

# A Green Building Tour

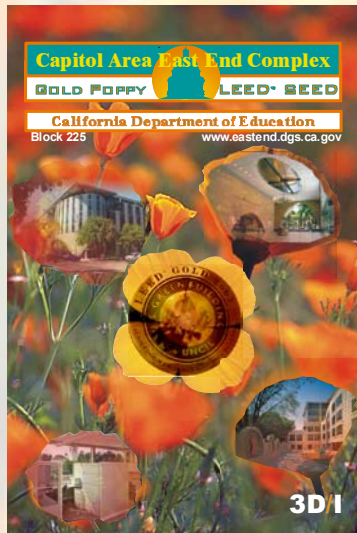


## Capitol Area East End Complex

California Department of Education Headquarters

1430 N Street (15<sup>th</sup> & N Sts), Downtown Sacramento 95814

**A self-guided virtual tour of environmental and worker-friendly architecture, engineering, construction and landscaping amenities**



The Golden Poppy became California's State Flower in 1903, celebrating its centennial during April and May 2003. Its botanical name, *Eschsholtzia californica*, was given by Adelbert Von Chamisso, a naturalist who arrived in northern California in 1816 surrounded by hills of the golden flowers. Native Americans living in the Northern Sacramento Valley boiled and ate the feathery foliage. In Southern California, Spanish Californians and Indians made a hair dressing out of golden poppy oil. It is said that, during the Gold Rush, Indians believed the gold that prospectors searched for was fallen poppy petals.

It seems only 'natural' that the Project Team, when developing the project logo in 1998, agreed the Golden Poppy be so prominently symbolized. Naturally, the 100-year anniversary of this beloved flower coincides with the completion of California's newest symbol of environmental stewardship, the Capitol Area East End Complex. The California Department of Education state office building is the 'greenest' in state history and, at the time of award, the largest project in the world to be recognized with a GOLD LEED™ rating by the United States Green Building Council.



### **For More Information:**

[www.eastend.dgs.ca.gov](http://www.eastend.dgs.ca.gov) - or -

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Real Estate Services Division  
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### **For Tour Information:**

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### **Produced By:**

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## The Project and Team



**Location:** Block 225, 1430 N Street, Sacramento, CA 95814



**Procurement:** Design-Build Agreement based on bridging/criteria documents  
\$68,680,000 - stipulated sum with award based on a 'Best Value.'



**Description:** Six story state office building  
Headquarters for the CA Department of Education (CDE)  
1,400 workstations  
213 below-grade parking spaces with 7 charging stations  
336,008 usable square feet on 2.2 acres  
6,100 square feet of commercial/retail space along 14<sup>th</sup> and O Streets  
7,900 square foot childcare center accommodating 100 children  
6,200 square feet of outdoor play area on O Street



### **Schedule:**

Bridging Documents  
Legislative Review  
Design-Build Schedule

January 1998 - November 30, 1998  
December 1, 1998 - April 1, 1999  
February 23, 2000 - June 30, 2002



### **Project Achievements:**

The largest LEED™ 2.0 Gold rated building in the world.  
The first LEED™ certified government building in California.  
The first LEED™ certified building of 2003.  
The first of five office buildings that make-up the largest state office project in California's history.  
The first project with sustainable goals at the onset of design.  
The states first use of a project website: [www.eastend.dgs.ca.gov](http://www.eastend.dgs.ca.gov)  
First state office building to utilize an underfloor air distribution (UFAD).  
The first state-wide 'green' modular system furniture (MSF) contract.  
The first use of building-integrated photovoltaics (BIPV).  
Exceeds California Energy Codes (Title 24) by more than 40 percent, saving over \$180,000 a year in energy costs alone.  
The first design-build office building project in the state's history.  
First state office building to utilize an Integrated Pest Management (IPM) program.  
Providing an economic impact to the Sacramento Region four times the cost of the project itself.



