



Atlantic Team 2011

Spring Presentation

Owners



Eric

Lauren



Architect



Maria

Engineer



Colin

Riam



Travis

Construction



Kim

Mike



Sebastjan



MEP



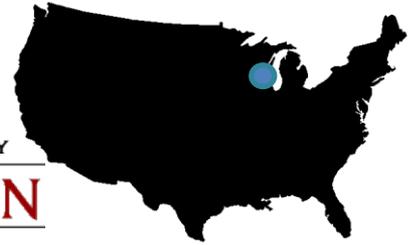
Anne-Laure

Site Location

Madison, Wisconsin



THE UNIVERSITY
of
WISCONSIN
MADISON



A
E
M
C
atlantic team

Site Conditions

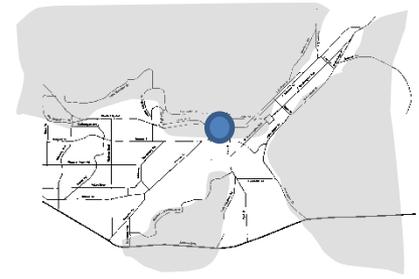
Madison, Wisconsin



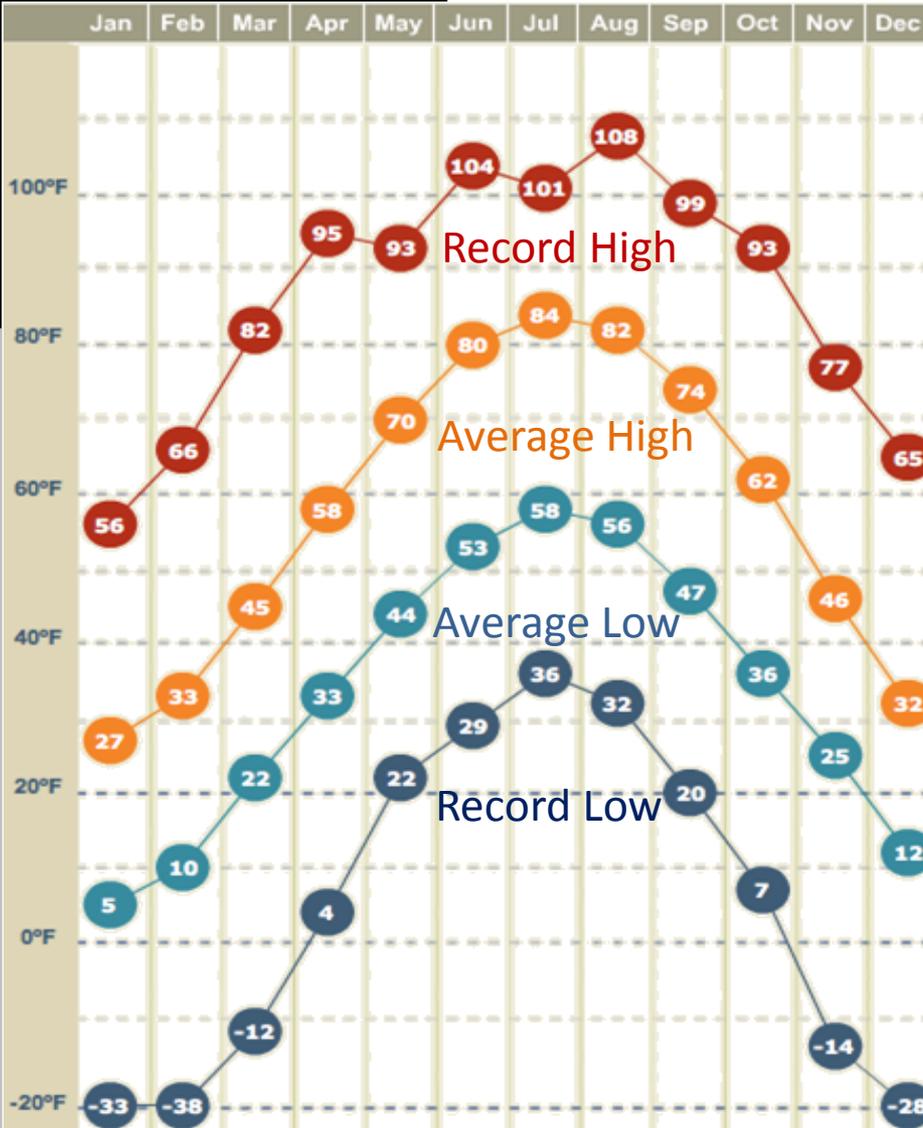
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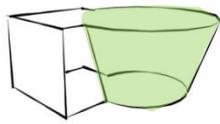
Weather & Climate



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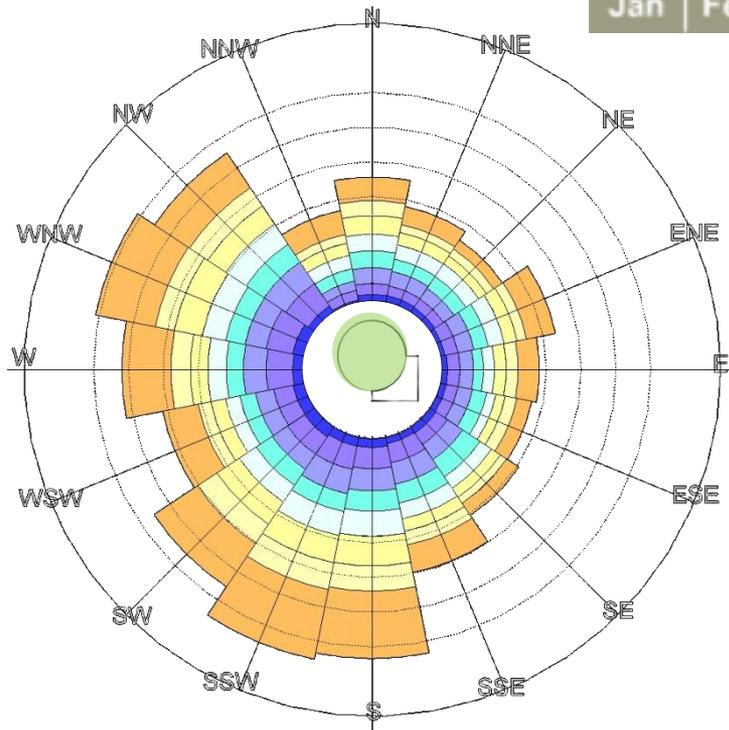


Weather & Climate



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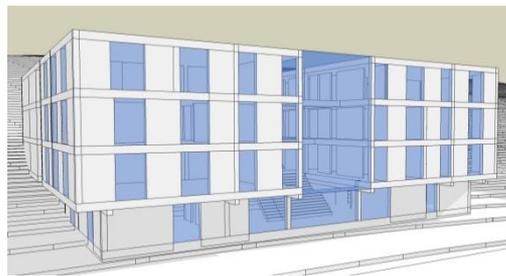
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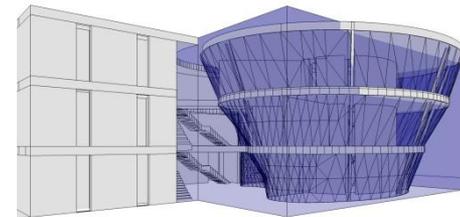
Heavy Rain: June – August
Average High Temps: 84° F
Average Low Temps: 58° F

Decision Matrix

Where We Left Off



The Staircase



Contrast

Scale: -2 to 2 with 0 Neutral

Metrics	The Staircase		Contrast		Weight
	Steel	RC	Steel	Mixed	
Symmetry	2	2	0	0	1
Feel	1	1	2	2	1
Iconicity	0	0	2	2	1
Aesthetics	0	0	2	2	1
Simplicity of Structure	0	-1	2	1	1
Innovation	0	0	1	1	1
Sustainability	1	2	1	2	1
Going Native	0	2	0	1	1
Schedule	2	1	1	0	1
Cost	1	2	-2	-1	2
Site	0	1	0	1	1
Constructability	2	1	-1	-1	1
Owner Preference	0	0	2	2	3

TOTAL	10	13	12	15
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Contrast

Shapes

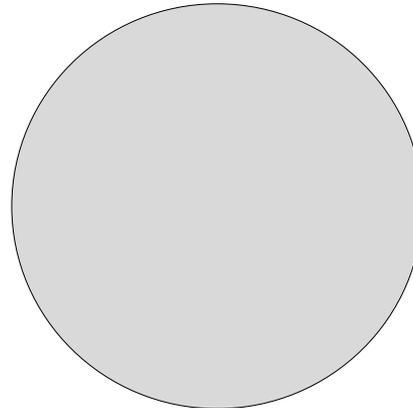
A

E

M

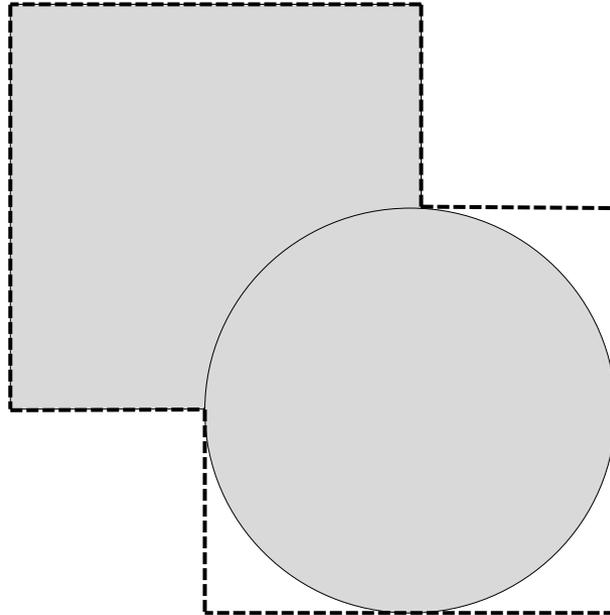
C

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Contrast

Shapes + Footprint



Contrast

Shapes + Cantilivers

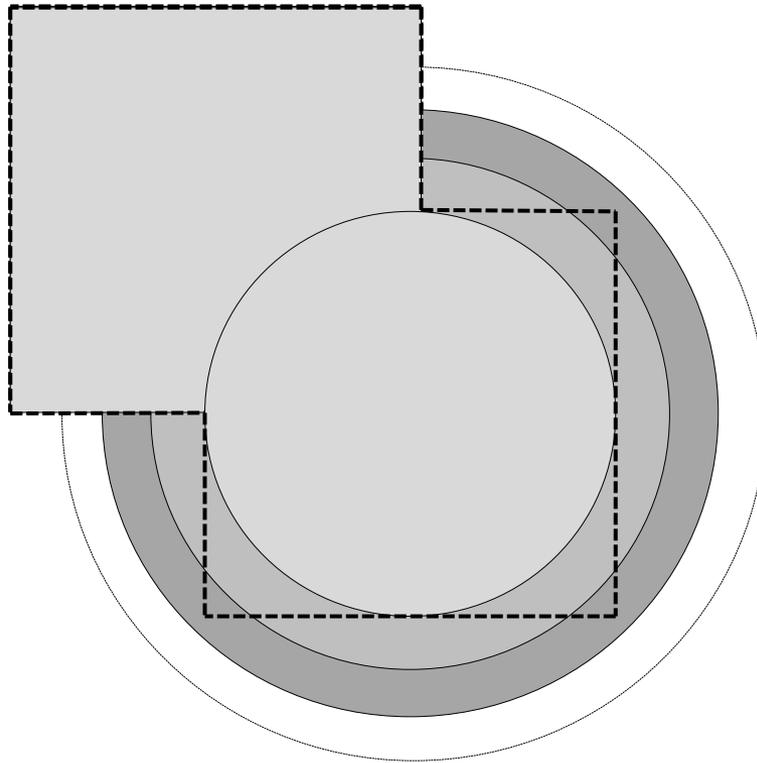
A

E

M

C

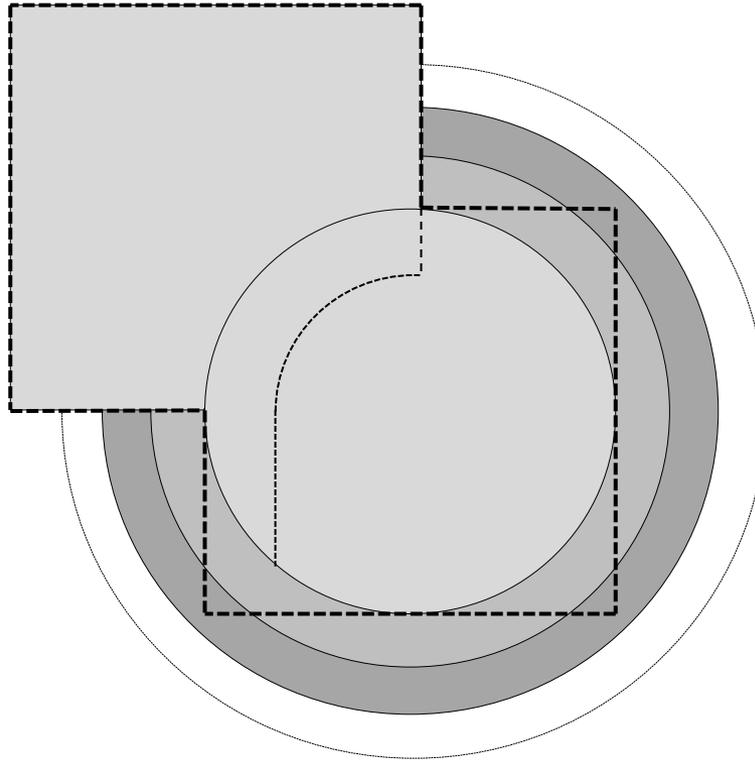
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Contrast

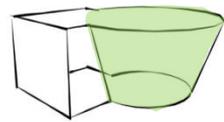
Shapes + Cantilivers

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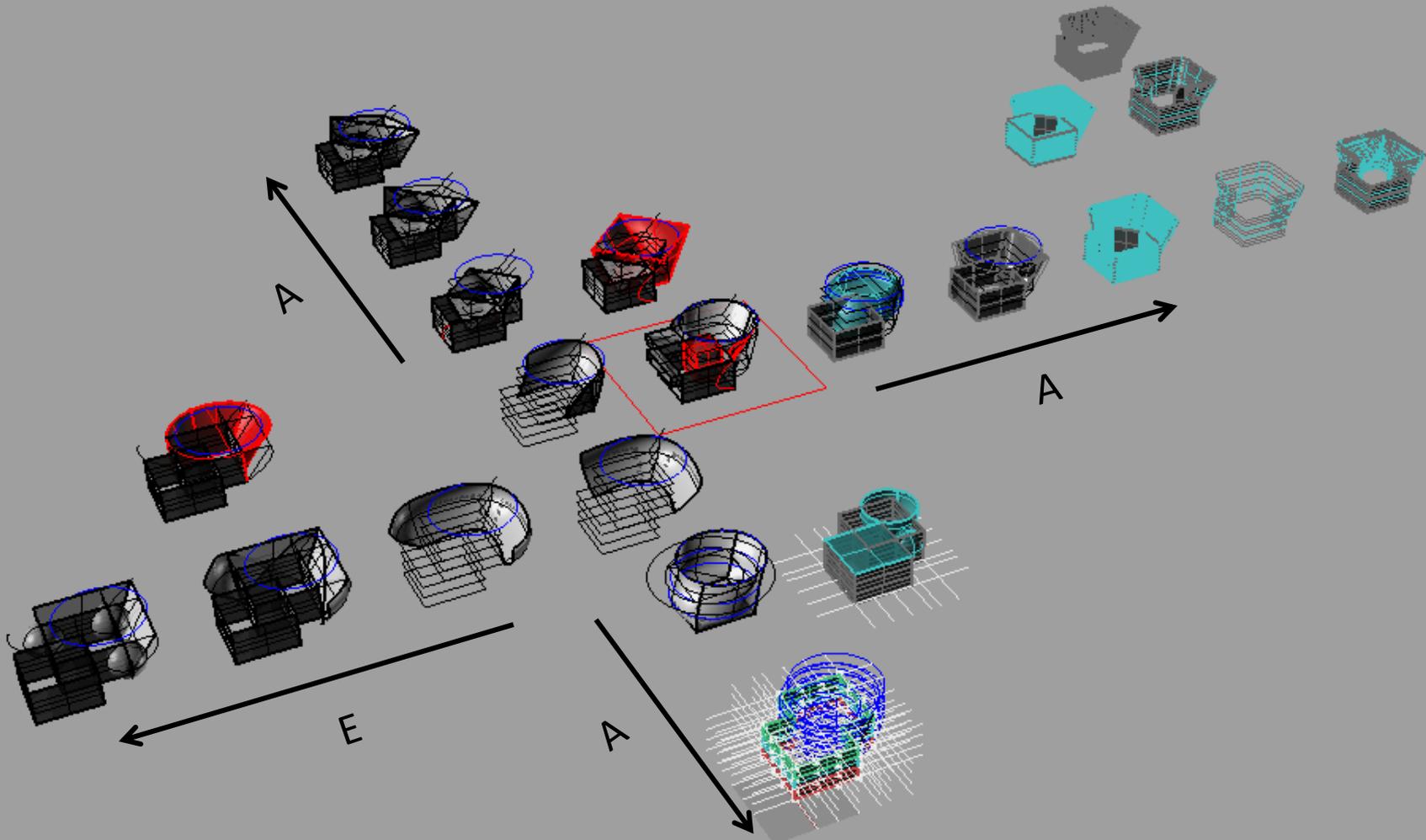


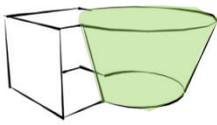
Change In Shape

Influence of Other Disciplines



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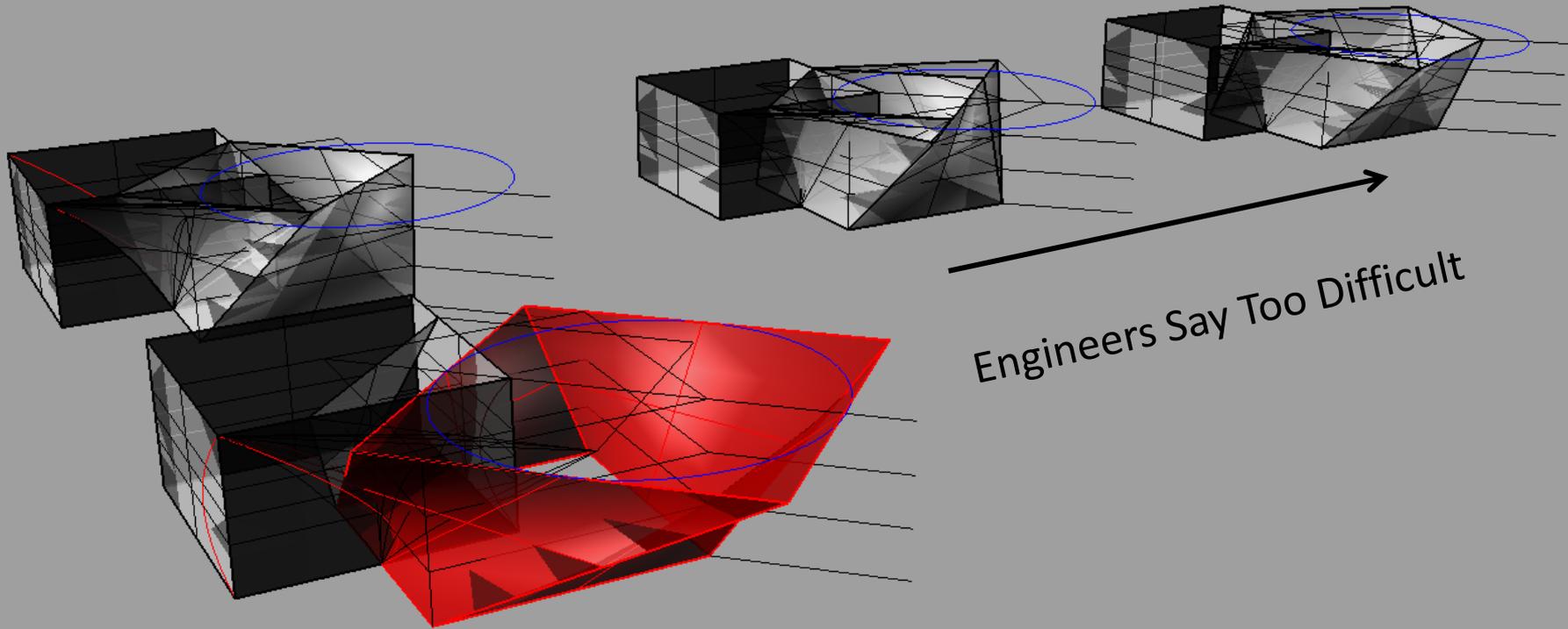


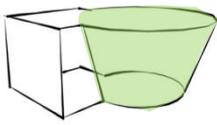


Change In Shape

Influence of Other Disciplines

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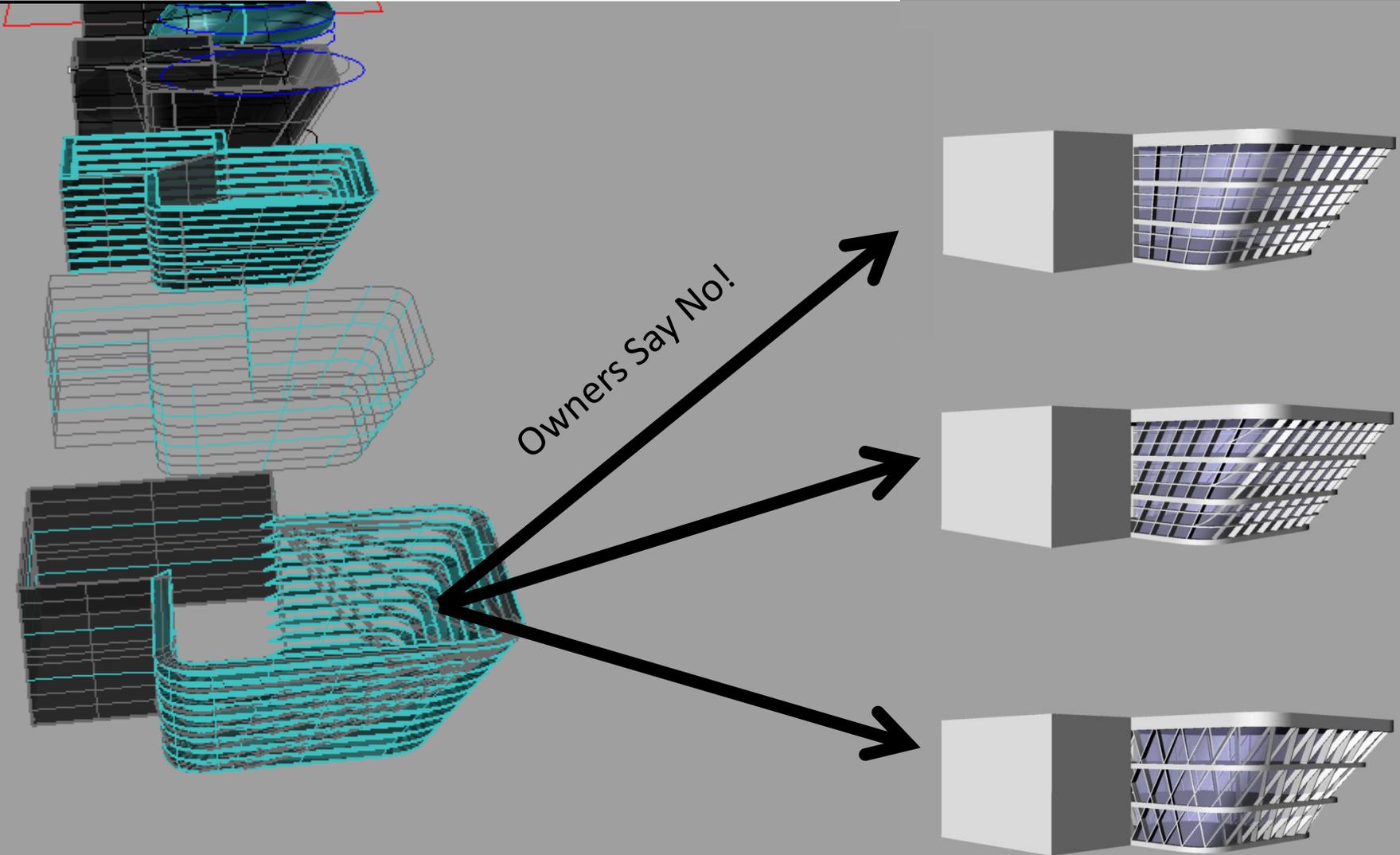




Change In Shape

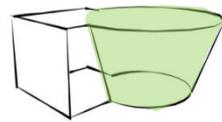
Influence of Other Disciplines

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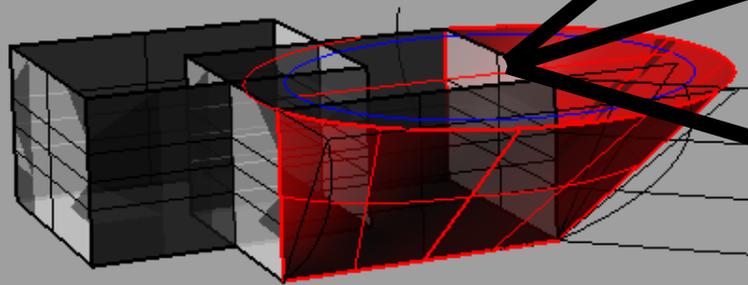


Change In Shape

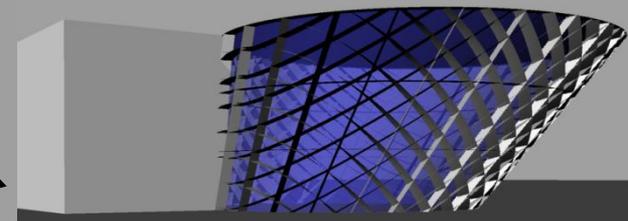
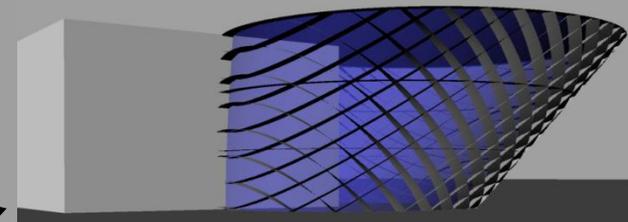
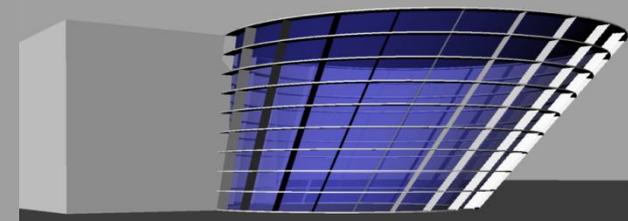
Influence of Other Disciplines



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Owners Say YES!



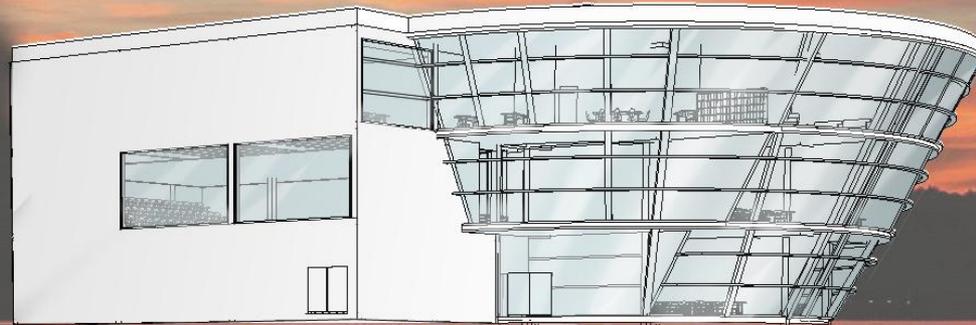
Contrast Site

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Contrast Site

A
E
M
C
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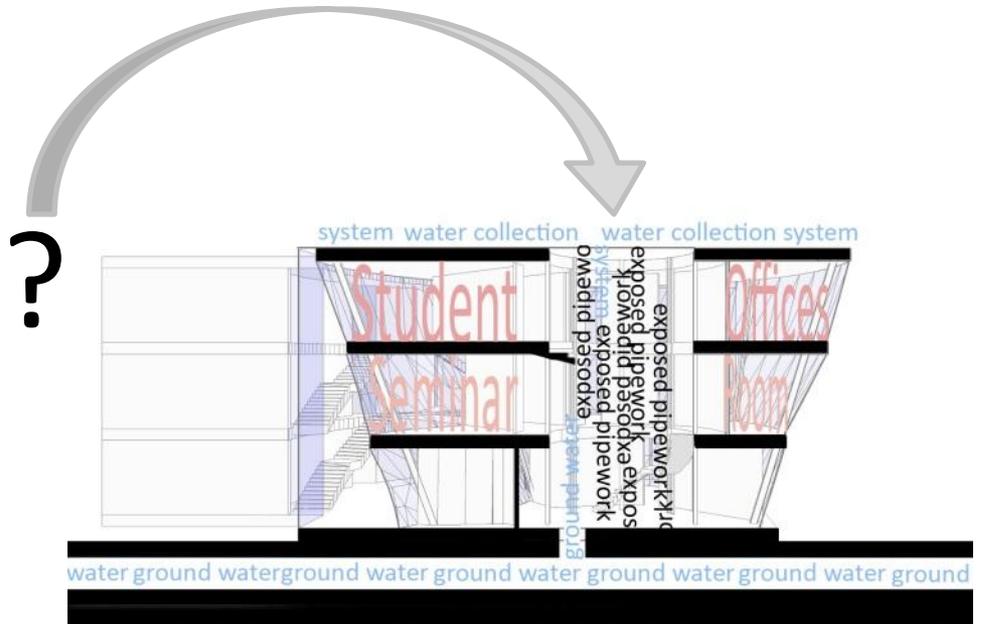
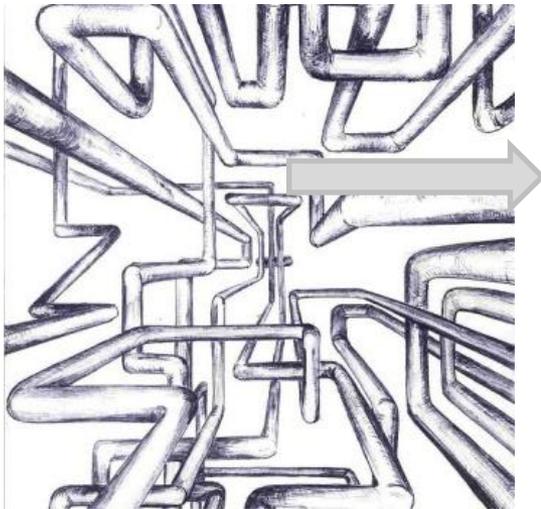


Contrast

MEP Integration/Going native

MEP

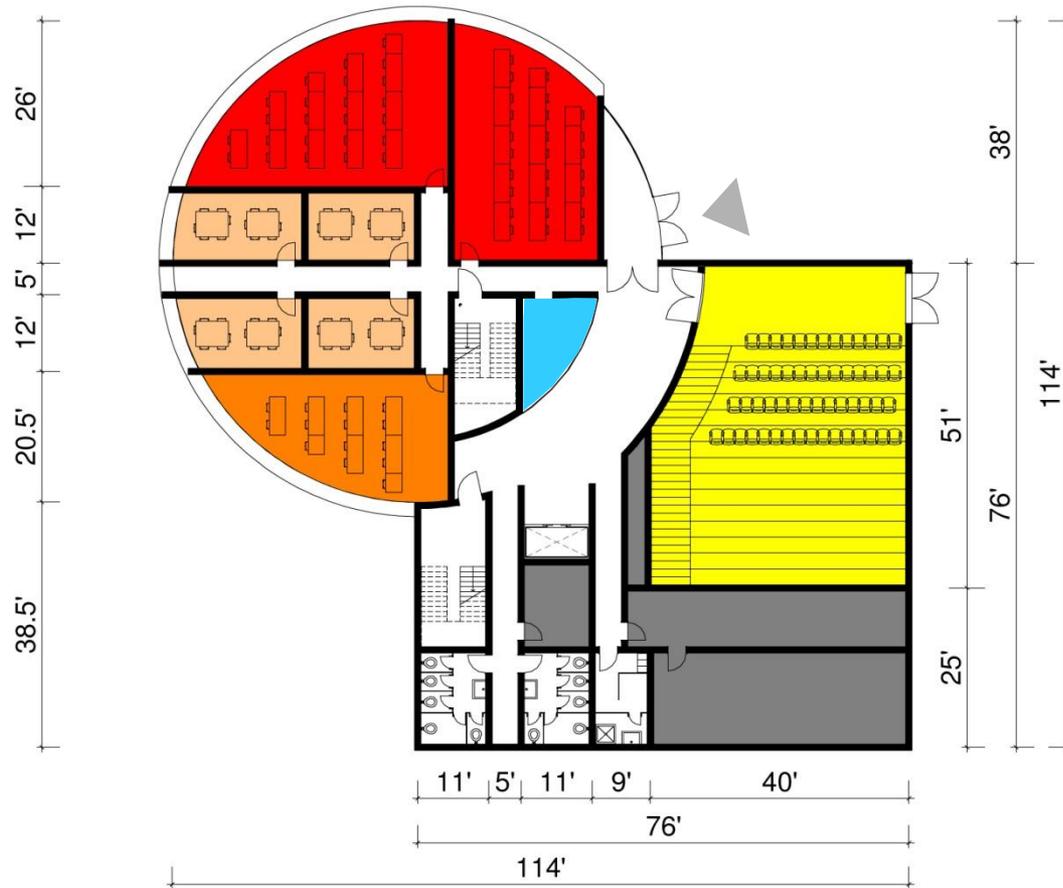
INTENSIVE
discussions



Contrast

1st floor

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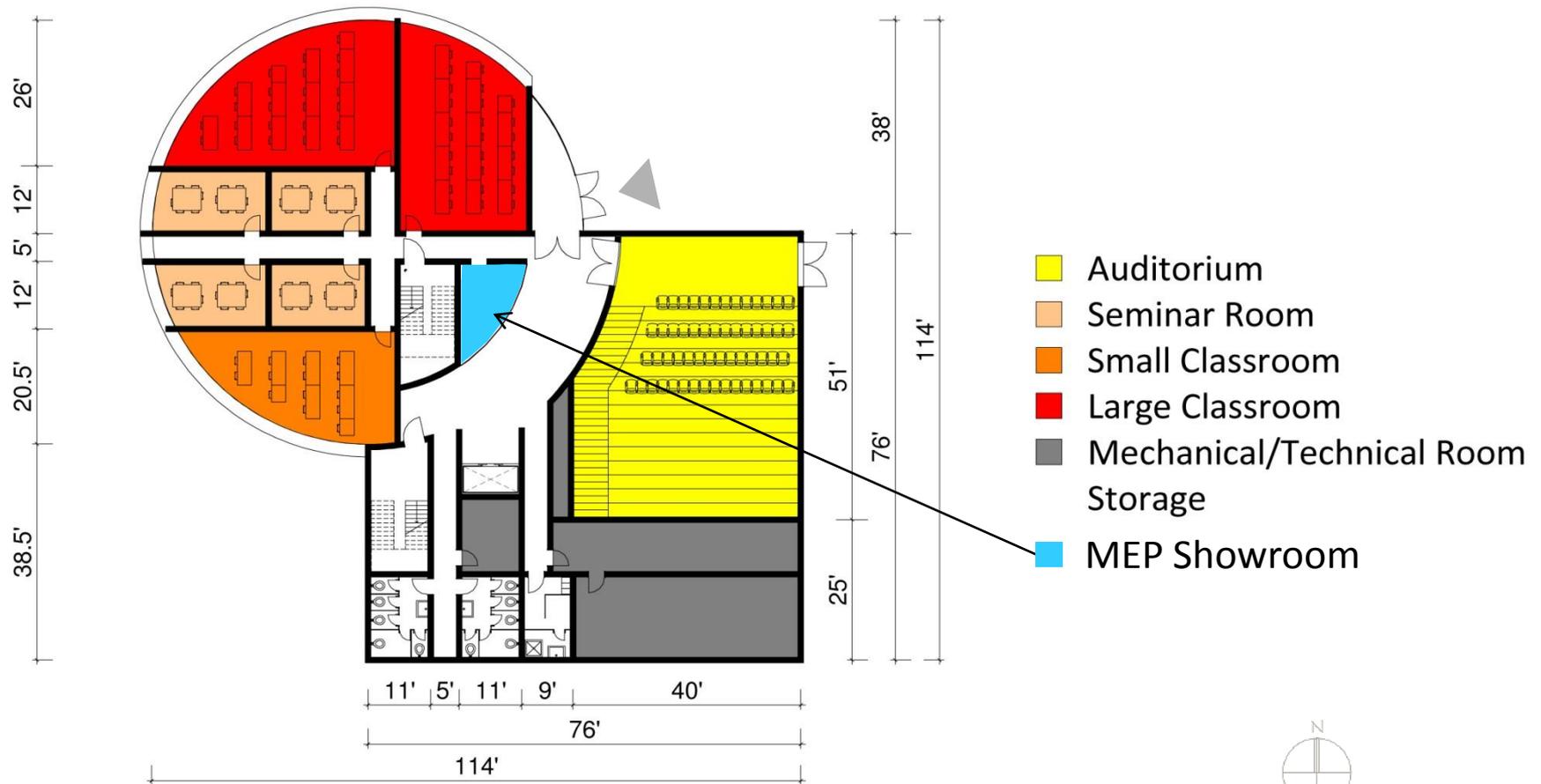
- Auditorium
- Seminar Room
- Small Classroom
- Large Classroom
- Mechanical/Technical Room
Storage



Contrast

1st floor

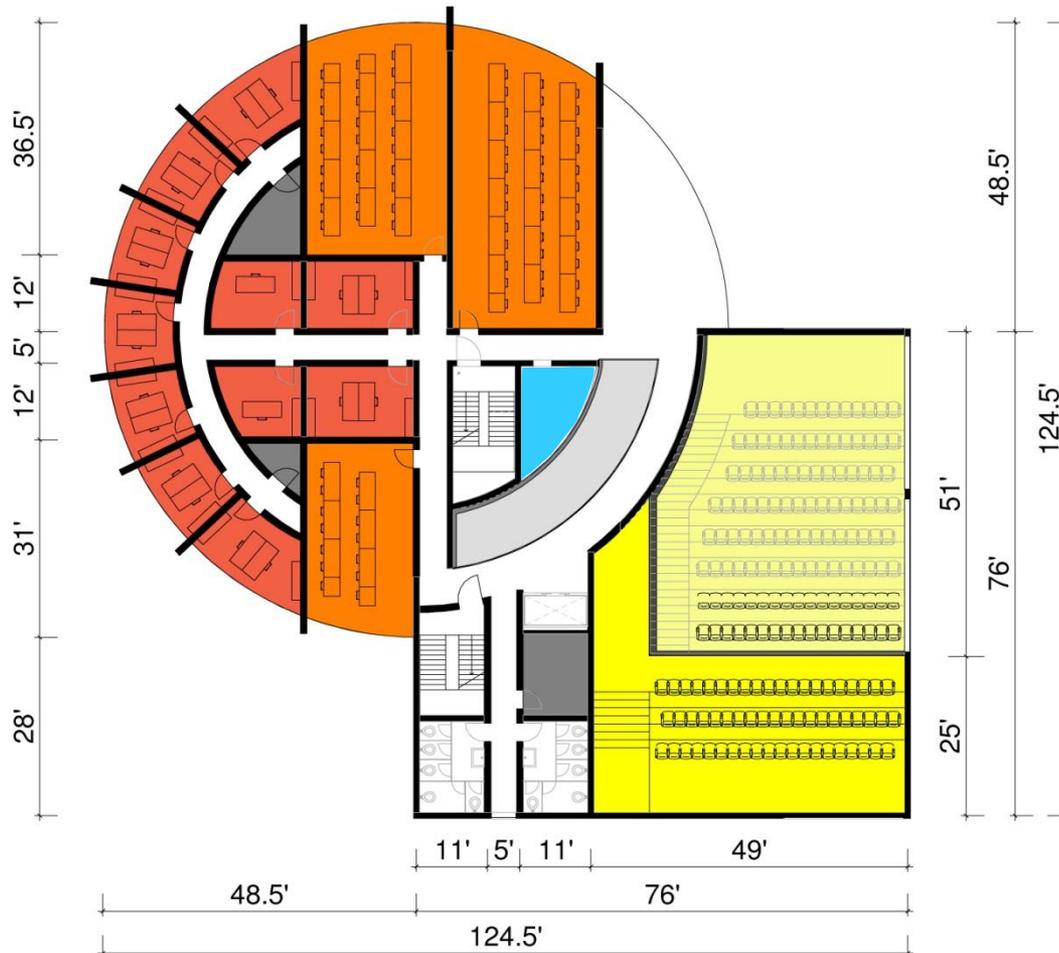
A
E
M
C
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Contrast

