Mercedes Benz & Audi of Palo Alto

LIGHTING REPORT

May 26, 2019

FRANCIS
KRAHE
& ASSOCIATES

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Introduction

Effective lighting will present a comfortable and attractive image of the Mercedes Benz Palo Alto to the surrounding community.

This Report presents lighting design and analysis for the critical public areas of the Project, with special emphasis on the placemaking aspects of light within the public realm, the visibility and brightness of the auto show room and display, and the impact of light trespass on the surrounding environment.

This Lighting Report summarizes the design recommendations developed by Francis Krahe & Associates to provide effective light for night use of the Property.

The lighting analsysis evaluates the proposed solutions with respect to the light trespass and glare at the Project property line adjaent to sensitive use properties.

The Project lighting design objective is to create an attractive and effective retail space while limiting the impact and effect on adjacent sensitive use areas.

Aesthetic Goals

Beautiful auto retail display space

Transparency and connection of interior to exterior space.

Modern, minimal lighting product design elements

Brightness aligned with architectural form and function.

Lighting controls minimize energy use

High energy efficiency LED products minimize energy use.

Environmental Goals

Avoid light trespass and glare at Baylands

Comply with CALGreen and IESNA light trespass LZ1 0.09 fc

Comfortable night brightness

Prevent Glare or high contrast by shielding light sources.

Contrast ratio less than 30 to 1 with BUG rating standards.

Warm 3000K light color to minimize impact to Baylands habitat

Basis of Design

The Project Illuminance design criteria are established in accordance with California Electric Code (CEC) the Illuminating Engineering Society of North America (IESNA) recommendations and Mercedes Benz of North America retail display standards.

The Project energy efficiency design goal is to meet or exceed CEC 2016 Title 24 lighting energy standards by utilizing high efficiency LED light fixtures, minimizing excess light in non-essential spaces, and employing state of the art control strategies.

The basis of design for lighting at the task area work plane surface, (average foot-candles) are as listed in the following table.

ILLUMINANCE DESIGN CRITERIA (fc)

Space	fc	
Entrance and Exit Doors	5	average
Egress Walkways	10	average
	1	minimum
Outdoor Display:	5	average
Outdoor Seating	1	average
Parking Roof Deck	15	average
Roads & Parking	2	average
Main Lobby Display:	100	average
Office, at desk:	50	average
Office, ambient:	30	average
Corridor floor surface	10	average

LIGHTING CONTROLS SYSTEM

The lighting control system will automate the on/off and dimming functions for interior and exterior lighting. The lighting control system will activate changes to the light intensity based upon a pre-programmed schedule and input from photocells, occupancy sensors and timeclock functions.

Each day will include the following sequence of control:

- Pre-dawn service is activated by time clock to gradually increase light intensity to the required illuminance for staff and customers.
- After sunrise the Photocell activates dimming function to reduce light energy as the sun light is greater than 100 fc.
- At dusk photocell activates dimming function to raise illuminance from exterior and interior lighting as the sunlight is reduced below 100 fc.
- After business hours the timeclock function dims all non essential lighting and maintains security and safety lighting.
- At night Occupancy sensor activates local area lights in the vicinity of the sensors

Site Lighting

Exterior lighting is designed to provide adequate illumination for the safety and security of the general public, retail customers, visitors and employees who use of the Project site during the evening and night.

The illumination intensity is designed in accordance with the recommended practice standards of the IESNA and complies with CALGreen and CEC standards for minimum illuminance at all building exits, exterior loading, and site roadways and parking.

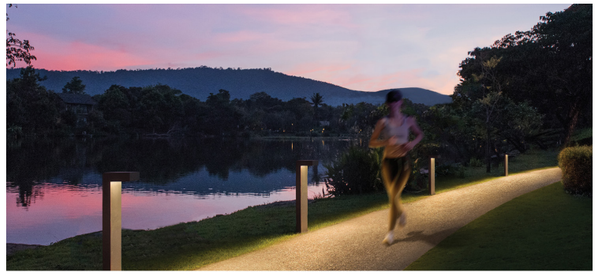
Light Trespass Illuminance at the Project Site complies with the following standards:

- At South Property Line adjacent to Baylands natural habitat Ev is less than 0.09 footcandles (fc).
- At north, east and west Project property lines adjacent to commercial properties E_v is less than 0.74 fc.

All exterior light fixtures are fully shielded, and direct light down to the ground plane.

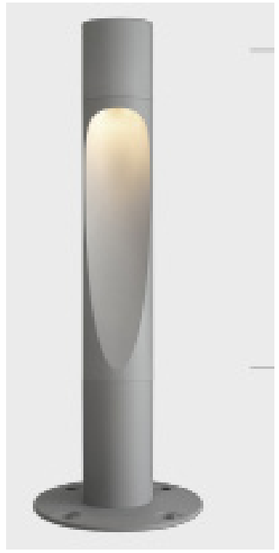
All exterior light fixtures comply with CALGreen Backlight Uplight and Glare (BUG) rating.

All exterior light fixtures are 3000K to conform to Dark Sky recommended practice.



Type SA Pole with Accent Light

Type SA-1 & SA-2 Pole



Type SB Bollard

Type SK Wall Mounted Downlight

Type SK-1 Wall Mounted Downlight

Exterior Facade

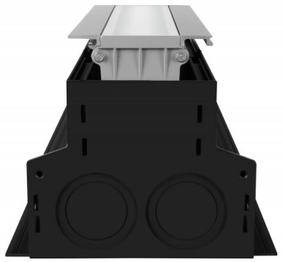
The Project building facade serves as the main entrance for the Project and a retail display for the auto showroom. Visitors and staff will utilize the exterior space in the evening to meet and review products.

The exterior facade is illuminated to promote transparency into the auto showroom space to feature the products and the people working and visiting.

The illumination intensity is designed in accordance with the Mercedes Benz of North America retail display guidelines, the recommended practice standards of the IESNA, and complies with CALGreen and CEC standards for minimum illuminance at building exit pathways and doors.

All exterior and interior light fixtures are fully shielded to limit glare and reflected glare.

Type SD Surface Mounted Downlight



Type SG Recessed Up Light

Exterior Parking Roof Deck

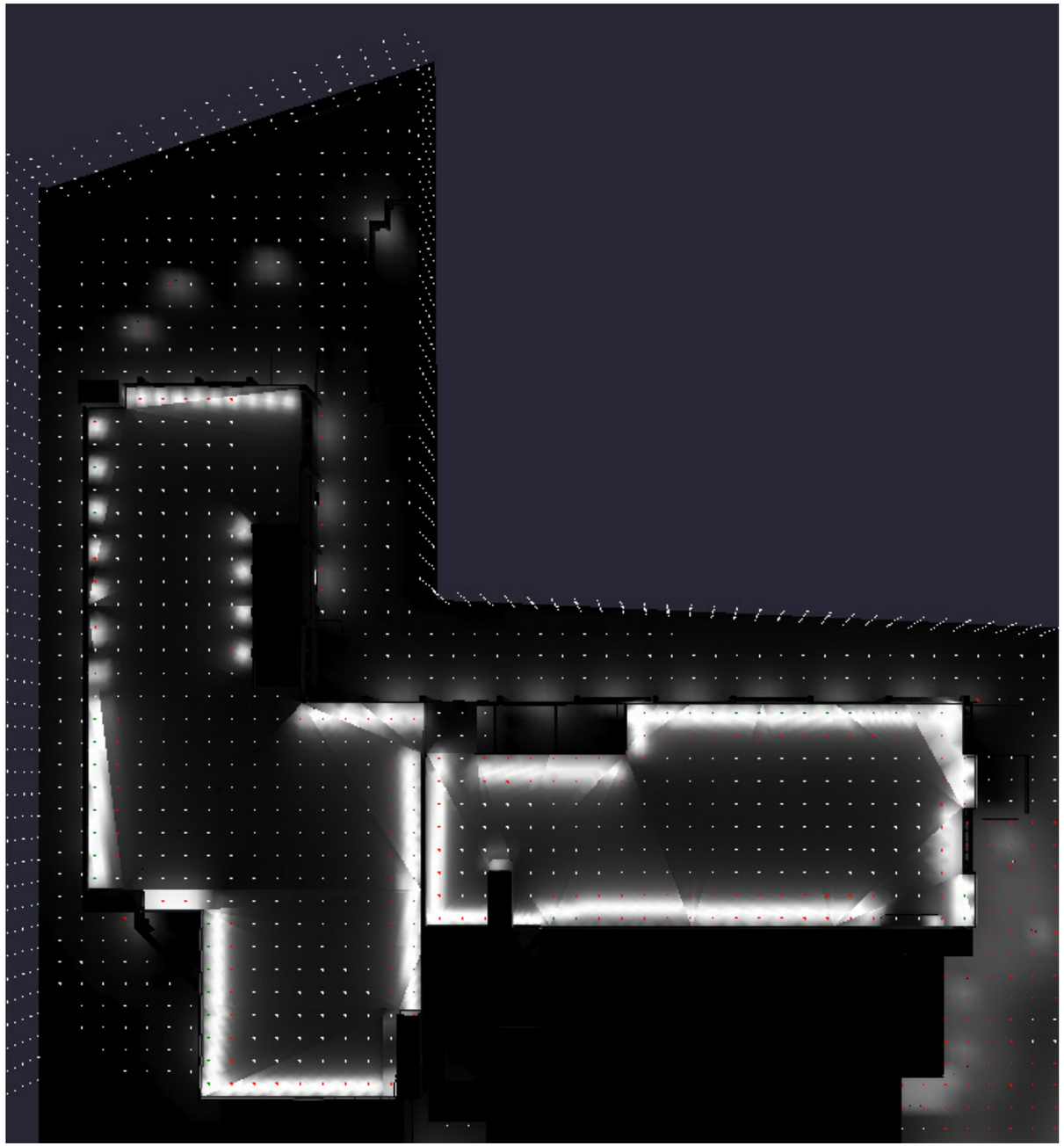
The Project exterior parking roof deck is illuminated by low level perimeter wall lights mounted to the exterior .

The illumination intensity is designed in accordance with the recommended practice standards of the IESNA and complies with CALGreen and CEC standards for minimum standards of illumination for exterior parking and egress lighting.

