

Light Gauge Framing
Perspective View



View from driveway looking northeast.

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Light Gauge Framing Site Plan

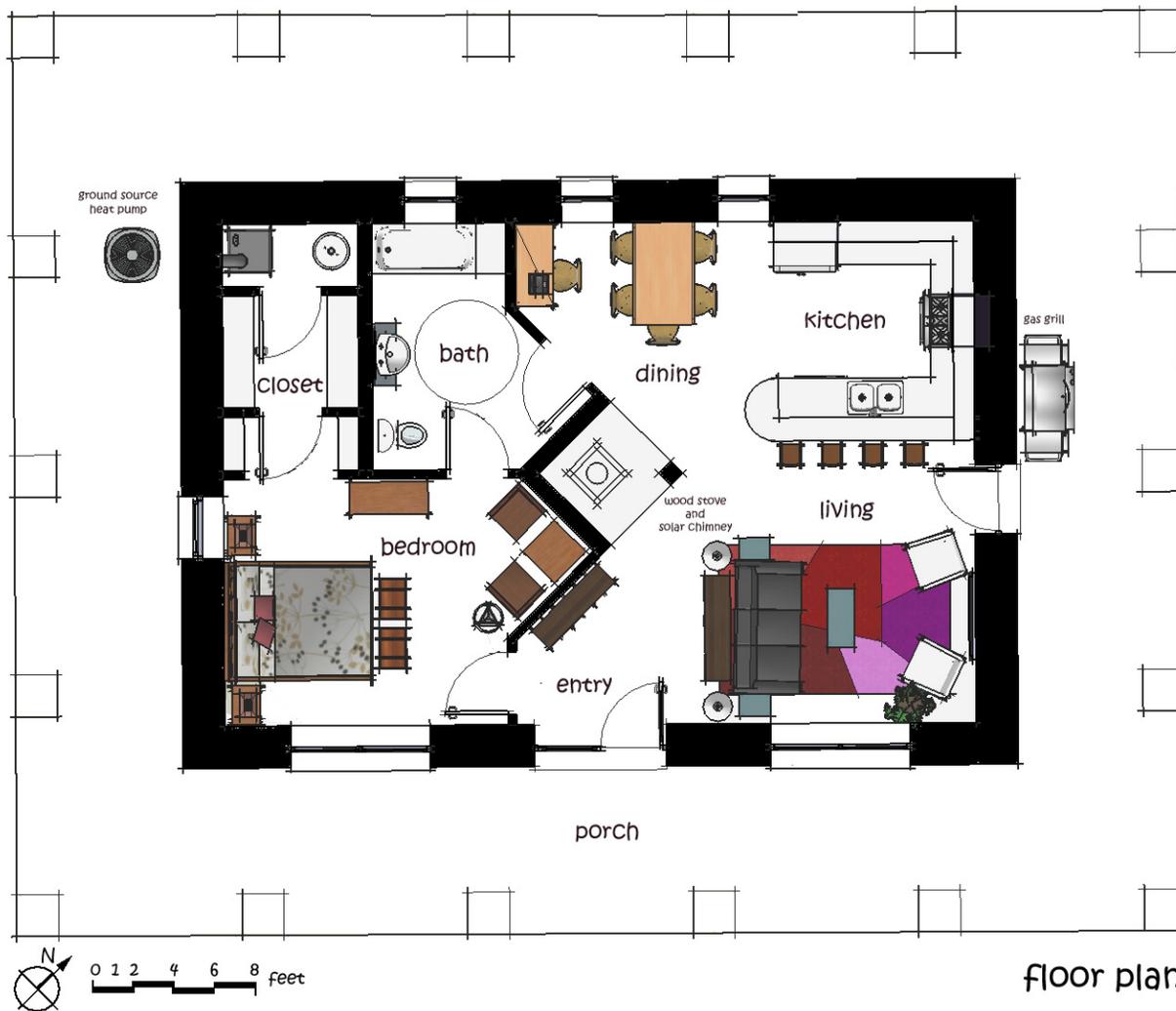


The new house is sited on the same spot as the former residence to allow easy connections to the well, septic tank and propane tank. The driveway is reused and expanded to allow for a turnaround. The house is rotated 45 degrees to face southwest and avoid direct views of the neighboring residence to the south. A shelterbelt along the south property lines also screens views and blocks summer sun. A yucca garden is the main focus of planting in an otherwise natural setting. Solar panels on the roof provide hot water for the house.

