

## Capital Planning for a Midwest Office Complex

### The Problem:

Chelsea Group was requested by the owner of a twenty-seven story high rise office building, originally constructed in the 1970's, to review in detail all of the mechanical projects identified in their 5-year capital expense budget. Approximately 20 different improvements were anticipated, but the owner desired an independent review of the projects listed by their property management firm for appropriateness and cost justification. Chelsea Group also took on a significant role in technical oversight of the improvements, including verification of proper installation and performance.



These projects included such improvements as:

- Install new building-wide computerized energy management system
- Inspect supply duct lining for condition and recommend action plan for addressing degraded liner
- Re-vamp existing air handling systems serving the lobby area to offset winter infiltration through lobby doors
- Inspect and recommend repair or replacement of existing cooling towers
- Address the magnitude of the tenant-owned cooling package units for potential sub-metering or lease adjustments
- Evaluate variable speed chilled water pumping

### Chelsea Group Intervention:

#### *BUILDING-WIDE COMPUTERIZED ENERGY MANAGEMENT SYSTEM (EMS)*

Over \$2 million was invested in the installation of a new EMS for the building. As a project close-out item prior to final payment to the installation contractor, the owner asked Chelsea Group to review:

- Sequences of operation
- As-built drawings
- Installed hardware

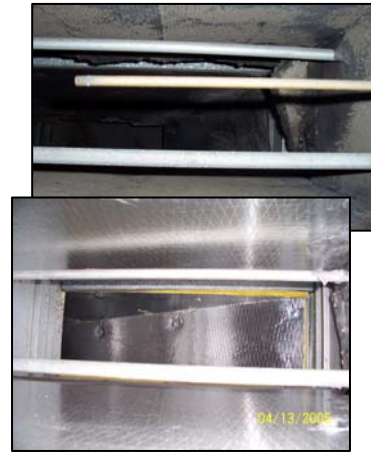
After discovering many omissions from the as-built documentation, Chelsea Group revised sequences to optimize energy conservation.

**Immediate results:** The review saved more than one hundred of thousand dollars in annual electrical costs by refining the operating sequences of the typical floor air handling systems.

### *SUPPLY DUCT LINING*

Tenants observed particulate matter dropping out of diffusers in their offices. Preliminary review revealed previous microbial non-viable growth on the duct liner, which had desiccated over time. After carrying out a complete survey of all 50 air handling systems in the building to establish existing conditions, Chelsea Group recommended a prioritized list of systems to be re-lined.

**Immediate results:** Re-lining the ducts has overcome the original problem, and tenants are no longer concerned over particulate deposition.



### *RE-VAMPING OF EXISTING AIR HANDLING SYSTEMS*

In cold climates tall buildings tend to act like a chimney, sucking in cold air at the lower levels and pushing warm air to the top. In this building, that effect was bringing in cold outdoor air into the entry lobby. Chelsea Group recommended modifications of the air handling systems to introduce larger amounts of conditioned outdoor air, and additional heating capacity to those systems to positively pressurize the lobby with warm air.

**Immediate results:** The pressurized lobby will prevent bitter cold outdoor air from entering the lobby during winter conditions, making the lobby much more comfortable.

### *INSPECT AND RECOMMEND REPAIR OR REPLACEMENT OF EXISTING COOLING TOWERS*

The existing cooling towers had been “band-aided” for a number of years, and were at the end of their useful service life. The owner wanted to know if the life of the towers could be prolonged by another 5 years or whether replacement was necessary.

Chelsea Group's inspection found:

- Leakage of condenser water
- Increasing maintenance needs
- Inefficient and costly cooling system operation

Chelsea Group recommended replacement of these towers by airlift from the top of the building.



**Immediate results:** The new cooling towers will reduce make-up water, require minimal maintenance, and improve overall system efficiency.

### *TENANT-OWNED COOLING PACKAGE UNITS*

Many tenants had installed their own packaged air conditioning systems, primarily to cool computer rooms. The owner desired an approach for assessing the energy cost impact of these systems and a method to assess that cost to the respective tenants, even though the electrical systems are not sub-metered.

Chelsea Group developed an approach for establishing tenant billing on the basis of measured amperage of each system for fan energy, and a British thermal unit (Btu) meter for quantifying electrical energy requirements for cooling. The Btu meter for each tenant is read on a monthly basis, and a line item on the monthly lease invoice reflects this additional energy charge.

**Immediate results:** By providing a method to measure additional energy use by some tenants, Chelsea Group helped the owner realize significant energy cost savings. Accounting for the tenant energy consumption enables the owner to charge back the energy costs to the tenants with the packaged cooling systems, as a result not penalizing the tenants without cooling packages.

### *VARIABLE SPEED CHILLED WATER PUMPING*



The existing chiller plant utilizes constant speed circulation pumps. Chelsea Group evaluated the potential energy cost savings of converting the constant speed pumping arrangement to a variable speed system.

Chelsea Group determined that the project was cost-justified because only minor piping revisions were needed and because two-way valves already existed at the cooling coils of the air handling systems.

**Immediate results:** Based on Chelsea Group's recommendation, conversion of the pumps to a variable speed system is underway. When the project is complete the owner will benefit from:

- Improved energy efficiency, able to run a pump at part speed as opposed to full speed all the time
- Improved indoor air quality by providing continuous dehumidification during cooling season
- Operational flexibility to simplify maintenance schedules, and respond to tenant changes

### **Final Results**

Chelsea Group helped the owner review and justify expenditures on necessary mechanical projects. Chelsea Group provided the owner of this building with:

- Substantial energy cost savings
- Technical review of building systems and documentation
- Impartial third party review of contracted work
- Mechanical system, ventilation, and building envelope expertise
- Means to address tenant needs