IPRO 311

IIT Campus
Sustainability
Development
Branding

IPRO 311

- Purpose:
  - Promote and Develop Sustainability
- Challenges/Obstacles:
  - Defining IPRO
  - Inter-group communication
  - Defining legacy

Roster

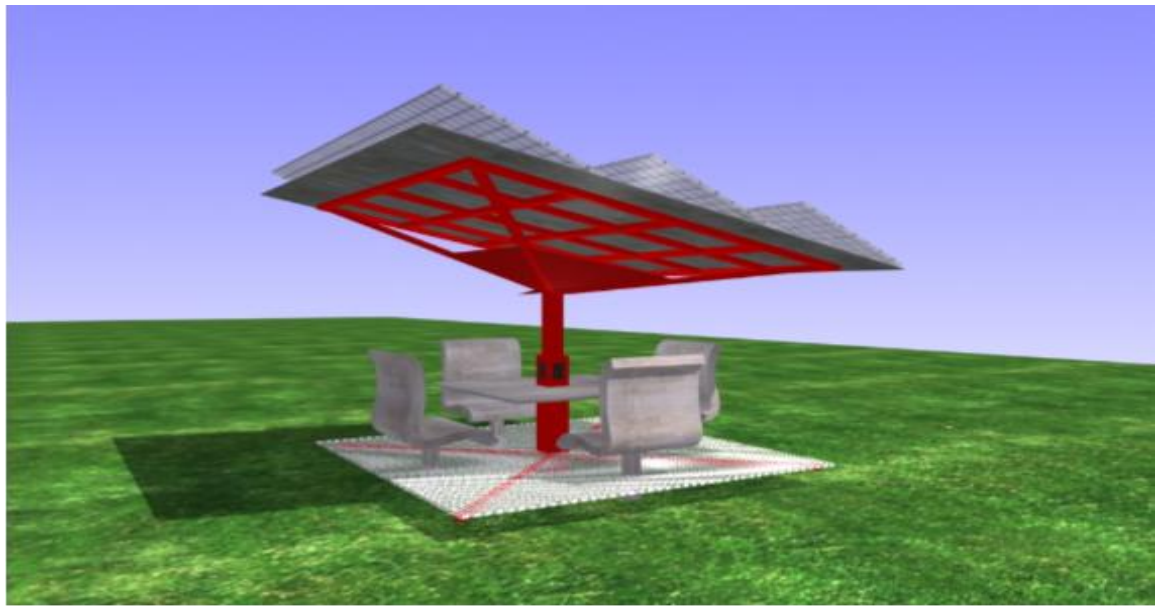
- Permeable Paving
  - Philip Korol (Arch.)
  - Ashley Ono (Arch.)
  - Ji Ae Park (Arch.)
- Heating & Energy
  - Elliot Barlow (Aero. Eng.)
  - Michael Chamales (Mat. Sci.)
  - Anne Nadler (Mech. Eng.)
- Green Walls
  - Prairna Gupta (Arch.)
  - Yunseok Song (Elec. Eng.)
- Solar Workstation
  - Abraham Contreras (Arch.)
  - Niels De Vita (Arch.)
  - Muhammad Ishaq (Psych.)
  - Richard King (Comp. Eng.)
  - Adam Stultz (Biomed. Eng.)

