

Appendix I Lighting Evaluation

Harvard-Westlake Parking Improvement Plan

REVISION 1

Lighting Evaluation

By: Lighting Design Alliance

Harvard Westlake Parking Improvement Plan Lighting and Glare Analysis

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1.0 EXECUTIVE SUMMARY

This report considers the potential lighting impacts of the proposed Harvard-Westlake Parking Improvement Plan. The proposed project consists of a three story (four level) parking structure, a practice field located on the top of the parking structure, and a pedestrian bridge connecting the structure to the Harvard-Westlake campus.

Currently, the proposed site consists of a large hillside with no existing lighting. This report examines the potential impact of the parking structure as it pertains to the neighborhood, motorists driving on Coldwater Canyon Avenue, and particularly to the five private residences located just north of the proposed site. The analysis will review the parking structure, the practice field, and the pedestrian bridge.

To reduce potential impacts to the adjacent residences the parking structure would be constructed on a site set into the hillside. Retaining walls would be used on the North, South, and West elevations enabling the structure to be recessed into the hill. The practice field would be 45 feet above grade (755 feet ASML) with focused lighting instruments used to illuminate the practice field which extend 39 feet above the field (794 feet AMSL). **Table 1.0-1** shows the elevations of the neighboring private residences.

TABLE 1.0-1: ELEVATIONS OF PRIVATE RESIDENCES	
Address	Elevation of Residence (AMSL)
3901 N. Van Noord	716 ft
12917 W. Galewood	765 ft
12920 W. Galewood	831 ft
3663 Potosi Avenue	849 ft
12949 W. Blairwood	866 ft
12952 W. Blairwood	945 ft

The fixtures within the parking structure would be shielded so that the source of the fixture cannot be seen from outside of the parking structure. Fixture shielding would prevent any potential glare caused from the fixtures. The interior parking structure lights on the North and West elevations are blocked by retaining walls and therefore there would be no spillover light from the parking structure on to the neighboring open spaces and private residences.

Musco sports lighting fixtures have been used to illuminate the adjacent Ted Slavin field (currently the only athletic field on campus) and similar shielded lights (lighting fixtures) would be used to illuminate the practice field on top of the parking structure. These fixtures, however, would be on a much shorter pole (39 foot) than the ones used on the Ted Slavin field.

When this analysis was first performed in 2013, metal halide lamping was the optimal solution (as is used for the school’s Ted Slavin field and pool, both located across Coldwater Canyon Avenue from the project site). As technology has changed and improved, LED fixtures have become available and, while more expensive than their halide predecessors, provide a superior solution when focusing light and reducing glare. While lighting of the proposed practice field with either solution would be well below the City of Los Angeles Municipal Code requirement which allows no

more than two footcandles (fcs)¹ of spillover light on private property developed with a residential use, LEDs are recommended. **Table 1.0-2**, based on calculations provided by Musco, illustrates the differences.

TABLE 1.0-2: HALIDE vs. LED DIFFERENCES (fcs)		
<u>Area</u>	<u>HALIDE</u>	<u>LED</u>
Practice field (avg)	30	30
Practice field (max)	72	38
Coldwater Canyon Avenue	3.5	0.4
Hacienda Dr (planned, proposed to be vacated)	0.3	0.2
Adjacent Open Space	0.0	0.0
Adjacent Residences	0.0	0.0

The pedestrian bridge lighting would be integrated within the handrails. Based on the proposed bridge design, the lighting for the bridge would be completely self-contained. The fixtures are concealed, eliminating any potential glare to motorists on Coldwater Canyon Avenue. There would also be no spillover light onto the roadway below from these fixtures.

After an in-field analysis of the site and review of the proposed lighting design (either metal halide or LED lighting) for the parking structure, practice field, and pedestrian bridge, it has been determined that the project would not create any significant impact to adjacent private residences, Coldwater Canyon Avenue, or to any adjacent open space.

2.0 PROJECT

2.1 Existing Conditions

Currently there is no existing lighting on the hillside of the proposed project site. Previously, the site was developed with two single family homes. Along Coldwater Canyon Avenue there are several street lights that provide general illumination for the roadway and the intersection of Coldwater Canyon Avenue and Harvard Westlake Driveway. Across the proposed site location is the Harvard-Westlake campus with an outdoor swimming pool and the Ted Slavin field directly adjacent to Coldwater Canyon Avenue, both of which are illuminated. See **Appendix A** for existing site photos.

2.2 The Project

Parking Structure

The project includes a three story (four level) parking structure that would be built into the hillside along Coldwater Canyon Avenue opposite the main campus of Harvard-Westlake. The parking structure would include natural colors and increased landscaping to help screen and blend the structure into the neighboring surroundings.

Practice Field

¹ A footcandle (fcs) is the unit of measurement for illuminance. One footcandle equals the light from one candle (candela or lumen) at a distance of one foot.

Illuminance is defined as the perceived power (or brightness) of light landing onto a surface, per unit area.

Luminance is defined as the intensity of light per unit area from a light source traveling in a given direction. Units are candela per square foot (c/ft²).

A practice field would be located on top of the proposed parking structure. The material used for the practice field would be Field Turf which would be approximately 3" thick to simulate normal grass. The field would be located approximately 45 feet above grade and would include a 32 foot tall catchment fence around the perimeter and on top of the field. The top of the catchment fence would be approximately 77 feet above grade. To illuminate the field, 10 light poles with metal halide fixtures are used, or 14 poles if the recommended LED fixtures are used. Each pole would have two to three (if halide) or four (if LED) adjustable sports lights. As the LED fixtures are not as bright, additional fixture heads are required. This would require additional cost, but the benefit to surrounding uses is that the brightness of the individual fixtures is further reduced. These 39 foot tall poles would be the tallest elements on the project reaching a height of approximately 84 feet above grade and painted a natural color to match the surrounding color palette.

Pedestrian Bridge

The project also includes a pedestrian bridge that would connect the parking structure with the campus. The bridge crosses over Coldwater Canyon Avenue leaving approximately 25 feet 7 inches in clearance from the bottom of the bridge to the roadway. The proposed bridge would be approximately 163 feet long, 13 feet wide, and reach an overall height of approximately 41 feet. The bridge would be constructed from prefinished metal and painted with a flat, diffuse texture with finishes that have an earthy tone and low reflectances. No glass is proposed on the bridge.

At each end of the bridge would be an elevator, where the elevator shaft on the West side would reach a height of 63 feet above grade and the elevator shaft on the East side would reach a height of 46 feet above grade. This bridge would be the only pedestrian pathway between the Harvard-Westlake campus and the proposed parking structure.

2.3 Intended Operations

Parking Structure

The parking structure would be used for supplemental parking for the Harvard-Westlake campus.

Practice Field

The practice field is not intended to be used on weekdays past 8:00pm and would be used only during limited daytime hours on weekends (no lights on weekends). The practice field is intended to be used for recreational play only, placing it in a "Class of Play" of IV according to the Illuminating Engineering Society (IES)².

Pedestrian Bridge

The pedestrian bridge is intended to be used as a connection between the parking structure and the Harvard-Westlake campus.

2.4 Proposed Lighting Design

Parking Structure

Parking structure lighting would have an average illuminance of 5 fcs over the parking stalls that diminish to approximately 1 fcs at the exterior perimeter of the structure. The lighting sources chosen would be either linear fluorescent striplights or LED downlights. Any fixtures used within

² *Illuminating Engineering Society: The Lighting Handbook Tenth Edition*, Section 35.1: Project Type and Status, Table 35.2

the interior of the parking structure would have shielding elements. When viewed from outside of the parking structure, these shielding elements eliminate any direct views of the light source.

There would be an average illuminance of 40 fcs at the parking structure entries and exits during daylight hours. This provides a transitional area to allow drivers to adapt to the relatively low illuminance levels within the parking structure.

To comply with the Title 24 energy codes, the parking structure would be controlled with photocells to conserve energy during daytime operational hours. The parking structure would also utilize occupancy sensors which would turn the lights off when no activity is detected within the structure.

Practice Field – Metal Halide Option

The practice field would be illuminated similarly to the Ted Slavin field by using similar fixtures manufactured by Musco. Ten 39 foot tall light poles would be used to illuminate the field, five light poles per side. Each pole would consist of two or three Musco sports lights. Each fixture would be individually aimed and use one of Musco's visor systems (see **Figure 2.4-1**) which allows for better light control, reduced glare, and reduced spill light. The fixtures also include an integral house side shield to minimize any spillover light behind the fixtures. Based off of the calculations provided by Musco, the average horizontal illuminance on the practice field would be approximately 30 fcs (see Appendix B),³ in contrast to the 75 fcs illuminance during play at the Ted Slavin field

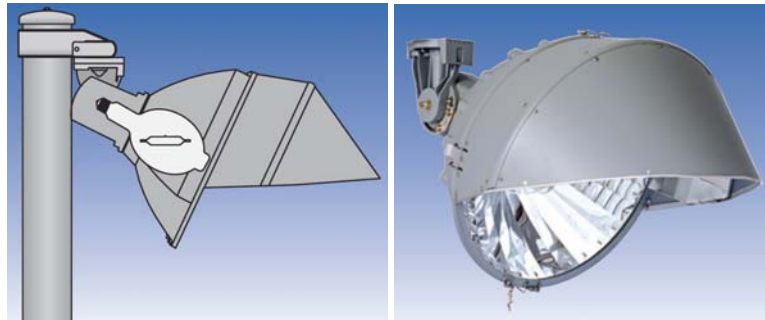


Figure 2.4-1
Musco luminaire with visor system

Practice Field - LED Option

As a new alternative, the practice field could be illuminated in a very similar application to the metal halide option above, using new fixtures that have been recently developed. The recommended manufacturer is Musco due to their enhanced glare control optics and available house-side shield. Fourteen 39 foot tall light poles would be used to illuminate the field, seven light poles per side. Each pole would consist of four Musco sports lights. As compared to the metal halide options, more fixtures are required when changing to the LED alternative. This is due to the maximum light output delivered by the LEDs being less than the metal halide option. This is a benefit to surrounding uses in that as the lumen output is lowered so too is the potential for any glare from the source optics.

³ Illumination levels provided by the design team, but they directly correspond to the recommended lighting levels within *Illuminating Engineering Society: The Lighting Handbook Tenth Edition*.



Backlight Shields- Before

Backlight Shields- After

Figure 2.4-2
Backlight Shields Comparison

A metal halide lamp generates light in all directions and then complicated reflectors are used to redirect that light towards the playing fields. Musco was originally recommended because their reflectors were state-of-the-art and directed more light towards the field, as opposed towards the street or neighboring residences. With the development of LED light sources, this performance is even improved further. Instead of a source (metal halide) that generates light in all directions, the LEDs are a focused or directional light source. All of the individual LEDs can actually be aimed directly at the field, similar to hundreds of precise “flashlights” aimed at the field which decreases the amount of “back-lighting.” To perform the 2015 update to this report, Lighting Design Alliance received one working sample for testing. Original inspections show that the LED lamps are deeply recessed and aimed in the proper orientation, or directly towards the playing field. In addition, Musco incorporated vertical internal louvers that provide excellent glare control. The product truly focuses all of the light where it is needed. Like the metal halides, each fixture would be individually aimed and focused at the field.



Low Brightness LED Sports Light

Close-Up Integral Baffles

Figure 2.4-3
Low Brightness LED Sports Light & Integral Baffles

Although definitely not needed, use of an optional house side shield would further focus light and reduce direct glare (although the LED fixture as tested already exceeds City of Los Angeles Municipal Code requirements). The side shield will be a small drop baffle that provides a physical shield to further eliminate any potential of adjacent residences viewing directly into the LED optical chamber.

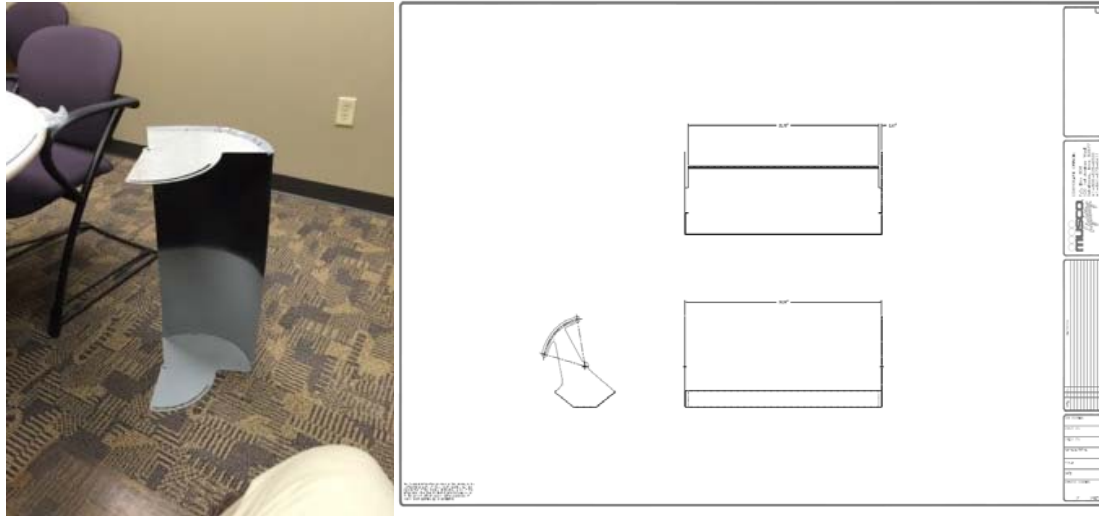


Figure 2.4-4
House Side Glare Shield

This shield will also provide additional controls to further reduce any spill light back, behind the fixtures. To illustrate the differences between the two technologies, refer to the photographs and fixture details above (see **Figure 2.4-4**). Similar to the metal halide option, the LED fixtures, based upon the calculations provided by Musco, the average horizontal illuminance on the practice field would be approximately 30 fcs (see Appendix B),⁴ in contrast to the 75 fcs illuminance during play at the Ted Slavin field.

LED fixtures offer additional benefits in comparison to metal halide fixtures. First of all, the fixtures can be dimmed. This allows the light levels to be exactly tuned to ensure that the practice field is not lighted above the 30 fc target levels. Programming would also allow the light levels to be reduced to safety levels or for pre- and post- practice field use to further reduce field illumination. The standard LED fixture from Musco is 5,700 degrees Kelvin and is the configuration that was analyzed. It provides a very cool colored light source; almost a crisp, bluish-white color tone. Musco can offer a warmer tone of 4,000 degrees Kelvin for LEDs, the same tone as the metal halide lamps. The warmer toned lamps may also be perceived as softer as compared to cooler lamps which appear harsher. Use of the warmer tone might be an option if it were desirable to match the proposed practice field with the existing Ted Slavin field and pool. As a side note, the warm toned lamps are not as efficient as the 5,700K lamps, so more fixtures could be required in order to achieve safe lighting levels on the practice field. Based on the analysis of the LED lamps, the addition of fixtures is not expected to increase the already-low levels of glare or light spillover to the project's surroundings.

⁴ Illumination levels provided by the design team, but they directly correspond to the recommended lighting levels within *Illuminating Engineering Society: The Lighting Handbook Tenth Edition*.

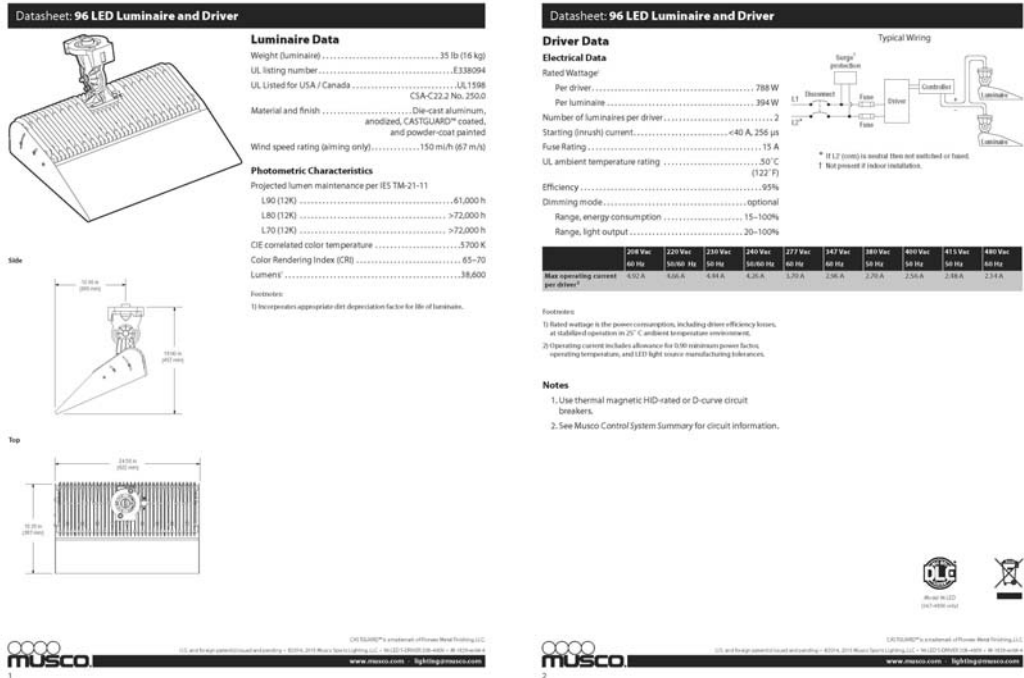


Figure 2.4-5 LED Data Cut Sheet

Pedestrian Bridge

The proposed lighting design for the bridge utilizes a small LED strip light that would be integrated within the handrail. The fixtures would be concealed so that there are no direct views of the source. The low level handrail lighting would be activated by occupancy sensors which would turn the lights off when no activity is detected on the bridge.

3.0 POTENTIAL IMPACTS

As defined by the Los Angeles CEQA Threshold Guide, the significance threshold shall be made on a case-by-case basis, considering the following factors:

- The change in ambient illumination levels as a result of project sources; and
- The extent to which project lighting would spill off the project site and affect adjacent light-sensitive areas.

