

the university of new mexico **albuquerque**

mary shanie victoria dustin milosz michael raleigh **express team**

team introduction



raleigh se



mary se



victoria ar



dustin cm



michael cm



shanie mep



milosz ar



0h

+2h

+9h

express team

team dynamics and process

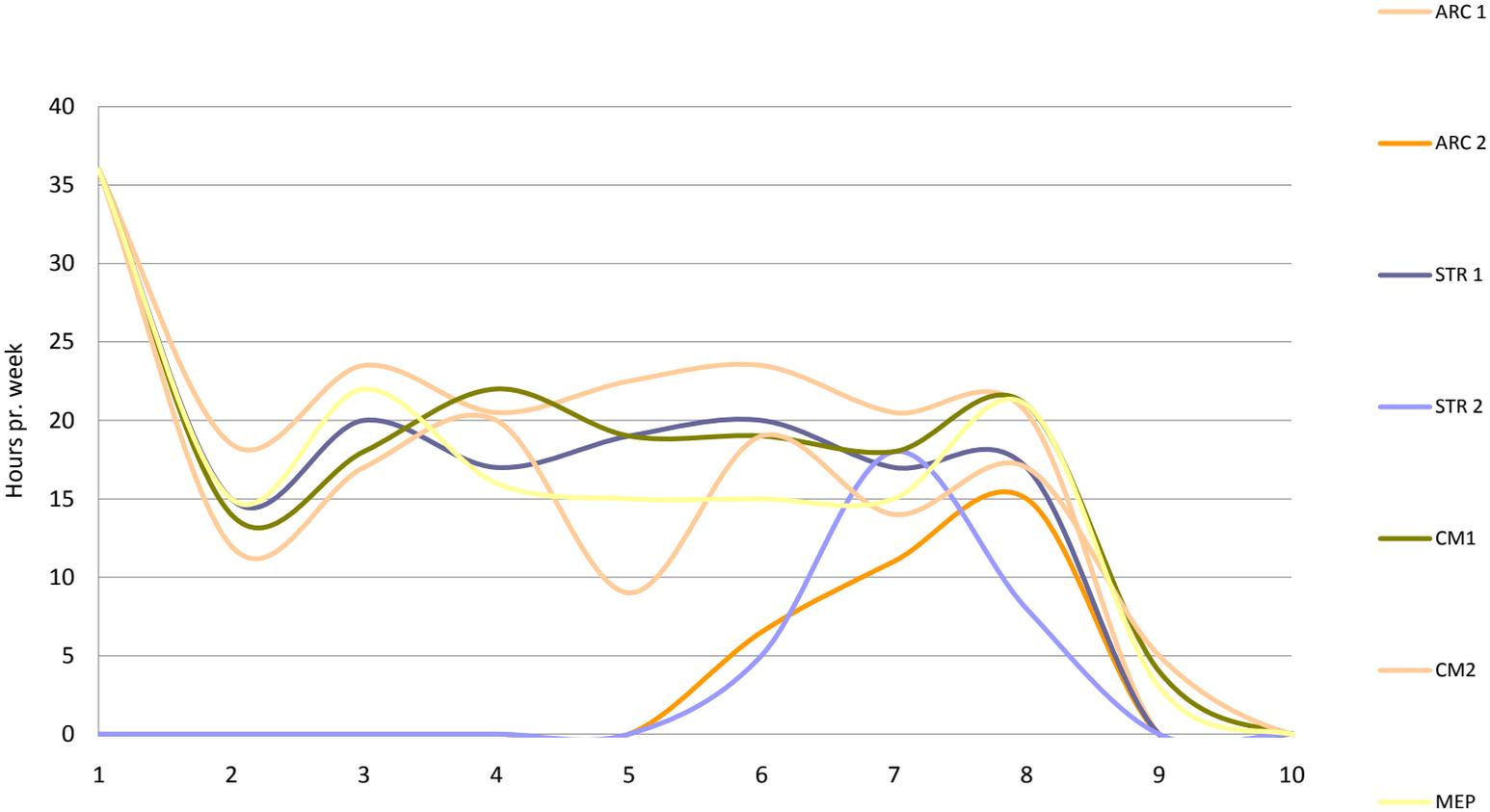


START	0 days
1ST ARCHITECTURAL CONCEPT	8 days
ARCHITECTURE	8 days
CONTEXT	4 days
VISION	4 days
SKETCHES	4 days
RELATION EXTERIOR/INTERIOR	4 days
EC -IMPACT	4 days
FLOOR PLANS	1 day
ELEVATIONS	1 day
FUNCTIONAL SPACES - DISTRIBUTION	1 day
FACADES	1 day
MATERIALS/CLADDING	5 days
STRUCTURAL	8 days
LOADS	8 days
LOCAL CODE REQUIREMENTS	8 days
CLIMATE	8 days
SOIL PROFILE	8 days
FOUNDATION ALTERNATIVES	8 days



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hours spent on project



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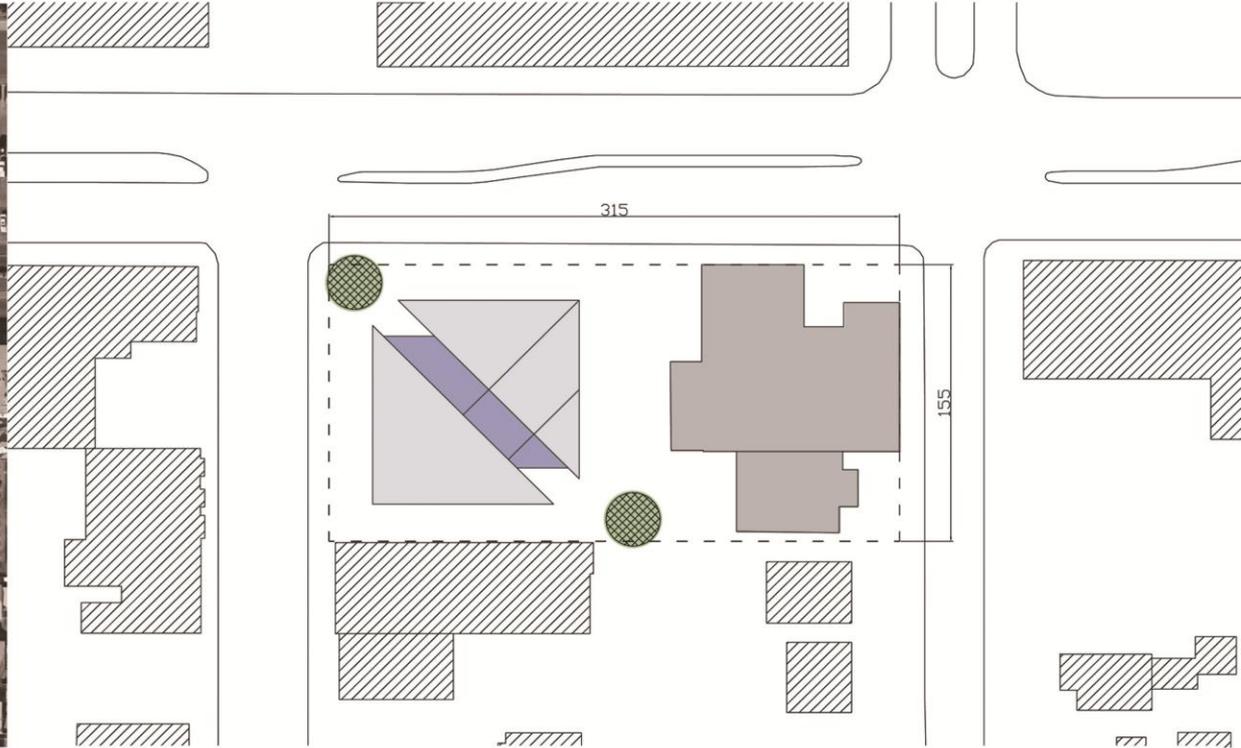
site



northern side- university buildings, crowded street, parking
surrounded by local architecture
urban grid

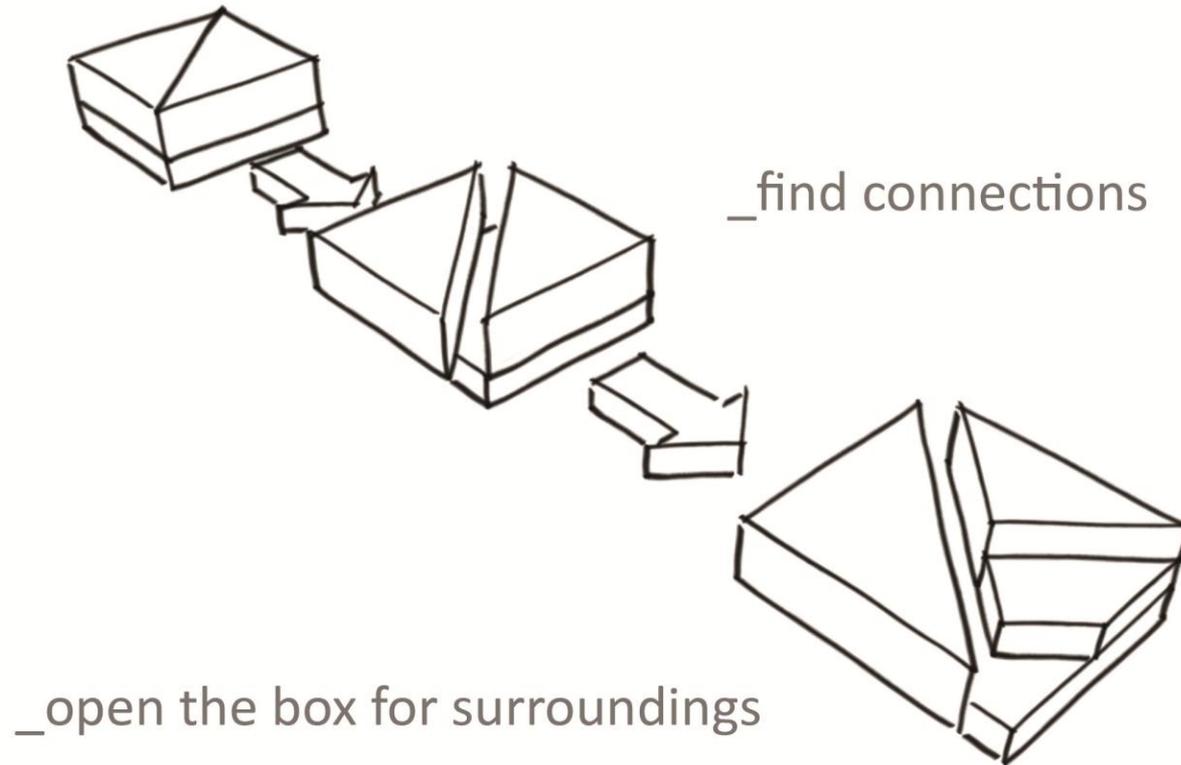
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site conditions



architecture

big idea

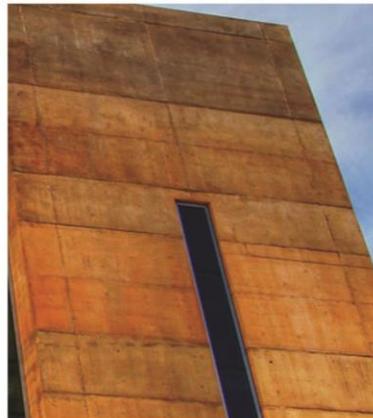
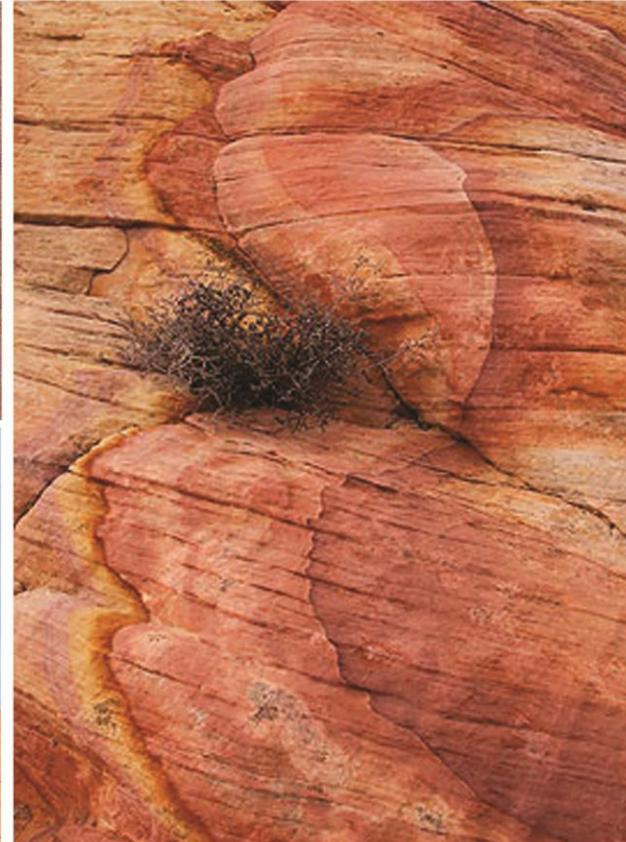
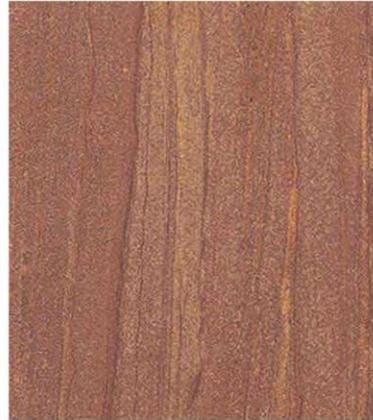


inspirations



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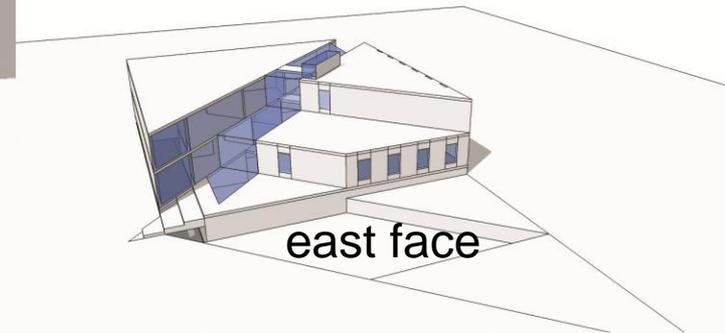
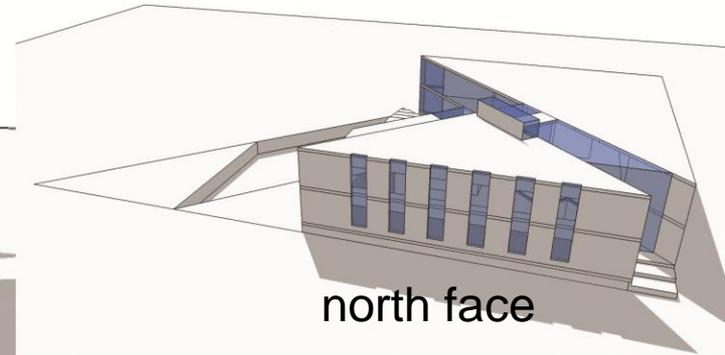
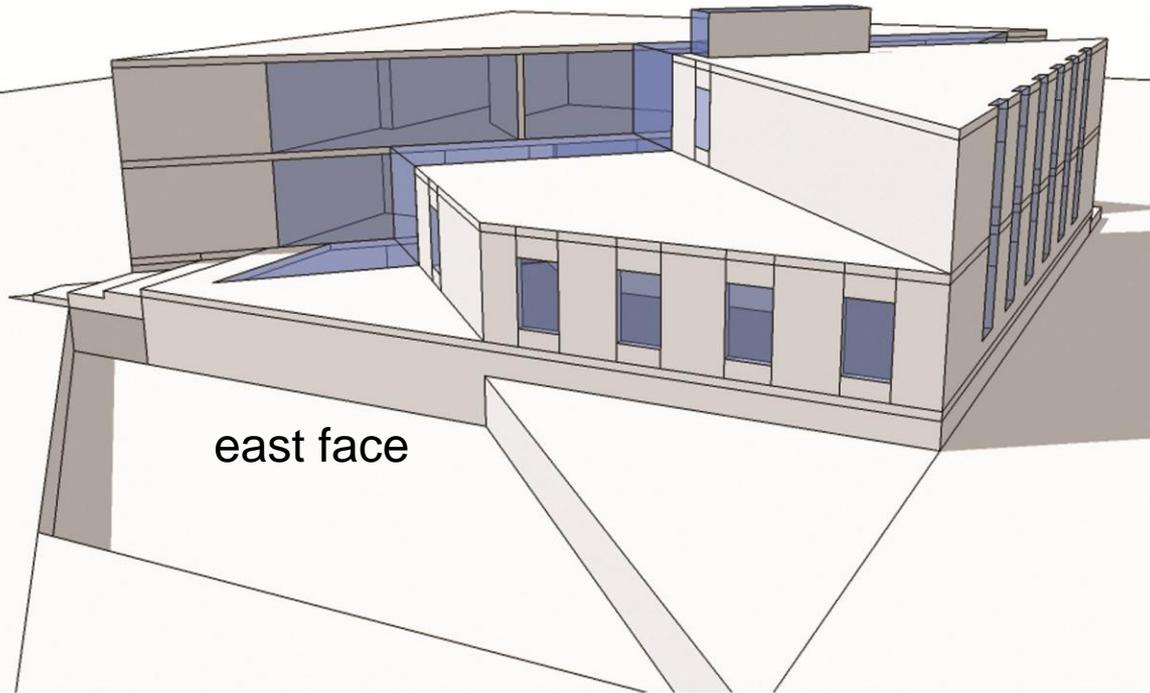
materials



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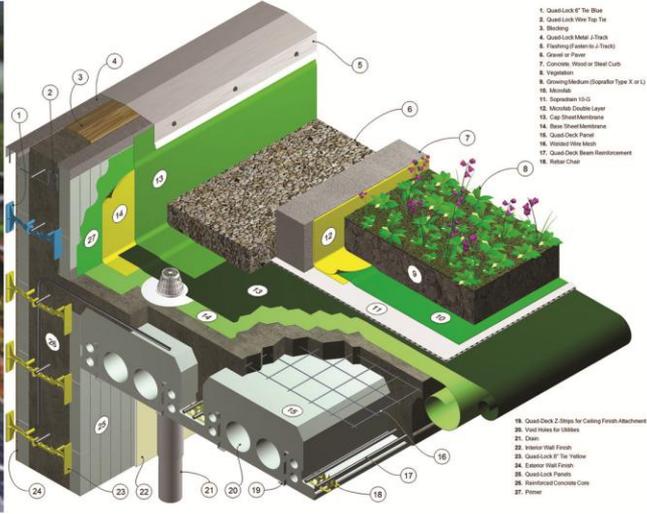
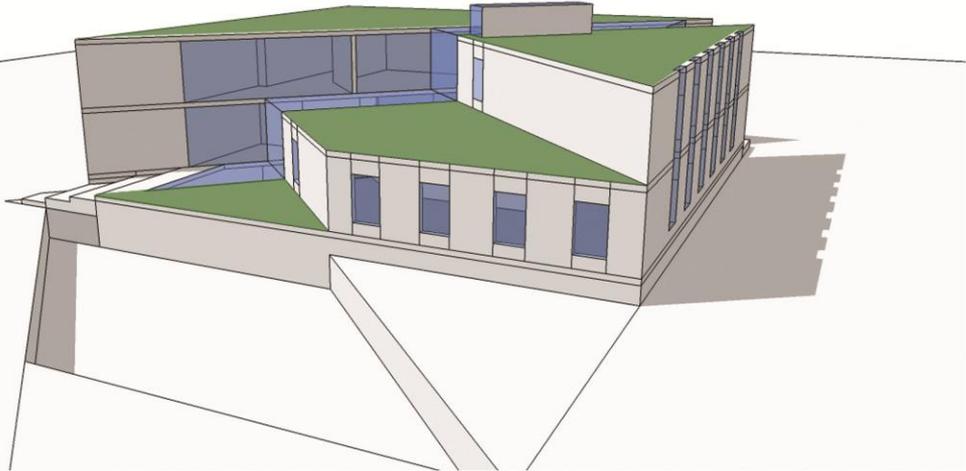


