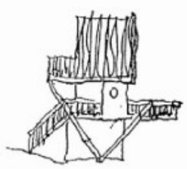
A Connecticut House

A prototype

It would be very easy simply to parade pretty pictures of diminutive houses across the pages of this book and state that exposure was complete. However, if the opportunity is missed to convey a deeper sense of what potential economies can be realized through small-house design, then the truths stated remain unproved.

Fortunately this author has spent the better part of 2 years translating ideas into a specific built form. Given the intimacy of involvement, a certain lack of objectivity must be forgiven in exchange for the amount of knowledge that is to be communicated.

The Dickinson House



LIST OF PARTICULARS

Location:	Madison, Connecticut	
Space:	Finished, heated	1100 square feet
	Defined, unheated (deck, carport, entry)	800 square feet
	Total perceived*	1800 square feet
Costs:	Lot	$ 28,500
	Construction only	65,000
	Site work	7,000
	Appliances	3,000
	Total project cost	$103,500**

*See page 27 for methodology.

**Does not include architect's fee; note that project is owner-painted.

Architect: Duo Dickinson

Contractor: Post Road Wood Products

In 1982 the Dickinsons, an architect and soon-to-be law student, decided that the central material focus in their lives was their home. In this case the home did not exist—but its vision was the single most important aspect of their material wants and desires.

Unfortunately, because the Dickinsons were in their late twenties, cash was far from a readily available commodity. They desired an in-town location in a coastal Connecticut town, and lots were either occupied by centuries-old homes or outrageously priced.

The first lot they inspected was well-situated but difficult to build on, and the price was simply prohibitive. Many other lots were walked, pondered, and rejected because they were too remote or too expensive or because there were too many questions about resale value.

After more than a year and a half of searching, the Dickinsons found that the original lot remained unsold. They made an offer far below the original asking price, negotiations were held, and satisfaction was reached.

The lot represents the ugly-duckling bargain that only a trained eye can see as having swan potential. A list of restrictions and problems reads as follows:

1. The lot was in a coastal wetlands-management area; therefore:
   - Any basement would have to be designed to resist hydrostatic loading—and would be quite expensive to build.
   - The septic field would also have to be engineered and constructed carefully—and quite expensively.
   - The first-floor height had to be at least 20 feet above area high water.
2. Vehicular and utility access to the site was over a 200-foot right-of-way; therefore:
   - Cars could access the site itself at only one point at the edge of a steep drop.
   - Utility lines had to traverse over 100 feet through rock-ledge, again increasing costs.
3. There was very poor passive solar potential. The site was essentially a hillside facing a northerly 6-acre salt marsh. Winter sunlight was indirect until the mid-morning

hours, and the primary view orientation was due north, with no potential for solar gain.

4. Since the lot was a subdivision of the backyard of an existing house, the owners of that house were the sellers, and they did not want their view restricted. Hence a sight line was determined as the point behind which all building could happen.
5. The proximity to the sellers' house was a problem. The sellers' house was a looming Shingle Style building. Aesthetically its nearness had to be addressed; functionally, its visual intrusion had to be avoided.
6. There was a steep drop-off at the site edge. If a normal home with yard and garage was to be accommodated, huge quantities of fill had to be brought in.

The site presented many negative aspects. Obviously a typical raised ranch house, Cape Cod cottage, or saltbox would be economically foolhardy in terms of the amount of site work needed. The wonderful salt-marsh view was obscured by lush undergrowth. The utility companies' estimates for hookups were outrageously expensive.

Amid all this adversity was a vision held by the architect, which led to a singular design concept. Three grand old white oaks stood on the site. From early morning until sunset, light struck their upper trunks and all their limbs. Seeing this simple fact, the architect saw the potential for a different type of "raised" house. If a simple method for raising the house could be provided, the crucial problem of poor solar penetration could be solved and the mandatory first-floor elevation could be effected without excessive landfill costs.

Utility-access costs could be greatly reduced if all blasting costs were directly assumed by the home owners, bypassing the bloated utility-company estimates. The other site restrictions and limitations could be dealt with—as long as optimism and a tight budget spurred on creativity.

