# IPRO 320

## Sustainability

# Introduction

# Summary of IPRO 320

- Problem Definition
- Scope
- Team Organization
  - University Teams
  - Data Team
  - Management Team

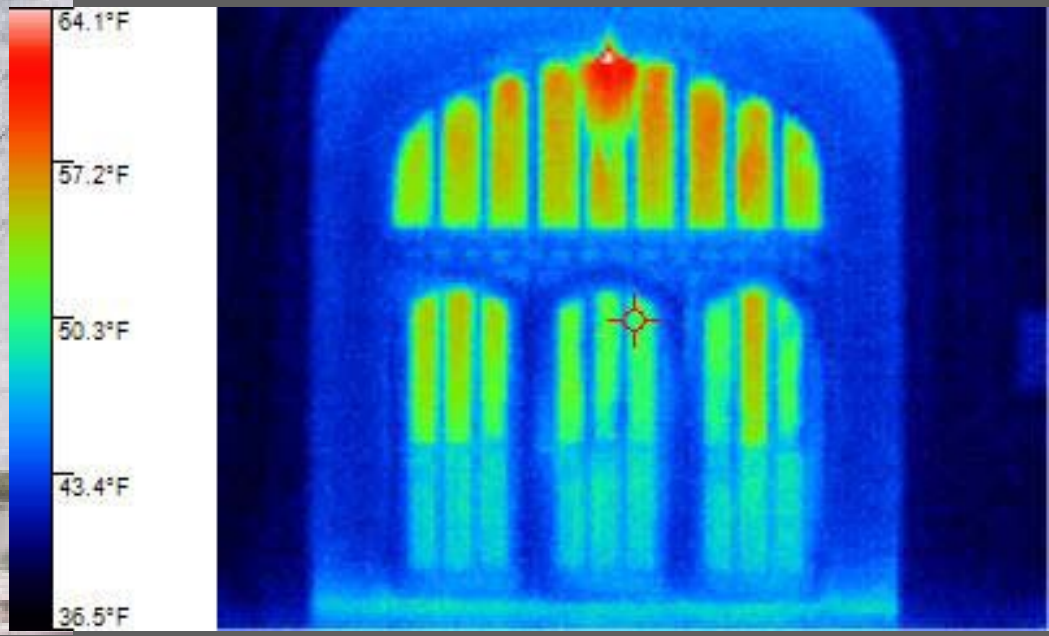
# Three Universities

- University of Chicago
  - Founded in 1890
  - Hyde Park
- Loyola University Chicago
  - Founded in 1870
  - North Chicago Lakeshore
- Illinois Institute of Technology
  - Founded in 1890
  - South Side

# University of Chicago

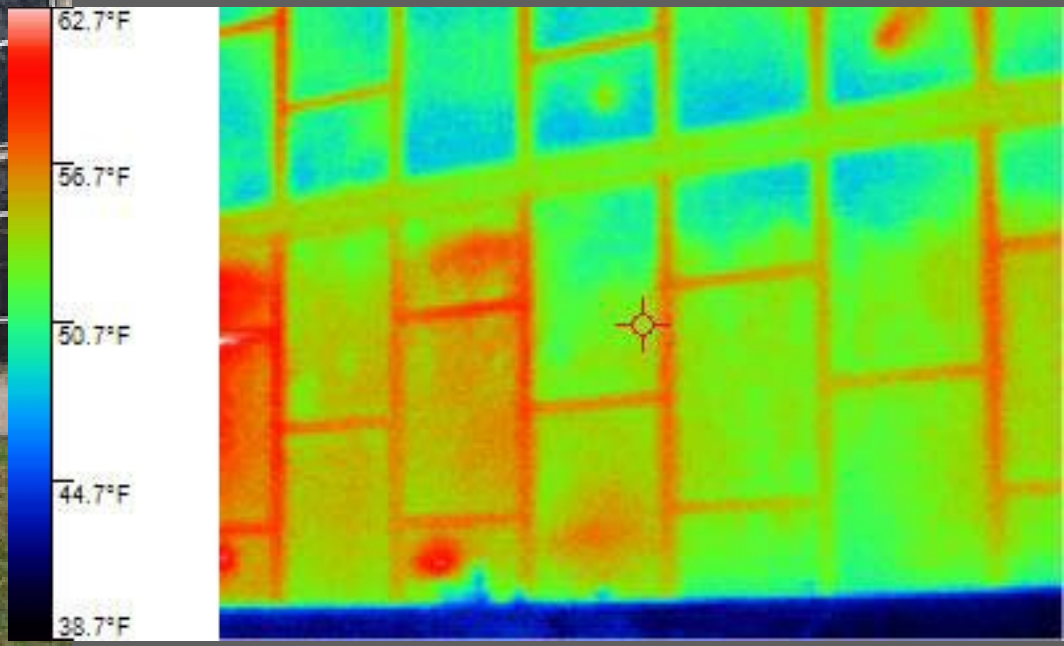
- Harper Memorial Library
  - Built in 1910
  - English Gothic Style from Stone
- Mott
  - Built in 1958
  - Concrete, Steel and Glass
- SSA
  - Built in 1964
  - Mies Steel and Glass

