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E. BUILDING MAINTENANCE MANUAL

NWRDC Maintenance Manual Sample
Go-Green building: Kennedy, Minnesota

I. **ELECTRIC**

A. **heating/ air conditioning units**
(locations Needs to be done on a monthly basis whenever system is running

1. Cost effectiveness keeps system running efficiently, prevents early burnout of unit

B. Lights

1. Quarterly inspection of fluorescent lights
2. Replace burned out bulbs when identified
3. Keep stock of bulbs on hand. (T8 32 watt 4 ft)
4. Ordering in quantity is more cost efficient than ordering a few at a time

C. Wall outlets / extension cords

1. Annually test grounds (test one per room)
2. Extension cords should have capacity to handle equipment plugged into cords
3. Extension cords should not be across walkways except for temporary use, and in such case, must be taped to the floor to avoid tripping hazards
4. Do not use 'ground cheaters' in any outlet

II. PLUMBING

A. Toilets, sinks, water fountains

1. Weekly cleaning of bathroom facilities (more often if building is heavily used)
2. Monthly inspection of all water fixtures for leaking or dripping water
3. Repair leaky faucets as soon as possible
4. Dripping water increases the monthly water bill

B. Sewer / drain facilities

1. Check weekly that drains are emptying properly.
2. Add drain cleaner or septic system cleaner if drains are running slow

III. FLOORS

A. Floors in rooms and hallways

1. Floors should be kept clean and free of dirt and debris. Daily sweeping, weekly washing, quarterly waxing of tile floors is recommended for a building with constant foot traffic. A reduced cleaning schedule is permitted when building is not being actively used.

2. Safety is the key concern. Wet floors should be promptly cleaned and dried. Safety cones should be set out while floors are being maintained and during drying time.
3. Marble or tile floors should be stripped of all wax yearly (depending on the wax product being used).

B. Bathroom floors

1. Floors should be mopped daily when building is being actively used. Weekly cleaning is permitted for a less active building.
2. Safety and cleanliness are the deciding factors for bathroom floor maintenance.

IV. Building exteriors

1. Check doors and windows yearly for air tightness.
2. Check that caulking, weatherstripping provides a tight seal.
3. Shining a flashlight around door seals at night is an excellent way to see if cracks have formed in the door hinged area. Lighting a candle around window sashes on windy day reveals leaks in weatherstrip or caulk. If the candle flickers, insulate.
4. Check annually that roof flashing and other building materials are securely fastened. Check the building exterior after violent weather events.

V. Grounds Maintenance

1. Remove show and ice as necessary to provide safe walkways for building clients. Treat icy areas immediately. Check parking lot for snowdrifts – contact plowing contractor or city maintenance to clear.
2. Pick up loose debris around the grounds to prevent possible damage to the building and to maintain a well kept site appearance.
3. Check playground equipment for safety concerns during the summer months.

SUMMARY

Keep track of recurring maintenance problems. Accurate records are the basis for future improvements, especially where energy savings can be achieved and an improved work environment (improved job safety) will be realized. Report all safety hazards (both interior and exterior) to the office manager to track recurring incidents. Keep track of corrective action taken by staff or contractor (if necessary). Members of the Commission must be informed of extraordinary damages or equipment failure which could require significant expenditure to correct.

F. SITE DRAINAGE OPTIONS AND ISSUES

Water drainage at building site is a chronic problem.

Ulteig Engineering: www. Ulteig.com

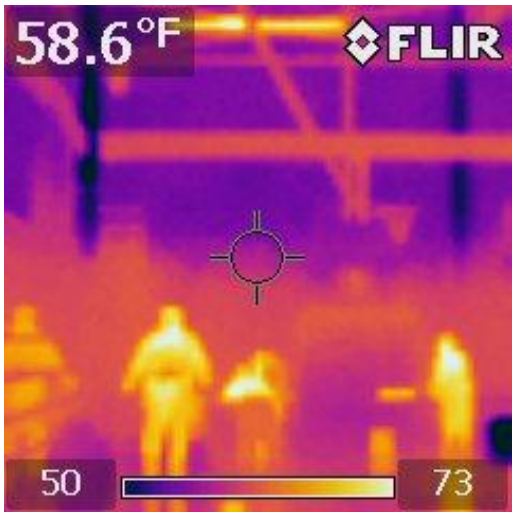
Or contact Carl Fingalson, Fargo office Tel: 701-280-8500

G. PHOTOS AND THERMAL IMAGES

The above photo and IR image were made on a 40 deg F day. The dark portion of the IR (infrared) image shows that the doors transmit a lot of heat and also leak air outside.