As the photographs and drawings best illustrate, this is a simple house made special by its situation—held aloft by two bearing walls—and by the articulation of its various parts. The system-by-system description that follows enhances the images shown.

Figures 1–7 *The construction process. A platform, made rigid by gusseted knee braces, supports walls, which in turn support sheathing and then a roof. All is clad in insulation and shingles, the finish trim is painted, and the stonework buttresses are completed. All steps involve simple-span symmetrical framing and standard techniques used in thoughtful ways.* *(Figures continue on pages 11 and 12.)*

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Photos 1–6 courtesy of the architect

CONSTITUENT SYSTEMS

1. ***Structure***

   - ***Foundation.*** There are two bearing walls with buttressed end conditions, plus continuous triangulated stiffening (in the form of framing) at the top edges of the walls.
   - ***Framing.*** Floors and roof 2 × 10s, 16 inches on center; walls are made of 2 × 4s, 16 inches on center; triangulating bracing made of 2 × 6s with ¾ inch plywood gussetts at the corners.
   - ***Beams.*** Two composite beams consisting of four 2 × 10s run the entire length of the house, terminating to the north as cantilevered support for the deck.
   - ***Sheathing.*** On all exterior walls and on the north and south interior walls of the living room, ½ inch plywood was used, creating shear walls. Wood sheathing (1 × 3s) was used on the roof.
   - ***Steel.*** Reinforcing bars were used throughout all concrete work, and an 18-foot, 6 × 6 steel angle was used to stiffen the living room's north wall. Also, ¾-inch steel tie-rods were used to prevent roof sag at the spring point of the cathedral ceiling.

2. ***Insulation.*** All exterior wall and floor cavities were filled with maximum-depth fiberglass batt insulation, with vapor barrier; all exterior walls and underside were covered with ¾ inch urethane sheathing (this meets U.S. Department of Housing and Urban Development guidelines for the region). Note that the living area serves as a de facto insulating air bag when not in use.

3. ***Exterior Surfaces.*** Roof and walls are covered with clear red cedar shingles, 6 inches to weather. All corners are mitred, and there is an 8-inch band of white cedar shingles, bordered by two 2-inch red cedar clapboards (1 inch to weather each). Underside and eaves are made of painted poplar 6-inch tongue and groove. Trim is made of clear cedar, painted.

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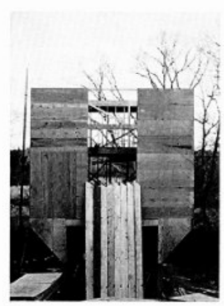

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4. ***Interior Surfaces***

    - All walls are made of ⅝-inch gypsum board, painted.
    - The first-story floor is made of 6-inch poplar, urethaned.
    - The bedroom floor and the steps are carpeted.
    - The bath has a mosaic tile floor and wainscot.
    - The kitchen and bath ceilings are made of painted poplar 6-inch tongue and groove; other ceilings are made of ⅝-inch gypsum board.
    - All trim is made of painted poplar.

5. ***Heating.*** The house is heated with gas-fired hot water, using radiator (versus baseboard) distribution. Note that the solar orientation of the south end of the house and the use of a fireplace in the living room aid in heating. Note also that the clothes drier vents internally and that the vents for the heating plant, hot-water heater, and chimney flue run inside the house, all allowing gain.

6. ***Plumbing.*** There is a single vent stack and a vertical chase.

7. ***Electricity.*** The house has standard 100-ampere service, expandable to 200 amperes.

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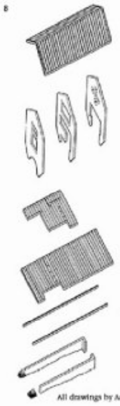

All drawings by Andrea Swartz

Figure 8 *Exploded structural axonometric. Two end-buttress bearing walls support single-direction floor framing. The second floor is essentially a loft set between two of the three shear walls designed to keep the structure rigid. The roof is a symmetrical simple-span structure held tight by the shear walls and three steel tie-rods.*

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Mick Hales

THE HOUSE ITSELF

Aesthetes and nonaesthetes have described this house as a "covered bridge," "doghouse," "car wash," and "ark." The simple truth is that this house is the direct result of two interfacing systems.

