Purchasing and Central Services

Monroe County, New York

Maggie Brooks
County Executive

Dawn C. Staub
Purchasing Manager

ADDENDUM NO: 2

RFP PROJECT: Energy Consumption Reduction Plan for the Monroe County Civic Center Complex through the Department of Environmental Services (DES)

DATE: November 14, 2012

PROPOSERS PLEASE NOTE:

The final RFP submission deadline has been extended. Final RFP submissions must now be received by 3:00 PM EST on December 14, 2012, at the address shown in Section 1.2 of the RFP. The right to withdraw will expire on this date and time.

Attached please find the following:

1. Clarifying Questions and Answers

SIGN this Addendum below acknowledging receipt and understanding and INSERT in PROPOSAL packet.

PURCHASING & CENTRAL SERVICES

Dawn C. Staub

The undersigned Respondent acknowledges receipt and understanding of Addendum No. 2 to the RFP for the Energy Consumption Reduction Plan for the Monroe County Civic Center Complex.

Date _____ Name of Company _____

Authorized Signature _____ Title _____

ENERGY CONSUMPTION REDUCTION PLAN
FOR THE MONROE COUNTY CIVIC CENTER COMPLEX

CLARIFYING QUESTIONS AND ANSWERS

Q1. What is the size of the emergency generator?

A1. Emergency generator sizes are as follows:

Jail Expansion - 3000kw
Jail Main Frame – 350kw
Public Safety Building - 210kw
Hall of Justice - 210kw

Q2. The utility information for the Civic Center appears to be incorrect for two of the months, September and November 2011 have an account number 020014324030 and not meter 020014564643.

A2. Please see Attachment #1for revised information.

Q3. We have not received the current water bills.

A3. Water data will be released in the near future as Addendum #3.

Q4. We would like to receive a lighting fixture inventory if possible.

A4. This information is not available. A survey can be done by the selected Respondent, should they so choose.

Q5. What percentage of the old jail is air conditioned?

A5. Approximately 20% of the Jail Main Frame is air conditioned.

Q6. How many prisoners are there on average for a typical year?

A6. The County cannot supply data regarding prisoners. The selected Respondent will be given the load information.

Q7. Condensate return piping details for each building showing the pumping stations and central return(s)

A7. This information is not available.

Q8. List of Steam Traps within the system, plus any steam trap surveys that they have conducted

A8. This information is not available. A survey can be done by the selected Respondent, should they so choose.

Q9. List of PRV's from RDH, service area and pressure reduction setpoint for each PRV

A9. The two (2) main Pressure Reducing Valves (PRV's) are 2/3 and 1/3, reducing the steam from approximately 170psi to 100psi. All but one building have a steam station that reduces the pressure from approximately 100 psi to 10psi. The exceptions are the Jail Expansion stations, one of which reduces steam from approximately 100psi to 20psi and feeds the kitchen; and the other, a 20psi to 10psi station which feeds the remainder of the building.

Q10. Available steam flow submeter data

A10. This information is not available, as the County has not started collecting data at this time. Meters are being commissioned in December of 2012.

Q11. There is a new chilled water plant design that has been completed. We would like at a minimum to receive piping drawings of the existing chilled water plant.

A11. Please see Attachment #2.

Q12. Please provide a complete computer inventory per floor containing:

a. The number of PCs (window based)/ floor
b. The number of MACs/floor
c. The number of flat screen monitors/floor
d. The number of CRT monitors/floor
e. The number of laptops/floor
f. Number of smart boards/floor

A12. This information is not available. A survey can be done by the selected Respondent, should they so choose.

Q13. Please provide the current occupied schedule and night setback temperatures for each building and Floor, a. Example: Occupied M-F 6 am to 6 pm / Sat-Sun Unoccupied, 60 degrees F

A13. Jail Main Frame - Occupied 24/7
Jail Expansion - Occupied 24/7
Public Safety Building - Occupied 24/7
Hall of Justice - Optimum Start time, shut down at 5:00pm to 55 degrees F; Sat-Sun Unoccupied, 55 degrees F
Watts Building - Optimum Start time, shut down at 5:00pm to 55 degrees F; Sat-Sun Unoccupied, 55 degrees F
Test Lab - Optimum Start time, shut down at 5:00pm to 55 degrees F; Sat-Sun Unoccupied, 55 degrees F

Q14. Please provide custodian staff hours for each building and floors

A14. Schedules vary during occupied time only. If staff is on site during unoccupied times, the building systems remain in unoccupied mode.

Q15. Please provide a schedule for any weekend activities taking place within each of the floors.

A15. Generally, there are no scheduled activities in buildings that have a setback schedule.

Q16. Please provide occupied and un-occupied building summer and winter temperature set points. a. Example: Summer 74 F Occ, 78 F Unocc / Winter 71F Occ, 62 F Unocc

A16. Summer: 74 F when occupied; 85 F when unoccupied.
Winter: 70F when occupied; 55 F when unoccupied.

Q17. Please provide a count of all cold, snack type vending machines and ice makers on each floor.

A17. This information is not available. A survey can be done by the selected Respondent, should they so choose.

Q18. As part of the award process, the County will be issuing a Letter of Intent to the prospective winner. Can the county give us a sample copy of the LOI and its content?

A18. Please see Attachment #3.

Q19. It is our understanding that the County will provide a final contract award in late summer of 2013. Will this be adequate time for the ordering, delivery, and installation of time sensitive equipment?

A19. Yes.

Q20. It is our understanding that the County engaged a third party to complete a study on the "chiller" plant. Due to the short turn-around time of the RFP response, it would be a great help if this study was released to the respondents. Is it possible to receive a copy of this study?

A20. Please see Attachment #4.

Q21. Who is on the decision committee and how will they ultimately make their selections? The reason I ask the question again is there was no point system assigned in the RFP other than general categories. Furthermore, I don't believe anyone can actually survey that many square feet and propose a reasonable project in a 3 hour walk through. We will be spending the majority of our time at the civic center tomorrow but clearly there are many more facilities that are included.

A21. The committee will be comprised of representatives from both the Monroe County Division of Purchasing and Central Services and the Department of Environmental Services. Selection will be made in accordance with the criteria listed in Section 3.6, Method of Evaluation, of the RFP. The weights for each criteria will be determined at the time of rating. The Civic Center Complex is the only facility associated with this RFP.

Q22. In the Pre bid conference there were a lot of questions. One was regarding presentations by the short list of companies after the rfp was submitted! Did I hear the answer correctly in that they were Not going select a short list or do any interviews of candidates?

A22. The County's intent is to short-list Respondents based on their proposals. However, the Selection Committee will determine whether a short list and/or interviews are necessary.

Q23. Is it mandated or necessary to select an engineering firm to work with in our project prior to submission of the rfp?

A23. No.

Q24. At the pre bid meeting I asked a question about guarantees on the energy project. I wanted to confirm the answer to my question was that Monroe County does want a certified guarantee on energy and operational savings and that a stipulates guarantee would NOT be acceptable.

A24. Yes, that is accurate. However, the County does understand that in order to apply some Energy Conservation Measurements (ECM's), we may need to accept stipulated savings.

