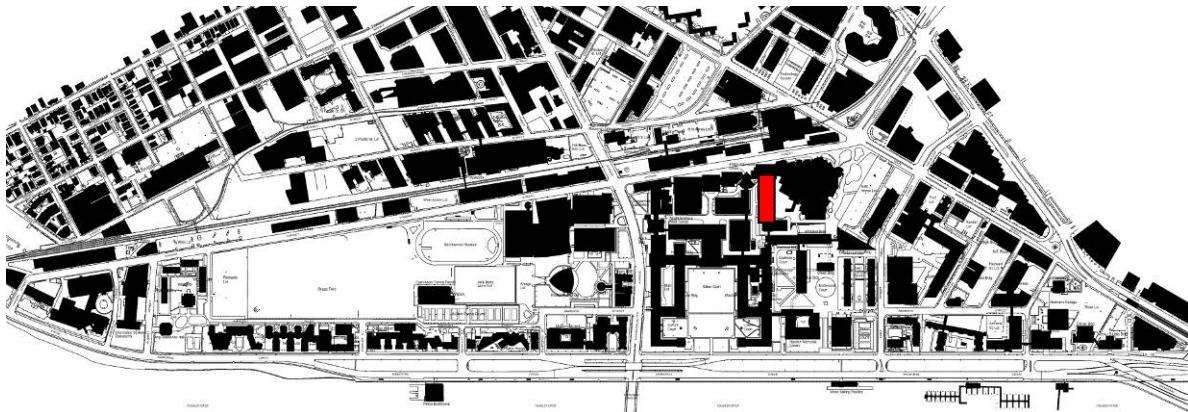
façade renovation/ transformation: building 26

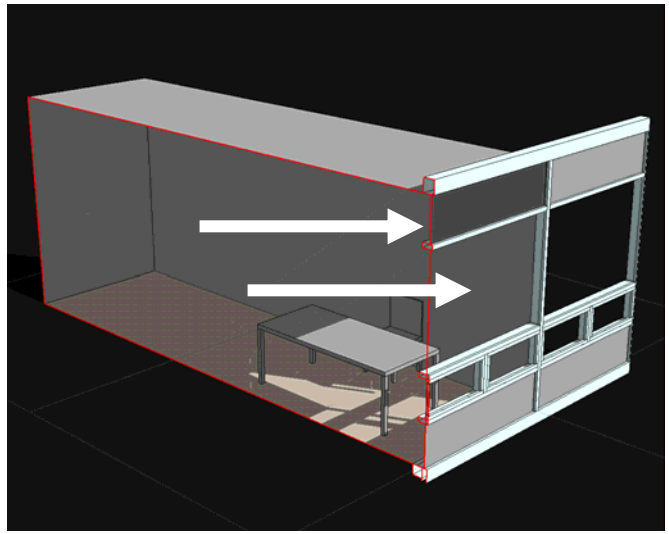
Ruchi Jain
Gordana Jakimovska
Ed Rice



2 Approaches:

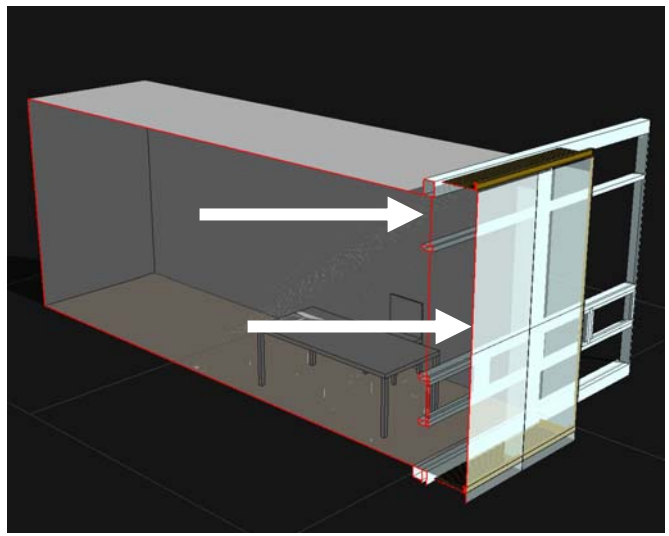
<u>Selective:</u>

Substitution of elements, glass panels, spandrel panels etc.



<u>Transformative:</u>

2nd layer on façade, for fixed shades, more clear glass area.



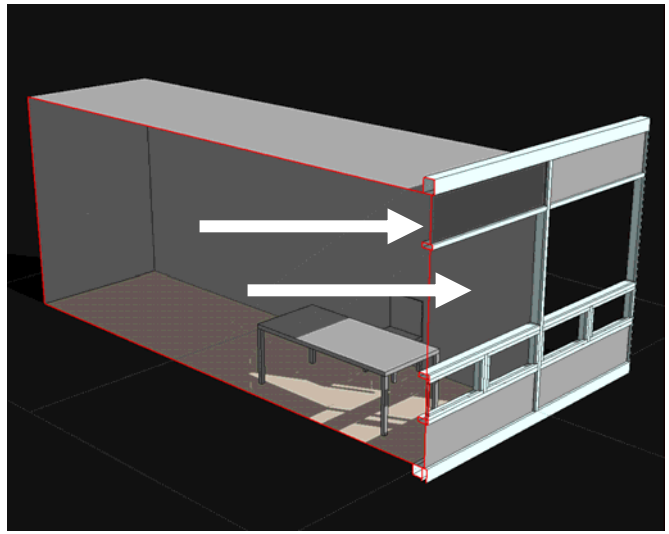
1) What is the effect of changing window size and location, or glass type?

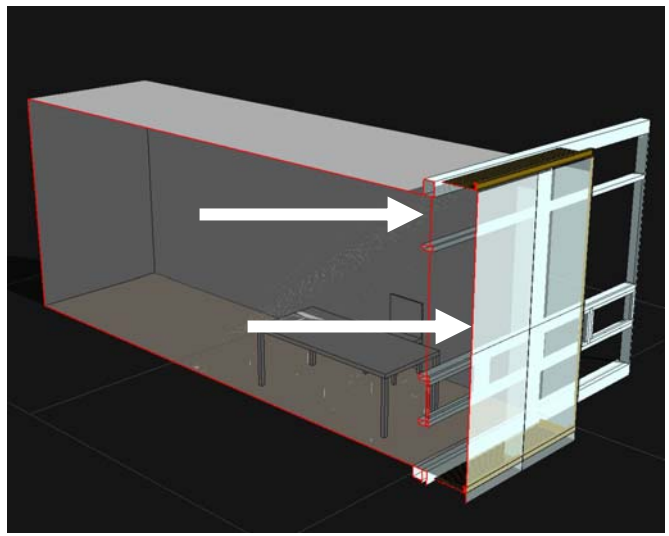
2) Is there a conflict between daylighting and glare protection in the current scheme?

