



# PACIFIC TEAM

Spring2003

Pacific



Construction  
Manager

Andrea Jungbecker  
Weimar



Engineer

Bo Martensson  
KTH



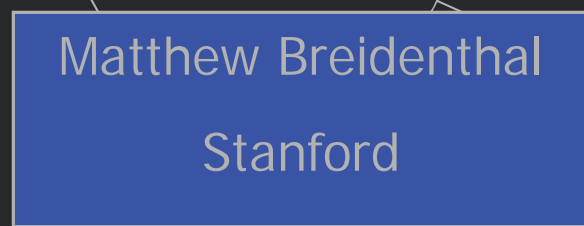
Construction  
Manager

Christian Perizzolo  
Stanford

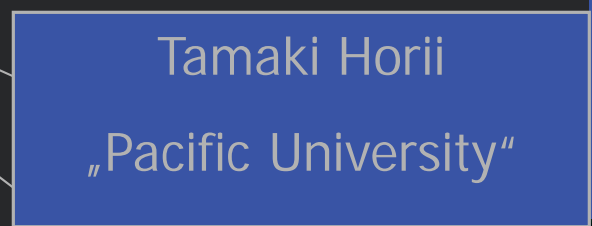


Architect

Daniel Puttcamp  
Kansas



Matthew Breidenthal  
Stanford



Tamaki Horii  
„Pacific University“



Engineer



Owner



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# Introduction



# University on the Oregon Coast

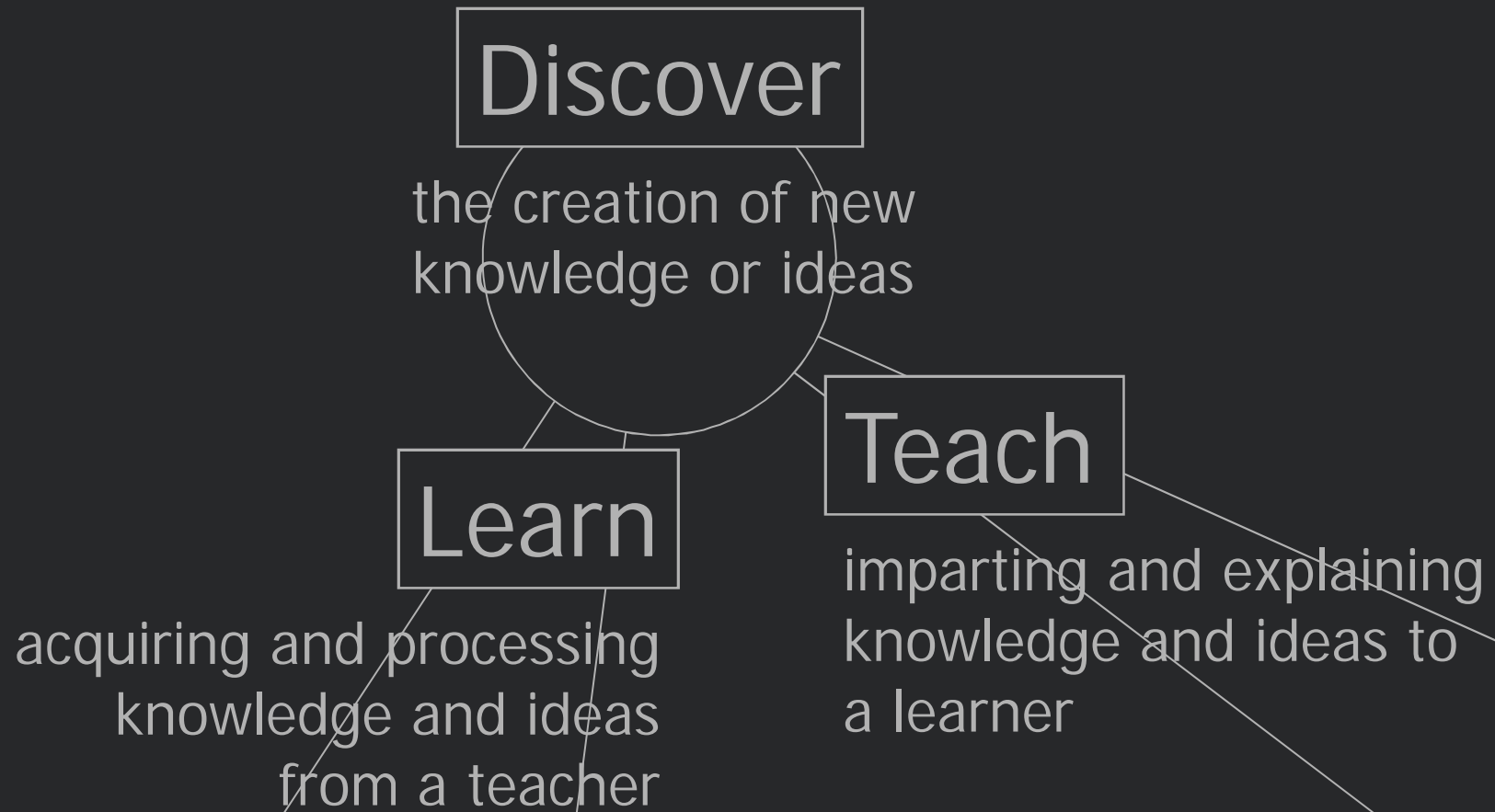


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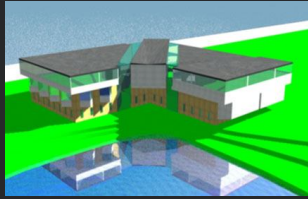
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Site

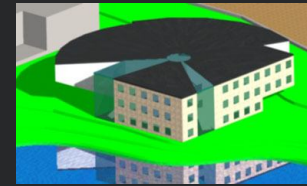
# Education is a process of growth and development



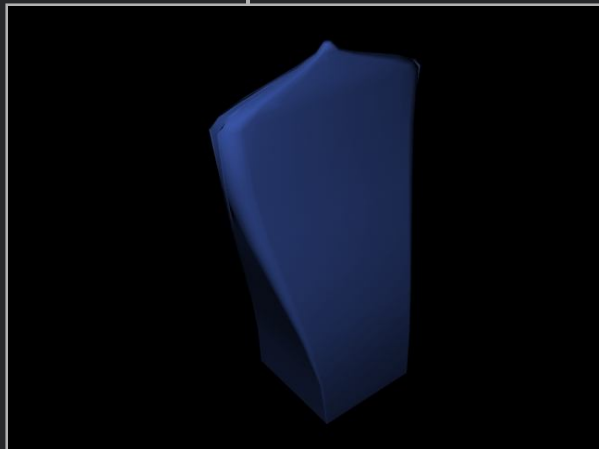
## Bottom Up



## Outside In



A	Well defined solution	Constrains compromise Design desires	More aggressive concept solution	Difficult spaces to define
E	Better grid Less cantilever	Structural depth Splitting columns	Easier auditorium structure	Cantilever More complex
C	Expensive construction space	Big trusses	More appealing	Difficult construction Complex envelope



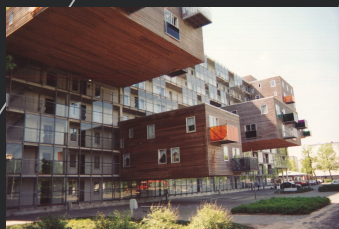
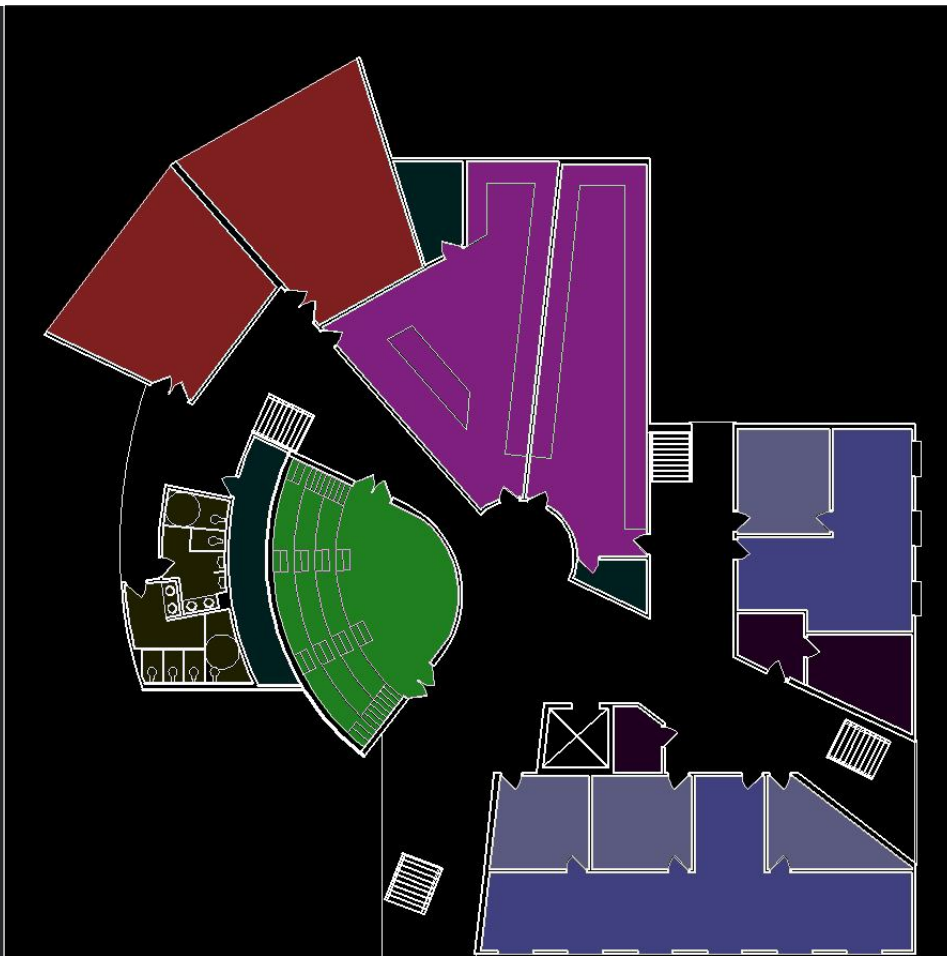
Students

Faculty

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Solution

- Classrooms
- Auditorium
- Faculty Offices
- Laboratory
- Storage
- Mechanical
- Restrooms
- Student Offices
- Seminar Rooms



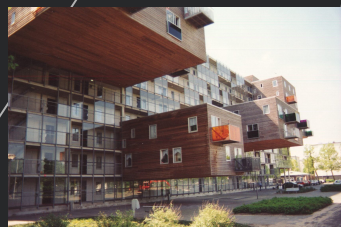
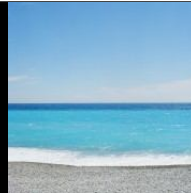
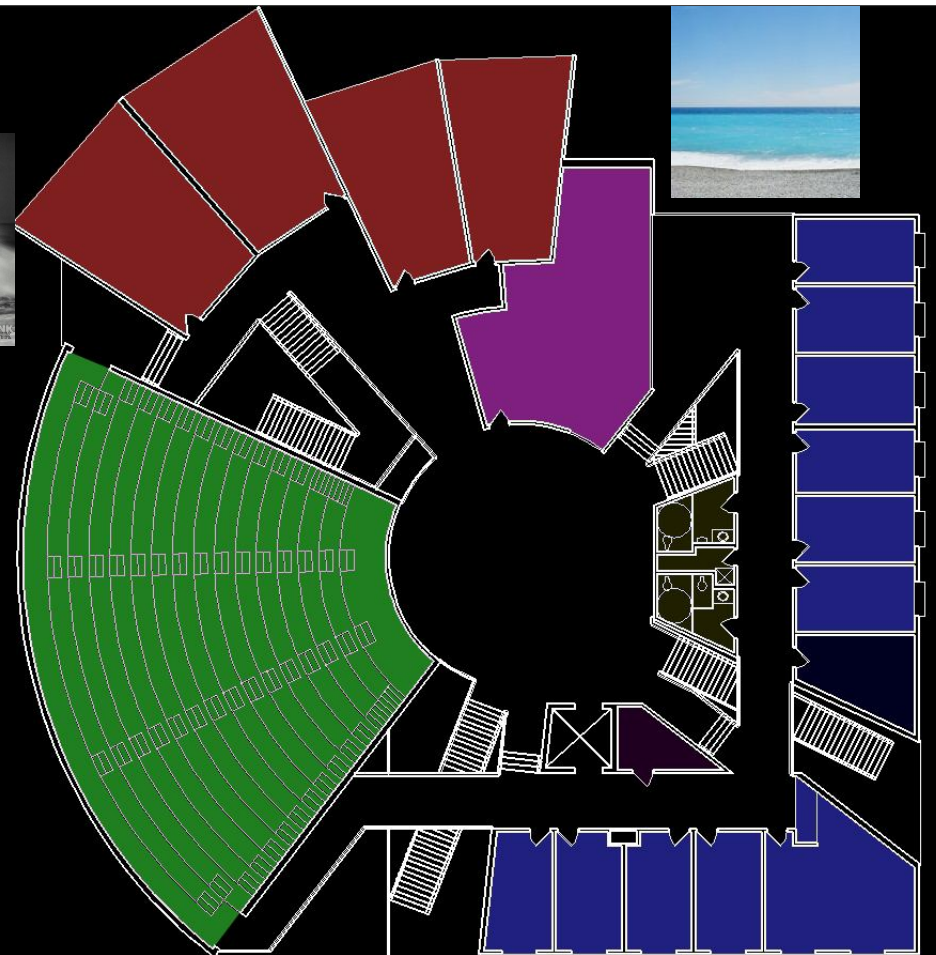
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# First Floor Plan



- Classrooms
- Auditorium
- Faculty Offices
- Laboratory
- Storage
- Mechanical
- Restrooms
- Student Offices
- Seminar Rooms

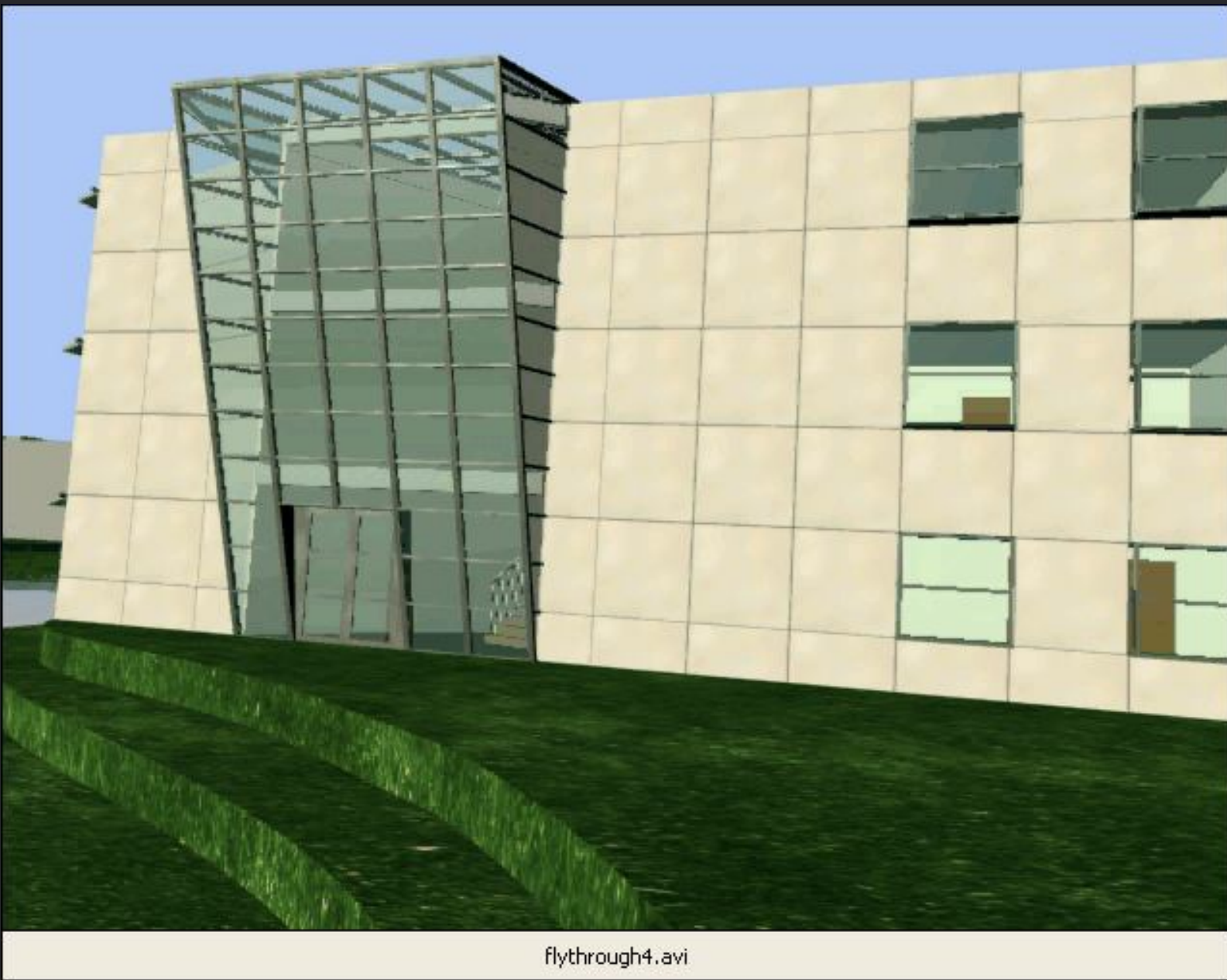


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# Third Floor Plan

Second  
Floor  
Similar





flythrough4.avi

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Tour

# Oregon Coastline

## Earthquake

Seismic Zone 3

Soil type  $S_B$  (Rock)

