

# Gen\*NY\*Sis Center for Excellence in Cancer Genomics

Rensselaer, NY



Meral Kanik

Structural Option Advisor: A.M. Memari April 14, 2008

# Gen\*NY\*Sis Center for Genomics

- Introduction
- Building Statistics
- Existing Structure
- Proposal
- Structural Redesign
- Lateral Redesign
- Vibration Analysis
- Sustainability Concerns
- Cost Analysis
- Schedule Change
- Conclusions





PHOTOS FROM ON HIGH  
CHRIS MILIAN: PHOTOGRAPHER

# Building Statistics

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Owner: *University at Albany*

Architect/Engineer: *Einhorn Yaffee Prescott  
Architecture & Engineering P.C.*

Location: *Rensselaer, NY*

Function: *Cancer Research Laboratories*

Size: *117,400 square feet*

Height: *87 feet*

Number of Stories: *4 above grade, 1 below grade*

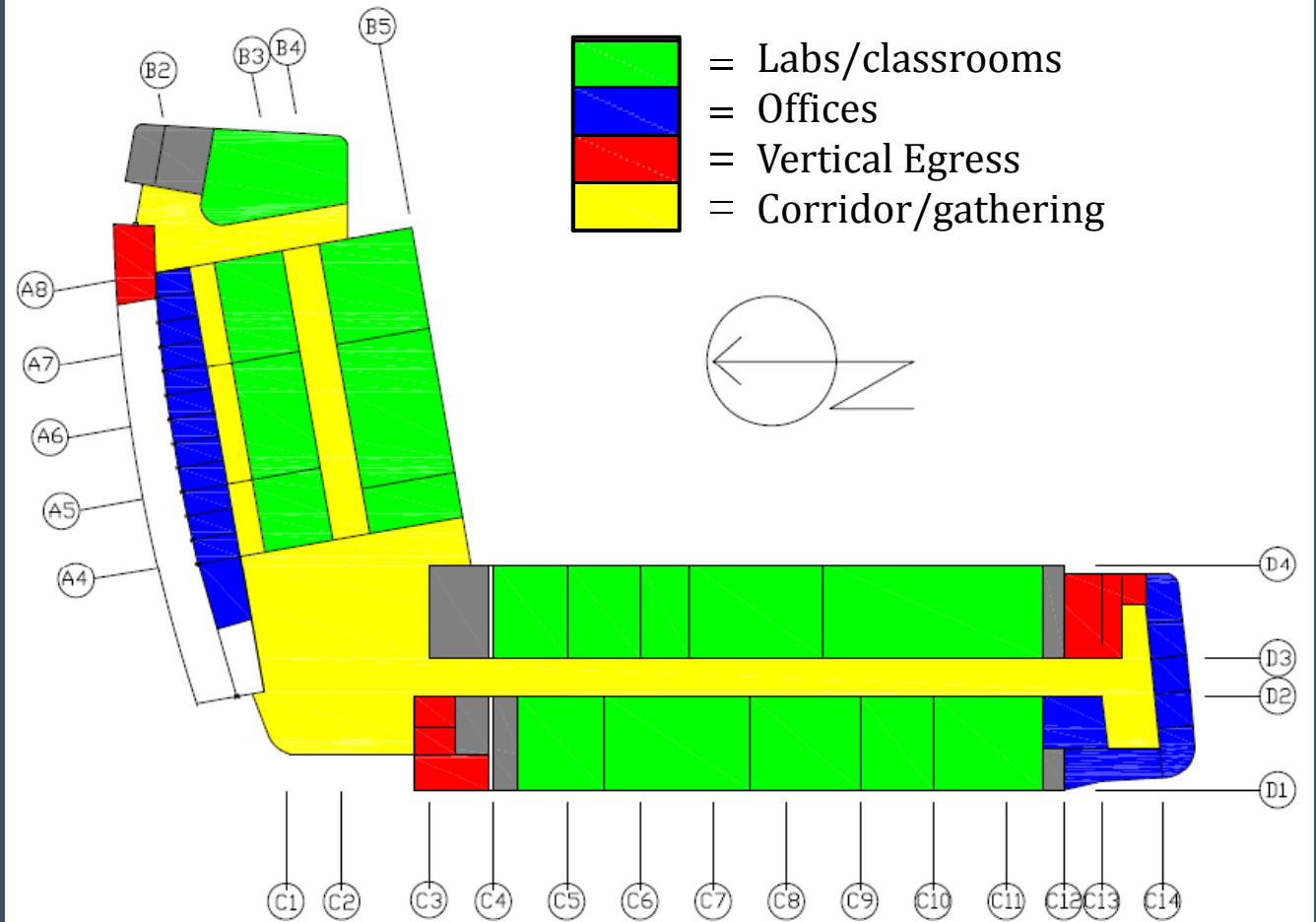
Cost: *\$45 million (base building cost)*

