IPRO 344

Cellular Towers in the Urban Environment

Statement of the Problem

Problem

- Capacity requirements of densely populated areas is increasing.
- Current designs do not fit space, zoning, and aesthetic constraints.

Solution

- Design an innovative cell tower using IIT as the urban setting.

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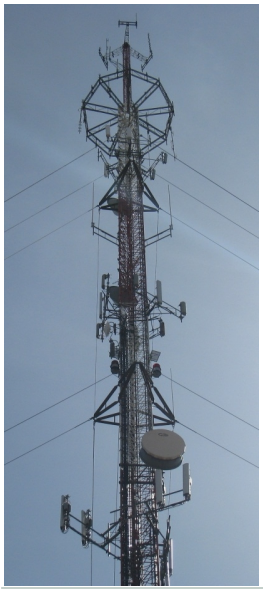
Mr. Charles Hayes

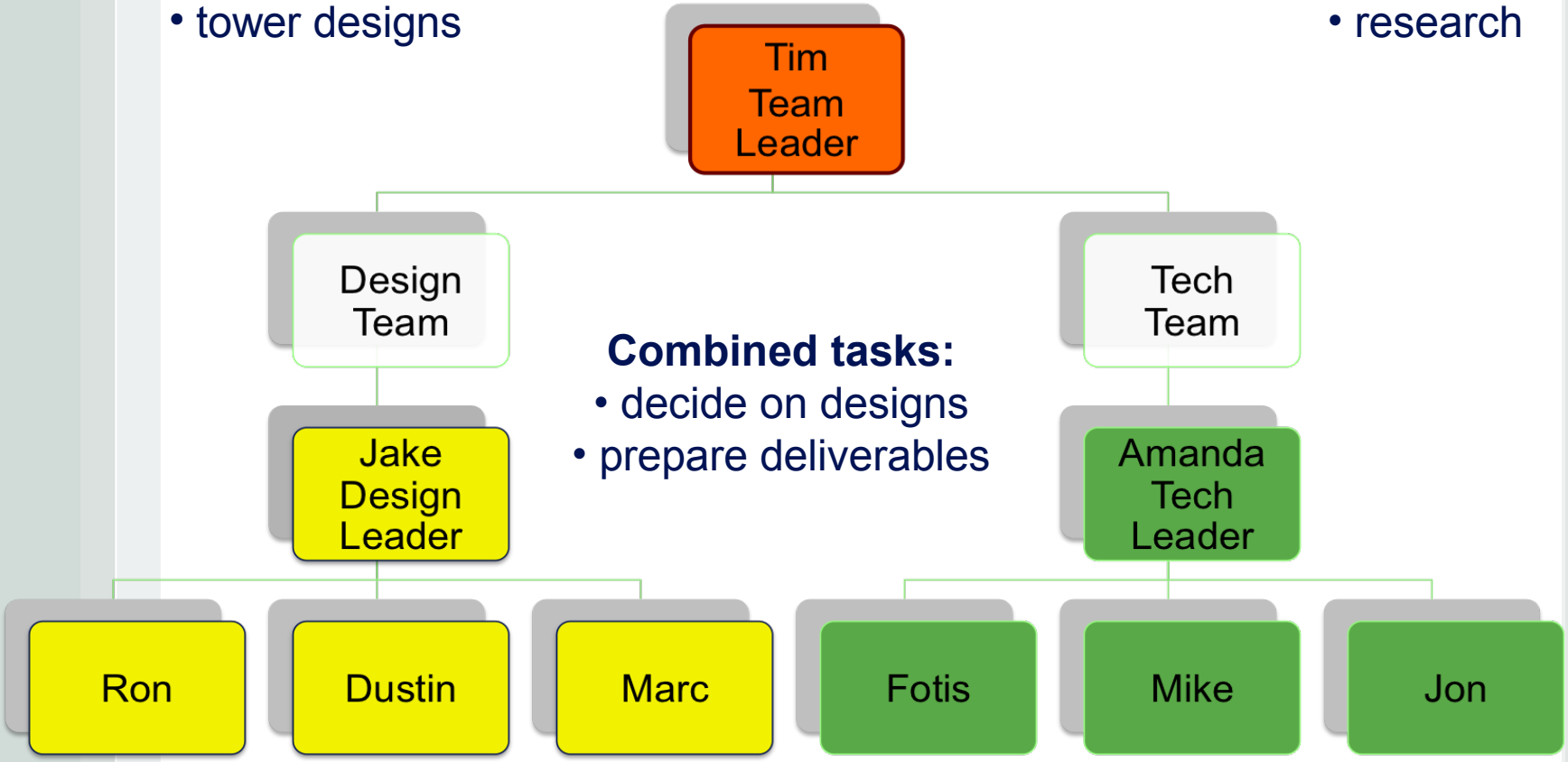
- South Bend, Indiana.
- Over 20 years experience
  - 40 sites located in Indiana, Michigan, Ohio, and Texas.
- Lattice, monopole, stealth, and guyed towers.
- Engineering, construction, operation and maintenance of tower.



