

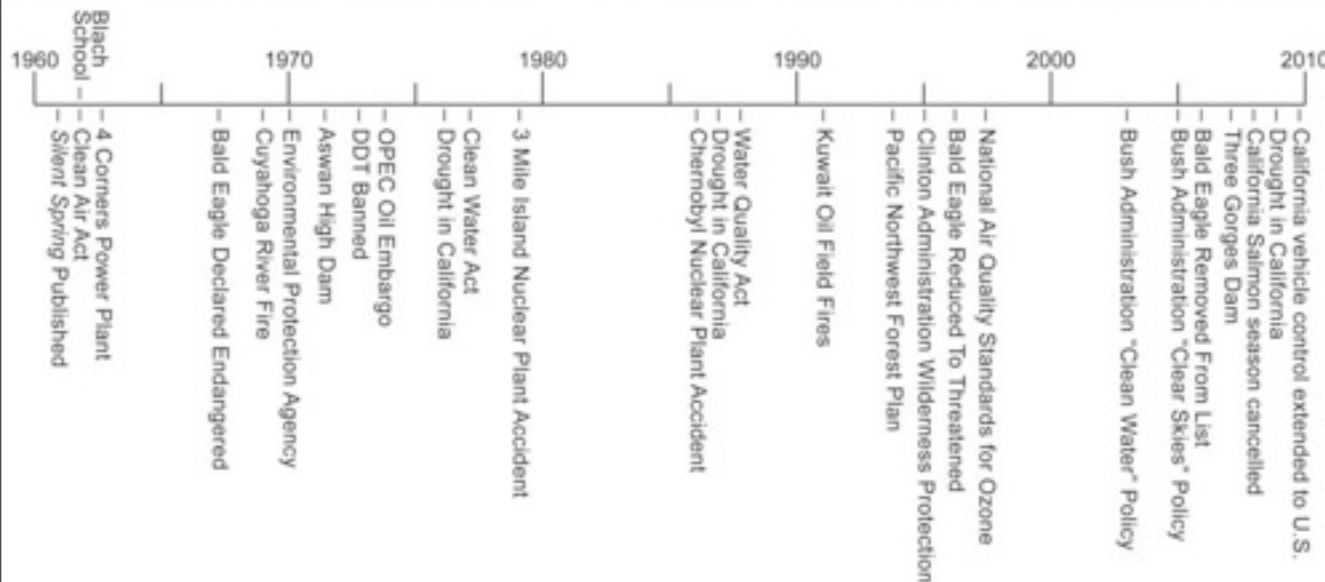
Sustainable School Architecture

CHPS and High Performance School Grants



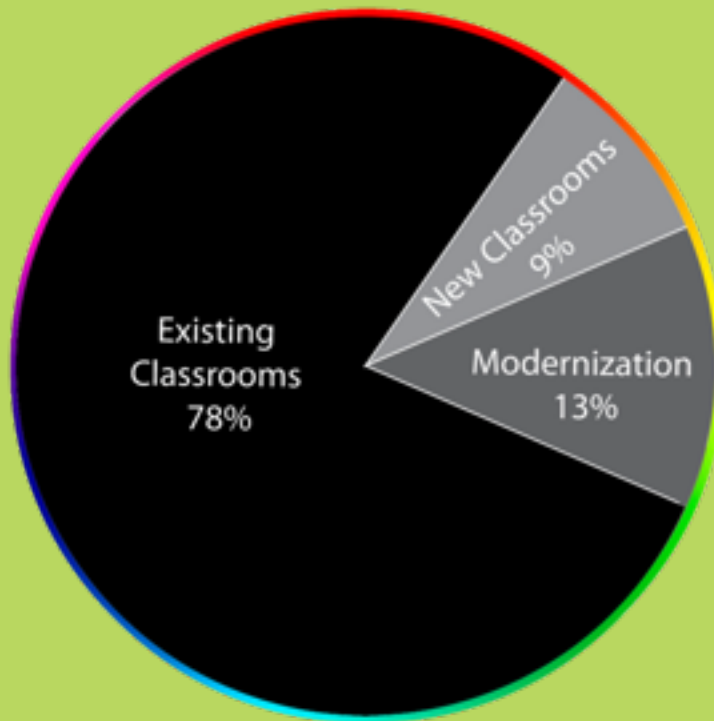
Sustainability

1. Sites and buildings designed for complete life cycle
2. Integration of site development, building orientation, massing, systems and features
3. Individual performance criteria set, met, and monitored
4. Building operation and maintenance considered in design



Where are the students?

They are mostly in existing buildings!



Nationwide...

55 million students

5 million faculty

20% of America's population

California Classroom need projections – 2007 to 2012 – Data from State Agencies



Integrated Design



1. Building as organism
2. Sites and buildings designed together
3. Building as cultural meaning



Sustainability

1. Sites and buildings designed for complete life cycle



Reuse of existing buildings is the most important strategy

At least 20% of a building's energy use is during construction
Few buildings are built/replaced annually
20% of landfill debris is construction debris



Sustainability

1. Sites and buildings designed for complete life cycle
2. Site development, building orientation and massing, systems and features designed in an integrated way



