

REVIVING CHERMAYEFF'S PATIO HOUSE: A DEEP ENERGY RETROFIT AND RENOVATION OF AN ICONIC MID-CENTURY MODERN HOME

Bruce Coldham¹

INTRODUCTION

Buildings in the mid-twentieth century were conceived within a bubble of expectation of boundless energy, a situation that was short-lived, and a mindset set that is hard to comprehend these days. Nowadays, it is easy to understand that the thermally flimsy products of this era require some dramatic invention—what we often call a “deep energy retrofit” (DER)—and there is an emerging set of standard responses to such envelope enhancement. But some of these buildings have high architectural significance, and deserve a more design-oriented solution than simply wrapping them in an insulative swaddle. This is the story of one such building.

KEYWORDS

deep energy retrofit; patio houses; mid-century modern; docomomo (documentation and conservation of buildings of the modern movement)

BACKGROUND

This is a renovation of a mid-twentieth century architectural icon. The house, in New Haven Connecticut, is a strangely-situated prototype for single-family urban housing development, designed for his own family by then Yale Professor of Architecture, Serge Chermayeff. Few architects have worked harder at resolving the tension between community and privacy in our increasingly expanding cities than Chermayeff, who, along with Christopher Alexander, produced the seminal book of the time, *Community & Privacy*. The house, composed of three connected single-story pavilions enclosing open courtyards, was the logical climax of the analysis underpinning *Community and Privacy*, but it is also a poster child product from the age of “electricity-too-cheap-to-meter.” Does anyone remember that there was a moment in time when this was considered a rational aspiration?

In keeping with its humanistic aspiration, the “patio house” and its courtyards created enchanting spatial harmonies, but the building envelope—an 8-inch thick minimally-insulated concrete masonry (CMU) exterior walls with a 2½ inch thick wood roof/exposed ceiling deck overlaid with ½ inch of expanded polystyrene (EPS) rigid insulation and roof membrane, and an array of large single-glazed aluminum framed sliding doors and windows—has the stunningly low average envelope R-value of 1.2 and was so leaky that a single blower door

¹FAIA, Coldham & Hartman Architects, bruce@coldhamandhartman.com.

was not able to get a base reading. The spatial enchantment was capsized by the discomfort from errant drafts, cold wintertime wall and window surfaces, and exorbitant energy bills when the promised energy supply bonanza failed to materialize.

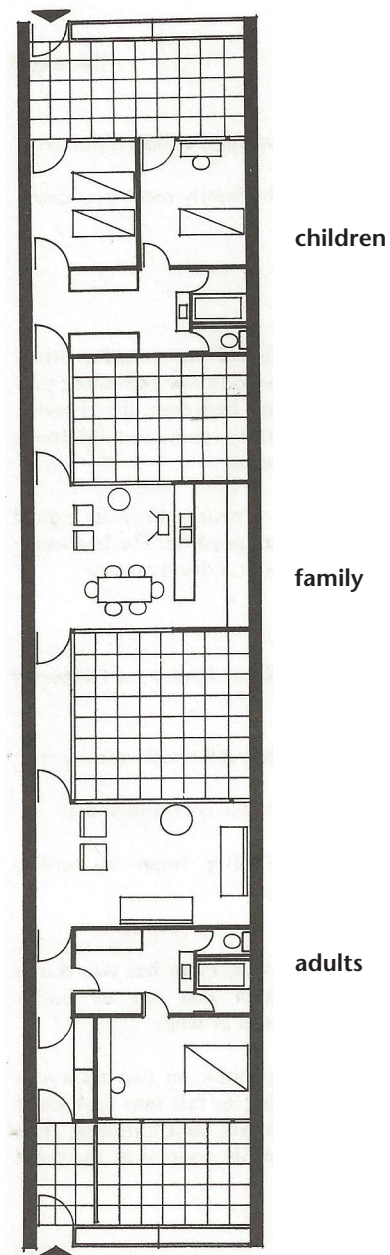
Our clients valued the architectural provenance but they wanted to flip the thermal performance from the bottom 1% to the top 1% of building performers. They also wanted an additional en suite bathroom—a small but disruptive requirement when coupled with the third fundamental: to retain the original architectural expression. In its day, the building was a prototype for advanced living, but sixty years on, expectations have changed. The average house size has more than doubled over the period. We—both the owners and the design team—were challenged to reconcile these evolved expectations within a static volume, respectful of the original design intentions.

