TEHNIČKA DOKUMENTACIJA

Za revitalizaciju spoljne rasvjete u VN postrojenju

TS 110/35 kV – BAR

OPIS RADOVA: Revitalizacija sistema spoljašnje rasvjete VN postrojenja

OBJEKAT: Trafostanica 110/35 kV, BAR

LOKACIJA: BAR, Crna Gora

INVESTITOR: Crnogorski elektroprenosni sistem AD, Podgorica

1. PREDMET PROJEKTA:

Za potrebe Investitora (CGES-a), potrebno je izvršiti kompletnu revitalizaciju sistema osvetljenja spoljne rasvjete (SR) trafostanice 110/35kV Bar. Novo rješenje je potrebno izvesti sa novijim energetski efikasnijim LED svetiljkama, uz obezbjeđivanje boljih uslova osvijetljenosti u odnosu na postojeće stanje. Obzirom na dotrajalost i stanje postojećih instalacija, predviđa se kompletna zamjena svih djelova sistema spoljne rasvjete novim. To obuhvata nabavku, transport i ugradnju novih elemenata tj. svjetiljki, pod-konstrukciju za iste, kablova za napajanje ormana i svjetiljki kao i ormane za razvod i upravljanje rasvjetom. Obzirom na dobro stanje i očuvanost kablovske instalacije za rasvjetu na postojećih stubovima po perimetru postrojenja, ista instalacija će se iskoristiti, samo će se na istu montirati nove LED svjetiljke. Ovo znači da se stubovi koji se ne koriste, demontiraju. Nove instalacije je potrebno izvesti u svemu prema usvojenom fotometrijskim rješenju, grafičkim prilozima kao i uz poštovanje svih zakonodavnih propisa i pozitivne inženjerske prakse.

2. CILJ PROJEKTA:

Revitalizacijom postojećeg sistema spoljašnje rasvjete planirano je unapređenje osvijetljenosti VN postrojenja u cilju zadovoljenja standarda, povećanje energetske efikasnosti i smanjenje emisije CO2, smanjenje troškova održavanja, kao i povećanje bezbjednosti kretanja i obavljanja radnih zadataka kroz VN postrojenje u noćnim satima. Novo rješenje mora biti u skladu sa aktuelnim standardom MEST EN 12464-2:2014, a konačan cilj projekta jeste funkcionalna rasvjeta kompletnog područja trafostanice.

3. LOKACIJA

Predmenta lokacija se nalazi na katastarskoj parceli br. 5557, KO Novi Bar, Opština Bar, pozicionirana na kraju saobraćajnice u okolnom naselju, gdje je i saobraćajni pristup. Lokacija je na relativno ravnom terenu sa uzdignutim dijelom površine (pod 110kV postrojenjem), pravilnog oblika na kojoj se nalazi postrojenje 110 kV, komandna zgrada sa pomoćnim objektima. Uzdignuti dio (110kV postrojenje) je uzvišeno 2.0m iznad kote ostalog terena trafostanice. Površina parcele je ≈ 4.850 m^2.

4. OPIS POSTOJEĆEG STANJA

Obzirom na starost i dotrajalost postojeće instalacije spoljne rasvjete, osim stubova na perimetru postrojenja (stubovi visine 4m) sva ostala instalacija se zanemariju i ne tretira. Stubovi u unutrašnjosti postrojenja se demontiraju a kako su zaliveni u betonskom temelju, iste je potrebno isjeći u dnu zatim rupe u temelju je potrebno zatvoriti kombinovanjem pur-pjene i adekvatnog silikona kako bi se spriječio ulazak vode u iste. Postojeće kablove u postrojenju nije potrebno demontirati.

5. PROJEKTOVANI RADOVI

5.1 RASVJETA I PRORAČUN

Projektom je predviđena implementacija novog sistema rasvjete sa novim LED svjetiljkama koje posjeduju dodatnu zaštitu od prenapona, u broju i pozicijama potrebnim za zadovoljenje nivoa osvjetljaja prema standardu MEST EN 12464-2:2014. Po ovom standardu, u tabeli 5.11 za elektrane I postrojenja, za "Overall Inspection" zahtjeva se srednji osvjetljaj od 50lx I ravnomjernost 0.4. Ovaj standard je potrebno zadovoljiti u zonama razvodnih postrojenja (RP) 110kV, sabirničkih sistema, kao i energetskih transformatora (ETR). Pored gore popisanih postrojenja, na predmetnoj lokaciji postoje još nekoliko različitih zona/prostora koje je potrebno osvijetliti u sledećim nivoima osvijetljenosti i ravnomjernosti:

ZONA 1 (niži nivo)

- Ulazna kapija – srednja osvijetljenost >50lx / ravnomjernost >0.5.
- Koridor – srednja osvijetljenost >15lx / ravnomjernost >0.4.
- Centralni i 110kV koridor – srednja osvijetljenost >30lx / ravnomjernost >0.4.
- Plato ispred objekta – srednja osvijetljenost >30lx / ravnomjernost >0.4.
- Plato iza objekta – srednja osvijetljenost >20lx / ravnomjernost >0.4.
- Postrojenja 110kV i ETR – srednja osvijetljenost >35lx / ravnomjernost >0.6.
- Perimetri (zone uz ograde) – srednja osvijetljenost >10lx / ravnomjernost >0.3.

ZONA 2 (viši nivo)

- Ulazna kapija – srednja osvijetljenost >50lx / ravnomjernost >0.5.
- Koridor – srednja osvijetljenost >20lx / ravnomjernost >0.4.
- Centralni i 110kV koridor – srednja osvijetljenost >30lx / ravnomjernost >0.4.
- Plato ispred objekta – srednja osvijetljenost >30lx / ravnomjernost >0.4.

- Plato iza objekta – srednja osvijetljenost >20lx / ravnomjernost >0.4.
- Postrojenja 110kV i ETR – srednja osvijetljenost >60lx / ravnomjernost >0.6.
- Perimetri (zone uz ograde) – srednja osvijetljenost >10lx / ravnomjernost >0.25.

DEA (nezavisna rasvjeta)

Uz rasvjetu postrojenja potrebno je osvijetliti i prostor oko DEA, koji će se nezavisno paliti sa grebenastog prekidača na KO u komandnoj sobi. Zbog rasporeda opreme, broj i raspored svjetiljki je fiksan. Potreban nivo osvjetljaja je:

- srednja osvijetljenost >200lx / ravnomjernost >0.6

Osim zamjene svetiljki projekat obuhvata i promjenu načina regulacije i upravljanja svetiljki sa ciljem racionalizacije potrošnje električne energije kao i samog intervala rada svetiljki (u dva nivoa – dva paljenja tj. dvije zone). Zona 1, definiše opšti nivo za cirkulaciju postrojenjem, dok zona 2 definiše maksimalni nivo, kojim se ispunjava gore opisani standard. Regulacija ova dva nivoa rasvjete se obavlja u komandnom ormanu (KO) koji je predviđen za montažu u komandnoj sobi, pomoću grebenastih prekidača (1-0-2 za zonu 1 i 1-0 za zonu 2) sa kog se komanduje i rasvjetom DEA.

Fotometrijskim proračunom je potrebno zadovoljiti tražene vrijednosti za obije zone upravljanja rasvjetom, te iste prikazati kao posebne scene u proračunu. Prilikom izvođenja, izvođač treba da poštuje sve pozitivne zakonske propise i prakse i da u skladu sa istima vrši radove, bez obzira da li su isti navedeni ili nisu u ovom projektu. Na podlogama za fotometrijski proračun dati su kompletni detalji potrebni za izradu proračuna, sa svim ucrtanim elementima, njihovim dimenzijama i uputima za njihovo formiranje u samom proračunu. Elemente date na podlozi je obavezno tretirati u proračunu.

U cilju provjere ispravnosti fotometrijskog proračuna, Izvođač je dužan dostaviti fotometrijski fajl (.evo npr) kako bi Investitor mogao provjeriti sve elemente proračuna.

5.2 KABLOVSKA INSTALACIJA I RAZVODNI ORMANI

Projektom je previđeno komplet polaganje novog napojnog kabla, na relaciji od ormana NN razvoda (odakle se napaja sistem spoljne rasvjete) do ormana GOSR (glavni orman spoljne rasvjete), zatim svi kablovi na relaciji od GOSR do lokalnih ormana na portalima postrojenja i lokalnih svjetiljki na fasadi objekta.

GOSR je predviđen kao nadgradni, na zidu u prostoriji podruma ispod komandne sobe u kojoj se nalazi NN razvod sa kog se napaja. Za isti je predviđeno napajanje sa postojećeg ormana NN razvoda, gdje je potrebno izraditi priključak sa postojećih sabirnica ormana. U istom je potrebno smjestiti i prekidačku/osiguračku opremu „drišer" za zaštiti glavnog napojnog kabla ka GOSR. Napojni kabl do GOSR je tipa **NYCY 4x6mm2**, kojeg štite nožasti osigurač NH01C 25A. Kabl se polaže kroz postojeće PNK regale, a dio i po novom PNK100 regalu. Kako se koristi postojeća instalacija za stubnu rasvjetu perimetra, kabl za napajanje stubova koji je završio u NN razvodu, treba ispitati i isti izvući iz NN razvoda zatim spojnicom povezati i produžiti do pozicije GOSR, u kojem isti treba povezati.

Sa GOSR se napajaju svi lokalni ormani rasvjete (RO-A, B, C), kablovima tipa NYCY **4x4mm2**. Kablovi se polažu kroz postojeće betonske kanale i cijevi, do krajnjih tačaka postojećih kanala tj do samih stubova, gdje se polažu nadgradno u PNK regalima 50mm po betonskom temelju i uz stub do pripadajućih ormana. Sa GOSR se još napajaju svjetiljke i foto-ćelija na fasadi objekta, kablovima tipa NYCY **3x1.5mm2**. Ovi kablovi se dijelom polažu kroz postojeće PNK regale i cijevi u objektu, zatim unutrašnjim zidovima objekta nadgradno u HF cijevima do izlaza iz objekta. Zatim se fasadom polažu u PVC kanalicama odgovarajućih dimenzija, u zavisnosti od količine kablova koji se u njima polažu.

Sa lokalnih ormana rasvjete u polju (RO – A, B i C) se napajaju svjetiljke na portalima, kablovima tipa **NYCY 3x1.5mm2**. Kablovi se od pripadajućeg RO vodi do svake svjetiljke, nadgradno po metalnoj konstrukciji stuba kroz pripadajuće **SAPA** crijevo, pričvršćujući se na svakih 1m za istu. Dio trase gdje ovi kablovi idu kroz zemlju, vode se u energetska crijeva, kako je to predviđeno grafičkim prilozima i specifikacijom radova.

Komanda (paljenje) rasvjete je predviđeno putem dva grebenasta prekidača koji će biti montirani na malom ormanu KO u komandnoj sobi komandne zgrade. Zona 1 kao osnovni scenario će se paliti preko preklopke „1-0-2" koja omogućava ručno paljenje (položaj 1) i automatski rad preko foto-ćelije (položaj 2). Zona 2 kao maksimalni scenario će se paliti pomoću preklopke „1-0". Pored ova dva grebenasta prekidača, na vratimo KO je predviđeno još jedan grebenasti prekidač „1-0" za paljenje rasvjete DEA prostora. U tu svrhu od GOSR do pozicije ormana KO se polaže kablovi tipa **NYCY 5x1.5mm2 (za zone 1 i 2) i NYCY 3x1.5mm^2 (za DEA).** Ovi kablovi se polažu dijelom nadgradno po unutrašnjim zidovima objekta u HF cijevima, a dijelom duplim podom do pozicije KO u komandnoj sobi.

Ormani na portalima za rasvjetu u polju (RO-A, B i C) moraju biti nadgradni, predviđeni za montažu na metalnu konstrukciju stubova. Ormani moraju biti izrađeni od poliestera ojačanog staklenim vlaknima otporan na UV zračenja i atmosferske uticaje, u zaštiti IP55.

Zbog blizine transformatora i relativno kratkih dionica kablova u energetskom smislu, sva sklopna tehnika korištena u ormanima mora biti isklopne moći 15kA.

5.3 POD-KONSTRUKCIJA I MONTAŽNO/DEMONTAŽNI RADOVI

Ovim projektom se ne tretiraju postojeći napojni kablovi za rasvjetu, već se oni zanemaruju. Postojeći stubovi se dijelom demontiraju a dijelom koriste, u skladu sa uputima na grafičkim prilozima i specifikaciji. Za svjetiljke koje se montiraju na portalima u 110kV postrojenju obavezna je izrada pod-konstrukcije (nosača) koji mora imati gumenu barijeru na mjestu montaže svjetiljke radi galvanskog odvajanja same svjetiljke od metalne mase stuba. Nosač je dovoljnog kapaciteta da "nosi" težinu svjetiljke i da istu drži u fiksnom položaju. Nosač je izrađen od čelika, sa adekvatnim premazima i antikorozivnom zaštitom i isti se mora bezbjedno povezati sa čeličnom konstrukcijom na koju se kači putem zavarivanja, šrafljenja ili ukliještanja. Postojeća konstrukcija na koju se kači nosač, mora biti adekvatno sanirana u slučaju oštećenja tokom radova. Tačan izgled i dimenzije pojedinačnih nosača uskladiti sa situacijom na licu mjesta i usvojenim fotometrijskim rješenjem.

5.4 ZAVRŠNE ODREDBE

Nakon svih izvedenih radova, Izvođač je dužan da izvrši testiranje i puštanje u rad spoljne rasvjete u prisustvu predstavnika Investitora. Po puštanju u rad, neophodno je izvršiti mjerenje nivoa osvjetljaja u skladu sa tačkama iz fotometrijskog proračuna. Devijacije u odnosu na proračunske vrijednosti ne smiju biti veće od 10%.

6. PRILOZI

6.1 NUMERIČKA DOKUMENTACIJA

Bilans snaga i energije – Spoljna rasvjeta TS BAR
Proračun napojnih kablova – Spoljna rasvjeta TS BAR
Fotometrijski proračun: Rasvjeta spoljašnjeg postrojenja TS BAR

6.2 GRAFIČKA DOKUMENTACIJA

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Prilog 2 – Situacija: Razvod kablova u postrojenju	R = 1:100
Prilog 3 – Portali ETR: Rasvjeta na portalima ETR (RO-A)	R = 1:100
Prilog 4 – Portali SS: Rasvjeta na portalima SS (RO-B)	R = 1:100
Prilog 5 – Portali DV: Rasvjeta na portalima DV (RO-C)	R = 1:100
Prilog 6 – Objekat TS: Razvod kablova na prizemlju (0)	R = 1:100
Prilog 7 – Objekat TS: Razvod kablova u podrumu (-1)	R = 1:100
Prilog 8 – Jednopolna šema ormana GOSR	
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Prilog 14 – Legenda opreme	
Prilog 15 – Situacija: Podloga za fotometrijski proračun	R = 1:100

BILANS SNAGA				
Tip potrošača	Razvodni orman - Potrošač	Instal. Snaga (W)	Koef. jednovr.	Jedn. snaga (W)
GOSR	RO - A	408	1.00	408
	RO - B	245	1.00	245
	RO - C	339	1.00	339
	FASADA	492	1.00	492
Ukupna instalisana snaga (W)				1,484
Koeficijent jednovremenosti (K)				1.00
Ukupna jednovremena snaga (W)				**1,484**
Ukupna aktivna snaga P (W)				1,484
cos φ				0.95
Ukupna prividna snaga S (VA)				**1,562**
Potrebna godišnja energija (kWh)				**5,300**

Podgorica, Mart 2025.

Pripremio:

Blažo Janković, dipl. ing. el.

TABELA 1.

PRORAČUN NAPOJNIH KABLOVA

Relacija		Instal. Snaga	Koef. Jednov.	Jedn. Snaga	Fakt. snage	Struja	Tip i presjek kabla	Nosiv. kabla	"A"	Korekcioni faktori			"B"	"C"	"D"	"E"			Duž. kabla	Pad napona	
																				dionica	ukupno
od	do	P_i (W)	k_j	P_j (W)	cos φ	I_b (A)	(mm^2)	I_d(A)	/	K_n	K_θ	K_λ	I_z(A)	I_n(A)	/	I_2 (A)	1,45xI_z	/	l(m)	%	%
NN	GOSR	1,484	1.00	1,484	0.95	**2.26**	NYCY 4x6	**52**	C	0.80	1.00	1.00	**41.60**	25	1.60	40.00	60.32	**zadov.**	**15**	**0.041**	**0.041**
GOSR	RO-A	408	1.00	408	0.95	**0.62**	NYCY 4x4	**40**	C	0.70	0.80	1.00	**22.40**	20	1.35	27.00	32.48	**zadov.**	**63**	0.072	**0.113**
GOSR	RO-B	245	1.00	245	0.95	**0.37**	NYCY 4x4	**40**	C	0.70	0.80	1.00	**22.40**	20	1.35	27.00	32.48	**zadov.**	**52**	0.036	**0.077**
GOSR	RO-C	339	1.00	339	0.95	**0.52**	NYCY 4x4	**40**	C	0.70	0.80	1.00	**22.40**	20	1.35	27.00	32.48	**zadov.**	**80**	0.076	**0.117**
RO-C	C8	44	1.00	44	0.95	**0.20**	NYCY 3x1.5	**23**	E	0.70	0.80	1.00	**12.88**	10	1.35	13.50	18.68	**zadov.**	**38**	0.075	**0.192**

"A" - tip električnog razvoda: prema JUS N.B2. 752

"B" - trajno dozvoljena struja $I_z = In \times K_n \times K_\theta \times K_\lambda$ (A)

"C" - I_n - nazivna struja zaštitnog uredjaja - osiguraca (A).

"D" - koeficijent zaštitnog uredjaja - osiguraca (k)

"E" - $I_2 = I_n \times k$ - struja kod koje zaštitni uređaj pouzdano djeluje (A)

1. $I_b < I_n < I_z$
2. $I_2 < 1.45 \times I_z$

K_n - zbog paralelnog vodjenja kablova

K_θ - zbog temperature ambijenta

K_λ - zbog termičke otpornosti zemlje

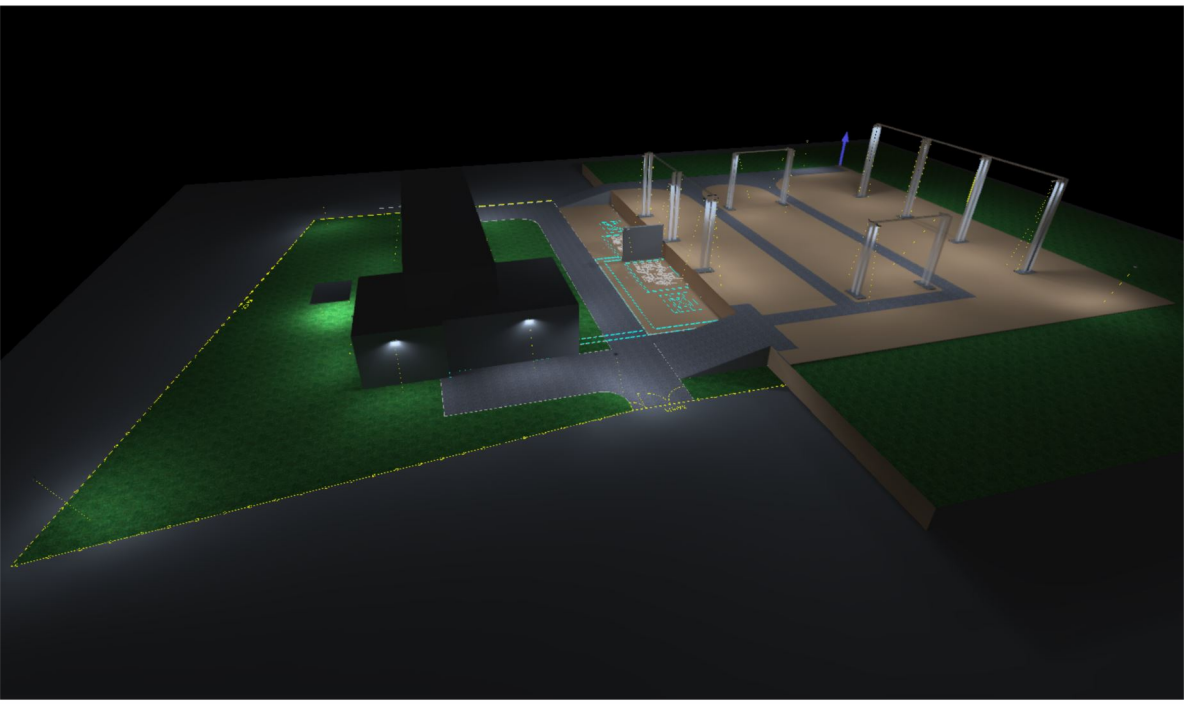
Pripremio:

Blažo Janković, dipl. ing. el.

Podgorica, Mart 2025.

Date 17/03/2025

CRNOGORSKI ELEKTROPRENOSNI SISTEM AD



RASVJETA SPOLJAŠNJEG POSTROJENJA - TS BAR

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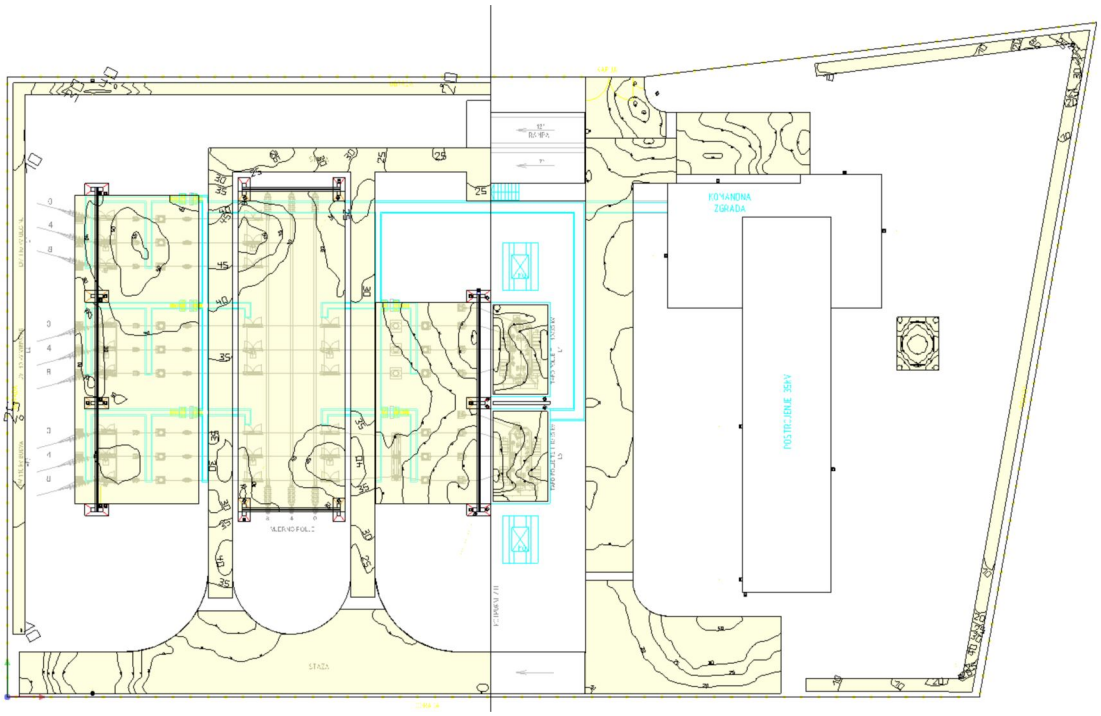
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Description

RASVJETA SPOLJAŠNJEG POSTROJENJA - TS BAR

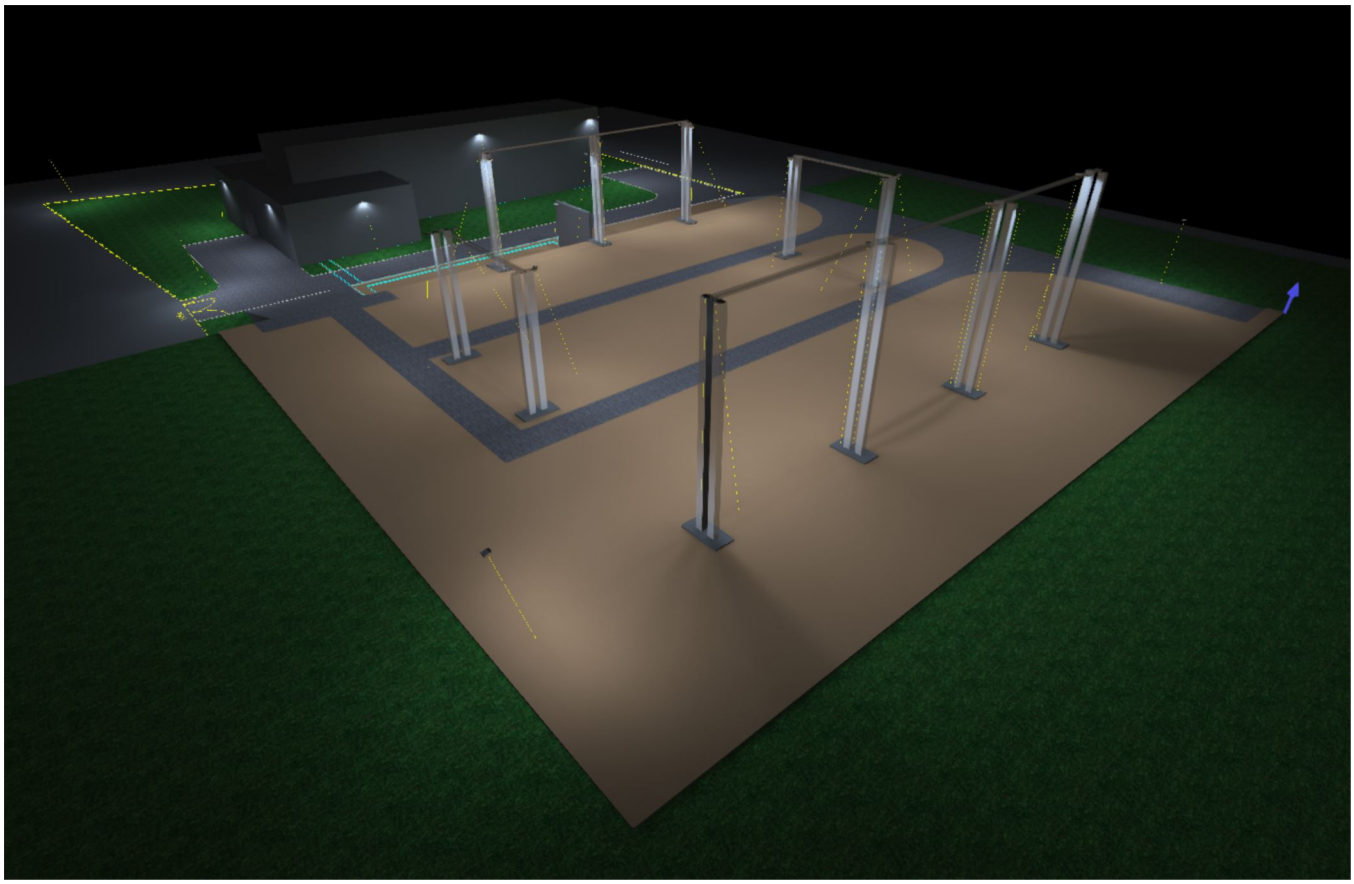
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The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