Light trespass or light pollution can introduce glare or stray light into private, residential lots. The balance of ambient light to promote pedestrian safety and a sense of security must be compared to stray light that could affect a resident from sleeping at night in their own bedroom. Section 93.0117 of the City of Los Angeles Municipal Code (LAMC) provides that no person shall construct, establish, create, or maintain any stationary exterior light source that may cause the following locations to either be illuminated by more than two fcs of lighting intensity or receive direct glare from the light source:

1. Any exterior glazed window or sliding glass door on any other property containing a residential unit or units

- 2. Any elevated habitable porch, deck, or balcony on any other property containing a residential unit or units
- 3. Any ground surface intended for uses such as recreation, barbecue, or lawn areas on any other property containing a residential unit or units.

It should be noted that the landscape and natural topography surrounding the proposed site would visually block the light from the parking structure. The Harvard-Westlake campus, located across from the proposed structure, contains pole mounted lights to illuminate the Ted Slavin field and the pool outside the Taper Athletic Pavilion. In addition, Coldwater Canyon Avenue contains street lighting which provides additional light for pedestrian safety at the intersection of Coldwater Canyon Avenue and the Harvard-Westlake Driveway. **Figure 3.0-1** below was developed to identify all potential sensitive receptors (the private residences shaded in orange) adjacent to the proposed parking structure.

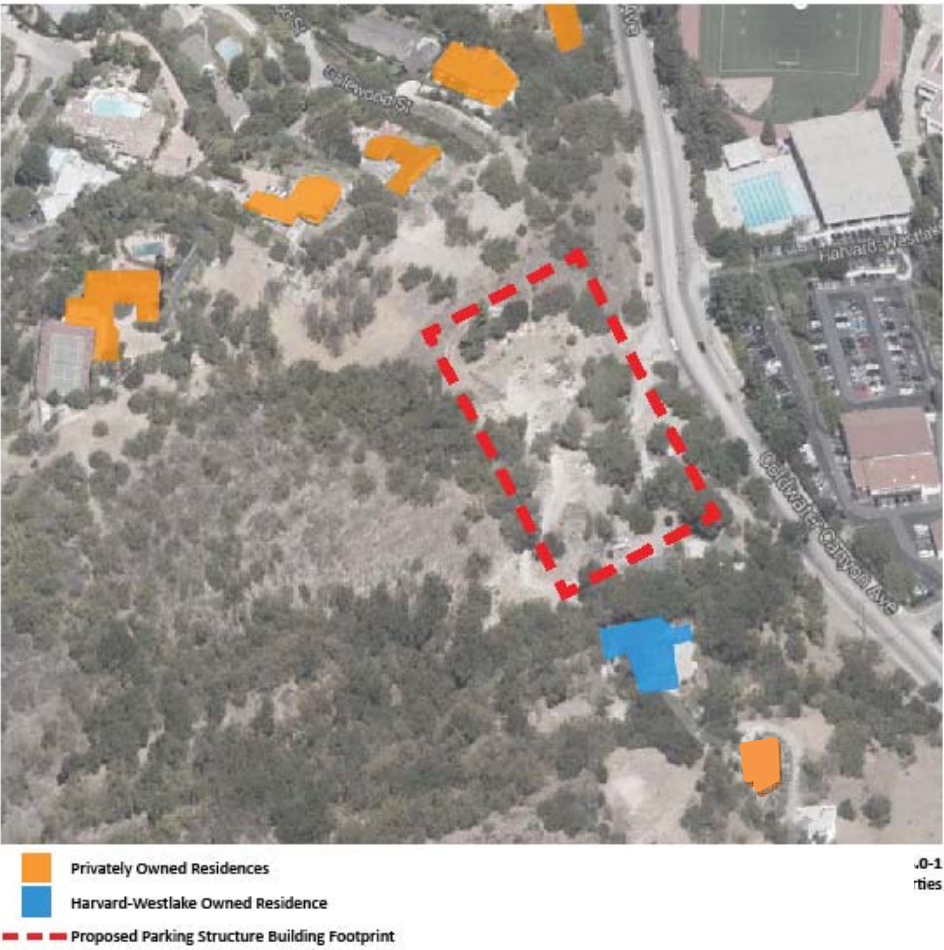


Figure 3.0-1
Aerial map showing location of adjacent residential properties

4.0 LIGHTING ANALYSIS

4.1 Methodology/Project Procedure

The process required to establish a design guideline is straightforward. The first step is to identify all of the current private properties that would be affected. This step is outlined and identified above. The second step is to determine adjacencies between the proposed parking structure and the surrounding residential neighbors. Specific residential properties would be identified as “sensitive receptors” that could be impacted by any lighting modifications. The next step is to evaluate the existing conditions with the proposed lighting design for the parking structure, the practice field, and the pedestrian bridge. By comparing current conditions with the proposed structure it would be possible to predict and to mitigate any future lighting issues. Next, any major violations of current lighting guidelines should be corrected, both as an act of good faith, but also to voluntarily comply with all known lighting ordinances or recommendations.

On September 16, 2013 between 6:30 PM and 8:30 PM, a site visit was conducted to analyze the current site features and lighting, and to measure the luminance of existing lighting within the project site. During this two hour window, we were able to see the project site during daylight hours and night time hours. The sky conditions were as follows: clear sky, full moon, clear visibility of up to approximately 20 miles. Luminance measurements were taken using a luminance meter, which measures in cd/m^2 , of the existing fixture to mimic the view point of the private residences. The brand of luminance meter that was used for the site survey was a Minolta LS-110 luminance meter.

On October 22, 2015 a similar evaluation was completed in the offices of Lighting Design Alliance. In a dark room, a working, unshielded LED fixture was turned on at full brightness and additional brightness readings were performed. The same meter was used for the LED fixture, as was for the metal halide fixtures. All of the readings were measured in terms of the same candelas per meter squared. As the LED fixture performed above our professional expectations, the brightness reading were slightly higher than the metal halide fixtures, basically because our sample was not shielded. Even with these higher test readings, the LED fixtures still conform to all of the City requirements. To increase the performance of the LED version, a second test was then conducted with the same LED luminaire. In this test, a full size house-side shield was added to the rear of the fixture. This test virtually blocked all backlight.

4.2 Lighting and Glare Evaluation: Parking Structure

The lighting design for the parking structure proposes using linear fluorescent fixtures or LED downlights. In either situation, fixtures would be shielded so the fixture source would not be visible from outside the parking garage thereby preventing glare from the fixtures. The parking structure would be constructed from materials which have low reflectance and have diffuse finishes to prevent any glare caused by the sun.

The private residences north and northwest of the parking structure would be most concerned with light trespass. The parking structure, however, would be situated within the hillside. The retaining walls surrounding the project on the North and the West side are higher than the walls of the parking structure; therefore there would be no spillover light from the parking garage onto the private residences. There may be some minor spillover light onto Coldwater Canyon Avenue, but the design intent is to have an average of 1fcs at the perimeter edge of the structure. As all fixtures would be shielded, spillover light onto Coldwater Canyon Ave would be less than 1 fcs and therefore negligible (see **Appendix B: Parking Structure Lighting Calculation**).

4.3 Lighting and Glare Evaluation: Practice Field

Of the surrounding six adjacent private residences, two of the residences (12917 W Galewood and 3901 N. Van Noord) are physically located below the pole mounted light fixtures which would be mounted approximately 84 feet above ground level (approximately 794 feet AMSL). Due to the design of the Musco light shields (whether metal halide or LED), any residence located above the pole mounted fixtures would not be able to see the fixture’s lamp source or any glare coming from the fixture or its reflector system.

The two residences below the fixtures (12917 W. Galewood and 3901 N. Van Noord) are the only two private residences that theoretically could experience glare from the fixtures. Given the amount of light coming off of a fixture (or its luminance) the amount of light onto a residence (or its illuminance) can be calculated using the following equation.

$$E_v = \frac{LQS}{D^2}$$

Where:

Ev= Illuminance (in fcs) onto the residence

L= Luminance (cd/ft²) out of the fixture

Q = Quantity of Fixtures per head

S= Area of the source (sq. ft)

D= Distance from the fixture to the property line

In order to determine the approximate luminance of the proposed fixture, a luminance meter was used to measure the luminance out of the existing metal halide, Musco fixtures. The luminance from one of the existing fixture would be the same as the proposed fixture assuming that the same Musco fixtures would be used for the new practice field. The luminance was measured at low angle increments that would be similar to the viewing angles experienced by the nearby residences. These field measured values are represented in **Table 4.3-1** below⁵.

Viewing Angle to the Fixture (degrees)	Luminance (cd/ft²)
0	22.30
5	13.85
10	33.41
15	53.49
20	81.46

In order to fully evaluate the potential of LED light sources, **Table 4.3-2** below⁶ shows the same fixture brightnesses for LEDs. These readings do not include shielding, the use of which will greatly reduce these high angle readings. Therefore, this is the worst case condition.

⁵ Luminance measurements were taken at the Harvard-Westlake campus on September 16, 2013 at approximately 8:00pm using a Minolta LS-110 luminance meter. Measurements were taken from one of the existing Musco fixtures located near the outdoor pool.

⁶ Luminance measurements were taken at the Harvard-Westlake campus on September 16, 2013 at approximately 8:00pm using a Minolta LS-110 Luminance Meter. Measurements were taken from one of the existing Musco fixtures located near the outdoor pool.

Table 4.3-2: OFFICE LUMINANCE MEASUREMENTS OF PROPOSED LED FIXTURE – unshielded and 5700K	
Viewing Angle to the Fixture (degrees)	Luminance (cd/ft ²)
0	95
5	285
10	492
15	890
20	1680

Similarly, **Table 4.3-3** below repeats the LED test but with the integrated shielding. The differences are significant, resulting in matching measurements for all but one viewing angle. This is because of the shield that was added, an opaque or solid barrier or baffle that is fabricated in a cylindrical shape and physically blocks all of the light from these high angle viewing positions.

Table 4.3-3: OFFICE LUMINANCE MEASUREMENTS OF PROPOSED LED FIXTURE – WITH BACK – GLARE SHIELD - 5700K	
Viewing Angle to the Fixture (degrees)	Luminance (cd/ft ²)
0	20
5	20
10	20
15	20
20	40

Of the two residences with the potential for glare from the practice field, the closer, 12917 W. Galewood, is located 257 feet from the parking structure and at an elevation of 765 feet, 29 feet below the light fixtures. Assuming the worst case scenario, where a pole is located exactly 257 feet away from the residential property line the maximum viewing angle into the fixtures would be 6 degrees above the horizon (see **Figure 4.3-1**). The luminance measured on a metal halide fixture at that approximate angle was 13.85 cd/m² (refer to **Table 4.3-1** for luminance measurements). The second residence, located at 3901 N. Van Noord, is 330 feet from the structure and 78 feet below the fixtures. The maximum viewing angle into the fixture for that residence would be 13 degrees above the horizon (see **Figure 4.3-2**). The luminance from the metal halide fixture would be approximately 53.49 cd/m².

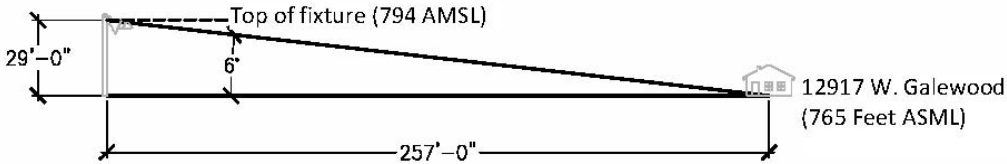


Figure 4.3-1
Angle from 12917 W. Galewood to the top of the practice field fixtures.

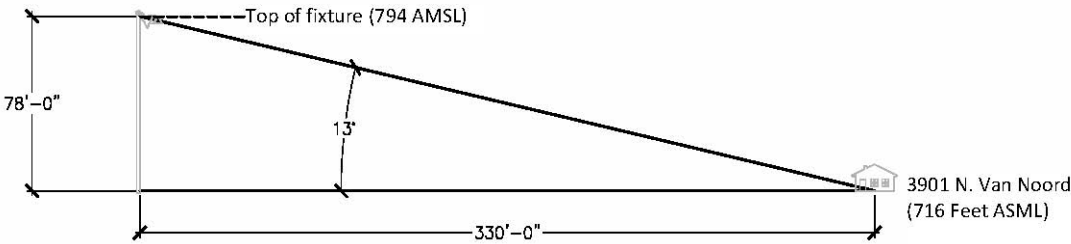


Figure 4.3-2
Angle from 3901 N. Van Nord to the top of the practice field fixtures.

Using these values we can calculate the illuminance onto the residences from both the metal halide and the LED light sources by the following equation:

$$E_v = \frac{LQS}{D^2}$$

For the two scenarios we get the following illuminance values outlined in **Table 4.3-4** through **Table 4.3-6**.

Table 4.3-4 METAL HALIDE ILLUMINANCE CALCULATION FROM SITE MEASUREMENTS					
Residence	[L] Measured Luminance	[Q] Quantity of Fixtures per pole	[S] Area of source (sqft)	[D] Distance (ft)	[E _v] Illuminance (fcs)
12917 W. Galewood	13.85	3	2*	257	0.0013
3901 N. Van Noord	53.49	3	2*	330	0.0029

*Assumed luminous area of each fixture head

Table 4.3-5 LED ILLUMINANCE CALCULATION FROM CONTROLLED MEASUREMENTS (unshielded and 5700K)					
Residence	[L] Measured Luminance	[Q] Quantity of Fixtures per pole	[S] Area of source (sqft)	[D] Distance (ft)	[E _v] Illuminance (fcs)
12917 W. Galewood	285	4	2*	257	0.035
3901 N. Van Noord	890	4	2*	330	0.065

*Calculated luminous area of each fixture head based upon hands on evaluation of fixture

Table 4.3-6 LED ILLUMINANCE CALCULATION FROM CONTROLLED MEASUREMENTS (shielded and 5700K)					
Residence	[L] Measured Luminance	[Q] Quantity of Fixtures per pole	[S] Area of source (sqft)	[D] Distance (ft)	[E _v] Illuminance (fcs)
12917 W. Galewood	20	4	2*	257	0.0024
3901 N. Van Noord	20	4	2*	330	0.0014

*Calculated luminous area of each fixture head based upon hands on evaluation of fixture

In a scenario where three metal halide luminaires are mounted on a pole located at the point closest to the residence (12917 W. Galewood), the illuminance on the residence as a result of the fixtures would be 0.0013 fcs. For shielded LEDs, the four luminaires would result in an illuminance on the residence of 0.0024 fcs. Similar results are true for the residence at 3901 N. Van Noord. Both of these extremely low levels would be unmeasurable by most lighting evaluation meters and show that the LEDs out-perform the metal halides in terms of cut-off and light trespass. In the equation for calculating illuminance, illuminance is indirectly proportional to the distance such that when distance increases illuminance decreases. The residences would have a decreased illuminance on their property as the distance from the fixture to the property line is increased. Even if all 30 metal halide fixtures were mounted at the same point on the practice field closest to the residence, the total cumulative effects of all the lights would only add 0.013 fcs onto the Galewood residence and 0.029 onto the Van Noord residence. Likewise, if we use a total of 14 poles and 56 fixture heads with LED lamps (all mounted at the point closest to the residences) the cumulative effect would be a maximum of .034 fcs (Galewood) and 0.02 fcs (Van Noord), still well below the two footcandles allowed by Section 93.0117 of the LAMC. Our professional predictions based upon the calculations above are that shielded LEDs, with or without warm lamp colors, will match or exceed the performance of the metal halide sources, and all well below all lighting standards and requirements. These calculations assume direct line of sight to the fixtures. It is important to note that the existing topography of the hillside and the natural vegetation would conceal the fixtures from view and further block the light from the fixtures.

The property located at 3663 Potosi Avenue would also have direct views of the fixtures, however, this residence is owned by Harvard-Westlake.

Another potential concern for the neighboring residences caused by the practice field lights would be light trespass. The proposed Musco metal halide fixtures incorporate a Light-Structure Green System with a unique reflector and visor system that allows for precise optics and minimal spill light. The LED fixtures actually have internal glare control optics and offer an optional house-side shield. Similar metal halide fixtures are currently being used to illuminate the Ted Slavin football field and the outdoor swimming pool. An in-field analysis of the existing fixture shows the precision of the Musco optics. **Figure 4.3-3** is a picture taken of the existing swimming pool fixtures at night. The poles are positioned approximately two to three feet from the edge of the roof line, and the light coming from the fixture only spills approximately two feet onto the roof. The majority of the light is being directed towards the swimming pool.

**Figure 4.3-3**

- (1) Shows the light distribution of the fixtures limited spill light on the roof.
 (2) Illustrates the fixture cutoff as the South wall is well illuminated however the adjacent East wall remains dark.

The City of Los Angeles indicates that spillover lighting shall not be greater than two fcs at any residential property⁷. Based off of the calculations provided by Musco, the most spillover lighting would occur on the public road of Coldwater Canyon Avenue with a maximum of up to 3.5 fcs (if metal halides are used) and 0.4 fcs (if LEDs are used). The lighting spillover at the 3680 Potosi Avenue residence (Harvard-Westlake owned property) would be approximately 0.3 fcs with metal halides and 0.0 with LEDs, and the spillover at the North and West adjacent spaces would be 0.0 fcs with both fixture types due to the topography of the site and the proposed architectural design (see **Appendix B: Harvard-Westlake Practice Field Lighting Calculation**). Based upon our field observations of the existing Musco fixtures and review of the photometric analysis provided by Musco, spillover light would be negligible and no substantial light would be anticipated to reach the neighboring private residences or open space property.

