MILL CREEK

Dec. 03, 2016

ARTS & TECHNOLOGY INNOVATION CENTER

Scheme 2

Melissa Lin
Tim Trivellin

Grow

Community

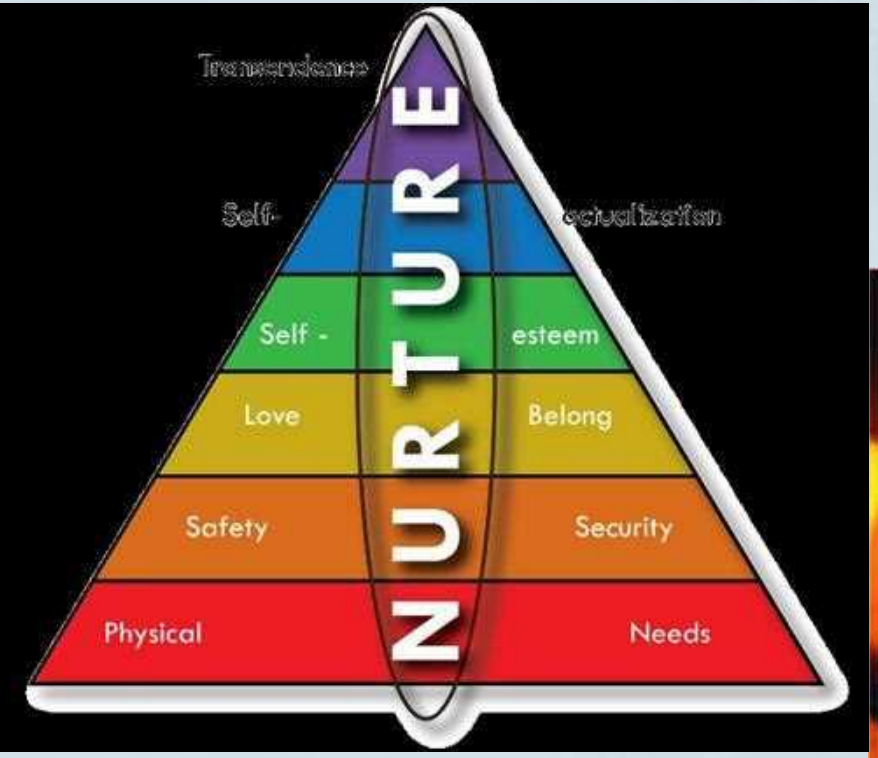
Culture

Belong

Nurture

Image retrieved at http://www.leinsterexpress.ie/news/your-community/217355/pop-up-wellness-hub-brings-mental-health-to-the-people.html

Essence of the Site



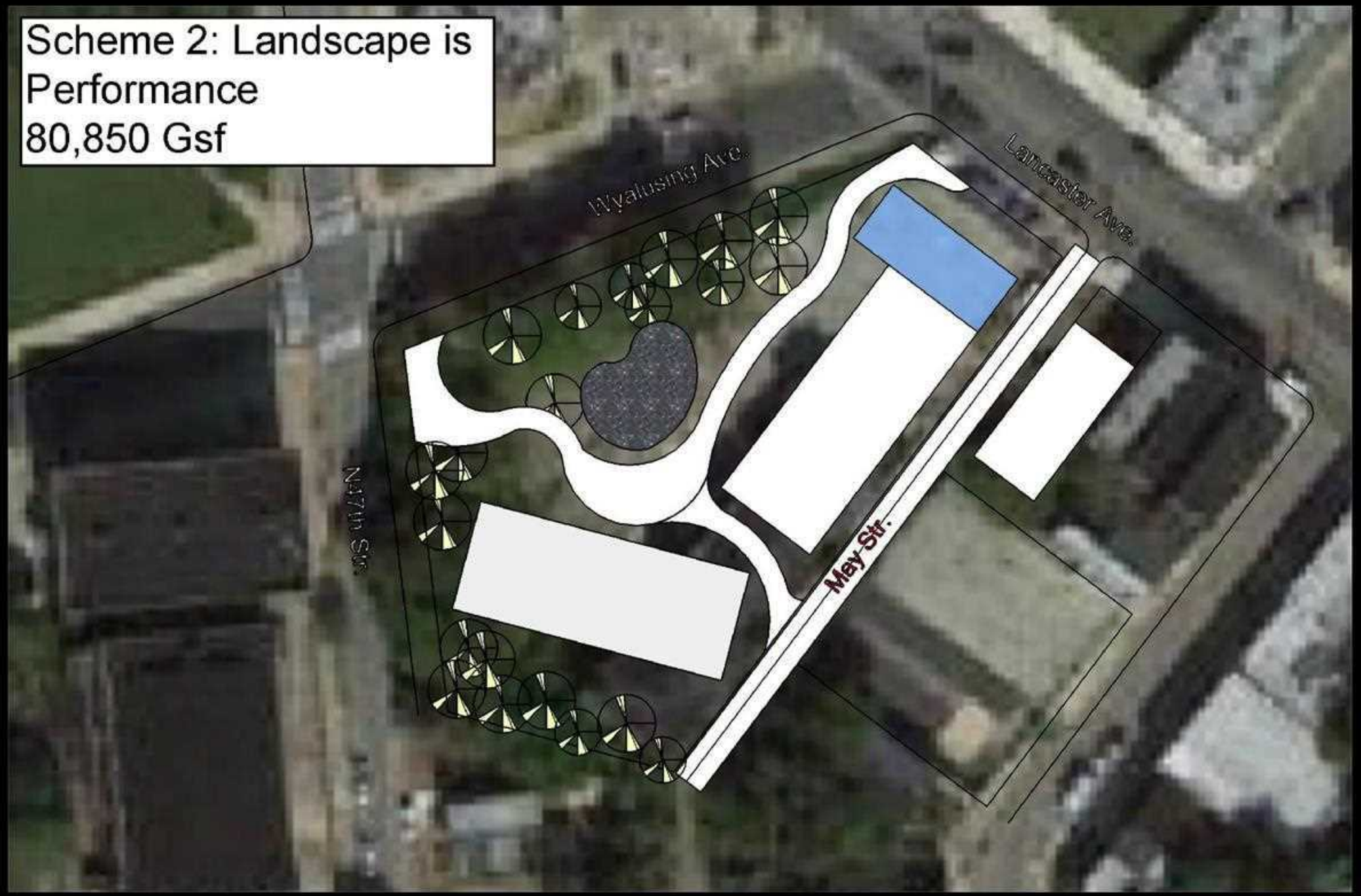
Culture
Belonging

Growth
Embrace
Diversity

Guiding Principles (selected from list)

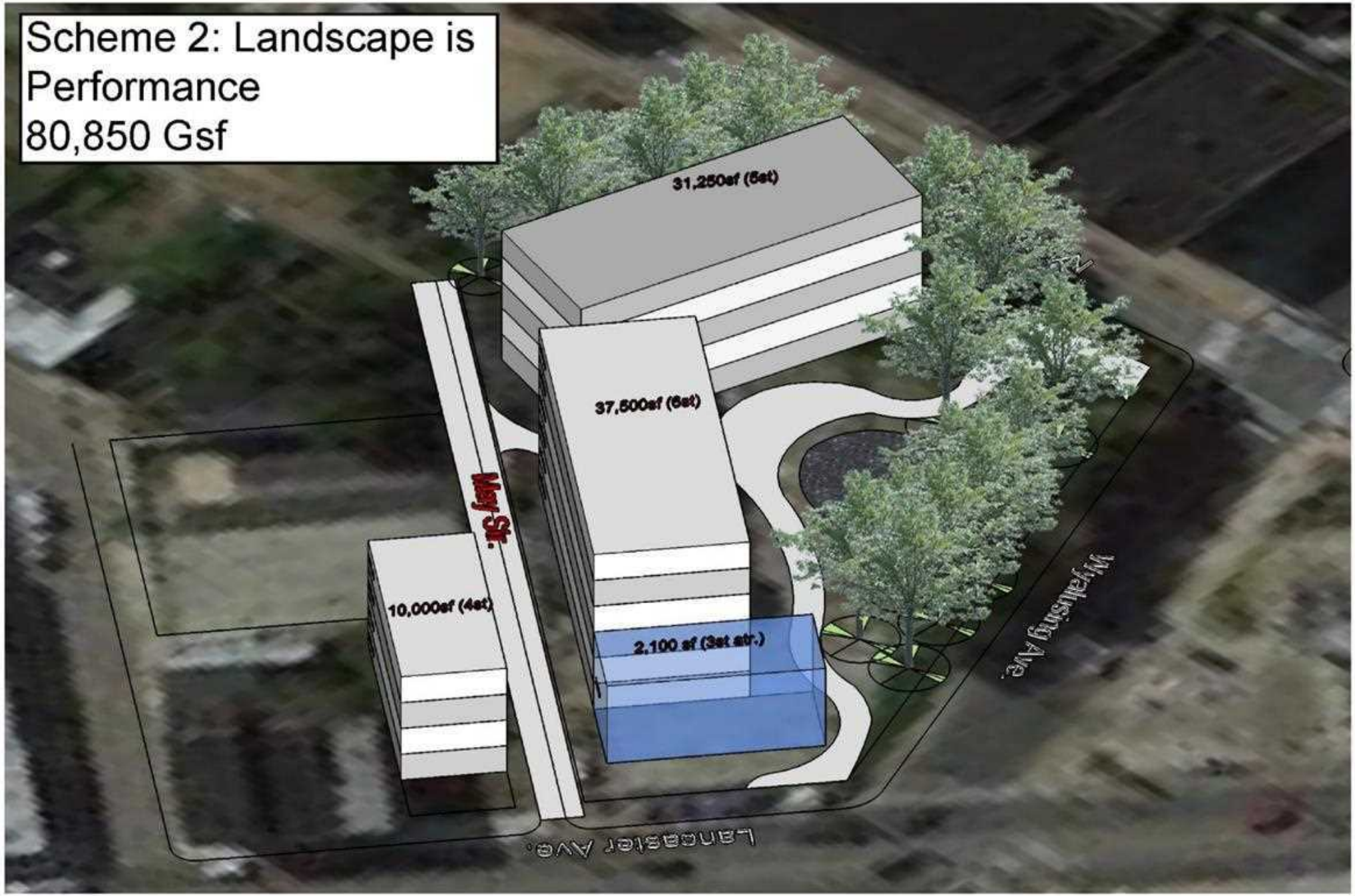
1. Foster and nurture a positive civic and cultural celebration in the Mill Creek and the surrounding local community.
2. Reflect artistic and technical innovation and cultural growth of the community through the design of the center.
3. Enable the center to aid in the children achieving the highest level of education and wellbeing possible.
4. Stimulate, revitalize, and sustain the local creative independent economy and ensure benefits to the community.

EVOLUTION OF A SCHEME



Original Scheme 2

Original Scheme 2



Original Scheme 2 Analysis

CONSTRAINTS
PARKING
NO VIEW AT REAR
NOISE
BUILDING ORIENTATION
DIRECT EXPOSURE TO WINTER WINDS
SECURITY

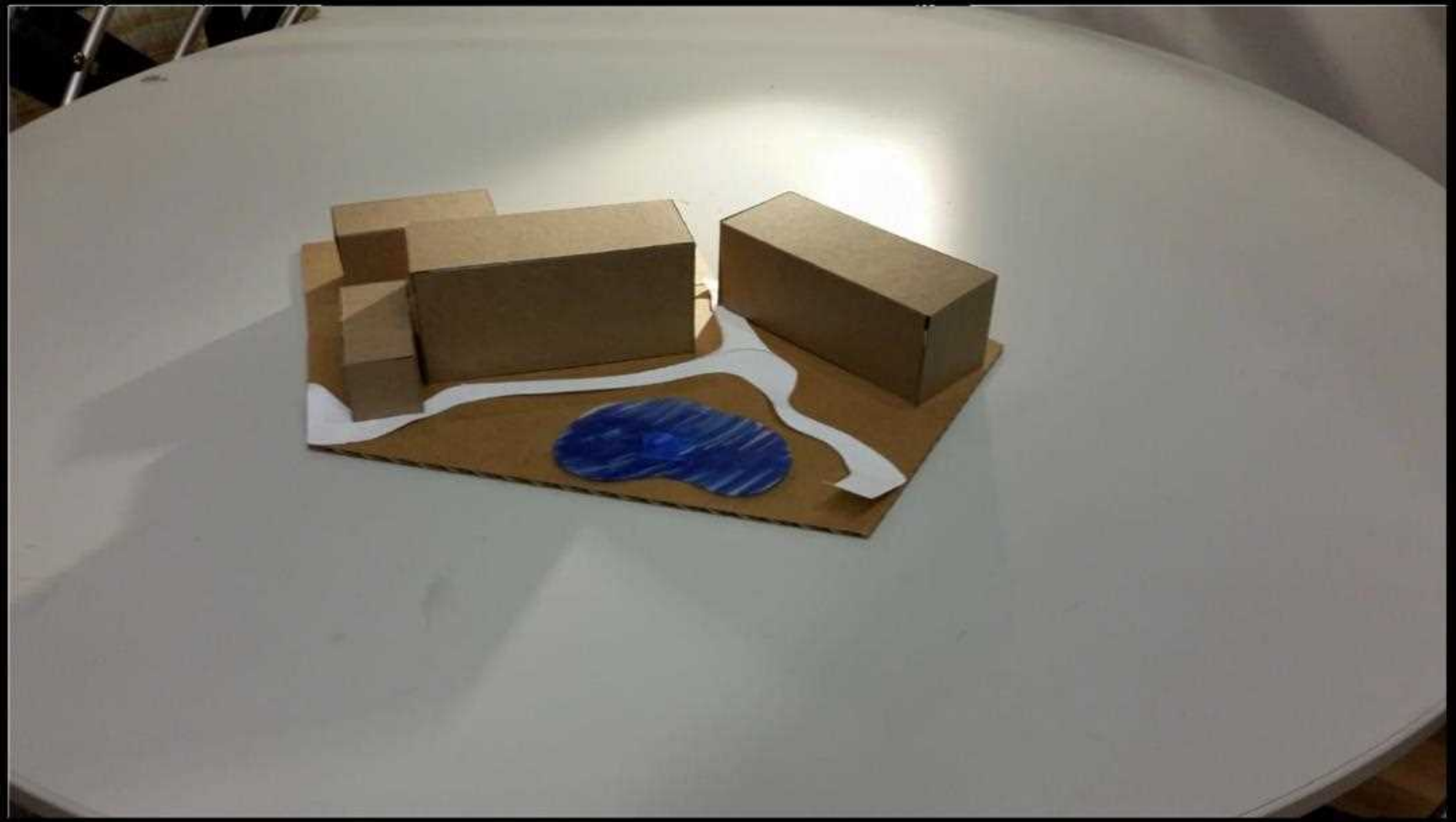
OPPORTUNITIES
OPEN TO COMMUNITY
GOOD CONNECTION
GOOD VIEW
LARGE OPEN AREA
ECOLOGICAL ZONE
HANDLE RAIN WATER

