SimCosm

Combined Lighting Case Study

SimCosm India Pvt. Ltd.

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Sample Lighting Case Study

- Case Assumptions
- Analysis Goals & Targets
- Snapshots Of Model
- Results
- Conclusions

Case Assumptions

- Space Area: 300 m²
- Location: Pune, India
- Analysis type: LEED Daylighting, Artificial Lighting Design for Night Working & Combined Day Lighting Design
- Window opening area: 70.25 m² (Double 6mm Clear Float Glass Used)
- Artificial Lighting Used: Philips Luminaire (2 x 35W Tubes)

Luminaire Used

PHILIPS

TCS 600/D7/235

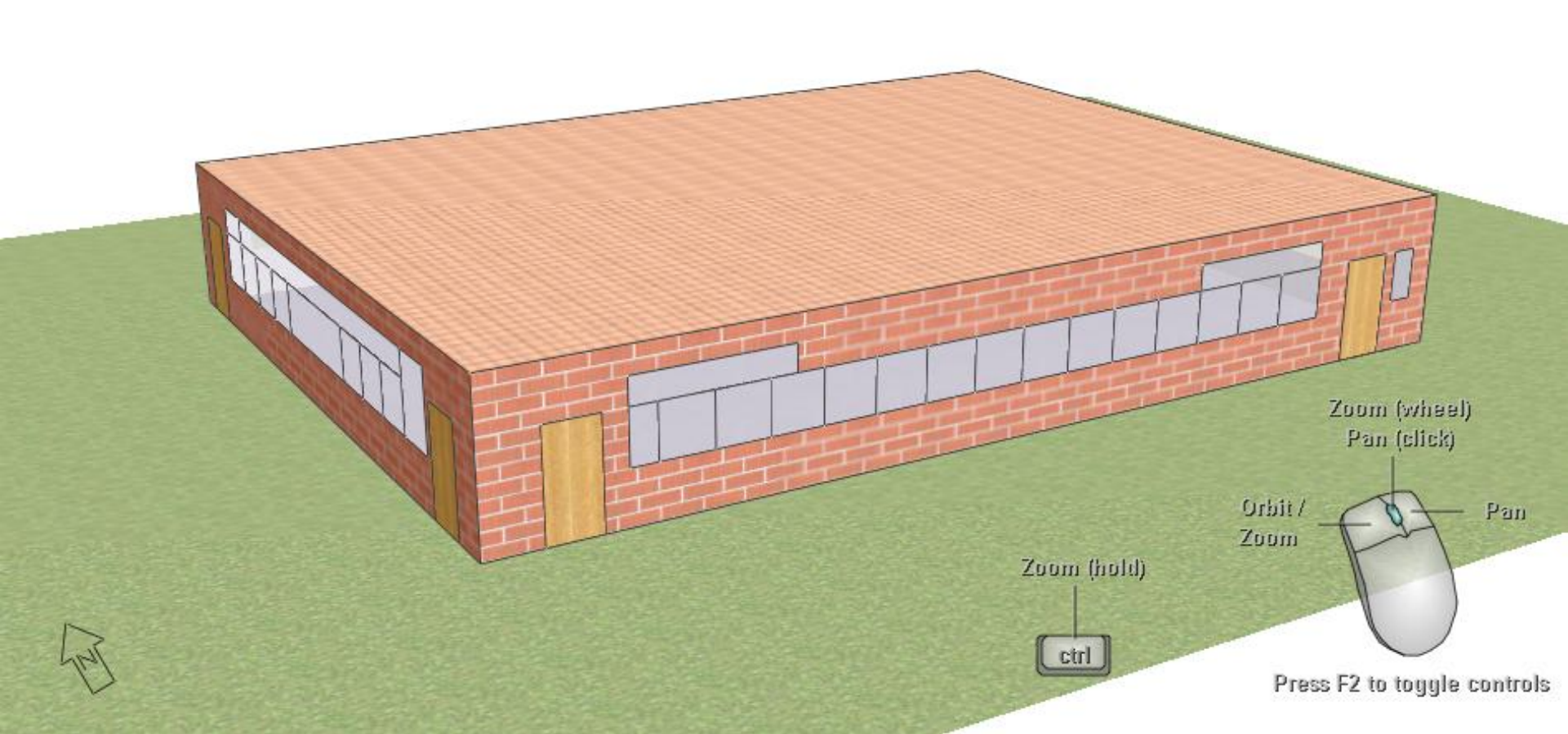
Type	Lamp	Net Wt. (kg)	Packing dimensions (mm)	Qty per box	Ordering number
TCS600/HF-P C7/60	1 x 'TL'5 28W			1	9104 015 52003
TCS600/HF-P D7/60	1 x 'TL'5 28W			1	9104 015 52103
TCS600/HF-P M1P	1 x 'TL'5 28W			1	9104 015 52403
TCS600/HF-P MD	1 x 'TL'5 28W			1	9104 015 51803
TCS600/HF-P D7/60	1 x 'TL'5 28W			1	9104 015 51103
TCS600/HF-P C7/60	1 x 'TL'5 35W			1	9104 015 50803
TCS600/HF-P D7/60	1 x 'TL'5 35W			1	9104 015 52203
TCS600/HF-P M1P	1 x 'TL'5 35W			1	9104 015 51703
TCS600/HF-P MD	1 x 'TL'5 35W			1	9104 015 50903
TCS600/HF-P C7/60	2 x 'TL'5 28W			1	9104 015 51603
TCS600/HF-P D7/60	2 x 'TL'5 28W			1	9104 015 52503
TCS600/HF-P M1P	2 x 'TL'5 28W			1	9104 015 51903
TCS600/HF-P D7/60	2 x 'TL'5 28W			1	9104 015 51403
TCS600/HF-P C7/60	2 x 'TL'5 35W			1	9104 015 50703
TCS600/HF-P C7/60	2 x 'TL'5 35W			1	9104 015 51503
TCS600/HF-P D7/60	2 x 'TL'5 35W			1	9104 015 52303
TCS600/HF-P M1P	2 x 'TL'5 35W			1	9104 015 51203
TCS600/HF-P MD	2 x 'TL'5 35W			1	9104 015 51003
TCS600/HF-P D7/60	2 x 'TL'5 35W			1	9104 015 51303

All 230V/50Hz. Other voltages/Hz are available on request.

Analysis Goals & Targets

- Daylighting analysis of space has to be done
- LEED Daylighting credit should be obtained
- Artificial lighting analysis should be done for night working
- Combined lighting analysis has to be done for calculating lighting saving
- Target lux on working plane: 300 lux
- Working plane height: 0.85m