While light from the light fixtures would not spill onto the neighboring private properties, the views of the site caused by the new field would alter the existing landscape. An illuminated field would now replace an otherwise dark hillside. While it is important to note that the field would not be operational after 8:00pm on weekdays and only during limited daytime hours on weekends, it is also important to note that this field would be used as a recreational field only. The field would not be used for competitive game play, and therefore falls within Class IV in the IES definition of class of play. For a Class IV recreational soccer field, the IES recommends a maintained average of approximately 50 fcs on the horizontal plane of play. The proposed Musco fixtures provide an average illumination of 30 fcs, 20 fcs below the IES recommended illuminance levels. In comparison, the neighboring Ted Slavin Field would be classified as a Class III playing field (competition play with some spectator facilities). The illuminance for a Class III field is recommended to be approximately 75 fcs on the horizontal plane of play. While there would be times before 8:00pm that the field would be in use, the lighting levels provided by the proposed

⁷ The City of Los Angeles Municipal Code Section 93.0117

fixtures would be approximately half the amount of light that is currently present on the Ted Slavin Field; therefore, Ted Slavin Field would still remain the brightest area on campus.

The final concern with the practice field is the new potential for glare as light from the lights reflects off the field. A sample of artificial grass was used to help better understand the reflectance of the material and to assess any potential glare. An illuminance meter was placed on the surface of the grass to determine the average illuminance on the horizontal plane of the grass (see **Figure 4.3-4**). The illuminance meter was then flipped over and held above the grass and another measurement was taken. Using the equation:

$$\rho = \frac{\phi_{off}}{\phi_{on}}$$

- ρ = reflectance
- ϕ_{off} = illuminance off of a surface [fcs]
- ϕ_{on} = illuminance on a surface [fcs]

It was observed that the illuminance on the grass was 210 fcs, and the illuminance off of the grass was 110 fcs resulting in a relatively low reflectance of approximately 0.50 (meaning the grass is absorbing 50% of the light that lands on the field). The grass also exhibits a diffuse reflectance. A diffuse reflection is a surface that has irregularities that are large and not locally smooth. Any light, whether it is daylight or electric light, would not be reflected off the grass in any predictable direction; therefore, no reflection or glare from the lights would be seen on the grass by any observer. Based off the observed low reflectance and the diffuse nature of the artificial grass, there would be no significant glare as a result of the proposed artificial grass.



Figure 4.3-4
Artificial grass reflectance calculation⁸

⁸ Reflectance measurements were taken on September 21, 2013 at approximately 2:00pm. Reflectances are based on relative illuminance values; therefore it is unnecessary for the illumination on the grass to be equal to the proposed illumination on the practice field.

The other visual impact from the practice field comes from the direct views of the light poles and fixtures themselves. As most of the private residences are above the light fixtures, there would be no impact to the scenic views that they currently have. For the two residences below the light fixtures (12917 W. Galewood and 3901 N. Van Noord), views to the field and the fixtures would be mostly screened by natural vegetation and the hillside itself.

Motorists on Coldwater Canyon Avenue would also have direct views of the light poles; however, any potential glare would be minimized due to the proposed Musco fixture's visor. Appendix B includes a photometric calculation with an unshielded LED fixture. According to the calculation, the field is evenly illuminated to the target 30 fc. The same calculation also shows that the unshielded fixture provides a sharp cut-off along the side of the field. This limits the amount of light oriented towards Coldwater Canyon and in fact the maximum calculated light trespass is 0.4 fc, which is well below the City requirements.

4.4 Lighting and Glare Evaluation: Pedestrian Bridge

The proposed lighting design for the bridge utilizes a small LED tapelight that would be integrated within the handrail. The biggest source of glare for this application would come from direct views of the individual LED diodes. Based on the design of typical LED handrail systems, direct views of the diodes only occur when the fixture is viewed from below. The design of the bridge consists of a solid stained concrete flooring combined with prefinished metal panel siding. The Americans with Disabilities Act (ADA) requires the top of gripping surfaces of handrails to be a minimum of 34 inches and a maximum of 38 inches vertically above walking surfaces. Assuming the prefinished metal panels are at a height greater than the maximum 38 inch required by ADA code, the light within the bridge would be self-contained and there would be no direct views of the LED fixture from outside the bridge. Similarly the light from the LED handrail system would also be contained and limited to only the bridge's walkable surface. There would be no spillover light onto any of the private residences or onto Coldwater Canyon Avenue below (See **Appendix B: Pedestrian Bridge Lighting Calculation**).

Another potential source of glare would come from the sun. Days when the sun is low in the sky, reflective surfaces have the potential to reflect light onto roadways, which can potentially distract drivers. The proposed design would minimize potential glare. The eastern elevator core would be positioned to the west to minimize potential glare cause by the winter morning's low sun. Extended overhangs shade the glass from direct sunlight during the day and early evenings, while the proposed landscape would screen the glass elements from street views. The materials of the bridge would be painted with diffuse finishes and have low reflectances. Similar to the practice field, any light reflecting off of the bridge's materials would be reflected in a diffuse manner; therefore the pedestrian bridge is not anticipated to result in significant glare.

4.5 Mitigation Recommendations

Based on the proposed design, we recommend the following steps be considered to ensure minimal lighting impact on adjacent private residences:

1. All interior parking garage fixtures must be shielded to prevent direct views of the source when viewed from outside the structure.
2. The design of the parking structure shall incorporate screening elements to prevent lighting and car headlights from disturbing residences around the project site.

3. Interior lighting fixtures shall be controlled by photocells and occupancy sensors to reduce the light output of the fixtures when the structure is unoccupied.
4. Permanent exterior lighting shall be fully (glare) shielded to prevent direct views of the fixture source from adjacent residential neighbors. Fixtures shall also be focused properly to limit the amount of spillover lighting.
5. Project shall comply with section 93.0117 of LAMC. Spillover lighting levels shall not exceed 2.0 fcs on adjacent privately owned residential properties.
6. Musco sports lighting fixtures (or equal alternative) with visor system shall be used to illuminate the practice field to provide better light control, reduce glare, and reduce the amount of spill light. This includes either Metal Halide or LED light Sources.
7. If LED sources are used, dimming is recommended for full light control and additional light level options
8. Sports lighting fixtures shall be painted a natural green color or painted to match the fencing so that they blend in to its natural surroundings.
9. Sports lighting fixtures shall be on a remotely controllable timer to ensure the fixtures are turned off at or before 8:00pm on weeknights.
10. Lighting for the pedestrian bridge should be integrated within the handrails and mounted at a height below the adjacent solid metal panels to eliminate any source of glare from the bridge. Light from the handrails shall illuminate the bridge walkway only and not spillover onto Coldwater Canyon Avenue.
11. All building materials shall be diffuse and of low reflectance to prevent potential glare.

5.0 CONCLUSION

Based on calculations provided by Lighting Design Alliance and Musco, it has been determined that no spillover light from the parking structure or the practice field would impede on any neighboring open spaces or private residences. This includes whether a metal halide or an LED light source is used. By utilizing an integrated handrail light, there would also be no spillover light coming from the pedestrian bridge.

All proposed lighting fixtures would be shielded to prevent any potential glare to the residences and motorists on Coldwater Canyon Avenue. Any potential glare caused by the reflection from direct sunlight on the practice field would be mitigated by the diffuse material of the Field Turf. Similarly, the diffuse materials used on the pedestrian bridge would also eliminate potential glare to the neighboring residences and motorists on Coldwater Canyon Avenue.

After a complete review and secondary analysis of newer potential technology, the proposed lighting design for the parking structure, the practice field, and the pedestrian bridge will not result in any significant impacts to the adjacent private residences.

All pictures were taken on September 16, 2013 between the hours of 6:30 PM and 8:30 PM.



Existing Musco Fixtures



Existing Musco Fixtures



View of Development Site



Intersection at Coldwater Canyon Avenue and Harvard Westlake Drive



View from on top of the Development site looking northeast



View from on top of the Development Site looking east.



View from on top of the Development site looking southeast



View from on top of the Development Site looking south



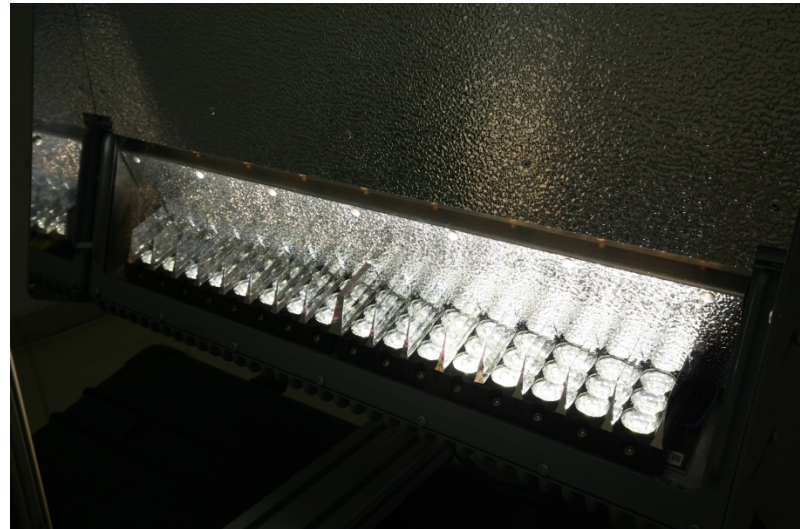
View from on top of the Development site looking at Taper Athletic Pavilion at before sunset

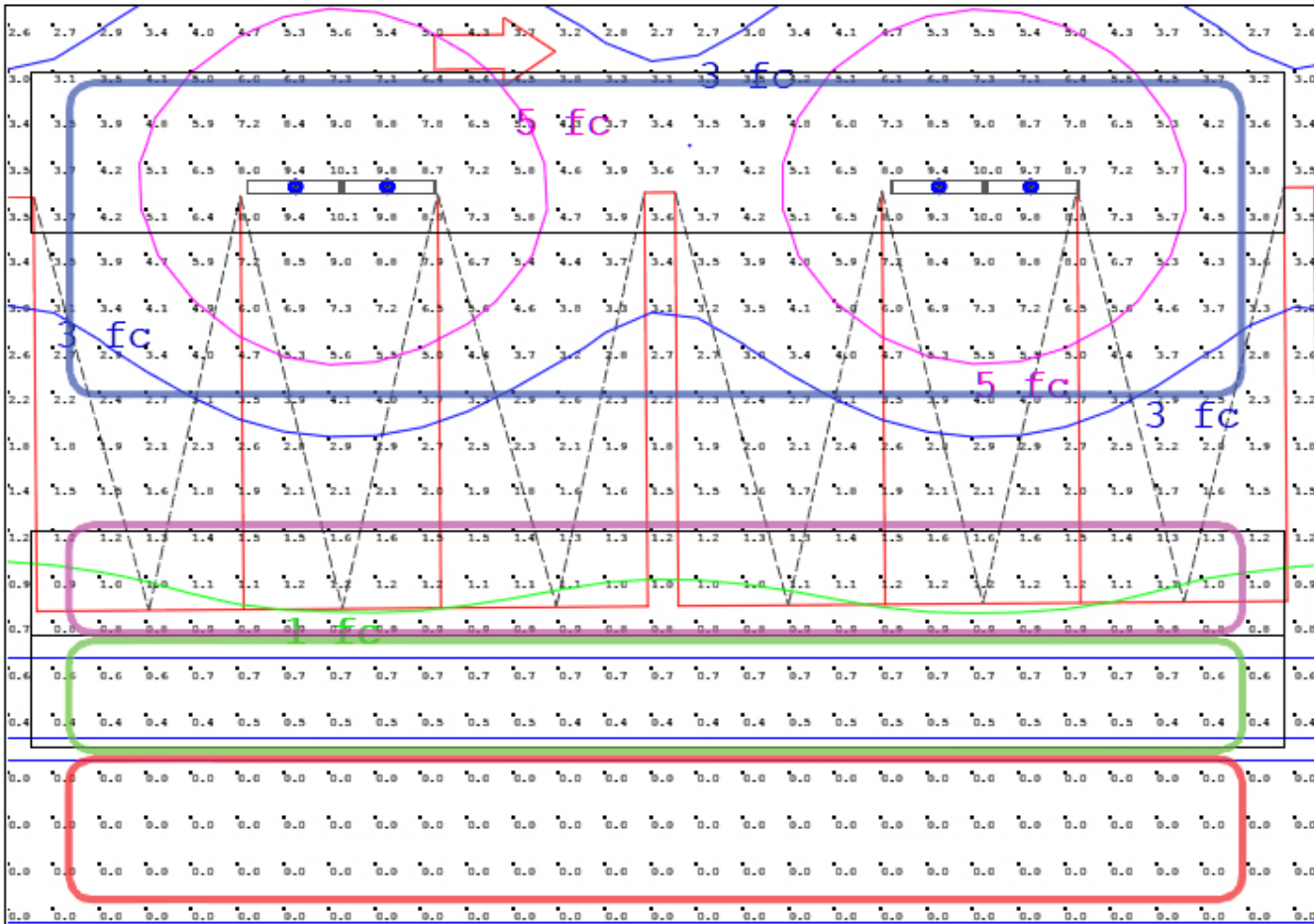


View from on top of the Development Site looking at Taper Athletic Pavilion after sunset



Metal Halide





Holophane
 Controlume Series
 1 32W T8 Fluorescent Lamp

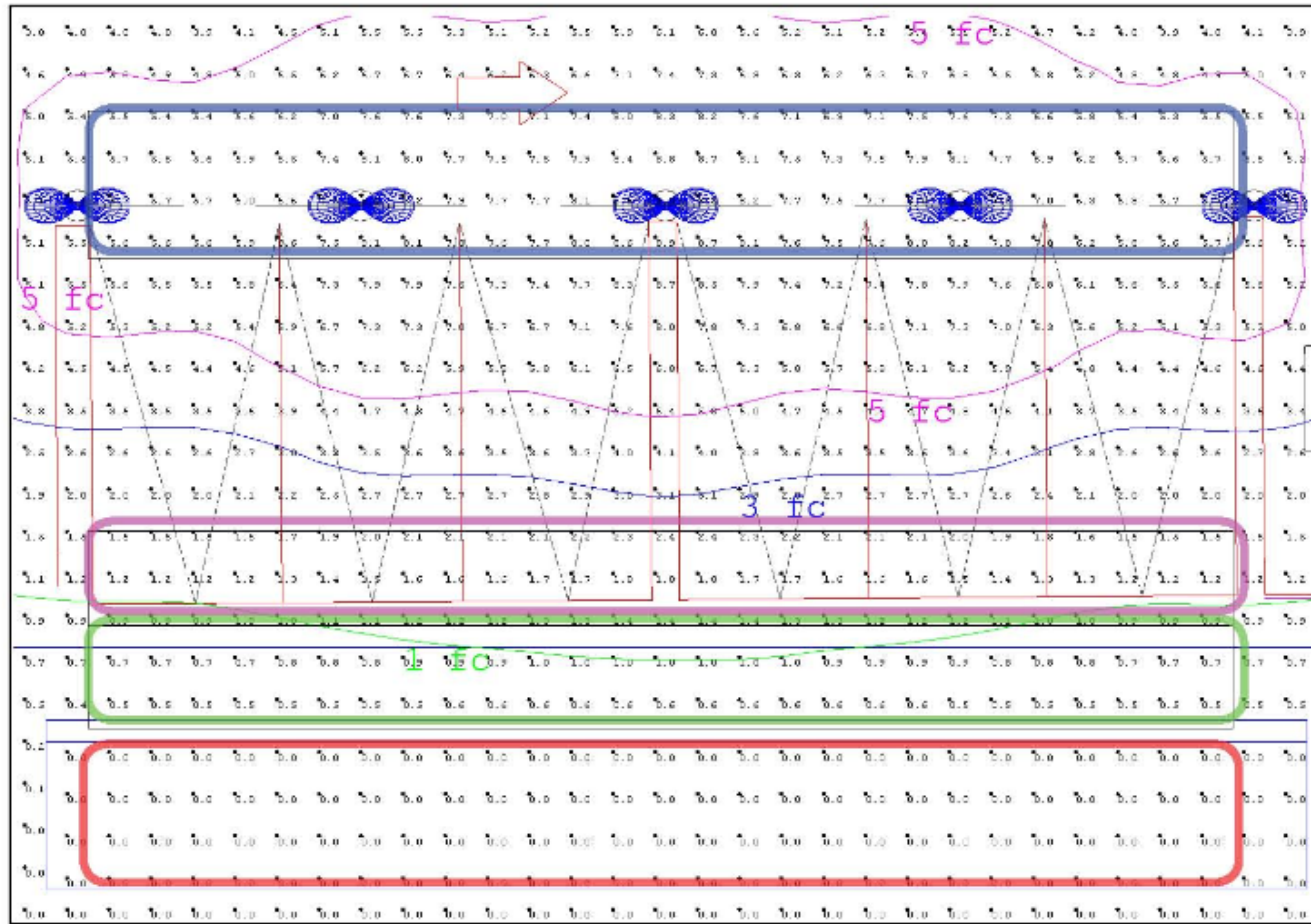
LIGHTING DESIGN ALLIANCE

Interior Drive Aisle Illuminance (fc.)
Maximum: 10.0
Minimum: 3.1
Average: 5.97
Max/ Avg: 1.68

Perimeter Edge Illuminance (fc.)
Maximum: 1.5
Minimum: 0.7
Average: 1.07
Max/ Avg: 1.40

Outside Structure Illuminance (fc.)
Maximum: 0.7
Minimum: 0.2
Average: 0.34
Max/ Avg: 1.70

Hill Top Illuminance (fc.)
Maximum: 0
Minimum: 0
Average: 0
Max/ Avg: N/A



Kim Lighting
 PGL7 LED
 PGL72-Type I 68W

LIGHTING DESIGN ALLIANCE

Interior Drive Aisle Illuminance (fc.)
Maximum: 9.0
Minimum: 5.3
Average: 7.12
Max/Avg: 1.26

Perimeter Edge Illuminance (fc.)
Maximum: 2.4
Minimum: 0.9
Average: 1.51
Max/Avg: 1.59

