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Design Notes

1. **Wall bracing:** information not necessary for straw bale construction. See Pima County straw bale prescriptive standards for information on shear.

2. **Sculpted sloping half wall:** this is a non-load bearing cob wall, formed on a framework of 6610 remesh with #3 rebar reinforcements. The cob wall will be attached to the straw bale wall by forming the cob around 12” #4 rebar pins that have been driven into each adjacent bale (similar to attaching the window and door bucks, p. 17). The adobe floor will be poured around this wall. The height of the cob wall where it meets the straw bale wall is 6’ 8,” and the top of the cob wall slopes down to a minimum height of 3.’

3. **Range/stove:** house plan does not show a range, which could be added on the east porch in the future.

4. **Roof ventilation:** blown-in cellulose insulation will fill the whole cavity up to the roof; roof ventilation is not needed.

5. **Tie down straps:** polyester machine strap from Carlson Systems, LLC [http://www.csystems.com/](http://www.csystems.com/) will be used to attach the roof bearing assembly to the foundation. The strap has a tensile strength of 775 pounds and will be triple looped, increasing the strength to 2325 pounds. See foundation details (p. 6 and p. 7A) and roofing details (p. 9) for attachment specifications.

6. **Vertical rebar:** 2’ lengths of #4 rebar set 8” into the foundation and 16” into the overlying bales. Pins are spaced at 2’ intervals under bales except where spaced more closely next to door frames.

7. **Straw bale dimensions:** standard dimensions of 3-string bales used are 4’ long x 2’ wide x 16” tall and bales will be of adequate density with very low moisture content.

8. **Building code:** All construction will comply with IRC 2000, and with Pima County prescriptive code (Appendix Chapter 72 Straw-Bale Structures, sections 7201-7206) unless otherwise noted and approved in these plans.


10. **Cooler installation:** To allow for installation of a cooler in the future, a 23” x 25” framed opening will be made in the bale wall, fitted with removable covers, and stuffed with straw. Cooler can be vented into kitchen and bedroom through ducts in closet.
Floor plan / room utilization

- Utilities
- Fridge
- Table
- Sun niche
- Cabinets above counters
- 5'h wall (7' tall see detail p. 16)
- Non load-bearing frame wall (see detail, p. 15)
- Sculpted sloping half wall (see note 2)
- Sun niche
- Post support beam (see detail, p. 78)
- Straw bale wall, 2' wide (see notes 1 and 7)
- Bed
- Closet

Casita Floor Plan

Interior (not including porches & walls): 400 ft²
Area including walls (not inc. porches): 576 ft²

Roof outline (inc. overhangs: see roof mass plan p. 10)
Elevations (EAST)

Casita east wall
Screened porch coming out of the page (not shown)

Gable roof, cathedral trusses
Painted corrugated metal roof
R 55 – 14" rafter
4:12 pitch, 18" overhangs
Elevations (SOUTH)

Casita south wall

Exterior finish: stucco

Gable roof:
Painted corrugated metal
4:12 pitch, 18” overhangs
Elevations (WEST) (Page 4)

Casita west wall
Unenclosed porch coming out of the page (not shown)

Gable roof, cathedral trusses
Painted corrugated metal roof
R 55 = 14" rafters
4:12 pitch, 18" overhangs
Casita north wall

Porch roofs:
- Rafters hung from roof bearing assembly (see detail, p. 13)
- Painted corrugated metal
- 2:12 pitch
Foundation plan details

- Vertical #4 rebar pins (see p. 7A and note 6)
- Standard spacing for vertical rebar (see note 6)
- Interior frame wall footings (see p. 7C)
- Continuous #4 rebar
- Roof tie-down anchors for polyester machine strap (6" eyebolts; see p. 7A, p. 9, and note 5)
- 10" long 1/2" diameter anchor bolts set 1" into concrete to secure door frame
- 6' (maximum spacing for eyebolts)
- 2' (maximum spacing for eyebolts)

Dimensions:
- 24'-0"
- 11.5'
(A) Main grade beam detail: Modified rubble trench

- Poly strap tie downs
- See note 5
- Pressure treated 2x4 toe-ups
- Nailed to grade beam
- See p. 8
- #4 Rebar (Continuous)
- 6" Eye bolts
  (tension anchors set at 45 deg.)
- See note 5 and p. 6
- 4" Plastic drain pipe
  (2" / 8' slope)
- Metal termite barrier
- 6mil Vapor barrier
- #4 Rebar (Continuous)

(B) Porch support beam footing detail

- 12" Concrete tube Form
- Metal 4x4 post bracket
- Concrete
- #4 Rebar (2 ft)
  See note 6 and p.6
- See note 5 and p. 6
- 1½" Crushed Stone / Rubble
- Trench and drain pipe lined
  with geotextile fabric
- Undisturbed soil
- 95% Minimum Soil Compaction
- 95% Minimum Soil Compaction
- Undisturbed soil

(C) Interior wall footing detail

- PT 2x6 Wall base plate
- #4 Rebar (Continuous)
- Concrete interior
  wall footings
- AB – Compacted earth and gravel
- Undisturbed soil
PT 2x4 lumber toe-ups laid horizontally in running bond. Nailed into the grade beam with 3" Galvanized nails to stabilize the boards.

Pea Gravel infill between all lumber.

All door bucks built after floor beam assembly to assist in placement of floor beam reinforcements.
½" OSB Decking top and Bottom laid in running bond formation

Location of tie-down straps (Three layers of poly strap tie downs) Strength: 2325 lbs. See note 5

Corners connected with 5/8" Machine bolts

2x6 Lumber bracing laid vertically in running bond. Avoid edges of OSB by 2’ minimum
2x4 lookouts on 2' centers to support roof overhang. Mortised into trusses and overhanging walls by 18"
Entire roof cavity filled with blown insulation

All interior walls are non load bearing.

