Lighting Analysts
illumination engineering software

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The following calculations of Daylight Factor were performed using AGi32 version 14.6. All models and test conditions are in accordance with the public study titled "Daylight Calculations in Practice", originally performed by the Danish Building Research Institute, Aalborg University, Copenhagen. Document identification SBI 2013:26.

As captured from the original document:

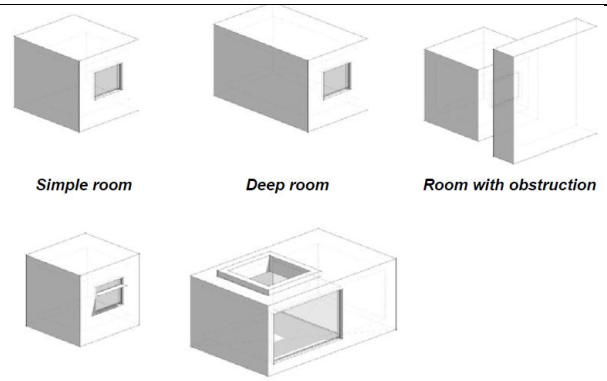



Figure 14: Chosen room types

*Room 1 – Simple room*
A simple room with one window. Light entering the space is reflected both from the side walls and the end walls. The room dimensions are: Width of 3.5 m, height of 2.8 m, depth of 4 m. The thickness of the wall is 0.4 m and the thickness of the window frame is 0.06 m. The dimensions of the window opening in the facade are; 2 m in width and 1.5 m in height. The height of the spandrel is 0.9 m.

*Room 2 – Deep room*
The room depth is increased from 4 m to 7 m. Otherwise, the room and the window is the same size as the simple room. The light will not be reflected from the end walls.

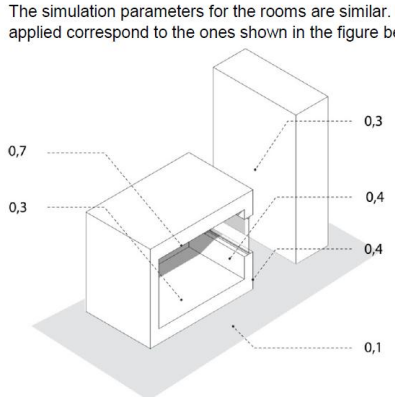
*Room 3 – Room with obstruction*
The dimensions of the room and the window are the same as those of the simple room. An obstruction is placed outside the window. In the simulation results, the effect of external obstructions on the daylight levels can be seen

*Room 4 – Room with light shelf*
The geometry of this room is similar to that of the simple room, with the only exception that a light shelf is included in the window. The room type is included in these investigations in order to be able to calculate a detail in the facade/window.

*Room 5 – Room with borrowed light*
Daylight will pass through two windows before it enters the room that requires daylight. Window openings are placed in the facade and as a sky light. The light has to pass through these openings and then through an internal window before it enters the calculated room.

## Simulation parameters

The simulation parameters for the rooms are similar. Surface reflectances applied correspond to the ones shown in the figure below.




*Note conflict in room floor reflectance with Table 5, all floor reflectances in these calculations use 0.3*

Table 5: Reflectances

| | Reflectance (r) |
|---|---|
| Ground plane | 0.1 |
| External walls and obstruction | 0.3 |
| Floor | 0.1 |
| Wall | 0.4 |
| Ceiling | 0.7 |
| Window frame | 0.8 |
| Side of window opening, internal | 0.7 |
| Side of window opening, external | 0.3 |
| Light shelf | 0.5 |

Table 6: Light transmittance

| | Light transmittance(LT) |
|---|---|
| Window in facade and sky light | 0.76 |
| Internal glass | 0.85 |

Table 7: Calculation points, calculation height and ground plane

| | |
|---|---|
| Height of work plane | 0.85m |
| Work zone | Distance from wall to calculated area is 0.5m |
| Grid | 0.25 m horizontal and vertical |

