Greening & Reuse of Queen of Peace High School Facilities

IPRO 314

IPRO 314 – Queen of Peace High School

Problem Statement

- Decline of enrollment in the past 5 years
  - Competing schools turning co-educational
  - Major schools overlapping Peace's drawing radius
- Proposal
  - Increase Revenue
  - Decrease Costs
  - Accelerate the school's reputation as a technologically-advanced, eco-friendly facility
- Reuse, Reduce, Recycle, Reputation

IPRO 314 – Queen of Peace High School
Methodology

- Greening (Physical)
  - Window Replacement
    - Nic Sahm
  - Roof Re-Design
    - Sana Ihmoud, Erin Pedersen, Kaumil Shah
  - Lighting Retrofit
    - Meghan Murdock
- Re-Use (Social)
  - Multi-Purpose Center
    - Kyle Dralle, Ryan Dudek, James Rossi, Mimi Wide
  - Communication Center
    - Rawan Abbasi, Sarah Pfeifer

IPRO 314 – Queen of Peace High School
Windows

- Current Window units original to school (Built 1963)
- Goals
  - Decrease facility heating expenditures (approx. $7,000)
  - Increase personal comfort during summer months
  - Beautification of Queen of Peace High School

Interior Wall

Scale: 3/16"=1'-0"

n/a = Unable to measure do to Heater

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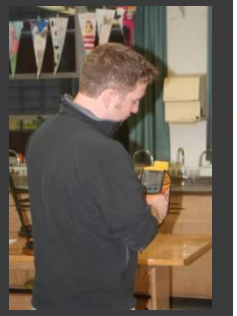
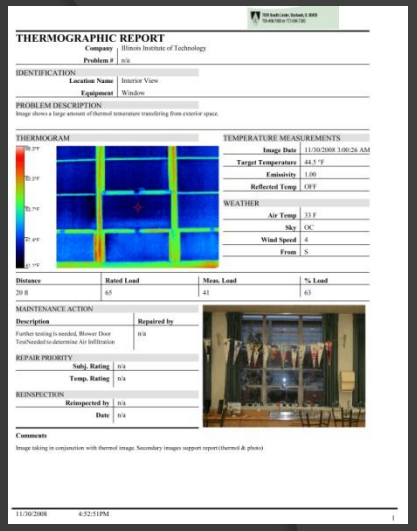
Windows

- Window SqFt.
  - North Wing: 1012 SqFt (Units 38)
    - Gymnasium / Cafeteria
    - Cafeteria 16 non replace units
  - Middle Wing: 9024 SqFt (Units 147)
    - Library /Classrooms
  - South Wing: 4494 SqFt (Units 143)
- Suggested Cost ($30 SqFt Units) / Suggested Savings (yearly)
  - North Wing: $30,360 / $6,950
  - Middle Wing: $270,720 / $6,950
  - South: $134,820 / $4,700
- Future window analysis will be approached as an independent project to incorporate new technologies that could lead to specific grant funding.





THERMOGRAPHIC REPORT

Company: Illinois Institute of Technology
Problem #: n/a

IDENTIFICATION
Location Name: Interior View
Equipment: Window

PROBLEM DESCRIPTION
Image shows a large amount of thermal temperature transferring from exterior space.

THERMOGRAM

TEMPERATURE MEASUREMENTS
Image Date: 11/30/2008 3:00:26 AM
Target Temperature: 44.5 °F
Emissivity: 1.00
Reflected Temp: OFF

WEATHER
Air Temp: 33 F
Sky: OC
Wind Speed: 4
From: S

Distance	Rated Load	Meas. Load	% Load
20 ft	65	41	63

MAINTENANCE ACTION
Description: Further testing is needed, Blower Door TestNeeded to determine Air Infiltration
Repaired by: n/a

REPAIR PRIORITY
Subj. Rating: n/a
Temp. Rating: n/a

REINSPECTION
Reinspected by: n/a
Date: n/a

Comments
Image taking in conjunction with thermal image. Secondary images support report(thermal & photo)

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THERMOGRAPHIC REPORT

Company: Illinois Institute of Technology
Problem #:

IDENTIFICATION
Location Name: Exterior View
Equipment: Window

PROBLEM DESCRIPTION
Image shows a large amount of thermal temperature transferring from interior space.