Design Base Shear = 740 kips

## Wind

Basic wind speed,  $V_{33} = 85$  mph

Exposure D (Very severe)

Design wind pressure, windward wall = 20.6 psf

## Soil\*

4' sand layer

Greywacke Bedrock (sandstone) –  $q_u = 3800$  psi = 550 ksf

*UBC 1997*

\*Source: SHN Consulting Engineers & Geologists, Inc.  
Draft Geotechnical Study

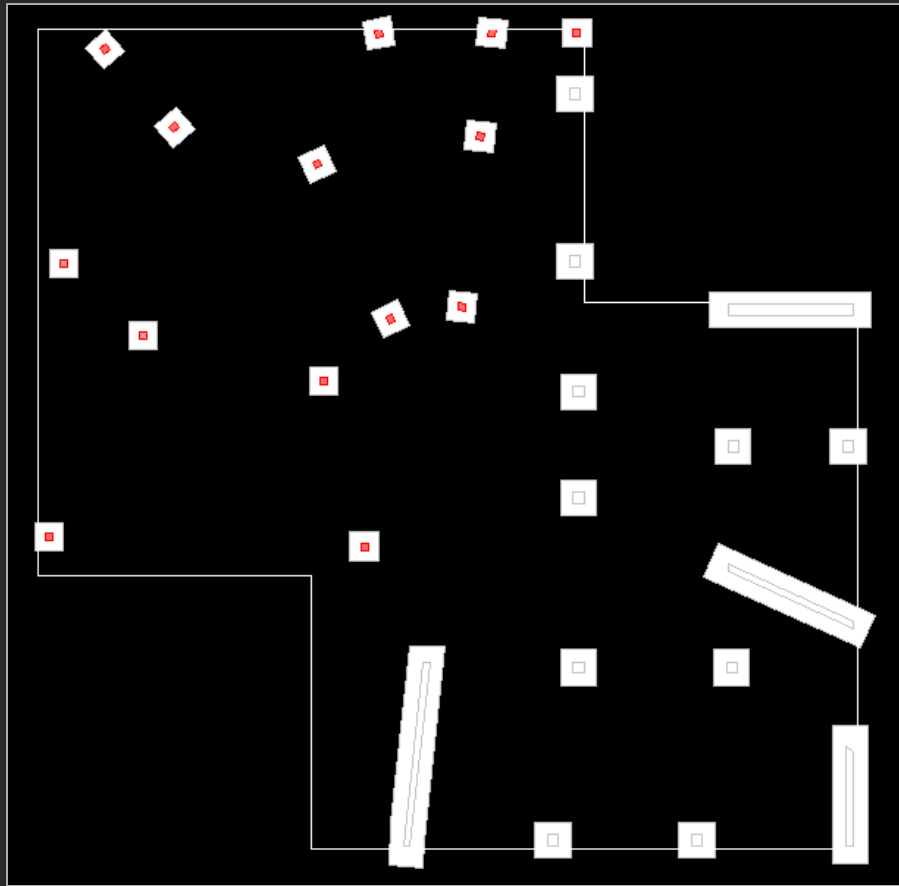


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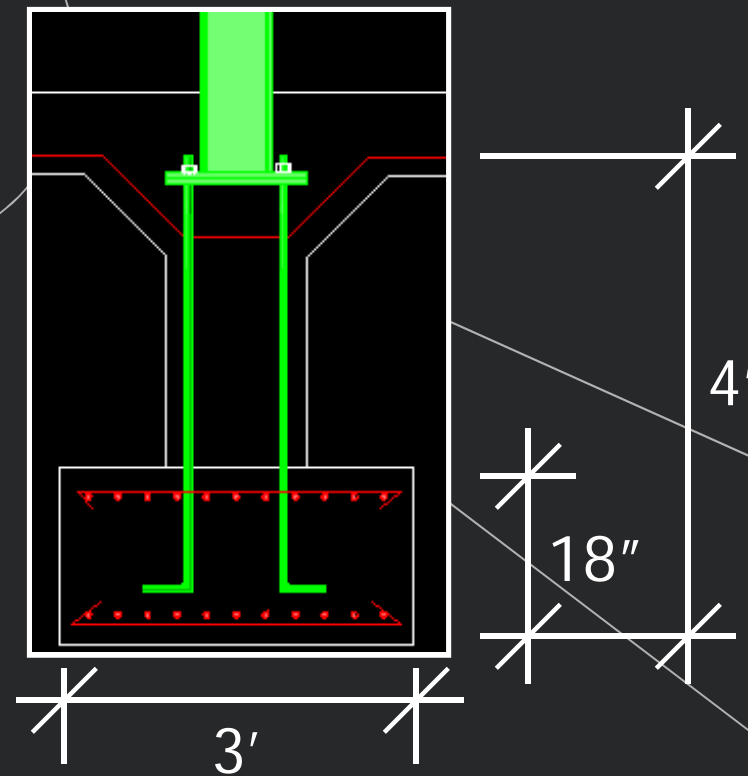
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# Site Conditions

- Spread footings
- Slab on grade



Steel Column Footing





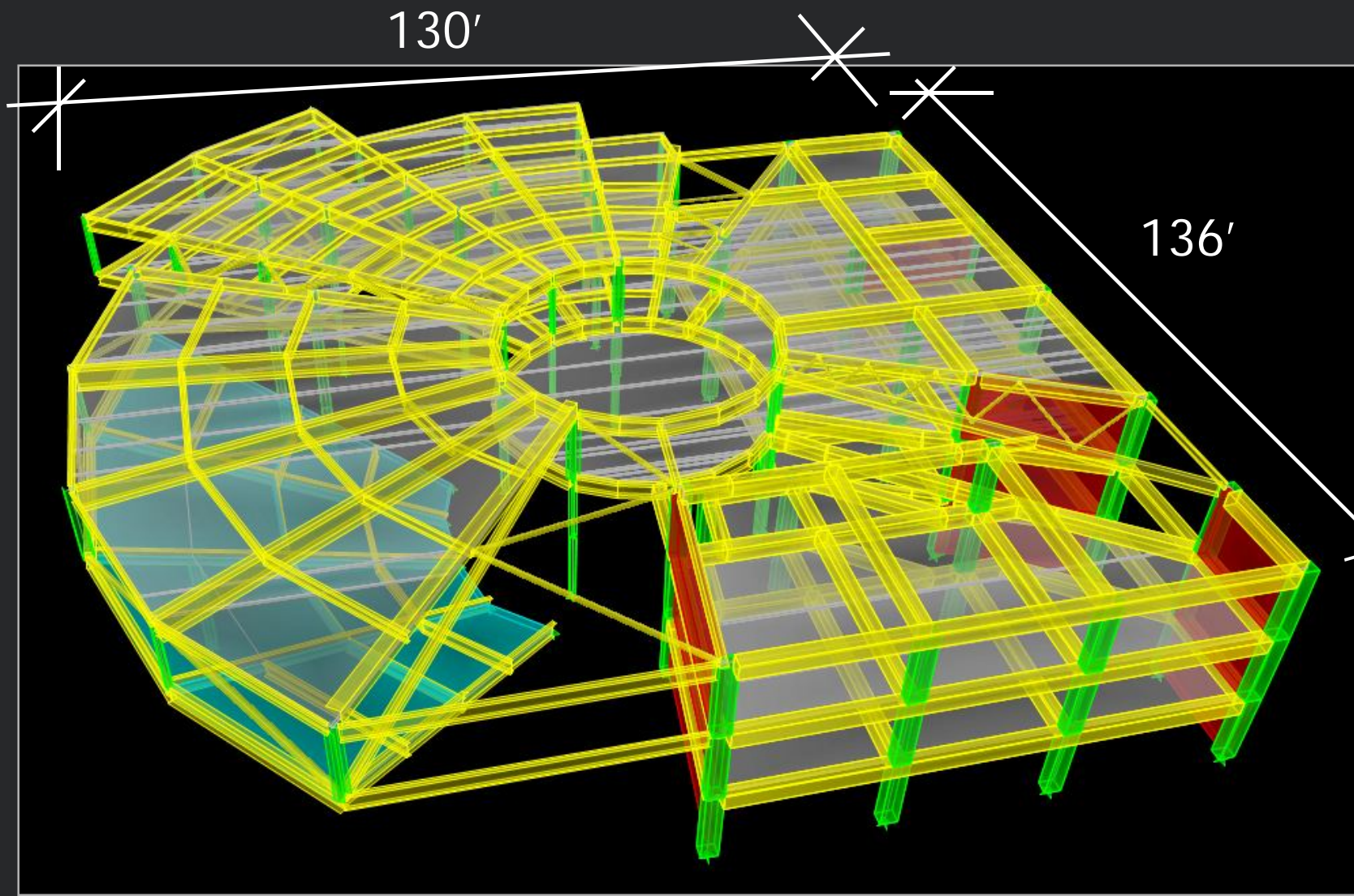
## Dead Loads

Lightweight Concrete Slab	55 psf
Steel Deck	5 psf
Misc. (flooring, ceiling, fireproofing)	12 psf
Partitions	20 psf
Exterior Cladding	50 psf
Steel Superstructure	9 psf
Concrete Superstructure	270 psf

## Live Loads

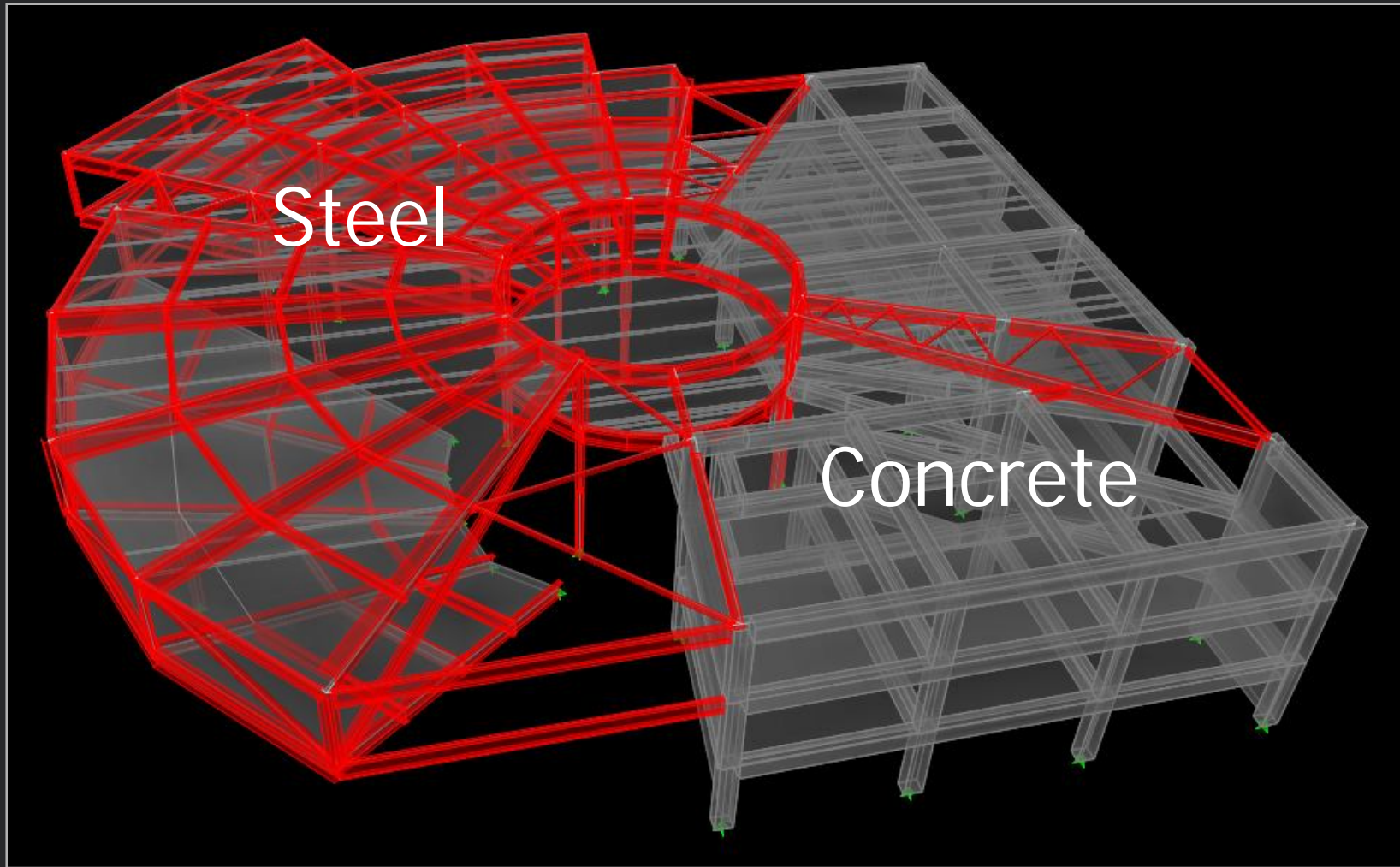
Offices	80 psf
Classrooms	80 psf
Auditorium	60 psf
Corridors	100 psf
Roof	20 psf





