



CONSTRUCTION COSTS HANDBOOK FOR TAOS

THE LEAN & GREEN EDITION

2009
2010



Prepared by Archetype Design
Vishu Magee, Designer

www.archetype-design.com

Dear Homebuilder,
As the economy and the housing market remain in turmoil, it is more important than ever to have a sound business plan for any construction project or real estate purchase. To help place you on a sound footing, I have compiled comprehensive cost data from over a dozen reliable building professionals.

At Archetype Design I take budgets seriously, even as I strive to make every detail of your house as functional and beautiful as possible. Every house I design is one-of-a-kind and is crafted to accommodate you, your building site, and your wildest dreams for life in Taos. Over the course of thirty-five years I've worked with an incredibly wide range of sites, styles, building systems, and client needs. I am well-prepared to design to your needs in a cost-effective way.

Today we face an unprecedented set of economic and environmental concerns which call for a correspondingly thoughtful design strategy. Right now remodeling is a good option, especially if it incorporates green upgrades. The choice is yours, but I am strongly recommending the theme of "lean and green."



"Far more than most of us realize, when we design our house we design our selves. Our home will condition our relationships, mold our attitude toward the community, and determine our place in the environment. This being so, we had better take care to design homes which can carry us far into the future in a healing and sustaining way."

- from Archetype Design, published in 1999.



I invite you to visit my website, archetype-design.com, which is packed with useful information: the **Design Questionnaire** walks you through the process of identifying everything an architect needs to know about your project. The **FAQ's** offer a houseful of information about the design/build process itself – timelines, financing, contractor selection, etc. The **Online Portfolio** displays a representative range of my past projects. A new **Green Building** page will be appearing soon. **Su Casa Magazine** columns and other of my writings will also be posted. Updates to the **Costs Handbook** appear from time to time.

I hope you find all this information useful and will consider me for your upcoming design project!

- Vishu Magee



INTRODUCTION

As I write on November 4, 2008, Congress has recently renewed the solar tax credits and there is great hope that an Obama administration will engineer an economic recovery which features a new era of alternative energy and green development. Meanwhile, however, we are enduring the most brutal building environment I have seen in thirty-five years of working in Taos. It's downright impossible to predict where building costs are heading in 2009, but at least I can provide you with accurate costs for the present and some suggestions for the future.

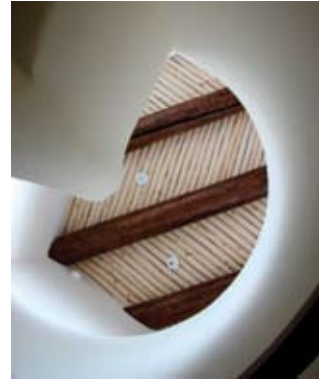
I've titled this the "Lean and Green Edition." "Lean," because along with a recession and a plummeting stock market, this is the deepest correction the housing market has seen since the Great Depression. "Green," because greenbuilding continues to be the dominant trend in homebuilding, and one which I think is vital to the future.



It's no coincidence that I've paired the two: I think that once the excesses of recent years are pared down, we'll arrive at a revised view of the world where "lean" simply makes the most sense and is, in fact, a fitting complement to "green." Let me explain.

Beginning around Y2K and continuing right through early 2007, we saw an amazing rise in construction costs – doubling during the hottest five years. Sure, it was partially a result of a hot global economy

competing for energy and basic materials – but we can now look back and also see how the housing bubble bid up prices on homes and contributed to inflated costs. In other words, rising real estate values supported rising construction costs, while easy mortgages kept the cash flowing. It didn't matter how much it cost to build a house when you knew you could flip it for a profit.



But as early as late summer 2006, building costs in Taos were beginning to outstrip real estate values, making it more difficult to get the 60% or 80% financing that homebuilders were seeking. Today the situation is far tighter. Real estate sales have tanked, home prices have dropped some 15%, and appraisals have pulled back even more. But building costs have merely tempered their rate of rise, leveling off only in a few areas – so there is now an even greater disparity between the cost of building a home and its sales value. Meanwhile, credit is harder to find than a creek in the sagebrush. I expect that it is going to take a few years before building costs and home prices are back in balance and we have a healthy building environment again. Of necessity, it will be a smarter, less wasteful, and leaner industry than that of the recent past.

