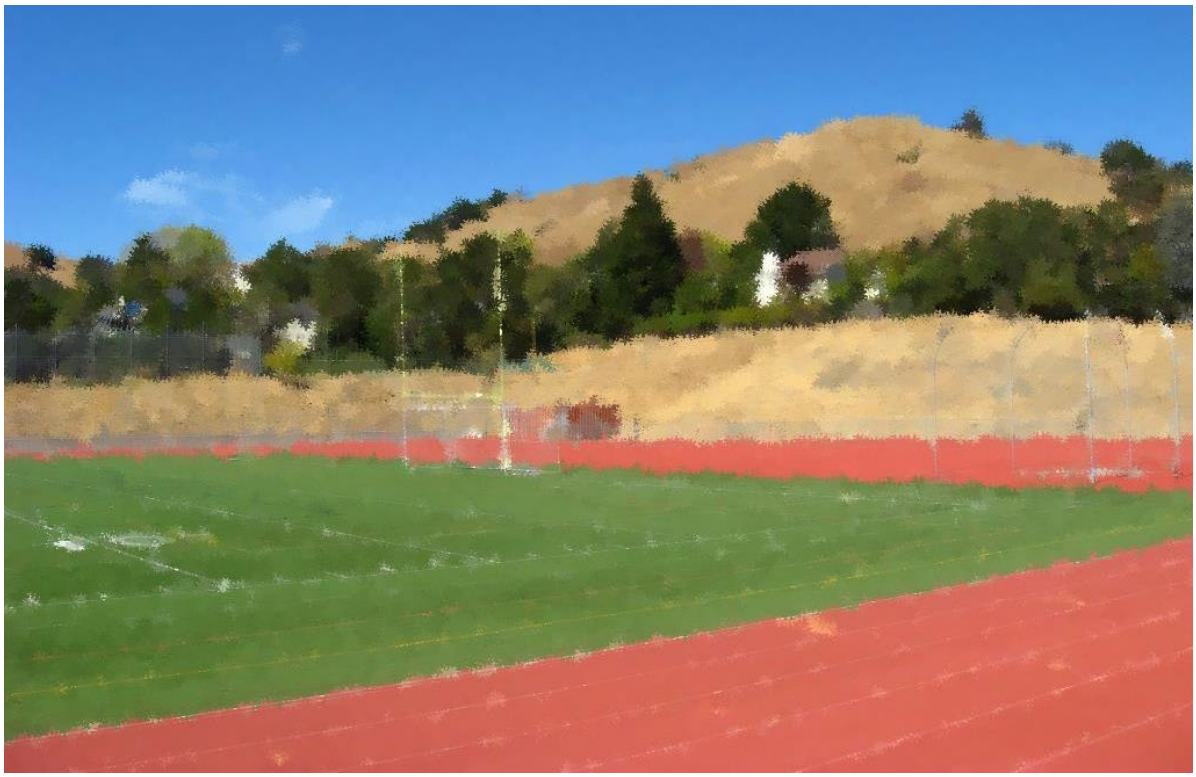

San Marin High School Stadium Lights Project

Partially Revised Draft Environmental Impact Report

SCH#2016082068

prepared by

Novato Unified School District
1015 7th Street
Novato, California 94945
Contact: Yancy Hawkins, Assistant Superintendent of Business and Operations

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July 2019

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1 Introduction

This document is a Revised Environmental Impact Report (EIR) for the proposed San Marin High School Stadium Lights Project, located in the City of Novato, California. For the purposes of this Revised EIR, the San Marin High School Stadium Lights Project refers to the installation of stadium lighting and athletic field improvements, as detailed in Section 2, Project Description, of the original EIR.

1.1 Environmental Impact Report Background

The Novato Unified School District's Board of Trustees certified a Final EIR for the proposed project in May of 2017. In January of 2019, after construction of the project, the Marin County Superior Court ordered NUSD to revise and republish the following sections of the EIR, and to desist from operation of the project until the Revised EIR is certified:

- Aesthetics
- Biological Resources (analyzed in the Initial Study, which was Appendix A to the Final EIR)
- Alternatives
- Cumulative Impacts

Please note that the section numbering in this Partially Revised Draft EIR is different from the numbering of the corresponding sections in the original EIR. The Aesthetics section, Section 2 of this Revised EIR, was Section 4.1 of the original EIR. The Alternatives section, Section 4 of this EIR, was Section 6 of the original EIR. Cumulative Impacts, Section 3 of this EIR, is a new section, presenting the cumulative impacts analyses for all of the topics studied in the original EIR. The Biological Resources from the original EIR was in Appendix A, Initial Study, of the original EIR; here, it is also in Appendix A.

Regarding revised and recirculated EIRs, California Environmental Quality Act (CEQA) Guidelines Section 15088.5(c) states that "If the revision is limited to a few chapters or portions of the EIR, the lead agency need only recirculate the chapters or portions that have been modified." Therefore, this Revised EIR consists only of the revised sections, as well this introduction and a list of new references not cited in the original EIR; it does not include those sections and discussions from the original Final EIR that the Court did not require to be revised and recirculated. Those sections and discussions are incorporated herein by reference. The Final EIR is on file and available for review at District offices, 1015 7th Street, Novato and online at https://nusd.org/departments/maintenance-operations-and-facilities/development-projects/san-marin-high-school-stadium-lights/.

In accordance with CEQA Guidelines Section 15088.5(f)(2), the District requests that reviewers limit the scope of their comments to the revised portions of this revised EIR.

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2 Aesthetics

This section discusses the project's potential impacts related aesthetics including, visual character and light and glare. In the original EIR, these impacts were discussed in Section 4.1, *Aesthetics*.

The analysis in this section is based primarily on the Sports Lighting CEQA Report prepared by Benya Burnett Consultancy (June 2019), which is included as Appendix B to this EIR; lighting standards, measurements, and concepts referenced in this EIR are contained or referenced in said report.

2.1 Setting

Baseline Visual Character of the Region

The City of Novato is a suburban community in northern Marin County in the San Francisco Bay Area (Novato 1996). Single-family residential neighborhoods with one- and two-story homes predominate, in addition to some multi-family housing that is dispersed mainly along arterial and collector streets (Novato 1996, 2014). Commercial uses are concentrated downtown along Grant Avenue, along Redwood Boulevard, in pockets along Highway 101, and in various small clusters and convenience centers (Novato 1996). Much of the urbanized area of Novato occupies a flat northwest-trending valley that follows Novato Creek, Vineyard Creek, Warner Creek and other tributaries flowing southeast from the hills to the Bay (Novato 2009). The topography of Novato varies from eastern flatlands at the margins of San Pablo Bay to hillsides and valleys to the west.

Scenic natural resources including hillsides, Bay plains, and Bay shorelines frame the City of Novato (Novato 2014). The City finds that views from Novato to the surrounding scenic resources are extremely important to Novato residents. These views provide physical orientation and are integral to the city's character and sense of place. Mt. Burdell, located north of the city, is a natural landmark that dominates views of Novato from U.S. 101 and most areas north and west of State Route (SR) 37. The 1,508-foot-high Mt. Burdell is part of an open space managed by the Marin County Department of Parks and Open Space which offers expansive views of Novato from a number of hiking and biking trails. Hillsides provide a scenic backdrop for developed areas. Designated open space is the largest single land use within Novato's sphere of influence (with 8,383 acres, or 37 percent of total land), followed by residential land uses (8,355 acres, or 37 percent of total land).

While there are no State-designated scenic highways in Marin County, U.S. Highway 101 (U.S. 101) is eligible for State designation as a scenic highway to the north of SR 37 in Novato (Caltrans 2016). This segment of U.S. 101, located approximately 2.3 miles east of the project site, provides scenic views of hillsides and ridgelines to the south, west, and north, and of wetlands and plains connected to San Pablo Bay to the east. The Bay plains are a key component of scenic views from U.S. 101 (Novato 1996).

Baseline Visual Character of the Project Site

San Marin High School is located in a suburban residential neighborhood in northwestern Novato, with single-family residences largely one story in height to the east of San Marin Drive, two-story multi-family residences to the north and northeast, and two-story single-family residences to the

west. The nearest residences are located approximately 120 feet north and northeast of the stadium track. All Saints Lutheran Church is situated to the southeast of the high school, across San Marin Drive (a four-lane road with a tree-lined median). The high school is located at the interface between suburban development and open space. The City's approximately 98-acre O'Hair Park, which includes equestrian facilities at Morning Star Farm, the Dogbone Meadow dog park, and trails through open space areas, is located across Novato Boulevard south of the school. The Dwarf Oak Trail to Mt. Burdell and single-family residences on Sandy Creek Way abut the school site to the west. Open hillsides with grassland and scattered oak trees rise to the north and west of San Marin High School.

The San Marin High School stadium (Mead Field) is at the northeast portion of the campus, with one- and two-story light brown rectangular school buildings and a small surface parking lot to the southwest, a baseball field (Lefty Gomez Field) to the northwest, and a surface parking lot to the southeast. The track and football field at the stadium are elevated approximately 10 to 15 feet above the surrounding parking lots. A retaining wall separates the bleachers at the southeastern side of the stadium from the adjacent parking lot. The northeastern end of the stadium is sunken below the level of multi-family residences to the north by an approximately 25-foot-high grassy berm. A chain-link fence rings the perimeter of the track. The most prominent visual features at the stadium are the relatively flat green athletic field surrounded by a reddish-brown oval track, a mounted scoreboard and flag pole at the southwest end of the field, yellow goal posts at each end, and gray bleachers on both long sides of the field. Mounted Bose speakers in the existing public address system also overlook the bleachers. Figure 1 shows photographs of baseline visual conditions at and surrounding the stadium, taken in 2016 prior to installation of the proposed stadium lighting.

Scenic resources visible from the project site and public viewing locations in its surroundings, as defined in the City's General Plan (adopted 1996), include ridgelines and hillsides that provide a backdrop for developed areas (Novato 1996). Mt. Burdell, a scenic landmark with an elevation of 1,508 feet, is visible to the northeast of San Marin High School. Figure 2 shows existing views of the stadium from the surrounding area. As shown in Photo 3, the Dwarf Oak Trail provides public views looking south toward the stadium. Some nearby residences have views of the stadium. As shown in Photo 4, the stadium's elevated position relative to San Marin Drive and deciduous and evergreen trees in the roadway's median largely obstruct views of the project site from residences to the southeast. School buildings fully obstruct views of the stadium from O'Hair Park to the south. Trees lining the Dwarf Oak Trail block views from residences to the west. A few single-family residences on San Ramon Way to the north have direct southward views looking down on the stadium.

Baseline Light and Glare Conditions

This Revised EIR defines the existing baseline for light and glare conditions as those present when the District released a Notice of Preparation of the original EIR in August 2016, before installation of the proposed stadium lighting system. Light and glare produced by this system are considered impacts of the proposed project and evaluated below in Section 2.2, *Impact Analysis*. As explained in the Methodology section, the impact analysis incorporates actual measurements of light levels generated by use of the stadium lights. As of August 2016, no permanent athletic field lighting was used at the San Marin High School stadium, although the mounted digital scoreboard produced low-intensity light during athletic events. Offsite sources also contribute to existing light conditions (or "illumination") at the stadium. Existing permanent light fixtures are present at the softball field on the southwest portion of the high school, approximately 750 feet southwest of the stadium. Exterior

Figure 1 Photographs of Baseline Conditions at Stadium Site

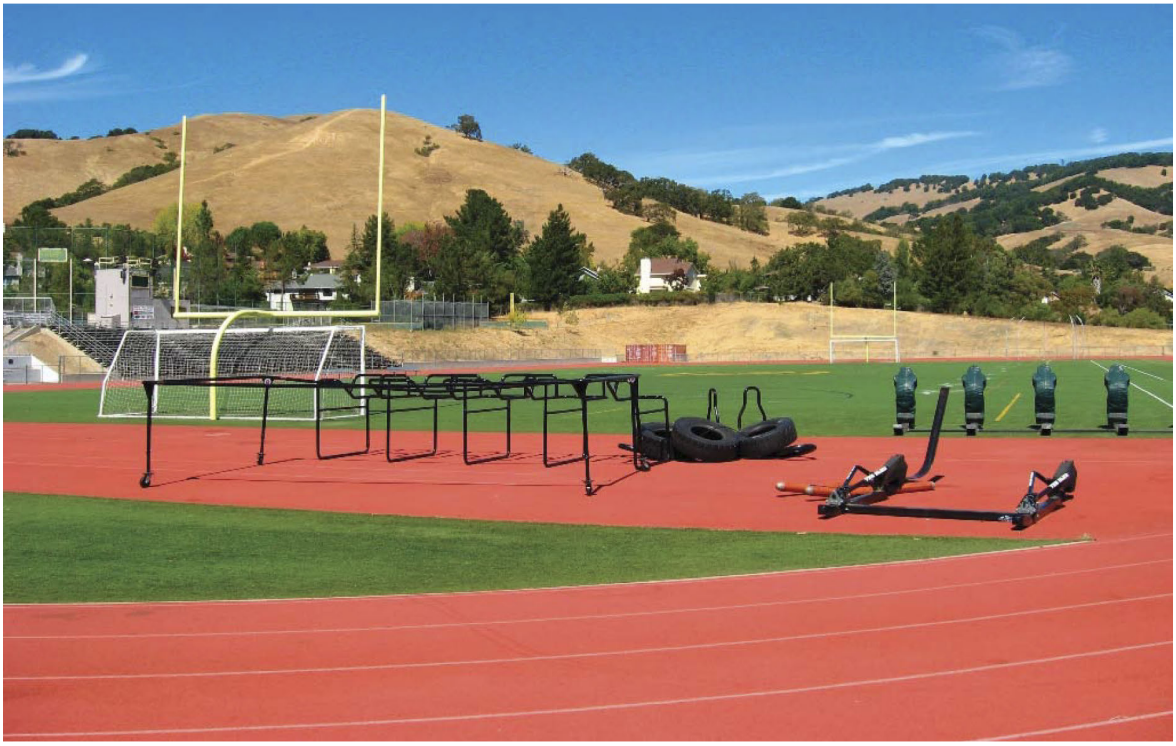

Photo 1: Northward view across stadium toward single-family residences on San Ramon Way and hillside open space.

Photo 2: View to northeast from stadium of school parking lot, San Marin Drive, and hillside open space.

Figure 2 Photographs of Baseline Conditions from Surrounding Area

Photo 3: Southward view of stadium from publicly accessible open space on Dwarf Oak Trail.

Photo 4: View of stadium to northwest from single-family residences on San Marin Drive.

security light fixtures are located at on-site school buildings and at on-site solar panels. In addition, the stadium receives spillover light to varying degrees from nearby streetlamps and the headlights of cars on San Marin Drive.

Glare refers to the discomfort or impairment of vision experienced when a person is exposed to a direct or reflected view of a light source, causing objectionable brightness that is greater than that to which the eyes are adapted (Pennsylvania Outdoor Lighting Council n.d.). By contrast, illumination is defined as the amount of light that strikes an object, including light cast by sources that are not directly seen by viewers. The intensity of glare ranges from the worst case of "disability glare," where visibility is lost, to "discomfort glare," where the light is distracting and uncomfortable. Discomfort glare is a subjective phenomenon and has not been directly linked to a physiological cause (Shuster 2014). The amount of glare depends on a set of factors such as the size of the source, the contrast between background light and the glare source, and the age of the viewer (Hiscocks 2011). General sources of glare at the stadium include headlights on and reflected sunlight from automobiles on adjacent streets and parking lots, and reflected sunlight from the windows of nearby buildings.

Anthropogenic sky glow is caused by all outdoor lighting, including streetlights, retail centers, car dealerships, and other commonly occurring outdoor lighting (Appendix B). In communities near the California coast, there are two types of sky glow: that caused by low clouds (the "marine layer") and that caused by uplight on clear nights (clear sky glow). The former is localized and on a cloudy night the stray uplight from a town or small city can cause a distinctive glow above it. The latter is the accumulation of the upward light from the entire metropolitan Bay Area and is affected by all the lighting within a radius of 100 miles or more from the viewer's location.

Sky glow from low clouds varies considerably depending on the time of year, the altitude of the clouds, the cloud density and reflectivity, temperature, and other factors (Appendix B). The primary causes tend to be downtown districts, regional malls, auto malls, and major freeway commercial corridors. Glow is caused by all the upward light from all the community, and not from just one neighborhood or cause. Sky glow levels from the marine layer throughout other areas of California that have similar proximity to the ocean and population density measure between 0.010 and 0.020 foot-candles.

Clear sky glow is measured using the Bortle Scale, a system of ranking the light pollution caused by communities throughout the world as well as identifying "dark sky" areas with little or no sky glow (Appendix B). The astronomer John Bortle originally published this nine-level scale in Sky & Telescope magazine in February 2001 (Bortle 2006). The entirety of Marin County is Bortle Class 5, which means a moderate amount of anthropogenic sky glow.

Regulatory Setting

State

Government Code Section 53094. This article of California's Government Code states that a school district is not required to comply with the zoning ordinances of a county or city unless the zoning ordinance makes provision for the location of public schools and unless the city or county has adopted a general plan. Furthermore, this article authorizes the governing board of a school district to render a local zoning ordinance inapplicable to a proposed use of property by the school district, by a vote of two-thirds of its members. The governing board may not take this action when the proposed use of the property is for non-classroom facilities, including, but not limited to, warehouses, administrative buildings, and automotive storage and repair buildings. Because the

proposed project is considered an improvement to educational facilities at a public school, the governing board of the District adopted Resolution No. 16-2016/17 to exempt the proposed project from local zoning ordinance requirements pertaining to aesthetics and other issues.

Local

Although the District is not required to comply with local zoning ordinances pursuant to Government Code Section 53094, the following regulatory information for the City of Novato is provided for reference.

City of Novato General Plan. The City of Novato's General Plan (1996) does not include objectives or policies applicable to visual character or scenic resources at the school site. While EN Policy 27 (Scenic Resources) in the Environment Chapter of the General Plan seeks to "protect visual values on hillsides, ridgelines, and other scenic resources," this policy addresses development on hillsides and ridgelines rather than scenic views available to or from such resources. The Community Identity Chapter states that "lighting should serve functional, safety, and aesthetic purposes." CI Policy 13 (Lighting Design Guidelines) calls for amending the City's Zoning Ordinance to incorporate design guidelines for exterior lighting that would mitigate impacts on open space or other valuable views. However, this policy has not been implemented (City of Novato 2015).

Novato Municipal Code. The City of Novato's Municipal Code has qualitative standards for light trespass and glare that would apply to the project, except that the District has exempted itself from the local zoning ordinance pursuant to Government Code Section 53094. Pursuant to the general development standards in Section 19.22.060 (Light and Glare), light or glare from exterior lighting must be shielded or modified to prevent emission of light or glare beyond the property line. The placement of exterior lights is required to eliminate spillover illumination or glare onto adjoining properties to the maximum extent feasible, and not interfere with the normal operation or enjoyment of adjoining properties. In addition, Section 19.22.060 requires that all non-essential internal and exterior lighting be turned off after 11:00 p.m. (except for uses with extended hours).

2.2 Impact Analysis

Significance Thresholds

The thresholds below are based on the CEQA Initial Study checklist contained in Appendix G of the CEQA Guidelines. An aesthetic impact is considered significant if the addition of stadium lights would:

1 Have a substantial adverse effect on a scenic vista;

2 Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;

3 Substantially degrade the existing visual character or quality of the site or its surroundings; or

4 Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

The Initial Study (Appendix A) determined that the project would not damage scenic resources such as trees, rock outcroppings, or historic buildings within a state scenic highway corridor. Therefore, the analysis of aesthetic impacts focuses on thresholds 1, 3, and 4.

Methodology

Scenic Vistas and Visual Character Impacts

The analysis of scenic vistas and visual character is based on a field reconnaissance, supplementary review of Google Maps, and photo documentation of the stadium site. The scenic vistas discussion focuses on identified public view locations, but also considers impacts to private views. The visual character analysis considers whether or not the proposed lighting and public address systems would substantially and adversely degrade the overall aesthetic qualities of the site relative to current conditions.

Light Impacts

Light trespass occurs when lighting systems that illuminate one site also illuminate adjacent sites, such as neighboring private property. Light impacts can be analyzed by quantifying illuminance, or the amount of incident light on a place surface, from the spillover of light at property lines nearest to residences (Pennsylvania Outdoor Lighting Council n.d.). The spillover of light is also known as "light trespass." Light trespass is measured on both the vertical plane (e.g., light shining through a window) and the horizontal plane (e.g., light falling on a bed), in terms of lux or foot-candles. Lux is the metric measurement of light levels, and approximately 10 lux is equivalent to 1 foot-candle (Appendix B).

The Revised EIR's analysis of light impacts is based on a lighting study of the proposed stadium lighting system, prepared by internationally recognized lighting consultant James Benya in June 2019 (Appendix B). As discussed in the lighting study, the District has decided to apply a standard set by the International Commission on Illumination (CIE) to limit light trespass. The standard, CIE:150, employs a lighting zone system that ranges from E1 to E4, based on existing ambient light in the general area. For example, in a nature preserve a candle can be seen for a mile, but in downtown San Francisco it would be lost in the haze of thousands of light sources. Lighting zone E1 represents the nature preserve and E4 is the city, with E2 and E3 being steps in between. The choice of lighting zone can be a matter of judgment; the E2 zone is described as "sparsely populated rural areas" and zone E3 is described as "well inhabited rural and urban settlements."

Although the E3 zone would be appropriate to apply to the project site because nearby light-sensitive residences are located in suburban developments, this analysis makes a conservative assumption that the San Marin High School site is located in the rural E2 zone due to its proximity to a substantial open space area, unique among the School District's campuses, particular to this analysis and not applicable to the School District, as a whole. The CIE's allowed maximum light trespass in the E2 zone is 5 lux, which is approximately equivalent to 0.5 foot-candle (Appendix B). In this Revised EIR, the District applies 5 lux as the threshold for significant light trespass at residential property lines. This threshold is more stringent than the 2 foot-candle threshold that the District previously used in the *PBC Parcels 1A and 1B Mitigated Negative Declaration* of June 2006 (NUSD 2006). Furthermore, it is more stringent than thresholds that other school districts have recently applied to comparable lighting projects in California. For example, the Glendale Unified School District has used a standard of 2.5 foot-candles on adjacent properties, while the San Mateo Union High School District has applied a standard of 0.8 foot-candles at the nearest residential property lines (Glendale Unified School District, 2012; San Mateo Union High School District, 2016).

To determine if the proposed stadium lighting system would meet the CIE's threshold for the E2 zone, the lighting study includes field verification of light trespass from the stadium lighting system. Consistent with the CIE:150 standard, illuminance from the lighting system was measured in the

vertical plane at the property boundary at a height of 5 feet above surface grade (Appendix B). The measurements were taken by James Benya on the evening of Monday, May 6, 2019, and are representative of typical lighting conditions during football games at San Marin High School. They were taken along two lines, one reasonably parallel to the northeast property line, and one southeast of the stadium along the west side of the San Marin Drive median. Each line represents a worst-case scenario for the most affected residential properties. This field verification of light trespass from the project reflects the actual performance of the stadium lighting system. Therefore, it is more accurate than and supersedes the predictive photometric studies that the lighting manufacturer, Musco, provided prior to construction of the project (see Appendix C).

Glare Impacts

This updated, in situ analysis properly uses light intensity as a proxy, representative of the amount of discomfort glare that residents near the stadium site would experience, because the visibility of a distant light source is proportional to its intensity (Hiscocks 2011). Discomfort glare is typically measured in terms of candelas. The amount of candelas depends on the luminous power per unit solid angle emitted by a point light source in a particular direction. In layman's terms, the degree of discomfort glare decreases the further that a viewer is located from a light source, due to the dispersion of light across distance. The lighting study prepared for this Revised EIR makes the conservative assumption that illuminance on the vertical plane of 5 lux or greater at adjacent residential property lines would indicate a potentially significant glare impact (Appendix B). This threshold of illuminance is applied as a reasonable surrogate for glare because direct measurement of glare in the field would be prohibitively expensive and unnecessary. Because glare is a complex sensation that factors in the luminance and size of the light source, the luminance and area of the background, the position of the light source in the field of view, as well as the viewer's unique sensitivity and physiology, it is impossible to measure glare directly except under laboratory conditions. Therefore, it is appropriate to rely on illuminance as an indicator of a potentially significant glare impact.