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Structural Concept

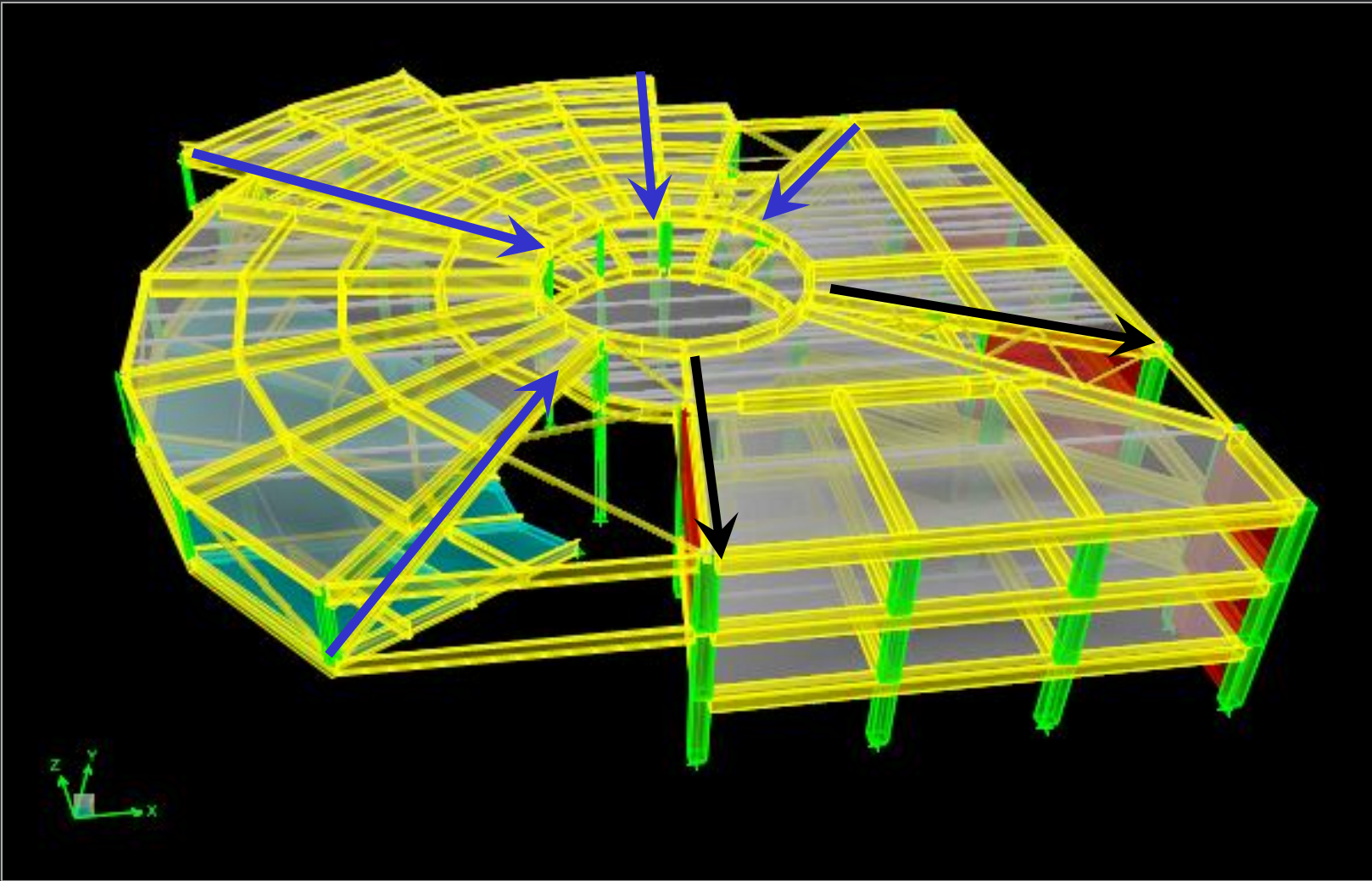


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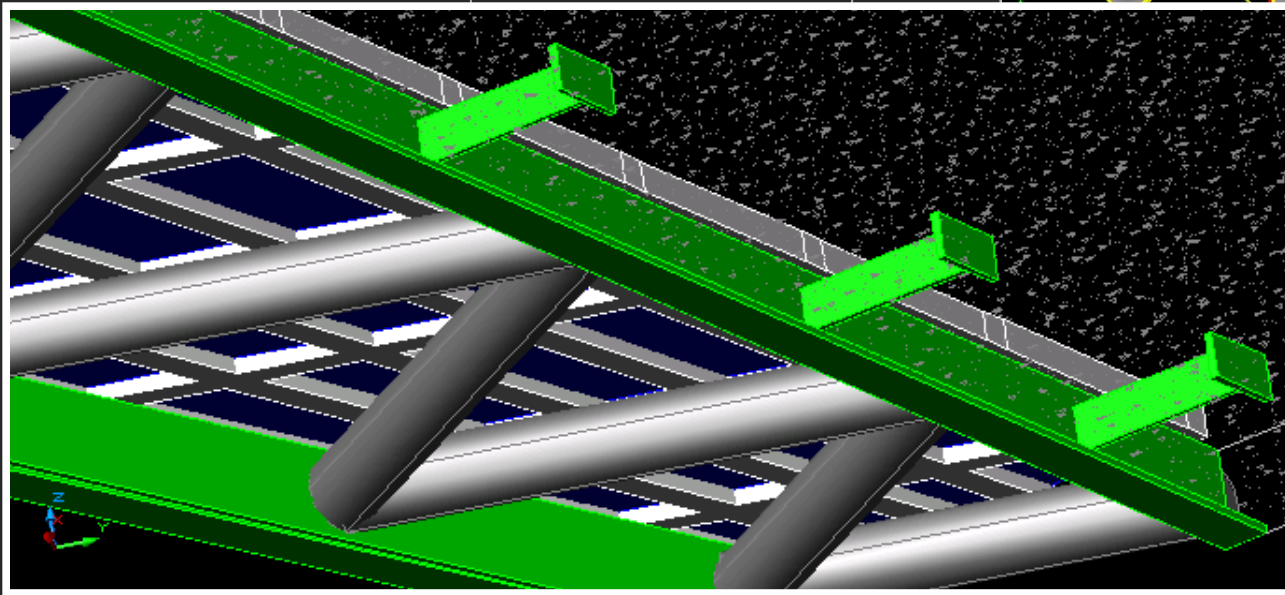
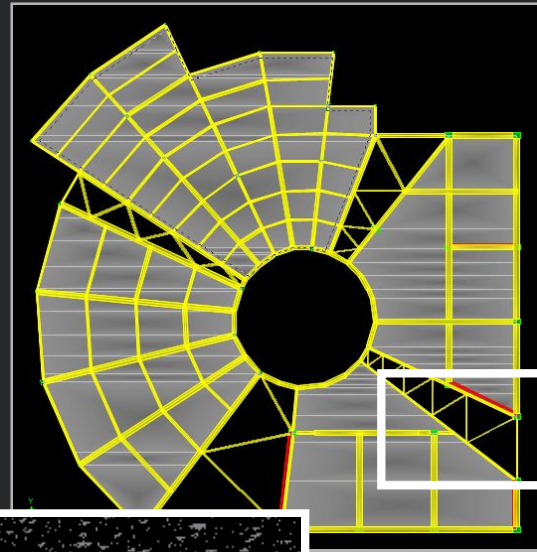
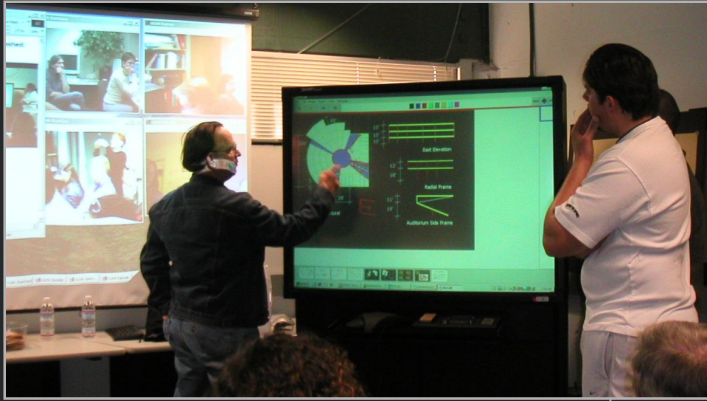
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Structural Concept





# Fishbowl session

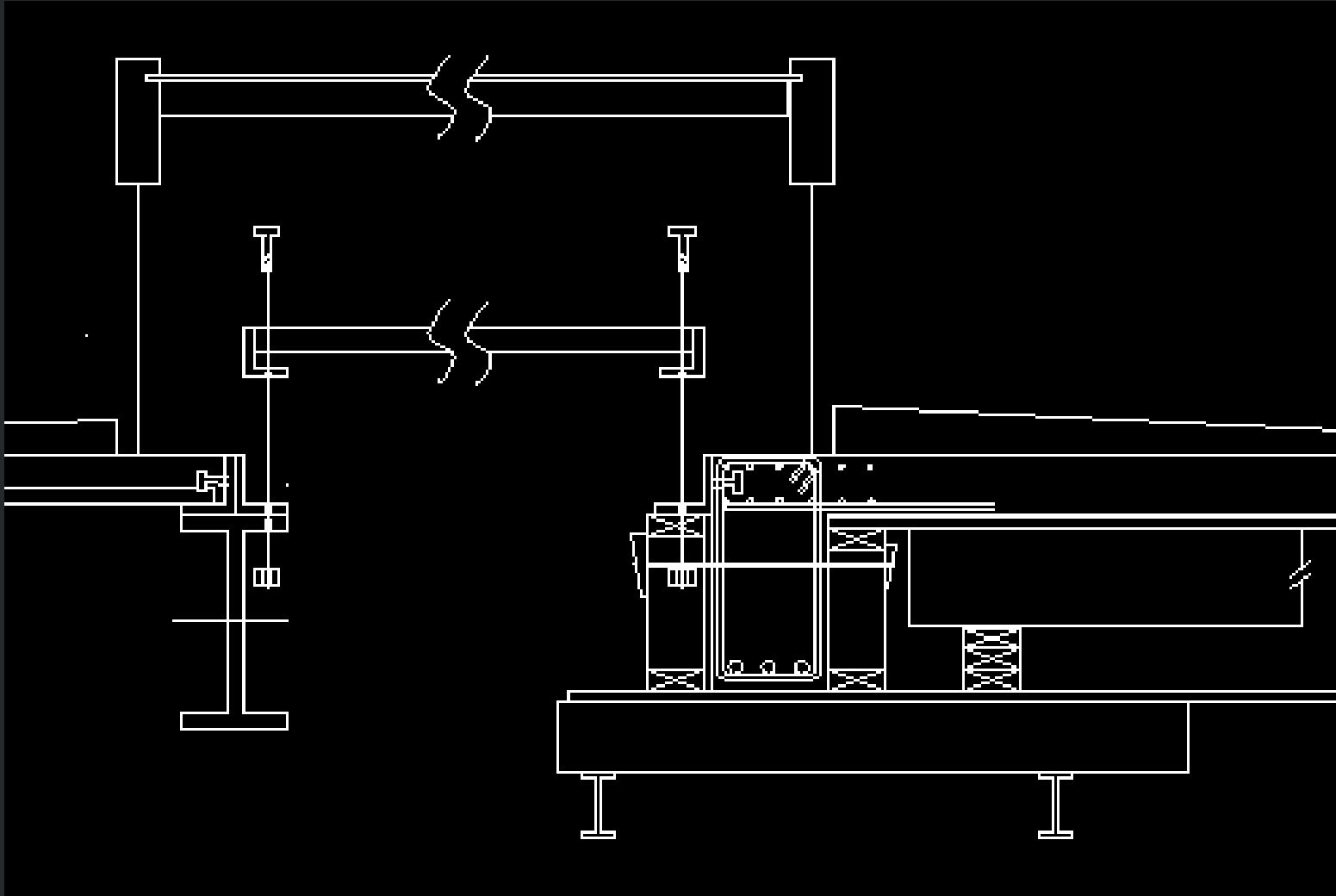


X-Bracing between roof slabs

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# "Enabling Detail"

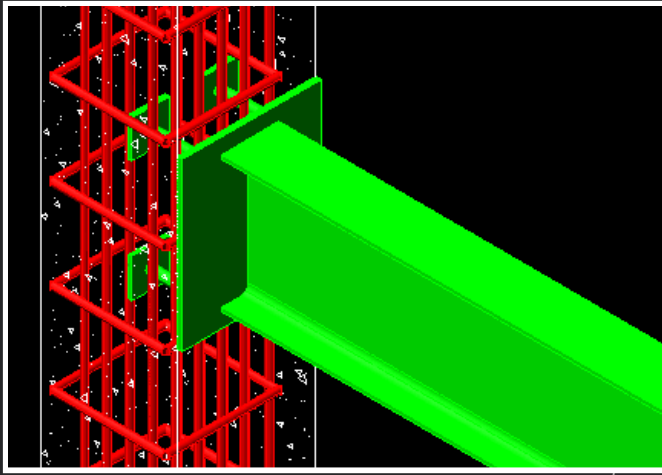


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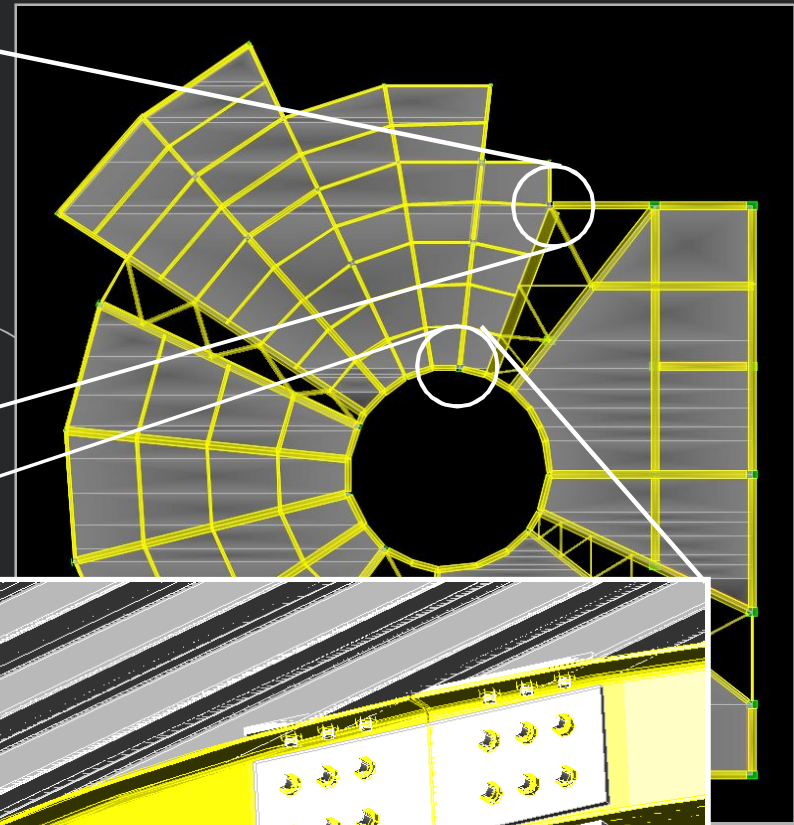
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Enabling Detail

