NATIVE AMERICAN CULTURAL CENTER | ARIZONA
SENIOR CAPSTONE PROJECT 2013

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Abstract

NATIVE AMERICAN CULTURAL CENTER

ARIZONA

LINDSAY FREDERICK | LIGHTING + ELECTRICAL
http://www.engr.psu.edu/ae/thesis/portfolios/2013/lrf5039/index.html

The **Native American Cultural Center** is a place for both members and public to learn about the culture and heritage of the Arizona tribe. From classrooms to art studios, the facility includes spaces for learning a range of topics relating to the tribe. Additionally there is a museum, café, and gift shop for the enjoyment of anyone interested in gaining an understanding of the tribe.

THE TEAM

OWNER: Arizona Native American Tribe
ARCHITECTURE/MEP ENGINEERING: SmithGroupJJR
CIVIL ENGINEERING: Coe & Van Loo Consultants Inc.
STRUCTURAL ENGINEERING: Caruso Turley Scott Inc.
CONSTRUCTION: Brignall Construction
MUSEUM DESIGN: BRC Imagination Arts
AUDIO VISUAL: Convergent Technologies
LIGHTING DESIGN: SmithGroupJJR

THE SYSTEMS

ARCHITECTURAL: The architectural design of the Cultural Center is inspired by nature, incorporating earthy tones and grounded geometry. The awning represents the weave of a basket as it provides an aesthetic appeal to the exterior. It is a 48,600 SF building with two levels. Only one story is above grade. It hasa mixed use occupancy with a museum, auditorium, classrooms, offices, and art rooms.

STRUCTURAL: The foundation is made up of strip, step and spread footings. The building is steel frame construction with concrete and masonry walls. It utilizes composite beam construction.

MECHANICAL: Two air handling units combine outside air and return air from the building. The system utilizes VAV (terminal) units that are controlled based on zone. Two boilers produce hot water for heating and a chiller produces chilled water cooling.

ELECTRICAL: The electrical system uses an Arizona public service utility transformer, thereby making it a secondary service. At the service entrance, there is a 1200 A, 277/408V service connected to a switchboard which distributes the power to the rest of the building.

LIGHTING:
Most of the lighting in the building is fluorescent or LED. The existing lighting design is carefully calculated to provide appropriate lighting levels in a pleasant fashion that is neither glaring nor uncomfortable. Each space has thoughtfully placed luminaires in a very regular and uniform fashion that allows them to recede into the backdrop of the room.

SMITHGROUP JJR ...a special thanks

Executive Summary

The Native American Cultural Center in Arizona is a one story, 48,600 sf facility created for tribe members and visitors to learn about the culture and heritage of the Arizona tribe. It has a mixed-use occupancy with museum, auditorium, classrooms, offices, and art rooms. The following report details the redesign of portions of the lighting, electrical, mechanical, and architectural systems within the building.

The lighting design pertains to the entry lobby, promenade, classroom and museum, with an overarching concept to embrace: embrace nature, embrace culture, and embrace the world in which we live. The purpose of the cultural center is to bring both tribe and public together to learn, understand, and celebrate the tribe's culture and heritage. The lighting should be responsive and enhance this idea. The tribe values nature, wisdom, respect and genuineness, all of which should be taken into consideration throughout the building's lighting design. The interactive nature of the cultural center is enhanced with color changing ceiling panels and displays of the constellations while other elements of the design accent and mimic architectural features of the building.

The lighting depth is deeply integrated with the architectural depth in which the ceiling panels were designed. Like with the lighting design, there exist two goals for the architectural breadth, and those are to bring harmony between the education and public sides of the cultural center and to further create an interactive and immersive learning environment for visitors and tribe members alike. The redesign of the classroom involves a stretch fabric ceiling with LED's mounted behind them that depict the major constellations in the tribe's culture. Similarly, the museum employs the same stretch fabric while using the LED's to create a soft glow over the exhibit spaces to evoke the feeling of being taken in and possibly reliving the history of the tribe.

In the electrical depth, the branch circuiting of the electrical system has been modified appropriately in response to the lighting changes. The major change to the distribution system is the addition of a panelboard specifically dedicated to the museum track lighting, which has to be 120/208V to feed the track. The electrical depth also determined that by switching to aluminum wiring, the owners could save 44% on material costs. Feasibility of a generator for emergency power was explored and deemed null as the $45,000 cost cannot be justified for a building of this size and with this function.

The mechanical breadth explores the effects of different glass types on the mechanical loads in the classroom and lobby spaces using COMFEN and Carrier HAP. It was determined that for performance ¼ inch bronze tinted glass would be the best choice for the lobby while for aesthetics and short-term economic purposes grey tinted glass would be more appropriate. In the classrooms Carrier HAP showed that there was not much of a disparity between glass types and the effect on the total coil load. COMFEN's results on the lowest overall energy usage swayed the result that double pane clear glass was the best choice for the classroom.

Please note that this project has been placed on indefinite hold by the Owner. For this reason, project name, location, tribe name, construction data, and cost data have been omitted from this document.

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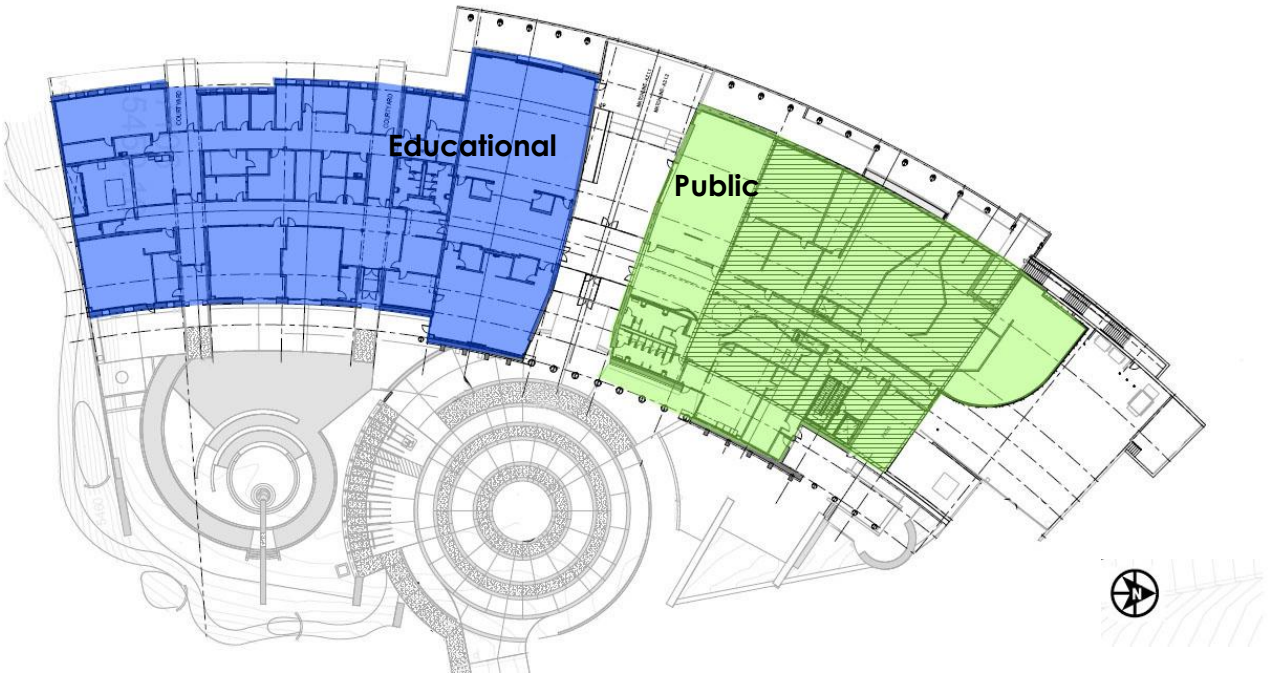
Project Overview

The Native American Cultural Center in Arizona is a one story, 48,600 sf facility created for tribe members and visitors to learn about the culture and heritage of the Arizona tribe. It has a mixed-use occupancy with museum, auditorium, classrooms, offices, and art rooms.

As if emerging from the hillside, the architecture is designed to welcome visitors to learn about the Arizona tribe's culture by telling the story of their history. The cultural center houses educational spaces, a museum, and a gift shop. The materials used in the design are natural and neutral, using wood and stone. The contemporary style also makes use of steel, metals, and glass. Large shading devices shaped like a basket weave were implemented throughout as a daylight control technique as well as aesthetic element. The site plan and landscape architecture is also an integral component in the architectural design because it is of the tribe's culture to enjoy and respect the land.

The curved shape draws you into the heart of the ground level, where the entry lobby is. To the left is the educational component with classrooms, craft centers, workshops and offices. To the right is the museum component where tribe members and the public can come and learn about the tribe's culture and heritage. Mechanical rooms, archive storage, and receiving areas are housed on the basement level of the building.



Native American Cultural Center 1st Floor Plan with Wing Designations

Project Team

Architecture/Engineering: SmithGroupJJR

Project Manager: Kent Willcox
Design Architect: Mark Roddy
Architect: Eric Watson
Architect: Ben Ayers
Electrical Engineer: Mark Greenawalt
Mechanical Engineer: Jon Silhol
Interiors: Kai Ekbundit
Landscape: Rick Jones

Civil Engineering: Coe & Van Loo Consultants Inc.
Structural Engineering: Caruso Turley Scott Inc.
Construction: Brignall Construction
Museum Design: BRC Imagination Arts
Audio Visual: Convergent Technologies

Proposal Overview

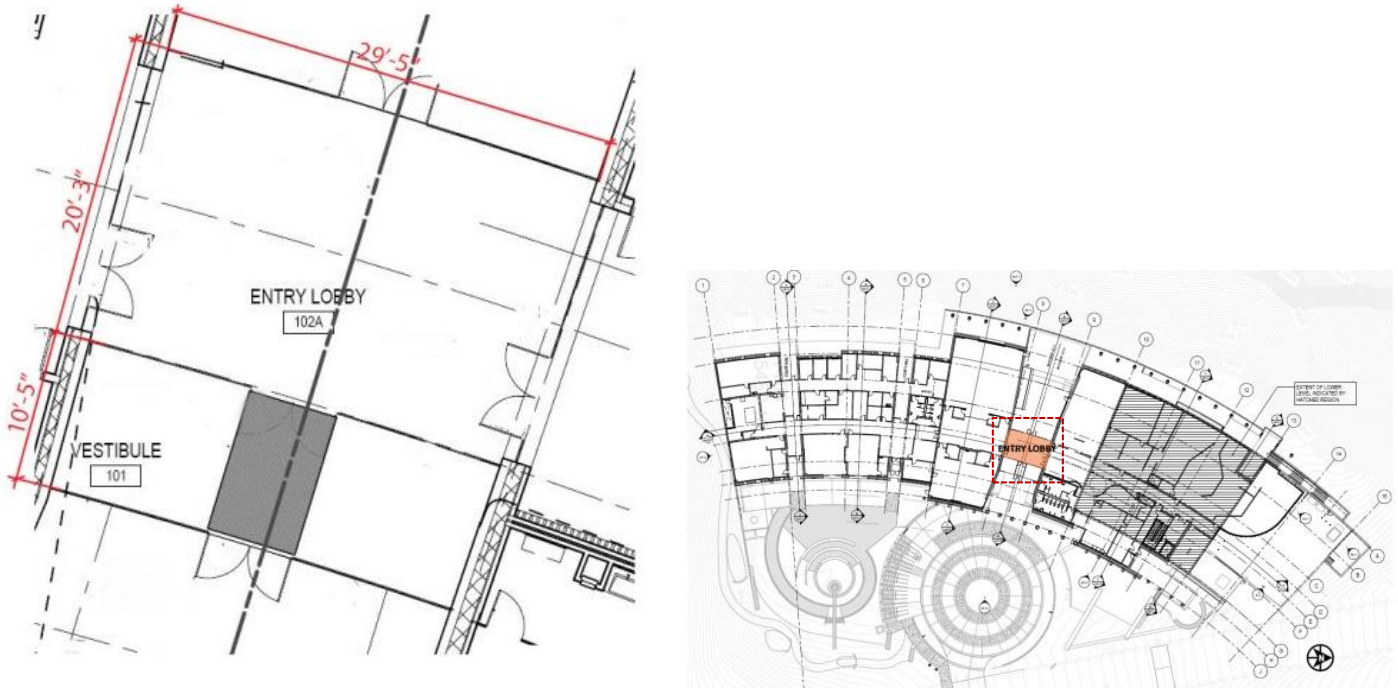
The focus of my Senior Capstone Project is based on the lighting and electrical systems within the Native American Cultural Center. The following topics discuss the lighting re-design of four spaces, as well as the integrated design decisions involving the electrical, architectural, and mechanical systems.

Mechanical Breadth

An important factor to take into consideration with this project, due to its location in Arizona, is the positive and negative effects of sunlight that occur in the building. While sunlight can be very beneficial, being that it is a natural light source and can decrease the load otherwise caused by electric light and heating, it is a major contribution in the form of cooling load to the mechanical systems. This breadth explores the effects of different glass types on the mechanical loads in two spaces: the 112 Classroom and the Entry Lobby. The goal of the study is to determine the ideal glass type to reduce mechanical loads and maintain the useful daylight in the space. The 112 Classroom has an 8' tall by 12' long window facing east, while the Entry Lobby has two exterior glass facades facing East and West and two interior glass walls. The nature of having more glass in the lobby suggests that the glass type will be more critical from a mechanical load standpoint than in the classroom; but, being that the cultural center is located in Arizona, I was interested in exploring how much glass type made a difference, mechanically, for both spaces. In this study, I used, both, COMFEN and Carrier's Hourly Analysis Program (HAP). The two programs are intended to compare energy loads based on the parameters specified by the designer, yet they both differ in their own ways. For instance, COMFEN has limitations in that it cannot specify two facades with windows, but rather it calculates one façade's contribution to the loads. Unlike HAP, however, COMFEN generates estimates for electric, in the form of heating, cooling, fans, and lighting and compares gas versus electric demand and CO_2 emissions. For these reasons, I chose to use both programs and to compare the results against each other to determine the best choice of glass type for the Native American Cultural Center.

Entry Lobby

The entry lobby is a 900sf space that has all glass walls as mentioned in the breadth introduction: exterior windows facing East and West, with two interior glass walls. The room dimensions are shown below. Due to the large amount of glass in this space, direct sunlight can cause issues for the cooling loads, so choosing an appropriate glass type can really make a difference. A limitation for these calculations is the inability to weigh the effects of the shadow cast by the rest of the building at low sun angles, for instance, on the west side of the building.



Entry Lobby Plan and Dimensions with Key Plan

There is an additional limitation with the use of COMFEN: this software only allows the user to analyze one façade at a time. In the case of the lobby, there are two exterior facades, East and West, which will experience direct sunlight. It was also necessary to ignore the intermediate wall that separates the vestibule for the use of COMFEN. Both software have varying inputs and varying specificity, so there are some discrepancies between some of the glass types.

COMFEN and Carrier Results

In COMFEN, five trials were run: double pane clear glass, double pane gray/clear glass, double pane low-e glass, double pane bronze/clear glass, and double pane bronze tinted glass. The results show that the double pane gray/clear glass has the lowest energy use, with double pane bronze/clear glass and double pane bronze tinted glass following closely behind.

The following chart lists the glass types and corresponding coil loads as estimated by Carrier HAP. The smallest estimated coil load occurs with the quarter inch bronze tinted glass, which is significantly less than all of the other choices.

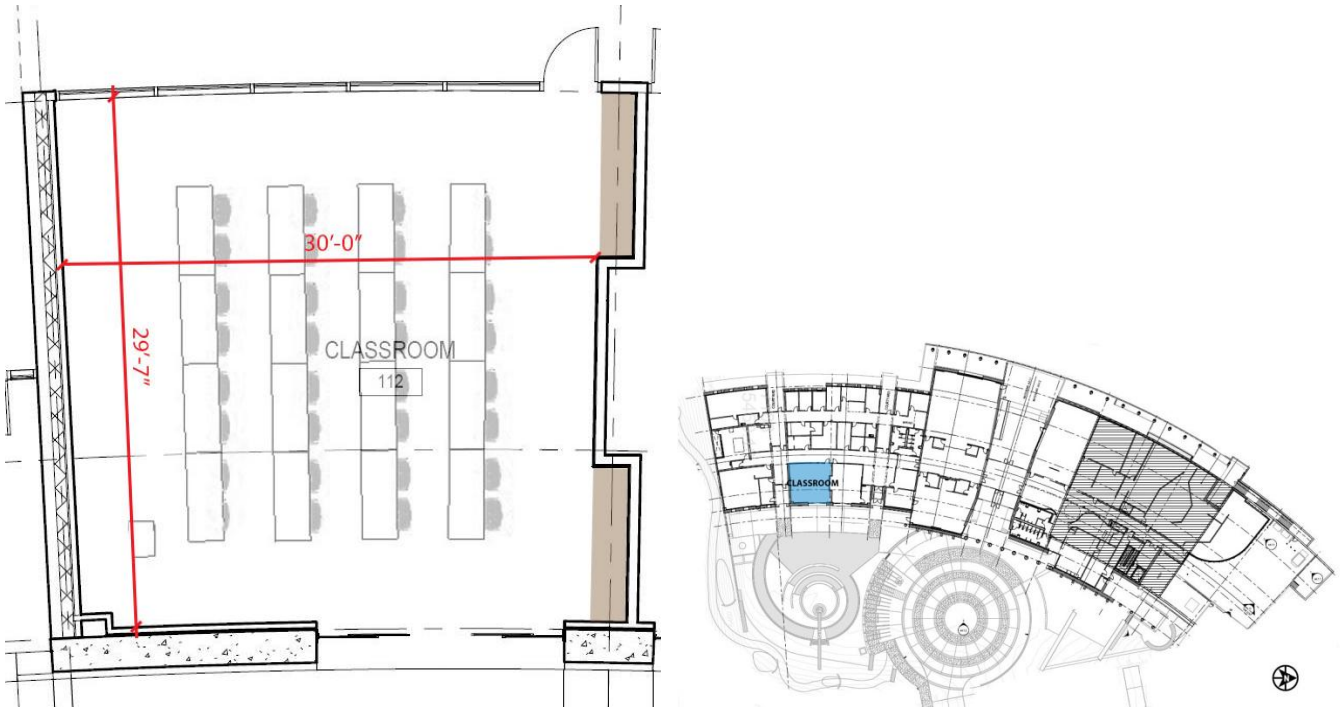
Based on the results, I would choose quarter inch double pane bronze tint glass.

Output data sheets can be found in Appendix C.

LOBBY

Glass Type	Total Coil Load
1/8 Inch Clear	3.3 Tons
1/8 Inch Grey Tint	2.7 Tons
1/4 Inch Low-E	2.6 Tons
1/4 Inch Bronze Tint	1.9 Tons
1/8 Inch Half Bronze	2.8 Tons
1/8 Inch Bronze Tint	2.8 Tons

Classroom



Floor Plan with Dimensions

COMFEN and Carrier Results

In COMFEN, five trials were run: double pane clear glass, double pane low-e glass, double pane gray/clear glass, PPG's double pane clear glass, and double pane bronze tinted glass.

For the least total energy use, the best two results were the double pane low-e glass and PPG's double pane clear glass. As far a heat gain, these two were moderate while the double pane gray/clear glass had the lowest heat gain. Conversely, the double pane gray/clear option had the highest heating and lighting energy estimate.

Through the Carrier Hourly Analysis Program with three options: 1/8th inch clear, ¼ inch low-e, and 1/8th inch grey tint, similar to COMFEN. The chart below lists the Total Estimated Coil Load with the respective glass type. The results did not vary as much in this space; in fact, I questioned them due to

the face that the lowest was the thinner clear glass. After re-running the calculations, I got the same results.

With the results from two programs, the glass I would choose is the PPG double pane clear glass.

Output data sheets can be found in Appendix C.

CLASSROOM

Glass Type	Total Coil Load
1/8 Inch Clear	1.6 Tons
1/4 Inch Low E	1.7 Tons
1/8 Inch Grey Tint	1.7 Tons

Note that this breadth and the architectural breadth are integrated specifically in the classroom with a common goal of optimizing useful daylight.

Cost Analysis

RSMeans Building Cost Data provides glazing cost for the following categories: 1/8" clear, 1/8" tinted, and ¼" film (Low-E). The costs are as follows :

1/8" clear = $9.65/sf

1/8" Tinted = $13.50/sf

¼" Tinted = $19.00/sf

¼" Film clear = $19.30/sf

For the lobby, the selection was the bronze tinted glass which would be $19.00/sf. Given the amount of energy saved by using this glass is so significant, 1.9 tons vs. 3.3 tons (clear), it would benefit the owners to spend the extra money up front and save in the energy costs.

For the classroom, all of the loads were very similar so it would benefit the owners to go with the clear glass type, simply for the cost savings.

Aesthetics

Both, the lobby and classroom scenarios yielded different results for the best glazing types for their respective rooms. For aesthetic purposes it may be desired to keep all of the glass types the same; this would ultimately be the decision of the architect and owner. Having bronze tinted glass can also affect the views from inside the lobby to the outside, which could be undesirable; in this case it would be better to choose the grey tint or Low-E options. Noting, again, the costs grey tint would be the more economical choice, since the difference in peak coil load is insignificant between the two.

Architectural Breadth

There exist two goals for the architectural breadth, and those are to bring harmony between the education and public sides of the cultural center and to further create an interactive and immersive learning environment for visitors and tribe members alike.

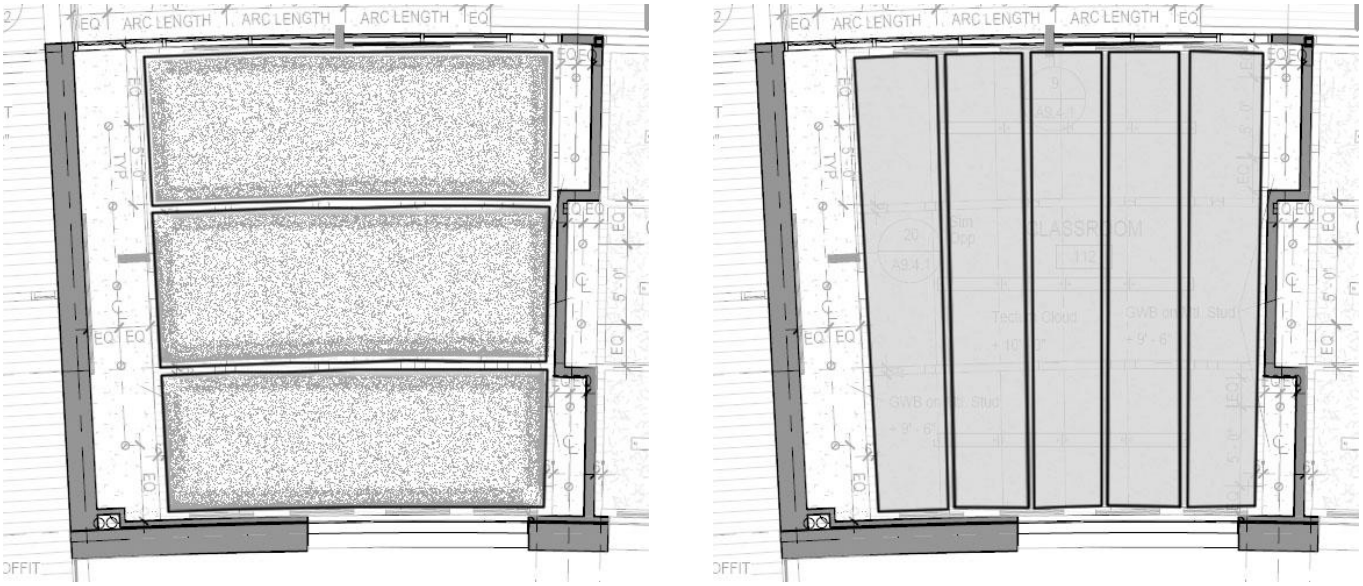
The goals set by the museum designers on the project, BRC, were to "create an emotional connection, "offer a life-changing experience", and to "make the guest part of the story." This architectural breadth embraces these concepts and attempts to apply them and fulfill them in both the museum and the classroom.

The solution involves the redesign of the classroom and museum ceilings with similar technologies that augment the two learning environments in different ways.

Classroom

There are multiple aspects to the classroom ceiling redesign. The initial ceiling, as designed by the architects at SmithGroupJJR, includes three large ceiling panels that span from the front of the room to the rear. They are each constructed of a tectum material and mounted 10' above finished floor. The first concept for the new ceiling was to slant the ceiling up and away from the windows and create an LED display of the constellations on the new surface. By separating the ceiling plane into multiple sections, it provides the opportunity to recess lighting fixtures to be flush against the ceiling plane. The new ceiling surface is created by using a translucent stretch fabric on a rigid frame, specifically the Barrisol brand material.

The ceiling design integrates with the lighting by incorporating suspended slot fixtures that fit in between the ceiling planes to provide the ambient light. The design of the ceiling panels themselves is inspired by astronomy which has played a major role in the tribe's history, as the stars are the source of many legends and myths within the culture. It gives visitors and tribe members the opportunity to learn and understand the starts and the stories behind them in a classroom setting. The lighting design specifics are discussed in the Classroom Lighting Design section of the Lighting Depth.



Original Ceiling Panel and New Ceiling Panel designs, respectively

Daylight Study

The study of the diagonal ceiling was to determine whether or not more useful daylight could be achieved by angling the ceiling away from the window rather than leaving it parallel with the floor. This study of useful daylight was conducted using the Daysim software. The results and comparison can be found in Appendix D. The study results concluded that there is no benefit to re-orienting the ceiling, but rather that the amount of useful daylight decreased as a result. Because of this, I chose to maintain the level ceiling at 10ft, while following through with the other changes as proposed.

Museum

The original design for the museum ceiling includes an exposed structure that is sloped from 18' to 23' above finished floor and a dropped ceiling on the north end where the roof height is 16', pushing the dropped ceiling to a height of 10' above finished floor to accommodate the mechanical equipment above. The redesign for the ceiling is to create a dropped ceiling at 15' above finished floor with the same Barrisol stretch fabric as in the classroom space. Note that this will only be in the area where there was originally an exposed ceiling and that the north end will maintain the dropped ceiling. By lowering the ceiling to 15', the separate sections become more intimate without feeling too enclosed. There is a grid of LED sources above the ceiling plane that can be controlled to create a wide range of displays on the ceiling. For my design, the ceilings will display colors based on the season of the corresponding section. For instance, the ceiling above the winter section of the museum will display a gray/white glow to portray gloominess, because the displays in this section involve the March of Tears, one of the most tragic events in the tribe's history. The ceiling hovers over the 12' partition walls, which means there will be angles at which the visitors can see the ceiling over the next section which works to the advantage of the museum because it sparks interest in the visitors before the visitors can even see the next displays.

As a side note, I had to take the mechanical systems into consideration where the new dropped ceiling is going to be. Originally there were round diffusers throughout the main exhibit space. A possible solution to this could be moving the diffusers to the edges of the room with flexible pipe, which may require further changes to equipment and duct sizing to moderate the flow velocity out of the diffusers.

Lighting Depth

The lighting depth encompasses the redesign of the Entry Lobby, the Promenade, the 112 classroom, and the museum. The main design goals were to provide interactive elements and to complement the architectural features throughout the cultural center.

Native American Cultural Center 1st Floor Plan with Room Designations

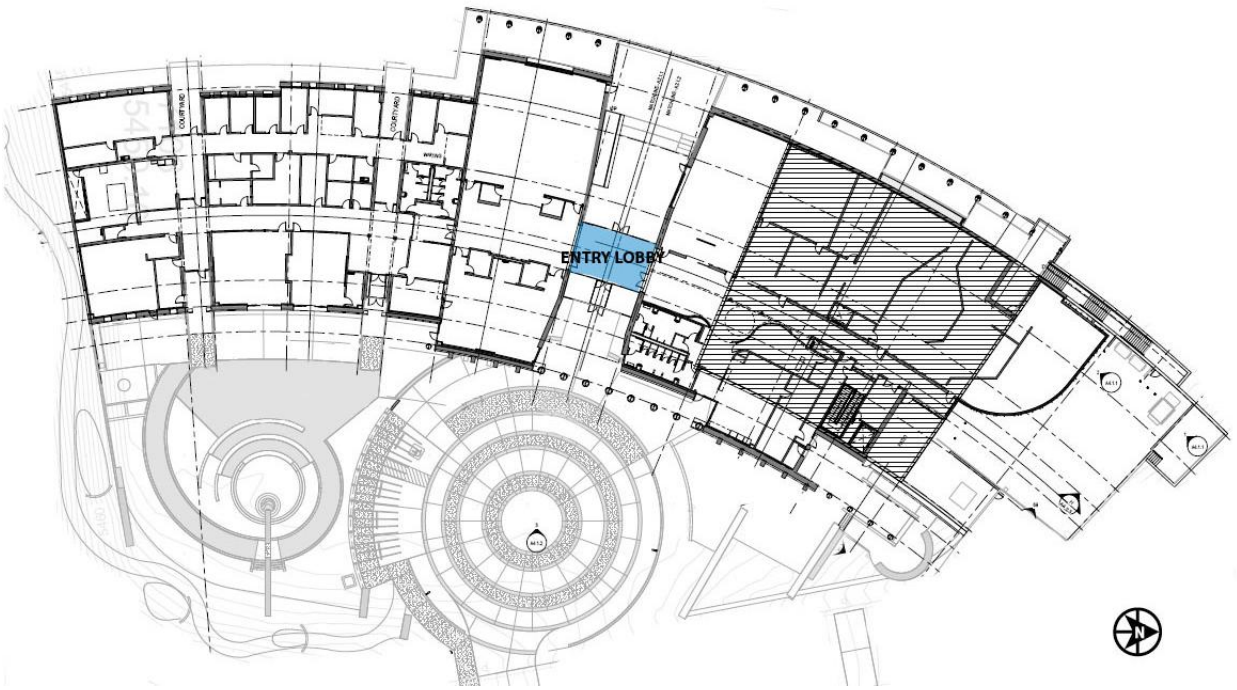
Concept

The purpose of the cultural center is to bring both tribe and public together to learn, understand, and celebrate the tribe's culture and heritage. The lighting should be responsive and enhance this idea. The tribe values nature, wisdom, respect and genuineness, all of which should be taken into consideration throughout the building's lighting design. The concept for the lighting is to embrace: embrace all aspects of the world we live in, from nature to the people. The Tribe feels that it is important to provide information to the neighboring communities in order to promote a better understanding and harmony among all inhabitants of the area.

Architecturally, the Native American Cultural Center is divided into two sides: education and public. The lighting concept should help bring these two differentiated elements together. For my design, I chose elements throughout the cultural center and mirrored or applied them in other manners to create a visual overlap, as well as incorporated interactive elements to create an immersive learning environment.

Entry Lobby Lighting Design

The Entry Lobby is the heart-center of the museum, the pivot point between the public and educational sides. The Lobby is 625 sf of transition area that can lead a visitor to three other main areas of the cultural center: the public side, the learning side, or the promenade directly ahead. It's a place for first impressions and way-finding.