Sky Glow. Sky glow impacts would be significant if the proposed lighting would emit a substantial amount of upward light, significantly contributing to marine layer sky glow or clear sky glow during nighttime hours.

Project Impacts and Mitigation Measures

Threshold 1:	Would the project have a substantial adverse effect on a local scenic vista?

Impact AES-1 THE ADDITION OF LIGHTS AND LIGHT POLES AT THE STADIUM HAS INCREMENTALLY ALTERED VIEWS OF AND THROUGH THE STADIUM SITE. HOWEVER, BECAUSE LIGHT POLES DO NOT SUBSTANTIALLY OBSTRUCT VIEWS OF SCENIC RESOURCES, IMPACTS TO SCENIC VISTAS WOULD BE LESS THAN SIGNIFICANT.

The project has introduced eight light poles up to 80 feet tall to the stadium site, incrementally altering existing views of and through the site. In addition, up to 36 poles (18 egress lighting poles and 18 public address system poles), each up to approximately 30 feet tall have been installed throughout the project site to provide lighting for safe egress and clean-up and to provide focused, distributed sound during athletic events. These structures do not substantially affect views from scenic roadways. While the segment of U.S. 101 to the north of SR 37 in Novato is eligible for State designation as a scenic highway, this highway is located approximately 2.3 miles east of the project

site; distance, existing trees and vegetation, and intervening hillsides obscure the new light and speaker poles from U.S. 101.

The light and speaker poles would affect views of scenic resources from local residences and parks. To demonstrate the project's effect on views, Figure 3 and Figure 4 show photographs of existing visual conditions after installation of the proposed stadium lighting system. These photographs were taken on a clear day in July 2019. They present approximately the same perspectives as those shown in photographs of baseline visual conditions (from before installation of the lighting system) in Figure 1 and Figure 2. As shown in Photo 8 in Figure 4, residences on the east side of San Marin Drive have views across the stadium to the northwest of hillsides and ridgelines in the Mt. Burdell Open Space area. Existing deciduous and evergreen trees in the median of San Marin Drive partially obstruct these views. In addition, equestrians south of Novato Boulevard at Morning Star Farm in O'Hair Park have similar northward views of hillside, atop the one-to-two-story buildings at San Marin High School. The new light and speaker poles are partially visible in the foreground of views toward scenic hillsides and ridgelines. However, as shown in Figure 3 and Figure 4, the narrow light and speaker poles only occupy a sliver of the overall views through the stadium site from the perspective of nearby residences and parks. In addition, the approximately 30-foot tall egress lighting and speaker poles are similar to poles that were on the stadium site under baseline conditions, such as the speaker poles behind the bleachers on the east side of the stadium, and similar to or shorter and narrower than the existing street lights on San Marin Drive (see Figure 1, Photo 2). The new egress lighting and speaker poles are partially screened by existing trees adjacent to the project site and do not substantially affect views of the surrounding hillsides and ridgelines (see Figure 4, Photo 8). The poles have minimal impact to the overall viewshed from surrounding properties and do not substantially obstruct views of any identified scenic resources. Consequently, impacts to scenic vistas would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Figure 3 Photographs of Stadium Site with New Stadium Lighting System

Photo 5: Northward view across stadium toward single-family residences on San Ramon Way and hillside open space.

Photo 6: View to northeast from stadium of school parking lot, San Marin Drive, and hillside open space.

Figure 4 Photographs from Surrounding Area with New Stadium Lighting System

Photo 7: Southward view of stadium from publicly accessible open space on Dwarf Oak Trail.

Photo 8: View of stadium to northwest from single-family residences on San Marin Drive.

Threshold 3:	Would the project substantially degrade the existing visual character or quality of the site or its surroundings?

Impact AES-2 THE PROPOSED LIGHT POLES HAVE INCREMENTALLY ALTERED DAYTIME AESTHETIC CONDITIONS AT THE STADIUM SITE. HOWEVER, THE LIGHT POLES DO NOT CONFLICT WITH THE VISUAL CHARACTER OF THE STADIUM'S VICINITY AND HAVE A NEGLIGIBLE EFFECT ON OVERALL VISUAL QUALITY. IMPACTS ON VISUAL CHARACTER AND QUALITY WOULD BE LESS THAN SIGNIFICANT.

The project has introduced eight light poles up to 80 feet tall to the stadium site, incrementally altering existing daytime visual character in the vicinity. In addition, up to 36 poles (18 egress lighting poles and 18 public address system poles), each up to approximately 30 feet tall have been installed throughout the project site to provide lighting for safe egress and clean-up and to provide focused, distributed sound during athletic events. As discussed in Impact AES-1, the new light and speaker poles are partially visible from residences on the east side of San Marin Drive and from recreational users at O'Hair Park. In addition, Photo 5 shows that several residences on San Ramon Way have a direct southward line of sight toward the stadium. The light and speaker poles are fully visible to these residences from a distance of at least 225 feet. In addition, Photo 7 shows that people using the Dwarf Oak Trail in the Mt. Burdell Open Space area have direct southward views of the light and speaker poles from a distance of approximately 1,100 feet (0.2 miles). Although the new light and speaker poles are partially or fully visible to neighboring residences and recreational users of open space areas, they are narrow and only occupy a sliver of the overall views through the stadium site. In addition, the approximately 30-foot tall egress lighting and speaker poles are similar to previous poles on-site, such as the speaker poles behind the bleachers on the east side of the stadium, and similar to or shorter and narrower than existing street lights on San Marin Drive (see Figure 1, Photo 2). The new egress lighting and speaker poles are partially screened by existing trees adjacent to the project site and do not substantially affect views through the stadium site (see Figure 4, Photo 8). The light and speaker poles are visually compatible with existing elevated structures at the stadium, including a flag pole at the southwest end of the field, yellow goal posts at each end, and bleachers and mounted speakers alongside the field. The mass, materials, architectural style, and surface treatments of the poles also are typical of elements commonly seen at sports stadiums. Nighttime aesthetics impacts from light and glare are analyzed separately in Impacts AES-3 and AES-4. Therefore, impacts to daytime visual character and quality would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4:	Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Impact AES-3 THE PROPOSED PROJECT HAS INTRODUCED A PERMANENT STADIUM LIGHTING SYSTEM TO BE USED FOR SPORTING COMPETITIONS, PRACTICES, AND OTHER EVENTS ON A SITE THAT LACKS EXISTING PERMANENT LIGHT SOURCES. BY DESIGN, THE STADIUM LIGHTING WOULD BE FOCUSED ON THE ATHLETIC FIELD AND WOULD MINIMIZE LIGHT TRESPASS. MEASURED LIGHT LEVELS FROM THE STADIUM LIGHTS DO NOT EXCEED THE CIE THRESHOLD FOR SITES IN THE E2 ZONE. THEREFORE, LIGHT TRESPASS AT PROPERTY LINES FACING RESIDENCES WOULD NOT SUBSTANTIALLY DISTURB RESIDENTS. LIGHTING IMPACTS WOULD BE LESS THAN SIGNIFICANT.

The project has introduced new permanent light sources at the San Marin High School stadium, which lacks existing permanent on-site light sources. Table 1 summarizes the physical features and frequency of use of the proposed lighting system.

Table 1 Characteristics of Proposed Stadium Lighting System

Lighting Feature	Details
Height of Lights	Approximately 30 to 80 feet
Number of Light Poles	8 tall poles (up to 80 feet in height) Up to 18 short poles (up to approximately 30 feet in height)
Lighting Type	Musco Light-Structure System LED (or equivalent)
Times of Use	Evening football, soccer, lacrosse games; evening football, soccer, lacrosse practices; track meets and practices; Powder Puff game, evening school events such as graduation

As shown in Table 1, the eight new primary LED light fixtures rise to 80 feet in height. Downward-facing luminaires have been affixed at a height of approximately 80 feet on each pole to illuminate the stadium during sport competitions, practices, and other events. Additional downward-facing luminaires are mounted at 70 feet on some poles in order to provide consistent illumination across the field surface. Lower output, upward-facing luminaires are mounted at 20 feet on each pole in order to illuminate airborne objects such as footballs during games. A second set of lower output LED luminaires are installed on up to 18 new and existing poles, each up to approximately 30 feet tall. These egress and clean-up lighting system poles are spaced evenly around the perimeter of the track and also along pathways leading to ADA-compliant accessible parking spaces.

The project has introduced a new permanent lighting system to a stadium that lacked existing permanent lighting. When the new lighting system is used for athletic events, it would result in a substantial increase in lighting on the field relative to baseline conditions. However, the proposed type of lighting system (state-of-the-art LED system) is designed specifically to minimize light trespass and would be operated during restricted time frames before normal sleeping hours. First, the approximate 80-foot height of the brightest stadium lights would enable each luminaire to be mounted with a narrow beam angle, which would focus light downward while still covering the athletic field, thereby limiting light trespass at the nearest off-site residences approximately 120 feet away. While it may be counterintuitive that highly mounted light fixtures would reduce light trespass relative to lower fixtures, their narrower beam angle would emit less light visible to neighboring residences. The proposed light fixtures also feature reflectors and visors to block upward light from the brightest fixtures. While lower-output luminaires mounted at 20 feet on each pole would cast light upward, these fixtures would only be lit during games to illuminate airborne

objects such as footballs. The proposed stadium lights also would be used only during certain events, as shown in Table 1, with the main lights turned off at set times:

- Evening football games (22 plus any playoff games per year) 8:30 PM on Thursday and by 9:45 PM on Friday
- Evening soccer games (20 on average per year plus any playoff games per year) by 8:30 PM on Tuesday through Saturday
- Evening lacrosse games (13 on average per year plus any playoff games per year) by 8:30 PM on Monday through Saturday
- Evening track meets (two on average per year plus any Track Finals) by 8:30 PM on Wednesday and Thursday
- Scheduled evening athletic practice by 8:00 PM on Monday through Friday
- Evening school events such as graduation by 9:45 PM
- Powder Puff game (one per year) by 8:00 PM on Friday

For further detail on the anticipated schedule of events, refer to Table 3 and Table 4 on pages 25 and 26 of the original Final EIR. The main stadium lights would be turned off by 9:45 PM or earlier, with the rare exception of games that extend to overtime, which could require the continued use of main stadium lights beyond this cut-off time. It is acknowledged that some neighbors of San Marin High School typically go to sleep before 9:45 PM. In addition, stadium lighting would emit light in the blue spectrum, exposure to which can suppress production of the hormone melatonin and impair sleep quality in the evening (American Medical Association 2016). However, the proposed stadium lights' narrow beam angle, reflectors, and visors would minimize the exposure of nearby residents to lighting that could potentially disturb sleep. Furthermore, unlike LED streetlights that are illuminated all night and have generated complaints from residents in cities like Davis, California, and Seattle, the proposed LED lights would be turned off by 8:30 PM most nights and by 9:45 PM fewer than approximately 15 times per year for home football and Powder Puff games. The stadium lights would have a 9:45 PM cut-off time that precedes the Illuminating Engineering Society of North America's identified "post-curfew" hours of 10:00 PM or later, which correspond to normal sleeping hours.

Table 2 shows the results of field verification of illuminance levels from use of the proposed stadium lighting system at property lines facing residences, and Figure 5 maps the locations of these measurements. As shown in Table 2, light trespass at residential property lines would be 2.75 lux at the greatest. This light level would not exceed the CIE threshold of 5 lux for sites in the E2 zone. Therefore, nearby residences would not be subject to excessive illuminance when stadium lights are in use. Although the District has exempted itself from the local zoning ordinance, illuminance also would not exceed the light and glare standards in the City of Novato's Municipal Code. Consistent with Section 19.22.060 (Light and Glare), exterior lights would be designed to minimize spillover onto adjacent properties to the maximum extent feasible, and all non-essential lighting would be turned off prior to 11:00 p.m. Lighting impacts would be less than significant.

Figure 5 Measurement Locations for Light Trespass from Stadium Lighting System

Source: Benya 2019

Table 2 Measured Light Trespass from Stadium Lighting System at San Marin High School

Measurement Location	Illuminance (Lux)	CIE Illuminance Threshold for E2 Zone (Lux)
Northeast Property Line		
1	2.36	5
2	2.17	
3	2.10	
4	2.63	
5	2.34	
6	2.44	
7	2.20	
8	2.75	
9	1.62	
Southeast Property Line		
11	0.54	5
12	1.10	
13	1.19	
14	1.69	
15	1.63	
16	0.85	

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4: Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Impact AES-4 THE PROPOSED STADIUM LIGHTS WOULD NOT GENERATE LIGHT LEVELS THAT COULD CAUSE EXCESSIVE DISCOMFORT COMFORT GLARE FOR RESIDENTS OR DISABILITY GLARE FOR PEDESTRIANS AND MOTORISTS. IMPACTS FROM GLARE WOULD BE LESS THAN SIGNIFICANT.

The proposed stadium lights would generate light intensity on-site at nearby residences, and on adjacent public streets and sidewalks. Light intensity at sports facilities can cause discomfort glare, an annoying or painful sensation when people are exposed to a bright light in the field of view (Shuster 2014). As discussed in Impacts AES-1 and AES-2, nearby residents would have at least partial views of the proposed stadium lights from San Ramon Way north of the stadium and east of San Marin Drive. However, sports luminaires focus most of their light onto the sports field, and off-site glare is usually the result of a luminaire that is mis-aimed towards the property line (Appendix B). Based on the field measurements of light trespass from the proposed stadium lighting system, shown in Table 2 above, the project would not generate illuminance on the vertical plane exceeding 5 lux at adjacent residential property lines. Therefore, the stadium lights would not subject nearby

residents to excessive discomfort glare, nor would it expose pedestrians and motorists outside the stadium to "disability glare" that reduces visibility. The project would have a less than significant impact from glare.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4:	Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area

Impact AES-5 THE PROPOSED STADIUM LIGHTS ARE SHIELDED AND THE BRIGHTEST LIGHTS WOULD BE DOWNWARD-FACING TO REDUCE LIGHT TRESPASS. UPWARD-FACING LIGHTS WOULD ONLY BE USED DURING GAMES AND WOULD BE DESIGNED TO PROVIDE ONLY THE MINIMUM AMOUNT OF ILLUMINATION NECESSARY TO SEE AIRBORNE OBJECTS IN THE STADIUM. THEREFORE, THE PROJECT WOULD NOT SUBSTANTIALLY CONTRIBUTE TO MARINE LAYER OR CLEAR SKY GLOW. IMPACTS FROM SKY GLOW WOULD BE LESS THAN SIGNIFICANT.

As discussed in Impact AES-3, the proposed stadium lighting has been designed to minimize light trespass. The approximate 80-foot height of the brightest stadium lights would enable each luminaire to be mounted with a narrow beam angle, which would focus light downward, thereby limiting light trespass outside the athletic fields and reducing sky glow. The proposed light fixtures also feature reflectors and a visor to block upward light. Although lower-output luminaires have been mounted facing upward at 20 feet on each light pole and would incrementally increase sky glow when in use by reflecting light off clouds and aerosols, these lights would only be used during games and would be designed to provide only the minimum amount of illumination necessary to see airborne objects in the stadium.

The lighting report prepared for the project evaluated the proposed stadium lighting system's contribution to both marine layer sky glow and clear sky glow. A marine layer was present in Novato on the night of lighting measurements in June 2019 (Appendix B). Sky glow illumination near the project site, in an area that the stadium lights could not directly illuminate, measured 0.016 foot-candles. This lighting level is typical of sky glow when a marine layer is present near the coast in California, which measures between 0.010 and 0.020 foot-candles. The stadium lights did not substantially contribute to sky glow produced by the greater community. Moreover, the lighting report determined that the stadium lighting does not contribute enough uplight to affect clear sky glow in Marin County.

The timing of stadium lights would also limit their contribution to sky glow. The use of all stadium lights would be limited to approximately 152 nights of the year, approximately 83 of which would be games (this estimate includes the maximum number of playoff games that could be played in any given year). For most lighted evenings, the lights would be turned off by 8:30 PM or earlier. For approximately 15 or fewer nights per year, the lights would be cut off by 9:45 PM in the evening. The minimal amount of sky glow that would be introduced with installation of the proposed lighting system would be limited to early evening hours (typically before 8:30 PM), would occur for a

maximum of 152 nights per year, and would occur in a location with existing nighttime lighting (including street lamps along the adjacent roadway and security lighting on the adjacent campus).

Therefore, the proposed stadium lights would not substantially contribute to sky glow during sensitive nighttime hours, and impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

3 Cumulative Impacts

CEQA requires EIRs to consider potential cumulative impacts from other past, present, and reasonably foreseeable future projects. CEQA defines "cumulative impacts" as two or more individual impacts that, when considered together, are considerable or will compound other environmental impacts. In the original EIR, cumulative impacts are discussed in the Initial Study (Appendix A to the original EIR) and at the end of each analysis section (Section 4.1, *Aesthetics*; Section 4.2, *Air Quality*; Section 4.3, *Cultural Resources*; Section 4.4, *Greenhouse Gas Emissions*; Section 4.5, *Noise*; and Section 4.6, *Transportation and Traffic*).

3.1 CEQA Requirements

State CEQA Guidelines Section 15130 requires that an EIR discuss cumulative impacts of a project and determine whether the project's incremental effects are "cumulatively considerable." The definition of cumulatively considerable is as follows:

> "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."
>
> Section 15065(a)(3)

For example, traffic impacts of two nearby projects may be insignificant when analyzed separately, but could have a significant impact when analyzed together. Cumulative impact analysis allows the EIR to provide a reasonable forecast of future environmental conditions and can more accurately gauge the effects of a series of projects. In addition, the CEQA Guidelines state that the mere existence of significant cumulative impacts caused by other projects alone does not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable.

3.2 Related Projects

Related projects, according to CEQA Guidelines Section 15355, consist of "closely related past, present and reasonably foreseeable probable future projects that would likely result in similar impacts and are located in the same geographic area." Planned and pending projects within the study area are listed in Table 3. Table 4 summarizes cumulative development in the study area by land use.

Table 3 Cumulative Projects List

Project Name/Applicant	Project Location	Description
Projects Located at San Marin High School		
Stadium Field Re-turf	15 San Marin Dr., Novato, CA 94945	Replacement of 12-year-old turf (useful life of 8-10 years), construction completed August 2018
Stadium Press Box	15 San Marin Dr., Novato, CA 94945	Project replaced an existing approx. 410 sq. ft., 19-foot tall press box/snack bar structure with a new 8 x 28 feet (224 sq. ft.) prefabricated building elevated on a platform 9.5 feet above the ground (total height about 23 feet) on the same site. No new lighting or sound system was included in the project.
Performing Arts Building	15 San Marin Dr., Novato, CA 94945	The project will replace the current PAC theater with a new building approximately 1,545 sq. ft. larger than the existing building. The structure will be a total of 8,010 sq. ft. with the capacity to seat 217, the same capacity as the existing PAC theater.
STEM Classroom Building	15 San Marin Dr., Novato CA 94945	The project would replace five existing portable classrooms with a single-story, 24-foot-high STEM building and associated improvements including a courtyard, outdoor project area, and landscaping. The building would contain approximately 18,466 sq. ft. of space. There would be ten classroom/labs, and three tables to create an additional outdoor classroom space. The classrooms would provide capacity for 320 students but would not increase enrollment.
Second Multi-Sport Turf Field	15 San Marin Dr., Novato CA 94945	No schematic design has been prepared for this project; however, it is confirmed that no lighting is proposed. In addition, no funding is identified/allocated for this project at the time of this writing.
Remodel of Current "Academy Building" into Maker Space	15 San Marin Dr., Novato CA 94945	This project involves internal improvements to the existing structure.
Various Misc. Improvements	15 San Marin Dr., Novato CA 94945	Internal renovations to buildings within the high school.
Projects Located within the City of Novato		
Novato Blvd. Improvement Project	Portions of Novato Blvd. between Diablo Ave. and Grant Ave.	City capital project to widen road, including bicycle lanes.
The Square Shopping Center	2001 Novato Blvd.	Mixed use project including renovation of 74,118 sq. ft. of commercial space, demolition of 28,246 sq. ft. of existing commercial space, and addition of 53 apartment units (11 affordable), and 218 on-site and 46 off-site parking spaces. New structures include a mixed-use building at the rear of the site that is 3 stories, up to 42' high, and new 2-story apartments fronting Novato Blvd.
Oakmont Senior Living	1461 S. Novato Blvd.	Development of a 78 room senior assisted living facility, featuring 50 assisted living units and 28 memory care rooms. The facility is proposed at 72,000 square feet and 2-stories in height.
Hamilton Square	970 C St.	31 townhomes in eight, 3-story buildings, and one, two-story building, 6 of which are affordable.

Project Name/Applicant	Project Location	Description
Atherton Place	7533 and 7537 Redwood	1,340 of retail space fronting Redwood Boulevard and 50 residential townhome units. Townhomes would be 2-stories over garage.
Laurel Ridge Senior Apartments	7711 Redwood Blvd.	100 senior apartments in a single 3-story buildings with a basement parking garage, including 20 affordable units.
Wood Hollow Hotel	7701 Redwood Blvd.	Four-story hotel building of 56,430 square-feet, with 87 to 95 rooms. Parking includes a combination of surface stalls (64 cars) and a basement garage (23 cars).
Bahia Heights	End of Misty Ct.	Single-family residential subdivision proposing 9 residences.
Hamilton Cottages	Hamilton Pkwy. West of Marblehead Lane	16 single-family, 2-story residences for senior occupancy, including 2 affordable for-sale homes at the moderate income level.
Landing Court	No address	34 new multi-family units in 2- and 3-story buildings, of which 7 are affordable units.
North Bay Children's Center	933 C St.	Renovate the existing day care center with a new 19,824 sq. ft. building and site amenities.
Former Bridgepoint Academy	1787 Grant Ave.	35 new multi-family units in 2 and 3- story buildings, including 7 affordable units.
Stone Tree Golf Course		Driving range on Marin County Flood Control District Property
McPhail's Office Amendments		Amend General Plan land use designation from BPO to LIO. Master Plan and Precise Development Plan amendments to allow wider range of office and light industrial uses.
Hyppolite Accessory Structure	1468 S. Novato Blvd.	Review of as-built accessory structure in rear yard.
Mohajer Land Division & Variance	1037 Simmons Ln.	Proposed 3 lot land division. Request for variance to allow non-conforming lot area and depth.
Schafer Stream Management Plan	896 Sutro Ave.	Request for use permit to allow the retention of Redwood trees in Stream Protection Zone.
Galvan Use Permit	15 Hamilton Dr.	Request for a use permit to allow outdoor storage of materials for art projects.
Chase Bank Pacheco Plaza	404 Ignacio Blvd.	Request to demolish existing bank building (vacant) and construct new bank of same size.
Muha Accessory Structure	823 Hayden Ave.	Request for design review approval to construct a 484 sq. ft. detached garage on a hillside parcel. Snyder Art Studio
Snyder Art Studio	6 Conchita	Construction of a 399 sq. ft. art studio on a hillside parcel.
McGuire Residence Addition	40 Baywood Cir.	583 sq. ft. first floor addition, 210 sq. ft. garage addition, and new pool and retaining walls on a hillside parcel.
DM Elite Properties	1108 Second St.	Conversion of an existing residence to an accessory dwelling unit and construction of a new primary single family residence.
Ghany Live/Work Unit	Bolling at Marin Valley	Request for entitlements to construct a live/work unit of approximately 1,700 sq. ft.

Project Name/Applicant	Project Location	Description
Johnson Residence Addition	753 Bradley Ave.	Second story addition of 685 sq. ft.
Hamilton Hospital Assisted Living Facility	516 Hospital Dr.	Senior assisted living facility and memory care center at the former Hamilton Hospital.