2nd floor

A
F
M
C
atlantic team



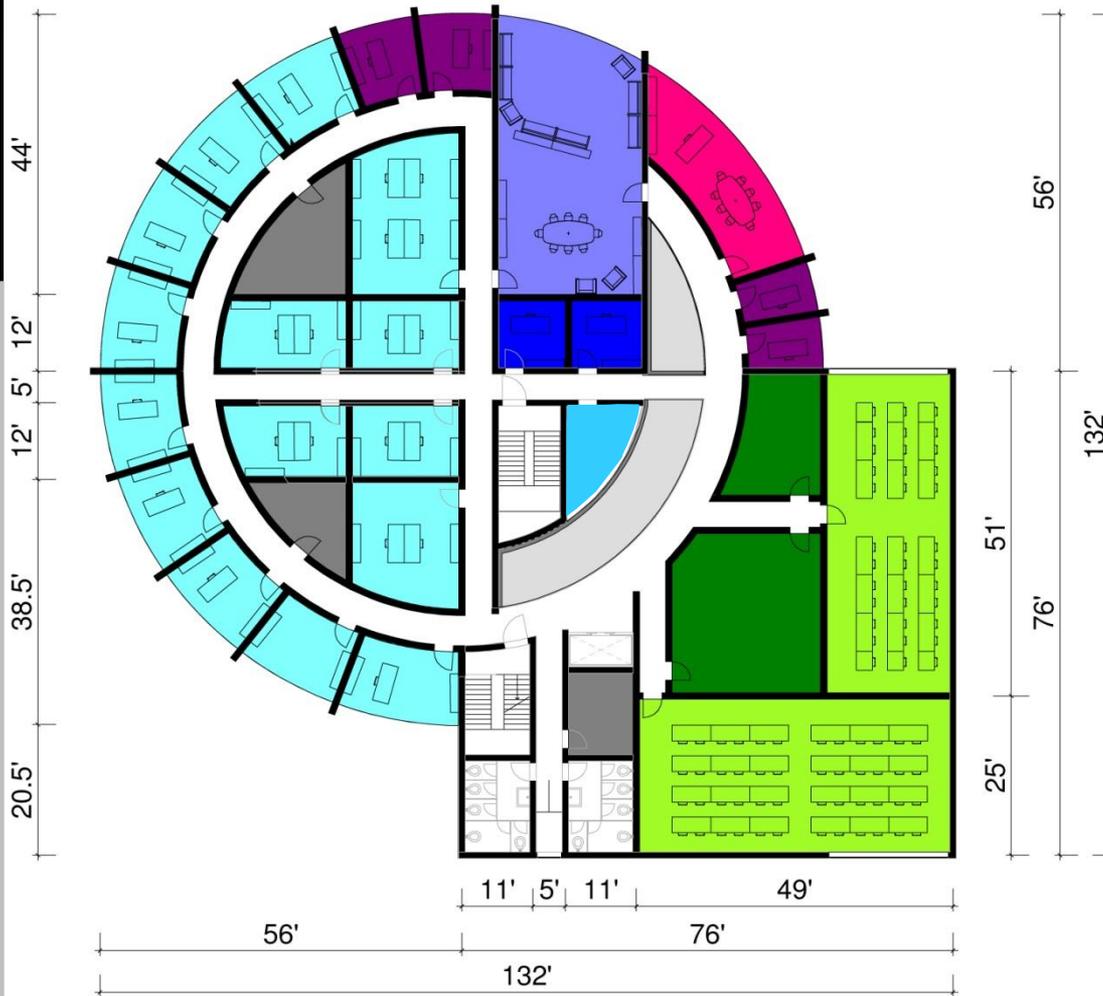
- Auditorium
- Small Classroom
- Student Offices
- Mechanical/Technical Room
Storage
- MEP Showroom



Contrast

3rd floor

A
E
M
C
atlantic team



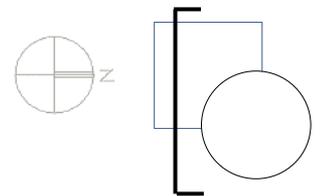
- Instructional Lab
- Server Room
- Faculty Offices
- Administrative Assistants
- Senior Administration Offices
- Faculty Lounge
- Department Chair's Office
- Mechanical/Technical Room
- Storage
- MEP Showroom



Contrast

Section North-South I - Atrium

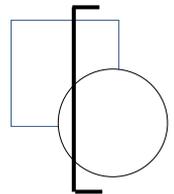
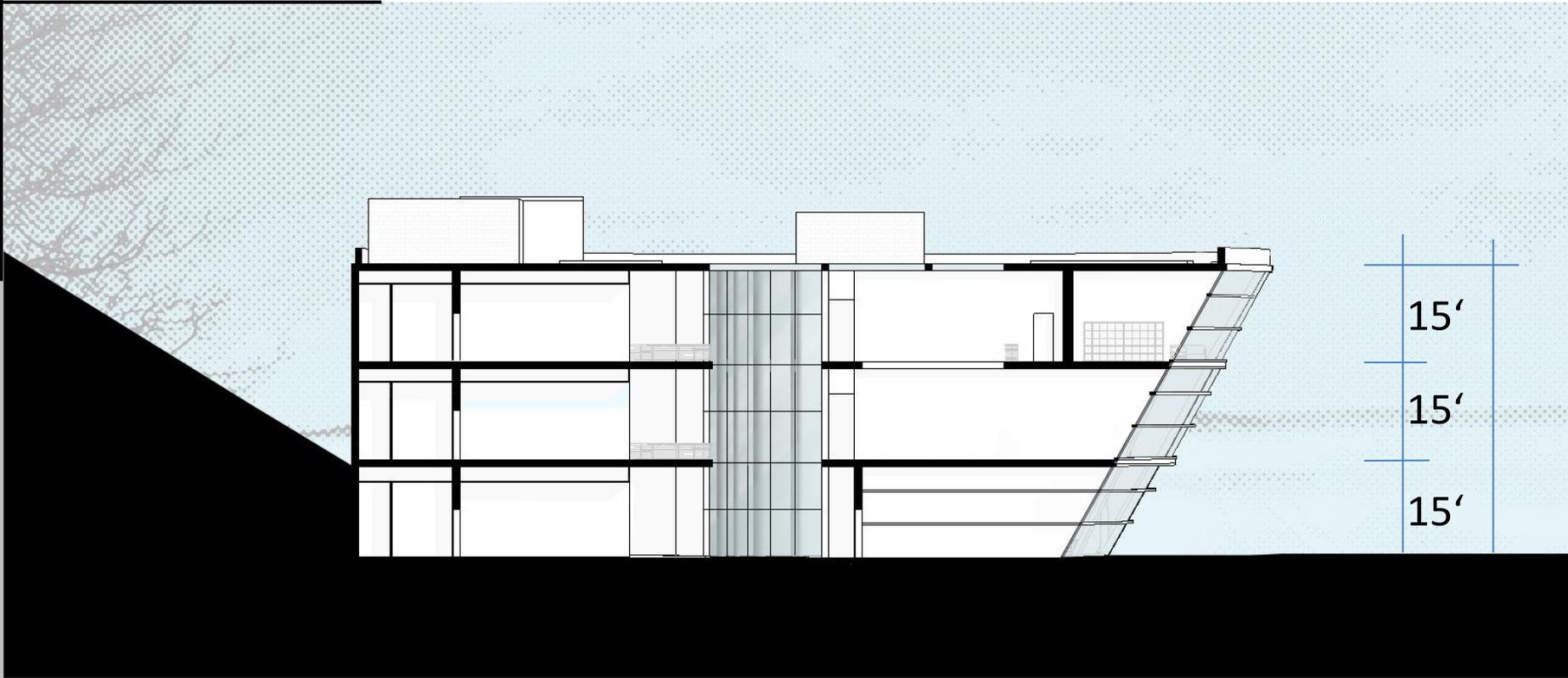
A
E
M
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Contrast

Section North-South II - Atrium

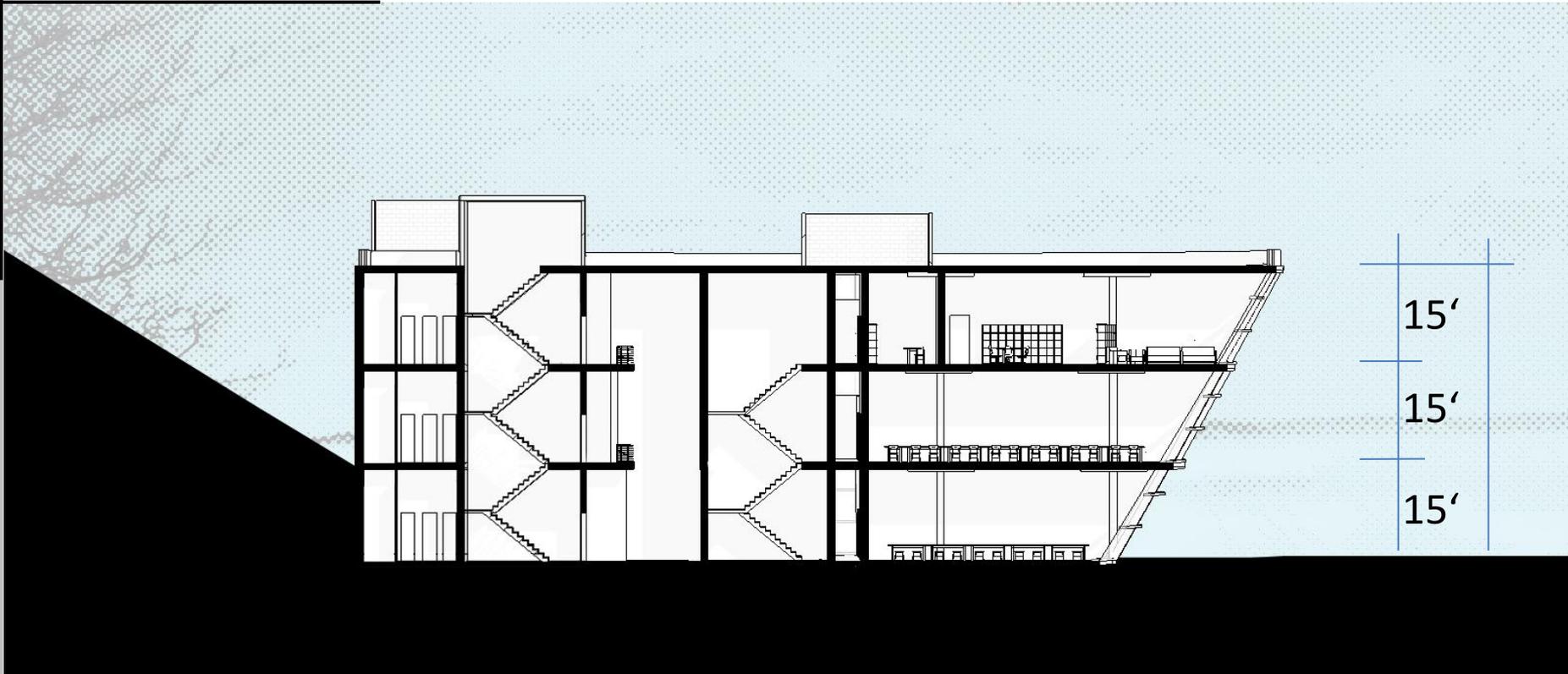
A
E
M
C
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Contrast

Section North-South III Staircases

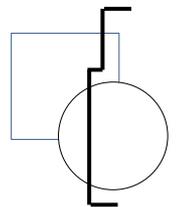
A
E
M
C
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15'

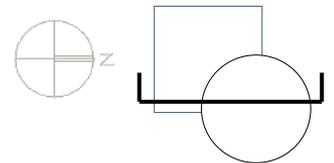
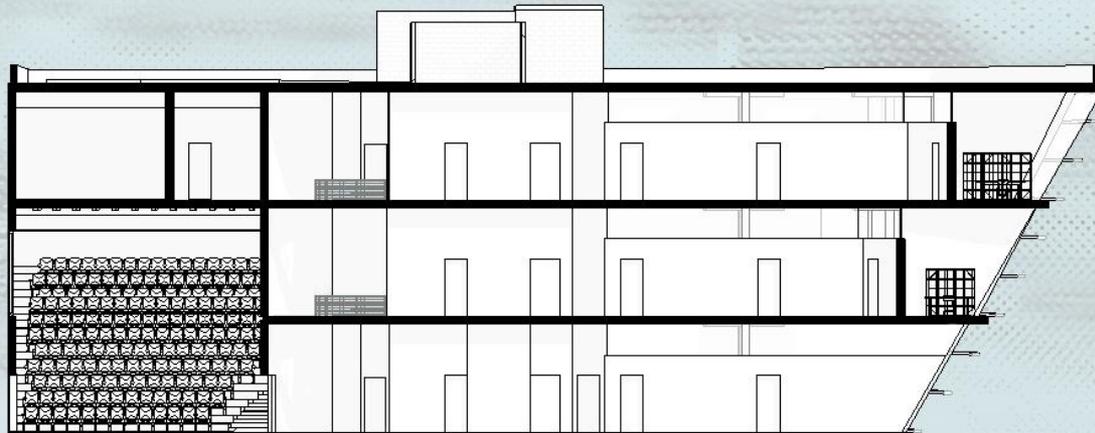
15'

15'



Contrast Section

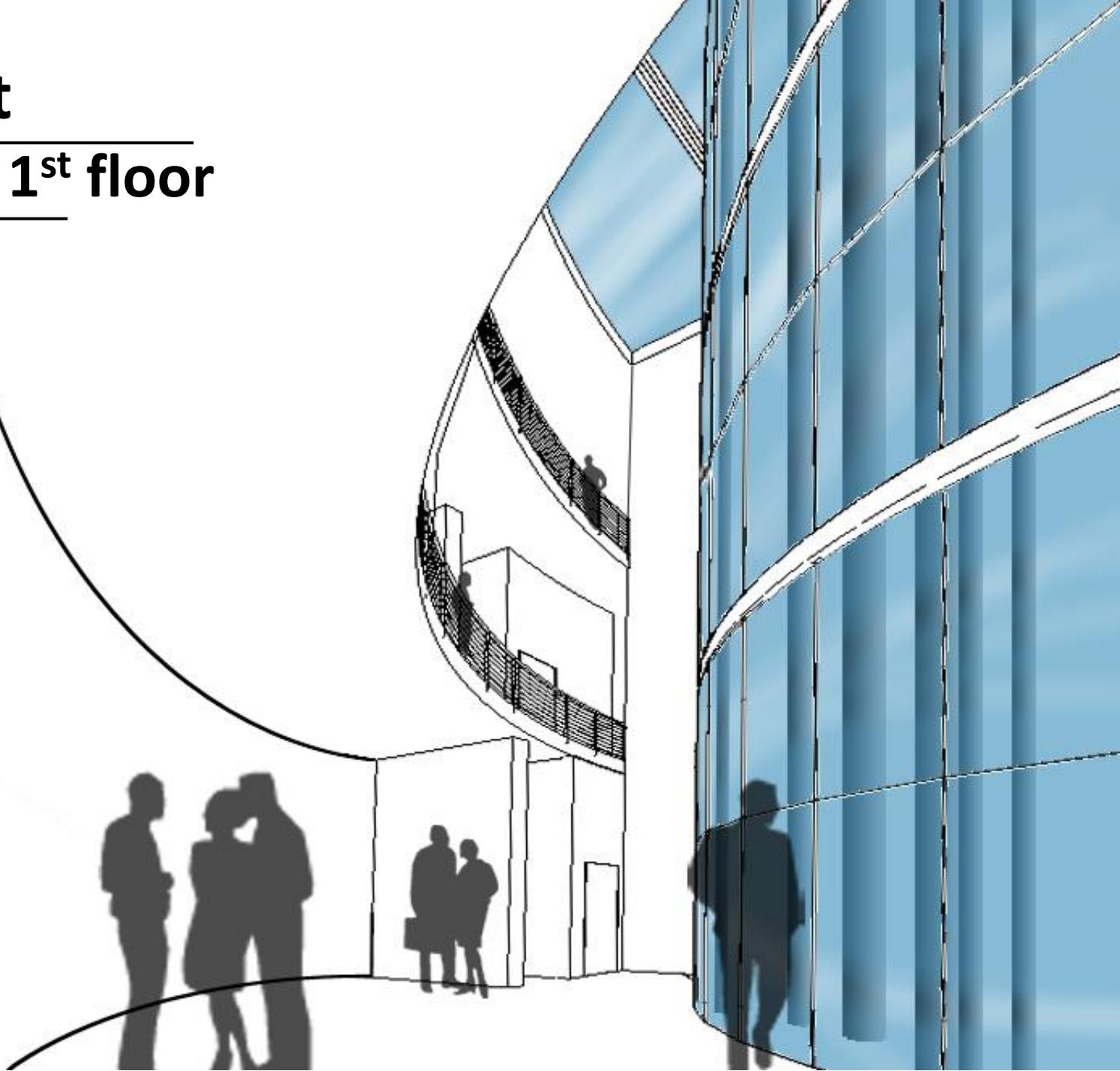
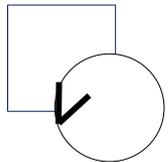
A
E
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Contrast

Entrance 1st floor

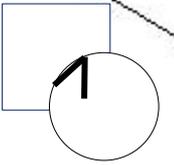
A
E
M
C
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Contrast

Atrium 2nd floor

A
E
M
C
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Contrast

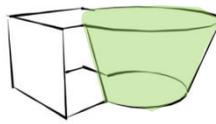
Studio 2nd floor

A
E
M
C
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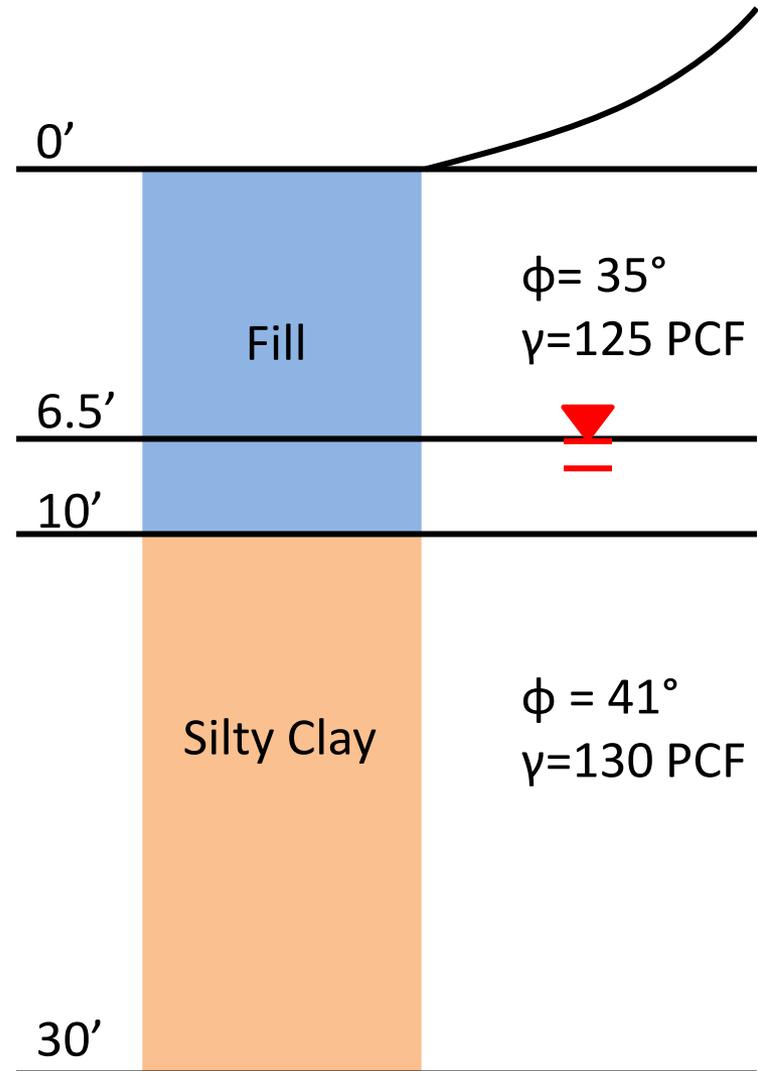


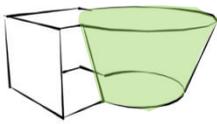
Soil Considerations

Soil Profile



- Bearing Capacity 4 KSF
- High Water Table
- Excavation Needed

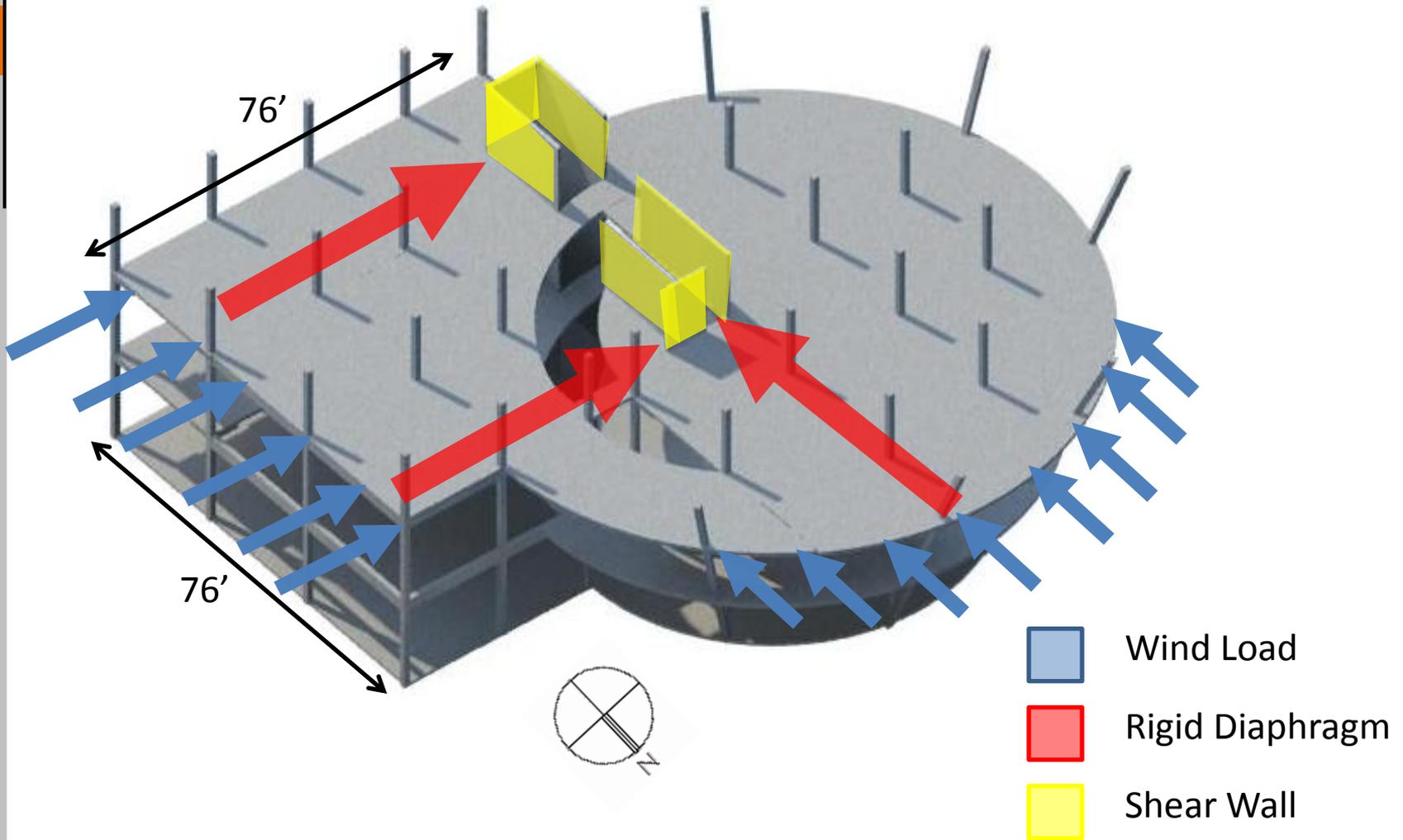




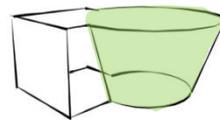
Loading Considerations

Lateral Load Path

A
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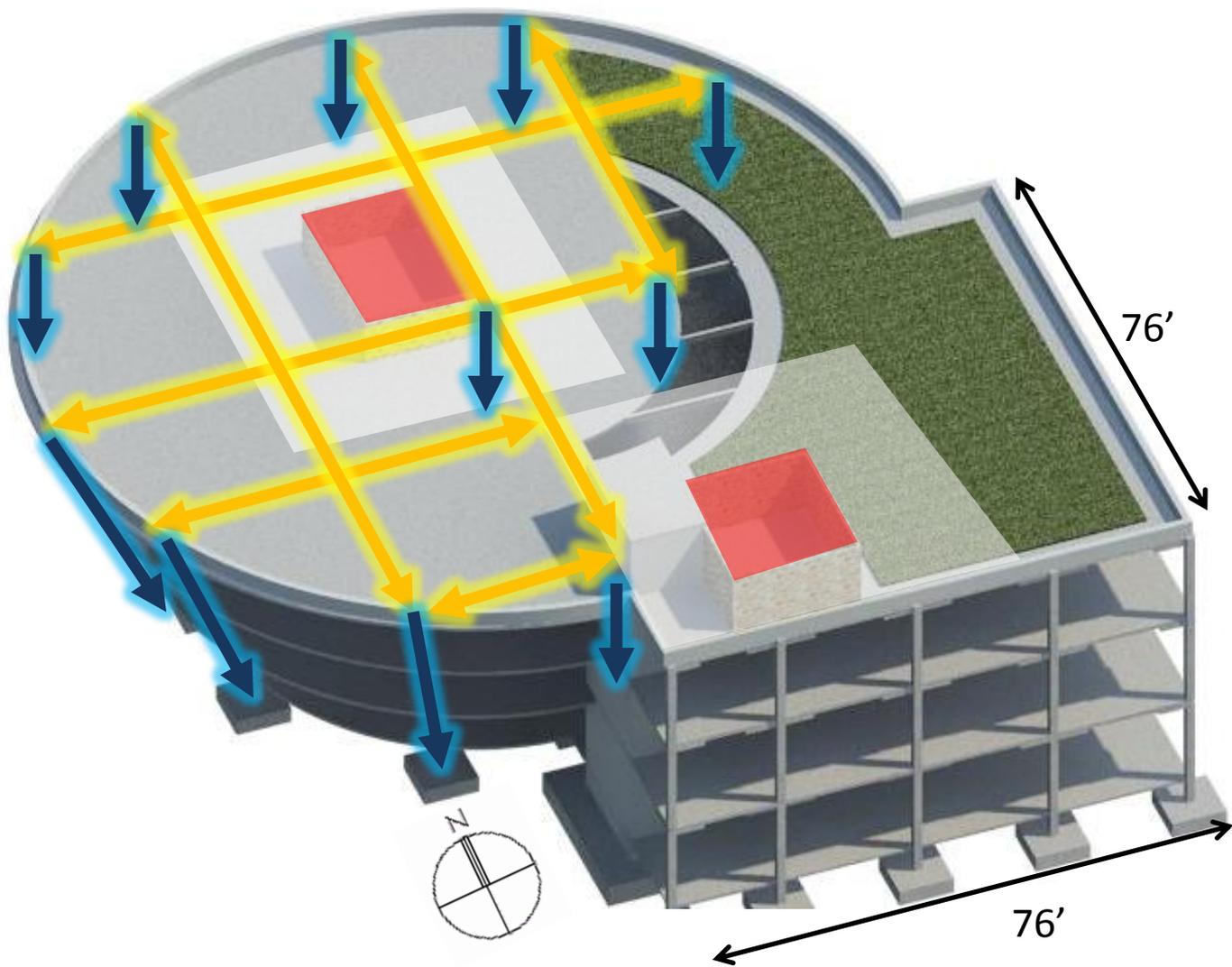


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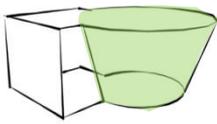


Gravity Load Path

A
E
M
C
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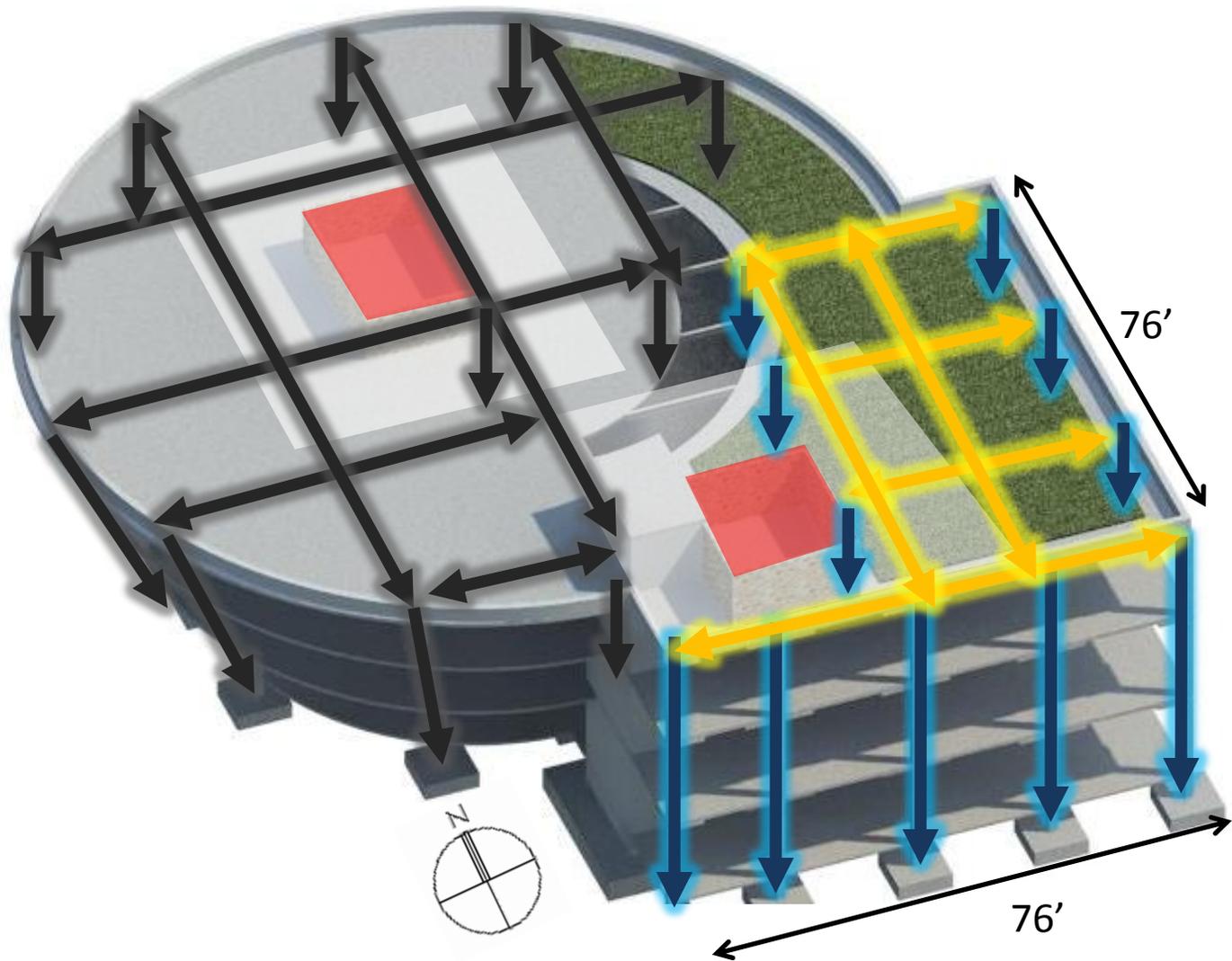


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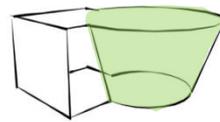


Gravity Load Path

A
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M
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Loading Considerations



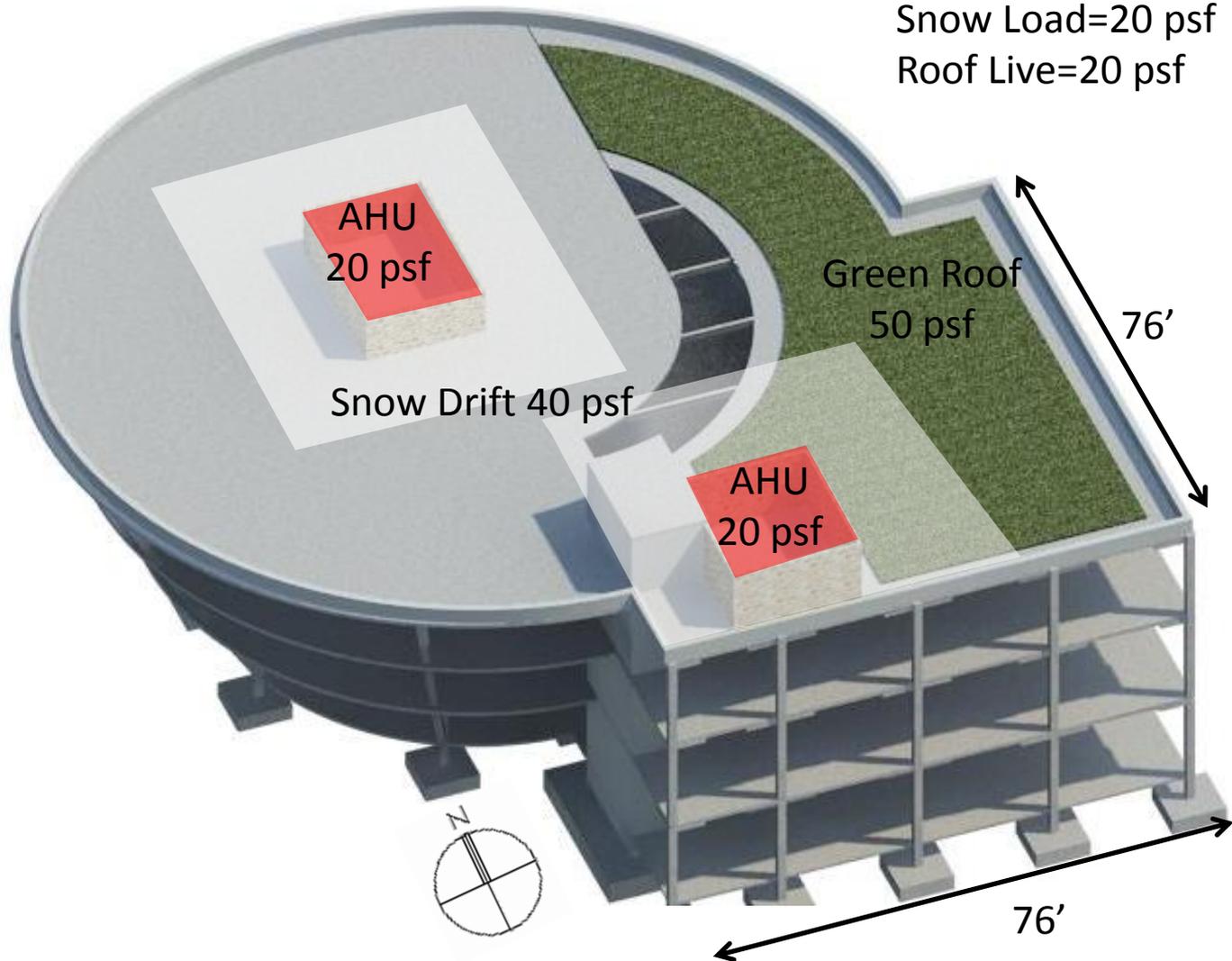
Roof Loads

Uniform Loads

Dead Load=Self Weight

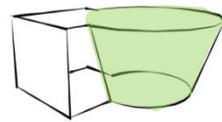
Snow Load=20 psf

Roof Live=20 psf



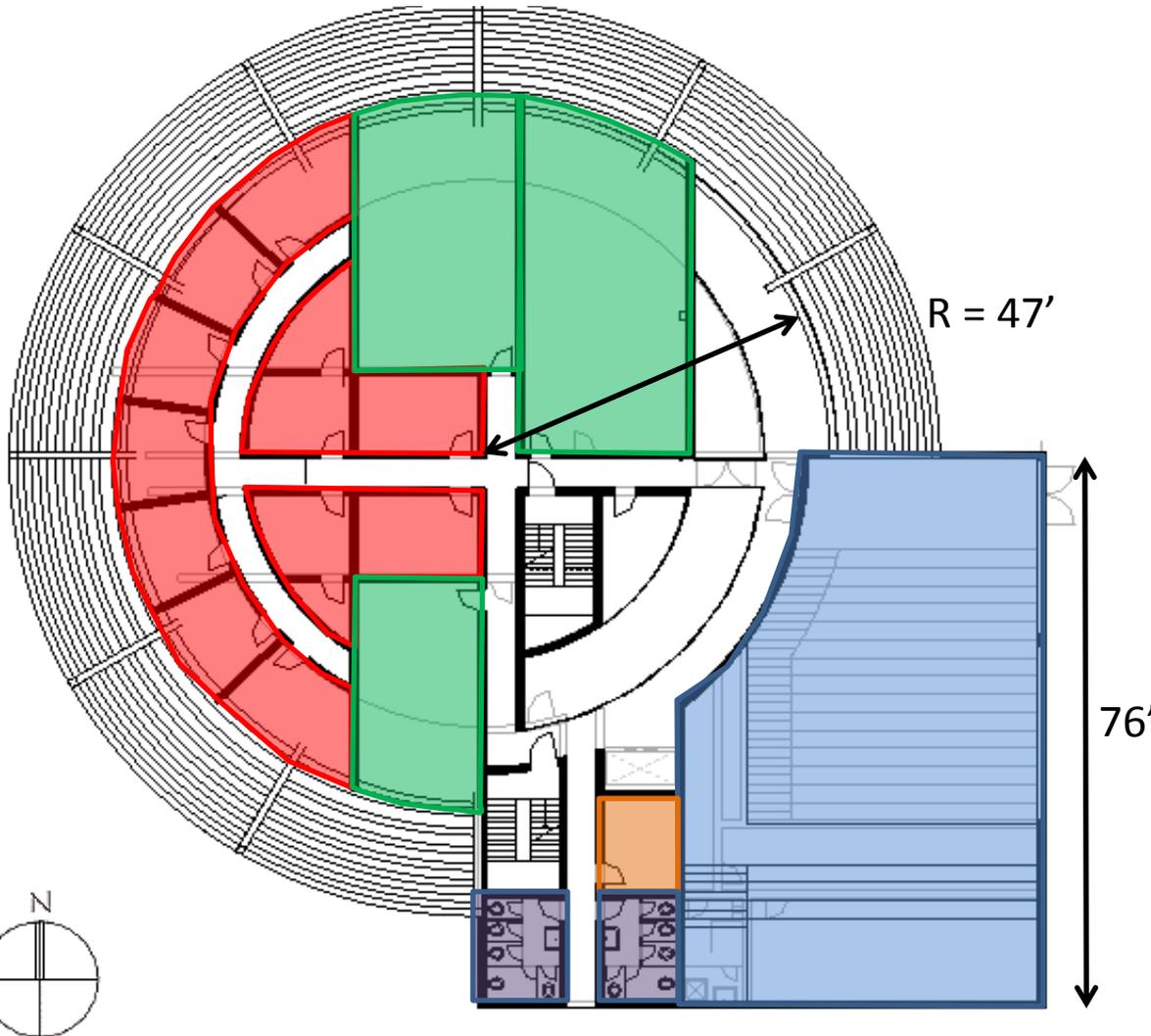
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Loading Considerations



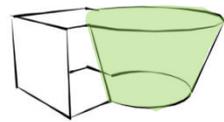
2nd Floor

A
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-  Auditorium 60 psf
-  Offices 50 psf
-  Classrooms 40 psf
-  Corridors 80 psf
-  MEP 100 psf
-  Bathroom 50 psf

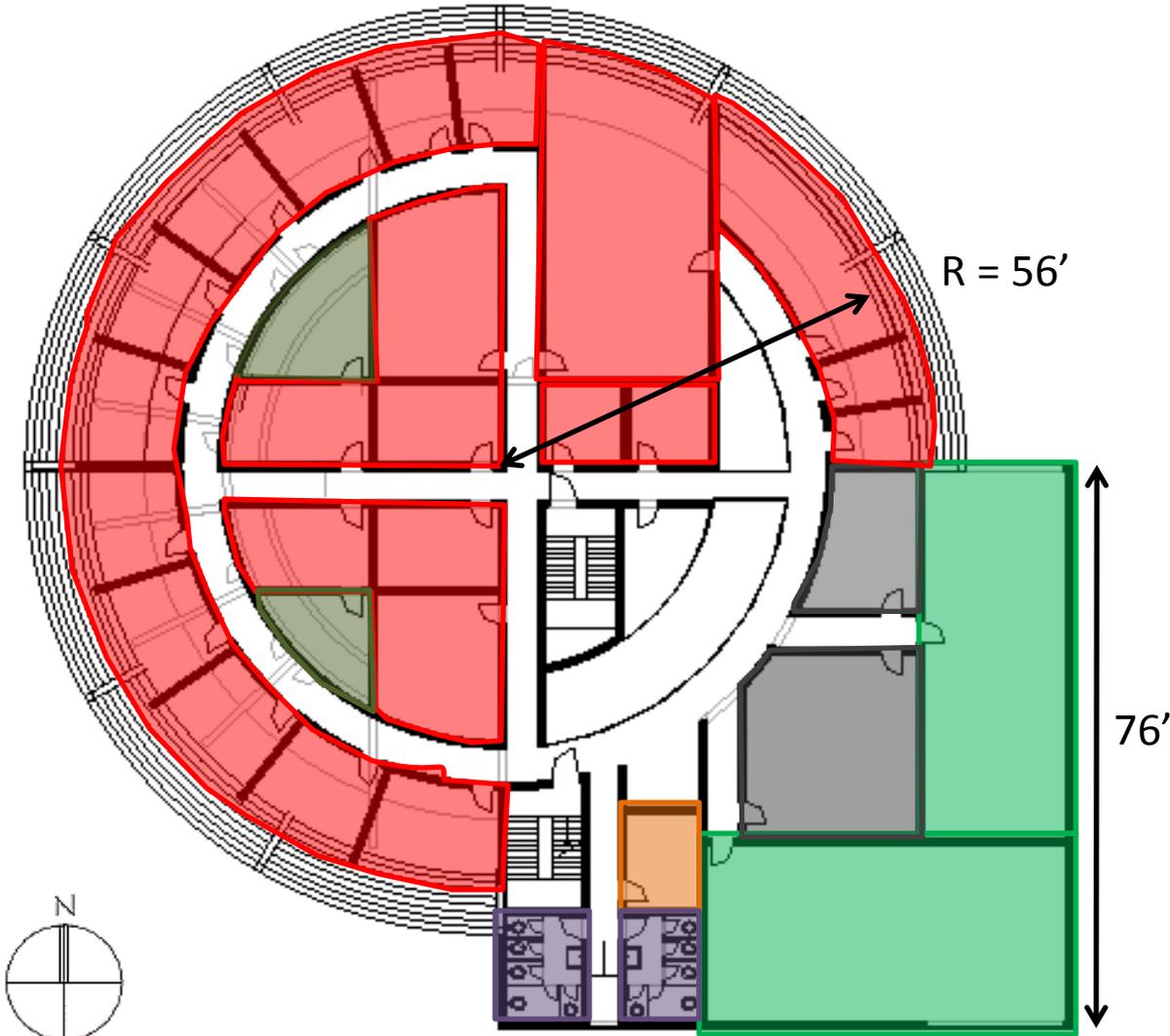
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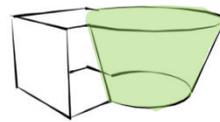
3rd Floor