ENERGY CONSUMPTION REDUCTION PLAN
FOR THE MONROE COUNTY CIVIC CENTER COMPLEX

ATTACHMENT #1 – REVISED ELECTRIC DATA

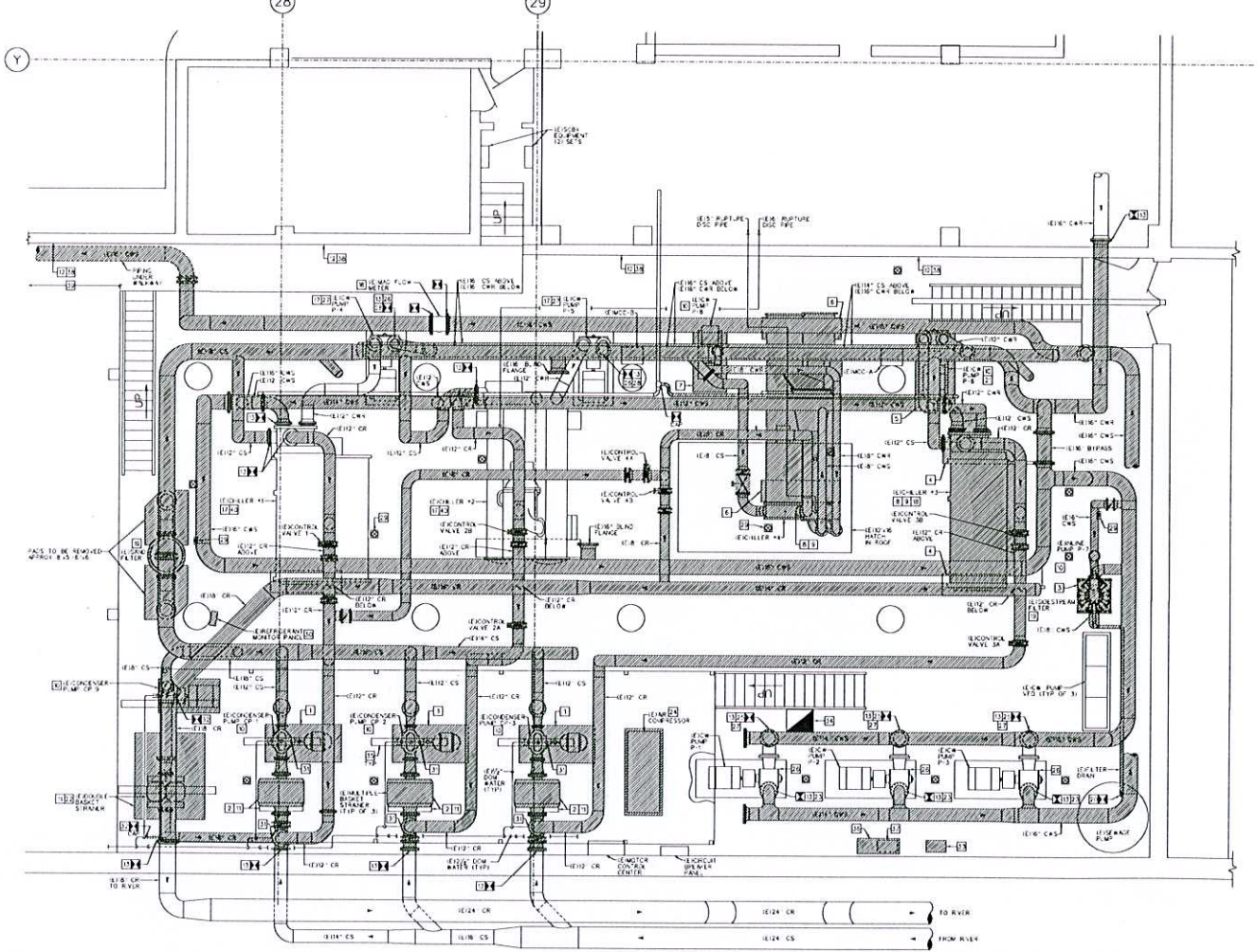
Please see attached.

Master Acct	POD ID	Insert	Start	End	kWh	Rate	Rtl	T&D	kW	On	Off	Cmdty	Mgmt	Facilty	Account No.
020014564643	R01000054198	11/2/2011	10/4/2011	10/31/2011	1,121,913	$0.0404	$95,233.49	$37,725.76	3,637	651,423	470,490	$45,328.12	$1,107.27	Center - 99 Exchange Blvd	R0100005419 8882
020014564643	R01000054198	9/7/2011	8/2/2011	8/31/2011	1,729,540	$0.0457	$133,865.87	$57,167.70	4,048	994,290	735,250	$78,984.92	$1,679.20	Center - 99 Exchange Blvd	R0100005419 8882

ENERGY CONSUMPTION REDUCTION PLAN
FOR THE MONROE COUNTY CIVIC CENTER COMPLEX

ATTACHMENT #2 – CHILLER ROOM DESIGN

Please see attached.


28
29
Y
TO RIVER
FROM RIVER

ENERGY CONSUMPTION REDUCTION PLAN FOR THE MONROE COUNTY CIVIC CENTER COMPLEX

ATTACHMENT #3 – LETTER OF INTENT BOILERPLATE

Please see attached.

Department of **Environmental Services**
Monroe County, New York

Maggie Brooks
County Executive

Michael J. Garland, P.E.
Director

November 2, 2012

Monroe County, New York
39 West Main Street
Rochester, NY 14614

Monroe County, New York (County) intends to seek legislative authorization to enter into an agreement with _____ for the Performance Contracting Program outlined in the Request for Proposal response submitted by _____on _____, pending successful completion of the tasks outlined within this document. _____ is authorized to proceed with a comprehensive energy audit and preliminary project design to determine the project's final scope of work. This comprehensive energy audit shall comply with the following:

1. _____ shall perform a professional energy audit for the facilities in compliance with NYS Energy Code, NYSERDA Grant guidelines and applicable local codes.

2. _____ responds with an audit report within forty-five (45) days.

3. The audit shall show the following:

    a. Project description with individual measures described in detail.
    b. Project costs with individual items broken out for review and selection.
    c. Projected savings associated with each item identified in item b.
    d. Financial Analysis showing all assets and liabilities on an annual basis for the term of the program.
    e. The projected annual energy cost savings to the County to be stated in a detailed projection prepared by _____ which shall include all necessary guarantees to allow the County to fully evaluate the viability of the project. Both _____ and the County agree that the audit must demonstrate acceptable guaranteed financial benefit from the Program to the County before a contract may be executed.

4. Grants will be investigated and applied for after the final scope is determined.

Monroe County will assist the _____ engineering staff with the audit and preliminary design by providing historical energy records, financial statements, full access to building equipment, accurate occupancy levels, building operating schedules and any other reasonable information necessary to conduct a professional energy audit and preliminary design.

MONROE COUNTY

_____.

_____
Approved By

MICHAEL J. GARLAND, P.E.
Director of Environmental Services

_____
Date

_____
Approved By

_____
Name

_____
Title

_____
Date

CC: James A. Fumia, Esq.
Justin Roj
Jason Kennedy
Don Irvine

ENERGY CONSUMPTION REDUCTION PLAN
FOR THE MONROE COUNTY CIVIC CENTER COMPLEX

ATTACHMENT #4 – CHILLER PLANT STUDY

Please see attached.

Rochester Civic Center Chiller Plant Analysis

Chilled Water Pumping

The chiller plant serves six buildings through a primary-secondary-tertiary pumping system. The chillers are arranged in parallel and each chiller has a dedicated primary chilled water pump. The combined output of the chillers flows to the (3) secondary chilled water pumps, which are controlled by variable frequency drives. The secondary chilled water loop serves each of the buildings through a reverse-return configuration. Each building has a tertiary chilled water pump that circulates chilled water to its terminal units and 2-way control valves that present a variable flow characteristic to the secondary chilled water loop.

The primary and secondary chilled water pumps were replaced in 2002, except for CHWP8 which was installed in 1989.

Tag	Area Served	Fluid	GPM	Head (ft)	HP	VFD?	Motor Eff.
CHWP1	All Buildings	Secondary Chilled Water	5,000	125	200	Yes	95.8%
CHWP2	All Buildings	Secondary Chilled Water	5,000	125	200	Yes	95.8%
CHWP3	All Buildings	Secondary Chilled Water	5,000	125	200	Yes	95.8%
CHWP4	Chiller 1	Primary Chilled Water	2,634	45	50	no	94.1%
CHWP5	Chiller 2	Primary Chilled Water	2,634	45	50	no	94.1%
CHWP6	Chiller 3	Primary Chilled Water	2,634	45	50	no	94.1%
CHWP8	Chiller 4	Primary Chilled Water	1,200	50	25	no	93.6%

Condenser Water

The chiller plant utilizes water drawn from the Genesee River as condenser water. All (4) condenser water pumps discharge into a common header that leads to each chiller. The condenser water leaving each chiller is piped to a recirculation line that leads to the suction side of one condenser water pump, or to a common discharge pipe for return to the river. The recirculation line is intended to protect the chillers from cold river water. Since all condenser water pumps discharge into a common header, the condenser water setpoint is determined by the chiller with the highest condenser water temperature requirement. Condenser water is generally held to between 75° and 80°.

