

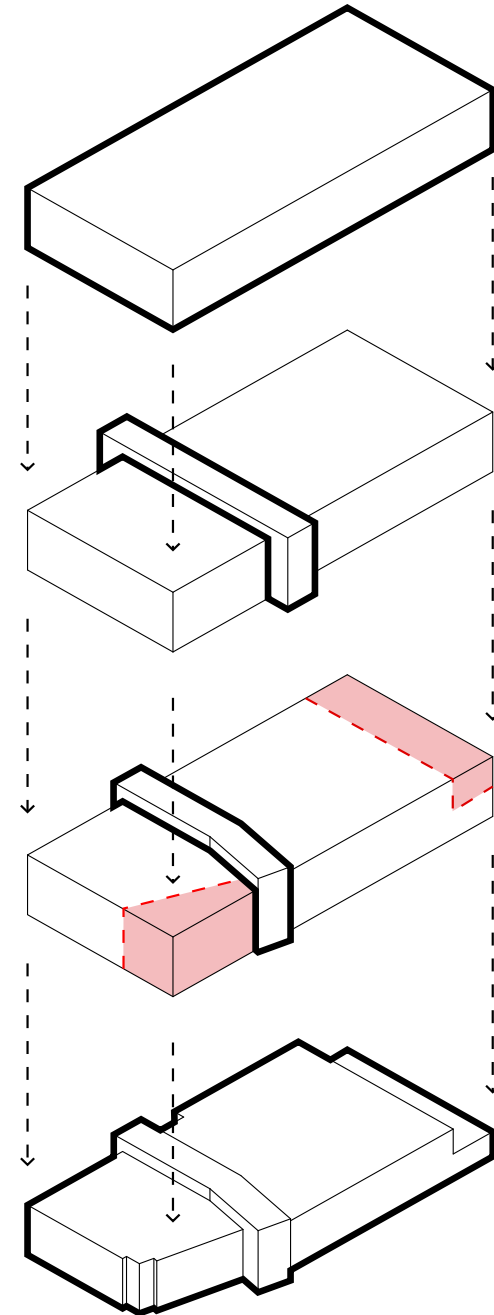
design development



concept

Most buildings are considered successful if they encourage people to remain in them; businesses seeking repeat customers, theaters anticipating return patrons, and offices pursuing recurring clients all desire architecture that makes people comfortable enough to stay. The organization Pivot, however, possesses a mission with a different pursuit, for it finds the most satisfaction when its youth clients feel capable enough to leave its space.

Pivot provides clients with tools they need to be successful, so this center functions as a tool to enable easy access to the services they may need along the way. The Pivot Community Center serves as a space to learn from others, communicate trauma, and ultimately become equipped to progress onward.