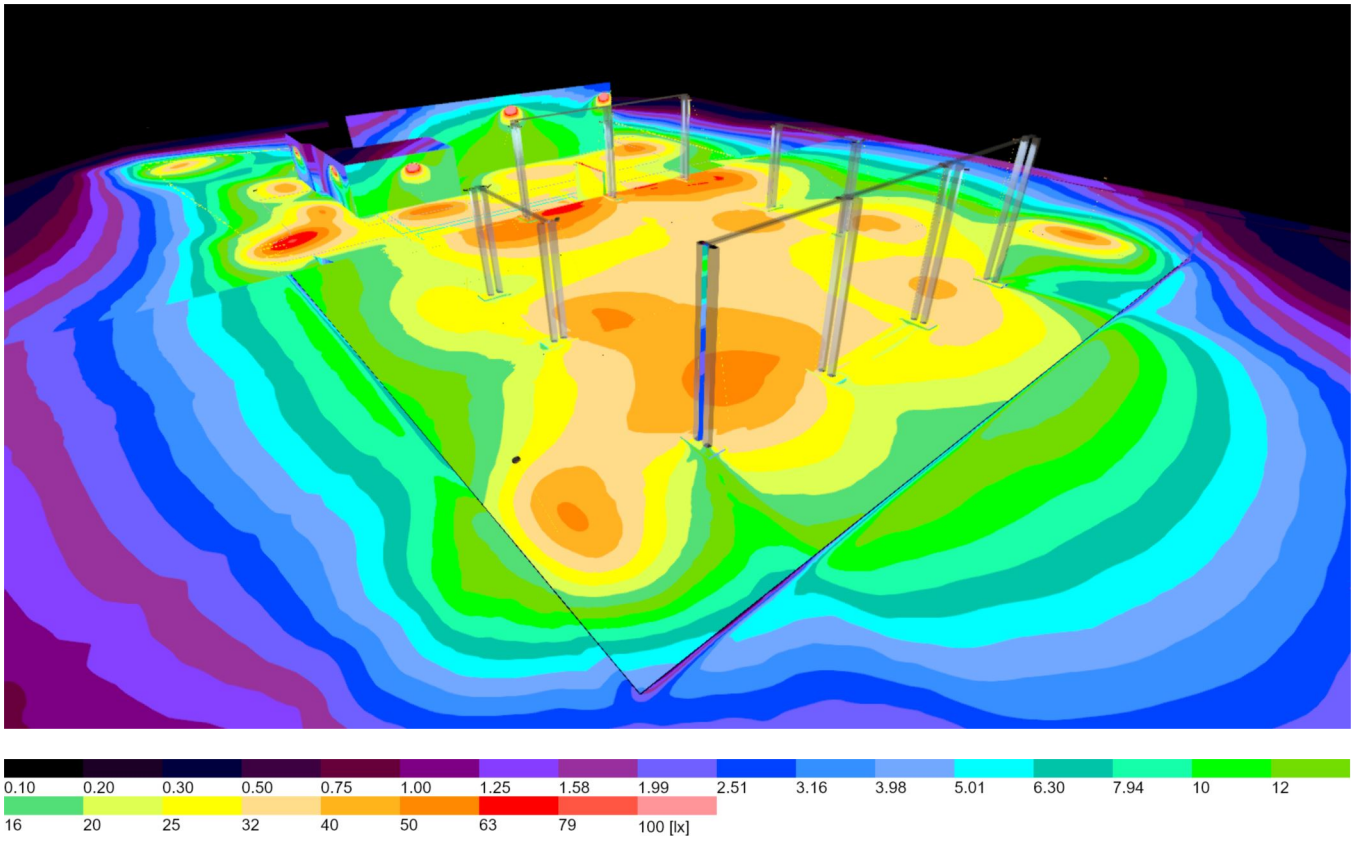
Images



Site 1 (162)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

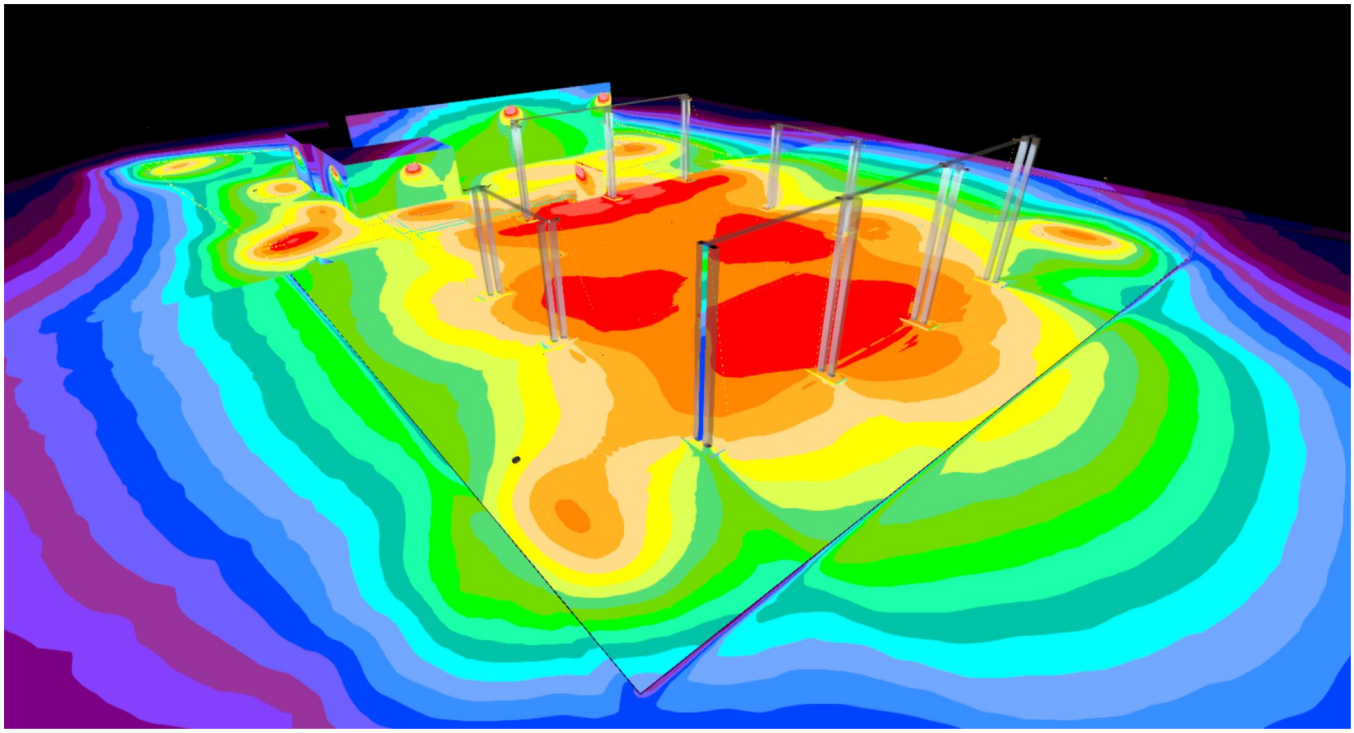
Images



Site 1 (163)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

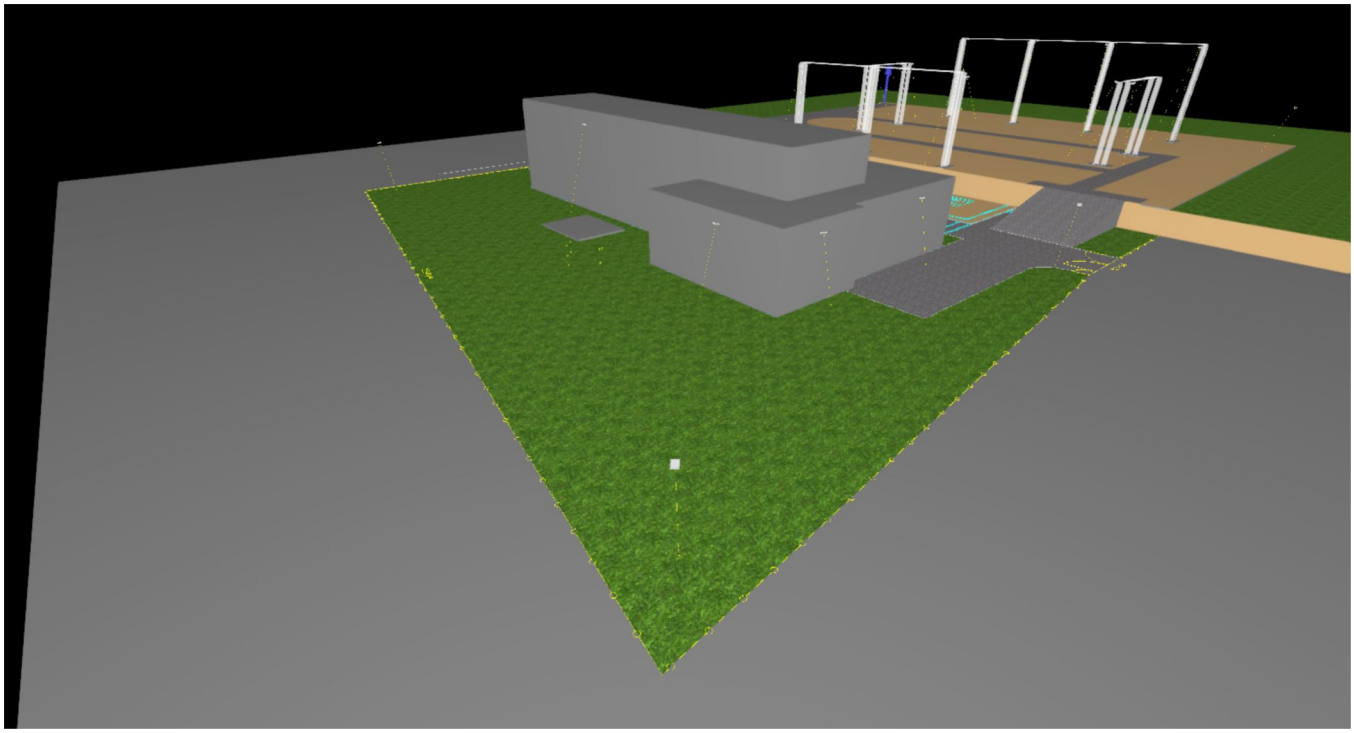
Images



Site 1 (164)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

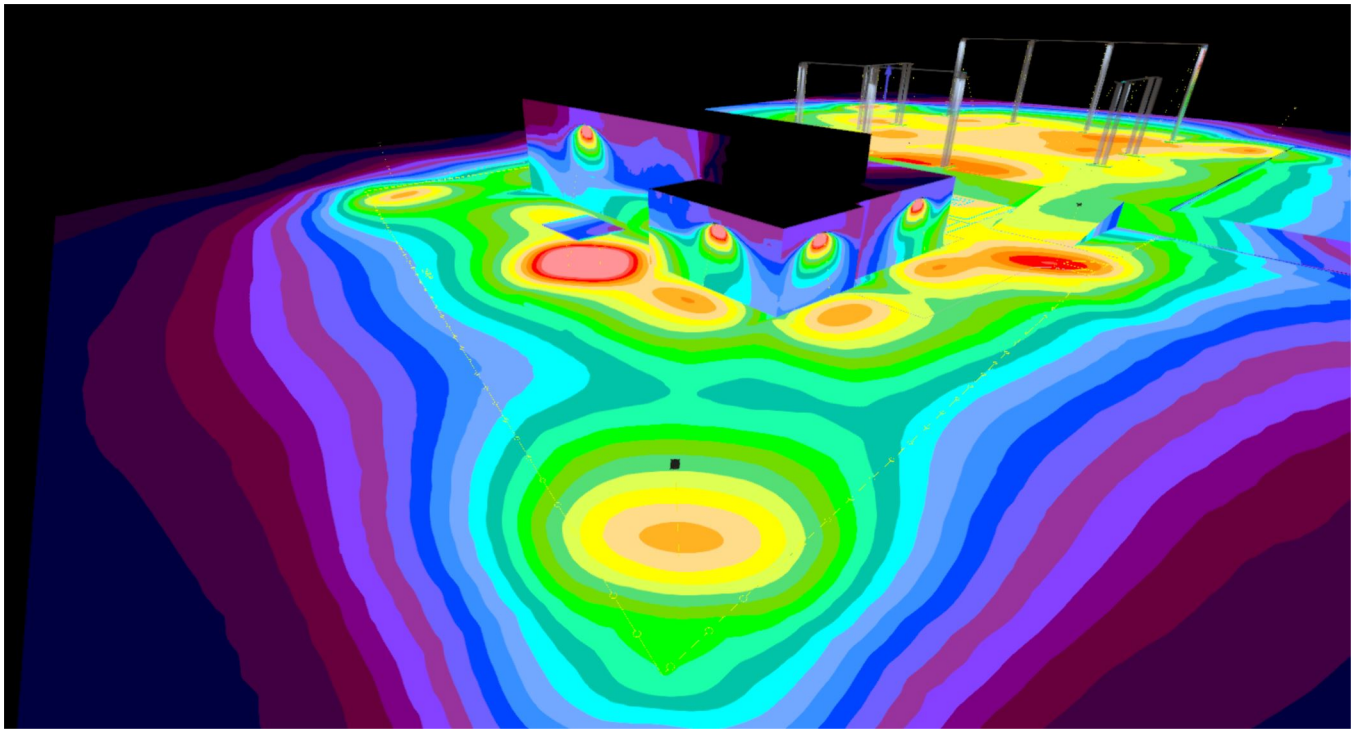
Images



Site 1 (165)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

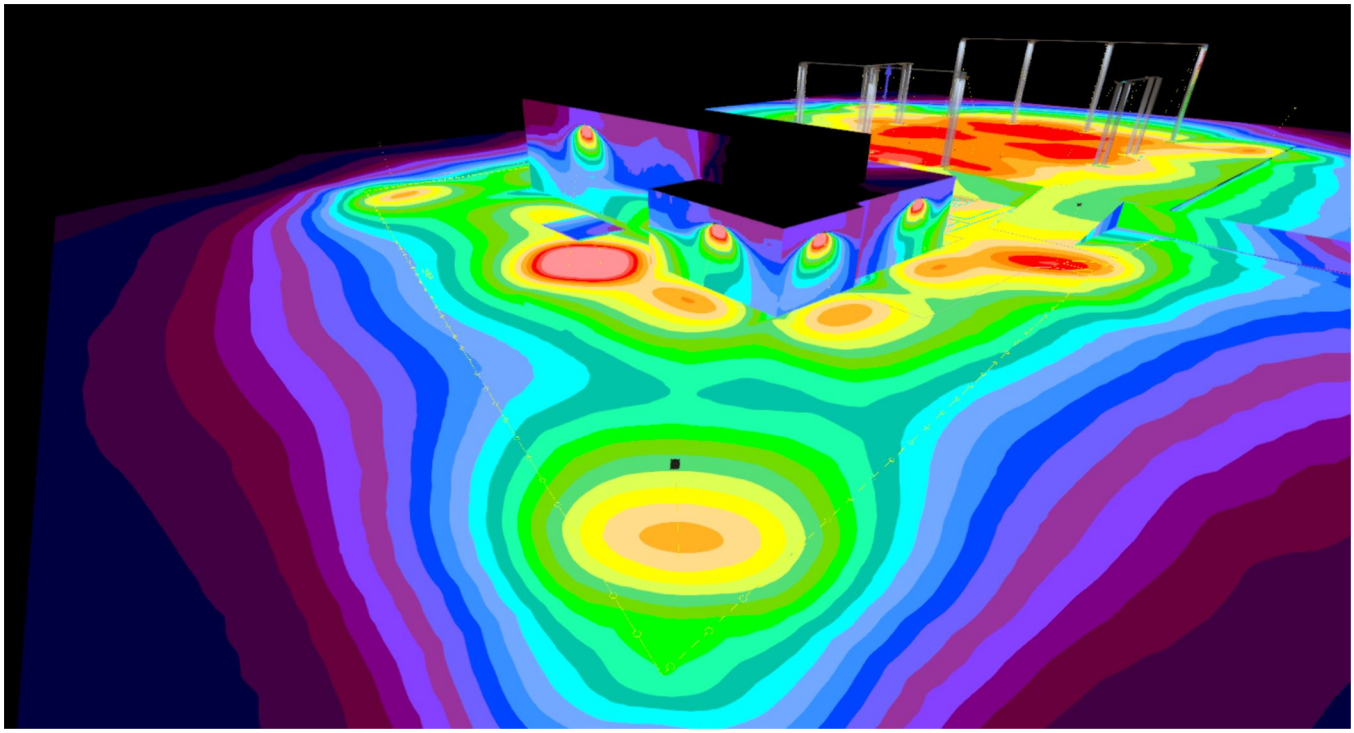
Images



Site 1 (166)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

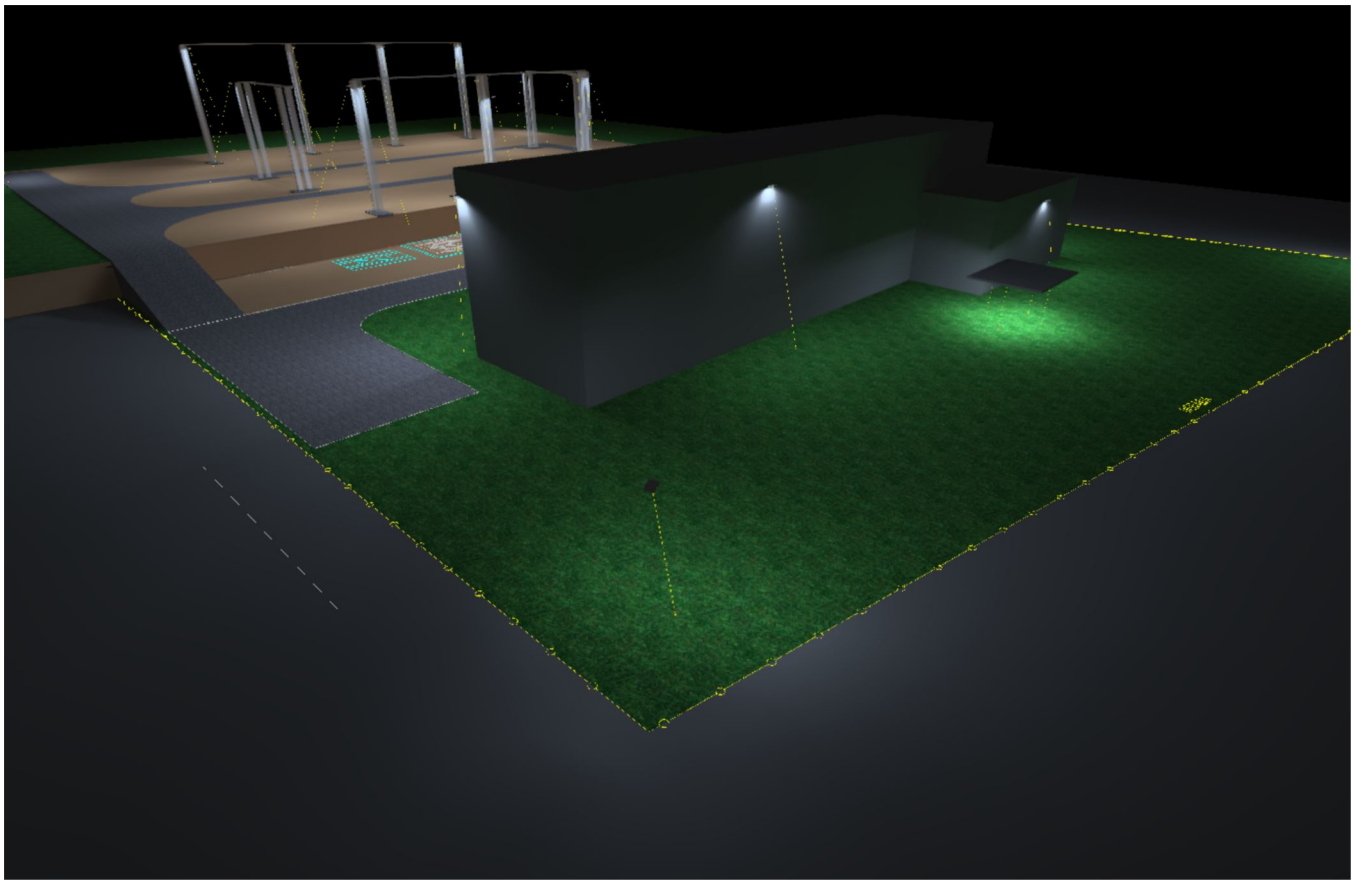
Images



Site 1 (167)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

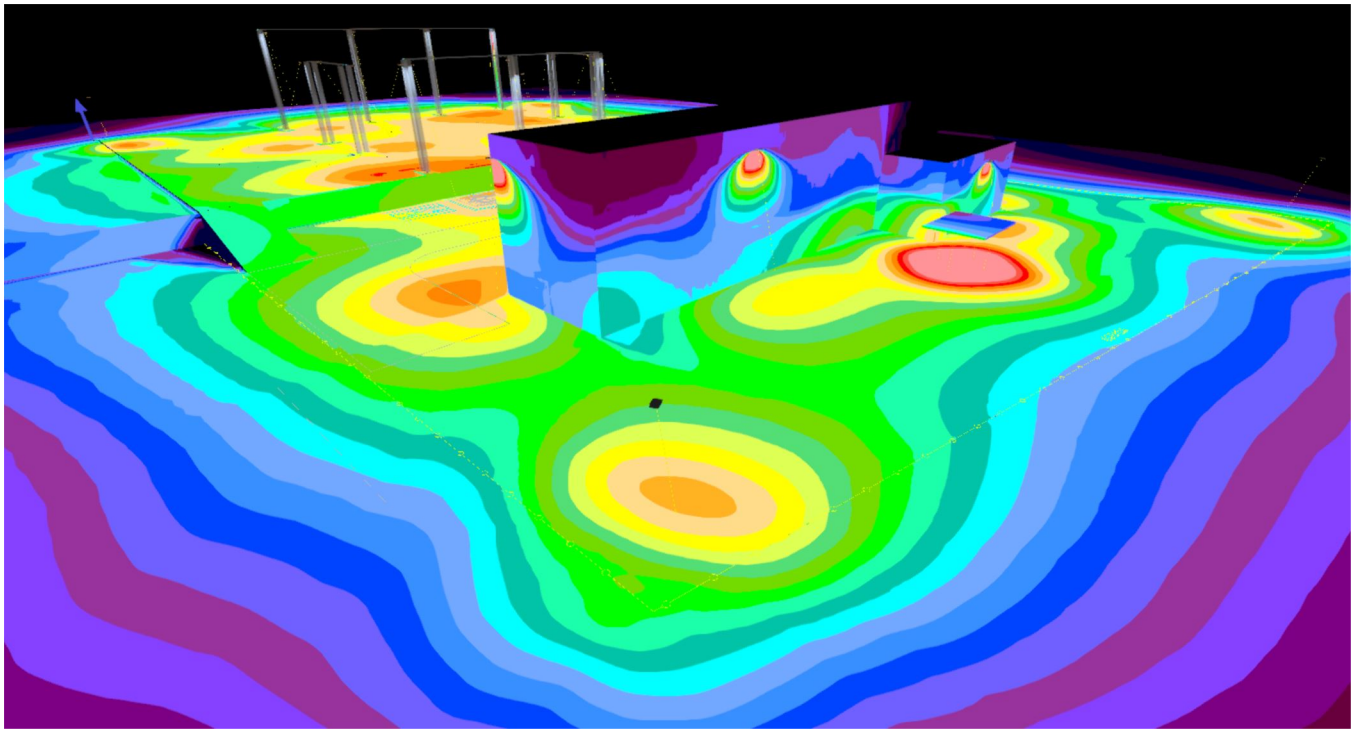
Images



Site 1 (168)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

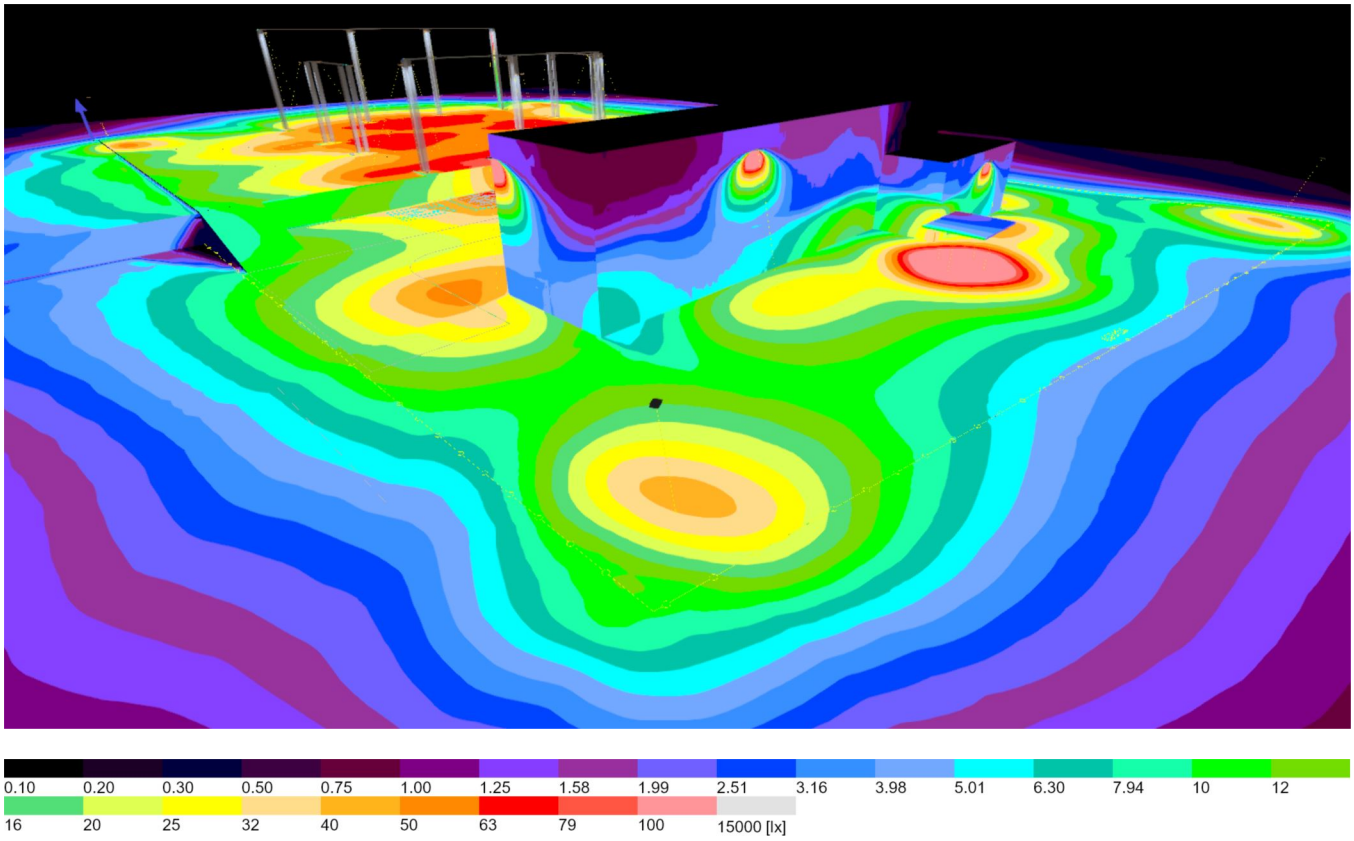
Images



Site 1 (169)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

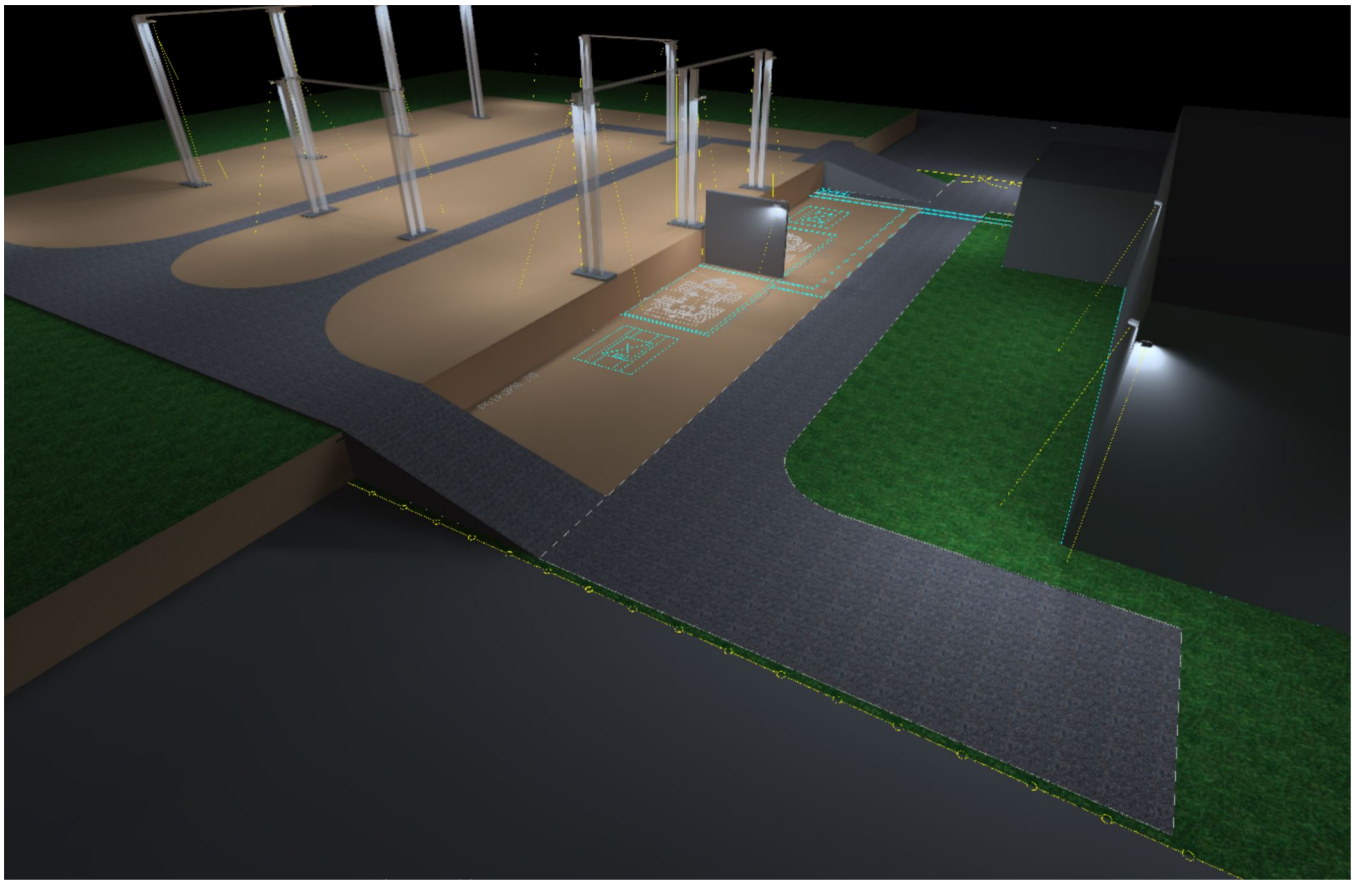
Images



Site 1 (170)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

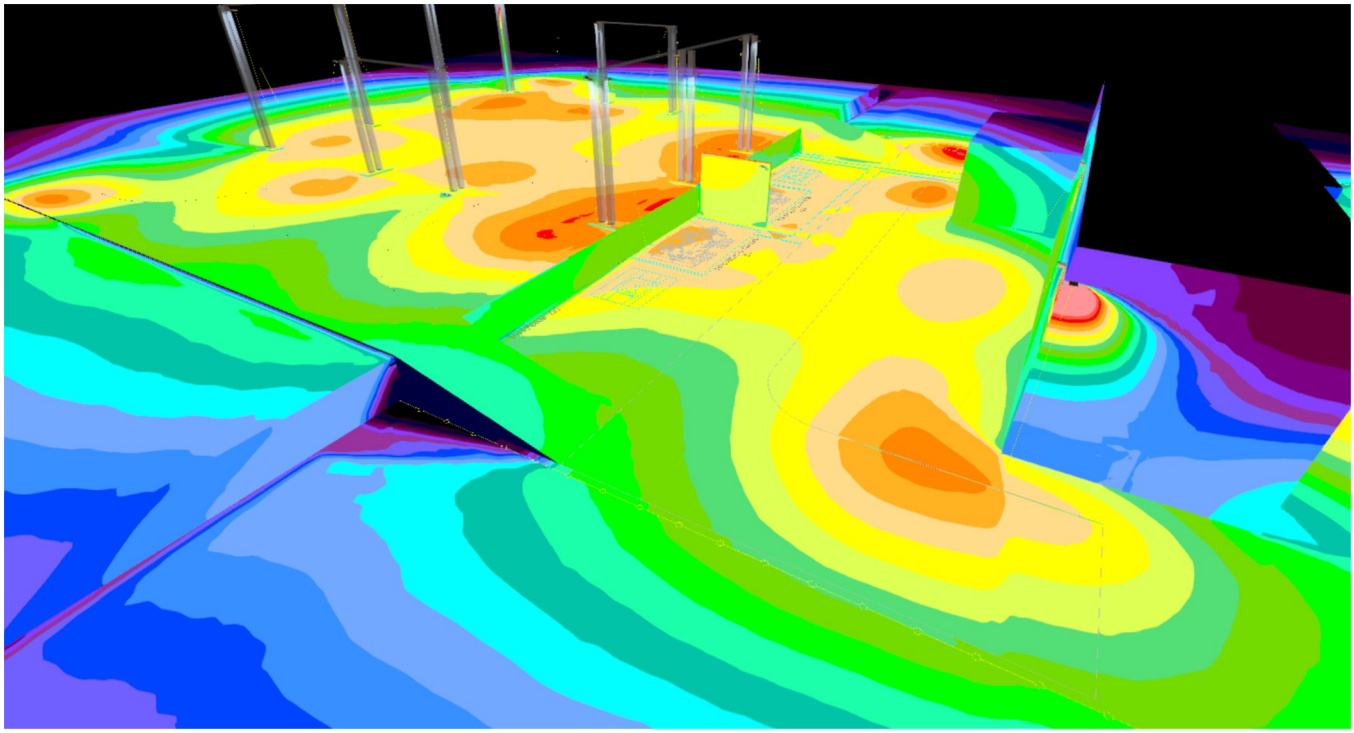
Images



Site 1 (171)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

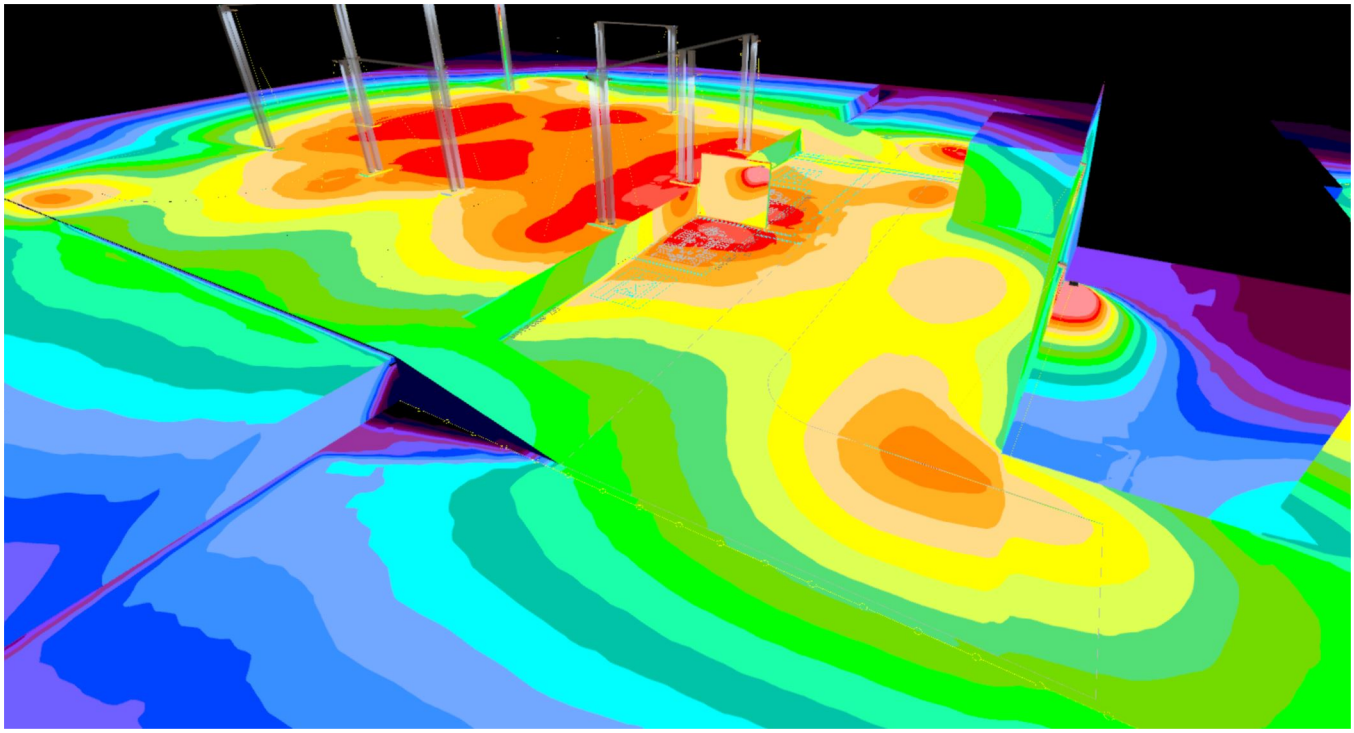
Images



Site 1 (172)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

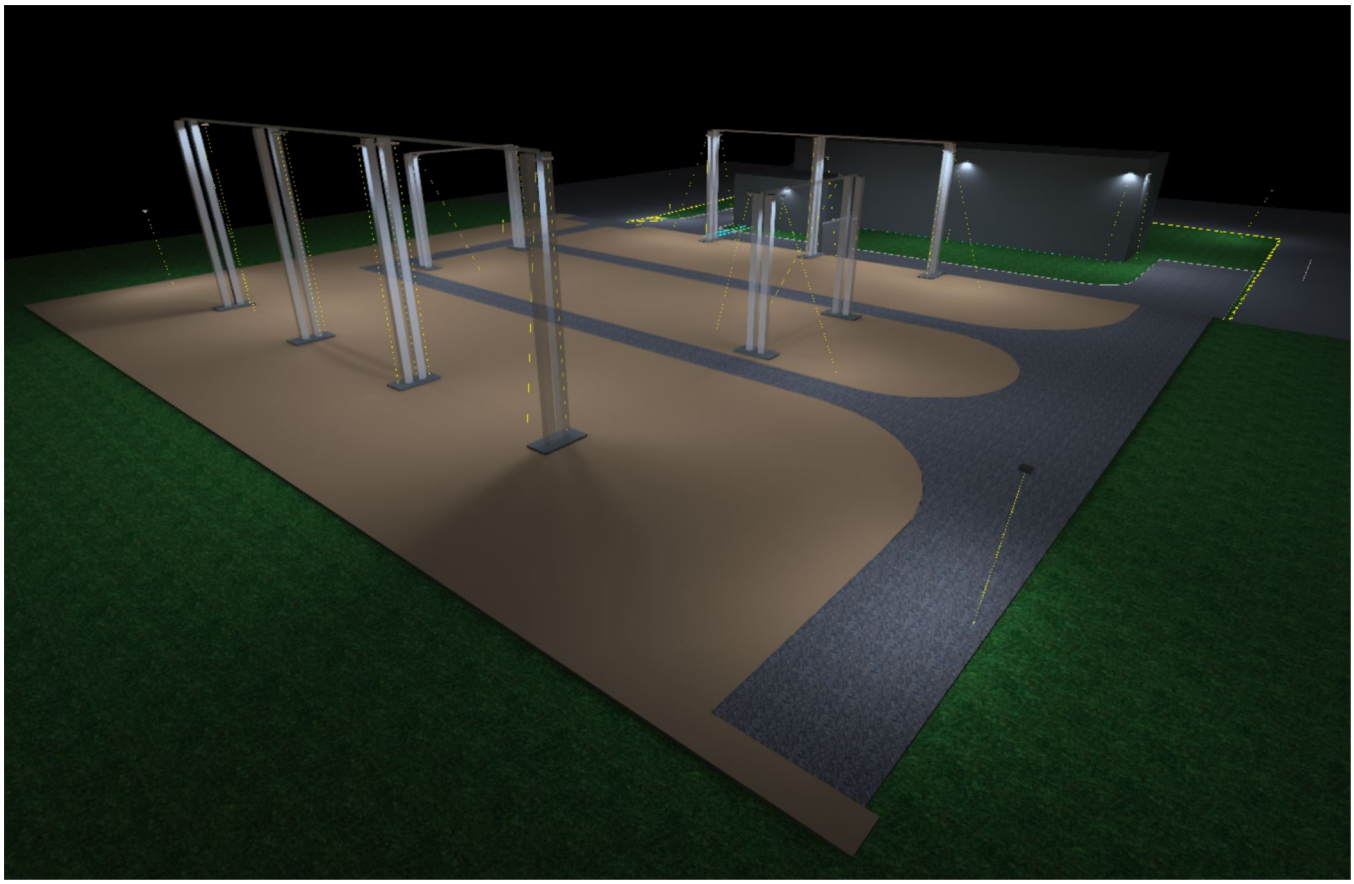
Images



Site 1 (173)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

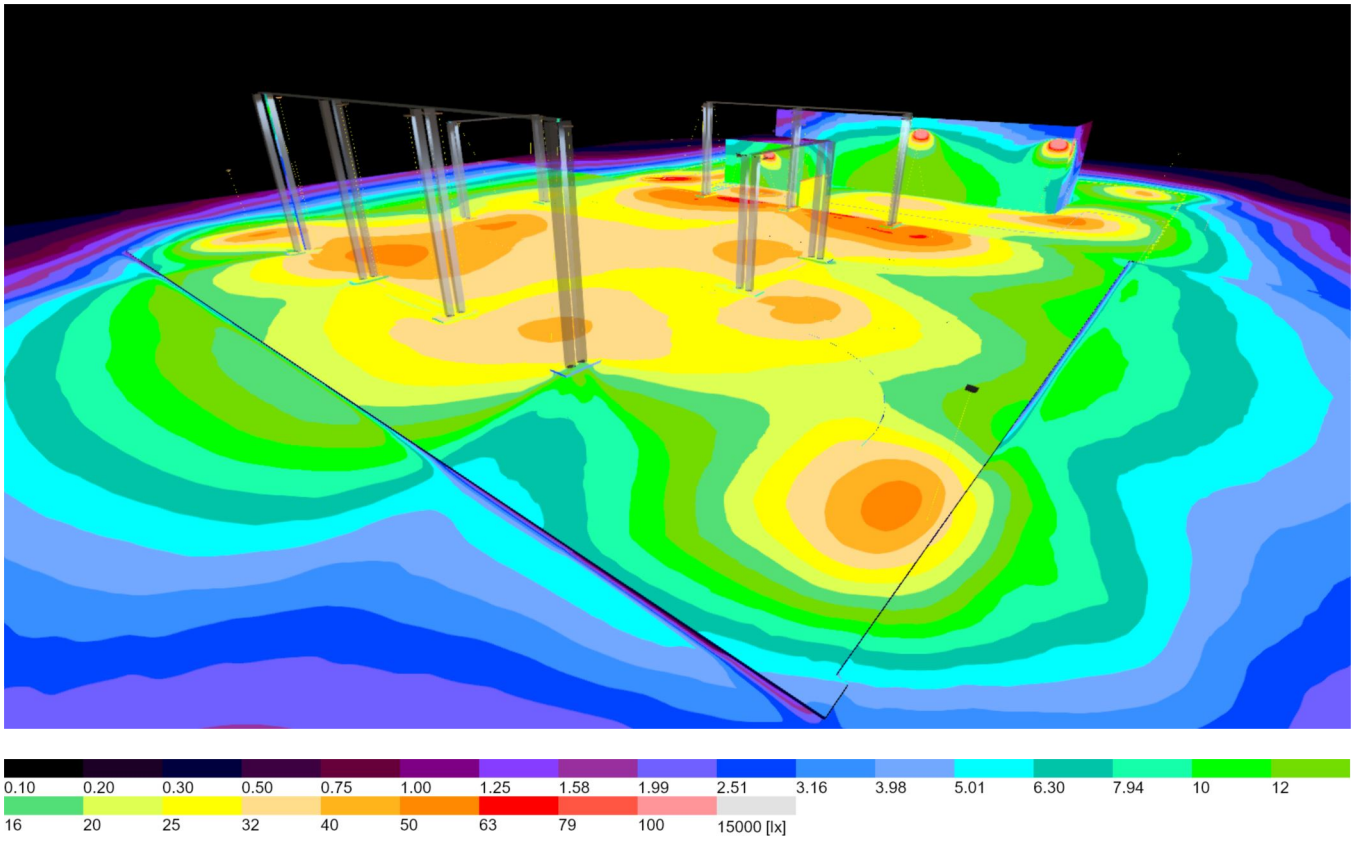
Images



Site 1 (174)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

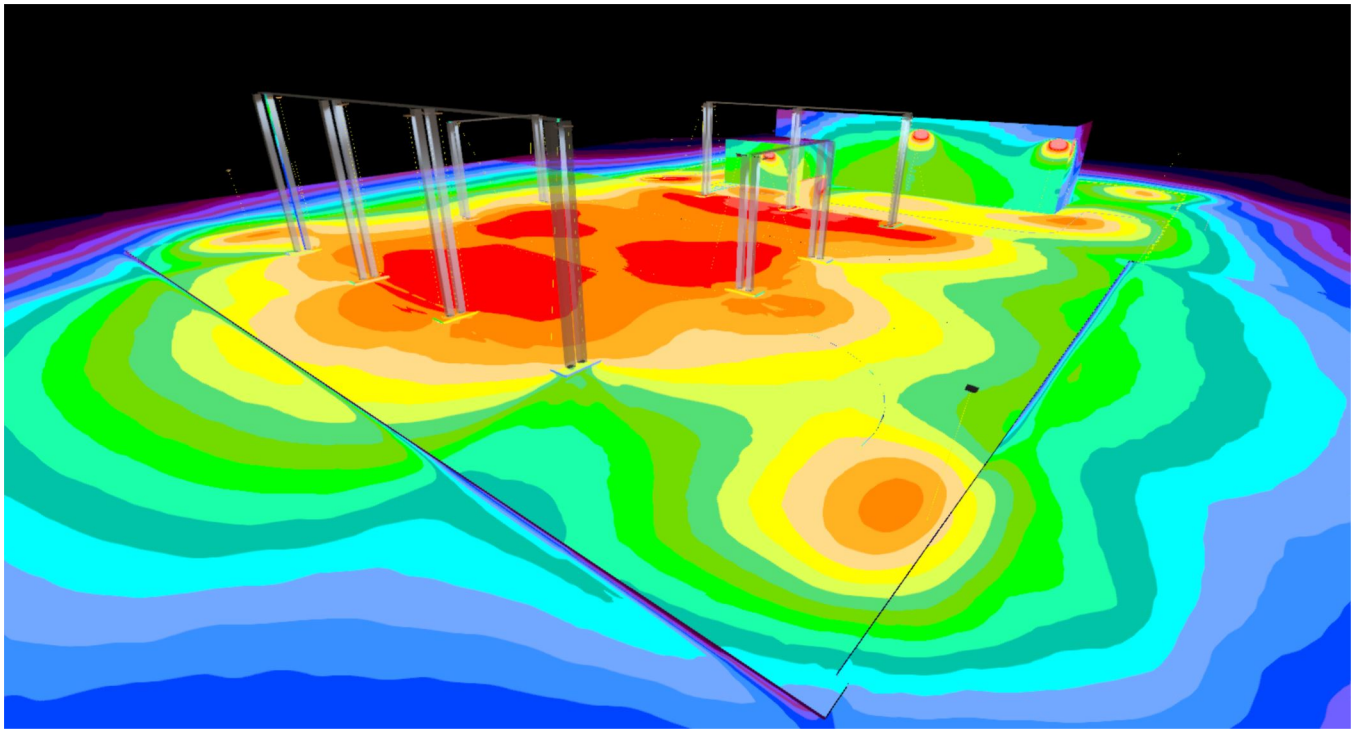
Images



Site 1 (175)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Images



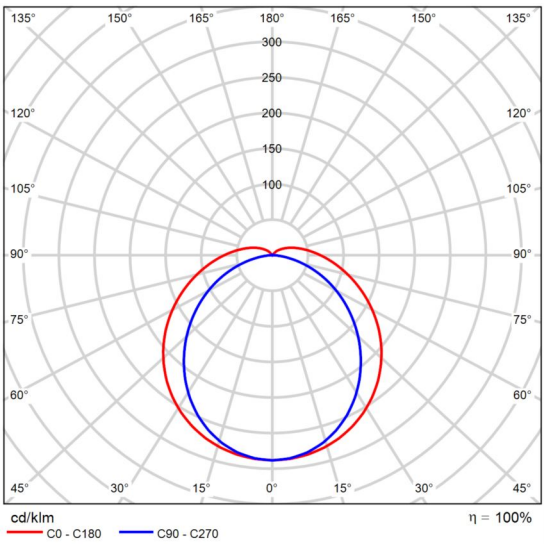
Site 1 (176)

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Product data sheet

LUG Light Factory - ATLANTYK 2.0 BASIC LED ED 2900m/840 PC opal IP65 grafit RAL7024

Article No.	090380.5L10.021
P	18.0 W
Φ_{Lamp}	2900 lm
$\Phi_{Luminaire}$	2900 lm
η	100.00 %
Luminous efficacy	161.1 lm/W
CCT	4000 K
CRI	80

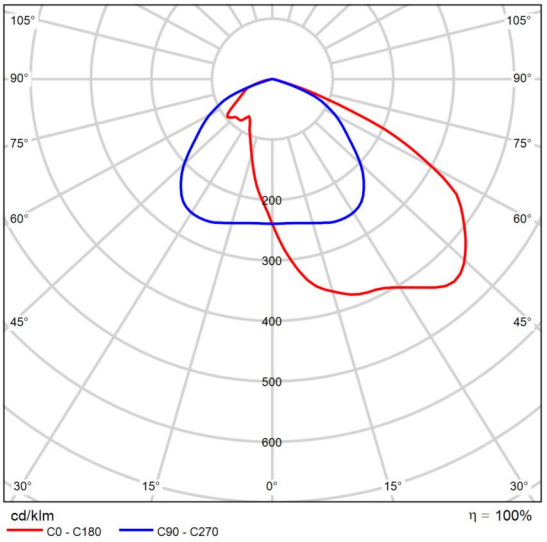


Polar LDC

Product data sheet

LUG Light Factory - POWERLUG MINI LED ED 3600lm/740 IP65 as szeroki szary

Article No.	120212.5L171.41
P	25.0 W
Φ_{Lamp}	3600 lm
$\Phi_{Luminaire}$	3600 lm
η	100.00 %
Luminous efficacy	144.0 lm/W
CCT	4000 K
CRI	70

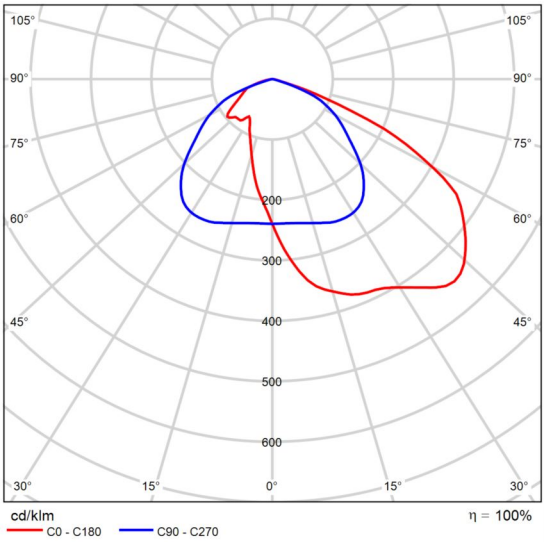


Polar LDC

Product data sheet

LUG Light Factory - POWERLUG MINI LED ED 6000lm/740 IP65 as szeroki szary

Article No.	120212.5L181.41
P	44.0 W
Φ_{Lamp}	6000 lm
$\Phi_{Luminaire}$	6000 lm
η	100.00 %
Luminous efficacy	136.4 lm/W
CCT	4000 K
CRI	70

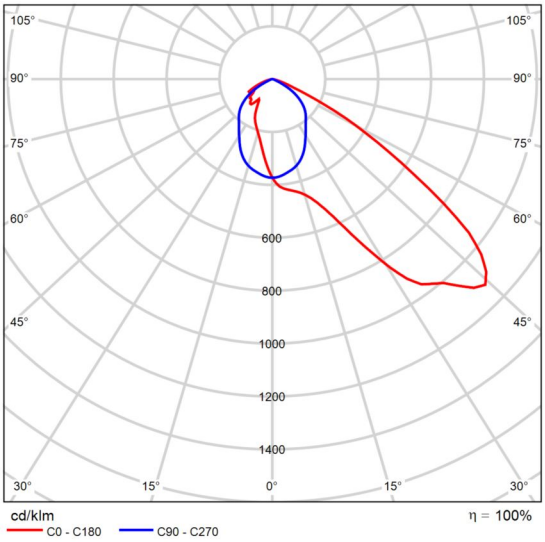


Polar LDC

Product data sheet

LUG Light Factory - POWERLUG MINI LED ED 6300lm/740 IP65 as w[1]ski szary

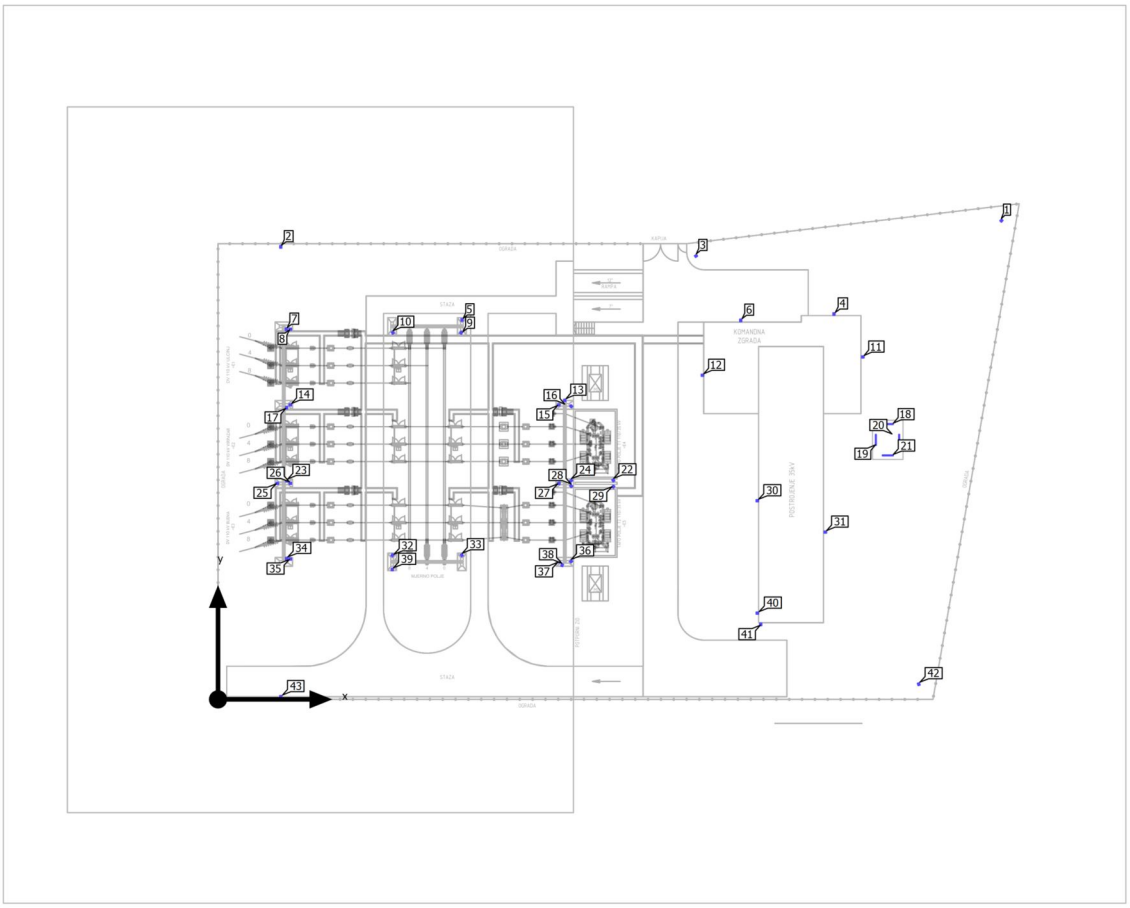
Article No.	120212.5L181.31
P	44.0 W
Φ_{Lamp}	6300 lm
$\Phi_{Luminaire}$	6300 lm
η	100.00 %
Luminous efficacy	143.2 lm/W
CCT	4000 K
CRI	70



Polar LDC

Site 1

Luminaire layout plan



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Site 1

Luminaire layout plan

LUG Light Factory - 090380.5L10.021 - ATLANTYK 2.0 BASIC LED ED 2900m/840 PC opal IP65 grafit RAL7024
1x LED 4000K

X	Y	Mounting height	Housing rotation	MF	Luminaire
76.879 m	31.600 m	2.300 m	0.0° / -0.0° / 90.0°	0.90	18
75.509 m	29.784 m	2.300 m	0.0° / -0.0° / -0.0°	0.90	19
78.184 m	29.784 m	2.300 m	0.0° / -0.0° / -0.0°	0.90	20
76.879 m	28.000 m	2.300 m	0.0° / -0.0° / 90.0°	0.90	21

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Site 1

Luminaire layout plan

LUG Light Factory - 120212.5L171.41 - POWERLUG MINI LED ED 3600lm/740 IP65 as szeroki szary 1x LED 4000K

X	Y	Mounting height	Housing rotation	MF	Luminaire
89.934 m	54.953 m	4.400 m	0.0° / -15.0° / -135.0°	0.90	1
7.200 m	51.943 m	6.400 m	0.0° / -15.0° / -90.0°	0.90	2
70.703 m	44.219 m	4.200 m	0.0° / -15.0° / 90.0°	0.90	4
28.006 m	43.544 m	9.200 m	0.0° / -10.0° / 90.0°	0.90	5
60.000 m	43.491 m	4.200 m	0.0° / -15.0° / 90.0°	0.90	6
74.005 m	39.300 m	4.200 m	0.0° / -15.0° / -0.0°	0.90	11
55.617 m	37.200 m	4.200 m	0.0° / -15.0° / -180.0°	0.90	12
7.867 m	33.476 m	11.500 m	0.0° / -0.0° / -90.0°	0.90	17
45.377 m	25.130 m	4.000 m	-0.0° / -15.0° / 120.0°	0.90	22
7.876 m	25.114 m	11.500 m	0.0° / -0.0° / 90.0°	0.90	23
