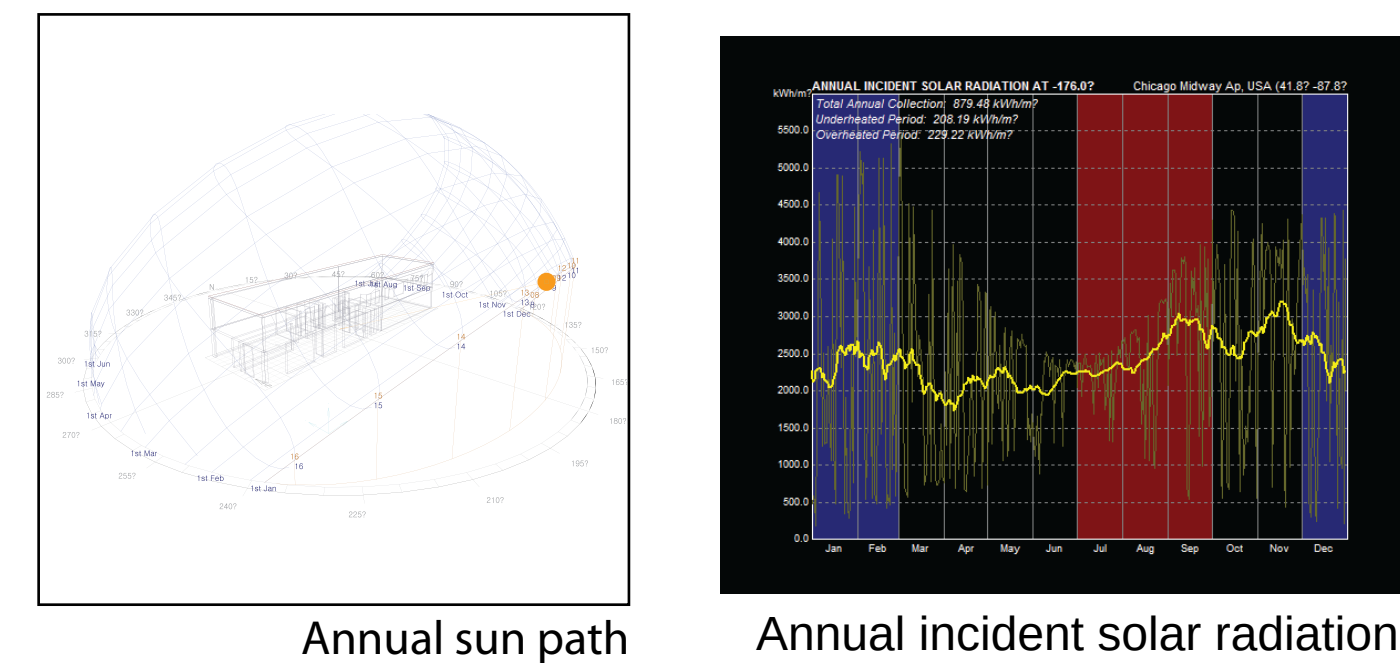
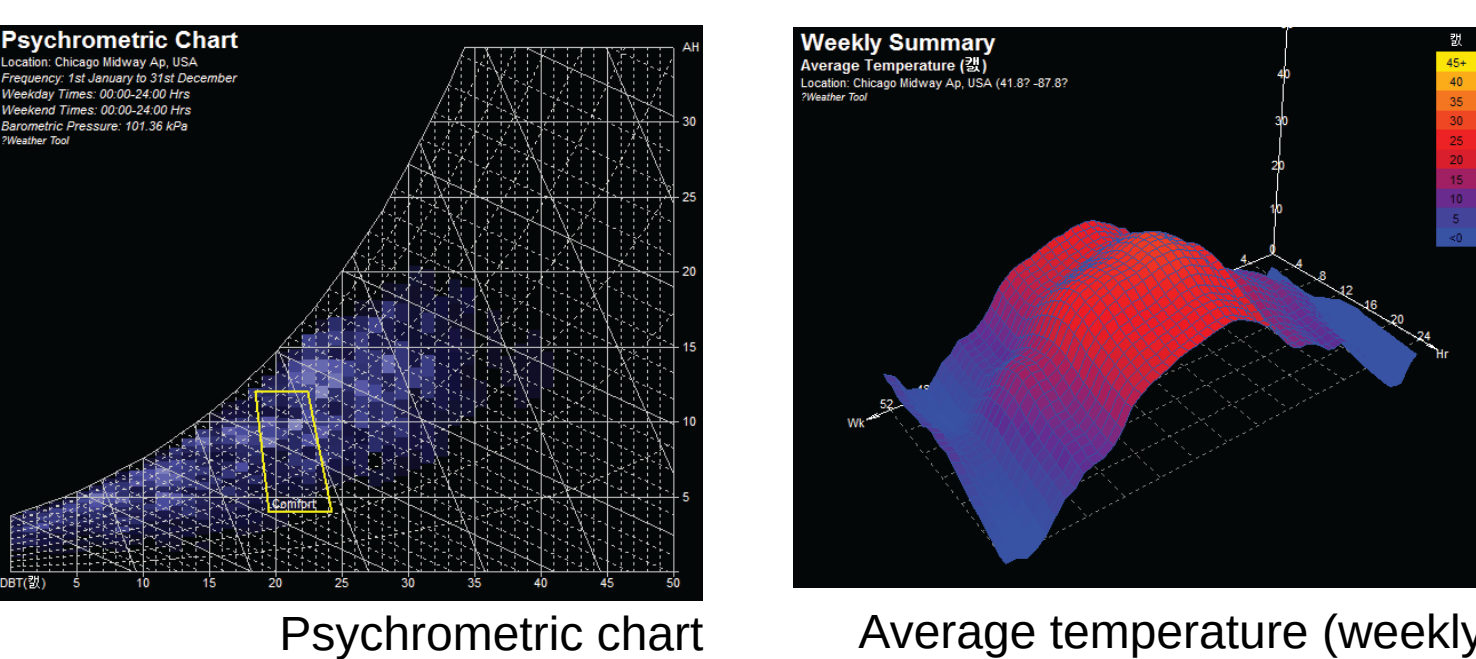