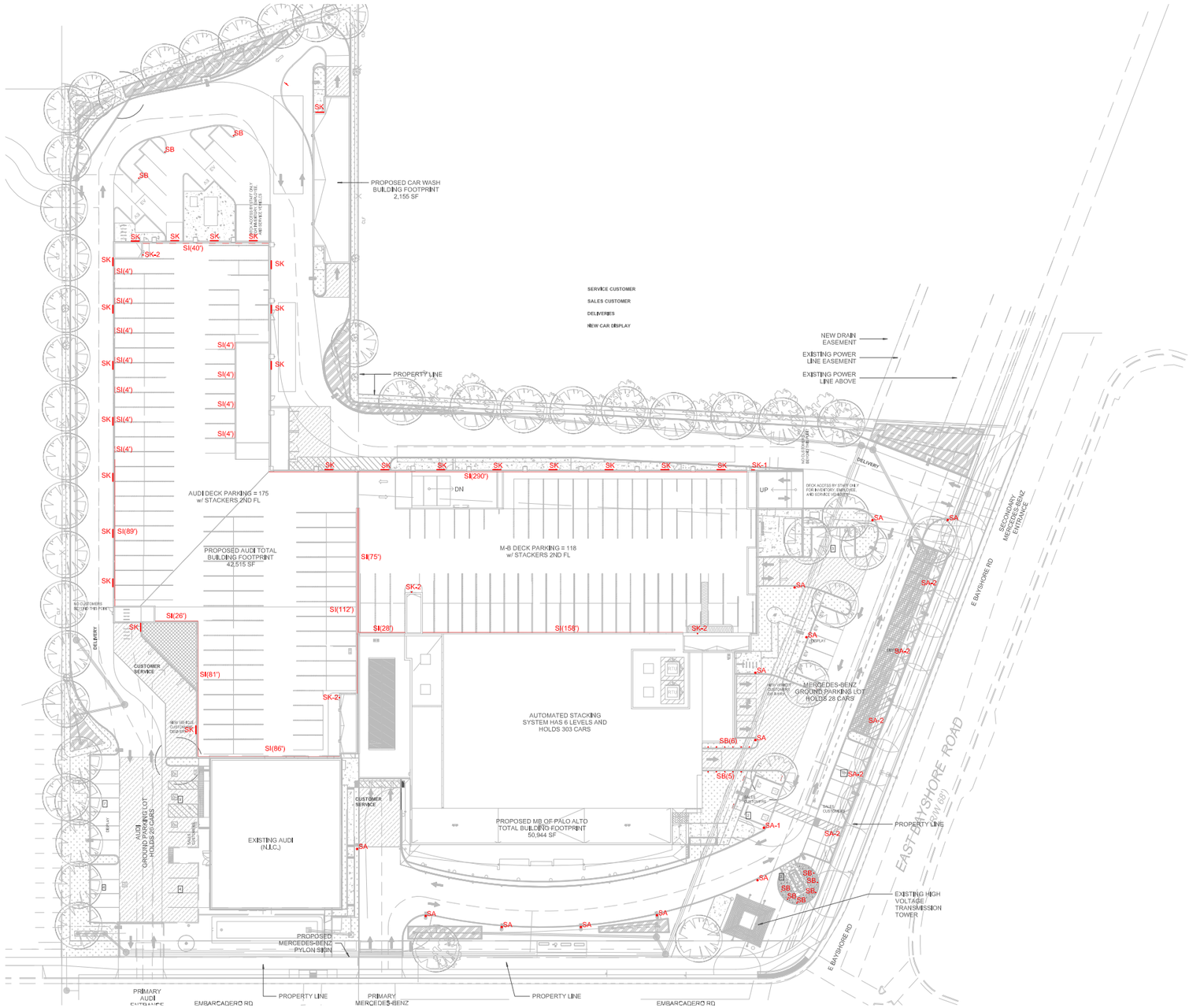
All exterior ight fixtures are fully shielded to limit glare and reflected glare.

Type SI: Parapet Wall Mounted Linear LED Downlight with Louvers

Type SK-2: Wall Mounted Downlight



Lighting Site Plan



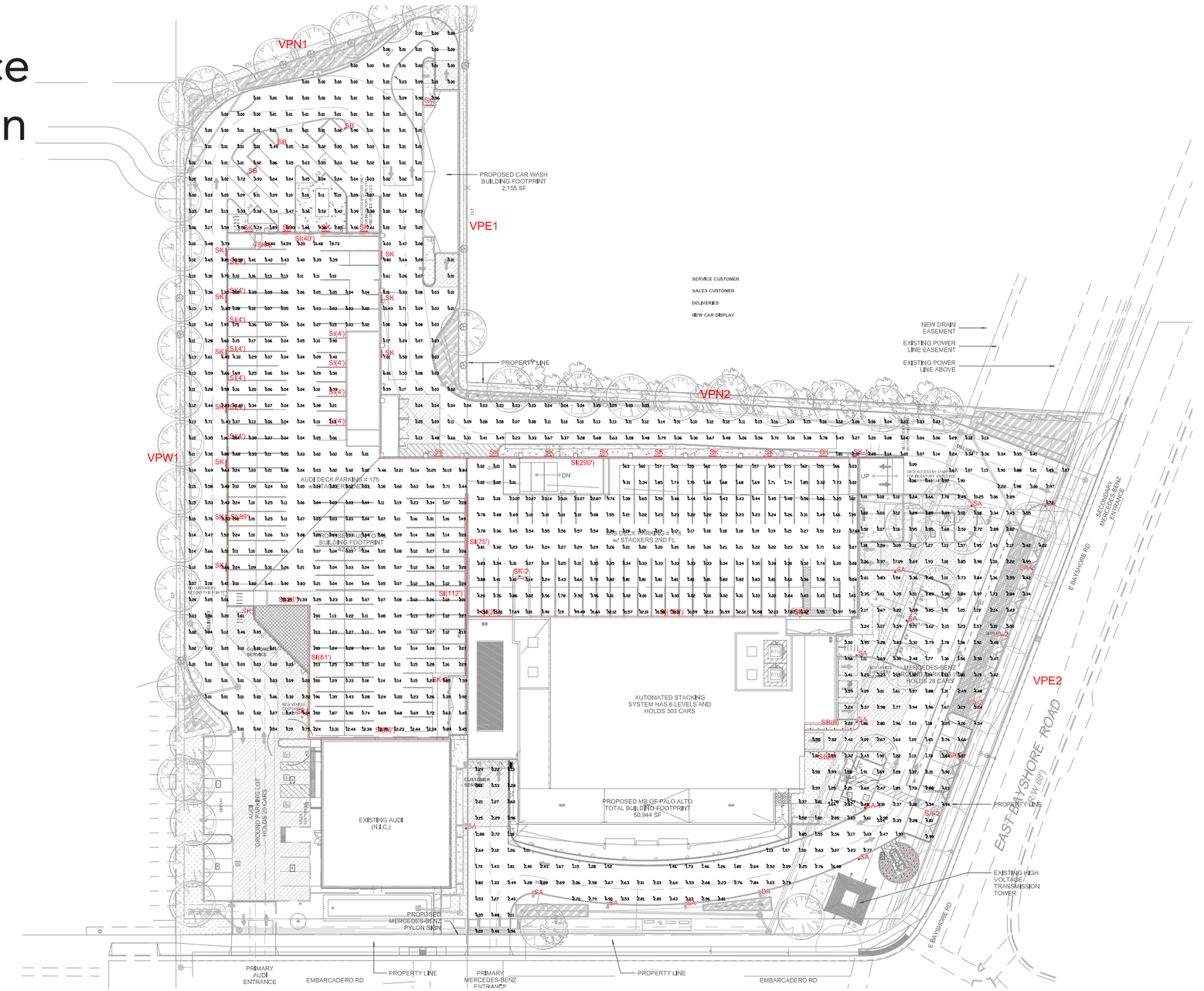
SITE LIGHTING PLAN
SCALE : 1/64" = 1'-0"

PLANNING REVIEW 05/26/2019

FIXTURE SCHEDULE

TYPE	DESCRIPTION	LUMINAIRE OUTPUT	MOUNTING HEIGHT
SA	SYMMETRIC POLE WITH ADJUSTABLE FLOODLIGHT	7444 LM	15 FT
SA-1	SYMMETRIC POLE	5748 LM	15 FT
SA-2	ASYMMETRIC POLE	5697 LM	15 FT
SB	BOLLARD	538 LM	3'-8" FT
SK	WALL MOUNTED DOWNLIGHT	1399 LM	8'-6" FT A.F.F.
SK-1	WALL MOUNTED DOWNLIGHT	587 LM	8'-6" FT A.F.F.
SK-2	WALL MOUNTED DOWNLIGHT	2021 LM	10' FT A.F.F.
SI	WALL MOUNTED LINEAR DOWNLIGHT WITH LOUVERS	540 LM/FT	3'-6" A.F.F.

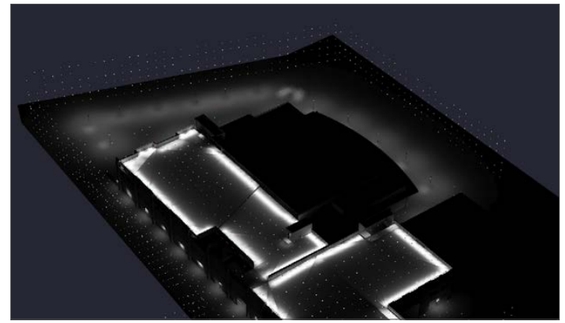
Exterior Illuminance Calculation



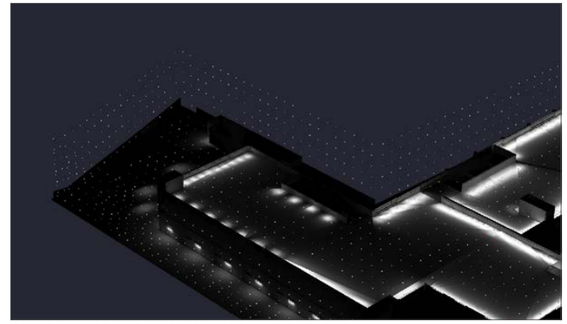
SITE PHOTOMETRIC CALCULATION
SCALE : 1/64" = 1'-0"

PLANNING REVIEW 05/26/2019

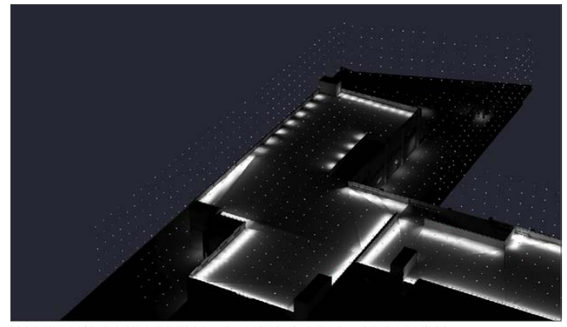
Label	Calc Type	Units	Avg	Max	Min	Avg/Min	Max/Min
Audi Garage Roof Top	Illuminance	Fc	21.77	229	0.01	2177	22911
Audi Parking Lot	Illuminance	Fc	0.00	0.00	0.00	N.A.	N.A.
Front Line Display - E Bayshore	Illuminance	Fc	2.53	17.09	0.01	253.00	1709
M-B Garage Roof Top	Illuminance	Fc	17.31	195	0.01	1731	19499
Rear Lot Parking Area	Illuminance	Fc	0.71	13.43	0.00	N.A.	N.A.
Store Front Drive	Illuminance	Fc	2.38	16.48	0.13	18.31	126.77
VPE1	Illuminance	Fc	0.05	0.15	0.00	N.A.	N.A.
VPE2	Illuminance	Fc	0.29	0.46	0.05	5.80	9.20
VPN1	Illuminance	Fc	0.06	0.09	0.01	6.00	9.00
VPN1	Illuminance	Fc	0.04	0.06	0.01	4.00	6.00
VPN2	Illuminance	Fc	0.21	0.48	0.09	2.33	5.33
VPS1	Illuminance	Fc	0.16	0.22	0.07	2.29	3.14
VPW1	Illuminance	Fc	0.17	0.38	0.02	8.50	19.00



SOUTH & EAST VERTICAL PLANES @ EMBARCADERO RD & E BAYSHORE RD



WEST VERTICAL PLANE @ REAR LOT PARKING



NORTH AND EAST VERTICAL PLANES @ REAR LOT PARKING

ysm DESIGN
www.ysmdesign.com

Exterior Photometric Calculation

10' increments

VPW1 (WEST PROPERTY LINE)