schematic design



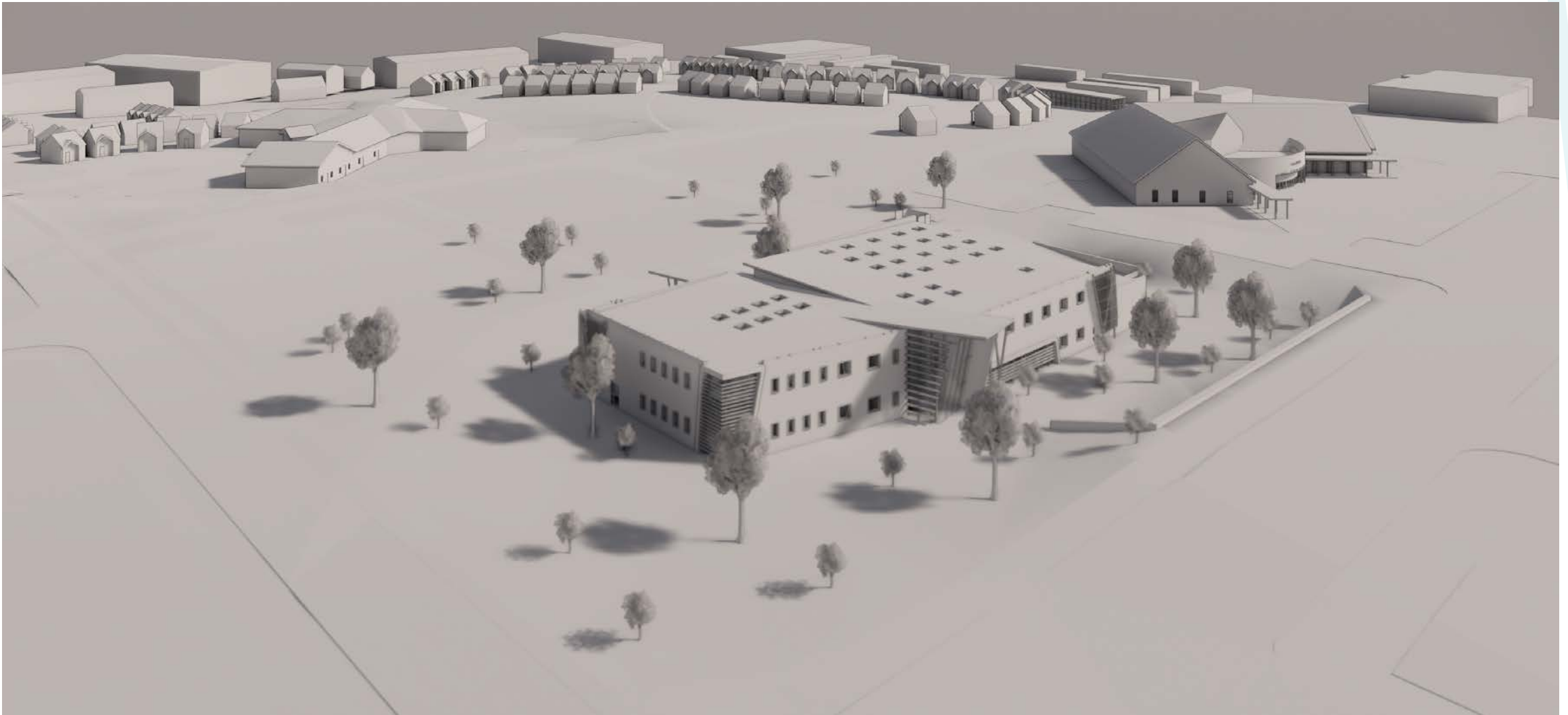
teen lounge render

schematic design



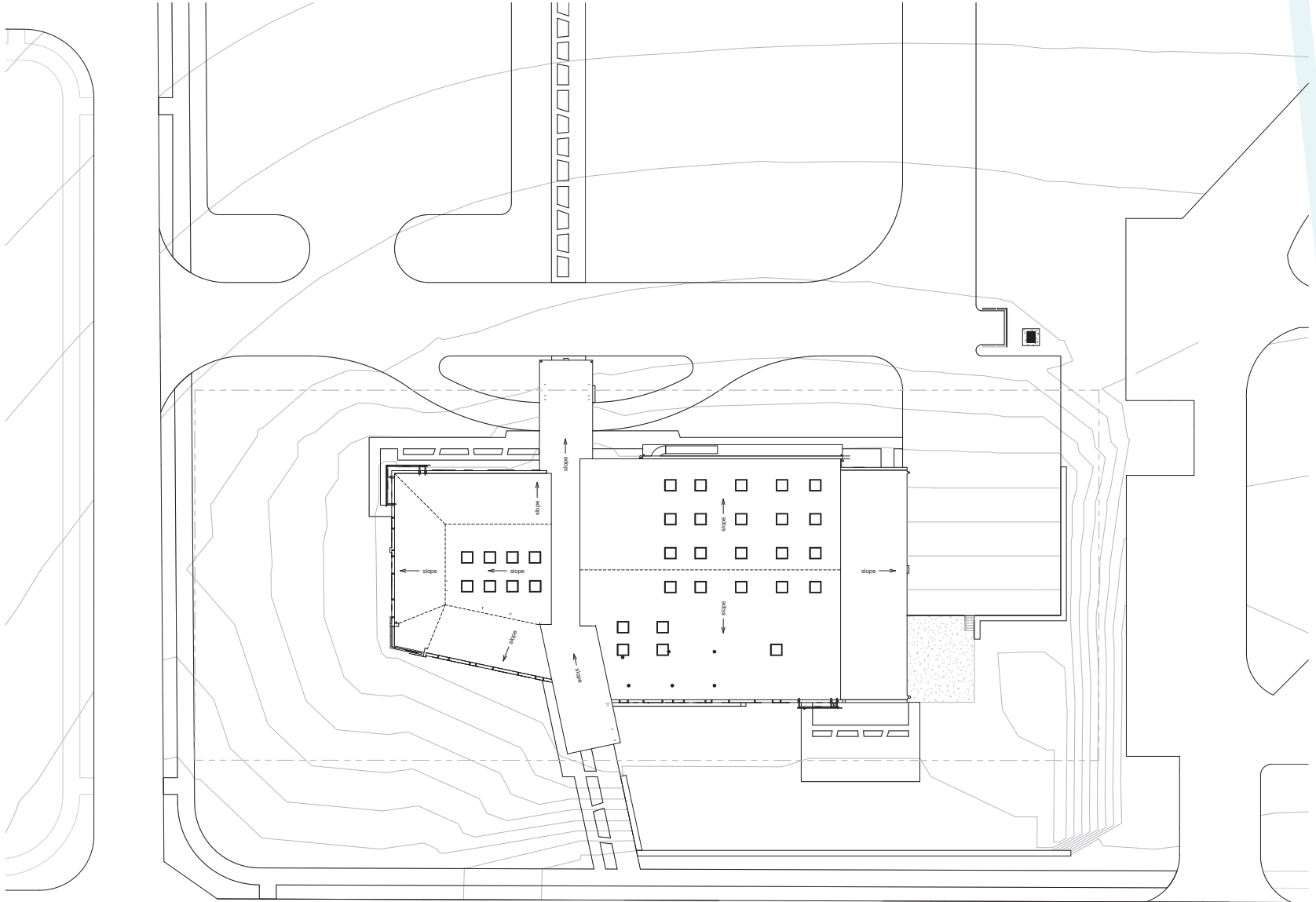
store hallway render

site



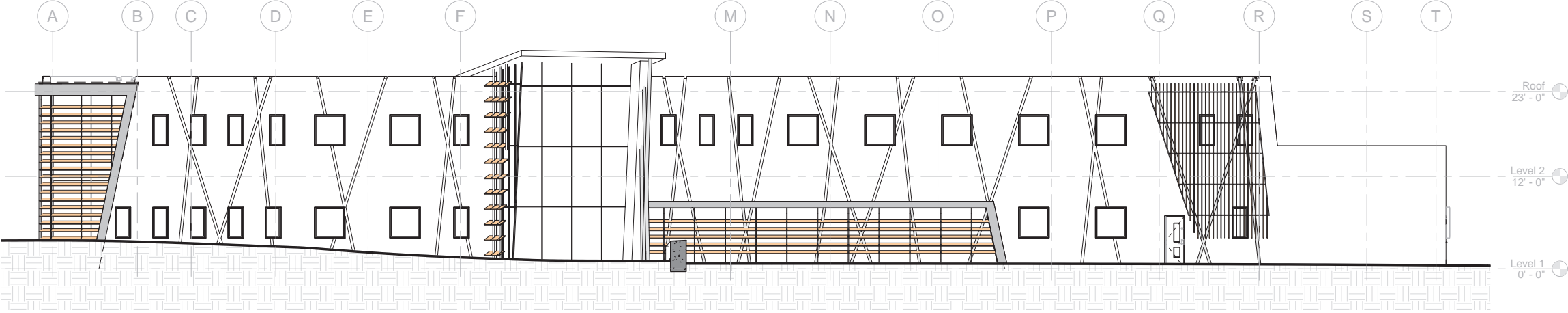
exterior birds eye

site



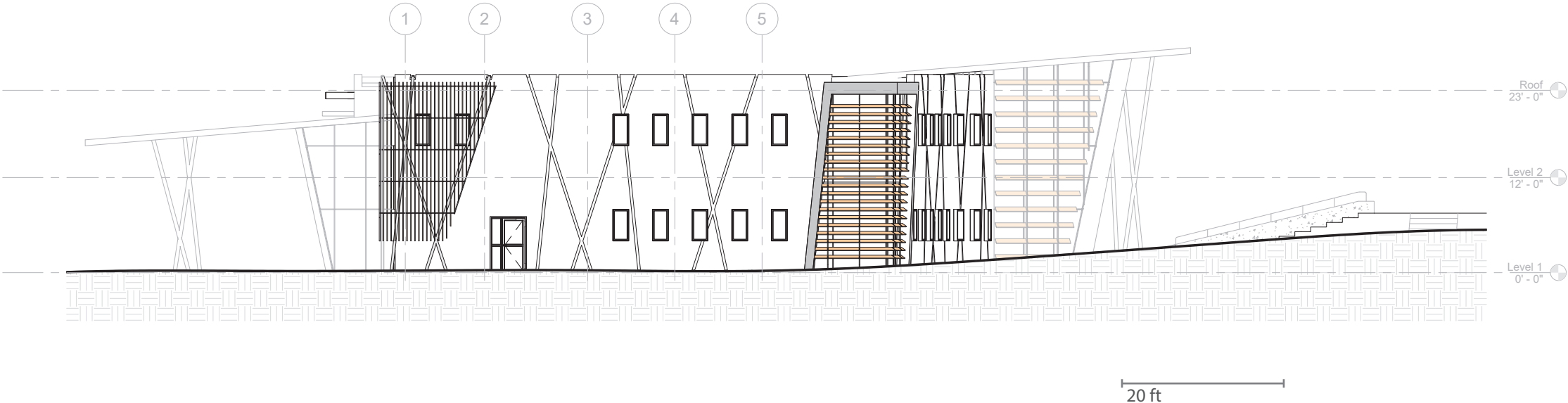
site plan

exterior



south elevation

exterior



standing seam overhang

exterior

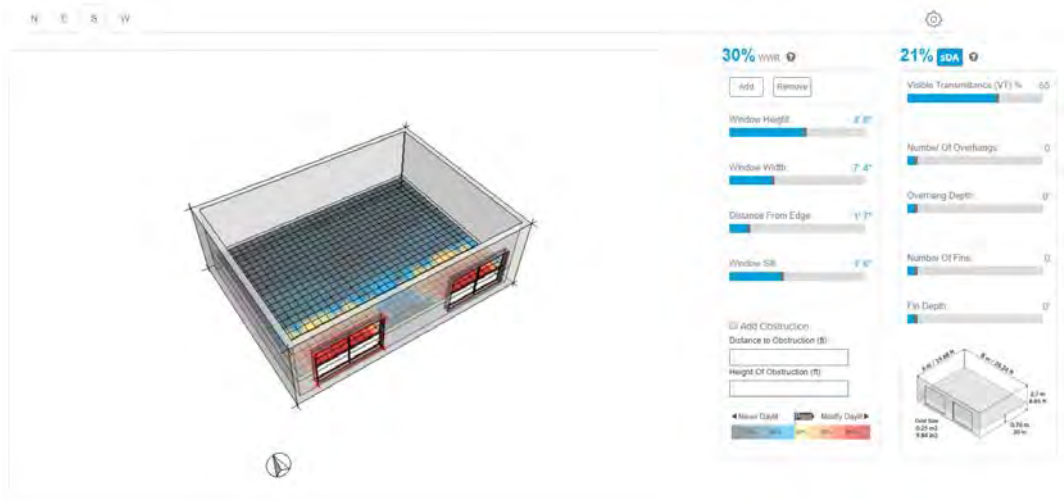


exterior perspective

building performance

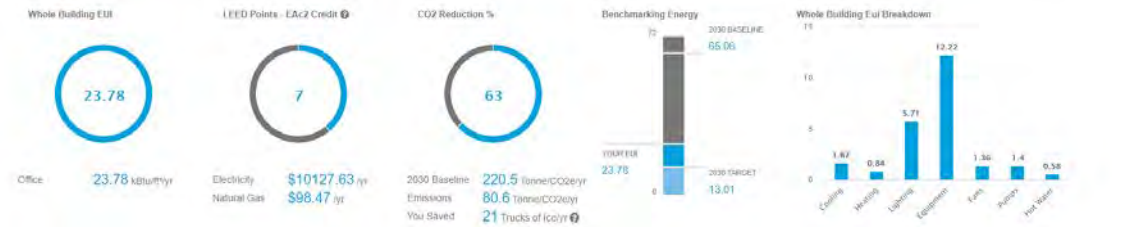
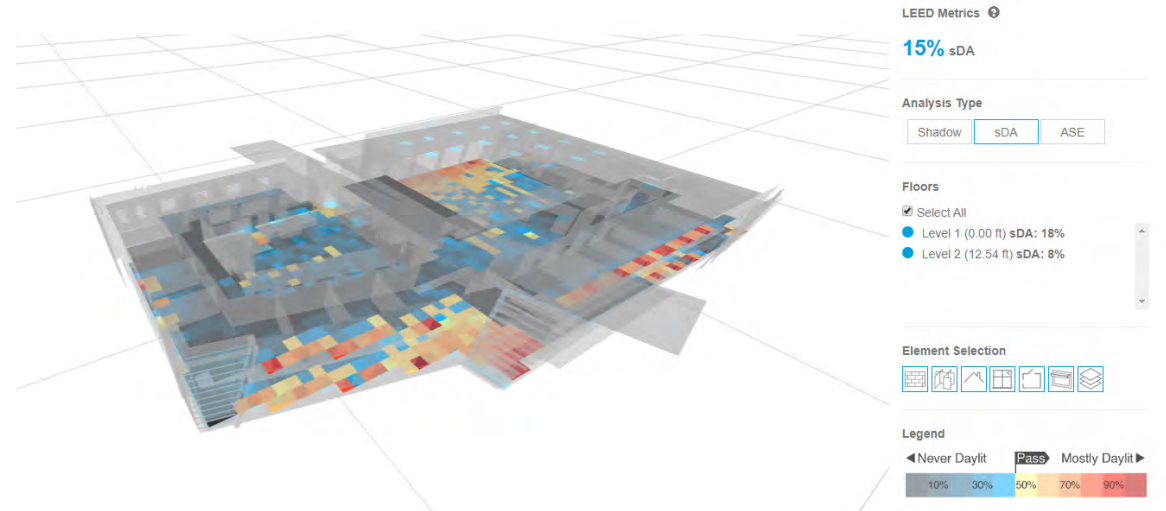
standard reference design

building analysis from Cove tool software
 similar requirements to baseline design for eQuest
 End Use Index (EUI) is 34
 much better than an typical existing building in the US (EUI of 65), but new construction will generally be better anyway



optimized performance design

building analysis from Cove tool software
 similar optimization strategies to eQuest design
 EUI is 24
 nearly 30% more efficient than standard reference design, based on the EUI metric
 utilization of daylight (sDa) not favorable



further development

I did not achieve my goal of improving useable daylight in the building; I would like to revisit it.