FROM THE BEGINNING

The house was Chermayeff's last major architectural product and was the constructed version of a module of his vision of contemporary mass housing—the fulfillment of the last chapter in *Community and Privacy*, and his sense that a house should “provide the proper separation of *realms* and appropriate *transitions* or *barriers* between them so as to assure their individual integrity and thereby promote the *enjoyment of privacy* in the same measure as that of communality.”¹

The building was constructed slab-on-grade to ensure a seamlessness to the all-important indoor-outdoor transitions. A three-foot-high crawl space running along the full extent of the spine allowed for the distribution of ducts and piping, though it was a fiendishly inappropriate location for the furnace that was somehow installed there. The high heat load required extensive ducting to be run out under the concrete into the pavilion spaces. The mechanical provisions have none of the flexible efficiency or lightness of touch exhibited by the spatial arrangements. Nonetheless, Alan Powers reports that Chermayeff was well pleased, regarding it as the “the most livable house we ever had.”

The Chermayeffs sold the building in the late 1960s to art historian Anne Hanson and her family. The new owners, in preparation for what became a 40-year stay, made some “improvements.” Bumping out the kitchen was a definite improvement over the eight-foot-wide galley/corridor kitchen created by Chermayeff, but the addition of an atrium by enclosing one of the courtyards, and eliminating the built-in living room seating in favor of installing a fireplace were markedly detrimental, as was the replacement of the white VCT flooring with a black slate. No doubt the fireplace was a first response to the



Floor Plan as building was originally created.



energy crisis of the early 1970s but it subverted the value of the clerestory space because the seating location, previously nested under the clerestory and looking out, was reversed. The clerestory lost its value, the seating experience was one of looking into a cave, and the seating arrangement impinged upon the dining activity, which presumably gave impetus to the enclosure of the courtyard as the now necessary additional dining space. Except for the kitchen widening, it was a cascade of unfortunate responses to correcting a problem that Chermayeff never recognized, but that was visited upon the building in full force when energy prices skyrocketed.

RECONCEPTION

Our clients had read Alan Powers' account of Chermayeff's professional life and his journey to executing this building toward the end of his career. They came to appreciate the significance of the property that they had purchased and wanted to restore the original spatial configuration. But closet and bathroom provisions that were considered sufficient 60 years ago are not similarly regarded today—they wanted, and prudent investment required—more. This proved to be a major design challenge in so far as there was a commitment to contain the program within the original massing. But even with the additional requirements for an en suite bathroom to the main bedroom and a small home office space that forced a reconfiguration, and

although every original partition was removed, the final rearrangement bears a strong resemblance to the original layout.

Only the kitchen, bumped out and enlarged by the intermediate owner, made sufficient sense to retain, and we did so. We ultimately chose to express its late arrival by cladding it in smooth cypress planking.

A visit to the Chermayeff archive at Columbia's Avery Library, however, was revealing. The original building wasn't so original after all. The initial designs, perhaps in deference to the New Haven Victorian suburban context, proposed brick cavity walls. A lone supplementary detail—seemingly executed just before construction—showed the eventual concrete masonry enclosure. Still more interesting and confusing was the realization that the original design had the courtyards facing northward onto the entry court shared with the neighboring house from which the lot for Chermayeff's house was sliced. This indicates some ambivalence in the thrust of Chermayeff's new urbanist thinking, but this is a subject for another article.

More challenging findings were to be revealed in the building itself. Structural analysis of the 16' spanning exposed glue-lam beams supporting the wood deck ceiling/roof showed them to be seriously undersized—only a half to a third as strong as required under current code.² Furthermore, the CMU cores below the point loads were unfilled. The existing roof was barely capable of supporting its unimproved load, let alone ready to accept any additional superimposition, be it additional assembly dead load, PV panels, or an increase in the

Floor Plan as renovated and thermally enhanced.



snow loading consequent upon the improved thermal insulation—never mind a green roof, an idea that we thought quite appropriate for this low, horizontal roof overlooked by the upper floors of all of the surrounding houses. Actually, the original roof, constructed with built-up perimeter edging, and with its blocked interior roof drains and accumulated debris, presented a “wetland marsh” aspect—so a green roof would have preserved what the neighbors had become accustomed to viewing.

