

# 2015 Exhibition of School Planning and Architecture

## **Solana Ranch Elementary School**

Category: New Construction

Solana Beach School District  
Solana Beach, CA





Community Park

Pacific Highlands Ranch



# Landscape Plan

## Community Environment:

Solana Ranch Elementary School is the most recent school completed for the Solana Beach School District, an independent elementary school district serving approximately 6,000 students north of San Diego. Situated on a new 10 acre site adjacent to a small park in the heart of the fast developing Pacific Highlands Ranch, the goal is to create a community oriented school appropriately scaled to the needs of the neighborhood.

Envisioned as a school initially housing between 500 and 600 Pre-K-6 students, the school is structured around the idea of smaller learning communities within the overall school environment. The concept is realized through three 'neighborhoods' or smaller learning communities of 175-200 students within the overall school context.

These neighborhoods constitute multi-grade clusters of approximately eight classrooms each with shared resource areas and defined outdoor teaching spaces, taking the form of two story houses.

Kindergarten and special education classrooms are also integrated into the cluster concept. The 'neighborhoods' are connected to each other by means of an 'indoor street' that acts as a space where teachers for all grades can facilitate multiple learning activities.

A multi-purpose building paired with an administrative cluster complement the neighborhoods and provide a shared focal point for the school.

The planning process involved participation by the District staff, bond members and teachers, with the HED design team in a series of interactive workshops. The process also incorporates the Savings By Design program which encourages a team approach to the design of energy efficient buildings. Each classroom was designed to maximize the passive use of light and energy.



-  Pre-K & Kinder LC
-  Shared Resources
-  Admin & Support
-  Small Learning Community 1
-  Small Learning Community 2
-  Small Learning Community 3

- 1 Pre-K Classrooms & Yard
- 2 MP Hall
- 3 Lunch Shelter
- 4 Playground
- 5 Main Entrance & Drop-off
- 6 Library Media Center
- 7 Science Garden
- 8 Reception Desk
- 9 Learning Terraces
- 10 Kindergarten
- 11 Typical Classrooms