Faculty: Nancy Hamill
Faculty Assistant: Rae Mindock

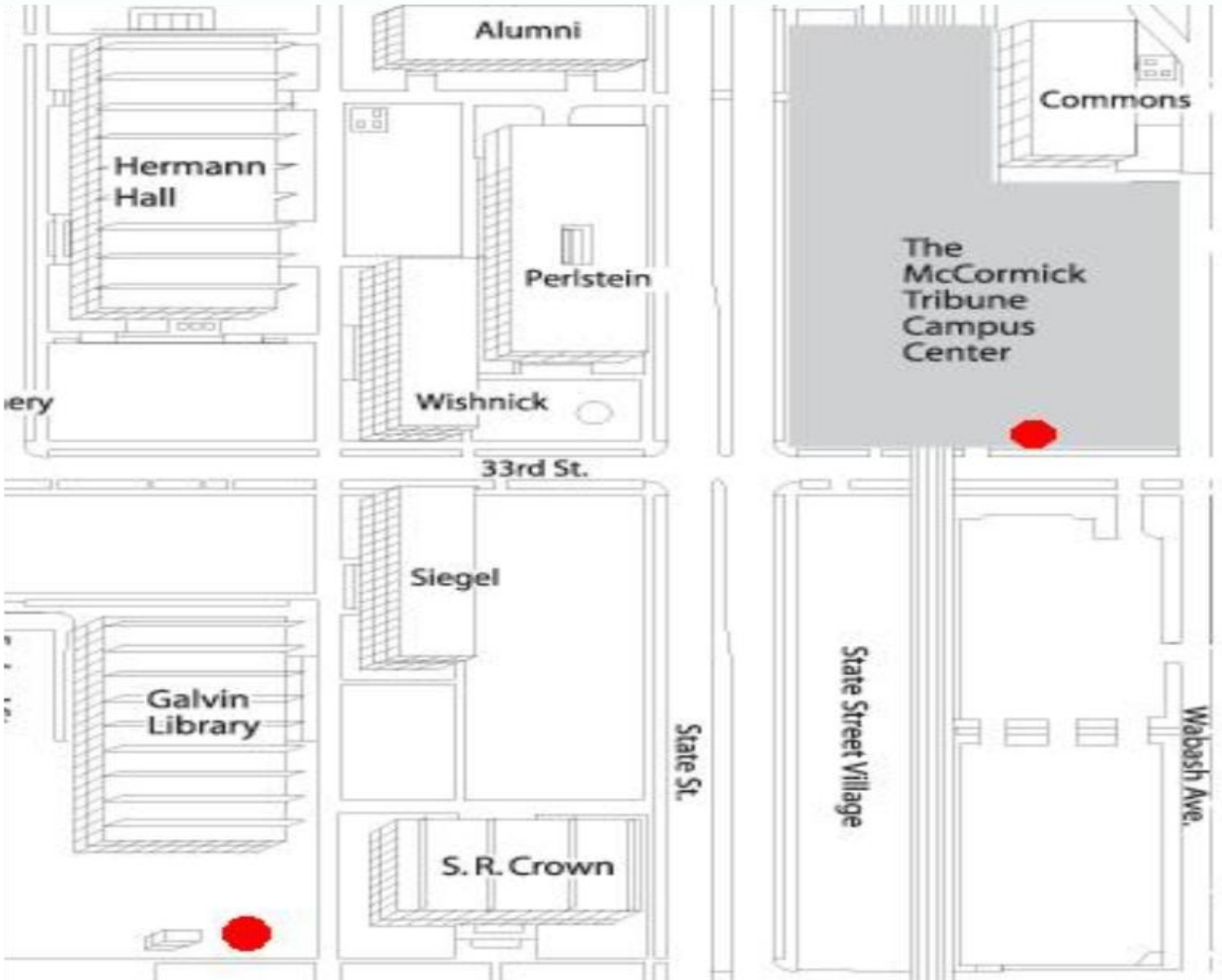
Solar Work Station

- **Purpose:**

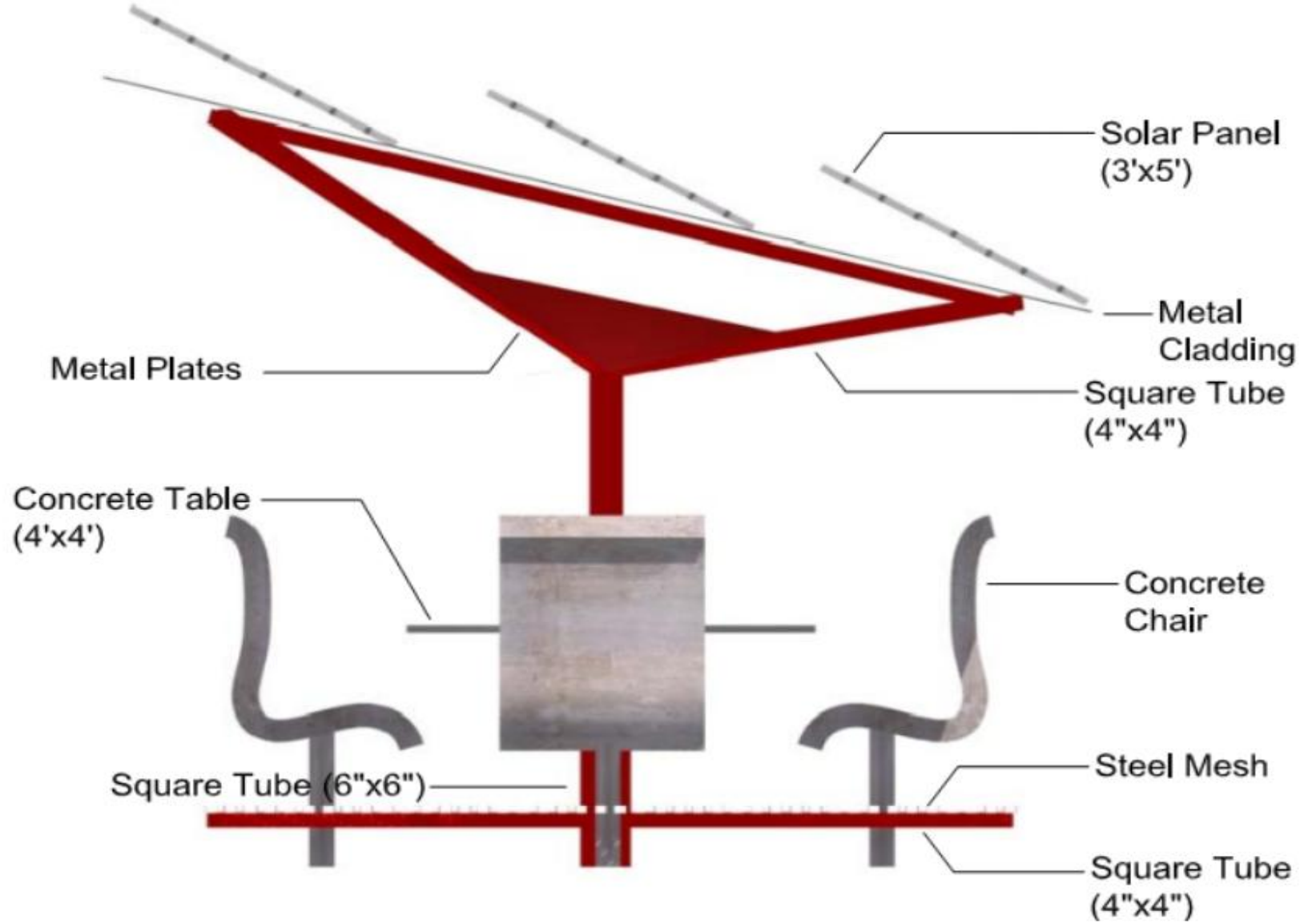
- Showcase IIT commitment to sustainability
- Reusable and flexible design
- Promote use of outdoor facilities
- Meet the needs of IIT students