Base Model – A Simple Space



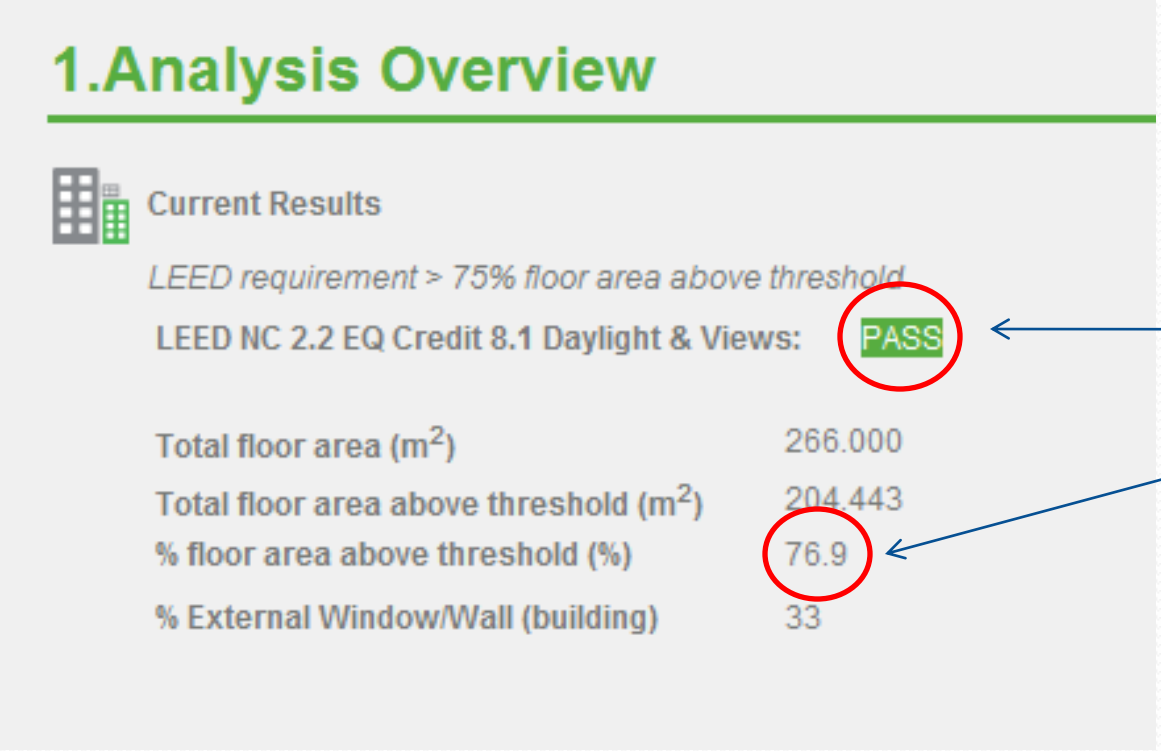
Base Model – A Simple Space

Results

LEED Daylighting

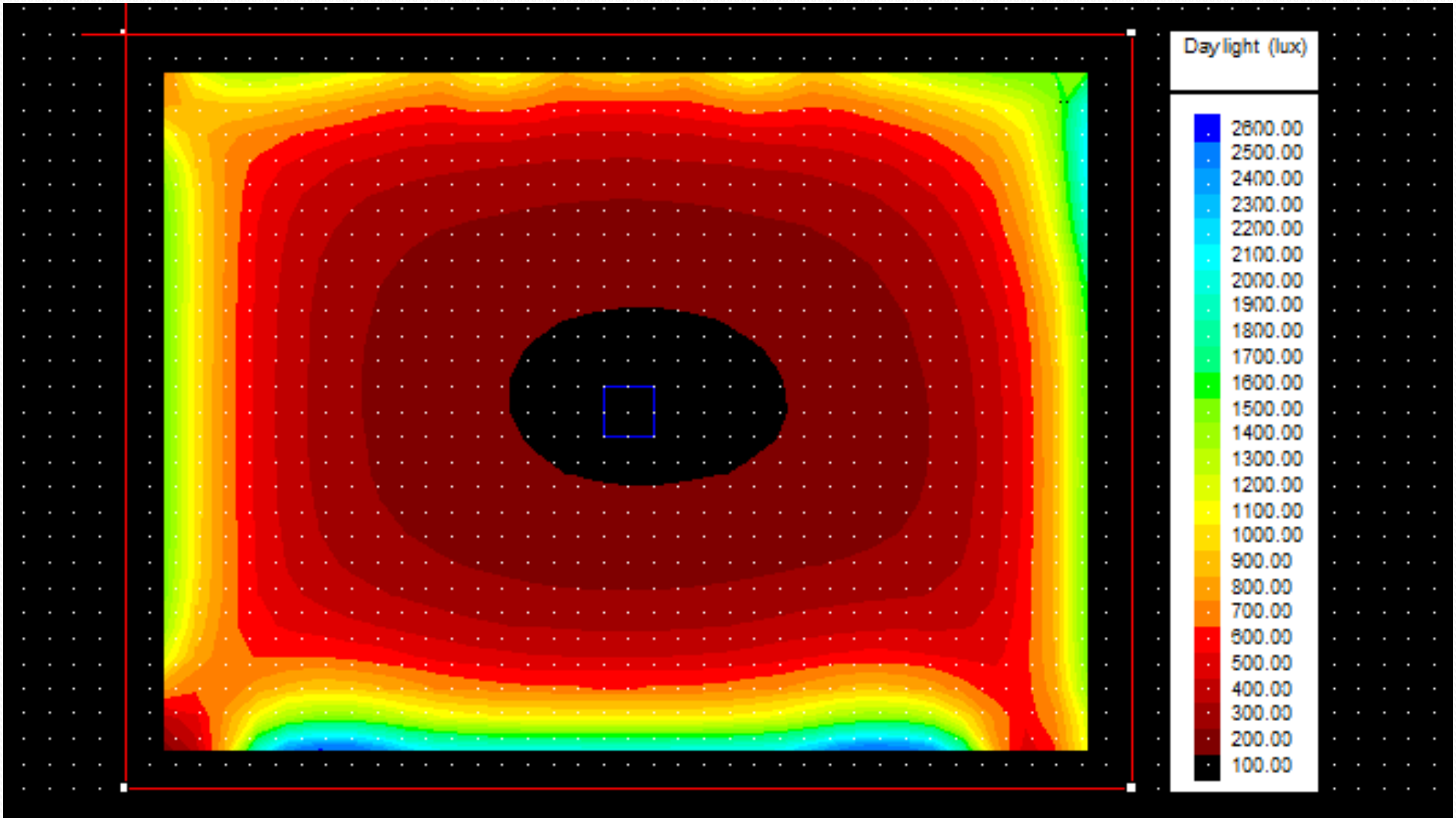
Direct Reportage using ***IES FlucsPro***

