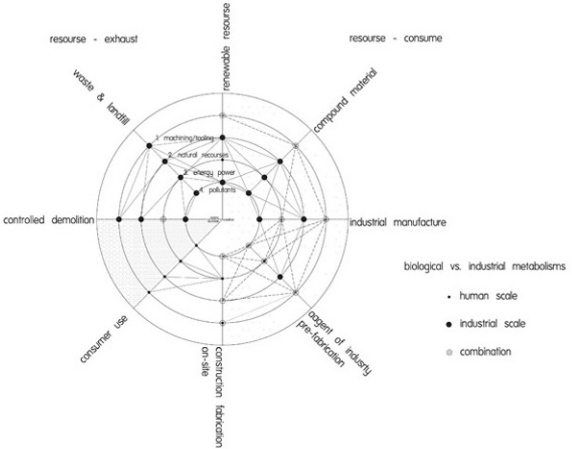


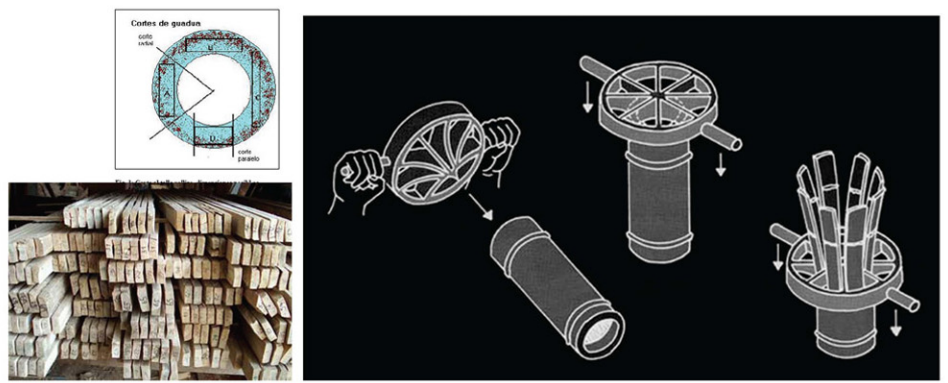
eco_clean dwelling

- _small scale housing typology
- _bamboo + plastic as materials
- _site responsive
- _low embodied energy
- _cradle to cradle

Material	Competing Family	Biodegradable	Inert	Chemical Composition	Low Embodied Energy	Off-gassing	Renewable	Cross-sectional Capacity
Infill								
Polyactic Acid	Polystyrene	Yes	No	Dextrose	Yes- Windmill power	No	Yes	Tensile
Polyactic Acid Fiber	Cotton	Yes	No	Dextrose	Yes- Windmill power	No	Yes	Tensile
Wool	Synthetics	Yes	No	Animal	Yes- Hand tools	No	Yes	Tensile
Plyboo	Plywood	Mostly	No	Bamboo, soy-resin	Mostly- petroleum machinery	No	Yes	Compressive
Earth brick	Ceramics veneer	Yes	No	clay dirt, fine gravel, coffee grind, water	Yes- If Unbaked-hand tools	No	Yes	Compressive
Paper-crete	NA	Mostly	No	paper, cardboard, cement, water	Yes- If Unbaked-hand tools	No	Mostly	NA
Cork	Ceramic Tile	Yes	No	Cork tree bark	Mostly- petroleum machinery	No	Yes	NA
Lime Plaster	Stucco	Yes	No	Gypsum water	Yes- Hand tools	No	Yes	Compressive
Earth bag	Earth bag	Yes-PLA Bag	No					
Structural								
Bamboo	Wood/Steel	Yes	No	Grass	Yes- Hand tools	No	Yes	Compressive
Eco-lumber	Wood	Yes	No	Wood from Managed Forest	Mostly- petroleum machinery	No	Yes	Compressive
Paper Tubes	Wood/Steel	Mostly	No	Paper, concrete, adhesives	Mostly- petroleum machinery	No	Mostly	Compressive
Pressed earth	CMU	Mostly	No	clay dirt, fine gravel, coffee grind, water	Yes- If Unbaked-hand tools	No	Mostly	Compressive
Adhesives								
Natural Rubber	Silicone/ Resin/ Epoxy	Mostly	No	latex, water	Mostly- petroleum machinery	No	Yes	Mechanical
Soy-resin	Silicone/ Resin/ Epoxy	Yes	No	soy dextrose, water	Mostly- petroleum machinery	No	Yes	Mechanical
Inherent								
	heating/melting	NA	NA		Yes- Hand tools	NA	NA	Mechanical
	joinery				Yes- Hand tools	NA	NA	Mechanical
	-friction fitting							