That returns us to "green," because the efficient and intelligent use of energy and materials is, by nature, lean. It implies, among other things, building small. It also implies building really well, so that a house will stand for centuries rather than a few decades. At a planetary level, this is a shift which we absolutely

must make in a world of growing demand and limited resources, not to mention a threatened environment. At an economic level, it's a shift we also have to make, because for most of us it's simply too costly to be wasteful or careless of energy and resources. Lean and green is the future. Fortunately for Taoseños, the cost of native materials like adobe and vigas, which are ideal for both greenbuilding and our traditional architecture, have not risen nearly as much as mainstream manufactured materials.



I do think that the Taos economy will recover as fast or faster as the rest of the country, if for no other reason than that baby boomers are lined up to move here as soon as they can. By that time, a home in Taos which is lean and green – sensible and environmentally sound – is going to look pretty good.

My hunch for the future: building costs will inevitably rise because there is only so much copper and iron and oil in the world. As long as the global economy is slow, cost increases are unlikely to exceed the typical 5% a year. It's even possible they'll flatten out for a while in the event of a deep recession and an epic bear market in stocks. But all bets are off when the global economy picks up – whenever that may be. Strictly in terms of costs, it's a good time to build.

This handbook is intended to provide quick, ballpark answers to questions frequently posed by prospective homeowners, homebuilders, and remodelers. The figures, distilled from data provided by numerous builders, are necessarily approximate: in many cases you could deduct 10-20% for a budget job, or add even more for top-notch work. But we all have to start somewhere, and the data in these pages should be useful as you contemplate a home purchase or construction project. As always, we recommend confirming all costs by thorough research or written bids. Here's the anatomy of a hypothetical mid-range custom home budget:

Utility package (builder's cost):	\$20,000
2,500 s.f. home @ \$200/sf (builder's cost):	\$500,000
300 s.f. attached portals @ \$125/sf (builder's cost):	\$37,500
500 s.f. garage @ \$100/sf (builder's cost):	\$50,000
Subtotal:	\$607,000
15% Profit & Overhead	\$91,050
8% Gross receipts tax:	\$55,844
Grand total:	\$753,894

In the sections below, items marked with an asterisk (*) are for materials only. All other figures include material and labor. Note that these costs may be subject to contractor's profit-and-overhead and to New Mexico Gross Receipts Tax. These numbers will be updated periodically and may be viewed on the website:

www.archetype-design.com.

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trees	water	energy	solid waste	greenhouse gases
4 fully grown	1,818 gallons	2 million Btu	170 pounds	423 pounds

Calculations based on research by Environmental Defense Fund and other members of the Paper Task Force.

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* INDICATES MATERIAL ONLY, UNINSTALLED

1. GENERAL COSTS


(Costs in this category include contractor's profit and overhead, but do not include tax.)

- * Economy home: \$150-\$175 p.s.f.
- * Low-end custom home: \$200-225 p.s.f.
- * Mid-range custom home: \$250-\$275 p.s.f.
- * High-end custom home: \$300 p.s.f. and up
- * 2x6 garage, insulated, slab, stucco, sheetrock: \$115-\$135 p.s.f.
- * Typical portal w. slab floor: \$95-\$115 p.s.f.
- * Typical carport w. slab floor: \$95-\$115 p.s.f.
- * Typical kitchen: \$300-\$350 p.s.f.
- * Typical bath: \$300-\$350 p.s.f.
- * Typical LR or BR: \$150-\$200 p.s.f.
- * Radical remodel: \$100-\$175 p.s.f.
- * Permits per \$1,000: \$2.50-\$4.75

- * Workers Comp insurance: 15-20% of payroll
- * Contractor profit & overhead: typically 15%
- * Gross Receipts tax: town 7.9375% county 6.875%
- * Annual price increases: historically 5-7%, recently volatile