All structural lumber shall be grade stamped.

Refer to foundation cross section plans for details on foundation, adobe floor, and bale assembly. See p. 7

Trusses attached to Roof Bearing Assembly with hurricane ties. See roof attachment detail on p. 13

Truss manufactured by a licensed AZ manufacturer

Bird blocking

1/2" Wall Board

Earth plaster

5/8 OSB roof sheathing

30# roofing felt

26 GA. Steel roofing panels

Truss cross section – looking east / west
All wall frames 2x6 lumber, studs on 16" centers

See porch roof attachment detail on p. 13
Refer to roof bearing assembly for construction details on p. 9
See p.13 for roof attachment details.

Refer to foundation cross section plans for details on foundation, adobe floor, and bale assembly. See p. 7
Interior bathroom walls

**NORTH / SOUTH Wall**

Bathroom is framed up with a drop ceiling. Initially, the gap between the truss and the non-load bearing wall will be 3". This gap will close as the bales compress and will be covered by the interior wall board.

- All wall frames 2x6 lumber, studs on 16" centers
- #4 Rebar rods driven through holes in interior walls and through bales.
- 6" Compression bolt

**EAST / WEST Wall**

- Concrete footing on grade to support interior wall. See p. 7C
- All wall frames 2x6 lumber, studs on 16" centers
- 5'-8" 5'-9" 5 1/2" 34.00in. 32.00in. 16.00in. 3'-6" 8"-6" 8"-7" 62.51in.

All interior walls are non load bearing. All structural lumber shall be grade stamped.
Interior kitchen wall  (Page 16)

This is a ¾ wall. 7’ high and cathedral ceiling is 3’ above.

All wall frames 2x6 lumber, studs on 16” centers

#4 Rebar rods driven through holes in interior walls and through bales.

2x4 Cabinet / Counter braces Set into vert. lumber

All interior walls are non load bearing.
All structural lumber shall be grade stamped.

Concrete footing on grade to support interior wall. See p. 7C
All window bucks are made on site with dimensions 1” greater than the width and height of the windows and doors.

They are pinned into the bales with 1’ rebar spikes anchored in holes drilled into the wood buck reinforcing beams. There will be at least one spike per bale.

Once the bale walls have settled, the bucks are covered in stucco mesh.

**EAST**
- 3’ x 5’ Window
- 3’ x 6’8” Door (x2)

**SOUTH**
- 7’ x 6’8” French Doors
- 5’ x 5’ Window

**WEST**
- 2’ x 2’ Window (x2)
- 3’ x 3’ Window

**NORTH**
- 3’ x 5’ Window
13, 15 electric backup for solar hot water heater (see p. 20) on west porch roof (30A@240)

See p. 19 for load calculations and panel schedule.
**Load calculations**

\[
\begin{align*}
576 \text{ ft}^2 \times 3 \text{ volt amps/ft}^2 &= 1728 \text{ VA} \\
1056 \text{ ft}^2 \text{ (inc. porches)} &= 1056 \text{ VA} \\
\div 120 &= 14.4 \text{ A}
\end{align*}
\]

Small appliance load:
- 2 x 20 amp @ 2400 = 4,800 W
- Washer (future) = 1,500 W
- Range (future) = 12,000 W
- Hot water heater 30A @ 240 = 7,200 W

Subtotal: 25,500 W

1st 10,000 @ 100% = 10,000 W
Remainder @ 40% = 15,500 x 0.4 = 6,200 W

Total rating = 16,200 W
\[\div 240 = 67.5 \text{ A}\]

Service size: 200 A

**Panel schedule**

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<thead>
<tr>
<th>Breaker</th>
<th>Circuit</th>
<th>Amps</th>
<th>Wire</th>
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<tr>
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<td>2</td>
<td>Kitchen GFI</td>
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<td>3</td>
<td>Kitchen</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>Refrigerator</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>Outdoor north and east</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>Outdoor north and west</td>
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<td>7</td>
<td>Outdoor east</td>
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<td>8</td>
<td>Bedroom AFCI (rec. &amp; SD)</td>
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<td>12</td>
</tr>
<tr>
<td>9</td>
<td>Desk</td>
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<td>11</td>
<td>AFCI Lighting</td>
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</tr>
<tr>
<td>12</td>
<td>Range (future)</td>
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<tr>
<td>13</td>
<td>Domestic hot water</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>14</td>
<td>Range (future)</td>
<td>50</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>Domestic hot water</td>
<td>30</td>
<td>10</td>
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Note: All outdoor outlets will be covered boxes.
Plumbing plan (Page 20)

SolaHart solar hot water heater (http://www.solahart.com) located on west porch roof above utility closet

Hot and cold water in: 1/2" Pex in PVC sleeves inside bale walls

Hose bibs: 3/4" Pex buried in foundation trench
Plumbing fixture count

- Low flow toilet (1) - 3 Fixture units
- Shower/tub (1) - 2 Fixture units
- Bathroom sink (pedestal) (1) - 2 Fixture units
- Kitchen sink (1) - 2 Fixture units
- Hose bibs (2) - 6 Fixture units
- Washing machine (future) - 2 Fixture units

TOTAL: 17 Fixture units

Total developed length is ?? ft from water pressure tank at well. Required size is 1.5” PVC?. Waste system is septic.
Heating / cooling mechanical plan (Page 22)

Solar hot water
on roof (see p. 20)

Open direct system
Length: ~250 ft
1/2" Pex

Cold water
in from well

Thermostat

Timer

30A/24V
solar panel

See above for detail

See notes 9 and 10

Washer (future)

Fridge

Desk

Bed

Bath (future)

Range (future)

Cooler (future)

3/4 wall