0.12	0.14	0.14	0.15	0.16	0.17	0.19	0.22	0.24	0.25	0.27	0.28	0.28	0.28	0.27	0.26	0.25	0.25	0.23	0.22	0.22	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.15	0.11	0.10	0.12	0.10	0.09	0.08	0.07	0.06	0.05	0.05	0.04
0.08	0.08	0.10	0.11	0.13	0.14	0.16	0.18	0.19	0.20	0.22	0.23	0.24	0.23	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.19	0.19	0.18	0.17	0.17	0.17	0.16	0.14	0.11	0.12	0.11	0.10	0.09	0.07	0.07	0.06	0.05	0.04	0.04
0.03	0.03	0.04	0.04	0.05	0.06	0.08	0.09	0.10	0.10	0.12	0.15	0.17	0.18	0.18	0.19	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.14	0.13	0.13	0.13	0.11	0.09	0.08	0.07	0.06	0.05	0.04	0.04
0.03	0.03	0.03	0.05	0.05	0.07	0.09	0.11	0.13	0.14	0.19	0.23	0.26	0.28	0.28	0.28	0.27	0.25	0.24	0.24	0.24	0.23	0.24	0.24	0.23	0.23	0.23	0.23	0.22	0.21	0.19	0.18	0.15	0.13	0.10	0.09	0.07	0.06	0.05	0.04	0.03
0.02	0.03	0.04	0.05	0.06	0.08	0.10	0.12	0.15	0.16	0.24	0.32	0.35	0.37	0.38	0.37	0.36	0.33	0.31	0.32	0.31	0.30	0.31	0.31	0.30	0.30	0.31	0.30	0.28	0.28	0.26	0.22	0.16	0.13	0.10	0.08	0.07	0.05	0.04	0.04	0.03
0.02	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.15	0.24	0.31	0.34	0.36	0.36	0.36	0.35	0.32	0.29	0.31	0.30	0.28	0.29	0.30	0.29	0.29	0.30	0.29	0.27	0.27	0.25	0.20	0.14	0.11	0.08	0.06	0.05	0.04	0.03	0.03	0.02

VPN1 (NORTH PROPERTY LINE @ REAR LOT PARKING AREA)

0.05	0.06	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.07	0.07	0.06
0.04	0.05	0.07	0.07	0.09	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.07	0.07	0.06
0.04	0.04	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.03
0.03	0.04	0.06	0.07	0.07	0.06	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03
0.03	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

VPE1 (EAST PROPERTY LINE @ CARWASH)

0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.06	0.07	0.07	0.08	0.11	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15														
0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.12	0.13														
0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06														
0.01	0.02	0.02	0.02	0.02	0.03	0.05	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.04	0.04	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.06														
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06														
0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01														

SITE PHOTOMETRIC CALCULATION-VERTICAL PLANES @ PROPERTY LINE
SCALE : 1/32" = 1'-0"

PLANNING REVIEW 05/26/2019

Exterior Photometric Calculation

VPN2(NORTH PROPERTY LINE)

0.48	0.43	0.40	0.38	0.36	0.35	0.33	0.33	0.33	0.33	0.33	0.32	0.33	0.33	0.34	0.33	0.33	0.34	0.35	0.38	0.40	0.43	0.43	0.39	0.31	0.26	0.23	0.21	0.21	0.22	0.22	0.22	0.23	0.22	0.22	0.22	0.20	0.17	0.16
0.26	0.25	0.24	0.24	0.23	0.23	0.24	0.25	0.27	0.29	0.29	0.29	0.30	0.30	0.31	0.30	0.29	0.28	0.28	0.27	0.28	0.29	0.30	0.28	0.24	0.20	0.19	0.19	0.19	0.20	0.21	0.22	0.24	0.23	0.23	0.22	0.21	0.18	0.16
0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.16	0.17	0.18	0.16	0.16	0.15	0.14	0.13	0.15	0.16	0.18	0.21	0.21	0.23	0.23	0.24	0.23	0.21	0.19	0.16
0.11	0.12	0.12	0.13	0.13	0.15	0.16	0.17	0.18	0.19	0.19	0.20	0.19	0.18	0.19	0.19	0.19	0.19	0.20	0.20	0.21	0.20	0.20	0.18	0.16	0.15	0.12	0.13	0.14	0.17	0.19	0.21	0.22	0.23	0.23	0.22	0.21	0.18	0.15
0.11	0.11	0.12	0.13	0.14	0.16	0.17	0.19	0.20	0.21	0.22	0.22	0.22	0.22	0.21	0.22	0.22	0.23	0.24	0.25	0.24	0.25	0.23	0.20	0.15	0.12	0.10	0.10	0.11	0.13	0.15	0.17	0.18	0.19	0.19	0.18	0.17	0.15	0.13
0.09	0.09	0.09	0.10	0.12	0.13	0.15	0.17	0.19	0.19	0.20	0.20	0.20	0.20	0.19	0.20	0.20	0.22	0.23	0.23	0.24	0.24	0.22	0.19	0.15	0.12	0.10	0.11	0.13	0.15	0.19	0.21	0.23	0.24	0.25	0.25	0.23	0.20	0.16

VPE2(@ MIDDLE OF E BAYSHORE ROAD

0.09	0.12	0.14	0.17	0.20	0.22	0.25	0.27	0.29	0.30	0.32	0.32	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.34	0.35	0.35	0.35	0.34	0.34	0.34	0.33	0.33	0.31	0.30	0.27	0.25	0.23	0.21	0.18	0.17	0.15	0.13
0.08	0.11	0.13	0.16	0.20	0.24	0.27	0.29	0.31	0.32	0.32	0.33	0.33	0.35	0.35	0.35	0.35	0.36	0.36	0.37	0.37	0.37	0.38	0.38	0.37	0.37	0.36	0.35	0.34	0.32	0.30	0.26	0.24	0.21	0.18	0.15	0.13	0.11
0.07	0.09	0.12	0.16	0.20	0.25	0.28	0.31	0.32	0.34	0.35	0.34	0.36	0.36	0.36	0.37	0.37	0.38	0.39	0.39	0.40	0.41	0.41	0.41	0.41	0.39	0.38	0.37	0.35	0.34	0.31	0.28	0.24	0.21	0.18	0.15	0.13	0.11
0.06	0.08	0.12	0.16	0.22	0.27	0.31	0.34	0.36	0.36	0.36	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.40	0.41	0.41	0.41	0.42	0.42	0.42	0.41	0.40	0.38	0.36	0.34	0.31	0.27	0.23	0.19	0.15	0.13	0.11	0.09
0.05	0.07	0.10	0.14	0.20	0.26	0.31	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.34	0.35	0.35	0.36	0.37	0.38	0.38	0.38	0.38	0.37	0.36	0.34	0.33	0.29	0.26	0.23	0.19	0.15	0.12	0.10	0.08	0.07
0.05	0.08	0.12	0.18	0.26	0.35	0.42	0.45	0.42	0.41	0.40	0.38	0.39	0.38	0.40	0.40	0.40	0.41	0.41	0.44	0.44	0.44	0.46	0.45	0.45	0.43	0.43	0.39	0.34	0.30	0.25	0.20	0.17	0.14	0.12	0.10	0.08	0.07

VPS1 (@ MIDDLE OF EMBARCADERO RD)

0.14	0.15	0.16	0.16	0.19	0.19	0.19	0.20	0.21	0.22	0.22	0.21	0.22	0.22	0.21	0.21	0.21	0.22	0.21	0.21	0.21	0.20	0.20	0.19	0.17	0.16	0.15	0.13	0.12										
0.13	0.14	0.15	0.16	0.17	0.18	0.18	0.18	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.19	0.20	0.19	0.18	0.18	0.17	0.15	0.14	0.12	0.11										
0.11	0.13	0.13	0.14	0.15	0.17	0.17	0.18	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.21	0.20	0.20	0.20	0.20	0.20	0.19	0.18	0.18	0.17	0.15	0.13	0.12	0.10										
0.10	0.11	0.12	0.12	0.14	0.14	0.15	0.16	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.20	0.19	0.19	0.19	0.19	0.19	0.18	0.17	0.16	0.15	0.14	0.12	0.10	0.08										
0.07	0.08	0.09	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.14	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.08	0.07										
0.08	0.09	0.10	0.11	0.12	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.15	0.14	0.12	0.11	0.09	0.07										

SITE PHOTOMETRIC CALCULATION-VERTICAL PLANES @ PROPERTY LINE
SCALE : 1/32" = 1'-0"

PLANNING REVIEW 05/26/2019

Exterior Light Fixtures

Type SA

Light Building Element - symmetric distribution, adjustable floodlight **BEGA**

Type:
BEGA Product:
Project:
Modified:

Application
Light Building Elements are luminous design features for public areas. These luminaires are ideally suited for delineating and structuring interior and exterior spaces such as landscape areas, plazas, building entrances, and atria. Provided with one integral floodlight to accentuate facades, trees, and other design elements in public spaces. The floodlight is adjustable from 0° to 30° and can be rotated 360°, flat beam and wide beam options available.

Materials
Luminaire housing and post constructed of die-cast and extruded marine grade, copper free (≤0.3% copper content) A360.0 aluminum alloy
UV stabilized acrylic diffuser
Clear safety glass
Reflector made of pure anodized aluminum
Silicone gasket
Mechanically captive stainless steel fasteners

NRTL listed to North American Standards, suitable for wet locations
Protection class IP65
Weight: 136 lbs.

EPA (Effective projection area): 11.84 sq. ft.

Electrical

Operating voltage	120-277V AC (surge protection)
Minimum start temperature	-30° C
Maximum ambient temperature	55° C
LED module wattage	47.7 W (luminaire) 19.3 W (floodlight)
System wattage	83.0 W
Controllability	0-10V dimmable
Color rendering index	Ra > 80
Luminaire lumens	6343 lumens (4000K, luminaire) 1101 lumens (4000K, floodlight)
LED service life (L70)	60,000 hours

LED color temperature

☐ 4000K - Product number + **K4**
☐ 3500K - Product number + **K35**
☐ 3000K - Product number + **K3**
☐ 2700K - Product number + **K27**

BEGA can supply you with suitable LED replacement modules for up to 20 years after the purchase of LED luminaires - see website for details

Finish
All BEGA standard finishes are matte, textured polyester powder coat with minimum 3 mil thickness.

Available colors ☐ Black (BLK) ☐ White (WHT) ☐ RAL:
☐ Bronze (BRZ) ☐ Silver (SLV) ☐ CUS:

Light Building Element · symmetric distribution, adjustable floodlight

	LED	β	A	B	C	D
88063	47.7 W		8⅝	27½	197	39⅜
	19.3 W	14°				

Available Accessories

☐ **10047** Wide beam spread lens (floodlight)
☐ **10016** Flat beam spread lens (floodlight)

BEGA 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 info@bega-us.com

Updated 01/15/19

Type SA-1

Light Building Element - symmetric **BEGA**

Type:
BEGA Product:
Project:
Modified:

Application
Light Building Elements are luminous design features for public areas. These luminaires are ideally suited for delineating and structuring interior and exterior spaces such as landscape areas, plazas, building entrances, and atria.

Materials
Luminaire housing and post constructed of die-cast and extruded marine grade, copper free (≤0.3% copper content) A360.0 aluminum alloy
UV stabilized acrylic diffuser
Reflector made of pure anodized aluminum
Silicone gasket
Mechanically captive stainless steel fasteners

NRTL listed to North American Standards, suitable for wet locations
Protection class IP65
Weight: 77.6 lbs.

EPA (Effective projection area): 11.84 sq. ft.

Electrical

Operating voltage	120-277V AC (surge protection)
Minimum start temperature	-30° C
Maximum ambient temperature	55° C
LED module wattage	47.7 W
System wattage	59.0 W
Controllability	0-10V dimmable
Color rendering index	Ra > 80
Luminaire lumens	5,748 lumens (4000K)
LED service life (L70)	60,000 hours

LED color temperature

4000K - Product number + **K4**
3500K - Product number + **K35**
3000K - Product number + **K3**
2700K - Product number + **K27**

BEGA can supply you with suitable LED replacement modules for up to 20 years after the purchase of LED luminaires - see website for details

Finish
All BEGA standard finishes are matte, textured polyester powder coat with minimum 3 mil thickness.