2. SITE DEVELOPMENT

- * Waterwell w. PVC casing \$25-\$30 p.f.
- * add for steel casing \$15 p.f.
- * typical pump/wire/control package: \$5,000-\$7,000
- * 300' waterwell complete: \$15,000-\$20,000
- * 750 gal. septic for well housing: \$1,250
- * 1,000 gal. septic system: \$4,000-\$6,000
- * 1,500 gal. septic system: \$5,000-\$7,500
- * 3" sewer line with trench: \$6.50-\$8.00 p.l.f.
- * 4" sewer line with trench: \$7.50-\$9.00 p.l.f.
- * 1" natural gas line with trench: \$6.00 p.l.f.
- * 1" LP gas line with trench: \$6.00 p.l.f.
- * 1" wirsbo water line with trench: \$8.00 p.l.f.
- * 1" Sch. 40 PVC w. trench: \$7.50 p.l.f.
- * Primary underground electric line*: \$3.95 p.l.f.
- * Electrical transformer: varies
- * 100 Amp meter base with disconnect: \$800-\$1,200
- * 200 Amp meter base with disconnect: \$1,200-\$1,600
- * Secondary underground electric cable*: \$3.50-\$5.00 p.l.f.
- * 14' wide roadway (graded, 6" base course): \$14-\$16 p.l.f.
- * 18' x 12" culvert: \$400-\$500
- * 4' deep utility trench: \$4.00-\$7.00 p.l.f.
- * Backhoe/bobcat per hour: \$80-\$100
- * Underground telephone line: \$0-\$2.00 p.l.f.




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3. UNIT COSTS

- * 2'x 2' footing trench: \$3.50-\$6.50 p.l.f.
- * 10"x 24" concrete footings: \$14-\$18 p.l.f.
- * 8" CMU stem wall, three courses: \$22-\$25 p.l.f.
- * Concrete slab including subgrade: \$10-\$15 p.s.f.
- * 1" insulation beneath slab: \$1.00-\$1.50 p.s.f.
- * 2" insulation beneath slab: \$2.00-\$3.00 p.s.f.
- * Complete typ. foundations through slab: \$24-\$28 p.s.f.
- * Tinted concrete: add \$1.00 p.s.f.
- * Acid stained concrete: add \$4.00-\$6.00 p.s.f.
- * 11-1/4" joisted TJI subfloor w. 3/4" ply: \$8.00-\$10.00 p.s.f.
- * Wall systems: see #6 below
- * 2x4 partitions: \$12-\$14 p.l.f.

- * 2x6 partitions: \$14-\$18 p.l.f.
- * Drywall 1/2" taped/textured: \$2.00-\$2.50 p.s.f.
- * Windows*:
 - 3248 clad casement, lo-e: \$400-\$450
 - economy 3248 clad casement: \$200
- * Skylights: 22"x46" and 46"x46"*: \$140/\$180
- * 2246 operable skylight*: \$350
- * 2246 Velux roof window*: \$775
- * 10" Solatube skylight*: \$325
- * 8" vigas*: \$5.50 p.l.f.
- * 10" vigas*: \$6.00 p.l.f.
- * 12" vigas*: \$7.00 p.l.f.
- * 6x8 roughcut beams*: \$3.50 p.l.f.
- * 8x8 roughcut beams*: \$5.50 p.l.f.



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- * Ceilings p.s.f.:
 - 10" viga/herringbone aspen latilla: \$15-\$18
 - 10" viga/coved plaster: \$16-\$20
 - 10" viga/herringbone roughcut: \$12-\$14
 - 10" viga/herringbone T&G: \$11-\$14
 - deduct for 6x8 beams: \$1.00
- * Roof framing: 2x8 sys. with 5/8" CDX: \$9-\$11 p.s.f.
- * Engineered trusses*: \$7-\$9 p.l.f.
- * 5/8" CDX Roof Deck: \$1.75-\$2.00 p.s.f
- * Canale w. galvanized flashing*: \$325
- * Canale w. copper flashing*: \$475
- * Extended viga canopies, copper: \$65-\$85
- * 2" rigid polystyrene insulation (walls): \$1.00-\$1.20 p.s.f.
- * 2x6 R-19 batt insulation: \$.80-\$1.00 p.s.f.


