Daylightful Library
An Analysis of the Library: Atlantic Center for the Arts
Team Blue:

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Abstract

An analysis of the daylighting and effects of glazing on the thermal and lighting environment in the library.
The library at the Atlantic Center for the Arts is an elegant design that provides daylighting, views of the water and natural landscape, and an intimate scale. Unfortunately, the view to the water is to the West, and there is a concern that the illumination and thermal effects from the extensive glazing in that direction may be uncomfortable.
Hypothesis

**HYPOTHESIS 1:**
The illuminance levels from daylight on the table in the library will meet industry standards between 6:00pm and 7:00pm, and 8:30am and 12:30pm.

**HYPOTHESIS 2:**
The illuminance levels from daylight in the loft in the library will meet industry standards between 6:00pm and 7:00pm, and 8:30am and 12:30pm.
Methodology

1. Set up HOBOs to take three measurements (Temperature, Relative Humidity, Light Intensity) every 15 minutes.

2. Set up six HOBOs on lower level of library, one at each seat at the table.

3. Set up two HOBOs on the second floor (loft) of the library, one on each reading chair’s arm rest.

4. Every half-hour manually read illuminance levels and surface temperature.

5. Compile industry standards.

6. Analyze data (form conclusion).
HOBO PLACEMENT
Table Light Levels

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Loft Light Levels

![Graph showing light levels for West Chair and North Chair from 6:00 to 1:00, with data points for each hour of the day.](image-url)
Analysis

• Hypothesis 1:
  • Morning lighting levels are lower than IESNA recommendations.
  • Afternoon lighting levels varied from 10fc to 60fc.
    • Noon to 1pm and 6pm to 7pm due to conditions provided
  • Wide variation in lighting levels at the various positions at the table.

• Hypothesis 2:
  • Lighting levels in the loft exceeded IESNA recommendations.
Conclusions

Hypothesis 1 was disproved: lower than IESNA recommendations of 30fc.

Trees provided shade.
Mid-afternoon data not available.

Hypothesis 2 was disproved: lighting levels exceeded IESNA standard.
Appendix: Future Studies

No Low E Coating?
Vegetation Shading?
ACALibrary Load Comparison

- Solar Gain (Btuh)
- Window Transmission Gain (Btuh)
- Wall Transmission Gain (Btuh)
- Roof Transmission Gain (Btuh)

Heat Gain?