

THE BENEFIT OF ENERGY EFFICIENT LIGHTING

Purpose

Operations faculty at East Carolina University have noticed that lights are being left on when no one is using them. These lights are staying on overnight and costing the university thousands of dollars in excess power usage. Controlling off-hours energy usage has proven to significantly reduce unnecessary energy consumption. To save money, we have done research to find which buildings will benefit the most from upgrading their current lighting systems.

Hypothesis

The older buildings will have outdated lighting which will cost the university more in lighting costs than the newer up to date buildings. The older buildings will not have automatic lighting controls meaning that lights will be left on due to failure to turn off lights by the last person to leave. The new buildings will not have this problem, because they will have automatically controlled lighting which will control when the lights are being used.

Procedure

- Walkthrough each building in project scope
 - Take picture of each light type
 - Count each light type
 - Make note of lighting controls
- Obtain information on each fixture type found
 - Name
 - Type of Bulb used
 - Wattage
- Check buildings for lights being left on during off-hours
- Calculate fixture wattage
 - (bulb wattage) x (number of bulbs) = fixture wattage
- Calculate building lighting usage
 - (fixture wattage) x (number of bulbs) = building lighting usage
- Calculate off-hours building lighting usage in kilowatt-hours
 - [(building wattage)/1000] x 8 = building off-hours use (per day)
 - [Off-hours use (per day)] x 30 = building off-hours use (per month)
- Calculate off-hours lighting cost per month
 - [building kwh usage (per month)] x (avg. kwh price) = off-hours lighting cost (per month)

Data Collected

BUILDING	TUBE – FLUORESCENT LIGHTING FIXTURES							
	40W QUAD	40W DOUBLE	32W QUAD	32W TRIPLE	32W DOUBLE	32W Double (U)	32W SINGLE	17W QUAD
AUSTIN	-	-	-	8	-	-	-	-
BATE	-	-	-	-	137	8	-	-
BREWSTER A	22	-	22	-	-	-	-	-
BREWSTER B	-	30	-	-	-	-	-	-
BREWSTER C	-	27	-	-	-	-	-	-
BREWSTER D	-	45	-	-	-	-	-	-
FLANAGAN	-	-	-	-	-	242	-	-
HOWELL SCIENCE COMPLEX	-	-	16	-	181	-	-	-
RAWL	-	-	-	-	-	-	-	-
RIVERS	-	-	-	37	-	-	90	99
SCIENCE & TECH	-	-	160	-	-	-	491	-
SPEIGHT	-	-	-	-	-	-	138	-
TOTAL	22	102	198	45	318	250	719	99

Off-Hours Building Energy Usage

Building	Yearly Cost
Austin	\$396.58
Bate	\$2,885.72
Brewster A	\$1,082.11
Brewster B	\$345.35
Brewster C	\$310.82
Brewster D	\$518.03
Flanagan	\$2,228.69
Howell Science Complex	\$1961.61
Rawl	\$362.62
Rivers	\$2,458.35
Science & Technology	\$3,650.39
Speight	\$635.45
Total	\$16,835.73

BUILDING	RECESSED AND ENCLOSED LIGHTING FIXTURES				
	28W ENCLOSED	56W RECESSED	32W RECESSED	28W RECESSED	26W RECESSED
AUSTIN	71	-	-	-	-
BATE	-	37	42	-	283
BREWSTER A	-	-	16	24	-
BREWSTER B	-	-	-	-	-
BREWSTER C	-	-	-	-	-
BREWSTER D	-	-	-	-	-
FLANAGAN	-	-	-	-	-
HOWELL SCIENCE COMPLEX	-	-	-	-	-
RAWL	90	-	-	-	-
RIVERS	-	70	-	-	-
SCIENCE & TECHNOLOGY	-	50	-	62	-
SPEIGHT	-	-	-	-	-
TOTAL	161	157	58	86	283

Energy Saving Options

Option 1 (**Recommended**): Install ceiling mounted occupancy sensors in all hallways. Occupancy sensors can perform a wide array of functions including controlling lights and logging area usage which can be downloaded to an excel spreadsheet (Leviton). Occupancy sensors can be purchased to fit any situation as there are many different models from which to choose.

Option 2 (**Recommended**): Upgrade all current light fixtures with the most energy efficient lamps available. Install all recessed lighting with LED lamps and switch all T12 and T8 32W with T8 28W lamps.

Option 3: Upgrade all T12 and T8 fixtures to LED fixtures (\$180/fixture). LED fixtures use 48W per fixture.