THERMOGRAM

TEMPERATURE MEASUREMENTS
Image Date: 11/30/2008 3:06:44 AM
Target Temperature: 37.7 °F
Emissivity: 1.00
Reflected Temp: OFF

WEATHER
Air Temp: 33 F
Sky: OC
Wind Speed: 4
From: S

Distance	Rated Load	Meas. Load	% Load
20 ft			

MAINTENANCE ACTION
Description: Further testing is needed
Repaired by:

REPAIR PRIORITY
Subj. Rating:
Temp. Rating:

REINSPECTION
Reinspected by: n/a
Date:

Comments
Image taking in conjunction with thermal image.

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- Estimated Project Cost: $435,900
- Estimated Savings: $18,600
- ***SIMPLE PAYBACK: 23.4 Years***
  - Secondary Funding Needed

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Lighting

- Determine current lighting inventory (convent & gym) and subsequent costs before the retrofit
- Calculate the lighting costs (purchase, installation, energy consumption) after retrofit
- Calculate the simple payback the school can expect to start realizing savings
  - Commonwealth Edison incentive
- Calculate the reduction in the production and emission of pollutants

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Lighting

- Kilowatt Hour Usage Per Year
  - Before Retrofit: 139,398 kWh
  - After Retrofit: 49,793 kWh
  - Savings: 89,605 kWh

- Lighting Cost Per Year
  - Before Retrofit: $17,731
  - After Retrofit: $6,333
  - Savings: $11,397

- Estimated Project Cost: $49,616
  - Com Ed Incentive: $9,147
- Net Project Cost: ~**$**40,500
- ***SIMPLE PAYBACK: 3.55 Years***

- Pollutant reduction
  - Carbon Dioxide: 201, 612 lbs/yr
  - Sulfur Dioxide: 1,568 lbs/yr
  - Nitrogen Oxide: 735 lbs/yr

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Roof Re-Design

- Utilize the roof space to install energy saving and energy generating green technology
  - Reflective roofing
  - Enhancing insulation
  - Solar panels
  - Water harvesting
- Reflective roofing
  - Reflects the suns rays to minimize heat transfer
    - Keeps the building cooler in the summer
    - Will allow the school to operate during the summer
  - Can save a minimum of 25% in energy usage.
    - The Lawrence Berkley Laboratory in California
  - Can extend the roof's life by up to 15 years by blocking UV rays

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Roof Re-Design

- Roofing Insulation
  - Prevents heat loss during the winter months
    - Reduces energy consumption due to heat retention
  - More testing needed on current school conditions to generate an accurate savings figure
- Solar Panel
  - Addition to current science curriculum (e.g. robotics)
  - Increase reputation as a technology school
  - Cost of one solar panel (5’ x 2’) ~$650-$800
- Water Harvesting research
  - Additional teaching aid
  - Increases soil moisture levels for urban greenery
  - Mitigates urban flooding
  - Improves the quality of groundwater