Project Delivery Method: *Fast Track Delivery*



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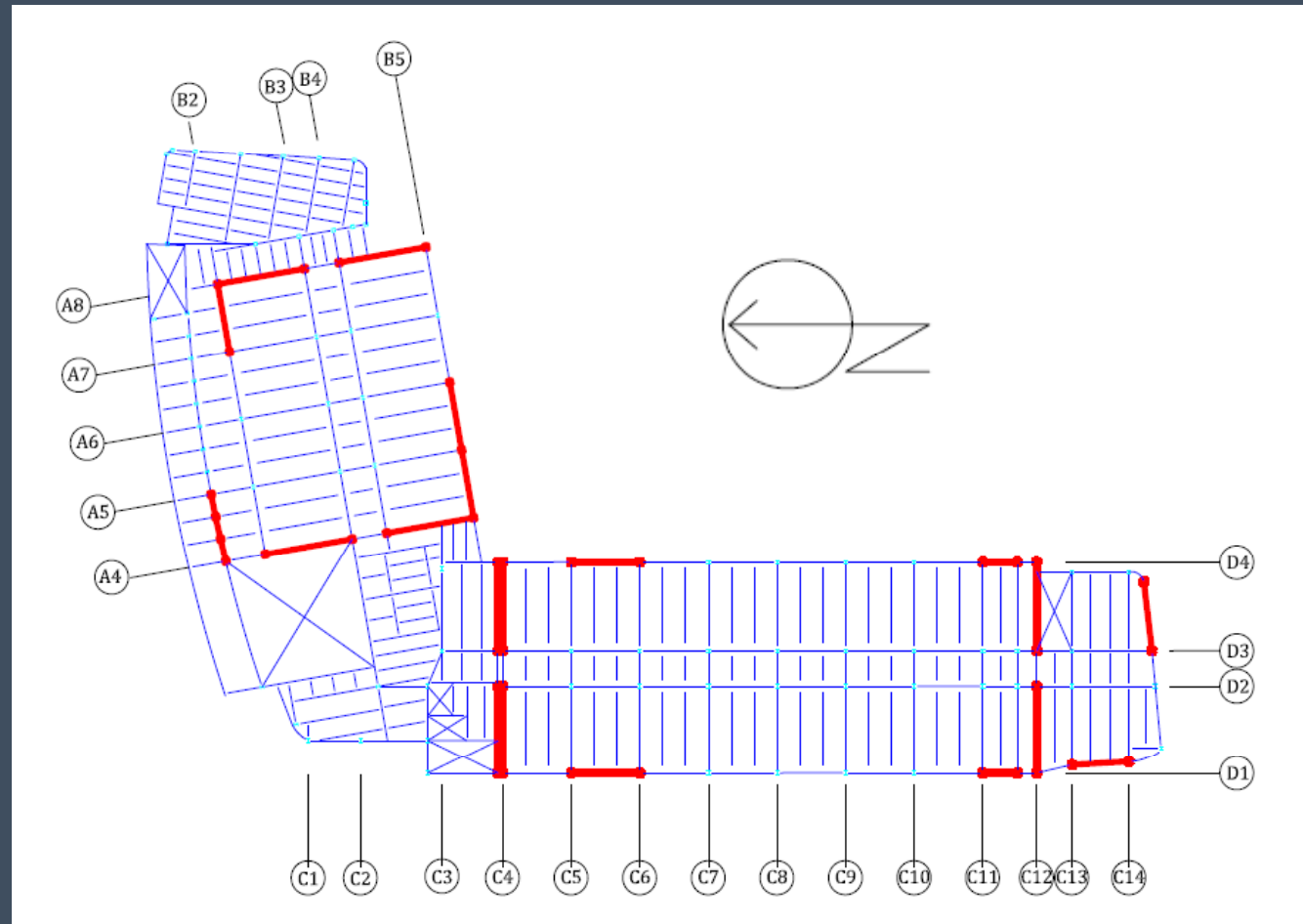
# Typical Floor Layout



# Existing Structure



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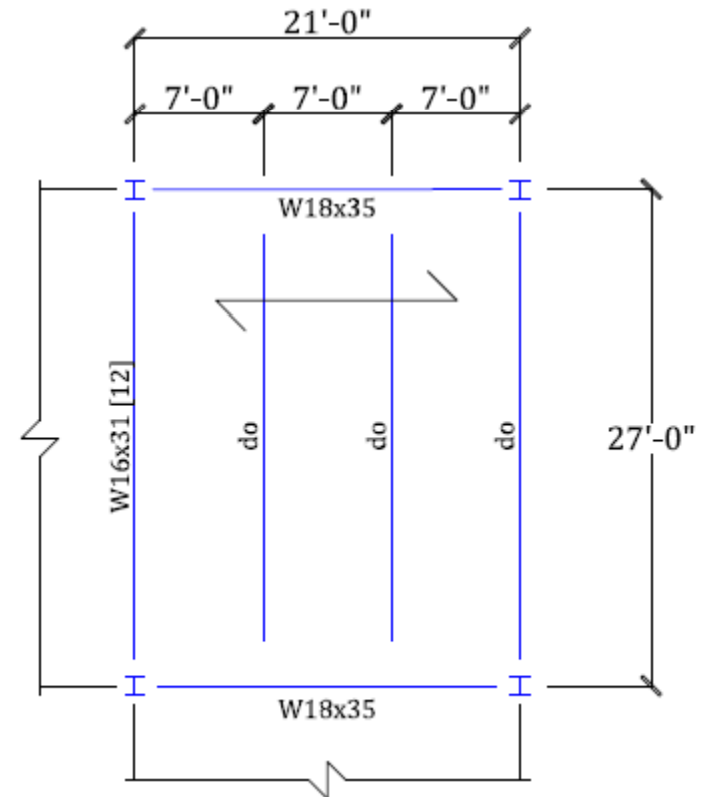


# Typical Bay



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- 4 ½" normal weight concrete
- 2" composite metal deck
- $f'_c = 3.5$  ksi
- $F_y = 50$  ksi

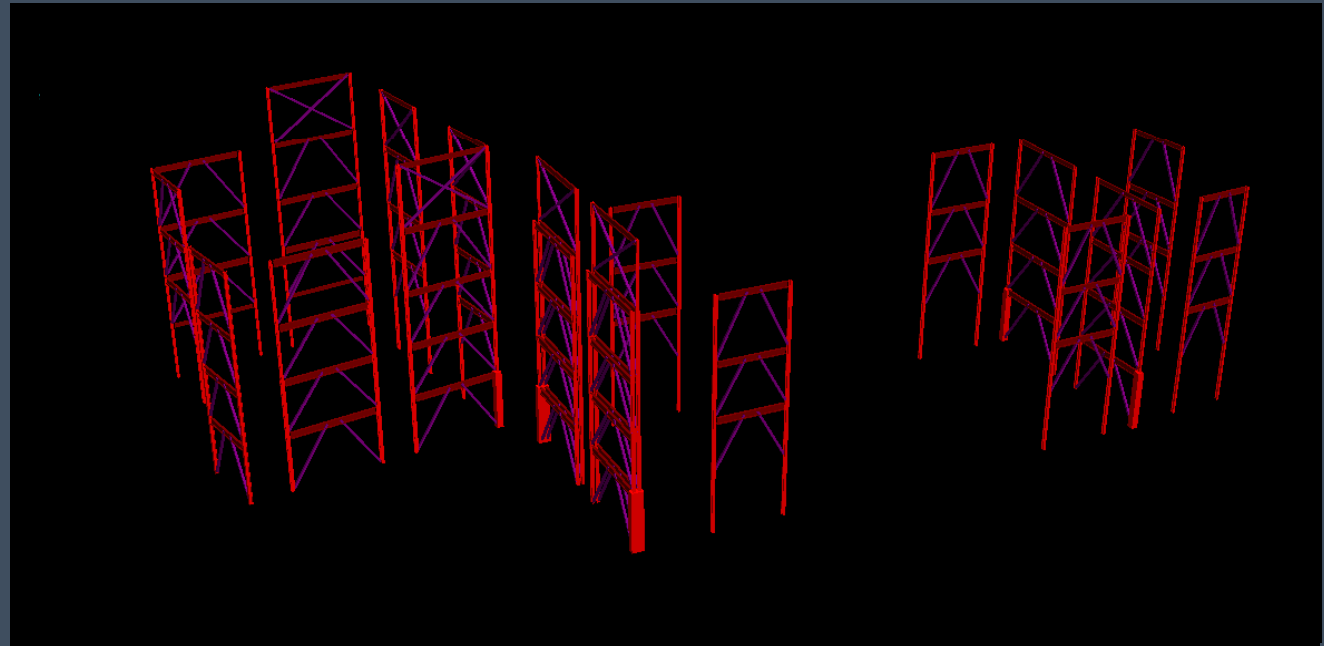




# Lateral System

- Non moment-resisting eccentrically braced frames
- Bracing diagonal of HSS8x8x5/16 steel
- Wind controlled