- * 2x10 R-30 batts: \$1.00-\$1.25 p.s.f.
- * 2x12 R-38 batts: \$1.25-\$1.50 p.s.f.
- * R-38 blown-in: \$1.25-\$1.50 p.s.f.
- * 2" spray foam insulation (walls): \$2.50-\$3.00 p.s.f.
- * Typ. insulation package for 2,000 sf 2x6 home: \$4,000-\$6,000
- * Brai roofing: \$2.00-\$2.25 p.s.f.
- * "Pro-Panel" metal roofing: \$2.25-\$2.75 p.s.f.
- * 5" foam roof system: \$6.00-7.00 psf.
- * 26 ga. galv. corrugated roofing: \$4.00-\$7.00 p.s.f.
- * Interior chicken wire for plaster: \$15-\$18 per square yard (9s.f.)
- * 2-coat floated structolite plaster w. wirecoat: \$36-\$40 p.s.y.
- * 3-coat hardtroweled interior plaster w. wirecoat: \$40-\$55 p.s.y.

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- * Dyed plaster add*:\$\$.50-\$.85 p.s.f.
- * 2-coats interior paint: \$.90 - \$1.10 p.s.f.
- * Stain/seal per 2,000sf house: \$12,000-\$15,000
- * Seal/stain wood ceiling:\$3.50 p.s.f.
- * Door finish, 3 coats: \$165
- * Wood window finish, 3 coats: \$150
- * Exterior stucco netting for plaster: 10-\$12p.s.y.
- * 2-coat stucco system w. wirecoat: \$30-\$36 p.s.y.
- * 3-coat conventional plaster system w. wirecoat :\$40 p.s.y..
- * 3-coat elastomeric plaster system w. wirecoat: \$45 p.s.y..
- * Add for reinforcing mesh: \$ 1.50 p.s.y.
- * Super saltillo tile: \$7-\$9 p.s.f.*
- * Labor p.s.f. for floor tile: \$6-\$8
- * 1-1/4" brick pavers on slab: \$8.00-\$10.00 p.s.f.

- * Flagstone on slab: \$20-\$24 p.s.f. and up
- * #2 red oak strip flooring with baseboard: \$12-\$15 p.s.f.
- * Base custom cabinets: \$275-\$375 p.l.f.
- * Prep for countertop: \$5-\$9 p.l.f.
- * Upper custom cabinets: \$225-\$275 p.l.f.
- * Granite/marble slab countertop: \$125-\$175 p.s.f.
- * Sandstone slab countertop: \$100-\$150 p.s.f.
- * Talavera tile countertop: \$12-\$16 p.s.f.
- * Tumbled marble countertop: \$15-\$20 p.s.f.
- * Maple countertop: \$12-\$15 p.s.f.
- * Caesarstone countertop: \$100-\$120 p.s.f.
- * Typical shower pan w. mudbed: \$350-\$500
- * Talavera tile surround: \$7-\$9 p.s.f.
- * Tumbled marble tile surround: \$15-\$20 p.s.f.
- * Prep surfaces for surround tile: \$4-\$6 p.s.f.
- * Typical labor charge for kitchen/bath tile: \$10-\$15 p.s.f.
- * Tiled bath nicho: \$200-\$300
- * Typ. bathroom fan: \$400-\$500
- * Cedar deck including posts and railing: \$20-\$25 p.s.f.
- * 8"x 8" glass block: \$18-\$20 p.s.f.*
- * Typ. shower door: \$275-\$350
- * Frameless shower door: \$800-\$1,500
- * Mirrors: \$7-\$8 p.s.f.
- * Closet systems: \$15-\$50 p.l.f.
- * Nichos each: \$200
- * Arches each: \$300
- * Pre-hung 2868 doors \$250-\$750 and up
exterior 2668 doors \$500-\$900 and up
- * Door hardware: interior \$40-\$150* and up;
exterior \$350-\$1,000 and up
- * 7'x16' garage door: \$1,200-\$2,000*
- * 1/2 h.p. door opener: \$325*



