University of Colorado
Anschutz Medical Campus

UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

CAMPUS SAFETY & PREPAREDNESS FACILITY

DESIGN REVIEW BOARD PRESENTATION

August 17, 2021

AndersonMasonDale Architects

SAUNDERS

Project Directory & Acknowledgments

Owner

University of Colorado
Anschutz Medical Campus

Design/Build Team

Saunders Construction
General Contractor

Anderson Mason Dale Architects
Architect

Kiel Moe, FAAR, AIA
Gerald Sheff Chair of Architecture, McGill University

S.A. Miro Inc.
Civil Engineer

Wenk Associates
Landscape Architect

KL&A Engineers & Builders
Structural Engineer

Cator Ruma & Associates
MEP Engineer

Ambient Energy
Energy Modeling

Acknowledgments

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Contents

Project Information

Campus Safety & Preparedness Facility

University of Colorado, Anschutz Medical Campus (CU AMC)

Project Address
13309 E 17th Pl, Aurora, CO 80045

Total Floor Area
26,100 SF

Executive Summary

The University of Colorado Anschutz Medical Campus has undertaken a strategic initiative in the Campus Safety and Preparedness Facility. The proposed facility will accommodate the immediate and long-term safety needs of a growing campus. The building will provide a new, consolidated headquarters for the campus safety and preparedness team including Police Operations, Electronic Security, Emergency Communications, and Emergency Management. And, the new facility will have a path to becoming the campus' first **net zero energy building**.

In December of 2020, CU Anschutz selected Saunders/Anderson Mason Dale Architects as one of two Design/Build Entities to engage in an eight week program verification and design competition, including participation with user groups and the Design Review Board. Working with the campus officers and facilities stakeholders, the design-build team began Program Confirmation of the new facility needs (using an existing Program Plan based on work completed by the DLR Group in 2017) to begin the competition. The Programming and Schematic Design phases took place during the months of January and February, 2021.

Following this initial phase, the Design/Build team is in the process of completing full design and construction services for the new facility. It is anticipated that Construction Documents will be complete at the end of 2021. Construction should be complete in the summer of 2022.

Project Summary

The University of Colorado Anschutz Medical Campus Safety and Preparedness Facility is a 26,100 gross square foot building at the north frontage of 17th Place between Victor Street and Wheeling Street. Working within the framework of the CU Anschutz Medical Campus 2012 Facilities Master Plan, the project will embrace the urban zone characteristics of the campus fabric outside of the core academic campus. The facility will improve the arrival experience at this important campus gateway moment to the campus to and from the east, north and south, and embrace a connection with the Art Walk, signaling the eastern beginning/terminus of this important campus place.

The Program consists of offices, open offices, conference space, training space, a fitness space, storage, commons areas and supporting restroom and break areas. Building 610 currently occupies the site for the new facility and was built in 1981. This project proposes a renovation of the existing one-story facility, and the addition of a second level, along with a new two-story bar constructed along 17th Place.

Site development will consist of public parking, secure fleet parking, a secure access drive. The building will house the following entities:

Administration
- Chief of Police
- Clery/Communications Manager
- Emergency Management
- Investigations
- Department IT

Electronic Security
- Workshop & Offices

Communications & Property
- Property & Evidence
- Communications
- Records

Shared Support Facilities
- Locker Rooms
- Exercise Room
- Break Room
- Training

Program Overview

	Area	Sworn	Non-Sworn	Quantity	Total asf	Notes / Comments
Administration					**2,768**	
Chief of Police	180	1		1	180	
Deputy Chief	120	1		1	120	
Office	100	1	4	5	500	
Open Work Stations	64		6	6	384	
Investigations Work Stations	64	6		6	384	
IT Services	240		2	1	240	located next to Patrol
Records Storage	120			1	120	
Conference Room	480			1	480	
Special Projects Room	280			1	280	
Work Copy	80			1	80	
Training					**1,800**	
Training Room	1,400			1	1,400	
Mat Storage	120			1	120	
Chair and Table Storage	120			1	120	
Storage	80			1	80	
Dedicated AV	80			1	80	
Lobby and Support Spaces					**660**	
Public Lobby	400			1	400	
Food Pantry	80			1	80	
Restrooms	80			1	80	
Report Taking (Soft Interview)	100			1	100	
Communications					**1,324**	
Office	100		1	1	100	
Dispatch Supervisors	240		3	1	240	
Dispatch Stations	100			4	400	
Monitor Stations	100			2	200	
Man Trap	60			1	60	
Wellness	80			1	80	
Small Break Room	120			1	120	
Restroom	60			1	60	
Lockers	8		8	8	64	
Patrol and Operations					**2,416**	
Commander	120	1		1	120	
Sergeants	80	4		4	320	
Corporals	80	4		4	320	
Officer Report Writing	36			16	576	
Squad / Briefing Room	400			1	400	
Small Conf Room	240			1	240	
Work Copy	80			1	80	
Gear Bags	6			30	180	
Equipment Issue	180			1	180	

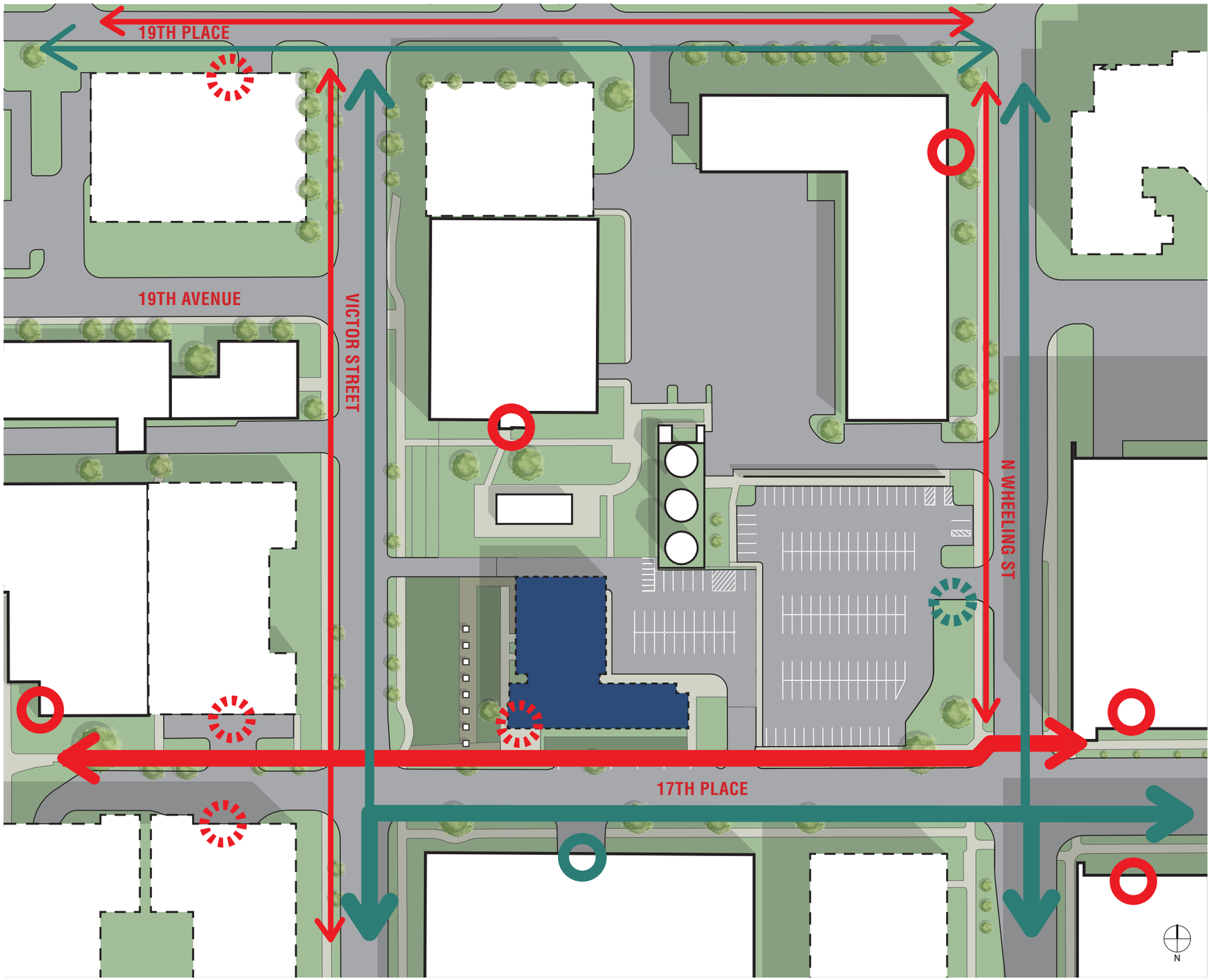
	Area	Sworn	Non-Sworn	Quantity	Total asf	Notes / Comments
Records					**260**	
Reception	80		1	1	80	
Records Technician	180		1	1	180	
Records Storage	-			0	-	in office
Lockers and Fitness					**2,940**	
Locker Room Non-Sworn	8		22	22	176	
Locker Room Sworn	14	36		36	504	
Shower	100			3	300	
Changing	40			4	160	
Wellness Room	100			1	100	
Break Room	300			1	300	
Fitness	1,400			1	1,400	
Police Support					**640**	
Police Storage	340			1	340	
Armory	150			1	150	
Bike Patrol	150			1	150	
Interview					**260**	
Inteview (Medium)	120			1	120	
Inteview (Small)	80			1	80	
Restroom	60			1	60	
Electronic Security					**2,860**	
Office	120		1	1	120	
Group Office	220		3	3	660	
Open Office Work Stations	64		10	10	640	
Work Copy	80			1	80	
Clean Storage	120			1	120	
Shop Space	240			1	240	
Cart Bay and Storage	1,000			1	1,000	
Property and Evidence					**1,110**	
Bag/Tag	120			1	120	
Processing	180		1	1	180	
Evidence Storage	500			1	500	
Narcotics | Fire Arms | Cash	50			1	50	
Discovery and Return	60			1	60	
Property Storage	200			1	200	

Net Area	***17,038***	**sf**
Building Gross Factor	0.653	
Total Gross Building Area	**26,100**	**sf**

DESIGN DRAWINGS

Micro Master Plan
Illustrative Site Plan
Enlarged Entry Plan
Building Sections
Campus Precinct Material Palette
Exterior Materials
Exterior Elevations
Context Elevations
Exterior Vignettes

Micro Master Plan



LEGEND

- P — PARKING
- MAJOR BUILDING ENTRY - FUTURE
- MAJOR BUILDING ENTRY - EXISTING
- FUTURE BUILDING
- EXISTING BUILDING
- PEDESTRIAN CIRCULATION
- VEHICULAR CIRCULATION

Illustrative Site Plan

LEGEND

1	VERTICAL RISE GATE
2	BOLLARD
3	EXISTING SWITCH CABINET TO REMAIN
4	MONUMENT SIGN (VEHICLE RAM DETERRENT)
5	BENCH
6	GENERATOR
7	BIO-SWALE
8	LANDSCAPE BERM WITH NATIVE SEED
9	CRUSHER FINES
10	ORNAMENTAL TREES

FLEET LOT: 26 SPACES
PARALLEL PARKING: 6 SPACES
PURGATORY LOT: 120 SPACES

VICTOR STREET

N WHEELING ST

17TH PLACE

0′ 20′ 40′ 80′

N

Enlarged Entry Plan

LEGEND

1 LOBBY
2 INTERVIEW
3 PANTRY
4 RECEPTION
5 ELECTRICAL
6 RECORDS
7 BRIEFING

Plans

LEGEND

1 LOBBY
2 INTERVIEW
3 PANTRY
4 RECEPTION
5 ELECTRICAL
6 RECORDS
7 BRIEFING
8 GEAR BAG STORAGE
9 OPEN OFFICE
10 OFFICE
11 CONFERENCE
12 ELECTRONIC SECURITY SHOP
13 ARMORY
14 BIKE PATROL
15 STORAGE
16 HOUSEKEEPING
17 TECHNOLOGY
18 EVIDENCE TECHNICIAN
19 EVIDENCE BAG & TAG
20 MECHANICAL