Location


Alumni
Commons
Hermann Hall
Perlstein
The McCormick Tribune Campus Center
Wishnick
33rd St.
Siegel
Galvin Library
State St.
State Street Village
Wabash Ave.
S. R. Crown

Design


Solar Panel
(3'x5')
Metal
Cladding
Metal Plates
Square Tube
(4"x4")
Concrete Table
(4'x4')
Concrete
Chair
Steel Mesh
Square Tube (6"x6")
Square Tube
(4"x4")

Cost

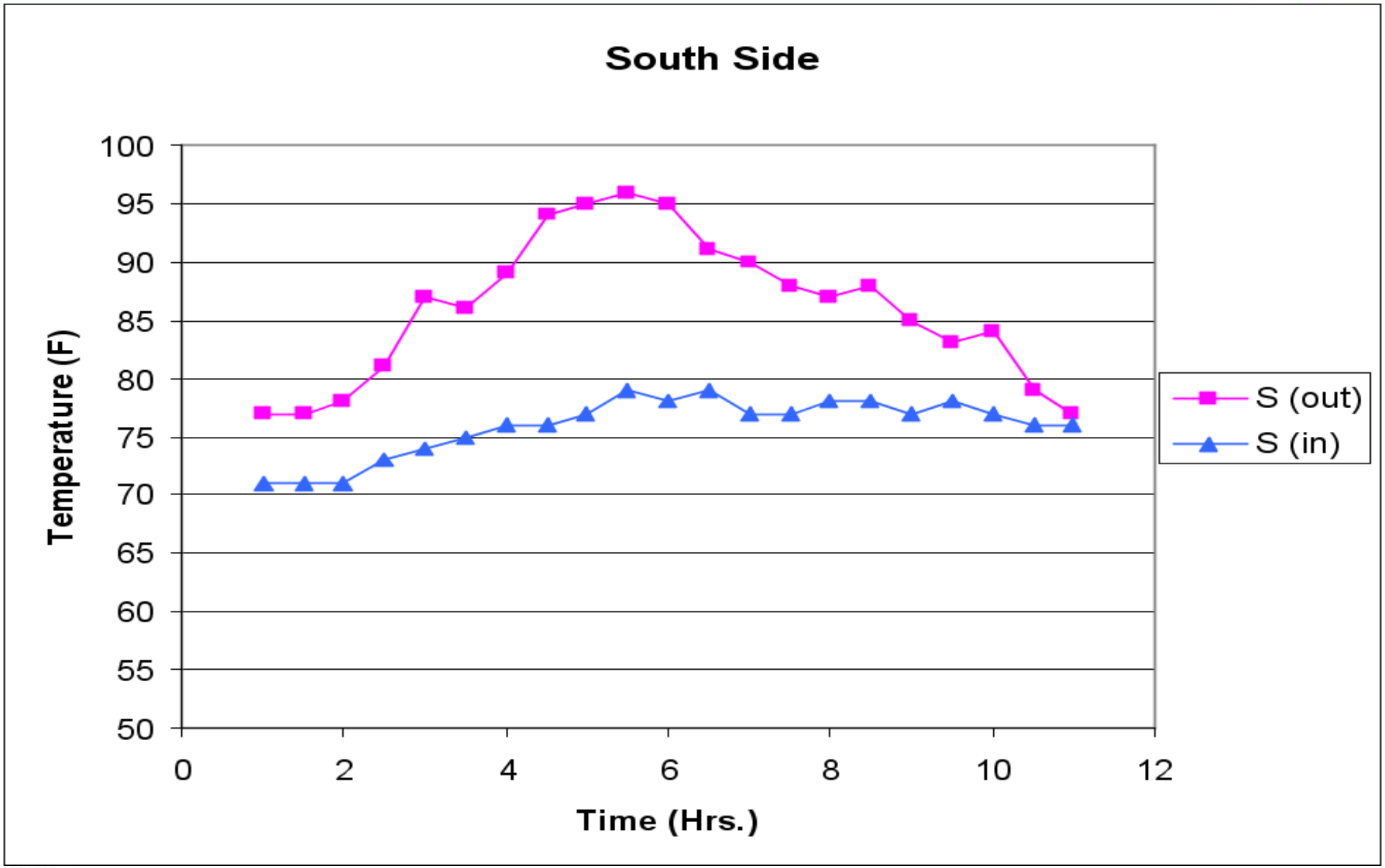
- ~$11,000

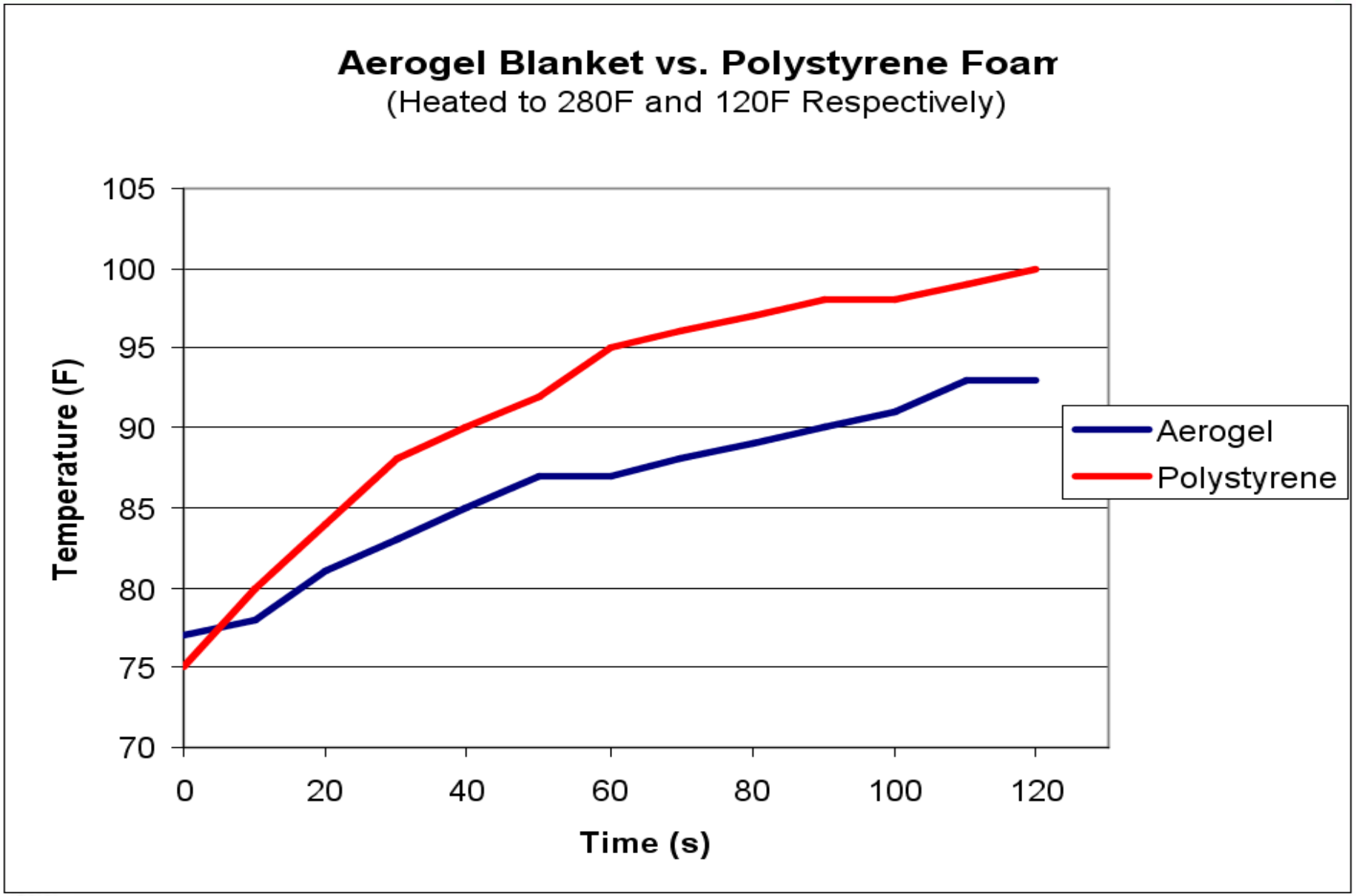
Item	#	$/1	Total $
Deka Solar batteries	2	$500.00	$1,000.00
Sharp 224W Solar Panel	6	$995.99	$5,975.94
2”x2” square tubing each 8’ long	2	$55.20	$110.40
8’x8’ metal mesh about ¼” thick	1		$800.00
6”x6” square tubing 3’7” tall	1	$164.12	$164.12
4”x4” square tubing about 2’ tall	1	$53.16	$53.16
2”x2” square tubing 8’ tall	10	$55.20	$552.00
10’x10’ metal roof (flat metal panels) ½” thick	1		$1,200.00
2’x2’ metal panels about ¼” thick	4		$500.00
60lb quick mix concrete	16	$2.56	$40.96
80lb concrete	2	$4.59	$9.18
other (screws, nails, paint, etc...)			$250.00
total			$10,655.76