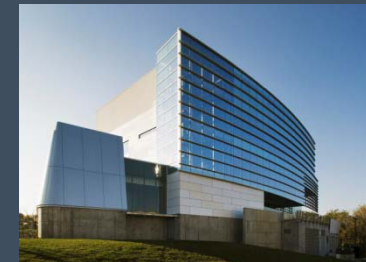
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# Proposal

- Replace steel gravity system
  - Employ hollow core planks
- Remove steel braced frames
  - Utilize concrete shear walls
- Evaluate vibration effects
  
- Implement PSU sustainable designs
  
- Reduce erection time
- Evaluate price differences

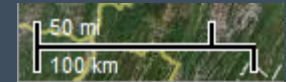




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# Proposal

Transfer the design from SUNY  
University at Albany to Penn State's  
Hershey Medical Center



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# New Design Criteria



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# Gravity Loading

## 4 Foliage: succulants-gross-herbs-wildflowers

Overall depth (excluding foliage) 6 3/4 inches

Max. saturated weight (including foliage) 45 lbs/sf

Typical dry weight (including foliage) 30 lbs/sf



Roofscapes, Inc.

[www.roofmeadow.com](http://www.roofmeadow.com)

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Must account for new roof loading

Previous machine weight of 160 kips

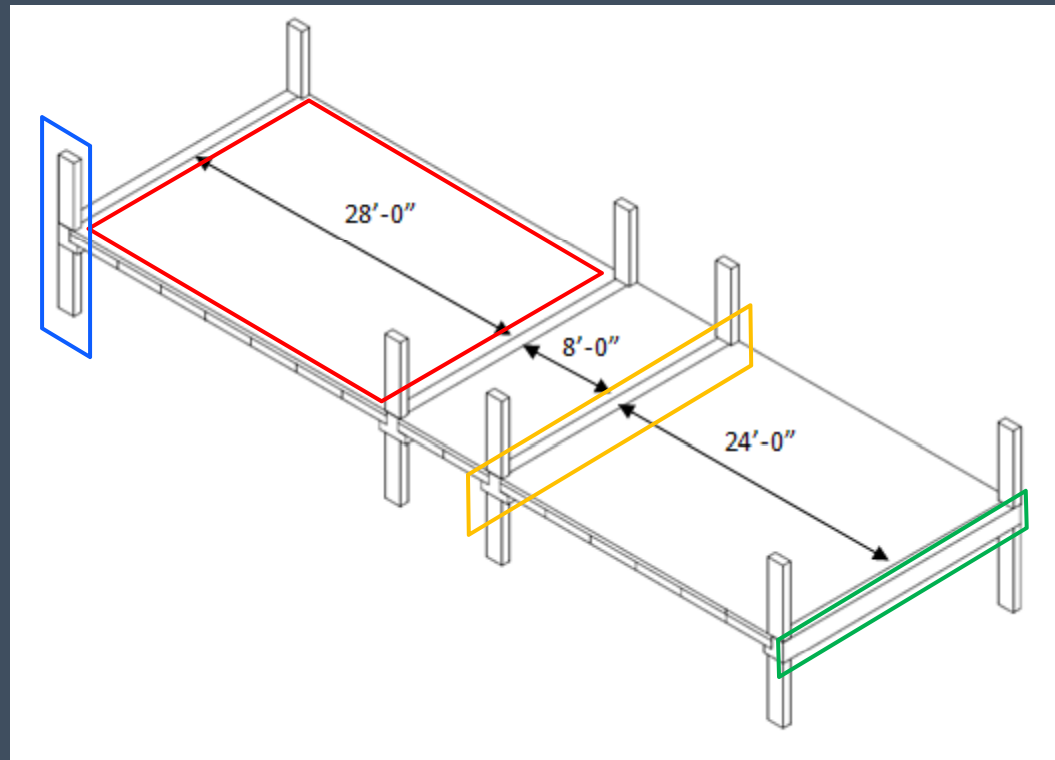
Add live load roof garden assembly

Area of roof garden = 14600 ft<sup>2</sup>

166 psf



# Hollow Core Planks



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4HC8 + 2" topping

20" square columns

20LB24

28IT20

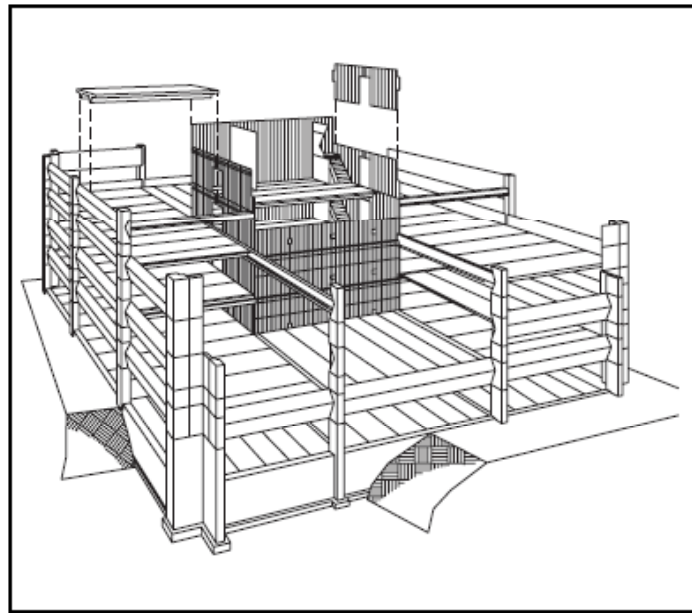
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# New Lateral Loads

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Cast In Place Concrete  
Shear Walls