Adapt buildings and sites to the context and climate

Daylight

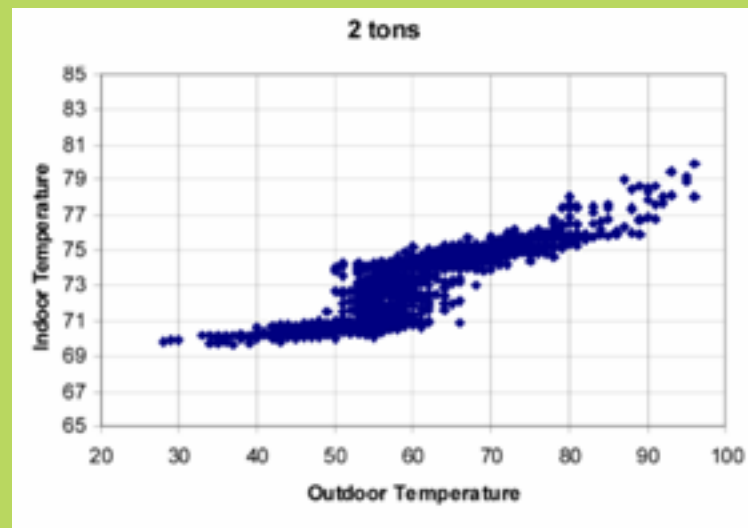
Natural ventilation and thermal comfort

Reuse of existing development





Light spaces appropriate to users and tasks



Right size mechanical systems

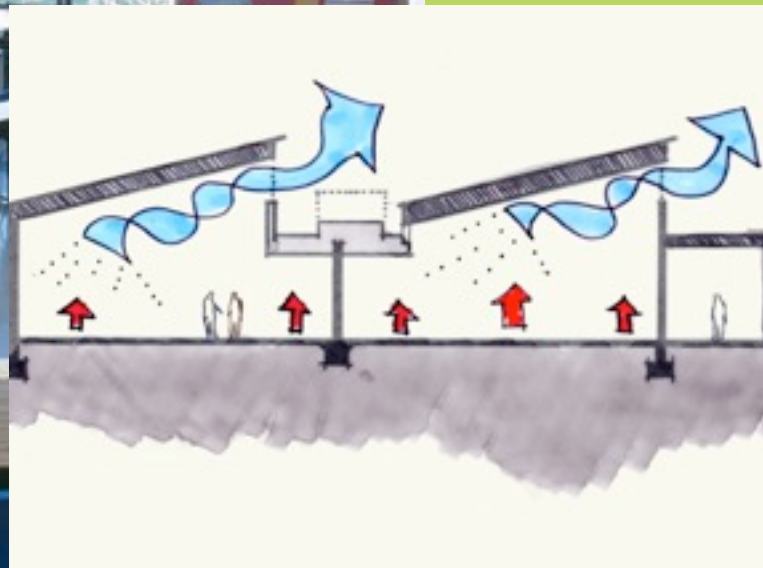
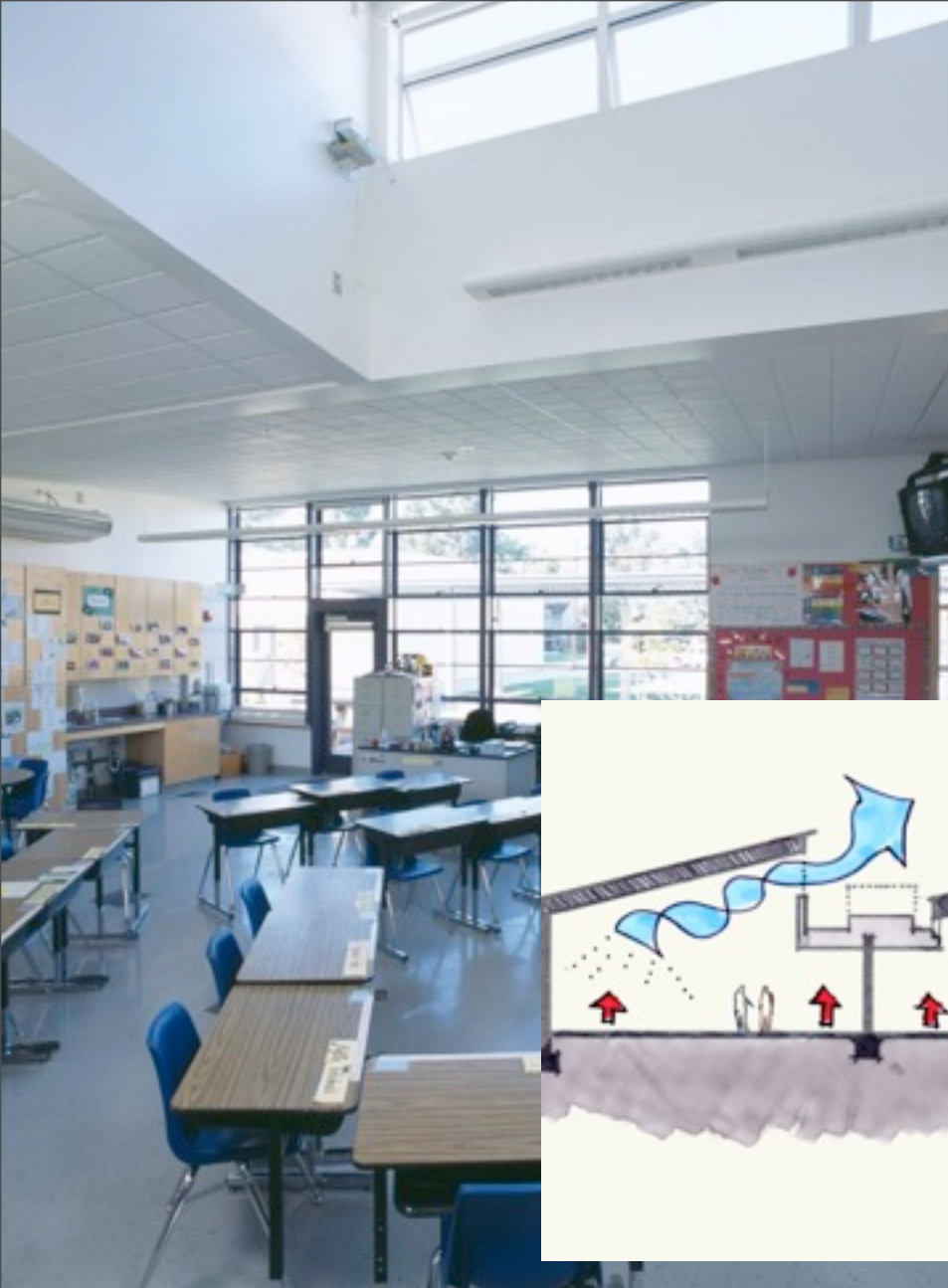
Sustainability

1. Sites and buildings designed for complete life cycle
2. Site development, building orientation and massing, systems and features designed in an integrated way
3. Individual performance criteria set, met, and monitored



Sustainability

1. Sites and buildings designed for complete life cycle
2. Site development, building orientation and massing, systems and features designed in an integrated way
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“Passive” features can be automatic too.





Market maker
Many building types
Third party verification



Residential developments
Tax credit funding standard
Includes community process

K-12 Education

High performance school grants
Verification or design standard



Voluntary until 2010
Many building types
LEED Silver



Green Metrics

LEED 2009 Criteria

Sustainable Sites

Water

Energy

Materials

Indoor Environmental Quality

Innovation in Design

Regional Priority

CHPS 2009 Criteria

Leadership, Education
and Innovation (LEI)

Sustainable Sites (SS)

Water (WE)

Energy (EE)

Climate Change (CL)

Materials (ME)

Indoor Environmental Quality (IEQ)