Historic temperature data for the Genesee River in Rochester was obtained for a 90 day period, from late May through early September 2010 and compared to hourly outdoor air temperatures. The river temperature was found to vary along with the mean daily

outdoor air temperature, with a certain degree of lag. There exists the potential for significant reductions in condenser water temperature for much of the cooling season. The new chiller plant should be designed to capitalize on this availability.

The plant was originally equipped with (3) 1100 ton steam turbine driven centrifugal chillers. Condenser water flow rates were 3600 GPM, or 3.3 GPM per ton. Presently, all four chillers are electric centrifugal types that typically require 3.0 GPM per ton for condenser water.

The condenser water pumps were installed in 1994, except for CWP9 which was installed in 1989.

Tag	Area Served	Fluid	GPM	Head (ft)	HP	VFD?	Motor Eff.
CWP 1	Chiller 3	Condenser Water	3,600	120	150	no	95.8%
CWP 2	Chiller 2	Condenser Water	3,025*	120	150	no	95.8%
CWP 3	Chiller 1	Condenser Water	3,600	120	150	no	95.8%
CWP 9	Chiller 4	Condenser Water	1,500	90	50	no	94.5%

** assumed flow by balance; pump nameplate flow is 3600 GPM*

Chillers

The chiller plant consists of the following units:

Tag	Make	Model	Tons	kW / Ton	year built	Refrig.
CH 1	Carrier	MN 19 EB8973DM	1100	0.626	1982	R500
CH 2	McQuay	WSC126-BAAAM	1100	0.517	2005	R134a
CH 3	Carrier	MN 19 EB8973DM	1100	0.626	1982	R500
CH 4	Trane	CVHE 056	500	0.641	1989	R123

Chillers 2 through 4 are started and stopped through the DDC system; chiller 1 is manually started and stopped as needed. Chiller #4 is utilized as the lead chiller early and late in the cooling season.

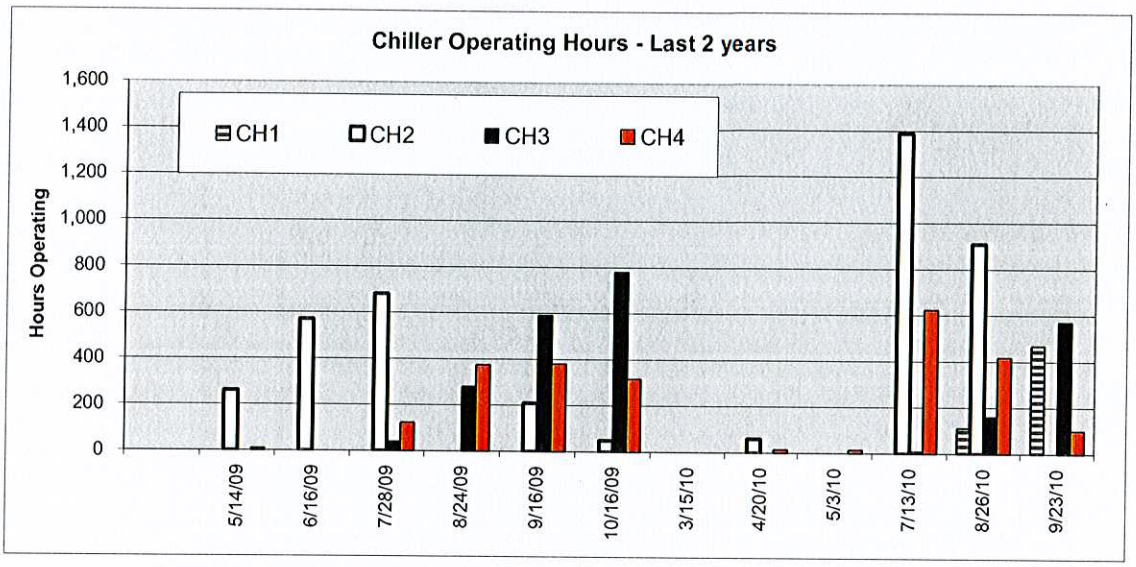
Chillers 1 and 3 use R-500 and at 28 years old, are at the end of their service life.

Chiller 2 is a 2005 McQuay centrifugal design that can operate efficiently at reduced condenser water temperatures. Although it does not have a VFD, it should be retained for use during peak load conditions.

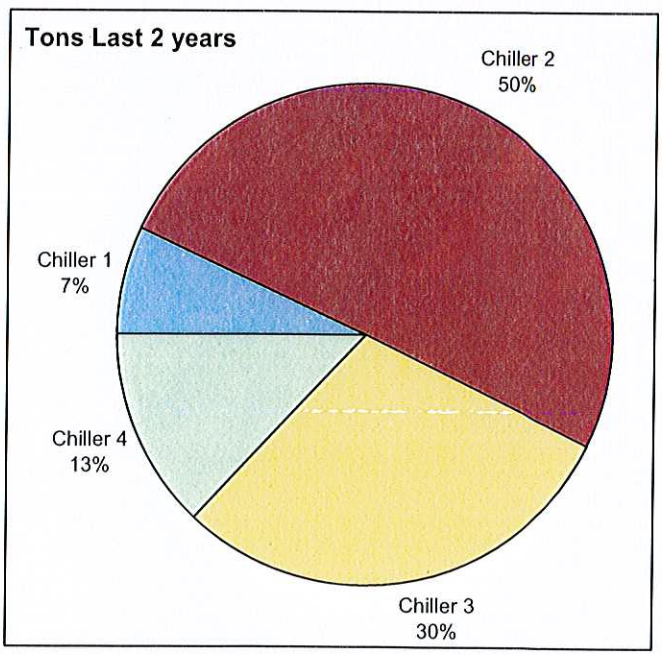
Chiller 4 is a 3-stage centrifugal design that was converted from R-11 to R-123 in 1996, reducing its capacity from 560 tons to approximately 500 tons. It is the least efficient chiller and would be less efficient at low loads than a new 1100 ton chiller with a VFD. There is little reason to keep this chiller, unless it is possible to operate the chiller simultaneously with chiller #1 to provide additional capacity when the arena is occupied.

Current Plant Operation

Currently the chiller plant utilizes Chiller #2 for 50% of the hours that chilled water is produced. Chiller #4 operates for 25% of the season while Chillers 1 and 3 operate for the remaining 25%



The pie chart shows the contribution of each chiller to the total cooling load, expressed in Tons of chilled water produced, over the last two years. The values must be considered approximate, as they are calculated based on operating hours and nameplate capacity, instead of actual chilled water production.



Alternative Chiller Plant Designs

Based on chiller plant data obtained from the DDC system for the months of August and September 2010, a chilled water load profile was established. Analysis of this data showed a clear difference between chiller loads between 5 am and 6 pm on weekdays and those at night and on weekends. Periods when the arena is in use showed very high loads of relatively short duration. The chiller plant load was established based on normalized bin data for weekdays and off-peak periods, using 2 degree bins based on outdoor air wet bulb temperature.

Alternatives included the following plant configurations:

1. Two electric 1100 ton chillers with VFD to replace chillers 1 and 3. These will function as the lead chillers, with Chiller 2 as lag and Chiller 4 (if retained) to be used in emergencies only.
2. One steam turbine driven 1100 ton chiller as lead with chiller #2 as lag chiller.
3. One double effect steam absorber 1100 ton chiller as lead with chiller #2 as lag chiller.

Analysis

Steam-driven Chillers

The high cost of steam precludes the steam-driven chillers from being cost-effective solutions for the RCC chiller plant. The cost of steam was calculated at the historic rate of $16.62 / MMBTU and the lowest possible rate of $8.13 (based on $0.65 per therm and 80% boiler efficiency) which would cover only the cost of fuel at the district plant. In each case, only one steam driven chiller was included in the model, an 1100 ton base load unit.

