

Reduce Illumination to Minimum Necessary Levels, Utilize Higher Efficiency Lights, Install Occupancy Sensors (Arcs 2.7111, 2.7142 & 2.7135)

(The analysis below was extracted from one of the assessment reports by the Clemson University Industrial Assessment Center (IAC). This is only an example recommendation and hence, not all the background information and sources for numbers are included here.)

<i>Est. Electric Consumption Savings</i>	<i>= 102,864 kWh /yr</i>
<i>Est. Electric Consumption Cost Savings</i>	<i>= \$4,937 \$/yr</i>
<i>Est. Electric Demand Savings</i>	<i>= 539 kW /yr</i>
<i>Est. Electric Demand Cost Savings</i>	<i>= \$6,813 /yr</i>
<i>Est. Total Cost Savings</i>	<i>= \$11,751 /yr</i>
<i>Est. Implementation Cost</i>	<i>= \$6,882</i>
<i>Simple Payback Period</i>	<i>= 7.03 months</i>

Recommended Action:

It is recommended to upgrade all lights to LED and reduce the number of bulbs in fixtures to the minimum necessary levels in areas where the lighting is too intense for the space. It is also recommended to install occupancy sensors and motion sensors in all office areas, restrooms, hallways, and break rooms.

Background:

The plant's current lighting system does utilize some LED fixtures; however, they are not implemented throughout the plant. The assessment team counted the number of lights, recorded the type of light, the wattage of each light, and the usage on a weekly and annual basis. The Table 1 below shows the current lighting setup and Table 2 shows the recommended lighting setup. The plant is charged \$0.048/kWh. The demand charge is \$12.64 per kW.

Table 1: Current Lighting

Location	Light Type	# of Fixtures	# of Bulbs per Fixture	Total Bulb	Length (ft)	Wattage per bulb (W)	Annual operational hours	Total wattage (kW)	Total consumption (kWh)	Additional Notes
Marketing Conference Room	Fluorescent	9	1	9		100	708	0.9	638	Rarely Used
	T8	2	2	4	4	34	708	0.136	96	Rarely Used
	Trail Lights	3	4	12		40	708	0.48	340	Rarely Used
Accounting Office 1	T8	2	2	4	4	34	2125	0.136	289	
Office 2	T8	2	2	4	4	34	2125	0.136	289	
Office 3	T8	2	2	4	4	34	2125	0.136	289	
Office 4	T8	2	2	4	4	34	2125	0.136	289	
Office 5	T8	2	2	4	4	34	2125	0.136	289	
Office 6	T8	2	2	4	4	34	2125	0.136	289	
Office 7	T8	2	2	4	4	34	2125	0.136	289	
Acct. Hallway 1	T8	9	2	18	4	34	2125	0.612	1301	
Acct. Hallway 2	T8	2	4	8	4	34	2125	0.272	578	
	U-light	1	2	2	4	34	2125	0.068	145	
Acct. Storage 1	T8	2	2	4	4	34	2125	0.136	289	
Acct. Storage 2	T8	2	2	4	4	34	2125	0.136	289	
Acct. Print Room	T8	1	2	2	4	34	2125	0.068	145	
Eng. Women's RR	T8	1	2	2	4	34	1417	0.068	96	Sensored
Eng. Men's RR	T8	1	2	2	4	34	1417	0.068	96	Sensored
Engineering Offices P1	T8	12	2	24	4	34	2125	0.816	1734	
Engineering Offices P2	T8	6	2	12	4	34	2125	0.408	867	
Engineering Electronics Stations	T8	4	2	8	4	34	2125	0.272	578	
Engineering Electronics Hallway	T8	2	2	4	4	34	2125	0.136	289	
Engineering	T8	16	2	32	4	34	2125	1.088	2312	

