Department of Public Works

City Hall
730 Washington Avenue
Racine, Wisconsin 53403
262.636.9121 – Public Works
262.636.9191 - Engineering

City of Racine, Wisconsin

John C. Rooney, P.E.
Commissioner of Public Works/City Engineer

Thomas M. Eeg, P.E.
Asst. Comm. of Public Works/Operations

MEMO

Date: October 7, 2019

To: Ald. John Tate II, Chairman Public Works & Services Committee

From: John C. Rooney, P.E., Commissioner of Public Works/City Engineer

Re: Legistar Item: 1144-19

Chairman Tate:

In 2016, the City of Racine (COR) entered into a performance contract with Johnson Controls Incorporated (JCI). The intent of the performance contract was for JCI to deliver a turn-key energy efficiency project over to the COR for the purposes of energy savings and return on investment (ROI). The project consisted of the retro-fit of 432 fixtures city-wide on street right-of-ways, bicycle paths, community centers, and other COR properties such as the Racine Zoological Gardens and Wustum Museum. This was a joint project between DPW and Parks Department. A total of $738,014 of budgeted capital funds ($293,719 DPW / $444,295 Parks) were expended. This two-year Energy Performance Contract, dated August 1, 2016, was completed January 15, 2017. The contract guaranteed $43,123 based on measured savings in Year One. After a contractually required measurement and verification analysis, Year One Savings Benefit was **$47,136**. Year Two Savings Benefit was measured and verified at **$48,550**, so with the Construction Period ($12,962) savings and Performance Years to date, the City has an excess savings of **$21,108** after Year Two.

At predicted cumulative rates of savings, the breakeven point was at Year Fourteen, and ROI would begin after that with a cumulative ROI of nearly $421,000 by Year Twenty. After analyzing actual costs from two years of M&V efforts, the breakeven point may arrive one year sooner and yield closer to $500,000 return by Year Twenty. This is based on these fixtures lasting for the entire 20 year analysis period. Nearly all these products have 10 plus year warranties. Many of our existing LED fixtures are now in their twelfth year of service with no real maintenance or service issues.

This project is a great example of how performance contracting can be used to rapidly upgrade facilities, reduce maintenance costs and more particularly energy costs. Another item of interesting note and importance is that JCI calculated the COR's reduction in our carbon footprint based on emission reductions. The emission reductions from the energy savings helps eliminate: CO2, SO2, NOx & CO gases; Hg toxic metal, PM particles and VOCs into the environment. Based on real source energy the COR uses, this is equivalent to:

CO2 sequestered by:
- 9,820 tree seedlings grown for 10 years in an urban area
- 82 acres of pine or fir forests

CO2 emissions from:
- 730 passenger vehicles
- 891 barrels of oil consumed
- Energy use of 33 homes for one year
- Burning of 2 coal rail cars

If the committee agrees, the recommendation is to conclude M&V and receive and file the report.

Total Project Benefits

Year	Measured Energy Savings	Operations & Maintenance Cost Avoidance**	Future Capital Cost Avoidance**	Annual Project Benefits
1	$43,123	$0	$0	$43,123
2	$44,417	$0	$0	$44,417
3	$45,749	$0	$0	$45,749
4	$47,122	$0	$0	$47,122
5	$48,535	$0	$0	$48,535
6	$49,991	$0	$0	$49,991
7	$51,491	$0	$0	$51,491
8	$53,036	$0	$0	$53,036
9	$54,627	$0	$0	$54,627
10	$56,266	$0	$0	$56,266
11	$57,954	$0	$0	$57,954
12	$59,692	$0	$0	$59,692
13	$61,483	$0	$0	$61,483
14	$63,328	$0	$0	$63,328
15	$65,227	$0	$0	$65,227
16	$67,184	$0	$0	$67,184
17	$69,200	$0	$0	$69,200
18	$71,276	$0	$0	$71,276
19	$73,414	$0	$0	$73,414
20	$75,616	$0	$0	$75,616
Total	**$1,158,731**	**$0**	**$0**	**$1,158,731**

*Utility Cost Avoidance is a Measured Project Benefit. Utility Cost Avoidance figures in the table above are based on anticipated increases in unit energy costs as set forth in the table in Section IV below.
** Operations & Maintenance Cost Avoidance and Future Capital Cost Avoidance are Non-Measured Project Benefits. Operations & Maintenance Cost Avoidance and Future Capital Cost Avoidance figures in the table above are based on a mutually agreed fixed annual escalation rate of (3%).

Within sixty (60) days of the commencement of the Guarantee Term, JCI will calculate the Measured Project Benefits achieved during the Installation Period plus any Non-Measured Project Benefits applicable to such period and advise Customer of same. Any Project Benefits achieved during the Installation Period may, at JCI's discretion, be allocated to the Annual Project Benefits for the first year of the Guarantee Term. Within sixty (60) days of each anniversary of the commencement of the Guarantee Term, JCI will calculate the Measured Project Benefits achieved for the applicable year plus any Non-Measured Project Benefits applicable to such period and advise Customer of same.