## Room 1 - Simple Room

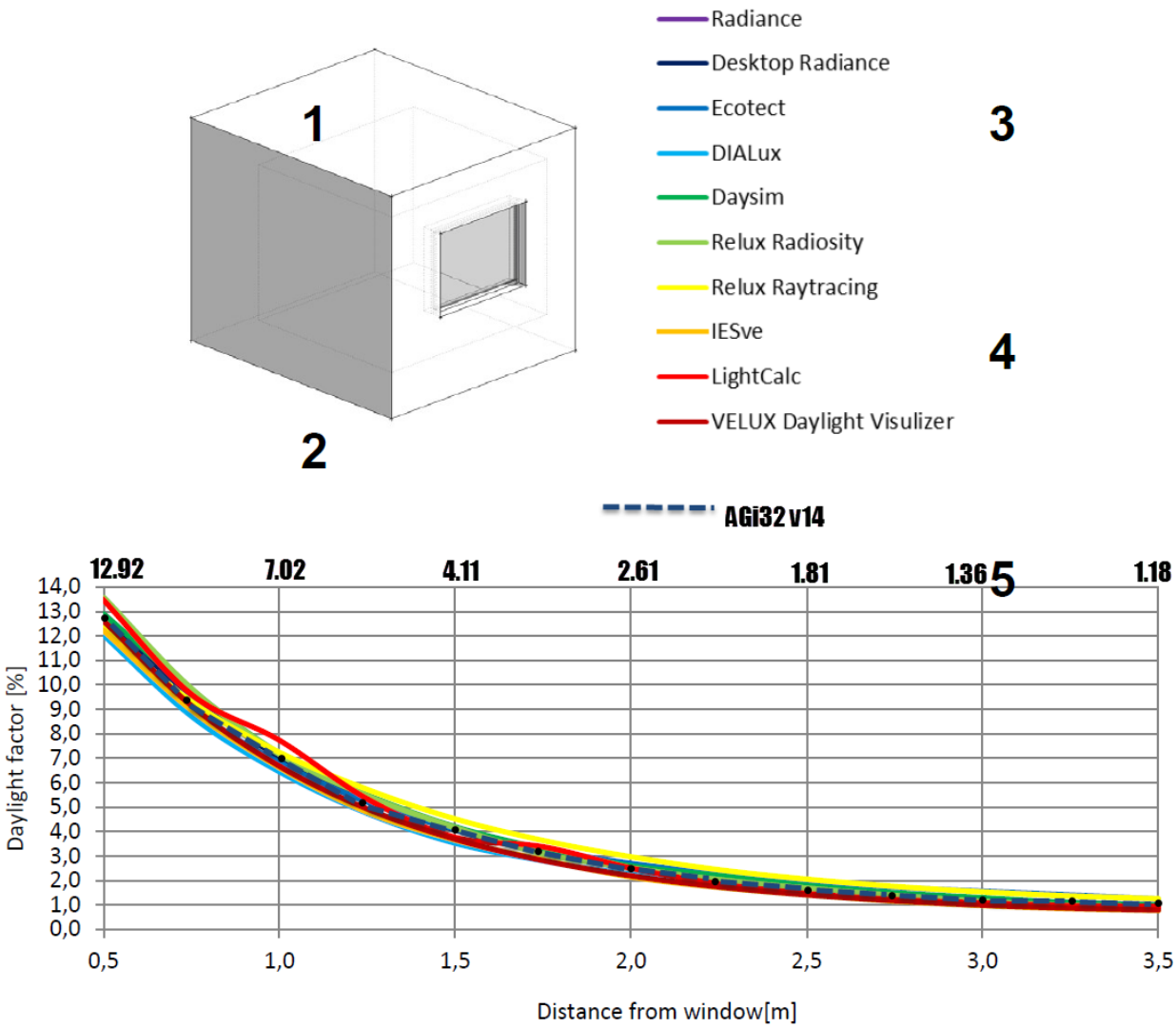
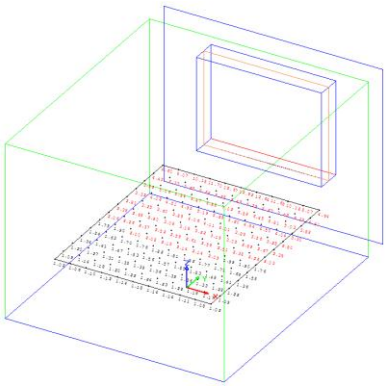
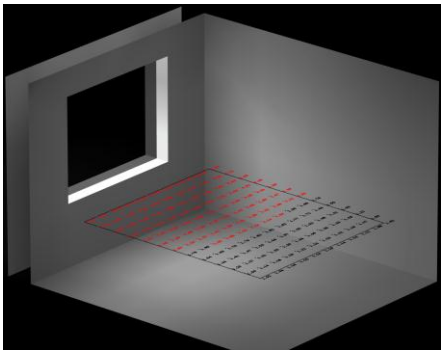


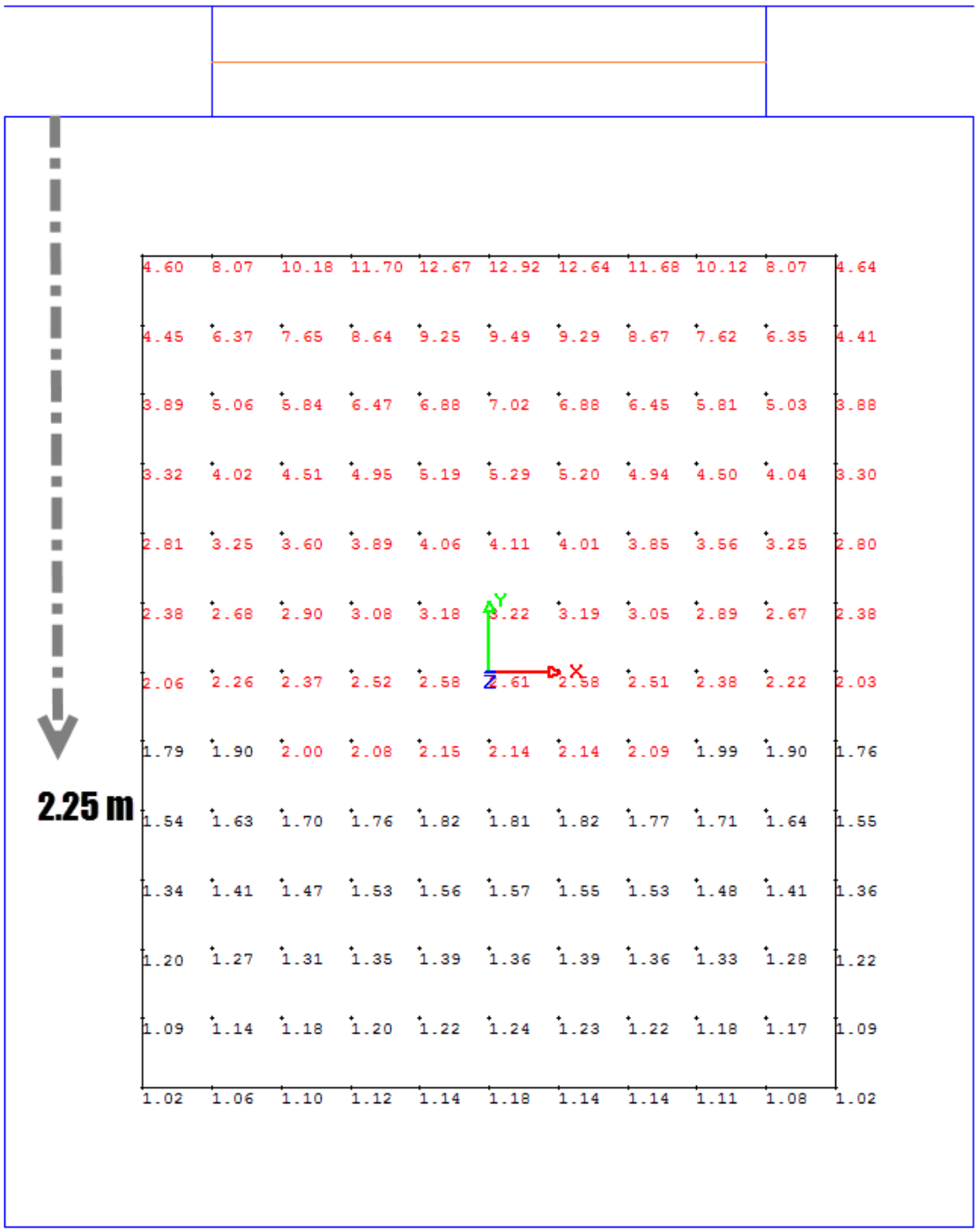

Figure 15: Daylight factor levels through the room





# Room 1 - Simple room Daylight Factor

Points ≥ 2.0 DF in red




Daylight Factor (%)
Average=3.46 Maximum=12.92 Minimum=1.02 Avg/Min=
3.39 Max/Min=12.67 PercentOver2%=58.04%