Source: City of Novato Current Planning Projects, Projects Under Review and In Process, November 2016, and NUSD 2019

Table 4 Cumulative Projects Summary

Land Use	Development
Residential Units	328 units
Non-Residential Space	171,260 square feet

Source: See Table 3

This analysis considers the relevance of the cumulative projects in light of the geographic scope of the specific resource area for which impacts may occur. For instance, cumulative aesthetic impacts are generally limited to potential projects within the immediate viewshed or line-of-sight of the stadium lights or potential projects that would affect the visual character of the immediately surrounding neighborhood, whereas cumulative traffic impacts consider other potential projects within a broader geographic scope. There are seven recently completed, planned or pending projects on the San Marin High School property. The closest project to San Marin High School property within the City of Novato is the mixed-use project at The Square Shopping Center (2001 Novato Boulevard) approximately 1.2 miles east of the project site.

3.3 Cumulative Impact Analysis

Aesthetics

As discussed in Section, *Cumulative Impacts*, proposed and pending development in the City of Novato, and surrounding areas would include at least 151,294 square feet of non-residential development and 328 residential units. In some cases, new cumulative development projects would alter the aesthetic character of the City by introducing larger structures with greater development intensity. As discussed in Chapter 3, there are no cumulative projects within one mile of the project site, with the exception of new performing arts and STEM classroom buildings and other minor improvements at San Marin High School. Therefore, there are no projects within the viewshed of the project that would substantially affect visual character and quality. Therefore, impacts associated with the proposed project would not combine with other projects to cumulatively impact the aesthetics of the area. Furthermore, the proposed lighting and PA systems also would not represent an increase in development intensity in these areas. In addition, as discussed in Impacts AES-3 through AES-5 in Section 2, *Aesthetics*, the stadium lighting system would not generate light trespass approaching the threshold of 5 lux in the CIE's E2 zone for rural areas, would not subject nearby residents to excessive discomfort glare or expose pedestrians and motorists to "disability glare" that reduces visibility, and would not substantially contribute to marine layer sky glow or clear sky glow during nighttime hours in the area. The cumulative project to convert a baseball field to a lighted soccer/lacrosse field at San Marin High School would not involve the addition of lighting.

Therefore, cumulative impacts for aesthetics would be less than significant and the project's contribution to cumulative aesthetic impacts would not be cumulatively considerable.

Agriculture and Forest Resources

The State Department of Conservation has classified much of Novato's agricultural land, particularly Bayfront land, as Farmland of Local Importance. Within the City limits, one active vineyard and one poultry ranch are under Williamson Act contract. The City of Novato has certain policies in place to protect the conversion of farmland and forestland to non-agricultural uses in the City's General Plan and through the establishment of an Urban Growth Boundary. As discussed in the Initial Study (Appendix A to the originally circulated EIR), there is no farmland or forest land on or directly adjacent to the project site. Installation of new lighting and an upgraded public address system at the San Marin High School would not result in the conversion of farmland or forestland to non-agricultural uses. The project would have no impact with respect to the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to non-agricultural use; conflicts with existing agricultural zoning or Williamson Act contract; the loss of forest land or conversion of forest land to non-forest use; or other conversion of farmland to non-agricultural use. The project would not contribute to a cumulative loss of agricultural land or forest land; therefore, the project's contribution to cumulative agricultural and forest resources impacts would not be cumulatively considerable.

Air Quality

The area of geographic consideration of cumulative impacts to air quality is the San Francisco Bay Area Air Basin (SFBAAB). SFBAAB is in nonattainment for the federal and state standards for ozone, as well as the state standard for particulate matter (PM_{10} and $PM_{2.5}$) and the federal standard for 24 hour $PM_{2.5}$. Growth from related projects within the SFBAAB would contribute to existing exceedances of ambient air quality standards when taken as a whole with existing development. The project would not result in an increase in regional population or other growth that is not anticipated under the 2010 Bay Area CAP; therefore, implementation of the project would not conflict with or obstruct the implementation of the 2010 Bay Area CAP. In addition, as discussed in Section 4.2, *Air Quality*, of the originally circulated EIR, all air pollutant emissions would be below BAAQMD thresholds. Therefore, the project's contribution to cumulative regional air quality impacts would not be cumulatively considerable.

Biological Resources

The city has biological resources in the form of oak woodlands which are found in the Novato area promoting a diversity of wildlife including animal, bird, reptile and insect species. Existing City policies and those of the county, state, and federal agencies protect biological resources on a per project basis. As discussed in Appendix A to this Revised EIR, a biological resource reconnaissance site visit was conducted at the proposed project site as well as a review of regulatory agency databases, literature review, an analysis of aerial imagery and review of construction plans. The proposed installation and operation of a new lighting and an upgraded public address system at San Marin High School would result in a less than significant impact to biological resources. The project's contribution to cumulative biological resource impacts would not be cumulatively considerable.

Cultural Resources

Many of the cumulative projects involve ground-disturbing activities that could affect cultural, paleontological, or tribal resources or human remains. However, existing City of Novato policies and County and state regulations would protect cultural and tribal resources on a case-by-case basis as projects are considered. In the event of discovery of cultural resources (e.g., prehistoric sites, human remains), paleontological resources (i.e., fossils), and tribal cultural resources during ground disturbance on the stadium site, the implementation of mitigation measures included in Section 3.4, *Cultural Resources*, of the originally certified Final EIR would have reduced the proposed project's impacts on such resources to less than significant levels. No cultural, paleontological, or tribal cultural resources were observed during ground disturbance for construction of the new stadium lighting system. Therefore, the proposed project has not resulted, and would not result in a cumulatively considerable contribution to a significant cumulative impact relative to cultural resources.

Geology and Soils

Geology and soils cumulative impacts are project specific, as they pertain to the site conditions and characteristics of each project. These impacts may be related to exposure to seismic hazards; increased risks associated with soil liquefaction and subsidence; and risks associated with mass wasting, expansive soils, and erosion. Existing regulations from the City, State and Federal government set mandates for required actions that must be followed during project development to adequately address the potential effects from construction or operation of projects based on the geology, soils, and seismicity of specific project sites. No habitable structures that would subject people to related hazards are proposed, no grading other than that required for lighting installation is required, and the existing use of the site as a sports field would be maintained. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts related to geology and soils would be less than significant. Therefore, the proposed project would not result in a cumulatively considerable contribution to a significant cumulative impact relative to geology and soils.

Greenhouse Gas Emissions

Greenhouse Gas Emissions and climate change are by definition cumulative impacts, as they affect the accumulation of greenhouse gases in the atmosphere. As discussed in Section 4.4, *Greenhouse Gas Emissions*, of the originally certified Final EIR, emissions associated with the project would be less than significant, and the project's impacts are therefore also cumulatively less than significant.

Hazards/Hazardous Materials

The transportation and storage of hazardous materials is a regional issue. Hazardous materials impacts may be related to the transport, use or disposal of hazardous materials; exposure to wildland fires; proximity to airports, and the potential to impair emergency response or evacuation plans. Hazards and hazardous materials impacts are not typically cumulatively considerable unless the projects are adjacent or cause potential releases of hazardous materials that could combine.

Temporary Construction Impacts

Construction of projects listed in Table 3 and the proposed project have the potential to result in a spill or accidental release of hazardous materials. An accidental spill or release of hazardous material or identification of a previously unidentified contamination encountered during construction would be handled, transported, and disposed of at an appropriate facility according to

applicable local, state, and federal regulations. One active case involving known hazardous materials is located on the project site. Construction of the proposed light and public address systems has not resulted in exposure to potential hazardous materials as all ground disturbance associated with the project is located at least 350 feet from the known active case. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts related to hazards and hazardous materials would be less than significant. Since the proposed project has resulted in less than significant impacts related to construction, the proposed project has not contributed to a cumulative impact during construction associated with hazards or hazardous materials. (As construction is already completed for the project, no potential remains for cumulative impacts in this regard.)

Operational Impacts

The proposed project, as well as those projects listed in Table 3, has the potential to involve hazardous materials typically used for cleaning, maintenance, and landscaping. The proposed project lighting and PA system would allow for an expanded schedule of athletic events similar to those that already take place at the stadium. High school and community athletic events do not involve the storage of large quantities of hazardous materials. In addition, the project, though located in a Moderate Fire Hazard Severity Zone, would result in less than significant impact related to fire hazard. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), operation of the project would not create a significant hazard to the public or the environment; impacts would not be cumulatively considerable.

Hydrology & Water Quality

The proposed project would involve the installation of poles to support new lighting and upgraded public address systems and the installation of conduit to provide power to those systems. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project would result in a less than significant impact to hydrology, flooding, and water quality. Cumulative projects listed in Table 3 would be required to implement appropriate on and off-site improvements to ensure these projects do not substantially affect water quality or result in flooding impacts. Impacts would not be cumulatively considerable.

Land Use & Planning

Pursuant to Government Code Section 53094, the governing board of a school district may render a local zoning ordinance inapplicable to a proposed use of property by the school district, by a vote of two-thirds of its members. The Governing Board of NUSD made such a finding on November 15, 2016 (Resolution 16-2016-17). All construction and operation activities for the project would occur within Novato Unified School District property and would not be subject to local zoning ordinances. Operation of the project would be subject to the policies and regulations of the District's Board of Education. Projects identified in Table 3 are subject to both environmental and discretionary review by the City of Novato and each cumulative project would be required to demonstrate consistency with applicable plans, policies, and programs adopted by the City. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the project would not have any impact on land use and planning, therefore the proposed project would not result in a cumulatively considerable land use impact.

Mineral Resources

There are no known State-designated minerals of regional or statewide importance within the City of Novato (California Department of Conservation, 2013). Therefore, cumulative impacts to mineral resources from those projects listed in Table 3 would not result in impacts to mineral resources. No conflicts with the availability of regionally or locally important mineral resource recovery sites would occur. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), no impact to mineral resources would occur due to the construction or operation of the project. Impacts would not be cumulatively considerable.

Noise

Temporary Construction Impacts

Construction of the proposed project and related projects in the area, as identified in Table 3, would generate similar noise levels compared to the proposed project. These noise levels generally would not exceed any local threshold because the applicable noise ordinances contain exemptions for temporary construction noise. Construction noise is localized and rapidly attenuates within an urban environment. Therefore, related projects outside the immediate site vicinity would be located too far from the project site to contribute to an increase in ambient noise levels associated with construction in the project area. The project's contribution to the cumulative increase has been less than cumulatively considerable. Cumulative construction noise impacts would be less than significant.(As construction is already completed for the project, no potential remains for cumulative impacts in this regard.)

Operational Impacts

Cumulative development in the City of Novato would incrementally increase traffic on the roadways in the vicinity of San Marin High School. This cumulative increase in traffic would subject sensitive receptors to additional roadway noise. Table 5 below, shows modeled sound levels for Future Year 2040 with traffic from cumulative traffic, with and without the project, and compares changes in traffic noise to FTA thresholds.

Table 5 Increase in Traffic Noise Under Future (2040) Traffic Conditions

Receptor	Future 2040 (dBA L_{eq})	Future 2040 Plus Project (dBA L_{eq})	Change in Traffic Noise Level	FTA Impact Threshold (dBA L_{eq})	Threshold Exceeded?
1-San Marin Drive	66.8	68.1	1.3	1	Yes
2-San Marin Drive	66.9	68.6	1.7	1	Yes
3-San Marin Drive	67.2	68.4	1.2	1	Yes
4-San Marin Drive	69.8	71.0	1.2	1	Yes
5-San Marin Drive	60.6	61.9	1.3	2	No
6-San Marin Drive	65.4	65.6	0.2	1	No
7-San Marin Drive	63.5	64.0	0.5	2	No
8-San Marin Drive	71.6	72.0	0.4	1	No
9-San Marin Drive	72.2	72.6	0.4	1	No
10-San Marin Drive	67.5	68.0	0.5	1	No
11-San Andreas Drive	59.0	62.1	3.1	3	Yes
12-Sutro Avenue	59.0	60.1	1.1	3	No
13-Wilson Avenue	65.7	66.7	1.0	1	Yes
14-Novato Boulevard	67.8	69.3	1.5	1	Yes
15-Novato Boulevard	65.2	65.7	0.5	1	No
16-Novato Boulevard	67.7	69.7	2.0	1	Yes
17-Novato Boulevard	73.3	73.9	0.6	1	No
18-Novato Boulevard	72.5	73.1	0.6	1	No
19-Novato Boulevard	72.1	72.5	0.4	1	No
20-Novato Boulevard	69.5	70.0	0.5	1	No
21-Novato Boulevard	71.7	72.1	0.4	1	No
22-De Long Avenue	65.8	66.1	0.3	1	No
23-De Long Avenue	73.0	73.3	0.3	1	No
24-De Long Avenue	73.4	73.6	0.2	1	No

As shown in Table 5, traffic generated by the project would incrementally increase roadway noise before and after events under cumulative conditions. The increase in cumulative traffic noise would exceed FTA thresholds at four receptor locations on San Marin Drive, two receptor locations on Novato Boulevard, and one receptor location on San Andreas Drive and Wilson Avenue. However, as described above under Impact N-3, this substantial increase in cumulative traffic noise on area roadways would only occur 16 times per year at home football games (plus any home playoff games) and for a maximum duration of two hours total per event. Traffic noise from spectators of football games would not be typical of the traffic noise associated with project activities during the vast majority of the year. Therefore, traffic noise associated with project and cumulative activities would not exceed FTA thresholds under typical conditions, and this impact would be less than significant.

Proposed and pending development in the City and surrounding areas would include approximately 171,260 square feet of non-residential development and 328 residential units. This cumulative development would result in stationary (non-traffic) operational noise increases in the vicinity of the project site. Implementation of the project would result in a significant noise impact for nearby

sensitive receptors during varsity football games. However, based on the fact that noise dissipates as it travels away from its source, noise impacts from on-site activities and other stationary sources would be limited to the project site and vicinity. Thus, cumulative operational (non-traffic) noise impacts from related projects, in conjunction with project-specific noise impacts, would not have the potential to result in cumulatively considerable adverse effects. Cumulative operational stationary (non-traffic) noise exposure would be less than significant.

Population & Housing

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project would not increase school enrollment and would not include the construction of housing or generate a substantial number of new jobs. No impact to population and housing would occur as a result of this project; therefore, impacts would not be cumulatively considerable.

Public Services

The demands for public services by the cumulative projects are consistent with the long-term planning of the City of Novato. Projects identified in Table 3 are subject to both environmental and discretionary review by the City of Novato and each project would be required to meet long-term plans that forecast the demand for services and identify specific facilities projects for public service and utility providers to meet projected demand and needs. The construction and operation of the proposed project would not change the total population served by existing services nor would the periodic concentration of the population of the project site relative to existing conditions. As discussed in the Initial Study (Appendix A to the previously certified Final EIR), impacts of the project to public services would be less than significant; therefore, impacts would not be cumulatively considerable.

Recreation

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the project would not add population to the City of Novato and would therefore not increase the demand for parks. The project would not contribute to cumulative impacts related to recreation in this regard. The proposed project is itself a recreational facility project. The project would be limited to the installation of support poles for new lighting, upgraded public address systems and electrical conduits to provide power. The potential adverse effects for this project are analyzed throughout this EIR. No additional adverse affects beyond those analyzed would occur. Impacts related to recreation would not be cumulatively considerable.

Transportation and Traffic

Cumulative impacts related to transportation and traffic are described under Impact T-2 in Section 4.6, *Transportation and Traffic*, of the originally certified Final EIR. Increases in traffic under cumulative plus project conditions would not cause intersection operations to fall below the LOS standard at any of the study intersections. The proposed project would not conflict with any of the City of Novato's transportation plans. Therefore, as described under Impact T-2, cumulative traffic impacts would be less than significant.

Utilities & Service Systems

As discussed in the Initial Study (Appendix A to the previously certified Final EIR), the proposed project would result in no impact to utilities and existing service systems in relation to water,

wastewater or stormwater, and a less-than-significant impact related to solid waste. Although the cumulative projects would increase demand for utilities, the project's contribution would not be cumulatively considerable.

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4 Alternatives

4.1 Introduction

In the original EIR, the discussion and analysis of alternatives is contained in Section 6, *Alternatives*.

The CEQA Guidelines require that EIRs identify and evaluate a reasonable range of alternatives that are designed to reduce the significant environmental impacts of the proposed project, while still satisfying most of the basic project objectives. The CEQA Guidelines also set forth the intent and extent of alternatives analysis to be provided in an EIR.

The following discussion evaluates alternatives to the proposed project and examines the potential environmental impacts associated with each alternative. Through comparison of these alternatives to the proposed project, the relative environmental advantages and disadvantages of each are weighed and analyzed. The CEQA Guidelines require that the range of alternatives addressed in an EIR should be governed by a rule of reason. Not every conceivable alternative must be addressed, nor do infeasible alternatives need to be considered (CEQA Guidelines Section 15126.6(a)). Section 15126.6 of the CEQA Guidelines states that the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency or other plans or regulatory limitations, and jurisdictional boundaries. Section 15126.6(b) of the CEQA Guidelines states that the discussion of alternatives must focus on alternatives capable of either avoiding or substantially lessening any significant environmental effects of the project, even if the alternative would impede, to some degree, the attainment of the project objectives or would be more costly. The alternatives discussion should not consider alternatives whose implementation is remote or speculative, and the analysis of alternatives need not be presented in the same level of detail as the assessment of the proposed Project.

Based on the CEQA Guidelines, several factors need to be considered in determining the range of alternatives to be analyzed in the EIR and the level of analytical detail that should be provided for each alternative. These factors include: (1) the nature of the significant impacts of the proposed project, (2) the ability of alternatives to avoid or lessen the significant impacts associated with the proposed project, (3) the ability of the alternatives to meet the objectives of the proposed project, and (4) the feasibility of the alternatives. The analysis in this EIR shows that the proposed project would result in significant and unavoidable impacts with respect to noise at adjacent residences during varsity football games. All other impacts of the project can either be mitigated to a level of less than significant or are less than significant. The alternatives examined herein represent alternatives that could potentially reduce or avoid the significant and less than significant impacts associated with implementation of the proposed project.

As required by Section 15126.6 of the CEQA Guidelines, this section of the EIR examines a range of reasonable alternatives to the proposed project. The following alternatives are evaluated in this EIR:

- Alternative 1: No Project
- Alternative 2: Stadium Lighting at Novato High School

- Alternative 3: Portable Lighting Systems
- Alternative 4: Reduced Athletic Lighting System

One alternative that was rejected as infeasible in the original Draft EIR is presented here in further detail for informational purposes in response to public comments received on the original Draft EIR. The College of Marin Indian Valley Campus (IVC) Existing Fields alternative is now presented as Alternative 5 to provide additional detail about the potential impacts of that alternative. However, the conclusion in the original Draft EIR that the IVC Existing Fields alternative would be infeasible remains valid.

This section also includes a discussion of the alternatives considered but rejected and the "environmentally superior alternative" among the alternatives analyzed.

As indicated above, project alternatives should feasibly be able to attain "most of the basic objectives of the project" (Section 15126.6(a) of the State CEQA Guidelines), even though implementation of the project alternatives might, to some degree, impede the attainment of those objectives or be more costly (Section 15126.6(b) of the State CEQA Guidelines). The following are the project objectives as described in Section 2.0, Project Description.

1 Provide extended availability of the athletic fields to improve academic performance by minimizing early class dismissal and missed instructional time for student athletes.
2 Allow for the scheduling of games at times when students, parents, and community members can more easily attend the events, which would increase school spirit and increase revenue from ticket purchases.
3 Provide nighttime opportunities for students to gather to cheer on their team offering an alternative to going to parties or other unhealthy recreational activities.
4 Improve athlete safety by providing superior lighting conditions during evening practices and sports events.
5 Improve safety by minimizing incompatible uses from sharing the field (e.g.: lacrosse teams and track/field teams practicing at the same time means that lacrosse balls may hit runners on the track).
6 Improve the public address system to focus and contain sound within the stadium.

4.2 Alternatives Considered but Rejected as Infeasible

Pursuant to CEQA Guidelines §15126.6(c), the District considered several alternative off-site facilities to host nighttime events and practices. These alternate sites were rejected as infeasible during the project's scoping process. This section discusses the alternative sites and the reasons the District decided not to carry them forward for further environmental analysis.

All of the off-site alternatives would require student athletes, coaches, and support staff to be transported to and from the site for games and practices. The off-site alternatives range in distance from adjacent to San Marin High School (O'Hair Park) to approximately seven miles away (Hamilton Site). With the exception of O'Hair Park which is adjacent to the school, the use of alternative sites for games and practices would necessitate cars and buses to transport student athletics, coaches, and support staff from San Marin High School to the alternative site. Therefore, the rejected alternatives would result in additional traffic, traffic noise, and mobile air pollution and greenhouse

gas (GHG) emissions compared to the proposed project. For this reason and the additional reasons listed below, these alternative sites were considered but rejected as infeasible.

Figure 6 and Figure 7 show the locations of the alternative sites considered but rejected.

a. San Andreas Site

NUSD owns the San Andreas site, which is approximately 20 acres located in northern Novato just off San Marin drive. The site is currently undeveloped and ungraded and is surrounded by residential uses. The site is not connected to the electrical grid or to any utilities such as water or wastewater. In order to support nighttime games, events, and practices, the site would need full development of a stadium and parking as well as infrastructure improvements and utility connections. Development of a stadium would result in construction-related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. Construction of a full stadium rather than the addition of lights to an existing stadium would result in a longer construction period with additional heavy construction equipment. Therefore, construction-related impacts would be worse than the proposed project. In addition, this site is adjacent to residential uses; therefore, similar crowd and public address (PA) system noise impacts as the proposed project would occur. This alternative likely would not eliminate the unavoidable noise impact during games and events. Further, development of this site would be cost-prohibitive.

b. Hamilton Site

The Hamilton site, known as Parcel 1A and owned by NUSD, is approximately nine acres in size located in south Novato close to Hamilton K-8 School and Novato Charter School. The site is situated on a former Air Force Base. Although there are no structures on the site, the concrete foundations from former buildings remain. This site would also require full development of a stadium and parking as well as infrastructure improvements, utility connections, and significant roadway improvements for access to the site. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. Construction of a full stadium rather than the addition of lights to an existing stadium would result in a longer construction period with additional heavy construction equipment. Therefore, construction-related impacts would be worse than the proposed project. In addition, since the site was a former military installation, significant soil and groundwater contamination may exist. Therefore, this alternative site would have additional impacts related to hazards and hazardous materials compared to the proposed project. Further, this site is adjacent to residential uses; therefore, similar crowd and PA system noise impacts as the proposed project would occur. This alternative likely would not eliminate the unavoidable noise impact during varsity football games. Lastly, development of this site would be cost-prohibitive.

c. Sinaloa Middle School or San Jose Middle School

These middle schools are within the District. Both schools currently have athletic fields and tracks, but the fields are not conducive to holding large events or games since they do not have bleachers, concessions, or restrooms. The District is planning on upgrading the fields at both schools by converting them from grass to artificial turf and upgrading the tracks to regulation size, but no additional facilities, lights, or a PA system are planned at either school. Adding bleachers, concessions, restrooms, lighting and a PA system at either school would be cost prohibitive. Further, both sites are adjacent to residential uses. At San Jose Middle School residences are located

Figure 6 Map of Alternative Sites Considered but Rejected

Figure 7 Map of College of Marin Indian Valley Campus Alternative Sites

approximately 100 feet west of the existing track and at Sinaloa Middle School residences are located approximately 25 feet south of the existing track. Therefore, for both sites, similar crowd and PA system noise impacts as the proposed project would occur. These alternative sites likely would not eliminate the unavoidable noise impact during varsity football games.

d. College of Marin IVC Lot 1

This site would require full development of a stadium as well as infrastructure improvements and utility connections. This site is located next to a major roadway, Ignacio Boulevard, and parking; therefore the site has adequate site access and would require minimal new parking. Due to the topography of this site, extensive grading would be required. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. The nearest sensitive receptors are the residences approximately 800 feet east of the site. Development of this site is not within the Campus Facilities Master Plan; therefore additional environmental analysis under CEQA would be required. Development of a stadium at this location would be cost prohibitive.

e. College of Marin IVC Lot 2

This site would require full development of a stadium and parking as well as infrastructure improvements, roadway improvements, and utility connections. Due to the topography of this site, extensive grading would be required, although less grading would be required than the Lot 1 site. Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. However, there are no residential uses within ¼ mile of this site. Development of a stadium at this location would be cost prohibitive.

f. Hill Recreation Area

Development of a stadium would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. This site is surrounded by sensitive receptors including a senior center, a high school, and residences. Plans for the site are currently being developed through an active community design planning process. During the process, it was decided that the site will not include lighted athletic fields; however, security and pathway lighting would be provided. Development of a stadium at this site would not be consistent with the outcome of the community design planning process. In addition, development of a stadium at this location would be cost prohibitive.

g. O'Hair Park

The City of Novato owns O'Hair Park, which is located adjacent to San Marin High School. Current uses include a lease for an equestrian operation with Morningstar Farm, the City's dog park, as well as public trails and open space. Other than the developed areas for horses and dogs, this park remains predominantly undeveloped with trails and open space. The current lease with Morningstar Farm is in force through October 31, 2022 or can be terminated with 18 months advance notice. Therefore, if the lease with Morningstar Farm was ended, the site could be developed with a stadium. However, this site would require full development of a stadium and parking as well as infrastructure improvements and utility connections which would result in construction related impacts such as air pollution and greenhouse gas emissions, noise, and construction traffic. In addition, Novato Creek runs through the middle of the site. Development of the site with a stadium

may result in water quality impacts or impacts to sensitive riparian species. Further, development of a stadium at this location would be cost prohibitive.

h. Install Turf on Existing Grass Practice Field:

The District desires to install turf on an existing grass practice field at San Marin High School. A resurfaced turf practice field will incrementally increase use of outdoor fields during inclement weather, but would not yield new or additional space for practices. While the conversion to a turf practice field will help with the number or practices by allowing incrementally more use of existing fields, it does not provide adequate additional practice time to solve the larger issue of missed class time. Games times will still need to start at 3:15. Also, in the winter there are four athletic teams that need practice fields. Even with two practice fields, there would not be enough daylight hours in the winter to accommodate four athletic teams. In addition, during overlaps between Fall/winter and winter/spring sports seasons, there can be up to 7 teams that need a place to practice. Finally, the District is considering a later school-day start time, which would reduce available daylight hours for sports practice even further.

i. Reduced Number of Events with Lighting

The District considered a reduction in the number of lighted events compared to the proposed schedule of events. However, as described above under the Additional On-site Turf Fields alternative, the proposed schedule of events is the minimum number of lighted events necessary to accommodate athletic practice needs and achieve the project objectives.