The above photo and IR images were made on a 0 deg F day. The dark portion of the center IR (infrared) image showing the inside of the door - shows that the doors transmit a lot of heat and also leak air outside. The right image was made from the outside showing the heat being transmitted.

The IR image were made in the office on a 0 deg F day. The dark portion of the IR image shows that the window type air conditioner (which was uncovered at the time) transfers a lot of heat outside.



The above photo and IR image were made in the gym on a 40 deg F day. The dark portion of the IR image shows that the columns and block walls transmit a lot of heat outside.

H. Energy Terms – Glossary OF TERMS AND UNITS OF MEASURE

Therm	**Therm**. Measure of gas that contains 100,000 BTUs. There are approximately 1000 BTUs per cubic foot of gas.

	One therm is about 100 cu. Ft. of natural gas.
Actual Demand	**Actual Demand the maximum rate at which energy is used, as measured in kilowatts (kW) (**the highest average 15 minutes of demand over a billing period).
Annual Fuel Utilization Efficiency (AFUE)	The total heating output of a furnace during its normal annual usage period for heating, divided by the total energy used.
Billed Demand	**Billed Demand** is the actual demand plus the adjusted demand for power factor correction.
British Thermal Unit (BTU)	A measure of heat equal to the amount of heat necessary to raise the temperature of one pound of water one degree F.
BTUs Methane	Measure of gas that contains 100,000 BTUs. As there are approximately 1,000 BTUs per cubic foot of gas, there are approximately 100 cubic feet of gas per therm.
C.O.P.Coefficient of Performance.	Ratio of the rate of heat delivered versus the rate of energy output in consistent units. Or a complete, operating heat pump system operating under design conditions.
CCF	**CCF** is 100 cubic feet of natural gas. For the purposes of measuring energy use, a therm and a CCF of natural gas are equivalent.
Cooling Ton	Measure of cooling capacity equal to 12,000 BTU/hr. The ton of cooling came originally from the refrigeration industry where 12,000 BTU would make a ton of ice in 24 hours.
Degree Day	A unit that represents one degree of decline from a given point (such as 65oF) in the mean outdoor temperature of one day. Often used in estimating fuel requirements of buildings.
Demand Charge	The demand charge is based on the highest-demand interval each month. Sometimes also called Billed Demand, Demand Charges are based on a twelve-month historical record of each metered facility.
EER Energy Efficiency Ratio.	Ratio used to rate the efficiency of air conditioners.
Energy	The quantity of electricity supplied, measured in kilowatt hours (kWh.)
Energy Lifestyle	The energy-usage habits of individuals and how they can be improved to use energy wisely and reduce monthly consumption.
Foot Candles	A measure of how much light is reaching a given location. Using foot-candles to measure light is akin to using a thermometer to measure temperature.
Foot Candles MIN MAX Avg	Variables used to measure how evenly light is distributed in a given layout. As a rule, the lower the difference between the maximum and the minimum, the better the design. The Average figure is often used to indicate the overall lighting level in a given area. However, this figure inaccurately measures uniformity, since an area with very bright and very dark spots can average the same as an area with much more evenly distributed light.