LEED Daylighting Results

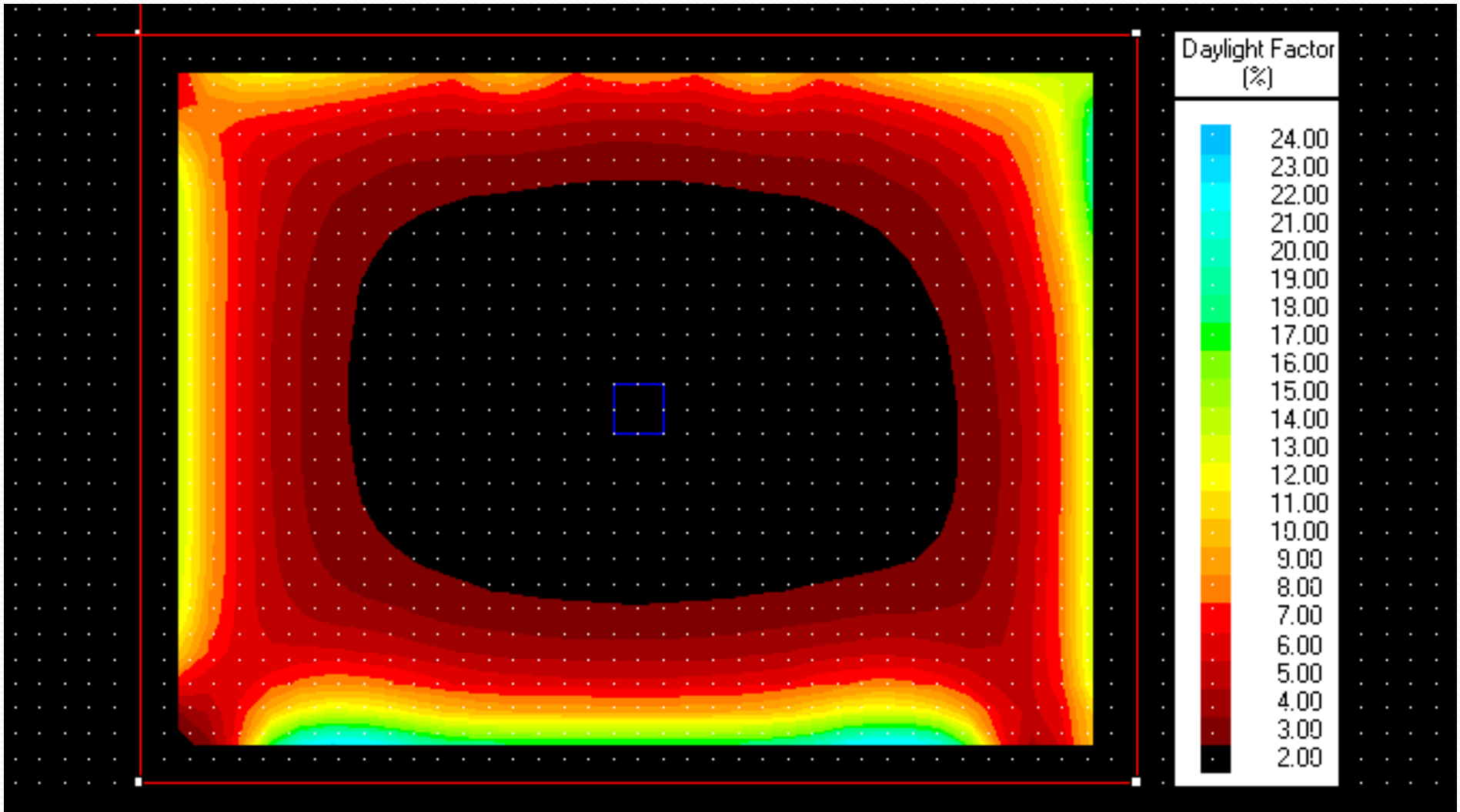


Design passes the credit

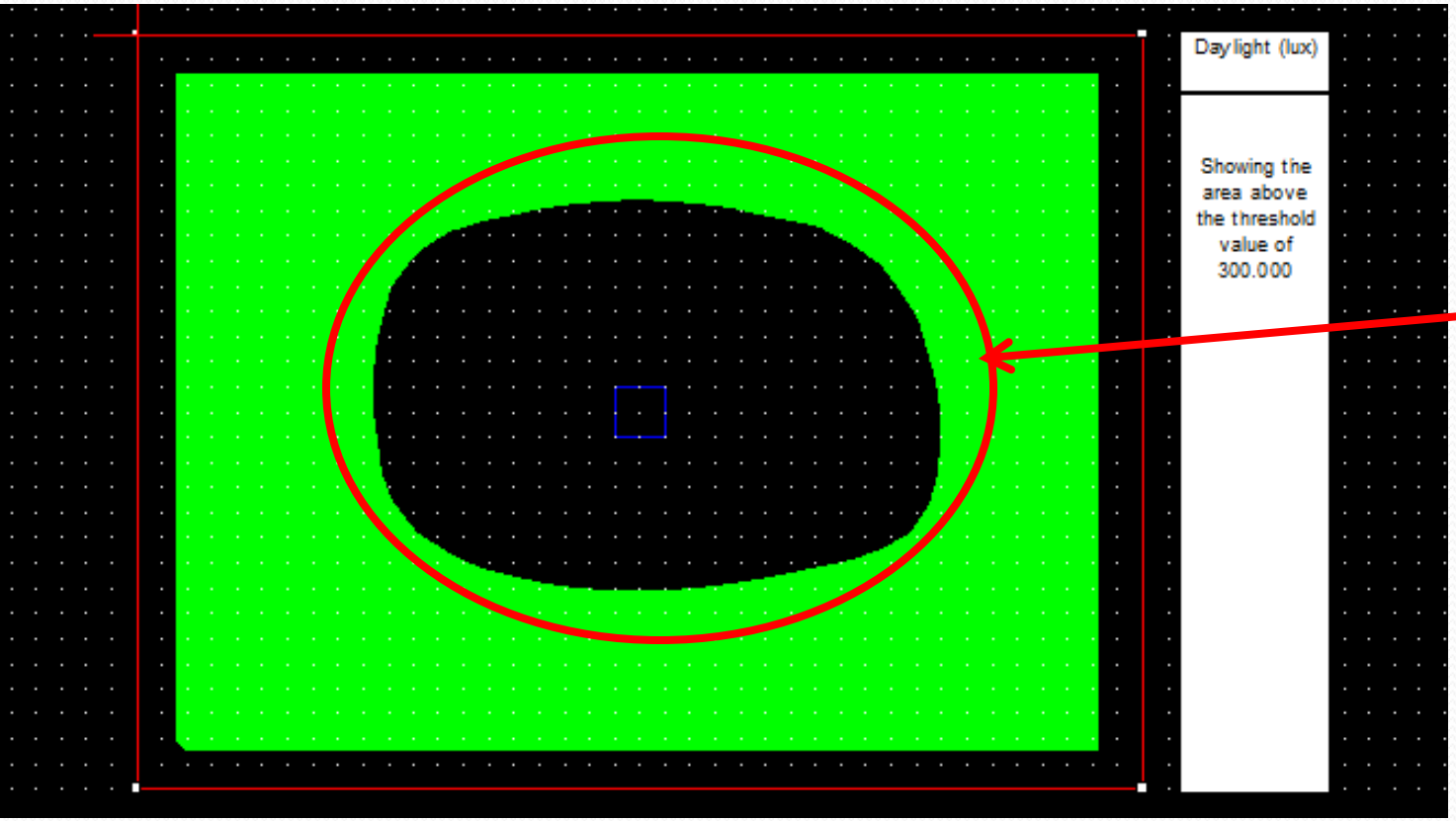
LEED Daylighting Results



LEED Daylighting Results



LEED Daylighting Results



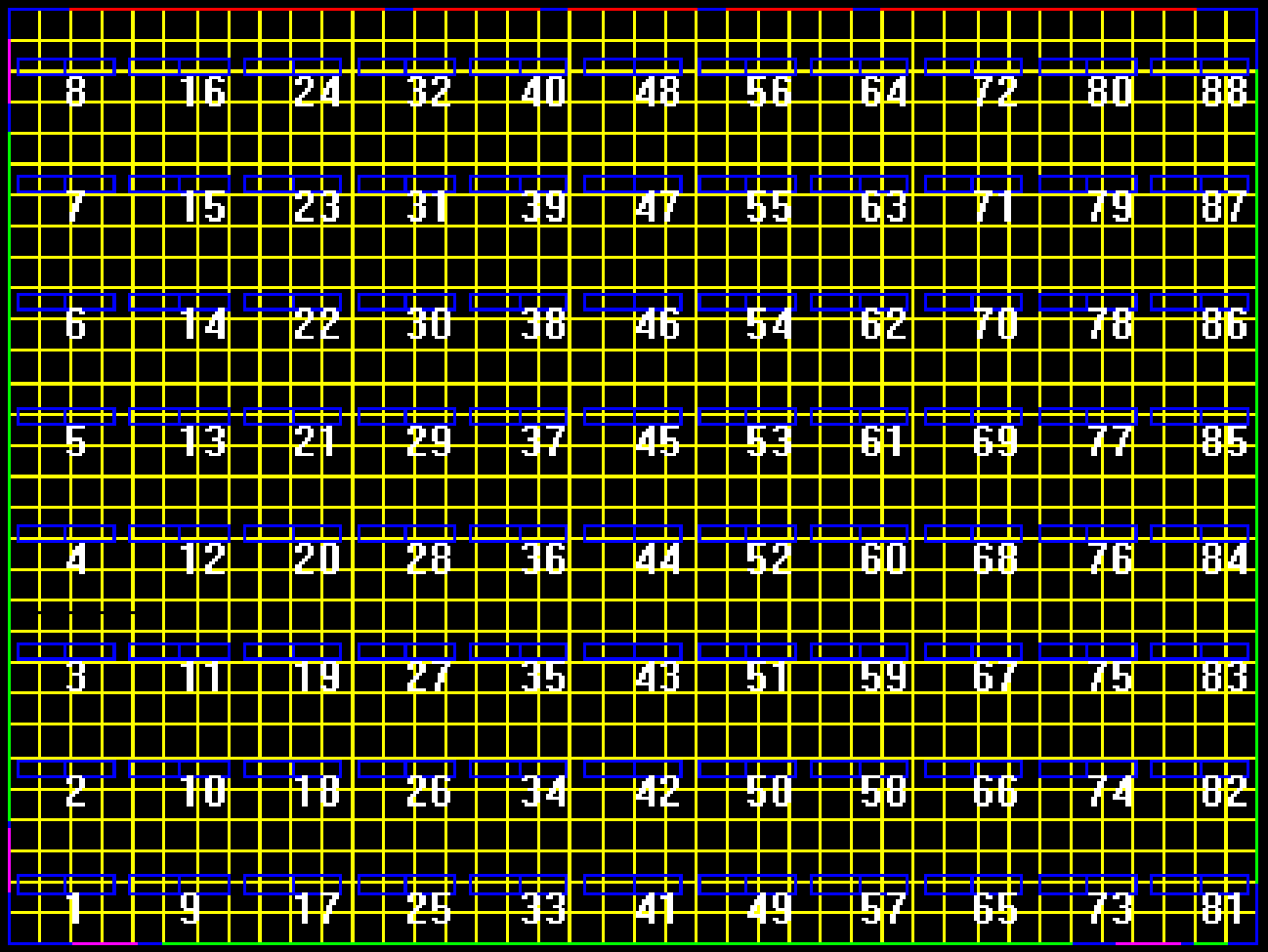
Although we pass the LEED daylighting credit, this space does not meet design criteria of 300 lux during the day.

This means that artificial lighting WILL be required in day time

Results

Artificial Lighting Case For Night Working Analysis Using ***IES LightPro & IES FlucsPro***

Artificial Lighting



Lighting array shown.

Design calculation in ***FlucsPro*** shows that 88 luminaries would be required to satisfy design criteria in night time

Artificial Lighting

Summary results for working planes and floor

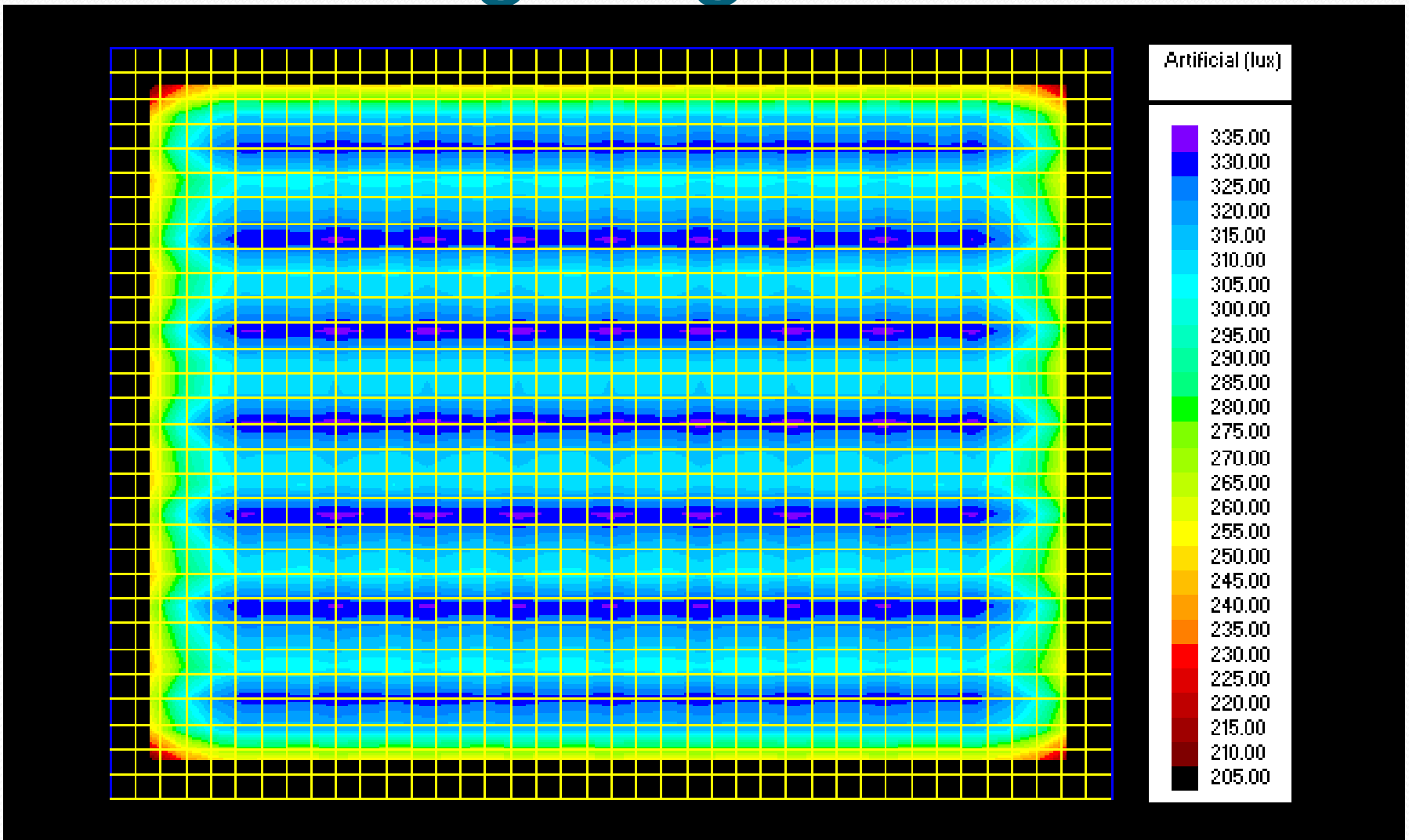
Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.61 m Area=266.000m² Margin=0.50 m	Artificial illuminance	205.89 lux	308.87 lux	337.08 lux	0.67	0.61
	Daylight factor	0.0 %	0.0 %	0.0 %	0.00	0.00
	Daylight illuminance	0.00 lux	0.00 lux	0.00 lux	0.00	0.00
	Total illuminance	205.89 lux	308.87 lux	337.08 lux	0.67	0.61