bamboo_structural



Building material	Energy of production MJ/kg	Density kg/m³	Energy of production MJ/m³	Stress kN/cm²	Relationship energy per unit stress
(1)	(2)	(3)	(4)	(5)	(4)/(5)
Steel	30,0	7800	234.000	1,600	150.000
Concrete	0,8	2400	1920	0,080	24.000
Lumber	1,0	600	600	0,075	8.000
Bamboo	0,5	600	300	0,100	3.000

Characteristic material values in kN/cm²		Guadua	Timber softwood S10 (DIN 4074 T 1)
MOE		2.000	1.000
Tension // fiber		15,0	0,7
Compression // fiber	Effective length = 3,22 m 2,09 m 0,37 m	2,7 3,9 5,6	0,85
Bending strength (without shrinkage cracks)		10,0	1,0
Shear strength		0,9	0,09
d = 12 cm ; d _i = 9 cm		A = 50 cm² W = 100 cm³ I = 700 cm⁴	

polylactic acid plastic_infill

NatureWorks® PLA Polymer 2002D Extrusion/Thermoforming

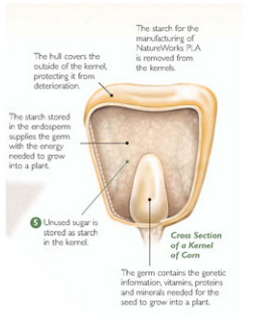
Typical Material & Application Properties (1)		
Physical Properties	PLA Polymer 2100D	ASTM Method
Specific Gravity	1.30	D792
Melt Index, g/10 min (190°C/2.16K)	5-15	D1238
Clarity	Opaque	
Mechanical Properties		
Tensile Strength @ Break, psi (MPa)	8,100 (56)	D638
Tensile Yield Strength, psi (MPa)	9,000 (62)	D638
Tensile Modulus, kpsi (GPa)	500 (3.5)	D638
Tensile Elongation, %	3.0	D638
Notched Izod Impact, ft-lb/in (J/m)	0.37 (19.8)	D638

NatureWorks® PLA Polymer 2100D

Typical Material & Application Properties (1)		
Physical Properties	PLA Polymer 2002D	ASTM Method
Specific Gravity	1.24	D792
Melt Index, g/10 min (190°C/2.16K)	4-8	D1238
Clarity	Transparent	
Mechanical Properties		
Tensile Strength @ Break, psi (MPa)	7,700 (53)	D882
Tensile Yield Strength, psi (MPa)	8,700 (60)	D882
Tensile Modulus, kpsi (GPa)	500 (3.5)	D882
Tensile Elongation, %	6.0	D882
Notched Izod Impact, ft-lb/in (J/m)	0.24 (12.81)	D256
Shrinkage is similar to PET (2)		

Processing Temperature Profile (1)

Melt Temperature	410°F	210°C
Feed Throat	113°F	45°C
Feed Temperature	355°F	180°C
Compression Section	375°F	190°C
Metering Section	390°F	200°C
Adapter	390°F	200°C
Die	375°F	190°C
Screw Speed	20-100 rpm	



