

The El Sol Science and Arts Academy: A Case Study
The Benefits of Rapid-Response Facility Solutions for K-12 District Planners
Orange County Schools Facility Planners: May 11th, 2016



Introductions



Joe Dixon
President
Dixon
SmartSchoolHouse

Former Asst.
Superintendent,
Santa Ana Unified



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Vice President
Project Frog

Former Director of
Strategies at
MKThink



Agenda

1. El Sol Context
2. District / Charter Partnership
3. Campus Development Model
 - Funding
 - Design
 - Delivery
4. Measuring Outcomes
5. Lessons Learned



El Sol Santa Ana Science and Arts Academy

An Excellent Public School

Founded in 2001

Grades: K-8

Number of Students: 850

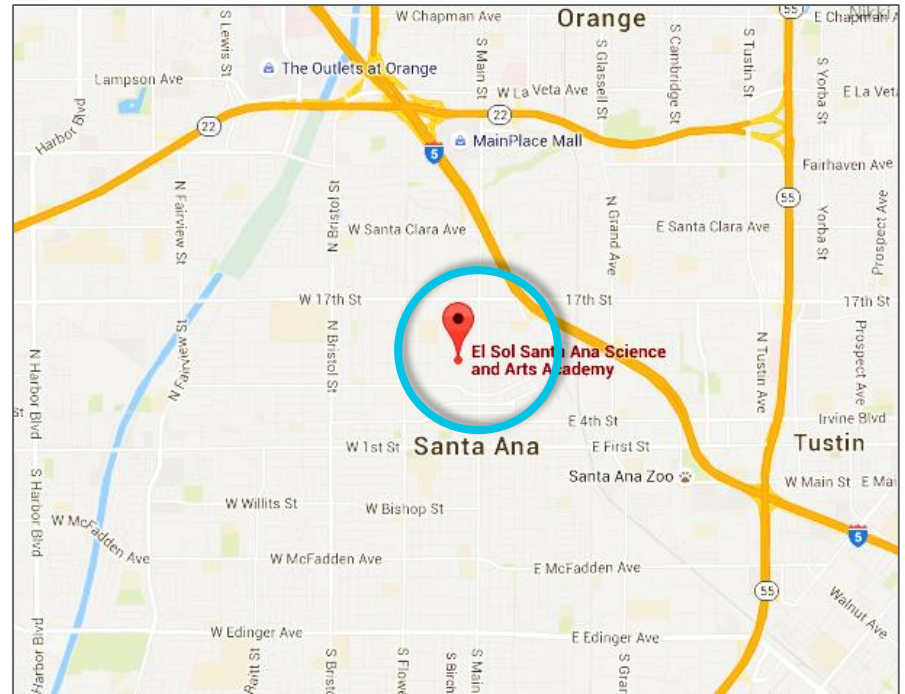
District: Santa Ana Unified School District

Features:

- 2.1 acre site
- 81% Free and Reduced Lunch
- 61% ESL
- Dual-Immersion Curriculum
- Onsite Preschool and Wellness Center
- Extended Day & Preschool Program

Awards and Accolades:

- Title I Academic Achievement Awards
- California Association of Bilingual Educators Award
- 2014 Hart Vision Award: Charter School of the Year





El Sol Science & Arts Academy | 2012: 800 Kids in 100% Portables
Santa Ana Unified School District, Santa Ana, CA



