

ET Summit 2019

Presented by



Designing for Technology & ZNE

Clifford L. Allenby Building
California Department of General Services

Nicholas Docous, AIA

Principal Architect, Lionakis



ZGF

LIONAKIS



Zero Net Energy

DGS definition of ZNE

"ZNE Source – Energy Efficient building that produces as much clean renewable energy as it consumes over the course of a year, when accounted for at the energy generation source."

Our Approach

A high-performance building that meets contemporary standards for occupant comfort and building systems while providing a superlative and collaborative work environment enhanced by occupant education and feedback that addresses building features and functions, receptacle-level energy reporting, and whole building operation optimization.

Critical Success Factors

- 01** | Create a **DISTINGUISHED AND INSPIRATIONAL** building design that fosters positive relationships with stakeholders, occupants, and the community.
- 02** | Ensure **TRANSPARENCY OF DEMOCRACY**, building security and safety for occupants, including during construction.
- 03** | Include **INNOVATION WITHOUT UNDUE RISK** utilizing proven technologies.
- 04** | Provide **FLEXIBLE WORKSPACES** to accommodate modern movements in employee behavior and technology, and attract future generations of employees.
- 05** | Create spaces that **ENCOURAGE COLLABORATION, WELLNESS AND SATISFACTION** of the occupants.
- 06** | **ENGAGE** the **COMMUNITY** by providing a welcoming commercial space on the first floor.
- 07** | Support sustainable, **ZERO NET ENERGY** strategies, including a maximum target Site Energy Use Intensity (EUI) of 30.
- 08** | Include **WATER CONSERVATION** and reuse measures that exceed code requirements.
- 09** | Provide a resilient, maintainable, durable, high-quality building designed and built to a **50-YEAR DESIGN STANDARD** with a 150 year life expectancy.
- 10** | **FOSTER POSITIVE RELATIONSHIPS** with all stakeholders.
- 11** | Complete the Project on budget and **MEET OR EXCEED** the schedule.

Design Approach

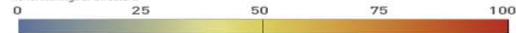




Massing Options

Continuous Daylight Autonomy

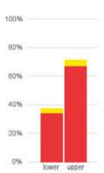
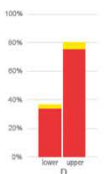
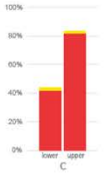
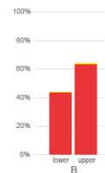
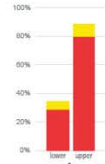
Percent electric light savings, 25 footcandles target
No furnishings or structure