0′ 8′ 16′ 32′ N

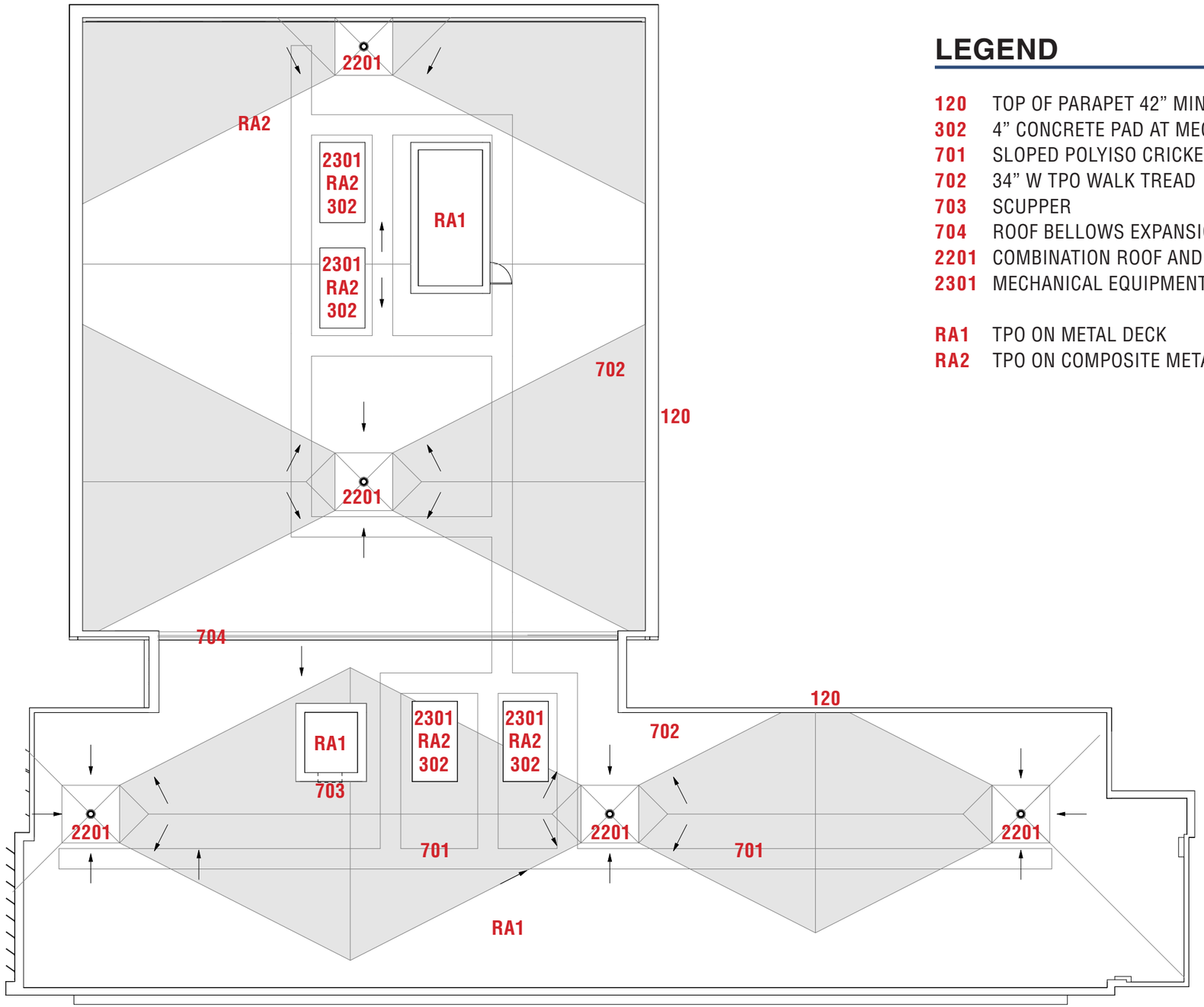
FIRST LEVEL FLOOR PLAN

SECOND LEVEL FLOOR PLAN

LEGEND

1	CONFERENCE
2	OFFICE
3	OPEN OFFICE
4	PROJECTS ROOM
5	ELECTRICAL
6	RECORDS
7	BREAK ROOM
8	DISPATCH
9	LOCKERS
10	TRAINING
11	STORAGE
12	AV CLOSET
13	WELLNESS
14	HOUSEKEEPING
15	TECHNOLOGY
16	FITNESS
17	CHAIR STORAGE

0′ 8′ 16′ 32′ N



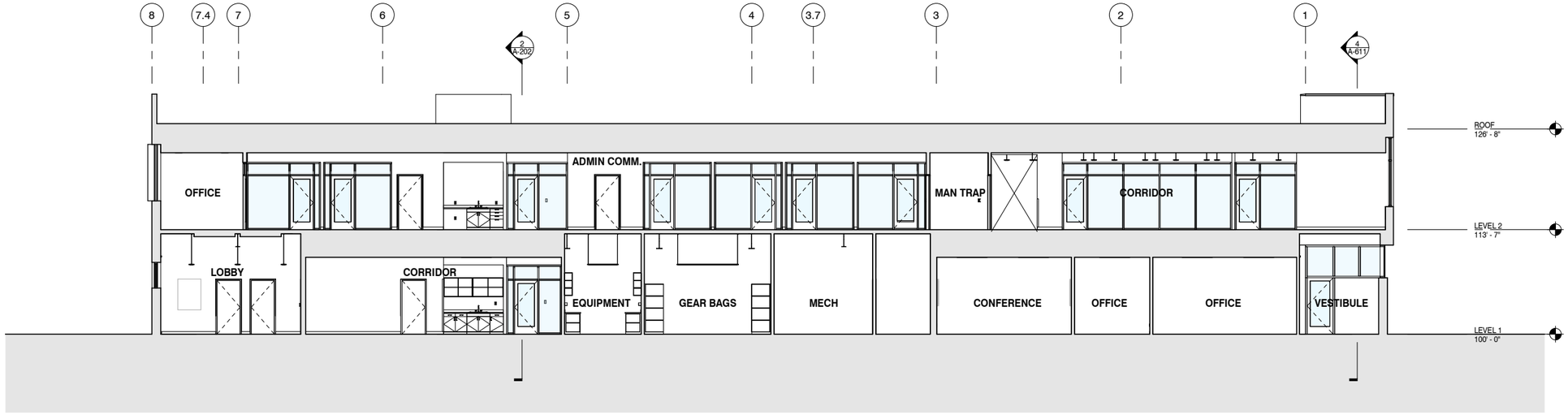
LEGEND

120	TOP OF PARAPET 42” MINIMUM ABOVE HIGHEST POINT OF INSULATION, TYP.
302	4” CONCRETE PAD AT MECHANICAL EQUIPMENT ZONE, RE: RA2
701	SLOPED POLYISO CRICKET
702	34” W TPO WALK TREAD
703	SCUPPER
704	ROOF BELLOWS EXPANSION JOINT AND CURB
2201	COMBINATION ROOF AND OVERFLOW DRAIN AND 8’X8’ POLYISO SUMP, TYP.
2301	MECHANICAL EQUIPMENT, RE: MECH
RA1	TPO ON METAL DECK
RA2	TPO ON COMPOSITE METAL DECK

