whitbybird

American Church

Briefing Note: Daylight Analysis

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Summary

The average daylight factor is a measure of the amount of skylight in a room. If the room is not too deep or obstructed an average daylight factor of 5% or more will ensure that an interior looks substantially daylit, except early in the morning, late in the afternoon or on exceptionally dull days. If the average daylight factor is less than 2% the interior will not be perceived as well daylit and electric lighting may need to be in constant use[1].

Based on Meeting Rooms category[2], it is recommended to maintain 300 lux illuminance for normal meeting rooms, and 500 lux for those where more intensive reading and writing is carried out. The minimum daylight requirements for office workspaces should be more than 0.5%, while the average daylight factor should be 2 – 5%[3].

Daylight assessment has been carried out for the American Church development. The summary of the results is:

- The fellowship room has sufficient daylight
- The 4 meeting rooms in the basement have no direct access to sunlight. The average daylight factor of these rooms is very small (< 0.5%). Additionally, Meeting Room 2 has been simulated with the reflectivity of the corridor wall under the basement rooflight been increased to 0.5. This has slightly increased the average daylight factor in the Meeting Rooms 2, however, not significant.
- The input data of the simulation is summarised below.

1 Input Data

Image generated	Illuminance working plane
Sky condition	Standard CIE overcast sky
Date	21 September
Time	12:00

Table 1. Input data

Colours

External wall	china (very light grey)
Ceiling and internal walls	china (very light grey)
External roof	leaf green
External ground	leaf green
Internal ground	White Matt (grey)
All other parts	Let as default

Table 2. Colours of walls, ceiling and ground

Transmittance

Internal & external glazing	0.79[4]
Glass block	0.75[5]

Table 3. Transmittance of glazing

[1] CIBSE – Daylighting and window design – Light Guide LG 10 (1999)
[2] CIBSE – Lighting Guide 7: Office Lighting (2005)
[3] British Council for Office Guide – Best practice in the specification for offices (2005)
[4] Pilkington – 6mm double glazing. Pilkington Group ltd UK.
[5] Transmittance of typical 150 mm glass block provided by www.glassblocks.co.uk. Please note that the glass block is represented as internal glassing partition with the provided properties of glass blocks.