Green Communities 2008 Criteria

Integrated Design

Site, Location and Neighborhood Fabric

Site Improvements

Water Conservation

Energy Efficiency

Materials Beneficial to the Environment

Healthy Living Environment

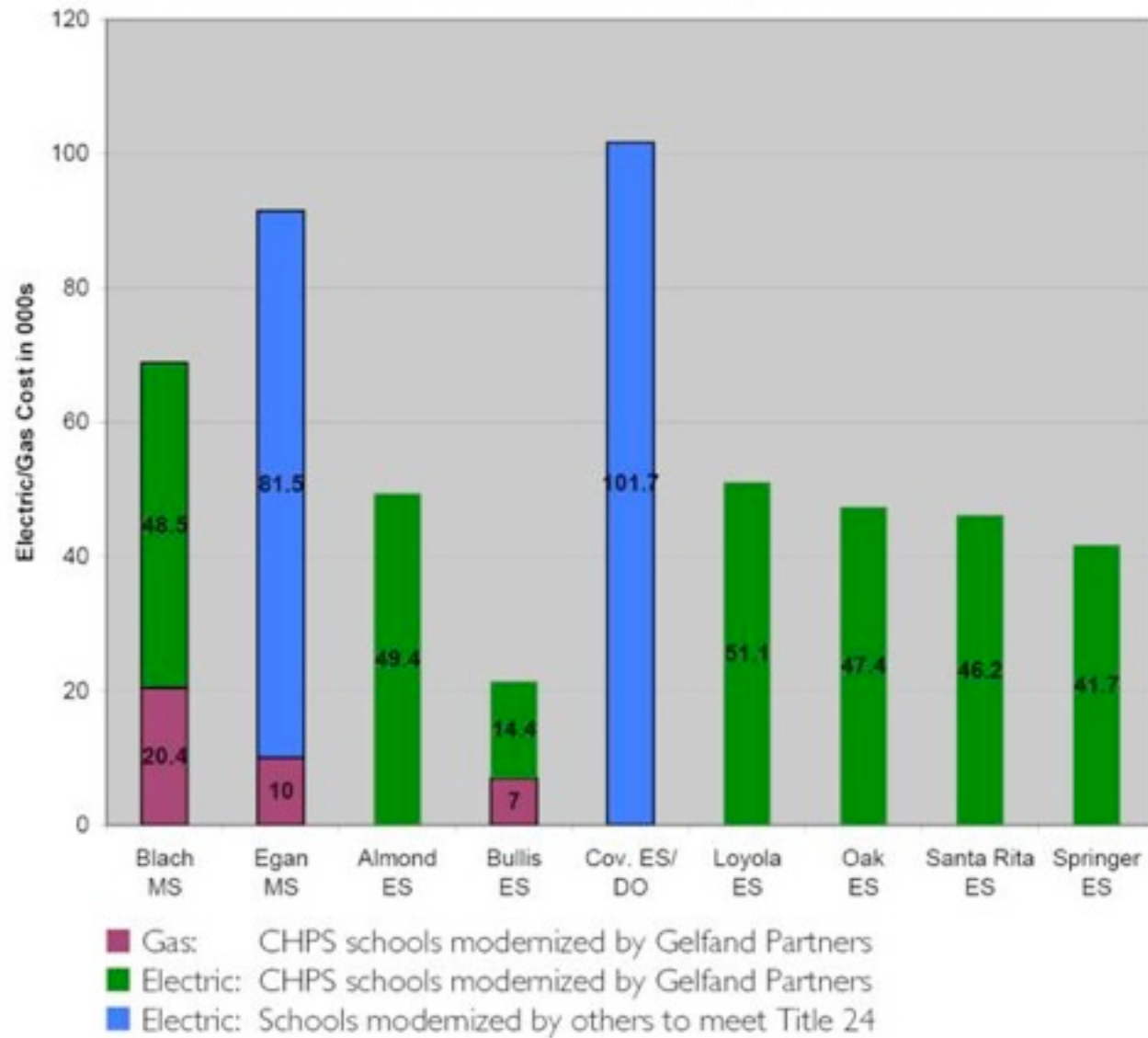
Operations and Maintenance





Monday, October 4, 2010

Los Altos School District: Electric/Gas Costs, Fiscal Year 2006/2007



Modernization HPS grants

Increase Mod Base Grant by:

2% at 20 points plus 0.025 % for each point from 21 through 33 points; or

2.35 % at 34 points plus 0.24 % for each point from 35 through 40 points; or

4 % at 41 points plus 0.36 % for each point from 42 through 54 points; or

9.05 % at 55 points plus 0.060 % for each point from 56 through 77 points.



District HPS Mod Grant Calculation

Ford Elementary—500 K-6 Grants

Basic Mod Grant: \$3,366

$500 \times \$3,366 = \$1,683,000$

CHPS Goal: 41points

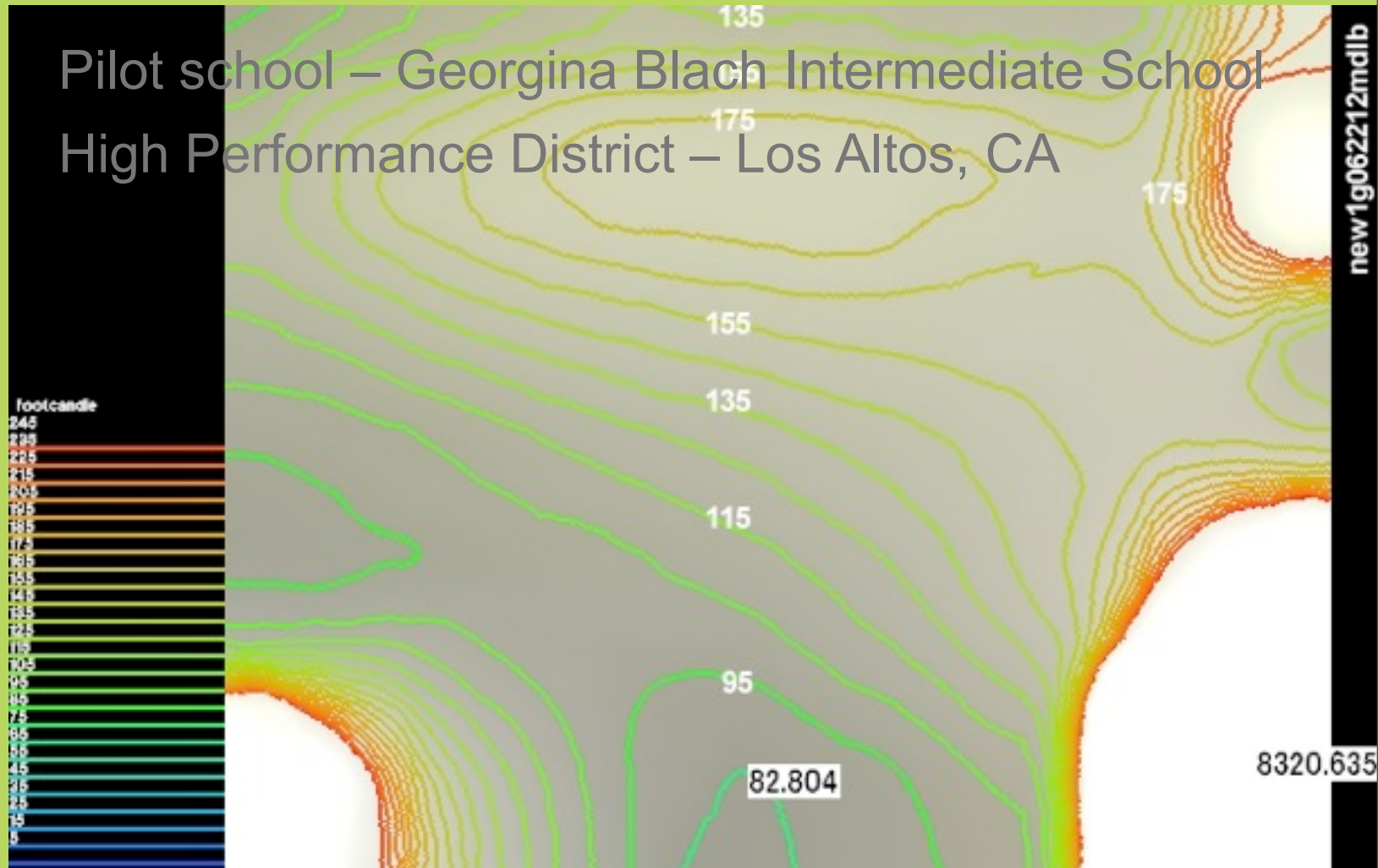
41 points = 4.0 % increase

$\text{HPS Grant} = \$1,683,000 \times .04 = \$67,320$



High Performance School Case Studies

Pilot school – Georgina Blach Intermediate School
High Performance District – Los Altos, CA



Pilot School



Georgina Blach Intermediate School,
before modernization



Original “Finger school” Campus



Public (grades 7-8)
Built 1958, 1962, 1978
450 students
34,000 sf
13 acres



Campus after modernization



75,000 sf
Daylit teaching spaces
New quad
New library
New gym
New systems
Energy use reduced
by 45%



High Performance Decision Points

Participate in demonstration program?