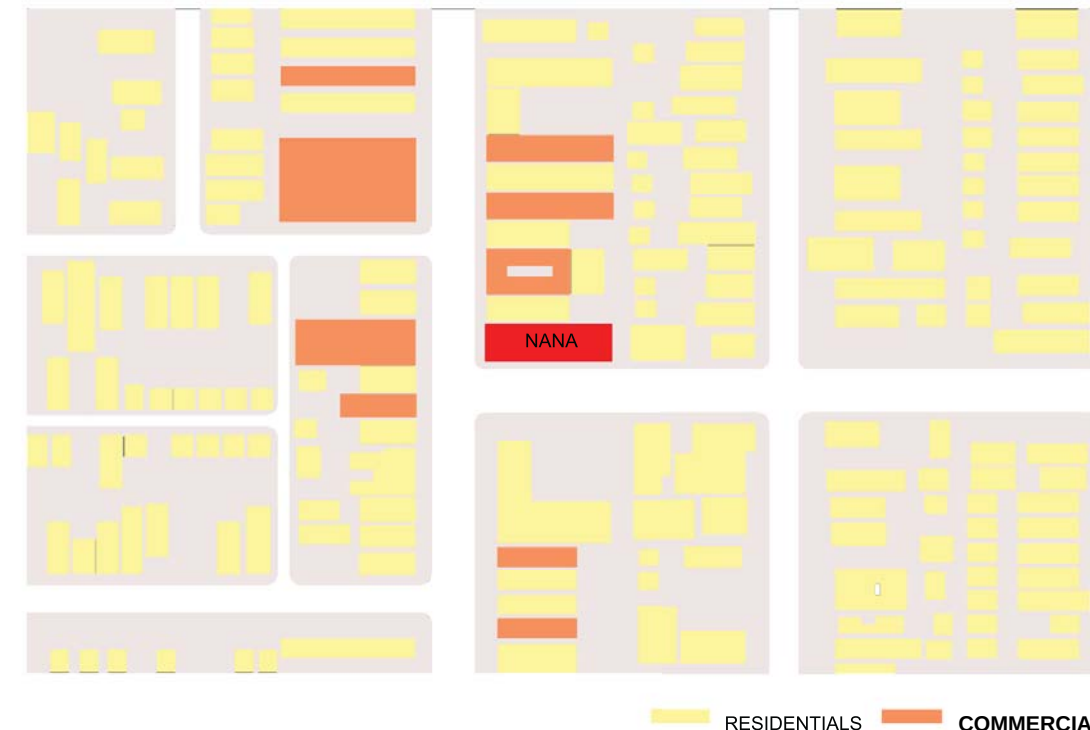
STUDY ENVIRONMENTAL ANALYSIS - A



STUDY ENVIRONMENTAL ANALYSIS - B



ZONING OF SITE



PUBLIC TRANSPORTATION

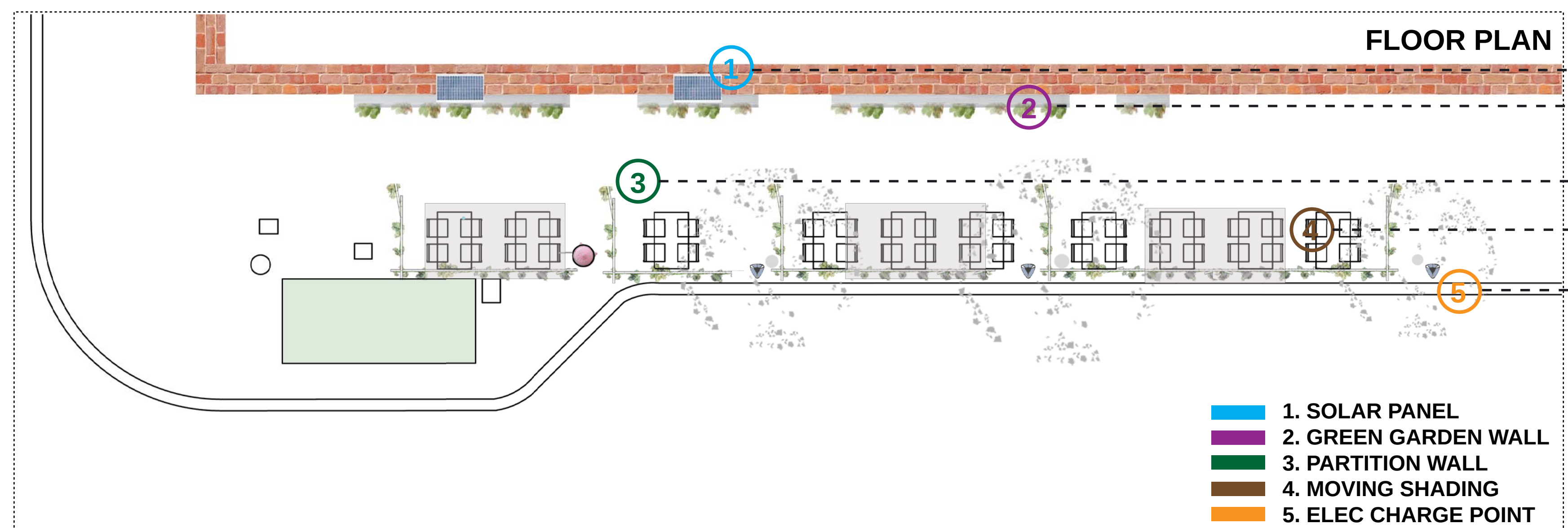


Improvements for NANA (Business):



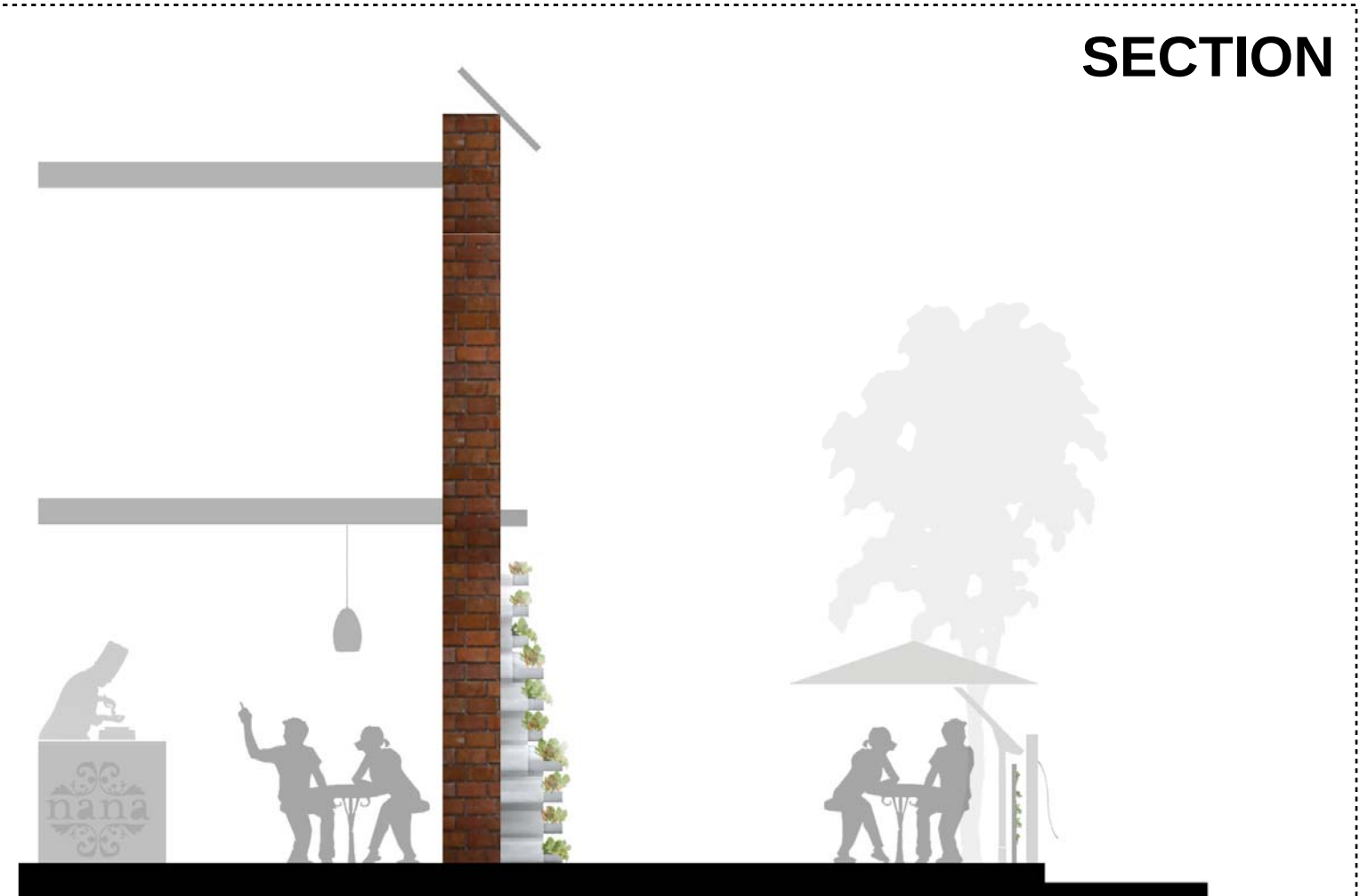
- Coupon
- Newspaper/ Radio Advertising Research
- Online Reviews: Research, Feedback and Implementation
- Social Networking
- Demographics
(based on Building Team's Research; see MAPS above)
- Grant Funding Research
- Online Restaurant Directories
- Student/Faculty Survey
- On campus Presentation
- Business Plan: Economic Feasibility of Expansions
 - Dinner
 - Inside dining
 - Outside patio area
- Text Messaging alerts
(table is ready vs. current pager technology)

