

Fall 2014

Envelope Optimization Analysis for South Cooper Mountain High School: Setaira Web-application

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Recommended Citation

Garduno, Juan C.; Manzi, Mike; Griffin, Corey T.; and Boora Architects, "Envelope Optimization Analysis for South Cooper Mountain High School: Setaira Web-application" (2014). *Research-Based Design Initiative*. 60.

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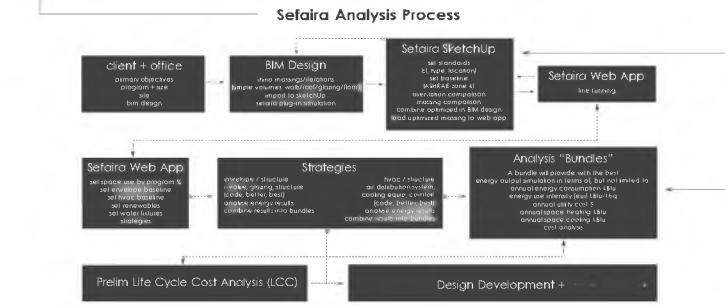
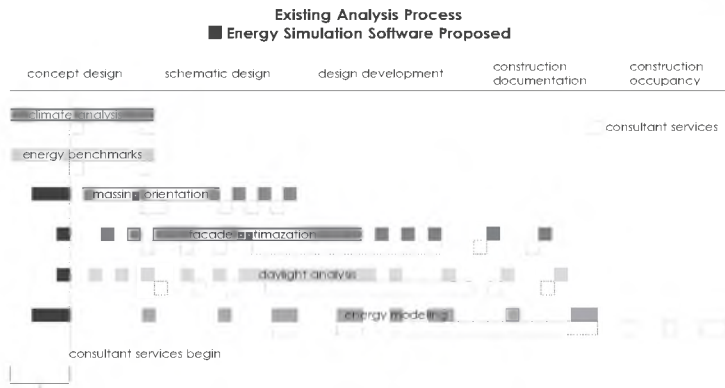


Envelope optimization analysis for South Cooper Mountain High School: Sefaira web-application

Portland State University + Boora Architects Research Collaboration

Juan C. Garduno, Mike Manzi, Corey Griffin

- Research Goals:**
1. Identify Sefaira's energy simulation limitations
 2. Identify successful Sefaira strategies/setting compared to eQuest strategies/settings



- Research Findings:**
- 1.1 Lacks temperature setback setting
 - 1.2 Lacks monthly space use setting
 - 1.3 Lacks dead-band setting
- 2.1 After some setting adjustments, envelope analysis in the Sefaira Web-Application matches closely to eQuest envelope analysis
 - 2.2 As a simulation tool, Sefaira makes the proper energy assumptions and simulations useful for the beginning phase of the design process
 - 2.3 Easy to use interface

Energy modeling software: Sefaira for SketchUp + Web Application

Initial Massing Studies

Massing Type	eQuest (PAE)	Sefaira
terrace massing:	64 EUI	66 EUI
corner massing:	63 EUI	65 EUI
hilltop massing:	60 EUI	61 EUI

-6.25% -7.58%

Massing Optimization

*sefaira eui shown reflects energy output after envelope + hvac settings were adjusted to match eQuest (PAE)

*proportional results were observed with initial energy readings using an ASHRAE 90.1 zone 4 baseline

Strategies Compared: eQuest - Sefaira

Component	Baseline	Sefaira
Infiltration	-5.14%	-4.70%
Roof	-18.92%	-13.15%
Glazing	-25.54%	-18.25%
Wall	-5.92%	-3.66%

Component	Baseline	Sefaira
Infiltration	-9.15%	-2.81%
Roof	-14.98%	-9.91%
Glazing	-17.43%	-14.62%
Wall	-3.34%	-2.83%

Component	Baseline	Sefaira
Infiltration	-1.67%	0%
Roof	-5.50%	-2.44%
Glazing	-8.37%	-4.88%
Wall	-1.91%	0%

Baseline vs Optimized Bundle

Bundle	Annual Energy Consumption (MBTU)	Infiltration (cfm/ftsq)	Roof (R-value)	Wall (R-value)	Glazing (U-value)
Baseline	12,996	0.40	R-20	R-15.6	U-0.46
Optimized	11,498	0.25	R-40	R-20	U-0.18

*building not in use during summer school break (July - August)