Option 4: Install and implement a timer on all hallways. Must be coordinated with occupants to ensure they know when the lights will be shut off.

Potential Savings

- Austin**
- Bate**
- Brewster A**
- Brewster B**
- Brewster C**
- Brewster D**
- Flanagan**
- Howell Science Complex**
- Rawl**
- Rivers**
- Science & Technology**
- Speight**

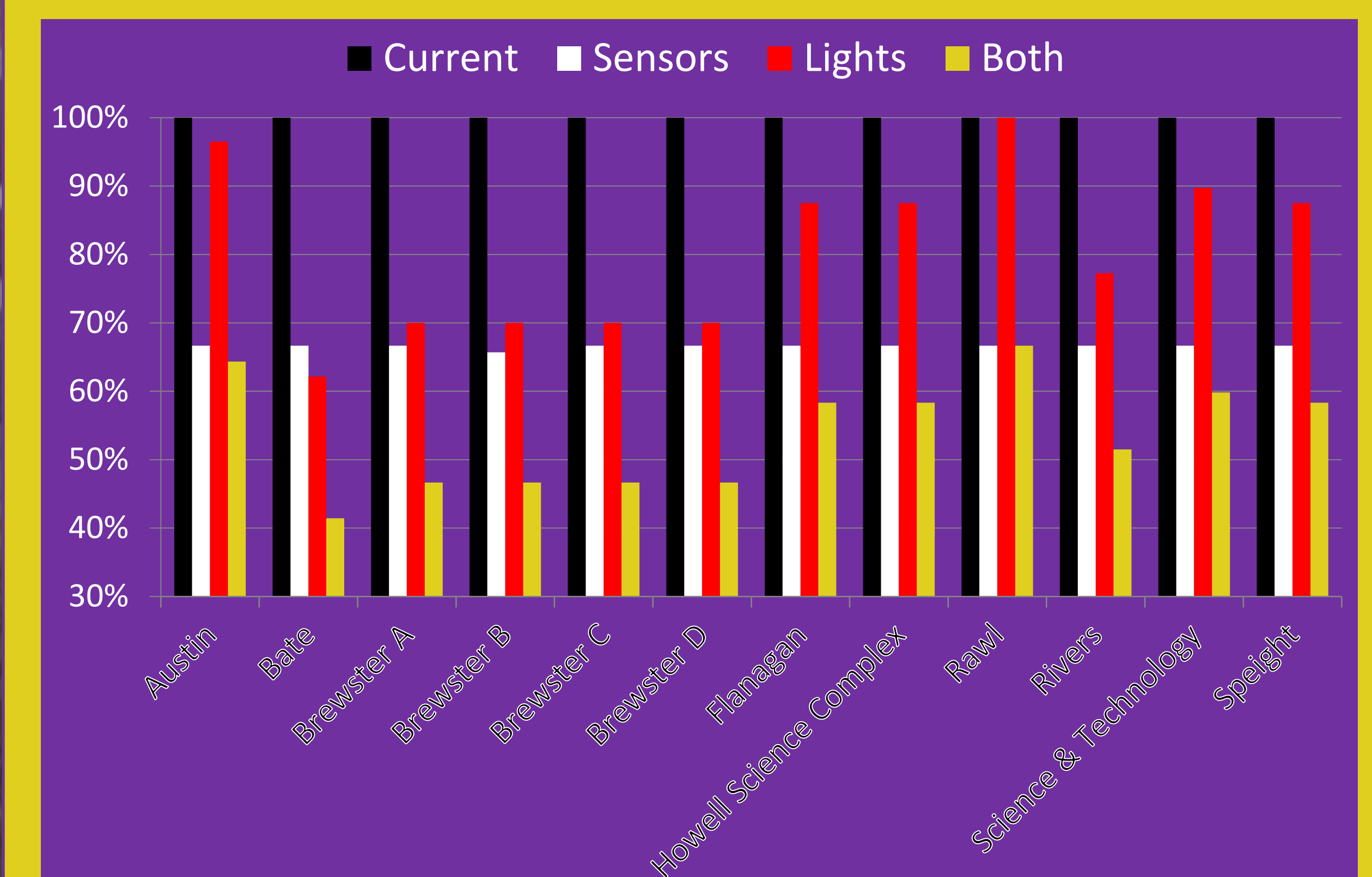
Fixture Types

TUBE - FLUORESCENT FIXTURES

- 40W QUAD
- 40W DOUBLE
- 32W QUAD
- 32W TRIPLE
- 32W DOUBLE
- 32W DOUBLE (U)
- 32W SINGLE
- 17W QUAD

RECESSED AND ENCLOSED FIXTURES

- 56W Recessed
- 32W Recessed
- 28W Recessed
- 26W Recessed
- 28W Enclosed



Purpose [Back to Poster](#)