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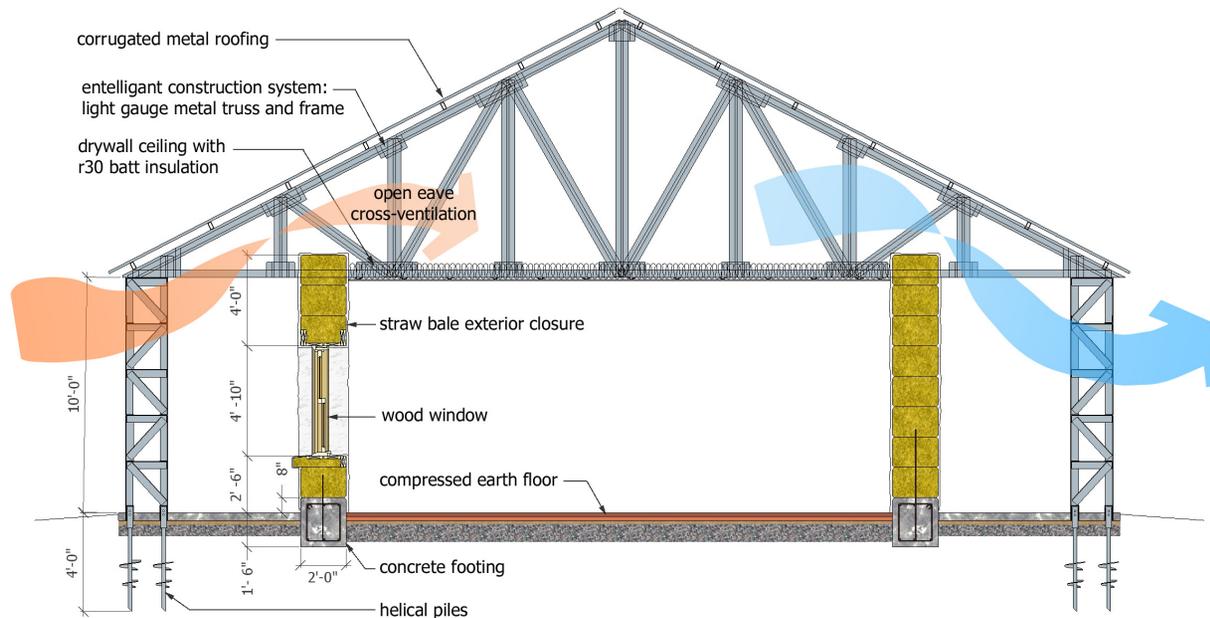
Light Gauge Framing Floor Plan

The light gauge metal frame functions purely as shelter covering the rectangular living space with an eight foot deep porch protecting the straw bale walls from weather and minimizing heat gain from solar radiation. The solar chimney and wood stove are placed directly in the center of the 800 square foot plan providing heat or supplemental cooling to all of the living spaces. The living area is divided into quarters with living room, kitchen/dining room, bedroom and bath/storage in each quadrant respectively. The penisular bar of the kitchen divides the main living area in an informal arrangement that gives the plan an open feel.



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Light Gauge Framing Building Section



The light gauge metal frame is constructed first to provide shelter for the rest of the project. Each piece is custom built using CNC machine technology and assembled on-site. Helical piles provide a solid and easily installed foundation.

The conditioned space is enclosed by straw bale walls and superinsulated ceiling. Interior and exterior surfaces are made with mud plaster. A compressed earth floor is durable and warm.

Air is allowed to circulate under the eaves and through the open attic to remove heat gain from the roof. Cross ventilation is also provided by windows on both sides of the habitable space.

Notes:

Light gauge framing from Entelligent Construction Systems: <http://www.entelligent.com/>.

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Light Gauge Framing Cost Estimate

Category	Quantity	Unit Cost	Unit	Subtotal	Totals
Site Preparation	1	\$ 5,000	ls	\$5,000	\$5,000
Foundation					\$3,660
Helical Piles	18	\$ 150	pile	\$2,700	
Concrete Footing	96	\$ 10	lf	\$960	
Structure					\$12,531
Light Gauge Truss and Framing	2560	\$ 4	sf	\$10,240	
Corrugated Metal Roofing	29	\$ 79	sq	\$2,291	
Exterior Closure					\$17,950
Straw Bales	1	\$ 1,350	ld	\$1,350	
Plaster	1920	\$ 5	sf	\$9,600	
Doors	3	\$ 1,000	ea	\$3,000	
Wood Clad Windows	8	\$ 500	ea	\$4,000	
Interior Construction					\$22,840
Drywall Partitions	64	\$ 80	lf	\$5,120	
Interior Doors	6	\$ 200	ea	\$1,200	
Drywall Ceiling	800	\$ 2	sf	\$1,600	
Batt Insulation	800	\$ 1	sf	\$800	
Cabinets/Counters	30	\$ 200	lf	\$6,000	
Compacted Earth Floor	2560	\$ 2	sf	\$5,120	
Appliances	1	\$ 3,000	ls	\$3,000	
Plumbing					\$8,000
Service	1	\$ 5,000	ls	\$5,000	
Fixtures	3	\$ 1,000	ea	\$3,000	
Mechanical					\$10,950
Ground Source Heat Pump	1	\$ 4,000	ea	\$4,000	
Furnace and Ductwork	1	\$ 3,000	ea	\$3,000	
Wood Stove and Chimney	1	\$ 2,000	ea	\$2,000	
Exhaust Fan and Damper	1	\$ 450	ea	\$450	
Solar Hot Water System	1	\$ 1,500	ea	\$1,500	
Electrical					\$6,600
Service	1	\$ 3,000	ea	\$3,000	
Power and Signal	800	\$ 3	sf	\$2,400	
Lighting	6	\$ 200	ea	\$1,200	
Grand Total					\$87,531

The house can be built in phases with the foundation and superstructure built first, followed by exterior closure, building systems, and interior construction and finish out last. Each phase costs approximately \$20,000. Costs listed include labor and could be reduced if volunteer labor is provided. These costs are preliminary estimates and not guaranteed prices. Final costs will be determined during development of the final design and construction. The University of Oklahoma is not responsible for pricing or construction.

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The Straw bale house is an ideal replacement of the regular wood or concrete structure homes.

The simplicity of construction, low costs, and benefits associated with it eliminate the need to a specialized contractor.

Why I chose straw bale house ?