Entry Lobby in Overall Floor Plan

Entry Lobby

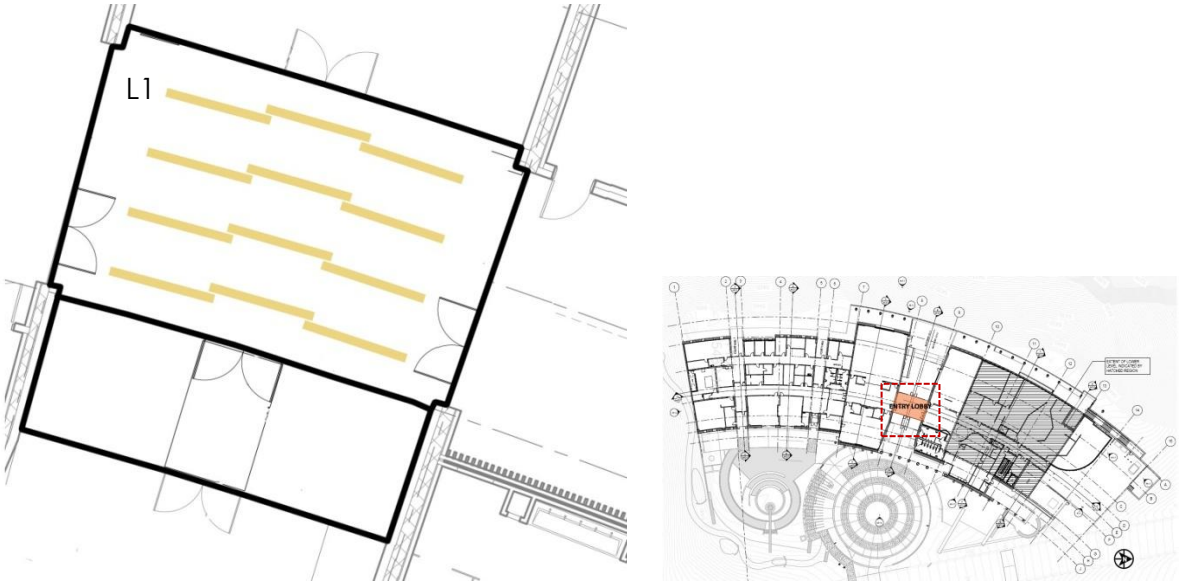
In the Entry Lobby, the walls are painted white and the ceiling is metal panel. The flooring is a combination of both ground concrete and stained concrete, with the stained concrete running in a stripe through the space, from the entry doors to the doors leading directly to the promenade area.

East Façade Awning

For the aforementioned reasons of the lobby's main purpose of being a transition space, I chose to go with a more simple design that incorporates the architectural element of the east façade awning/shading device that mocks the weave of a basket. This will add an element of interest in the space while permitting the visitors' attention to move to the other areas of the cultural center. There are twelve indirect linear fluorescent fixtures which are pendant-mounted at a diagonal in the fashion of the exterior awning. Specifically for calculations I chose the

Peerless Lightline Indirect T8 fixture. The finish on the luminaires is a custom champagne color, similar to that of the awning.

According to the Illuminating Engineering Society, the average horizontal illuminance for a lobby space should be 100 lux during the day and 50 lux at night. These discrepancies appeal to the adaptation issues between exterior and interior light levels. The achieved average horizontal illuminance value is approximately 45 lux which is within an acceptable ten percent of the recommended value for the evening.



Entry Lobby Lighting Plan and Key Plan

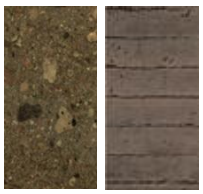
Because the lobby is all glass, the design takes advantage of the natural light. The lighting will be controlled via a photosensor integrated with the luminaire, meaning that for most of the day the lighting will be off as long as there is sufficient daylight into the space. As designed, the lobby consumes 0.67 W/sf, below the allowable power density of 1.1 W/sf.

Lobby Final Lighting Design

Promenade Lighting Design

The Promenade is approximately 3000 square feet of sanctuary, a place for tribe members and guests to enjoy the outdoors and admire nature. Admiring and respecting nature is something that is an integral part of the tribe's culture. From below the trellis, individuals can view down over the hillside and take in the Arizona landscape. The trellis is more of an architectural feature than a shading device as it is on the west and north-west side of the building. It is suggestive of a basket weave which is an art form of the tribe, and thereby symbolizes who they are. The exterior promenade is not only a place for visitors to enjoy the outdoors, but it is also a key façade that overlooks the adjacent city from the hillside.

The exterior wall of the building is boardform concrete in an adobe brown. The floor is a stained concrete with metal grating near the exterior wall. The trellis is made of aluminum and steel.



Exterior Promenade in Overall Floor Plan

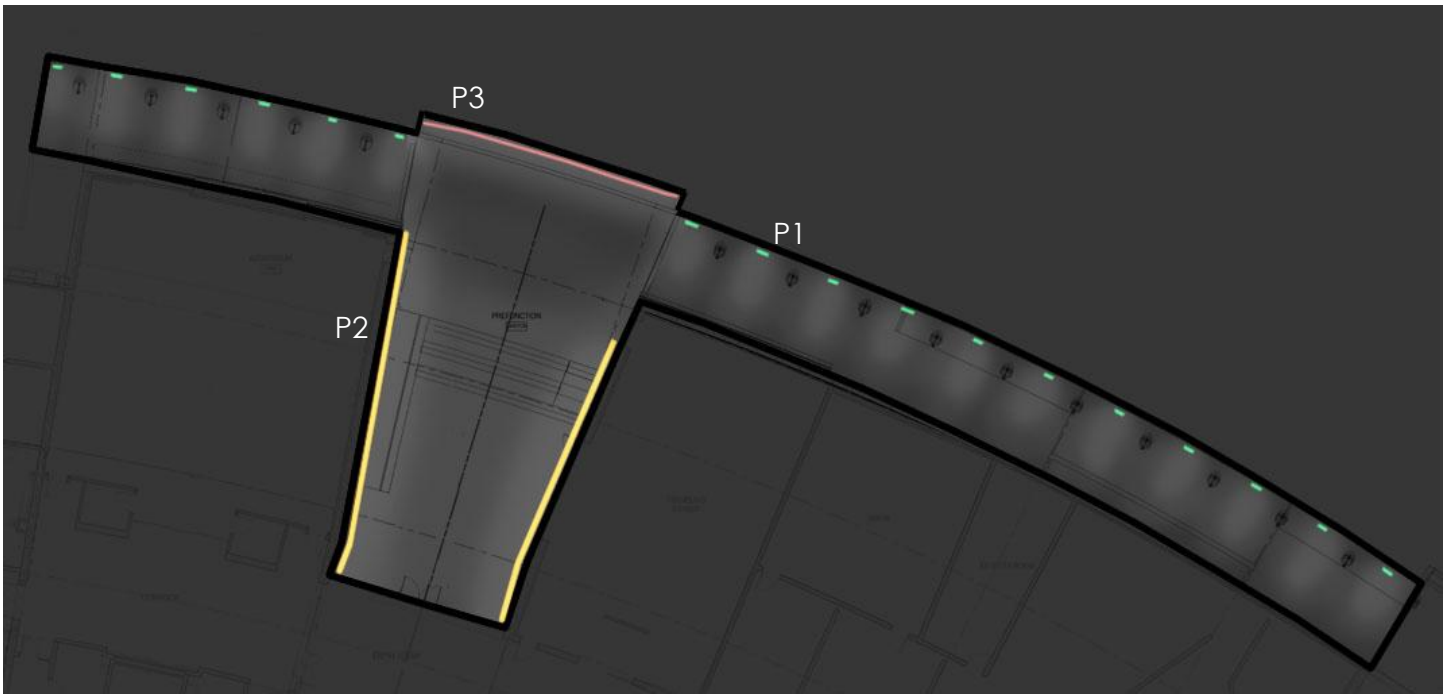
The new lighting is designed to complement the materials and architectural features while allowing visitors to enjoy the surrounding nature. The design provides an emphasis on the "heart" which is the pre-function space that leads to the entry lobby; it creates balance and symmetry; and it maintains an over-all subdued effect which will invite visitors to enjoy the scenery and nature that surrounds them.

The walkway along the west façade includes recessed CFL wall fixtures that light up the ground below visitors' feet, removing light and glare from the view of the individuals looking out over the hill and across the landscape. The fixture chosen for the calculations is the ERCO CFL Visor series, with a recessed wall mounting type. The design decision for CFL fixture was made because the CFL fixtures provide the appropriate amount of lighting, while LED's could be glaring in this setting. Due to the location in Arizona, the effect of cold weather on compact fluorescents is less of a concern. The lookout at the edge of the pre-function is highlighted with Philips ColorKinetics eW Fuse in 1ft sections to follow the curve. These fixtures are aimed down to highlight the wall and ground by the lookout to draw people while also keeping the lighting out of the eyes so that the visitors can more easily enjoy the nature. They are also 2700K to accent the warm tones in the stone. The two walkways merge at the pre-function area where social gatherings can be held. Here the stone façade is grazed by in-grade linear LED sources. For calculation purposes, I chose the Phillips ColorKinetics eW Graze fixtures which are also at 2700K. Their intensity gradually increases from 50% to full output as they near the lobby entrance.

The recommended illuminance in the outdoors space is 2 lux. This was the criteria used for the walkways which have approximately 10 lux at the hottest spot from the wall fixtures and this decreases to 2 lux in between fixtures. Because the pre-function space is a more social place for visitors, slightly higher horizontal and vertical illuminance values are maintained at 15 horizontal lux at, both, the entry lobby doors and the overlook, and these values decrease to 2 lux at the bottom of the steps. Because of the location in Arizona, the cultural center is considered to be in a Lighting

Zone III with a curfew and low activity. Consequently, there must be considerations for light pollution. As discussed, the new lighting design includes uplighting that grazes the walls to either side of the pre-function space.

Most of the exterior lighting is governed by Arizona's *Title 49. Arizona Title 49-1103*: Nonconforming light fixtures states the following, "in addition to other exemptions provided in this article, outdoor light fixtures not meeting the provisions of this article shall be allowed provided such fixtures are extinguished between the hours of midnight and sunrise by an automatic shutoff device." Therefore, all exterior fixtures must be turned off when the building is not occupied at night, or, for special occasions, the owner will have to be granted special permission by the local municipality to have the lights operating after the established curfew.



Promenade Lighting Plan; Luminaire Schedule in Appendix A

Pre-function Lighting Render

Promenade Walkway and Lookout Render

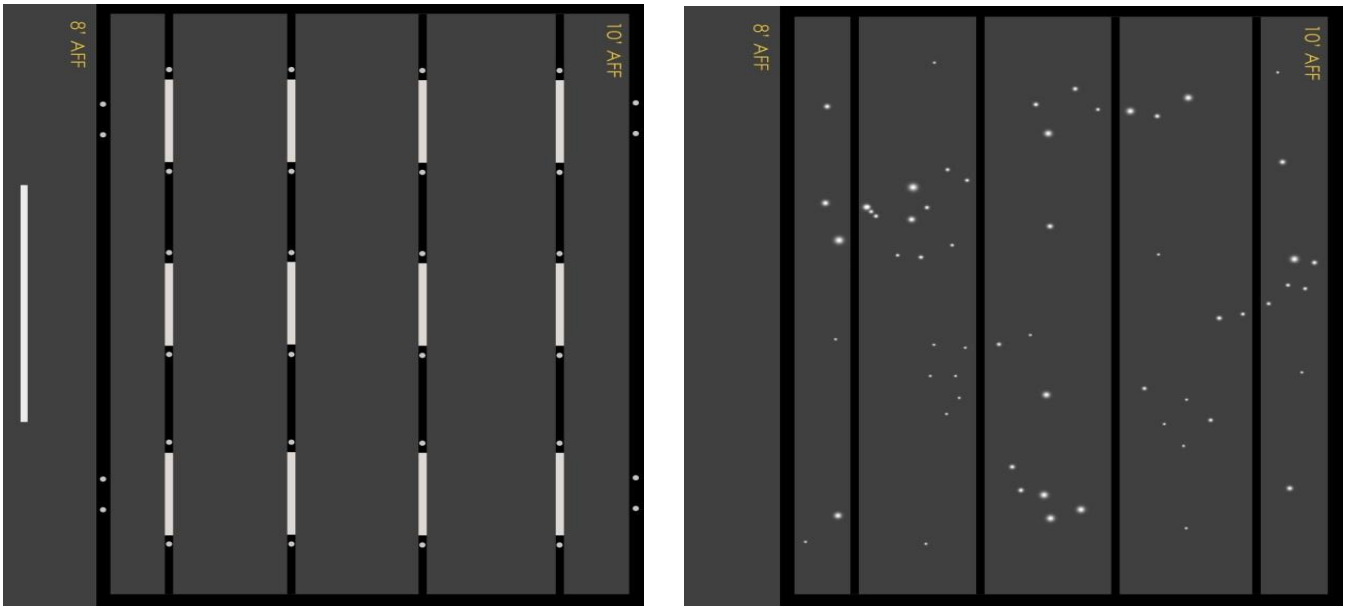
112 Classroom

The 112 Classroom is a space designed for functionality as well as interactive learning. In order to make the space an immersive learning environment, as discussed in the architectural breadth, the ceiling has been reconfigured with an LED lighting system to display major constellations. Astronomy has played a major role in the tribe's history, and the stars are the source of many legends and myths within the culture. It gives visitors and tribe members the opportunity to learn and understand the starts and the stories behind them in a classroom setting.

The classroom has been designed with functional, suspended fluorescent/metal halide combination luminaires that create linear divisions in the ceiling surface. For design calculations, I chose the RSA Combolight, employing 28W T5 fluorescent and 20W ceramic metal halide options. The spacing between ceiling panels also provides the opportunity to incorporate the mechanical and audio systems within the gap to create a clean ceiling surface. The whiteboard will be illuminated by linear fluorescent wall washers mounted from the ceiling above. The chosen whiteboard fixture is Litecontrol's Mod44 Recessed Wall/Wash with a T8 linear fluorescent.

Classroom Functional Lighting Render

The ceiling panels are made of a white stretch fabric on a rigid frame. Above the panels there will be sixty LED's arranged such that they resemble the major constellations. By varying the distance from LED to fabric, the intensity and size of the light on the surface will change, allowing for a more realistic display of the different sizes of the stars. These LED's differ from those in the museum because these are a smaller diameter allowing for a more precise point on the fabric. The fabric used for this installation must have a higher transmissivity than in the museum. Whereas in the museum it is desired to have a more diffuse look, here it is more important to be able to distinguish the separate points of light. In relation, it is also important for some of the light to be diffused; this way the students will not be able to view the direct source or receive too much glare. The feature lighting is intended for learning purposes and not to provide ambient or task lighting in the classroom.



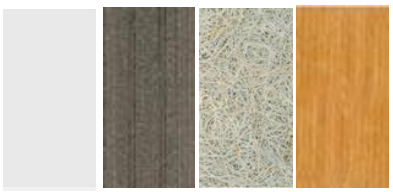
Classroom 112 Reflected Ceiling Plans: functional and feature lighting, respectively

The constellation display would only be operating when switched to "on" by the teacher, when all of the other lights are off. This can easily be accomplished when controlled with a scene selector panel. Controls will be important in the classroom from a code standpoint. The lighting will be turned on to 50 percent power by an occupancy sensor that will recognize when people have entered the room, and turn the lights off when the room is vacated. A photosensor will control dimming of the dim zone which will include the six luminaires in the back right corner of the space, closest to the windows. There will also be a manual scene controller for the instructor to turn the lights up to full bright or to off, in addition to enabling AV and feature lighting settings. The allowable LPD for the classroom is 1.3 W/sf. As designed the classroom uses 1.25 W/sf. The recommended illuminance for the space is 300 lux on the task plane for reading and writing, 50 lux on the task plane for AV settings, and 300 lux on the white board. The as designed values are 302 lux on the task plane, and 312 lux on the whiteboard. AV settings on the task plane can be achieved through dimming.

Museum

The Arizona Tribe believes that it is very important to pass on information of its culture and heritage to the younger generations for both tribe and non-tribe individuals. They want more than just to spread knowledge, however; they want to create an emotional connection with visitors. One of the ways they want to do this in their new cultural center is through a museum the progresses through the seasons, instilling the importance of nature while also telling the story of the Tribe's traditions and hardships.

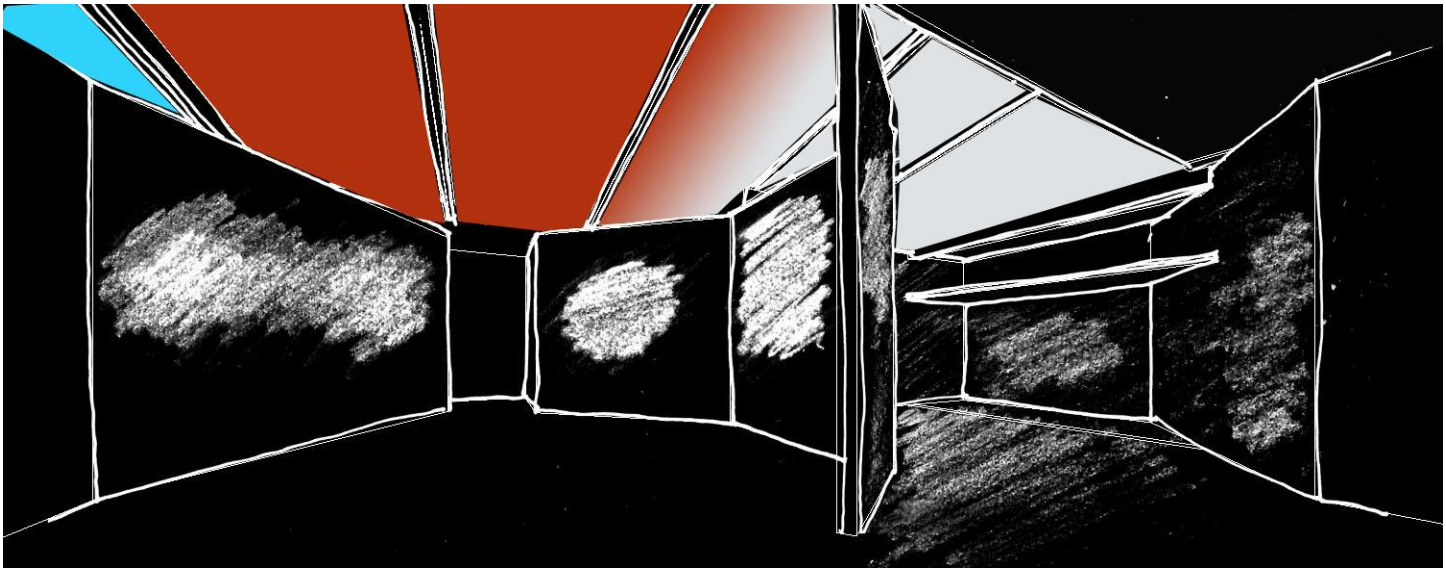
The museum is a 6000 sf space separated into five sections by 6" two-sided-assembly partition walls. There are displays including items like a faux stone partition for petroglyphs and display cases for items such as baskets and bows. The museum will also have portable and temporary displays for community members to have their own



exhibits from time to time. Additionally, the each section has its own projector to display images and videos.

Materials in the museum consist of a lighter brown carpet, white paint walls, plastic laminate casework with a light wood finish, and tectum ceiling tiles.

As designed, the museum provides an interactive environment for visitors to learn about the tribe's history. The architectural design for the museum involves five sections. The first section is where visitors enter and can either move into the show room or into the exhibit space. This section has suspended track lighting for any initial displays as people enter. Once in the main exhibit spaces, there are four other sections that the museum designers metaphorically designated as summer, fall, winter, and spring. These four sections have their own personalities as they each present a period of time in the tribe's history, e.g. winter is the period known as the March of Tears. The museum space is the one in which I explored employing psychological impressions, specifically somber and/or festive space as they progress through the rooms and in order to tell the story of the suffered hardships and celebrate their great traditions. Visual attention, created through increased and/or decreased contrast is a way to promote visual cues for way finding and to establish focal points (levels of hierarchy, as previously discussed)[1]. Along the lines of somber, by highlighting the peripheral surfaces and removing contrast, the conditions promote a "more relaxed, introspective attitude in the occupants," which is very important when the idea of the museum is for individuals to reflect on what they are learning as they pass through the space[2]. By doing the reverse and adding a higher contrast and general lighting level, an individual will be prompted to communicate more with others around them, creating a higher energy level for the space: festive, as interpreted from Flynn's Article 6 on the psychology of light.



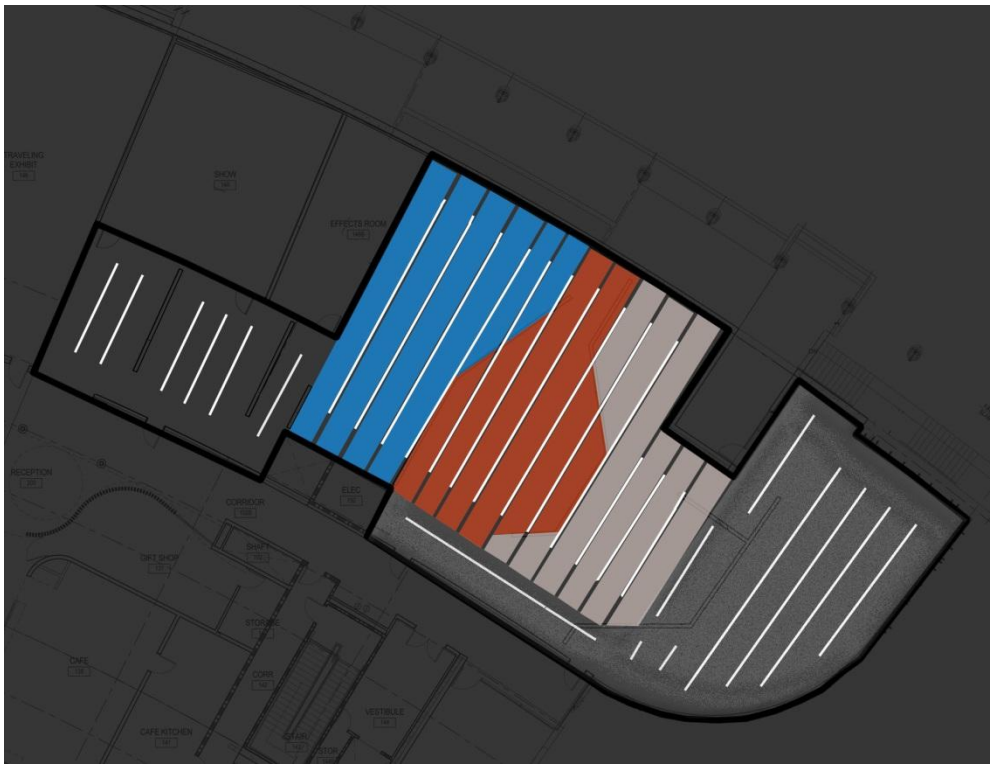
Schematic Drawing of Museum; Fall on left, Winter onRight

The lighting for these spaces is designed to enhance the experience by not only providing the functional lighting for the displays but also by creating an immersive environment as the ceiling is lit

[1] Flynn Psychology of Light Study 1972, p 15
[2] Flynn Psychology of Light Study 1972, Article 6

up by color changing LED's to portray the corresponding season. These fixtures are ColorKinetics iColor Flex LMX. The ceiling in the museum, as in the classroom, is also a stretch fabric panel. In this instance, the LED's are larger, spaced 12" apart in a grid fashion, and set back further from the panels to create a softer glow from the ceiling. The ceiling is intended to augment the environment so it's important not to create a distraction with the ceiling. The north end of the museum has a change in roof height and consequentially a change in ceiling height, as the mechanical system runs above. Because of this change in ceiling height, the color changing ceiling cannot be continued through to this section.

The illuminance criteria are variable depending on the goal of the lighting, and can be modified when the displays change. Much of the lighting in this space is considered except or as a part of an allowance through code.



Museum Reflected Ceiling Plan

The track lighting set back 5' from the wall and spaced approximately 4.5' apart, corresponding to the gaps in the ceiling panels. The track is used for both decorative and ambient lighting. The emergency lighting in this space is a series of strip lighting placed above the fabric panels that will only operate in the case of an emergency. They will be operated by an inverter system that is placed in the museum electrical closet.

I also want to mention that because I created a dropped ceiling across the entire museum, this is going to affect the mechanical system. The original mechanical system was exposed; therefore with the changes to the architecture, the diffusers will have to be moved to the edges of the room where slot diffusers can be used.

Electrical Depth

The following electrical depth involves the adjustments to the panel boards and distribution system due to the modifications in the lighting system; the calculation of the cost savings for switching to aluminum wiring; and the analysis cost and benefits of installing a generator for emergency power.

Panelboard and Distribution System Design

For the most part, only minor changes occurred on the panelboard schedules, as shown in the following pages, and required no change in panelboard size. The most significant change required a new 120/208V panelboard dedicated to the museum track lighting which is low voltage. The new track lighting panelboard connects to a transformer which branches from the museum lighting panel board. See Appendix B for Panelboard schedules. Please note that final amperage was calculated using a demand factor of 1.25 for continuous lighting loads.

Aluminum Wiring Replacement Study

An easy way to cut costs in a building is to replace copper wiring with aluminum. Because aluminum wire only comes in sizes #8 and up, I conducted this study with the distribution wiring and did not include branch wiring in the calculation. Please refer to Appendix B for calculation charts. By switching to aluminum wiring, the owner can save approximately 55% on the wire, according to the RSMeans Electrical Cost Data 2013. Because switching to aluminum also requires larger wire sizes, it's also important to factor in the increased cost for larger conduit. The final savings factoring in the increased cost of conduit is 44% or approximately $8,724.68.

Alternate Emergency Power Study

The original design for the emergency power involves solely battery back-up power. In this analysis, I determined the added cost and potential benefits for having a generator as back-up power for the museum.

There are a couple downsides to using battery power as the back-up source in the case of an emergency. The first is that each lighting fixture or piece of life safety equipment that is used in the case of emergency will require a battery which increases the price of each fixture and piece of equipment. Another factor is that batteries must be tested and maintained on a regular basis to be sure that they are always in operating condition. The batteries will also have to be replaced if they are ever used.

There are also downsides to using a generator for power. First there will need to be a place in the building to house the generator, or there will need to be a structure outside of the building to house the generator. A generator needs a distribution system, meaning that there will need to be at least one panel board, a transfer switch, and separate wiring to all of the life-safety equipment. In the case of this building it is required that there be two panel boards, one at 120/208V and one at 277/480V due to the low voltage ambient lighting in the museum space. This also requires a transformer.

In the Native American Cultural Center, emergency lighting accounts for approximately 18000 VA. The elevator adds 13815 VA. Assuming another 20000 VA for security and fire alarm systems, back-up power would need to support 60kVA at a voltage of 277/480V.

The total cost for the diesel generator, two panel boards, a transformer, and a transfer switch, based on the RSMeans Electrical Cost Data is approximately $43,000. Note that this number does not include the wiring and conduit nor the labor for installing the wiring and conduit. This number also cannot include the qualitative loss of possible storage space or the quantitative loss if there was a separate foundation and structure built for the generator itself.

To determine the cost vs. benefits of changing the emergency power system, it is important to look at the larger picture. This is a cultural center where, in the case of an emergency, visitors will simply leave, and there isn't, for instance, a major data system that would require back-up. The lighting, fire alarm system, card access, and elevators are going to be the only items that require emergency back-up. By not having a generator, the only loss that there will be is the ability to use the elevator in the case of an emergency, but it is a one story building, so this issue become less relevant. The only other benefit would be that there would no longer be a maintenance cost for the battery back-up power. Because of these reasons, I have deemed this an extra cost that is not needed for the project. Batteries would cost approximately $70 more per lighting fixture according to the RSMeans Electrical Cost Data.

Conclusion

The tribe values nature, wisdom, respect and genuineness and feels that it is important to provide information to the neighboring communities in order to promote a better understanding and harmony among all inhabitants of the area. The design for the Native American Cultural Center in Arizona is all about embracing the harmony with and becoming a part of the tribe's culture. The goals are to create an immersive environment for learning and engaging in what the tribe has to offer. The design is meant to embody the values of the tribe, from the glass types used to create the optimal views out to nature to the constellations displayed in the electric lighting design. The purpose of the cultural center is to bring both tribe and public together to learn, understand, and celebrate the tribe's culture and heritage. The lighting should be responsive and enhance this idea. The tribe values nature, wisdom, respect and genuineness. The Tribe feels that it is important to provide information to the neighboring communities in order to promote a better understanding and harmony among all inhabitants of the area.