Summer Solstice

Shadows cast at noon on first day of Summer are the shortest

Winter Solstice

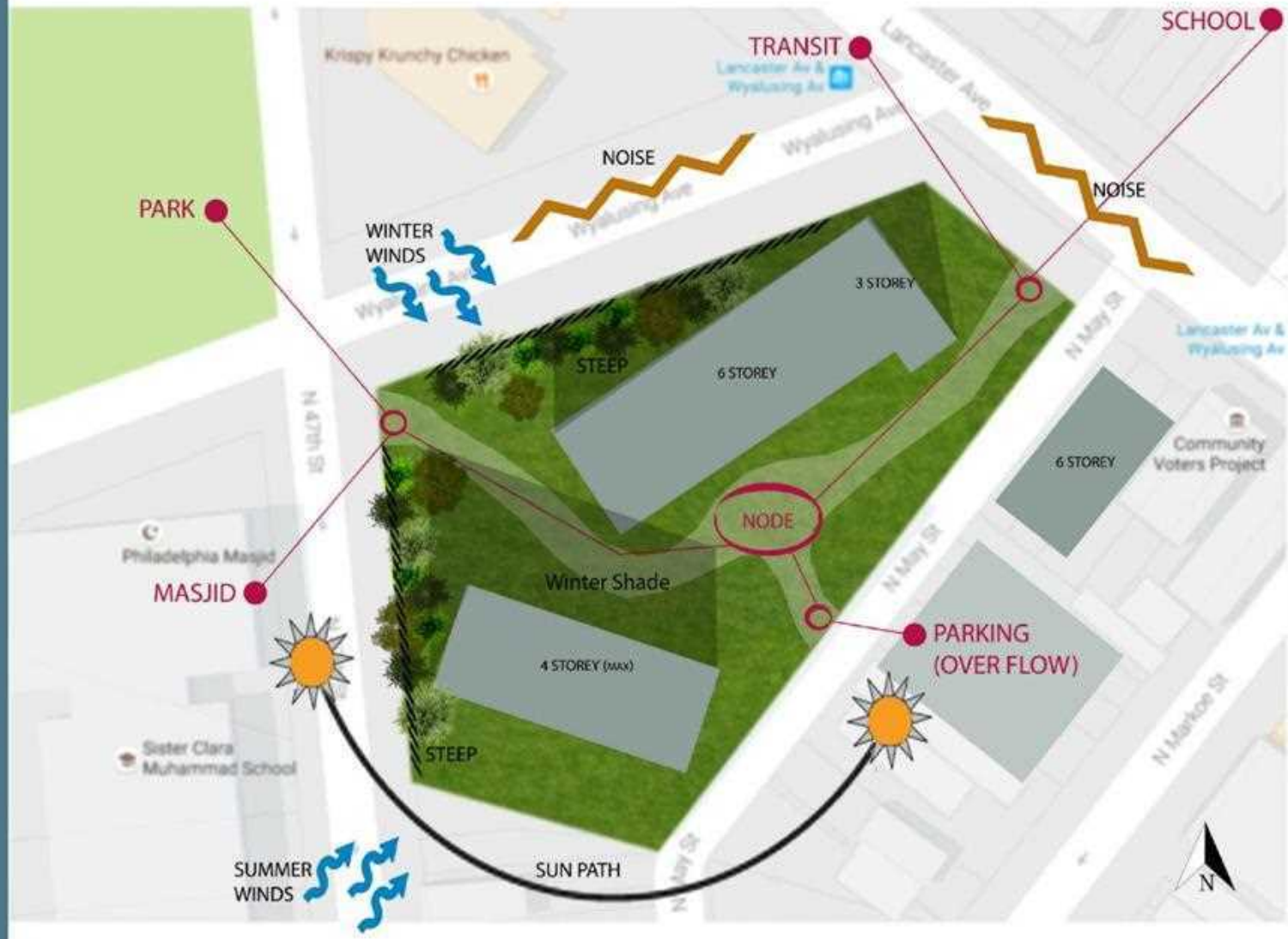
Shadows cast at noon on first day of Winter are the longest



TOO MUCH SHADE?

LET'S FLIP IT.

Original Scheme 2 Flipped

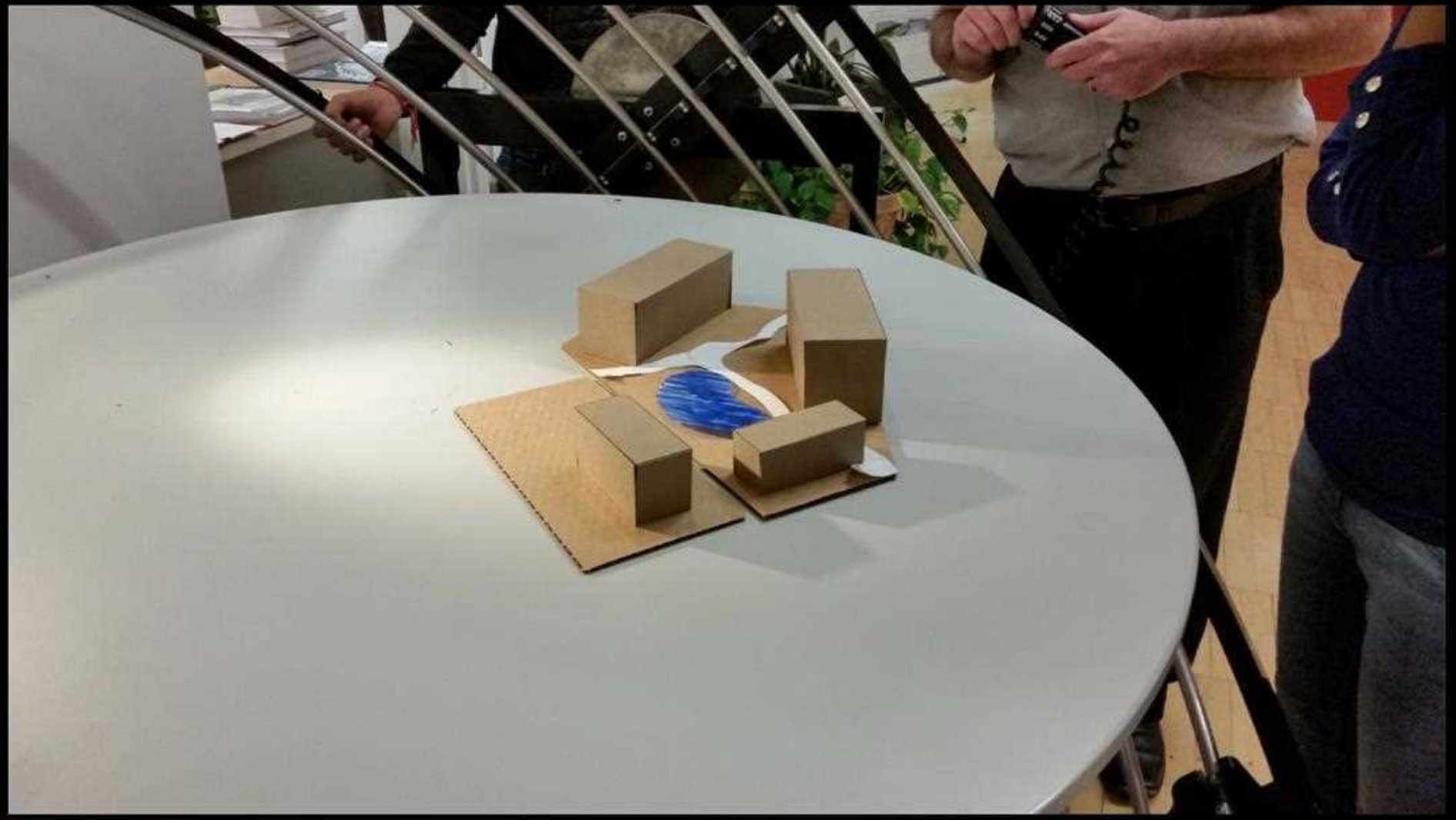


CONSTRAINTS
NOISE 2 SIDES
BUILDING ON THE STEEP SIDES
LESS DIRECT CONNECTION TO THE TROLLEY

OPPORTUNITIES
GOOD CONNECTION TO PARK, SCHOOL, MOSQUE
CENTRAL OPEN AREA
MORE SOUTHERN EXPOSURE
MAY ST. IS MORE ACTIVE/ SECURE
BETTER CONNECTION TO OVER FLOW PARKING
VIEWS ON BOTH SIDES OF 6 STORY BUILDING
OPEN TO SUMMER WINDS
CLOSED TO WINTER WINDS
3 BUILDINGS RELATE TO EACH OTHER

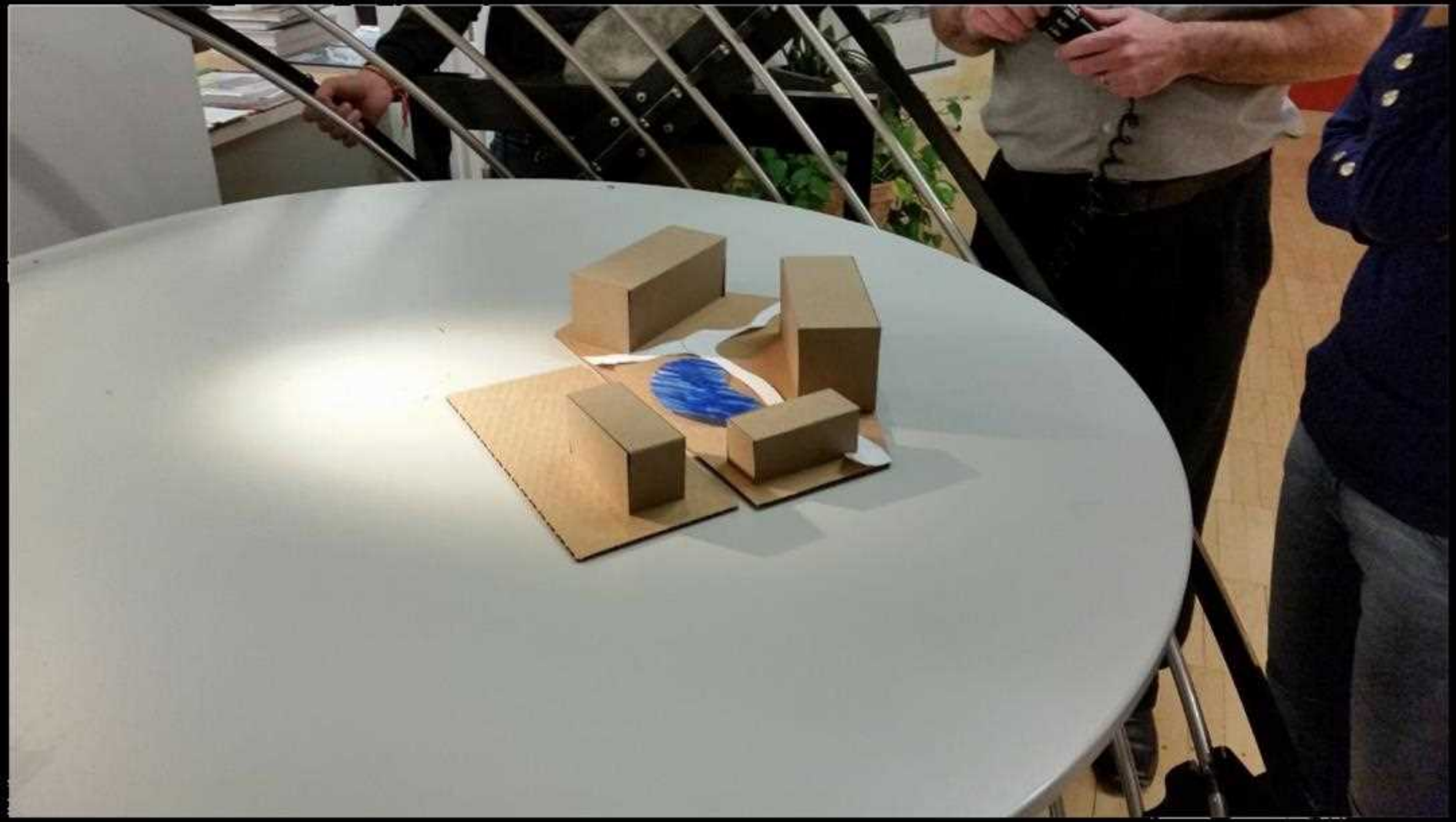
Summer Solstice

There is less shade with Scheme 2 flipped.



Winter Solstice

There is less shade with Scheme 2 flipped.



MAKING ROOM FOR THE SUN

New Scheme 2 Analysis

CONSTRAINTS
NO DIRECT CONNECTION TO THE TROLLEY

OPPORTUNITIES
GOOD CONNECTION TO PARK, SCHOOL, MOSQUE
CENTRAL OPEN AREA
MORE SOUTHERN EXPOSURE
MAY ST. IS MORE ACTIVE/ SECURE
BETTER CONNECTION TO OVER FLOW PARKING
VIEWS ON BOTH SIDES
OPEN TO SUMMER WINDS
CLOSED TO WINTER WINDS
3 BUILDINGS RELATE TO EACH OTHER

Summer Solstice

Early SketchUp

Model.

Winter Solstice

Early SketchUp

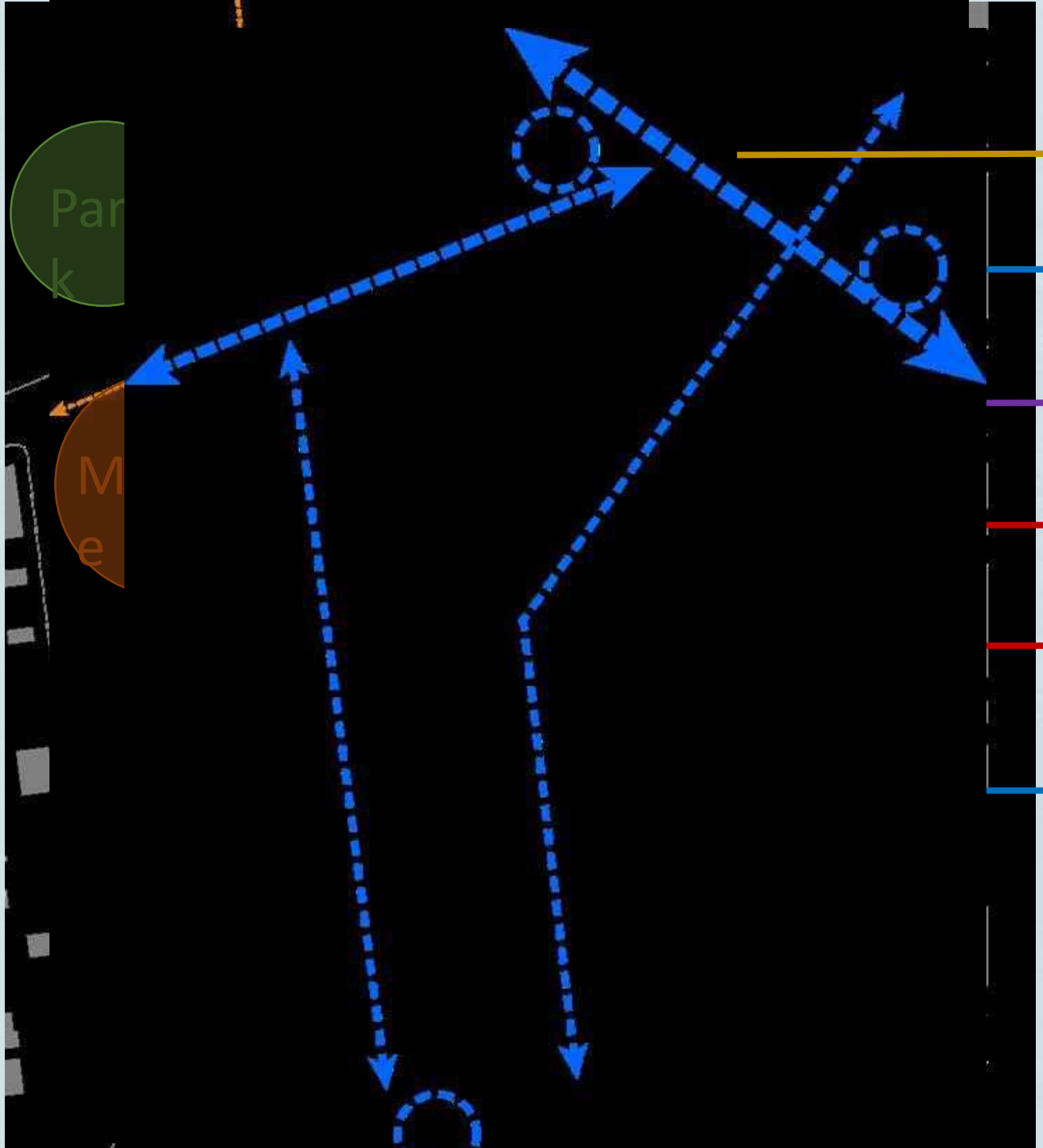
Model.

