



**CURRENTS**

FALL 2013

# *Too Hot To Handle – Not For Metropolitan Industries!*



*Installation of the pre-fabricated boiler-house for the new Veterans Affairs Outpatient Center at Hines Veteran Administration of Joliet, measuring 47-feet long by 20-feet wide by 13-feet tall, one of Metropolitan's largest housed system to date.*

## **Veterans Affairs Outpatient Center at Hines Veterans Administration – Joliet, Illinois**

What started as an engineering and fabrication challenge for Metropolitan Industries, has turned into one of the largest housed systems we have produced in our 55 plus year history: A prefabricated boiler-house measuring 47-feet long by 20-feet wide by 13-feet tall and weighing almost 90,000 lbs.

Following months of arduous labor and immense preparation from the Metropolitan team, the modular central steam plant designed for the new Veterans Affairs Outpatient Center at Hines Veterans Administration of Joliet, Ill. departed our facility and was placed in its permanent home.

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**Plus...**

- **Local Refinery Upgrades Booster System, Custom Fabrication**
- **High Demands Met With Northwestern Hospital Break-Tank/Booster System Upgrade, No Water Loss Installation**

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*Officially disconnected from the original Silver Cross Hospital central loop, the VA is now receiving steam and water utilities from the Joliet Modular Central*

Designed to provide steam and water utilities to a facility purchased by the Veterans Administration and located on the Old Silver Cross Hospital Campus in Joliet, mechanical division salesman Mike Temes described the project as “fast moving” and said Metropolitan wasn’t brought in on the project until the bidding process was nearly closed. The short time frame from bidding the project to receiving the customer’s letter of intent required extensive planning amongst the many departments of our company.

“Once we came to the realization that we were a legitimate contender to receive this project, a meeting was conducted between our engineering, electrical, fabrication and sales staff to determine whether or not we could complete such an intricate job during the allotted time,” said Temes. “From the start everyone involved in the project was extremely eager to help and provide support. These individuals were extremely supportive

in the early process of this project and it could not have gotten off the ground without them.”

With a project integrating so many complex components, Temes said that both he and project engineer Neil Vogel relied heavily upon the expertise of Metropolitan’s staff for direction, and that the sacrifices exhibited were striking.

“This entire project has been a valuable exercise in teamwork and unity,” said Temes. “As relatively new employees, Neil and I are novices in the design of prefabricated structures and relied greatly upon our co-workers for help. Our staff members experienced in the design of these structures went above and beyond to assist us with this project, and the sacrifices made speaks volumes about the team atmosphere present here at Metropolitan.”

Among the many challenges faced throughout the project’s development, two

particular challenges were overcome during the process.

“This structure is larger than what we could accommodate when it came to erecting the building within our facility,” said Vogel. “Fortunately Metropolitan invested in the expansion of our warehouse doors, thus allowing us to complete almost all of the fabrication and wiring of the building indoors during the harsh winter months.”

He also cited the drawing and assembly of the structure as a demanding process for our engineering staff. The final submittals were extremely intricate, which required our engineering, fabrication and electrical staffs to pay very close attention to detail throughout the project’s construction.

The steam boilers for this project had the longest lead time of any equipment on this project. For that reason we had to wait until the steam boilers were at our facility to start the majority of the structural fabrication.



*Steam Plant. (Interior View)*

“One of the most extraordinary aspects of this project is the fact that the majority of its construction has taken place over a 10 week period,” said Temes. “We couldn’t order materials and put torch to metal until we received the approved submittals, and studied the precise specifications that the customer required.”

Due to the sheer size and weight of the building we needed to have the base design stamped by a professional structural engineer.

“The collaboration of efforts between Metropolitan’s sales, engineering, fabrication and electrical departments, the trucking company, and the crane operator, ultimately played the most prominent role in the installation’s success,” said Metropolitan’s project engineer Neil Vogel. “Transporting such a large structure from one site to another is no easy feat, but we were able to achieve positive results with the right team and strategy in place.”

## ***Boiler-House Overview:***

- Fully functional, pre-piped, skid-mounted & housed boiler plant.
- Third-party inspected and certified by ETL.
- Equipped with three (3) 50 HP, 3-pass scotch marine steam boilers.
- Complete combustion management system.
- EPA approved continuous emissions monitoring system.
- Communications data transfer interface system.
- Stainless steel triplex boiler-feed system.
- Blow down separator with automatic aftercooler.
- Emergency eyewash/safety shower.
- Boiler chemical-feed system.
- Steam/condensate/makeup water flow meters with totalizers.
- Schedule-80 steam/condensate piping.
- Exterior aggregate finish, brick patterned and color matched to other on-site buildings.