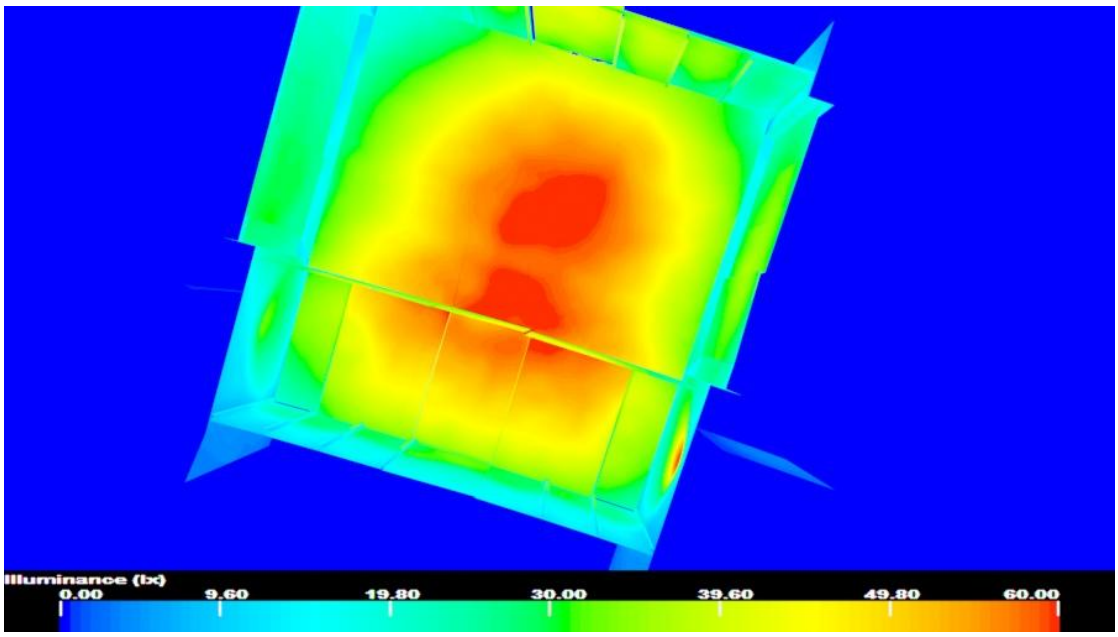
Appendix A

Lighting Equipment Schedule

TYPE	DESCRIPTION	MANUFACTURER	MODEL	LOAD	LAMP	VOLT	MOUNTING	Quantity
L1	8' suspended, T8 linear fluorescent, indirect, rectangular, extruded aluminum fixture with custom champagne finish	Peerless	LL1M1 32 8FT R8 277 ADZT SCT LP830 F2/XX CO99 ACG OJB SLP ADC	35W	T8	277	Special Mounting	12
P1	CFL Visor Floor washlight; circular housing with safety glass lens; asymmetric reflector system.	ERCO	33301000 1xTC DEL 10W	10W	CFL	277	Wall recessed, 3' AFF	17
P2	eW Graze Power Core 1' fixture, 2700K, dimmable	Color Kinetics	523-000030-08	15W	LED	277	In Grade	80
P3	1' LED 2700K eW Fuse Powercore with 10x60 degree beam angle, end to end connectors for flexibility	Color Kinetics	523-000065-08	12W	LED	277	Special Mounting	44
C1	Part of a continuous lighting system, T5 linear fluorescent fixture with silver finish, LED downlights, 4000K	RSA	CCF 1 032T8L CS 2	36W	T5, LED	277	10' AFF	12
C2	iColor Flex MX, 60 nodes, individually operable, clear dome lens	Color Kinetics	101-000068-05	0.5W	LED	277	Varies	60
C3	4' recessed linear fluorescent wall washer , 4000K; for drywall ceiling	Litecontrol	R-WWD-44-14T5	28W	T5, LED	277	Ceiling	3
M1	iColor Flex LMX, 12" spacing, clear flat lens	Color Kinetics	101-000067-01	0.5 W	LED	277	16' AFF	2000
M2	Stella; T4 50W 12V 950lm Track head with spot reflector; includes low voltage transformer, cross baffle and anti-glare cap, includes 0-90 yoke, and 360 rotation, dimming capable; white finish	ERCO	73504.023	50W	Low Voltage Halogen	12	Track	80
M2a	UV filter for Stella track heads	ERCO	70688.000	n/a	n/a	n/a	n/a	80
M2b	Line Voltage Track, 2 - 20A circuit, 12' length; white finish, separate neutrals for dimming	ERCO	12033.023	n/a	n/a	120	at Ceiling plane	19
M3	Utility Fluorescent T8 Strip Light	Cooper Metalux	SNF-132-277-EB8	35W	T8	277	16'6" AFF	16

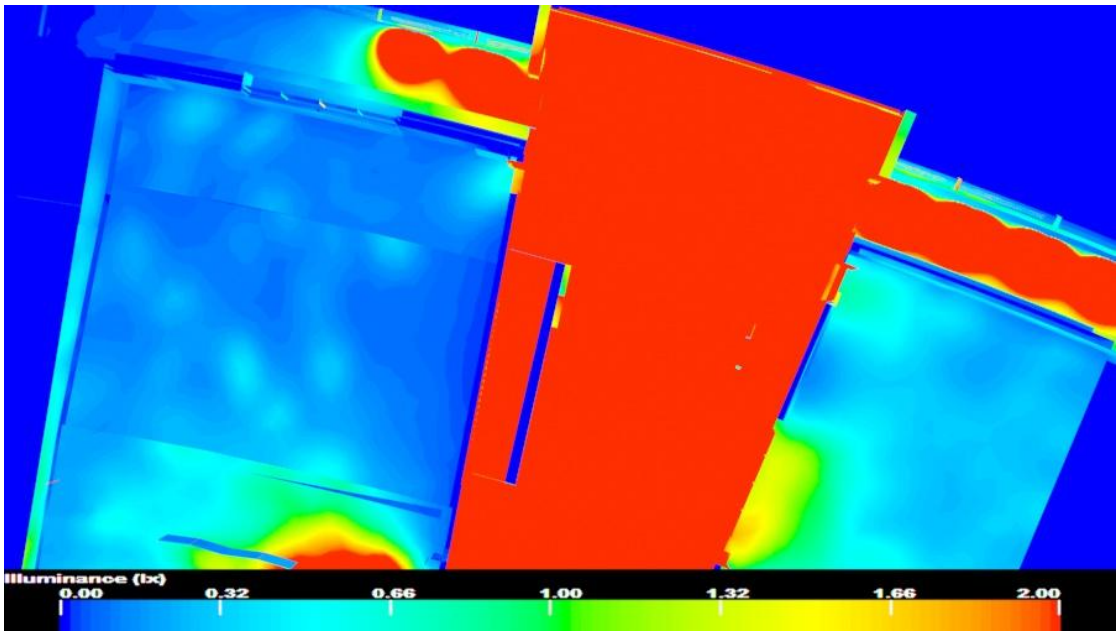
Lighting Calculations

Entry Lobby

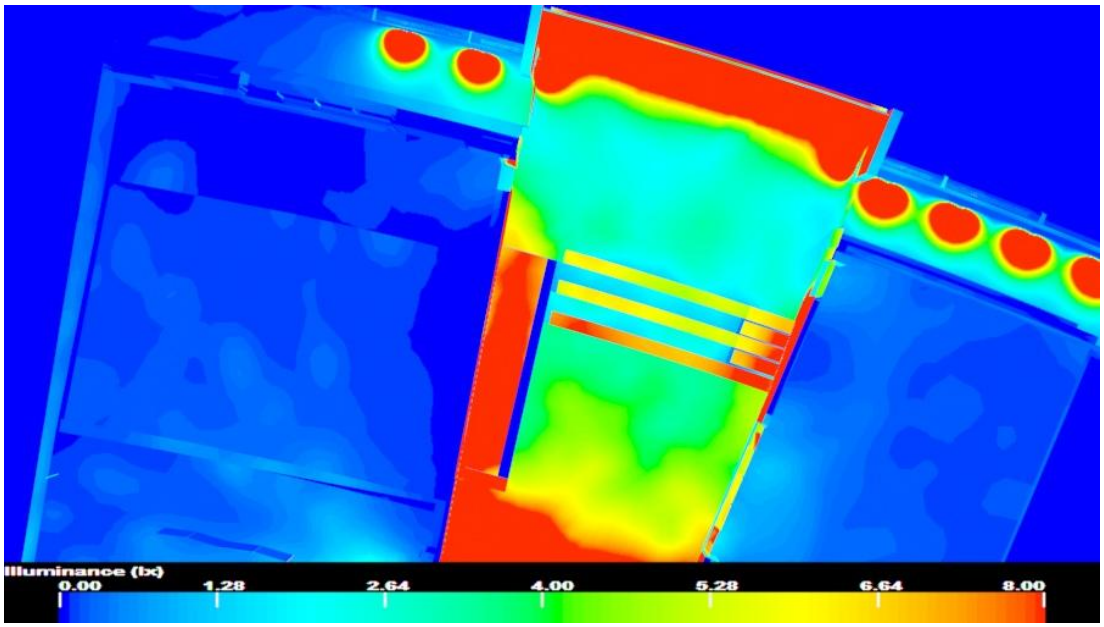


Entry Lobby Pseudo-Color Rendering

Promenade

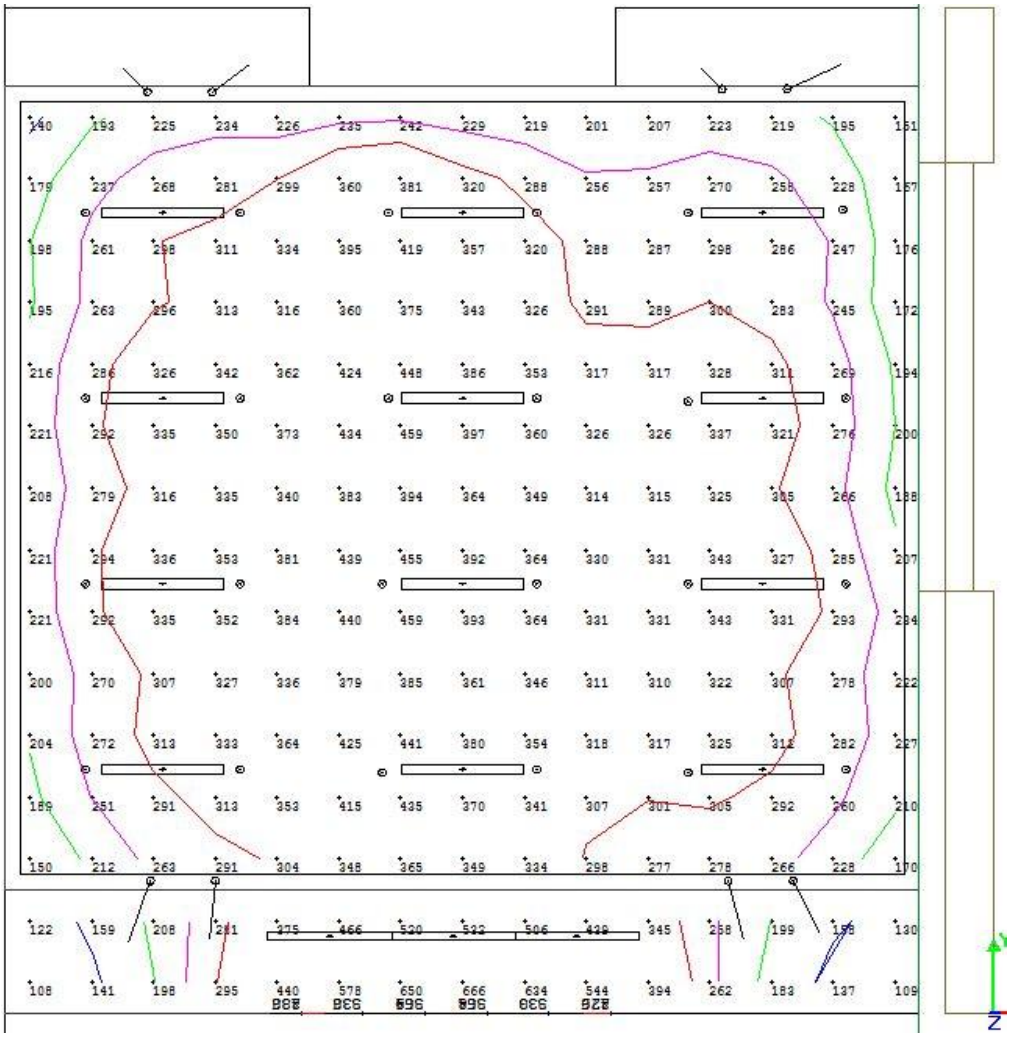


Promenade Pseudo Color at 2 lux max to show it meets code



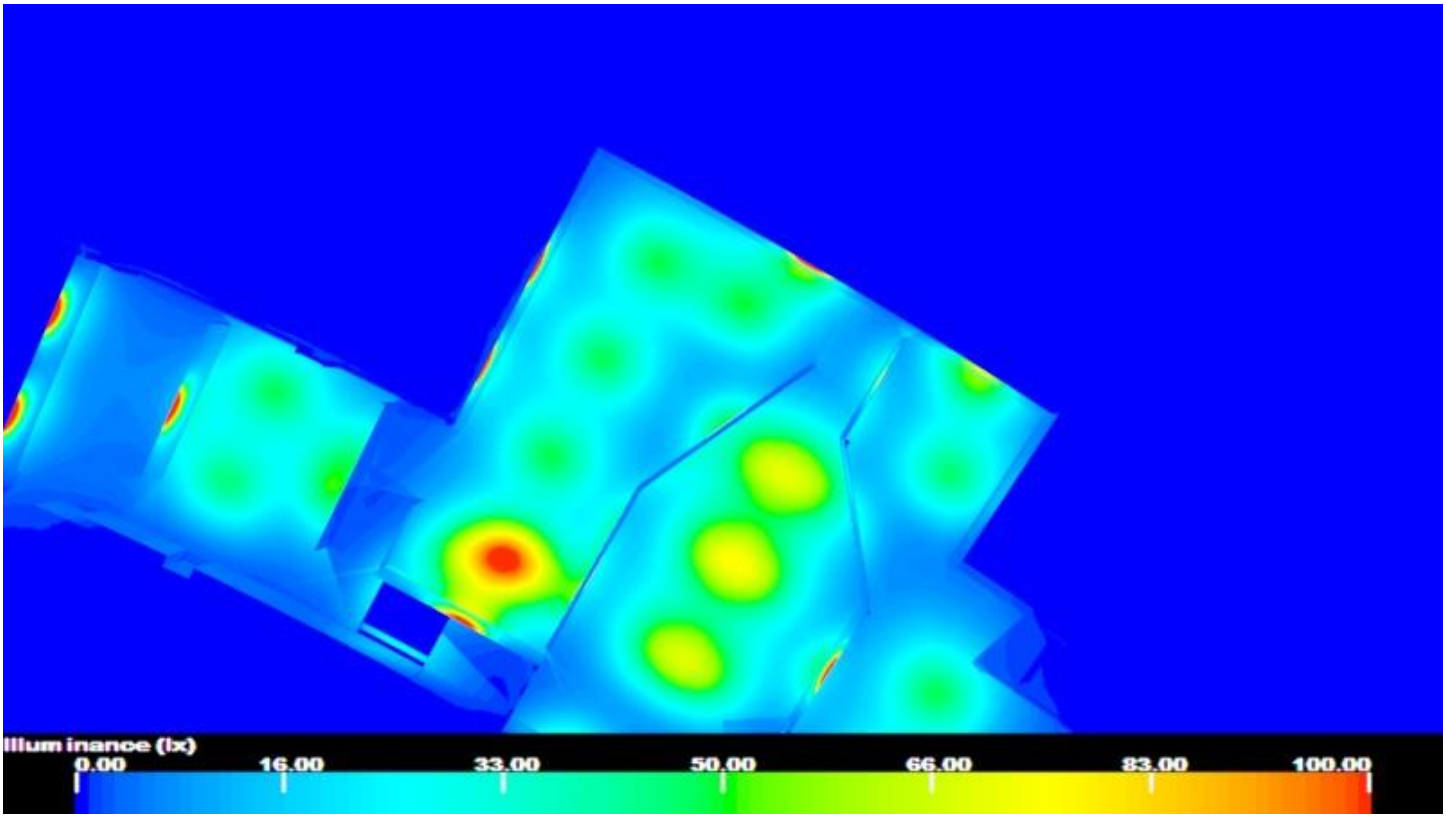
Promenade Pseudo Color at 8 lux

Classroom



AGi32 Calculation and Isolines and Statistics

Museum



In-uniformity in Museum, specific to space and desired look. This will be constantly changing.

Appendix B – Electrical

Panelboard Schedules

Panelboard - 1HB

Voltage: 480Y/277 **Main Breaker:** 400 A **Feeder:** 4-350kcmil, #4g, 3 **(#, size wire & conduit)**

Description	LOAD (VA) A	LOAD (VA) B	LOAD (VA) C	Brk. Trip (A)	LP Cond. Size			LP Cond. Size	LOAD (VA) A	LOAD (VA) B	LOAD (VA) C	Brk. Trip (A)	Description
LTG - Viewpoint	3			20	#12	1	2	#12	132			20	LTG - s corridor gen
LTG - Entrance step		227		20	#12	3	4	#12		690		20	LTG - s corridor gen
LTG - Parking			954	20	#12	5	6	#12			466	20	LTG - n corridor dere
LTG - step lights	99			20	#12	7	8	#12	462			20	LTG - n corridor dnlts
LTG - Entrance Lobby		420		20	#12	9	10	#12		225		20	LTG - prefunc gen
Living Room Accent			312	20	#12	11	12	#12			420	20	LTG - aud. Center up
MP front wall	165			20	#12	13	14	#12	330			20	LTG - wrap dn graze
MP pendant dnlt		198		20	#12	15	16	#12		396		20	LTG - wrap up graze
MP pendant uplt			198	20	#12	17	18	#12			792	20	LTG - aud downlights
MP side ww	256			20	#12	19	20	#12	363			20	LTG - aud front ww
MP front light		350		20	#12	21	22	#12		384		20	LTG - dress 103 stor 104
LTG - south canyons			387	20	#12	23	24	#12			542	20	LTG - Restrooms south
LTG - s canyon uplt	2112			20	#12	25	26	#12	1176			20	LTG - 129,127,115, 125,123B,123A
LTG - Ext W Façade		600		20	#12	27	28	#12		1094		20	LTG - Classrooms
LTG - Security Ext S			100	20	#12	29	30	#12			832	20	LTG - lounge, kitchen
LTG - Ext Perim Ingr	333			20	#12	31	32	#12	1952			20	LTG - Library, Offices
LTG - Prom. Plaza		252				33	34	#12		896		20	LTG - Utility, Storage
						35	36						
Mech Equip EF -1	903			15	#12	37	38						
		903				39	40						
			903			41	42						
Mech Equip EF-2	292			15	#12	43	44	1/0	28488			150	T-1LB1
		292				45	46			30014			
			292			47	48				37122		
Mech Equip EUH-2	2500			20	#12	49	50	1/0	29916			150	Mech Equip AHU-2
		2500				51	52			29916			
			2500			53	54				29916		
	6663	5742	5646						62819	63615	70090		

Total Load on Phase A: 69,482 VA

Total Load on Phase B: 69,357 VA

Total Load on Phase C: 75,736 VA

Total Load on Panel: 268 kVA Demand

322.6170157 A

Panelboard - 1HA

Voltage: 480Y/277 **Main Breaker:** 400 **A** **Feeder:** 4-350kcmil, #4g, 3
(#, size wire & conduit)

Description	LOAD (VA)			Brk. Trip (A)	LP Cond. Size			Cond. Size	LOAD (VA)			Brk. Trip (A)	Description
	A	B	C						A	B	C		
LTG - Reception cove	738			20	#12	1	2	#12	297			20	LTG - Café 138, Corr 157
Reception Blue Cirde		306		20	#12	3	4	#12		1376		20	LTG - Café/Kit 141, Fire 145, Vest 144, Corridor
Reception Downlights			132	20	#12	5	6	#12			947	20	LTG - Womens 136
N Corridor Fluorescent	99			20	#12	7	8	#12	66			20	LTG - Gift shop
N Corridor Clerestory		1292		20	#12	9	10	#12		138		20	LTG - Ext. Perim N In-grades
Travelling exhibit entr			48	20	#12	11	12	#12			179	20	LTG - Ext N EM Door
Travelling exh. House	768			20	#12	13	14	#12	103			20	LTG - Ext Stair/Egress
BRC House - Show		468		20	#12	15	16	#12		135		20	LTG - Ext Stair step N/W
BRC House - Zone 1			1419	20	#12	17	18	#12			86	20	LTG - Stair Step N
BRC House - Zone 2	1335			20	#12	19	20	#12	200			20	LTG - Ext Loading EM
Exhibit Ceiling		750		20	#12	21	22	#12		450		20	LTG - Ext Loading
Exhibit Ceiling			750	20	#12	23	24	#12			180	20	Ext. Courtyard Accent
Exhibit Ceiling	750			20	#12	25	26						
						27	28						
						29	30	#12			783	20	Exterior Slat Uplights
						31	32						
						33	34						
						35	36						
T-1LA1	15630			100	#1	37	38	4/0	41667			175	T-1LA3
		16500				39	40			41667			
			12860			41	42				41667		
Mech Equip EF-4	930			15	#12	43	44	#3	0			100	T-1LA1IG XFMR
		930				45	46			0			
			930			47	48				0		
Mech Equip MAU-2	903			15	#12	49	50	#12	930			20	Mech Equip EF-3
		903				51	52			930			
			903			53	54				930		
	21153	21149	17042						43263	44696	44772		

Total Load on Phase A: 64,416 VA
Total Load on Phase B: 65,845 VA
Total Load on Phase C: 61,814 VA

Total Load on Panel: 240 kVA Demand
288.7878983 A

Panelboard - 1LA3

Voltage: 208Y/120 **Main Breaker:** 400 **A** **Feeder:** 4-500kcmil, #3g, 3.5 cond
(#, size wire & conduit)

Description	LOAD (VA)			Brk. Trip (A)	LP			Cond. Size	LOAD (VA)			Brk. Trip (A)	Description
	A	B	C		Cond. Size				A	B	C		
Museum Track Lighting	1920			20	#12	1	2	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	3	4	#12		1920		20	Museum Track Lighting
Museum Track Lighting			1920	20	#12	5	6	#12			1920	20	Museum Track Lighting
Museum Track Lighting	1920			20	#12	7	8	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	9	10	#12		1920		20	Museum Track Lighting
Museum Track Lighting			1920	20	#12	11	12	#12			1920	20	Museum Track Lighting
Museum Track Lighting	1920			20	#12	13	14	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	15	16	#12		1920		20	Museum Track Lighting
Museum Track Lighting			1920	20	#12	17	18	#12			1920	20	Museum Track Lighting
Museum Track Lighting	1920			20	#12	19	20	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	21	22	#12		1920		20	Museum Track Lighting
Museum Track Lighting			1920	20	#12	23	24	#12			1920	20	Museum Track Lighting
Museum Track Lighting	1920			20	#12	25	26	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	27	28	#12		1920		20	Museum Track Lighting
Museum Track Lighting			1920	20	#12	29	30	#12			1920	20	Museum Track Lighting
Museum Track Lighting	1920			20	#12	31	32	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	33	34	#12		1920		20	Museum Track Lighting
Museum Track Lighting			1920	20	#12	35	36	#12			1920	20	Museum Track Lighting
Museum Track Lighting	1920			20	#12	37	38	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	39	40	#12		1920		20	Museum Track Lighting
Museum Track Lighting			1920	20	#12	41	42	#12			1920	20	Museum Track Lighting
Museum Track Lighting	1920			20	#12	43	44	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	45	46	#12		1920		20	Museum Track Lighting
Museum Track Lighting			1920	20	#12	47	48	#12			1920	20	Museum Track Lighting
Museum Track Lighting	1920			20	#12	49	50	#12	1920			20	Museum Track Lighting
Museum Track Lighting		1920		20	#12	51	52						
Museum Track Lighting			1920	20	#12	53	54						
	17280	17280	17280						17280	15360	15360		

Total Load on Phase A: 34,560 VA
Total Load on Phase B: 32,640 VA
Total Load on Phase C: 32,640 VA

Total Load on Panel: 125 kVA Demand
346.4101615 A

Electrical Calculations

	Panel	Dist.	Copper Wire Size	# Copper wires	Alum Wire Size	# Alum wires	$Copper /lf	$Alum/lf	$Copper (Total)	$Alum (Total)	Savings
South Electrical Closet	1HB	250	350kcmil	4	4/0	8	$8.30	$1.56	$8,300.00	$3,120.00	$5,180.00
	1LB1	4	350kcmil	4	4/0	8	$8.30	$1.56	$132.80	$49.92	$82.88
	1LB2	6	350kcmil	4	4/0	8	$8.30	$1.56	$199.20	$74.88	$124.32
North Electrical Closet	1LB3	90	#3	4	#1	4	$1.25	$0.80	$450.00	$288.00	$162.00
	1HA	100	350kcmil	4	4/0	8	$8.30	$1.56	$3,320.00	$1,248.00	$2,072.00
	1LAIG	4	#3	4	#1	4	$1.25	$0.80	$20.00	$12.80	$7.20
	1LA1	4	4/0	4	300kcmil	4	$4.95	$2.63	$79.20	$42.08	$37.12
	1LA2	6	4/0	4	300kcmil	4	$4.95	$2.63	$118.80	$63.12	$55.68
	1LA3	8	4/0	4	300kcmil	4	$4.95	$2.63	$158.40	$84.16	$74.24
Lower Level Electrical Room	BHA	8	350kcmil	4	4/0	8	$8.30	$1.56	$265.60	$99.84	$165.76
	1LK	90	4/0	4	300kcmil	4	$4.95	$2.63	$1,782.00	$946.80	$835.20
	1LK2	210	#3	4	#1	4	$1.25	$0.80	$1,050.00	$672.00	$378.00
	BLA1	4	4/0	4	300kcmil	4	$4.95	$2.63	$79.20	$42.08	$37.12
	BLA3	6	4/0	4	300kcmil	4	$4.95	$2.63	$118.80	$63.12	$55.68
LL Corr	BLA2	160	4/0	4	300kcmil	4	$4.95	$2.63	$3,168.00	$1,683.20	$1,484.80
								Totals:	$19,242.00	$8,490.00	$10,752.00

Phase and Neutral Wire Calculation Using RSMeans 2013 Electrical Cost Data

	Panel	Dist.	Grnd Size	Alum	# Grnd	$Copper /lf	$Alum/lf	$Copper (Total)	$Alum (Total)	Savings
South Electrical Closet	1HB	250	#4	#2	1	$1.01	$0.55	$252.50	$137.50	$115.00
	1LB1	4	#4	#2	1	$1.01	$0.55	$4.04	$2.20	$1.84
	1LB2	6	#4	#2	1	$1.01	$0.55	$6.06	$3.30	$2.76
North Electrical Closet	1LB3	90	#8	#6	1	$0.37	$0.33	$33.30	$29.70	$3.60
	1HA	100	#4	#2	1	$1.01	$0.55	$101.00	$55.00	$46.00
	1LAIG	4	#8	#6	1	$0.37	$0.33	$1.48	$1.32	$0.16
	1LA1	4	#6	#4	1	$0.63	$0.40	$2.52	$1.60	$0.92
	1LA2	6	#6	#4	1	$0.63	$0.40	$3.78	$2.40	$1.38
	1LA3	8	#6	#4	1	$0.63	$0.40	$5.04	$3.20	$1.84
Lower Level Electrical Room	BHA	8	#4	#2	1	$1.01	$0.55	$8.08	$4.40	$3.68
	1LK	90	#6	#4	1	$0.63	$0.40	$56.70	$36.00	$20.70
	1LK2	210	#8	#6	1	$0.37	$0.33	$77.70	$69.30	$8.40
	BLA1	4	#6	#4	1	$0.63	$0.40	$2.52	$1.60	$0.92
	BLA3	6	#6	#4	1	$0.63	$0.40	$3.78	$2.40	$1.38
LL Corr	BLA2	160	#6	#4	1	$0.63	$0.40	$100.80	$64.00	$36.80
							Totals:	$659.30	$413.92	$245.38

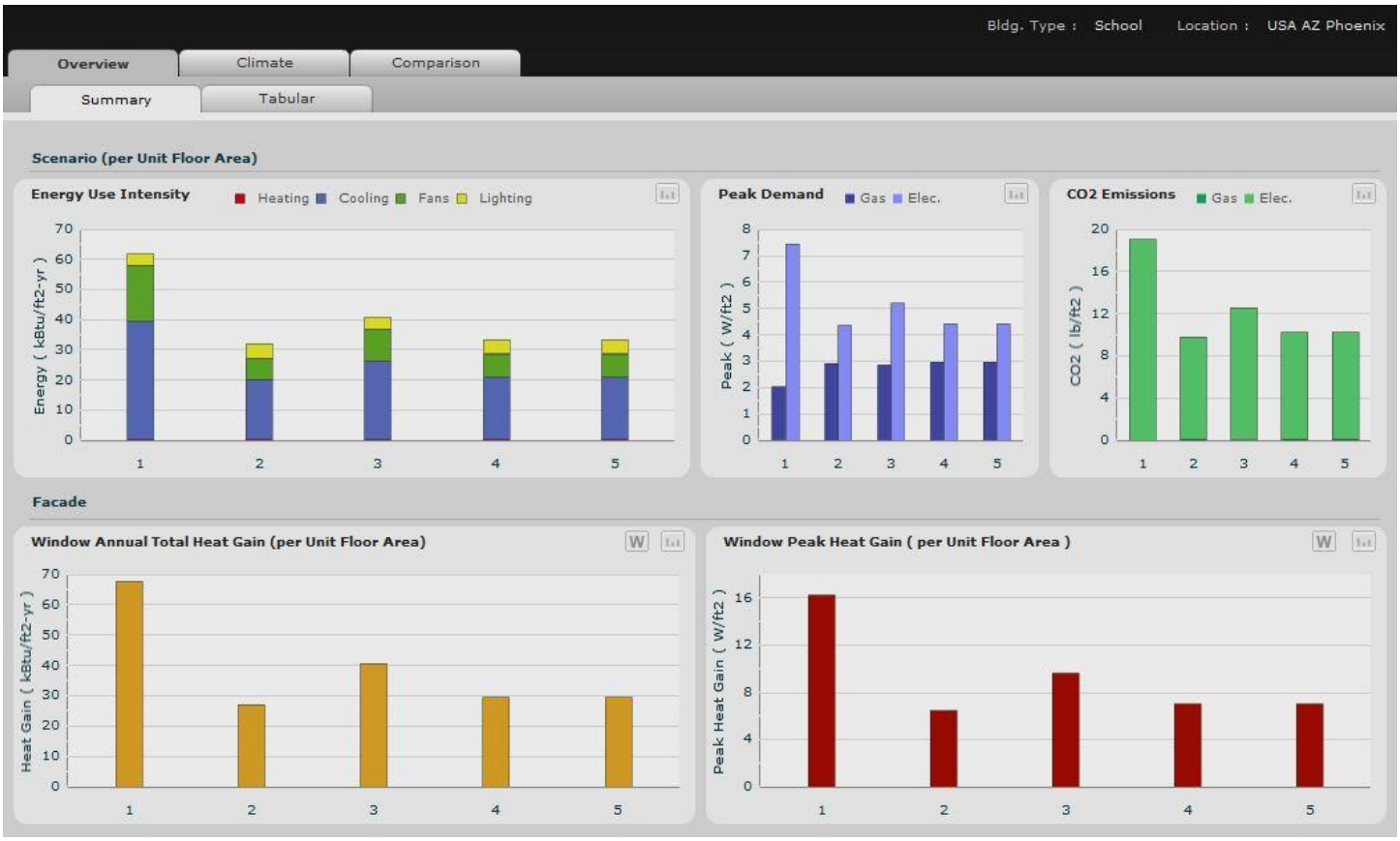
Ground Wire Calculation

Copper Wire Size	Conduit Size	$Cond. Copper Wire	Alum Wire Size	Conduit Size	$Cond. Alumin.Wire	Savings
350kcmil	2.5	$3,737.50	4/0	2	$3,950.00	($212.50)
350kcmil	2.5	$59.80	4/0	2	$63.20	($3.40)
350kcmil	2.5	$89.70	4/0	2	$94.80	($5.10)
#3	1.25	$481.50	#1	1.25	$481.50	$0.00
350kcmil	2.5	$1,495.00	4/0	2	$1,580.00	($85.00)
#3	1.25	$21.40	#1	1.25	$21.40	$0.00
4/0	2	$31.60	300kcmil	2.5	$59.80	($28.20)
4/0	2	$47.40	300kcmil	2.5	$89.70	($42.30)
4/0	2	$63.20	300kcmil	2.5	$119.60	($56.40)
350kcmil	2.5	$119.60	4/0	2	$126.40	($6.80)
4/0	2	$711.00	300kcmil	2.5	$1,345.50	($634.50)
#3	1.25	$1,123.50	#1	1.25	$1,123.50	$0.00
4/0	2	$31.60	300kcmil	2.5	$59.80	($28.20)
4/0	2	$47.40	300kcmil	2.5	$89.70	($42.30)
4/0	2	$1,264.00	300kcmil	2.5	$2,392.00	($1,128.00)
						($2,272.70)