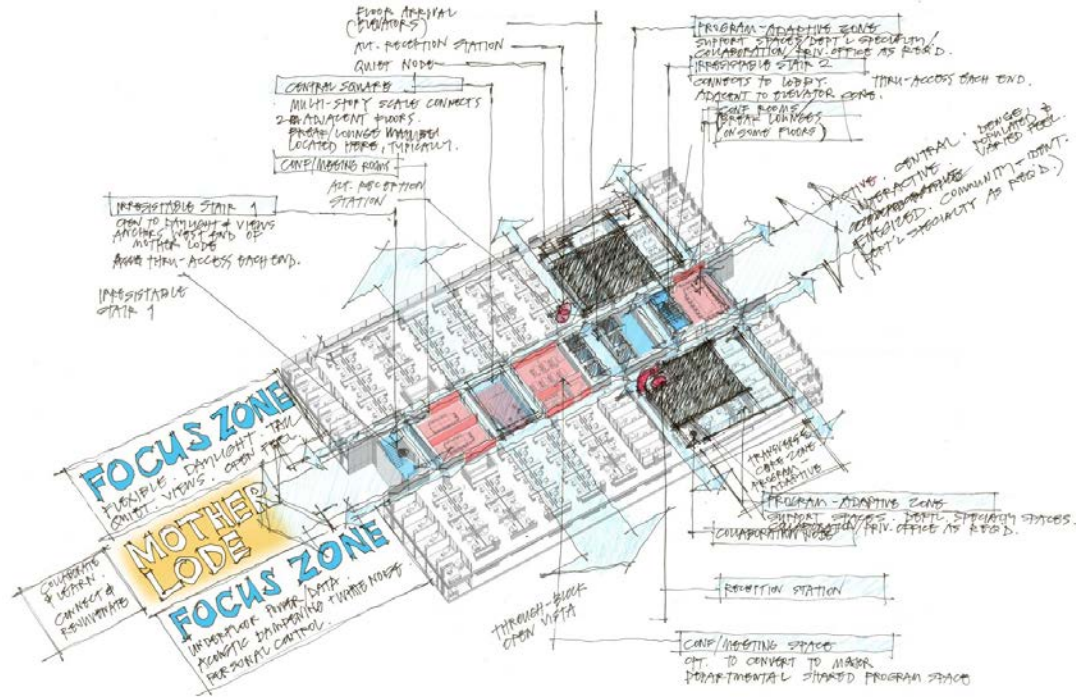
Lower floor

Upper floor

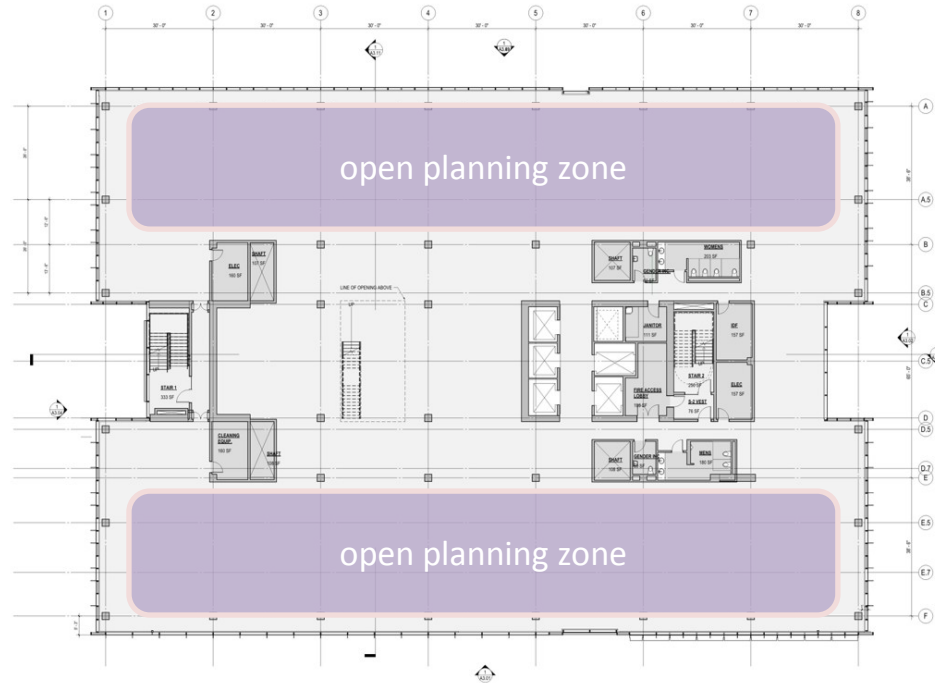
■ North / South Windows Only
■ East / West Windows Closed
■ With East / West Windows Open