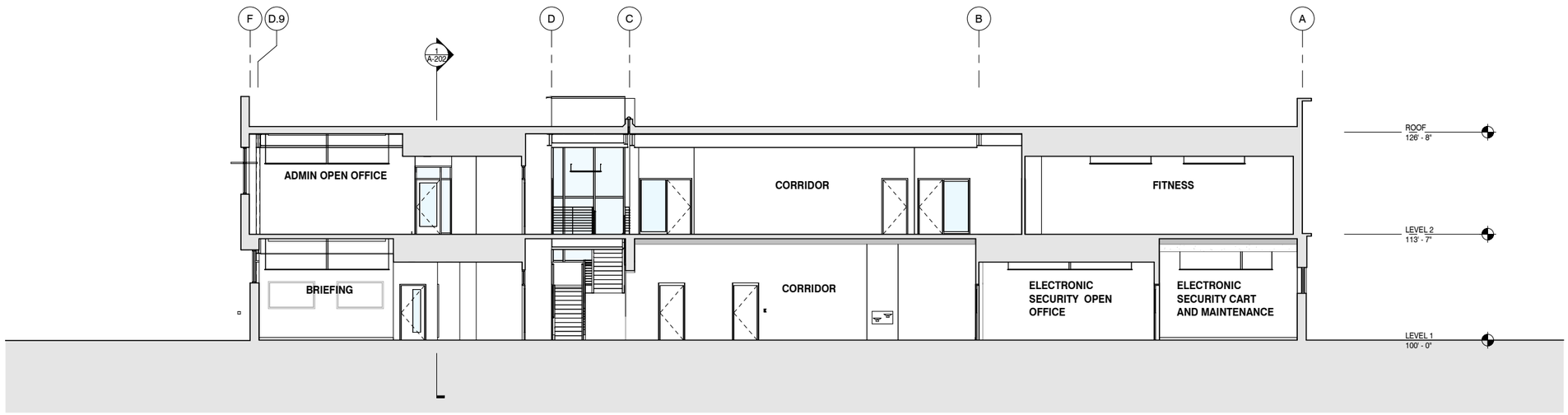
0’ 8’ 16’ 32’ N

ROOF PLAN

Building Sections



BUILDING SECTION EAST/WEST

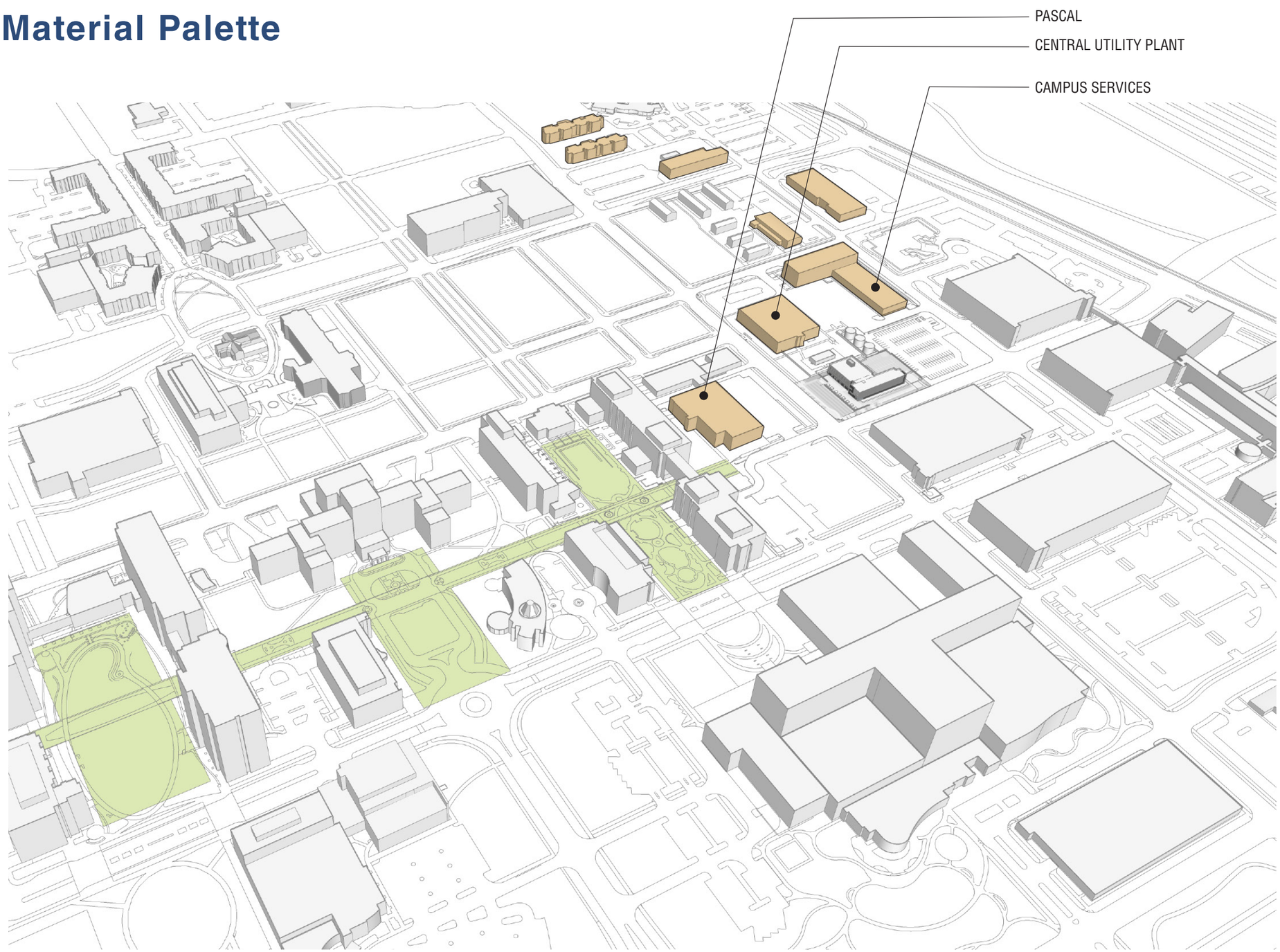


BUILDING SECTION NORTH/SOUTH

0′ 8′ 16′ 32′

Campus Precinct Material Palette

ADJACENT BUILDINGS UTILIZING BLONDE MASONRY



Exterior Materials

FLAT & CORRUGATED METAL PANEL BLEND

EXISTING BRICK

GROUND FACE CMU

ACCENT SPLIT FACE CMU

Exterior Elevations

SOUTH ELEVATION

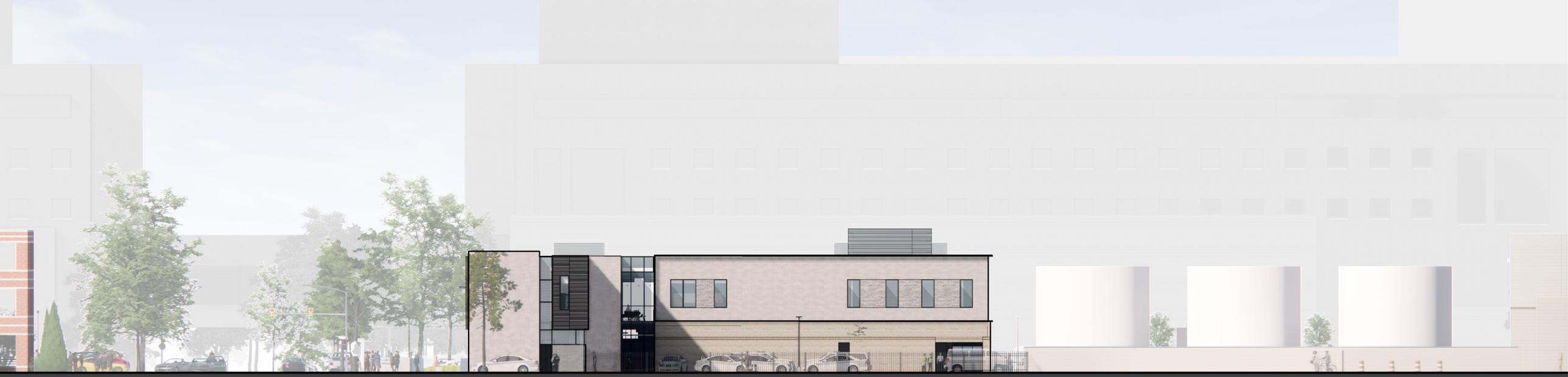
EAST ELEVATION

NORTH ELEVATION

WEST ELEVATION

Context Elevations

SOUTH ELEVATION



EAST ELEVATION

NORTH ELEVATION

WEST ELEVATION

Exterior Vignettes

SOUTHWEST

SOUTHWEST ENTRY

SOUTHEAST

NORTHEAST ENTRY

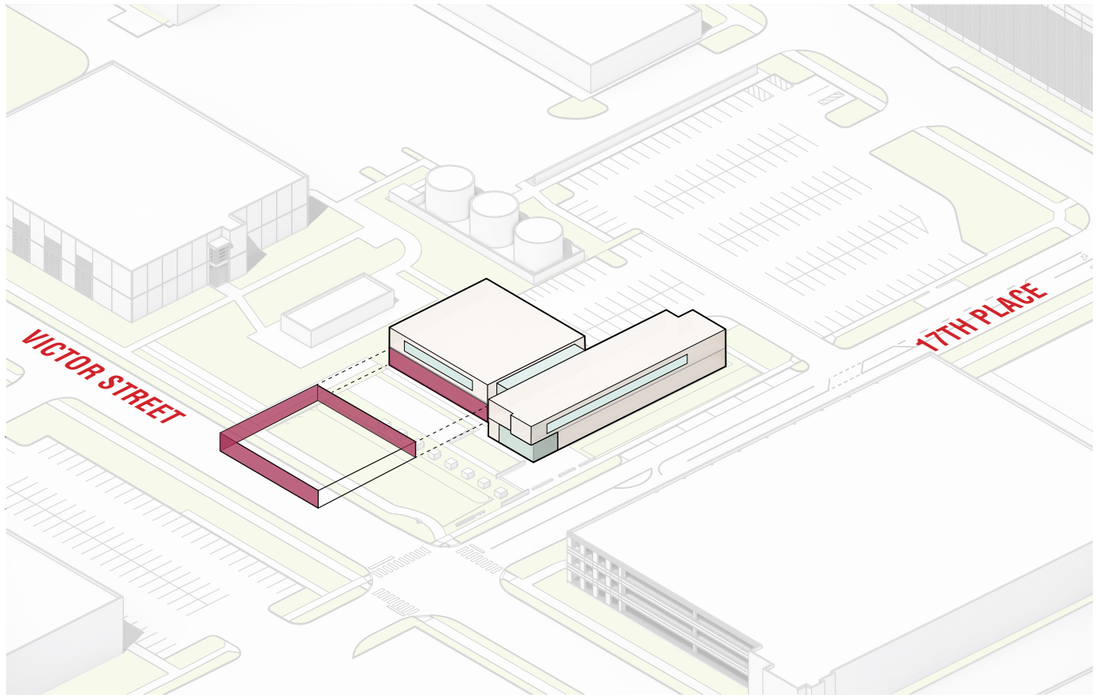
SOUTHWEST ENTRY

SOUTHWEST

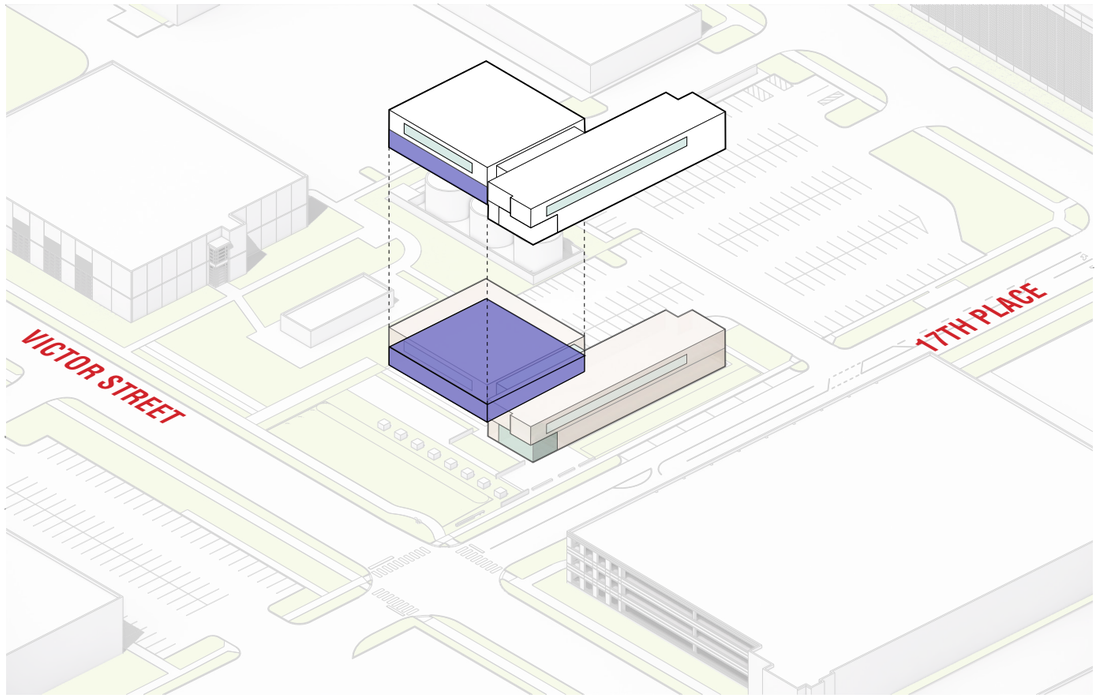
SUSTAINABILITY NARRATIVE

Energy Report
Sustainability Measures

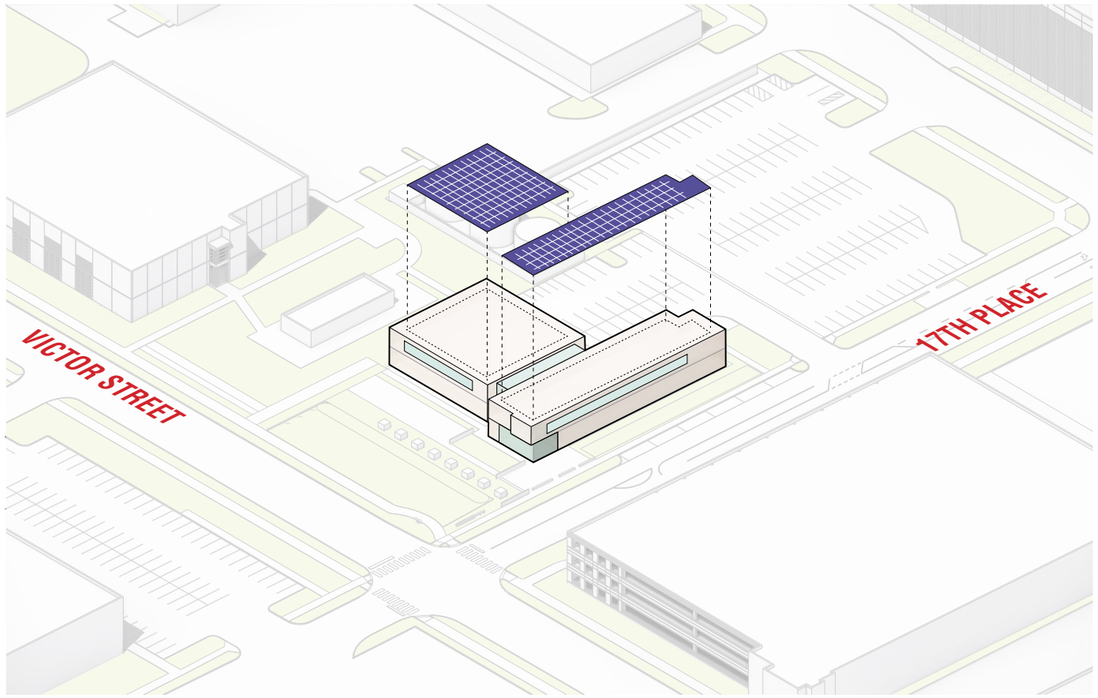
Sustainability Measures



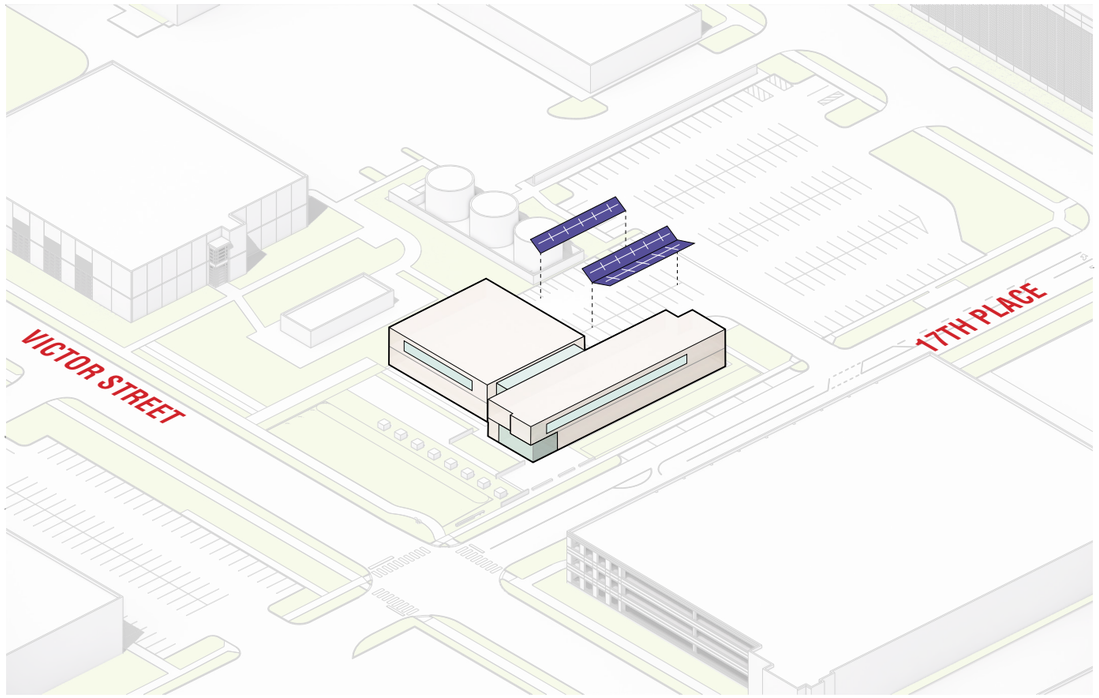
REUSE: BRICK MASONRY



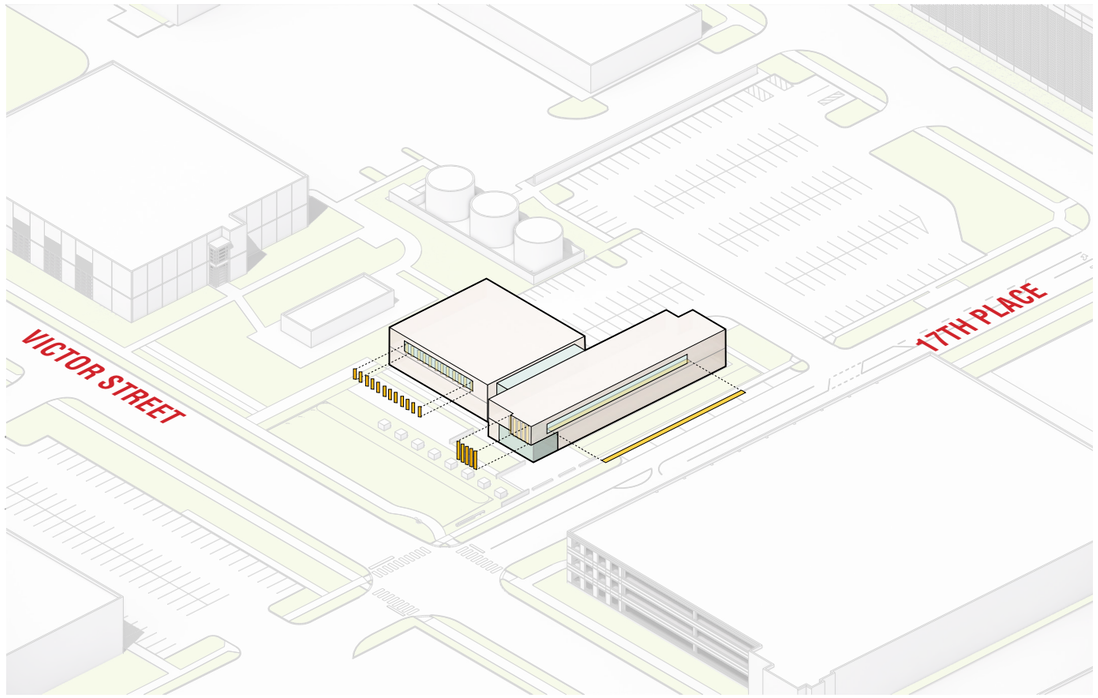
REUSE: CONCRETE STRUCTURE



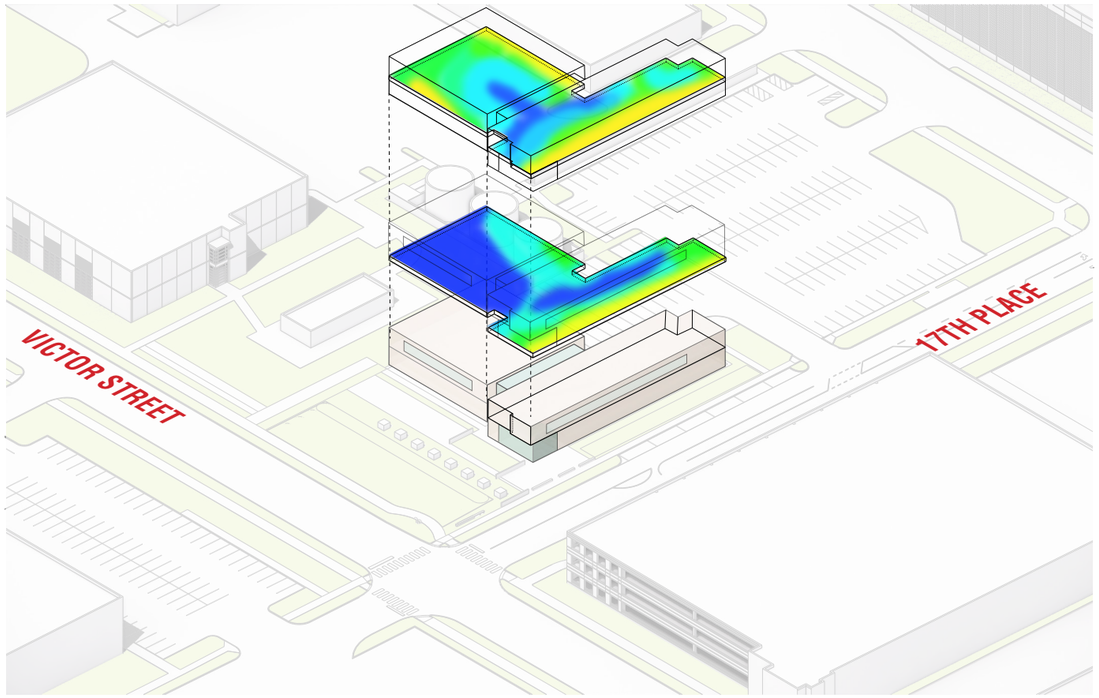
CAPTURE SOLAR ENERGY: FUTURE PHOTOVOLTAIC ROOF PANELS



CAPTURE SOLAR ENERGY: FUTURE PHOTOVOLTAIC CANOPIES



SOLAR CONTROL



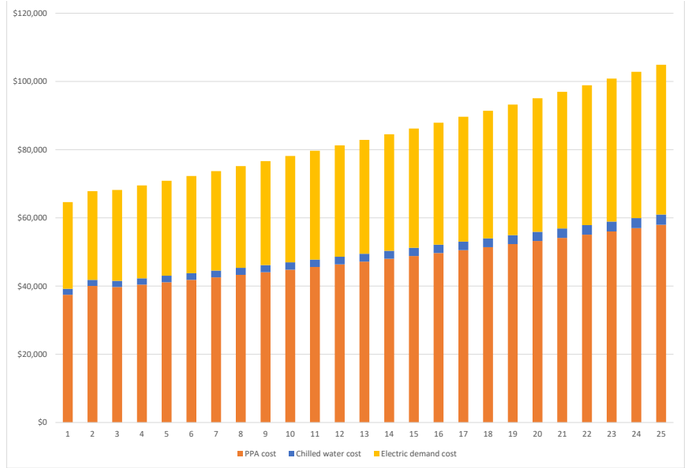
DAYLIGHT AUTONOMY

Energy Report

Energy Design Narrative

Life Cycle Cost Analysis of Energy Conservations Measures

The Saunders-AMD team modeled and compared six mechanical system options on an Energy Use Intensity (EUI), photovoltaic system size, energy cost, and first cost basis. The final system was reviewed in terms of life-cycle cost including the operational costs to CU Anschutz for a solar photovoltaic system agreement through a power purchase agreement over 25 years. The figure below shows the cost of each fuel source over time.