2 Fellowship Room

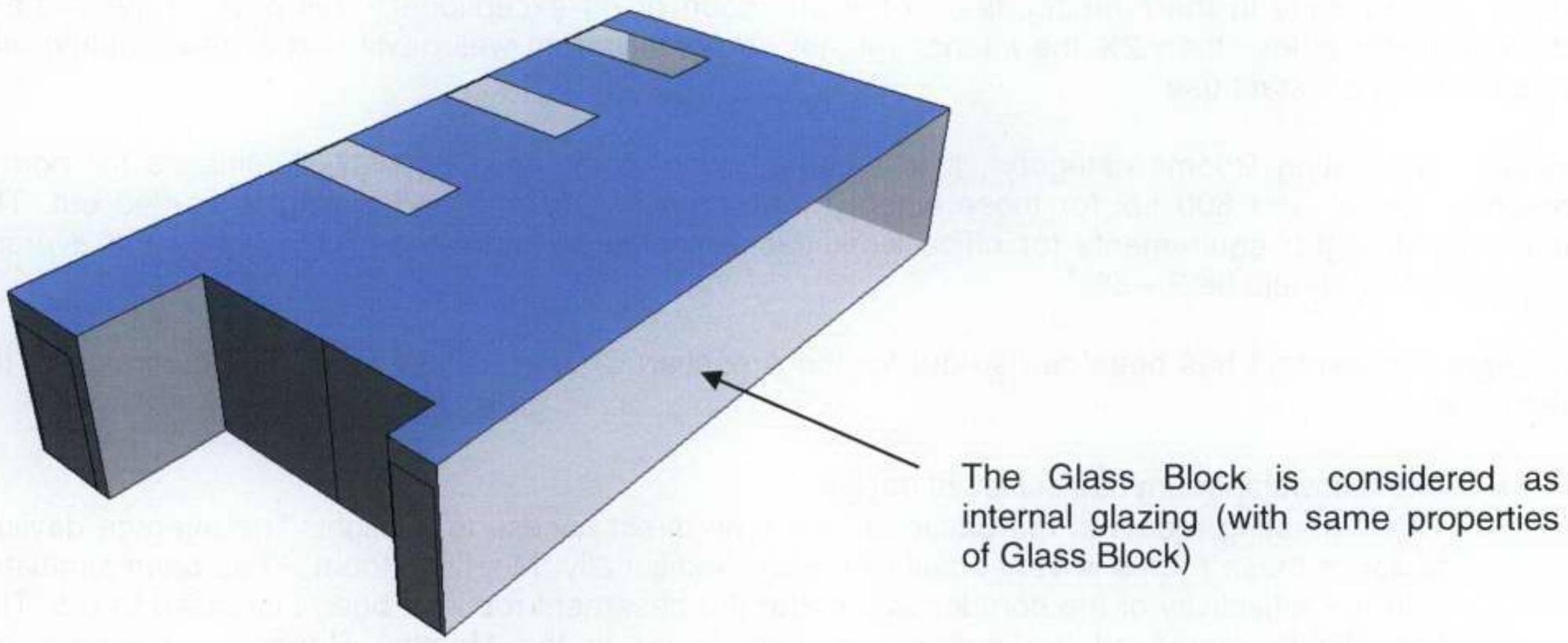

Figure 1. Fellowship room

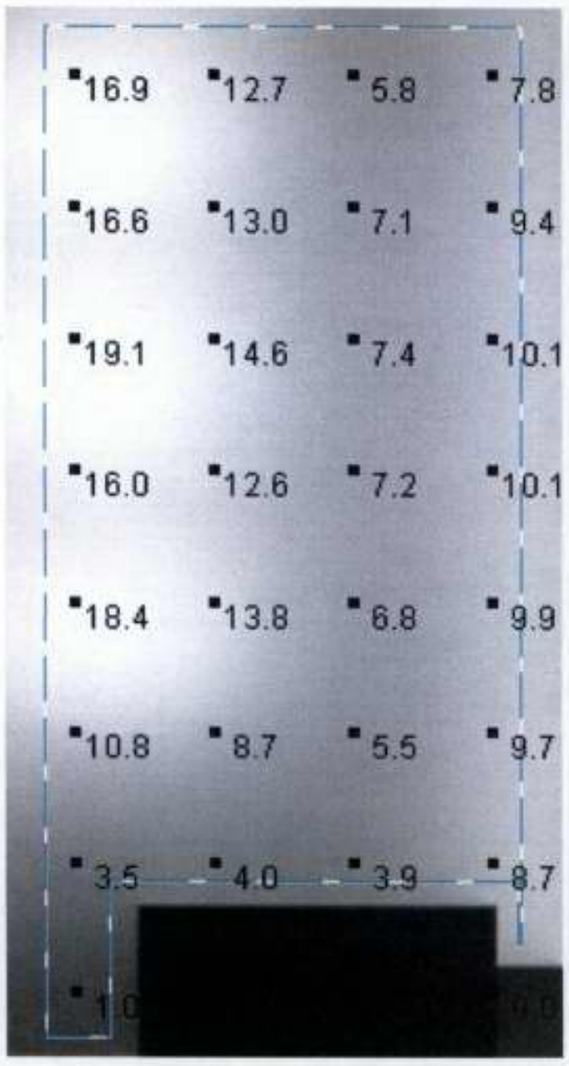

Figure 2A. Daylight Factor (DF)