No daylighting numbers here as we have done analysis for night time only

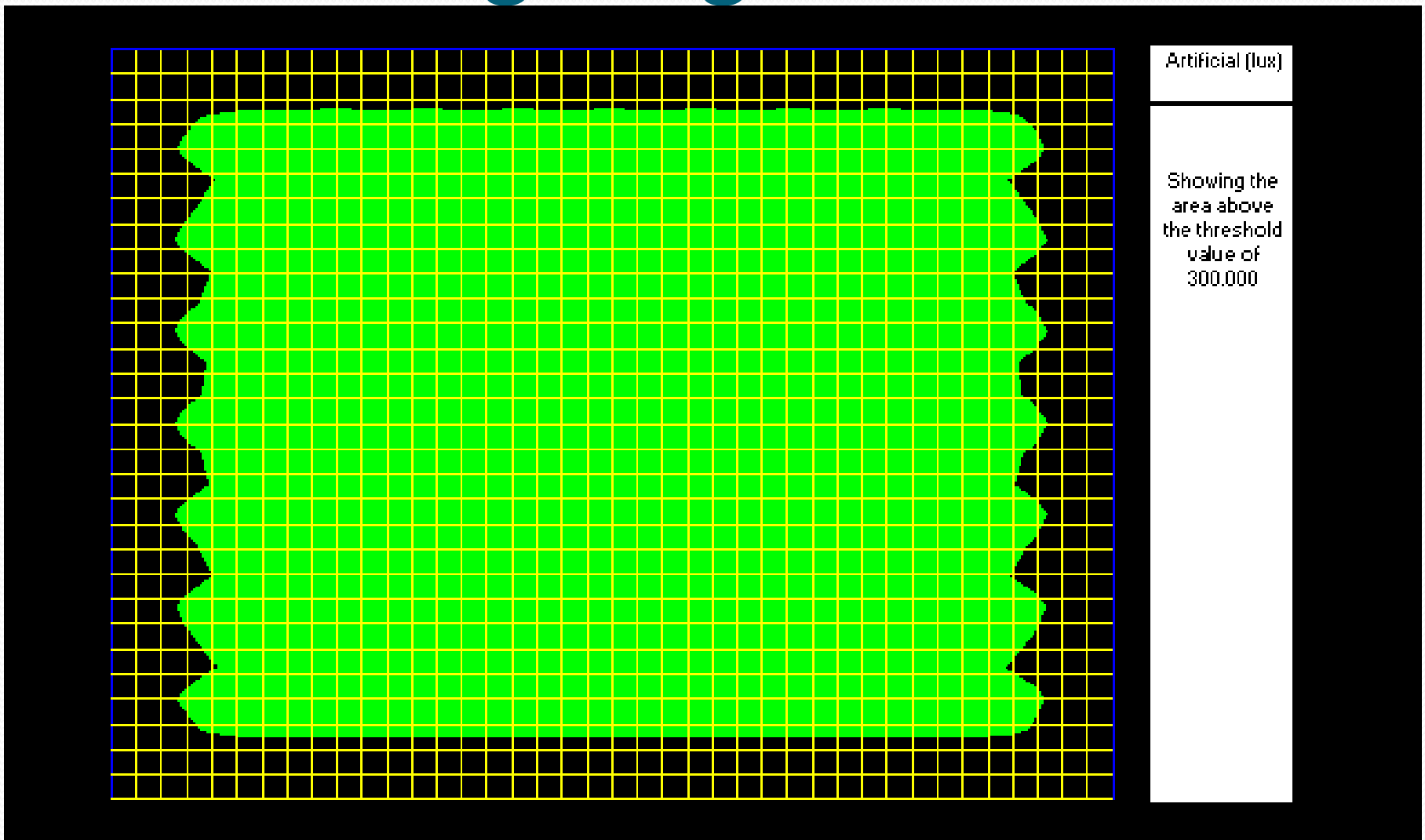
Luminous efficacy for each working plane

Name	Total bare flux (lm)	Total luminaire power (W)	Power density (W/m²)	Power density (W/m²/(100 lux))	Luminous efficacy (lm/W)
Working plane 1	176000.00	7040.00	23.47	7.60	25.00