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- * Corner fireplaces: \$5,000-\$7,500
- * CMU core for stone fireplace: \$7,000-\$12,000
- * Stone fireplace finish: \$10,000-\$20,000
- * Woodstove: \$2,000-\$3,000*
- * Woodstove chimney system: \$300-\$500*
- * Gas stove: \$2,000-\$3,000*
- * Stairs, oak: \$275-\$425 per riser
- * Anasazi stone veneer: \$25-\$35 p.s.f.
- * Cut stone veneer: \$40-\$60 p.s.f.
- * Refrigerator: \$750-\$2,000* and up
- * Cooktop: \$750-\$1,500* and up
- * Double wall oven: \$1,000-\$2,000* and up
- * Slide-in range: \$500-\$1,200* and up
- * Dishwasher: \$300-\$700* and up
- * Microwave: \$150-\$300* and up
- * Clothes washer: \$400-\$1,000* and up
- * Clothes dryer: \$400-\$1,000* and up
- * Hot tub: \$3,000-\$7,000* and up
- * Central vacuum systems: \$2,500-\$5,000


4. PLUMBING & HEATING

- * 30 gal. pressure tank: \$400-\$550*
- * Water softener: \$1,200-\$3,000*
- * Backwashing sediment filter: \$500-800*
- * Cartridge sediment filter: \$100-\$250*
- * Reverse osmosis system: \$500-\$1,500*
- * Radiant heat 12" centers. tubing only:
\$2.00 p.s.f.
- * Radiant heat 6" centers, tubing only:
\$3.00 p.s.f.
- * Hot water baseboard p.l.f: \$12-\$15
- * Controls/valves per heating zone: \$600-\$700
- * Boiler for typical 2,000sf house:
\$4,000-\$6,000
- * 40 gal. hi-recovery hot water heater:
\$800-\$1,000*

- * 40 gal. "Sidekick" hot water storage tank:
\$1,300-\$1,600*
- * Swamp cooler: \$2,000-\$2,500
- * Air conditioning: \$18-\$22 p.s.f.
- * Recirc pump and piping for hot water:
\$600-\$800
- * 117 BTU Aquastar water heater:
\$1,000-\$1,200*
- * Floor drain: \$300-\$400
- * Rough-in per fixture: \$750-\$1,000
- * Installation per fixture: \$350-\$500
- * Ductwork per bathroom fan: \$170-\$210
- * Ductwork per range hood: \$225-\$325
- * Frost-free hose faucet: \$100-\$150
- * Frost-free standpipe faucet: \$200-\$300
- * Typical cast iron bathtub: \$600-\$800*
- * Typical tub/shower valve: \$175-\$350*

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- * Typical shower valve: \$250-\$500*
- * Typical lav faucet: \$150-\$250*
- * Typical toilet: \$400-\$600*
- * Typical 2-basin stainless kitchen sink: \$250-\$300
- * Typical kitchen faucet with sprayer*: \$250-\$400
- * Typical vitreous lavatory*: \$125-\$200

5. ELECTRICAL WIRING

- * 100 Amp breaker panel: \$600-\$800
- * 200 Amp breaker panel: \$800-\$1,200
- * Rough-in and dacora trim per switch or plug: \$80-\$110
- * Rough-in per light fixture or 110.v appliance: \$80-\$110
- * 220v 50' to oven or hot tub: \$600-\$800
- * 220v 50' to dryer: \$300-\$400
- * Typical bathroom fan less ductwork: \$90-\$110
- * Typical bathroom fan/light/heater less ductwork: \$300-\$450
- * Floor devices—electrical or telephone: \$250-\$300
- * Central surge protection: \$400-\$600
- * Rough-in per doorbell and chime: \$250-\$350
- * Rough-in and trim per audio speaker: \$150-\$200