The El Sol Development Team



Monique Daviss
Exec. Director
El Sol



Marshall Kaplan
Director,
Mirage
Foundation /
Fundraiser



John Sun
CEO
Pacific Charter
School Development



Joe Dixon
Former Asst.
Superintendent,
Santa Ana Unified

MODULAR

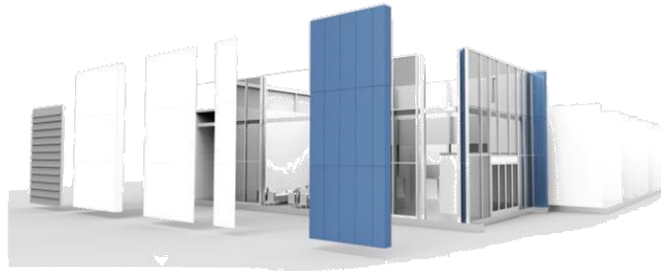
100% of construction occurs off-site



Standard Module

COMPONENT

50-90% of construction occurs off-site



Kit of Parts

























TRADITIONAL

100% of construction occurs on-site



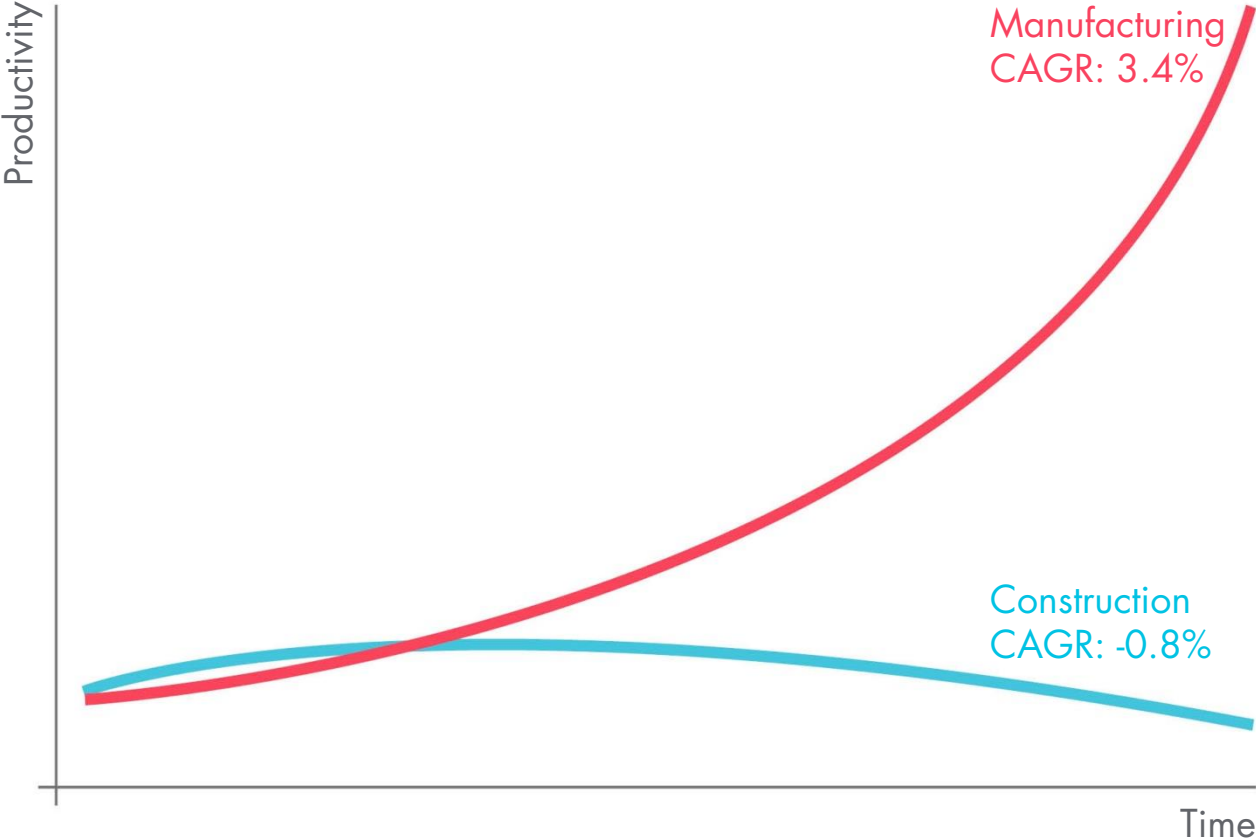
Stick-built

Building Alternatives Evaluation Matrix

	Stick-Built Construction	Modular	Permanent Component Buildings
Building Performance & Sustainability Optimize learning via superior acoustics, indoor air quality, & natural daylight			
Image & Identity Enhance surrounding community and provide connectivity to the outdoors			
Site Impact Minimize construction waste and impact on surrounding community			
Schedule Ensure project completion by January 2014			
Building Quality & Adaptability Provide high-quality, high-efficiency and long-lasting systems and structures			
First and Lifecycle Costs Minimize upfront costs and increase energy efficiency and maintenance standards			
Adaptability to District Standards Minimize lifecycle costs and ensure ease of long-term maintenance			
Procurement & Permitting Expedite design process and streamline procurement			



Productivity



Source: Bureau of Labor Statistics, Bureau of Economic Analysis, Stanford University Dept. of Civil and Environmental Engineering
Note: Productivity measured as real sector GDP divided by total labor hours