Project Goals

- Create a dynamic environment to Engage with the neighborhood Community through landscape & buildings.
- Enable the site to Nurture and Connect the people in its Community
- Attain LEED PLATINUM rating
- Eliminate 80% or more of Potable water usage
- Building EUI's less than or equal to 30

EXISTING ITE

Existing Site Analysis



Noise

Mass Transit Stop

High Point

Insecure, Secluded, Crime

Unwanted Activities

Path To School

PROPOSED SITEPLAN

Site

Site Plan

Landscape plan provided by Evan McNaught & Rachel Meier

Site Plan


Park
Wyalusing Ave
Art, Retail, Residential
Lancaster Ave.
Amphitheater
Plaza
Restaurant
Mosque
47th Street
Theater, I.T., Classes
Overflow Parking

Site Plan

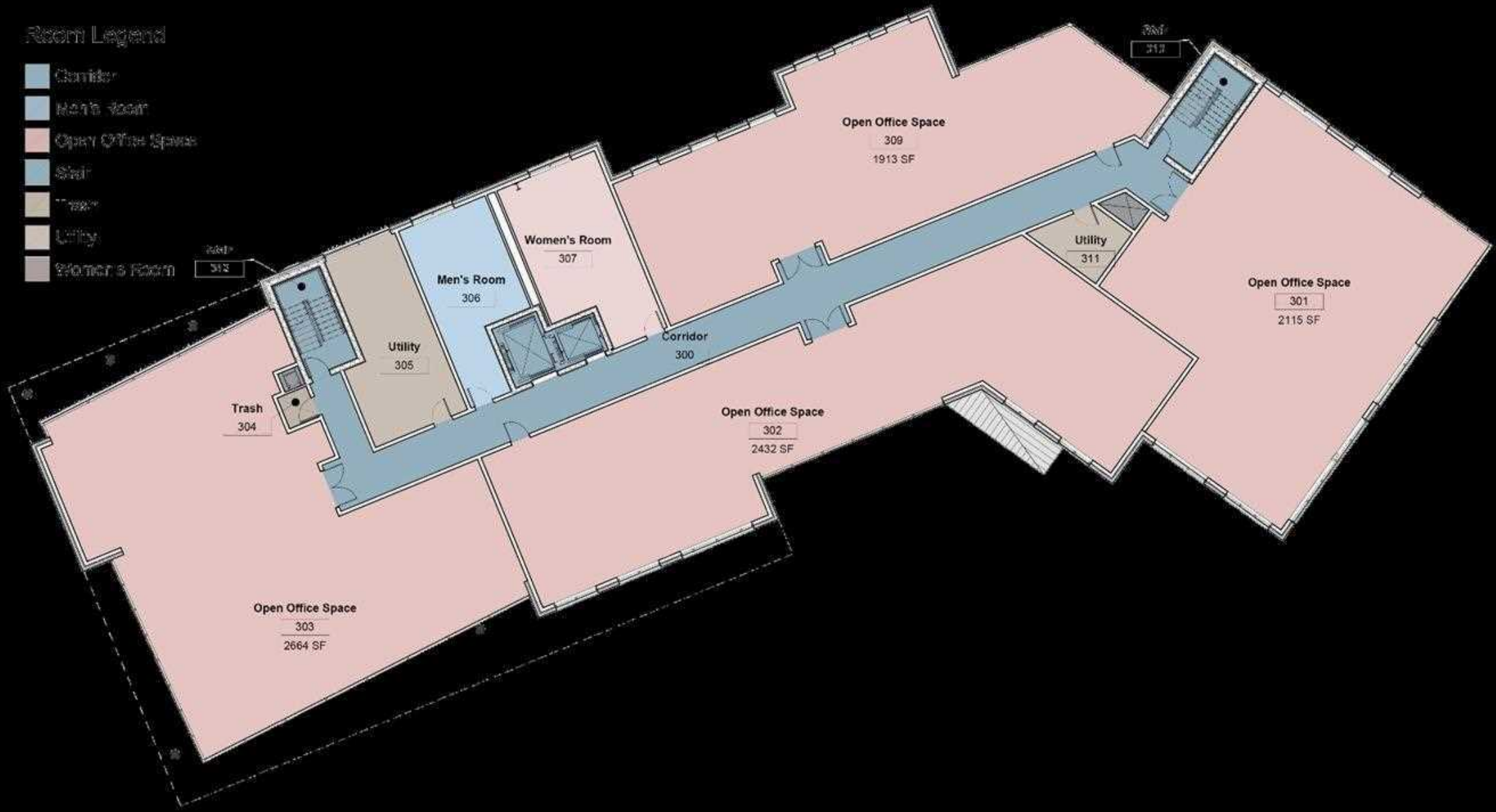

Park
Wyalusing Ave
Art, Retail, Residential
Lancaster Ave.
Amphitheater
ACTIVE
Plaza
Restaurant
Mosque
47th Street
ACTIVE
Overflow Parking
Theater, I.T., Classes

Art Studio & Gallery, Commercial,
Retail, Residential

Basement Plan


Lobby
100
Retail
104
1333 SF
Retail
102
1541 SF
Women's Room
113
Men's Room
112
Art Studio
111
Art Studio
109
Corridor
115
Resource Center
121
645 SF
Flex Space
101
1005 SF
Cafe
103
372 SF
Art Studio
105
Art Studio
106
Art Studio
107
Gallery
110
1430 SF
Gift Shop
108
549 SF
UP
UP
UP
UP
DN

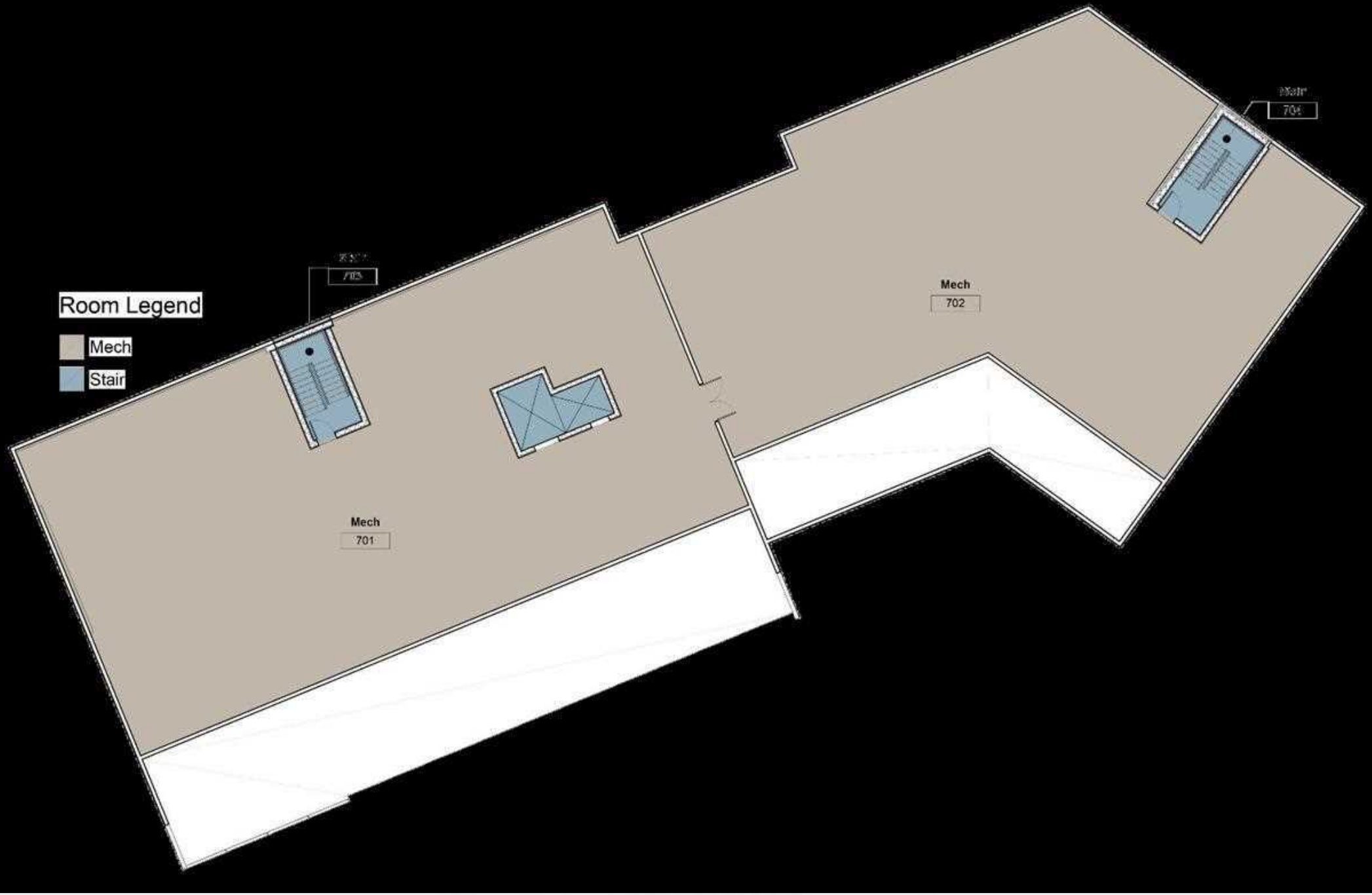
Second Floor Plan


Room Legend
Corridor
Men's Room
Open Office Space
Stair
Trash
Utility
Women's Room
Open Office Space
309
1913 SF
Women's Room
307
Men's Room
306
Utility
305
Trash
304
Corridor
300
Utility
311
Open Office Space
301
2115 SF
Open Office Space
302
2432 SF
Open Office Space
303
2664 SF


Room Legend
Corridor
Elev.
Laundry
Studio
Mech
Trash
One Bedroom
Two Bedroom
Roof Terrace
Two Bedroom
401
Studio
402
Trash
417
Two Bedroom
403
One Bedroom
404
Studio
405
451 SF
One Bedroom
406
Studio
407
Two Bedroom
408
Corridor
400
Two Bedroom
412
Laundry
411
Mech
410
One Bedroom
409
Roof Terrace
420
906 SF
One Bedroom
413
One Bedroom
414
One Bedroom
415
One Bedroom
416


Corridor
500
Studio
502
Trash
518
Two Bedroom
503
One Bedroom
504
Studio
505
One Bedroom
506
Studio
507
Studio
508
Lounge
509
Mech
511
Laundry
512
One Bedroom
510
Two Bedroom
513
Two Bedroom
501
One Bedroom
514
One Bedroom
515
One Bedroom
516
One Bedroom
517


Room Legend
Corridor
Laundry
Lounge
Mech
One Bedroom
Stair
Studio
Trash
Two Bedroom
Studio
608
Studio
607
One Bedroom
606
712 SF
Lounge
610
Studio
605
462 SF
One Bedroom
604
Mech
612
Laundry
613
Two Bedroom
603
Two Bedroom
614
One Bedroom
611
Studio
602
Corridor
600
Trash
619
Two Bedroom
601
One Bedroom
615
One Bedroom
616
One Bedroom
617
One Bedroom
618


