6	21.8	12.9	21.2	21	78	50	24	476	Mon
45         220         213         214         224         128         213         20         26         108         23           56         221         216         226         236         224         129         215         216         26         108         23           60         217         216         228         224         129         216         20         26         107         20           31         214         200         213         224         215         128         209         16         24         99         20           31         216         213         224         229         218         129         213         17         24         99         20           40         214         216         218         218         128         213         11         21         220         21         21         21         22         21 </td <td>04-Nov-97</td> <td>2.3</td> <td>21.8</td> <td>21.3</td> <td>22.0</td> <td>23.1</td> <td>22.0</td> <td>12.9</td> <td>21.2</td> <td>17</td> <td>24</td> <td>101</td> <td>20</td> <td>485</td> <td>Tue</td>	04-Nov-97	2.3	21.8	21.3	22.0	23.1	22.0	12.9	21.2	17	24	101	20	485	Tue
56         22,1         21.6         22,2         23,6         22,4         12,9         21.5         26         70         26         107         23           5,8         21,9         21,5         22,4         12,9         21,6         20         26         107         23           6,0         21,7         21,0         21,3         22,4         12,9         11,6         20         26         107         23           3,1         21,4         20,6         21,3         22,4         22,9         21,8         12,8         20,1         16         24         96         20           2,3         21,6         21,2         22,9         22,0         12,8         21,3         11         21         24         96         20           2,3         21,6         21,9         22,0         12,7         21,2         21,3         11,6         21,3         11         11         21         8         16         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         2	05-Nov-97	4.5	22.0	21.3	21.9	23.4	22.2	12.8	21.3	20	<b>5</b> 8	108	23	481	Wed
58         219         215         228         23.7         224         129         216         26         107         23           6.0         21.7         21.0         21.9         22.9         21.8         12.9         21.3         17         24         102         20           3.7         21.4         21.0         21.9         22.9         21.8         12.9         21.3         17         24         96         20           2.0         21.6         21.2         22.9         22.0         12.8         21.3         11         21         99         20           2.1         21.6         22.9         22.0         12.8         21.3         11         21         99         20           2.1         21.6         22.9         22.0         12.8         21.9         11         12         21         98         16           2.1         21.5         21.9         22.9         21.9         12.0         12.0         10         19         8         16         16           2.1         21.5         21.9         21.9         12.0         12.0         12.0         12.0         12.0         12.0         12.0	06-Nov-97	5.6	22.1	21.6	22.2	23.6	22.4	12.9	21.5	73	<b>5</b> 8	108	73	488	Thu
60         21.7         21.0         21.9         22.9         21.8         12.9         21.3         17         24         102         20           3.1         21.4         20.8         21.3         22.4         21.5         12.8         20.9         16         24         99         20           3.1         21.6         21.2         21.6         22.8         21.8         12.8         21.1         16         24         99         20           2.3         21.2         21.2         22.9         22.0         12.7         11         21         24         96         20           2.3         21.6         21.3         21.6         22.9         21.9         12.0         10         19         88         16           3.5         21.5         21.9         22.9         21.9         12.6         21.0         10         19         88         16           3.5         21.5         21.9         21.9         21.9         21.0         10         19         88         16           4.1         21.4         21.9         21.9         21.9         21.0         11         1         2         88         15	07-Nov-97	5.8	21.9	21.5	22.8	23.7	22.4	12.9	21.6	20	56	107	83	477	Fi
3.7         21,4         20,8         21,3         22,4         21,5         12,8         20,9         16         24         98         20           3.1         21,6         21,2         21,6         22,8         21,8         12,8         21,1         16         24         98         20           -0.6         21,6         21,3         22,4         22,9         21,9         12,9         11         21         36         20           -2.3         21,5         21,3         21,6         22,9         22,9         12,7         21,2         21,9         16         19         98         16           -2.4         21,5         21,3         21,4         22,6         21,8         12,0         10         19         98         16           -2.4         21,5         21,6         22,9         21,3         13,5         21,1         10         20         16         13           -2.4         21,6         21,2         21,2         21,2         21,1         13,5         21,1         10         20         16         13           -2.4         21,6         21,2         21,2         21,2         21,2         21,1	08-Nov-97	6.0	21.7	21.0	21.9	22.9	21.8	12.9	21.3	17	24	102	8	393	Sat
3.1         21.6         21.2         21.6         22.8         21.8         12.8         21.1         16         24         96         20           -0.6         21.6         21.3         22.4         22.9         22.0         12.8         21.3         11         21         83         16           -2.3         21.7         21.5         22.9         22.0         12.7         21.0         10         19         80         16           -2.1         21.5         21.9         22.9         21.9         12.0         10         19         80         16           -3.5         21.5         21.9         21.9         21.9         21.0         10         19         70         16           -3.5         21.5         21.9         21.9         21.0         10         19         70         16         14         14         11         10         20         80         14         14         14         21.1         14         21.1         13.5         21.1         11         20         80         14         14         14         14         20         80         14         14         14         14         14         1	09-Nov-97	3.7	21.4	20.8	21.3	22.4	21.5	12.8	20.9	16	24	8	8	385	Sun
-0.6         21.6         21.3         22.4         22.9         22.0         12.8         21.3         11         21         83         16           -2.3         21.7         21.5         21.9         22.0         12.7         21.2         12         20         88         15           -2.1         21.5         21.9         22.0         12.7         21.2         12         20         88         15           -3.6         21.5         21.9         21.9         12.6         21.9         12.0         10         19         89         15           -3.5         21.5         21.3         21.4         21.4         21.1         11.5         21.0         10         19         89         15           -4.1         21.4         21.6         21.1         21.1         13.5         21.1         11         20         89         16         13           -1.6         21.7         21.2         21.9         22.0         13.5         21.1         11         20         89         16           -1.6         21.7         21.2         21.9         13.5         21.1         11         20         89         16	10-Nov-97	3.1	21.6	21.2	21.6	22.8	21.8	12.8	21.1	9	24	8	8	463	Mon
2.3         21.7         21.5         21.9         23.0         12.7         21.2         12.9         23.0         12.7         21.2         12.9         23.0         12.9         22.0         12.0	11-Nov-97	9.0-	21.6	21.3	22.4	22.9	22.0	12.8	21.3	=	7	83	9	473	Tue
2.1         21.5         21.3         21.6         22.9         21.9         12.6         21.0         10         19         82         14           -3.6         21.5         21.3         21.4         22.6         21.8         13.0         21.0         10         19         78         14           -3.5         21.5         20.5         21.6         21.9         21.3         13.5         21.1         10         10         19         78         14           -4.1         21.4         20.6         21.8         21.3         13.5         21.1         10         20         76         13           -2.4         21.6         21.9         21.1         13.5         21.1         11         20         80         14           -1.6         21.7         21.2         21.9         21.9         13.6         21.2         10         19         80         14           -1.6         21.7         21.2         21.9         13.5         21.2         11.2         11.2         11.2         11.2         11.2         11.2         11.2         11.2         11.2         11.2         11.2         11.2         11.2         11.2         11	12-Nov-97	-2.3	21.7	21.5	21.9	23.0	22.0	12.7	21.2	12	20	88	र	478	Wed
3.6         21.5         21.3         21.4         22.6         21.8         13.0         21.0         19         78         14           3.5         21.5         20.5         21.6         21.9         21.3         13.5         21.1         10         20         76         13           4.1         21.4         20.6         21.8         21.4         21.1         13.5         21.1         10         20         76         13           2.4         21.6         21.9         21.4         21.1         13.5         21.1         11         20         70         13           1.6         21.7         21.2         22.1         21.6         13.5         21.1         11         20         70         14           1.1         21.6         21.7         21.9         13.5         21.7         12         14         21         14         20         70         14           1.1         21.6         21.7         21.3         22.0         13.7         21.5         14         21         16         15         13         14         21         14         21         14         21         22         22         22	13-Nov-97	-2.1	21.5	21.3	21.6	22.9	21.9	12.6	21.0	9	19	82	4	477	Thu
.3.5         21.5         20.5         21.6         21.9         21.3         13.5         21.1         10         20         76         13           -4.1         21.4         20.6         21.8         21.4         21.1         13.5         21.0         8         18         70         70         12           -2.4         21.6         21.8         21.1         21.6         13.5         21.0         11         20         80         14           -1.6         21.7         21.2         21.9         21.9         13.6         21.0         10         19         80         14           -0.1         21.6         21.9         22.9         21.9         13.7         21.2         12         19         80         14           0.4         21.6         21.1         21.6         23.3         22.0         13.7         21.2         12         19         89         15           2.4         21.9         22.1         22.5         13.7         21.6         14         21         80         17         17           5.0         22.1         22.2         22.5         13.7         13.6         14         13	14-Nov-97	-3.6	21.5	21.3	21.4	22.6	21.8	13.0	21.0	5	19	78	4	450	Ē
4.1         21.4         20.6         21.8         21.4         21.1         13.5         21.0         8         18         70         12           -2.4         21.6         21.6         21.6         13.5         21.1         11         20         80         14           -1.6         21.6         22.1         22.1         21.6         13.6         21.2         10         19         80         14           -0.1         21.6         21.2         21.9         13.6         21.2         10         19         80         14           0.4         21.6         21.1         21.6         23.3         22.0         13.7         21.2         12         19         83         15           2.4         21.6         21.1         21.6         23.5         22.5         13.7         21.5         14         21         86         17           2.4         21.9         22.0         22.5         13.7         21.6         18         25         81         17           2.0         21.8         22.0         22.6         13.7         21.6         18         25         81         17           2.3         21.8 </td <td>15-Nov-97</td> <td>-3.5</td> <td>21.5</td> <td>20.5</td> <td>21.6</td> <td>21.9</td> <td>21.3</td> <td>13.5</td> <td>21.1</td> <td>9</td> <td>8</td> <td>9/</td> <td>13</td> <td>385</td> <td>Sat</td>	15-Nov-97	-3.5	21.5	20.5	21.6	21.9	21.3	13.5	21.1	9	8	9/	13	385	Sat
-24         21.6         21.0         22.1         21.6         13.5         21.1         11         20         80         14           -1.6         21.7         21.2         21.9         22.9         21.9         13.6         21.2         10         19         80         14           -0.1         21.6         21.3         22.9         21.9         13.6         21.2         12         19         80         14           0.4         21.6         21.1         21.8         23.3         22.0         13.7         21.2         12         19         80         15           4.7         21.8         22.1         22.5         13.7         21.5         19         20         80         15           5.0         22.1         22.7         22.5         22.5         13.7         21.6         14         21         85         17           1.0         21.8         22.0         22.5         22.5         13.7         21.6         18         25         81         17           2.1         21.8         22.9         22.0         13.5         21.4         13         22         81         17           2.3 </td <td>16-Nov-97</td> <td>1.4-</td> <td>21.4</td> <td>20.6</td> <td>21.8</td> <td>21.4</td> <td>21.1</td> <td>13.5</td> <td>21.0</td> <td>ω</td> <td>48</td> <td>2</td> <td>12</td> <td>384</td> <td>Sun</td>	16-Nov-97	1.4-	21.4	20.6	21.8	21.4	21.1	13.5	21.0	ω	48	2	12	384	Sun
-1.6         21.7         21.2         21.9         22.9         21.9         13.6         21.2         10         19         80         14           -0.1         21.6         21.1         21.8         23.3         22.0         13.5         21.2         12         19         83         15           0.4         21.6         21.1         21.8         23.3         22.0         13.7         21.2         12         60         88         15           4.7         21.8         22.1         21.5         22.5         13.7         21.5         19         25         97         21           5.0         22.1         22.1         22.5         13.7         21.6         14         21         85         17           1.0         21.8         22.0         22.5         13.7         21.6         18         25         81         17           2.3         22.0         22.5         22.0         13.5         21.1         13.6         21         13         22         81         17           2.3         21.8         22.0         22.0         13.5         21.1         13.6         21.1         13         22	17-Nov-97	-2.4	21.6	21.0	22.1	22.1	21.6	13.5	21.1	=	8	8	4	484	Mon
-0.1         21.6         21.1         21.8         23.3         22.0         13.7         21.2         12         19         83         15           0.4         21.6         21.1         21.6         23.3         22.0         13.7         21.2         12         20         88         15           4.7         21.6         21.1         21.6         22.0         13.7         21.5         19         25         97         21           2.4         21.9         22.1         22.5         13.7         21.6         14         21         85         17           5.0         22.1         22.2         22.6         13.7         21.6         18         25         91         21           1.0         21.8         20.9         21.7         13.6         21.4         13         22         81         17           2.3         22.9         22.0         13.5         21.1         13         22         80         17           2.3         21.3         22.9         21.7         13.6         21.1         13         22         80         17           4.1         21.4         20.5         21.3         21.4 <td>18-Nov-97</td> <td>-1.6</td> <td>21.7</td> <td>21.2</td> <td>21.9</td> <td>22.9</td> <td>21.9</td> <td>13.6</td> <td>21.2</td> <td><b>.</b>e</td> <td>49</td> <td>80</td> <td>4</td> <td>493</td> <td>Tue</td>	18-Nov-97	-1.6	21.7	21.2	21.9	22.9	21.9	13.6	21.2	<b>.</b> e	49	80	4	493	Tue
0.4         21.6         21.7         21.3         22.0         13.7         21.2         12         20         88         15           4.7         21.8         21.8         22.1         21.7         23.5         22.5         13.7         21.5         19         25         97         21           2.4         21.9         22.1         23.5         22.5         13.7         21.6         14         21         85         17           5.0         22.1         22.4         23.5         22.6         13.7         21.6         18         25         91         21           1.0         21.8         20.9         21.7         22.6         22.0         13.5         21.4         13         22         81         17           2.3         21.8         20.9         21.7         22.6         21.7         13.6         21.1         13         22         80         17           1.9         21.3         22.9         21.1         13.6         21.1         13.6         24         90         19           4.1         21.4         21.4         21.4         13.6         21.1         22         80         17	19-Nov-97	-0.1	21.6	21.1	21.8	23.3	22.0	13.5	21.2	12	19	83	15	484	Med
47         21.8         22.1         21.7         23.5         22.5         13.7         21.5         19         25         97         21           2.4         21.9         22.0         22.1         23.5         22.5         13.7         21.6         14         21         85         17           5.0         22.1         22.2         22.6         13.7         21.6         18         25         91         21           1.0         21.8         21.4         22.3         22.9         22.0         13.5         21.4         13         22         81         17           2.3         21.8         20.9         21.7         22.6         21.7         13.6         21.1         13         22         80         17           1.9         21.7         21.8         21.3         21.4         13.6         21.1         13         22         80         17           4.1         21.4         21.3         21.4         21.4         13.6         21.3         14         21.3         14           4.1         20.5         21.3         21.4         12.6         21.3         14         20.9         14	20-Nov-97	4.0	21.6	21.1	21.6	23.3	22.0	13.7	21.2	12	20	88	15	472	ם
2.4         21.9         22.0         22.1         23.5         22.5         13.7         21.6         14         21         85         17           5.0         22.1         22.0         22.4         23.5         22.6         13.7         21.6         18         25         91         21           1.0         21.8         21.4         22.3         22.0         13.5         21.4         13         22         81         17           2.3         21.8         20.9         21.7         22.6         21.7         13.6         21.1         13         22         80         17           1.9         21.7         21.8         21.3         21.3         13.6         21.3         16         24         90         17           4.1         21.4         21.3         21.4         21.1         12.6         21.3         21.6         9         19         19           9.8         22.1         22.1         23.0         23.7         22.6         13.7         21.6         13.7         21.6         13.7         21.6         13.7         21.6         21.3         21.3         21.3         21.3         21.3         21.3         21.3<	26-Nov-97	4.7	21.8	22.1	21.7	23.5	22.5	13.7	21.5	19	52	26	77	489	Wed
5.0         22.1         22.0         22.4         23.5         22.6         13.7         21.6         18         25         91         21           1.0         21.8         21.4         22.3         22.9         22.0         13.5         21.4         13         22         81         17           2.3         21.8         20.9         21.7         13.6         21.1         13         22         80         17           1.9         21.7         13.6         21.1         13.2         21.3         16         24         90         19           4.1         21.4         21.3         21.4         21.1         12.6         20.9         8         18         70         12           9.8         22.1         22.1         23.0         23.7         22.6         13.7         21.6         37         39         108         36	27-Nov-97	2.4	21.9	22.0	22.1	23.5	22.5	13.7	21.6	4	23	82	17	484	TL
1.0         21.8         21.4         22.3         22.9         22.0         13.5         21.4         13         22         81         17           2.3         21.8         20.9         21.7         22.6         21.7         13.6         21.1         13         22         80         17           1.9         21.7         22.6         21.7         13.6         21.3         16         24         90         19           4.1         21.4         20.5         21.3         21.4         21.1         12.6         20.9         8         18         70         12           9.8         22.1         22.1         23.0         23.7         22.6         13.7         21.6         37         39         108         36	28-Nov-97	5.0	22.1	22.0	22.4	23.5	22.6	13.7	21.6	81	52	9	21	485	Ē
2.3         21.8         20.9         21.7         22.6         21.7         13.6         21.1         13         22         80         17           1.9         21.7         21.3         22.9         22.9         21.9         13.2         21.3         16         24         90         19           4.1         21.4         21.1         12.6         20.9         8         18         70         12           9.8         22.1         22.1         23.0         23.7         22.6         13.7         21.6         37         39         108         36	29-Nov-97	1.0	21.8	21.4	22.3	22.9	22.0	13.5	21.4	13	23	81	17	425	Sat
1.9     21.7     21.3     22.0     22.9     21.9     13.2     21.3     16     24     90     19       4.1     21.4     20.5     21.4     21.1     12.6     20.9     8     18     70     12       9.8     22.1     22.1     23.0     23.7     22.6     13.7     21.6     37     39     108     36	30-Nov-97	2.3	21.8	20.9	21.7	22.6	21.7	13.6	21.1	13	22	80	17	405	Sun
1.9 21.7 21.3 22.0 22.9 21.9 13.2 21.3 16 24 90 19 4.1 21.4 20.5 21.3 21.4 21.1 12.6 20.9 8 18 70 12 9.8 22.1 22.1 23.0 23.7 22.6 13.7 21.6 37 39 108 36	Sum														
4.1 21.4 20.5 21.3 21.4 21.1 12.6 20.9 8 18 70 12 9.8 22.1 22.1 23.0 23.7 22.6 13.7 21.6 37 39 108 36	Avg	1.9	21.7	21.3	22.0	22.9	21.9	13.2	21.3	16	24	06	19	452	
9.8 22.1 22.1 23.0 23.7 22.6 13.7 21.6 37 39 108 36	Min	4.	21.4	20.5	21.3	21.4	21.1	12.6	20.9	œ	8	20	12	384	
	Max	8.6	22.1	22.1	23.0	23.7	22.6	13.7	21.6	37	39	108	36	493	