# Harper Memorial Library



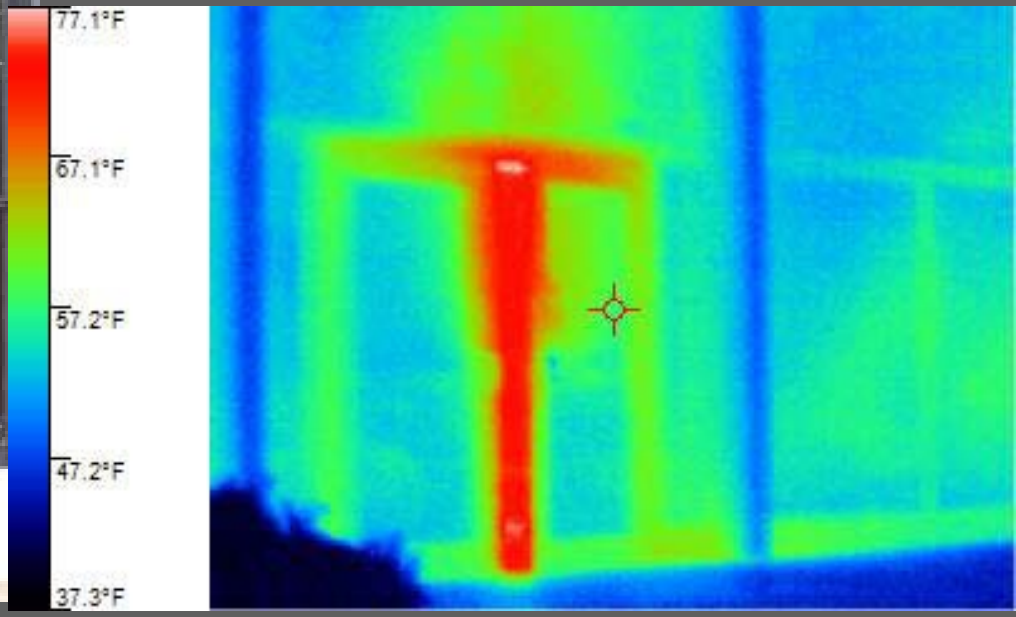

**Est. R value= 1.136 ft² (°F)* (hours/BTU)**

# MOTT




**Est. R value= 1.82 ft² (°F)* (hours/BTU)**

# SSA

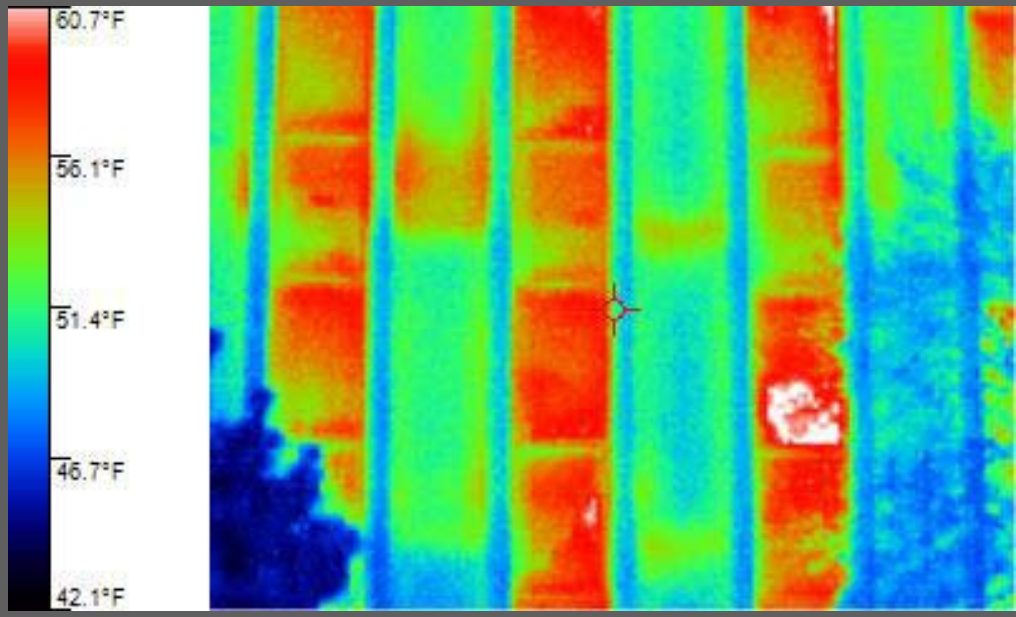




**Est. R value= 1.35 ft² (°F)* (hours/BTU)**