Outside Structure Illuminance (fc.)
Maximum: 1.0
Minimum: 0.5
Average: 0.7
Max/Avg: 1.43

Hill Top Illuminance (fc.)
Maximum: 0
Minimum: 0
Average: 0
Max/Avg: N/A

EQUIPMENT LIST FOR AREAS SHOWN							
Pole			Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID
4	S1, S10 S5-S6	35'	-	35'	1500W MZ	3	3
6	S2-S4 S7-S9	35'	-	35'	1500W MZ	2	2
10	TOTALS					24	24



MY PROJECT
 Name: Harvard Westlake School Rugby
 Location: Studio City, CA

GRID SUMMARY
 Name: -40' Blanket Grid
 Size: 332' x 195'
 Spacing: 30.0' x 30.0'
 Height: 40.0' below grade

CONSTANT ILLUMINATION

SUMMARY	HORIZONTAL FOOTCANDLES
Entire Grid	
Scan Average:	0.6
Maximum:	7
Minimum:	0
Avg / Min:	72.10
Max / Min:	861.91
UG (adjacent pts):	4.54
CV:	2.06
No. of Points:	360

LUMINAIRE INFORMATION

Luminaire Type: Green Generation
 Rated Lamp Life: 5,000 hours
 Avg Lumens / Lamp: 134,000
 Avg Lamp Tilt Factor: 1.000
 No. of Luminaires: 24
 Avg KW: 37.54 (40.8 max)



Guaranteed Performance: The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

Field Measurements: Illumination measured in accordance with IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

ENGINEERED DESIGN
 By: Joel Stout
 File # / Date: 164456-D 12-Aug-13

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Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	
4	S1, S10 S5-S6	35'	-	35'	1500W MZ	3	3	
6	S2-S4 S7-S9	35'	-	35'	1500W MZ	2	2	
10	TOTALS						24	24



MY PROJECT
 Name: Harvard Westlake School Rugby
 Location: Studio City, CA

GRID SUMMARY
 Name: 5' Contour Spill
 Spacing: 30.0'
 Height: 5.0' above grade

CONSTANT ILLUMINATION

SUMMARY	HORIZONTAL FOOTCANDLES
Entire Grid	
Scan Average:	0.742
Maximum:	4.40
Minimum:	0.00
No. of Points:	6

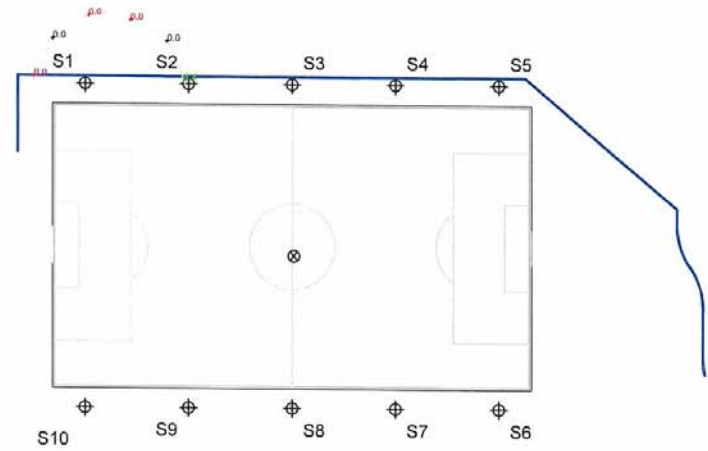
LUMINAIRE INFORMATION
 Luminaire Type: Green Generation
 Rated Lamp Life: 5,000 hours
 Avg Lumens / Lamp: 134,000
 Avg Lamp Tilt Factor: 1.000
 No. of Luminaires: 24
 Avg KW: 37.54 (40.8 max)

Guaranteed Performance: The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

Field Measurements: Illumination measured in accordance with IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.



Pole location(s) Ⓢ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN
 By: Joel Stout
 File # / Date: 164456-D 12-Aug-13

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ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole			Luminaires					
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	
4	S1, S10 S5-S6	35'	-	35'	1500W MZ	3	3	
6	S2-S4 S7-S9	35'	-	35'	1500W MZ	2	2	
10	TOTALS					24	24	0



MY PROJECT
 Name: Harvard Westlake School Rugby
 Location: Studio City, CA

GRID SUMMARY
 Name: 10' Contour Spill
 Spacing: 30.0'
 Height: 10.0' above grade

CONSTANT ILLUMINATION

SUMMARY	HORIZONTAL FOOTCANDLES
Entire Grid	
Scan Average:	0.430
Maximum:	3.58
Minimum:	0.00
No. of Points:	13

LUMINAIRE INFORMATION
 Luminaire Type: Green Generation
 Rated Lamp Life: 5,000 hours
 Avg Lumens / Lamp: 134,000
 Avg Lamp Tilt Factor: 1.000
 No. of Luminaires: 24
 Avg KW: 37.54 (40.8 max)

Guaranteed Performance: The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

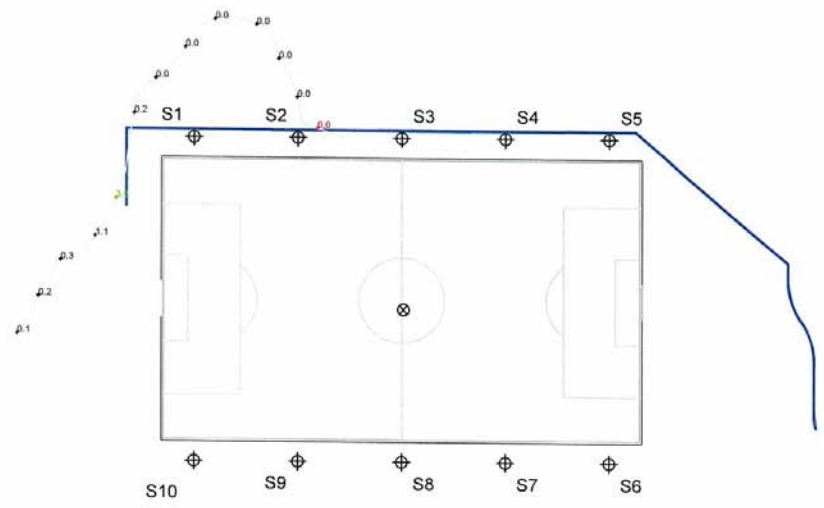
Field Measurements: Illumination measured in accordance with IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

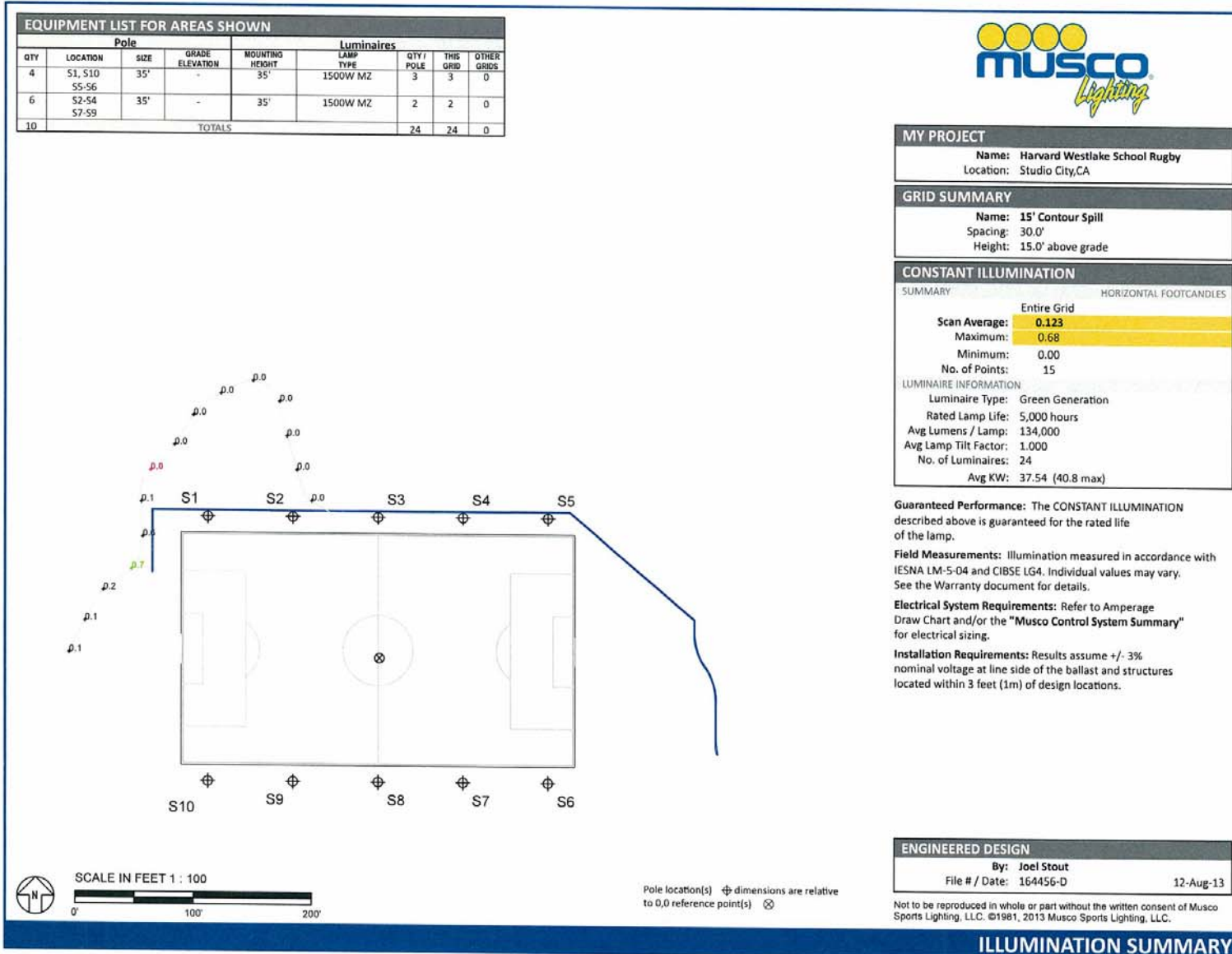
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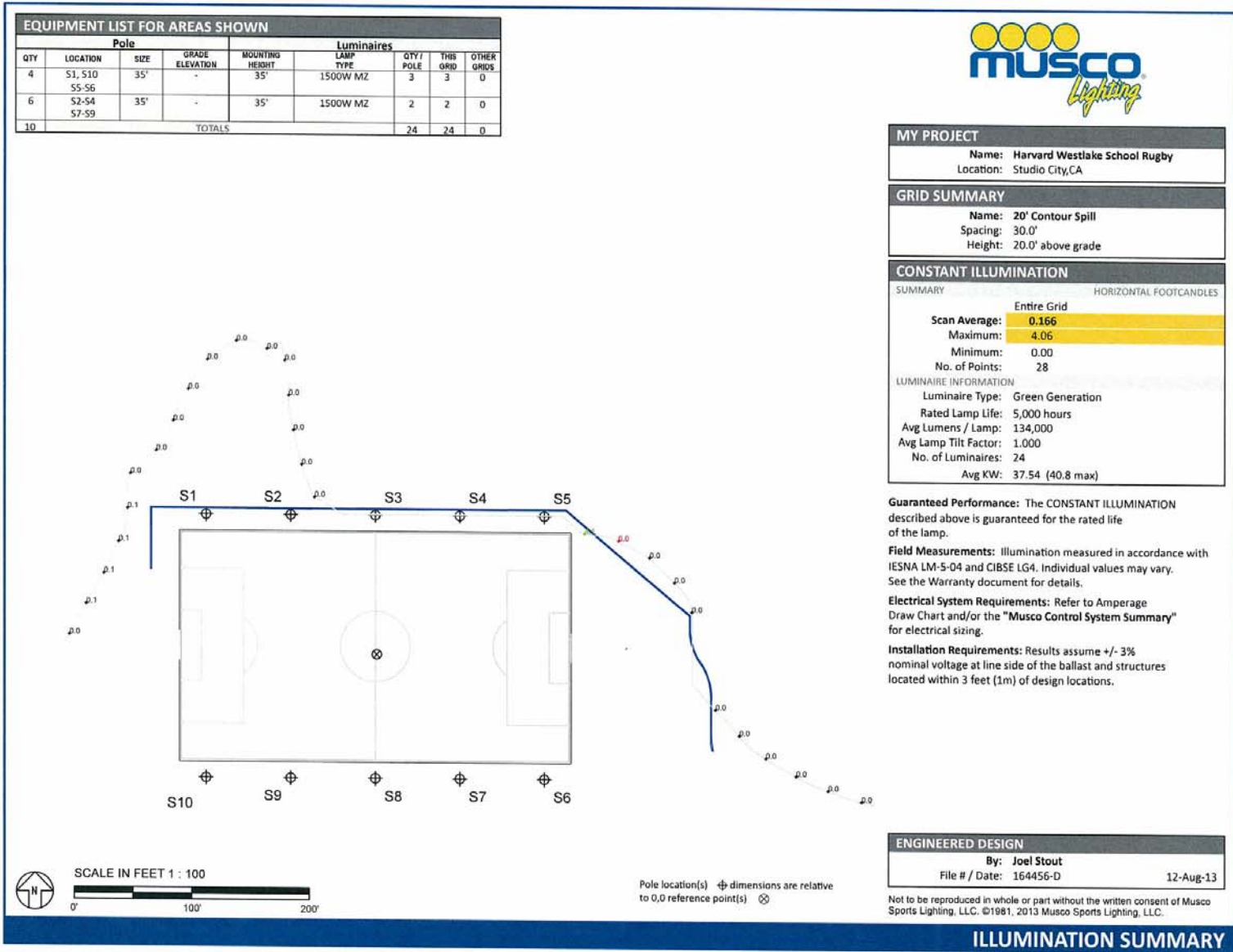


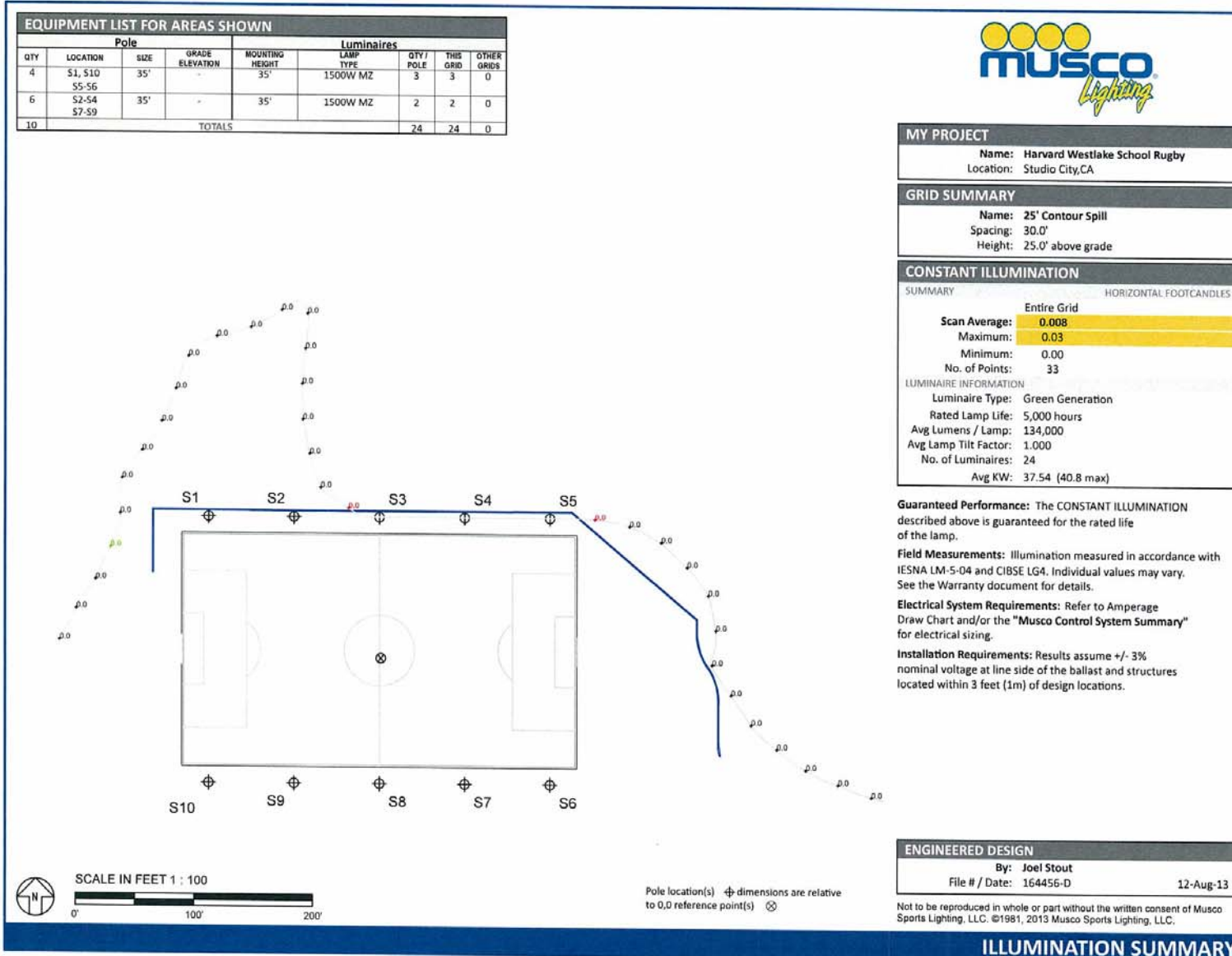
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ILLUMINATION SUMMARY



ILLUMINATION SUMMARY





EQUIPMENT LIST FOR AREAS SHOWN									
Pole			Luminaires						
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	OTHER GRIDS	
4	S1, S10 S5-S6	35'	-	35'	1500W MZ	3	3	0	
6	S2-S4 S7-S9	35'	-	35'	1500W MZ	2	2	0	
10	TOTALS						24	24	0