Heating and Energy

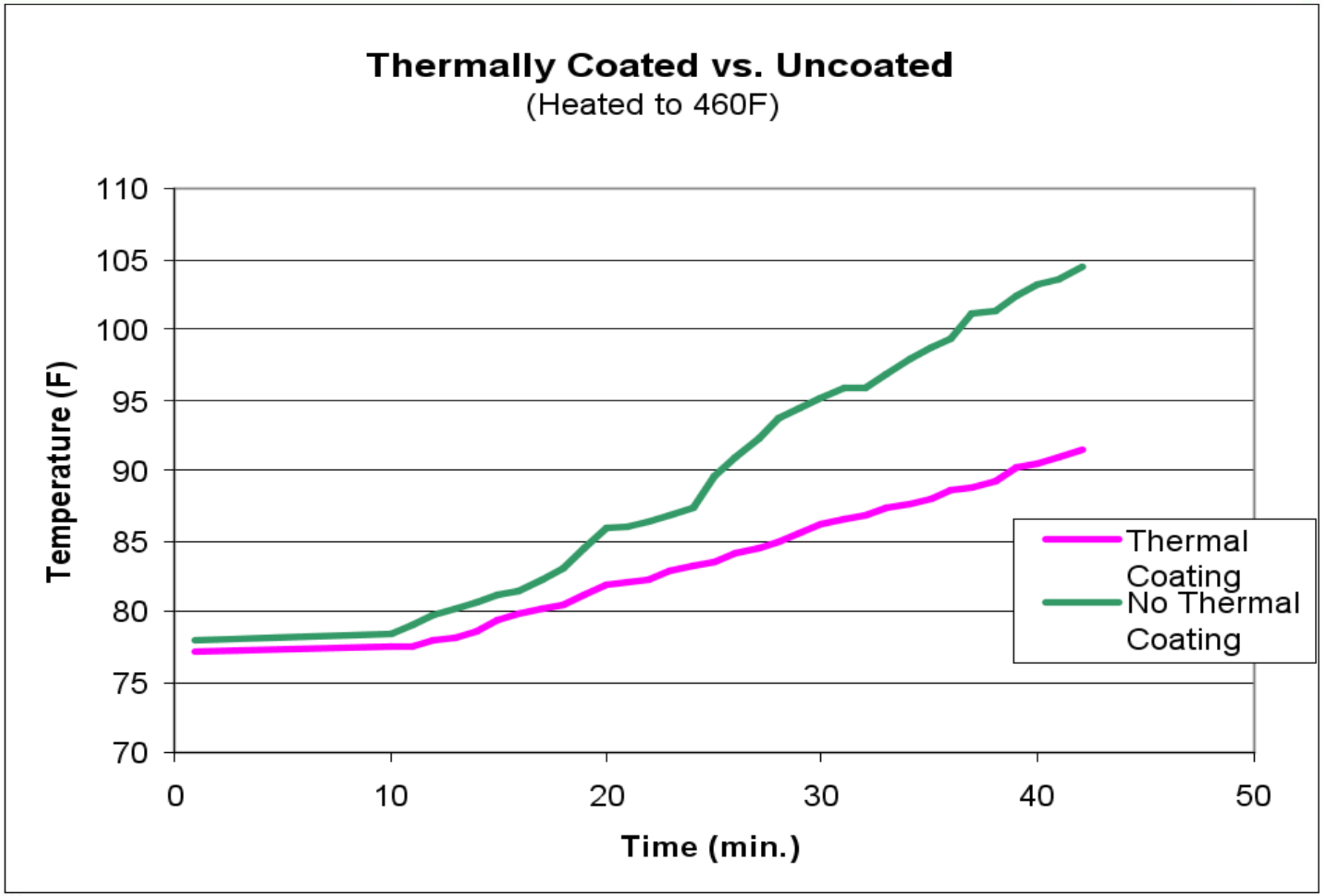
- Campus buildings have little to no insulation
- Inefficient heating and cooling costs money
- Wall insulation improves brick buildings
- Answer to IIT insulation issue: Aerogel
  - Best insulating material available
  - Over 3X as insulating as fiberglass

Aerogel blanket material


South Side
Temperature (F)
100
95
90
85
80
75
70
65
60
55
50
0
2
4
6
8
10
12
Time (Hrs.)
S (out)
S (in)


Aerogel Blanket vs. Polystyrene Foam
(Heated to 280F and 120F Respectively)
Temperature (F)
105
100
95
90
85
80
75
70
0
20
40
60
80
100
120
Time (s)
Aerogel
Polystyrene

- Insulating capabilities of structures like Galvin Library can be enhanced with a thermal coating
- Steel conducts outside temperature directly inside building
- For this application Supertherm paint may be applied to I-beams
  - Paint consists of three ceramic layers
  - One coat is R-19


Thermally Coated vs. Uncoated
(Heated to 460F)
Temperature (F)
110
105
100
95
90
85
80
75
70
0
10
20
30
40
50
Time (min.)
Thermal Coating
No Thermal Coating

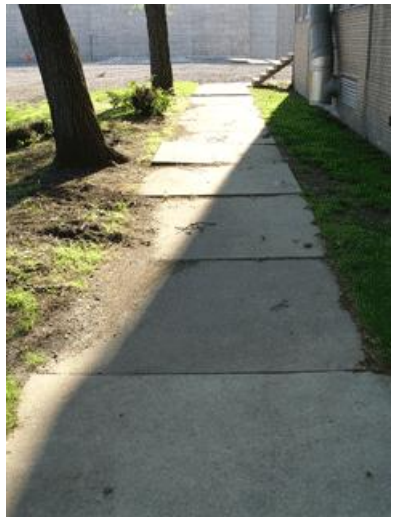
Development

IIT Campus

- Our goal is to develop IIT's sustainability image
- Our campus is in poor shape
- Prove IIT's commitment to the environment and improve campus

Goals

- Provide comprehensible research for follow through in future semesters
- Provide a series of phase plans identifying critical areas

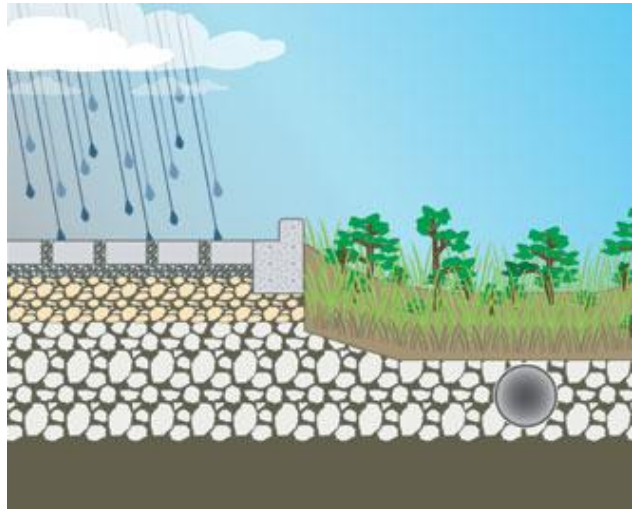


The Problem

Environmental Impacts

- Impervious pavement causes water run-off
- This causes flooding which collects pollutants
- Contaminated water then reaches Chicago's storm water systems
- Permeable Pavement allows water to penetrate the surfaces