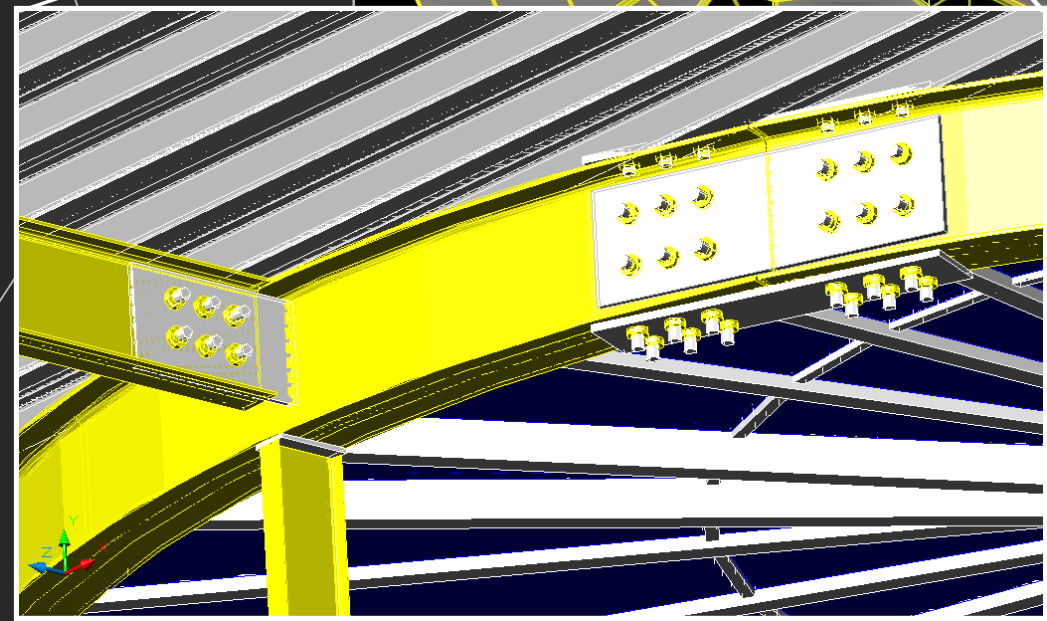




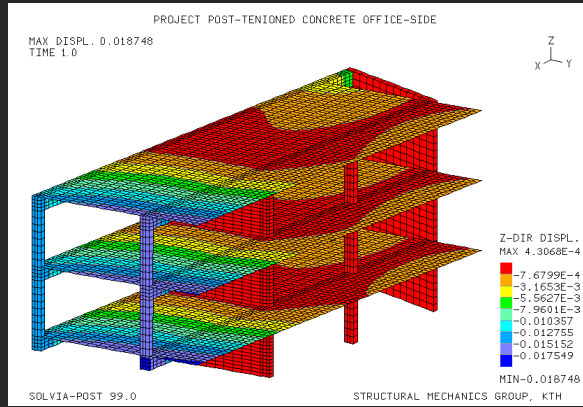
Steel Girder to  
Concrete Column



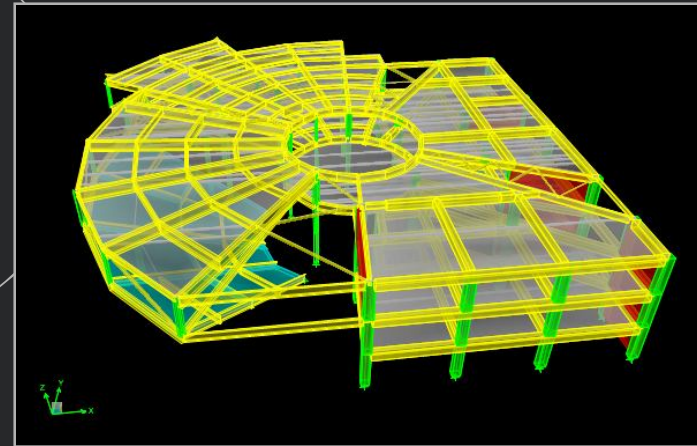
Tension ring



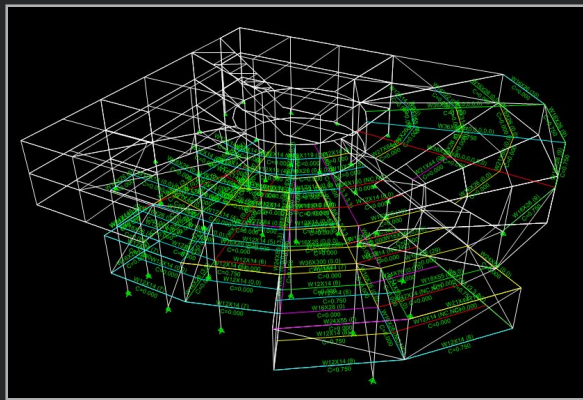
# SOLVIA Concrete Analysis



## Final ETABS Analysis Model



+



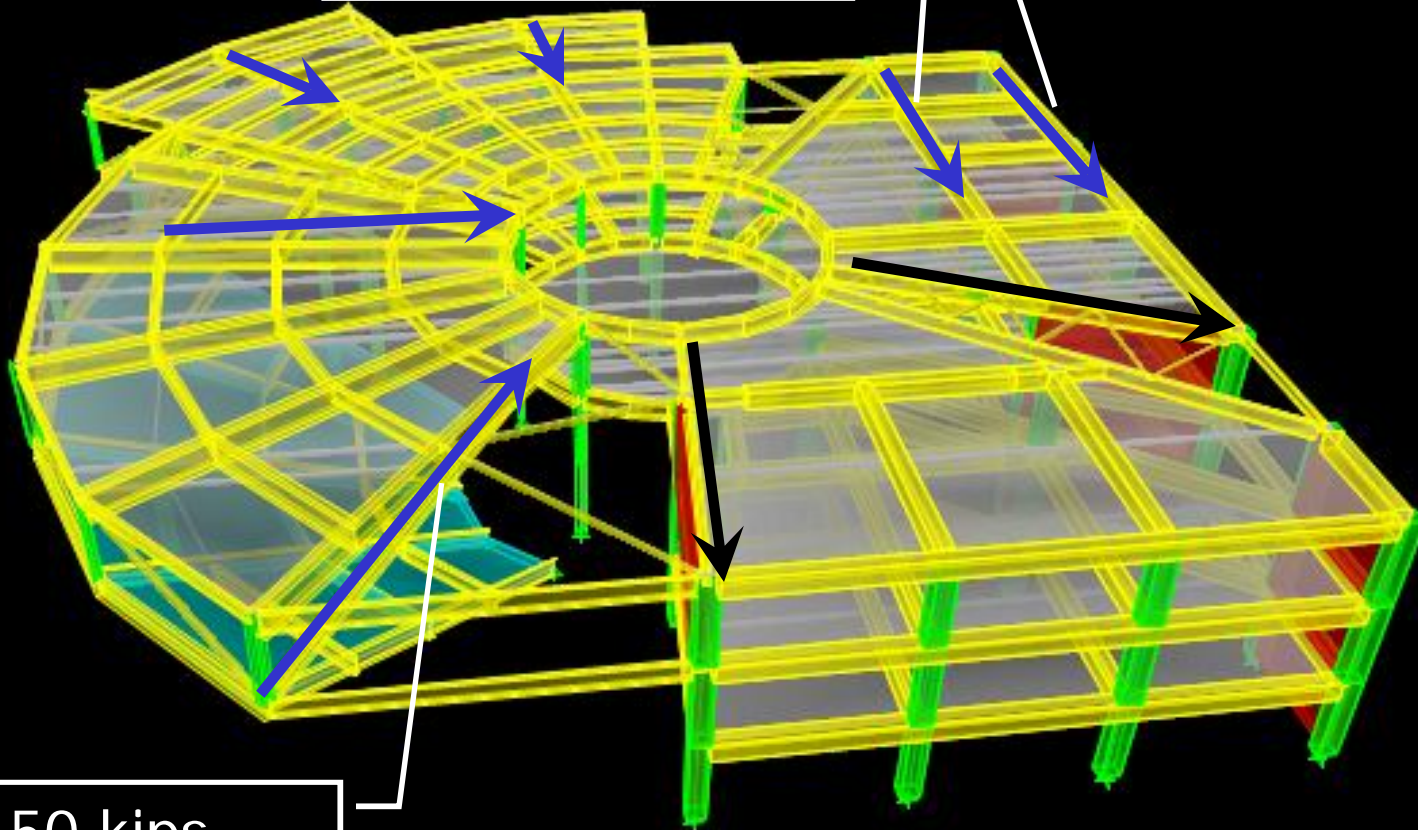
## ETABS Steel Analysis

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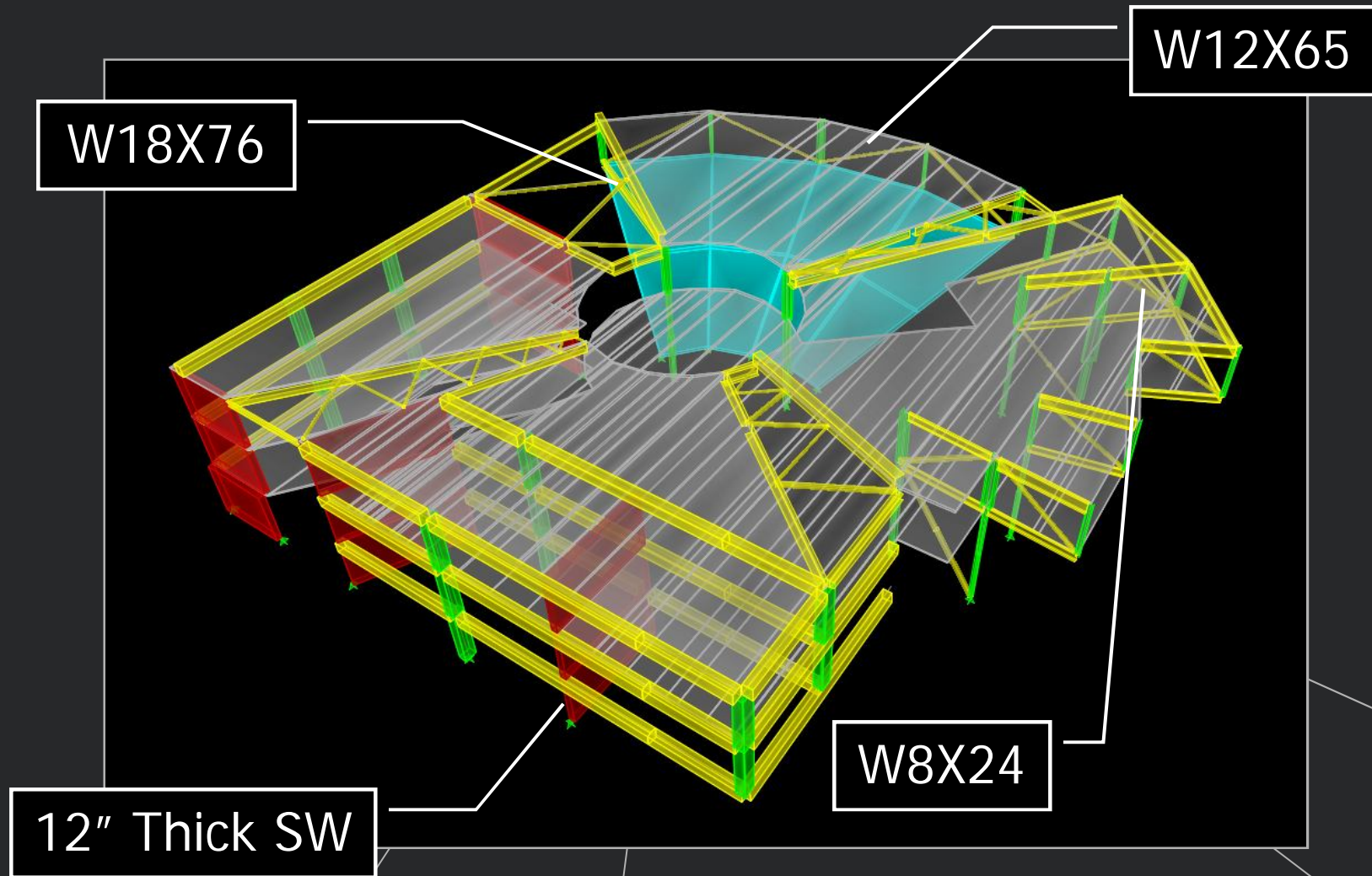
# Design Process

90 kips each  
(from cantilever)

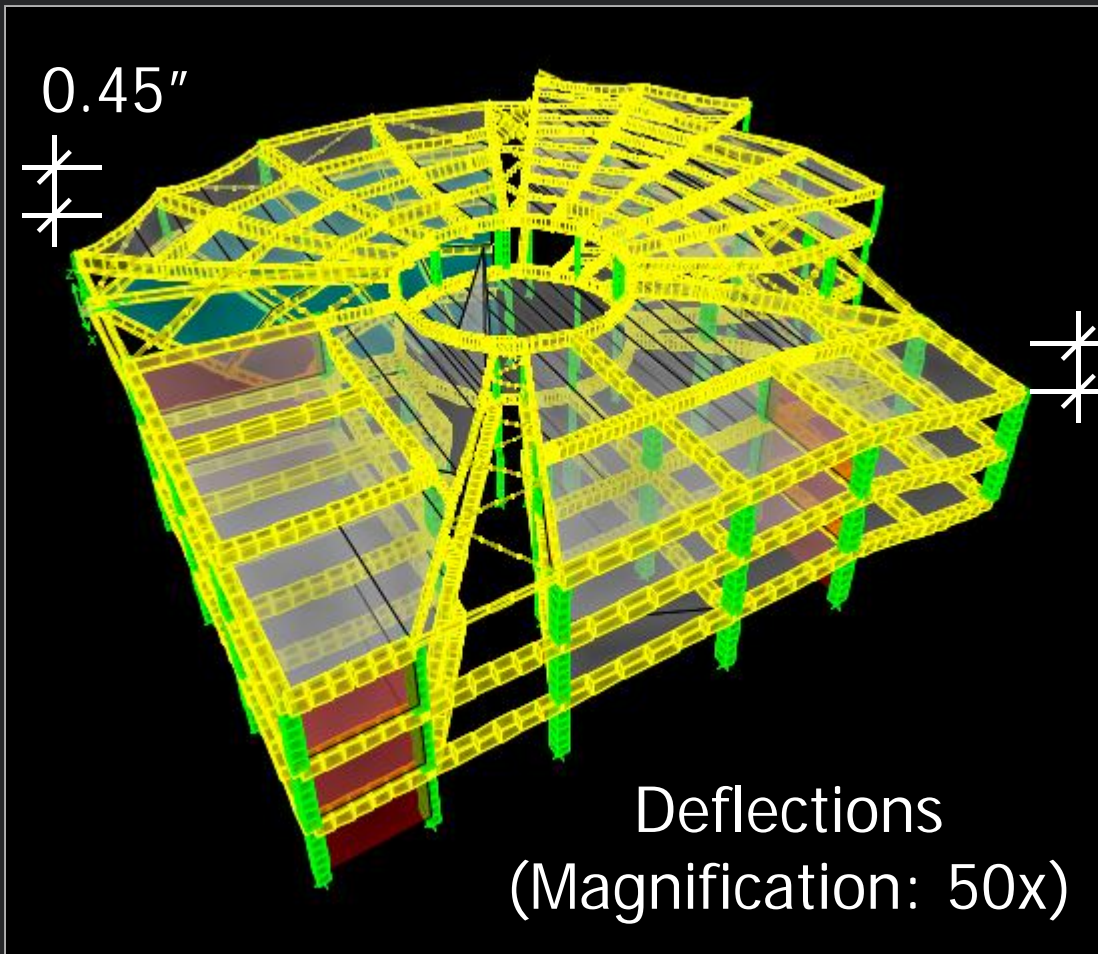


150 kips  
(350 k, seismic)









Story Drift: 0.8%

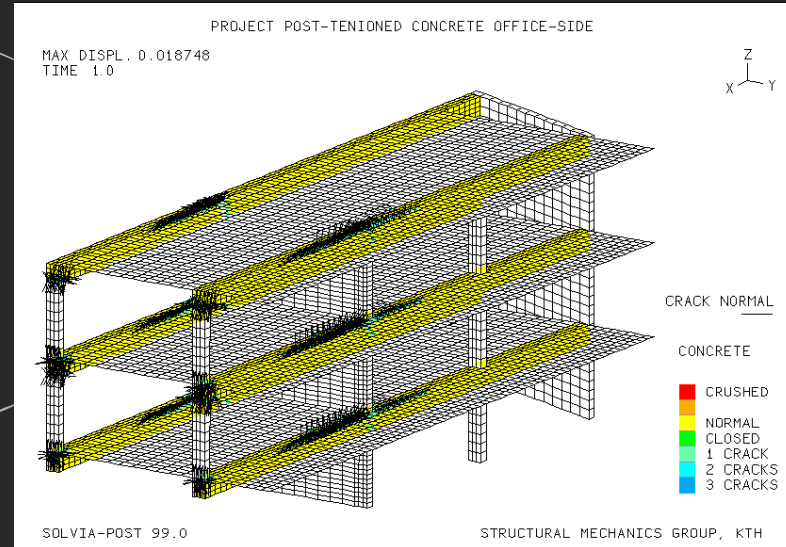
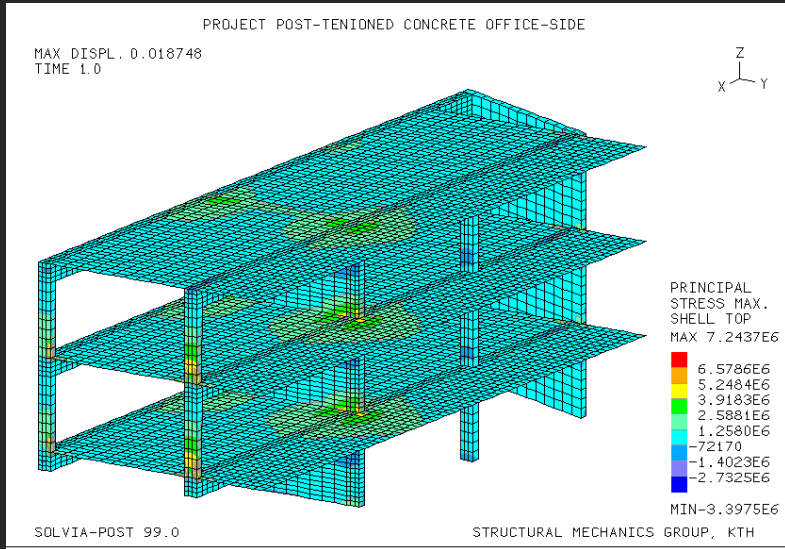
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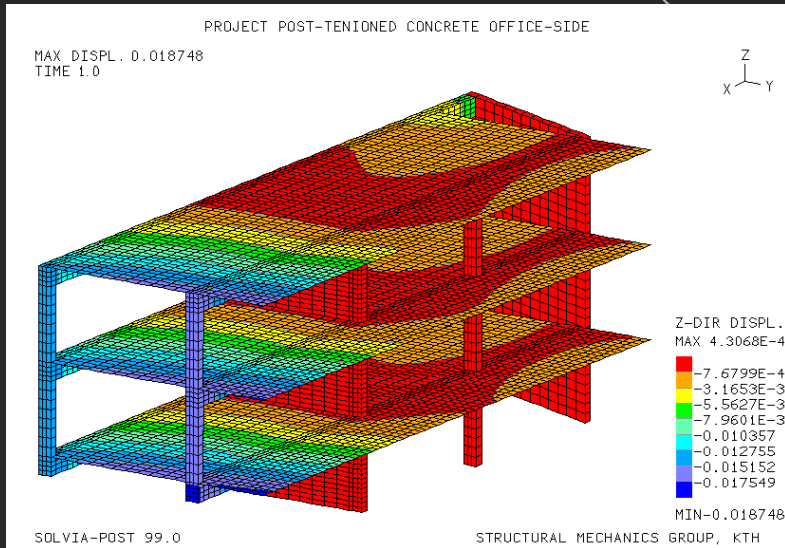
Deflected Shape