A
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- Storage 100 psf
- Offices 50 psf
- Classrooms 40 psf
- Corridors 80 psf
- MEP 100 psf
- Bathroom 50 psf
- Server Room 100 psf

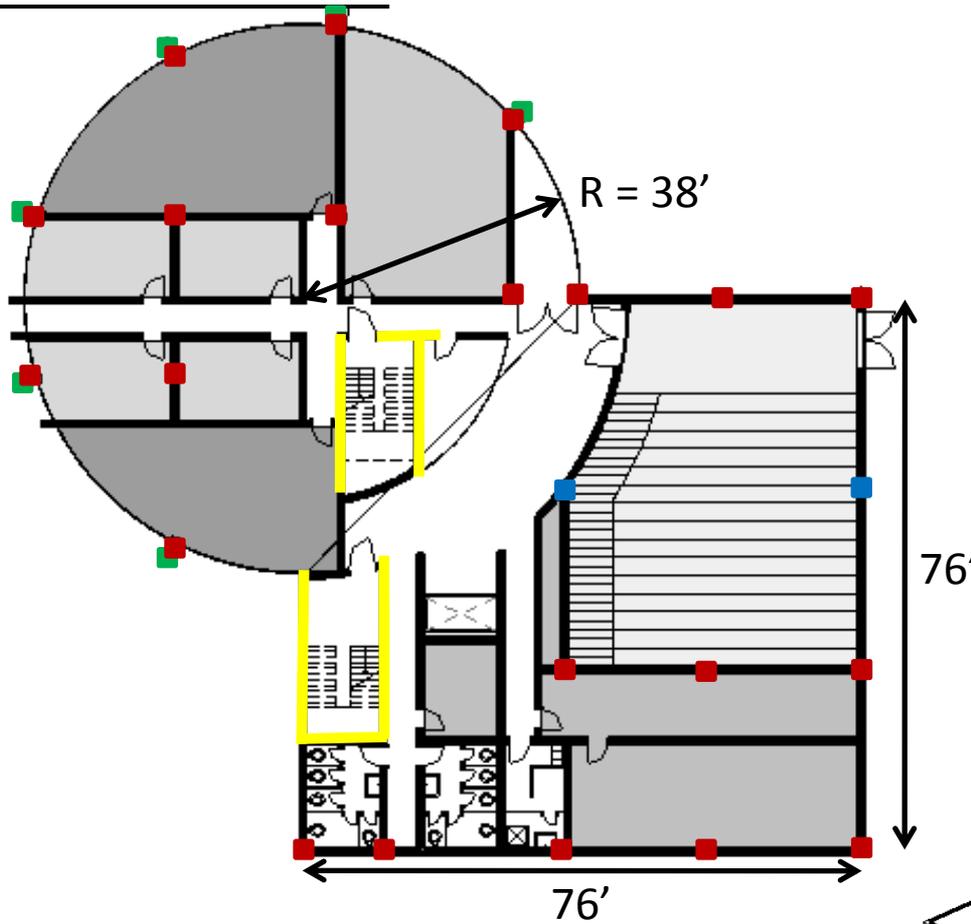


Structural System

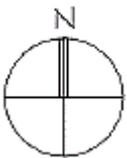
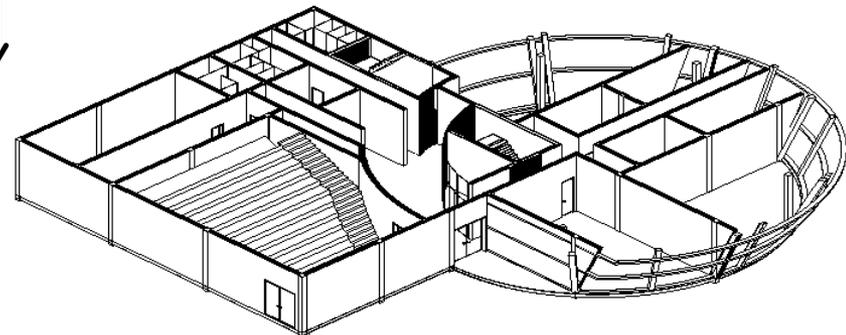


1st Floor

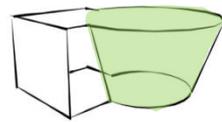
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- 8" Concrete Shear
- 16" x 16" Columns
- 12" x 12" Slanted Columns
- 20" x 20" Columns

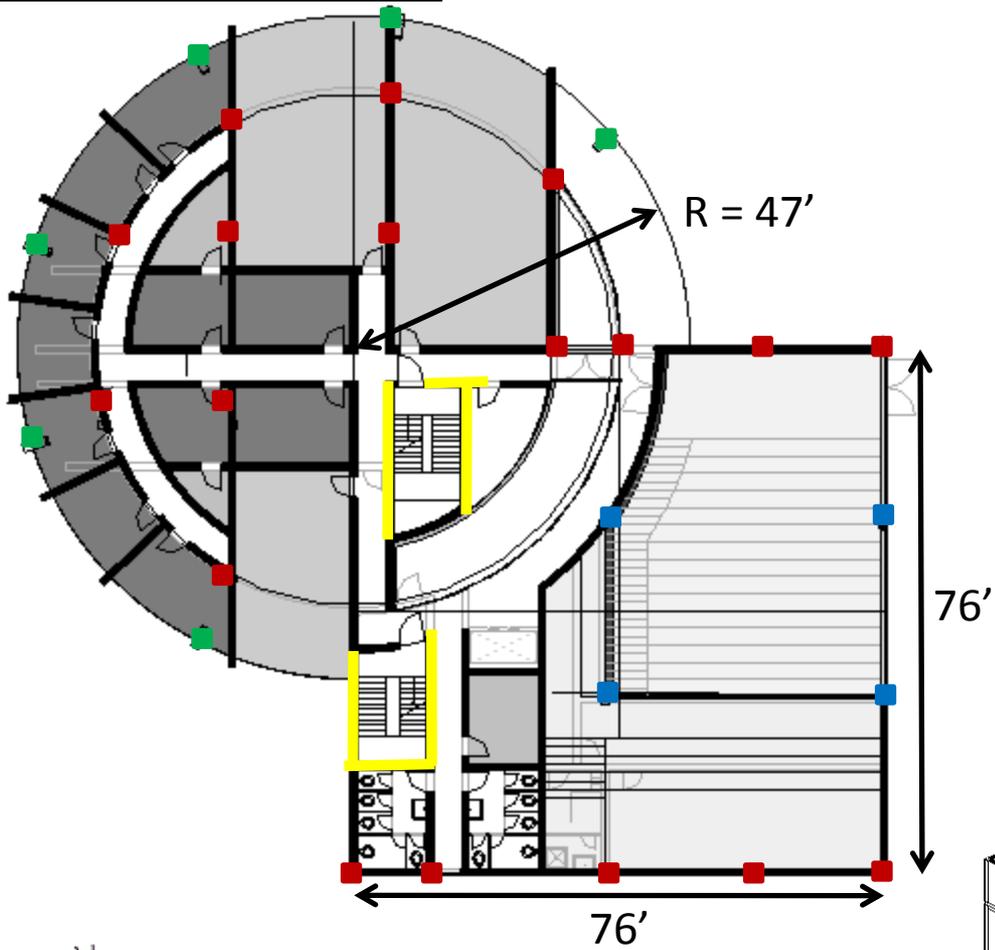


Structural System

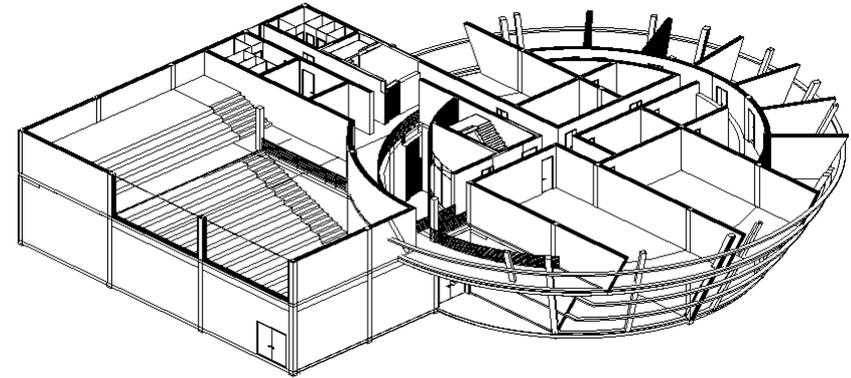


2nd Floor

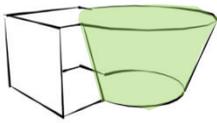
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- 8" Concrete Shear
- 16"x16" Columns
- 12"x12" Slanted Columns
- 20" x 20" Columns

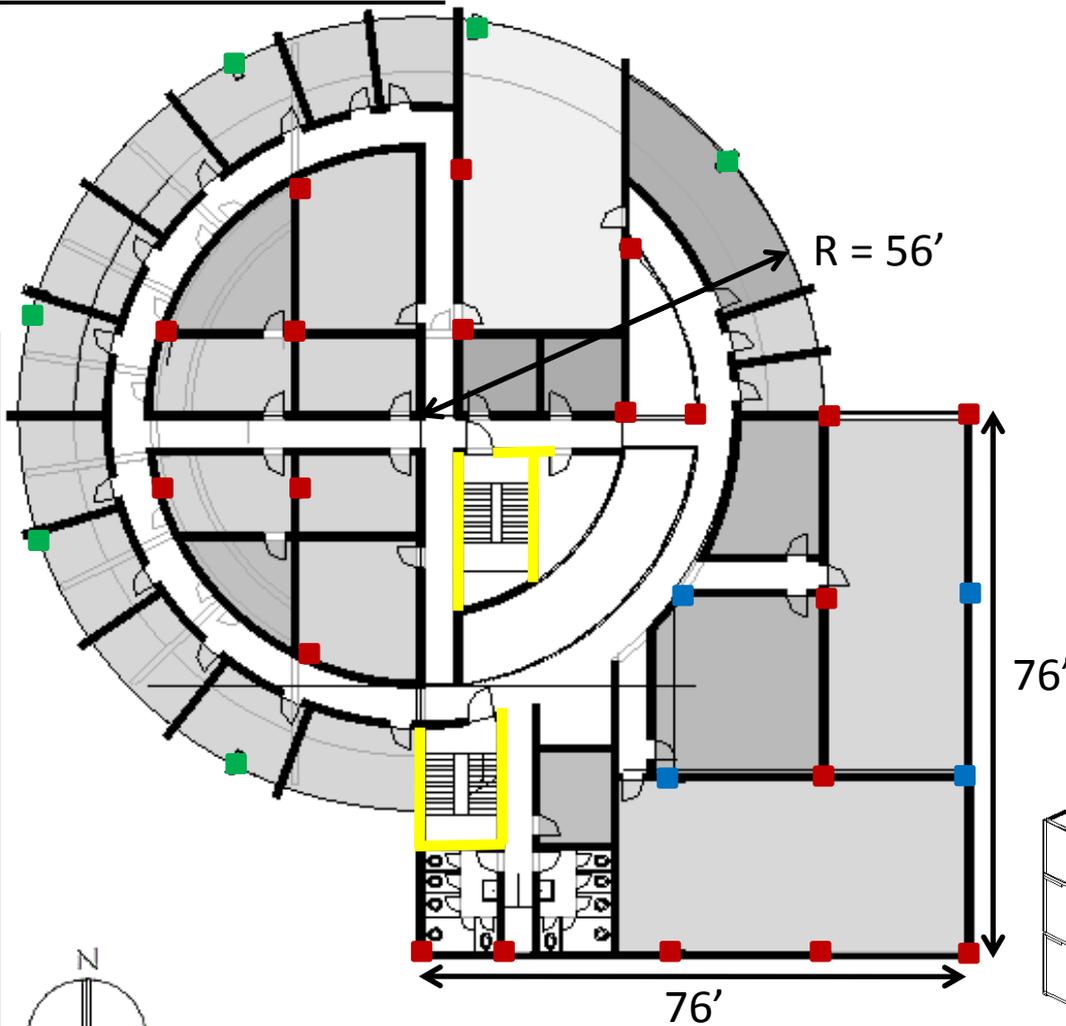


Structural System

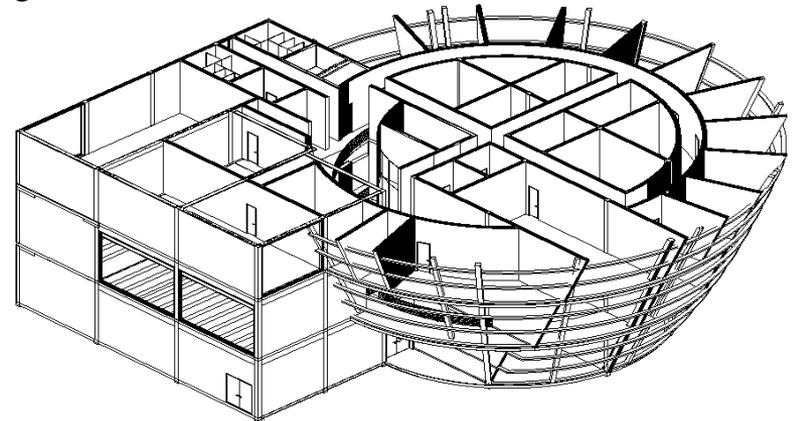


3rd Floor

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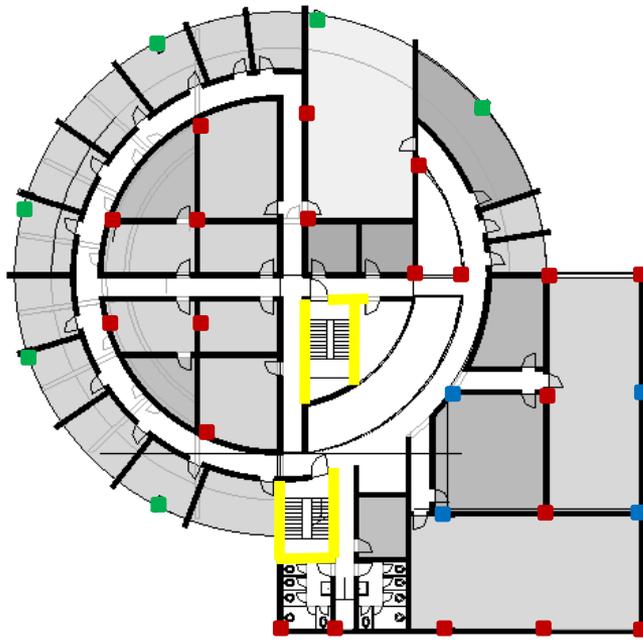
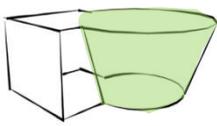


- 8" Concrete Shear
- 16"x16" Columns
- 12"x12" Slanted Columns
- 20" x 20" Columns



Details

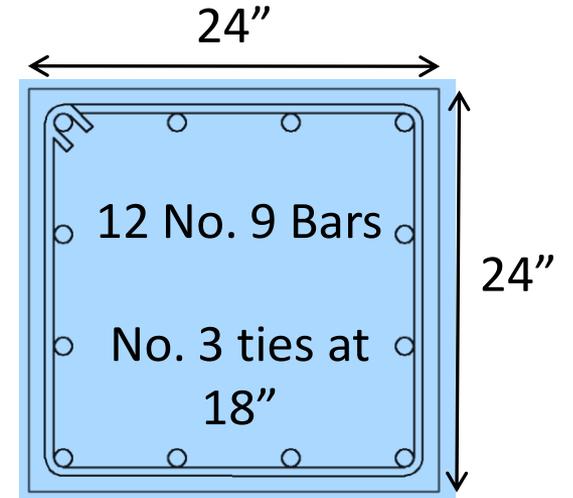
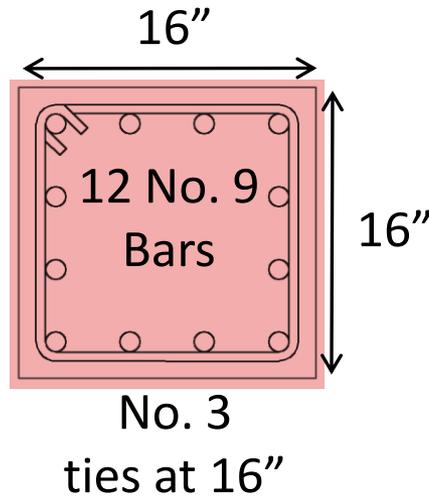
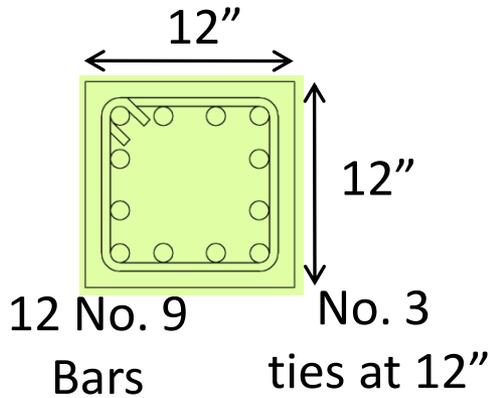
Column Sizes



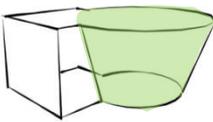
Slanted Columns

Typical Columns

Auditorium Columns

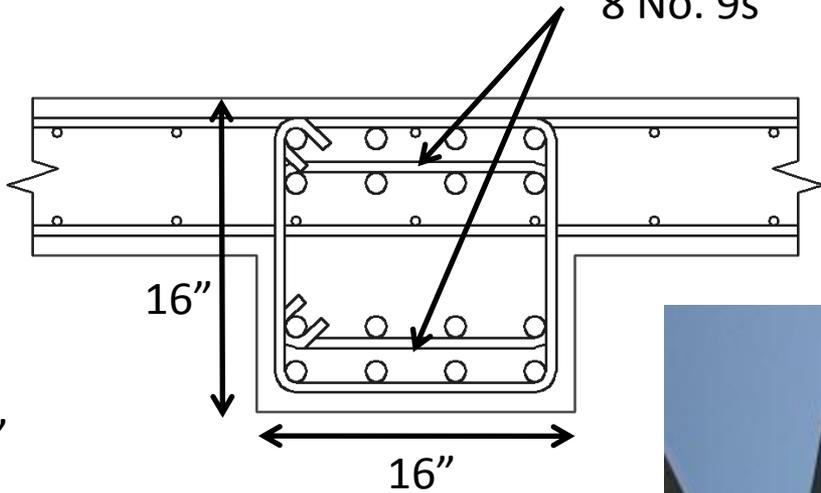
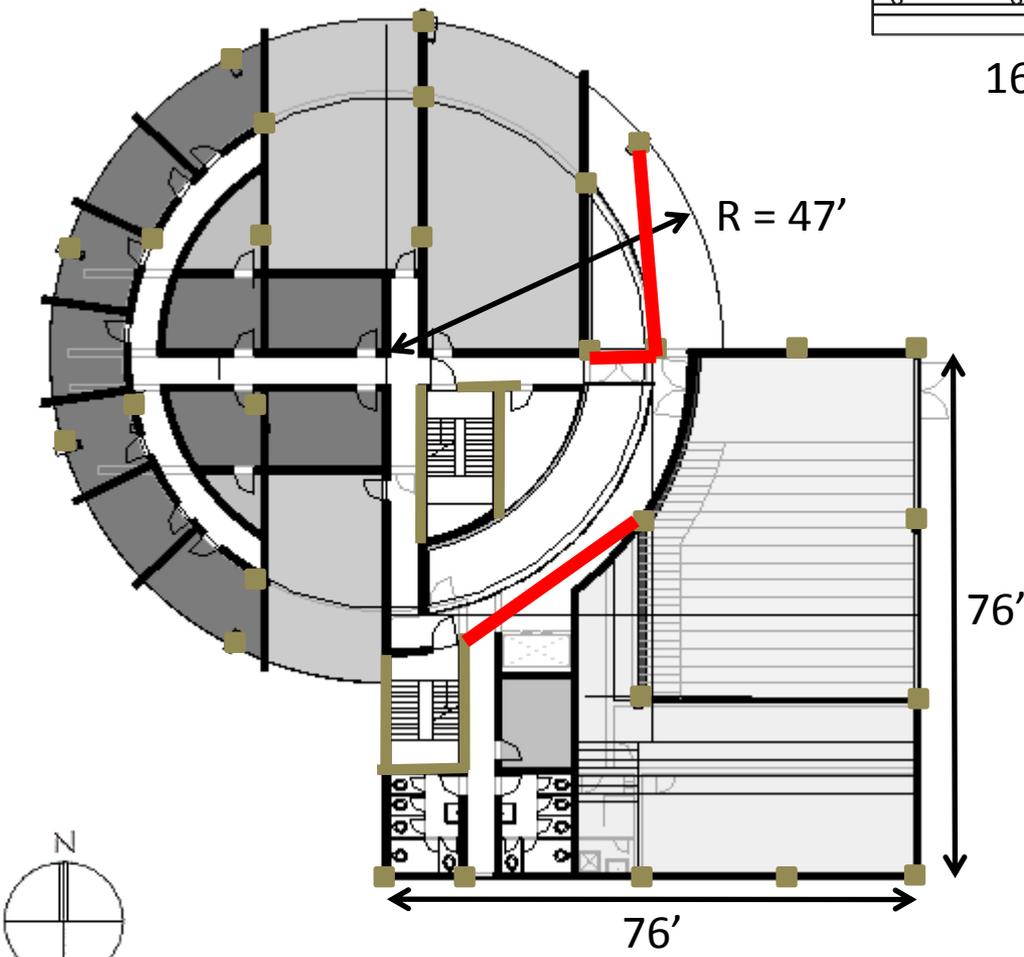


Walkway Details



A
E
M
C
atlantic team

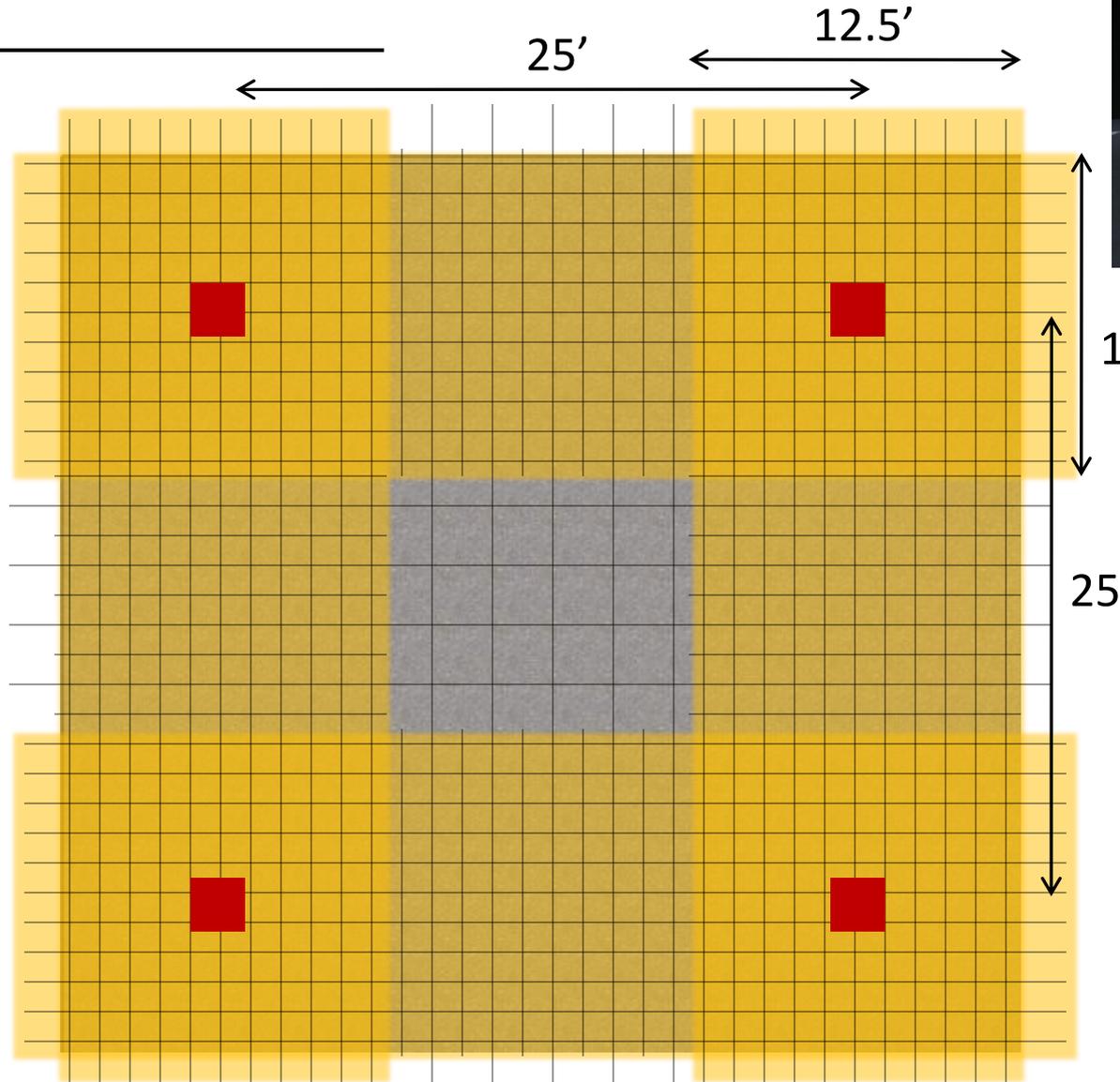
8 No. 9s



Flat Slab System



A
E
M
C
atlantic team



12.5'

25'

8" Slab system

■ Columns

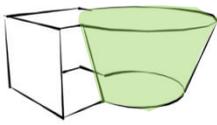
Typical Slab System

- Positive 1 No. 4 / ft

■ Column Strip System

- Positive 2 No. 4/ ft

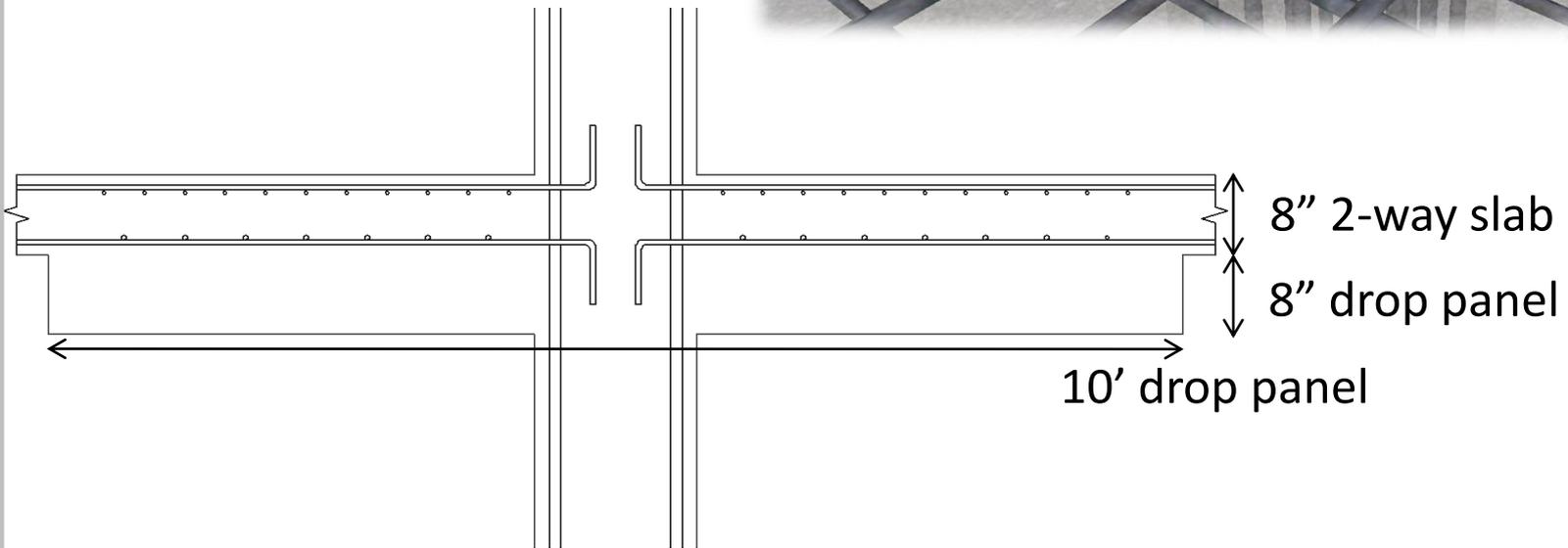
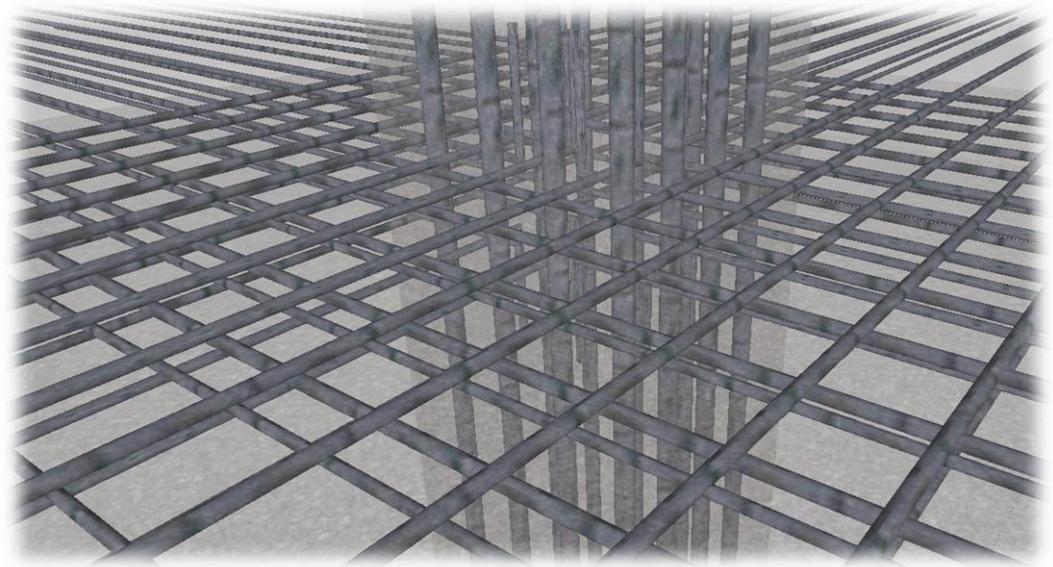
- Negative 3 No. 4/ ft
(8 ft cutoff)



Connections

Slab to Column

A
E
M
C
atlantic team

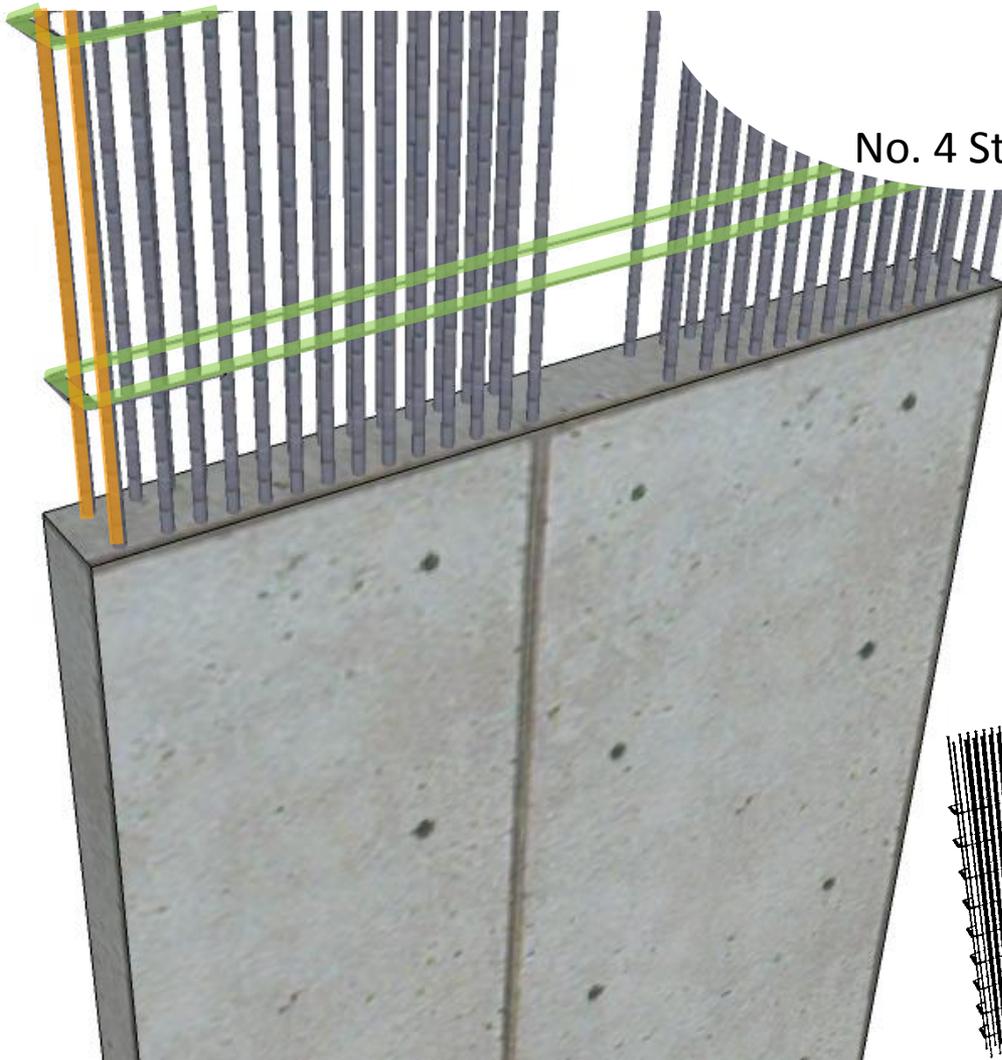


Details

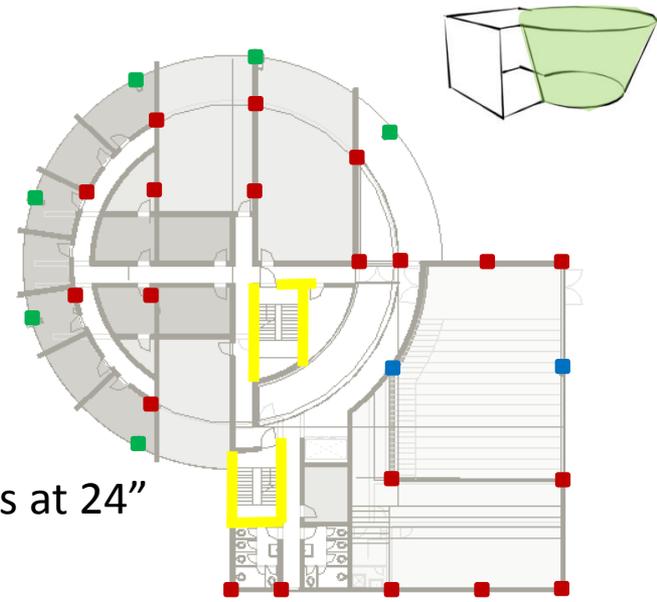
Shear Wall

A
E
M
C
atlantic team

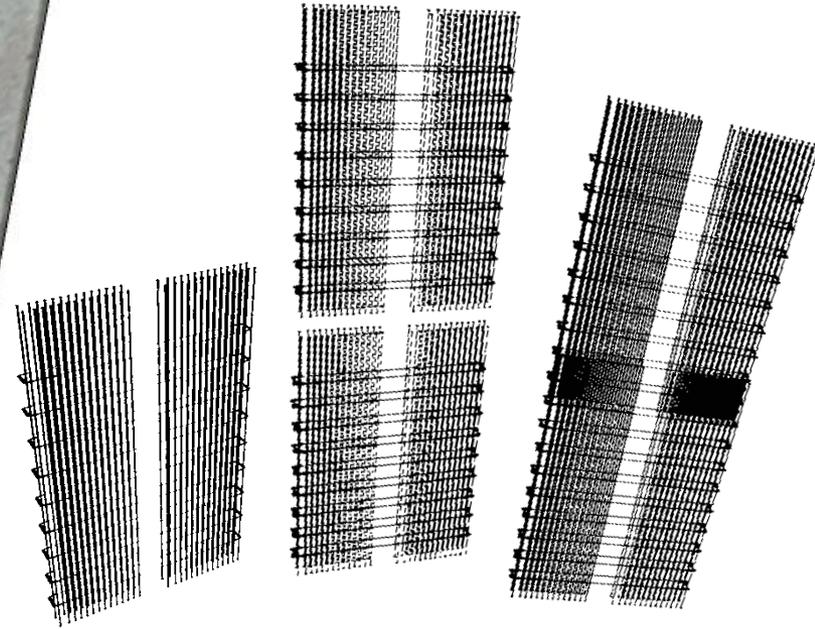
28 No. 6 Longitudinal Bars



No. 4 Stirrups at 24"



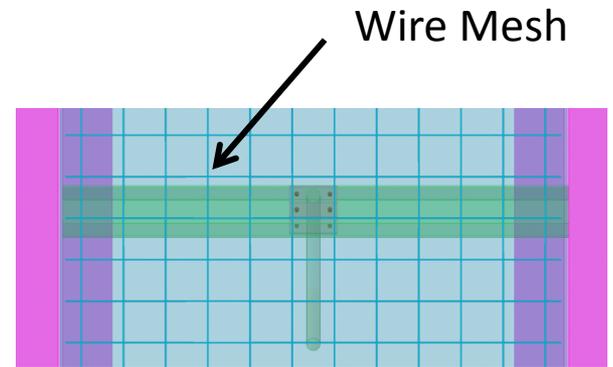
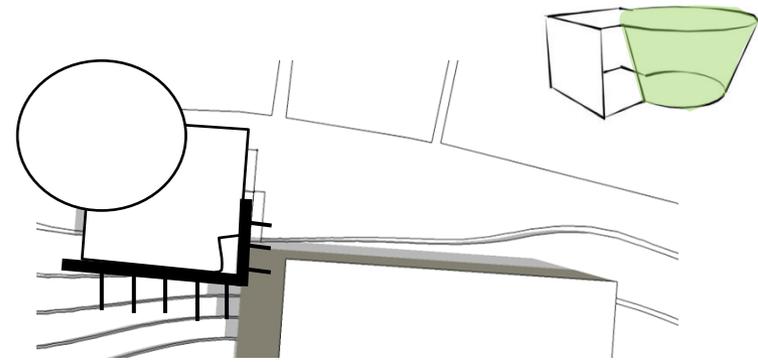
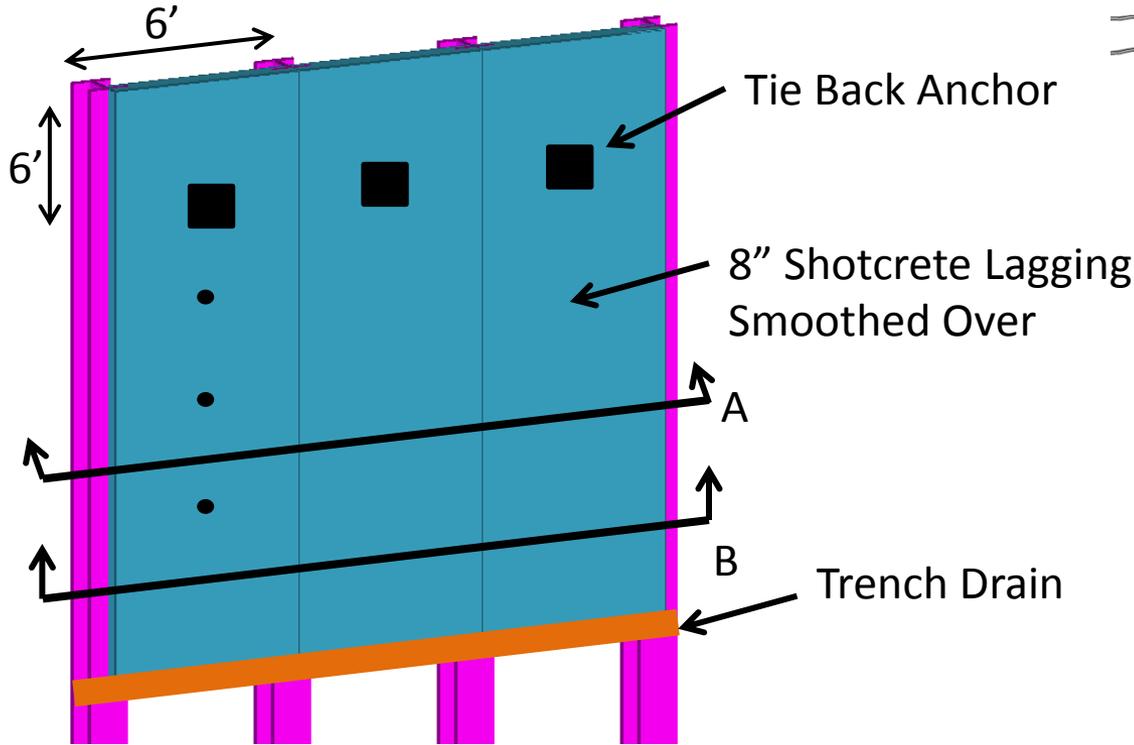
Modular Design



