

CASE STUDY 1: DAYLIGHTING STUDY



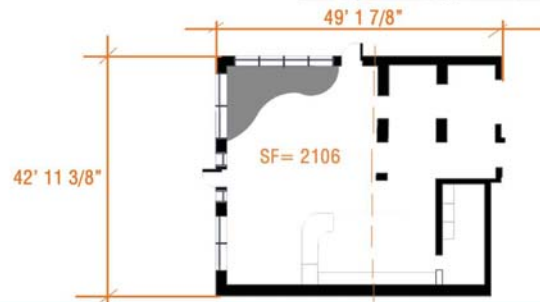
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GENERAL SPACE DESCRIPTION



Located on the corner of 6th St and Main, One World Cafe is a frequented cafe that caters to the town of Moscow, ID and the college population. With both east and south facing window systems, One World Cafe is generously lit throughout the day both with daylight and direct sunlight. Various electric light fixtures help regulated the distribution of light throughout the spaces over the course of the day as well as in the evening and night. The goal of this study was to see if the direct sunlight could be decreased in order to better maximize daylighting and passive heating and lighting in the space.

DETAILED SPACE DESCRIPTION



The material primarily used consist of brick, glazing along the exterior walls, with wood detail used throughout the interior
 The interior is open in plan, spaces are divided both by furniture arrangements and variation in levels

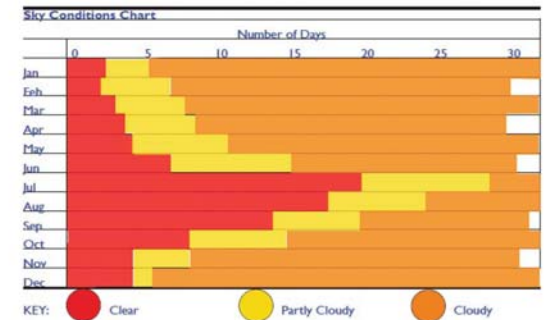
MOSCOW, ID CLIMATE

/Fall or Spring equinox months are March or September: 22 Calendar days

/Winter Solstice month is December: 25 Calendar days

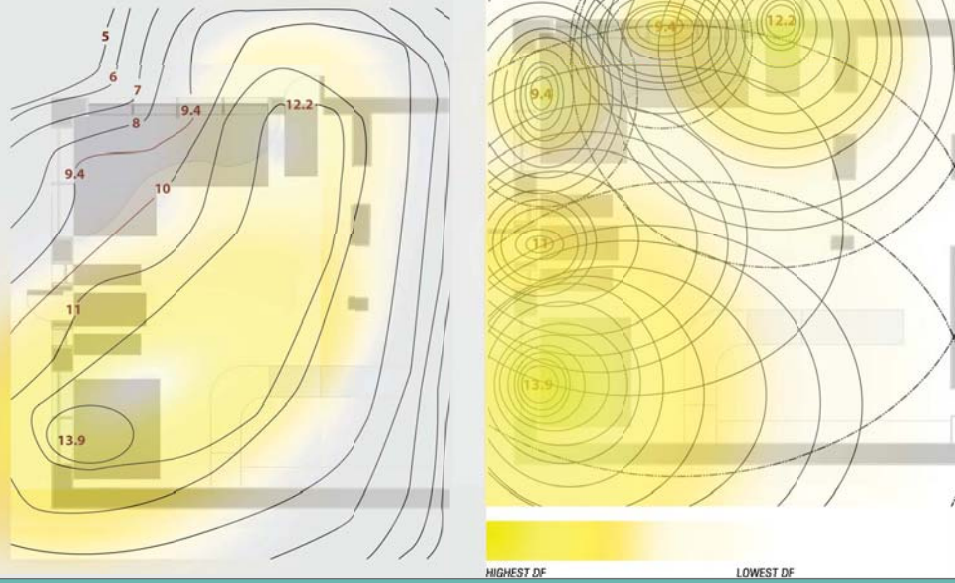
/Worst case scenario 8am or 4pm for December: 75 FC

