UNITY INTERNATIONAL GROUP

An ENGIE company

Citibank Headquarters

New York, New York

THE OPPORTUNITY

Unity was awarded a project to do all electrical work on a complex, multi-year renovation project at Citibank headquarters in Manhattan. The building houses a public town square, and a range of other important operations.

THE PROJECT

Unity was contracted to do all electrical work including all new normal power, all emergency power, and all backup systems for the entire building. Unity was also contracted to do all in-house electrical moves, and changes.

The challenge was to replace all existing power systems while the building remained fully occupied and operational. Any service interruption needed to be planned months in advance, and be approved by a wide range of internal stakeholders. Small scheduling changes could lead to work cancellations with less than a day's notice, requiring complex re-scheduling. Despite the logistical and technical complexity of the project, Unity delivered all work on-time, within budget, and to high levels of customer satisfaction.

CHALLENGES

Unity encountered an unexpected challenge on this project. Early in the project it was determined that the switchboard replacement wasn't going to fit as designed by another firm, so the General Contractor asked Unity to propose a new solution. Unity accepted the challenge and created a new switchboard solution, and implemented it. Unity was given broad responsibility to create a protocol for shutting down the building sequentially, and for arranging all of the equipment to fit within existing space. The switchboard project was a huge success. Mike Ruggiero, Unity's Project Manager, noted recently: "It's all working beautifully."

Project Overview

- Project started in 2015, and is ongoing
- Unity responsible for all electrical construction and maintenance
- High logistical complexity as the building remained occupied throughout the project

Key Benefits

- Massive modernization of the company's most prized facility
- Densification, more people in the building
- Significant energy savings
- State-of-the-art facilities

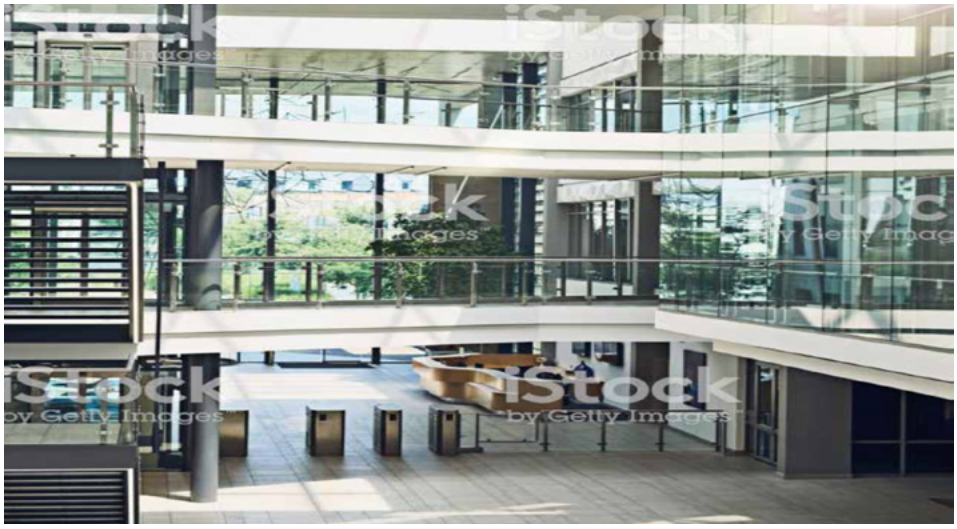
Technical Scope

- Normal and emergency power systems
- Emergency risers
- Chiller plant electrical upgrades
- Emergency and automatic transfer systems
- 20 floors of electrical fit outs, ongoing

(Continued on the back)

THE IMPACT

Unity's work with Citibank is ongoing, and the customer remains fully satisfied with project outcomes. Unity and Citibank enjoy a trusted relationship built on a foundation of well-executed projects in a showcase building with consequential global operations.



Trystate Mechanical, Inc.

An ENGIE company

The Hebrew Home by RiverSpring Health

Cogeneration Modernization Project - Bronx, NY

THE OPPORTUNITY

The Hebrew Home is a 705-bed nursing home campus located in the Bronx, providing 24-hour nursing staff and on-site physicians. The campus has more than 700,000 zoned square feet of useable space plus additional cellar level space bringing the total to approximately 1 million square feet. During Hurricane Sandy, the facility served as a designated emergency shelter for the City of New York. The Hebrew Home wanted to both accommodate their current residents and ensure that the facility could continue to serve as a safe-haven for their community in the case of future emergency events.