Organization of the Team

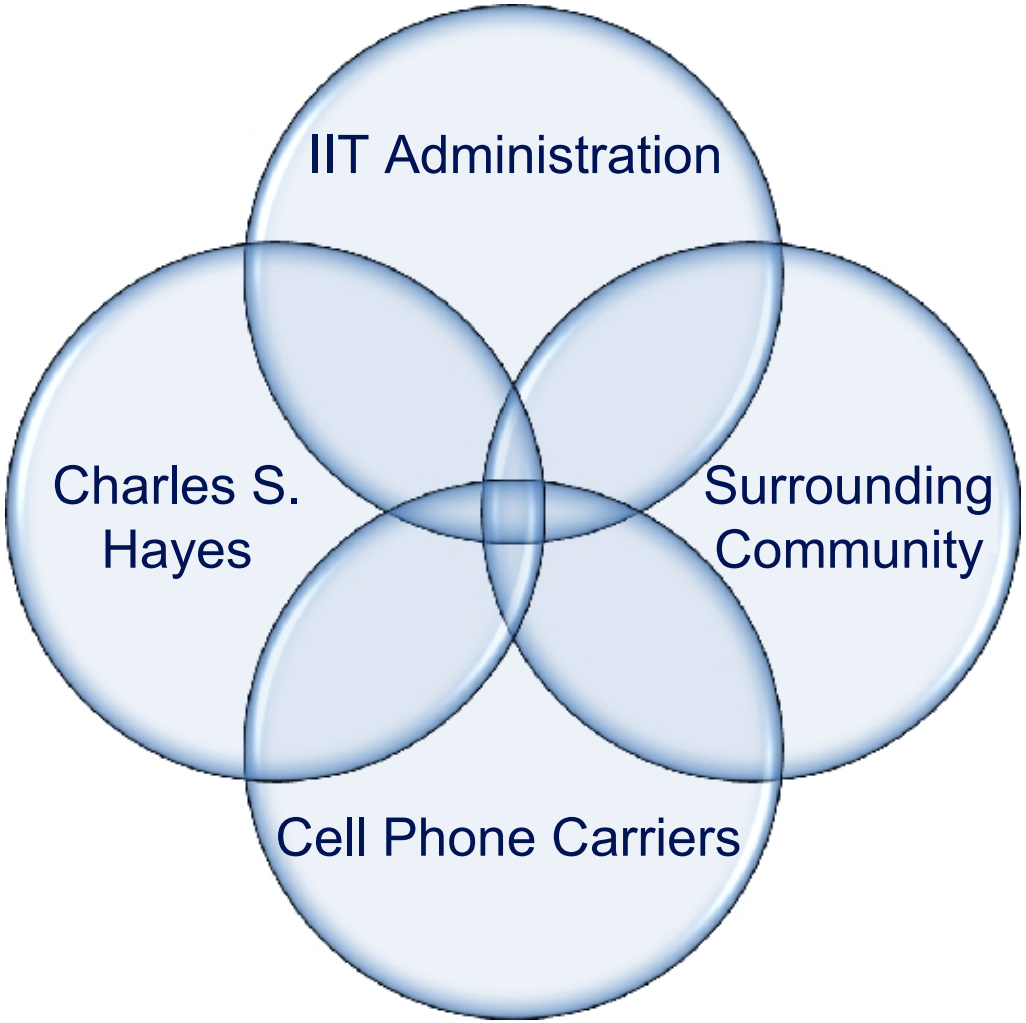
Design Team:
- site analysis
- tower designs

Technical Team:
- stakeholders
- research



Combined tasks:
- decide on designs
- prepare deliverables

Stakeholders



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Carriers, IIT Administration