- additional utility funding
- additional technical support
- potential unproven technology
- potential competing goals
- ongoing site visits and monitoring
- unknown effects on construction



*PG+E lighting
classroom
helped set desired light
levels*



No dark classrooms

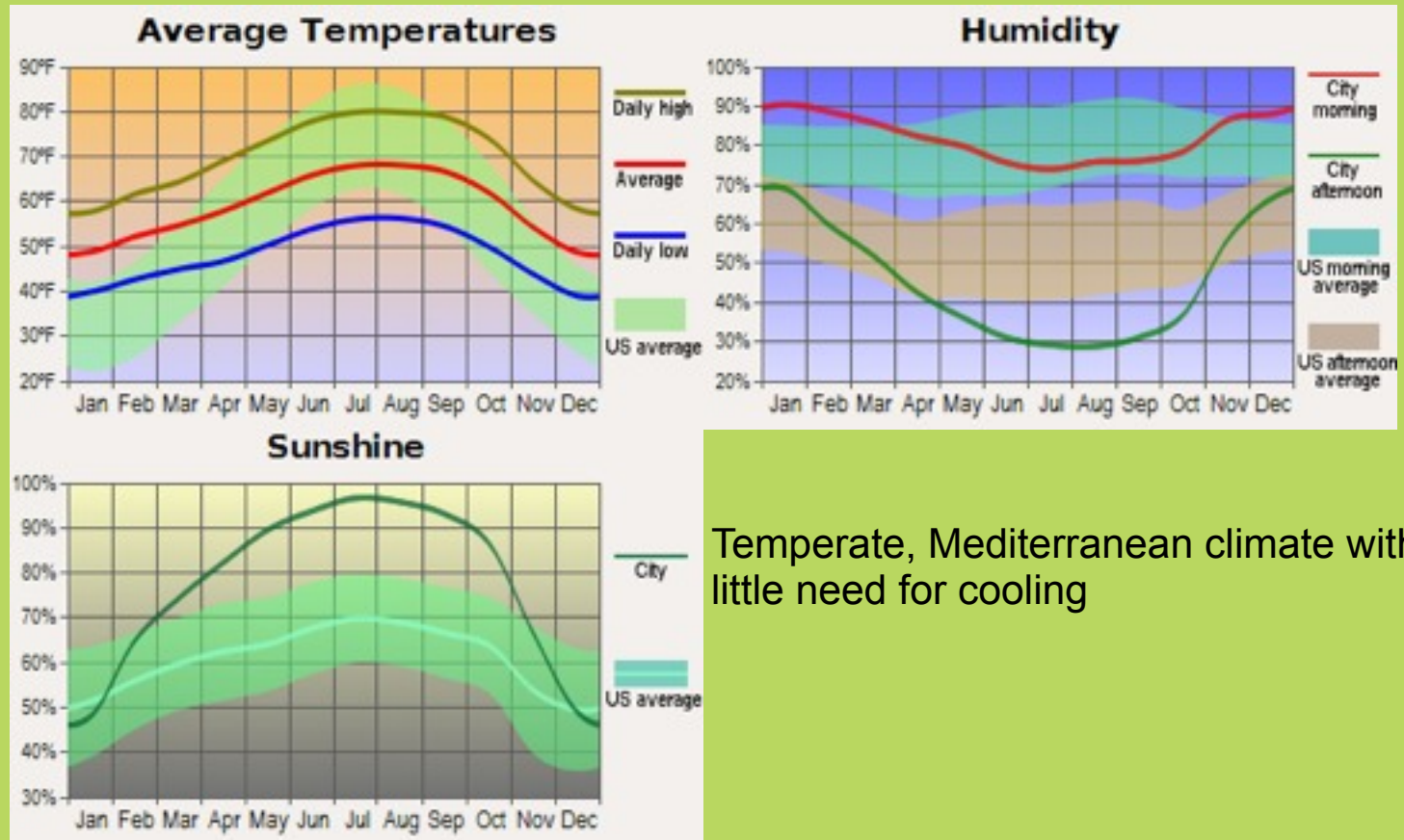


New classroom

Original classroom



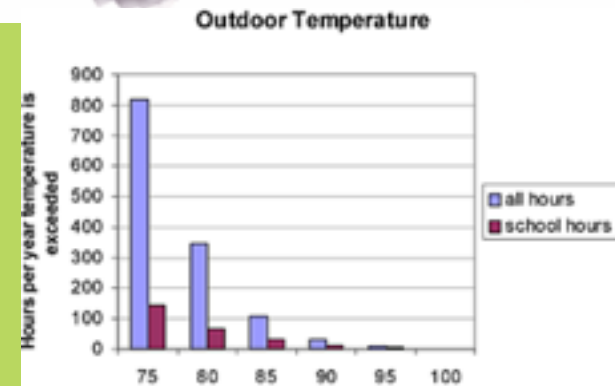
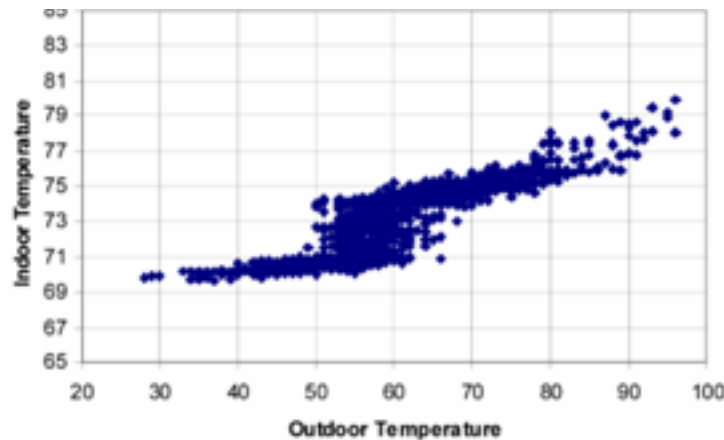
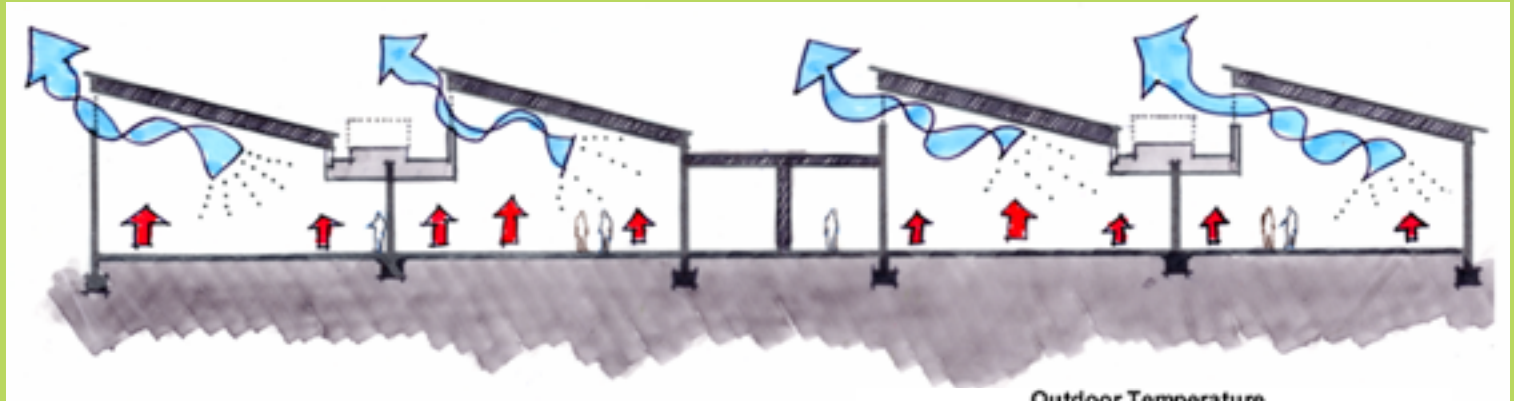
Los Altos climate



