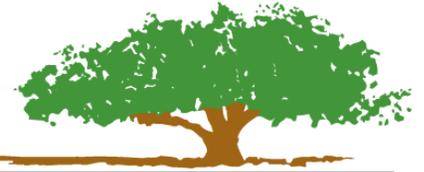


Sports Lighting Capital Replacement

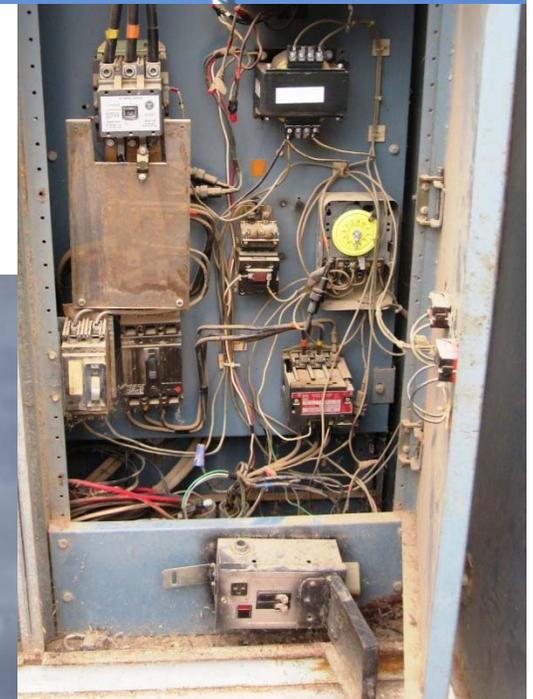


Tucson Parks and Recreation

A sports lighting system beyond its use life span:

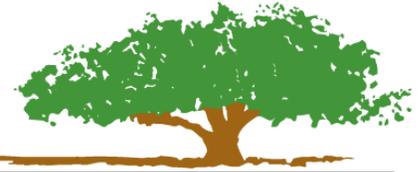
- exceeds 25-year useful life
- cannot be repaired
- does not meet Dark Sky principles
- does not meet sports lighting criteria
- spills light onto adjacent property
- is served by obsolete wiring and controls

Parks & Recreation has tested the electrical systems for all lit sports fields, and has made repairs or replacements as funding allowed. Some field lighting has been permanently shut off.



Sports Lighting Capital Replacement

The Parks & Recreation Department has also performed curb-to-curb electrical evaluations at a number of parks.



Tucson Parks and Recreation

- visual observation of electrical equipment and underground pullboxes
- Electrical Code compliance
- current leakage testing to 6mA standard, same as is allowed for GFCI receptacles
- corrective actions described
- unsafe conditions immediately de-energized
- less critical conditions catalogued for future work
- typically, 50% of the wiring and equipment was condemned

Unsafe conditions:

- Broken conduits
- Exposed wiring
- Rusted cabinets
- Frayed insulation
- Failed splices & improper splices
- Incomplete demolition
- Incorrect materials



Sports Lighting Capital Replacement



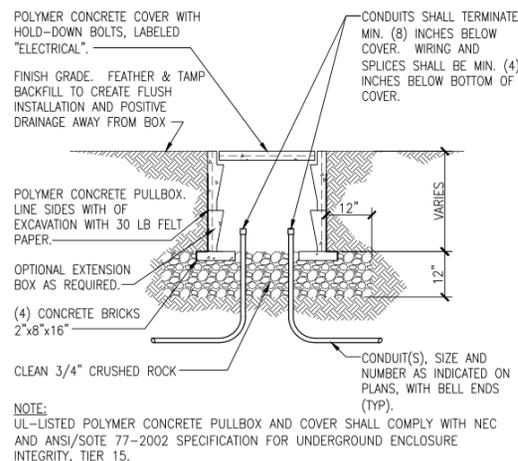
Tucson Parks and Recreation

Safer electrical design and construction standards were developed for City parks.

- better underground wire than required by Code
- non-metallic underground pullboxes
- ground fault circuit breakers
- elimination of splices as much as possible
- submersible splices where necessary
- owner, engineer, plans examiner, contractor, inspector approval required for all electrical work

Unsafe conditions:

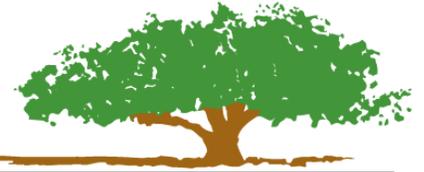
- Broken conduits
- Exposed wiring
- Rusted cabinets
- Frayed insulation
- Failed splices & improper splices
- Incomplete demolition
- Incorrect materials



1 UNDERGROUND PULLBOX
SCALE: NOT TO SCALE
INSTALLATION IN TURF AREAS



Sports Lighting Capital Replacement



Tucson Parks and Recreation

Ongoing maintenance does:

- Re-lamping as needed
- Test and repair underground wiring
- replace control cabinets components

Ongoing maintenance does not:

- alleviate Outdoor Lighting Code issues
- accomplish end-of-life replacements
- improve field lighting
- reduce light trespass and glare
- reduce energy use



Sports Lighting Capital Replacement



Tucson Parks and Recreation

Modern sports lighting:

- uses white light, not yellow
- meets the Outdoor Lighting Code
- uses less energy
- meets field lighting criteria
- puts light on the turf, not next door
- shuts off automatically



Sports Lighting Capital Replacement



Tucson Parks and Recreation



Prior Floodlighting

Photographs taken from Sentinel Peak (A Mountain).
Before and After photographs taken with same camera at same settings:
Nikon D2 camera with 200mm lens; shutter speed - 1/60 sec.; lens aperture - f/2.8; ISO - 2000

Key Points:

- Over 100,000 watts in energy savings from prior lights – 500,000 kWh estimated reduction over next 25 years
- Increased on-field light levels by 25% to meet NCAA Best Practices for BCS competition levels
- Reduced measurable off-site spill light by 75%
- Improved uniformities on-field
- Eliminated maintenance costs for next 25 years

25-Year Life-Cycle Savings: \$113,000

ARIZONA STADIUM, UNIVERSITY OF ARIZONA Tucson, AZ

125 constant horizontal/vertical footcandles; 1.5:1 uniformities

System Energy Consumption:

- Prior Floodlighting – 463.3 kW	- Musco Green™ – 362.8 kW
95 horizontal footcandles	125 horizontal footcandles



After Green Generation Lighting®