### **State Management Team**

State of California  
Department of General Services (DGS)  
Real Estate Services Division  
Project Management Branch  
Professional Services Branch  
Building & Property Mgt Branch

Owner  
Developer  
Project Executive  
Project Director  
Project Inspection  
Project Operator/Facility Manager  
Project Consultant/Manager

**3D/I**





### ***Bridging Team***

Johnson Fain  
ESS Engineering  
Capital Engineering Consultants  
Levine/Seegel  
Middlebrook & Louie  
Julie K. Brown, CSI, CCS

Master/Bridging Architect  
Energy Modeling Criteria Verification  
Mechanical/Plumbing Criteria  
Electrical Criteria  
Structural Criteria  
Specifications Consultant



### ***State Green Team***

CA Department of Health Services  
CA Air Resources Board  
CA Integrated Waste Management Board  
CA Energy Commission  
CA Department of Water Resources

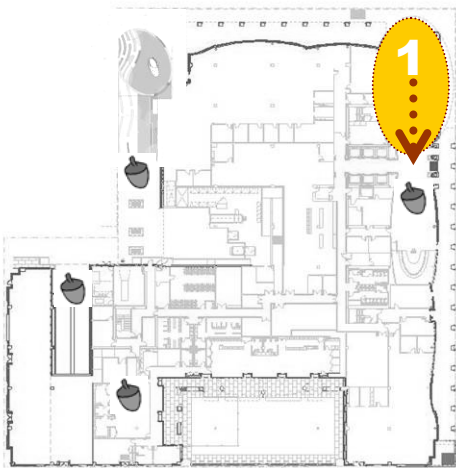
Indoor Air Quality  
Environmental Air Quality  
Waste Management  
Energy Efficiency  
Water Efficiency



### ***Design Build Team***

Hensel Phelps Construction Company  
Fentress Bradburn Architects  
Dreyfuss & Blackford Architects  
SMWM  
(Simon Martin Vegue Winkelstein Moris)  
Dr. Hal Levin  
Berkeley Analytical  
Indoor Environmental Engineering  
Acoustics & Vibration Group  
Nolte  
GEOLABS, Inc.  
HLA  
Mason Engineering  
Tiechert Inc.  
Paul Koehler Engineering  
Schuff Steel Company  
Royal Glass Company, Inc.  
Columbia Stone  
Campolonghi Italia S.R.L  
Willis Construction  
Kone Elevators  
Critchfield Mechanical, Inc.  
Taylor Engineering  
Yamas Controls, Inc.  
Rosendin Electric, Inc.  
The Engineering Enterprise  
Siemens Building Technologies  
JYA Consulting Engineers  
J.W. McClenahan Co.

General Contractor  
Architect of Record  
Interior Architect  
Green Building Architect &  
Tenant Space Planning  
Indoor Air Quality Consultant  
Materials Testing Lab and Consultant  
Indoor Air Quality Testing  
Acoustical Consultant  
Civil Engineer  
Geotechnical Engineer  
Landscape Architect  
Mass Excavation/Shoring Contractor  
Concrete Supplier  
Structural Designer  
Steel, Structural Contractor  
Curtainwall Contractor  
Stone Contractor  
Stone Supplier  
Precast Concrete Contractor  
Vertical Transportation  
Mechanical/UFAD Design Builder  
Energy Systems Mechanical Designer  
Mechanical Controls  
Electrical Design Builder  
Energy Systems Electrical Designer  
Access and Fire-Life-Safety  
Plumbing Designer  
Plumbing Contractor



## Lobby

**Location:** A six-story office building with 336,008 usable square feet including 6,398 square feet of retail space at the corner of 14<sup>th</sup> and O Streets and a childcare center with an outdoor play area along O Street. The main entrance to the building is at the corner of 15<sup>th</sup> and N Streets. The entrance to the 213-space below-grade parking, as well as all delivery and loading elements, is from 14<sup>th</sup> Street.

**Starting Point:** Enter through the glass doors from the northeast corner of the building at 15<sup>th</sup> and N Streets. **SIGN-IN AT THE SECURITY DESK.**

**Ending Point:** End the tour at N Street adjacent to the water feature..

**Owner/Developer/Operator:** California Department of General Services

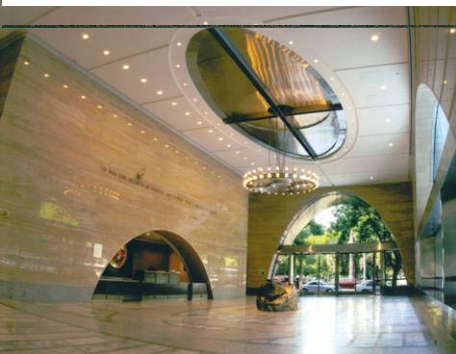
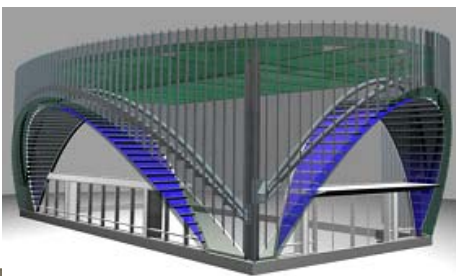
**Project Consultant:** 3D/I

The main lobby is the largest (3,500 sf) of the five buildings of the Capitol Area East End Complex. The building was completed in June 2002.