Precast Concrete  
Shear Wall Panels

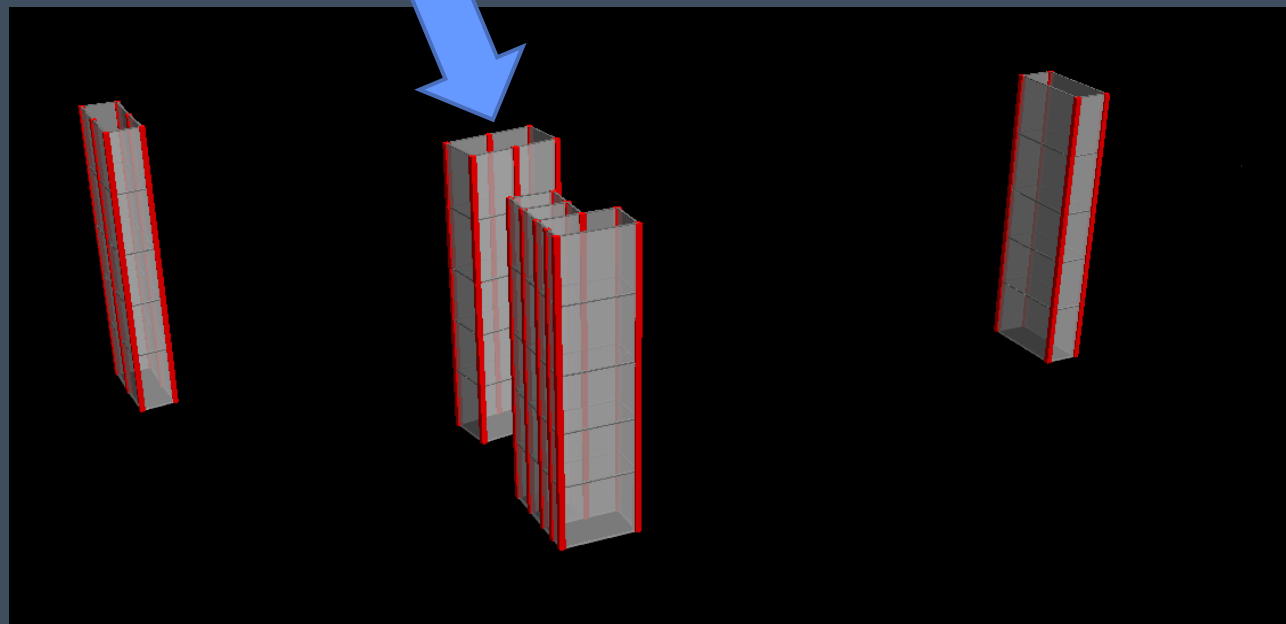


# New Lateral System

Use vertical egress as shear walls

Add new stair case

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# Effects of Drift



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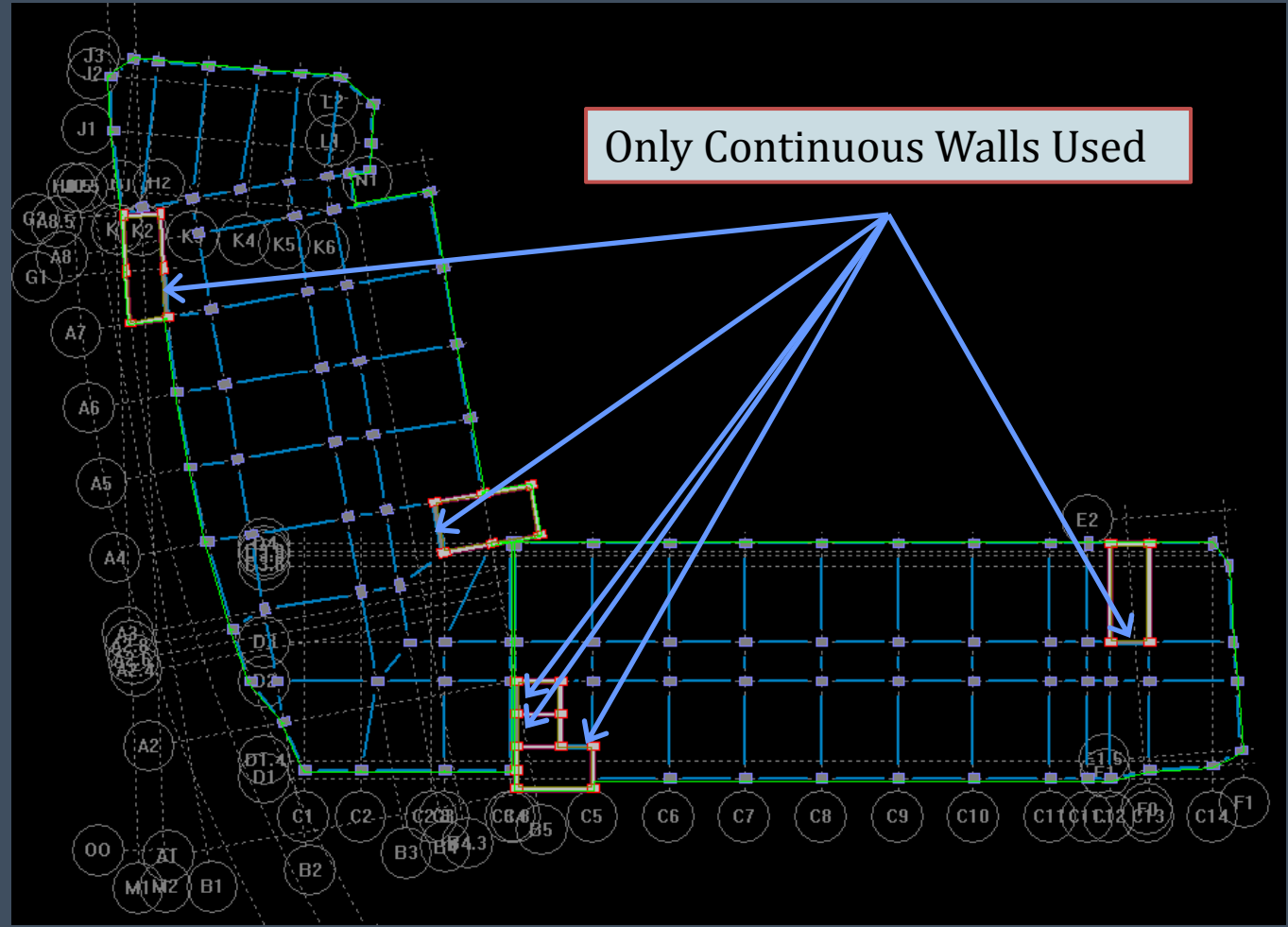
According to IBC,  
 $\Delta_{WIND} = H/400$