A “DEEP ENERGY” RETROFIT

The exterior walls

Addressing the reduction in thermal load led immediately to deciding whether to enhance the envelope to the interior or to the exterior. Adding to the exterior is almost always easier, since it avoids thermal bridging at intersecting partitions and at the uninsulated floor slab—if, as we did, the insulation is extended down to the footing. It retains the interior materiality and the mass coupling to the interior, which has a beneficial thermal flywheel benefit. The 8'-wide spinal corridor and ancillary storage and service spaces could little afford a 10" or more reduction, especially through the kitchen zone. But adding to the exterior involved covering the CMU block face that was now a key part of the building's signature, and it seemed that the cost of excavating, extending the footing, and reconstructing a CMU veneer would be unacceptably expensive. In fact, after trolling through six or more alternatives—stucco, fiber cement panels of various manufacture, and clear-finished wood, both gapped and tongue & groove jointed—it was ultimately revealed that the CMU would be less expensive than the preferred alternative—salvaged cypress wood. It all had to do with finding a contractor for whom the prospect of excavating a trench around the entire perimeter—often with only four feet of side-yard width to work in—and finding a way to store the excavated material on this exceptionally tight site where the below grade footing and CMU portion of the wall was laid, was not a nightmare. We were lucky to find such a sub-contractor, so we did what we could to make re-skinning with CMU as manageable as possible. We wanted to maintain the 8" module of the original so as to make the addition visually seamless. We realized that by using a nominal 4" CMU block and compressing the cavity to a 3/8" polypropylene mesh that we could retain the 8" module with 4" of polyiso insulation, mechanically fastened to the existing CMU substrate over a Carlisle ‘MiraDri’ adhesive membrane that became the air barrier.

Exterior insulation being installed after windows and doors.



The foundation walls and sub-slab

While the CMU block veneer was laid up from an extended footing, we preserved the appearance of the original concrete turned-down “slab edge” by casting a grade beam to simulate the slab edge foundation wall and using sawn hemlock form boards to get the 1960s wood form look of the original. The existing floor slab sat directly on gravel fill with no insulation below,

but by continuing the exterior insulation all the way down to the footing we created a much longer path for heat flow. The interior floor slab remains ground-coupled, but the ground below will be warmer and quite comfortable with the overlaid bleached wood plank floor that was installed.

The roof

After exploring various complex and expensive ways of stiffening the undersized beams and still retaining the aesthetic quality, it was decided that overlaying a completely new roof structure was the most appropriate course. It involved increasing the height of the building by 20" rather than the 8" that a built-up mat of rigid insulation would have involved. But a computer-generated massing study indicated to us and to our clients that this would be acceptable—especially if the enclosing fence was raised by a similar dimension. By overlaying clear-spanning engineered I-joists, the point load problems were dissipated as the joists distributed the load around the perimeter. The new roof is capable of supporting both itself, the increased snow load associated with the far better insulated roof plane, a PV array, and even a vegetated roof, though this was eventually eliminated as a cost-reduction measure.

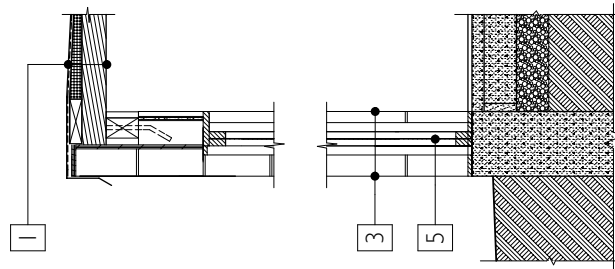
The air barrier in this assembly is a continuation of the membrane applied to the exterior face of the original CMU wall that folds over the roof sheathing applied over the rafter I-joists below the continuous application of rigid insulation that also—by tapering its thickness from 8" to 3"—provides the drainage slope to the three interior roof drains.

