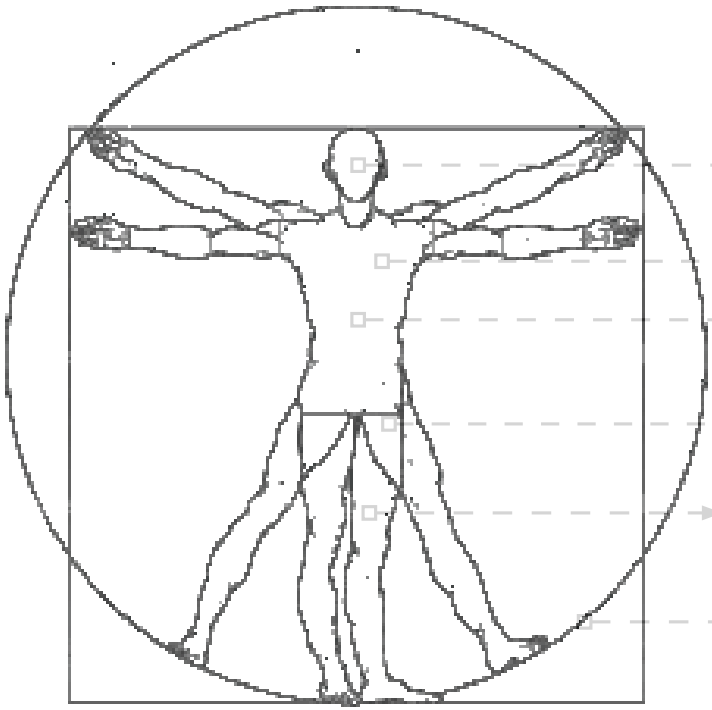
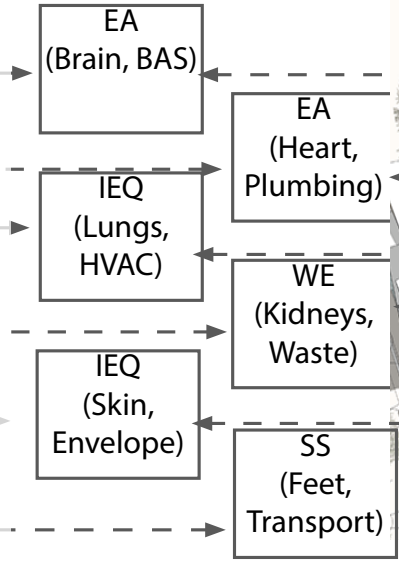
Reynolds School District
Wilkes Elementary
Portland, OR

Eco-charrette Report
June 1, 2016





Systemic Sustainability

Credits

ecoREAL, Summer Gorder, LEED/Sustainability Facilitator
summer@ecorealsolutions.com
503.703.6213

EcoREAL, Phil Corah, Green Building Assistant
PhilC@ecorealsolutions.com
503.621.8102

Elin Shepard, Energy Trust Oregon
elin.shepard@clearesult.com
503.314.9021

Day CPM, Robert Collins, Owners Rep
rcollins@daycpm.com
503-641-4100
BLRB, Architects

Owner's Rep - Architect
gschnaidt@daycpm.com
503-754-0282

Richard Higgins, Architects
rhiggins@blrb.com
503.535.0707

PAE, Ruwan Jayaweera, Mechanical Engineers
ruwan.jayaweera@pae-engineers.com
503.542.0521

Hodaie Engineering, Saifan Hodaie, Electrical & Solar Ally Rep
Energy & Solar Analyst
saifan@hodaieengineering.com
503.808.9295

Pierre Dehaze
Reynold's School District - Facilities Supervisor
503 550 4285
PDehaze@rsd7.net