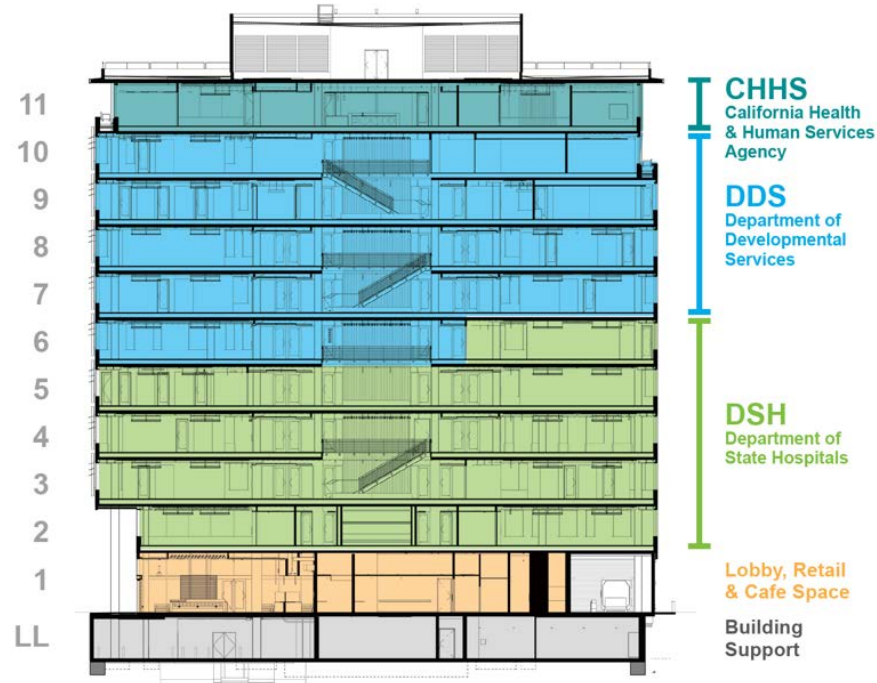
Mother Lode Concept



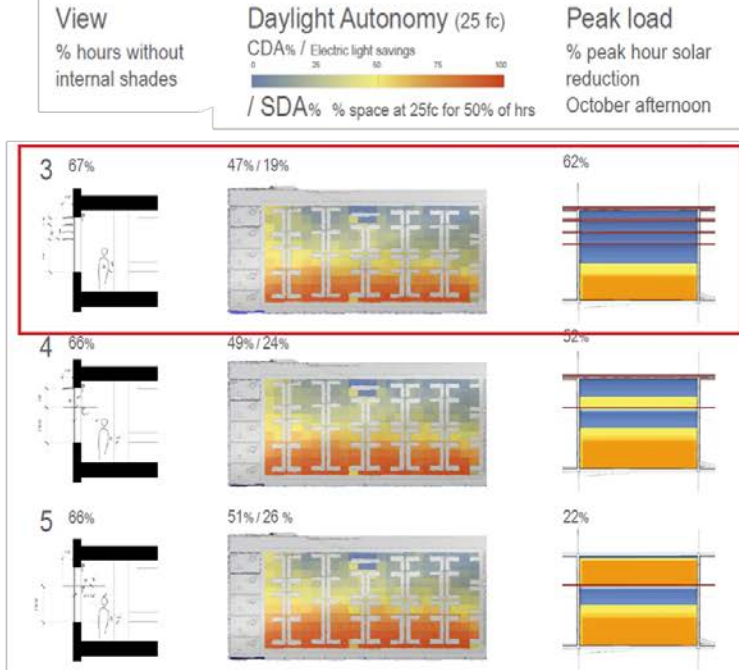
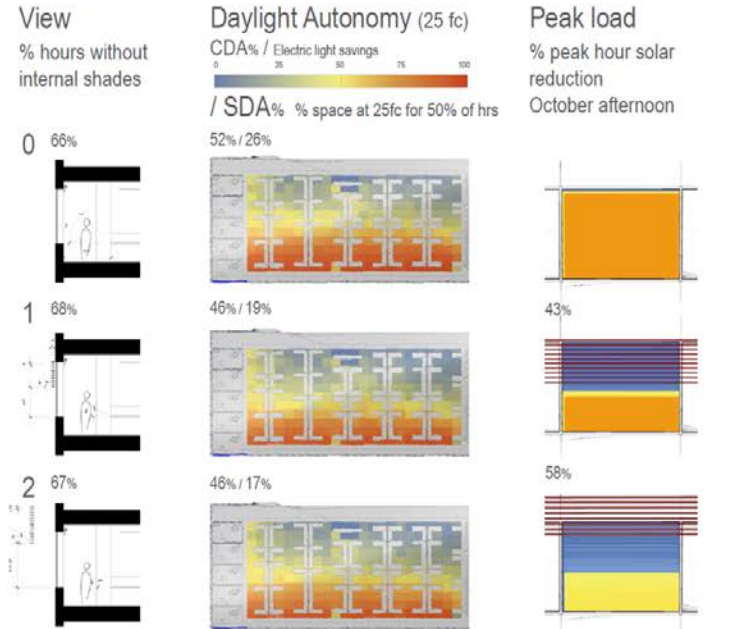
Typical Floor