Temperate, Mediterranean climate with little need for cooling



Fresh air AND energy efficiency



Teachers' union agreement required air conditioning
Cooling load reduced to reduce unit sizes and increase efficiency
Passive stack ventilation developed to reduce air conditioning hours



Reuse existing structures



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Reduce impermeable paving



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Show your work



Glazing orientation varies with solar orientation



Roof run-off visible under canopy





New library inserted between two existing buildings



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Thorough modernization



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Maximize north light



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Automate fresh air



*Energy management system
activates clerestory window operator*



Fresh air drawn in through louver

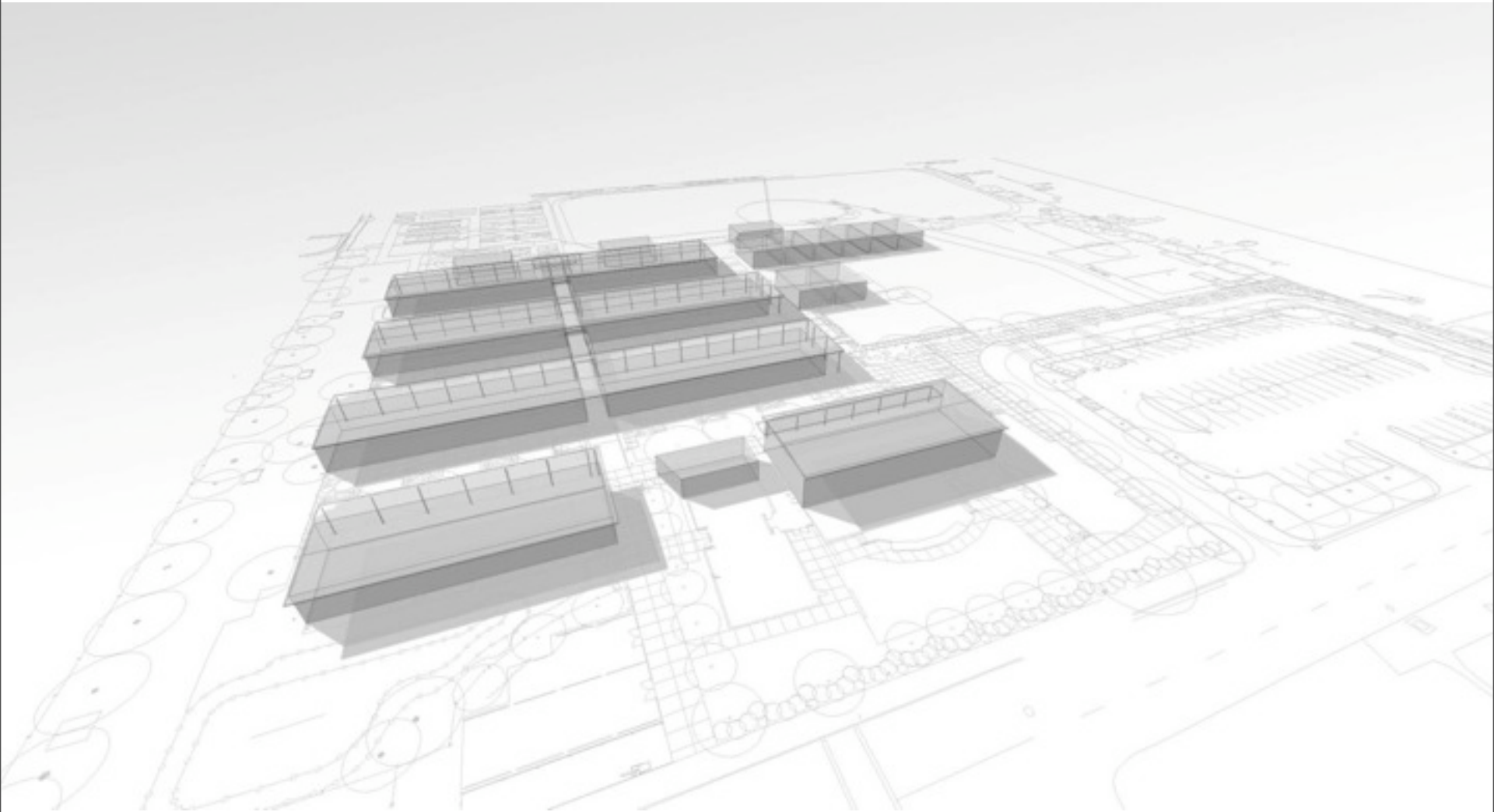


Daylight compensation dimming

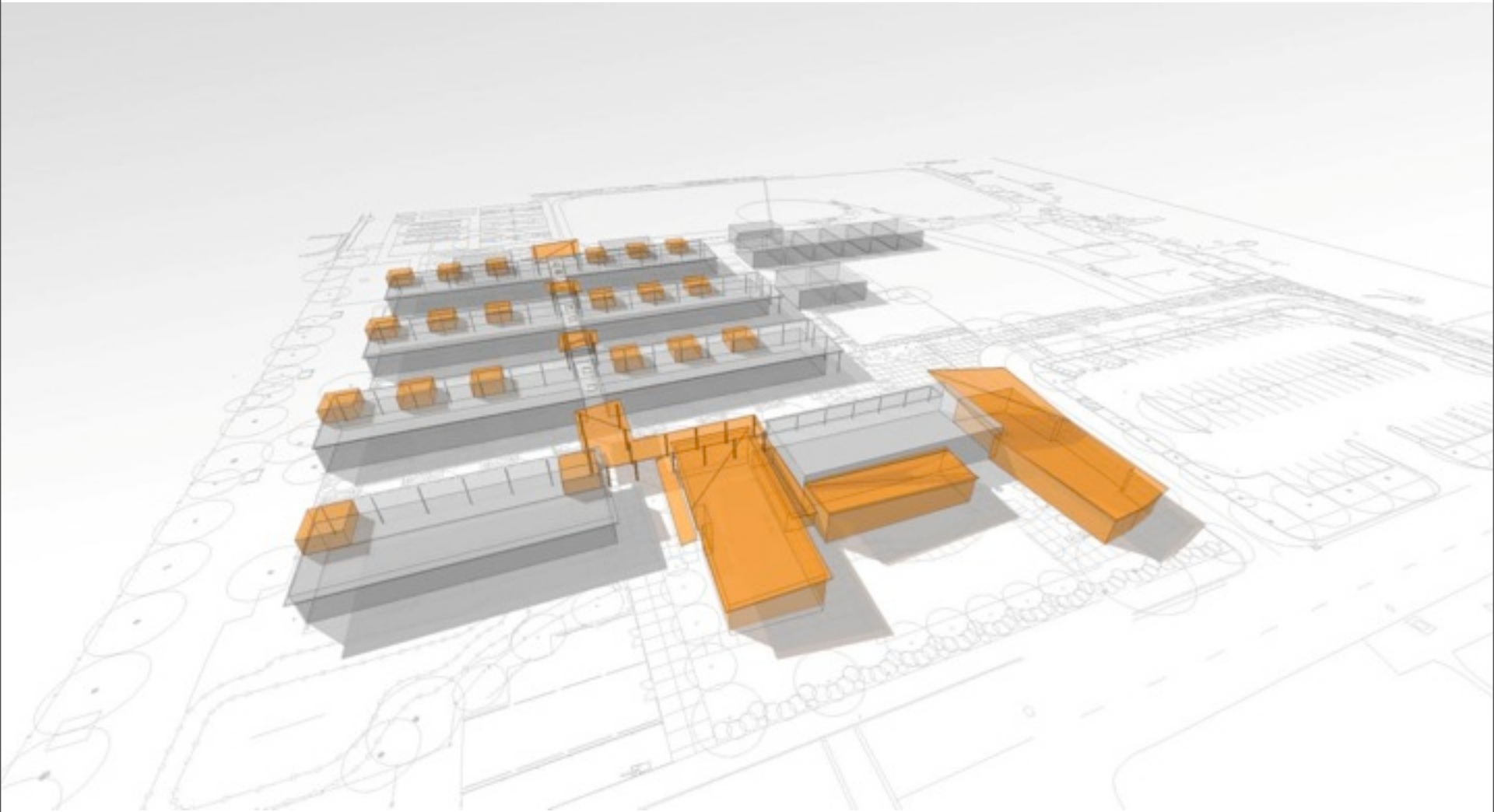
Sensors measure illumination and dim lights to maintain constant levels



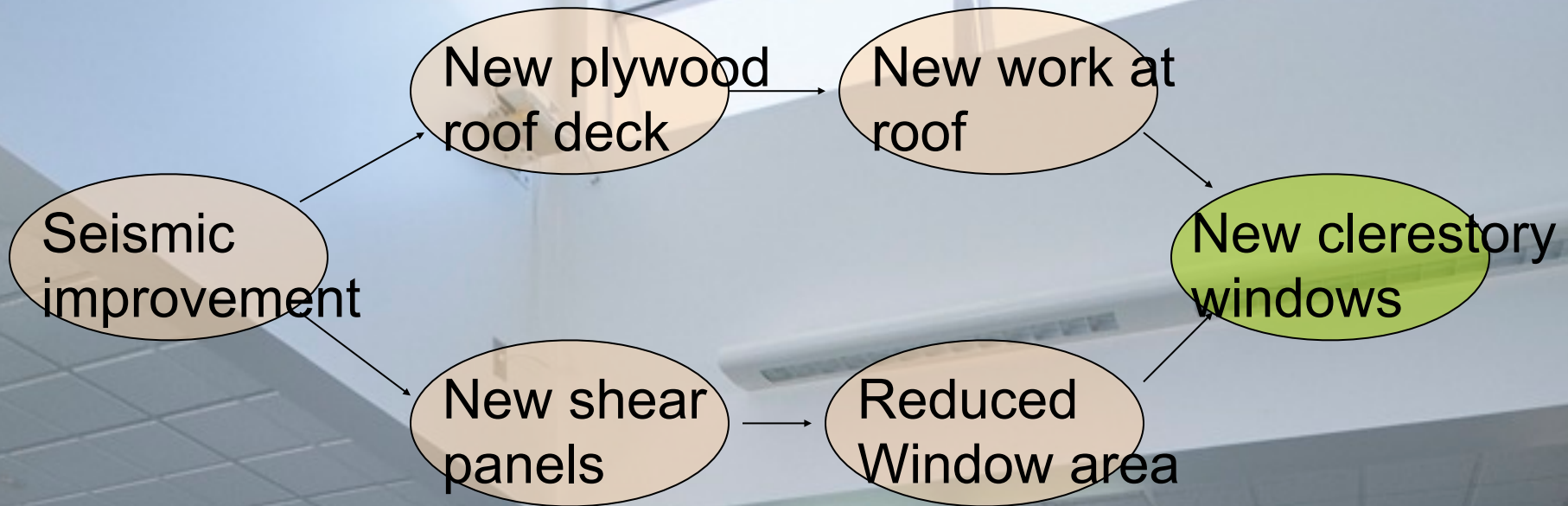
Integrated Design



Integrated Design



Decision flow





Before – no lateral system



After – shear walls installed, display windows added, roof diaphragm strengthened, roof monitors added



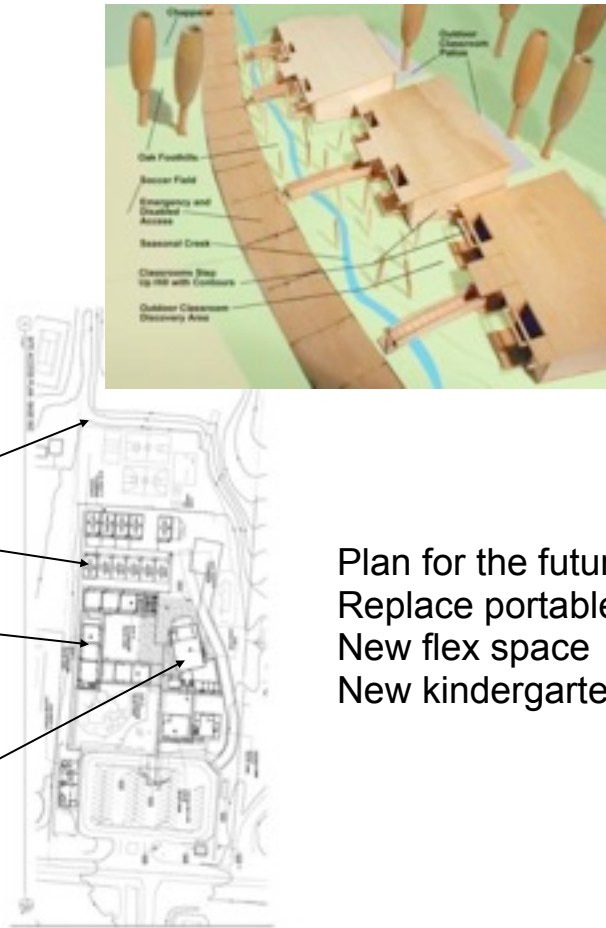
Modernization vs replacement

- Does the site plan work?
 - for education
 - for sustainability
- Are classroom structures sound?
- What kind of funding is available?