ENERGY COST OVER 25 YEARS

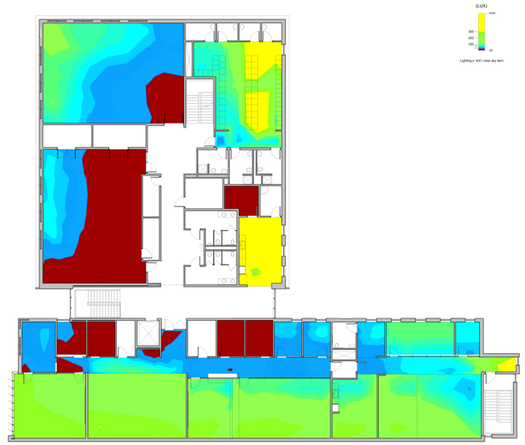
Utility rates include the following with 2.5% escalation rate on the Power Purchase Agreement and a 2.3% escalation factor on the electrical and chilled water rates:

A. Electricity - Xcel Energy Primary General ($0.082/kWh blended)
B. Chilled Water Return - CUP Chilled Water ($0.253/ton-hr)
C. Power Purchase Agreement rates - $0.1015/kWh

Daylighting Analysis

The Saunders-AMD team developed important aspects to maximize daylight availability and autonomy for the operation of the building and delight of its occupants. The general organization and massing of the south bar on an east-west axis is ideal for optimal daylighting and shading design: abundant but controllable daylight from the south, and minimized solar gains from the low sun on east and west exposures. The configuration of apertures on all sides of the building were shaped through iterations of daylight simulation analysis and design. While the final composition and location of the apertures will benefit final calibration in the next stage of project design, the process has yielded a scheme and strategies that maximizes daylight performance.

LEVEL 1 - DAYLIGHTING



LEVEL 2 - DAYLIGHTING

Energy Report

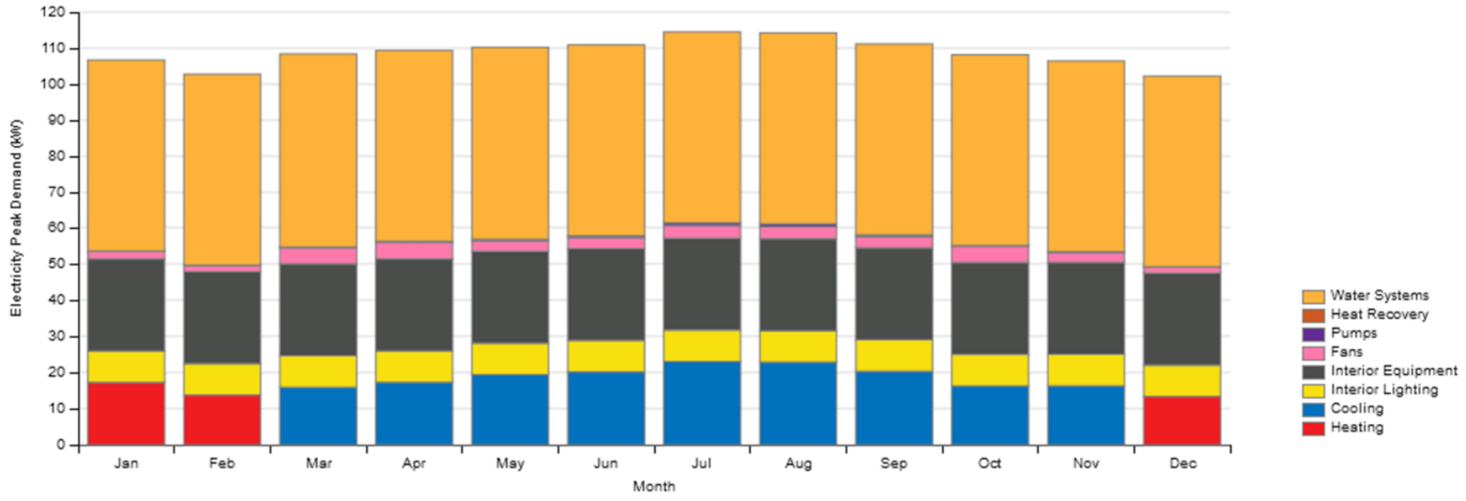
Energy Goal Setting

For a zero net energy project, it is critical to first establish a target for energy efficiency. This minimizes the cost of renewables required, and establishes a method for right sizing a net zero energy project.