# Stresses

Max. 1.45 kips/in<sup>2</sup>



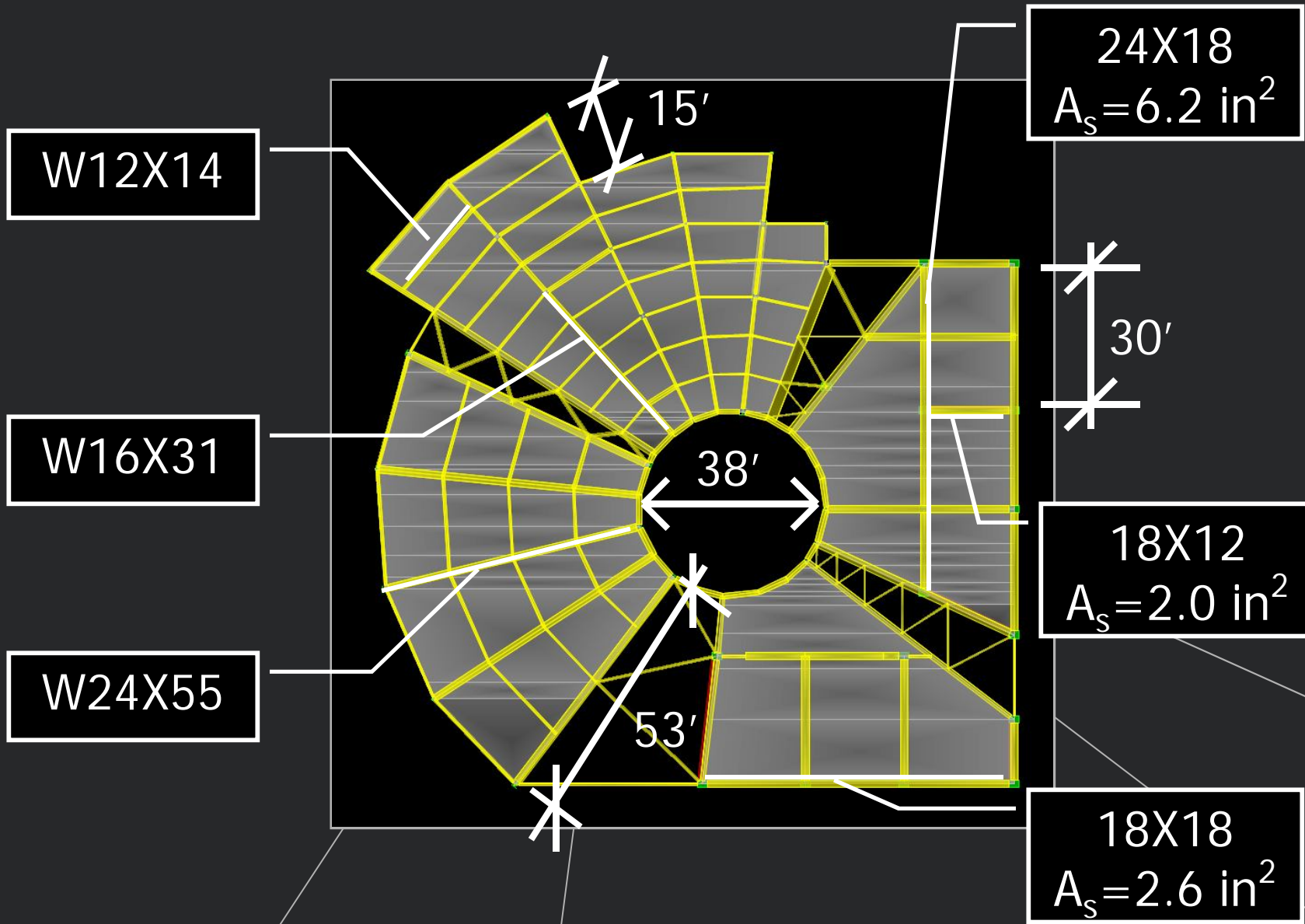
# Cracking



# Displacements

Max. 0.5 in

# Concrete Analysis



W12X26

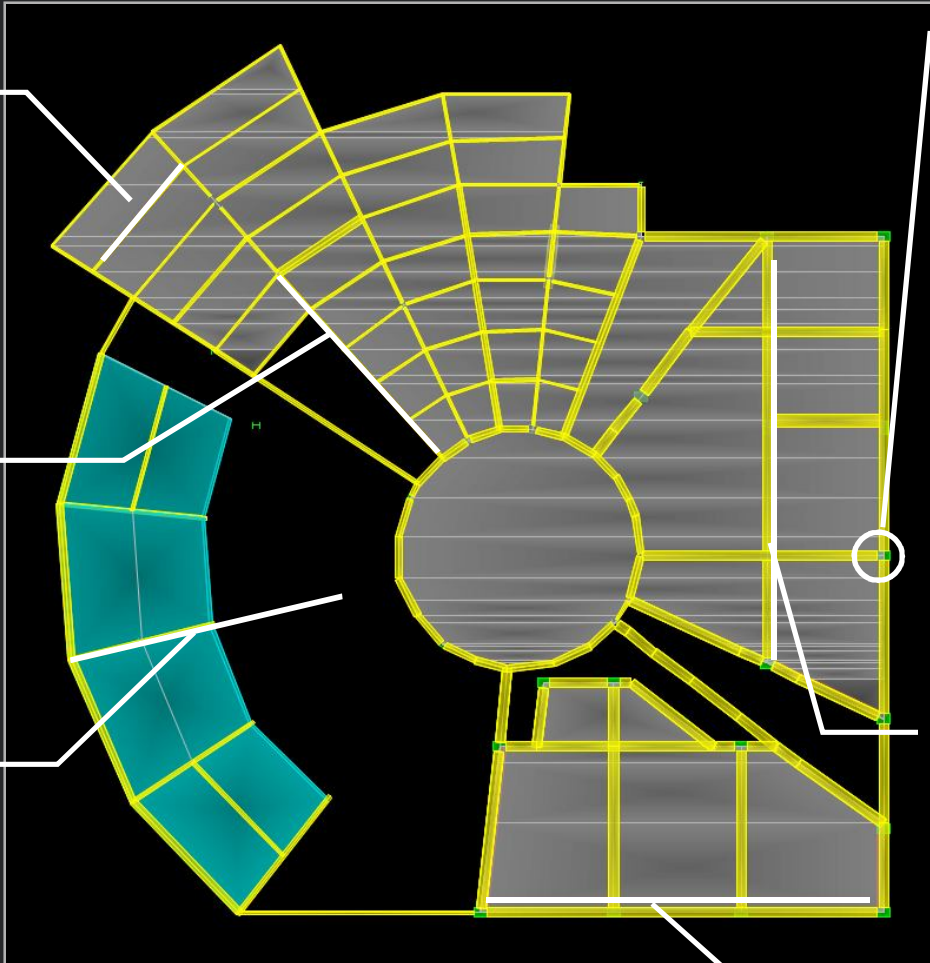
W24X55

W24X117

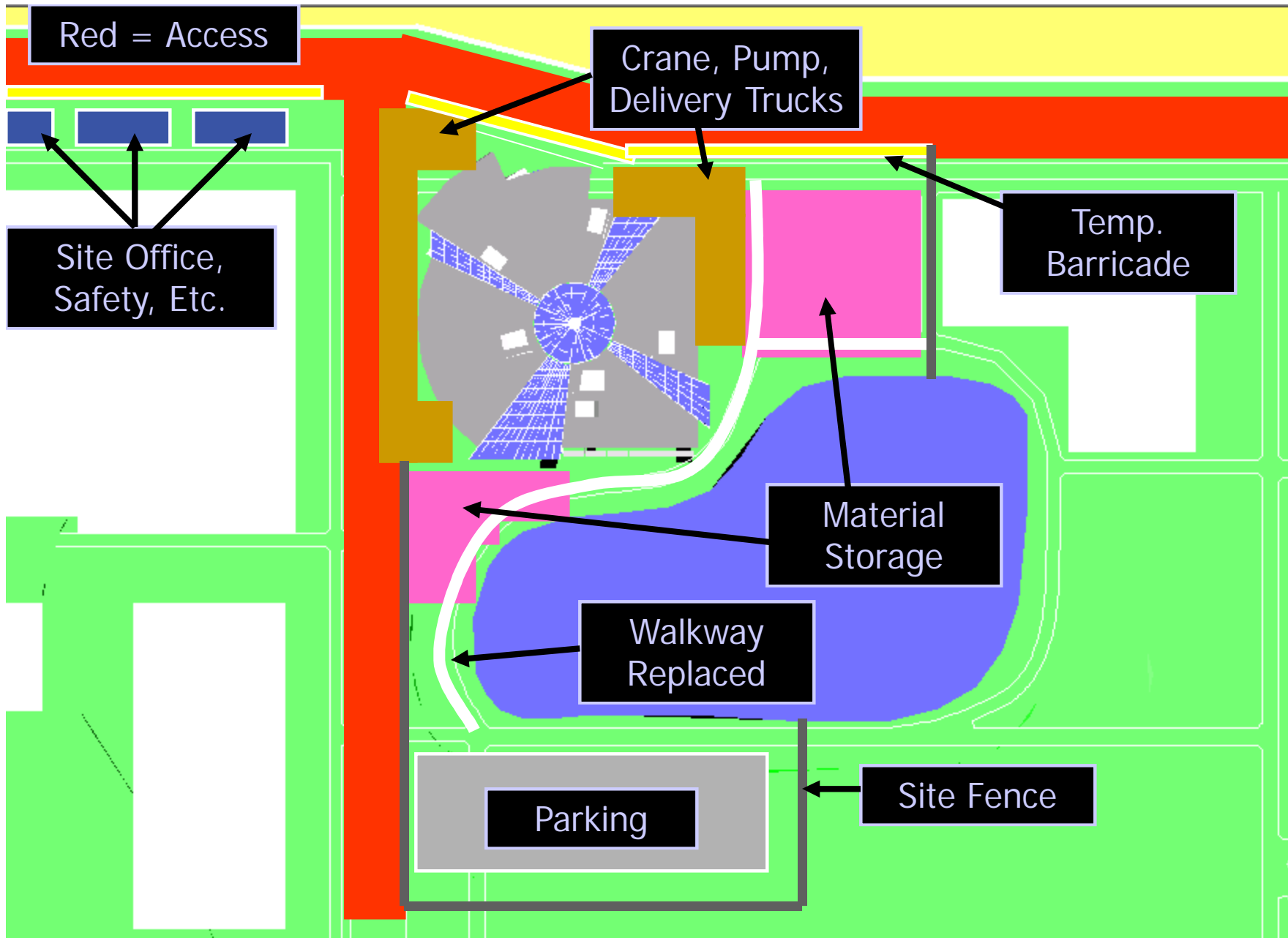
18X18  
 $A_s = 1.5 \text{ in}^2$

24X18  
 $A_s = 6.0 \text{ in}^2$

18X18  
 $A_s = 2.5 \text{ in}^2$







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# Site Layout

Lifting Equipment



Excavation



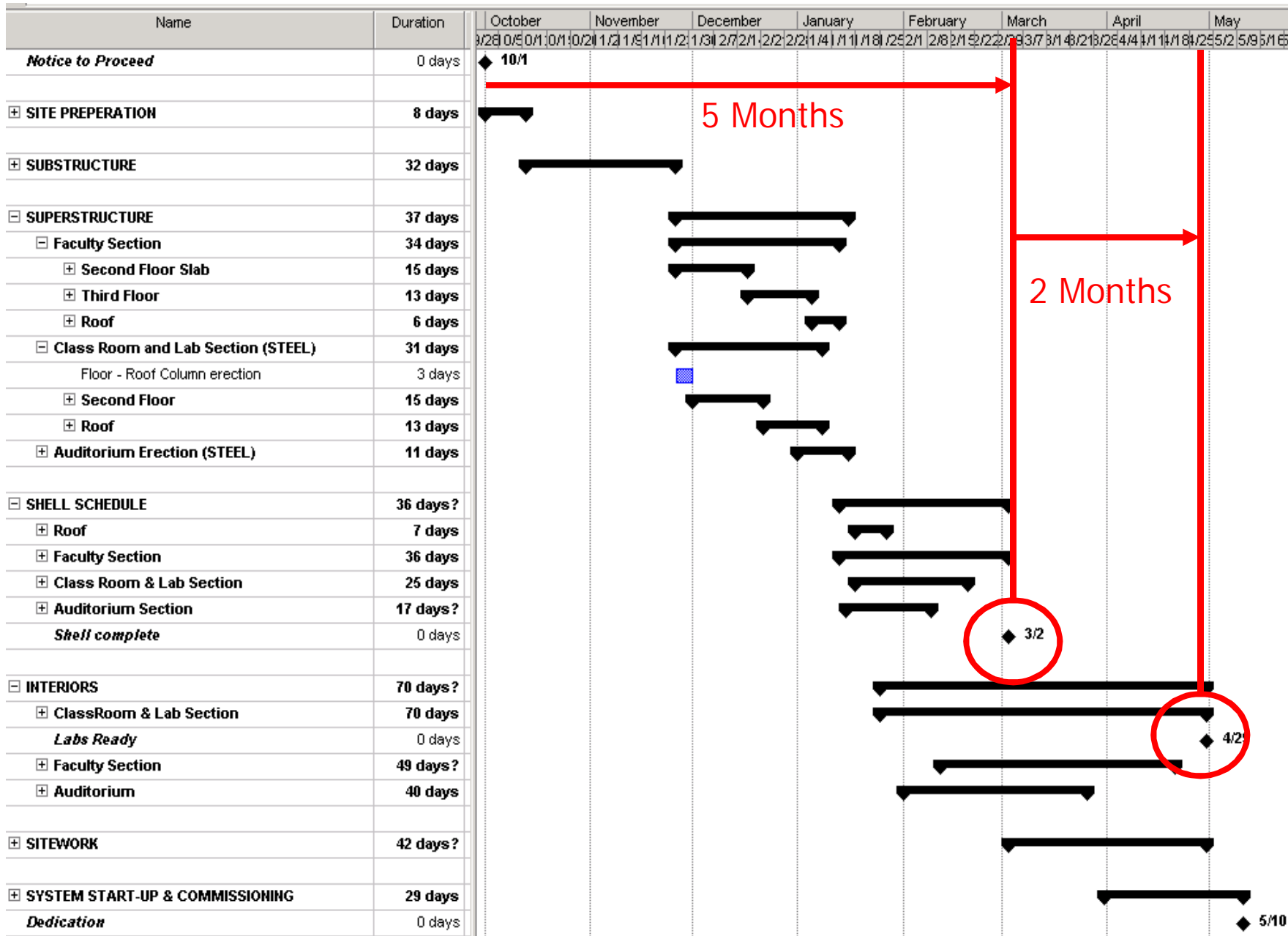
Concrete Processing

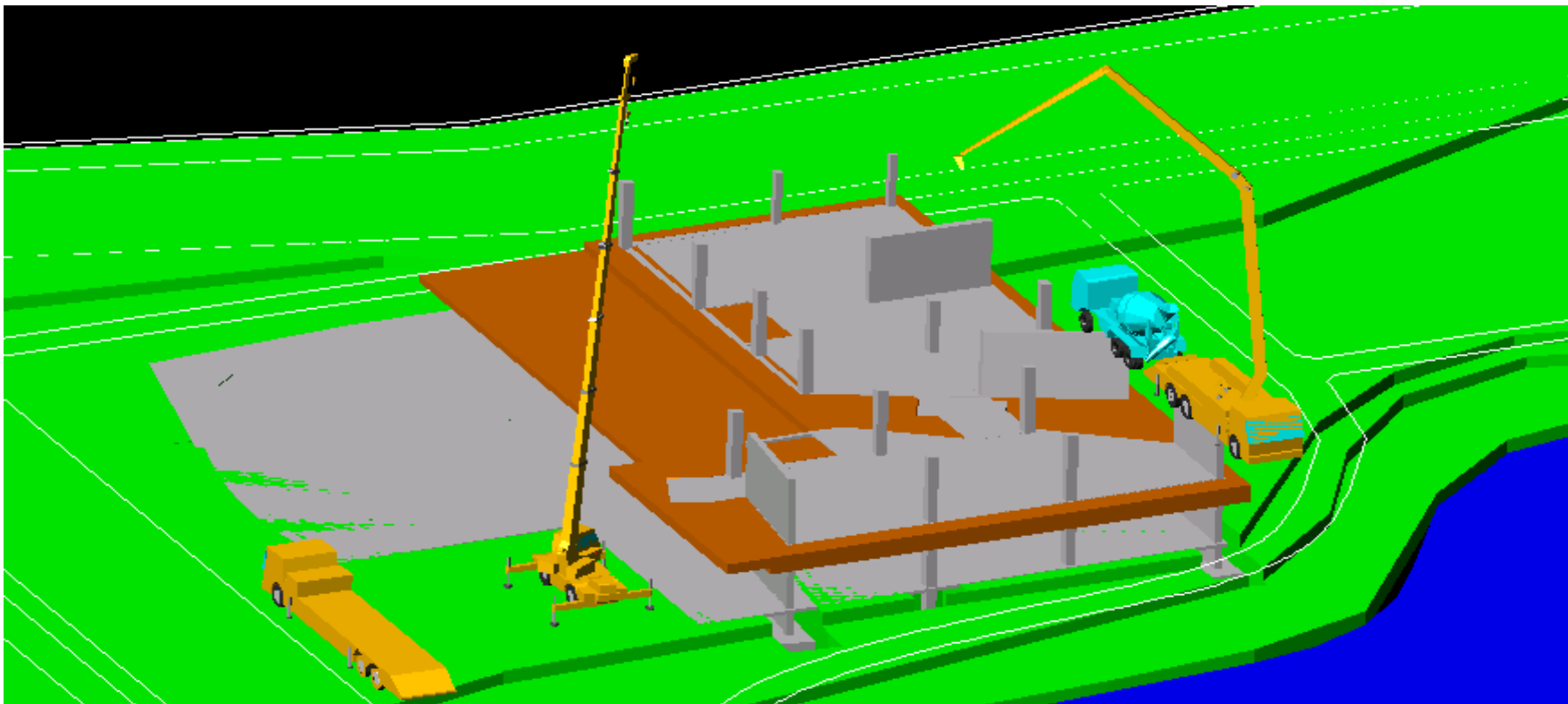


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Equipment





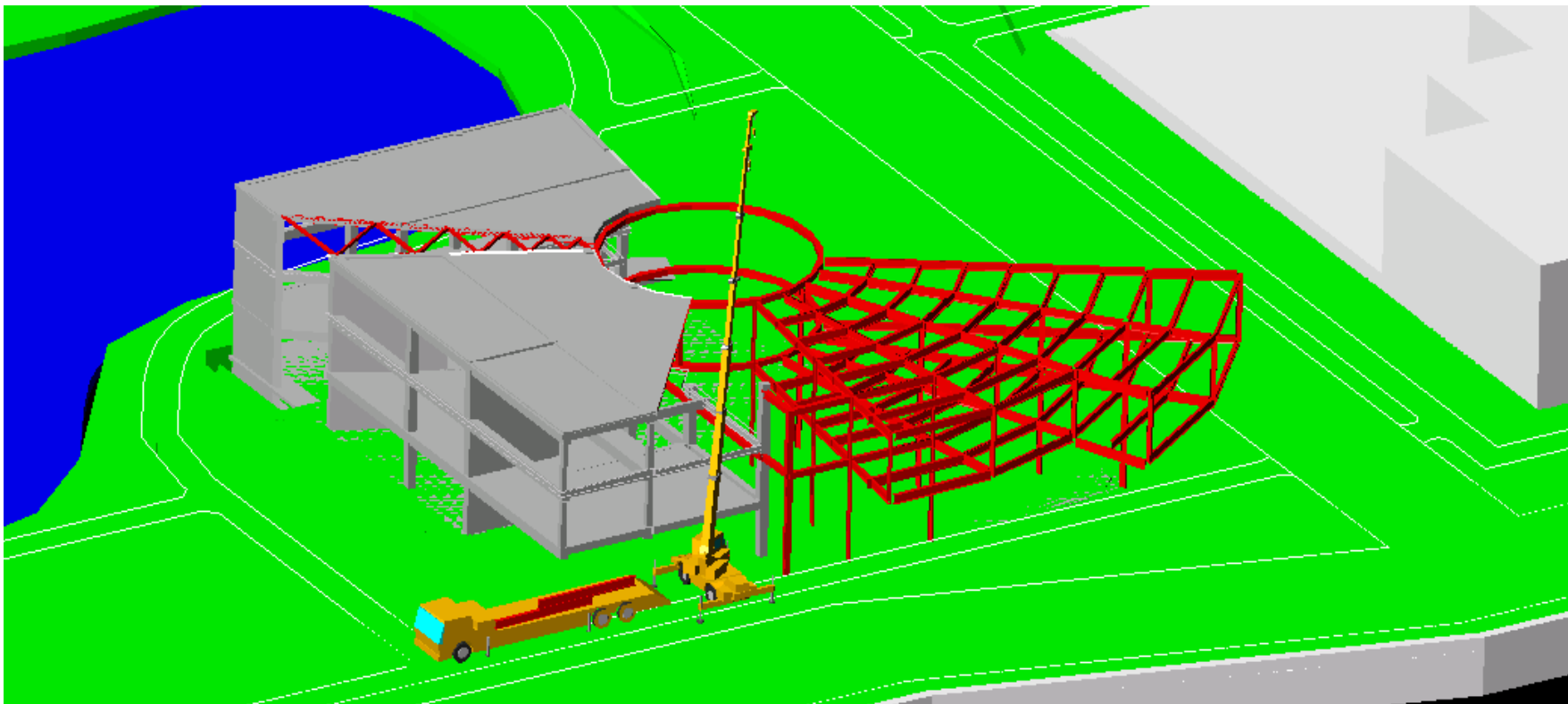
Name	Duration	December				January				February						
		11/23	11/30	12/7	12/14	12/21	12/28	1/4	1/11	1/18	1/25	2/1	2/8	2/15		
<input type="checkbox"/> SUPERSTRUCTURE	69 days?	[Gantt bar spanning from 11/23 to 2/15]														
<input type="checkbox"/> Faculty Section	34 days	[Gantt bar spanning from 11/23 to 1/18]														
<input type="checkbox"/> Class Room and Lab Section (STEEL)	31 days	[Gantt bar spanning from 11/23 to 1/11]														
<input type="checkbox"/> Auditorium Erection (STEEL)	9 days?	[Gantt bar spanning from 1/11 to 1/25]														
<input type="checkbox"/> SHELL SCHEDULE	53 days?	[Gantt bar spanning from 11/23 to 1/18]														
<input type="checkbox"/> Roof	7 days	[Gantt bar spanning from 1/11 to 1/18]														
<input type="checkbox"/> Faculty Section	32 days	[Gantt bar spanning from 1/11 to 2/15]														
<input type="checkbox"/> Class Room & Lab Section	19 days	[Gantt bar spanning from 1/11 to 2/8]														
<input type="checkbox"/> Auditorium Section	17 days?	[Gantt bar spanning from 1/11 to 2/1]														
<i>Shell complete</i>	0 days															

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Schedule



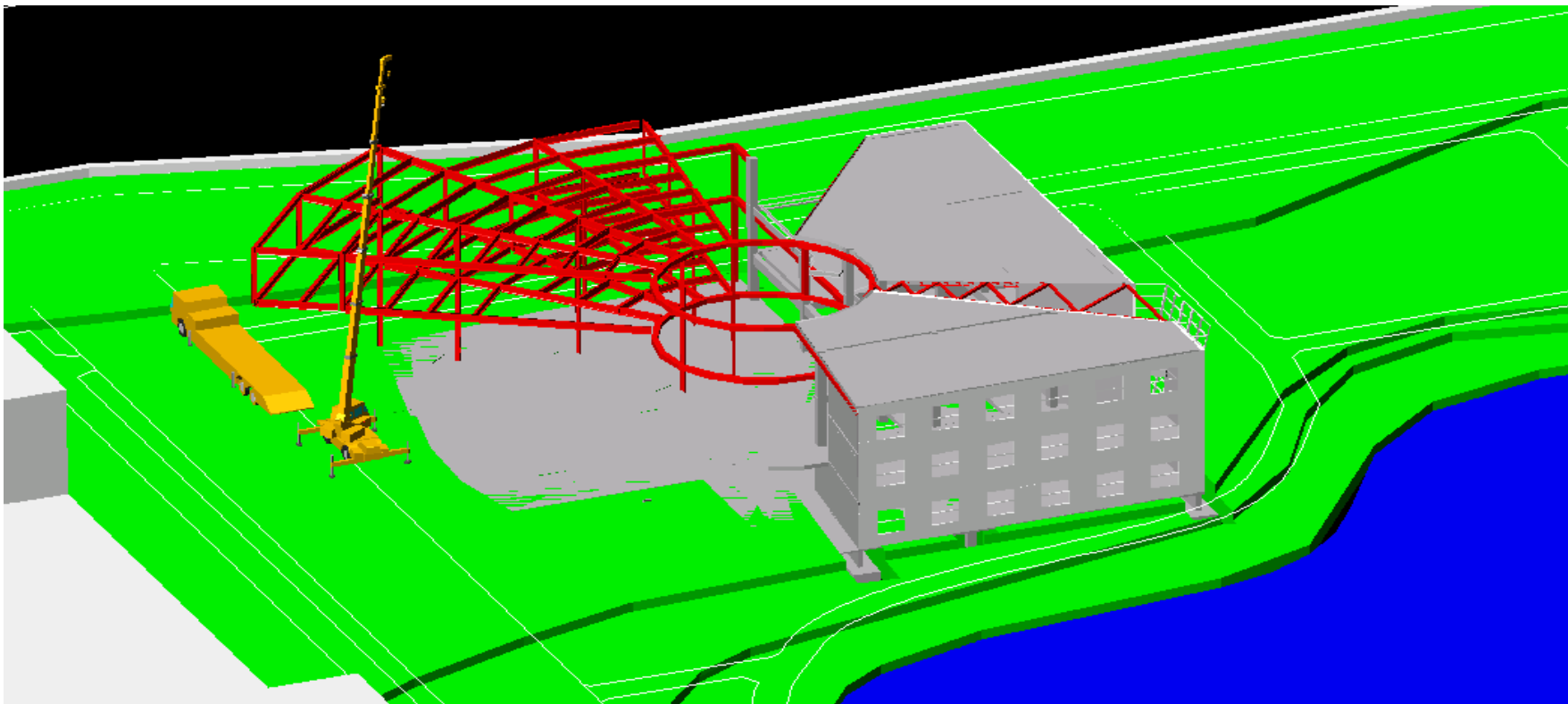


Name	Duration	December				January				February					
		11/23	11/30	12/7	12/14	12/21	12/28	1/4	1/11	1/18	1/25	2/1	2/8	2/15	
<input type="checkbox"/> SUPERSTRUCTURE	69 days?	[Gantt bar spanning from 11/23 to 1/18]													