4.3 Alternative 1: No Project

4.3.1 Description

This alternative assumes that the proposed project is not implemented and the project site remains in its current condition. Currently, there are no stadium lights and the public address (PA) system does not focus sound on the field.

4.3.2 Impact Analysis

The No Project alternative would involve no changes to the physical environment and thus would have no environmental effects. As such, air pollution emissions, greenhouse gas (GHG) emissions, and noise associated with construction would be avoided because no lighting system would be installed. In addition, operational impacts associated with light trespass and glare, air pollution and GHG emissions, nighttime PA system and crowd noise, and nighttime event traffic would not occur. The No Project Alternative would eliminate the proposed project's significant and unavoidable noise impact. No mitigation measures would be required for the No Project alternative. Overall impacts would be lower than those of the proposed project since no change to environmental conditions would occur.

The No Project Alternative would not meet any of the objectives of the proposed project. This alternative would not extend play time on the fields and minimize missed instructional time (Objective 1), increase school and community participation (Objective 2), provide nighttime recreational activities for students (Objective 3), improve safety (Objectives 4 and 5), or improve the PA system (Objective 6).

4.4 Alternative 2: Stadium Lighting at Novato High School

4.4.1 Description

This alternative would involve the installation of new lighting at the Novato High School stadium instead of San Marin High School. This stadium would host nighttime events for both Novato and San Marin high schools. The lighting equipment would be similar (height, configuration, type, etc.) to the proposed project. The existing PA system at the school would be updated to focus sound to the field. Like the proposed project, some Novato High School practices and games that currently occur at the field would shift to evening hours. In addition, Novato High School would host some San Marin High School evening events and games. However, the overall number of evening events (e.g.: 16 football games) would remain the same as with the proposed project.

4.4.2 Impact Analysis

a. Aesthetics

Because this alternative would involve similar lighting system and schedule as the proposed project in a neighborhood that is also residential, it would result in similar impacts as the proposed project with respect to views to, through, and from the stadium; change in visual character; and light, glare, and sky glow. However, impacts would be shifted from San Marin High School to Novato High School. At San Marin High School, the nearest residences are 120 feet away. At Novato High School, the nearest residences are adjacent to the stadium less than 25 feet away. Since residences are closer to the Novato High School stadium compared to the San Marin High School stadium, light and glare impacts could be greater under this alternative. Nonetheless, with mitigation measures similar to those in this EIR (AES 3and AES-4) to design the lighting system to reduce light trespass and glare at these residences, impacts are expected to be less than significant. Under this alternative, aesthetic impacts would be generally similar to the proposed project and would remain less than significant or less than significant with mitigation. Mitigation measures related to light and glare would still apply.

b. Air Quality

This alternative would involve the permanent installation of lighting fixtures at Novato High School. The amount and duration of construction would be similar or the same under this alternative. Therefore, construction-related emissions would be similar to or the same compared to the proposed project. Mobile emissions associated with transportation between San Marin High School and Novato High School would be slightly increased. Energy-related operational emissions associated with new lighting systems would be the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. Nonetheless, like the proposed project, impacts would be less than significant.

c. Cultural Resources

Similar to the proposed project, this alternative would involve some subsurface work to install lighting poles. Further research would be needed to determine the likelihood of discovering cultural, paleontological, or tribal resources or human remains at Novato High School. Nonetheless, in order to avoid potential impacts to cultural resources the mitigation measures outlined in Section 4.4, *Cultural*

Resources, of the original EIR, would continue to apply. Impacts would be the same as the proposed project and would remain significant but mitigable.

d. Greenhouse Gas Emissions

This alternative would involve the permanent installation of lighting fixtures at Novato High School. The amount and duration of construction would be similar or the same under this alternative. Therefore, construction-related GHG emissions would be similar to or the same compared to the proposed project. Mobile GHG emissions associated with transportation between San Marin High School and Novato High School would be slightly increased. Energy-related GHG emissions associated with new lighting systems would be the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. However, like the proposed project, impacts would be less than significant.

e. Noise

For the proposed project, the nearest sensitive noise receptors are the classrooms approximately 100 feet from the stadium track and the residences approximately 120 feet from the stadium track. At the Novato High School alternative site, residences are located immediately adjacent to the northwestern boundary of the existing stadium. Therefore, construction-related noise impacts would be greater compared to the proposed project. Additional mitigation measures may be needed related to construction noise for this alternative.

The stadium at Novato High School currently has a PA system but it is only used for daytime events since the stadium has no lighting. Under this alternative, the PA system use would shift to nighttime for night games and additional crowd noise would occur during evening hours. At Novato High School, sensitive noise receptors (residences) are located immediately adjacent to the stadium. Therefore, crowd and PA noise impacts would be greater than those of the proposed project. A mitigation measure similar to Mitigation Measure N-2 required for the proposed project would apply to this alternative. The significant and unavoidable noise impact would remain.

This alternative would also involve additional traffic noise associated with trips to transport San Marin High School transport student athletes, coaches, and support staff to Novato High School for games. Traffic noise impacts would be increased compared to the proposed project but would be expected to remain less than significant.

f. Transportation/Traffic

This alternative would involve additional roadway traffic to transport student athletes, coaches, and support staff to Novato High School for games. Impacts would be increased compared to the proposed project but would be expected to remain less than significant.

4.5 Alternative 3: Portable Lighting

4.5.1 Description

Under this alternative, stadium lighting for night games at San Marin High School would be provided by portable lighting systems that are powered by diesel generators. The portable lighting systems would only be used for nighttime football, soccer, track, and lacrosse games. It is assumed that portable lighting would not remain in place but would be installed prior to games and removed after games

or the following morning. Practices would continue to meet during daytime hours and would not use the portable lighting system.

4.5.2 Impact Analysis

a. Aesthetics

This alternative would not involve the permanent addition of stadium lighting. However, this alternative would involve the use of portable light fixtures. Therefore, this alternative would incrementally alter views of and through the stadium when the fixtures are in use. However, because lighting systems would not be permanent but would be used temporarily and only occasionally, views would be affected to a lesser extent than the proposed project. This alternative would not substantially alter daytime aesthetic conditions and visual character of the stadium since portable fixtures would only be used for nighttime events. Depending on type of fixtures used, portable lighting may be more or less efficient than the proposed permanent light fixtures. Therefore, light and glare impacts may be better or worse than the proposed project. Since this alternative would only involve lighting for nighttime events and not practices, potential light and glare impacts would be less frequent than the proposed project. The mitigation measures required for the proposed project (AES-3and AES-4) would not apply since no permanent lighting systems are proposed. Like the proposed project, this alternative would not substantially increase sky glow. Therefore, overall, aesthetic impacts associated with this project would be less than significant and would be slightly reduced compared to the proposed project.

b. Air Quality

This alternative would not involve the permanent installation of lighting fixtures. This alternative would involve trucks or light machinery to set up and remove the portable fixtures, but emissions associated with installation would be minor. Therefore, construction-related emissions would be reduced compared to the proposed project. However, this alternative would involve diesel-powered portable lighting. Operational diesel emissions would be increased compared to the proposed project. It is anticipated that overall air pollution emissions associated with diesel generators would be more than emissions associated with energy use to power permanent energy-efficient lighting fixtures. In addition, nearby sensitive receptors may be affected by diesel exhaust and odor emissions. Overall, air quality impacts would be increased compared to the proposed project under this alternative.

c. Cultural Resources

This alternative would not involve ground disturbing activities since the lighting poles would not be installed. Therefore, no impacts to cultural resources would occur. The mitigation measures outlined in Section 4.3, *Cultural Resources*, would not apply. Impacts would be reduced compared to the proposed project.

d. Greenhouse Gas Emissions

This alternative would not involve the permanent installation of lighting fixtures. This alternative would involve trucks or light machinery to set up and remove the portable fixtures, but emissions associated with installation would be minor. Therefore, construction-related GHG emissions would be reduced compared to the proposed project. However, this alternative would involve diesel-powered portable lighting. GHG emissions associated with diesel generators would be increased

compared to the proposed project. It is anticipated that overall GHG emissions associated with diesel generators would be more than GHG-emissions associated with energy use to power permanent energy-efficient lighting fixtures. Overall, GHG impacts would be increased compared to the proposed project under this alternative.

e. Noise

Since this alternative would not involve the permanent installation of light fixtures, construction noise would be reduced compared to the proposed project. However, this alternative would involve minor infrequent noise associated with installing and removing the portable fixtures. Like the proposed project, construction noise impacts would be less than significant.

This alternative would still involve a shift of athletic games to the evening hours, though unlike the proposed project this alternative would not shift practices to the evening hours. This alternative would not involve improvements to the PA system that would reduce PA system noise at nearby residences; therefore, PA system noise impacts on nearby receptors would be greater than the proposed project. In addition, this alternative would still involve nighttime varsity football games; therefore, the significant and unavoidable noise impact from crowd noise would remain. The diesel-generators would also produce noise not associated with the proposed project. Overall, noise impacts would be greater under this alternative than for the proposed project. Mitigation measures similar to those required for the proposed project (N-2) would still apply.

f. Transportation/Traffic

Like the proposed project, this alternative would result in a shift of some stadium activities, such as varsity football games to nighttime instead of daytime. Therefore, the traffic impacts associated with evening football games for the proposed project would still occur with this alternative. Impacts would be generally the same as the proposed project and would be less than significant.

4.6 Alternative 4: Reduced Lighting System Alternative

4.6.1 Description

The Reduced Lighting System Alternative would involve the installation of a stadium lighting system with reduced-intensity lighting. As measured in May 2019, the proposed stadium lighting system generates illuminance reaching 441 lux at the center of the field (Appendix B). This alternative would reduce the lighting level during athletic events for the purpose of minimizing the exposure of residential neighbors to light trespass.

4.6.2 Impact Analysis

a. Aesthetics

It is assumed that this alternative would involve the installation of stadium lighting fixtures in the same locations as proposed and up to the same maximum height of 80 feet. Therefore, this alternative would incrementally alter views of and through the stadium. Similar to the proposed project, light poles would not conflict with the visual character of the stadium's vicinity and would have a negligible effect on overall visual quality.

This alternative would reduce the intensity of lighting during events at the San Marin High School stadium, which would result in incrementally less light trespass at property lines adjacent to

residences than would the proposed stadium lighting system. As shown in Table 2 in Section 4.1, Aesthetics, the proposed system would generate light trespass of up to 2.75 lux. This light level would not exceed the CIE threshold of 5 lux for sites in the E2 zone. Because this alternative would reduce the proposed lighting levels, it would also not generate light trespass exceeding the threshold of 5 lux. The impact from light trespass would be incrementally reduced but would remain less than significant.

By reducing light trespass from the stadium site relative to the proposed project, the alternative would incrementally reduce glare. Similar to the proposed project, illuminance on the vertical plane would not exceed the applied threshold of 5 lux at adjacent residential property lines. Therefore, the impact from glare would be incrementally reduced but would remain less than significant. This alternative also would incrementally reduce the stadium site's contribution to sky glow, which would be minimal under the proposed project. Therefore, the impact from sky glow would be slightly reduced but would remain less than significant.

b. Air Quality

The Reduced Lighting System Alternative would involve a similar duration and intensity of construction to the proposed project. Because the scope of construction activity would not change, the alternative also would not generate construction emissions also would not exceed the BAAQMD's thresholds, and would not expose sensitive receptors to substantial pollutant concentrations. This impact would remain less than significant.

It is assumed that by reducing the intensity of lighting, this alternative would require incrementally less electricity use relative to the proposed project. However, reducing lighting would not alter the number of visitors to athletic events at the stadium site, so mobile emissions would be similar to those generated by the proposed project. Similar to the project, operational emissions would not result in net increase in any criteria pollutant for which the project region is in non-attainment under applicable federal or state ambient air quality standards and would not expose sensitive receptors to substantial pollutant concentrations. Therefore, this impact would be incrementally reduced but would remain less than significant.

c. Cultural Resources

This alternative would involve a similar degree of surface ground disturbance to the proposed project, which would have the potential to disturb previously unidentified archaeological resources, paleontological resources, human remains, or tribal cultural resources. The mitigation measures outlined in Section 4.3, *Cultural Resources*, would apply to identify and protect such cultural resources in the event of their discovery during ground disturbance. Similar to the proposed project, impacts on cultural resources would be less than significant with mitigation.

d. Greenhouse Gas Emissions

This alternative would involve a similar scope of construction activity to the proposed project and would result in a similar amount of construction-related GHG emissions. As noted above, dimmer lighting would incrementally reduce electricity use from the stadium site, although it would not affect the number of visitors and associated mobile emissions. Therefore, this alternative would incrementally reduce operational GHG emissions. Similar to the proposed project, the alternative would not result in a population increase, and as such would be consistent with ABAG population projections. It would also be consistent with goals and measures from the City's CCAP related to

renewable energy, vehicle efficiency, and alternative fuels. Therefore, the overall GHG impact would be slightly reduced but would remain less than significant.

e. Noise

Because this alternative would involve a similar scale of construction activity to the proposed project at the stadium site, it would generate similar temporary increases in noise levels at nearby residences. The impact from construction noise would remain less than significant.

It is assumed that reduced lighting would not affect the type or frequency of athletic events hosted at the stadium site. Therefore, similar to the proposed project, varsity football game noise under this alternative would generate L_5 noise levels that exceed the threshold of 55 dBA at nearby sensitive receptors. The mitigation measures in Section 4.5 to reduce operational noise during athletic events would apply to this alternative. However, similar to the proposed project, it is possible that an L_5 sound level of 55 dBA at the nearest residences would not be achievable even with implementation of mitigation measures. Therefore, the impact from operational noise would remain significant and unavoidable.

f. Transportation/Traffic

Because this alternative would involve a similar amount of athletic use at the stadium site to the proposed project, it would generate a similar number of vehicle trips. Stadium lighting, even at reduced intensity, would still enable nighttime stadium activities such as varsity football games. Therefore, the timing of new vehicle trips would also be similar to the proposed project. Resulting traffic impacts would be less than significant, similar to the proposed project.

4.7 Alternative 5: College of Marin Indian Valley Campus (IVC) Existing Fields

4.7.1 Description

The Indian Valley Campus (IVC) contains two grass athletic fields on the western portion of the campus which are configured for softball and soccer. The fields contain lighting but the lighting is configured to accommodate softball games. Therefore, the fields and lighting system would need to be reconfigured to accommodate football. The field house, restrooms, and bleachers would need to be upgraded to accommodate larger crowds associated with varsity football games. Parking and pathways may need to be improved to meet ADA standards. The fields do not contain a track and could not accommodate track practices or a track meet. In addition, the field would require drainage improvements which would necessitate grading. The fields are surrounded on three sides by open space to the west, north, and east. The Indian Valley Campus Organic Farm and Garden borders the fields to the southwest. Campus buildings, including maintenance facilities, border the fields to the southeast. The nearest sensitive receptors to the field are classroom facilities approximately 1,000 feet to the southeast and residences located on a ridge approximately 1,300 feet to the north-northeast.

Both the College of Marin and the City of Novato use these fields and would not accommodate NUSD's proposed usage. The College of Marin owns the IVC site, and has entered into a 40-year agreement with the City of Novato. That agreement, which governs use of the fields, will be up for renewal in the year 2036. The District would have to enter into a three-way agreement with the college and city to use the fields. Both the City of Novato and the College of Marin have stated that

it would be difficult to reach an agreement between all three parties. Based on the Agreement in place between the City of Novato and Marin Community College District regarding Indian Valley Campus athletic fields, the Marin Community College District has first priority for use of the athletic fields between the hours of 8:00 AM and 3:00 PM on Monday, Wednesday, and Friday and between the hours of 8:00 AM and 5:00 PM on Tuesdays and Thursdays. The City has priority for use of the athletic fields between the hours of 3:00 PM and 10:00 PM on Monday, Wednesday, and Friday; between the hours of 5:00 PM and 10:00 PM on Tuesday and Thursday; between the hours o 9:00 AM and 5:00 PM on Saturdays; and between the hours of 12:00 PM and 5:00 PM on Sundays and holidays. These times correspond with many of the times that San Marin High School students would also use the fields for practices and games. Additionally, the fields are closed November through January for maintenance and to reduce the damage to the natural turf during the rainy season. This closure would impact approximately 66 events that are planned to occur under the proposed project during this time period including both practices and games. Furthermore, there is currently no room to add a new football field under the lights without reducing the space for the existing programs or eliminating many community uses all together. The City of Novato has indicated that there is not room to add a new football field at the IVC site without reducing space for existing City programs or eliminating many community uses at the site altogether. The City does not support use of the IVC site for San Marin High School athletic events (City of Novato, 2017). Therefore, the District's schedule would not be accommodated at this facility.

4.7.2 Impact Analysis

a. Aesthetics

Because this alternative would involve a similar lighting system and schedule as the proposed project, it would result in similar impacts as the proposed project with respect to views to, through, and from the stadium; change in visual character; and light, glare, and sky glow. However, impacts would be shifted from San Marin High School to the IVC. At San Marin High School, the nearest residences are approximately 120 feet away. At the IVC, the nearest residences are located approximately 1,300 feet to the north-northwest on a ridge above the stadium. Since residences are further from the IVC field compared to the San Marin High School stadium, the severity of light and glare impacts on nearby sensitive receptors would be reduced under this alternative compared to the proposed project.

Unlike the stadium at San Marin High School, the IVC fields border directly on open space, and therefore the impact of implementation of this project on the visual character of the surrounding area and ambient lighting levels may be slightly increased.

Nonetheless, with implementation of mitigation measures similar to those contained in Section 4.1, *Aesthetics,* (AES-3 and AES-4) to design the lighting system to reduce light trespass and glare at nearby residences, impacts are expected to be less than significant. Under this alternative, aesthetic impacts would be slightly reduced when compared to proposed project and would remain less than significant or less than significant with mitigation. Mitigation measures related to light and glare would still apply.

b. Air Quality

This alternative would involve the permanent installation of lighting fixtures at the IVC existing fields. The amount and duration of construction for the lighting component of the project would be the same under this alternative. However, the grading associated with the drainage improvements

would be in addition to any excavation or grading associated with the lighting component of the proposed project. Additional construction compared to the proposed project would be required for this alternative (such as improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways). Therefore construction-related emissions would be slightly higher compared to the proposed project. Mobile emissions associated with transportation between San Marin High School and the IVC would also be slightly increased. Energy-related operational emissions associated with new lighting systems would be similar to or the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. Nonetheless, similar to the proposed project, impacts would be less than significant.

c. Cultural Resources

Similar to the proposed project, this alternative would involve some subsurface work to install lighting poles. Further research would be needed to determine the likelihood of discovering cultural, paleontological, or tribal resources or human remains at the IVC. Nonetheless, in order to avoid potential impacts to cultural resources the mitigation measures outlined in Section 4.4, *Cultural Resources*, would continue to apply. Impacts would be the same as the proposed project and would remain significant but mitigable.

d. Greenhouse Gas Emissions

This alternative would involve the permanent installation of lighting fixtures at the IVC existing fields. The amount and duration of construction for the lighting component of the project would be the same under this alternative. However, the grading associated with the drainage improvements would be in addition to any excavation or grading associated with the lighting component of the proposed project. Additional construction compared to the proposed project would be required for this alternative (such as improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways). Therefore, construction-related GHG emissions would be slightly increased compared to the proposed project. Mobile GHG emissions associated with transportation between San Marin High School and the IVC would also be slightly increased. Energy-related GHG emissions associated with new lighting systems would be similar to or the same as the proposed project. Overall, operational emissions levels would be slightly higher than levels associated with the proposed project. However, like the proposed project, impacts would be less than significant.

e. Noise

For the proposed project, the nearest sensitive noise receptors are the classrooms approximately 100 feet from the stadium track and the residences approximately 120 feet from the stadium track. At the IVC alternative site, residences are located approximately 1,300 feet from the northeast boundary of the northernmost existing softball field. Construction activities, including the grading associated with the drainage improvements and construction of improved restrooms, an improved field house, new bleachers, and ADA-compliant parking and pathways would be in addition to any excavation or grading associated with the lighting component of the proposed project. Overall construction noise would be slightly greater compared to the proposed project. However, the nearest sensitive receptors are classrooms and residences located approximately 1,000 feet and 1,300 feet from the IVC field site, respectively. Due to the attenuation of noise over distance, construction noise for this alternative would be lower at the nearest sensitive receptors compared to the proposed project. Therefore, construction-related noise impacts would be reduced in comparison to the proposed project.

The IVC fields do not currently have a PA system and a new system would be installed under this alternative. Crowd noise from attendees at athletic events would be similar compared to the proposed project. This alternative would also involve additional traffic noise associated with trips to transport San Marin High School student athletes, coaches, and support staff to IVC for practices and games. Traffic noise impacts would be increased compared to the proposed project but would be expected to remain less than significant. Due to the distance between the fields and nearby sensitive receptors (approximately 1,000 feet or greater), operational noise impacts would be reduced compared to the proposed project. A mitigation measure similar to Mitigation Measure N-2 required for the proposed project may be required for this alternative in order to reduce potential impacts associated with a new PA system. Because of the distance between the fields and the nearest sensitive receptors, operational noise levels associated with this alternative most likely would be below identified thresholds. This alternative likely would eliminate the significant and unavoidable noise impact associated with the proposed project.

f. Transportation/Traffic

This alternative would involve additional roadway traffic to transport student athletes, coaches, and support staff to IVC for games and practices. Impacts would be increased compared to the proposed project but would be expected to remain less than significant.