Motivated by their experience during the 2012 hurricane and by the fact that they saw potential inadequacies and points of failure in their existing infrastructure, the Hebrew Home hired an integrated project delivery (IPD) team to implement new cogeneration infrastructure. Trystate Mechanical (part of ENGIE MEP Services), was brought on as the construction manager and design-assist partner, concurrently with an engineering firm and equipment supplier, and provided pre-construction design assistance and estimating and value engineering.

THE PROJECT

Working as a unified team, the IPD team designed and developed the project to reduce campus energy consumption and increase power reliability through a turnkey installation. Trystate managed the interconnection of two 800 kW natural gas cogeneration units, with heat recovery and steam generators, a modular 250-ton steam absorption chiller and cooling tower, and campus electrical distribution upgrades. Additionally, Trystate managed the design, fabrication, and installation of a modular mechanical-electric room (MER).

During the pre-construction phase, TMI developed several proposals to save time and money. For instance, Trystate managed the design, assembly and installation

Project Highlights

- Achieves annual utility savings of ~$1.2MM, in addition to a substantial New York State Energy Research and Development Authority (NYSERDA) rebate of $2.4MM
- New cogeneration units provide both electricity and steam to the campus, fueled from natural gas
- Ensures campus resiliency; in the case of an emergency event, the Hebrew Home will now be able to accommodate both its current residents and members of their local community
- Uncovered additional dollars that Hebrew Home could reallocate to other critical facility needs

Project Role

- Construction Manager
- Integrated Project Delivery

Services

- Value Engineering

(Continued on the back)

- HVAC Piping
- Sheet Metal
- Controls
- Testing and Balancing
- Rigging
- Electrical
- Plumbing
- General Construction

Challenges

- Campus Coordination
- Interconnection of Existing Heating & Electrical Services

Completion Date

2018

of a modular MER housing the new 250-ton steam absorption chiller and associated equipment. The modular MER will be rigged in one piece to the roof of an existing building for interconnection to a new cooling tower, existing electrical systems and the campus steam loop.

In addition to serving in an IPD role, Trystate's sister company H.T. Lyons supported the project in a design-build role for the modular chiller plant construction. Demonstrating end-to-end solutions, the plant was designed, modularized, and tested in our 95,000 square foot fabrication shop in Allentown, Pennsylvania. The modular construction of the plant ensured product quality, more rapid construction and delivery, and limited facility disruption, in addition to reducing costs and materials. The chiller was delivered to the project site and rigged to the rooftop of the Jacob Reingold Pavilion.

On top of all of the traditional MEP work on this project, the Trystate team managed responsibility for 100% of the building infrastructure and lifecycle systems in the project scope. Underground electrical distribution work, concrete, steel, and rigging was completed under Trystate's supervision and management. One part of campus was serviced by a grid that experienced ongoing reliability issues. Trystate coordinated with the utility to integrate all parts of the campus to be connected to the same grid, providing better day-to-day electrical service and allowing Trystate to complete the full electrical integration with the new cogeneration system.

To reduce costs and keep the project under tight budget control, Trystate installed the smallest possible cogeneration system to serve the needs of the Hebrew Home campus effectively, while eliminating electrical demand. Old chillers were replaced with ones that could be powered from the new system, removing approximately 400 kW of electric load and downsizing the cogeneration system to be affordable for the owner. Hebrew Home and Trystate stuctured the project scope to be fundable, through a combination of energy savings, New York Green Bank, and the Bank of America's energy group funding. Through pricing exercises, efficient purchasing, and design, Trystate was able to uncover additional dollars that Hebrew Home could reallocate to other critical facility needs.