## Room 2 – Deep Room

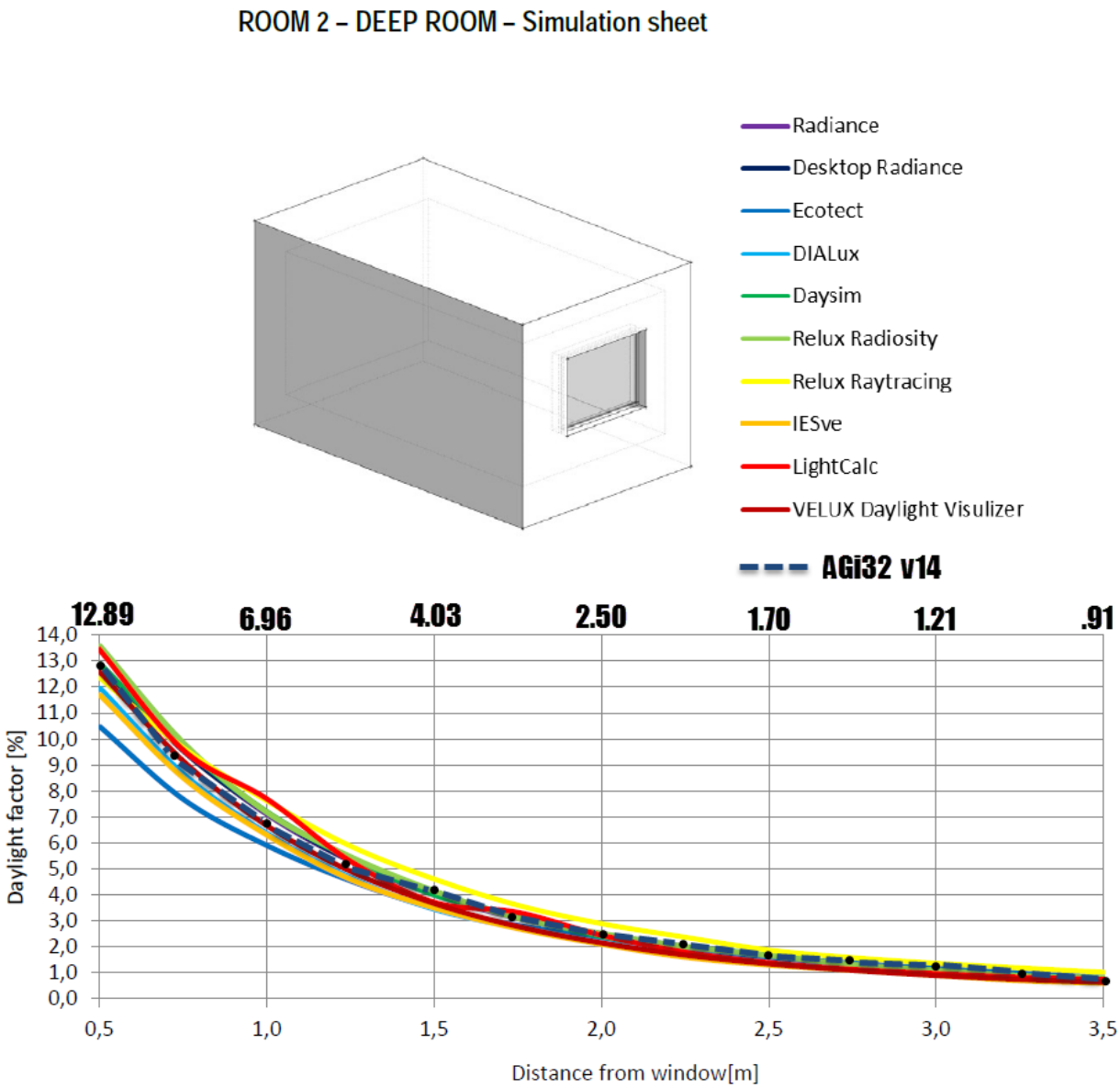
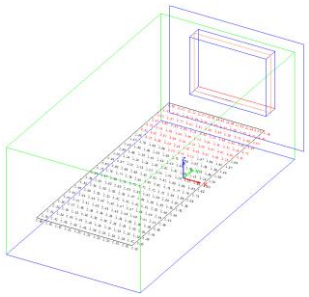
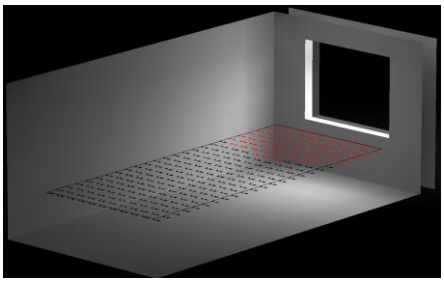


