

# Retrofit One Proposed Change Order



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<b>PCO No.:</b> 01	<b>Date:</b> September 20, 2014
<b>ESCO:</b> NORESKO, LLC ("NORESKO")	<b>PBC Project #:</b> 04292-N
<b>Contracts:</b> Guaranteed Energy Performance Contract dated April 11, 2014 (the "GEPC") between Chicago Infrastructure Trust ("CIT") and NORESKO, LLC ("NORESKO"); and Energy Services Agreement dated April 11, 2014 (the "ESA") between CIT and the City of Chicago (the "City")	
<b>ECM Project Name:</b> City Hall New Chiller Installation	<b>Facility ID Number:</b> F596
<b>Facility Address:</b> 121 N. LaSalle Street	<b>Project Manager:</b> George Marquisos

**TECHNICAL DESCRIPTION OF CHANGE:**

NORESKO was contracted under the GEPC, as subcontractor to CIT under the ESA, to install new cooling equipment in the basement of City Hall that replaces the existing Thermal Chicago chilled water utility connection. In lieu of the six (6) MultiStack 85 ton modular chiller units described in Section III of Exhibit A – "Detailed Description of ECMs -- ECM: New Chiller Installation" of the GEPC and the ESA, NORESKO will design, provide, install, and guarantee the performance of a new chilled water system that utilizes two (2) Carrier 23XRV, 250Ton screw chillers as more particularly described in Exhibit A hereto. The cost of this change shall be the sole responsibility of the City. This change shall have no adverse effect on (i) the timing or the amounts of the City's payments under the ESA or (ii) the Savings Guarantee Commencement Date or the Guaranteed Annual Savings Amount (as such terms are defined in the GEPC).

**JUSTIFICATION FOR CHANGE:**

This equipment change was requested by the City acting by and through the Chicago Department of Fleet and Facility Management ("2FM") for lifetime durability and maintenance considerations. Past 2FM experience with modular type chillers in older buildings with existing chilled water piping has resulted in continual servicing of sediment filters and clogging of heat exchangers resulting in equipment down time and excessive 2FM maintenance. Given the critical nature of the spaces being cooled by the new system the 2FM feels the screw type chiller is a more reliable product for this application. Note: the two Carrier screw chillers are more efficient than the six modular chillers and are estimated will save an additional \$11,000 annually; this additional savings is not being guaranteed to minimize the altering of financial documents. The additional time is the result of a seasonal condition; system requires a cooling season in order to be fully commissioned and tested.

**Funding :**

Contract Contingency:  Direct Funding From Client:  Financing Required:  Other:

**Contract Sum and Guaranteed Savings Impact:**

Original Contract Sum: \$ 2,614,046.00	Original Contract Guaranteed Annual Savings: \$ 273,818.00
Estimated Amount of this Change: \$ 349,000.00	Guaranteed Annual Savings From This Change: \$ 0.00

**Reason for Change:**

Differing Site Conditions:  Client Directed:  Error or Omission:  Other:

**Estimated Impact to Substantial Completion Date:**

Increased By: 57 Days  Decreased by: Days  No Change

Recommend – PBC Project Manager (CIT Agent)

Approved – CIT Chief Executive Officer

Approved – City of Chicago, acting by and through Chicago Dept. of Fleet & Facility Mgmt.(2FM)



## Exhibit A

### ECM: New Chiller Installation

NORESCO will install new cooling equipment that will replace the existing Thermal Chicago utility connection. The existing heat exchanger for the connection to Thermal Chicago, which the Client owns, will remain in place. NORESKO will install two new Carrier 250 Ton Screw Chillers. The peak load on the plant is approximately 400 tons, which allows for additional capacity. In addition to the new chillers, NORESKO will also install new CHW pumps, CW pumps, refurbish the east cooling tower (quantity of one), and re-purpose the existing heat exchangers for water-side economizing purposes.

As part of the replacement, both CHW and CW pumps will be located in the open area on the west side of the mechanical room to increase access and simplify the mechanical space. The new CHW pumps will be installed with VFDs so that the plant operates as a variable-primary pumping system. The existing cooling tower will be refurbished by replacing fill, re-lining the basin, and servicing the mechanical components.

### City Hall — Basement Chillers, Detailed Scope of Work

The scope of work includes demolishing the existing non-functional chiller and installing a new chiller in its place. The new installation will result in a functional CHW plant, which will allow the building to disconnect from the existing Thermal Chicago CHW service. The scope includes:

Remove the existing Carrier chiller.