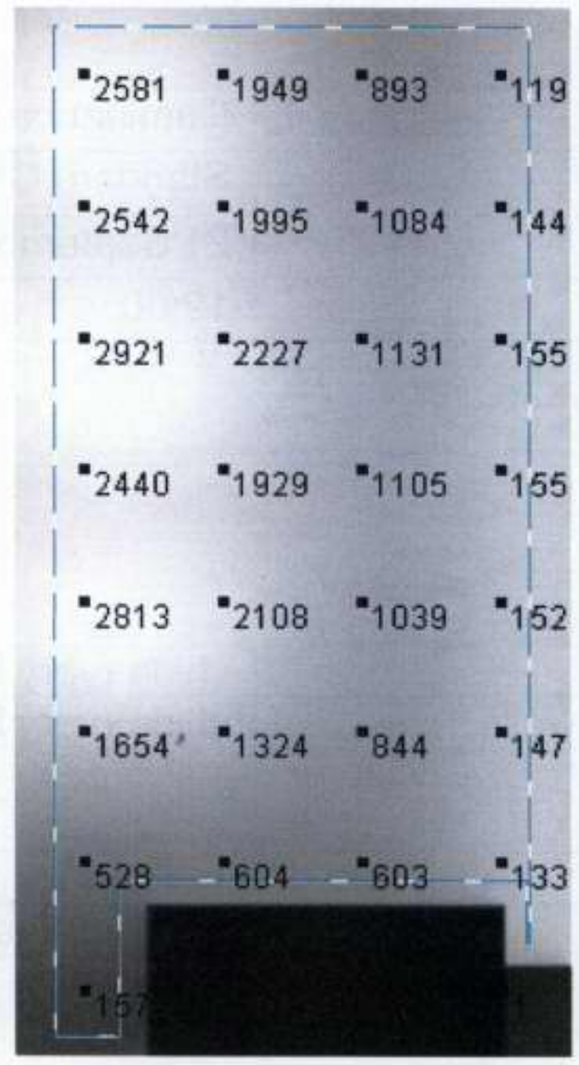

Figure 2B. Illuminance

Average daylight factor (DF)	10.13
Minimum	0.69
Maximum	20.31
Uniformity	0.068
Diversity	0.034

Table 4. Summary of area of interest (area within the blue marked zone)

