



Master Plan
SUSTAINABILITY ROAD MAP
CASTILLEJA SCHOOL

CONNECTING
POLICY AND
PRACTICE WITH
DESIGN

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Prepared for
Castilleja School

Prepared By
Ann Edminster
Project Principal

Urban Fabrick, Inc.
Sustainability Consulting
& Communications

2 Mint Plaza, Suite 206
San Francisco, CA 94103

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MASTER PLAN SUSTAINABILITY ROAD MAP

Castilleja School

6/21/16

INTRODUCTION

The Castilleja School community is committed to achieving ambitious sustainability goals throughout the design, deconstruction, re-construction, and operation of the school as it builds out its master-planned new campus. The renewed campus will achieve significant sustainability benefits, over a long span of time, to many constituents beyond the school itself – at a minimum, to the surrounding neighborhood and to the City of Palo Alto. These will include reduced carbon emissions, reduced potable water demand, reduced stress on stormwater infrastructure, reduced traffic-related impacts, and enhancements to bicycle infrastructure. It will further serve as a model of a sustainably-designed campus for the State of California and the US as a whole.

What follows is a description of the sustainability strategies Castilleja will employ in the implementation of its master plan. Strategies in the following categories are addressed:

- Fossil fuel-free building operation
- Zero net energy
- Transportation
- Site work, water efficiency and landscape
- Environmentally preferable materials & indoor air quality
- Light pollution reduction
- Operational practices
- LEED (which overlaps with many of the categories above)

For each of these categories, this Sustainability Road Map provides a summary of the statutory requirements (whether established by the State of California or the City of Palo Alto) and a summary of Castilleja's sustainability goals that are *in addition to and/or above and beyond* the statutory requirements. The school will also comply with the City of Palo Alto's rigorous requirements regarding deconstruction and materials salvage and reuse, stormwater pollution prevention, and construction waste recycling.

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Fossil fuel-free operations

Statutory requirements:

- None

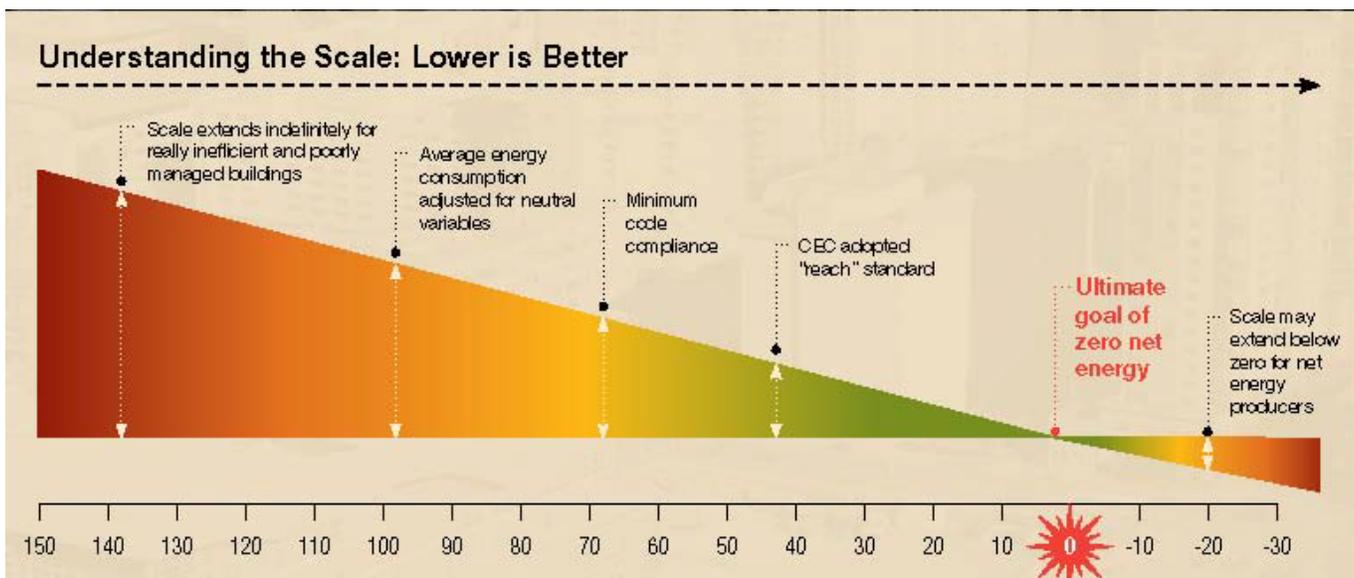
Castilleja's goals:

- All-electric building operations (outside of instructional use); no natural gas used for
 - Space heating
 - Cooking
 - Water heating
 - Pool heating

Zero net energy

Statutory requirements:

- CALGreen mandatory measures plus Tier 2, including electives
- Energy demand reduced by 15% relative to the code baseline ("Standard Design")
- Energy Star Benchmark in Portfolio Manager
- Design Phase and Construction Phase Building Commissioning (Cx) required in accordance with the California Energy Code Section 120.8



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Castilleja's goals:

- Zero net energy – the school's annual energy demand shall be met with clean, renewable energy sources
 - Onsite renewable energy used to meet the majority of energy demand – e.g., photovoltaics, solar water heating, wastewater heat recovery
 - The balance of demand (if any) to be met with renewable energy credits (RECs)
- Energy use intensity of 25 kBtu per square foot per year, or less (not including renewable energy); strategies to achieve this include
 - Energy audit to document current electrical loads and inform selection of equipment
 - Develop early energy budget
 - Integrative design process
 - Above-code levels of insulation, installed to rigorous specifications
 - High-performance windows (double-glazed, low-e)
 - Highly efficient heating, e.g., electric heat pumps
 - Cooling provided principally via passive strategies such as thermal mass and cross-ventilation; air conditioning limited to assembly spaces and as a resiliency strategy for increasing temperatures
 - Wastewater heat recovery
 - Daylighting using light shelves, reflective skylights, solar tubes, north-facing glazing
 - Smart daylighting, lighting and ventilation controls
 - Efficient lighting (LED)
 - Comprehensive commissioning
 - Building dashboard for metering and monitoring ongoing energy performance and for occupant engagement/teaching

Transportation

Statutory requirements:

- Electric vehicle facilities: 11 EVSE (electric vehicle supply equipment) installed + 43 conduit only, EVSE-ready, or EVSE installed
- Bicycle parking per Traffic Demand Mitigation (TDM) program: 1 space per 8 students; 54 for 438 students, 68 for 540 students

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Electric
vehicle
charging
station



Castilleja's goals:

- 140 bicycle parking spaces
- Public bicycle 'rest stop' amenity, with
 - Repair station
 - Tune-up days
 - Community-accessible bike-share facility, such as Bay Area BikeShare
- Enhanced school shuttle service, to include
 - Added shuttle routes
 - Added stops (staff-monitored)
 - After-hours service for students involved in extracurricular activities
 - Walking drop-off stop to encourage students to walk the final mile (with other students/chaperones)
 - Alternative transportation education offered to school community
 - Off-site parking, car-share, and no-drive incentives for employees
- According to TDM consultant Nelson Nygaard, additional recommended TDM measures could result in a 12-22% further decrease in peak vehicle trips per student, producing
 - Greenhouse gas emissions reduction
 - Improved air quality in school environs
 - Health benefits from increased walking & biking

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Site work, water efficiency and landscape

Statutory requirements:

- Excavation dewatering (pumping) allowed only April through October; additional dewatering requirements per [City of Palo Alto requirements](#)
- Water-efficient bathroom fixtures
- Dual plumbing for use of recycled water for toilet and urinal flushing
- Recycled water infrastructure for irrigation
- Dedicated irrigation meters
- Additional requirements per CA Model Water Efficient Landscape Ordinance (MWELO)

Castilleja's goals:

- Maximize onsite use of water from excavation dewatering (e.g., irrigation, dust suppression, wheel washing of construction vehicles)
- Ultra-water-efficient bathroom fixtures (below State-mandated flow/flush levels)
- Low-water consumption irrigation system (CALGreen elective A4.304.1)
 - Low-volume equipment (drip emitters, bubblers, etc.)
 - No overhead sprinklers or spray type heads except at turf grass areas
- No turf grass except on sports fields
- 90% drought-tolerant/climate-adapted plant species in non-turf grass areas

Environmentally preferable materials & indoor air quality

Statutory requirements:

- Low-VOC materials per CALGreen – paints, adhesives, etc.