- The straw bale walls provide roughly three times the fire resistance of conventional homes .Loose straw is indeed flammable, but the bales are so tightly packed that they actually increase fire resistance. In a tightly packed bale, there's no oxygen, which reduces the chance for combustion. The plaster coating of the walls adds an additional fire-resistant seal. The National Research Council of Canada conducted testing where straw bale walls withstood temperatures up to 1,850 degrees Fahrenheit (1,010 degrees Celsius) for two hours [source: Magwood, Mack, Therrien].
- The real cost savings of straw bale building relate to energy efficiency. The straw bales, finished by plaster, have a high R-value. The R-value measures the insulation resistance of the wall; straw bale walls provide an incredible insulation that can easily keep heat in or out, depending on your needs. A straw bale home can save up to 75 percent on heating and cooling costs annually [source: Morrison, Amazon Nails]. This represents a huge savings over the life of the house
- These thick walls also provide excellent soundproofing. Straw bale building has been used for recording studios and for homes near busy highways.
- you can squeeze out some cost savings depending on who builds the **house**

Straw Bale House



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Before



After

Straw Bale House Site Analysis

Location

7001 132nd Ave SE, Noble, OK 73068

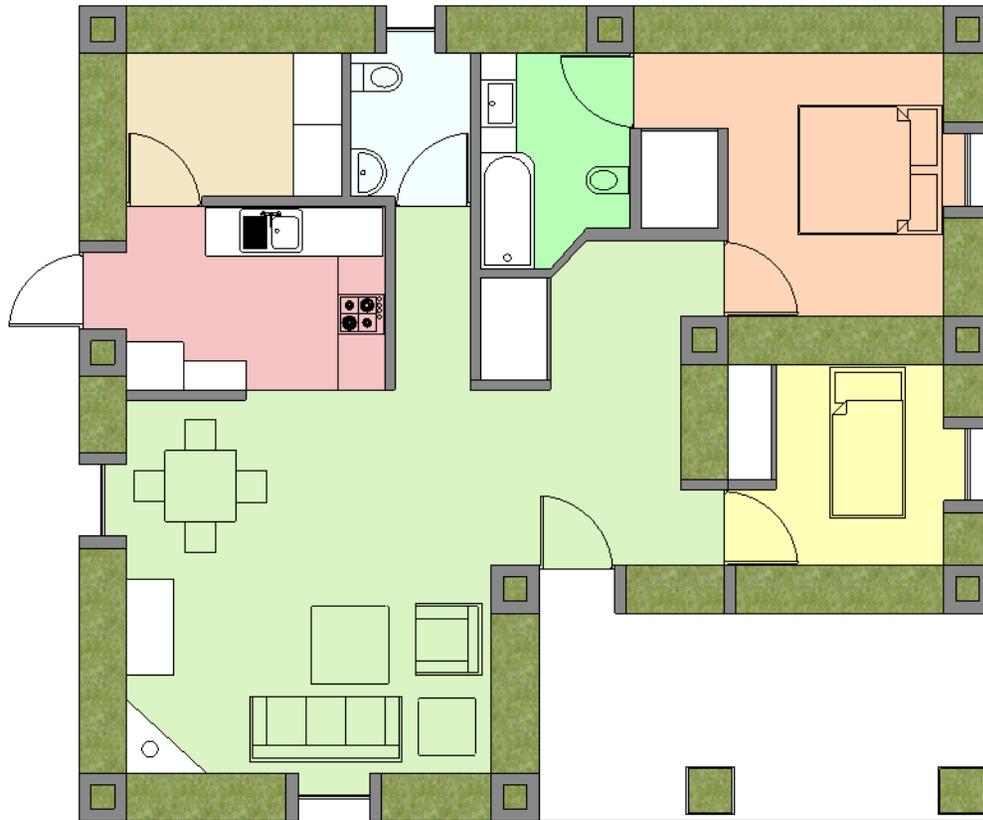
Lot: 87,120 sq ft – 2 acres

The land is relatively flat on the south west quarter of the lot. It gradually slopes off to the east and becomes slightly steeper on the eastern fifth of the lot near the east tree line.

Along the north of the lot, there is a relatively steep decline into the woods and a more drastic drop into a creek off of the property which appears to sun along that grey line around the site.

Note: The Blue Arrow Showing North

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Straw Bale House Floor Plan

- Kitchen Area
- Guest Bedroom
- Master Bedroom
- Master Bathroom
- Living&Dining Area
- Utility Room