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	Outdoor		ant Suite Ter	Tenant Suite Temperatures (°C)	[3.]	Avgerage	Avg. Vent.	Avg. Vent	Tenant Suite RH (X)	to RM CXJ	Average	Average	Average	Day of
Date	Amblent Temn ("C)	Tenant 1	Tenant 2	Tenant 3	Tenant 4	Building Temp. ("C)	Supply Temp. ("C)	Exhaust Temp. ("C)	Tenant 1	Tenant 4			<b>CO2 (ppm)</b>	Week
01-Dec-97	-10	21.8	21.6	21.9	23.0	22.1	13.7	21.2	10	18	99	14	474	Mon
02-Dec-97	. <del>1.</del> 3. 43	22.1	21.9	21.9	23.5	22.4	13.6	21.2	80	17	89	13	477	Tue
03-Dec-97	<u>;</u>	21.7	21.5	22.4	23.3	22.2	13.9	21.2	=======================================	19	74	14	505	Wed
04-Dec-97	5 7	21.8	21.5	22.1	23.2	22.2	13.6	21.1	13	20	78	16	487	Thu
04-Dec-97	, « : c	21.7	21.3	21.6	23.3	22.0	13.7	21.0	7	19	02	14	468	Ħ.
06-Dec-97	, <del>-</del> -	21.3	20.5	20.6	22.6	21.3	13.8	20.6	o	18	29	13	395	Sat
02-Dec-07		21.3	20.6	19.6	22.4	21.2	13.7	20.4	6	18	73	13	396	Sun
08-Dec-97	. e	21.7	21.3	20.1	22.9	21.8	13.7	20.7	10	18	89	13	478	Mon
09-Dec-97	2.0-	21.8	21.3	21.3	23.0	22.0	13.8	21.0	o	17	89	13	481	Tue
10-Dec-97	-2.7	21.7	21.3	21.7	23.0	22.0	13.6	20.9	თ	18	65	13	480	Wed
11-Dec-97	. 4-	21.8	21.5	21.7	23.0	22.1	13.7	21.0	o	18	42	13	475	Τh
12-Dec-97	9.6-	22.1	21.8	21.7	23.1	22.3	13.9	21.1	10	18	22	13	472	Ē
13-Dec-97	-2.1	21.8	20.2	21.1	22.5	21.3	13.7	20.6	7	18	23	12	401	Sat
14-Dec-97	-3.6	21.8	19.9	21.0	22.4	21.1	13.6	20.5	S.	15	23	Ξ	396	Sun
15-Dec-97	0.5	22.1	21.0	21.8	23.0	21.9	13.9	21.0	80	17	22	12	488	Mon
16-Dec-97	2.6	22.2	21.7	22.2	23.3	22.3	13.8	21.3	O	18	21	13	498	Tue
17-Dec-97	0.0	22.2	21.7	22.4	23.6	22.5	13.8	21.5	10	18	21	<del>1</del>	496	Wed
18-Dec-97	-1.3	22.2	21.6	22.2	23.3	22.3	13.6	21.4	თ	17	21	13	206	무
19-Dec-97	1.7	22.2	21.7	21.9	23.2	22.3	13.7	21.4	12	19	70	15	485	F.
20-Dec-97	-0.9	22.0	20.5	21.3	22.7	21.5	13.6	21.0	80	18	21	5	399	Sat
21-Dec-97	-5.6	21.9	19.8	20.9	22.5	21.2	13.6	20.8	4	14	23	9	396	Sun
22-Dec-97	6.5-	21.9	20.8	21.3	22.7	21.7	13.7	21.1	9	14	22	7	463	Mon
23-Dec-97	-0.2	22.2	21.6	21.8	23.0	22.2	13.7	21.4	10	18	21	<u>ნ</u>	479	Tue
24-Dec-97	-0.1	21.8	21.3	21.3	23.0	21.9	13.8	21.1	æ	17	22	12	426	Wed
25-Dec-97	9.0	21.2	20.5	20.2	22.3	21.2	13.6	20.6	6	18	77	5	392	₽
26-Dec-97	6.0-	21.1	20.3	20.1	22.0	21.0	13.6	20.5	80	17	22	12	397	፰
27-Dec-97	-3.0	21.1	20.2	20.0	22.0	20.9	13.6	20.6	9	16	22	<del>-</del>	389	Sat
28-Dec-97	-7.0	19.9	19.1	19.7	21.3	20.0	11.5	19.3	4	4	23	= :	400	Sun
29-Dec-97	-1.8	18.0	18.2	19.7	20.4	19.1	13.1	18.7	80	11	22	42	481	Mon
30-Dec-97	-5.5	20.9	21.3	21.4	22.1	21.5	11.9	20.5	9	15	23	=	455	Lne
31-Dec-97	-13.0	20.4	21.3	20.8	22.3	21.5	1.6	18.6	3	13	28		431	Wed
Sum										٠		;		
Avg	-1.9	21.5	20.9	21.2	22.7	21.7	13.2	20.7	œ	17	တ္က ႏ	₽ (	450	
Min	-13.0	18.0	18.2	19.6	20.4	19.1	1.6	18.6	ო	13	50	9	389	

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# Indoor Comfort Conditions - Total Building

	Outdoor		ant Suite Ter	Tenant Suite Temperatures (*C)	5	Avgerage	Avg. Vent.	Avg. Vent.	Tenant So	Tenant Suite RH (X)	Average	Average	Average	Day of
Date	Ambient Tame CC1	Tenant 1	Tenant 2	Tenant 3	Tenant 4	Building Temp. ("C)	Supply Temp. ("C)	Exhaust Tomp. (°C)	Tenant 1	Tonant 4	Supplify RH CX3	EXITABLES (	CO2 (ppm)	X BBX
04 lan 08	-47	20.6	20.7	20.7	22.6	21.3	11.0	20.1	3	13	23		394	Thu
90 44 00	70	600	21.3	21.6	23.0	21.8	14.8	21.3	7	91	21	12	451	Ē
06-Hat-2	7 Y	20.2	2 2 2	20.6	22.8	21.6	14.9	21.0	15	21	6	18	401	Sat
03-Jan-96	. o	20.7	1 7 1 4	19.8	22.8	21.5	14.4	20.8	13	24	18	17	395	Sun
04-Jan-98	۰ ر ۱۹	7.07		20.00	23.2	21.9	13.0	20.8	15	23	19	19	514	Mon
05-Jan-98	0.2	20.3 20.5	. t.	2 5	23.5	22.6	11.9	21.0	83	33	8	32	200	Tue
06-Jan-98	ao n	1.77	27.5	2 <u>2</u> 5 4	23.5	2 22	. 1.	20.9	24	8	83	28	485	Wed
07-Jan-98	t. i	22.0	7.77	† r	5.55	22.3	11.8	20.8	16	23	16	21	481	Th
08-Jan-98	0.7	22.5	o 1	7.17	- 66	2 2 2	. <del>.</del> .	602	4	77	Ξ	11	482	ቿ
09-Jan-98	-0.1	22.1	c:17	0.7 6	, c	2 2	126	20.9	œ	18	=	13	410	Sat
10-Jan-98	-2.8	22.0	50.5 7	2. 5 0. 0	22.8	2.7	11.7	20.7	4	16		5	399	Sun
11-Jan-98	χ. Σ. (	7.1.2	7.07	2 C	2 2	200	11.1	20.7	9	15	12	12	260	Mon
12-Jan-98	လုံ ( ဆ	7.7.	2. 1. 2. 1.	2. 2. 2. 3.	23.3	22.3	11.9	21.0	œ	17	13	12	517	Tue
13-Jan-98	D. 7	S. 22	5.5	2 6 6 6	73.3	22.1	11.2	20.7	7	15		=	525	Wed
14-Jan-98	4. (	7:77	2 . 5 . r.	2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	23.2	22.3	12.2	20.9	œ	16		Ξ	206	Th
5-Jan-98	ο Ο υ	0.27	2. 2	22	23.2	22.2	12.2	20.9	80	16		Ξ	511	Fi
08-1an-90	, ć	2.5.5		2   6	22.3	21.2	12.3	20.5	2	4		9	414	Sat
17-Jan-98	7. ¢	4 5	5 6	2 3	21.6	20.8	12.3	20.4	က	4			407	Sun
10-Jail-90		2 6	20.9	21.6	21.9	21.4	12.3	20.7	S.	15		=	203	Mon
19-Jan -90	ָ טעי	23.0	21.4	21.5	22.3	22.0	12.3	20.7	2	16		Ξ	512	Tue
20-Jan 90	e c	22.5	27.3	21.5	22.2	21.8	12.2	20.6	လ	15		5	502	S N
מס מבו ככ	9 6	22.7	21.8	22.0	22.0	22.0	12.2	20.7	9	5		Ξ	502	롣
06-11at-27	0.7	22.7	24.3	22.1	21.7	21.8	12.3	20.7	ထ	17	12	4	200	Ē
23-Jan-90	6.7 8.0	22.5	20.5	21.5	20.6	21.0	12.4	20.3	4	91		Ξ	405	Sat
25. Jan. 08	o e	22.5	20.4	21.1	20.0	20.7	12.3	20.2	က	4			396	Sun
26- Jan-98	79-	22.7	21.7	21.7	20.8	21.6	12.2	20.6	ഹ	15		10	514	<b>W</b> ou
27 Jan 08	. e	22.5	22.1	22.1	21.7	22.1	12.3	20.9	7	17		13	223	Tue
28 Jan 08		22.7	22.1	22.4	22.2	22.3	12.2	21.0	80	18		12	545	Med Med
20-Jan 08	- «	22.6	22.1	22.5	22.4	22.3	12.3	21.0	5	19	=	4	536	₽
20-Jan-08	; <del>-</del> ;	22.6	22.0	22.5	22.5	22.3	12.2	21.0	9	18	5	4	516	E
31-Jan-98	-2.2	21.7	21.5	22.3	21.7	21.7	12.3	20.8	4	15		10	413	Sat
Sum									•	ş	5	*	475	
Avg	-2.9	22.0	21.3	21.7	22.4	21.8	12.3	8.02	<b>3</b> 0	<u> </u>	<u>e</u> :	<u>t</u>		
Min (	4.6	20.6	19.9	19.8	20.0	20.7	11.0	20.1	es ;	<del>.</del> .	2 9	2 \$	4 G	
													::	

Tuesday, 17 November, 1998

Green on the Grand	e Grand				Indoor C	omfort	Condition	Comfort Conditions - Total Building	Buildin				Febr	February 1998
Daily odillik	Outdoor	Tens	ant Sulte Ten	Tenant Suite Temperatures (°C)		Avgerage	Avg. Vent.	Avg. Vent.	Tenant Su	Tenant Suite RH (X)	Average	Average	Average	Day of
Date	Amblent Temn CC)	Tenant 1	Tenant 2	Tenant 3	nant 4	Bullding Temo. ("C)	Suppty Temp. ("C)	Exhaust Temp. ("C)	Tenant 1	Tenant 4			CO2 (ppm)	Week
04 Ech 08	10mp. 1 65	21.7	24.7	21.9	21.5	21.7	12.2	20.7	8	4			404	Sun
01-rep-90	† o	223	22.4	22.4	22.3	22.3	12.2	21.1	œ	17		4	533	Mon
02-rep-90	e. 4	22.6	22.4	22.4	22.6	22.5	12.2	21.0	7	16		=	519	Tue
03-rep-30	1 9 1 9	22.3	22.1	22.0	22.7	22.3	12.2	20.8	4	4		9	512	Wed
05-Feb-98	9. 4-	22.3	21.7	22.5	22.8	22.3	12.2	20.9	4	4			206	
06-Feb-98		22.0	21.5	21.4	22.8	22.0	11.2	20.5	4	4			420	Έ ,
10-Feb-98	2.9	23.8	23.1	22.8	24.1	23.5	11.5	21.2	9	16		15	586	en !
11-Feb-98	5.1	23.0	22.3	22.0	23.2	22.7	1.1	20.8	တ	€	12	<del>.</del>	533	Ş i
12-Feb-98	0.5	22.7	22.0	21.7	23.2	22.5	11.1	20.7	12	8	12	15	499	를 ;
13-Feb-98	ල	22.5	21.7	21.0	22.6	22.1	11.1	20.4	80	16		=	507	Ξ;
14-Feb-98	<u>ნ</u> .	21.8	20.6	20.8	21.9	21.3	10.8	20.1	ო	13			397	Sat
15-Feb-98	-6.0	21.3	19.8	20.5	21.8	20.8	10.8	19.9	ო	5		į	388	<u> </u>
16-Feb-98	-2.2	22.2	21.3	21.1	22.7	21.9	11.7	20.6	ഹ	4		9	531	uo i
17-Feb-98	9.0	22.6	22.0	21.1	23.1	22.4	12.2	20.9	9	19	<del>=</del>	4	514	9 ]
18-Feb-98	6.0	23.0	22.0	21.0	23.1	22.4	12.2	20.9	12	8	12	9 !	90	S &
19-Feb-98	1.0	23.2	22.5	21.7	23.2	22.8	12.2	21.2	4	21	=	14	523	2 :
20-Feb-98	8.0	23.0	22.6	22.3	23.1	22.8	12.2	21.2	13	73	=	1,	502	= 1
21-Feb-98	-0.3	22.1	21.7	21.3	21.9	21.8	12.3	20.6	80	<del>2</del>		<u>ස</u> :	904	sat
22-Feb-98	-0.1	22.0	21.4	20.1	21.5	21.4	12.3	20.3	7	17		<b>=</b> :	402	uns :
23-Feb-98	0.4	22.9	22.4	20.9	22.4	22.4	12.3	20.9	œ	18		<u>to</u> :	512	No.
24-Feb-98	-0.7	23.2	22.3	22.2	22.7	22.6	12.3	21.1	ထ	17		12	517	9 ]
25-Feb-98	4.	23.3	22.4	23.0	23.1	22.9	12.2	21.2	9	19	=	र्ट :	517	N F
26-Feb-98	8.	23.4	22.4	23.2	23.3	23.0	12.3	21.2	5	19		4 (	515	2 ;
27-Feb-98	4.	23.6	22.0	22.9	23.3	22.8	12.2	21.1	9	<del>6</del>		<u>. 13</u>	513 (2.	Ē ;
28-Feb-98	2.7	22.3	21.3	21.5	22.4	21.9	12.3	20.6	12	21	22	16	424	sat
Sum					;	ć	7		a	<b>†</b>	<del>.</del>	5	487	
Avg	-1.3	22.6	21.9	21.7	22.7	5.22	r. 6	8. 6 <del>1</del>	. r:	: 2	: =	<b>£</b>	388	
Min	တ <u>့</u> တ	21.3	19.8	20.1	6.T2	8.02 2.03		21.5	<b>,</b> 4	2 2	. 22	17	989	
Max	2.9	23.8	23.1	23.2	24.1	6.62	ć. <del>7</del> 1	4: 	ţ	ï	.			

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# Indoor Comfort Conditions - Total Building

# Green on the Grand Dally Summary

Outdoor Date Amblent	10L	Tenant Suite Temperatures ("E)	mperatures	E	Avgerage Puliding	AVG. VBIII.	AVG. VBIIL.		i elizii e ele uu tvi		Fyhenet	Fylamet	in ÉBA
	•									PILIPLIA			
Tamn CC1	ent FG Tenant 1	ti Tenant 2	Tenant 3	Tenant 4	Temp. ("C)	auppry Temp. (*C)	ckilaust Temp. (°C)	Tenant 1	Tenant 4	RH (X)	RH (X)	CO2 (ppm)	T REAL
04 Mar 08 3.8	22.0	21.0	20.4	21.6	21.3	12.3	20.2	15	24	41	20	411	Sun
			20.9	22.2	22.0	12.2	20.6	13	8	12	18	519	Mon
			22.1	22.7	22.4	12.2	21.0	13	23	12	11	521	Tue
			21.6	22.6	22.3	12.2	20.8	9	19	0	15	514	Wed
			21.5	22.7	22.3	12.2	20.8	10	18		4	206	₽₽
			22.2	22.8	22.5	12.2	20.9	6	17		12	504	Ē
			21.8	21.8	21.8	12.3	20.6	9	16		Ξ	417	Sat
			21.2	21.7	21.5	12.3	20.4	7	17	12	12	406	Sun
			21.9	22.5	22.2	12.3	20.9	17	55	21	70	503	Mon
		21.7	21.5	22.6	21.7	11.9	20.5	7	17		12	501	Tue
			21.5	22.5	21.7	10.3	20.1	က	4		5	508	Wed
			22.5	22.7	22.2	11.2	20.6	4	4			510	Thu
			22.1	22.5	22.1	12.2	20.6	4	4		-	491	Ē
			22.1	21.6	21.1	12.2	20.4	ო	4			400	Sat
			21.7	22.0	21.2	11.9	20.3	ო	5			366	Sun
			22.3	22.8	22.0	9.4	20.2	ო	<del>1</del> 3			200	Mon
			22.9	22.8	22.6	11.6	20.9	4	13			207	Tue
			23.0	22.8	22.2	12.3	21.1	တ	18	12	13	509	Wed
			22.9	22.7	22.2	12.3	21.1	=	19	12	ट	513	The
			22.9	22.5	22.0	12.2	21.0	თ	19	=	13	495	Ē
			22.0	21.6	21.3	12.3	20.5	Ω.	4		5	398	Sat
			21.6	21.5	21.1	12.2	20.5	ო	13			395	Sun
			22.4	22.7	22.2	12.2	20.9	4	13			208	Mon
			22.2	23.0	22.6	10.9	20.7	ო	13			516	Tue
			22.1	23.1	22.5	10.6	20.5	9	15	5	12	534	Wed
			23.0	23.7	23.3	15.9	21.9	20	53	<b>5</b> 8	23	499	2
			24.0	24.4	24.1	19.0	23.4	99	39	83	<del>8</del>	429	Ē
			23.5	24.4	24.1	17.3	22.9	59	38	37	8 8	398	Sat
			22.9	23.9	23.7	15.4	21.9	27	36	\$	8	390	Sun
			24.1	24.8	24.7	19.6	23.5	34	\$	4	4	421	Mon
		3 25.4	25.0	25.3	25.4	20.8	24.4	34	\$	33	33	424	Tue
Sum					;	•			č	7	6	469	
Avg 1.2			22.3	22.8	22.4	13.0	L.12	Ξ,	7 (	7	2 5	000	
Min -11.2	1.2 20.1	1 20.4	20.4	21.5	21.1	9.4	20.1	ro	E	2 :	2 9	080	
Max 20.0	.0 25.8	3 25.4	25.0	25.3	26.4	20.8	24.4	34	43	40	40	450	

