ENERGY TEAM

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01

INTRODUCTION

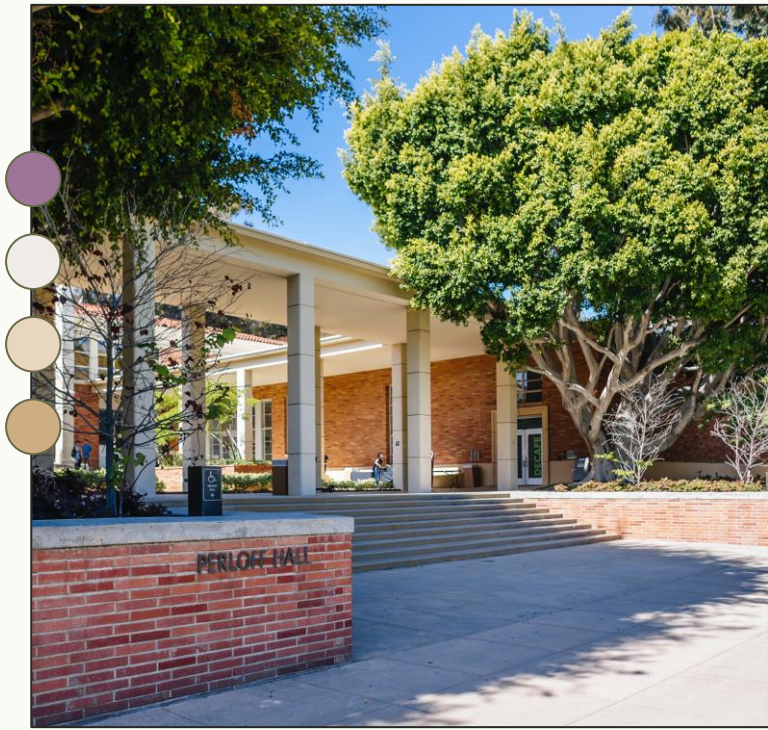
Research Question:

How can **building occupancy** data be integrated into UCLA facility management to **promote energy efficiency**?

Considerations:

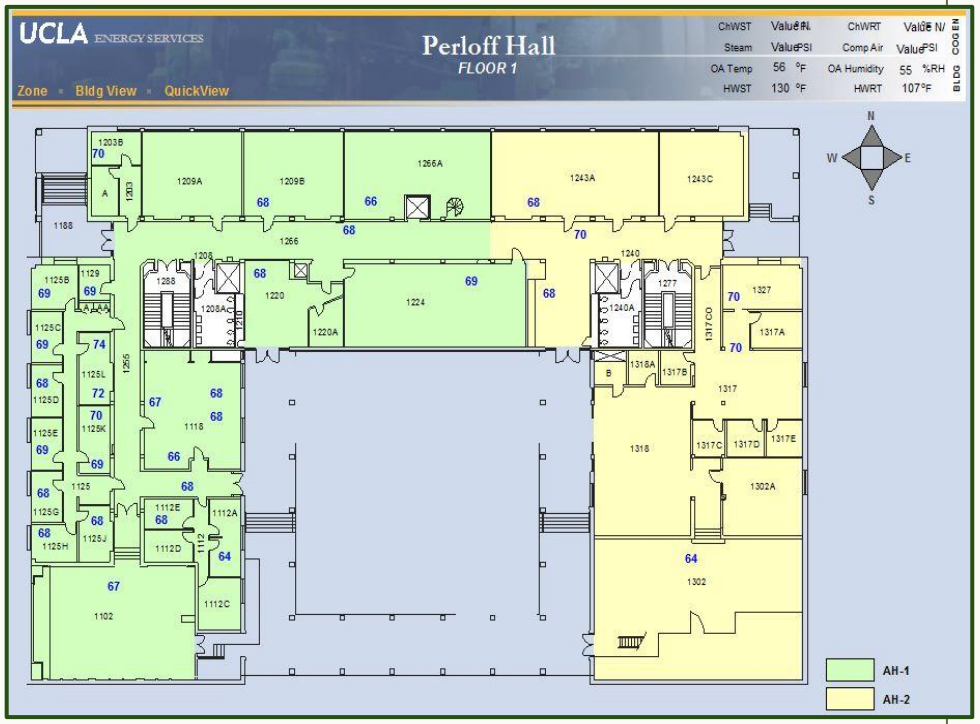
- Findings from last year’s energy team
- Past attempts to collect occupancy data
- Custodial scheduling and preferences
- Level of control and implementation process