Available colors Black (BLK) White (WHT) RAL:
Bronze (BRZ) Silver (SLV) CUS:

Light Building Element · symmetric

	LED	A	B	C	D
88065	47.7 W	8⅝	27½	197	39⅜

BEGA 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 info@bega-us.com

Updated 01/15/19

Exterior Light Fixtures

Type SA-2

Light Building Element - asymmetric wide beam

BEGA

Application
Light Building Elements are luminous design features for public areas. These luminaires are ideally suited for delineating and structuring interior and exterior spaces such as landscape areas, plazas, building entrances, and atria.

Materials
Luminaire housing and post constructed of die-cast and extruded marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy
UV stabilized acrylic diffuser
Reflector made of pure anodized aluminum
Silicone gasket
Mechanically captive stainless steel fasteners

NRTL listed to North American Standards, suitable for wet locations
Protection class IP 65
Weight: 77.6 lbs.

EPA (Effective projection area): 11.84 sq. ft.

Electrical

Operating voltage	120-277 V AC (surge protection)
Minimum start temperature	-30° C
Maximum ambient temperature	50° C
LED module wattage	47.7 W
System wattage	59.0 W
Controllability	0-10V dimmable
Color rendering index	Ra > 80
Luminaire lumens	5,697 lumens (4000K)
LED service life (L70)	60,000 hours

LED color temperature

4000K - Product number + **K4**
3500K - Product number + **K35**
3000K - Product number + **K3**
2700K - Product number + **K27**

BEGA can supply you with suitable LED replacement modules for up to 20 years after the purchase of LED luminaires - see website for details

Finish
All BEGA standard finishes are matte, textured polyester powder coat with minimum 3 mil thickness.

Available colors	Black (BLK)	White (WHT)	RAL:
	Bronze (BRZ)	Silver (SLV)	CUS:

Type:
BEGA Product:
Project:
Modified:

Light Building Element · asymmetric wide beam

	LED	A	B	C	D
88 068	47.7 W	8 5/8	27 1/2	197	39 3/8

Type SB

Specification sheet 1/2

Flindt Bollard

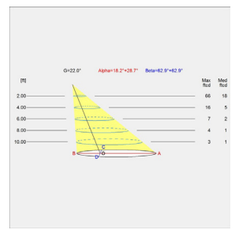
Project name:

Project type:

Notes:

Light distribution diagrams

Cartesian



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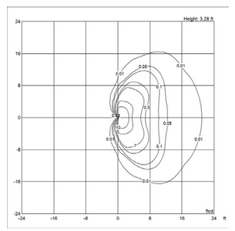
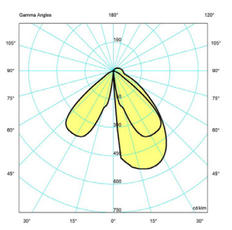
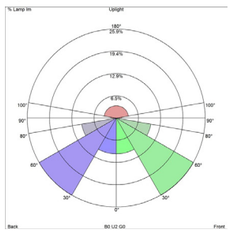


Polar



Bug



Variant options

Dimension	Light source	Voltage frequency	Color	Mounting	Lighting control
31.5 IN	14W LED/3000K	120-277V/60HZ	Corten color	-	Dim 0-10v
43.3 IN	LED 4000K		Nat paint alu	POST W/BASE PLATE	
				POST W/DIRECT BURIAL	

louis

BEGA 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 info@bega-us.com

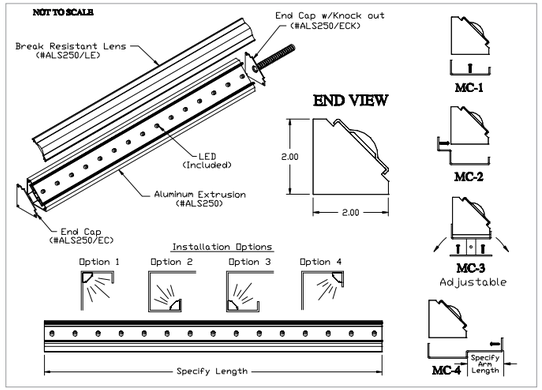
Exterior Light Fixtures

Type SI

alumLEDs™
Manufactured in the U.S.A.

MODEL NUMBER: **ALS250T**

FIXTURE TYPE:



FEATURES

APPLICATIONS	Indirect Lighting
VOLTAGE	120 Volts
LAMP TYPE	High, Mid & Standard Output LEDs
LENGTH	Built to Order
CONSTRUCTION	Aluminum Extrusion
MOUNTING	Clip-on Brackets
LISTING	Dry and Wet Location
CRI	High Output (HO) > 90 Mid Output (MO) > 80 Standard Output (SO) > 80
DIMMING	PWM (HO), 0-10V (MO), Forward Phase (SO)

APPLICATIONS

Designed for indoor or outdoor use, *alum*LEDs is ideal for many applications including the amusement, recreation, and architectural industries. *alum*LEDs is excellent for cove lighting, undercabinet lighting, accent lighting, and many more applications.

COLOR TEMPERATURE OPTIONS

High Output white LEDs are available in increments of 100K from 2700K to 7000K. For example, Warm White LEDs can be specified in 2700K, 2800K, 2900K, 3000K, 3100K, 3200K, 3300K, 3400K, etc. Specific color temperatures can be specified by adding 2.9K for 2900K after LED lamp number: LED-2.9K.

ELECTRICAL

*alum*LEDs is available with 120 volt integral drivers. Add "DM" after watts per foot for dimming (8WDM). Consult factory for dimming protocols to verify compatibility with dimming controls. Consult factory for 277V.

LAMP SPECIFICATIONS

LAMP NUMBER	DESCRIPTION	L70 LED LIFE	RATED LUMENS PER WATT		
			HIGH OUTPUT	MID OUTPUT	STANDARD OUTPUT
LED-2.4K	2400K Incand. White	50,000 hrs.	90	75	65
LED-2.7K	2700K Warm White	50,000 hrs.	90	75	65
LED-3.0K	3000K Warm White	50,000 hrs.	90	75	65
LED-3.5K	3500K Neutral White	50,000 hrs.	90	75	65
LED-4.0K	4000K Neutral White	50,000 hrs.	110	80	70
LED-4.5K	4500K Neutral White	50,000 hrs.	110	80	70
LED-5.0K	5000K Cool White	50,000 hrs.	110	80	70
LED-5.7K	5700K Cool White	50,000 hrs.	110	80	70

HOW TO ORDER OR SPECIFY Product Code: (Fill in the Blanks)

_____ - _____ - _____ - _____ - _____ - _____ - _____ - _____ - _____

SERIES	FINISH	LED	BEAM SPREAD	WATTS PER FOOT	OUTPUT	FEED POINT	DRY OR WET	LENGTH OF FIXTURE
Example: ALS250T-FCF	*WH*	*LED-2.7K*	*45D*	*4WDM*	*HO*	*EF*	*DRY*	*36"*
ALS250T (Clear Lens)	Natural (NA)	LED-2.4K	15 Degree (15D)	12 Watts (12W)	High	End	Indoor (DRY)	Specify
ALS250T-SF (Semi-Frost Lens)	Polished (PA)	LED-2.7K	30 Degree (30D)	8 Watts (8W)	(HO)	Feed (EF)	Outdoor (WET)	Length
ALS250T-F (Frost Lens)	White (WH)	LED-3.0K	45 Degree (45D)	6 Watts (6W)	Mid	Side		
	Satin (SA)	LED-3.5K	60 Degree (60D)	5 Watts (5W)	(MO)	Feed (SF)		
	Black (BK)	LED-4.0K	120 Degree	4 Watts (4W)	Standard	Bottom		
	Green (GN)	LED-4.5K	(120D)	3 Watts (3W)	(SO)	Feed (BF)		
	Red (RD)	LED-5.0K		2 Watts (2W)				
	Silver (SR)	LED-5.7K		1.5 Watts (1.5W)				

CALI
CALIFORNIA ACCENT LIGHTING, INC.
2034 E. Lincoln Ave. #431, Anaheim, CA 92806
ph. 800.921.CALI (2254) or 714.535-7900 \ fx. 714.535.7902
info@calilighting.com \ calilighting.com

Type SK

LED wall luminaire - light output on one side

BEGA

Type:
BEGA Product:
Project:
Modified:

Application
The LED wall mounted luminaire has light output on one side. Arranged individually or in groups, this is a great design element for a host of lighting applications. For downlight applications only.

Materials
Luminaire housing constructed of die-cast and extruded marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy
Matte safety glass
High temperature silicone gasket
Mechanically captive stainless steel fasteners

NRTL listed to North American Standards, suitable for wet locations
Protection class IP 65
Weight: 26.2 lbs

Electrical

Operating voltage	120-277 V AC
Minimum start temperature	-30° C
LED module wattage	30.4 W
System wattage	36 W
Controllability	0-10V dimmable
Color rendering index	Ra > 80
Luminaire lumens	1399 lumens (3000K)
Lifetime at Ta = 15° C	>500,000 h (L70)
Lifetime at Ta = 45° C	229,000 h (L70)

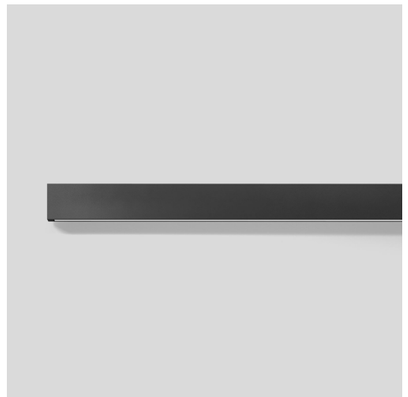
LED color temperature

☐ 4000K - Product number + **K4**
☐ 3500K - Product number + **K35**
☐ 3000K - Product number + **K3**
☐ 2700K - Product number + **K27**

BEGA can supply you with suitable LED replacement modules for up to 20 years after the purchase of LED luminaires - see website for details

Finish
All BEGA standard finishes are matte, textured polyester powder coat with minimum 3 mil thickness.

Available colors ☐ Black (BLK) ☐ White (WHT) ☐ RAL:
☐ Bronze (BRZ) ☐ Silver (SLV) ☐ CUS:



LED wall luminaire · light output on one side

	LED	A	B	C	Required wiring box
44419	30.4 W	59 7/8	4 1/8	5	**19537**

BEGA 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 info@bega-us.com

Updated 09/10/18

Exterior Light Fixtures

Type SK-1

LED wall luminaire - light output on one side **BEGA**

Type:
BEGA Product:
Project:
Modified:

Application
The LED wall mounted luminaire has light output on one side. Arranged individually or in groups, this is a great design element for a host of lighting applications. For downlight applications only.