MY PROJECT
 Name: Harvard Westlake School Rugby
 Location: Studio City, CA

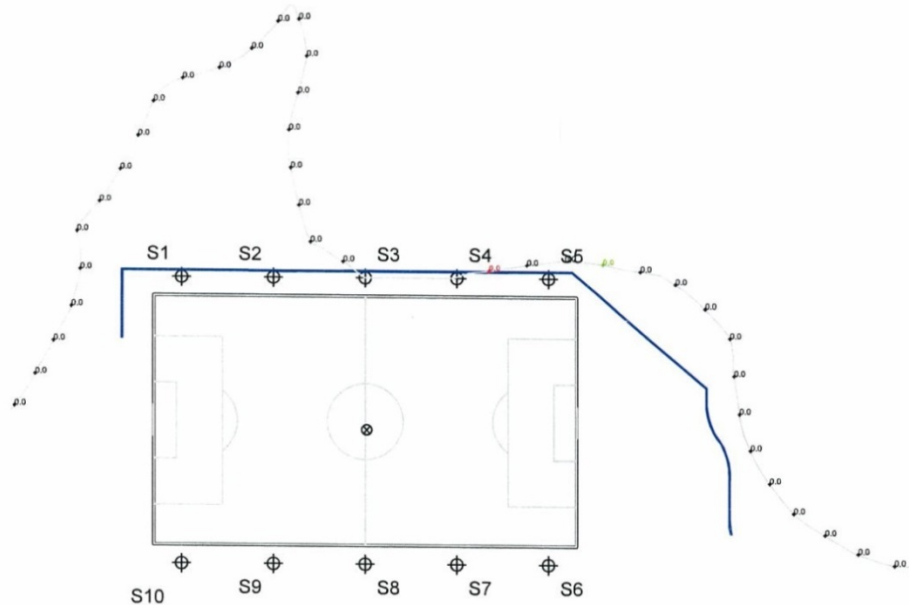
GRID SUMMARY
 Name: 30' Contour Spill
 Spacing: 30.0'
 Height: 30.0' above grade

CONSTANT ILLUMINATION

SUMMARY	HORIZONTAL FOOTCANDLES
Entire Grid	
Scan Average:	0.004
Maximum:	0.01
Minimum:	0.00
No. of Points:	38

LUMINAIRE INFORMATION

Luminaire Type:	Green Generation
Rated Lamp Life:	5,000 hours
Avg Lumens / Lamp:	134,000
Avg Lamp Tilt Factor:	1.000
No. of Luminaires:	24
Avg KW:	37.54 (40.8 max)



Guaranteed Performance: The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

Field Measurements: Illumination measured in accordance with IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

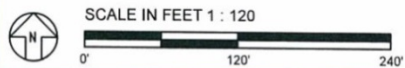
Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

ENGINEERED DESIGN
 By: Joel Stout
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ILLUMINATION SUMMARY



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

EQUIPMENT LIST FOR AREAS SHOWN									
QTY	Pole			Luminaires					
	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	OTHER GRIDS	
4	S1, S10	35'	-	35'	1500W MZ	3	3	0	
	S5-S6								
6	S2-S4	35'	-	35'	1500W MZ	2	2	0	
	S7-S9								
10	TOTALS						24	24	0

MY PROJECT	
Name:	Harvard Westlake School Rugby
Location:	Studio City, CA

GRID SUMMARY	
Name:	35' Contour Spill
Spacing:	30.0'
Height:	35.0' above grade

CONSTANT ILLUMINATION	
SUMMARY	HORIZONTAL FOOTCANDLES
Entire Grid	
Scan Average:	0.000
Maximum:	0.00
Minimum:	0.00
No. of Points:	40
LUMINAIRE INFORMATION	
Luminaire Type:	Green Generation
Rated Lamp Life:	5,000 hours
Avg Lumens / Lamp:	134,000
Avg Lamp Tilt Factor:	1.000
No. of Luminaires:	24
Avg KW:	37.54 (40.8 max)

Guaranteed Performance: The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

Field Measurements: Illumination measured in accordance with IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 120

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN		
By:	Joel Stout	
File # / Date:	164456-D	12-Aug-13

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ILLUMINATION SUMMARY



MY PROJECT	
Name:	Harvard Westlake School Rugby
Location:	Studio City, CA

GRID SUMMARY	
Name:	40' Contour Spill
Spacing:	30.0'
Height:	40.0' above grade

CONSTANT ILLUMINATION	
SUMMARY	HORIZONTAL FOOTCANDLES
Entire Grid	
Scan Average:	0.000
Maximum:	0.00
Minimum:	0.00
No. of Points:	42
LUMINAIRE INFORMATION	
Luminaire Type:	Green Generation
Rated Lamp Life:	5,000 hours
Avg Lumens / Lamp:	134,000
Avg Lamp Tilt Factor:	1.000
No. of Luminaires:	24
Avg KW: 37.54 (40.8 max)	

Guaranteed Performance: The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

Field Measurements: Illumination measured in accordance with IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

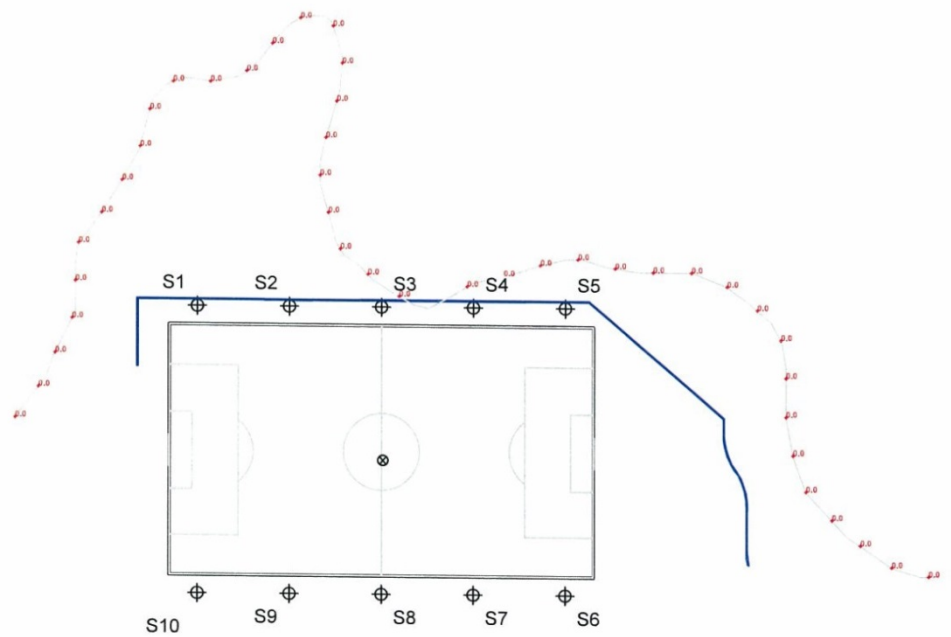
Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

ENGINEERED DESIGN		
By:	Joel Stout	
File # / Date:	164456-D	12-Aug-13

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EQUIPMENT LIST FOR AREAS SHOWN								
Pole			Luminaires					
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1, S10 S5-S6	35'	-	35'	1500W MZ	3	3	0
6	S2-S4 S7-S9	35'	-	35'	1500W MZ	2	2	0
TOTALS						24	24	0



Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ILLUMINATION SUMMARY



MY PROJECT
 Name: Harvard Westlake School Rugby
 Location: Studio City, CA

GRID SUMMARY
 Name: 45' Contour Spill
 Spacing: 30.0'
 Height: 45.0' above grade

CONSTANT ILLUMINATION

SUMMARY	HORIZONTAL FOOTCANDLES
Entire Grid	
Scan Average:	0.000
Maximum:	0.00
Minimum:	0.00
No. of Points:	43

LUMINAIRE INFORMATION
 Luminaire Type: Green Generation
 Rated Lamp Life: 5,000 hours
 Avg Lumens / Lamp: 134,000
 Avg Lamp Tilt Factor: 1.000
 No. of Luminaires: 24
 Avg KW: 37.54 (40.8 max)

Guaranteed Performance: The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

Field Measurements: Illumination measured in accordance with IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

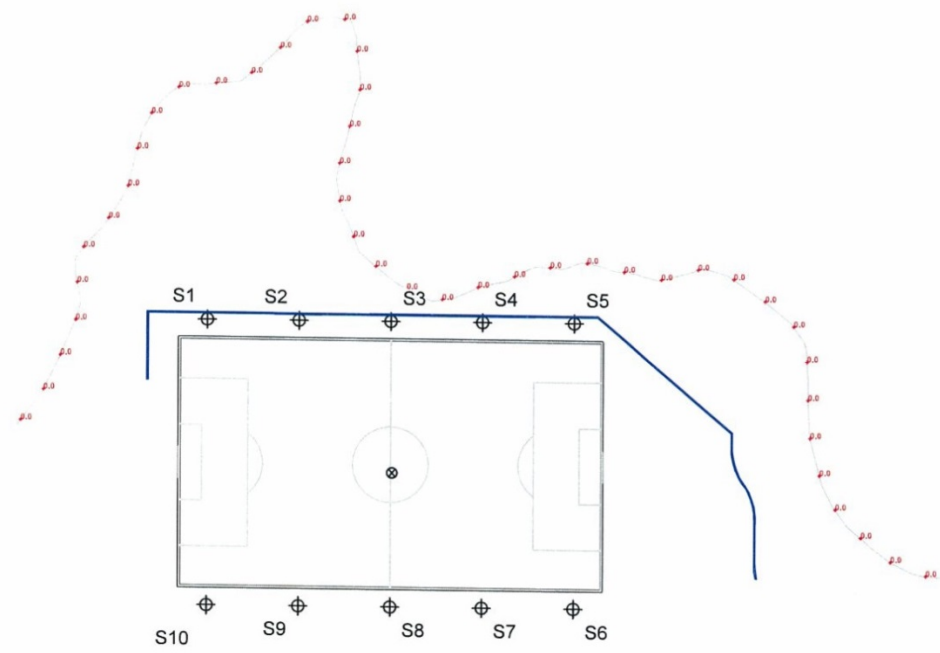
ENGINEERED DESIGN
 By: Joel Stout
 File # / Date: 164456-D 12-Aug-13

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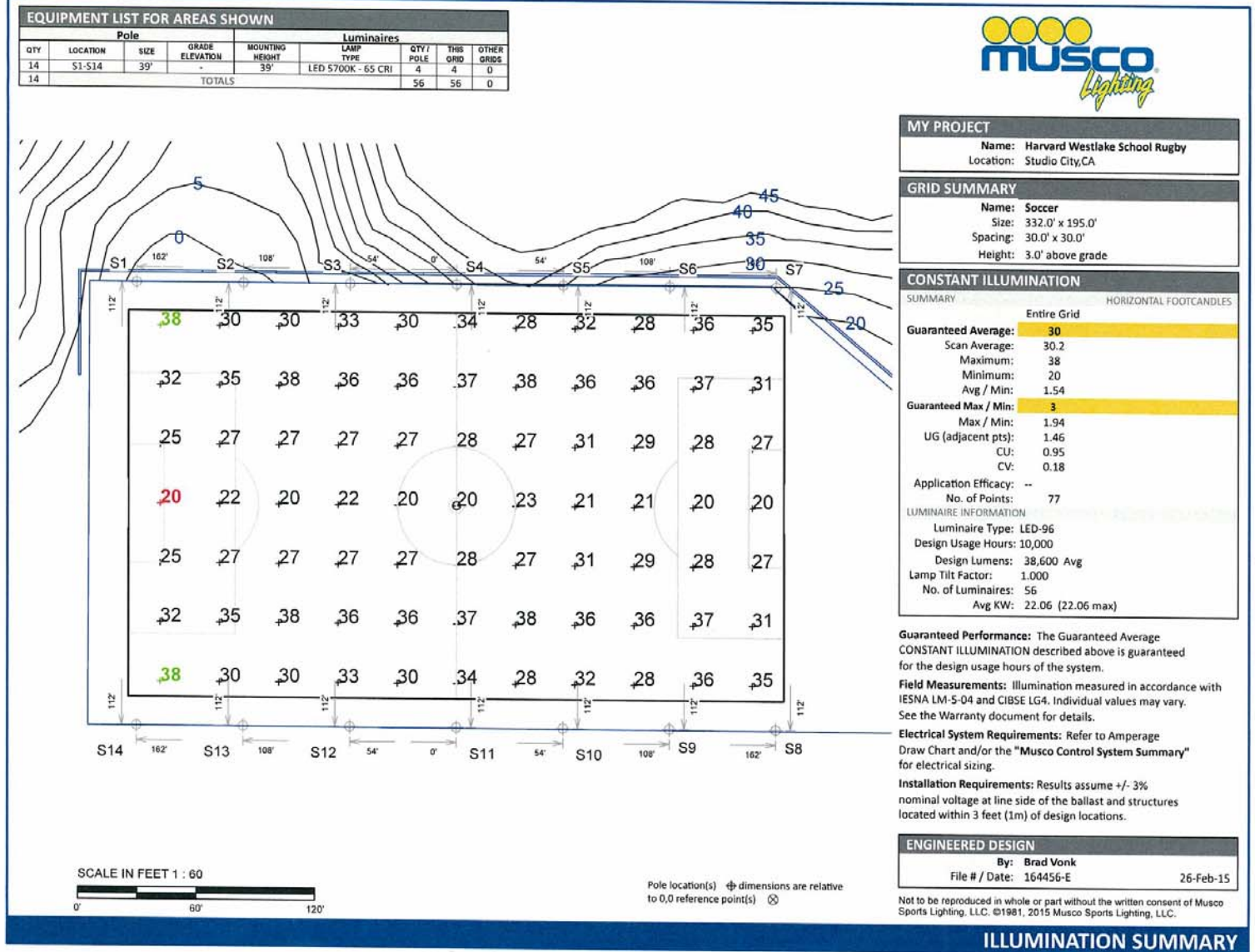
ILLUMINATION SUMMARY