Artificial Lighting



Artificial Lighting



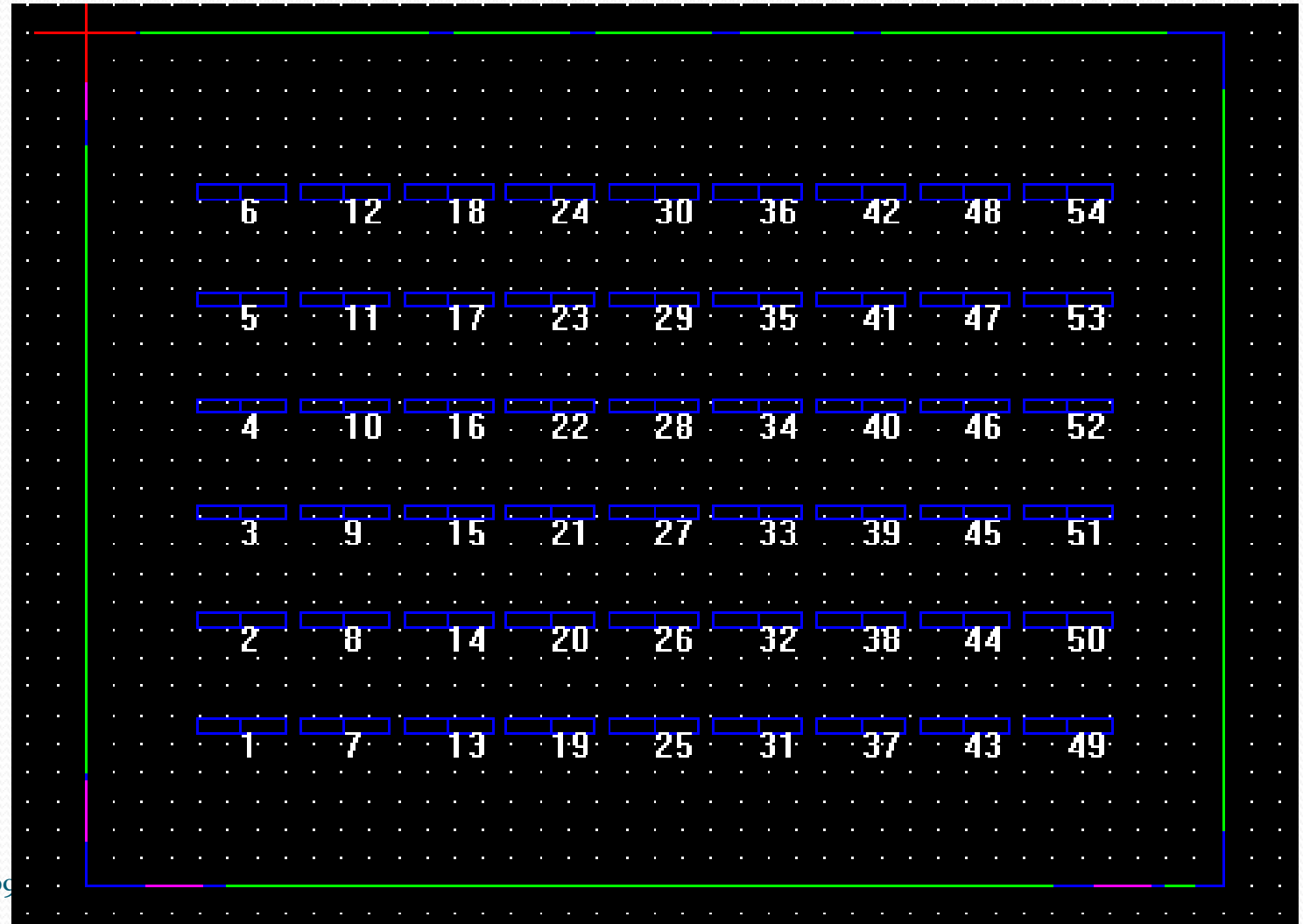
Results

Combined Daylighting & Artificial Lighting

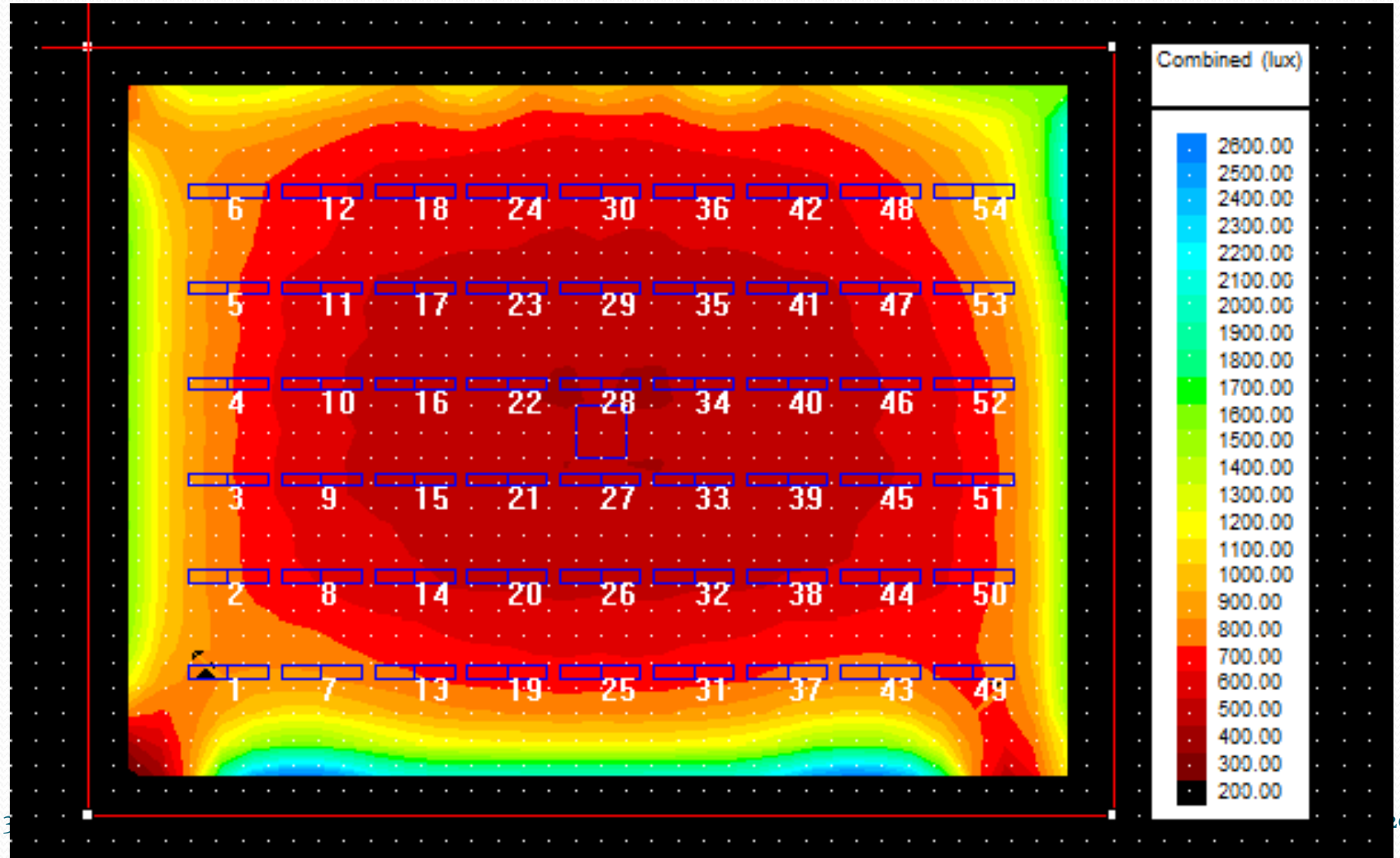
Case 1: Removing 34 Luminaries

Analysis Using ***IES LightPro & IES FlucsPro***

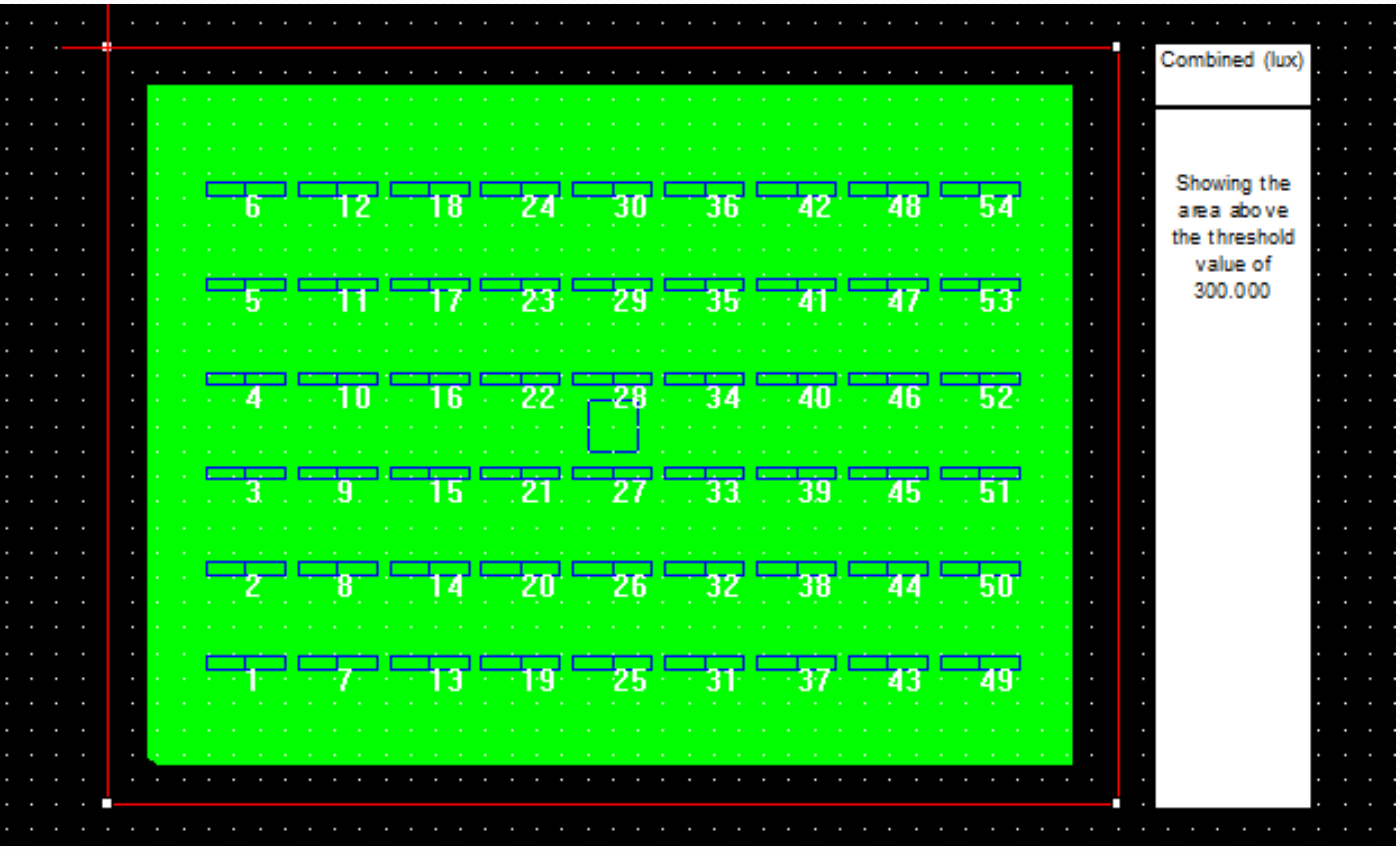
Combined Lighting – Removing Luminaries Adjacent To Windows



Combined Lighting – Removing Luminaries Adjacent To Windows



Combined Lighting – Removing Luminaries Adjacent To Windows



Combined lux threshold plot now shows absence or previous void as seen in Slide 12

Thus, criteria is satisfied

Next, question, can we reduce more luminaries?