IPRO 317 : Nana: A Sustainable Restaurant Development

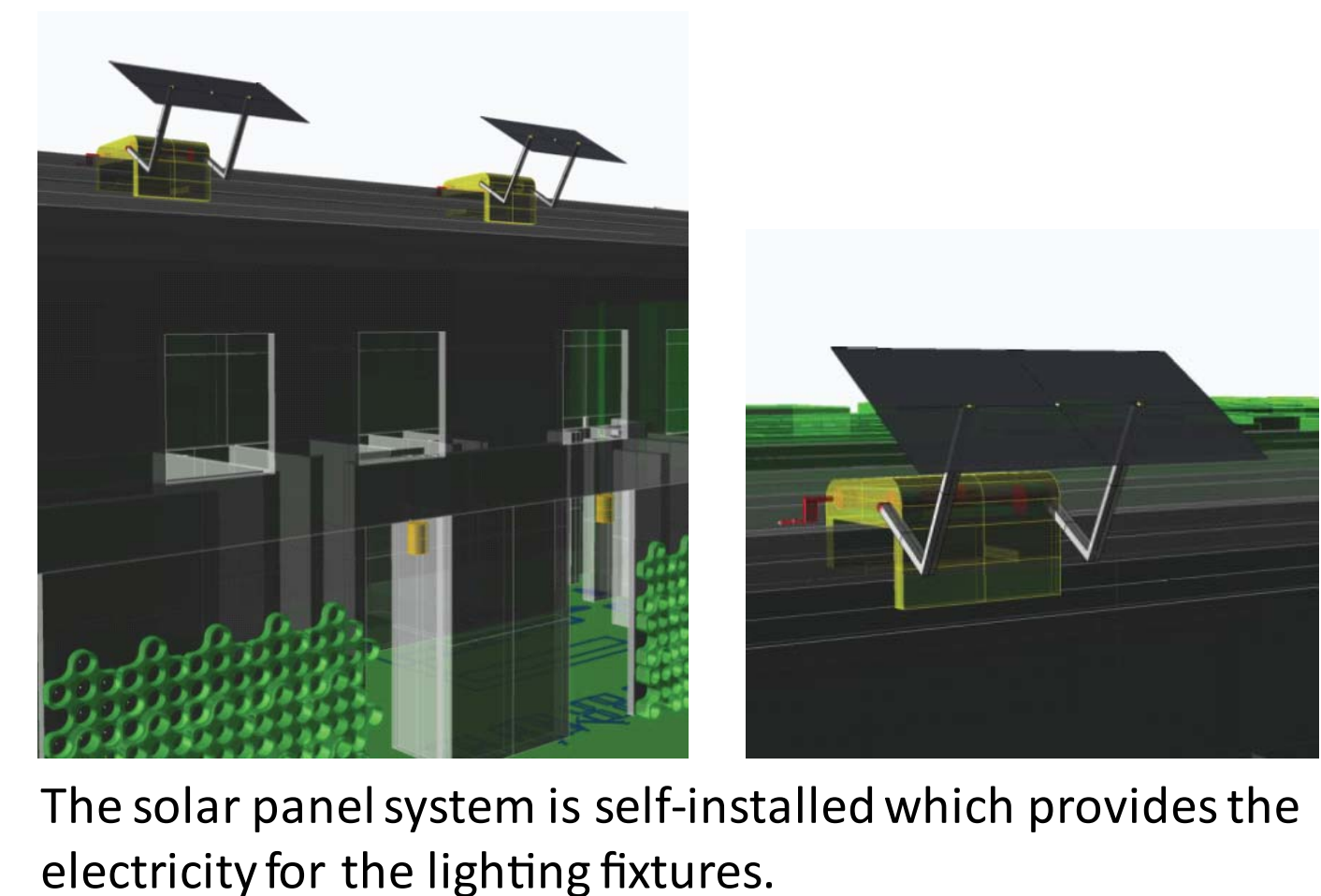


BUILDING IMPROVEMENT

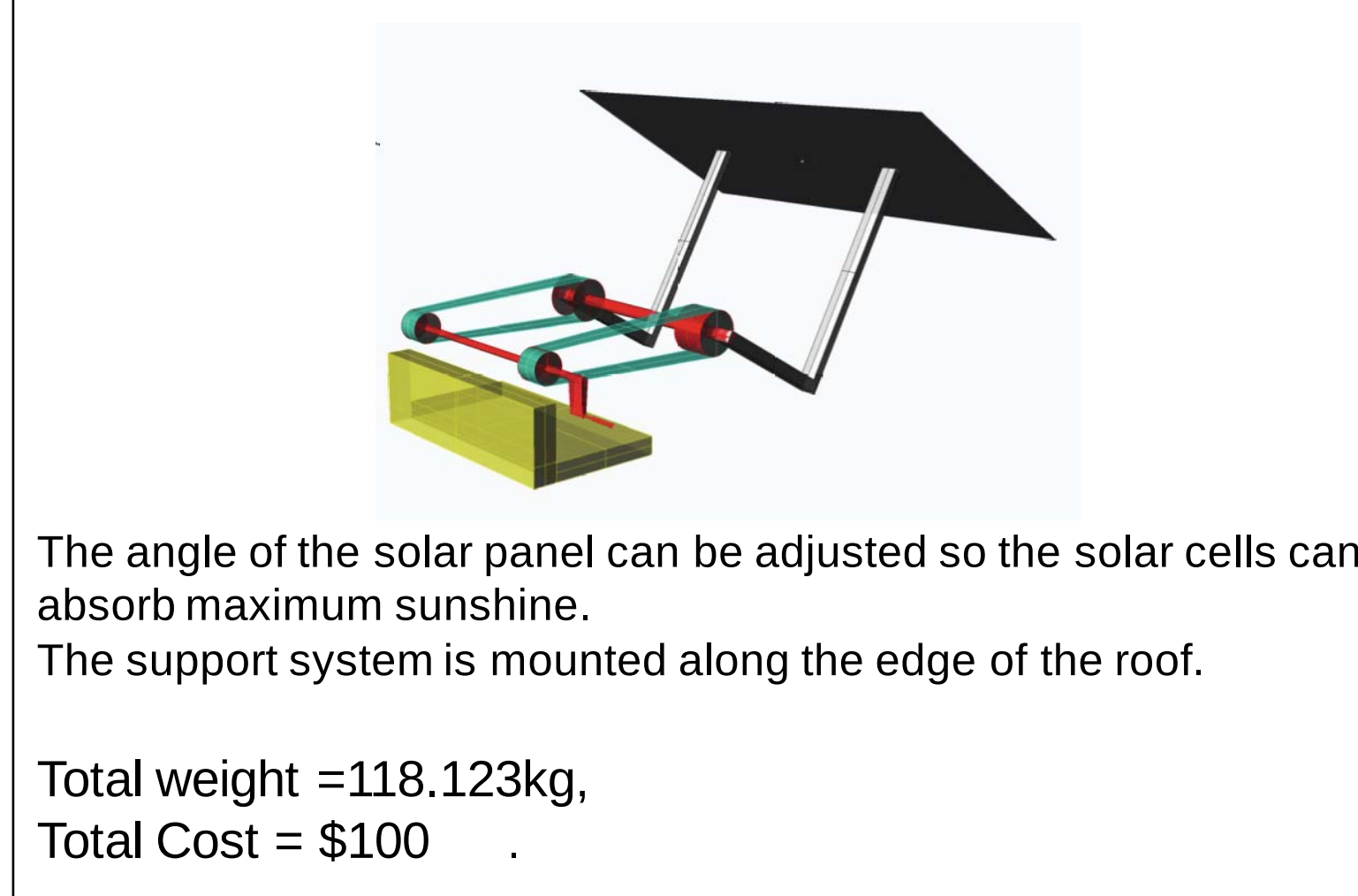
- Based on the client's desires and the Business and Environmental groups' goals, the building team resolved to:
- provide building insulation via a vertical garden (attached to the façade)
 - propose a (shaded) outdoor seating café (to advertise and maximize profits)
 - install solar panels on the building's upper façade, providing light/heat to the outdoor seating area
 - propose electrical charge (car) station



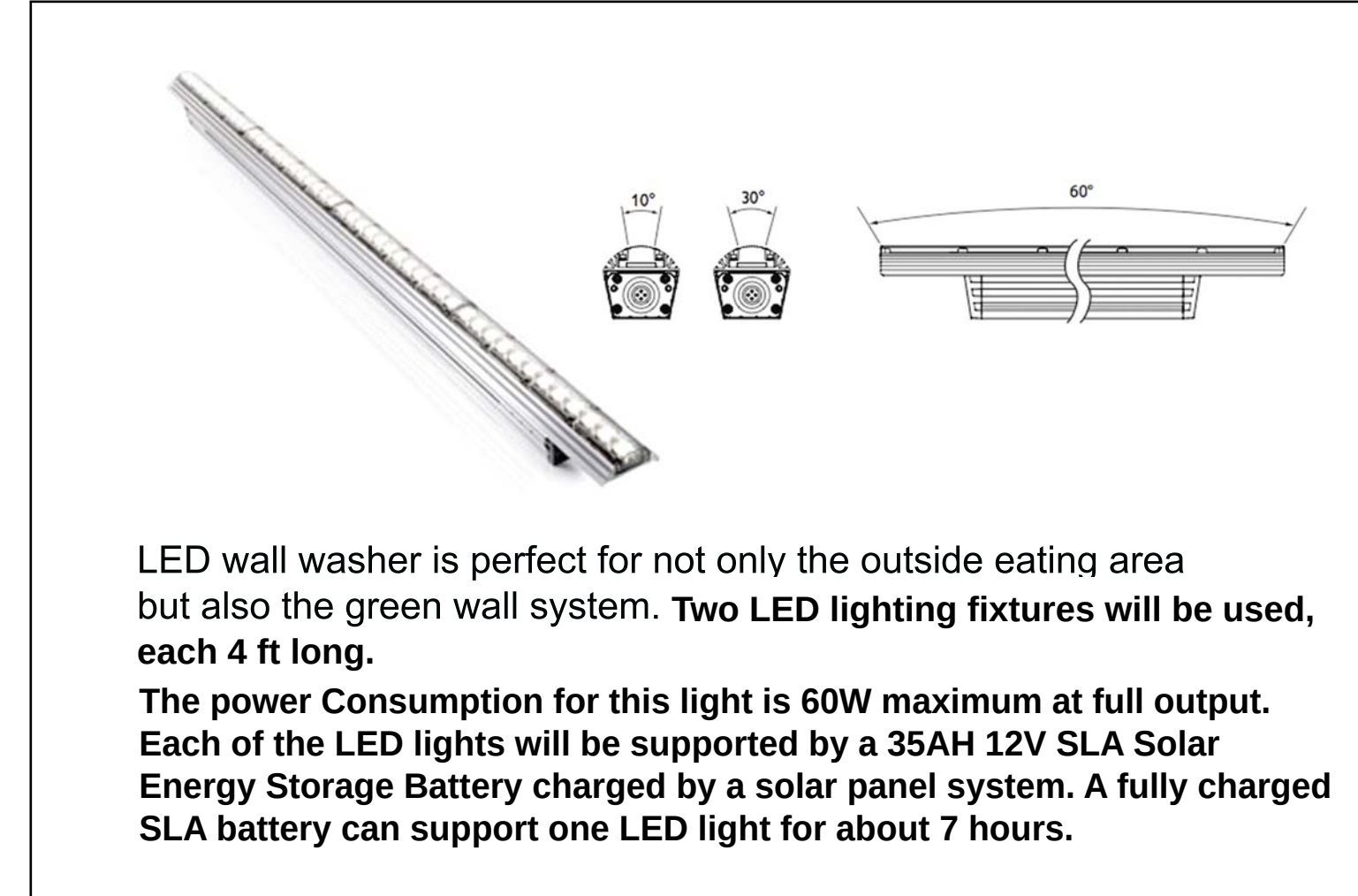
SOLAR PANEL SYSTEM



SOLAR PANEL DETAIL



OUTDOOR LIGHTING FIXTURE



ENERGY AND COST ANALYSIS

Number of Solar Cells	Output/hour (Wh)	Ave. Sun Hours (Chicago)	Elec. Loss from Inverter	Daily Output (Wh)
72	108	3.14hrs	< or = 13%	295.03