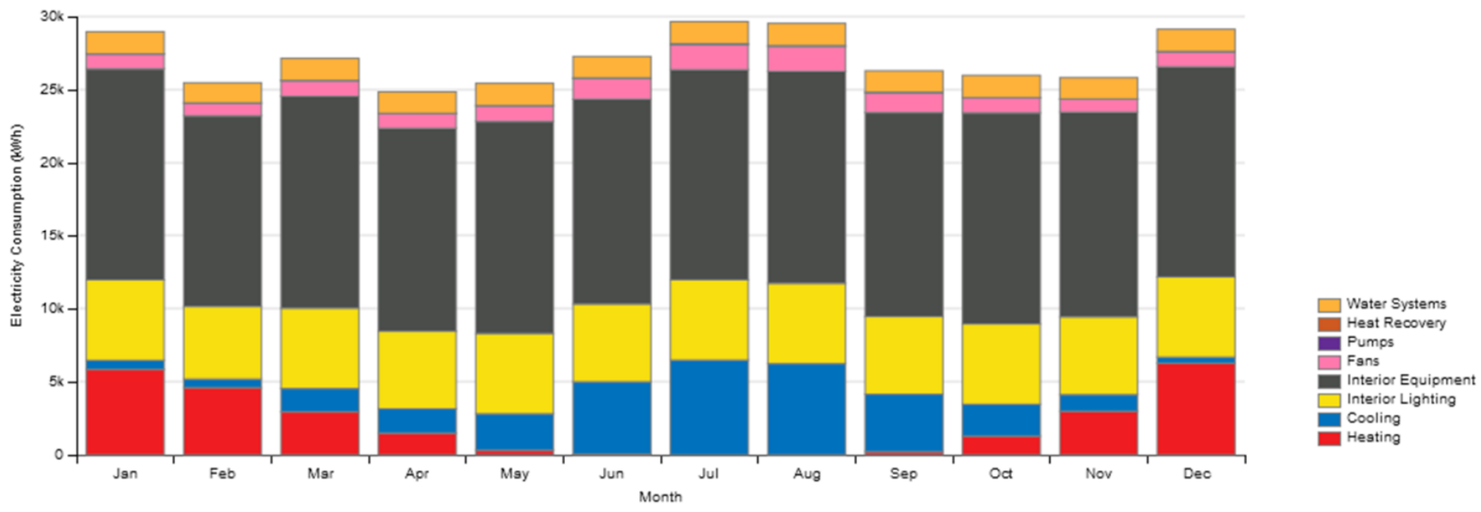
Ambient Energy selected four data sources for energy benchmarking in terms of Energy Use Intensity (EUI) to set a building energy goal target for the project – the Zero Tool, Energy Star (2 parameters) and a similar emergency operations project with a net zero energy goal. A goal for annual energy usage per building area of 42 kBtu/sf/yr was established for the project. The EUI is how projects compare buildings of the same type to each other, with the lower the EUI, the lower the annual total energy usage. This is an aggressive energy goal for a building with 24/7 operations.

ENERGY GOALS AND BENCHMARKING

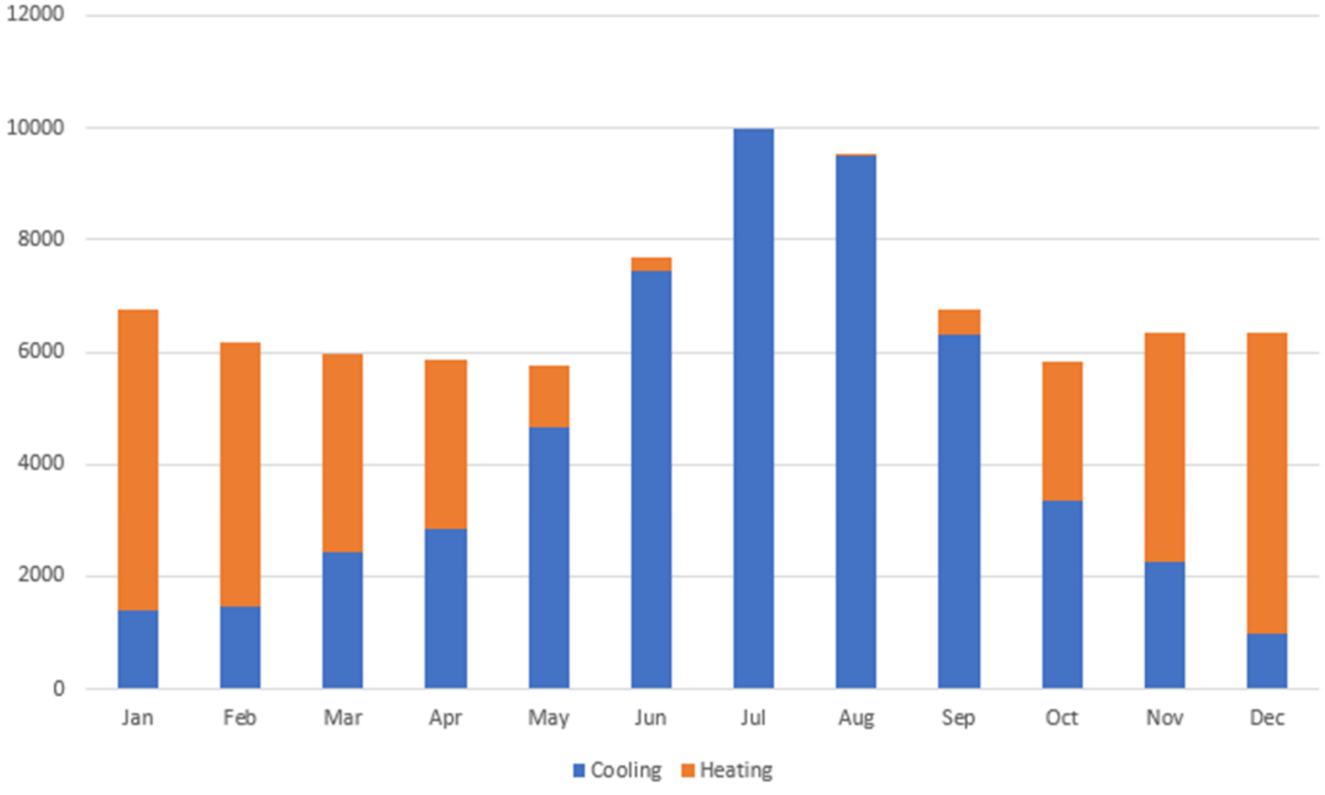
Benchmark	Parameter	EUI (kBtu/sf/yr)
Zero Tool	Zero Score 60	42
Energy Star	60% better than median	50
Energy Star	70% better than median	31
Similar Project: Contra Costa County Emergency Operations Center		41
Energy Benchmark for CSPF		**42**



ELECTRICITY PEAK DEMAND (KW)



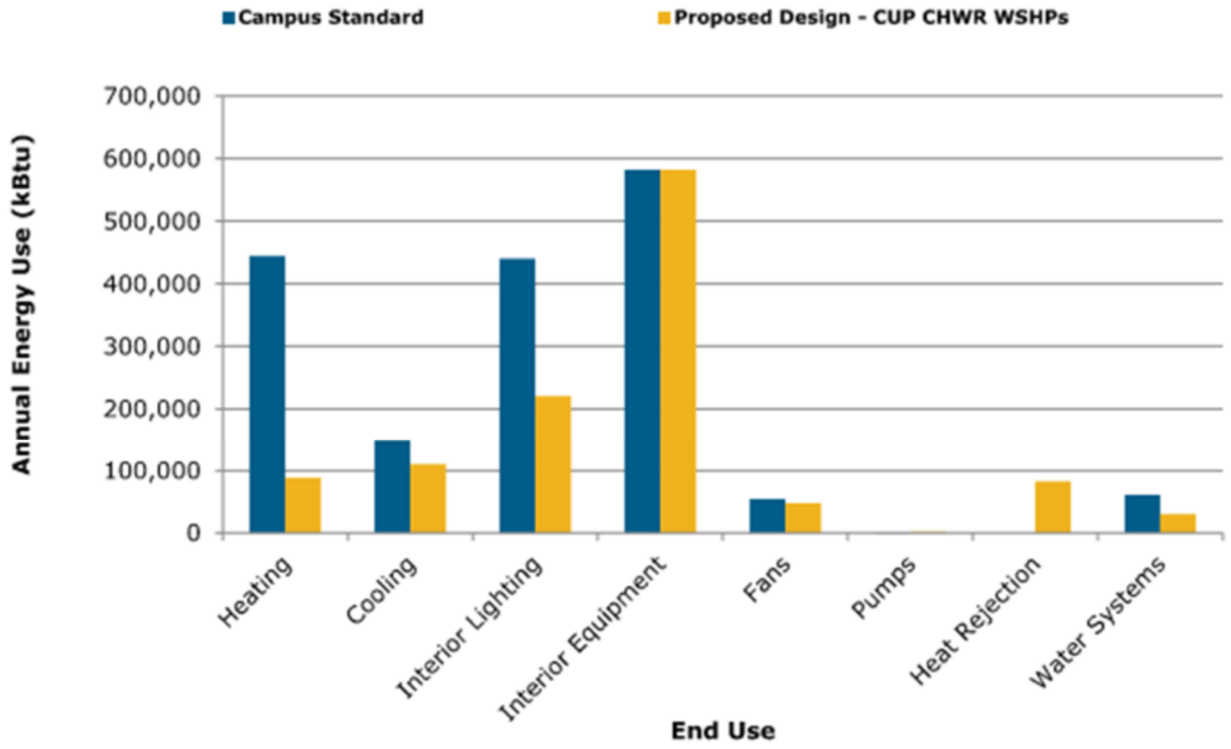
ELECTRICITY CONSUMPTION (KWH)