Tuesday, 17 November, 1998

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Green on the Grand Dally Summary	Grand				A	r Handlir	ir Handling Unit Performance	ormanc	<b>ფ</b>					October 1997
Pate			Supply Air	Return Air	ıVı	Clg/Htg	ERV Sonsible	Htg/Clg	Htg/Clg Coll Effect (KWh)	KWb)	EV .	Energy Consume	nsemed	Day of
	Temp (°C)	冐	Temp (°C)	Temp (*C)	22 22 23		EIIBELIKWII	Senible	Latent		LAMIL			Week
01-Oct-97	6.7	47	13.8	20.3	5 E	ن آ	) 4. (	9 6	2 6	9 6	475.0	n 0	7 O. O.	- A
02-Oct-97	χ, ή Ο η	28 6	12.7	, to	7 7	ָב בֿ	, c	2.74 9	) (	234.2	176.8	0.67	314.4	Ē
03-Oct-97	0.0.	8 8	. 6. . 6.	E 1.5	£ 4	<u> </u>	5.5. 6.6.	383.8	. 0	-393.8	-323.4	69.1	462.8	Sat
05-Oct-97	17.2	2 45	5.45	20.1	<del>. 1</del>	ပ	5. 6. 6. 6.	-249.4	6. O	-250.3	-201.3	0.69	321.4	Sun
06-Oct-97	18.8	5 5	14.1	20.4	4	O	49.8	-383.7	8.0	-382.9	-249.4	77.3	461.1	Mon
07-Oct-97	16.2	29	13.2	20.3	8	ပ	4.0	-400.9	<b>-</b> 0.8	-401.7	-291.8	9.62	484.5	Tue
08-Oct-97	17.5	83	12.9	20.3	8	ပ	-30.8	-430.4	0.0	-430.4	-392.1	77.3	507.7	Wed
09-Oct-97	18.6	73	13.6	20.5	20	ပ	-19.6	-541.8	-0.7	-542.5	499.7	77.5	622.5	Thu
10-Oct-97	12.0	22	14.2	20.3	42	ပ	6.1	-49.9	0.3	49.6	93.1	79.3	132.9	E
11-Oct-97	8.9	53	14.2	19.4	32	ပ	2.2	-6.5	0.2	-6.4	170.0	70.3	87.4	Sat
12-Oct-97	10.8	26	15.5	19.4	37	ပ	1.8	21.4	5.0	26.4	152.2	0.69	0.96	Sun
13-Oct-97	16.5	9	19.4	20.9	4	ပ	-0.2	5.5	7.1	12.6	102.4	76.1	100.6	Mon
14-Oct-97	11.2	4	13.6	20.5	4	ပ	2.4	-14.5	6.0-	-15.4	106.4	8.77	95.0	Tue
15-Oct-97	9.2	4	15.9	20.4	31	<b>O</b>	168.2	-1.9	9.1	6.0	273.3	78.2	78.8	Wed
16-Oct-97	7.4	4	16.8	20.9	30	O	294.5	-2.7	0.7	-2.0	255.4	79.2	81.5	Thu
17-Oct-97	6.2	8	15.9	20.8	78	ပ	214.1	4.5	6.4	0.4	293.2	80.3	81.1	Ē
18-Oct-97	5.4	54	15.8	20.3	27	ပ	246.0	.3. 1.0	2.3	6.0	280.4	68.2	69.3	Sat
19-Oct-97	8.9	55	16.0	19.8	78	ပ	216.1	-2.0	0.7	-1.3	257.0	67.9	8.69	Sun
20-Oct-97	7.3	84	13.7	20.5	27	C/H	187.8	-0.7	0.5	-0.2	677.3	6.77	79.1	Mon
21-Oct-97	<b>4</b> .	25	11.9	20.9	22	I	259.0	0.0	0.0	0.0	2.99	79.2	79.2	Tue
22-Oct-97	6.0	25	12.8	20.5	8	I	436.6	8.9	0.0	6.8	95.2	9.62	86.3	Wed
23-Oct-97	2.7	84	12.8	21.0	18	I	410.3	0.0	0.0	0.0	39.7	9.77	9.77	Thu
24-Oct-97	5.9	54	12.9	21.4	21	I	258.1	0.0	0.0	0.0	52.2	78.4	78.4	Ē
25-Oct-97	5.0	54	12.8	21.1	19	I	285.4	0.0	0.0	0.0	46.1	70.3	70.3	Sat
26-Oct-97	0.9	99	12.7	20.6	17	I	403.1	2.7	0.0	2.7	99.3	69.2	71.9	Sun
27-Oct-97	1.7	99	12.9	21.3	18	I	459.4	0.0	0.0	0.0	37.9	77.0	77.0	Mon
28-Oct-97	3.7	46	12.9	21.9	17	I	360.9	0.0	0.0	0.0	47.0	78.9	78.9	Tue
29-Oct-97	7.2	94	12.9	21.9	21	I	187.4	0.0	0.0	0.0	2.09	79.3	79.3	Wed
30-Oct-97	6.1	\$	13.1	21.5	20	I	237.6	0.0	0.0	0.0	29.8	75.3	75.3	Тħ
31-Oct-97	9.6	63	13.5	22.0	29	I	81.2	0.0	0:0	0.0	67.8	78.5	78.5	Fi

Tuesday, 17 November, 1998

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5,157.9 166.4 69.3 622.5

67.9 80.3

499.7

-542.5 26.4

-0.9

2,353.1 75.9

1,648.2 53.2

2,662.9 -85.9

21.3 0.7

-2,684.2 -86.6 -541.8 21.4

4,479.2 144.5 -65.9 459.4

31 17 50

20.7 19.4 22.0

14.0 11.9 19.4

55 41 78

9.2 0.9 18.8

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## Air Handling Unit Performance

November 1997

Dally Summary														
	Fresh Air	Air	<b>Supply Air</b>	Return Air	i Air	Clg/Htg	ERV Sensible	是/是	Htg/Cig Coll Effect (KWh)	Z Z	2	Energy Constance		Day of
Date	Team (°C)	RH [X]	Termo ("C)	Termo (°C)		<b>¥</b> oce ¥	Effect (KWh)	Serrible	Latent	Total	CKWID	EB 28	Total	Week
01 Nov 07	104	78	12.9	21.6	36	Ŧ	36.3	0.0	0.0	0.0	67.0	68.5	68.5	Sat
02-Nov-97		2 49	12.9	21.3	33	I	129.9	0.0	0.0	0.0	60.3	68.1	68.1	Sun
03-Nov-97	4.7	. 60	12.9	21.2	24	I	314.4	0.0	0.0	0.0	49.7	9.92	76.6	Mon
03-Nov-97	. 6	. 6	12.9	21.2	70	I	382.1	0.0	0.0	0.0	43.3	7.77	7.77	Tue
05-Nov-97	7. 5	99	12.8	21.3	23	I	288.5	0.0	0.0	0.0	9.09	77.8	77.8	Wed
76-VON-90	9 6	57	12.9	21.5	23	I	232.8	0.0	0.0	0.0	8.73	78.8	78.8	Thu
07-Nov-97	8 6	52	12.9	21.6	23	I	210.1	0.0	0.0	0.0	59.8	79.3	79.3	Ē
08-Nov-97	7.3	36	12.9	21.3	20	I	173.3	0.0	0.0	0.0	55.4	73.5	73.5	Sat
76-NoN-00	. 4 5 00	23	12.8	20.9	50	I	291.5	0.0	0.0	0.0	45.4	69.1	69.1	Sun
10-Nov-97	5 <b>4</b>	29	12.8	21.1	50	I	341.4	0.0	0.0	0.0	46.2	77.5	5.77	Mon
11-Nov-97	) i	5 4	12.3	21.3	16	I	429.8	7.0	0.0	7.0	120.1	7.7.7	84.7	Tue
12 Nov-97	, o	5. 5.	12.7	21.2	15	I	540.5	5.4	0.0	5.4	689	77.5	82.9	Wed
12 Nov 97	5 6	45	12.6	21.0	14	I	402.7	39.8	0.0	39.8	210.9	78.4	118.2	Thu
18-NON-97	1.0	9 99	13.0	21.0	14	I	339.7	43.1	0.0	43.1	339.9	78.9	122.0	Ē
15-Nov-07	. 6	52	13.5	21.1	13	I	358.2	31.2	0.0	31.2	298.4	9.89	2.66	Sat
16 Nov 97	5. 6.	49	13.5	21.0	12	I	307.7	49.6	0.0	49.6	377.6	70.8	120.5	Sun
10-1404-97	1.7.	ç ç	13.5	21.1	4	I	409.9	19.8	0.0	19.8	241.2	76.8	9.96	Mon
16-NON-91	- 6	8 4	13.6	21.2	14	I	414.5	28.2	0.0	28.2	202.4	77.0	105.2	Tue
10-NOV-97	. +	, r	13.5	21.2	15	I	518.9	0.5	0.0	0.5	35.6	81.7	82.1	Wed
19-Nov-97	- +	- <b>T</b>	13.7	212	15	I	385.8	12.9	0.0	12.9	163.3	78.3	91.1	Thu
26 Nov 97	- u	, <u>,</u>	13.7	21.5	21	I	265.1	0.0	0.0	0.0	8.69	76.4	76.4	Wed
27-Nov-97	۶. د ۲. د	49	13.7	21.6	17	I	369.0	0.0	0.0	0.0	2.79	9.92	76.6	Thu
29 Nov 07		2.5	13.7	21.6	21	I	240.3	0.0	0.0	0.0	75.8	6.9	6.9	Ē
20 Nov 07	, c	, y	13.5	21.4	17	I	397.2	0.0	0.0	0.0	8.09	68.2	68.2	Sat
30-Nov-97	9 6	28	13.6	21.1	17	I	346.3	0.0	0.0	0.0	62.4	68.5	68.5	Sun
S							8,125.9	237.4	0.0	237.4	2,930.2	1,879.1	2,116.6	
	~	24	13.2	21.3	19		325.0	9.5	0.0	9.5	117.2	75.2	84.7	
5 4 <b>3</b>	5. 6	5 8	12.6	20.9	12		36.3	0.0	0.0	0.0	35.6	68.1	68.1	
- X	10.4	282	13.7	21.6	36		540.5	49.6	0.0	49.6	377.6	81.7	122.0	

	Fresh Air	Supply Air	Return Air		Clg/Htg	ERV Sensibie	Htg/Clg	Htg/Clg Coil Effect (KWh)	(KWh)	HRV	Energy Consumed	msumed	Day of
	Termp ("C) RH (%)	Temp ("C)	Tomp CC) RI	RHCZ	Mode	Effect (KWh)	Serritie	Latent	Total	CKWIII		lota	¥88¥
	0.4 36	13.7	21.2	14	r	523.3	0.0	0.0	0.0	53.3	75.9	75.9	No.
	-0.4 41	13.6	21.2	13	I	545.6	0.0	0.0	0.0	54.7	76.1	6.1	- ne
	-1.1 62	13.9	21.2	14	I	463.8	14.2	0.0	14.2	172.0	76.3	90.5	Wed
04-Dec-97		13.6	21.1	16	I	417.2	0.0	0.0	0.0	55.9	75.8	75.8	The
		13.7	21.0	14	I	521.5	0.0	0.0	0.0	49.4	75.5	75.5	Ē
		13.8	20.6	13	I	514.9	0.0	0.0	0.0	43.5	67.4	67.4	Sat
		13.7	20.4	13	I	471.5	0.0	0.0	0.0	43.9	9′29	9.79	Sun
		13.7	20.7	13	I	514.7	0.0	0.0	0.0	46.9	76.2	76.2	Mon
		13.8	21.0	13	I	537.4	0.0	0.0	0.0	47.7	76.1	76.1	Tre
		13.6	20.9	13	I	601.9	0.0	0.0	0.0	50.9	76.1	76.1	Wed
		13.8	21.0	13	I	461.9	17.0	0.0	17.0	246.1	73.2	90.2	Thu
		9.50	21.1	13	I	509.5	11.6	0.0	11.6	175.1	9.77	89.2	፰
		13.7	20.6	12	I	537.8	0.0	0.0	0.0	42.0	67.3	67.3	Sat
		13.6	20.5	=	I	496.7	25.0	0.0	25.0	158.0	6.79	92.9	Sun
		13.9	21.0	12	I	442.8	1.	0.0	1.	82.4	78.5	79.5	Mon
		13.8	21.3	13	I	354.3	0.1	0.0	0.1	8.69	75.2	75.3	Tue
		13.8	21.5	14	I	498.0	0.8	0.0	8.0	58.8	75.8	76.7	Wed
		13.6	21.4	13	I	450.2	6.1	0.0	6.1	118.7	78.0	84.1	T <sub>E</sub>
		13.7	21.4	15	I	417.0	0.0	0.0	0.0	56.2	77.4	77.4	Ē
		13.6	21.0	13	I	508.4	0.0	0.0	0.0	46.3	68.7	68.7	Sat
		13.6	20.8	10	I	488.4	28.3	0.0	28.3	247.8	69.3	97.6	Sun
		13.7	21.1	<del>-</del>	I	528.8	14.6	0.0	14.6	182.2	9.92	91.1	Mon
		13.7	21.4	13	Ξ	503.1	0.0	0.0	0.0	53.3	76.3	76.3	Tue
		. c.	21.1	12	I	515.6	0.0	0.0	0.0	50.5	77.2	77.2	Wed
24-Dec-9/		. t.	20.6		I	467.2	0.0	0.0	0.0	51.5	9.97	9.92	큠
		 	20.5	12	I	517.6	0.0	0.0	0.0	48.3	75.9	75.9	Ē
20-Dec-97		, t	20.6	<del>-</del> -	I	537.7	6.1	0.0	6.1	93.3	68.4	74.5	Sat
		2. C	19.3	: =	I	308.5	31.9	0.0	31.9	397.6	70.2	102.9	Sun
		13.1	18.7	12	I	286.8	0.0	0.0	0.0	205.3	35.5	35.5	Mon
		- 6	20.5	! <del>=</del>	r	241.8	0.0	0.0	0.0	278.3	23.3	23.3	Tue
30-Dec-9/	4.4		186	:	I	-0.2	0.0	0.0	0.0	432.5	25.3	25.3	Wed
						4.183.	156.9	0.0	156.9	3,711.9	2,156.9	2,314.7	
	47	13.2	202	£.		457.5	5.7	0.0	5.1	119.7	9.69	74.7	
			18.6	. 6		-0.2	0.0	0.0	0.0	42.0	23.3	23.3	
		2 5	3 40	, <del>,</del>		6019	31.9	0.0	31.9	432.5	78.5	102.9	

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## Air Handling Unit Performance

Green on the Grand Dally Summary	Grand FY				¥	r Handlin	Air Handling Unit Performance	orman	99					January 1998
Date	Fresh Air Temn ("E) RH	h Alr BH (2)	Supply Air Temn (12)	Retur Tamn (*C.)	Return Atr	Clg/Htg Mode	ERV Sonsible Effect (kWh)	Htg/Cig Senible	Htg/Clg Coll Effect (KWh)	(KWb) Total	HRV (KWB)	EBBTERY C	Energy Consumed	Day of
01-Jan-98	-3.1		11.0	20.1	1	I	236.7	0.0	0.0	0.0	213.5	23.6	23.6	Thu
02-Jan-98	3.6	39	14.8	21.3	12	I	329.0	0.0	0.0	0.0	21.5	23.4	23.4	Fri
03-Jan-98	7.2	51	14.9	21.0	18	I	258.9	0:0	0.0	0.0	46.1	68.3	68.3	Sat
04-Jan-98	0.0	65	14.4	20.8	17	I	480.3	0.0	0.0	0.0	120.1	68.7	68.7	Sun
05-Jan-98	2.8	81	13.0	20.8	19	I	318.7	0.0	0:0	0.0	68.3	65.5	65.5	Mon
06-Jan-98	9.0	85	11.9	21.0	32	I	44.6	0.0	0.0	0.0	72.0	66.4	66.4	Tue
07-Jan-98	5.8	81	11.8	20.9	88	I	180.0	0.0	0.0	0.0	9.99	2.79	2.79	Med
08-Jan-98	1.7	9/	11.8	20.8	2	I	362.0	0.0	0.0	0.0	55.3	66.2	66.2	Thu
09-Jan-98	1.0	73	11.8	20.9	17	I	380.2	0.0	0.0	0.0	26.0	65.0	65.0	Ë
10-Jan-98	-0.7	41	12.6	20.9	13	I	456.4	0.0	0.0	0.0	41.9	53.3	53.3	Sat
11-Jan-98	-6.5	45	11.7	20.7	9	I	430.8	0:0	0.0	0.0	262.7	51.7	51.7	Sun
12-Jan-98	4.4	54	11.1	20.7	12	I	353.4	0.0	0.0	0.0	201.3	42.9	45.9	Mon
13-Jan-98	-5.5	49	11.9	21.0	13	I	618.5	0.0	0.0	0.0	45.0	48.3	48.3	Tue
14-Jan-98	-8.1	43	11.2	20.7	Ξ	I	9.069	-0.2	0.0	-0.2	35.0	48.5	48.7	Wed
15-Jan-98	-7.0	99	12.2	20.9	=	I	674.7	0.0	0.0	0.0	45.7	52.6	52.6	Thu
16-Jan-98	9.9-	20	12.2	20.9	4	I	672.1	0.0	0.0	0.0	30.6	49.9	49.9	Ē
17-Jan-98	-4.7	29	12.3	20.5	10	I	8'609	0.0	0.0	0.0	33.1	50.9	50.9	Sat
18-Jan-98	-2.8	19	12.3	20.4		I	529.7	0.0	0.0	0.0	36.9	50.7	50.7	Sun
19-Jan-98	-2.2	26	12.3	20.7	=	I	496.1	0.0	0.0	0.0	39.0	52.6	52.6	Mon
20-Jan-98	-4.0	54	12.3	20.7	7	I	568.4	0.0	0.0	0.0	33.9	48.7	48.7	Tue
21-Jan-98	-3.6	45	12.2	20.6	10	I	551.3	0.0	0.0	0.0	35.0	48.7	48.7	Wed
22-Jan-98	-6.2	53	12.2	20.7	Ξ	I	656.7	0.0	0.0	0.0	32.0	48.5	48.5	Thu
23-Jan-98	-1.6	69	12.3	20.7	4	I	467.6	0.0	0.0	0.0	39.7	49.1	49.1	Fri
24-Jan-98	-1.6	26	12.4	20.3	Ξ	I	483.5	0.0	0.0	0.0	38.5	51.0	51.0	Sat
25-Jan-98	-2.5	25	12.3	20.2		I	519.6	0.0	0.0	0.0	35.6	51.9	51.9	Sun
26-Jan-98	-5.5	22	12.2	20.6	Ξ	I	582.2	0.0	0.0	0.0	96.0	48.8	48.8	Mon
27-Jan-98	-2.8	92	12.3	50.9	13	I	524.4	0.0	0.0	0.0	36.9	48.3	48.3	Tue
28-Jan-98	-2.1	99	12.2	21.0	13	I	454.9	0.0	0.0	0.0	6.05	47.5	47.5	Wed
29-Jan-98	-0.1	9/	12.3	21.0	4	I	414.2	0.0	0.0	0.0	43.9	48.3	48.3	Thu
30-Jan-98	-0.4	29	12.2	21.0	4	I	421.7	0.0	0.0	0.0	44.5	48.5	48.5	Fri
31-Jan-98	-1.0	49	12.3	20.8	10	I	454.6	0.0	0.0	0.0	42.1	51.3	51.3	Sat
Sum			•				14,221.3	-0.2	0.0	-0.2	2,009.6	1,606.7	1,607.0	
Avg	-1.7	28	12.3	20.8	4		458.8	0.0	0.0	0.0	64.8	51.8	51.8	
Min	48.1	34	11.0	20.1	9		44.6	-0.2	0.0	-0.2	21.5	23.4	23.4	
Max	9.0	82	14.9	21.3	32		9.069	0.0	0.0	0.0	262.7	68.7	68.7	

Tuesday, 17 November, 1998

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## Air Handling Unit Performance Green on the Grand