Hallway										
Engineering Storage	U-light	1	2	2	4	34	2125	0.068	145	
Engineering Room	T8	8	2	16	4	34	2125	0.544	1156	
Customer Service Hallway	T8	28	2	56	4	34	2125	1.904	4046	
Customer Service Main Lobby	T8	6	2	12	4	34	2125	0.408	867	
CS Women's RR	T8	2	2	4	4	34	1417	0.136	193	Sensored
CS Not Used Office 1	T8	1	2	2	4	34	708	0.068	48	
Chuck's Office	T8	4	2	8	4	34	2125	0.272	578	
Chuck's RR	T8	4	2	8	4	34	2125	0.272	578	
First Aid Room	T8	4	2	8	4	34	2125	0.272	578	
Large Hallway	T8	16	2	32	4	34	2125	1.088	2312	
Large Hallway Men's RR	T8	7	2	14	4	34	1417	0.476	674	Sensored
Large Hallway Women's RR	T8	6	2	12	4	34	1417	0.408	578	Sensored
LH Conference Room	T8	16	2	32	4	34	2125	1.088	2312	
Neptune Info. Room	T8	8	2	16	4	34	2125	0.544	1156	
IT Common Area	T8	8	2	16	4	34	2125	0.544	1156	
Server Room	T8	6	2	12	4	34	2125	0.408	867	
Canteen + Canteen Hallway	T8	15	2	30	4	34	2125	1.02	2168	
Little Room in Canteen	U-light	2	2	4	4	34	2125	0.136	289	
Maintenance Hall	T8	11	6	66	4	34	2125	2.244	4769	
	T8	2	3	6	4	34	2125	0.204	434	
Maintenance extension	T8	4	6	24	4	34	2125	0.816	1734	
Brown & Shape Room	T8	4	2	8	4	34	2125	0.272	578	
Quality Storage	T8	1	2	2	4	34	2125	0.068	145	
	U-light	2	2	4	4	34	2125	0.136	289	

John Dorn Office	T8	2	2	4	4	34	2125	0.136	289	
Quality Walk way	T8	2	2	4	4	34	2125	0.136	289	
	T8	19	2	38	4	34	2125	1.292	2746	
Engineering Junk Room	T8	5	2	10	4	34	708	0.34	241	Sensored
	U-light	2	2	4	4	34	2125	0.136	289	
Engineering Storage	T8	2	7	14	4	34	1063	0.476	506	not used
Welding Room-Mass Flow section	T8	9	2	18	4	34	2125	0.612	1301	
Meter Testing-Mass flow Section	Metal Halide	16	1	16	4	400	2125	6.4	13600	
Marketing Hallway	T8	4	4	16	4	34	2125	0.544	1156	
Conference Canteen	T8	3	4	12	4	34	2125	0.408	867	
Office 1 Canteen	T8	2	2	4	4	34	2125	0.136	289	
IT Office 1	T8	3	4	12	4	34	2125	0.408	867	
IT Office 2	T8	2	4	8	4	34	708	0.272	193	Vacant
Customer Service Restroom	T8	2	4	8	4	34	1417	0.272	385	Sensored
Customer Service Hallway 1	T8	25	4	100	4	34	2125	3.4	7225	
Receiving Area 1	Metal Halide	20	1	20		400	2125	8	17000	
Area 2	T8	38	6	228	4	34	2125	7.752	16473	
Women's restroom Floor	T8	2	2	4	4	34	1417	0.136	193	Sensored
Men's restroom Floor	T8	4	4	16	4	34	2125	0.544	1156	
Quality Hallway	T8	3	4	12	4	34	2125	0.408	867	
Quality Office	T8	2	4	8	4	34	2125	0.272	578	
Quality Control	T8	6	2	12	4	34	2125	0.408	867	
Maintenance Restroom	T8	2	4	8	4	34	2125	0.272	578	
Machining	T8	26	6	156	4	34	2125	5.304	11271	
Machining Station 1	T8	1	2	2	4	34	2125	0.068	145	

Machining Station 2	T8	1	2	2	4	34	2125	0.068	145	
Mass Flow Testing Office 1	T8	2	4	8	4	34	2125	0.272	578	
Mass Flow Testing Office 2	T8	1	4	4	4	34	2125	0.136	289	
Chamber	T8	6	4	24	4	34	2125	0.816	1734	
Shipping	T8	8	6	48	4	34	2125	1.632	3468	
Gear Train	T8	8	6	48	4	34	2125	1.632	3468	
Gear Train Station	T8	3	2	6	4	34	2125	0.204	434	
Station	T8	9	2	18	4	34	2125	0.612	1301	
Service Parts	T8	17	6	102	4	34	2125	3.468	7370	
Outside	Fluorescent	2	2	4		100	4198	0.4	1679	Dusk till Dawn Timer is Broken
Outside Parking	Metal Halide	4	1	4		150	4198	0.6	2519	Dusk till Dawn Timer is Broken
Outside Parking	LED	1	1	1		105	4198	0.105	441	Dusk till Dawn Timer is Broken
Outside building perimeter	Metal Halide	15	1	15		400	4198	6	25185	Dusk till Dawn Timer is Broken
Outside Walkway	Fluorescent	4	1	4		100	708	0.4	283	Rarely Used
							Total	74.489	166,989	