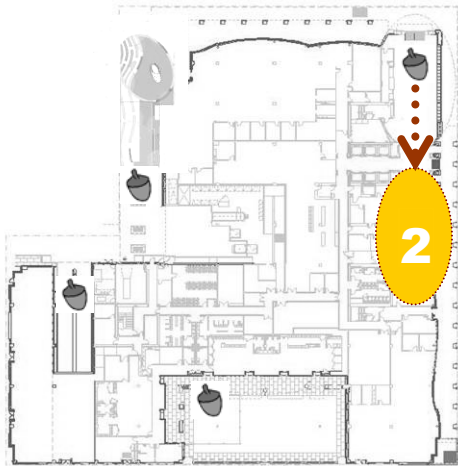
3,000 pieces of Roman travertine limestone was set at 120 pieces per day. Gasgone blue marble from Portugal provides the horizontal banding. There are three types of floor stone, over 2,000 pieces, including 1,300 square feet of marble salvaged from the old book stacks in the historic (c.1928) Library and Courts Building located at 914 Capitol Mall and widely regarded as one of the most beautiful buildings in state government.

To create the dramatic clear-span window wall fronting 15<sup>th</sup> Street, the largest piece of structural steel, seen left, was required. Architects used 3-D modeling to assist in determining the structural solutions for this complex elliptical shape with diagonal wedges removed at the base. 5,800 square feet of curved-cut oliva verde granite clad the exterior of the ellipse.

The wood-veneer security counter comes from a Forest Stewardship Council (FSC) certified sustainable forest. The FSC certifies wood products with a mission to preserve old growth forests and improve forest management on a global scale. The structural material below the veneer is a wood composite material high in recycled content and very low Volatile Organic Compound (VOC) emissions.







## Board Room

**Location:** Directly adjoining the south end of the main lobby.

**Starting Point:** Enter through the frosted glass doors at the south end of the main lobby. **DO NOT DISTURB ACTIVE SESSIONS.** Check with the Security Personnel prior to entering.

**Ending Point:** Return through the same doors then left toward the elevator lobby.



The unfinished lobby and board room provided an opportunity to view the fundamental differences between a conventional overhead HVAC system and an Underfloor Air Distribution (UFAD) system. The second floor UFAD system can be seen above the beam spanning the board room entrance. Only the first floor uses a conventional HVAC system.

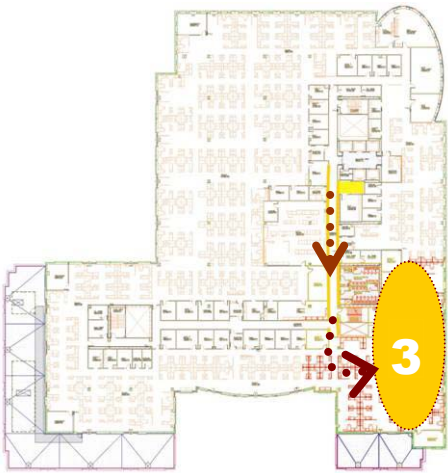


Acoustical requirements necessitated an integrated design approach to mitigate ground level exterior noise and assimilate with the state-of-the-art audio/video system. The exterior skin contractor provided dual-paned insulated glass; the mechanical contractor's design minimizes fan-cycle noise; architects selected ceiling tiles for high acoustical absorption values; acousticians were consulted to determine metal stud spacing in the ceilings and walls to reduce noise reverberation; the contractor filled the wall cavities between the framing with acoustical insulation; and fabric-wrapped acoustical wall panels line the room.



These high-quality building materials, used throughout the building, are also environmentally responsible.

