PARK CHASE APARTMENTS
GHP Retrofit Provides Energy Efficiency for HUD

PARK CHASE APARTMENTS (543 TONS) was renovated beginning in 1991 and is currently saving the US Department of Housing and Urban Development (HUD) close to $60,000 annually. The complex consists of 64 buildings containing 348 apartments, spread out over 27 acres.

During the late 1980s, Park Chase suffered a decline in occupancy, due in part to deferred maintenance. The 27-year-old electric chillers (720 tons) and gas boilers needed to be replaced. One 360-ton chiller had been inoperative for years, and the gas boilers were leaking. HUD repossessed the property in 1991 and began plans for renovation.

Kevin Cahill, the construction manager for the project, explained that HUD was unfamiliar with the benefits of GHP systems and had to be sold on the idea. “They wanted us to fix the heating and air, but didn’t know how,” he said. “They explored several options and did a cost and pay-back analysis for each.”

HUD installed a prototype system of each kind under consideration: a gas hydronic, a water-to-air heat pump, and a water-to-water heat pump. Each was installed at the complex and monitored for a six-month period. In addition, a case study compared the operational and maintenance costs of an existing geothermal system and a hydronic system at two other Tulsa apartment complexes.

After analyzing the results and finding that the GHP had the lowest operating cost and the lowest first costs, HUD chose the GHP system.

Bills for individual apartments now average $33/month on utilities. Since the apartments were not individually metered prior to the renovations, direct comparisons of monthly bills are unavailable. However, the overall yearly savings in 1995 was $60,804.

If just energy use is compared, without the base rates for the additional meters, the savings figure was $102,924—an especially impressive amount, since occupancy rates have nearly doubled during that time span.

Carl Hall of American Management Inc., the property managers, has been very happy with the savings. He says that, "in the first 8 months we saw a 50% reduction in energy cost."

**Project Information**

**NAME AND LOCATION:**
- Park Chase Apartments
  Tulsa, Oklahoma

**COMPLETION DATES:**
- July 1993/HVAC
- July 1996/Thermal Improvements

**HOUSING TYPE:**
- 64 Building Apartment Complex on 27 acres, 348 units ranging in size from 650 to 962 square feet

**SYSTEM:**
- 543-ton Closed Loop GHP System
- 348 Individual Vertical Loops
- 416 ClimateMaster VE series GHPs, ranging from 1.75-2.0 tons
- 95,000 feet of vertical bore

**GENERAL CONTRACTOR:**
- Kevin Cahill
  Ralph Jones Co., Inc.

**INSTALLING HVAC CONTRACTOR:**
- Jay Murphy
  K & M Shillingford Inc.

**UTILITY REPRESENTATIVE:**
- Bryan Henderson
  Public Service Company of Oklahoma

**CONSULTING ENGINEER:**
- Wes Smith
  Warren Smith & Associates

**CONTACTING OFFICER:**
- Kenneth Beck
  US Department of Housing & Urban Development (HUD)
Lowering the First Costs

Individual Load Calculations

In order to get first costs as low as possible, PSO did 38 separate load calculations, sizing each loop and system to each apartment. “We wanted to match the well to the load,” said Jay Murphy, president of K&M Shillingford, the HVAC contractor for the project. “The loops are tailored to each apartment’s size and location in the complex.”

Apartments with a northern or western exposure have greater loads and correspondingly longer loops: a 275 foot well bore as opposed to a 250-foot well bore for apartments on the complex’s interior.

Thermal Improvements

To further reduce the load, the building envelopes were improved. New double-pane windows were put in, over 10,000 square feet of glass was removed (roughly 15%), storm windows were installed where old windows remained, caulking and weather stripping was put in and checked with blower door tests, and R-30 attic insulation was put in. The improvements cost $244,000. However, the system requirements could then be dropped 180 tons, a savings of $396,200. By thus reducing the load, HUD saved $437 per unit on its first costs, for a total savings of $152,200. If the system had been gas hydronic, the improvements would only have lowered first costs by around $46,400.

Utility Incentives

First costs were reduced an additional $240 per ton by Public Service Company of Oklahoma’s (PSO’s) utility incentives, totalling $133,650.

GHP Benefits

- Lower utility costs: Individual apartments save 50% over the old system. Utility bills average $33 per month per unit.
- Lower capital costs: Thermal improvements lowered the number of installed GHPs necessary from 724 to 516 tons—greatly reducing first costs.
- Incentive program: HUD received $133,650 of incentives through Public Service Company (PSO), saving the owners about $240 per ton.
- Improved comfort: Residents have total control of their comfort level with individual thermostats and meters.
- Requires Less Space: The old boiler room, a 40’ x 20’ separate building, is scheduled to be renovated into a community learning center.
- Reduced maintenance: Eliminates damage due to weather, since there is no outdoor equipment. All maintenance required is performed inside.
- Durable-long life: ASHRAE standards use a 19-year service life for WSHPs, which compares well with the 15 years ASHRAE states for residential split units.
- Vandalism: All equipment is located inside; minimizing the risk of vandalism and theft.
- Environmentally safe: Meeting new government energy standards, the GHP refrigerant circuits are precisely sealed at the factory and will seldom or never require recharging.

“‘There’s no comparison between the old system and the new. The maintenance on the boiler and chiller was an everyday chore. The new GHP system is a lot easier. We go weeks between calls.’”

Joe Starks
Maintenance man for Park Chase

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