Table 2: Recommended Lighting

Location	Light Type	# of Fixtures	# of Bulbs per Fixture	Total Bulb	Length (ft)	Wattage per bulb (W)	Annual operational hours	Total wattage (kW)	Total consumption (kWh)	Additional Notes
Marketing Conf Room	LED	9	1	9		30	708	0.270	191	
	LED	2	2	4	4	18	708	0.072	51	
	LED	3	4	12		9	708	0.108	77	
Account Office 1	LED	2	2	4	4	18	1594	0.072	115	OCC Sensor
Office 2	LED	2	2	4	4	18	1594	0.072	115	OCC Sensor
Office 3	LED	2	2	4	4	18	1594	0.072	115	OCC Sensor
Office 4	LED	2	2	4	4	18	1594	0.072	115	OCC Sensor OCC Sensor OCC Sensor
Office 5	LED	2	2	4	4	18	1594	0.072	115	
Office 6	LED	2	2	4	4	18	1594	0.072	115	
Office 7	LED	2	2	4	4	18	1594	0.072	115	OCC Sensor
Acct. Hallway 1	LED	9	2	18	4	18	2125	0.324	689	
Acct. Hallway 2	LED	2	4	8	4	18	2125	0.144	306	
	LED	1	2	2	4	18	2125	0.036	77	
Acct. Storage 1	LED	2	2	4	4	18	2125	0.072	153	
Acct. Storage 2	LED	2	2	4	4	18	2125	0.072	153	
Acct. Print Room	LED	1	2	2	4	18	2125	0.036	77	
Eng. Women's RR	LED	1	2	2	4	18	1417	0.036	51	
Eng. Men's RR	LED	1	2	2	4	18	1417	0.036	51	
Engineering Offices P1	LED	12	2	24	4	18	2125	0.432	918	
Engineering Offices P2	LED	6	2	12	4	18	2125	0.216	459	
Eng Elect Stations	LED	4	2	8	4	18	2125	0.144	306	
Eng Elect Hallway	LED	2	2	4	4	18	2125	0.072	153	

Eng Hallway	LED	16	2	32	4	18	2125	0.576	1224	
Eng Storage	LED	1	2	2	4	18	2125	0.036	77	
Eng Room	LED	8	2	16	4	18	2125	0.288	612	
Customer Service Hallway	LED	28	2	56	4	18	2125	1.008	2142	
Customer Service Main Lobby	LED	6	2	12	4	18	2125	0.216	459	
CS Women's RR	LED	2	2	4	4	18	1417	0.072	102	
CS Not Used Office 1	LED	1	2	2	4	18	708	0.036	25	
Chuck's Office	LED	4	2	8	4	18	2125	0.144	306	
Chuck's RR	LED	4	2	8	4	18	2125	0.144	306	
First Aid Room	LED	4	2	8	4	18	2125	0.144	306	
Large Hallway	LED	16	2	32	4	18	2125	0.576	1224	
Large Hallway Men's RR	LED	7	2	14	4	18	1417	0.252	357	Sensored
Large Hallway Women's RR	LED	6	2	12	4	18	1417	0.216	306	
LH Conference Room	LED	16	2	32	4	18	2125	0.576	1224	
Neptune Info. Room	LED	8	2	16	4	18	2125	0.288	612	
IT Common Area	LED	8	2	16	4	18	2125	0.288	612	
Server Room	LED	6	2	12	4	18	2125	0.216	459	
Canteen + Canteen Hallway	LED	15	2	30	4	18	1417	0.540	765	OCC Sensor
Little Room in Canteen	LED	2	2	4	4	18	1417	0.072	102	OCC Sensor
Maintenance Hall	LED	11	3	33	4	18	2125	0.594	1262	
	LED	2	3	6	4	18	2125	0.108	230	
Maintenance extension	LED	4	3	12	4	18	2125	0.216	459	
Brown & Shape Room	LED	4	2	8	4	18	2125	0.144	306	
Quality Storage	LED	1	2	2	4	18	2125	0.036	77	
	LED	2	2	4	4	18	2125	0.072	153	