BOEING

Efficiency through Prefabrication



TOYOTA

Standard Components Across Models



IKEA

Flat packed Shipping & Assembly





DESIGNED FOR MANUFACTURING
ZERO DEFECTS



DESIGNED FOR DELIVERY
FLAT PACK SHIPPING

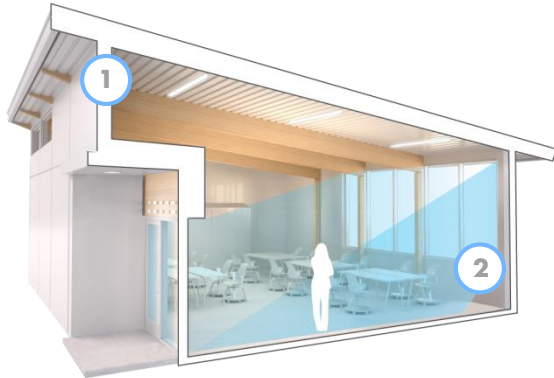


DESIGNED FOR ASSEMBLY
SPEED TO MARKET

Reverse Designed for Manufacturing, Delivery and Assembly



light



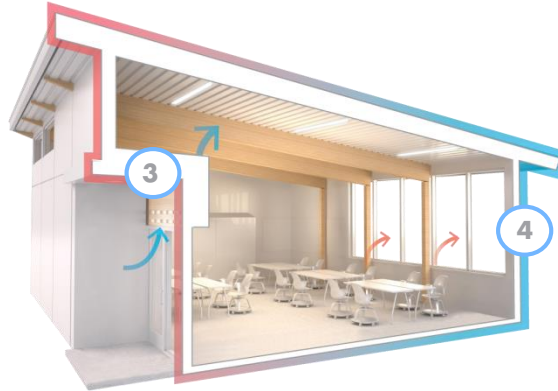
1 Abundant natural daylighting is correlated with reduced absenteeism.

Large operable view windows, high clerestories, LED lighting and high-performance low-e glazing facilitate an even distribution of light and views to the outdoors.

2 Daylit classrooms yield up to 26% faster learning rates and 14% improved test scores.

Frog classrooms are designed to be 75% daylight autonomous.

air



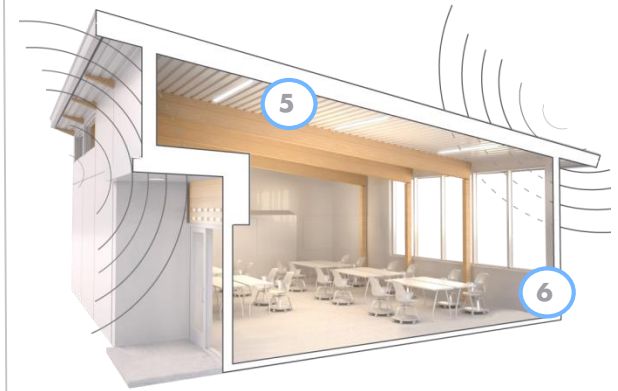
3 Superior indoor air quality reduces rates of respiratory illnesses such as asthma, the #1 cause of absenteeism.

Voluminous spaces and operable windows encourage continuous air flow.

4 High-performance building envelopes deliver significant energy & cost savings.

A life cycle analysis comparing Frog vs. traditional portables showed Frog buildings will generate \$690K in life time savings.

sound

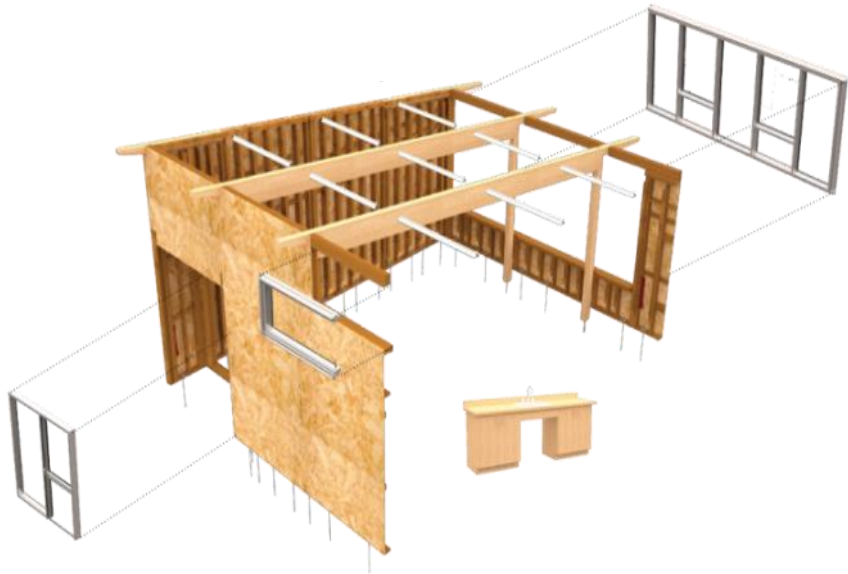


5 Good acoustics are linked to increased student performance and enhanced comprehension.

Insulated roof and wall panels mitigate sound and reduce reverberation.

6 Good acoustics are correlated with increased teacher retention.

Frog classrooms are designed to a max 45 dBA and 0.6 reverberation time.