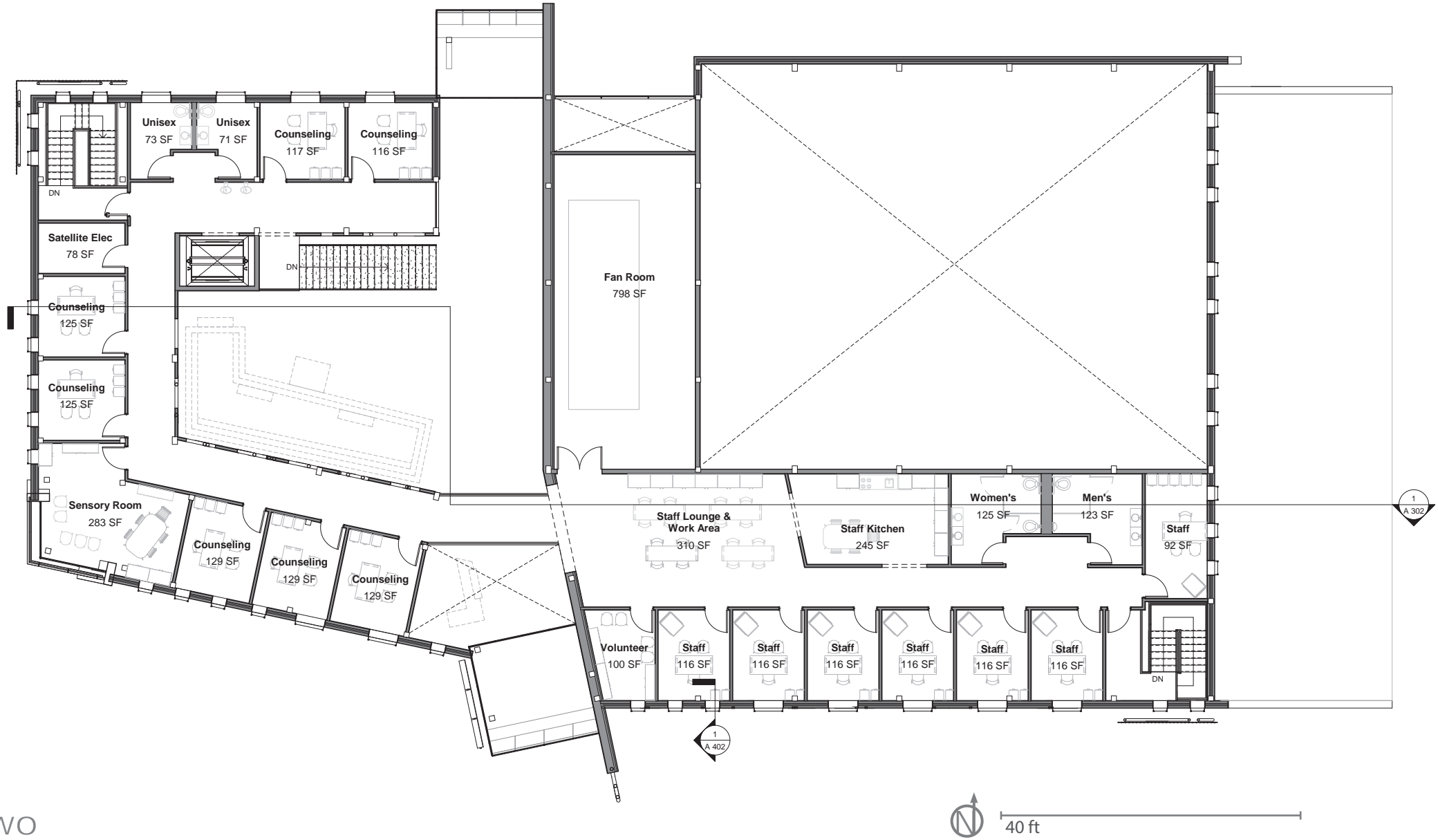
plan



floor one

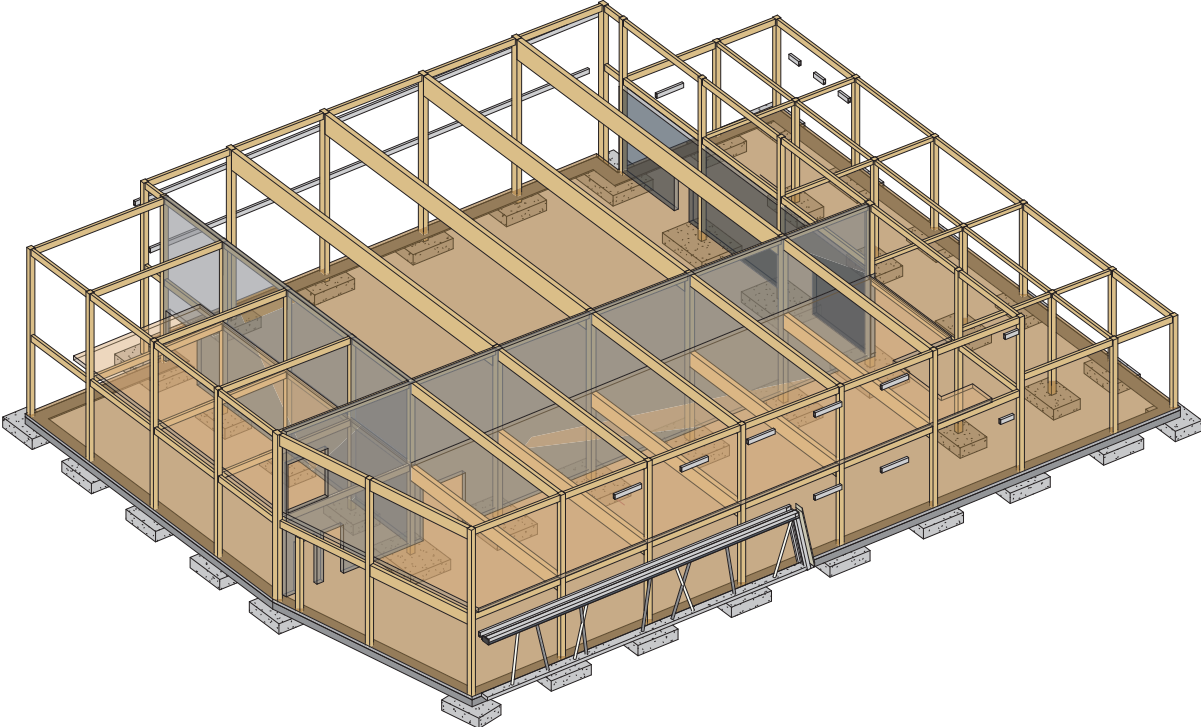


plan



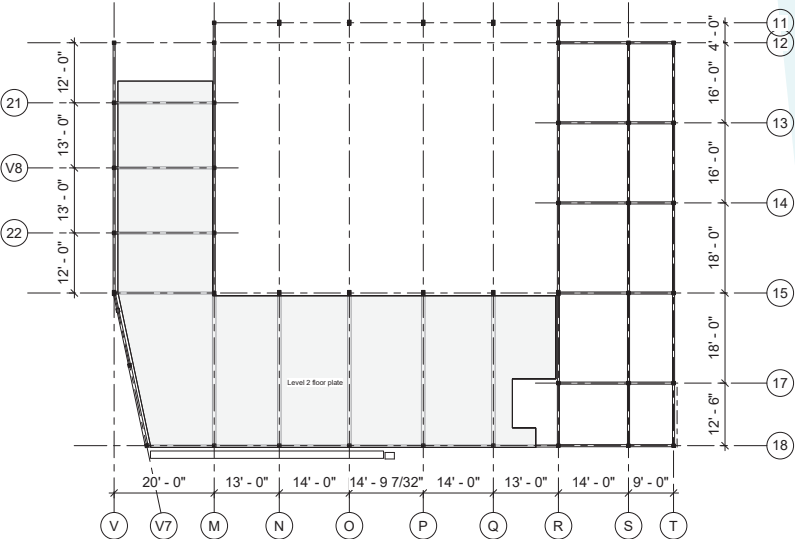
floor two

structural integration

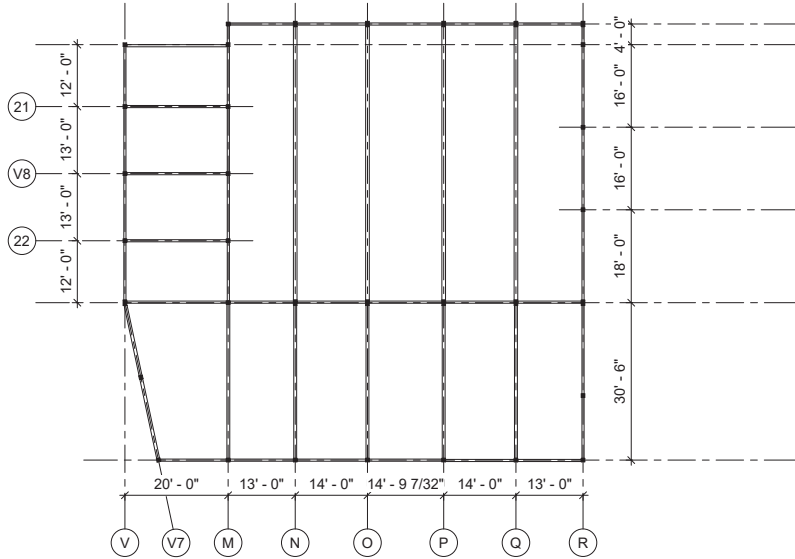


structural axonometric