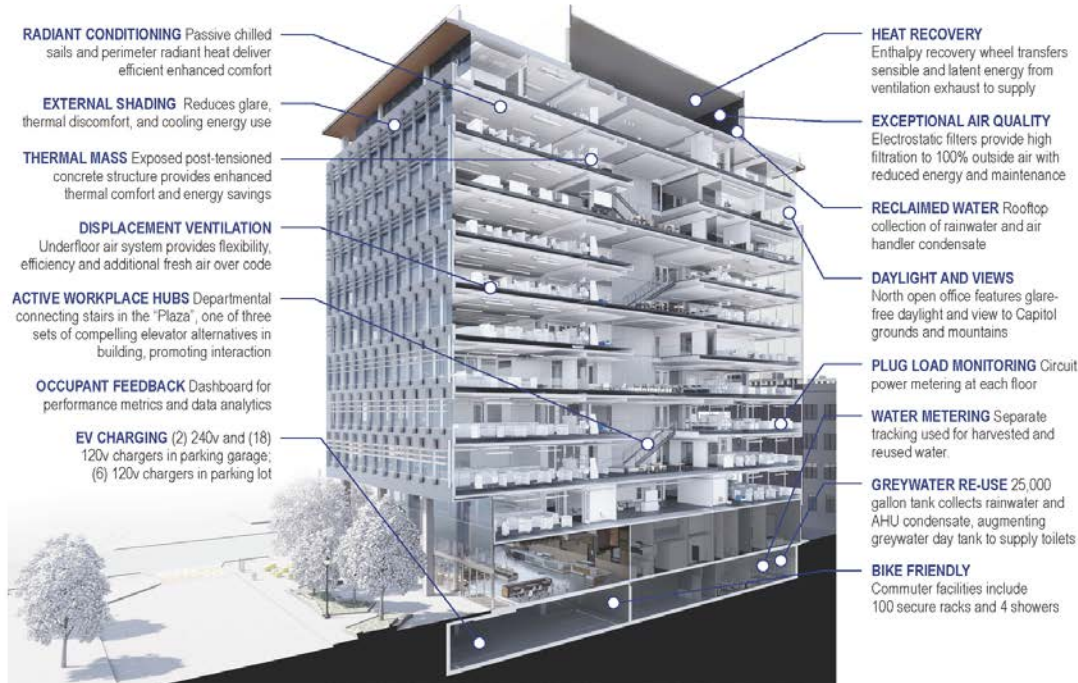
Departmental Stack



Shading Optimization



Systems



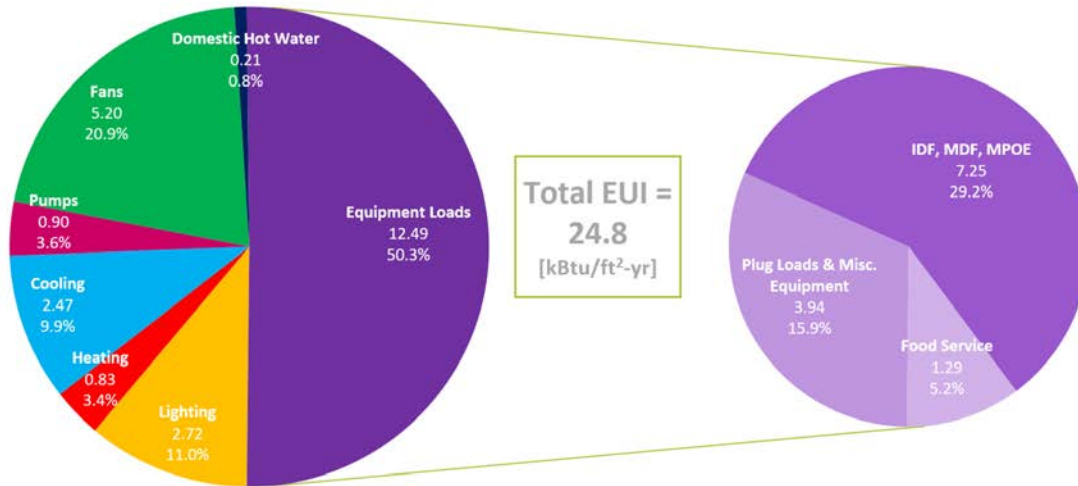
Water Optimization



Energy: Roles & Responsibilities

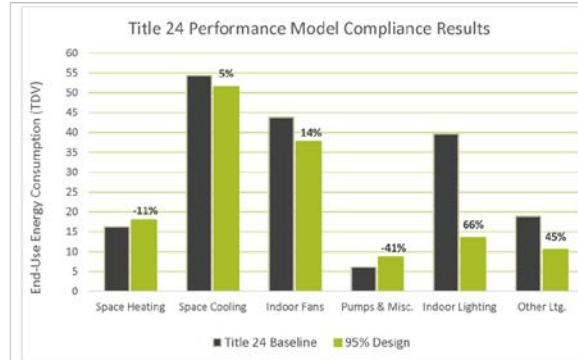
Phase	Task	Responsible Party	Role
Design	Create Energy Model	Glumac	Energy Modeler
	Generate M&V Plan	Glumac	MEP Engineer
Construction	Implement M&V Infrastructure	Schetter, Airco	Elec, Mech/Plumb Contractors
	Implement M&V Software	L&H Airco	Controls Contractor
	Commission M&V System	Enovity	Commissioning Authority
Post-Construction	Data Collection	L&H Airco	Controls Contractor
	Implement M&V Plan	Glumac, DGS, Airco, Schetter	MEP Engineer, Owner, Mech/Plumb, Elec Contractors
	Model Calibration	Glumac	Energy Modeler
	Building Calibration	R&S, L&H Airco, Airco, Schetter, Glumac, DGS	GC, Controls, Mech/Plumb, Elec Contractors, MEP Engineer, Owner
	Data Analysis	Glumac	MEP Engineer
	Confirmation of ZNE	DGS	Deputy Director - Sustainability