35' brush + residential housing begins

127° n
37° e

28' site boundary

26' small shrubs + ice plants

25' access road

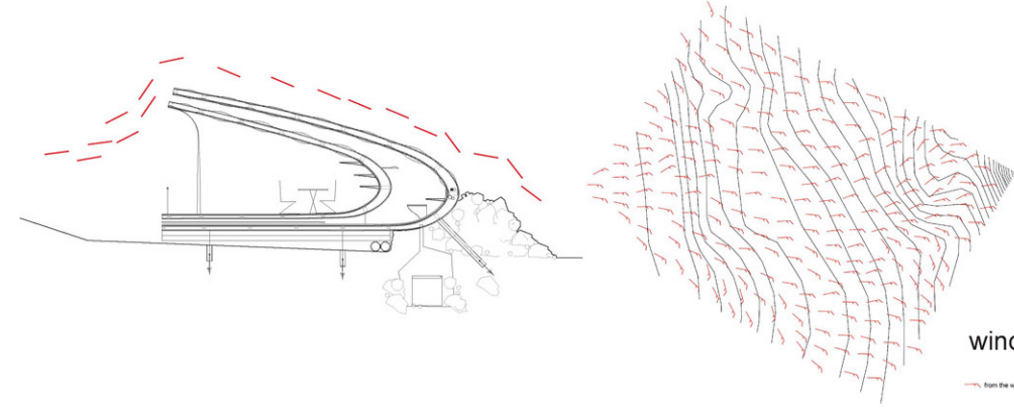
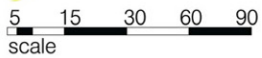
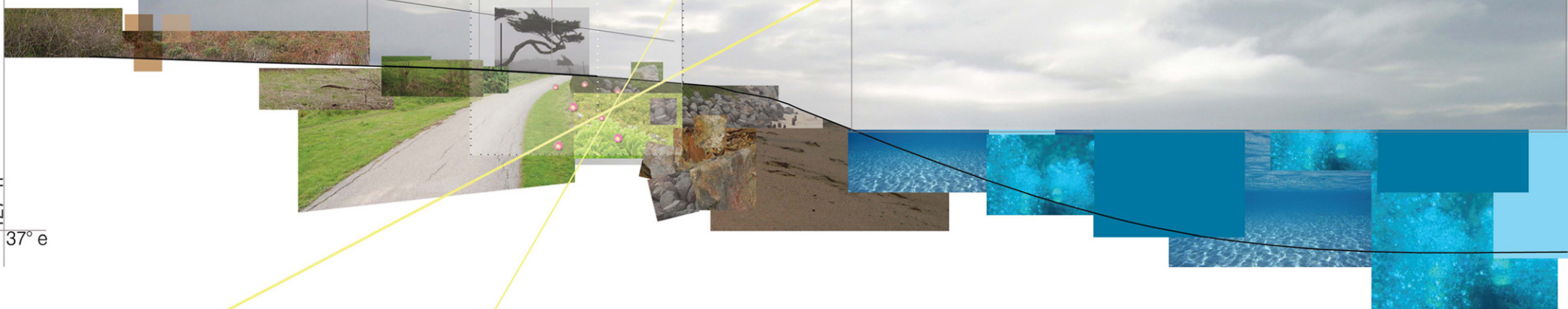
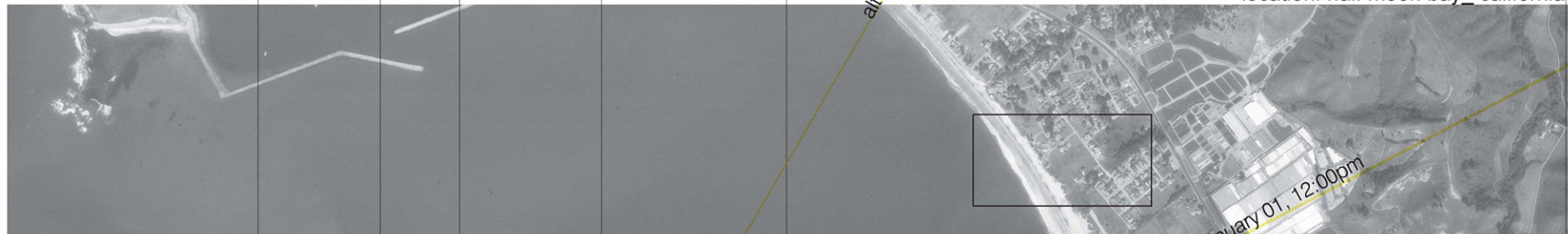
20' granite boulders