- Recycled rubber reduces air pollution from tire burning



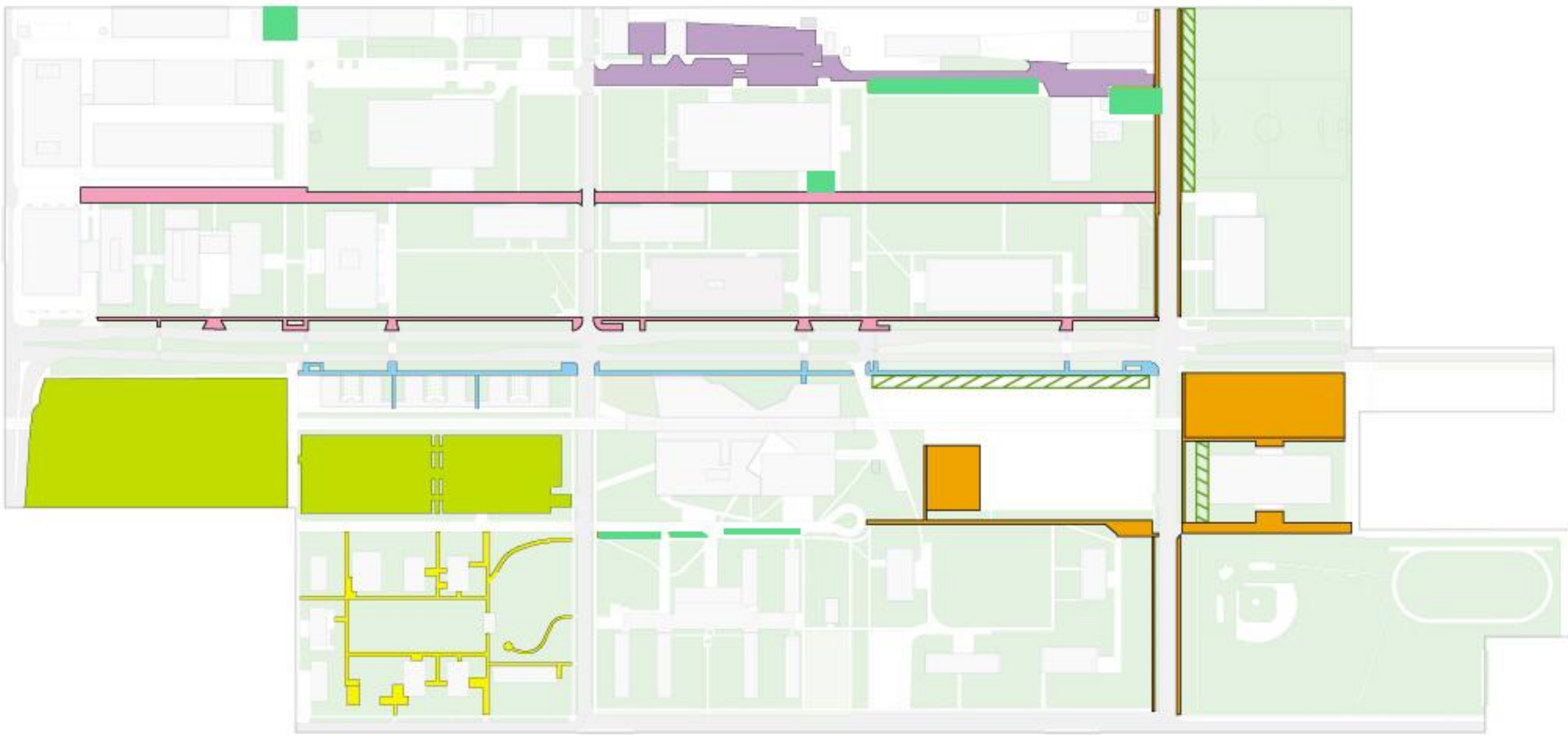
Permeable Pavement

- Interlocking Concrete Pavers
- Recycled Rubber Bricks
- Porous Concrete
- Permeable Asphalt
- Interlocking Blocks with Grass
- Porous Plastic Pavement