Scenario	Billed kW/year	kwh Used	MLbs Steam used for HVAC Loads	Electric Cost	Steam Cost	Total Operating Cost	Savings vs. Present
Existing Chiller Plant	8,737	2,205,211	0	$ 151,057	$ 0	$ 151,057	
Proposed Steam Chiller Plant (1) York 1100 Ton Steam Turbine chillers, #2 as lag $8.13/MMBtu steam	4,675	1,118,068	26,910	$ 76,588	$ 218,646	$ 295,233	($ 144,176)
Proposed Steam Chiller Plant (1) York 1100 Ton Steam Turbine chillers, #2 as lag $16.62/MMBtu steam	4,675	1,118,068	26,910	$ 76,588	$ 447,248	$ 523,836	($ 372,779)
Proposed Steam Chiller Plant (1) 1100 Ton Steam double effect absorber, #2 as lag $16.62/MMBtu steam	4,656	1,106,194	19,964	$ 75,774	$ 331,802	$ 407,576	($ 256,519)
Proposed Steam Chiller Plant (1) 1100 Ton Steam double effect absorber, #2 as lag; $8.13 MMBTU steam	4,656	1,106,194	19,964	$ 75,774	$ 162,307	$ 238,082	($ 87,025)

Electric VFD Chillers

The electric centrifugal chillers with variable frequency drives offer the lowest operating cost of the alternatives considered. The primary benefit of the VFD is to reduce chiller kW per ton at partial loads when the condenser water temperature is lower than 80°. Since condenser water temperature is driven by the river temperature, there are many hours when cooling loads are less than 1000 tons and low temperature condenser water is available.

After the Existing Chiller Plant in the table below, the proposed plants include:

1.) Replace chillers #1 &3 with 1100 ton electric centrifugal chillers, both with VFD control. Chiller #4 not used
2.) Replace chillers #1 &3 with 1100 ton electric centrifugal chillers, one with VFD control and one constant speed machine. Chiller #4 not used
3.) Replace chillers #1 &3 with 1100 ton electric centrifugal chillers, both with VFD control. Chiller #4 used as the lead chiller during low load conditions (under 500 tons)

For all cases, new chillers will operate with 3.0 gpm per ton condenser water instead of the current 3.3 GPM per ton.

Scenario	Billed kW/year	kwh Used	MLbs Steam used for HVAC Loads	Electric Cost	Steam Cost	Total Operating Cost	Savings vs. Present
Existing Chiller Plant	8,737	2,205,211	0	$ 151,057	$ 0	$ 151,057	
Proposed Electric Chiller Plant (2) York 1100 Ton VSD chillers	6,700	1,844,429	0	$ 126,343	$ 0	$ 126,343	$ 24,714
Proposed Electric Chiller Plant (2) York 1100 Ton chillers, VFD on CH1 only.	7,203	1,934,648	0	$ 132,523	$ 0	$ 132,523	$ 18,534
Proposed Electric Chiller Plant (2) York 1100 Ton VSD chillers; #4 as lead	7,017	1,988,727	0	$ 136,228	$ 0	$ 136,228	$ 14,829

The plant configuration that shows the lowest cost of operation consists of (2) 1100 ton chillers equipped with VFD control.

Calculation Methodology

Chilled water loads were established by evaluating historic data from the Alerton DDC system in the chiller plant. Weekday chilled water loads increase at 5:00 am when various ventilation systems are started and continue through 6:00 pm. When separated into weekday and non-weekday datasets, there is a clear correlation between outdoor air temperature and chilled water load. From this data, a regression analysis was used to generate load curves for use in the calculations of weekday and off-peak periods.

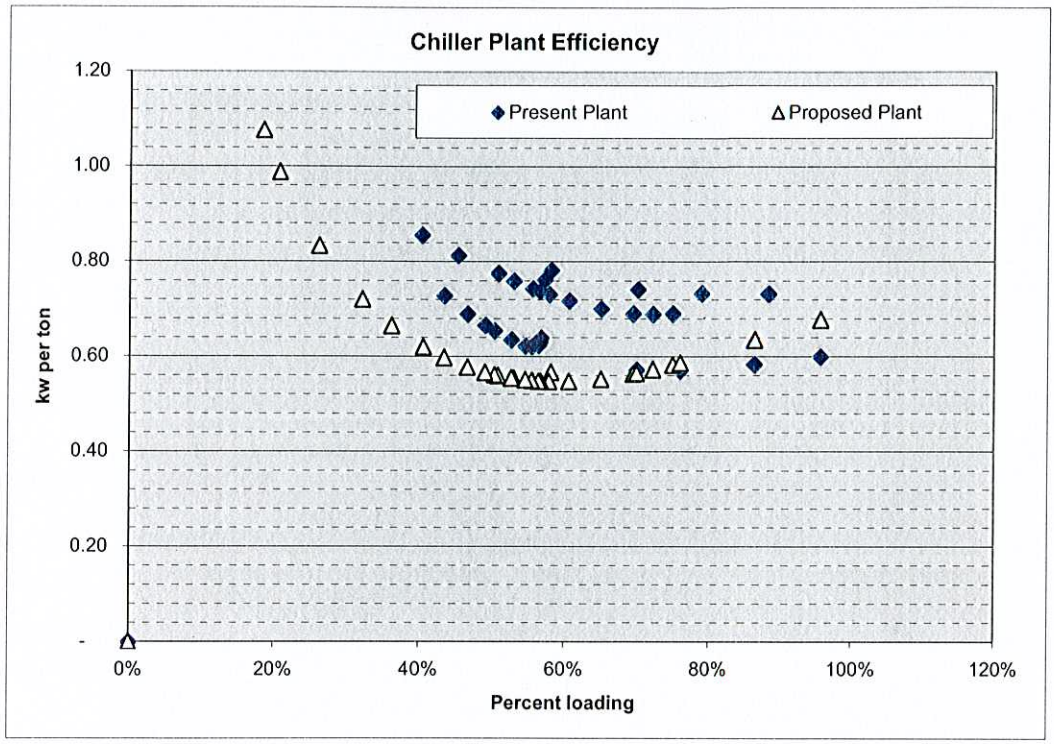
The periods when the arena was occupied do not fit the curve as they are not dependent on outdoor air temperature; since there are relatively few such hours, energy calculations were performed based on the hours when the arena was not in use.

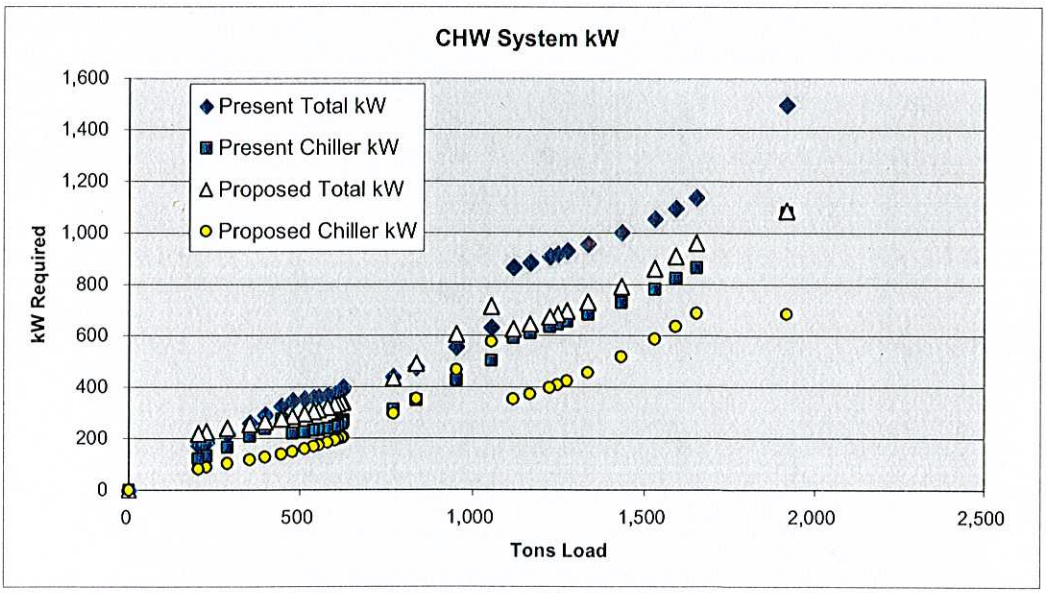
Bin data for weekday and off-peak periods was generated for the period April 1 through October 31, which is slightly longer than the actual season of April 15 through October 15. The bin interval is 2° F. The chilled water load curves were applied to the outdoor air temperature for the respective periods to produce a chilled water load in tons for each bin.