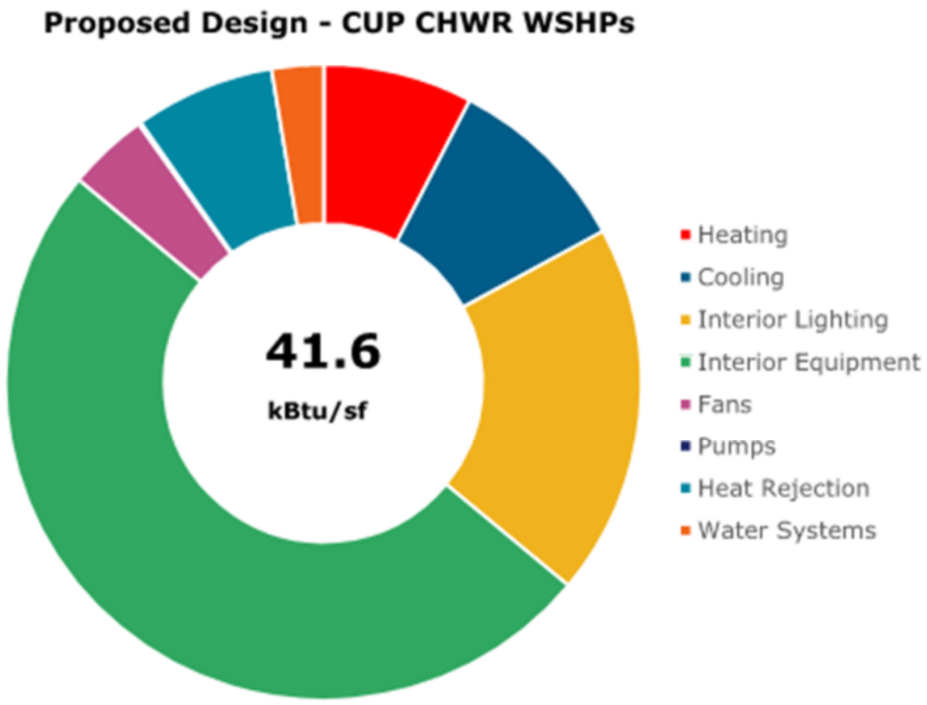


ELECTRICITY PEAK DEMAND (KW)

ENERGY COST RESULTS	First Cost Mechanical	Total Energy Cost	Energy Cost Index	Electricity			District Energy		Savings	
	($/sf)	($/yr)	($/sf)	Total Electric Cost	Use	Facility Demand	Cooling	Heating	Energy Cost	Energy Cost %
Campus Standard	$56.14	$44,554	$1.59	$35,231	$11,673	$23,558	$3,139	$6,184		
Proposed Design - CUP CHWR WSHPs	$49.76	$37,846	$1.35	$36,097	$10,669	$25,428	$1,110	$639	$6,708	15.1%

ENERGY USE RESULTS	PV Size for NZE	Energy Use Index	Electricity			District Energy		Savings
	kW	(kBtu/sf*yr)	Use (kWh/yr)	Annual Demand (kW/yr)	Peak Demand (kW/mo)	Cooling (MBtu/yr)	Heating (MBtu/yr)	Energy Use %
Campus Standard	311	61.9	333,272	1,211	103	149	445	
Proposed Design - CUP CHWR WSHPs	217	41.6	325,528	1,302	114	53	30	32.8%





MECHANICAL OPTIONS ENERGY MODEL RESULTS - MARCH 18, 2021

Energy Results Summary

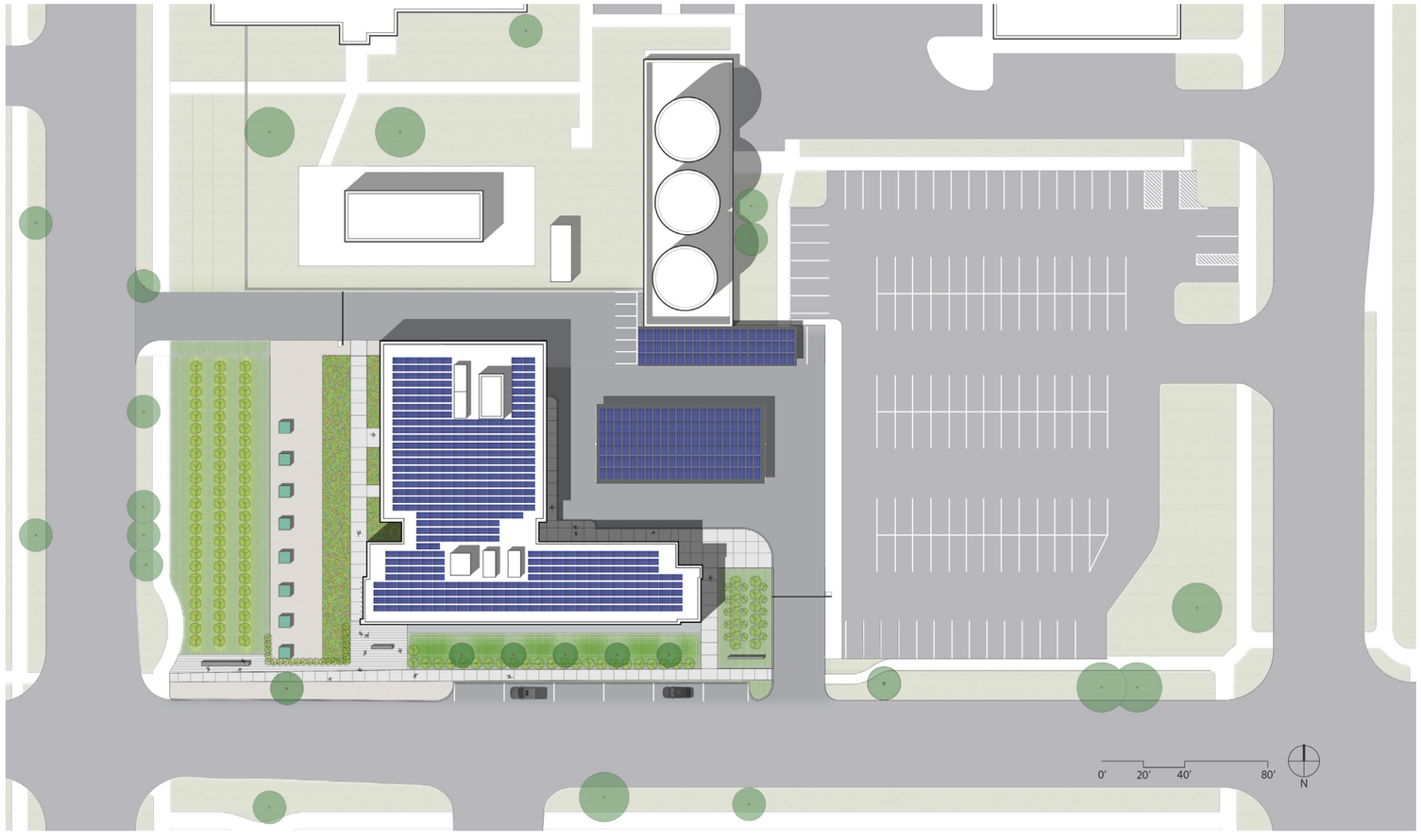
The proposed design saves 15% in energy cost and 33% in energy usage compared to the Campus Standard. The site EUI for the proposed design is 41.6 kBtu/sf-yr, meeting the 42 EUI target goal. While the solar photovoltaic size for the proposed design is 217 kW, this does not take into account the solar energy needed to create the condenser water loop at the CUP. Converting the energy usage from using the Campus Central Utility plant for the condenser water loop, assuming the CUP is 0.7 kW/ton in efficiency, the solar system needs to be sized for a 233 kW system to be zero-net energy.

Analysis Methods

Whole-building energy simulation performed during the design-build competition phase using Open Studio, which is based on Energy Plus software was used to determine energy usage and energy cost between a typical Campus Standard baseline, many alternatives, and a final selected building mechanical system, the As Designed case. NREL's PV Watts program was used to size the photovoltaic system. Operating costs were combined with the results from the power purchase agreement to provide further life cycle cost information for energy costs over time to the University. Further analysis in Design Development will document energy cost, energy use, and LEED points estimates of design options through published energy reports. In Construction Documents, energy performance credits will be thoroughly documented for LEED certification and zero net energy verification.

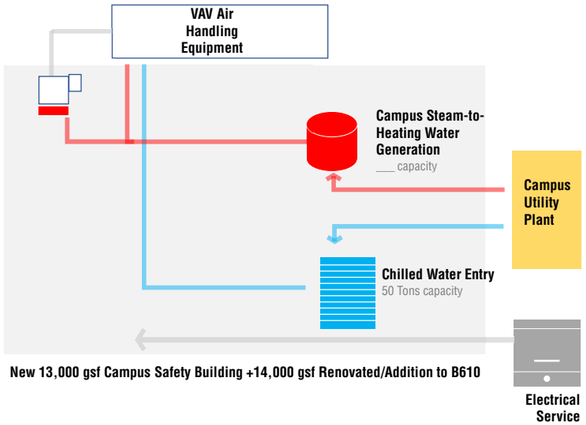
Equipment Energy Budget

While Ambient Energy provided a detailed spreadsheet for determining the plug load assumptions going into the energy model, more information needs to be obtained to predict the plug loads within a certain range of accuracy. For the purposes of this analysis, a plug load estimate of 1.06 W/sf is provided. If desired, a measured plug load study can be performed, as Ambient Energy has done for several other projects pursuing zero net energy.



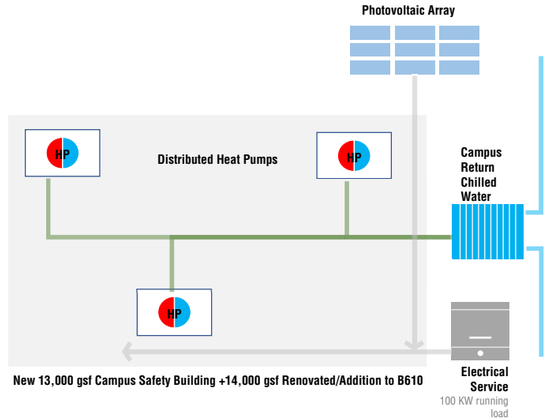
POSSIBLE FUTURE PHOTOVOLTAIC PANEL LAYOUT

"CAMPUS STANDARD"



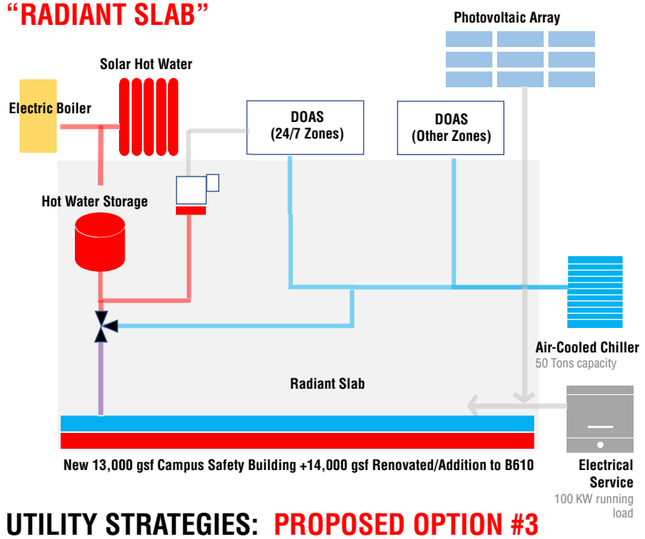
UTILITY STRATEGIES: BASE CASE

DISTRIBUTED HEAT PUMPS + HEAT REJECTION TO CUP"



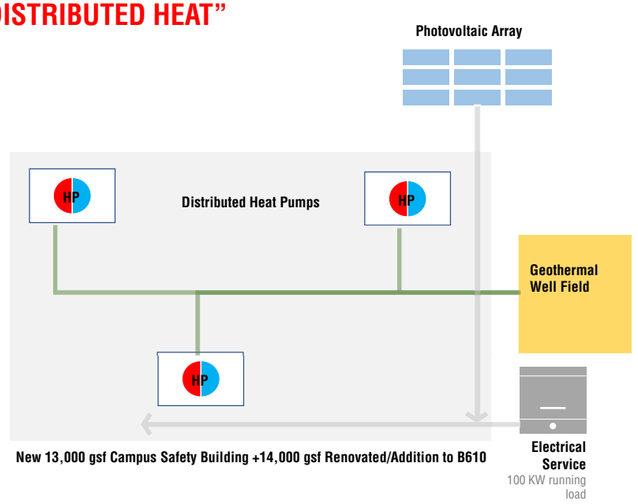
UTILITY STRATEGIES: PROPOSED OPTION #1A

"RADIANT SLAB"



