Proposed Parking Structure
Example Life Cycle Cost Analysis

TABLE 1. LIFE CYCLE COST ANALYSIS

Lighting System Information

System ID	Option #1	Option #2	Option #3a	Option #3b	Option #4	Option #5a	Option #5b	Option #6a	Option #6b
Luminaire	Lithonia TDM 232 al	PRU-11 2T5HO	ta LED 4 bars	ta LED 5 bars	Lithonia PGR	KIM PGL1	ECO 100W	LIMELIGHT	LIMELIGHT
Lens/Refractor	p Around Prismatic Acrylic	ated Metal Uplight	Clear acrylic	Clear acrylic	Clear acrylic	Clear acrylic sm	atic Acrylic	Prismatic Acrylic	Prismatic Acrylic
Lamp	Four, 4-ft, T8 fluorescent	T5HO fluorescent	LED	LED	175W MH/PS	85W Induction	0W Induction	-ft, T8 fluorescent	-ft, T8 fluorescent
System Voltage	277 V	277 V	277 V	277 V	277 V	277V	277V	277 V	277 V
Longitudinal Spacing, ft	36	36	36	36	36	36	36	36	36
Lateral Spacing, ft	20	20	20	20	20	20	20	20	20
Ceiling Height, ft	10.913	10.913	10.913	10.913	10.913	10.913	10.913	10.913	10.913
Mounting Height, ft	10.50	10.50	10.50	10.50	9.83	9.83	9.83	10.50	10.50
Covered Floor Area, sf (7 levels)	478,100	478,100	478,100	478,100	478,100	478,100	478,100	478,100	478,100
Area/Luminaire, sf	675	675	675	675	675	675	675	675	675

Illuminance Calculations

Horizontal Illuminance on Pavement									
Average	10.9	10.4	8.3	10.3	10.2	4.9	5.4	10.8	4.1
Maximum	19.8	21.3	11.8	14.7	15.2	9.4	10.3	20.9	8.6
Minimum	4.1	3.1	3.6	4.5	4.8	1.8	1.8	4.0	1.1
Avg/Min Ratio	2.7	3.4	2.3	2.3	2.1	2.7	3.0	2.7	3.7
Max/Min Ratio	4.8	6.9	3.3	3.3	3.2	5.2	5.7	5.2	7.8

Luminaire Information

Maufacturer	Lithonia	Prudential	Beta	Beta	Lithonia	KIM	ECO	TWISTHINK	TWISTHINK
Model #	TDMW 232	PRU-11	LED T5	LED T5	PGR	PGL1		LIMELIGHT	LIMELIGHT
IES Photometric File	L6402.ies								
Number of Luminaires	708	708	708	708	708	708	708	708	708
Lamps/Luminaire	4	2	1	1	1	1	1	3	1
Watts/Luminaire	112	123	104	128	208	86.8	112	111	39
Luminaire Cost (including lamps)	$125.00	$200.00	$800.00	$1,000.00	$200.00	$400.00	$400.00	$425.00	$425.00
Installation Hours/Luminaire	2.5	3.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Hourly Labor Installation Cost	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00
Installation Cost/Luminaire	$375.00	$450.00	$375.00	$375.00	$375.00	$375.00	$375.00	$375.00	$375.00
Cleaning Hours/Luminaire	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Houlry Labor Cleaning Cost	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00
Cleaning Cost/Luminaire	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00

Lamp Information

Lamp Manufacturer	Sylvania	Sylvania	Beta	Beta	Venture	Philips	Philips	GE	GE	
Lamp Model #	F032T8	54/841/C/HO/ECO	LED	LED	MS175W/BU/PS	85W-if	100W - if 32	T8 High Lumen	32T8 High Lumen	
Lamp Watts	32	54	104	128	175	85	100	32	32	
Lamp Life	30,000	35,000	100,000	100,000	15,000	100,000	100,000	42,000	42,000	
Initial Lumens	11,800	9,800	6,800	8,500	17,000	6,000	6,000	9,300	3,100	
Lamp Lumen Depreciation	0.90	0.90	0.70	0.70	0.70	0.70	0.70	0.88	0.88	
Dirt Depreciation	0.90	0.90	1.00	1.00	0.90	0.80	0.80	0.90	0.90	
Ballast Factor	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.15	1.15	
Temperature Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Equipment Factor	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00	1.00	
Toal Light Loss Factor	0.71	0.81	0.70	0.70	0.50	0.56	0.56	0.91	0.91	
Maintained Lumens	8,411	7,938	4,760	5,950	8,568	3,360	3,360	8,470	2,823	
Cost/Lamp	$2.00	$4.00	$800.00	$1,000.00	$20.00	$250.00	$250.00	$3.00	$3.00	$3.00
Relamp Labor Hours/Lamp	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.2
Hourly Labor Relamping Cost	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00
Relamp Labor Cost/Lamp	$15.00	$15.00	$30.00	$30.00	$30.00	$30.00	$30.00	$15.00	$15.00	$15.00