- 300,000 square feet of acoustical ceiling tile is made with at least 82% recycled material and contains very low levels of VOCs. The metal grid that holds the ceiling tiles in place has 25% recycled content.
- 50,000 pounds of acoustical insulation has over 30% recycled content and is made formaldehyde-free thus contributing to the indoor air quality. This product, a specialty item at the time of construction, is now available 'off-the-shelf' to the building community. This is just one example of how the East End Complex has changed the construction materials market place.
- 60,000 pounds of metal framing studs are used in the building ceilings and walls, nearly 1/3 of which comes from recycled metal. 100% of scrap and waste metal was collected during construction, sent to a local recycling center for processing, and diverted from area landfills.




## Open Office Floor Plan - Materials

**Location:** 3<sup>rd</sup> Floor – southeast building corner.


**Starting Point:** Enter through the maple door at the south end of the main north-south corridor. If arriving from the central stairway, enter directly to the left as you step into the corridor. **KEY CARD REQUIRED.**

**Ending Point:** Exit through the same door continuing straight toward the elevator lobby. The freight elevator is located immediately prior.




 The modular furniture meets new environmental specifications for energy efficiency, recycled content materials, and indoor air quality that are considered by the furniture industry as the most “sustainable” in the world. Initially, industry leaders baulked at the stringent requirements. The state and manufacturers worked together resulting in a state-wide modular systems furniture contract that meets the environmental requirements *and* costs less than the previous contract. This line of AllSteel furniture is available to all government agencies.



 During the construction of the Capitol Area East End Complex, emissions testing, in addition full building flushouts, were completed at various stages of construction to determine the impact of building materials, particularly modular furniture and other interior finishes, on the indoor environmental quality. Section 01350 of the specification addressed indoor air quality and recycled content requirements for the building materials of Block 225. The indoor air quality requirements are similar to those specified in the office furniture, but modified for construction materials based on research at Lawrence Berkeley Laboratory.



 Materials were selected for high recycled content and low emissions; including carpet with 53% recycled content and acoustical ceiling tiles with 82% recycled content.

 Other Sustainable Features:

- Ventilation throughout construction.
- Air monitoring occurred at six stages beginning with pre-furniture installation.
- Maximize use of durable products.
- Maximize use of products that can be cleaned using non-toxic substances.
- Occupancy sensors in all closed offices.







## Open Office Floor Plan – Lighting

**Location:** 3<sup>rd</sup> Floor – southeast building corner.

**Design Intent:** Daylighting strategies complemented by high-efficiency lighting with 0.9 watts per square foot of energy usage and a minimum of 30 foot candles at the work surfaces.

Lighting provides a strong example of how building systems can be integrated to maximize individual qualities into a whole-building design.



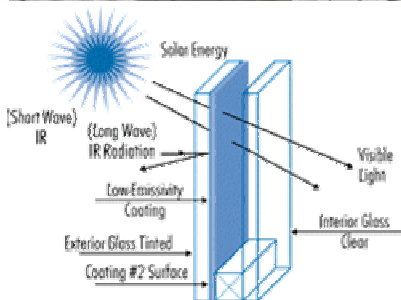
### Daylighting Strategies.

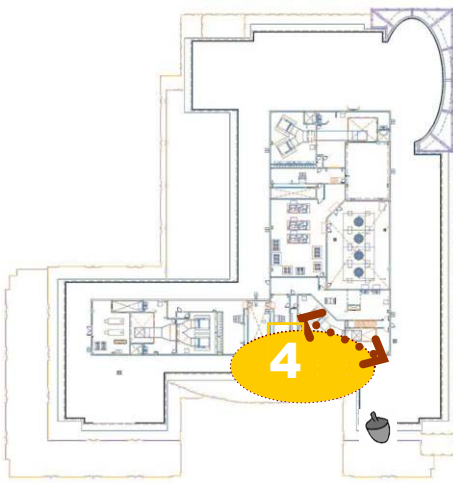
- Early in the bridging phase, a commissioned study investigated several types of glass and glazing systems. The exterior glazing was selected for its ability to maximize the admission of daylight, insulate against Sacramento's intense summer heat, and keep the cold on the outside in winter. Low-E coatings on tinted glass play an important role in thermal performance by possessing high-visible light transmission and low heat transfer properties. Furthermore, Low-E coatings on tinted glass reduce glare, which was important to the project's neighbors.
- Suspended lighting and ceiling tiles.
- As the daylight penetrates the interior spaces, light-colored walls and building materials help 'bounce' the light rays deep into the large floor plates. Additionally, closed offices are moved to the building core and modular systems furniture is designed with vision glass and lower partition heights.