40.528 m	25.097 m	8.700 m	-0.0° / -10.0° / 45.0°	0.90	24
6.800 m	24.800 m	11.500 m	0.0° / -0.0° / -180.0°	0.90	25
40.528 m	24.485 m	8.700 m	0.0° / -10.0° / -45.0°	0.90	28
45.377 m	24.420 m	4.000 m	-0.0° / -15.0° / -120.0°	0.90	29
80.436 m	1.737 m	4.400 m	-0.0° / -15.0° / 110.0°	0.90	42
7.200 m	0.300 m	6.400 m	0.0° / -5.0° / 90.0°	0.90	43

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1

Luminaire layout plan

LUG Light Factory - 120212.5L181.31 - POWERLUG MINI LED ED 6300lm/740 IP65 as w¹ski szary 1x LED 4000K

X	Y	Mounting height	Housing rotation	MF	Luminaire
27.915 m	42.099 m	9.200 m	0.0° / -25.0° / -120.0°	0.90	9
20.050 m	42.099 m	9.200 m	-0.0° / -25.0° / -60.0°	0.90	10
39.807 m	34.302 m	9.700 m	-0.0° / -25.0° / 90.0°	0.90	13
20.004 m	16.532 m	9.200 m	0.0° / -25.0° / 60.0°	0.90	32
27.989 m	16.532 m	9.200 m	0.0° / -25.0° / 120.0°	0.90	33
39.500 m	15.417 m	9.700 m	-0.0° / -25.0° / -110.0°	0.90	38
20.000 m	14.922 m	9.200 m	-0.0° / -25.0° / -90.0°	0.90	39

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1

Luminaire layout plan

LUG Light Factory - 120212.5L181.41 - POWERLUG MINI LED ED 6000lm/740 IP65 as szeroki szary 1x LED 4000K

X	Y	Mounting height	Housing rotation	MF	Luminaire
54.872 m	50.900 m	4.400 m	0.0° / -15.0° / -145.0°	0.90	3
7.844 m	42.486 m	11.500 m	0.0° / -10.0° / -90.0°	0.90	7
8.300 m	42.484 m	11.500 m	0.0° / -0.0° / -0.0°	0.90	8
8.300 m	33.800 m	11.500 m	0.0° / -0.0° / -0.0°	0.90	14
39.105 m	33.800 m	9.700 m	0.0° / -0.0° / -180.0°	0.90	15
40.528 m	33.652 m	9.700 m	-0.0° / -10.0° / -45.0°	0.90	16
8.300 m	24.800 m	11.500 m	0.0° / -0.0° / -0.0°	0.90	26
39.109 m	24.792 m	9.700 m	0.0° / -0.0° / -180.0°	0.90	27
61.919 m	22.800 m	6.900 m	0.0° / -15.0° / -180.0°	0.90	30
69.703 m	19.200 m	6.900 m	0.0° / -15.0° / -0.0°	0.90	31
7.876 m	16.154 m	11.500 m	-0.0° / -10.0° / 90.0°	0.90	34
8.300 m	16.107 m	11.500 m	0.0° / -0.0° / -0.0°	0.90	35
40.528 m	15.833 m	9.700 m	-0.0° / -10.0° / 45.0°	0.90	36
39.105 m	15.785 m	9.700 m	0.0° / -0.0° / -180.0°	0.90	37
61.919 m	9.900 m	6.900 m	0.0° / -15.0° / -180.0°	0.90	40
62.300 m	8.606 m	6.900 m	0.0° / -5.0° / -90.0°	0.90	41

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1

Luminaire list

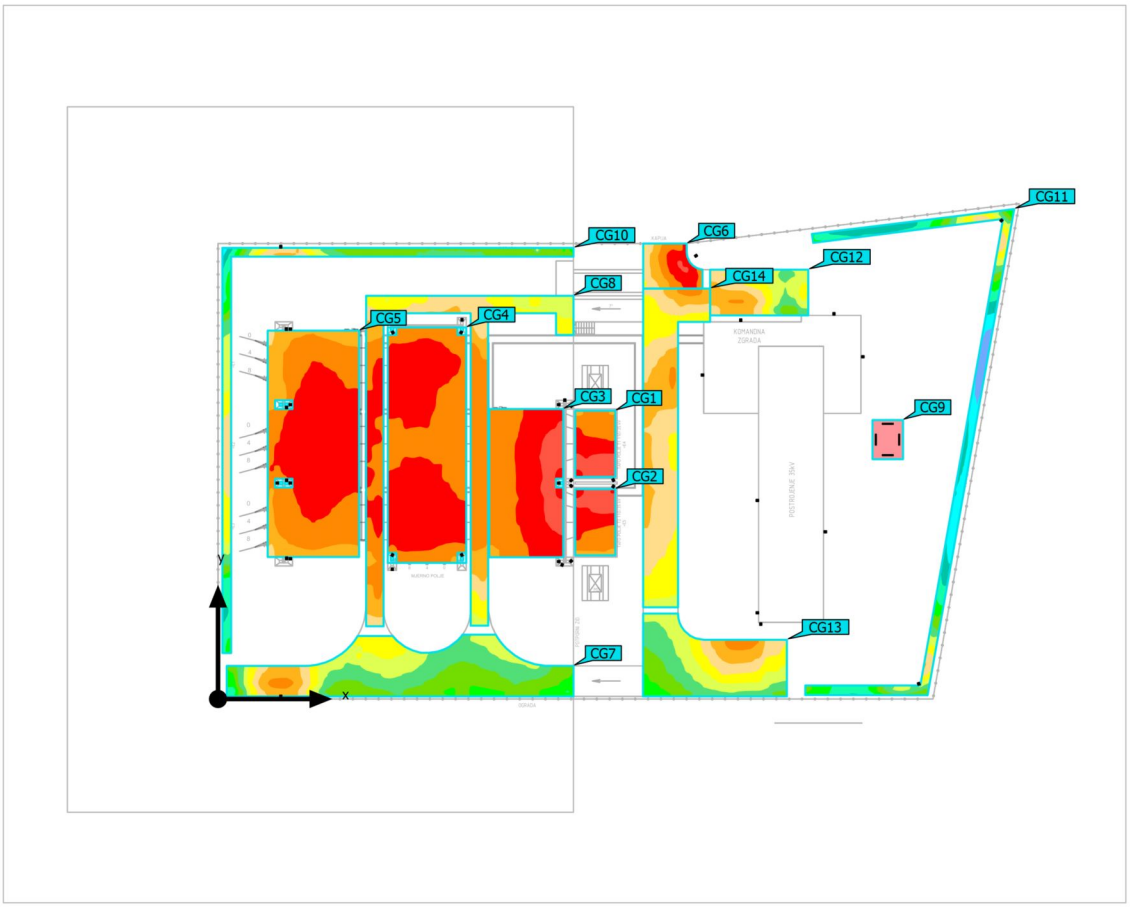
Φ_{total}	P_{total}	Luminous efficacy
209300 lm	1484.0 W	141.0 lm/W

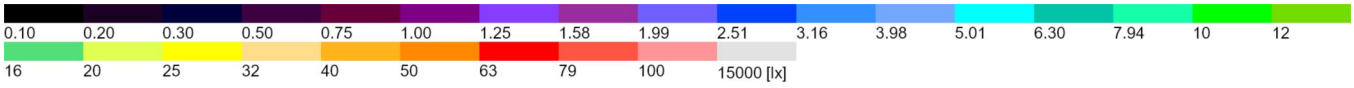
pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
4	LUG Light Factory	090380.5L 10.021	ATLANTYK 2.0 BASIC LED ED 2900m/840 PC opal IP65 grafit RAL7024	18.0 W	2900 lm	161.1 lm/W
16	LUG Light Factory	120212.5L 171.41	POWERLUG MINI LED ED 3600lm/740 IP65 as szeroki szary	25.0 W	3600 lm	144.0 lm/W
7	LUG Light Factory	120212.5L 181.31	POWERLUG MINI LED ED 6300lm/740 IP65 as w¹ski szary	44.0 W	6300 lm	143.2 lm/W
16	LUG Light Factory	120212.5L 181.41	POWERLUG MINI LED ED 6000lm/740 IP65 as szeroki szary	44.0 W	6000 lm	136.4 lm/W

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Site 1 (SCENA 1 - ZONA 2 (FULL))

Calculation objects





The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

Calculation objects

Calculation surfaces

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 1 - ETR 1 Perpendicular illuminance Height: 0.020 m	69.8 lx	48.7 lx	95.1 lx	0.70	0.51	CG1
CS 2 - ETR 2 Perpendicular illuminance Height: 0.020 m	68.9 lx	48.5 lx	94.7 lx	0.70	0.51	CG2
CS 3 - RP 110kV Perpendicular illuminance Height: 2.020 m	68.0 lx	48.8 lx	93.1 lx	0.72	0.52	CG3
CS 4 - RP 110kV Perpendicular illuminance Height: 2.020 m	64.0 lx	47.3 lx	76.3 lx	0.74	0.62	CG4
CS 5 - RP 110kV Perpendicular illuminance Height: 2.020 m	60.9 lx	37.5 lx	78.0 lx	0.62	0.48	CG5
CS 6 - Ulaz (kapija) Perpendicular illuminance Height: 0.020 m	55.5 lx	30.9 lx	81.0 lx	0.56	0.38	CG6
CS 7 - Koridor Perpendicular illuminance Height: 2.020 m	20.6 lx	8.81 lx	55.4 lx	0.43	0.16	CG7
CS 8 - Koridor RP 110kV Perpendicular illuminance Height: 2.020 m	46.5 lx	21.3 lx	71.6 lx	0.46	0.30	CG8
CS 9 - DEA Perpendicular illuminance Height: 0.020 m	230 lx	138 lx	285 lx	0.60	0.48	CG9
CS 10 - Perimetar 1 Perpendicular illuminance Height: 2.020 m	19.6 lx	5.43 lx	42.4 lx	0.28	0.13	CG10
CS 11 - Perimetar 2 Perpendicular illuminance Height: 0.020 m	12.2 lx	4.05 lx	40.7 lx	0.33	0.100	CG11