# Loyola University Chicago

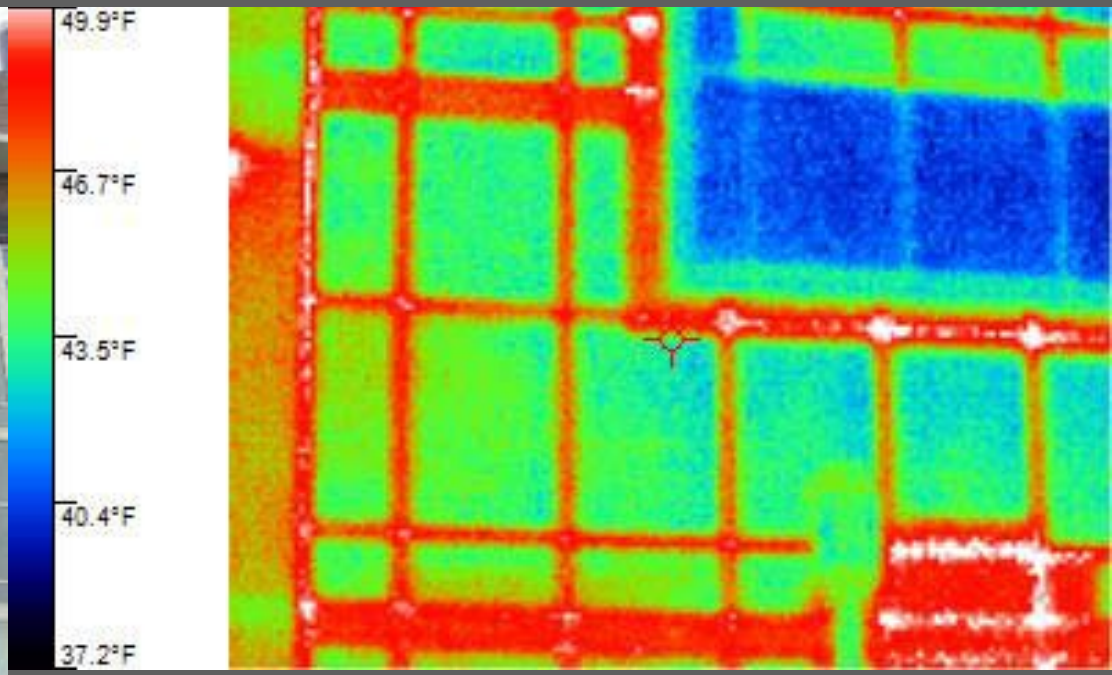
- Flanner Hall
  - Built in 1975
  - Poured Concrete
- Quinland Life Sciences
  - Built in 2004
  - Brick and Glass Lab Building
- Mundelein Center
  - Built in 1930
  - 15 story stone Art Deco