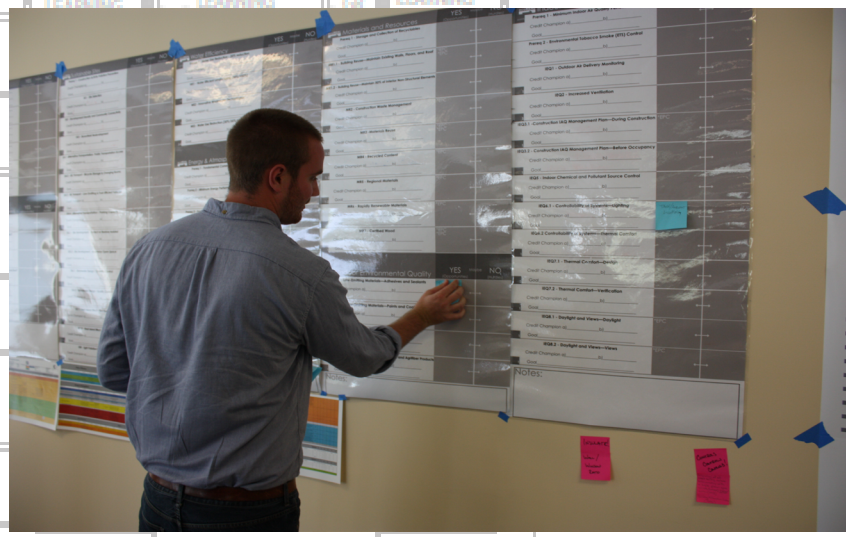
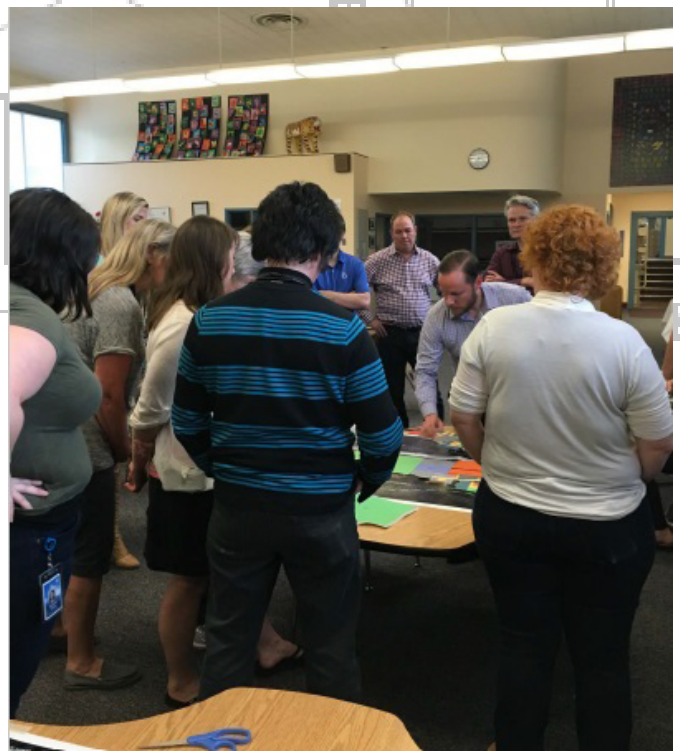
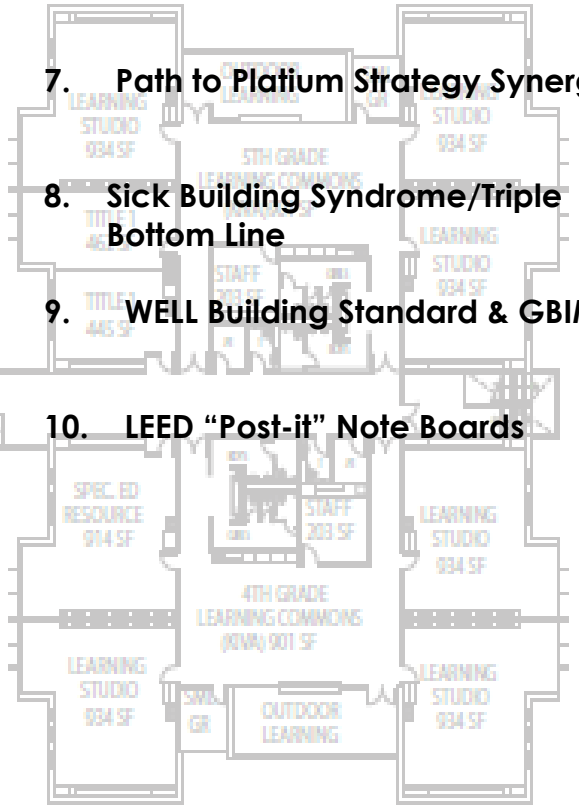


Table of Contents





Reynolds Elementary School Eco Charrette

The eco-charrette for the Reynolds Elementary School District kick-starts the integrated design process. In the spirit of collaboration various stake-holders from Reynolds School District, facility managers, mechanical, engineers, architects, consultants and owner representative's team gathered together to asses systems, strategies, and goals. The diverse group provided a dynamic conversation about sustainable strategies for **sites, water efficiency, energy, materials, indoor environmental quality and wellness features.** **Energy Trust sponsored** the charrette as part of the **incentive program.** The charrette covered goals, ETO Energy Efficiency Measure strategies, and sustainable design synergies with interactive exercises **(see end of reports).** The results are documented in this report.