Conduit Calculation

Appendix C – Mechanical Calculations

Lobby COMFEN



1. double pane clear glass

2. double pane gray/clear glass

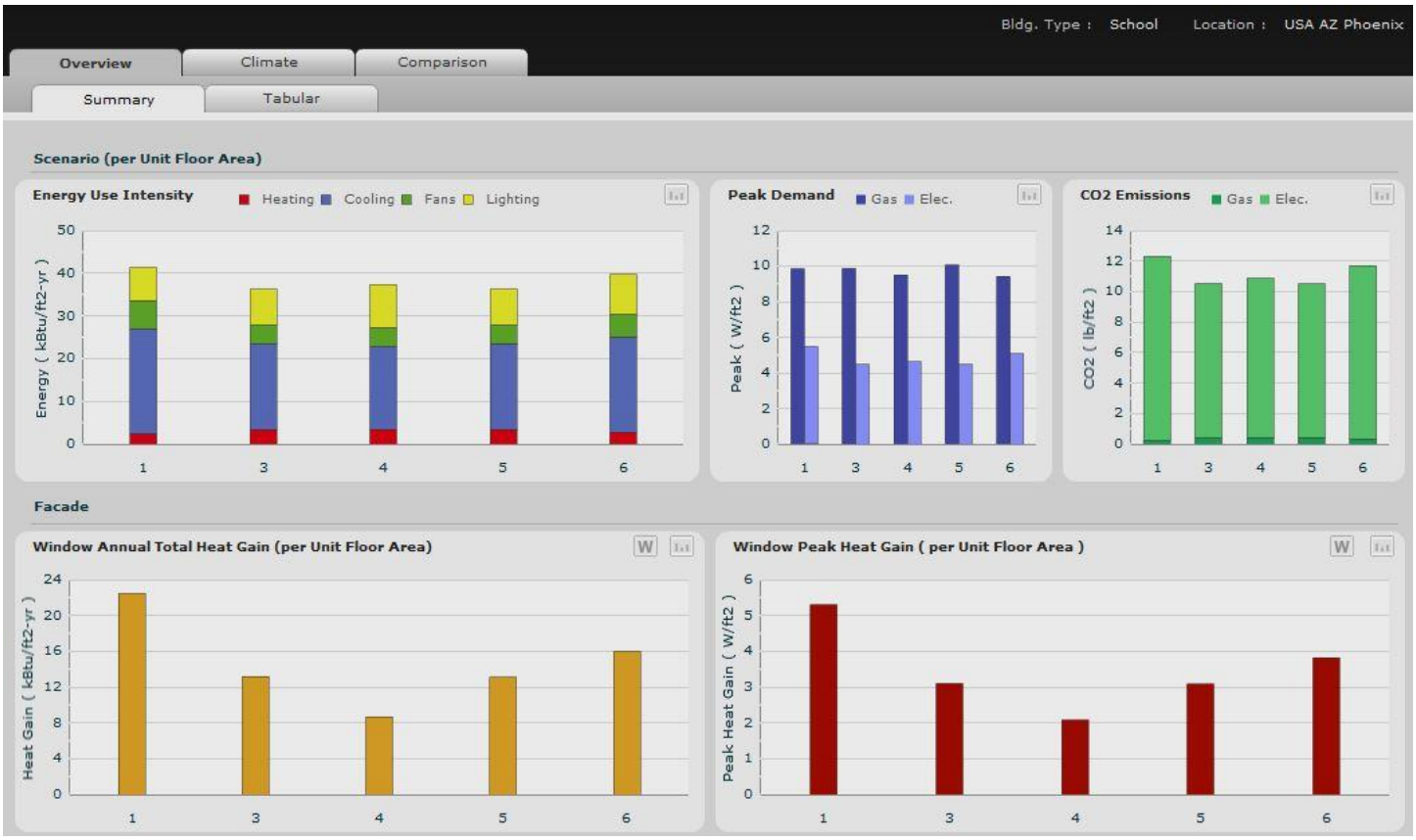
3. double pane low-e glass

4. double pane bronze/clear glass

5. double pane bronze tinted glass

Lobby Carrier

Classroom COMFEN



1. double pane clear glass

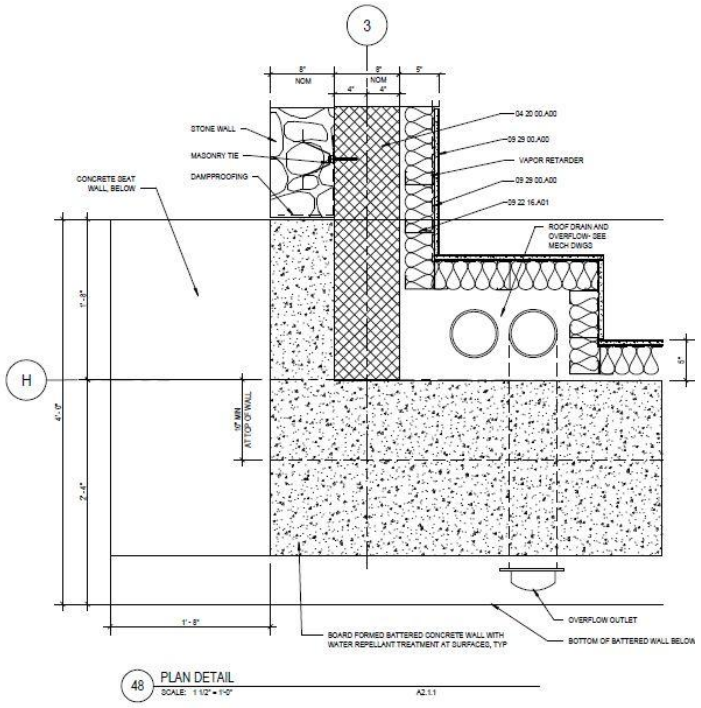
3. double pane low-e glass

4. double pane gray/clear glass

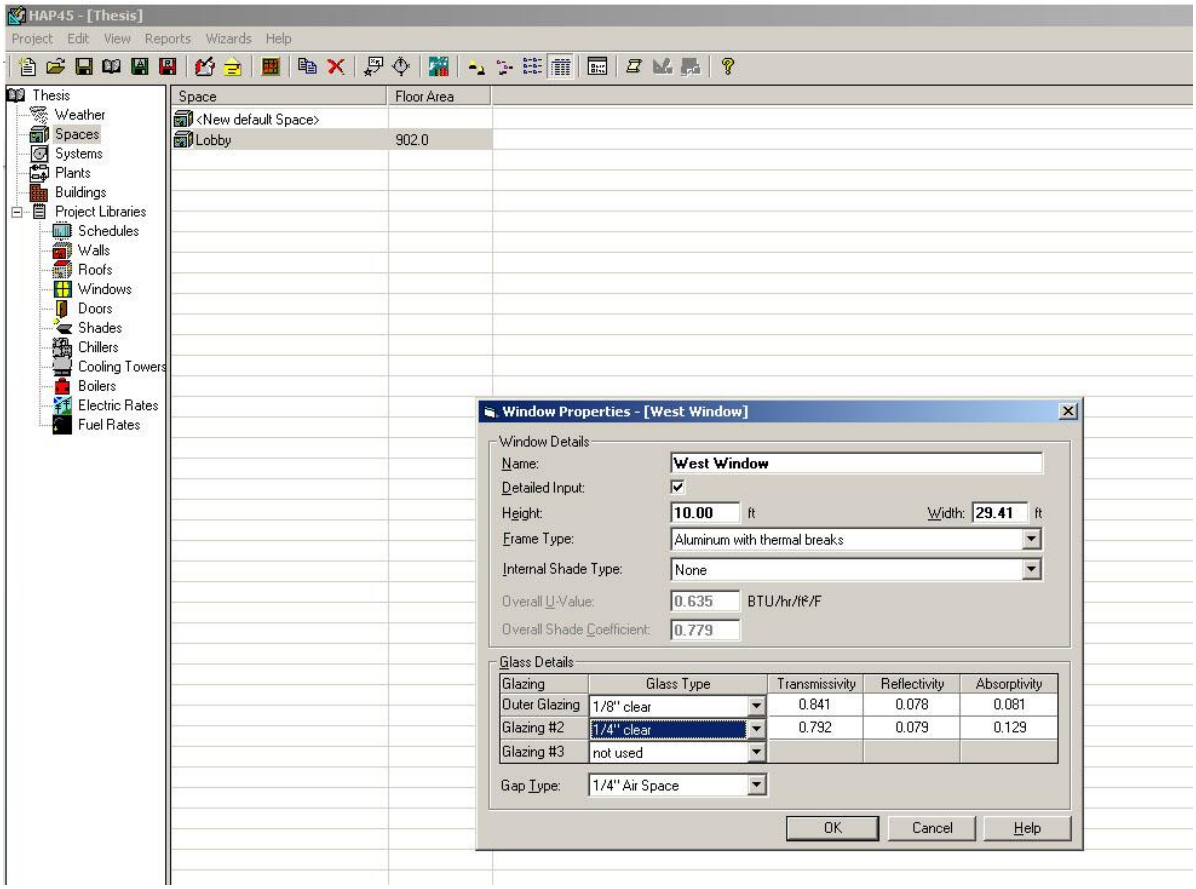
5. PPG's double pane clear glass

6. double pane bronze tinted glass.

Classroom Carrier



Wall Detail used to determine inputs for Carrier



Sample Screenshot of Carrier HAP

Classroom Eighth Inch Clear Glass

Air System Information

Air System Name	Default System		Number of zones	1	
Equipment Class	UNDEF		Floor Area	900.0	ft²
Air System Type	VAV		Location	[redacted] Arizona	

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load		Calculation Months	Jan to Dec	
Space CFM	Individual peak space loads		Sizing Data	Calculated	

Central Cooling Coil Sizing Data

Total coil load	1.6	Tons	Load occurs at	Jul 1500	
Total coil load	19.7	MBH	OA DB / WB	94.0 / 60.0	°F
Sensible coil load	19.7	MBH	Entering DB / WB	90.5 / 59.7	°F
Coil CFM at Jul 1500	620	CFM	Leaving DB / WB	55.0 / 46.5	°F
Max block CFM at Jul 1500	760	CFM	Coil ADP	51.1	°F
Sum of peak zone CFM	760	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	40	%
ft²/Ton	547.5		Design supply temp.	55.0	°F
BTU/(hr-ft²)	21.9		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	3.95	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

Max coil load	14.2	MBH	Load occurs at	Des Htg	
Coil CFM at Des Htg	620	CFM	Ent. DB / Lvg DB	24.4 / 50.0	°F
Max coil CFM	760	CFM			
Water flow @ 20.0 °F drop	1.42	gpm			

Supply Fan Sizing Data

Actual max CFM at Jul 1500	760	CFM	Fan motor BHP	0.00	BHP
Standard CFM	631	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	0.84	CFM/ft²	Fan static	0.00	in wg

Outdoor Ventilation Air Data

Design airflow CFM	620	CFM	CFM/person	20.00	CFM/person
CFM/ft²	0.69	CFM/ft²			

Classroom Quarter Inch Low-E

Air System Information

Air System Name	Default System		Number of zones	1	
Equipment Cl	UNDEF		Floor Area	900.0	ft²
Air System Type	VAV		Location	[redacted] Arizona	

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load		Calculation Months	Jan to Dec	
Space CFM	Individual peak space loads		Sizing Data	Calculated	

Central Cooling Coil Sizing Data

Total coil load	1.7	Tons	Load occurs at	Jul 1500	
Total coil load	20.4	MBH	OA DB / WB	94.0 / 60.0	°F
Sensible coil load	20.4	MBH	Entering DB / WB	91.6 / 59.7	°F
Coil CFM at Jul 1500	620	CFM	Leaving DB / WB	55.0 / 46.1	°F
Max block CFM at Jul 1600	701	CFM	Coil ADP	50.9	°F
Sum of peak zone CFM	701	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	40	%
ft²/Ton	529.8		Design supply temp.	55.0	°F
BTU/(hr-ft²)	22.7		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	4.08	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

Max coil load	16.2	MBH	Load occurs at	Des Htg	
Coil CFM at Des Htg	620	CFM	Ent. DB / Lvg DB	20.9 / 50.0	°F
Max coil CFM	701	CFM			
Water flow @ 20.0 °F drop	1.62	gpm			

Supply Fan Sizing Data

Actual max CFM at Jul 1600	701	CFM	Fan motor BHP	0.00	BHP
Standard CFM	582	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	0.78	CFM/ft²	Fan static	0.00	in wg

Outdoor Ventilation Air Data

Design airflow CFM	620	CFM	CFM/person	20.00	CFM/person
CFM/ft²	0.69	CFM/ft²			

Classroom Eighth Inch Grey Tint

Air System Information

Air System N[illegible]	Default System		Number of zones	1	
Equipment C	UNDEF		Floor Area	900.0	ft²
Air System Type	VAV		Location	[redacted]tt, Arizona	

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load		Calculation Months	Jan to Dec	
Space CFM	Individual peak space loads		Sizing Data	Calculated	

Central Cooling Coil Sizing Data

Total coil load	1.7	Tons	Load occurs at	Jul 1500	
Total coil load	20.2	MBH	OA DB / WB	94.0 / 60.0	°F
Sensible coil load	20.2	MBH	Entering DB / WB	91.3 / 59.7	°F
Coil CFM at Jul 1500	620	CFM	Leaving DB / WB	55.0 / 46.2	°F
Max block CFM at Jul 1600	714	CFM	Coil ADP	51.0	°F
Sum of peak zone CFM	714	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	40	%
ft²/Ton	534.2		Design supply temp.	55.0	°F
BTU/(hr-ft²)	22.5		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	4.05	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

Max coil load	15.7	MBH	Load occurs at	Des Htg	
Coil CFM at Des Htg	620	CFM	Ent. DB / Lvg DB	21.7 / 50.0	°F
Max coil CFM	714	CFM			
Water flow @ 20.0 °F drop	1.57	gpm			

Supply Fan Sizing Data

Actual max CFM at Jul 1600	714	CFM	Fan motor BHP	0.00	BHP
Standard CFM	593	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	0.79	CFM/ft²	Fan static	0.00	in wg

Outdoor Ventilation Air Data

Design airflow CFM	620	CFM	CFM/person	20.00	CFM/person
CFM/ft²	0.69	CFM/ft²			

Lobby Quarter Inch Bronze Tint

Air System Information

Air System N[illegible]	Default System		Number of zones	1	
Equipment C	UNDEF		Floor Area	902.0	ft²
Air System Type	VAV		Location	Presc[redacted]na	

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load		Calculation Months	Jan to Dec	
Space CFM	Individual peak space loads		Sizing Data	Calculated	

Central Cooling Coil Sizing Data

Total coil load	1.9	Tons	Load occurs at	Jul 1700	
Total coil load	22.7	MBH	OA DB / WB	91.5 / 59.2	°F
Sensible coil load	22.7	MBH	Entering DB / WB	76.3 / 53.9	°F
Coil CFM at Jul 1700	1187	CFM	Leaving DB / WB	55.0 / 45.4	°F
Max block CFM at Jul 1600	1327	CFM	Coil ADP	52.6	°F
Sum of peak zone CFM	1327	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	24	%
ft²/Ton	476.6		Design supply temp.	55.0	°F
BTU/(hr-ft²)	25.2		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	4.54	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

No heating coil loads occurred during this calculation.

Supply Fan Sizing Data

Actual max CFM at Jul 1600	1327	CFM	Fan motor BHP	0.00	BHP
Standard CFM	1103	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	1.47	CFM/ft²	Fan static	0.00	in wg

Outdoor Ventilation Air Data

Design airflow CFM	0	CFM	CFM/person	0.00	CFM/person
CFM/ft²	0.00	CFM/ft²			

Lobby Eighth Inch One Pane Tint

Air System Information

Air System	Default System	Number of zones	1
Equipment Class	UNDEF	Floor Area	902.0 ft²
Air System Type	VAV	Location	[redacted], Arizona

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load	Calculation Months	Jan to Dec
Space CFM	Individual peak space loads	Sizing Data	Calculated

Central Cooling Coil Sizing Data

Total coil load	2.8	Tons	Load occurs at	Jul 1700	
Total coil load	33.8	MBH	OA DB / WB	91.5 / 59.2	°F
Sensible coil load	33.8	MBH	Entering DB / WB	76.4 / 53.9	°F
Coil CFM at Jul 1700	1762	CFM	Leaving DB / WB	55.0 / 45.4	°F
Max block CFM at Jul 1700	1942	CFM	Coil ADP	52.6	°F
Sum of peak zone CFM	1942	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	24	%
ft²/Ton	320.6		Design supply temp.	55.0	°F
BTU/(hr-ft²)	37.4		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	6.76	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

No heating coil loads occurred during this calculation.

Supply Fan Sizing Data

Actual max CFM at Jul 1700	1942	CFM	Fan motor BHP	0.00	BHP
Standard CFM	1613	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	2.15	CFM/ft²	Fan static	0.00	in wg

Outdoor Ventilation Air Data

Design airflow CFM	0	CFM	CFM/person	0.00	CFM/person
CFM/ft²	0.00	CFM/ft²			

Lobby Eighth Inch Bronze Tint

Air System Information

Air System Name	Default System	Number of zones	1
Equipment C	UNDEF	Floor Area	902.0 ft²
Air System Type	VAV	Location	[redacted], Arizona

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load	Calculation Months	Jan to Dec
Space CFM	Individual peak space loads	Sizing Data	Calculated

Central Cooling Coil Sizing Data

Total coil load	2.8	Tons	Load occurs at	Jul 1700	
Total coil load	33.1	MBH	OA DB / WB	91.5 / 59.2	°F
Sensible coil load	33.1	MBH	Entering DB / WB	76.3 / 53.9	°F
Coil CFM at Jul 1700	1727	CFM	Leaving DB / WB	55.0 / 45.4	°F
Max block CFM at Jul 1700	1904	CFM	Coil ADP	52.6	°F
Sum of peak zone CFM	1904	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	24	%
ft²/Ton	327.2		Design supply temp.	55.0	°F
BTU/(hr-ft²)	36.7		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	6.62	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

No heating coil loads occurred during this calculation.

Supply Fan Sizing Data

Actual max CFM at Jul 1700	1904	CFM	Fan motor BHP	0.00	BHP
Standard CFM	1582	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	2.11	CFM/ft²	Fan static	0.00	in wg

Outdoor Ventilation Air Data

Design airflow CFM	0	CFM	CFM/person	0.00	CFM/person
CFM/ft²	0.00	CFM/ft²			

Lobby Eighth Inch Clear

Air System Information

Air System Name	Default System		Number of zones	1	
Equipment Class	UNDEF		Floor Area	902.0	ft²
Air System T	VAV		Location	[redacted] Arizona	

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load		Calculation Months	Jan to Dec	
Space CFM	Individual peak space loads		Sizing Data	Calculated	

Central Cooling Coil Sizing Data

Total coil load	3.3	Tons	Load occurs at	Jul 1700	
Total coil load	39.6	MBH	OA DB / WB	91.5 / 59.2	°F
Sensible coil load	39.8	MBH	Entering DB / WB	76.4 / 53.9	°F
Coil CFM at Jul 1700	2079	CFM	Leaving DB / WB	55.0 / 45.4	°F
Max block CFM at Jul 1700	2281	CFM	Coil ADP	52.6	°F
Sum of peak zone CFM	2281	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	24	%
ft²/Ton	271.7		Design supply temp.	55.0	°F
BTU/(hr-ft²)	44.2		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	7.97	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

No heating coil loads occurred during this calculation.

Supply Fan Sizing Data

Actual max CFM at Jul 1700	2281	CFM	Fan motor BHP	0.00	BHP
Standard CFM	1895	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	2.53	CFM/ft²	Fan static	0.00	in wg

Outdoor Ventilation Air Data

Design airflow CFM	0	CFM	CFM/person	0.00	CFM/person
CFM/ft²	0.00	CFM/ft²			

Lobby Eighth Inch Grey Tint

Air System Information

Air System Name	Default System		Number of zones	1	
Equipment Class	UNDEF		Floor Area	902.0	ft²
Air System Type	VAV		Location	[redacted] Arizona	

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load		Calculation Months	Jan to Dec	
Space CFM	Individual peak space loads		Sizing Data	Calculated	

Central Cooling Coil Sizing Data

Total coil load	2.7	Tons	Load occurs at	Jul 1700	
Total coil load	32.9	MBH	OA DB / WB	91.5 / 59.2	°F
Sensible coil load	32.9	MBH	Entering DB / WB	76.3 / 53.9	°F
Coil CFM at Jul 1700	1715	CFM	Leaving DB / WB	55.0 / 45.4	°F
Max block CFM at Jul 1700	1891	CFM	Coil ADP	52.6	°F
Sum of peak zone CFM	1891	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	24	%
ft²/Ton	329.5		Design supply temp.	55.0	°F
BTU/(hr-ft²)	36.4		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	6.57	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

No heating coil loads occurred during this calculation.

Supply Fan Sizing Data

Actual max CFM at Jul 1700	1891	CFM	Fan motor BHP	0.00	BHP
Standard CFM	1571	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	2.10	CFM/ft²	Fan static	0.00	in wg

Outdoor Ventilation Air Data

Design airflow CFM	0	CFM	CFM/person	0.00	CFM/person
CFM/ft²	0.00	CFM/ft²			

Lobby Quarter Inch Low-E

Air System Information

Air System Name	Default System	Number of zones	1
Equipment Class	UNDEF	Floor Area	902.0 ft²
Air System Type	VAV	Location	[redacted] Arizona

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	Peak zone sensible load	Calculation Months	Jan to Dec
Space CFM	Individual peak space loads	Sizing Data	Calculated

Central Cooling Coil Sizing Data

Total coil load	2.6	Tons	Load occurs at	Jul 1700	
Total coil load	31.7	MBH	OA DB / WB	91.5 / 59.2	°F
Sensible coil load	31.7	MBH	Entering DB / WB	76.4 / 53.9	°F
Coil CFM at Jul 1700	1657	CFM	Leaving DB / WB	55.0 / 45.4	°F
Max block CFM at Jul 1700	1825	CFM	Coil ADP	52.6	°F
Sum of peak zone CFM	1825	CFM	Bypass Factor	0.100	
Sensible heat ratio	1.000		Resulting RH	24	%
ft²/Ton	341.0		Design supply temp.	55.0	°F
BTU/(hr-ft²)	35.2		Zone T-stat Check	1 of 1	OK
Water flow @ 10.0 °F rise	6.35	gpm	Max zone temperature deviation	0.0	°F

Preheat Coil Sizing Data

No heating coil loads occurred during this calculation.

Supply Fan Sizing Data

Actual max CFM at Jul 1700	1825	CFM	Fan motor BHP	0.00	BHP
Standard CFM	1516	CFM	Fan motor kW	0.00	kW
Actual max CFM/ft²	2.02	CFM/ft²	Fan static	0.00	in wg

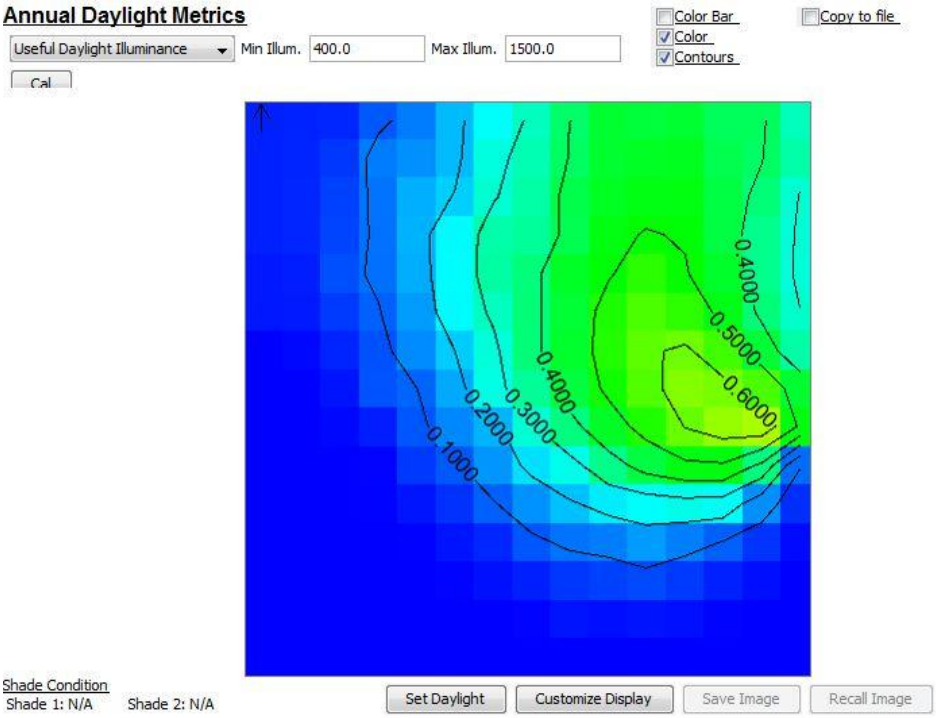
Outdoor Ventilation Air Data

Design airflow CFM	0	CFM	CFM/person	0.00	CFM/person
CFM/ft²	0.00	CFM/ft²			

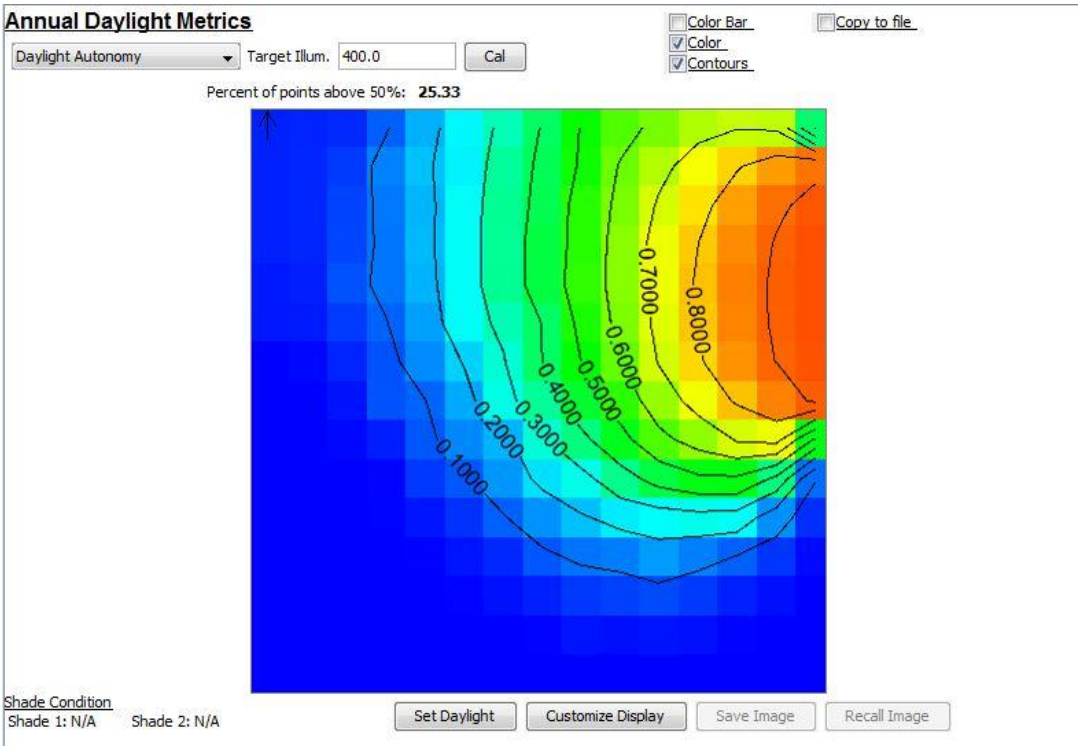
Appendix D - Architectural Breadth Daylighting Calculations

Original Classroom Design Calculations

Useful Daylight – Spatial Daylight Autonomy at 400 lux

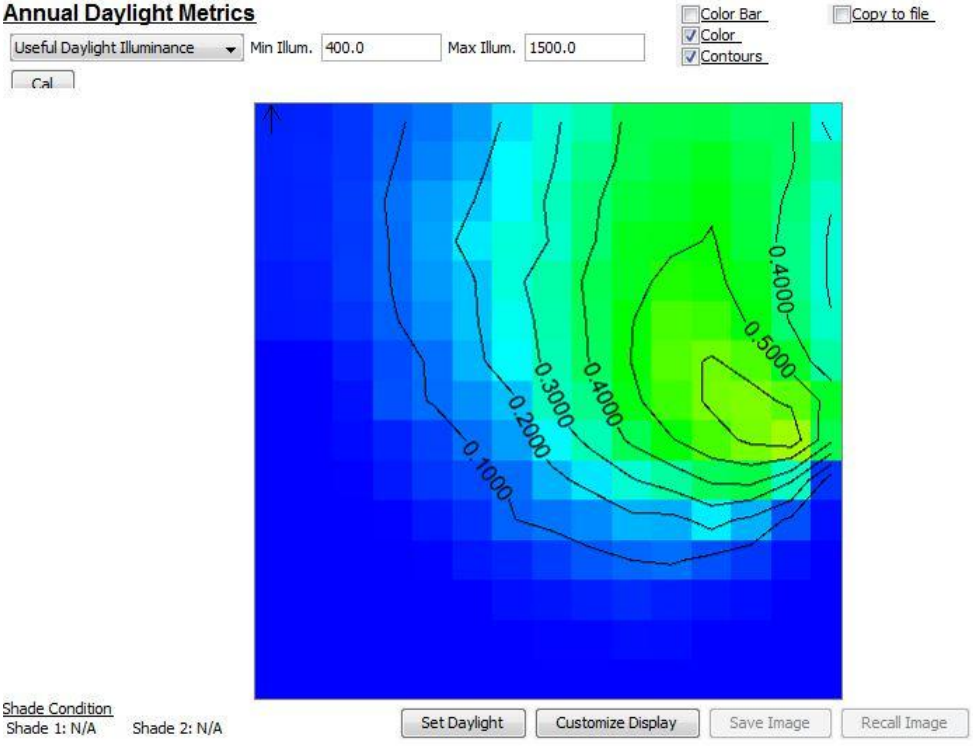


Daylight Autonomy at 400 lux

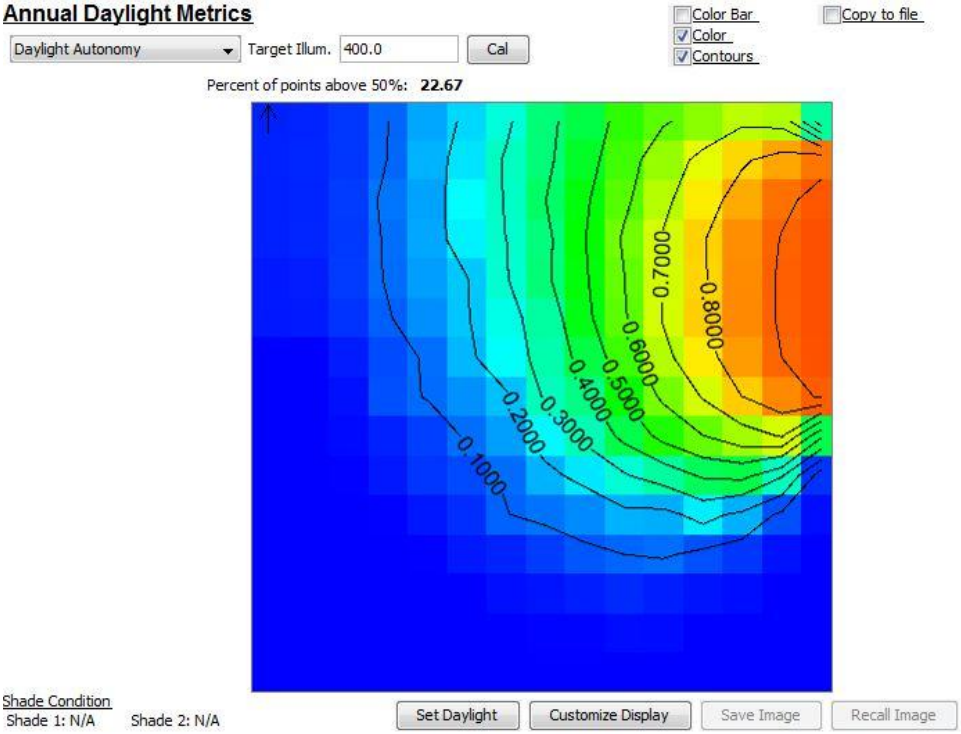


New Classroom Calculations – Daysim Output

Useful Daylight – Spatial Daylight Autonomy at 400 lux

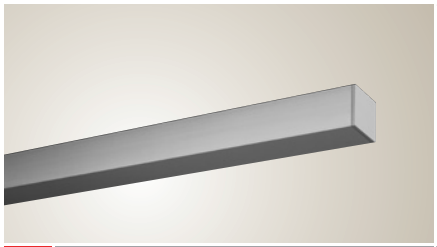


Daylight Autonomy at 400 lux



Appendix E – Lighting Equipment Specification Sheets

Peerless®



Lightline®
Indirect T8

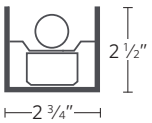
Type: **L1**

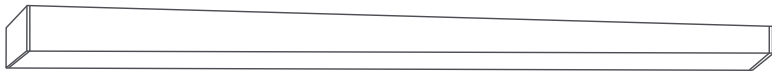
Project:

SPECIFICATIONS | Suspended | **LL1M1**

LAMPING OPTIONS

☐ **LL1M1**





SPECIFICATIONS

Construction
Housing is extruded aluminum forming a 2 ¾" x 2 ½" rectangular profile. Die-cast end plate mechanically attaches with no exposed fasteners.

