Case Study: Orinda City Offices

Image Courtesy Siegel & Strain Architects

Project Type

Office Building

Services Provided

HVAC and Controls Design, Energy Modeling, Integrated Façade Design, Natural Ventilation Analysis

Completion Date

2007

Innovation

Comfort cooling with evaporative cooling only; no compressor cooling

Key Accomplishments

Predicted Percent Below California Energy Code: ~72%

Awards

2007 Energy Star Challenge Award

2007 Best New Construction, Excellence Award from the Structural Engineers Association of California

Recognition

2009 LEED NC Gold

Orinda's City Hall is a high-performance building that leverages numerous passive and low-energy active solutions to provide a comfortable and efficient building. The building includes daylighting, mixed mode ventilation with a green light notification system, exterior shading, a high performance building envelope, and a high measure of occupant control.

The project targeted and achieved LEED Gold. To achieve low energy design, the building relied on mixed-mode natural ventilation, with cooling by evaporation without refrigerated cooling, as well as ceiling fans to allow for an expanded comfort temperature range. This project demonstrated that comfort cooling without refrigeration is possible in Orinda.

The project's early design phase included best practice early collaborative design. Siegel and Strain's basis of design was natural ventilation. Taylor Engineering worked on designing, developing, and testing the natural ventilation. Because of Taylor Engineering's connections to University of California, Berkeley, we worked with the students from a graduate architecture natural ventilation class. The graduate students tested our natural ventilation designs in their wind-tunnel. Using the wind-tunnel testing the design team optimized the building orientation, building mass and window design for the natural ventilation.

Taylor Engineering used an eQUEST energy model to get feedback on our design and to inform the team on LEED points. The most interesting part of the energy model was the indirect-direct evaporative cooling which allowed us to have no compressors on the project. To achieve this the loads in the building had to be well-

controlled including the building envelope and low internal loads. This included project façade changes such as re-sizing the windows, using lower solar energy transmission glass, and relocating windows so orientation was less problematic. The team worked collaboratively to develop external shading.

The project also included a detailed comfort analysis using ASHRAE comfort software, which helped us design with air movement to achieve an expanded comfort temperature range using ceiling fans.

Given some atypical elements of the HVAC design, occupant training was an important part of the building turnover phase. For occupant training, the design team created a sustainable strategies diagram describing how the systems and natural ventilation work. This diagram was included in an occupant training handout for current and future building occupants. Since the windows are occupant controlled, we included signage that illuminates when the windows should be opened for natural ventilation and closed otherwise. Occupants have given positive feedback about the building's daylight and their appreciation of operable windows under occupant control.

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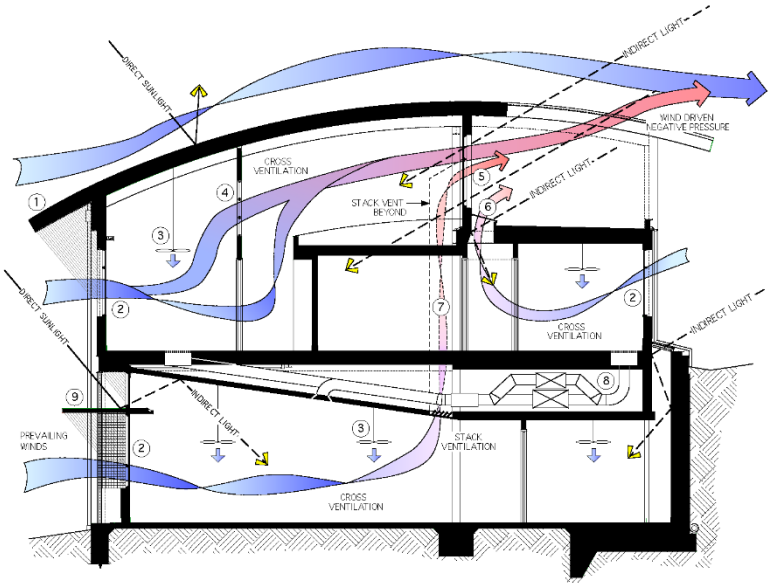

More About Taylor Engineering:

Founded in 1995, Taylor Engineering is a nationally recognized engineering firm specializing in mechanical systems design and construction, energy conservation, indoor air quality, controls, and system commissioning. Taylor Engineering specializes in cost effective and innovative solutions that are designed from the start with construction and operation in mind. Complementing our engineering expertise, Taylor Engineering employees have extensive field experience including mechanical contracting; control system installation and operation; HVAC system monitoring, measurement and evaluation; and site auditing. Our cutting-edge design is informed through our involvement in energy and indoor air quality codes and standards, building science research, and the development of state-of-the-art simulation tools.