Reynolds is not pursuing certification, but the LEED Checklist is used as a means to look at the building holistically against a nationally recognized Green Building Standard:

Y	?	N			
18	7	1	**Sustainable Sites**	**Possible Points:**	**26**
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
	5		Credit 2	Development Density and Community Connectivity	5
	1		Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
	1		Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
	3		Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
1			Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
	1		Credit 6.2	Stormwater Design—Quality Control	1
		1	Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
	1		Credit 8	Light Pollution Reduction	1
5	5		**Water Efficiency**	**Possible Points:**	**10**
Y			Prereq 1	Water Use Reduction—20% Reduction	
2	2		Credit 1	Water Efficient Landscaping	2 to 4
	2		Credit 2	Innovative Wastewater Technologies	2
3	1		Credit 3	Water Use Reduction	2 to 4
15	14	6	**Energy and Atmosphere**	**Possible Points:**	**35**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
10	9		Credit 1	Optimize Energy Performance	1 to 19
	1	6	Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
	2		Credit 4	Enhanced Refrigerant Management	2
3			Credit 5	Measurement and Verification	3
	2		Credit 6	Green Power	2
7	1	6	**Materials and Resources**	**Possible Points:**	**14**
Y			Prereq 1	Storage and Collection of Recyclables	
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

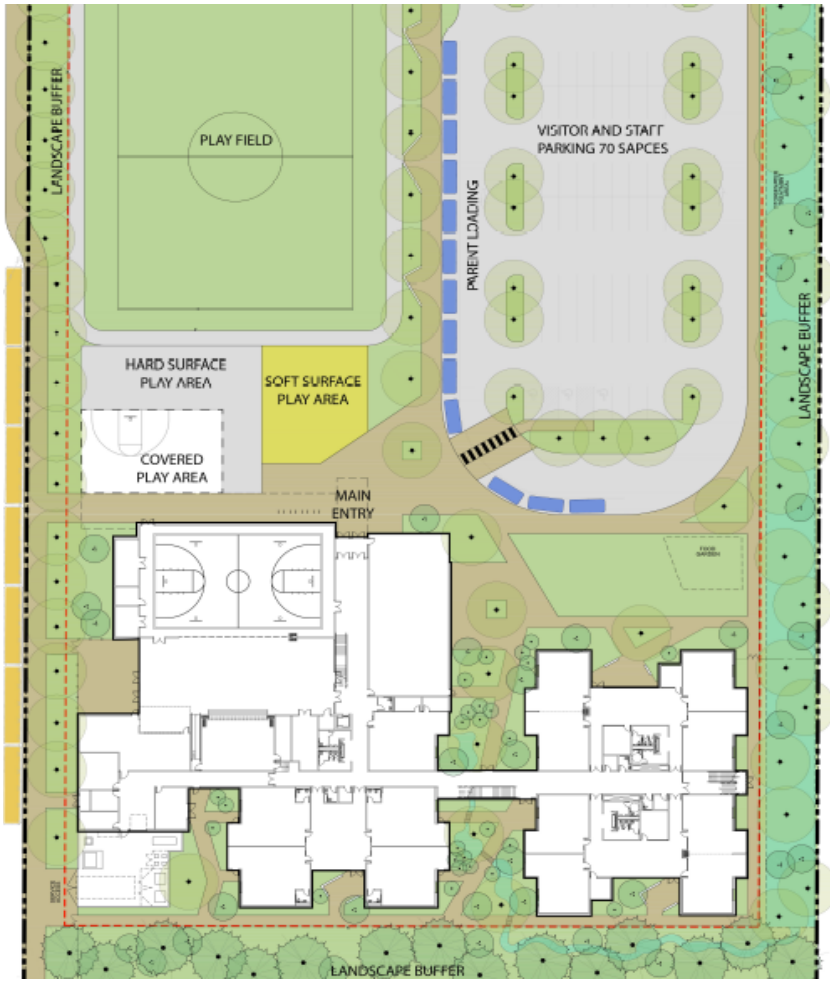
Y	?	N			
			Materials and Resources, Continued		
2			Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
	1		Credit 6	Rapidly Renewable Materials	1
1			Credit 7	Certified Wood	1
10	4	1	**Indoor Environmental Quality**	**Possible Points:**	**15**
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1			Credit 1	Outdoor Air Delivery Monitoring	1
	1		Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
	1		Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
	1		Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			Credit 7.1	Thermal Comfort—Design	1
1			Credit 7.2	Thermal Comfort—Verification	1
	1		Credit 8.1	Daylight and Views—Daylight	1
		1	Credit 8.2	Daylight and Views—Views	1
6			**Innovation and Design Process**	**Possible Points:**	**6**
1			Credit 1.1	Innovation in Design: Specific Title	1
1			Credit 1.2	Innovation in Design: Specific Title	1
1			Credit 1.3	Innovation in Design: Specific Title	1
1			Credit 1.4	Exemplary Performance SSc5.1: 30% open space (green-roof)	1
1			Credit 1.5	Innovation in Design: Specific Title	1
1			Credit 2	LEED Accredited Professional	1
2	2		**Regional Priority Credits**	**Possible Points:**	**4**
1			Credit 1.1	Regional Priority: SSc5.1	1
	1		Credit 1.2	WEc2: Innovative Waste Water	1
	1		Credit 1.3	SSc3: Brownfield	1
1			Credit 1.4	MRc7: Certified Wood	1
63	33	14	**Total**	**Possible Points:**	**110**