Details

Soldier Pile Retaining Wall

A
E
M
C
atlantic team

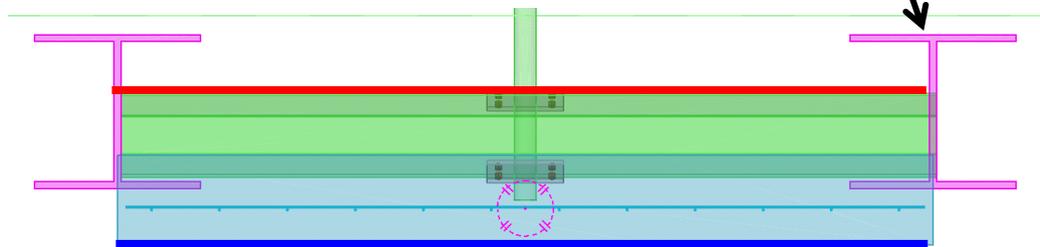
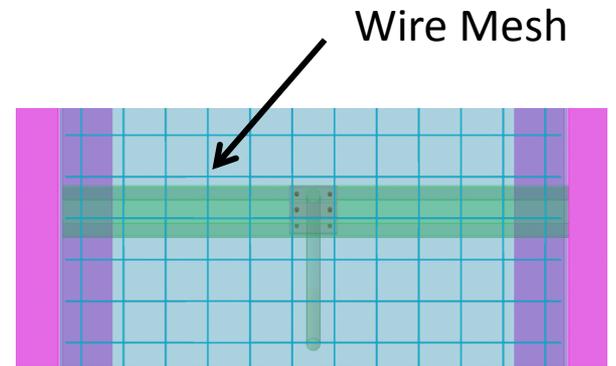
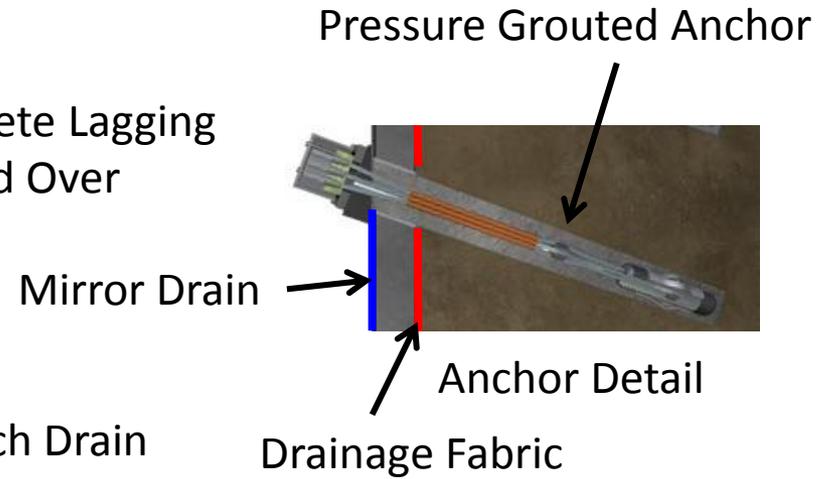
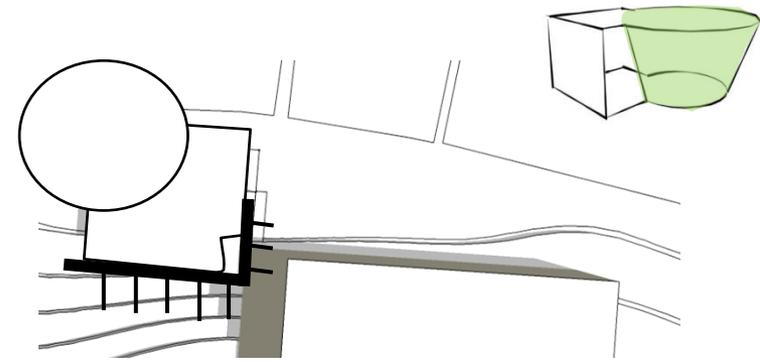
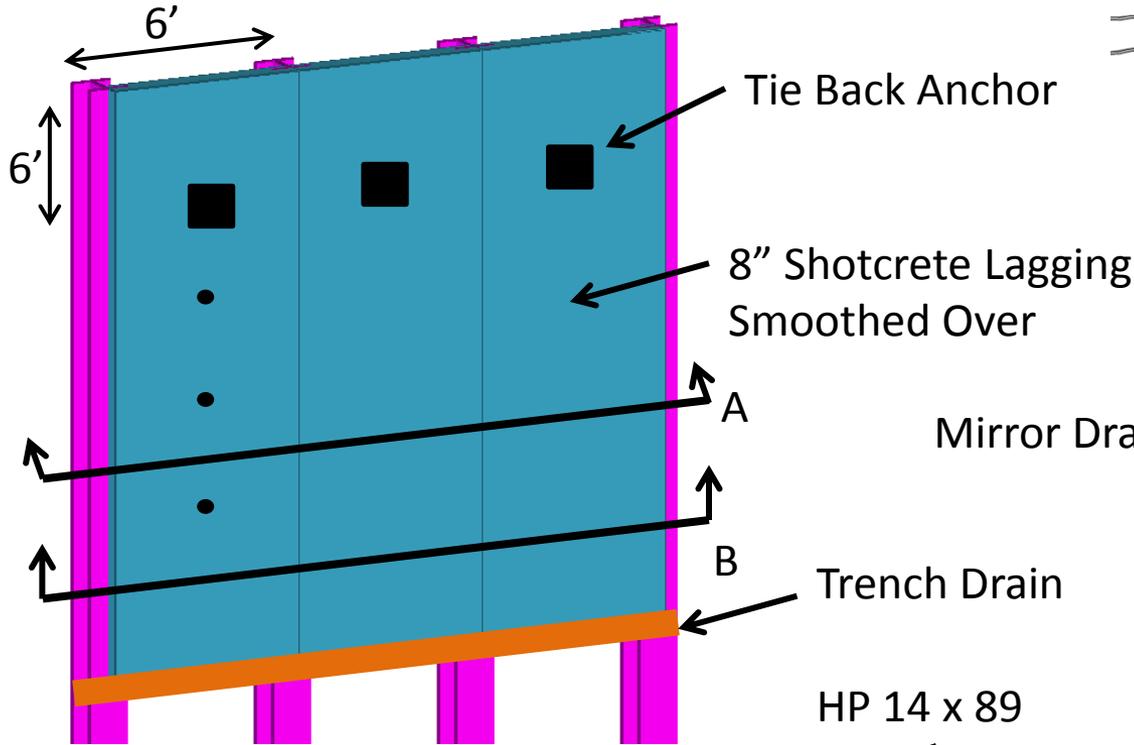


Section B

Details

Soldier Pile Retaining Wall

A
E
M
C
atlantic team

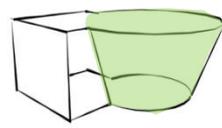


Section A

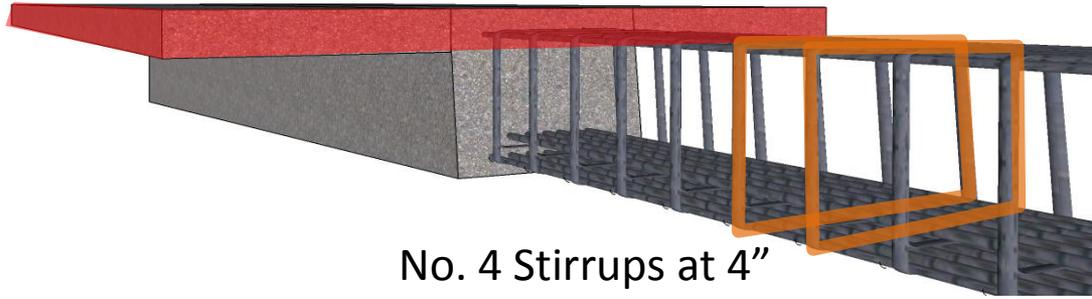
Section B

Details

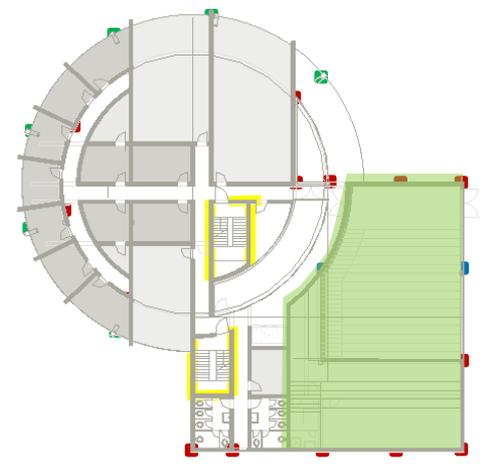
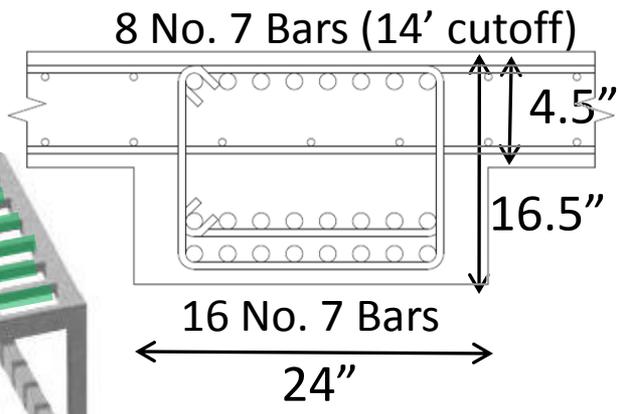
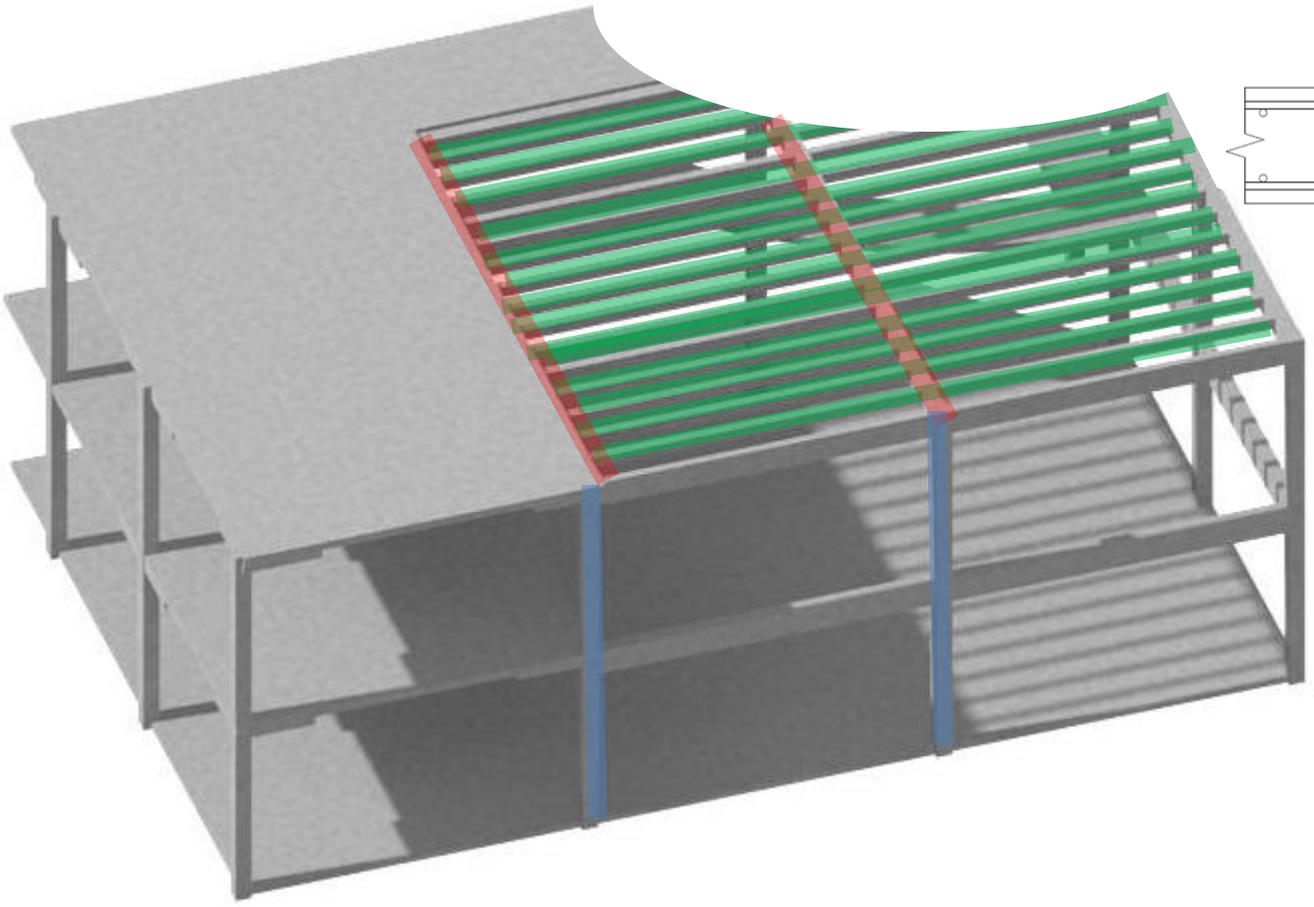
Auditorium



A
E
M
C
atlantic team

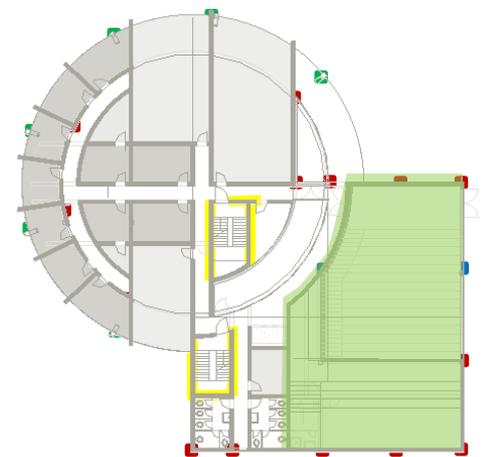
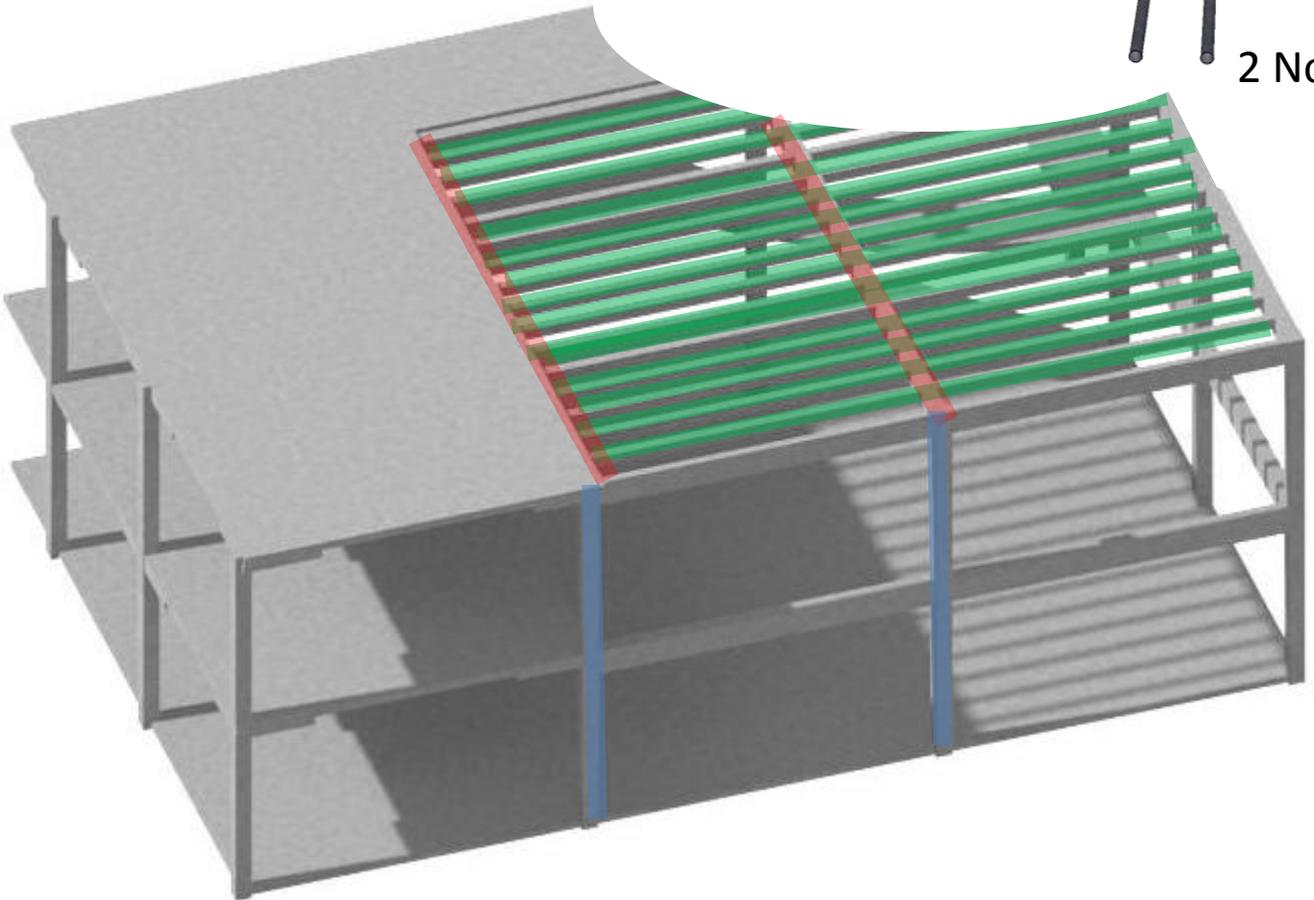
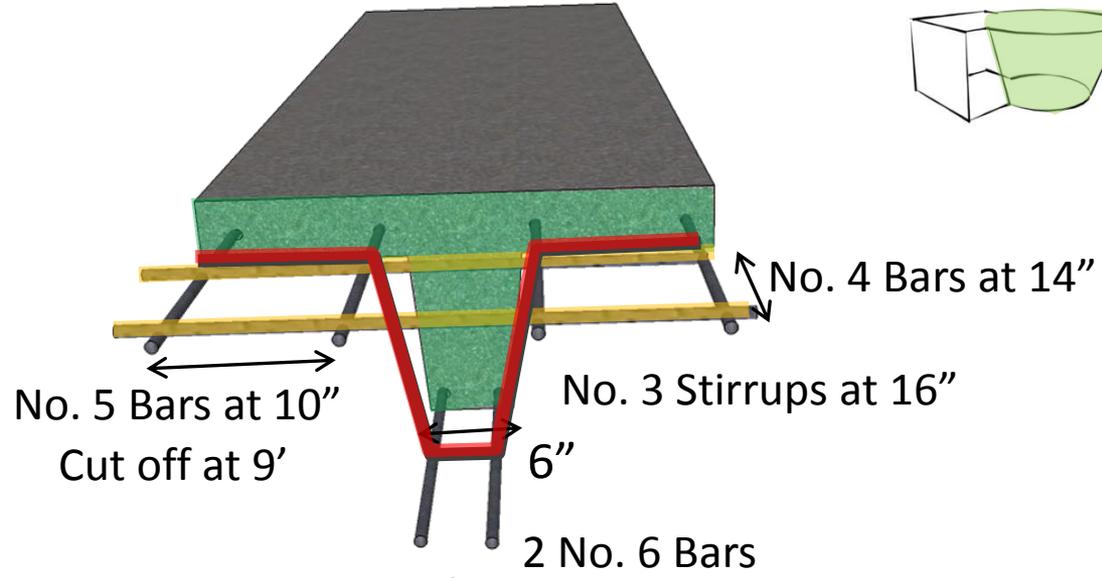
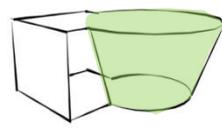


No. 4 Stirrups at 4"



Details

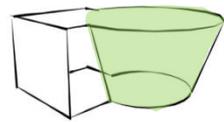
Auditorium



A
E
M
C
atlantic team

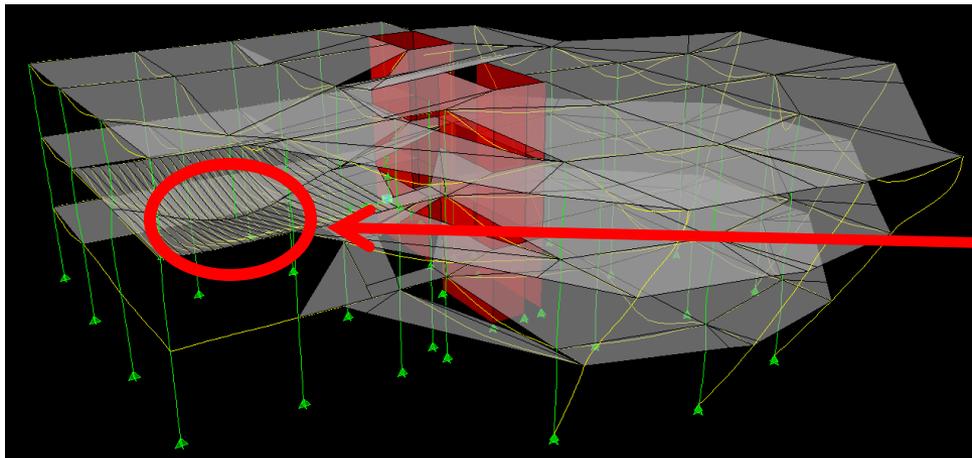
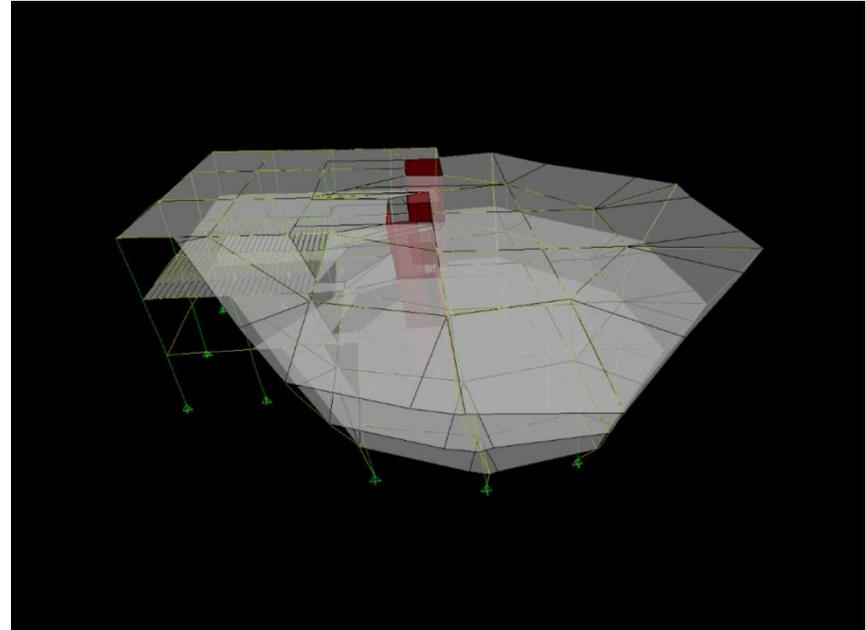
Modeling

ETABS



A
E
M
C
atlantic team

Mode shape showing lateral interaction



Max deflection = 1.25"
Allowable deflection=1.33"

MEP biotope

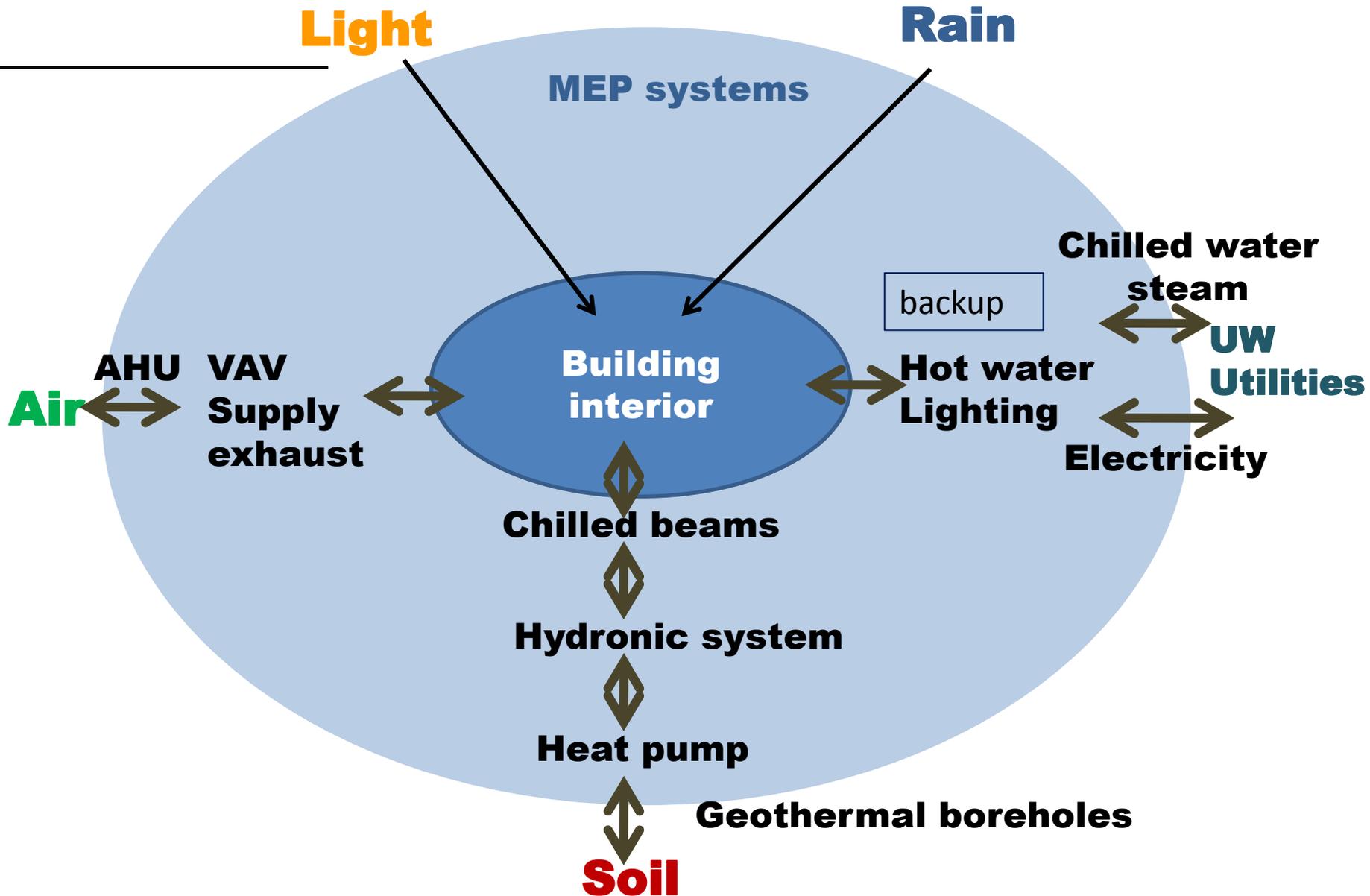
Blossom

A
E
M
C



MEP biotope *Environment*

A
E
M
C



MEP structure

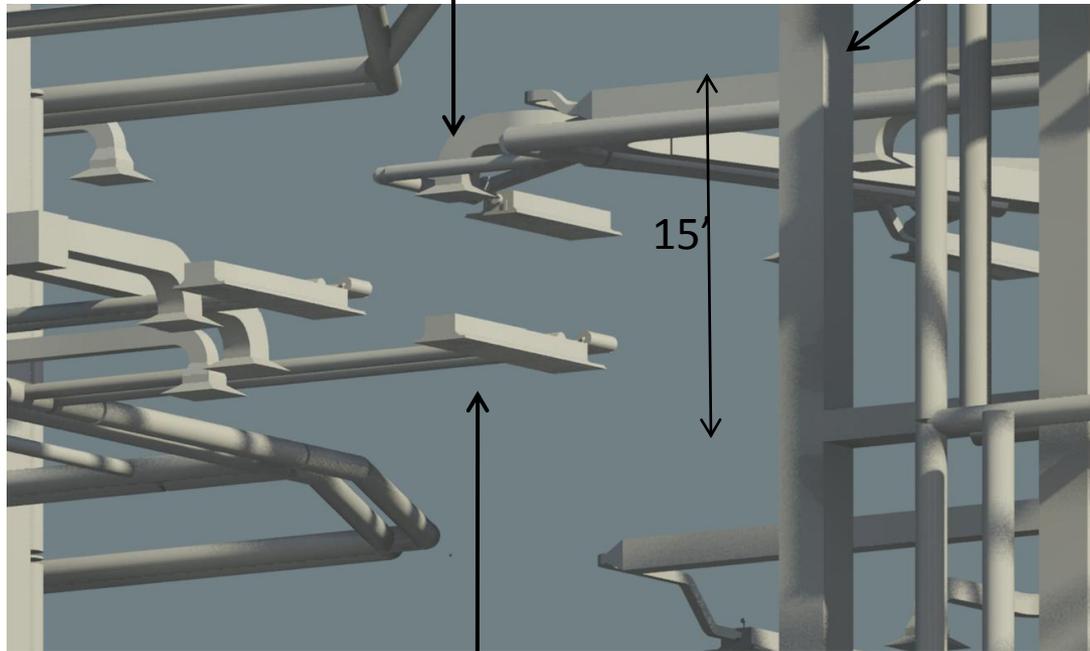
HVAC



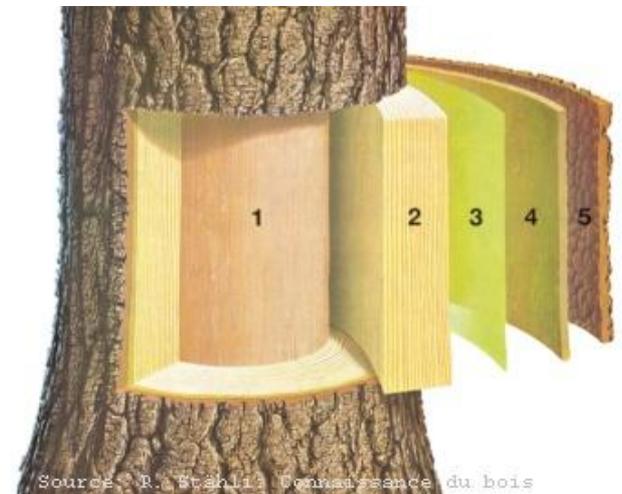
A
E
M
C

Diffusers + Ducts

Ducts in shafts



Chilled beams + Ducts + Pipes

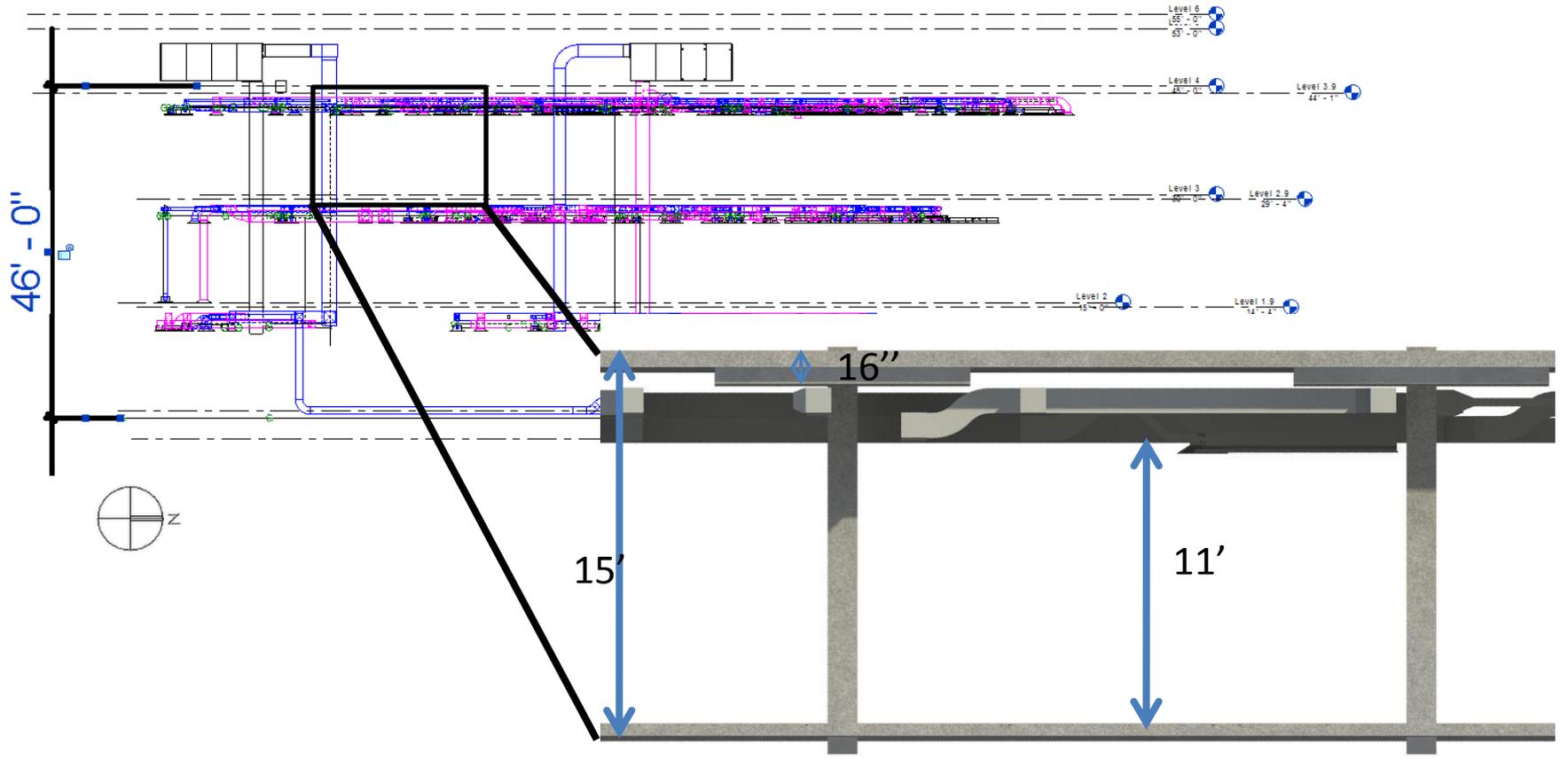




Floor sandwich

3 1/2 " of MEP space

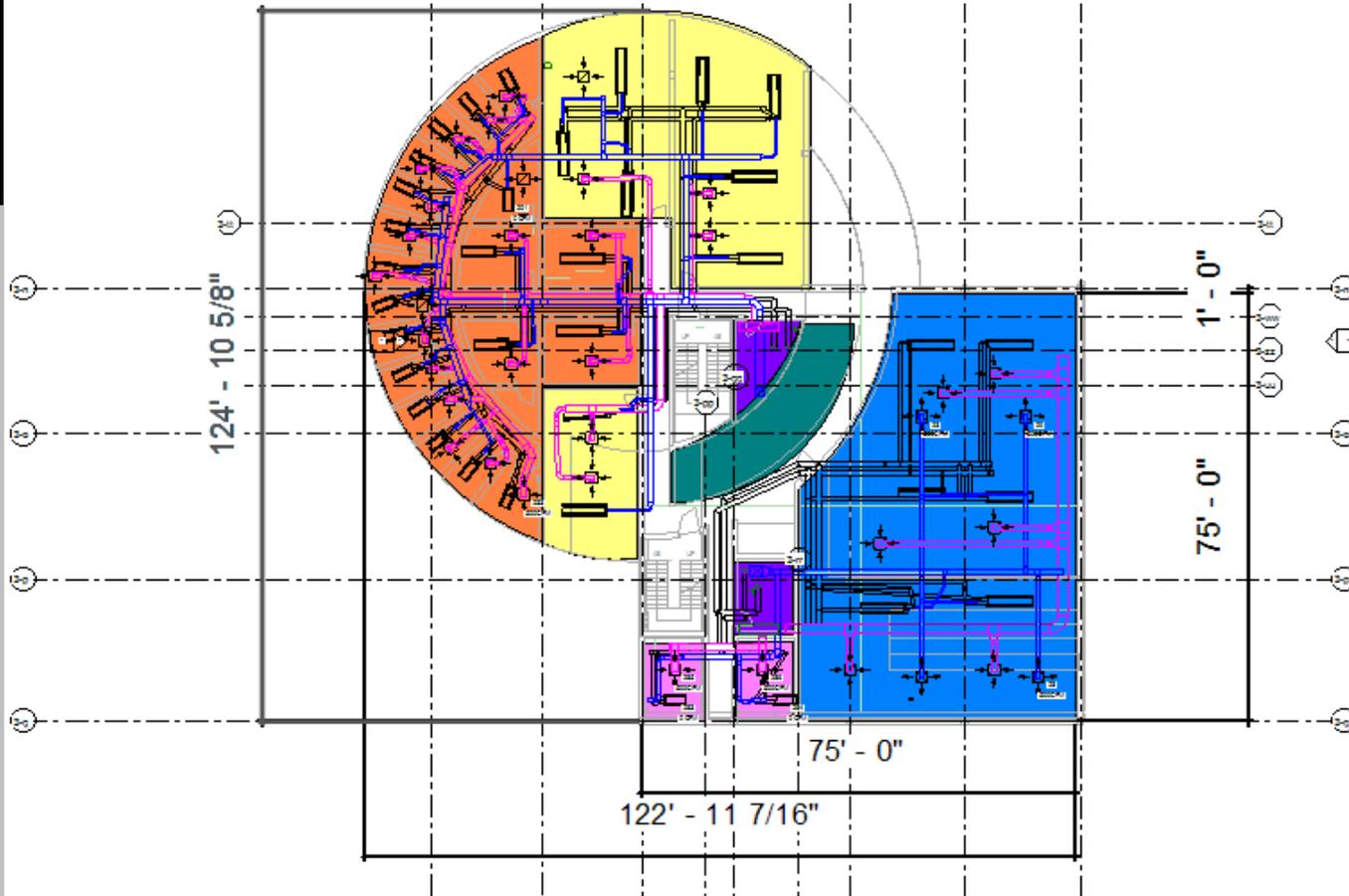
A
E
M
C



MEP Floor plans

Second floor

A
E
M
C

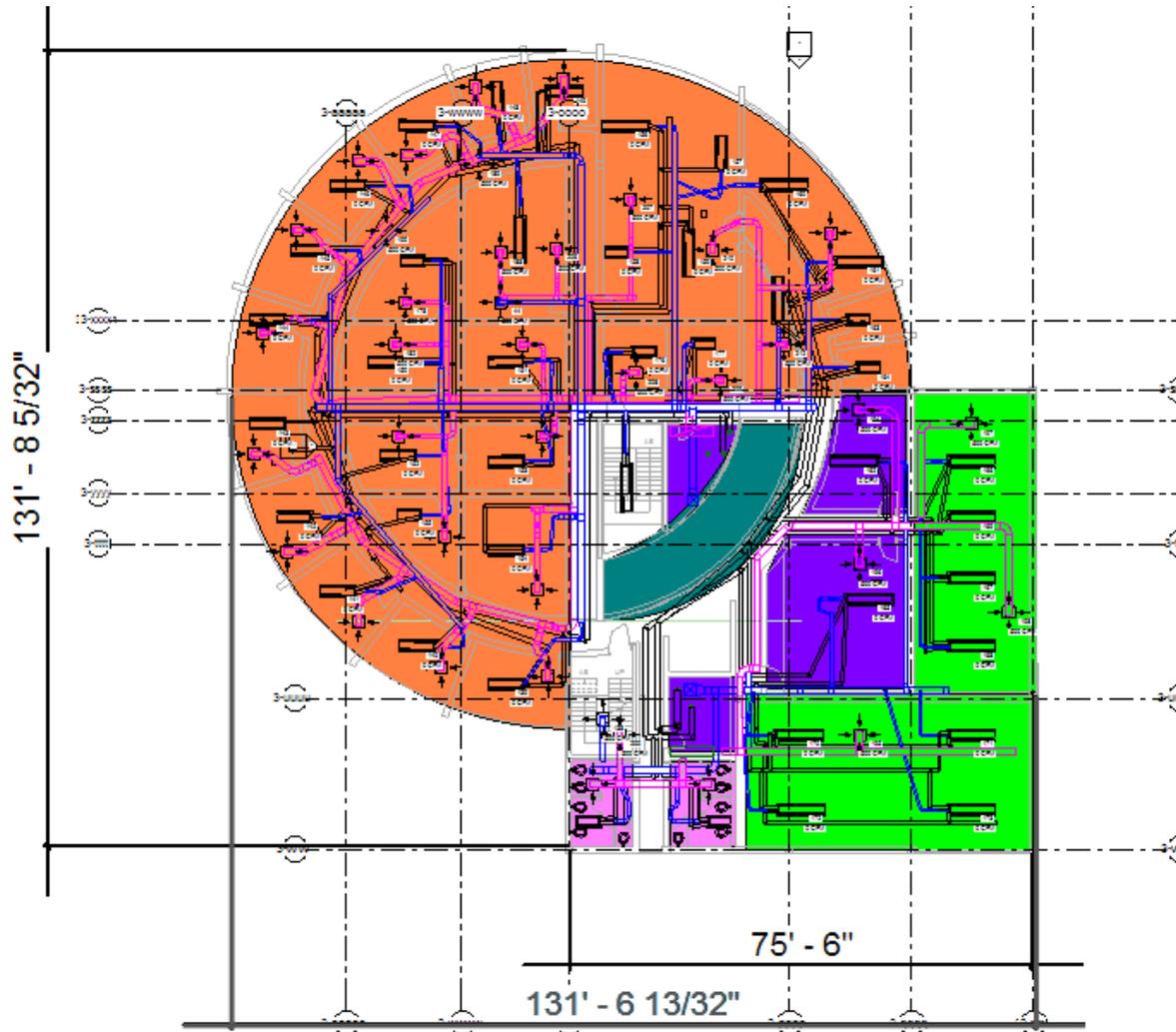


-  Classrooms
 -  Auditorium
 -  Offices
 -  Atrium
 -  Restrooms
 -  Mechanical rooms
 -  Corridors
- 