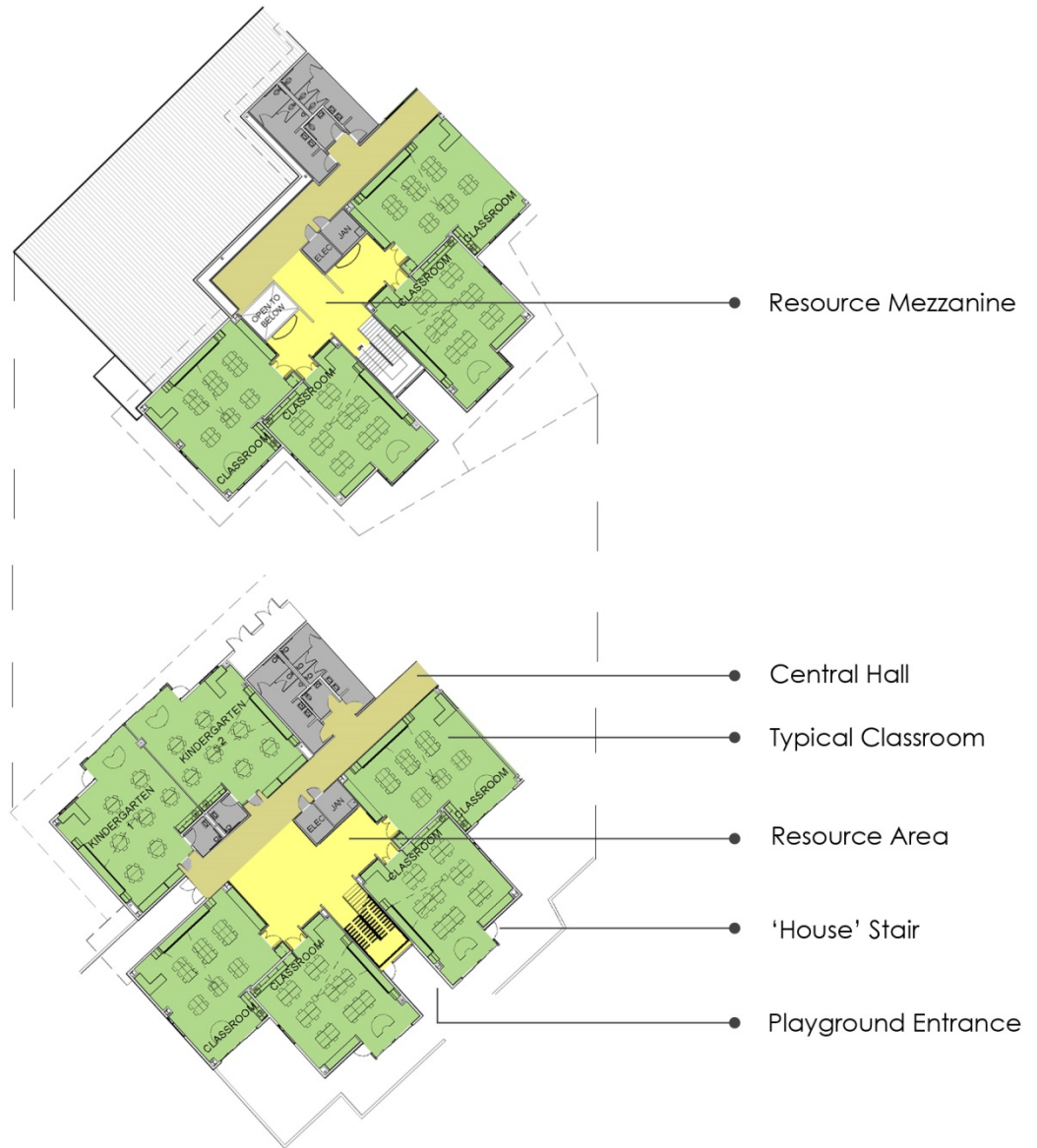


# Small Learning Communities

## Community Environment:

Commons and widened corridors act as an 'indoor street' allowing teachers for all grades to facilitate multiple learning activities.

Two-story house Learning Community (LC) clusters of 8 classrooms act as 'neighborhoods' each with their own commons and outdoor learning spaces. Special Ed spaces are integrated into the clusters.



# Flexible configuration

## Learning Environment

Desired learning program wish list:

- *Outdoor shaded learning spaces directly accessible from indoor learning spaces*
- *Adjustable lighting for varying learning modes*
- *Integrated teaching technology*
- *Controlled acoustics in all learning spaces for open areas such as commons*
- *Flexibility student / teacher configuration to support various learning modalities simultaneously*
- *Varied, spatially articulated activity zones*
- *Classroom clustering with break out spaces and commons*

Top:

North facing second floor classroom in the main building. The teaching wall in the background is flanked by diffusers for displacement ventilation. Balance light comes from window bays on the left and clearstory windows on the right.

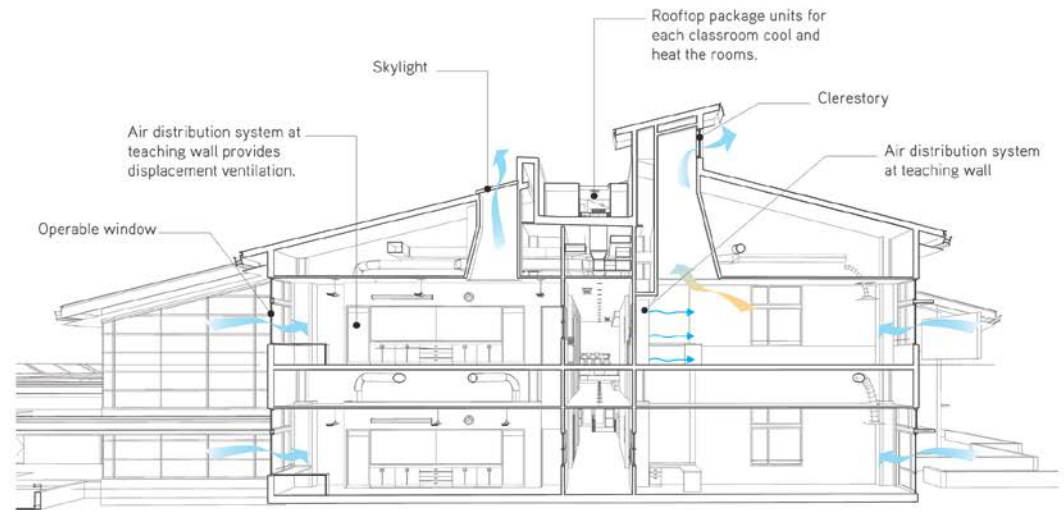
Bottom:

Interior classroom of the child development center.