Sustainable Site Context

While the floor plan of the Wilkes Elementary School is identical to the Fairview floor plan, The orientation of the building is rotated and flipped on the site. This opens up the building to a different series of opportunites and challenges. Having most of the classrooms and pods facing the East side creates more moring light, producing more glare and heat in the classrooms. While the gymnasium, sitting on the Northwest side loses a lot of heat and direct sunlight. The school is also located right off of I-84, located across NE Wilkes Rd. Currently seperated by a sound wall, setting the new building back from that wall may cause efficiency issues in the wall.

N

Eastern morning light also applies to Western afternoon light, but not as applicable due to school hours.



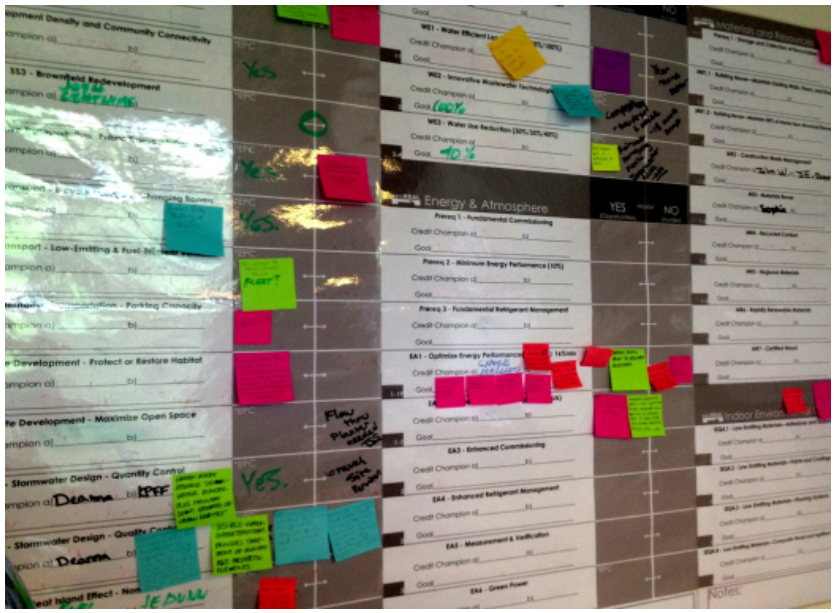
The noise barrier seperating the school and the freeway, is only effective within 200 feet from the wall. The current building is located within that peramiter but the new construction is outside of the threshold.

Using View Dynamic Glass in south and southwest facing windows could help control direct light in the classroom, as well as controlling the heat infiltration from the sun. increasing the overall comfort in the classroom.

East morning light can be too bright, and produce glare that can distract from kids production. Blinds or exterior vertical fins could help control direct perimeter lights.

Wilkes Elementery

Trees on the southern face can be an efficient way to block direct summer solar heat gain and glare, while allowing more winter light when leaves are gone.



Group Discussion

Goals:

- System that's not complicated but gears for low maintenance cost
- Long lasting
- User friendly to staff
- Get the most out of it that we can
- Learner focused and safety oriented
- Work with change in education and teaching curriculums
- 100% free and reduced lunch and breakfast, that every student is eligible for. Compared to 40% in South Salem
- Shy away from solar thermal due to lack of use during summer months.