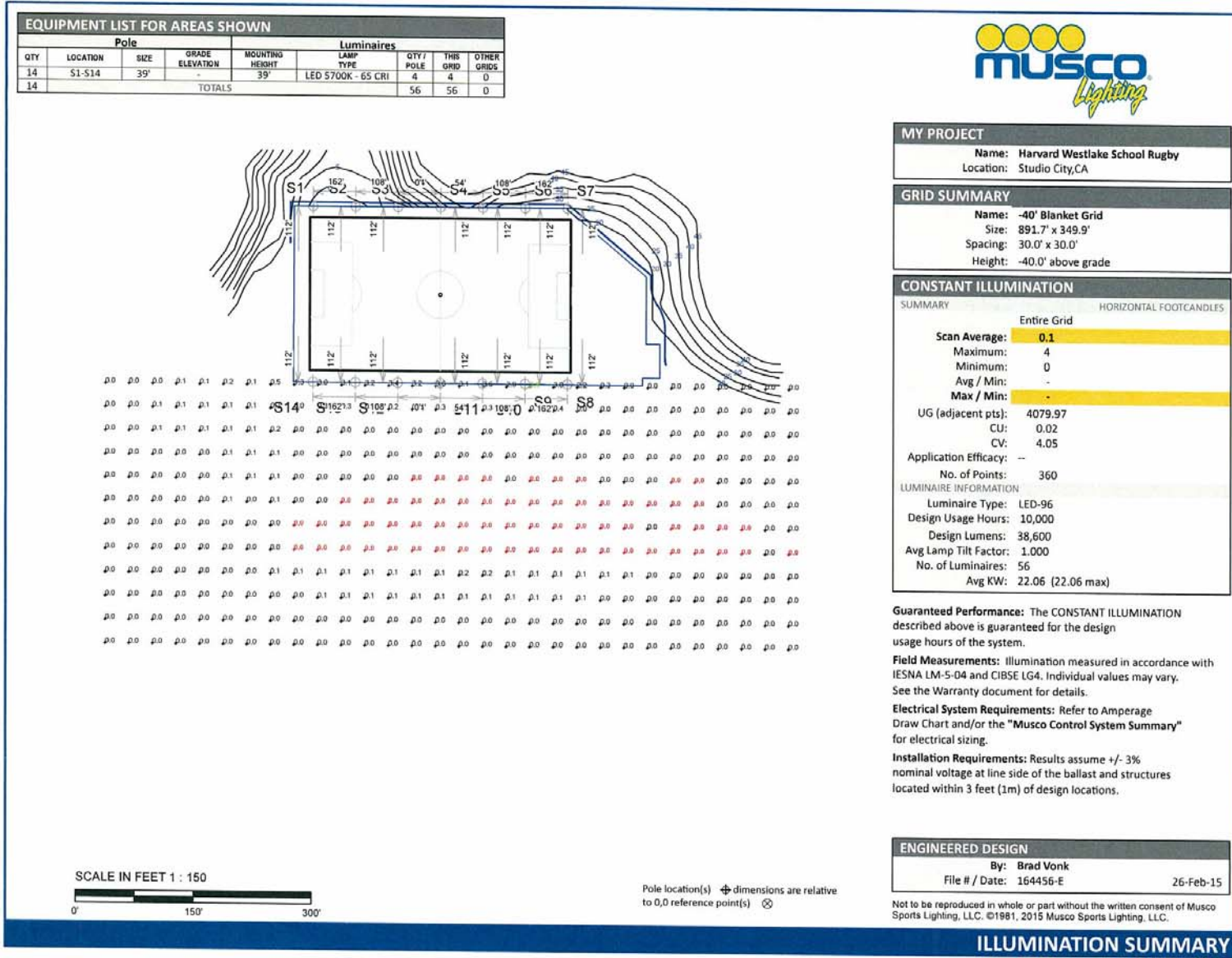
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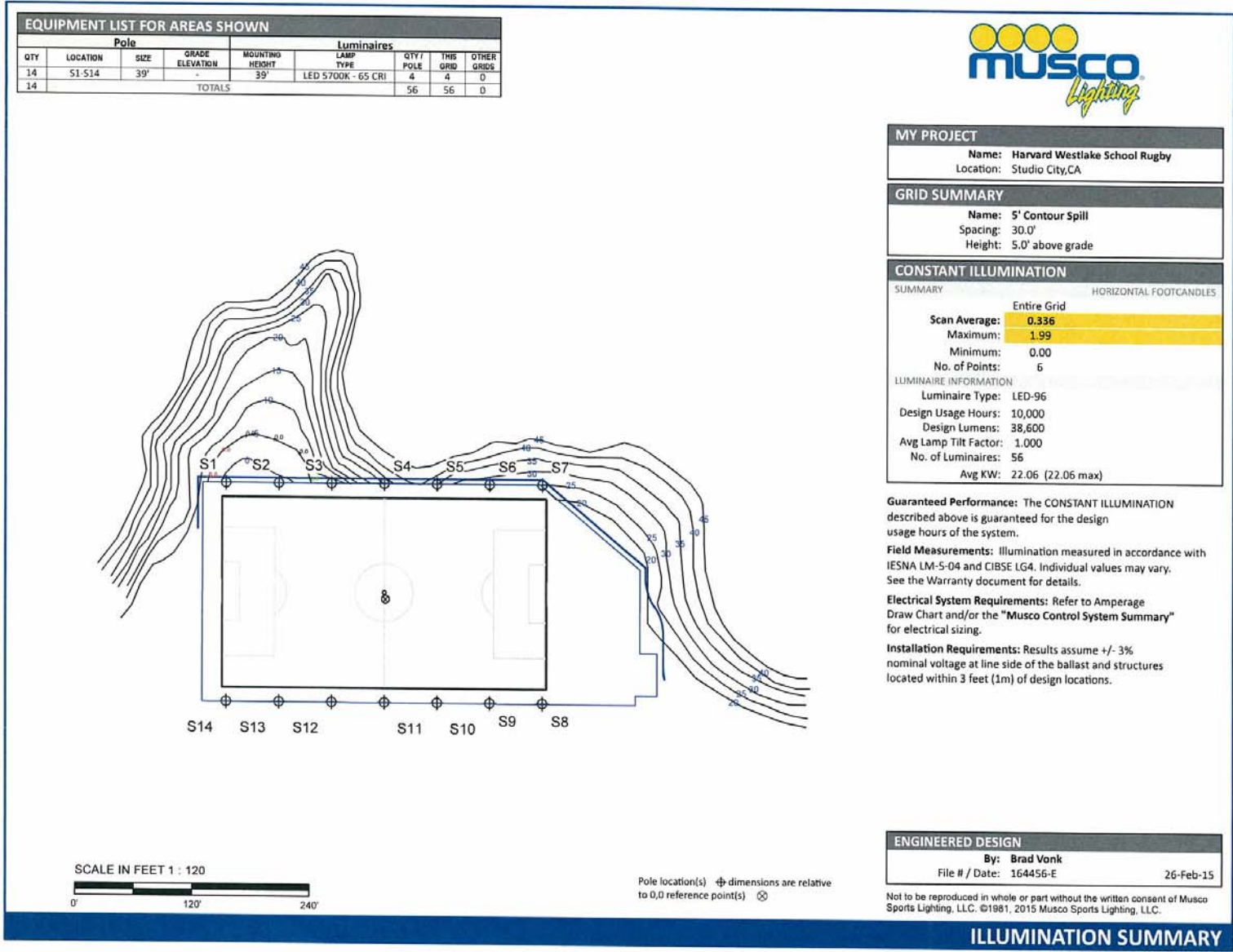
Pole				Luminaires					
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	OTHER GRIDS	
4	S1, S10 S5-S6	35'	-	35'	1500W MZ	3	3	0	
6	S2-S4 S7-S9	35'	-	35'	1500W MZ	2	2	0	
10	TOTALS						24	24	0

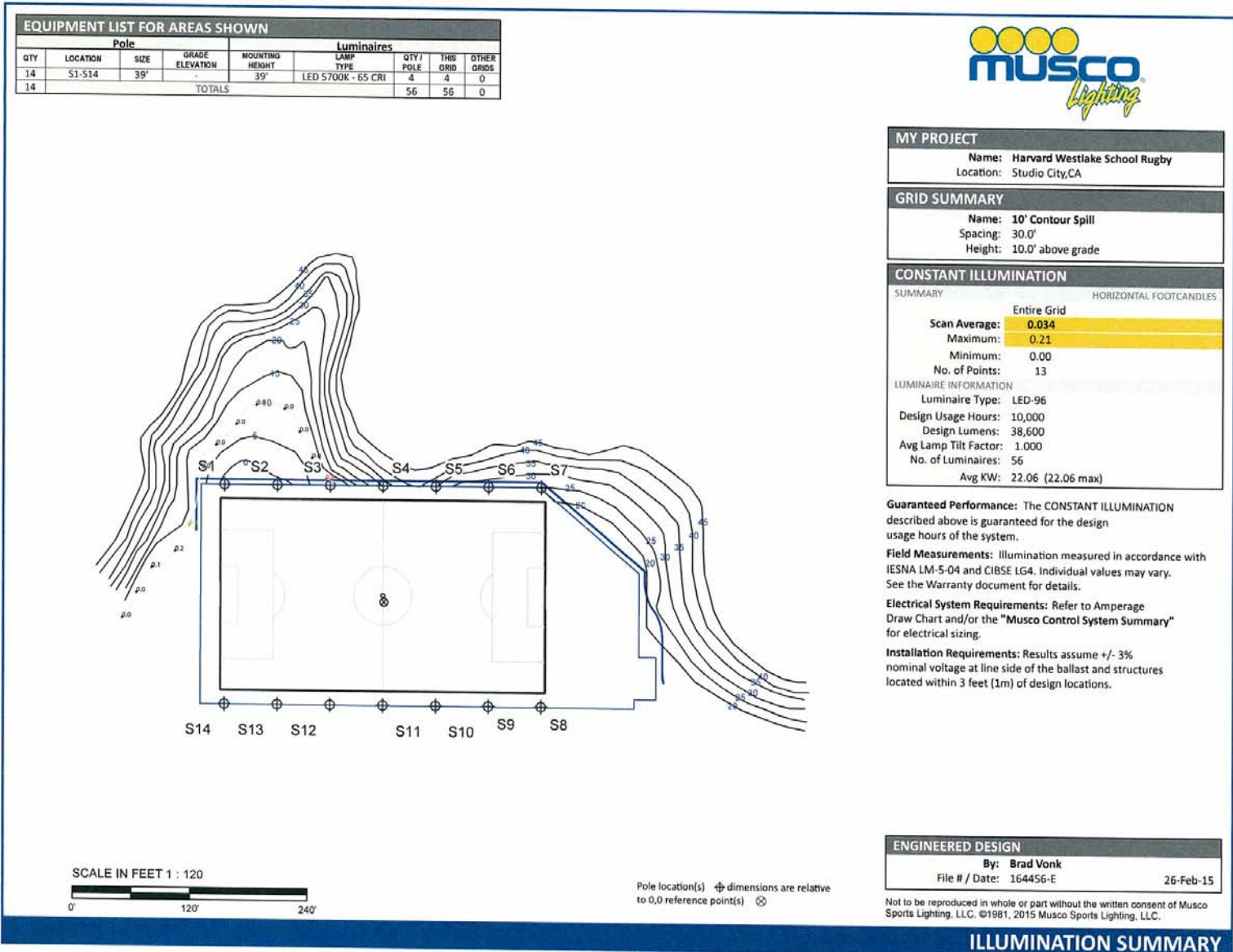


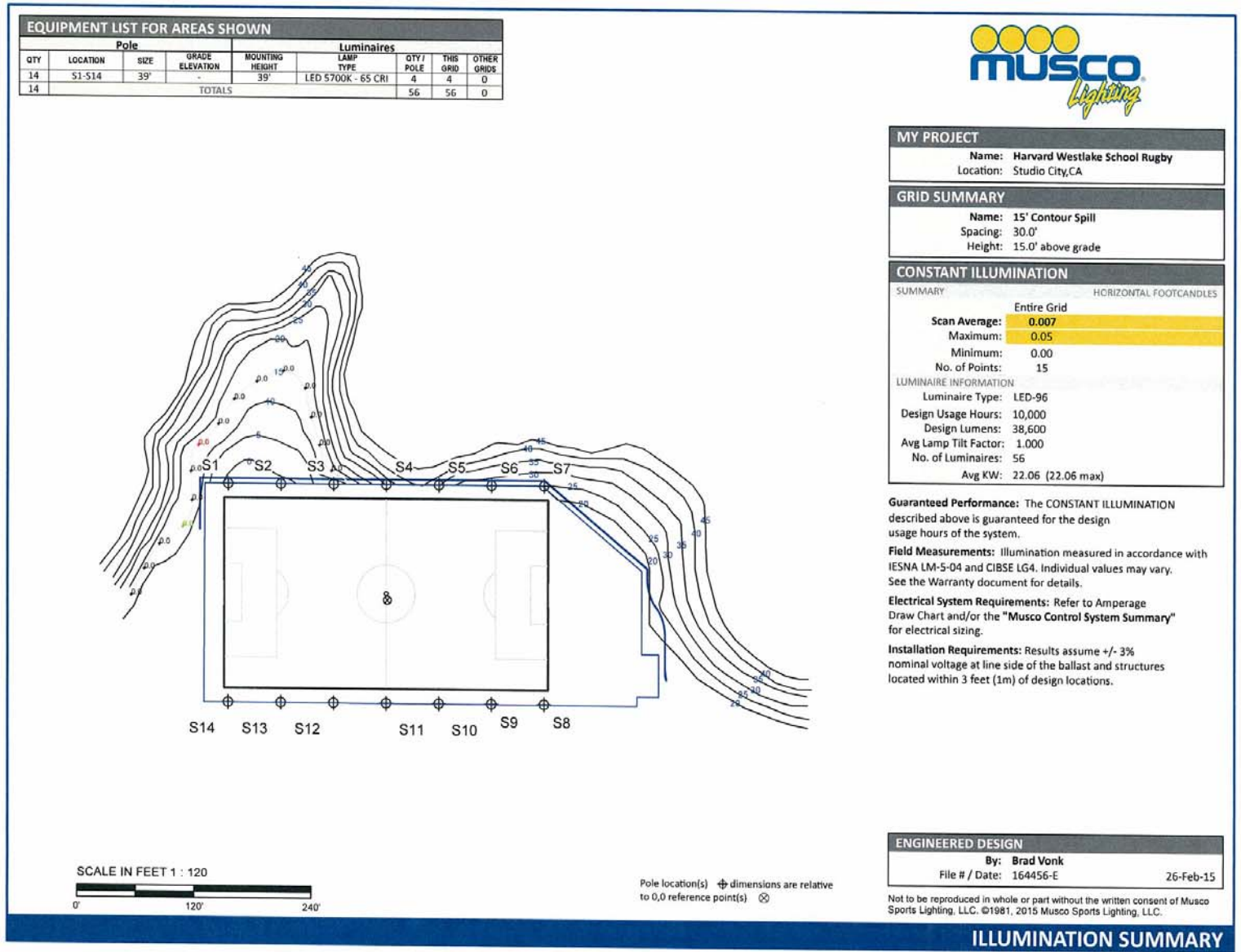
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