# Flanner Hall



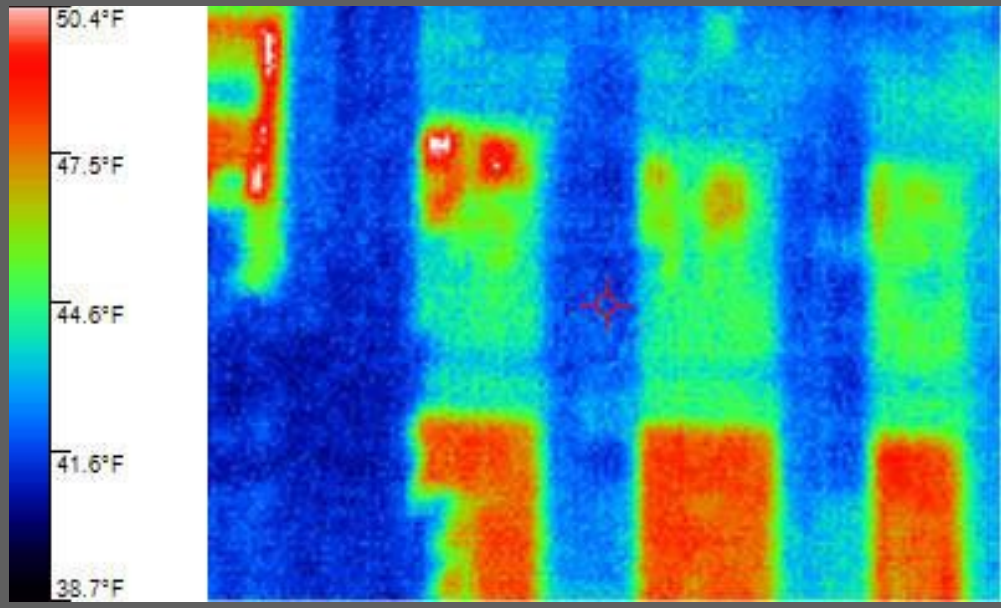

**Est. R value= 3 ft² (°F)* (hours/BTU)**

# Quinland Life Sciences




**Est. R value= 20 ft² (°F)* (hours/BTU)**

# Mundelein Center

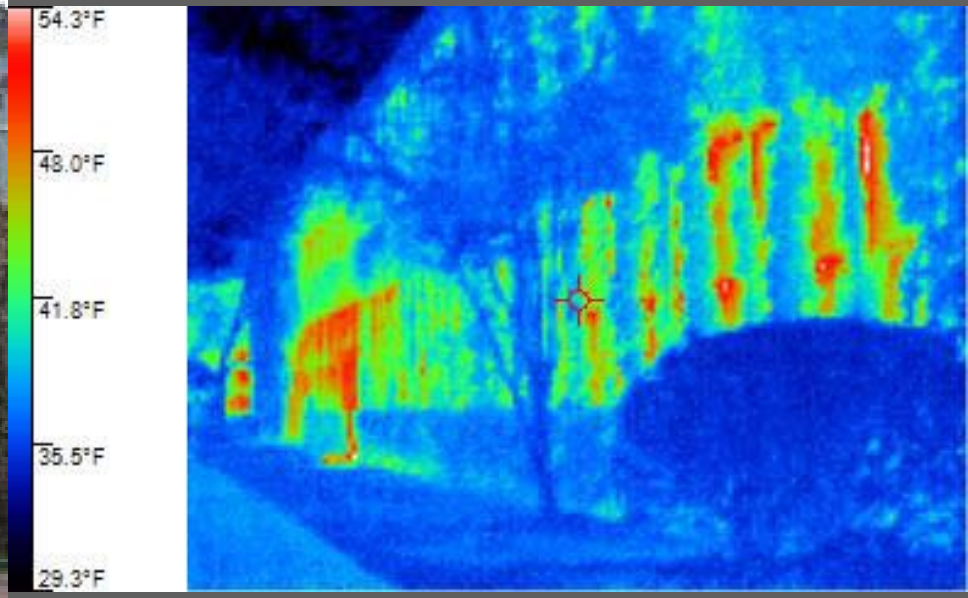



**Est. R value= 2.5 ft² (°F)* (hours/BTU)**

# Illinois Institute of Technology

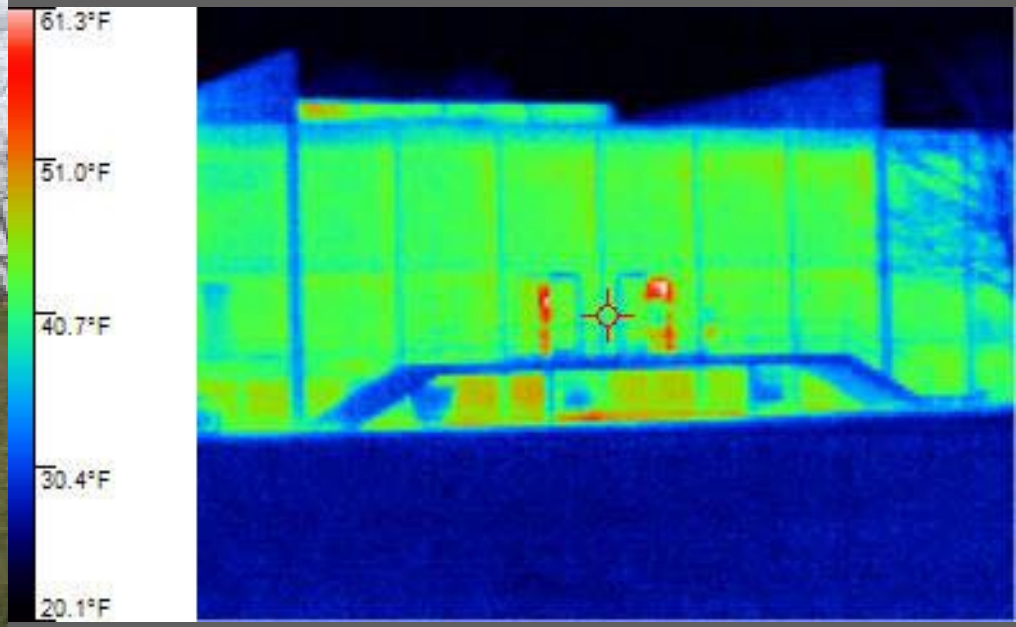
- Perlstein Hall
  - Built in 1946
  - Brick, Steel and Glass (Mies)
- S.R. Crown Hall
  - Built in 1956
  - Steel and Glass (Mies)
- Main Building
  - Built in 1891
  - Red Brick/Terra Cotta