Special notes:

- Kids are traumatized by separation from school because for some it means separation from food and safety
- Largest section-aid housing on Halsey and 25% of Fairview come from that housing
- Multi generational
- Mindful parents of safety of children after Reynolds school tragedy
- Conscious of bond money.
- 1.5% solar required, but alternatives will be explored.
- Acoustic study due to the direct flight path of landing planes
- Ambient air quality, being off of I-84
- Investigate how being set back from the sound wall can effect sound quality and air quality

ETO Special notes:

- Solar Ready Program can fund conduits, structure, etc. to be "future ready".
- Passive heating/cooling (option 1 mechanical see next page) could lead to Path To Net Zero (PTNZ) incentive opportunity.
- PTNZ means 40% better than code, not necessarily Net Zero
- PTNZ could provide more ETO incentives for monitoring.
- 1 year retro commissioning recommended
  ETO pays 50% commissioning design review
- *Case study- OES Beaverton
  Cooling gets hot in corner classroom with passive heating/ cooling system, larger testing on construction.
  OES is going on path to net zero (ptnz)

Group Discussion

Energy Reduction Strategie overview:

- The school is orientated around existing building, north and south orientation would disrupt school therefore east and west is ideal
- Open cafeteria for community use
- Security doors to close off school from open public during public use
- Everything 2 stories except gymnasium and kiva
- 4 formal studios, centered around kiva, ideal size for 80-100 kids, each kiva equipped with different furniture and exterior learning environment
- Smaller group learning room adjacent to each kiva.
- Higher glazing on north and south, punched out windows on east and west
- Connecting walkway to connect all four kivas
- Monumental stairs on north and south hallway, open to lobby
- Library on upper level above administration on NE corner of west building
- Ideas of green roof near library but budget affects ability for eco roof
- Overhang on first level kivas due to patios on the second floor

Interactive Team Exercises:

The group had an open discussion on all the topics covered, each including their point of views on budget-acceptable ideas. General discussions of making the building "Future Ready" when the budget allows for further expansion on LEED and WELL certficiation.

Water Heater System

Option 1:

- Water heater smaller 50 gal an hr per pod, larger water heater for kitchen, more equipment, smaller, easier to swap out, easier to make electric. Save a lot in piping installation and insulation
- May need pump for larger kitchen water heater

Option 2:

- one single system, storing in tanks, pumping throughout building. *talk of instant hot- tankless water heater (less waste water waiting to get hot) but causes higher pwr rating.
- Incentive for gas water heater not electric
- Insta Hot brand, individual unit in each classroom for teacher use
  *Adds equipment, eliminates piping.
  *Case study- Reed college insta hot water placed in performing arts school, kids love access to hot water.

Lighting

- LED's with daylighting controls- censored- manual on/ auto off
  Daylighting study we pay 50%
- Standardize LED fixtures (T8 fixtures)
- Lighting control with automation system
  No incentives to automated lighting systems
  *(*Energy modeling for one project compared to all 3, however, all 3 projects are fairly similar)*
- *use of* **View Dynamic Glass** *to decrease glare, help uncomfortable overheating classrooms and minimuze the use of HVAC systems*

Kitchen-

- Full commercial kitchen
- o Full prep on site for kitchen
  ***Good incentives for kitchen appliances, no longer have fridge/freezer, primarily oven, warming, grill etc. Maybe hood cover.**
- Exhaust system may need further design
- Exhaust fans generally only use 1 hour a day in schools.
- 5000 cfm cap- over will require controls, under-no requirement.
- C02 sensors required by code
- Gym and commons will have their own air units.
- Same with admin-separate system for heating/cooling without using whole building.
- Temp controls separate from classrooms and kivas.

Energy Use Breakdown

- East and west side, vertical loops
- Vertical openings with vertical fins- fixed *incentive to later make operable
- story- likely hood of solar exposure
  shelter over parking lot with solar on roof
  Cover over basketball court
- Rainwater harvesting PVs over library
  PV introduced to all school distracts
- Solar ready to add panels in the future
  ETO pays 75% of solar ready program
  90% solar plan
- No cooling in class rooms but cooling in admin and media center
- Idea of server closet.
  Incentives 18 sear
- using transfer fan to move heat from server room to outside rooms.