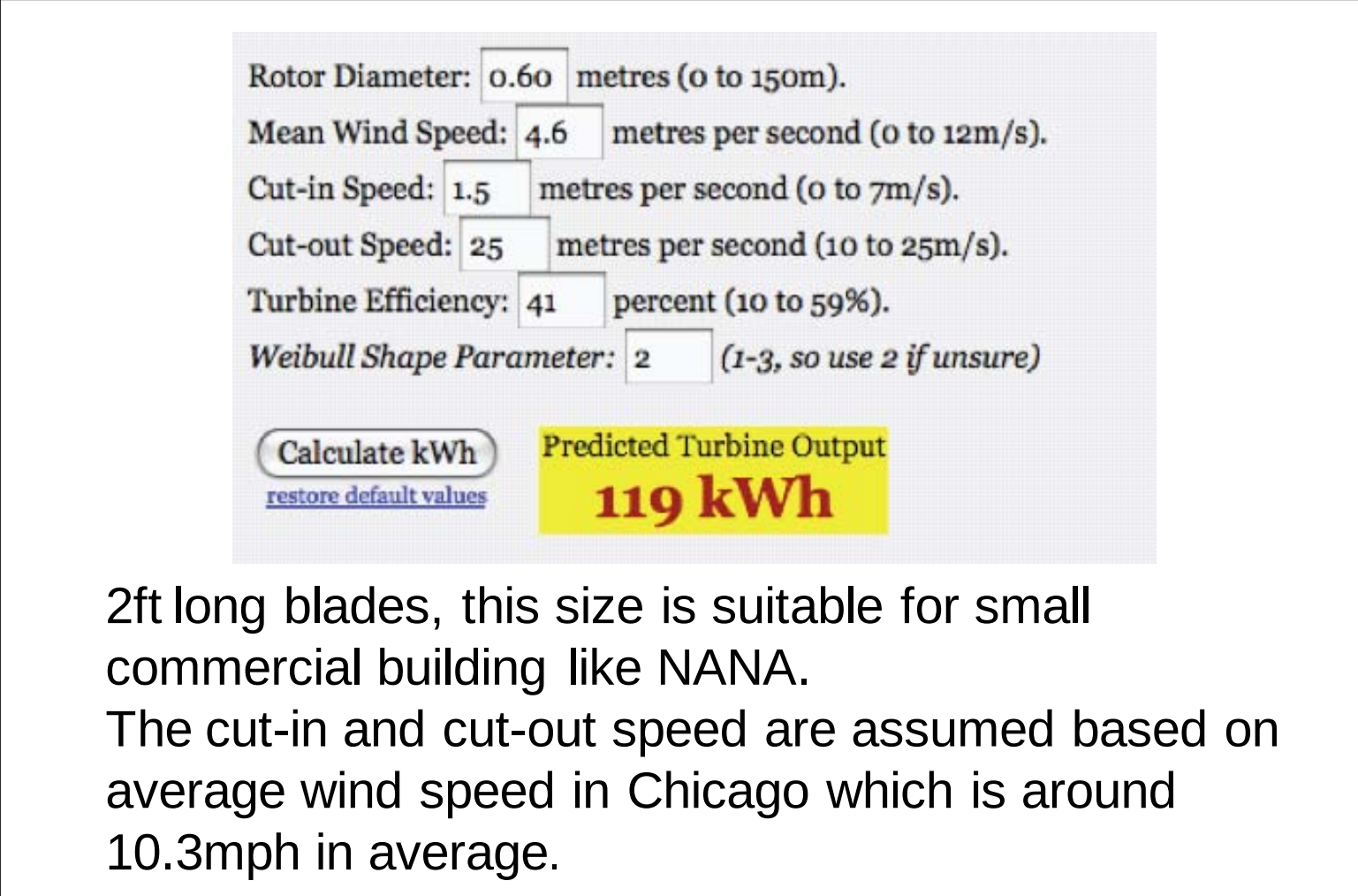
Item	Cost (USD)
Solar Cells	109.95
Inverter	99.99
SLA Battery	79.95
Charge Controller	20.50
TOTAL	\$310.39

The cells settled on are 3 X 6 inches in size and are rated at roughly 3 Amps. Each cell produces about 1/2 Volt. One Solar Cell can produce 3 Amps @ 1/2 Volt which equals to about 1.5 Watts.

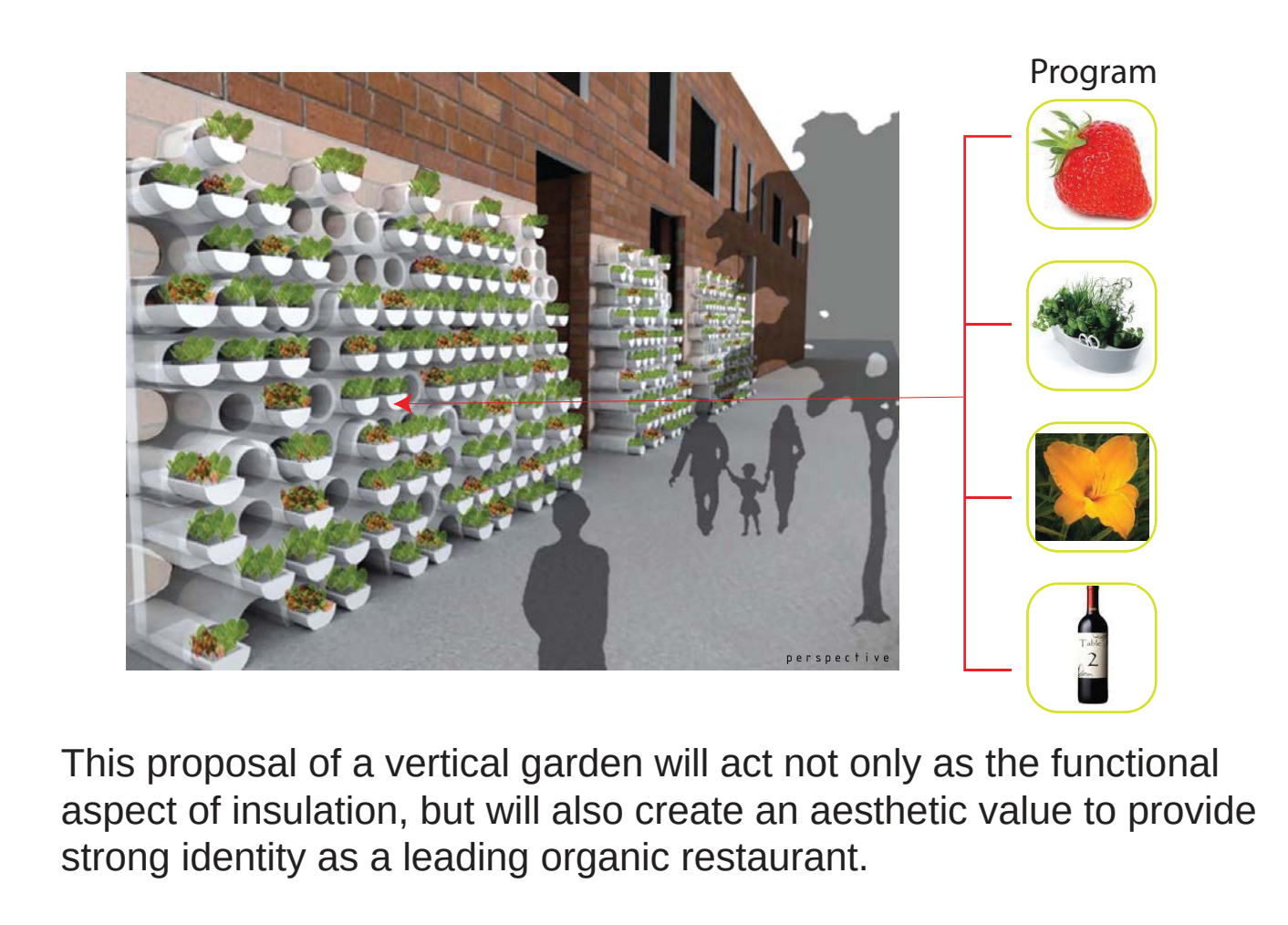
The solar cells are arranged as 6 pieces in a row and 12 pieces in a column.

The size is 36x36 inches, or around nine square feet.