/Worst case 8am or 4pm in March or September: 887.5 FC



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LIGHT DISTRIBUTION

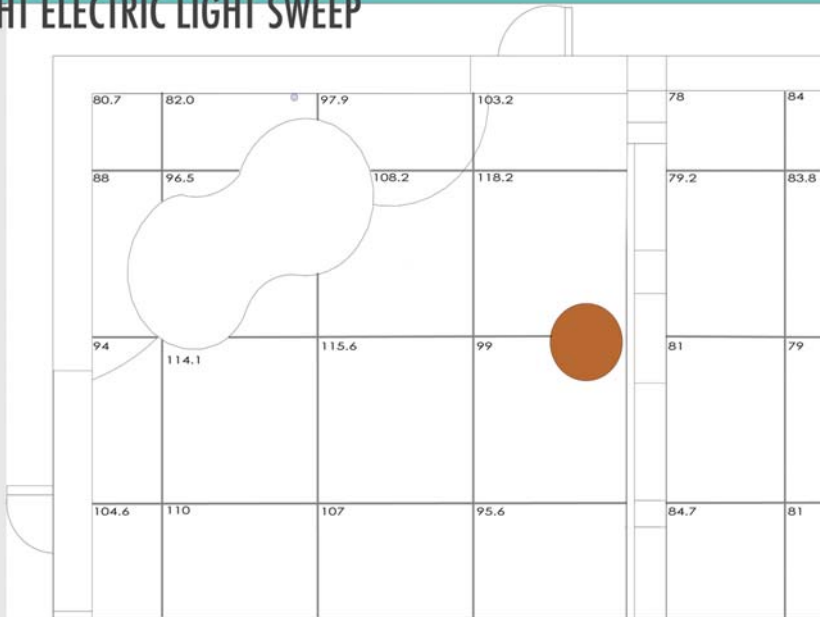


CURRENT LIGHTING PERFORMANCE

The current glazing system, while allowing generous amounts of daylight, also permits large amounts of direct exposure from the east and south, resulting in relatively large amounts of glare in the areas next to the windows.



NIGHT ELECTRIC LIGHT SWEEP



CURRENT LIGHTING PERFORMANCE

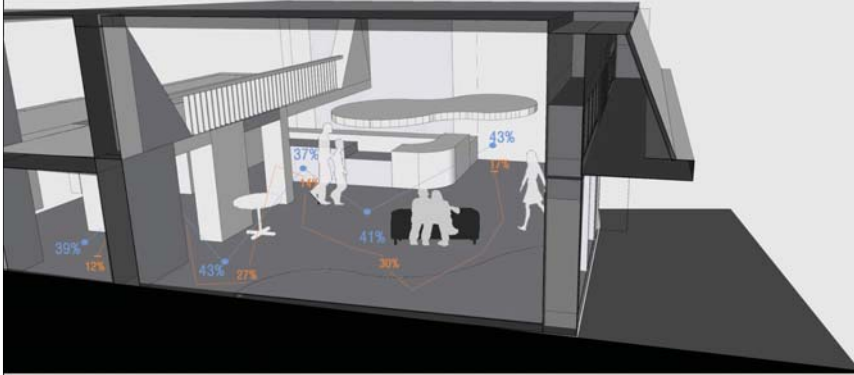
With the use of an illuminance meter, we were able to calculate the amount of daylight (measured in lux) currently found in various locations of the cafe.



CURRENT LIGHTING PERFORMANCE

/ADDITIONAL STUDIES

Additional readings of the daylighting in the space were taken on both a partly cloudy (blue), as well as a sunny day (orange). After comparing the three conditions, we were able to establish that the daylighting was at its best during rainy conditions.



ENERGY USAGE & SAVINGS

/Current Inventory

- 8 LED Bulbs at 72w, 1723w
- 3 CFL Bulbs at 75w, 1800w
- 24 Incandescents at 1440w, 34,560w

//Resulting in 38.1kW/Day when electric lights are used over 24 hr period

/Hours Electric Light is Needed

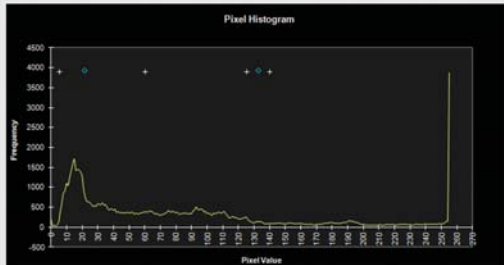
- Winter: 6am-8am, 4pm-10pm -8hrs usage
- Spring/Fall: 6am-7am, 7pm-10pm -4hrs usage
- Summer: 6am-7am, 8pm-10pm -3hrs usage