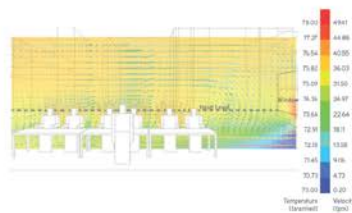


# Natural Ventilation

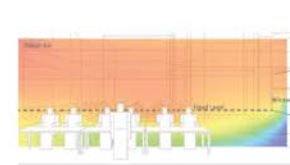
## Learning Environment



**NATURAL VENTILATION THROUGHOUT the CLASSROOM BUILDING**



Very low air velocity  
10 feet per minute (fpm)  
Temperature at head level is comfortable  
(75 to 76 F)



The age of air should not be older than  
900 seconds to meet ASHRAE 61.1  
The oldest air sits above the breathable  
zone at greater than 950 seconds.



The age of air at head level is  
constant, and is right at the  
900 second threshold.

### AIRFLOW and THERMAL ANALYSIS

## Natural Ventilation

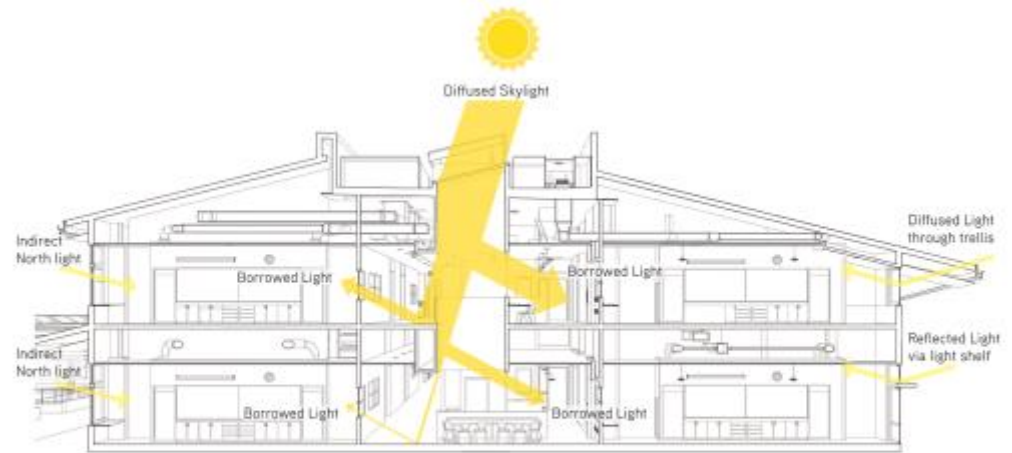
Openings in the building are strategically placed to encourage adequate airflow and daylighting to occupants. Supplementary clerestory fan units, as well as increased opening sizes, higher ceilings, low supply diffusers, and high exhaust vents improve comfort. Most of the classrooms within the stepped footprint have two exposures, facilitating cross ventilation.

# Daylight

## Physical Environment

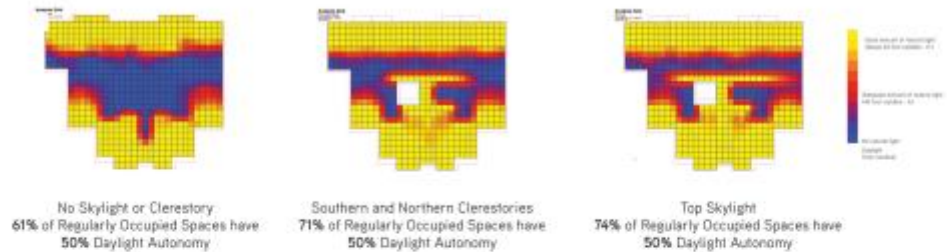
The classrooms have been oriented either north or south to maximize the use of controlled natural light. Ample, shaded windows combined with clearstories or skylights provide light from at least two directions in every classroom for balanced natural day lighting while reducing the consumption of energy for artificial lighting.