continued development and enhancement of portion of building with focus space

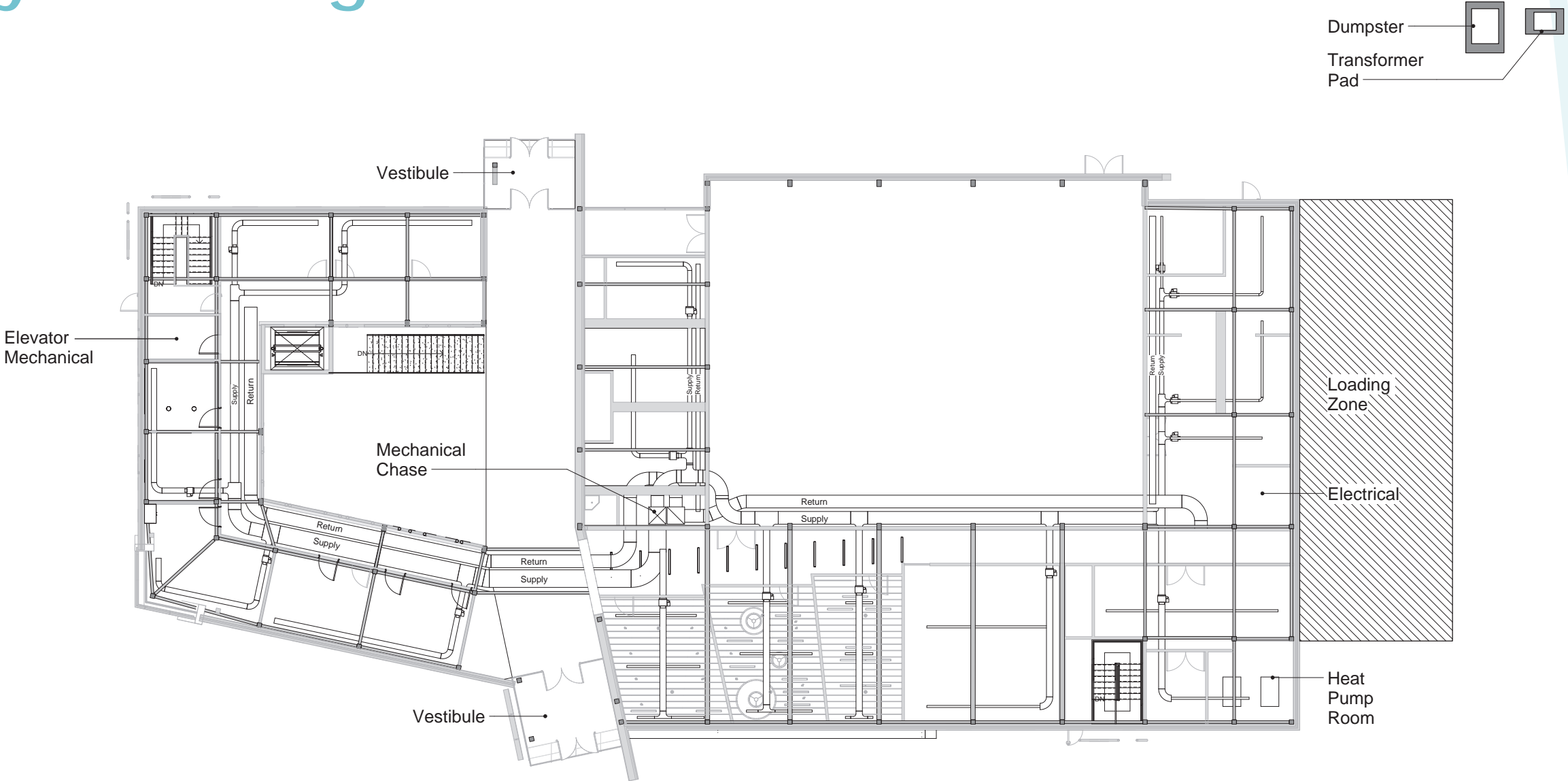


floor two framing plan
3" = 1"



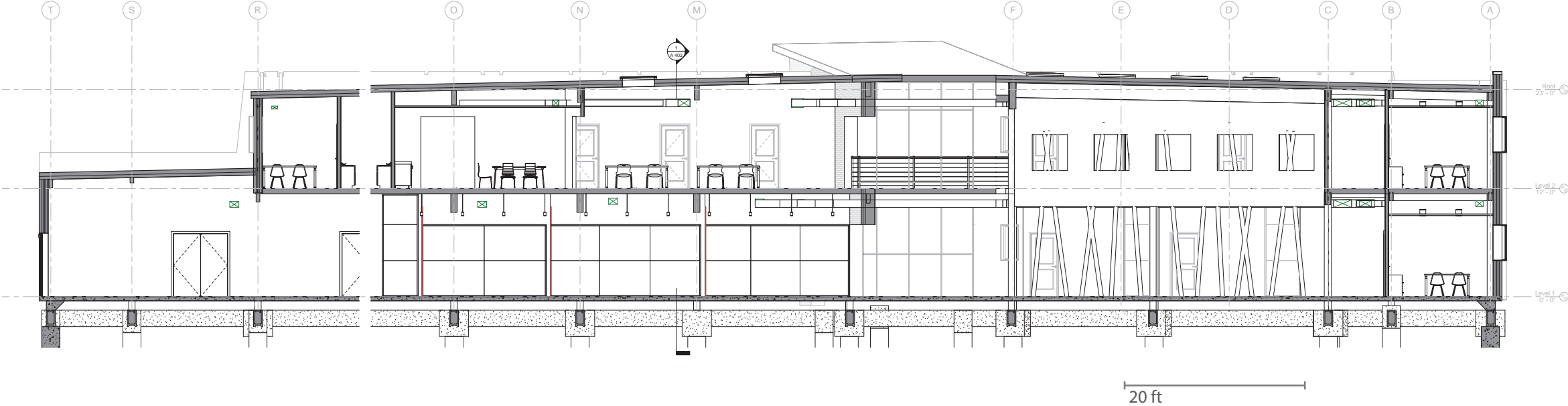
roof framing plan

system integration



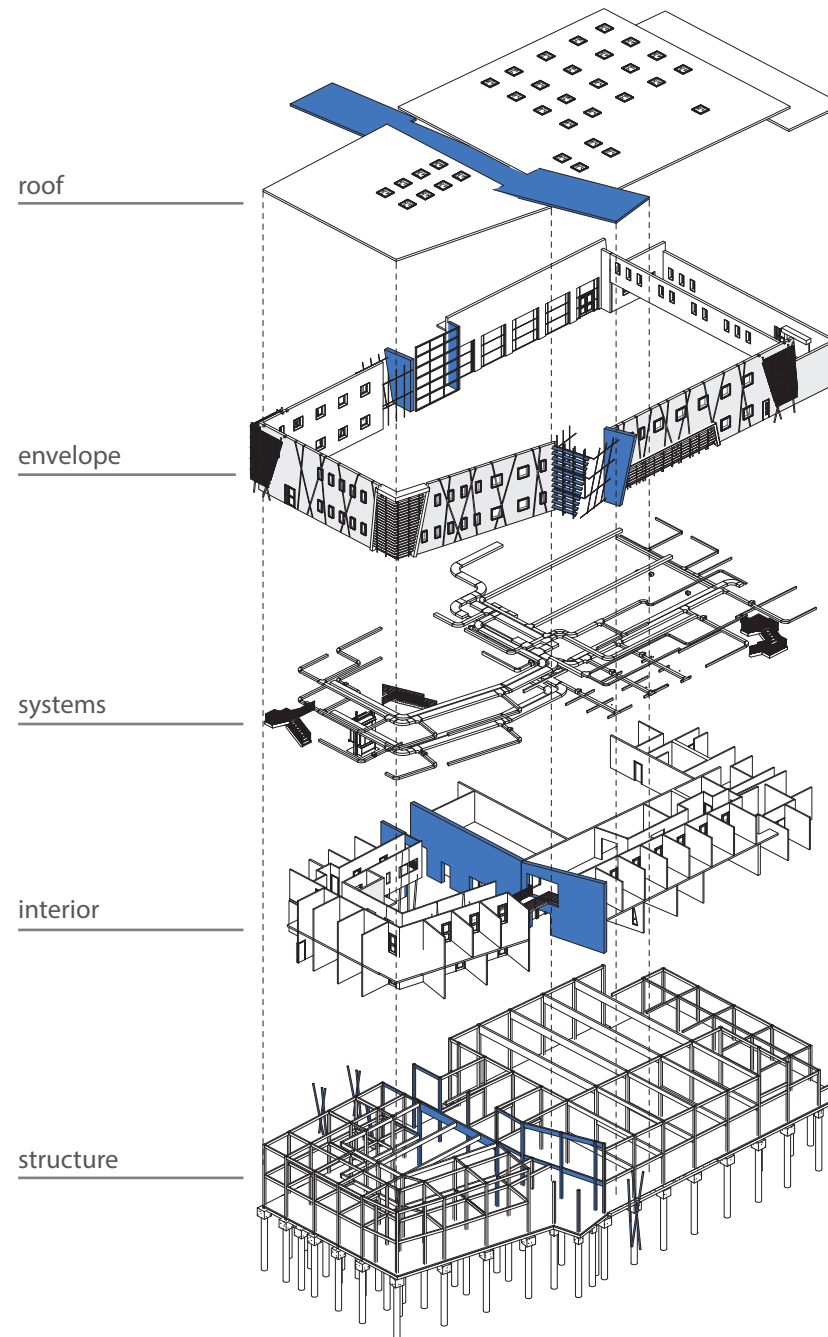
floor one mechanical plan
3" = 1"