02
METHODS



Facility Selection

- Why Perloff?
- Meet with Building Coordinator
- HVAC Control Zones



Data Collection

- Pre-made data collection sheet
- Occupancy Observation
- Data Collection Schedule: 7-11pm, May 3-12th

Perloff May x xx:xxpm		B Level								Floor 1			
AH1	0	AH1	Y/N	AH2	Y/N	AH3	Y/N	AH4	Y/N	AH1	Y/N	AH2	Y/N
B203		B203		B227		B125		B321		1102		1243A	
B212		B212		B229		B128		B315		1112		1243B	
B215		B215		B230			Shop Rooms [A]	B311		1112A		1243C	
B225		B225		B233				B309		1112C		1327	
B222		B222		B237				B302		1112D		1317	
1102				B241				B306		1112E		1318	
1112				B243				B320		1118		1302	
1112A				B330				B324		1125A-L			
1112C										1125AA			
1112D										1255			
1112E										1129			
1118										1203A			
1125A-L										1203B			
1125AA										1209A			
1255										1209B			
1129										1220			
1203										1224			
1203A										1266			
1203B													
1209A													
1209B													
1220													
1224													
1266													
AH2	0												
B227													

Saving Cost Calculator

- Submitted the new schedule into the saving cost calculator
- Produced monetary savings & the emission reductions

BUILDING ENERGY CALCULATOR

BLDG: Perloff
DATE: May 23, 2023

			Based on 70% of design.	1 = YES	1 = YES	NORMAL OPERATION					ENERGY OPERATION								
						OCCUPIED HOURS / day				ANNUAL ENERGY	OCCUPIED HOURS / day				VENTILATION HOURS				ANNUAL ENERGY
UNIT	SERVING	FUNCTION	CFM	100% OA	RECIRC	M-F	SAT	SUN	HOURS		M-F	SAT	SUN	HOURS	M-F	SAT	SUN	HOURS	
AH-1			21,200	1		8	8	8	2,912	26,500	7	7	7	2,548				0	23,188
AH-2			22,000	1		8	8	8	2,912	27,500	7	7	7	2,548				0	24,063
AH-3			3,700	1		8	8	8	2,912	4,625	7	7	7	2,548				0	4,047
AH-4			4,800	1		8	8	8	2,912	6,000	7	7	7	2,548				0	5,250
AH-5			10,000	1		8	8	8	2,912	12,500	7	7	7	2,548				0	10,938
AH-6			8,500	1		8	8	8	2,912	10,625	7	7	7	2,548				0	9,297
EXHAUST FANS			2,000	1		8	8	8	2,912	2,500	7	7	7	2,548				0	2,188
									0	0				0				0	0
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									0	0				0				0	0