<input type="checkbox"/> Faculty Section	34 days	[Gantt bar spanning from 11/23 to 1/18]													
<input type="checkbox"/> Class Room and Lab Section (STEEL)	31 days	[Gantt bar spanning from 1/11 to 1/18]													
<input type="checkbox"/> Auditorium Erection (STEEL)	9 days?	[Gantt bar spanning from 1/11 to 1/18]													
<input type="checkbox"/> SHELL SCHEDULE	53 days?	[Gantt bar spanning from 1/11 to 1/18]													
<input type="checkbox"/> Roof	7 days	[Gantt bar spanning from 1/11 to 1/18]													
<input type="checkbox"/> Faculty Section	32 days	[Gantt bar spanning from 1/11 to 1/18]													
<input type="checkbox"/> Class Room & Lab Section	19 days	[Gantt bar spanning from 1/11 to 1/18]													
<input type="checkbox"/> Auditorium Section	17 days?	[Gantt bar spanning from 1/11 to 1/18]													
<i>Shell complete</i>	0 days	[Gantt bar spanning from 1/18 to 1/18]													

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Schedule

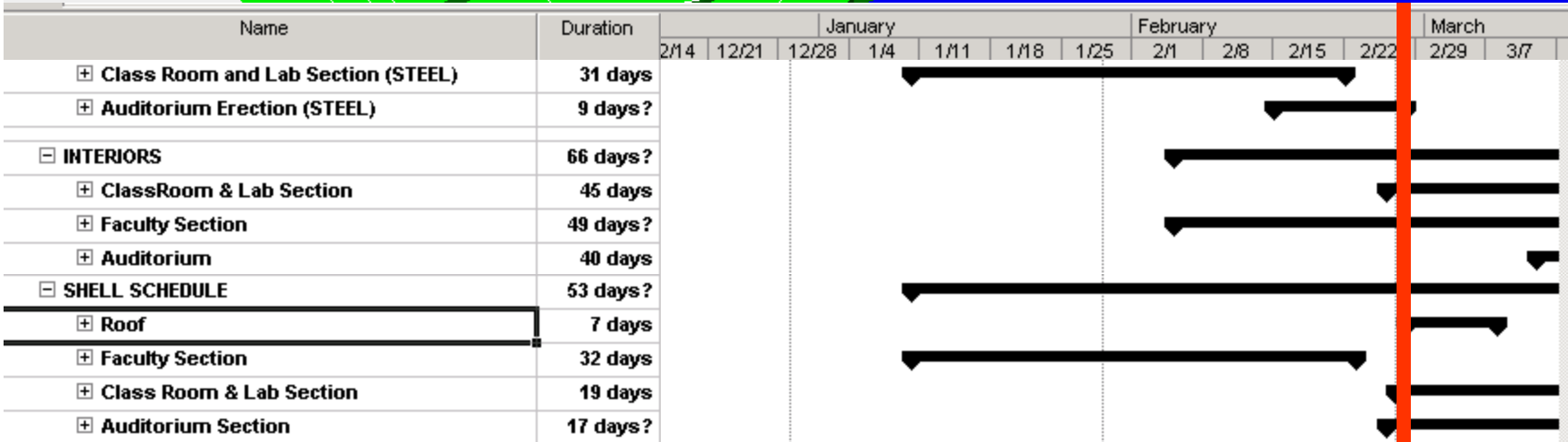
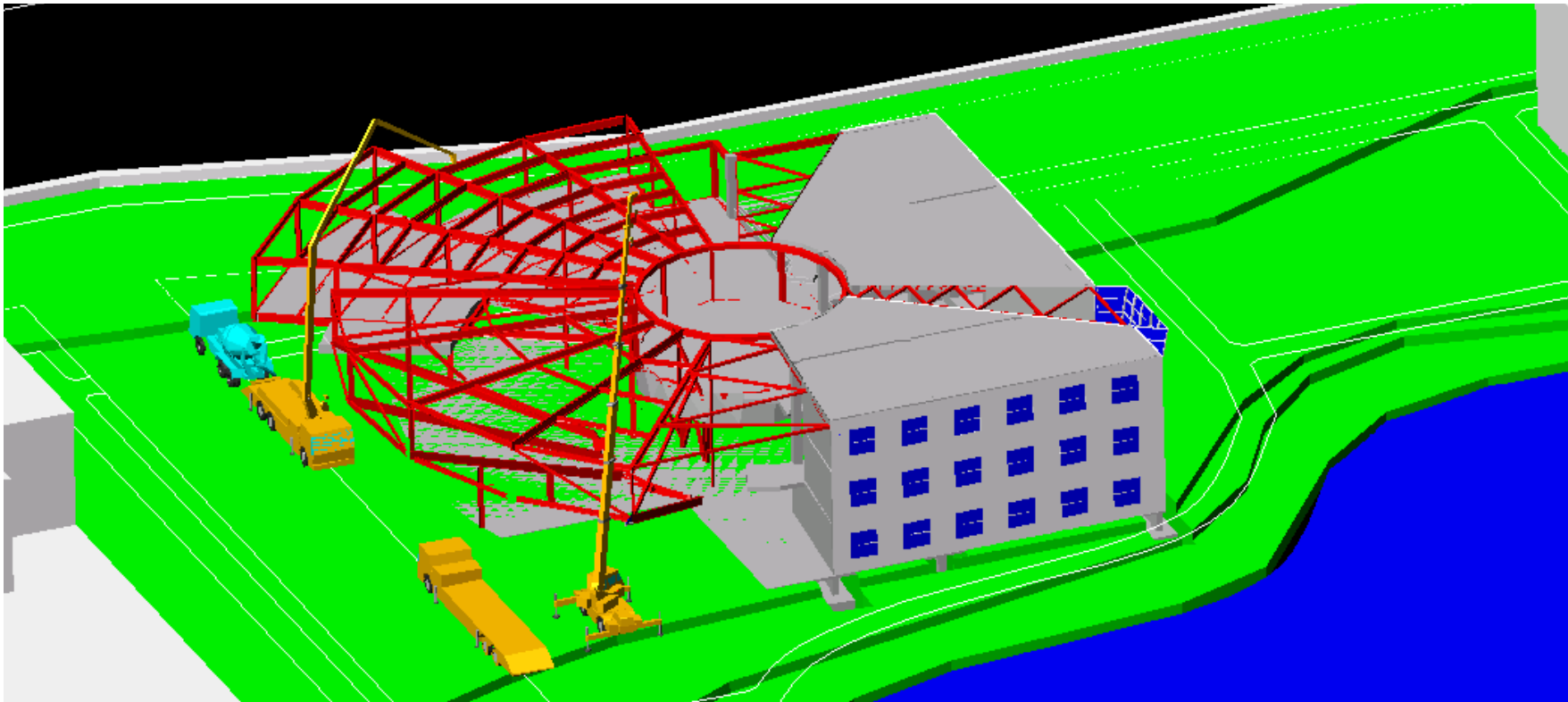


Name	Duration	December			January			February							
		11/23	11/30	12/7	12/14	12/21	12/28	1/4	1/11	1/18	1/25	2/1	2/8	2/15	
<input type="checkbox"/> SUPERSTRUCTURE	69 days?	[Gantt bar spanning from 11/23 to 2/15]													
<input type="checkbox"/> Faculty Section	34 days	[Gantt bar spanning from 11/23 to 1/11]													
<input type="checkbox"/> Class Room and Lab Section (STEEL)	31 days	[Gantt bar spanning from 11/23 to 1/11]													
<input type="checkbox"/> Auditorium Erection (STEEL)	9 days?	[Gantt bar spanning from 1/11 to 1/18]													
<input type="checkbox"/> SHELL SCHEDULE	53 days?	[Gantt bar spanning from 11/23 to 2/15]													
<input type="checkbox"/> Roof	7 days	[Gantt bar spanning from 1/11 to 1/18]													
<input type="checkbox"/> Faculty Section	32 days	[Gantt bar spanning from 11/23 to 1/11]													
<input type="checkbox"/> Class Room & Lab Section	19 days	[Gantt bar spanning from 11/23 to 1/11]													
<input type="checkbox"/> Auditorium Section	17 days?	[Gantt bar spanning from 11/23 to 1/11]													
<i>Shell complete</i>	0 days	[Gantt bar spanning from 1/18 to 1/18]													