Room Legend
Mech
Stair
Mech
701
Mech
702
Stair
704

Southeastern Perspective

Northwestern Perspective

Southwestern Perspective

Southern Perspective

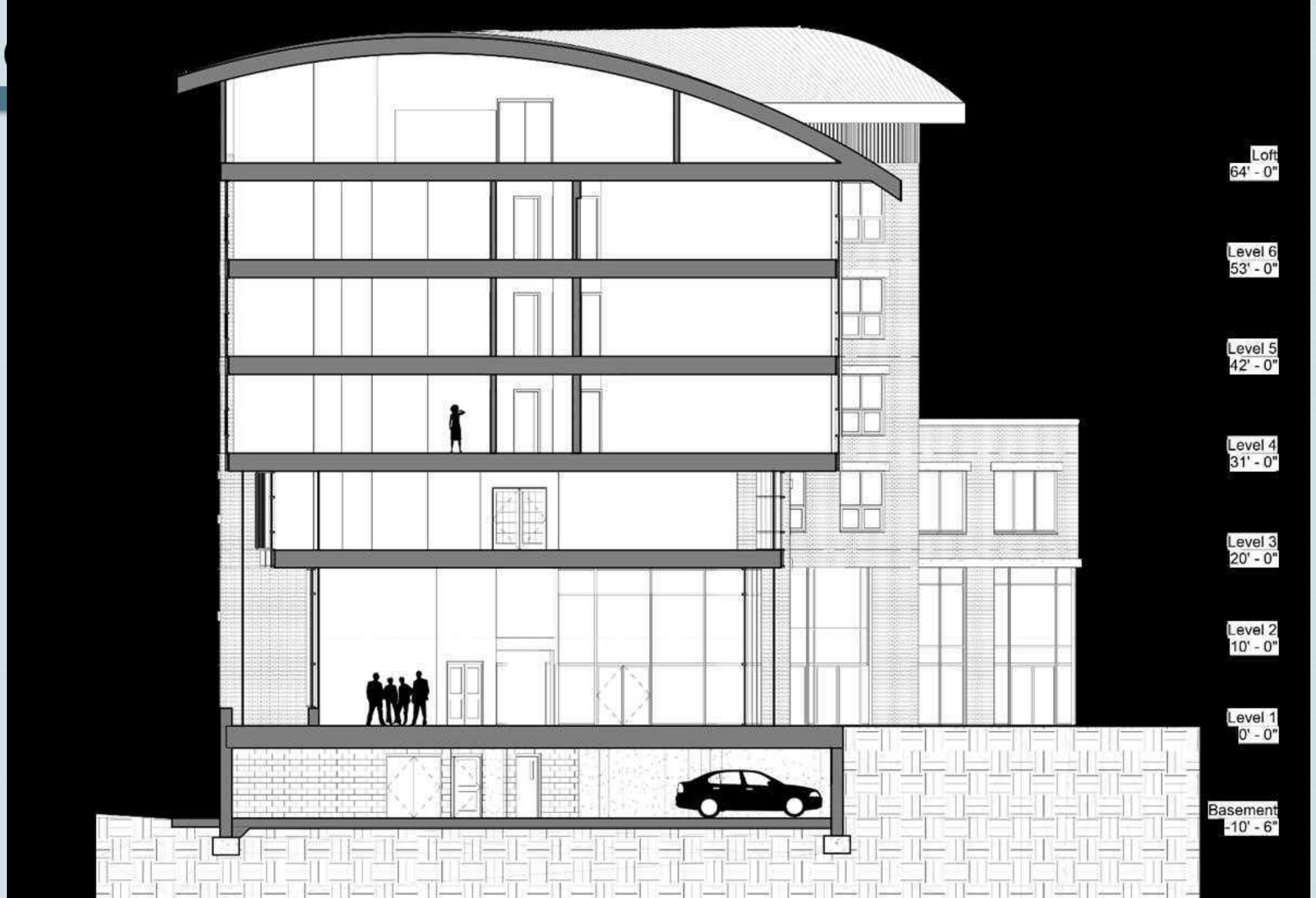
Sun Screen

http://www.chandleraz.gov/default.aspx?pageid=73

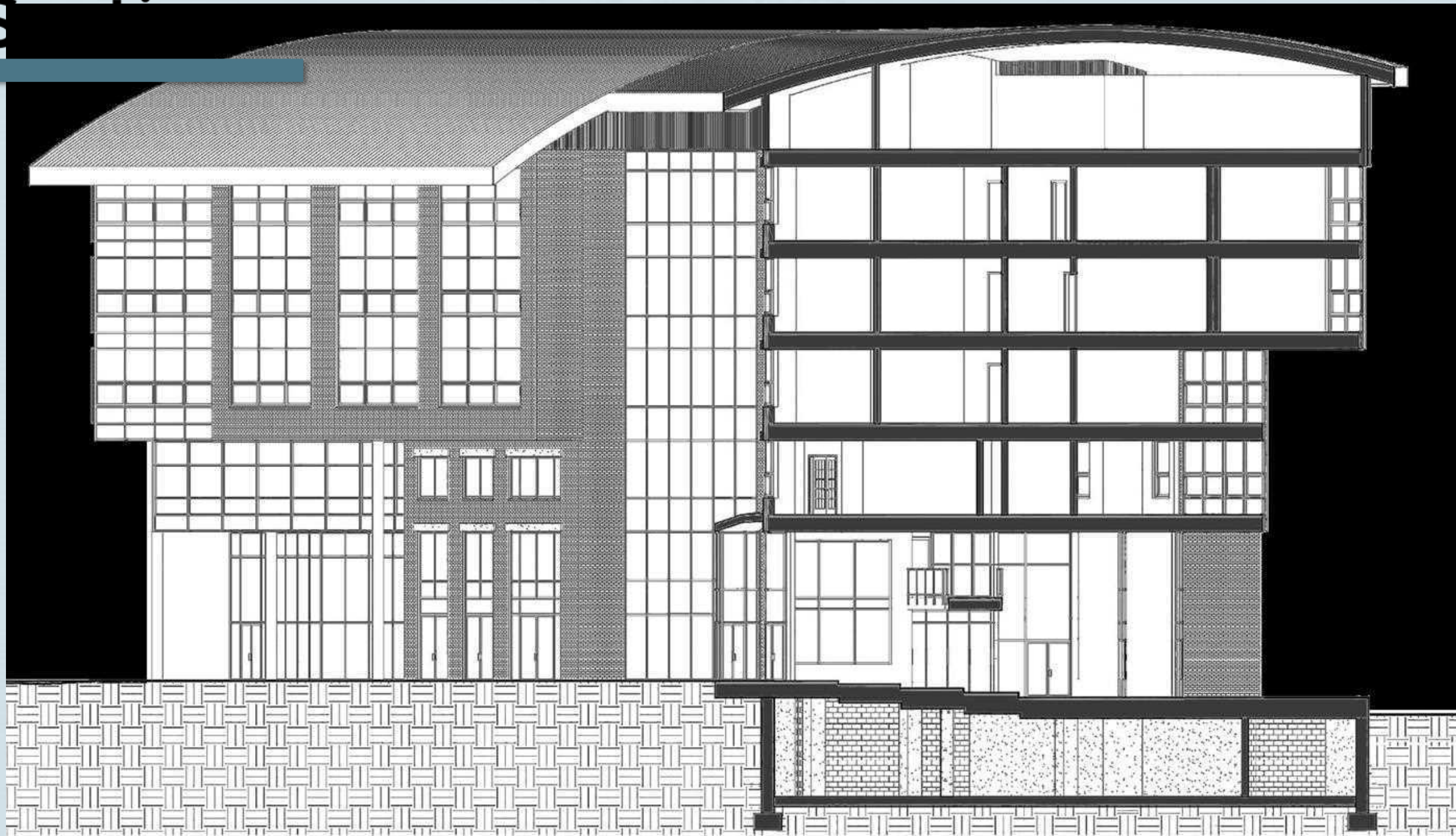
http://www.highresmediallc.com/commercial/chandler-city-hall/

Chandler City Hall Western Façade – “Turbulent Shade”

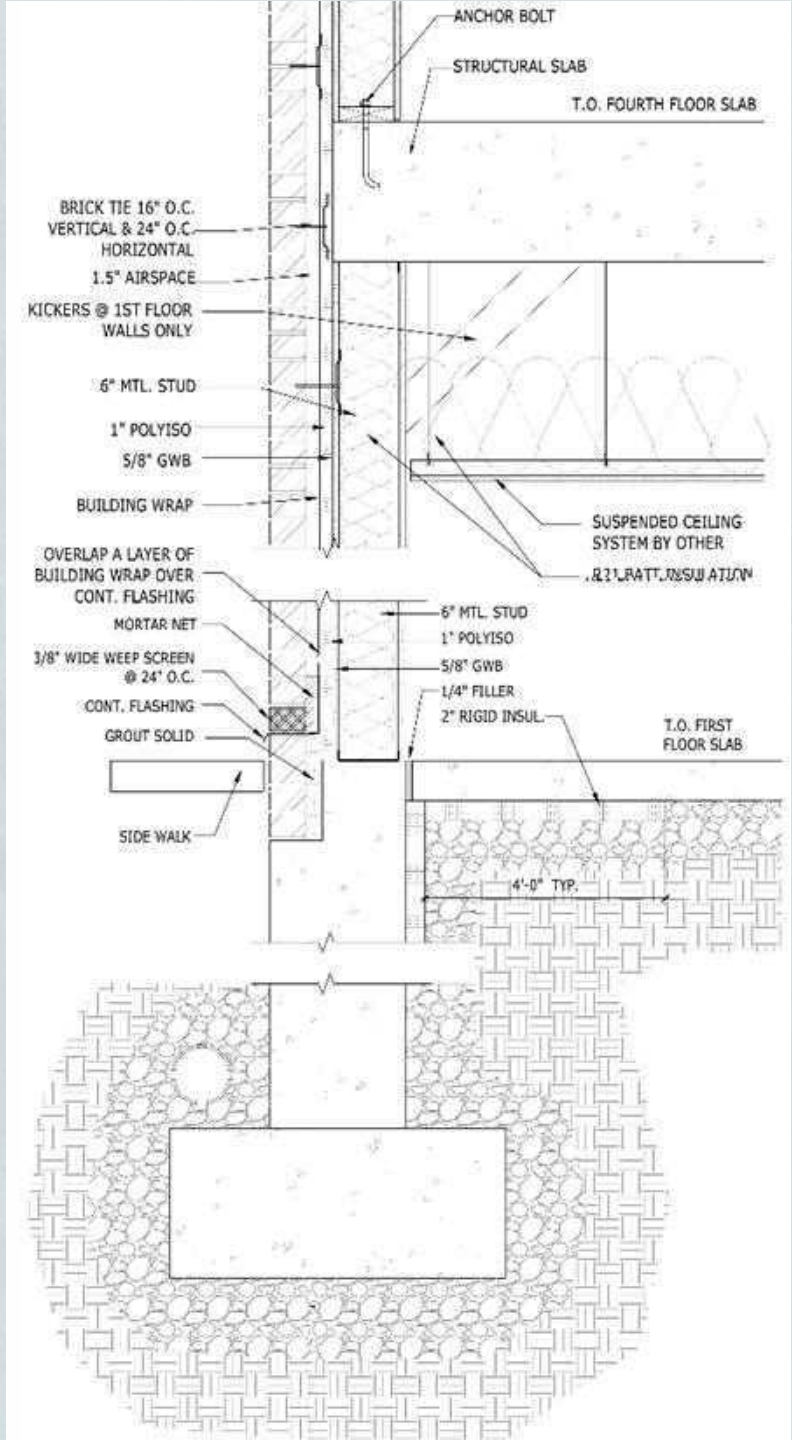
Secti

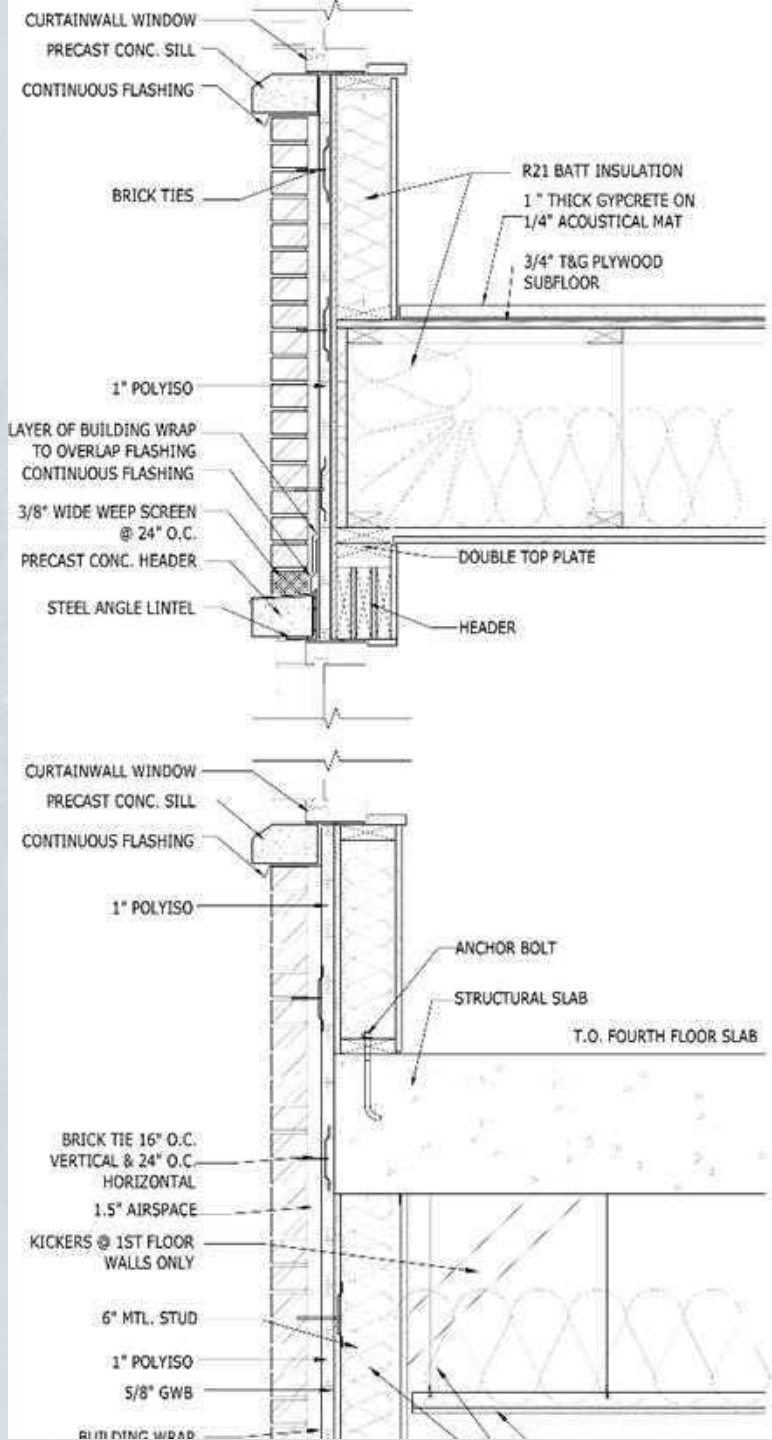

Loft
64' - 0"
Level 6
53' - 0"
Level 5
42' - 0"
Level 4
31' - 0"
Level 3
20' - 0"
Level 2
10' - 0"
Level 1
0' - 0"
Basement
-10' - 6"

S



Wall Section





Performing Arts & Technology


Electrical Room
001
1038 SF
Trash
002
332 SF
Mechanical Room
003
778 SF

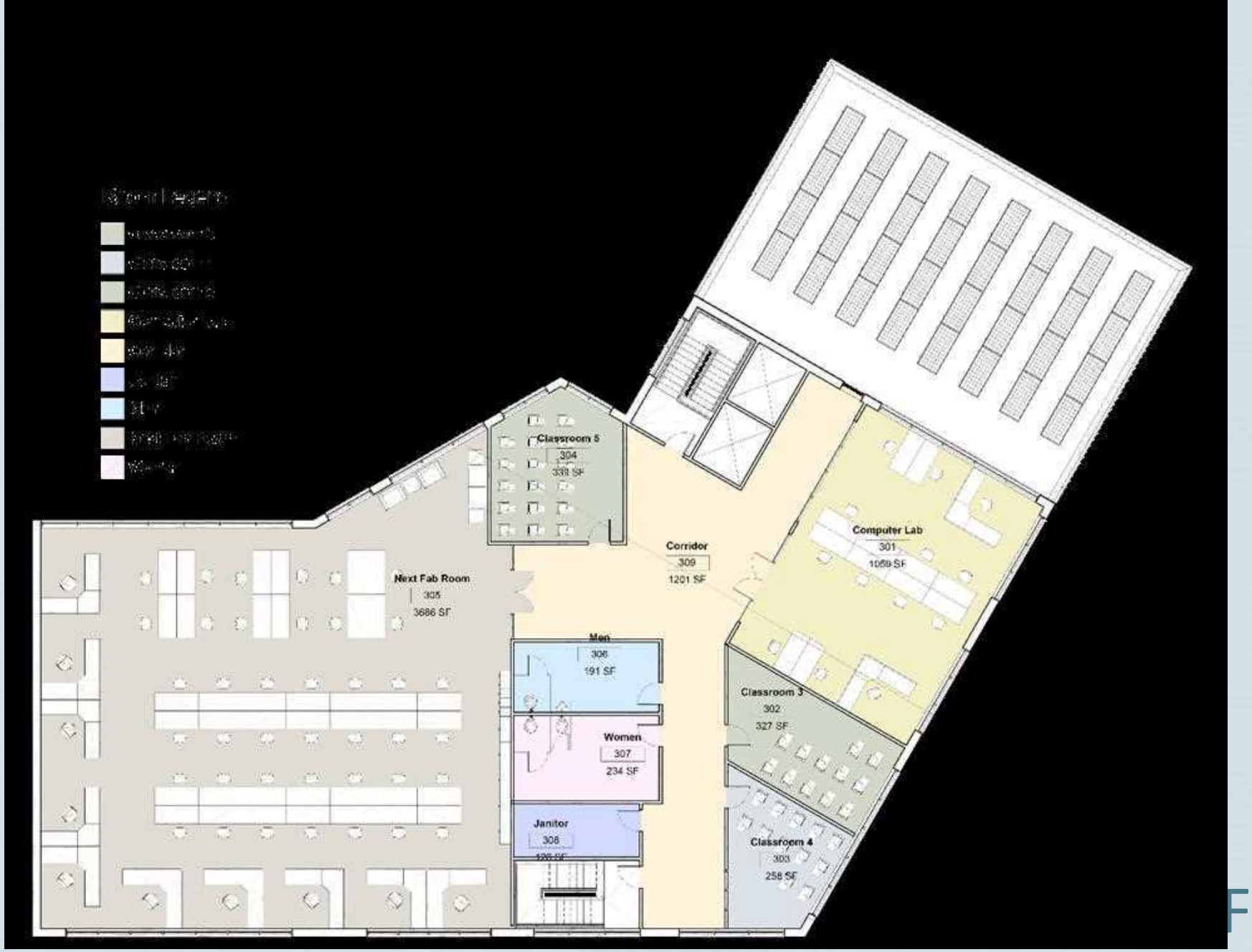
nent Plan


Theater/Multi functional
101
1994 SF
Washroom 1
102
283 SF
Lobby
100
2128 SF
Adminstration
109
2047 SF
Washroom 2
103
260 SF
Dressing Room
106
497 SF
Men
104
191 SF
Production
108
1050 SF
Women
105
234 SF
Storage
107
593 SF
Janitor
108
126 SF