# Perlstein Hall



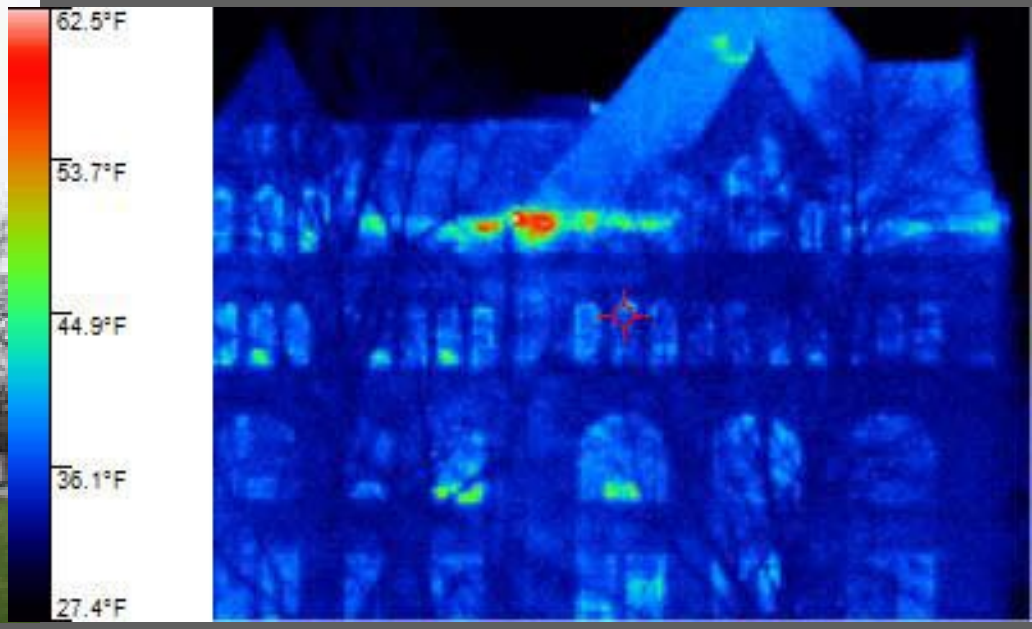

**Est. R value= 10.23 ft² (°F)* (hours/BTU)**

# S.R. Crown Hall



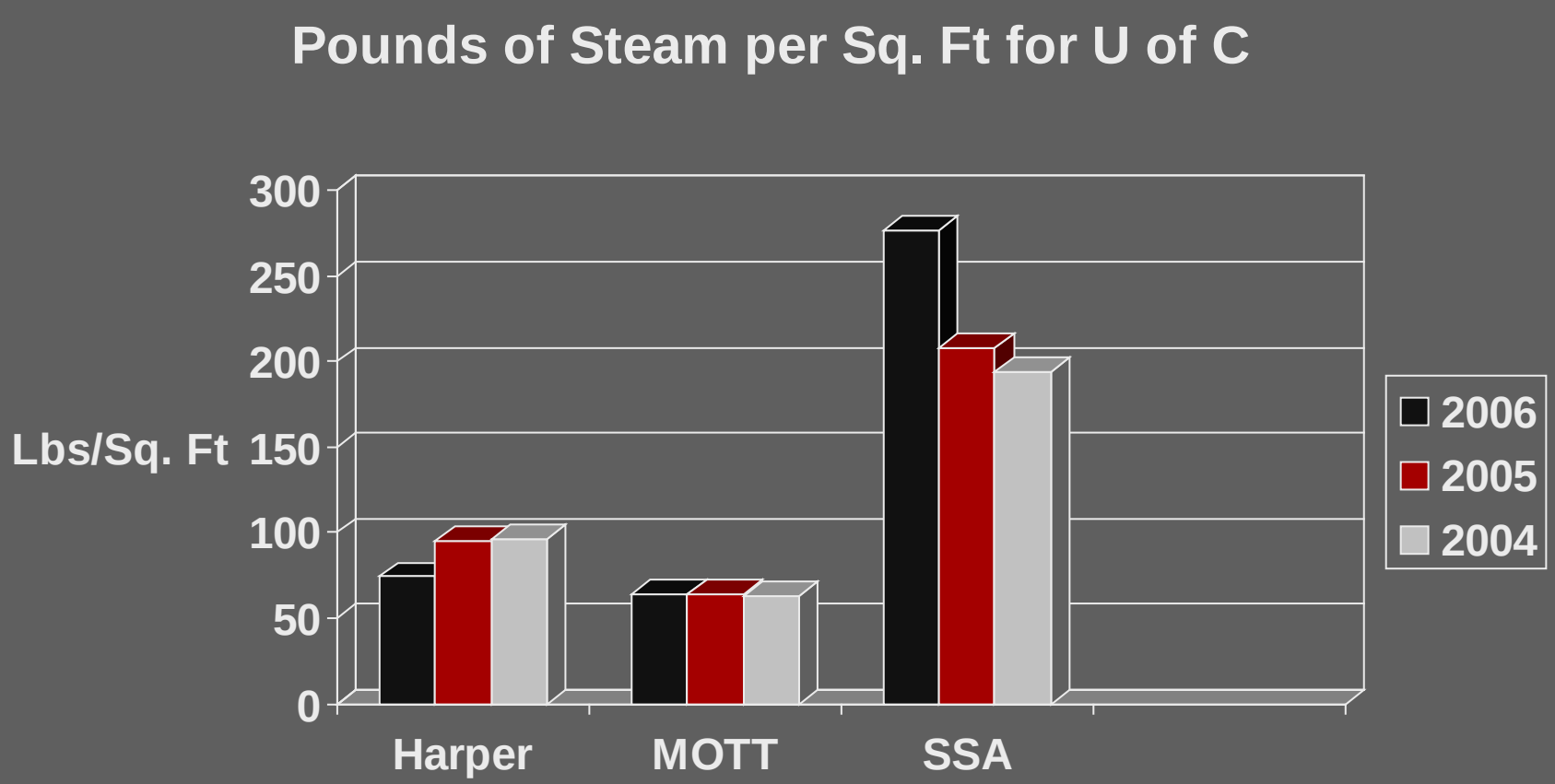

**Est. R value= 2.67 ft² (°F)* (hours/BTU)**

# Main Building

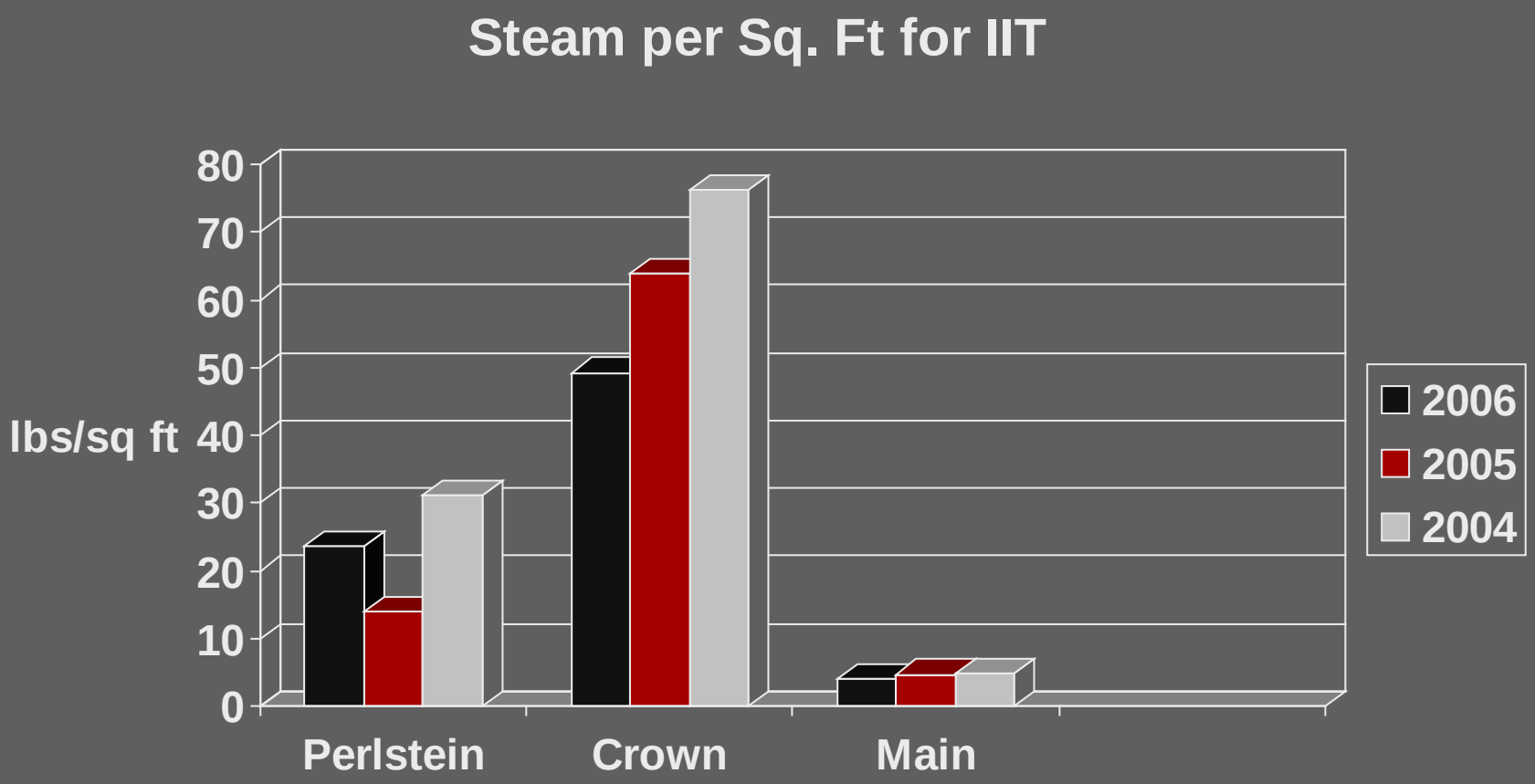