- Redirect drainage
- Replace aged portables
- Rehab classrooms
- Remove deteriorated administrative building
- Replace existing multipurpose



- Plan for the future
- Replace portables
- New flex space
- New kindergartens





Existing permanent facilities limited
Existing construction shoddy
Existing classrooms dark
Drainage problems at existing site







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Funding sources

State funding
Developer bonds

Needs

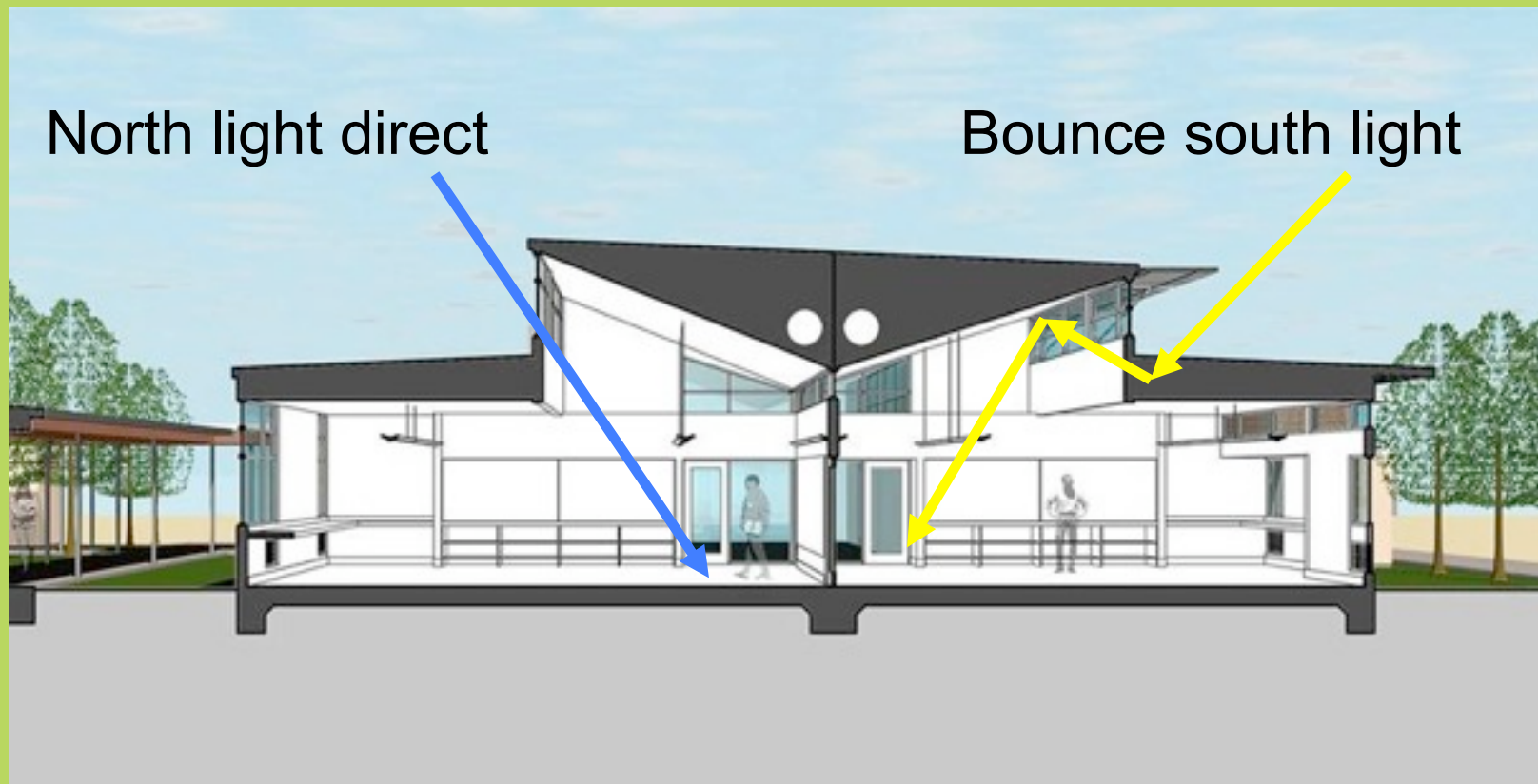
Classrooms used all day
Space for teacher prep
Flexibility

Strategies

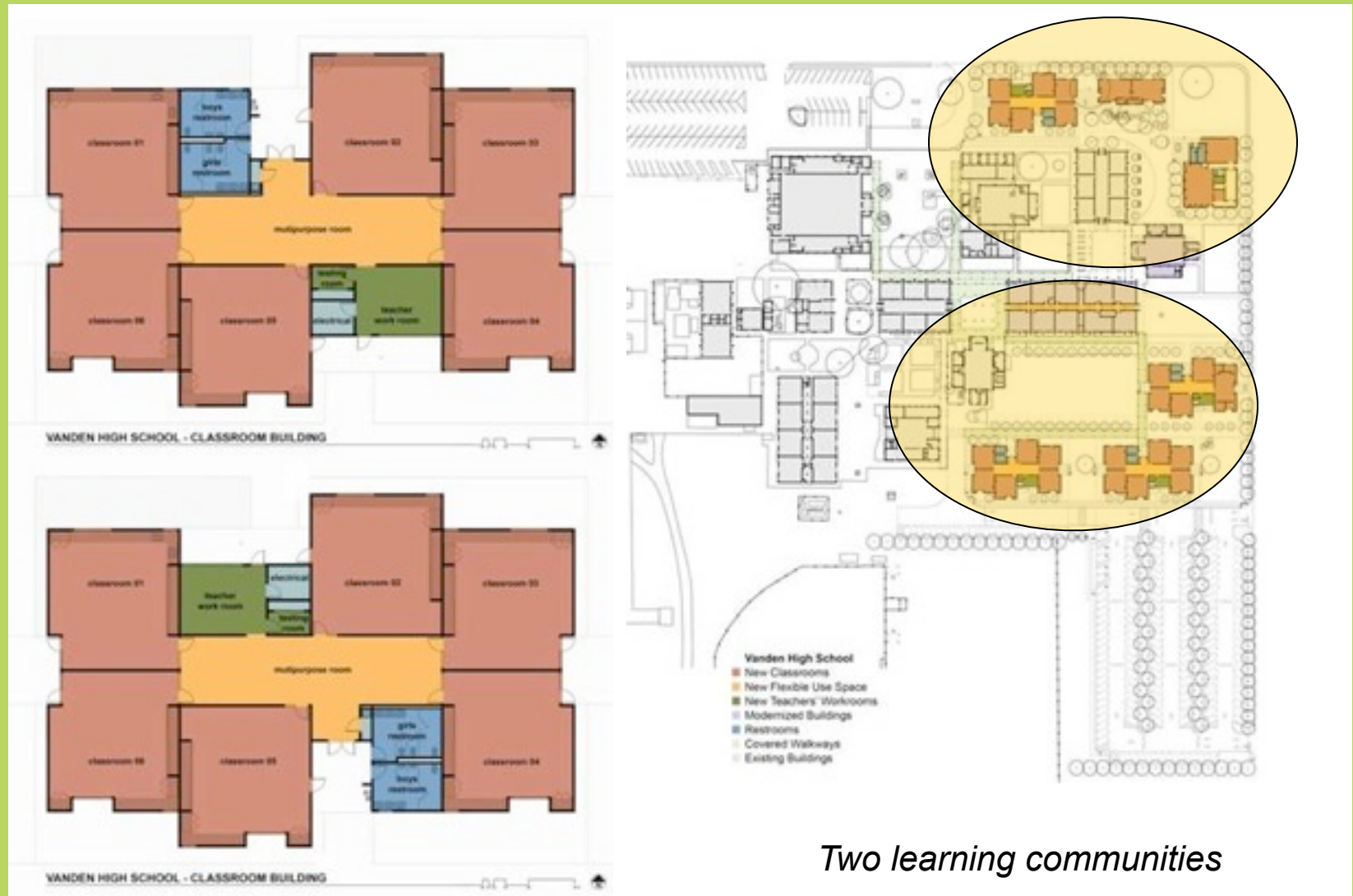
Cost effective design
Use (e) buildings better
Create defined academies
Repeat prototypes
Plan for future uses
High performance design
Phase construction