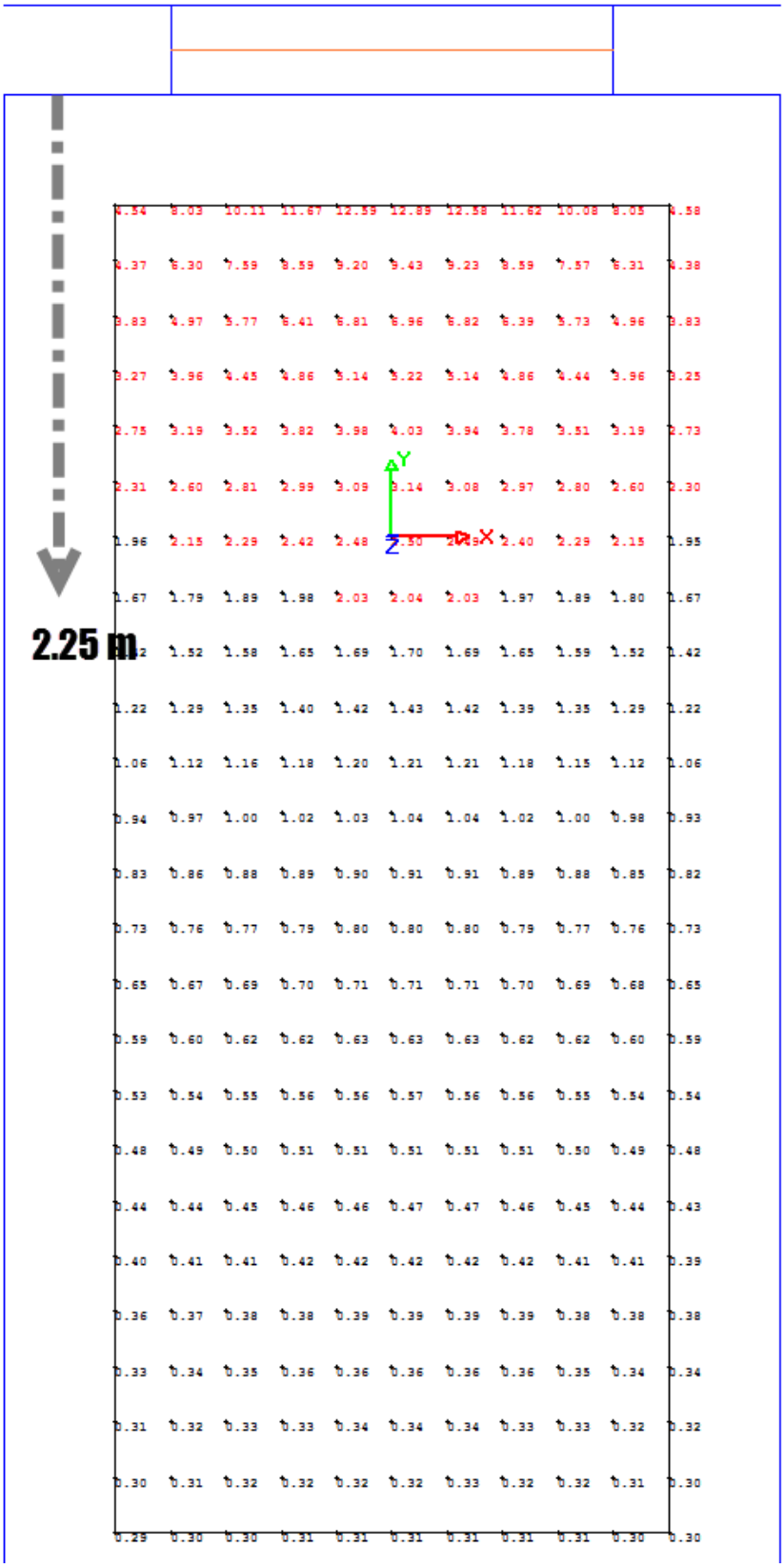

Figure 19: Daylight factor level throughout the room





## Room 2 – Deep Room Daylight Factor

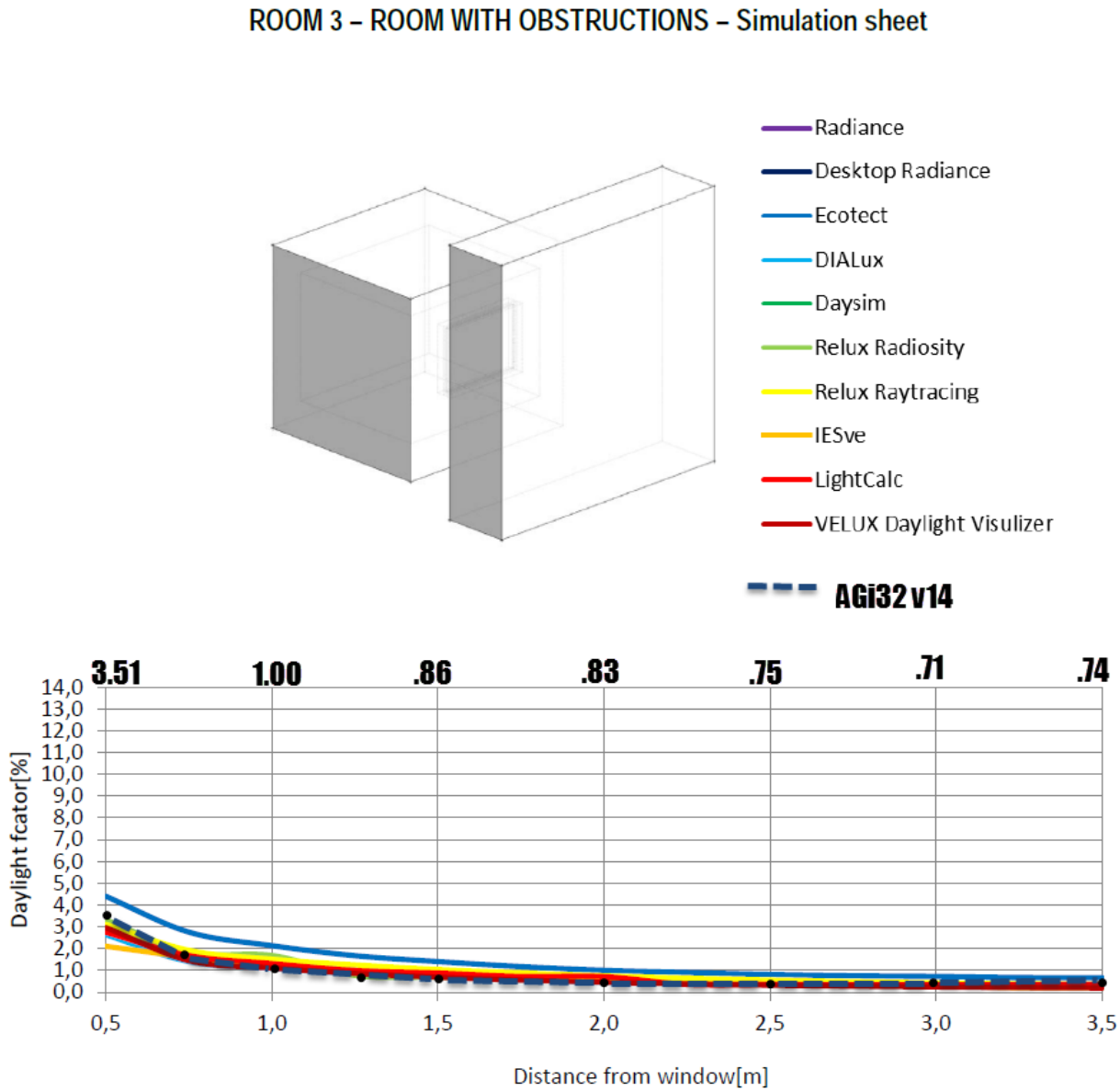
Points ≥ 2.0 DF in red

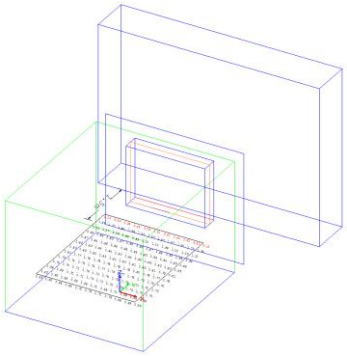


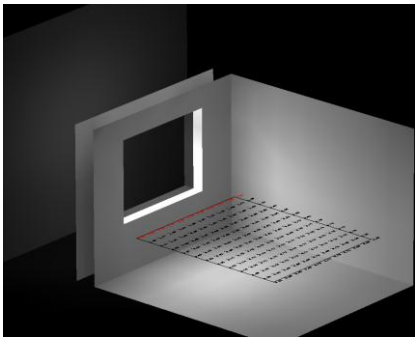

Daylight Factor (%)
Average=1.97 Maximum=12.89 Minimum=0.29 Avg/Min= 6.79 Max/Min=44.45 PercentOver2%=28.36%

