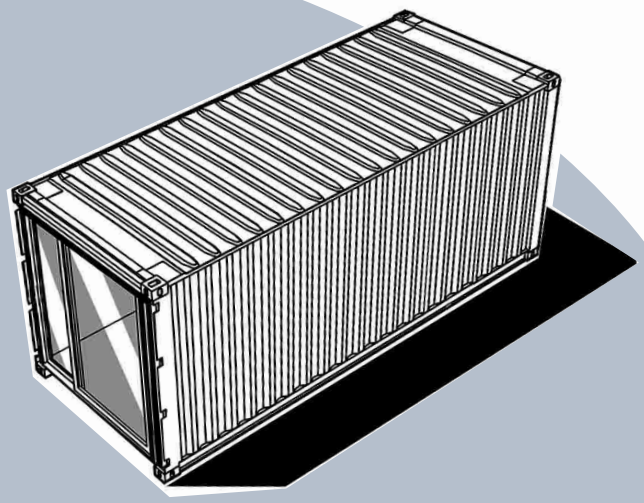

PRO/con
package building system

PRO con

jones, partners: architecture
3620 the Strand
Manhattan Beach, CA 90266
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f: 310 802 8987
www.jonespartners.com

J,P:A

It seems like everybody has a container-based housing scheme these days. Stack them up in interesting patterns and voila: Instant architecture. The result is inherently clever and can be spun towards greenness or social critique. Yet, aside from some notable temporary constructions and building-art installations, none of these schemes have been built so far. There are lots of reasons for this, but the most compelling—and architectural—reason is that these containers are not in fact simple bricks that may be arranged any old way. In fact, what makes those examples art installations rather than architecture or even legitimate buildings is that they use the containers merely stage set props, totally ignoring their tectonic reality and structural integrity.

It is a respect for the tectonic integrity of the container that sets the ***PRO/con*** system apart. For Mies, architecture lay in bringing "two bricks together *carefully*." The Program Container, or ***PRO/con***, system uses the 20' ISO shipping container *carefully*—as a basic building block to create an almost limitless variety of basic buildings. The system takes advantage of the container's unique fusion of structure and enclosure to provide cost- and time-savings during construction, and relies on the highly developed global infrastructure of the shipping industry to facilitate its storage, transport and modification.

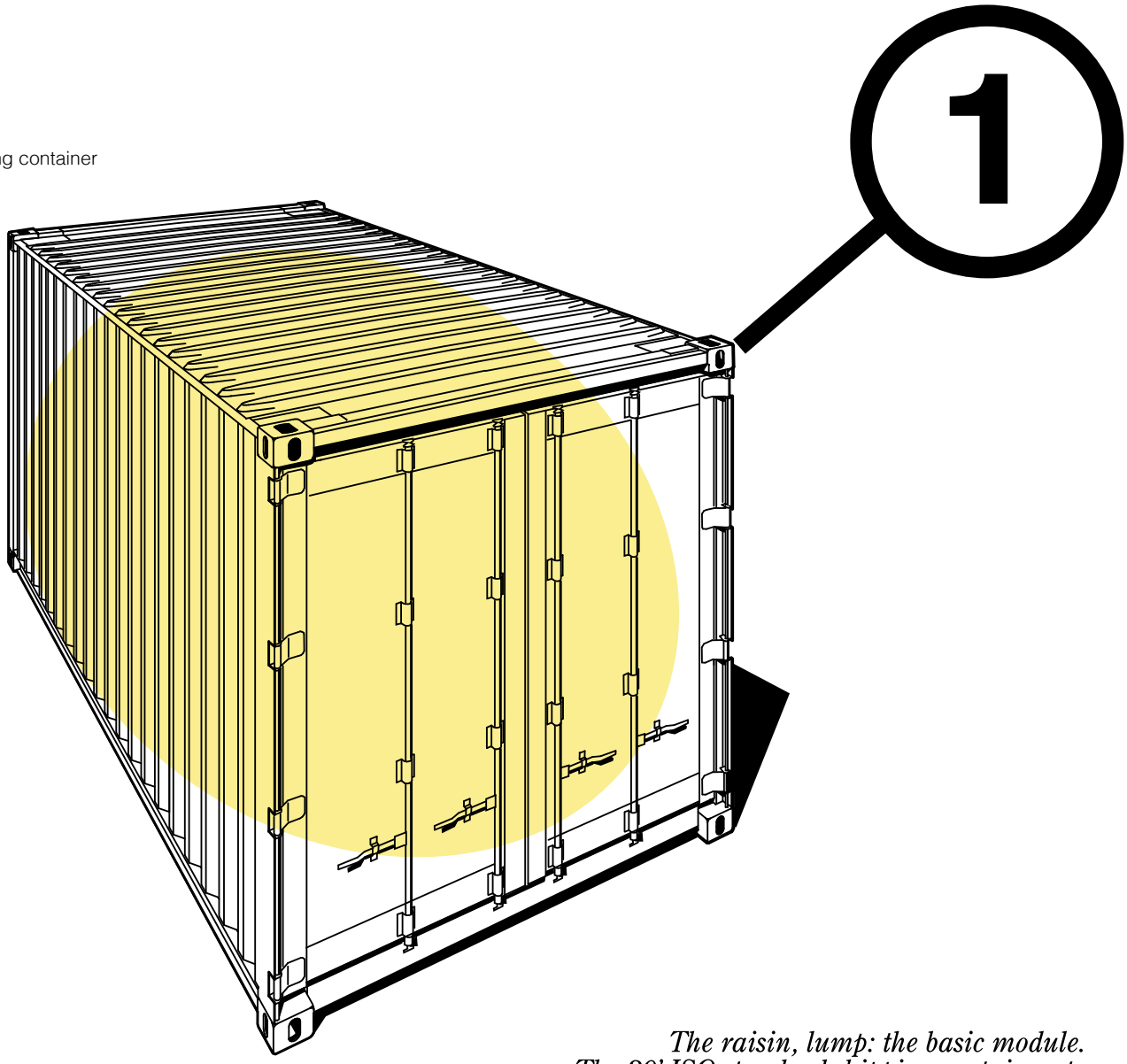
In the ***PRO/con*** PACKAGE HOUSE system, homeowners build up their dwelling from a collection of individual fully outfitted, program-specific containers, such as kitchens, baths, closets, home offices, and children's rooms, which are ordered online, shipped to the site and there assembled to the homeowner's specification. A ***PRO/con*** PACKAGE HOUSE can be arranged in any number of configurations that take advantage of local construction economies, combining the production and cost efficiencies of factory fabrication with the specificity and flexibility of on-site construction.

The success of the ***PRO/con*** system is based on its acceptance of a "loose fit" between the factory-built units, in terms of their arrangement on the site and the tolerances achievable by local construction methods. This is in contrast to the traditional approach to modular pre-fabrication, which stipulates an exactitude of fit between pre-fabricated elements that is rarely achievable in the field. We call it a *loose modularity*, obeying the *lumpy logic* of raisins in a pudding or nuts in batter.

The ***PRO/con*** system is environmentally responsible. The adaptively re-used, discarded shipping containers sit lightly on the land. While it is in the nature of the ***PRO/con*** system that it can use a variety of foundation systems, from jacks or loose cement blocks to continuous footings, the whole structure may also be perched simply on friction piles to minimize the impact on the site and allow the natural conditions to flow freely by underneath. The containers can be stacked or minimized to respond to specific climatic conditions, site contingencies, or to respond to the changing needs of its clients—challenging the impulse towards pocket mansions and other wasteful schemes that seem to characterize so much suburban development these days. In addition to its obvious flexibility and expandability, ***PRO/con*** can anticipate and accommodate second-hand or after-market container adaptations that could effectively recycle technologies and appliances otherwise constrained by planned obsolescence. In this way the dwelling could be considered to be continuously evolving: the loose modularity of the ***PRO/con*** housing system has no expectations for completeness that the user must either fail or chafe against.

From the ready-cut housing that supported Western expansion at the turn of the century to the development of the 4x8 prefabricated panel that has propagated the American suburb since the 1940s, the dream of the factory-made house has been largely advanced through the agency of the module. However, despite the continued proliferation of modular units in construction, very few examples of fully prefabricated structures have been considered successful by both the market and by the designers. Most efforts fall within the limitations of overly rigid systems with a factory-determined flexibility and try to mask their modularity with flimsy suburban decorative frosting. The ***PRO/con*** system *features* the module—the container—celebrating its harmonic proportions, geometric and material strength, and economic and environmental integrity—secure in the confidence that the result will be a better dwelling and enduring modernism.

1. 20’ ISO shipping container

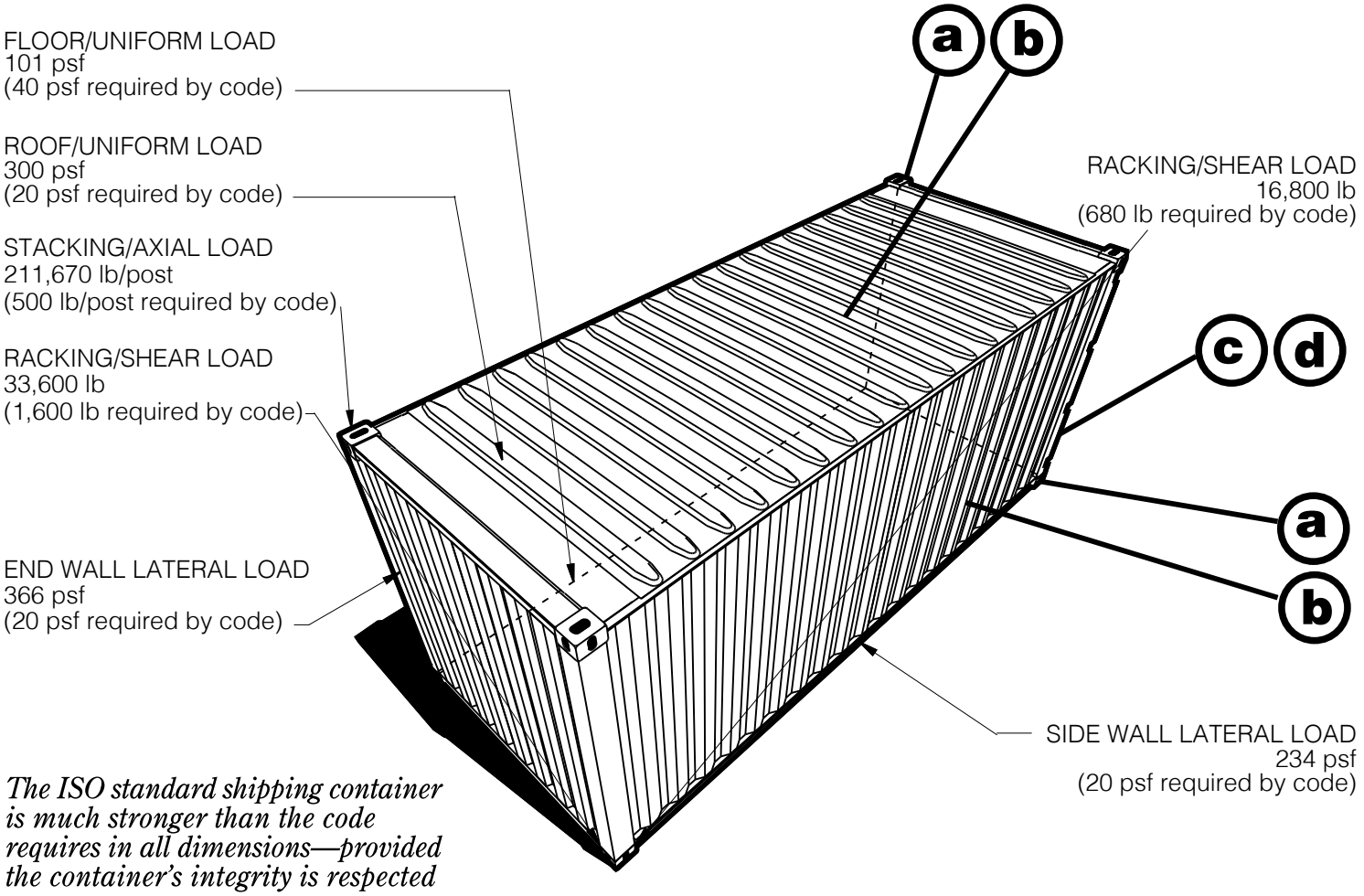


The raisin, lump: the basic module.
The 20’ ISO standard shipping container, to be loosely arranged with others

The PRO/con Background

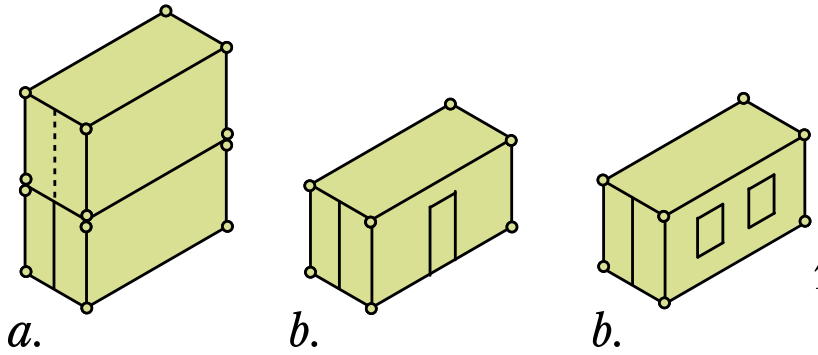
Architects and builders have been fascinated with the idea of prefabrication and modular construction for a long time, and there have been many attempts to bring such a system to market over the years. So far, mobile homes and pattern-book houses are the only lasting products of that interest, and though commercially successful they leave a lot to be desired. Yet there continues to be great pressure towards the development of a viable prefab modular construction model; it could even be called the natural trend for the building industry to progress in this direction. The early promise of prefabrication and modularity was disappointed by a vicious codependency between public acceptance, volume production, and distribution infrastructure. None of the three could exist without the others. So public acceptance awaited the promised price reductions and convenient availability, while those reductions and convenience in turn depended upon a large public demand to fund their development.

a. standard ISO corner fitting
b. 10ga. corrugated weathering steel wall and roof panels
c. container post (outer)
d. container post (inner)



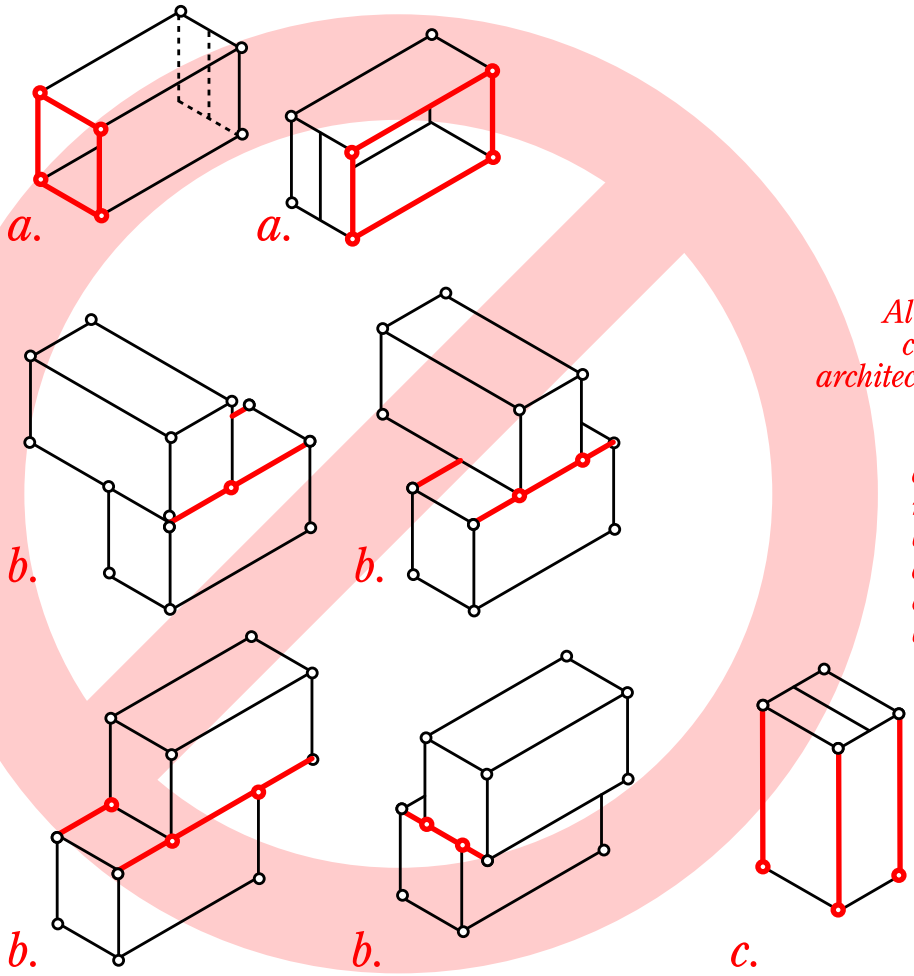
The ISO standard shipping container is much stronger than the code requires in all dimensions—provided the container's integrity is respected

The PRO/con breakthrough bypasses that chicken-or-egg dilemma, because it makes use of an existing industry that has solved this problem beyond the wildest dreams of the early prefab pioneers. If such an industry had to be set up from scratch it would never happen. The PRO/con idea snuck into existence because while the building industry was trying to develop a modular, pre-fab building strategy that might be suited to mass production—like cars or sneakers or ipods—the cargo industry was perfecting the steel ISO standard shipping container. While the building industry was trying to force trees onto an assembly line, the steel fabrication industry was developing the means for substantial local variation with real flexible strength. While the building industry was trying to sell the world glued-on decoration as an antidote to cookie-cutter monotony, the transportation industry was refining a globe-girdling storage and delivery system that opens the door to a planet's worth of choice. So in effect, the shipping industry has already done all the hard work in the development of a mass-produced space-containing module for economical construction.