4.8 Environmentally Superior Alternative

Table 6 compares the physical impacts for each of the alternatives to the physical impacts of the proposed project. The No Project Alternative (Alternative 1) would be the overall environmentally superior alternative since it would avoid all project impacts. However, the No Project Alternative would not achieve the basic project objectives as stated in Section 2.0, *Project Description*.

Among the development options, Alternative 3 (Portable Lighting System) would reduce aesthetic and cultural impacts compared to the proposed project but would increase noise, air quality, and GHG impacts compared to the proposed project. Alternative 3 would not eliminate the unavoidably significant noise impact. Because this alternative would increase the project's already significant noise impact, while slightly reducing already less than significant aesthetic and cultural impacts, it would not be environmentally superior to the project.

Alternative 4 (Reduced Athletic Lighting System) would slightly reduce light and glare, air quality, and GHG impacts, but these impacts would remain less than significant. It is important to emphasize that further reducing the project's already less than significant light and glare impacts would not achieve a primary CEQA objective for alternatives: to "avoid or substantially lessen any of the significant effects of the project" (CEQA Guidelines Section 15126.6(a)), particularly inasmuch as any reductions that remained useful would be slight. As discussed in Section 2, *Aesthetics*, the project would not cause light trespass exceeding the CIE's threshold of 5 lux in the E2 zone for rural areas. Further reducing light trespass would not alter attainment of this threshold. This alternative also would not avoid the project's unavoidably significant noise impact. Because Alternative 4 would not avoid or substantially lessen a significant impact, it is not environmentally superior to the project.

Alternative 2 (Novato High School Lighting) would have similar aesthetic, air quality, and GHG impacts compared to the proposed project but would shift these impacts to Novato High School instead of San Marin High School. Alternative 2 would also increase traffic compared to the proposed project; but impacts are expected to remain less than significant. Alternative 2 would not eliminate the unavoidably significant noise impact but would shift it to Novato High School. Overall,

Alternative 2 is considered the environmentally superior alternative. However, since Alternative 2 would not involve the installation of stadium lighting at San Marin High School, it would not meet most of the basic project objectives due to the fact that demand for field time from both Novato High School and San Marin High School combined would exceed the lighted field availability.

It should be noted that Alternative 5 (COM IVC Existing Fields) would eliminate the significant and unavoidable noise impact associated with the proposed project and would be considered the environmentally superior alternative. However, as described above, this alternative would be infeasible due to the unavailability of the site for purchase or lease by the District.

Table 6 Impact Comparison of Alternatives

Issue	Proposed Project Impact Classification	Alternative 1: No Project	Alternative 2: Novato High School Lighting	Alternative 3: Portable Lighting System	Alternative 4: Reduced Athletic Lighting System	Alternative 5: COM IVC Existing Fields
Aesthetics	II	+	=	+	+/=	+
Air Quality	II	+	=	-	+/=	-
Cultural Resources	II	+	=	+	=	=
Greenhouse Gas Emissions	III	+	=	-	+/=	-
Noise	I	+	-	-	=	+
Transportation/Traffic	II	+	-	=	=	-

+ Superior to the proposed project (reduced level of impact)

- Inferior to the proposed project (increased level of impact)

= Similar level of impact to the proposed project

5 References

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5.2 List of Preparers

This EIR was prepared by Rincon Consultants, Inc., under contract to the Novato Unified School District. Consultant staff involved in the preparation of the EIR are listed below.

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Appendix A

Revised Initial Study Biological Resources Analysis

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES				
-- Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	■	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	■	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	■
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	■	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	■	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	■

a) ***LESS THAN SIGNIFICANT IMPACT***. The project site is situated in a suburban neighborhood in Novato, California within the campus of San Marin High School. The project site is bordered to south by a parking lot, to the east by a grass field, to the north by baseball fields, and to the west by the high school campus. Residential neighborhood surrounds the high school campus on the south, east, and north. To the south and west, Novato Boulevard

separates the high school campus from a riparian corridor along Novato Creek. Approximately 700 feet north of the stadium, and separated from the project site by the residential neighborhood, is open space consisting of oak/grassland vegetation community. Mature trees are present adjacent to the project site on the south and eastern sides and few scattered mature trees are present on the high school campus to the west of the project site. The closest mature trees are located over 100 feet away from the proposed locations for the main stadium light poles.

A biological resource reconnaissance-level site visit was conducted by Rincon Consultants on April 30, 2019. The reconnaissance survey was conducted to provide field verification of project-area habitat types and vegetation communities, document plants and animal species observed on-site, assess the potential for the project site to support sensitive species, and determine if the project site provides suitable nesting bird and roosting bat habitat.

The project site is completely developed with athletic field infrastructure, bare ground, and stadium seating. The fill slopes encircling the athletic field and the grassy field north of the stadium support a mix of non-native annual grasses and ruderal vegetation consisting predominantly of wild oat (*Avena fatua*), annual ryegrass (*Lolium multiflorum*), foxtail barley (*Hordeum murinum*), black mustard (*Brassica nigra*), bristly ox-tongue (*Helminthotheca echioides*) and purple star thistle (*Centaurea solstitialis*). A few individual coyote bush (*Baccharis pilularis*) and ornamental maple (*Acer* sp.) occur within the vegetated peripheries of the stadium. Mature trees occur on the school property within a few hundred feet of the athletic field and between the project site and the residential neighborhood to the east, including coast live oak (*Quercus agrifolia*), valley oak (*Quercus lobate*), pine (*Pinus* sp.), scrub oak (*Quercus sp.*), coast redwood (*Sequoia sempervirens*) and blue gum eucalyptus (*Eucalyptus globulus*). Wildlife observed during the reconnaissance survey include American crow (*Corvus brachyrhynchos*), turkey vulture (*Cathartes aura*), mourning dove (*Zenaida macroura*), cliff swallow (*Petrochelidon pyrrhonota*) and California ground squirrel (*Otospermophilus beecheyi*).

Sensitive Species

In order to determine the potential presence of sensitive species or habitat, Rincon Consultants reviewed regulatory agency databases, conducted a literature review, analyzed aerial imagery, and reviewed the construction plans. According to the California Natural Diversity Database (CNDDB 2016), there is potential for special status wildlife species to occur within a five-mile radius of the project site. Based on the reconnaissance survey, the project site does not support special status species habitat and no special status species were observed during the survey. No nesting birds or potential bat roosting habitat was observed within the project site. Potential nesting habitat is present within mature trees and shrubs located within the surrounding residential neighborhood outside of the project area. Few special status birds and bats may fly through or over the project site, but project activities will not have a significant impact on any bird or bat species such that population size is reduced to a level below being self-sustaining.

This additional discussion is based on the results of the lighting report prepared by lighting consultant James Benya in June 2019 (Appendix B to the Revised EIR), which was provided after publication of the Draft EIR. Light impacts can be analyzed by quantifying illuminance from the spillover of light, or "light trespass." Light trespass is measured on both the vertical

plane (e.g., light shining through a window) and the horizontal plane (e.g., light falling on a bed), in terms of lux or foot-candles (more detailed definitions can be found in Section 2, *Aesthetics,* of the EIR). The lighting report found that illuminance at residential property lines adjacent to the stadium site was no greater than 2.75 lux, which is consistent with lighting levels in sparsely populated rural areas. As discussed in Section 2, *Aesthetics*, this level of light trespass beyond the stadium site would not exceed the International Commission on Illumination's (CIE) allowed maximum of 5 lux in rural areas.

Special Status and Other Bat Species. Native bats species that have not been identified as threatened or endangered may be present in the project area. Seven bat species that could potentially occur around the project site are considered California species of special concern (CSSC) either due to lacking information or because of suspected decline of the species range in California. These species (global and state ranking and CDFW special status included in parenthesis) include: the pallid bat (G5 S3; Class II), Townsend's big-eared bat (G3G4 S2; Class I), western red bat (G5 S3; Class II), fringed myotis (G4 S3; Class II), long-legged myotis (G5 S3; Class II), western mastiff bat (G5T4 S3S4; Class II), and big free-tailed bat (G5 S3; Class II). Two additional species are placed on the Watch List (WL) because of restricted distribution and the need for additional field efforts to establish population trends. These two species include: the silver-haired bat (G5 S3S4) and the hoary bat (G5 S4). The CDFW lists the primary reasons for bat decline as closures, human disturbance, and direct extermination thought "pest control" measures at colony rooting sites (Bolster 1998). Additionally, unsustainable management practices of public and private forest lands for cavity-dwelling species, and farming practices such as removal of riparian forests and use of insecticides are notes as causes of bat declines. No evidence currently exists that would suggest the installation of the stadium lights would have a significant impact on bat populations.

Studies that have shown effects on species biology as a result of artificial light are generally related to long periods of lighting, for example streets and other city lights that are on all night (Rowse et al. 2016). The few hours each night that stadium lights would be on may have some effect on bat foraging behavior, but not to the level of a negative impact on the population. On the contrary, evidence exists that while not natural behavior, bat foraging around lights may have a positive effect by increasing foraging efficiency, especially for insectivorous species that hunt in open spaces above canopy or along vegetation edges (Rowse et al. 2016 and references therein). Many Myotis species have been found to simply avoid lit areas, seemingly preferring to forage in darkness. The open space to the north of the project site and along the riparian corridor associated with Novato Creek provides ample dark foraging opportunities.

Native bats use roosting habitats such as trees, bridges, and abandoned buildings. However, the proposed project plans do not include the removal of any nearby trees, and no other suitable habitat in proximity to the project site would be impacted. Furthermore, higher quality foraging and roosting habitat is located one quarter-mile south at Novato Creek, making it less likely that any bats would frequent the proposed project area. Bats that are roosting around the project site could generally be considered habituated to human activities and are unlikely to be disturbed by any increased activities associated with the stadium lighting. Bats have been shown to be very resilient to urbanization and urban activities and in some cases have been found to be more diverse and abundant in association with urban landscapes (Jung and Threlfall 2016).

It is possible that bats may forage around the lights during the brief periods lights are on. However, little to no evidence exists that bats would be specifically attracted to the lights (Evans Ogden, 1996) and the lack of light trespass beyond 100 feet from the stadium further reduces the likelihood that bats would be attracted to the lights. The brief period of illumination combined with the distance from any suitable bat roosting areas and lack of light trespass makes it unlikely for lighting to have a negative impact on bat behavior. As discussed in the introductory section to this Initial Study under *Description of Project – Project Components*, project activities would take place during the months of September through January. Since construction would occur early in general mating season for native bats, it would not impact maternity roosting colonies. Based on available information, no evidence exists that the project would negatively impacts bat behavior. Potential impacts to incidental foraging bats would be less than significant.

Nesting or Migratory Birds

Nesting birds and raptors are protected by the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (CFGC). Common avian species that have adapted to urban and suburban environments, such as sparrows, finches, American crows, and barn owls, are present in the project area.

Construction. The nesting season in the area generally extends from February through August. As discussed in the introductory sections to this Initial Study under *Description of Project – Project Components*, project activities would take place during the months of September through January. Therefore, construction during this period would avoid the potential for impacts to nesting birds. In addition, construction of the project would occur within previously disturbed areas adjacent to the sports stadium and parking area on the San Marin High School campus. Work would occur on previously paved areas or areas that are landscaped with non-native vegetation, including non-native lawn grass. No activity would occur on previously undisturbed ground. Disturbed vegetation (consisting primarily of lawn) above trenches and bore pits would be restored to pre-construction conditions following installation of the electrical conduits. No tree removal or trimming is proposed as part of this project. Therefore, no impacts during construction would occur.

Operation. Once constructed, poles would be a maximum of 80 feet (24.3 meters) tall. Given the small surface area of their vertical and horizontal structure, poles would not have a significant impact on bird flight, including during migration.

Nighttime events at the stadium requiring lighting would occur approximately 152 or fewer times per year, with the majority of the light use occurring between October and May. Lighting would occur for approximately two hours per evening during week days (6 to 8 PM) to 3.75 hours during 15 or fewer Friday evenings (6 to 9:45 PM). Therefore, stadium light would be on for only short periods consisting of two to four hours a night for up to four months. There have been some cases where lighting has been shown to impact bird species; however, this has typically occurred where light is otherwise scarce, such as on offshore oil platforms (Huppop et al., 2015) and in forests (The Nature Conservancy, 2015). There is no evidence that shows birds are attracted to urban lights (Evans Ogden 1996). Since lighting would occur during short durations and little light trespass would occur, stadium lights are unlikely to result in birds becoming trapped within the light zone, known as the "trapping effect" (Evans Ogden 1996),

especially on diurnal (daytime active) birds (Outen 2002). In addition, lighting events would mostly occur during August through December which falls outside the usual nesting bird season. Therefore, lighting is optimally planned to have little to no impact on nesting birds (Gason et al. 2012).

Three owl boxes have been installed around the margin of the high school campus to the north and west, the nearest of which is approximately 700 feet from the project site, which is beyond the standard agency-required buffer distance of 500 feet between active raptor nests and active project construction activities. These owl boxes would most likely be occupied by barn owls given the size and location of the owl boxes. Barn owls adapted to urbanized landscapes (as would be expected for existing resident barn owls) would already be tolerant of, and acclimated to, the current level of human activities from the existing athletic field and surrounding residences. The addition of lights and sporting activities carry on for up to 3.75 hours after sunset would have no additional impact on nesting owls above that already occurring during day-time. Natural prey availability for owls, such as native small rodents, is unlikely to occur in the athletic field area and owls are more likely to forage in open space to the north of the project site and along the riparian corridor to the west and south. Potential impacts to barn owls would be less than significant. Overall impacts to nesting and migratory birds would be less than significant. Based on the project parameters discussed above, ~~I~~impacts associated with adverse effects on candidate, sensitive, or special-status species would be less than significant and further analysis of this issue in an EIR is not warranted.

b) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would occur within previously disturbed areas on the San Marin High School campus. Ground disturbance during construction of the proposed project would be limited. Excavation would be required for the installation of pole foundations, and limited trenching and boring would be required for the installation of new electrical connections. This ground disturbance would occur on previously disturbed areas within and near the existing stadium. The nearest riparian area to the stadium is located approximately one-quarter mile to the south and southwest at Novato Creek in O'Hair Park. Although light pollution can adversely affect wildlife in riparian areas, the proposed light fixtures would be narrowly focused on the stadium and downcast. Given that light trespass would not exceed 2.75 lux at residential property lines approximately 125 feet from light poles on the stadium site, light trespass at the greater distance of Novato Creek (about one-quarter mile) would be negligible. The lighting design for the project follows standard recommendations from The Nature Conservancy regarding downward facing design and reduced period when lights are on (The Nature Conservancy 2015, https://www.nature.org). Therefore, construction and operation of the project would not have a substantial adverse effect on riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulation, or by state or federal agencies. The impact on riparian habitat and sensitive natural communities would be less than significant, and further analysis of this issue in an EIR is not warranted.

c) ***NO IMPACT***. As described above, ground disturbance associated with construction of the project would occur on previously disturbed areas within and near the existing stadium. As shown on the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are no federally protected wetlands on or adjacent to the stadium (USFWS, 2016). The nearest mapped wetland area is an intermittent stream that runs immediately north of the San Marin High School tennis courts, located approximately 600 feet southwest of the stadium. Limited ground

disturbance within the stadium would not adversely affect this wetland area. Implementation of the project would not result in adverse effects on wetlands and further analysis of this issue in an EIR is not warranted.

d) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would involve the installation of free-standing poles to support new lighting and upgraded public address systems and underground electrical conduits to supply electricity to those systems, all within the existing stadium. No fences, walls, or other linear obstructions to wildlife movement would be constructed. No streams would be affected.

Trees near the project site and those in the riparian vegetation to the northwest may provide nesting opportunities for birds. However, as discussed in detail under subsection (a), no disturbance to birds nesting behavior would occur. Light disturbance levels at nearby trees that could support nesting would be low relative to ambient levels associated with the residential neighborhood and would be short-term in daily duration. Birds that may nest in the trees near the stadium (approximately 100 feet away from the main stadium light pole locations at the nearest) would likely be habituated to human activity and would not likely be disturbed by the increased activity level and lighting resulting from the project.

Implementation of the project would increase the frequency and intensity of evening and nighttime lighting at the stadium. Many migratory birds use the stars to orient themselves during the spring and fall migratory season (generally April through May and September through November). In overcast conditions or heavy fog, they can become disoriented and attracted to any elevated light source. The birds would fly around the light source rather than continuing to migrate and may excessively use up fat stores. However, as discussed in Section 2, *Aesthetics*, the proposed modern lighting system would be designed to minimize glare and fugitive light, and it would not substantially contribute to existing sky glow in the area. The timing of lighting would also limit effects on migratory birds. While nighttime bird migration begins about one hour after sunset and continues until about 2:00 AM, peak activity generally occurs after 10:00 PM (Pettingill, 1985). Lighting would generally not occur after 10:00 PM and would occur that late nine or fewer times a year. Lighting would not have a significant impact on bird migratory behavior.

The project site lies within the general area known as the "Pacific Flyway," an area that extends across the width of California, though most migration occurs along the immediate coast and offshore and through the inland Sacramento and San Joaquin Valleys. The number of birds present at any one portion of the flyway at a particular time is dependent on a wide variety of conditions, including current weather patterns and the amount of available food resources as the birds need to "re-fuel" during daytime hours to continue their migration.

The project is not expected to "interfere substantially with the movement of any native resident or migratory fish or wildlife species" for multiple reasons. First, migratory bird kills as a result of athletic field lighting at O.co Coliseum in Oakland, Candlestick Park, AT&T Park and other athletic fields in the Bay Area have not been reported. Second, because the project site is within a suburban area, available food resources for migratory species and most wildlife species are lacking on-site and large numbers of migratory birds do not occur at the project site or in the immediate vicinity. Third, current night lighting conditions for the area show bright light sources already present in the suburban area of Novato (NASA, International Space Station,

2013). Fourth, the proposed lights would be turned off before the peak time period of migratory activity (after 10:00 PM). Impacts related to substantial interference with the movement of any native or migratory fish or wildlife species or their established movement corridors would be less than significant, and further analysis of this issue in an EIR is not warranted.

e) ***LESS THAN SIGNIFICANT IMPACT***. Construction of the project would not result in impacts to environmentally sensitive biological resources. Vegetation removal would be limited to the areas above trenching sites bore pits for conduit installation. This vegetation would typically consist of non-native lawn grass. Any vegetation that is disturbed during conduit installation would be restored to pre-construction conditions after completion of the installation. Therefore, implementation of the project would not conflict with local policies or ordinances targeting these resources. No tree removal is proposed, so tree preservation ordinances or policies would not apply. This impact would be less than significant and no further analysis in an EIR is warranted.

f) ***NO IMPACT***. The project would not occur within the area of an adopted Habitat Conservation Plan or Natural Community Conservation Plan (CDFW, 2015). No other approved local, regional, or state habitat conservation plans have been identified on any of the project site. No further analysis of this issue in an EIR is warranted.

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Appendix B

Lighting Report

Sports Lighting CEQA Report

New Football Field Lighting at San Marin High School

Novato, CA
June 15, 2019

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Abstract

In 2015, the Novato Unified School District ("NUSD") undertook to install LED sports lighting for the San Marin High School ("SMHS") stadium. An Environmental Impact Report filed in May 2017 ("EIR") demonstrating compliance with the California Environmental Quality Act ("CEQA") was developed by Rincon Consultants for and approved by NUSD. It listed Potential Aesthetic Impacts that might be caused by new lighting, all of which were deemed less than significant when mitigated as described in the EIR.

To demonstrate compliance with the EIR, field measurements of the lighting impact on the field, adjacent hillsides and residences were taken on the evening of May 6, 2019 by James Benya, PE, Principal of Benya Burnett Consultancy, Davis, CA, who was retained by Rincon Consultants. Field measurements confirmed compliance with the EIR by meeting light level requirements for lighting zone E3 of (a) less than 2.0 footcandles at the SMHS property line per AES-3 of the EIR and (b) less than 10,000 cd of illumination at the SMHS property line per AES-4 of the EIR. In fact, lighting measurements showed compliance with the stricter requirements of lighting zone E2. Although not part of the EIR, light levels on the football field proper are designed and measured to be about 400 lux, average, which is slightly less than IES Class II and slightly more than IES Class III, which is appropriate for the location and size of the stadium seating.

Introduction

According to the Novato Unified School District ("NUSD") website, the project to install lights and other stadium improvements (the "Project") at the San Marin High School ("SMHS") began in 2015. Following normal procedures for such projects, NUSD retained consultants to prepare the design and to produce the Environmental Impact Report required by the California Environmental Quality Act ("CEQA"). The current Environmental Impact Report ("EIR") was produced in May 2017 for review by the NUSD and the public. It established lighting criteria using an international anti-light pollution standard, CIE:150, that addresses light trespass and glare.

It is my understanding that this report was commissioned to assess and confirm the lighting performance relative to the EIR criteria and directly related considerations.

Issues

I reviewed the May, 2017 EIR and responses to comments concerning it to become more acquainted with the findings and recommendations upon which the project was based. The principal lighting issues appear to be:

- Whether the project's criteria for its impact should be based on lighting zone E2 or E3 as defined by CIE:150, an international standard for controlling light pollution;
- Because the lighting is now installed and its performance measured, the extent to which the photometric reports are germane to the approval process at this time;
- Whether the stadium lighting could be reduced as a mitigating measure.

Lighting Zones

NUSD and its design and environmental consulting team chose to employ an international lighting environmental standard developed by the Commission Internationale de l´Eclairage (CIE) that establishes criteria to limit light trespass and glare. The Standard, CIE:150[1], employs a lighting zone system based on ambient light in the general area. For example, in a nature preserve a candle can be seen for a mile, but in downtown San Francisco it is lost into the haze of thousands of light sources. Lighting zone E1 is the nature preserve and E4 is the city, with E2 and E3 being steps in between. Zone E2 is described as "sparsely populated rural areas" and zone E3 is described as "well inhabited rural and urban settlements". Choice of lighting zone requires some professional judgement and further information such as population density.

Light Trespass (EIR AS-3)

Light trespass occurs when lighting systems illuminating one site (the sports field) also illuminate adjacent sites, such as neighboring private property. The metric used by CIE:150 is to restrict measured illuminance in the vertical plane at the property boundary at 5' above grade. The allowed maximum is 10 lux[2] in zone E3 and 5 lux in zone E2, which are by convention the same as 1 footcandle in zone E3 and 0.5 footcandle in zone E2. For my work, I use a field meter calibrated in lux and used that to evaluate the lighting.

Glare (EIR AS-4)

Glare is a sensation based on a combination of light source luminance, the luminance of the background, the size of the light source, the area of the background, the position of the light source in the field of view, the spectrum of the light source, and other factors. It can also be affected by the viewer's unique sensitivities, physiology, correction (glasses), age, and especially, the viewer's adaptation. Being this complex, there is no such thing as a "glare" meter. It is essentially impossible to measure glare except under laboratory conditions and, even then, because the perception of glare is so subjective, no practical standard exists to characterize field measurements.

In CIE:150, the intensity (candlepower) of a light source is used as a surrogate measurement of glare. The EIR established a maximum off-site intensity taken from CIE:150 of 10,000 candela (cd) aimed in the direction(s) of the viewer. Sports luminaires focus most of their light onto the sports field and excessive off-site glare is usually the result of a luminaire that is mis-aimed towards the property line.

There is currently not a practical field instrument capable of measuring candlepower at a distance. However, using the distance squared law, it is practical to use same measurements made for light trespass to identify glare problems. I determined that perpendicular plane illuminance at the property line of 5 lux would indicate a possible glare problem requiring additional study.

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[1] CIE 15:2017 is the most recent version of the standard. The values differ slightly from those used in the EIR in that they are stricter and are therefore used in my analysis.

[2] Lux is the metric measurement of light levels. It is equal to lumens per square meter whereas foot-candles is equal to lumens per square foot. Technically, 1 foot-candle is equal to 10.76 lux, but for general convenience, the ratio is simplified to 10 lux=1 footcandle.