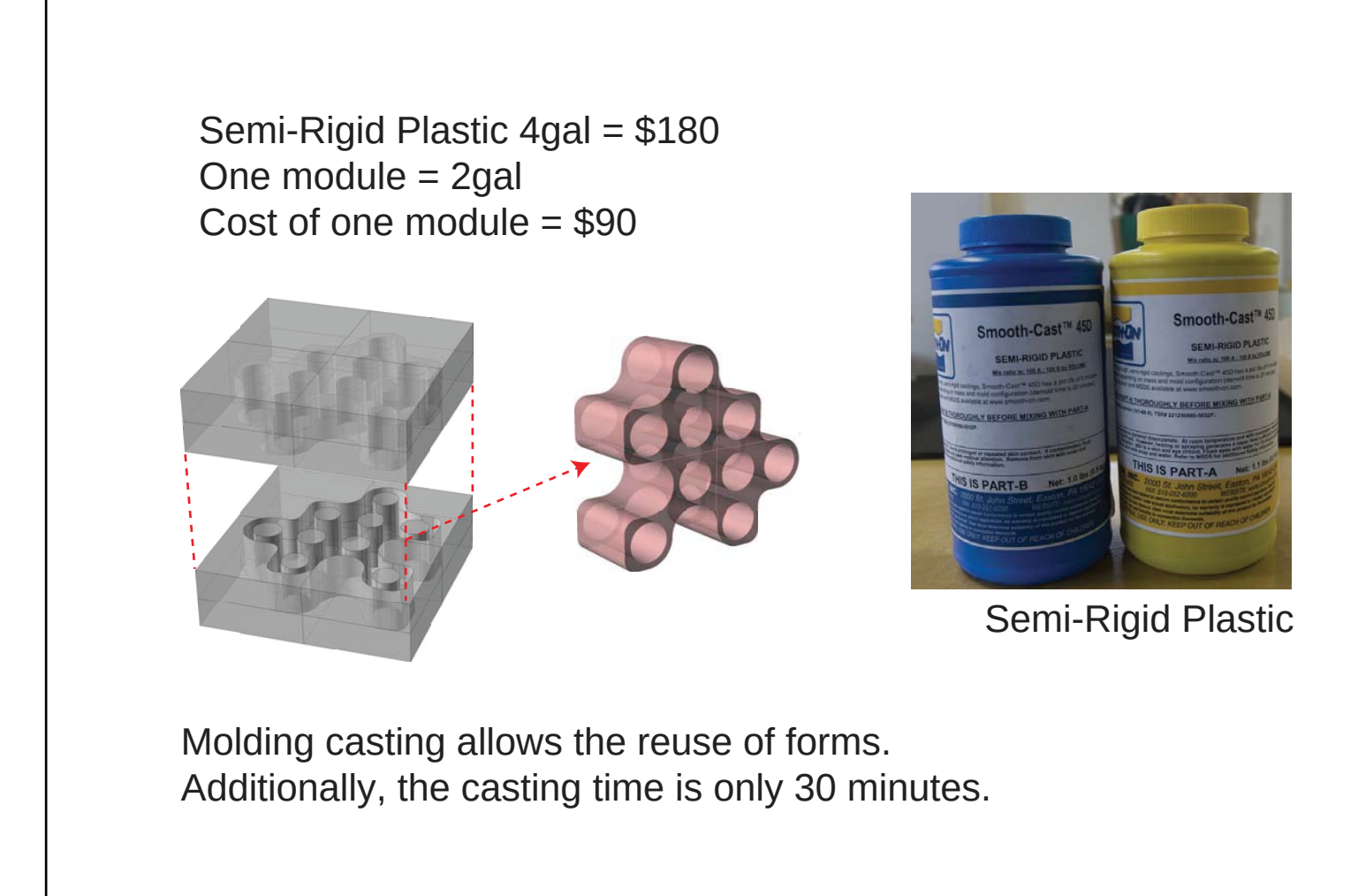
WIND TURBINE



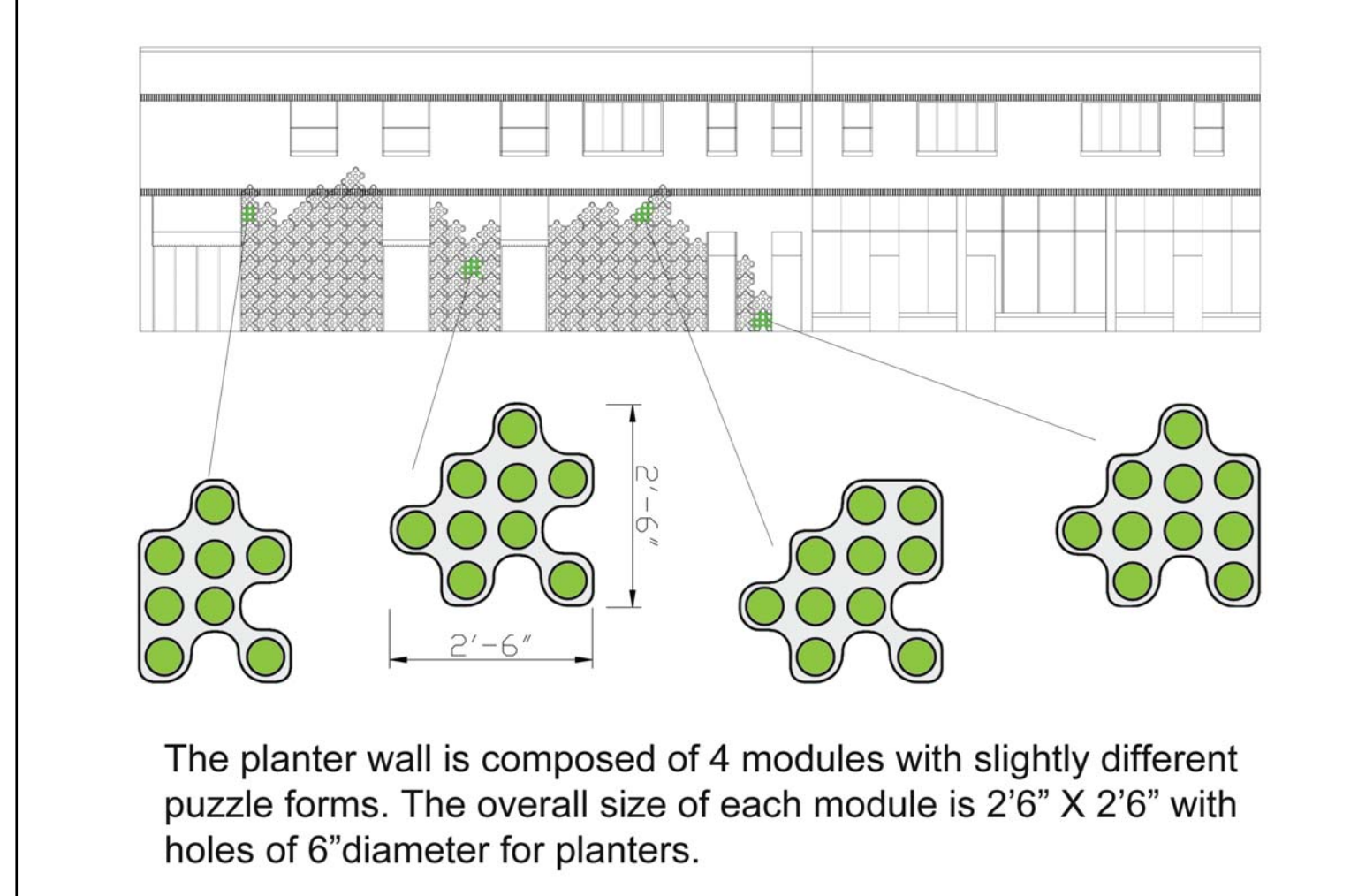
GREEN GARDEN WALL



GREEN GARDEN WALL DETAIL



GREEN GARDEN WALL MODULE



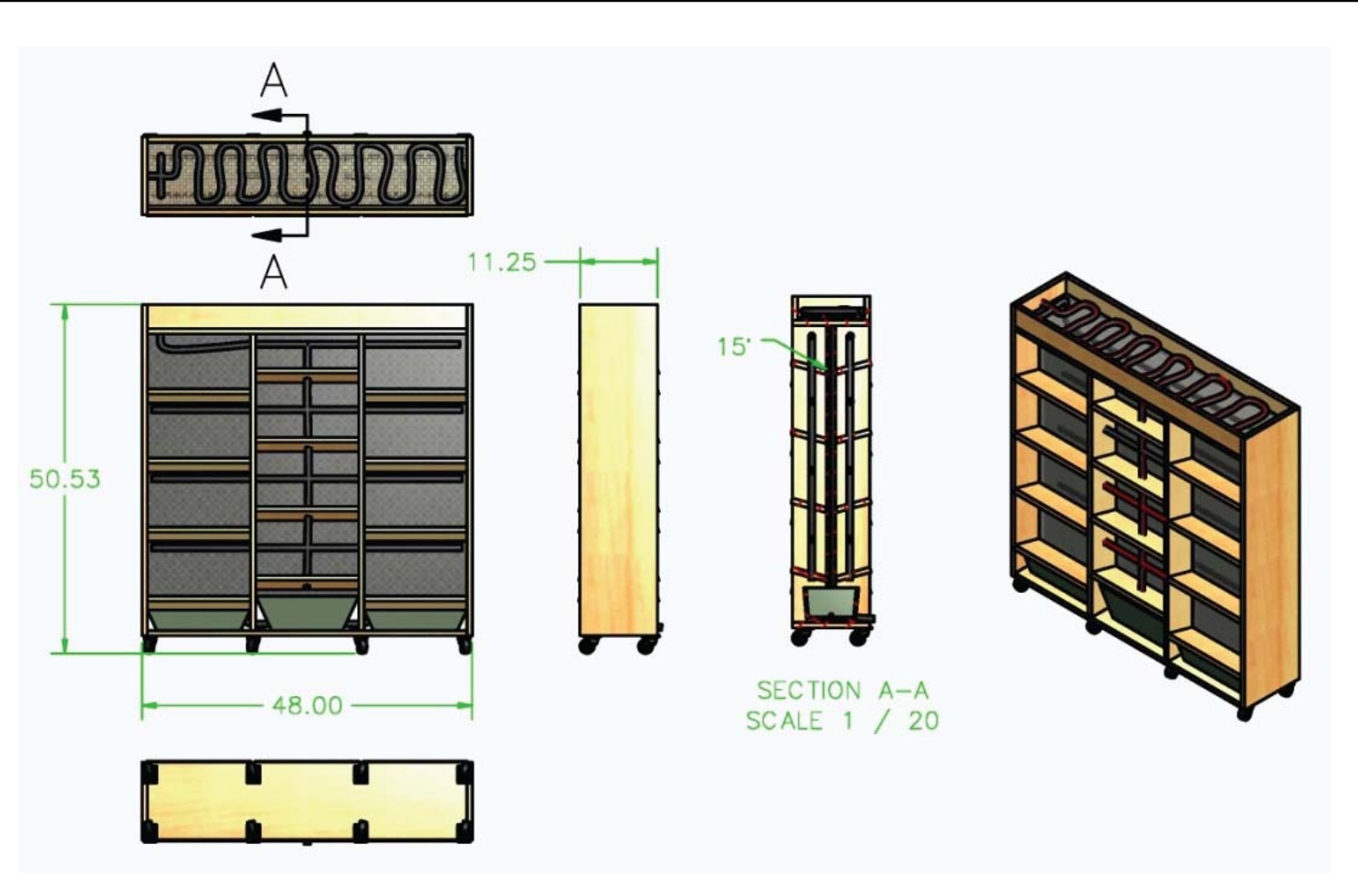
INSULATION IMPROVEMENT

	Before Green Wall Installation	After Green Wall Installation
Theoretical Heat Loss, Q (kWh/month)	505	151
Cost (\$/month)	33	10