This is the extent of what the container likes:

a. simple stacking at corner fittings
b. small openings, preservation of shear resistance



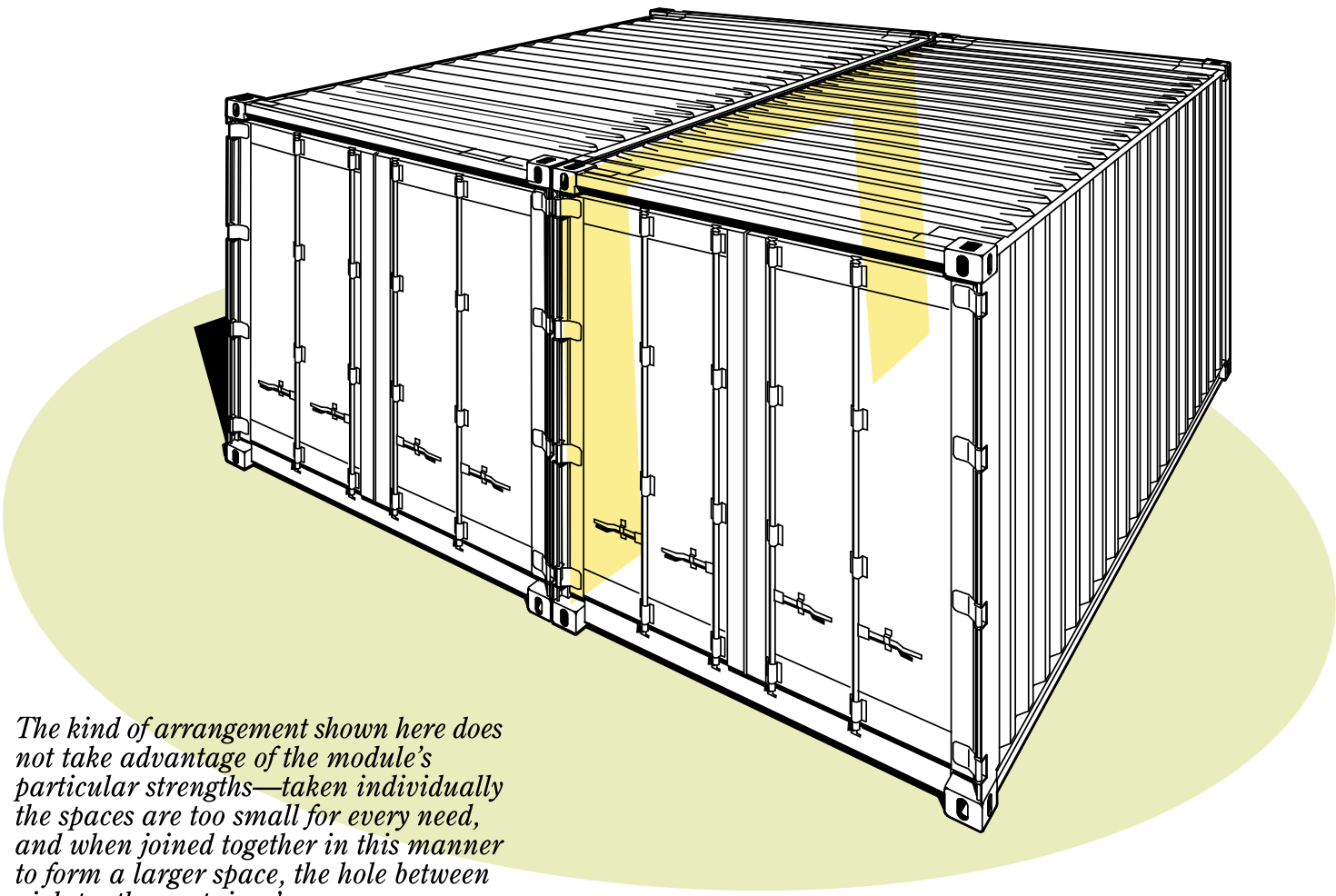
All of these arrangements, which are common to most shipping container architectural schemes, violate the container's tectonic and structural integrity:

a. removal of full side, loss of shear resistance
b. unsupported mid-span connection at top rail
c. upended configuration; vertical beam insufficient for gravity loads

The rules of the game

That there might be "rules" for the use of shipping containers would not be obvious from the various examples of architectural re-use in the media these days. In fact, it is the system of rules and the shipping industry's promulgation of them that has allowed the use of the ISO standard shipping container to become so widespread—that has made it the standard. This may seem obvious, but so far architects who have dabbled with this "medium" have shown little appreciation for it, and thus have missed out on the containers real advantages of strength, durability, participation in a global infrastructure of transportation and storage, and not least of all, formal nobilty imparted by the discipline that a respect for all this imposes.

The first rule for the use of containers is that the corner fitting, or "corner block," rules. The entire shipping container system is based on the location of these fittings in space and the way they receive and transfer forces through the monocoque construction of the container. The rule is that

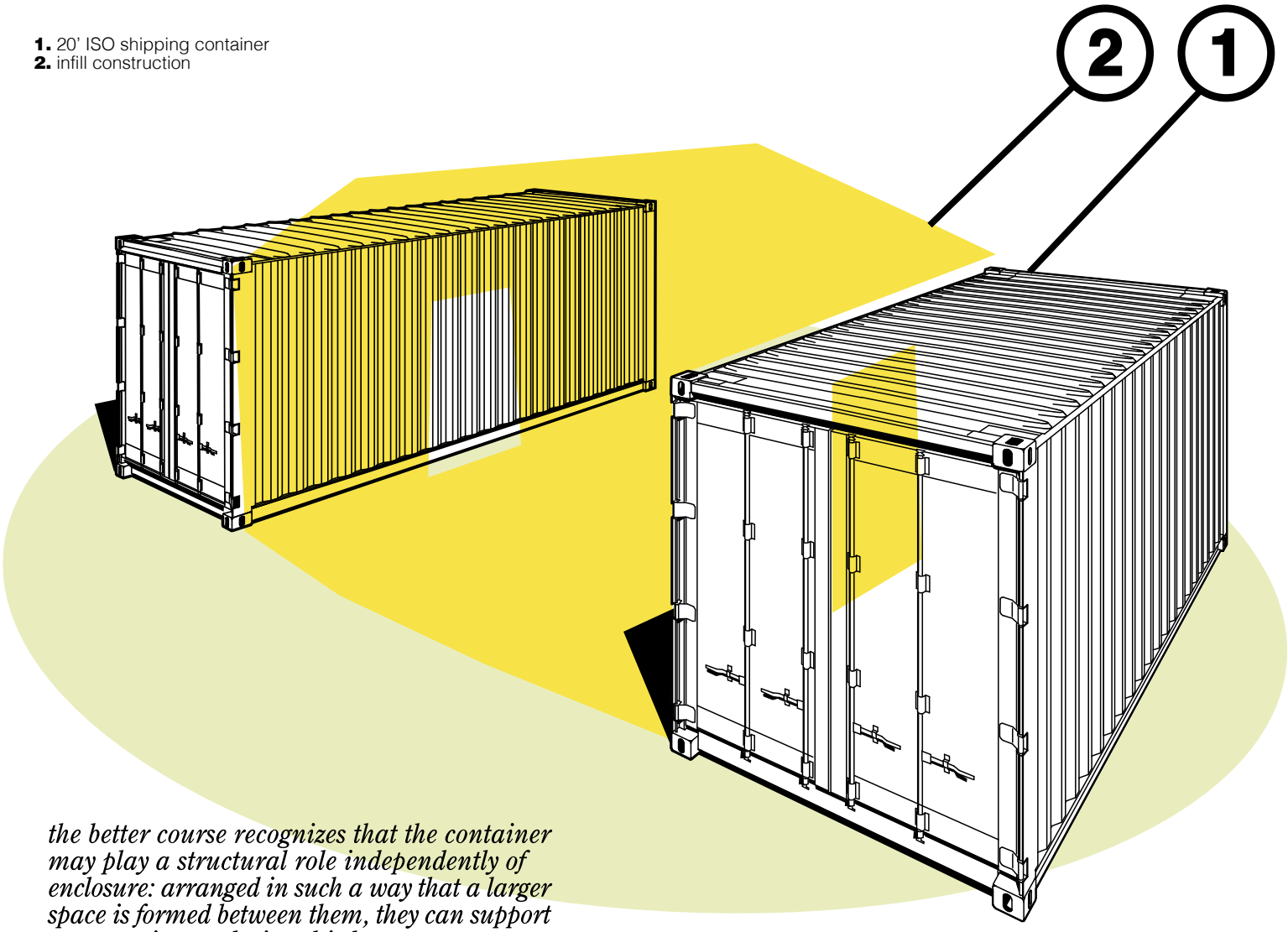


The kind of arrangement shown here does not take advantage of the module's particular strengths—taken individually the spaces are too small for every need, and when joined together in this manner to form a larger space, the hole between violates the container's structural integrity

forces may be applied to containers only at the corner fitting. This determines how they may be stacked or otherwise arranged. Thus, the container is not designed to bear loads at other locations, such as along the top side rail, nor is it designed to be itself supported anywhere besides the corner fitting. Thus it itself may not be cantilevered or held along its bottom rail. Apparent examples of this practice in other architect's systems depend on the use of additional structure which demotes the container to a decorative gimmick.

The second rule is that the container may not be cut apart indiscriminately. Because the container is a monocoque structural entity it depends on the integrity of its surface for its strength—this is how it is able to have such a good strength-to-weight ration and hold such heavy loads so efficiently. Consequently, there are only certain places where holes may be cut in the skin of a container. The container acts like a beam, and so, like a beam, it can only tolerate limited reductions in material along its neutral access and where the stresses are otherwise minimized.

1. 20' ISO shipping container
2. infill construction



the better course recognizes that the container may play a structural role independently of enclosure: arranged in such a way that a larger space is formed between them, they can support construction enclosing this larger space

The PRO/con Idea

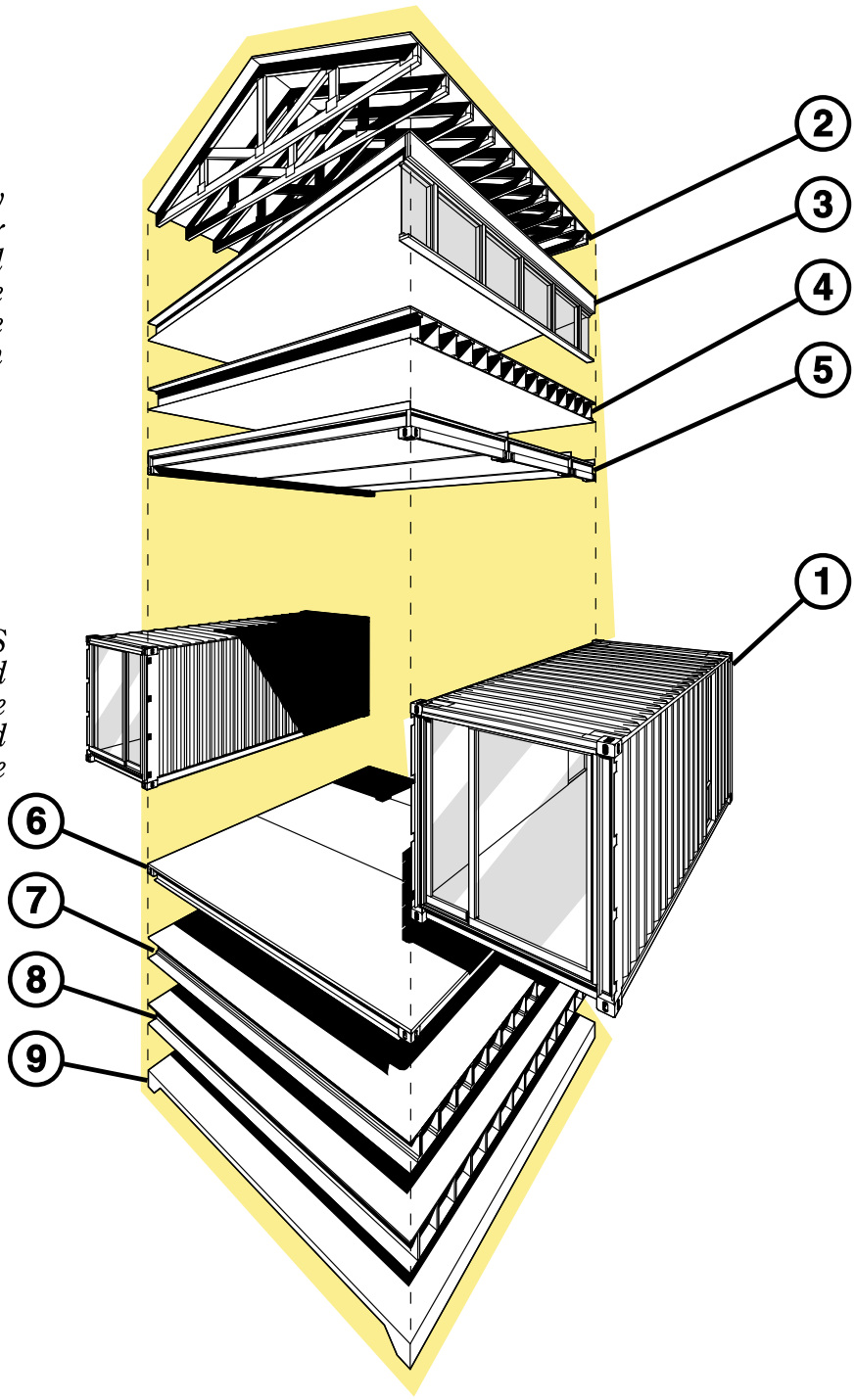
The PRO/con system is a way of building using ISO standard 20' shipping containers. In the PROgram/conTAINER system the containers act as building-blocks; stacked up or arranged in various ways these "blocks" can accommodate a wide range of different program arrangements on just about any size, shape or type building site. Each container is outfitted with the fixtures and furniture for one PROgrammed room, like a private office, bathroom complex or storage room, and the overall structure is the sum of all these specific conTAINER rooms.