Operations faculty at East Carolina University have noticed that lights are being left on when no one is using them. These lights are staying on overnight and costing the university thousands of dollars in excess power usage. To save money, we have done research to find which buildings will benefit the most from upgrading their current lighting systems. [Back to Poster](#)



Hypothesis [Back to Poster](#)

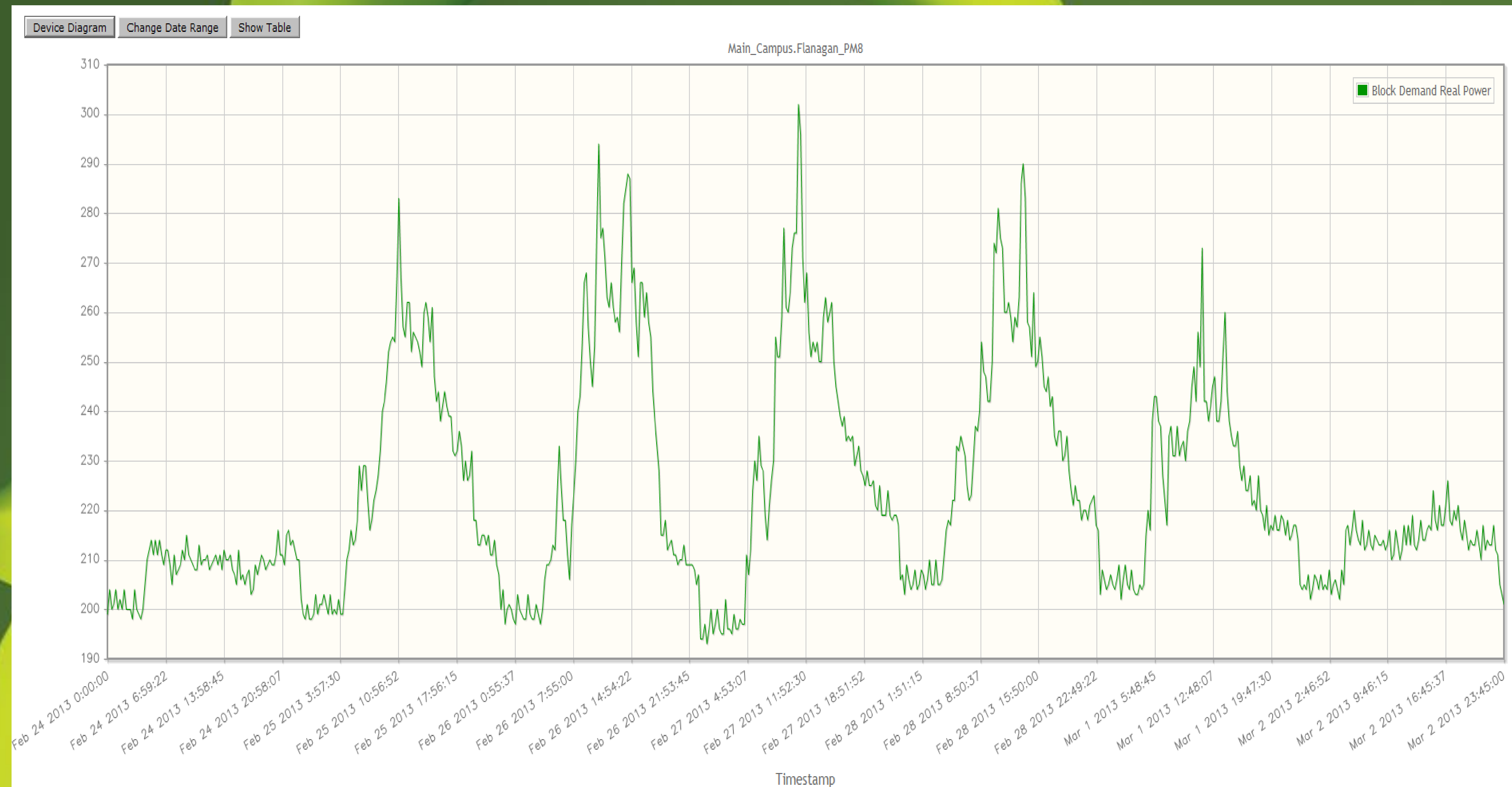
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Procedure [Back to Poster](#)