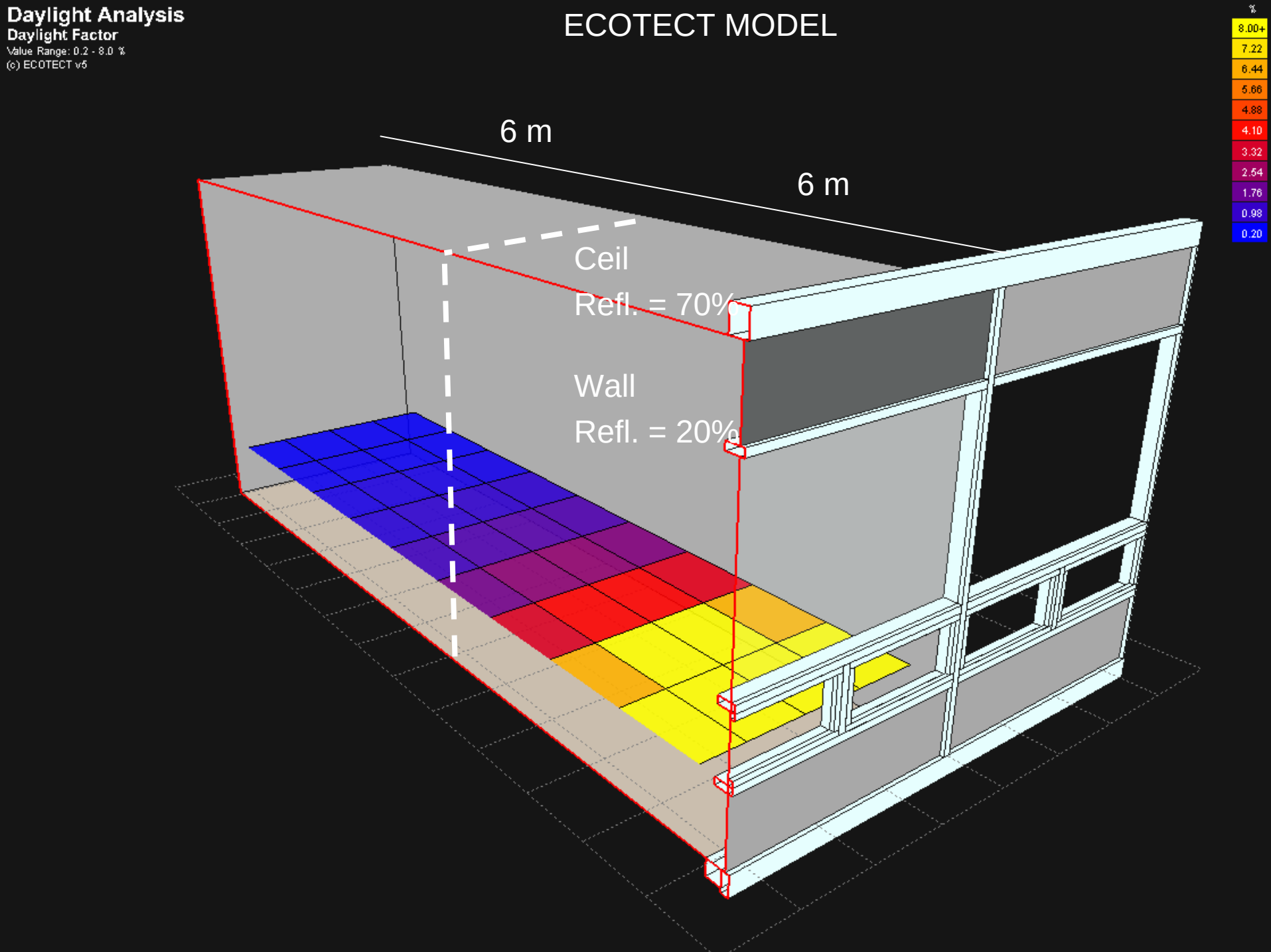
3) Are there any materials which may help protect from direct sun and daylight simultaneously?

4) How would a multi-leaf façade change the feel of the interior space?

5)Would it help or hurt daylighting overall?



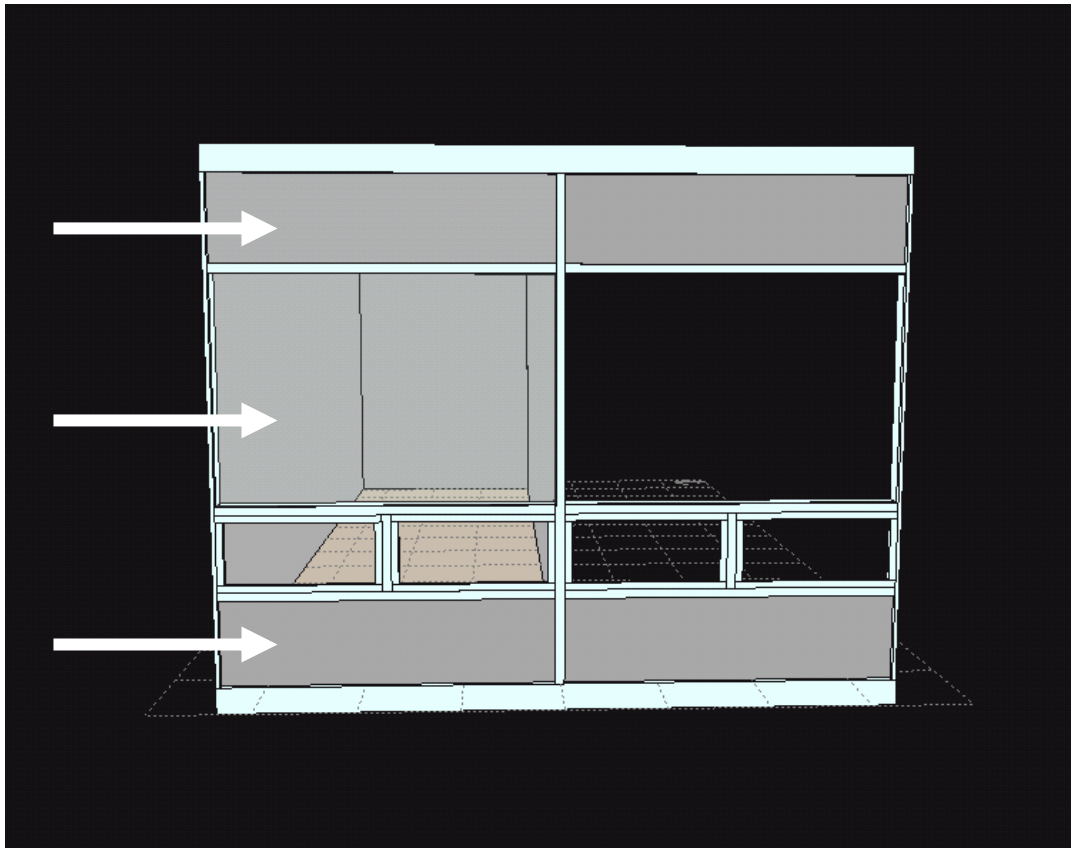



Daylight Analysis
Daylight Factor
Value Range: 0.2 - 8.0 %
(c) ECOTECT v5
ECOTECT MODEL
%
8.00+
7.22
6.44
5.66
4.88
4.10
3.32
2.54
1.76
0.98
0.20
6 m
6 m
Ceil
Refl. = 70%
Wall
Refl. = 20%