Ballast Information

Ballast Type	Electronic	Electronic	None	None	CWA	Magnetic	Magnetic	Electronic	Electronic	
Ballast Watts	-16	15	0	0	33	1.8	12	15	7	
Ballast Life, hrs	100,000	100,000	0	0	60,000	100,000	100,000	100,000	100,000	100,000
Ballast Factor	0.88	0.88	1.00	1.00	1.00	1.00	1.00	1.15	1.15	1.15
Power Factor	0.90	0.90	1.00	1.00	0.90	1.00	1.00	0.90	0.90	0.90
Ballast Cost/Luminaire	$40.00	$40.00	$0.00	$0.00	$25.00	$200.00	$200.00	$40.00	$40.00	$40.00
Reballast Labor Hours/Luminaire	1	1			1	1	1	1	1	1
Hourly Labor Reballasting Cost	$75.00	$75.00			$75.00	$75.00	$75.00	$75.00	$75.00	$75.00
Reballast Cost/Luminaire	$75.00	$75.00			$75.00	$75.00	$75.00	$75.00	$75.00	$75.00

Energy Consumption:

Energy Unit Cost, $/KWH	0.10									
Avg Weekday Operating Hours/Day	24	24	24	24	24	24	24	24	24	
Avg Saturday Operating Hours	24	24	24	24	24	24	24	24	24	
Avg Sunday Operating Hours	24	24	24	24	24	24	24	24	24	
Annual Operating Hours	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	
Total Lighting Load, KVA	88	97	74	91	164	61	79	87	31	
Watts/SF	0.17	0.18	0.15	0.19	0.31	0.13	0.17	0.16	0.06	
Energy Unit Cost, $/KWH	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	

Economic Analysis

System ID	Option #1	Option #2	Option #3a	Option #3b	Option #4	Option #5a	Option #5b	Option #6a	Option #6b	
Initial Costs:										
Lighting Equipment Cost	$88,500	$141,600	$566,400	$708,000	$141,600	$283,200	$283,200	$300,900	$300,900	
Lighting Installation Cost	$265,500	$318,600	$265,500	$265,500	$265,500	$265,500	$265,500	$265,500	$265,500	
Wiring Unit Cost, $/KVA	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	
Wiring Cost	$264,320	$290,280	$220,896	$271,872	$490,880	$184,363	$237,888	$261,960	$92,040	
Service/Distribuion Unit Cost, $/KVA	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	
Service/Distribution Cost	$264,320	$290,280	$220,896	$271,872	$490,880	$184,363	$237,888	$261,960	$92,040	
Lighting Control Equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Instrumentation & Controls Installation	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Initial Cost	$882,640	$1,040,760	$1,273,692	$1,517,244	$1,388,860	$917,426	$1,024,476	$1,090,320	$750,480	
Annual Energy Costs:	$69,463	$76,286	$64,502	$79,387	$129,003	$53,834	$69,463	$68,843 (run 3 24/7)	$24,188 (run 1 24/7)	$0 (run control)
Annual Maintenance Costs:										
Lamp Burnouts/Year	413	177	Replace Once	Replace Once	207	31	31	222	74	150
Annual Relamping Cost	$7,021	$3,363	$0	$0	$10,350	$8,680	$8,680	$3,996	$1,332	$2,700
BalLast Failures/Year	0.17	0.17	NA	NA	0.28	0.17	0.17	0.17	0.17	0.15
Annual Reballasting Cost	$13	$13	$0	$0	$21	$13	$13	$13	$13	13
Annual Cleaning Cost	$6,195	$2,655	$0	$0	$3,105	$465	$465	$3,330	$1,110	$ 3,330
Total Annual Maintenance Cost	$13,229	$6,031	$0	$0	$13,476	$9,158	$9,158	$7,339	$2,455	$6,043
Total Life Cycle Cost:										
Useful Life of Lighting System, yrs	25	25	25	25	25	25	25	25	25	25
Inflation Factor	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Life Cycle Energy Cost	$3,636,018	$3,993,127	$3,376,302	$4,155,449	$6,752,605	$2,817,914	$3,636,018	$3,603,553	$1,266,113	$0
Life Cycle Maintenance Costs	$692,451	$315,676	$831,900	$973,500	$705,406	$479,357	$479,357	$384,143	$128,492	$316,318
Initial Cost	$882,640	$1,040,760	$1,273,692	$1,517,244	$1,388,860	$917,426	$1,024,476	$1,090,320	$750,480	$1,090,320
Total Life Cycle Cost	$5,211,109	$5,349,563	$5,481,894	$6,646,193	$8,846,871	$4,214,697	$5,139,851	$5,078,016	$2,145,086	$1,406,638
Amortized Annual Cost	$208,444	$213,983	$219,276	$265,848	$353,875	$168,588	$205,594	$203,121	$85,803	$56,266
Ratio to MH	59%	60%	62%	75%	100%	48%	58%	57%	24%	16%
Cost Ratios:										
Life Cycle Energy Cost	70%	75%	62%	63%	76%	67%	71%	71%	59%	
Life Cycle Maintenance Costs	13%	6%	15%	15%	8%	11%	9%	8%	6%	
Initial Cost	17%	19%	23%	23%	16%	22%	20%	21%	35%	
Total Life Cycle Cost	100%	100%	100%	100%	100%	100%	100%	100%	100%	
LCC per fixture per year	$294	$302	$310	$375	$500	$238	$290	$287	$121	
LCC/SF/YR	$0.44	$0.45	$0.46	$0.56	$0.74	$0.35	$0.43	$0.42	$0.18	