### Lighting Technologies.

- All closed offices and utility rooms are equipped with adjustable motion sensors that automatically turn lights on and off.
- Suspended direct-indirect lighting fixtures with T-8 lamps are used throughout the open office areas. Most of the fluorescent light is projected up at the ceiling tiles where their highly-reflective properties work in unison to evenly 'wash' the spaces with light.
- Perimeter dimming controls lower the artificial lighting levels during the times of day when natural light is abundant and electrical loads are at their peak.
- Task lighting is provided at each work station with a power strip equipped with a motion sensor that automatically turns off after a period of inactivity.





## Penthouse

**Location:** The Penthouse (7<sup>th</sup> Floor) is only accessible from the central staircase.

**Starting Point:** From the top stair landing - enter through the hollow-metal door to your *left* as you reach the top of the staircase.

**Ending Point:** Exit through the same door then enter the door immediately to the left (east) to access the roof – or – down the central staircase to the 3<sup>rd</sup> Floor open office space.



The enclosed Penthouse is actually part of the return air system for the floors supplied by the Underfloor Air Distribution (UFAD) system.

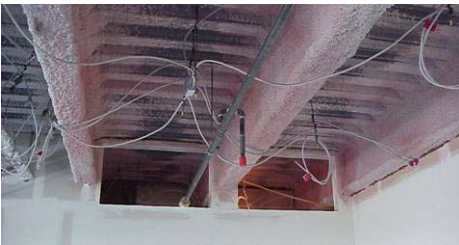
Looking down the supply-return shaft, louvered vents can be seen on the sides. The louvers are where the return air is drawn into the shaft from above the ceilings on each floor and either exhausted out of the building or re-circulated and re-conditioned. The 'pink' color on the fireproofing was added to a low-VOC sealer used at locations where high-velocity air movement exists. The exhaust fans are variable speed, so they only work as hard as necessary.



The return air that is not exhausted is drawn to a set of louvers at the end of the hall. Carbon Dioxide sensors (tubes) constantly monitor the condition of the air adding more fresh outside air as required.

The return air passes through the louvers into a chamber where it is mixed with fresh air before being re-filtered, cooled as necessary, and returned to the floors below as supply air.

The huge filter bank contains 70 micro-pleated filters that are rated over 90% efficient – the highest efficiency available at the time of construction. These filters are monitored by the Building Management Team and cleaned when necessary.

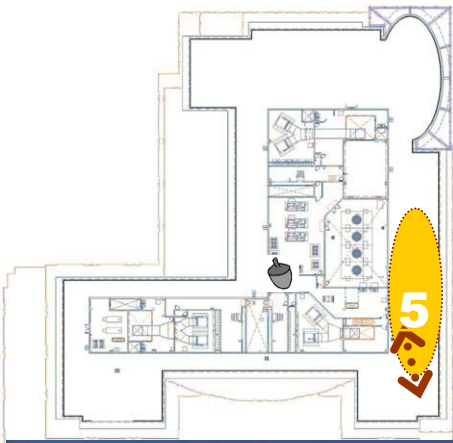


After filtration, the air passes across coils filled with chilled water to bring the air temperature down to 63°F. Conventional overhead HVAC systems require conditioned air to be delivered at 56°-58°F. The difference in air temperature is one of the many benefits of an UFAD system and contributes to saving the state nearly \$150,000 per year in energy costs alone.



High-efficiency centrifugal chillers pump the chilled water to the coils. The chiller design provided for an N+1 redundancy, meaning at any time one of the units can be off-line for maintenance or repair without affecting the systems ability to cool the building. It also means the units do not have to work as hard thus extending their useful life.





## Roof

**Location:** The Roof (7<sup>th</sup> Floor) is only accessible from the Central Staircase.

**Starting Point:** From the top stair landing - Enter through the hollow-metal door with the elevated threshold. You were facing it as you reached the top.

**Ending Point:** Exit through the same door then enter the door immediate to the right (north).



As a design-build enhancement, a portion of the curtain wall generates solar electricity becoming the first example of building integrated PV (BIPV) systems being designed into new Sacramento buildings under the SMUD BIPV program.