Customer acknowledges and agrees that if, for any reason, it (i) cancels or terminates receipt of M&V Services, (ii) fails to pay for M&V Services in accordance with Schedule 4, (iii) fails to fulfill any of its responsibilities necessary to enable JCI to complete the Work and provide the M&V Services, or (iv) otherwise cancels, terminates or materially breaches this Agreement, the Assured Performance Guarantee shall automatically terminate and JCI shall have no liability hereunder.

Johnson Controls, Inc. Initials: _____ *Customer Initials:* _____

Sampling Plan

Contractor's documentation will be reviewed from the pre and post lighting retrofit data, and measure post-retrofit performance using sampling plan with 80/20 confidence/precision. Post-retrofit sample readings will verify fixture wattage reduction values for input to the calculation variable data.

Fixtures to be sample and quantities for 80/20 Plan

Retrofit ID	Sum of New Fixture Qty	Sum of Dollars Saved	Percent of Total Dollars Saved	Running Percentage of Total Dollars Saved	Samples for 80/20
BXRA-A-(H / K)-5-D-U-3-7	146	$12,192	28.27%	28.27%	11
ESL2 P30S 40K AS BK TG 3 S L1H NL2X2 WLDF13 200 BK P7 PCLL	95	$6,958	16.14%	44.41%	10
CXB-A-UV-H-40K-8-UL-M w/CXBP16+CL16	44	$5,175	12.00%	56.41%	9
ARE-EDR-5M-R3-04-E-UL-SV-350	26	$3,867	8.97%	65.38%	8
OSQ-A-NM-5ME-K-30K-UL-BZ w/OSQ-AABZ	11	$2,386	5.53%	70.91%	5
BXSP2-HO-HT-3M-165W-40K-UL-SV PD-1H4BZ	26	$1,911	4.43%	75.34%	8
DPT-A-SB-FR-A-30K-UL	58	$1,742	4.04%	79.38%	10
CXB-A-UV-M-40K-8-UL-M w/CXBP16+CL16	26	$1,606	3.72%	83.11%	8

Data Collection Plan

- Obtain contractor pre-retrofit and post-retrofit lighting performance values.
- Johnson Controls to collect post-retrofit lighting performance values from sample populations to verify calculations.

Analysis Method

Based on pre-lighting retrofit lighting survey report data, engineering calculations, and post-retrofit sample measurements (Option A protocol). Pre-retrofit value minus post-retrofit value will indicate projected financial savings through calculations analysis. The savings for this measure will be determined once during post-retrofit performance. Subsequent lighting hours and fixture watt performance will be agreed upon.

Equations for Calculating Lighting Retrofit Savings

Demand (kW)

$kW\ Savings = \sum_u [\ (kW/Fixture_{baseline} \times Quantity_{baseline} - kW/Fixture_{post} \times Quantity_{post})]_{t,u}$

where:

$kW/fixture_{baseline}$ = lighting baseline demand per fixture for usage group u

$kW/fixture_{post}$ = lighting demand per fixture during post-installation period for usage group

$Quantity_{baseline}$ = quantity of affected fixtures before the lighting retrofit for usage group u

PRICE AND PAYMENT TERMS

Customer shall make payments to JCI pursuant to this Schedule 4.

1. *Work*. The total price to be paid by Customer for the Work shall be $738,014.
   The cost breakout by department is as follows:
   Department of Public Works $ $293,719
   Department of Parks & Recreation $ $444,295

2. Payments (including payment for materials delivered to JCI and work performed on and off-site) shall be made to JCI as follows:

First payment due: 50%	[$369,007 August 25, 2016]
Second payment due: 20%	[$147,602.80 September 25, 2016]
Third payment due: 20%	[$147,602.80 October 25, 2016]
Forth payment due: 10%	[$73,801.40 November 25, 2016]

2. *M&V Services*. State performance contracting statue 66.0133, requires JCI to provide an annual report for as long as the guarantee is in place. JCI's will provide the minimal services required to generate the report, as detailed on Schedule 2 of this Agreement. The City has the right to cancel the M&V Services and associated guarantee at any time after the first two years upon a 30 day written notice. The cost to generate said report, is $1,000 per year and is NOT included in the above price. This $1,000 cost will be invoiced annually and is payable within 30 days of receipt of invoice.