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3. Check buildings for lights being left on during off-hours
4. Calculate fixture wattage
 - (bulb wattage) x (number of bulbs) = fixture wattage
5. Calculate building lighting usage
 - (fixture wattage) x (number of bulbs) = building lighting usage
6. Calculate off-hours building lighting usage in kilowatt-hours
 - [(building wattage)/1000] x 8 = building off-hours use (per day)
 - [Off-hours use (per day)] x 30 = building off-hours use (per month)
7. Calculate off-hours lighting cost per month
 - [building kwh usage (per month)] x (avg. kwh price) = off-hours lighting cost (per month)

Controlled Lighting Effects [Back to Poster](#)



This chart was provided by Brian Pipkin (ECU facility services). The data used to create this graph was taken from energy usage of the Flanagan building on East Carolina University's campus. Flanagan is controlled using an automatic timer that turns off the majority of the building's lights at night and on weekends, which attributes to the low points on the above graph.

Data Collected [Back to Poster](#)

TUBE – FLUORESCENT LIGHTING FIXTURES								
BUILDING	40W QUAD	40W DOUBLE	32W QUAD	32W TRIPLE	32W DOUBLE	32W Double (U)	32W SINGLE	17W QUAD
AUSTIN	-	-	-	8	-	-	-	-
BATE	-	-	-	-	137	8	-	-
BREWSTER A	22	-	22	-	-	-	-	-
BREWSTER B	-	30	-	-	-	-	-	-
BREWSTER C	-	27	-	-	-	-	-	-
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FLANAGAN	-	-	-	-	-	242	-	-
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RAWL	-	-	-	-	-	-	-	-
RIVERS	-	-	-	37	-	-	90	99
SCIENCE & TECH	-	-	160	-	-	-	491	-
SPEIGHT	-	-	-	-	-	-	138	-
TOTAL	22	102	198	45	318	250	719	99

RECESSED AND ENCLOSED FIGHTING FIXTURES					
BUILDING	28W ENCLOSED	56W RECESSED	32W RECESSED	28W RECESSED	26W RECESSED
AUSTIN	71	-	-	-	-
BATE	-	37	42	-	283
BREWSTER A	-	-	16	24	-
BREWSTER B	-	-	-	-	-
BREWSTER C	-	-	-	-	-
BREWSTER D	-	-	-	-	-
FLANAGAN	-	-	-	-	-
HOWELL SCIENCE COMPLEX	-	-	-	-	-
RAWL	90	-	-	-	-
RIVERS	-	70	-	-	-
SCIENCE & TECH	-	50	-	62	-
SPEIGHT	-	-	-	-	-
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Fixture Types [Back to Poster](#)

Recessed and Enclosed Lighting Fixture

- 56W Recessed – contains two (2) 4 pin 26W lamps; can be replaced with two (2) 6W LED
- 32W Recessed – contains one (1) 32W lamp; can be replaced with 12W LED
- 28W Recessed – contains one (1) 28W lamp; can be replaced with 6W LED
- 26W Recessed – contains two (2) 4 pin 13W lamps; can be replaced with two (2) 6W LED
- 28W Enclosed – contains one (1) 28W lamp; cannot be replaced with LED due to risk of overheating

TUBE - FLUORESCENT LIGHTING FIXTURES

- 40W QUAD – contains four (4) 40W T12 fluorescent tube lamps; By law, this must be replaced; replacements include T8 (32W or 28W) four (4) lamp fixture or 48W LED fixture.
- 40W DOUBLE – contains two (2) 40W T12 fluorescent tube lamps; By law, this must be replaced; replacements include T8 (32W or 28W) two (2) lamp fixture or 48W LED fixture.
- 32W QUAD – contains four (4) 32W T8 fluorescent tube lamps; can be replaced either with four (4) 28W T8 lamps or 48W LED fixture.
- 32W TRIPLE – contains three (3) 32W T8 fluorescent tube lamps; can be replaced either with three (3) 28W T8 lamps or 48W LED fixture.
- 32W DOUBLE – contains two (2) 32W T8 fluorescent tube lamps; can be replaced either with two (2) 28W T8 lamps or 48W LED fixture.
- 32W DOUBLE (U) – contains two (2) 32W U-shaped T8 fluorescent tube lamps; can be replaced either with two (2) 28W U-shaped T8 lamps.
- 32W SINGLE – contains one (1) 32W T8 fluorescent tube lamps; can be replaced either with one (1) 28W T8 lamp.
- 17W QUAD – contains four (4) 17W T8 fluorescent tube lamps.