Looking north - Photovoltaic panels form mechanical equipment screens on Blocks 171-174.

On-site power generation for all five buildings comes from over 5,500 photovoltaic panels producing up to 160 kilowatts of free and clean electricity. Equivalent to the consumption of 50 local homes.

The “cool” roofing material is made with 100% rubber from Firestone and is therefore 100% recyclable and contains no PVC or its by-products.

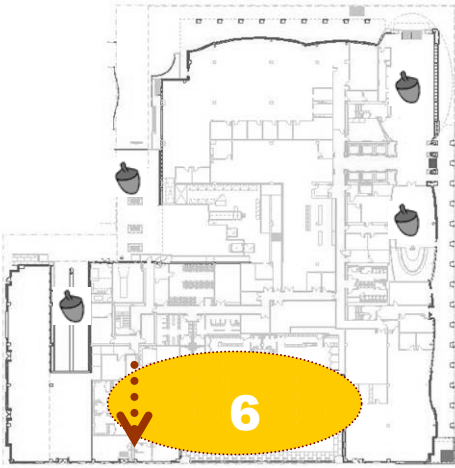
Benefits of the thermoplastic membrane roofing system:

- Reflects +70% of solar radiation/sunlight.
- Lowers roof temperature to 15°-25°F above the ambient temperature.
- Lower roof temperatures extend the life of the roof.
- Lowers cooling loads by 10-15%, extending the life of cooling equipment.
- Lower peak electrical demand.
- Reduced energy consumption contributes to reduced pollution.
- Typical paybacks based solely on energy savings are 1-3 years.
- Reduces urban heat islands.
- ENERGY STAR labeled product.

A small roof-top terrace was built entirely of FSC-certified redwood.

Look over the parapet and you’ll see city streets paved with rubberized asphalt concrete (RAC). This City-State partnership was made possible by a \$240,000 grant from the California Integrated Waste Management Board (CIWMB) and will serve as case study for future city RAC projects.

Paving the streets around the East End Complex with RAC consumed about 11,000 waste tires, creates a quieter driving surface, and requires less maintenance.



## Childcare Center

**Location:** The main entrance is located on O Street.

**Starting Point:** Access for the tour will be through the 'back-of-house' door, directly adjacent to the retail space.

**Ending Point:** Exit through the same door. **CAUTION:** Using the doors in the play area will engage a security alarm.

**Child Care Fence Artist:** Gale McCall, Inglewood, CA



🌻 This facility is designed to house 100 children – infants, toddlers, and pre-school age. The center will be operated by a vendor selected by a non-profit board of director's made-up of parents of children attending the center. This center will serve all five buildings at the East End Complex.

🌻 This is the only interior space that has the 'new building smell.' This is from the linoleum flooring. This classic 'green' product has been available for years and is made from readably renewable materials like linseed oil, cork, jute backing, etc.

🌻 The play surface material is partially made of used tires. This product was purchased through a grant from the CIWMB in lieu of typical tan-bark. The depth is based on the height of the play equipment, in this application it is four inches. This will allow additional play equipment pieces to be added at a later date.

🌻 This is the only space within the building that uses operable windows.

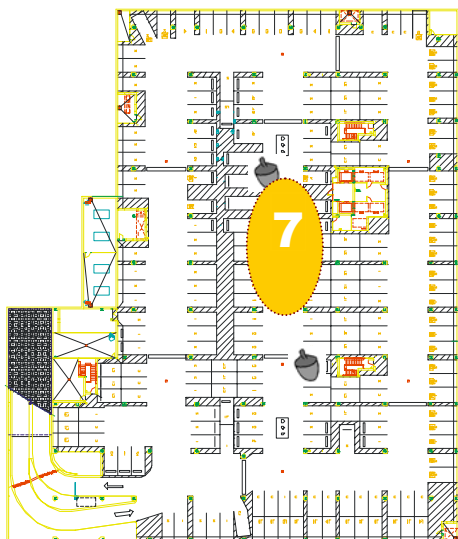
🌻 The concrete flatwork used in the play area is made with a 25% fly-ash mix.

🌻 Trees were preserved around the building site that provide shading for the play area and help reduce the urban heat-island effect.

🌻 Equipped with ENERGY STAR appliances.