Mechanical systems

Option 1

- Build envelope with good enough materials- passive heating/cooling in classrooms
- Match heat loss with heat gain for maximum comfort level
- Funding materials in envelope, ridding the project of piping pumps and boilers- decreases maintenance costs
- $42 sq. ft. on exterior skin

Option 2

- Use heat recovery for ventilation in administration rooms, use simple systems in classrooms-no cooling
- $28 sq. ft. on exterior skin

R Values/U factor

- R-40 walls
- R- 50 roof
- .18 sq. ft. for infiltration
- .28-.3 assembly windows- double pane windows
  ETO pays 50% of cost of energy models for the schools

Reynolds Summary of ETO Incentives

Eco-Charrette:
- $2,500
- EcoREAL is compiling required report

Solar Ready:
- Solar Feasibility – 90% of fee up to $1,700 in incentives to determine the solar potential of your project.
- Solar Ready Design—Up to $15,000 in incentives to build to Energy Trust solar ready standards if you can't install solar panels

Energy Modeling:
- 50% of the cost for Energy Modeling up to $50,000 ($25,000 for daylighting, CFD, etc.)
- Received at the end of design phase

Commissioning:
- Up to $500 in additional early design incentives
- Design review with 50 percent cost share, up to $15,000
- $0.15 per square foot for functional testing, up to $40,000

Modeled Savings Approach Incentives:
- Up to $0.30/Kwhr saved over code
- Energy Model determines savings amount (22% energy savings= $0.22/Kwhr)
- Received after Construction Phase

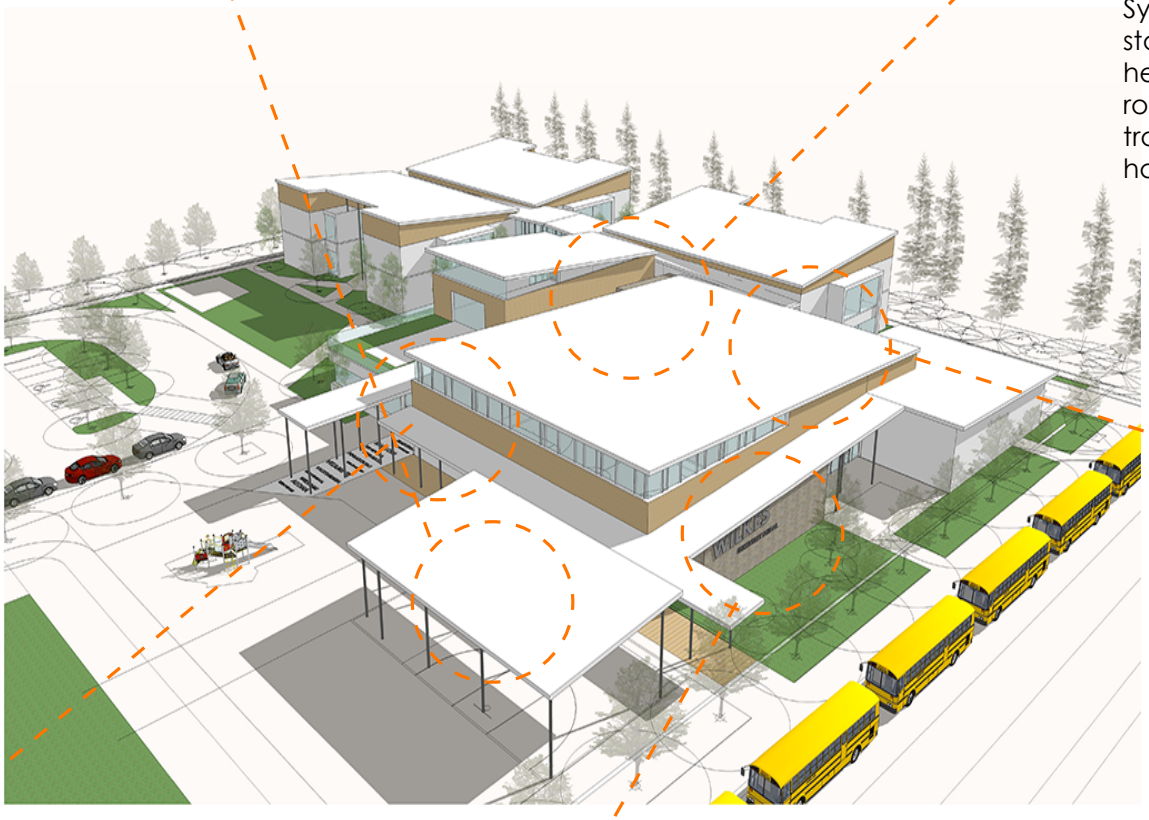
Standard Incentives can be pursued on a case by case basis:
- Examples: Boilers, kitchen equipment, task lighting not included in the Energy Model

LEED Equivalent Path

The diagram highlights some strategies that present multiple environmental and long-term financial benefits to be further examined by the design team and Reynolds School District.