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

Calculation objects

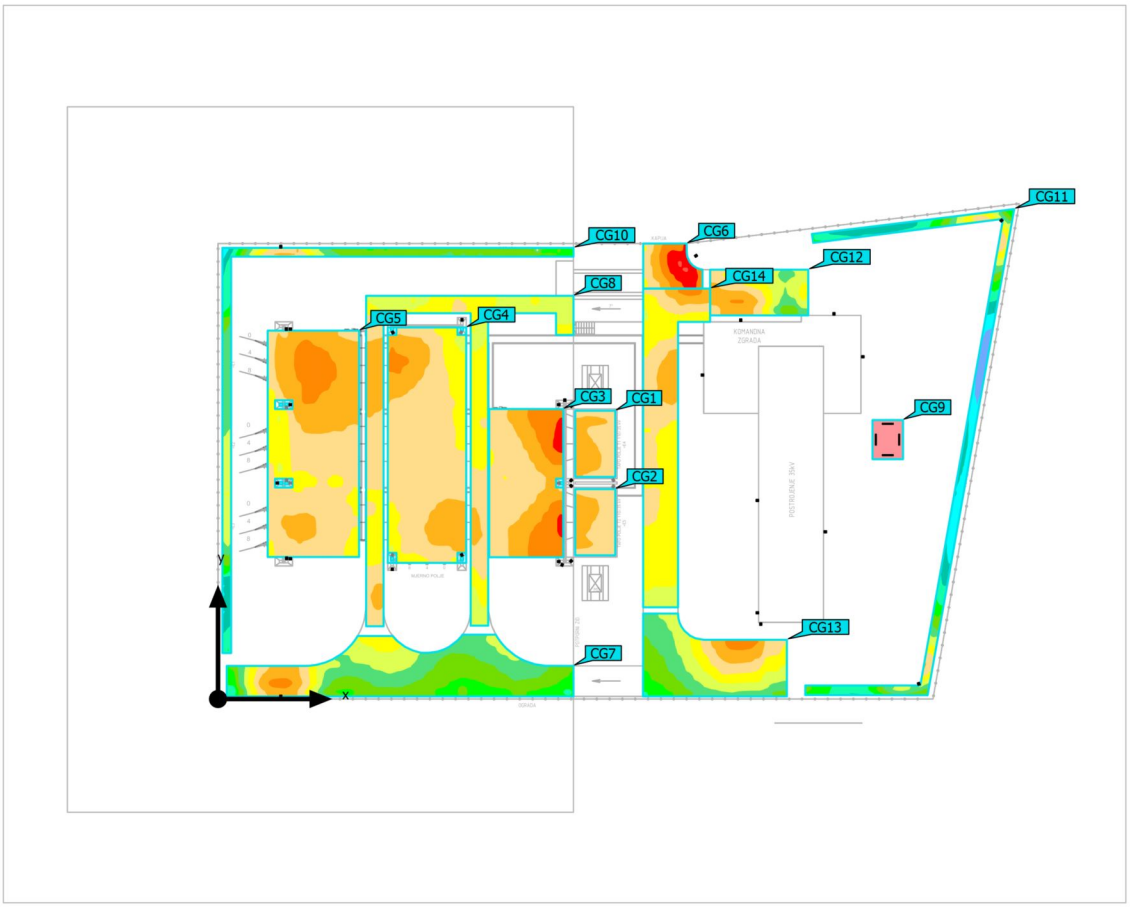
CS 12 - Plato ispred objekta Perpendicular illuminance Height: 0.020 m	30.6 lx	13.8 lx	50.7 lx	0.45	0.27	CG12
CS 13 - Plato iza objekta Perpendicular illuminance Height: 0.020 m	24.8 lx	10.3 lx	55.3 lx	0.42	0.19	CG13
CS 14 - Centralni koridor Perpendicular illuminance Height: 0.020 m	35.8 lx	23.6 lx	56.7 lx	0.66	0.42	CG14

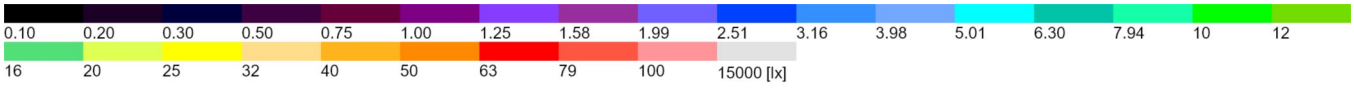
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

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Site 1 (SCENA 2 - ZONA 1 (LOW))

Calculation objects





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Site 1 (SCENA 2 - ZONA 1 (LOW))

Calculation objects

Calculation surfaces

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 1 - ETR 1 Perpendicular illuminance Height: 0.020 m	40.1 lx	35.7 lx	46.8 lx	0.89	0.76	CG1
CS 2 - ETR 2 Perpendicular illuminance Height: 0.020 m	39.0 lx	33.4 lx	45.8 lx	0.86	0.73	CG2
CS 3 - RP 110kV Perpendicular illuminance Height: 2.020 m	43.8 lx	31.2 lx	70.9 lx	0.71	0.44	CG3
CS 4 - RP 110kV Perpendicular illuminance Height: 2.020 m	36.4 lx	22.7 lx	52.8 lx	0.62	0.43	CG4
CS 5 - RP 110kV Perpendicular illuminance Height: 2.020 m	39.0 lx	24.1 lx	55.5 lx	0.62	0.43	CG5
CS 6 - Ulaz (kapija) Perpendicular illuminance Height: 0.020 m	54.8 lx	29.8 lx	80.4 lx	0.54	0.37	CG6
CS 7 - Koridor Perpendicular illuminance Height: 2.020 m	19.6 lx	8.33 lx	54.9 lx	0.43	0.15	CG7
CS 8 - Koridor RP 110kV Perpendicular illuminance Height: 2.020 m	31.3 lx	20.0 lx	49.8 lx	0.64	0.40	CG8
CS 9 - DEA Perpendicular illuminance Height: 0.020 m	230 lx	138 lx	285 lx	0.60	0.48	CG9
CS 10 - Perimetar 1 Perpendicular illuminance Height: 2.020 m	16.4 lx	5.04 lx	42.0 lx	0.31	0.12	CG10
CS 11 - Perimetar 2 Perpendicular illuminance Height: 0.020 m	12.2 lx	4.05 lx	40.7 lx	0.33	0.100	CG11

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

Calculation objects

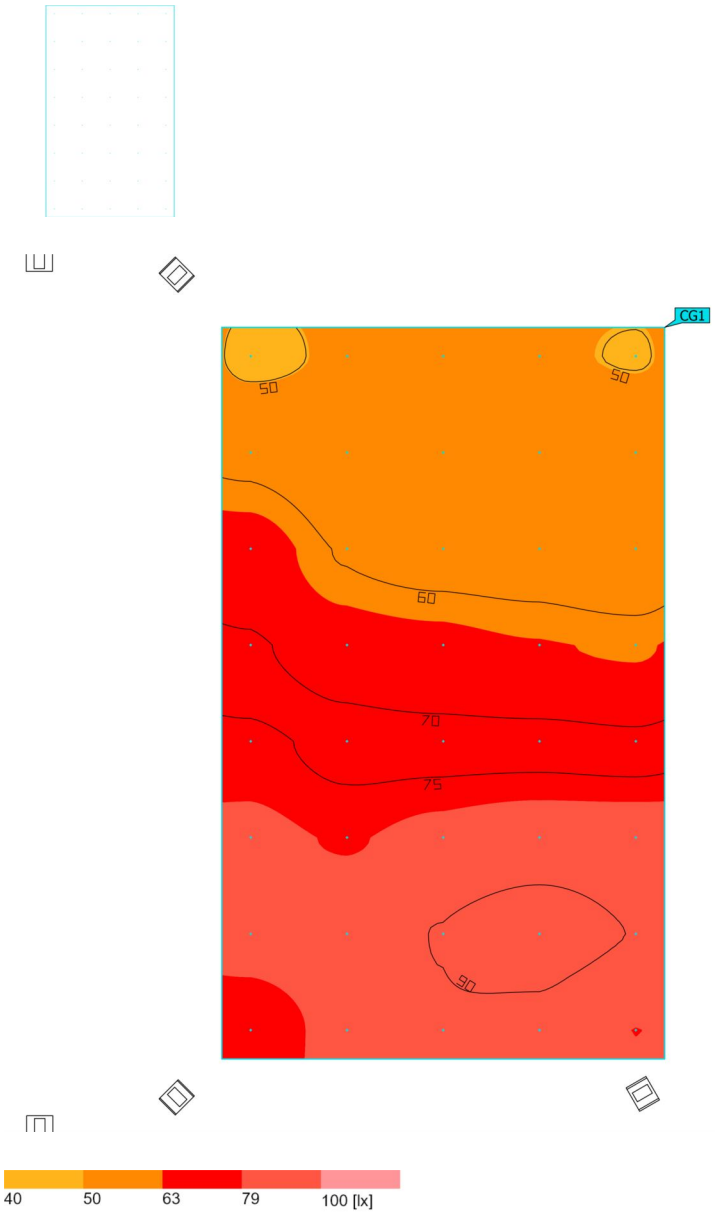
CS 12 - Plato ispred objekta Perpendicular illuminance Height: 0.020 m	30.4 lx	13.8 lx	50.7 lx	0.45	0.27	CG12
CS 13 - Plato iza objekta Perpendicular illuminance Height: 0.020 m	24.4 lx	9.84 lx	55.2 lx	0.40	0.18	CG13
CS 14 - Centralni koridor Perpendicular illuminance Height: 0.020 m	32.6 lx	21.5 lx	56.2 lx	0.66	0.38	CG14

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 1 - ETR 1



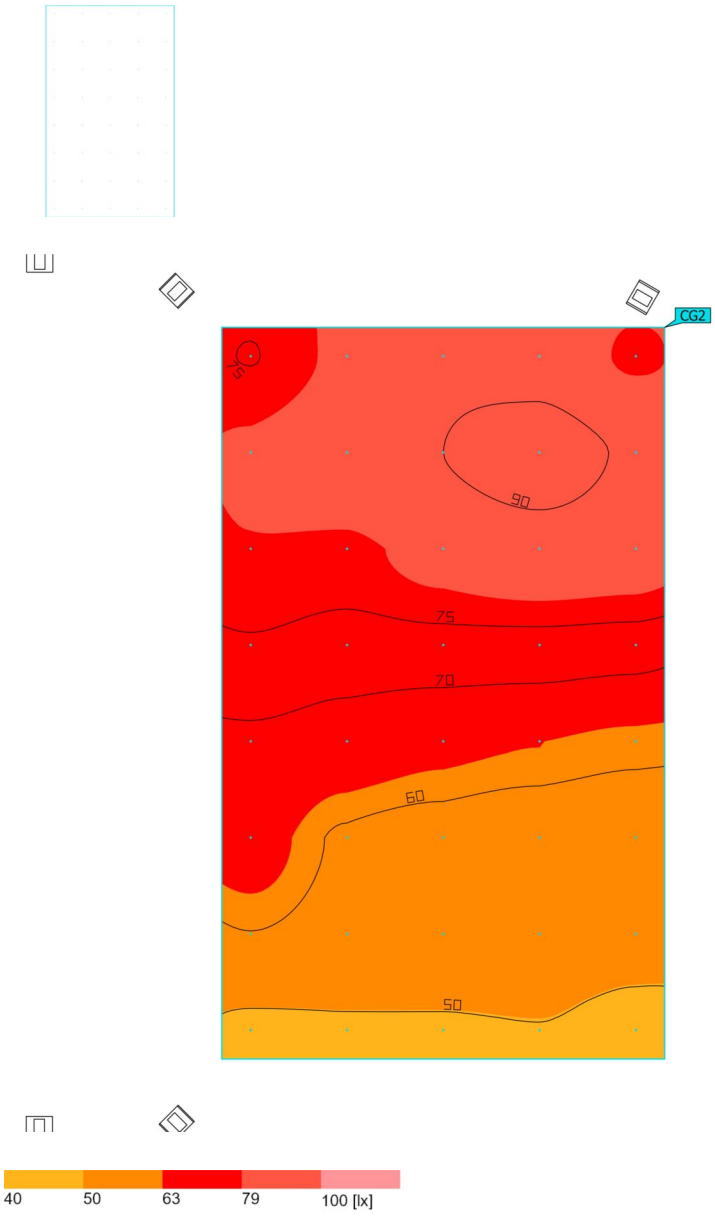
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 1 - ETR 1 Perpendicular illuminance Height: 0.020 m	69.8 lx	48.7 lx	95.1 lx	0.70	0.51	CG1

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 2 - ETR 2



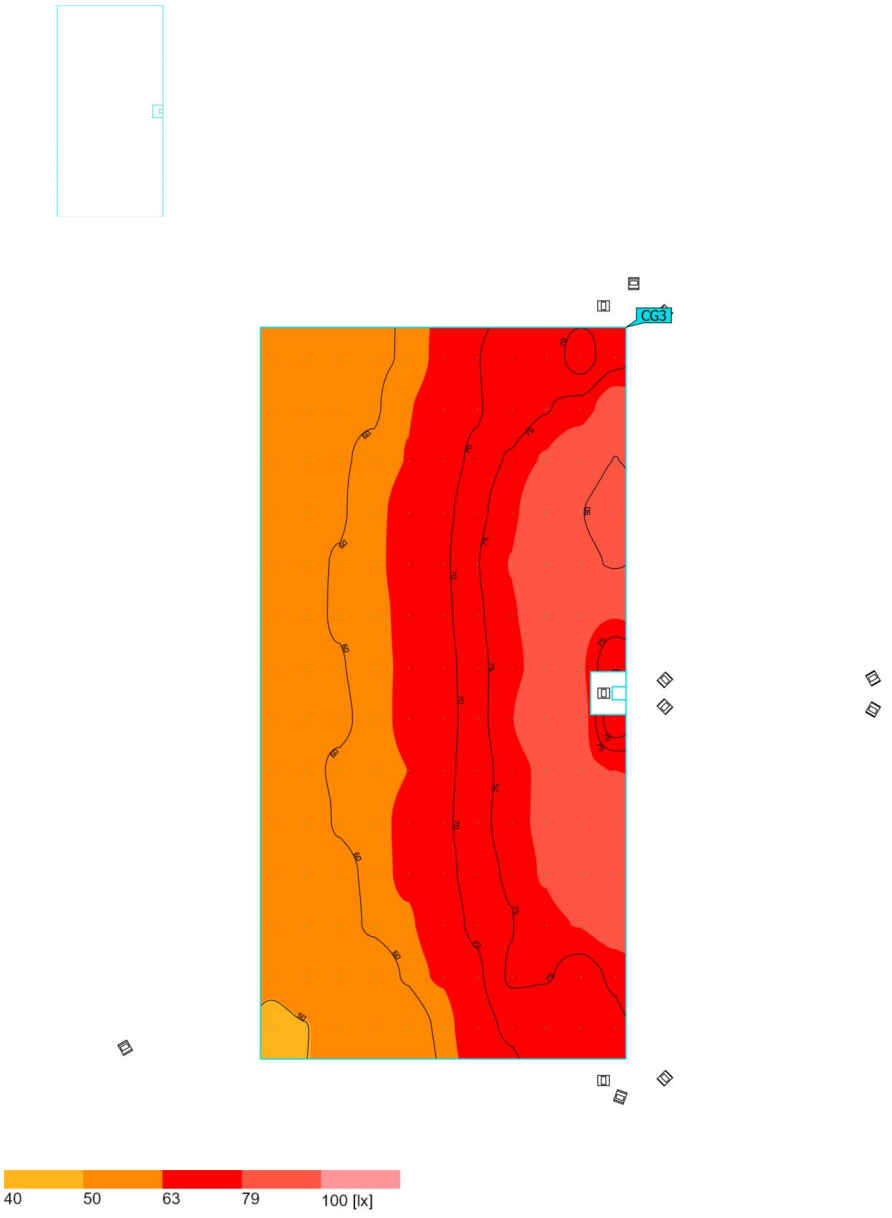
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 2 - ETR 2 Perpendicular illuminance Height: 0.020 m	68.9 lx	48.5 lx	94.7 lx	0.70	0.51	CG2

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 3 - RP 110kV



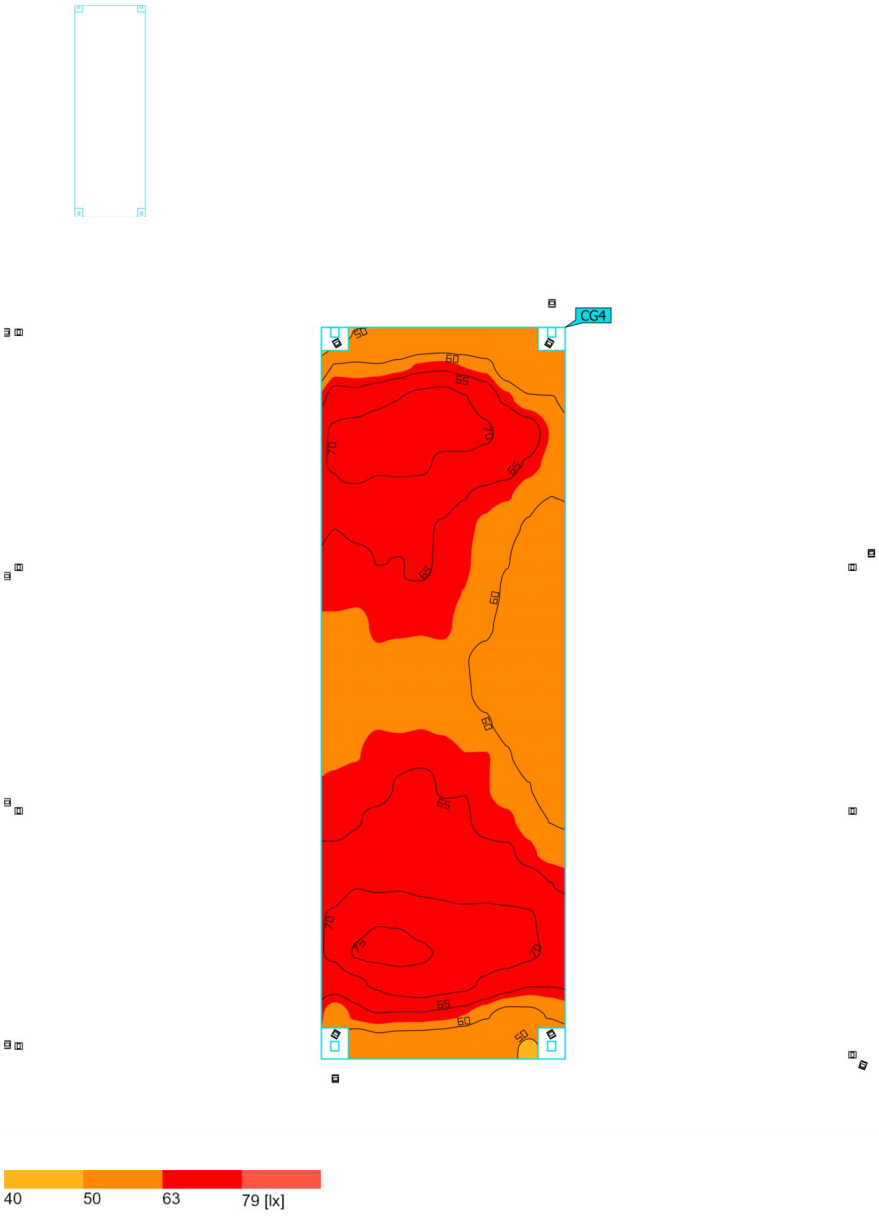
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 3 - RP 110kV Perpendicular illuminance Height: 2.020 m	68.0 lx	48.8 lx	93.1 lx	0.72	0.52	CG3

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 4 - RP 110kV



Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 4 - RP 110kV Perpendicular illuminance Height: 2.020 m	64.0 lx	47.3 lx	76.3 lx	0.74	0.62	CG4

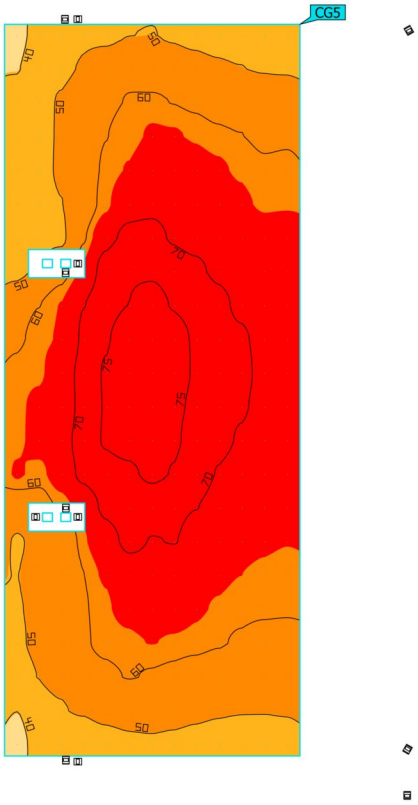
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 5 - RP 110kV





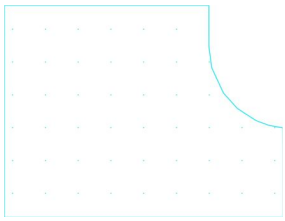
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 5 - RP 110kV Perpendicular illuminance Height: 2.020 m	60.9 lx	37.5 lx	78.0 lx	0.62	0.48	CG5

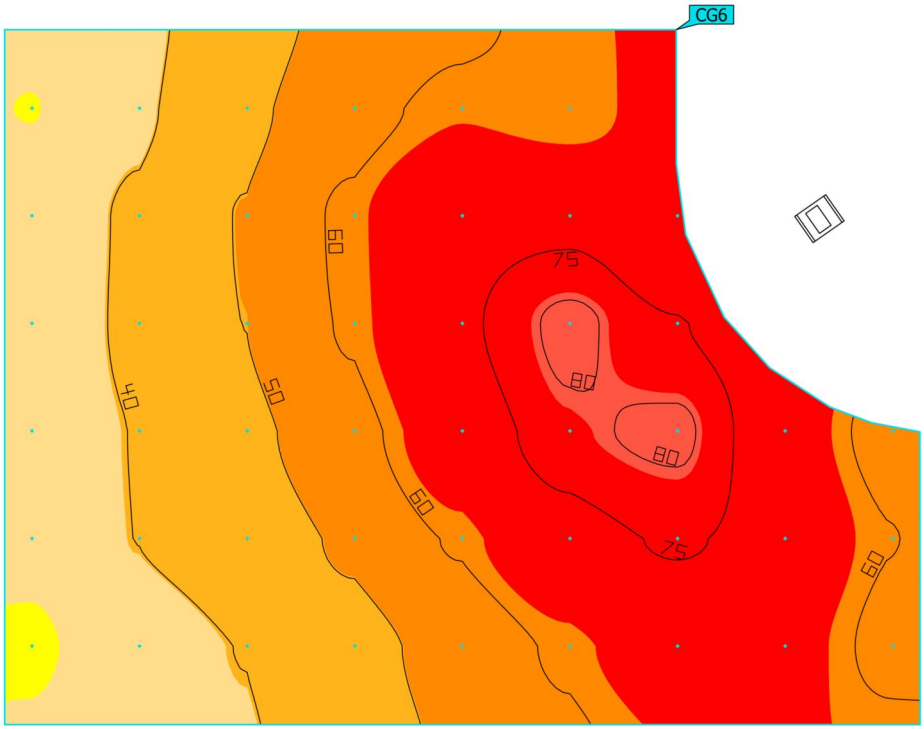
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 6 - Ulaz (kapija)







Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 6 - Ulaz (kapija) Perpendicular illuminance Height: 0.020 m	55.5 lx	30.9 lx	81.0 lx	0.56	0.38	CG6

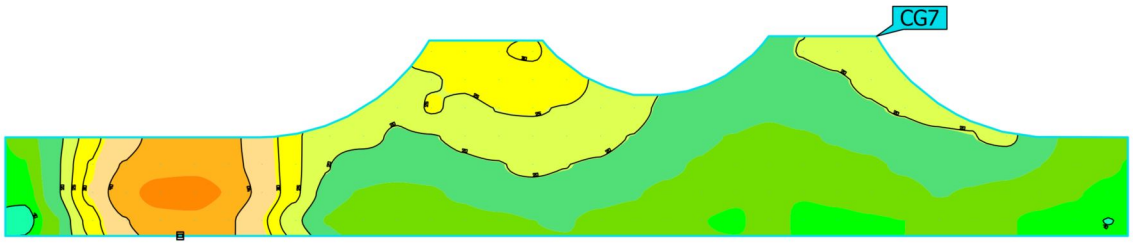
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

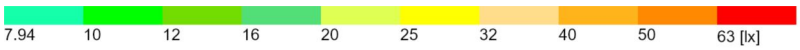
The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 7 - Koridor







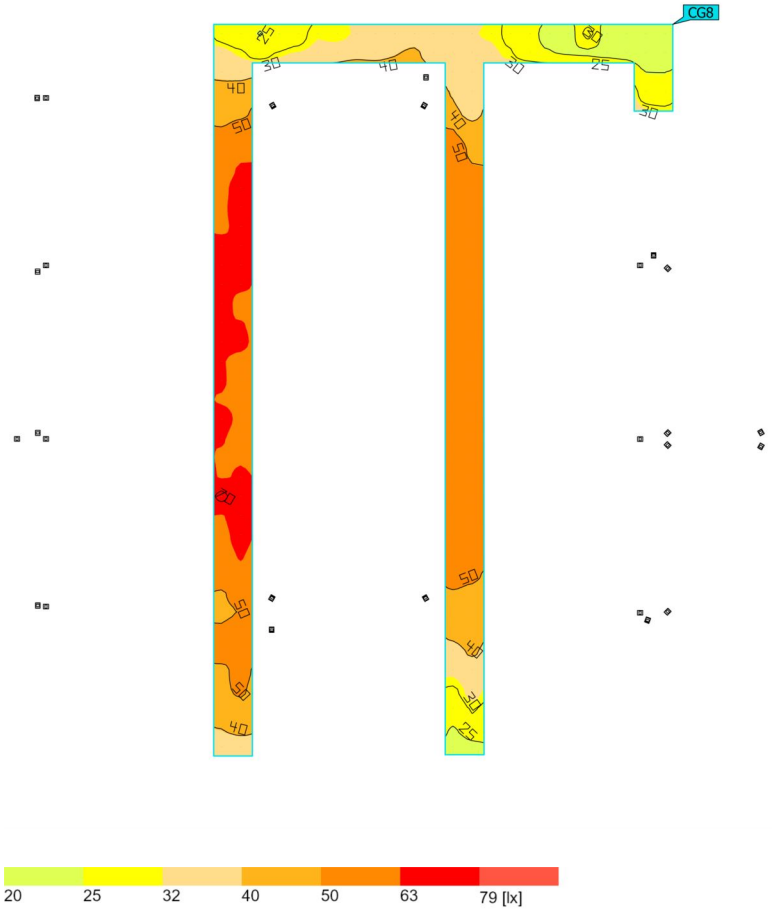
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 7 - Koridor Perpendicular illuminance Height: 2.020 m	20.6 lx	8.81 lx	55.4 lx	0.43	0.16	CG7

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 8 - Koridor RP 110kV



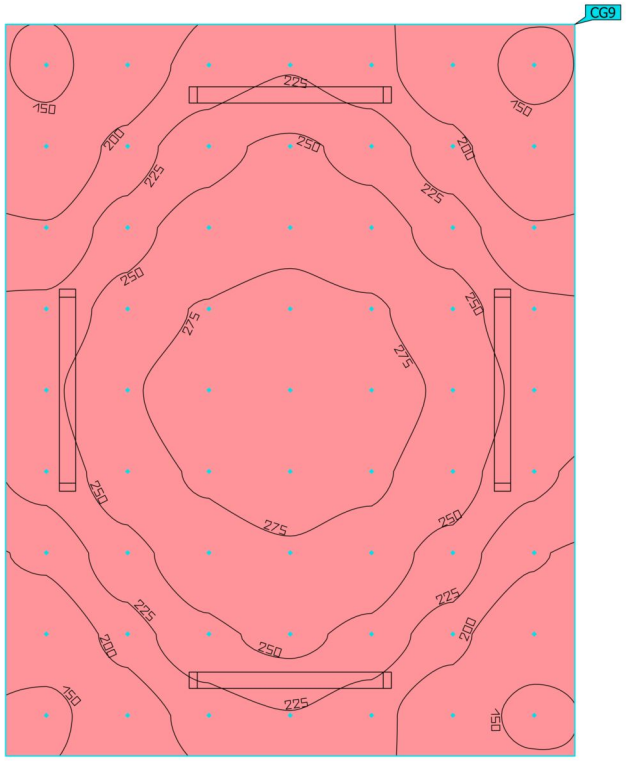
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 8 - Koridor RP 110kV Perpendicular illuminance Height: 2.020 m	46.5 lx	21.3 lx	71.6 lx	0.46	0.30	CG8

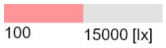
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 9 - DEA





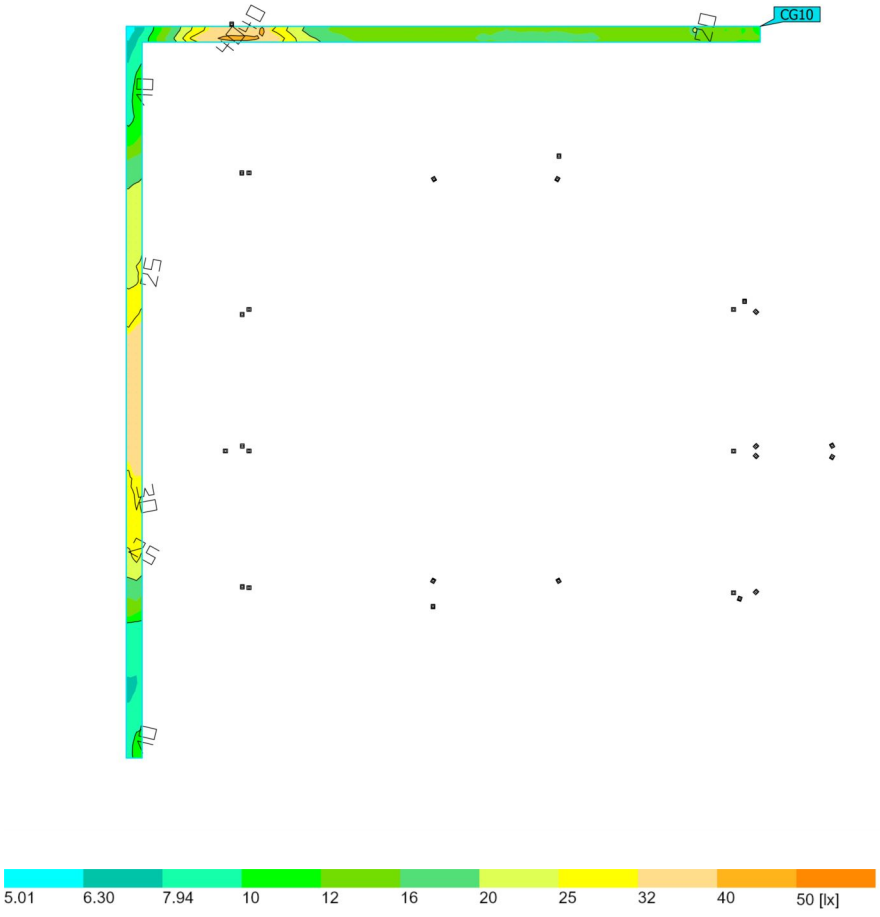
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 9 - DEA Perpendicular illuminance Height: 0.020 m	230 lx	138 lx	285 lx	0.60	0.48	CG9