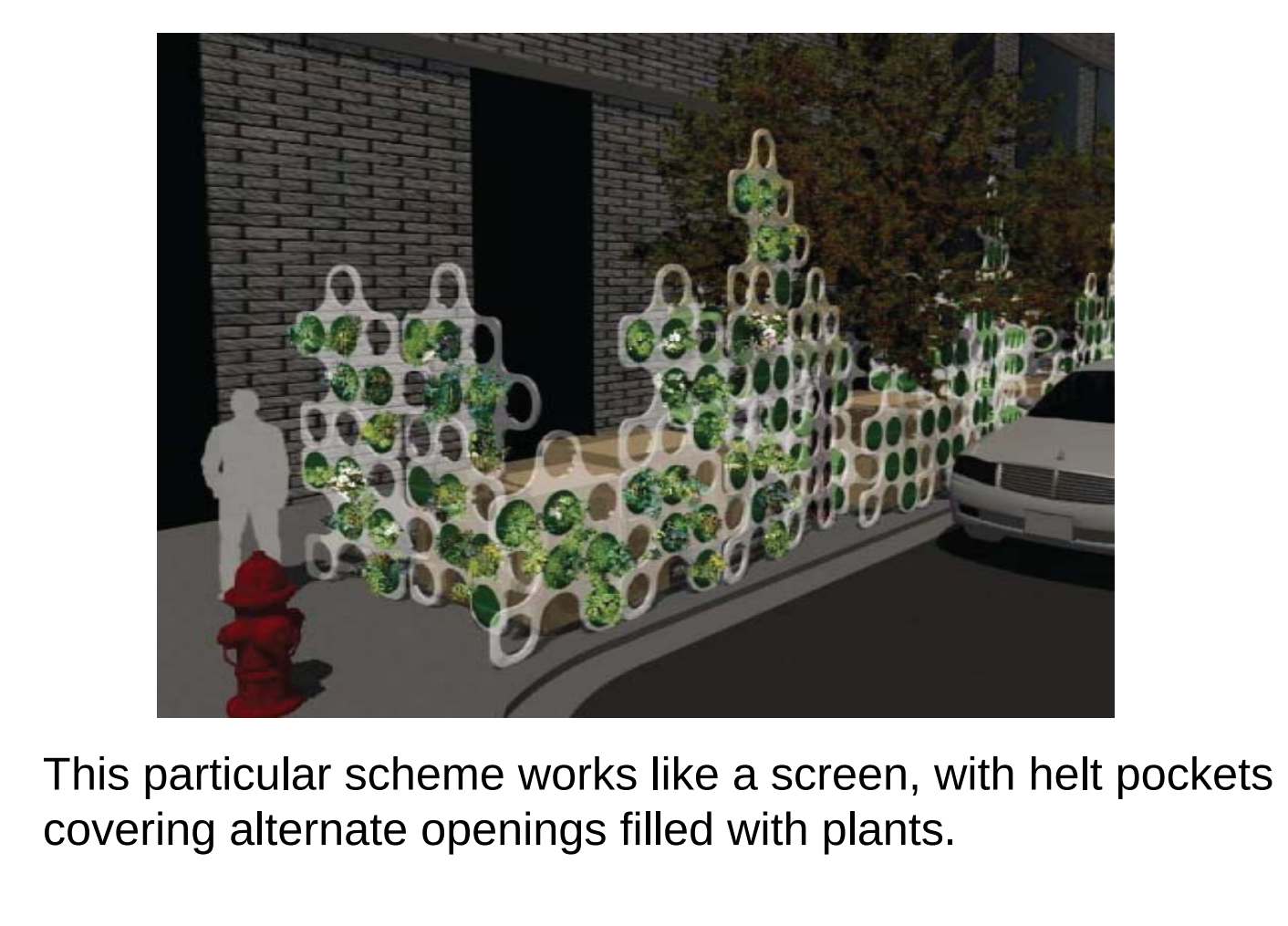
Main Assumptions:

- Heat transfer rate changes only at the south wall (green wall).
- The air temperature inside and outside remains constant, and heat transfer is steady.
- Heat transfers mainly during the business hours (8am to 3pm).
- Air hardly circulates in the holes of the green wall module.

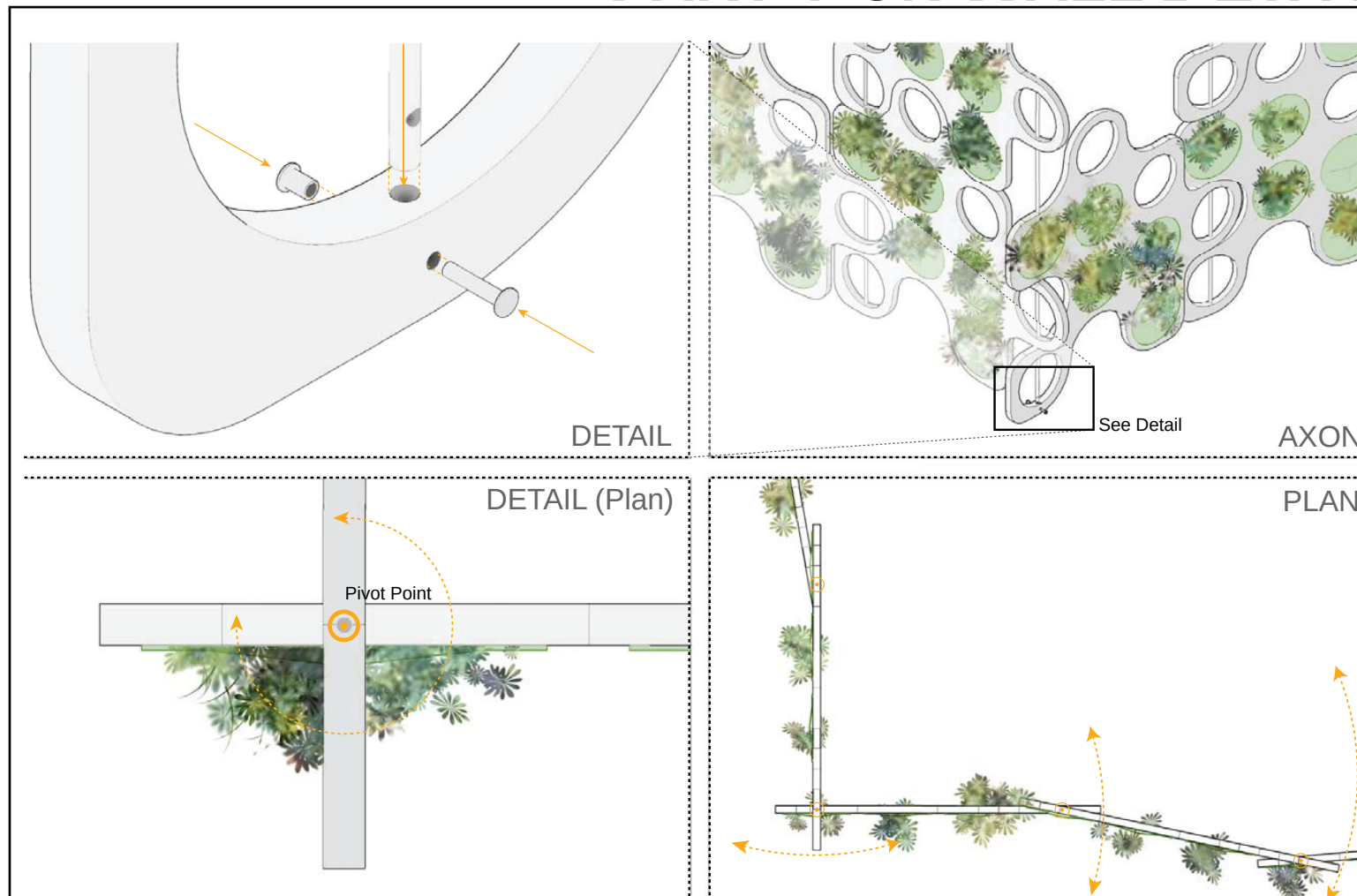
VERTICAL GARDEN (ALT2)