The classrooms make use of natural cross ventilation as well as fan assisted natural ventilation and employ displacement ventilation for the active mechanical system. Photovoltaic panels are provided on all flat and south facing roofs and could provide as much as 100% power offset.



DAYLIGHTING of INTERIOR SPACES

- Each classroom was designed to maximize the passive use light and energy.
- The classrooms have been oriented either north or south to maximize the use of controlled natural light.
- Ample, shaded windows combined with clerestory windows or skylights provide light from at least two directions in every classroom for balanced natural day lighting while reducing the consumption of energy for artificial lighting.
- The classrooms make use of natural cross ventilation as well as fan assisted natural ventilation and employ displacement ventilation for the active mechanical system.
- Photovoltaic panels are provided on all flat and south facing roofs and could provide as much as 100% power offset.



DAYLIGHTING ANALYSIS

## Daylight

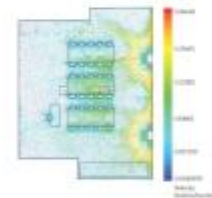
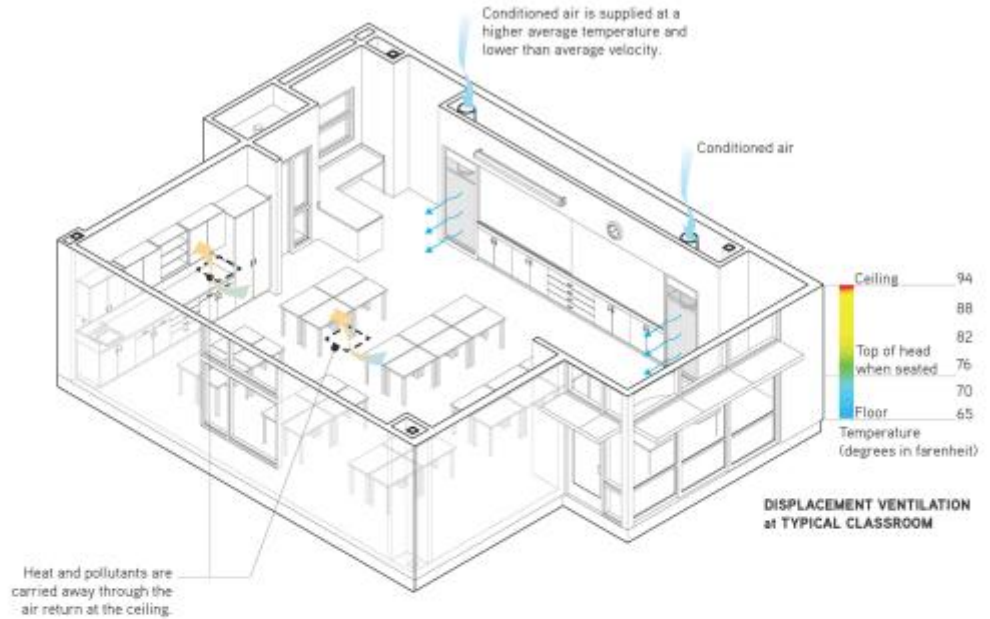
Solana Ranch Elementary School has been designed to maximize the effective use of daylight. Above are diagrams showing the effect of different daylight sources to bring natural light into the center of the building. A combination of clerestories and skylights help to balance the light of the sun as it enters the classrooms and collaboration zones. Other features include:

- Direct/indirect lighting is used for the most comfort and the least glare.
- Classrooms use high efficiency pendant direct/indirect fixtures, incorporating TB lamps with high efficiency electronic ballast to light the classrooms.
- Daylight harvesting photo sensors are located near the windows.
- Occupancy sensors automatically turn off lights in unoccupied rooms to save energy.
- Lights are designed for continuous, flicker-free dimming from 100% to 1%.
- Lighting control centers are provided in the classrooms.