shape

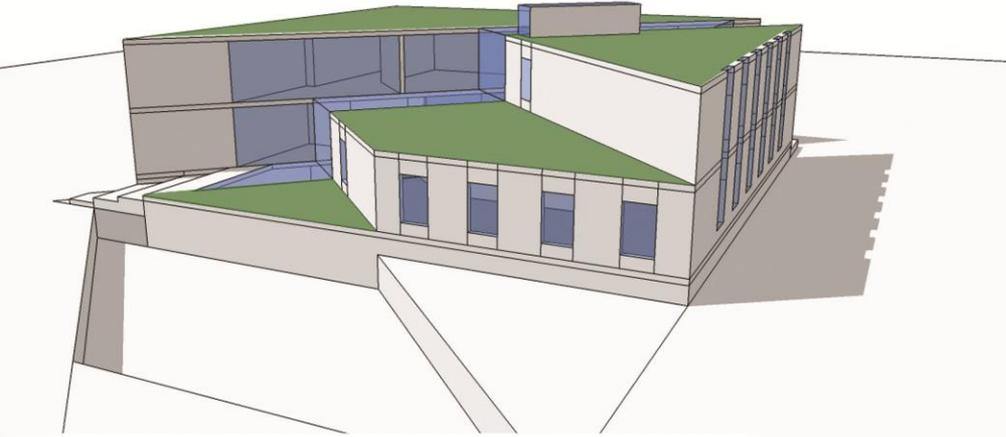


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green extensive roof



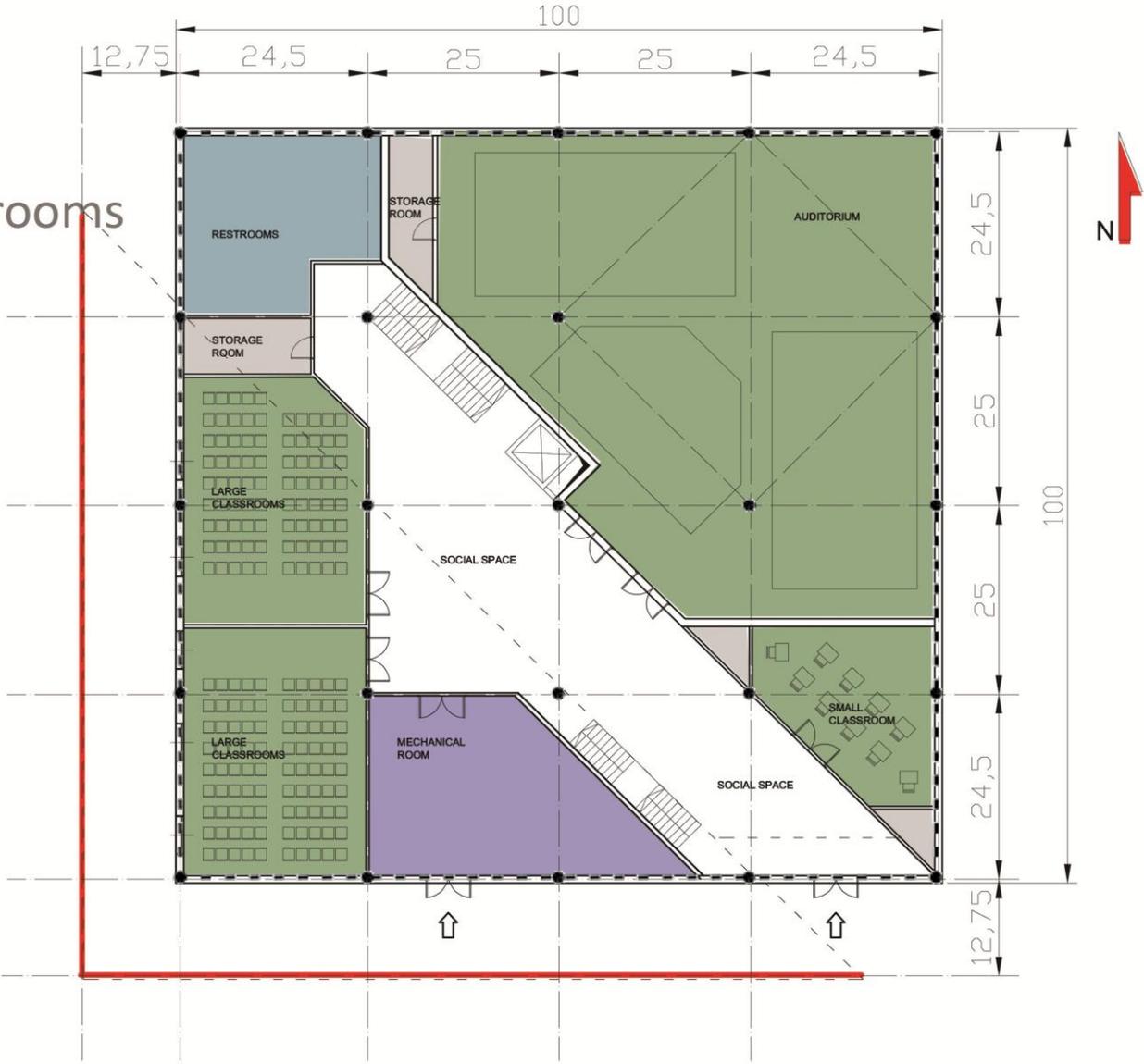
social space



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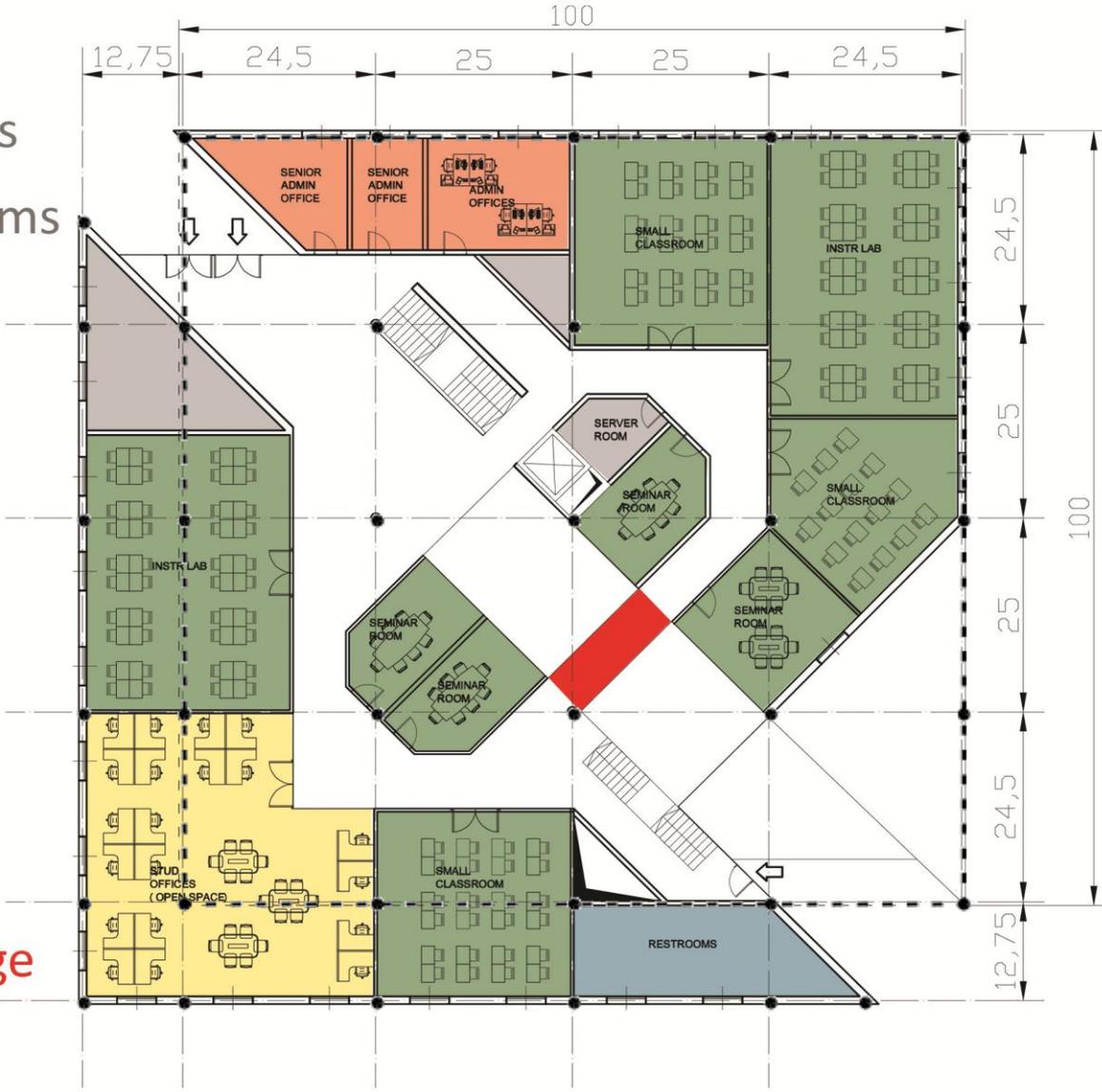
1st floor

- storage rooms
- auditorium+classrooms
- restrooms
- mep room



2nd floor

- storage/server rooms
- auditorium+classrooms
- restrooms
- students offices
- offices



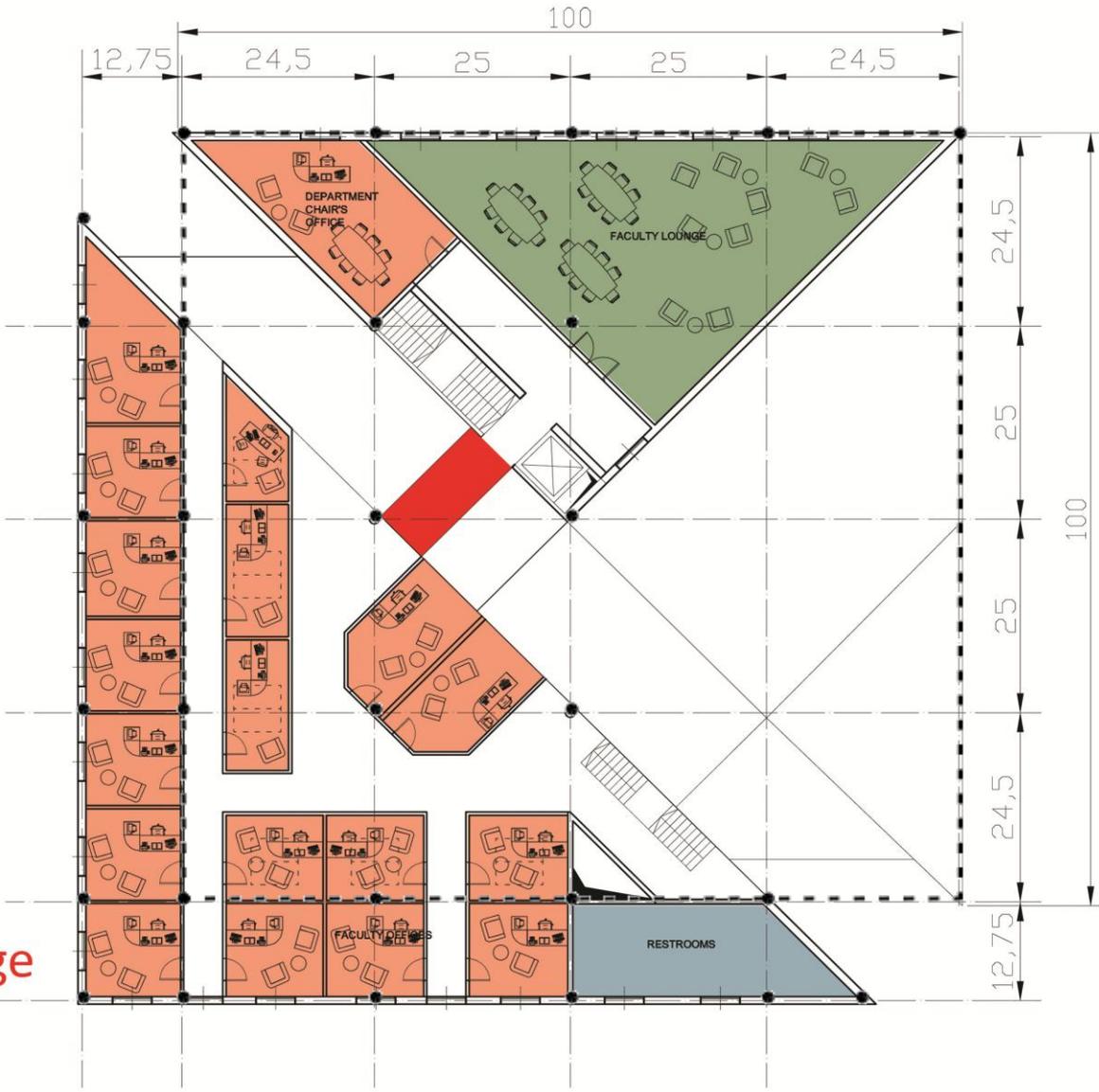
focal point- footbridge



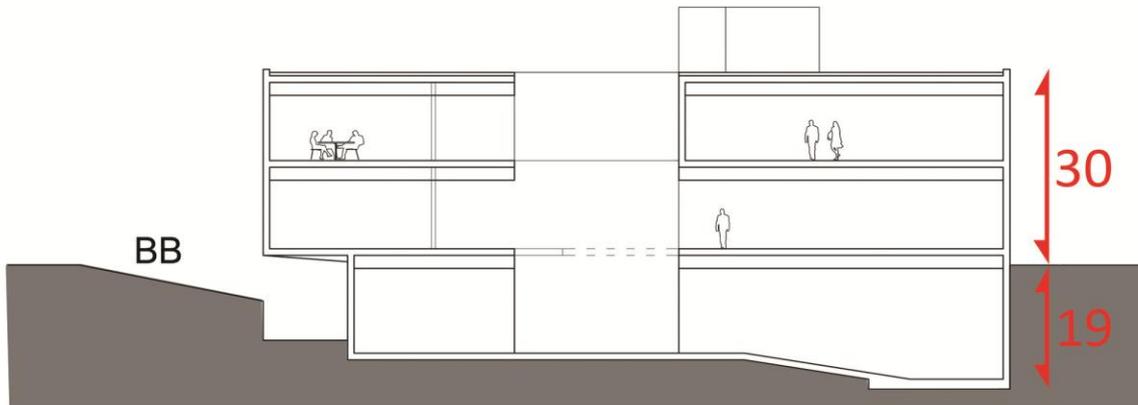
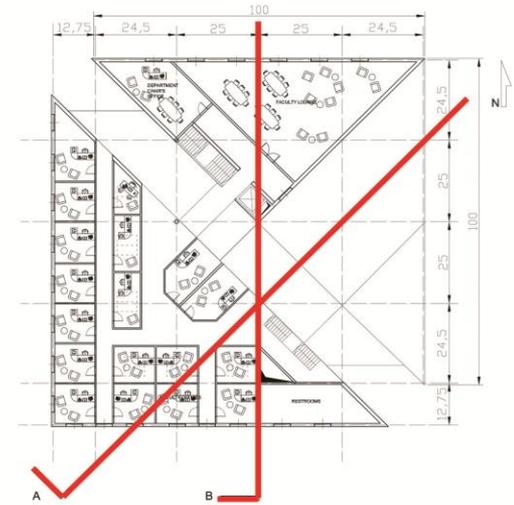
3rd floor

- faculty lounge
- restrooms
- offices

focal point- footbridge

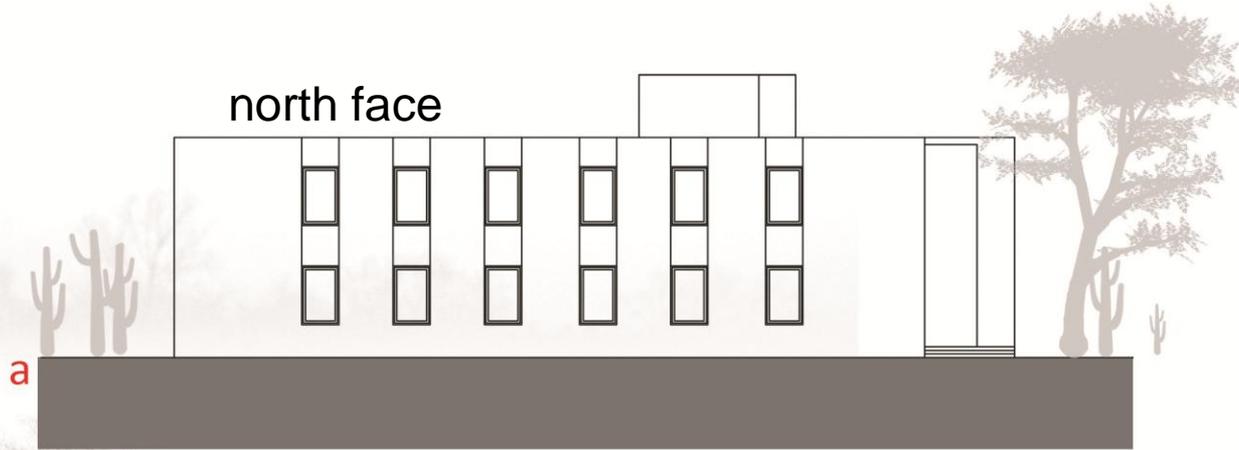


section

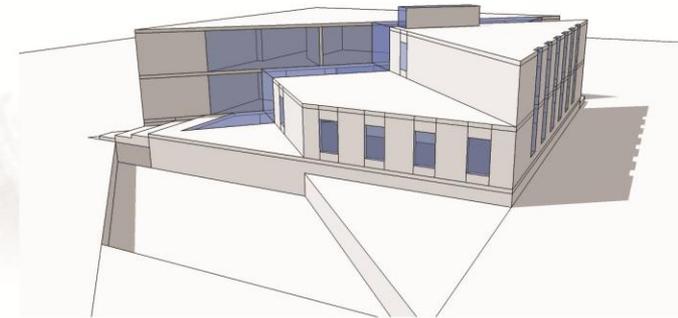
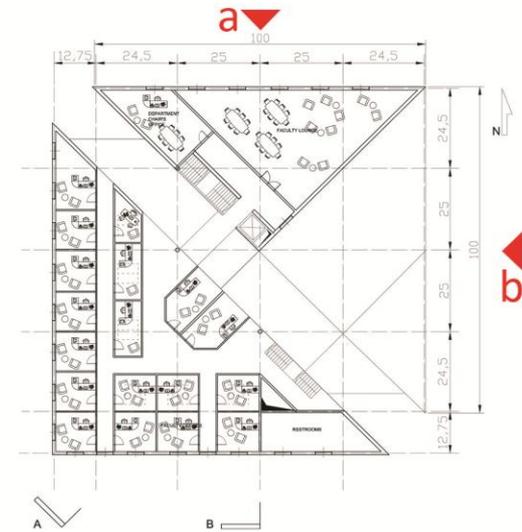
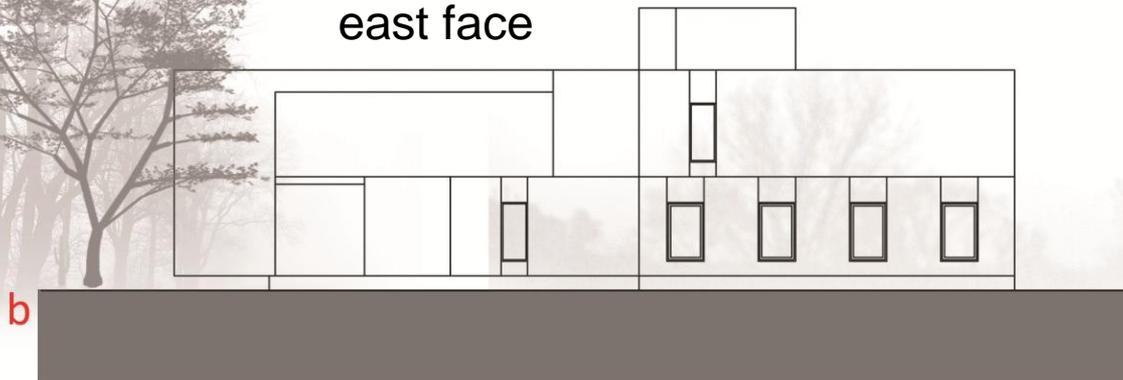


facades

north face



east face



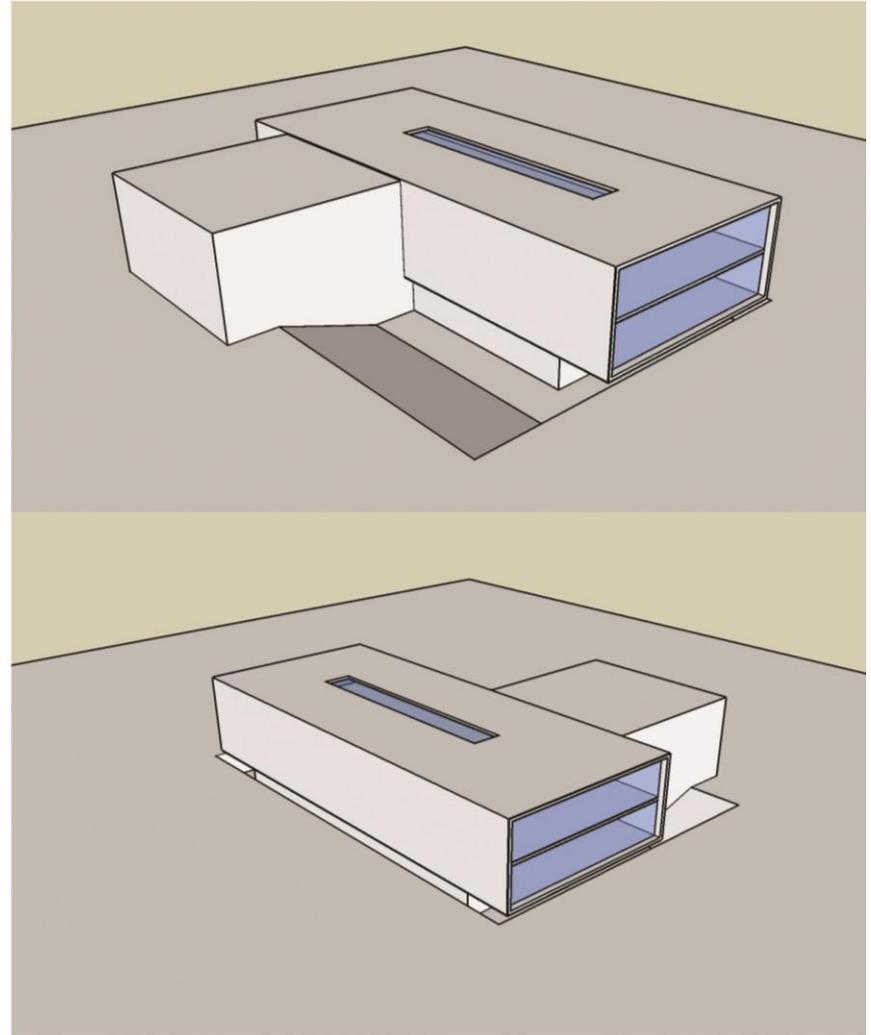
2nd concept- big ideas

_transparency

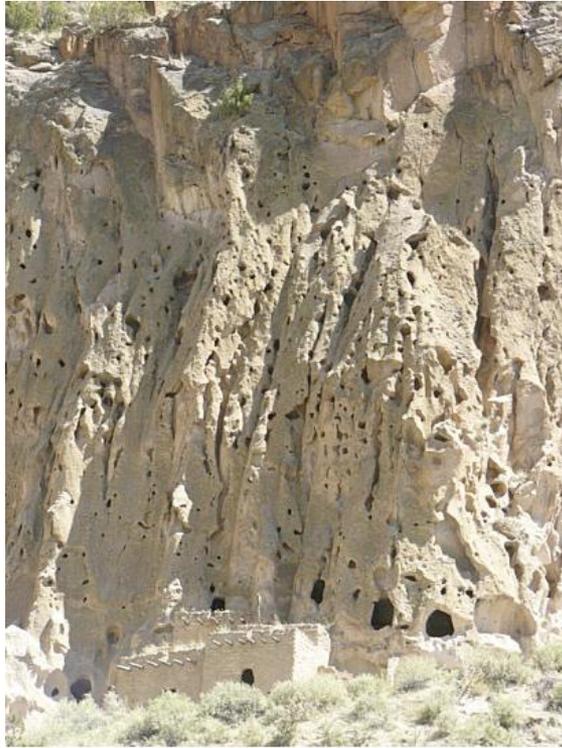
_sustainable ideas

respond to community needs

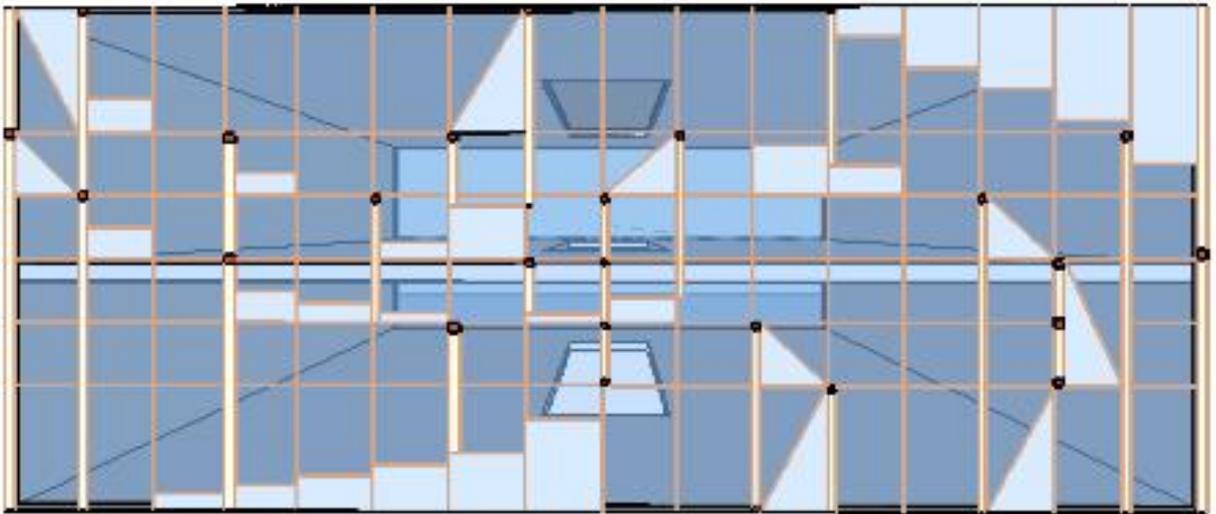
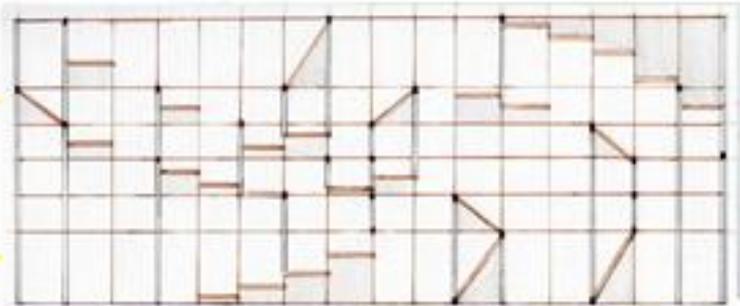
flexibility in structure and plan