THE IMPACT

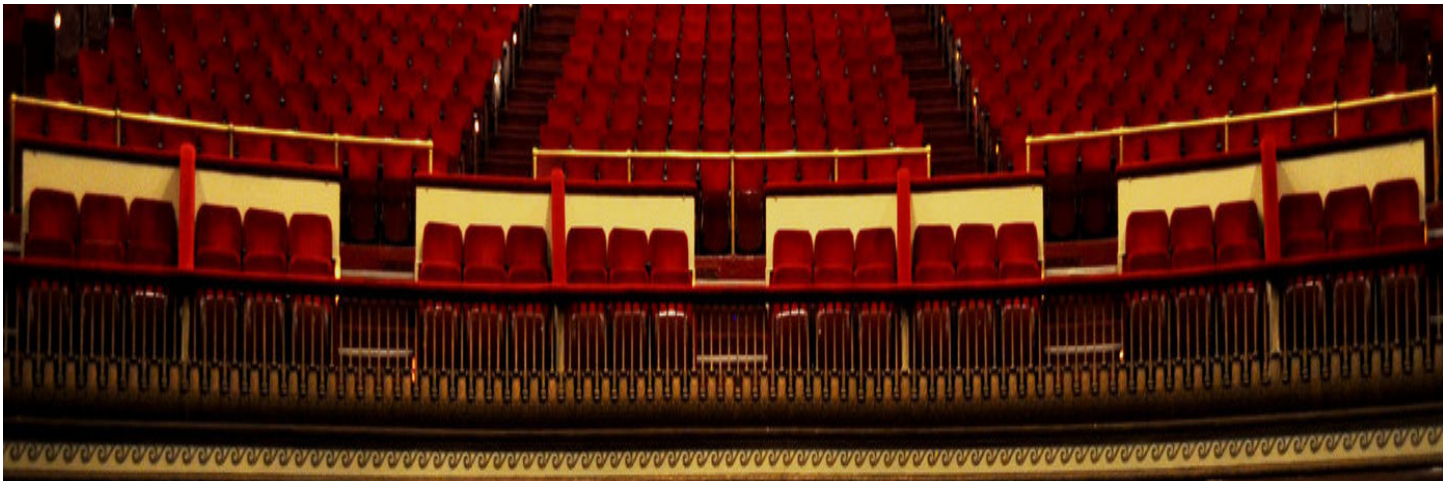
This project has been promoted as a state-wide model for how other nursing facilities in New York State can overcome reliability issues and build true resiliency in operations. Trystate worked with the Hebrew Home to customize the scope of the project to make it financially feasible and sustainable, while utilizing ENGIE MEP Services' efficiencies such as access to a prefabrication shop for the modular construction of a 250-ton steam absorption chiller plant.

Insert caption

donnelly MECHANICAL

An ENGIE company

The Town Hall Foundation



THE OPPORTUNITY

The Town Hall, a national historic landmark seating over 1,500 people, had two outdated cooling towers on the roof as well as five 18-year old R22 chillers in the basement of the building that had served beyond their useful life and needed to be replaced.

THE PROJECT

Donnelly Mechanical's design-build approach determined that replacing the existing water-cooled system with an air-cooled chiller system was the best solution - allowing for less equipment, more efficiency and better serviceability. Donnelly disconnected, removed and disposed of five old chillers in the basement and two existing cooling towers from the roof. New steel dunnage was provided to handle the new equipment. The new 110-ton air-cooled chiller was placed on the roof by use of crane. New ultra-quiet sound insulation was installed with the new chiller to minimize noise levels for the venue. All feeds were connected, and the new equipment was tested.

THE OUTCOME

Donnelly Mechanical leveraged its design build expertise to provide a new design and an enhanced air-cooled solution that:

a. Eliminated all chemical treatment and testing, and associated costs, required for cooling towers;
b. Saved valuable space in the basement needed by The Town Hall
c. Generated considerable savings on electricity, with ROI achieved in less than three years.

Project Role

- Special Projects

Technical Scope

- Remove (5) old chillers and (2) cooling towers
- Install new steel dunnage
- Run new chilled water lines and power up the side of the building
- Install new 110-ton air cooled chiller
- Provide all required drawings and permits for the job, including landmark status

Challenges

- Landmark Status - Special steps needed to be taken to meet codes and regulatory requirements

(Continued on the back)

Donnelly was involved in every phase of the project: from design right through starting and testing the newly installed system, including supplying the drawings, spec'ing the equipment, and executing all aspects of the turn-key installation. This afforded The Town Hall management a single point of contact throughout the entire process for a smooth and successful project.

