PRITCHARD ART GALLERY

CASE STUDY

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BUILDING DESCRIPTION

Established in 1982, The Pritchard Art gallery is located at 414 S. Main St. Moscow, Idaho.

The gallery consists of a mixture of electric lighting and daylight systems (skylight and sidelighting), to host a variety of exhibitions.

Depending on the type of artwork, a specific lighting strategy may be used (diffuse skylight or electric spot lighting).

Translucent glazing on the West façade is the only sidelighting implemented in the building design.

Two partition walls (Approx 9’ high) in the gallery entry block any direct sunlight entering through the West façade glazing.
EXISTING LIGHT INVENTORY

ELECTRIC LIGHTING SCHEME

<table>
<thead>
<tr>
<th>Electric Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaulted Space: GE PAR 120 HIRFL40XL</td>
</tr>
<tr>
<td>Life of 6,000 hrs</td>
</tr>
<tr>
<td>Temperature of 2800K</td>
</tr>
<tr>
<td>Entry Space &amp; lower gallery: 50 PAR 120 HFL</td>
</tr>
<tr>
<td>Life of 2,000/4,000 hrs</td>
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<tr>
<td>Temperature of 2750K</td>
</tr>
</tbody>
</table>

EXISTING LIGHT INVENTORY

DAYLIGHTING SCHEME

<table>
<thead>
<tr>
<th>Daylighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidelighting Glazing System</td>
</tr>
<tr>
<td>Translucent glazing (pane)</td>
</tr>
<tr>
<td>85-90 transmittance value</td>
</tr>
<tr>
<td>West façade entrance</td>
</tr>
</tbody>
</table>
**LIGHTING ZONES**

* Lights can be added/removed according to preference, variance in actual lighting numbers may exist

- Mixed daylight and 13 50W lamps
- Vaulted space consists of 13 90W lamps
- Entry gallery space consists of 16 50W lamps

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**PERFORMANCE ANALYSIS**

CURRENT ELECTRIC/DAYLIGHTING DESIGN

- Average Illuminance (Lux) : 136.7
- Average Daylight: 13.1%
PERFORMANCE ANALYSIS
DAYLIGHT ONLY*

- Average Illuminance (Lux): 20.6
- Average Daylight: 2.1%

PERFORMANCE ANALYSIS
SKY COVERAGE (MOSCOW, ID)

- Sky conditions favor cloudy skies for the majority of the year (good for toplighting)
PERFORMANCE ANALYSIS

Available Illuminance

- Sky luminance values for overcast day
  - Latitude: 46
  - 11:00 am – 1:00 experience highest illumination values
  - These values can be utilized year round with the implementation of a toplighting system
    - North and South facade

REDESIGN PROPOSAL

- Analysis suggests high glare contrast due to the West façade translucent glazing system
- Implementation of a vertical monitor toplighting system along the North and South façade will bring diffuse light into the space throughout the day
  - A diffuse daylight factor of 1 is ideal for gallery space inside out D2.4.1
  - Help to reduce existing glare problem
- Vertical monitors will be integrated with an adjustable shutter system to close toplighting apertures for alternate lighting scenarios
  - Preference of daylight and electric lighting can make a difference in how art and sculpture is displayed (warm light vs cool white)
**REDESIGN**

**BEFORE**

- Inadequate distribution of daylight
  - Front of gallery daylight factor was 7%
  - Back of gallery daylight factor was .5%

Glare Problem

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**REDESIGN**

**GLARE ANALYSIS (BEFORE)**

- Schiller glare (YES) ratio of 4.29:1
Implementation of dual vertical monitors on North and South facade featuring splayed apertures to increase diffuse daylighting evenly among the gallery.

Schiller glare (NO) of 1.44:1
REDESIGN

DAYLIGHT COMPARISON (BEFORE)*

- Current design shows variation in light levels:
  - High: 260-245
  - Low: 0-4
- Uneven distribution of light

REDESIGN

DAYLIGHT COMPARISON (AFTER)*

- Redesign shows an even distribution of light among the space:
  - High: 260-230
  - Low: 9-20
REDESIGN SECTION

- Panels span 60'L x 4'H
- Direct light from the South façade hits splayed aperture, diffusing the light downward
- Adjustable shutters at each window allow for preference in how much light enters the space

ENERGY SAVINGS

- Existing Halogen
  - Avg. Watts: 70
  - Avg. Lamp Life: 4500hrs
  - Cost per year: $1800
    @ $0.17 per kWh

- Future Potential
  - 50 W
  - Lamp life: 4200hrs
  - Savings of $514.40 per year
ENERGY SAVINGS

- LBL Nomograph suggests an energy savings of 65.8% per year with vertical monitor installation.

CONCLUSION

- Top lighting system allows for more daylight.
- Flexible design allows for variety of exhibition lighting schemes.
- Reduces glare and contrast.
- Reduces energy.