The chiller plant was defined in terms of the design kW/ton, chilled water and condenser water pump kW and part load curve for each chiller. The chiller operating strategy was then defined, indicating what combination of chillers is enabled for each range of chilled water load. For each range of load, all chillers are assumed to be equally loaded in terms of % of chiller capacity. For example, if a 500 ton and an 1100 ton chiller were enabled and the total chilled water load was 1200 tons, each chiller would be assumed to be loaded to 75% of its nameplate capacity. For each bin the chiller kW is calculated using the part load curve, its design kW per ton and its loading.

Present Plant vs. **Proposed Electric Chiller Plant (2) York 1100 Ton VSD chillers.**

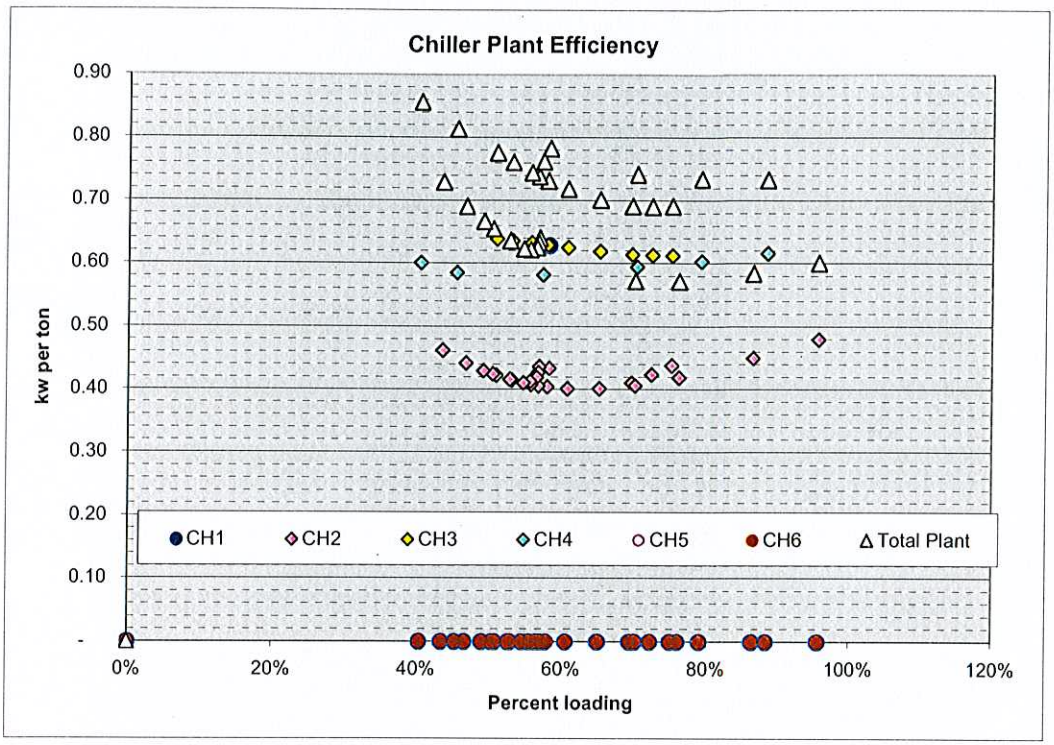
$ 151,057 Present Plant $ 126,343 Operating cost for this scenario

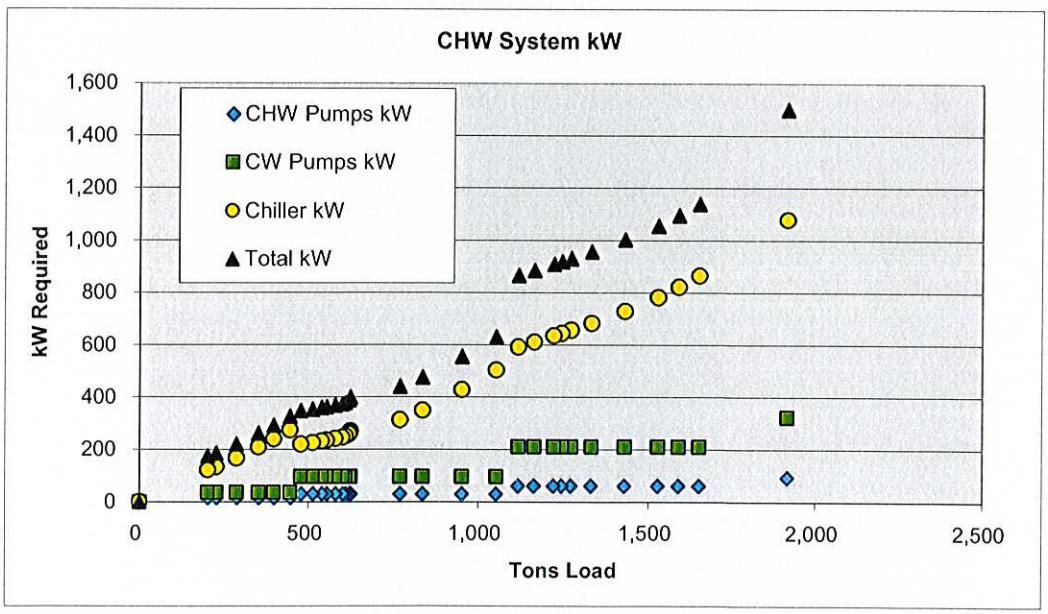




Conditions: Existing Chiller Plant

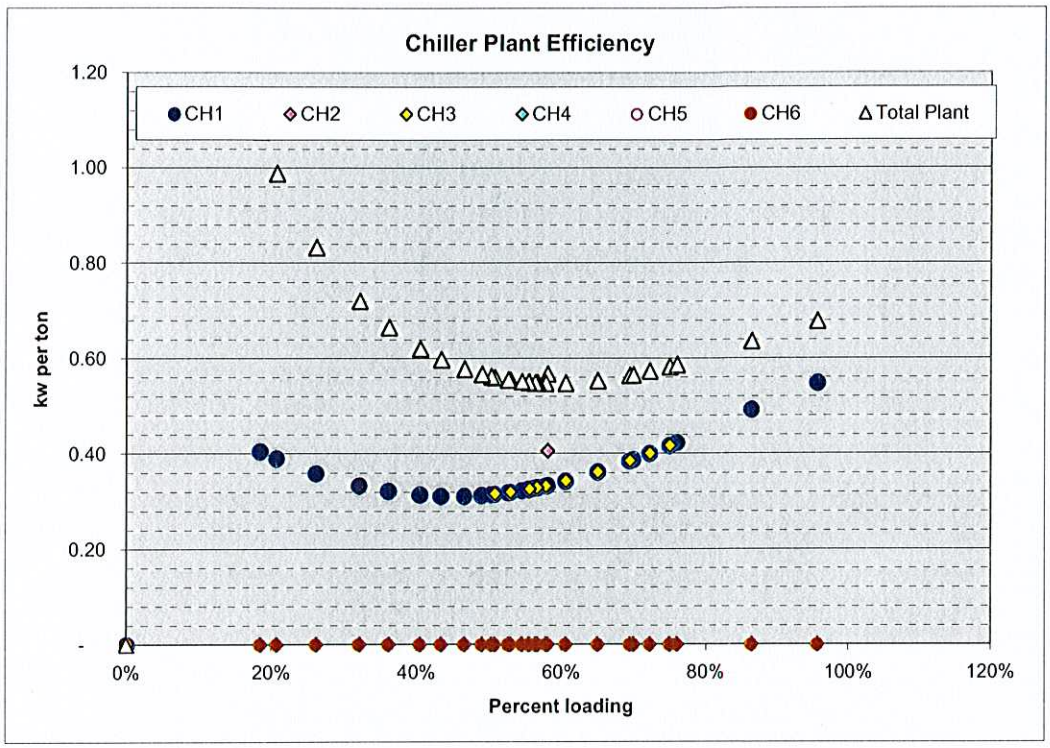
$ 151,057 Operating cost for this scenario