Doors and windows

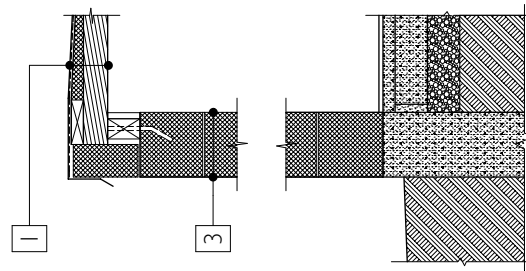
The doors and windows were a particular challenge. In all cases (except the kitchen addition bump-out) these read as transparent voids rather than punched openings in the masonry wall. The question of whether to violate the void-ness of these full-height 10'-wide openings was quickly resolved; they were critical to the architectural quality of spatial interconnectedness. We considered two options for upgrading and improving their thermal properties. The first was to situate a 3' full height, fully-glazed hinge door adjacent to a 5'-wide fixed glazed panel. The second (preferred) option was to replicate the large sliders, but no North American product achieved a sufficient standard of air tightness. We eventually decided upon a German company—Bayerwald—that could provide doors (Bayerwald model PST) and windows (Bayerwald HW87) with narrow, wood, thermally-broken stiles, and krypton-filled triple glazing. However, even with superlative glazing, there remained concern for two relatively low mean radiant temperature surfaces in close proximity to seated humans—the dining table right between two large expanses of glazing. There is no space to accommodate curtains, not without diminishing the sense of transparency so effortfully achieved. So a pocket behind the valence across the opening head was created to accommodate thermal shades should they be considered desirable. The replacement doors were mounted 4" out from their original location, co-planar with the exterior insulation. This is an important detail for thermal continuity, and it deepened the interior reveal, exposing the full depth of the original 8" masonry—also desirable. It required a continuous steel angle to be bolted to the existing foundation, but the steel was held substantially within the thermal envelope and was not to become an outrageous thermal bridge.

The two exterior entry doors on the north (public) side of the house required an opaque product. And here our clients invested in an extraordinary product—a vacuum-insulated 1¾-inch-thick product produced by VIP Door of Enon, OH, that claims an overall R30

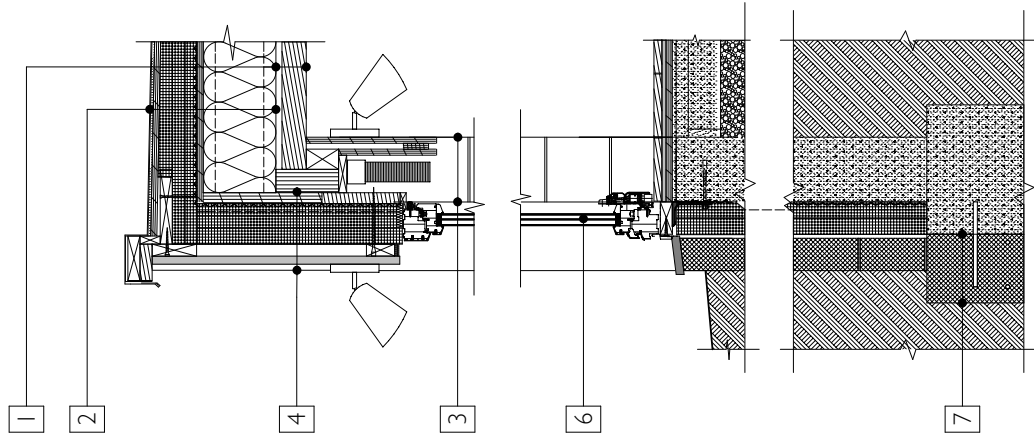
Section through existing door.



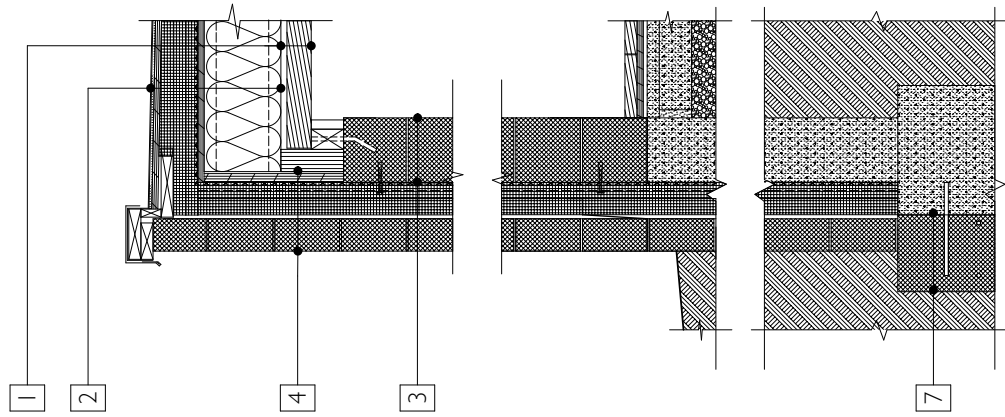
Section through original wall.



- 1 - existing roof
- 2 - new roof
- 3 - existing wall
- 4 - new skin
- 5 - existing sliding glass door
- 6 - new sliding glass door
- 7 - new footing extension



Section through new, thermally enhanced patio door.