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OFF HOURS ENERGY USE

BUILDING	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ¹	NIGHTLY COST ²	MONTHLY COST ³	YEARLY COST ⁴
AUSTIN	2756	2.756	\$ 0.14	\$ 1.09	\$ 32.60	\$ 396.58
BATE	20054	20.054	\$ 0.99	\$ 7.91	\$ 237.18	\$ 2,885.72
BREWSTER A	7520	7.520	\$ 0.37	\$ 2.96	\$ 88.94	\$ 1,082.11
BREWSTER B	2400	2.400	\$ 0.12	\$ 0.95	\$ 28.39	\$ 345.35
BREWSTER C	2160	2.160	\$ 0.11	\$ 0.85	\$ 25.55	\$ 310.82
BREWSTER D	3600	3.600	\$ 0.18	\$ 1.42	\$ 42.58	\$ 518.03
FLANAGAN	15488	15.488	\$ 0.76	\$ 6.11	\$ 183.18	\$ 2,228.69
HOWELL SCIENCE COMPEX	13632	13.632	\$ 0.67	\$ 5.37	\$ 161.23	\$ 1,961.61
RAWL	2520	2.520	\$ 0.12	\$ 0.99	\$ 29.80	\$ 362.62
RIVERS	17084	17.084	\$ 0.84	\$ 6.74	\$ 202.06	\$ 2,458.35
SCIENCE & TECH	25368	25.368	\$ 1.25	\$ 10.00	\$ 300.03	\$ 3,650.39
SPEIGHT	4416	4.416	\$ 0.22	\$ 1.74	\$ 52.23	\$ 635.45
TOTAL	116998	116.998	\$ 5.77	\$ 46.13	\$ 1,383.76	\$ 16,835.73

¹cost based on off-peak hours price of \$0.04928/kilo-watt hour

²hourly cost multiplied by eight hours (11pm-7am)

³nightly cost multiplied by 30 nights

⁴nightly cost multiplied by 365 nights

Energy Savings Options [Back to Poster](#)

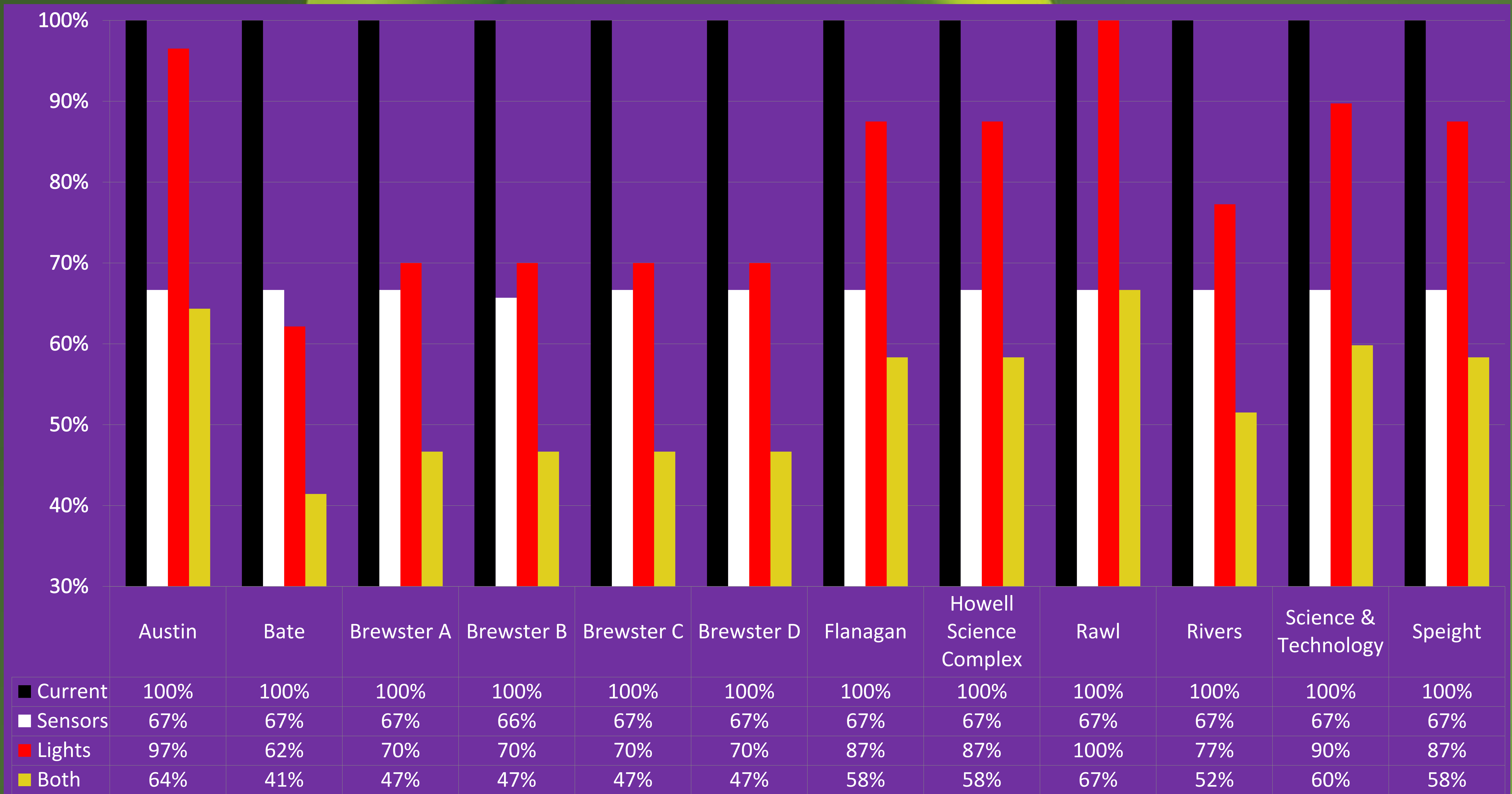
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Option 3: Upgrade all T12 and T8 fixtures to LED fixtures (\$180/fixture). LED fixtures use 48W per fixture.