3 Basement Meeting Rooms

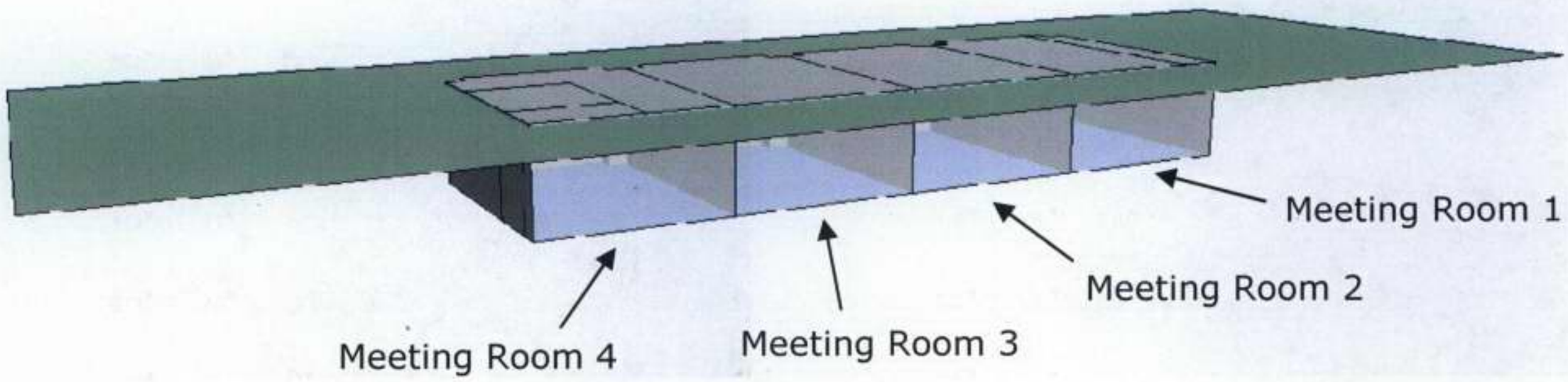

Figure 3. Basement meeting rooms

3.1 Meeting Room 1

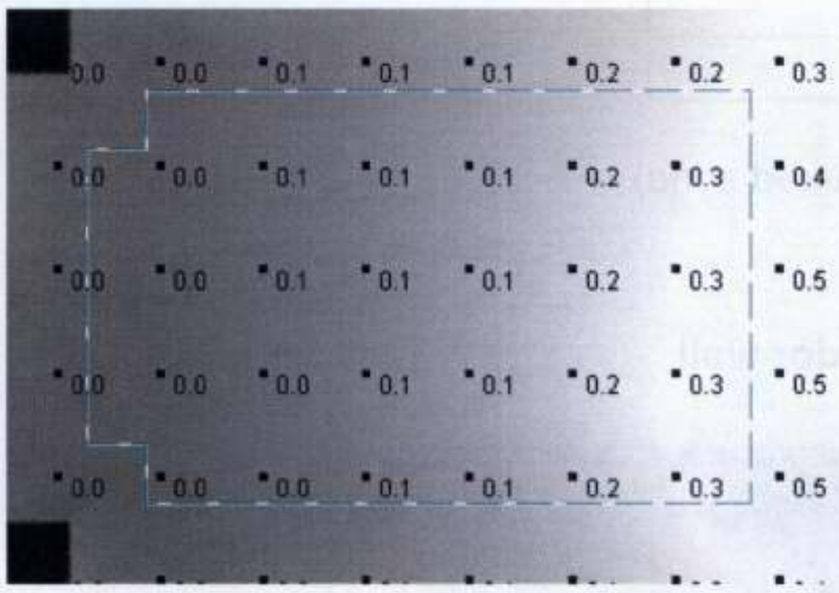

Figure 4A. Daylight Factor (DF)

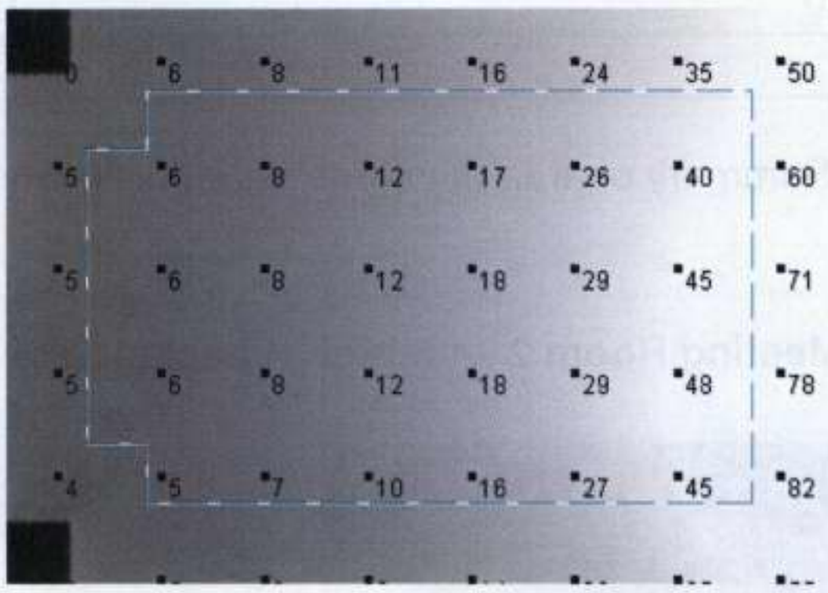

Figure 4B. Illuminance

Average daylight factor (DF)	0.13
Minimum	0.03
Maximum	0.46
Uniformity	0.226
Diversity	0.065

Table 5. Summary of area of interest (area within the blue marked zone)

3.2 Meeting Room 2

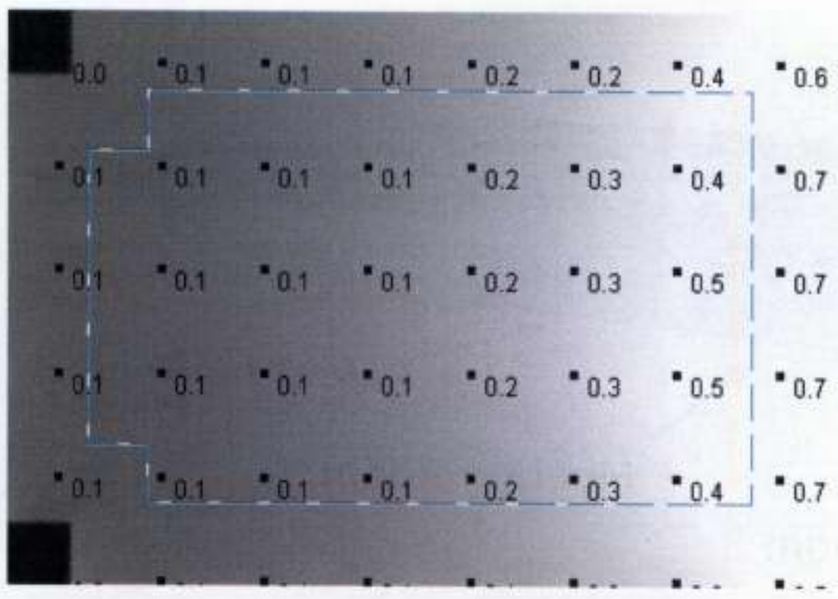

Figure 5A. Daylight Factor (DF)