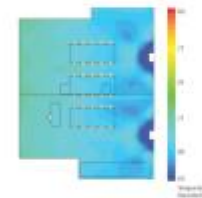


# Displacement Ventilation

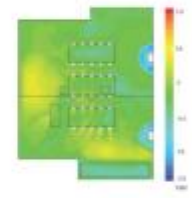
## Physical Environment



Air flow at floor level



Temperature distribution at floor level



Predicted Mean Vote (PMV) Measurement of thermal comfort

### AIRFLOW and THERMAL COMFORT ANALYSIS

## Displacement Ventilation

Solana Ranch is one of the first schools in Southern California to be comprehensively heated and cooled through a displacement ventilation system. Each classroom is cooled and heated by its own rooftop package unit, and air distribution systems have been designed to provide displacement ventilation in all occupied spaces.

In a displacement ventilation system, conditioned air is supplied directly into the occupied space at a low velocity. Heat sources, such as people and electronic devices, create upward convective flow via thermal plumes. These plumes carry heat and pollutants to a high level, away from occupants, and exhaust at the ceiling. Cool to warm air is allowed to layer horizontally in the space.



SOLANA BEACH ELEM. SCHOOL #7  
 FIRST FLOOR PLAN  
 SCALE 1/8" = 1'-0"



SOLANA BEACH ELEM. SCHOOL #7  
 SECOND FLOOR PLAN  
 SCALE 1/8" = 1'-0"

First Floor

Second Floor

Submitting Firm :	
Project Role	Architect
Project Contact	John R. Dale
Title	Principal-in-Charge
Address	601 S. Figueroa St. Suite 500
City, State or Province, Country	Los Angeles, CA 90017
Phone	213.542.4500

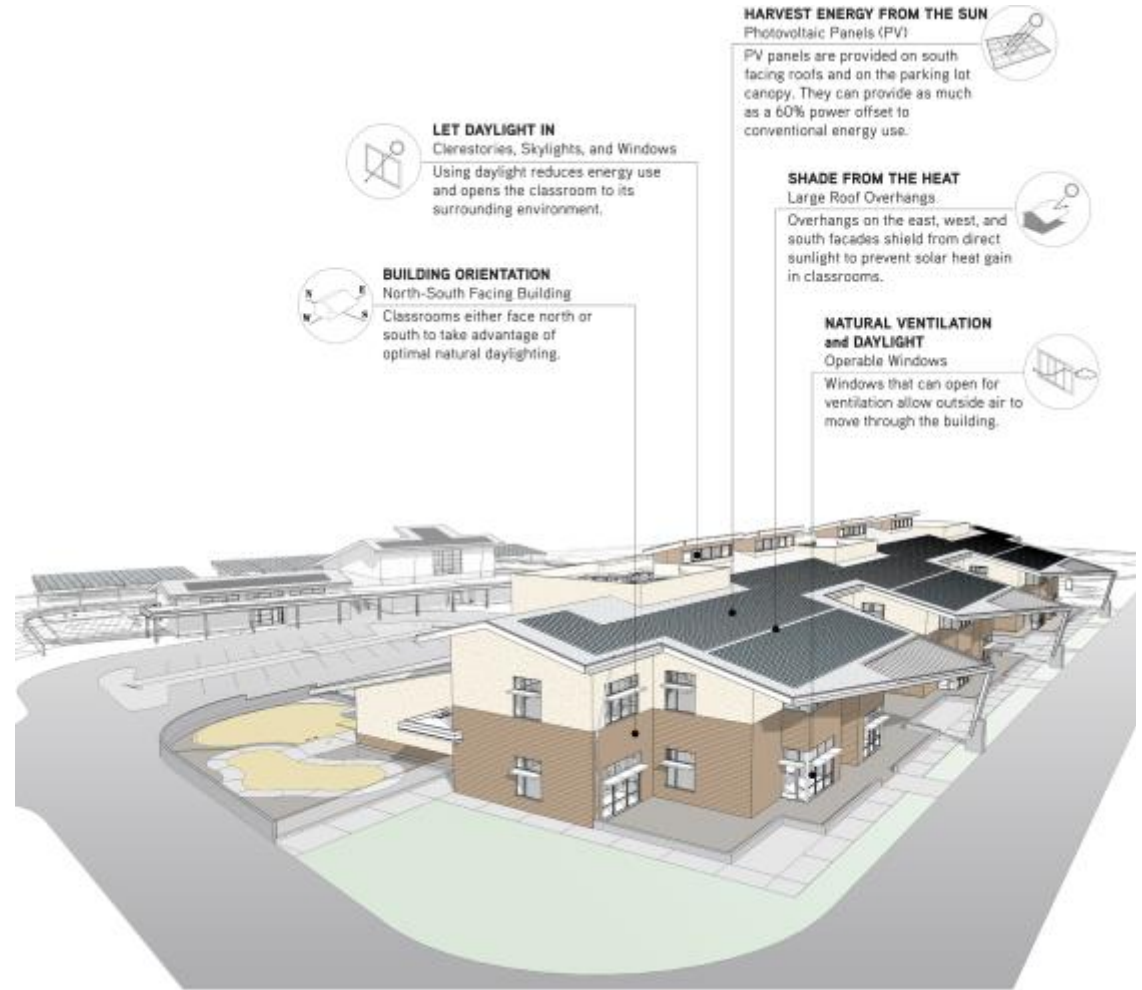
Joint Partner Firm:	
Project Role	N/A
Project Contact	N/A
Title	N/A
Address	N/A
City, State or Province, Country	N/A
Phone	N/A