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Potential Savings (1) [Back to Poster](#)



Potential Savings (2) [Back to Poster](#)

AUSTIN

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	2756	2.756	\$ 0.14	\$ 3.26	\$ 97.79	\$ 1,189.75
WITH OCC. SENSORS ¹	2756	2.756	\$ 0.14	\$ 2.17	\$ 65.19	\$ 793.16
WITH LIGHTING UPGRADE ²	2660	2.660	\$ 0.13	\$ 3.15	\$ 94.38	\$ 1,148.30
WITH BOTH	2660	2.660	\$ 0.13	\$ 2.10	\$ 62.92	\$ 765.54
SAVINGS	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 1.09	\$ 32.60	\$ 396.58
WITH LIGHTING UPGRADE ²	96	0.096	\$ 0.00	\$ 0.11	\$ 3.41	\$ 41.44
WITH BOTH	96	0.096	\$ 0.00	\$ 1.16	\$ 34.87	\$ 424.21

BATE

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	20054	20.054	\$ 0.99	\$ 23.72	\$ 711.55	\$ 8,657.17
WITH OCC. SENSORS ¹	20054	20.054	\$ 0.99	\$ 15.81	\$ 474.37	\$ 5,771.44
WITH LIGHTING UPGRADE ²	12464	12.464	\$ 0.61	\$ 14.74	\$ 442.24	\$ 5,380.62
WITH BOTH	12464	12.464	\$ 0.61	\$ 9.83	\$ 294.83	\$ 3,587.08
SAVINGS	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 7.91	\$ 237.18	\$ 2,885.72
WITH LIGHTING UPGRADE ²	7590	7.59	\$ 0.37	\$ 8.98	\$ 269.31	\$ 3,276.55
WITH BOTH	7590	7.59	\$ 0.37	\$ 13.89	\$ 416.72	\$ 5,070.09

BREWSTER A

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	7520	7.520	\$ 0.37	\$ 8.89	\$266.82	\$ 3,246.33
WITH OCC. SENSORS ¹	7520	7.520	\$ 0.37	\$ 5.93	\$ 177.88	\$ 2,164.22
WITH LIGHTING UPGRADE ²	5264	5.264	\$ 0.26	\$ 6.23	\$ 186.78	\$ 2,272.43
WITH BOTH	5264	5.264	\$ 0.26	\$ 4.15	\$ 124.52	\$ 1,514.95
SAVINGS	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 2.96	\$ 88.94	\$ 1,082.11
WITH LIGHTING UPGRADE ²	2256	2.256	\$ 0.11	\$ 2.67	\$ 80.05	\$ 973.90
WITH BOTH	2256	2.256	\$ 0.11	\$ 4.74	\$ 142.30	\$ 1,731.38

¹Occupancy sensors are assumed to eliminate 8 hours of lighting use per day ²Lighting upgrade calculations account for use of 28W T8 and LED recessed lighting

³calculated using off-peak hours cost of \$0.04928

Potential Savings (3) [Back to Poster](#)