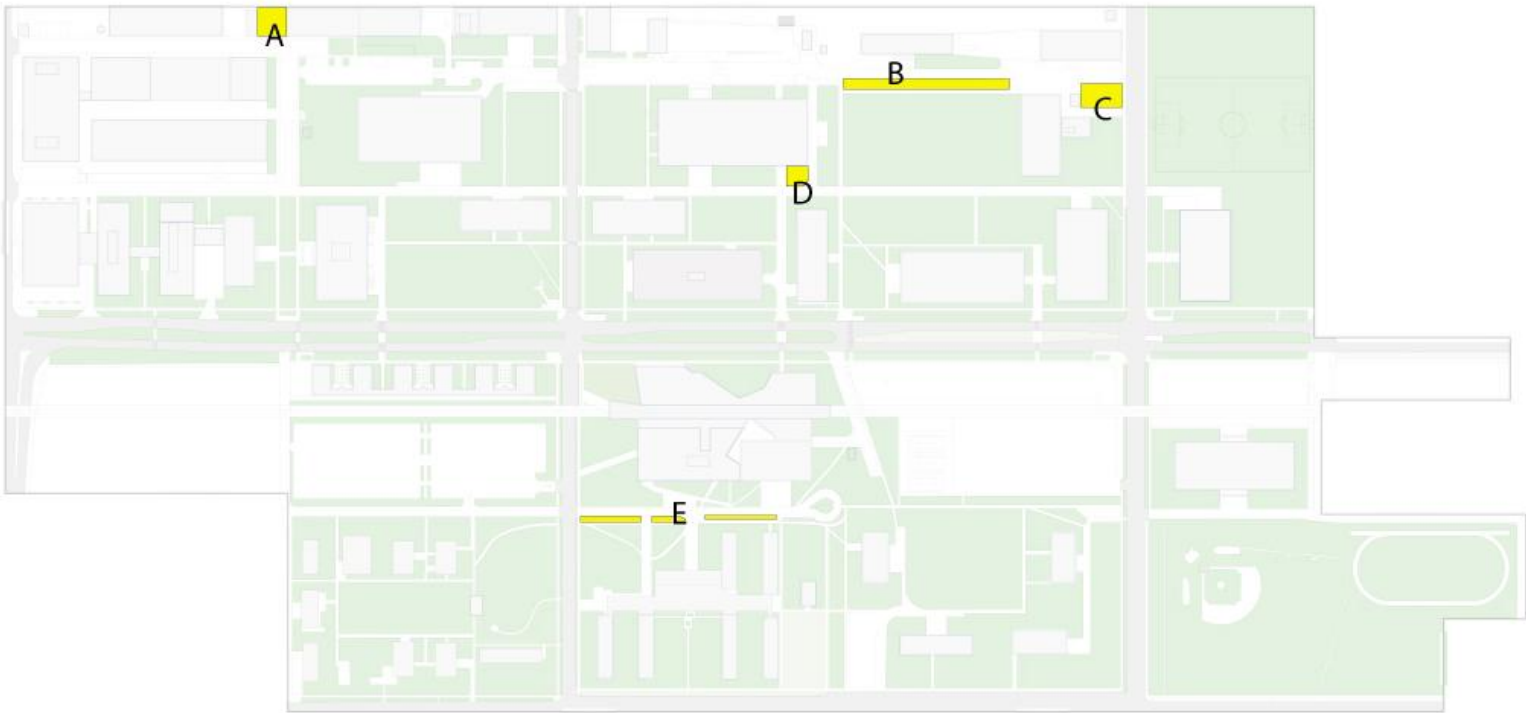


ALL PHASES



Experimental Phase
Porous Stone Pavers
Recycled Rubber
Porous Stone Pavers
Permeable Concrete
Permeable Asphalt
Porous Plastic Pavers

PHASE ONE - EXPERIMENTAL ZONES



SQUARE FOOTAGE BY ZONE

ZONE A = 4,823.05 SQ.FT.	Permeable Asphalt
ZONE B = 9,022.89 SQ.FT.	Permeable Concrete
ZONE C = 5,511.30 SQ.FT.	Recycled Rubber
ZONE D = 2,305.15 SQ.FT.	Porous Stone Pavers
ZONE E = 4,354.41 SQ.FT.	Porous Plastic Pavers

PHASE THREE - ATHLETIC ZONE

PARKING & DRIVEWAY ONLY
= 11,165.57 + 54,702.94
= 65,868.51 SQ.FT.
SIDEWALK ONLY
= 6,146.03 + 4,702.94 + 5,821.91 + 3,288.67 + 12,653.26
= 32,612.81 SQ.FT.
TENNIS COURTS?
= 18,724 SQ.FT.

Recycled Rubber

Green Walls

Purpose

- Sustainability
- Marketing / Branding
- Energy Efficiency

Our Work

- Researched the technology
- Explored the IIT campus
- Selected the suitable locations
- Created a budget estimate

