

LEDs

INPUT

OUTPUT

LONGEVITY

A



ENERGY



GUIDE



TIME



LABOR



BY



MATERIALS



litelab

COST

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MR16 BY THE NUMBERS

	MR16	MR16 rLED ¹	C2- LED
INPUT	50w	7w	20w
OUTPUT	600 LUMENS	400 LUMENS	1450 LUMENS ²
CRI	100	95	98
LIFE	2000 hrs	25,000 hrs L70	66,500 hrs L70
COST	\$3.50 / ea.	\$25.00 / ea.	CONSULT FACTORY

ANNUAL COST
1000 UNITS
60 HRS/WK

MR16

MR16
rLED

C2-
LED

156,000 kWh

\$21,840.00

ANNUALLY

21,840 kWh

\$3,075.60

ANNUALLY

62,400 kWh

\$8,736.00

ANNUALLY³

ENERGY

267 HRS

ANNUALLY

45 HRS

ANNUALLY

AMORTIZED

7 HRS

ANNUALLY

AMORTIZED

TIME

\$12,015.00

ANNUALLY

\$2,025.00

ANNUALLY

AMORTIZED

\$300.00

ANNUALLY

AMORTIZED

LABOR

\$7,000.00

ANNUALLY

\$8,333.33

ANNUALLY

AMORTIZED

\$0.00⁴

ANNUALLY

MATERIALS

\$40,855.00

\$13,433.93

\$9,036.00

ANNUAL
COST

PAR38 BY THE NUMBERS

	PAR38 ⁵	PAR38 rLED ⁶	C3- LED
INPUT	250w	25w	30w
OUTPUT	3000 LUMENS	2500 LUMENS	3000 LUMENS
CRI	99	92	98
LIFE	4000 hrs	50,000 hrs L70	66,500 hrs L70
COST	\$40.00 / ea.	\$40.00 / ea.	CONSULT FACTORY

ANNUAL COST
1000 UNITS
60 HRS/WK

PAR38

PAR38
rLED

C3-
LED

780,000 kWh
 \$109,200.00
 ANNUALLY

78,000 kWh
 \$10,920.00
 ANNUALLY

93,600 kWh
 \$13,104.00
 ANNUALLY

ENERGY

267 HRS
 ANNUALLY

27 HRS
 ANNUALLY
 AMORTIZED

7 HRS
 ANNUALLY
 AMORTIZED

TIME

\$12,015.00
 ANNUALLY

\$1,201.05
 ANNUALLY
 AMORTIZED

\$300.00
 ANNUALLY
 AMORTIZED

LABOR

\$80,000.00
 ANNUALLY

\$16,000.00
 ANNUALLY
 AMORTIZED

\$0.00⁴
 ANNUALLY

MATERIALS

\$92,124.00

\$28,121.00

\$13,404.00

LIFETIME
 COST

AR111 BY THE NUMBERS

	AR111	AR111 rLED ⁷	C2- LED
INPUT	50w	12.5w	16w
OUTPUT	4° 45,000 CBCP	8° 16,740 CBCP	6° 24,481 CBCP
CRI	99	95	90+
LIFE	3000 hrs	25,000 hrs L70	66,500 hrs L70
COST	\$11.00 / ea.	\$45.00 / ea.	CONSULT FACTORY

ANNUAL COST
100 UNITS
60 HRS/WK

AR111

AR111
rLED

C2-
LED

15,600 kWh

\$2,184.00

ANNUALLY

3,900 kWh

\$546.00

ANNUALLY

4,992 kWh

\$699.00

ANNUALLY

ENERGY

27 HRS

ANNUALLY

5 HRS

ANNUALLY

AMORTIZED

0.7 HRS

ANNUALLY

AMORTIZED

TIME

\$1,215.00

ANNUALLY

\$225.00

ANNUALLY

AMORTIZED

\$31.50

ANNUALLY

AMORTIZED

LABOR

\$2,200.00

ANNUALLY

\$1,500.00

ANNUALLY

AMORTIZED

\$0.00⁴

ANNUALLY

MATERIALS

\$5,599.00

\$2,271.00

\$730.50

LIFETIME
COST

INPUT & CONTROLS

	HALOGEN	rLED	LED
EFFICACY	25 L/W +/-	100 L/W+	100 L/W+
POWER	< (4)wLED	> (1/4)w HALOGEN	> (1/4)w HALOGEN
DIMMING	MLV ELV 0-10v SCREENS	ELV 0-10v WIRELESS (LIMITED)	ELV, 0-10v, DALI, DMX, WIRELESS, ON-BOARD
COMPATIBILITY	✓	?	✓
NOISE	X	√ ⁸	X

HALOGEN

rLED

LED

OUTPUT

10% OUTPUT

(LOW EFFICACY)

70% OUTPUT

(HIGH EFFICACY)

70% OUTPUT

(HIGH EFFICACY)

380-750NM
(LIGHT)

90% OUTPUT

30% OUTPUT

30% OUTPUT

700NM-1MM
(HEAT)

$75\mu\text{WLUMEN}^{-1}$

$<1\mu\text{WLUMEN}^{-1}$

$<1\mu\text{WLUMEN}^{-1}$

100-400NM
(UV)

99

97

(HIGH CRI LAMPS)

97

(HIGH CRI)

600-750NM
(R9)