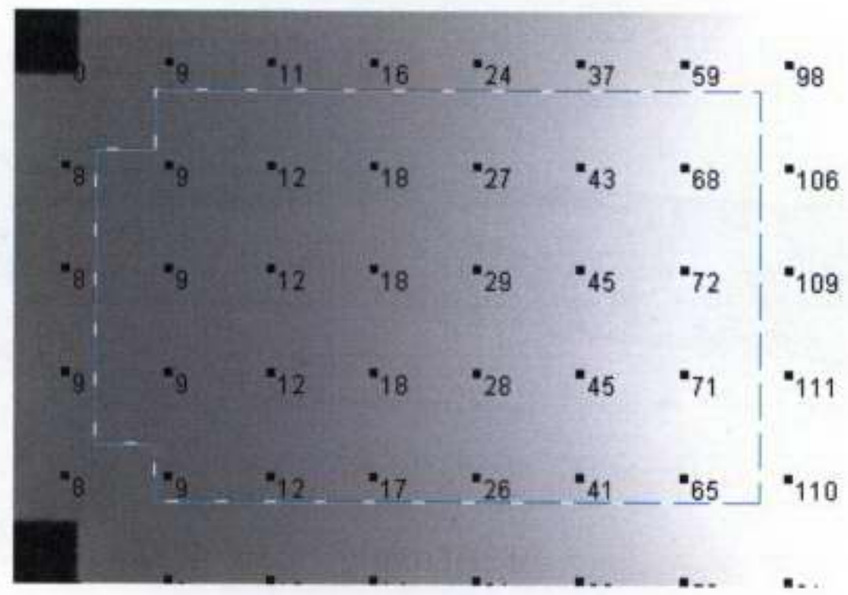

Figure 5B. Illuminance

Average daylight factor (DF)	0.21
Minimum	0.05
Maximum	0.64
Uniformity	0.251
Diversity	0.081

Table 6. Summary of area of interest (area within the blue marked zone)

3.2.1 Meeting Room 2 with high reflectance of the corridor wall

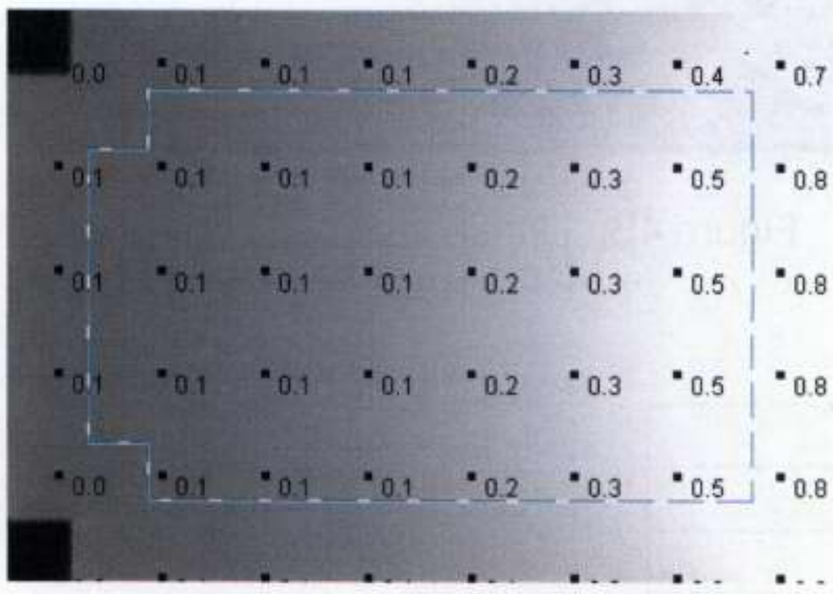

Figure 5C. Daylight Factor (DF)