Ushered by police escorts and accompanied by many Metropolitan personnel, the boiler-house was moved nearly 10 miles to the job site with complete ease, and the installation process began shortly thereafter.

The entire installation went as well as we had envisioned, and no issues were encountered throughout the process. Both the police escorts and the trucking company did a fabulous job of not only ensuring that the structure arrived safely, but did so in a timely manner. The entire installation was a valuable exercise in teamwork and everyone involved should be credited for its success.

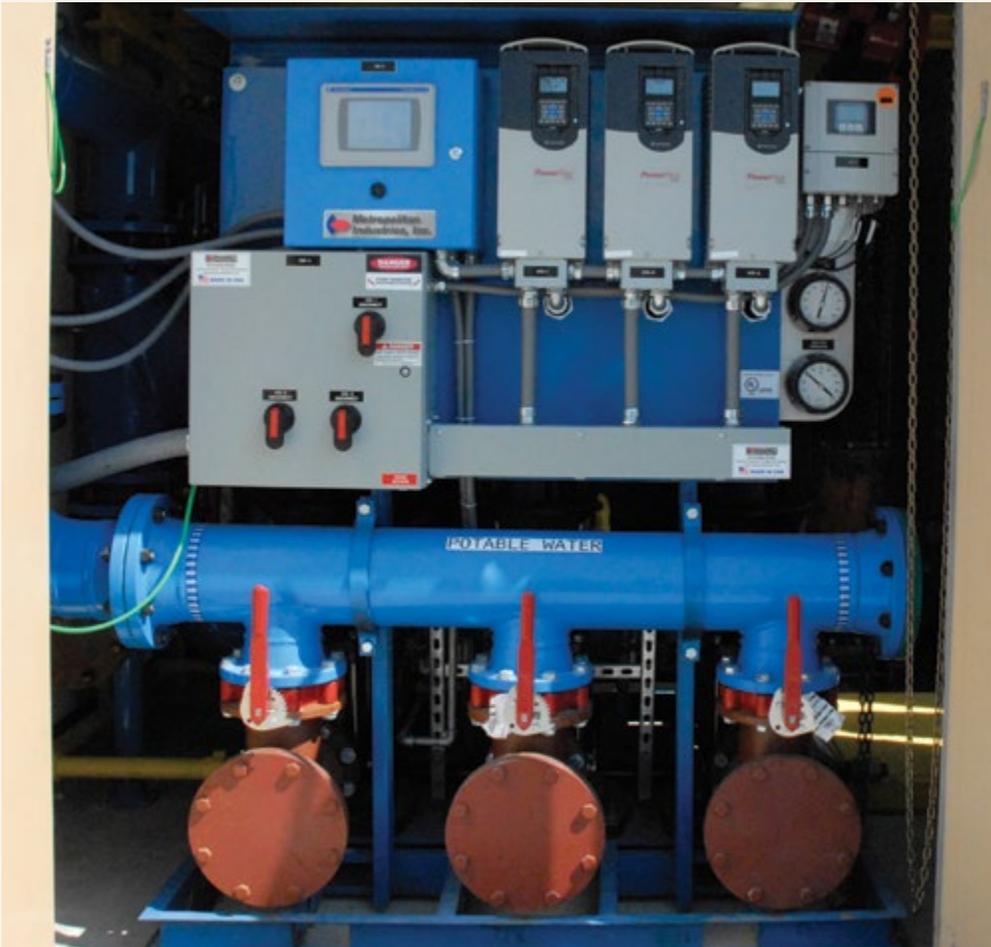
In an effort to provide a cost effective benefit, the VA was able to officially disconnect its building from the original Silver Cross Hospital central loop and is now receiving its

steam from the new modular central steam plant.

Project engineer Peter Papanikolaou of KJWW Engineering Consultants was pleased Metropolitan was ultimately brought in to contribute to the project and is satisfied with the end result.

“I was very familiar with the work Metropolitan had completed in regard to housed pumping stations, and was pleased to discover that they could engineer a sophisticated steam-based system like this,” said Papanikolaou. “It was comforting working with a local organization, which ultimately helped everyone involved with the project. Overall, I would describe Metropolitan as extremely professional and helpful during this entire venture.”