0' sea level

alt 60.2° september 01, 12:00pm

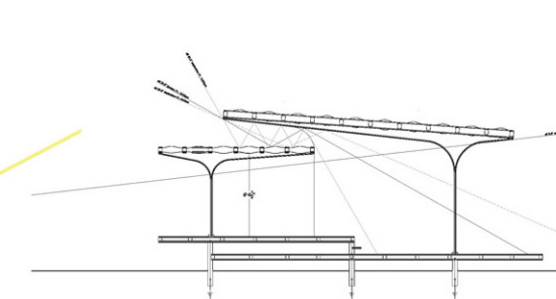
alt 29.5° january 01, 12:00pm

location: half moon bay_california



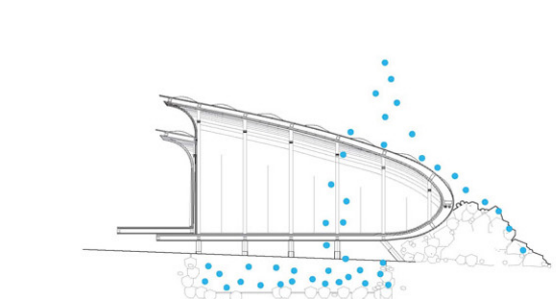
wind

From the west at 10mph
scale: 1/32" = 1/8" north"



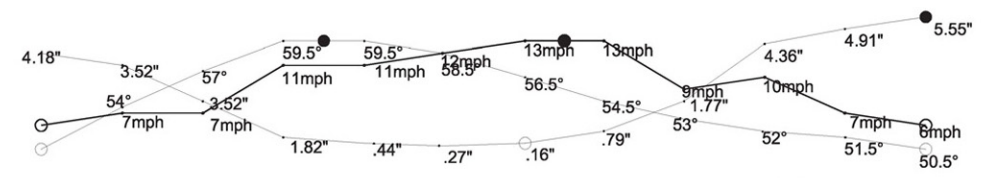
sun

local temperature via heat gain
scale: 1/32" = 1/8" north"



water

maximum flow
minimum flow
precipitation quantity
scale: 1/32" = 1/8" north"



• wind speed_mph
1" = 0mph
• temperature_F°
1" = 0°
○ precipitation_inches
1" = 0"



Material Cost Estimate

150'-0" @ \$95.00 = 0.63

Large Surface = 5394.64'

Small Surface = 3529.76

Total = 89244

@ 63 = \$56,223.72

+ flooring @ 493.86

Total = \$56717.52



Large surface 1583.75sq. ft.

Small surface 1055.83 sq. ft.

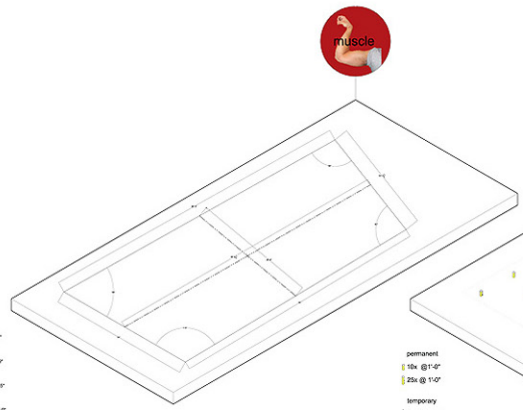
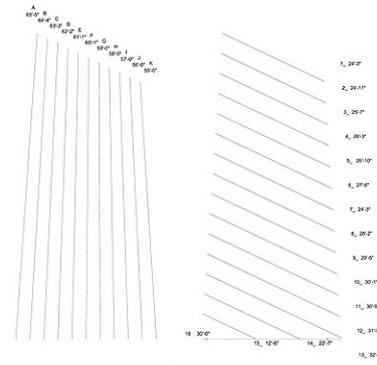
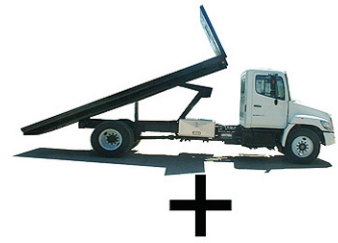
Total = 2639.58

@ 1.28/ sq.ft.