Materials
Luminaire housing constructed of die-cast and extruded marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy
Matte safety glass
High temperature silicone gasket
Mechanically captive stainless steel fasteners

NRTL listed to North American Standards, suitable for wet locations
Protection class IP 65
Weight: 10.8 lbs

Electrical

Operating voltage	120-277V AC
Minimum start temperature	-30° C
LED module wattage	9.6 W
System wattage	13 W
Controllability	0-10V dimmable
Color rendering index	Ra > 80
Luminaire lumens	587 lumens (3000K)
Lifetime at Ta = 15° C	>500,000 h (L70)
Lifetime at Ta = 50° C	212,000 h (L70)

LED color temperature

☐ 4000K - Product number + **K4**
☐ 3500K - Product number + **K35**
☐ 3000K - Product number + **K3**
☐ 2700K - Product number + **K27**

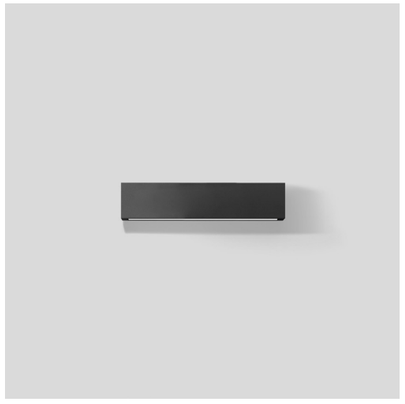
BEGA can supply you with suitable LED replacement modules for up to 20 years after the purchase of LED luminaires - see website for details

Finish
All BEGA standard finishes are matte, textured polyester powder coat with minimum 3 mil thickness.

Available colors ☐ Black (BLK) ☐ White (WHT) ☐ RAL:
☐ Bronze (BRZ) ☐ Silver (SLV) ☐ CUS:

LED wall luminaire · light output on one side

	LED	A	B	C	Required wiring box
44 417	9.6 W	24 3/8	4 1/8	5	**19 537**



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Updated 09/10/18

Type SK-2

LED wall luminaires - directed light **BEGA**

Type:
BEGA Product:
Project:
Modified:

Application
LED wall luminaires with directed light distribution designed for general illumination of pathways and building entrances from various mounting heights.

Materials
Luminaire housing constructed of die-cast marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy
Clear safety glass
Reflector made of pure anodized aluminum
Silicone applied robotically to casting, plasma treated for increased adhesion
High temperature silicone gasket
Mechanically captive stainless steel fasteners

NRTL listed to North American Standards, suitable for wet locations
Protection class IP 64
Weight: 3.5 lbs

Electrical

Operating voltage	120-277V AC
Minimum start temperature	-40° C
LED module wattage	14.0 W
System wattage	17.0 W
Controllability	0-10V, TRIAC, and ELV dimmable
Color rendering index	Ra > 80
Luminaire lumens	2,021 lumens (3000K)
Lifetime at Ta = 15° C	290,000 h (L70)
Lifetime at Ta = 30° C	220,000 h (L70)

LED color temperature

☐ 4000K - Product number + **K4**
☐ 3500K - Product number + **K35**
☐ 3000K - Product number + **K3**
☐ 2700K - Product number + **K27**

BEGA can supply you with suitable LED replacement modules for up to 20 years after the purchase of LED luminaires - see website for details

Finish
All BEGA standard finishes are matte, textured polyester powder coat with minimum 3 mil thickness.

Available colors ☐ Black (BLK) ☐ White (WHT) ☐ RAL:
☐ Bronze (BRZ) ☐ Silver (SLV) ☐ CUS:

LED wall luminaire · directed light

	LED	A	B	C
24 503	22.0 W	5 1/8	9 1/8	6

BEGA 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 info@bega-us.com

Updated 02/06/18

Interior Showroom

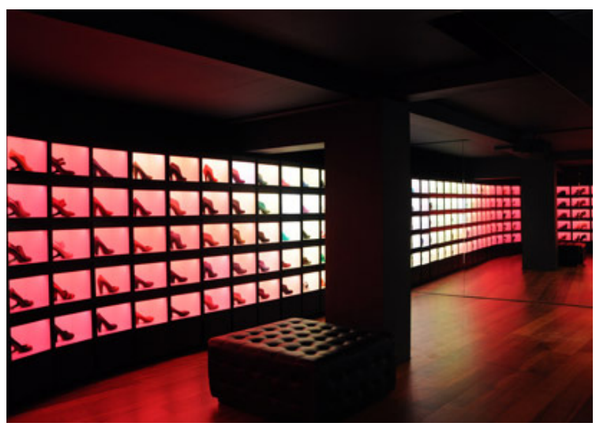
The Project Interior Showroom serves as the main interior lobby and as retail display for the auto showroom. Visitors and staff will utilize the interior space in the evening to meet and review products.

The interior showroom is brightly illuminated to promote transparency into the interior space to feature the products and the people working and visiting.

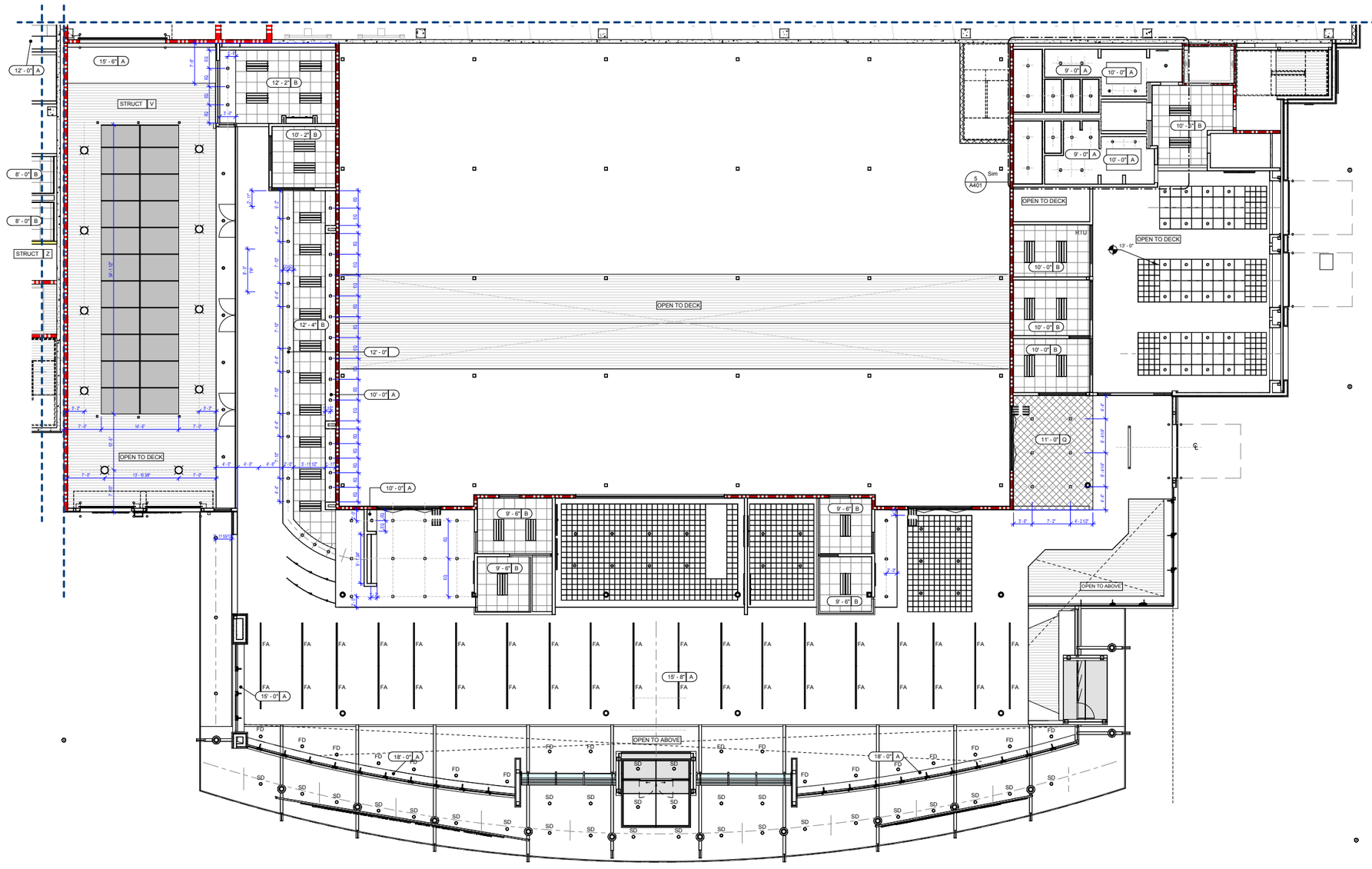
The illumination intensity is designed in accordance with the Mercedes Benz of North America retail display guidelines, the recommended practice standards of the IESNA, and complies with CALGreen and CEC standards for minimum illuminance at building exit pathways and doors.

All interior light fixtures are fully shielded to limit glare and reflected glare.

Type FA Suspended Pendants



Lighting Plan



1 A181a RCP - M-B SHOWROOM 1ST FLOOR
1/8" = 1'-0"

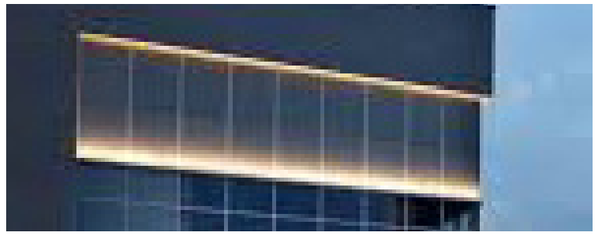
Interior Vehicle Inventory Stacker

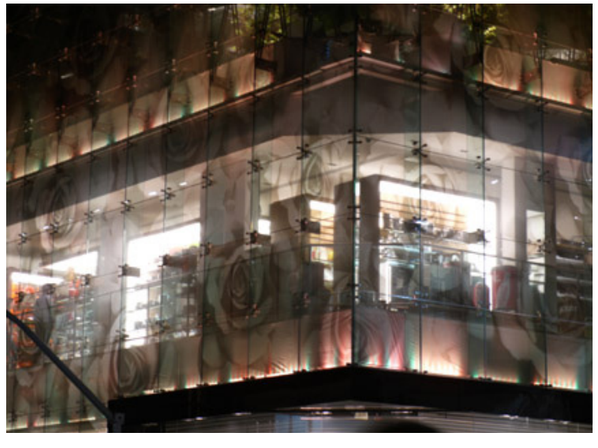
The Vehicle Inventory Stacker serves as a secondary retail display for the auto showroom. Visitors and staff will view the cars within the interior space of the Inventory Stacker in the evening.

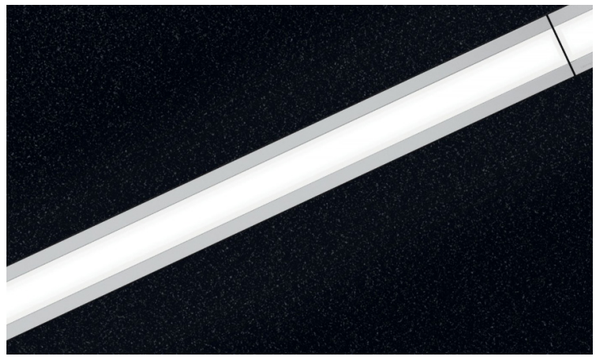
The interior of the Vehicle Inventory Stacker is brightly illuminated to promote transparency into the interior space from the exterior and to feature the products and the system moving the cars within the Stacker.

The illumination intensity is designed in accordance with the Mercedes Benz of North America retail display guidelines, the recommended practice standards of the IESNA, and complies with CALGreen and CEC standards for minimum illuminance at building exit pathways and doors.

All interior light fixtures are fully shielded to limit glare and reflected glare.