Gus Gonzalez Recruiting Manager, T-Mobile

Prishant Patel Retail Manager, Clear; Associate, Sprint / Nextel

Terry Frigo VP Facilities, IIT

Ophir Trigalo CIO, IIT

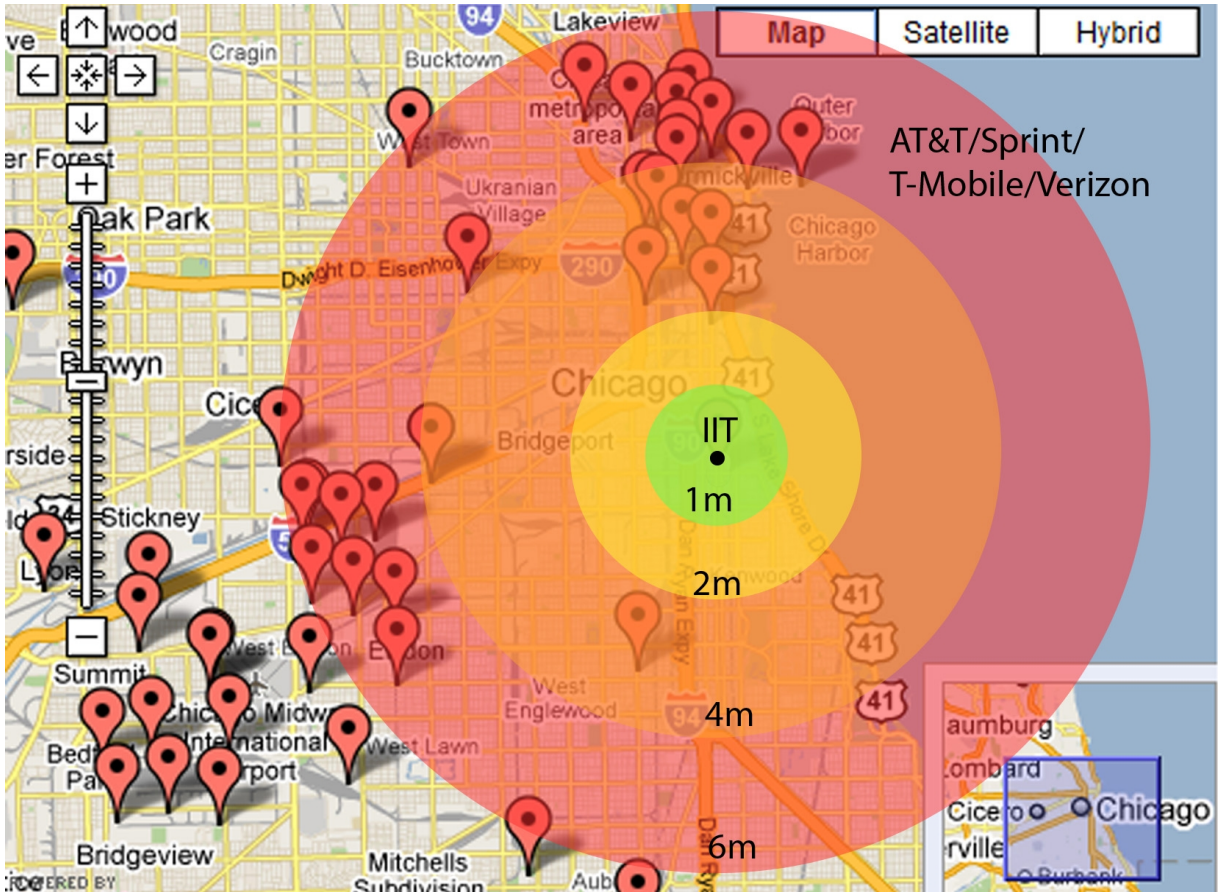
Concentration of Local Towers

1 mile:
Interstate 55

2 miles:
Roosevelt Road

4 miles:
Navy Pier

6 miles:
Armitage Avenue



IIT Community

- Students were asked to comment on the traditional monopole design
  - Negative comments: too big, out of place, ugly
  - Positive comments: simple, functional, minimalistic
- Suggested site of tower: edges of campus
- Largest issue: White Sox games