window inspirations/textures

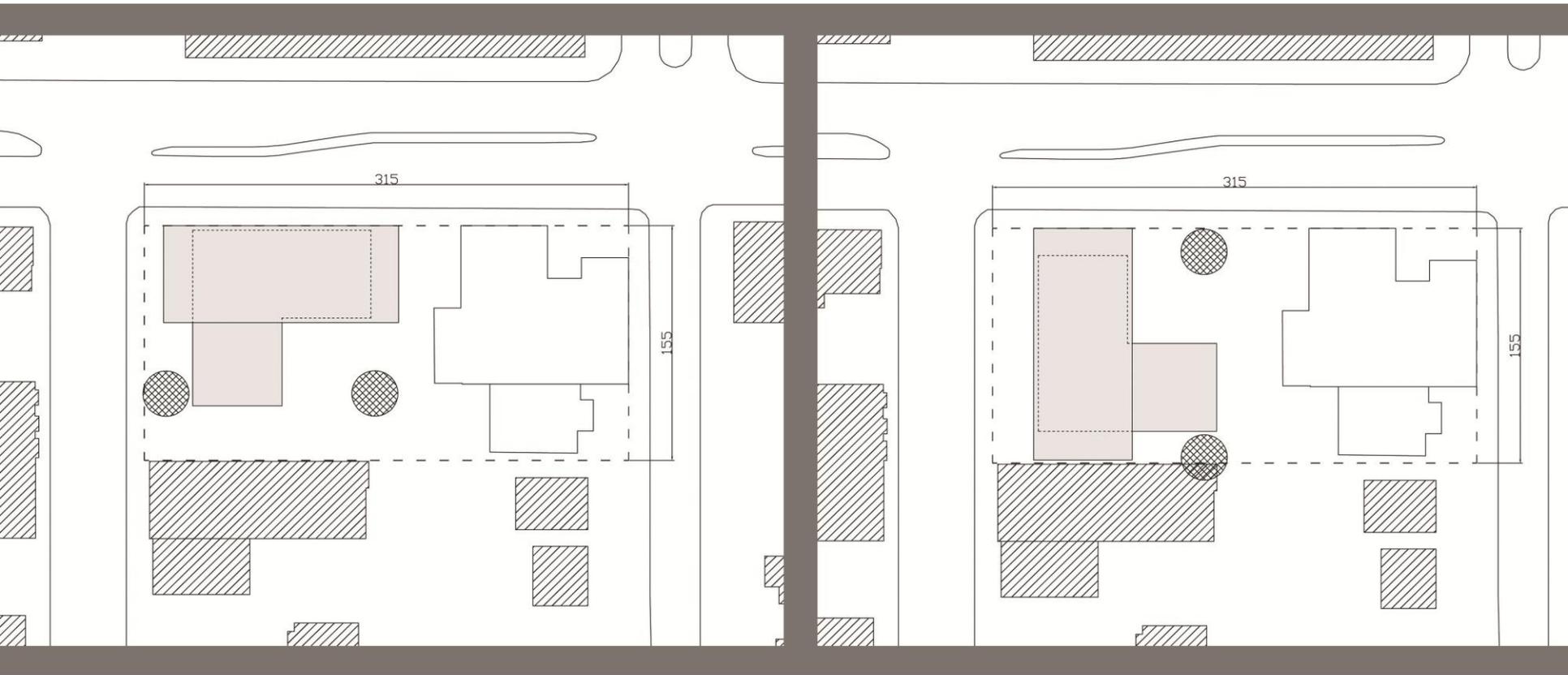


fenestration



east & west face

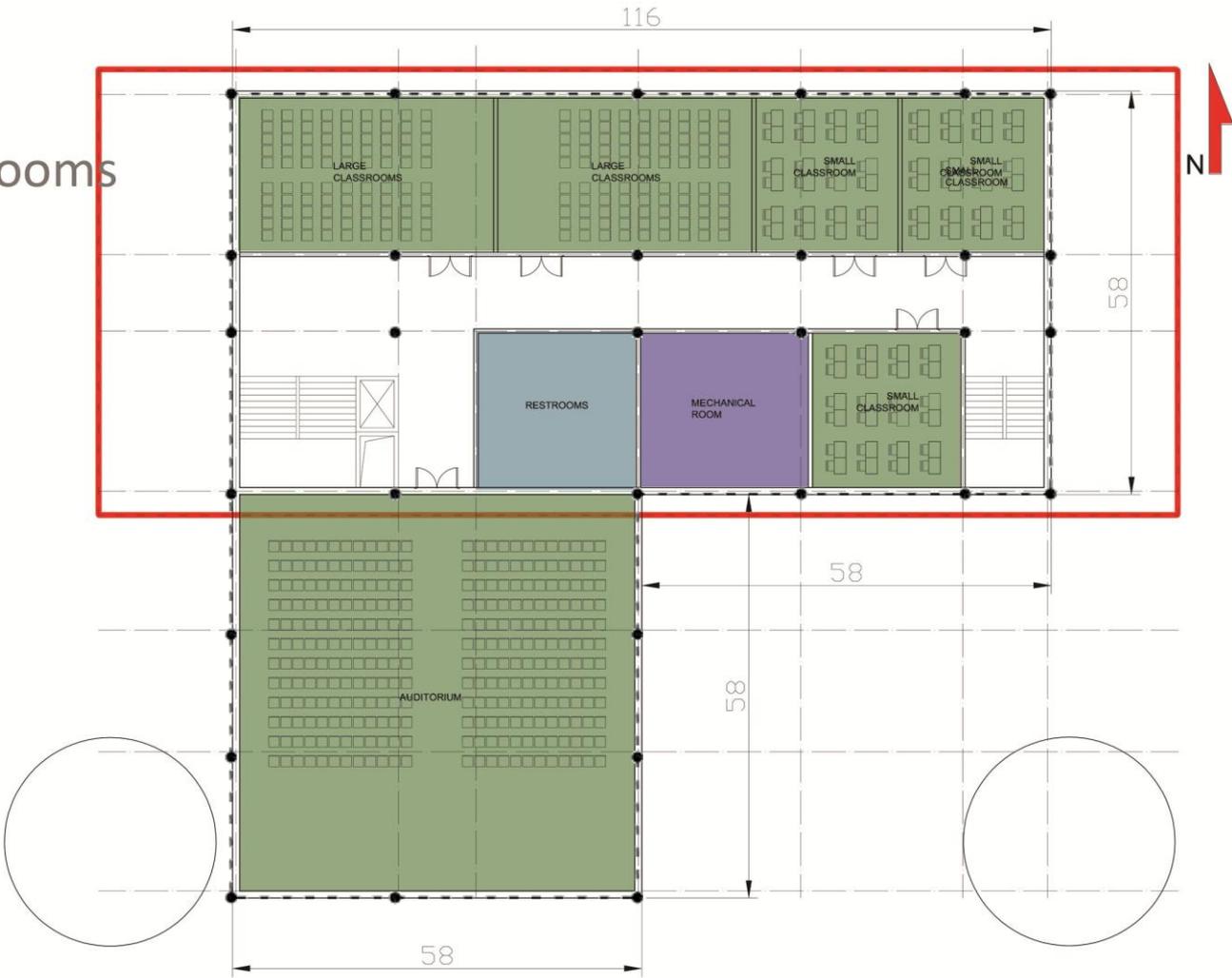
site



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1st floor

- storage rooms
- auditorium+classrooms
- restrooms
- mep room



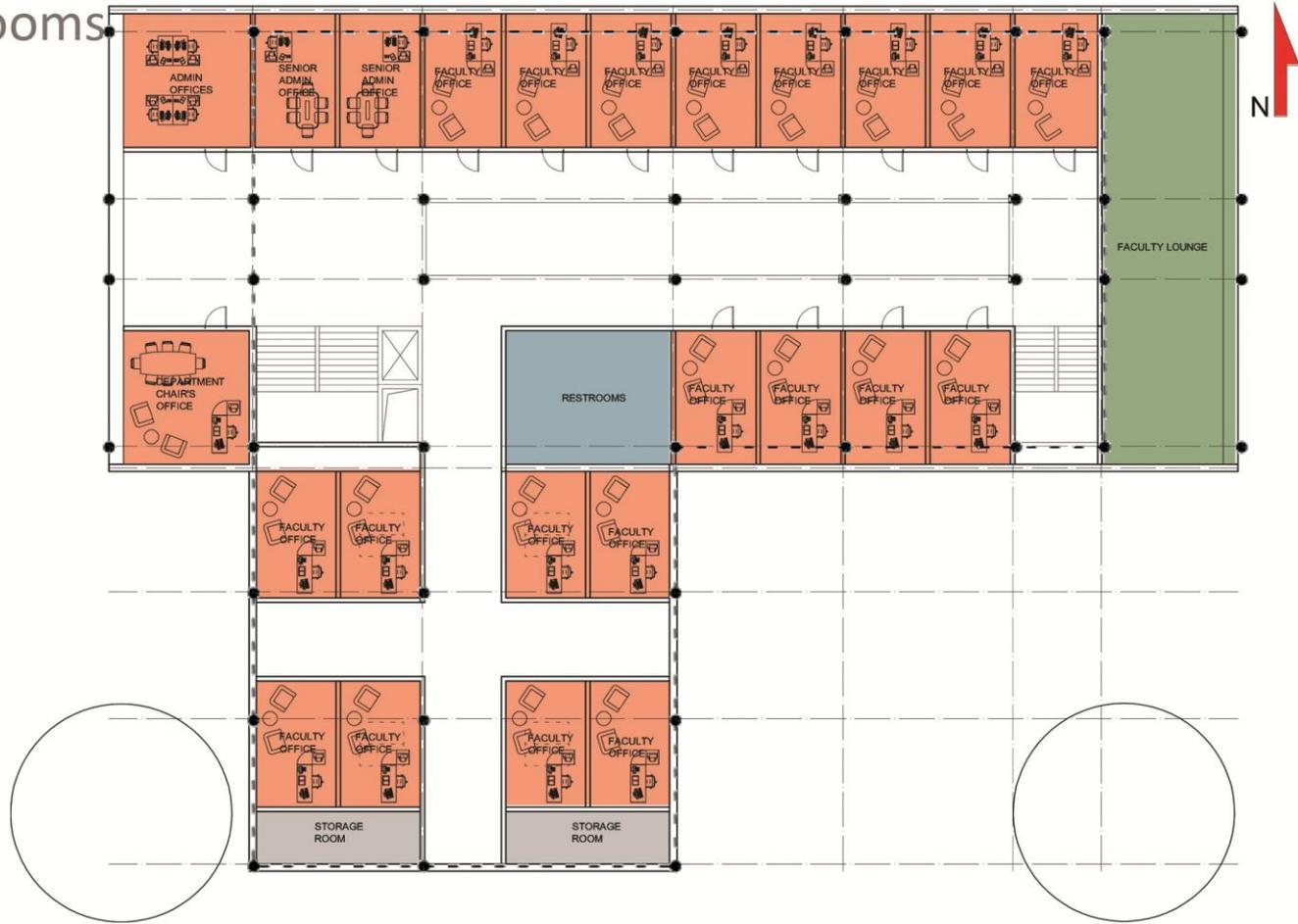
2nd floor

- storage/server rooms
- labs/classrooms
- restrooms
- students offices

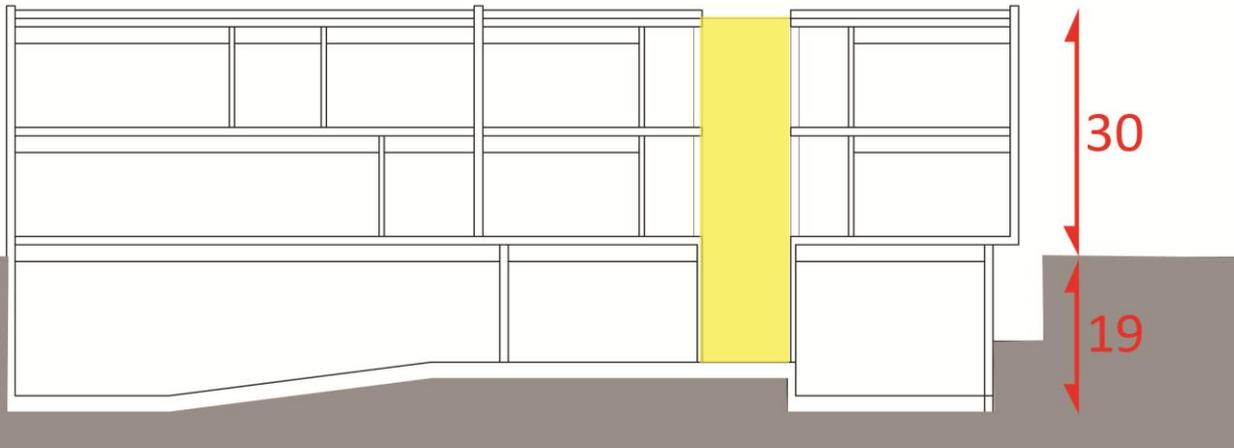
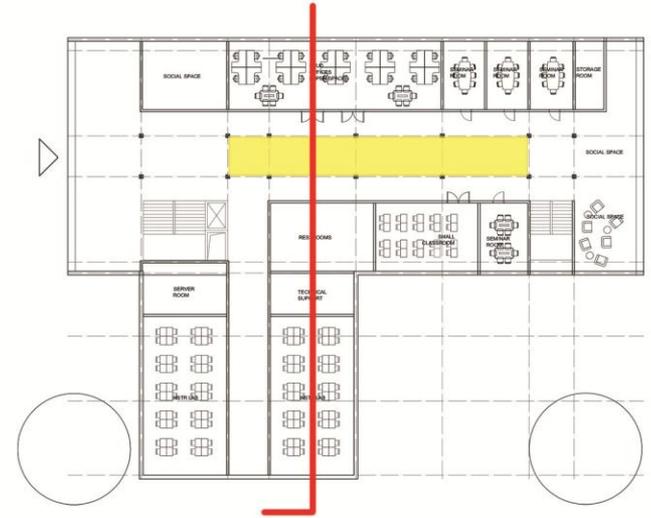


3rd floor

- storage/server rooms
- faculty lounge
- restrooms
- offices



section



structure

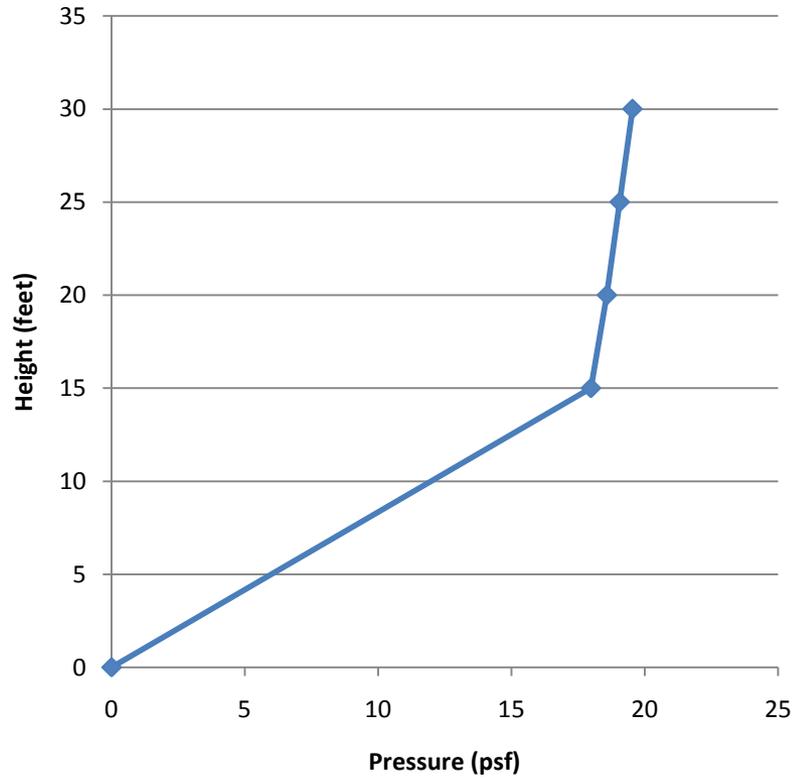
gravity loads: live loads by room

Occupancy Type	Live Load
Faculty Offices	50
Department Chair's Office	50
Senior Administration Office	50
Administrative Assistants	50
Faculty Lounge	100
Student Offices	50
Auditorium	40
Large Classrooms	40
For Flexibility Use	100

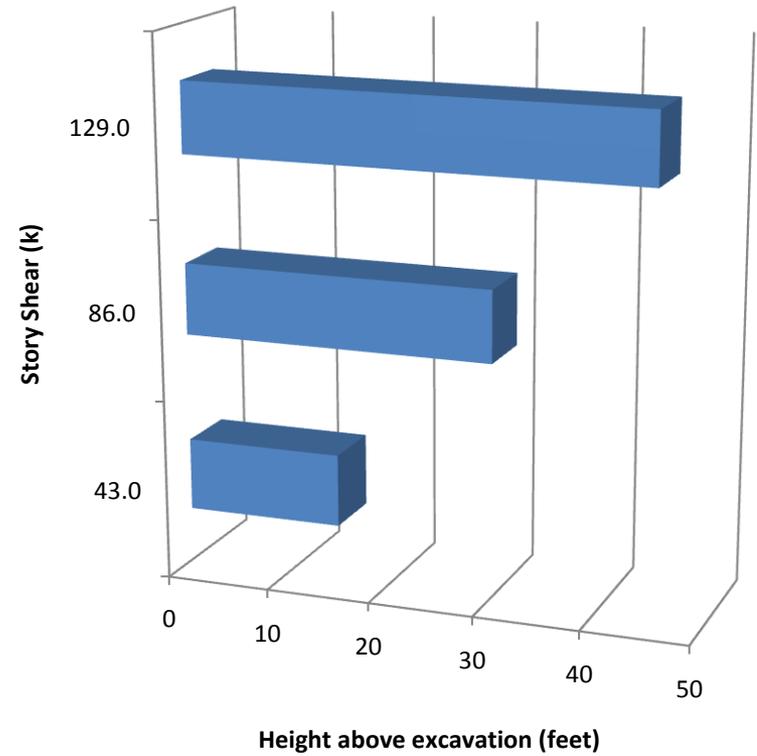
Occupancy Type	Live Load
Small Classroom	40
Seminar Rooms	40
Instructional Labs	100
Server Room	125
Technical Support	50
Storage Rooms	125
First Floor Corridors	100
Second Floor Corridors	80

lateral loads

Wind Pressure



Earthquake (ELF)

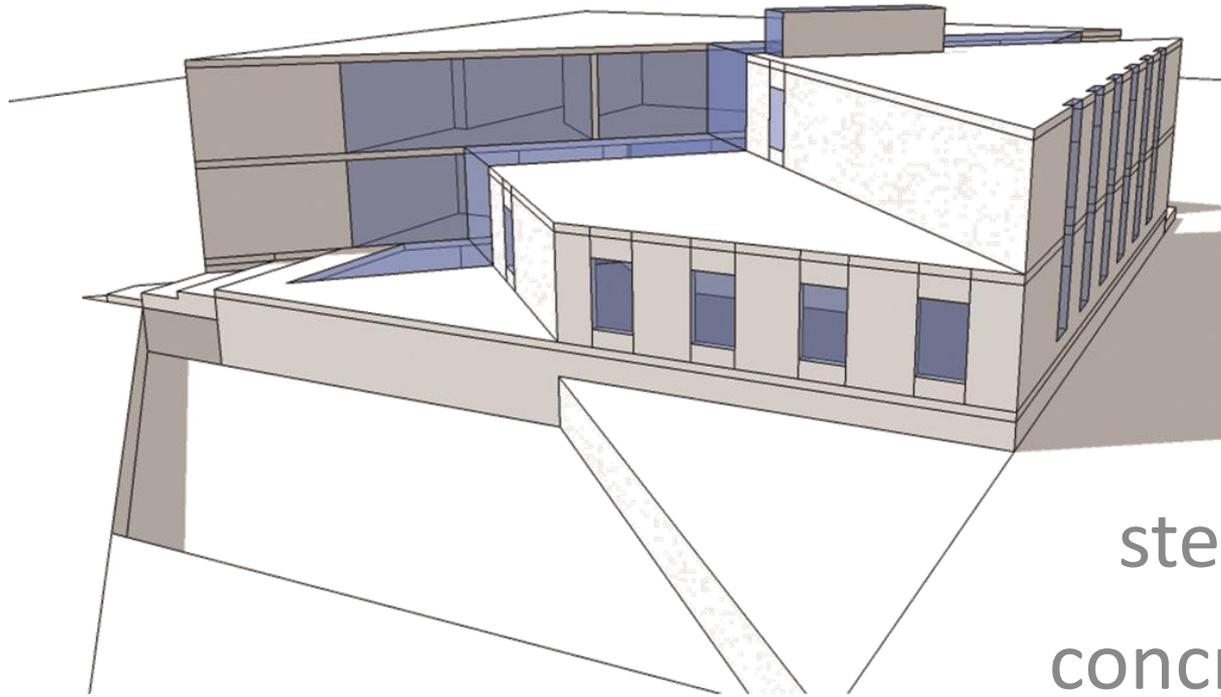


soil and foundation

- soil conditions
 - medium compact sands and inorganic silts
 - 4 ksf bearing capacity
 - deep groundwater
- mat foundation
- square footing foundation