Appropriate Amount of Light on the Field

Although not addressed in the EIR, it is reasonable to question whether the amount of lighting is appropriate and whether reduced lighting could be an additional potential mitigation measure. The reference standard for North America is IES Recommended Practice RP-6-15, Sports and Recreational Area Lighting ("RP-6"). For football stadiums of up to 2,000 spectators, RP-6 recommends 300 lux (30 footcandles) of average illumination and for stadiums up to 5,000 spectators, it recommends 500 lux (50 footcandles).

Field Measurements

General

Prior to proceeding with measurements, I surveyed the perimeter of the entire site. Residential properties to the northwest and west were unaffected by the sports lighting largely because the baseball field and tree line provided an excellent buffer, and the school and topography mitigates stray light in the southwest and south directions. My measurements were made using a Minolta T-1 field illuminance meter that was laboratory calibrated in October 2017. The meter was mounted in the vertical plane to a tripod set at 5'-0" (1.5 meters) above grade.

Light Trespass Measurements

From my review of site plans and discussions with NUSD officials, I determined that the necessary lighting measurements would be made along two lines, one reasonably parallel to the northeast property line, and one southeast of the stadium along the west side of the San Marin Drive median. Each would represent a worst case for the most affected residential properties. The northeast property line was the more difficult, being 15' to 20' higher at the property line than field level and uneven ground. The southeast measurements were on more-or-less flat land at or near the field level. In both cases, locations were chosen where the land was sufficiently flat for the tripod to be level and measurements not affected by trees or overhanging branches. The measurement points and readings are presented in the following Google Earth photograph and Table A. All measurements were less than 5 lux, and therefore the installed lighting complies with the maximum light trespass limits for both Lighting Zones E2 (5 lux) and E3 (10 lux).

Glare Measurements

Since all my light trespass measurements were less than 3 lux, based on the distance squared law referenced above, I determined that there was no reasonable chance that glare at the property line met or exceeded the maximum threshold of 10,000 cd according to CIE:150.

Sports Field Illumination

The SMHS stadium has a bleacher capacity of 2,400 persons with standing room around the field for an additional approximately 1,600 persons. The photometric calculations supplied by the lighting system manufacturer indicated that the lighting was designed to provide 400 lux (40 footcandles) average on the field for football or soccer. To confirm the outcome, I did not take a full set of readings of the sports field lighting, but I took a center-of-the-field measurement of 441 lux (41 footcandles), horizontal at grade. For the lighting on the field, in my opinion the lighting system performs essentially as calculated and the amount of light is consistent with RP-6.


Measurement points
Ev @ 5'-0" above grade
Facing perpendicular to
field boundary
1
2
3
4
5
6
7
8
9
11
12
13
14
15
16
Alder Pl
Spruce Pl
Cottonwood Pl
Cottonwood Pl
Aspen Dr
San Marin Dr
San Marin Dr
San Marin Dr
San Felipe Way
Sign in
3D
Google
Imagery ©2019 Google, Map data ©2019 Google United States Terms Send feedback 100 ft

TABLE A – VERTICAL PLANE MEASUREMENTS AT 5' ABOVE ADJACENT GRADE ALONG AXIS TO FIELD CENTERLINE

Approximate distance including elevation 125' to nearest light pole

Point	Location Note	E_v, Lux	Criterion, Lux (1 foot-candle = 10.76 lux) E3 and E2	Comment
NORTHEAST PROPERTY LINE				
1	About 5' from fence	2.36	E3 =10 E2 = 5	Resident was taking photos from property line
2	About 8' from fence/bush	2.17		
3	About 10' from fence/tree and bush	2.10		
4	About 15' from fence/bushes	2.63		Lost pen due to terrain
5	About 20' from fence/bushes	2.34		
6	About 20' from fence/flat, open	2.44		
7	About 20' from fence/flat, open	2.29		
8	About 20' from fence/flat, open	2.75		
9	About 10' from fence sloping toward house	1.62		
SOUTHEAST PROPERTY LINE				
11	At curb facing stadium	0.54	E3 =10 E2 = 5	
12	At curb facing stadium	1.10		
13	At curb facing stadium	1.19		
14	At curb facing stadium	1.69		
15	At curb facing stadium	1.63		
16	At curb facing stadium	0.85		

To confirm light levels on the field, I took one sample measurement of light levels on the field at midfield and the reading was 441 lux (41 footcandles), effectively the same as predicted by the manufacturer.

Summary of Measurements and Observations

AES-3 (Light Trespass) Compliance

The installed lighting meets the more restrictive E2 limits as well as the limits for E3 used by the EIR. No single measurement exceeded 3 lux, with the maximum allowable under E2 being 5 lux.

AES-4 Compliance

The installed lighting does not create substantial glare impinging on off-site viewers that reaches or exceeds the maximum candlepower of 10,000 cd per CIE:150.

Notes About Photometric Analyses developed by Manufacturer (Musco)

Photometrics supplied by the manufacturer are predictions of light levels produced by the sports lighting system exclusively. Once installed, the actual performance of the lighting is what matters and is the subject of this report. The Manufacturer's photometrics, attached as an appendix, differ slighting from reality and this is not unusual as the field readings can also include light from buildings, streetlights, and other local and stray light sources. I feel there is no significance in the differences between measurements and predictions since the installed lighting complies with the strict requirements of the E2 lighting zone.

Notes About Sky Glow

Anthropogenic sky glow is caused by all outdoor lighting, including streetlights, retail centers, car dealerships, and other commonly occurring outdoor lighting. In communities near the California coast, there are two types of sky glow: that caused by low clouds (the "marine layer") and that caused by uplight on clear nights (clear sky glow). The former is localized and on a cloudy night the stray uplight from a town or small city can cause a distinctive glow above it. The latter is the accumulation of the upward light from the entire Bay Area metropolitan area and is affected by all the lighting within a radius of 100 miles or more from the viewer's location.

Low cloud sky glow varies considerably depending on the time of year, the altitude of the clouds, the cloud density and reflectivity, temperature and other factors. The primary causes tend to be downtown districts, regional malls, auto malls, and major freeway commercial corridors. Glow is caused by all the upward light from all the community, and not from just one neighborhood or cause. Based on my experience, marine layer sky glow levels throughout other areas of California having similar proximity to the ocean and population density measure between 0.010 and 0.020 footcandles. A marine layer was present on the night of measurements. There was no distinctive relationship of the sky glow to the stadium – the sky glow persisted over a much larger area, and I was able to measure 0.016 footcandles of sky glow illumination in an area near SMHS that the stadium lights could not directly illuminate. In my opinion the contribution of the stadium lighting to the sky glow I observed did not significantly increase the sky glow compared to the community's contribution without the stadium lighting.

Clear sky glow is measured using the Bortle Scale, a system of ranking the light pollution caused by communities throughout the world as well as identifying "dark sky" areas with little or no sky glow. The

entirety of Marin County is Bortle Class 5, which means a moderate amount of anthropogenic sky glow. The stadium lighting creates far too little uplight to affect the clear sky glow of Marin County.

Conclusion

The lighting for the SMHS Stadium meets and betters the applicable light impact standards set for lighting zone E2 as set by CIE:150-2017, which in my professional opinion demonstrates that the impact of the sports lighting is less than significant as claimed by NUSD and their consultants.

Submitted June 15, 2019

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Appendix: Musco Calculations *[these are contained in Appendix C to the EIR]*

Appendix C

Photometric Studies

San Marin High School Football

Novato,CA

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
F1	90'	90'	5	TLC-LED-1150	5.75 kW	A
F2	80'	14'	2	TLC-BT-575	1.15 kW	A
		80'	4	TLC-LED-1150	4.60 kW	A
		52'	1	TLC-LED-600	0.58 kW	B
F3	80'	12'	2	TLC-BT-575	1.15 kW	A
		80'	4	TLC-LED-1150	4.60 kW	A
		47'	1	TLC-LED-600	0.58 kW	B
F4	80'	80'	6	TLC-LED-1150	6.90 kW	A
F5	90'	90'	6	TLC-LED-1150	6.90 kW	A
		64'	1	TLC-LED-600	0.58 kW	B
F6	90'	34'	2	TLC-BT-575	1.15 kW	A
		90'	4	TLC-LED-1150	4.60 kW	A
F7	90'	36'	2	TLC-BT-575	1.15 kW	A
		90'	4	TLC-LED-1150	4.60 kW	A
F8	90'	90'	5	TLC-LED-1150	5.75 kW	A
		64'	1	TLC-LED-600	0.58 kW	B
8			***50***		***50.62 kW***	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Field Lights	48.3 kW	46
B	Bleacher	2.32 kW	4

Fixture Type Summary

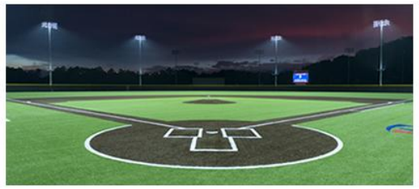
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>63,500	>63,500	>63,500	8
TLC-LED-1150	LED 5700K - 75 CRI	1150W	121,000	>63,500	>63,500	>63,500	38
TLC-LED-600	LED 5700K - 75 CRI	580W	65,600	>63,500	>63,500	>63,500	4

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
East Res Prop Line	Horizontal	0	0	0	0.00		A,B	50
East Res Prop Line	Max Candela (by Fixture)	17.9	0	204	0.00		A,B	50
East Res Prop Line	Max Vertical Illuminance Metric	0	0	0	0.00		A,B	50
Football	Horizontal Illuminance	40.7	33.2	47.3	1.43	1.22	A	46
Home Bleachers - Egress	Horizontal	11.5	2.90	23.9	8.25	3.96	B	4
Home Bleachers	Horizontal	12	2.60	22.4	8.47	4.63	A	46
Home Safe Dispersal Area	Horizontal	12.2	1.49	28	18.76	8.14	B	4
North Res Prop Line	Horizontal	0	0	0	0.00		A,B	50
North Res Prop Line	Max Candela (by Fixture)	61.2	0	266	0.00		A,B	50
North Res Prop Line	Max Vertical Illuminance Metric	0	0	0.01	0.00		A,B	50
Soccer	Horizontal Illuminance	40.2	32.2	47.9	1.49	1.25	A	46
Track	Horizontal Illuminance	18.4	1.90	38	20.28	9.69	A	46
Visitor Bleachers - Egress	Horizontal	3.54	0.90	8.60	9.72	3.93	B	4
Visitor Bleachers	Horizontal	13.4	1.20	28.3	23.15	11.14	A	46
Visitor Safe Dispersal Area	Horizontal	6.91	1.20	11.1	9.41	5.76	B	4

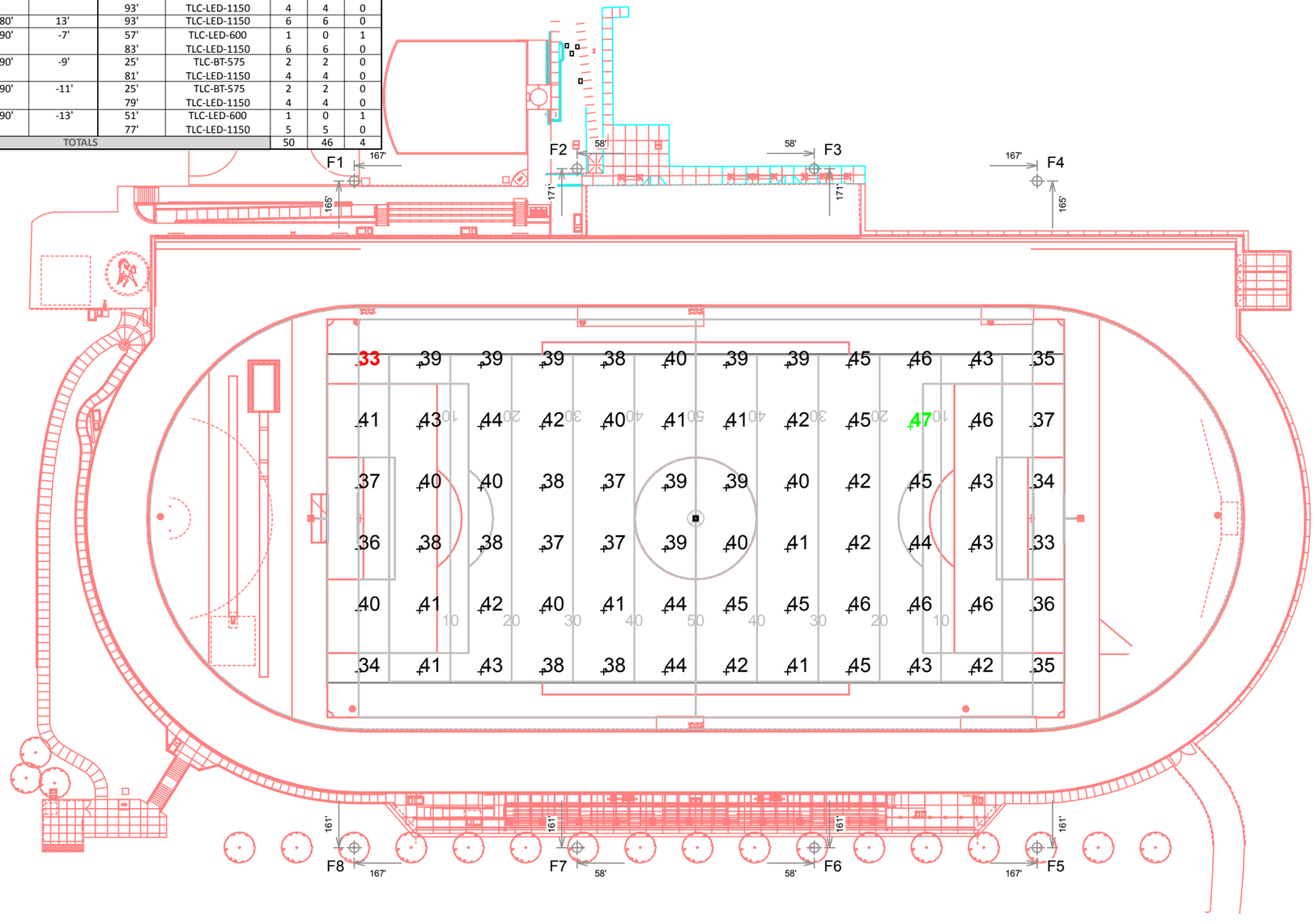
From Hometown to Professional



We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

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San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Football**
Size:	360' x 160'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**40**
Scan Average:	40.66
Maximum:	47.3
Minimum:	33.2
Avg / Min:	1.23
Guaranteed Max / Min:	**2**
Max / Min:	1.43
UG (adjacent pts):	1.28
CU:	0.54
No. of Points:	72

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

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

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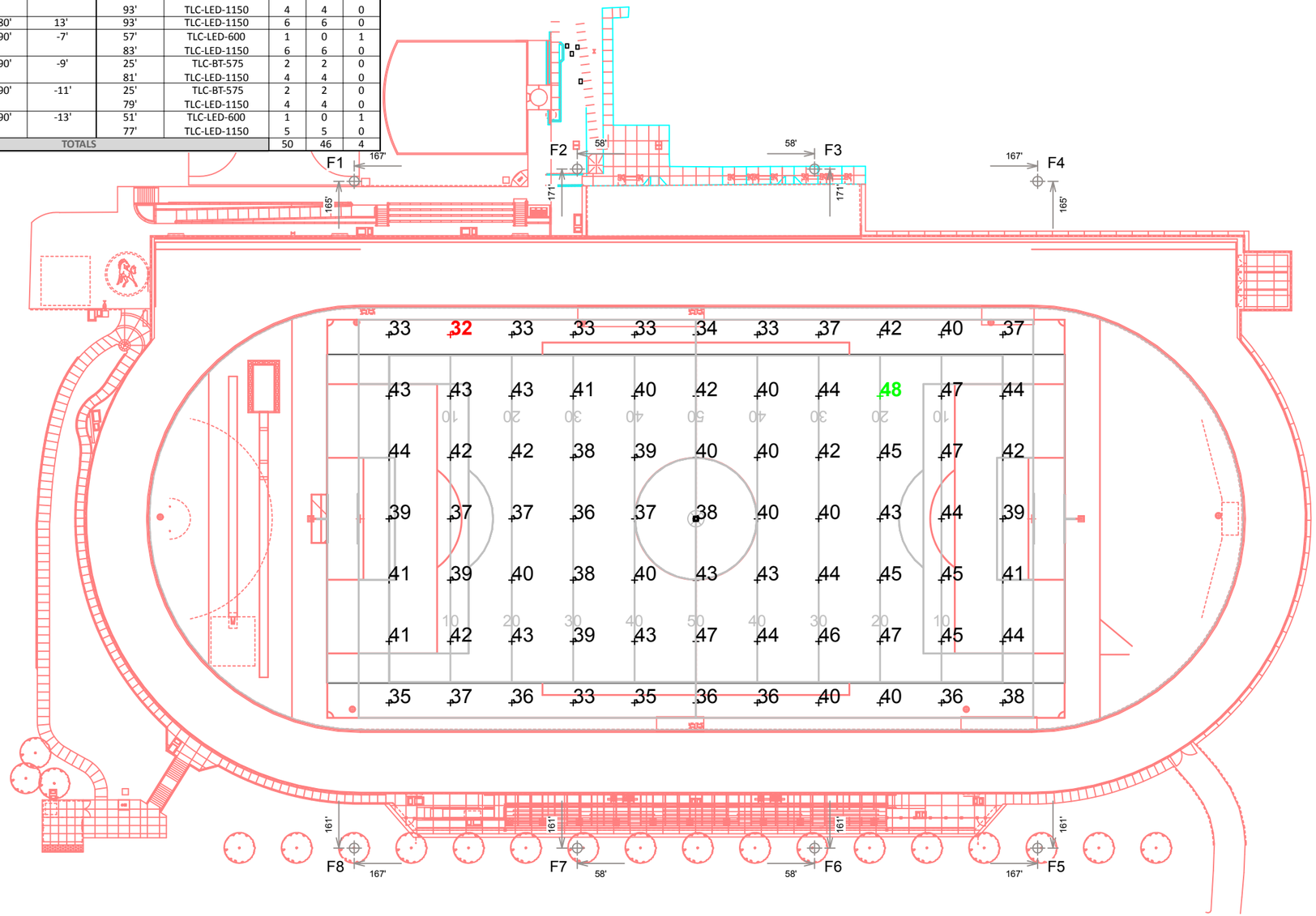
San Marin High School Football

Novato,CA

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

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

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GRID SUMMARY

Name:	**Soccer**
Size:	330' x 195'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**40**
Scan Average:	40.19
Maximum:	47.9
Minimum:	32.2
Avg / Min:	1.25
Guaranteed Max / Min:	**2**
Max / Min:	1.49
UG (adjacent pts):	1.35
CU:	0.57
No. of Points:	77

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

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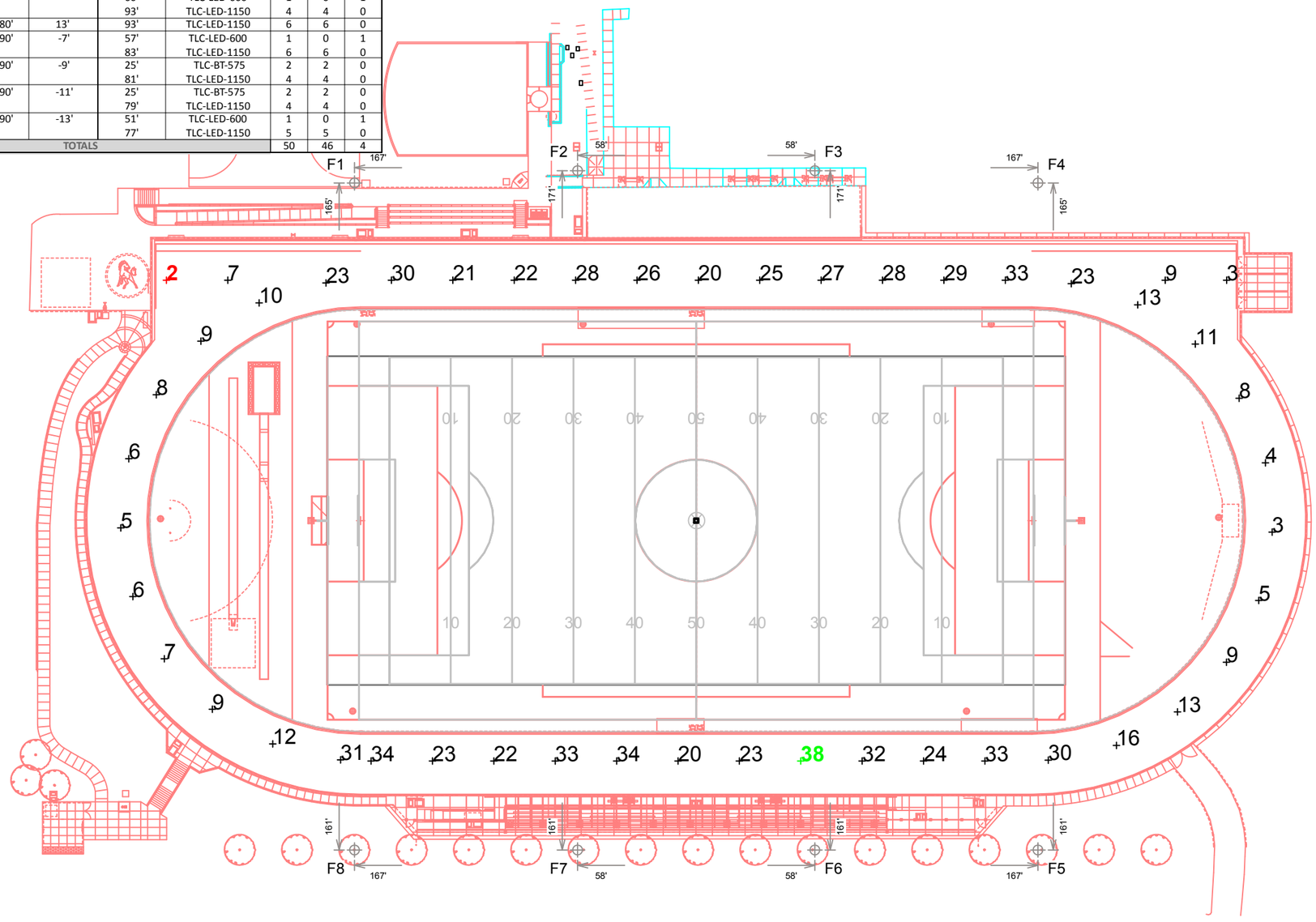
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



SCALE IN FEET 1 : 60

0' 60' 120'

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Track**
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**18.41**
Maximum:	38.0
Minimum:	1.9
Avg / Min:	9.83
Max / Min:	**20.28**
UG (adjacent pts):	0.00
CU:	0.16
No. of Points:	48

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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