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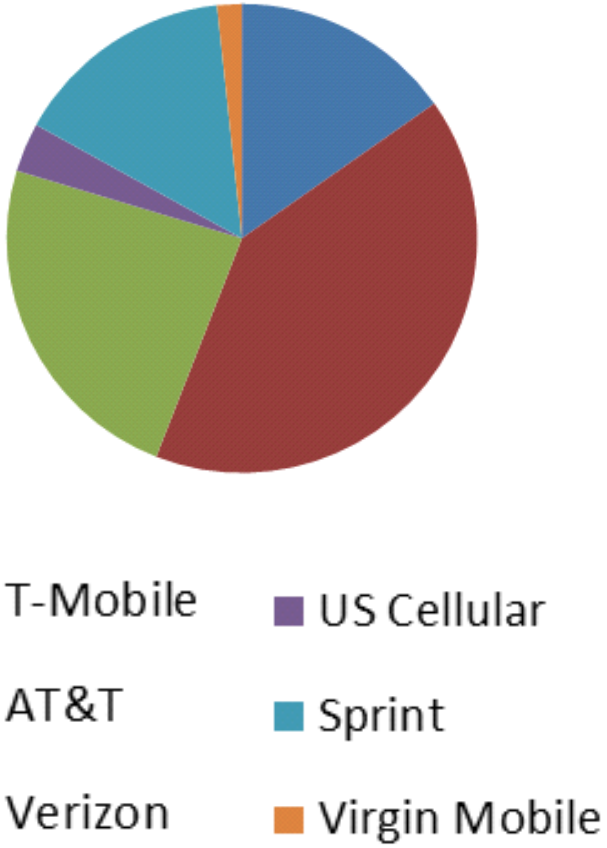
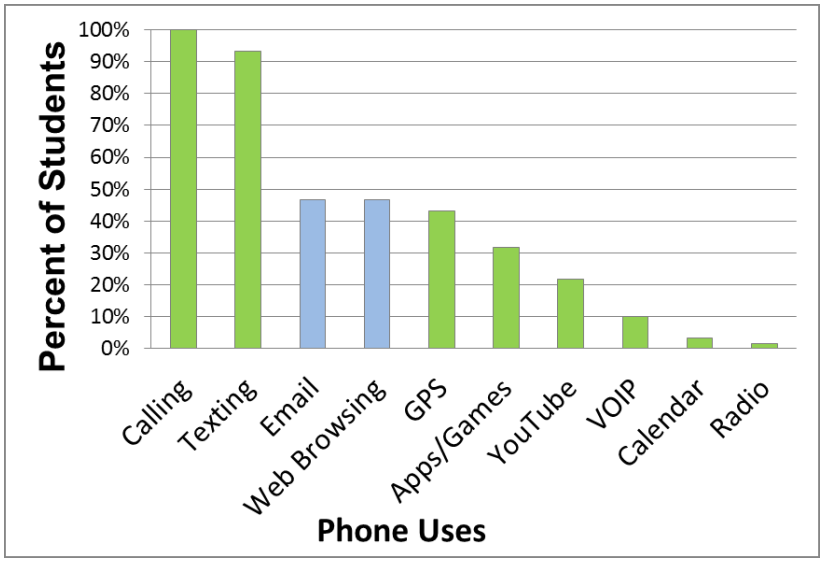
IIT Community





Zoning Research

General:

- No artificial lighting
- Galvanized steel finish or neutral paint color

Freestanding:

- 150 feet
- Monopole construction
- Safety
- Six foot fence

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Site Analysis

* The FCC does not require every antenna structure to be registered, and the map may or may not list all the towers in the area.

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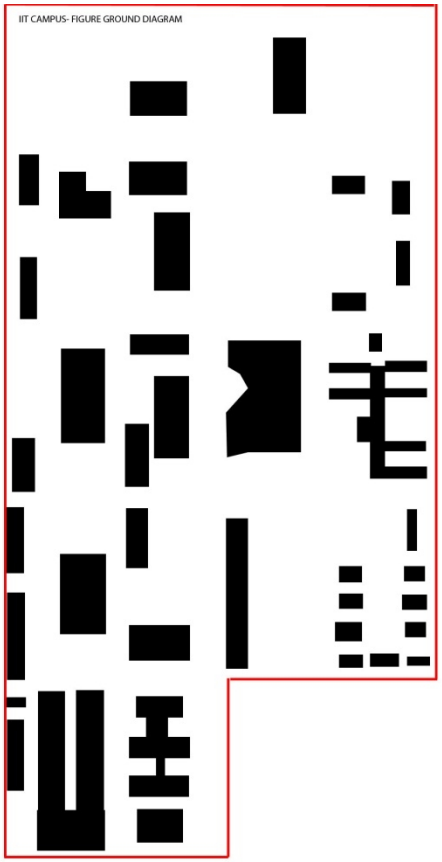
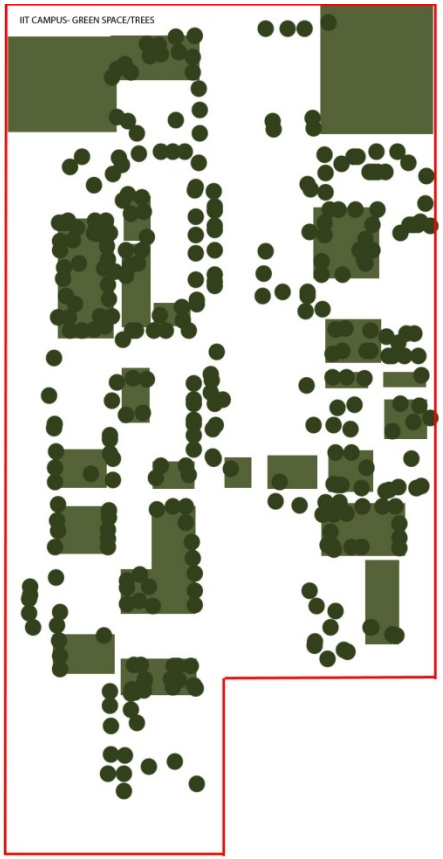
Site Analysis