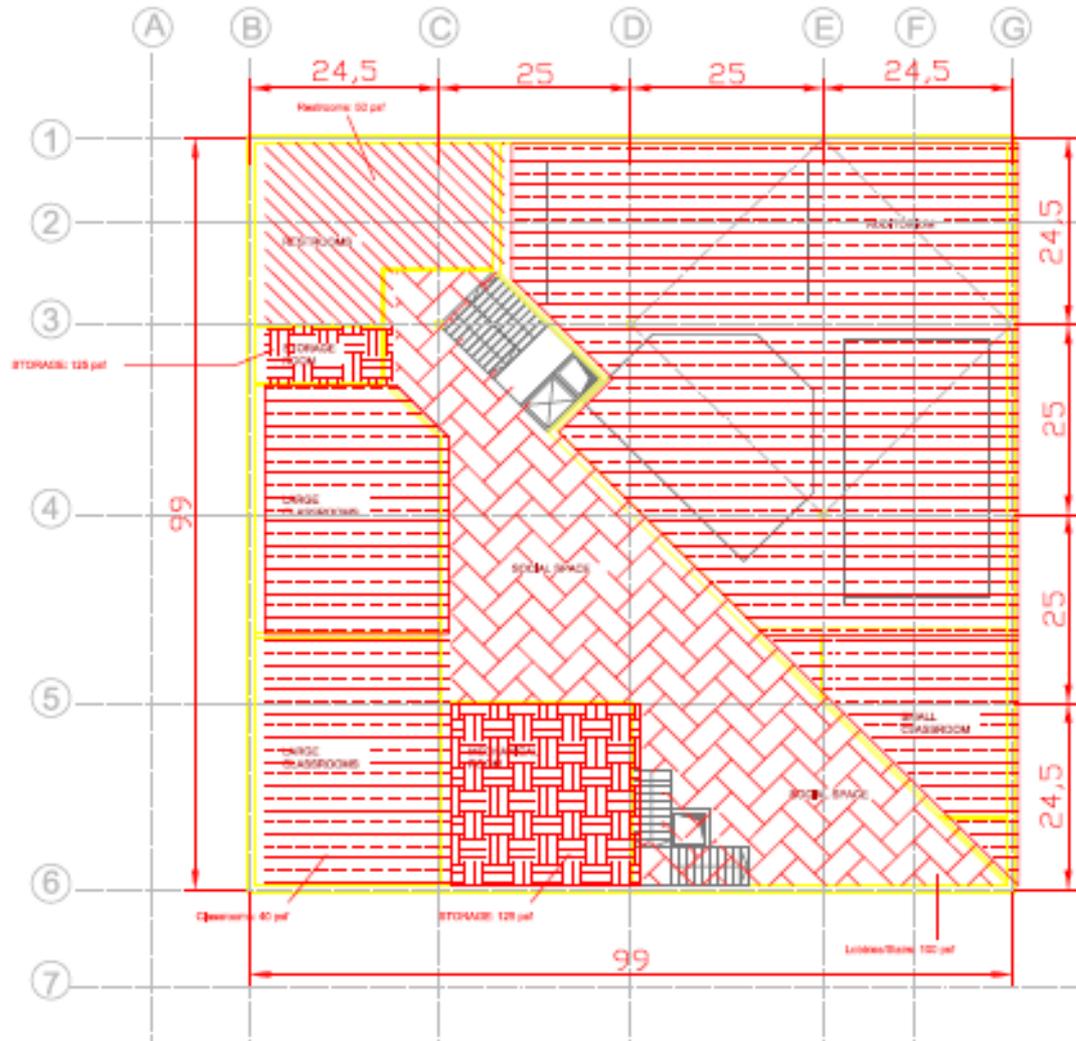
architectural concept one



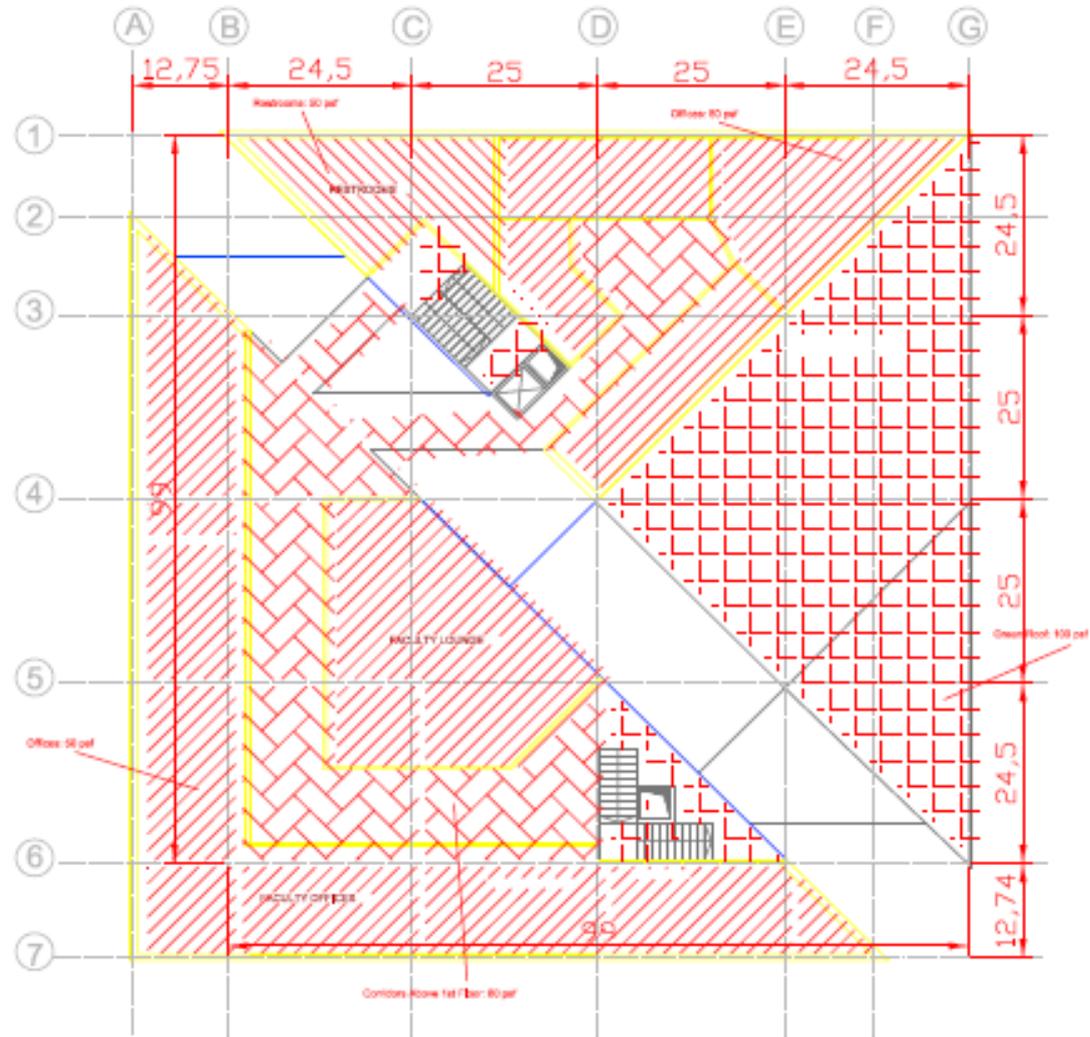
steel option
concrete option



first floor load diagram



third floor load diagram



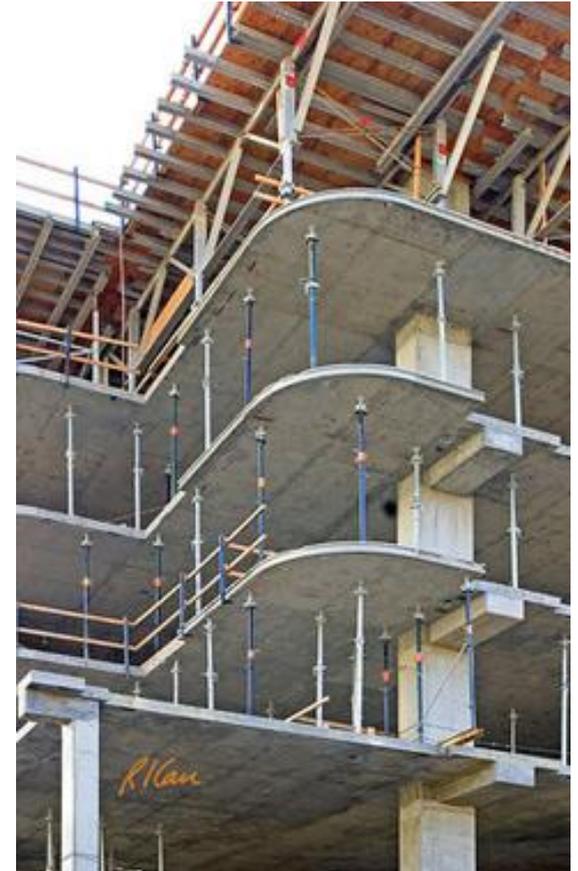
steel

- lateral system
 - steel moment frames
- floor system
 - full composite action between slab and beams
 - cast in place concrete on metal deck

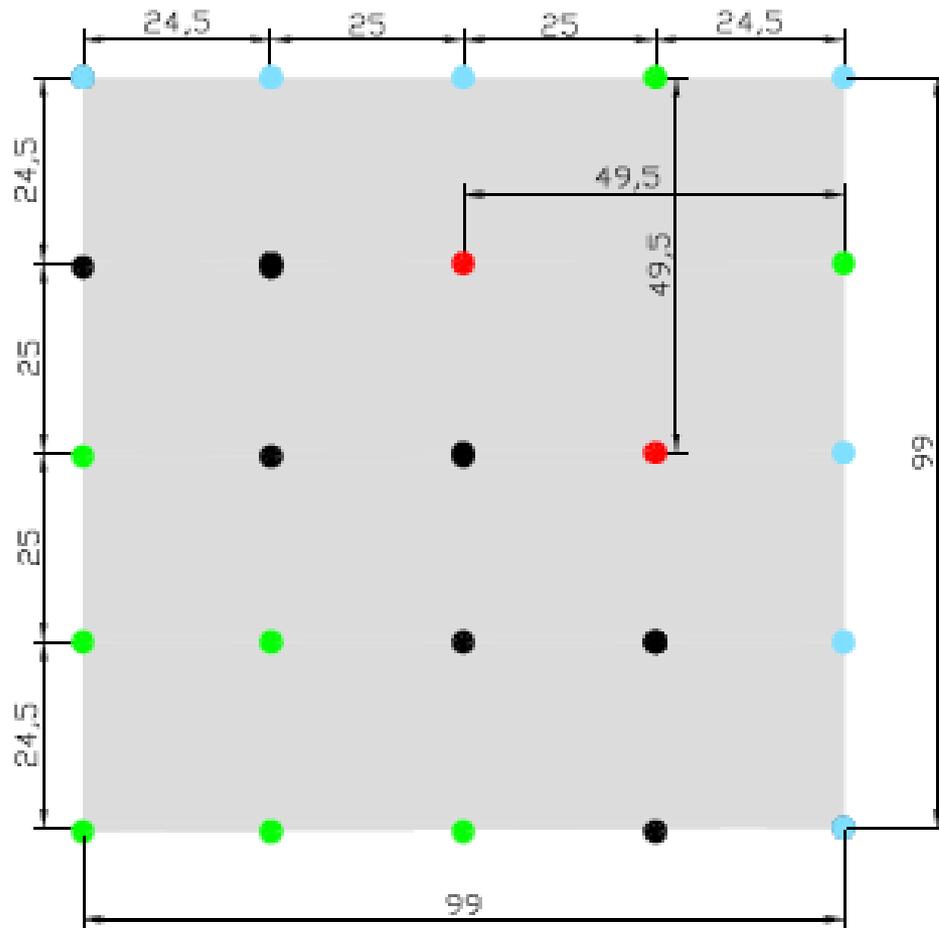


concrete

- lateral system -concrete moment frames
- floor slab
- floor beams



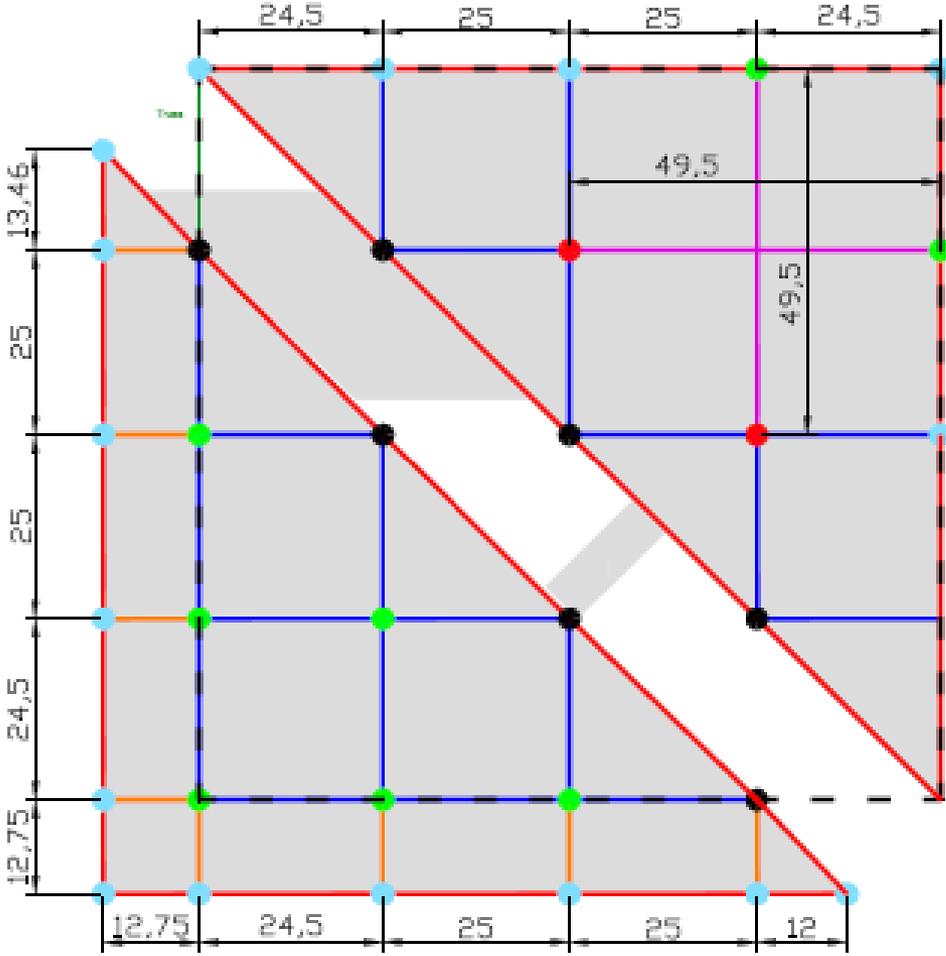
first floor framing



Concrete Option Steel Option

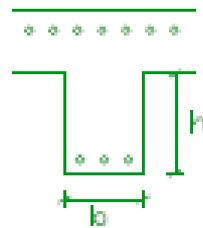
Column	●	14' x 14'	W14x26
Column	●	16' x 16'	W14x43
Column	●	14' x 14'	W14x30
Column	●	18' x 18'	W14x48

second floor framing



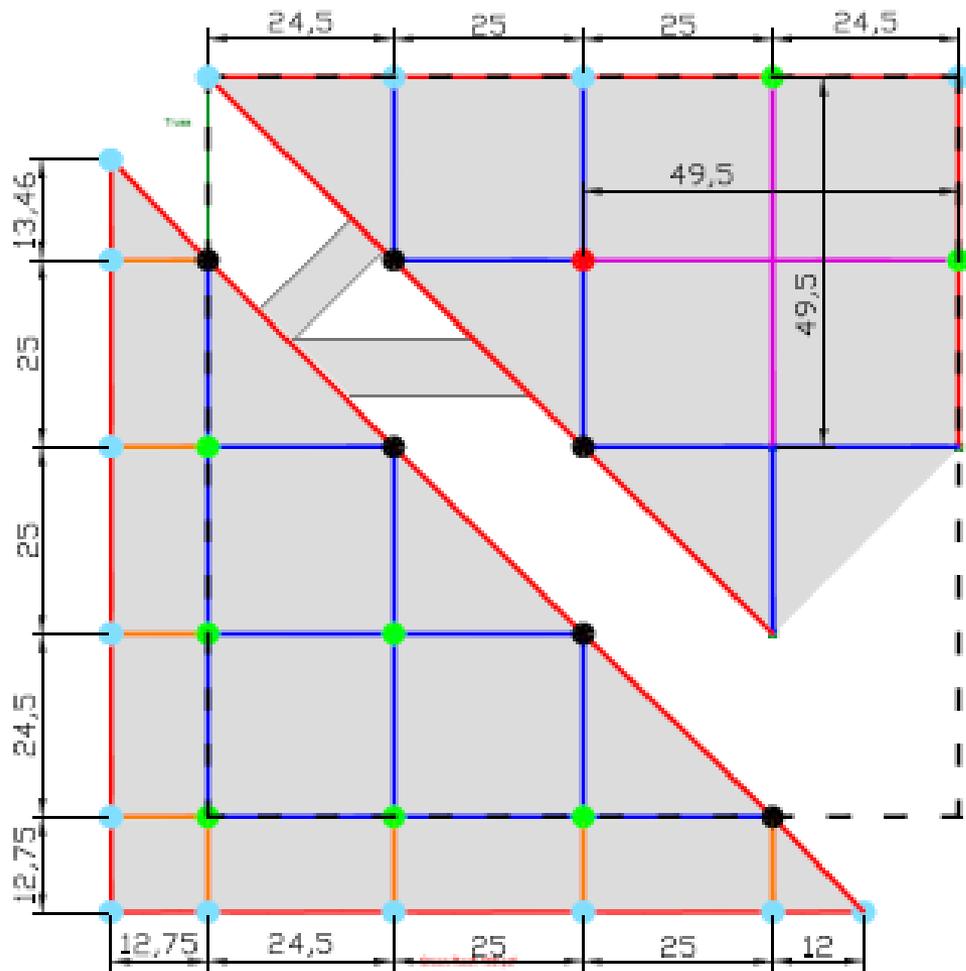
Concrete Option Steel Option
 Slab thickness = 10" 5"

	h	b	Full Composite
Beam	10"	14"	W12x19
Beam	10"	16"	W12x19
Beam	14"	16"	W12x19
Beam	Prestressed		
Beam	24"	16"	W16x67



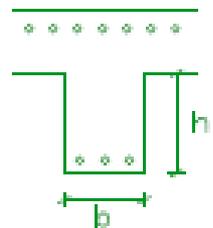
Column	●	14" x 14"	W14x26
Column	●	16" x 16"	W14x43
Column	●	14" x 14"	W14x30
Column	●	18" x 18"	W14x48

third floor framing



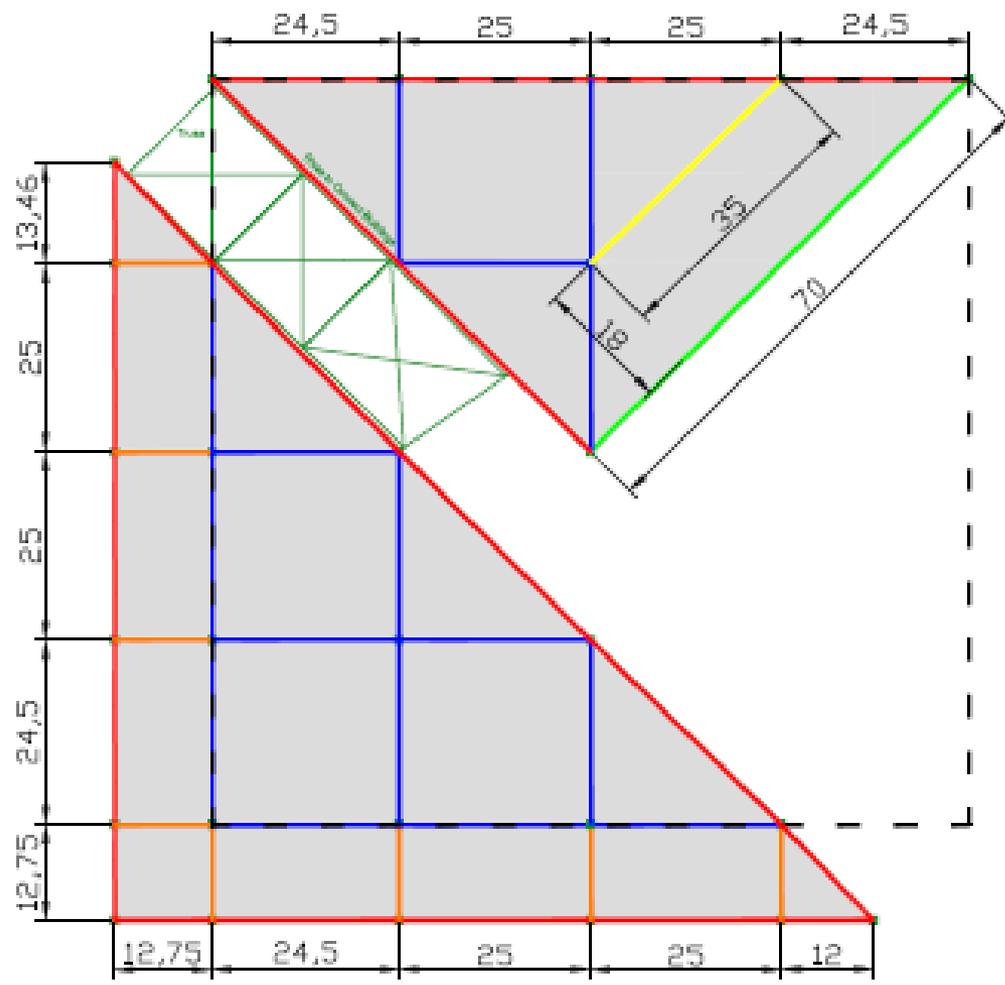
Concrete Option Steel Option
 Slab thickness = 10" 5"

	h	b	Full Composite
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Beam	10"	16"	W12x19
Beam	14"	16"	W12x19
Beam	Prestressed		
Beam	24"	16"	W16x67



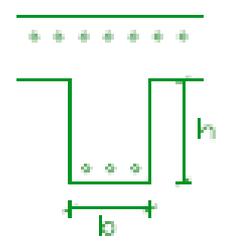
Column	●	14" x 14"	W14x26
Column	●	16" x 16"	W14x43
Column	●	14" x 14"	W14x30
Column	●	18" x 18"	W14x48

roof framing

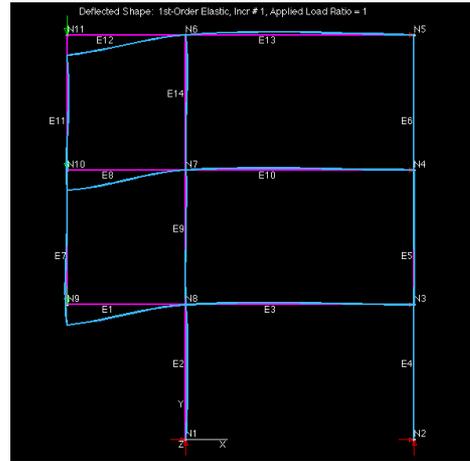
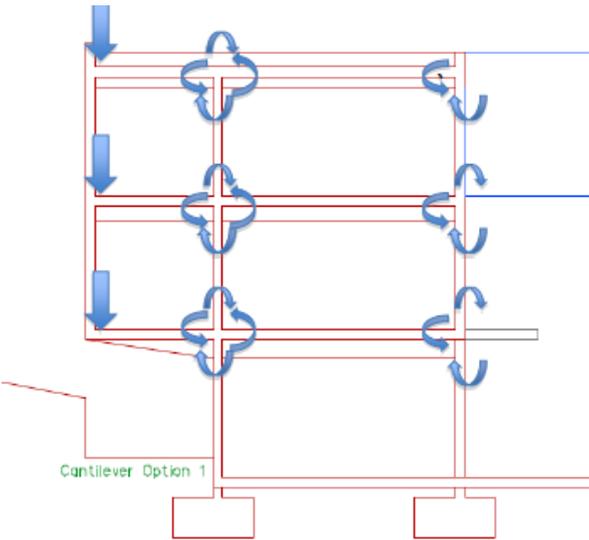


Concrete Option Steel Option
 Slab thickness = 10" 5"

	h	b	Full Composite
Beam	10"	14"	W12x19
Beam	10"	16"	W12x19
Beam	14"	16"	W12x19
Beam	14"	16"	W14x34
Beam	Prestressed 36"	24"	W18x106

