## Electric Light Cost Savings (Field Analysis) Experiment: Science and Math Building

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**Northwest College, Powell Wyoming**

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### History (Science Math Building)

The Science Math Building was constructed in 1994. The Science and Math Building features classrooms, offices, engineering facilities, drafting, engineering, geology, math, and physics. This building wasn’t built using energy efficiency for lighting in mind. Built in a time of relatively cheap energy costs as compared to today’s energy costs the concern of higher future energy demands and costs wasn’t incorporated into the design.

Built with an **Over-Abundance** of fluorescent light bulbs...Total bulbs = 1,995 throughout the First and Second Floors. Energy efficient techniques such as "Occupancy Sensors" were not installed, even though the technology existed in 1994.

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### Lighting Layout

- Each of the 18 Classrooms has overhead lighting ranging between 48 to 88, (32 watt) fluorescent light bulbs.
- Each of the 29 Offices has overhead lighting ranging between 6, 8, or 12, (32 watt) fluorescent light bulbs.
- Science Math Building Lighting Layout identified on the CADD drawing provided.

### Proposal

Reduce the Brightness to a manageable level within each room of the Science Math Building, by removing as many fluorescent light bulbs as possible as not to hinder the standard daily routine of students, staff, and instructors.

- All of 1,995 light bulbs are turned "ON" at 5am each morning (Monday-Friday) at the facilities managers start of the day.
- All of 1,995 light bulbs are turned "OFF" at 11pm nightly (Monday-Friday) by security personnel during night rounds except the 88 Security lights.

1,995 lights are "ON" 18 hours per day, five days per week & (88 Safety lights are "ON" a total of 13.5 days per Month).

### Field Analysis

Each room was individually examined by removing light bulbs deemed not necessary, in order to determine the best reduced lighting. Each room tested was approved by the instructors or staff as acceptable reduced lighting. Each room was individually examined by removing light bulbs deemed not necessary, in order to determine the best reduced lighting. A "Visual - Determination" rather than the "Light-Meter" technique was used in determining acceptable lighting for each room.

#### Daytime study

- The majority of rooms have windows. The natural sunlight entering into each room helped in determining the amount of light bulbs to remove. (Ambient light reduces the need for overhead lighting).

#### Nighttime study

- Confirmation after removal of all room light bulbs found no-adverse-affects on room lighting at night. Reasoning that the amount of lights remaining operational (at 32 watts per bulb) generated an effective lighting environment during nighttime even though the ambient sunlight source was missing.

### Experiment

This experiment is to remove a total of 684 fluorescent light bulbs throughout the building "Visual Determination".

**The First Floor** will have 262 lights removed out of a total of 920 (28% Reduction). All of the fluorescent lights approved for removal have been identified on the CADD drawing provided.

### Cost -to -Reduced Cost Savings Calculations (Calculations Rounded-Up)

#### Current Monthly Electric Cost (30 days)

<table>
<thead>
<tr>
<th>Lights</th>
<th>Cost per day</th>
<th>Bulbs</th>
<th>Daily Sept. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$0.043724</td>
<td>1,995</td>
<td>$87.23 x 22</td>
</tr>
<tr>
<td></td>
<td>$1919.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Reduced Monthly Electric Cost (30 days)

<table>
<thead>
<tr>
<th>Lights</th>
<th>Cost per day</th>
<th>Bulbs</th>
<th>Daily Sept. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>$0.058296</td>
<td>88</td>
<td>$5.13 x 13.5</td>
</tr>
<tr>
<td></td>
<td>$69.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Monthly Savings = $7,896.24

#### Savings on Future Orders of Additional Purchases

- 684 removed bulbs / 30 in a pack = 22.8 packs
- 22.8 packs x 95 = approx. $2,165

> The 684 bulbs are placed in storage as reserve bulbs. When an active bulb needs replacement a reserve bulb is used.

### Conclusion

By removing 684 bulbs gives Northwest College a **Monthly Savings = $658.02** and a **Yearly savings = $7,896.24**

The experiment commences September 1, 2016 and concludes September 30, 2016.