Prototyping high performance



Fit site needs and energy needs



Daylight, fresh air, flexibility



Tight budget





Vanden music room, high performance, integrated design

- How far can we afford to go?



- **Meet basic CHPS goals:**

- Daylighting
- Energy efficiency
- Finish selection

- **Future Upgrades**

- Ceiling



INTERIOR ELEVATIONS TYPICAL CLASSROOM



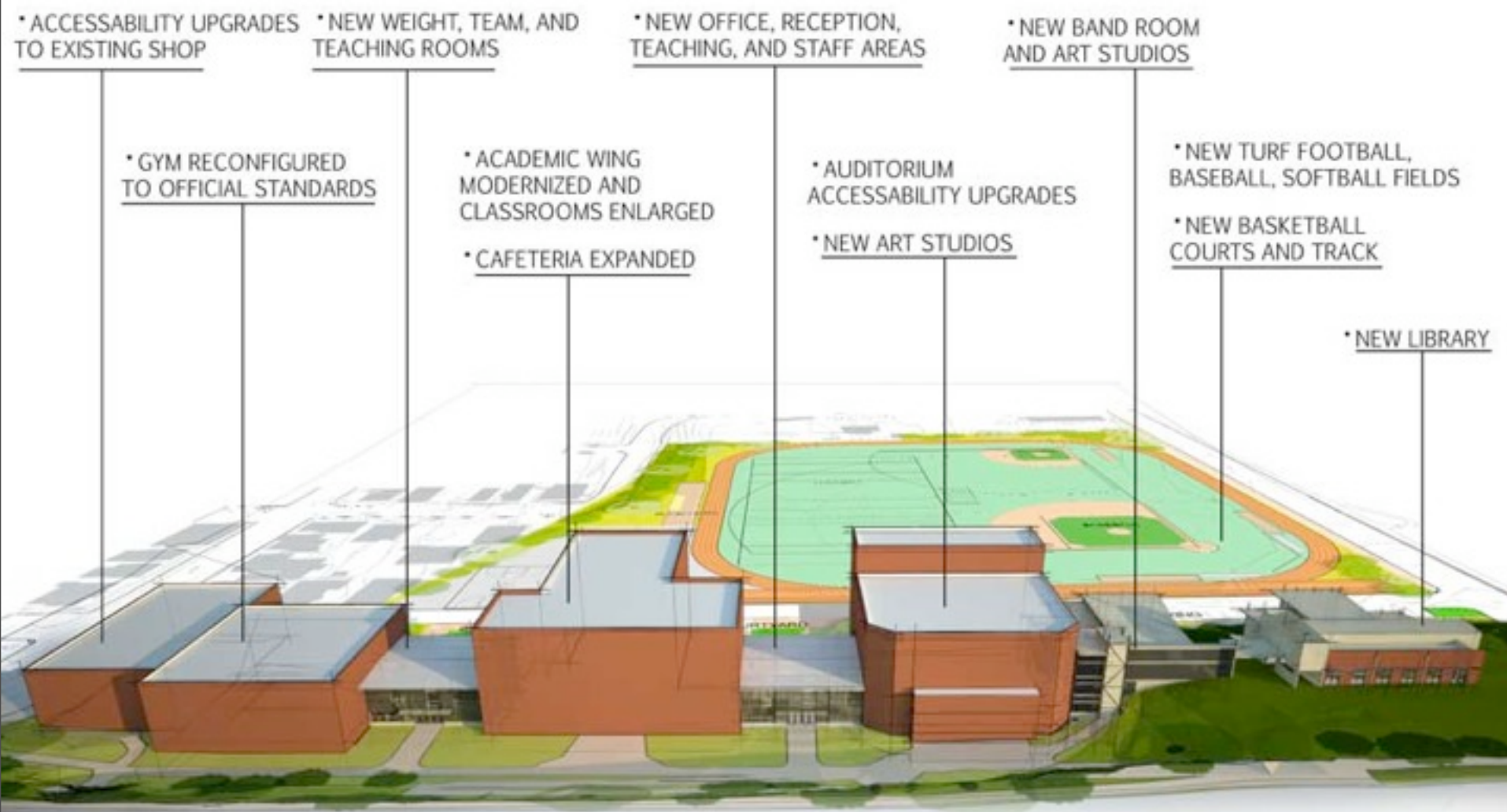
- **45 points** (exponential incentive funding relationship)
- **10.5% cost factor** (4% landscape)
- **23% better than title 24**



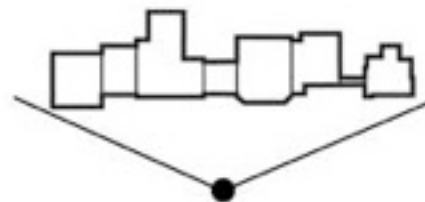


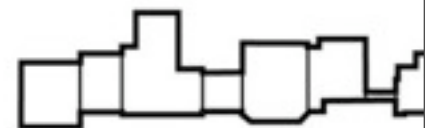
JOHN SWETT HIGH SCHOOL RENOVATION

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JOHN SWETT HIGH SCHOOL RENOVATION UPGRADES AND NEW CONSTRUCTIONS





JOHN SWETT HIGH SCHOOL RENOVATION NEW LIBRARY

Monday, October 4, 2010



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Ohlone Elementary School, Palo Alto