Other Firm:	
Project Role	N/A
Project Contact	N/A
Title	N/A
Address	N/A
City, State or Province, Country	N/A
Phone	N/A

Construction Firm:	
Project Role	Balfour Beatty Construction
Project Contact	Grace Chan
Title	Project Manager
Address	10620 Treena Street #300
City, State or Province, Country	San Diego, CA 92131
Phone	858.795.1576

Project Name	Solana Ranch Elementary School
City	San Diego
State	CA
District Name	Solana Beach School District
Supt/President	Nancy Lynch, Ed.D.
Occupancy Date	August 2014
Grades Housed	Pre-K-6th
Capacity(Students)	650 capacity
Site Size (acres)	10
Gross Area (sq. ft.)	68,311
Per Occupant(pupil)	132 -110
gross/net please indicate	66,348 / 61,129
Design and Build?	N/A
If yes, Total Cost:	N/A
Includes:	N/A
If no,	
Site Development:	\$20,000,000
Building Construction:	\$21,857,192
Fixed Equipment:	\$1,400,000
Other:	
Total:	\$43,257,192

# Sustainable Features



## What makes a Building Healthy?

The broad, north-sloping site allows for an ideal building orientation. Most of the classrooms within the stepped footprint have two exposures, facilitating cross ventilation and balanced daylighting. While each classroom will be cooled and heated by its own rooftop package unit, air distribution systems have been designed to provide displacement ventilation throughout all the teaching spaces. Photovoltaic panels are provided on south facing roofs as well as the parking canopy.

The school has been sited to take advantage of an almost ideal solar orientation, with all classrooms and other learning spaces facing either north or south. The school forms two welcoming outstretched wings that define an entry courtyard. To the north are the Child Development Center, Multi-Purpose Building and Lunch Shelter. To the south is a two-story classroom building and Media Center. The administration wing links these two components together.

Entry view of the campus from the north west



General view of the campus from the south east





Vegetable gardens maintained by students and parents outside the science classroom.



Student and a parent at work in the science garden.



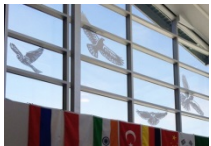
View of south classroom wing with integrated photovoltaics and clerestory daylighting



General view of the campus from the south east

Main entry lobby and staircase with silhouette graphics of local birds and plants. Kindergarten terrace is seen through the windows on the right.

School art program: included in the playground is a mosaic compass rose which locates the school relative to other places. Silhouettes of native flora and fauna enhance the lobby area.



Looking along indoor street at bridge crossing main lobby.



Shared resource area (collaborative zone) at lower level with 'house' stair in background.





Multi-purpose hall with stage & clearstory lighting