But this is not what makes the PRO/con system special. Instead of just using only the containers themselves as enclosures, like other systems—and therefore limiting room sizes to the size of the container, PRO/con uses the containers as building blocks to frame larger spaces *between*. This is possible because the containers have strength left over, even after stacking them up, for supporting additional structure—floors, roofs and walls—

1. 20' ISO shipping container
2. gabled truss roof
3. 2x10 shed roof
4. 12" TJI buit-up roof
5. steel frame modular roof system
6. steel frame modular floor system
7. 14" TJI floor
8. 2x12 floor
9. slab on grade

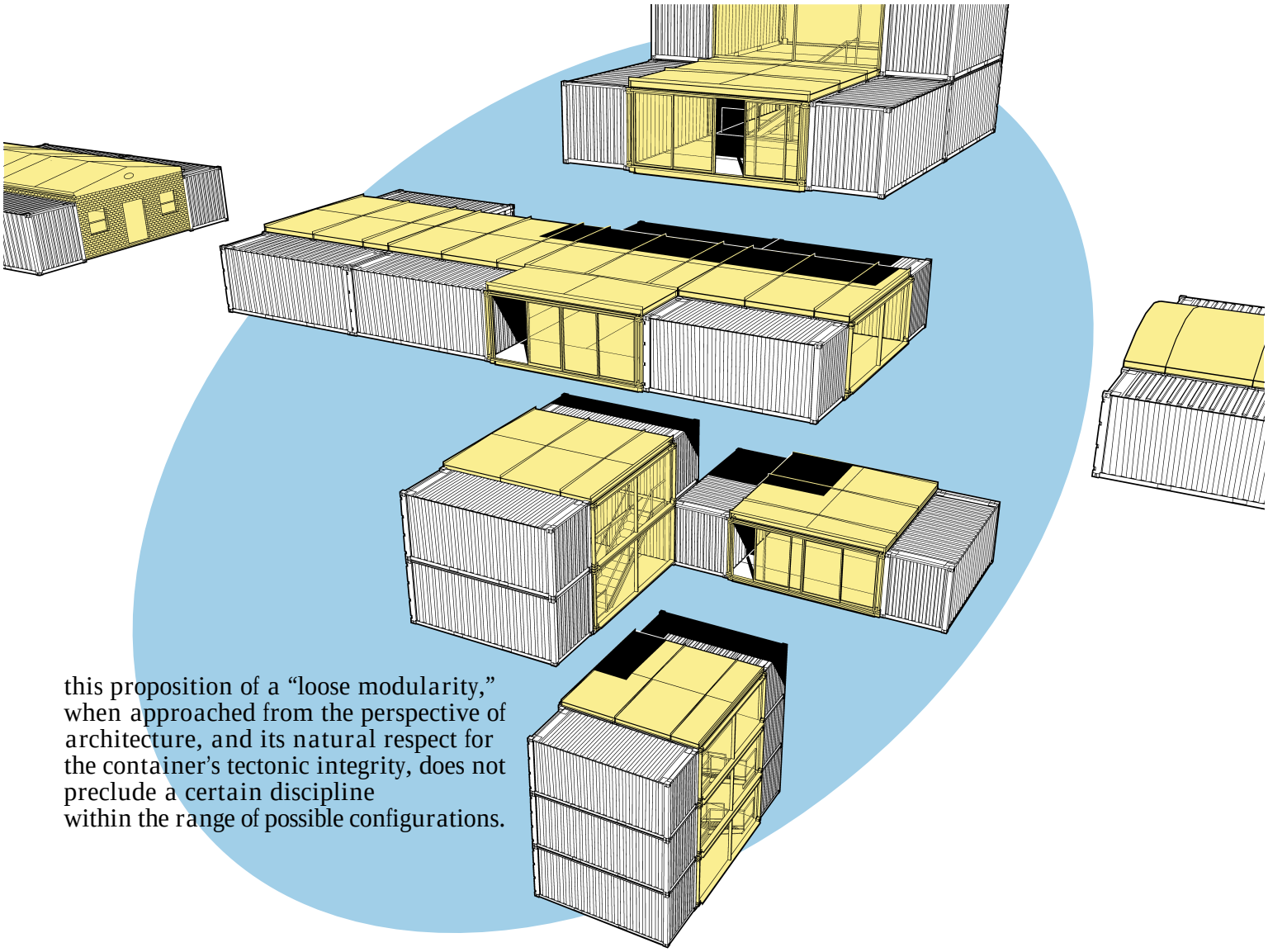
such arrangement does not in any way dictate the architectural nor constructional character of this infill material, allowing great flexibility to use local means and methods to the construction of the space between

the PROgram/conTAINERS themselves, on the other hand, are finished in the factory, taking advantage of the higher quality standards and efficiencies possible there



between the containers themselves. By using the space between the containers as well as inside them, a full range of room sizes are possible. These larger rooms are available to serve more loosely programmed activities where the greater area is more useful.

The result is not necessarily prefab, nor totally modular: rather, it is an intelligent mix of both, avoiding the shortcomings of each, while capitalizing on their strengths, to create a speedily constructed, durable, highly flexible, cost effective but architecturally sophisticated building. Right now, PRO/con is a *system of design, not a product*. We are working on turning it into something you can just order up and have delivered (see the PACKAGE HOUSE presentation later in this submittal), but at this time you can only get a PRO/con house through a streamlined, but still conventional, architectural design and construction process.

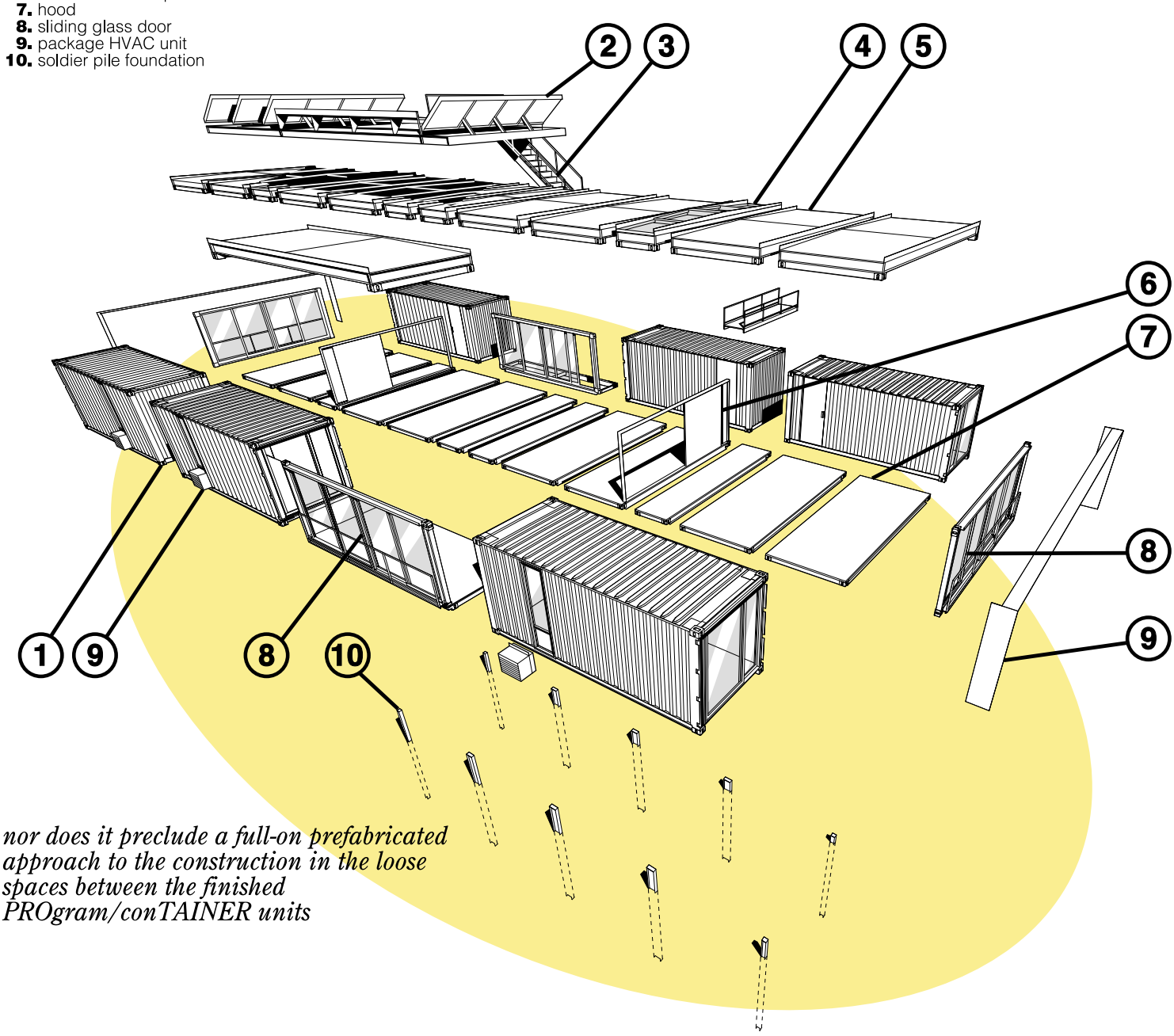


this proposition of a “loose modularity,” when approached from the perspective of architecture, and its natural respect for the container’s tectonic integrity, does not preclude a certain discipline within the range of possible configurations.

The PRO/con Difference: FLEXIBILITY

Even though it is made from standardized boxes, the PRO/con system is inherently flexible. PRO/con does not restrict the owner to a limited series of floor plans, with different decoration options, but leaves the arrangement open-ended within the limitations of the container’s structural logic. By combining the advantages of modularity and prefabrication (of the more involved parts of the building that benefit most from production within a factory environment), with the creativity of custom-designed architecture (for the “loose” spaces between), tailored to the owner’s desires, PRO/con allows the homeowner to think creatively outside the box. The ultimate layout is limited only by imagination, budget and the requirements of the local building department.

And this flexibility is enjoyed not only during its initial arrangement, but when the time comes to change that arrangement in response to changing needs. Because of the nature of the fittings which join them, and the flexibility of the construction between, individual PRO/con units may



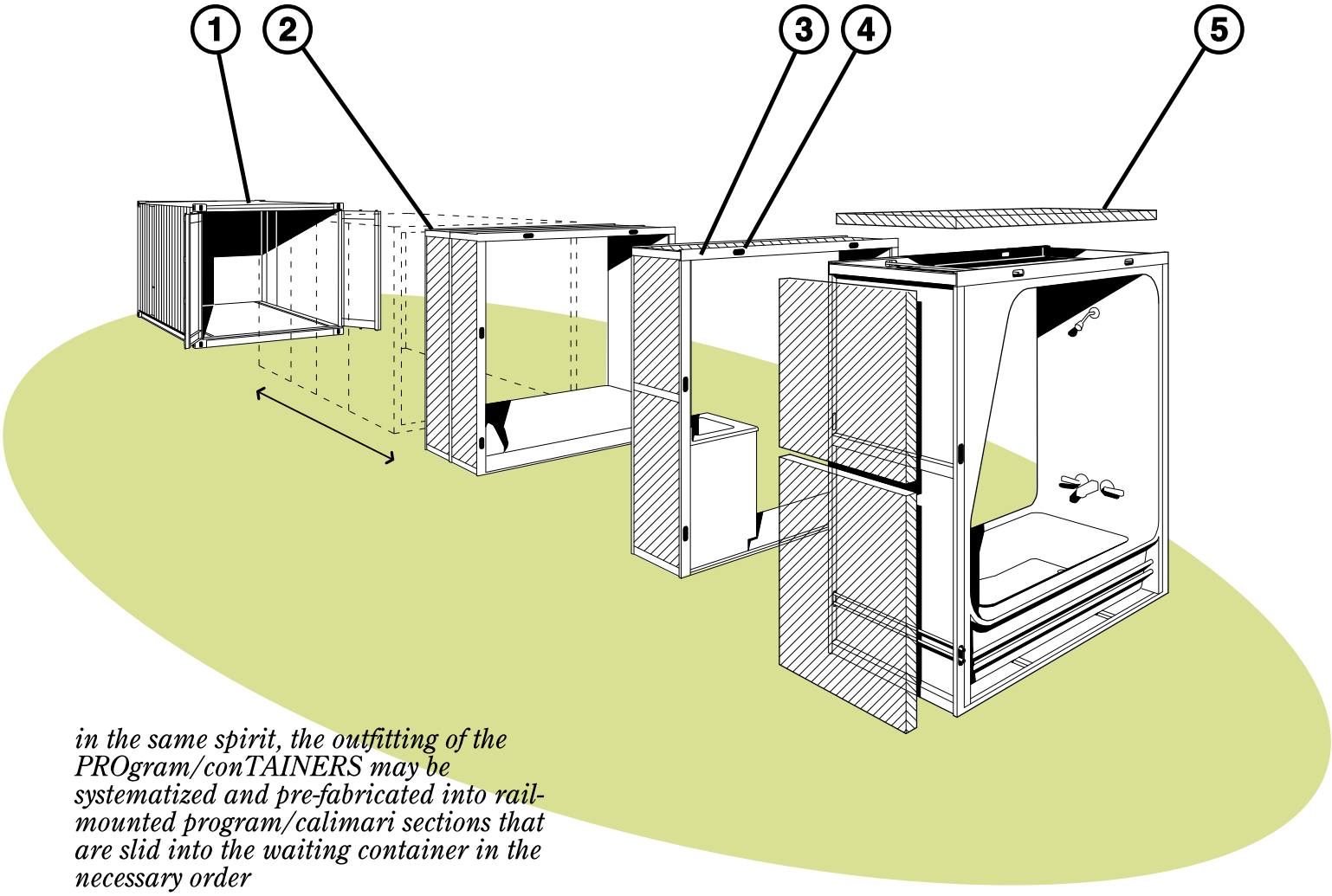
nor does it preclude a full-on prefabricated approach to the construction in the loose spaces between the finished PROgram/conTAINER units

be detached and traded for upgraded versions of themselves or for completely different program units, over the lifespan of the structure. Indeed, this may ultimately be the chief attraction of the system, and the one that takes greatest advantage of the global infrastructure already in place for handling the ISO standard container. Because of its globally-sanctioned modularity, any household furnishings manufacturer—not to mention any local shop—can produce proprietary PROgram conTAINERS for the market, confident in their universal fit.

No PC vs. Mac problems for this industry. And of course the consumer is freed from worry about getting stuck with obsolescent furnishings, so that the "extreme makeover" can be as common as a coat of paint or new shutters. Or the consumer can take it all with them when they move.

In this way, the PRO/con system distinguishes between good, useful flexibility and that other kind of flexibility that is mostly show (and a lot of work)—and usually ends up just getting in the way.

1. 20' ISO shipping container
2. modular program liner
3. steel frame
4. conduit/ pipe chase
5. rigid insulation



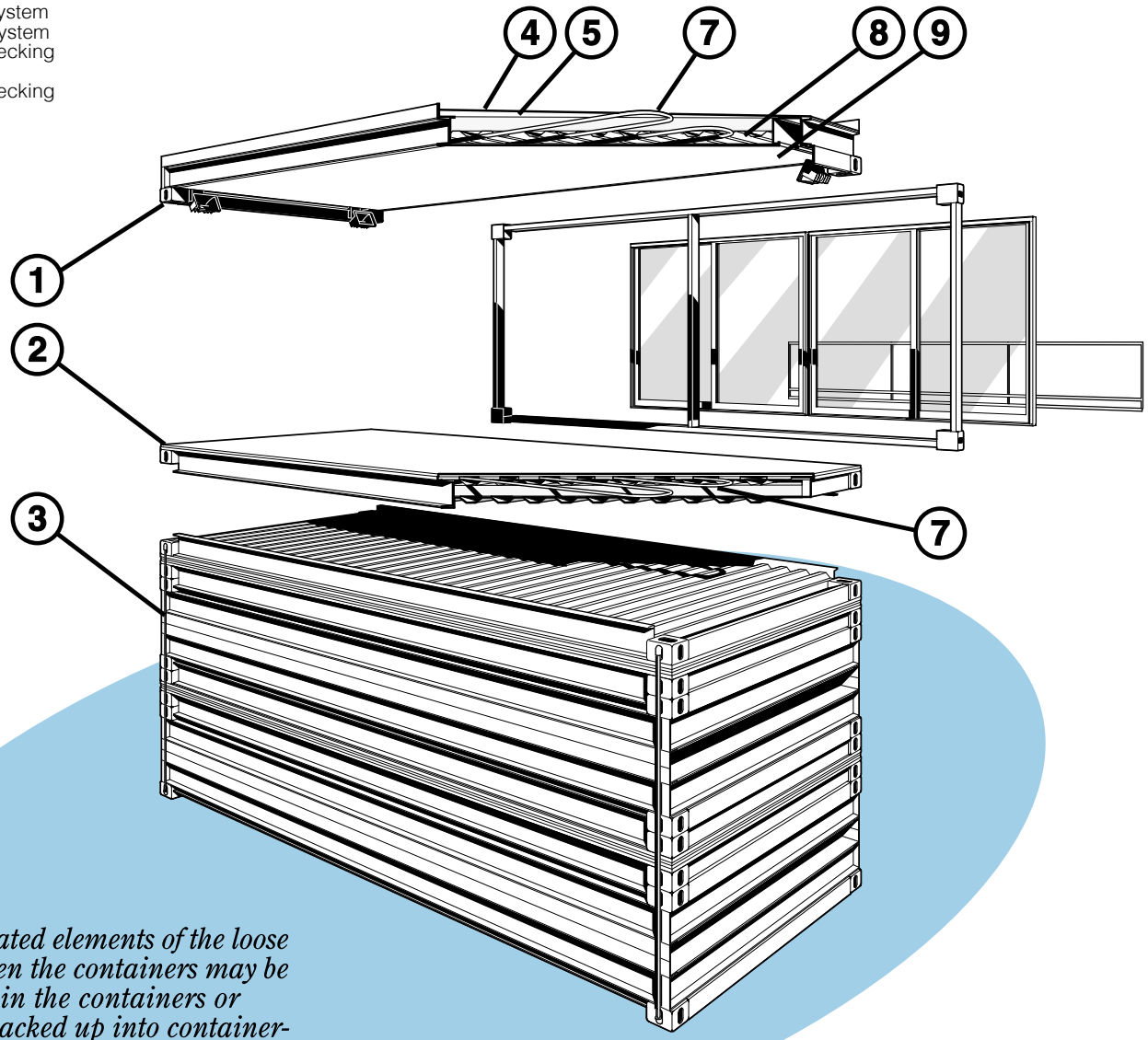
in the same spirit, the outfitting of the PROgram/conTAINERS may be systematized and pre-fabricated into rail-mounted program/calimari sections that are slid into the waiting container in the necessary order

The PRO/con Difference: SPEED

You expect a prefab, modular construction system to go up fast, and PRO/con is no different, even though it is not necessarily prefab, and not completely modular. Starting with its delivery via the well-oiled machine/infrastructure of the global shipping industry, and continuing with the smoothly coordinated efforts of the riggers and local contractors that erect it, the PRO/con package building can be ready for occupation in as little as a month after delivery, depending on its size and complexity. Before that, count on a couple of weeks for programming and contractual matters, a month or so of design and documentation, and then, depending on the locality, between a few weeks to a few months for the building permit and Contractor selection process. Once that's all taken care of the prefabrication process itself can take as little as a month of time before delivery to the site. So, it all adds up to as little as four months from phone call to move-in date.