MEP Floor plans

Third floor

A
E
M
C



-  Labs
-  Offices
-  Atrium
-  Restrooms
-  Mechanical rooms
-  Corridors
- 



HVAC

CFM requirements

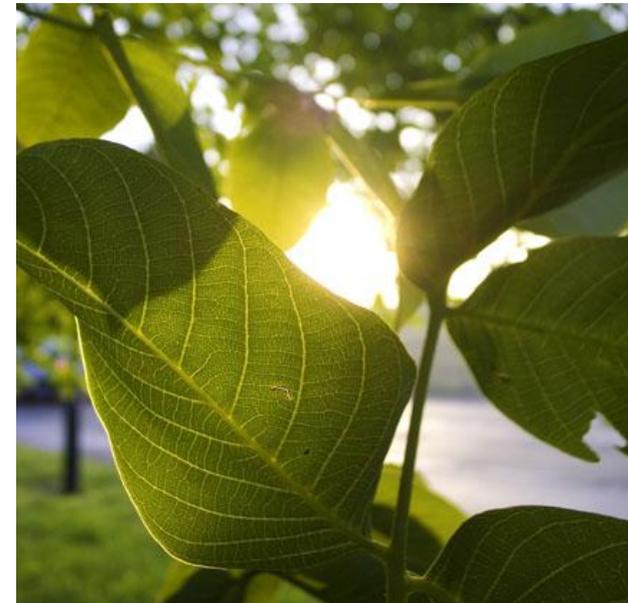
A
E
M
C

	area %	max occupancy	CFM/pers	max CFM zone
Classrooms	10.8	75	15	1125
Offices	17.5	200	20	4000
Corridor	11.9	20	15	300
Auditorium	19.1	470	15	4700
Atrium	27.4	500	10	5000
Restrooms	4	20	50	1000
Labs	7.2	100	20	2000
Server room	2	25	15	375
			TOTAL CFM	18500

Lighting

and additional heat loads

	area %	Lighting (W/sqft)	Additional Load (W/sqft)
Classrooms	10.8	1.45	20
Offices	17.5	1.49	20
Corridor	11.9	0.57	
Auditorium	19.1	1.62	5
Atrium	27.4	1.77	
Restrooms	4	0.77	
Labs	7.2	1.24	40
Server room	2	1.45	50



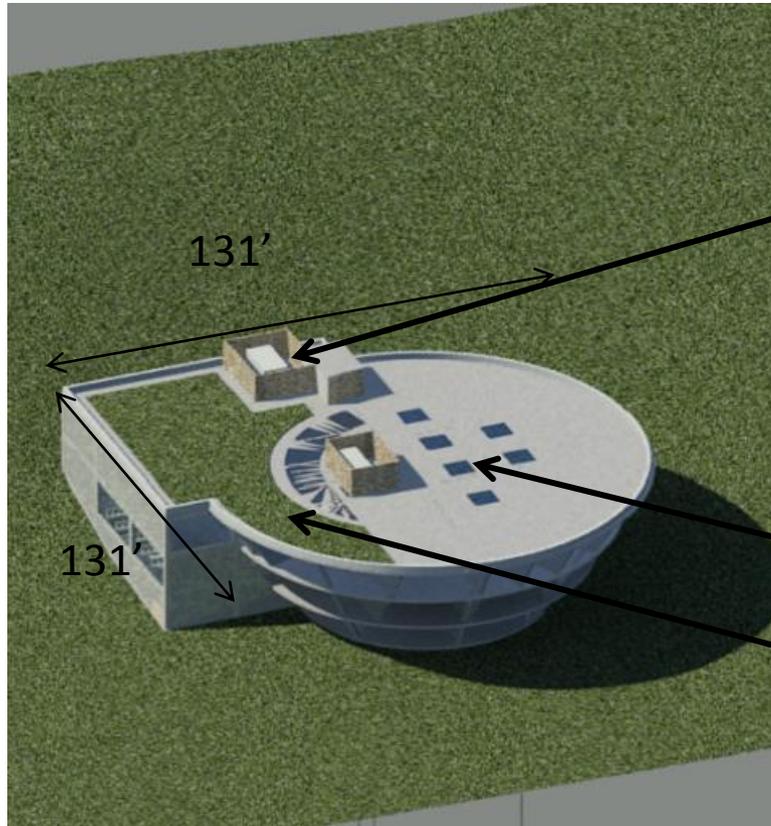
RAIN

AIR

Roof area

Water catchment

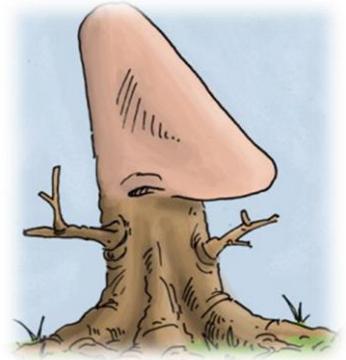
A
E
M
C



Air Handling Unit
10,000 CFM

Water catchment

Green roof
Additional R-11

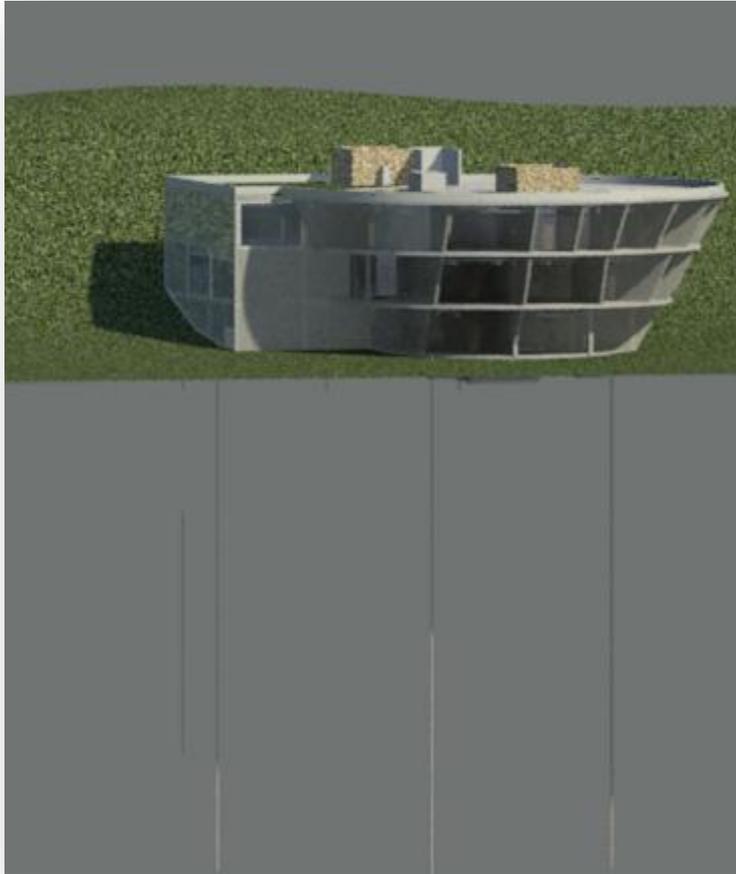




Geothermal roots

Ground source heat pump

A
E
M
C



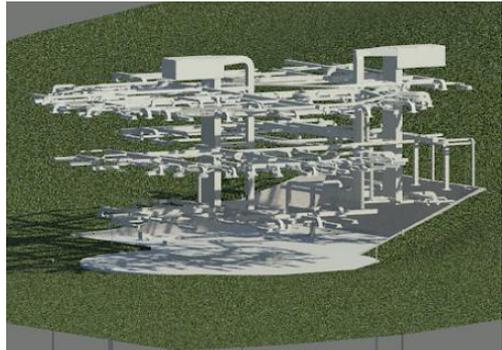


Ground source heat pump

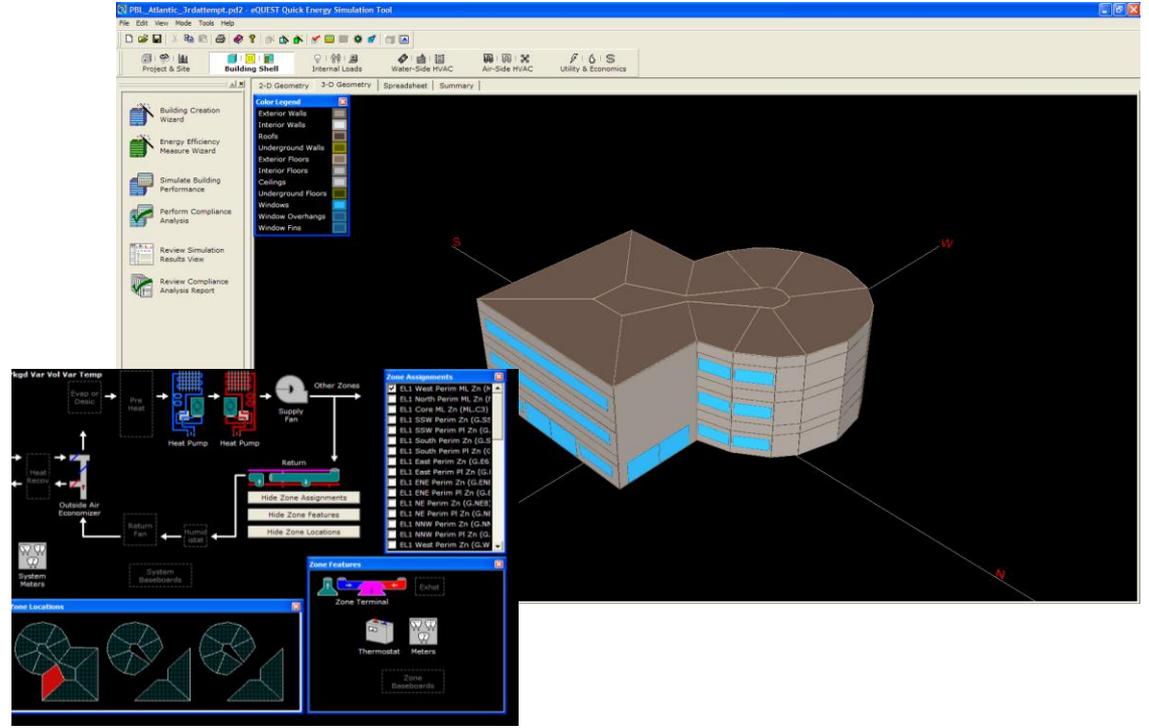
Sizing

Six 150 ft- deep boreholes and heat pump 11 EER sized with Equest :

A
E
M
C



150 ft



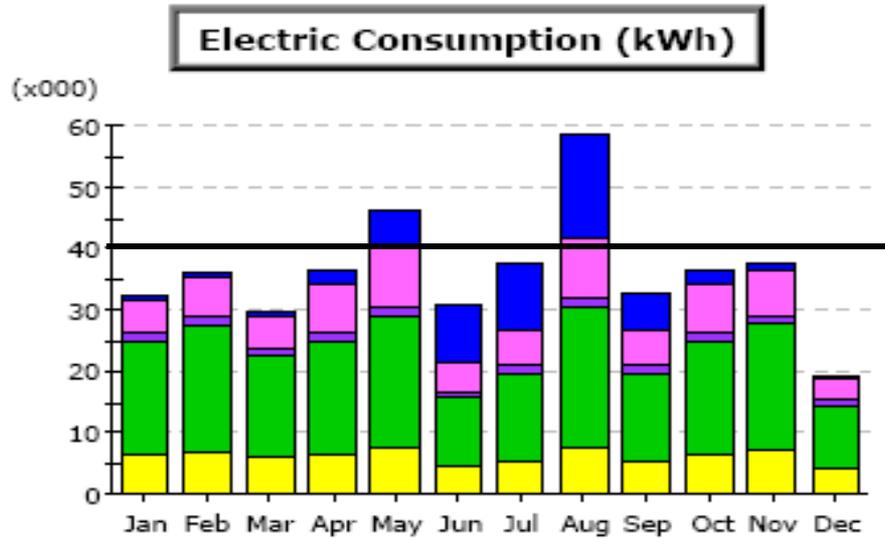
MEP ↔ C : First delay estimated 2 months, finally only one week and first cost in the budget!



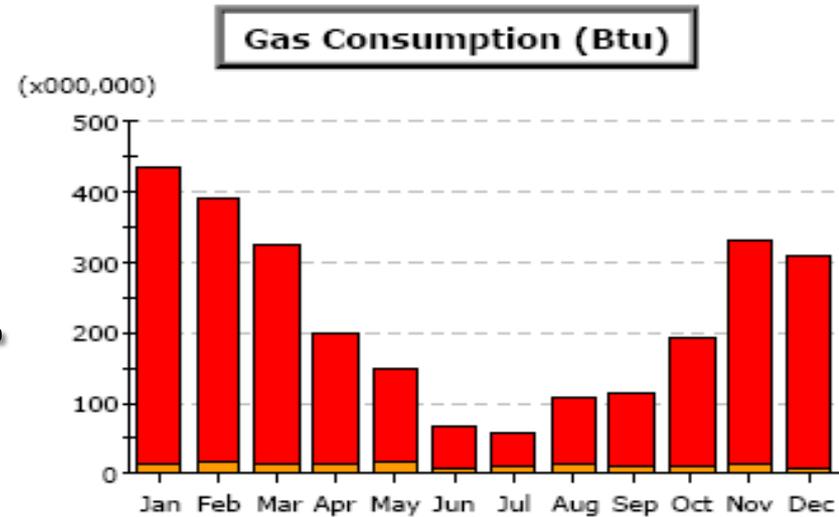
Baseline Energy Consumption

without ground source heat pump

A
E
M
C



+



- Area Lighting
- Task Lighting
- Misc. Equipment
- Exterior Usage
- Pumps & Aux.
- Ventilation Fans

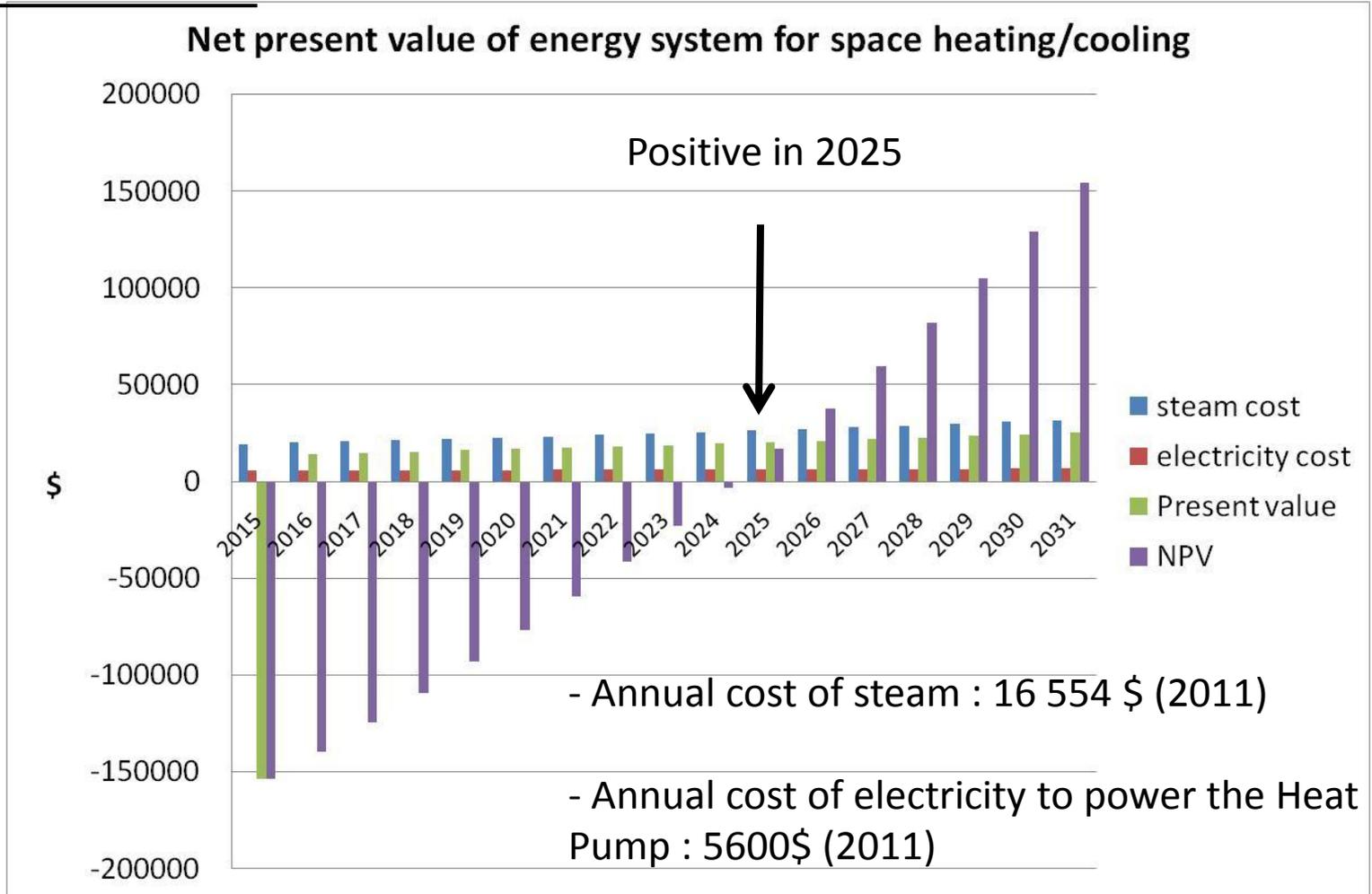
- Water Heating
- Ht Pump Supp.
- Space Heating
- Refrigeration
- Heat Rejection
- Space Cooling



NPV for ground source heat pump

10 years payback

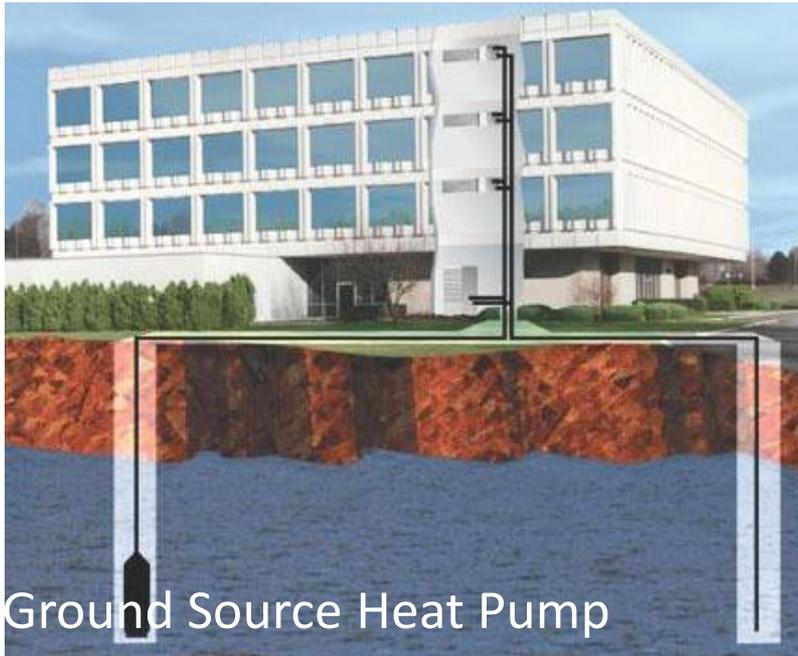
A
E
M
C



Energy And Atmosphere



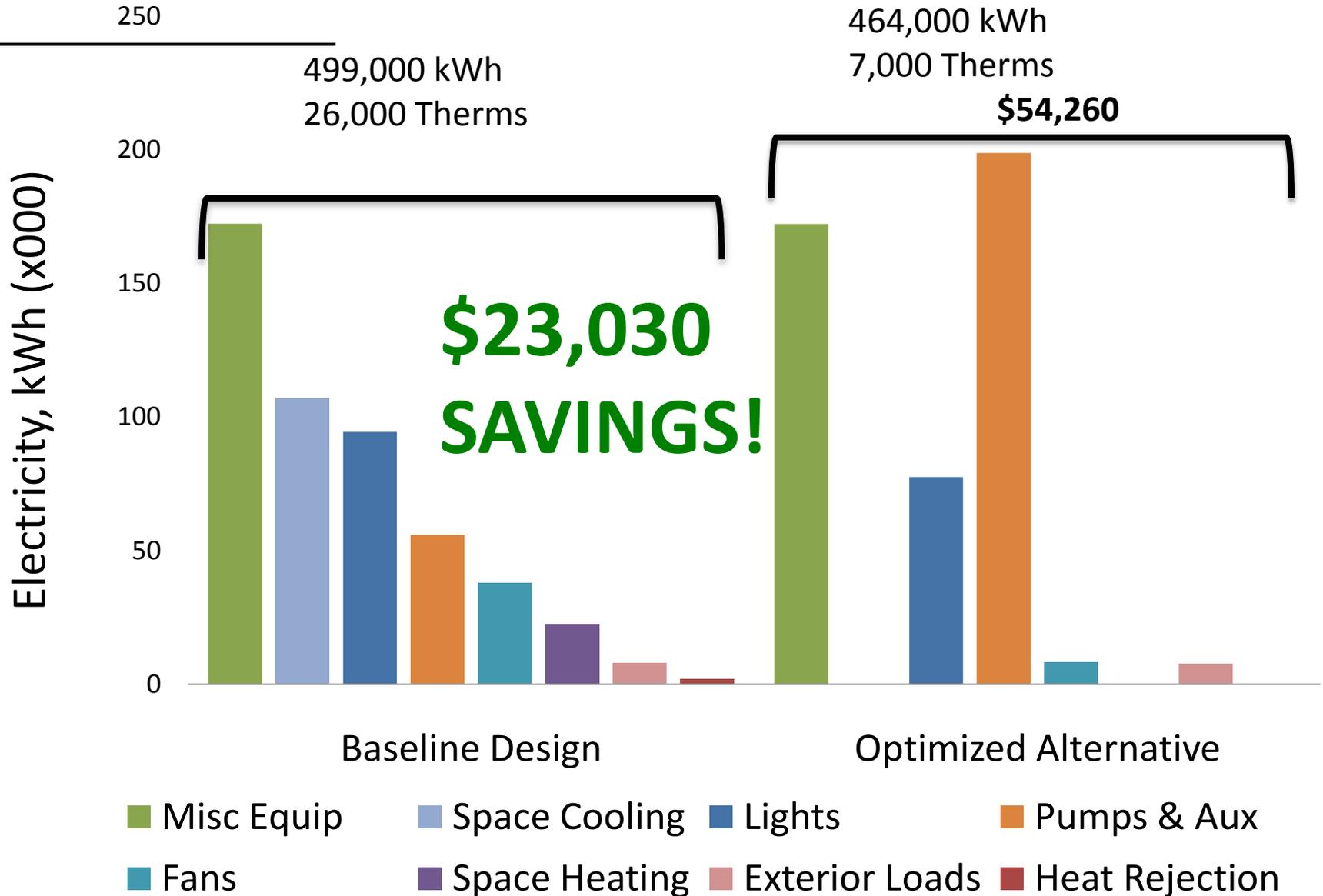
A
E
M
C
atlantic team



Annual Electricity End Use



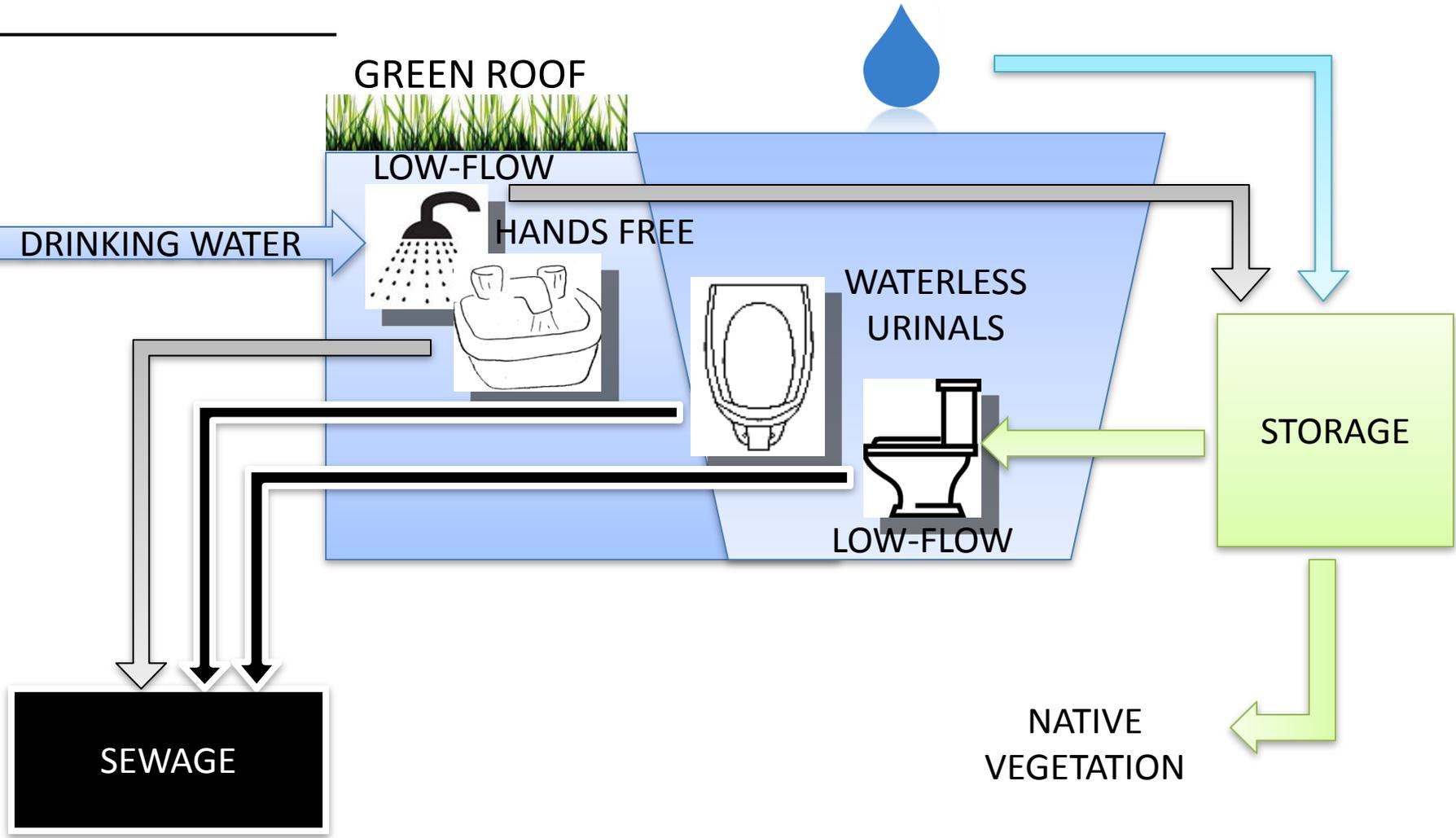
A
E
M
C
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Water Efficiency

A
E
M
C

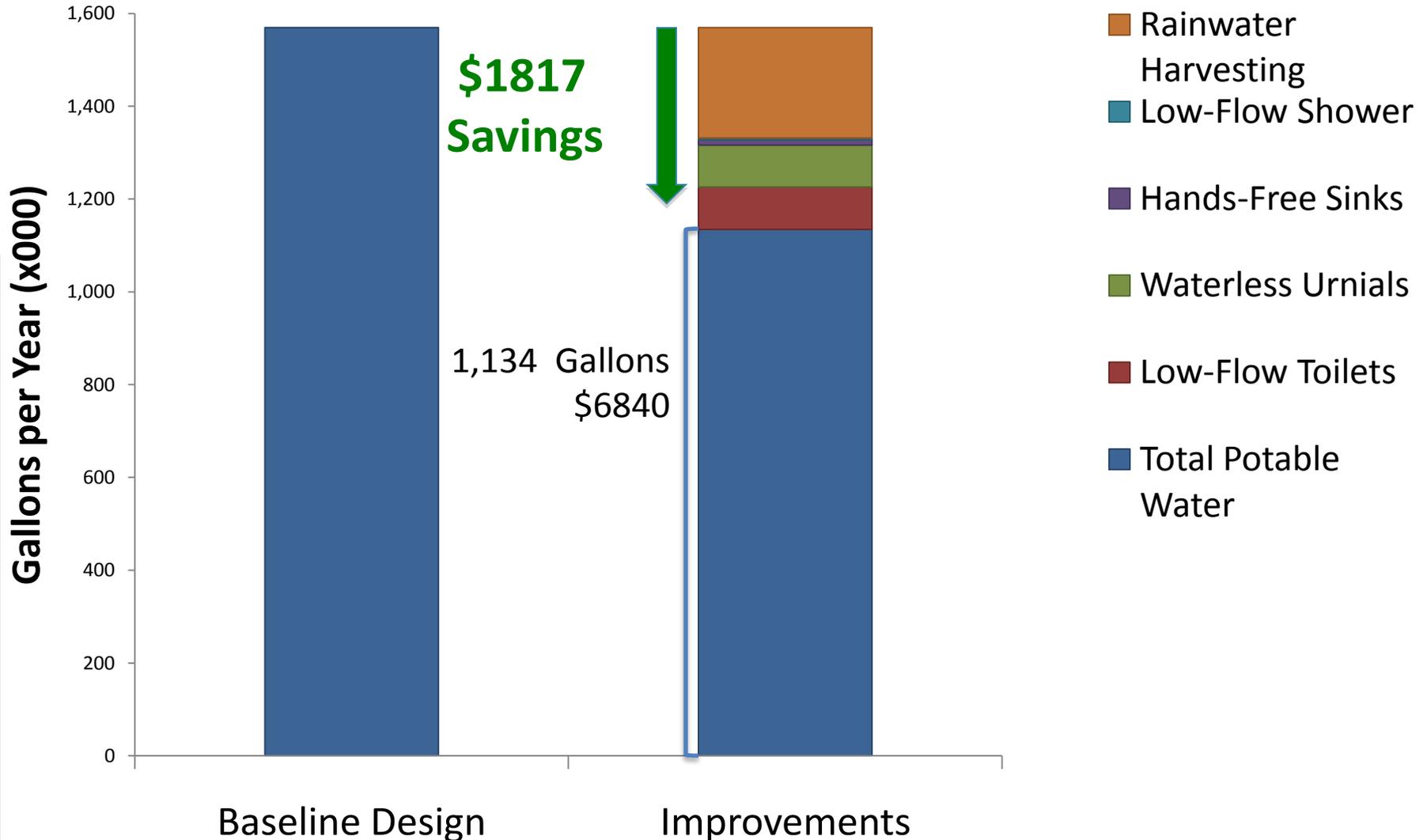
atlantic team



Water Indoor Usage

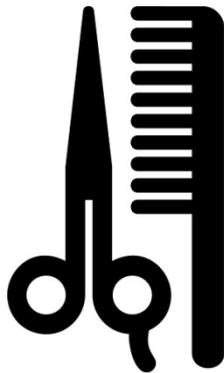
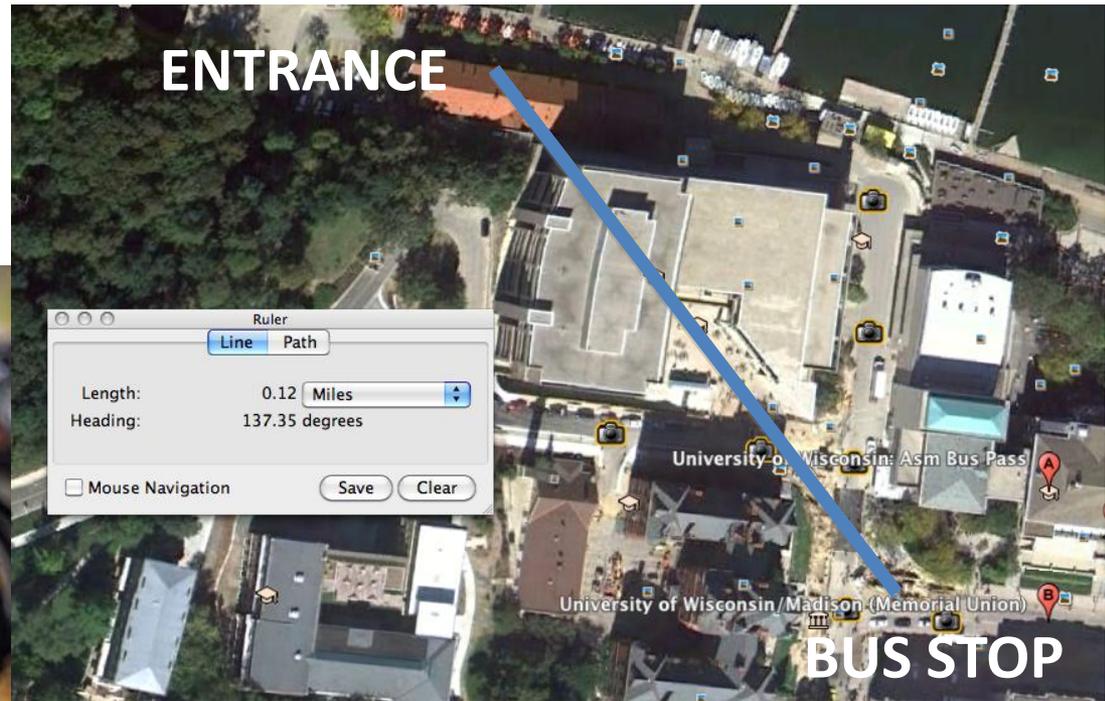


A
E
M
C
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Sustainable Site

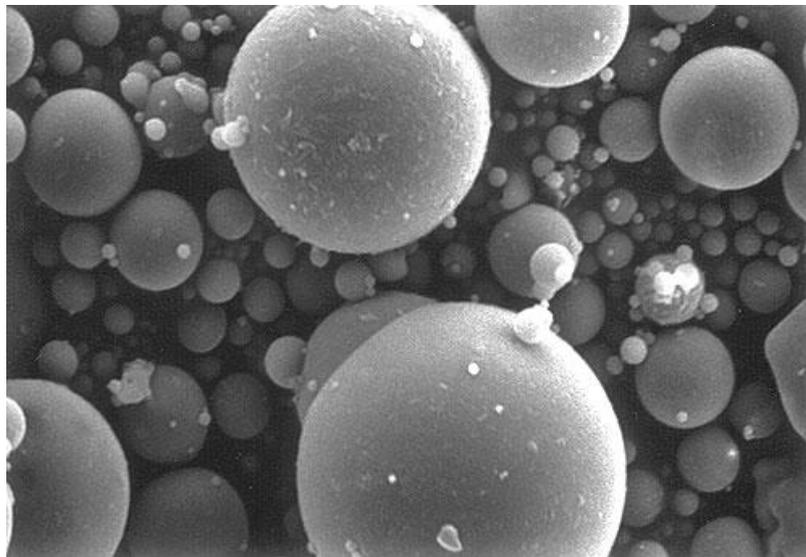
A
E
M
C
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Materials and Resources