- * Rough-in and trim per telephone jack: \$80-\$100
- * Rough-in and trim per TV jack: \$80-\$100
- * Rough-in and trim per Cat-5 outlet: \$95--\$115
- * Typical dimmer installed: \$100-\$135
- * Typical recessed light installed: \$100-\$135
- * Typical LV recessed light installed: \$175-\$250
- * Low voltage transformer installed: \$250-\$325
- * Surfacemount light fixture installation: \$65-\$90*
- * 18" closet fluorescent: \$35*
- * Ceiling fixtures, basic: \$20-\$75*
- * Wall sconce, ceramic or copper: \$50-\$175*
- * Monopoints: \$40-\$75*
- * 8' track: \$60-\$80
- * Track light fixtures: \$50-\$150*
- * Lo-voltage track fixtures w. transformer: \$150-\$250*
- * Exterior floods: \$40-\$50*
- * Bathroom bar lights: \$50-\$150*
- * Bathroom valances, copper: \$100-\$250*
- * Doorbell and chime: \$40-\$125*
- * Ceiling fan: \$150-\$300*

ERIC GLADSTONE
Manager

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6. COMPARATIVE COSTS: WALL SYSTEMS

(for 8' high plaster-prepped wall from slab to and including bond beam: R-value adjusted to reflect actual performance)

- * 14" rastra \$130-\$135 p.l.f. (R=40)
- * 12" rastra \$125-\$130 p.l.f. (R=36)
- * 10" rastra \$120-\$125 p.l.f. (R=32)
- * 14" adobe with 2" insulation \$100-\$110 p.l.f. (R=22)
- * 10" adobe with 2" insulation \$90-\$100 p.l.f. (R=19)
- * 14" pumice-crete \$95-\$105 p.l.f. (R=24-28)
- * 18" strawbale with timberframe structure \$55-\$60 p.l.f. (R=46-48)
- * 2x6 frame, drywall int., plywood ext. \$60-\$70 p.l.f. (R=19)

- * 2x8 frame, drywall int. plywood ext. \$65-\$80 p.l.f. (R=24)
- * 2x10 frame, drywall int. plywood ext. \$70-\$80 p.l.f. (R=30)

7. SPECIALTY SYSTEMS

- * Typical security system - rough-in only: \$350-\$875
- * Typical security system - complete: \$2,000-\$3,000
- * Security monitoring: \$75/month
- * Satellite TV— usually free w. subscription
- * Satellite internet: \$800-\$1,000 and \$50-\$70/mo.
- * Whole house cellular interface: \$500-\$1,000
- * "Structured" wiring for audio/video/telecom: \$275-\$375/drop
- * LCD TV: \$1,000* and up
- * Home theater components: \$250* (basic) \$1,000* and up (quality)
- * Whole house state of the art audio-video: \$20,000 and up
- * Fire suppression system: \$15-\$20 p.s.f.
- * Central vacuum system: \$3,500-\$4,000

8. LANDSCAPING

(installed including soil amendments)

- * 1-gal. plant: \$11-\$15
- * 5-gal. plant: \$48-\$55
- * 15-gal. plant: \$150-\$215
- * Bluegrass sod w. 4" topsoil: \$4-\$6 p.s.f.
- * Pinon per foot: \$25-\$30*
- * Pine or spruce per foot: \$25-\$30*
- * Fruit tree, 5 gal.: \$50-\$60
- * Fruit tree, 15 gal.: \$150-\$200
- * Shade tree, 15 gal.: \$200-\$250

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- * Weed barrier installed: \$.35 p.s.f.
- * 4" topsoil: \$.75 p.s.f.
- * Shredded bark topping installed: \$.56 p.s.f.
- * typical 4-zone drip irrigation timer/filter/valves from underground supply: \$1,500-\$2,000
- * Drip irrigation per plant: \$3-\$6
- * Water features: \$1,500 and up
- * 6'-8' latilla fence: \$20-\$30 p.l.f.
- * 6' masonry wall: \$50-\$200 p.l.f.
- * Mossrock walls per s.f. of face: \$25-\$30
- * Boulders: \$100-\$600
- * Flagstone on sand: \$15-\$20 p.s.f.
- * Flagstone on concrete: \$18-\$22 p.s.f.
- * Brick on sand: \$10-\$12 p.s.f.
- * Low voltage lighting per fixture: \$20-\$120