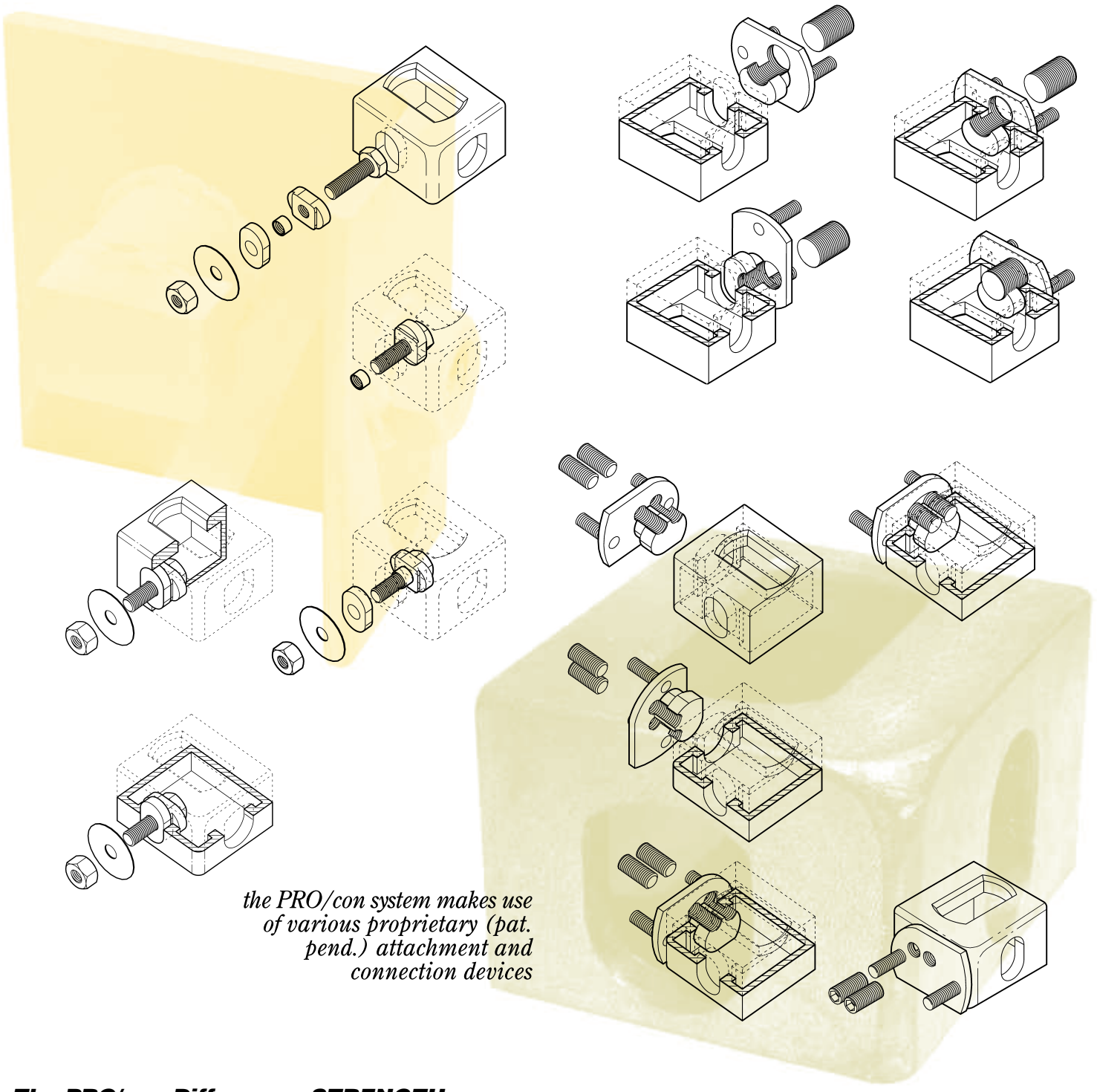
Because it is based on the shipping container (all of its

1. steel frame roof panel
2. steel frame floor panel
3. floor/roof panel bundle
4. EPDM roof membrane
5. rigid insulation
6. hydronic cooling system
7. hydronic heating system
8. corrugated steel decking
9. finish ceiling
10. corrugated steel decking



the prefabricated elements of the loose spaces between the containers may be shipped within the containers or themselves stacked up into container-sized assemblies for shipping

parts are either containers or fit inside containers), the PRO/con system is well-suited to travel and very inexpensively shipped anywhere a container can go (the means for handling all the components of the system exist wherever containers are found). And once the containers are in place they provide the foundation and framework for the rest of the construction, so that this remaining work can be tailored to make use of the best local methods and procedures—whether all prefabricated and just assembled in the field, or all built conventionally on site. Finally, because it is a *loose* modular system, no effort is wasted in trying to make pieces that fit together so well in the controlled environment of the factory work together the same way in the field. The PRO/con system leaves room for the contractor to adjust to the actual conditions on the site.

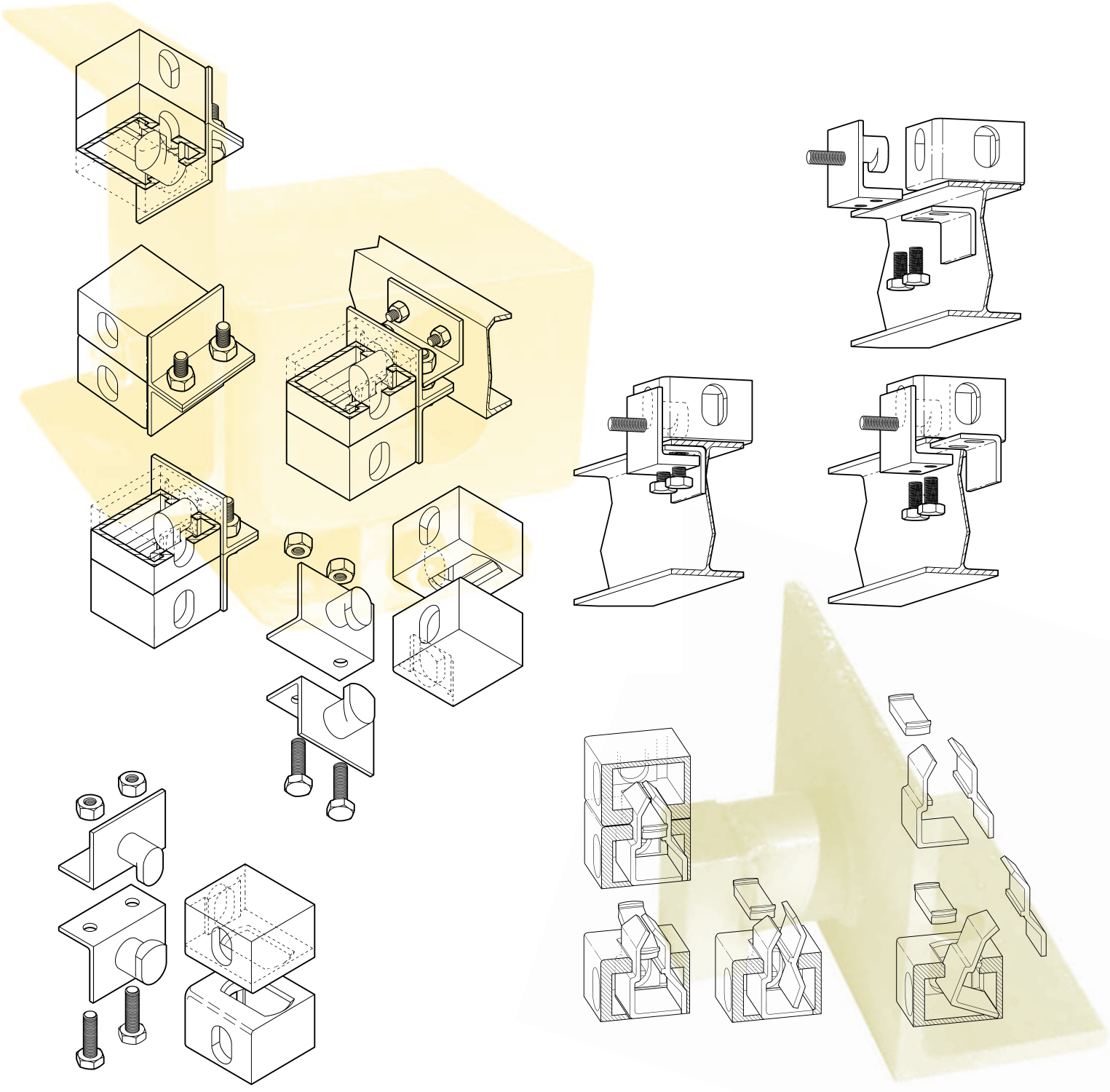


the PRO/con system makes use of various proprietary (pat. pend.) attachment and connection devices

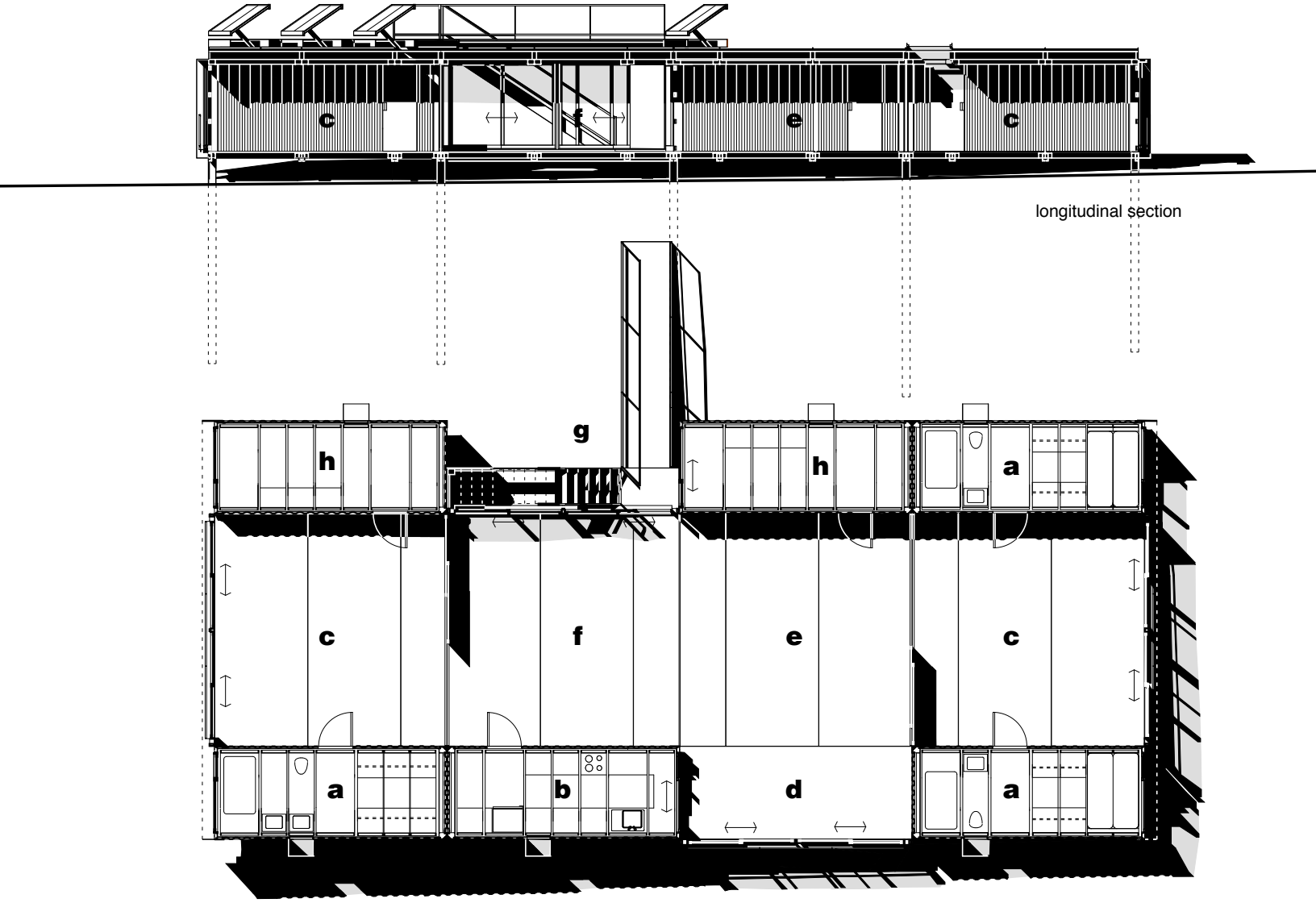
The PRO/con Difference: STRENGTH

While it may not be the first thing you notice about it, the biggest difference between the PRO/con package building and other modular or prefabricated products, is its strength. The all-welded-steel ISO standard 20' shipping container is the result of years of development and refinement, designed to withstand the most brutal handling on the docks and high seas. Structurally, it is at least twice as strong (and in some places *eight* times as strong) as any building code requires, yet it is no heavier than comparably sized rooms of conventional construction.

The key to its strength and light weight is the efficiency with which it puts its steel to work. Essentially structured like a monococque auto racing body, its geometry compensates for the thinness of its material. The folds of corrugation stiffen its walls, and the walls themselves serve as beams, so that the container spans freely between its corner fittings without the need for additional structure. Though the PRO/con system cuts holes into those wall/beams, the openings are strategized to work within the container's natural order to preserve its strength.



Where, due to program requirements, such strategizing is not possible, the holes may be reinforced to regain any sacrificed strength. The PRO/con system uses this strength not only to stack up the arrangements of containers, but to help support the additional large spaces between them that are the system's trademark and key to its tremendous flexibility. This is possible because the containers are designed to bear much greater loads internally and in stacking arrangements than any building codes require—in essence they have strength to share. Because they operate like beams themselves, and have the convenient corner fittings for tieing them together it is natural for them to carry additional structure that can be tied right into the system they use for their own purposes.