50%

The Frog Kit: Core and Shell
Fast deployment, standardization where it matters

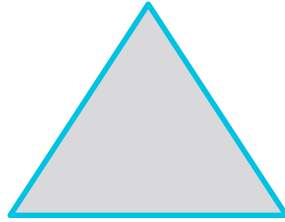
50%

General Contractor & Architect: Fit-Out & Finish
Flexibility in program, MEP systems, and finishes

One size doesn't fit all.

Solving the Critical Path for Speed of Delivery |
& Adapting District Standards for Design, Maintenance and Operations

Owner



**Architect of
Record**

**General
Contractor**

**Building
Architect**

Vendors

Project Frog

Project Frog

**Structural
Engineers**

Subcontractors

MEPF Engineers

Framers

Civil Engineers

Glazers

Landscape Engineers

Roofers

M/E/P/F

PFI Roles and Responsibilities



El Sol Science & Arts Academy 2014
Santa Ana Unified School District, Santa Ana, CA



El Sol Science & Arts Academy - Present (2016)
Santa Ana Unified School District, Santa Ana, CA



Towards a better way



El Sol Science & Arts Academy - Present (2016)
Santa Ana Unified School District, Santa Ana, CA





projectfrog 

El Sol Science + Arts Academy, 19,000 sf

9-week construction sequence

Directional Pricing

Project Frog

Partners

Soft Costs

Arch/Engineering,
Soils, Survey

Site

Site Work
(demolition. utilities)

Building Costs

Project Frog
Components and
Delivery

\$ 100/sf -
\$ 120/sf

Foundation,
Component Install,
Fit and Finish Scope

\$ 180/sf -
\$ 200/sf

**Building
Hard
Costs:**
\$ 280/sf -
\$ 320/sf

GC Fees, Bonds,
General Cond/Req's

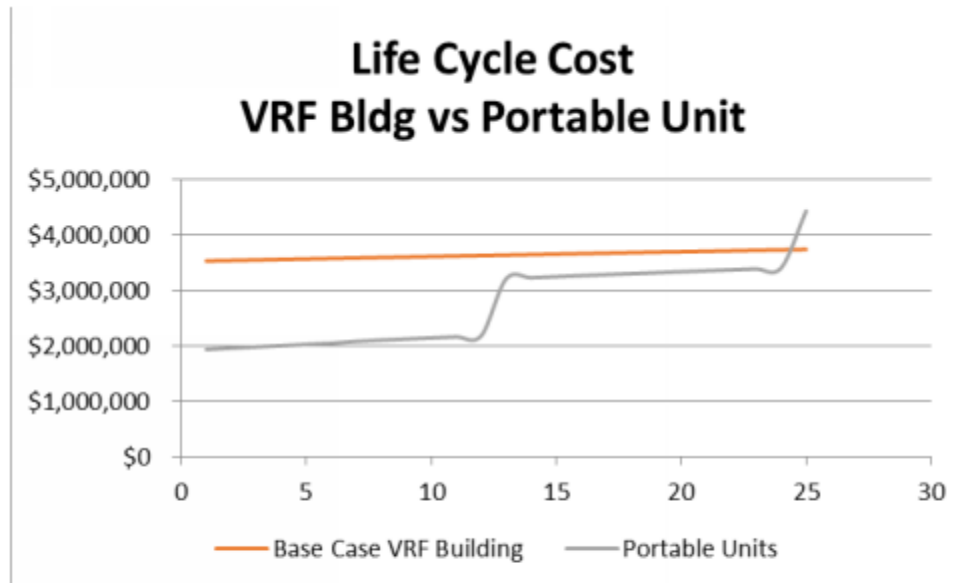
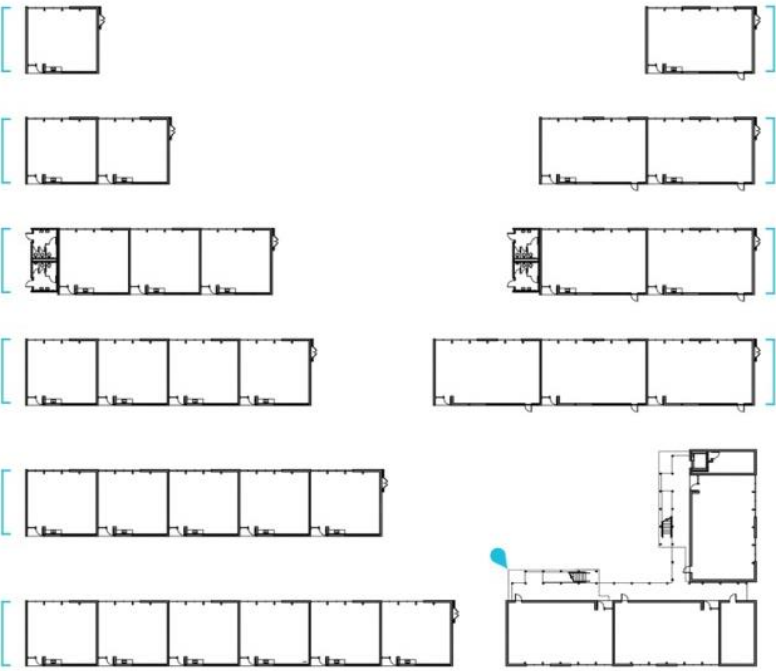