Fuel adjustment	Fuel adjustment or fuel recovery charges are based on the current month's cost of fuel to operate the power generation plants. FACs or FRCs vary from 1¢ - 5¢ per kWh. Because tariff rate schedules are set for the year, if fuel costs have decreased since the rate was set, the charge can appear as a credit on the bill. (also called fuel cost recovery)
Heat gain	The amount of heat flowing into a home as a result of sunshine, warm air leakage, warming of the walls and roof, and heat given off by people and equipment
Heating Seasoned Performance Factor (HSPF)	Total heating output of a heat pump during its normal annual usage period for heating, divided by total electric power input during the same period.
kilowatt	A unit for measuring electrical energy. One kilowatt is 1,000 watts and equal to 3,413 BTUs. A kilowatt-hour equals one kilowatt of electrical power taken from an electrical circuit steadily for one hour.
KVAR charges	Power factor is a measure of how effectively the current delivered to a motor is converted into useful energy. KVAR reflects the extent that current and voltage cycle in phase. The best and most efficient power factor is 100%, which occurs when current and voltage are perfectly in phase. kVAR is shown as a percentage.
Load Factor	**Load Factor** is a measure of efficiency. Load factor is the ratio of average load in kilowatt supplied during a designated period to the peak load occurring that period. Load Factor = kWh supplied in a period / Peak kW in a period X Hours in a Period
Load Shifting	The ability to change the amount of energy used at any given time. Load shifting can be accomplished by turning off a piece of equipment; switching to internal, off-grid power generation sources; or operation of equipmentduring off-peak hours.
Lumen	A measure of the amount of light given off by the lamp in a light fixture. A fixture with a higher level of lumens gives off more light.
Meter constant	The number by which the total kWh in a billing cycle is mulitplied to accurately reflect the number of kWh registered on the meter.
Off Peak	Periods of relatively low demand on the utility's electrical system. In general, off-peak times are considered as 7 p.m. - 6 a.m. and weekends.
On Peak	Periods of relative high demand on the utility's electrical system. The highest demand time is usually mid-afternoon on weekdays.
Power Factor	**Power Factor** measures how your equipment uses electric current from the utility. Power factor is a measure of how the current delivered to the equipment is converted corresponds to the watts (energy used), and is shown as a percentage. If your power factor is below 90 percent Xcel Energy, like many utilities, charges extra for

	low power factor, because it costs the utility more to build and operate the additional equipment that carries the extra current to operate your equipment.
R value	A measure of a substance's resistance to the transfer of heat. The higher the number, the greater the resistance.
Real-Time Pricing	Real-Time Pricing enables customers using very large amounts of energy to buy surplus energy real-time on the energy market at reduced rates.
SEER Seasonal Energy Efficiency Ration (SEER)	A measure of the efficiency of an air conditioner or a heat pump, expressed as the ratio of output in BTUs to the energy input in watts.
Therm:	**Therm**: A Therm is a unit of energy equivalent to 100,000 BTU.
cooling degree day	A cooling degree day is a unit used to relate the day's temperature to the energy demands of air conditioning. Cooling degree days are calculated by subtracting 65 from a day's average temperature. For example, if the day's high is 90°F and the day's low is 70°F, the day's average is 80°F. Eighty minus 65 is 15 cooling degree days. Cooling degree days can be used to compare the current summer to past summers. It can also be used to compare the heat in one part of the country with another. More specifically, the number of heating degrees in a day is defined as the difference between a reference value of 65°F (18°C) and the average outside temperature for that day. The value of 65°F is taken as a reference point because experience shows that if the outside temperature is this value then no heating or cooling is normally required. Occupants and equipment within a building usually add enough heat to bring the temperature up to a more comfortable level.

I. Websites

1. http://www.eere.energy.gov/
2. http://www.fresh-energy.org/
3. http://www.communityservices.nd.gov/Energy/
4. http://www.nd.edu/~ndenergy/areas-of-research/energy-efficiency.shtml

5. http://apps1.eere.energy.gov/state_energy_program/projects_all_by_state.cfm/state=ND
6. http://www.energystar.gov/
7. www.mnenergychallenge.org
8. http://www.iea.org/Textbase/subjectqueries/keyresult.asp?KEYWORD_ID=4122
9. http://www.aceee.org/altsites/index.htm
10. http://www.greenhousing.umn.edu/links.html

J. References

- US Department of Energy; http://www.eere.energy.gov/
- US Environmental Protection agency; http://www.energystar.gov/
- Residential Energy, Krigger- Dorsi, 2009 Saturn Resource Management
- Other websites listed above