On-Site Sorting > 75% of Debris



Fly Ash

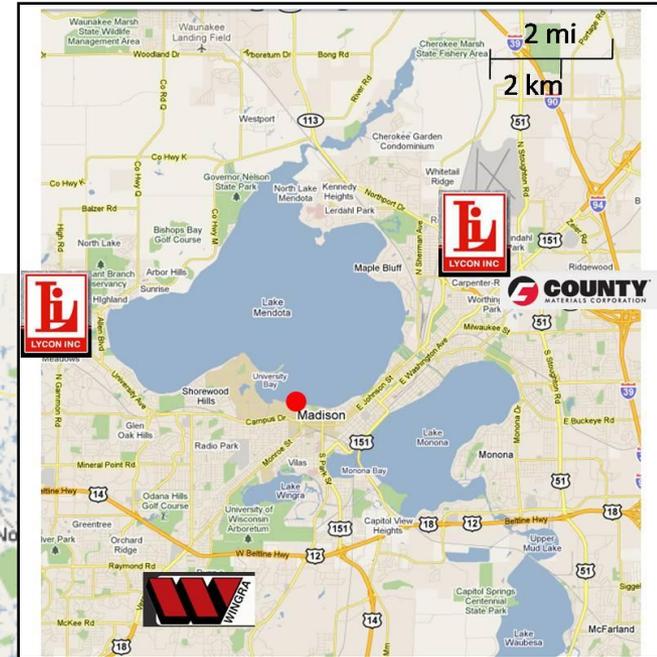


Local Aggregate

Materials and Resources

Local Materials 500 mile radius

40 mile radius



5 mile

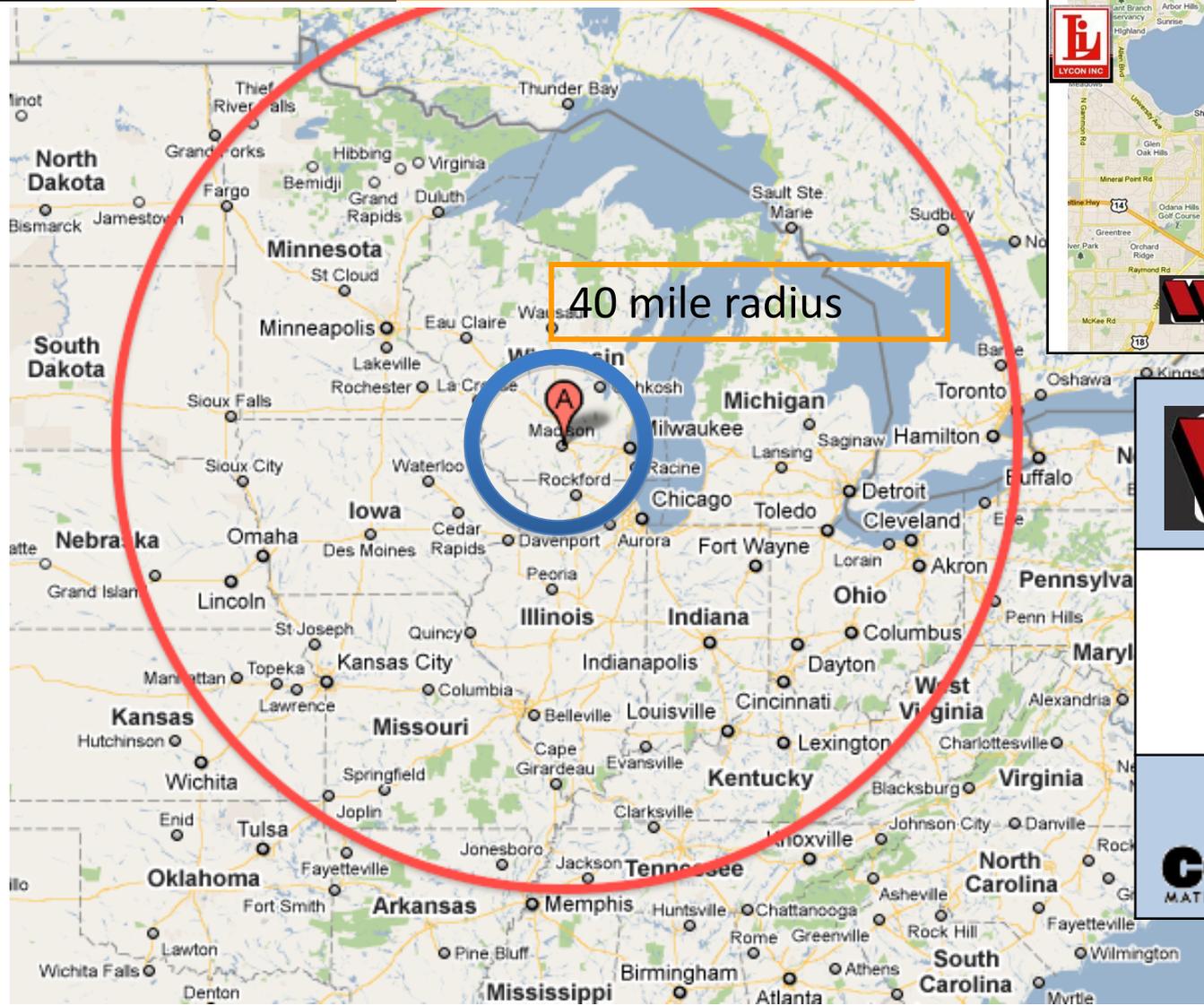


35 mile



8 mile

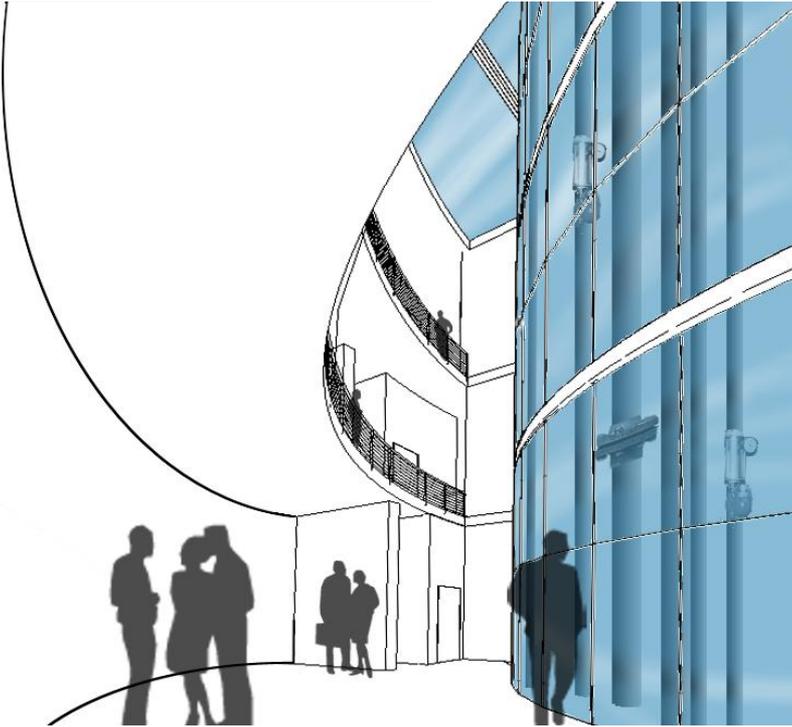
A
E
M
C
atlantic team



Indoor Environmental Quality



A
E
M
C
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LEED Certification

A
E
M
C

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SUSTAINABLE SITE

20

WATER EFFICIENCY

9

ENERGY & ATMOSPHERE

22

MATERIALS & RESOURCES

5

INDOOR ENVIRONMENTAL QUALITY

13

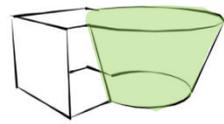
TOTAL

70

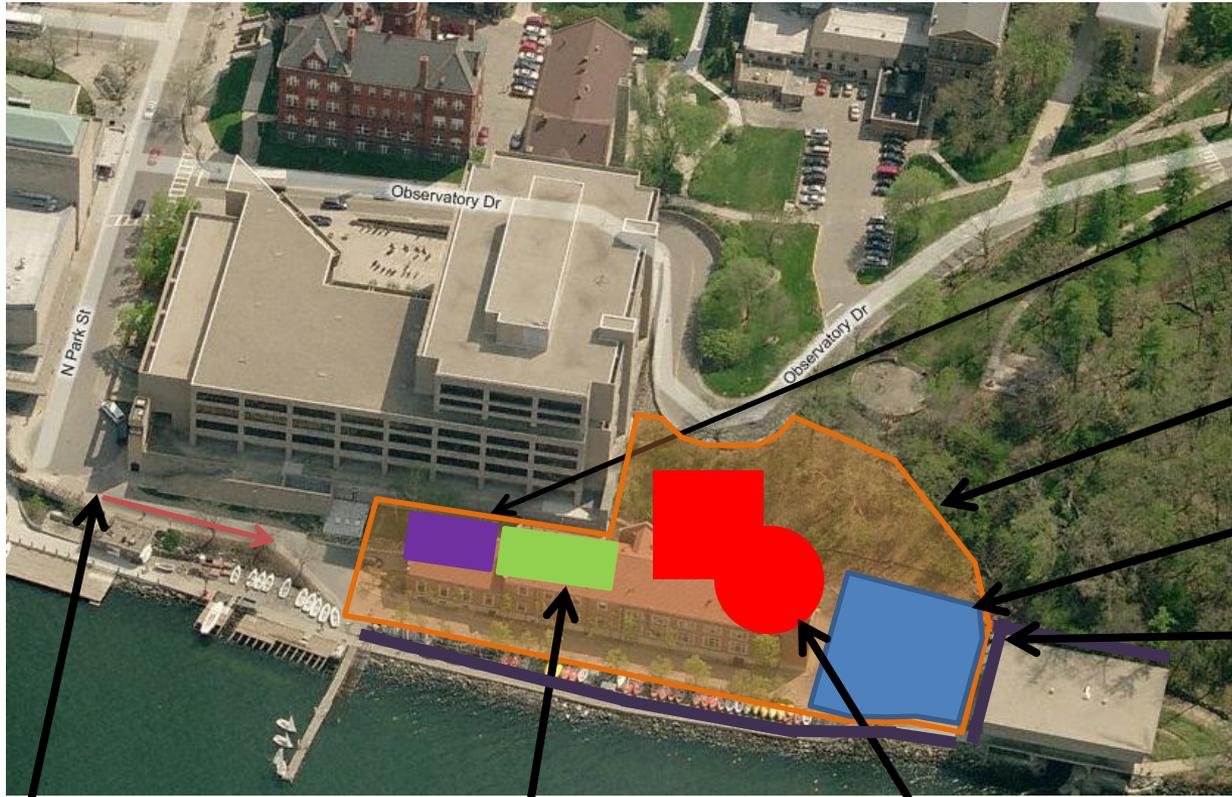


LEED Gold

Site Plan for Construction



A
E
M
C
atlantic team



TEMPORARY FACILITIES

SITE FENCE

MULTIPURPOSE AREA

- Mobile crane
- Bus
- Unloading area

PEDESTRIAN BYPASS

LIMITED ACCESS SPACE (45 feet)

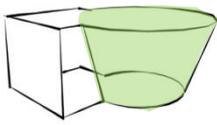
RECYCLING AREA

POSITION OF THE BUILDING



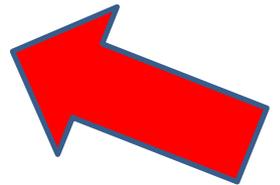
Site Access

Delivery Path

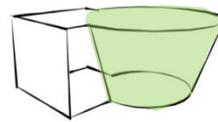


A
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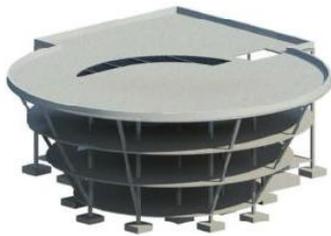
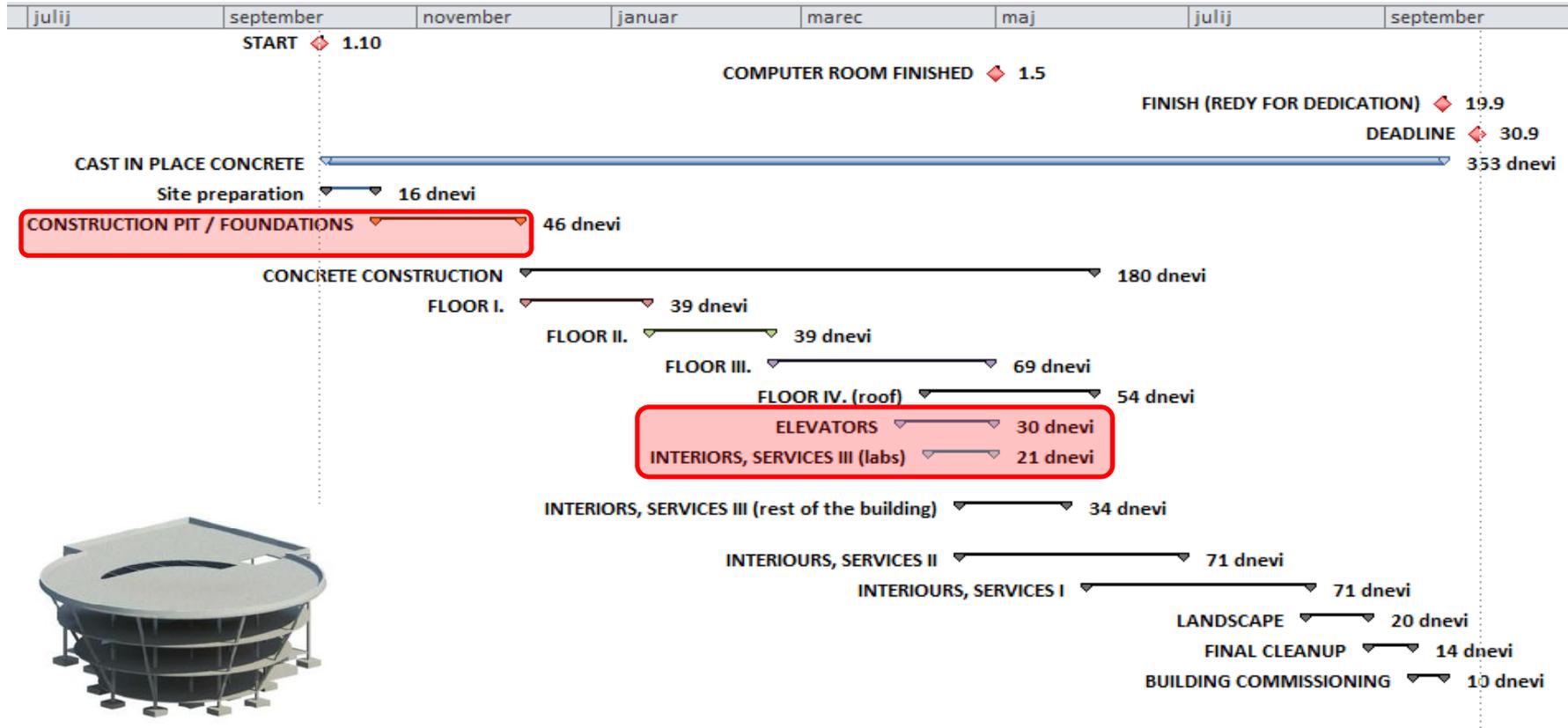
atlantic team



Schedule

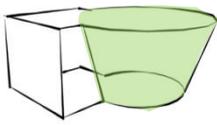


A
E
M
C
atlantic team



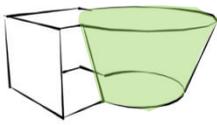
Schedule

4D Animation



A
E
M
C

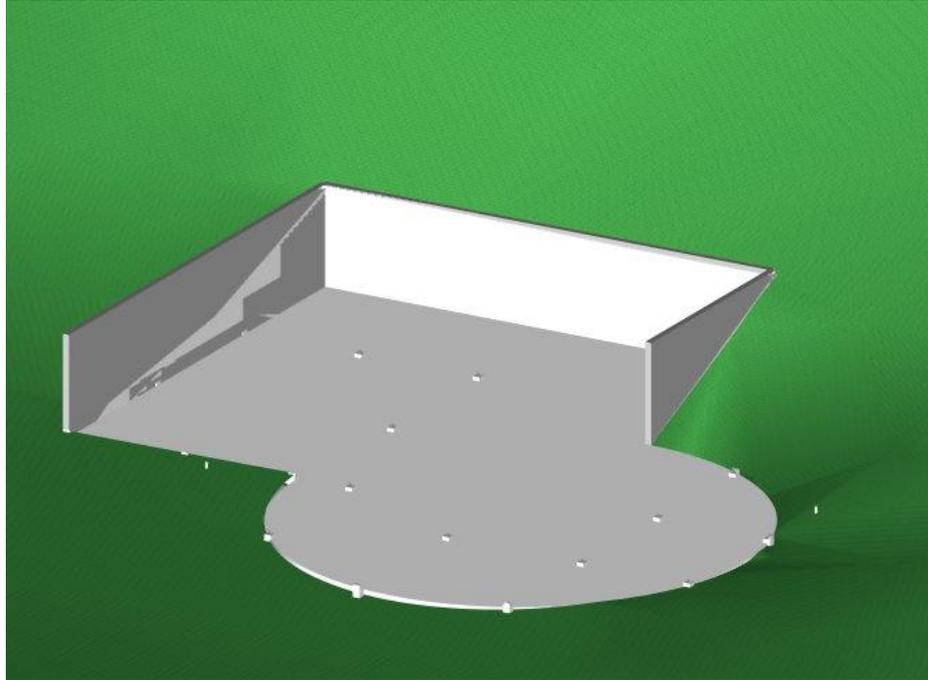
atlantic team



Critical Construction Zone I

Sub Structure

A
E
M
C
atlantic team



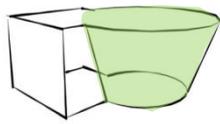
Retaining Wall and Foundation

Limited Construction Site



Critical Construction Zone I

Equipment



1x PILING RIG



1 EXCAVATOR



1x SHOTCRETE



4x CONCRETE MIXER



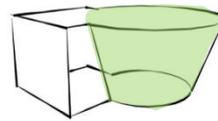
1x CONCRETE PUMP



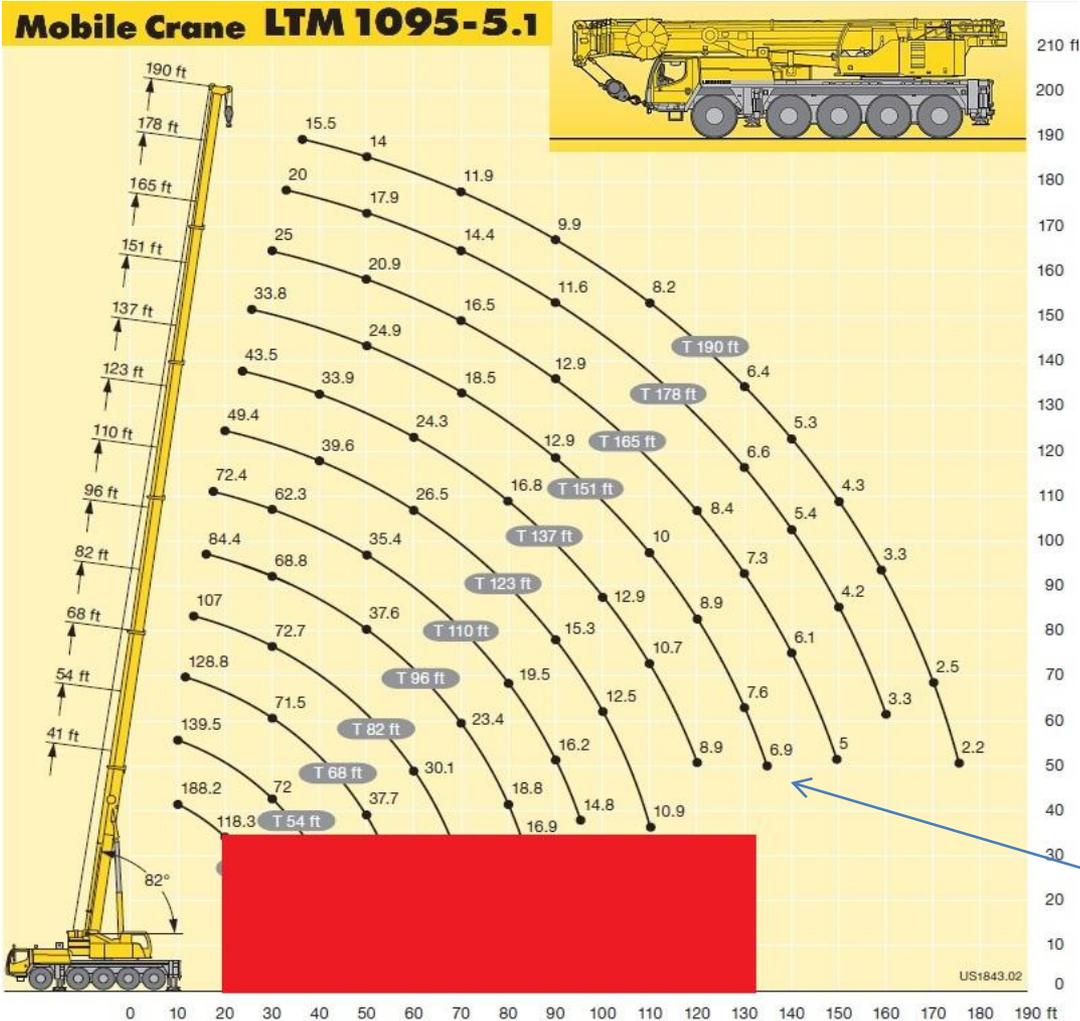
1x TRUCK MOUNTED RIG

Mobile Crane

Haviest Lift

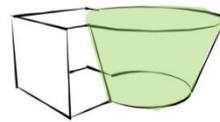


A
E
M
C
atlantic team



45' Long Crane

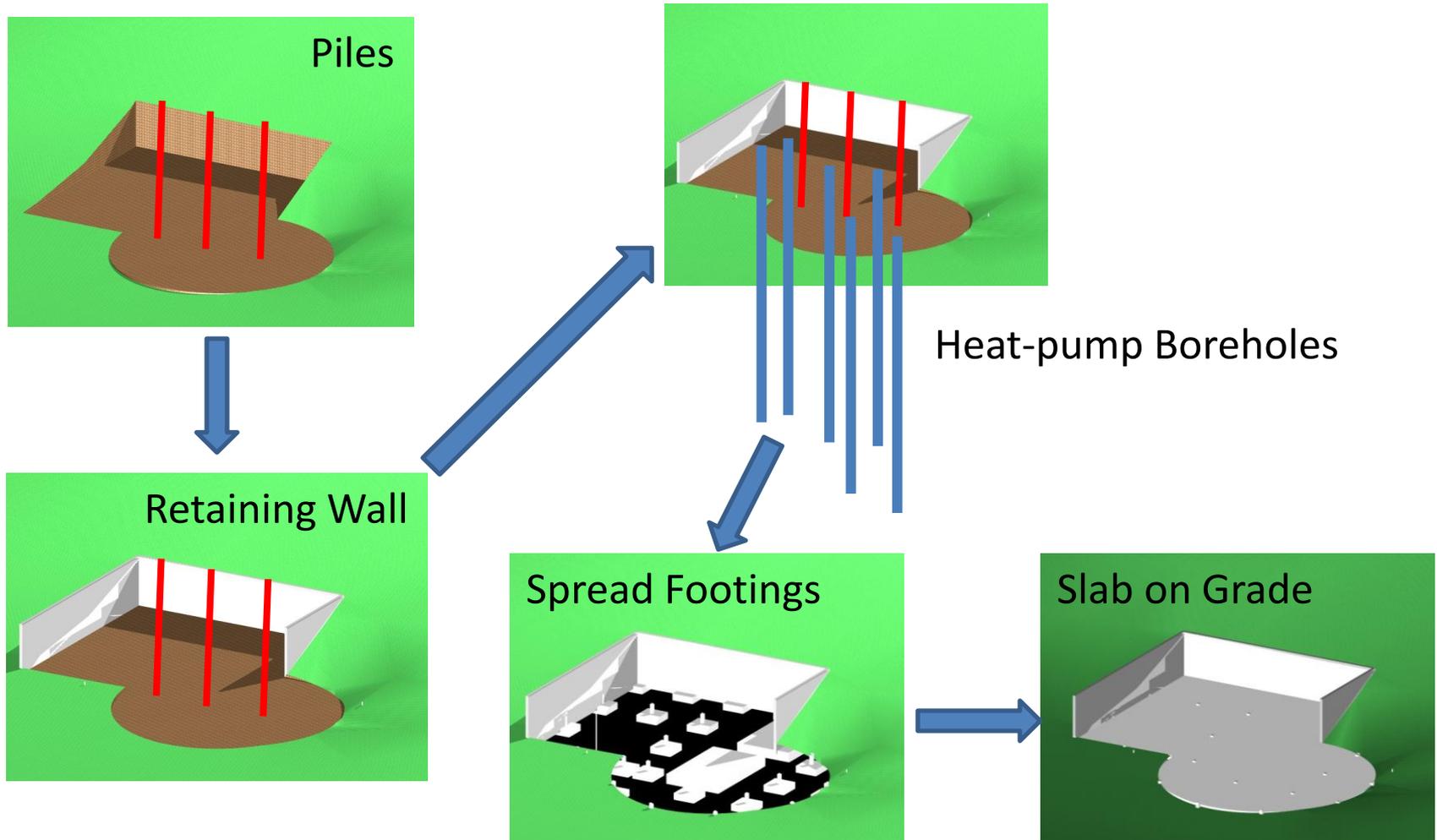
Heaviest Lift is 6 klbs

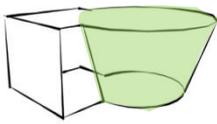


Critical Construction Zone I

Foundation – Construction Sequence

A
E
M
C
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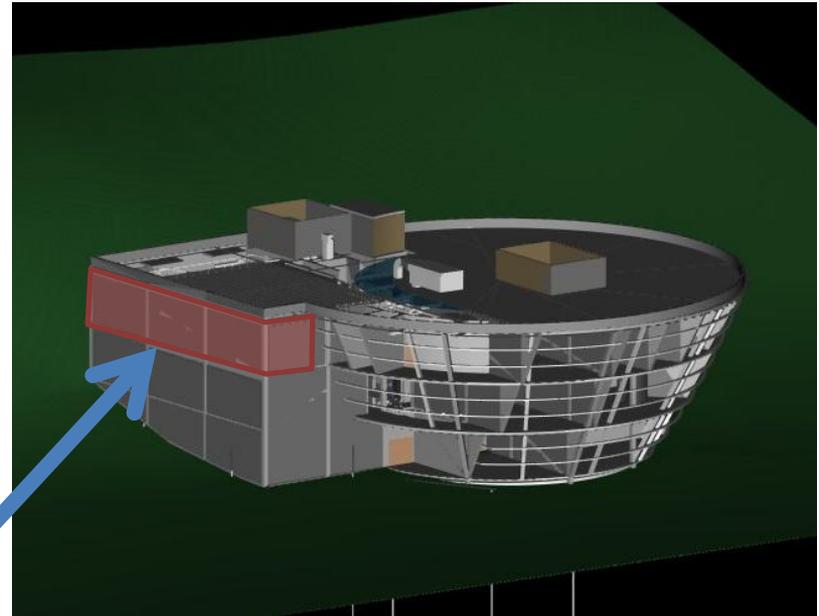
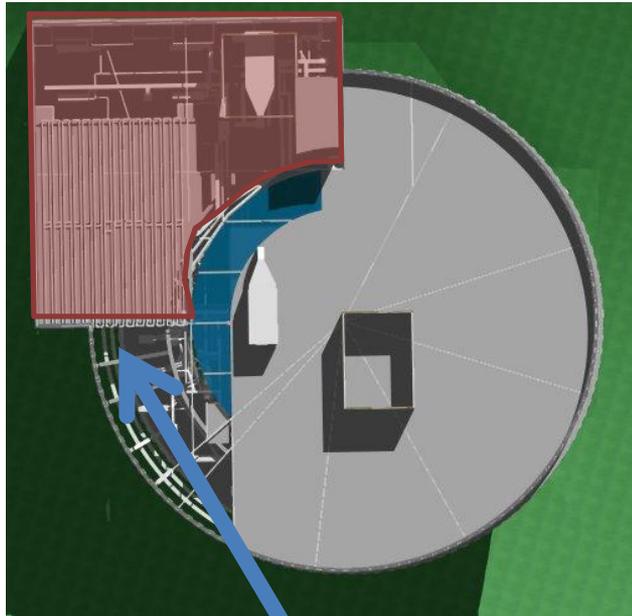




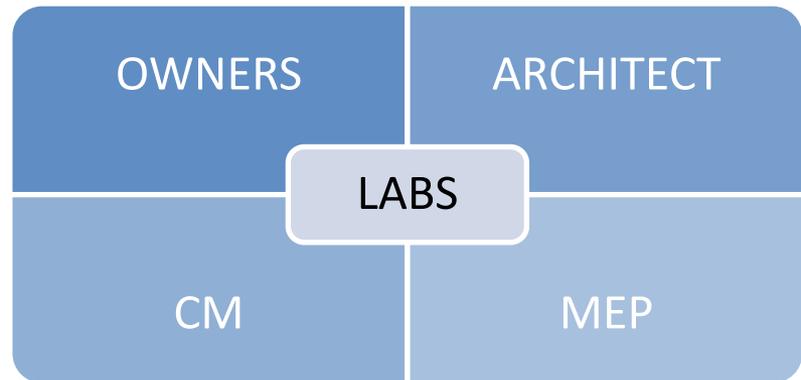
Critical Construction Zone II

Labs

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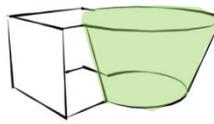


LABS



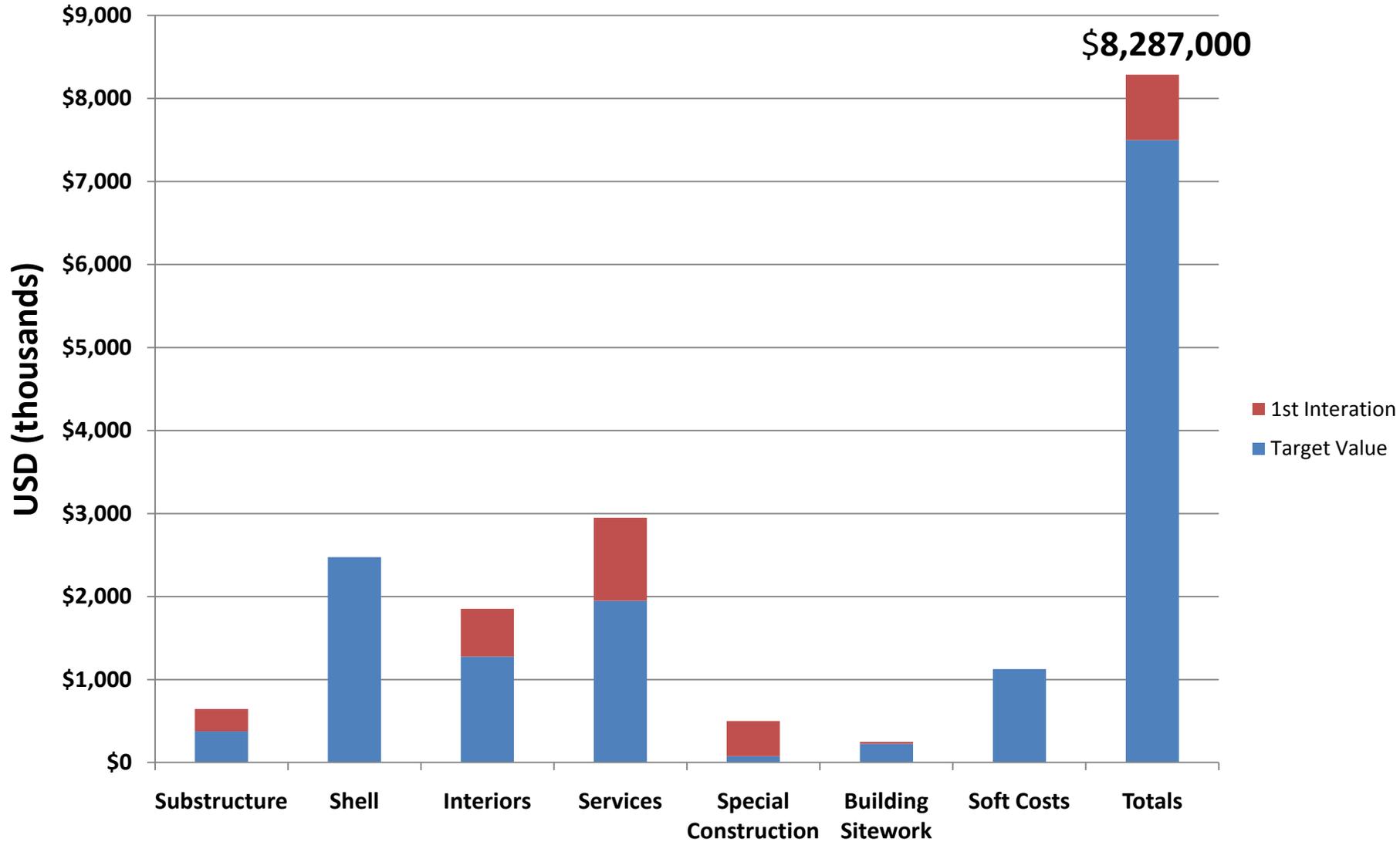
Target Value Design

1st Estimate, 2/2/2011



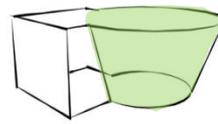
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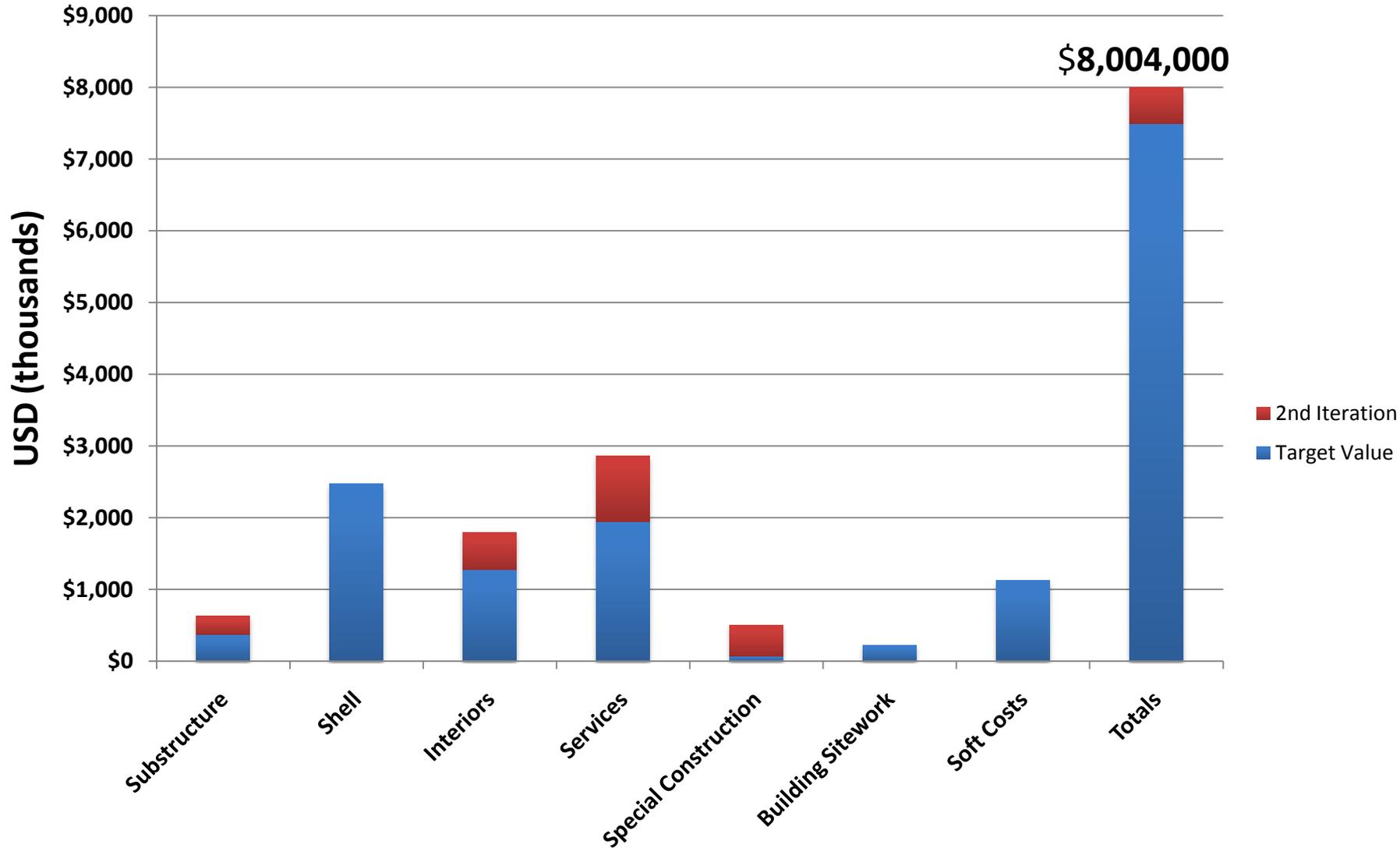


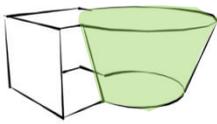
Target Value Design

2nd Estimate, 3/6/2011



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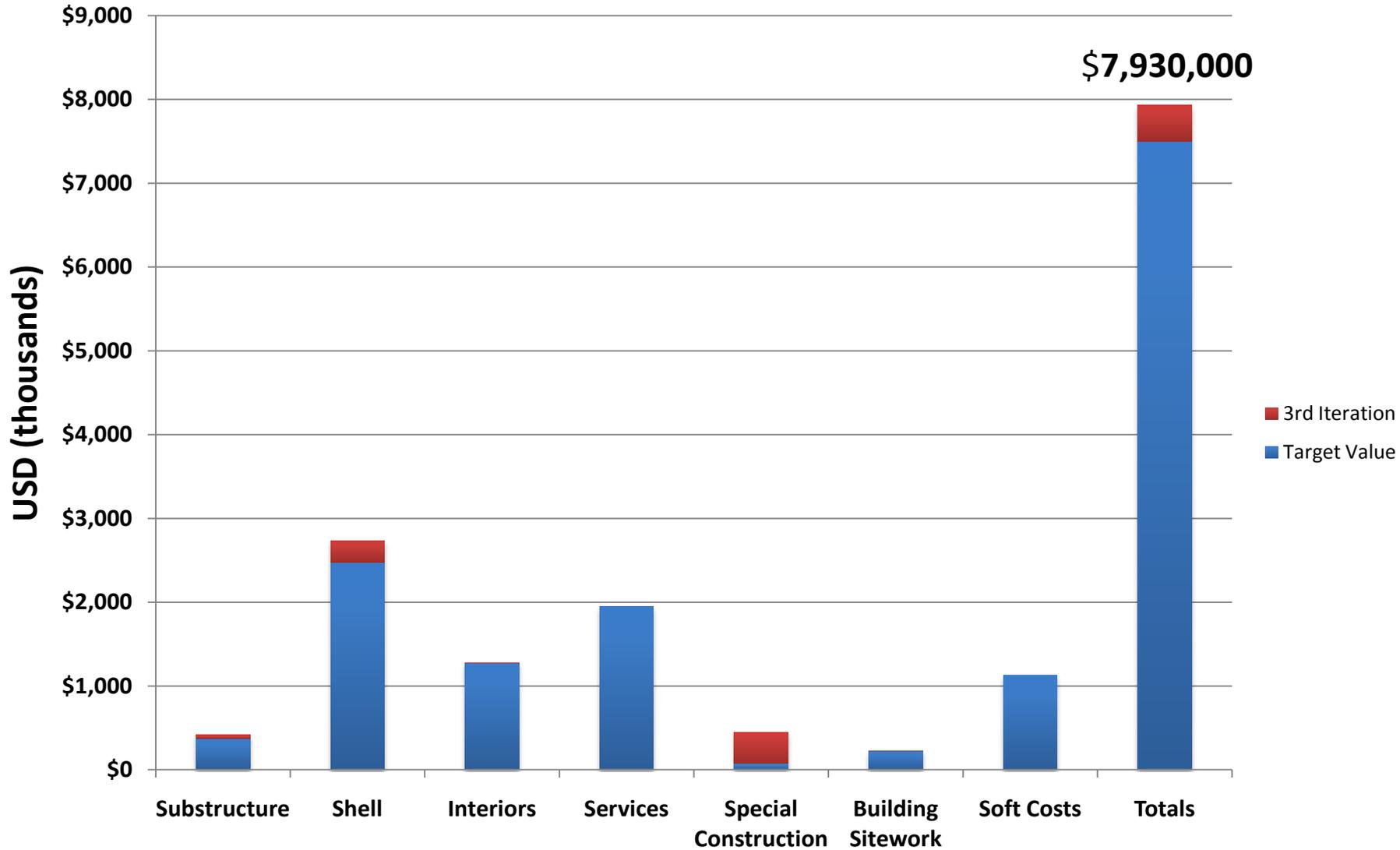


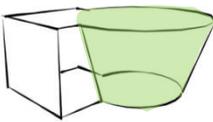


Target Value Design

3rd Estimate, 4/25/2011

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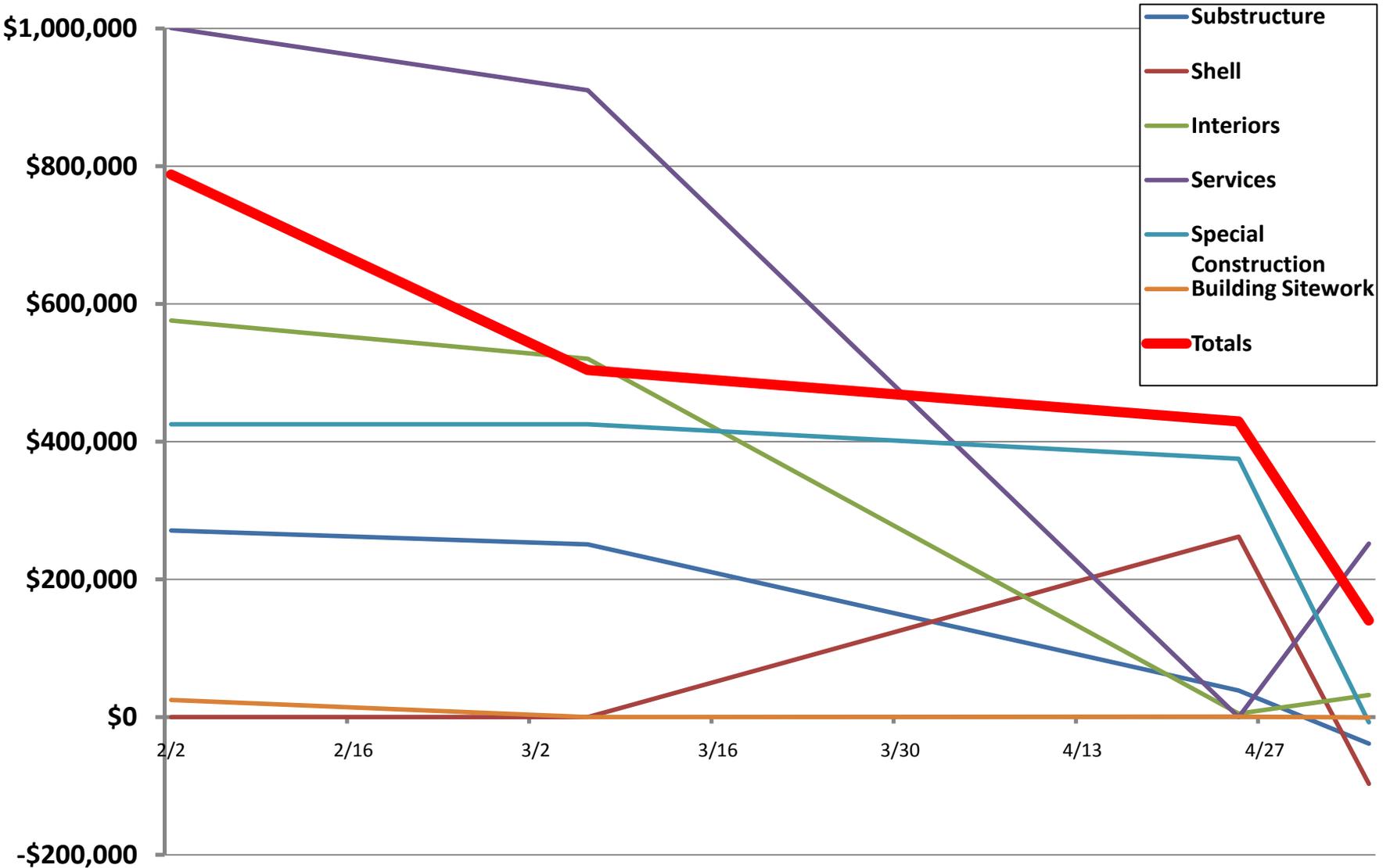


Target Value Design

Target Variance

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Target Value Design

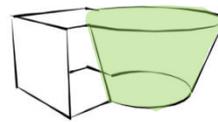
Description	Quantity	Unit	Unit Cost	Total Price	TargetCost
Floor Construction	1.0	-	553,246.46	▲ 553,246.46	440,000.00
Roof Construction	1.0	-	312,783.38	▲ 312,783.38	275,000.00