February 1998

Dally Summary	Ţ				<b>E</b>		l Hailling Vint r & 101 Halle		ا چ					occi (impiga
Data	Fresh Air	_	Supply Air	Return Alr	IAF	Clg/Htg Lode	ERV Sonsible	Htg/Glg	Htg/Clg Coll Effect (KWh)	KWE		Energy Consumed	Pasamod Tetal	Day of
	Temp [15]	=	19 <b>11 (18</b> )		KH (7)	annu.	FIIORI IVAIII		Latell	10101	45.5		1010 E1 1	MOON COLOR
01-Feb-98	6. 1.	20	12.2	20.7		r	406.9	0.0	9	9	ç. Ç	- ·	- ·	5 ;
02-Feb-98	2.1	<b>₹</b>	12.2	21.1	4	I	315.1	0.0	0.0	0.0	49.7	48.5	48.5	Mon
03-Feb-98	-2.7	8	12.2	21.0	=	I	511.0	0.0	0.0	0.0	38.8	48.0	48.0	Tue
04-Feb-98	4.6	35	12.2	20.8	9	I	416.6	0.0	0.0	0.0	81.5	48.2	48.2	Wed
05-Feb-98	-3.0	21	12.2	20.9		I	176.2	0.0	0.0	0.0	9.0	47.9	47.9	Thu
06-Feb-98	-8.2	8	11.4	20.5		I	154.2	0.0	0.0	0.0	39.2	7.5	7.5	Ē
10-Feb-98	3.3	32	11.5	21.2	12	I	138.5	0.0	0.0	0.0	33.7	29.8	29.8	Tue
11-Feb-98	1.3	29	11.1	20.8	13	I	301.6	0:0	0.0	0.0	55.2	48.4	48.4	Wed
12-Feb-98	6.	92	11.1	20.7	15	I	304.2	0.0	0.0	0.0	55.1	48.4	48.4	Thu
13-Feb-98	-2.2	4	11.1	20.4	11	I	445.0	0.0	0.0	0.0	44.9	48.0	48.0	Ē
14-Feb-98	-7.8	31	10.8	20.1		I	504.6	0.0	0.0	0.0	122.6	51.6	51.6	Sat
15-Feb-98	5.1	4	10.8	19.9		I	215.2	0.0	0.0	0.0	121.2	51.8	51.8	Sun
16-Feb-98	6.	20	11.7	20.6	9	I	276.0	0.0	0.0	0.0	33.5	49.5	49.5	Mon
17-Feb-98	1.6	9/	12.2	20.9	14	I	339.5	0.0	0.0	0.0	47.5	48.2	48.2	Tue
18-Feb-98	<del>1</del>	78	12.2	20.9	16	I	333.0	0.0	0.0	0.0	47.5	48.2	48.2	Wed
19-Feb-98	2.0	9/	12.2	21.2	17	I	325.3	0.0	0.0	0.0	49.4	48.9	48.9	Th
20-Feb-98	2.0	69	12.2	21.2	17	I	323.4	0.0	0.0	0.0	49.9	48.3	48.3	Ē
21-Feb-98	6.0	22	12.3	20.6	13	I	381.3	0.0	0.0	0.0	45.3	51.4	51.4	Sat
22-Feb-98	0.1	28	12.3	20.3	=	I	379.7	0.0	0.0	0.0	43.0	51.4	51.4	Sun
23-Feb-98	1.5	51	12.3	20.9	13	I	350.5	0.0	0.0	0.0	45.9	48.1	48.1	Mon
24-Feb-98	0.8	49	12.3	21.1	12	I	375.7	0.0	0.0	0.0	46.2	48.4	48.4	Tue
25-Feb-98	2.5	55	12.2	21.2	15	I	300.4	0.0	0.0	0.0	50.2	48.2	48.2	Wed
26-Feb-98	2.7	47	12.3	21.2	4	I	296.9	0.0	0.0	0.0	9.09	48.5	48.5	Thu
27-Feb-98	2.4	4	12.2	21.1	13	I	307.2	0.0	0.0	0.0	50.0	48.1	48.1	Ē
28-Feb-98	3.8	62	12.3	20.6	16	I	249.3	0.0	0.0	0.0	51.2	52.0	52.0	Sat
Sum							8,127.3	6.1	0.0	-0.1	1,306.6	1,168.6	1,168.6	
Avg	-0.2	52	11.9	20.8	t		325.1	0.0	0.0	0.0	62.3	46.7	46.7	
Mi.	-8.2	21	10.8	19.9	9		138.5	0.0	0.0	0.0	9.0	7.5	7.5	
Max	3.8	78	12.3	21.2	17		511.0	0.0	0.0	0.0	122.6	52.0	62.0	

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#### Green on the Grand Dally Summery

## Air Handling Unit Performance

Dally Summary														
4	Fresh Alr	Alr	Supply Air	Return Air	¥	Clg/Htg	ERV Sensible	Htg/Clg	Htg/Clg Coll Effect (KWh)			Energy Censumed		Day ef
	Temp ("C)	RH (X)	Tamp ("C)	Tomp ("C)		Mode	Effect (kWh)	Senible	Latent	Total	(KWB)	<b>38</b>	Tetal	Yeek
01-Mar-98	4.8	20	12.3	20.2	50	I	220.5	0.0	0.0	0.0	51.9	51.1	51.1	Sun
02-Mar-98	2.1	99	12.2	20.6	18	I	320.0	0:0	0.0	0.0	46.9	47.7	47.7	Mon
03-Mar-98	2.0	64	12.2	21.0	17	I	321.9	0.0	0.0	0.0	49.0	47.5	47.5	Tue
04-Mar-98	9.0	28	12.2	20.8	15	I	382.7	0:0	0.0	0.0	4.4	47.8	47.8	Wed
05-Mar-98	0.7	52	12.2	20.8	4	I	378.5	0.0	0.0	0.0	43.9	48.5	48.5	Thu
06-Mar-98	0.1	20	12.2	20.9	12	I	404.9	0.0	0:0	0.0	43.0	48.9	48.9	Fri
07-Mar-98	4.	52	12.3	20.6	1	I	351.2	0.0	0.0	0.0	45.8	52.1	52.1	Sat
08-Mar-98	6.	99	12.3	20.4	12	I	366.6	0.0	0.0	0.0	44.4	51.3	51.3	Sun
09-Mar-98	1.4	72	12.3	20.9	8	I	237.3	0.0	0.0	0.0	52.4	47.4	47.4	Mon
10-Mar-98	-7.8	37	11.9	20.5	12	I	572.6	0.0	0.0	0.0	162.5	48.2	48.2	Tue
11-Mar-98		33	10.3	20.1	10	I	358.4	0.0	0.0	0.0	363.9	46.9	46.9	Wed
12-Mar-98	-7.0	38	11.2	20.6		I	468.5	0.0	0.0	0.0	214.2	48.6	48.6	Thu
13-Mar-98	43.4	4	12.2	20.6		I	490.5	0.0	0.0	0.0	. 59.6	48.1	48.1	F
14-Mar-98	<del>-</del> -	64	12.2	20.4		I	454.5	0.0	0.0	0.0	41.0	58.6	58.6	Sat
15-Mar-98	-5.8	45	11.9	20.3		I	612.5	0.0	0.0	0.0	54.1	51.7	51.7	Sun
16-Mar-98	6.5	30	9.6	20.2		I	369.4	0.0	0.0	0.0	227.4	49.1	49.1	Mon
17-Mar-98	-2.2	4	11.6	20.9		I	303.8	0.0	0:0	0.0	126.6	52.0	52.0	Tue
18-Mar-98	1.0	75	12.3	21.1	13	I	372.6	0.0	0.0	0.0	44.1	48.7	48.7	Wed
19-Mar-98	1.0	62	12.3	21.1	15	r	372.6	0.0	0:0	0.0	45.1	66.1	66.1	Thu
20-Mar-98	0.0	62	12.2	21.0	13	I	410.1	0.0	0.0	0.0	43.3	48.2	48.2	Ē
21-Mar-98	<del>1.</del> 8.	61	12.3	20.5	01	I	494.7	0.0	0.0	0.0	38.3	51.1	51.1	Sat
22-Mar-98	<u>.</u> 3	52	12.2	20.5		I	470.2	0.0	0.0	0.0	39.4	50.9	50.9	Sun
23-Mar-98	-2.9	38	12.2	20.9		I	477.4	0.0	0.0	0.0	53.3	48.3	48.3	Mon
24-Mar-98	<del></del>	34	10.9	20.7		I	311.2	0.0	0.0	0.0	93.7	48.5	48.5	Tue
25-Mar-98	3 8	56	10.6	20.5	12	I	157.6	0.0	0.0	0.0	49.0	44.8	44.8	Wed
26-Mar-98	14.1	36	15.9	21.9	ಜ	I	16.9	0.0	0.0	0.0	42.6	40.9	40.9	Ŧ
27-Mar-98	17.9	4	19.0	23.4	34	I	3.5	0.0	0.0	0.0	42.6	72.8	72.8	Fri
28-Mar-98	16.1	46	17.3	22.9	34	I	6.4	0.0	0.0	0.0	38.2	26.7	26.7	Sat
29-Mar-98	14.1	47	15.4	21.9	34	I	7.0	0.0	0.0	0.0	41.5	52.1	52.1	Sun
30-Mar-98	18.6	47	19.6	23.5	9	I	1.9	0.0	0.0	0.0	38.2	69.5	69.5	Mon
31-Mar-98	19.8	38	20.8	24.4	39	I	1.8	0.0	0.0	0.0	39.5	70.1	70.1	Tue
Sum							9,717.6	0.0	0.0	0.0	2,290.0	1,614.2	1,614.2	
Avg	2.3	20	13.0	21.1	20		313.5	0.0	0.0	0.0	73.9	52.1	52.1	
Min	9.1	26	4.6	20.1	9		1.8	0.0	0.0	0.0	29.6	40.9	40.9	
Max	19.8	79	20.8	24.4	40		612.5	0.0	0.0	0.0	363.9	72.8	72.8	
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Tuesday, 17 November, 1998

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Green on the Grand	and				Boile	ır/Chi	ller Per	Boiler/Chiller Performance	2			Septe	September 1997
Date	Outdoor Amblent	Clg/Htg Mode	HI Start (count)	Le Start (count)	Avg. Cycle Time (min) Hi Fire Lo Fire	me (min) Lo Fire	Evap. Supply	Cond. Return Temn (*C)	Q Delivered (KWh)	Fuel Consumed (KWh)	Elec. Consumed (KWh)	Daffy COPth	Day ef Week
	I BIII C						in the second	ion de la compa	8	000	188		Sat
20-Sep-97	14.1	ပ	0	0			18	7	8.5	9.0	3 3		i d
21.Sep.97	96	O	0	0			19	8	0.00	90.00	<u>\$</u>		ino :
10 do 07	12.0	، ر	C	0			19	19	0.70	0.00	42.93		Mon
16-dac-77	6.4. 6.4.	) (	, 5	8	60		4	19	-143.53	264.77	69.83	0.54	Tue
73-Sep-97	7.7	) د	3 6	} <	•		60	19	0.20	00'0	36.43		Wed
24-Sep-97	<i>)</i> .	، د	<b>o</b> (	o 'c			ξ	17	0.05	0.00	80.70		Thu
25-Sep-97	12.6	ပ (	<b>&gt;</b> {	> {	o	•	5 4	. 2	-151.74	264.33	42.82	0.57	Fri
26-Sep-97	10.7	ပ	77	31 '	0	_	ŗţ	. d	-0.73	000	44.57		Sat
27-Sep-97	9.7	O	0	0			- 8	5 6	9 6		101 81		Sun
28-Sep-97	14.1	ပ	0	0			გ გ	<u>o</u> •		8 6	135.81		Mon
29-Sep-97	16.0	O	0	0	,		7 ;	0 9	70077	588.01	12411	0.81	Tue
30-Sep-97	13.3	ပ	17	18	6	32	2	18	-420.24	10,000	1.3		
			49	9					-752.02	1,095.11	682.73		
Enc.	Ş		}	i ic	<b>~</b>	=	4	19	-68.37	99.66	62.07	0.64	
Avg	7. 9				<b>&amp;</b>	_	9	17	458.24	0.00	1.84	0.54	
	0L 9F		, 22	8	တ	32	21	21	1.72	566.01	135.81	0.81	
YBM	2												