0 Floor Plan
A00 Scale: 1/8" = 1'-0"

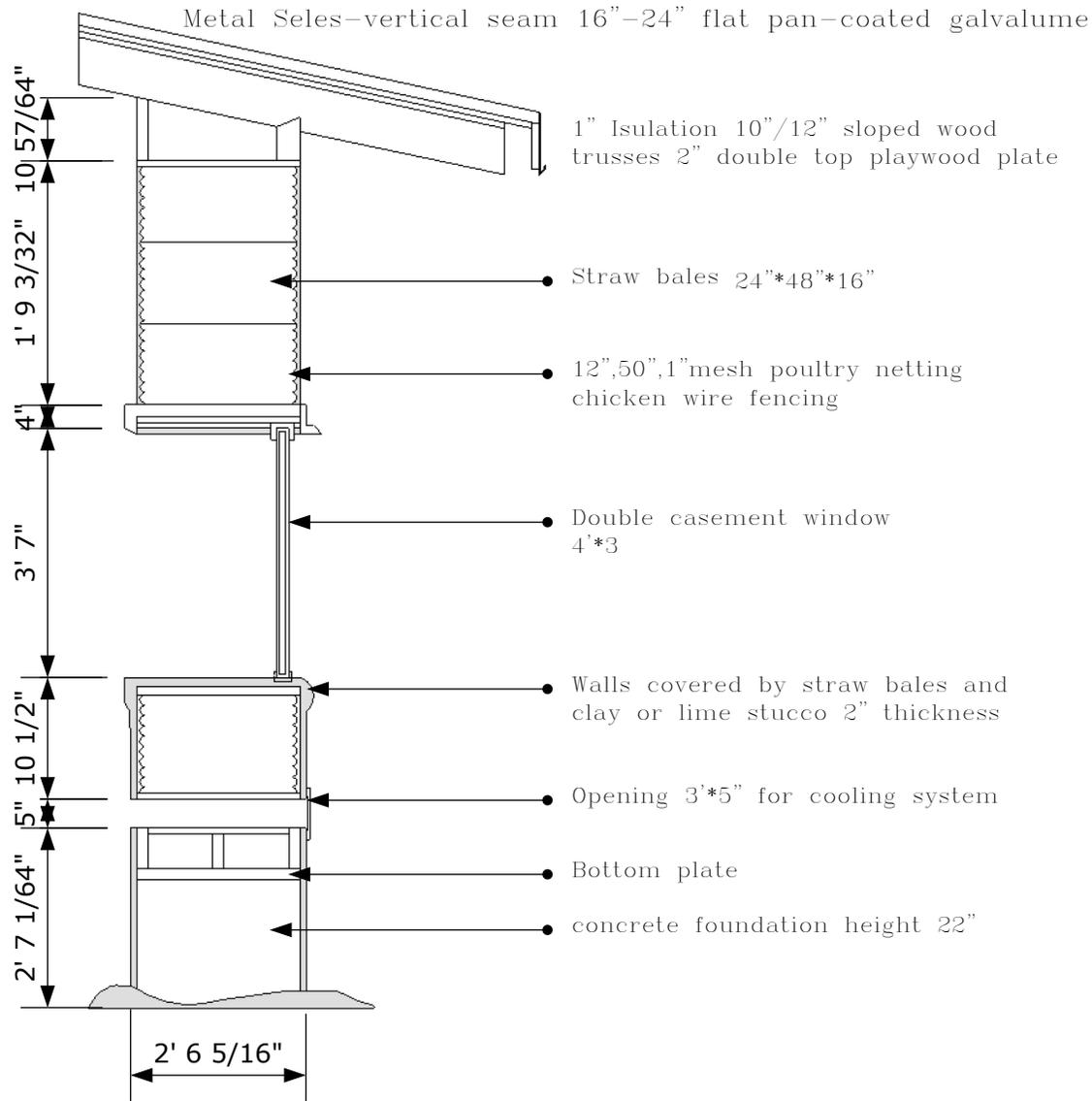
Total Area: 1105 Sq.Ft
 Net Area: 791.5 Sq.Ft
 Exterior Walls: 1688 Sq.Ft

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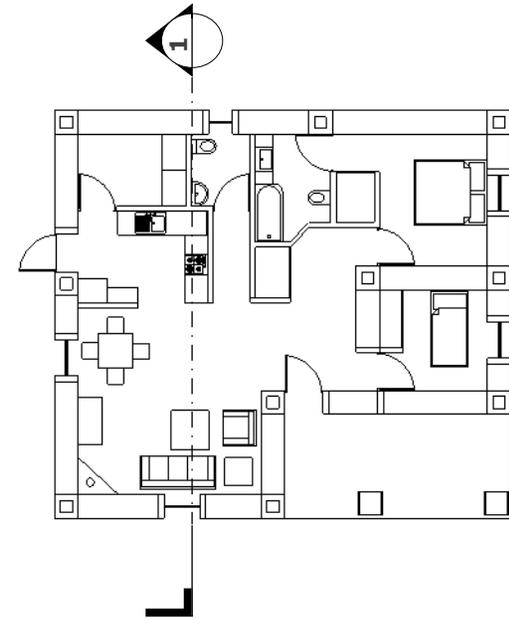


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Straw Bale House Wall Section



1 wall section
A00 Scale: 3/4"=1'-0"