UV FILTER
SCREENS

SCREENS
DIFFUSION
LENSES

LOCAL DIMMING

CONTROL

CRI & TM-30

	CRI	TM-30	
REFERENCE SAMPLES	8	99	
METRICS	CRI R_a [FIDELITY]	TM-30 R_f [FIDELITY]	TM-30 R_g [SATURATION]
SCALE	100	100	100
ADVANTAGES	SIMPLE ESTABLISHED FAMILIAR	COMPREHENSIVE [SAMPLES] INCLUSIVE [SOURCES] UNIFORM MODEL [CAM02] EXHAUSTIVE [$R_f + R_g$]	
FAULTS	LIMITED COLOR REFERENCES <i>INCANDESCENT BIASED</i> NON-UNIFORM CIE 1960 UV COLOR MODEL	COMPLEX NEW LOW ADOPTION	

LIFE

HALOGEN

rLED

LED

42.9 MJ/20⁶
LUMEN HOURS

132 MJ/20⁶
LUMEN HOURS

264 MJ/20⁶
LUMEN HOURS
(ESTIMATED)

EMBODIED
ENERGY

13,000 MJ/
20⁶ LUMEN
HOURS

3,540 MJ/20⁶
LUMEN HOURS

1,630 MJ/20⁶
LUMEN HOURS

USE PHASE
ENERGY

14,072 MJ/
20⁶ LUMEN
HOURS

3,804 MJ/20⁶
LUMEN HOURS

1,894 MJ/20⁶
LUMEN HOURS

TOTAL
LIFETIME
ENERGY

1,691 KG
CO₂e/20⁶
LUMEN HOURS

459 KG
CO₂e/20⁶
LUMEN HOURS

229 KG
CO₂e/20⁶
LUMEN HOURS

TOTAL
EMBODIED
CARBON

NON-HAZARDOUS
NON-RECYCLABLE
STANDARD
DISPOSAL

HAZARDOUS
RECYCLABLE
REQUIRES SPECIAL
DISPOSAL

HAZARDOUS
RECYCLABLE
REQUIRES SPECIAL
DISPOSAL

DISPOSAL

NOTES

NOTES TO PAGES

- 1 REFERENCE LAMP: SORAA 7.5 W VIVID MR16 GU 5.3 BASE
- 2 LUMEN OUTPUT FOR A LITELAB C2- SERIES 2" DIAMETER LED IS MORE THAN 3 TIMES THAT FOR AN LED REPLACEMENT LAMP. WHILE COST ON THE NEXT PAGE IS CALCULATED USING EQUIVALENT FIXTURE COUNTS, IT IS POSSIBLE TO REDUCE THE TOTAL NUMBER OF FIXTURES USED BY UP TO 1/3 BY USING HIGHER OUTPUT LEDs.
- 3 BASED ON NOTE 2 ABOVE, USING FEWER LAMPS WILL LOWER ENERGY CONSUMPTION, AND HENCE COST.
- 4 ESTIMATE DOES NOT INCLUDE COST OF THE FIXTURE, AND IS ONLY REPRESENTATIVE OF MAINTENANCE COSTS OVER 20 YEARS, THE ESTIMATED LIFETIME OF AN INTEGRAL FIXTURE.
- 5 HIGH OUTPUT PAR38 LAMPS WILL BE DISCONTINUED IN JULY 2023 DUE TO CODE RESTRICTIONS.
- 6 REFERENCE LAMP: GREEN CREATIVE 25 W HO PAR38
- 7 REFERENCE LAMP: SORAA 12.5 W VIVID AR111
- 8 NOISE: SOME LED REPLACEMENT LAMPS ARE SENSITIVE TO FEEDBACK. LAMPS AFFECTED BY FEEDBACK WILL STROBE SYNCHRONOUSLY. TO CORRECT THE ISSUE, EITHER REMOVE LAMPS UNTIL FEEDBACK IS REDUCED TO BELOW THE DAMPENING THRESHOLD OF THE LAMP OR SOURCE AN ALTERNATIVE LAMP.

- a THE HIGHEST COST FOR AN INTEGRAL LED FIXTURE IS THE FIXTURE ITSELF. HOWEVER, MOST LED FIXTURES HAVE AN ESTIMATED LIFETIME OF OVER 20 YEARS. WHEN CONVERTING TO LED, IT IS IMPORTANT TO CONSIDER THE AGE OF THE EXISTING INFRASTRUCTURE, AVAILABILITY OF COMPONENTS AND THE COST OF LED REPLACEMENT LAMPS OVER TIME. THERE ARE ALSO PROGRAMS TO HELP OFFSET THE COST OF CONVERTING TO LED, INCLUDING THOSE PROVIDED BY LOCAL MUNICIPALITIES, STATES AND EVEN ENERGY PROVIDERS.
- b CRI WAS DEVELOPED USING AN INCANDESCENT REFERENT. AS A RESULT, HALOGEN SOURCES ARE ALMOST ALWAYS LISTED WITH 99+ CRI. TM-30 WAS DEVELOPED TO REMOVE THIS BIAS, AND PROVIDE A MORE CONTEMPORARY MEANS FOR EVALUATING COLOR RENDERING.
- c 90% OF THE OUTPUT OF A HALOGEN LAMP IS HEAT. THIS RESULTS NOT ONLY IN SUBSTANTIALLY LOW EFFICACY COMPARED TO LEDs, BUT IT CAN CONTRIBUTE TO THERMAL GAIN. DEPENDING ON SEASON AND REGION, THIS CAN CONTRIBUTE SIGNIFICANTLY TO BUILDING ENERGY CONSUMPTION.
- d DATA FOR THE EMBODIED ENERGY AND CARBON OF LEDs IS FAIRLY SPARSE; THE INFORMATION PROVIDED IS ESTIMATED FROM DOE REPORTS THAT ARE SEVERAL YEARS OLD. IT HAS BEEN ADJUSTED TO ALIGN WITH THE ENERGY PROFILES OF CONTEMPORARY SOURCES.

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