2016 JCI Performance Contract - City of Racine

Year	Dates	Annual Energy Savings/Project Benefit	Cumulative Savings/ Benefit	Predicted Cumulative Recovery	Predicted Cumulative Return	M&V Savings/ Benefit	M&V Annual Difference	M&V Cumulative Difference	Adjusted M&V Cumulative Savings/Benefit	Actual Cumulative Recovery	**Excess Cumulative Return**
0	8/16 to 2/17			$ 738,014		$12,962	$12,962		$12,962	$ 725,052	**$ 12,962**
1	3/17 to 2/18	$43,123		$ 694,891		$47,136	$4,013	$16,975	$60,098	$ 677,916	**$ 16,975**
2	3/18 to 2/19	$44,417	$87,540	$ 650,474		$48,550	$4,133	$21,108	$108,648	$ 629,366	**$ 21,108**
3		$45,749	$133,289	$ 604,725							
4		$47,122	$180,411	$ 557,603							
5		$48,535	$228,946	$ 509,068							
6		$49,991	$278,937	$ 459,077							
7		$51,491	$330,428	$ 407,586							
8		$53,036	$383,464	$ 354,550							
9		$54,627	$438,091	$ 299,923							
10		$56,266	$494,357	$ 243,657							
11		$57,954	$552,311	$ 185,703							
12		$59,692	$612,003	$ 126,011							
13		$61,483	$673,486	$ 64,528							
14		$63,328	$736,814	$ 1,200							
15		$65,227	$802,041		$64,027						
16		$67,184	$869,225		$131,211						
17		$69,200	$938,425		$200,411						
18		$71,276	$1,009,701		$271,687						
19		$73,414	$1,083,115		$345,101						
20		$75,616	$1,158,731		$420,717						

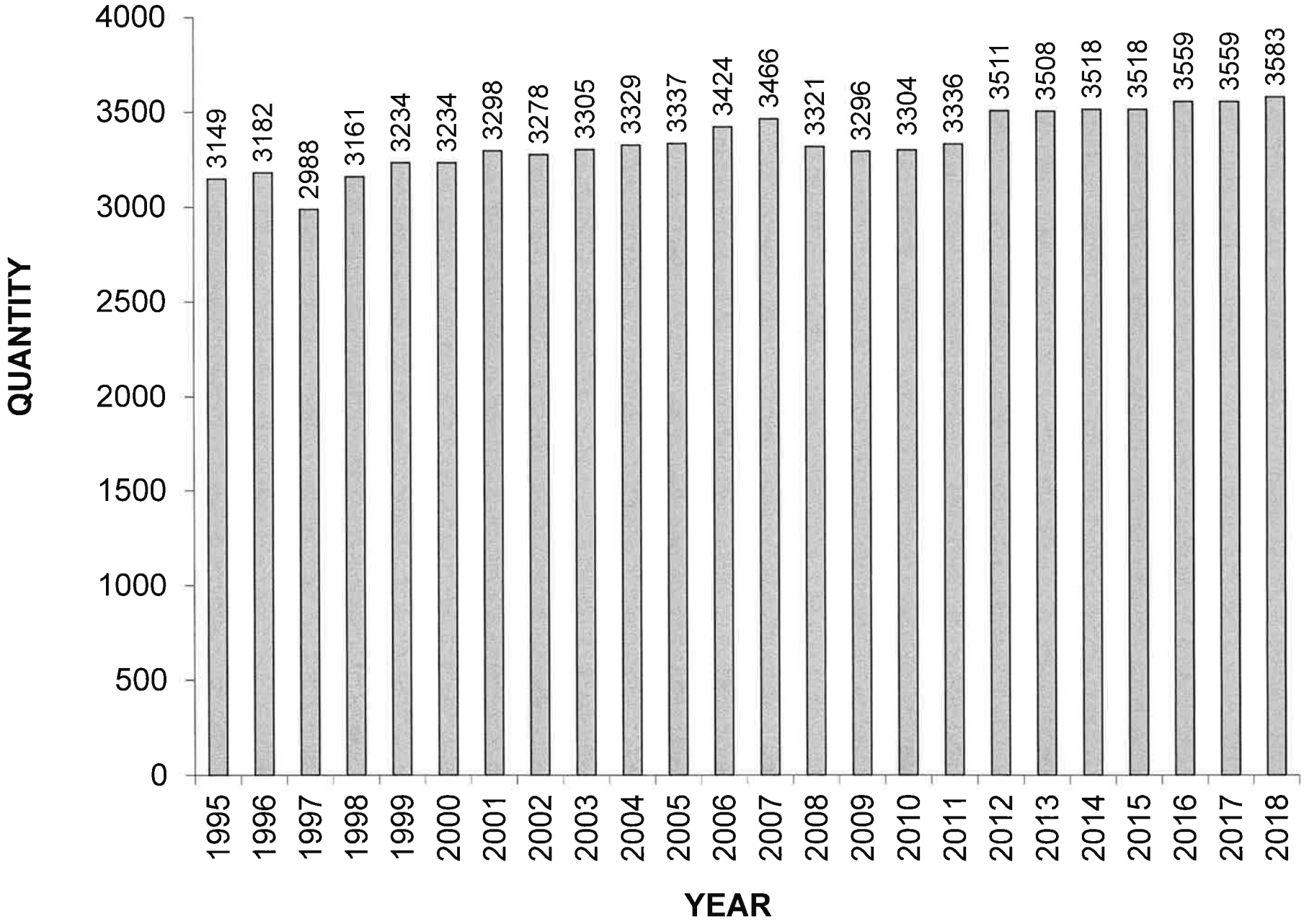
Total $1,158,731

Total Project Cost = $ 738,014

Parks = $ 444,295

DPW = $ 293,719

CITY OWNED METERED STREET LIGHT QUANTITIES



CITY OWNED METERED STREET LIGHTS - ANNUAL COST