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Option         Option         City (line)         (F start)         Control (start)         (F start)         (F start)	Green on the Grand Dally Summary	Srand V				B	iler/Ch	iller Pel	Boiler/Chiller Performance	991		-	Ŏ	October 1997
67         C         O         O         7         19         415         000         271         03           15.5         C         O         O         T         19         745         754         200         271         03         17         415         000         271         03         17         415         000         271         03         17         426.47         572.70         99.92         07         17         426.47         572.70         99.92         07         17         426.47         572.70         99.92         07         17         426.47         572.70         99.92         07         17         426.47         572.70         99.92         07         17         426.47         572.70         99.92         17         426.47         17         426.47         572.70         176.53         17         426.47         17         426.47         176.53         17         426.47         17         426.47         176.53         176.46         17         426.47         186.50         176.46         17         426.47         186.50         176.46         186.50         176.46         186.50         176.47         186.50         176.50         186.50	Date	1	Clg/Htg Mode	HI Start (count)	Lo Start (count)	Avg. Cycle III Fire	Time (min) Lo Fire	Evap. Supply Temp (°C)	Cond. Return Temp (°C)	Q Delivered (KWh)	Fuel Consumed (KWh)	Elec. Consumed (KWh)	Daffy COP Lh	Day ef Week
8.0         CM         5         46         9         6         37         18         79.87         22.89         32.85         0.35           15.5         CM         16         18         24         24         17         -65.47         20.83         119.40         0.35           17.2         C         18         18         24         17         19         -66.40         90.83         119.40         0.36           17.2         C         36         18         2         7         19         -66.40         90.83         119.40         0.36           16.2         C         36         2         7         2         -66.83         19.90         119.90         0.36           16.2         C         36         6         27         6.63         7         7.40         19.90         119.90         0.36           11.2         C         31         6         37         2         -66.23         76.30         146.60         0.36           11.2         C         31         6         37         2         -66.23         76.30         146.60         0.36           11.2         C         16	01-Oct-97	6.7	O	0	0			17	19	-4.15	0.00	2.71		Wed
15.5         CM+         6         29         18         24         29         17         -62.47         57.70         99.22         0.74           17.2         C         18         29         19         65         17         19         -635.24         695.00         11085         0.74           17.2         C         58         37         6         20         10         22         -635.24         695.00         11085         0.65           16.2         C         26         26         7         29         -636.24         685.00         11085         0.65           17.5         C         26         26         20         7         29         -686.20         11085         0.65           18.6         C         27         6         20         7         29         -686.20         147.49         0.89           18.6         C         20         6         1         2         20         20         6.00         0.89         0.99         0.89         0.89         0.89         0.89         0.89         0.89         0.89         0.89         0.89         0.89         0.89         0.89         0.89         0.	02-Oct-97	8.0	CH	ß	4	თ	ဖ	37	18	79.67	228.97	32.85	0.35	Thu
17.2         C         12         12         65         7         19         106 40         50050         1194 0         0.96           14.2         C         58         9         7         2         146 50         1600         1096         0.96           148.8         C         58         9         7         2         16         22         46520         16050         14660         0.83           148.6         C         25         5         2         2         46500         14660         0.83           148.6         C         24         2         6         2         7         28         46500         14660         0.83           148.6         C         24         2         6         2         7         2         46600         14600         0.83           148.9         C         6         2         7         2         6         2         7         2         6600         14600         0.83           110.8         C         6         2         1         2         14600         14600         0.83           110.8         C         6         0         0	03-Oct-97	15.5	S	ဖ	8	18	24	88	17	-425.47	572.70	39.92	0.74	Fri
17.2         C         58         58         7         2         -149.2.2.2.         665.00         110.08.5.         0.63           116.2         C         36         37         6         7         26.66.80         110.08.5.         141.65         0.63           116.2         C         36         37         6         27         56.26         77.00.55         144.52         144.65         0.84           116.6         C         31         30         6         27         56.26         76.37         77.47         14465         0.84           112.0         C         20         30         6         27         56.26         76.37         77.47         14465         0.84           112.0         C         14         14         6         2         7         26.33         77.47         14465         0.89           112.0         C         0	04-Oct-97	17.2	O	12	12	6	89	7	19	-606.40	630,53	119.40	96.0	Sat
18	05-Oct-97	17.2	O	28	88	7	2	10	23	-435.23	695.00	110.85	0.63	Sun
162         C         25         25         7         35         6         27         66971         78224         14552         064           11.5         C         24         24         6         27         5         66723         78305         14749         0.09           12.0         C         24         24         6         27         5         28225         78477         14665         0.09           12.0         C         14         14         6         2         17         20         -78437         7747         1665         0.00           11.5         C         14         14         6         2         17         20         -78437         7474         0.00	06-Oct-97	18.8	O	36	37	9	20	7	92	-656.80	789.35	146.60	0.83	Mon
17.5         C         31         30         6         27         5         28         78353         74749         047           18.6         C         24         24         24         6         39         7         7837         74477         14465         0.07           11.6         C         24         24         6         24         13         6         22.23.56         466.50         846.50         846.60         0.07           11.6         C         14         14         6         2         13         0.00         851.64         0.00           11.1         C         0         0         0         0         0         0         0         0         0.00         0         0.00         0	07-Oct-97	16.2	O	52	ĸ	7	35	9	27	-639.71	762.24	148.52	0.84	Tue
186         C         24         24         6         39         7         256         776477         14865         0.99           120         C         140         6         1         1         2         77567         76477         14665         0.99           103         C         14         6         1         1         2         22255         46650         88.99         0.47           103         C         14         6         1         1         1         20         -134         0.00         98.53         0.47           116         C         0	08-Oct-97	17.5	O	31	ଛ	9	27	ហ	78	-667.23	763.05	147.49	0.87	Wed
120         C         50         50         50         6         1         8         223         496.50         88.99         0.47           10.8         C         14         14         6         2         13         22         -53.33         147.49         94.64         0.40           10.8         C         14         14         6         2         13         10         0.00         99.55         0.44           16.5         C         0         0         0         0         0         0         0.00         1.84         0.45           7.4         C         0	09-Oct-97	18.6	ပ	24	54	9	39	7	83	-758.97	764.77	148.65	0.99	Thu
8.9         C         14         14         6         2         13         25         -58.33         147.44         3464         0.40           10.8         C         0         0         0         17         20         -13.4         0.00         99.58           11.5         C         0         0         0         0         0         0         99.58         16.54         0.00           7.6         C         0         0         0         0         0         0         1.84         0.43           7.4         C         0         0         0         0         0         0         1.84         0.43           7.4         C         0         0         0         0         0         0         1.84         0         0           6.2         C         0         0         0         0         0         0         0         1.84         0         0         0         0         1.84         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <td>10-Oct-97</td> <td>12.0</td> <td>O</td> <td>20</td> <td>8</td> <td>9</td> <td>-</td> <td>დ</td> <td>26</td> <td>-232.95</td> <td>496.50</td> <td>88.99</td> <td>0.47</td> <td>Ē</td>	10-Oct-97	12.0	O	20	8	9	-	დ	26	-232.95	496.50	88.99	0.47	Ē
10.8         C         0         0         17         20         -1.34         0.00         53.15           116.5         C         0         0         0         1         1         1         1         0         -1.34         0.00         53.15           11.2         C         0	11-Oct-97	6.8	ပ	4	4	9	2	13	22	-58.33	147.49	34.64	0.40	Sat
16.5         C         0         0         21         19         0.00         0.00         99.55           111.2         C         62         62         62         6         1         11         19         -240.36         659.36         165.34         0.43           7.6         C         6         0         0         0         0         0         0.00         1.61         0         0         0         1.61         0	12-Oct-97	10.8	ပ	0	0			17	20	-1.34	0.00	53.15		Sun
11.2         C         62         62         1         11         11         19         240.36         559.36         105.34         0.43           7.6         C         0         0         0         0         0         1.94         0.43           7.4         C         0         0         0         0         0         0         1.84         0.00         1.84         0.00         1.82         0.00         0.00         1.82         0.00         0.00         1.82         0.00         0.00         1.82         0.04         0.00         0.00         1.82         0.00         0.00         0.00         0.00         0.00         0.00         0.00         0.00	13-Oct-97	16.5	O	0	0			21	19	0.00	0.00	99.55		Mon
7,6         C         0         0         15         20         0.00         0.00         1.84           7,4         C         0         0         1         1         1         1         0         0         1.81         1           6,2         C         0         0         0         1	14-Oct-97	11.2	O	62	62	ဖ	τ-	7	19	-240.36	559.36	105.34	0.43	Tue
7,4         C         0         0         14         14         0         0         181           6,2         C         0         0         0         17         19         0.00         0.00         1.82           6,4         C         0         0         0         17         19         0.00         1.82         1.82           7,3         C/H         57         57         4         7         7         19         0.00         0.00         1.83         1.82           4,8         H         46         3         0         36         19         141.35         318.55         38.52         0.44           0,9         H         46         46         3         0         36         19         141.35         318.55         38.52         0.44           0,9         H         46         46         3         0         36         141.35         318.55         38.52         0.44           0,9         H         73         73         3         0         55         18         140.35         313.45         55.33         0           2,0         H         10         5         1	15-Oct-97	7.6	O	0	0			15	8	0.00	0.00	1.84		Wed
6.2         C         0         0         17         19         0.00         0.00         1.82           5.4         C         0         0         17         19         0.00         0.00         1.82           6.8         C         0         0         17         19         0.00         0.00         1.82           7.3         C/H         57         4         0         36         19         14.35         38.55         38.52         38.57 <td>16-Oct-97</td> <td>7:4</td> <td>O</td> <td>0</td> <td>0</td> <td></td> <td></td> <td>8</td> <td>19</td> <td>0.00</td> <td>0.00</td> <td>1.81</td> <td></td> <td>Thu</td>	16-Oct-97	7:4	O	0	0			8	19	0.00	0.00	1.81		Thu
5.4         C         0         0         17         19         0.00         0.00         1.82           7.3         C/H         57         6         17         19         0.00         0.00         1.83           7.3         C/H         57         46         2         17         19         0.00         0.00         1.83           7.3         C/H         57         46         3         6         36         19         141.35         318.55         38.32         0.44           0.4         H         46         3         0         46         19         150.35         38.55         36.37         0.44           2.7         H         87         87         9         46         19         150.35         38.55         36.37         37.35	17-Oct-97	6.2	ပ	0	0			17	19	0.00	0.00	1.82		Ē
6.8         C         0         0         17         19         0.00         0.00         1.83           7.3         C/H         57         4         0         36         19         141.35         318.55         38.92         0.44           4.8         H         46         46         3         0         36         19         141.35         318.55         38.92         0.43           0.9         H         46         46         3         0         46         19         163.35         201.58         6.43         0.43           2.7         H         66         7         6         55         18         163.55         6.33         0.43           5.0         H         75         7         2         6         55         18         73.09         399.24         55.80         0.27           0.9         H         105         105         10         55         18         162.19         482.55         55.80         0.37           1.7         H         108         108         3         0         55         18         162.19         482.55         55.80         0.31           1.7	18-Oct-97	5.4	O	0	0			17	19	0.00	0.00	1.82		Sat
7.3         C/H         57         67         4         0         36         19         141.35         318.55         38.92         0.44           4.8         H         46         46         3         0         46         19         160.35         389.95         54.37         0.43           0.9         H         73         73         3         0         46         19         165.35         389.95         54.37         0.43           2.7         H         73         3         0         6         5         18         165.35         389.95         55.50         0.39           5.0         H         67         3         0         5         18         103.85         381.61         54.35         0.37           5.0         H         75         3         0         5         18         73.06         33.24         55.33         0.17           0.9         H         105         105         0         5         18         162.19         462.12         55.89         0.37           1.7         H         10         5         18         162.19         26.71         162.19         162.19         1	19-Oct-97	6.8	ပ	0	0			17	19	0.00	0.00	1.83		Sun
4 8         4 6         4 6         4 6         6 8         9 9         150.35         201.58         54.37         0.43           0.9         H         73         73         3         0         46         19         150.35         389.95         55.50         0.39           2.7         H         73         3         0         55         18         150.36         55.50         0.39           5.0         H         75         3         0         55         18         103.45         55.50         0.39           5.0         H         75         3         0         55         18         54.36         55.33         0.17           0.9         H         105         105         0         55         18         73.09         55.89         0.37           1.7         H         108         108         0         55         18         191.52         56.50         0.31           2.7         H         108         10         55         18         191.52         171.59         56.50         0.31           2.7         H         10         5         18         191.52         287.11         1	20-Oct-97	7.3	C/H	22	22	4	0	98	19	141.35	318.55	38.92	0. 4	Mon
0.9         H         73         73         9         46         19         150.35         55.50         6.39         6.33         6.17         6.39         6.33         6.17         6.23         6.23         6.23         6.23         6.23         6.24         6.23         6.24         6.23         6.24         6.24         6.23         6.24         6.24         6.24         6.24         6.24         6.24         6.24         6.24         6.24         6.24         6.24	21-Oct-97	8.4	I	46	46	က	0	38	19	86.83	201.58	54.37	0.43	Tue
2.7         H         87         3         0         55         18         103.83         381.61         54.36         027         0.27           5.9         H         75         75         3         0         55         18         54.36         313.45         53.33         0.17           5.0         H         75         3         0         55         18         73.09         392.4         55.80         0.17           0.9         H         105         105         3         0         55         18         162.19         55.80         0.27           1.7         H         108         108         3         0         55         18         191.52         452.12         56.80         0.37           3.7         H         108         3         0         55         18         190.70         36.50         0.41           6.1         H         69         69         3         0         55         18         36.6         11.15         46.63         37.9         0.12           6.1         H         49         49         3         0         55         18         36.6         13.11	22-Oct-97	6.0	r	73	23	က	0	46	19	150.35	389.95	55.50	0.39	Wed
5.9         H         75         75         3         6         55         18         54.36         313.45         55.33         0.17           5.0         H         85         85         3         6         55         18         73.09         339.24         55.80         0.22           0.9         H         105         105         3         0         55         18         162.19         438.25         55.89         0.37           1.7         H         108         108         3         0         55         18         191.52         462.12         56.56         0.41           2.2         H         108         3         0         55         18         190.70         36.50         0.41           6.1         H         69         69         3         0         56         18         30.78         264.86         53.29         0.14           6.1         H         62         62         3         0         56         18         36.67         267.11         46.63         0.12           1.2         H         40         5         18         3.66         20.71         46.63         0.12	23-Oct-97	2.7	I	87	87	ဗ	0	55	18	103.83	381.61	54.35	0.27	Thu
5.0         H         65         16         73.09         73.09         73.04         55.80         0.22           0.9         H         105         105         3         0         55         18         162.19         438.25         55.89         0.37           1.7         H         108         108         3         0         55         18         191.52         56.86         0.41           7.2         H         108         3         0         55         18         130.70         396.50         121.59         0.41           7.2         H         69         62         3         0         55         18         130.70         396.50         121.59         0.41           6.1         H         49         3         0         55         18         33.15         267.11         51.89         0.14           9.9         H         49         3         0         55         18         3.66         213.71         46.63         0.12           1         40         42         5         10         5         14         46.63         0.02           1         0         0         0	24-Oct-97	5.9	I	75	75	က	0	22	18	54.36	313.45	53.33	0.17	Fri
0.9         H         105         105         6         55         18         162.19         438.25         55.89         0.37           1.7         H         108         108         3         0         55         18         191.52         462.12         56.56         0.41           3.7         H         69         69         3         0         55         18         130.70         396.50         121.59         0.33           6.1         H         69         69         3         0         56         18         39.78         284.86         53.29         0.14           6.1         H         49         49         3         0         56         18         33.75         267.11         51.88         0.12           9.9         H         49         49         3         0         55         18         3.66         213.71         46.63         0.02           1         40         49         49         3         0         55         18         3.66         213.71         46.63         0.02           1         40         40         40         40         40         40         40	25-Oct-97	5.0	I	85	88	က	0	33	18	73.09	339.24	55.80	0.22	Sat
1,7         H         108         108         3         0         55         18         191.52         462.12         56.56         0.41           3,7         H         93         93         3         0         55         18         130.70         396.50         121.59         0.33           7,2         H         69         3         0         56         18         39.78         284.86         53.29         0.14           6,1         H         62         6         5         18         33.15         267.11         51.88         0.14           9,9         H         49         49         3         0         55         18         3.66         213.71         46.63         0.12           1         1229         1292         1         2         18         3.66         213.71         46.63         0.02           1         0         0         0         0         0         0         0         112.14         336.03         66.00         0           4         0         0         0         0         0         0         0         0         112.14         336.03         18         0.0	26-Oct-97	6.0	ェ	105	105	က	0	55	18	162.19	438.25	55.89	0.37	Sun
3.7         H         93         93         6         65         18         130.70         396.50         121.59         0.33           7.2         H         69         69         3         0         55         18         39.78         284.86         53.29         0.14           6.1         H         62         6         18         33.15         267.11         51.88         0.14           9.9         H         49         49         3         0         55         18         33.15         267.11         46.63         0.12           9.9         H         49         49         3         0         55         18         33.45         46.63         0.12           9         40         40         40         5         10         141.14         10,416.90         2,465.90         0.20           1         0	27-Oct-97	1.7	I	108	108	ဗ	0	55	18	191.52	462.12	56.56	0.41	Mon
7.2         H         69         69         3         0         55         18         39.78         284.86         53.29         0.14           6.1         H         62         62         3         0         56         18         33.15         267.11         51.88         0.12           9.9         H         49         49         3         0         55         18         3.66         71.71         46.63         0.12           9         40         42         5         10         29         70         712.14         336.35         66.00         0.47           1         0         0         0         3         0         5         17         768.97         0.00         1.81         0.02           19         10 <td>28-Oct-97</td> <td>3.7</td> <td>I</td> <td>93</td> <td>93</td> <td>ღ</td> <td>0</td> <td>52</td> <td>18</td> <td>130.70</td> <td>396.50</td> <td>121.59</td> <td>0.33</td> <td>Tue</td>	28-Oct-97	3.7	I	93	93	ღ	0	52	18	130.70	396.50	121.59	0.33	Tue
6.1         H         62         62         3         0         56         18         33.15         267.11         51.88         0.12           9.9         H         49         49         3         0         55         18         3.66         17         46.63         0.02           9         H         40         42         5         10         29         20         -112.14         336.33         66.00         0.47           1         0         0         0         3         0         5         17         -758.97         0.00         1.81         0.02           19         10         10         10         10         10         148.65         148.65         0.99	29-Oct-97	7.2	I	69	69	ю	0	55	18	39.78	284.86	53.29	0.14	Wed
9.9         H         49         49         3         0         55         18         3.66         213.71         46.63         0.02           1229         1229         1292         3,476.47         10,416.90         2,045.90         0.02           9         40         42         5         10         29         20         -112.14         336.03         66.00         0.47           1         0         0         0         5         17         -758.97         0.00         1.81         0.02           19         10	30-Oct-97	6.1	I	62	62	ო	0	56	18	33.15	267.11	51.88	0.12	Thu
1229     1229     1229     20     -3,476.47     10,416.90     2,045.90       9     40     42     5     10     29     20     -112.14     336.03     66.00       1     0     0     0     5     17     -758.97     0.00     1.81       19     108     18     65     56     29     191.52     789.35     148.65	31-Oct-97	6.6	I	49	49	က	0	55	18	3.66	213.71	46.63	0.02	ᇤ
9     40     42     5     10     29     20     -112.14     336.03     66.00       1     0     0     3     0     5     17     -758.97     0.00     1.81       19     108     18     65     56     29     191.52     789.35     148.65	Sum			1229	1292					-3,476.47	10,416.90	2,045.90		
1 0 0 3 0 5 17 -758.97 0.00 1.81 19 108 18 65 56 29 191.52 789.35 148.65	Ava	a		40	42	ĸ	10	29	20	-112.14	336.03	00.99	0.47	
19 108 108 18 65 56 29 191.52 789.35 148.65	Min	-		•	0	ო	0	ယ	17	-768.97	0.00	1.81	0.02	
	Max	19		108	108	18	9	99	29	191.52	789.35	148.65	0.99	

Page 2 of 7

Tuesday, 17 November, 1998

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Green on the Grand	Grand •				ă	oiler/Ch	Boiler/Chiller Performance	forma	99			Nov	November 1997
Date	Outdoor Ambient Town (*C)	Clg/Htg Mode	HI Start (count)	Lo Start (count)	Avg. Cycle Time Lmin) Hi Fire Lo Fire	Time (min) Lo Fire	Evap. Supply Temo (*C)	Cond. Return Temp (°C)	( Delivered (KWh)	Fael Consumed (KWh)	Elec. Consumed (KWh)	Daffy COP th	Day of Week
10 11 10	Tombi of		98	49	3	°	56	18	-6.27	210.55	51.44	0.03	Sat
76-vov-10	4.0		3 8	} £	o en		26	8	70.11	312.95	54.36	0.22	Sun
02-Nov-97	Ø. 4 7		S / 2	2 %	o m	0	22	8	92.37	331.97	53.67	0.28	Mon
03-Nov-97	4 C		2,7	5 2	) m		22	8	91.62	324.28	53.18	0.28	Tue
04-Nov-97	is in		* E	t 92	. n	, m	S	18	64.89	254.95	53.98	0.25	Wed
76-NON-50	7.0		} =	6	1	ဖ	55	18	46.20	226.82	55.34	0.20	Thu
02 Nov. 07	. a	ΞΞ	) C	: 8		ဖ	55	17	47.33	218.40	55.43	0.22	Fri
76-NON-90	7 O. W	= =		8 8		ဖ	32	17	61.23	238.61	56.23	0.26	Sat
76-Nov-97	- <u>-</u>	: 1	0	74		ဖ	52	11	101.41	281.33	58.05	0.36	Sun
76-NON-60	<b>i</b> 2	: 1		8		7	22	17	107.20	281.08	56.98	0.38	Mon
10-Nov-97	4, C	= 1	) C	2 2		80	55	17	139.62	311.60	57.10	0.45	Tue
/6-NON-11	5.0 6.0	I	. 0	2 2		7	55	17	126.84	312.94	57.14	0.41	Wed
76-1404-21		= 3		29		5	54	17	192.84	385.03	58.36	0.50	Thu
13-100-97	<u>.</u> .			. F		5	54	17	230.50	419.10	59.32	0.55	Ē
14-Nov-97	- 7-		) C	7.		Ξ	54	11	281.40	464.70	61.88	0.61	Sat
15-Nov-97		= 3	) C	. 2		12	54	17	342.76	522.56	63.48	99.0	Sun
16-NoN-91	-4.1	בם	o c	. 6		ග	54	17	198.95	384.03	57.79	0.52	Mon
/6-NON-/1		<b>.</b> .	o c	3 6		. o	54	17	162.46	339.21	56.28	0.48	Tue
18-Nov-97	-0.3		o c	7 6		. ~	22	16	99.85	285.46	55.88	0.35	Wed
/6-Nov-9/			o C	6 6		ග	53	16	125.98	317.43	26.60	0.40	Thu
76-V0VI-02	- L	בב	) C	; <b>%</b>		φ	55	16	84.34	256.45	56.02	0.33	Wed
/6-NON-97	0. c	ב	) C	9 9		7	55	17	105.72	292.09	56.21	0.36	Thu
/6-NON-/7	4. (.	= 1	o c	8		9	55	15	64.30	244.87	54.82	0.26	Ē
/6-A0N-87	9 0	= =	o C	76		œ	55		161.19	363.14	61.07	0. 4	Sat
79-NoN-62	2.3 8.8	c 3	0	. <b>%</b>		<b>.</b>	55		199.12	394.25	60.34	0.51	Sun
1000000		-	305	1702					3,191.95	7,973.82	1,420.93		
Ens.	¢		÷ 5	89	m	7	55	17	127.68	318.95	56.84	0.37	
Avg	m (			8 4	, to	. 0	54	<del>.</del>	-6.27	210.55	51.44	0.03	
u :			, 16	: <b>5</b> 2	, m	12	26	8	342.76	522.56	63.48	99.0	
Max	2		<u>-</u>	)	ı								