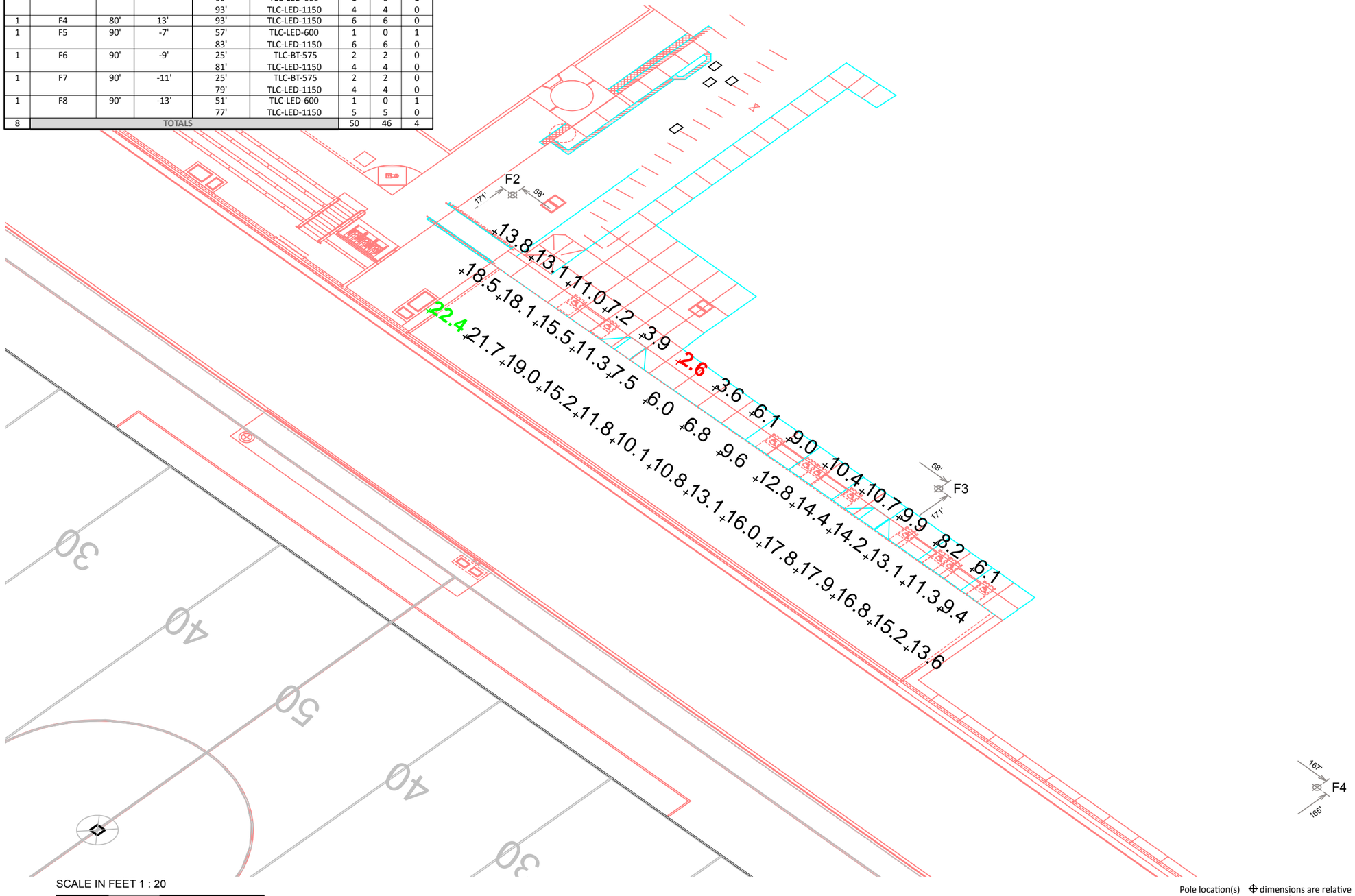
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



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

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Bleachers**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**12.04**
Maximum:	22.4
Minimum:	2.6
Avg / Min:	4.56
Max / Min:	**8.47**
UG (adjacent pts):	2.26
CU:	0.01
No. of Points:	42

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

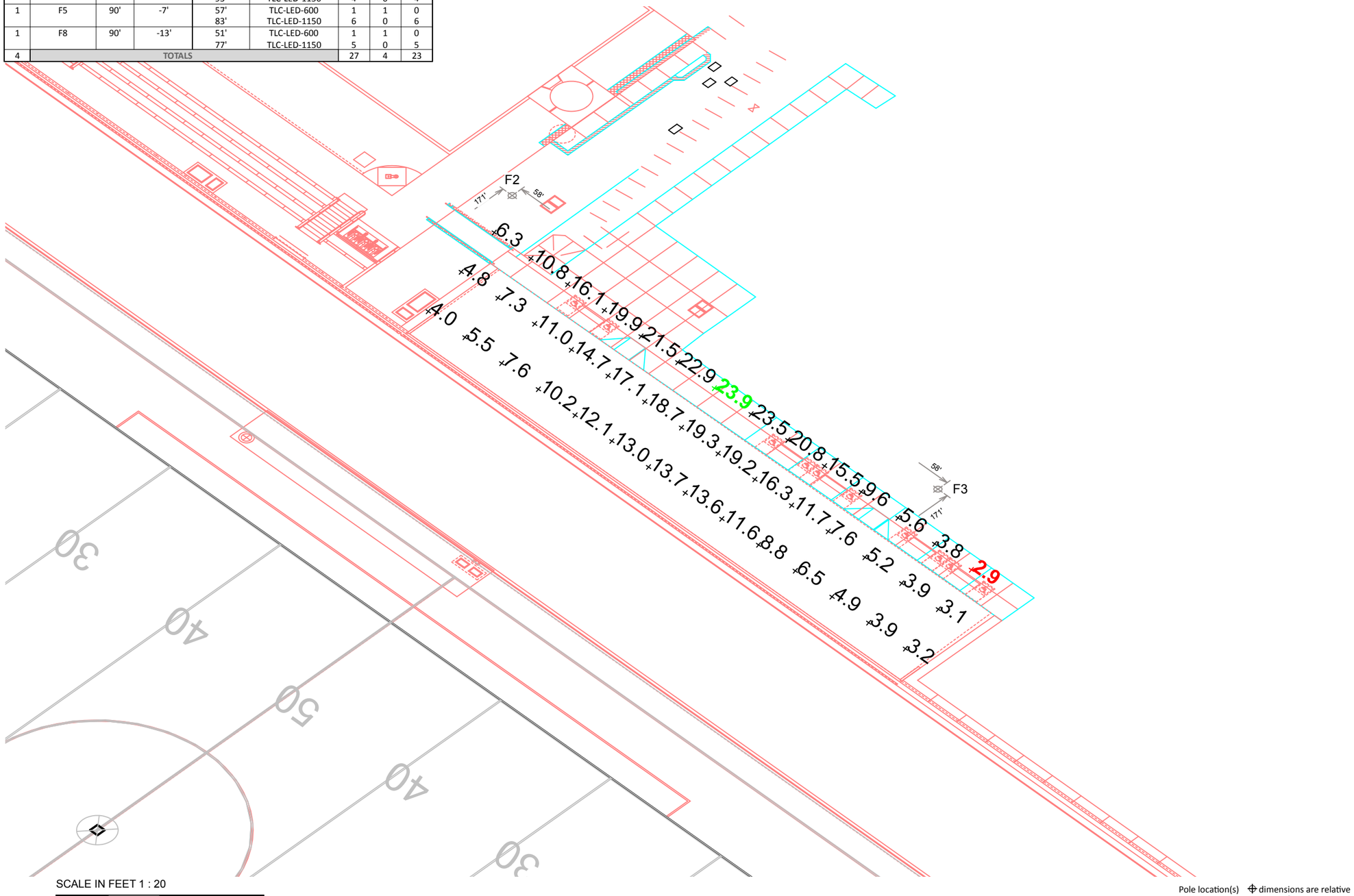
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

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

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4	TOTALS					27	4	23



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

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Bleachers - Egress**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**11.47**
Maximum:	23.9
Minimum:	2.9
Avg / Min:	3.95
Max / Min:	**8.25**
UG (adjacent pts):	1.71
CU:	0.14
No. of Points:	42

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

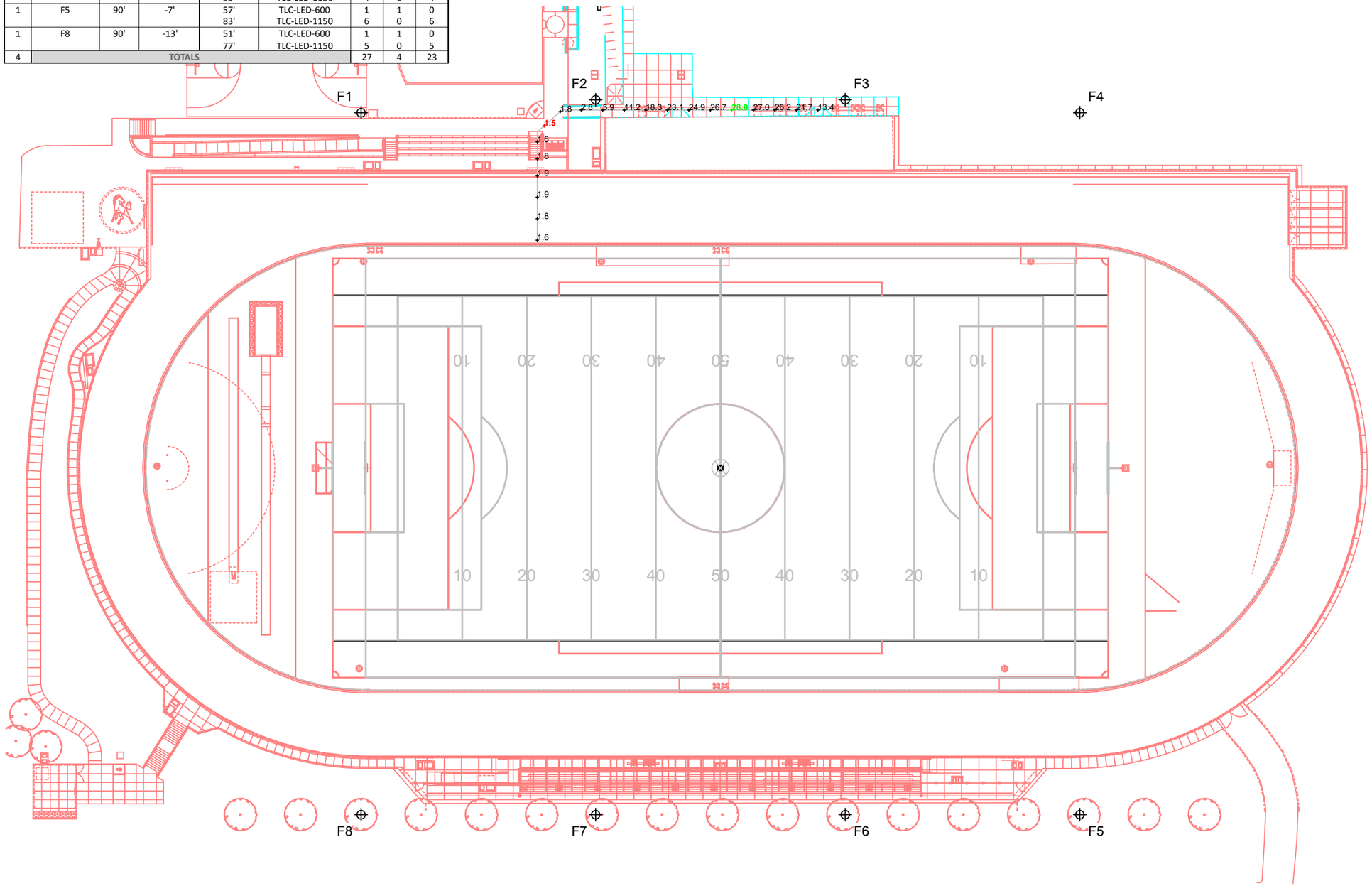
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

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

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4	TOTALS					27	4	23



SCALE IN FEET 1 : 50

0' 50' 100'

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

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Home Safe Dispersal Area**
Spacing:	10.0'
Height:	3' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**12.1594**
Maximum:	28.028
Minimum:	1.494
No. of Points:	20

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

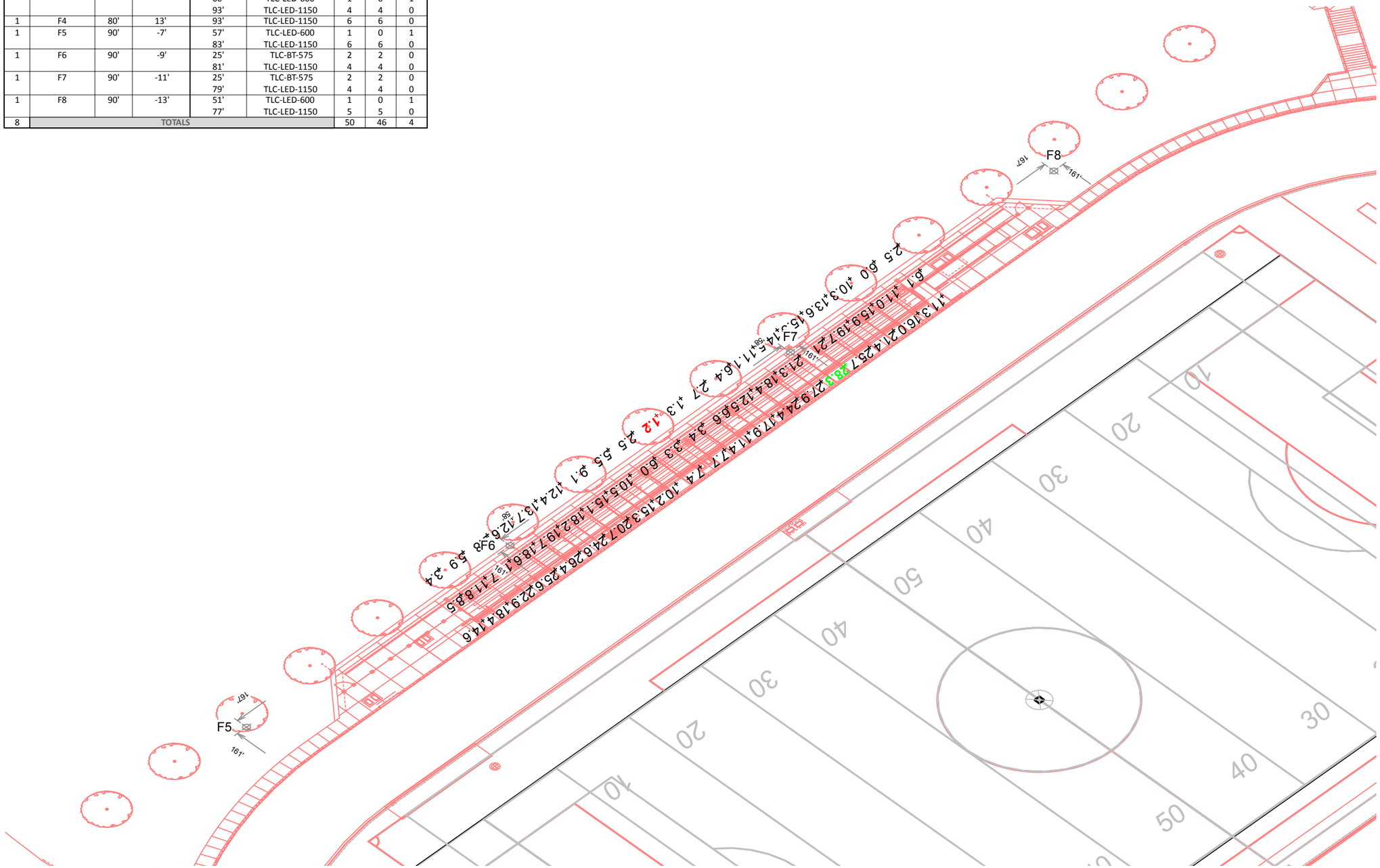
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

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

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	0	1
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	0	1
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	0	1
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	0	1
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	46	4



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

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Visitor Bleachers**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**13.37**
Maximum:	28.3
Minimum:	1.2
Avg / Min:	10.95
Max / Min:	**23.15**
UG (adjacent pts):	2.73
CU:	0.01
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 lumens
No. of Luminaires:	**46**
Total Load:	48.3 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

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San Marin High School Football

Novato,CA

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4	TOTALS					27	4	23

SCALE IN FEET 1 : 30

0' 30' 60'

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

GRID SUMMARY

Name:	**Visitor Bleachers - Egress**
Spacing:	10.0' x 10.0'

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**3.54**
Maximum:	8.6
Minimum:	0.9
Avg / Min:	4.00
Max / Min:	**9.72**
UG (adjacent pts):	1.55
CU:	0.07
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

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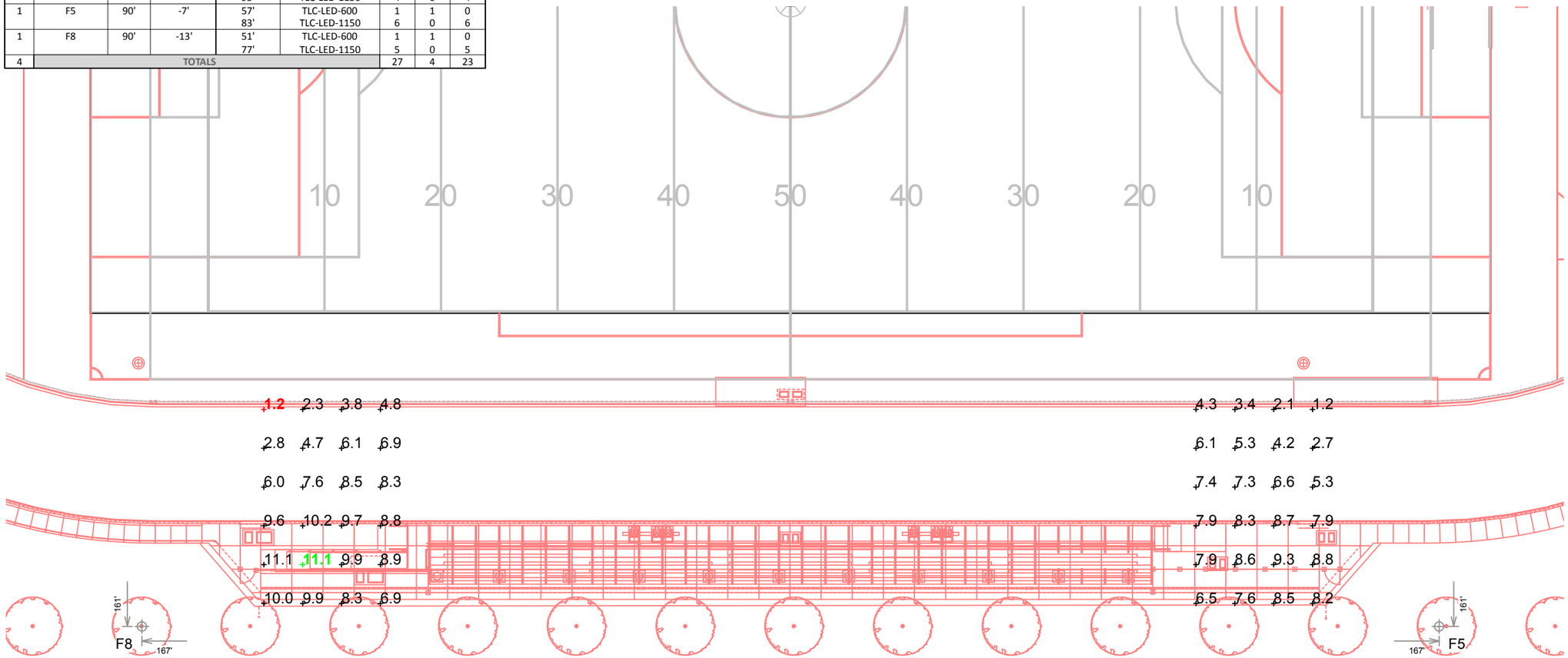
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F2	80'	11'	25'	TLC-BT-575	2	0	2
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	0	4
1	F3	80'	13'	25'	TLC-BT-575	2	0	2
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	0	4
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	0	6
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	0	5
4	TOTALS					27	4	23



SCALE IN FEET 1 : 30

0' 30' 60'

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San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**Visitor Safe Dispersal Area**
Spacing:	10.0' x 10.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**6.91**
Maximum:	11.1
Minimum:	1.2
Avg / Min:	5.85
Max / Min:	**9.41**
UG (adjacent pts):	2.37
CU:	0.13
No. of Points:	48

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	65,600 lumens
No. of Luminaires:	**4**
Total Load:	2.32 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

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

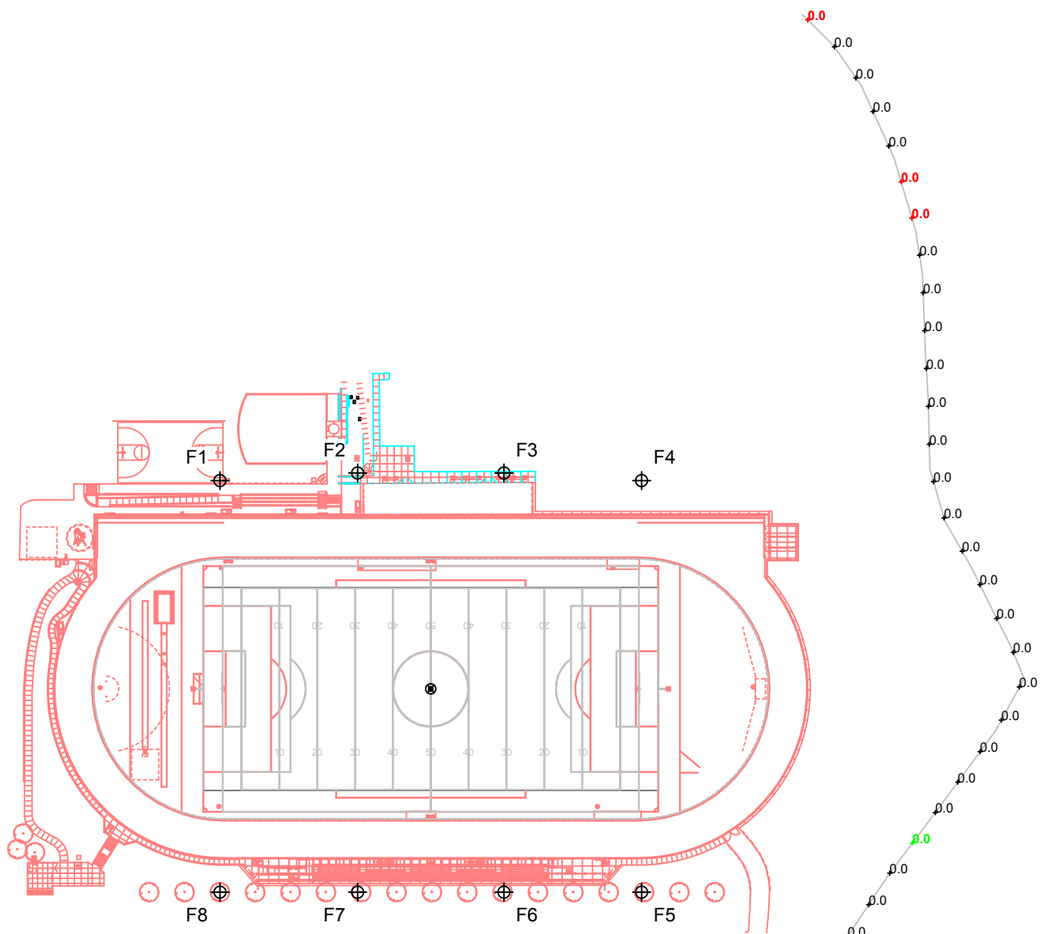
We Make It Happen.