Floor	Story Height (ft)	Allowable Story Drift (in)	RAM Story Drift (in)		
Penthouse	18.42	0.553	0.134	<input checked="" type="checkbox"/>	1
Roof	18.58	0.557	0.121	<input checked="" type="checkbox"/>	1
3rd	16	0.480	0.084	<input checked="" type="checkbox"/>	1
2nd	16	0.480	0.081	<input checked="" type="checkbox"/>	1
1st	18	0.540	0.036	<input checked="" type="checkbox"/>	1



# Concrete Shear Walls

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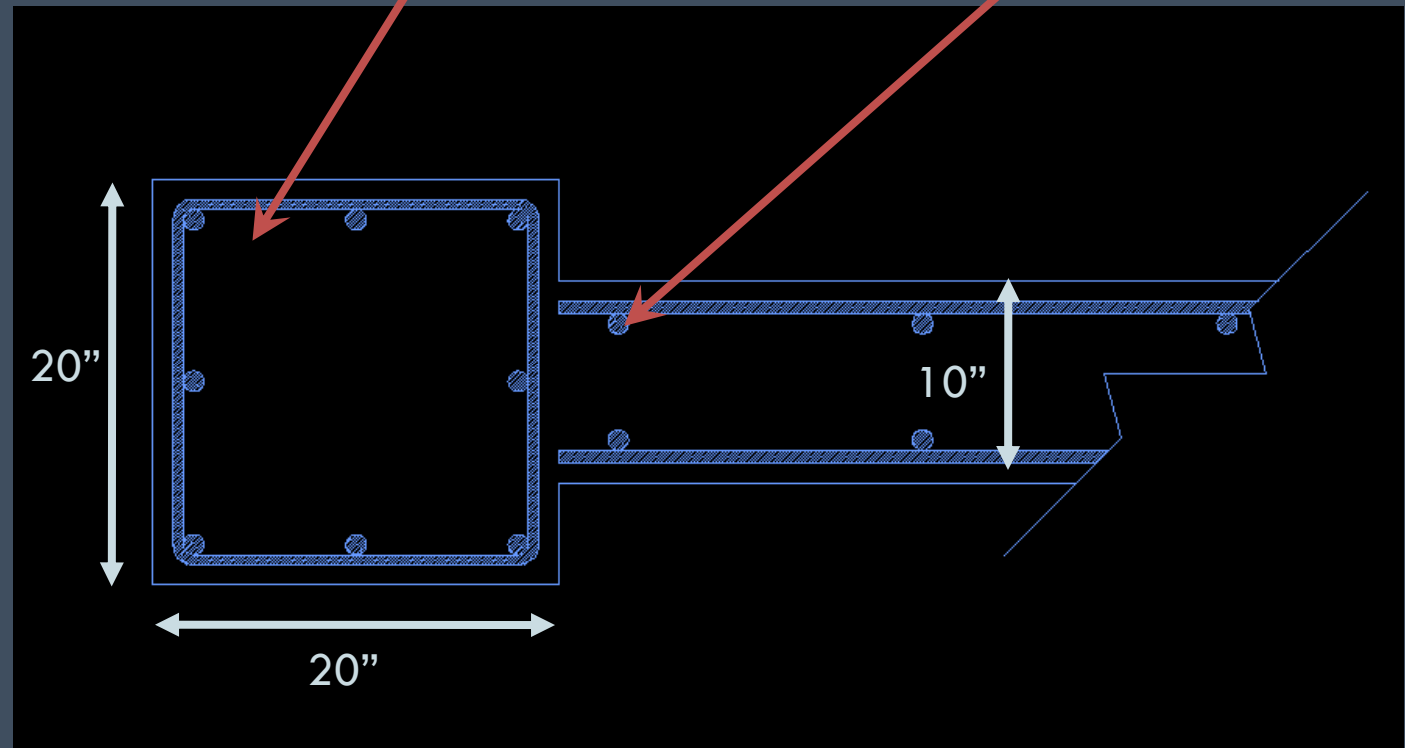


# Shear Wall Boundary Element

(8)#9  
#3 Ties

#5 Vertical 15" o.c.  
#5 Horizontal 15" o.c.

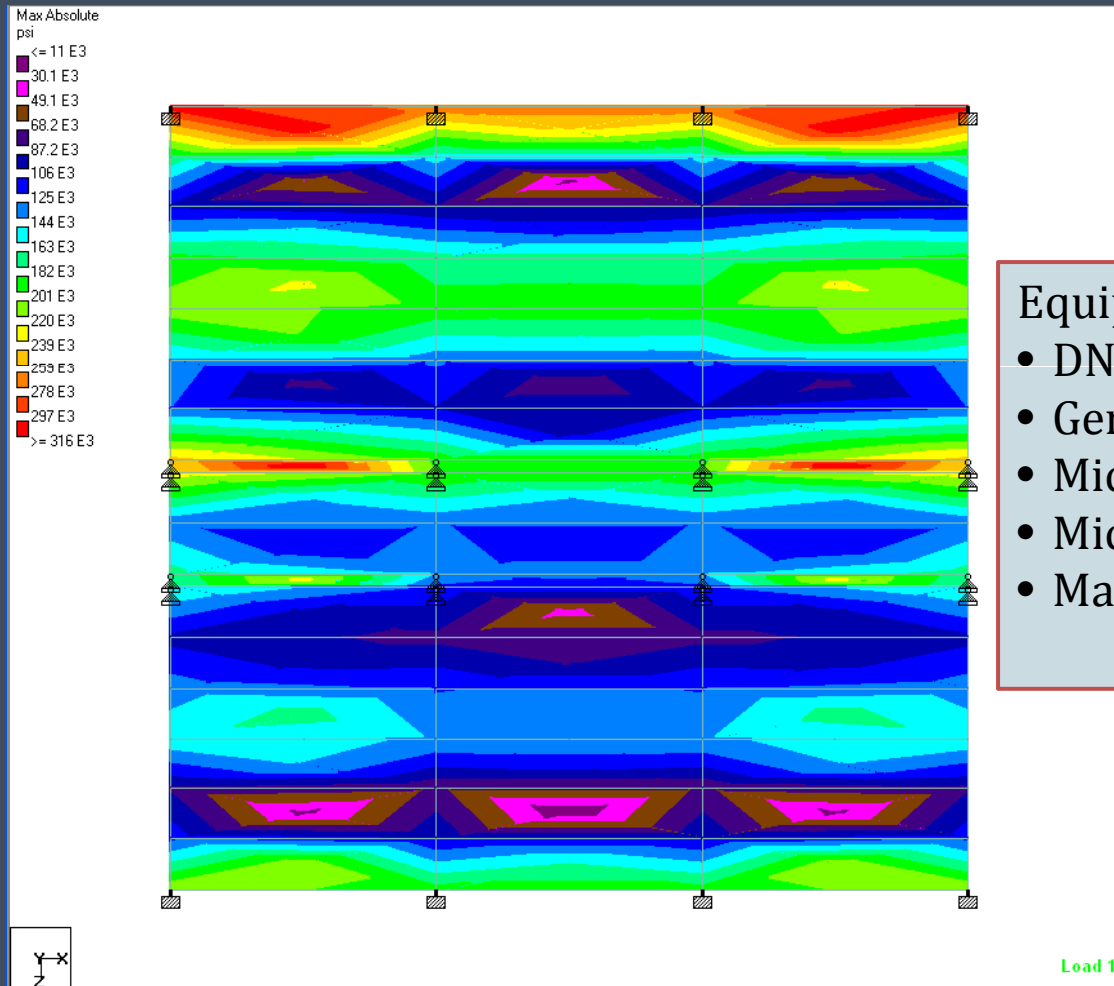
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# Laboratory Facilities



