



# SOUNDVIEW PLAYFIELD RENOVATION SYNTHETIC TURF REPLACEMENT SEATTLE PARKS AND RECREATION

## ***LIGHTING DESIGN REPORT***

***July 13, 2018***

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### **SCOPE AND BASIS OF DESIGN**

Electrical lighting for this project will include new exterior lighting for the existing Soundview Playfield in Seattle, WA. The analysis described in this report and the proposed design are in accordance with the applicable standards and requirements of the following:

- Washington State Energy Code -- Latest Approved Edition
- National Electric Code (NEC) NFPA 70 -- Latest Approved Edition
- Washington Administrative Code (WAC) – latest approved edition
- Illuminating Engineering Society (IES) – Latest Edition

### **Parking Lot and Pedestrian Circulation Lighting and Controls**

All parking areas, pedestrian circulation and field lighting will utilize LED fixtures, which compared to other sources of light are more energy efficient and more precisely control the distribution of light in order to illuminate only the areas necessary. All parking and circulation light fixtures will be selected to ensure that no light will be directed above the 90-degree plane of the fixture; therefore, the lighting is classified as full cut-off and complies with the International Dark Sky Association (IDA).

Exterior lighting will be used to illuminate two (2) distinct areas in addition to the playfield: the existing parking lot along NW 90<sup>th</sup> Street and pedestrian circulation on the East and West sides of the existing playfields.

The parking area will utilize LED fixtures mounted on approximately 15' aluminum poles. This relatively shorter mounting height for the parking area has been designed to minimize measurable light from being seen at the adjacent property line and for ease of access for maintenance.

The attached Site Illumination Analysis (computer aided photometric calculation plan) for parking and pedestrian areas was prepared by BCE Engineers in accordance with IES Guidelines. The calculation shows that the parking lot to approximately 1.3 average horizontal footcandles.

The photometric plan also shows that no single point along the curb on the North side of NW 90<sup>th</sup> Street exceeds .45 horizontal footcandles on the ground and .05 footcandles at the curb on the South side of NW 90<sup>th</sup> Street. Therefore, the new parking lot lighting will have no perceivable impact to the surrounding properties. To further mitigate the amount of light from the fixture, the lighting can be provided with integral motion sensors which will allow the fixture to operate at approximately half light output unless motion is detected.

A footcandle is defined as the illuminance on a one-square foot surface of which there is a uniformly distributed flux of one lumen or alternatively the illuminance on a one square foot surface from a uniform source of light. The term is derived from the equivalent illumination produced by a source of one candle at a distance of one foot and equal to one lumen incident per square foot.

All exterior lighting will be controlled by a new lighting control system with a manual override. The parking lot lighting will be able to be controlled independently from the pedestrian circulation lights, however both zones of light are planned to be scheduled on from sunset to sunrise and off all other times.

### **Field Lighting and Controls**

New Athletic Field Lighting will be provided to illuminate the renovated field surface at Soundview Playfields. Field lighting will utilize High Efficient LED fixtures in order to achieve three primary objectives when compared to traditional HID sources: 1.) To reduce maintenance over the lifetime of the lighting system 2.) increased energy savings, 3.) precise control of the light to direct it only to the field or area it is intended to illuminate.

The attached Illumination Analysis (photometric report) prepared by Musco Sports Lighting shows (47) sports field type, 1150W LED fixtures mounted near the top of (7) total, 70' or 80' tall, galvanized steel poles to produce a guaranteed minimum average illumination of 50 footcandles on the baseball infields and 30 footcandles on the outfields and multipurpose field. The LED sources will be provided with 5700K Correlated Color Temperature (CCT) and minimum of 75 CRI (Color Rendering Index).

The calculation and lighting level is provided in accordance with an IES recommended Class III level of play which include provisions for some spectator seating. The Analysis by Musco shows that precisely controlling the light from the fixture to be directed toward the center of the field provides appropriate protection against light spillage along the perimeter of the site.

The proposed floodlighting systems available utilize the latest technology in reflector and shielding design for athletic field floodlighting. The use of high efficiency LED arrays provide more precise control of light to be delivered to the field. The reflector and shielding design further reduces the amount of light transmitted off site and into the atmosphere. The floodlights utilize additional external visors mounted to the floodlight that extends in front of the floodlight. The floodlights design is similar to “full cutoff” and “cutoff” style lights as they dramatically limit the amount of light that is emitted above the plane of the floodlight.



**LED Floodlight with shielding visor**

Due to the dramatic reductions in the amount of up-light generated there will be a zone of darkness above the field while the field lights are on. This creates a safety hazard for baseball play to safely track balls hit high into the air. Therefore, in addition to the field lights, One or two shielded up-lights would be mounted at a height 15' on each pole and be directed above the field. These floodlights will be at a lower wattage than the floodlights and provide the minimal amount of light necessary for safe play. One additional low wattage “full cutoff” area light will be mounted at a height of 30' above grade on each pole used to illuminate pathways and provide safe pedestrian circulation. The use of these lights allows field lights to be turned off immediately concluding the prescribed activity and minimize the amount of time that the field lights will be on. In all cases, the field lighting will be controlled separately

from the ball tracking lights and the area lights with a fully programable, electronic control system with local override and remote operation.



**Unshielded Floodlights**



**Field and Ball Tracker LED Floodlights with Shielding**

The illuminated playfields sit in a depressed area of land approximately centered on the Park property. To the North; the fields abut directly to slightly elevated playfields and outdoor sports courts owned by Seattle Public Schools; to the East and West, the illuminated fields are buffered by additional Park property with multi-family residential to the East and single family residential to the West; to the South the fields are buffered by a parking lot with single family residential on the South side of NW 90<sup>th</sup> Street. The new field lights are proposed to be installed on the South, East and West sides of the field and concentrated to the playfield surface thus eliminating any chance of direct beam angle view toward the single family residences to the South. There are substantial trees on the on the South, East and West sides of the playfields to further mitigate reflected light from the playfield. With the School District playfields to the North, additional park property buffer at the East and West and trees on South, East and West sides of the playfields, only spill light to the South would need to be considered for further analysis. Without taking the trees on the South property line into consideration, the maximum calculated light level when measured at three feet above grade at the North curb along NW 90<sup>th</sup> Street is 0.08 horizontal footcandles and 0.20 vertical footcandles The Analysis prepared by Musco through computer aided photometric calculations, performed in accordance with industry standard IES guidelines, for the field lighting demonstrates that there will be no measurable impact to surrounding properties.

The amount of “sky glow” that is visible from a lighting system is difficult to quantify. There is no current method to calculate “sky glow” but it is recognized that there is a direct correlation to the amount of direct and reflected light that is emitted into the atmosphere. The amount of visible “sky glow” is dependent on a multitude of factors. Several factors include the amount of ambient light that exists, darkness of the night sky, amount of moonlight, atmospheric conditions, level of cloud ceiling, amount particulate matter, location of the observer and age of the observer. To reduce the amount of “sky glow” that is visible the floodlights will need to be mounted higher than 30 feet. At a height of 30 feet the amount of direct light emitted into the atmosphere is excessive. With the increased mounting heights floodlights will have steeper aiming angles resulting in more effective use of the external shields. The majority of the total light output will be directed down to the field with the increased mounting height. To maximize “sky glow” reduction the owner is providing additional mitigation with the use of “full cutoff” or “cutoff” style LED floodlights that provide the most advanced light control and shielding currently available in the sports lighting industry. The use of this equipment will also block a significant amount of direct light that is emitted into the atmosphere.