Code	Description	Quantity	Unit	Unit Cost	Total Price	TargetCost
+ B1010	Floor Construction	1.0	-	553,246.46	▲ 553,246.46	440,000.00
- B1020	Roof Construction	1.0	-	312,783.38	▲ 312,783.38	275,000.00
- B1020.09	Roof Deck (One Way)	2,831.6	sf	11.81	▲ 33,454.37	25,000.00
- 03111.62.0	Forming/Prep Slab	2,831.6	sf	9.04	▲ 25,585.70	6,250.00
03-110.02	Forming Labor, C-2 Crew	271.8	hr	64.33	17,487.24	3,125.00
03-111.33	Forms in Place, 1-Way Joist Pans, 4 use	2,831.6	sf	2.86	8,098.46	3,125.00
- 03211.61.0	Reinforcing Slab (#4 to #7)	1.8	ton	1,626.79	▲ 2,879.04	6,250.00
03-210.25	4 Rodm, C-25 Crew	19.5	hr	61.23	1,195.67	3,125.00
03-211.06.04	Reinforcing in Place, Slab	1.8	ton	951.18	1,683.36	3,125.00
- 03310.61.0	Pouring Slab (Pumped)	26.2	cy	136.74	▲ 3,585.15	6,250.00
03-310.20	Placing Concrete, C-20 Crew	10.5	hr	69.35	727.31	3,125.00
03-313.4000	Concrete in Place, 4000 psi Normal Weight	26.2	cy	109.00	2,857.84	3,125.00
- 03352.93.0	Finishing Concrete, Broom Finish	24.5	hr	57.23	▲ 1,404.48	6,250.00
03-350.10	Finishing Concrete, C-10 Crew	24.5	hr	57.23	1,404.48	6,250.00
- B1020.10	Roof Deck	11,274.0	sf	18.95	▲ 213,590.30	190,000.00
- 03111.62.0	Forming/Prep Slab	11,274.0	sf	11.97	▲ 134,899.12	47,500.00
03-110.02	Forming Labor, C-2 Crew	1,589.6	hr	64.33	102,260.95	23,750.00
03-116.22	Forms in Place, Slab 4 use	16,911.0	sf	1.93	32,638.17	23,750.00
- 03211.32.0	Reinforcing Roof Deck	19.1	ton	1,626.79	▲ 31,024.60	47,500.00
03-210.25	4 Rodm, C-25 Crew	210.4	hr	61.23	12,884.62	23,750.00
03-211.06.04	Reinforcing in Place, Slab	19.1	ton	951.18	18,139.99	23,750.00
- 03310.32.0	Pouring Roof Deck	282.5	cy	136.74	▲ 38,633.68	47,500.00
03-310.20	Placing Concrete, C-20 Crew	113.0	hr	69.35	7,837.49	23,750.00
03-313.4000	Concrete in Place, 4000 psi Normal Weight	282.5	cy	109.00	30,796.19	23,750.00
- 03350.14.0	Finishing Roof Deck	157.8	hr	57.23	▲ 9,032.90	47,500.00
03-350.10	Finishing Concrete, C-10 Crew	157.8	hr	57.23	9,032.90	47,500.00
- B1020.40	Sky Roof	1,493.4	sf	44.02	▲ 65,738.72	60,000.00
- 05121.42.0	Erect Steel Beams - W12x26	124.2	lf	37.55	▲ 4,664.10	15,000.00
05-120.02	Steel Erection, E-2 Crew	8.0	hr	112.13	891.46	7,500.00
05-124.32	W12x26	124.2	lf	30.37	3,772.64	7,500.00
- 05121.47.0	Erect Steel Beams - W14x30	38.0	lf	42.06	▲ 1,598.36	15,000.00
05-120.02	Steel Erection, E-2 Crew	2.4	hr	112.13	264.18	7,500.00
05-124.36	W14x30	38.0	lf	35.11	1,334.18	7,500.00
- 07810.11.0	Fireproofing Steel Beams	325.8	sf	1.44	▲ 470.40	15,000.00
07-810.02	Fireproofing, G-2 Crew	5.2	hr	60.23	314.00	7,500.00
07-811.10	2 hr Spray Fireproofing	325.8	sf	0.48	156.40	7,500.00
- 08451.00.0	Sky Roof Intallation	1,493.4	sf	39.51	▲ 59,005.87	15,000.00
08-450.03	G-3 Crew	135.9	hr	65.40	8,887.75	7,500.00
08-451.01	Skyroof, translucent panel, 2-3/4" thick	1,493.4	sf	33.56	50,118.11	7,500.00

Cost Based on:

- Labor
- Material
- Equipment

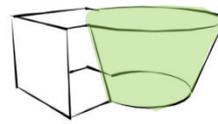
Target Value Design



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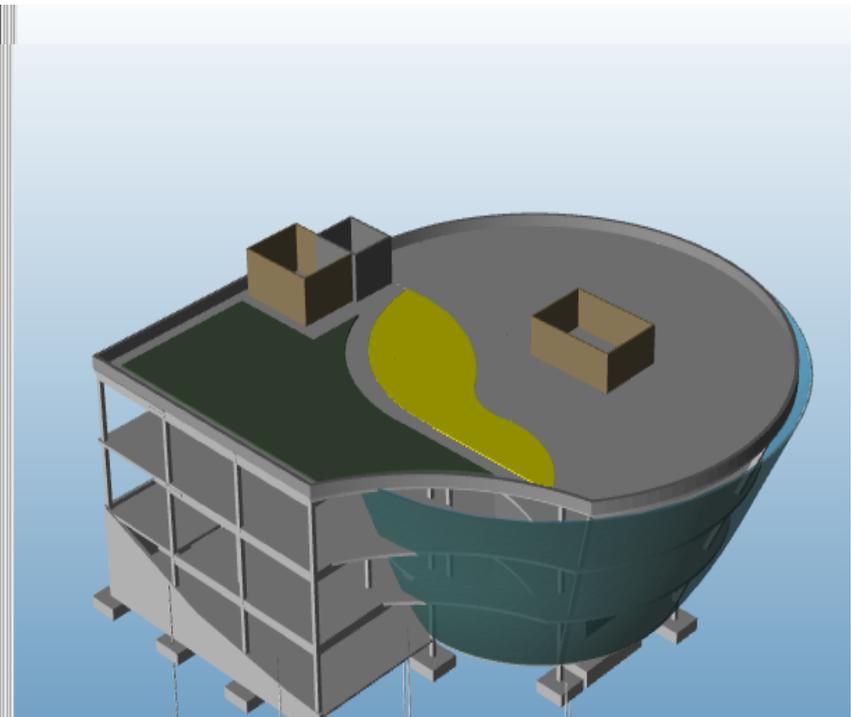
Code	Description	Quantity	Unit	Unit Cost	Total Price	TargetCost
+ B1010	Floor Construction	1.0	-	553,246.46	▲ 553,246.46	440,000.00
- B1020	Roof Construction	1.0	-	312,783.38	▲ 312,783.38	275,000.00
- B1020.09	Roof Deck (One Way)	2,831.6	sf	11.81	▲ 33,454.37	25,000.00
+ 03111.62.0	Forming/Prep Slab	2,831.6	sf	9.04	▲ 25,585.70	6,250.00
+ 03211.61.0	Reinforcing Slab (#4 to #7)	1.8	ton	1,626.79	▲ 2,879.04	6,250.00
+ 03310.61.0	Pouring Slab (Pumped)	26.2	cy	136.74	▲ 3,585.15	6,250.00
+ 03352.93.0	Finishing Concrete, Broom Finish	24.5	hr	57.23	▲ 1,404.48	6,250.00
- B1020.10	Roof Deck	11,274.0	sf	18.95	▲ 213,590.30	190,000.00
+ 03111.62.0	Forming/Prep Slab	11,274.0	sf	11.97	▲ 134,899.12	47,500.00
+ 03211.32.0	Reinforcing Roof Deck	19.1	ton	1,626.79	▲ 31,024.60	47,500.00
+ 03310.32.0	Pouring Roof Deck	282.5	cy	136.74	▲ 38,633.68	47,500.00
+ 03350.14.0	Finishing Roof Deck	157.8	hr	57.23	▲ 9,032.90	47,500.00
- B1020.40	Sky Roof	1,493.4	sf	44.02	▲ 65,738.72	60,000.00
+ 05121.42.0	Erect Steel Beams - W12x26	124.2	lf	37.55	▲ 4,664.10	15,000.00
+ 05121.47.0	Erect Steel Beams - W14x30	38.0	lf	42.06	▲ 1,598.36	15,000.00
+ 07810.11.0	Fireproofing Steel Beams	325.8	sf	1.44	▲ 470.40	15,000.00
+ 08451.00.0	Sky Roof Intallation	1,493.4	sf	39.51	▲ 59,005.87	15,000.00

Target Value Design

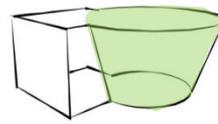


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Code	Description	Unit	Unit Cost	Total Price	TargetCost
B1020.09	Roof Deck (One Way)	sf	11.81	33,454.37	25,000.00
+ 03111.62.0	Forming/Prep Slab	sf	9.04	25,585.70	6,250.00
+ 03211.61.0	Reinforcing Slab (#4 to #7)	ton	1,626.79	2,879.04	6,250.00
+ 03310.61.0	Pouring Slab (Pumped)	cy	136.74	3,585.15	6,250.00
+ 03352.93.0	Finishing Concrete, Broom Finish	hr	57.23	1,404.48	6,250.00
B1020.10	Roof Deck	sf	18.95	213,590.30	190,000.00
+ 03111.62.0	Forming/Prep Slab	sf	11.97	134,899.12	47,500.00
+ 03211.32.0	Reinforcing Roof Deck	ton	1,626.79	31,024.60	47,500.00
+ 03310.32.0	Pouring Roof Deck	cy	136.74	38,633.68	47,500.00
+ 03350.44.0	Finishing Roof Deck	hr	57.23	9,032.90	47,500.00
B1020.40	Sky Roof	sf	44.02	65,738.72	60,000.00
+ 05121.42.0	Erect Steel Beams - W12x26	lf	37.55	4,664.10	15,000.00
+ 05121.47.0	Erect Steel Beams - W14x30	lf	42.06	1,598.36	15,000.00
+ 07810.11.0	Fireproofing Steel Beams	sf	1.44	470.40	15,000.00
+ 08451.00.0	Sky Roof Intallation	sf	39.51	59,005.87	15,000.00
B2010	Exterior Walls	-	979,718.96	979,718.96	440,000.00
B2020	Exterior Windows	ea	0.00	0.00	440,000.00
B2030	Exterior Doors	-	0.00	0.00	440,000.00
B3010	Roof Coverings	-	325,114.36	325,114.36	440,000.00
	Interiors	-	513,357.28	513,357.28	1,275,000.00
	Services	-	390,547.14	390,547.14	1,950,000.00

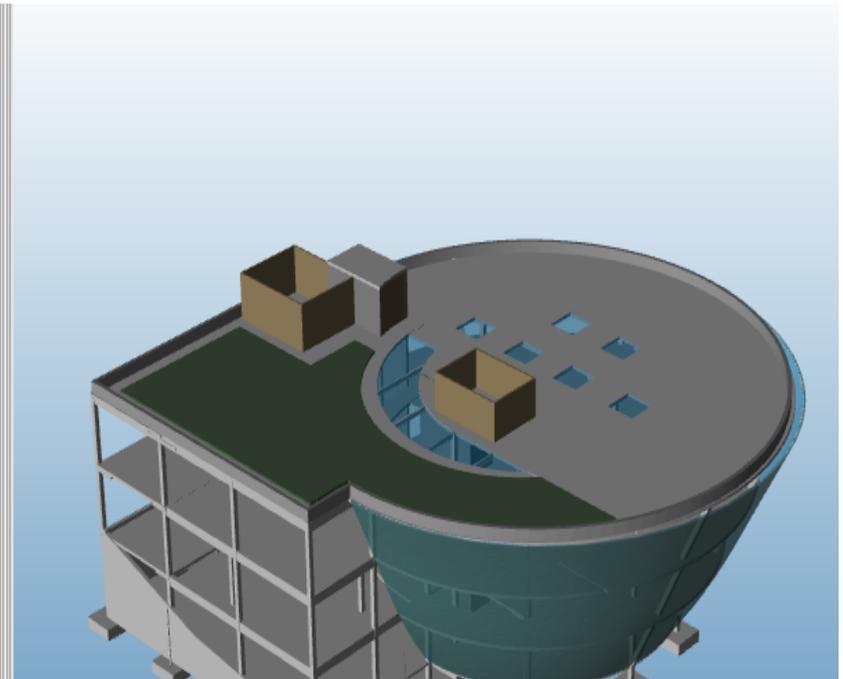


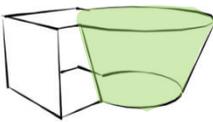
Target Value Design



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ID	Description	Unit	Unit Cost	Total Price	TargetCost
- B1020	Roof Construction	-	253,180.41	▲ 253,180.41	275,000.00
- B1020.09	Roof Deck (One Way)	sf	13.20	▲ 24,926.00	25,000.00
+ 03111.02.0	Forming Prep Slab	sf	0.04	▲ 17,007.20	0,250.00
+ 03211.61.0	Reinforcing Slab (#4 to #7)	ton	1,626.79	▲ 2,879.07	6,250.00
+ 03310.61.0	Pouring Slab (Pumped)	cy	136.74	▲ 3,585.19	6,250.00
+ 03352.93.0	Finishing Concrete, Broom Finish	hr	57.23	▲ 1,404.48	6,250.00
- B1020.10	Roof Deck	sf	15.12	▲ 188,623.83	190,000.00
+ 03111.02.0	Forming Prep Slab	sf	7.90	▲ 39,300.47	47,500.00
+ 03211.32.0	Reinforcing Roof Deck	ton	1,626.79	▲ 35,239.00	47,500.00
+ 03310.32.0	Pouring Roof Deck	cy	136.74	▲ 43,881.70	47,500.00
+ 03350.14.0	Finishing Roof Deck	hr	57.23	▲ 9,994.73	47,500.00
- B1020.40	Sky Roof	sf	41.35	▲ 39,630.58	60,000.00
+ 03121.42.0	Erect Steel Beams - W12x20	lf	37.33	▲ 7,040.07	15,000.00
+ 05121.47.0	Erect Steel Beams - W14x30	lf	0.00	● 0.00	15,000.00
+ 07810.11.0	Fireproofing Steel Beams	sf	1.44	▲ 123.13	15,000.00
+ 08451.00.0	Sky Roof Intallation	sf	39.51	▲ 37,866.84	15,000.00
+ B2010	Exterior Walls	-	979,718.96	▲ 979,718.96	440,000.00
+ B2020	Exterior Windows	ea	0.00	● 0.00	440,000.00
+ B2030	Exterior Doors	-	0.00	● 0.00	440,000.00
+ B3010	Roof Coverings	-	330,937.90	▲ 330,937.90	440,000.00



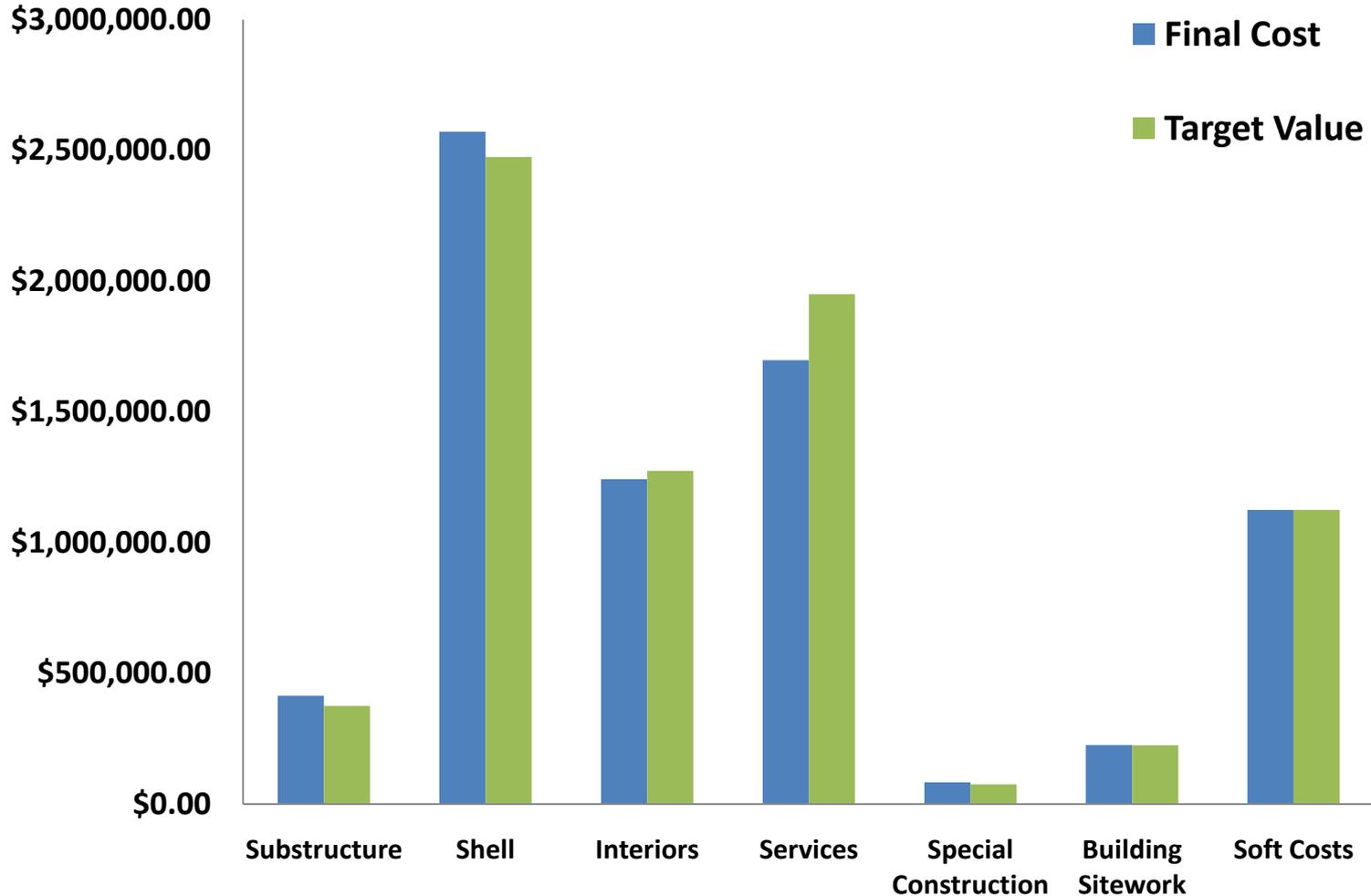


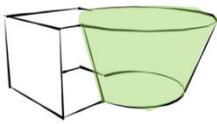
Target Value Design

Final Cost, 5/5/2011

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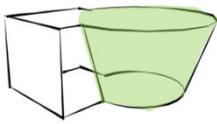


Target Value Design

Final Cost, 5/5/2011

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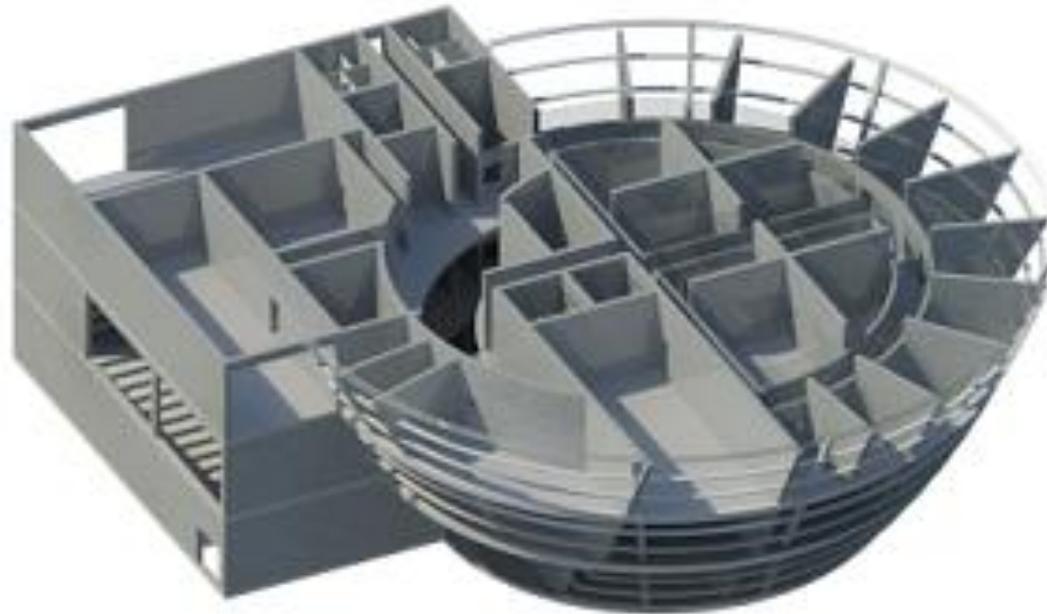
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B Shell			\$2,571,800.00	35%
C Interior			\$1,243,000.00	17%
D Services (MEP)			\$1,698,000.00	23%
F Special Construction			\$82,500.00	1%
G Building Sitework			\$225,800.00	3%
I Soft Costs			\$1,125,000.00	15%
Totals			<u>\$7,359,800.00</u>	<u>100.00%</u>



Target Value Design

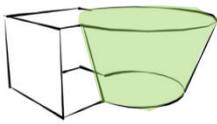
Final Cost, 5/5/2011

\$7,360,000



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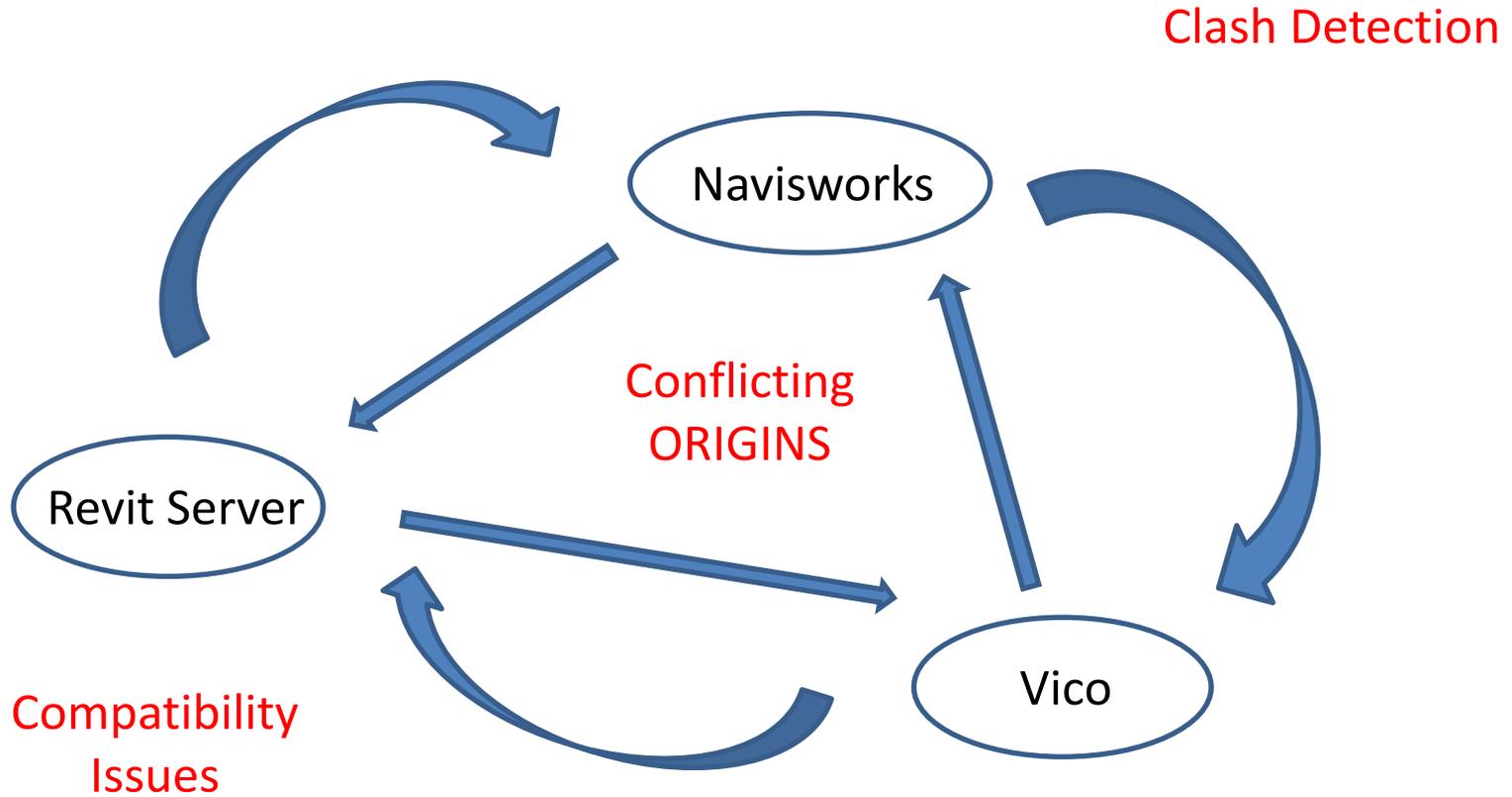


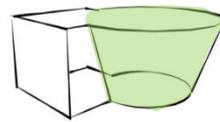
BIM Modeling

Coordinating Multiple Model Iterations

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BIM Modeling

Coordinating Multiple Model Iterations

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Description	Stat..
Contract Structure	✓
Version1 - Contrast Structure	✓
Version2 - Contrast Structure	✓
Version3 - Contrast Structure	✓
Version4 - Contrast Structure	✓
Version5 - Contrast Structure	✓
Version6 - Contrast Structure	✓
Version7 - Contrast Structure_fixed origin	✓
Version8 - Contrast Structure	✓
Version9 - Contrast Structure	✓
Version10 - Structure - The Contrast	✓
Version11 - Contrast Structure	✓
Version12 - Contrast Structure	✓
Version13 - Contrast Structure	✓
Version14 - Contrast Structure	✓
Contract Architecture	✓
Version1 - Contrast Architecture	✓
Version2 - Contrast Architecture	✓
Version3 - Contrast Architecture_fixed origin	✓
Version4 - Contrast Architecture	✓
Version5 - Contrast Architecture	✓
Version6 - Contrast Architecture	✓
Version7 - Architecture - The Contrast	✓
Version8 - Architecture - The Contrast	✓
Version9 - Arch	✓
Version10 - Arch	✓
Version11 - Contrast Architecture	✓
Contract CENTRAL	✓
Version1 - Contrast CENTRAL	✓
Contract MEP	✓
Version1 - Contrast MEP	✓
Version2 - Contrast MEP	✓
Version3 - Contrast MEP	✓
Site-Graded	✓
Version1 - Site-Graded	✓
Version2 - Site-Graded	✓
Version3 - Site-Graded	✓
Contract Facade	✓
Version1 - Contrast Facade	✓
Contract Architecture	✓
Version1 - Contrast Architecture	✓

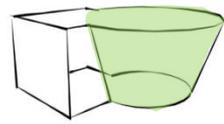
**AVG 6 min per version x 14
versions = 84 total min**

**AVG 6 min per version x 11
versions = 66 total min**



Project Evolution

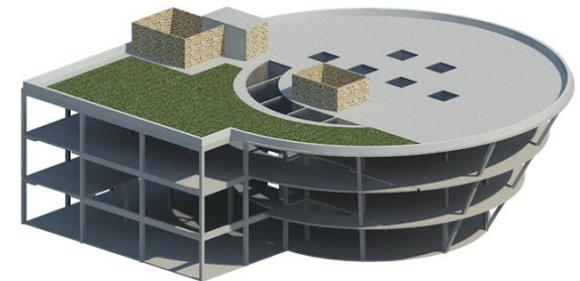
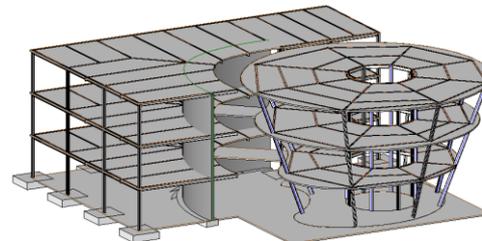
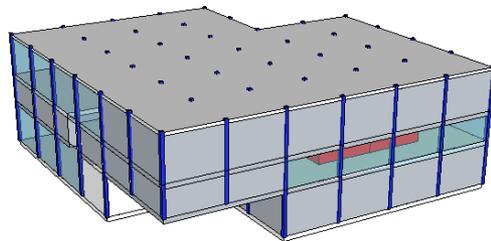
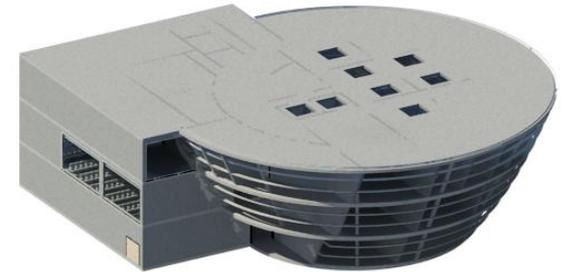
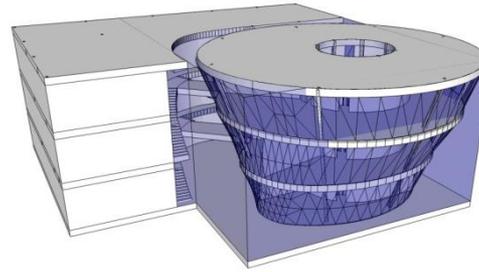
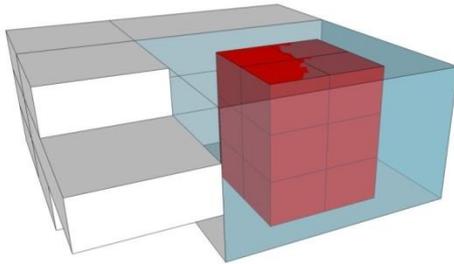
Multiple Iterations



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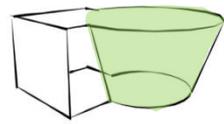
Architectural Models



Structural Models

BIM Modeling

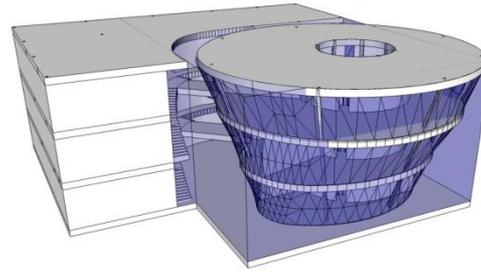
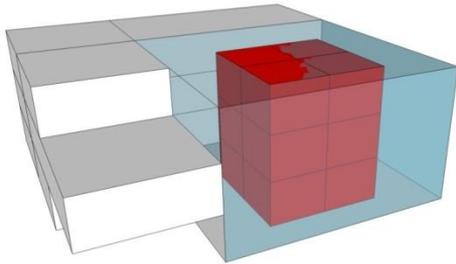
Multiple Iterations



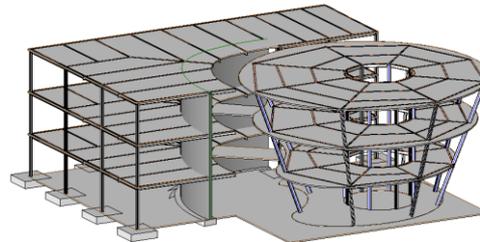
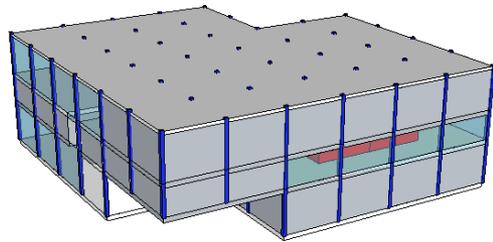
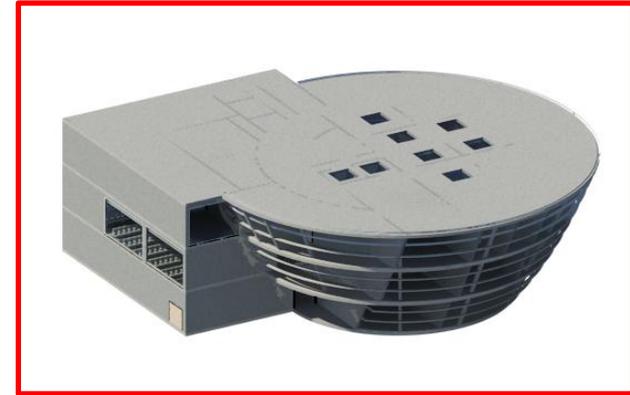
A
E
M
C

atlantic team

Architectural Models



Final Design

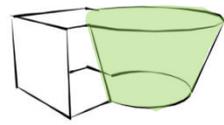


Structural Models



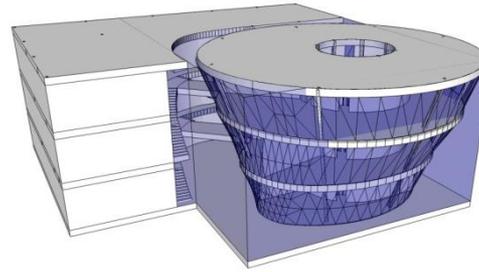
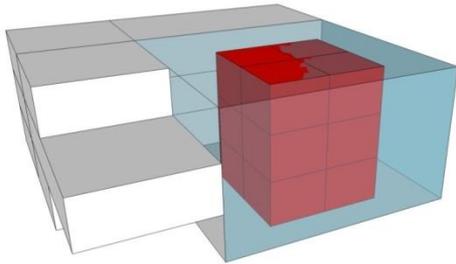
Project Evolution

Multiple Iterations

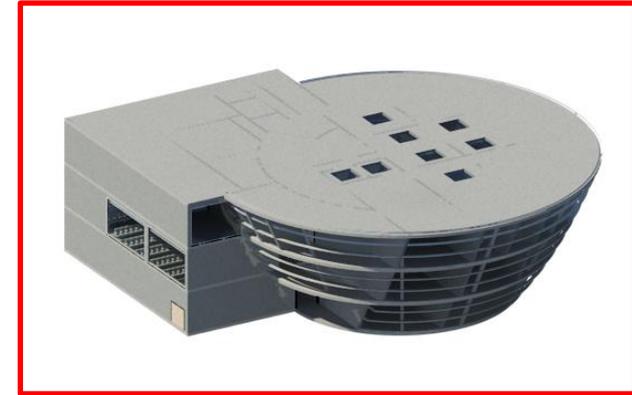


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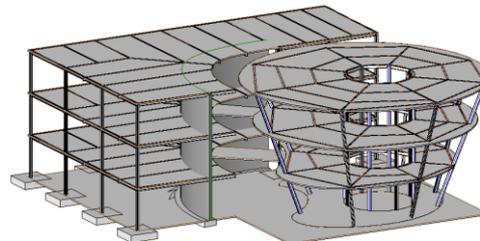
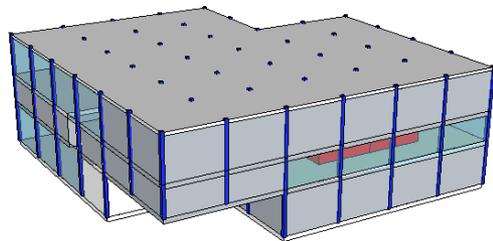
Architectural Models



Final Design

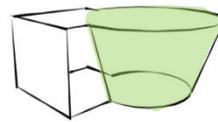


Over 30 Architectural Models
And 20 Structural Models



Structural Models

IPD Process Evolution

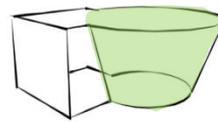


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Need ID #	Needs	From Who	For Whom	Meeting Request	Needed By:	Received (Yes/No)
1	Local Materials Research	KIM			1/28/2011	YES
2	size and position of the building	Maria			1/27/2011	YES
3	Floor Plan with Dimensions	Maria			2/4/2011	YES
4	Updated structural SketchUp Model	Colin			2/9/2011	YES
5	max length of members (columns etc	SE, MEP				YES
6	weight of members	SE, MEP				YES
7	foundation depth	SE	CM			YES
8	Rough Lateral Design	SE's	CM	2/15/2011	1/17/2011	YES
9	Rough Foundation Design	SE's	CM	2/15/2011	1/17/2011	YES
10	Rough Column Design	SE's	CM	2/15/2011	1/17/2011	YES
11	Dewatering Cost	CM		2/23/2011	3/4/2011	YES
12	Excavation Cost	CM		2/23/2011	3/4/2011	YES
13	Basement Insulation	MEP		2/23/2011	3/4/2011	Yes
14	Basement Waterproofing	CM		2/23/2011	3/4/2011	YES
15	Flood Control	CM		2/23/2011	3/4/2011	YES
16	groundwater pumping requirement	CM	MEP		3/3/2011	YES
17	Floor plans	A	MEP		3/2/2011	No
18	Beams dimensions	SE	MEP		3/1/2011	No
19	Floor to floor dimensions	A	MEP		3/1/2011	No
20	Beam positions	SE	MEP		3/2/2011	No
21	Material quantity/types in the cost est	CM	MEP		3/2/2011	No
22	Revised C1 Structural Quantities	SE's	CM		3/3/2011	No
23	First C2 Structural Quantities	SE's	CM		3/4/2011	No
24	A MODEL C2	A	SE		3/4/2011	YES
25	C1 Revit Model	A	CM		3/6/2011	YES

ID #	Activity	Deliverable	By Whom	Need ID #
ENG-38	LATERAL SYSTEM C2 STEEL	LATERAL SYS	RIAM, TRAVIS	24
ENG-39	LATERAL SYSTEM C2 CONCRETE	LATERAL SYS	RIAM, TRAVIS	24

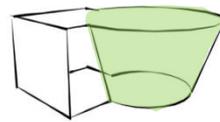
IPD Process Evolution



A
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Need ID #	Needs	From Who	For Whom	Meeting Request	Needed By:	Received (Yes/No)
1	Local Materials Research	KIM			1/28/2011	YES
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5	max length of members (columns etc	SE, MEP				YES
6	weight of members	SE, MEP				YES
7	foundation depth	SE	CM			YES
8	Rough Lateral Design	SE's	CM	2/15/2011	1/17/2011	YES
9	Rough Foundation Design	SE's	CM	2/15/2011	1/17/2011	YES
10	Rough Column Design	SE's	CM	2/15/2011	1/17/2011	YES
11	Dewatering Cost	CM		2/23/2011	3/4/2011	YES
12	Excavation Cost	CM		2/23/2011	3/4/2011	YES
13	Basement Insulation	MEP		2/23/2011	3/4/2011	Yes
14	Basement Waterproofing	CM		2/23/2011	3/4/2011	YES
15	Flood Control	CM		2/23/2011	3/4/2011	YES
16	groundwater pumping requirement	CM	MEP		3/3/2011	YES
17	Floor plans	A	MEP		3/2/2011	No
18	Beams dimensions	SE	MEP		3/1/2011	No
19	Floor to floor dimensions	A	MEP		3/1/2011	No
20	Beam positions	SE	MEP		3/2/2011	No
21	Material quantity/types in the cost est	CM	MEP		3/2/2011	No
22	Revised C1 Structural Quantities	SE's	CM		3/3/2011	No
23	First C2 Structural Quantities	SE's	CM		3/4/2011	No
24	A MODEL C2	A	SE		3/4/2011	YES
25	C1 Revit Model	A	CM		3/6/2011	YES