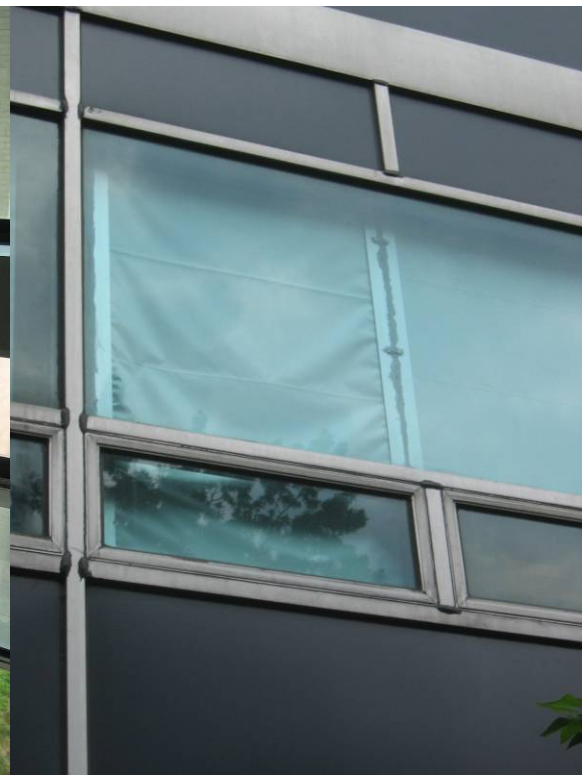
Spandrel or translucent glass in the upper panel

Solex or clear glass in the middle panels

Spandrel in the lower panel

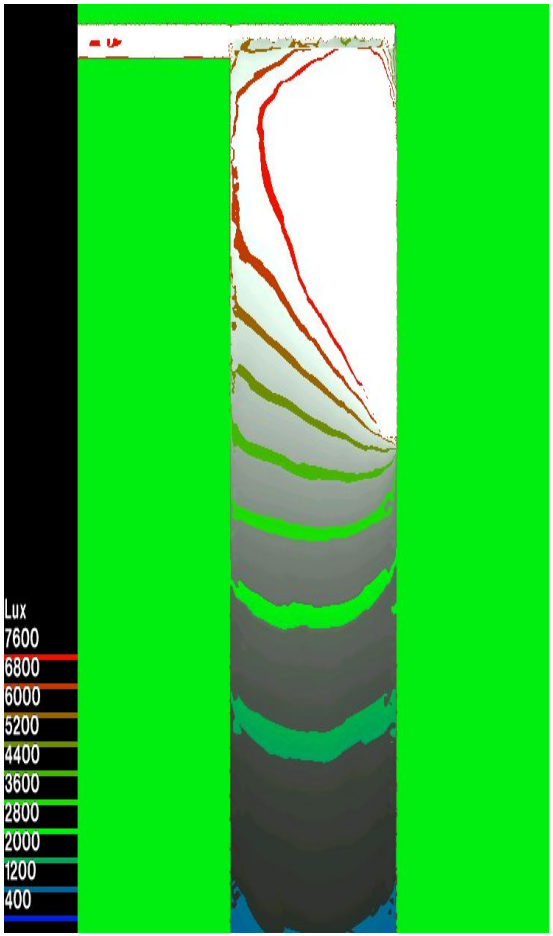


Definition of existing Solex glass in radiance:

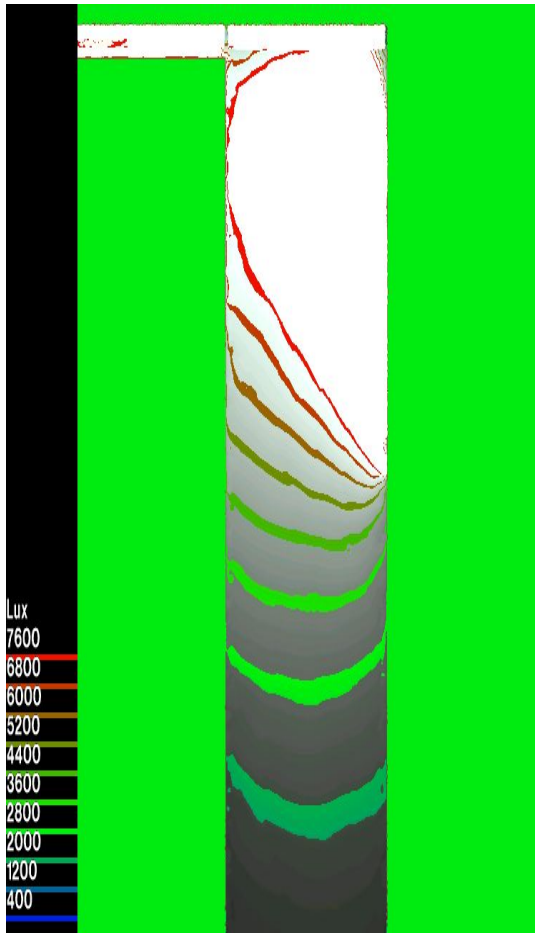


```
FileName= SOLEX_8.PPG
# Product Name= Solex®
# NFRC ID= 5021
# Manufacturer Name= PPG Industries
# Glazing Type= Monolithic
# Coated Side= Neither
# Transmittance= 0.718
# Front Reflectance= 0.072
# Back Reflectance= 0.073
# Thickness(mm)= 0.000
# Appearance= Light Green
#


void  glass       SOLEX_8_glass
0
0
3    0.656     0.835     0.756

void  BRTDfunc    SOLEX_8_front
10
     0.063     0.076     0.073
     0.602     0.766     0.693
     0 0 0
     .
0
9 0 0 0 0 0 0 0 0 0

void  BRTDfunc    SOLEX_8_back
10
     0.064     0.076     0.074
     0.602     0.766     0.693
     0 0 0
     .
0
9 0 0 0 0 0 0 0 0 0
```