Chart 1: Life Cycle Cost Comparison

As the chart above depicts, the life cycle cost of the VRF building is \$3,737,254 at the end of 25 years, whereas the Portable unit had a life cycle cost of \$4,426,183. The permanent state of the art building has a life cycle cost savings of \$688,929.

DSA Off-the-Shelf Typologies

BRIGHTPACK



BRIGHTPLEX



BRIGHTHUB



Summer Build 2015

97 Classrooms

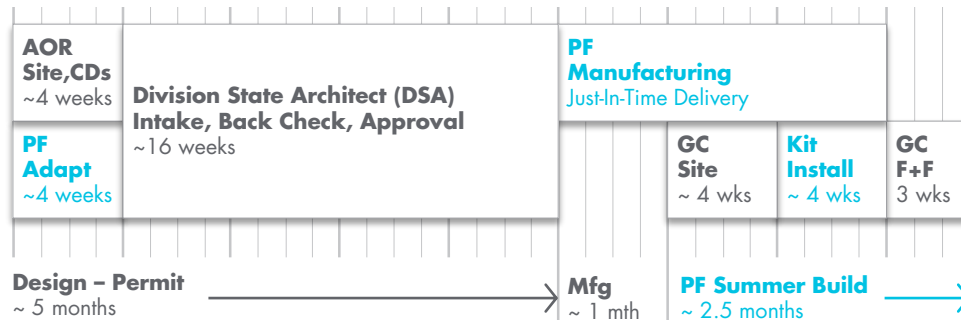
- Davis: Cesar Chavez Elementary School
- Davis: Holmes Junior High School
- Fremont: Mattos Elementary School
- Fremont: Azevada Elementary School
- OUSD Greenleaf Elementary School
- SSFUSD: South San Francisco HS
- SSFUSD: Parkway MS
- SSFUSD: Buri Buri ES
- SSFUSD: Junipero Sera ES