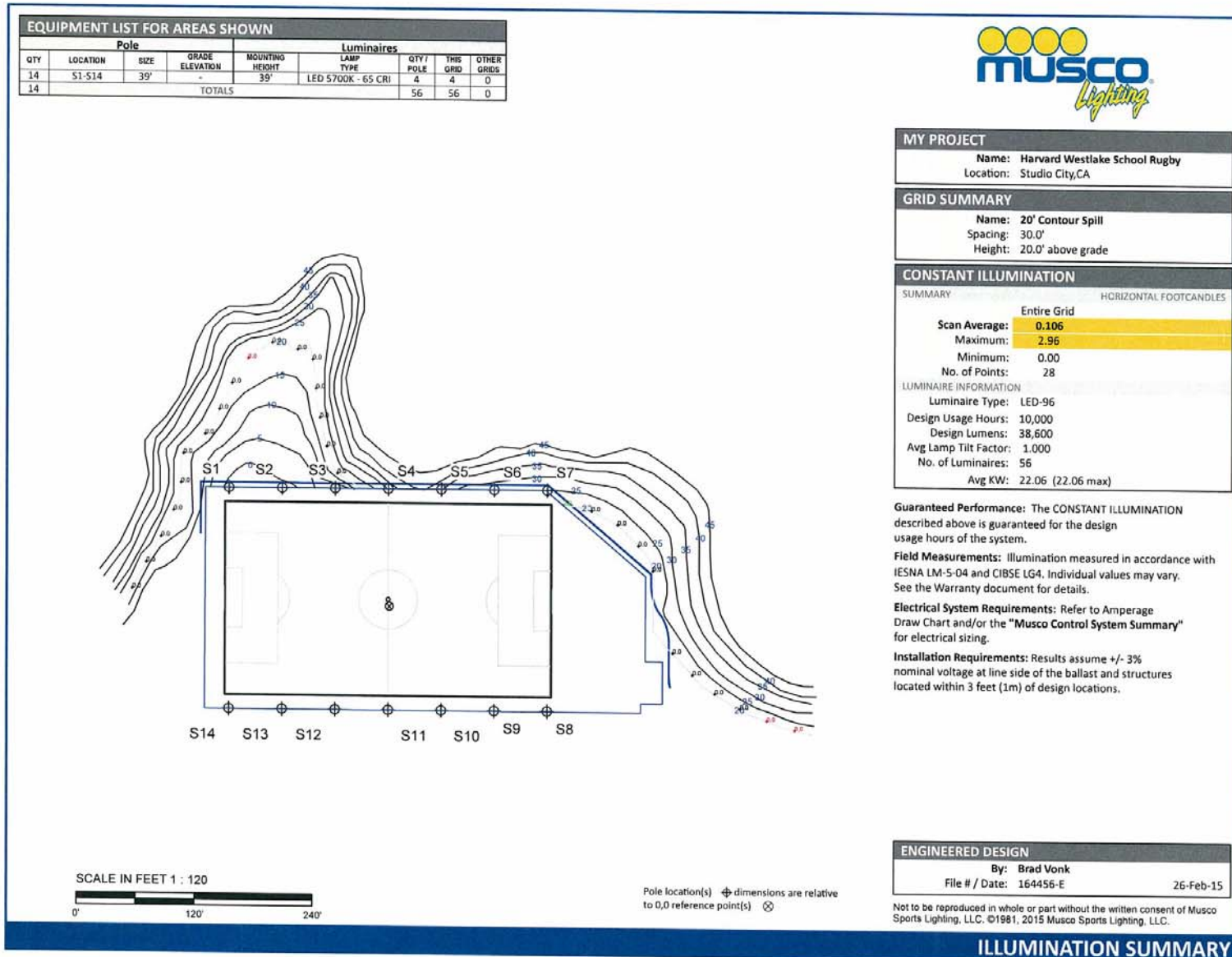


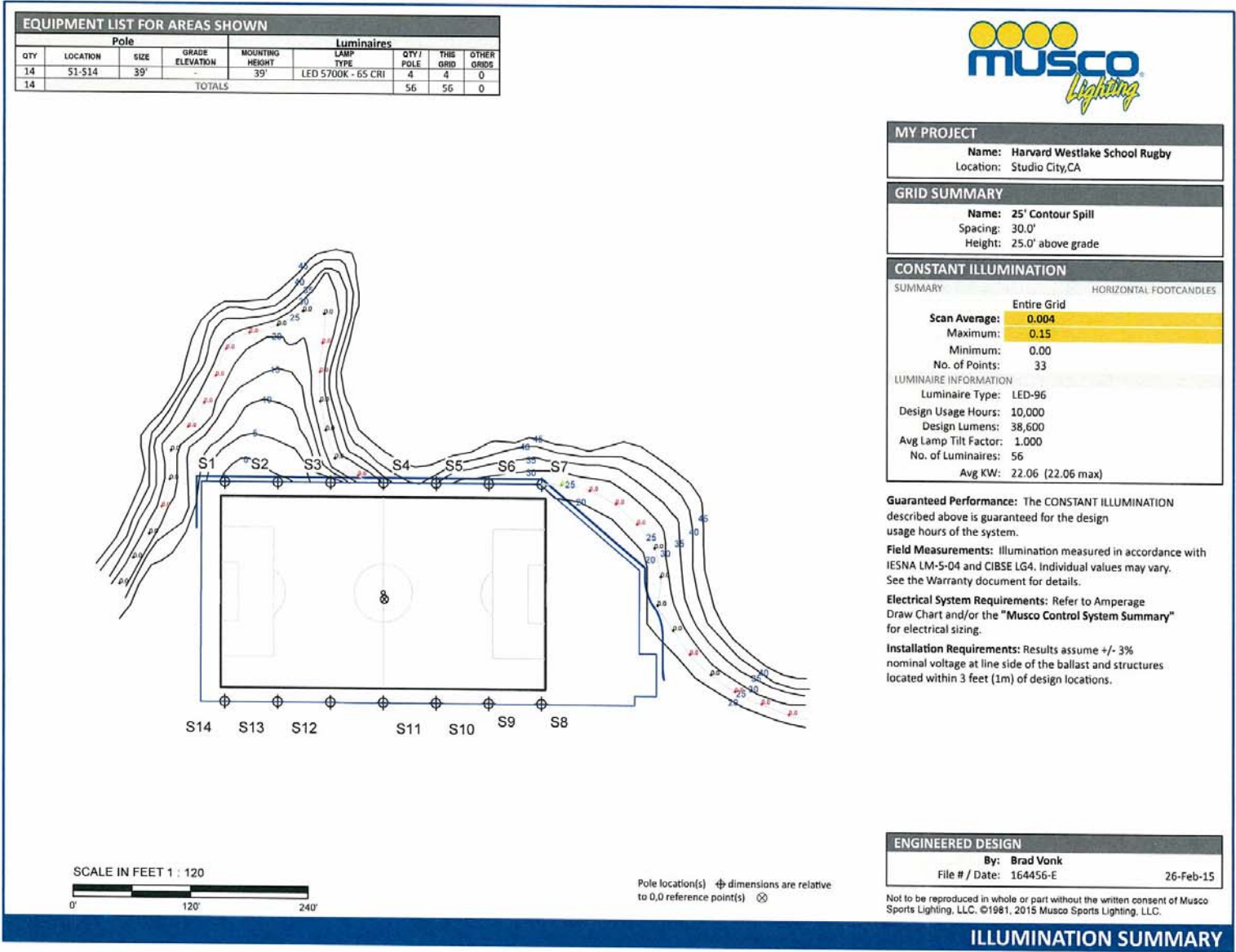




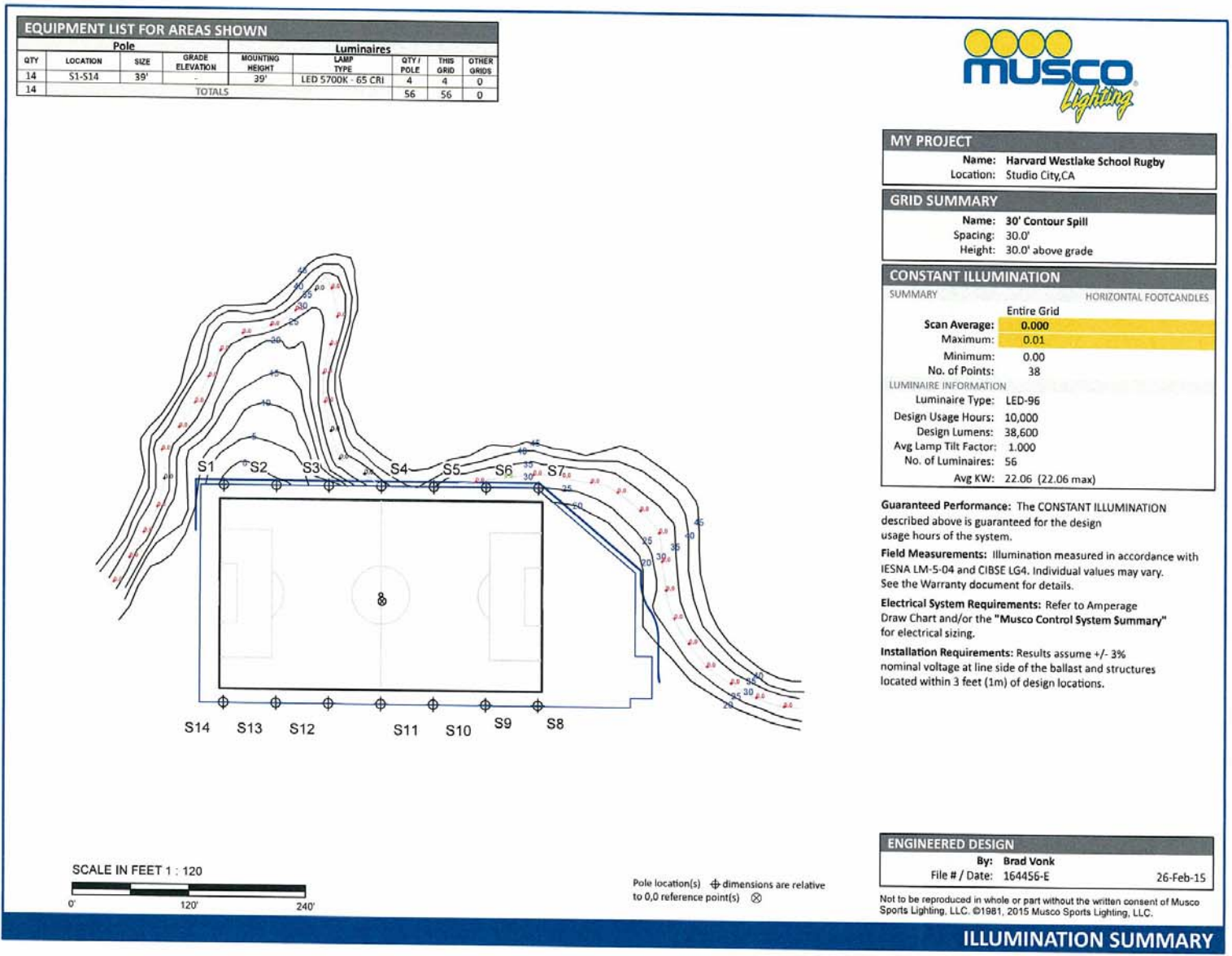


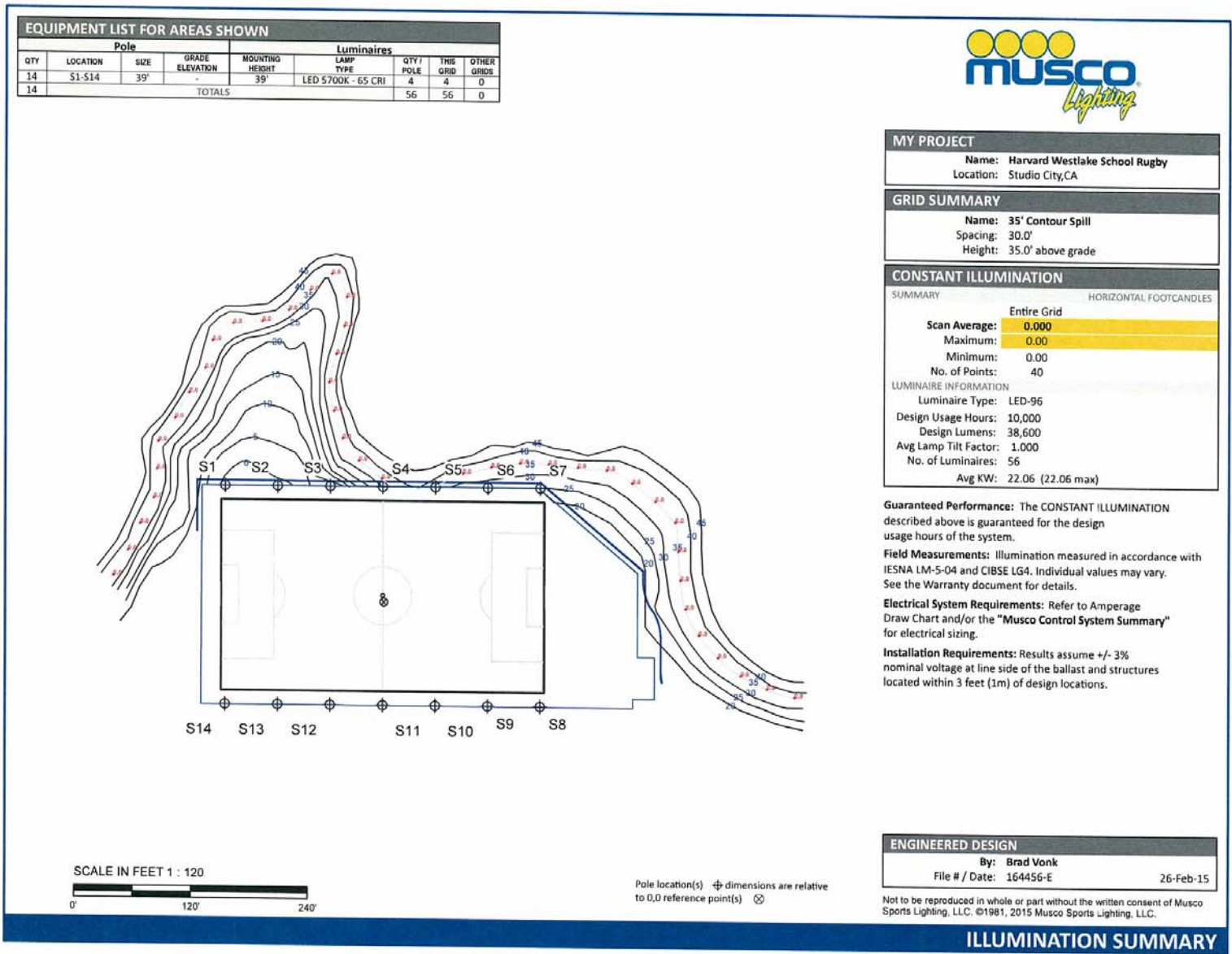


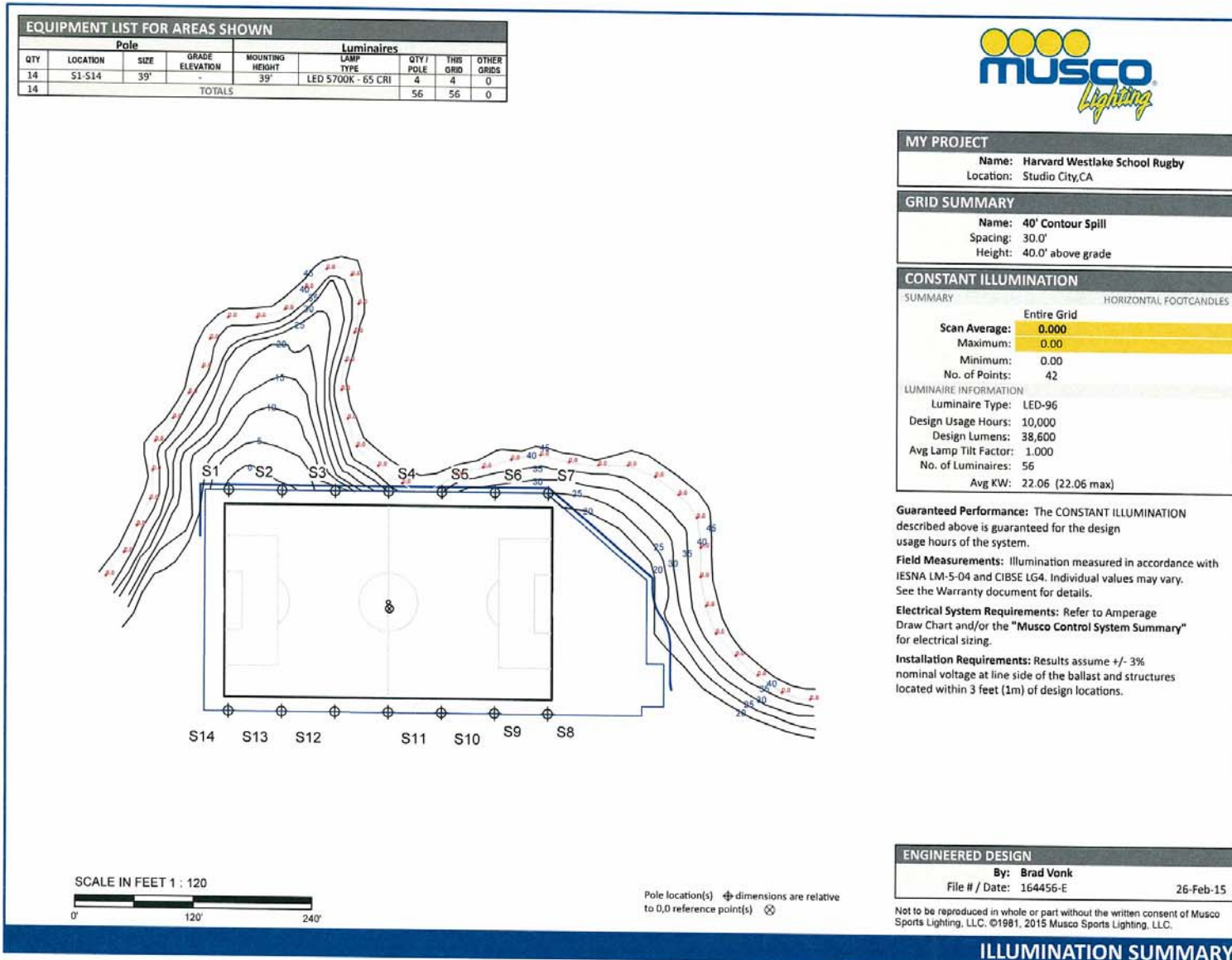




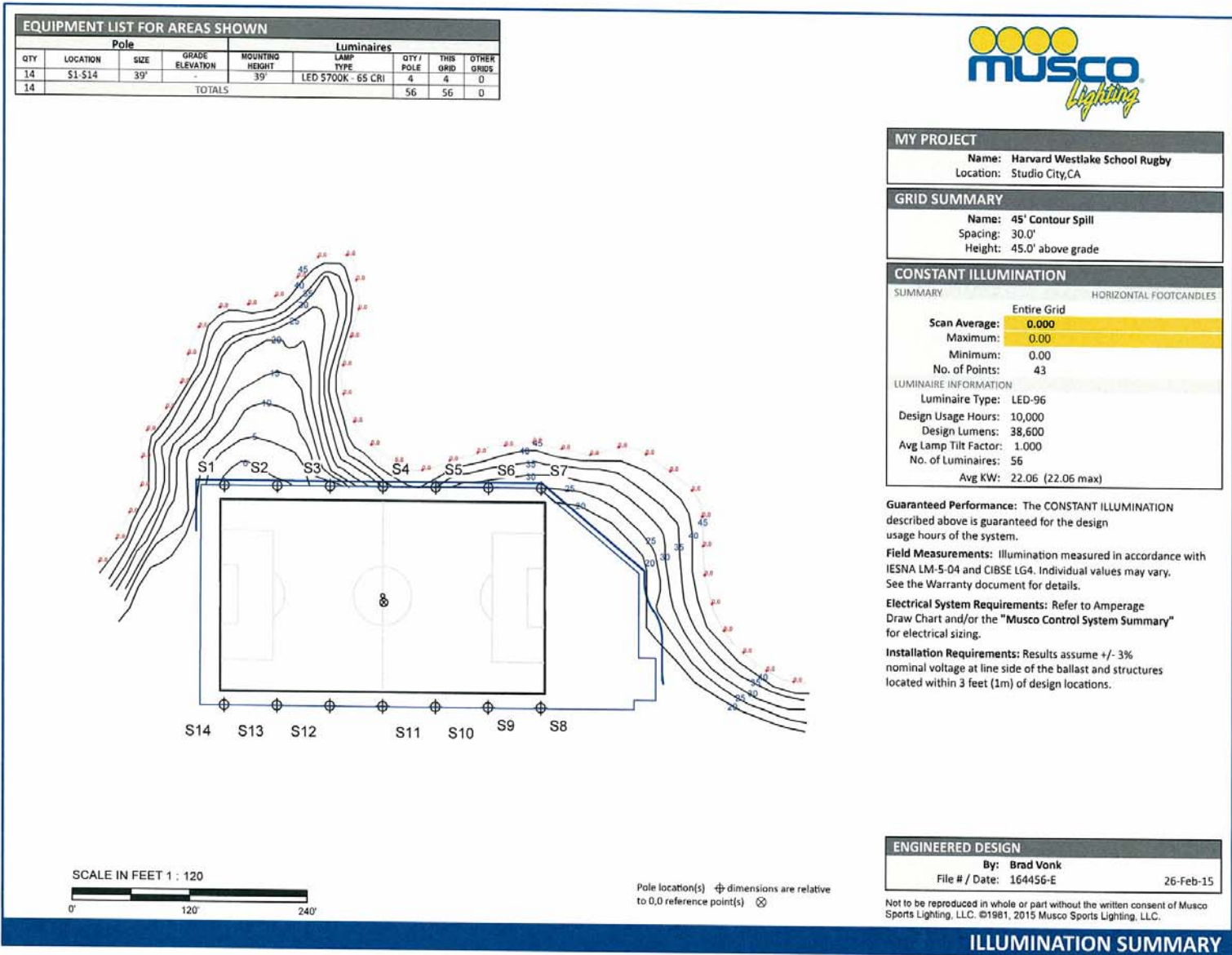
ILLUMINATION SUMMARY



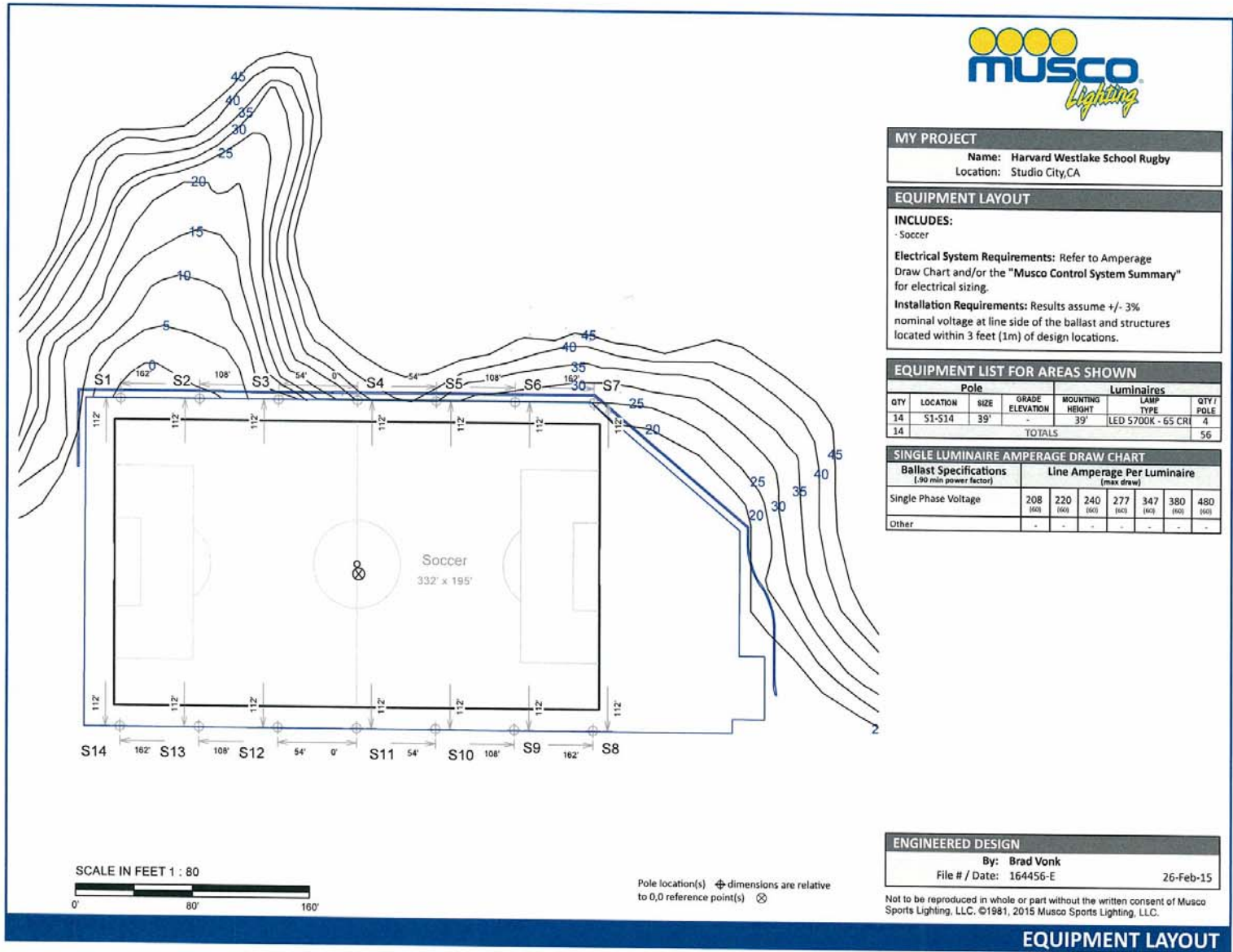


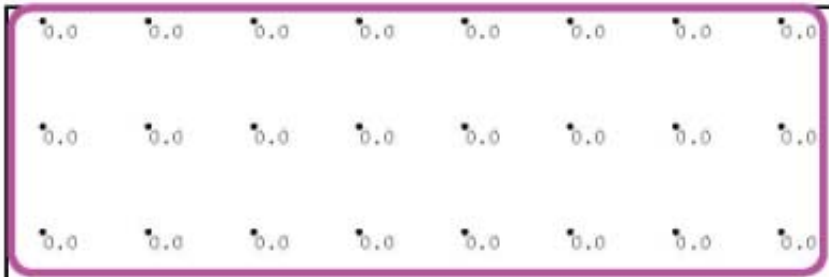


ILLUMINATION SUMMARY

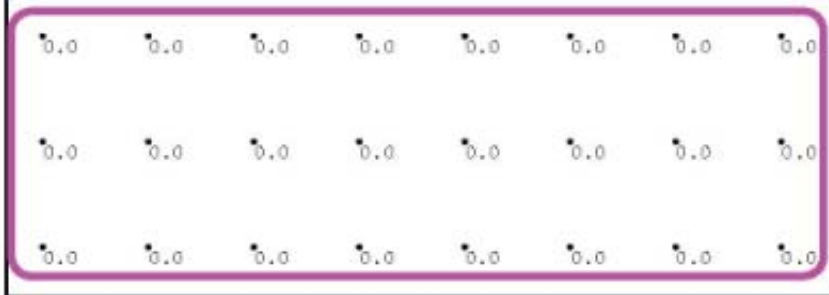
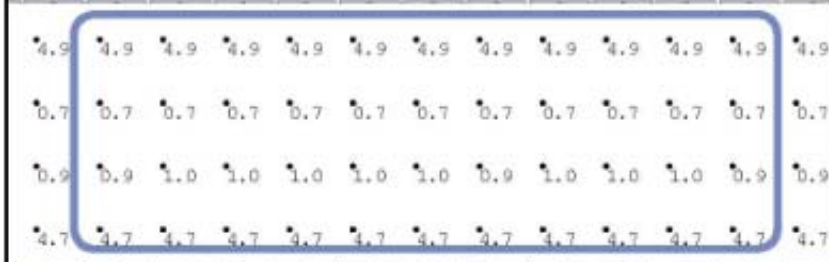


ILLUMINATION SUMMARY



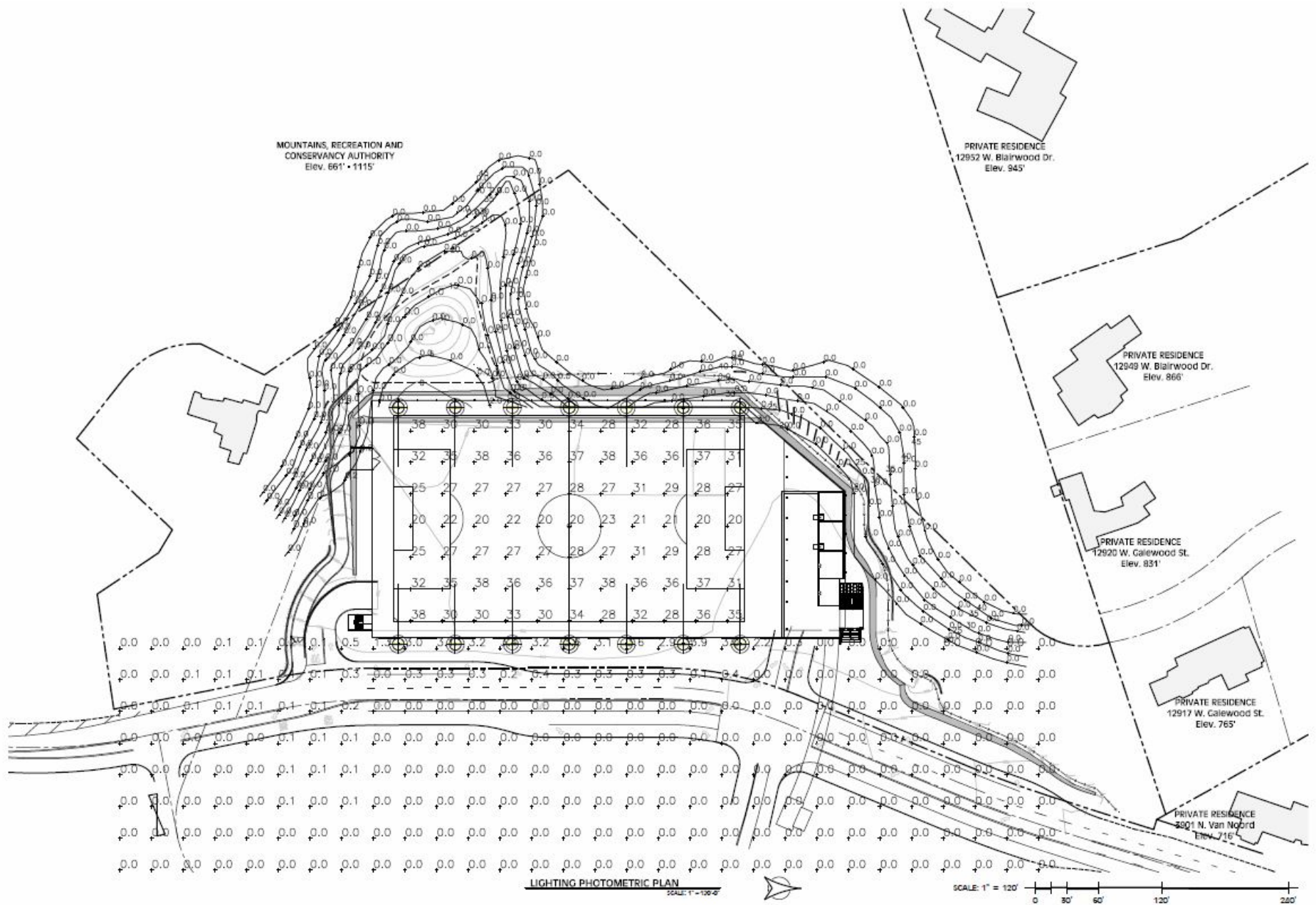


IO Lighting
Luxrail
Asymmetrical Standard Output

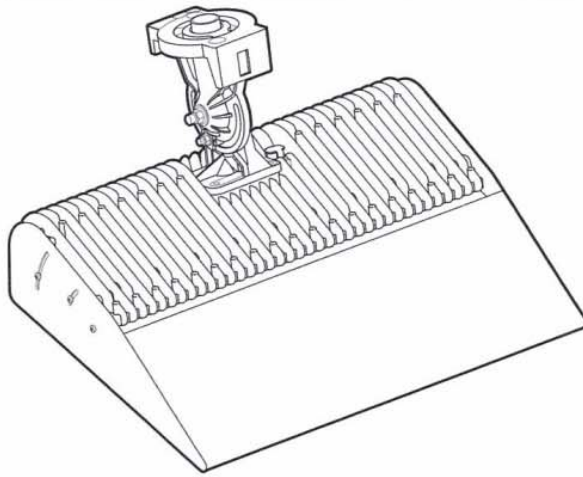


Pedestrian Bridge Top
Illuminance (fc.)
Maximum: 4.9
Minimum: 0.7
Average: 2.82
Max/ Avg: 1.74

Coldwater Canyon Avenue
Illuminance (fc.)
Maximum: 0
Minimum: 0
Average: 0
Max/ Avg: N/A



Datasheet: 96 LED Luminaire and Driver



Luminaire Data

Weight (luminaire) 35 lb (16 kg)
 UL listing number E338094
 UL Listed for USA / Canada UL1598
 CSA-C22.2 No. 250.0
 Material and finish Die-cast aluminum,
 anodized, CASTGUARD™ coated,
 and powder-coat painted
 Wind speed rating (aiming only) 150 mi/h (67 m/s)

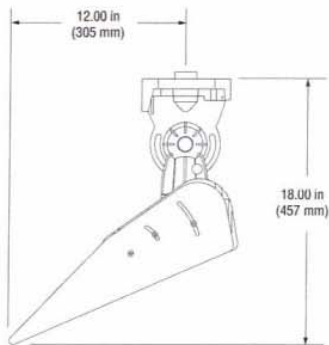
Photometric Characteristics

Projected lumen maintenance per IES TM-21-11
 L90 (12K) 61,000 h
 L80 (12K) >72,000 h
 L70 (12K) >72,000 h
 CIE correlated color temperature 5700 K
 Color Rendering Index (CRI) 65–70
 Lumens¹ 38,600

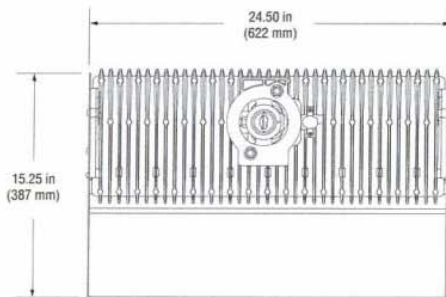
Footnotes:

1) Incorporates appropriate dirt depreciation factor for life of luminaire.

Side



Top



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www.musco.com • lighting@musco.com

Datasheet: 96 LED Luminaire and Driver

Driver Data

Electrical Data

Rated Wattage¹

Per driver..... 788 W

Per luminaire 394 W

Number of luminaires per driver..... 2

Starting (inrush) current..... <40 A, 256 µs

Fuse Rating 15 A

UL ambient temperature rating50°C
(122°F)

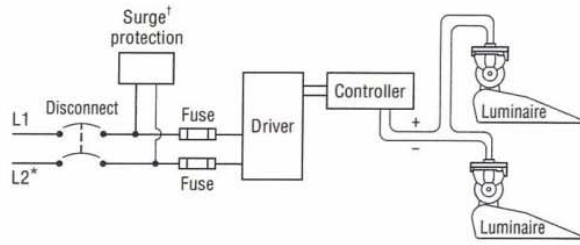
Efficiency 95%

Dimming mode..... optional

Range, energy consumption 15–100%

Range, light output..... 20–100%

Typical Wiring



* If L2 (com) is neutral then not switched or fused.
† Not present if indoor installation.

	208 Vac 60 Hz	220 Vac 50/60 Hz	230 Vac 50 Hz	240 Vac 50/60 Hz	277 Vac 60 Hz	347 Vac 60 Hz	380 Vac 50 Hz	400 Vac 50 Hz	415 Vac 50 Hz	480 Vac 60 Hz
Max operating current per driver²	4.92 A	4.66 A	4.44 A	4.26 A	3.70 A	2.96 A	2.70 A	2.56 A	2.48 A	2.14 A

Footnotes:

- 1) Rated wattage is the power consumption, including driver efficiency losses, at stabilized operation in 25° C ambient temperature environment.
- 2) Operating current includes allowance for 0.90 minimum power factor, operating temperature, and LED light source manufacturing tolerances.

Notes

1. Use thermal magnetic HID-rated or D-curve circuit breakers.
2. See *Musco Control System Summary* for circuit information.



Model 96 LED
(347–480V only)



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www.musco.com • lighting@musco.com

CHARLES E. ISRAEL, FIALD, MIES, LEED® AP, LC

Chief Executive Officer & Founder

Chip Israel is an internationally recognized lighting designer with over 27 years of experience and is past President of the IES, the Illuminating Engineering Society. In 1992, he founded LIGHTING DESIGN ALLIANCE, a full-service architectural lighting design firm, where he built a highly-select team of lighting-design professionals who now serve a variety of clients worldwide. As Founder, Chip works closely with the owner, the design team, and manufacturers to ensure lighting systems are fully integrated with the architectural design and enhance the designer's concepts. Lighting Design Alliance has also been recognized by winning over 100 National and International design awards, including multiple awards for sustainable lighting design.