Essentially those systems are the built parts (the structure) and the applied parts (the inserted elements, such as doors, windows, cabinet work, mill work, lighting, and plumbing).

There were inherent limitations in building this house—not the least of which was a modest budget ($65,000 to $70,000 for construction), but there were equally inherent means to defeat the sense of limits. The house was to have an extremely simple occupancy (a married couple), and it would be built with an adventurous spirit born of the home owners' relative youth (27 at the beginning of the project).

The owners hoped to use existing technologies for construction to reduce the complexity of fabrication while creating a fresh sense of space and form with innovative applications of those very same standard building techniques.

To help define the internal dynamism of familiar systems used in interpretive ways, let us turn to a discussion of the rationales behind the two systems, built and applied.

The Constructed House

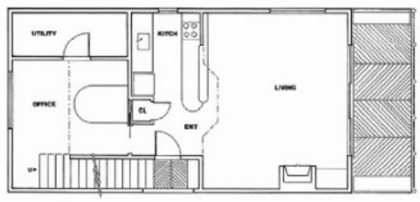
In contemplating a small prototypical house, famous architects of the past and present have sought to reinvent the methods used to design and build small structures. Whether it is Gropius and his grid/frame, Frank Lloyd Wright and his hexagonal or circular grids, Le Corbusier and his Modulor, or Buckminster Fuller and his geodesic dome, the heroic designer of the past has inspired contemporaries and future admirers.

Unfortunately none of the average houses built in the United States today use the techniques developed by such designers, primarily because the architect-applied materials, techniques, or dimensioning systems involved are thoroughly uncoordinated with the existing building technology that has been in use since the late ninteenth century. The architects, some of this era, some of the past, who have advocated everything from air-inflated structures to urethane foam shells to recycled beer cans set in concrete as methods of construction have ignored one simple historical truth: A concept becomes the status quo only when its utility is proved over time.

Standardized use of dimension lumber (2 × 4s, 2 × 6s, 2 × 8s, etc.) and the 16-inch module that progresses into 4 × 8 foot sheets of material is simply a fait accompli in the building trade. To ignore this fact and invent a new system simply prevents that new system from having economic viability for the vast majority of American homes.

So the dimensioning, form, and structural detailing of the Dickinson house have been based on the use of standard building materials and the 16-inch framing module, plus several essential cost-saving applications of that technology. Presented in the form of a list, here are the various uses familiar framing technology has been put to, maximizing its economy by reinforcing its latent simplicity.

1. ***Length of Building.*** Determined by 16-inch framing module.
2. ***Width of Building.*** Determined by uncut 20-foot-long 2 × 10 joists. (Note that 20 feet is fifteen 16-inch modules.)
3. ***Location of Foundation Walls.*** Placed at maximum span (12 feet) and cantilever (4 feet) of 2 × 10 joists noted above.
4. ***Straight-Run Stairs.*** No platforms or winders.
5. ***No Curved Walls.*** The only curves present in the house are in the form of cut surfaces (south wall opening, countertops).
6. ***Standard Roof Pitch (8 in 12).*** This accommodates prefabricated vent flue flashing.
7. ***Symmetrical Roof Framing.*** No valleys, dormers, changes in pitch, or crickets.
8. ***Single-Direction Framing.*** All loads bear directly on foundation walls; there are no load-bearing and -collecting beams or columns.
9. ***No Crenellations in House Form.*** All formal variation is via *reduction* from the building perimeter derived by 20-foot joist and 16-inch framing module.



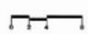


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Figure 9 *First floor. The entry axis through the kitchen is counterpointed by the grand axis extending the entire length of the house. A generous living room (right) has an applied deck addressing the salt-marsh view, while a "career room" (left) serves as a convection space above which sits the bedroom. Note that the utility room/basement stakes out the southwest corner of the house.*

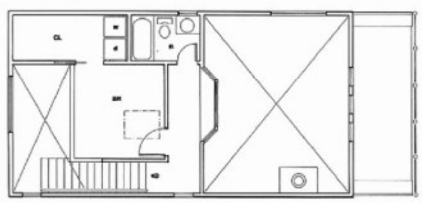

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Figure 10 *Second floor. The open space on either side of the bedroom makes it appear to "float." The closet and bath vertically extend the service zone which is defined on the first floor by the utility room. Note the common utility chase between washer-dryer and tub. Note also the use of the standard bay window to separate the two heating zones. The entire northern portion of the house is given over to the living room, creating an expansive space and an air-bag insulating space for the southerly portion of the house, more often used in the winter months.*