Section through new, thermally enhanced wall.

TABLE 1. Summary of thermal enhancement.

Element	Component Construction	R Value	Notes
Exterior wall—above grade	Two 2-inch thick “whythes” of paper-faced rigid polyisocyanurate foam (R6.2+/inch) unbroken over the existing CMU wall	R 25	The insulation thickness was the best we could achieve within the constraint of maintaining an 8-inch module with the added CMU veneer.
Exterior wall—below grade	Two 2-inch thick “whythes” of extruded polystyrene foam (R4.5/inch) over the existing concrete foundation wall	R18	
Windows	Bayerwald—matching doors below. (These were custom manufactured in Germany.)	R 6± (U=).75 W/m2K)	This value was as close as we could get to the NFRC comparative method
Doors	Bayerwald HW87 — PST; aluminum-clad wood framed glazing panels, with clear finished wood (Euro Larch) interior. (These were custom manufactured in Germany.)	R 6± (U=).75 W/m2K)	These are very large sliding doors, but their tested air tightness was spectacular.
Roof	13 inches of cellulose at 3.5 pcf in the joist cavity; then an average of 3 inches of tapered rigid polyisocyanurate foam unbroken over the roof plane.	R 60	The overlayed I Joist rafters were set one inch above the existing roof deck to simplify routing of conduit.
Skylights	Wasco triple glazed low e units mounted on site built curbs that rise 16 inches above the roof plane and have a 15 degree pitch to shed snow.	R 5	This is the unit R value; it does not account for the site-built curb loss; curbs wrapped in 2 inches of rigid PI foam.
Sub-slab	No intervention		

thermal performance. We shipped a batch of the milled cypress boards matching those used to clad the bump-out kitchen and had them factory applied as the exterior finish of the door.

Skylights were an integral component of the original design—essentially to admit light without the intrusive need of windows along the north (public) side. We retained all of those originals and added one to light the new children’s bathroom. We chose Wasco fixed, triple-glazed E-class units. Their occurrence along the spinal corridor additionally served to accentuate this axis. This aspect of the original design was retained, though the skylight wells became considerably deeper with the additional roof depth—resulting in slightly less glare, but also a more restricted view of the clouds and sky above. Resurrecting the light-colored floor of the original—this time with pickled wood rather than vinyl tile—restored the considerable value of the skylighting that was severely compromised with the black slate floor.

Interior finishes

The interior finishes palette was substantially retained, with the “fair-faced” (Chermayeff’s term) CMU, the oiled-wood decked ceiling, and the plaster partitions. Only the floor, now a pickled white Scandinavian soft wood in place of the original vinyl and the more recent black slate, is a modest departure from the original. An alternative floor treatment, in consideration for a time, was grinding/polishing and densifying (with a sodium silicate sealer) the original concrete once the overlaying tile was removed. Such a finish is in character with the spatial

materiality and seemed prudent in case of the water entry ordinarily anticipated with large sliding doors around the perimeter. But the clients preferred wood, and the 9' ceiling heights tolerated the 2½" accumulated superimposition without noticeable effect. (*Note:* We never considered raising the floor level further in order to accommodate (say) 2" of high-R rigid insulation. We felt that the sense of the space would be unacceptably compromised, and that extending the perimeter insulation down would create a sufficient "thermal dome" below the uninsulated slab that we roughly computed would be only 3± degrees cooler.)

All but a few of the interior doors were retained at their full (approximate 8 feet) height and at 27" width. This unusual proportioning, that took the door head to the underside of the structural beams, worked to accentuate ceiling height and the sense of spaciousness. The unusually narrow doors make the narrow spinal corridor seem less narrow. Furthermore, we retained the original door hardware mounting height at 33".

BUILDING SYSTEMS

Heating/cooling and ventilation

The original oil furnace was located in a largely inaccessible (and largely useless) crawlspace along the north side "spine"—and, by some miracle of low-maintenance survival, it was still operational sixty years later. It was removed by cutting an access hole in the concrete floor slab—an opening that facilitated the removal of the very large original ducts (remember the original thermal load!) and the installation of new plumbing piping and other services. The furnace distributed air to the pavilion spaces via an elaborate maze of ducting running (uninsulated) below the existing slab. Our new situation would reduce the peak thermal load from around 300,000 Btu/hr to around 25,000 Btu/hr, but the spaces were still as dispersed as ever.