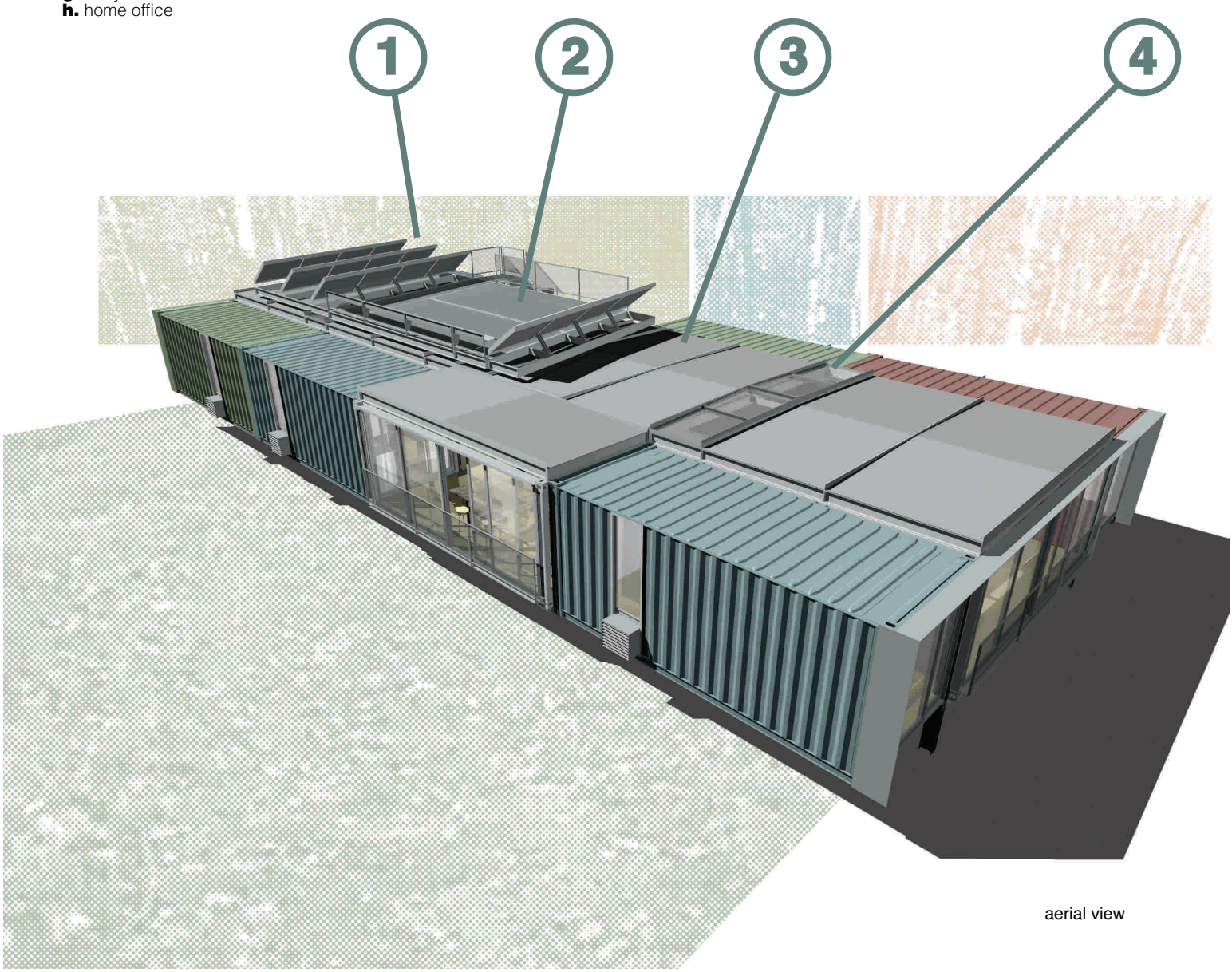
The PRO/con Difference: COST

The bottom line is that flexibility plus speed plus efficiency and strength equals cost savings. Starting from a proven system like the ISO shipping container that over the years has worked off all the fat, and then adding only what is necessary for its new use, is the recipe for the leanest faire in contemporary small and medium scaled building. The container brings with it a built-in global infrastructure and the benefits of the largest volume mass production (in the least expensive part of the world), which drives prices way down. By beginning from such extreme economy, PRO/con is able to splurge a little on other parts of the construction without ruining the bottom line.

Yet, this is no Frankenstein solution or smorgasbord proposal. PRO/con blends the unique contributions of the two worlds intelligently, so that their requirements complement each other and the result is seamless. The building's actual inexpensiveness is not obvious in the

a. bath/closet
b. kitchen
c. bedroom
d. dining
e. music area
f. living room
g. entry
h. home office

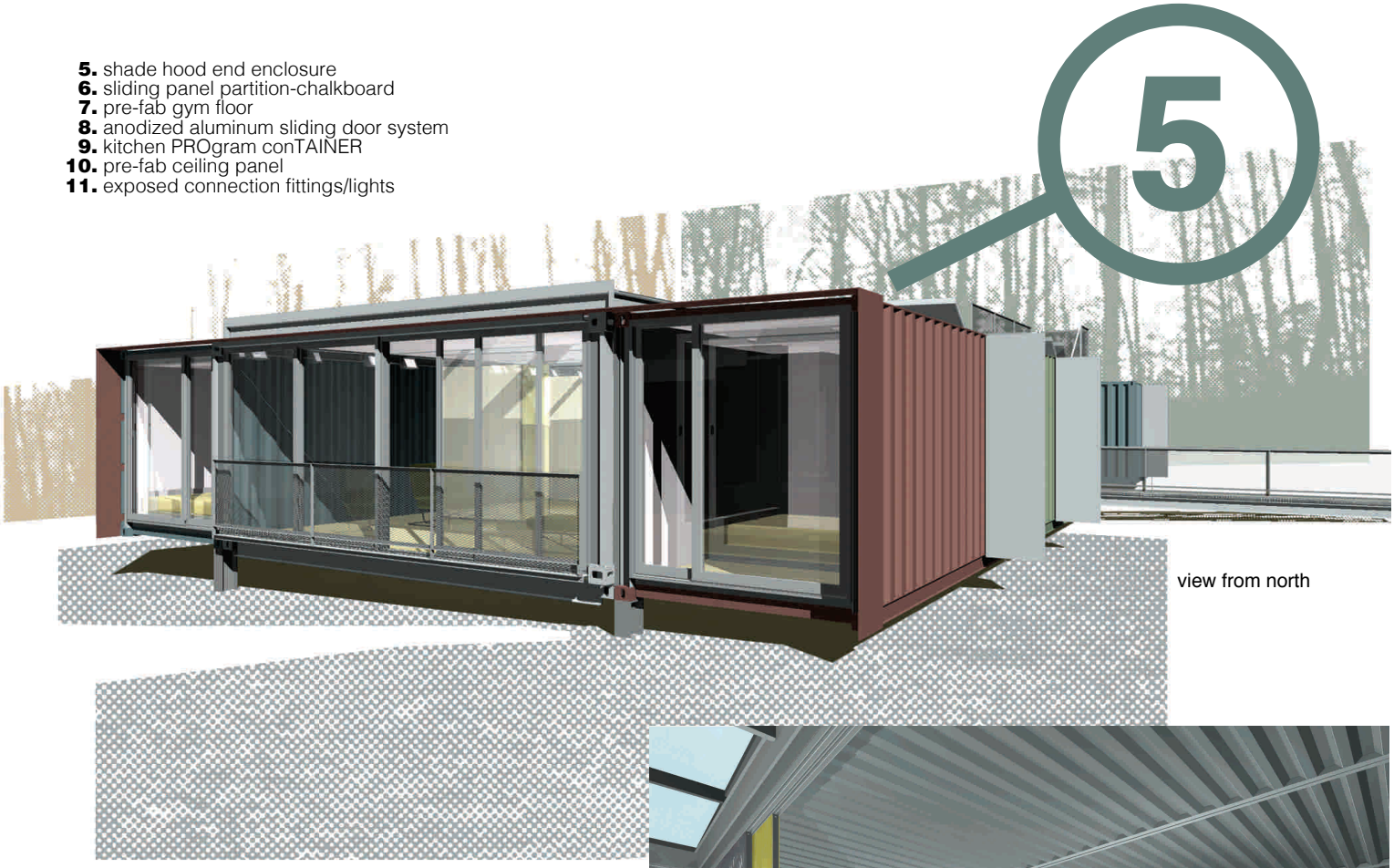
1. photovoltaic array
2. roofdeck/solar panel service access
3. pre-fab roof panel
4. pre-fab skylight panel



aerial view

finished product. Limited production and work on test rigs so far indicates an average price of about $40k per container module can be taken as a rule of thumb, or between $100-$120/square foot, amortized across a typical medium-sized installation. This rule of thumb price has increased dramatically in the last year due to increases in material costs throughout the building industry, but still represents a substantial savings over other most other methods of construction. It includes both the container and the adjacent portion of the infill between the containers, assuming a conventional construction or middle level prefab. Obviously more complex schemes, or schemes which use more expensive infill material systems would be more expensive; also, smaller schemes might be proportionally more per container and larger schemes less.

5. shade hood end enclosure
6. sliding panel partition-chalkboard
7. pre-fab gym floor
8. anodized aluminum sliding door system
9. kitchen PROgram conTAINER
10. pre-fab ceiling panel
11. exposed connection fittings/lights



view from north

interior view

C03.03/1 DWELL HOME PRO/CON
(also shown in preceding spread)

Client: Dwell magazine/Nathan Wieler and Ingrid Tung

Site: gently sloping clearing on heavily wooded multi-acre property in North Carolina

Program: single family residence: 6 PRO/con units, for two bedroom suites, office, kitchen; living/dining/family and decks in space between

Size: 2,750 sq.ft.

Cost: $250,000

Completion: Spring 2003 (competition)

Notes: 20' ISO standard containers and steel framed prefab infill panels for roof and floor on driven steel piles; aluminum sliding glass door and solid door interior partition system.

Project Text: While a PRO/con home can be arranged in any number of configurations to take advantage of local construction economies, the one shown here has been tailored to meet the specific needs of the clients. This residence therefore combines the production and cost efficiencies of factory fabrication with the specificity and flexibility of on-site construction.

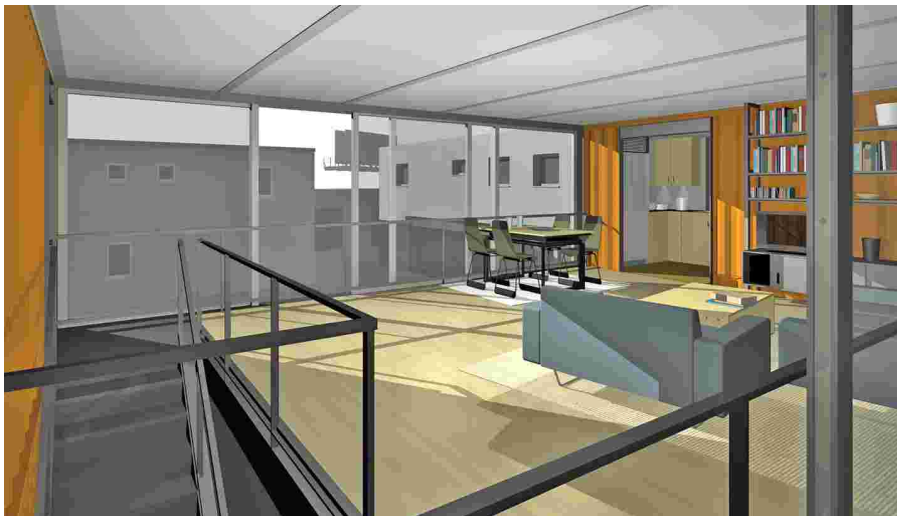
The success of the PRO/con system is based on its acceptance of a "loose fit" between the factory-built units, their arrangement on the site, and local tolerances. This is in contrast to the traditional approach to modularity, which stipulates a level of exactitude that is rarely

interior view

achievable in the field. By combining the containers with a prefabricated panel system of 8'x20' panels that can be deployed for the floor, wall, ceiling, or roof, the space between the containers can serve as a generous open space, or, as shown here, can be flexibly subdivided to provide a sunny and expansive master bedroom, living room, violin rehearsal space, and children's den. Using transverse partitions that double as convenient chalkboards for creative inspiration, this large but divisible interstitial space is also capable of an infinite set of flexible options. For added convenience, the panels can be stacked in a shipping-container block for transport.

The PRO/con system is environmentally responsible. The adaptively re-used, discarded shipping containers sit lightly on the land. The whole structure is perched on friction piles that have a minimal impact on the site and allow the natural conditions to flow freely by underneath. Heating and cooling are provided by a system of solar panels accessible by a roof deck also manufactured from the prefabricated panels. The containers can be stacked or minimized (as in the garage unit) to respond to specific climatic conditions, site contingencies, or to respond to the changing needs of its clients — challenging the impulse towards pocket mansions and other wasteful schemes that seem to characterize so much suburban development these days. In addition to the expandability demonstrated here in the inserted children's rooms, PRO/con can anticipate and accommodate second-hand or after-market container adaptations that could effectively recycle technologies and appliances otherwise constrained by planned obsolescence.

interior view, upper level



exterior view

MODERN MODULAR URBAN PROTOTYPE

Client: home shoppers, Modern Modular website

Site: anywhere, but assumed urban wasteland

Program: single family live/work: 4 PRO/con units, for one bedroom suite, office, kitchen; laundry, living/dining/family

Size: 1,000 sq.ft.

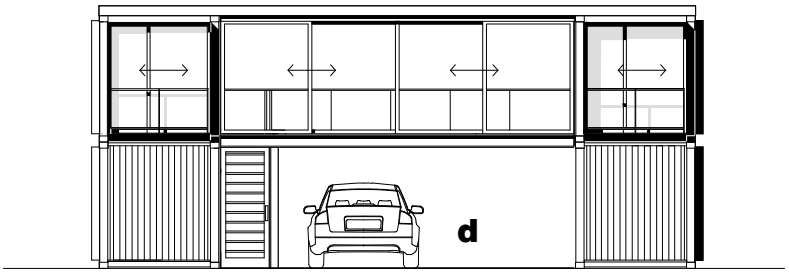
Cost: $150,000

Completion: Fall 2004 (website)

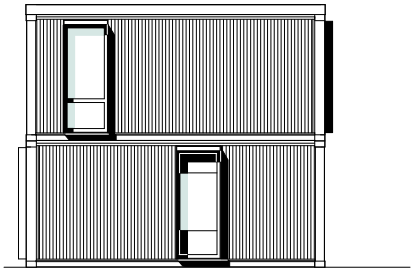
Notes: 20' ISO standard containers and steel framed prefab infill panels, aluminum sliding glass door system for loose space between on second level.

Project Text (excerpt): We were approached by Modern Modular to contribute designs to their list of products by a stable of associated architects. In order to demonstrate the broadest possible range in the least number of examples we combined the size and location variables into three prototypes. This one here is the smallest, designed for an urban wasteland type site most likely to be available for live/work type applications. It enjoys loose spaces between the containers both indoors and outdoors on the two levels, allowing even greater flexibility for the work type and set up, from messy work such as auto mechanics downstairs to cleaner office type functions upstairs. The downstairs open work bay is supported on either side by plumbed containers available for laundry or wet shop type applications.

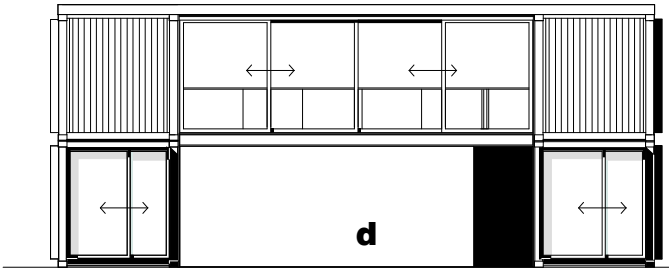
a. kitchen/breakfast
b. bed/bath
c. laundry/wet shop
d. outdoor work/carport
e. home office/shop
f. living room