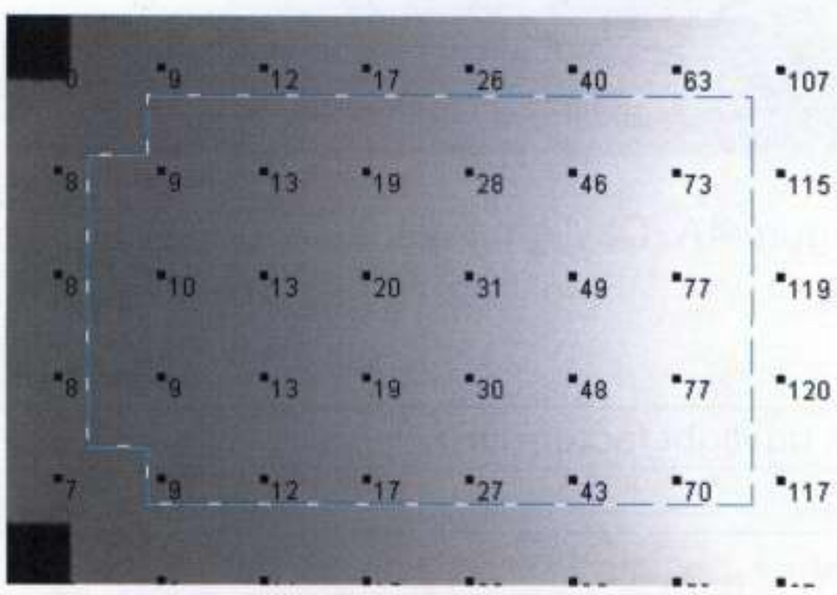

Figure 5D. Illuminance

Average daylight factor (DF)	0.22
Minimum	0.05
Maximum	0.71
Uniformity	0.22
Diversity	0.069

Table 7. Summary of area of interest (area within the blue marked zone)

3.3 Meeting Room 3

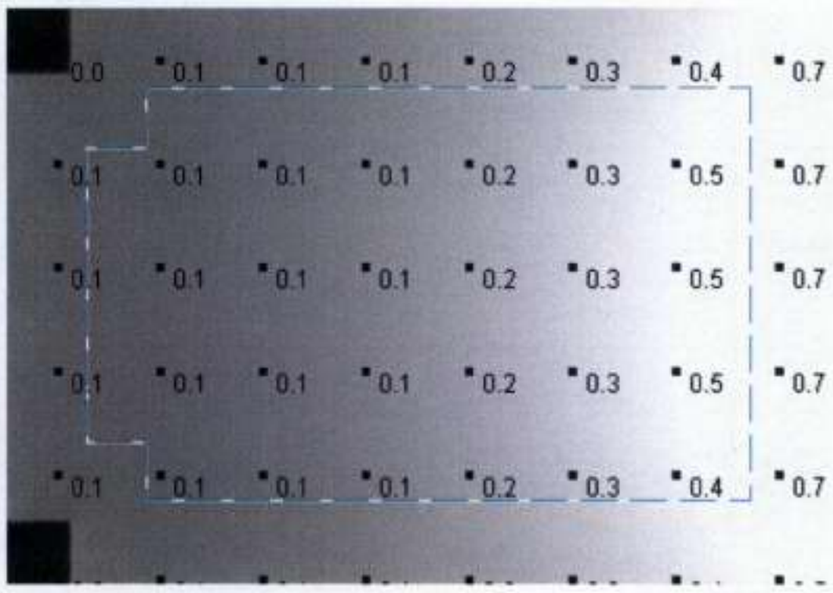

Figure 6A. Daylight Factor (DF)

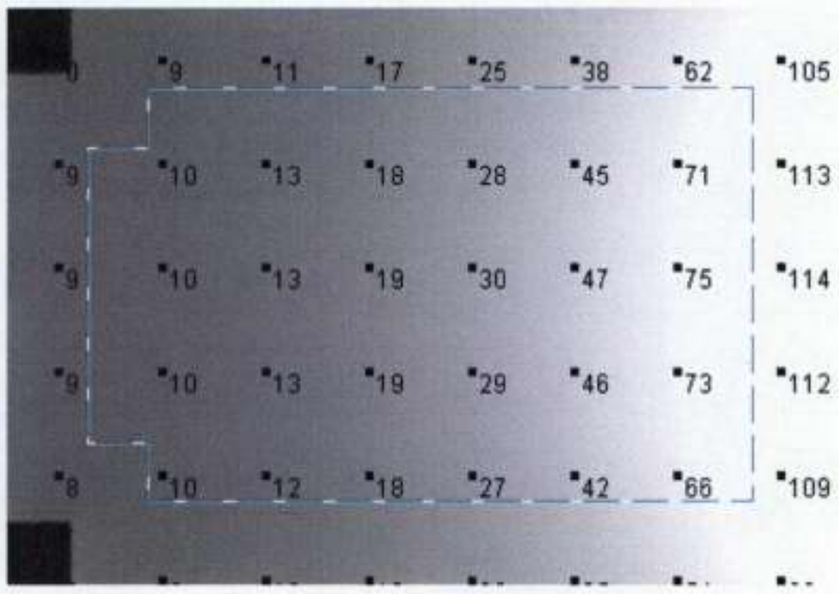

Figure 6B. Illuminance

Average daylight factor (DF)	0.22
Minimum	0.06
Maximum	0.66
Uniformity	0.26
Diversity	0.084