Reflectors
Die-formed, pre-finished white reflector with hammertone specular aluminum.

Electrical
Specify 120V, 277V or 347V. Pre-wired with 16AWG fixture wires. For special circuiting or wire gauge, consult factory. Plug-in electrical connectors included. UL and C-UL listed.

Finish
Standard colors include satin anodized aluminum, and white white (low gloss).

Luminaire Length
4', 8', and 12' lengths in a single section for suspension spacing of 4', 8', and 12'. For total luminaire length, add ¾" for each end plate. Using internal joiners, 4', 8', and 12' sections can be joined to form longer rows.

CATALOG NUMBER

Examples: LL1M1 32 12FT R12 120 GEB10 SCT LP835 F1/12 C100 — LL1M1 1 32 12FT R8 120 GEB10 SCT LP841 F1/24 C041 ACG

Luminaire	# of Lamps in Cross Section	Lamp Type	Luminaire Row Length	Maximum Section Length	Voltage	Ballast Type	# of Emergency Modules	Emergency Type[2]
LL1M1	**1**	**32** 32W T8	**X FT** (4' increments)	**R4** 4' section(s) **R8** 8' section(s) **R12** 12' section(s)	**120** **277** **347**	**GEB10** <10% THD Electronic **ADEZ**[1] Advance Mark 10 dim **DMHL3D**[1] Lutron Hi-Lume dim **ADZT**[1] Advance Mark 7 0-10V dim *Reference Ballast Wizard on website or consult factory for other options.*	**(Blank)** None **1SE** 1 section **2SE** 2 sections **XSE** X sections	**(Blank)** None **EC** Emergency circuit **EL**[1] Emergency battery pack **EN**[1] Emergency battery pack w/night light circuit

Switching	Lamp Color	Mounting Type /	Overall Suspension	Finish	Options
SCT Single circuit	**L/LP** No lamp **L/LPE** No lamp. Wired for energy saving lamps. **LP830** 3000K 80+ CRI **LP835** 3500K 80+ CRI **LP841** 4100K 80+ CRI *Reference Lamp Chart on website or consult factory for other options.*	**F1/** T-bar ceiling (universal mounting bracket) **F1A/** T-bar ceiling (UMB with integrated J-box) **F2/** Hard ceiling (horizontal J-box) **F3/** Rigid stem **F4A/** IDS clip 15/16" tee **F4B/** IDS clip 9/16" tee **F4C/** IDS clip screw slot	**12** 12" **15** 15" **18** 18" **21** 21" **24** 24" **XX** XX" *Overall suspension is measured from ceiling to bottom of luminaire.*	**C041** White white (low gloss) **C100** Satin anodized finish **C099** Custom finish	**ACG** Adjustable cable grippers **BLK** Black cord, cord manager and canopy (not available with F3) **CP** Chicago plenum (available with F1A only) **DL** Damp location label **DU** Dust cover **ELH** Emergency through wiring w/separate feed **ELS** Emergency through wiring w/single feed, shared neutral **ELS2** Emergency through wiring w/single feed, separate neutrals **GLR** Fusing (fast blow) **GMF** Fusing (slow blow) **MCS** Matching feed canopy at support **OJB** Offset junction box **SLP** Sloped ceiling (for 10-45°, must be specified with F2, ACG and OJB options) **XXXX** Integrated sensor; choose options and obtain code on page 2

Notes:
1 Not available in 347V
2 Emergency type is installed in last 4' of luminaire sections. Separate feed required unless ELS or ELS2 is specified

2246 5th Street, Berkeley, CA 94710 • Tel: 510.845.2760 • Fax: 510.845.2776 • Email: techsupport@peerlesslighting.com • PeerlessLighting.com

Peerless

Lightline® Indirect T8

Type:

Project:

Suspended **LL1M1**

INTEGRATED NLIGHT MICRO SENSOR

Determine the appropriate sensor type, network type and sensor power source for your application. Enter the code in the Options section of the Catalog Number.

EXAMPLE: **PDT1**

Sensor Type (choose one)	
ADC nLight model nES ADCX	**Daylight Dimming** Specify 0-10V dimming ballast No occupancy sensing
PDT nLight model nES PDT7 ADCX	**Daylight Dimming and/or Occupancy Detection** Specify 0-10v dimming ballast for daylight dimming Specify fixed-output ballast for occupancy detection only (daylight dimming disabled)

Network Type & Sensor Power Source (choose one)	
1*	**nLight-Enabled (Network-Ready) with Luminaire-Integrated Power Pack** 10′ Cat-5e cable provided
2	**Standalone Operation (No Networking) with Luminaire Integrated Power Pack** No Cat-5e cable provided
3*	**nLight-Enabled (Network-Ready) with Remote nLight Power Pack or nPanel** 10′ Cat-5e cable provided Order required remote nLight Power Pack or nPanel separately through nLight (Acuity Brands Controls)

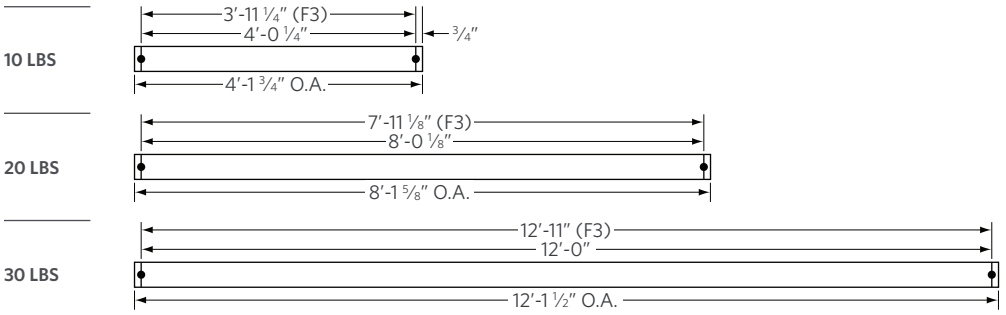
For more information about the Integrated nLight Micro Sensor, its capabilities and options, download the PDF guide at: *PeerlessLighting.com/nLight-Sensor-Guide*
*nLight-Enabled (network-ready) options include one RJ-45 connector on the luminaire and 10 feet of Cat-5e cable to control the entire luminaire row (depending on wattage/voltage limitations). The Cat-5e cable drop is located in the same section as the sensor. For multiple zones, please contact techsupport@peerlesslighting.com.

WEIGHTS & SUPPORT SPACING

Suspension spacing equals section length. Consult factory for stem mounting suspension spacing.

STANDARD SECTIONS

Key:
● Support or feed location



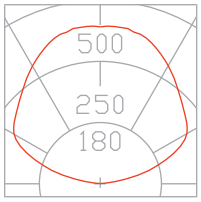
PLAN VIEW

CONFIGURATIONS

Mitered "L", "X" and "T" connectors available for suspended configurations.
Reference *Pattern Connector Guide* for additional details.

PHOTOMETRICS

Actual performance may differ as a result of end-user environment and application.



1-LAMP T8
71.6% efficiency
2039 delivered lumens

100.0% up / 0.0% down

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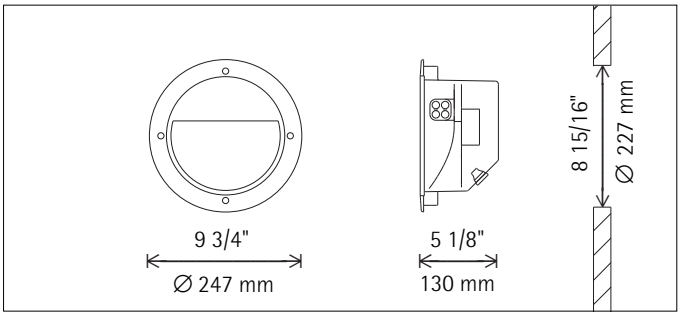
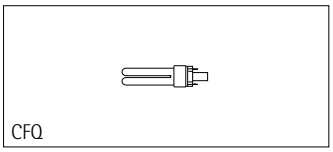
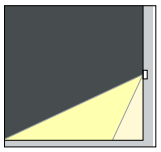
Visor Floor washlight

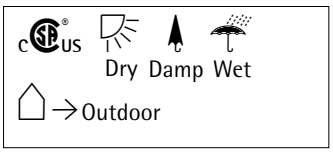
for compact fluorescent lamps

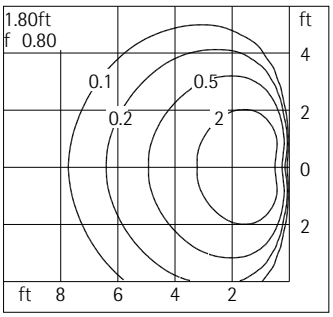
P1











CFQ 9W G23-2 525lm

33301.023
CFQ 9W G23-2 525lm

Product description
Housing for recessed mounting in brickwork and dry-wall partitions: corrosion-resistant, cast aluminum, No-rinse surface treatment. Black double powder-coated.
Mounting by means of an adjustable bar. Clamp extension 1/32"-25/32" / 1-20mm. Pre-drilled holes in the base of the housing.
Control gear 120V, 60Hz. 2 cable entries. Through-wiring possible. 5-pole terminal block.
Asymmetric reflector system: aluminum, silver, satin matt anodized.
Screw-fastened cover with sculpture lens as safety glass: corrosion resistant stainless steel. Optimized surface for reduced accumulation of dirt.
Suitable for wet location (IP65): dust-proof and water jet-proof.
Weight 7.28lbs / 3.30kg
Temperature on the cover glass 105°F / 40°C

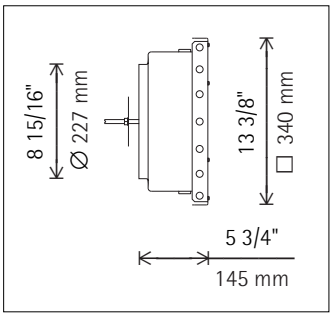
ERCO Lighting Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

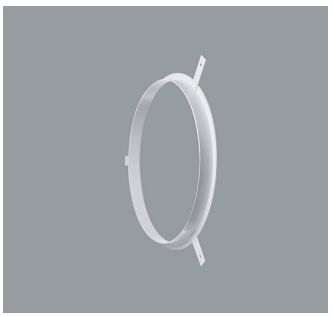
Technical region: 120V/60Hz
We reserve the right to make technical and design changes.
Edition: 25.10.2012
Current version under
www.erco.com/33301.023

Visor Floor washlight

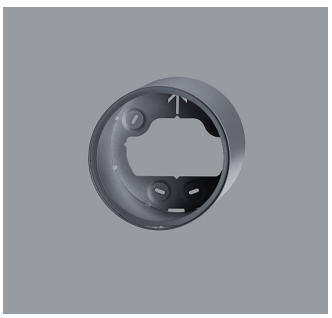
Accessories

33977.000
Concrete housing
Metal, galvanized.
Recommended aggregate grain size of the concrete is 0-5/16" / 0-8mm.
Weight 9.92lbs / 4.50kg





33971.000
Plaster ring
Metal, white.



33984.000
Surface-mounted housing
Corrosion-resistant aluminum, No-Rinse surface treatment. Graphit m, double powder-coated.
Weight 1.94lbs / 0.88kg

P2

Date: _____ Type: _____

Firm Name: _____

Project: _____

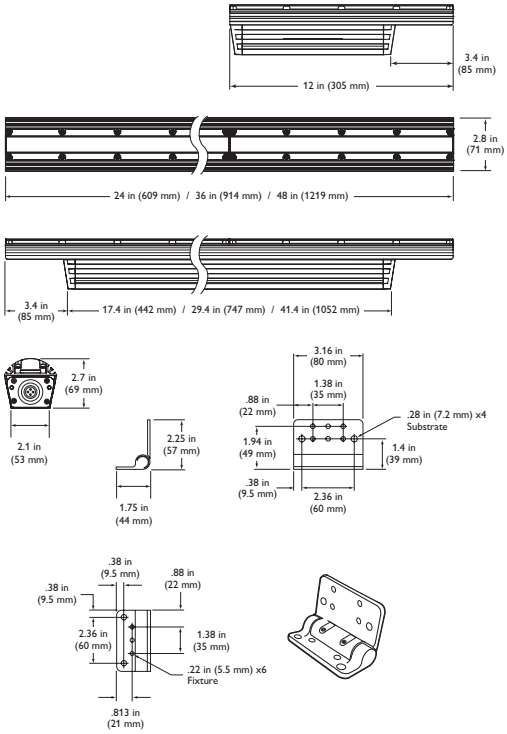
eW Graze Powercore

2700 K, 10° x 60° beam angle

Linear exterior LED wall grazing fixture with solid white light

eW Graze Powercore Powercore linear LED lighting fixtures are ideal for surface grazing and wall-washing applications that require high-quality white light. Featuring Powercore technology, eW Graze Powercore processes power directly from line voltage, eliminating the need for external power supplies. Fixtures are available in seven color temperatures, ranging from a warm 2700 K to a cool 6500 K, including standard color temperatures of 2700 K and 4000 K. eW Graze Powercore offers superior illumination quality and dramatic energy savings for new installations and retrofit upgrades. A space-efficient, low-profile aluminum housing and flexible mounting options allow discreet placement within a wide range of compact architectural details.

- Tailor light output to specific applications — eW Graze Powercore is available in standard 1 ft and 4 ft exterior-rated housings, and standard 10° x 60° and 30° x 60° beam angles.
- High-performance illumination and beam quality — Superior beam quality offers striation-free saturation as close as 6 in (152 mm) from fixture placement with no visible light scalloping between fixtures.
- Supports new applications for white light— Long useful source life (50,000 hours at 70% lumen maintenance) significantly reduces or eliminates maintenance problems, allowing the use of white lighting in spaces where lamp maintenance may be limited or unfeasible.
- Universal power input range — eW Graze Powercore accepts line voltage input of 100, 120, 220 – 240, and 277 VAC.
- Versatile installation options — Constant torque locking hinges offer simple position control from various angles without special tools. The low-profile extruded aluminum housing accommodates installation within architectural niches of many different shapes and sizes.
- Support for installations requiring conduit to fixtures — eW Graze Powercore Conduit fixtures have flying leads and threaded openings for 1/2 in NPT conduit to support installations in North America where conduit is required.



- Wide range of custom configurations — Additional fixture lengths, beam angles, and color temperatures up to 6500 K are available as custom configurations. See the eW Graze Powercore Ordering Information specification sheet for complete details.
- "Cool lighting" functionality — eW Graze Powercore fixtures do not heat illuminated surfaces, discharge infrared radiation, or emit ultraviolet light.
- Dimming capability — Patented DIMand technology offers smooth dimming capability with selected commercially available reverse-phase ELV-type dimmers.

For detailed product information, please refer to the eW Graze Powercore Product Guide at www.philipscolorkinetics.com/ls/essentialwhite/ewgraze/

PHILIPS

Specifications

Due to continuous improvements and innovations, specifications may change without notice.

Item	Specification	1 ft (305 mm)	4 ft (1.2 m)
Output	Lumens†	437	1748
	Efficacy (lm / W)	34.1	
	CRI	83	
	Mixing Distance	6 in (152 mm) to uniform beam saturation	
	Lumen Maintenance‡	100,000+ hours L_{70} @ 25° C 50,000 hours L_{70} @ 50° C	
Electrical	Input Voltage	100 / 120 / 220 – 240 / 277 VAC, 50 / 60 Hz	
	Power Consumption	15 W maximum at full output, steady state	60 W maximum at full output, steady state
Control	Dimming	Compatible with selected commercially available reverse-phase ELV-type dimmers§	
Physical	Dimensions *(Height x Width x Depth)*	2.7 x 12 x 2.8 in (69 x 305 x 71 mm)	2.7 x 48 x 2.8 in (69 x 1219 x 71 mm)
	Weight	2.7 lb (1.2 kg)	10.8 lb (4.9 kg)
	Housing	Extruded anodized aluminum, cool gray hinge color	
	Lens	Clear polycarbonate	
	Fixture Connectors	Integral male / female waterproof connectors	
	Humidity	0 – 95%, non-condensing	
	Temperature Ranges	-40° – 122° F (-40° – 50° C) Operating -4° – 122° F (-20° – 50° C) Startup -40° – 176° F (-40° – 80° C) Storage	
	Fixture Run Lengths	To calculate fixture run lengths and total power consumption for your specific installation, download the Configuration Calculator from www.philipscolorkinetics.com/support/install_tool/	
Certification and Safety	Certification	UL / cUL, FCC Class B (120 VAC), CE, C-Tick, CCC	
	Environment	Dry / Damp / Wet Location, IP66	

* Color temperatures conform to nominal CCTs as defined in ANSI Chromaticity Standard C78.377A.

† Lumen measurement complies with IES LM-79-08 testing procedures.

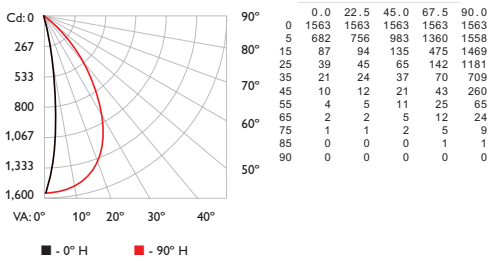
‡ L_{70} = 70% lumen maintenance (when light output drops below 70% of initial output). Ambient luminaire temperatures specified. Lumen maintenance calculations are based on lifetime prediction graphs supplied by LED source manufacturers. Calculations for white-light LED fixtures are based on measurements that comply with IES LM-80-08 testing procedures. Refer to www.philipscolorkinetics.com/support/appnotes/ for more information.

§ See www.philipscolorkinetics.com/support/appnotes/notes/ for specific details.

Photometrics

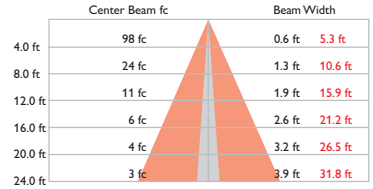
2700 K, 1 ft, 10° x 60° beam angle

Polar Candela Distribution



	0.0	22.5	45.0	67.5	90.0
0	1563	1563	1563	1563	1563
5	682	756	983	1360	1558
15	87	94	135	475	1469
25	39	45	65	142	1181
35	21	24	37	70	709
45	10	12	21	43	260
55	4	5	11	25	65
65	2	2	5	12	24
75	1	1	2	5	9
85	0	0	0	1	1
90	0	0	0	0	0

Illuminance at Distance



39.5 ft (12.0 m)
1 fc maximum distance

■ Vert. Spread: 9.2°
■ Horiz. Spread: 67.1°

Lumens	437
Efficacy	34.1 lm / W

For lux multiply fc by 10.7

OPTIBIN® CK TECHNOLOGY | POWERCORE® CK TECHNOLOGY | DIMAND® CK TECHNOLOGY

Fixtures

See the eW Graze Powercore Ordering Specification Sheet for a complete list of standard and custom configurations.

Fixture	Length	Item Number	Philips 12NC
eW Graze Powercore, 2700 K, 10° x 60° Beam Angle 100 VAC	1 ft (305 mm)	523-000030-24	910503700585
	4 ft (1.2 m)	523-000030-26	910503700302
eW Graze Powercore, 2700 K, 10° x 60° Beam Angle 120 VAC	1 ft (305 mm)	523-000030-00	910503700276
	4 ft (1.2 m)	523-000030-02	910503700278
eW Graze Powercore, 2700 K, 10° x 60° Beam Angle 220 – 240 VAC	1 ft (305 mm)	523-000030-16	910503700292
	4 ft (1.2 m)	523-000030-18	910503700294
eW Graze Powercore, 2700 K, 10° x 60° Beam Angle 277 VAC	1 ft (305 mm)	523-000030-08	910503700284
	4 ft (1.2 m)	523-000030-10	910503700286
eW Graze Powercore, 2700 K, 10° x 60° Beam Angle Conduit / 120 VAC	1 ft (305 mm)	523-000061-03	910503701849
	4 ft (1.2 m)	523-000061-48	910503701894
eW Graze Powercore, 2700 K, 10° x 60° Beam Angle Conduit / 277 VAC	1 ft (305 mm)	523-000062-03	910503701515
	4 ft (1.2 m)	523-000062-48	910503701560

Use Item Number when ordering in North America.

Accessories

Item	Type	Size	Item Number	Philips 12NC
Leader Cable	UL / cUL	50 ft (15.2 m)	108-000041-00	910503700320
	CE		108-000041-01	910503700320
Jumper Cable	UL / cUL	End-to-End	108-000039-00	910503700314
		1 ft (305 mm)	108-000039-01	910503700315
		5 ft (1.5 m)	108-000039-02	910503700316
	CE	End-to-End	108-000040-00	910503700317
		1 ft (305 mm)	108-000040-01	910503700318
		5 ft (1.5 m)	108-000040-02	910503700319
Glare Shield		1 ft (305 mm)	120-000081-00	910503700745
		2 ft (610 mm)	120-000081-01	910503700746
		3 ft (914 mm)	120-000081-02	910503700747
		4 ft (1.2 m)	120-000081-03	910503700748
Additional Terminators		Quantity 10	120-000074-00	910503700580
Additional Hinge		Quantity 1	120-000098-00	910503700772

Use Item Number when ordering in North America.

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, Massachusetts 01803 USA
Tel 888.385.5742
Tel 617.423.9999
Fax 617.423.9998
www.philipscolorkinetics.com

DAS-000009-01 R08 07-12

Date: _____ Type: P3

Firm Name: _____

Project: _____

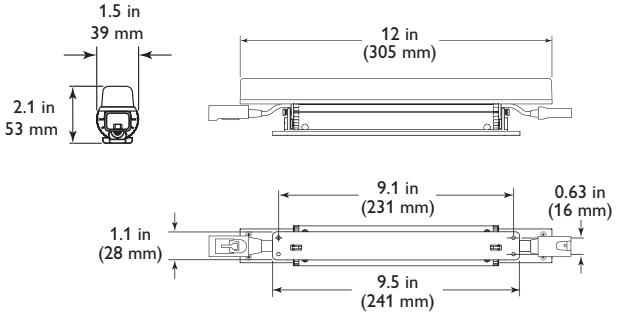
eW Fuse Powercore

1 ft (305 mm), 2700 K, 10° x 60° beam angle

Linear interior LED wall grazing fixture with solid white light

With narrow and medium beams of intense white light, eW Fuse Powercore is an excellent choice for a full range of surface grazing and wall-washing applications. Its ultra-compact form factor permits installation in tight spaces too small to accommodate conventional grazing fixtures. Meets or exceeds the performance of comparable linear fluorescent fixtures while lowering installation, energy, and maintenance costs. Offers environmentally-conscious buyers a green, energy-efficient grazing fixture with industry-leading light quality and quantity.

- Cost-effective alternative — Long useful source life and low-maintenance operation represent a cost-effective alternative to traditional grazing fixtures.
- High-performance beam quality — Available narrow 10° x 60° or medium 30° x 60° beam angle. Superior beam quality delivers striation-free light as close as 6 in (152 mm) from fixture placement. Interlocking connectors for end-to-end installation with no light scalloping between fixtures.
- Two lengths and multiple color temperatures for design and application flexibility — 1 ft (305 mm) and 4 ft (1.2 m) fixtures are available in 2700 K, 3000 K, 3500 K, and 4000 K for applications calling for warm, neutral, or cool white light.
- Optibin advanced binning algorithm — Exceeds the recognized standards for color quality to guarantee uniformity and consistency of hue and color temperature across LED sources, fixtures, and manufacturing runs.
- Integrates patented Powercore technology — Powercore rapidly, efficiently, and accurately controls power directly from line voltage, eliminating the need for an external power supply, dramatically simplifying installation, and lowering total system cost.
- Support for multiple voltages — Accepts power input of 100 – 277 VAC for consistent installation and operation from line voltage in most locations.
- Dimming capability — Patented DIMand technology offers smooth dimming capability with selected commercially available reverse-phase ELV-type dimmers.
- Simple installation — Contractor-friendly installation with long product runs. Easy-to-install mounting tracks for linear applications.



- Easy mounting and positioning — With end-to-end locking power connectors that can make 180° turns, eW Fuse Powercore fixtures are easy to position in even the most challenging mounting circumstances. Fixtures rotate in 10° increments through 180° for precise aiming and color mixing. Optional mounting tracks support vertical and overhead positioning. 1 ft (305 mm) and 5 ft (1.5 m) jumper cables can add extra space between fixtures.

For detailed product information, please refer to the eW Fuse Powercore Product Guide at www.philipscolorkinetics.com/ls/essentialwhite/ewfusepc/

PHILIPS

Specifications

Due to continuous improvements and innovations, specifications may change without notice.

Item	Specification	1 ft (305 mm), 2700 K*, 10° x 60° beam angle
Output	Lumens†	553
	Efficacy (lm / W)	45.7
	CRI	83
	Lumen Maintenance‡	50,000 hours L_{70} @ 25° C 37,000 hours L_{70} @ 50° C 90,000 hours L_{50} @ 25° C 80,000 hours L_{50} @ 50° C
Electrical	Input Voltage	100 – 277 VAC, auto-switching, 50 / 60 Hz
	Power Consumption	12.5 W maximum at full output, steady state
	Power Factor	.99 @ 120 V
Control	Dimming	Compatible with selected commercially available reverse-phase ELV-type dimmers§
Physical	Dimensions *(Height x Width x Depth)*	2.1 x 12 x 1.5 in (53 x 305 x 39 mm)
	Weight	0.98 lbs (.45 kg)
	Housing	Die-cast aluminium, white powder-coated finish
	Lens	Polycarbonate
	Fixture Connections	Integral male / female connectors
	Temperature Ranges	-40° – 122° F (-40° – 50° C) Operating -4° – 122° F (-20° – 50° C) Startup -40° – 176° F (-40° – 80° C) Storage
	Humidity	0 – 95%, non-condensing
	Fixture Run Lengths	To calculate fixture run lengths and total power consumption for your specific installation, download the Configuration Calculator from www.philipscolorkinetics.com/support/install_tool/
Certification and Safety	Certification	UL / cUL, FCC, Class B, CE, C-Tick, CCC
	Environment	Dry / Damp Location, IP20

* Color temperatures conform to nominal CCTs as defined in ANSI Chromaticity Standard C78.377A.

† Lumen measurement complies with IES LM-79-08 testing procedures.

‡ L_{70} = 70% lumen maintenance (when light output drops below 70% of initial output). L_{50} = 50% lumen maintenance (when light output drops below 50% of initial output). Ambient luminaire temperatures specified. Lumen maintenance calculations are based on lifetime prediction graphs supplied by LED source manufacturers. Calculations for white-light LED fixtures are based on measurements that comply with IES LM-80-08 testing procedures. Refer to www.philipscolorkinetics.com/support/appnotes/lm-80-08.pdf for more information.

§ Refer to www.philipscolorkinetics.com/support/appnotes/ for specific details.

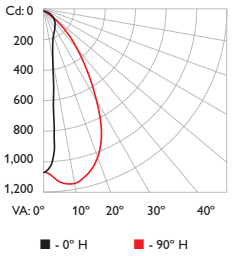
Accessories

Item	Type		Item Number	Philips 12NC
Leader Cable with terminator and strain relief	UL / cUL	10 ft (3 m)	108-000047-00	910503700972
	CE / CCC	10 ft (3 m)	108-000047-01	910503700973
Wiring Compartment with terminator	UL / cUL		120-000077-01	910503700994
Jumper Cable	UL / cUL	1 ft (305 mm)	108-000048-00	910503700974
		5 ft (1.5 m)	108-000048-01	910503700975
	CE / CCC	1 ft (305 mm)	108-000048-02	910503700976
		5 ft (1.5 m)	108-000048-03	910503700977
Terminators	10 / box		120-000099-00	910503701120
Mounting Track, White	Quantity 1	4 ft (1219 mm)	120-000124-00	910503701787

Photometrics

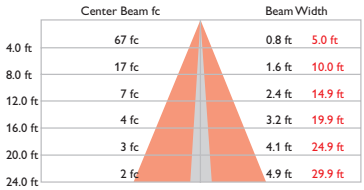
1 ft (305 mm), 2700 K, 10° x 60° beam angle

Polar Candela Distribution



	0.0	22.5	45.0	67.5	90.0
90°	0	1078	1078	1078	1078
80°	5	660	715	881	1063	1127
	15	191	192	216	520	1110
70°	25	151	144	148	205	868
	35	113	111	108	120	466
60°	45	118	100	72	47	88
	55	63	55	39	24	32
	65	39	32	20	15	18
50°	75	22	19	12	8	8
	85	11	10	6	3	1
	90	8	8	4	2	0

Illuminance at Distance



32.9 ft (10.0 m)
1 fc maximum distance

Vert. Spread: 11.6°
Horiz. Spread: 63.8°

Lumens	553
Efficacy	45.7 lm / W

For lux multiply fc by 10.7

OPTIBIN® CK TECHNOLOGY | POWERCORE® CK TECHNOLOGY | DIMAND™ CK TECHNOLOGY

Fixtures

Type	Beam Angle	Item Number	Philips 12NC
1 ft (305 mm) 2700 K	10° x 60°	523-000065-08	910503701717
	30° x 60°	523-000065-12	910503701721
1 ft (305 mm) 3000 K	10° x 60°	523-000065-09	910503701718
	30° x 60°	523-000065-13	910503701722
1 ft (305 mm) 3500 K	10° x 60°	523-000065-10	910503701719
	30° x 60°	523-000065-14	910503701723
1 ft (305 mm) 4000 K	10° x 60°	523-000065-11	910503701720
	30° x 60°	523-000065-15	910503701724
4 ft (1.2 m) 2700 K	10° x 60°	523-000065-16	910503702617
	30° x 60°	523-000065-20	910503702621
4 ft (1.2 m) 3000 K	10° x 60°	523-000065-17	910503702618
	30° x 60°	523-000065-21	910503702622
4 ft (1.2 m) 3500 K	10° x 60°	523-000065-18	910503702619
	30° x 60°	523-000065-22	910503702623
4 ft (1.2 m) 4000 K	10° x 60°	523-000065-19	910503702620
	30° x 60°	523-000065-23	910503702624

Use Item Number when ordering in North America.