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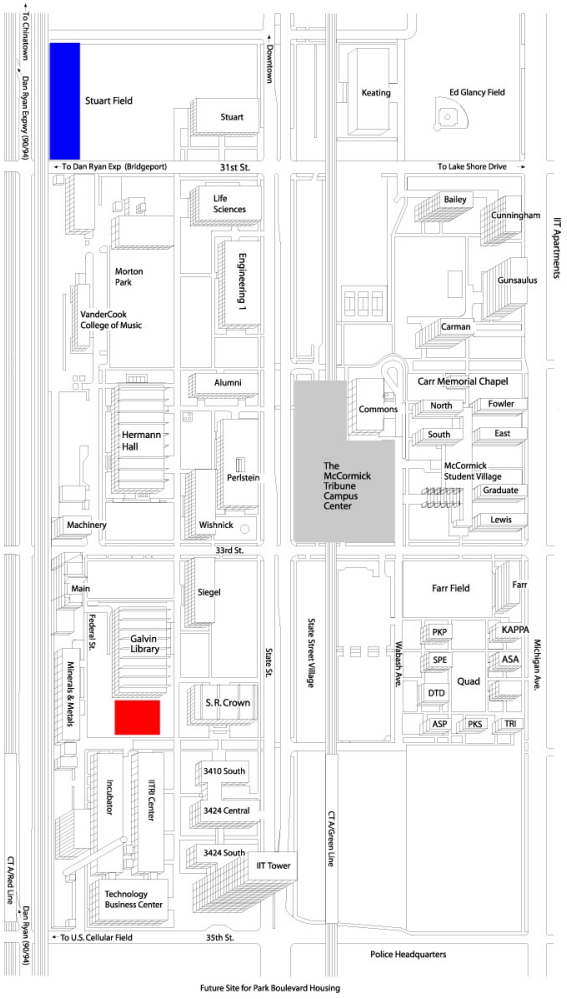
Site Analysis

Site One:
Edge of campus,
out of the way.

Site Two:
Public, open area,
high visibility.



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Current Problem

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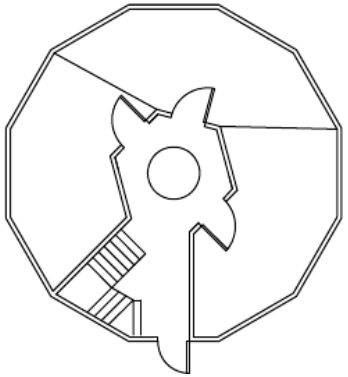
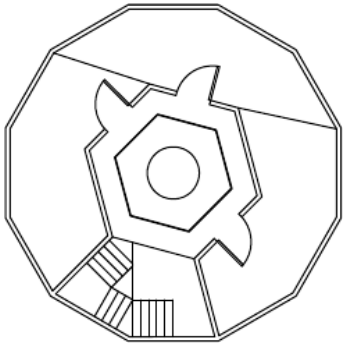
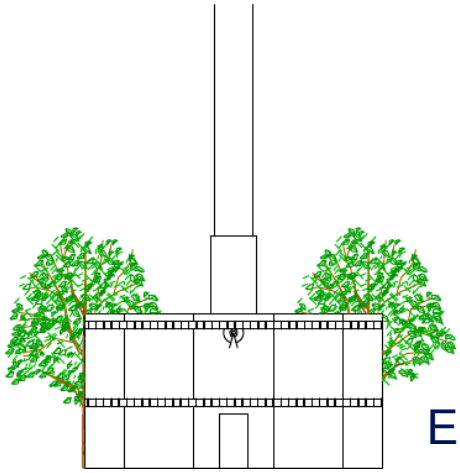
Base Design