# Large Demands, Short Timeline



*Water pressure booster system added to the back flow prevention facility.*



*Interior of the back flow facility left little room for a water pressure booster system.*

When a local refinery added a back flow prevention facility to their water service system back in 2009, they inadvertently created an adverse effect on the water pressure available to the refinery.

The back flow prevention facility intercepts a 12 inch water main originating from the local city's water line. The water pressure entering the facility from the city varies from approximately 30 psi in the winter months to as low as 20 psi in the summer months.

The diverted flow through the back flow facility ultimately began to rob the refinery of precious operating pressure. As the water flow moved through the refinery, it also encountered additional losses, in the form of pipe, valve and fitting friction losses. This lower pressure required a solution, to ensure that the refinery has a reliable source of pressurized water, and can continue to function properly.

Metropolitan began to work with a local engineering company to derive and implement a reliable solution. All parties concluded that a water pressure booster system would need to be added to the back flow facility. The situation at the facility included a number of challenges, which would be sure to test the capability of any system's manufacturer. One of the most challenging aspects involved the space limitation within the back flow facility itself.

The building was not designed to house additional equipment of the size required to overcome the reduced pressure dilemma. The 12 inch water service enters the facility, splits off into two 8 inch lines, each with its own large 8 inch back flow preventer, which is then combined back into one 12 inch main before leaving the facility on its way to the refinery. This large gallery of piping and equipment left little room for a water pressure booster system.

# For Local Refinery Upgrades.



om for the water booster system.

## **Water Pressure Booster System & Large Custom Piping Fabrications Overview:**

- Fully functional, pre-piped, skid mounted water pressure booster system.
- Equipped with three (3) 30 HP multi-stage pumps, each rated 750 GPM @ 80 Ft. TDH.
- 8" Suction & 8" discharge header assemblies, each with three 6" branch piping connections.
- Three 6" flow guides with built in strainers.
- One 3" hydraulically-operated dual-solenoid actuated electronic recirculation valve.
- 8" custom piped fabrication with 8" hydraulically-operated system bypass check valve.
- Dual redundant pressure transducers to measure differential pressure for control.
- One MetroTech II logic control panel with Allen-Bradley PLC & color touch screen interface.
- Three Allen-Bradley Powerflex-755 variable frequency drives.

Secondly, the local refinery made it clear to all parties involved, that the water service upgrade project must be designed to ensure that the water demands of the facility would not adversely affect the operation of the city's public water system. In addition, the application required that a number of large custom piping fabrications be provided beyond the boundary of the pumping system. These custom piping fabrications were required to mate precisely with the existing pipe connections within the facility, with no room for error.

Additionally and possibly the most critical situation facing the group, was reliability. The upgrade needed to be designed to eliminate any possibility that water service to the refinery could be interrupted.

Finally, the time line required to implement the solution was

formidable. The team was only given 60 days during which to design, engineer, document, refine and manufacture the system. This challenge was coupled with the requirement that the installation take place, without interrupting flow to the refinery, or to anyone receiving water from the local city system.

The system featured an impressive operational design, which monitored flow and pressure to the refinery, as well as to the local city, and could adjust the operation according to the demands of one entity, without sacrificing operational effectiveness to the other.

The system was manufactured on time, and the delivery and installation were coordinated with seamless precision, allowing the refinery and municipal water to flow continuously during the entire upgrade process.

# Northwestern Memorial Hospital



*New booster pump system designed with potential future expansion in mind.*

Recognized as one of the country's premier academic medical centers, Northwestern Memorial Hospital of Chicago, Ill. serves as one of the Midwest's most important medical institutions.

Ranked as the No. 1 Illinois-based hospital in U.S. News & World Report's 2012-13 rankings, Northwestern is nationally renowned in many adult specialties including cancer, cardiology and heart surgery, neurology and neurosurgery.

The Galter and Feinberg Pavilions are Northwestern's center for inpatient care services. Complete with intensive care units, surgery suites, medical office space, laboratories, and various amenities including a cafeteria, museum and non-denominational chapel, Feinberg spans 22 floors and consists of patient rooms with private restrooms and showers.

In anticipating future development of Feinberg, representatives at Northwestern Memorial Hospital and CBRE made the decision to upgrade an existing water booster pump system, domestic water supply riser, and reserve osmosis filtration system located in the pavilion. They turned to the trio of Environmental Systems Design, Inc. of Chicago, Ill., Great Lakes Plumbing and Heating Company of

Chicago, Ill. and Metropolitan Industries, Inc. of Romeoville, Ill. to provide a custom solution of engineering, pumping equipment and retrofit installation.