Site Energy

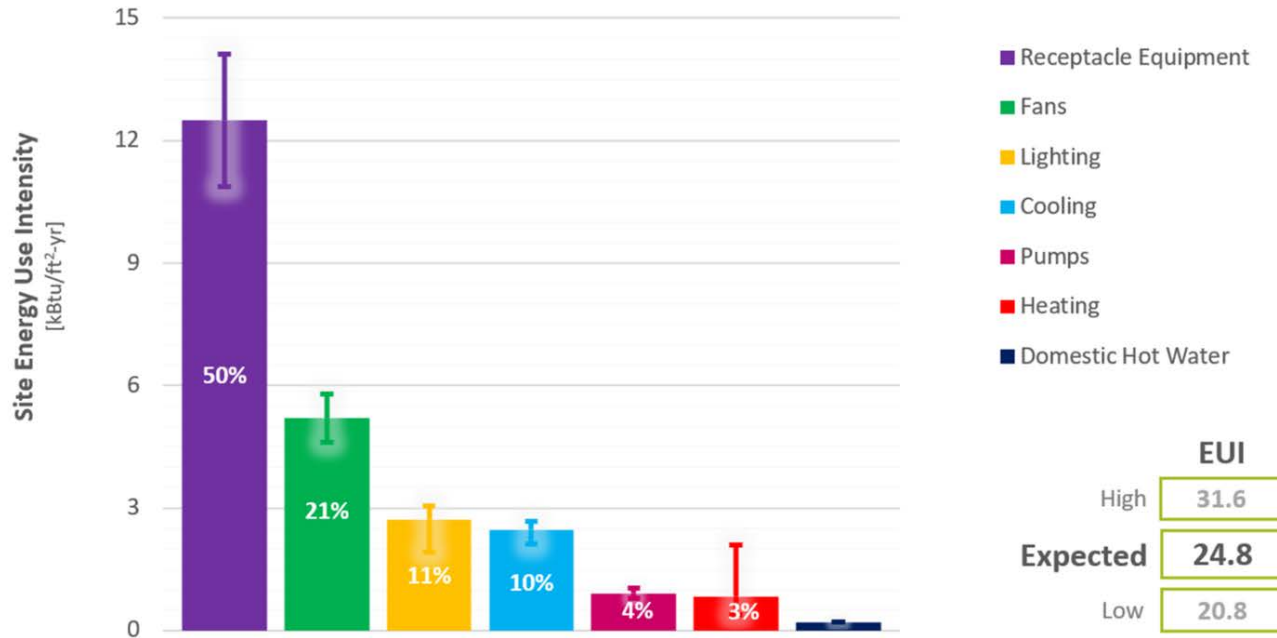


LEED & Title 24 Compliance

Parameter	Unit	LEED Baseline	95% Design
Natural Gas Consumption	Mtu	5,972,362	460,873
Electricity Consumption	kWh	3,483,634	2,564,759
Total Energy Consumption	Mtu	11,851,196	9,212,662
On-Site Solar PV Energy Generation	kWh	0	0
SMID Solar/Heat Purchased Electricity	kWh	0	2,762,000
SMID Solar/Heat Purchased Electricity	%	0.0%	30.3%
Electricity Consumption with Renewables	kWh	3,483,634	1,95,250
Total Energy Consumption with Renewables	Mtu	17,403,196	9,249
Building Area	ft ²		171,209
Site EUI	Mtu/ft ² -yr	68.39	24.82
Site Energy Savings	%		48.4%
Site EUI with Renewables	Mtu/ft ² -yr	68.39	0.60
Site Energy Savings with Renewables	%		100.0%
Natural Gas Cost	\$/therm		1.0172
Electricity Cost	\$/kWh		0.1171
Total Energy Cost	\$	\$468,448	\$305,020
Energy Cost Savings	%		34.3%
Natural Gas Source Energy Multiplier	-		1.09
Electricity Source Energy Multiplier	-		3.15
Total Source Energy	Mtu	41,929,799	38,061,708
Source Energy Savings	%		9.1%
Natural Gas GHG Emission Factor	metric ton CO ₂ /MMtu		0.053000
Electricity GHG Emission Factor	metric ton CO ₂ /kWh		0.0007030
Total GHG Emissions	metric ton CO ₂	2,794	(71)
GHG Emissions Saving	%		102.6%
Improvement Over LEED Baseline:			69.3%
LEED Points:			18



Design End-Use Energy



Change Management

- Tenant engagement and user education
- Managing and optimizing building performance
- Measuring success



E-Blast Newsletter

Clifford L. Allenby Building

E-Blast Volume 1, Issue 1

March 2019

Introduction

Welcome to the first edition of the new monthly E-Blast for this Clifford L. Allenby Building! Each month, we will report on the building's construction progress, offer insights into the design, and discuss the high-performance strategies that we need to achieve Net-Zero Energy. We will also keep you updated on how your internal teams are working to prepare for a smooth move-in process for the California Health and Human Services Agency, the Department of Developmental Services, and the Department of State Hospitals, leading a seamless transition into your occupancy of this long-overdue, modern, sustainable workplace.