section



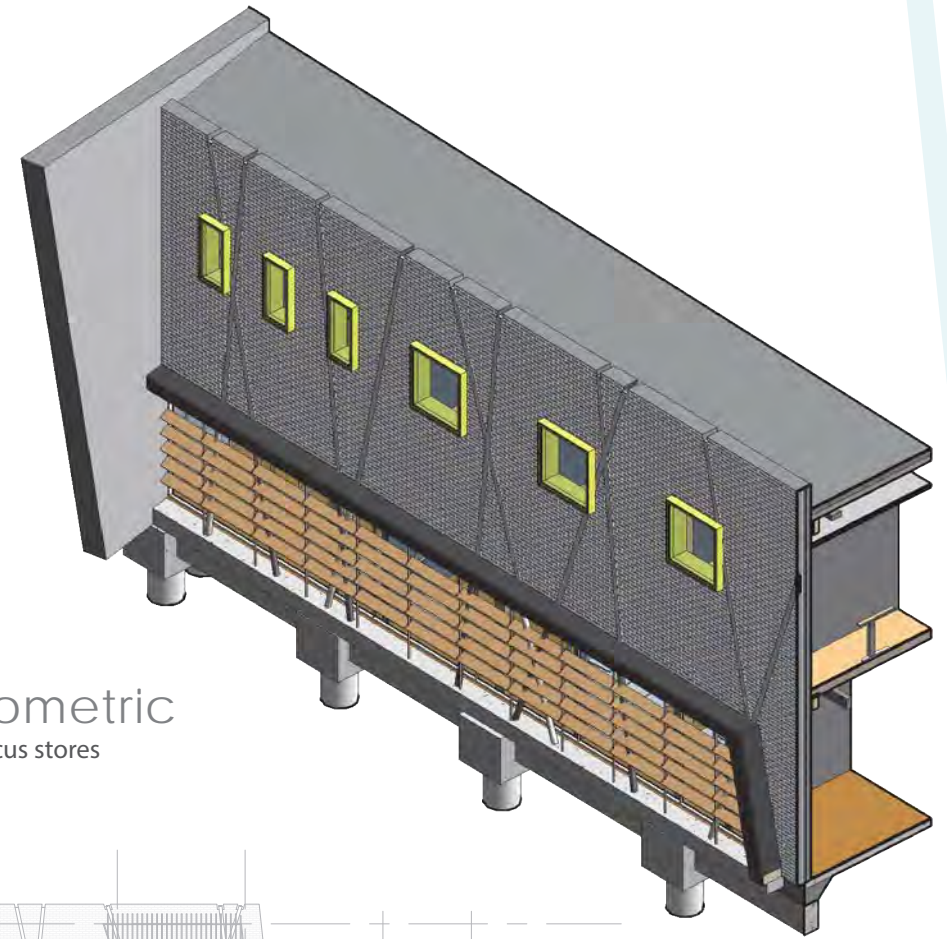
longitudinal building section
east to west

system integration

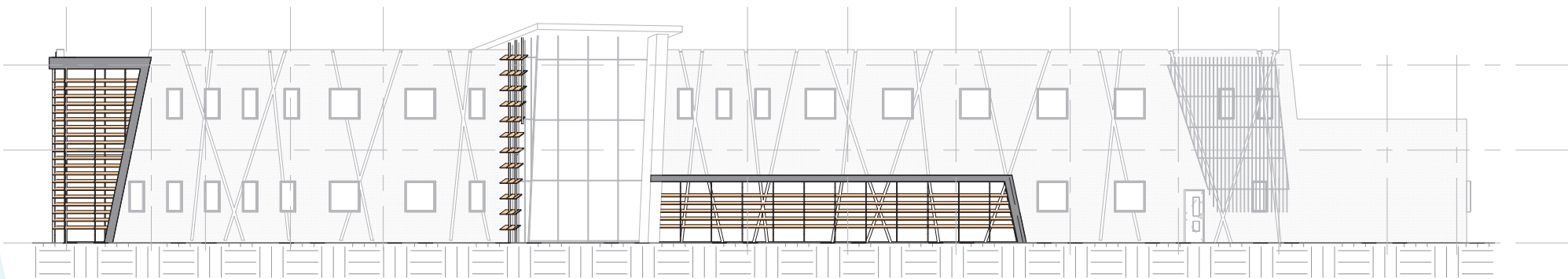


exploded axonometric

focus space

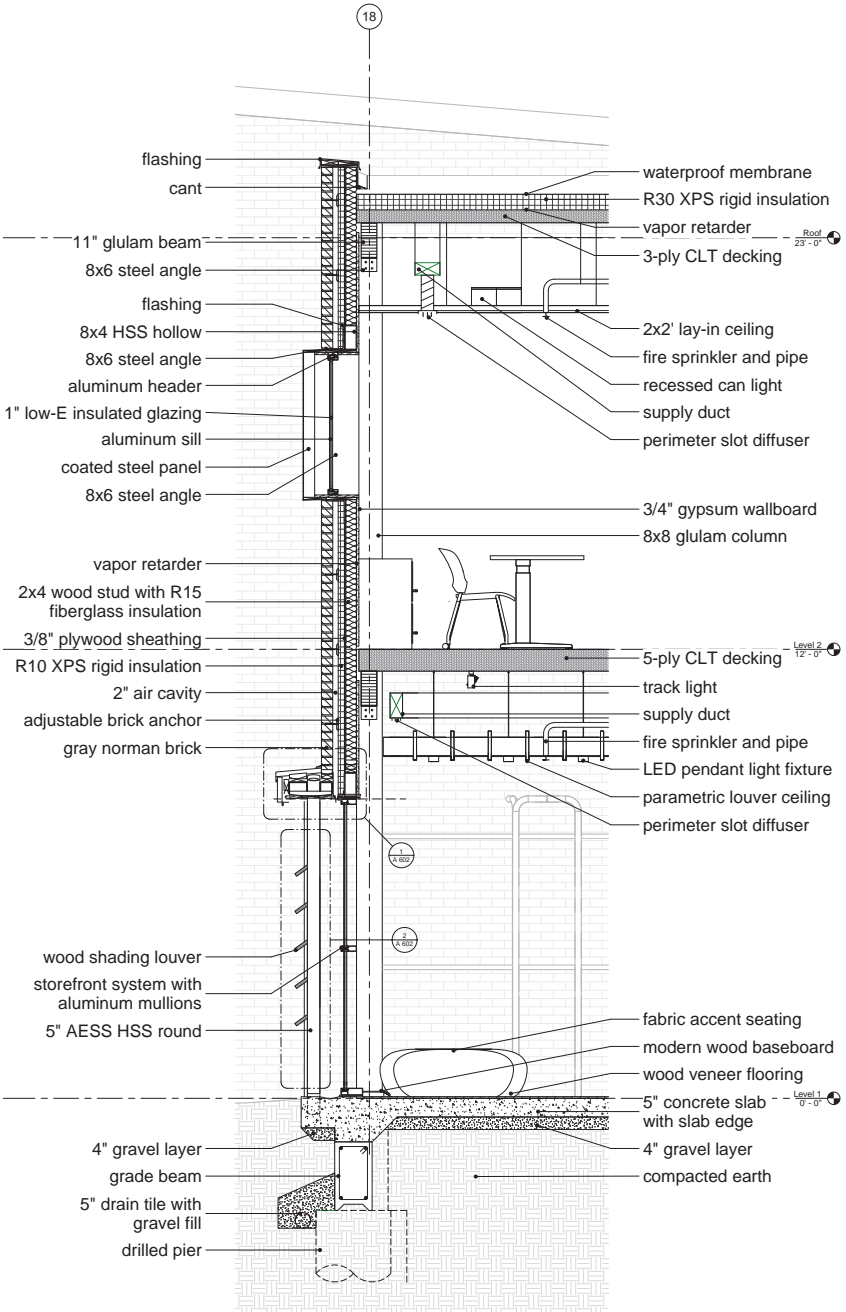
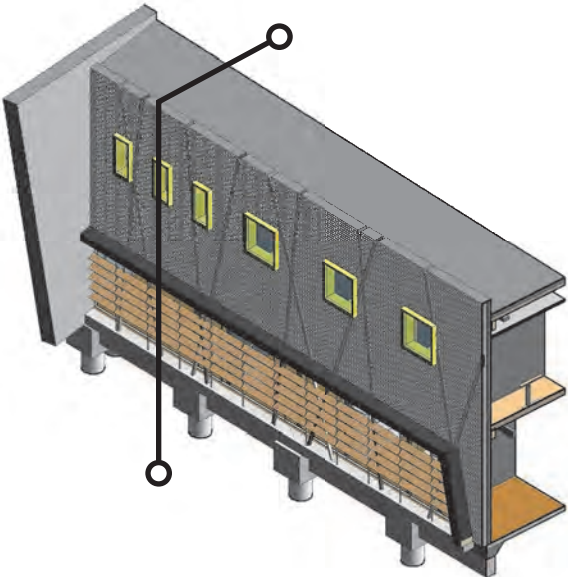