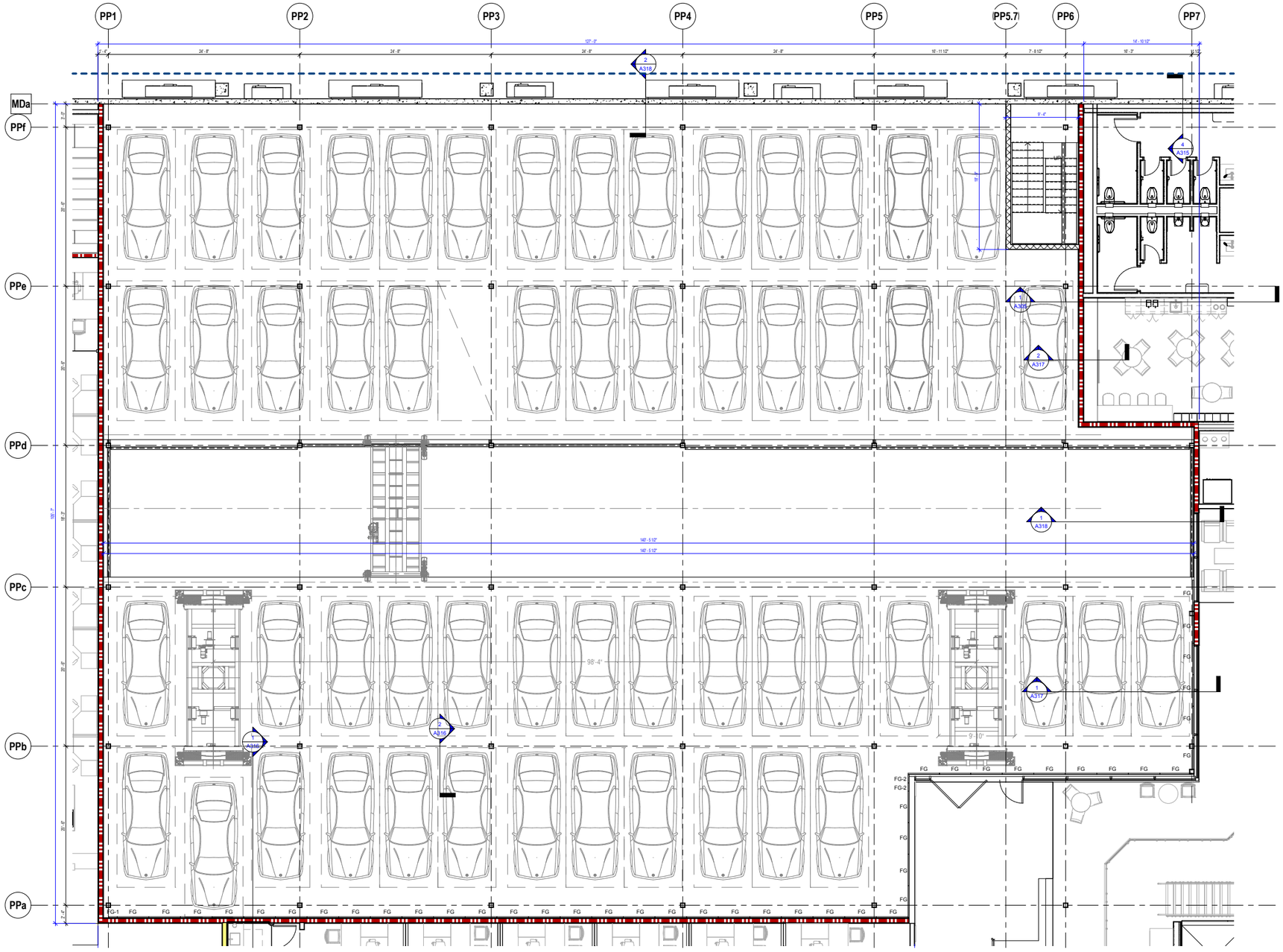






Type FG In-ground Uplight

Lighting Plan



SECTION AND DESCRIPTION
8. PARTITIONS SHOWN ARE FOR ARCHITECTURAL COORDINATION. WHERE PROVIDED, REFER TO METAL STUD ENGINEERING DRAWINGS FOR STUD SIZES.
9. TOP ELEVATION REPRESENTS TOP OF GYP FINISH. STUD FRAMING MAY CONTINUE TO DECK, OR BE BRAC TO DECK, AS REQUIRED BY ENGINEERED STUD DRAWINGS. GC SHALL FIELD COORDINATE WITH OTH BUILDING SYSTEMS.

METAL STUD ENGINEERING

ALL METAL STUD CONSTRUCTION SHALL BE DESIGNED AND SEALED BY AN ENGINEER LICENSED IN THE JURISDICTION WHERE THIS PROJECT IS LOCATED. IF ENGINEERED STUD DRAWINGS AND CALCULATIONS ARE NOT PROVIDED BY THE DESIGN TEAM AS PART OF THE CONTRACT DOCUMENTS, THE GC AND ITS SUBCONTRACTOR SHALL PROVIDE STUD ENGINEERING DRAWINGS AND CALCULATIONS, SEALED BY AN ENGINEER, SUBMITTED TO THE DESIGN TEAM FOR REVIEW, AND SUBMITTED TO THE LOCAL AUTHORITY HAVING JURISDICTION AS REQUIRED.

SEE STRUCTURAL DRAWINGS, STUD DRAWINGS, AND SPECIFICATIONS FOR DESIGN CRITERIA.

1. THESE ITEMS, INCLUDING MEMBER SIZES, SPACING AND CONNECTIONS, SHALL BE ENGINEERED:
A) ALL EXTERIOR FRAMING.
B) INTERIOR AND EXTERIOR CONNECTIONS WHERE STUDS ARE HUNG FROM THE DECK OR STRUCTURE ABOVE.
C) INTERIOR FRAMING USED AS SUPPORT FOR ACCORDIAN PARTITIONS
D) INTERIOR PARTITIONS TO DECK 12FT IN HEIGHT OR TALLER

2. THESE ITEMS ARE THE SOLE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND SUBCONTRACTOR AND DO NOT REQUIRE SEALED ENGINEERING (SUBJECT TO LOCAL AUTHORITY REQUIREMENTS):
A) INTERIOR PARTITIONS LESS THAN 12 FT IN HEIGH
B) INTERIOR PARTITION OVERHEAD BRACING.
C) CONNECTIONS TO STRUCTURE ABOVE AND TO FLOOR, OF FLOOR MOUNTED INTERIOR PARTITIONS.

3. INTERIOR PARTITIONS TO RECEIVE TILE FINISH SHALL BE ENGINEERED FOR DEFLECTION L/360 PER ANSI 108.11 AS RECOMMENDED BY THE TCNA. STUD SPACING AT INTERIOR TILED WALLS SHALL BE 16" O.C

4. OVERHEAD CONNECTIONS OF HANGING STUD FRAMING SHALL NOT USE POWDER DRIVEN FASTENERS UNLESS APPROVED BY THE STUD ENGINEER OR PROJECT ENGINEER OF RECORD.

5. DEFLECTION - REFER TO STRUCTURAL AND/OR STUD ENGINEERING DRAWINGS. IF NOT SHOWN, LIMI DEFLECTION TO L/600 WHERE BACKING MASONRY OR STUCCO, AND L/360 WHEN BACKING EIFS OR METAL PANEL SIDING.

6. UNLESS OTHERWISE INDICATED BY ENGINEERING DESIGN, STUD SPACING MAY BE 24" O.C.

7. IN JURISDICTIONS REQUIRING NOA OR OTHER APPROVALS FOR SYSTEMS INCLUDING, BUT NOT LIMITED TO, EIFS, STUCCO, METAL PANELS, AND MASONRY VENEERS, THE NOA DESIGN WILL GOVERN. PLEASE REFER TO NOA NUMBERS SHOWN ELSEWHERE IN THESE DRAWINGS.

FIRE EQUIPMENT LEGEND

ALL FIRE EXTINGUISHERS ARE TO MEET OR EXCEED NFPA 10 CODE STANDARDS.

- FE — SURFACE MOUNTED FIRE EXTINGUISHE
- FEC — RECESSED OR SEMI-RECESSED FIRE EXTINGUISHER CABINET RECESSED IN STUD WALL 8" OR DEEPER
- FACP — FIRE ALARM CONTROL PANEL
- FAAP — FIRE ALARM ANNUNCIATOR PANEL