Green Wall Technology

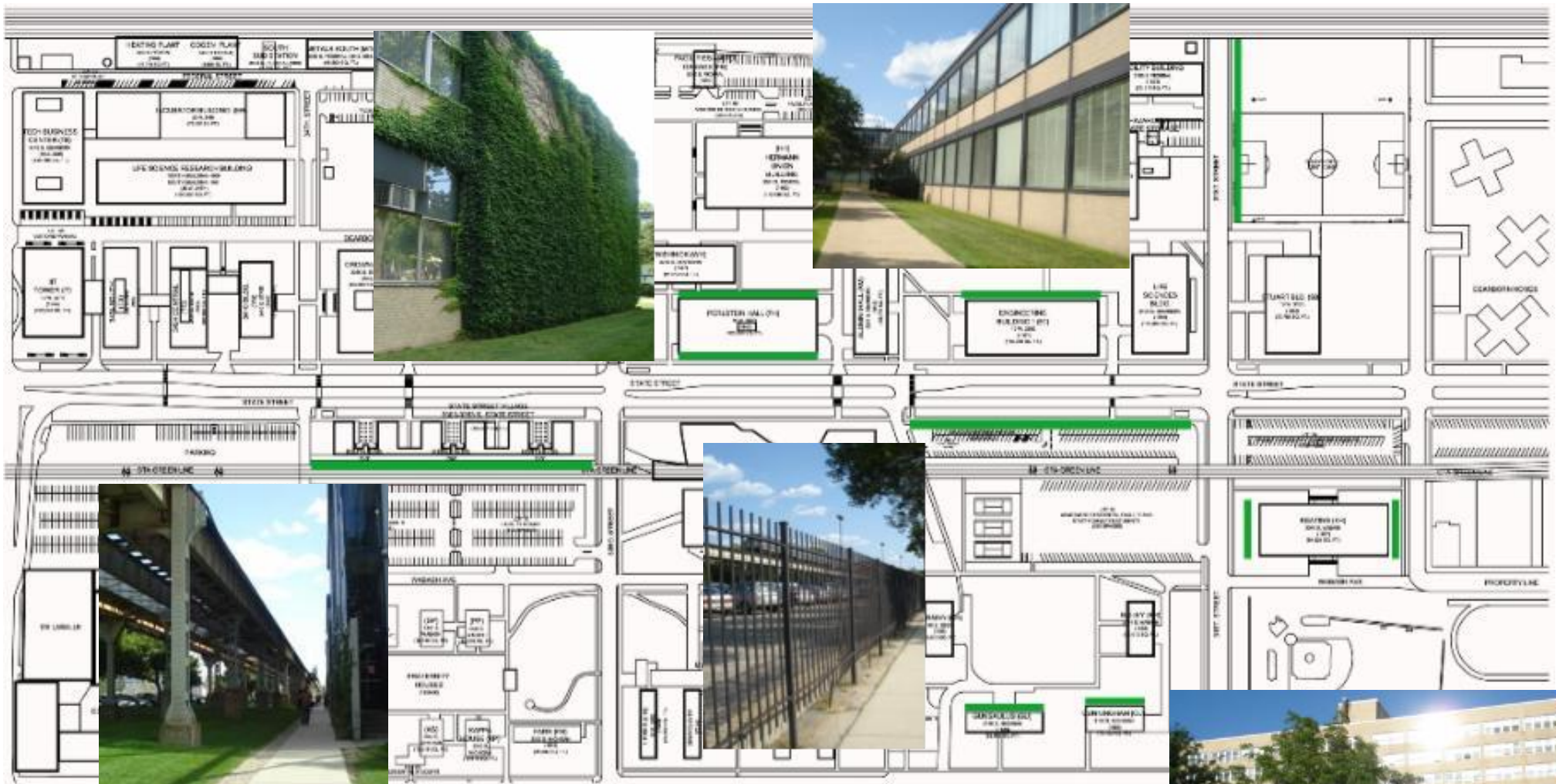
Advantages

- Building Protection
- Heat Island Mitigation
- Energy Savings
- Clean Air + CO_2 Fixation
- Sound Insulation

Types

- Wall Hung
- Free-standing / Fence
- Columns
- Curved

Suitable Locations



Our Design

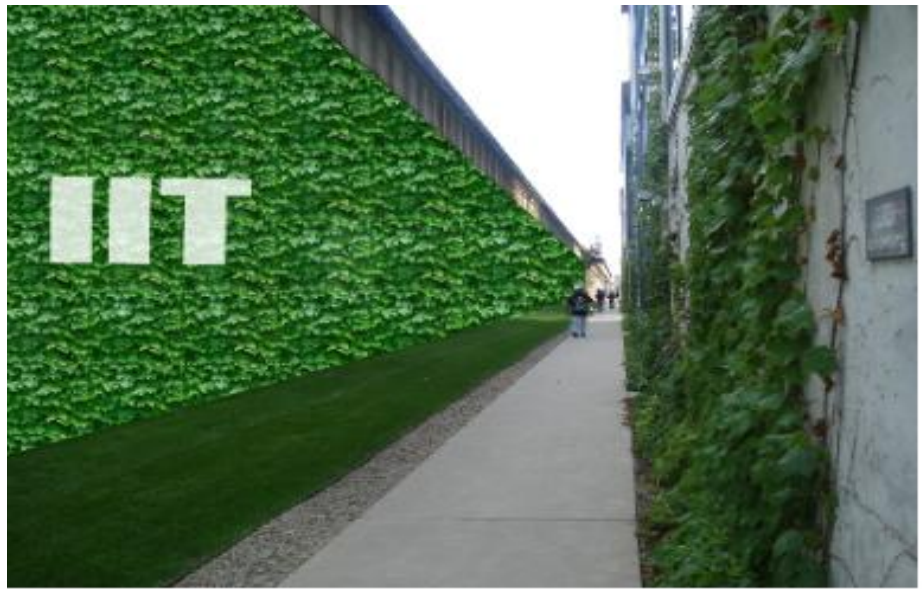
- Heat Protection

Engineering One

- Direction: West
- Element: Wall hung
- Size: 2400 sq. ft.
- Price: $24000

CTA Station

- Direction: East
- Element: Freestanding
- Size: 4270 sq. ft.
- Price: $42700



IIT Sign & Logo

Stuart Soccer Field

- Direction: South
- Element: Freestanding
- Size: 3700 sq. ft.
- Price: $37000

State Street Parking Lot

- Direction: West
- Element: Freestanding
- Size: 2470 sq. ft.
- Price: $24700

Conclusion

- Developed the concepts from the previous IPRO team into actual design proposals
- Investigated the sustainability awareness and interest climate
- Created eco-friendly and self-sustained projects
- Continued to develop a design manual for the future IPRO team

Questions

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