## Room 3 – Simple room with obstruction

Assumptions: obstruction is 1.5m back from wall, 4m tall

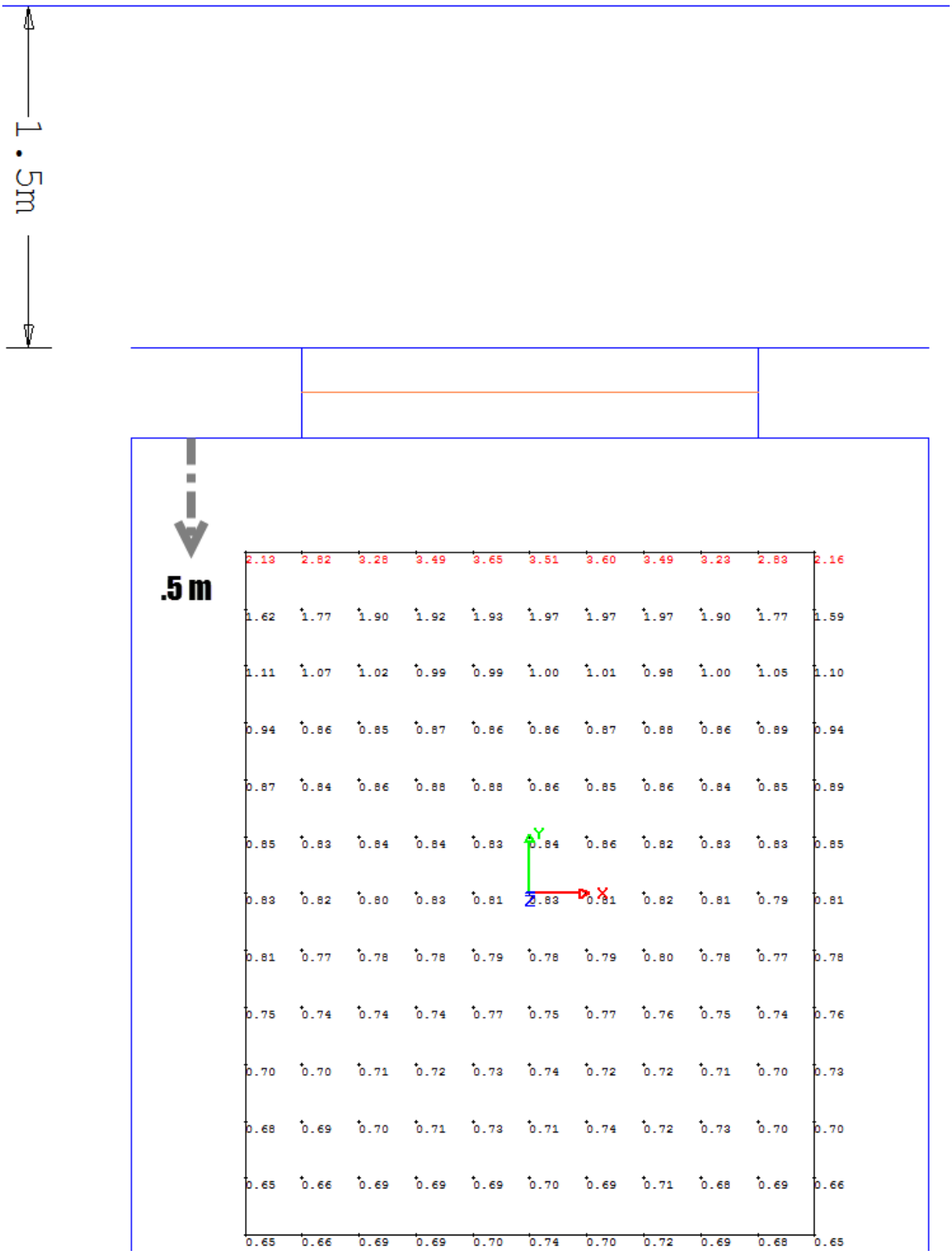




## Room 3 – Simple room with obstruction Daylight Factor

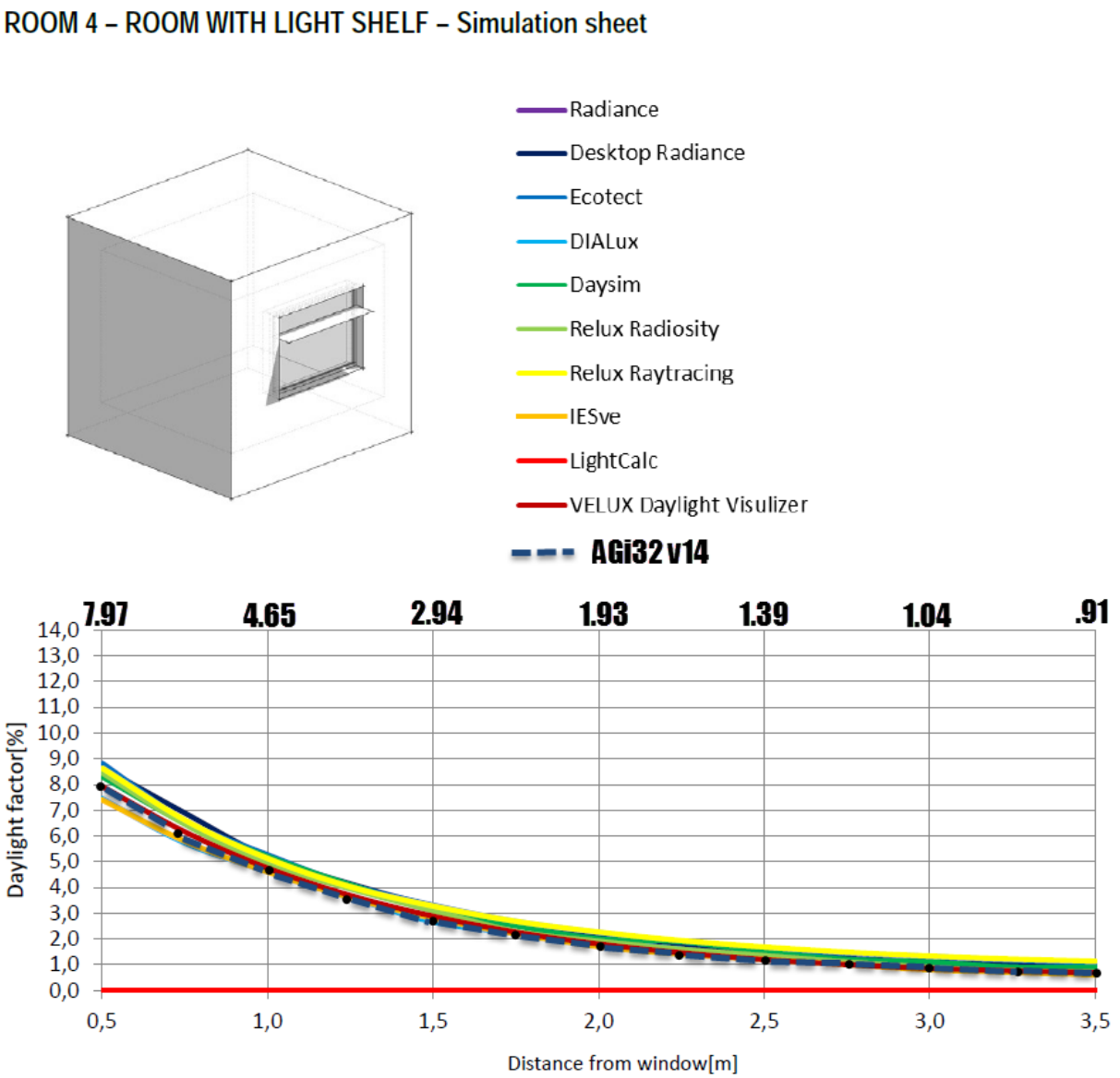
Points ≥ 2.0 DF in red

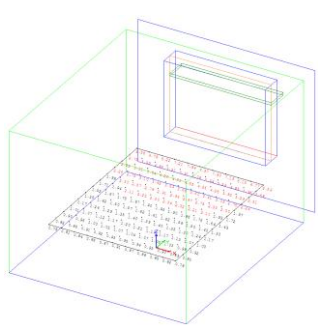


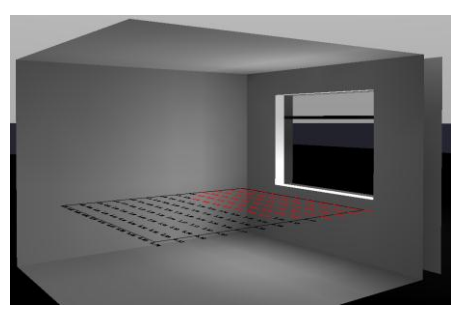

Daylight Factor (%)
Average=1.05 Maximum=3.65 Minimum=0.65 Avg/Min=1.62
Max/Min=5.62 PercentOver2%=7.69%