PARTITION LEGEND

- 1-HOUR FIRE BARRIE
- 2-HOUR FIRE BARRIE
- 3-HOUR FIRE BARRIE
- EXISTING PARTITION
- PROPOSED PARTITIO

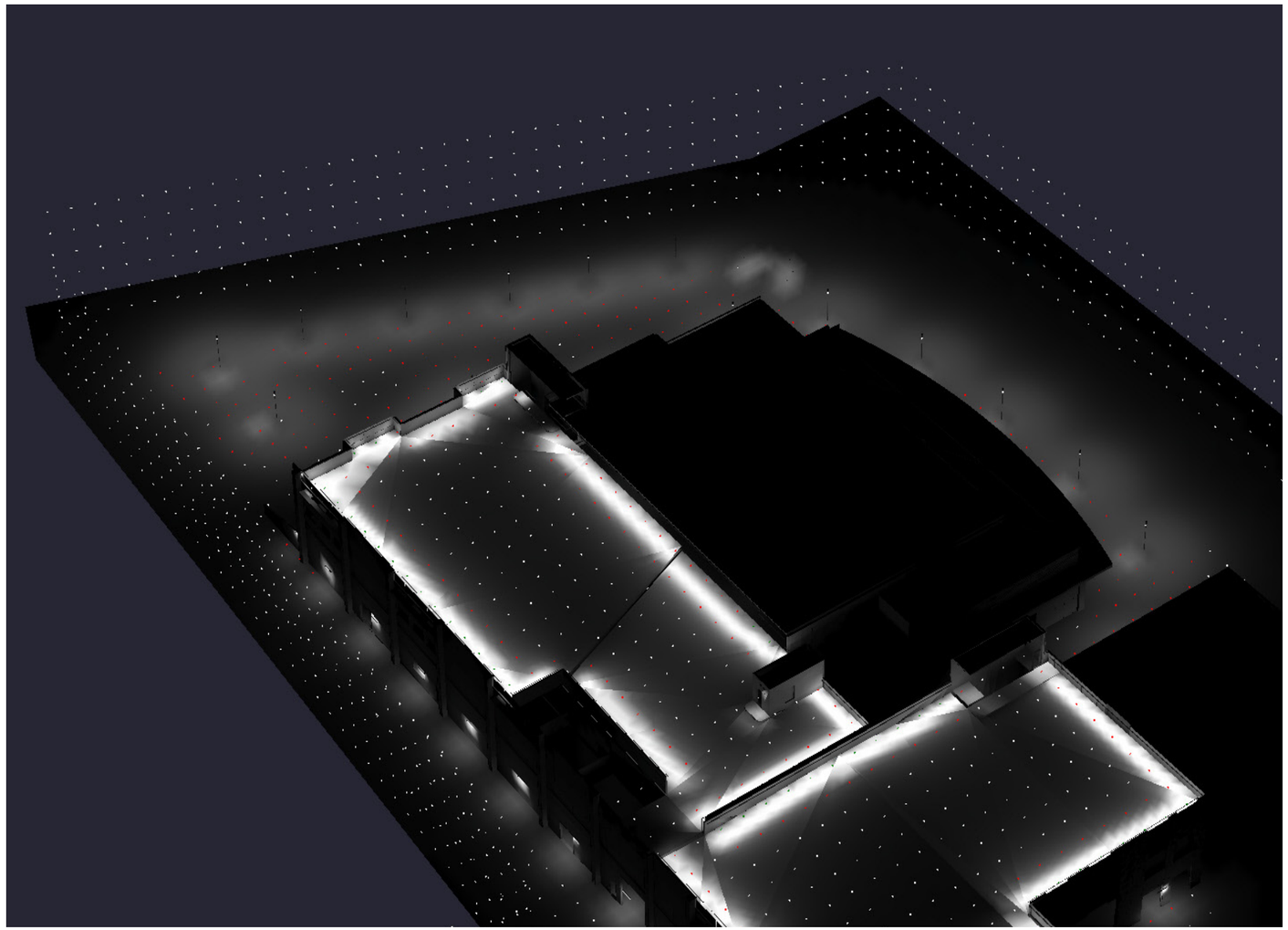
GRIDLINE TYPE LEGEND

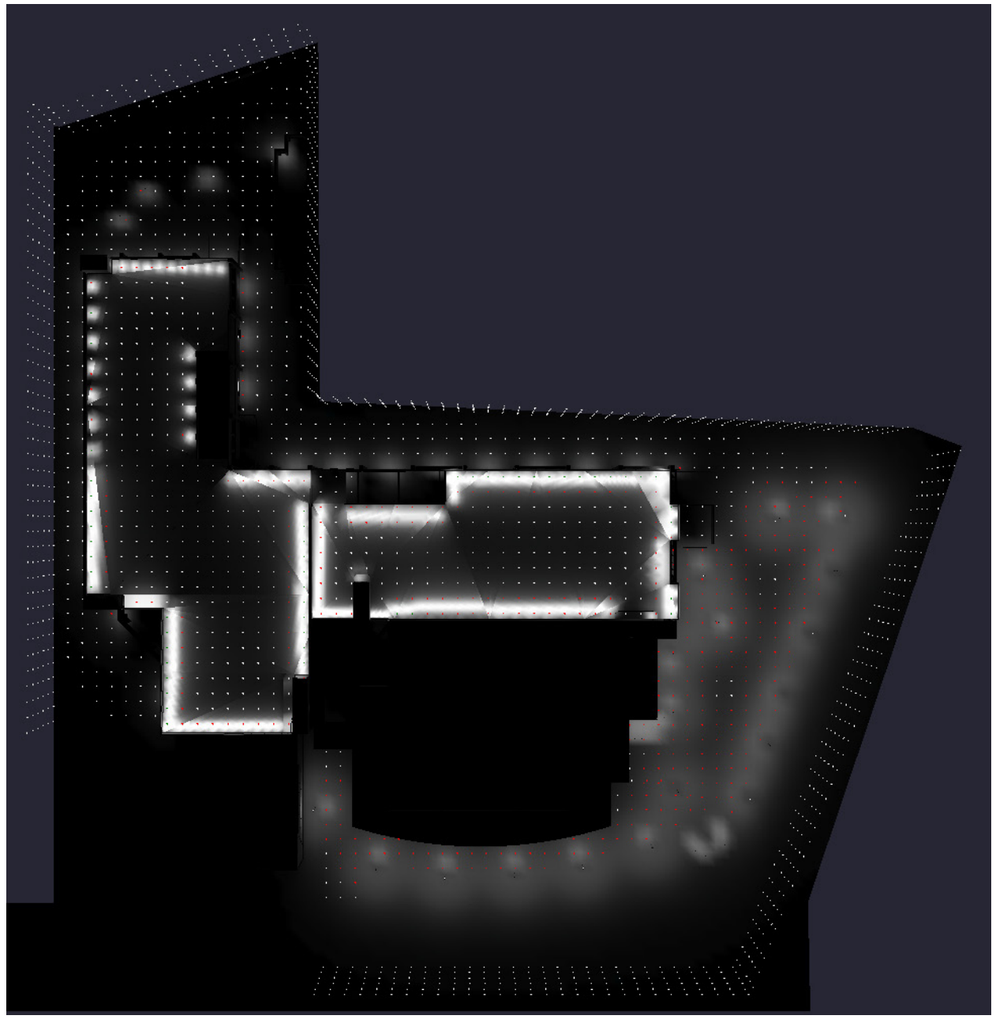
- NEW GRIDLINE
- EXISTING GRIDLINE
- F.O. MASONRY / CONCRETE
- MB MD — MERCEDES WORK SCOPE
- AU AD — AUDI WORK SCOPE
- CP — AUTOMATED PARKING SCOPE

PARTITION SYMBOL LEGEND

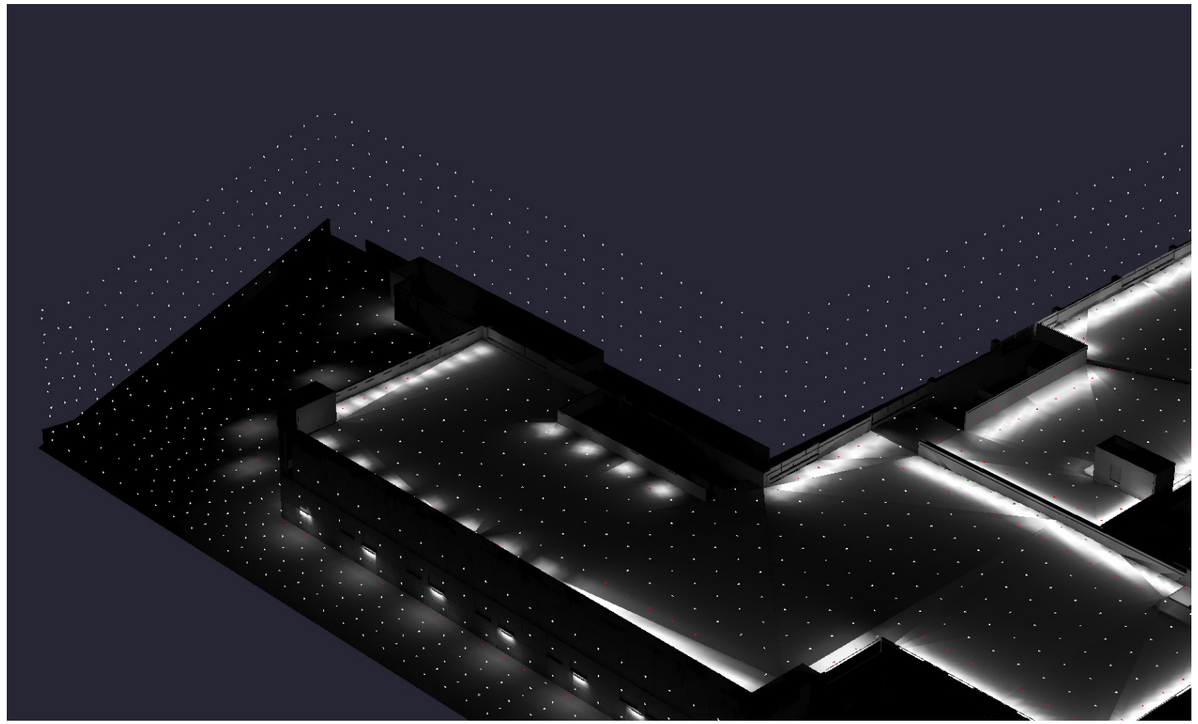
- W034 10'-0" — W034 = PARTITION TYPE 10'-0" = ELEVATION TO TOP OF GYP FINISH
- SOUND BATT INSULATION WHERE INDICATED

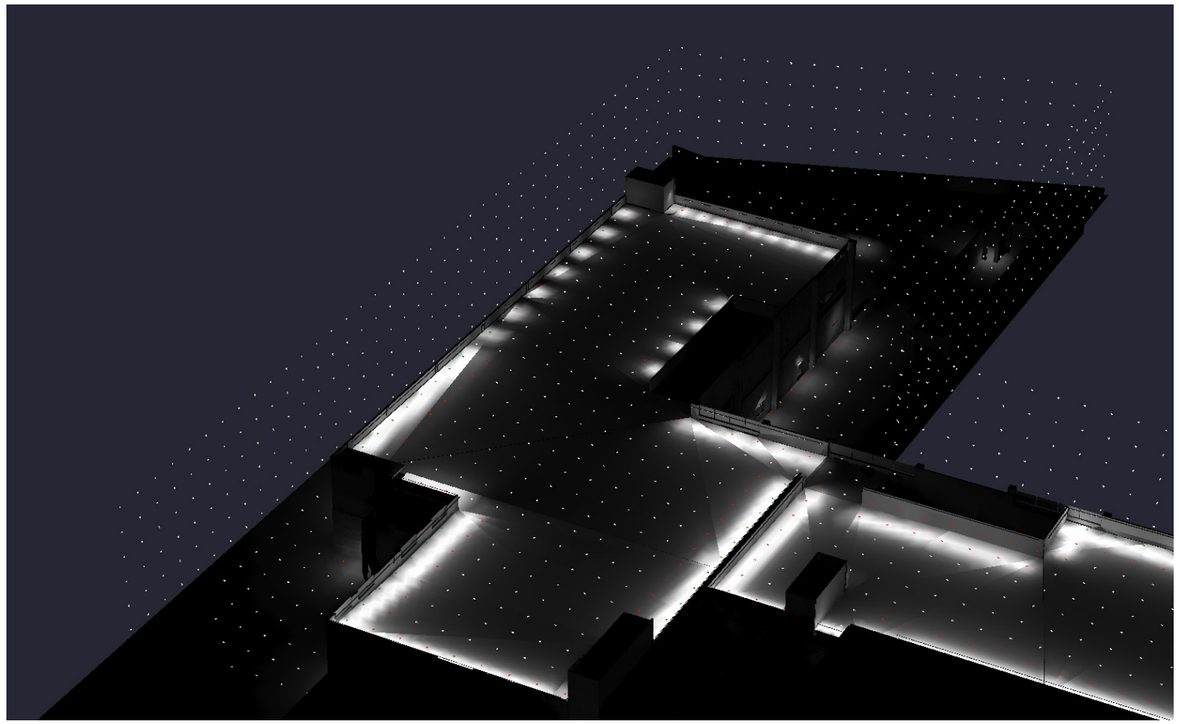
Exterior Light Trespass Illuminance Render View





Exterior Light Trespass Illuminance Render View





Lighting Renders

Lighting Renders

Lighting Renders

Lighting Renders

Exterior Lighting Analysis

Exterior lighting impact issues are focused around two key subjects: Light Trespass and Glare. These two technical terms are defined by the Illuminating Engineering Society of North America (IESNA) as follows:

- **Light Trespass** is the light that falls on a property but originates on an adjacent property. Light Trespass is measured in terms of illuminance (foot-candles or metric units lux), and can be measured at any point and in any direction. Where Light Trespass is evaluated the illuminance is measured perpendicular to the source of light, toward the source of light, at the property line, or the location where light is causing an issue, such as a residential window or balcony.
- **Glare** occurs when either the luminance is too high or the range of brightness in a visual field is too large. A bright light source, such as a flood light or street light, viewed against a dark sky may be uncomfortable to look at, and may create a temporary sensation of blindness, which is referred to as disability glare. Glare is evaluated by measuring the luminance (footlamberts or metric units candelas/m2) at the source of light, such as a digital display, in comparison to the surrounding adjacent luminance. The term which describes the extent of Glare at an observer position for a view is referred to as contrast, and is determined by the variation of luminance within the field of view. "High," "Medium," and "Low" contrast are terms used to describe contrast ratios. The ratio of peak measured luminance to the average within a field of view: contrast ratios greater than 30:1, between 10:1 and 30:1, and below 10:1, respectively. Contrast ratios above 30:1 are generally uncomfortable for the human eye to perceive. Any source luminance that is more than 50 times the adjacent background will be viewed as prominent, and may be viewed as distracting.

Light Trespass is evaluated at night. Glare may occur either during the day or night.

All urban areas within California are designated Lighting Zone 3 as default under the CEC, which limits the Light Trespass to 8 lux (0.74 footcandles). Per the CEC, California Building Energy Efficiency Standards, Section 10-114, page 40, 41, the designations for outdoor lighting zones in urban areas are as follows:

"The default for urban areas, as defined by the U.S. Census Bureau, is Lighting Zone 3. Local AHJs (Authorities Having Jurisdiction) may designate areas to Lighting Zone 4 for high intensity nighttime use, such as entertainment or commercial districts or areas with special security considerations requiring very high light levels."