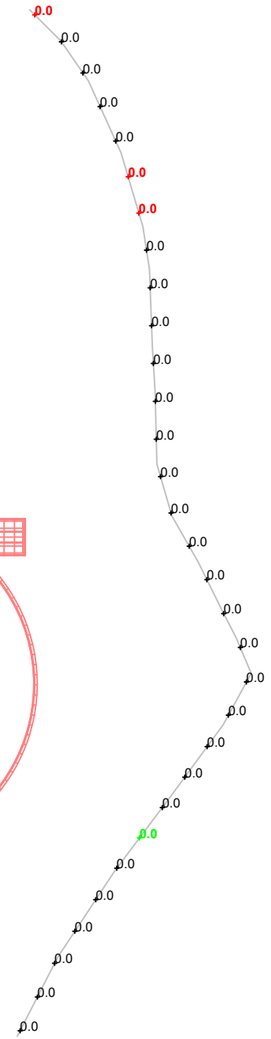
San Marin High School Football

Novato,CA

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0003**
Maximum:	0.002
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 120

0' 120' 240'

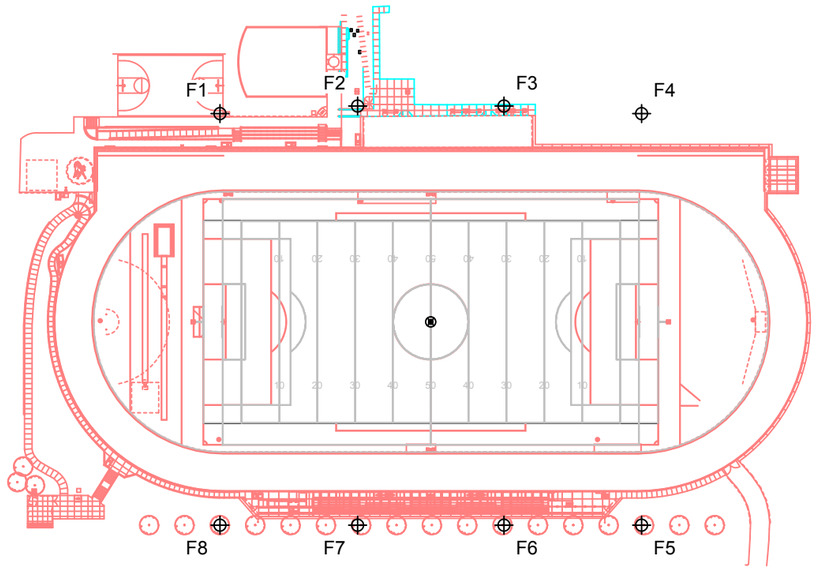
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

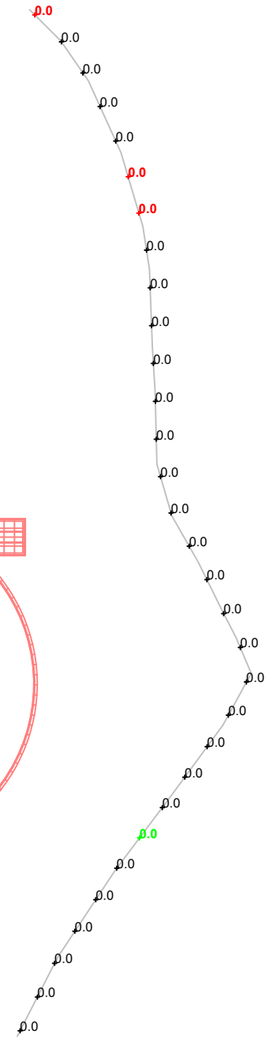
ENGINEERED DESIGN By: D.Alexander • File #120079H2 • 01-Jun-18

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0009**
Maximum:	0.005
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

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

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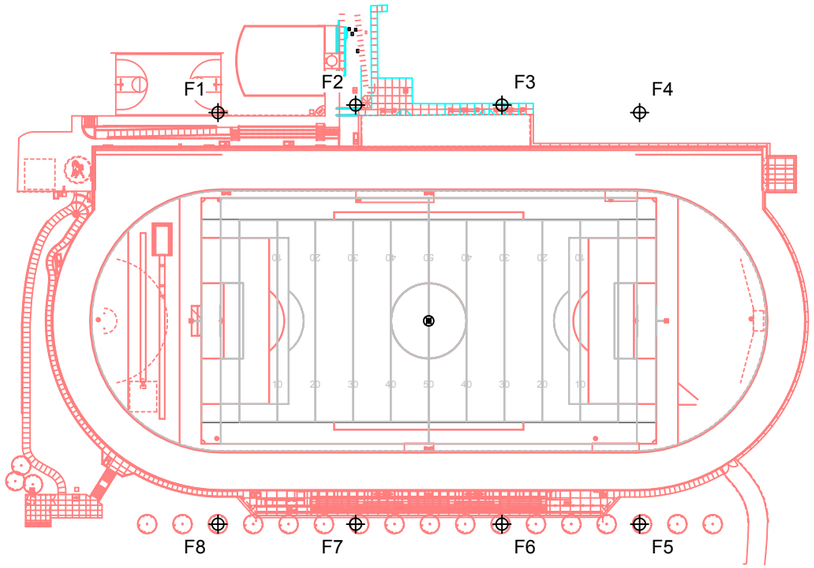
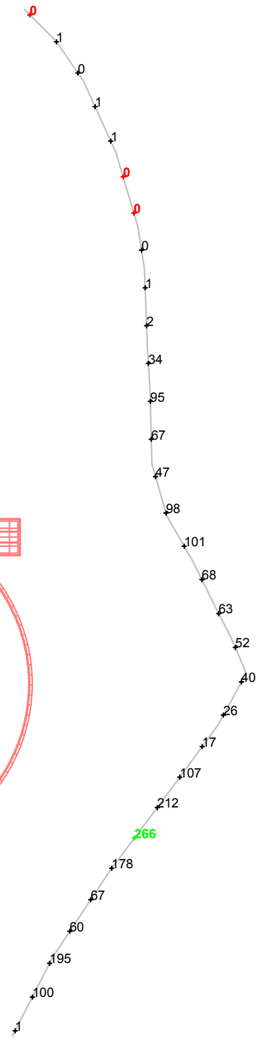
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**North Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**61.1800**
Maximum:	265.781
Minimum:	0.000
No. of Points:	31

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 120

0' 120' 240'

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

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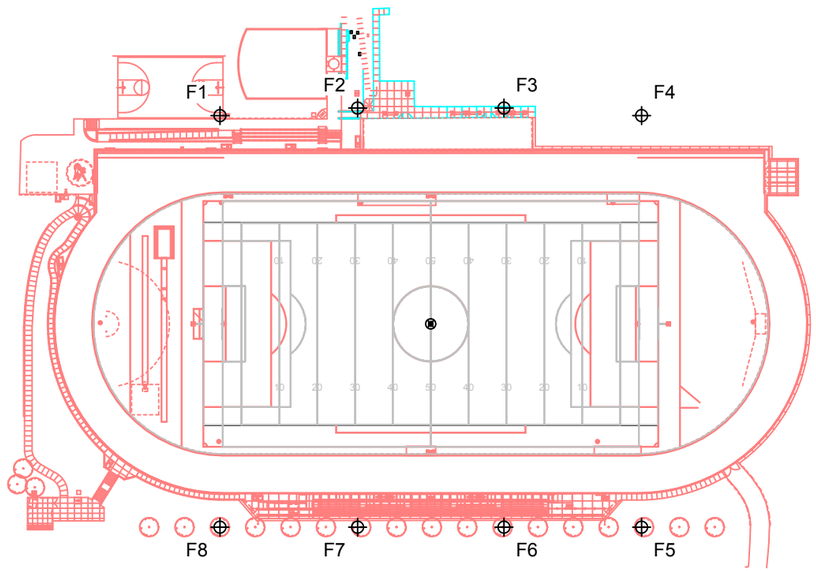
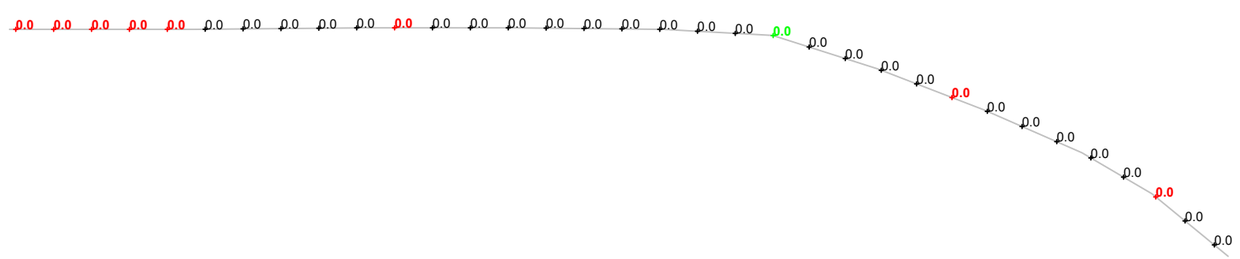
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

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San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0000**
Maximum:	0.000
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

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

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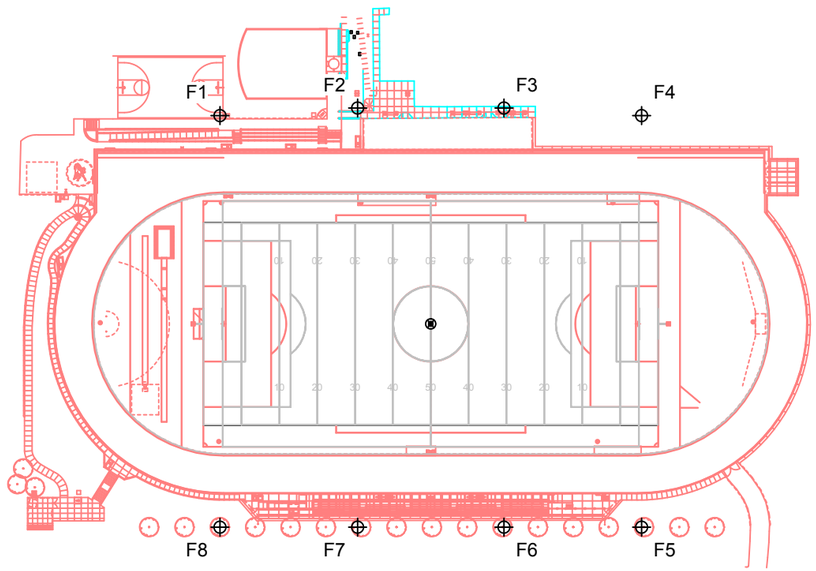
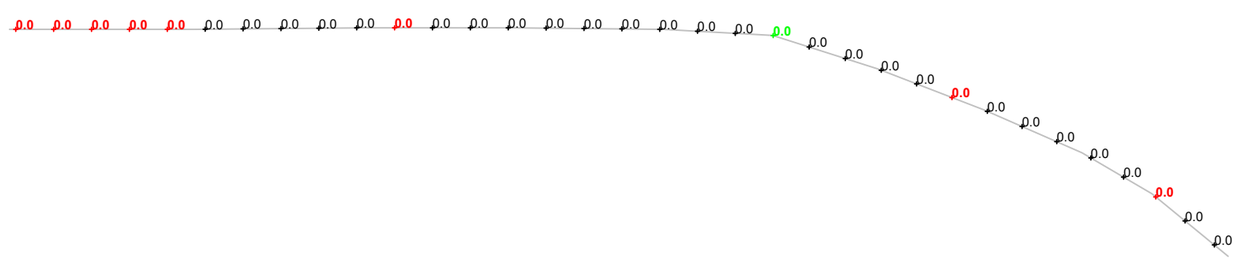
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

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San Marin High School Football

Novato,CA

GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0001**
Maximum:	0.001
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

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

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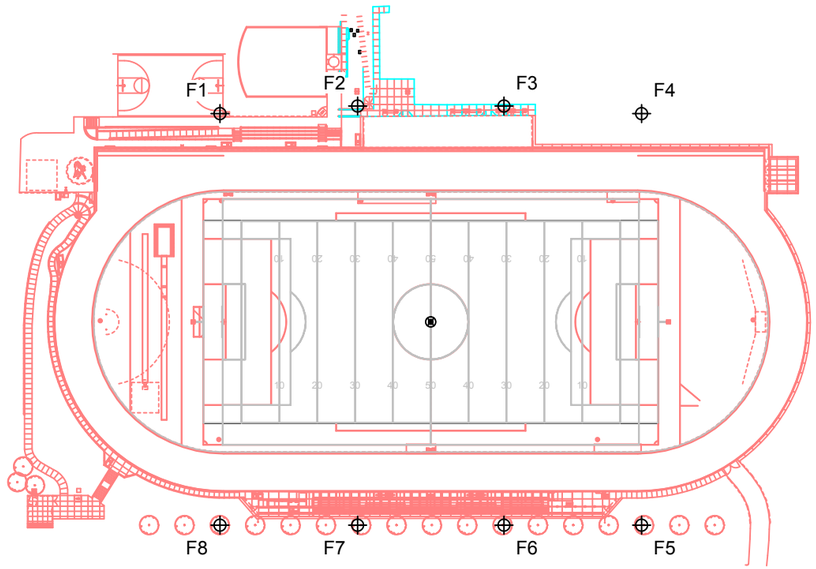
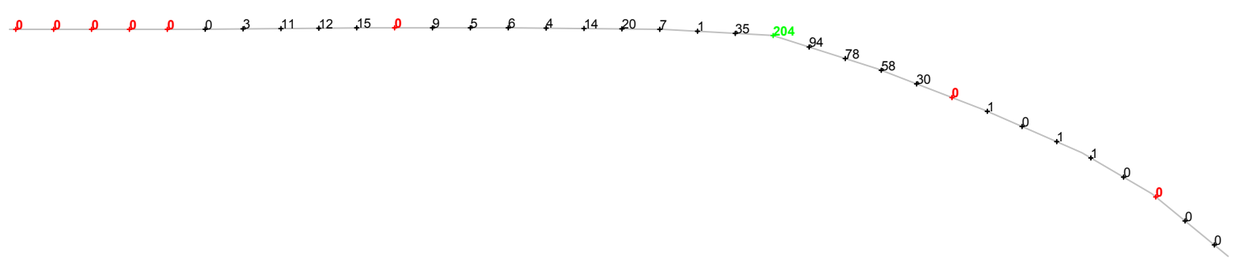
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
1	F1	90'	4'	94'	TLC-LED-1150	5	5	0
1	F2	80'	11'	25'	TLC-BT-575	2	2	0
				63'	TLC-LED-600	1	1	0
				91'	TLC-LED-1150	4	4	0
1	F3	80'	13'	25'	TLC-BT-575	2	2	0
				60'	TLC-LED-600	1	1	0
				93'	TLC-LED-1150	4	4	0
1	F4	80'	13'	93'	TLC-LED-1150	6	6	0
1	F5	90'	-7'	57'	TLC-LED-600	1	1	0
				83'	TLC-LED-1150	6	6	0
1	F6	90'	-9'	25'	TLC-BT-575	2	2	0
				81'	TLC-LED-1150	4	4	0
1	F7	90'	-11'	25'	TLC-BT-575	2	2	0
				79'	TLC-LED-1150	4	4	0
1	F8	90'	-13'	51'	TLC-LED-600	1	1	0
				77'	TLC-LED-1150	5	5	0
8	TOTALS					50	50	0





SCALE IN FEET 1 : 120

0' 120' 240'

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San Marin High School Football

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GRID SUMMARY

Name:	**East Res Prop Line**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	**17.9049**
Maximum:	204.261
Minimum:	0.000
No. of Points:	34

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	52,000 / 121,000 / 65,600 lumens
No. of Luminaires:	**50**
Total Load:	50.62 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-BT-575	>63,500	>63,500	>63,500
TLC-LED-1150	>63,500	>63,500	>63,500
TLC-LED-600	>63,500	>63,500	>63,500

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

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

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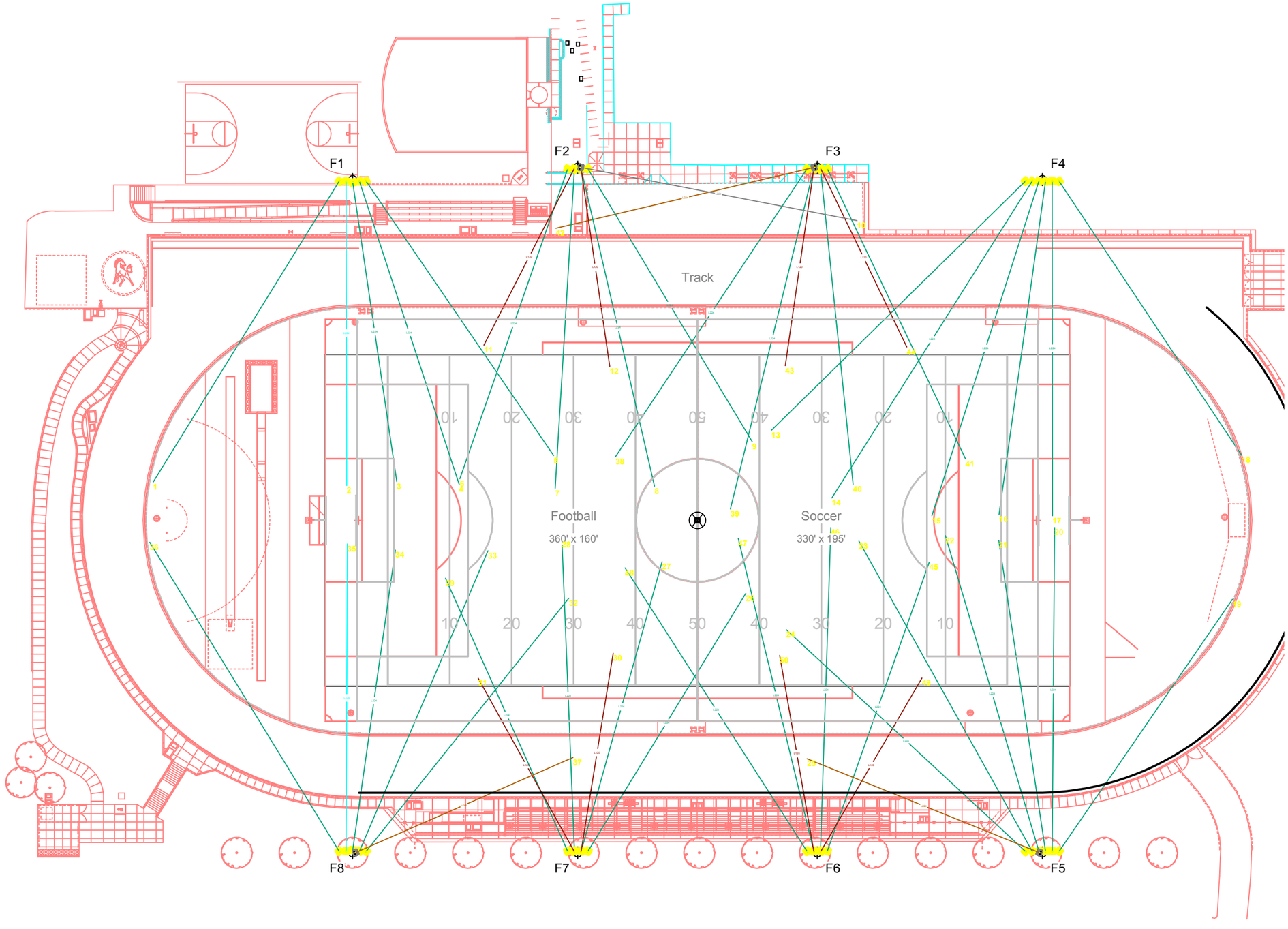

EQUIPMENT LAYOUT

INCLUDES:
- Bleacher
- Football
- Soccer
- Track

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 driver and structures located within 3 feet (1m) of design locations.

EQUIPMENT LIST FOR AREAS SHOWN

		Pole		Luminaires		
QTY	LOCATION	CLASS	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
1	F1	LSS90A	4'	94'	TLC-LED-1150	5
1	F2	LSS80B	11'	25'	TLC-BT-575	2
				63'	TLC-LED-600	1
				91'	TLC-LED-1150	4
1	F3	LSS80B	13'	25'	TLC-BT-575	2
				60'	TLC-LED-600	1
				93'	TLC-LED-1150	4
1	F4	LSS80B	13'	93'	TLC-LED-1150	6
1	F5	LSS90B	-7'	57'	TLC-LED-600	1
				83'	TLC-LED-1150	6
1	F6	LSS90B	-9'	25'	TLC-BT-575	2
				81'	TLC-LED-1150	4
1	F7	LSS90B	-11'	25'	TLC-BT-575	2
				79'	TLC-LED-1150	4
1	F8	LSS90B	-13'	51'	TLC-LED-600	1
				77'	TLC-LED-1150	5
8	TOTALS					50

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-BT-575	3.2	3.0	2.8	2.4	1.9	1.7	1.4
TLC-LED-1150	6.8	6.5	5.9	5.1	4.1	3.7	3.0
TLC-LED-600	3.4	3.2	3.0	2.6	2.0	1.9	1.5

SCALE IN FEET 1 : 50

0' 50' 100'

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

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San Marin High School Football

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GLARE IMPACT

Summary

Map indicates the maximum candela an observer would see when facing the brightest light source from any direction.

A well-designed lighting system controls light to provide maximum useful on-field illumination with minimal destructive off-site glare.

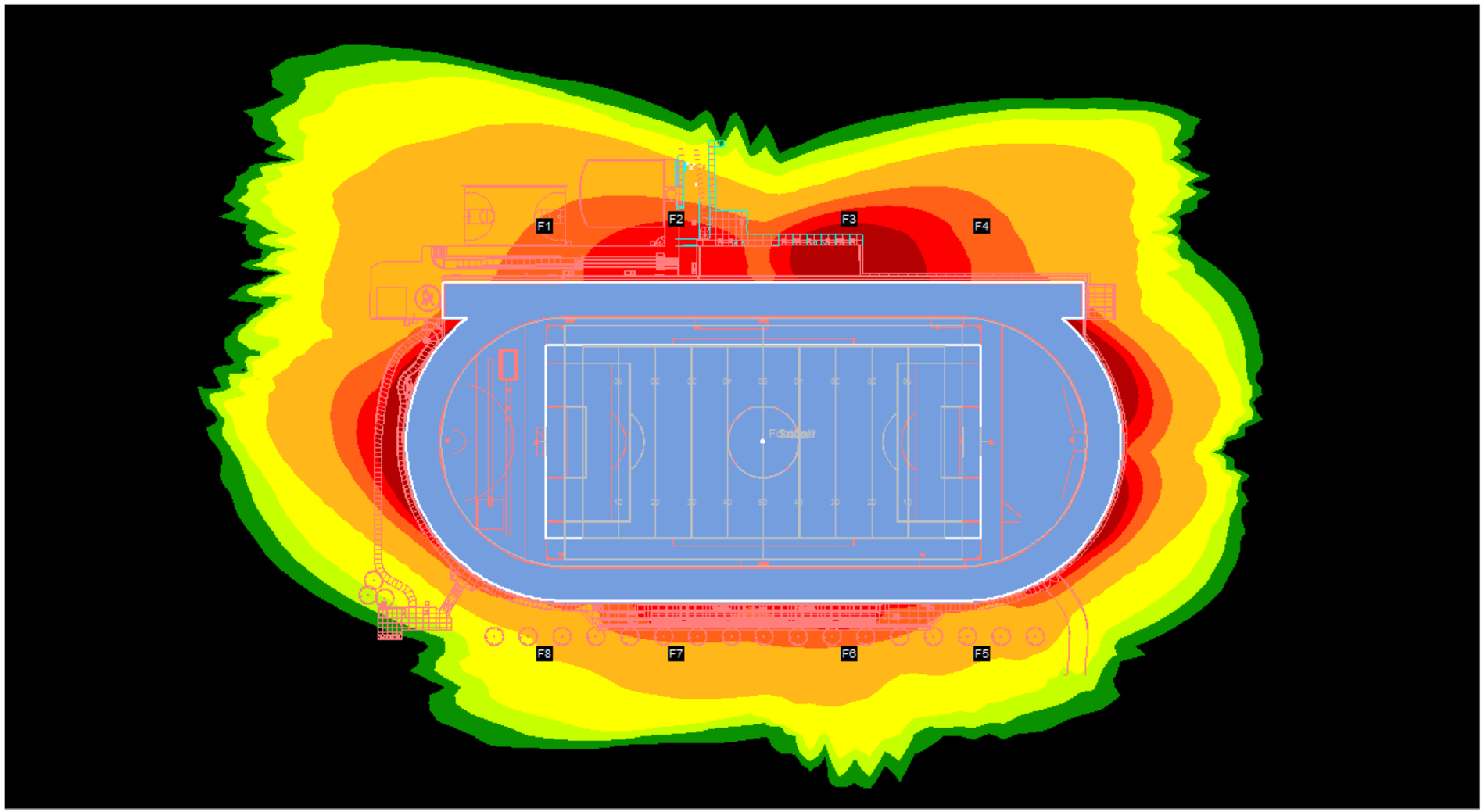
GLARE

Candela Levels

High Glare: 150,000 or more candela
Should only occur on or very near the lit area where the light source is in direct view. Care must be taken to minimize high glare zones.

Significant Glare: 25,000 to 75,000 candela
Equivalent to high beam headlights of a car.

Minimal to No Glare: 500 or less candela
Equivalent to 100W incandescent light bulb.



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