Magnolia Field Lights Proposal

USF Student Green Energy Fund

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Idea/Initiative

The idea is to replace the current metal halide lights in the Magnolia Fields (Tampa campus) by LED lights with the purpose of drastically reducing the energy consumption and contributing towards a more sustainable campus.

Current status

Currently there are 6 light poles (3 on each side of the field, as shown in Figures 1 and 2). Each one of the 6 poles holds 13 metal halide lamps. That makes a total of 78 lamps. Each lamp consumes a nominal power of 1.58 kilowatts, totaling 123.24 kilowatts for all lamps. However, consumption data provided by the USF utilities department as well as the Musco lighting company indicates that the actual power consumed when all lamps are on is 131 kilowatts.

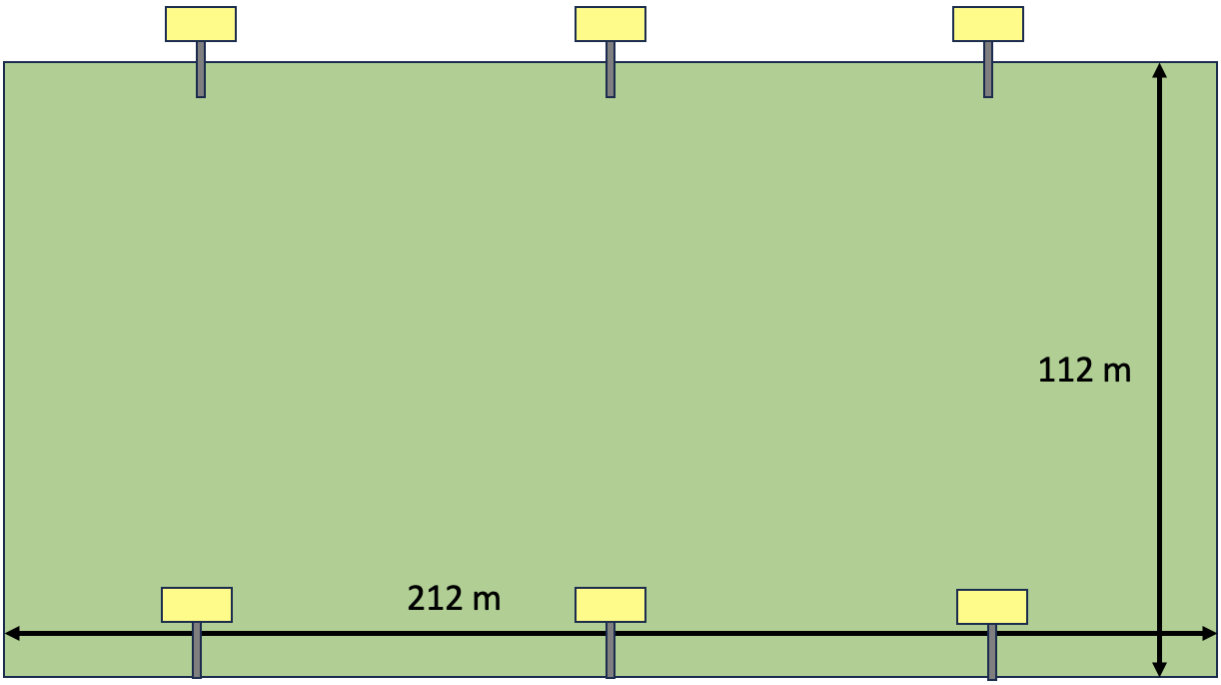

Figure 1: Sketch of Magnolia Field dimensions and light poles.

Figure 2: Current satellite view of Magnolia fields.

The Magnolia field lights are only used in the Fall and Spring semesters. They are turned on 4 days/week from sunset to 12:15AM. Here is an approximate breakdown of the lights usage during each semester.

<u>Fall</u>

September: 68 hours
October: 74 hours
November: 98 hours

<u>Spring</u>

February: 72 hours
March: 83 hours
April: 86 hours

Total annually: ~480 hours.

Considering the total power consumption of 123 kilowatts and the estimated annual hours (480 h) yields a total energy consumption of 59,040 kWh per year. This is similar to the energy consumption data provided by USF Utilities for the year 2022, which is 60,722 kWh.

New plan proposition

Replace the current 78 metal halide lamps with 54 TLC-LED lamps (10 of the TLC-LED-1200, and 44 of the TLC-LED-1500). The average power consumption of one of the new LED lamps is 1.3656 kilowatts. The total power consumption for the 54 lamps is 73.74 kilowatts, as opposed to the current 123 kilowatts.

The annual energy consumption with the new LED lamps would total 35,040 kWh, which is a 41% reduction with respect to the 60,722 kWh consumed in 2022. Given the cost of the kWh in Tampa ($0.17/kWh), the new plan would imply $4,080 in savings per year.

Benefits for a more sustainable campus

The new LED lights will require 73 kW of power as opposed to the 123 kW required by the current lights. This translates into a reduction of more than 40% in energy consumption with the new LED lights. In terms of energy, the total amount saved each year will be 24,000 kWh. This is equivalent to 17 metric tons of CO_2 emissions avoided or 1,887 gallons of gasoline saved each year.