Solar thermal and/or

PV on roof, playground or over parking



Green-roof

Synergies with open space, stormwater management, heat island reduction and roof insulation. Potential trade-off with rainwater harvesting

Rainwater Harvesting

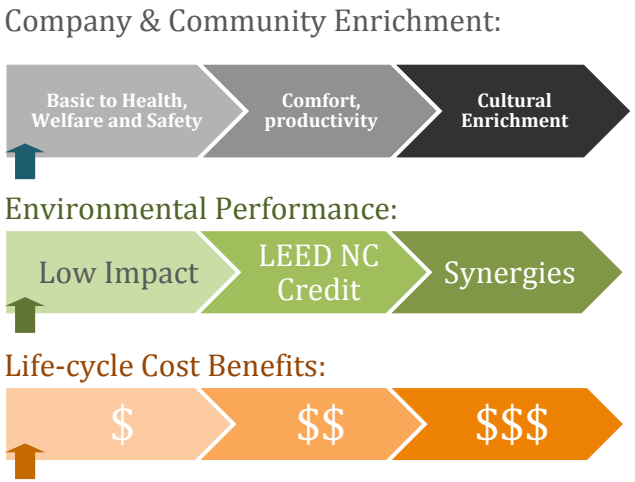
Could be harvested and reused for toilet flushing, irrigation, make-up water or janitorial uses

Solar exposure at long southeast facade for passive daylight and heating/cooling with structural concrete massing for "Trombe Wall" effect

Geothermal / Heat pump

Triple Bottom Line

The triple bottom line provides a value propositoin that takes environemntal, economic and social impacts into consideration for design and construction strategies. This report provides a preliminary assessment of the benefits and trade-offs of sustainable strategies through a triple bottom line lens. Social impacts are rated on a scale of basic Health, Safety and Welfare to Cultural Enrichment that not only effect the faculty and students and community members that are within the building but also how it relates to the greater community. Environmental Performance is based on lowering the impact of the building on virgin materials, potable water, energy use, which results in a lower Carbon Footprint. The economic bottom line goes beyond first costs to take into consideration the life-cycle cost impacts of a strategy from pre-design through operation and maintenance.



Why It's Important

Sick Building Syndrome has become a major dilemma in schools. The National Education Association found in 2000 that one-third of school buildings need major repairs or total replacement due to the poor environmental conditions. While most common health problems found are not life threatening, illness such as upper respiratory illnesses, chronic headaches, stomachaches, and the exacerbation of asthma do interfere with learning and teaching.

Tips on inexpensive repairs in schools:

- Select a committee of teaching staff, maintenance staff, and parents to walk through the school and identify potential environmental contaminants.
- Discuss findings with the maintenance staff and develop plans and routines to correct and modify regular maintenance procedures.
- Present to the school board the findings that will require additional funding outside the annual budget
- Develop a preventive maintenance plan for heating, ventilating, and air conditioning systems
- Discuss with maintenance staff about appropriate times to apply pesticides, floor finishes and paints that require chemical products.
- Discuss with teachers about proper ventilation in classrooms (Vents are open and clear of any obstructions.)
- Avoid having school buses idle in front of exterior open doors. Bus exhaust can significantly increase levels of carbon monoxide inside of buildings.