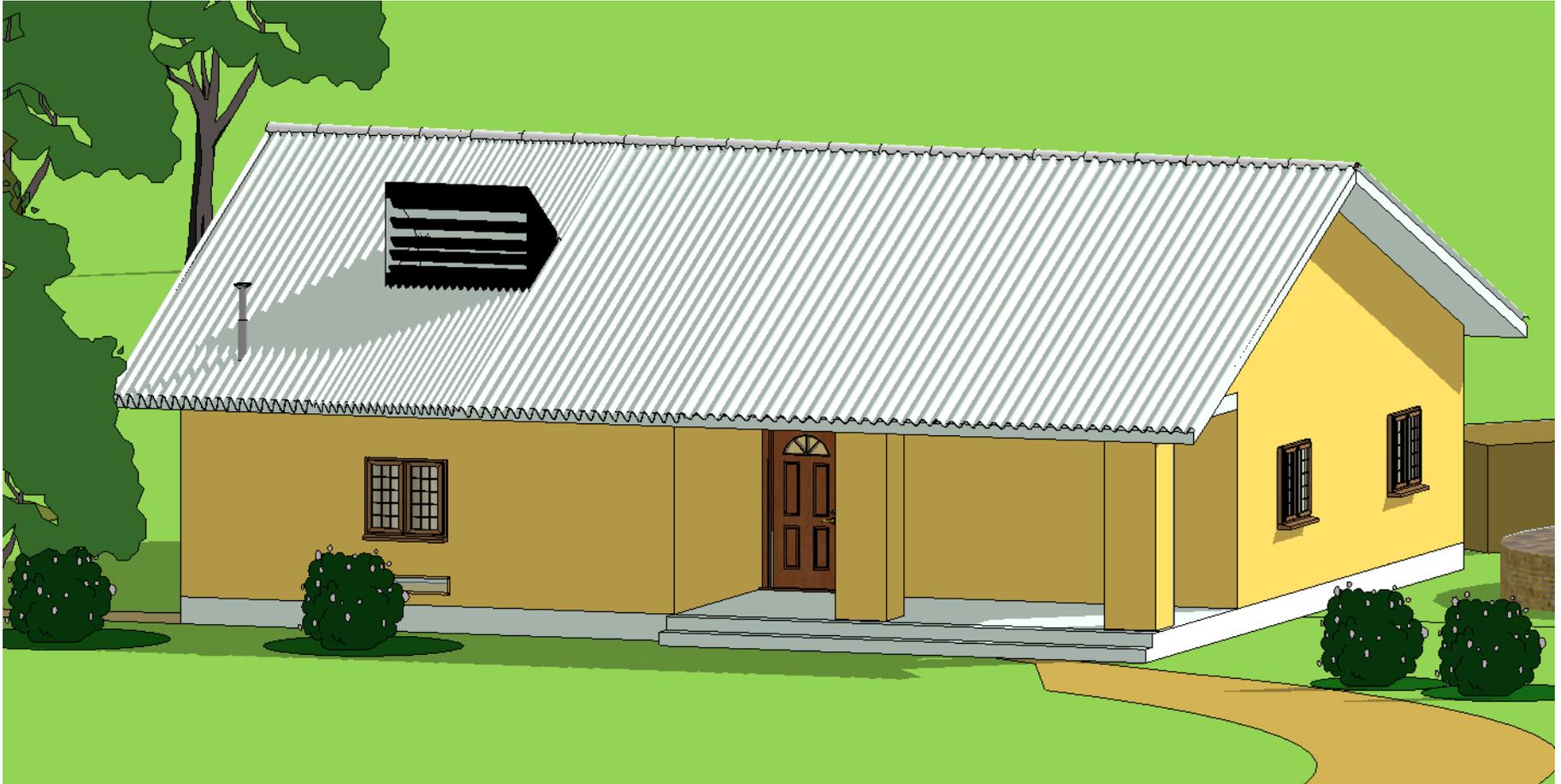
1 wall section
A00 Scale: 1/16"= 1' : 0"

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Straw Bale House
3D Design



Straw Bale 3D Model

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Straw Bale House Budget Summary

Total Area (Sq. Ft.)	1105					
Net Area (Sq. Ft.)	791.5					
Exterior walls (Sq. Ft.)	1688					
Category	Component / Description	Area Sq. Ft.	Qty. Unit	Qty.	U. Price \$	Total \$
Exterior Walls	Straw Bale	3.89	Block	434	4.00	1,736.00
	Lumber (2x4x8)	105.00	Panel		3.97	416.85
Interior Walls	Wood Partition	472.00	Panel		10.30	4,861.60
	Cement Partition 5 x 3	13.50	Panel		9.60	129.60
Roofing	Panel tiles 42 Sq. Ft	1,680.00	Tile	40	28.70	1,148.00
	Wooden frames and Trusses		L/S	-		5,200.00
Paints	Exterior (2 coats)	2,535.00	5 G Bucket	8	130.00	1,040.00
	Interior (2 coats)	2,767.00	5 G Bucket	8	148.00	1,184.00
	Ceiling (2 coats)	2,508.00	5 G Bucket	8	54.00	432.00
Doors	Front Door		Each	1	800.00	800.00
	Rear Door		Each	1	800.00	800.00
Windows	Room Window		Each	4	220.00	880.00
	Bathroom Window		Each	1	90.00	90.00
Plumbing & Fixtures			L/S			3,000.00
Hardware & Tools			L/S			1,450.00
Electrical Works			L/S			3,769.00
Water Well			L/S			2,250.00
Site Preparation			L/S			3,500.00
Equipment Rental			L/S			1,000.00
Grand Total \$						33,687.05
Add 15% as labor estimate						38,740.11
Electrical wire, conduit, breaker box, receptacles, lights bulb and general wiring, smoke alarms.						
installed the pump and other electrical						
fill dirt, raise the floor height at least 2 ft.						

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Liveability:

The main concern using shipping containers is the restrictive dimensions. A high cube shipping container, as used in this design is 8' wide, 40' long, and 9'6" high. While other designers have laid two containers side by side and eliminated the touching walls, that concept was restrictive due to costs. This design, then, focused on making the least number of modifications to the existing shipping containers while maximizing living space. The concept moved from focusing primarily on the indoor space to finding a way to maximize outdoor/indoor living opportunities. While the first two containers form an "L" shape, the next containers should complete a square formation, creating a courtyard effect. This space can then be gradually enclosed or modified to enhance cool shade in the summer and warm sunlight in the winter.