John Dorn Office	LED	2	2	4	4	18	2125	0.072	153	
Quality Walk way	LED	2	2	4	4	18	2125	0.072	153	
	LED	19	2	38	4	18	2125	0.684	1454	
Engineering Junk Room	LED	5	2	10	4	18	708	0.180	128	
	LED	2	2	4	4	18	2125	0.072	153	
Engineering Storage	LED	2	7	14	4	18	1063	0.252	268	not used
Welding Room-Mass Flow section	LED	9	2	18	4	18	2125	0.324	689	
Meter Testing- Mass flow Section	LED	16	1	16	4	150	2125	2.400	5100	
Marketing Hallway	LED	4	4	16	4	18	2125	0.288	612	
Conference Canteen	LED	3	4	12	4	18	2125	0.216	459	
Office 1 Canteen	LED	2	2	4	4	18	2125	0.072	153	
IT Office 1	LED	3	4	12	4	18	1417	0.216	306	OCC Sensor
IT Office 2	LED	2	4	8	4	18	708	0.144	102	
Customer Service Restroom	LED	2	4	8	4	18	1417	0.144	204	
Customer Service Hallway 1	LED	25	4	100	4	18	2125	1.800	3825	
Receiving Area 1	LED	20	1	20		150	2125	3.000	6375	
Area 2	LED	38	3	114	4	18	2125	2.052	4361	
Women's restroom Floor	LED	2	2	4	4	18	1417	0.072	102	
Men's restroom Floor	LED	4	4	16	4	18	2125	0.288	612	
Quality Hallway	LED	3	4	12	4	18	2125	0.216	459	
Quality Office	LED	2	4	8	4	18	1417	0.144	204	OCC Sensor
Quality Control	LED	6	2	12	4	18	2125	0.216	459	
Maintenance Restroom	LED	2	4	8	4	18	2125	0.144	306	
Machining	LED	26	3	78	4	18	2125	1.404	2984	
Machine Station 1	LED	1	2	2	4	18	2125	0.036	77	
Machine Station 2	LED	1	2	2	4	18	2125	0.036	77	

Mass Flow Test Office 1	LED	2	4	8	4	18	1594	0.144	230	OCC Sensor
Mass Flow Testing Office 2	LED	1	4	4	4	18	1594	0.072	115	OCC Sensor
Chamber	LED	6	4	24	4	18	2125	0.432	918	
Shipping	LED	8	3	24	4	18	2125	0.432	918	
Gear Train	LED	8	3	24	4	18	2125	0.432	918	
Gear Train Station	LED	3	2	6	4	18	2125	0.108	230	
Station	LED	9	2	18	4	18	2125	0.324	689	
Service Parts	LED	17	3	51	4	18	2125	0.918	1951	
Outside	LED	2	2	4		40	4198	0.160	672	Dusk till Dawn timer
Outside Parking	LED	4	1	4		40	4198	0.160	672	Dusk till Dawn timer
Outside Parking	LED	1	1	1		40	4198	0.040	168	Dusk till Dawn timer
Outside building perimeter	LED	15	1	15		150	4198	2.250	9444	Dusk till Dawn timer
Outside Walkway	LED	4	1	4		40	708	0.160	113	
							Total	29.608	64785	

Anticipated Savings:

The assessment team recommends using LED bulbs in all areas. Occupancy, motion, and photo sensors are recommended to be installed in office areas, restrooms, conference, break rooms, and outside. Though LEDs are much more efficient and use less energy than other fixtures, over lighting the area can lead to higher energy costs. Reducing the number of LED bulbs and installing occupancy and motion sensors will provide the necessary light levels for occupants to function comfortably and safely while reducing energy consumption and costs.

The estimated annual *electric consumption savings*, *ECS*, for installation of the proposed lamps, ballasts, and occupancy sensors is determined by the following relation:

$$ECS = \frac{(CN \times CFW) \times H1}{1,000W/kW} - \frac{(PN \times PFW) \times H2}{1,000W/kW}$$

Where:

CN	=	Number of current fixtures,
PN	=	Number of proposed fixtures,
CFW	=	Power rating of current fixtures, (W),
PFW	=	Power rating of proposed fixtures, (W), and
H ₁	=	Operating hours of fixtures, (hr./yr.)
H ₂	=	New operating hours of fixtures, (hr./yr.)
H ₂	=	New operating hours of fixtures, (hr./yr.)