overhang axonometric
section of south facade along focus stores



south elevation
louver extents emphasized

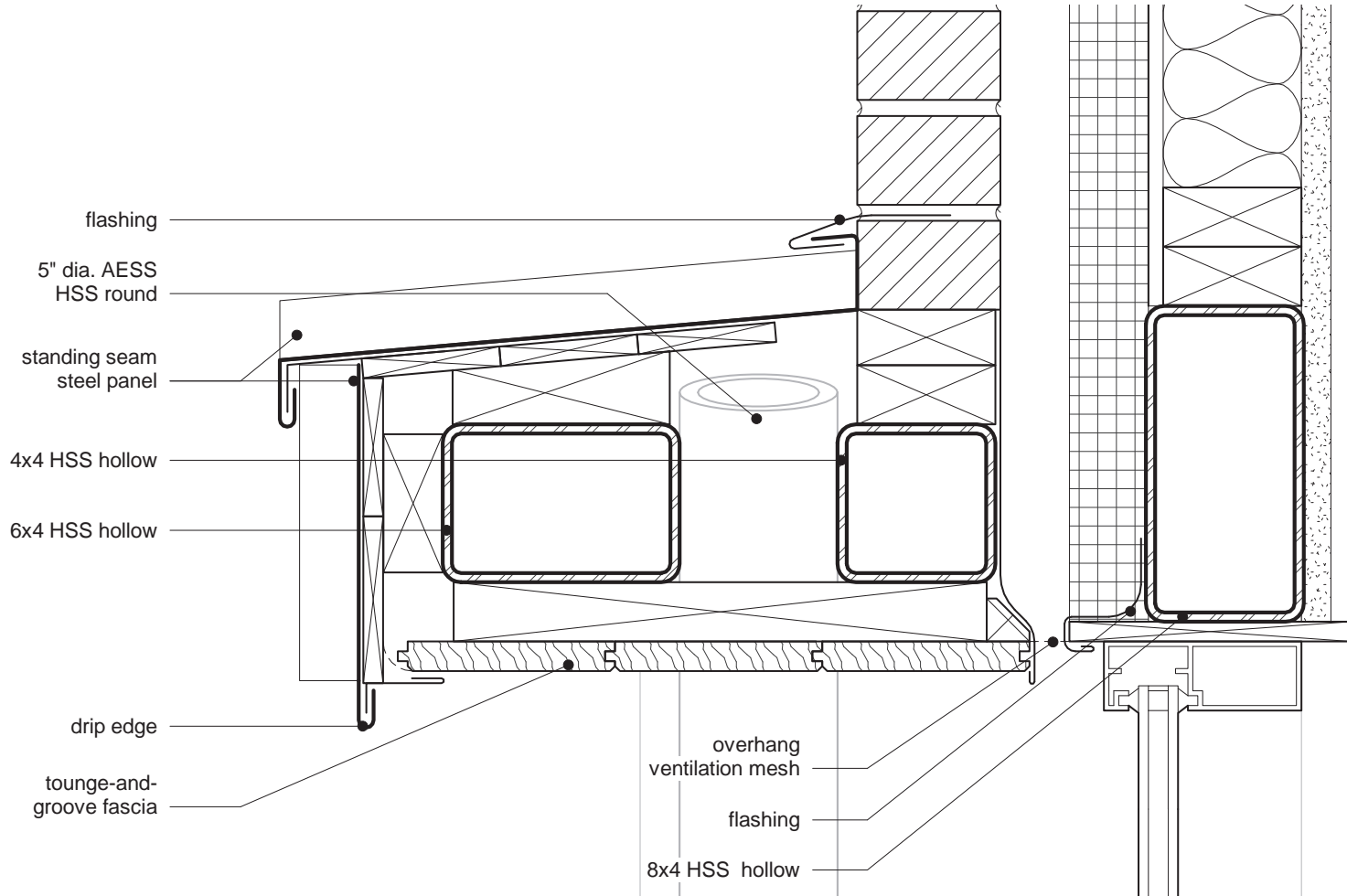
section



focus stores wall section

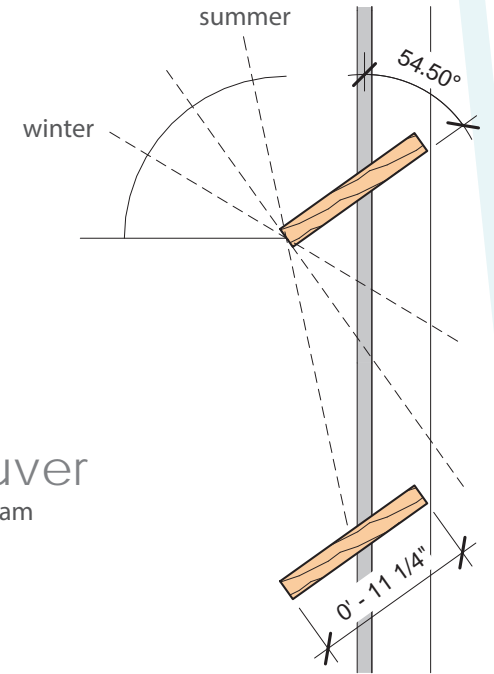
4 ft

focus space

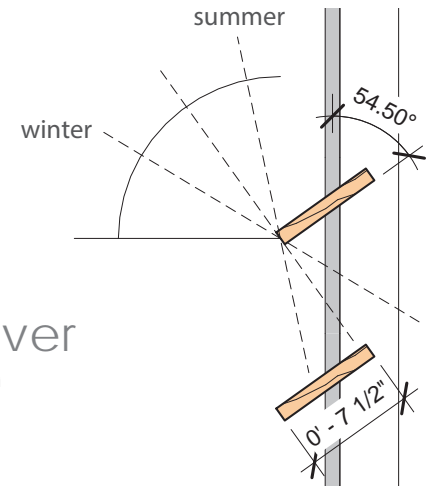


standing seam overhang
3" = 1"

west louver
solar angle diagram



south louver
solar angle diagram



building performance

code compliance

thermal performance as designed tested against prescriptive R- and U-values given by IECC 2018

R-value & U-factor Calculations

William Crawford

3/30/20

Roof	layer	R-value/in	thickness (in)	R-value	Code Compliance
	exterior air film (summer)			0.25	
	vapor membrane: seal			0.12	
	XPS rigid foam insulation	5.00	6.00	30.00	
	3-ply CLT decking	1.25	4.13	5.16	
	interior ceiling air film (summer)			0.92	
			insulation	30.00	Minimum R-value R 25 ci
			total	36.45	Complies? yes
			U-value = 1/R	0.027	Maximum U-value 0.039
					Complies? yes

Wall	layer	R-value/in	thickness (in)	R-value	Code Compliance
	exterior air film (summer)			0.25	
	brick		3.63	0.44	
	air layer		1.75	1.00	
	vapor membrane: permeable			0.06	
	XPS rigid foam insulation	5.00	2.00	10.00	
	plywood sheathing		0.50	0.79	
	wood joist w/ insulation		3.50	15.00	
	vapor membrane: seal			0.12	
	gypsum wall board		0.75	0.56	
	interior wall air film			0.68	
			insulation	25.00	Minimum R-value R 13 + R 3.8 ci
			total	28.90	Complies? yes
			U-value = 1/R	0.035	Maximum U-value 0.064
					Complies? yes