Figure 11 *Section. This section evidences the two spatial and environmental zones facing west. The southerly bedroom study (left) and the northerly kitchen–living room (right) interlock at the corridor and bay window extension. Note the balcony posture of the bedroom and the low-wall division of the kitchen from the living area. Note also the tiny attic pinched between the north and south portions of the house, and how its imposition above the central hall creates the one horizontally focused space in the house.*

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The Applied Parts

As with the construction techniques discussed above, those items that are inserted into and applied onto the structural frame can be viewed as opportunities for finding delight in redefining existing technology. A chief selling point to architect-designed residences is their level of finish. This is due to better use of higher-quality materials and components.

The counterpoint to the sense of care in the detailing of architect-designed buildings is the seemingly devil-may-care attitude about certain crucial functional aspects of the detailing.

First and foremost of the unfortunate truths about architect-designed homes is that skylights, custom glazing, and awkward flashing conditions all tend to invite leaks. Second, seamless aesthetics employed in Modernist architecture are anathema to the natural world of expansion and contraction, corrosion and use. Last, custom-designed and -crafted items are all untested; hence, they may prove to be dysfunctional over time more often than standard products.

But if innovation were always ignored for the safety of the familiar, this would be a book about the small cave. The choice is not simply between impractical innovation and stultifying mundanity; there is a middle ground of prioritized points of customization versus wholesale standardization.

When this book's introduction dealt with using the exciting dynamics of scale as a means to liberate the small house from aesthetic inertia, windows and doors were crucial aspects of that interplay. Similarly, locations of all applied parts should harmonize with the structural module discussed, and these objects should be placed to reinforce dominant views, axes, and spatial organizations. Here is a listing of those objects that helped create the lively spirit of the Dickinson house.

1. ***Windows.*** Windows were oriented to specific views and light conditions (south, north, and west). Larger windows are best for light and view, smaller ones for ventilation, backlighting, and small spaces. All of these guidelines can *reduce* the total number of windows in a house, and hence the cost, while they *increase* energy efficiency and aesthetic impact.

2. ***Doors.*** The number of doors needed was minimized by creating multiple-purpose spaces. A door can be used to release the power of an axis (as in the Dickinson entry).

3. ***Custom Items.*** The following custom items were used to reinforce the overriding qualities of the spaces they are situated in: mouldings, cabinet work, work station, upper window units (south and west), front door, deck benches and bollards, front steps, range hood, handrails, fireplace moulding, living room shelf, and bay window underside.

4. ***Standard Items, Used Reinterpretively.*** In the Dickinson house, you find an interior bay window, sliding doors used as windows, standard tile patterned creatively, and a prefabricated firebox used in a special way. All of these create custom-quality amenity at no more cost than that of the catalog components these items truly are.

5. ***Lighting.*** The number of lighting fixtures needed was minimized through impact-conscious use.

6. ***Oddball Catalog Items.*** Radiators, sink faucet, bath hardware, lighting—all add a sense of delight to potentially bland settings without the cost of custom fabrication.

7. ***Paint.*** With the use of four tones, from white to light yellow, portions of the house were highlighted, enhancing latent intricacies and formal identities at no additional cost, save time to the owners, who painted the house themselves.

By taking nothing for granted, you can use proven technologies—economical in both purchase price and installation cost—for the interior finishing of a house, and you can use them in innovative ways to reinforce the basic organization and aesthetics of the house. In the Dickinson house, a mix of custom, standard, and imaginatively reinterpreted items has been used to add depth to an otherwise simplistic house.

Similarly, for construction the most familiar of building technologies—standard lightweight frame construction—was used in such a direct manner that the subtractive manipulations of the exterior form derived enormous power.

Now that the site restrictions encountered and the building techniques employed have been discussed, it is time to assess the latent organizational and aesthetic intentions of the Dickinson house.