The estimated annual *electric consumption cost savings*, *ECCS*, that results from installation of the proposed lamps, ballasts, and sensors is determined by the following relation:

$$ECCS = ECS \times \$0.048/kWh$$

The estimated annual *electric demand savings*, *EDS*, for installation of the proposed lamps, ballasts, and sensors is determined by the following relation:

$$EDS = \frac{(CN \times CFW - PN \times PFW)}{1,000W/kW} \times 12 \text{ months/yr}$$

The estimated annual *electric demand cost savings*, *EDCS*, for installation of the proposed lamps, ballasts, and sensors is determined by the following relation:

$$EDCS = EDS \times \$12.64/kW$$

The *total cost savings*, *TCS*, associated with installation of the proposed lamps, ballasts, and sensors is determined by the following relation:

$$TCS = (ECCS + EDCS)$$

Table 3 shows the energy savings, energy cost savings, demand savings, the demand cost savings, and the total cost savings because of the light installation project.

Table 3: Total Cost Savings

Fixture Location	Annual Consumption Savings (kW/yr.)	Annual Demand Cost Savings (\$/yr.)	Demand Savings (kW)	Annual Consumption Cost Savings (\$/yr.)	Annual Total Cost Savings (\$/yr.)
Marketing Conf Room	446.25	95.56	7.56	21.42	116.98
	45.33	9.71	0.77	2.18	11.88
	263.50	56.42	4.46	12.65	69.07
Accounting Office 1	174.25	9.71	0.77	8.36	18.07
Office 2	174.25	9.71	0.77	8.36	18.07
Office 3	174.25	9.71	0.77	8.36	18.07
Office 4	174.25	9.71	0.77	8.36	18.07
Office 5	174.25	9.71	0.77	8.36	18.07
Office 6	174.25	9.71	0.77	8.36	18.07
Office 7	174.25	9.71	0.77	8.36	18.07
Acct Hall 1	612.00	43.68	3.46	29.38	73.06
Acct Hall 2	272.00	19.42	1.54	13.06	32.47
	68.00	4.85	0.38	3.26	8.12
Acct Storage 1	136.00	9.71	0.77	6.53	16.24
Acct Storage 2	136.00	9.71	0.77	6.53	16.24
Acct. Print Room	68.00	4.85	0.38	3.26	8.12
Eng. Women's RR	45.33	4.85	0.38	2.18	7.03
Eng. Men's RR	45.33	4.85	0.38	2.18	7.03
Engineering Offices P1	816.00	58.25	4.61	39.17	97.41
Engineering Offices P2	408.00	29.12	2.30	19.58	48.71
Engineering Elect Stations	272.00	19.42	1.54	13.06	32.47
Engineering Elect Hallway	136.00	9.71	0.77	6.53	16.24
Engineering Hallway	1088.00	77.66	6.14	52.22	129.88
Engineering Storage	68.00	4.85	0.38	3.26	8.12
Engineering Room	544.00	38.83	3.07	26.11	64.94
Customer Service Hall	1904.00	135.91	10.75	91.39	227.30
Cust Service Main Lobby	408.00	29.12	2.30	19.58	48.71
CS Women's RR	90.67	9.71	0.77	4.35	14.06
CS Not Used Office 1	22.68	4.85	0.38	1.09	5.94