Donnelly installed a new air-cooled chiller system, allowing for less equipment, more efficiency, and better serviceability.

An ENGIE company

Lindt & Sprüngli (USA)

High Efficiency Premium Chilled Water Plant
Systecon VariPrime® Chilled Water System

"Working with Systecon made the process easy. They were very responsive and professional, making sure our needs were addressed and our project went smoothly."

- John C. Hobden, P.E., Project Engineer, Lindt

THE OPPORTUNITY

Lindt & Sprüngli, a leader in the market for premium quality chocolate, needed to replace an existing air-cooled plant at one of their high-production facilities. The plant was at the end of its useful life and lacked the capacity to adequately support the facility's 24 hour a day, 365 days a year process chilling needs. They wanted a new, high efficiency system that could serve the existing manufacturing load and accommodate future growth while providing energy savings - maximizing utility incentives and project payback.

Quick installation was also vital to the project. Lindt did not want to curtail production while the system was replaced, so they needed a system that could be installed quickly and provide a smooth transition from the old plant.

THE PROCESS AND SOLUTION

Lindt enlisted independent consulting engineering firm B2Q Associates, Inc. to determine the system needs and criteria. They analyzed efficiencies (being of primary importance), constructability, cost and scheduling to determine that a Systecon Inc. modular system featuring Trane chillers, while not the lowest in initial cost, would provide the overall optimal solution for the project.

The chillers were selected first. After comparing options presented by three chiller manufacturers, Trane water-cooled centrifugal chillers were determined to be the best choice to deliver the desired efficiency. Then began analysis of how and where the system would be built. It included comparing traditional field built to factory-built options and reviewing multiple manufacturers. After assessing the data and visiting the factory, Systecon Inc. was selected to manufacture a new modular plant.

Project Highlights

- New chilled cooling plant is expected to provide $500,000 in energy savings annually
- Lindt's new system can accommodate future growth with redundancy and expansion
- Quick installation did not curtail production in the facility and provided a smooth transition from the old plant

Key System Components

- (3) 825 ton Trane water-cooled centrifugal chillers | M/N: CVHF1070
- (2) Marley open, crossflow, induced draft cooling towers | M/N: NC8414WAS2
- (3) 100 HP Patterson pumps | M/N: S10A13A-4
- (3) 50 HP Patterson pumps | M/N: E6N13A-2
- Systecon Inc. VariPrime® variable pumping system
- Systecon Inc. controls with ABB PWM variable frequency drives
- Manufactured to Systecon Inc. construction standards

(Continued on the back)

"After comprehensive analysis of all available options, Systecon was the superior option from a design feasibility, economic, reliability, and serviceability standpoint."

- Joseph Boisvert, Project Designer, B2Q Associates, Inc.

Having the chillers selected prior to selecting the system manufacturer was not a problem since Systecon is accustomed to working with customers to design a system specific to their project needs. In fact, communication and teamwork were notable factors to the success of this project with weekly conference calls between the owner, engineer, Systecon, Trane, and the mechanical contractor Granite State Plumbing and Heating, LLC.
The high efficiency level of this plant was achieved through comprehensive analysis and design. B2Q modeled the chiller plant data for every hour of the year which was analyzed at specific temperature ranges to calculate overall KW hours for the plant. This data was used to estimate operating costs and determine the most efficient chiller solution.

Systecon's VariPrime® variable pumping system provided the most efficient pumping solution for the plant. Using a single set of pumps to vary the flow of system water, VariPrime® maximizes chiller capacity - tying staging to load, not flow, and optimizes chiller sequencing with independent pump sequencing. It requires less energy than primary/secondary systems, less total connected motor horsepower and less space. Wire-to-Water Efficiency was also used to determine optimum pump selection, helping to further maximize the efficiency of the pumping system. The entire system was manufactured to Systecon's industry leading construction standards and utilizes Systecon's integrated controls with ABB variable frequency drives to achieve the best speed, reliability and redundancy.