The existing conditions within and surrounding the Project site are consistent with the definition of Lighting Zone 3 noted above. In addition, the IESNA defines Lighting Zone 3 as:

"areas of human activity where the vision of human residents and users is adapted to high light levels. Lighting is generally considered necessary for safety, security and/or convenience and it is mostly uniform or continuous."

IESNA Handbook 11th Editiona Table 26.5, lists a Pre-curfew 8 Lux (0.74 footcandles) maximum at the location where trespass is under review for Zone 3. The CEC standard is well defined and supported by the IESNA and ASHRAE, and other independent lighting organizations such as the International Dark Sky Organization and U.S. Green Building Council.

The existing conditions to the south of the Project site are consistent with the definition of Lighting Zone 1 noted above. In addition, the IESNA defines Lighting Zone 1 as:

"Areas where lighting might adversely affect flora and fauna or disturb the character of the area. The vision of human residents and users is adapted to low light levels. Lighting may be used for safety, security and/or convenience but it is not necessarily uniform or continuous. After curfew most lighting should be extinguished or reduced as activity levels decline."

IESNA Table 26.5, lists a Pre-curfew 1 Lux (0.09 footcandles) maximum at the location where trespass is under review for Lighting Zone 1.

Exterior Light Trespass Illuminance (fc)

The analysis of the Project includes evaluation of the Light Trespass Illuminance from the Project at the nearest adjacent sensitive use property line, and an evaluation of Glare from the Project visible at sensitive use properties or at adjacent roadway locations.

This Report presents a conservative analysis with respect to Light Trespass and Glare. The Project Lighting is evaluated with a configuration of the maximum permissible lights that are within the limits of the California Building Code. This Study evaluates the Project Lighting as described above

a. Project Light Trespass Analysis

Light Trespass illuminance is calculated at the location where lighting is under review through the illumination modeling software program AGI32. This software utilizes the 3-dimensional architectural computer model, including Project Exterior Site and Building Lighting locations, dimensions, and luminous specifications to generate an accurate prediction of future illuminance. Light Trespass illuminance is evaluated with respect to horizontal and vertical illuminance at the locations where lighting is under review.

To evaluate Light Trespass Illuminance at the nearest sensitive use properties, the illuminance from the Project is calculated at the review location within a vertical plane at the sensitive use property line, extending from grade to a maximum viewing elevation above grade (for this Project 50 feet above grade). The calculated illuminance data is presented at 5 feet on center. The calculation plane simulates the illumination (fc) captured by light meters. The vertical calculation planes analyze the lighting at the locations adjacent to the Project property line, which will be greater than the illuminance at any location more distant from the Project. Incident light (fc) from a source degrades in proportion to the inverse square of the distance from the source to the location where lighting is under review. The illuminance EV (fc) incident at any given distance D (ft) from an illuminated surface S (ft2) with uniform surface luminance of L (cd/m2) is calculated by the following formula:

$$EV = (L \times S) / 10.76 \times D2$$

This formula illustrates the reduction in illuminance at any location as the distance increases from a light source. More distant sensitive use properties will receive less light from the Project due to the increased distance. Therefore, the Project will produce a less significant Light Trespass impact on sensitive use properties more distant from the nearest adjacent property line

The calculated maximum light trespass illuminance at the south property line adjacent to the Baylands is 0.09 fc.

The calculated maximum light trespass illuminance at the east, north, and west property lines is 0.48 fc.

The maximum light trespass illuminance is less then the threshold established by Calgreen, thereore the Project will not introduce a new source of light trespass.

Lighting Glossary

Discussions of lighting issues include precise definitions, descriptions or terminology of the specific lighting technical parameters. The following glossary summarizes explanations of the technical lighting terms utilized in this Study and the related practice standards to facilitate discussion of these issues. The following technical terms are used in this Study.

Brightness: The magnitude of sensation that results from viewing surfaces from which light comes to the eye. This sensation is determined partly by the measurable luminance of the source and partly by the conditions of observation (Context), such as the state of adaptation of the eye. For example, very bright lamps at night appear dim during the day, because the eye adapts to the higher brightness of daylight.

BUG Rating: A luminaire classification system established in IES TM15-11, BUG Ratings Addendum that provides for uniform assessment of the directional characteristics of illumination for exterior area lighting. BUG is an acronym composed of Backlight, Uplight, and Glare. BUG ratings are based on a zonal lumen calculations for secondary solid angles defined in IES TM15-11.

Candela: Measure of light energy from a source at a specific standard angle and distance. Candela (cd) is a convenient measure to evaluate output of light from a lamp or light fixture in terms of both the intensity of light and the direction of travel of the light energy away from the source.

Contrast: Calculated evaluation of high, medium and low contrast of visible light sources or surfaces within the Property by a ratio of luminance. Contrast is the ratio of one surface luminance to a second surface luminance or to the field of view. Contrast exceeding 30 to 1 are usually deemed uncomfortable; 10 to 1 are clearly visible; and less than 3 to 1 appear to be equal.

Fully Shielded: A lighting fixture constructed in such a manner that all light emitted by the fixture, either directly from the lamp or a diffusing element, or indirectly by reflection or refraction from any part of the Luminaire, is projected below the horizontal as determined by photometric test or certified by the manufacturer. Any structural part of the light fixture providing this shielding must be permanently affixed. In other words, no light shines above the horizontal from any part of the fixture.

Glare: Glare is visual discomfort experienced from high luminance or high range of luminance. For exterior environments at night, glare occurs when the range of luminance in a visual field is too large. The light energy incident at a point is measured by a scale of footcandles or lux, and is described in the technical term Illuminance. This incident light is not visible to the eye until it is reflected from a surface, such as pavement, wall, dust in the atmosphere or the surface of a light bulb. The visible brightness of a surface is measured in footlamberts (or metric equivalent candelas per square meter) and is described by the term Luminance.

The human eye processes brightness variations across a very broad spectrum of intensities. The range of brightness generated by direct noon sun versus a moonlight evening is over 5000 to 1. Human eyes are capable of accommodating to this range of intensities given adequate time to adjust. However, the eye cannot process brightness ratios of more than 30 to 1 within a view without discomfort. See IESNA 10th Edition Handbook, Section 4.10.1, Discomfort Glare and Section 10.9.2 Calculating Glare. For the purpose of this analysis, brightness of light sources may be described subjectively by the following criteria:

High Contrast Conditions: View of light fixture emitting surface, such as a lens, reflector, or lamp, where brightness contrast ratio exceeds 30 to 1 (source Luminance to background Luminance ratio in footlamberts).

Medium Contrast Conditions: Brightly lighted surfaces where contrast ratio exceeds 10 to 1, but is less than 30 to 1 (lighted surface Luminance to background Luminance ratio in footlamberts).

Low Contrast Conditions: Illuminated surfaces where contrast ratio exceeds 3 to 1, but less than 10 to 1 (source Luminance to background Luminance ratio in footlamberts).

Illuminance: Illuminance is the means of evaluating the density of Luminous Flux. Illuminance indicates the amount of Luminous Flux from a light source falling on a given area. Illuminance is measured in footcandles (fc)

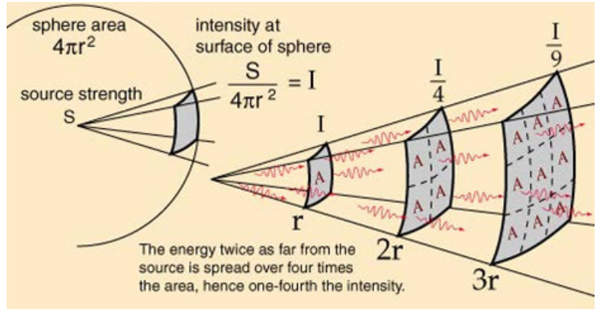
Lighting Glossary

which is the lumens per square foot, or Lux (lumens per square meter). Illuminance need not necessarily be related to a real surface since it may be measured at any point within a space. Illuminance is determined from the Luminous intensity of the light source. Illuminance of a point source decreases with the square of the distance from the light source (see Inverse Square Law definition).

Horizontal Illuminance: Illuminance incident upon a horizontal plane. The orientation of the illuminance meter or calculation point will be 180 degrees from Nadir.

Vertical Illuminance: Illuminance incident upon a vertical plane. The orientation of the illuminance meter or calculation point will be 90 degrees from Nadir.

Inverse Square Law: In physics, an inverse-square law is any physical law stating that a specified physical quantity or intensity is inversely proportional to the square of the distance from the source of that physical quantity. The fundamental cause for this relationship can be understood as geometric dilution corresponding to point-source radiation into three-dimensional space (see Figure 2). The divergence of a vector field which is the resultant of radial inverse-square law fields with respect to one or more sources is everywhere proportional to the strength of the local sources, and hence zero outside sources. Newton's law of universal gravitation follows an inverse-square law, as do the effects of electric, magnetic, light, sound, and radiation phenomena. Thus, Illuminance decreases with the square of the distance from the light source. Light Source: Device which emits light energy from an electric power source.



Light Trespass: Electric light from subject property incident onto adjacent properties, measured in footcandles or lux, usually analyzed by measurement at or near the adjacent property line.

Lighting Zone (LZ): Defined by IESNA and summarized in Table 26.4 in the Handbook and adopted by CALGreen.

Lighting Zone LZ1: Areas where lighting might adversely affect flora and fauna or disturb the character of the area. The vision of human residents and users is adapted to low light levels. Lighting may be used for safety, security and/or convenience but it is not necessarily uniform or continuous. After curfew most lighting should be extinguished or reduced as activity levels decline..

Lighting Zone LZ2: Outdoor areas of human activity where the vision of human residents and users is adapted to moderate light levels. Lighting is not uniform or consistent. Lighting is generally desired for safety, security and/or convenience.

Lighting Zone LZ3: Outdoor areas of human activity where the vision of human residents and users is adapted to moderately high light levels. Lighting is generally desired for safety, security and/or convenience.

Lighting Zone LZ4: Outdoor areas of human activity where the vision of human residents and users is adapted to high light levels. Lighting is generally desired for safety, security and/or convenience.

Luminaire: A complete lighting unit consisting of a light source designed to distribute the light, to position and protect the source, and to connect the source to the power supply. Also referred to as a Light Fixture.

Luminance: Luminance is a measure of emissive or reflected light from a specific surface in a specific direction over a standard area. Luminance is measured in footlamberts (fL) ($1/\pi$ Candela per square foot) or cd/m2 (Candela per square meter). $1fL = 3.43\ cd/m^2$. Whereas Illuminance indicates the amount of Luminous Flux falling on a given surface, Luminance describes the brightness of an illuminated or luminous surface. Luminance is defined as the ratio of luminous intensity of a surface (Candela) to the projected area of this surface (m^2 or ft^2).

Luminous Flux: Mean value of total Candelas produced by a light source. Luminous Flux describes the total amount of light emitted by a light source. The unit for measuring Luminous Flux is Lumen (lm). This radiation could basically be measured or expressed in

Lighting Glossary

watts. This does not, however, describe the optical effect of a light source adequately, since the varying spectral sensitivity of the eye is not taken into account. To include the spectral sensitivity of the eye the Luminous Flux is measured in lumen. Radiant Flux or 1 W emitted at the peak of the spectral sensitivity (in the photopic range at 555 nanometers produces a Luminous Flux of 683 lumen). The unit of lumen does not define direction.