He served as 2012-2013, President of the Illuminating Engineering Society of North America (IESNA). Chip has been an instructor at UCLA and the American College of Applied Arts in the field of interior lighting. Chip's design experience ranges from building facade lighting, to custom fixture design, to corporate office spaces, to themed hotels and resorts.

EDUCATION

Pennsylvania State University
Bachelor of Architectural Engineering, Environmental Systems

AWARDS & HONORS

International Association of Lighting Designers (IALD)—Fellow
Pennsylvania State University College of Engineering—Outstanding Engineering Alumnus
Martin Professional Lighting Designer of the Year—2002

PUBLICATIONS

Projects have been featured in World Gaming and Leisure Review, Casino Lighting- Architectural Record, The Citadel Landscape Architect & Specifier, Landscape Lighting, Architectural Lighting, and P'ZAZZ Yacht Showboats International.

ASSOCIATIONS

International Association of Lighting Designers (IALD)—Past Board of Directors, Past Director of Education
IALD Education Trust—Founder and Past President
Lighting Certified by the National Council on Qualifications for the Lighting Profession (LC)
Designers Lighting Forum—Past President
La Sfacciata Lighting Academy—Past Board of Directors
Illuminating Engineering Society of North America (IESNA)—Past President, Hospitality Committee, Bridges, and Building Committee

LECTURES & SEMINARS

Chip Israel is committed to promoting excellence in lighting design through education. As a leading industry spokesman, he has presented technical papers and educational seminars in 11 countries and lectured at over a dozen universities across the country. Chip is routinely asked to speak at domestic and international industry events - Designers Lighting Forum, Illuminating Engineering Society National, International Congress on Architecture and Technology in Germany, Energy Efficiency Program in Saudi Arabia, Light in India, various conferences and trade shows, Hospitality Design, NeoCon, and LightFair International.

AWARDS

IESNA Awards of Merit

The Twin Parks
Hollywood Casino – Kansas City
Ziegler Cooper Architect's Office
Disney Animal Kingdom Villas– Kidani Village
Ameristar Kansas City Lobby
Katsuya – Hollywood
Payless Shoe Source Prototype Store
City National Plaza Lobby
Port of Los Angeles Waterfront
Cheesecake Factory – Rancho Mirage & Grove
Thomas Properties Group Office
Vincent Thomas Bridge
Port of Los Angeles Waterfront
City National Plaza Lobby
Disney's Wide World of Sports
Disney's Coronado Springs
Disney's Wilderness Lodge
MCA Music Publishing
Ontario Airport

Hospital Build Middle East Exhibition & Congress
Cleveland Clinic Abu Dhabi

IES Lumen West Award of Excellence
Katsuya Glendale

Williams-Sonoma
Lighting Design Alliance Office
Stanley Fountain at the Hollywood Bowl
Co-Cathedral of the Sacred Heart Exterior
The Cheesecake Factory – Atlanta
Westlake Village Hotel & Spa – Exterior
Port of Los Angeles Waterfront Phase I
Borgata Hotel, Casino and Spa
Disney's Grand Californian Hotel
Sketchers
The Venetian – Exterior
The Venetian – Interiors
50 Beale Street
Pershing Square Park

GE Award of Excellence

The Venetian
911 Wilshire Lobby Renovation
Morrison & Foerster Law Offices

IES Lumen West Award of Merit

Herman Miller LA Showroom
Co-Cathedral of the Sacred Heart – Interior
Harvey Nichols Jakarta
The Water Club
Cole Haan Outlet
Caesars Palace-Beijing Noodle Co. No.9

Harvard-Westlake School
Ameristar Kansas City Lobby
Westlake Village Hotel & Spa - Interior
City National Plaza Lobby
Vincent Thomas Bridge
Spa Resort and Casino
Moody Gardens Aquarium
Parker's Lighthouse
Juxtapose
Bayside, Newport Beach
365 Murad Salon
The Citadel

GE Award of Merit

50 Beale Street
Sony Imageworks
Lighting Design Alliance Office

IES Illumination Award of Merit

The D Hotel Valet
United Brotherhood of Carpenters International Training Center
Hengqin Bay Marine Hotel Exteriors
Hengqin Bay Marine Hotel Interiors
Beats by Dre



LIGHTING DESIGN ALLIANCE

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LOS ANGELES | DUBAI | SHANGHAI

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