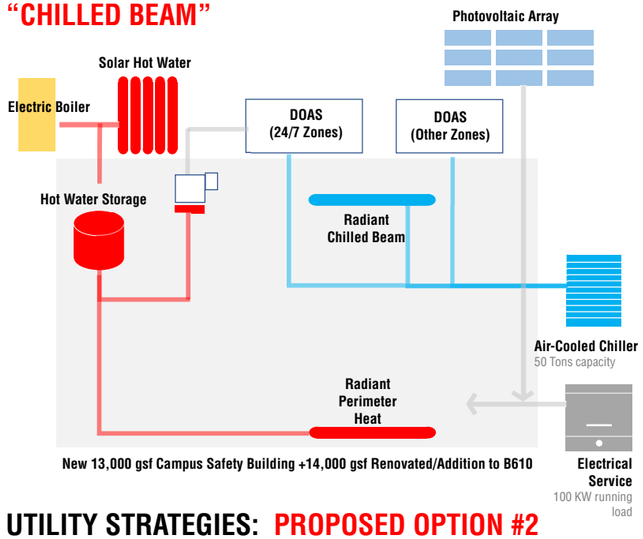
UTILITY STRATEGIES: PROPOSED OPTION #3

"DISTRIBUTED HEAT"



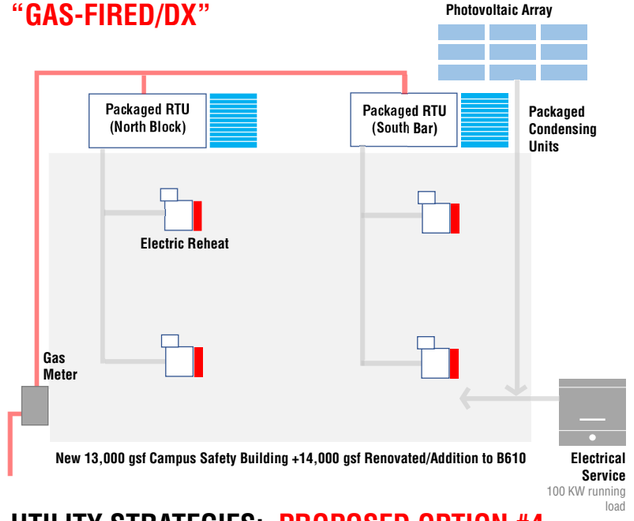
UTILITY STRATEGIES: PROPOSED OPTION #1

"CHILLED BEAM"



UTILITY STRATEGIES: PROPOSED OPTION #2

"GAS-FIRED/DX"



UTILITY STRATEGIES: PROPOSED OPTION #4

Energy Conservation Features Studied

Ambient Energy analyzed six different mechanical system options during the course of the design-build competition. These systems are described in the following diagrams provided by Cator Ruma Engineers.

The final Proposed Design, the heat pumps using the central utility plant as a condenser water loop, was selected as it meets the EUI benchmarking goals established for this zero net energy project and is all electric, meeting the Greening of Government goals for electrification. The heat pump to CUP option has 41.6 EUI, while the original goal developed for the project is 42 EUI.

The following strategies are more efficient than typical code compliant practice to achieve the EUI benchmarking goals:

- **A.** CU Anschutz standards for roof, wall, windows, and glazing
- **B.** Dedicated outdoor air units with energy recovery ventilators
- **C.** Water source heat pumps with campus chilled water return for heat rejection
- **D.** Occupied and unoccupied setpoints
- **E.** Demand control ventilation for offices
- **F.** Super premium efficiency motors
- **G.** Heat pump water heaters
- **H.** Efficient lighting design targeting 0.4 W/sf overall for 50% LPD reduction
- **I.** Daylight control and vacancy control for lighting and HVAC

MECHANICAL ANALYSIS INPUTS - MARCH 18, 2021

General	Campus Standard	Proposed
Energy Code	IECC 2018	IECC 2018
Input Source	Campus Standards	Simple box, design team discussions
Climate Zone and Weather Location	Same as Proposed	5B, Denver Intl AP TMYx 2004-2018
Elevation (ft)	Same as Proposed	5403
Location	Same as Proposed	Aurora, CO
Orientation from North	Same as Proposed	0
Schedule	Same as Proposed	Office: M-F 8 am - 5 pm Operations: 24/7
Size (sf)	Same as Proposed	Total: 27,943 sf Office: 15,800 sf Operations: 12,143 sf
Occupancy	Same as Proposed	Total: 80 ppl (86 ppl) Office: 24 ppl (43 ppl) Operations: 56 ppl (43 ppl)
Utility Rates	**Campus Standard**	**Proposed**
Electricity	Same as Proposed	Xcel Energy - Primary General ($0.082/kWh blended)
Natural Gas	Same as Proposed	Xcel Energy - Large Commercial ($4.977/MMBtu)
Purchased Heat	Same as Proposed	CUP Steam - $14.42/Mlb ($1.39/therm)
Purchased Chilled Water	Same as Proposed	CUP CHW - $0.253/ton-hr ($2.1083/therm)
Architectural	**Campus Standard**	**Proposed**
Roofs	Insulation Entirely Above Deck U-0.032 (R-30 c.i.)	Insulation Entirely Above Deck U-0.025 (R-40 c.i.) Existing Roof (TBD)
Walls, Above Grade	Steel Framed U-0.064 (R-13 + 7.5 c.i.) (R-15.6)	Steel Framed U-0.043 (R-13 + R-15 c.i.) (R-28-30) Existing Wall (1st floor) - 12" CMU w/ R-30 Spray Foam U-0.040
Slab-On-Grade Floors	Unheated F-0.54 Heated F-0.79 (R-15 for 36 in)	Unheated F-0.54 Heated F-0.79 (R-15 for 36 in)
Opaque Doors	Swinging: U-0.37 Nonswinging: U-0.31 (R-4.75)	Swinging: U-0.37 Nonswinging: U-0.31 (R-4.75)
Window Assemblies	Non-metal Framing U-0.38, SHGC-0.48 (N), SHGC-0.36 (E/W/S) VT-0.42	Non-metal Framing U-0.26, SHGC-0.18, VT-0.42
Window to Wall Ratio (%)	40%	N/S: 30-40%; E/W: 20-30%
Exterior Shading	NA	Overhangs on south façade; recessed glazing E/W
Interior Shading	NA	Light shelves south façade
Infiltration (cfm per sf exterior area)	0.046	0.046 (lower with spray foam insulation)
Electrical	**Campus Standard**	**Proposed**
Interior Lighting Power (W/sf)	22.3 kW total Building Area Method - Office: 0.8 - Operations: 0.8	11.2 kW total (Encelium or Nlight System) Building Area Method - Office: 0.4 - Operations: 0.4
Interior Lighting Daylighting Controls	All spaces	All spaces
Interior Lighting Occupancy Controls	All Spaces (Occupancy sensors also control HVAC)	All Spaces (Occupancy sensors also control HVAC)
Exterior Lighting Power (W)	(NM)	(NM)
Receptacle Loads (W/sf)	Same as Proposed	AE Assumption - Emergency: 1.06 W/sf - Office: 1.06 W/sf

Future Design Refinements

Ambient Energy will perform energy analysis to demonstrate progress towards the following goals:

A. Validate Energy Use Intensity goal and project performance at each stage of design
B. Achieve a minimum of 20% energy cost reduction compared to an ASHRAE 90.1-2010 baseline for LEED Optimize Energy Performance
C. Produce on-site renewable energy through a Power Purchase Agreement of at least 100% of the blended rate for the project including the offsetting the campus condenser water loop

Net Zero Energy Approach

Ambient Energy will be involved during construction to review energy related construction submittals and to update the final energy model to an as-designed model after receipt of the 100% record drawings. If additional confirmation is desired by CU Anschutz for net zero energy achievement post construction, then the following services may need to be coordinated:

A. Equipment load study
B. ZNE dashboard
C. Facilities and occupant training
D. Validate ZNE for a year after stable operation
E. ZNE certification (USGBC LEED Zero or ILFI Zero Energy)

MECHANICAL ANALYSIS INPUTS - MARCH 18, 2021

Mechanical	Campus Standard	Proposed Design
Setpoints	Same as Proposed	Occupied: 74F clg, 70F htg (confirm with campus standards) Unoccupied: 85F clg, 65F htg
Primary HVAC System	AHU Direct Evap, w/ VAV Hydronic Reheat, CUP for Heating and Cooling	CUP Chilled Water Return as condensing loop, Distributed Water Source Heat Pumps; (2x) DOAS vfd, WSHP Heating and Cooling, VAVs, ERV, (controlled by occ sensors)
Other HVAC System	IDF / MDF / IT: CHWS FCU Vestibules, mechanical: HHWS Unit Heater	IDF / MDF / IT: WSHP Vestibules, mechanical: WSHP
Semiheated and Unconditioned Spaces	NA	NA
Equipment Efficiencies	NA	NA
Equipment Capacities	Heating: 520 MBH Cooling: 60 tons	Heating: 520 MBH Cooling: 60 tons
Design Air Flow Rates (cfm)	Fan total: 32,000 cfm	Fan DOAS Total: 14,000 cfm (0.5 cfm/sf DOAS)
Ventilation (cfm)	Same as Proposed	ASHRAE 62.1-2019
Exhaust (cfm)	Same as Proposed	Exhaust fan 1 (Restrooms): 900 cfm Exhaust fan 2 (fitness): 500 cfm
Demand Controlled Ventilation	Same as Proposed	Per code for high density spaces
Economizers	75 F high limit shut off	75 F high limit shut off
System Fan Power (W)	Fan Total: 31,000 W *	Fan GSHP Total: 10,000 W * Fan DOAS Total: 22,000 W *
Exhaust Air Energy Recovery	NA	50% effective
Supply Air Reset	55-65 F	DOAS: 65 F
Hot Water Plant	To be provided by client CUP Heating: XX CUP 70% thermal efficiency (0.75 kW/ton)	Distributed Heat Pumps: 3.5 COP
Hot Water Loop	Supply 180 F, return 140 F Reset 180 F at 0 F, 130 F at 60 F Pumps 21 W/gpm, 30 gpm, 60 ft head	NA
Chilled Water Plant	CUP Cooling: under 0.7 kW/ton total plant	NA
Chilled Water Loop	Supply 46 F, return 56 F (check campus standards- 47 F likely) Reset XX F at XX F, XX F at XX F Direct district feed	NA
Heat Rejection	NA	CUP CHW Return Supply 57 F CUP efficiency: 0.65 kW/ton (5.41 COP)
Plumbing	**Campus Standard**	**Proposed**
SHW Type	Steam water heater HX	Heat Pump Water Heater
SHW Efficiency	70%	COP 2.0
SHW Loop	Supply 120F	Supply 120F

* assumption

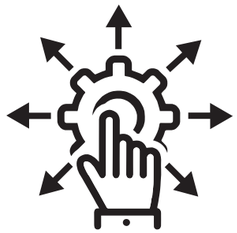
(NM) not modeled

Sustainability

The University of Colorado Anschutz (CU Anschutz) Campus Safety and Preparedness Facility (CSPF) is a building that will model the University of Colorado's key pillars: fiscal sustainability, campus wellness, and innovation. By combining three locations on campus into one, modern facility, the new facility will allow functions and departments to be consolidated. The building is approximately 26,100 GSF and includes law enforcement, security and emergency preparedness services for the Anschutz Medical Campus.

The project goals for Sustainability for this design-build project include:

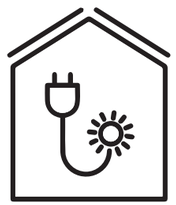
Utility



Design a durable and flexible building that meets the current and future needs, allows for expansion and adaptability.

One of the programmatic drivers of the project was stewardship of the site. Building 610 currently occupies the site for the new facility and was built in 1942, but is currently unoccupied. In an effort to support the mission of the project, the building will not be demolished, and instead will be renovated and reused, further reinforcing the vision around sustainability. The new 2-story addition consists of a column-free 40 foot deep floor plate that is suited to meet current programmatic needs, but is also extremely flexible and adaptable if the function were to change over time.

Sustainability



Design an innovative, energy efficient building that meets the team's forward-thinking aspirations of a net zero energy building.