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 10 - Perimetar 1



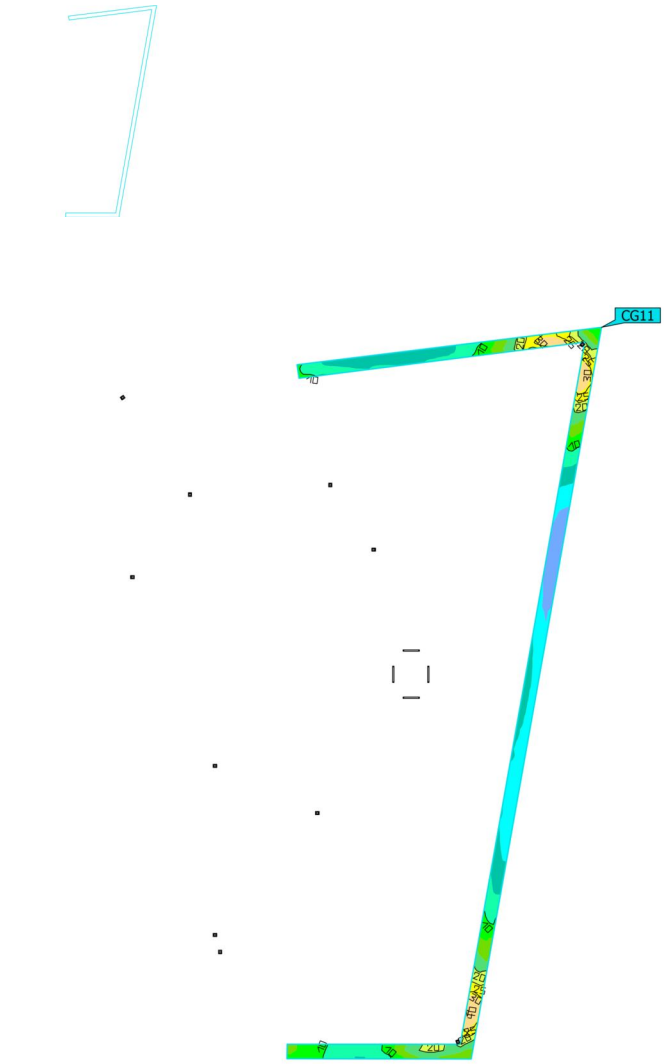
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 10 - Perimetar 1 Perpendicular illuminance Height: 2.020 m	19.6 lx	5.43 lx	42.4 lx	0.28	0.13	CG10

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 11 - Perimetar 2



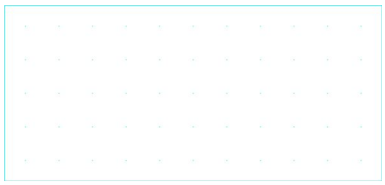
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 11 - Perimetar 2 Perpendicular illuminance Height: 0.020 m	12.2 lx	4.05 lx	40.7 lx	0.33	0.100	CG11

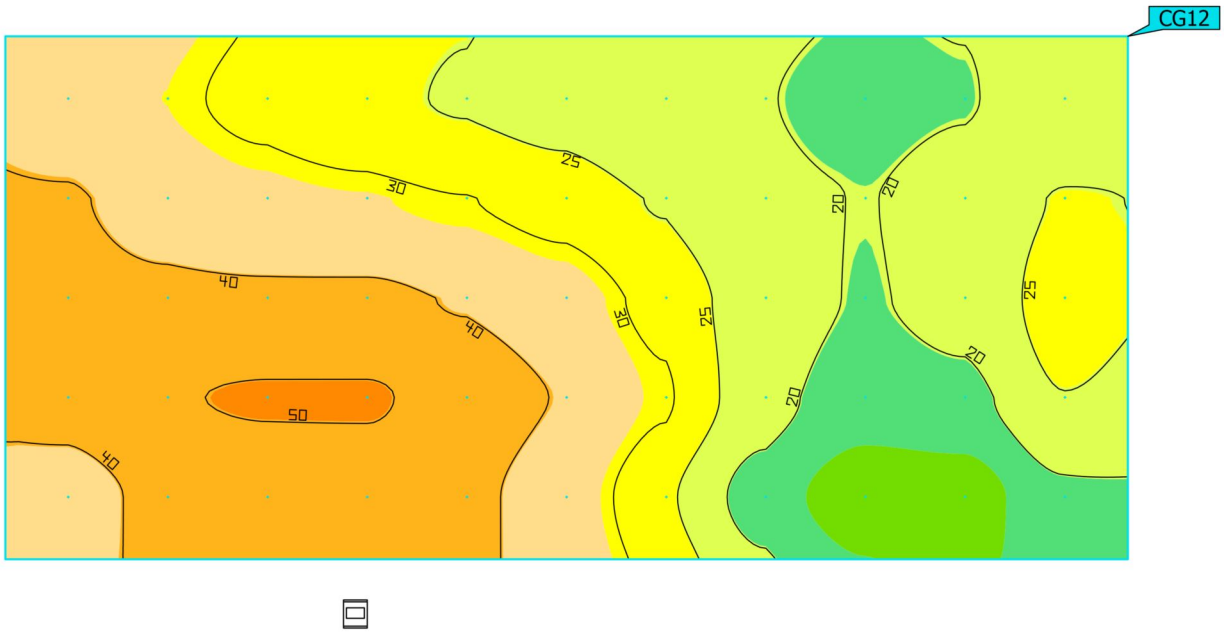
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

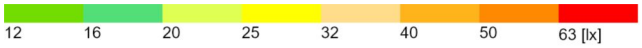
The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 12 - Plato ispred objekta







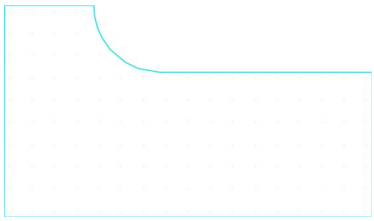
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 12 - Plato ispred objekta Perpendicular illuminance Height: 0.020 m	30.6 lx	13.8 lx	50.7 lx	0.45	0.27	CG12

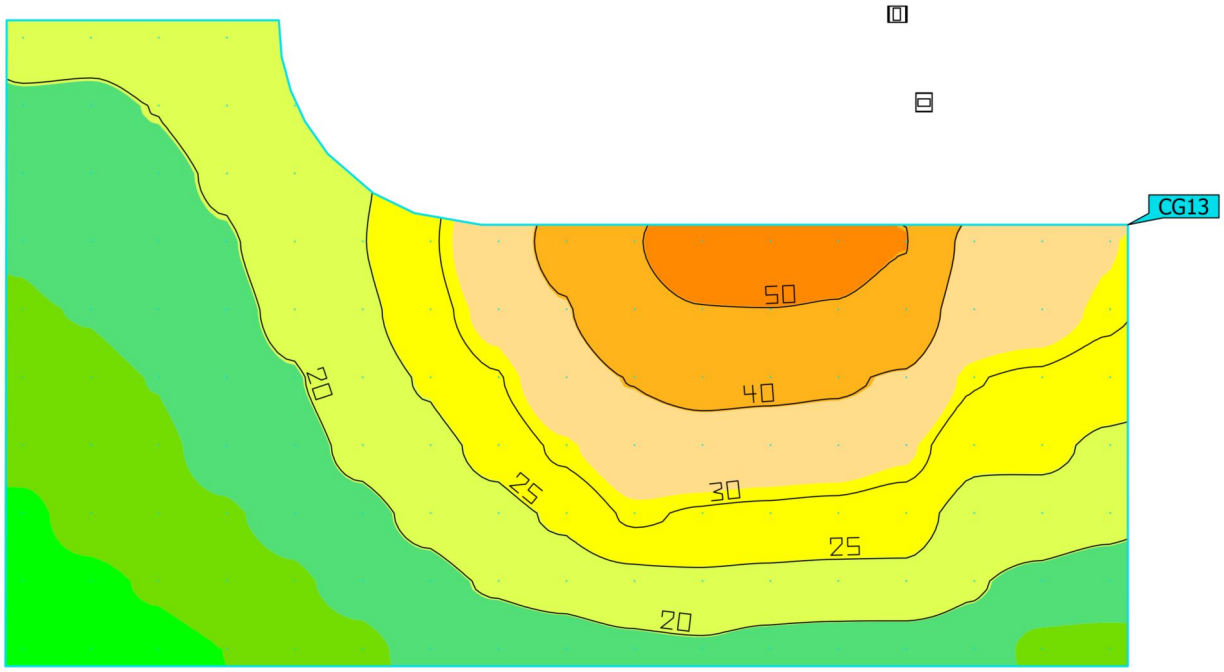
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

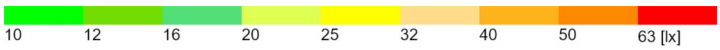
The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 13 - Plato iza objekta







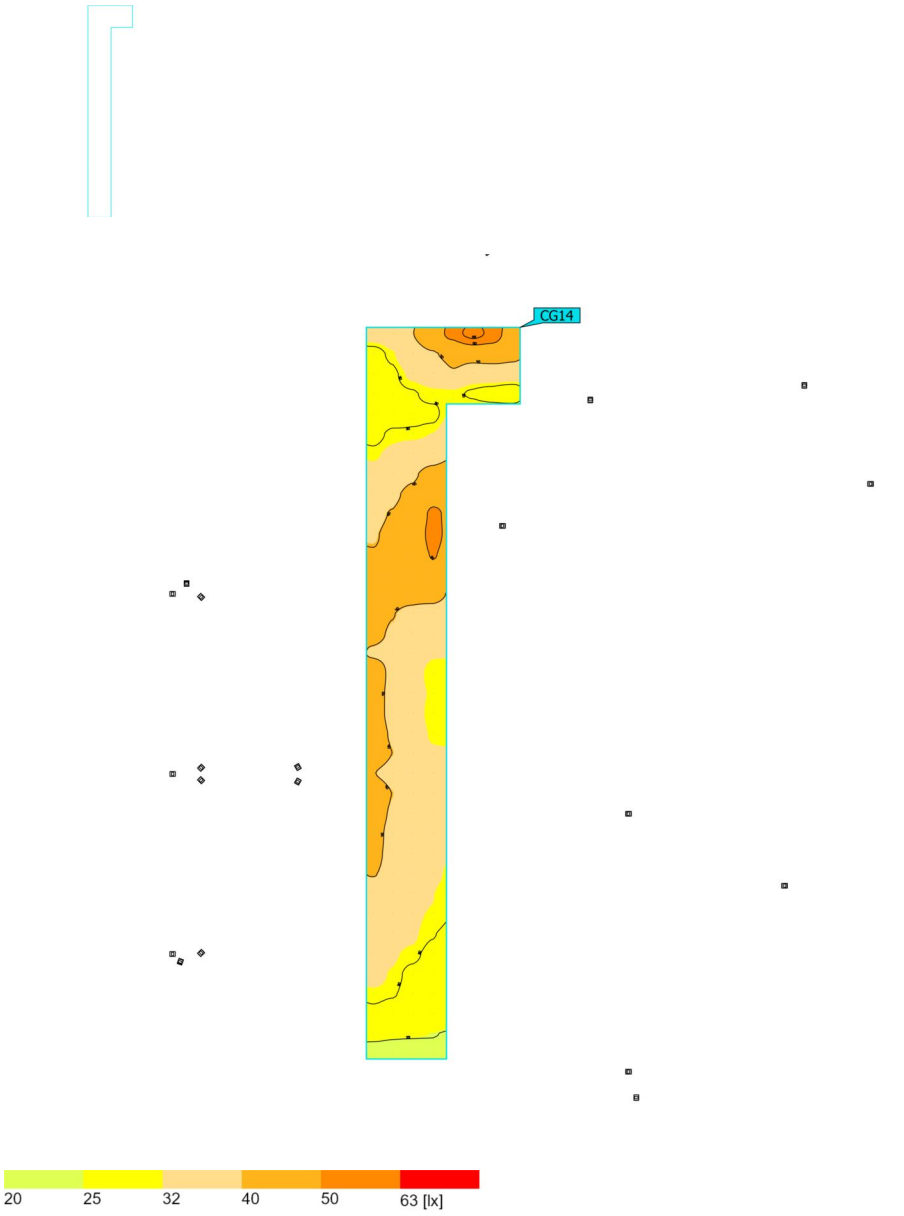
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 13 - Plato iza objekta Perpendicular illuminance Height: 0.020 m	24.8 lx	10.3 lx	55.3 lx	0.42	0.19	CG13

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 1 - ZONA 2 (FULL))

CS 14 - Centralni koridor



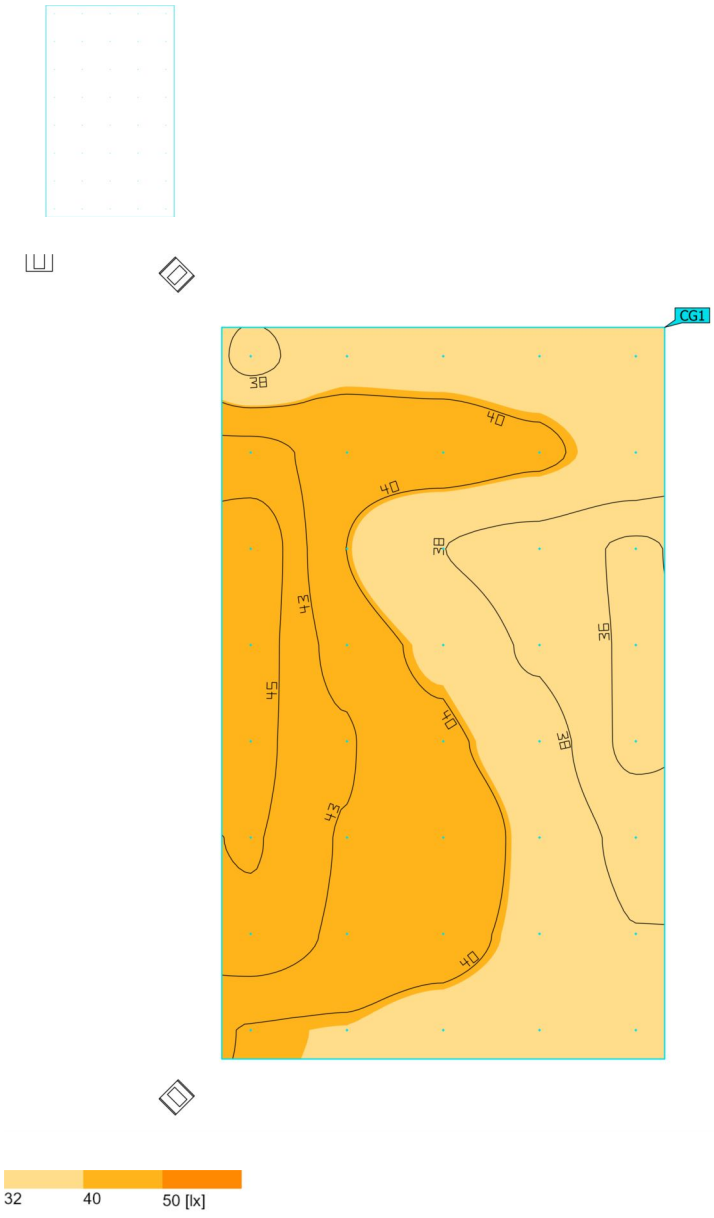
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 14 - Centralni koridor Perpendicular illuminance Height: 0.020 m	35.8 lx	23.6 lx	56.7 lx	0.66	0.42	CG14

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 1 - ETR 1



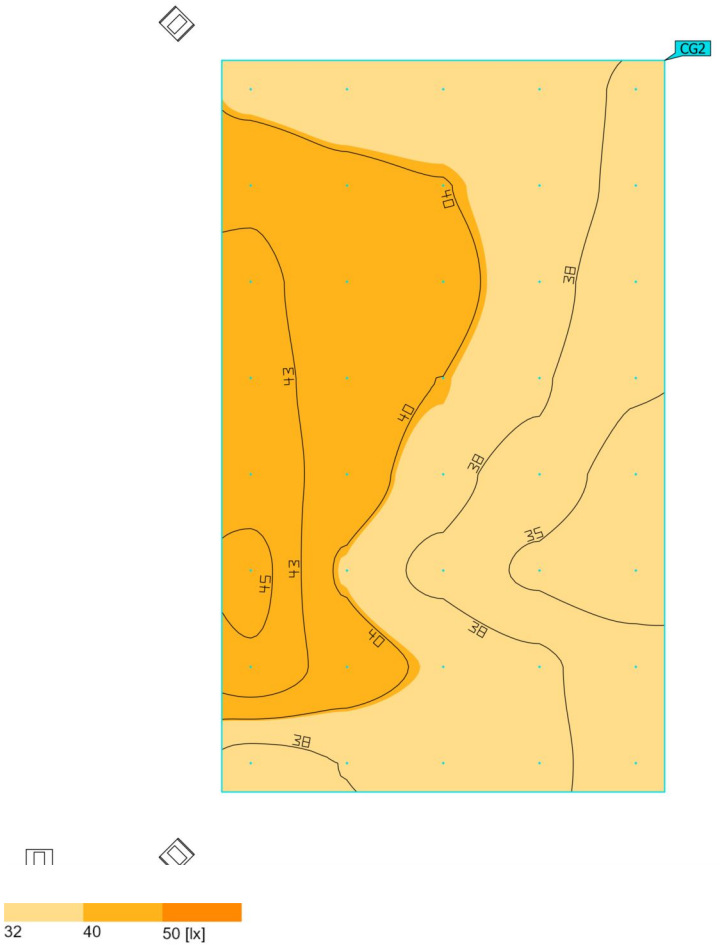
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 1 - ETR 1 Perpendicular illuminance Height: 0.020 m	40.1 lx	35.7 lx	46.8 lx	0.89	0.76	CG1

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 2 - ETR 2



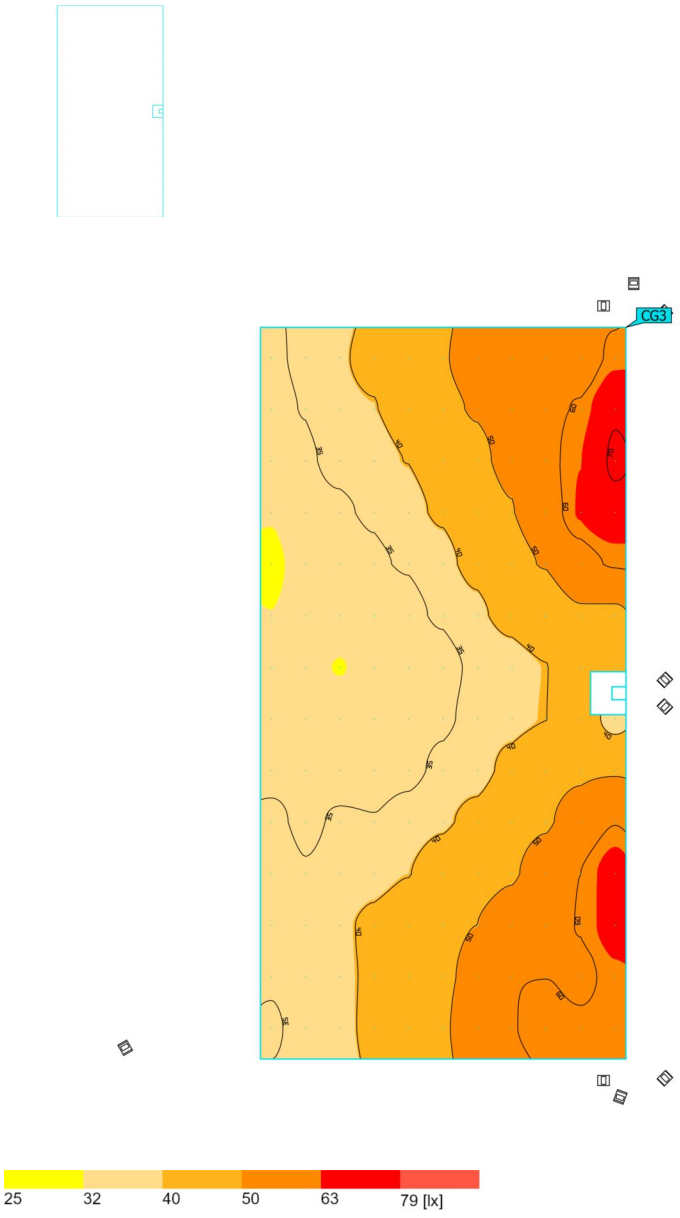
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 2 - ETR 2 Perpendicular illuminance Height: 0.020 m	39.0 lx	33.4 lx	45.8 lx	0.86	0.73	CG2

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 3 - RP 110kV



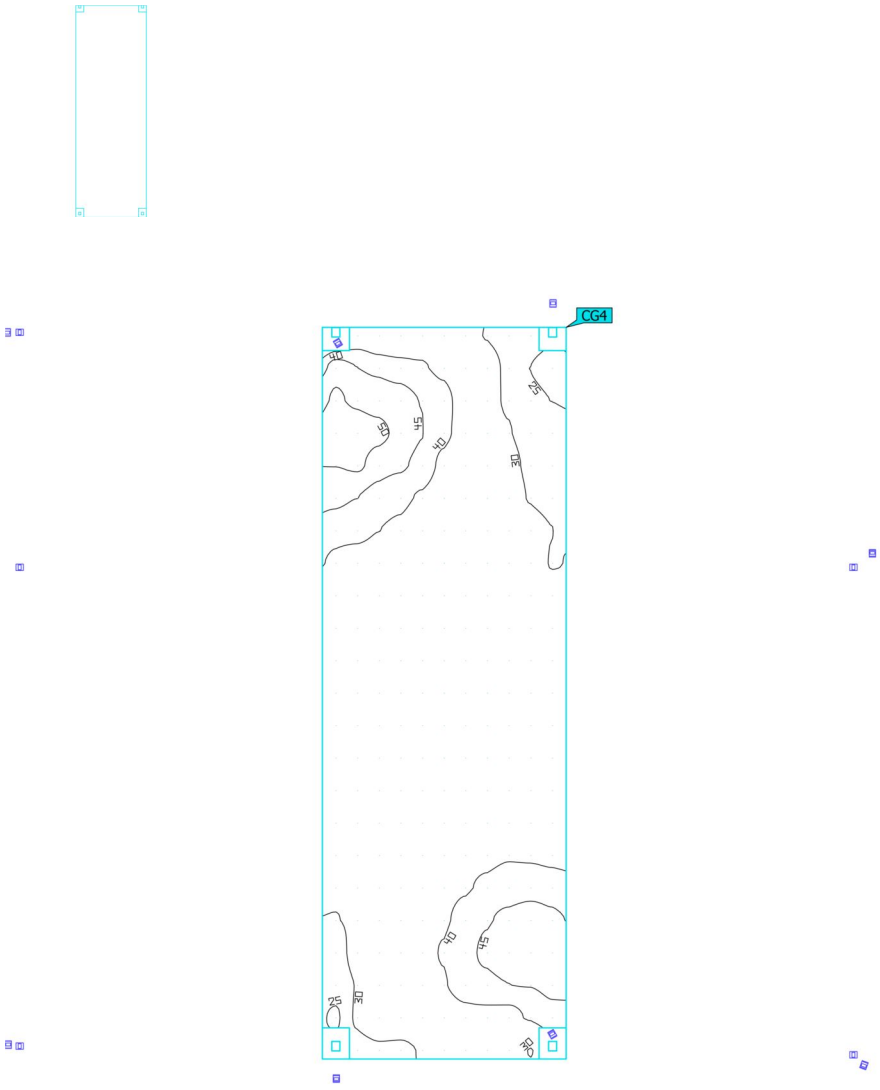
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 3 - RP 110kV Perpendicular illuminance Height: 2.020 m	43.8 lx	31.2 lx	70.9 lx	0.71	0.44	CG3

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 4 - RP 110kV



Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 4 - RP 110kV Perpendicular illuminance Height: 2.020 m	36.4 lx	22.7 lx	52.8 lx	0.62	0.43	CG4

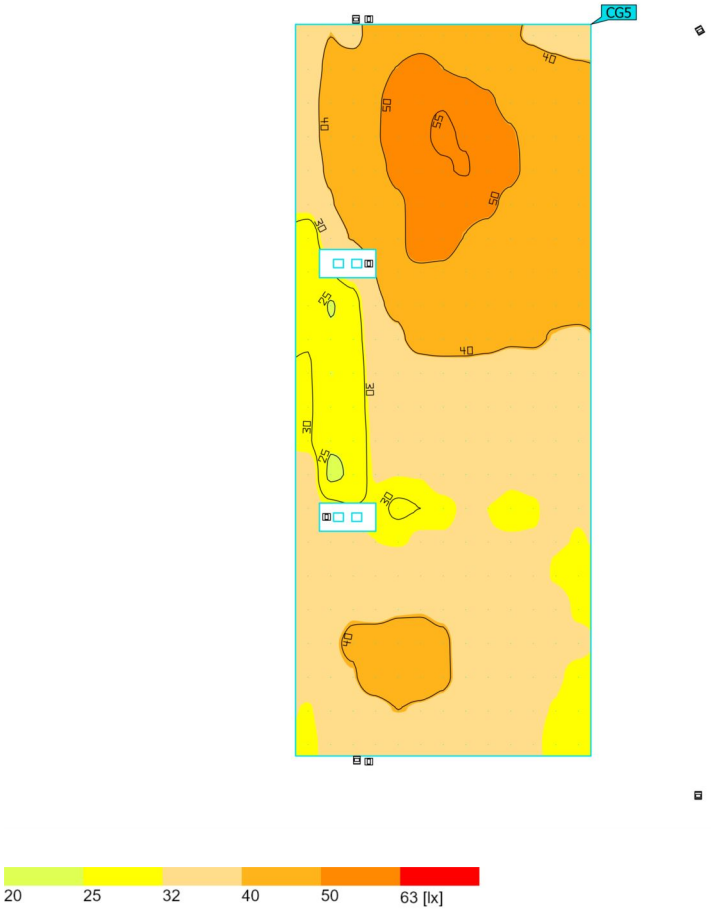
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 5 - RP 110kV





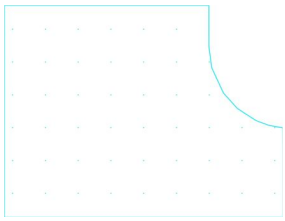
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 5 - RP 110kV Perpendicular illuminance Height: 2.020 m	39.0 lx	24.1 lx	55.5 lx	0.62	0.43	CG5

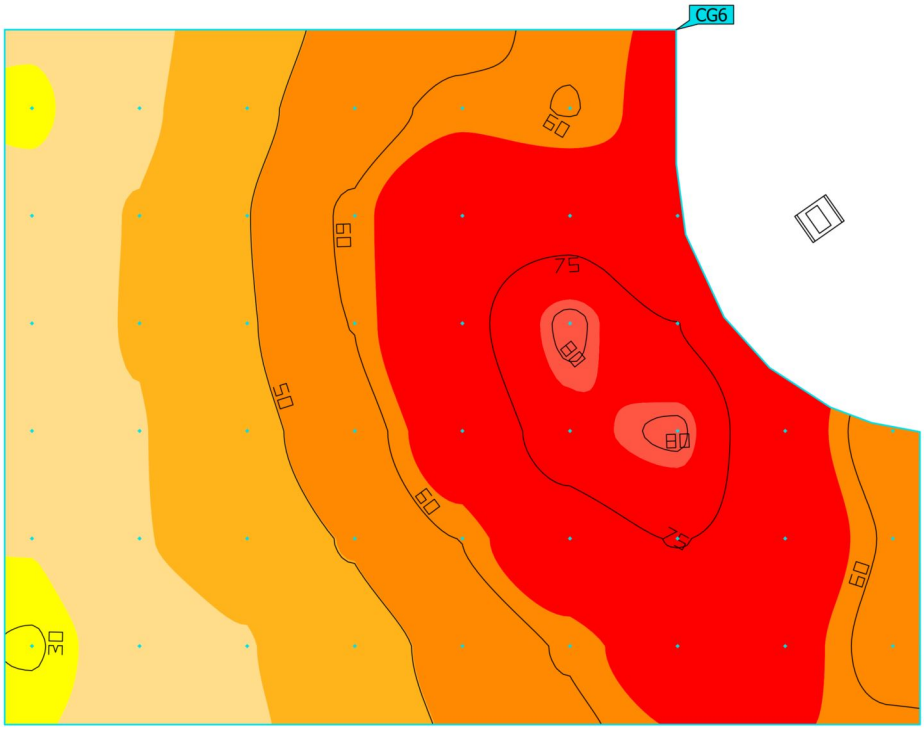
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 6 - Ulaz (kapija)







Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 6 - Ulaz (kapija) Perpendicular illuminance Height: 0.020 m	54.8 lx	29.8 lx	80.4 lx	0.54	0.37	CG6

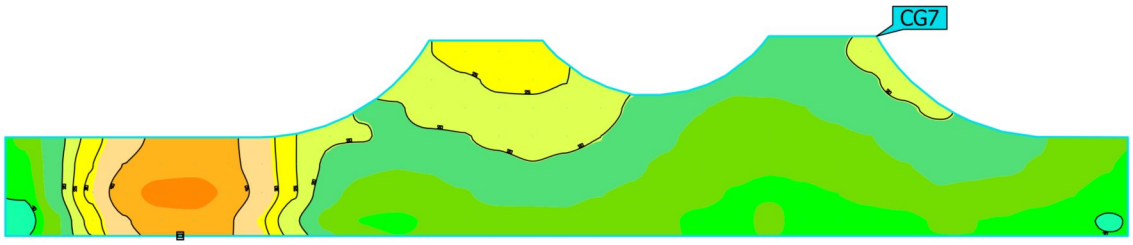
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

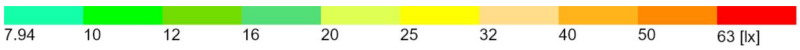
The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 7 - Koridor







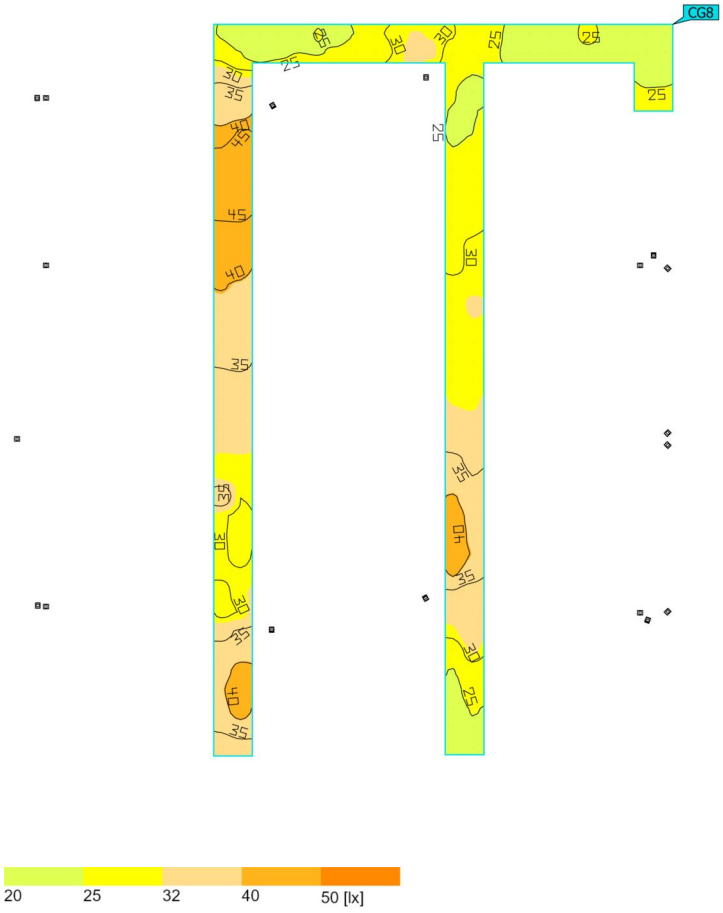
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 7 - Koridor Perpendicular illuminance Height: 2.020 m	19.6 lx	8.33 lx	54.9 lx	0.43	0.15	CG7

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 8 - Koridor RP 110kV



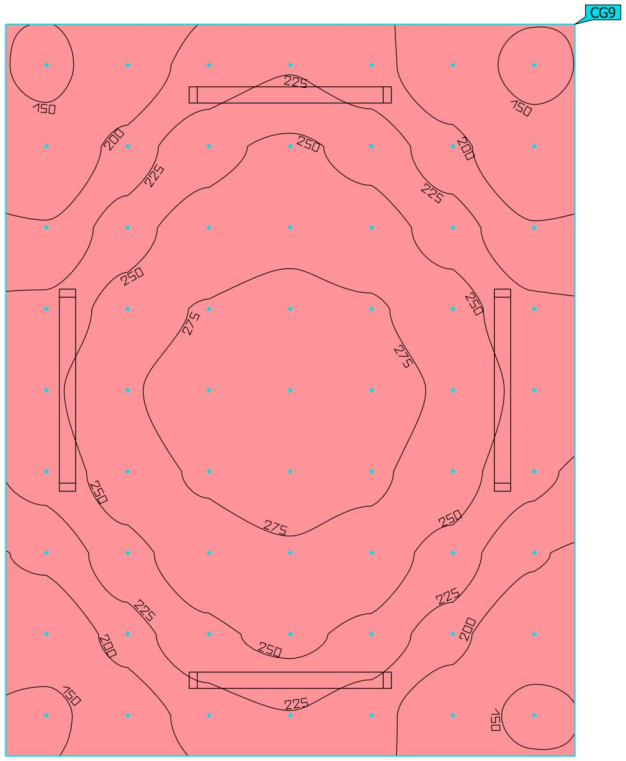
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 8 - Koridor RP 110kV Perpendicular illuminance Height: 2.020 m	31.3 lx	20.0 lx	49.8 lx	0.64	0.40	CG8