9. RELATED COSTS

- * Appraisal per plans/specs: \$500-\$750
- * Appraisal of house: \$500-\$750
- * Certified home inspection: \$275-\$500
- * Builder's Risk insurance per \$100,000: \$20-\$42
- * Water test, local: \$75-\$100
- * Water test, National Testing Laboratories, \$325
- * Realtors' commission, improved property: 6%
- * Mortgage: Costs and rates vary.
- * Survey, typ. house on 2 acre: \$1,000-\$1,500
- * Improvement location report: \$400
- * ½ acre topographical survey: \$1,000-\$1,200






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ABOUT GREENBUILDING

At Archetype Design we prefer to design homes which, regardless of style, are energy-efficient and in harmony with the land. This usually means educating prospective homebuilders about green systems: what works and what doesn't; what is cost-effective and user-friendly and what is not; what fits the style of your house; what is appropriate for your particular site or personal lifestyle. Here are some basic guidelines for a greenbuilding plan:

Build small. Whatever your "dream house" might be, build 25% smaller. You'll conserve resources in the short term and save tons of energy for heating over the long term.

Build solid. Take some of the savings from building small and build a house that will last centuries rather than decades.

Build close to town. It makes no sense to have a green home with a thirty mile commute.

Super-insulate. A super-insulated house needs less energy to heat or cool, and less solar gain as well.

These green building examples are from Archetype Design projects going back to 1983.



The collectors pocketed into the garage wall heat this entire 2,200 s.f. pumice-crete home

Use Thermal mass. Slab floors or subfloors and interior walls of adobe help temper the home against rapid fluctuations of heat and cold.

Limit heat loss. North facing windows and extensive exterior walls are to be minimized.

Work with Nature and keep it simple, so that you can heat your house and hot water with passive solar techniques - minimizing pumps, pipes, collectors and controls.

Direct your roofwater to major trees and shrubs, avoiding expensive cisterns and another set of pumps, pipes and controls.

Use native, non-toxic materials such as adobe, pumice-crete, vigas, roughcut wood, and stone - make your house healthy, reduce the energy costs of manufacture and transportation, and support both the local economy and building traditions.

Use energy-efficient appliances, heating systems, daylighting and electric lighting.

Radon abatement may be desirable in areas known to harbor radon gas in the soil.



Who says solar can't be beautiful?

Heat Recovery Ventilation in today's supertight homes is a way to ensure fresh, pure air - particularly in the case of environmental sensitivity.

Water testing and treatment may be an important health consideration.

Landscape with natural cooling in mind: Spot trees to serve as exterior swamp coolers and to protect from excessive sun penetration.

We think it's important to recognize that every home has an environmental impact and each of us has to achieve a realistic balance between lifestyle and earth-friendliness. Not everyone is prepared to live an alternative lifestyle, but almost everybody is interested in making some initial steps towards sustainability. A 50% solar house might be a reasonable goal for almost any homeowner, while a completely solar home will appeal to only a few. Start with greenbuilding systems which are user-friendly, cost-effective, and utilize fewer resources to manufacture and install.



Natural viga post, roughcut treads, hand-forged brackets, and clay plaster

These systems and techniques top the list for cost-effectiveness and user-friendliness:

1. Passive solar gain (heat from the sun penetrating through south-facing windows).
2. Super-insulation (foundations and slabs, walls, roofs, window coverings).
3. Solar hot water heating (the simpler the better!)
4. Roofwater utilization (directly to trees or, for household use, to a cistern).
6. Energy-efficient appliances, daylighting, electric lighting, and backup heating systems.
7. Drip irrigation, permaculture, and xeriscapic plants in a natural cooling design.



This aspen grove acts like a swamp cooler for the adjacent rooms

Many other options are available to complement your particular needs. For example, if you have an art collection and great furniture, you may need to reduce the sun penetration characteristic of passive solar gain, and instead resort to an active solar system with collectors, pumps and controls. Stand-alone solar electricity is not cost-effective if you have ready access to grid power, but if your site is remote you may have no choice. Graywater systems are prohibitively expensive if installed per state health codes, but out in the boondocks there may be no one around to care if you cut a few corners. The construction process itself is also worthy of attention, and more homeowners are requiring their builders to recycle cardboard and discarded building materials, use certified sustainably-harvested lumber, and guard against erosion or loss of ground cover.