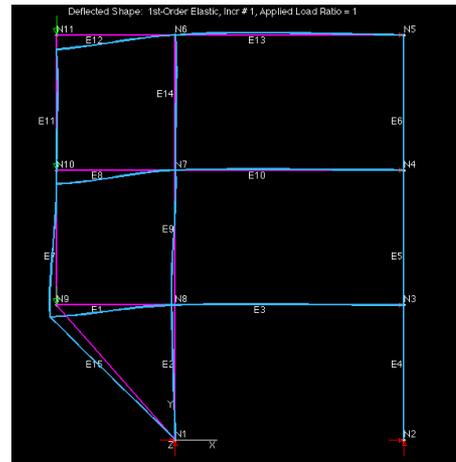
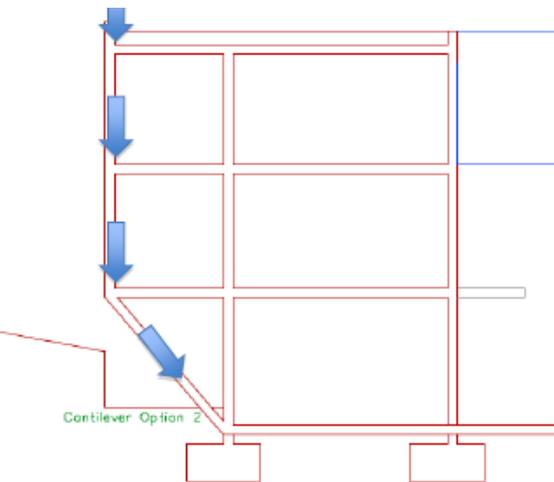


cantilever exploration



Less stiff

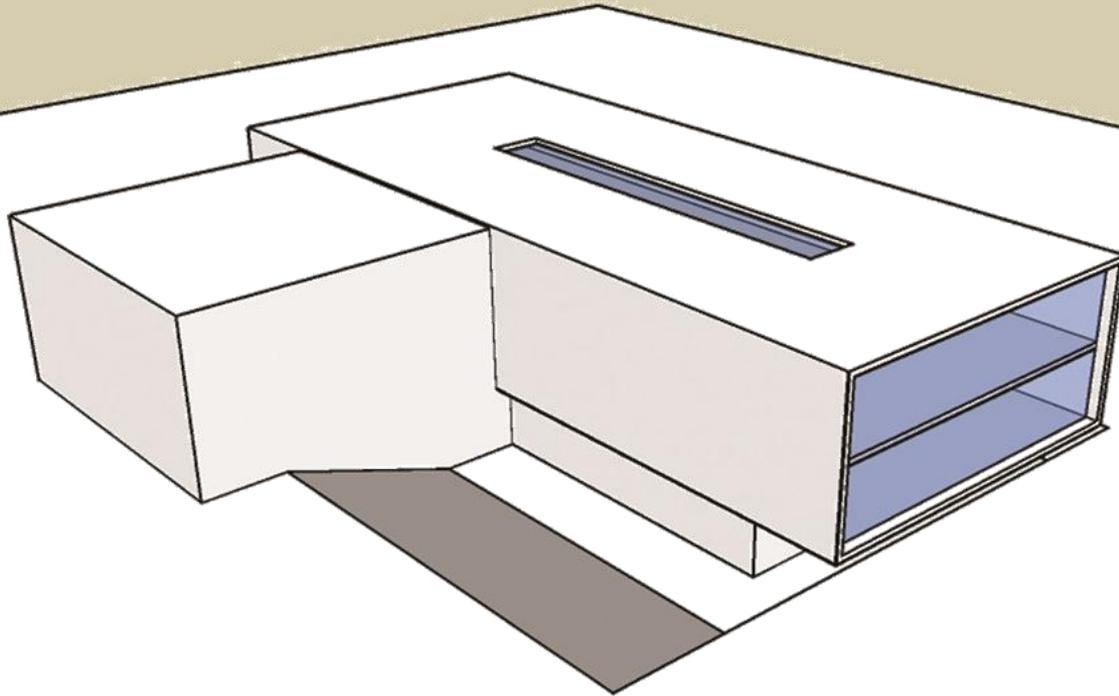
Better for architecture



More stiff

Hinders architectural vision

architectural concept two

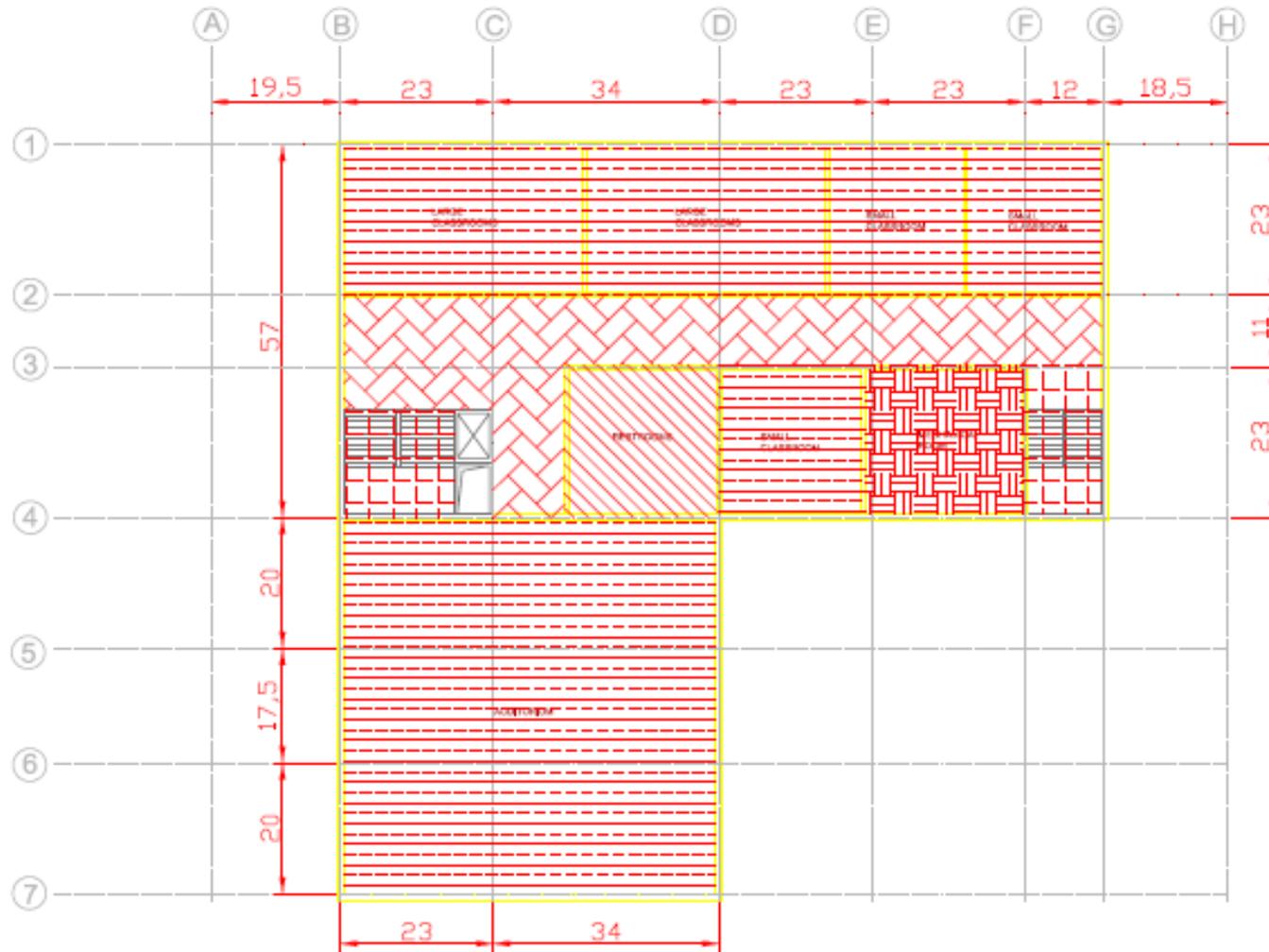


steel option

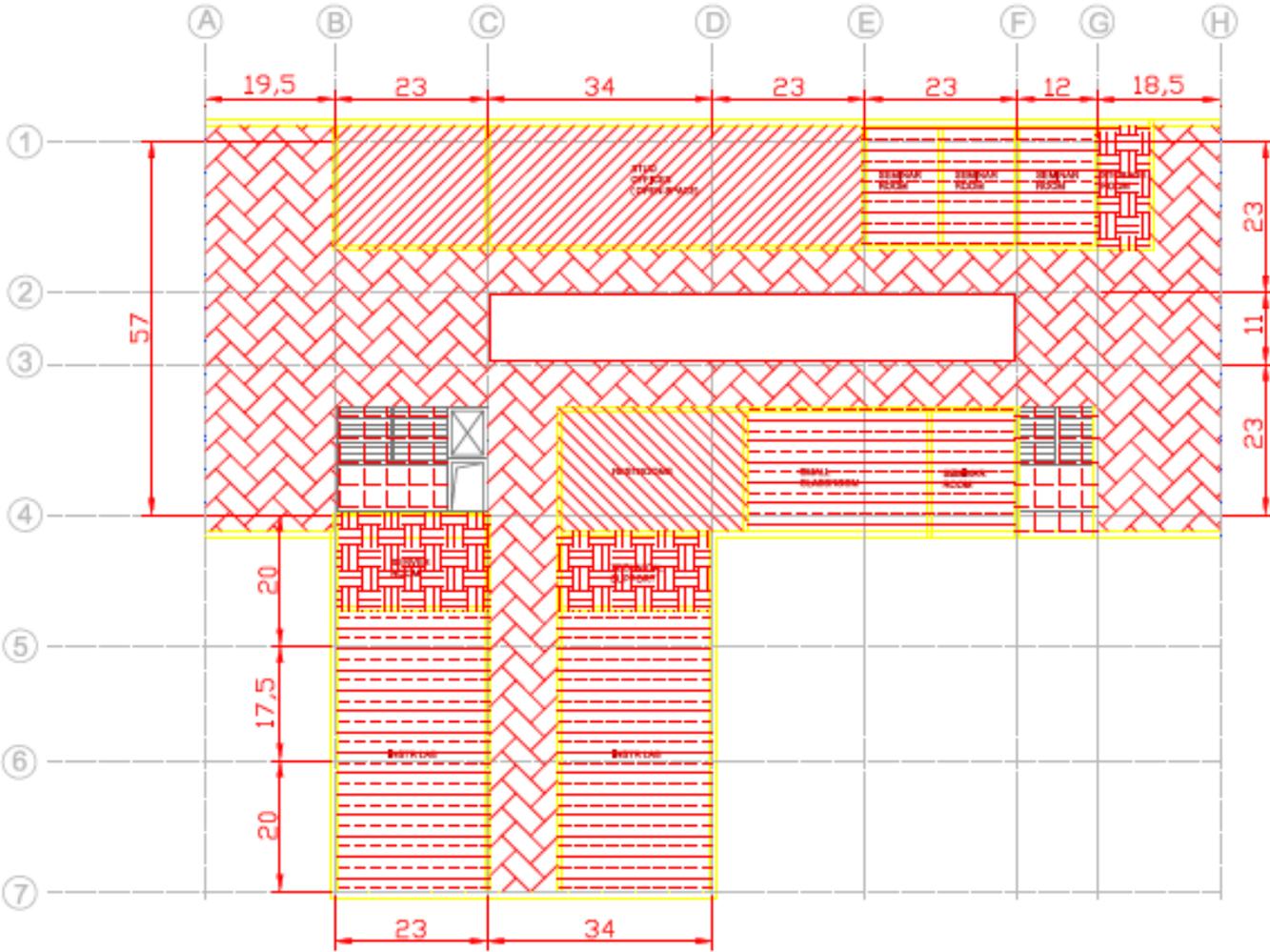
concrete option



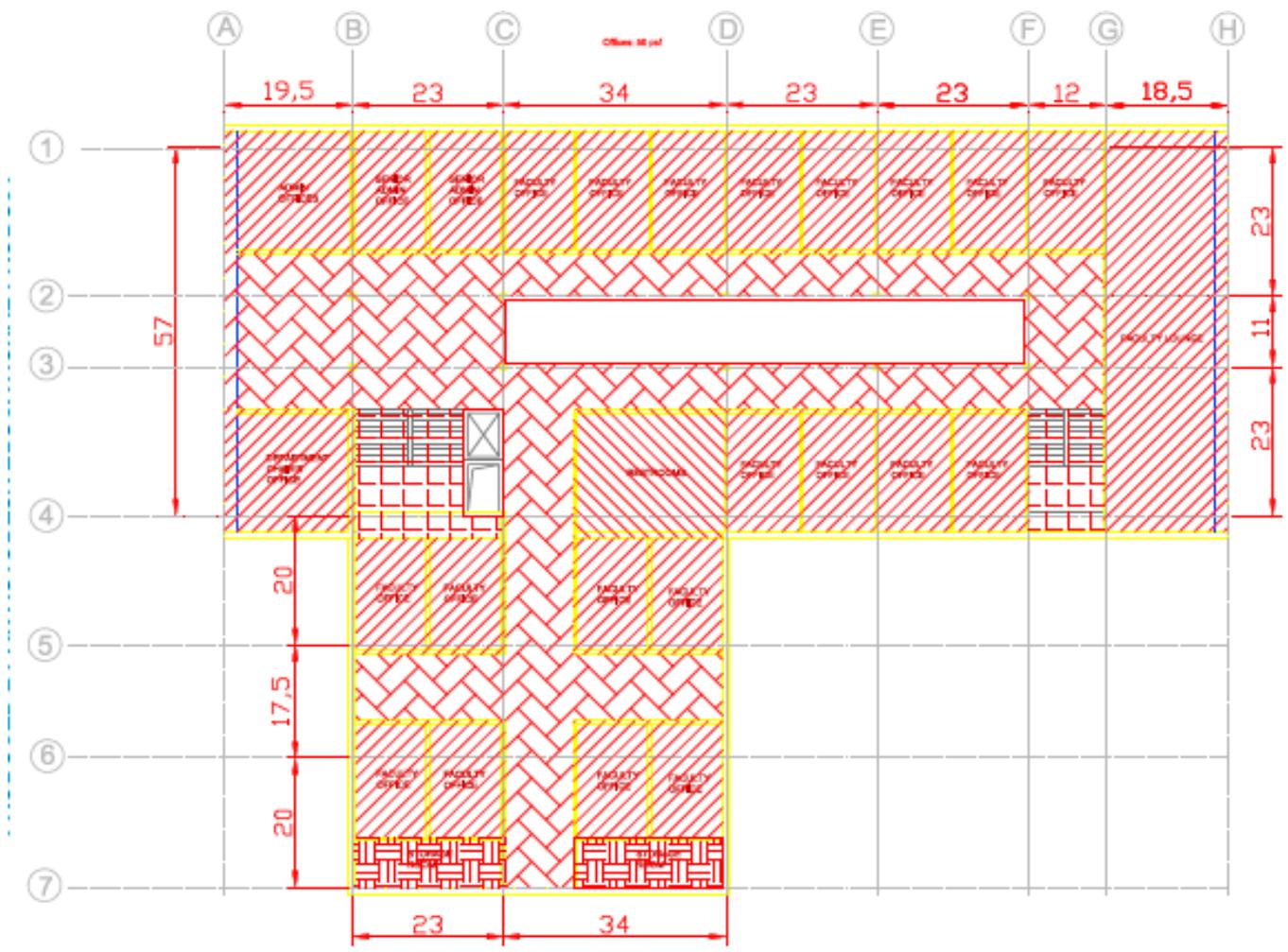
first floor load diagram



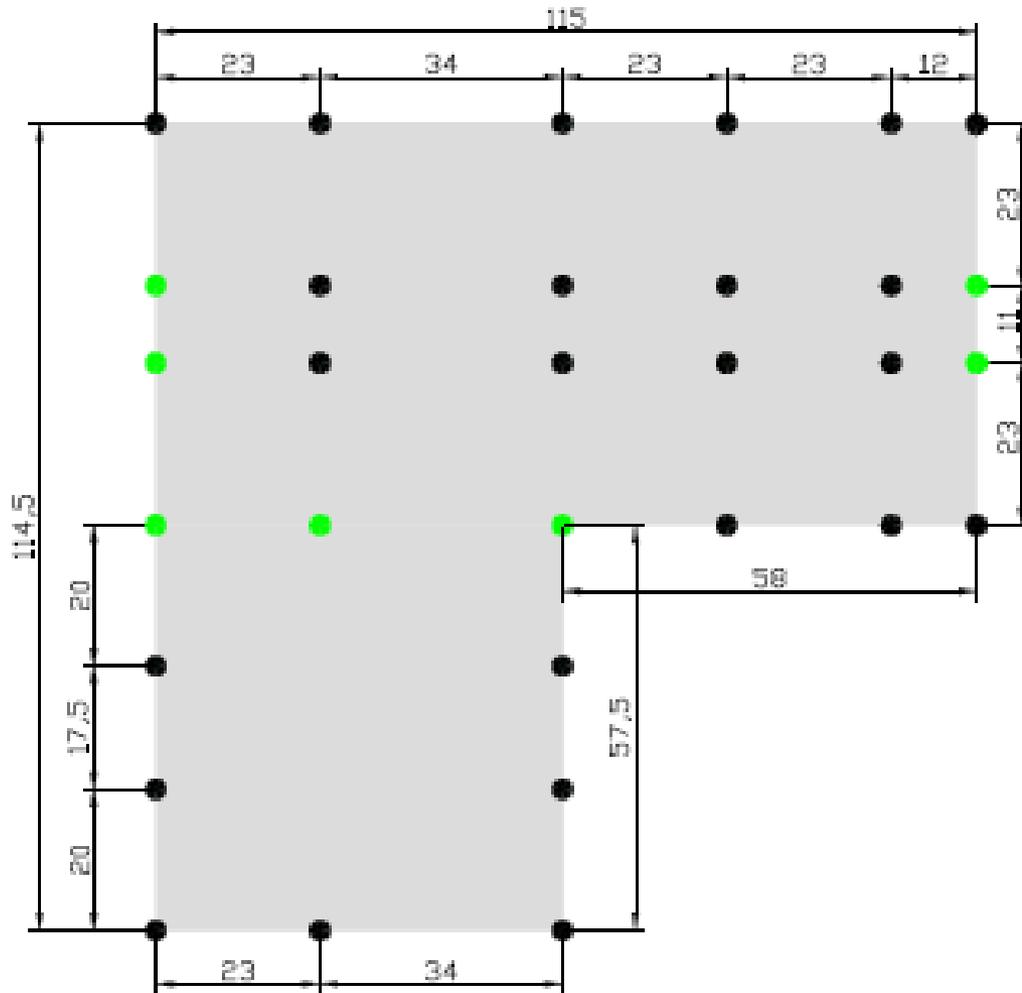
second floor load diagram



third floor load diagram



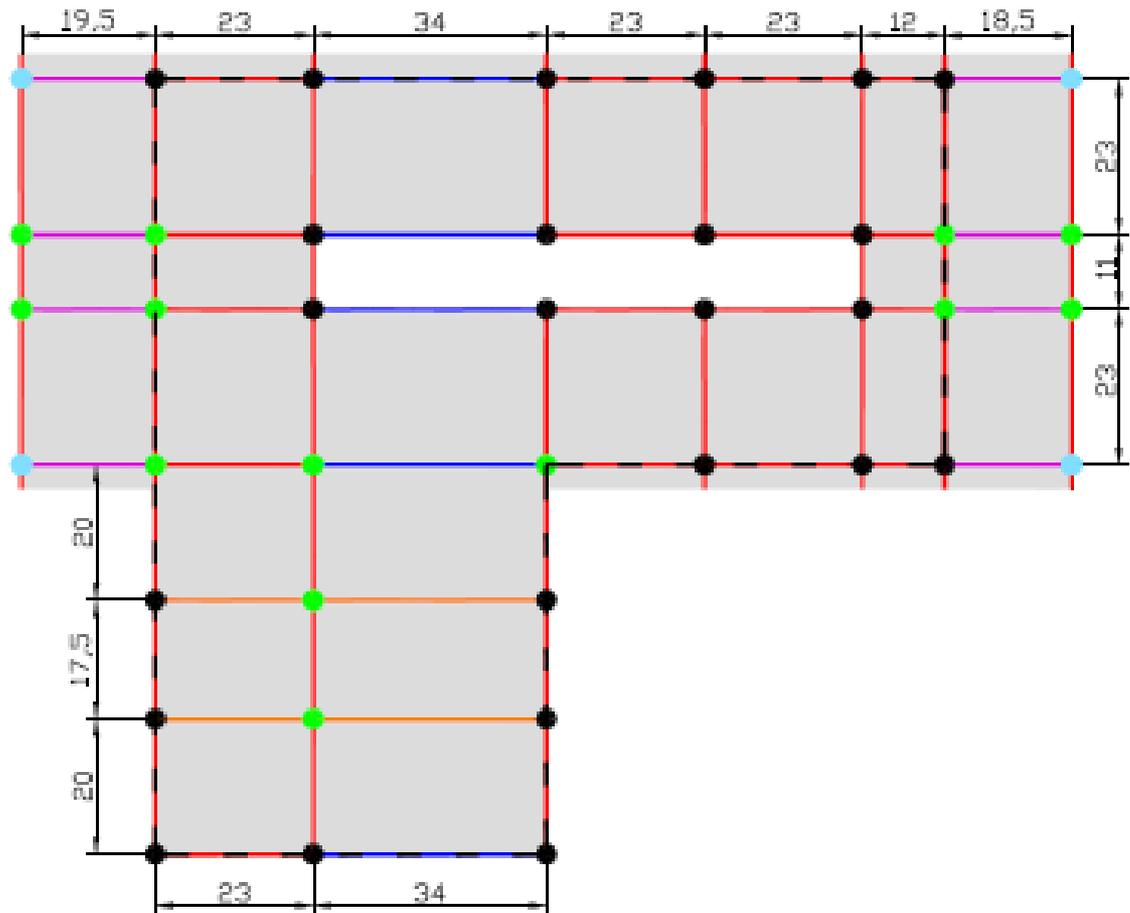
first floor framing



	Concrete Option	Steel Option
Column ●	10' x 14'	W14x30
Column ●	14' x 14'	W14x30



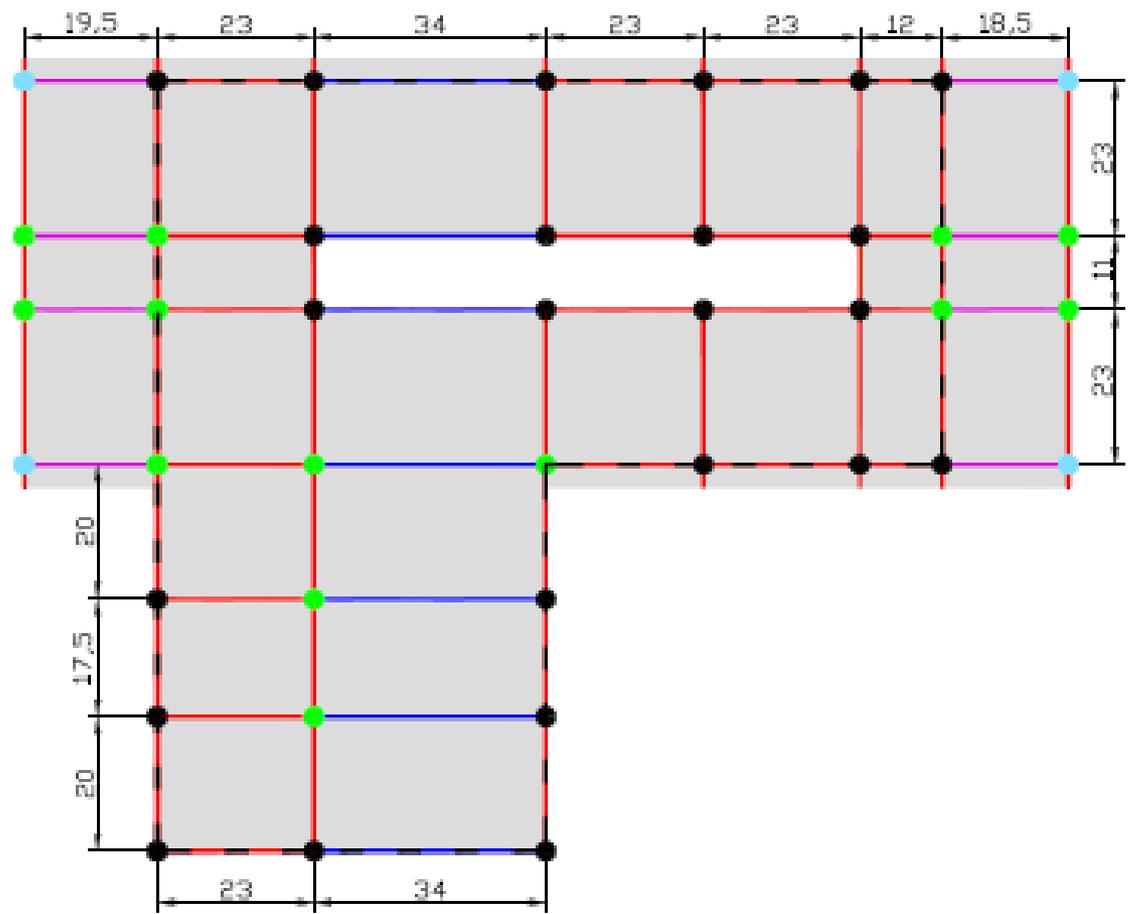
second floor framing

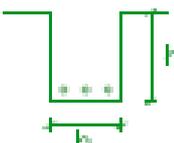


Concrete Option		Steel Option	
Slab thickness = 10"		5"	
	<u>h</u>	<u>b</u>	<u>Full Composite</u>
Beam	10"	14"	W14x22
Beam	20"	20"	W14x34
Beam	36"	24"	W36x100
Beam	Prestressed		
	28"	18"	W16x77
Column	●	10" x 14"	W14x30
Column	●	14" x 14"	W14x30
Column	●	16" x 16"	W14x120



third floor framing



	Concrete Option	Steel Option	
Slab thickness	=10'	5'	
	<u>h</u>	<u>h</u> Full Composite	
Beam	10'	14'	W14x22
Beam	20'	20'	W14x34
Beam	36'	24'	W36x100
		
			
Column	● 10' x 14'	W14x30	
Column	● 14' x 14'	W14x30	
Column	● 16' x 16'	W14x120	



roof framing



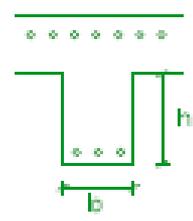
Concrete Option

Steel Option

Slab thickness = 10'

5'