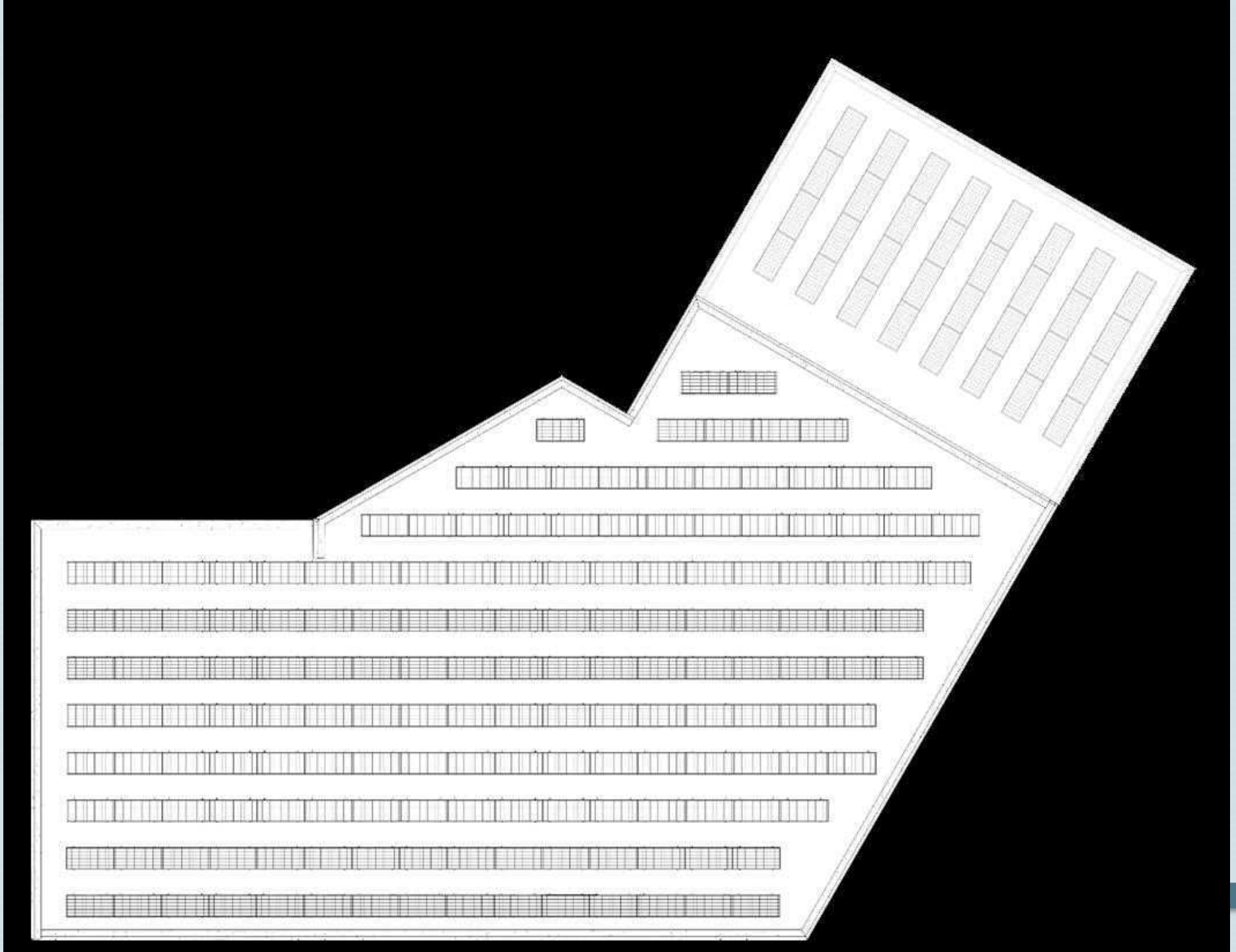
loor Plan


2 Story Multipurpose/Theater
Open to Below
IT Innovation
201
3831 SF
Corridor
208
1237 SF
Library
204
1061 SF
MER
202
191 SF
Women
203
234 SF
Janitor
207
126 SF
Classroom 1
205
327 SF
Classroom 2
206
258 SF

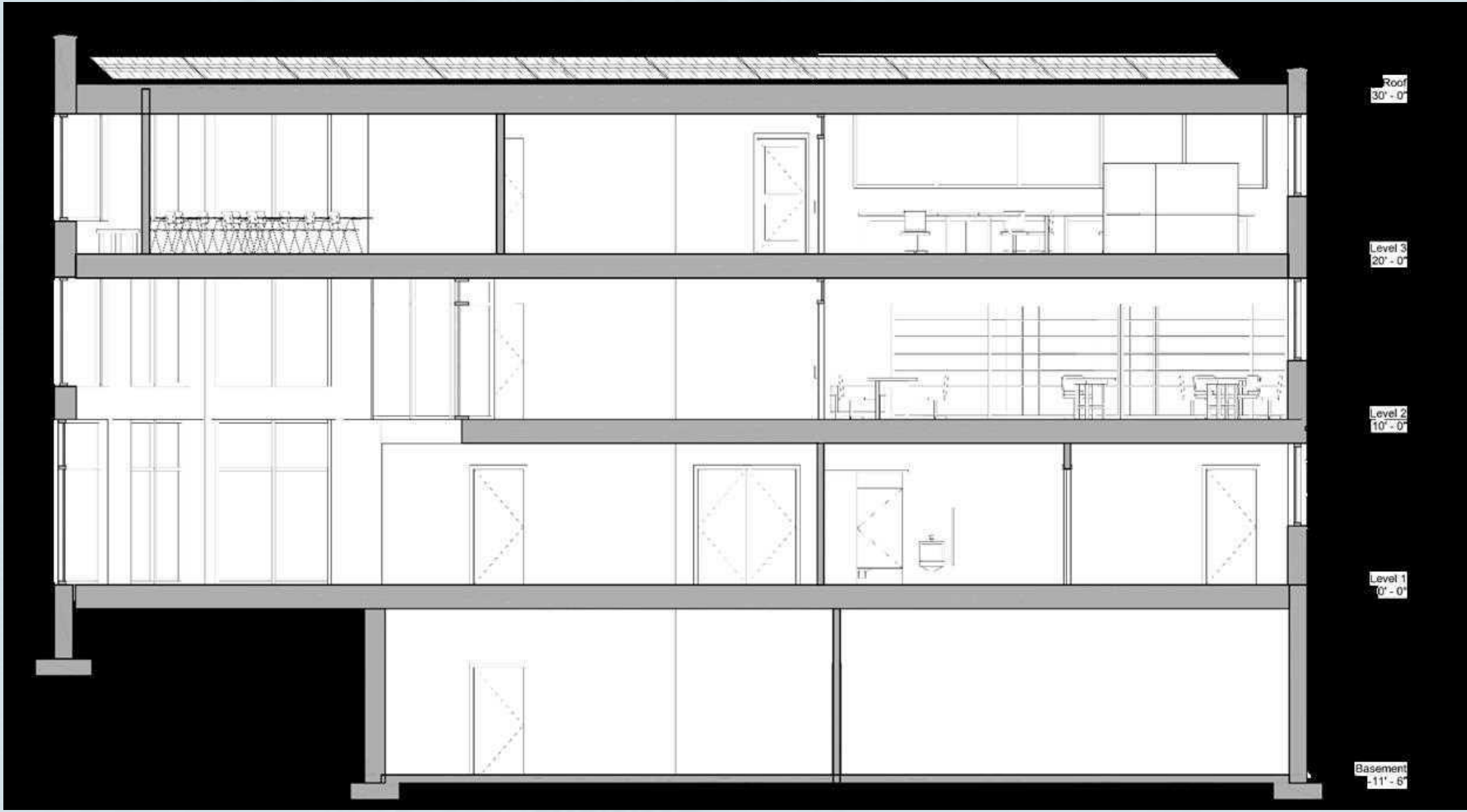
d Floor Plan


Classroom 5
304
338 SF
Corridor
309
1201 SF
Computer Lab
301
1059 SF
Next Fab Room
305
3686 SF
Men
306
191 SF
Women
307
234 SF
Janitor
308
Classroom 3
302
327 SF
Classroom 4
303
258 SF

Floor Plan



Building Section



Building Section

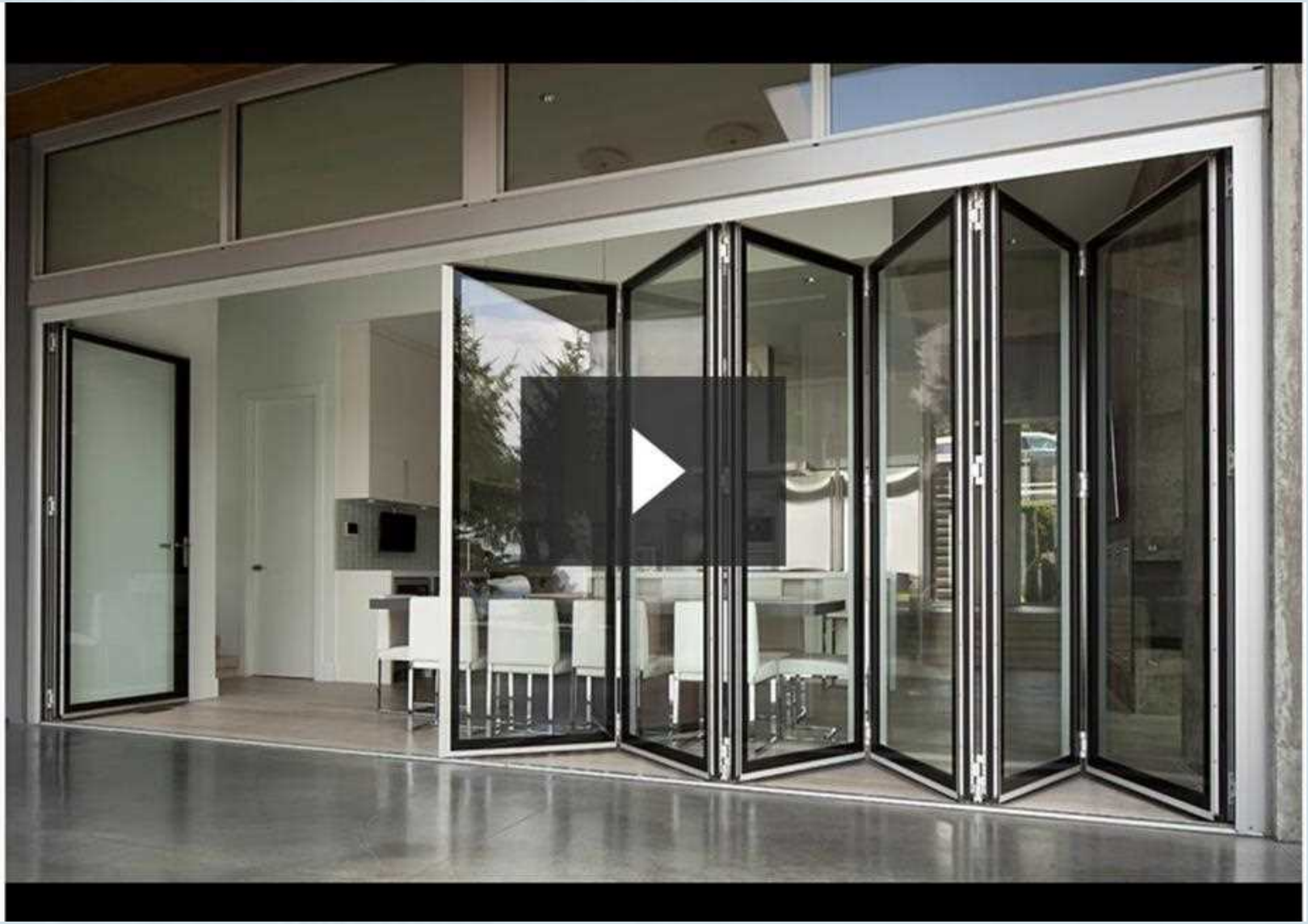
Northern Perspective

Courtyard Perspective

Southern Perspective

Operable/Folding Glass Wall

Folding Glass Walls are connected by bi-fold door panels at Exterior of Art Studios & Multipurpose/ Theater