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, Massachusetts 01803 USA
Tel 888.385.5742
Tel 617.423.9999
Fax 617.423.9998
www.philipscolorkinetics.com

DAS-000079-01 R04 07-12

RSA LIGHTING

DESCRIPTION

An adjustable multi-lamp horizontally suspended fixture with all aluminum grid construction suitable for accent applications. Integral power supplies. Compatible with 8W LED heads mixed with compact or linear fluorescent lamps.

Catalog #		**Type**
Project		C1, C2
Comments		**Da**
Prepared by		

SPECIFICATION FEATURES

A ... Fixture
A horizontally suspended fixture with aircraft cable suspension. Lamps in adjustable double gimbal lamp holders mounted in aluminum grid with 0º - 90º adjustability. Fixture grid is made of .75" square aluminum tubing with .062" wall thickness.

B ... Electrical
Integral electronic LED drivers. Drivers housed in perforated mesh compartments on fixture body. Includes coverplate for powerfeed from ceiling mounted junction box.

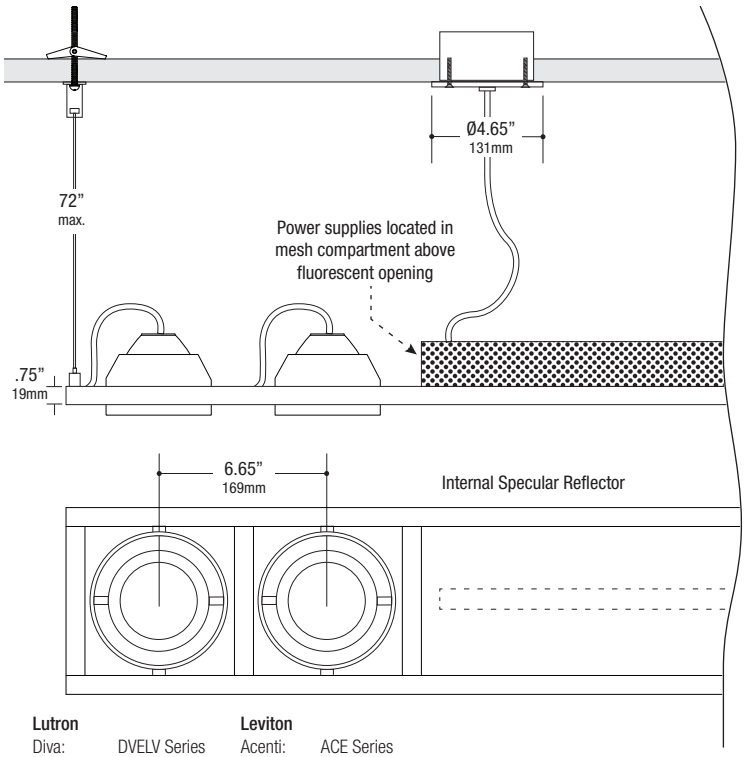
C ... LED Heads
Can accept up to three optical accessories *(i.e. lens + hex louver + snoot, optional media holder required)*. 90º x 90º lamp adjustment. LEDs are provided.

D ... Fluorescent Module
Module to accomodate various compact and linear fluorescent lamps. Includes internal reflector, power supply, and diffuser.

E ... Mounting
Includes one 6' length of aircraft cable for each fixture corner (four total cables) with locking adjustable fasteners. Ceiling mounting toggle bolts included. Adjustable cable suspension fasteners at four corners of fixture.

F ... Labels
cULus listed for use in damp locations.

Typical configuration "4" shown for dimensional purposes only

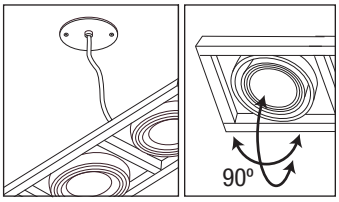


COMBOLIGHT®
SURFACE MOUNT
Horizontal Suspended Fixture

Medium Size

Integral Power Supply

8W LED Stasis w/ Fluorescent Lamp Module

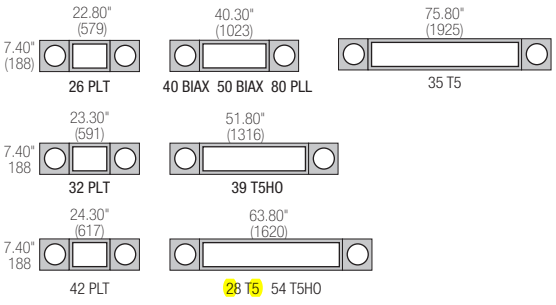


Fully dimmable to 10% with electronic low voltage equipment (ELV dimmers need a neutral connection in the wall box and are 120V only). Recommended ELV Dimmers:

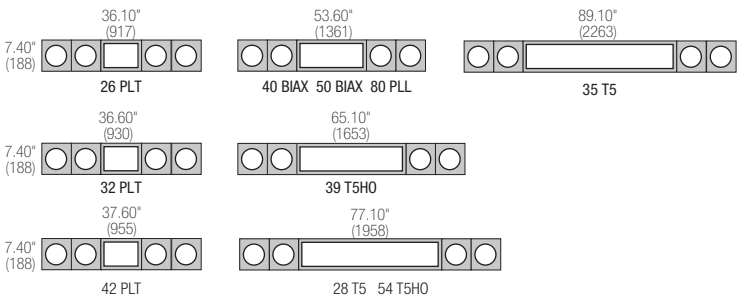
Lutron		Leviton	
Diva:	DVELV Series	Acenti:	ACE Series
Maestro:	MAELV Series	Illumatech:	IPE Series
Nova:	NTELV Series		
Skylark:	SELV Series		

CONFIGURATIONS

Configuration 2



Configuration 4



ORDERING INFORMATION

CSH				E	U		

Fixture
CSH = Horizontal Suspended Fixture Mixed Lamps

Configuration
2 = 2 Accent / One Fluorescent
4 = 4 Accent / One Fluorescent

Accent Lamping / Wattage
N30SML = 8W 3000K LED 9º Beam
N40SML = 8W 4000K LED 9º Beam
M30SML = 8W 3000K LED 25º Beam
M40SML = 8W 4000K LED 25º Beam
W30SML = 8W 3000K LED 40º Beam
W40SML = 8W 4000K LED 40º Beam

Fluorescent Lamping
1 = 40W BIAX **6** = 42W PLT
2 = 50W BIAX **7** = 28W T5
3 = 80W PLL **8** = 35W T5
4 = 26W PLT **9** = 39W T5HO
5 = 32W PLT **0** = 54W T5HO

Power Supply
E = Integral Electronic LED Drivers
(Fluorescent module has integral ballast)

Power Supply Voltage
U = Universal 120, 240, or 277V

Finish
W = White
B = Black
S = Starlight Silver

Fluorescent Shielding
2 = Parabolic Louver
T = Textured White Diffuser

RSA LIGHTING

ACCESSORIES FOR 8W LED HEADS - SMALL SIZE 2.5”

MEDIA HOLDER (required)

Media Holder White **LM10520P**
Media Holder Black **LM10520MB**
Media Holder Silver **LM10520G**

Note: Media holder adds 1/2” height to each bezel. Holds up to 2 pieces.

LENS

Solite Lens **DIF-20**

FILTERS

Red Dichroic **F76-20**

Amber Dichroic **F72-20**

Peach Dichroic **F71-20**

Light Blue Dichroic **F78-20**

Medium Blue **F33-20**

Medium Green **F44-20**

LIGHT CONTROL

Hex Cell **LNSML-LVR**

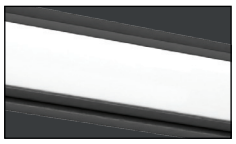
Cross Baffle

White	**LNSML-CB-W**
Black	**LNSML-CB-B**
Silver	**LNSML-CB-G**

Snoot

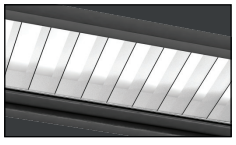
White	**LNSML-SN-W**
Black	**LNSML-SN-B**
Silver	**LNSML-SN-G**

ACCESSORIES FOR FLUORESCENT LAMPS



LENS

Textured White Diffuser
Specify “**T**” in accessory slot in catalog number



LIGHT CONTROL

Semi-Specular Parabolic Louver
Specify “**2**” in accessory slot in catalog number

Date: _____ Type: C2

Firm Name: _____

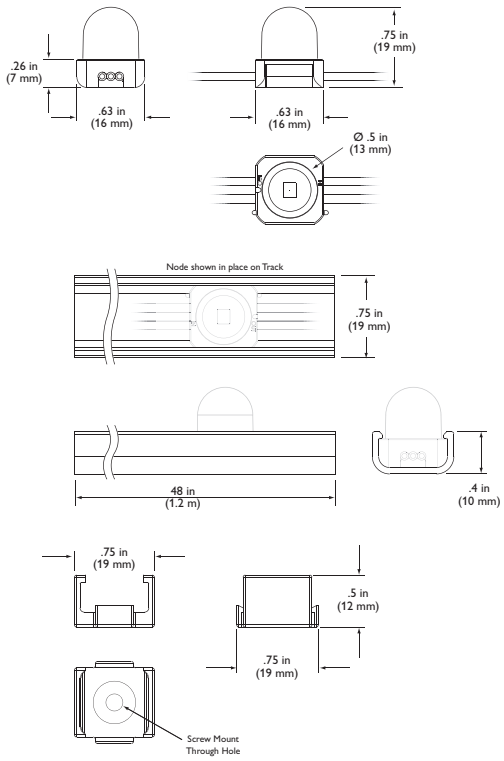
Project: _____

iColor Flex MX

Flexible strands of high-intensity LED nodes with intelligent color light

iColor Flex MX is a multi-purpose, high-intensity strand of 50 full-color LED nodes for generating extraordinary effects without the constraints of fixture size or shape. iColor Flex MX enables patterns and video on almost any interior or exterior surface, including ceilings, floors, three-dimensional objects, sculptures, and more. Its small node size allows installation in tighter spaces than the larger iColor Flex SLX and iColor Flex LMX strands.

- Superior light output — iColor Flex MX strands consist of 50 individually controllable, high-intensity LED nodes. Each node produces full-color light output of up to 1.44 candela.
- Supports cost-effective video displays — Flexible form factor, offering maximum lighting control at 25 W per strand, accommodates unique lighting installations, including two- and three-dimensional video displays.
- Multiple lens options — Clear dome and translucent dome lenses are standard. Clear flat and translucent flat lenses are also available.
- Adaptable mounting — Strands can be mounted directly to a surface, like traditional string lights. Detachable leader cables in multiple lengths allow you to install strings at the appropriate distance from power / data supplies. Optional mounting tracks ensure straight linear runs, while snap-on spacers hide cabling and mounting hardware. Single node mounts can be positioned individually as anchor points for installations with uneven node spacing or complex geometries.
- Standard and custom lengths and node spacing — iColor Flex MX strands are available with standard on-center node spacing of 4 in (102 mm) or 12 in (305 mm) along a three-wire, 18 AWG cable. Custom on-center node spacing from 2 in (51 mm) to 24 in (610 mm) supports virtually any lighting or video design and offers finer pixel pitch than the larger Flex strands. Standard 50-node lengths can be shortened in the field. Custom lengths of 5 to 72 nodes are also available.



- Custom Leader Cables — Custom Leader Cable lengths are available in addition to standard cables of 25 ft (7.6 m), 50 ft (15.2 m), and 100 ft (30.5 m).
- Industry-leading controls — iColor Flex MX works seamlessly with the complete Philips line of controllers, including Video System Manager Pro, Light System Manager, and iPlayer 3, as well as third-party DMX controllers.
- Durable and weather-resistant — Fully sealed for maximum fixture life and IP66-rated for outdoor applications.

For detailed product information, please refer to the iColor Flex MX Product Guide at www.philipscolorkinetics.com/ls/rgb/flexmx/

PHILIPS

Specifications

Due to continuous improvements and innovations, specifications may change without notice.

Item	Specification	Details
Output	Lumen Maintenance*	50,000+ hours L_{50} @ 50° C (full output)
	LED Channels	Red / Green / Blue
Electrical	Input Voltage	7.5 VDC via PDS-60ca and sPDS-480ca
	Power Consumption	.5 W max. per node at full output, steady state
	Power Factor	.98 @ 120 VAC
Control	Interface	sPDS-480ca 7.5V (Ethernet) PDS-60ca 7.5V (Pre-programmed or DMX / Ethernet)
	Control System	Philips full range of controllers, including Video System Manager Pro, Light System Manager, and iPlayer 3, or third-party DMX controllers
Physical	Node Dimensions *(Height x Width x Depth)*	.63 x .63 x .75 in (16 x 16 x 19 mm)
	Weight	13.4 oz (381 g) 50-node strand, 4 in on-center node spacing
	Housing	White or black polycarbonate
	Lens	Clear or translucent plastic
	Fixture Connections	Integrated watertight 3-pin connector
	Temperature Ranges	-40° – 122° F (-40° – 50° C) Operating ≥ 32° F (≥ 0° C) Handling -4° – 122° F (-20° – 50° C) Startup -22° – 185° F (-30° – 85° C) Storage
	Humidity	0 – 95%, non-condensing
	Maximum Fixtures Per Power / Data Supply	sPDS-480ca 7.5V: 16 strands PDS-60ca 7.5V: 2 strands
Certification and Safety	Certification	UL / cUL, FCC Class A, CE
	Environment	Dry / Damp / Wet Location, IP66

* L_{50} = 50% lumen maintenance (when light output drops below 50% of initial output). Ambient luminaire temperatures specified. Lumen maintenance calculations are based on lifetime prediction graphs supplied by LED source manufacturers. Calculations for white-light LED fixtures are based on measurements that comply with IES LM-80-08 testing procedures. Refer to www.philipscolorkinetics.com/support/appnotes/lm-80-08.pdf for more information.

CHROMACORE CK TECHNOLOGY | CHROMASIC™ CK TECHNOLOGY | OPTIBIN® CK TECHNOLOGY

Photometrics

Brightness Per Node

Lensing	On-Axis Candela	Viewing Angle
Clear flat lens	1.44	104°
Clear dome lens	1.23	110°
Translucent flat lens	0.81	109°
Translucent dome lens	0.52	149°

Luminance of 1 m^2 Grid

All figures in nits (cd / m^2)	On-Center Node Spacing		
Lensing	2 in	4 in	12 in
Clear flat lens	520	144	23
Clear dome lens	444	123	20
Translucent flat lens	292	81	13
Translucent dome lens	188	52	8

Fixtures and Accessories

Item	Type		Item Number	Philips 12NC
iColor Flex MX *4 in on-center node spacing*	White	Clear Dome Lens	101-000068-04	910503700712
		Translucent Dome Lens	101-000068-00	910503700708
	Black	Clear Dome Lens	101-000068-06	910503700714
		Translucent Dome Lens	101-000068-02	910503700710
iColor Flex MX *12 in on-center node spacing*	White	Clear Dome Lens	101-000068-05	910503700713
		Translucent Dome Lens	101-000068-01	910503700709
	Black	Clear Dome Lens	101-000068-07	910503700715
		Translucent Dome Lens	101-000068-03	910503700711
Leader Cables	Black	25 ft (7.6 m)	108-000045-00	910503700696
		50 ft (15.2 m)	108-000045-01	910503700697
		100 ft (30.5 m)	108-000045-02	910503700698
Mounting Track *Qty 1*	White	4 ft (1.2 m)	101-000024-00	910503700015
	Black		101-000024-01	910503700016
Spacers *Qty 50*	White	4 in (102 mm)	101-000047-00	910503700030
	Black		101-000047-01	910503700031
	White	12 in (305 mm)	101-000048-00	910503700032
	Black		101-000048-01	910503700033
Single Node Mounts *Qty 50*	White		101-000039-00	910503700025
	Black		101-000039-01	910503700026

Power / Data Supplies

Item	Type	Item Number	Philips 12NC
PDS-60ca 7.5V	Pre-programmed	109-000015-00	910503700093
	DMX / Ethernet	109-000015-03	910503700094
sPDS-480ca 7.5V	Ethernet	109-000022-00	910503700107

Use Item Number when ordering in North America.

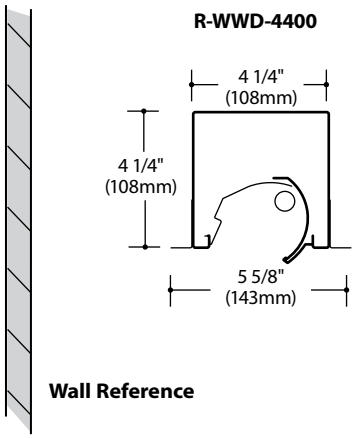
Philips Color Kinetics
3 Burlington Woods Drive
Burlington, Massachusetts 01803 USA
Tel 888.385.5742
Tel 617.423.9999
Fax 617.423.9998
www.philipscolorkinetics.com

DAS-000049-01 R05 07-12

LITECONTROL

Fixture Type:
Project Name:

C3



Mod 44
Recessed Wall/Wash

R-WWD-4400, RP-WWD-4400

Plaster, Drywall, Concealed Spline Ceilings
Recessed Flanged Wall Wash Direct

Product Description

A recessed flanged fixture with an optical system designed to provide uniform wall wash lighting. The WWD-4400 has a low-profile housing (nominally 4" x 4") and uses T8, T5 or T5HO lamping. The fixture can be row-configured for continuous run installations along a wall, and has an optional regressed lens that completely shields the lamp from view. UL Listed. This fixture is Cradle to Cradle Silver Certified[CM] by MBDC.

Ordering Guide

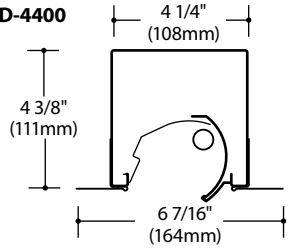
Product, Lamping & Length						Options				
R -	**WWD -**	**44**					**CWM -**			
Mounting	Distribution	Series	Lamp Count	Nominal Length (ft)	Lamp Type	Diffuser	Finish	Ballast	Other options	Volts
R Recessed **RP** Recessed with Plaster Trim	**WWD** Wall Wash Direct	**44**	**1 →** **2 →** see **notes**	**2 , 3, 4** **6, 8**	**T8** **T5** **T5HO**	**--** **SGL**	**CWM** (Matte White) is standard	**ELB10** is std. for T8 **LP/ELB is** std. for T5 or T5HO **DA/MK7** **DL/ECO** **DO/HEL** see **Ballast Options**	**F** **CCEA** see **Other options**	**120** **277**

notes:
Lamp Count = total number of lamps in the fixture
For Ordering guide information in shaded areas, choose selection by reading ACROSS the shaded areas for correct specifications.

R-WWD-4414T8-CWM-ELB10-F-120 is a typical catalog number for a 1-lamp, 4-foot long T8 fixture, Matte White finish, with an electronic ballast, optional fuse, 120 volts.

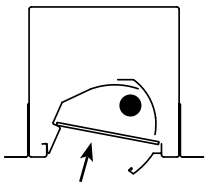
Cross-section lamping

RP-WWD-4400



Diffuser

SGL Soft Glow Lens. Extruded, frosted acrylic lens regressed at an angle above the ceiling to soften view of lamp from directly below while minimizing visibility from normal viewing angles.



Ballast

Specify in place of **LP/ELB**, contact factory for availability/compatibility with lamping:

DA/MK7 Advance Mark VII dimming ballast.
DL/ECO Lutron ECO-10 dimming ballast.
DO/HEL Osram Sylvania dimming ballast.

Other Options

F Fuse. Slow or fast blow, determined by Litecontrol.
CCEA City of Chicago Environmental Air Modification.

Questions to Ask

1. Row information, including desired fixture length?
2. Diffuser type? **3.** Other options? **4.** 1 20 or 277 volt?

Quick Find **44wwd**
litecontrol.com

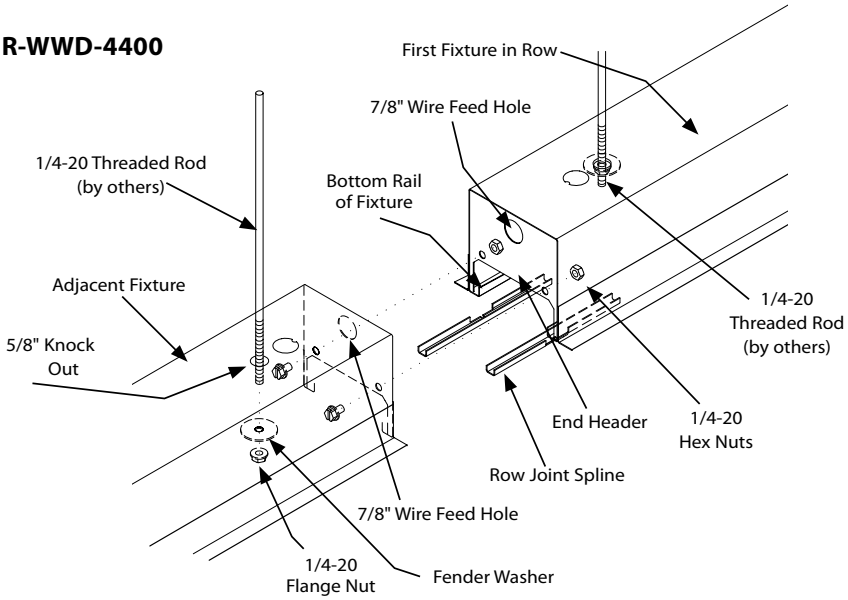
Specifications

HOUSING. Die-formed and welded steel, with 3/8" regression at housing bottom for rigidity and appearance, furnished with 6" long, steel splines for insertion at each side of housing at junction of fixtures in rows for precise alignment. End headers have clearance holes for easy row installation.
SPACKLE TRIM. (**RP-WWD** only) Continuous Spackle Trim with beaded edge welded to housing sides. Spackle trim allows plaster coat up to fixture edge for clean ceiling appearance.
REFLECTOR. Formed semi-specular high reflectance aluminum primary optic. Formed steel wall-side reflector painted gray. Painted, extruded aluminum room-side reflector shield extends below the ceiling and includes a pre-installed alignment spline that is slid between adjoining fixtures in the field.
END CAPS. Steel, finished to match housing. Two mounting holes on each end cap allow tight attachment to ends of individual fixtures and ends of rows.
BALLAST. Electronic Ballast (**ELB10**- for T8 lamping) or Low-profile Electronic Ballast (**LP/ELB** - for T5 or T5HO lamping), high power factor, thermally protected Class P, Sound Rated A, less than 10% THD, manufactured by a UL Listed manufacturer, as available, determined by Litecontrol. Ballasts with a voltage range of 120 to 277 will be used when fixture configuration and ballast availability allow. The minimum number of ballasts will be used.
BALLAST DISCONNECT. Fixture supplied with a ballast disconnect device to enable compliance with the NEC.
LAMPING. Available in one-lamp T8, T5, or T5HO in cross-section.
MOUNTING. Two 1/4-20 threaded rods (by others) installed in the ceiling provide simple fixture attachment with a washer and 1/4-20 flange nut.
CERTIFICATION. Fixture and electrical components are UL and/or CUL Listed, and bear the I.B.E.W., A.F. of L. label. This fixture is Cradle to Cradle Certified^{CM} Silver by MBDC. Note: Litecontrol reserves the right to change specifications without notice for product development and improvement.

General notes for specifiers and contractors

1. Fixtures may be mounted in plaster, drywall, or concealed spline ceilings,individually, or in rows. Each fixture is supported by two 1/4-20 threaded rods.
2. Prior to fixture installation (2) 1/4-20 threaded rods per fixture must be located and installed in the ceiling. Note: threaded rods must end 3" above finished ceiling.
3. Electrical and ceiling contractors should both understand that this system is not a standard troffer construction (due to continuous light feature), so coordination between the two trades is essential.
4. Installation instructions for this fixture and all Litecontrol fixtures are available from your Litecontrol representative or by contacting the factory. Instructions are also provided with every fixture shipment.

R-WWD-4400

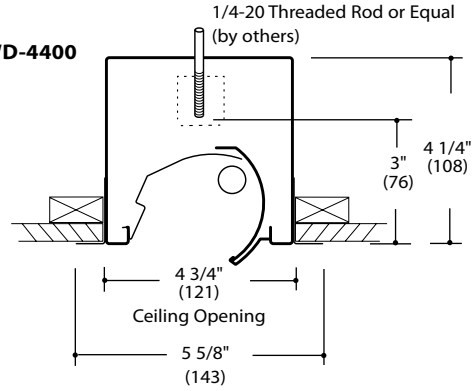


LITECONTROL

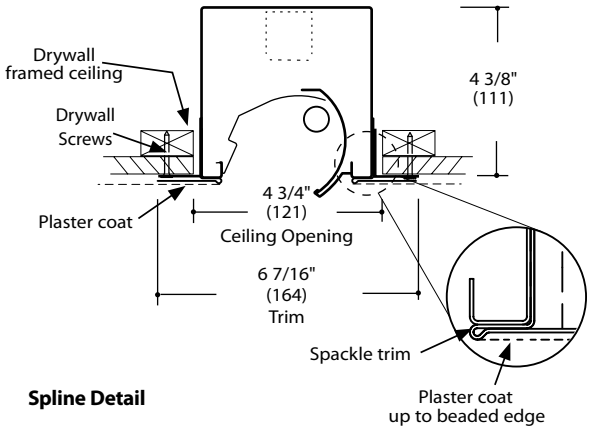
100 Hawks Avenue Hanson, MA 02341
781 294 0100 f: 781 293 2849 litecontrol.com

Planning for installation

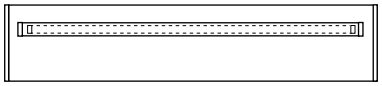
R-WWD-4400

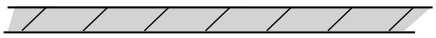


RP-WWD-4400



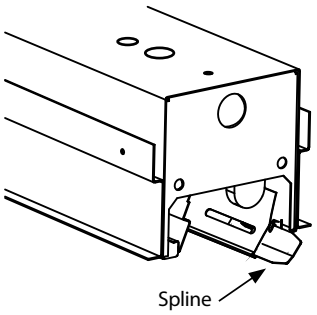
Lamp Position



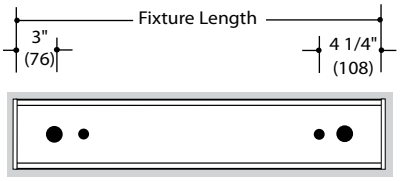


Wall Reference

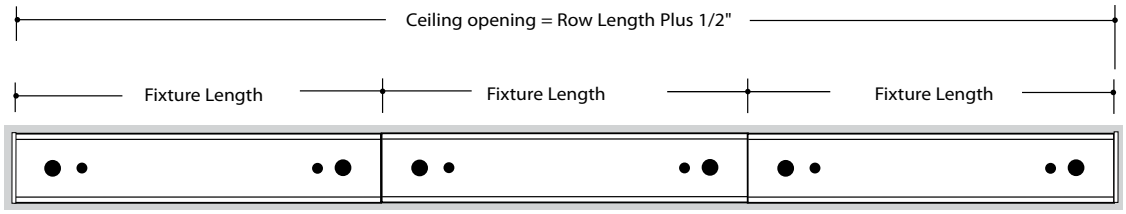
Spline Detail



Individual Fixture



Row Diagram



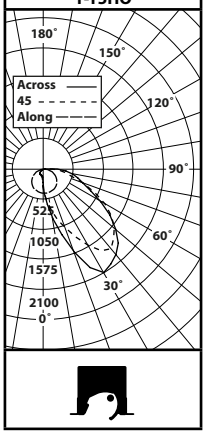
Fixture Lengths: 24", 36", 48", 72", and 96"
● 7/8" diameter knockout, electrical feed
• 5/8" knockout for 1/4" diameter threaded rod locations

LITECONTROL

100 Hawks Avenue Hanson, MA 02341
781 294 0100 f: 781 293 2849 litecontrol.com

Photometric data

1-T5HO



CANDLEPOWER SUMMARY

ANGLE	0	45	90	135	180
90	3	3	6	138	223
85	2	2	25	271	379
80	6	9	61	377	503
75	32	23	103	489	607
70	36	47	147	722	718
65	52	64	182	970	890
60	60	86	219	1220	1132
55	84	111	249	1425	1388
50	95	130	278	1581	1619
45	104	121	306	1702	1812
40	119	120	332	1802	1932
35	120	115	353	1729	2011
30	109	120	374	1520	2068
25	113	128	386	1300	1883
20	122	142	394	1089	1537
15	128	150	407	916	1180
10	141	181	414	724	884
5	230	300	420	563	617
0	418	418	418	418	418

R-WWD-4414T5HO 68.7% Efficiency
Litecontrol Certified Test Report #66016000

RCC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																		
0	82	82	82	82	80	80	80	80	76	76	76	73	73	73	70	70	70	69
1	73	69	66	63	71	68	65	62	65	62	60	62	60	58	60	58	56	55
2	66	59	54	49	64	58	53	49	55	51	48	53	50	46	51	48	45	44
3	59	51	45	40	57	50	44	39	48	43	39	46	42	38	44	40	37	36
4	54	44	38	33	52	44	37	32	42	36	32	40	35	31	38	34	31	29
5	49	39	32	27	47	38	32	27	37	31	27	35	30	26	34	30	26	24
6	45	35	28	23	43	34	28	23	33	27	23	31	26	23	30	26	22	21
7	41	31	24	20	40	30	24	20	29	24	20	28	23	19	27	23	19	18
8	38	28	22	17	37	27	21	17	27	21	17	26	21	17	25	20	17	15
9	35	25	19	15	34	25	19	15	24	19	15	23	18	15	23	18	15	13
10	33	23	17	13	32	23	17	13	22	17	13	21	17	13	21	16	13	12

Floor Cavity Reflectance .20

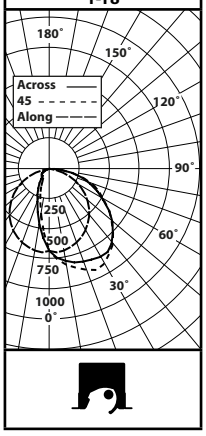
ZONAL LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% LUMINAIRE
180-90°	0	0	0
90-0°	3093	69	100
180-0°	3093	69	100

LUMINANCE SUMMARY (cd/m²)