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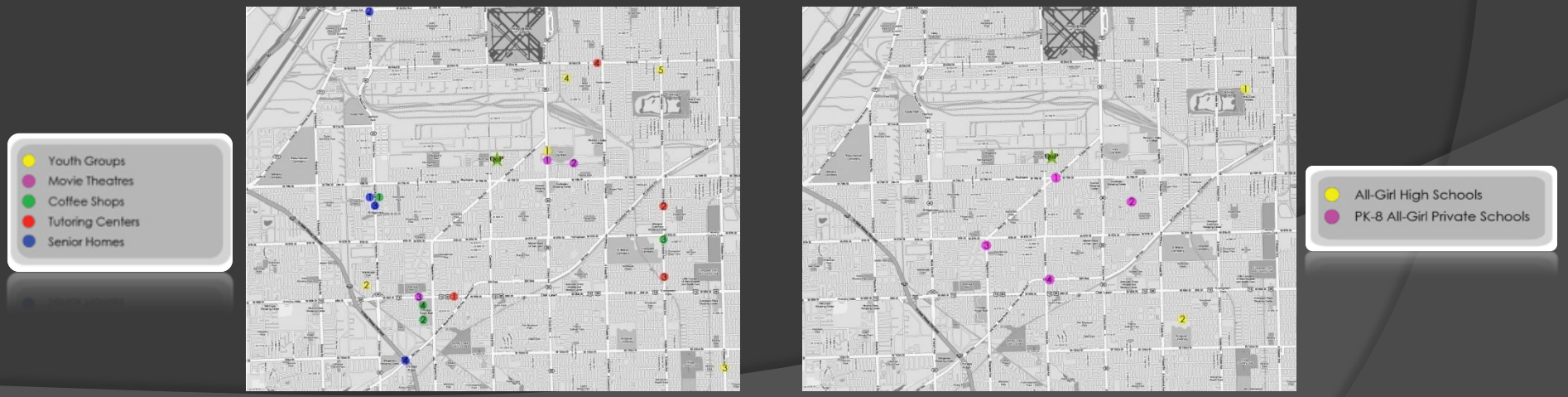
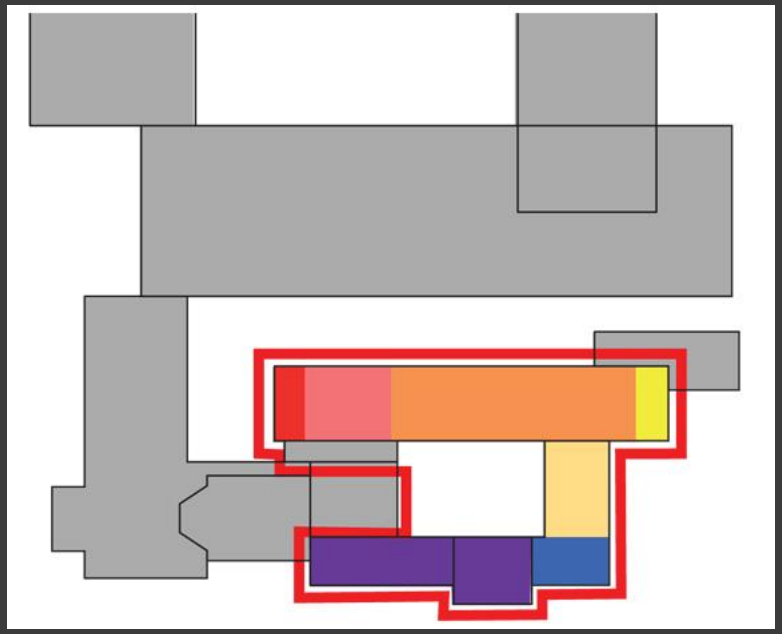
Multi-Purpose Center

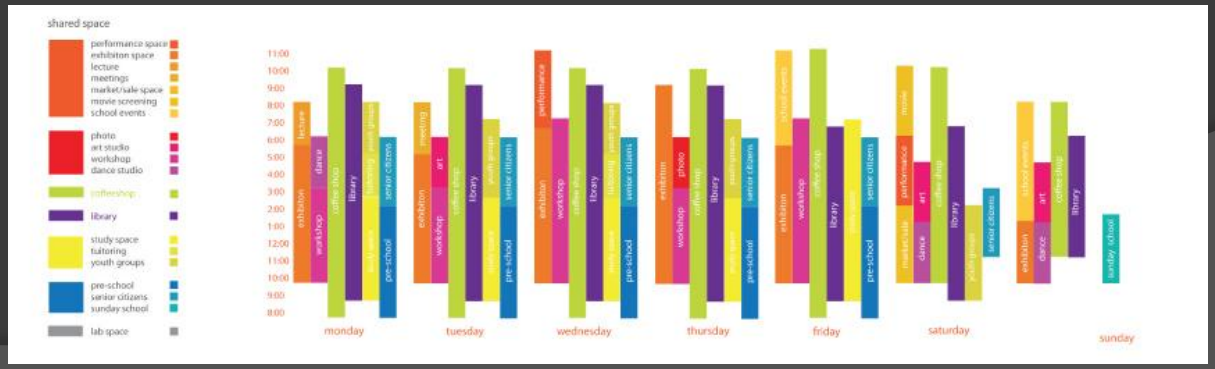
- New construction cost is comparable to restoration