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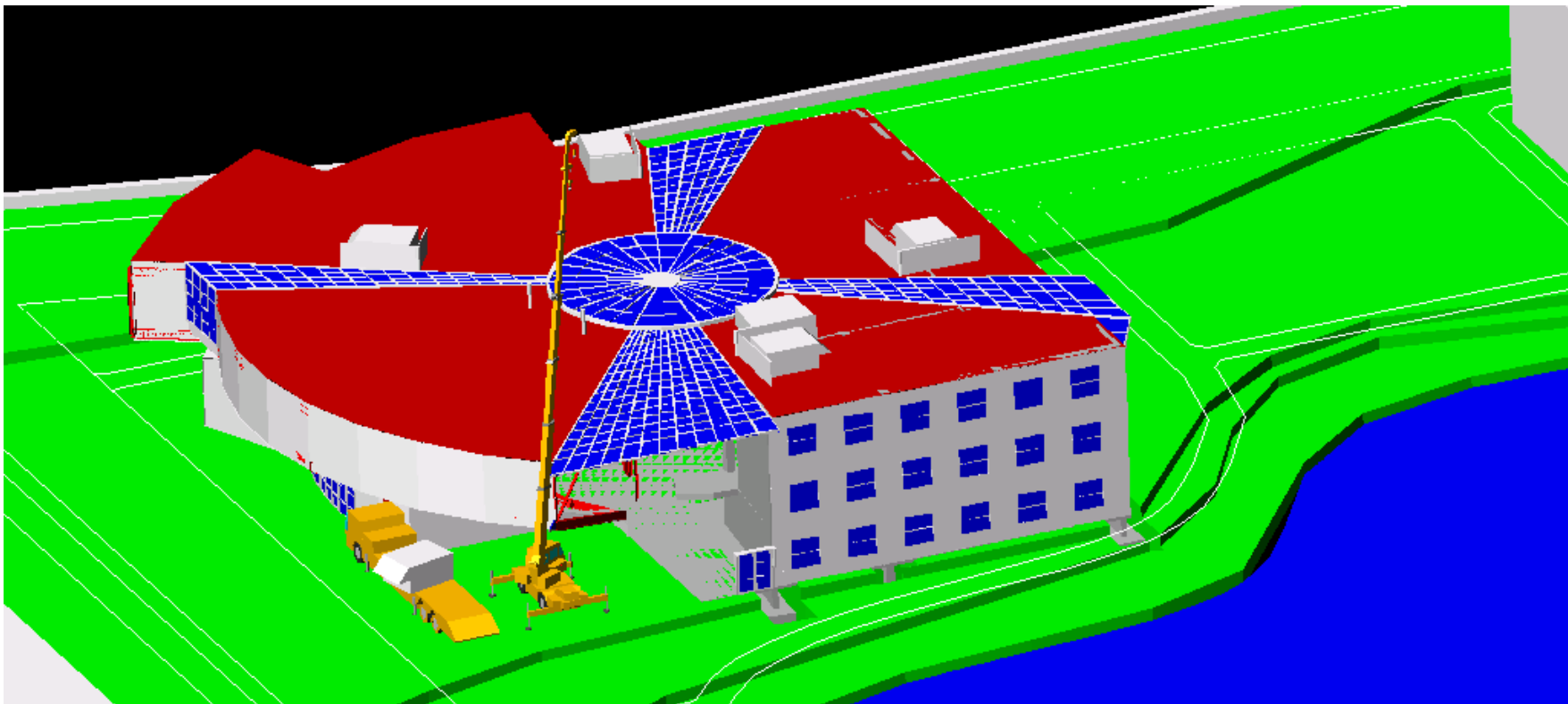
Schedule



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Schedule



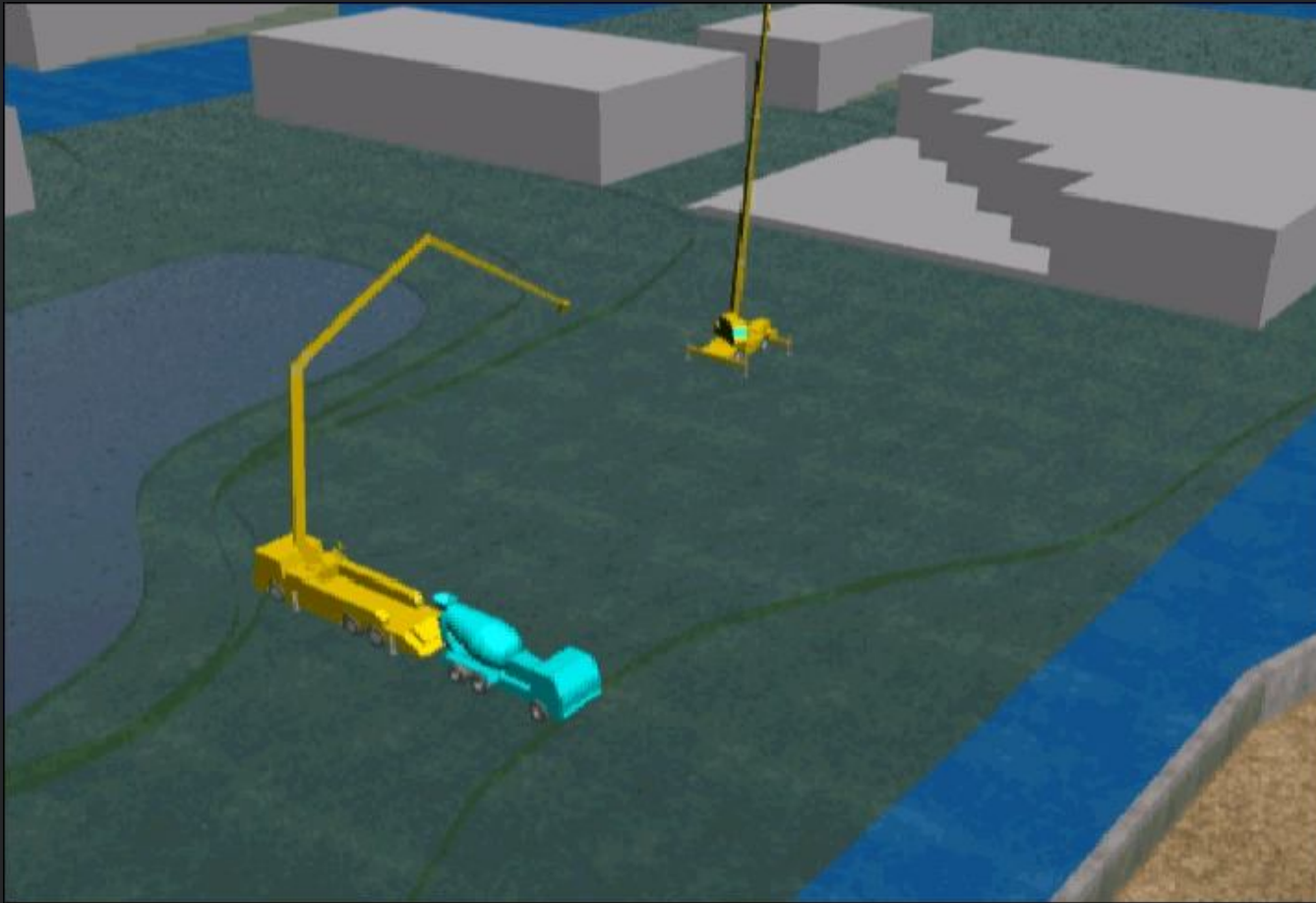
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<b>Shell complete</b>	0 days	◆ 3/25										
<input type="checkbox"/> <b>INTERIORS</b>	<b>66 days?</b>	—————▶										
<input type="checkbox"/> <b>ClassRoom &amp; Lab Section</b>	<b>45 days</b>	—————▶										
<input type="checkbox"/> <b>Faculty Section</b>	<b>49 days?</b>	—————▶										
<input type="checkbox"/> <b>Auditorium</b>	<b>40 days</b>	—————▶										
<i>Interiors Complete</i>	0 days	◆ 5/9										
<input type="checkbox"/> <b>SITWORK</b>	<b>42 days?</b>	◀—————										
<input type="checkbox"/> <b>SYSTEM START-UP &amp; COMMISSIONING</b>	<b>29 days</b>	—————▶										
<i>Dedication</i>	0 days	◆ 6/2										

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Schedule



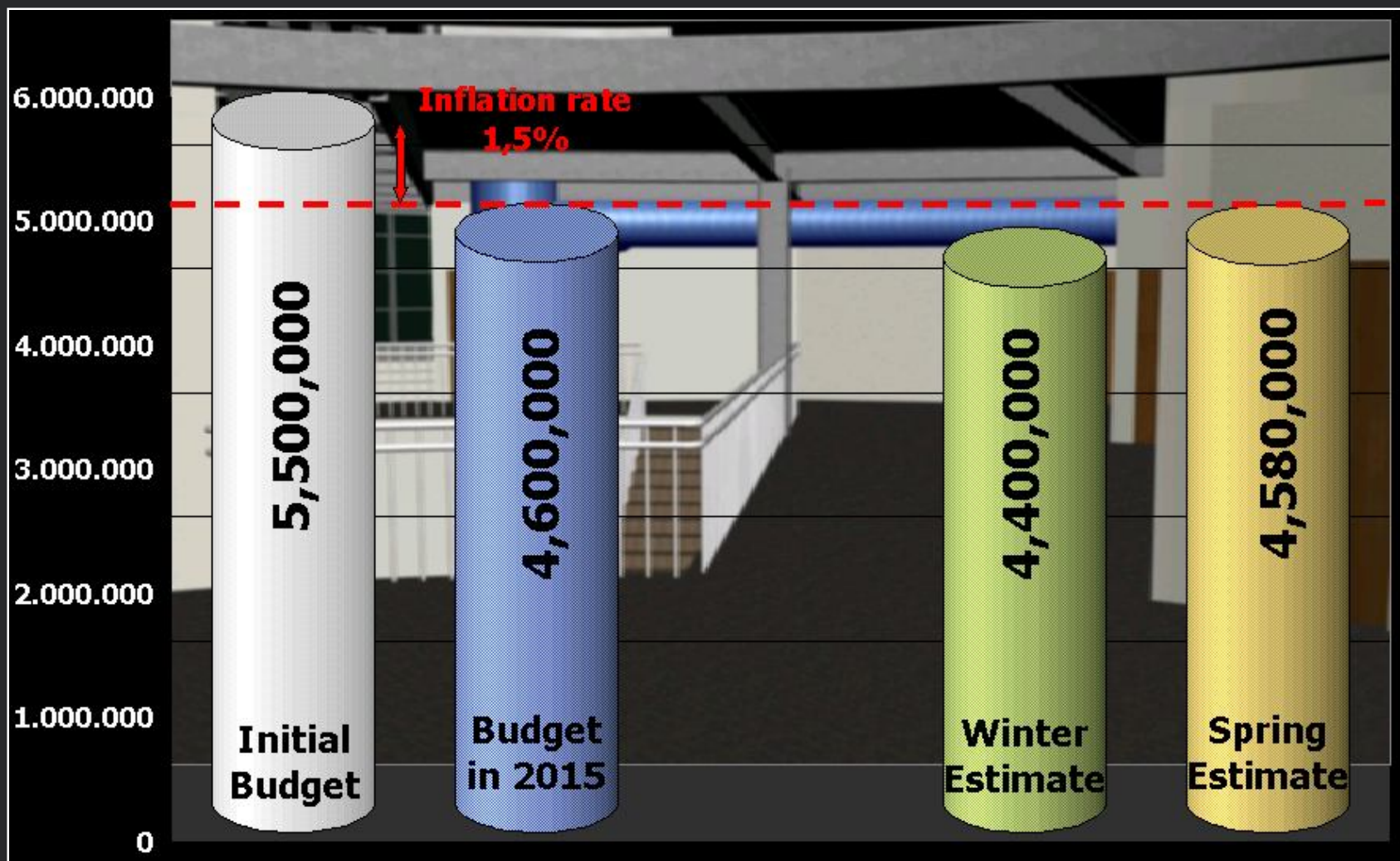


4D slow.avi

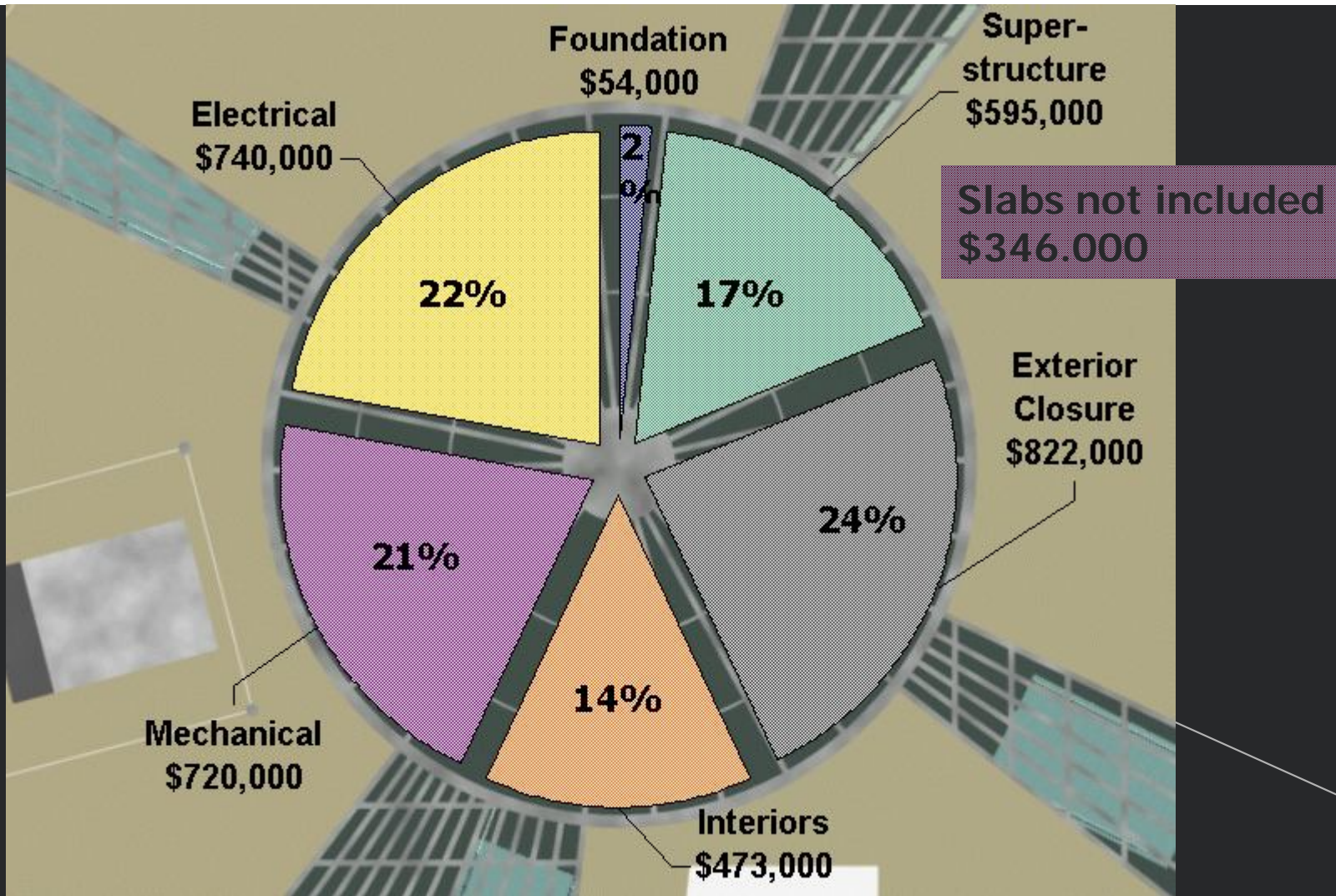
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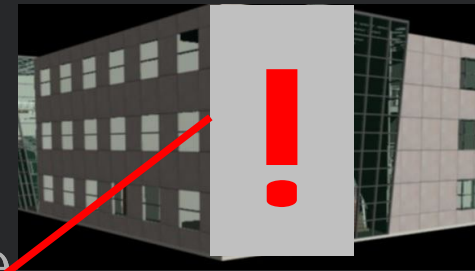
Sequence