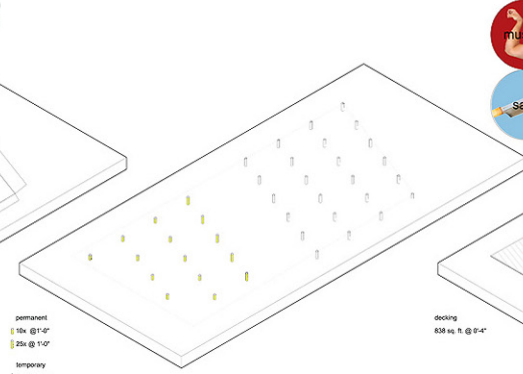
Total = \$3,378.66

\$56717.52 + \$3,378.66

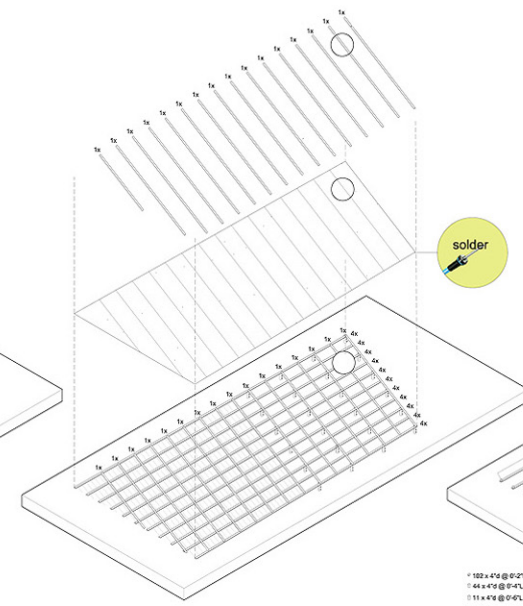
Total = \$60,096.19



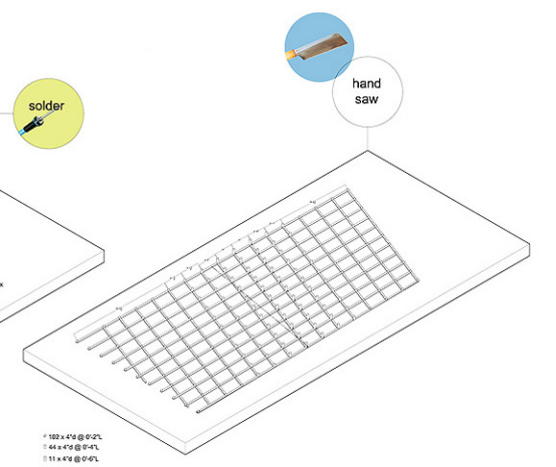
day 1



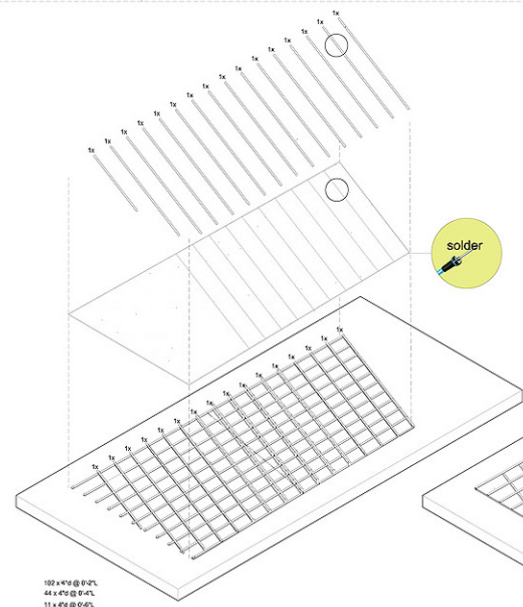