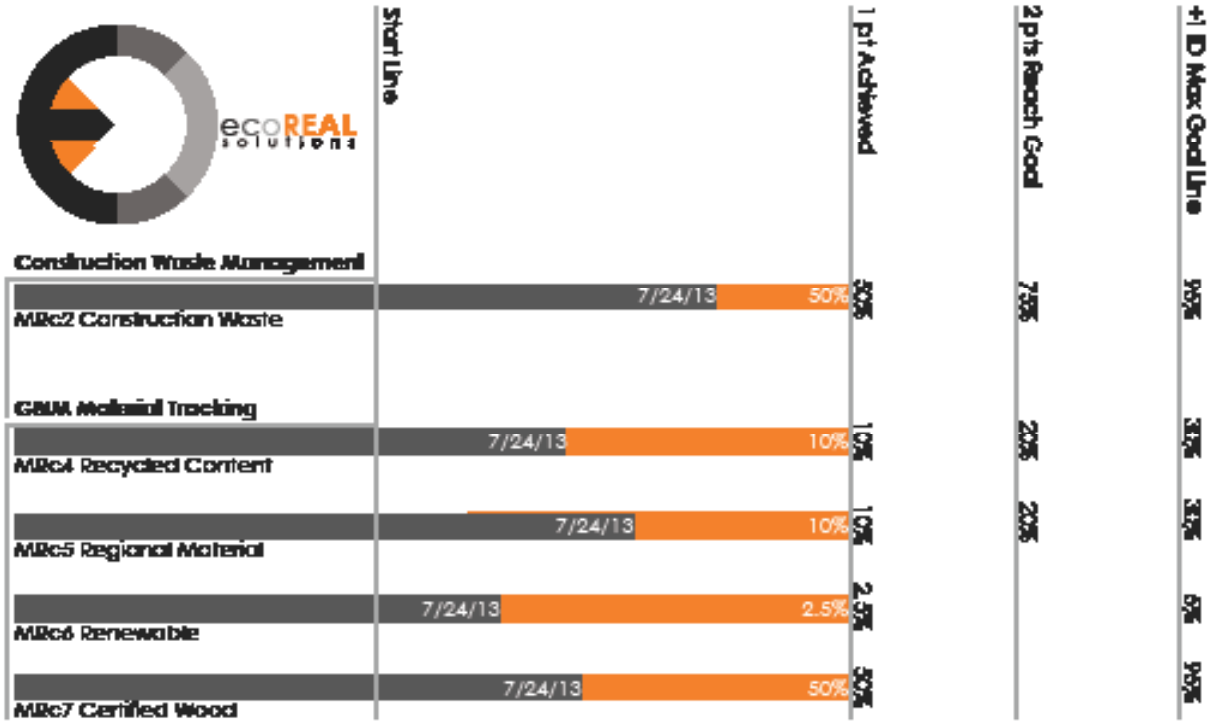
WELL Building Standard

The Well Building Standard features can help manage "Sick Building Syndrome".

The WELL Building Standard® is an evidence-based system for measuring, certifying and monitoring the performance of building features that impact health and well-being. WELL is administered by the International WELL Building Institute™ (IWBI), a public benefit corporation whose mission is to improve human health and well-being through the built environment. WELL is third-party certified by Green Business Certification Inc. (GBCI), which administers LEED certification and LEED professional credentialing.

Healthy Material Tracking

ecoREAL's "GBIM" Tracking Tools:
Green Building Integrative Management
LEED Material and Resource Credits and IEQ Low-emitting materials will be measured throughout the project. **Reynolds School districts healthy product initiative** can be overlaid with the LEED credit tracking. During schematic design ecoREAL can collaborate with the team and County to assess Sustainable Material goals per the specifications. The ***Lean LEED toolkit*** provides **construction management tools** to **streamline the LEED verification and tracking process**, and ensure correct bidding by **MWESB's**. The Sustainable Material Data Sheets that go to suppliers automatically **"red-flag VOC violations for low-emitting materials** to ensure only healthy products are in the building, and can be used for ongoing Sustainable procurement and reporting.



*Example LEED tracking report image to be customized per team and client's input

Interactive Exercise with Boards (example image)

Although LEED certification is not a requirement, LEED serves as a framework for collaboration to identify cost-effective strategies through synergies between Sustainable Sites, Water Efficiency, Energy and Atmosphere, Material and Resource and Indoor Air Quality categories.

During the Eco-charrette ecoREAL gathered and posted information onto LEED Exercise Boards pertaining to priority credits, champions and considerations from feedback during the eco-charrette.

Explanation of Interactive LEED Exercise:

- Each discipline was assigned a color that correlated to the LEED Matrix
- Post-it notes will be used on the board to right opportunities and/or hurdles for each strategy assigned to your discipline
- Whole team will review board to determine credit goals, targets and innovations
- The result is a priority list that will be utilized for desicion making.

Next Steps

1)The information from the eco-charrette is being integrated into EcoREAL Sustainability Matrix.

2) Triple Bottom Line assessment will be developed for the strategies the team and owner want to explore.

3)The Energy Model is a key component for the comparative analysis of energy efficiency measures to maximize long term return on investment and incentives.