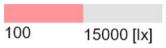
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 9 - DEA





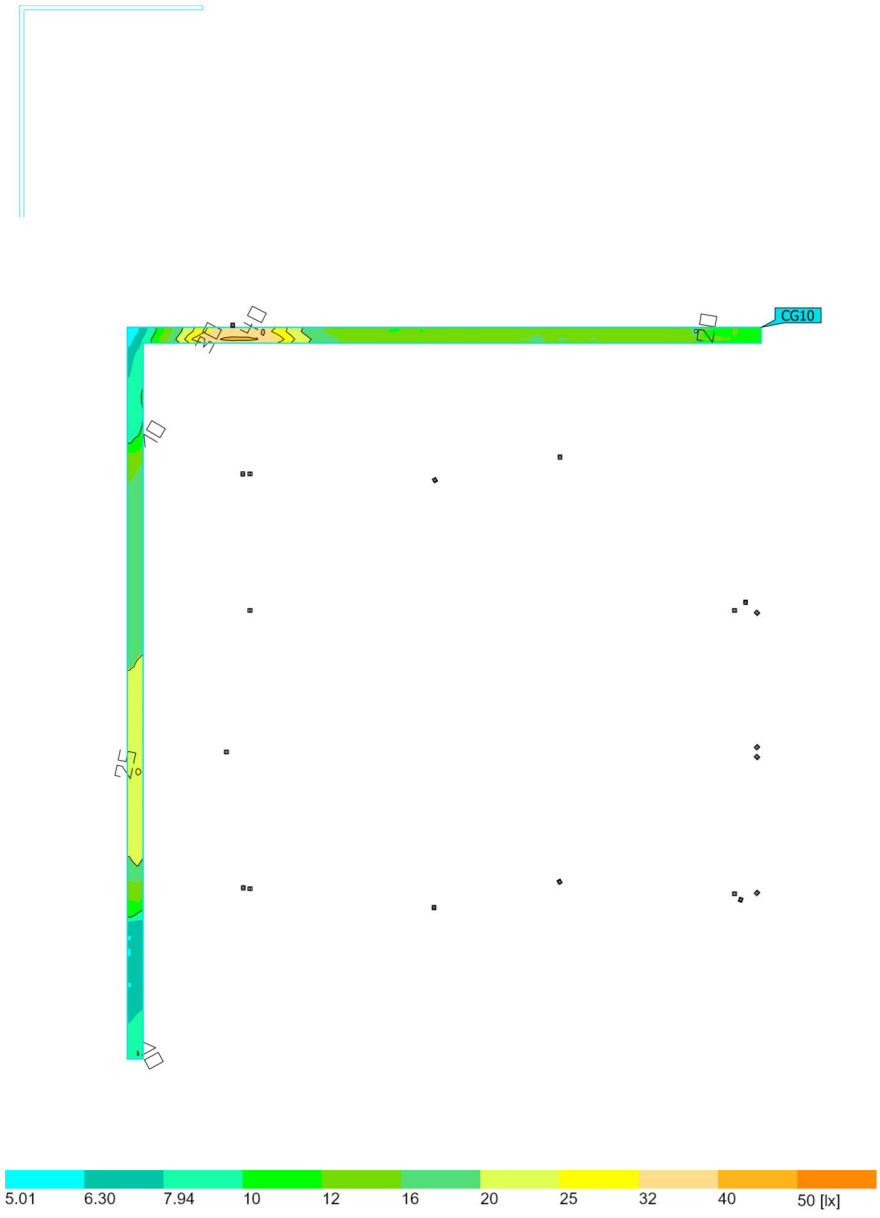
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 9 - DEA Perpendicular illuminance Height: 0.020 m	230 lx	138 lx	285 lx	0.60	0.48	CG9

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

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Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 10 - Perimetar 1



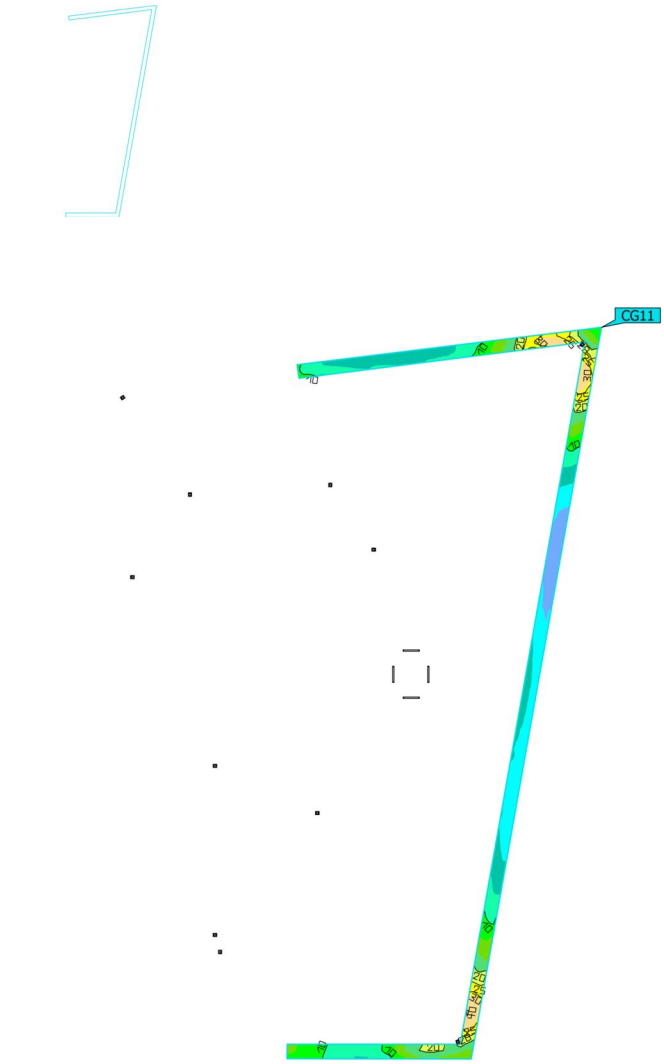
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 10 - Perimetar 1 Perpendicular illuminance Height: 2.020 m	16.4 lx	5.04 lx	42.0 lx	0.31	0.12	CG10

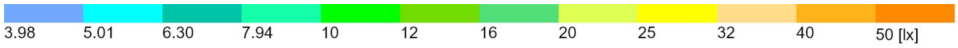
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 11 - Perimetar 2





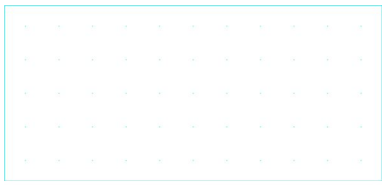
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 11 - Perimetar 2 Perpendicular illuminance Height: 0.020 m	12.2 lx	4.05 lx	40.7 lx	0.33	0.100	CG11

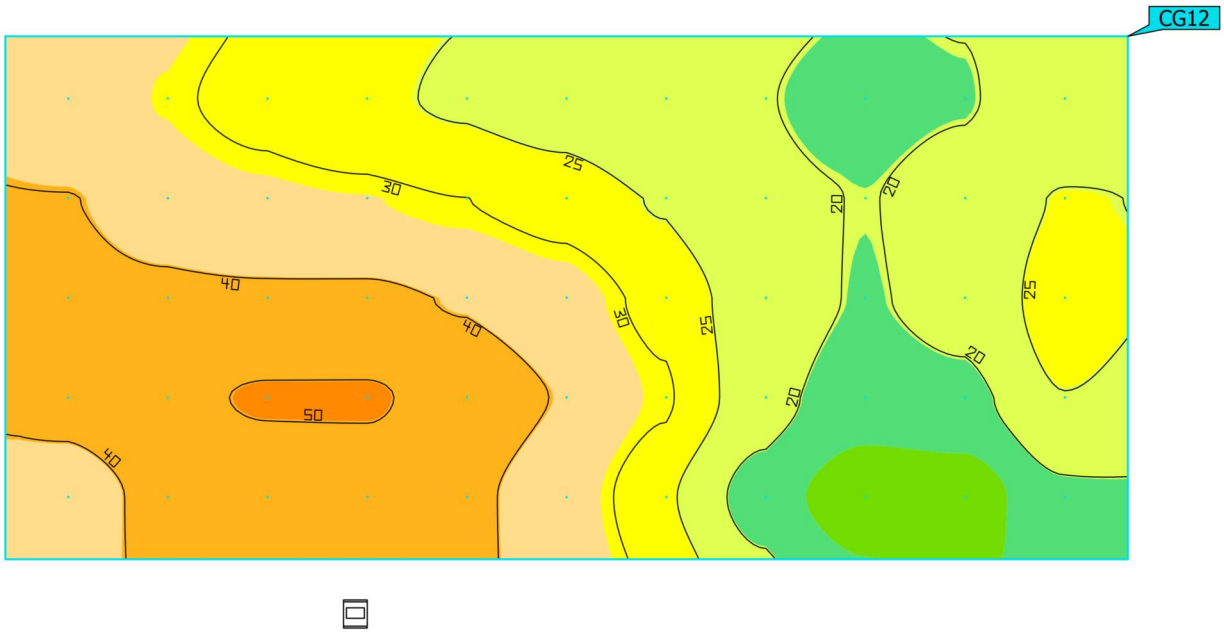
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

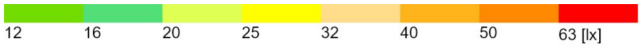
The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 12 - Plato ispred objekta







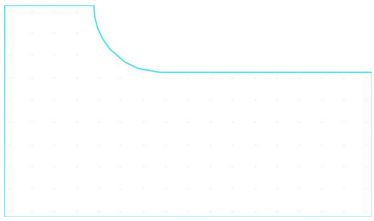
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 12 - Plato ispred objekta Perpendicular illuminance Height: 0.020 m	30.4 lx	13.8 lx	50.7 lx	0.45	0.27	CG12

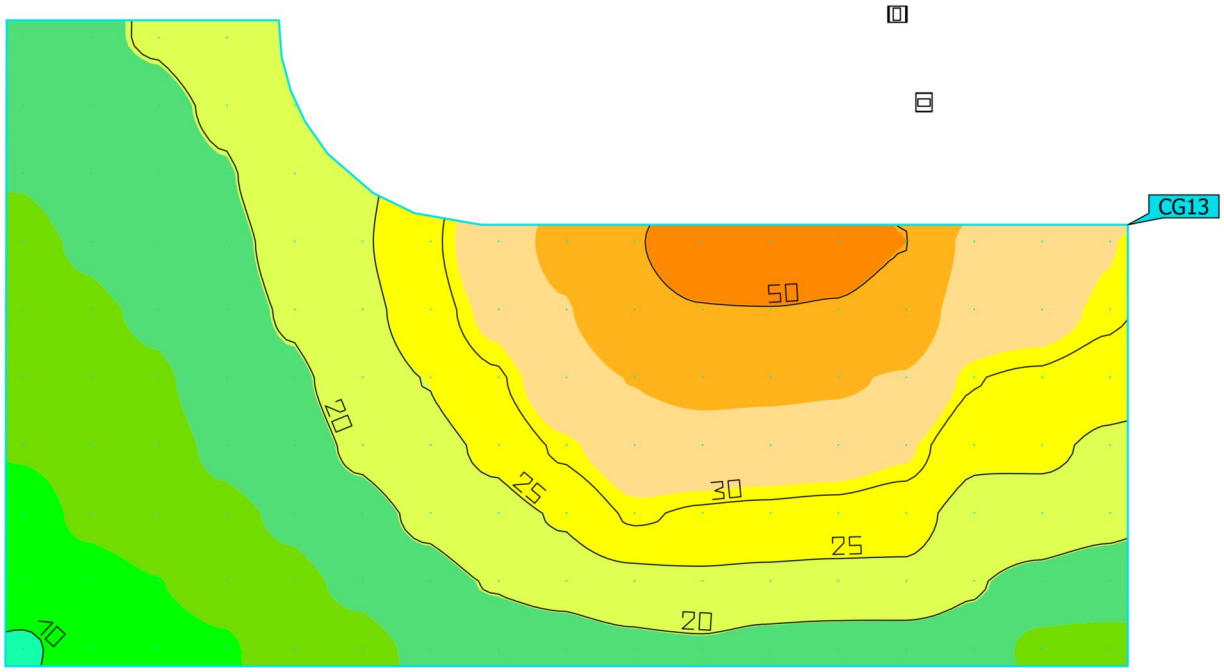
Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

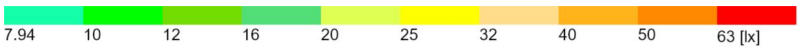
The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 13 - Plato iza objekta







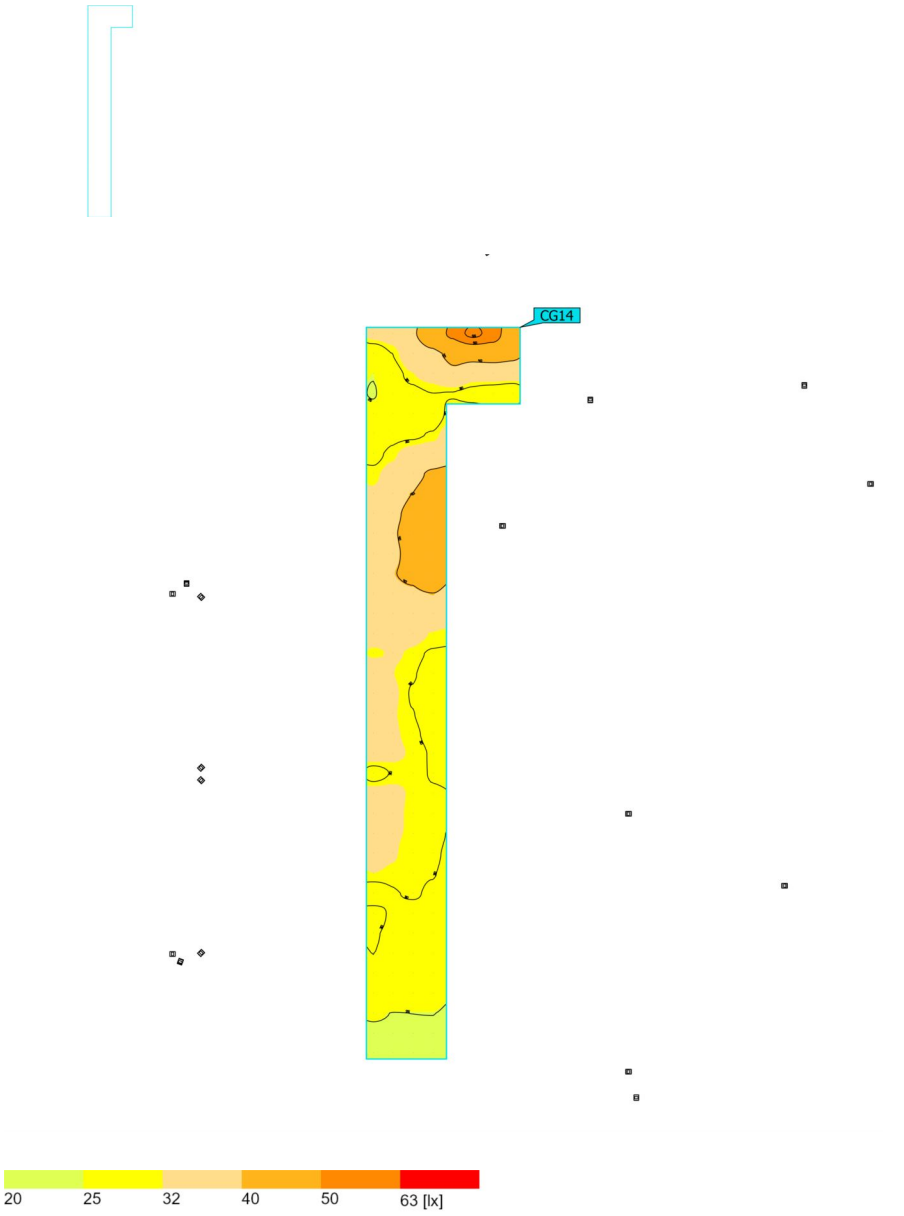
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 13 - Plato iza objekta Perpendicular illuminance Height: 0.020 m	24.4 lx	9.84 lx	55.2 lx	0.40	0.18	CG13

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

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Site 1 (SCENA 2 - ZONA 1 (LOW))

CS 14 - Centralni koridor



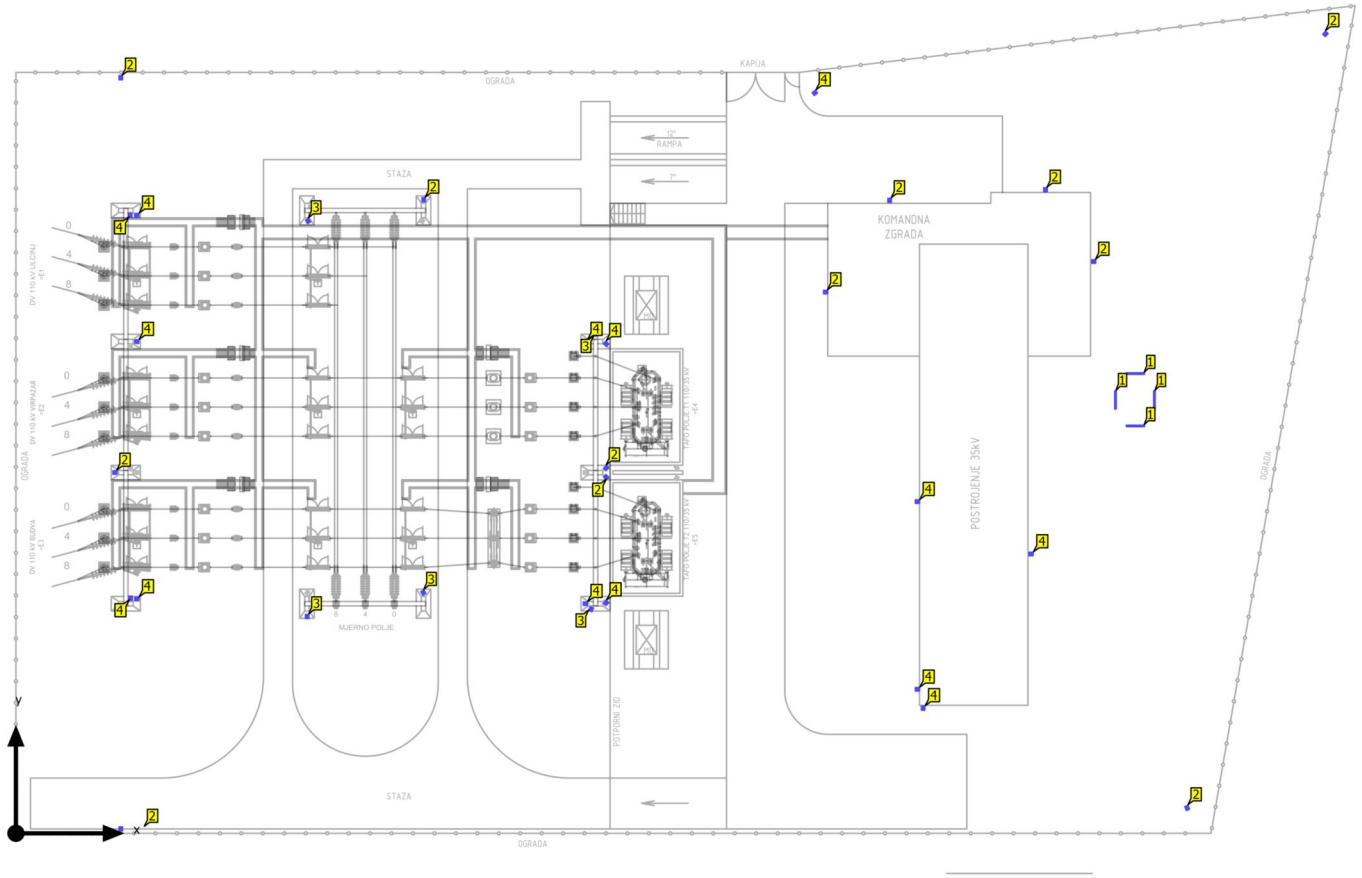
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
CS 14 - Centralni koridor Perpendicular illuminance Height: 0.020 m	32.6 lx	21.5 lx	56.2 lx	0.66	0.38	CG14

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1

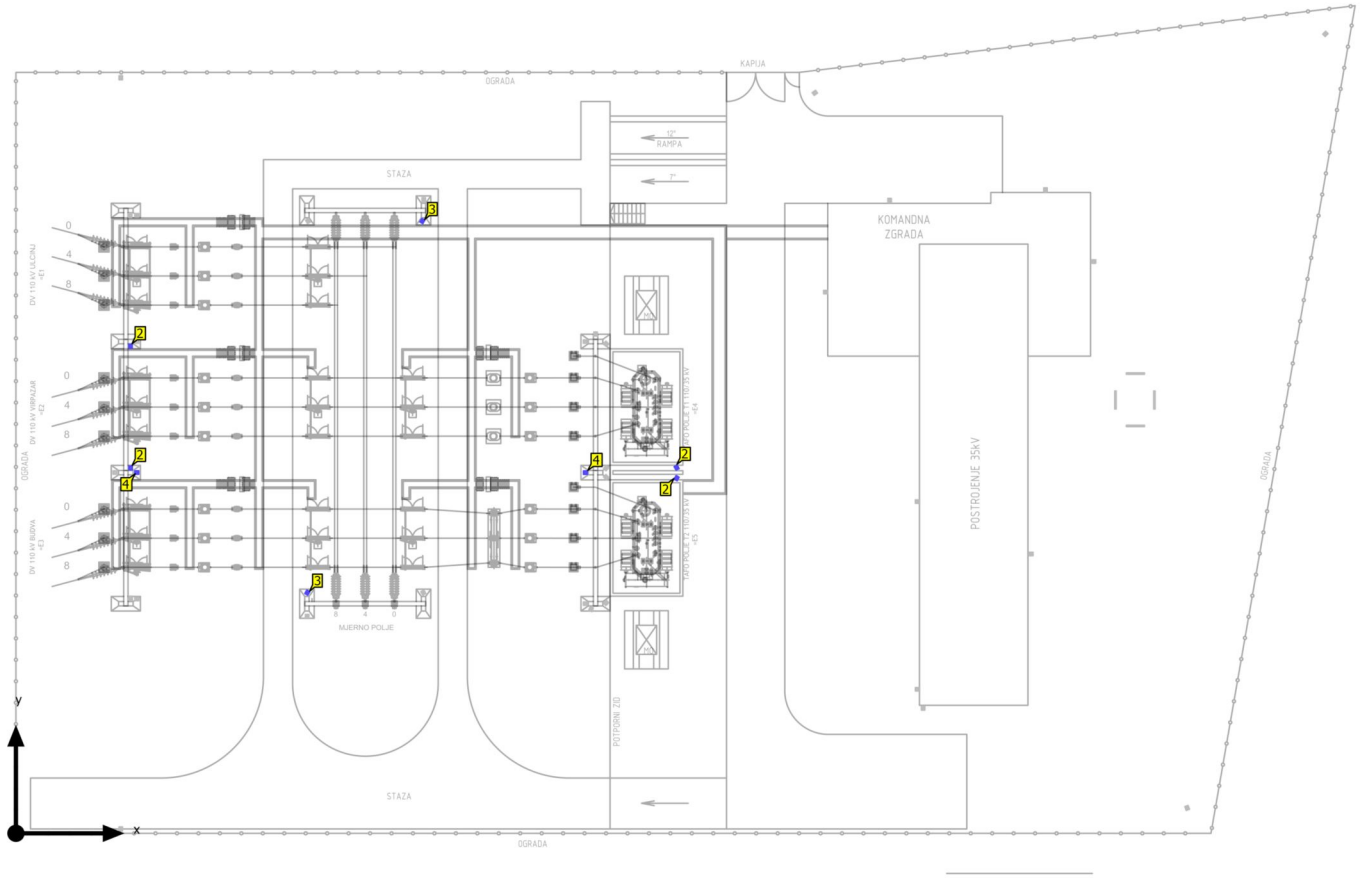
Control group CG 1



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Site 1

Control group CG 2



The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.

Site 1

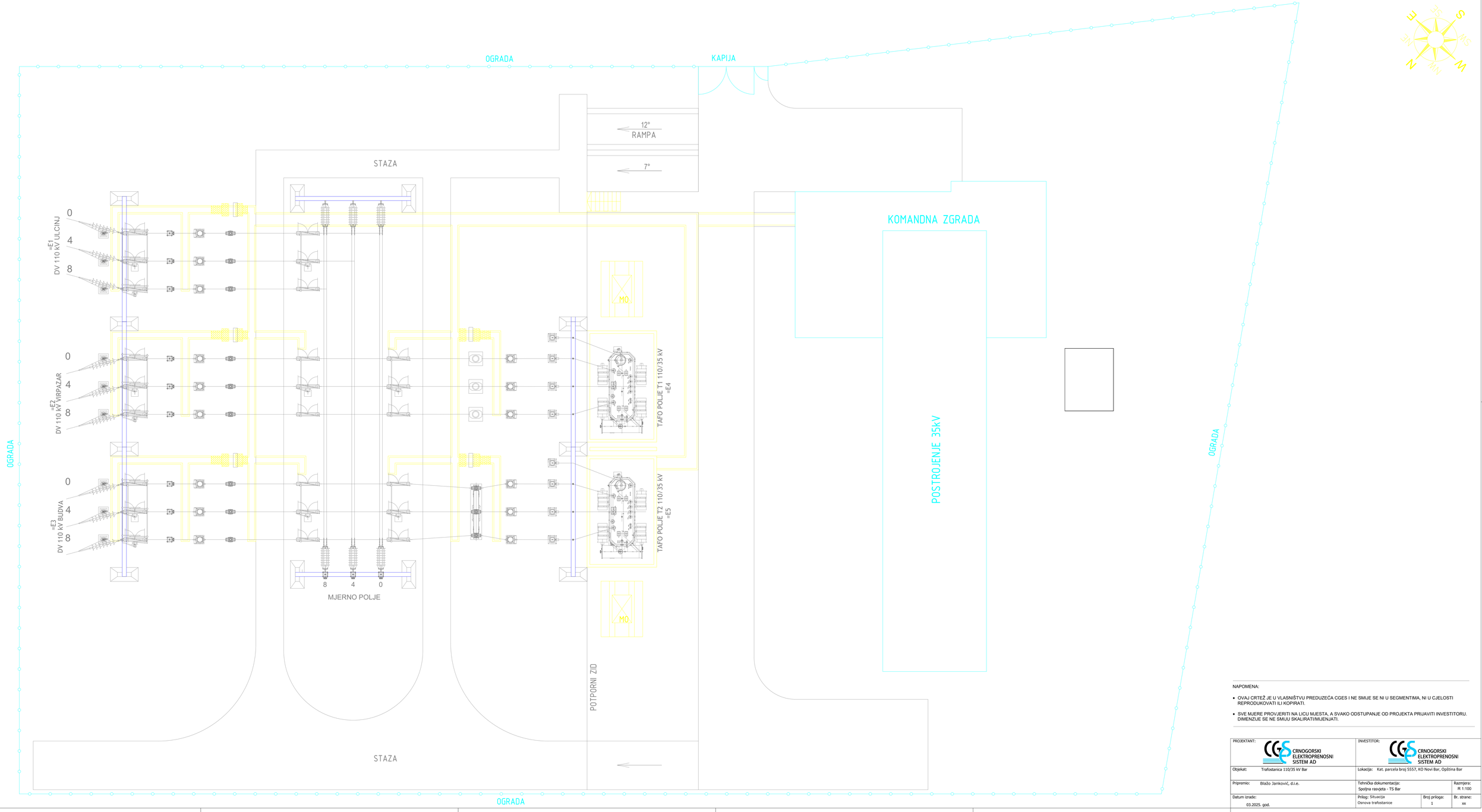
Control groups

Control group	CG 1	CG 2
SCENA 1 - ZONA 2 (FULL)	100	100
SCENA 2 - ZONA 1 (LOW)	100	–

Dimming values [%]

pcs.	Manufacturer	Article No.	Article name	P	Index
4	LUG Light Factory	090380.5L10.021	ATLANTYK 2.0 BASIC LED ED 2900m/840 PC opal IP65 grafit RAL7024	18.0 W	1
16	LUG Light Factory	120212.5L171.41	POWERLUG MINI LED ED 3600lm/740 IP65 as szeroki szary	25.0 W	2
7	LUG Light Factory	120212.5L181.31	POWERLUG MINI LED ED 6300lm/740 IP65 as w¹ski szary	44.0 W	3
16	LUG Light Factory	120212.5L181.41	POWERLUG MINI LED ED 6000lm/740 IP65 as szeroki szary	44.0 W	4

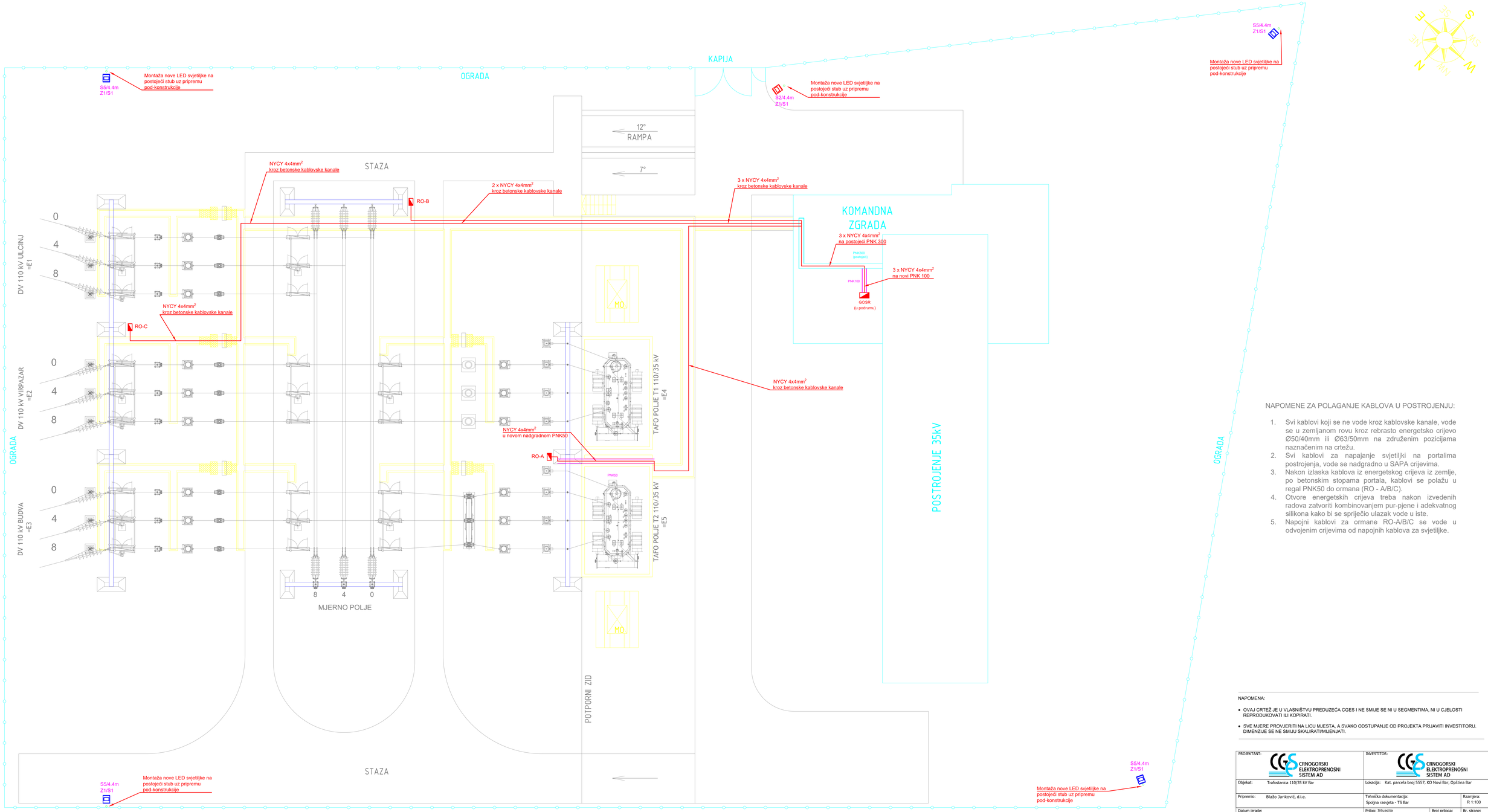
The project is not the offer as concerns law. The presented results are approximate and may change. The actual results may vary depending on the conditions in which the luminaires are installed.