One simple thing we can all do is sign up at the Kit Carson Electric Co-op for the Green Energy program, ensuring that your electricity comes from wind-generated sources on the Great Plains rather than from coal-fired plants at the Four Corners. It costs a few pennies more, but it's a great way to help give birth to a new, clean-energy industry and avoid new power plants. Call 758-2258 for details.



A living roof is about as green as it gets!



This flagstone path drains 600 sf of patio into the perennial beds, while the apricot tree behind shades the living room from excessive afternoon sun.



This house in Sag Harbor, Long Island, is entirely cooled with geothermal heat exchange.

10. GREENBUILDING AND RENEWABLE ENERGY SYSTEMS

A. Electricity

- Photo-voltaic system w. batteries for typical 2,000 sf house: \$18,000-\$28,000* less tax credits
- 12KW automatic back-up generator: \$3,000-5,000*
- Gridtie PV system for 2,000 sf house: \$10,000-\$20,000* less tax credits
- 500 watt wind turbine: \$700 and up* less tax credits
- Compact fluorescent light bulbs: \$10-\$30*

B. Hot Water

- 125K BTU Aquastar tankless water heater: \$900-\$1,200*
- Rinnai Continuum tankless water heater: \$1,200-\$2,000*
- 80 gallon hot water storage tank w. heat exchanger: \$1,200-\$1,600*
- 4x8 solar hot water collector: \$1,000-\$1,500*
- Basic 80 gallon active solar hot water system: \$5,000-\$7,000 installed Less tax credits



This rooftop clerestory isn't pretty, but you never see it. It captures the solar energy which heats the water tanks below to 100 degrees on a decent solar day. (see photo right).

- State-of-the-art active solar heat and hot water system for 2,000sf house: (seven panels, controls, tank & heat exchanger, radiant tubing on 6" centers) \$35,000-\$50,000 installed less tax credits.

C. Water Systems

- Underground plastic cistern \$1.50-\$2.00 per gallon installed
- 30 gallon pressure tank: \$300-\$500*
- Solar waterwell pump packages: \$3,500-\$7,500*
- Whole house filtration for roof catchment supply: \$1,250-\$1,750

D. Wastewater and Solid Waste

- Complete graywater system (per NM code w. dedicated septic tank, split black/graywater lines, aeration/circulation, storage tank): \$15,000-\$25,000
- Plastic water tank only: \$1.50-\$1.75 gal.
- Cost of split black/graywater lines only: \$2,500-\$4,500



- Interior wetlands planter for graywater treatment: \$4,000-\$6,000
- Composting toilet: \$1,200-\$2,500*

E. Energy-efficient Appliances and Add-ons

- Clothesline: \$5.00
- Conserve energy-efficient refrigerator: \$1,000-\$1,400*
- Sunfrost 19 c.f.energy-efficient refrigerator: \$3,500*
- Staber energy-efficient clothes washer: \$1,400-\$2,000*
- Premier spark ignition ranges: \$500-\$1,500*
- LP refrigerator \$1,200-\$1,600*
- Insulating window coverings: \$15 p.s.f and up
- hot water tank insulating jacket: \$25-\$40*
- weatherstripping, typical exterior door: \$7-\$15



This trombe wall radiates heat into a bookshelf-lined study.

F. General Construction / Healthy Home

- Typical 4'w. x 8' h. section of trombe wall (6" CMU plastered two sides; 4676 PDR glazing): \$200-\$225 p.l.f.
- Two-coat adobe interior plaster system, no wire coat: \$25-\$35 p.s.y.
- Micaceous clay slip coat: \$10-\$12 p.s.y.
- Adobe floor: \$10-\$12 p.s.f.
- Radon abatement system: \$1,500-\$2,000 for typical 2,000sf house.
- Reverse osmosis water filter: \$400-\$1,800*
- Whole house activated carbon water filter: \$2,000-\$3,000*
- Heat Recovery Ventilation (HRV) system for supertight homes or people with environmental sensitivities: \$7,000-\$10,000



This west-facing portal provides covered dining and shades the interior from the brutal afternoon sun.

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