ANGLE	0°	45°	90°
45°	1464	1704	4309
55°	1458	1927	4323
65°	1225	1508	4288
75°	1231	885	3963
85°	228	228	2856

1-T8



CANDLEPOWER SUMMARY

ANGLE	0	45	90	135	180
90	1	0	1	27	38
85	0	0	16	100	102
80	8	11	60	195	196
75	17	22	117	285	295
70	28	40	179	359	396
65	42	56	239	441	461
60	60	72	302	518	525
55	76	78	361	609	608
50	87	80	416	686	675
45	92	80	467	746	748
40	91	101	515	807	819
35	89	142	556	844	864
30	112	186	595	845	911
25	160	234	626	830	925
20	219	290	652	820	890
15	287	372	672	804	849
10	390	472	688	775	808
5	529	576	696	742	754
0	680	680	680	680	680

R-WWD-4414T8 64.8% Efficiency
Litecontrol Certified Test Report #66012000

RCC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																		
0	77	77	77	77	75	75	75	75	72	72	72	69	69	69	66	66	66	65
1	70	67	64	61	68	65	63	60	62	60	58	60	58	56	58	56	55	53
2	63	58	53	49	62	57	52	49	54	51	48	52	49	46	50	48	45	44
3	58	51	45	41	56	50	44	40	48	43	40	46	42	39	44	41	38	37
4	53	45	39	34	51	44	38	34	42	37	34	41	36	33	39	36	33	31
5	48	40	34	29	47	39	33	29	38	33	29	36	32	29	35	31	28	27
6	45	36	30	26	43	35	30	25	34	29	25	33	28	25	32	28	25	23
7	41	32	27	23	40	32	26	22	31	26	22	30	25	22	29	25	22	21
8	39	30	24	20	37	29	24	20	28	23	20	27	23	20	27	23	20	18
9	36	27	22	18	35	27	22	18	26	21	18	25	21	18	25	21	18	17
10	34	25	20	16	33	25	20	16	24	19	16	23	19	16	23	19	16	15

Floor Cavity Reflectance .20

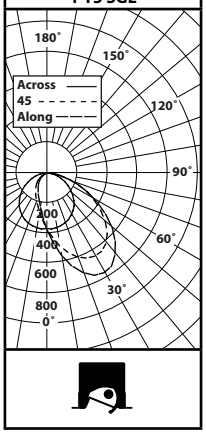
ZONAL LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% LUMINAIRE
180-90°	0	0	0
90-0°	1880	65	100
180-0°	1880	65	0

LUMINANCE SUMMARY (cd/m²)

ANGLE	0°	45°	90°
45°	1296	1127	6576
55°	1319	1354	6267
65°	990	1319	5631
75°	654	846	4501
85°	0	0	1828

1-T5 SGL



CANDLEPOWER SUMMARY

ANGLE	0	45	90	135	180
90	1	1	1	30	41
85	1	1	16	49	59
80	1	1	45	95	86
75	0	3	74	158	147
70	5	11	104	226	222
65	9	17	135	295	304
60	17	37	166	372	391
55	29	55	197	444	482
50	45	74	228	513	572
45	63	91	257	572	649
40	78	109	285	615	711
35	95	127	306	637	757
30	113	147	326	641	767
25	134	169	342	625	752
20	158	196	354	593	704
15	187	225	364	546	637
10	232	266	370	491	552
5	292	312	374	428	456
0	369	369	369	369	369

R-WWD-4414T5-SGL 49.3% Efficiency
Litecontrol Certified Test Report #68316600

RCC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																		
0	59	59	59	59	57	57	57	57	55	55	55	52	52	52	50	50	50	49
1	53	51	49	47	52	50	48	46	48	46	45	46	45	43	44	43	42	41
2	49	44	41	38	47	44	40	38	42	39	37	40	38	36	39	37	35	34
3	44	39	35	32	43	38	34	31	37	33	31	35	33	30	34	32	30	29
4	40	34	30	27	39	34	30	26	33	29	26	31	28	26	30	28	25	24
5	37	31	26	23	36	30	26	23	29	25	22	28	25	22	27	24	22	21
6	34	28	23	20	33	27	23	20	26	22	20	25	22	19	25	22	19	18
7	32	25	21	17	31	24	20	17	24	20	17	23	20	17	22	19	17	16
8	29	23	18	15	29	22	18	15	22	18	15	21	18	15	20	17	15	14
9	27	21	17	14	27	20	16	14	20	16	14	19	16	14	19	16	14	13
10	26	19	15	12	25	19	15	12	18	15	12	18	15	12	17	14	12	11

Floor Cavity Reflectance .20

ZONAL LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% LUMINAIRE
180-90°	0	0	0
90-0°	1286	49	100
180-0°	1286	49	100

LUMINANCE SUMMARY (cd/m²)

ANGLE	0°	45°	90°
45°	1141	1648	4653
55°	647	1228	4397
65°	273	515	4089
75°	0	148	3660
85°	147	147	2350

LITECONTROL

100 Hawks Avenue Hanson, MA 02341
781 294 0100 f: 781 293 2849 litecontrol.com

Date: _____ Type: M1

Firm Name: _____

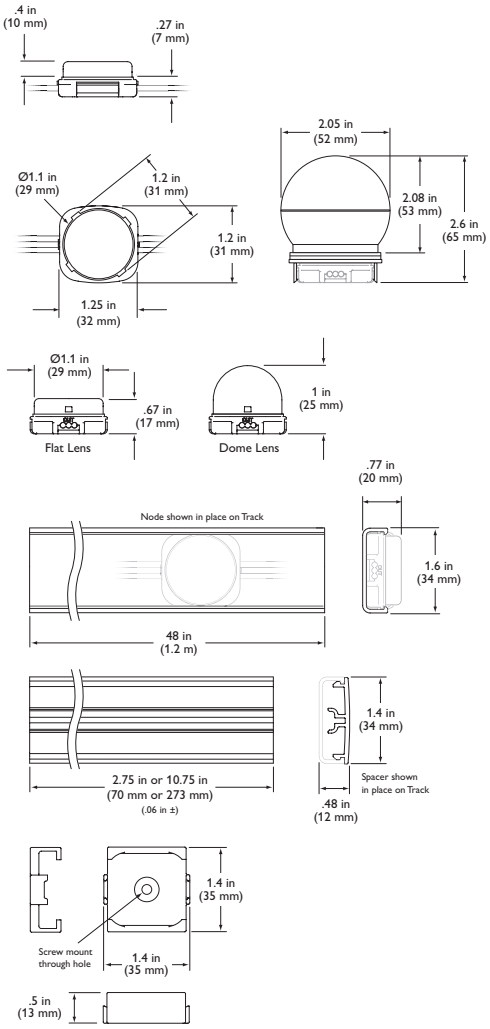
Project: _____

iColor Flex LMX

Flexible strands of large high-intensity LED nodes with intelligent color light

iColor Flex LMX are flexible strands of large, high-intensity, full-color LED nodes designed for extraordinary effects and expansive installations without the constraints of fixture size, or shape. Each iColor Flex LMX strand consists of 50 individually addressable LED nodes, featuring dynamic integration of power, communication, and control. The flexible form factor accommodates two- and three-dimensional configurations, while high light output affords superior long-distance viewing for architectural perimeter lighting, large-scale signage, and building-covering video displays.

- Superior light output — Each iColor Flex LMX node produces light output of up to 6.56 candela (full on).
- Multiple lens options — Clear flat and translucent dome lenses are standard. Optional marquee lenses, available in clear, translucent, and semi-frosted, snap onto flat-lens nodes to create the appearance of bulbs on a traditional theatre marquee.
- Adaptable mounting — Strands can be mounted directly to a surface like traditional string lights. Detachable leader cables in multiple lengths allow you to install strings at the appropriate distance from power / data supplies. Optional mounting tracks ensure straight linear runs, while snap-on spacers hide cabling and mounting hardware. Single node mounts can be positioned individually as anchor points for installations with uneven node spacing or complex geometries.
- Standard and custom lengths and node spacing — Standard on-center node spacing of 4 in (102 mm) or 12 in (305 mm) and custom spacing from 3 in (76 mm) to 24 in (610 mm) support virtually any lighting or video design. Standard 50-node strands can be field-shortened. Custom lengths of 5 to 72 nodes are also available.
- Custom Leader Cables — Custom Leader Cable lengths are available in addition to standard cables of 25 ft (7.6 m), 50 ft (15.2 m), and 100 ft (30.5 m).



- Industry-leading controls — Works seamlessly with the complete Philips line of controllers, including Video System Manager Pro, Light System Manager, and iPlayer 3, as well as third-party controllers.
- Outdoor rated — Fully sealed for maximum fixture life and IP66-rated for outdoor applications.

For detailed product information, please refer to the iColor Flex LMX Product Guide at www.philipscolorkinetics.com/ls/rgb/flexlmx/

PHILIPS

Specifications

Due to continuous improvements and innovations, specifications may change without notice.

Item	Specification	Clear Flat Lens	Translucent Dome Lens
Output	Lumen Maintenance*	50,000+ hours L_{50} @ 50° C (full output)	
	LED Channels	Red / Green / Blue	
Electrical	Input Voltage	24 VDC via sPDS-480ca, PDS-60ca, sPDS-60ca	
	Power Consumption	1 W max. per node at full output, steady state	
Control	Interface	sPDS-60ca 24 V (DMX / Ethernet) PDS-60ca 24V (Pre-programmed, DMX, or Ethernet) PDS-480ca 24V (Ethernet)	
	Control System	Philips full range of controllers, including Video System Manager Pro, Light System Manager, and iPlayer 3, or third-party controllers	
Physical	Node Dimensions *(Height x Width x Depth)*	1.2 x 1.25 x .67 in (31 x 32 x 17 mm)	1.2 x 1.25 x 1 in (31 x 32 x 25 mm)
	Weight	2.2 lb (1 kg) 50-node strand, 4 in on-center node spacing	
	Housing	White or black polycarbonate	
	Lens	Clear or translucent plastic	
	Fixture Connections	Integrated watertight 3-pin connector	
	Temperature Ranges	-40° – 122° F (-40° – 50° C) Operating ≥ 32° F (≥ 0° C) Handling -4° – 122° F (-20° – 50° C) Startup -22° – 185° F (-30° – 85° C) Storage	
	Humidity	0 – 95%, non-condensing	
	Maximum Fixtures Per Power / Data Supply	sPDS-480ca 24V: 8 strands sPDS-60ca 24V: 1 strand PDS-60ca 24V : 1 strand	
Certification and Safety	Certification	UL / cUL, FCC Class A, CE	
	Environment	Dry / Damp / Wet Location, IP66	

* L_{50} = 50% lumen maintenance (when light output drops below 50% of initial output). Ambient luminaire temperatures specified. Lumen maintenance calculations are based on lifetime prediction graphs supplied by LED source manufacturers. Calculations for white-light LED fixtures are based on measurements that comply with IES LM-80-08 testing procedures. Refer to www.philipscolorkinetics.com/support/appnotes/lm-80-08.pdf for more information.

Photometrics

Brightness Per Node

Lensing	On-Axis Candela	Viewing Angle
Clear flat lens	6.56	105°
Translucent dome	1.16	172°
Clear marquee lens	5.17	105°
Semi-frosted marquee lens	4.60	92°
Translucent marquee lens	0.62	260°

Luminance of 1 m^2 Grid

All figures in nits (cd / m^2)	On-Center Node Spacing		
Lensing	3 in	4 in	12 in
Clear flat lens	1109	656	105
Translucent dome	196	116	19
Clear marquee lens	874	517	83
Semi-frosted marquee lens	777	460	74
Translucent marquee lens	105	62	10

Fixtures and Accessories

Item	Type		Item Number	Philips 12NC
iColor Flex LMX *4 in on-center node spacing*	White	Clear Flat Lens	101-000067-02	910503700702
		Translucent Dome Lens	101-000067-06	910503700706
	Black	Clear Flat Lens	101-000067-00	910503700699
		Translucent Dome Lens	101-000067-04	910503700704
iColor Flex LMX *12 in on-center node spacing*	White	Clear Flat Lens	101-000067-03	910503700703
		Translucent Dome Lens	101-000067-07	910503700707
	Black	Clear Flat Lens	101-000067-01	910503700701
		Translucent Dome Lens	101-000067-05	910503700705
Leader Cables	Black	25 ft (7.6 m)	108-000045-00	910503700696
		50 ft (15.2 m)	108-000045-01	910503700697
		100 ft (30.5 m)	108-000045-02	910503700698
Marquee Lens Kits *Qty 50*	White	Clear	999-007997-00	910503702308
	Black		999-007997-01	910503702309
	White	Semi-frosted	999-007997-04	910503702312
	Black		999-007997-05	910503702313
	White	Translucent	999-007997-02	910503702310
	Black		999-007997-03	910503702311
Mounting Track *Qty 1*	White	4 ft (1.2 m)	101-000057-00	910503700044
	Black		101-000057-01	910503700045
Spacers Qty 50	White	4 in (102 mm)	101-000059-00	910503700048
	Black		101-000061-00	910503700052
	White	12 in (305 mm)	101-000059-01	910503700049
	Black		101-000061-01	910503700053
Single Node Mounts *Qty 50*	White		101-000058-00	910503700046
	Black		101-000058-01	910503700047
sPDS-480ca 24V	Ethernet		109-000026-00	910503700110
PDS-60ca 24V	Pre-programmed		109-000016-00	910503700095
	DMX		109-000016-01	910503700333
	Ethernet		109-000016-02	910503700334
sPDS-60ca 24V	DMX / Ethernet		109-000021-02	910503700106

Use Item Number when ordering in North America.

CHROMACORE CK TECHNOLOGY | CHROMASIC™ CK TECHNOLOGY | OPTIBIN® CK TECHNOLOGY

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, Massachusetts 01803 USA
Tel 888.385.5742
Tel 617.423.9999
Fax 617.423.9998
www.philipscolorkinetics.com

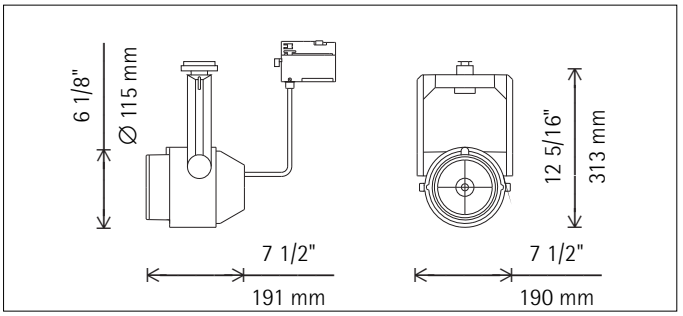
DAS-000050-01 R07 07-12

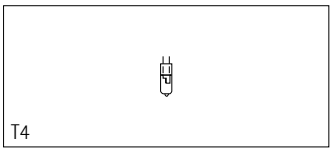
ERCO

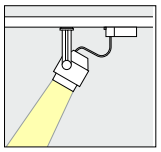
Stella Spotlight

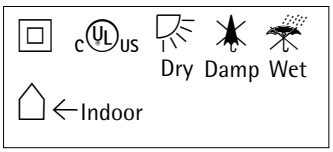
for low-voltage halogen lamps

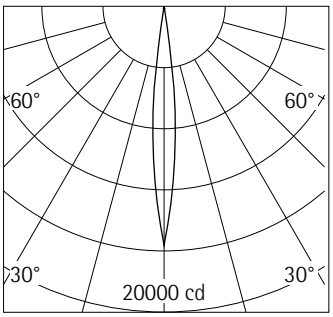
M2, M2a











T4 50W 12V GY6.35 950lm

h(ft)	E(fc)	D
		11°
3	1736	0'7"
6	434	1'2"
9	193	1'9"
12	109	2'4"
15	69	2'11"

73504.023 Silver
T4 50W 12V GY6.35 950lm
Spot reflector

Product description
Housing and yoke: cast aluminum, powder-coated. 0°-90° tiltable, on the mechanical adapter rotatable through 360°. Calibration for setting of group alignment.
Only for ceiling mounting.
Turning transadapter with cable for ERCO 2-circuit track: plastic. Electronic transformer 120/12V, 60Hz, 20-50W.
Reflector: aluminum, silver anodized, specular. Anti-glare cap attached to the safety glass. Back part of housing can be rotated for lamp focusing.
Snoot: cast aluminum, silver powder-coated. Internal anti-glare ring with cross-baffle, rotatable, black lacquered. Un-clip snoot for lamp replacement.
For service safety, all settings can be fixed with the Allen-key located in the bracket.
Use dimmers for electronic transformers (trailing edge).
Weight 5.07lbs / 2.30kg

Mounting
ERCO 2-circuit track
Hi-trac 2-circuit track
Monopoll 2-circuit track

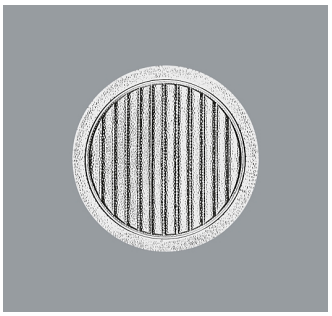
ERCO Lighting Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

Technical region: 120V/60Hz
We reserve the right to make technical and design changes.
Edition: 25.10.2012
Current version under
www.erco.com/73504.023

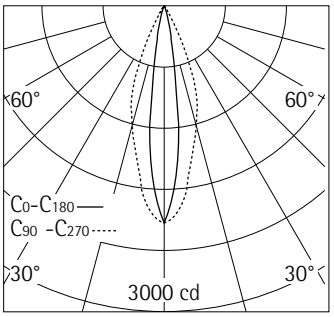
ERCO

Stella Spotlight

Accessories

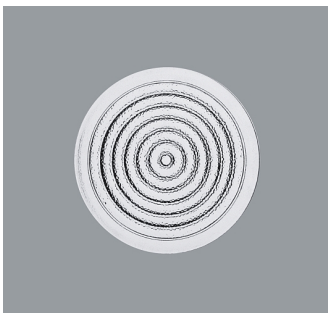


70692.000
Sculpture lens

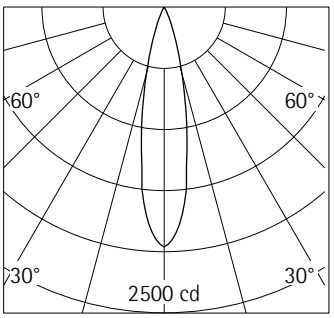


T4 50W 12V GY6.35 950lm

h(ft)	E(fc)	D C0 15°	C90 36°
3	237	0'9"	1'11"
6	59	1'7"	3'11"
9	26	2'4"	5'10"
12	15	3'2"	7'10"
15	9	3'11"	9'9"

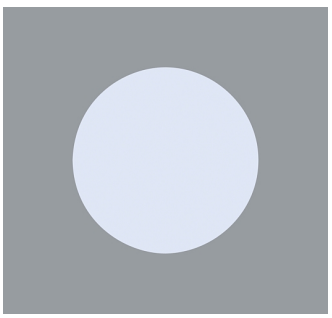


74481.000
Flood lens

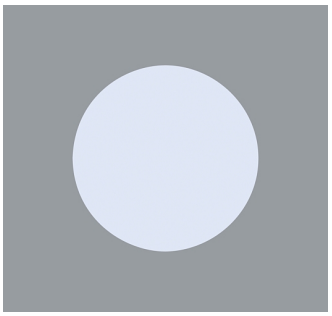


T4 50W 12V GY6.35 950lm

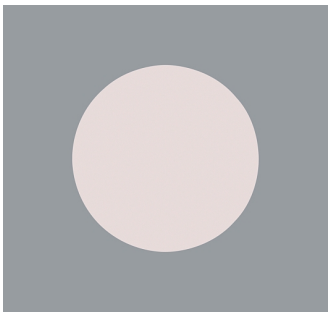
h(ft)	E(fc)	D 22°
3	218	1'2"
6	55	2'4"
9	24	3'6"
12	14	4'8"
15	9	5'10"



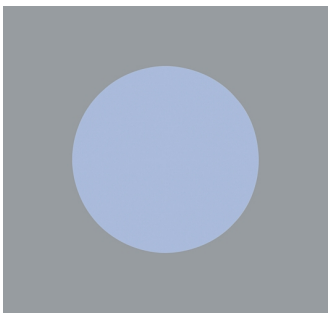
70688.000
UV filter



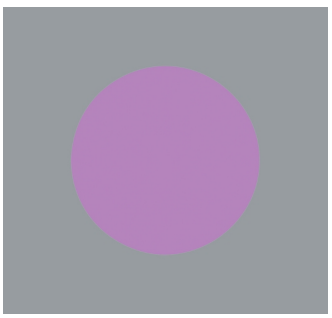
70689.000
IR filter



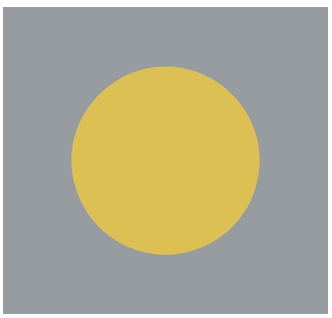
74488.000
Skintone filter



74489.000
Daylight conversion filter



74455.000
Dichroic color filter
Magenta

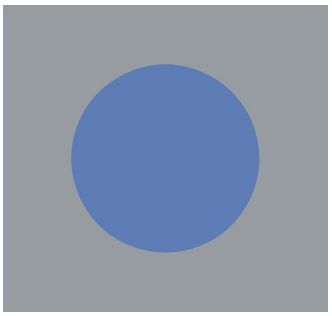


74456.000
Dichroic color filter
Amber

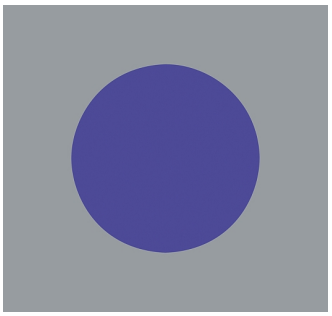
ERCO

Stella Spotlight

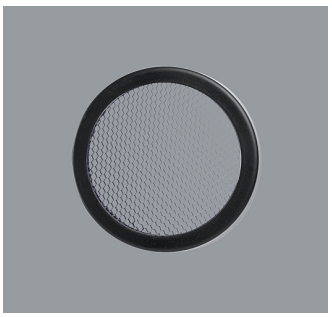
Accessories



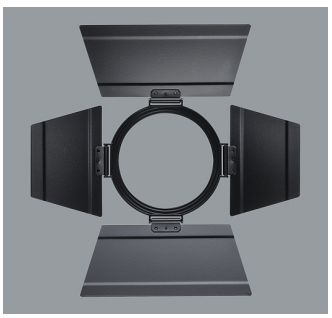
74457.000
Dichroic color filter
Sky blue



74458.000
Dichroic color filter
Night blue



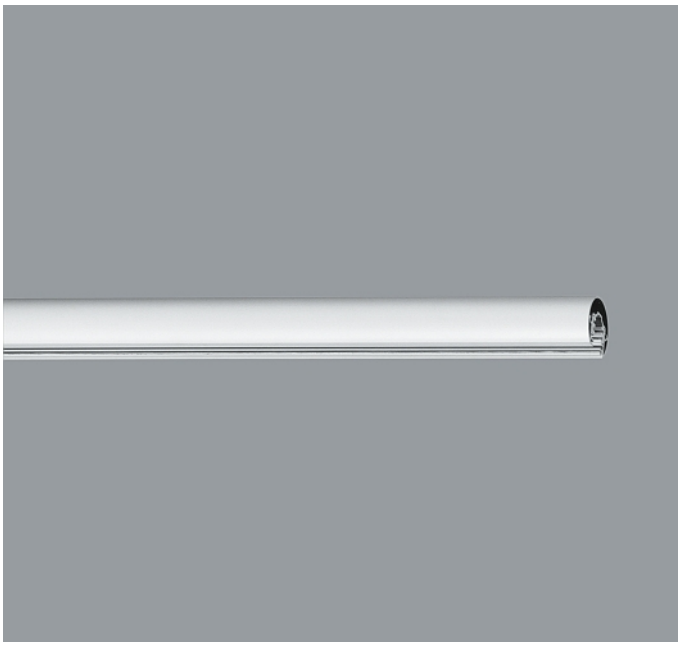
75857.000
Attachment ring with honeycomb louver

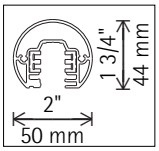


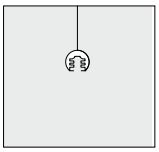
75940.000
Barn doors
Metal, powder-coated.
Black

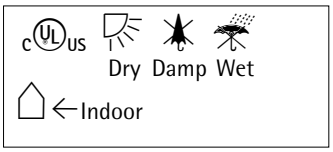
ERCO Monopoll 2-circuit track

M2b









12033.023 White
Length 12ft

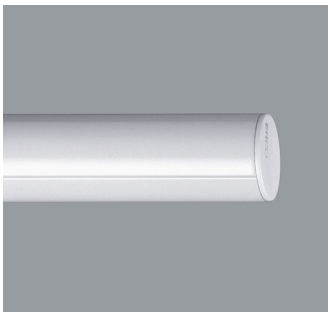
Product description
Extruded aluminum profile, powder-coated.
4 isolated copper conductors and earth conductor.
ERCO track have been tested and approved for 20A in accordance with UL1598.
When connecting the track to a 120V system, a total load of 20A per circuit is possible.
Weight 11.68lbs / 5.30kg

ERCO Lighting Inc.
160 Raritan Center Parkway
Suite 10
Edison, NJ 08837
USA
Tel.: +1 732 225 8856
Fax: +1 732 225 8857
info.us@erco.com

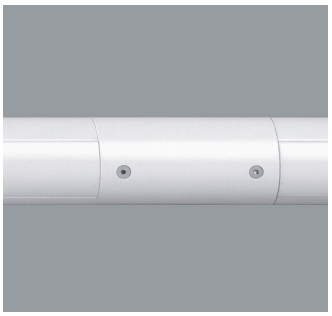
Technical region: 120V/60Hz
We reserve the right to make technical and design changes.
Edition: 25.10.2012
Current version under
www.erco.com/12033.023

ERCO Monopoll 2-circuit track

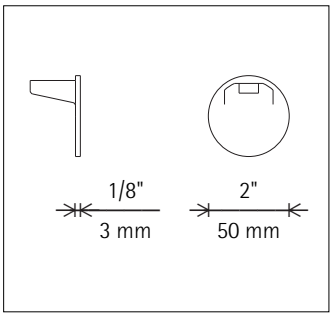
Accessories

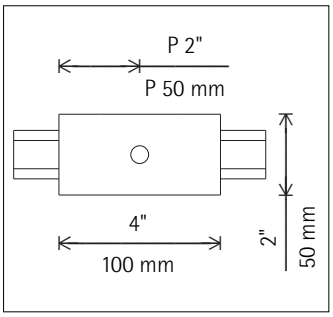


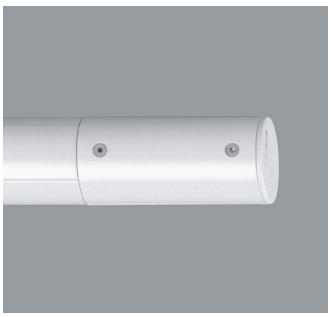
12606.000
Monopoll End cap
for ERCO 2-circuit track and empty profiles. Fixing plate and screw. Plastic, white.
Indoor
Dry Damp Wet



12617.023
Monopoll Coupler housing
Cast aluminum, white (RAL9002) powder-coated. Rotatable graduated fixing ring. Monopoll profiles can be locked in position every 15°.
Feeding and through-wiring to be ordered separately.
Weight 0.77lbs / 0.35kg
Indoor
Dry Damp Wet

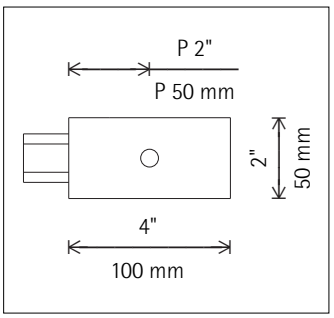


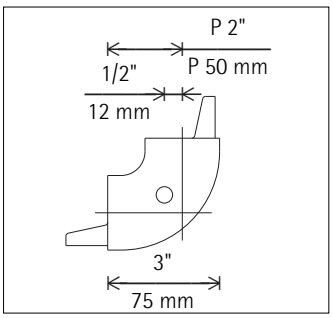




12612.023
Monopoll Live end housing
Cast aluminum, white (RAL9002) powder-coated. Rotatable graduated fixing ring. Monopoll profiles can be locked in position every 15°.
Feeding to be ordered separately.
Weight 0.77lbs / 0.35kg
Indoor
Dry Damp Wet

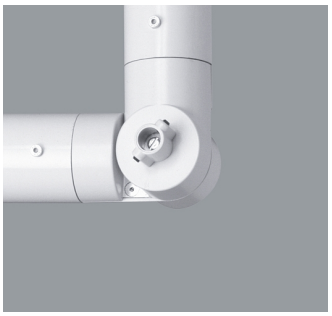
12527.023
Monopoll 90° connector
Cast aluminum, white (RAL9002) powder-coated. Rotatable graduated fixing ring. Monopoll profiles can be locked in position every 15°.
Feeding and through-wiring to be ordered separately.
Weight 0.44lbs / 0.20kg
Indoor
Dry Damp Wet



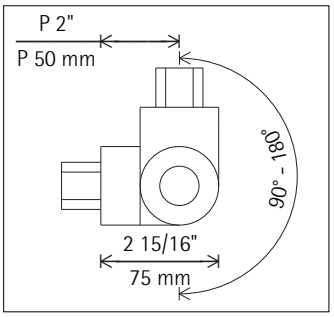


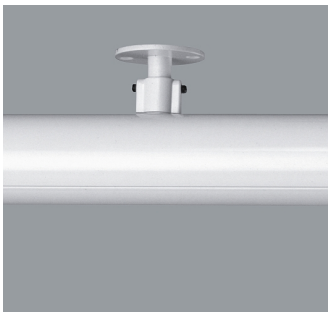
ERCO Monopoll 2-circuit track

Accessories

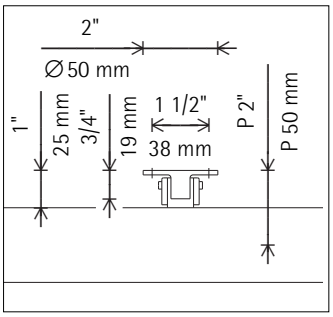


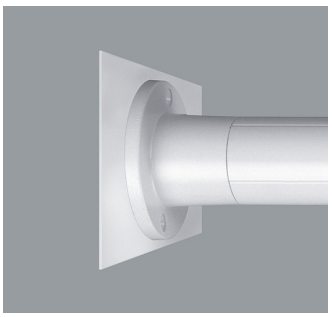
12602.000
Monopoll L-connector
With mounting bush 12567.000. Cast aluminum, white (RAL9002) powder-coated. Adjustable from 90° to 180°.
Rotatable graduated fixing ring.
Monopoll profiles can be locked in position every 15°.
Feeding not possible. Through-wiring to be ordered separately.
Weight 1.10lbs / 0.50kg
c UL us ←Indoor
Dry Damp Wet