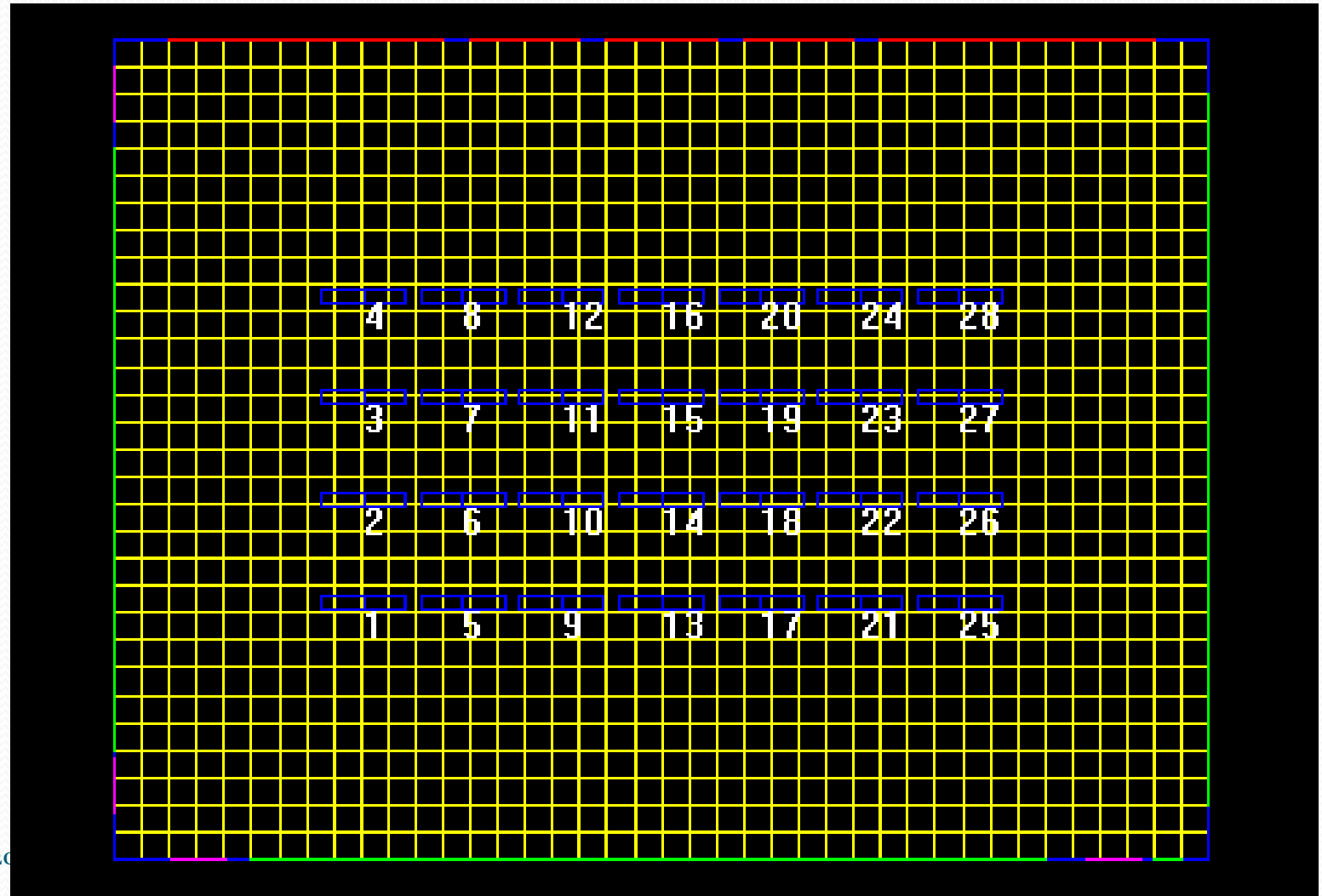
Results

Combined Daylighting & Artificial Lighting

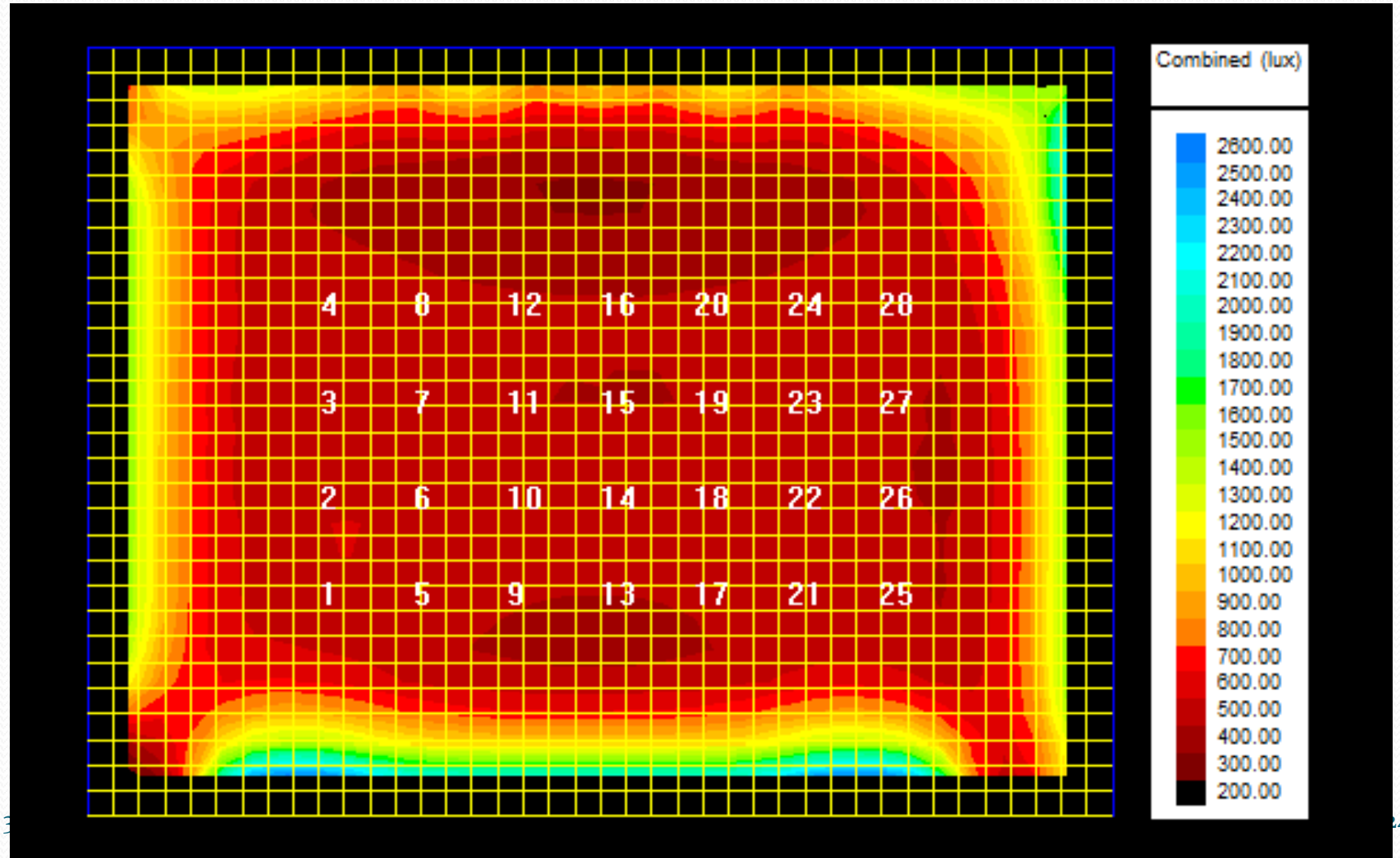
Removing 60 Luminaries

Analysis Using ***IES LightPro & IES FlucsPro***

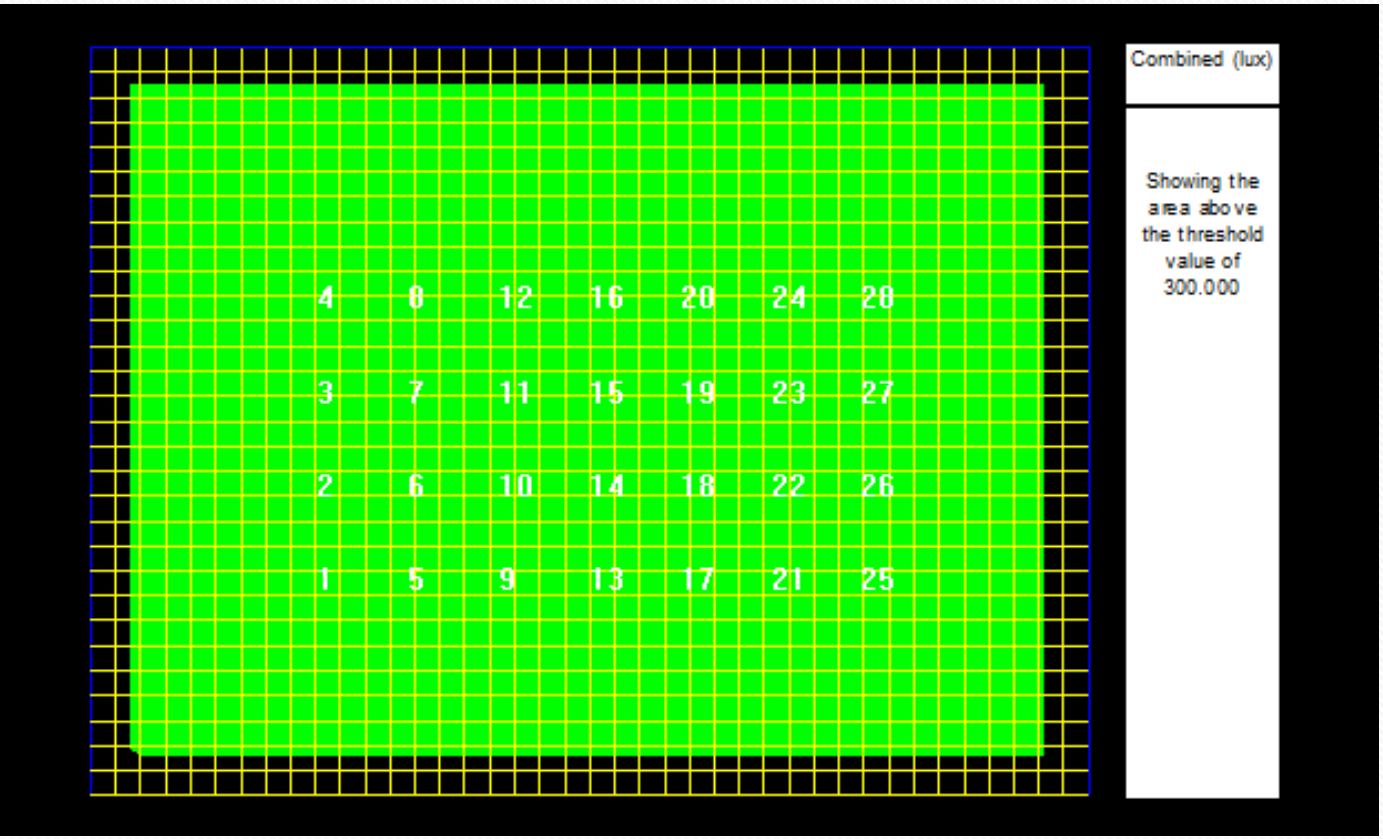
Combined Lighting – Removing 2 Rows Of Luminaries Adjacent To Windows