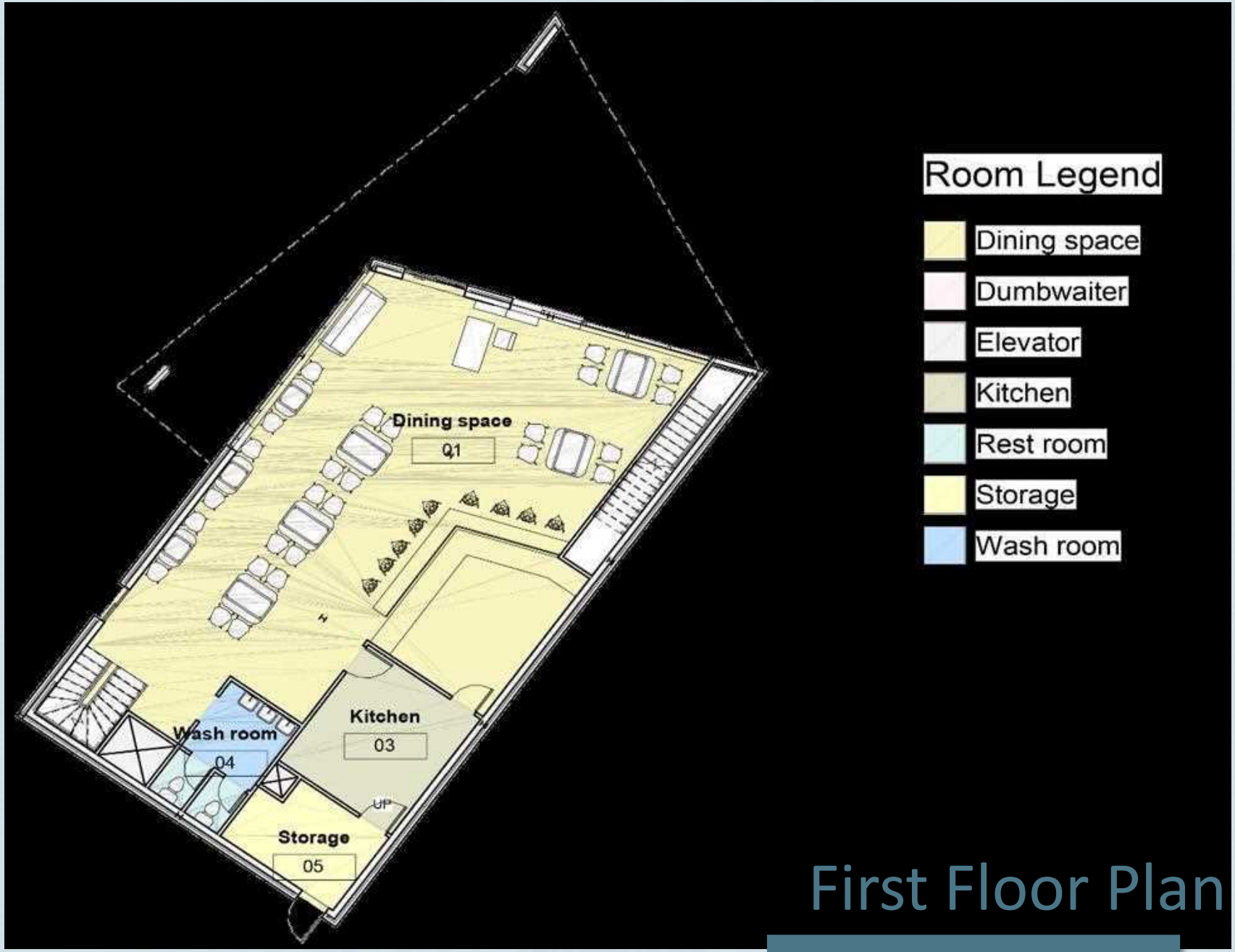


https://www.nanawall.com/

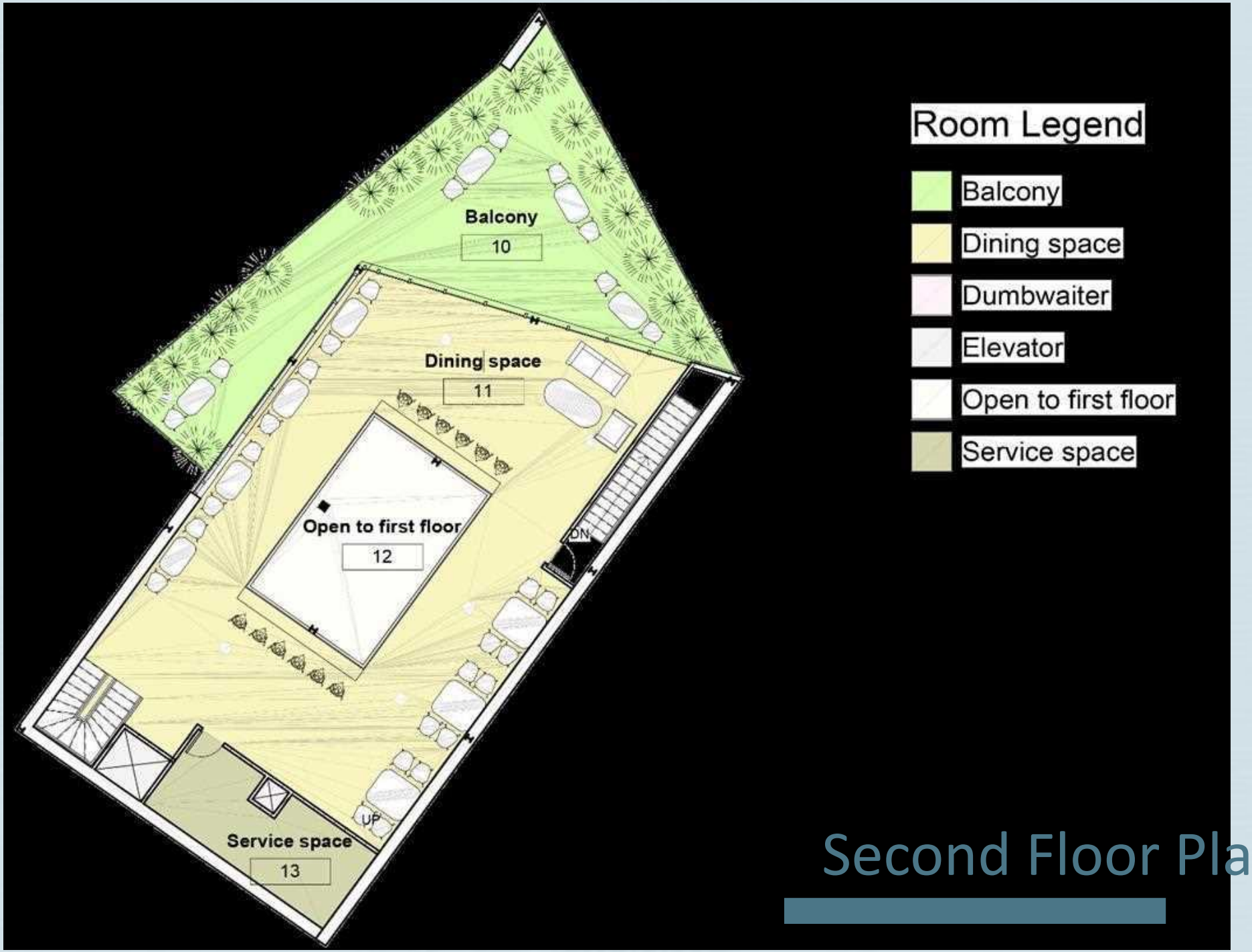
Restaurant

by Mrudula Mrudu

Basement Plan



First Floor Plan



Second Floor Plan

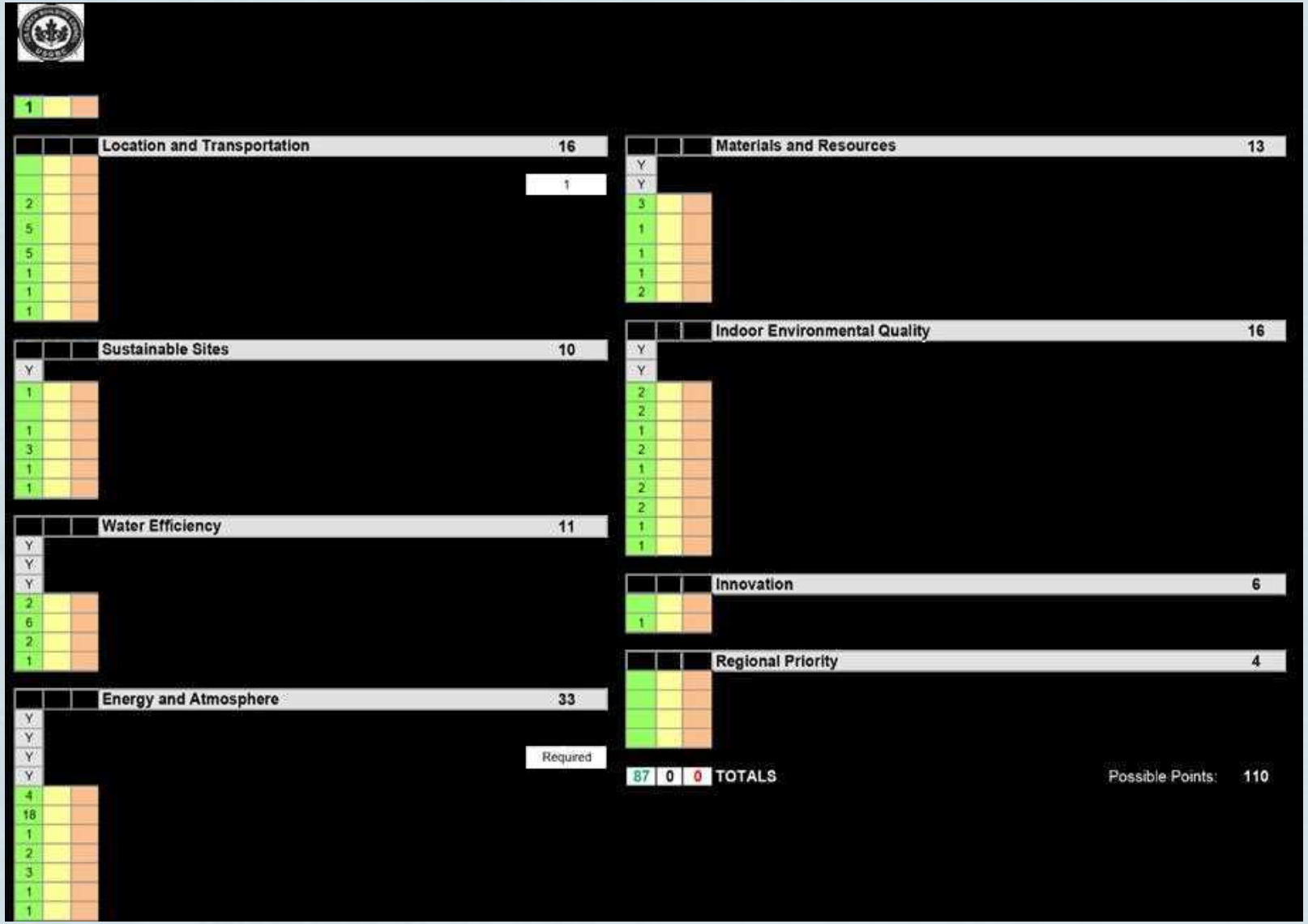
Northern Perspective

Northwestern Perspective

Building Systems

LEED V4 Platinum

- Location and Transportation
- Sustainable Site
- Water and Energy Efficiency
- Material and Resources

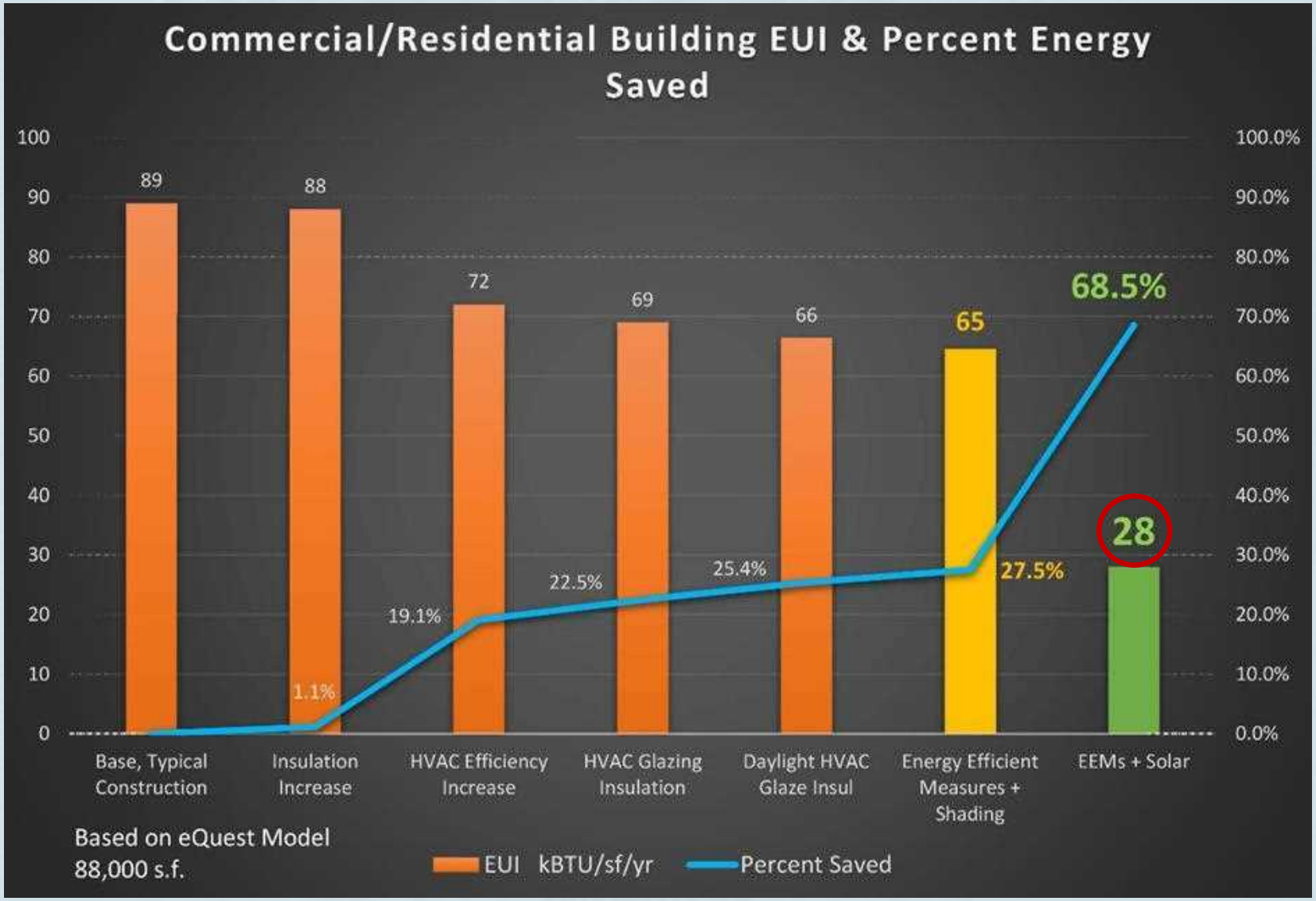


Building Systems- Energy

Energy Usage - Site Energy Efficiency Measures

1. Low U-value and solar heat gain coefficient on all glazing.
2. White roofs.
3. Operable Windows for Residential Units & Restaurant
4. Underfloor HVAC system for Non-Residential Spaces.
5. Screens and other Sun Shading devices to reduce cooling loads.
6. High Efficiency HVAC system.
7. Increases Insulation value of walls & roofs.
8. Daylighting controls for Non-Residential Spaces to reduce Artificial Lighting Use.
9. Solar Panel Arrays to reduce Electric Grid use

Energy Model - Art, Commercial & Residential



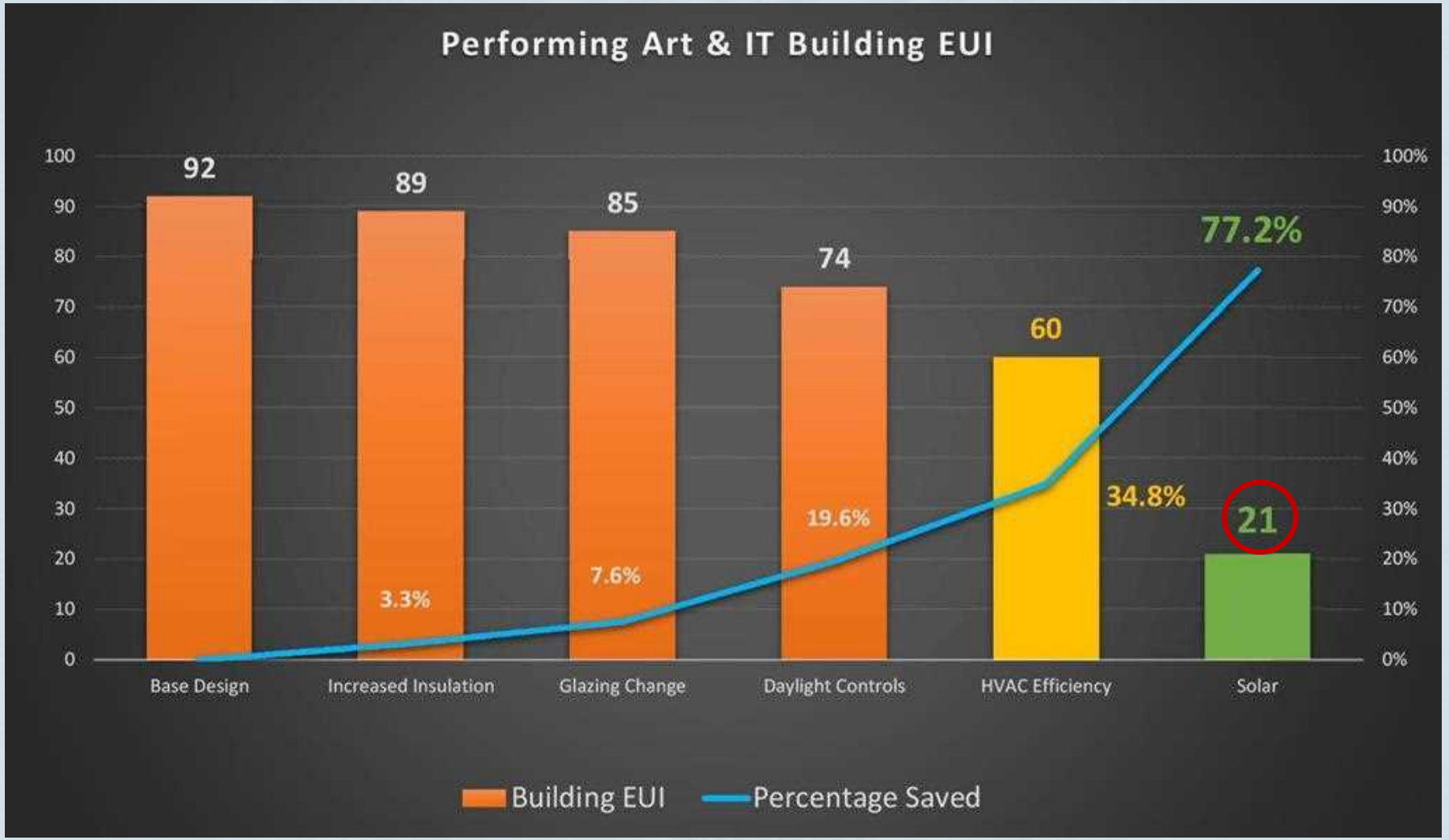
Solar Energy - Art, Commercial & Residential

Potential Site Production			
Avg Sun Peak (S)	Number of Panels by area	Power Produced by panels	
	499 Panels		316,114.5 kwh

Potential Financial & CO2 Savings Compared to other Energy Efficiency Measures			
581,465.0 kwh	316,114.5 kwh	265,350.5 kwh	
$24,143.00	$13,125.38	$11,017.62	
Potential CO2 Emissions Reduction 1kWh = 0.541 kgCO2e			54.37%
314,572.6 kgCO2e	171,017.9 kgCO2e	143,554.6 kgCO2e	
346.76 US Tons CO2	188.51 US Tons CO2	158.24 US Tons CO2	

http://pinington.co.uk/projects/curved-solar-pv-panel-system-new-skills-roof-line/