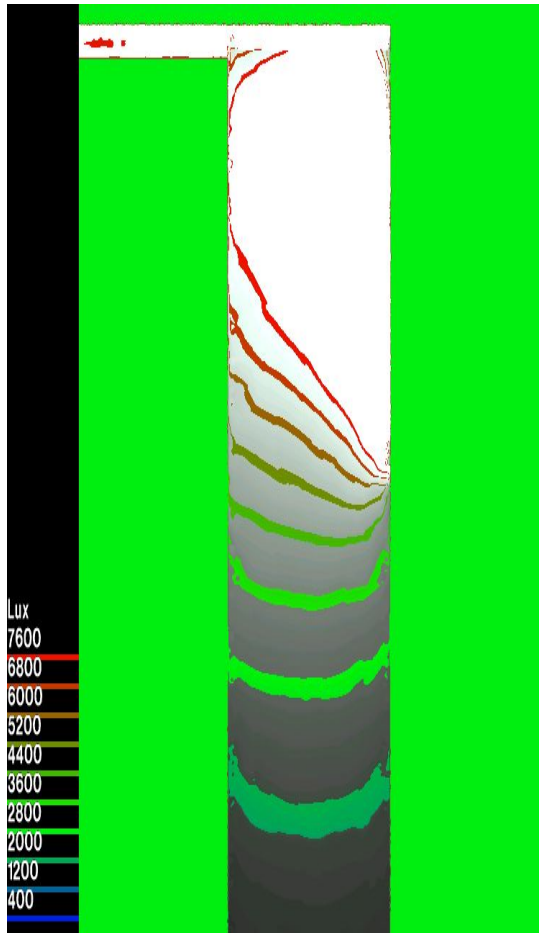
Direct Light



Solex glass in the middle panels with spandrel in the upper panel

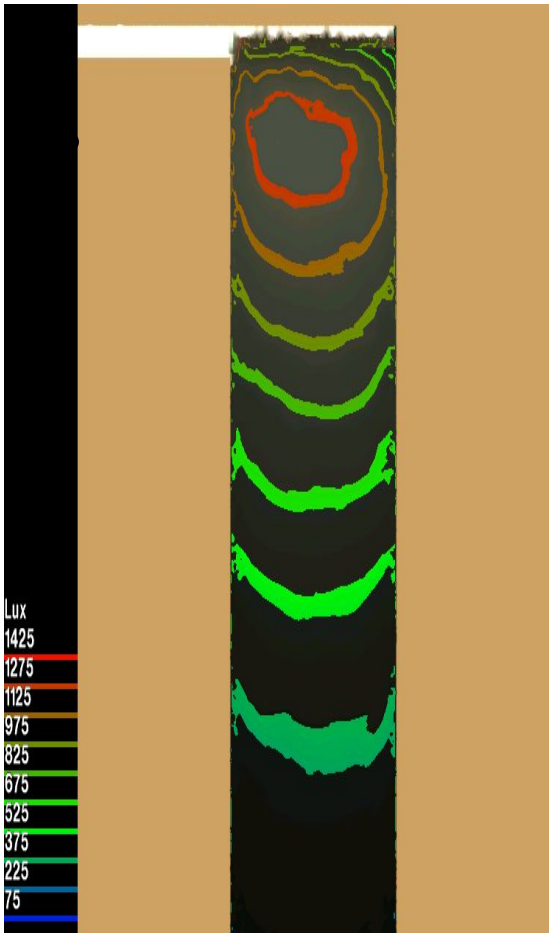


Clear glass in the middle panels with spandrel in the upper panel

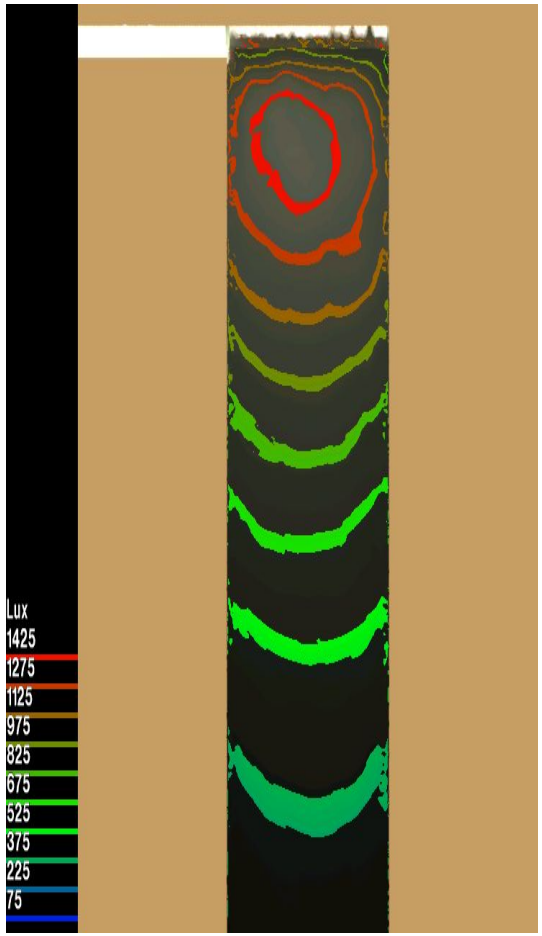


Translucent glass in the upper panel with clear glass in the middle panels

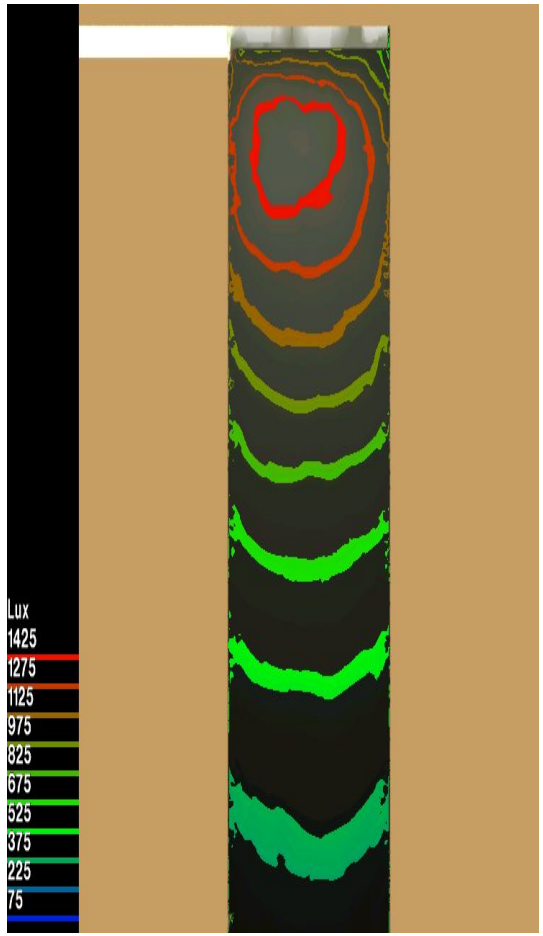
Diffuse Light



Solex glass in the middle panels with spandrel in the upper panel



Clear glass in the middle panels with spandrel in the upper panel

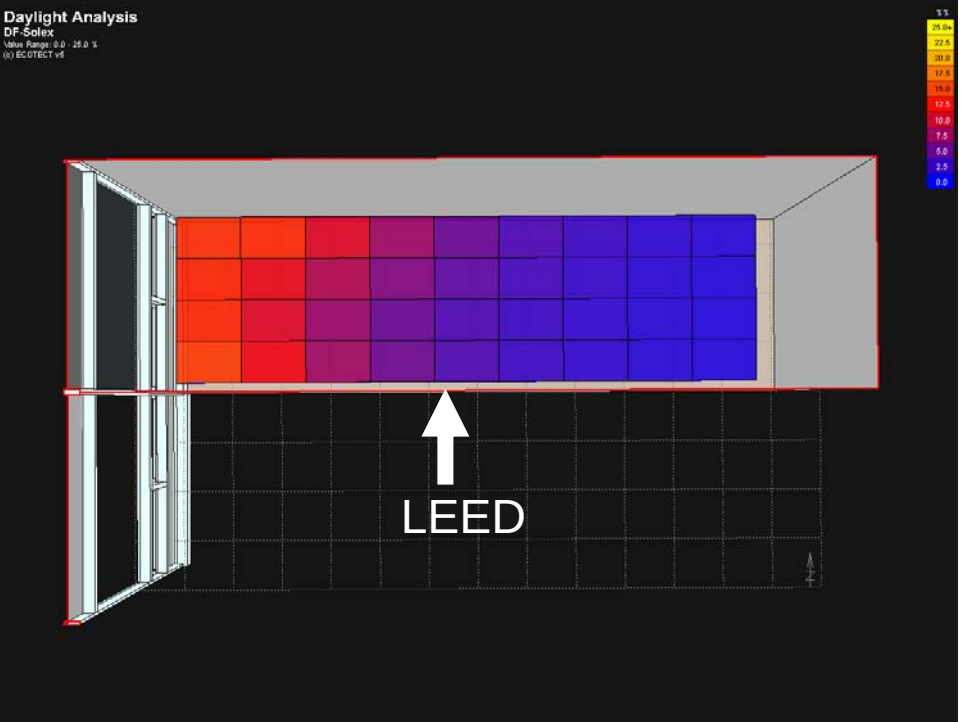


Translucent glass in the upper panel with clear glass in the middle panels

Dynamic Simulation w/ Daysim

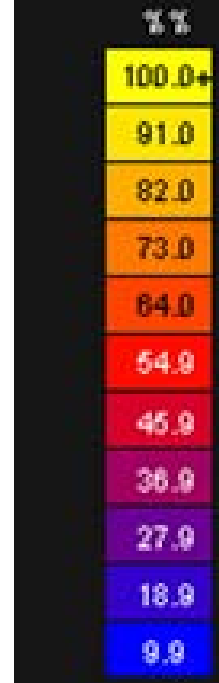
DA:

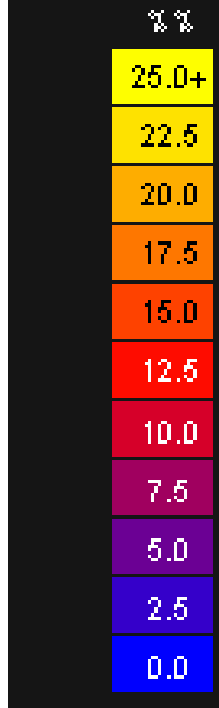
Existing Solex Glass



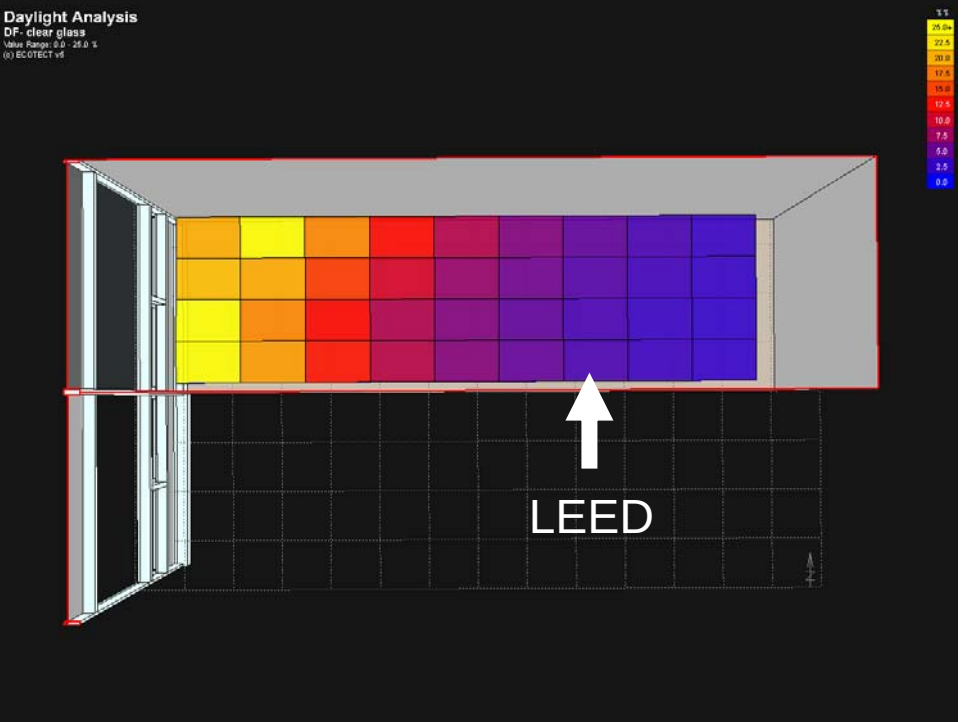
DF:

Existing Solex Glass





DA:
Clear Glass

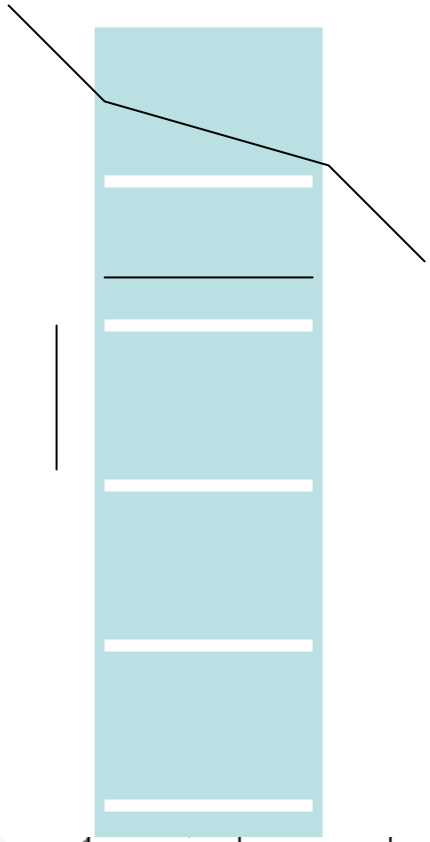


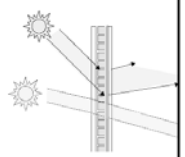
DF:
Clear Glass

lcp panel material definition in radiance

Phillip Greenup, Arup 3/9/98

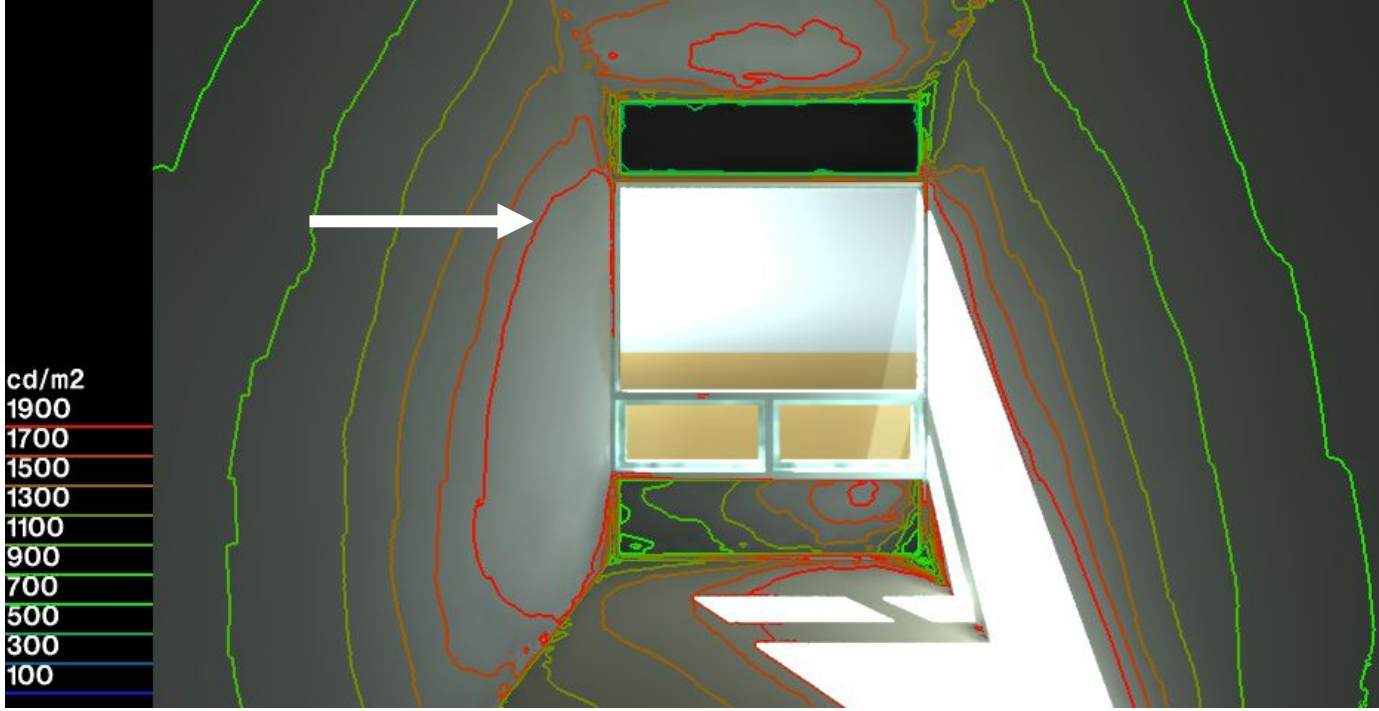
```
void prism2 26_LCP
11 f1 dx1 dy1 dz1 f2 dx2 dy2 dz2 lcp0.cal -rz 90
0
2       0.5 1.5

        Phillip Greenup                                 3/9/98

}

{ Fresnel calculations of transmission and reflection }
cos_i=abs(Rdot);
cos_t=sqrt(A2*A2-1+cos_i*cos_i);
rte=(cos_i-cos_t)/(cos_i+cos_t);
rtm=(A2*A2*cos_i-cos_t)/(A2*A2*cos_i+cos_t);
R=(rte*rte+rtm*rtm)/2;
T=1-R;

{ Fractions deflected and undeflected }
tan_rp=abs(Dz)/(sqrt(A2*A2-1+Dx*Dx));
m=floor(tan_rp/A1);
fd0=(tan_rp/A1)*(-1)^m+2*floor((m+1)/2)*(-1)^(m+1);
fu0=1-fd0;
fd=fd0*T*T;
fu=fu0*T*T;

{ Selection of two strongest components }
N1=if(fu-fd,if(fu-R,1,3),if(fd-R,2,3));
N2=if(fu-fd,if(fu-R,if(fd-R,2,3),1),if(fd-R,if(fu-R,1,3),2));

f1=select(N1,fu,fd,R);
dx1=select(N1,Dx,Dx,-Dx);
dy1=Dy;
dz1=select(N1,Dz,-Dz,Dz);

f2=select(N2,fu,fd,R);
dx2=select(N2,Dx,Dx,-Dx);
dy2=Dy;
dz2=select(N2,Dz,-Dz,Dz);
```