Combined Lighting – Removing 2 Rows Of Luminaries Adjacent To Windows



Combined Lighting – Removing 2 Rows Of Luminaries Adjacent To Windows



This plot too shows achievement of design criteria

Next, question, can we reduce further?

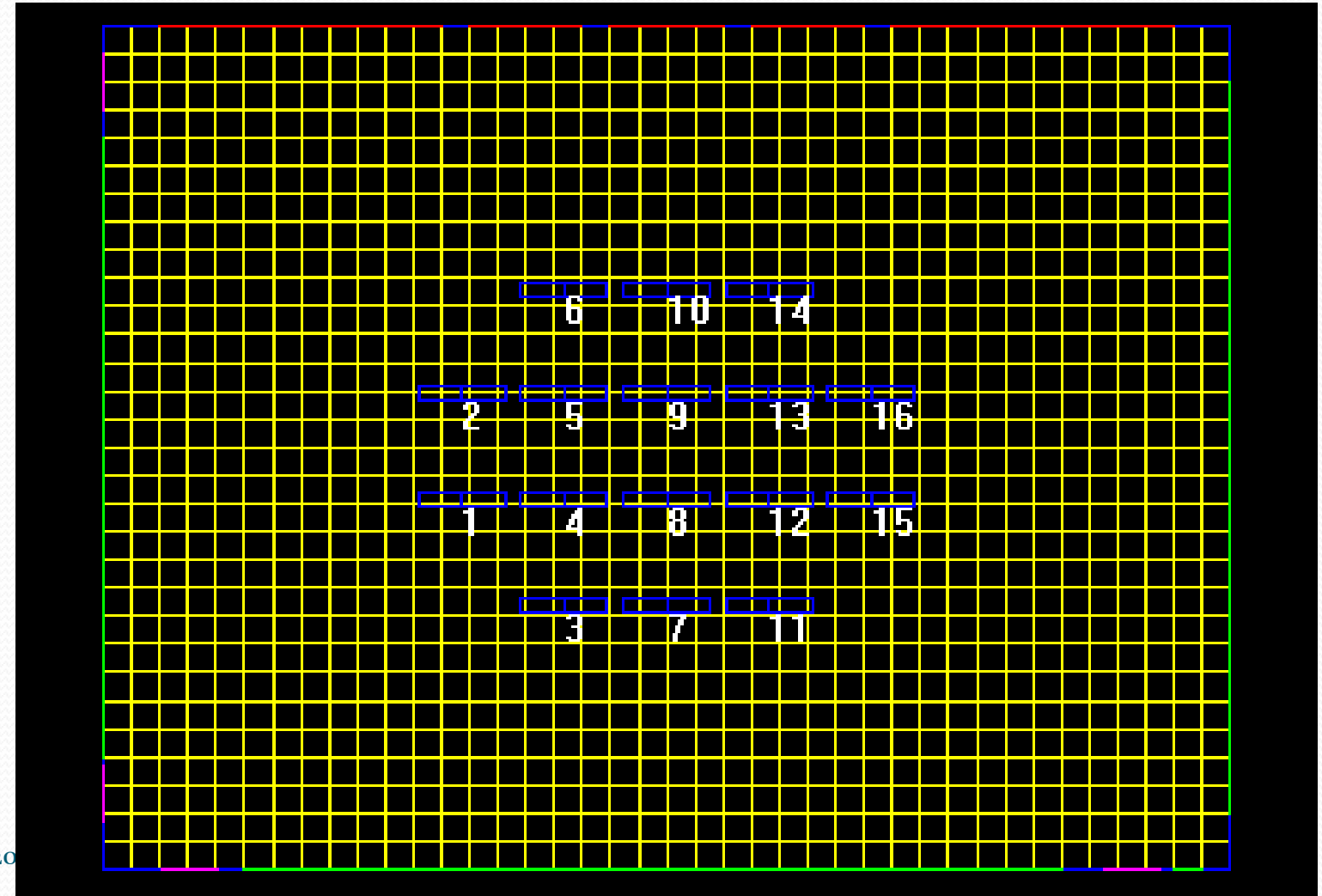
Results

Combined Daylighting & Artificial Lighting

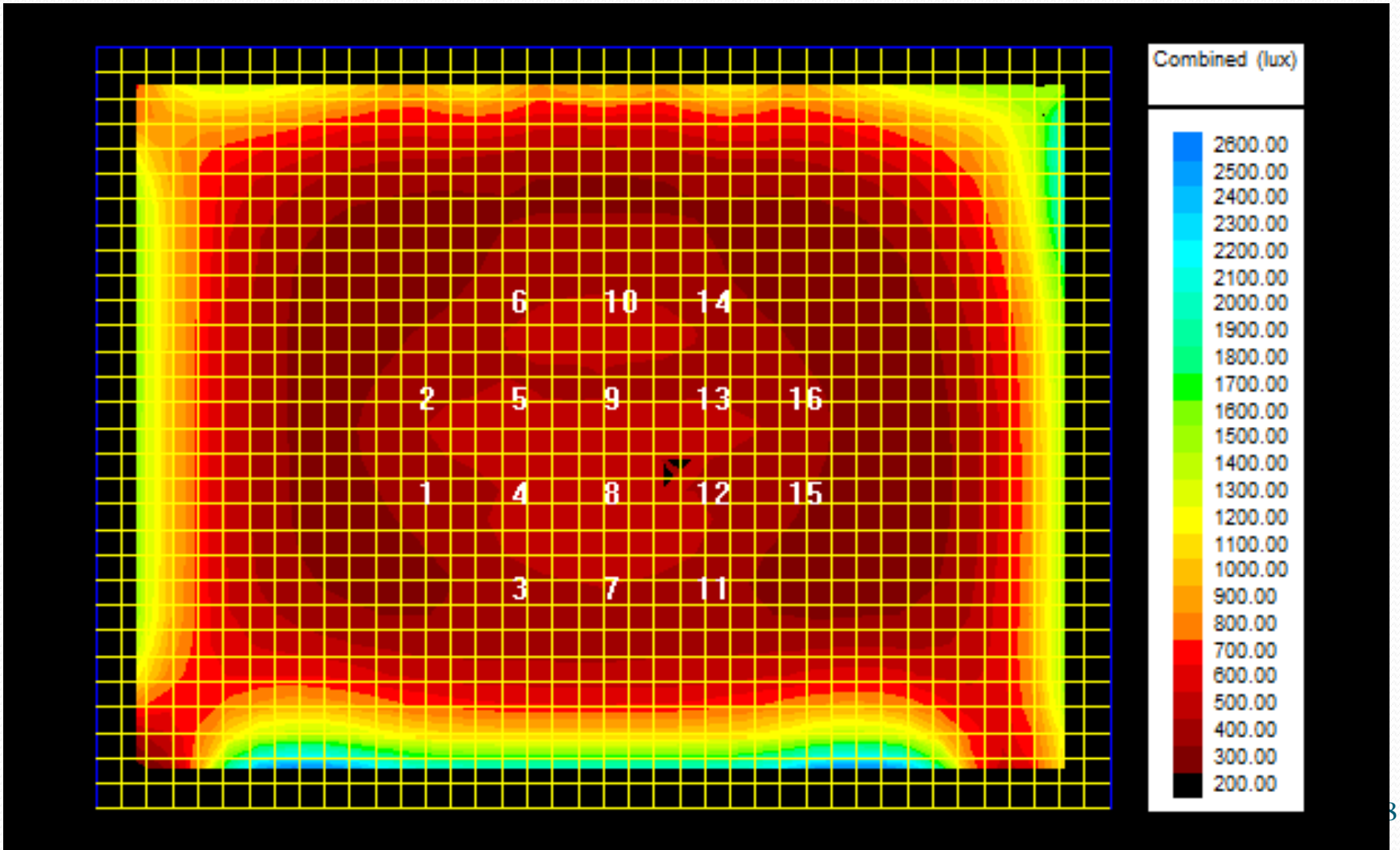
Final Case After Removing 72 Luminaries

Analysis Using ***IES LightPro & IES FlucsPro***

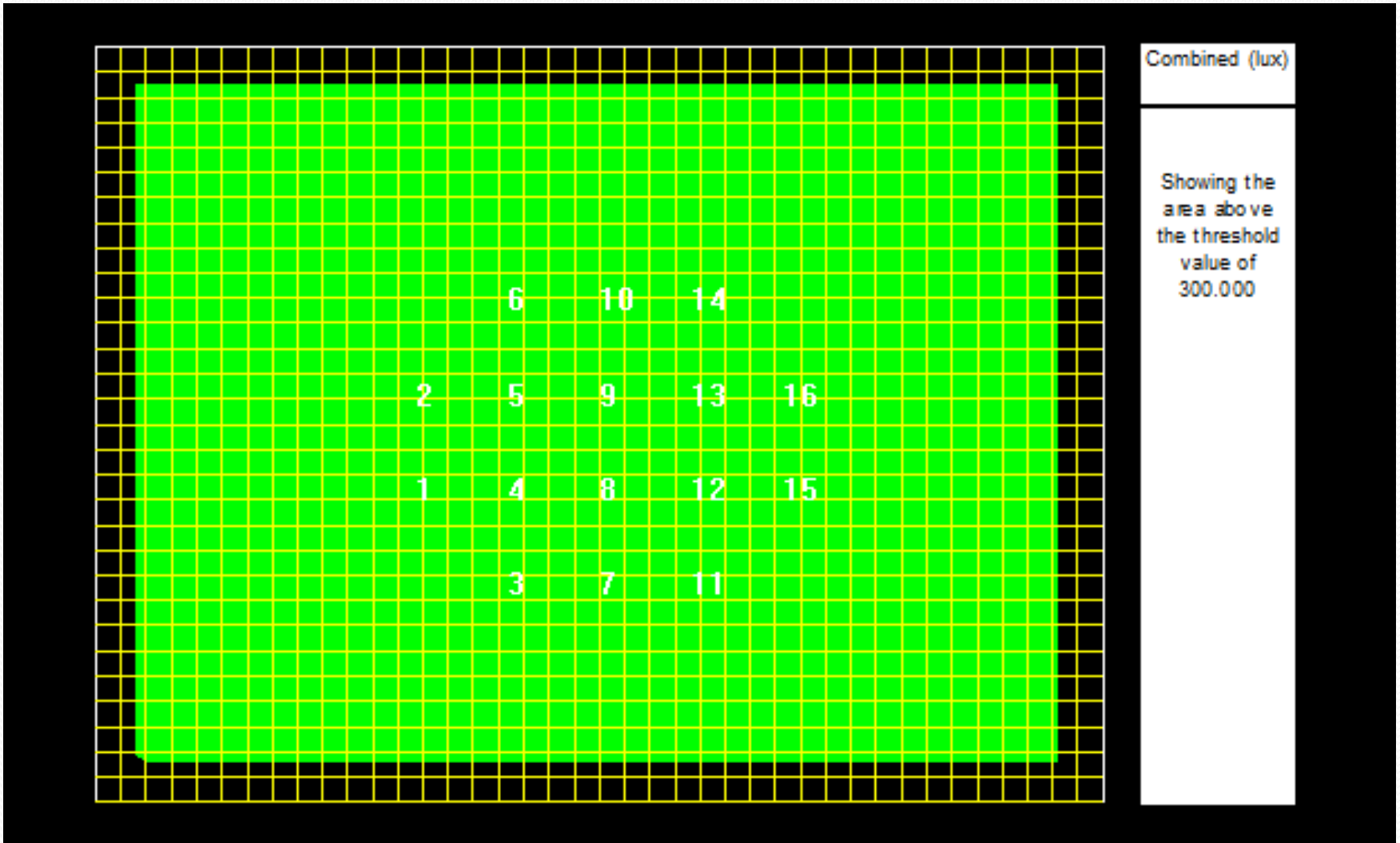
Combined Lighting – Final Design



Combined Lighting – Final Design



Combined Lighting – Final Design



Combined Lighting – Final Design

Analysis calculation for room RM1_0000 (Room1)

Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.61 m Area=266.000m² Margin=0.50 m	Artificial illuminance	0.00 lux	66.09 lux	333.76 lux	0.00	0.00
	Daylight factor	1.6 %	5.7 %	23.0 %	0.28	0.07
	Daylight illuminance	181.23 lux	647.80 lux	2600.53 lux	0.28	0.07
	Total illuminance	248.94 lux	713.89 lux	2600.54 lux	0.35	0.10

Combined numbers