Affordability:

This concept is roughly \$74/sq. ft. finished. The shipping containers by themselves are \$14/sq. ft. The finished cost includes framing, drywall, electrical, plumbing, heat and air, and a completed kitchen and bathroom.

Sustainability:

Reuse, reduce, recycle. This concept takes the green theme to heart by utilizing used shipping containers and reducing the ecological footprint. While not included in the initial estimate, a green roof would be easily adapted to a shipping container setting, allowing for lower heating and air conditioning needs, providing carbon offset, and possibly nutritious food.

Disaster Resistance:

When a disaster comes, a shipping container can be closed up and become impervious to most disaster events. When coated with intumescent paint, the entire structure will be fire resistant, and with the addition of a green roof, will keep burning embers from catching.

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Shipping Containers Site Plan



Shipping containers are located slightly north of previous house in order to allow for future additions. The circle represents the 30' diameter tree-less area that should surround the structures for firescaping. This area should be landscaped with materials like sand, concrete, and stone with plant material containing high water content. Native plants should also be used.

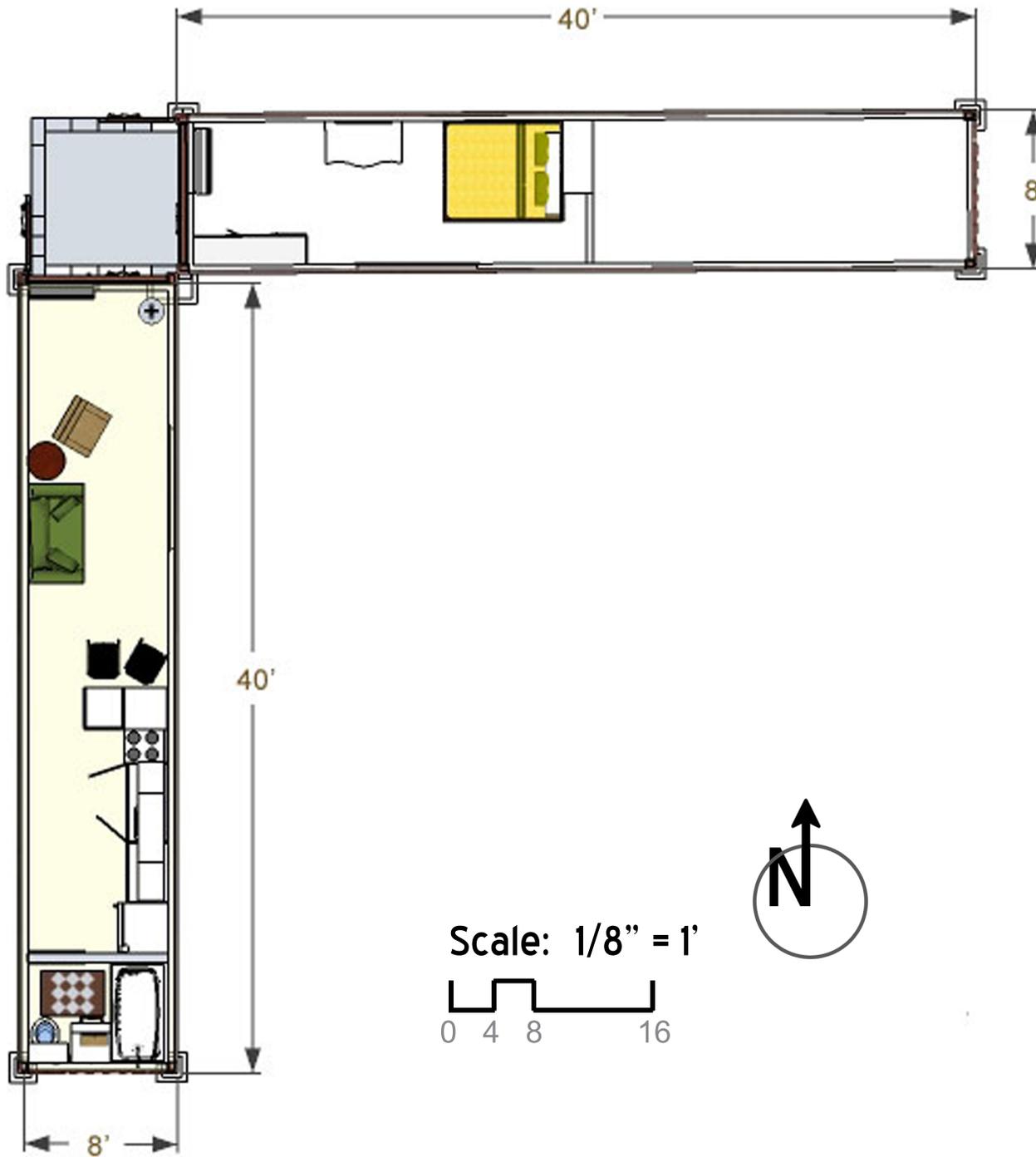


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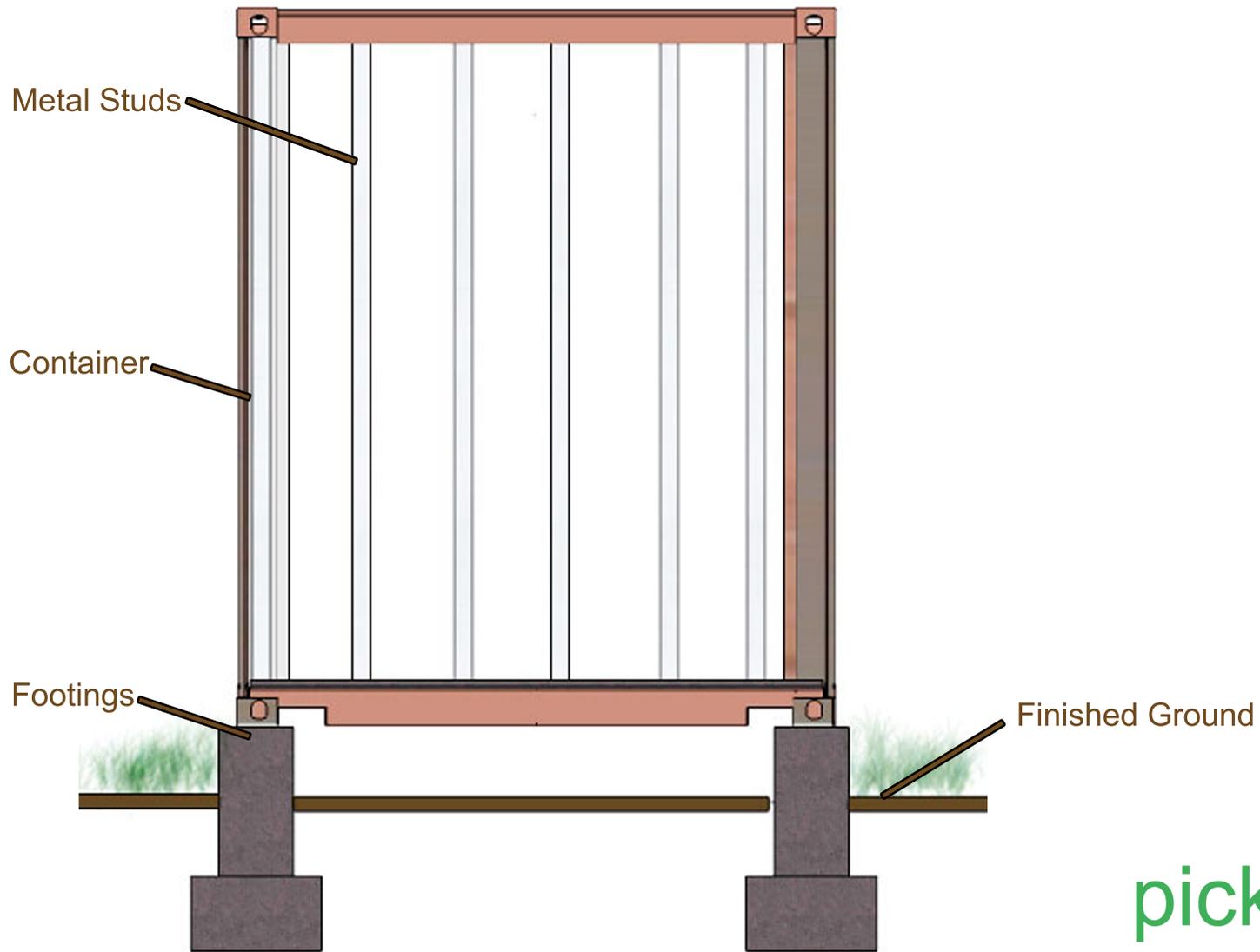
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Shipping Containers Floor Plan



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Shipping Containers Wall Section