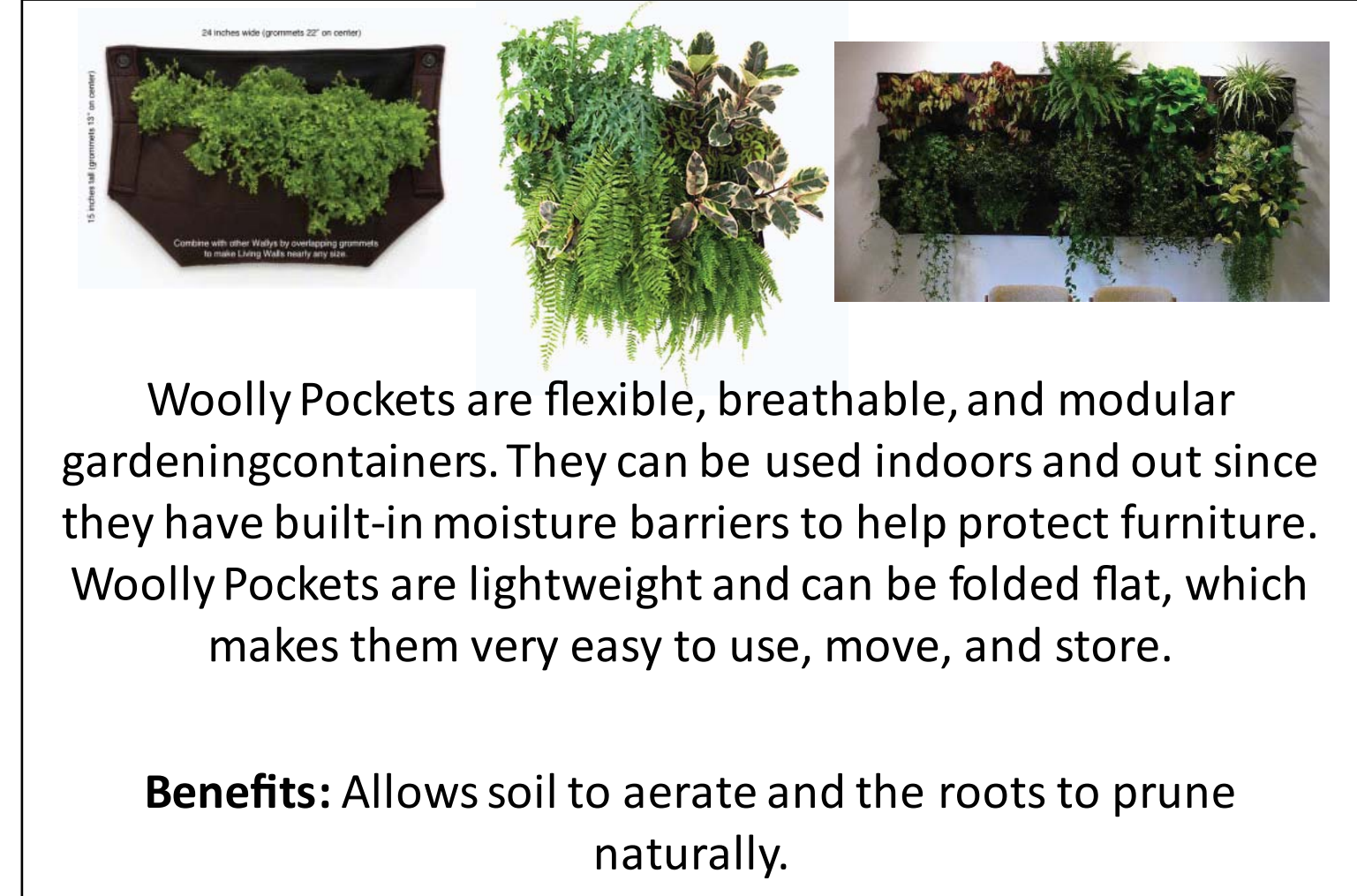
PARTITION WALL



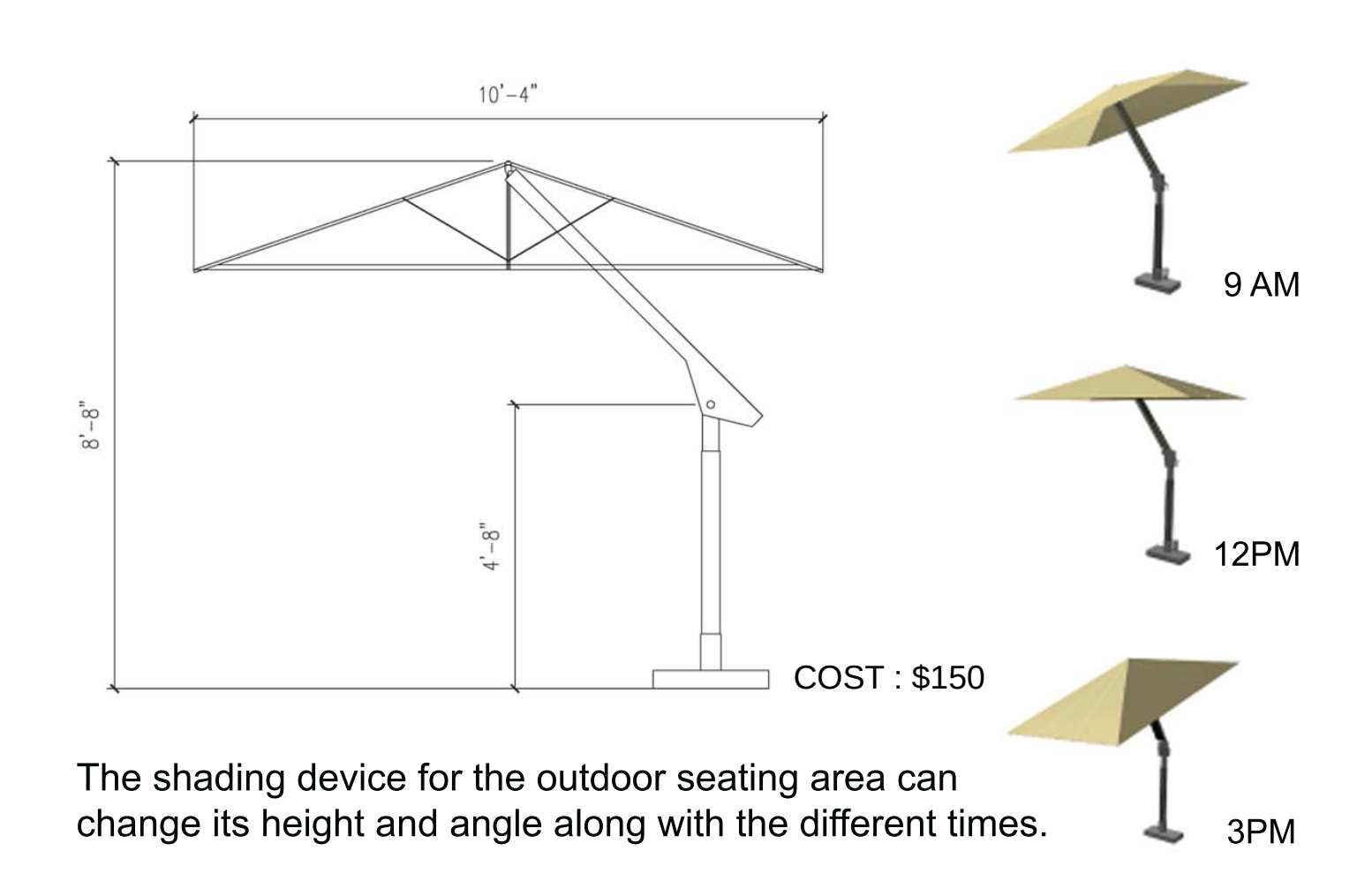
PARTITION WALL DETAIL



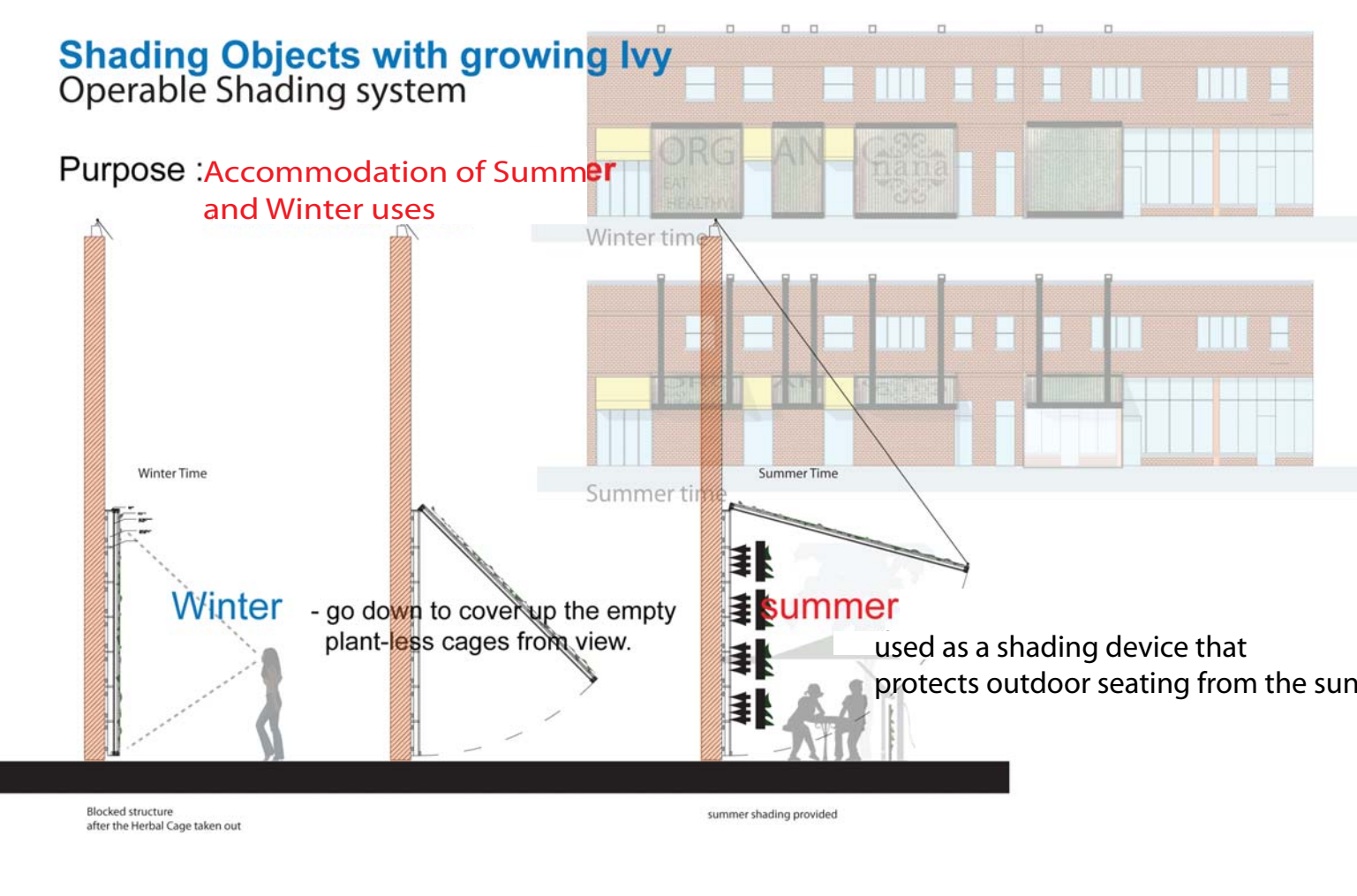
WOOLLY POCKETS



SHADING DEVICE



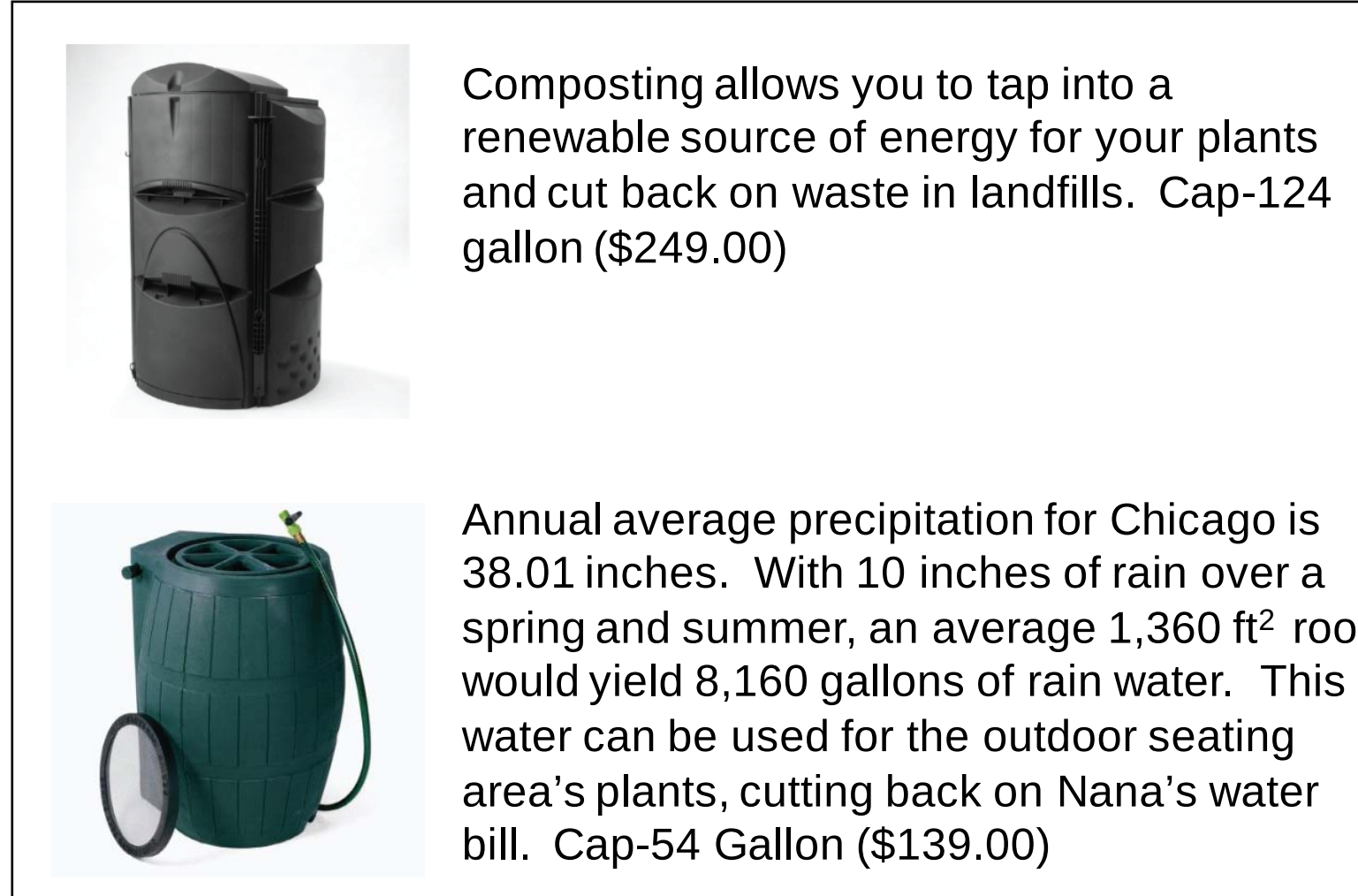
ALTERNATE SHADING DEVICE



ELECTRIC CHARGE POINT



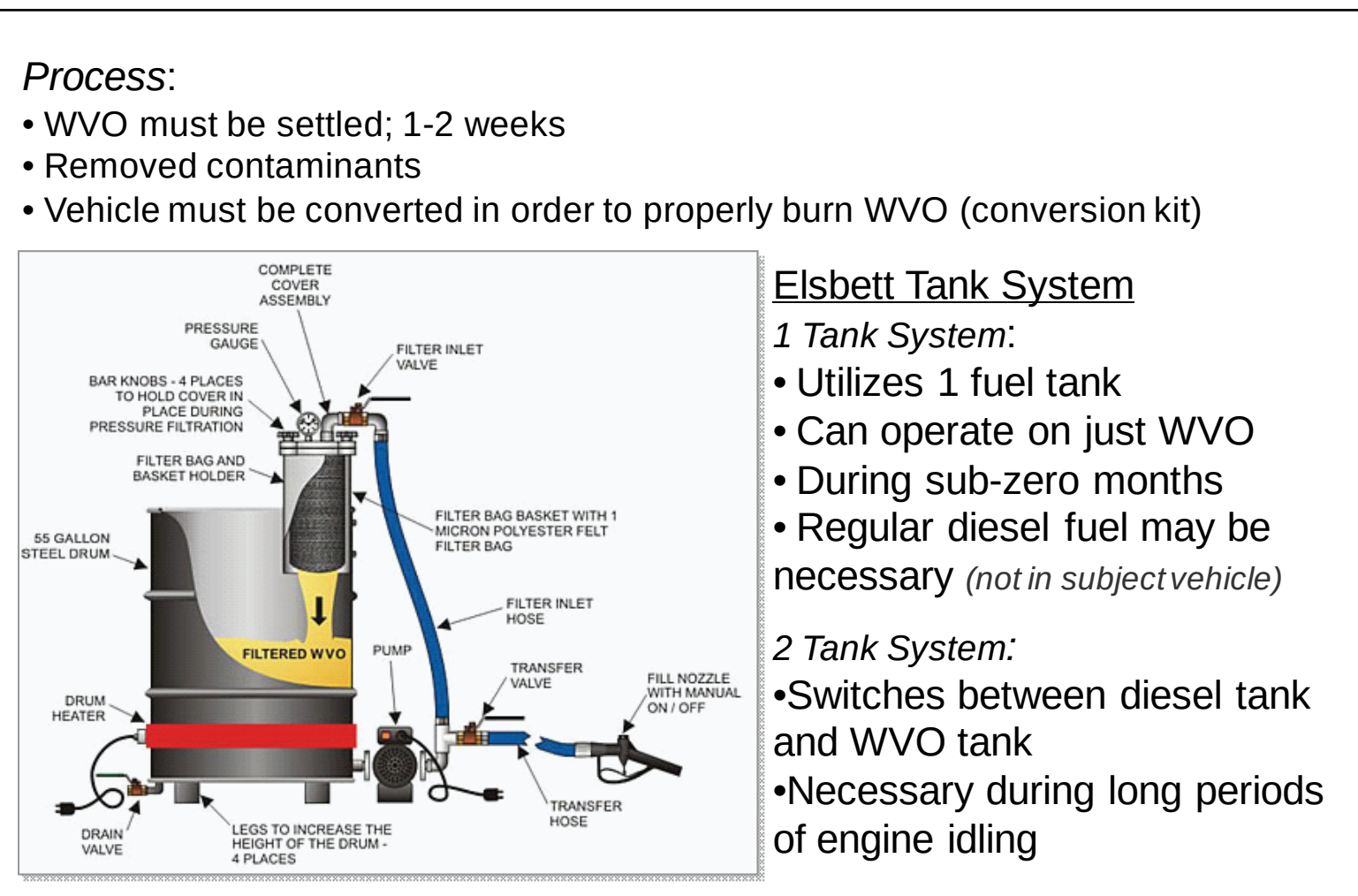
COMPOST AND RAINCATCHER



ENVIRONMENTALLY FRIENDLY CLEANERS

Cleaner Genre	Current Cleaner	Cost / oz.	Recommended Cleaner	Cost / oz.
All-Purpose	Ecolab G.P. Liquid	\$0.15	Sunshine Makers Simple Green Concentrate ¹	\$0.07
Bathroom	Ecolab Kemsan	\$0.26	Canberra Corp. Husky 325 ¹	\$0.10
Degreaser	Ecolab Degreaser	\$0.30	The Clean Environment Co. PH Neutral	\$0.11
Floor	Ecolab Wash 'N Walk	\$0.40	Amrep Misty Neutra Clean	\$0.10
Oven	Ecolab Husky	\$0.40	The Clean Environment Co. Non-Toxic Cleaner	\$0.18