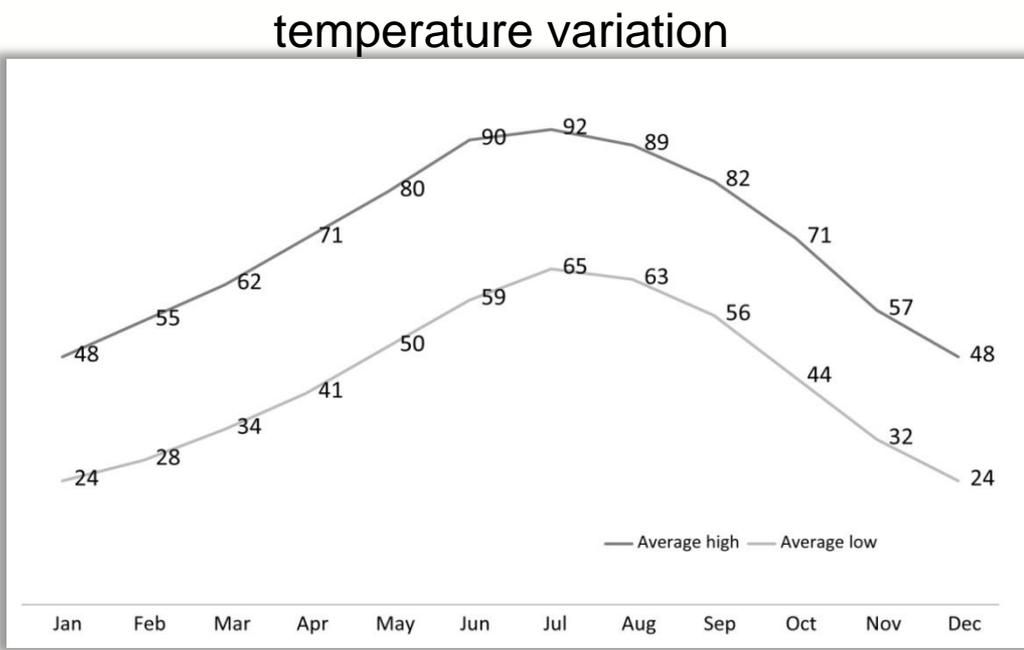
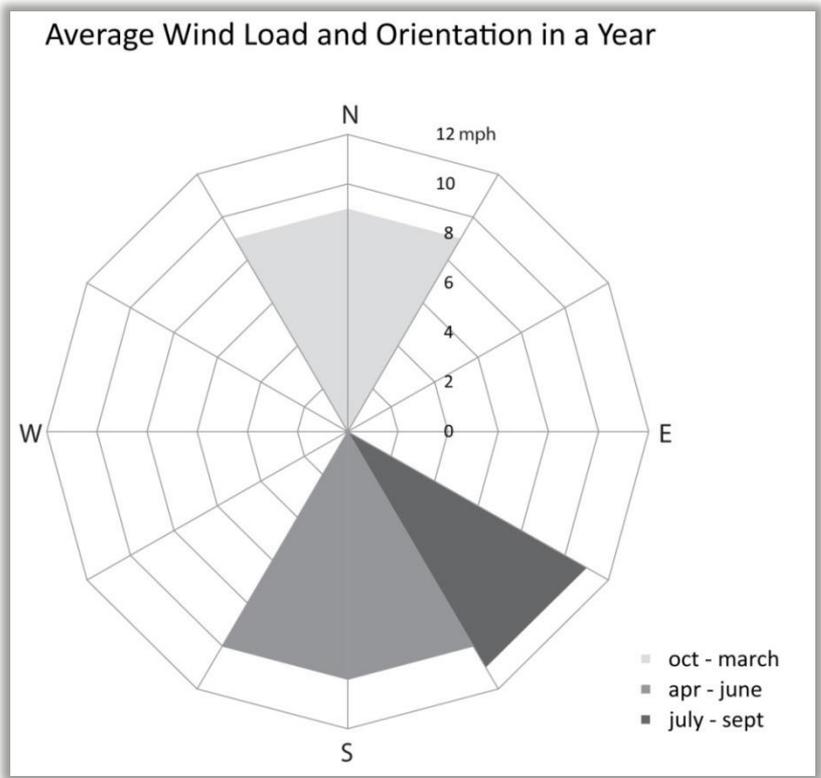
	h	b	Full Composite
Beam	10'	14'	W14x22
Beam	20'	20'	W14x34
Beam	36'	24'	W36x100



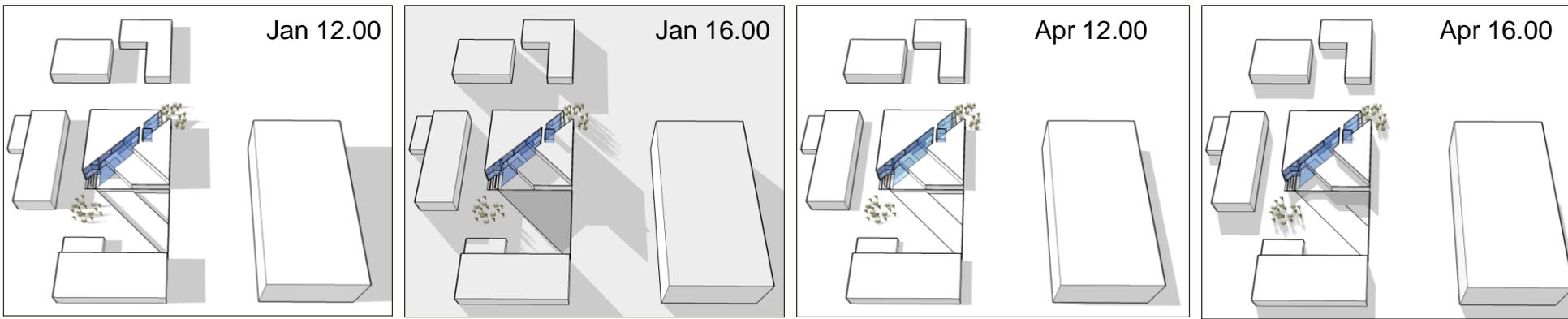
MEP systems

desert climate

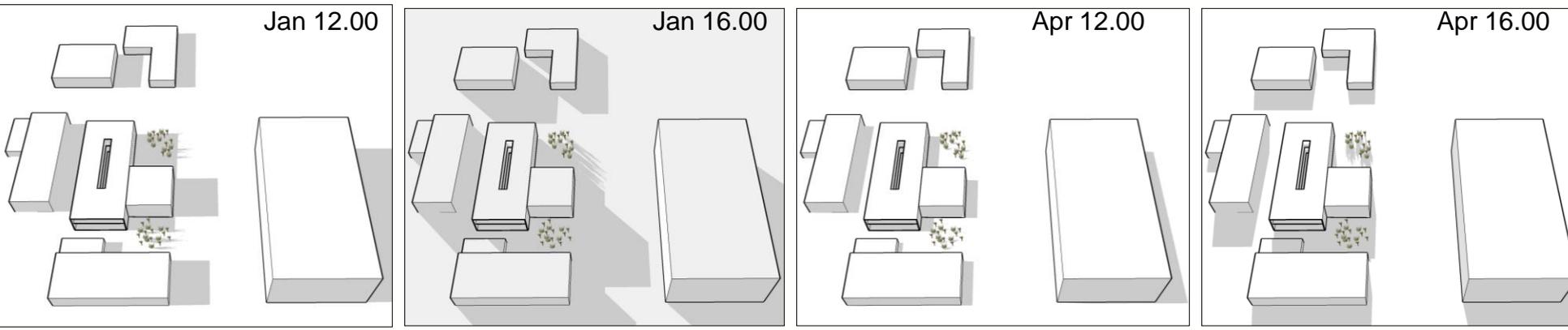
Average Morning Humidity: 45-68 %
Average Afternoon Humidity: 18-43 %



shadow diagrams

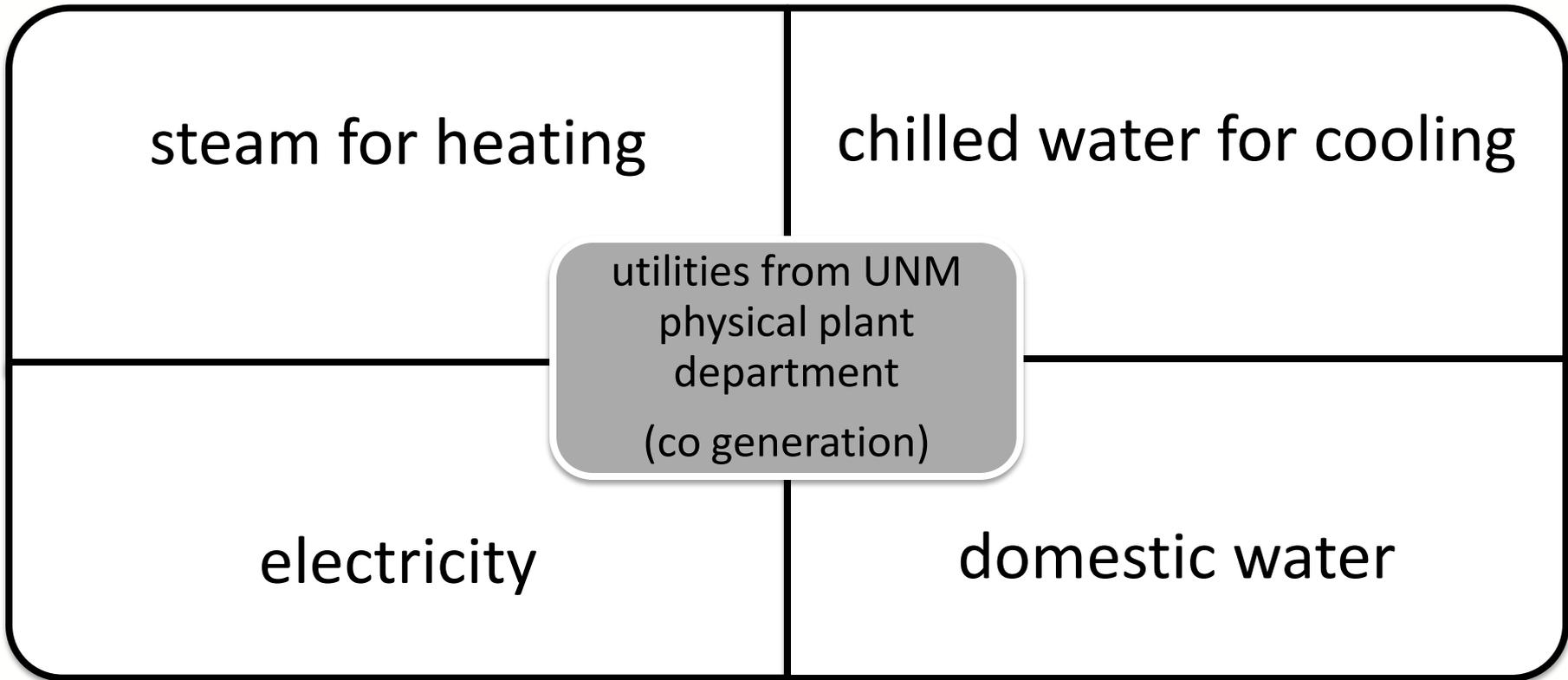


Concept 1



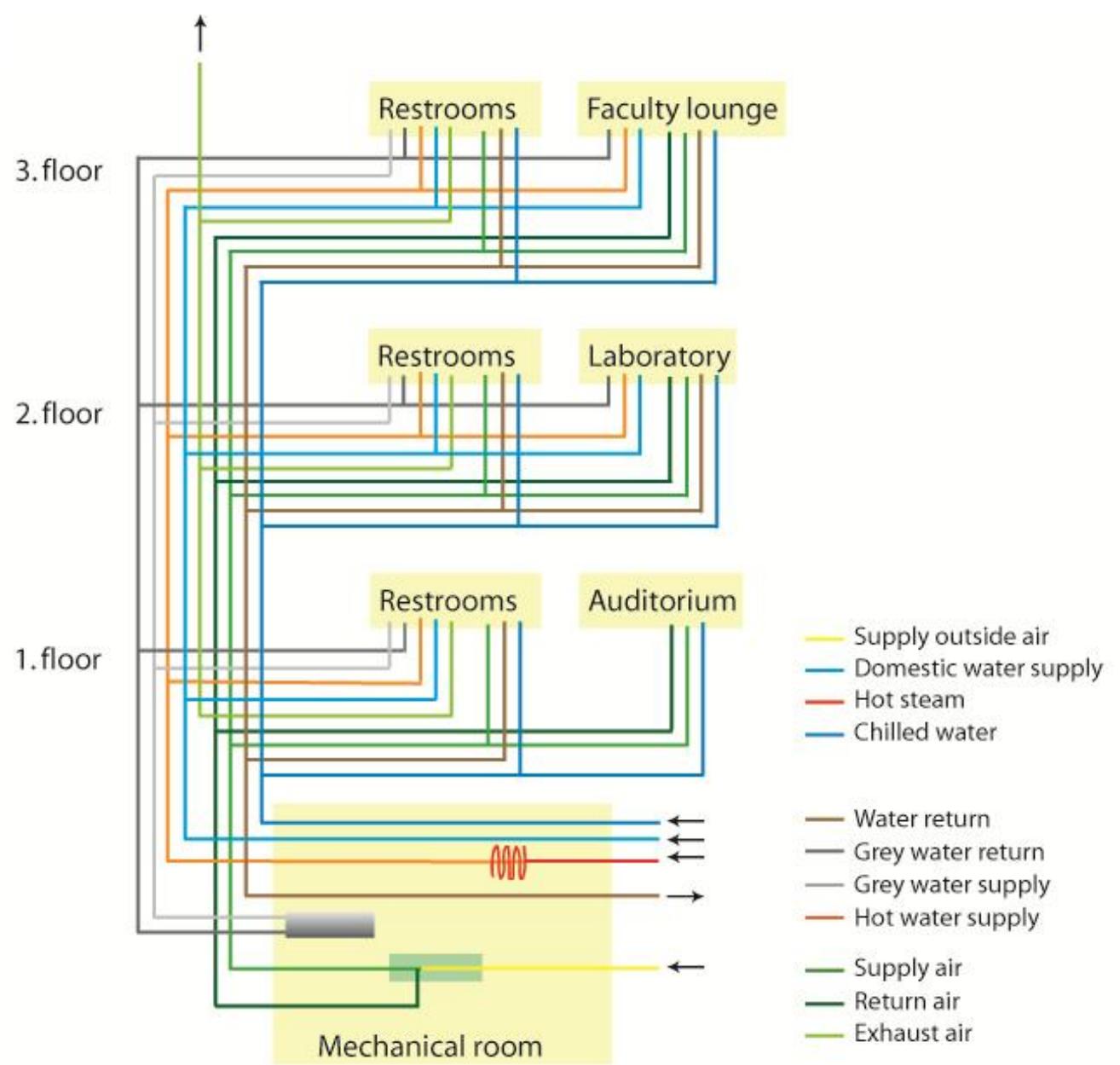
Concept 2

utilities



Allows the building to be constructed without individual boiler and HVAC units

vertical shaft

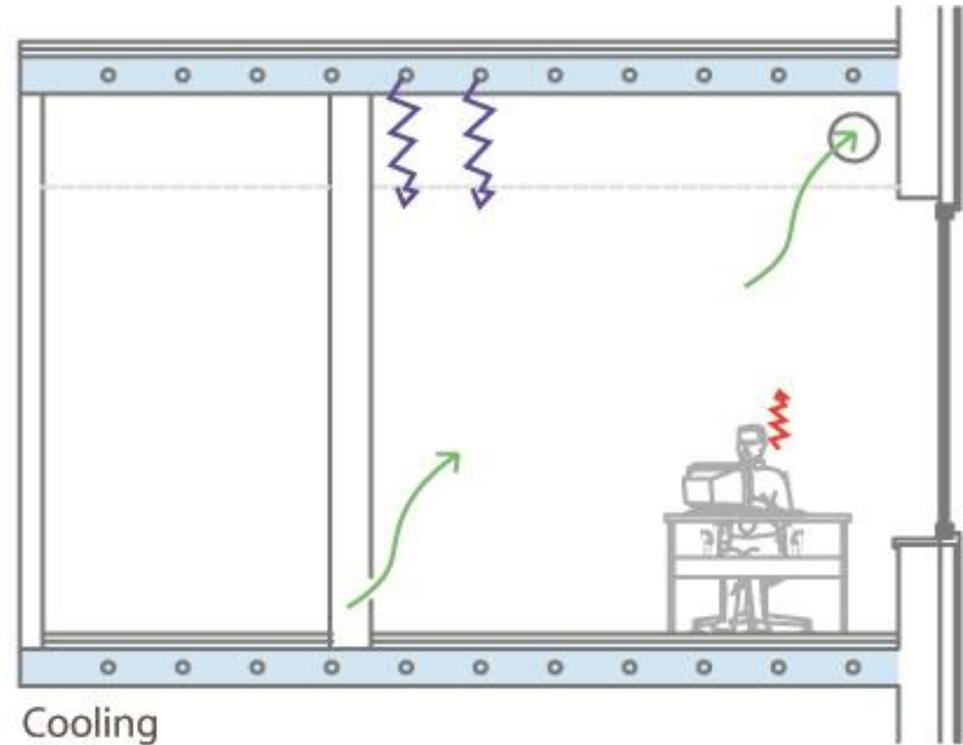
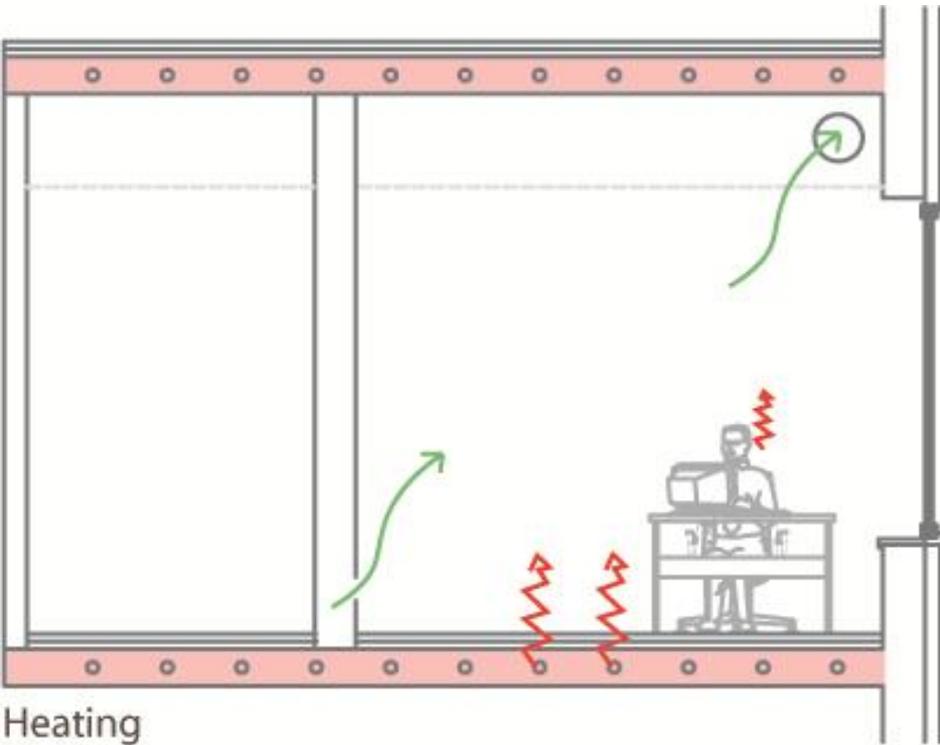