This project was first authorized as part of the State Project Infrastructure Fund (SPIF)'s 2016-17 budget. The Performance Criteria phase was completed over the first half of 2017, with the design build competition occurring in the Fall of 2017. The HAS/OSP A small design-build team was selected in December 2017, and the notice to proceed was issued in early February 2018. The team demolished the Food and Agriculture Annex Building in early August 2018, and immediately began shoring and excavation to prepare the site for the new building. Project completion is slated for December 2020 with occupancy in January 2021.

These E-blasts will serve as one part of a comprehensive communication strategy that will keep you informed on the building's construction progress and prepare you to continue your vitally important work for the State of California in a brand-new building.

We welcome your questions, comments, and suggestions for topics for future E-Blasts. Please submit to clblast@cliff.ca.gov

Coming Attractions
Clifford L. Allenby Building
Town Hall
Early April 2019
Bateson Building Atrium



Construction Update

Formwork for the first floor concrete slab is complete. Steel reinforcing is being installed in both the lower slab and at the vertical shear walls. Electrical conduit, plumbing drains, and other infrastructure that is embedded in the first floor slab is also being installed. Electrical and telecommunication vaults and conduit located in Neighbor's Alley is substantially complete. The extension of the utility structure in 12th Street is complete and installation of the chilled water piping to the building is progressing well.



Using the Environmental Benefits of Portland Cement

Cement is a key ingredient in the high energy manufacturing of concrete. It is the high energy portion required to mine, heat, and transport the cement and the related energy production, the release of greenhouse gas emissions to 1% of the world's total greenhouse gas emissions is also being installed. Electrical and telecommunication vaults and conduit located in Neighbor's Alley is substantially complete. The extension of the utility structure in 12th Street is complete and installation of the chilled water piping to the building is progressing well.

Our various concrete mixes have replaced between 10% and 50% of Portland cement with SCM's, a high ratio relative to concrete mixes traditionally used in the Sacramento area. Overall, the use of SCM's will reduce the building's greenhouse gas emissions by over 10%. We worked closely with the concrete suppliers to carefully design appropriate levels of SCM inclusion in order to create our high performance, sustainable concrete mixes. Additionally, SCM's can improve the workability of concrete without impacting its strength when used in the correct proportions.

Whole Building Life Cycle Impact

The following environmental credits are achieved through a 20% reduction in the amount of greenhouse gas emissions from the concrete used in the building.

Category	2018	2019	2020	2021	2022	2023	2024	2025
Greenhouse Gas Emissions (tCO2e)	1000	800	600	400	200	100	50	25

Questions, comments, suggestions? Please submit to clblast@cliff.ca.gov

Clifford L. Allenby Building

E-Blast Volume 1, Issue 2

April 2019

Introduction

In this edition of our monthly E-blast, we explore how the building is designed to perform its efficiency as possible, how innovative heating and cooling systems will create a comfortable environment, and what you can do to help the building achieve Zero Net Energy (ZNE).



Construction Update

At this time, the placement of the concrete slab at the first floor is complete. Shear walls and column concrete are complete on the east side of the first floor, and reinforcing is in progress on the west side. Architectural wall forms between the first and second floors have been erected on the north side. Chilled water piping is in use, servicing the Clifford L. Allenby Building, the California Department of Food & Agriculture, and the California Department of Veterans Affairs.

Work in April will include completion of walls and columns to the second floor on the west side, architectural walls to the second floor on the east side, and the framing of the second floor deck.

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Save the Date
Clifford L. Allenby Building
Town Hall
April 10, 2019, 1:00pm
Bateson Building Atrium

We welcome your questions, comments, and suggestions for topics for future E-blasts. Please submit to clblast@cliff.ca.gov



Category	Value
Microclimate Equipment	12%
Lighting	7%
Heating	10%
Refrigeration	5%
Other	3%
Total Savings	37%

Energy Savings Summary

ESB Target: 24.8
ESB Actual: 37.0

Questions, comments, suggestions? Please submit to clblast@cliff.ca.gov

Ongoing Measurement



Workplace Environment



















Relationships

Performance

Design

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Principal Architect

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