Toilet Bowl	Palmolive Disinfectant Bowl Cleaner	\$0.16	The Clean Environment Co. No-Dye Cleaner	\$0.14
Window	Ecolab Windex	\$0.26	Rochester Midland Corp. Enviro Care ¹	\$0.10

WVO TANK SYSTEM



COST AND REPAYMENT

Subject Vehicle: 2010 Volkswagen Jetta Wagon, TDI			
•14.5 Gallon Fuel Tank, Automatic Transmission			
•Economy 2010 VW Jetta: 30 MPG-City, 42 MPG-Highway, 34 MPG-Combined			
•Local Diesel Fuel Price: (2-17-10, 3400 Milwaukee Ave, Gas Depot) \$2.89/gal			
UPFRONT COSTS		TIME OF REPAYMENT	
Conversion Kit	\$1,139.00	14.5 gals of Diesel at \$2.89 (Weekly)	\$41.91
Install (8hrs at \$95)	\$760.00		
Filtration (drum/line)	\$240.00		
TOTAL UPFRONT COST	\$2,139.00	Savings-YEAR 1 (52 weeks)	-\$66.63
5% Contingency	\$106.95	Savings-YEAR 2 (104 weeks)	\$2,095.50
TOTAL (with contingency)	\$2,245.95		
CONCLUSION:			
Converting the used oil to fuel the company vehicle is a feasible option that will be repaid in 54 weeks			