NAPOMENA:

- OVAJ CRTEŽ JE U VLASNIŠTVU PREDUZEĆA CGES I NE SMIJE SE NI U SEGMENTIMA, NI U CJELOSTI REPRODUKOVATI ILI KOPIRATI.
- SVE MJERE PROVJERITI NA LICU MJESTA, A SVAKO ODSTUPANJE OD PROJEKTA PRIJAVITI INVESTITORU. DIMENZIJE SE NE SMIJU SKALIRATI/MIJENJATI.

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: R 1:100
Datum izrade: 03.2025. god.		Prilog: Situacija Osnova trafostanice	Broj priloga: 1 / Br. strane: xx



NAPOMENE ZA POLAGANJE KABLOVA U POSTROJENJU:

1. Svi kablovi koji se ne vode kroz kablovske kanale, vode se u zemljanom rovu kroz rebrasto energetsko crijevo Ø50/40mm ili Ø63/50mm na združenim pozicijama naznačenim na crtežu.
2. Svi kablovi za napajanje svjetiljki na portalima postrojenja, vode se nadgradno u SAPA crijevima.
3. Nakon izlaska kablova iz energetskog crijeva iz zemlje, po betonskim stopama portala, kablovi se polažu u regal PNK50 do ormana (RO - A/B/C).
4. Otvore energetskih crijeva treba nakon izvedenih radova zatvoriti kombinovanjem pur-pjene i adekvatnog silikona kako bi se spriječio ulazak vode u iste.
5. Napojni kablovi za ormane RO-A/B/C se vode u odvojenim crijevima od napojnih kablova za svjetiljke.

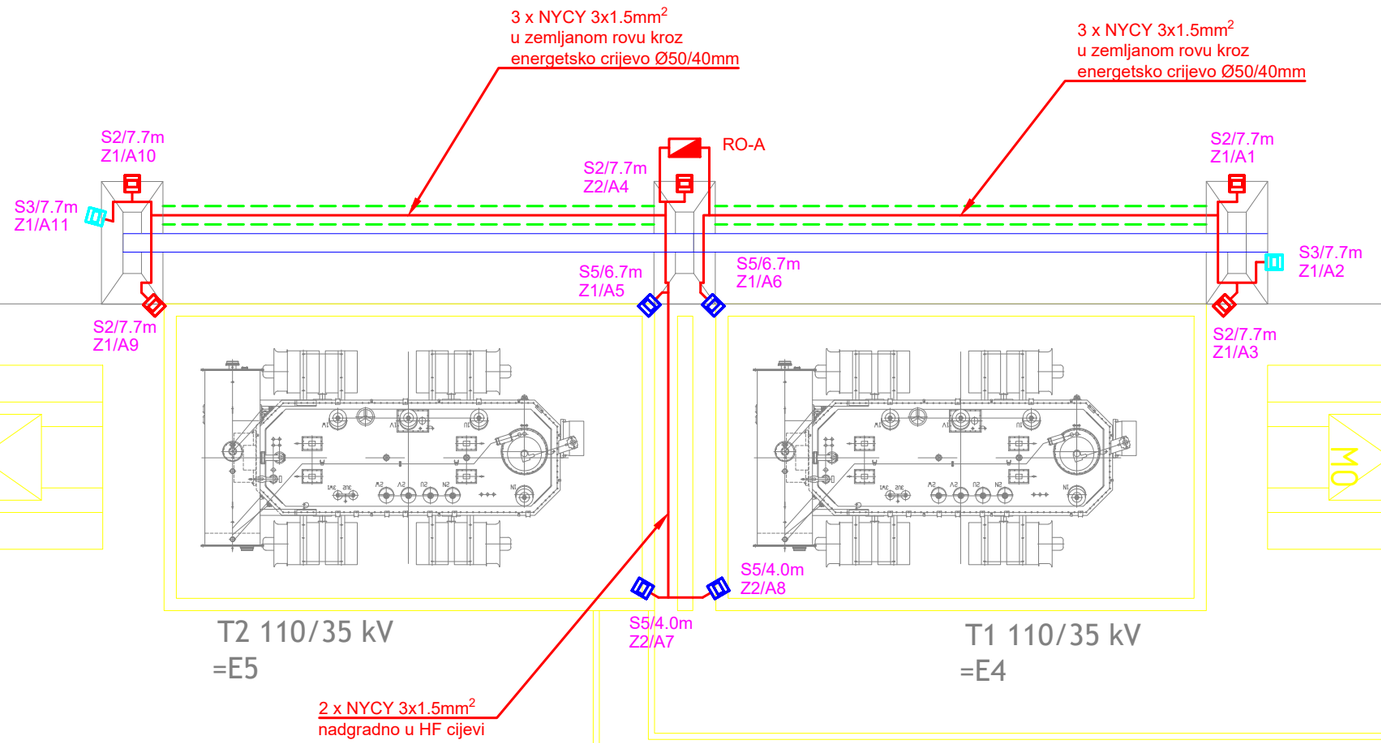
NAPOMENA:

- OVAJ CRTEŽ JE U VLASNIŠTVU PREDUZEĆA CGES I NE SMIJE SE NI U SEGMENTIMA, NI U CJELOSTI REPRODUKOVATI ILI KOPIRATI.
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PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna razvjeta - TS Bar	Razmjera: R 1:100
Datum izrade: 03.2025. god.		Prilog: Situacija Razvod kablova u postrojenju	Broj priloga: 2 / Br. strane: xx

NAPOMENE ZA POLAGANJE KABLOVA U POSTROJENJU:

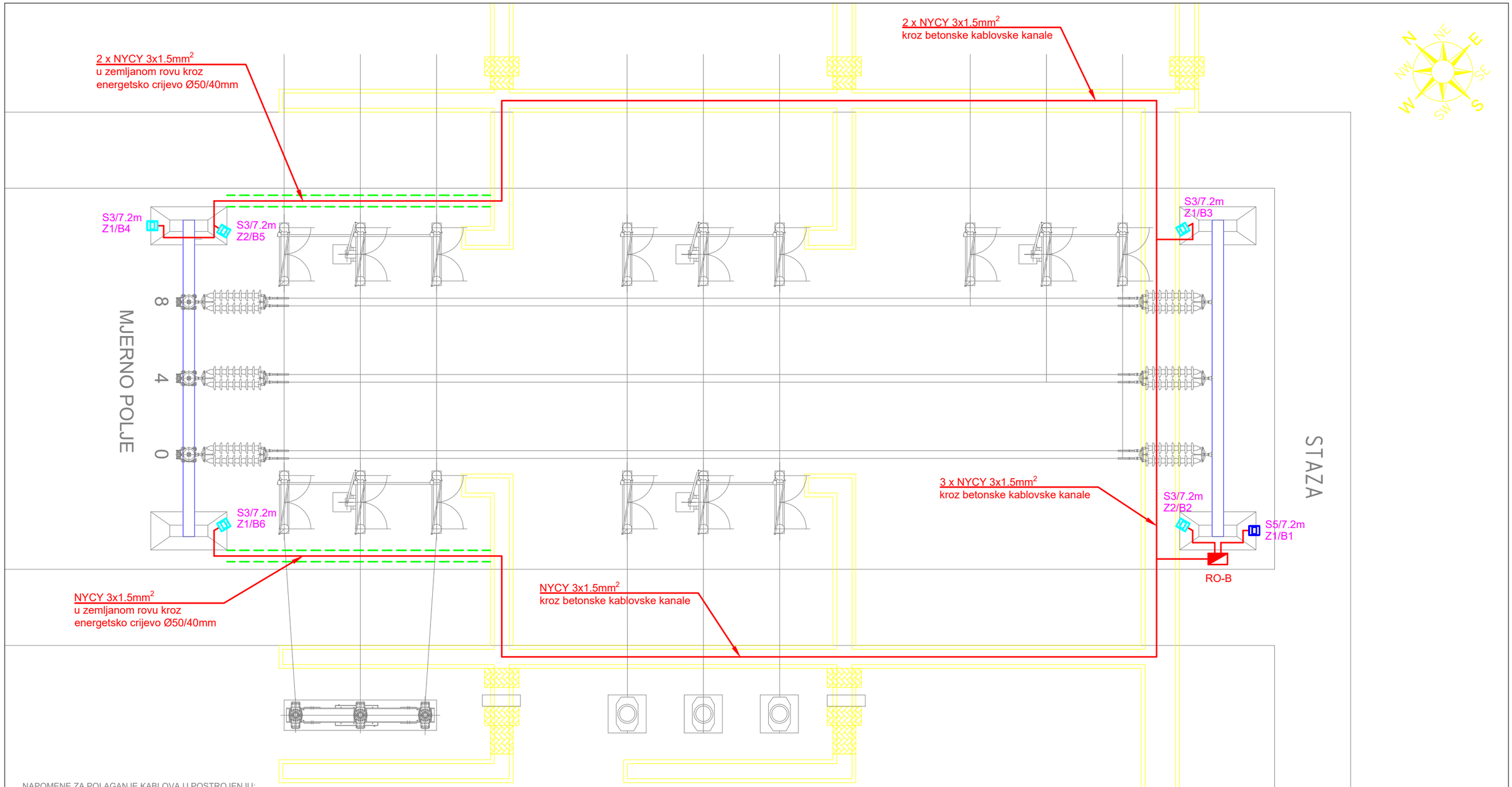
1. Svi kablovi koji se ne vode kroz kablovske kanale, vode se u zemljanom rovu kroz rebrasto energetsko crijevo Ø50/40mm ili Ø63/50mm na združenim pozicijama naznačenim na crtežu.
2. Svi kablovi za napajanje svjetiljki na portalima postrojenja, vode se nadgradno u SAPA crijevima.
3. Nakon izlaska kablova iz energetskog crijeva iz zemlje, po betonskim stopama portala, kablovi se polažu u regal PNK50 do ormana (RO - A/B/C).
4. Otvore energetskih crijeva treba nakon izvedenih radova zatvoriti kombinovanjem pur-pjene i adekvatnog silikona kako bi se spriječio ulazak vode u iste.
5. Kablovi za napajanje svjetiljki na betonskom zidu između ETR-ova, se polažu nadgradno u HF cijevima.



NAPOMENA:

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PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: R 1:100
Datum izrade: 03.2025. god.		Prilog: Portali ETR Rasvjeta na portalima ETR (RO-A)	Broj priloga: 3 / Br. strane: xx



NAPOMENE ZA POLAGANJE KABLOVA U POSTROJENJU:

1. Svi kablovi koji se ne vode kroz kablovske kanale, vode se u zemljanom rovu kroz rebrasto energetsko crijevo Ø50/40mm ili Ø63/50mm na združenim pozicijama naznačenim na crtežu.
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PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: R 1:100
Datum izrade: 03.2025. god.		Prilog: Portali SS Rasvjeta na portalima SS (RO-B)	Broj priloga: 4 / Br. strane: xx

OGRADA

DV 110 kV BUDVA
=E3

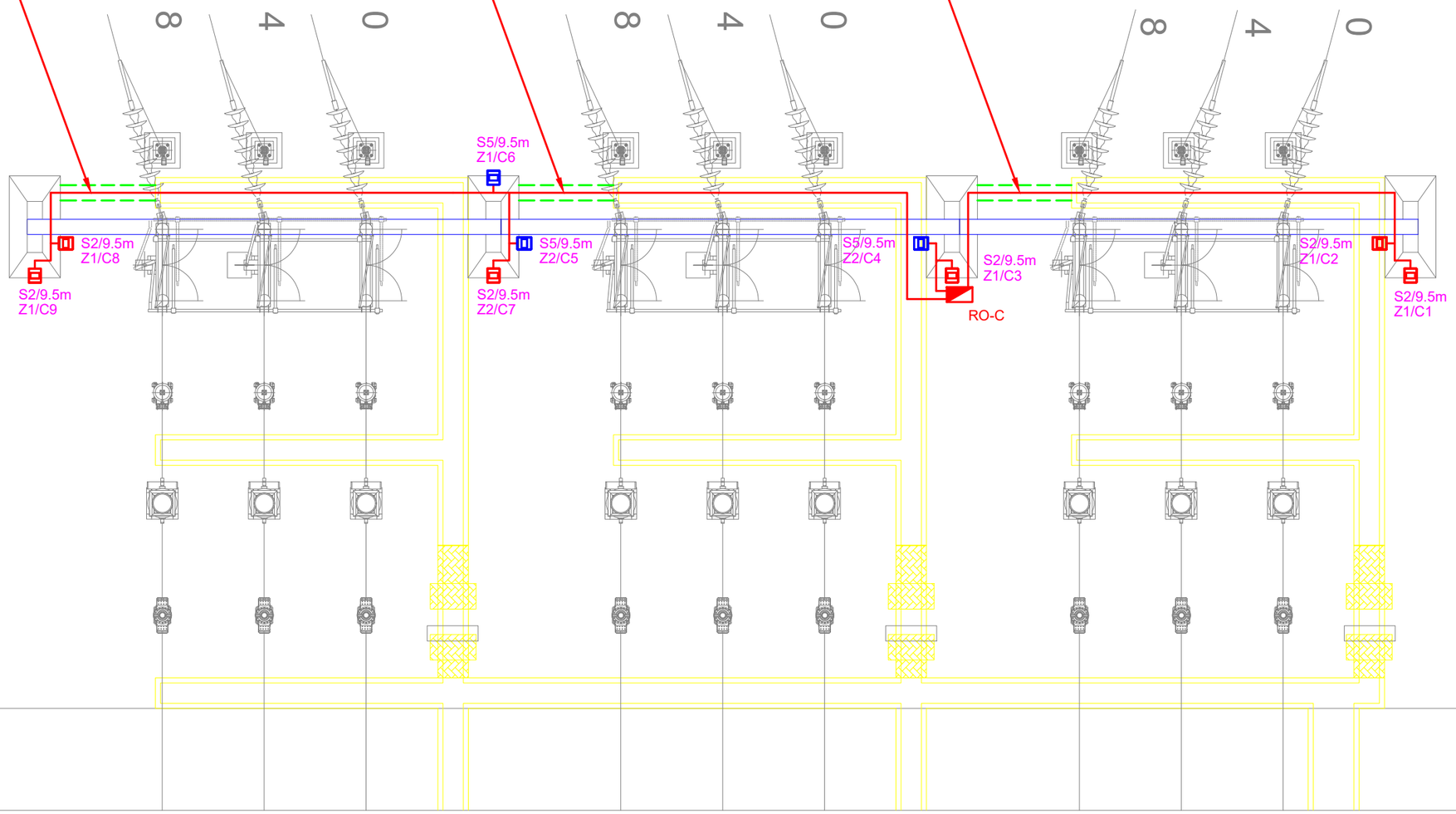
DV 110 kV VIRPAZAR
=E2

DV 110 kV ULCINJ
=E1

2 x NYCY 3x1.5mm^2
u zemljanom rovu kroz
energetsko crijevo Ø50/40mm

5 x NYCY 3x1.5mm^2
u zemljanom rovu kroz
energetsko crijevo Ø63/50mm

2 x NYCY 3x1.5mm^2
u zemljanom rovu kroz
energetsko crijevo Ø50/40mm



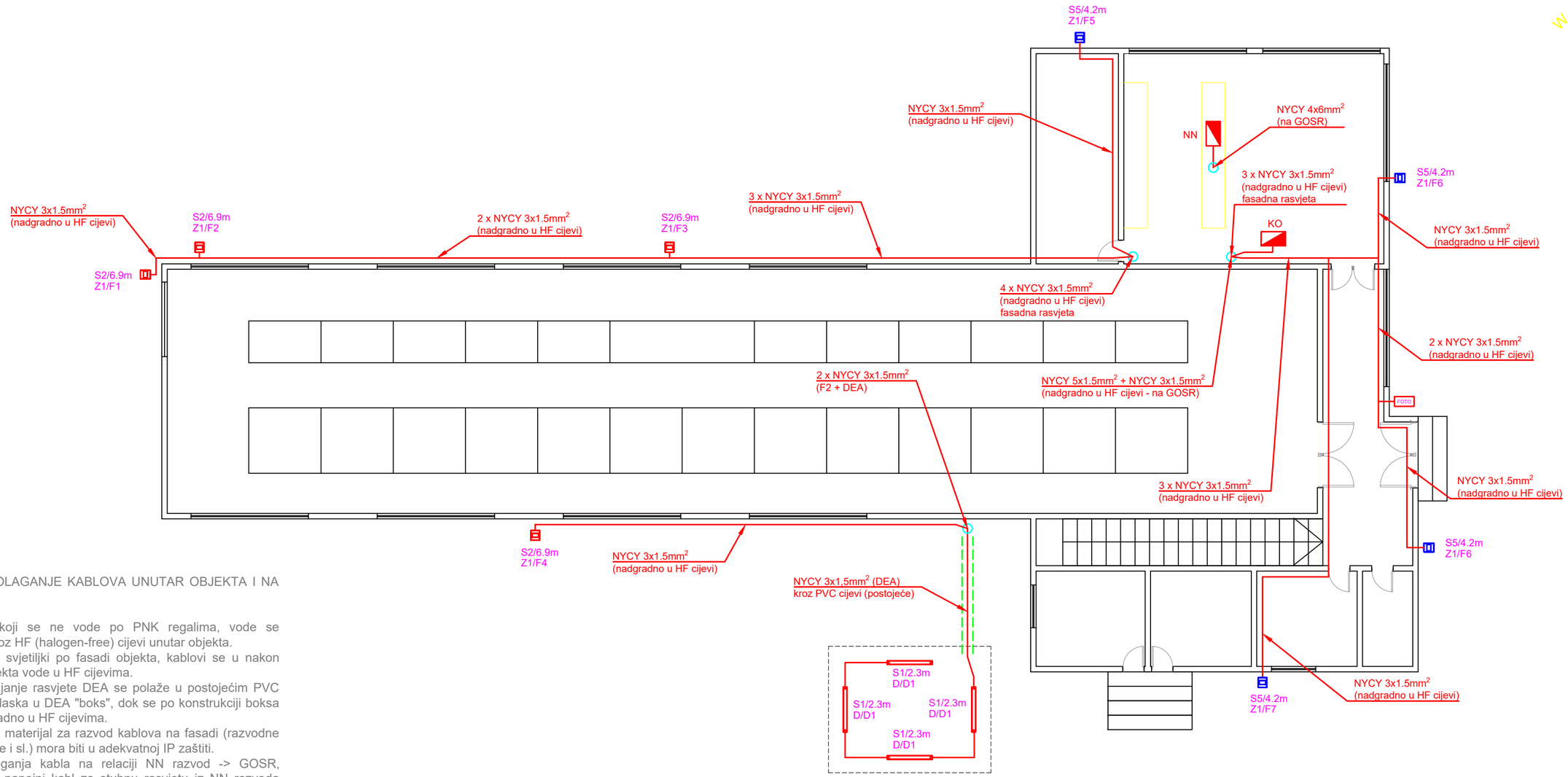
NAPOMENE ZA POLAGANJE KABLOVA U POSTROJENJU:

1. Svi kablovi koji se ne vode kroz kablovske kanale, vode se u zemljanom rovu kroz rebrasto energetsko crijevo Ø50/40mm ili Ø63/50mm na združenim pozicijama naznačenim na crtežu.
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PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: R 1:100
Datum izrade: 03.2025. god.		Prilog: Portali DV Rasvjeta na portalima DV (RO-C)	Broj priloga: 5 / Br. strane: xx



NAPOMENE ZA POLAGANJE KABLOVA UNUTAR OBJEKTA I NA FASADI:

1. Svi kablovi koji se ne vode po PNK regalima, vode se nadgradno kroz HF (halogen-free) cijevi unutar objekta.
2. Za napajanje svjetiljki po fasadi objekta, kablovi se u nakon izlaska iz objekta vode u HF cijevima.
3. Kabl za napajanje rasvjete DEA se polaže u postojećim PVC cijevima do ulaska u DEA "boks", dok se po konstrukciji boksa polaže nadgradno u HF cijevima.
4. Sav potreban materijal za razvod kablova na fasadi (razvodne kutije, spojnice i sl.) mora biti u adekvatnoj IP zaštiti.
5. Prilikom polaganja kabla na relaciji NN razvod -> GOSR, potrebno je i napojni kabl za stubnu rasvjetu iz NN razvoda povući do nove pozicije GOSR.

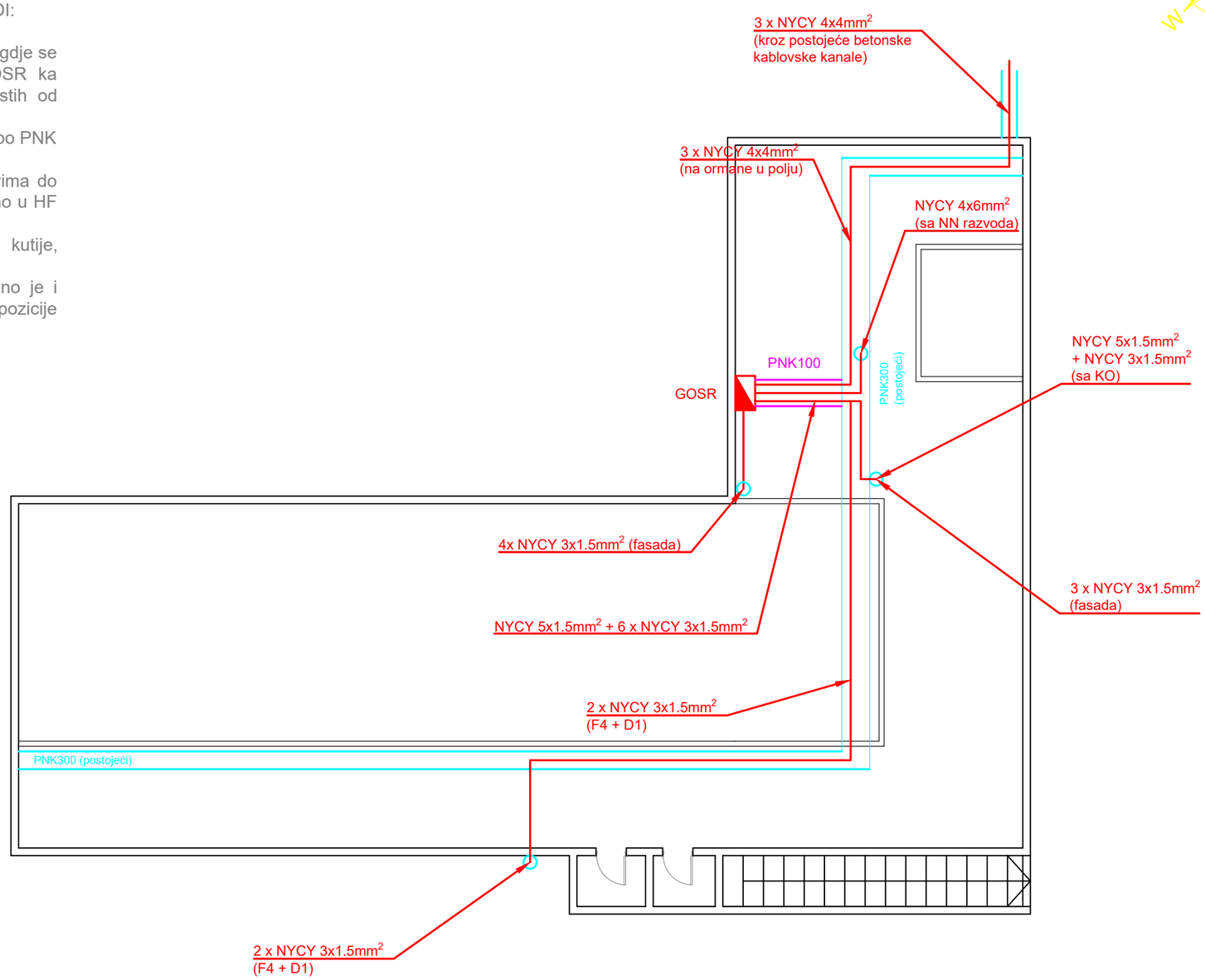
NAPOMENA:

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PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: R 1:100
Datum izrade: 03.2025. god.		Prilog: Objekat TS Razvod kablova na prizemlju (0)	Broj priloga: 6 / Br. strane: xx

NAPOMENE ZA POLAGANJE KABLOVA UNUTAR OBJEKTA I NA FASADI:

1. Svi kablovi u podrumu se vode po postojećim PNK regalima u dijelu gdje se trase mogu uskladiti. Za napojne kablove (ka GOSR i od GOSR ka RO-A,B,C) predvidjeti dodavanje dijela PNK100 radi polaganja istih od GOSR do postojećih PNK regala.
2. Kablovi za napajanje svjetiljki po fasadi objekta, se pored polaganja po PNK regalima, vode nadgradno u HF cijevima.
3. Kabl za napajanje rasvjete DEA se polaže u postojećim PVC cijevima do ulaska u DEA "boks", dok se po konstrukciji boksa polaže nadgradno u HF cijevima.
4. Sav potreban materijal za razvod kablova na fasadi (razvodne kutije, spojnice i sl.) mora biti u adekvatnoj IP zaštiti.
5. Prilikom polaganja kabla na relaciji NN razvod -> GOSR, potrebno je i napojni kabl za stubnu rasvjetu iz NN razvoda povući do nove pozicije GOSR.



NAPOMENA:

- OVAJ CRTEŽ JE U VLASNIŠTVU PREDUZEĆA CGES I NE SMIJE SE NI U SEGMENTIMA, NI U CJELOSTI REPRODUKOVATI ILI KOPIRATI.
- SVE MJERE PROVJERITI NA LICU MJESTA, A SVAKO ODSTUPANJE OD PROJEKTA PRIJAVITI INVESTITORU. DIMENZIJE SE NE SMIJU SKALIRATI/MIJENJATI.

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: R 1:100
Datum izrade: 03.2025. god.		Prilog: Objekat TS Razvod kablova u podrumu (-1)	Broj priloga: 7 / Br. strane: xx

Upravljanje/kontrola zone 1
Upravljanje/kontrola zone 2

	RO-A	RO-B	RO-C	S2	S2	S2	S2	S5	2xS5	S5	4xS5 1xS2	4xS1	UKUPNO PO FAZI: Z1	UKUPNO PO FAZI: Z1 + Z2	UKUPNO:
L3	157 W	88 W	94 W	44 W		44 W		25 W		25 W			383 W	477 W	1 484 W
L2	157 W	88 W	113 W		44 W				50 W			72 W	364 W	452 W	
L1	94 W	69 W	132 W				44 W				144 W		389 W	483 W	

RO-A, RO-B, RO-C
L1 L2 L3
NYCY 4x4mm²
S2, S5, 2xS5: NYCY 3x1,5mm²
4xS5 1xS2, 4xS1: NYCY 4x4mm²

Foto-ćelija na fasadi objekta
FOTO
NYCY 5x1,5mm² na/sa KO
NYCY 3x1,5mm² na/sa KO

na vratima ormana **
L1 L2 L3
C6A

KZ2-A, KZ2-B, KZ2-C
KZ1-A, KZ1-B, KZ1-C
L1 L2 L3
D20A

KZ1-F1, KZ1-F2, KZ1-F3, KZ1-S, K-DEA
C10A

Z1 Z2
na vratima ormana*

L1 L2 L3 RO-A RO-B RO-C 1 4 2 3 5 6 7 STUBNA D1 K1(SR) K2(DEA)

GOSR

ISFT 160/80A
V50-3+NPE-280
OBO-Bettermann
ISFT 160/40A

H07V-K 1x35 mm²
sa uzemljivačkog provodnika

NYCY 4x6 mm²
sa NN razvoda

ISFT 160/25A
NN

Pi = 1.484 W
k = 1,0
Pj = 1.484 W

NAPOMENE:

* - Signalne sijalice 220V u crvenoj boji na vratima ormana, za signalizaciju aktivnosti zona spoljne rasvjete (Z1 i Z2). Natpis iznad sijalica "komanda Z1" i " komanda Z2".

** - Signalne sijalice 220V u zelenoj boji na vratima ormana, za signalizaciju prisustva faza. Natpis iznad sijalica "L1", "L2" i "L3" .

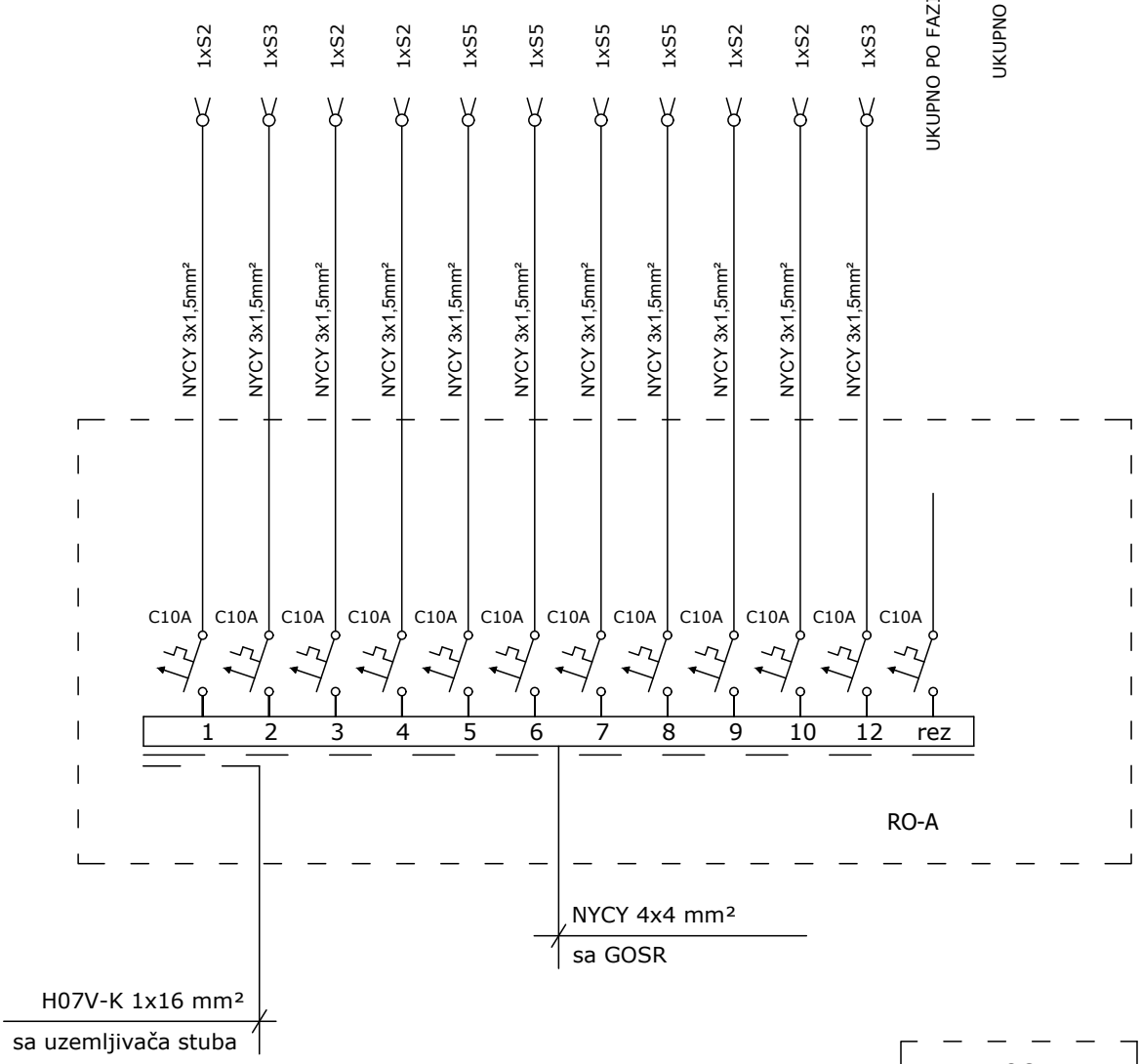
U ormanu ostaviti minimum 30% slobodnog prostora.