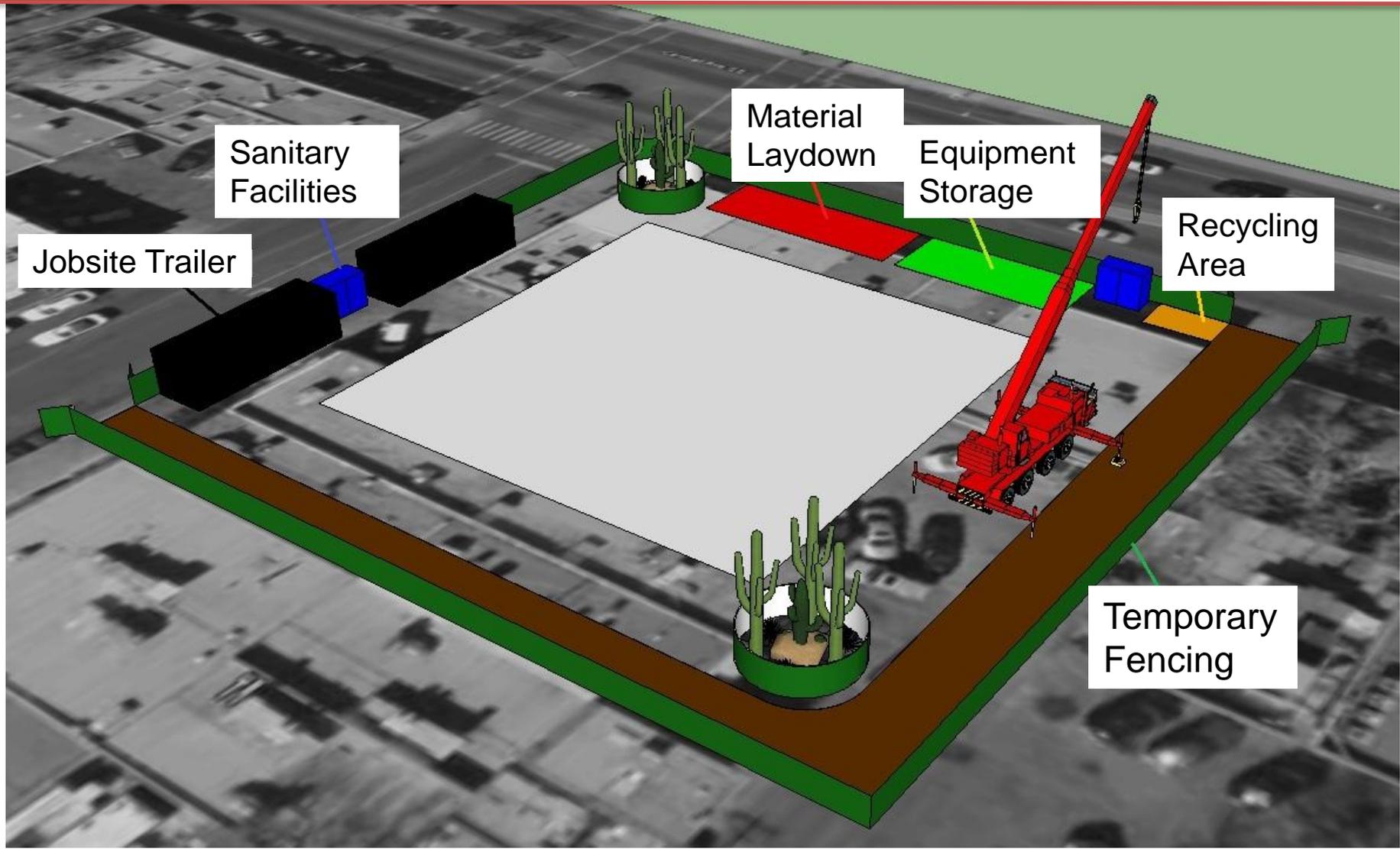
MEP plan

- Cold/grey water supply
- Grey water return
- Plumbing
- Hot water supply



mechanical system





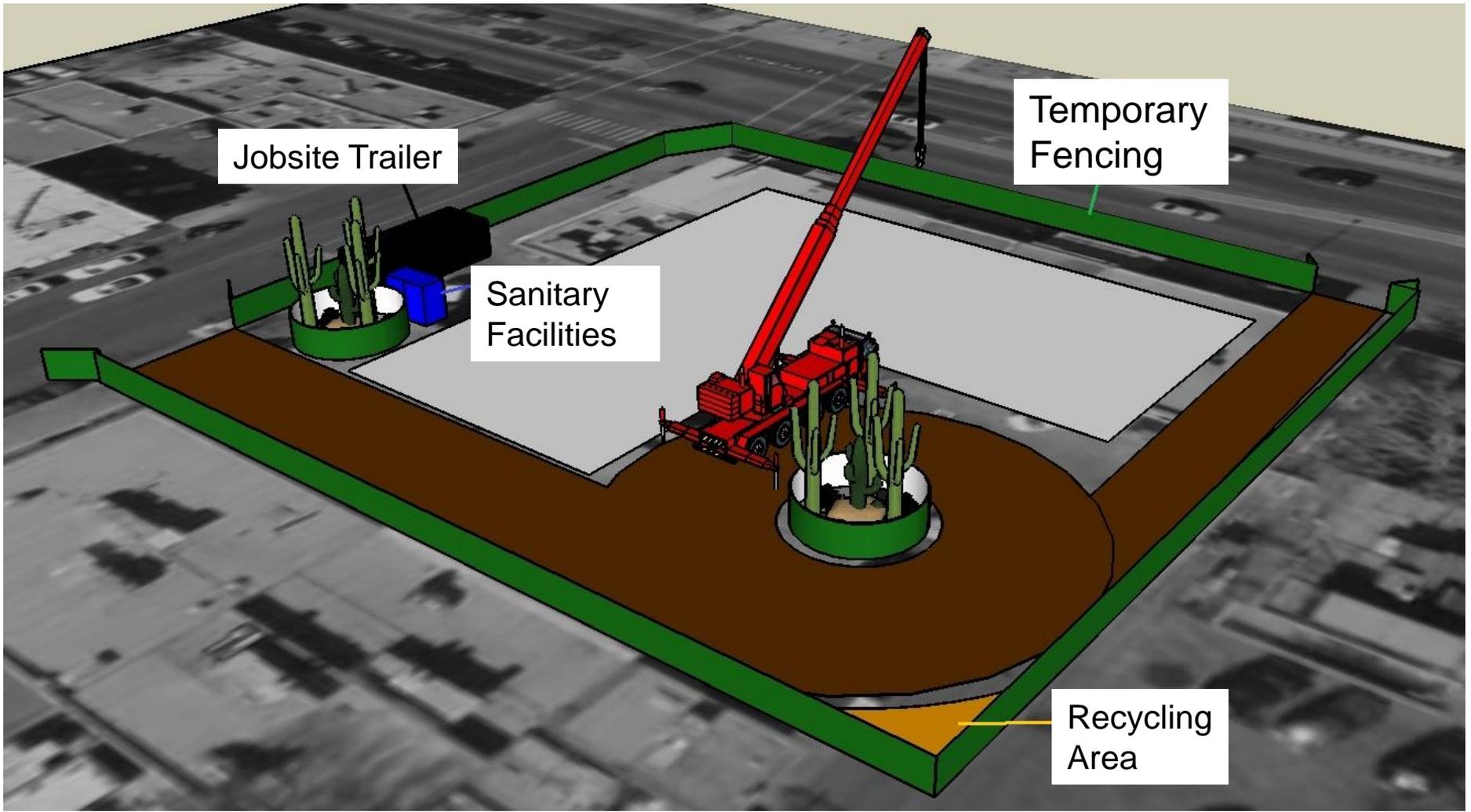
concept 1 access route



mary shanie victoria dustin milosz michael raleigh express team

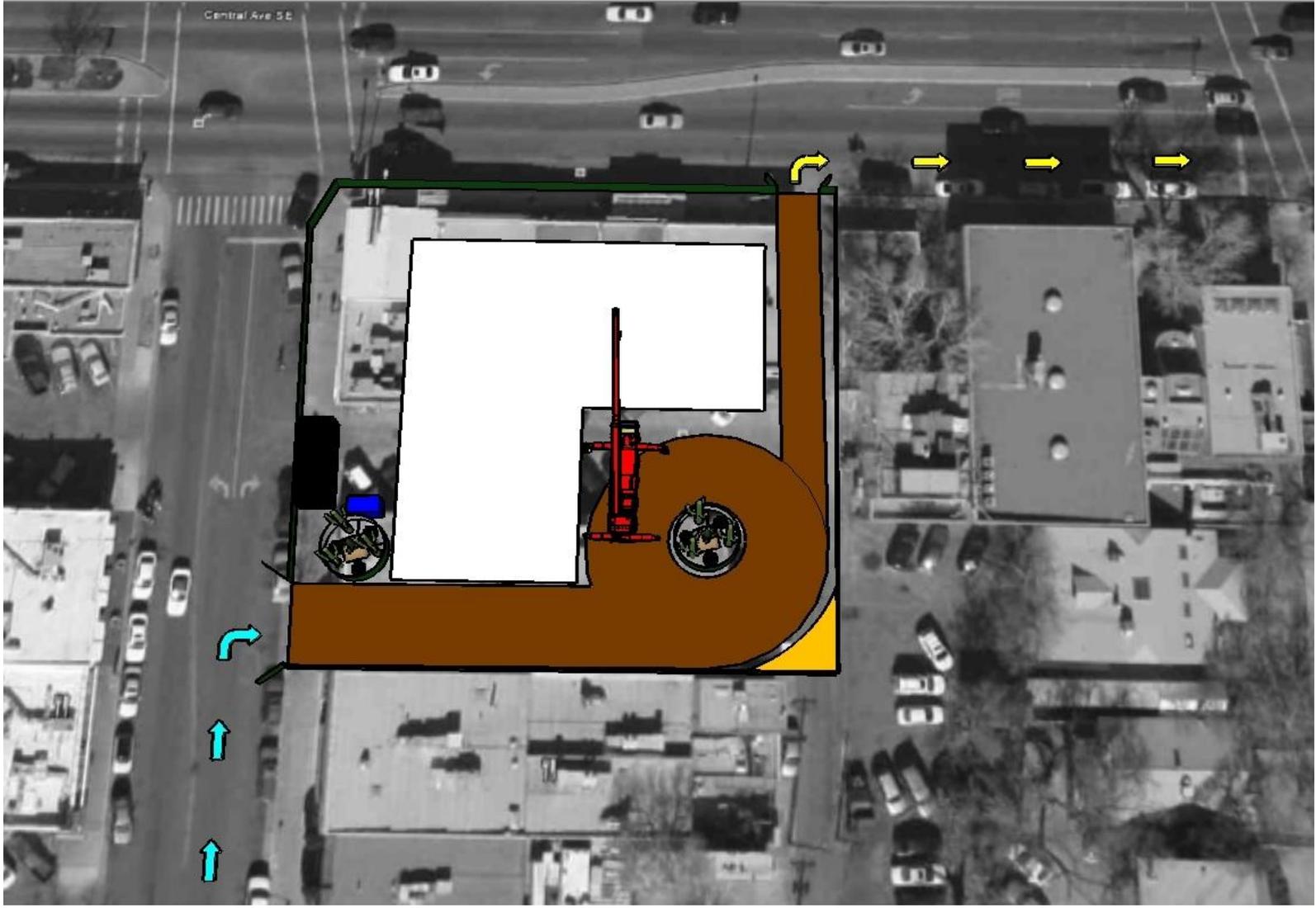


concept 2 site



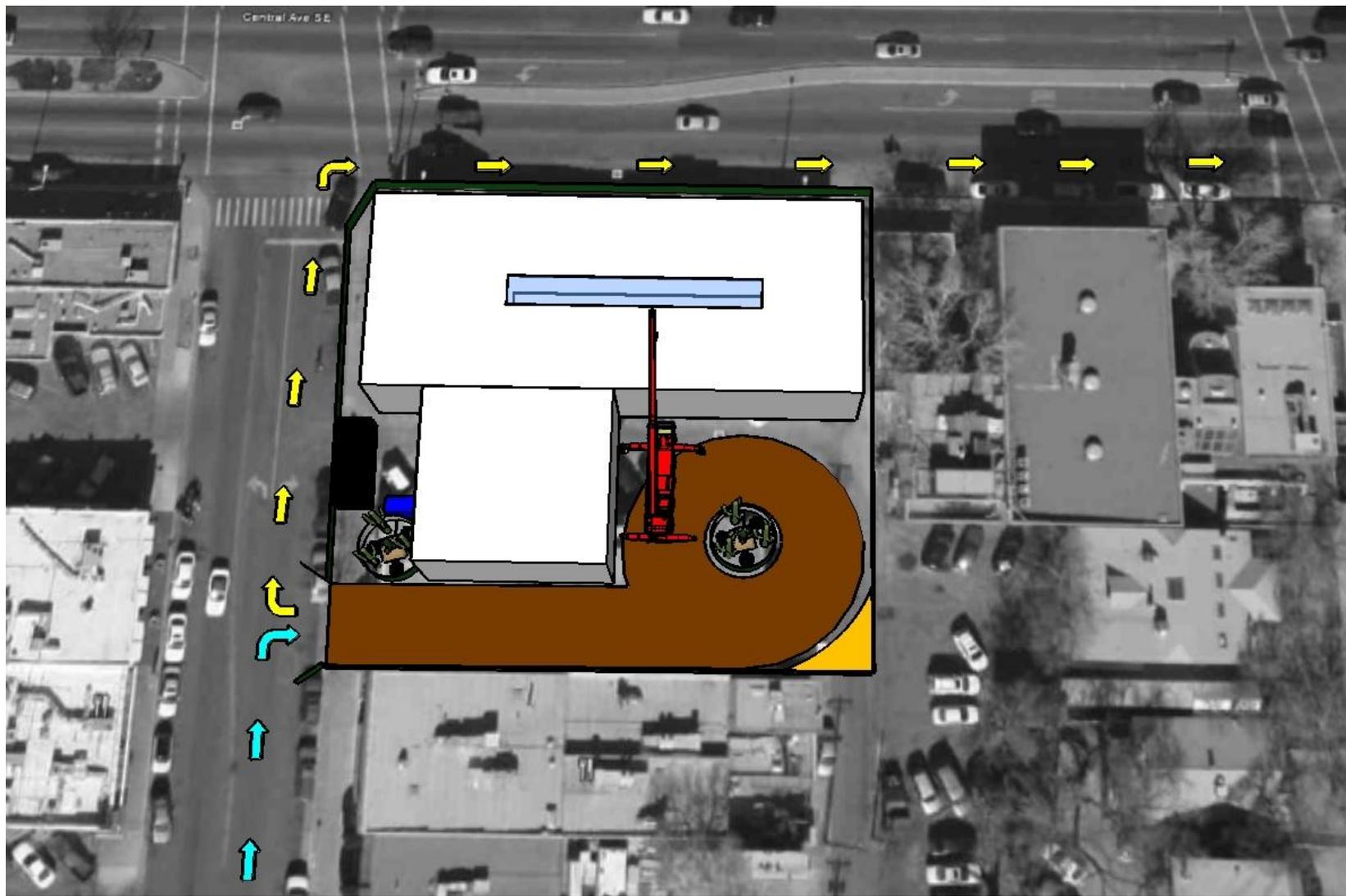
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concept 2 access routes



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concept 2 access routes



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employee parking



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employee parking

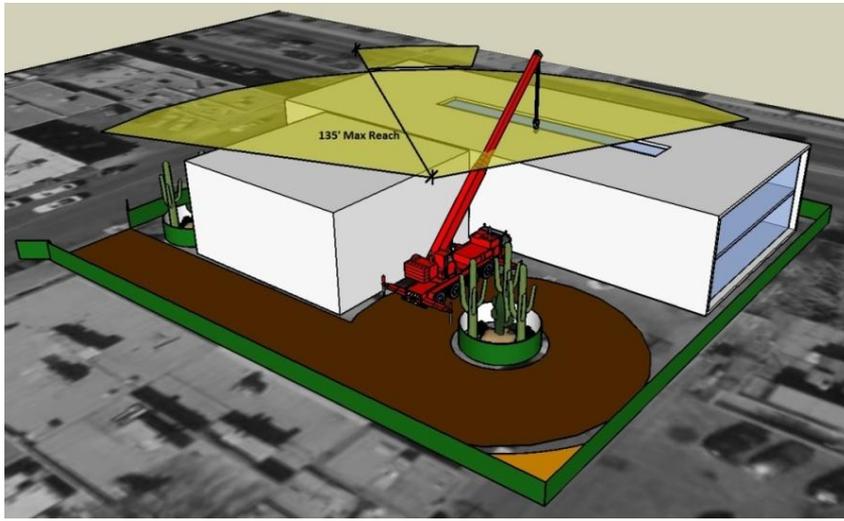


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crane selection



concept 1
135' max reach

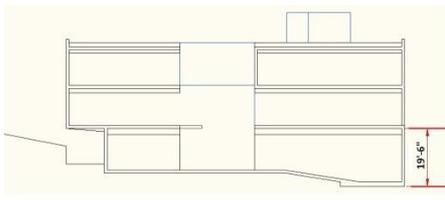


concept 2
130' max reach

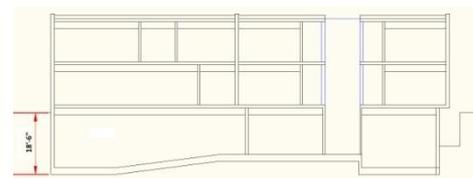


all-terrain crane

excavator selection

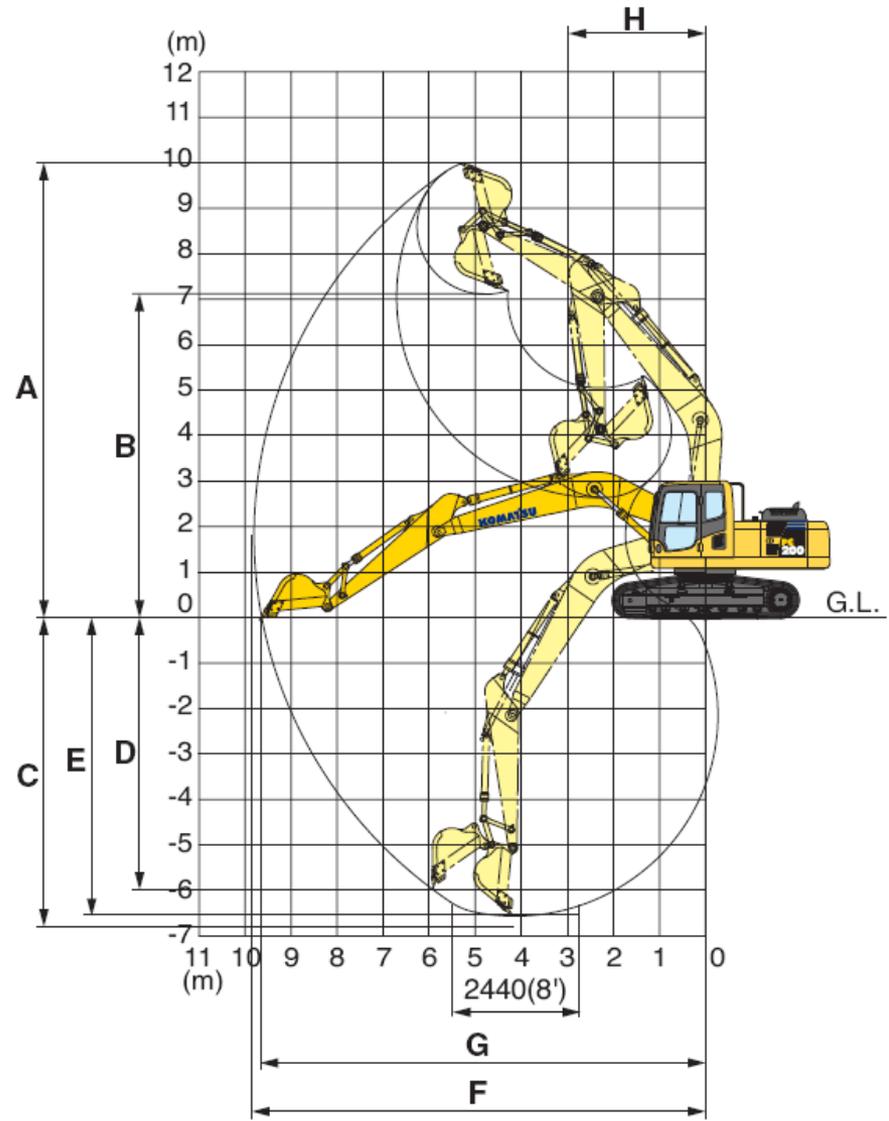


“concept 1”
19'-6" excavation



“concept 2”
18'-6" excavation

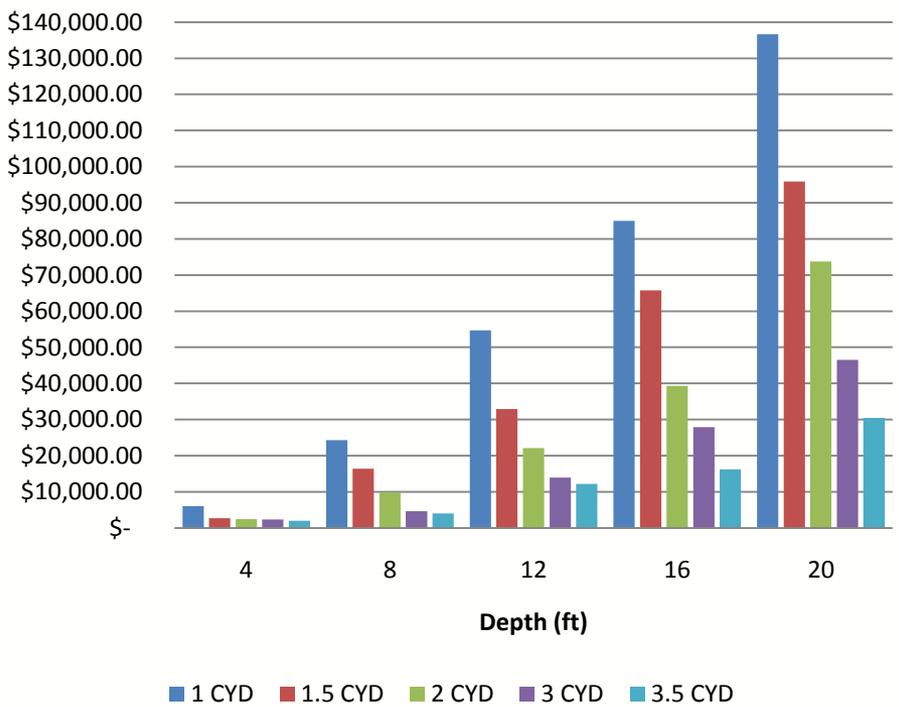
	Arm	2925 mm	9'7"
A	Max. digging height	10000 mm	32'10"
B	Max. dumping height	7110 mm	23'4"
C	Max. digging depth	6620 mm	21'9"
D	Max. vertical wall digging depth	5980 mm	19'7"
E	Max. digging depth of cut for 8' level	6370 mm	20'11"
F	Max. digging reach	9875 mm	32'5"
G	Max. digging reach at ground level	9700 mm	31'10"
H	Min. swing radius	3040 mm	10'0"