TOTAL CFM.. 72,200

TOTAL ANNUAL COST.. $90,250

TOTAL RESCHEDULED COST.. $78,969

ENERGY RATES

SYSTEM $ per CFM per YEAR

TOTAL OPERATING HOURS.. 20,384 | 17,836 | 0

$3.75 100 % OUTSIDE AIR

LESS RESCHEDULED COST.. $78,969

TOTAL RESCHEDULED HOURS.. 17,836

$2.50 RECIRCULATED AIR

NET ANNUAL SAVINGS.. $11,281

REDUCED OPERATING HOURS.. 13%

$1.25 VENTILATION MODE

03
RESULTS

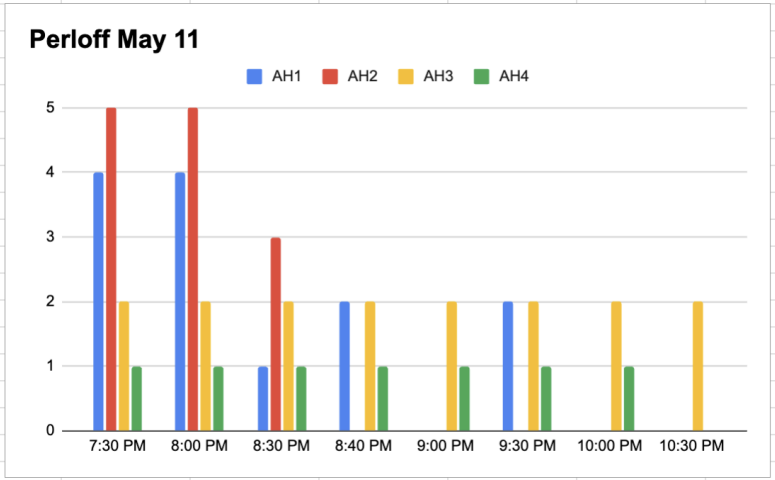
Converged Data

Converted hourly data into this format:

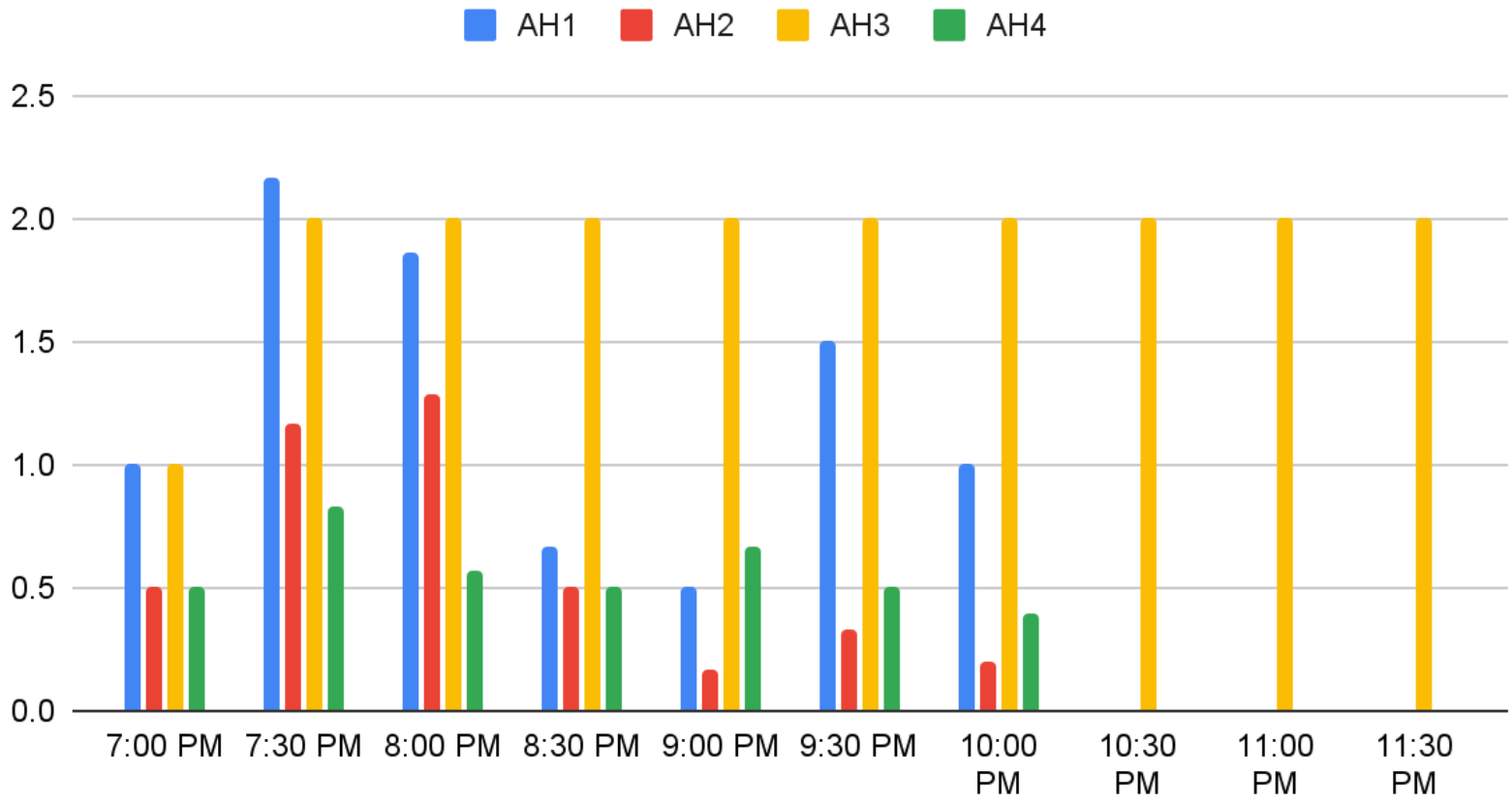
- Amount of people per air handler zone at given time
- Graphed each day
- Created an aggregated format of data graph