Factory building the modular system at Systecon allowed the existing plant to continue operating throughout the construction and installation process. It also allowed the system to undergo factory testing to ensure the expected performance before delivery, facilitating a smooth and quick installation and start-up process. Having an experienced, professional mechanical contractor like Granite State - committed to working as part of an integrated project team - also played a significant role in achieving the required quick installation.

CHALLENGES

Determining the plant location was the biggest challenge to the project. While the Lindt facility has a large campus, there was limited space available to situate the new chilled water system. The existing plant location wasn't an option since production at the facility would have to be shut down for the length of time needed to demo the old plant and install the new. Other seemingly prime locations would have blocked access to existing underground utilities or obstructed a fire lane. There were also local building codes to comply with and ordinances that prevented building the new plant too close to the property line and restricted the height of the plant.

Fortunately, Systecon's in-house team of engineers is experienced in designing systems in the most economic, energy and space-efficient way. They were able to work with the project designer and engineer to determine the optimal plant arrangement for the space that was available.

THE IMPACT

The transition from the old air-cooled plant to the new chilled water plant was as seamless as possible - everything remained online so there was no production lost due to the changeover. Lindt now has a premium, high efficiency plant that provides the reliability they need and cost savings they want.

The system is running effectively, meeting cooling loads and estimated to provide $500,000 in energy savings per year. They also have a system that can accommodate future growth with redundancy and expansion built in. Designed to operate all three chillers but only use two and using a VariPrime® pumping system which can easily handle future expansion, the system is prepared to support additional capacity when needed.

H.T. LYONS

An ENGIE company

FreshDirect Headquarters & Food Processing Facility

New Cogeneration Plant

THE OPPORTUNITY

FreshDirect is an online grocer that delivers to residences and offices in the New York City metro area and several other metro areas throughout the Northeast. Opening in 2018, FreshDirect built a $100 million 500,000-square-foot distribution hub and corporate headquarters at Harlem River Yards in the Bronx. The new facility is expected to expand FreshDirect's operations capacity and create 1,000 additional jobs. For the new facility, FreshDirect partnered with H.T. Lyons, an ENGIE company, to install a one megawatt cogeneration system to provide reliable power to its new facility.

THE PROJECT

In one turnkey, comprehensive program, H.T. Lyons designed and constructed a new cogeneration plant, which included a C1000S microturbine with integrated heat recovery modules, power distribution integration with plant's 480V substation system, fuel gas distribution, hot water distribution and integration with the facility's boiler plant and all related hydronic system controls. To aid with project financing, H.T. Lyons helped secure a $1.4 million New York State Energy Research and Development Authority (NYSERDA) grant for the cogeneration application.

THE IMPACT

The new cogeneration plant powers FreshDirect's new operations facility and provides greater power reliability with backup capability. In total, the plant produces 8.1 milllion kWh annually and 235,000 therms of gas. In normal grid connect operating mode, the system supplements the power and process hot water demands of a 24/7 food processing and packaging operation. In island mode, the system enables the facility to maintain operation of refreigeration systems that are critical to the processing and storage of Fresh Direct's in-process and finished products, ultimately preventing financial losses during power outages.

Project Highlights

- Designed and constructed the 1 MW new cogeneration plant, with infrastructure capable of supporting a 2 MW system
- The new cogeneration system supplements the power and hot water demands of FreshDirect's round-the-clock food processing and packaging operation
- Secured a $1.4MM New York State Energy Research and Development Authority (NYSERDA) grant for the cogeneration application

Technical Scope

H.T. Lyons designed and built all mechanical, HVAC, power distribution, and controls for a 1 MW cogeneration system in FreshDirect's new 500,000 square foot facility on 16 acres on the Harlem River Yard, including:

- Capstone C1000 series microturbine
- Integrated heat recovery modules
- Power distribution integration
- Boiler plant integration
- Gas distribution

(Continued on the back)

- Hot water distribution
- Plumbing

Controls
- Electrical
- Steamfitting
- Rigging

Challenges
- Permitting issues

In addition to the one megawatt system installed under this phase of the project, H.T. Lyons designed and installed the infrastructure that will be required when the cogeneration plant expands to two megawatts using a second C1000S microturbine, further increasing FreshDirect's sustainability profile and paving the way for FreshDirect's future growth.