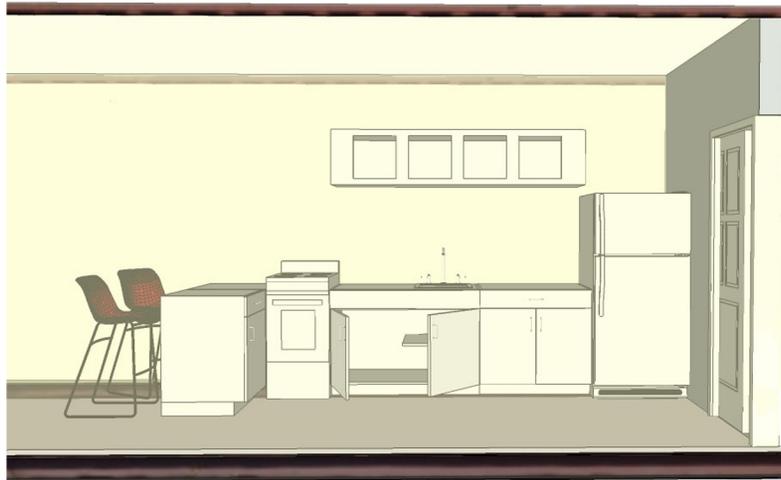
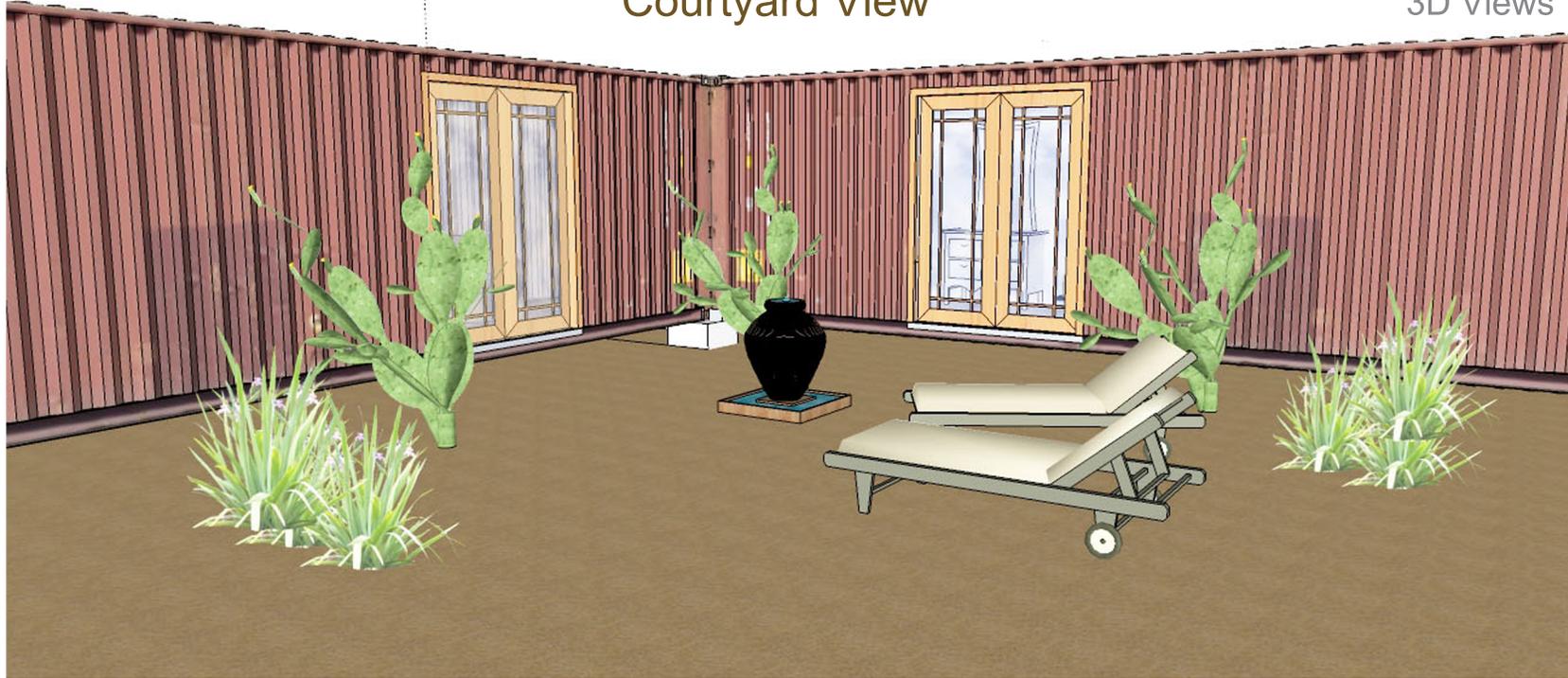


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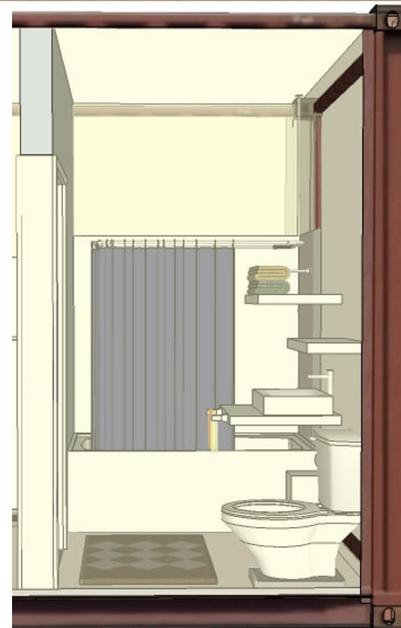
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Courtyard View



Kitchen View



Bathroom View

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Cost estimate

Shipping Containers Budget

Item	Cost/Unit	# of Units	Shipping	Subtotal
40' high cube shipping	4,250.00	2.00	225.00	8,950.00
Footings/Pilasters	1,000.00	7.00		7,000.00
Patio Door Cut Out	250.00	2.00		500.00
Patio Doors	348.00	2.00		696.00
Door Installation	100.00	4.00		400.00
Front Doors	88.00	2.00		176.00
Ductless Heat and Air Installation	2,500.00	1.00		2,500.00
Insulation, sq. ft. per inch	1.70	2,208.00		3,753.60
Framing, Steel	1,400.00	1.00		1,400.00
Drywall	9.48	76.00		720.48
Drywall Installation	1,500.00	1.00		1,500.00
Laminate hardwood floor	6300	1.00		6,300.00
Electric Panel	52.97	1.00		52.97
Electrical Wire and Installation	3,000.00	1.00		3,000.00
Kitchen Cabinets	426.00	1.00		426.00
Kitchen Sink	75.97	1.00		75.97
Sink and Cabinet Installation	1,500.00	1.00		1,500.00
Countertop	2,500.00	1.00		2,500.00
Plumbing Installation	1,000.00	4.00		4,000.00
Bathtub	219.00	1.00		219.00
Sink	210.00	1.00		210.00
Vanity	60.00	1.00		60.00
Toilet	129.00	1.00		129.00
Hot Water Heater, Point	289.00	1.00		289.00
Front Porch CMUs (DIY)	1.76	96.00		168.96
Front Porch Sand (DIY)	75.00	1.00		75.00
Total				\$46,858

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