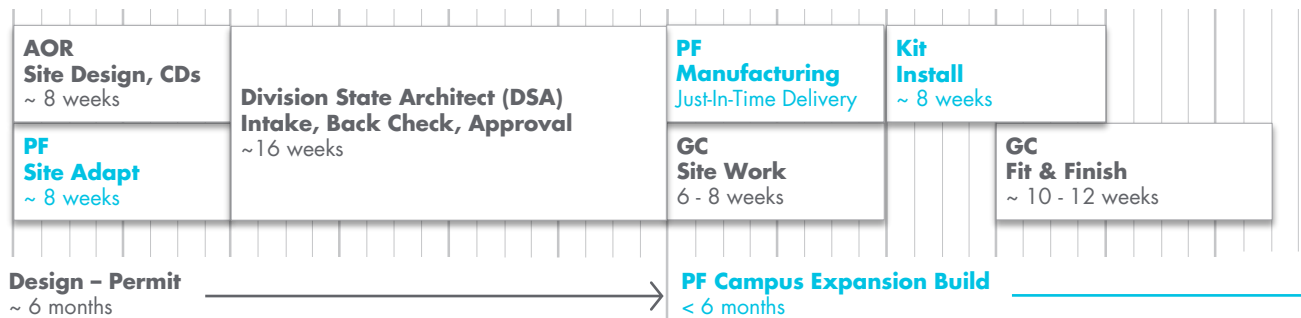


Project Frog Summer Build | One-Story Typologies Up to 8,000 sf



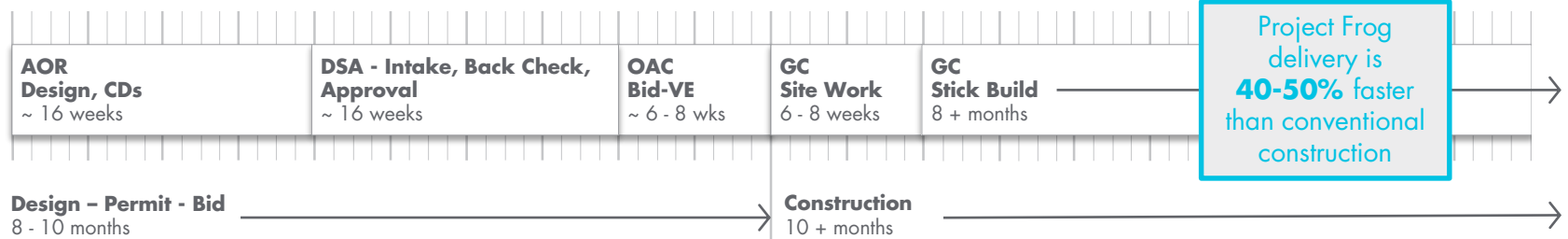
1-story
~8 1/2 months
 Design - Completion

Project Frog Campus Expansion | Two-Story and Multi-Purpose Typologies



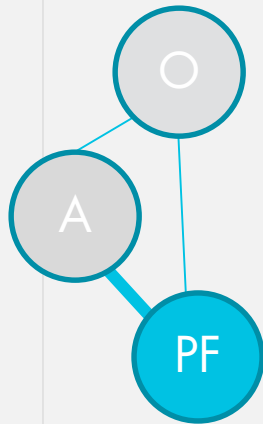
2-story
~12 months
 Design- Completion

Design - Bid - Build | Conventional Delivery



Lease Lease Back (public/private)

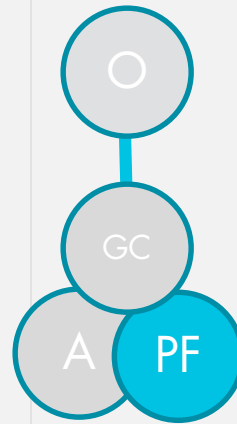
Design



Contract early with Architect as basis of design to circumvent restrictive procurement

Ex: Evergreen: Cedar Grove

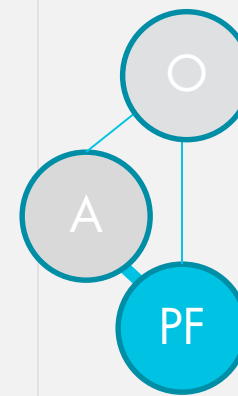
Design / Build



Single design/build contract with Owner/ Contracting entity includes A/E and GC.

Ex: Fremont

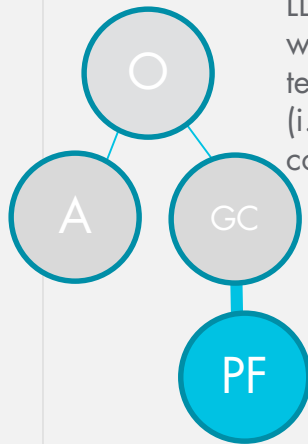
Design Bid Build Using 'Piggy Back'



Owner approves Frog piggy back and contracts with Architect using Frog as basis of design

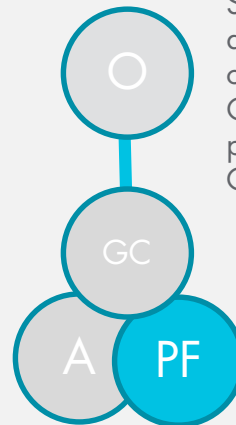
Ex: El Sol 2

Kit



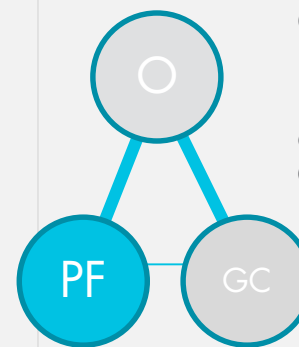
LLB contract with GC for term of lease (i.e., construction)