**Est. R value= 24ft² (°F)* (hours/BTU)**

# Data Analysis



# Data Analysis



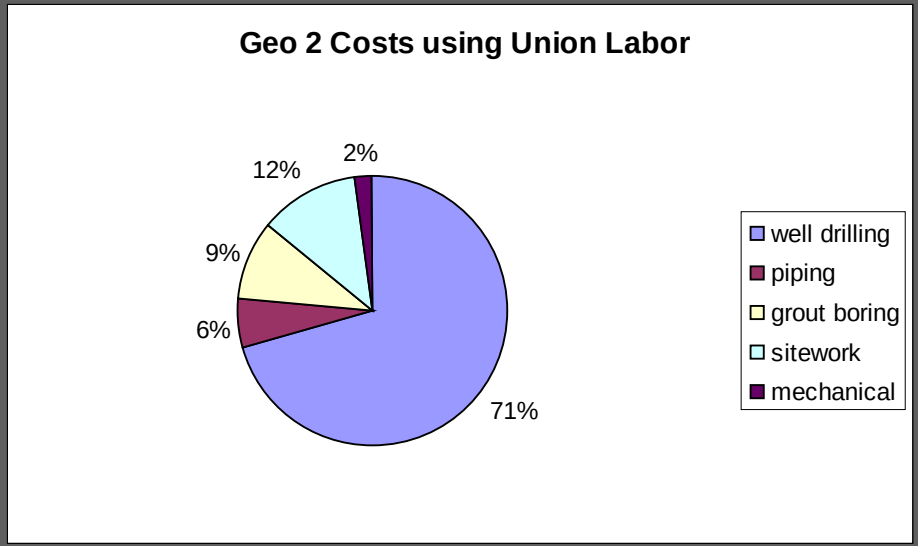
# Data Analysis

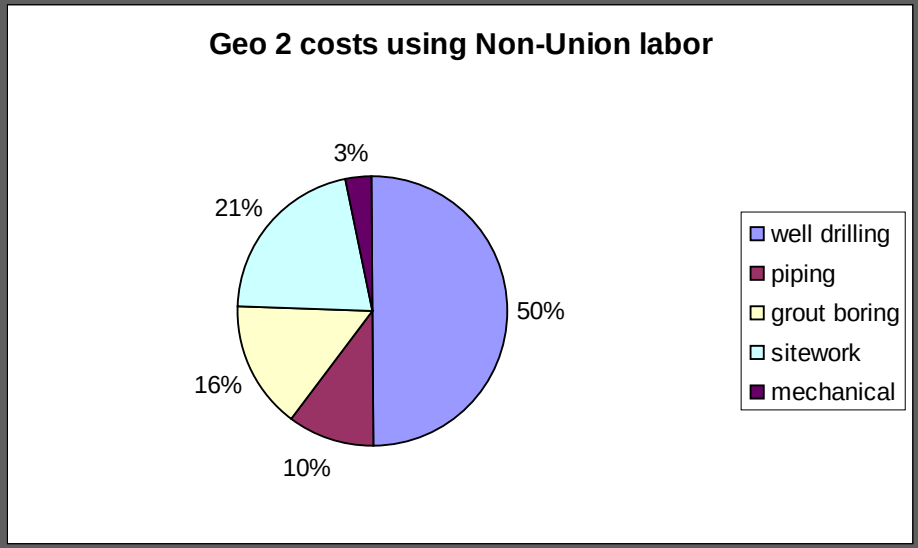
- Problems encountered
  - Loyola did not meter steam by building
  - U of C did not give total energy produced/used for fiscal year
  - Electricity information was not broken down by use (ie: electronics, lighting, heating)

# Alternatives

- Geothermal Energy

- Union – cost = $1,953,641.67; payback = 49.83 years
- Non-Union – cost = $1,146,464.67; payback = 29.24 years