Chuck's Office	272.00	19.42	1.54	13.06	32.47
Chuck's RR	272.00	19.42	1.54	13.06	32.47
1st Aid Room	272.00	19.42	1.54	13.06	32.47
Large Hall	1088.00	77.66	6.14	52.22	129.88
Large Hall Men's RR	317.33	33.98	2.69	15.23	49.21
Large Hall Women's RR	272.00	29.12	2.30	13.06	42.18
LH Conf Room	1088.00	77.66	6.14	52.22	129.88
Nep Info Room	544.00	38.83	3.07	26.11	64.94
IT Common Area	544.00	38.83	3.07	26.11	64.94
Server Room	408.00	29.12	2.30	19.58	48.71
Canteen + Hallway	1402.50	72.81	5.76	67.32	140.13
Little Room in Canteen	187.00	9.71	0.77	8.98	18.68
Maintenance Hall	3506.25	250.27	19.80	168.30	418.57
	204.00	14.56	1.15	9.79	24.35
Maintenance extension	1275.00	91.01	7.20	61.20	152.21
Brown & Shape Room	272.00	19.42	1.54	13.06	32.47
Quality Storage	68.00	4.85	0.38	3.26	8.12
	136.00	9.71	0.77	6.53	16.24
John Dorn Office	136.00	9.71	0.77	6.53	16.24
Quality Walk way	136.00	9.71	0.77	6.53	16.24
	1292.00	92.22	7.30	62.02	154.24
Engineering Junk Room	113.33	24.27	1.92	5.44	29.71
	136.00	9.71	0.77	6.53	16.24
Engineering Storage	238.00	33.98	2.69	11.42	45.40
Welding Room-Mass Flow section	612.00	43.68	3.46	29.38	73.06
Meter Test Mass flow Section	8500.00	606.72	48.00	408.00	1014.72
Marketing Hallway	544.00	38.83	3.07	26.11	64.94
Conf Canteen	408.00	29.12	2.30	19.58	48.71
Office 1 Canteen	136.00	9.71	0.77	6.53	16.24
IT Office 1	561.00	29.12	2.30	26.93	56.05
IT Office 2	90.67	19.42	1.54	4.35	23.77
Cust Service Restroom	181.33	19.42	1.54	8.70	28.12
Cust Service Hallway 1	3400.00	242.69	19.20	163.20	405.89
Receiving Area 1	10625.00	758.40	60.00	510.00	1268.40

Area 2	12112.50	864.58	68.40	581.40	1445.98
Women RR Floor	90.67	9.71	0.77	4.35	14.06
Men RR Floor	544.00	38.83	3.07	26.11	64.94
Quality Hallway	408.00	29.12	2.30	19.58	48.71
Quality Office	374.00	19.42	1.54	17.95	37.37
Quality Control	408.00	29.12	2.30	19.58	48.71
Maintenance Restroom	272.00	19.42	1.54	13.06	32.47
Machining	8287.50	591.55	46.80	397.80	989.35
Machining Station 1	68.00	4.85	0.38	3.26	8.12
Machining Station 2	68.00	4.85	0.38	3.26	8.12
Mass Flow Test Office 1	348.50	19.42	1.54	16.73	36.14
Mass Flow Test Office 2	174.25	9.71	0.77	8.36	18.07
Chamber	816.00	58.25	4.61	39.17	97.41
Shipping	2550.00	182.02	14.40	122.40	304.42
Gear Train	2550.00	182.02	14.40	122.40	304.42
Gear Train Station	204.00	14.56	1.15	9.79	24.35
Station	612.00	43.68	3.46	29.38	73.06
Service Parts	5418.75	386.78	30.60	260.10	646.88
Outside	1175.30	42.47	3.36	56.41	98.88
Outside Parking	1846.90	66.74	5.28	88.65	155.39
Outside Parking	272.84	9.86	0.78	13.10	22.96
Outside perimeter	15740.63	568.80	45.00	755.55	1324.35
Outside Walkway	170.00	36.40	2.88	8.16	44.56
TOTAL	102,864.09	\$6,813.62	539.05	\$4,937.48	\$11,751.09

Implementation Cost:

The following relation determines the estimated implementation cost, IC, associated with installation of the proposed lamps, ballasts, and sensors:

$$IC = N \times IFC$$

Where:

N = Number of installed fixtures, and
IFC = Installed cost, (\$/fixture)

Table 4 below summarizes the implementation cost for each project.

Table 4: Summary of Cost Implementation

Number Needed	Light/Fixture Type	Cost per Bulb/Fixture	Labor Cost (\$)	Implementation Cost
78	4 ft. 18W LED	\$8.00	260	\$884.00
35	150 W LED	\$114.99	233.33	\$4,257.98
4	40 W LED	\$73.00	13.33	\$305.33
12	9 W LED	\$2.00	40	\$64.00
22	Dusk till Dawn Sensor	\$30.00	220	\$880.00
13	Occupancy Sensor	\$32.80	65	\$491.40
			Total	\$6,882.72

Simple Payback Period:

The *simple payback period*, *SPP*, associated with installation of the proposed lamps, occupancy sensors and motion sensors in a given area.

$$SPP = \frac{IC}{TCS} = \frac{\$6,882.72}{\$11,751.09/yr} \times \frac{12 \text{ months}}{\text{year}}$$

$$SPP = 7.03 \text{ months}$$