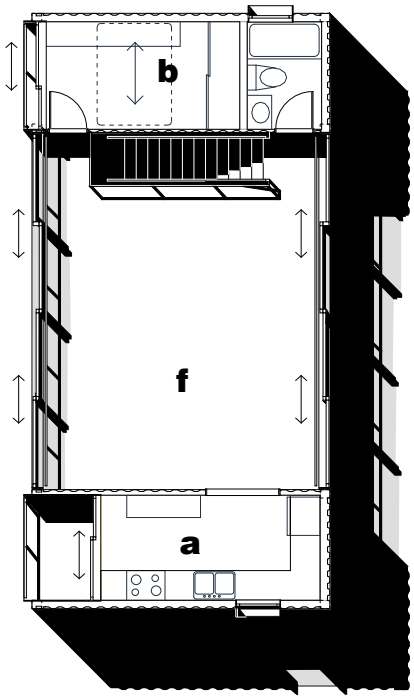
entry elevation



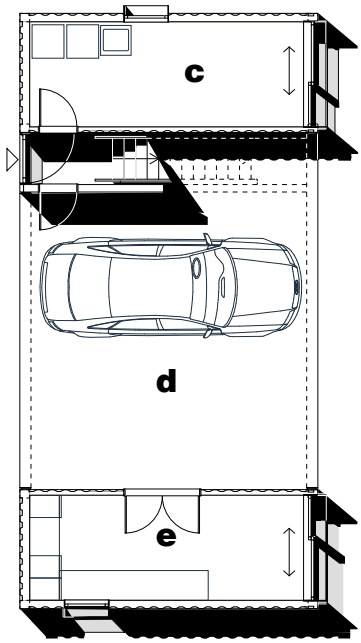
side elevation



rear elevation

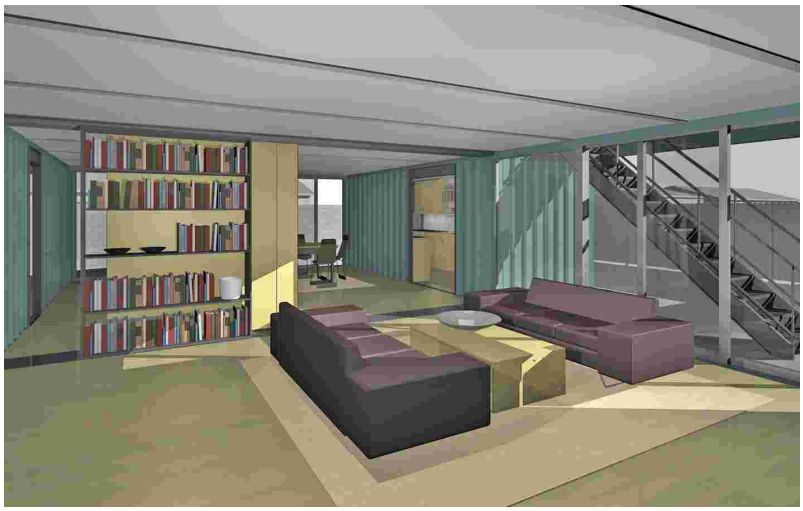


upper level plan

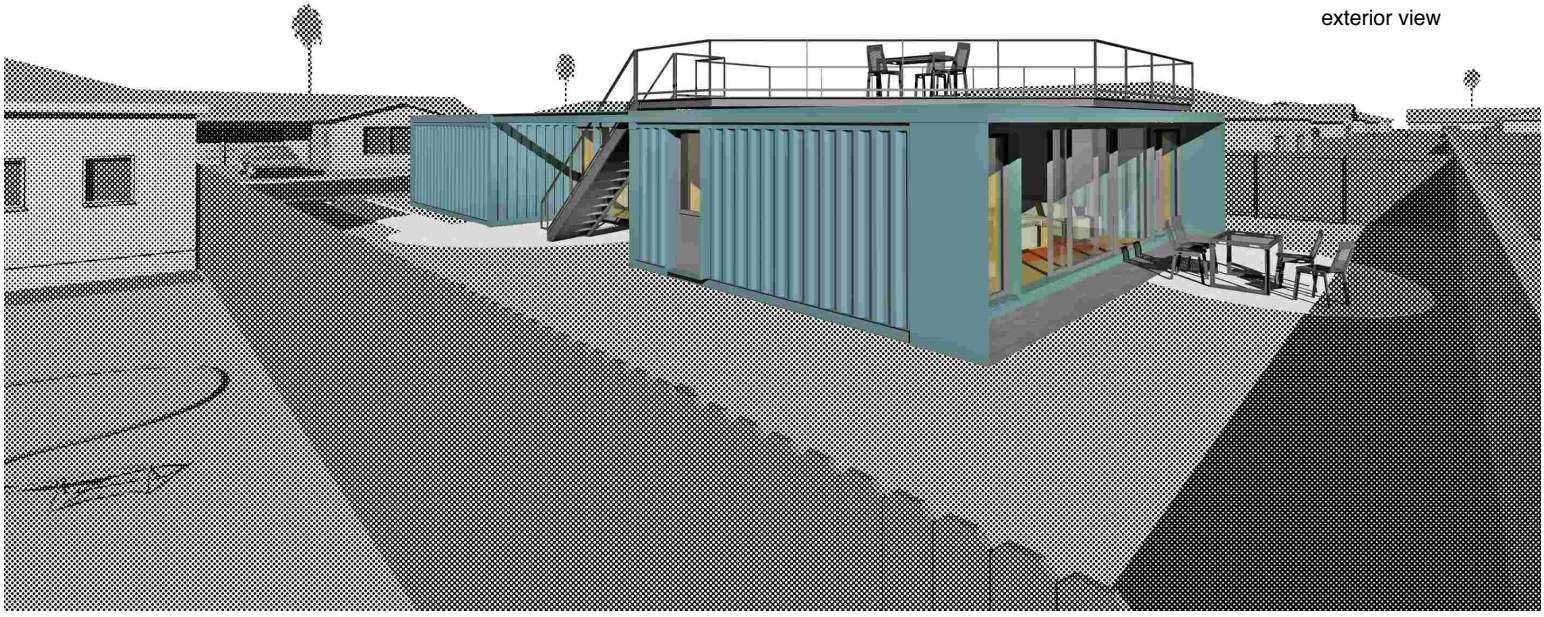


ground level plan

interior view, upper level



exterior view



MODERN MODULAR SUBURBAN PROTOTYPE

Client: home shoppers, Modern Modular website

Site: anywhere, typical suburban tract

Program: single family lresidence; two bedrooms, kitchen, dining, family, laundry/storage

Size: 2,000 sq.ft.

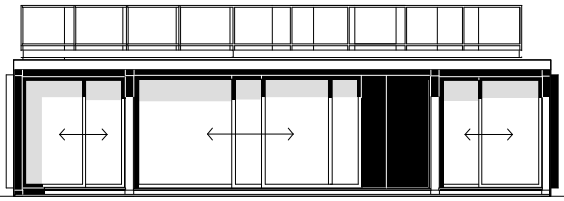
Cost: $200,000

Completion: Fall 2004 (website)

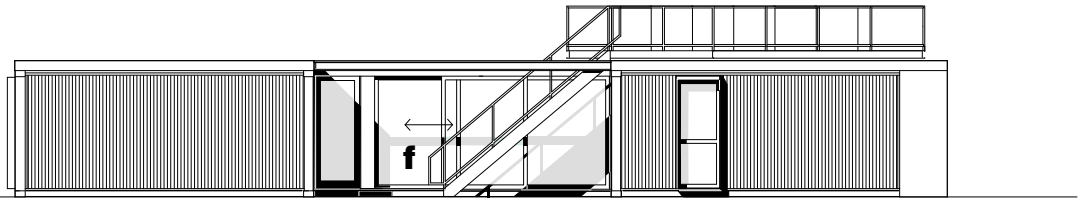
Notes: 20' ISO standard containers and steel framed prefab infill panels for roof, slab on grade for floor; sliding glass door system for loose space enclosure, steel framed roof deck with fiberglass decking.

Project text (excerpt): designed to fit the standard 50x100 lot in suburban subdivisions, this version of the Modern Modular family of prototypes goes well in any neighborhood. Posing as a Case Study House, it challenges the rest of the block to match its pragmatic, streamlined elegance. It sits on the lot lengthwise, rather than across its width so that the residual yard space is shaped like an 'L'. In this way a more continuous gradient of privacy is created from the sheltered space in the rear to the public yard alongside the driveway. Within the house itself, the disposition of the PROgram conTAINERS around the central loose-fit interior space of the living areas recapitulates on the interior of the dwelling the (sub)urban spatial dynamics of the exterior, giving a continuity of experience similar to that which distinguishes the suburban development as a whole.

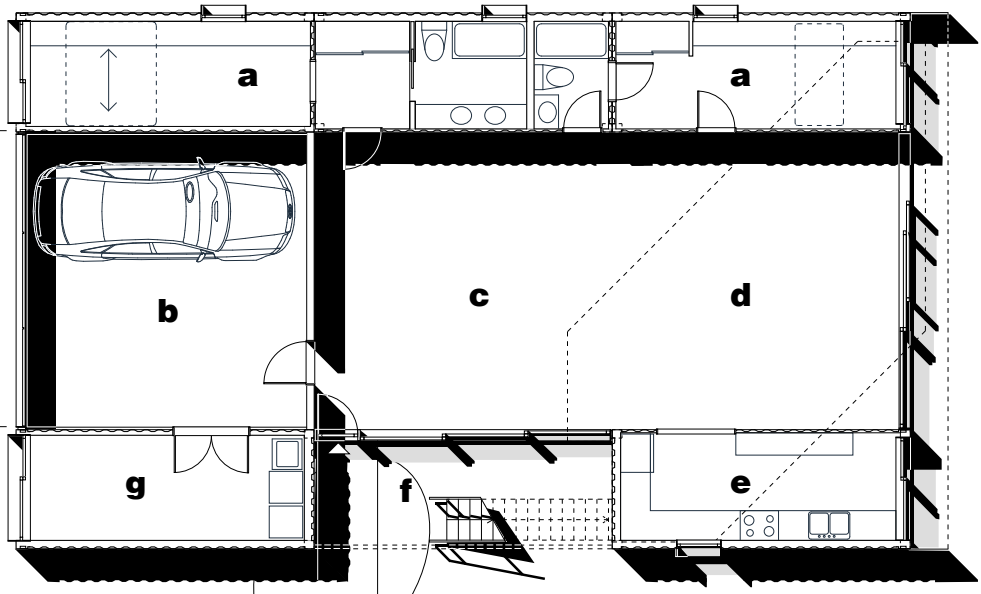
a. bed/bath/closet
b. garage
c. living area
d. family/dining
e. kitchen
f. entry
g. laundry/shop



backyard elevation



entry elevation



plan

a. family room
b. library
c. lliving room
d. dining
e. entry
f. kitchen
g. laundry/office
h. garage
i. storage
j. roof deck
k. bedroom
l. master closet/bath

interior view

exterior view

MODERN MODULAR RURAL PROTOTYPE

Client: home shoppers, Modern Modular website

Site: anywhere, rural areas or larger suburban lots

Program: single family residence: three bedrooms, family, library, home office, storage, kitchen, dining

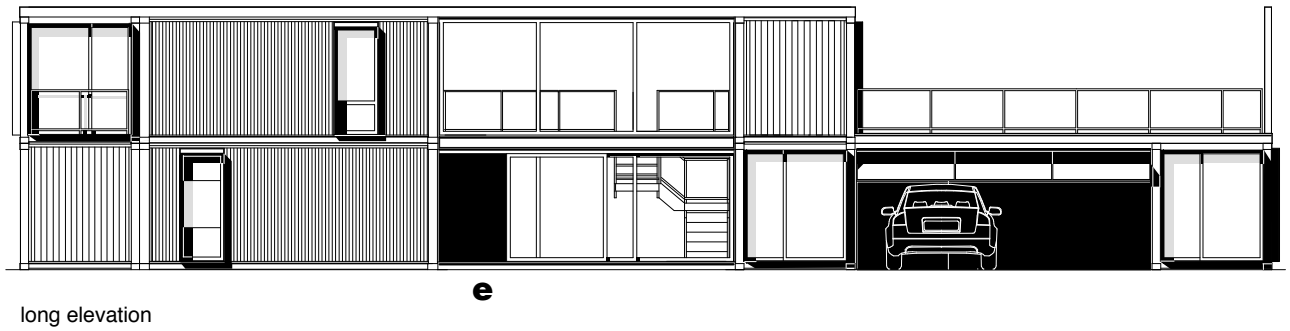
Size: 2,400 sq.ft.

Cost: $250,000

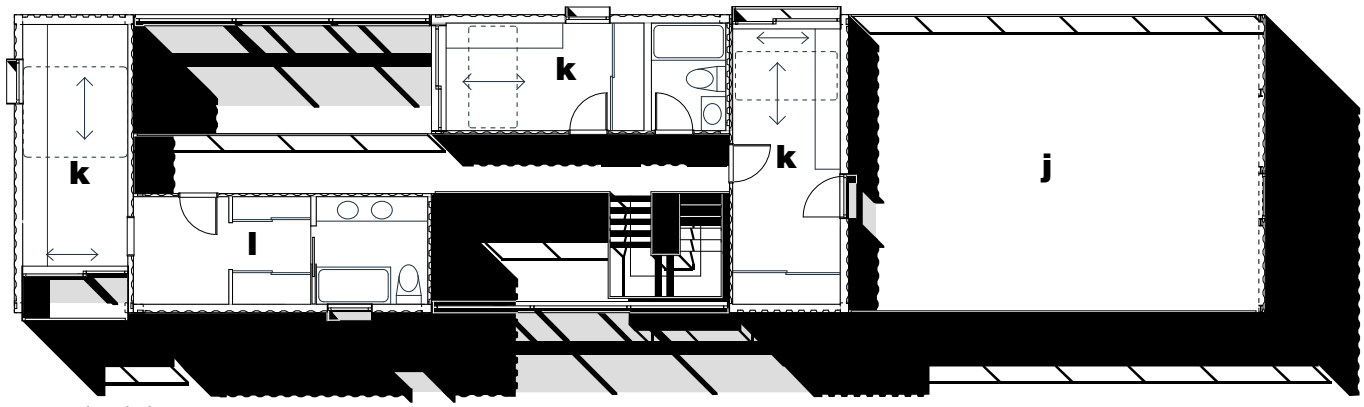
Completion: Fall 2004 (website)

Notes: 20' ISO standard containers and steel framed prefab infill panels for roof, slab on grade for ground floor, steel decking and ply for upper level walkways; aluminum sliding glass door and storefront glazing for open area enclosure.

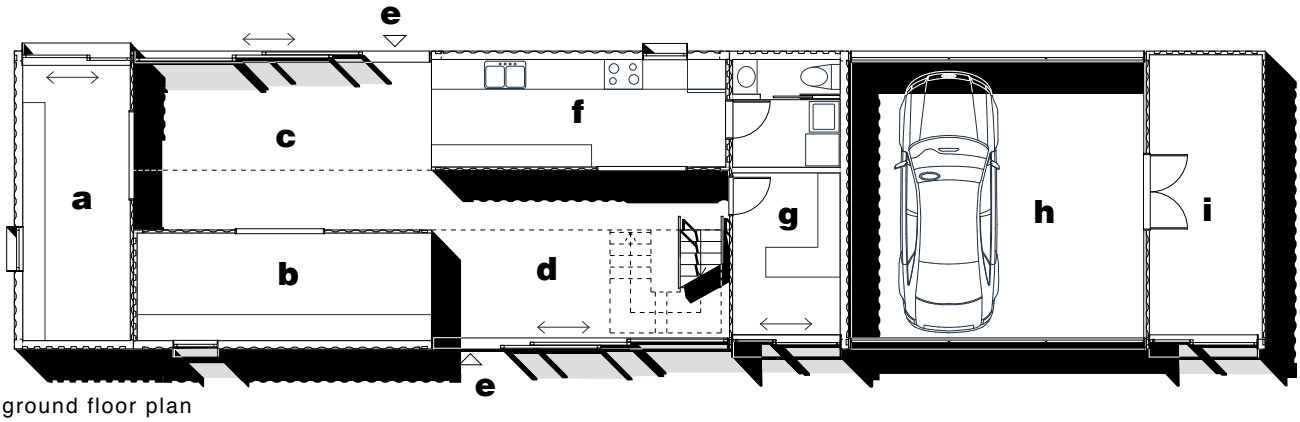
Project text (excerpt): this instance of the PRO/con system takes the abundance of area on the site as license for a more attenuated, rambling layout. Instead of the more common "diatomic" scheme, this version explores the tectonic implications and spatial dynamics of a cross-grain container disposition. Forming 'L' shapes around an interior residual space with figural coves at the main living areas, this arrangement of containers echoes the greater freedom and variety of its rural siting. By spreading its bulk out over the landscape the design organizes that landscape into yards, which it addresses with its long facades, dividing front from back, north from south, and sponsoring related activiy spaces immediately outside its living coves on the inside.