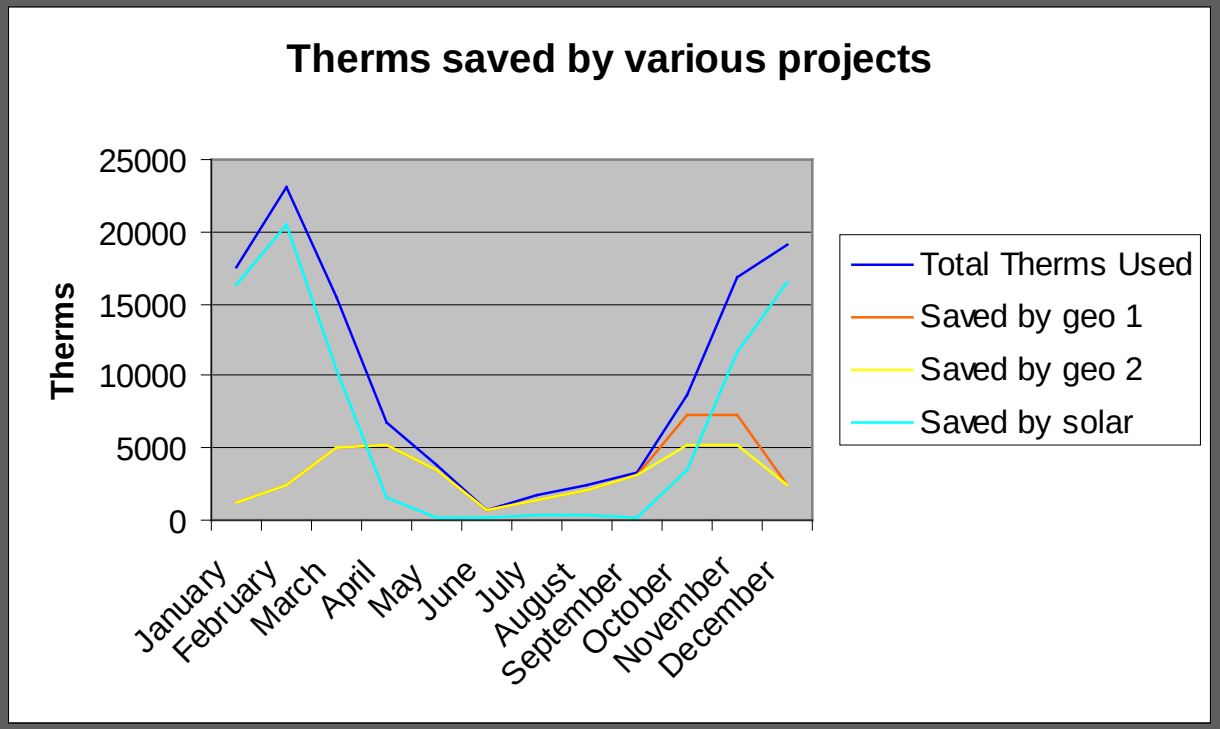


# Alternatives- Solar Power

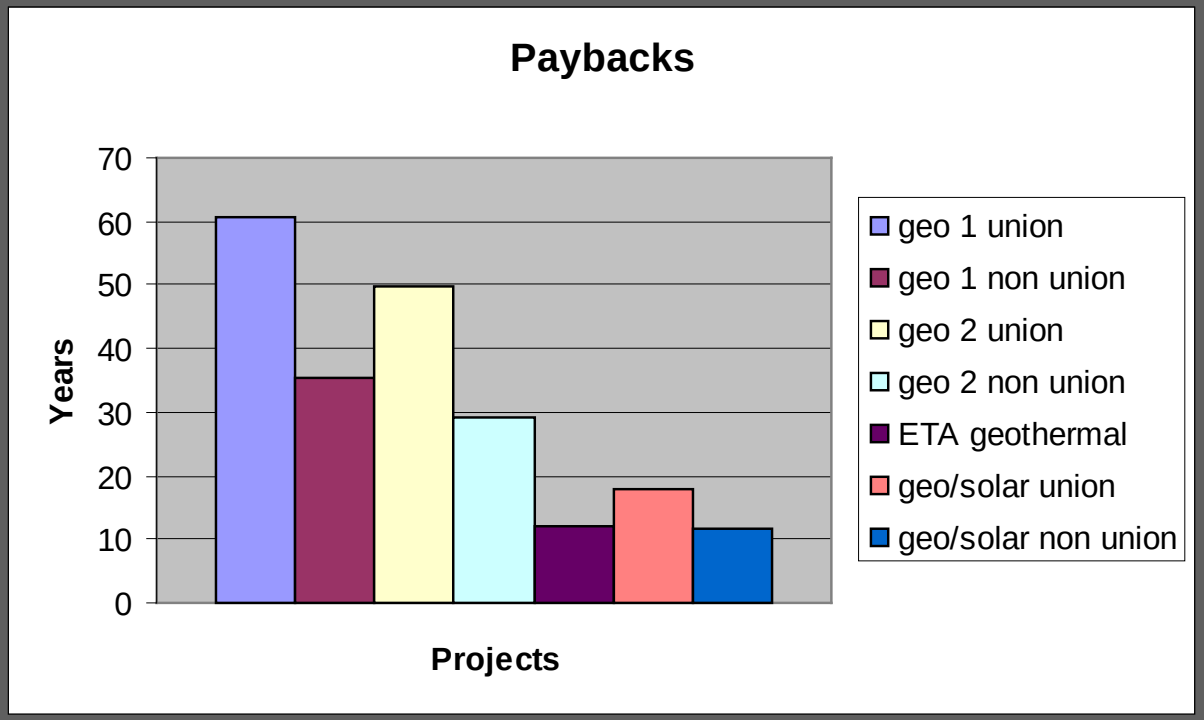
- After a cost of $1025 per panel, and installation costs, this array comes out to $342,868.67.
- Coupled with our second geothermal site, our total cost with a non-union drilling company comes to $1,489,333.34.

- With the maximum yearly return, our payback becomes only 11.48 years.



# Alternatives- Earth to Air

- At a cost of $0.46 per Btuh in the installation and purchase of the field, we find the cost of this field to be only $1,571,436.76.
- This puts the payback of this system at 12.11 years



# Alternatives-Recommendations

- The best choice is the ETA system, followed closely by a non-union built solar/geothermal system.
- Regardless of which system is chosen though, we can rest assured that we are using a sustainable system that emits no pollution whatsoever, and doing a small part in making our species more eco-friendly

# Alternatives

- Campus Recycling

# Recommendations

- Insulate pipes
- Use thermal imaging to locate ‘hot spots’
- Electronic monitoring
- Thicker glass
- Alternative energy

# Reflections

- Team Structure
  - In the future, integrate experience levels
  - Good organization based on concentration
- Other Team Factors

# THANK YOU!!