day 2



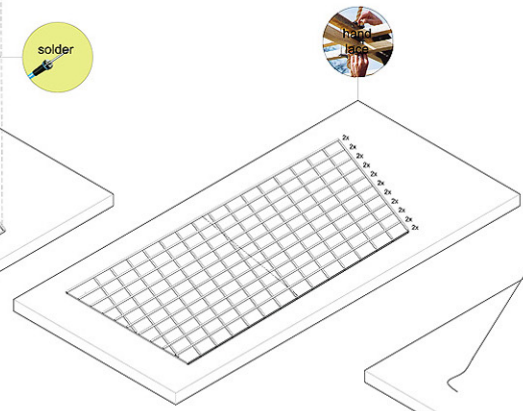
day 4



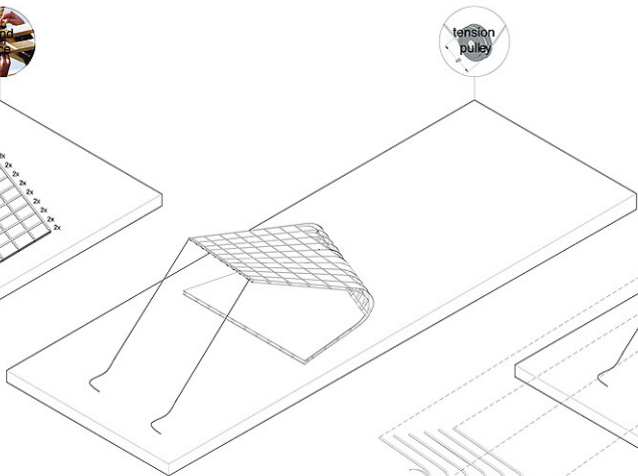
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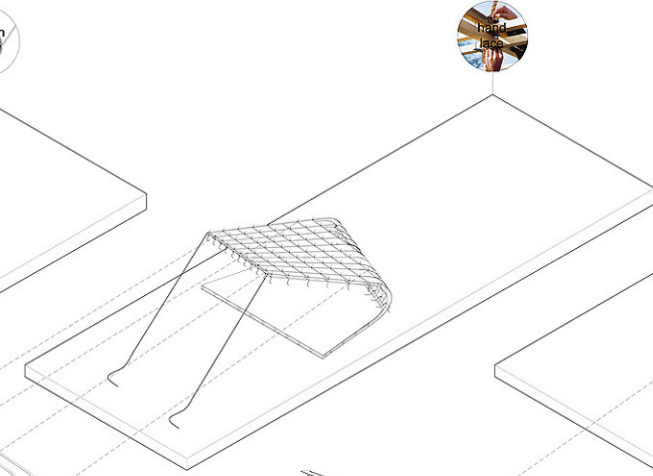
day 6