long elevation



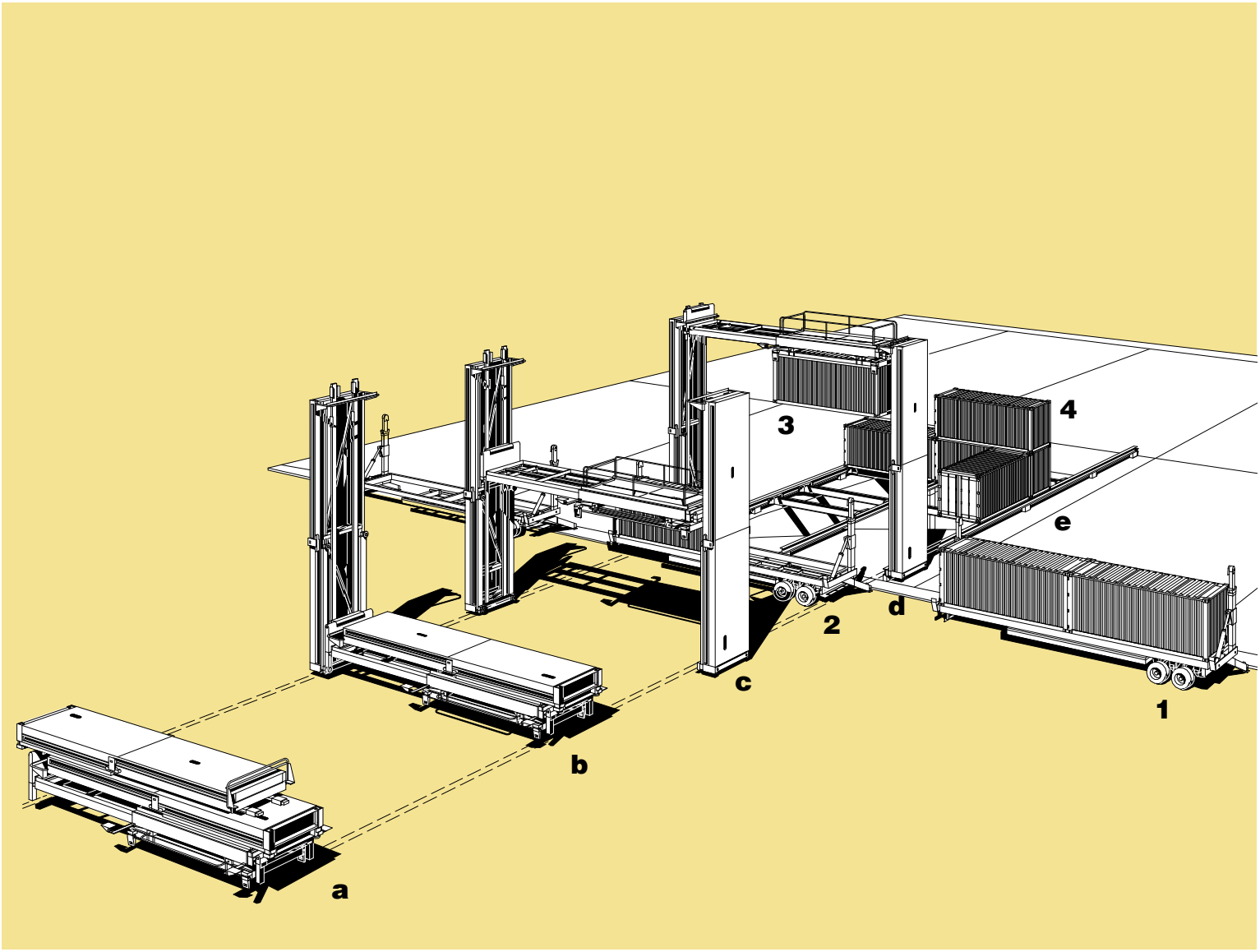
upper level plan



ground floor plan

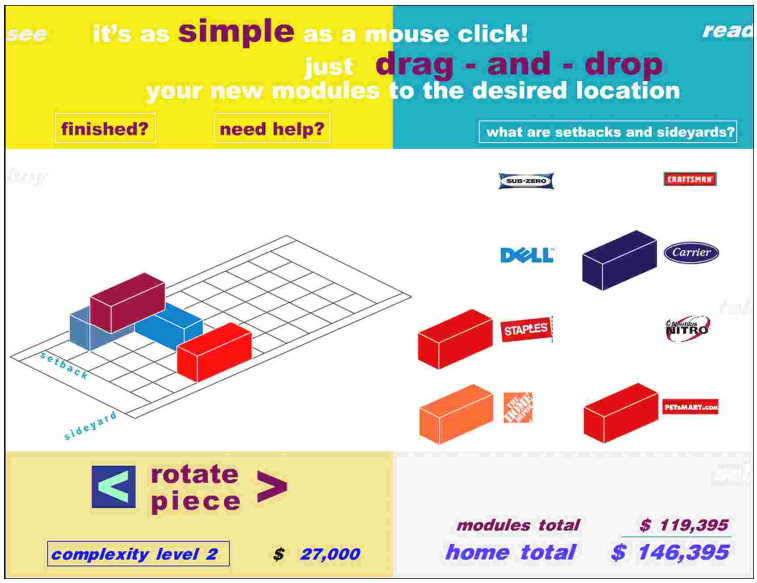
a. ISO crane as it comes off truck
b. crane uprights unfold
c. crane bridge/lifter deploys
d. crane lifts PRO/con unit from truck
e. PRO/con unit deployed into site along rail

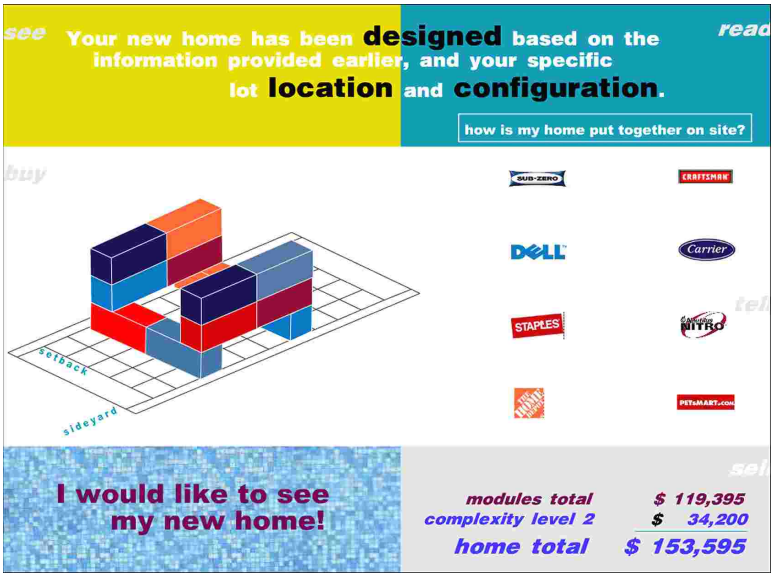
1. ISO PRO/con unit as deliverred
2. empty truck bed after crane picks unit
3. crane deploying unit onto site
4. PRO/con units installed on site



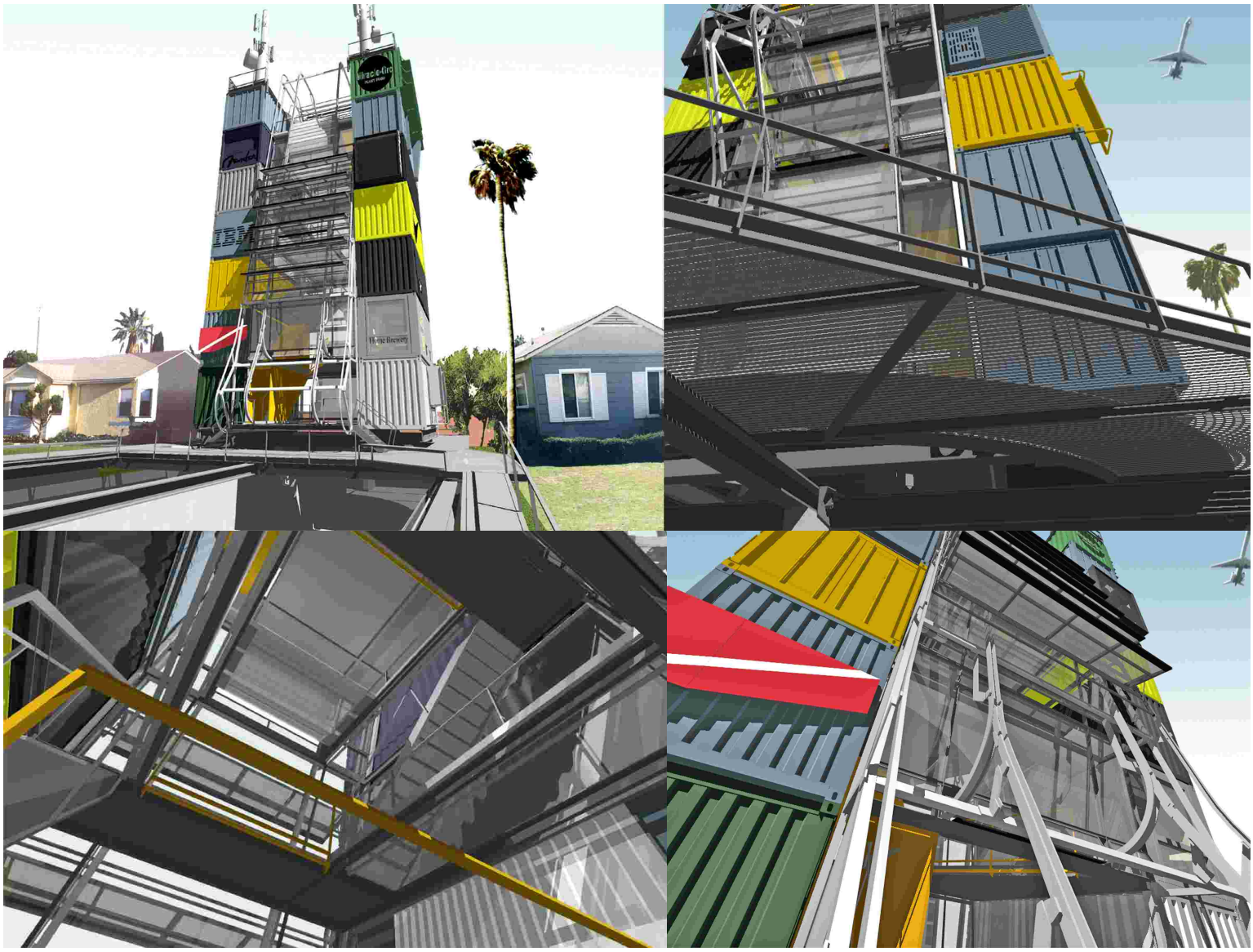
The future of PRO/con

In the future, PRO/con will look like this: a web-based design, procurement, delivery, assembly and construction, and resale brokerage network. Both proprietary and aftermarket PROgram conTAINERS would be available through links to the websites of the companies that offered them. These would be companies like Sears, Whirlpool and Sub-Zero, Ethan Allen, Microsoft or Apple, Sony or any one else that makes the products that fill the built environment, and they would provide full containers based on their products and the programs those products serve. So, for example, it would be possible to purchase a Sears Kenmore kitchen container, or a Steelcase office container. These containers would be marketed like the products that are presently sold by these companies. Among the companies offering competing versions, with different options and for varying budgets, there would be the sort of choice we have come to expect as consumers. The design of a home would proceed first with the collection of the various program specific





containers that would eventually be brought together on site to produce the dwelling—an overt mapping of the needs and desires of the occupants, conspicuous consumption on display. Shopping for these containers would occur online, through a centralized portal for this purpose, as well as on the specific linked websites of the companies offering the containers. In order to maximize the benefits of this choice and flexibility both initially and in the future, the best method for deploying these units would be a linear rail mouned slide system, which would allow the containers to be offloaded from the trucks at the street and moved into the depth of the lot directly without swinging them over adjoining lots. By the time the new industry had matured to this degree PRO/con would be more involved in arranging the delivery of the various containers to the site, designing their arrangement and the spaces between, and then assembling them, rather than in the design or construction of the actual PROgram conTAINERS themselves.



PRO/con PACKAGE HOME "TOWER" PROTOTYPE

Client: The Hammer Museum/UCLA

Program: student housing, with hobby/activity specific module units arranged around central multi-level free space

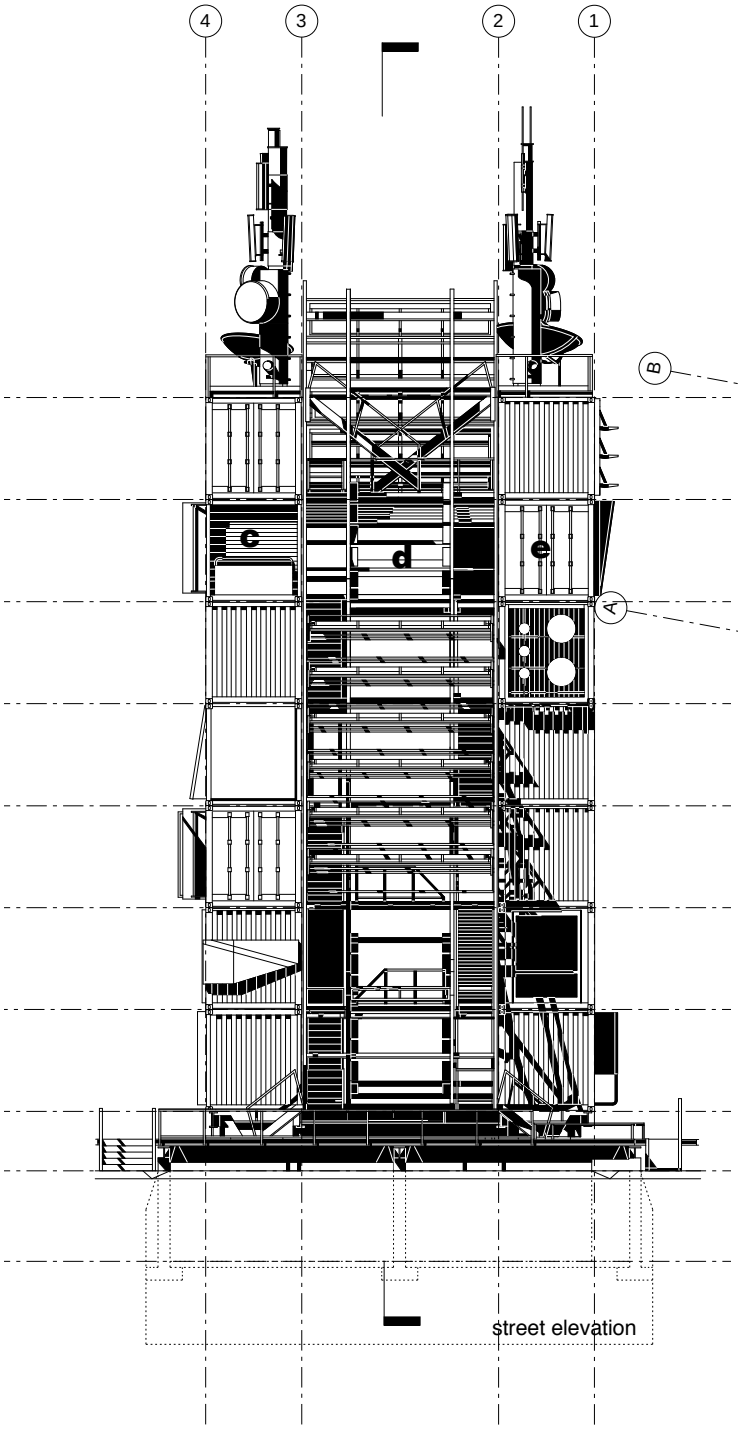
Size: 14 container units stacked 7 high

Cost: $320,000

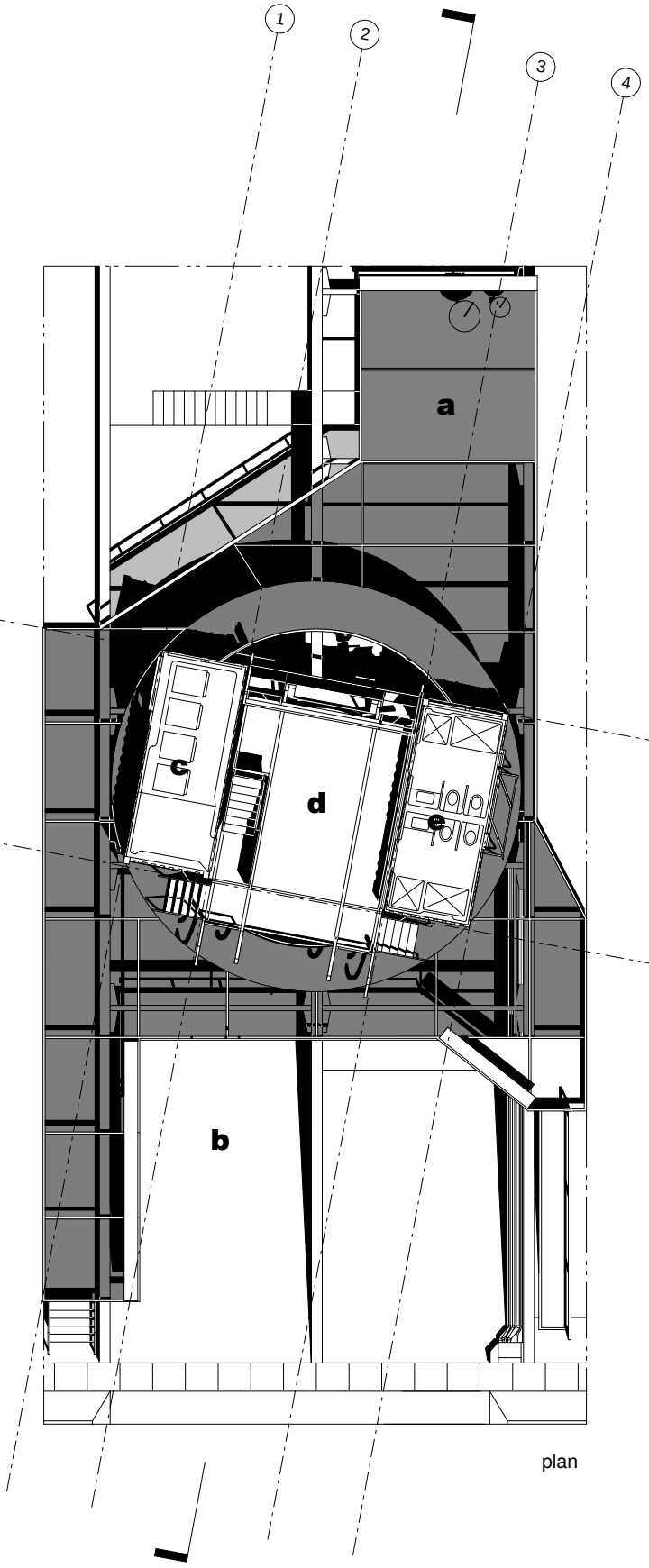
Completion: August 2000 (exhibition)

Notes: This demonstration of the PRO/con PACKAGE HOUSE system was intended to maximize the critical impact of the idea—sort of a bambi vs. godzilla approach to the premise of the "LIve Dangerously" show at the Hammer Museum, which supplemented the "Unprivate House" show that the Hammer had brought out from MoMA and was the occasion for this series of three designs. In this installation the stack of PROgram conTAINERS sits atop a slewing ring that allows them to rotate as a whole in order to tune the relationship of the tower to the elements. In addition, the space between, where the looseness of the "loose modularity" idea is emphasized, is devoid of fixed floors. Instead a vertical void space is circled by the stairs providing access to the stacked containers. Floors are introduced across this void as needed. When not deployed internally, they double as re-positionable sun-shades on the exterior. Using the same continuous track system as the RDU PRO/con design shown later in this presentation, these floor panels are able to traverse the entire vertical perimeter (profile/section) of the tower in order to provide flooring or shade wherever needed.