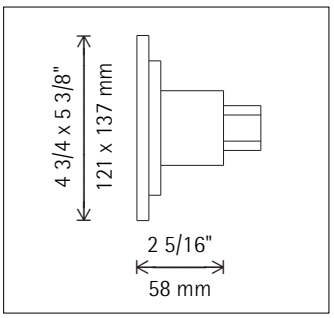


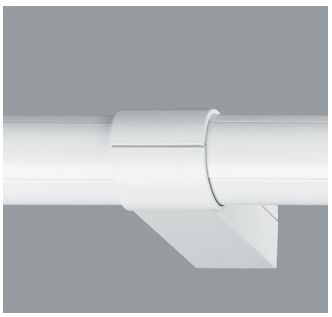
12597.000
Monopoll Wall/ceiling fixing
Cast aluminum, white (RAL9002) powder-coated.
Mounting device for connector or intermediate suspension to be ordered separately.
Load 44lbs / 20kg.
c UL us ←Indoor
Dry Damp Wet
Only in conjunction with:
12567.000
12572.000
12602.000



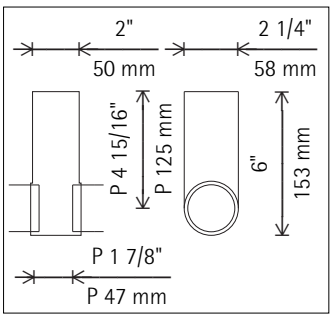


12587.023
Monopoll Wall and ceiling plate
Cast aluminum, white (RAL9002) powder-coated. Rotatable graduated fixing ring. Monopoll profiles can be locked in position every 15°.
Feeding to be ordered separately.
c UL us ←Indoor
Dry Damp Wet



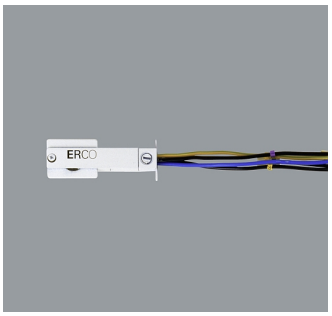


12482.000
Monopoll Wall/ceiling cantilever as end/intermediate fixing.
Cast aluminum, white (RAL9002) powder-coated. One end plate: plastic, white.
Feeding and through-wiring to be ordered separately.
Load 55lbs / 25kg.
Weight 1.81lbs / 0.82kg
c UL us ←Indoor
Dry Damp Wet

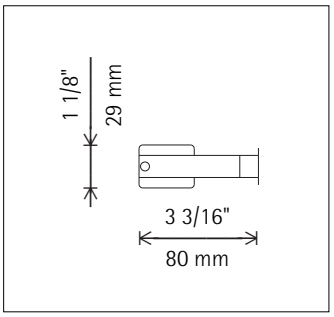


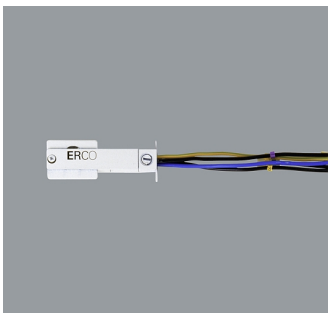
ERCO Monopoll 2-circuit track

Accessories

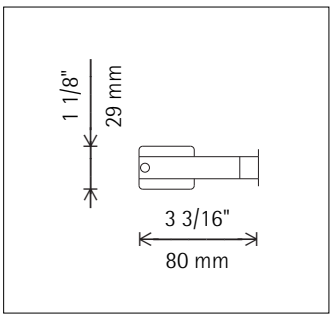


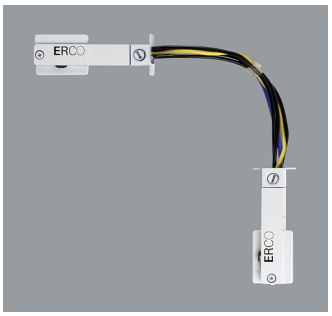
12552.023
Feeding and through-wiring
for 2-circuit track.
Plastic, white.
Earth conductor left.
Must be used to energize track.
c UL us ←Indoor
Dry Damp Wet
Only in conjunction with:
12527.023
12612.023
12617.023



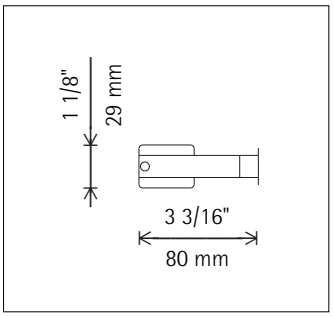


12553.023
Feeding and through-wiring
for 2-circuit track.
Plastic, white.
Earth conductor right.
Must be used to energize track.
c UL us ←Indoor
Dry Damp Wet
Only in conjunction with:
12527.023
12612.023
12617.023

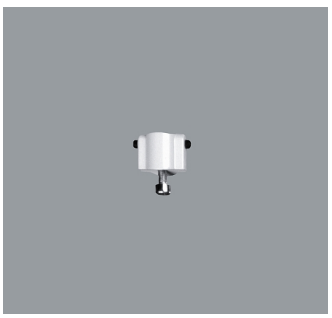




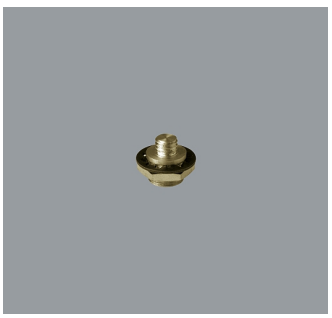
12556.023
Electric coupler
for the through-wiring of connectors.
Plastic, white.
c UL us ←Indoor
Dry Damp Wet
Only in conjunction with:
12527.023
12602.000



12567.000
Mounting device
for suspension on connector.
Metal,white.
Only in conjunction with:
12527.023
12612.023
12617.023



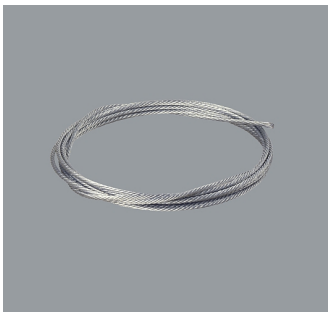
12572.000
Mounting device
for suspension on profile. Profile to be
drilled on-site. Metal, white.



12657.000
Mounting device
for suspension on connector.
Metal.
Only in conjunction with:
12527.023
12612.023
12617.023

ERCO Monopoll 2-circuit track

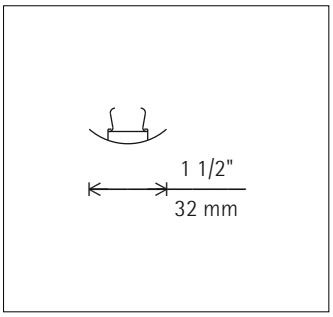
Accessories



12440.000
Wire rope
Load 44lbs / 20kg.
Diameter 1/16" / 1.75mm.
Length 32.8 ft / 10m.

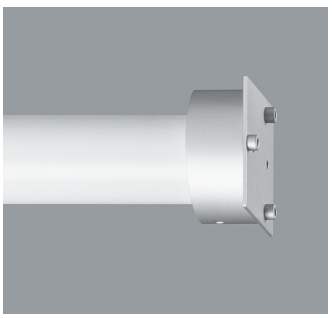
12083.023
Monopoll Cover profile
Aluminum, white (RAL9002) powder-coated.
Length 1.64ft / 500mm.
Width 1 1/2" / 32mm.
cULus ←Indoor
Dry Damp Wet

16910.000
Turnbuckle with 2 clamps
Metal, galvanized.
Load 132lbs / 60kg.
Only in conjunction with:
12440.000

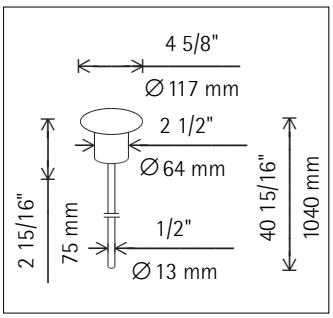


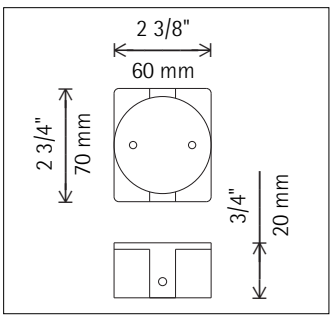
12499.000
Monopoll Cable nippers
for shortening the copper conductors in Monopoll tracks.

79944.023
Pendant tube suspension
Tube: metal, powder-coated, ø 1/2" / 13mm, L 40 15/16" / 1040mm.
Canopy: plastic, ø 4 5/8" / 117mm, H 2 15/16" / 75mm.
Feeding possible.
Load 44lbs / 20kg.
White
cULus ←Indoor
Dry Damp Wet
Only in conjunction with:
12567.000
12572.000



12099.000
Hole gauge
for on-site cutting of Monopoll track and profiles.
Cast aluminum, with hardened sleeve.

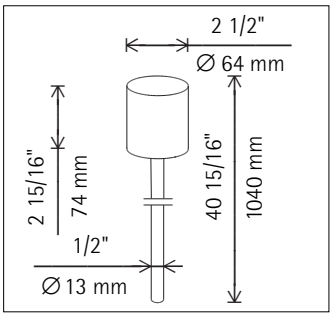




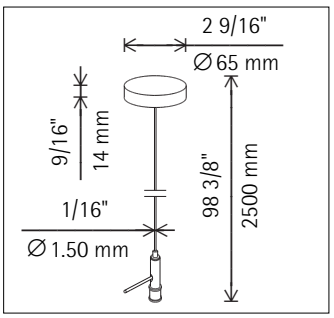
ERCO Monopoll 2-circuit track

Accessories

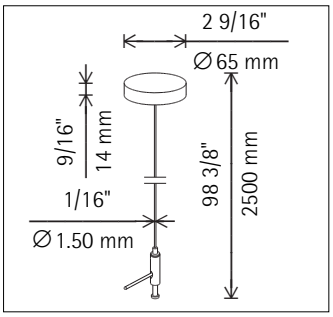
12446.023
Pendant tube suspension
Pendant tube: metal, powder-coated. ø 1/2" / 13mm, L 40 15/16" / 1040mm.
Canopy: plastic. ø 2 1/2" / 64mm, H 2 15/16" / 74mm.
Load 44lbs / 20kg.
White
Indoor
Dry Damp Wet
Only in conjunction with:
12567.000
12572.000
12602.000



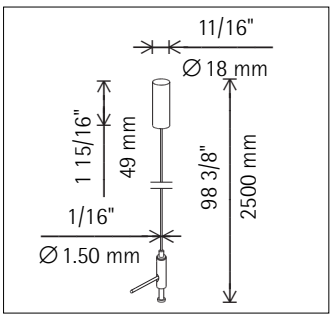
12561.000
Wire rope suspension
With rapid connector for adjustment levelling.
Wire rope: ø 1/16" 1.5mm, L 98 3/8" / 2500mm.
Ceiling fixture: cast aluminum/metal, powder-coated. ø 2 9/16" / 65mm, H 9/16" / 14mm.
Load 44lbs / 20kg.
White
Indoor
Dry Damp Wet
Only in conjunction with:
12567.000
12572.000
12602.000



12563.000
Wire rope suspension
With rapid connector for adjustment levelling. Also for suspension on profile. Profile to be drilled on-site.
Wire rope: ø 1/16" / 1.5mm, L 98 3/8" / 2500mm.
Ceiling fixture: cast aluminum/metal, white powder-coated. ø 2 9/16" / 65mm, H 9/16" / 14mm.
Load 44lbs / 20kg.
Indoor
Dry Damp Wet
Only in conjunction with:
12657.000

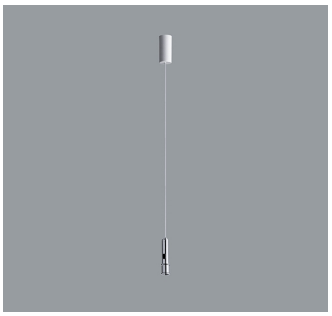


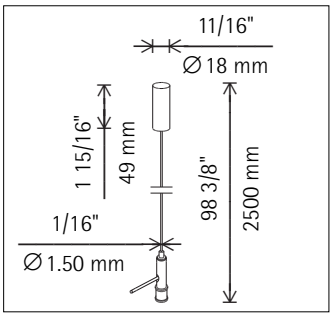
12558.000
Wire rope suspension
With single-point fixing. With rapid connector for adjustment levelling. Also for suspension on profile. Profile to be drilled on-site.
Wire rope: ø 1/16" / 1.5mm, L 98 3/8" / 2500mm.
Ceiling fixture: cast aluminum/metal, white powder-coated. ø 11/16" / 18mm, L 1 15/16" / 49mm.
Load 44lbs / 20kg (with heavy load dowel).
Indoor
Dry Damp Wet
Only in conjunction with:
12657.000



ERCO Monopoll 2-circuit track

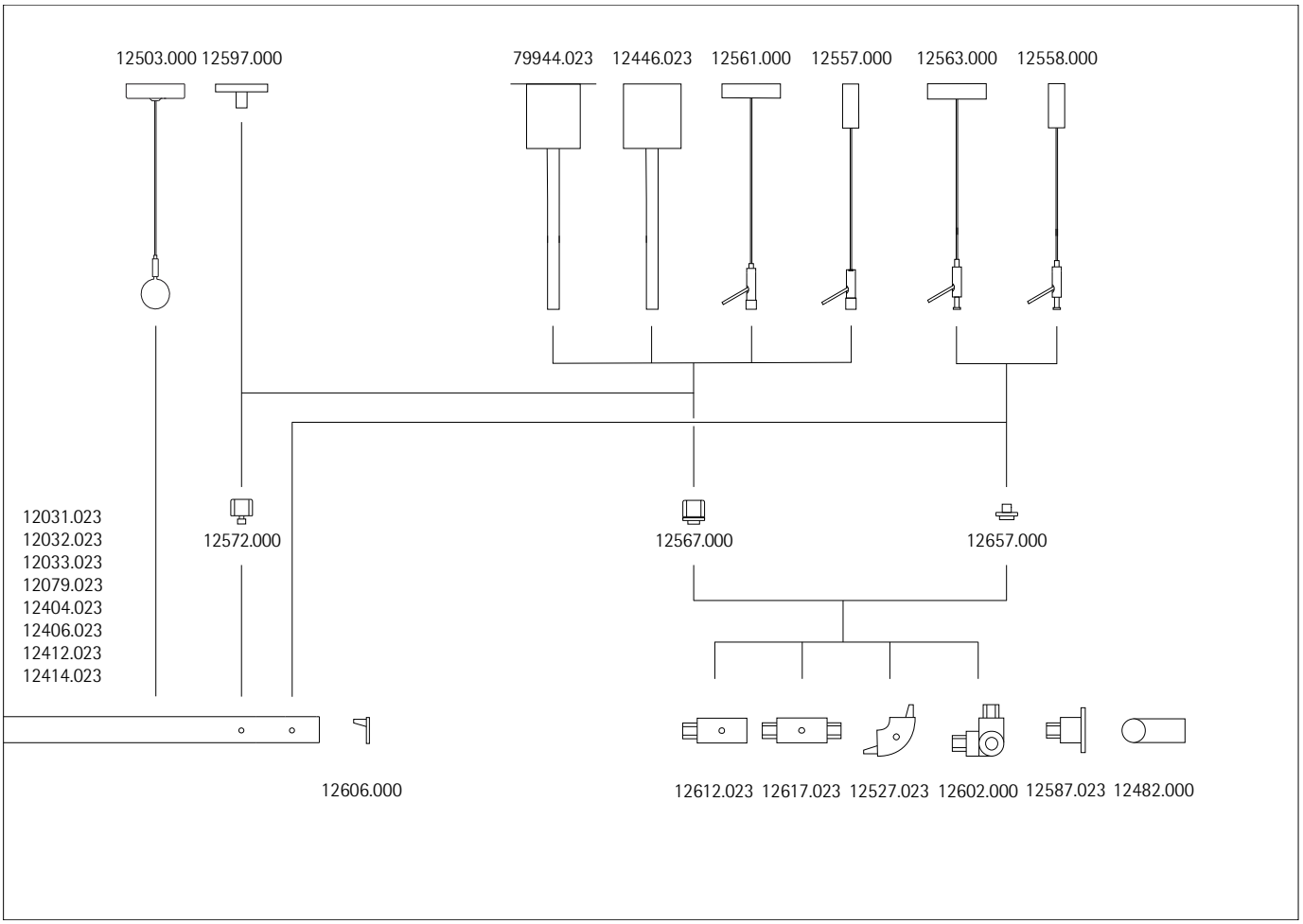
Accessories





12557.000
Wire rope suspension
With single-point fixing and rapid connector for adjustment levelling.
Wire rope: ø 1/16" / 1.5mm, L 98 3/8" / 2500mm.
Ceiling fixture: cast aluminum/metal, white powder-coated. ø 11/16" / 18mm, L 1 15/16" / 49mm.
Load 44lbs / 20kg (with heavy load dowel).
c UL us ←Indoor
Dry Damp Wet
Only in conjunction with:
12567.000
12572.000
12602.000

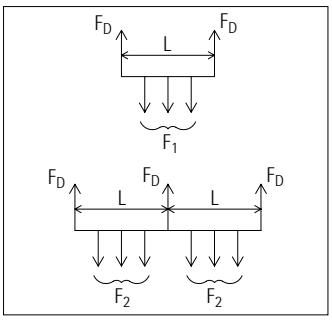
ERCO Monopoll 2-circuit track



The permissible load is limited by the permissible deflection of profiles and the permissible load of suspension devices. The load distribution consists of the weight of the system and evenly distributed point loads.

L	(ft/m)	Length of profile
f_e	(ft/m)	Deflection due to weight -of profile
F_D	(lbs/kg)	Maximum loading of suspension device
F_e	(lbs/kg)	Weight of profile
F_1	(lbs/kg)	Permissible load (span L) for suspension at both ends within the permissible deflection of L/250
F_2	(lbs/kg)	Permissible load (span L) for a series of suspensions within the permissible deflection L/250

L	(mm)	1219	2438	3657
	(ft)	4	8	12
F_e	(kg)	1.77	2.68	4.03
	(lbs)	3.90	7.81	11.71
f_e	(mm)	1.00	4.90	15.50
	(inch)	0.04	0.19	0.61
F_D = 44.09 lbs / 20.00 kg				
F_1	(kg)	22	6	–
	(lbs)	48.50	13.23	–
F_2	(kg)	16	6	–
	(lbs)	35.27	13.23	–
F_D = 132.28 lbs / 60.00 kg				
F_1	(kg)	22	6	–
	(lbs)	48.50	13.23	–
F_2	(kg)	16	6	–
	(lbs)	35.27	13.23	–



COOPER LIGHTING - METALUX®

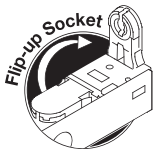
DESCRIPTION

The SNF Series is a functional and multi-purpose narrow strip family that incorporates premium performance and construction durability. Designed with our easy-to-use Flip-Up socket design, the SNF significantly reduces installation time. The performance and application versatility of this series can be increased by incorporating symmetrical or asymmetrical reflectors. The SNF Series can be installed using various mounting methods and numerous options and accessories are available. The small size of the SNF makes it an ideal choice for size-restricted architectural applications. The SNF Series can be the illumination solution in commercial, industrial, retail and residential applications. Fixtures can be used in storage/utility areas, coves, display cases, shops, task and general area lighting.

Catalog #		**Type**
Project		M3
Comments		**Date**
Prepared by		

SNF
117, 125
125
128T8, 132
217, 225
228T8, 232

2', 3' OR 4' STRIP
1 OR 2 T8 LAMPS
Narrow Striplite



SPECIFICATION FEATURES

A···Construction

Channel is die formed cold rolled steel with numerous KOs for ease of installation. Groove for Tong Hanger. End plate quickly converts to snap-in channel connector for continuous row alignment. Lamp holder bracket flips in place. Channel/wireway cover secured with quarter-turn fasteners.

B···Electrical*

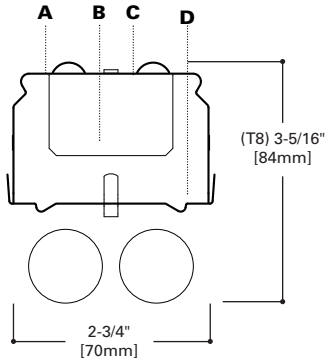
Ballasts are CBM/ETL Class "P" and are positively secured by mounting bolts. Rotor Lock lampholders. UL/CUL listed. Suitable for damp locations.

C···Finish

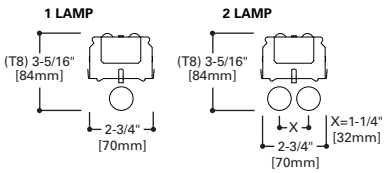
Multistage iron phosphate pretreatment ensures maximum bonding and rust inhibitor. Lighting upgrade, baked white enamel finish. Prepainted material is standard, PAF optional.

D···Channel/Wireway Cover

Die formed heavy gauge steel. Tight fit for ease of maintenance. Easily removed without use of tools. Optional reflector available incorporating silver technology enhancements (Silver Lining). Consult Pre Sales Technical Support.



LAMP CONFIGURATIONS



MOUNTING DATA

ENERGY DATA

Input Watts:

EB Ballasts Normal Ballast Factor
117 (20), 217 (34), 125 (23), 128T8 (28), 132 (31), 225 (53), 228T8 (49), 232 (58)
HB Ballasts Normal Ballast Factor
117 (18), 217 (31), 128T8 (25), 228T8 (48), 132 (28), 232 (53)
EB Ballasts Low Ballast Factor
125 (21), 128T8 (22), 132 (25), 225 (40), 228T8 (44), 232 (48)

Luminaire Efficacy Rating
LER = FS-85
Catalog Number: SNF-132

Yearly Cost of 1000 lumens, 3000 hrs at .08 KWH = $2.82

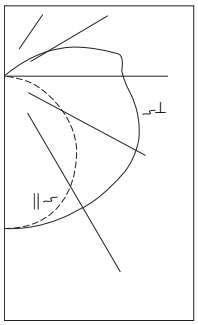
*Reference the lamp/ballast data in the Technical Section for specific lamp/ballast requirements. [1] One lamp only.

LAMPS CONTAIN MERCURY. DISPOSE ACCORDING TO LOCAL, STATE OR FEDERAL LAWS

LINEAR DISCONNECT
Safe and convenient means of disconnecting power.

ADF081660

PHOTOMETRICS



SNF-132
Electronic Ballast

F32T8/35K Lamps
2900 Lumens

Spacing criterion: (II) 1.2 x mounting height, (⊥) 1.5 x mounting height

Efficiency 93.4%

Test Report: SN132.IES

LER = FS-85

Yearly Cost of 1000 lumens, 3000 hrs at .08 KWH = $2.82

Coefficients of Utilization

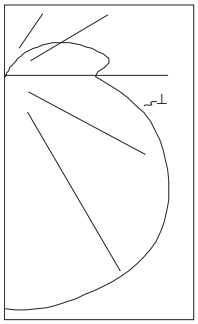
Effective floor cavity reflectance	20%																			
rc	80%				70%				50%			30%			10%			0%
rw	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																		
0	107	107	107	107	102	102	102	102	94	94	94	86	86	86	79	79	79	76
1	94	89	84	79	90	85	80	76	77	74	70	71	68	65	64	62	60	57
2	84	75	68	61	80	72	65	59	66	60	55	60	55	51	54	51	48	44
3	76	65	57	50	72	62	55	48	57	51	45	52	47	42	47	43	39	36
4	69	57	48	41	66	55	47	40	50	43	38	46	40	35	42	37	33	30
5	63	50	41	34	60	48	39	33	44	37	31	40	34	29	37	31	27	25
6	58	44	35	29	55	43	34	28	39	32	27	36	30	25	33	27	23	21
7	53	40	31	25	50	38	30	24	35	28	23	32	26	21	29	24	20	18
8	49	36	27	21	46	34	26	21	31	24	20	29	23	18	26	21	17	15
9	45	32	24	18	43	31	23	18	28	21	17	26	20	16	24	19	15	13
10	42	29	21	16	40	28	21	16	26	19	15	24	18	14	22	17	13	11

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixture
0-30	391	13.5	14.4
0-40	662	22.8	24.5
0-60	1307	45.1	48.3
0-90	2192	75.6	81.0
90-180	515	17.8	19.0
0-180	2708	93.4	100.0

Candela

Angle	Along II	45°	Across⊥
0	481	481	
10	474	478	479
20	448	468	481
30	405	447	479
40	347	421	480
50	278	393	481
60	201	367	474
70	120	332	449
80	44	278	408
90	2	237	368
100	2	213	367
110	2	120	259
120	2	38	144
130	3	2	42
140	0	0	0
150	0	0	0
160	0	0	0
170	0	0	0
180	0	0	0



SNF-232
Electronic Ballast

Two F32T8/35K Lamps
2800 Lumens

Spacing criterion: (II) 1.2 x mounting height, (⊥) 1.5 x mounting height

Efficiency 90.1%

Test Report: SNF232.IES

LER = FS-

Yearly Cost of 1000 lumens, 3000 hrs at .08 KWH = $

Coefficients of Utilization

Effective floor cavity reflectance	20%																			
rc	80%				70%				50%			30%			10%			0%
rw	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																		
0	103	103	103	103	99	99	99	99	90	90	90	83	83	83	76	76	76	72
1	91	86	81	77	87	82	78	74	75	72	68	68	66	63	62	60	58	55
2	82	73	66	60	78	70	64	58	64	59	54	58	54	50	53	50	47	44
3	74	64	55	49	70	61	53	47	55	49	44	51	45	41	46	42	38	35
4	67	56	47	41	64	53	45	39	49	42	37	44	39	35	41	36	32	30
5	62	49	41	34	58	47	39	33	43	37	31	40	34	29	36	31	27	25
6	57	44	36	30	54	42	34	29	39	32	27	36	30	25	33	28	24	22
7	52	40	31	26	50	38	30	25	35	28	24	32	27	22	30	25	21	19
8	49	36	28	23	46	35	27	22	32	25	21	29	24	20	27	22	19	17
9	45	33	25	20	43	32	25	20	29	23	19	27	22	18	25	20	17	15
10	42	30	23	18	40	29	22	18	27	21	17	25	20	16	23	18	15	13

Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixture
0-30	805	14.4	16.0
0-40	1364	24.4	27.0
0-60	2638	47.1	52.3
0-90	4049	72.3	80.3
90-180	993	17.7	19.7
0-180	5043	90.1	100.0

Luminance Data

Angle in Deg	Average 0-Deg cd/sm	Average 45-Deg cd/sm	Average 90-Deg fcd/sm
45	13624	17577	20140
55	12829	19375	22766
65	11676	22113	27282
75	9619	28523	36952
85	5173	56907	82706

Candela

Angle	Along II	45°	Across⊥
0	989	989	989
10	974	986	991
20	924	958	989
30	835	918	995
40	716	868	982
50	572	797	921
60	413	689	829
70	248	563	715
80	92	412	566
90	1	272	420
100	1	304	490
110	0	240	410
120	1	179	325
130	1	121	235
140	2	66	149
150	2	18	69
160	3	2	9
170	3	2	0
180	2	2	2

ORDERING INFORMATION

SAMPLE NUMBER: SNF-232-UNV-EB81-U

Tandem
Blank=2', 3' or 4' Length
8T=8' Length

Series
SNF=Commercial Narrow Striplite

Number of Lamps[1]
1=1 Lamp
2=2 Lamp
(Not Included)

Wattage
17=17W T8 (24")
25=25W T8 (36")
28T8=28W T8 (48")[7]
32=32W T8 (48")

Voltage[2]
120V=120 Volt
277V=277 Volt
347V=347 Volt
UNV=Universal Voltage 120-277

Options[2]
GL=Single Element Fuse
GM=Double Element Fuse
EL4LP=Low Profile Emergency Installed[4, 5]

Ballast Type[2, 5]
EB8_=T8 Electronic Instant Start. Total Harmonic Distortion < 10%
No. of Ballast 1 or 2
EB8_/PLUS=T8 Electronic Instant Start. High Ballast Factor >1.13. Total Harmonic Distortion < 10%
No. of Ballast 1 or 2
ER8_=T8 Electronic Program Rapid Start. Total Harmonic Distortion < 10%
No. of Ballast 1 or 2
ER8_/PLUS=T8 Electronic Program Start. High Ballast Factor >1.13. Total Harmonic Distortion < 10%
No. of Ballast 1 or 2

HPT8 Ballast
Ballast
HB8_L=T8 Electronic Instant Start. Low Ballast Factor .77
HB8_=T8 Electronic Instant Start. Ballast Factor .88
HB8_N=T8 Electronic Instant Start. Normal Ballast Factor 1.0
HB8_H=T8 Electronic Instant Start. High Ballast Factor 1.15-1.2
HR8_DIM=T8 Electronic Program Start Step Dimming. Ballast Factor .88
HR8_L=T8 Electronic Program Start. Low Ballast Factor .77
HR8_=T8 Electronic Program Start. Ballast Factor .88
HR8_H=T8 Electronic Program Start. High Ballast Factor 1.15-1.2

Options
RIF1=Radio Interference Suppressor
6-3/18 SJT-C&P-515P=Cord & Plug (120V) (15 AMP)[6]
6-3/18 SJT-C&P L715P=Cord & Plug (277V) (15 AMP)[6]
PI/CPI=Plug-In Option[6]

Packaging
U=Unit Pack
6B=6 Bulk Packing (96")

NOTES: [1]2 lamps T8 only. [2]Products also available in non-US voltages and frequencies for international markets. [3]For SilverLining reflector add SS in Catalog Number, Example: SNF-ASY-SS-4. [4]Not available for 2' version. [5]Maximum width clearance for ballast in channel is 2-7/32". [6]Socket brackets left uninstalled. [7]When utilizing 28W T8 lamps, HPT8 Ballast must be specified. Other ballast restrictions may apply. Consult your Cooper Lighting Representative for availability and ordering information.

Specifications & dimensions subject to change without notice. Consult your Cooper Lighting Representative for availability and ordering information.

ACCESSORIES

(Order Separately)

AYC-Chain/Set=36" Chain Hanger (Use 1 Set Per Fixture)
SCF=Fixed Stem Set (Specify Length)
SCS=Swivel Stem Set (Specify Length)
SCA=Adjustable 48" Stem Set
EYE-CHAIN/SET-B=Eye Bolt Chain (Use 1 Set Per Fixture)
SNF-ASY-4[3]=3" Asymmetric Reflector (Specify 2', 3' or 4')
SNF-SYM-4[3]=6" Symmetric Reflector (Specify 2', 3' or 4')
SNF-REV-4[3]=Reverse Asymmetric Reflector (Specify 2', 3' or 4')
WG/SNF-2FT=2' Wire Guard
WG/SNF-3FT=3' Wire Guard
WG/SNF-4FT=4' Wire Guard
A1B/Spacer-U=Spacer 1-1/2" to 2-1/2" from ceiling (Use 2 Per Fixture)
TOGGLE=Single Toggle NO. 2 (Specify Length)
Y-TOGGLE=Y Toggle NO. 2 (Specify Length)

(Additional Accessories Available. See Options and Accessories Section.)

SHIPPING INFORMATION

Catalog No.	Wt.
SNF-117	5 lbs.
SNF-217	5 lbs.
SNF-125	6 lbs.
SNF-225	6 lbs.
SNF-132	12 lbs.
SNF-232	12 lbs.
SNF-128T8	12 lbs.
SNF-228T8	12 lbs.
8TSNF-132	14 lbs.
8TSNF-232	14 lbs.