The previous pump system in the Galter and Feinberg Pavilions contained three 100-horsepower (hp) pumps and was designed to provide a total flow rate of 1,500 gallons per minute (gpm). The new system with an increased flow rate was designed due to a conversion in usage from medical use (MOB) to patient use (POB) with the expectation of future development and planned expansion of the central sterile.

In addition, the preceding configuration had also insufficiently delivered water to the facility's cooling towers. This was also accounted for in increasing the flow capacity, all while maintaining the required redundancy of the facility.

Manufactured by Metropolitan Industries, the new booster system contains four pumps, each designed to provide a flow rate of 450 gpm at 401 feet of total dynamic head. The system operates at a total capacity of 1,800 gpm at a designed constant discharge pressure of 204 pounds per square inch (psi). Pump motors are rated at 60 hp,

# Upgrades Booster Pump System

3,500 rpm, 60 Hz, 480 volts, three-phase and 80 percent efficient. Four variable-frequency drives and a controller were also provided for seamless flow changes.

Despite a design point, alterations made to the facility's risers have allowed operators to run the new system at a set point of 190 psi while still satisfying building operation, therefore, saving even more energy.

Previously, Feinberg's risers had been constructed in galvanized steel piping, which had collected calcification over the years, leading to pressure fluctuations and ultimately, excessive pressure losses. The existing telescope galvanized steel risers were replaced with new copper risers from the basement to the penthouse. Copper piping incurs less friction losses in comparison to galvanized piping, and clean pipes ensure flow is no longer restricted.

Along with changing the material, piping was also sized differently to avoid pressure losses. The existing piping reduced in size as it made its way up the building, which led to friction losses. The new piping is sized at 8 inches for the entire arrangement. This design decreases pipe friction losses, also allowing operators to run the system at a set point of 190 psi.

In addition to the booster pump system, a duplex variable-speed combination pump system/break tank system with a protected water supply was designed for and installed in Feinberg's 22nd floor. Also manufactured by Metropolitan, the combination pump system/break tank system contains two pumps, each designed to provide a flow rate of 120 gpm at 140 feet of total dynamic head for a total system capacity of 240 gpm. Each pump motor is rated at 7.5 HP, 3,500 rpm, 60 Hz and 480 volts. Included with the package was a 46-inch diameter by 68-inch tall break tank.

The combination pump system/break tank system was installed to meet City of Chicago code requirements for backflow prevention serving a high-pressure steam boiler system, supplied by the new reverse osmosis filtration system.

Among the many challenges faced throughout the project's development, the most critical was keeping Feinberg's water supply reliable simultaneously with upgrades taking place. At no point during the installation of pumping equipment and piping could the water supply be shut down. This required a tactful approach from the design team and installing contractor.

To maintain a reliable water supply and conduct upgrades, Metropolitan manufactured the four-pump booster system into two separate systems, which allowed for coordinated startups of each system. This allowed installers to have one of the two-pump systems

running and providing water at a temporary location while the other two-pump system was being installed. Once the first system was permanently installed and running, the temporary system was removed from location and installed directly next to its counterpart, creating a four-pump system.

In addition to creating a plan to keep the water running, another challenge the team faced was a short lead time from design to installation. The team was given just 12 weeks to manufacture and install both the four-pump booster system and combination pump system/break tank system from the moment the new copper risers were implemented. Despite the challenges, the water supply remained intact and functioning for the Galter and Feinberg Pavilions.

The truly distinctive aspect of this project is the approach the complete team took from design to installation to ensure the building never lost its water supply. At an alternative location such as a condominium complex, installers may have a timeframe throughout the installation process the water supply can be shut down and a system can be installed without impacting the comfort of tenants. In this case, no such luxury was present, but attention to detail and development of a coordinated schedule allowed for the installation of significant upgrades without impacting the water supply.



*Combination pump system and break tank system with a protected water supply designed with a flow rate of 120 gpm.*

# Metropolitan Industries, Inc.

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**Future  
dates to  
be added!**

# SEMINARS 2013

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**Energy Saving Strategies:  
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**A Discussion of  
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Dates Available: 10/2  
Time: 9:00 am - 2:00 pm

Dates Available: 10/23  
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Dates Available: 12/4  
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Dates Available: 12/11  
Time: 9:00 am - 2:00 pm

Dates Available: Upon Request

Dates Available: 11/6  
Time: 9:00 am - 2:00 pm