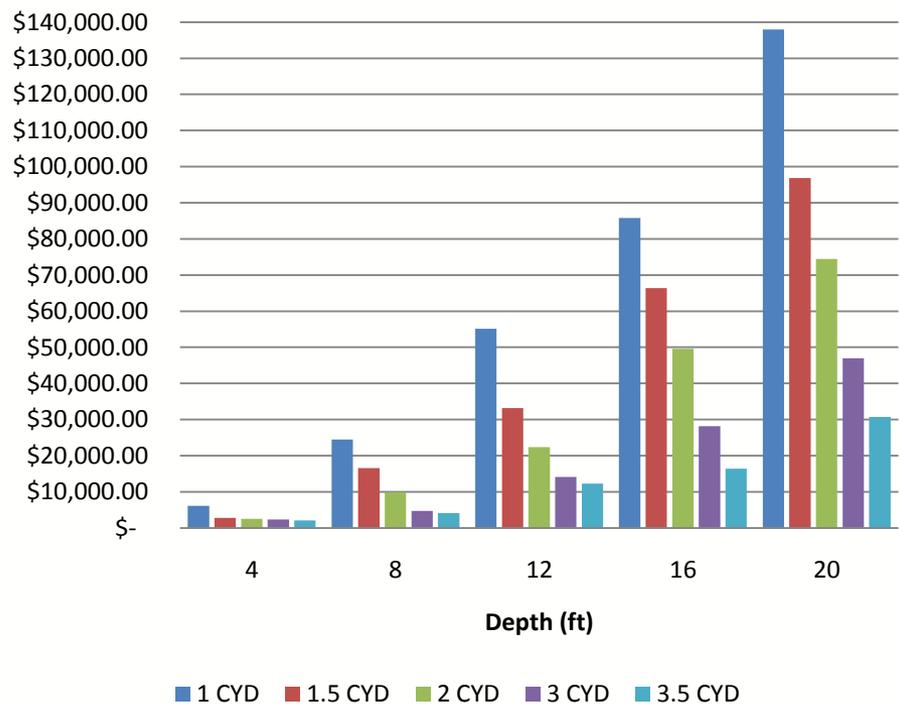
excavation impact

method: RS means & footprints

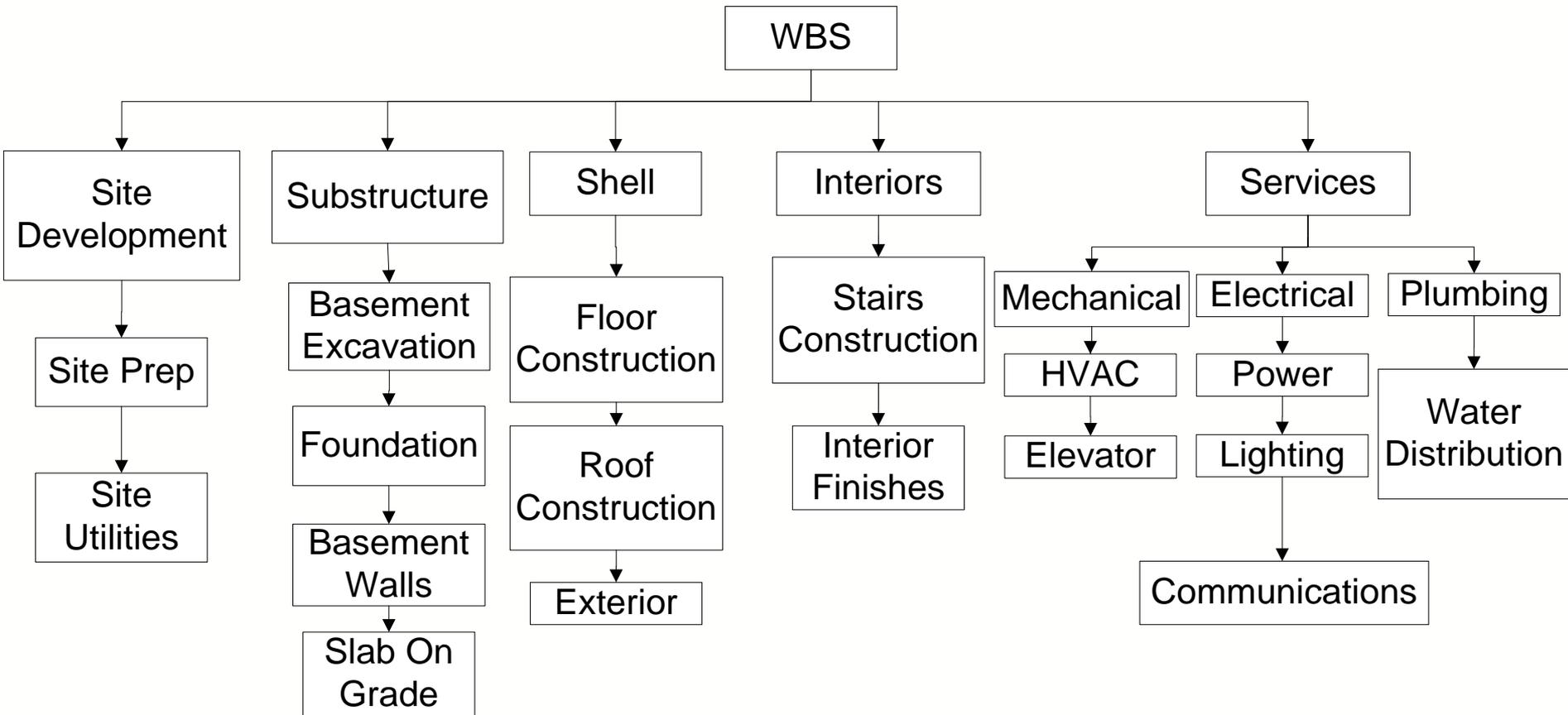
Excavation Impact - Concept 1



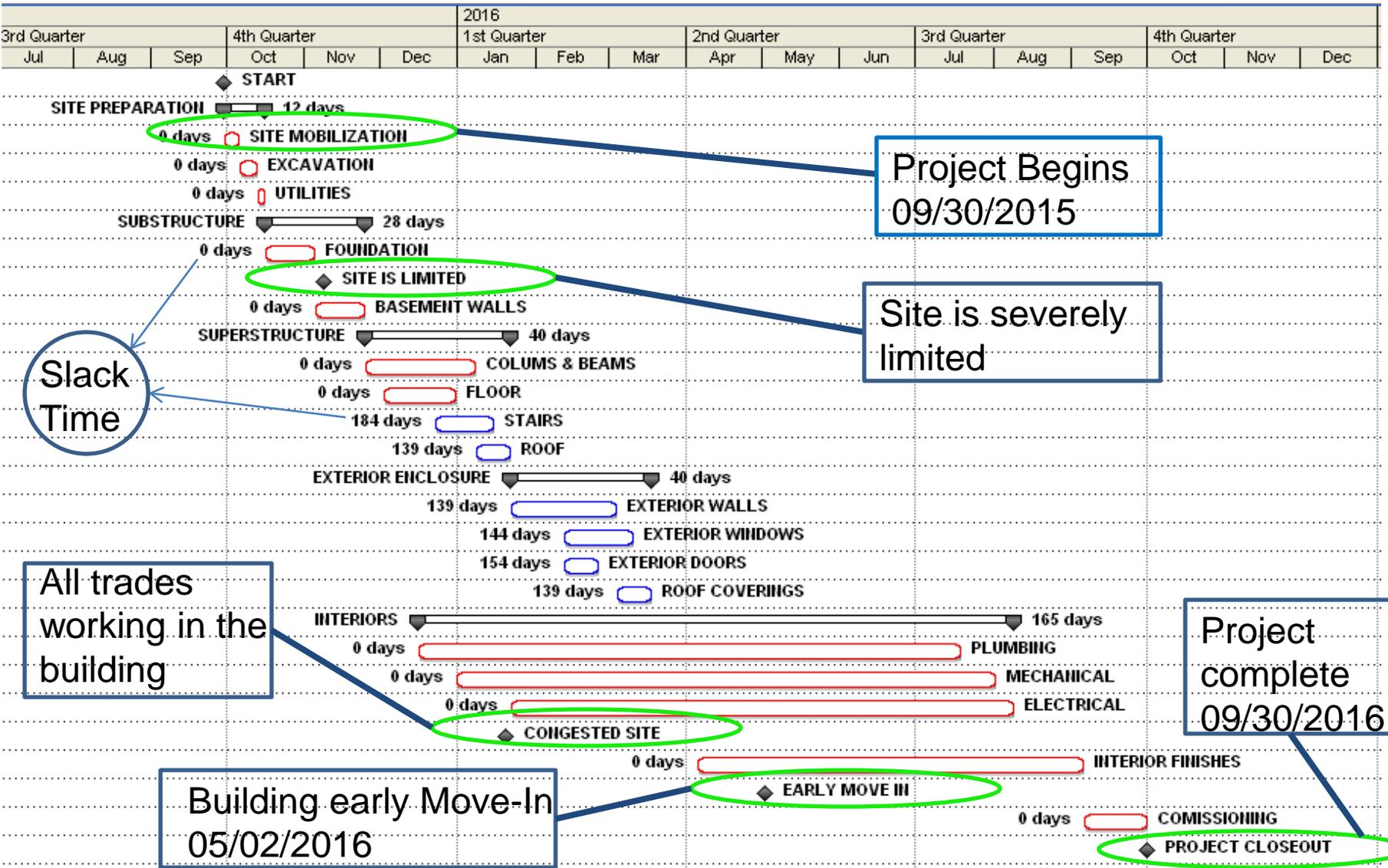
Excavation Impact - Concept 2



work breakdown structure



schedule – critical path method (CPM)



normal sequence of events

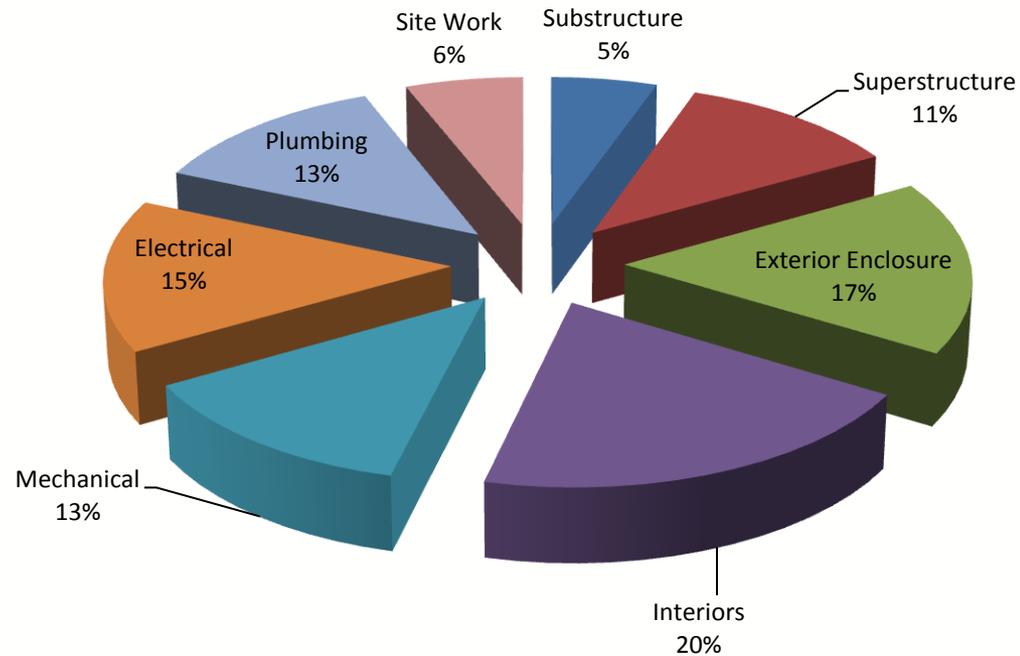
Activity Number	Description	dependency	Duration	Early Start	Early Finish	Late Start	Late Finish	Total Slack
1	SITE MOBILIZATION		4 days	9/30/2015	10/5/2015	9/30/2015	10/5/2015	0 days
2	EXCAVATION	1	5 days	10/6/2015	10/12/2015	10/6/2015	10/12/2015	0 days
3	UTILITIES	2	3 days	10/13/2015	10/15/2015	10/13/2015	10/15/2015	0 days
4	FOUNDATION	3	14 days	10/16/2015	11/4/2015	10/16/2015	11/4/2015	0 days
5	BASEMENT WALLS	4	14 days	11/5/2015	11/24/2015	11/5/2015	11/24/2015	0 days
6	COLUMNS & BEAMS	5	30 days	11/25/2015	1/7/2016	11/25/2015	1/7/2016	0 days
7	FLOOR	6SS+5 days	20 days	12/2/2015	12/30/2015	12/2/2015	12/30/2015	0 days
8	STAIRS	7SS+15 days	15 days	12/23/2015	1/14/2016	9/12/2016	9/30/2016	184 days
9	ROOF	6	10 days	1/8/2016	1/21/2016	7/25/2016	8/5/2016	139 days
10	EXTERIOR WALLS	9	30 days	1/22/2016	3/3/2016	8/8/2016	9/16/2016	139 days
11	EXTERIOR WINDOWS	10SS+15 days	20 days	2/12/2016	3/10/2016	9/5/2016	9/30/2016	144 days
12	EXTERIOR DOORS	10SS+15 days	10 days	2/12/2016	2/25/2016	9/19/2016	9/30/2016	154 days
13	ROOF COVERINGS	10	10 days	3/4/2016	3/17/2016	9/19/2016	9/30/2016	139 days
14	PLUMBING	7SS+10 days	150 days	12/16/2015	7/18/2016	12/16/2015	7/18/2016	0 days
15	MECHANICAL	14SS+10 days	150 days	12/31/2015	8/1/2016	12/31/2015	8/1/2016	0 days
16	ELECTRICAL	15SS+15 days	140 days	1/22/2016	8/8/2016	1/22/2016	8/8/2016	0 days
17	INTERIOR FINISHES	16SS+50 days	110 days	4/5/2016	9/5/2016	4/5/2016	9/5/2016	0 days
18	COMMISSIONING	17	19 days	9/6/2016	9/30/2016	9/6/2016	9/30/2016	0 days
19	PROJECT CLOSEOUT	11,12,13,18	0 days	9/30/2016	9/30/2016	9/30/2016	9/30/2016	0 days

budget

System	Cost / SF	Cost
Substructure	\$13.38	\$405,000.00
Superstructure	\$28.04	\$ 849,000.00
Exterior Enclosure	\$42.06	\$ 1,273,500.00
Interiors	\$49.79	\$ 1,507,500.00
Mechanical	\$31.87	\$ 964,800.00
Electrical	\$36.85	\$ 1,115,550.00
Plumbing	\$30.87	\$ 934,650.00
Site Work	\$14.86	\$450,000.00
Subtotal	\$247.72	\$7,500,000
Contractor Fees (O&P)	\$61.93	\$ 1,875,000
Architectural Fees	\$21.68	\$ 656,250



Concrete System



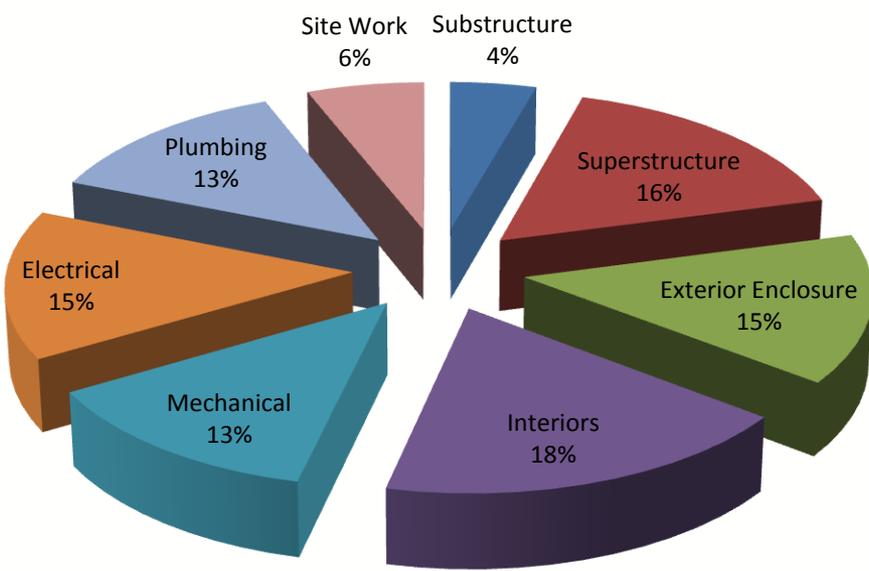
**Total Cost (W/O&P) = \$10,031,250
or \$331.33/sq-ft**

budget

System	Cost/sf	Total Cost
Substructure	\$11.00	\$330,000
Superstructure	\$41.08	\$1,232,250
Exterior Enclosure	\$36.43	\$1,092,750
Interiors	\$45.50	\$1,365,000
Mechanical	\$32.32	\$969,600
Electrical	\$36.36	\$1,090,800
Plumbing	\$32.32	\$969,600
Site Work	\$15.00	\$450,000
Subtotal	\$250.00	\$7,500,000
Contractor Fees (O&P)	\$62.50	\$ 1,875,000

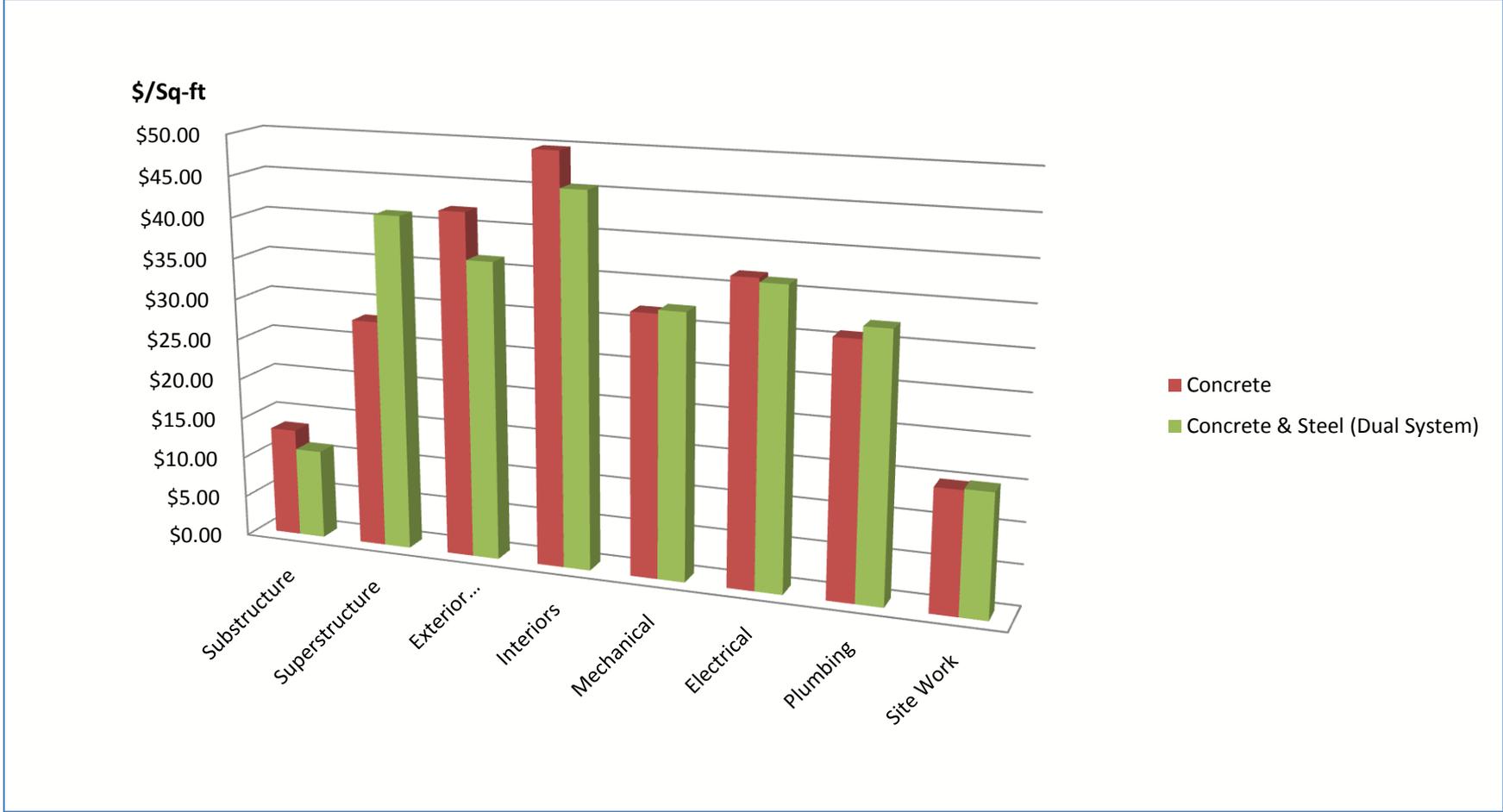


concrete & steel (dual system)



**total cost (W/O&P) = \$10,031,250
or \$334.38/sq-ft**

concrete vs. steel



method 2

George Pearl Hall

Facts:

In Service: Jan 1, 2008

Loc. : Albuquerque, NM

Cost: \$22 Million

Architect: Antoine
Predock

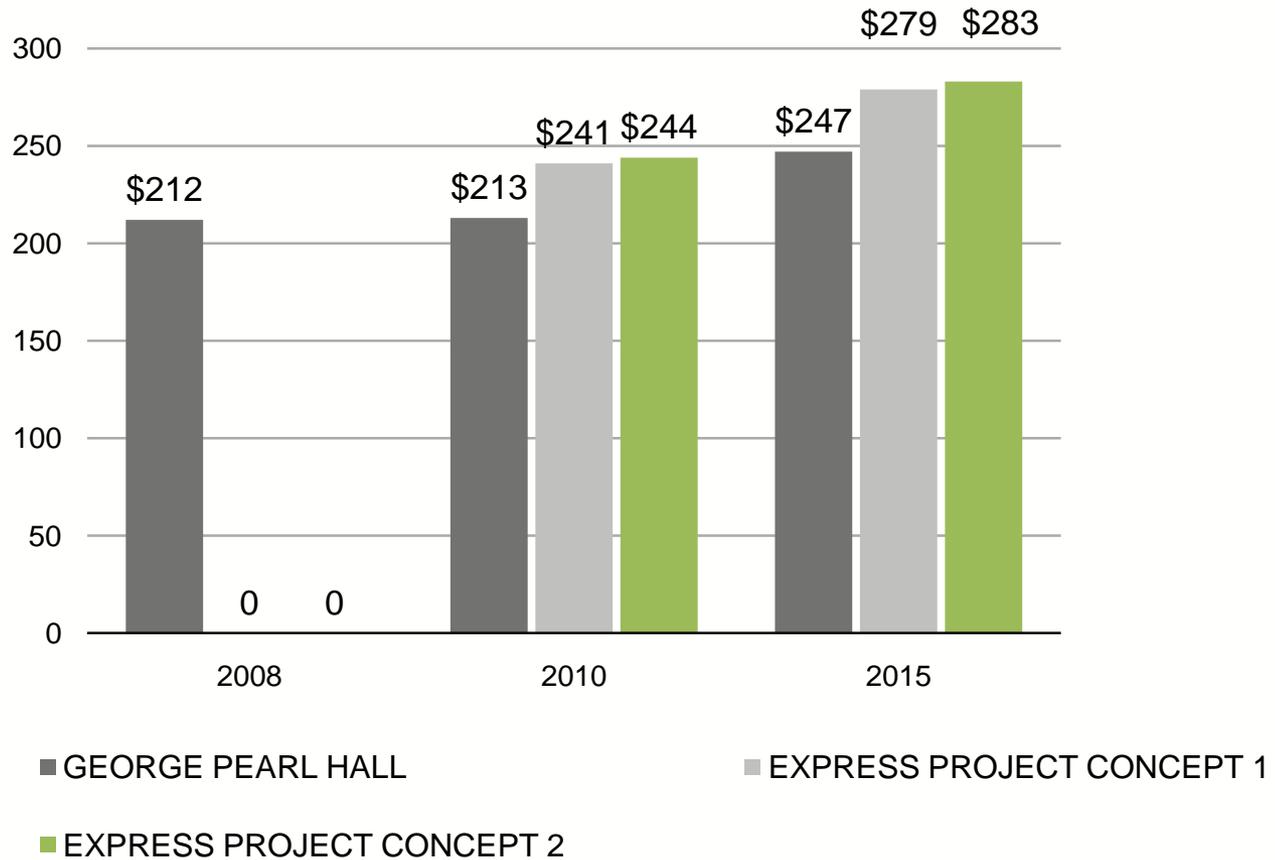
Contractor: Jaynes Corp

Construction Duration:
Nov 2005 - Sept 2007

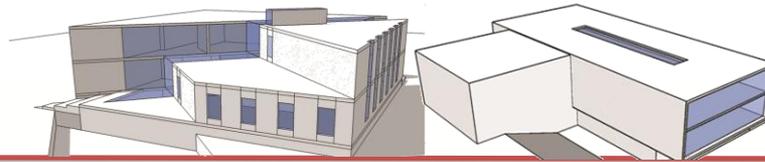


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\$ / SQ ft building comparison



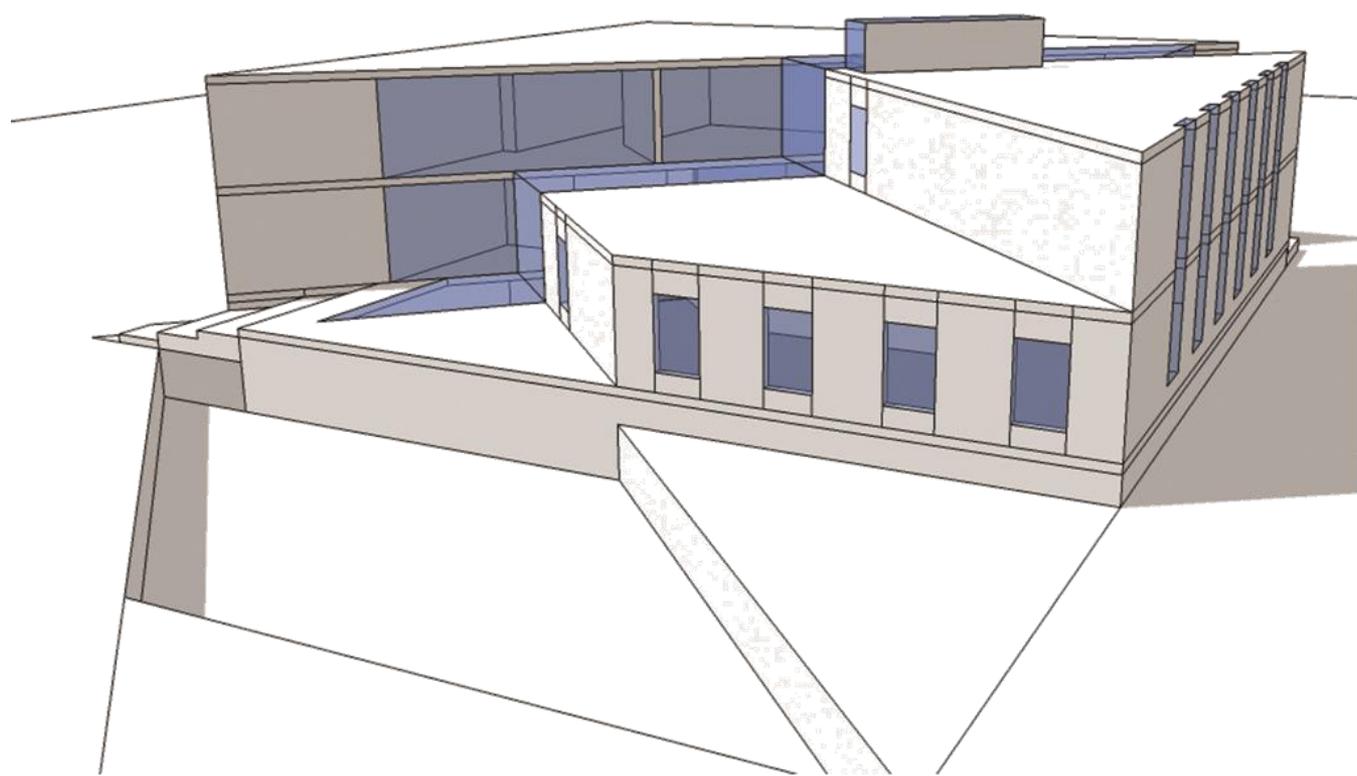
decision matrix



		Concept 1		Concept 2	
		Steel	Concrete	Steel	Concrete
Arch	Sunlight	+	+	-	-
	Circulation	+	+	+	+
	Façade	+	+	+	+
	Design/Form	+	+	-	-
Structural	Grid	+	+	-	-
	Weight	+	-	+	-
	Floor System Depth	+	+	-	-
	Reuse/Renovation	+	-	+	-
	Fire proofing	-	+	-	+
MEP	Mechanical difficulties	-	-	+	+
	Sun path	+	+	-	-
	MEP height	S	S	S	S
	Thermal mass	-	+	-	+
	Sustainable design	+	+	-	-
	Utilities	S	S	S	S
CM	Cost	-	+	-	+
	Schedule	+	-	+	-
	Constructability	-	-	+	+
	Site Plan	+	+	-	-
Owner	Owners' Preference	+	+	-	-
Total		13	13	7	7
Total		5	5	11	11
Total score		8	8	-4	-4

Thank you!

the university of new mexico **albuquerque**



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