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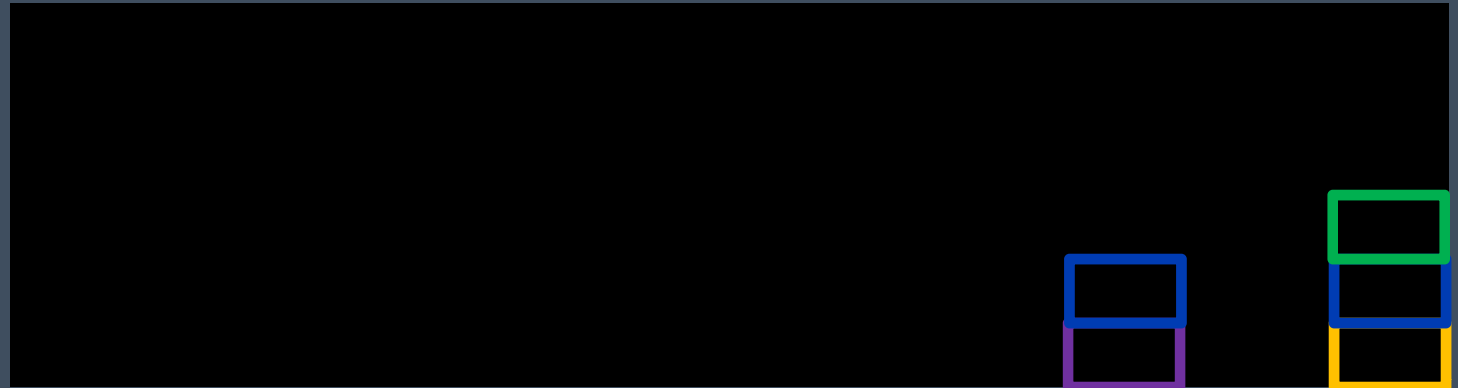


## Equipment Used For:

- DNA sequencing
- Gene cloning
- Microarray
- Mice Testing
- Mass Spectrometry

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Microscopes up to 100x

Microscopes up to 400x

Microscopes over 400x

Microscopes up to 30,000x

# Green Roof



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## Provide:

- Wind Erosion Stabilization
- Passive irrigation
- Habitat creation
- Moderate maintenance



“Meadow” Roof Garden Examples set up by RoofScapes inc.



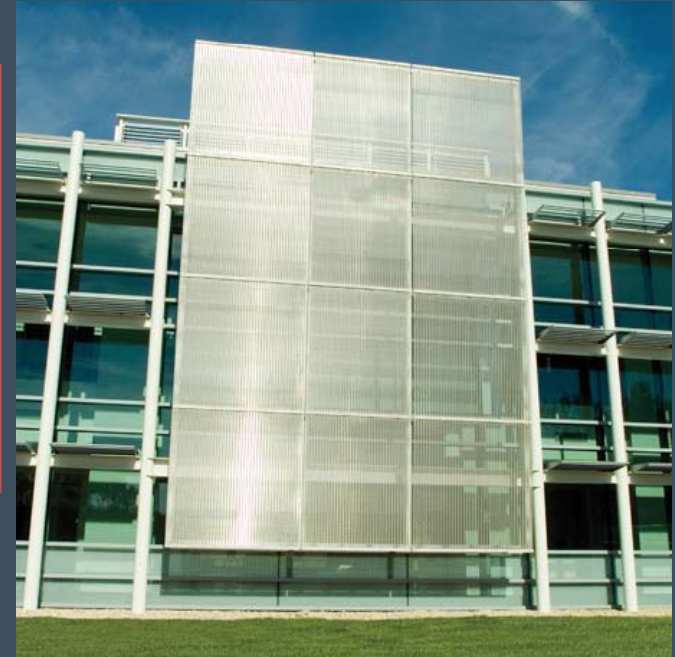
# Metal Mesh Shading



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## Provide:

- Shade from harsh summer day
- Gain heat to save energy costs
- Still utilize curtain wall view