## Room 4 – Simple Room with Light Shelf

Assumptions: shelf is ¼ distance down window height
Shelf is .4m deep

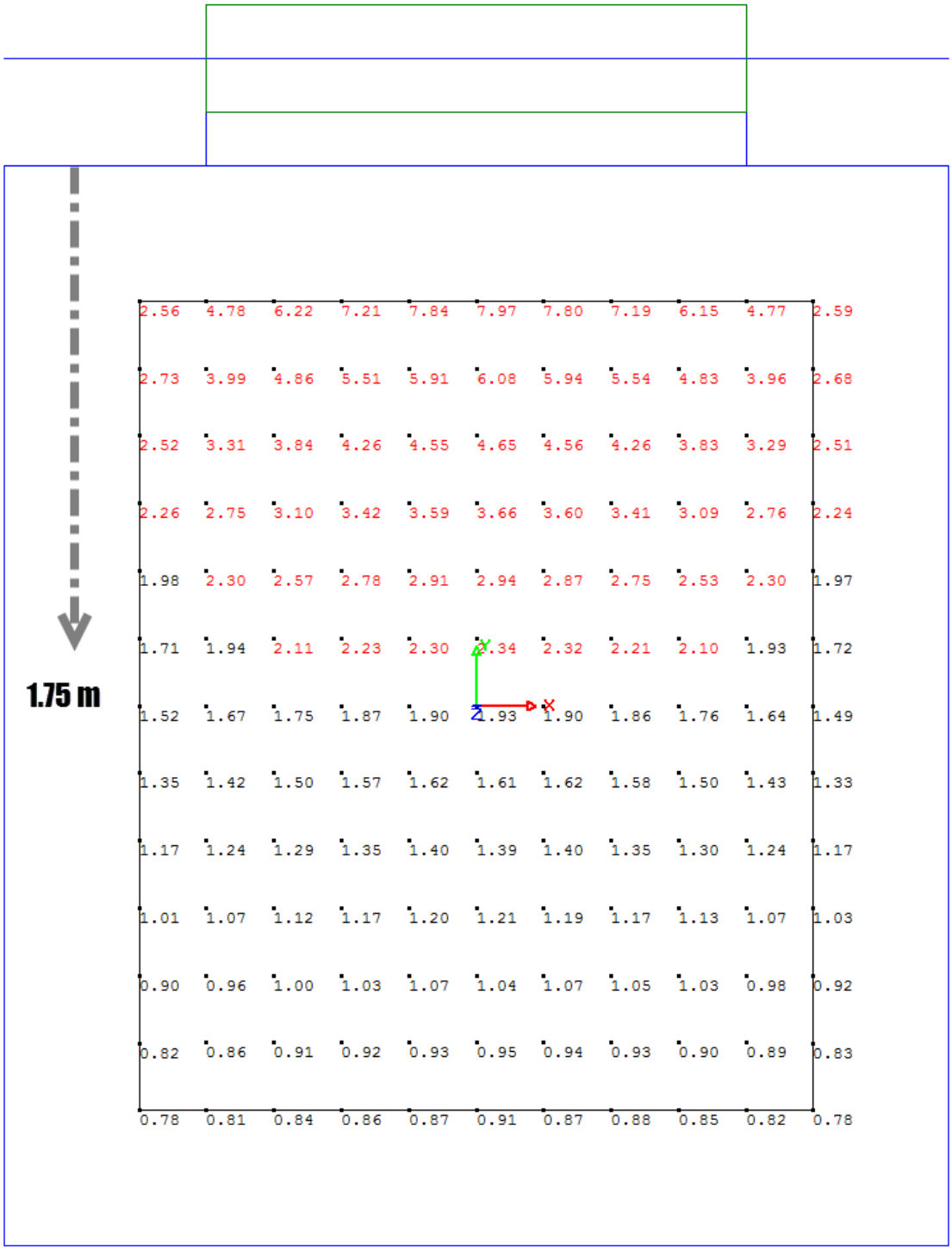




# Room 4 – Simple Room with Light Shelf Daylight Factor

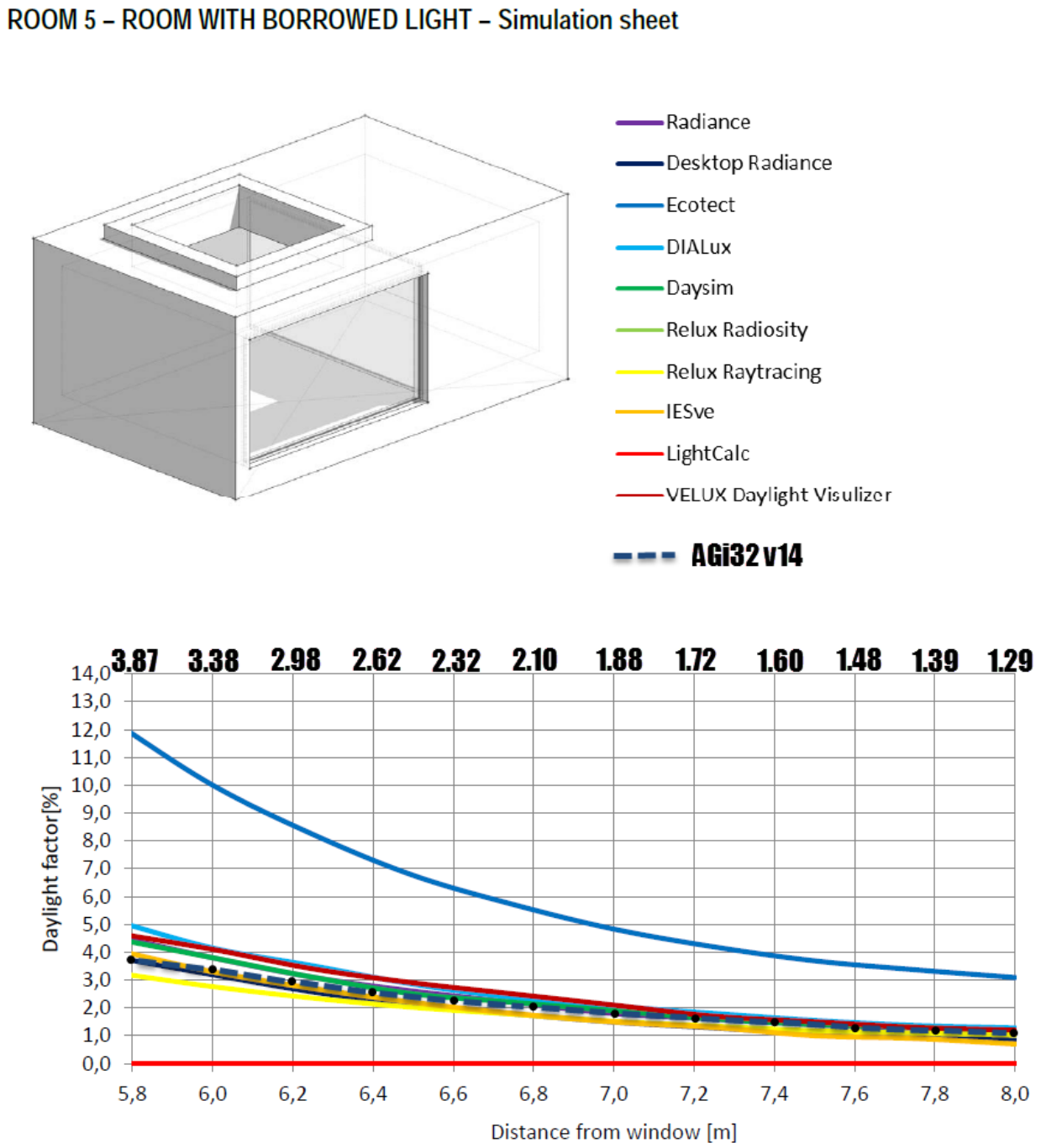
Points ≥ 2.0 DF in red

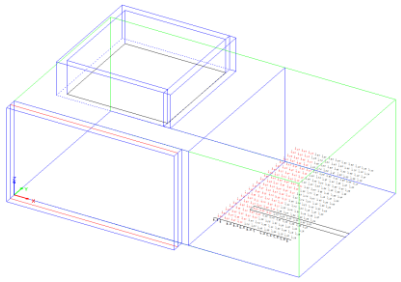


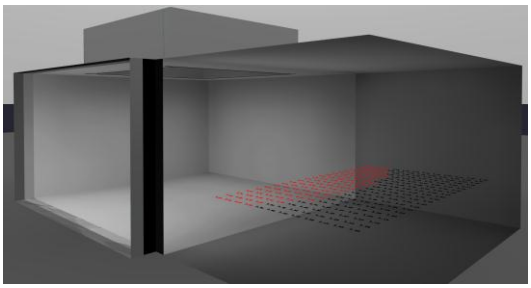

Daylight Factor (%)