BREWSTER B

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	2400	2.400	\$ 0.12	\$ 2.84	\$ 85.16	\$ 1,036.06
WITH OCC. SENSORS ¹	2400	2.400	\$ 0.12	\$ 1.89	\$ 56.77	\$ 690.71
WITH LIGHTING UPGRADE ²	1680	1.680	\$ 0.08	\$ 1.99	\$ 59.61	\$ 725.24
WITH BOTH	1680	1.680	\$ 0.08	\$ 1.32	\$ 39.74	\$ 483.50
SAVINGS	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS ³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS	0.000	0.000	\$ -	\$ 0.95	\$ 28.39	\$ 345.35
WITH LIGHTING UPGRADE ²	720	0.72	\$ 0.04	\$ 0.85	\$ 25.55	\$ 310.82
WITH BOTH	720	0.72	\$ 0.04	\$ 1.51	\$ 45.42	\$ 552.57

BREWSTER C

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	2160	2.160	\$ 0.11	\$ 2.55	\$ 76.64	\$ 932.46
WITH OCC. SENSORS ¹	2160	2.160	\$ 0.11	\$ 1.70	\$ 51.09	\$ 621.64
WITH LIGHTING UPGRADE ²	1512	1.512	\$ 0.07	\$ 1.79	\$ 53.65	\$ 652.72
WITH BOTH	1512	1.512	\$ 0.07	\$ 1.19	\$ 35.77	\$ 435.15
SAVINGS	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS ³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 0.85	\$ 25.55	\$ 310.82
WITH LIGHTING UPGRADE ²	648	0.648	\$ 0.03	\$ 0.77	\$ 22.99	\$ 279.74
WITH BOTH	648	0.648	\$ 0.03	\$ 1.36	\$ 40.87	\$ 497.31

BREWSTER D

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	3600	3.600	\$ 0.18	\$ 4.26	\$ 127.73	\$ 1,554.09
WITH OCC. SENSORS ¹	3600	3.600	\$ 0.18	\$ 2.84	\$ 85.16	\$ 1,036.06
WITH LIGHTING UPGRADE ²	2520	2.520	\$ 0.12	\$ 2.98	\$ 89.41	\$ 1,087.87
WITH BOTH	2520	2.520	\$ 0.12	\$ 1.99	\$ 59.61	\$ 725.24
SAVINGS	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS ³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 1.42	\$ 42.58	\$ 518.03
WITH LIGHTING UPGRADE ²	1080	1.08	\$ 0.05	\$ 1.28	\$ 38.32	\$ 466.23
WITH BOTH	1080	1.08	\$ 0.05	\$ 2.27	\$ 68.12	\$ 828.85

¹Occupancy sensors are assumed to eliminate 8 hours of lighting use per day ²Lighting upgrade calculations account for use of 28W T8 and LED recessed lighting.

³calculated using off-peak hours cost of \$0.04928

Potential Savings (4) [Back to Poster](#)

FLANAGAN

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	15488	15.488	\$ 0.76	\$ 18.32	\$ 549.54	\$ 6,686.06
WITH OCC. SENSORS ¹	15488	15.488	\$ 0.76	\$ 12.21	\$ 366.36	\$ 4,457.37
WITH LIGHTING UPGRADE ²	13552	13.552	\$ 0.67	\$ 16.03	\$ 480.85	\$ 5,850.30
WITH BOTH	13552	13.552	\$ 0.67	\$ 10.69	\$ 320.56	\$ 3,900.20
SAVINGS						
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 6.11	\$ 183.18	\$ 2,228.69
WITH LIGHTING UPGRADE ²	1936	1.936	\$ 0.10	\$ 2.29	\$ 68.69	\$ 835.76
WITH BOTH	1936	1.936	\$ 0.10	\$ 7.63	\$ 228.97	\$ 2,785.86

HOWELL SCIENCE COMPLEX

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	15488	15.488	\$ 0.76	\$ 18.32	\$ 549.54	\$ 6,686.06
WITH OCC. SENSORS ¹	15488	15.488	\$ 0.76	\$ 12.21	\$ 366.36	\$ 4,457.37
WITH LIGHTING UPGRADE ²	13552	13.552	\$ 0.67	\$ 16.03	\$ 480.85	\$ 5,850.30
WITH BOTH	13552	13.552	\$ 0.67	\$ 10.69	\$ 320.56	\$ 3,900.20
SAVINGS						
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 6.11	\$ 183.18	\$ 2,228.69
WITH LIGHTING UPGRADE ²	1936	1.936	\$ 0.10	\$ 2.29	\$ 68.69	\$ 835.76
WITH BOTH	1936	1.936	\$ 0.10	\$ 7.63	\$ 228.97	\$ 2,785.86