Outribor         Clighting         H Start         LoStart         Augus Lonnil         Grountl         H Fire         Lonnil Lonnil         Lonnil         H Fire         Lonnil         Lonnil         Lonnil         H Fire         Lonnil         L Fire         L Fire <th>(min) Evap.</th> <th>Cond O Delivered</th> <th></th> <th>The General</th> <th></th> <th></th>	(min) Evap.	Cond O Delivered		The General		
0.4 H 0 72 0.4 H 0 69 0.1 H 0 69 0.1 H 0 69 0.1 H 0 69 0.1 H 0 73 0.0 H 0 73 0.1 H 0 88 0.1 H 0 73 0.2 H 0 75 0.2 H 0 75 0.3 H 0 75 0.4 H 0 88 0.9 H 0 75 0.1 H 0 88 0.9 H 0 75 0.1 H 0 88 0.9 H 0 75 0.1 H 0 88 0.0 H 0 75 0.1 H 0 88 0.1 H 0 75 0.2 H 0 88 0.3 H 0 75 0.4 H 0 75 0.5 H 0 88 0.6 H 0 77 0.6 H 0 88 0.7 H 0 88 0.8 H 0 77 0.9 H 0 88 0.9 H 0 77 0.1 H 0 88 0.1 H 0 88 0.1 H 0 77 0.1 H 0 88 0.1 H 0 77 0.1 H 0 77 0.1 H 0 71 0.1 H 0 71 0.1 H 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		_ 😅	red fuel Consumed 1) (KWN)	CKWN)	Daily copth	Bay of Week
-0.4 H 0 69 -1.1 H 0 73 -2.5 H 0 64 -1.1 H 0 73 -1.6 H 0 74 -1.6 H 0 79 -1.6 H 0 79 -1.6 H 0 79 -1.6 H 0 79 -1.7 -1.2 H 0 79 -1.6 H 0 79 -1.6 H 0 79 -1.7 -1.2 H 0 79 -1.7 -1.2 H 0 79 -1.1 H 0 71 -1.1 H 10		171.16	6 351.84	57.60	0.49	Mon
2.5 H 0 73 2.5 H 0 64 0.1 H 0 71 0.1 H 0 89 0.1 H 0 89 0.1 H 0 89 0.2 H 0 79 0.3 H 0 79 0.5 H 0 79 0.6 H 0 79 0.7 1 0.7 1 0.8 1 0.9 H 0 77 0.1 H 0 82 0.9 H 0 77 0.1 H 0 82 0.9 H 0 77 0.1 H 0 82 0.6 H 0 82 0.6 H 0 83 0.6 H 0 77 0.7 1 0.7 1 0.8 1 0.9 H 0 83 0.1 H 0 83 0.1 H 0 83 0.1 H 0 83 0.1 H 0 83 0.2 H 0 83 0.3 H 0 77 0.4 H 0 83 0.5 H 0 83 0.7 1 0.7	7 55	128.49	9 301.62	56.48	0.43	Tue
2.5 H 0 64 0.1 H 0 71 0.6 H 0 71 0.6 H 0 88 0.1 H 0 88 0.1 H 0 79 0.5 H 0 79 0.9 H 0 75 0.9 H 0 75 0.0 H 0 65 0.1 H 0 0 82 0.1 H 0 0 75 0.2 H 0 0 63 0.4 H 0 0 75 0.5 H 0 0 64 0.6 H 0 0 75 0.7 H 0 0 77 0.7 H 0 0 777	8 55	173.75	5 353.23	57.64	0.49	Wed
0.4 H 0 71 0.6 H 0 89 0.1 H 0 89 0.6 H 0 89 0.7 -2.1 H 0 89 0.9 H 0 73 0.9 H 0 65 0.0 H 0 65 0.1 H 0 65 0.2 H 0 65 0.4 H 0 65 0.5 H 0 0 65 0.6 H 0 0 75 0.6 H 0 0 75 0.6 H 0 0 75 0.7 -1.2 H 0 0 64 0.7 -1.2 H 0 0 77 0.5 -1.4 H 0 0 77 0.5 -1.4 H 0 0 77 0.5 -1.7 H 0 0 77 0.6 H 0 0 77 0.7 -1.6 H 0 0 77 0.7 -1.7 H 10 0 77 0.7 H 10 0 7	7 55	98.63		57.26	0.37	Thu
1.1 H 0 87 1.1 H 0 89 0.6 H 0 79 0.1 H 0 79 1.2.1 H 0 73 1.2.1 H 0 73 1.5 H 0 73 1.6 H 0 73 1.6 H 0 65 1.6 H 0 65 1.7 1 1.7 1 1.4 H 0 78 1.7 1 1.7 1 1.7 1 1.7 1 1.8 H 0 79 1.7 1 1.9 H 0 79 1.1 1 1.1 1 1 1 0 73 1.1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7 55	17 117.02	292.26	54.91	0.40	Ę.
1.1 H 0 89 0.6 H 0 79 0.1 H 0 79 1.6 H 0 79 1.6 H 0 73 1.6 H 0 73 1.6 H 0 75 1.6 H 0 69 1.7 1 1.6 H 0 64 1.7 1 1.7 H 0 79 1.8 1 1.9 H 0 75 1.0 H 0 76 1.1 H 0 76 1.2 H 0 76 1.4 H 0 77 1.5 H 0 79 1.7 1 1.8 H 0 77 1.9 H 0 79 1.1 H 0 79 1.1 H 0 71 1.1 H 1 0 71 1.1 H	8 55	17 230.39		59.64	0.55	Sat
0.6 H 0 79 -1.6 H 0 79 -2.1 H 0 73 -2.1 H 0 73 -2.1 H 0 73 -3.8 H 0 65 -3.0 H 0 77 -4.2 H 0 76 -4.4 H 0 77 -1.4 H 0 79 -1.4 H 0 77 -1.5 H 0 77 -1.4 H 0 77 -1.5 H 0 77 -1.6 H 0 77 -1.7 H 0 71	8 55	17 250.91	11 432.20	86.09	0.58	Sun
0.1       H       0       79         -1.6       H       0       71         -2.1       H       0       73         -2.1       H       0       75         -2.1       H       0       75         -2.1       H       0       65         3.8       H       0       76         0.9       H       0       76         0.2       H       0       77         0.6       H       0       77         -1.6       H       0       77         -0.5       H       0       77         -1.2       H       0       77         -1.4       H       0       77         -1.4       H       0       77         -1.4       H       0       71         -1.4       H       0       29         -1.7 <t< td=""><td>.7 55</td><td>17 158.16</td><td></td><td>122.17</td><td>0.47</td><td>Mon</td></t<>	.7 55	17 158.16		122.17	0.47	Mon
-1.6 H 0 82 -3.0 H 0 71 -2.1 H 0 73 -0.5 H 0 73 -0.5 H 0 75 -2.1 H 0 69 -3.8 H 0 65 -4.2 H 0 76 -4.2 H 0 64 -4.2 H 0 82 -1.6 H 0 83 -1.6 H 0 77 -1.6 H 0 77 -1.6 H 0 77 -1.7 H 0 29 -1.1 H 0 77 -1.1 H 0 35 -1.1 H 0 35 -1.1 H 0 35 -1.1 H 0 35	7 55	17 144.10	0 332.50	57.68	0.43	Tue
-3.0 H 0 71 -2.1 H 0 73 -0.5 H 0 73 -0.5 H 0 75 -2.1 H 0 75 -2.1 H 0 69 0.9 H 0 76 0.2 H 0 76 -4.2 H 0 84 -4.2 H 0 83 -3.0 H 0 64 -4.2 H 0 78 -1.4 H 0 83 -1.4 H 0 29 -1.4 H 0 35 -1.1 H 0 35 -1.1 H 0 35	7 55	17 160.54		58.02	0.45	Wed
2.1 H 0 73 -0.5 H 0 82 -0.5 H 0 69 3.8 H 0 65 0.9 H 0 76 0.1 H 0 76 -4.2 H 0 63 -3.0 H 0 64 -4.2 H 0 82 -1.4 H 0 83 -1.2 H 0 29 -1.4 H 0 35 -1.4 H 0 35 -1.4 H 0 35	9 54	17 224.22	2 401.41	57.07	0.56	Thu
-0.5       H       0       82         -2.1       H       0       75         1.6       H       0       69         3.8       H       0       65         0.9       H       0       71         2.6       H       0       75         3.0       H       0       63         -4.2       H       0       64         0.6       H       0       63         1.4       H       0       77         -1.6       H       0       77         -4.4       H       0       77         -4.4       H       0       29         -11.4       H       0       21         -1.4       H       0       21         -1.4       H       0       21         -1.4       H       0       21         -1.7       H       0       21         -1.7       H       0       21         -1.7       H       0       21         -1.7       H       0       21         -1.1       0       22       21         -1	9 54	17 201.01	385.86	122.04	0.52	Fri
-2.1 H 0 75 -3.8 H 0 65 0.9 H 0 65 0.1 H 0 76 -4.2 H 0 84 -4.2 H 0 63 -3.0 H 0 64 -4.2 H 0 82 -1.4 H 0 82 -1.2 H 0 29 -1.4 H 0 35 -1.4 H 0 35 -1.4 H 0 35	9 55	17 286.16	6 467.12	62.00	0.61	Sat
1.6 H 0 69 3.8 H 0 65 0.9 H 0 71 0.1 H 0 76 0.2 H 0 75 0.6 H 0 63 0.6 H 0 82 0.6 H 0 78 0.6 H 0 78 1.4 H 0 77 -1.2 H 0 29 -1.4 H 0 29 -1.4 H 0 29 -1.4 H 0 29 -1.5 H 0 29 -1.5 H 0 29 -1.6 H 0 77 -1.7 H 0 35	11 54	17 331.72	.2 510.02	127.24	0.65	Sun
3.8 H 0 65 0.9 H 0 71 0.1 H 0 76 0.2 H 0 84 -4.2 H 0 63 0.6 H 0 78 0.6 H 0 78 0.5 H 0 78 -1.6 H 0 29 -1.2 H 0 29 -1.4 H 0 29 -1.4 H 0 29 -1.4 H 0 29 -1.5 H 0 29 -1.5 H 0 29 -1.6 H 0 77 -1.7 H 0 29 -1.1 H 0 29 -1.1 H 0 2178	8 55	17 146.10	0 321.43	116.14	0.45	Mon
0.9 H 0 76 0.1 H 0 76 0.2 H 0 84 -4.2 H 0 63 0.6 H 0 78 0.6 H 0 82 1.4 H 0 83 -1.6 H 0 77 -1.2 H 0 29 -1.4 H 0 29 -1.4 H 0 29 -1.4 H 0 29 -1.5 H 0 2178	7 55	17 89.00	0 266.36	44.81	0.33	Tue
0.1       H       0       76         2.6       H       0       75         0.2       H       0       84         -3.0       H       0       64         0.6       H       0       78         0.6       H       0       78         0.5       H       0       77         -6.0       H       0       77         -4.4       H       0       29         -1.4       H       0       217         -1.4       H       0       2178         -1       0       2178	7 55	17 103.22		44.99	0.36	Wed
2.6 H 0 75 0.2 H 0 84 -4.2 H 0 64 0.6 H 0 64 0.6 H 0 82 1.4 H 0 83 -1.6 H 0 77 -1.2 H 0 29 -1.4 H 0 35 -1.4 H 0 35	8 54	17 170.42	12 372.04	47.34	0.46	로
0.2 H 0 84  -4.2 H 0 63  -3.0 H 0 64  0.6 H 0 78  0.5 H 0 82  -1.6 H 0 77  -1.2 H 0 29  -4.4 H 0 35	7 55	17 130.70		46.40	0.40	Ē
4.2 H 0 63 -3.0 H 0 64 0.6 H 0 78 0.5 H 0 82 -1.6 H 0 79 -1.2 H 0 17 -4.4 H 0 29 -1.4 H 0 35	9 54	17 273.18		50.58	0.58	Sat
-3.0 H 0 64 0.6 H 0 78 0.6 H 0 82 0.5 H 0 79 -1.6 H 0 77 -1.2 H 0 29 -1.4 H 0 21 -1.4 H 0 35	16 53	17 392.31	11 596.47	53.39	99.0	Sun
0.6 H 0 78 0.6 H 0 82 1.4 H 0 83 -1.6 H 0 77 -6.0 H 0 17 -1.2 H 0 29 -4.4 H 0 2178	14 54	17 324.45	5 526.30	51.56	0.62	Mon
0.6 H 0 82 1.4 H 0 83 0.5 H 0 77 -1.6 H 0 77 -1.2 H 0 29 -4.4 H 0 21 -1.4 H 0 35	8 55	17 186.53	3 373.96	48.43	0.50	Tue
1.4 H 0 83 0.5 H 0 79 -1.6 H 0 77 -1.2 H 0 29 -4.4 H 0 71 -11.4 H 0 35	8 55	17 187.32	375.63	50.05	0.50	Wed
0.5 H 0 79 -1.6 H 0 17 -6.0 H 0 17 -1.2 H 0 29 -4.4 H 0 71 -11.4 H 0 35	10 54	17 285.09		51.88	09.0	로
-1.6 H 0 77 -6.0 H 0 17 -1.2 H 0 29 -4.4 H 0 71 -11.4 H 0 35	11 54	17 340.21		52.83	0.64	<u>-</u>
-6.0 H 0 17 -1.2 H 0 29 -4.4 H 0 71 -11.4 H 0 35 -1 0 70	12 54	17 338.69		52.89	0.64	Sat
-1.2 H 0 29 -4.4 H 0 71 -11.4 H 0 35 -1 0 2178	37 29	17 252.77		38.74	69 0	Sun
4.4 H 0 71 -11.4 H 0 35 -1 0 2178	21 30	16 239.97	361.10	103.42	99.0	Mon
-11.4 H 0 35 0 2178 -1 0 70	11 54	16 278.09	9 475.88	49.46	0.58	Tue
0 2178	34 52	17 502.25	5 722.59	54.57	0.70	Wed
0 0 1-		6,916.56	56 12,580.37	1,968.18		
	11 53	17 223.11		63.49	0.53	
Min -11 0 17 7		16 89.00		38.74	0.33	
May 4 0 89 37	37 55	17 502.25	5 722.59	127.24	0.70	

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Grand	γ
Green on the G	Dally Summar