Perloff May 11

	AH1	AH2	AH3	AH4
7:30 PM	4	5	2	1
8:00 PM	4	5	2	1
8:30 PM	1	3	2	1
8:40 PM	2	0	2	1
9:00 PM	0	0	2	1
9:30 PM	2	0	2	1
10:00 PM	0	0	2	1
10:30 PM	0	0	2	0

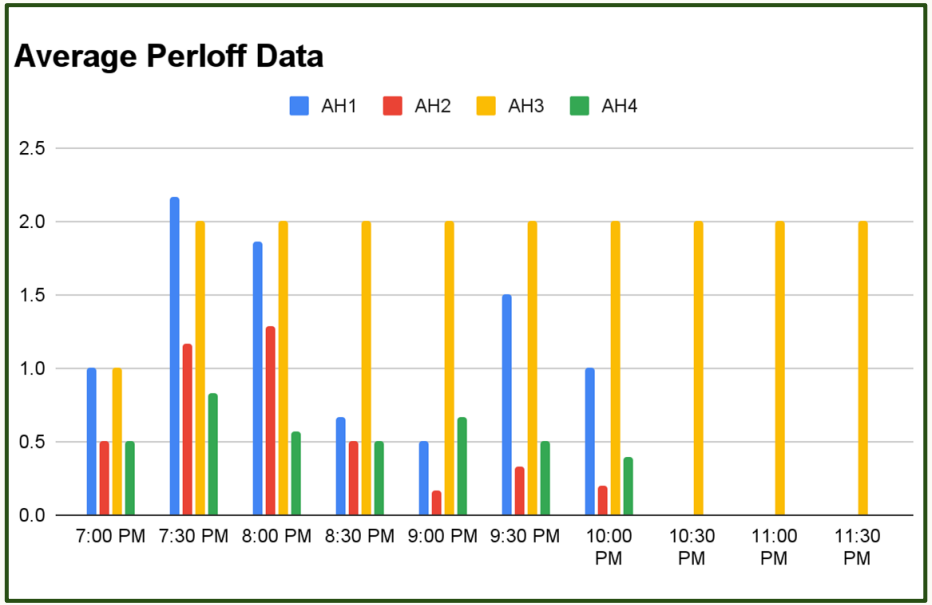


Average Perloff Data



Data Analysis

- Downwards trend
  - After 10pm people are gone
- Major changes in occupation in **AH1, AH2, AH4 after 10:00pm**



Deliverable: Proposed Schedule Changes

Perloff (during the week)

Zone	Open	Close
AH1	7:00	23:59
AH2	7:00	21:00
AH3	6:00	23:59
AH4	7:00	21:00
AH5	6:00	23:59
AH6	9:30	17:00