	elements with HOEs (→ 4.10)		cloudy skies	(especially in court-yards), skylights			
2B Direct light guiding Systems	Laser Cut Panel (→ 4.6)		All climates	Vertical windows, skylights	**N**	**Y**	
	Prismatic panels		All climates	Vertical windows	**D**	**D**	

South Exposure-

West Exposure-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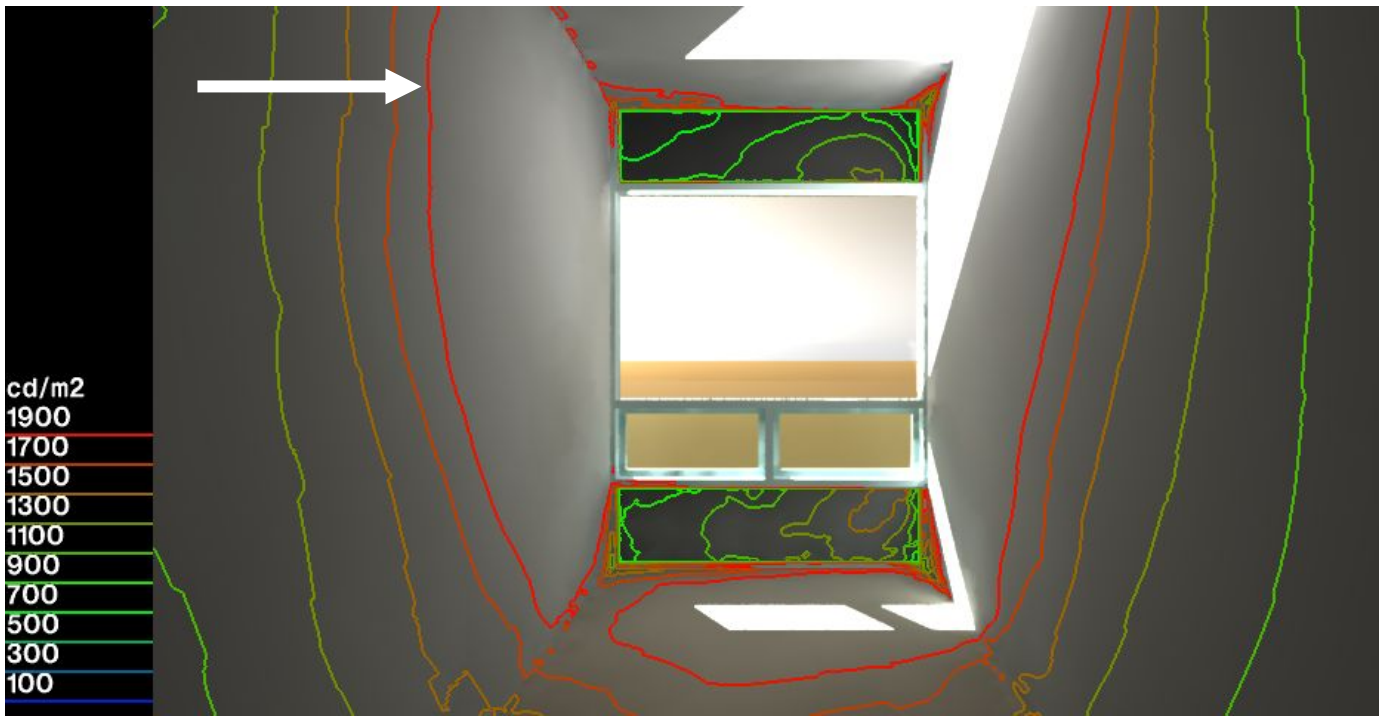
1900
1700
1500
1300
1100
900
700
500
300
100