Table 8. Summary of area of interest (area within the blue marked zone)

3.4 Meeting Room 4

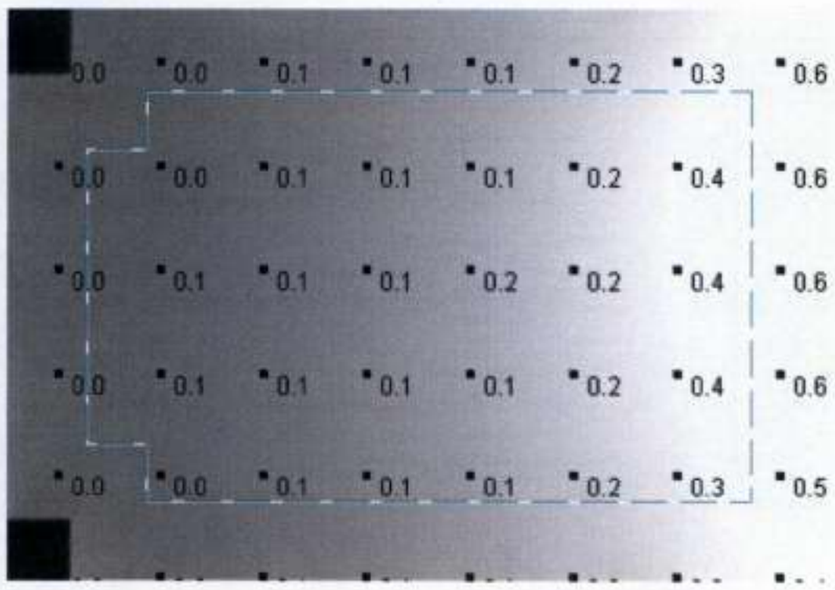

Figure 7A. Daylight Factor (DF)

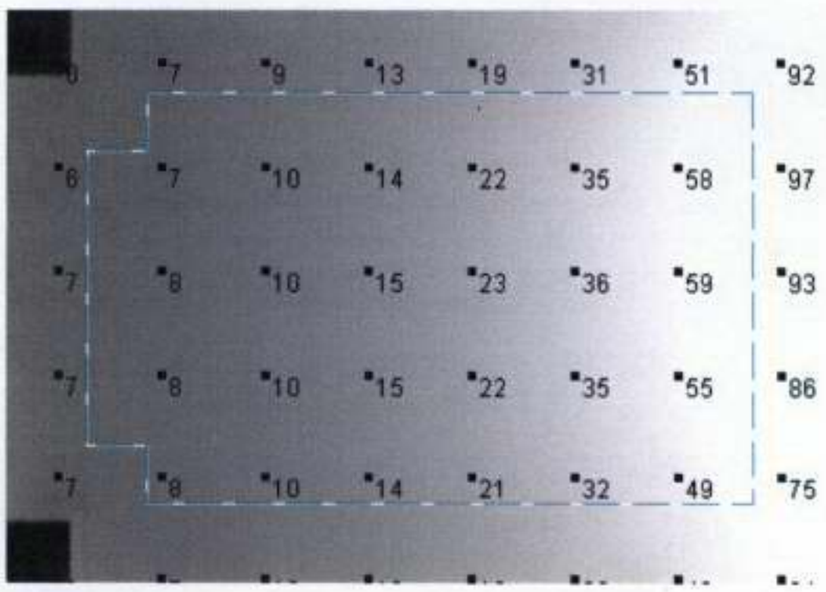

Figure 7B. Illuminance

Average daylight factor (DF)	0.17
Minimum	0.04
Maximum	0.55
Uniformity	0.24
Diversity	0.072

Table 9. Summary of area of interest (area within the blue marked zone)