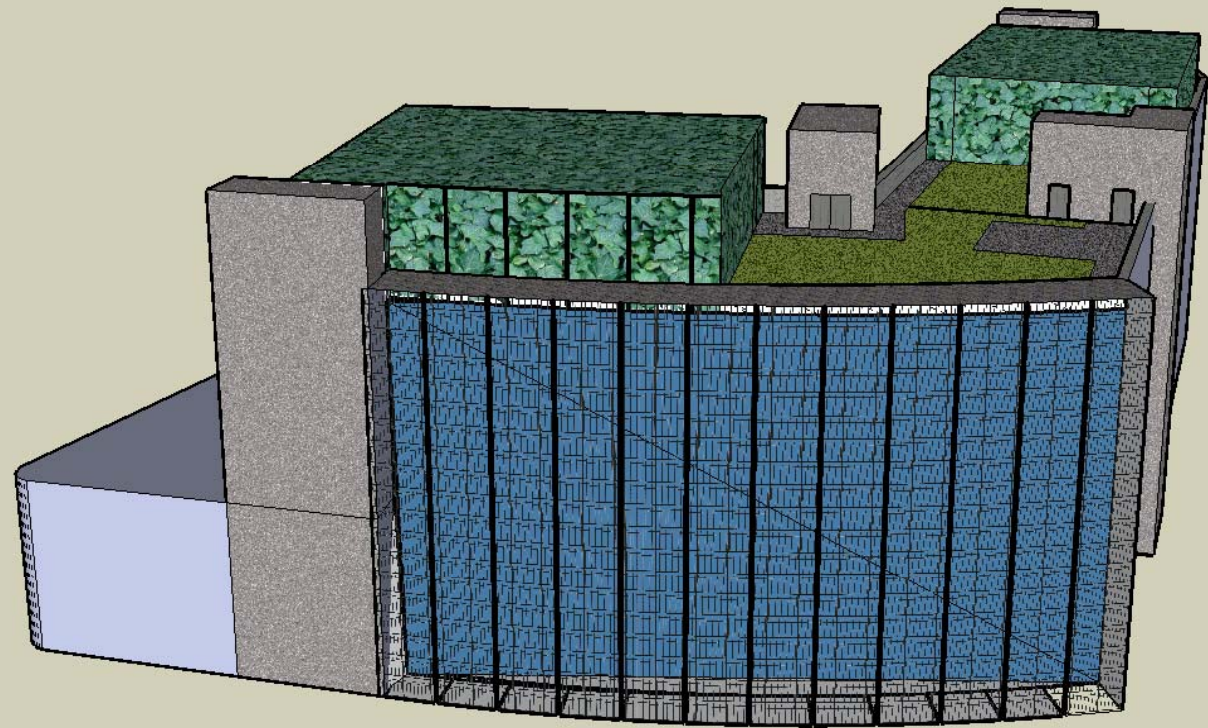


Metal Screen from Cambridge Architectural

# New Green Look



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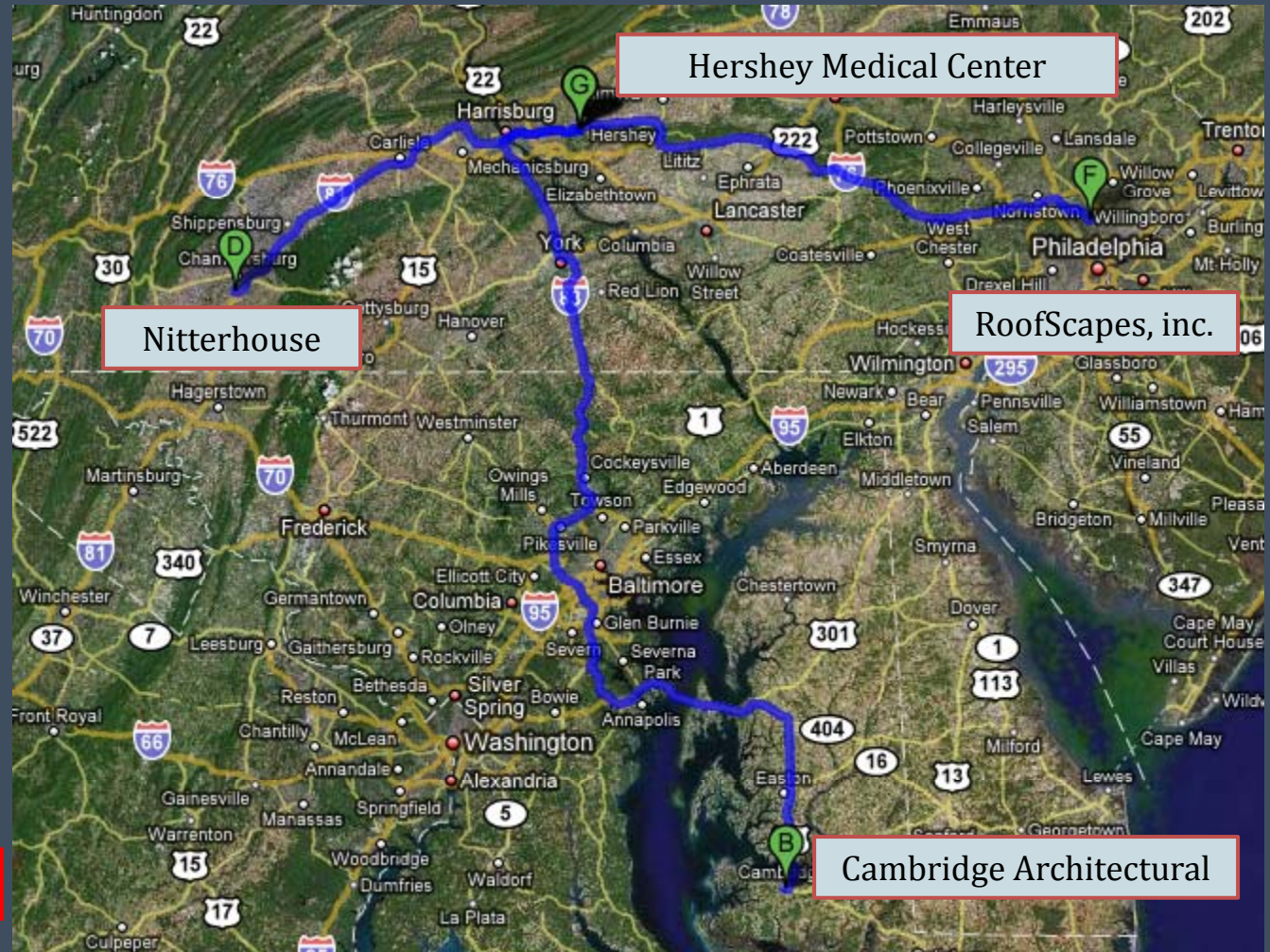
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# Local Materials