Ex: Evergreen: Cedar Grove



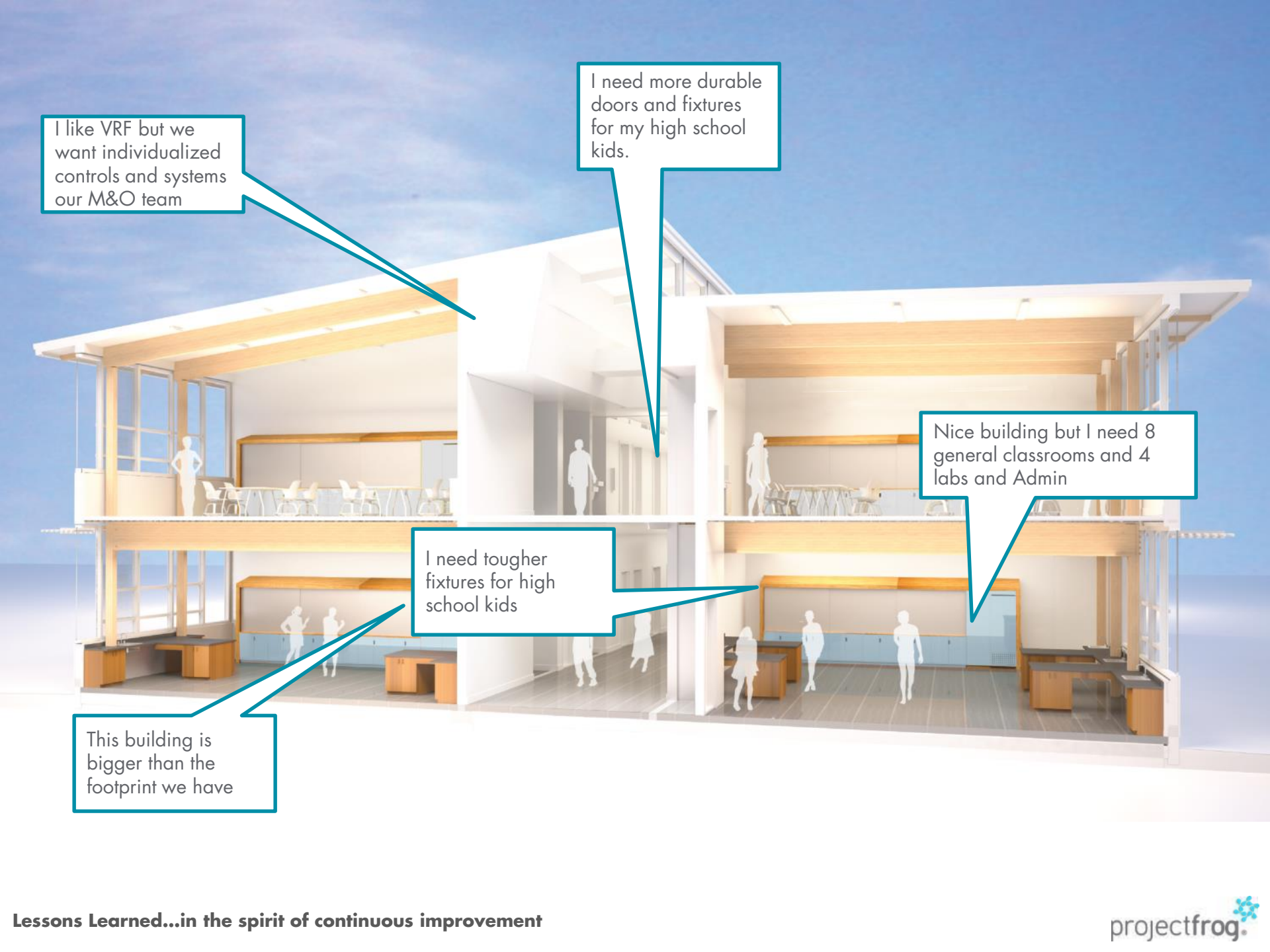
Single design/build contract with Owner. Frog kit purchased by GC.

Ex: Fremont



Owner purchases Frog kit directly. GC installs.

Ex: El Sol 2

An architectural cutaway rendering of a two-story school building. The building features a modern design with large windows, wooden accents on the ceiling and walls, and a central hallway. The ground floor contains classrooms with desks and whiteboards, while the second floor has a common area with tables and chairs. Several white human silhouettes are placed throughout the building to indicate scale. Five callout boxes with blue borders and white text are connected to the building by lines, providing feedback on various aspects of the design.