This project has been designed with energy efficiency and innovation in mind, and with a partnership between CU Anschutz and our Power Purchase Provider to contract a Power Purchase Agreement, is designed to achieve net-zero energy.

The CSPF will generate excitement and continue CU Anschutz legacy of sustainability on campus by including concepts such as: reducing consumption of resources (energy, water, and waste), ensuring efficient operations and maintenance through commissioning, providing renewable energy, using healthy materials, and providing a demonstrable example, the first one on the campus, of a net zero energy building. Optimizing offices and conference rooms through thermal comfort, daylight and a direct line of site to the outdoors is key to creating more productive and healthy places for staff, officers and visitors. Studies have found an increase in occupant performance in healthier buildings.

The project will be required to meet the High-Performance Certification Program (HPCP) requirements mandated by the State of Colorado for projects receiving public funding as well as Executive Order Greening of State Government D 2019 016.

The construction of this building will achieve the requirements of the U.S. Green Building Council's (USGBC) LEED® for New Construction™ Version 4, Gold minimum level certification. As shown in the LEED scorecard provided in Appendix C, the project's goals will be refined as the design team moves through the design process. The project team has identified 68 "yes" points for pursuit with an additional 19 points identified for further investigation as "maybe'" (Gold rating requires 60 points; Platinum requires 80 points out of the 110 possible). The additional maybe points represent an opportunity to create a Platinum building.

The Campus Safety and Preparedness Facility will be a model of net zero energy and sustainability as well as a teaching tool for the campus and the City of Aurora.

Meeting the High-Performance Certification Program and Greening of State Government

The Campus Safety Building meets Executive Order Greening of State Government D 2019 016 focused on reducing greenhouse gas emissions and the Office of the State Architect's High Performance Certification Program for New Construction and Substantial Renovations (July 2018 update). Specifically the following relevant requirements are met for the CUA project:

A. **Certification** The project is on track to meet or exceed a LEED for New Construction Gold rating.
B. **Utility** metering and reporting The design includes the necessary sub metering for water

and electricity usage and campus condenser water loop energy usage. CUA will commit to meet report annual utility data to the Office of the State Architect as required.

C. **Renewable** energy production Renewable energy will be provided through a Power Purchase Agreement (PPA) between CU Anschutz and the power purchase provider. The provider will provide an option for on-site storage of critical loads.

D. **Vehicle** charging The final selected design includes prewiring for 20% of parking spaces and chargers for 5% of parking spaces planned for the project. This equates to 5 spaces, and 2 spaces, respectively.

E. **Electrification** The final selected design includes fully electric building systems.

Sustainability Goals

USGBC's LEED Building for Design and Construction certification represent a holistic approach to sustainable design, construction and operation. Specific goals for various sustainability categories are listed below.

Integrative Process

A. During the integrative process, energy and water goals will be explored and systems can begin to be defined. Some of this work has already been done for the design-build competition. A water analysis needs to additionally be conducted.

Location and Transportation

A. Locating the project on previously developed land preserves greenspace.
B. Building in a dense area with access to multiple services and multiple and different modes of alternative transportation.
C. Providing bicycle storage, locker rooms, and showers for staff, police force, and visitors.
D. The final selected design includes prewiring for 20% of parking spaces and chargers for 5% of parking spaces planned for the project. This equates to 5 spaces, and 2 spaces, respectively.

Sustainable Sites

A. Providing vegetation and open space for people and other natural habitat
B. Utilizing roof and hardscape materials that help to mitigate the heat island effect through high SRI materials or vegetated roofs
C. Installing exterior lighting that limits light pollution

Water Efficiency

A. Reducing annual water usage from indoor plumbing by selecting ultra-low flush and flow fixtures by at least 35%
B. Reducing water demand for landscaping by at least 50%
C. Landscape design considers sustainable practices that promote biodiversity, native drought tolerant plants and efficient water requirements
D. Metering and submetering installed to track indoor and outdoor water usage

Energy Efficiency

A. CU Anshutz to select commissioning provider to perform enhanced, envelope, and monitoring-based commissioning of building energy systems.
B. Project is designed to achieve at least 50% reduction in energy costs compared to ASHRAE Standard 90.1-2010 baseline building including renewable energy through a Power Purchase Agreement and Renewable Energy Credit purchase.
C. Use metering, submetering and data analysis to track energy usage. Submetering to be provided on every load greater than 10% of energy usage.

Materials & Resources

A. Reuse existing building on the site to save embodied carbon.
B. Recycle and/or salvage at least 75% non-hazardous construction and demolition debris during demolition and construction
C. Reduce the environmental impact of building materials by using at least 20 permanently installed products that contain an Environmental Product Declarations
D. Reduce the human health impacts of building materials by using at least 20 permanently installed products that contain a Health Product Declaration, Declare, Cradle to Cradle label or a chemical inventory
E. Design and construct the project to include recycled content and certified wood products

Indoor Environmental Quality

A. Incorporate low or no emitting materials throughout (adhesives, sealants, paints, coatings, flooring systems, composite wood, furniture, and insulation)

B. Develop and implement an indoor air quality management plan. In addition, perform a building ventilation flush-out or air quality testing.

C. Provide individual lighting controls and high-quality lighting for building occupants which includes addressing visual acuity levels, glare, color temperature and direction

D. Ensure occupant thermal comfort through enhanced indoor air quality strategies and individual controls

E. Provide natural daylight and high-quality views to the outdoors

F. Provide a comfortable environment to building occupants by mitigating noise through acoustic design from outside to the inside, between indoor spaces and within open area workstations

Innovation

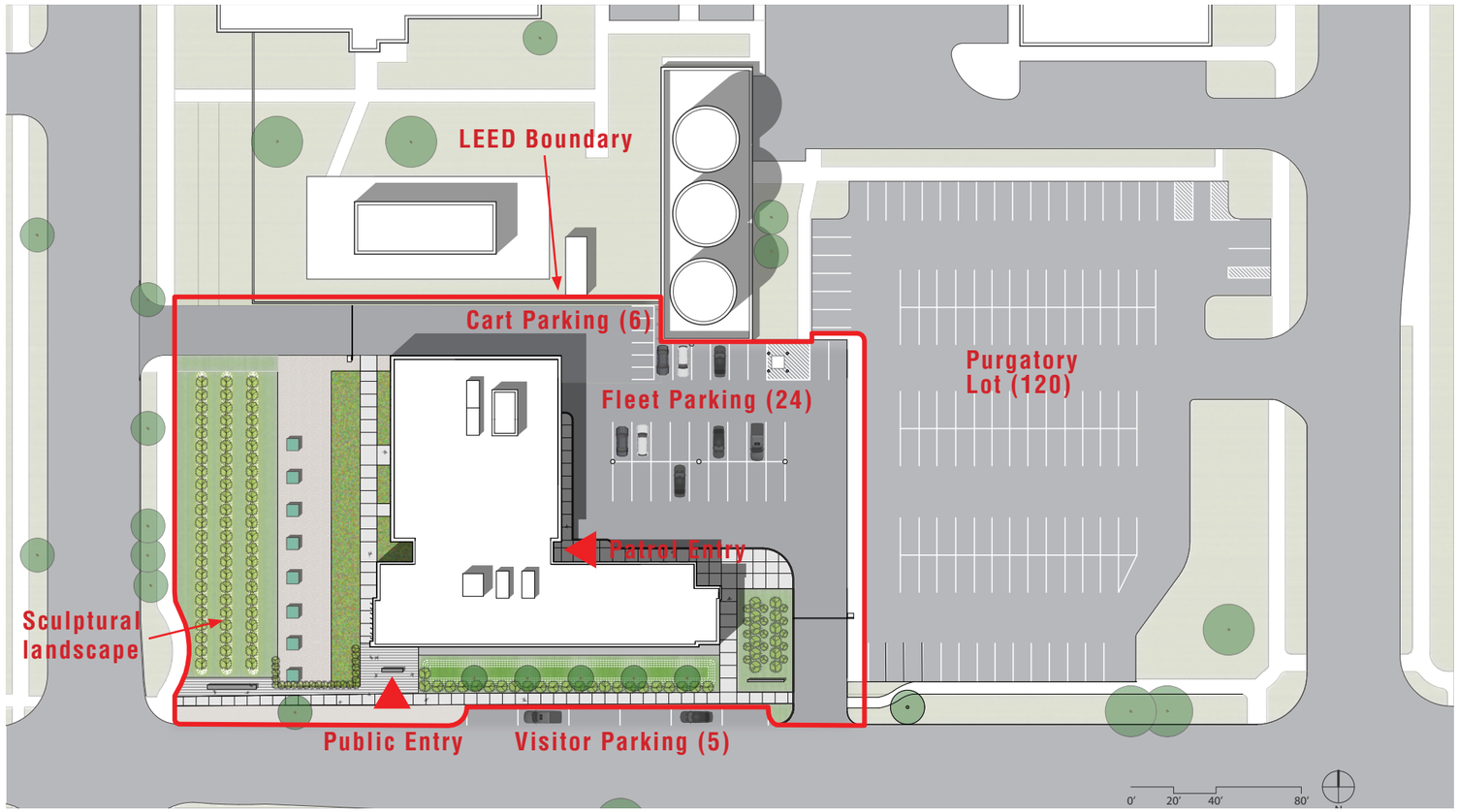
A. LEED projects will pursue a variety of strategies including Exemplary Performance (EP), Pilot Credits, and strategies from the Innovation Catalog

B. Innovation credits recommended to pursue for MSU Denver are as follows:

- Green Education
- O+M Starter Kit (Policies)
- Purchasing Lamps

C. Pilot credits recommended to pursue are as follows:

- Designing with Nature, Biophilic Design for the Indoor Environment
- Quality Views in non-regularly occupied spaces
- Integrative Process for Health Promotion
- Solar Access to Green Space



SITE PLAN: BASE

LEED Summary

The design build team will, at a minimum, achieve a LEED-NC Gold v4 certification for this project, which requires at least 60 points. A simple LEED for New Construction v4 scorecard provided in Appendix A identifies the following:

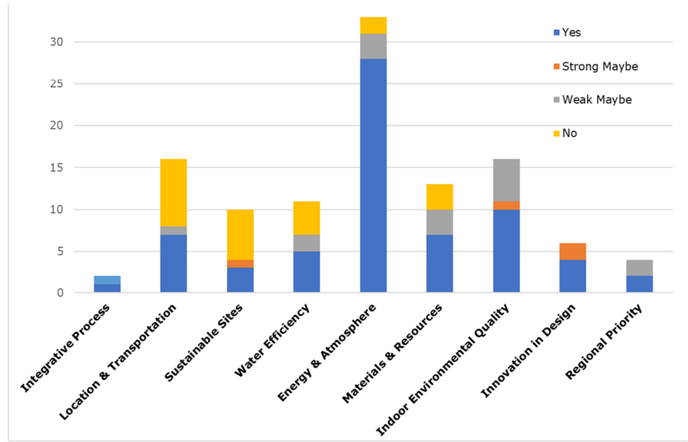
A. Likely achievable credits (Yes), potentially achievable credits (Strong and Weak Maybe), and credits not reasonably achievable or not applicable (No)
B. Requirements for prerequisites and credits
C. Credit champions who are responsible for meeting credit requirements and for completing and signing the final LEED-Online credit templates

The previous LEED boundary indicates how LEED points will be allocated towards site related credits.

The following image shows the status of the LEED score for the project and indicates the number of points in the Yes, Maybe, and No categories along with the number of points required for each level of LEED certification.

LEED-NC V4 POINT SUMMARY FOR
CU ANSCHUTZ CAMPUS SAFETY

The image below shows how points are distributed across the seven categories of LEED in terms of the Yes, Maybe, and No. As shown, the Campus Safety Building is doing quite well in Energy and Atmosphere, resulting in low utility costs as well as in Indoor Environmental Quality, which helps achieve occupant comfort, productivity and wellness.



LEED-NC V4 POINT SUMMARY FOR
CU ANSCHUTZ CAMPUS SAFETY