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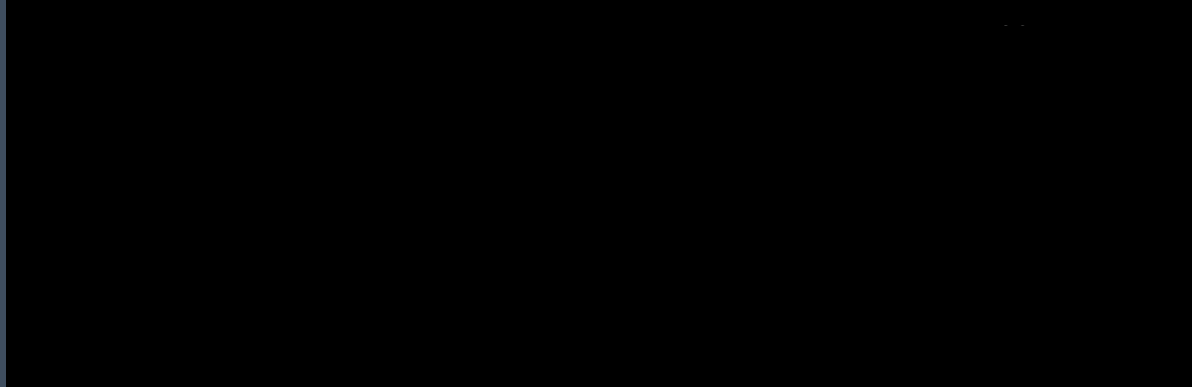
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# Structural System Costs

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Low \$\$ Lateral System

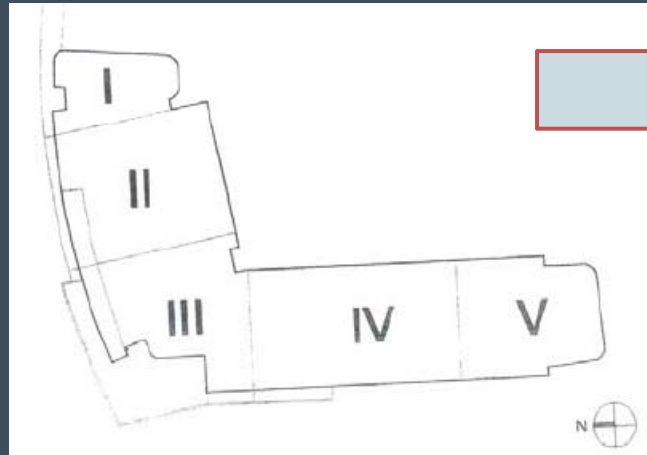
OR

Low \$\$ Gravity System

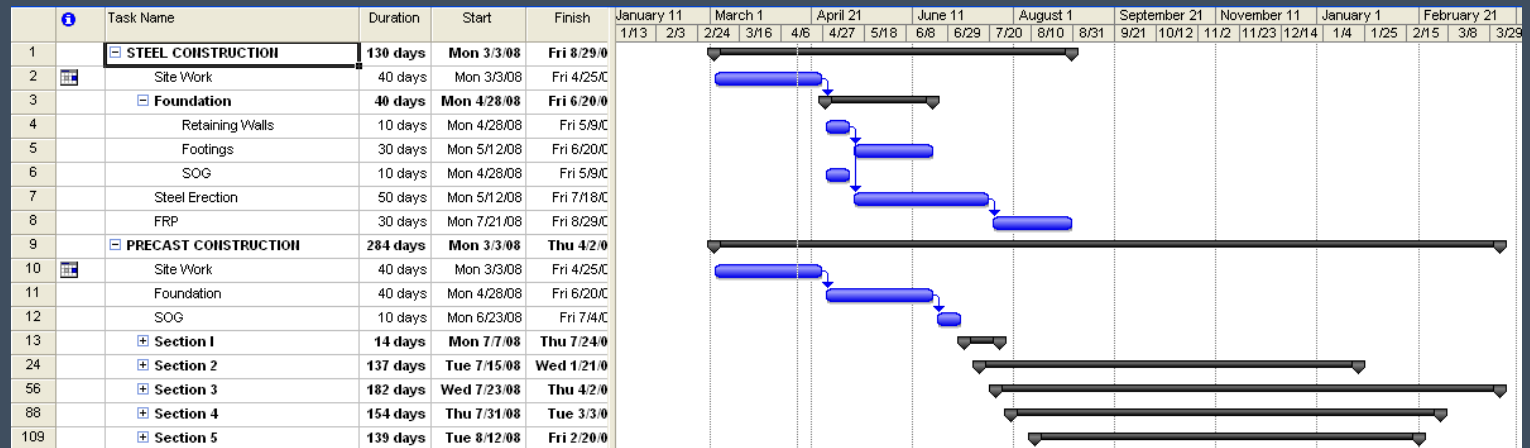


# Structural System Schedule

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## Phases of Construction







# In Retrospect...





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## Structural

- Precast Planks → 
- Drift → 
- Shear Walls → 
- Vibration → 

## Sustainability

- Green Roof → 
- PSU LEED → 

## Construction

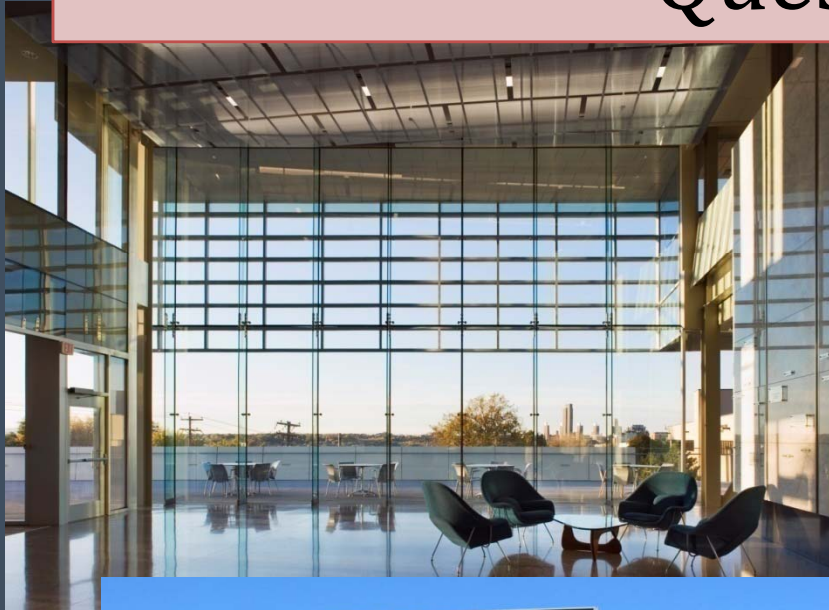
- Erection Time → 
- Cost → 



# Special Thanks To...

- E.Y.P.A.E.
  - Franklin Lancaster
  - David Clemenzi
- PSU AE Faculty and Staff
  - Dr. Ali Memari
  - Professor Kevin Parfitt
  - Professor Bob Holland
- Fellow AE students
- All of my family  
(Ben Sizin Seviyorum)
- Penn State Rugby  
(Lessss GO State!)

# Questions?



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