## Boiler/Chiller Performance

January 1998

0.57 0.54 0.57 0.34 0.11 0.55 0.34 0.56 0.59 0.59 0.59 0.59 0.59 0.59 0.59 0.59	Duny Cummer					-								
1971   1971   1972	Date	Outdoor Amblent Town (T)	Clg/Htg Mode	HI Start (count)	Lo Start (count)	Avg. Cycle Til Hi Fire	ne (min) Lo Fire	Evap. Supply Tamm (TC)	Cond. Return Tamn (*C.)	Q Delivered (KWh)	Fuel Consumed (KWh)	Elec. Consumed (KWh)	Delly COPth	Day of Week
3-51         H         O         C		in I dillight	-		5		22	£3	16	437.09	649 44	53.28	290	IAT
3.6         H         O         CR         CR         O         CR         CR         O         CR         <	J-Jan-96	ان ا	<b>E</b> :	<b>5</b> (	3 8		<b>3</b> c	3 1	9 9	156 50	07 756	46.63	970	ü
7.2         H         0         7.7         5.5         16         149.48         350.10         46.50         0.74           2.8         H         0         6         6         5.5         16         14.86         177.64         46.50         0.34           2.8         H         0         6         6         5.5         16         14.86         177.64         46.50         0.34           5.8         H         0         0.55         6         5.5         16         19.36         177.64         46.50         0.34           1.7         H         0         0.55         6         5.5         16         19.36         177.64         46.50         0.34           0.7         H         0         0.55         16         19.36         46.77         0.50         0.47           0.7         H         0         0.56         11         5.4         16         19.36         48.70         14.77         0.47           4.6         H         0         0.56         11         5.4         16         18.96         14.84         48.50         0.51           4.6         H         0         0	)2-Jan-98	3.6	I	<b>-</b>	8		<b>o</b> 1	6 1	2 !	20.00	200.12	7.05	5 6	
0.0         H         0	3-Jan-98	7.2	I	0	11		_	22	16	149.48	320.18	<del>8</del>	0.47	Sat
2.8         H         0         68         7         55         16         3469         77784         46.20         0.34           5.8         H         0         55         6         55         16         173.55         258.42         45.73         0.28           5.8         H         0         75         5         16         173.55         258.42         45.73         0.28           1.7         H         0         75         5         16         173.55         258.42         45.73         0.28           0.7         H         0         75         5         16         173.55         258.23         45.73         45.	4-Jan-98	0.0	I	0	8		თ	54	16	257.54	448.98	48.90	0.57	Sun
9.0         H         0         55         56         16         113.6         178.63         42.42         0.11           1.7         H         0         72         5         5         16         178.63         335.81         47.73         0.41           1.0         H         0         75         6         16         186.96         386.84         46.07         0.41           6.5         H         0         75         19         55         16         186.96         386.84         46.07         0.41           6.5         H         0         75         19         54         16         289.86         48.47         90.77         0.41           4.4         H         0         75         19         54         16         289.86         48.47         90.77         0.41           4.4         H         0         77         11         54         16         280.87         52.97         18.89         0.54           4.7         H         0         77         11         54         16         280.43         47.39         18.89         0.54           4.7         1         1         54 </td <td>5-Jan-98</td> <td>2.8</td> <td>ï</td> <td>0</td> <td>88</td> <td></td> <td>7</td> <td>55</td> <td>16</td> <td>94.69</td> <td>277.64</td> <td>45.20</td> <td>0.34</td> <td>Mon</td>	5-Jan-98	2.8	ï	0	88		7	55	16	94.69	277.64	45.20	0.34	Mon
5.8         H         0         72         6         65         16         1325         25842         45.75         0.28           1.7         H         0         76         8         6         16         16551         33.51         47.73         0.28           1.0         H         0         76         8         11         54         16         1680         33.51         47.73         0.41           1.0         H         0         76         11         54         16         293.65         48417         50.75         0.61           1.0         H         0         56         13         54         16         293.61         48417         11800         0.61           1.2         H         0         74         11         54         16         203.75         403.77         11800         0.61           1.2         H         0         74         11         54         16         204.77         4000         0.61           1.2         H         10         70         11         54         16         204.87         40.78         0.61           1.2         H         11         <	6-Jan-98	06	Ι	0	ĸ		2	20	16	19.36	178.63	42.42	0.11	Tue
1,7         H         0         0         7         65         16         19651         33355         47,73         0,41           1,0         H         0         75         11         54         16         20366         464,17         50,77         0,47           1,0         H         0         75         11         54         16         23365         444,17         50,77         0,47           4,4         H         0         76         13         54         16         23365         464,17         51,80         0,67           4,4         H         0         76         13         54         16         23366         50,91         160         0,69           4,7         H         0         76         11         54         16         23067         50,91         0,69         0,69           4,7         H         0         70         11         54         16         23067         50,91         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69         0,69	7-Jan-98	. K	Ξ.	0	72		9	55	16	73.22	258.42	45.75	0.28	Wed
10         H         0         75         8         55         16         169.09         358.64         48.07         0.47           -0.7         H         0         76         11         54         16         234.55         368.47         180.0         0.61           -6.5         H         0         75         13         54         16         234.27         400.01         48.47         180.0         0.61           -6.5         H         0         75         13         54         16         234.27         400.01         48.49         0.61         0.61           -6.6         H         0         72         11         54         16         234.27         408.56         50.76         0.61           -6.0         H         0         77         11         54         16         274.60         48.29         0.51           -6.0         H         0         77         11         54         16         274.60         48.23         0.51           -6.2         H         0         70         70         70         54         16         274.90         48.23         0.51         0.51	JR. lan-98	17	I	0	8		7	55	16	136.51	333.51	47.73	0.41	판
	99- Jan-98		: I	0	. 52		<b>&amp;</b>	55	16	169.09	358.64	48.07	0.47	Ë
-6.5         H         0         56         19         54         16         454.41         643.70         11800         0.68           -6.5         H         0         56         13         54         16         231.77         408.65         50.01         158         0.54           -6.5         H         0         66         13         54         16         205.15         408.65         50.01         0.59           -7.0         H         0         77         11         54         16         271.97         485.35         52.87         0.59           -7.0         H         0         77         11         54         16         271.97         485.35         52.87         0.59           -7.0         H         0         77         11         54         16         271.97         485.36         5.287         0.59           -2.2         H         0         76         76         16         173.4         353.64         0.59         0.59           -6.2         H         0         76         76         16         173.4         353.67         46.37         0.59           -6.2         H	0-1an-98	, C	: I	0	92		=	54	16	293.65	484.17	50.75	0.61	Sat
4.6         H         6.6         13         54         H         40.46         40.46         60.00         64         H         65.0         63.17         430.01         43.48         0.54         65.0	1-Jan-98	i q	ï	0	99		19	24	16	435.41	643.70	118.00	0.68	Sun
-5.5         H         0         74         9         54         16         205.15         408.56         50.76         0.50           -8.1         H         0         68         13         54         16         205.15         50.77         50.76         0.59           -8.7         H         0         77         11         54         16         224.60         445.03         51.93         0.59           -4.7         H         0         70         11         54         16         224.60         442.03         62.79         0.59           -2.2         H         0         78         11         54         16         224.60         442.03         62.34         0.51           -2.2         H         0         72         7         55         16         129.47         30.18         6.34         0.51           -3.6         H         0         7         5         16         157.12         36.88         46.39         0.51           -4.0         H         0         7         5         16         157.12         36.88         46.39         0.54           -4.0         H         0 <t< td=""><td>7-Jan-98</td><td>4.4</td><td>Ξ.</td><td>0</td><td>8</td><td></td><td>13</td><td>24</td><td>16</td><td>231.27</td><td>430.01</td><td>48.48</td><td>0.54</td><td>Mon</td></t<>	7-Jan-98	4.4	Ξ.	0	8		13	24	16	231.27	430.01	48.48	0.54	Mon
8.1         1.0         68         1.3         54         1.6         308.07         50.21         51.33         0.59           7.0         H         0         7.1         1.1         54         1.6         271.97         463.35         51.97         0.56           7.0         H         0         7.0         1.1         54         1.6         274.0         442.03         48.29         0.59           7.2         H         0         7.9         1.0         54         1.6         274.2         442.03         6.59         0.59           2.2         H         0         7.8         1.1         54         1.6         274.2         442.03         6.59         0.59           2.2         H         0         7.8         1.1         54         1.6         274.2         53.46         0.59         0.59           4.0         H         0         7.2         7         5.5         1.6         147.2         301.85         46.20         0.59           5.0         H         0         7.0         80         8         5.5         1.6         147.65         304.85         46.23         0.59           1	3-Jan-98	5.5	Ξ.	0	74		ത	54	16	205.15	408.56	50.76	0.50	Tue
-7.0         H         0         71         11         54         16         271,97         485.35         52.97         0.56           -6.6         H         0         70         11         54         16         224.60         442.03         62.97         0.56           -4.7         H         0         79         10         54         16         224.60         442.03         6.048         0.51         0.56           -2.2         H         0         76         80         11         54         16         224.60         442.03         6.048         0.51         0.56         0.56         0.56         0.56         0.56         0.56         0.56         0.56         0.56         0.56         0.56         0.56         0.56         0.61         0.56         0.61         0.56         0.61         0.56         0.61         0.61         0.61         0.61         0.61         0.61         0.61         0.61         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.62         0.	4-lan-98	, e	ï	0	88		13	25	16	308.07	520.21	51.93	0.59	Wed
66         H         0         70         11         54         16         224.60         442.03         48.28         0.51           -4.7         H         0         79         10         54         16         224.60         442.03         48.28         0.51           -2.8         H         0         78         11         54         16         278.45         59.47         50.48         0.56           -2.2         H         0         72         7         55         16         143.24         301.85         46.39         0.56           -2.2         H         0         72         7         55         16         143.24         301.85         46.39         0.59           -2.6         H         0         7         7         55         16         157.12         301.85         46.39         0.33           -6.2         H         0         7         8         55         16         157.12         301.85         46.89         0.43           -1.6         H         0         8         5         16         159.29         46.89         6.91         0.59           -2.5         H <td< td=""><td>5-Jan-98</td><td>-7.0</td><td>ï</td><td>0</td><td>71</td><td>٠</td><td>=</td><td>54</td><td>16</td><td>271.97</td><td>485.35</td><td>52.97</td><td>0.56</td><td>Thu</td></td<>	5-Jan-98	-7.0	ï	0	71	٠	=	54	16	271.97	485.35	52.97	0.56	Thu
4.7         H         0         79         10         54         16         278.42         493.37         50.48         0.56           2.2         H         0         78         11         54         16         226.45         50.487         53.46         0.59           2.2         H         0         76         7         55         16         143.24         353.08         46.39         0.41           2.2         H         0         72         7         55         16         143.24         353.08         46.39         0.59           2.2         H         0         72         7         55         16         143.24         353.08         46.39         0.41           4.2         H         0         7         5         16         157.12         366.88         46.39         0.41           4.2         H         0         7         8         5         16         165.06         424.65         48.19         0.59           4.1         H         0         82         9         55         16         143.24         36.17         46.25         0.48           5.5         H         0 <td>6-Jan-98</td> <td>99</td> <td>: <b>:</b>::::::::::::::::::::::::::::::::::</td> <td>0</td> <td>2</td> <td></td> <td>Ξ</td> <td>54</td> <td>16</td> <td>224.60</td> <td>442.03</td> <td>48.28</td> <td>0.51</td> <td>Ē</td>	6-Jan-98	99	: <b>:</b> ::::::::::::::::::::::::::::::::::	0	2		Ξ	54	16	224.60	442.03	48.28	0.51	Ē
2.8         H         0         78         11         54         16         295.45         504.87         53.46         0.59           -2.2         H         0         76         7         55         16         143.24         353.88         46.39         0.41           -4.0         H         0         72         7         55         16         157.12         36.88         46.39         0.41           -6.2         H         0         78         9         54         16         157.12         36.88         46.39         0.41           -1.6         H         0         78         9         54         16         15.060         42.465         46.19         0.43           -1.6         H         0         80         55         16         16.58         361.70         46.69         0.56           -2.5         H         0         84         55         16         179.29         48.96         49.14         0.56           -2.5         H         0         8         55         16         17.56         42.22         46.16         0.46           -2.1         H         0         7	7-Jan-98	7.4-	I	0	6/		10	54	16	278.42	493.37	50.48	0.56	Sat
-2.2         H         0         76         8         55         16         143.24         353.08         46.39         0.41           -4.0         H         0         72         7         55         16         157.12         366.88         46.39         0.43           -3.6         H         0         78         9         54         16         157.12         366.88         46.92         0.43           -6.2         H         0         78         9         55         16         157.12         366.88         46.92         0.43           -6.2         H         0         78         9         55         16         157.12         366.88         46.92         0.43           -1.6         H         0         82         9         55         16         248.78         430.52         48.59         0.56           -2.5         H         0         82         9         55         16         279.29         458.96         50.15         0.51           -2.8         H         0         71         8         55         16         147.56         322.40         48.70         0.46           -0.1	8-Jan-98	-2.8	I	0	78		11	24	16	295.45	504.87	53.46	0.59	Sun
-4.0         H         0         72         7         55         16         99.17         301.85         44.83         0.33           -3.6         H         0         78         9         54         16         157.12         366.86         46.92         0.43           -6.2         H         0         78         9         54         16         210.60         42.65         48.19         0.50           -1.6         H         0         80         8         55         16         210.60         42.65         0.46           -2.5         H         0         82         9         55         16         248.78         49.55         0.58           -2.5         H         0         84         9         55         16         248.78         49.55         0.58           -2.1         H         0         82         9         55         16         147.56         322.40         46.70         0.47           -2.1         H         0         7         55         16         140.56         46.44         0.45           -0.1         H         0         7         55         16         124.96	9-Jan-98	-2.2	I	0	9/		æ	8	16	143.24	353.08	46.39	0.41	Mon
-3.6         H         0         80         8         55         16         157.12         366.88         46.92         0.43           -6.2         H         0         78         9         54         16         210.60         424.65         48.19         0.50           -1.6         H         0         80         8         55         16         165.58         361.70         48.19         0.50           -2.5         H         0         82         5         16         248.78         49.55         0.56           -2.5         H         0         8         5         16         279.29         48.66         50.15         0.56           -2.5         H         0         8         5         16         179.29         48.66         60.15         0.61           -2.1         H         0         7         0         8         55         16         147.56         336.44         46.70         0.46           -0.1         H         0         7         5         16         147.56         346.44         0.61           -0.1         H         0         7         5         16         124.96	0-Jan-98	4.0	I	0	72		7	55	16	99.17	301.85	44.83	0.33	Tue
6.2         H         0         78         9         54         16         210.60         424.65         48.19         0.50           -1.6         H         0         80         8         55         16         165.58         361.70         46.66         0.46           -1.6         H         0         82         9         55         16         248.78         430.92         49.55         0.58           -2.5         H         0         84         9         55         16         279.29         458.96         50.15         0.58           -2.8         H         0         82         9         55         16         279.29         458.96         50.15         0.58           -2.1         H         0         71         8         55         16         147.56         322.40         46.70         0.46           -0.1         H         0         75         7         55         16         147.56         322.40         46.44         0.46           -0.4         H         0         76         7         55         16         149.96         48.84         46.44         0.46           -0.4	1-Jan-98	-3.6	I	0	8		80	55	16	157.12	366.88	46.92	0.43	Wed
-1.6         H         0         80         8         55         16         165.58         361.70         46.66         0.46           -1.6         H         0         82         9         55         16         248.78         430.92         49.55         0.58           -2.5         H         0         84         9         55         16         279.29         458.96         50.15         0.51           -2.8         H         0         71         8         55         16         159.44         338.54         46.70         0.51           -2.1         H         0         71         8         55         16         147.56         322.40         46.70         0.46           -0.1         H         0         75         7         55         16         159.44         45.77         0.39           -0.1         H         0         76         7         55         16         159.30         311.26         46.44         0.39           -0.1         H         0         76         7         55         16         129.30         311.26         46.44         0.49           -1.0         H <t< td=""><td>2-Jan-98</td><td>-6.2</td><td>I</td><td>0</td><td>78</td><td></td><td>თ</td><td>54</td><td>16</td><td>210.60</td><td>424.65</td><td>48.19</td><td>0.50</td><td>ם</td></t<>	2-Jan-98	-6.2	I	0	78		თ	54	16	210.60	424.65	48.19	0.50	ם
-1.6         H         0         82         9         55         16         248.78         430.92         49.55         0.58           -2.5         H         0         84         9         55         16         279.29         458.96         50.15         0.61           -5.5         H         0         82         9         55         16         159.44         338.54         49.14         0.56           -2.1         H         0         71         8         55         16         147.56         322.40         46.70         0.47           -0.1         H         0         75         7         55         16         147.56         322.40         46.70         0.46           -0.1         H         0         75         7         55         16         147.56         322.40         46.00         0.46           -0.4         H         0         76         7         55         16         129.30         448.44         9.27         0.41           -0.4         H         0         2265         5         16         274.96         448.84         49.62         0.61           -2         0	3-Jan-98	-1.6	I	0	8		80	55	16	165.58	361.70	46.66	0.46	Ξ
-2.5         H         0         84         9         55         16         279.29         458.96         50.15         0.61           -5.5         H         0         82         9         55         16         237.18         422.28         49.14         0.56           -2.8         H         0         71         8         55         16         159.44         338.54         46.70         0.47           -2.1         H         0         70         7         55         16         147.56         322.40         46.70         0.46           -0.1         H         0         75         7         55         16         147.56         322.40         46.00         0.46           -0.4         H         0         76         7         55         16         179.50         46.44         0.46           -1.0         H         0         82         5         16         174.96         46.44         0.47           -1.0         H         0         2265         5         16         174.96         48.84         49.62         0.61           -2         0         73         16         19.36	4-Jan-98	1.6	I	0	82		6	55	16	248.78	430.92	49.55	0.58	Sat
-5.5         H         0         82         55         16         159.44         422.28         49.14         0.56           -2.8         H         0         71         8         55         16         159.44         338.54         46.70         0.47           -2.1         H         0         70         7         55         16         147.56         322.40         46.00         0.46           -0.1         H         0         75         7         55         16         129.30         311.26         46.00         0.46           -0.4         H         0         76         7         55         16         129.30         311.26         46.44         0.45           -1.0         H         0         82         9         54         16         274.96         448.84         49.62         0.61           -2         1         1         23.05         1         2405.75         148.84         49.62         0.61           -2         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1 <td< td=""><td>5-Jan-98</td><td>-2.5</td><td>I</td><td>0</td><td>28</td><td></td><td>თ</td><td>55</td><td>16</td><td>279.29</td><td>458.96</td><td>50.15</td><td>0.61</td><td>Sun</td></td<>	5-Jan-98	-2.5	I	0	28		თ	55	16	279.29	458.96	50.15	0.61	Sun
-2.8         H         0         71         8         55         16         159.44         338.54         46.70         0.47           -2.1         H         0         70         8         55         16         147.56         322.40         46.00         0.46           -0.1         H         0         75         7         55         16         116.07         295.14         45.57         0.39           -0.4         H         0         76         7         55         16         129.30         311.26         46.44         0.39           -1.0         H         0         75         9         54         16         274.96         448.84         49.62         0.61           -1.0         H         0         2255         1         6.405.75         12,411.95         49.62         0.61           -2         0         73         9         55         16         20.64         400.39         50.50         0.49           -3         0         50         53         16         40.35         178.63         6.45         0.11           -3         0         6         53         16         40.73	6-Jan-98	-5.5	I	0	82		თ	જ	16	237.18	422.28	49.14	0.56	Mon
-2.1         H         0         70         8         55         16         147.56         322.40         46.00         0.46           -0.1         H         0         75         7         55         16         116.07         295.14         45.57         0.39           -0.4         H         0         76         7         55         16         129.30         311.26         46.44         0.42           -1.0         H         0         82         9         54         16         274.96         448.84         49.62         0.61           -2         1.0         2255         1         6,405.75         12,411.95         1,666.65         0.61           -2         0         73         9         65         16         206.64         400.39         50.50         0.49           -8         0         50         6         63         16         40.39         64.42         0.11           9         50         6         53         16         40.39         50.50         0.11           9         0         84         22         56         16         437.09         649.44         118.00         0.68 <td>7-Jan-98</td> <td>-2.8</td> <td>I</td> <td>0</td> <td>7</td> <td></td> <td>œ</td> <td>55</td> <td>16</td> <td>159.44</td> <td>338.54</td> <td>46.70</td> <td>0.47</td> <td>Lne</td>	7-Jan-98	-2.8	I	0	7		œ	55	16	159.44	338.54	46.70	0.47	Lne
-0.1         H         0         75         55         16         116.07         295.14         45.57         0.39           -0.4         H         0         76         7         55         16         129.30         311.26         46.44         0.42           -1.0         H         0         2255         9         54         16         274.96         448.84         49.62         0.61           -2         0         73         9         55         16         206.64         400.39         50.50         0.49           -8         0         50         50         5         5         16         19.36         470.39         50.50         0.41           -8         0         84         22         56         16         437.09         649.44         118.00         0.68	8-Jan-98	-2.1	I	0	2		8	. 22	. 16	147.56	322.40	46.00	0.46	Wed
-0.4 H 0 76 75 55 16 129.30 311.26 46.44 0.42 0.42 1.2 1.0 H 0 82 9 54 16 274.96 448.84 49.62 0.61 0.61 0.61 0.61 0.61 0.61 0.61 0.61	9-Jan-98	-0	I	0	75		7	55	16	116.07	295.14	45.57	0.39	를
-1.0 H 0 82 9 54 16 274.96 448.84 49.62 0.61  2.255  2.255  3.55  4.405.75 12,411.95 1,665.65  2.255  6.405.75 12,411.95 1,665.65  9.55 16 206.64 400.39 60.50 0.49  -8.50 60 60 60 60 60 60 60 60 60 60 60 60 60	0-Jan-98	4.0-	I	0	9/		7	55	16	129.30	311.26	46.44	0.42	Ξ
-2 0 2255 6,405.75 12,411.95 1,565.65 -2 0 73 9 55 16 206.64 400.39 50.50 -8 0 50 5 53 16 19.36 178.63 42.42 9 0 84 22 56 16 437.09 649.44 118.00	1-Jan-98	-1.0	I	0	82		6	54	16	274.96	448.84	49.62	0.61	Sat
-2 0 73 9 55 16 206.64 400.39 50.50 -8 0 50 5 53 16 19.36 178.63 42.42 9 0 84 22 56 16 437.09 649.44 118.00	Eig			0	2255					6,405.75	12,411.95	1,565.65		
-8 0 50 5 53 16 19.36 178.63 42.42 9 0 84 22 56 16 437.09 649.44 118.00	Ava	7-		0	73		ø	92	16	206.64	400.39	50.50	0.49	
9 0 84 22 56 16 437.09 649.44 118.00	Min	, <b>e</b> ç		0	20		10	53	16	19.36	178.63	42.42	0.11	
	Max	on on		•	ձ		22	26	16	437.09	649.44	118.00	89.0	