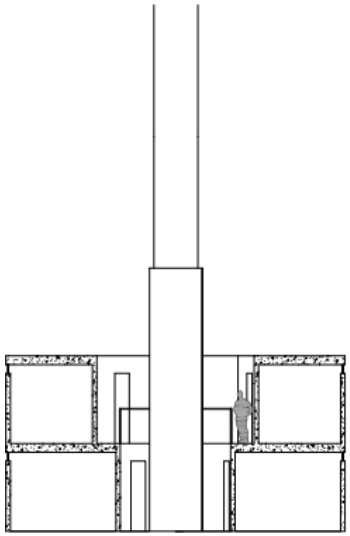
First Level

Second Level





Elevation



Section

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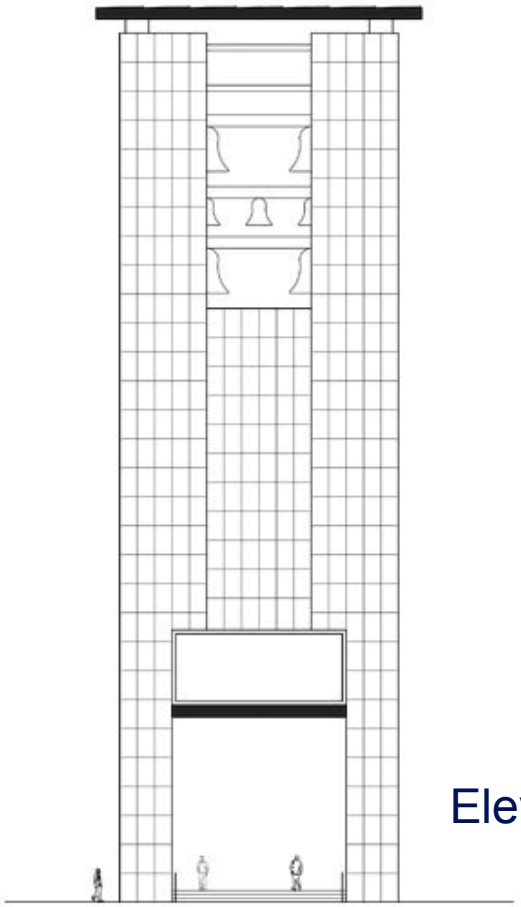
Monument Design



Elevation

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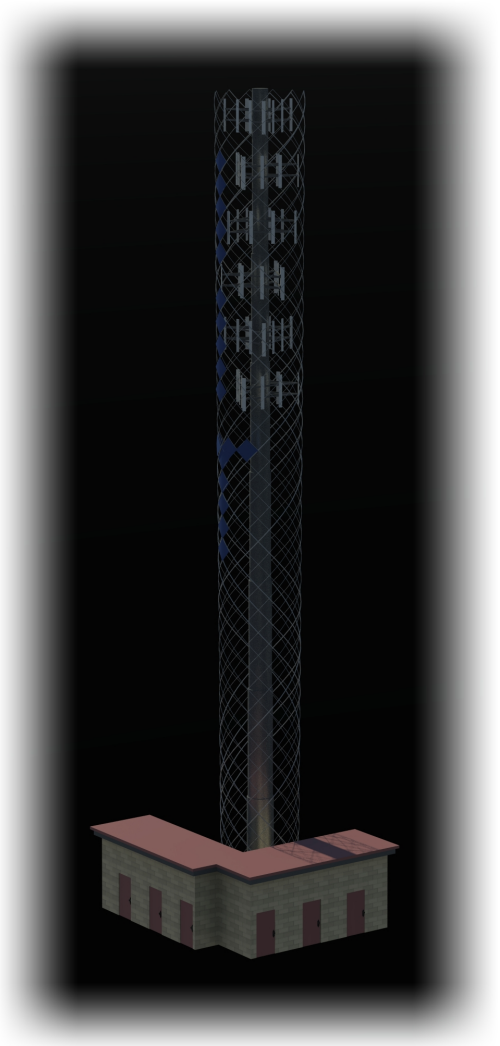
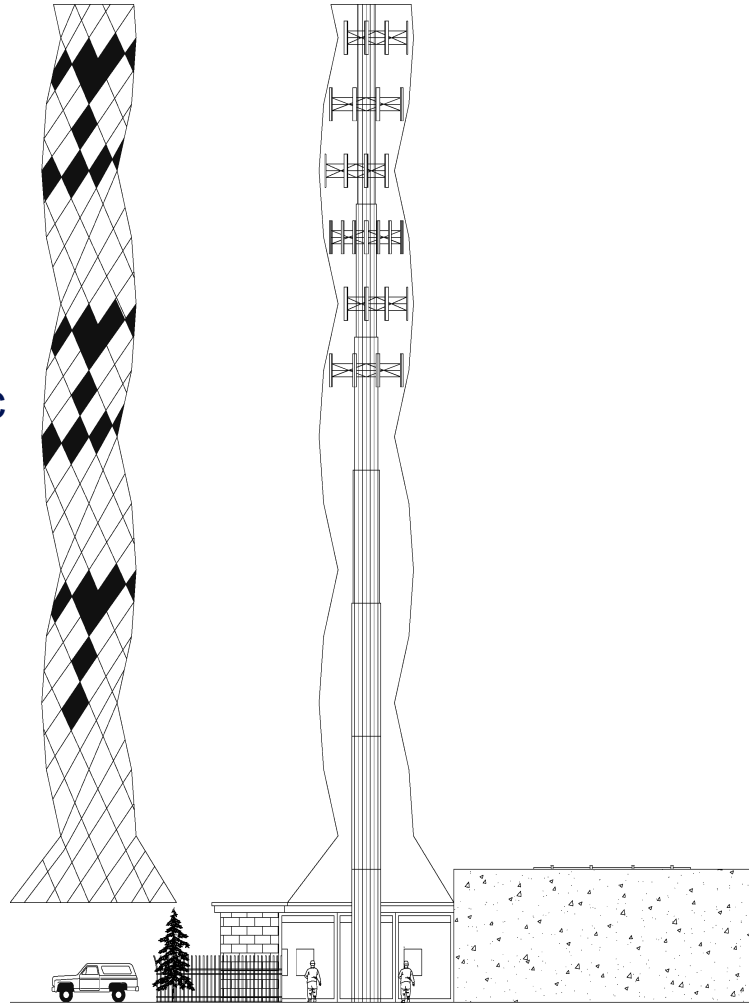
Sustainable Design