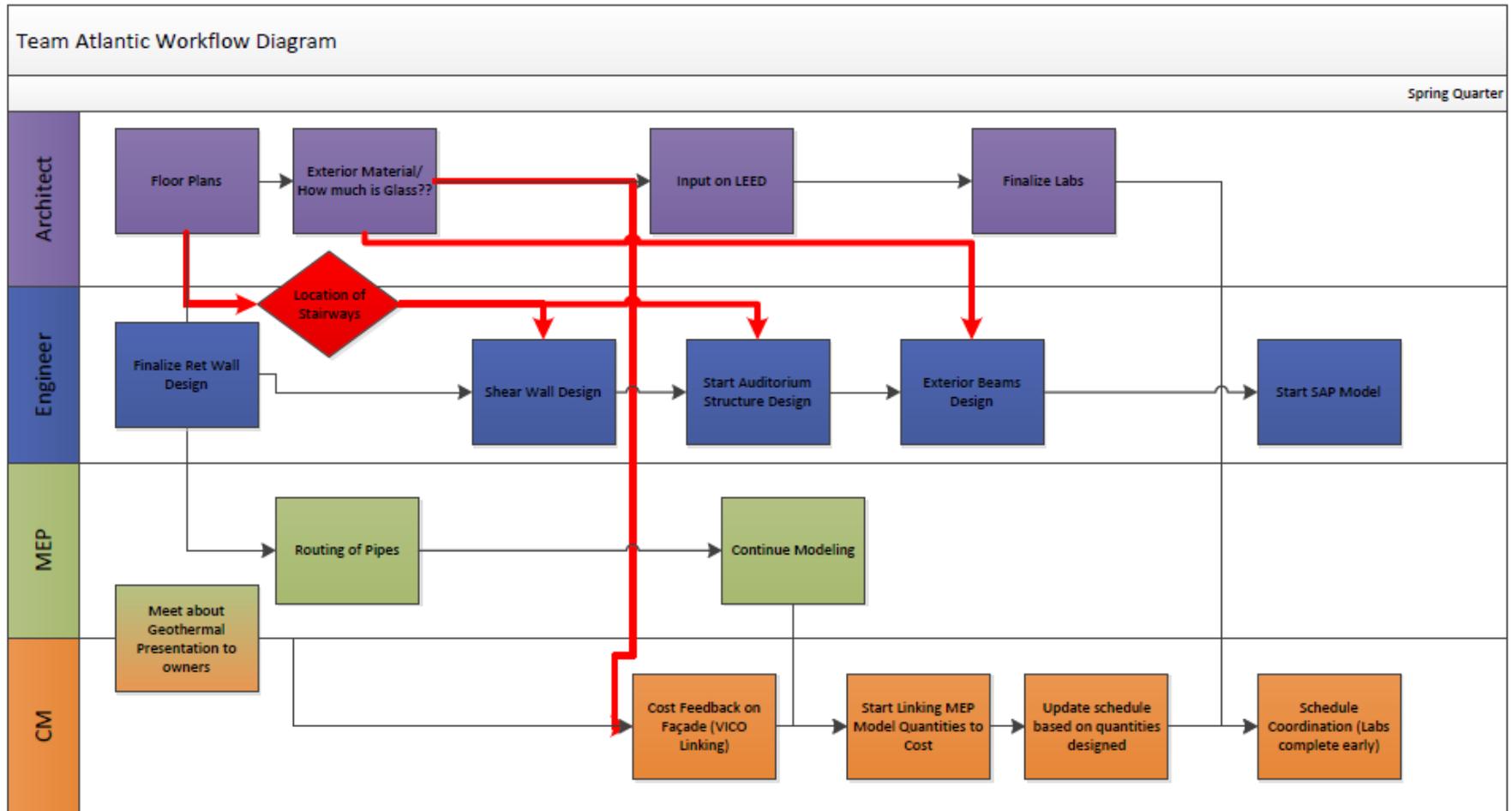
By Whom	Need ID #	Start Date	Finish/Due Date	Total Work Hours to Complete	Actual Work Hours to Date	Status	% Complete
RIAM, TRAVIS	24	3/5/2011	3/6/2011	5	1	In Progress	20%
RIAM, TRAVIS	24	3/5/2011	3/6/2011	5	0.5	In Progress	10%

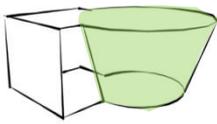


IPD Process Evolution

Workflow Diagram

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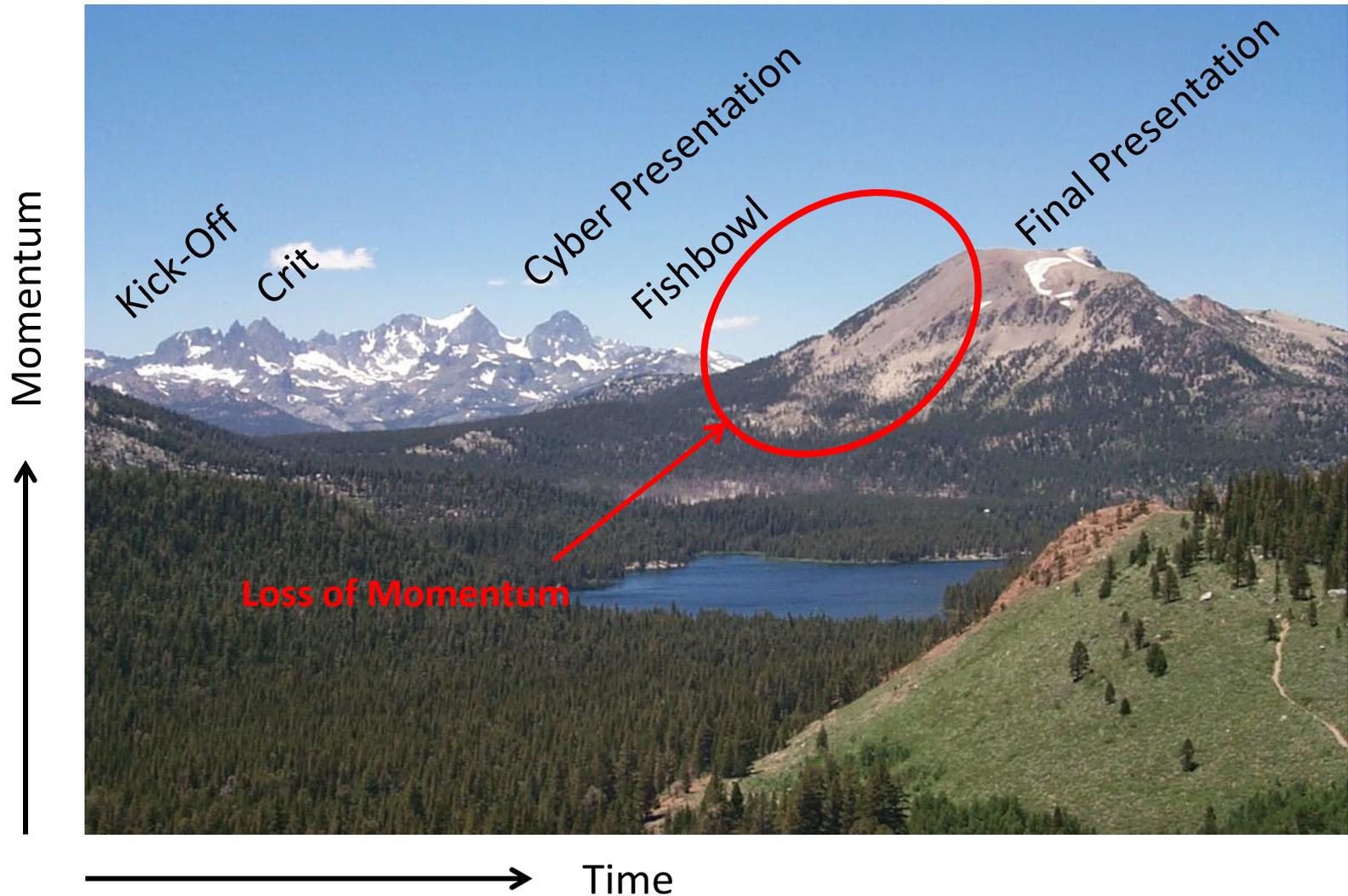


Changes From Winter Quarter

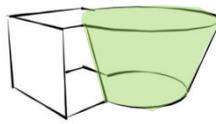
Progression of Momentum With Time

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M
C

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Collaboration



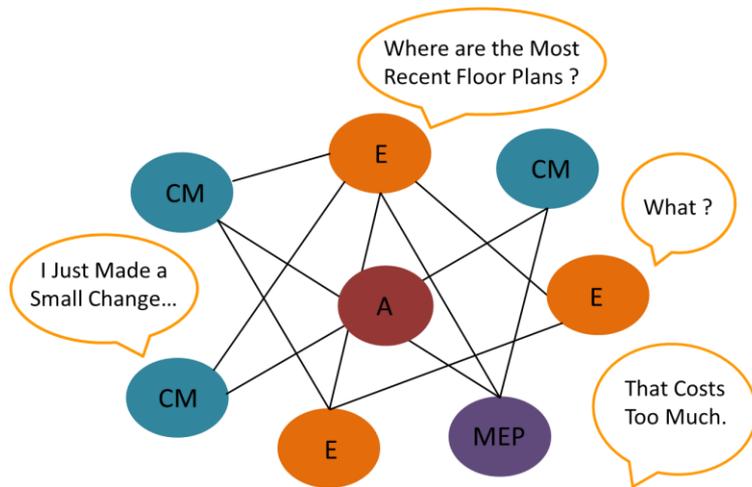
A

E

M

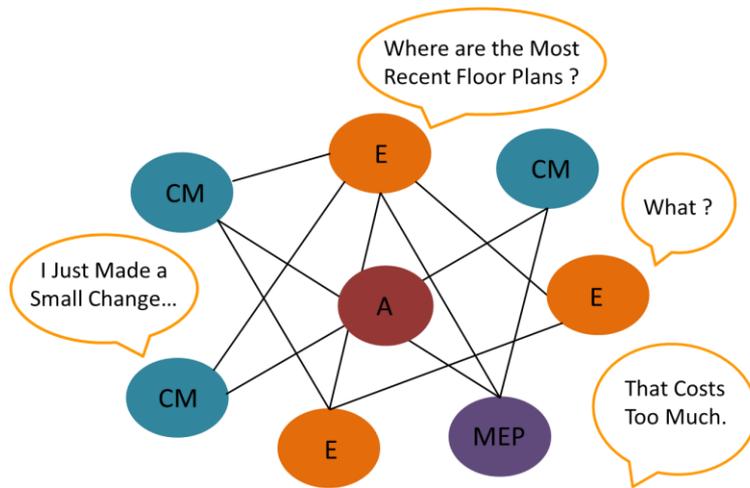
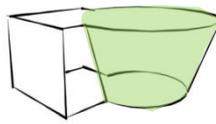
C

atlantic team

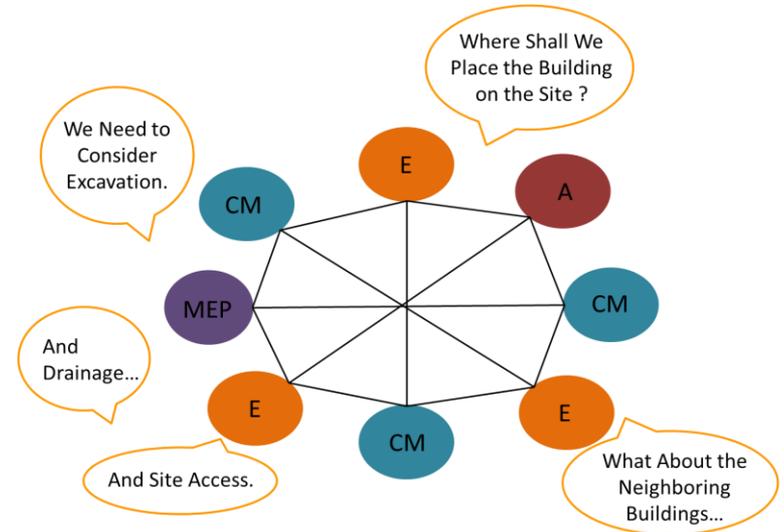


Complete Chaos

Collaboration

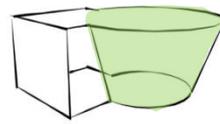


Complete Chaos

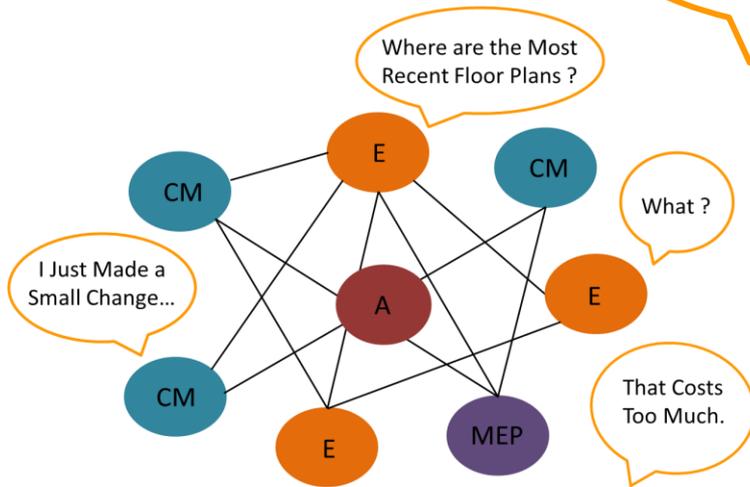


Some Order

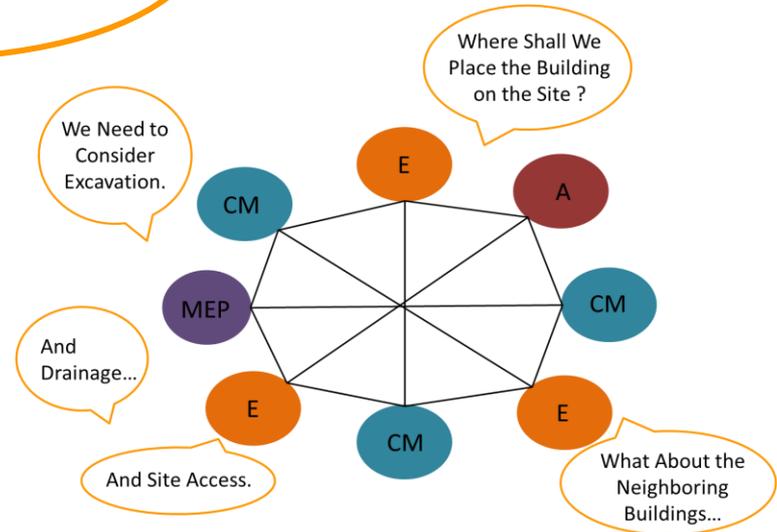
Collaboration



Where are the Most Recent Floor Plans ?

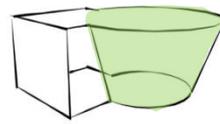


Complete Chaos

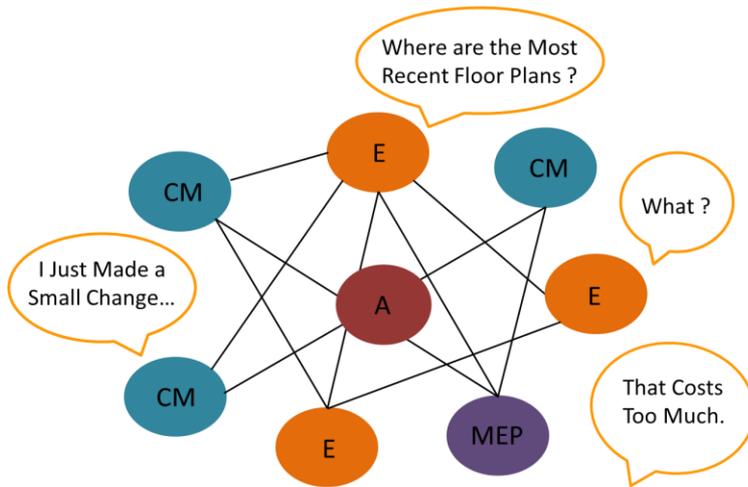


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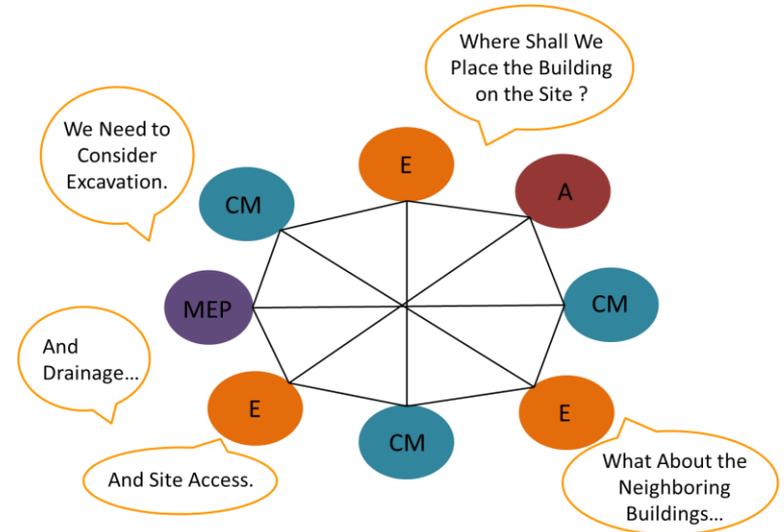
Collaboration



What ?

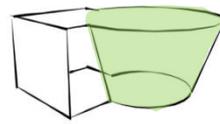


Complete Chaos

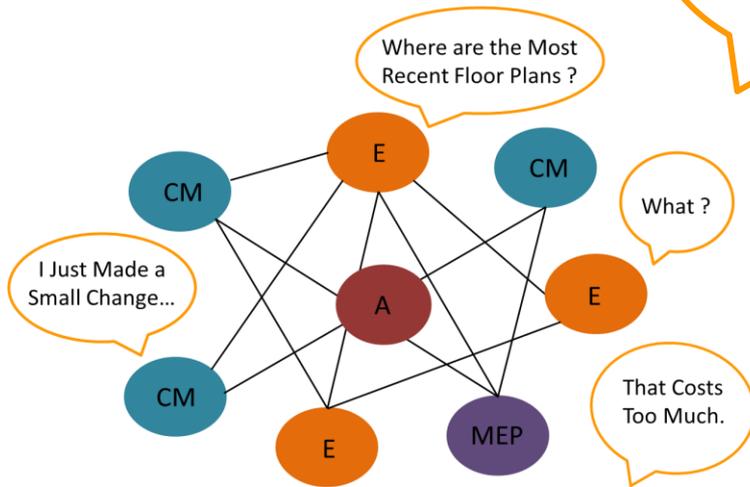


Some Order

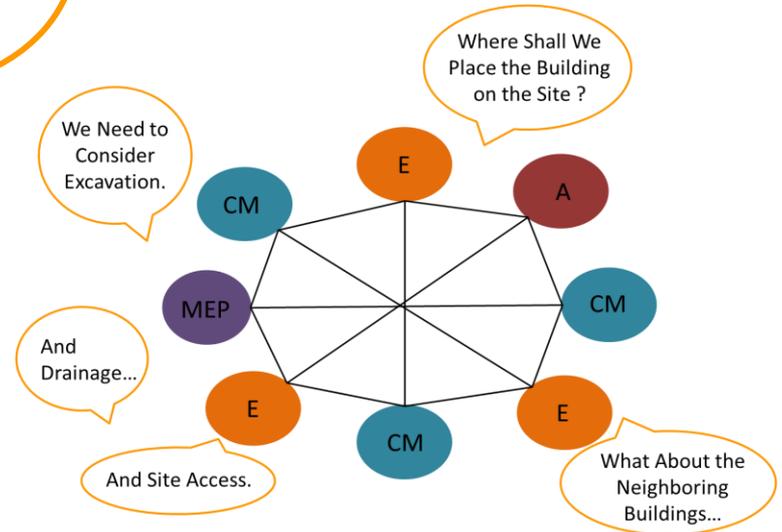
Collaboration



That Costs Too Much.

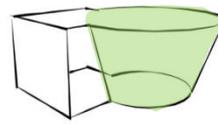


Complete Chaos

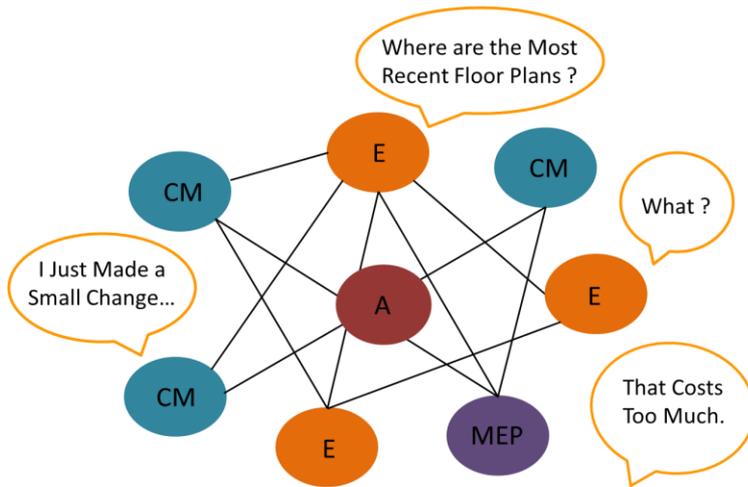


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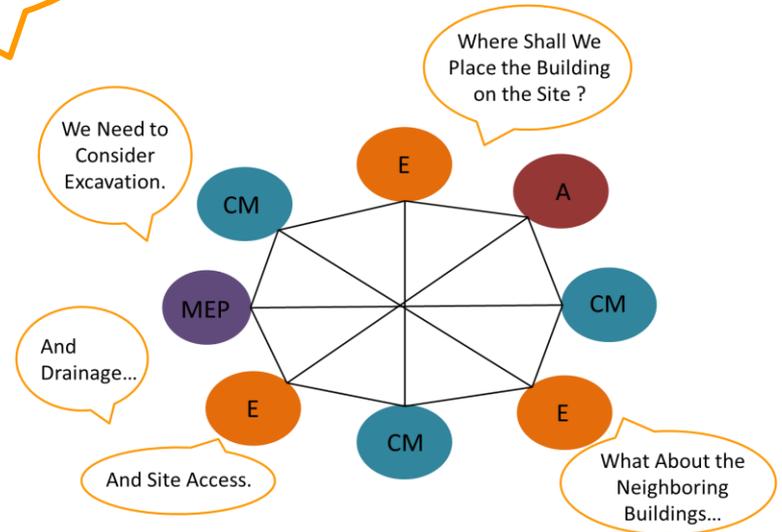
Collaboration



I Just Made a Small Change...

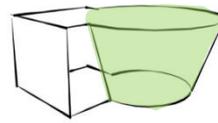


Complete Chaos

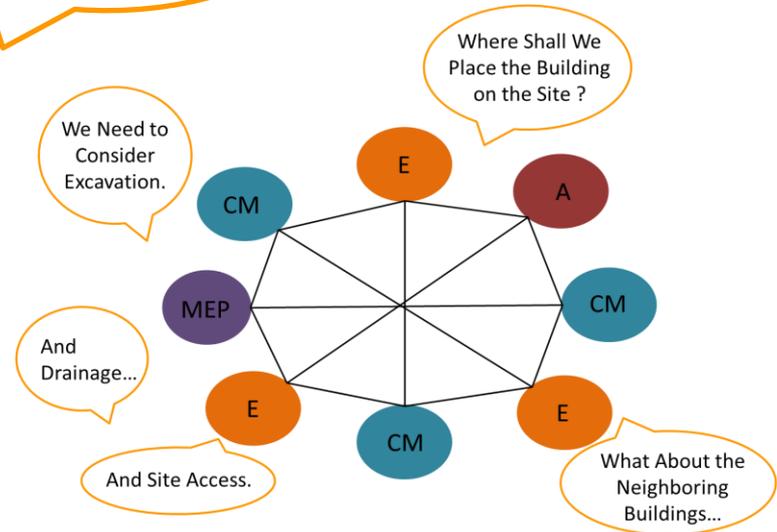
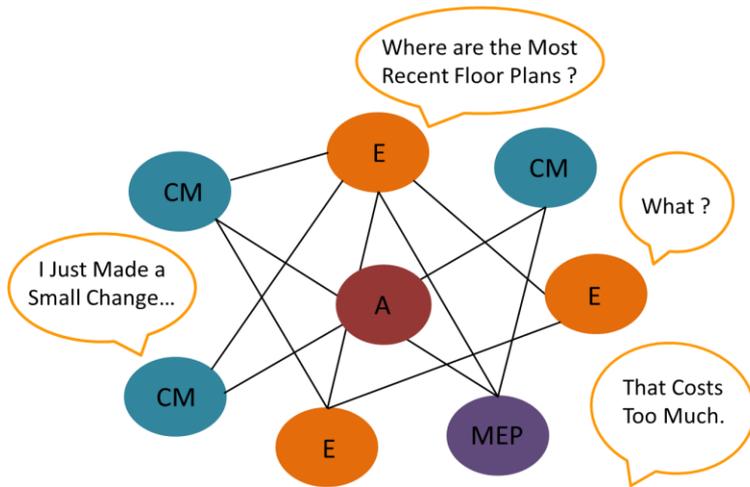


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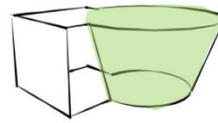
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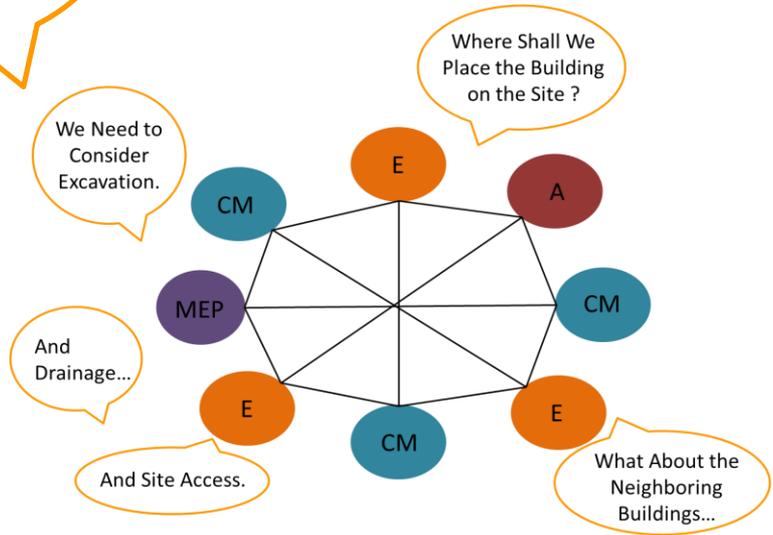
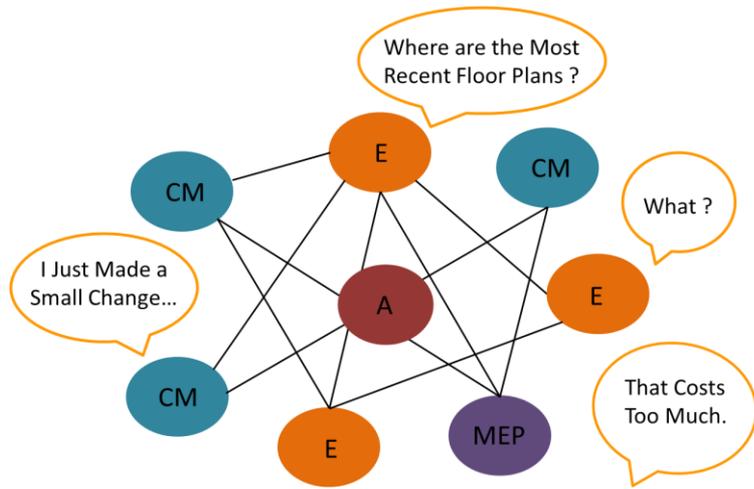
Where Shall We Place the Building on the Site ?



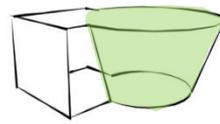
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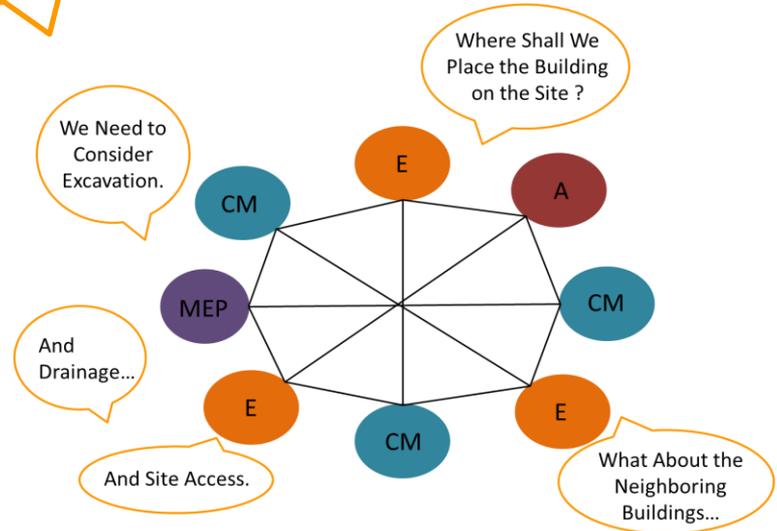
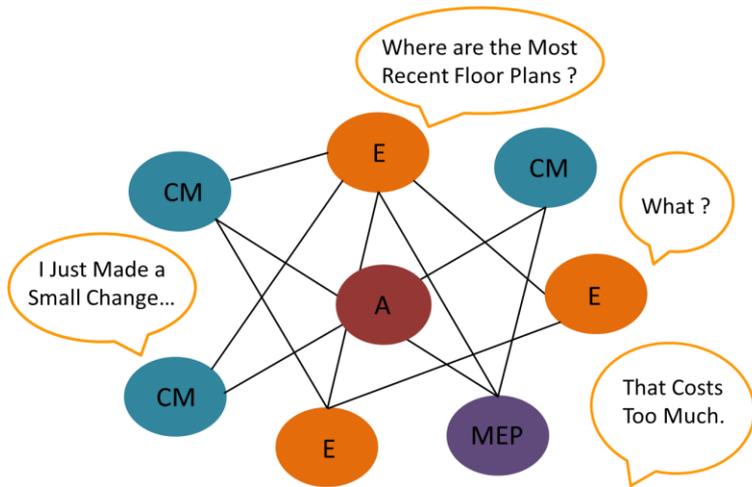
We Need to Consider Excavation.



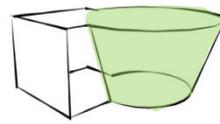
Collaboration



And
Drainage...

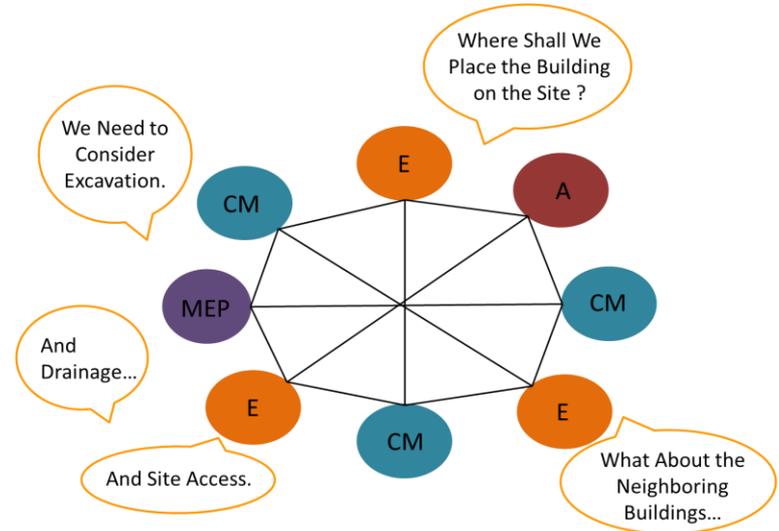
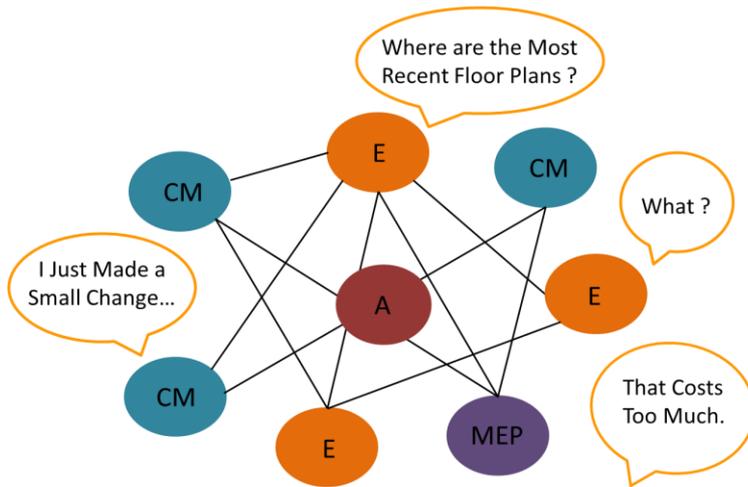


Collaboration

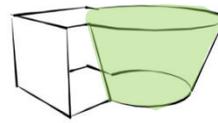


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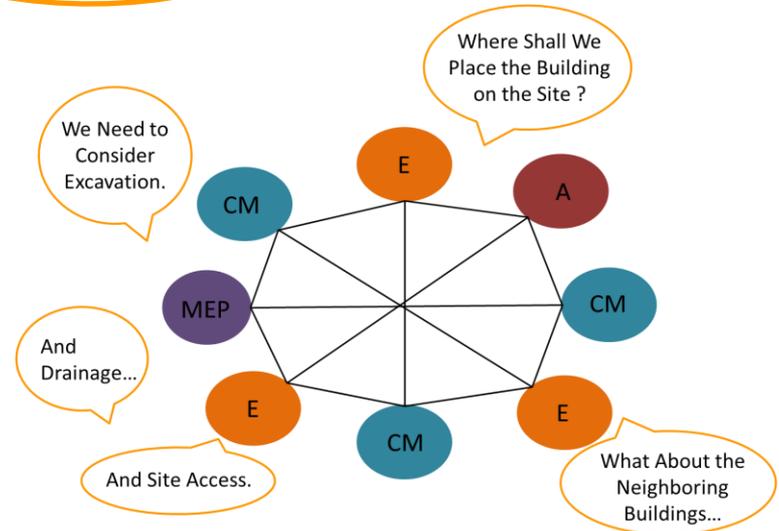
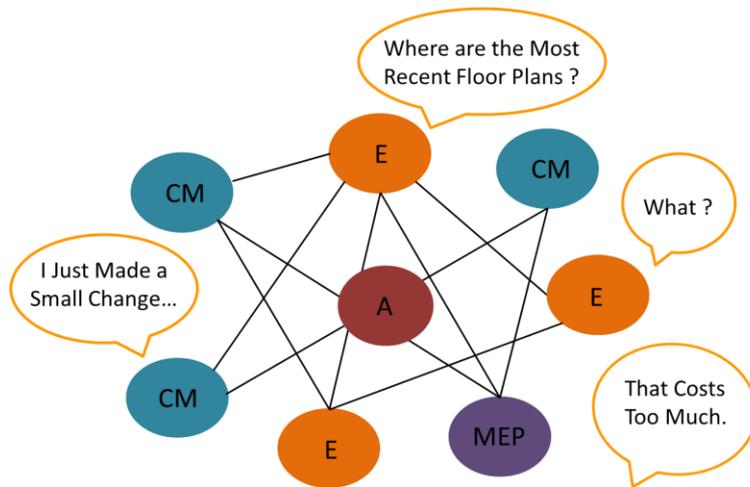
And Site Access.



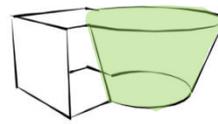
Collaboration



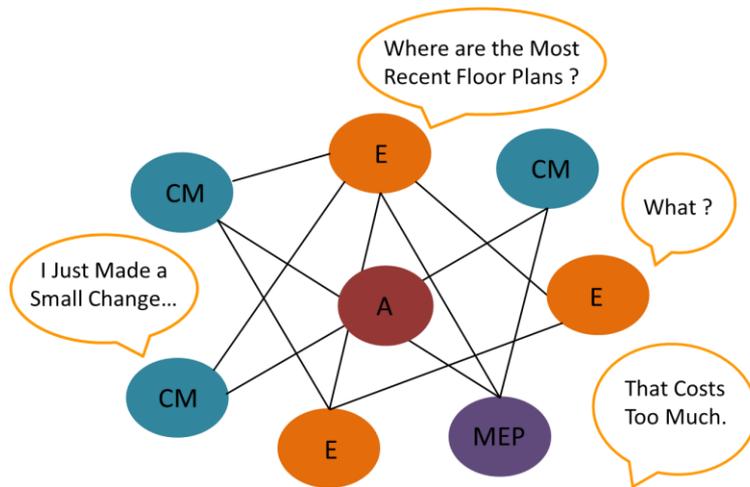
What About the Neighboring Buildings...



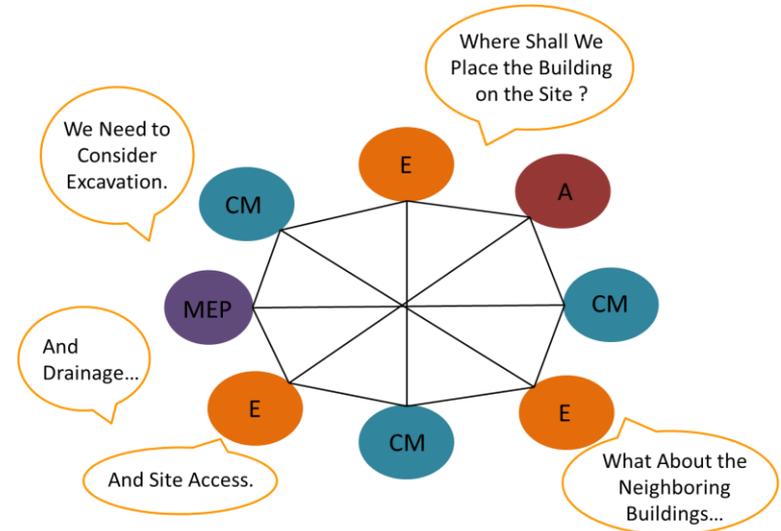
Collaboration



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Complete Chaos



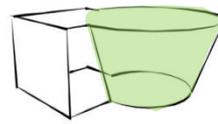
Some Order

Confusion About
Other Disciplines

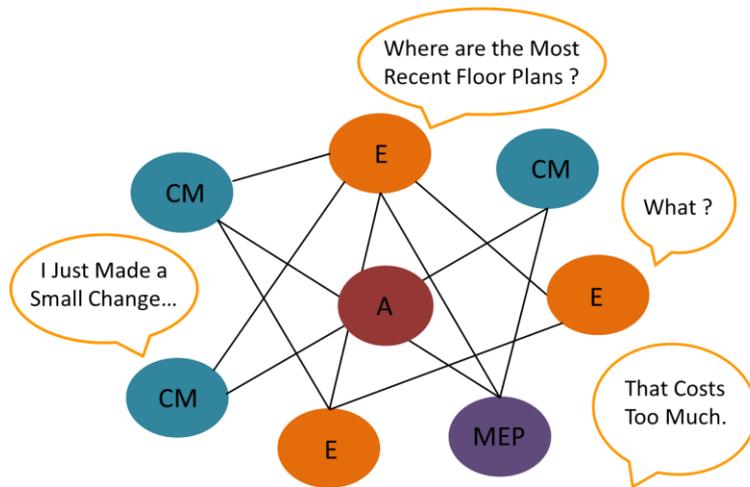


Appreciation and
Understanding of Other
Disciplines

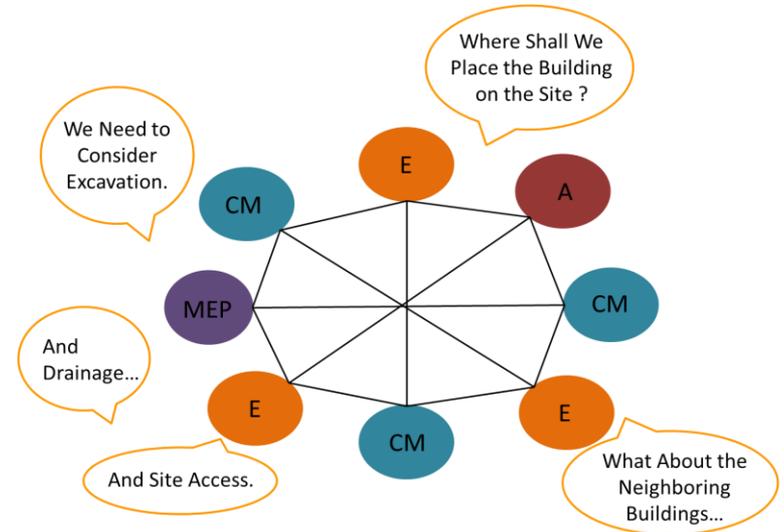
Collaboration



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Complete Chaos



Some Order

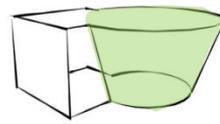
Communication

Confusion About
Other Disciplines



Appreciation and
Understanding of Other
Disciplines

Communication



A
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M
C
atlantic team

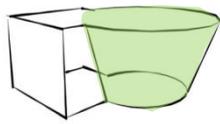


Most Effective Communication Software For Us



No Email Policy

Communication



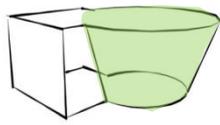
A
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M
C

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Most Effective Communication
Occurred When Co-Located

Communication



A

E

M

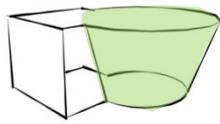
C

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What am I
supposed to
do?...Let's meet.

Communication



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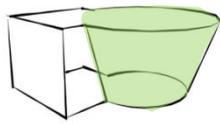


What am I
supposed to
do?...Let's meet.



And now we
will talk...and
talk...

Communication



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What am I
supposed to
do?...Let's meet.

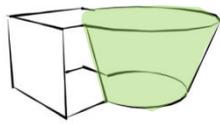


And now we
will talk...and
talk...



Understanding.
Educated Questions
and Communication

Lessons Learned

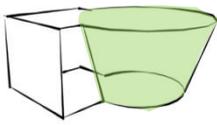


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- A global team is only as fast as its slowest network speed
- Nobody's done until everybody's done
- Even if you are still learning don't forget to educate your team
- An enemy isn't really an enemy

"I choose my friends for their good looks, my acquaintances for their good characters, and my enemies for their good intellects. A man cannot be too careful in the choice of his enemies. I have not got one who is a fool. They are all men of some intellectual power, and consequently they all appreciate me."

-Henry Wotton, The Picture of Dorian Gray



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M
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Josh Odelson

Glenn Katz

All the Mentors

Renate

Martin Dembski

Tine Logonder

Thank You!

David Bendet

Willem Kymmell

Lauren Scammell

Eric Borchers

Ivo Zagar

Prof. Miranda

Marko Balant

Prof. Borja

Michael Pearson

Prof. Krawinkler

Greg Luth

Prof. Nelson