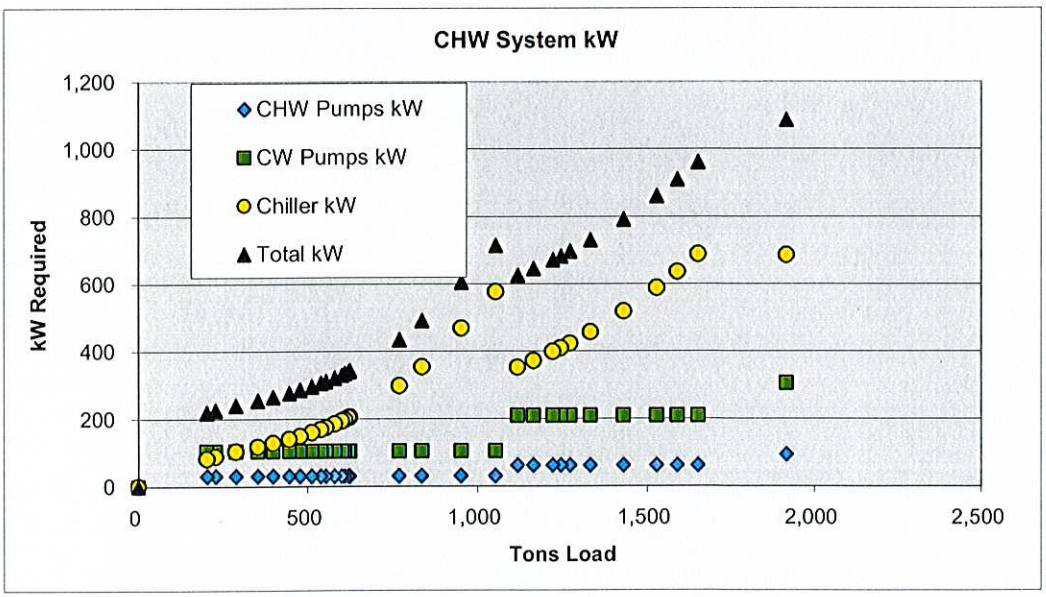




Conditions: **Proposed Electric Chiller Plant (2) York 1100 Ton VSD chillers.**

$ 126,343 Operating cost for this scenario





Chiiled Water Plant Definition

Rochester Civic Center
Rochester, NY

		1	2	3	4		
Chiller	Tag	CH1	CH2	CH3	CH4	Total	
Data	Type	2-stage Centrifugal	2005 McQuay 80°CW	2-stage Centrifugal	3-stage Centrifugal		
	Perf Curve #	1	7	1	2		
	Make	Carrier	McQuay	Carrier	Trane		
	Model	19EB	WSC	19EB	CVHE056		
	Refrigerant	R500	R134a	R500	R123		
	Year Built	1982	2005	1982	1989/1996		
	Nom. Tons	1,100	1,100	1,100	504	3,804	tons
	FL kW	689	569	689	323	2,272	kw
	FL kW/ton	0.63	0.52	0.63	0.64	0.60	kw/ton avg.
	Steam MBH/ton	-	-	-	-		
Chilled	HP	50	50	50	25	175	HP
Water	GPM	2,634	2,634	2,634	1,200	14,370	gpm
CHW	Head	45	45	45	50		
	VFD?	N	N	N	N		
	Minimum Head						
	Minimum Speed						
	Pump Eff.	75%	75%	75%	75%		
	BHP	40	40	40	20		
	Motor Eff.	94.1%	94.1%	94.1%	93.6%		
CHW	kW	31.6	31.6	31.6	16.1	174	kw
Condenser	HP	150	150	150	50	500	HP
Water CW	GPM	3,600	3,025	3,600	1,500	18,325	gpm
	Head	120	120	120	90		
	VFD?	N	N	N	N		
	Minimum Head						
	Minimum Speed						
	Pump Eff.	75%	75%	75%	75%		
	BHP	145	122	145	45		
	Motor Eff.	95.0%	95.0%	95.0%	94.5%		
CW	kW	114.2	96.0	114.2	35.9	570	kw
Chiller	Design CHW T.	44	44	44	44		
Reset Data	CW T.	85	85	85	85		
	Design Tons	1,100	1,100	1,100	504		
	Design kW	689	569	689	323		
	Design kW/ton	0.63	0.52	0.63	0.64		
	Reset CHW T.	46	46	46	46		
	CW T.	85	85	85	85		
	Reset Tons	1,100	1,100	1,100	504		
	Reset kW	*675*	*557*	*675*	*317*		
	Reset kW/ton	0.61	0.51	0.61	0.63		

Chiller Sequencing Strategies

Rochester Civic Center
Rochester, NY

Directions: *Adjust the OA wet bulb temperatures to define the load ranges for each chiller operating strategy*

Enter "1" to enable each chiller to operate in a given load range

	Wet Bulb			Bldg Load (tons)		1100	1100	1100	504	1	1	Plant Loading		Tons
Period	From OA	To OA	Strategy	From	To	1	2	3	4	5	6	From	To	Online
Weekday	0	46	1	-	500				1			0%	99%	504
Weekday	46	54	2	500	1,100		1					45%	100%	1,100
Weekday	54	71	3	1,100	1,600		1	1				50%	73%	2,200
Weekday	71	75	4	1,600	2,200		1	1				73%	100%	2,200
Weekday	75	77	5	2,200	2,700	1	1	1				67%	82%	3,300
Weekday	77	77	6	2,700	3,300	1	1	1				82%	100%	3,300
Weekday	77	80	7	3,300	3,300	1	1	1				100%	100%	3,300
Weekday	77	80	8	3,300	3,300	1	1	1				100%	100%	3,300
Weekday	77	80	9	3,300	2,560	1	1	1				100%	78%	3,300
Weekday	77	80	10	2,560	2,800	1	1	1				78%	85%	3,300
Off-peak	0	57	11	-	500				1			0%	99%	504
Off-peak	57	77	12	500	1,100		1					45%	100%	1,100
Off-peak	77	77	13	1,100	1,600		1	1				50%	73%	2,200
Off-peak	77	77	14	1,600	2,200		1	1				73%	100%	2,200
Off-peak	77	77	15	2,200	2,700	1	1	1				67%	82%	3,300
Off-peak	77	77	16	2,700	3,300	1	1	1				82%	100%	3,300
Off-peak	77	77	17	3,300	3,300	1	1	1				100%	100%	3,300
Off-peak	77	80	18	3,300	3,300	1	1	1				100%	100%	3,300
Off-peak	77	80	19	3,300	693	1	1	1				100%	21%	3,300
Off-peak	77	80	20	693	758	1	1	1				21%	23%	3,300