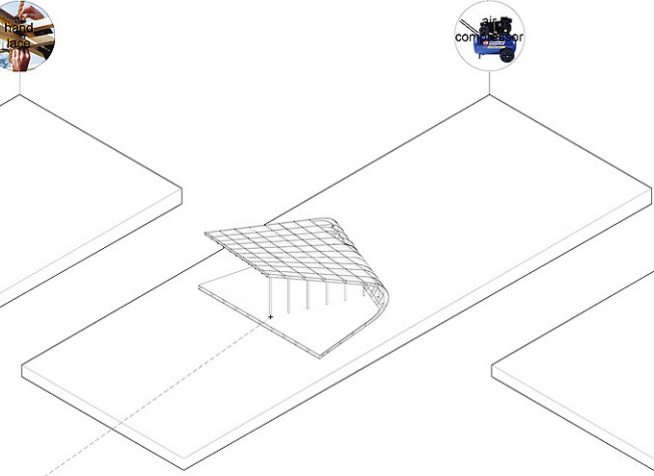
day 7



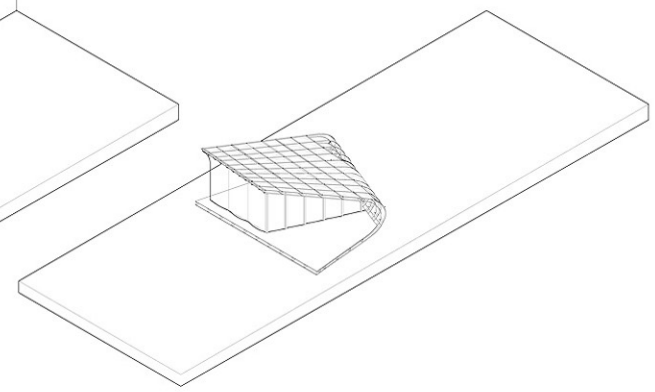
day 8



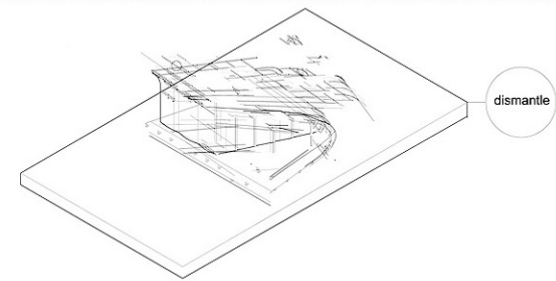
day 9-10



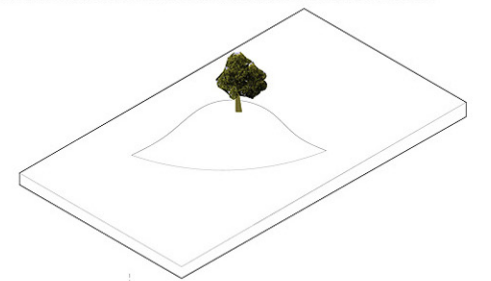
day 11-15



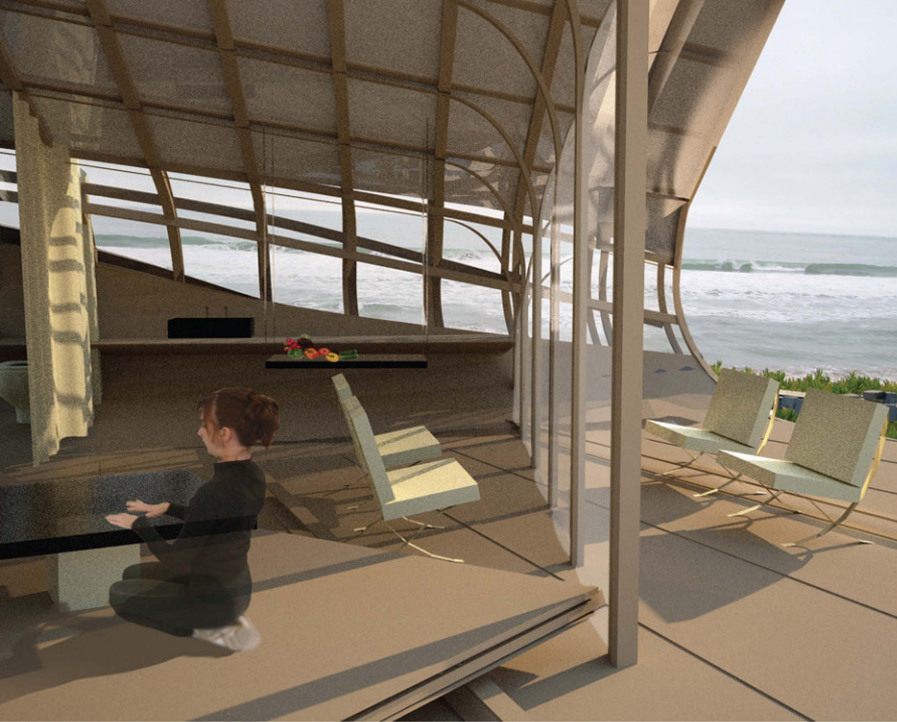
day 16-20



year 12



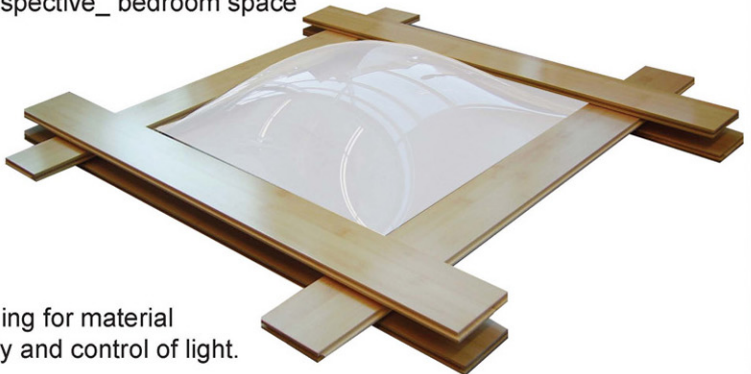
year 13



interior perspective_ living space



interior perspective_ bedroom space



1:1 detailing for material assembly and control of light.



1. water harvest collection pool
2. thermal berm_local stones
3. solar cell energy collection
4. vegetable garden + compost