Slab	layer	R-value/in	thickness (in)	W	Code Compliance
	interior floor air film			0.92	
	wood flooring	0.91	0.50	0.46	
	concrete	0.08	5.00	0.40	
			insulation	0.00	Minimum R-value Not Required
			total	1.78	Complies? yes
			U-value = 1/R	0.563	Maximum U-value 0.730
					Complies? yes

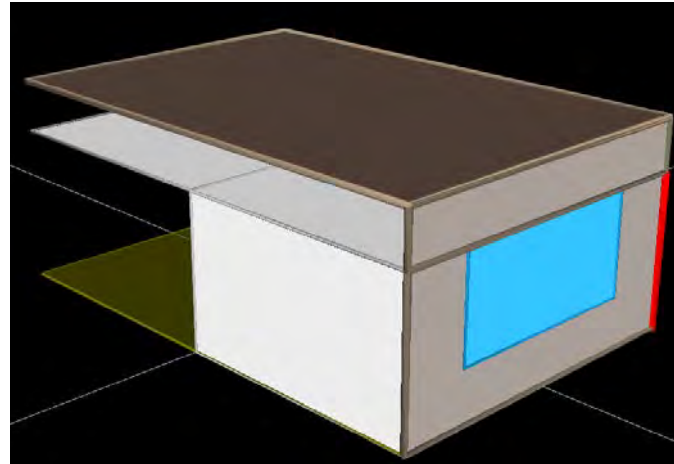
Glazing	U-value (summer)	Maximum U-value	Complies?
	0.2	0.46 fixed	yes
	SHGC	Maximum SHGC	Complies?
	0.22	0.3	yes

Skylights	U-value	Maximum U-value	Complies?
	0.33	0.55	yes
	SHGC	Maximum SHGC	Complies?
	0.31	0.35	yes

performance optimization

Performing better than the code minimum not only saves energy, but money. If Pivot operates facilities on a low maintenance cost, that allows more resources to be invested into programs for the youth!

Use of eQuest, Cove tool, and feedback from professionals [namely, Professor Mansy] enabled the optimization of the building envelope in terms of environmental performance.

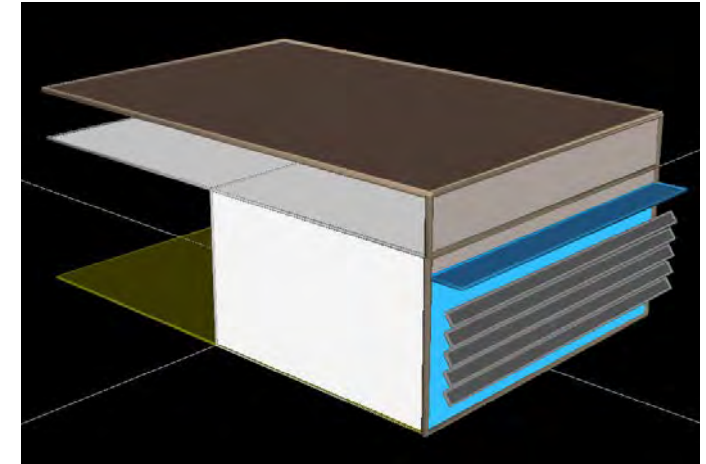


baseline design

minimum thermal resistance of wall assembly by code
 maximum thermal transmittance of glazing by code
 no overhangs or shading devices
 30% glazing

baseline result

simulated in eQuest software
 0.96 CFM/sf peak cooling load
 not bad, but plenty of room for more efficiency or more glass



optimized louver design

favorable thermal resistance of wall [details to the left]
 thermally efficient glazing selected
 overhangs and louvers optimized to reduce heating load
 66% glazing

design result

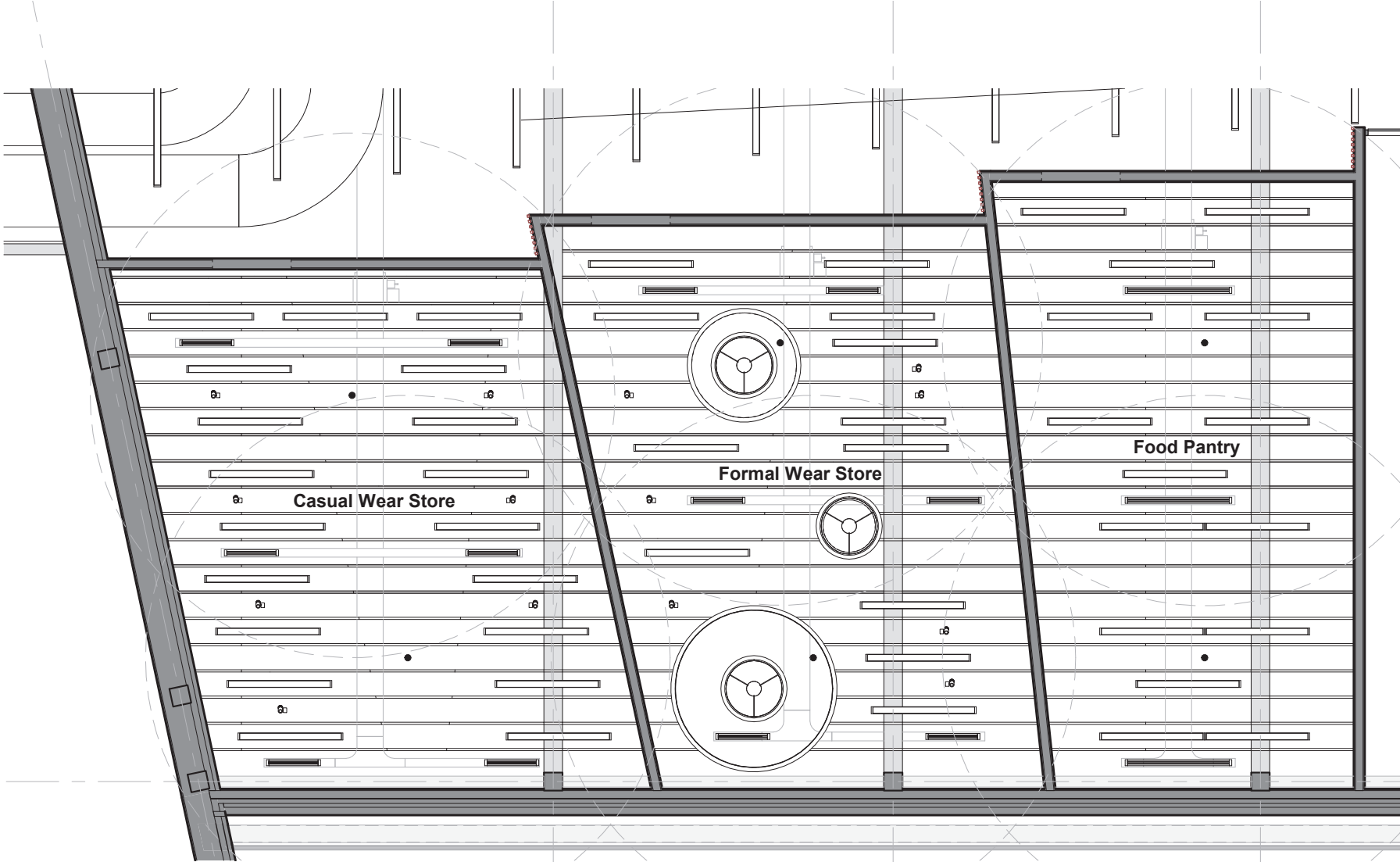
simulated in eQuest software
 0.96 CFM/SF peak cooling load
 doubled glazing without taxing cooling load
 save energy and money!

focus space



interior render

focus space



focus space reflected ceiling plan

thank you