🌻 The artist commissioned to fill the pre-cast concrete courtyard 'rings' effectively integrated security and privacy issues and artistic expression. Exterior cameras continuously monitor the grounds, with sophisticated access control and emergency paging capabilities.





## Parking Garage

**Location:** 14<sup>th</sup> Street alley between N and O Streets, behind the historic Dean Apartments and below the education building.

**Starting Point:** Enter Elevator #1 (shuttle) at the ground floor elevator lobby. The *down* button calls the only elevator serving the garage.

**Ending Point:** The parking garage elevator lobby.



### Structural System:

- *Mat Foundation* - 40% fly-ash in 7,000 cubic yards of concrete
  - Avoided noise pollution from pile driving = good neighbors
  - No pumps required to relieve hydrostatic pressure
- *Retaining Walls* – Shotcrete application in lieu of formed walls avoided tons of plywood formwork from filling area landfills.
- *Structural Steel* - 76% post-consumer recycled content
- *Metal Decking* – 60% post-consumer recycled content
- *Fireproofing* – Factory blended with integral mold-inhibitors
  - A low-VOC sealer was applied to fireproofing in the path of high-velocity air movement.
- *Soundproofing* – The ceiling is coated with a non-toxic sound insulation material to avoid noise migration into the tenant spaces.



Seven electric vehicles recharging stations are located close to the parking garage elevator lobby. Preferred parking locations are also provided for carpool and vanpool vehicles. Secure bicycle storage, shower facilities, and mass transit incentives provide state workers alternative transportation amenities to promote clean air.



Wheel stops and speed bumps are made from recycled plastic



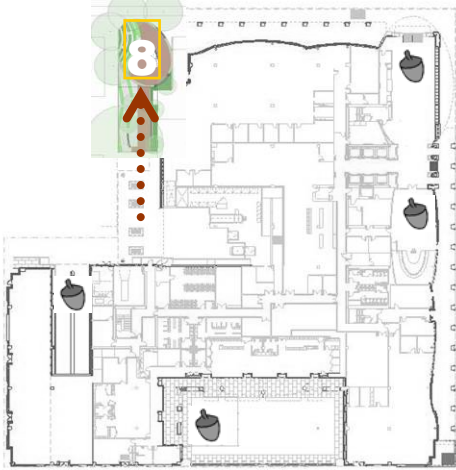
Drinking fountain drains are connected to a reservoir in the garage where the water is collected, conditioned, and then pumped to the Pocket Park for use in the fountain.



Carbon Monoxide (CO) sensors placed throughout the garage constantly monitor pollutant levels. If CO levels begin to elevate, variable speed fans quickly exhaust the pollutants and while inducing fresh outside air.



Blue-light call stations are positioned approximately 100 feet apart providing direct communication with the central security room.



## Pocket Park

**Location:** Northwest corner of the project site, adjacent to the historic Dean Apartments (former home of Governor Jerry Brown).

**Starting Point:** Enter from the south end of the park, adjacent to the alley.

**Ending Point:** End the tour at N Street adjacent to the water feature. Remind participants to remove their security nametags and/or return to them to the security desk in the main lobby.

**Park Artist:** Cliff Garten – Venice, California

🌻 The Pocket Park creates as a gentle transition between the office building and the historic apartment building providing a quiet location for state workers and the surrounding community.

🌻 Central Valley indigenous landscaping was utilized with an underground irrigation system that provides water to the plant roots rather than broadcasting the water above ground and lost through evaporation.

🌻 The Central Valley's Native Americans are represented in the park design. The decorative fence reflects a children's game that used acorns and rope. Deer grass was used for basketry and clothing. A poetic Indian song is etched in the granite pavers. The same Sierra granite is used in the fountain feature.

🌻 Gray water is collected from the building drinking fountains and childcare lavatories—treated—then re-used for the water feature.

🌻 Wood benches from an FSC certified sustainable forest. FSC certifies wood products with a mission to preserve old growth forests and improve forest management on a global scale.

🌻 Biological landscape maintenance practices have been incorporated, eliminating the need for harsh pesticides. The DGS maintenance and management staff has been trained on the use of beneficial insects and organisms designed by nature to control pests. This approach carries forward the sustainable achievements made during design and construction into the day-to-day operations of the facility and is consistent with the environmental cleaning program implemented by the building custodial staff.

*\*See signage on south wall.*



### Interpretive/Educational Signage Locations