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: - // -
Datum izrade: 03.2025. god.	Prilog: Jednopolna šema ormana GOSR	Broj priloga: 8	Br. strane: xx

Upravljanje/kontrola zone 1

Upravljanje/kontrola zone 2

L3		44 W			25 W				44 W		44 W	157 W	408 W
L2	44 W		44 W			25 W				44 W		157 W	
L1				44 W			25 W	25 W				94 W	

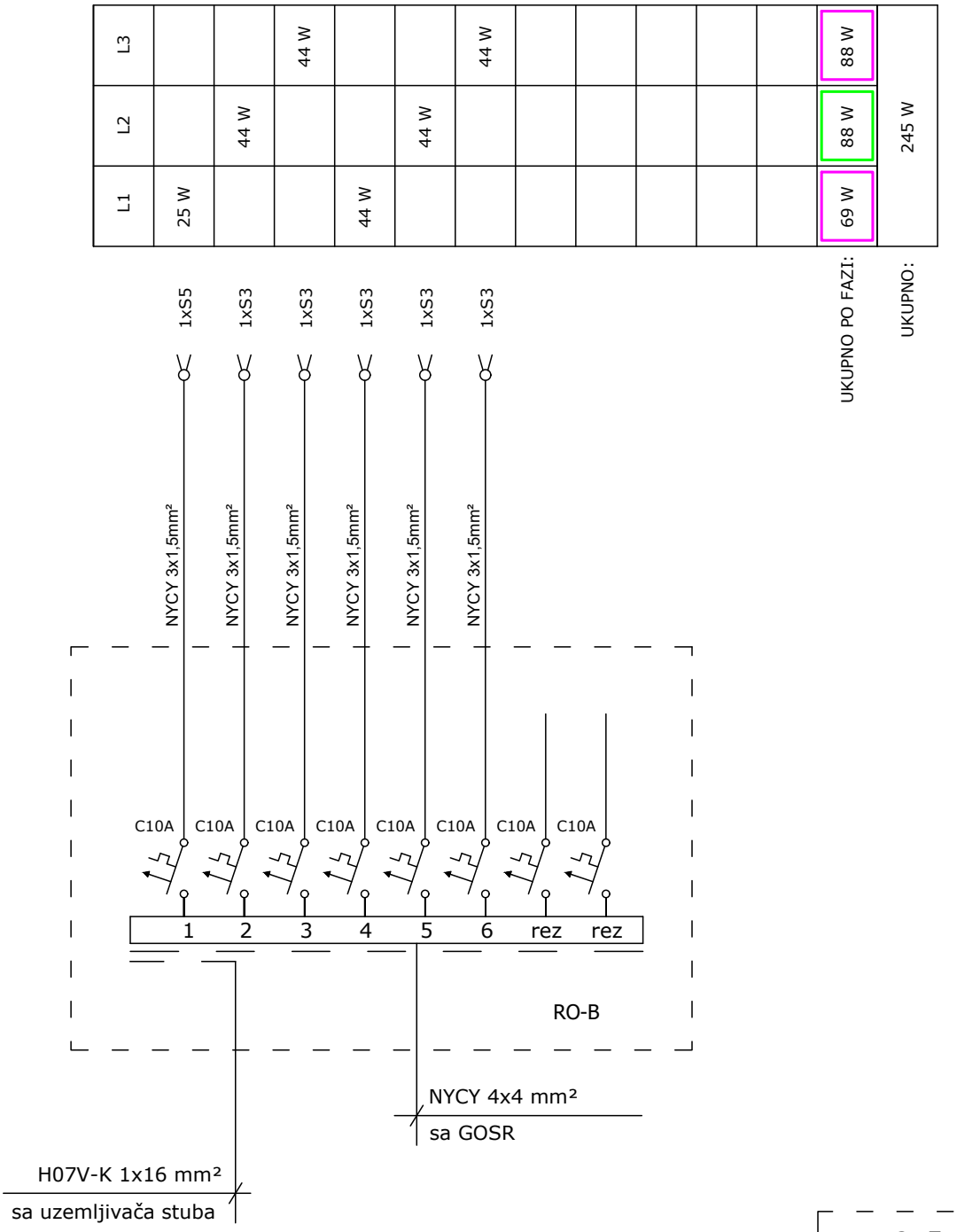


Pi = 408 W
k = 1,0
Pj = 408 W

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: - // -
Datum izrade: 03.2025. god.		Prilog: Jednopolna šema ormana RO-A	Broj priloga: 9 / Br. strane: xx

Upravljanje/kontrola zone 1

Upravljanje/kontrola zone 2



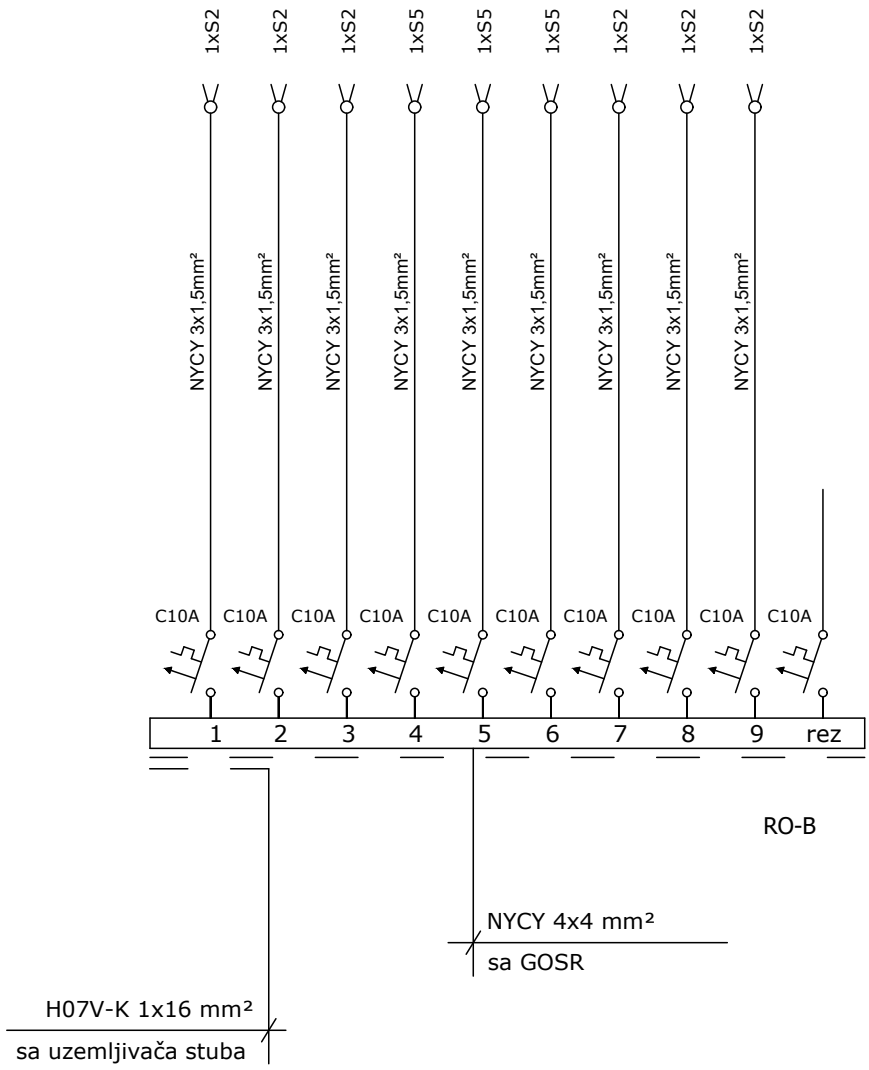
Pi = 245 W
k = 1,0
Pj = 245 W

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD
Objekat: Trafostanica 110/35 kV Bar	Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar
Pripremio: Blažo Janković, d.i.e.	Tehnička dokumentacija: Spoljna rasvjeta - TS Bar; Razmjera: - // -
Datum izrade: 03.2025. god.	Prilog: Jednopolna šema ormana RO-B; Broj priloga: 10; Br. strane: xx

Upravljanje/kontrola zone 1

Upravljanje/kontrola zone 2

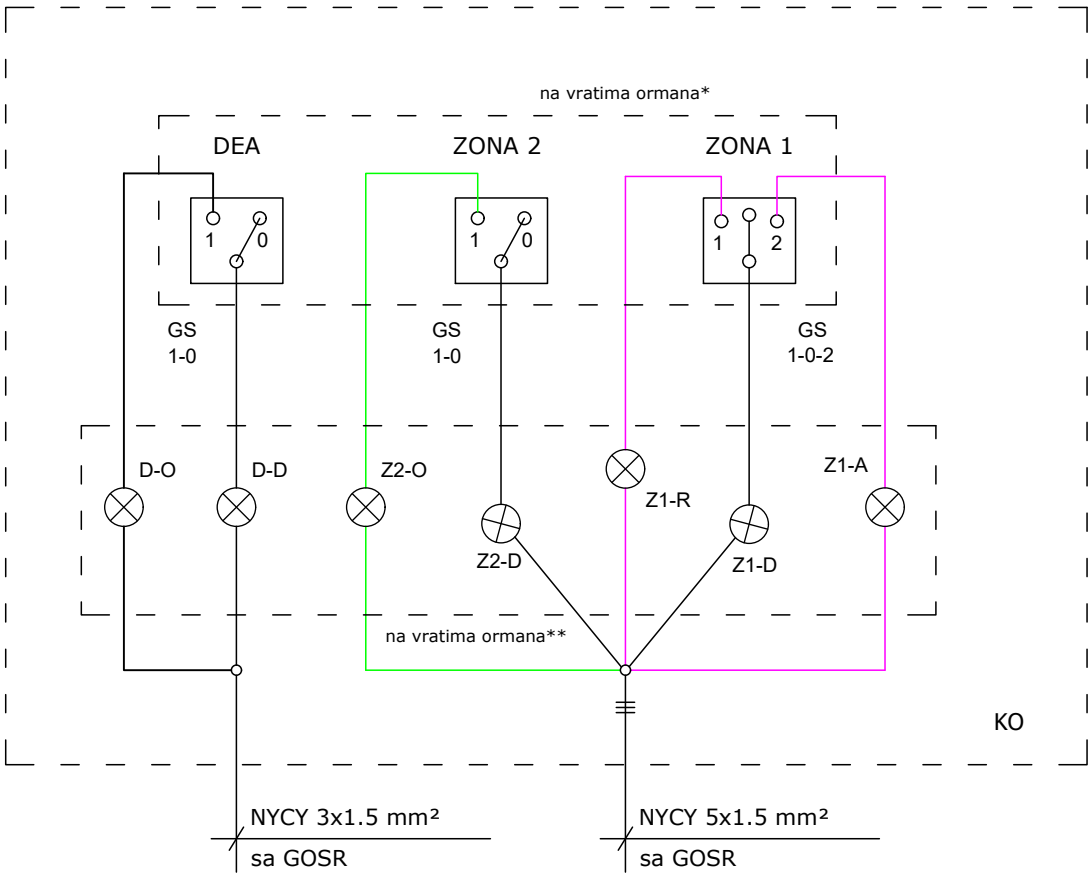
L3				25 W	25 W		44 W					94 W	339 W
L2		44 W				25 W		44 W				113 W	
L1	44 W		44 W						44 W			132 W	
												UKUPNO PO FAZI:	UKUPNO:



Pi = 339 W
k = 1,0
Pj = 339 W

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: - // -
Datum izrade: 03.2025. god.		Prilog: Jednopolna šema ormana RO-C	Broj priloga: 11 / Br. strane: xx

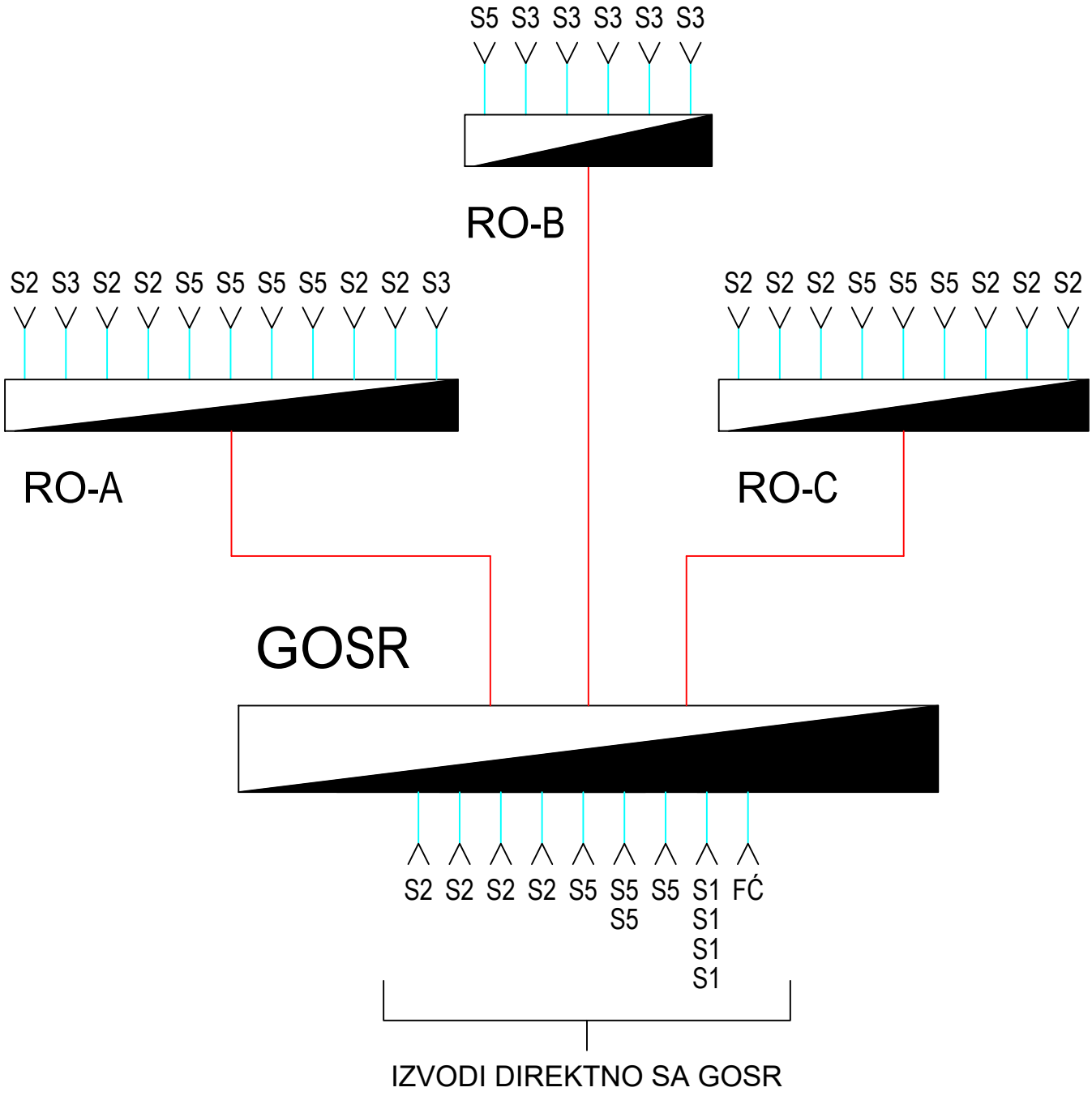
Upravljanje/kontrola zone 1
Upravljanje/kontrola zone 2



NAPOMENE:

* - Grebenaste sklopke na vratima ormana, za komandu aktivnosti zona spoljne rasvjete (Z1 i Z2).
Natpis iznad sijalica "komanda Z1" i " komanda Z2".
** - Signalne sijalice 220V na vratima ormana, za signalizaciju dovodnih i odvodnih signala:
Z1-D - Signalizacija dovoda signala Z1, zelene boje. Natpis "DOVOD Z1"
Z2-D - Signalizacija dovoda signala Z2, zelene boje. Natpis "DOVOD Z2 "
Z1-A - Signalizacija aktivacije signala Z1 - automatski režim, crvene boje. Natpis " Z1 AUTO "
Z1-R - Signalizacija aktivacije signala Z1 - ručni režim, crvene boje. Natpis " Z1 RUČNO "
Z2-O - Signalizacija aktivacije signala Z2, crvene boje. Natpis " Z2 UKLJUČENO "
D-D - Signalizacija dovoda signala DEA, zelene boje. Natpis " DOVOD DEA "
D-O - Signalizacija aktivacije signala DEA, crvene boje. Natpis " DEA UKLJUČENO "

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: - // -
Datum izrade: 03.2025. god.		Prilog: Jednopolna šema ormana KO	Broj priloga: 12 / Br. strane: xx



GOSR - Glavni orman spoljne rasvjete

RO-A - Razvodni orman - stub A

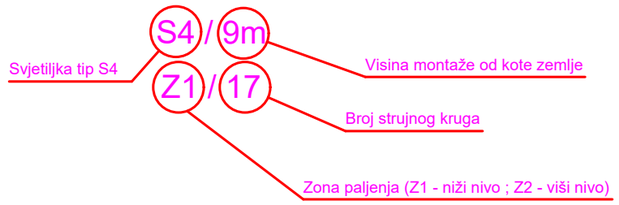
RO-B - Razvodni orman - stub B

NYCY 4x4mm2

NYCY 3x1.5mm2

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: - // -
Datum izrade: 03.2025. god.	Prilog: Blok šema napajanja SR	Broj priloga: 13	Br. strane: xx

LEGENDA OPREME NA CRTEŽIMA			količina
S1		Linijska svjetiljka 18W, difuzne emisije svijetla, opalnog difuzora, 2900lm, CRI80, 4000K, IP65 IK08, 230Vac, slična tipu 090380.5L10.021 ATLANTYK 2.0 BASIC, LUG Poljska.	4
S2		Reflektorska svjetiljka 44W, široko-asimetričnog snopa optike ASW, 6000lm, CRI70, 4000K, IP65 IK09, 230Vac, slična tipu 120212.5L181.41 POWERLUG MINI, LUG Poljska.	16
S3		Reflektorska svjetiljka 44W, usko-asimetričnog snopa optike ASN, 6300lm, CRI70, 4000K, IP65 IK09, 230Vac, slična tipu 120212.5L181.31 POWERLUG MINI, LUG Poljska.	7
S5		Reflektorska svjetiljka 25W, široko-asimetričnog snopa optike ASW, 3600lm, CRI70, 4000K, IP65 IK09, 230Vac, slična tipu 120212.5L171.41 POWERLUG MINI, LUG Poljska.	16
FĆ	FOTO	Foto-ćelija za paljenje/gašenje SR . Vanjska montaža za ugradnju na zid, minimalna zaštita IP44.	1
		Razvodni orman	4

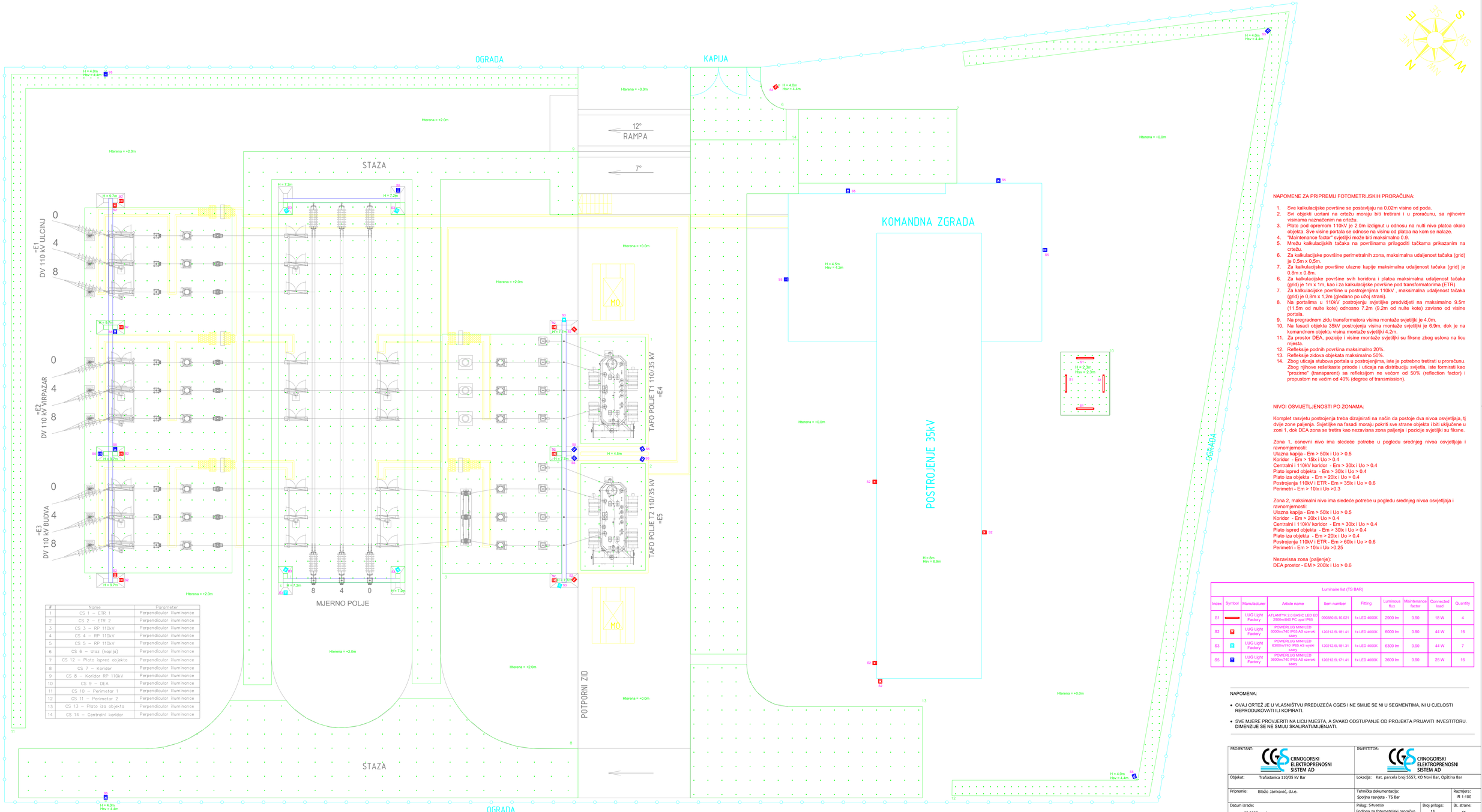
LEGENDA OZNAKE SVJETILJKI


LEGENDA OZNAKE ELEMENATA U TABLI GOSR	
KZ1-A	Kontaktor 2NO 25A - zona 1 - RO-A
KZ2-A	Kontaktor 1NO 25A - zona 2 - RO-A
KZ1-B	Kontaktor 2NO 25A - zona 1 - RO-B
KZ2-B	Kontaktor 1NO 25A - zona 2 - RO-B
KZ1-C	Kontaktor 2NO 25A - zona 1 - RO-C
KZ2-C	Kontaktor 1NO 25A - zona 2 - RO-C
KZ1-F1	Kontaktor 2NO 25A - zona Z1 - Fasada objekta 2
KZ1-F2	Kontaktor 2NO 25A - zona Z1 - Fasada objekta 1
KZ1-F3	Kontaktor 3NO 25A - zona Z1 - Fasada objekta 1
KZ1-S	Kontaktor 1NO 25A - zona Z1 - Rasvjeta na stubovima
K-DEA	Kontaktor 1NO 25A - DEA - prostor agregata
GS 1-0	Grebenasta sklopka/prekidač na vratima ormana 1-0, 1P, 20A, 230V
GS 1-0-2	Grebenasta sklopka/izbornik položaja na vratima ormana 1-0-2, 1P, 20A, 230V
⊗	Signalna sijalica 220V
FĆ	Foto-ćelija na fasadi objekta.
	Upravljanje/kontrola zone 1
	Upravljanje/kontrola zone 2

NAPOMENA:

- OVAJ CRTEŽ JE U VLASNIŠTVU PREDUZEĆA MONCORE DOO I NE SMIJE SE NI U SEGMENTIMA, NI U CJELOSTI REPRODUKOVATI ILI KOPIRATI.
- SVE MJERE PROVJERITI NA LICU MJESTA, A SVAKO ODSTUPANJE OD PROJEKTA PRIJAVITI PROJEKTANTU. DIMENZIJE SE NE SMIJU SKALIRATI/MIJENJATI.

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		
Objekat: Trafostanica 110/35 kV Bar	Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar		
Pripremio: Blažo Janković, d.i.e.	Tehnička dokumentacija: Spoljna rasvjeta - TS Bar		Razmjera: - // -
Datum izrade: 10.2024. god.	Prilog: Legenda opreme	Broj priloga: 14	Br. strane: xx



#	Name	Parameter
1	CS 1 – ETR 1	Perpendicular Illuminance
2	CS 2 – ETR 2	Perpendicular Illuminance
3	CS 3 – RP 110kV	Perpendicular Illuminance
4	CS 4 – RP 110kV	Perpendicular Illuminance
5	CS 5 – RP 110kV	Perpendicular Illuminance
6	CS 6 – Ulaz (kapija)	Perpendicular Illuminance
7	CS 12 – Plato ispred objekta	Perpendicular Illuminance
8	CS 7 – Koridor	Perpendicular Illuminance
9	CS 8 – Koridor RP 110kV	Perpendicular Illuminance
10	CS 9 – DEA	Perpendicular Illuminance
11	CS 10 – Perimetar 1	Perpendicular Illuminance
12	CS 11 – Perimetar 2	Perpendicular Illuminance
13	CS 13 – Plato iza objekta	Perpendicular Illuminance
14	CS 14 – Centralni koridor	Perpendicular Illuminance

NAPOMENE ZA PRIPREMU FOTOMETRIJSKIH PRORAČUNA:

1. Sve kalkulacijske površine se postavljaju na 0.02m visine od poda.
2. Svi objekti uctani na crtežu moraju biti tretirani i u proračunu, sa njihovim visinama naznačenim na crtežu.
3. Plato pod opremom 110kV je 2.0m izdignut u odnosu na nulti nivo platoa okolo objekta. Sve visine portala se odnose na visinu od platoa na kom se nalaze.
4. "Maintenance factor" svjetljki može biti maksimalno 0.9.
5. Mrežu kalkulacijskih tačaka na površinama prilagoditi tačkama prikazanim na crtežu.
6. Za kalkulacijske površine perimetralnih zona, maksimalna udaljenost tačaka (grid) je 0,5m x 0,5m.
7. Za kalkulacijske površine ulazne kapije maksimalna udaljenost tačaka (grid) je 0.8m x 0.8m.
6. Za kalkulacijske površine svih koridora i platoa maksimalna udaljenost tačaka (grid) je 1m x 1m, kao i za kalkulacijske površine pod transformatorima (ETR).
7. Za kalkulacijske površine u postrojenjima 110kV , maksimalna udaljenost tačaka (grid) je 0,8m x 1.2m (gledano po užoj strani).
8. Na portalima u 110kV postrojenju svjetiljke predvidjeti na maksimalno 9.5m (11.5m od nulte kote) odnosno 7.2m (9.2m od nulte kote) zavisno od visine portala.
9. Na pregradnom zidu transformatora visina montaže svjetiljki je 4.0m.
10. Na fasadi objekta 35kV postrojenja visina montaže svjetiljki je 6.9m, dok je na komandnom objektu visina montaže svjetiljki 4.2m.
11. Za prostor DEA, pozicije i visine montaže svjetiljki su fiksne zbog uslova na licu mjesta.
12. Refleksije podnih površina maksimalno 20%.
13. Refleksije zidova objekata maksimalno 50%.
14. Zbog uticaja stubova portala u postrojenjima, iste je potrebno tretirati u proračunu. Zbog njihove rešetkaste prirode i uticaja na distribuciju svjetla, iste formirati kao "prozirne" (transparent) sa refleksijom ne većom od 50% (reflection factor) i propustom ne većim od 40% (degree of transmission).

NIVOI OSVIJETLJENOSTI PO ZONAMA:

Komplet rasvjetu postrojenja treba dizajnirati na način da postoje dva nivoa osvjetljaja, tj dvije zone paljenja. Svjetiljke na fasadi moraju pokriti sve strane objekta i biti uključene u zoni 1, dok DEA zona se tretira kao nezavisna zona paljenja i pozicije svjetiljki su fiksne.

Zona 1, osnovni nivo ima sledeće potrebe u pogledu srednjeg nivoa osvjetljaja i ravnomjernosti:
Ulazna kapija - Em > 50lx i Uo > 0.5
Koridor - Em > 15lx i Uo > 0.4
Centralni i 110kV koridor - Em > 30lx i Uo > 0.4
Plato ispred objekta - Em > 30lx i Uo > 0.4
Plato iza objekta - Em > 20lx i Uo > 0.4
Postrojenja 110kV i ETR - Em > 35lx i Uo > 0.6
Perimetri - Em > 10lx i Uo >0.3

Zona 2, maksimalni nivo ima sledeće potrebe u pogledu srednjeg nivoa osvjetljaja i ravnomjernosti:
Ulazna kapija - Em > 50lx i Uo > 0.5
Koridor - Em > 20lx i Uo > 0.4
Centralni i 110kV koridor - Em > 30lx i Uo > 0.4
Plato ispred objekta - Em > 30lx i Uo > 0.4
Plato iza objekta - Em > 20lx i Uo > 0.4
Postrojenja 110kV i ETR - Em > 80lx i Uo > 0.6
Perimetri - Em > 10lx i Uo >0.25

Nezavisna zona (paljenje):
DEA prostor - EM > 200lx i Uo > 0.6

Luminaire list (TS BAR)

Index	Symbol	Manufacturer	Article name	Item number	Fitting	Luminous flux	Maintenance factor	Connected load	Quantity
S1		LUG Light Factory	ATLANTYK 2.0 BASIC LED EO 2900lm/840 PC opal IP65	090380.SL10.021	1x LED 4000K	2900 lm	0.90	18 W	4
S2	E	LUG Light Factory	POWERLUG MINI LED 6000lm/740 IP65 AS sivi/crni szary	120212.SL181.41	1x LED 4000K	6000 lm	0.90	44 W	16
S3	E	LUG Light Factory	POWERLUG MINI LED 6300lm/740 IP65 AS wyski szary	120212.SL181.31	1x LED 4000K	6300 lm	0.90	44 W	7
S5	E	LUG Light Factory	POWERLUG MINI LED 3600lm/740 IP65 AS sivi/crni szary	120212.SL171.41	1x LED 4000K	3600 lm	0.90	25 W	16

NAPOMENA:

- OVAJ CRTEŽ JE U VLASNIŠTVU PREDUZEĆA CGES I NE SMIJE SE NI U SEGMENTIMA, NI U CJELOSTI REPRODUKOVATI ILI KOPIRATI.
- SVE MJERE PROVJERITI NA LICU MJESTA, A SVAKO ODSTUPANJE OD PROJEKTA PRIJAVITI INVESTITORU. DIMENZIJE SE NE SMIJU SKALIRATI/MIJENJATI.

PROJEKTANT: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD		INVESTITOR: CRNOGORSKI ELEKTROPRENOSNI SISTEM AD	
Objekat: Trafostanica 110/35 kV Bar		Lokacija: Kat. parcela broj 5557, KO Novi Bar, Opština Bar	
Pripremio: Blažo Janković, d.i.e.		Tehnička dokumentacija: Spoljna rasvjeta - TS Bar	Razmjera: R 1:100
Datum izrade: 03.2025. god.		Prilog: Situacija Podloga za fotometrijski proračun	Broj priloga: 15 / Br. strane: xx