Average=2.35 Maximum=7.97 Minimum=0.78 Avg/Min=3.01
Max/Min=10.22 PercentOver2%=41.96%

## Room 5 – Borrowed Light

Differences from other models: report grid spacing is changed to .2m x .2m to match report

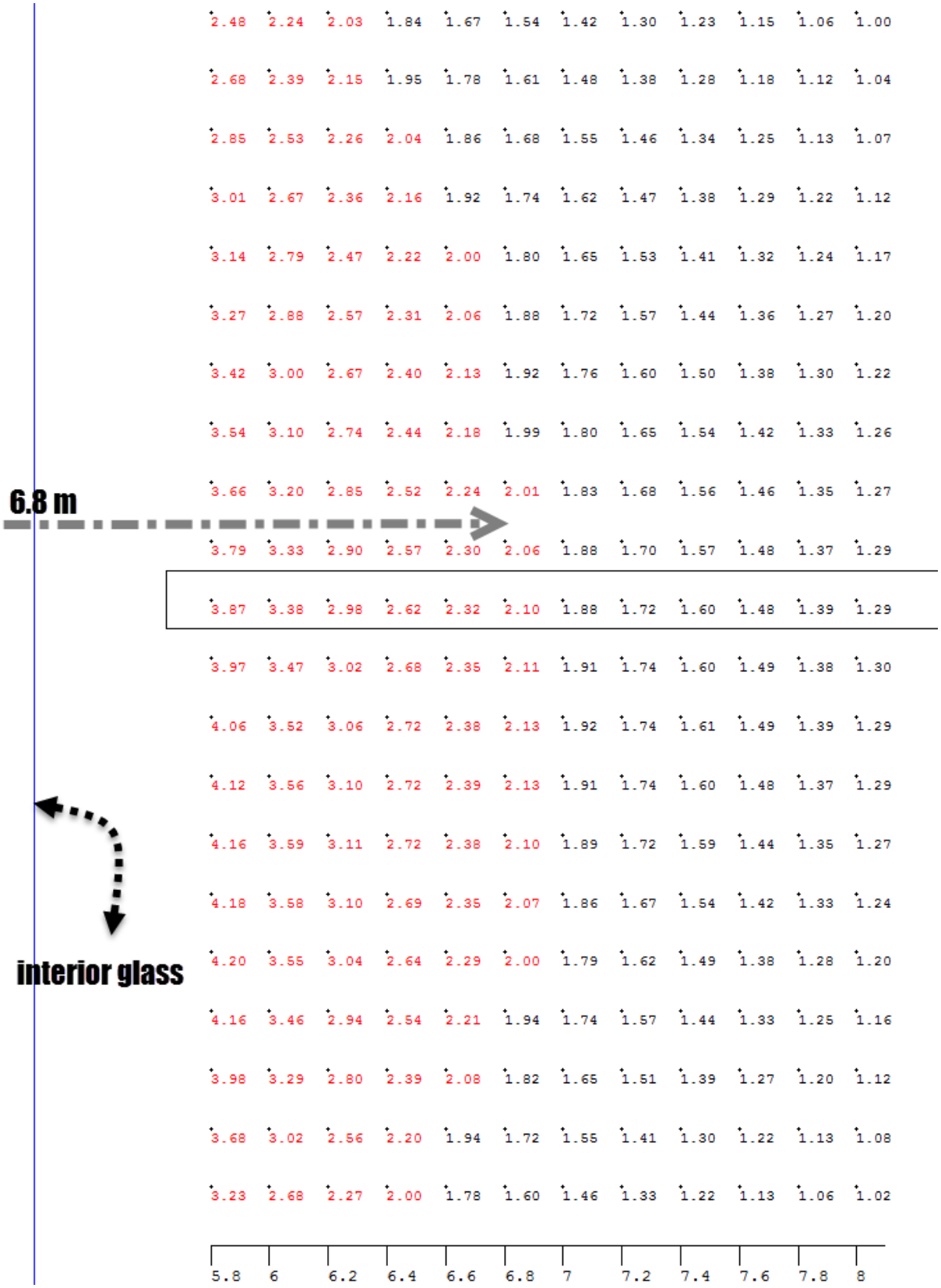




## Room 5 – Borrowed Light Daylight Factor

Points ≥ 2.0 DF in red




Daylight Factor (%)
Average=2.03 Maximum=4.20 Minimum=1.00 Avg/Min=2.03
Max/Min=4.20 PercentOver2%=42.063%