ArchEcology Case Study

Energy & Water Use Profiles for SHA

ArchEcology created energy and water use profiles for two of Seattle Housing Authority's (SHA) oldest and largest residential high rise apartment buildings, Denny Terrace and Jefferson Terrace. Both buildings were constructed in the 1970's and contain more than 200 studio units. Both buildings are home to low income residents, while Jefferson Terrace also houses some social services programs. To thoroughly assess the performance of each existing building and evaluate potential improvements, we performed an on-site investigation and physical assessment, conducted a survey of on-site building staff, studied available plans, then created an energy model of each building in Equest.

We carefully calibrated each model, using information on tenant occupancy and a year's worth of actual meter readings for each building. Once calibrated, we modeled numerous potential energy conservation measures and construction assemblies to determine which options would be most cost effective, while yielding the best possible reduction in energy use.

A building's performance is more than the just the sum of its individual systems. An energy model approach allows potential upgrades to envelope systems, lighting and HVAC to be evaluated holistically. The cost to implement each measure can be weighed against its effectiveness when used in conjunction with the other proposed measures to provide a true cost benefit analysis on a whole building basis. Future utility savings can be calculated to determine payback periods for each potential measure.

Proposed infrastructure improvements were carefully evaluated against not only initial cost, potential energy reduction and utility savings, but also against durability and low maintenance requirements. The resulting recommendations were used as a tool to obtain green retrofit financing and to further refine capital needs assessments. Recom-

mended improvements projected energy reductions of more than 30% over their current annual use.

Denny Terrace Input Data				
HVAC				
Heating System Description	Residential: Electric Baseboard Heaters, no thermostat Common Areas: Rooftop Air Handling Units with electric heat.	Residential: Replace with new lower wattage electric baseboards with thermostats. Common Areas: New rooftop air handling units with electric heat.	Same as Proposed Run #1	Rooftop Air handling units are ERV's which recover unit exhaust. Sensible Heat Exchanger. Operates only in heating mode. ERV equipped with an outside air bypass.
Cooling System Description	None	None	None	None
Cooling Equipment Efficiency	NA	NA	NA	NA
Ventilation System Description	Units: Intermittent bath fans at 70 CFM. Most units bath fans exhaust to roof 54 units exhaust horizontally; Common Areas: fresh air from rooftop AHU.	Continuously operating bath fans at 35 CFM. Most to roof. 54 units vent horizontally. Fans may be increased to 80 CFM by occupant.	Same as Proposed Run #1	Same as Proposed Run #1
Fan Power Efficiency	Standard	High Efficiency	Same as Proposed Run #1	Same as Proposed Run #1
Domestic Hot water				
Domestic Hot Water loop and pump parameters	3 electric water heaters with recirculation pump. Assume constant flow. 125 degrees with loss of 15 degrees.	Replace with new electric water heaters and add VSD and demand control. 125 degrees with loss of 15 degrees.	Replace with new natural gas boilers. Pumps to have VSD and demand control.	Same as Proposed Run #1

To reduce water use and further enhance utility savings, we also examined building fixtures and appliances in apartment units, common areas, central kitchens and central laundry facilities. We created a baseline case, calibrated to actual meter readings, and then compared that baseline to a variety of proposed low flow fixtures. By specifying new low flow toilets, lavatory sinks, showers, kitchen sinks and washing machines in central laundries, future water use could be reduced more than 30% over then current levels.

Using these recommendations, the SHA successfully obtained $10M in ARRA financing for the renovation of Denny Terrace in 2010. Construction was completed in 2012. As a condition of funding, the SHA was required to demonstrate that targeted reduction levels had been achieved after a year of operation. For that purpose, ArchEcology prepared a measurement and verification program to be conducted over the following year to confirm building performance. Our subsequent evaluation of the building's performance post renovation confirmed anticipated savings.