Energy Model - Performing Arts & IT Technology



Solar Energy - Performing Arts & IT Technology

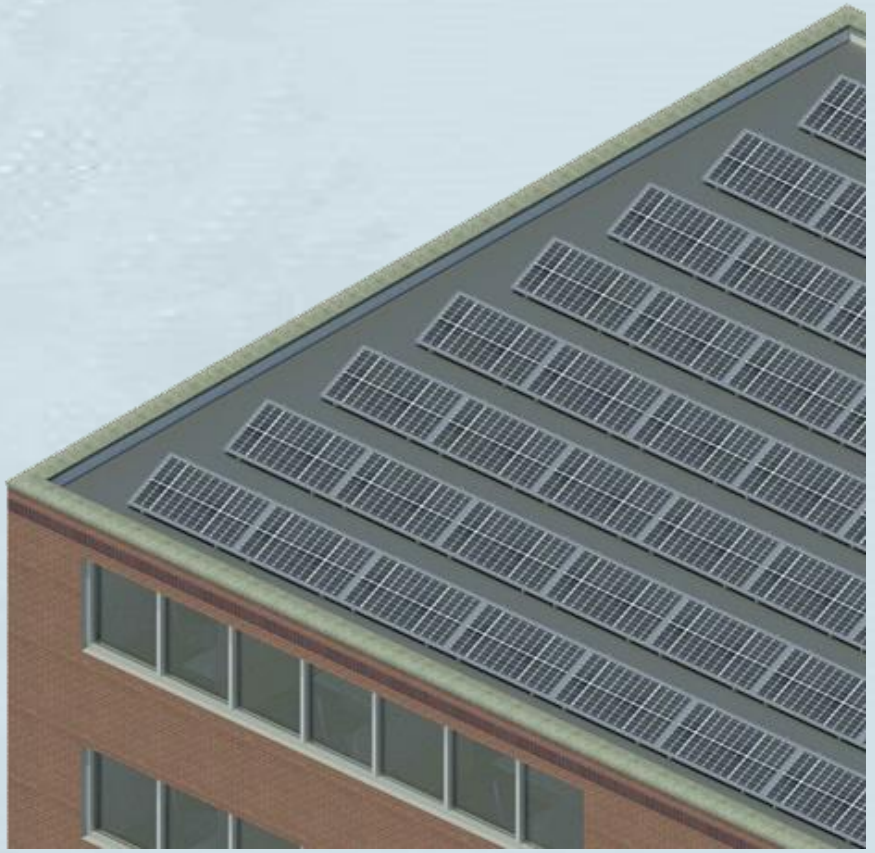
Potential Site Production						
Panel numbers are based on how many panels will fit within a rectangle and not a square that simply using sqft numbers would give.			Number of Panels by area	Roof area (9,912 sf)	Power Produced by panels	Roof Production (K)
Avg Sun Peak (S)	Lat	4.5		P=(bL/pW)*(bW/pL)		
				190 Panels		124,396.2 kwh

Watts per Panel		Panel Size		Building	System Loss =
W=	450 w	pW=	3.432 '	Panels layed out on roof to determine number	0.8858
		pL=	6.780 '		

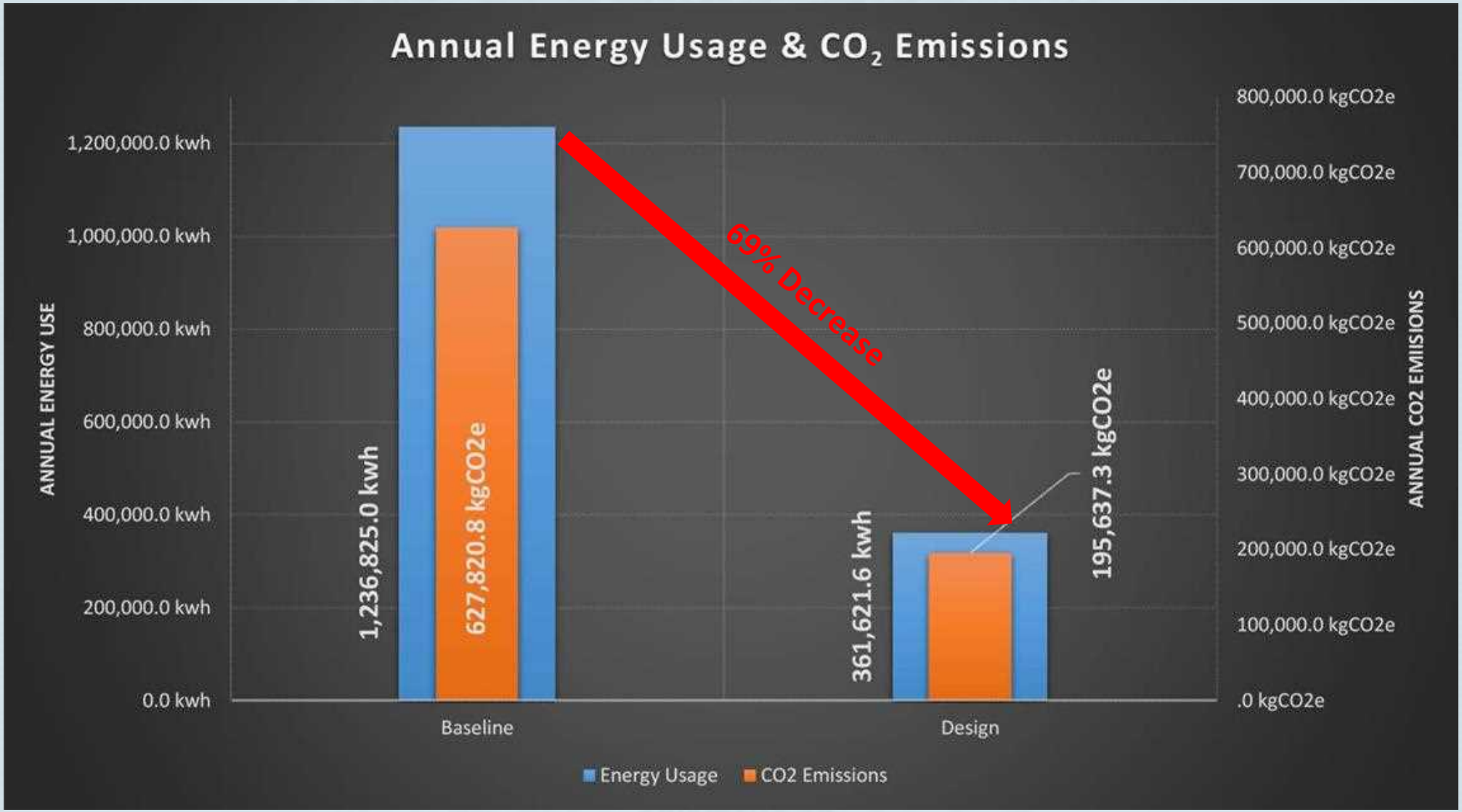
K = (P * W * S * 365 * 0.8858) / 1000

Total annual kWh generated or needed = (# of Panels x Panel Watts x Peak Sun Hours x 365d/yr x system losses) / 1000 W/kW

Potential Financial & CO2 Savings Compared to other Energy Efficiency Measures			
193,279.0 kwh	124,396.2 kwh	68,882.8 kwh	64.36%
$7,972.95	$5,131.47	$2,841.48	
Potential CO2 Emissions Reduction 1kWh = 0.541 kgCO2e			
104,563.9 kgCO2e	67,298.4 kgCO2e	37,265.6 kgCO2e	
115.26 US Tons CO2	74.18 US Tons CO2	41.08 US Tons CO2	



Site Performance – Energy & CO_2 Savings



Building Systems- Water

Water Usage - Site Water Efficiency Measures

Primary Saving Measures

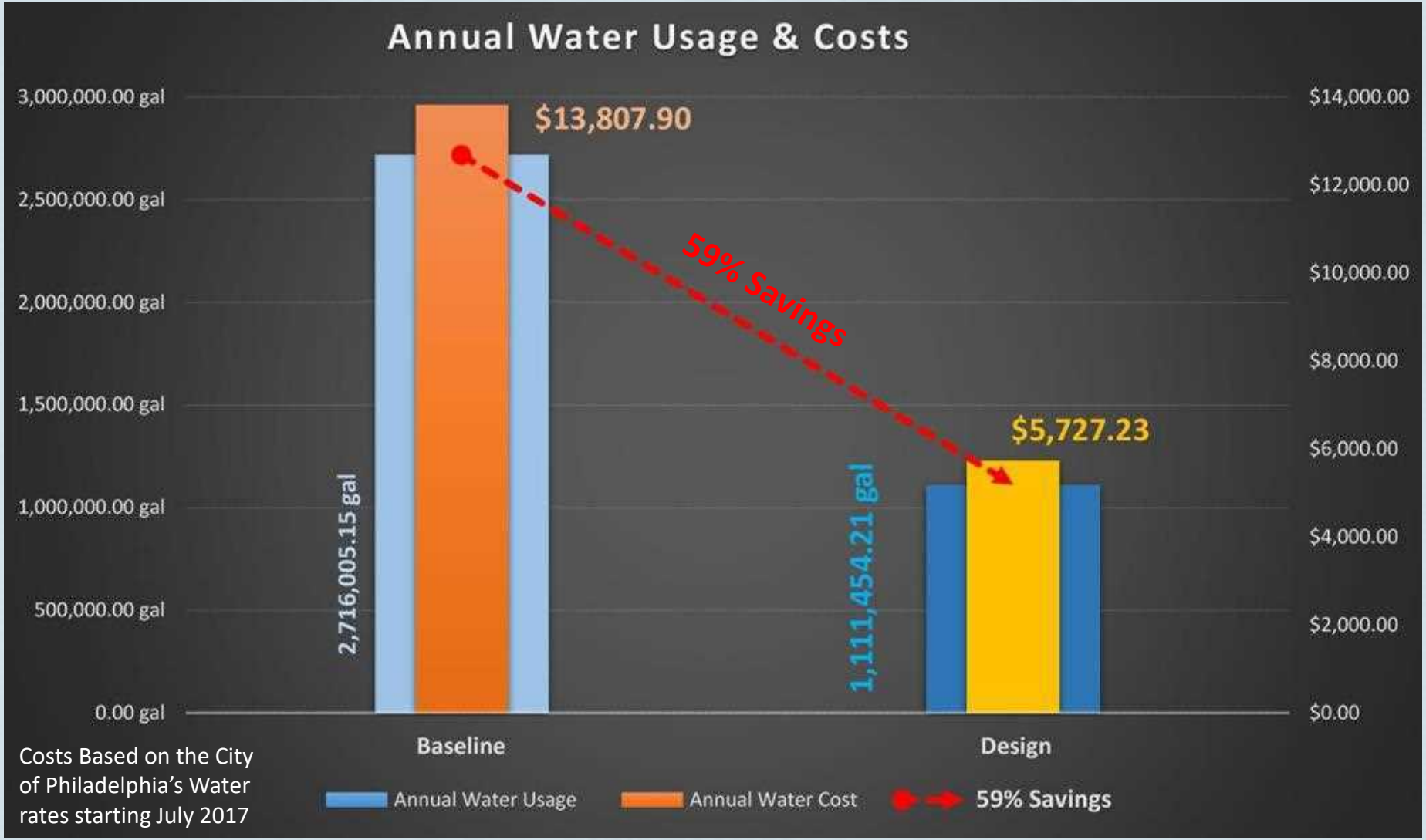
1. Dual Low Flush toilets that use 0.8/1.1 gallons per flush compared to 1.6 gallons per flush
2. Low flush urinals – 1/8 gallon per flush
3. Water efficient dishwashers & washing machines which are large water consumers 4 gallon & 11 gallon respectively.
4. Low flow showerheads and faucets in bathrooms and kitchen.
5. Low water consuming landscaping

Water Usage - Site Water Efficiency Measures

Rainwater and Gray water

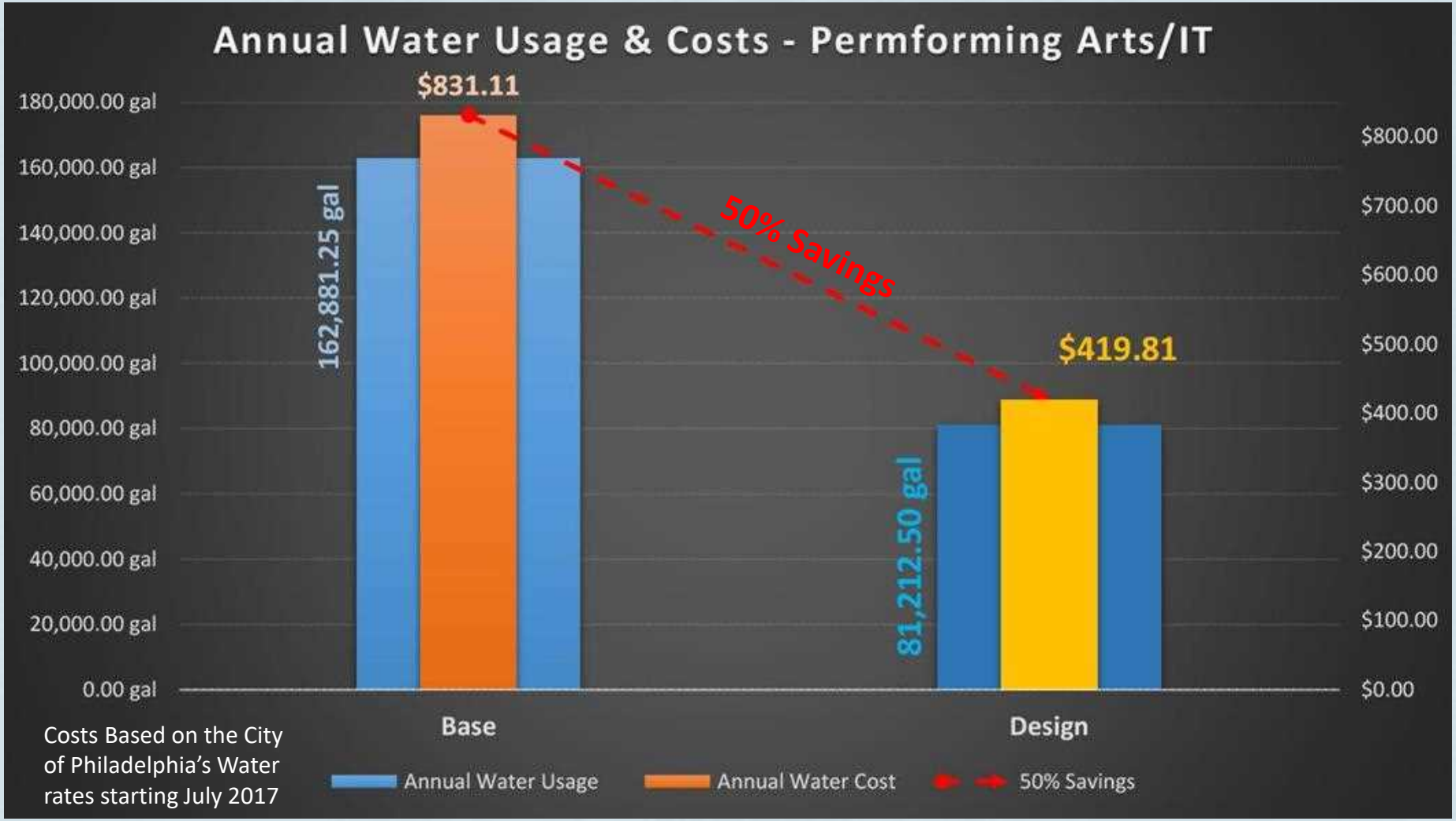
1. Rainwater collection from buildings' roofs – **28,967 sf**.
2. Reusing water from **kitchens and dishwashers** for **flushing toilets**
3. Reusing water from other sources to flush toilets and use for landscaping.

