# Case Study

# *Mendota Apartments*

**Boiler Replacement Needs:** The Mendota, a historic apartment building in Washington, D.C., was heated by a 40-year-old gas steam boiler which fired all day long and never shut off. Building tenants reported that they either didn't have enough heat or that it was too warm. The cost of natural gas annually had become an enormous expense, and as the heating system became less reliable over the years, the Mendota board of directors needed a better solution.

**Project Installation Date:** July 2009

**Type of Facility:** Apartment Building

**Name of Building:** Mendota Apartments

**Location:** Washington, D.C.

**Construction Details:** Total Number of Boilers Required for Job - One

**Solution:** Weil-McLain LGB-20 atmospheric draft steam boiler

**Installing Contractor:** Foley Mechanical, Inc.

## Background

Built at the turn of the last century in 1901, the seven-story Mendota is Washington D.C.'s oldest intact luxury apartment building. Though much of the building had been restored over the years, one area requiring attention was the facility's heating system. Upgrading to a modern steam boiler restored the Mendota to its former heating glory, improving resident comfort and offering major energy savings.

*Washington D.C.'s historic Mendota Apartments, built in 1901*


*The existing steam boiler, in place for over 40 years*

*A view of the Mendota's lobby with column-style cast iron radiators.*

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The Mendota was built during the golden age of D.C. apartment houses along the trolley line in an area that was, at the time, considered the far northern suburb of the city. Today, it's recognized as the first apartment building constructed in the residential neighborhood of Kalorama Heights.

"The Mendota is one of the grand old apartment houses in D.C.," said Jim Wood, head of the building and grounds committee for the Mendota board of directors. "While many other D.C. buildings of the era have lost their visual character, the configuration of nearly every apartment unit in the Mendota is identical to when it was built." The Mendota's 50 apartments include architectural details like 10-foot ceilings, ornate crown molding, tall windows, heart pine floors, built-in cabinetry and Victorian-tiled fireplaces. The apartment building was converted to a co-op in the 1950s.

Another historic feature is the Mendota's original heating system – which consisted of a coal-fired boiler that's still in place but has long been disconnected. The Mendota is heated by a one-pipe steam system connected to column-style cast iron radiators.

Over the years, the coal boiler was abandoned and a gas steam boiler was installed. But, that system, after many years in operation, had become less reliable. "We allocated approximately $75,000 annually for natural gas, and this expense was a huge portion of our budget," said Wood. "Also, many tenants complained it was either too warm – requiring them to open windows – or that they didn't have enough heat. We had to do better."

## System Repairs Pick Up Steam

Dan Foley, president and owner of Foley Mechanical, Inc., based in Lorton, Va., was selected to help remedy the heating woes. "When we started working with Mendota, a 40-year old steam boiler provided heat," said Foley. "Upon inspection, we noticed the boiler fired all day long and never shut off."

Foley also noted that the main venting system was not appropriate for the two 6-inch steel mains that circled the basement of the facility. The boiler would flood on a regular basis, and the condensate would lag as it percolated through the clogged wet returns.

"When the condensate would finally return, the boiler would flood, which required a service call," said Foley. "Water continuously drained from the boiler as fresh water was added, causing the boiler to disintegrate from the inside out." Foley and Wood decided first to make incremental improvements to the aging boiler.

Enhancements included, but were not limited to, replacing multiple ribbon burners, replacing the boiler relief valve and safety controls and rebuilding the main venting system. Despite improvements, the comfort of the tenants and annual expenses were still not ideal. Foley believed there still was room for more improvement.

*The front facade of the Mendota Apartments*

When service calls began to become a weekly occurrence and most of the operational parts of the boiler were replaced, building management knew it was time to consider replacement.

## Boiler Replacement Full Steam Ahead

After several years of maintaining the aging boiler, Foley recommended installing a new boiler, re-piping the header and replacement of the rotted, clogged wet returns. "I submitted a six-figure proposal, and at first the board balked at the price," said Foley. "When I suggested they review what they paid in fuel over the past five years and add in the service calls and tenant complaints, they quickly came around."

Foley recommended installation of a Weil-McLain LGB-20 atmospheric draft steam boiler at 2.5 million BTUs. At up to 84% combustion efficiency, the LGB line is one of the more efficient commercial cast iron atmospheric Weil-McLain gas boilers. Its compact design allows for more

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piping and venting headroom and the unit's short draw rods permit faster, easier assembly of boiler sections. The boiler was sized to the connected radiation using a 1.5 pick-up factor. The header was repiped to manufacturer specifications.

"Before we removed the old boiler, we conducted a system overhaul to optimize the distribution piping, vents and the radiators in every room," said Wood. "We then installed new main line steam vents, both at the beginning and the end of the line, checked all the mud legs and replaced the near boiler piping because it had been clogged.

"Our preparatory work and due diligence ensured the whole system would work much more efficiently and we could slip the new unit right in," Wood added. The project took two weeks to complete. Installation challenges included navigating stairs and working in a small space.

After the new boiler was installed, the team cleaned the system with steam cleaner and ran it for several weeks to flush out the sediments. Afterwards, Foley skimmed the water line until it ran clear. Loop seals also were clogged with sediment. Foley's team meticulously flushed out each loop seal with water, allowing the condensate to drain and the steam to flow freely. This process helped balance the system.

## New System Benefits

With the new boiler optimized and in service, several benefits were quickly realized. Radiators that had not heated in years were hot. Steam circled the mains quickly and the risers received steam at the same time. Windows previously opened in January were closed.

"We actually installed a few dozen additional radiators that had been removed with the previous system because it had been run at such a high level that the building was overheating in some areas," said Wood. The operational parameters of the boiler don't have to be changed throughout the year. "The controls are such that we don't make adjustments at all," said Wood. "The system learns and fine-tunes settings as needed."

One of the most significant benefits of the more efficient Weil-McLain boiler installation was the energy savings. Fuel costs for the building decreased to about $30,000 annually – a significant reduction of more than 40% from prior gas bills. The system also operates quietly. "When the boiler turns on and the radiators are operating you sense the heat but you don't hear anything," Wood said. "It just purrs."

Most importantly, tenant complaints were reduced. "I believe that steam boilers with radiators really are the most perfect, comfortable heating method," Wood added. "We have been absolutely pleased since the new boiler was installed. And, we've saved a lot of money."

*The Weil-McLain LGB-20 steam boiler in the Mendota boiler room*


*Additional controls in the Mendota boiler room*

*Piping and gauges in the Mendota boiler room*