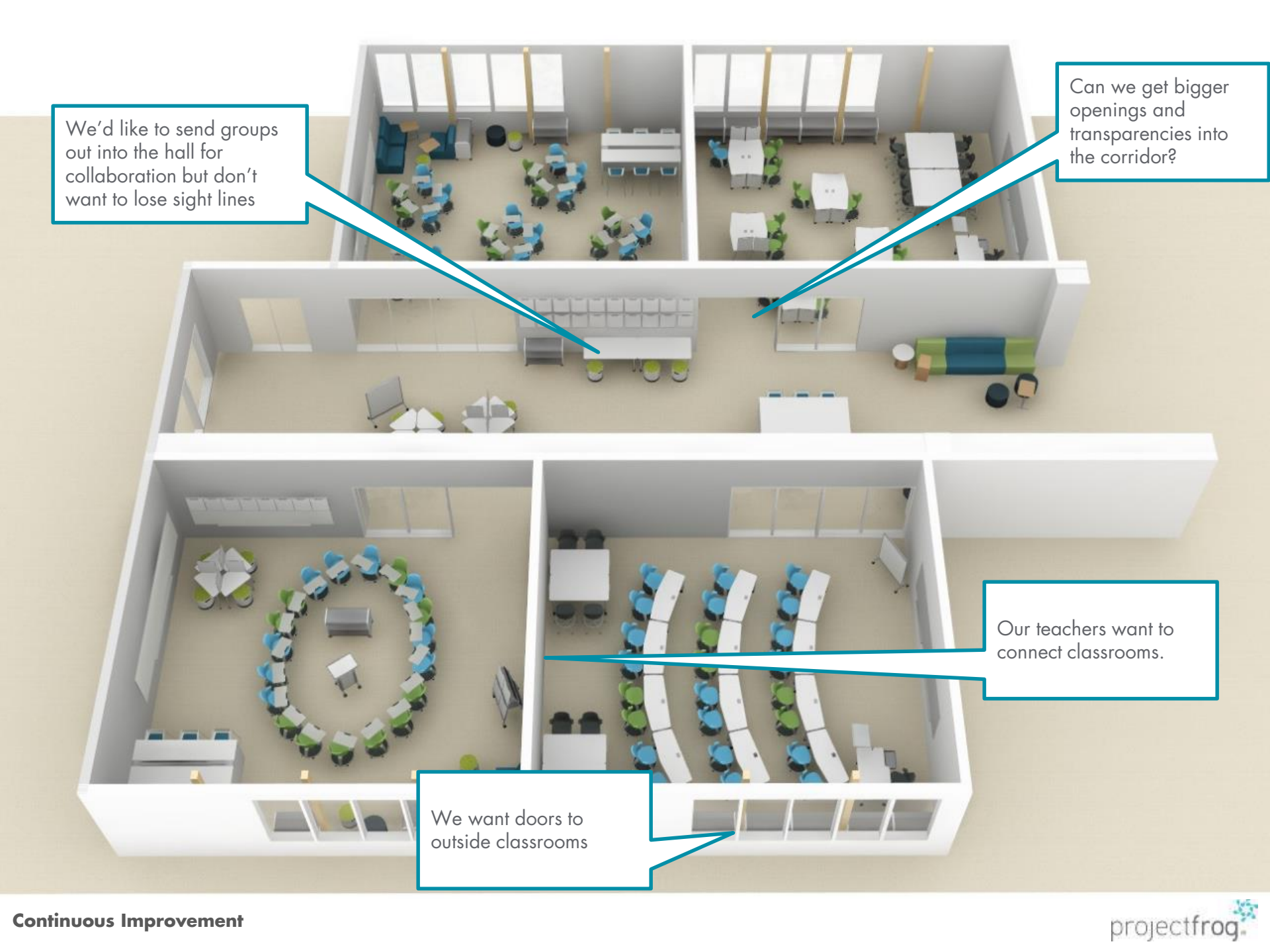
I like VRF but we want individualized controls and systems our M&O team

I need more durable doors and fixtures for my high school kids.

Nice building but I need 8 general classrooms and 4 labs and Admin

I need tougher fixtures for high school kids

This building is bigger than the footprint we have

A 3D architectural rendering of a school layout, viewed from an elevated perspective. The layout includes several classrooms, a central hallway, and a common area. Callout boxes with blue borders and white text are connected to the rendering by blue lines. The callouts discuss design goals such as sight lines, transparency, classroom connectivity, and outdoor access. The rendering shows various furniture arrangements, including round tables, rectangular tables, and curved desks, along with blue and green chairs. Large windows are visible along the top walls of the rooms.

We'd like to send groups out into the hall for collaboration but don't want to lose sight lines

Can we get bigger openings and transparencies into the corridor?

Our teachers want to connect classrooms.

We want doors to outside classrooms



Product Evolution | Increased flexibilities and transparencies





MPR Rendering
South San Francisco USD



Lessons Learned

Component construction was critical to success of the project

- **Speed was a necessity** not a nice to have given state of the campus
- High quality finishes signaled value to school & surrounding community
- **Limited laydown area demanded 'Just In Time' materials delivery**
- School integrated construction process into STEM related curriculum

Plan for Continuous Improvement

- PC can stymie product evolution– especially in 2-story

Design/Build delivery allowed true design/delivery partnership

- HMC, Bernards and Frog collaborated from project conception – transparency of project costs passed to client

Project Frog kit of parts slips easily into GC managed Project Schedule & sequencing

- 'Product only' scope gives GC flexibility for trade coordination
- Quickly delivered weather tight shell facilitates early utility rough-in and allows interior finishes earlier than stick built construction.
- Interior bathroom pods, while innovative and easy to install, caused potential issues for inclement weather

VRF system, while highly efficient, needs consistent maintenance and commissioning