Chilled Water Plant Definition
New Chillers

Rochester Civic Center
Rochester, NY

		1	2	3	4	5	6		
Chiller Data	Tag	CH1	CH2	CH3	CH4	CH5	CH6	Total	
	Type	2010 York w/ VFD	2005 McQuay w/ CW Relief	2010 York w/ VFD	3-stage Centrifugal	2-stage Absorber	Steam Turbine Centrifugal		
	Perf Curve #	8	7	8	2	5	6		
	Make	York	McQuay	York	Trane	Trane	York		
	Model	YK1100w/VSD	WSC	YK1100w/VSD	CVHE056	YK1000w/VSD	YST HF GB J1-KG F S		
	Refrigerant	R134a	R134a	R134a	R123	R134a	R134a		
	Year Built		2005		1989/1996				
	Nom. Tons	1,100	1,100	1,100	504	1,100	1,100	6,004	tons
	FL kW	613	569	613	323	7.5	1.0	2,126	kw
	FL kW/ton	0.557	0.517	0.557	0.64	0.01	0.00	0.35	kw/ton avg.
	Steam MBH/ton	-	-	-	-	9.13	11.66		
Chilled Water CHW	HP	50	50	50	25	50	50	275	HP
	GPM	2,634	2,634	2,634	1,200	2,634	2,634	14,370	gpm
	Head	45	45	45	50	45	45		
	VFD?	N	N	N	N	N	N		
	Minimum Head								
	Minimum Speed								
	Pump Eff.	75%	75%	75%	75%	75%	75%		
	BHP	40	40	40	20	40	40		
	Motor Eff.	94.1%	94.1%	94.1%	93.6%	94.1%	94.1%		
CHW	kW	31.6	31.6	31.6	16.1	31.6	31.6	174	kw
Condenser Water CW	HP	150	150	150	50	150	150	800	HP
	GPM	3,300	3,025	3,300	1,500	3,300	3,600	18,025	gpm
	Head	120	120	120	90	120	120		
	VFD?	N	N	N	N	N	N		
	Minimum Head								
	Minimum Speed								
	Pump Eff.	75%	75%	75%	75%	75%	75%		
	BHP	133	122	133	45	133	145		
	Motor Eff.	95.0%	95.0%	95.0%	94.5%	95.0%	95.0%		
CW	kW	104.7	96.0	104.7	35.9	104.7	114.2	560	kw
Chiller Reset Data	Design CHW T.	44	44	44	44	44	44		
	CW T.	85	85	85	85	85	85		
	Design Tons	1,100	1,100	1,100	504	1,100	1,100		
	Design kW	613	569	613	323	8	1		
	Design kW/ton	0.56	0.52	0.56	0.64	0.01	0.00		
	Reset CHW T.	46	46	46	46	46	46		
	CW T.	85	85	85	85	85	85		
	Reset Tons	1,100	1,100	1,100	504	1,100	1,100		
	Reset kW	*600*	*557*	*600*	*317*	*7*	*1*		
	Reset kW/ton	0.55	0.51	0.55	0.63	0.01	0.00		

Chiller Sequencing Strategies

Proposed Electric Chiller Plant (2) York 1100 Ton chillers, VFD on CH1 only.

Rochester Civic Center
Rochester, NY

Directions: *Adjust the OA wet bulb temperatures to define the load ranges for each chiller operating strategy*

Enter "1" to enable each chiller to operate in a given load range

	Wet Bulb			Bldg Load (tons)		1100	1100	1100	504	1100	1100	Plant Loading		Tons
Period	From OA	To OA	Strategy	From	To	1	2	3	4	5	6	From	To	Online
Weekday	0	46	1	-	500	1						0%	45%	1,100
Weekday	46	54	2	500	1,100	1						45%	100%	1,100
Weekday	54	71	3	1,100	1,600	1		1				50%	73%	2,200
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Weekday	77	80	10	2,560	2,800	1	1	1				78%	85%	3,300
Off-peak	0	57	11	-	500	1						0%	45%	1,100
Off-peak	57	77	12	500	1,100	1						45%	100%	1,100
Off-peak	77	77	13	1,100	1,600	1		1				50%	73%	2,200
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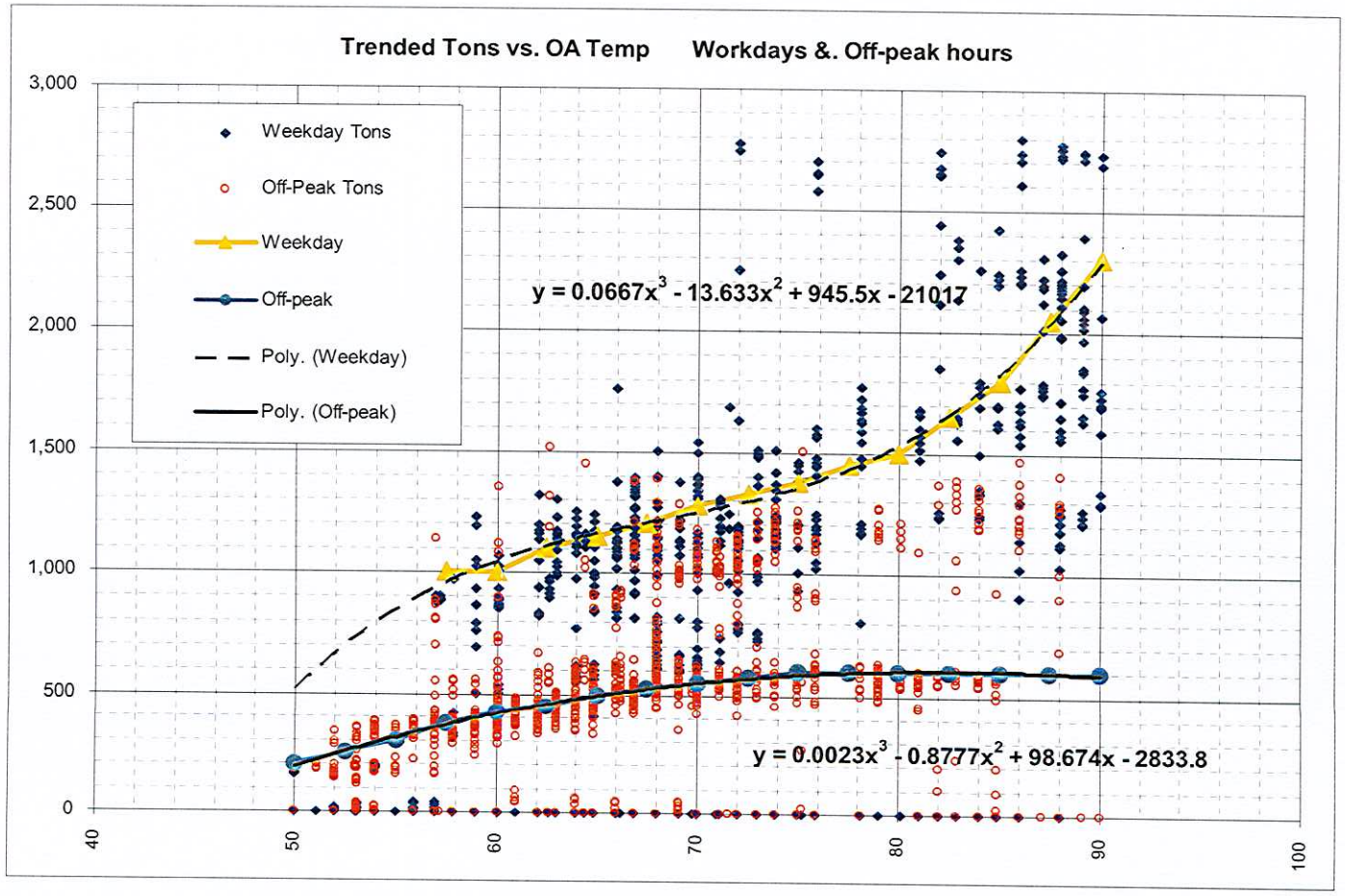
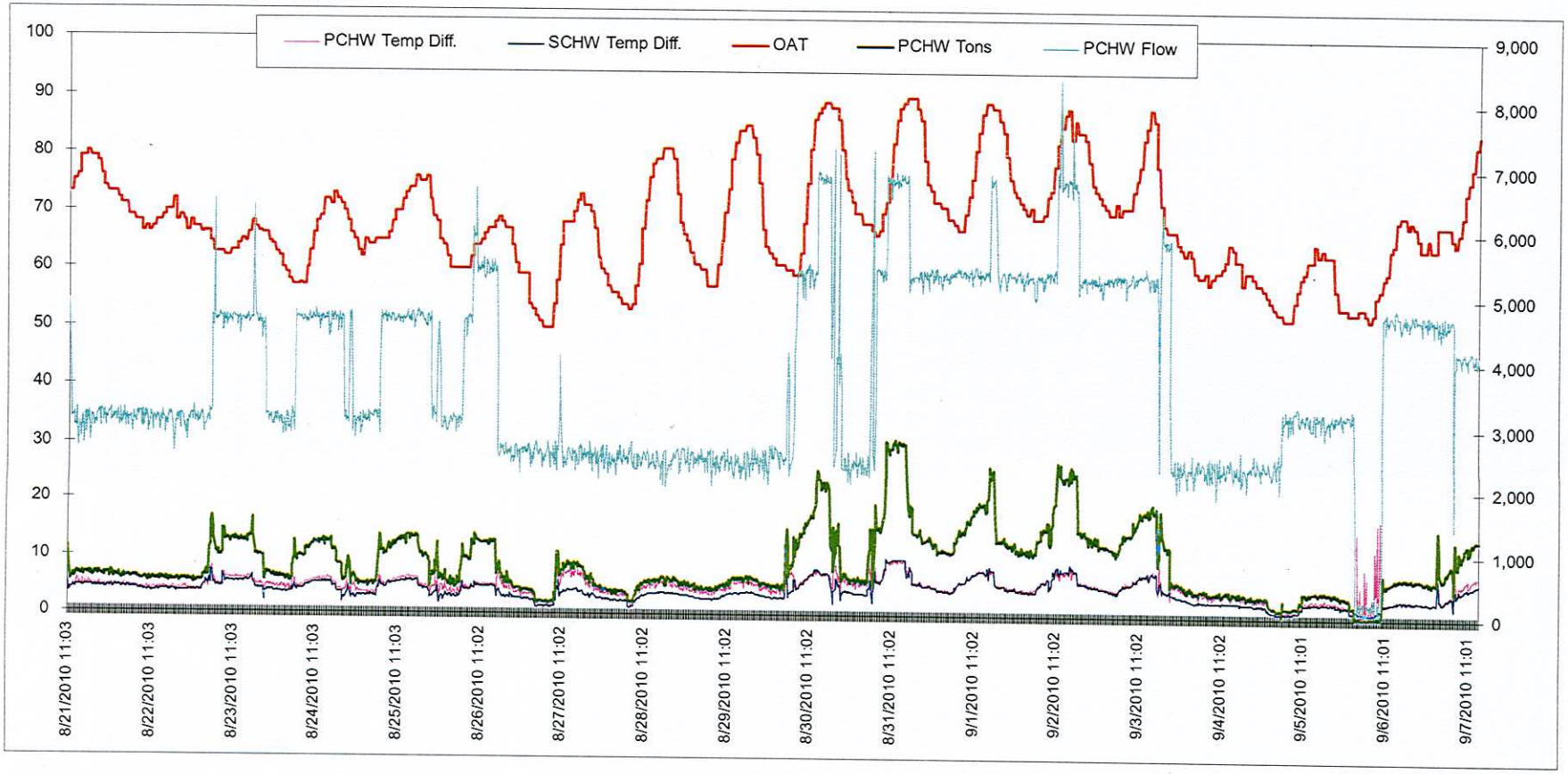
Off-peak	77	80	19	3,300	693	1	1	1				100%	21%	3,300
Off-peak	77	80	20	693	758	1	1	1				21%	23%	3,300