Castilleja's goals:

- Low-VOC and healthy materials throughout; maximum feasible compliance with Living Building Challenge 'red list' of hazardous chemicals
- Perform life-cycle analysis (LCA) to facilitate reduction of embodied carbon in building design
- Provide fresh-air ventilation
- Install high-performance filters to control air pollutants

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Light pollution reduction

Statutory requirements:

- Per CALGreen A4.106.10

Castilleja's goals:

- Meet dark sky standards per LEED credit – for all exterior luminaires, meet uplight and light trespass requirements, using the backlight-uplight-glare (BUG) method or the calculation method
- Minimal scheduling of night-time events

Operational practices

Statutory requirements:

- None

Castilleja's goals:

- Maintenance policies to ensure optimum system functions (e.g., ongoing commissioning, filter replacement, etc.)
- Site management policy to reduce harmful chemical use, energy waste, water waste, air pollution, solid waste, and chemical runoff for all operational elements of buildings and grounds, per LEED pilot credit 88, O+M Starter Kit (PC88)
- Environmentally preferable purchasing, waste, and renovation policies (per PC88)
- Green cleaning policy and integrated pest management plan (per PC88)

LEED

Statutory requirements:

- LEED Silver rating (minimum score of 50 points)

Castilleja's goals:

- LEED Platinum (80+ points); specific beyond-Silver credits (some of which are already addressed on the preceding pages) and the associated points are listed below
 - Site Assessment (1 point)
 - Site Development - Protect or Restore Habitat (1 point)
 - Light Pollution Reduction (1 point)

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- Site Master Plan (1 point)
- Joint Use of Facilities (1 point)
- Enhanced Commissioning (4 points)
- Optimize Energy Performance (6 points)
- Demand Response (2 points)
- Building Life-Cycle Impact Reduction (3 points)
- Building Product Disclosure and Optimization – Environmental Product Declarations (1 point)
- Building Product Disclosure and Optimization – Sourcing of Raw Materials (1 point)
- Low-Emitting Materials (1 point)
- Indoor Air Quality Assessment (1 point)
- Daylight (1 point)
- Acoustic Performance (1 point)
- Innovation (4 points) – e.g., operational practices listed in preceding section
- Regional Priority (2 points)

A draft LEED Platinum checklist is shown on the following pages.

Castilleja School LEED Platinum

LEED v4 for BD+C: Schools

Issue Date: June 21, 2016



Y	?	N			
1			Credit	Integrative Process	1
6	0	9	Location and Transportation		15
		N/A	Credit	LEED for Neighborhood Development Location	15
1			Credit	Sensitive Land Protection	1
		2	Credit	High Priority Site	2
2		3	Credit	Surrounding Density and Diverse Uses	5
1		3	Credit	Access to Quality Transit	4
1			Credit	Bicycle Facilities	1
		1	Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1
11	0	0	Sustainable Sites		12
Y			Prereq	Construction Activity Pollution Prevention	Required
Y			Prereq	Environmental Site Assessment	Required
1			Credit	Site Assessment	1
1			Credit	Site Development - Protect or Restore Habitat	2
1			Credit	Open Space	1
3			Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1
1			Credit	Site Master Plan	1
1			Credit	Joint Use of Facilities	1
6	6	0	Water Efficiency		12
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2			Credit	Outdoor Water Use Reduction	2
3	4		Credit	Indoor Water Use Reduction	7
	2		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1
28	3	0	Energy and Atmosphere		31
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
4	2		Credit	Enhanced Commissioning	6
16			Credit	Optimize Energy Performance	16
1			Credit	Advanced Energy Metering	1
2			Credit	Demand Response	2
3			Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

Castilleja School LEED Comparison

Y	?	N			
6	5	2	Materials and Resources		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
3		2	Credit	Building Life-Cycle Impact Reduction	5
1	1		Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
1	1		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
	2		Credit	Building Product Disclosure and Optimization - Material Ingredients	2
1	1		Credit	Construction and Demolition Waste Management	2
15	1	0	Indoor Environmental Quality		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
Y			Prereq	Minimum Acoustic Performance	Required
2			Credit	Enhanced Indoor Air Quality Strategies	2
3			Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
2			Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
2			Credit	Interior Lighting	2
3			Credit	Daylight	3
	1		Credit	Quality Views	1
1			Credit	Acoustic Performance	1
6	0	0	Innovation		6
5			Credit	Innovation	5
1			Credit	LEED Accredited Professional	1
3	1	0	Regional Priority		4
1			Credit	Regional Priority: Rainwater Management	1
	1		Credit	Regional Priority: Indoor Water Use Reduction	1
1			Credit	Regional Priority: Optimize Energy Performance	1
1			Credit	Regional Priority: Building Life-Cycle Impact Reduction	1
82	16	11	TOTALS		Possible Points: 110

Certified: 40 - 49 points, **Silver:** 50 - 59 points, **Gold:** 60 - 79 points, **Platinum:** 80 - 110