The absence of an attic, basement, and garage, and the decision not to expand the envelope, created an extraordinary premium on space. This was not a candidate for distributing thermal energy from a central device requiring a dedicated mechanical room. We chose instead an air source heat pump (ASHP)—a Mitsubishi S Series system with five interior heads all served from a single, four-ton capacity outdoor compressor/condenser unit located in place of the original oil tank. This enabled short duct runs or none at all, in the case of the wall-mounted units. We located two concealed ducted cassettes serving the bedroom/bathroom suites for the adults and children in spaces created by lowering the ceiling over the main bedroom closet and the short rear corridor. Fitting our mechanical systems into these tight spaces required careful modeling of the units themselves, their access requirements, and duct routing—all of which was modeled in ArchiCad and verified by our mechanical engineering consultant, and finally by the mechanical contractor to ensure an intelligent (if extremely tight) fit. In all cases but one, the modeled layout and final installation were congruent.

The central living space cassette was integrated with the reconstruction of the original built-in seating, and a wall-mounted cassette was tucked up on the clerestory wall over the kitchen. Coupled with the huge reduction in thermal load, the air sourced heat pump technology was well suited to a providing heating and cooling in a situation where there was almost no concealed space for running ducts—even routing refrigerant and condensate lines was a challenge.

The domestic hotwater requirement was satisfied using an instantaneous gas Navien NR wall-mounted unit. This is unusual for us because we are constantly striving to eliminate fossil fuel combustion from our projects. We frequently use heat pump water heaters in conjunction

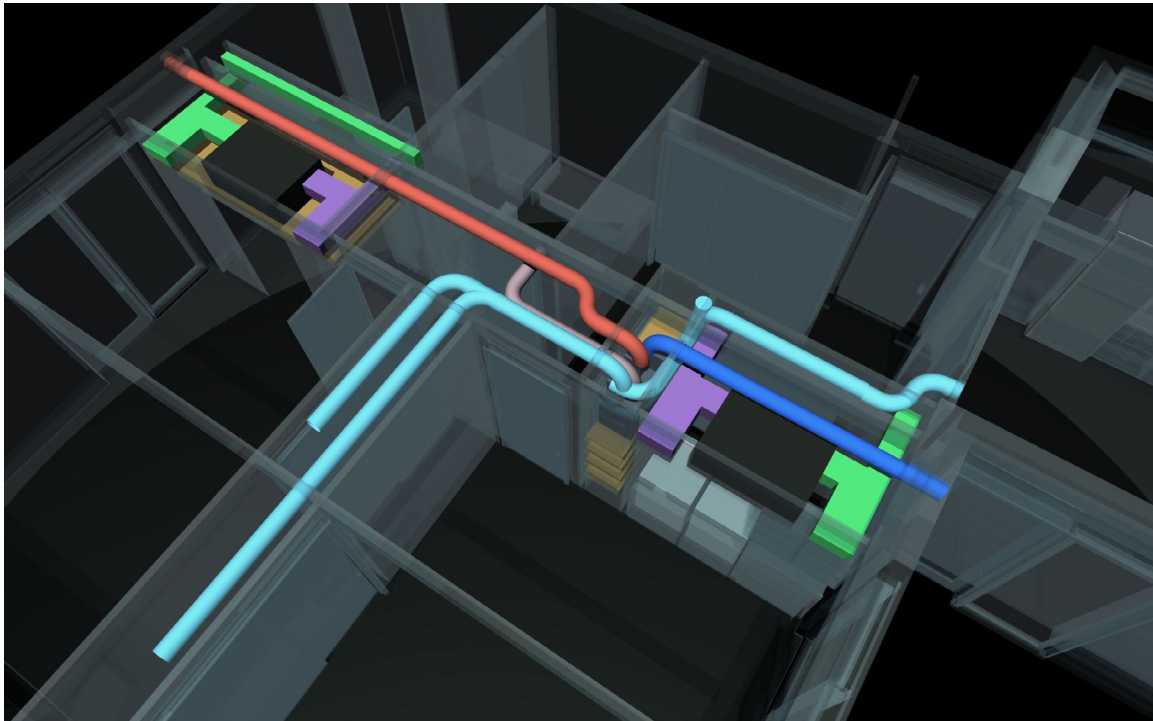
Peak heat loss computations for the original building.