Water Usage - Art, Commercial & Residential



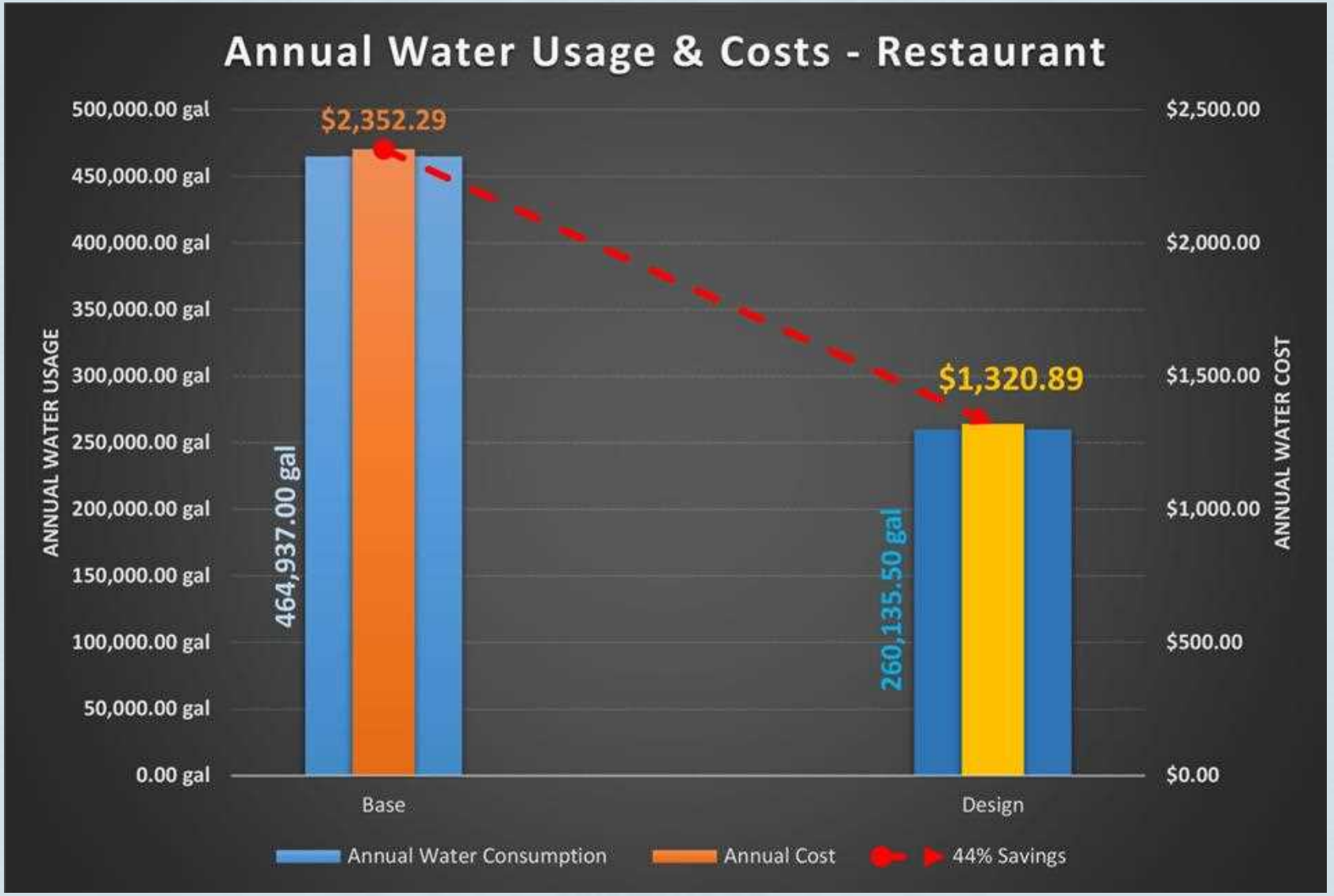
Costs Based on the City of Philadelphia's Water rates starting July 2017

Water Usage - Performing Arts & IT Technology

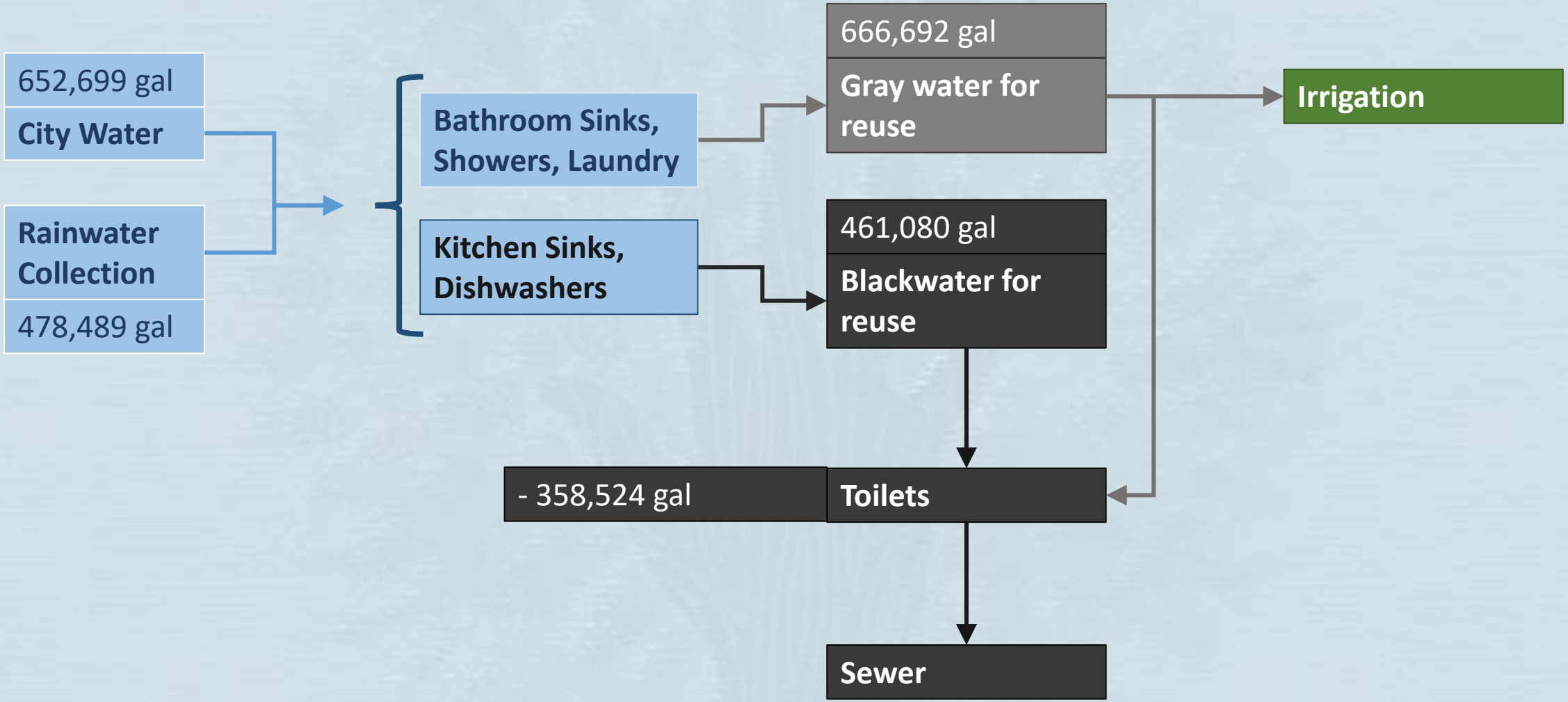


Costs Based on the City of Philadelphia's Water rates starting July 2017

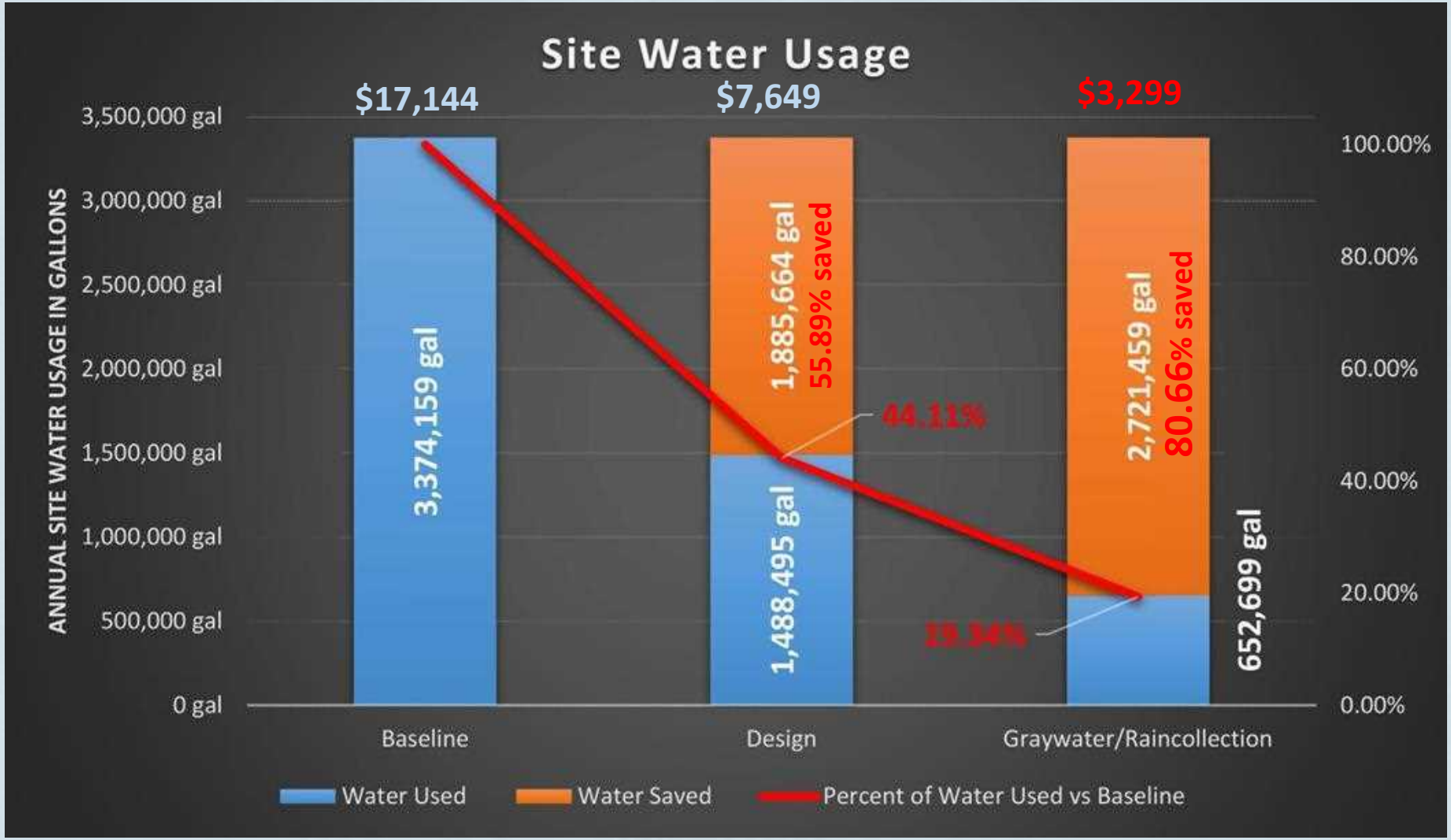
Water Usage - Restaurant



Water Usage - Rainwater & Gray Water



Water Usage - Rainwater & Gray Water



Water System - Rain Garden

A rain garden takes advantage of rainfall, storm-water runoff, and filter pollution; and replenish the groundwater supply and provide a self-irrigating landscape

http://www.organicfarmingreport.com/sop-up-a-soggy-yard-with-a-new-kid-simple-rain-garden-solution-you-will-absolutely-love/2/

Building Systems- Air

Ventilation - Site Energy Efficiency Measures

1. Low U-value and solar heat gain coefficient on all glazing.
2. Operable Windows for Residential Units & Restaurant
3. Underfloor HVAC system for Non-Residential Spaces.
4. Screens and other Sun Shading devices to reduce cooling loads.
5. High Efficiency HVAC systems.

Ventilation – Under Floor System

Underfloor Air Distribution (UFAD) system:
Use the underfloor plenum formed by installation of a raised floor to provide air ventilation and space conditioning in buildings

Benefits:

- Improve occupants' thermal comfort
- Easily relocated to accommodate furniture modifications
- Cut maintenance costs
- Provide proven operational efficiency with 30 years track record

Drawbacks:

- Designers and occupants are not familiar with the approach
- No re-process for returned air

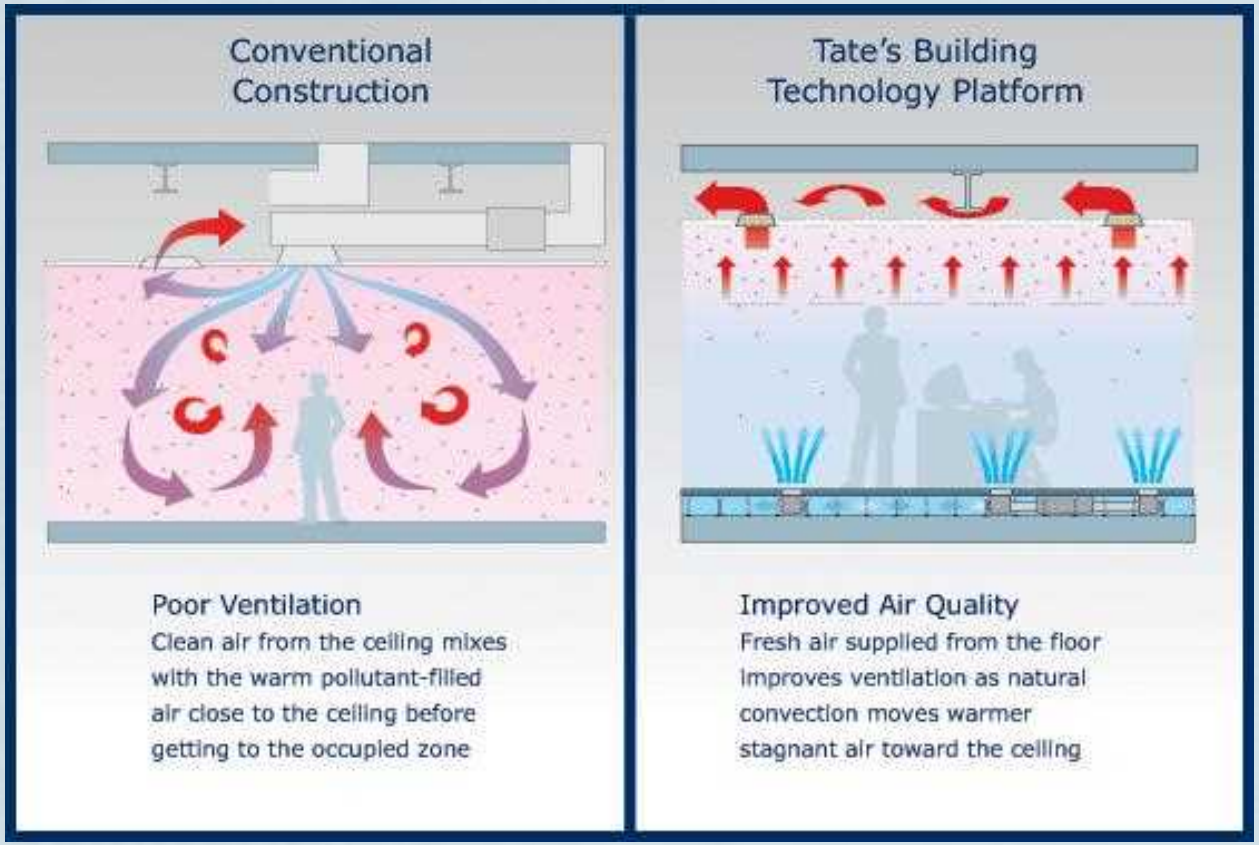


Image retrieved at http://www.interiorsandsources.com/article-details/articleid/5131/title/sustainable-benefits-of-underfloor-service-distribution.aspx

Wind Energy – The “Wind Tree”

French company NewWind has created the "Arbre a Vent" or "Wind Tree," a 3-meter-tall generator designed and consists of 72 micro turbine "aeroleaves" that rotate in the wind, generating an estimated 3.1. kW of power.

Image retrieved at http://www.alternative-energy-news.info/tree-shaped-wind-turbines-paris/


The End
Thank you.