cd/m2
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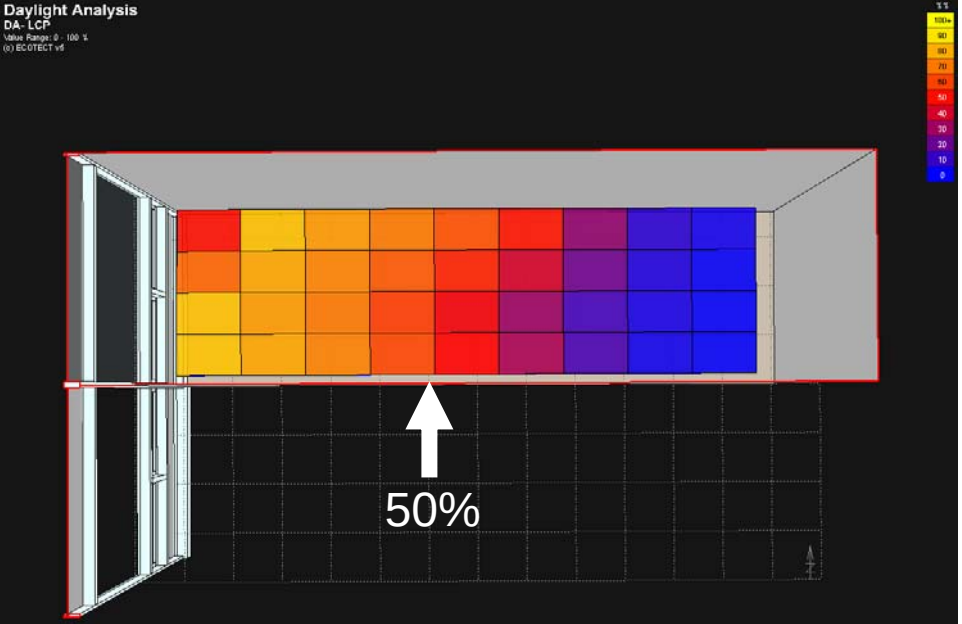
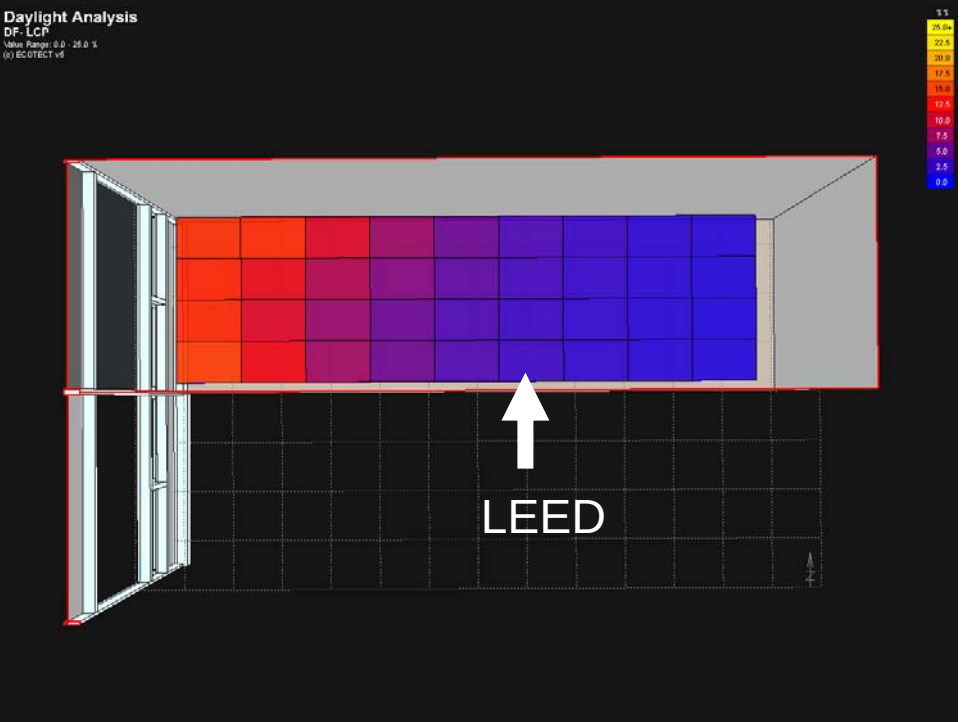


DA:
LCP Glass

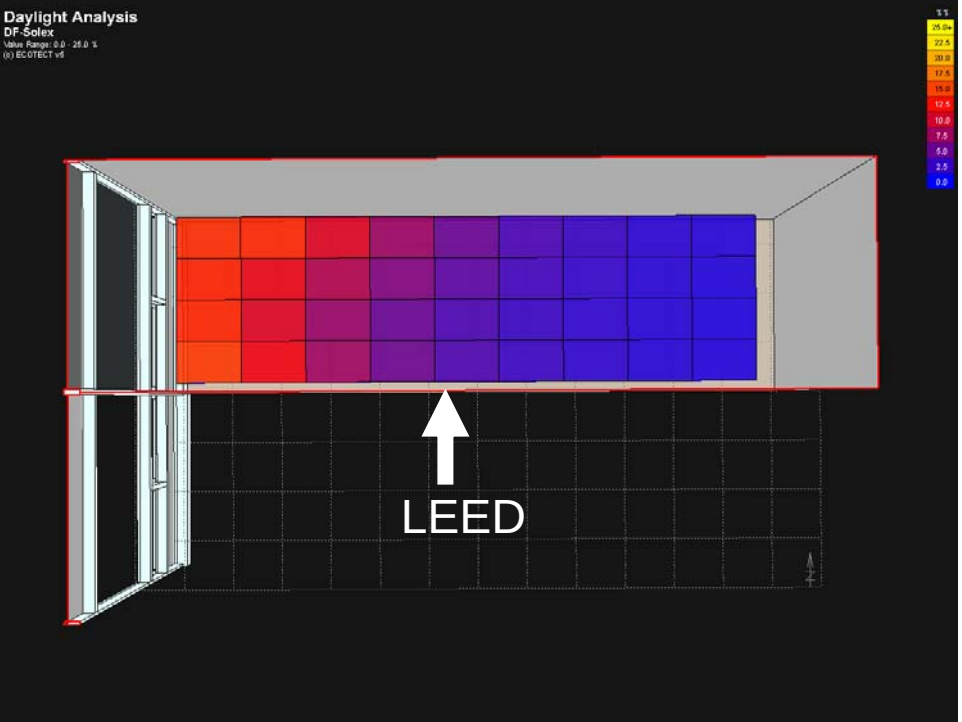


DF:
LCP Glass

Dynamic Simulation w/ Daysim

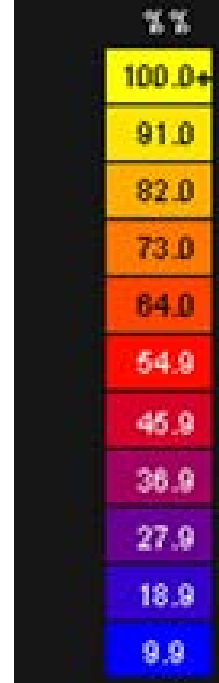
DA:

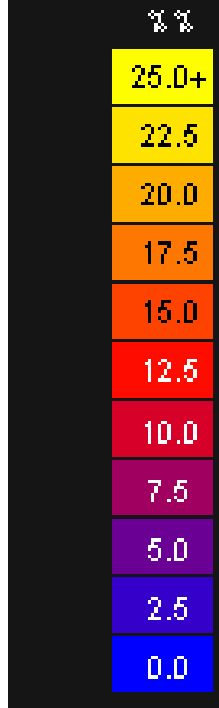
Existing Solex Glass



DF:

Existing Solex Glass





January- East

March- East

May- East

October- East

January- West

March- West

March- West

August- East

October- West

March- East

May- East

March- West

March- West

January- Single Facade- West

March- Single- East

May-Single- East

July- Single- West

January- East

March- East

May- East

January- West

March- West

March- West

July- West

October- West

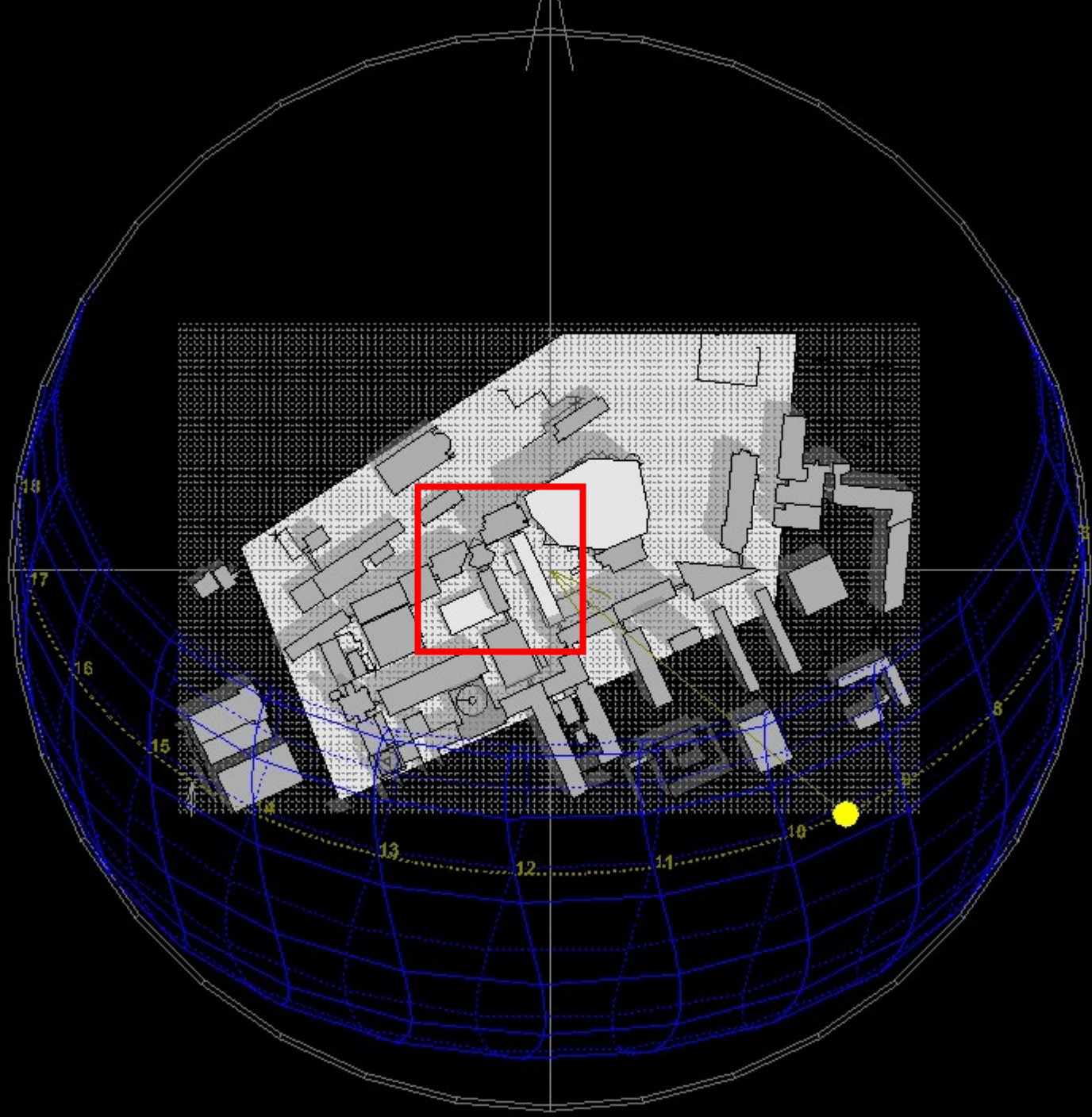
January- South

July- South- Mirror Blinds

July- South- Glass Blings

January- Single Facade- West

March- Single- East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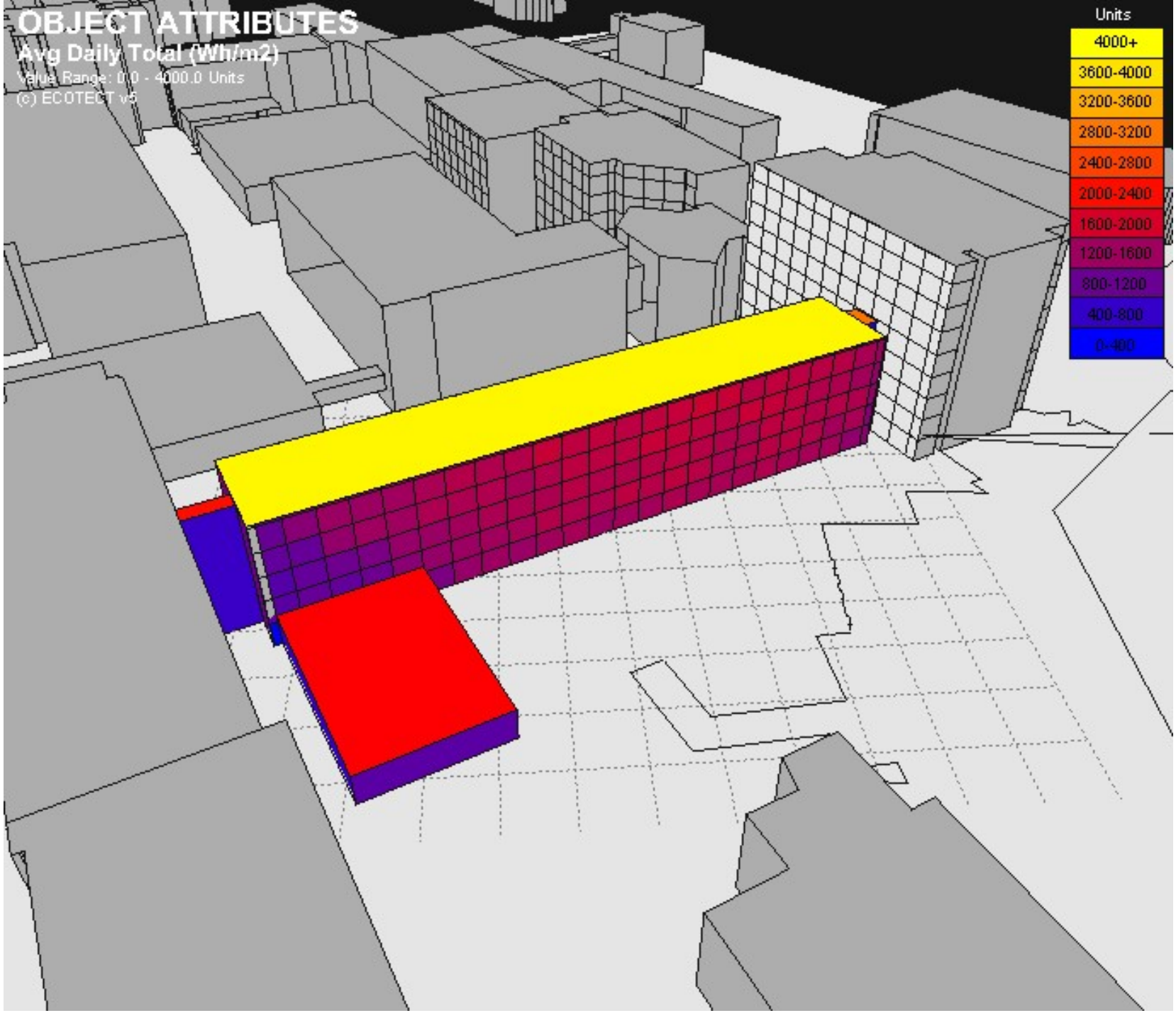
OBJECT ATTRIBUTES
Avg Daily Total (Wh/m2)
Value Range: 0.0 - 4000.0 Units
(c) ECOTECT v5
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3600-4000
3200-3600
2800-3200
2400-2800
2000-2400
1600-2000
1200-1600
800-1200
400-800
0-400