Heat Loss Component Budget — EXISTING				13-Apr-10
Former Chermayeff House, New Haven, CT				
		Design Temperature Difference	65	deg F
R VALUES	1/(Btu/hr*degF*sf)			
Exterior Wall (8" CMU)	1.20	Roof plane (1/2" EPS over existing deck)	3.00	
Aluminum slider — single glazing etc.	1.00	Skylights —	1	
Aluminum windows — single glazing	1.00			
Slab edge (same as for wall above)	1.20	Exterior door	3.00	
VOLUME of Building	22,149	cf (Est.)	Floor area (nic crawl space)	2,335 sf
		Ventilation system capacity	75	cfm
ELEMENT	AREA (s.f.)	AU (Btu/hr*deg F)		
Exterior Wall	2,886	2405.00	Slab edge perimeter	352 linear ft
Basement Wall - below grade		0.00	Basement perimeter	linear ft
Slab edge (if no foundation wall)		236.75		
Basement wall above grade				
Sliding doors	526	526.40		
Skylights	31	31.25		
Roof Plane	2,335	778.33		
Windows	152	151.60		
Entry Door	48	16.00		
	ACH-Natural			
INFILTRATION	1.00	398.68	Equiv. AU	
Ventilation (@75% eff.)		20.25		
AU Conduction Only	4145.33			
AU Total	4564.26	Btu/hr*deg F		
Design Heat Loss, BTU/Hr	296,677	Btu/hr	(Capacity of Heating System)	
Design Heat Loss, Kw	86.93			
Design heat loss per unit area	127.1	Btu/hr/sf		

Peak heat loss computations for the renovated building.

Heat Loss Component Budget — REMODELED					13-Apr-10
Former Chermeyeff House, New Haven, CT					
			Design Temperature Difference	65	deg F
R VALUES	1/(Btu/hr*degF*sf)				
Exterior Wall (8" CMU) — with applied 4" of rigid PU to the exterior or interior	24.80		Roof plane (5" average additional rigid PU over existing deck)	65.75	
Bayerwald slider/windows — triple glazing etc.	5.00		Skylights — (best available)	4	
Bayerwald windows	5.00				
Slab edge (same as for wall above)	24.80		Exterior door (.....)	12.00	
VOLUME of Building	22,149	cf (Est.)	Floor area (nic crawl space)	2,335	sf
			Ventilation system capacity	75	cfm
ELEMENT	AREA (s.f.)	AU (Btu/hr*deg F)			
Exterior Wall	2,886	116.37	Slab edge perimeter	352	linear ft
Basement Wall - below grade		0.00	Basement perimeter		linear ft
Slab edge (if no foundation wall)		49.26			
Basement wall above grade					
Windows	526	105.28			
Skylights	31	7.81			
Roof Plane	2,335	35.51			
Windows	152	30.32			
Entry Door	48	4.00			
	ACH-Natural				
INFILTRATION	0.08	31.89	Equiv. AU		
Ventilation (@75% eff.)		20.25			
AU Conduction Only	348.55				
AU Total	400.70	Btu/hr*deg F			
Design Heat Loss, BTU/Hr	26,045	Btu/hr	(Capacity of Heating System)		
Design Heat Loss, Kw	7.63				
Design heat loss per unit area	11.2	Btu/hr/sf			

Space conditioning—with no space for services:
Distributed air source heat pump heads in 14" deep soffits above lowered ceilings.
Short duct runs.



with photovoltaic power generation, but this site was not immediately suitable for PV because of shading from the adjacent three-story buildings and the profusion of trees. Heat pump water heaters also take more floor space than we could afford in this especially tight floor plan.

Lighting

The building, as originally conceived and constructed, allowed no service spaces (other than a full-length service crawlspace to the north side). This was useful for ducts and pipes, but less so for the wiring. Accordingly, Chermayeff developed the simple expedient of a continuous perimeter electric power raceway as a frieze between the top of the CMU wall and the plank ceiling. He was a tall, graceful fellow who had once, in 1927, been the world tango champion, so we supposed that electrical outlets placed uniformly 9' above the floor was workable for him. But my clients and the regulatory authority demurred. However, we liked the surface-mounted spot floodlights, centered inside and out in the door spandrel panels, that Chermayeff had linked to his perimeter raceway. Our lighting solution was to replicate these fixtures. They were custom-made using a single original fixture that we were able to retrieve as a prototype but with LED lamping in lieu of the tungsten filaments. In addition, and reflecting the 60 years of progress in lighting technology since the original, we used thin-section Del Ray ST9 series linear fluorescent pendant luminaires for area lighting and recessed Lightolier 'Calculite' LED lamped fixtures for specific function areas—kitchen work counters, showers, etc. The addition of the overlay roof structure with the air barrier at the plane of sheathing (and substantial continuous rigid foam insulation beyond that) enabled these 5½" deep