- Recycled Aluminum Mesh
- Photovoltaic Cells
- IIT or location branding



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Wind as Renewable Energy

Aerotecture
610V model

Helix Wind
S594 model

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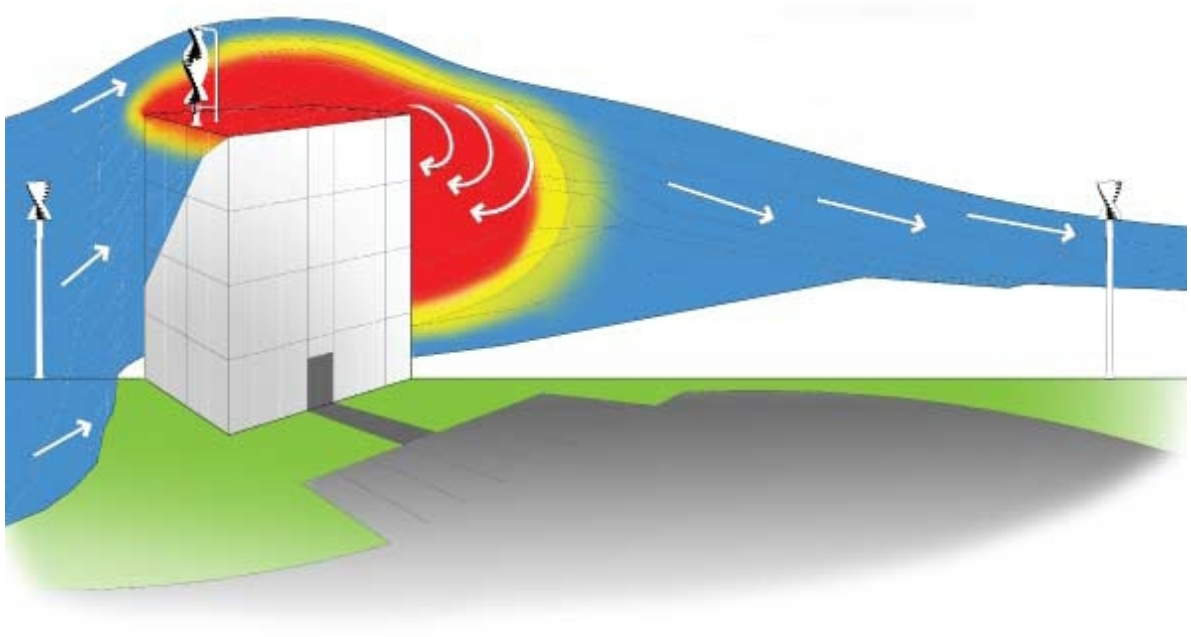
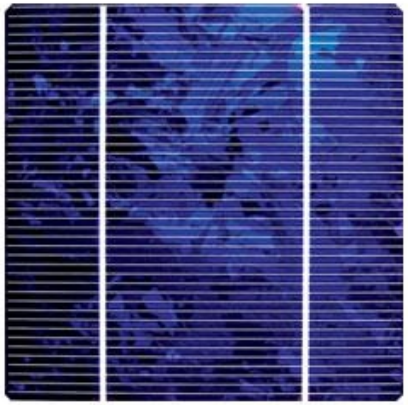
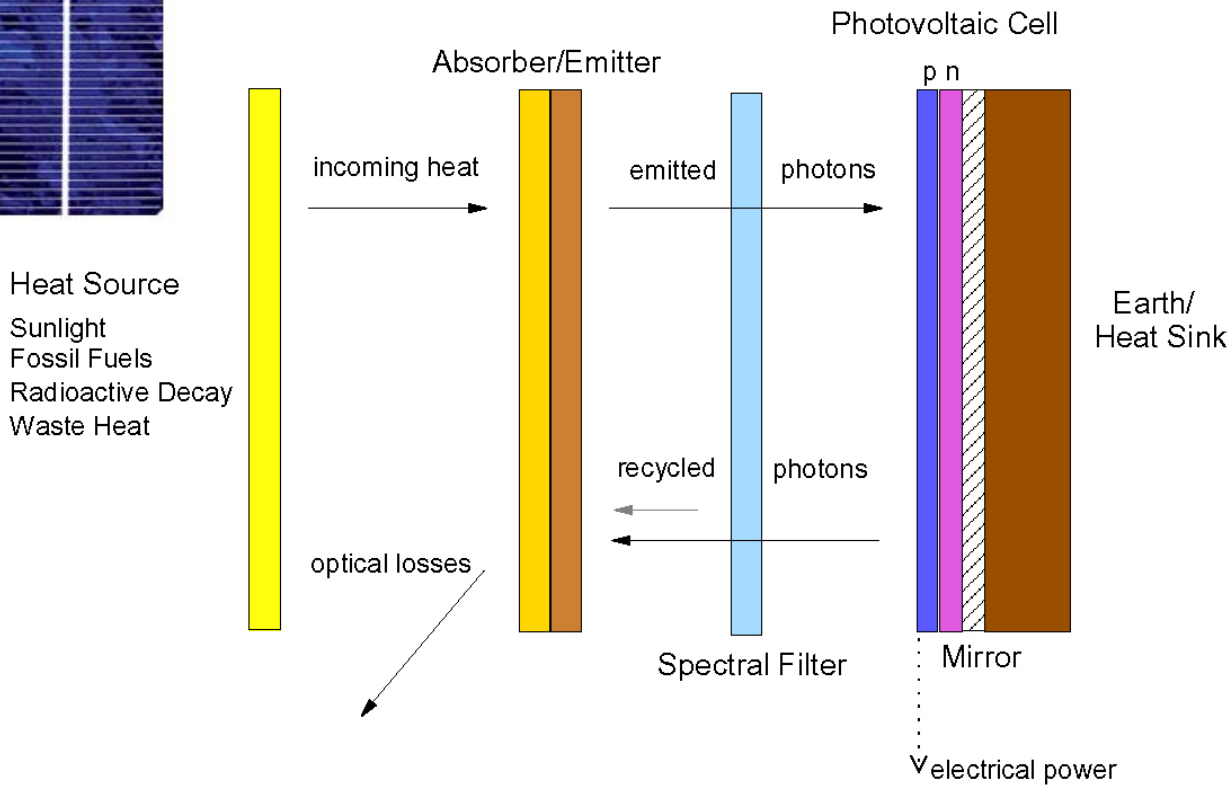
Wind as Renewable Energy



Blue	Smooth laminar wind flow
Yellow	Turbulence boundary
Red	High wind turbulence

Solar as Renewable Energy





Cost Estimate

Task	Cost ($)
Permits, Engineering	20,000
Foundation	50,000
Site Work	25,000
Tower	90,000
Tower Erection	20,000
Grounding	10,000
Fence	10,000
Generator	25,000
Landscaping	10,000
Total	**260,000**

The Next Steps

- Obtain approval from sponsor.
- Submit proposal to the IIT Planning Committee.
- Submit design to Chicago's ordinance board.

Is There a Need?

- With the potential new developments near campus, the need for data capacity will increase.
- Multiple design options to fit the needs of most site requirements.
- Building-mounted antennas are an alternative.
- Given the site's conditions, we've determined that it fits the needs of the project's scope.

Questions?