Green on the Grand	Daily Summary

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Outdoor         Op/Indio         Might         Logit         Outdoor         O													
-0.1         H         0         82         9         54         16         279.30         446.57         46.57         46.57         46.57         46.57         46.57         46.57         46.57         46.57         46.57         46.57         46.57         46.57         46.57         46.01         66.40           -2.7         H         0         77         7         55         16         170.68         308.39         1048         0.44           -3.0         H         0         77         8         55         16         170.61         385.69         46.20         0.46           -3.0         H         0         72         13         54         16         106.68         16.20         10.48         0.46           3.3         H         0         22         16         55         16         10.68         14.22         17.34         0.64           -2.2         H         0         70         6         55         16         10.42         47.82         0.74           -1.3         H         0         76         7         55         16         10.42         20.25         14.58         0.25	Date	Outdoor Amblent Temp (*C)	Clg/Htg Mode	H Start (count)	Lo Start (count)	Avg. Cycle Time (min) HI Fire Lo Fire	Evap. Supply Temp (°C)	Cond. Return Temp (°C)	Q Delivered (KWh)	Fuel Consumed (KWh)	Elec. Censumed (K.W.b.)	Daily copth	Day ef Week
2.1         H         0         74         7         55         16         120,78         298,32         46.38         0.40           4.2         H         0         773         7         55         16         1736,65         398,39         108.68         108.69         1	01-Feb-98	-0.1	T	0	82	6	54	16	279.30	448.57	49.79	0.62	Sun
2.7         H         0         73         7         55         16         155.05         306.39         108.66         0.44           -4,6         H         0         77         8         55         16         176.11         306.39         46.01         0.46           -3,0         H         0         77         8         55         16         170.66         152.90         46.01         0.46           3,3         H         0         22         13         54         16         106.86         162.90         6.67         6.67         6.64         6.67<	02-Feb-98	2.1	I	0	74	7	83	91	120.78	298.32	45.38	0.40	Mon
46         H         0         77         8         55         16         17611         38707         4601         0.48           3.3         H         0         78         55         16         17686         38899         46.29         0.48           3.3         H         0         28         13         64         16         38899         46.29         0.64           3.3         H         0         28         13         64         16.29         16.20         87.20         87.34         0.64           2.2         H         0         70         69         7         65         16         50.25         44.85         0.06           2.2         H         0         7         6         55         16         124.29         314.64         47.82         0.06           2.1         H         0         7         6         55         16         124.29         314.64         47.82         0.06           2.1         H         0         7         6         55         16         124.29         314.64         47.82         0.61           2.1         H         0         7	03-Feb-98	-2.7	I	0	73	7	SS	91	135.05	308.39	108.66	0.44	Tue
30         H         0         73         8         55         16         170 66         358 69         46.29         0.43           3.3         H         0         23         13         54         16         1656         1658         15.28         0.44           3.3         H         0         23         13         54         16         63.40         255.91         44.53         0.64           1.3         H         0         70         6         55         16         63.40         255.91         44.53         0.25           7.8         H         0         76         75         16         50.25         242.52         44.53         0.25           7.8         H         0         76         75         16         50.25         44.53         0.25           7.8         H         0         77         13         16         50.25         44.53         0.25           1.0         H         0         72         13         54         16         50.25         44.53         0.27           1.0         H         0         72         16         55         16         44.63 <t< td=""><td>04-Feb-98</td><td>-4.6</td><td>I</td><td>0</td><td>14</td><td>ω</td><td>SS.</td><td>16</td><td>176.11</td><td>367.07</td><td>46.01</td><td>0.48</td><td>Wed</td></t<>	04-Feb-98	-4.6	I	0	14	ω	SS.	16	176.11	367.07	46.01	0.48	Wed
9.2         H         0         223         13         54         16         108.69         169.80         15.28         0.64           3.3         H         0         229         6         55         16         5.37         94.22         87.34         0.06           1.3         H         0         6         55         16         5.57         44.52         0.07           2.2         H         0         70         6         55         16         124.20         44.53         0.05           2.2         H         0         70         70         6         55         16         124.20         314.64         47.35         0.07           2.2         H         0         70         70         55         16         124.20         314.64         47.35         0.01           2.2         H         0         72         13         54         16         136.31         37.31         47.35         0.02           1.6         H         0         72         9         55         16         139.31         37.31         47.34         0.02           2.0         H         0         7	05-Feb-98	-3.0	I	0	78	80	SS.	16	170.66	358.69	46.29	0.48	Thu
3.3         H         0         29         6         55         16         537         94.22         87.34         0.06           1.3         H         0         69         6         55         16         65.91         44.63         0.05           1.2         H         0         76         6         55         16         526.51         44.63         0.25           2.2         H         0         76         76         75         16         528.55         44.64         47.82         0.06           2.2         H         0         76         76         16         528.55         44.64         47.82         0.06           4.5         H         0         72         17         54         16         528.55         44.84         0.06         0.06           1.6         H         0         72         0         55         16         19.07         50.28         0.04         1.06         0.05         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06         1.06	06-Feb-98	-8.2	I	0	8	13	73	16	108.68	169.80	15.28	0.64	Œ
1,3         H         0         69         65         16         63.40         255.91         44.63         0.25         0.25         16         63.25         6.25         16         63.25         44.55         0.21         0.21         0.21         0.21         0.22         0.22         0.24         0.25         0.26         0.25         0.26         0.25         0.26         0.25         0.26         0.25         0.26         0.26         0.25         0.26         0.25         0.26         0.25         0.26         0.25         0.26         0.25         0.26         0.26         0.26         0.26         0.26         0.26	10-Feb-98	3.3	æ	0	8	ဖ	55	16	-5.37	94.22	87.34	90'0	Tue
1,3         H         0         70         6         55         16         50.25         24252         44.35         0.21           -2,2         H         0         76         7         55         16         124.29         3464         47.82         0.21           -7,8         H         0         78         11         54         16         298.55         463.19         50.28         0.40           -1,3         H         0         72         13         55         16         193.31         379.11         47.80         0.61           1,6         H         0         72         9         55         16         193.31         379.11         47.80         0.61           1,6         H         0         73         6         55         16         193.31         46.85         0.61           2,0         H         0         71         6         55         16         19.67         44.94         0.63           2,0         H         0         72         6         55         16         185.04         36.17         46.85         0.63           1,0         H         0         8	11-Feb-98	1.3	I	0	8	9	55	16	63.40	255.91	44.63	0.25	Wed
-2.2         H         0         76         75         16         124.29         314.64         47.82         0.40           -7.8         H         0         78         11         54         16         298.55         493.19         50.28         0.40           -5.1         H         0         72         13         54         16         298.57         493.19         50.28         0.61           1.6         H         0         72         9         55         16         193.31         47.90         0.51           1.6         H         0         73         6         55         16         193.31         47.90         0.51           2.0         H         0         71         6         55         16         17.97         46.96         0.32           2.0         H         0         7         5         16         118.24         27.33         46.56         0.32           2.0         H         0         7         5         16         118.24         47.94         0.32           2.0         H         0         7         5         16         118.24         46.51         46.18	12-Feb-98	1.3	I	0	02	g	R	16	50.25	242.52	44.35	0.21	Thu
7.8         H         0         78         11         54         16         298.55         493.19         50.28         0.61           -5.1         H         0         72         13         54         16         366.77         555.11         51.44         0.66           -1.3         H         0         72         9         55         16         193.31         379.11         51.44         0.66           1.6         H         0         73         6         55         16         193.31         379.11         46.94         0.61           2.0         H         0         71         6         55         16         111.82         371.71         46.95         0.32           2.0         H         0         72         6         55         16         111.82         301.71         46.95         0.32           1.0         H         0         72         6         55         16         116.04         45.18         45.18         0.32           1.5         H         0         88         7         55         16         57.09         25.94         45.79         0.24           2.4         H	13-Feb-98	-2.2	I	0	9/	7	RS S	16	124.29	314.64	47.82	0.40	Ë
-5.1         H         0         72         13         54         16         366.07         555.11         51.44         0.66           -1.3         H         0         72         9         55         16         193.31         379.11         47.60         0.51           1.6         H         0         73         6         55         16         193.31         379.11         47.60         0.51           2.0         H         0         71         6         55         16         79.07         269.64         44.94         0.29           2.0         H         0         80         6         55         16         111.82         301.71         46.95         0.37           2.0         H         0         87         5         16         185.04         365.15         46.95         0.37           1.0         H         0         87         7         55         16         185.65         46.96         0.51           1.5         H         0         88         5         16         185.64         45.19         0.54           2.5         H         0         12.3         12.3         12.4 </td <td>14-Feb-98</td> <td>-7.8</td> <td>I</td> <td>0</td> <td>78</td> <td>#</td> <td>22</td> <td>16</td> <td>298.55</td> <td>493.19</td> <td>50.28</td> <td>0.61</td> <td>Sat</td>	14-Feb-98	-7.8	I	0	78	#	22	16	298.55	493.19	50.28	0.61	Sat
-1,3         H         0         72         9         55         16         193.31         379.11         47.60         0.51           1,6         H         0         73         6         55         16         79.07         269.64         44.94         0.29           1,8         H         0         71         6         55         16         87.94         273.33         46.65         0.32           2,0         H         0         72         6         55         16         86.77         265.79         46.95         0.37           0,9         H         0         7         55         16         185.04         365.75         46.95         0.37           1,5         H         0         7         55         16         185.04         46.96         0.37           0,8         H         0         7         55         16         130.85         48.91         0.54           0,8         H         0         7         55         16         130.85         46.71         0.42           0,8         H         0         7         5         16         57.09         253.86         107.49	15-Feb-98	-5.1	I	0	72	13	75	16	366.07	555.11	51.44	99.0	Sun
1.6         H         0         73         6         55         16         79.07         269.64         44.94         0.29           1.8         H         0         71         6         55         16         87.94         273.93         46.83         0.32           2.0         H         0         72         6         55         16         111.82         301.71         46.85         0.37           2.0         H         0         72         6         55         16         86.77         265.79         45.18         0.37           1.0         H         0         87         7         55         16         185.04         365.15         49.08         0.51           1.0         H         0         88         5         16         130.85         314.51         46.71         0.42           2.7         H         0         74         6         55         16         57.99         45.79         0.23           2.4         H         0         74         6         55         16         57.99         45.79         0.24           2.4         H         0         6         6 <td< td=""><td>16-Feb-98</td><td>-1.3</td><td>I</td><td>0</td><td>72</td><td><b>თ</b></td><td>55</td><td>16</td><td>193.31</td><td>379.11</td><td>47.60</td><td>0.51</td><td>Mon</td></td<>	16-Feb-98	-1.3	I	0	72	<b>თ</b>	55	16	193.31	379.11	47.60	0.51	Mon
1,8         H         0         71         6         55         16         87.94         273.93         46.63         0.32           2,0         H         0         80         6         55         16         111.82         301.71         46.85         0.37           2,0         H         0         72         6         55         16         86.77         45.18         0.37           0,9         H         0         72         6         55         16         185.04         356.15         45.18         0.32           1,0         H         0         87         7         55         16         185.04         356.15         46.71         0.54           1,0         H         0         78         7         55         16         130.85         314.51         46.71         0.42           2,5         H         0         7         6         55         16         57.09         233.68         107.49         0.23           2,7         H         0         6         5         16         57.09         233.68         107.49         0.23           2,4         H         0         6	17-Feb-98	1.6	I	0	57	9	53	16	79.07	269.64	44.94	0.29	Tue
2.0         H         0         80         6         55         16         111.82         301.71         46.95         0.37           2.0         H         0         72         6         55         16         86.77         265.79         45.18         0.32           0.9         H         0         87         7         55         16         185.04         365.15         49.08         0.51           1.0         H         0         88         8         55         16         220.52         405.55         48.91         0.51           1.5         H         0         74         6         55         16         314.51         46.71         0.42           2.7         H         0         74         6         55         16         37.98         45.79         0.33           2.7         H         0         64         6         55         16         57.09         23.68         40.79         0.33           2.4         H         0         64         6         55         16         57.09         23.69         44.51         0.19           2.4         H         0         6 <td< td=""><td>18-Feb-98</td><td>1.8</td><td>I</td><td>0</td><td>7</td><td>9</td><td>55</td><td>16</td><td>87.94</td><td>273.93</td><td>46.63</td><td>0.32</td><td>Wed</td></td<>	18-Feb-98	1.8	I	0	7	9	55	16	87.94	273.93	46.63	0.32	Wed
2.0         H         0         72         6         55         16         86.27         265.79         45.18         0.32           0.9         H         0         87         7         55         16         185.04         365.15         49.08         0.51           1.0         H         0         88         8         55         16         220.52         405.55         48.91         0.51           1.5         H         0         78         7         55         16         130.85         314.51         46.71         0.54           0.8         H         0         74         6         55         16         57.09         233.68         46.71         0.42           2.7         H         0         64         6         55         16         57.09         235.89         44.51         0.23           2.4         H         0         67         6         55         16         51.84         231.89         44.51         0.19           3.8         H         0         68         6         55         16         45.84         231.61         112.14         0.19           8         0	19-Feb-98	2.0	I	0	8	ဖ	53	16	111.82	.301.71	46.95	0.37	护
0.9         H         0         87         7         55         16         185.04         365.15         49.08         0.51           1.0         H         0         88         8         55         16         220.52         405.55         48.91         0.54           1.5         H         0         78         7         55         16         130.85         314.51         46.71         0.42           0.8         H         0         74         6         55         16         57.09         23.68         46.71         0.42           2.7         H         0         6         55         16         57.09         23.68         47.51         0.23           2.7         H         0         6         55         16         53.44         235.89         44.51         0.24           2.4         H         0         6         55         16         51.84         231.80         0.24           2.4         H         0         6         55         16         51.84         231.80         0.24           3.8         H         0         6         55         16         45.84         231.80	20-Feb-98	2.0	I	0	72	ဖ	53	16	86.27	265.79	45.18	0.32	逜
1.0         H         0         88         8         55         16         220.52         405.55         48.91         0.54           1.5         H         0         78         7         55         16         130.85         314.51         46.71         0.42           0.8         H         0         74         6         55         16         57.99         45.79         0.33           2.5         H         0         6         5         16         57.99         233.68         107.49         0.24           2.4         H         0         6         5         16         53.44         235.89         44.51         0.24           2.4         H         0         6         5         16         51.84         231.80         43.42         0.24           3.8         H         0         6         5         16         45.84         231.80         43.42         0.19           4         H         0         176         5         16         45.84         237.61         112.14         0.19           5         1         13.23.98         7,700.66         1,366.57         1.4         1.4 <t< td=""><td>21-Feb-98</td><td>6.0</td><td>I</td><td>0</td><td>87</td><td>7</td><td>53</td><td>16</td><td>185.04</td><td>365.15</td><td>49.08</td><td>0.51</td><td>Sat</td></t<>	21-Feb-98	6.0	I	0	87	7	53	16	185.04	365.15	49.08	0.51	Sat
1.5         H         0         78         7         55         16         130.85         314.51         46.71         0.42           0.8         H         0         74         6         55         16         93.17         279.84         45.79         0.33           2.5         H         0         63         6         55         16         57.09         235.89         44.51         0.24           2.7         H         0         67         6         55         16         51.84         235.89         44.51         0.23           2.4         H         0         67         6         55         16         45.84         231.80         43.42         0.19           3.8         H         0         68         6         55         16         45.84         237.61         112.14         0.19           0         1753         1         5         16         45.84         237.61         112.14         0.19           0         1753         7         1         13.66.63         13.66.63         13.66.63         13.66.71         112.14         0.05           0         0         0         0	22-Feb-98	1.0	I	0	88	· •	55	16	220.52	405.55	48.91	0.54	Sun
0.8         H         0         74         6         55         16         93.17         279.84         45.79         0.33           2.5         H         0         63         6         55         16         57.09         233.68         107.49         0.24           2.7         H         0         64         6         55         16         51.84         235.89         44.51         0.23           2.4         H         0         6         55         16         51.84         231.80         44.51         0.23           3.8         H         0         6         55         16         45.84         237.61         112.14         0.19           0         7         6         55         16         45.84         237.61         112.14         0.19           0         7         7         6         55         16         131.36         136.63         4.65         0.05           0         7         7         6         54         16         45.84         150.66         136.7         15.28         0.06           0         7         7         6         54         16         45.84	23-Feb-98	1,5	I	0	78	7	53	16	130.85	314.51	46.71	0.42	Mon
2.5         H         0         63         65         16         57.09         233.68         107.49         0.24           2.7         H         0         64         6         55         16         53.44         235.89         44.51         0.23           2.4         H         0         67         6         55         16         51.84         231.80         44.51         0.23           3.8         H         0         68         6         55         16         45.84         237.61         112.14         0.19           0         77         77         55         16         131.36         7,700.66         1,366.63         0.09           -8         0         70         70         7         55         16         131.36         308.03         54.67         0.39           -8         0         23         6         54         16         5.37         94.22         15.28         0.06           4         0         88         13         56.11         112.14         0.66         0.66         0.66	24-Feb-98	0.8	I	0	74	9	55	16	93.17	279.84	45.79	0.33	Tue
27         H         0         64         65         65         16         53.44         235.89         44.51         0.23           2.4         H         0         67         6         55         16         51.84         231.80         43.42         0.22           3.8         H         0         6         55         16         45.84         237.61         112.14         0.19           0         1763         7         55         16         45.84         237.61         112.14         0.19           0         176         7         55         16         131.36         308.03         54.67         0.39           -8         0         23         6         54         16         -5.37         94.22         15.28         0.06           4         0         88         13         55         16         366.07         556.11         112.14         0.66	25-Feb-98	2.5	I	0	8	9	55	16	57.09	233.68	107.49	0.24	Wed
2.4         H         0         67         65         55         16         51.84         231.80         43.42         0.22           3.8         H         0         68         6         55         16         45.84         237.61         112.14         0.19           0         1753         1753         17,00.66         1,366.63         1,36	26-Feb-98	2.7	I	0	8	9	55	16	53.44	235.89	44.51	0.23	ŦP
3.8         H         0         68         55         16         45.84         237.61         112.14         0.19           0         1763         7         55         16         131.36         308.03         54.67         0.39           -8         0         23         6         54         16         -5.37         94.22         16.28         0.06           4         0         88         13         55         16         366.07         555.11         112.14         0.66	27-Feb-98	2.4	I	0	29	9	55	16	51.84	231.80	43.42	0.22	Fri
0     1753     3,283.98     7,700.66     1,366.63       0     70     7     55     16     131.36     308.03     54.67       -8     0     23     6     54     16     -5.37     94.22     15.28       4     0     88     13     55     16     366.07     555.11     112.14	28-Feb-98	3.8	I	0	89	မ	22	16	45.84	237.61	112.14	0.19	Sat
0 70 77 55 16 131.36 308.03 54.67 -8 0 23 6 54 16 -5.37 94.22 15.28 4 0 88 13 55 16 366.07 565.11 112.14	Sum			0	1753				3,283.98	7,700.66	1,366.63		
-8 0 23 6 54 16 -5.37 94.22 15.28 4 0 88 13 55 16 366.07 555.11 112.14	Avg	•		0	70	7	22	16	131.36	308.03	54.67	0.39	
4 0 88 13 55 16 366.07 555.11 112.14	Min	œ		0	23	G	54	16	-5.37	94.22	15.28	90.0	
	Max	4		0	88	13	55	16	366.07	555.11	112.14	99.0	

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0.40 0.01 0.67

Green on the Grand Dally Summary	rand				Boiler	Boiler/Chiller Performance	Perfo	rman	99		
Date	Outdoor Ambient Temp (*C)	Clg/Htg Mode	HI Start (count)	Lo Start (count)	Avg. Cycle Time (min) Hi Fire Lo Fire	nin) Evap. re Supply Temp (°C)		Cond. Return Temp (*C)	( Delivered (KWh)	feel Consumed (KWh)	Elec. Consumed (KWh)
01-Mar-98	4.8	I	0	۶	9	55	,	16	63.47	256.32	45.30
02-Mar-98	2.1	I	0	ಜ	9	55	·-	16	92.77	278.55	45.66
03-Mar-98	2.0	I	0	88	9	55		16	64.14	245.18	44.35
04-Mar-98	9.0	I	0	8	9	55		16	62.83	245.02	43.84
05-Mar-98	0.7	I	0	75	9	8		16	98.37	282.29	45.19
06-Mar-98	0.1	I	0	28	7	55		91	127.12	304.02	46.12
07-Mar-98	1.4	I	0	₩	80	<b>S</b>	•	16	196.73	370.82	50.44
08-Mar-98	1.3	I	0	87	8	55		16	230.27	407.34	112.65
09-Mar-98	4.1	I	0	8	9	52		91	80.32	230.98	43.03
10-Mar-98	-7.8	I	0	74	8	55		16	166.21	342.40	45.38
11-Mar-98	-9.1	I	0	72	10	54		16	261.85	443.84	47.37
12-Mar-98	-7.0	I	0	98	11	54		16	239.91	423.65	47.29
13-Mar-98	-3.4	I	0	71	80	55		16	151.05	337.56	45.38
14-Mar-98	-1.1	I	0	8	6	54		16	230.42	417.29	49.15
15-Mar-98	-5.8	I	0	11	10	54		16	249.90	439.78	49.27
16-Mar-98	-6.5	I	0	9	12	54		16	250.30	440.83	48.16
17-Mar-98	-2.2	I	0	8	6	55		16	133.20	315.65	45.30
18-Mar-98	1.0	I	0	88	9	55		16	38.71	231.37	44.72
19-Mar-98	1.0	I	0	88	9	55		16	48.39	237.96	45.57
20-Mar-98	0.0	I	0	20	7	<b>SS</b>		16	84.94	272.66	45.28
21-Mar-98	-1.8	I	0	62	6	55		16	212.67	402.17	49.49
22-Mar-98	-1.5	I	0	8	O	54		16	237.63	425.20	48.86
23-Mar-98	-2.9	I	0	7.		55		91	152.96	338.02	45.82
24-Mar-98	-1.8	I	0	ደ	7	55		16	109.02	289.36	45.09
25-Mar-98	3.8	I	0	8	9	55		16	48.34	210.30	43.55
26-Mar-98	14.1	I	0	ස	ဖ	20		5	-1.16	110.83	30.95
27-Mar-98	17.9	I	0	က	9	32		15	-7.66	11.35	21.33
28-Mar-98	16.1	I	0	7	23	29		5	8.21	27.81	17.91
29-Mar-98	14.1	I	0	0		24		15	-0.23	0.00	17.49
30-Mar-98	18.6	I	0	0		22		5	-0.07	0.00	10.00
31-Mar-98	19.8	I	0	0		20	,	15	00'0	0.00	1.85
Sum			0	1818					3,630.60	8,338.56	1,321.77
Avg	7		0	69	80	20	•	91	117.12	268.99	42.64
Min	6-		•	•		20		15	-7.66	0.00	1.85
Max	20		0	87	23	55		16	261.85	443.84	112.65

Wed Thu Sat San Mon Tue Wed Thu Mon Tue Sun Mon Tue Wed Thu Sun Mon Tue Wed Thu Sat Sun Mon Tue Sat Sun Mon Tue Sat Sun Thu Tue Tri Sat Sun Thu Tue Tri Sat Thu Tue Tri Sat Thu Tue Tri Sat Thu Tue Tri Sat Sun Mon Tue Sat

0.35
0.49
0.59
0.57
0.657
0.67
0.17
0.20
0.31
0.53
0.56
0.45
0.38
0.23
0.23
0.23

March 1998

Dathy COPth

#### Tuesday, 17 November, 1998