fixtures to be inserted into the lower portion of roof insulation plane—but mostly we held to our standard design practice of creating soffits and not penetrating the insulation plane. A final lighting tier using switch receptacles for floor lamps rounded out the palette of lighting solutions. The clever, but impractical perimeter frieze power race was eliminated, though a painted frieze board reflecting the original presence was retained. The overlaid roof created a cavity allowing the distribution of power to the interior walls. The discontinued sub-slab air ducts were re-purposed as over-sized conduits serving floor outlets in locations beyond the reach of interior partitions (i.e., adjacent to the CMU walls). True to Chermayeff's original intention, the CMU walls remained unadulterated with electrical paraphernalia.

CONCLUSION

This was quite an expensive renovation, but not more so than a new house at this level of finish. The result is a fully re-primed house ready for a very long life in an established neighborhood—much longer than its original prospect—while retaining the character and intention of the original. It met the goals of thermal comfort and energy efficiency; of quietness and healthy interior air; and of fidelity to the original design concept. The owners are happy, the architect and contractor are proud, and the neighbors are relieved.

NOTES

1. From *Community and Privacy—Toward a New Architecture of Humanism*, by Serge Chermayeff and Christopher Alexander, Doubleday 1963, page 218, italics in original text.
2. We were initially puzzled as to how an architect could have structural elements that were less than half as robust as they should have been. But Chermayeff came into architecture by an interesting route. He was, according to Powers, stranded in London after the Bolshevik October revolution as a young man about to go to university—but suddenly without the funds to do so. He was a great dancer and gave lessons to the social set in London, eventually marrying well and getting into high-end furniture sales and interior decorating/design. He was also part of an emerging set of youthful proponents of Modernism in the United Kingdom—and all of this eventually led to his being accepted into the professional architectural world “by acclamation of his peers”—just before the Architect's Registration Act came into force in the UK. So he apparently had had minimal training in aspects of practice relating to structure. His work in this country was mainly focused on teaching.

APPENDIX

The following is a project description, presumably written by Chermayeff himself as fulfillment of the “descriptive data” component of an entry in the 1964 Homes for Better Living Program sponsored by the AIA:

“The house is located in a “turn-of-the-century” residential street. The plan has been carefully disposed to preserve the many trees growing on the site, which was formerly part of the garden of the adjacent house.

The house (except for minor modifications to suite site conditions and local setback requirements) is a prototype study for one unit of high density “on the ground” urban mass housing. This single unit would therefore appear at mid-scale in an hierarchical organization of systems ranging from the separation of conflicting elements of service in the dwelling to the articulation of conflicting activities in the neighborhood. At the smallest scale within each unit, this principle is reflected in the disposition of the separate components of the house into appropriate realms

and integrities. For example, the services, such as plumbing & heating, are grouped in an accessible under-floor trench, which runs the full length of the house and over which are grouped all units—such as bathrooms, etc., which require the service. Also, all electrical circuits are kept separate from the structure and are exposed (and accessible) by visually integrating into the detailing of the junction of the masonry walls and the wooden ceiling framing. A parallel discipline dictates the planning into hierarchical groupings, grading communality to privacy—loud areas to quiet, etc. By the grouping of areas into pavilions, these physical and social separations can be made. But visual continuity can be maintained, if desired, by the uninterrupted views across and through the open courts, which are themselves proportional and scaled as similar to the totally enclosed rooms.

In a large project of this type, housing units would be tightly clustered to demark similar principles in organization of private, communal and public spaces, social and service access, etc.

This prototype house is constructed of load-bearing concrete block, fair faced internally and externally, built on a slab-on-grade. The roofing is flat timber decking, exposed internally and topped with a built-up roof. All door and window openings & closets are from floor to roof beams. The windows of all communal rooms are full length sliding glass doors. The floors are white vinyl tile. The courts are fenced with half-round cedar fencing, 7'-high and are covered in gravel with concrete base reliefs laid loosely. The carport and entry walk are paved with concrete slabs, poured in situ with gravel aggregate exposed between 2×6s on edge, slightly recessed. Ideally, the court walls would have been 9'-high, of the same “waylite” block as the house proper. The owner of the house to the north agreed to remove all fencing so that the alley became one and the fine trees on the property could be enjoyed by both neighbors.”