Luminous efficacy for each working plane

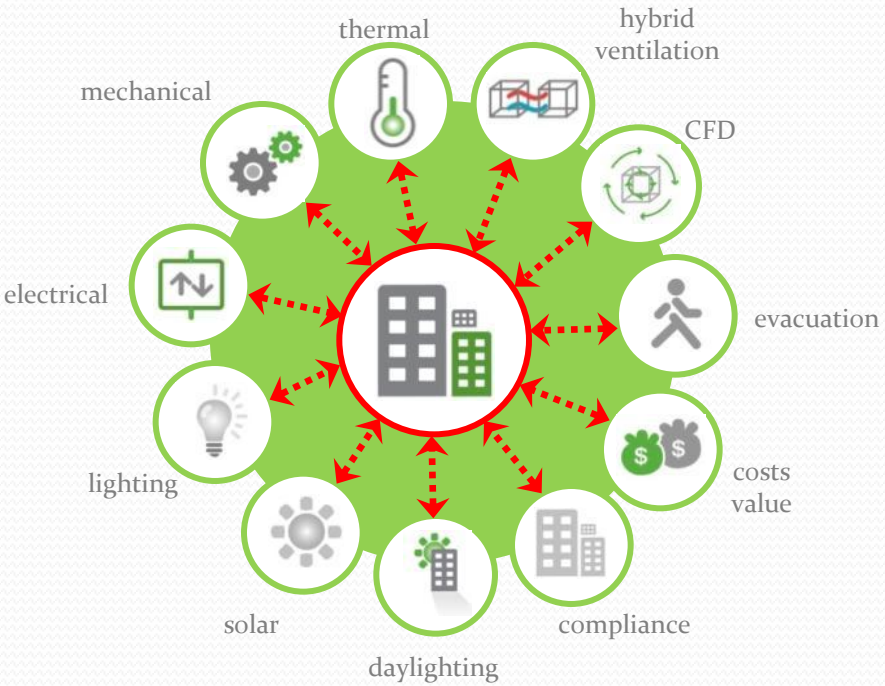
Name	Total bare flux (lm)	Total luminaire power (W)	Power density (W/m²)	Power density (W/m²/(100 lux))	Luminous efficacy (lm/W)
Working plane 1	32000.00	1280.00	4.27	6.46	25.00

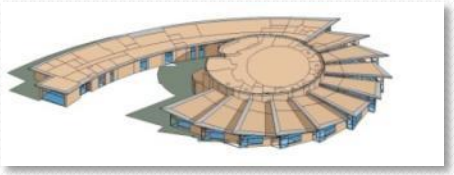
Conclusions of Base Case

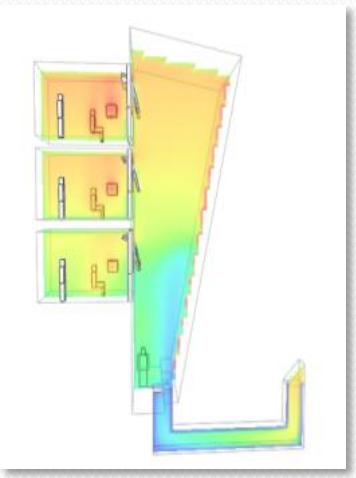
- Design passes for LEED daylighting credit
- **76.9%** floor area is above required threshold of 2% DF
- Night-time artificial lighting requires 88 luminaries for satisfying design criteria of 300 lux on WP
- Night-time power density: **23.47 W/m²**
- Day-time requires 16 luminaries for satisfying design criteria of 300 lux on WP (82% saving as compared to night-time)
- Day-time power density: **4.27 W/m²**

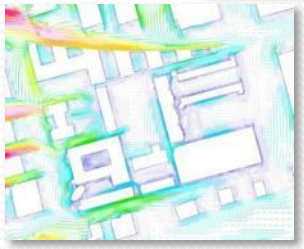
Providers of IES <Virtual Environment>
Integrated Building Performance Analysis

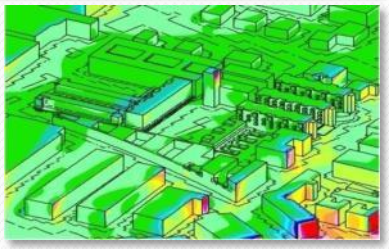
SimCosm











Need More Information?

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