Perloff (during the week)

Zone	Open	Close	
AH1	7:00	**22:00**	Shift end time to 22:00
AH2	7:00	**20:00**	Shift end time to 20:00
AH3	6:00	23:59	No Changes (due to occupation)
AH4	7:00	21:00	No Changes
AH5	6:00	23:59	No Changes (not sampled)
AH6	9:30	17:00	No Changes (not sampled)

Proposed Schedule Changes

Changes to Air Handlers 1 & 2

- AH1 and AH2 have the largest zones
- Reducing the time every weekday by three hours

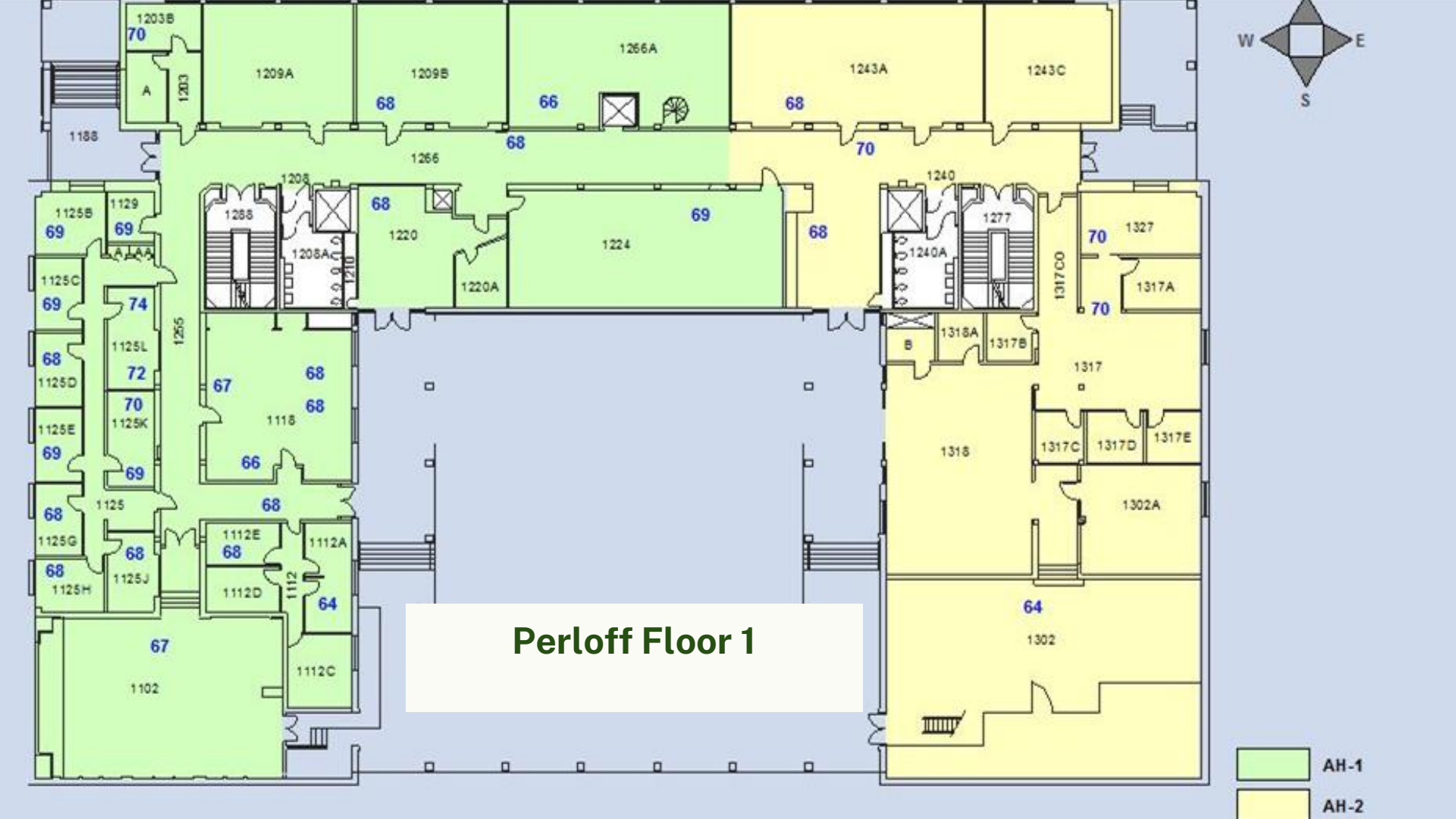
→

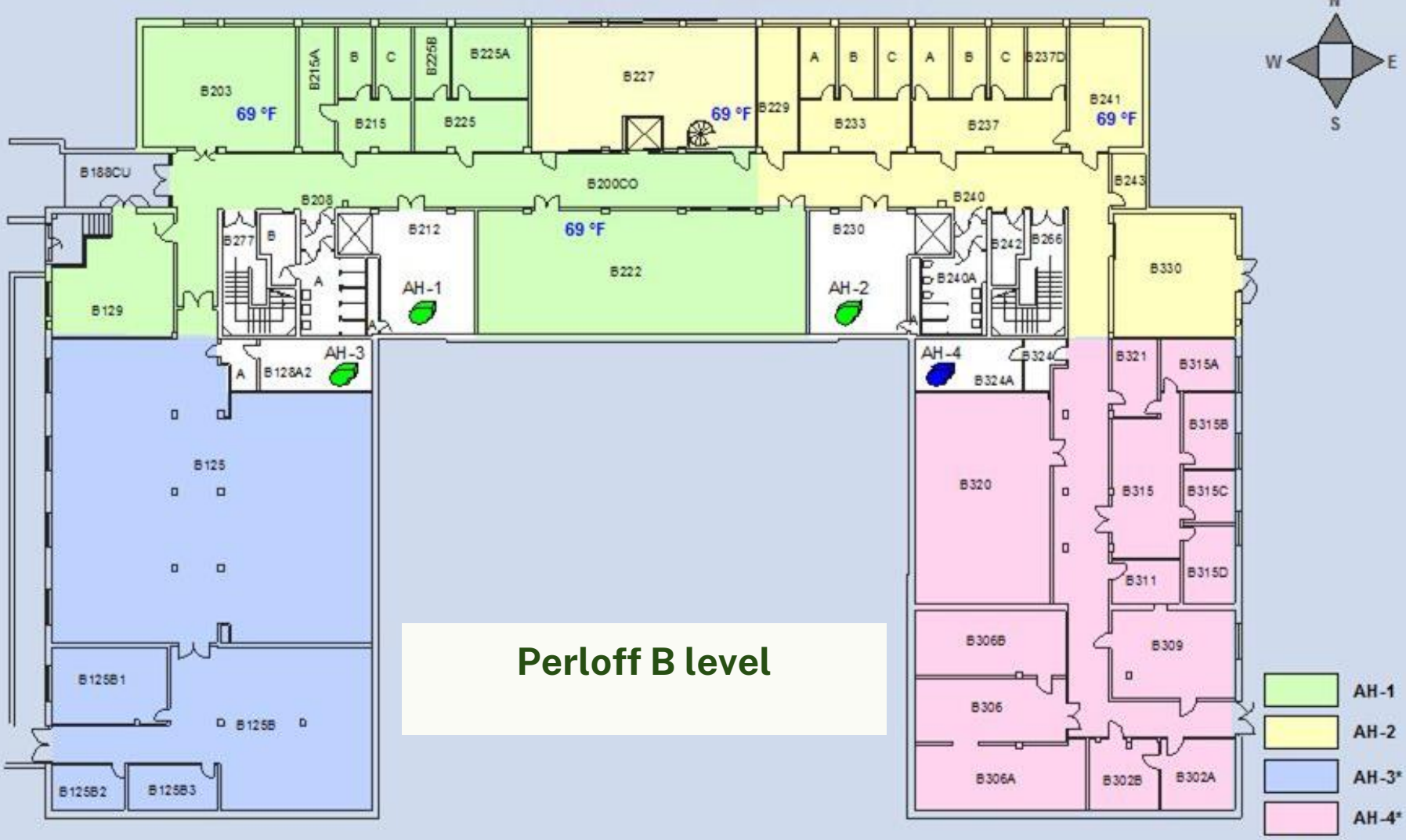
Effects of Reduction

15 hours reduced weekly

=

780 hours annually!