- Goals
  - Increase appeal in Queen of Peace
  - Attract people from various age-groups and neighborhoods
  - Display presence of Queen of Peace



IPRO 314 – Queen of Peace High School Multi-Purpose Center





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Communication Center

- Problem:
  - Current Library under-utilized
- Objectives:
  - Opportunity for online classes
  - Enhance technology
  - Develop reputation through world-wide networking
    (e.g. military families)
  - Adding conference rooms and exhibition spaces
- Research:
  - Loyola's Information Commons
  - Videoconferencing Equipment, TV's, Furniture, Wall Partitions

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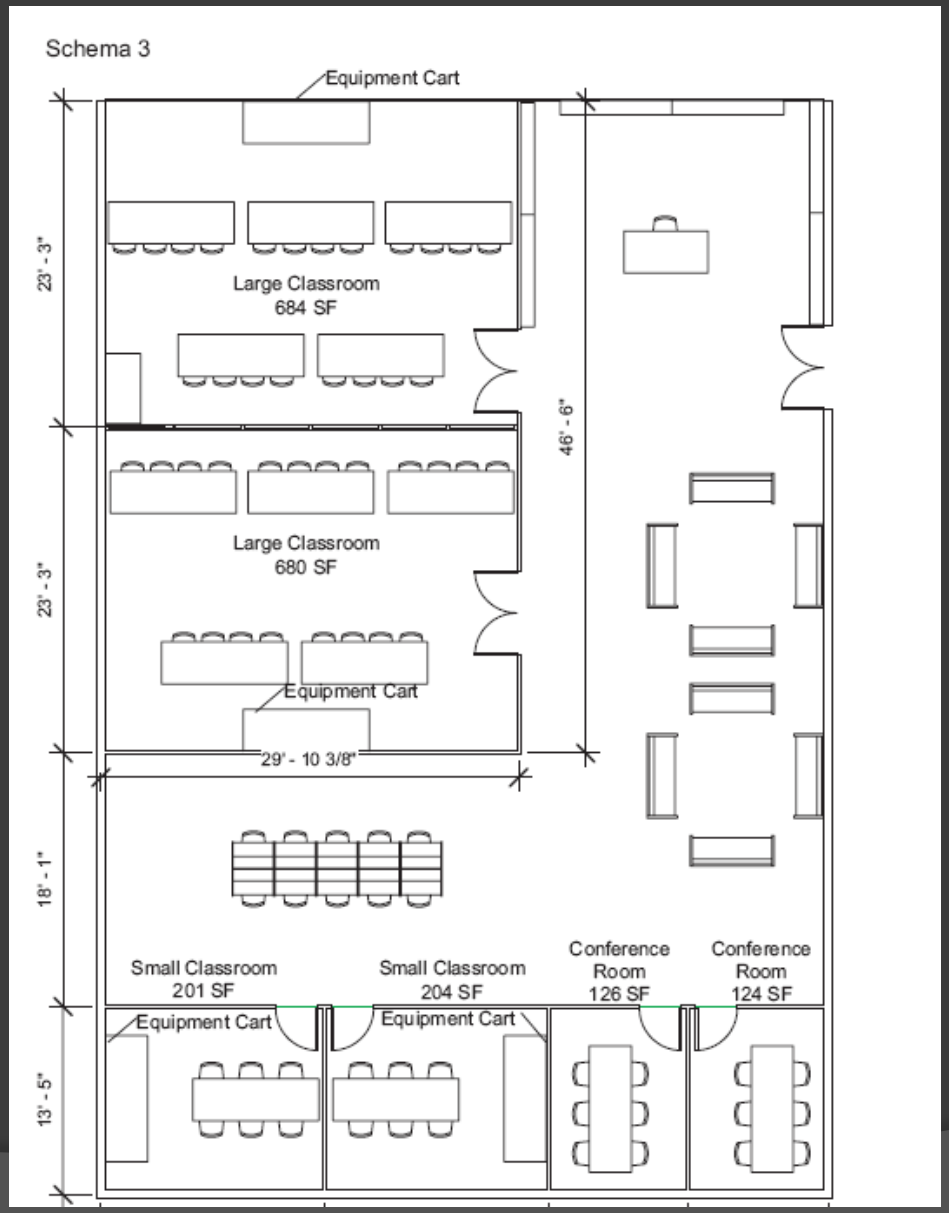
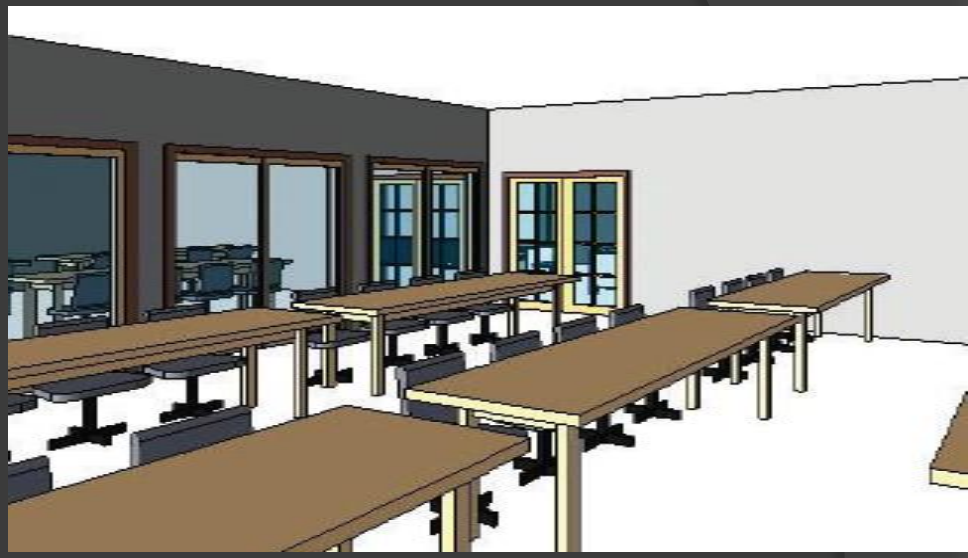
Communication Center





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Communication Center

- Costs
  - Cheapest videoconferencing package: $7,000
  - Most expensive videoconferencing package: $14,642
  - All new furniture: $36,423
  - New furniture & re-using furniture: $17,550
  - Wall partitions: ~ $5,000
  - Grand Total: $26,500-$54,882

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Conclusion

- Major impacts, risks and challenges associated with the project:
  - Risks:
    - Funding for proposals
    - Changing demographic over timeline of the proposals
  - Challenges:
    - Defining the scope/goals of the project
    - Retaining an all-girls school put limitations on proposals ideas
    - Coordinating schedules (students, QoP, consultants) for on-site visits
    - Coordinating outside equipment for testing

IPRO 314 – Queen of Peace High School
Conclusion

- Next steps for future IPROs:
  - Further research and analysis needed on proposal ideas
    - Continued market research on surrounding community
    - Further testing on windows and green-roof
  - Further schematic design
  - Further development of cost versus benefit analysis
  - Getting approval from school on proposal ideas
  - Funding of proposals

Q & A