# Facade Material



## Options



\$ 60/sf

➔ Precast, colored with texture

*Pros:*  
saves time for erection  
good maintainability

*Cons:*  
no economy of scale  
Expensive ingredients



\$ 80/sf

➔ Stone & Precast/Stone imbedded in Precast

*Pros:*  
Easy erection  
good maintainability

*Cons:*  
Very expensive!  
High handling costs



\$ 50/sf

➔ Stone over steel stud framing

*Pros:*  
good maintainability  
matches with the concept

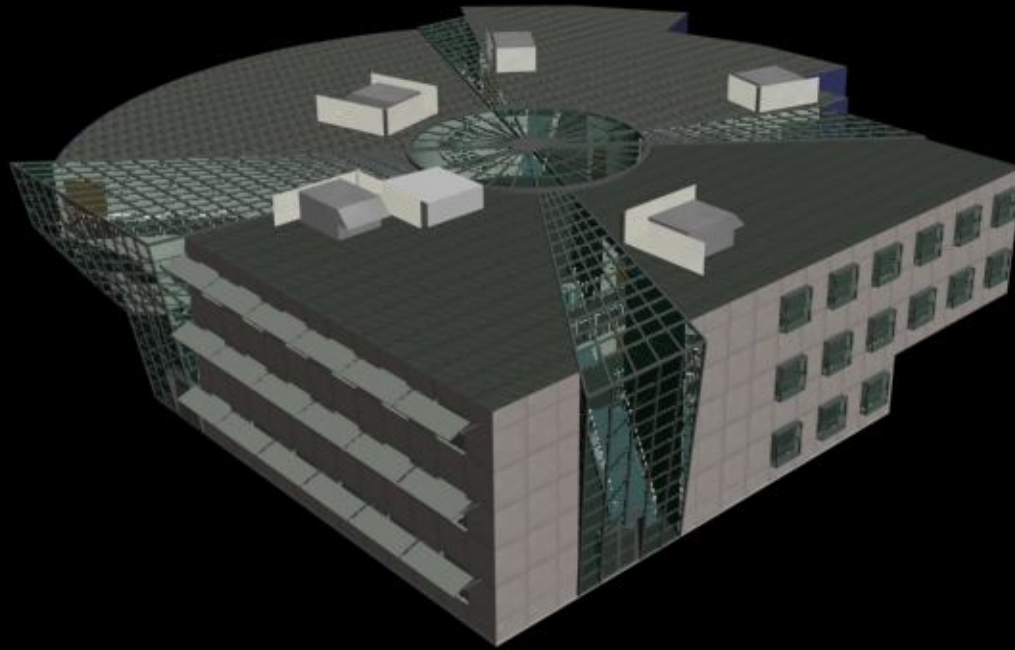
*Cons:*  
Slowest option

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# Trade-off Analysis





South



East

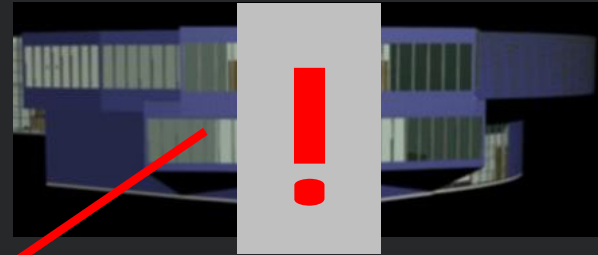


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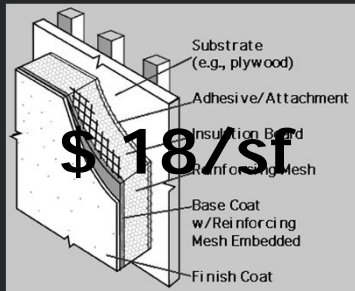
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# Faculty Elevations

# Facade Material



## Options



→ EIFS

*Pros:*  
good price

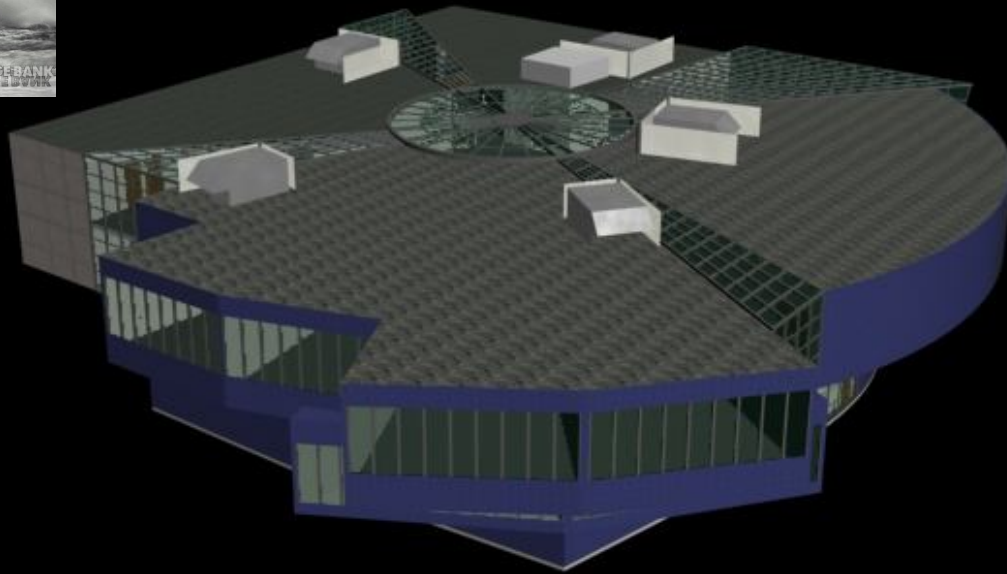
*Cons:*  
bad maintainability



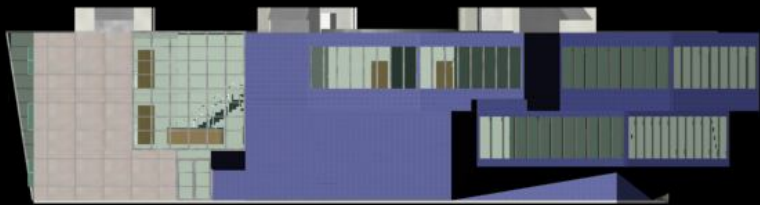
→ Recycled Glass

*Pros:*  
green material  
good price  
durability  
resistance against  
chemical attacks

*Cons:*



North



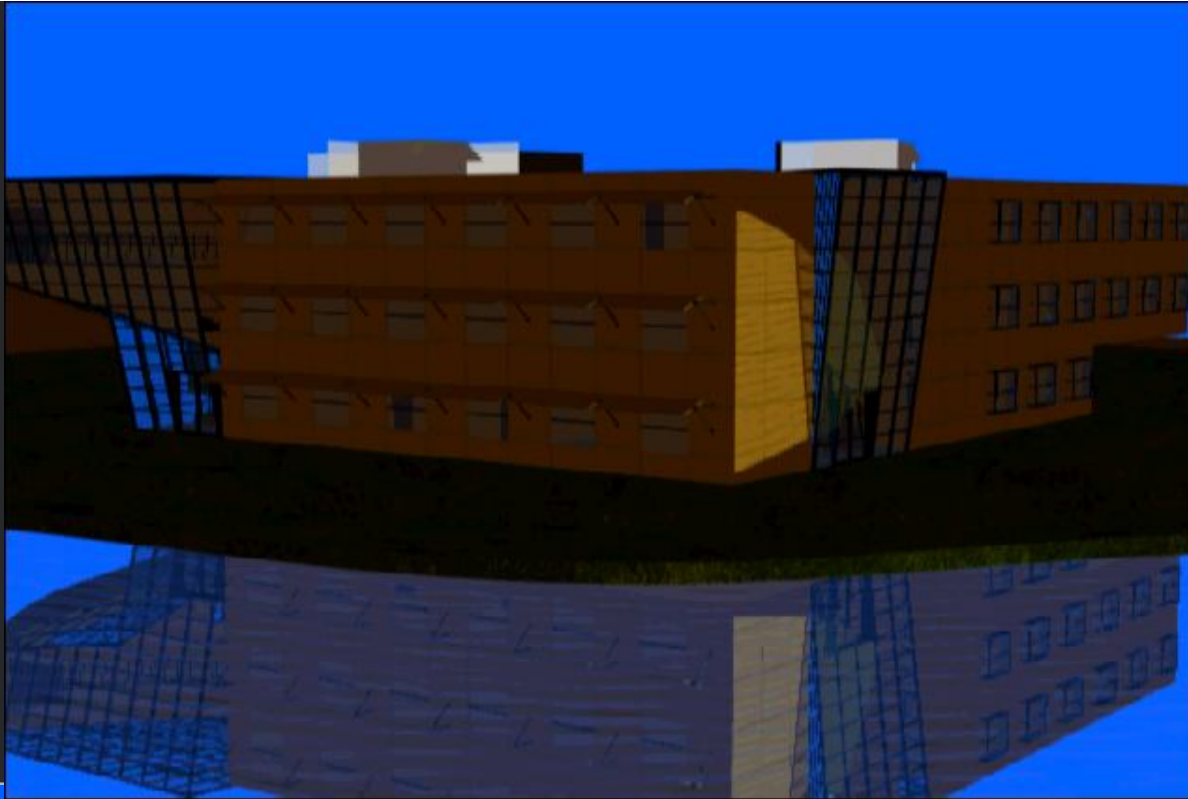
West



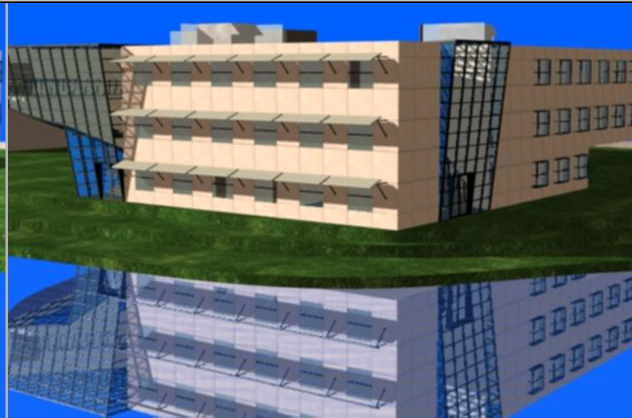
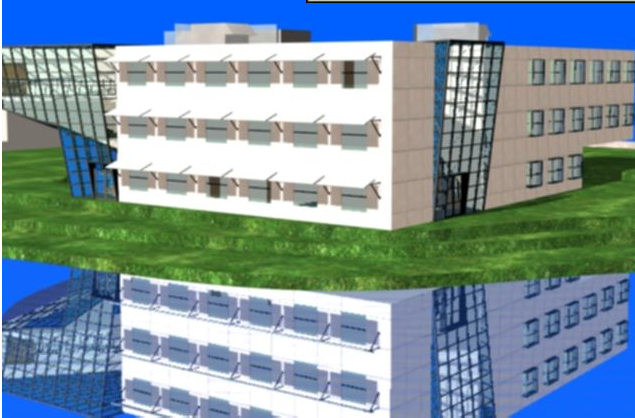
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Student Elevations



shadows2.avi



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Shadows



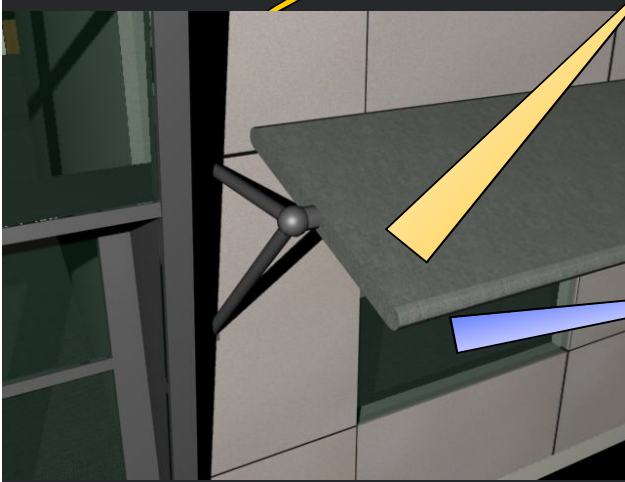
Summer



Recycled Glass

Winter

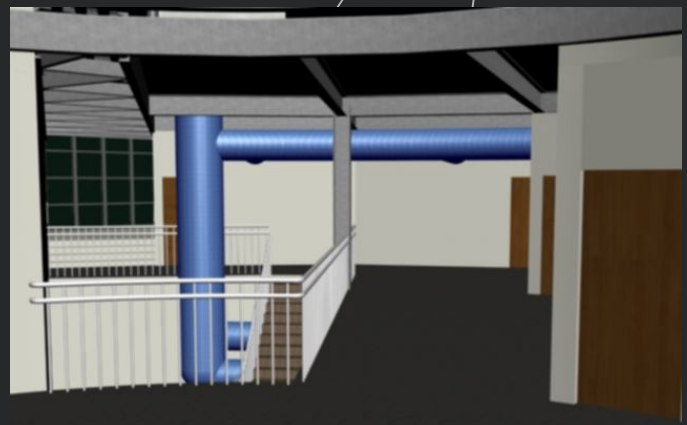
Louvers



Rain Water Collection



Exposed Ductwork



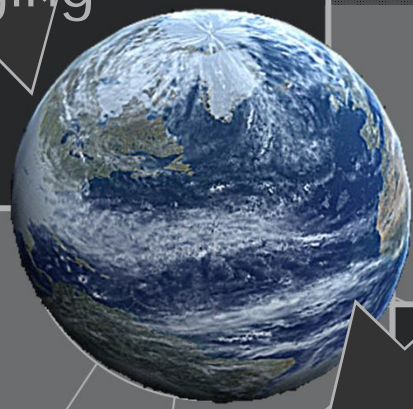
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Sustainability

# Changes in Communication

Winter → Spring

- Less use of ThinkTank
- More Instant Messaging
- More One-on-One
- Shorter Meetings



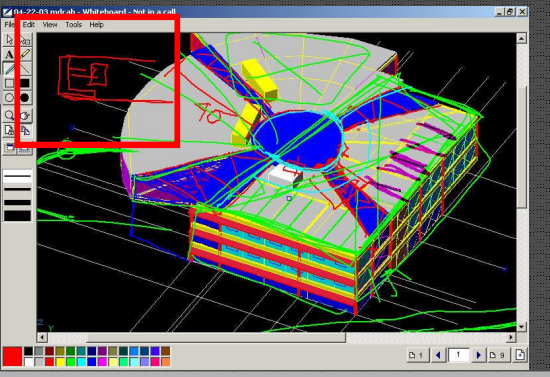
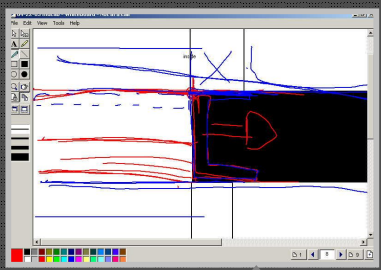
**IM for urgent matters**

NetMeeting - Keine Ve...  
Anrufen Ansicht Extras ?  
171.64.55.75

**Dan - Unterhaltung**  
Bearbeiten Ansicht Aktionen ?  
Dan <hebrews1110@hotmail.com>  
hey  
Dan sagt:  
how are you?  
Andrea sagt:  
fine thanks. I need to show you something  
Dan sagt:  
shoot  
Andrea sagt:  
can you open the whiteboard  
Dan sagt:  
yeah  
Dan sagt:  
use my laptop IP

I want to talk about the facade material...

NetMeeting - Keine Ve...  
Anrufen Ansicht Extras ?  
171.64.55.75



Working out  
Enabling Details on  
the Whiteboard

Still Use of:

- NetMeeting
- Email
- Face-to-face in Stanford

Spring2003  
Pacific

# Communication



„Changing the way you work can yield huge advantages...”



„When you make a change make sure everyone knows *all* of its implications...”



„Do not expect progress when you are not organized - you might even be going backwards...”



„Making progress means - Communication, Communication, Communication...”



„Just because it is understood does not mean it is understood...”





Kickoff Jan '03



Winter Presentation Mar '03



Pacific Team 8 May '03



Fishbowl Apr '03



Mentoring May '03

Spring 2003

Pacific

# Evolution of a Team





A

Dan



E

Bo



E

Matt



C

Christian



C

Andrea



Tamaki

- Bob Tatum
- Henry Tooryani
- H. W. Alfen
- Robert Alvarado
- James Bartone
- Dan Gonzales
- Tomas Engelbertsson
- Eric Elsesser
- Jens Uwe Wagner
- Greg Luth
- Reinhold Braschel
- Helmut Krawinkler
- Eduardo Miranda
- Adhamina Rodriguez
- Bruce Johnson
- Kim Roddis
- Paola Sanguinetti
- Ronaldo Borja
- Renate Fruchter

Thanks for all the Support!