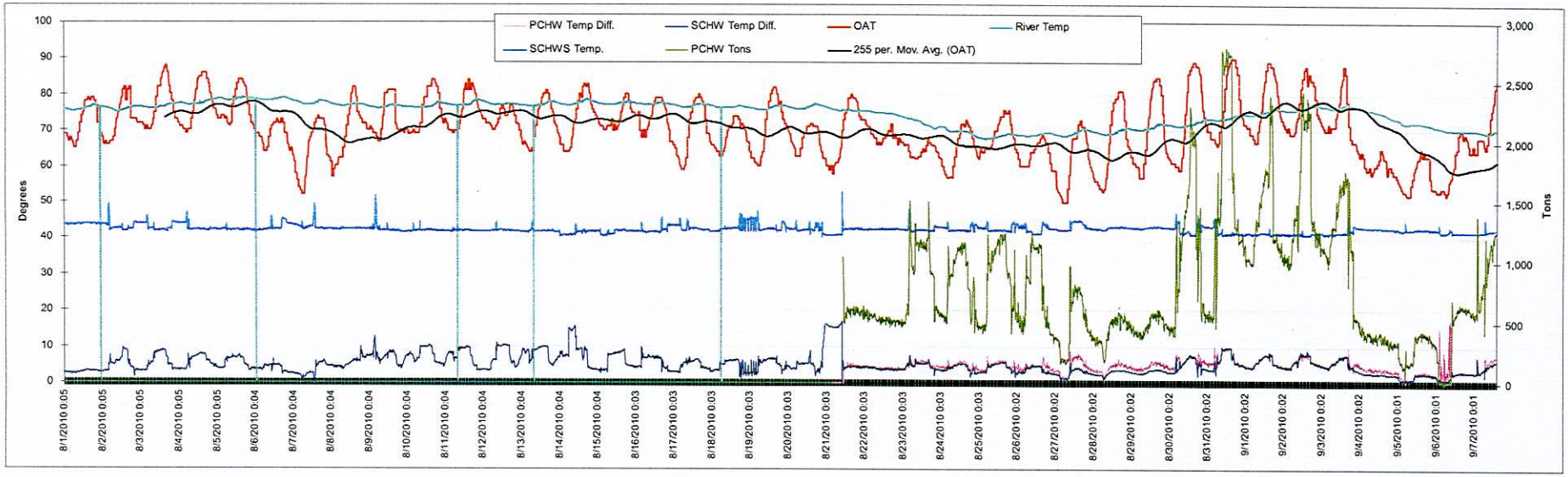


The chart above plots the Chilled Water Load against Outdoor Air temperature. Data is separated into weekday periods and overnight or weekend periods. Note the points between 2600 and 2800 tons that reflect times the Arena is occupied; these loads do not correlate with outdoor air temperature

The following chart plots the chilled water load in tons against outdoor air temperature. Also shown is the Primary Chilled Water flow (in GPM) which changes based on the number of chillers operating. Data is charted from 8/21/2010 through 9/8/2010.



The following chart adds the river water temperature and begins on August 1, 2010 Primary Chilled Water Flow data was not reliable prior to 8/21/2010, so total CHW tonnage cannot be graphed. The black trendline is a 255 hour moving average of the outdoor air temperature; this was calculated to compare with the river water temperature.



ATTACHMENT 4

MONROE CIVIC CENTER DDC ANALYSIS

Rochester Civic Center ECM-13: Upgrade DDC

Concept

Direct digital control (DDC) systems utilize microprocessor based controllers. Energy is saved as a result of tight control and optimization of equipment operation. These systems often control electronic end-devices on equipment such as damper and valve actuators with positive positioning. HVAC equipment runtime is reduced through the use of: occupied/unoccupied schedules, holiday schedules, operator overrides, optimum start/stop and even occupancy sensors to insure equipment only runs when necessary.

Existing Equipment Conditions and Schedules

SAC-01-08

Description:

SAC-01-08 are located in the penthouse mechanical room, and servers multiple zones. Court these units are mixed air multi zone constant volume air handling units. Outside air is drawn through louvers in an exterior wall of the MER. A return air fan pulls air from the space and is mixed with outside air (OA) and/or exhausted out louvers in an exterior wall of the MER.

The AHU's is scheduled to operate:

Unit	Mon. Start Hour	Mon. Stop Hour	Tue. Start Hour	Tue. Stop Hour	Wed. Start Hour	Wed. Stop Hour	Thu. Start Hour	Thu. Stop Hour	Fri. Start Hour	Fri. Stop Hour
SAC 01	4:30	17:00	4:40	21:00	4:30	17:00	4:30	17:00	5:30	17:00
SAC 02	6:00	17:00	6:00	22:00	6:00	21:00	6:00	17:00	6:30	17:00
SAC 03	5:15	17:00	6:15	21:00	6:15	17:00	6:15	17:00	6:45	21:00
SAC 04	5:30	17:00	6:15	17:00	6:15	17:00	6:15	17:00	6:45	17:00
SAC 05	5:45	17:00	5:45	17:00	5:45	21:00	5:45	17:00	6:15	17:00