Perloff Floor 1
W
E
S
AH-1
AH-2
1203B
70
A
1203
1209A
1209B
1266A
1243A
1243C
1188
1266
1208
1288
1208A
1210
1220
1220A
1224
1240
1240A
1277
1327
1317A
1317CO
1318A
1317B
B
1317
1318
1317C
1317D
1317E
1302A
1302
1125B
1129
1125C
1125L
1255
1125D
1125K
1125E
1125
1125G
1125J
1125H
1118
1112E
1112A
1112D
1112
1112C
1102



Perloff B level

Annual Savings

Energy

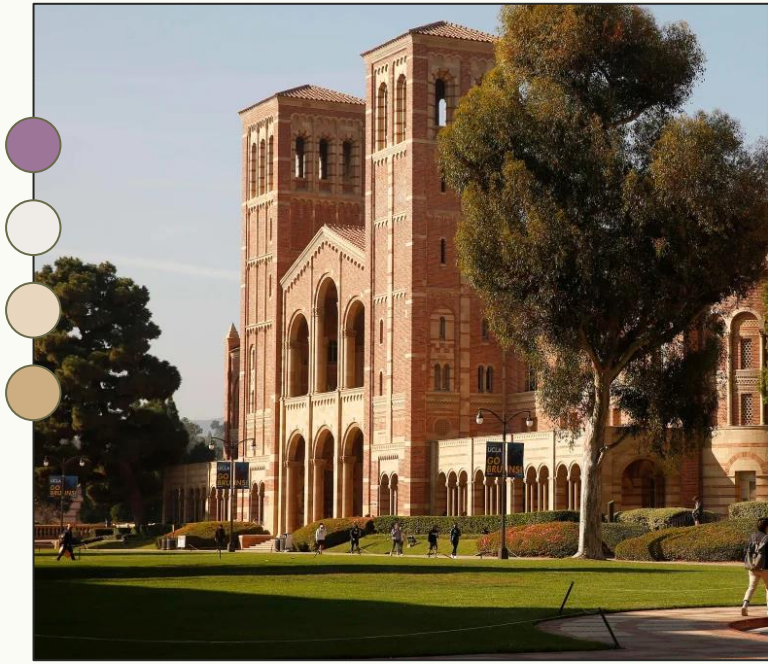
- **3,945.31** pounds of carbon dioxide

Financial

- **$3,354** net cost reduction

04

SIGNIFICANCE



Significance

Ensure high usability while reducing energy

Offers a low cost and flexible plan

Nearly 2 metric tons of carbon dioxide reduction!

Potential method for further energy reduction

The importance of HVAC Control Zones

$3,354 net cost reduction!

Next Steps

Apply HVAC methodology to reduce hours in other buildings

Buildings should keep updated scheduling and schedule change request databases

UCLA Facilities Management

Disseminate findings within Facilities Management for schedule changes

EDI: Involve more staff in decision-making processes

Special Thanks to

- SAR Program! Carl, Cully, Racquel, Julia, Jeff
- Stakeholder: Spencer Middleton, UCLA Facilities Management Energy Analyst
- Philip Soderlind + Linda Holmes: Perloff Building Coordinators
- Robert Striff: Assistant Director of Energy Services and Energy Controls
- Justin Wisor: Director of Custodial and Grounds
- Christian Tsouras: UCLA Facilities Management Project Manager

And THANK YOU for listening!

Any questions?