Provide and install two (2) Carrier 23XRV, 250 Ton screw chillers. Install one (1) in same location as existing chiller. The second 250 Ton machine will shall be installed in the location of the existing Chilled Water Heat Exchanges due to accessible height. The heat exchangers shall to be relocated and re-piped to an area on the side of the new second chiller location. Pumps, chilled water and condenser water piping shall be reconfigured. Pumps as per original contract, sizing will not change. In order to get the two new 250 Ton chillers in the City Hall mechanical room, same general contracting work is required which involves offloading the chillers from Daley Center dock through the common City/County hallway to the City Hall mechanical room apply. The work consists of but is not limited to removing and replacing rails/bollards, metal protective wall plates and a corner of one wall which will need to be removed to accommodate sliding the chillers down the hallway to the mechanical room. Rigging, pipe welding and general contracting work shall take place after hours (after 4pm). Due to the Chillers size and the accessibility of getting them into the building the machines will have to come in two pieces, tube bundle and compressor. These will have to be field re-connected and recertified by Carrier on site.

-Furnish and install two (2) new 30 hp CHW pumps. The new CHW pumps will utilize VFDs and will result in a variable-primary pumping system.

-Install .new two (2) new 40 hp CW pumps.

-Repurpose the existing City-owned large plate-and-frame heat exchangers for a water-side economizing system. The system will allow the plant to create CHW in cooler months without having to run the chillers.

-Install new DDC control points to control the new installation.

Note: refrigerant monitoring system is not included — as directed by 2FM the new chillers' refrigerant capacity is below the threshold required for monitoring and exhaust of refrigerant. The cost to reuse or extend the services of Thermal Chicago shall be the responsibility of the City.

Refurbish the existing East cooling tower, capable of approximately 500 tons of cooling, and install freeze protection in the basin and on the CW piping to allow for winter operation as follows:

1. Install air inlet filter on adjacent operating towers to eliminate debris entering system- if required.
2. Remove and dispose of existing fill, eliminators, louvers and water distribution orifices.
3. Cover and seal motors and gear boxes.
4. Plug water inlet and outlet connections.
5. Sandblast tower interior including hot water basin & cold water basin. Patch basins as required.

## Exhibit A – Continued

6. Combine Fireproof EvapLiner polyurethane with a thickening agent to obtain a trowel grade consistency. Apply this trowel grade liner over interior basin seams to ensure seams are encapsulated in polyurethane.
7. Apply primer and Fireproof EvapLiner, elastomeric polyurethane membrane liner to the cold water and hot water basins. This liner is applied via high pressure spray system which results in 50-70 mils thickness on all applied surfaces.
8. Provide and install pultruded fiberglass bottom fill support system. (System elevates the fill approximately 8" above the basin floor allowing easy basin cleaning)
9. Provide and install intermediate fiberglass fill support system, as required.
10. Provide and install high efficiency PVC fill, eliminators and louvers.

NOTE: The heat transfer fill shall be constructed of polyvinyl chloride (PVC). Fill shall be resistant to rot, decay and biological attack; formed, crossfluted bonded together for strength and durability in block format for easy removal and replacement; self extinguishing with flame spread rating of 5 per ASTM E84-81a; able to withstand continuous operating temperature of 120°F fabricated to ensure water breaks up into droplets; specially treated to resist ultraviolet light.

11. Fill kit shall include all intermediate and upper fill supports, and all eliminator supports. All supports shall be constructed of pultruded fiberglass. Flexible membrane air seals shall be installed on the air inlet to prevent water from leaking out the top of the fill bundles, and to prevent air from by-passing the heat transfer section of the fill pack.
12. All fill bundles shall be capable of being removed and re-used in order to provide access to all internal sheet metal surfaces and sheet metal seams, to allow for maintenance or repairs. 'D Fill kit shall include drift eliminators with a maximum drift loss of .002% of the recirculating water.
13. Provide and install new set of water distribution orifices sized for proper flow range. Balance water flow. D Gravity flow nozzles shall be crown nozzles to prevent debris build up in the entering orifice of the crossflow nozzle, and to eliminate the vortex spiral of water entering the nozzle thereby providing a consistent uniform diffusion pattern at any height of head. Nozzles shall be a two piece construction; a bottom telescoping nozzle body with lock in tabs and a top vortex crown. Nozzle tabs shall lock in the nozzle to the opening in the hot water basin floor when the top vortex crown is inserted in the bottom telescoping nozzle body.
14. Supply and install input gear seal.
15. Change gear box oil.
16. Supply and install access door wing nuts.
17. Adjust fan pitch to maximize air flow and align fan shaft.
18. Furnish and install two (2) new 10kW/460V/3ph electric resistance basin heaters to protect the basin water from freezing at temps at or above zero degrees Fahrenheit.
19. Furnish and install one (1) 120V/1ph thermostat and low water cutout in cooling tower basin for control of heater system.
20. Furnish and install one (1) 480V/3ph NEMA3R basin heater control panel. This panel is complete with main circuit breaker disconnect, selector switches, operating lights, and control power transformer for control circuit wiring.

### Equipment Manufacturers

The proposal is based on the price and performance of the following new equipment:

1. Basement Installation
  - a. Chiller: Carrier 23XRV, 250 Ton Screw Chillers
  - b. CHW Pumps: Bell & Gossett 1510-SE
  - c. CW Pumps: Bell & Gossett 6x8x12XL
  - d. VFDs: ABB Drives with Electronic Bypasses