/If the cafe used electric lighting only when needed, usage would drop to:

- Winter 12.70kw, 25.4 kw saved
- Spring/Fall 6.35kw, 31.75kw saved
- Summer 4.76kw, 33.34kw saved



GLARE COMPARISON



Overall Image	
Weighted Avg Pixel Intensity	96.54
Total Number of Pixels	76800
Background Bell Curve	
Low End Pixel Value	6
High End Pixel Value	66
Background Median Value	21
Number of Background Pixels	37184
Background Percentage of View	48.42%

Individual Pixel	
Individual Pixel Value	130
Corresponding Luminance	29.98 footlamberts
Spike	
Low End Pixel Value	125
High End Pixel Value	140
Spike Median Value	132
Number of Spike Pixels	2253
Spike Percentage of View	2.93%

Spike to Background Ratio	
Median Spike to Median Background	6.29 TO 1
Schier Glare 7	YES



Using Photoshop and Rascal, we were able to study the glare currently found in the space. Glare was found to be an issue for spaces close to the east and south facing windows.

REDESIGN SAVINGS & COMPARISON

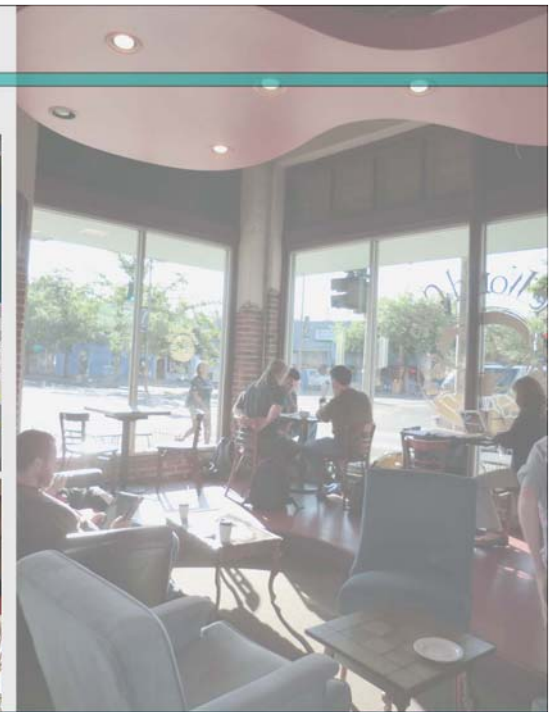
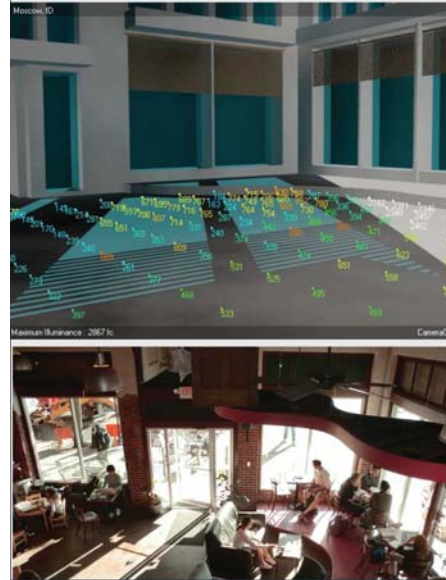
After taking inventory of the current electrical lighting system and its efficiency, we chose to leave all of the existing fixtures, but only to have them in use during the hours where the space does not receive sufficient daylight. Reopening the small windows above the curtain wall as well as implementing light shelves, allows the daylight to reach farther back into the space to better illuminate the cafe. Furthermore, installing shading devices on the windows will allow direct sunlight to be blocked or filtered depending on the season.



ONE WORLD CAFE REDESIGN



REDESIGN COMPARISON



CONCLUSION

Following our daylighting studies of One World Cafe, we found that the space itself has great potential to be a very successfully daylit space due to its generous amounts of east and south facing windows. However as there were no design elements implemented to filter direct sunlight, glare was a prevalent issue with spaces near the windows. Our redesign allows the existing daylight to illuminate the space, while filtering the sunlight to better passively heat and light the cafe throughout the year.