RAWL

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	2520	2.520	\$ 0.12	\$ 2.98	\$ 89.41	\$ 1,087.87
WITH OCC. SENSORS ¹	2520	2.520	\$ 0.12	\$ 1.99	\$ 59.61	\$ 725.24
WITH LIGHTING UPGRADE ²	2520	2.520	\$ 0.12	\$ 2.98	\$ 89.41	\$ 1,087.87
WITH BOTH	2520	2.520	\$ 0.12	\$ 1.99	\$ 59.61	\$ 725.24
SAVINGS						
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 0.99	\$ 29.80	\$ 362.62
WITH LIGHTING UPGRADE ²	0.000	0.000	\$ -	\$ -	\$ -	\$ -
WITH BOTH	0.000	0.000	\$ -	\$ 0.99	\$ 29.80	\$ 362.62

¹Occupancy sensors are assumed to eliminate 8 hours of lighting use per day ²Lighting upgrade calculations account for use of 28W T8 and LED recessed lighting.

³calculated using off-peak hours cost of \$0.04928

Potential Savings (5) [Back to Poster](#)

RIVERS

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	17084	17.084	\$ 0.84	\$ 20.21	\$ 606.17	\$ 7,375.04
WITH OCC. SENSORS ¹	17084	17.084	\$ 0.84	\$ 13.47	\$ 404.11	\$ 4,916.69
WITH LIGHTING UPGRADE ²	13200	13.200	\$ 0.65	\$ 15.61	\$ 468.36	\$ 5,698.34
WITH BOTH	13200	13.200	\$ 0.65	\$ 10.41	\$ 312.24	\$ 3,798.90
SAVINGS						
	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS ³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 6.74	\$ 202.06	\$ 2,458.35
WITH LIGHTING UPGRADE ²	3884	3.884	\$ 0.19	\$ 4.59	\$ 137.81	\$ 1,676.69
WITH BOTH	3884	3.884	\$ 0.19	\$ 9.80	\$ 293.93	\$ 3,576.14

SCIENCE & TECHNOLOGY

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	25368	25.368	\$ 1.25	\$ 30.00	\$ 900.10	\$ 10,951.18
WITH OCC. SENSORS ¹	25368	25.368	\$ 1.25	\$ 20.00	\$ 600.06	\$ 7,300.79
WITH LIGHTING UPGRADE ²	22764	22.764	\$ 1.12	\$ 26.92	\$ 807.70	\$ 9,827.05
WITH BOTH	22764	22.764	\$ 1.12	\$ 17.95	\$ 538.47	\$ 6,551.37
SAVINGS						
	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS ³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 10.00	\$ 300.03	\$ 3,650.39
WITH LIGHTING UPGRADE ²	2604	2.604	\$ 0.13	\$ 3.08	\$ 92.39	\$ 1,124.13
WITH BOTH	2604	2.604	\$ 0.13	\$ 12.05	\$ 361.63	\$ 4,399.81

SPEIGHT

POWER CONSUMPTION	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY COST ³	DAILY COST	MONTHLY COST	YEARLY COST
CURRENT USAGE	4416	4.416	\$ 0.22	\$ 5.22	\$ 156.69	\$ 1,906.36
WITH OCC. SENSORS ¹	4416	4.416	\$ 0.22	\$ 3.48	\$ 104.46	\$ 1,270.90
WITH LIGHTING UPGRADE ²	3864	3.864	\$ 0.19	\$ 4.57	\$ 137.10	\$ 1,668.06
WITH BOTH	3864	3.864	\$ 0.19	\$ 3.05	\$ 91.40	\$ 1,112.04
SAVINGS						
	TOTAL POWER (WH)	TOTAL POWER (KWH)	HOURLY SAVINGS ³	DAILY SAVINGS	MONTHLY SAVINGS	YEARLY SAVINGS
WITH OCC. SENSORS ¹	0.000	0.000	\$ -	\$ 1.74	\$ 52.23	\$ 635.45
WITH LIGHTING UPGRADE ²	552	0.552	\$ 0.03	\$ 0.65	\$ 19.59	\$ 238.29
WITH BOTH	552	0.552	\$ 0.03	\$ 2.18	\$ 65.29	\$ 794.31

¹Occupancy sensors are assumed to eliminate 8 hours of lighting use per day ²Lighting upgrade calculations account for use of 28W T8 and LED recessed lighting.

³calculated using off-peak hours cost of \$0.04928

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