The lamp life for the current metal halide lamps is 5,000 hours. Given the current usage of the fields (480 hours/year), these lamps will last 10.4 years. That is, the current metal halide lights must be replaced every 10.4 years. On the contrary, the new LED lamps have a life expectancy of 81,000 hours, and therefore they would need to be replaced every 168 years. This implies a major step forward reducing waste material generation in our campus and hence significantly increasing its sustainability. In the span of 168 years, our campus would have to dispose of 1,240 metal halide lamps versus 54 LED lamps.

In terms of sustainability, over the lifetime of the LED lamps (~168 years), the amount of metric tons of CO_2 avoided would be 2,766 or in terms of gasoline, it would equivalent to not burning 311,288 gallons of gasoline.

Economic benefits for USF

The direct economic benefit obtained with the new LED lamps relates to the electric bill. By saving around 24,000 kWh each year, USF would save $4,080 per year. In addition, the maintenance cost for metal halide lamps in our campus amount to approximately $8,000 each year. This information can be obtained from the Recreation and Wellness department here at USF. In total, USF will be saving $12,080 every year. Also, once the current warranty expires for the metal halide lamps, the cost of relamping is approximately $60,000 (see appendix for details), which would take place every 11-13 years. With the new LED lights, we would avoid 10 of these metal halide relamping cases during the 168 years they function for.

Partners

Our partners for this project will be the Recreation and Wellness department at USF.

Continued maintenance

The company in question offers a 25-year warranty covering all materials and labor for any repair when necessary. After 25 years, the Recreation and Wellness department at USF will be in charge of maintaining the lights.

Project implementation

We have already reached out to the company that installed the current halide lights and they have already calculated the conversion to LED lights, since they have the photometrics measurements for the fields. The company will replace the crossarm assemblies and install the new LED lamps. No other changes in the infrastructure are required. The company can replace one pole per day without interrupting the schedule of intramural activities taking place during the semester.

There are six poles in total. Each pole currently holds 13 lamps, so there is a total of 78 metal halide lamps. Given the greater luminous power of LED lamps and their ability to direct light to specific target areas, it will only be necessary to have a total of 54 lamps, that is, 9 lamps per pole.

Timeline

Once the purchase order is received, the company spends 8 weeks manufacturing the new crossarm assemblies. After that, it will take 1-2 days to replace the lamps for each pole. Since there are 6 poles in the Magnolia Fields, this part of the project would take 8-12 business days. Therefore, from the time the purchase order is placed, it will take approximately 11 weeks to have the new LED lamps fully functioning on the field.

Budget

The total cost of this projects amounts to $332,375 (see appendix for quote). This includes:

- 54 new LED lamp.
- 6 new crossarm assemblies.
- Remote electrical component enclosure and pole wire harness.
- 25-year warranty and maintenance including all materials and labor.
- Guaranteed constant light for 25 years.
- Proactive monitoring.
- Installation of poles and fixtures.

Return of investment

The payback period is estimated to be 30 years. Here is the breakdown: during the next 11 years, USF will save $4,080 from the electricity bill. No maintenance cost yet since the warranty covers it until 2035. After 2035, the maintenance cost for halide lights is estimated to be $8,000 per year. Also, between 2037 and 2040 another relamping would be necessary since halide lights last about 11 years. The cost of relamping is around $60,000. Considering all these costs, which will be avoided with LED lights, the return of investment is at 29.8 years, thus by 2054.

After that, considering the same maintenance and relamping costs as well as electricity savings, the total amount saved until the LED lights need to be replaced in 2190 would be $2,230,800.

Appendix

Cost of relamping: these numbers were provided by Musco, the same employee that provided us with the budget quote.

- The cost of each halide lamp is $250. For 78 halide lamps, this amounts to $19,500.
- The bucket truck rental currently costs $3,000 per day. Assuming 10 days of work to replace all 78 lamps, the total would be $30,000.
- Labor was estimated to be $150/hour. Considering the 10 full days of work, the total would be $12,000.

Therefore, the total cost of relamping is approximately $61,500.

Musco Sports Lighting * 2220 Cluster Oak Dr. #H * Clermont, FL 34711
Telephone (352) 243-9999 * Fax (352) 243-2791

Budget Estimate

USF MAGNOLIA FIELDS
TAMPA, FL

Date: November 22, 2023

Field Description: Per Musco Lighting Design #225825B

Light Structure Green™ System delivered to your site in Five Easy Pieces™

- 6 x Galvanized Steel Pole top crossarm assemblies
- UL Listed remote electrical component enclosure & Pole length wire harness
- Factory-aimed and assembled LED luminaires

Also Includes:

- 25 Year warranty and maintenance program that includes all materials, labor
- Guaranteed of a constant light for 25 years.
- Re-Use existing Control Link® System for flexible control and facility management of your lighting system.
- 25 year proactive monitoring
- 80% less glare light than other open faced LED technology
- Installation of poles & fixtures as per attached scope of Work

Materials + Retrofit

Field Description	QTY	$ Per	Total
Soccer Fields Installation of new crossarms & fixtures Surge Protection Pole Grounding			
		TOTAL $	**332,375**

- Sales tax is NOT included in this quote.

Pricing good for 60 Days

Robert A. DeCouto