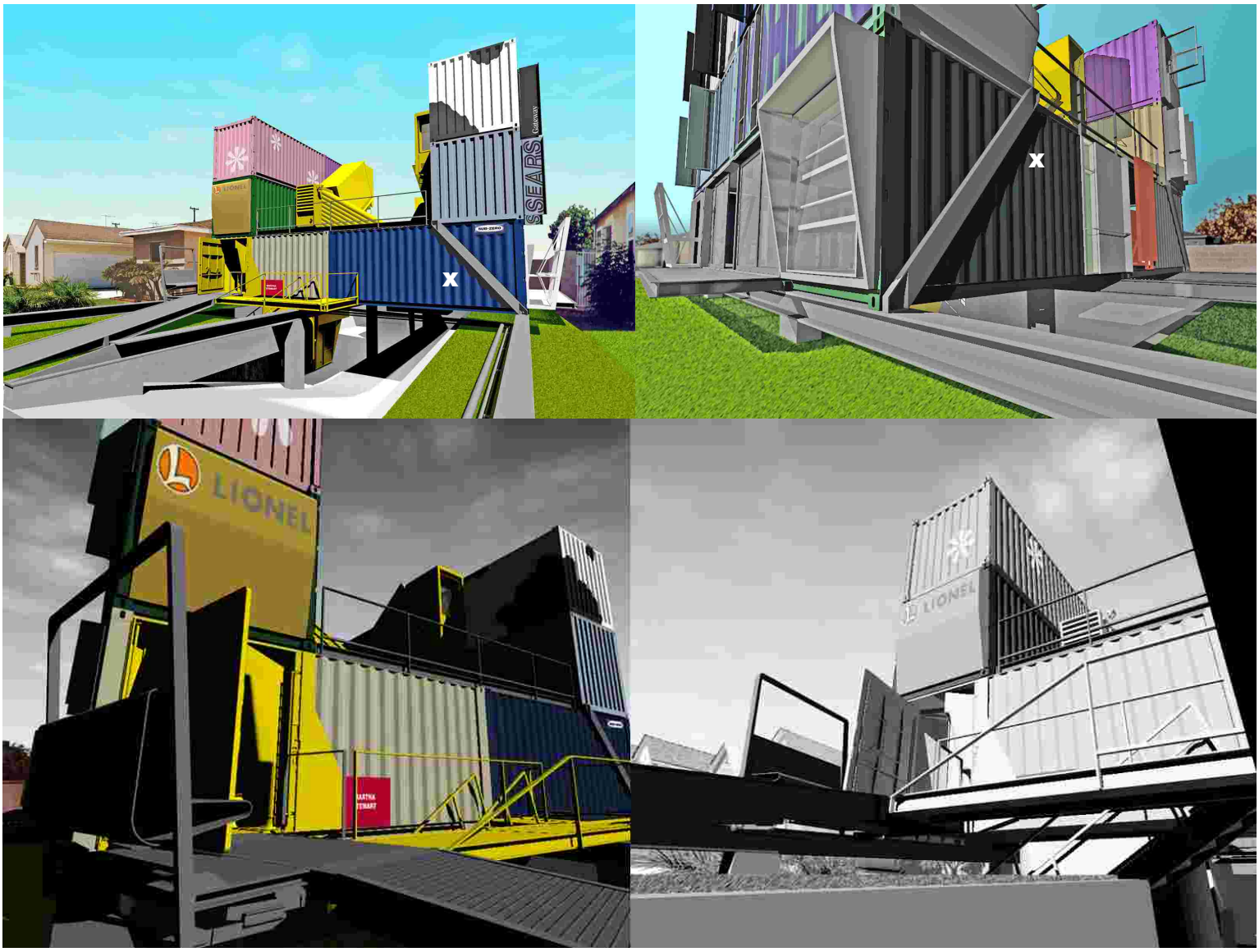
a. party deck
b. down to parking
c. whirlpool laundry PRO/con unit
d. full height loose space
e. American Standard restroom PRO/con unit



street elevation



plan



PRO/con PACKAGE HOME "SHORT STACK" PROTOTYPE

Client: The Hammer Museum/UCLA

Program: single family residence; 3 bedroom, kitchen, dining, den(s), garden/shop rooms

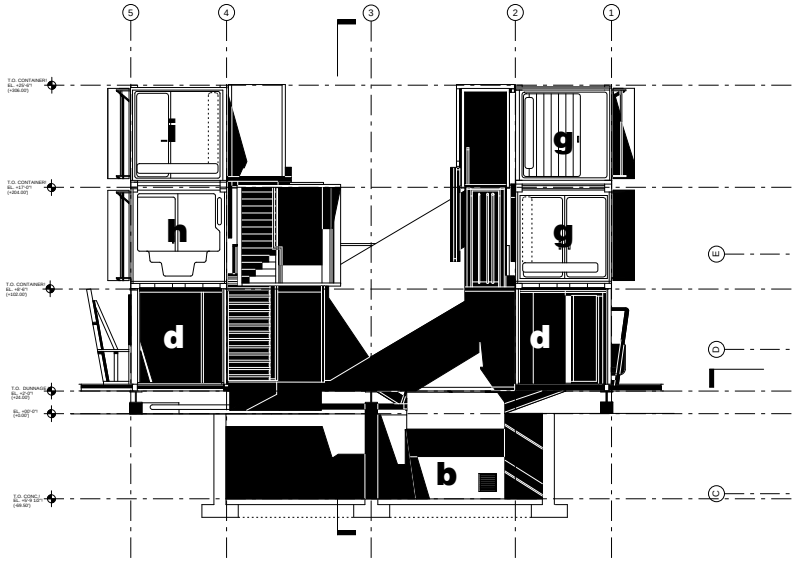
Size: 8 container units stacked 3 high

Cost: $280,000

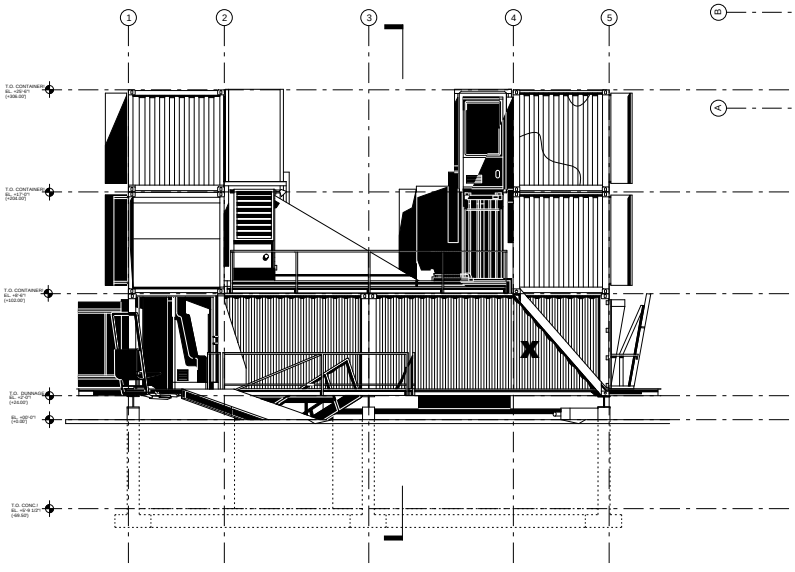
Completion: August 2000 (exhibition)

Notes: This demonstration of the PRO/con PACKAGE HOUSE system was designed to maximize the critical impact of the idea, so the conatiner units are shown with corporate logos that demonstrate the nature of the contents. This modular form of conspicuous consumption continues the contemporary spirit of the suburbs—keeping up with the Jones's—into the age of amazon.com and google. In this version of the PRO/con idea, the loose space in between the PROgram conTAINERS is not fully enclosed but instead outfitted as a sort of habitrail connecting the entries to the various containers, offering a critique of the familial (NOT) nature of the contemporary nuclear family, by eliminating the spaces typically claimed for "living" and "family" activiities. The proposition is that the family unit is more like a grouping of individuals, holed up in their individual, themed spaces and participating in the public realm online, rather than in the livingroom. Thus this is a reductive demonstration of the PROgrammatic basis of the PRO/con idea.

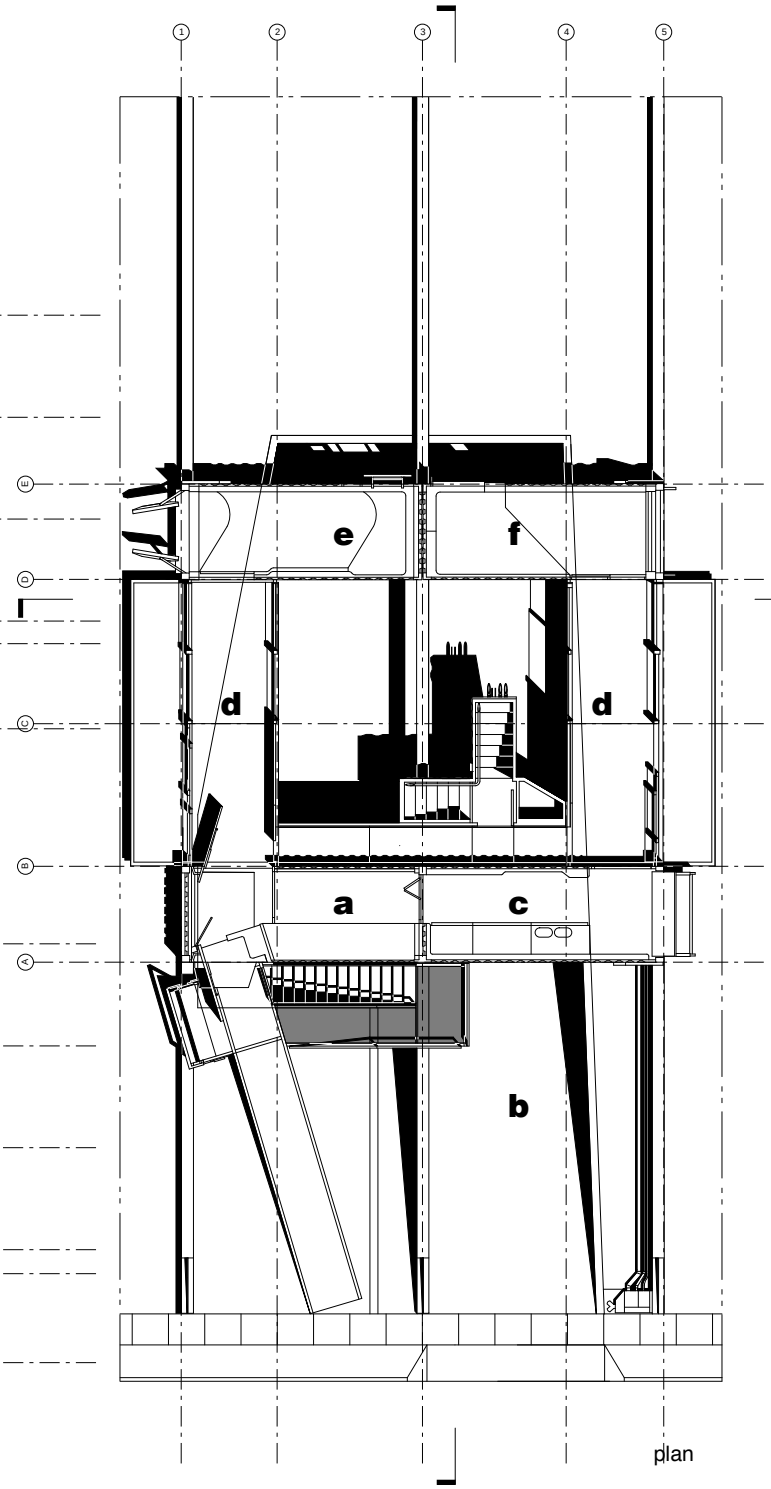
a. Martha Stewart entry PRO/con unit
b. down to parking
c. Kenmore kitchen PRO/con unit
d. loose space below longitudinal bridging units
e. Miracle Gro garden PRO/con unit
f. Home Depot Home Shop unit
g. Sears Bedroom PRO/con unit
h. Lionel Trainset PRO/con unit
i. Mattel Barbie bedroom unit
g. Sears Bedroom PRO/con unit
x. diagonal support for out-of-system placement



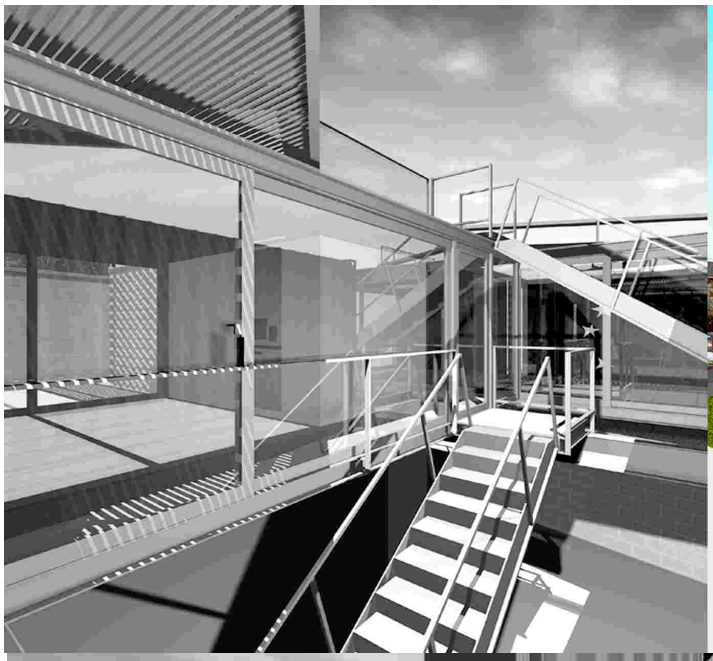
transverse section

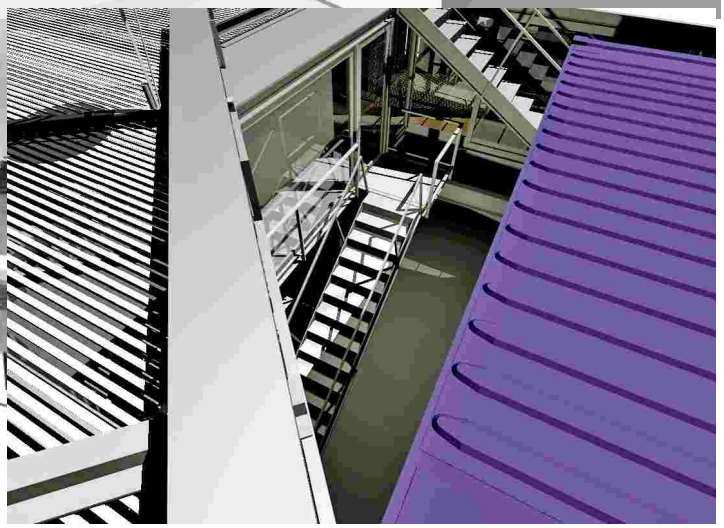


street elevation



plan





PRO/con PACKAGE HOME "RANCH HOUSE" PROTOTYPE

Client: The Hammer Museum/UCLA

Program: single family "starter home"

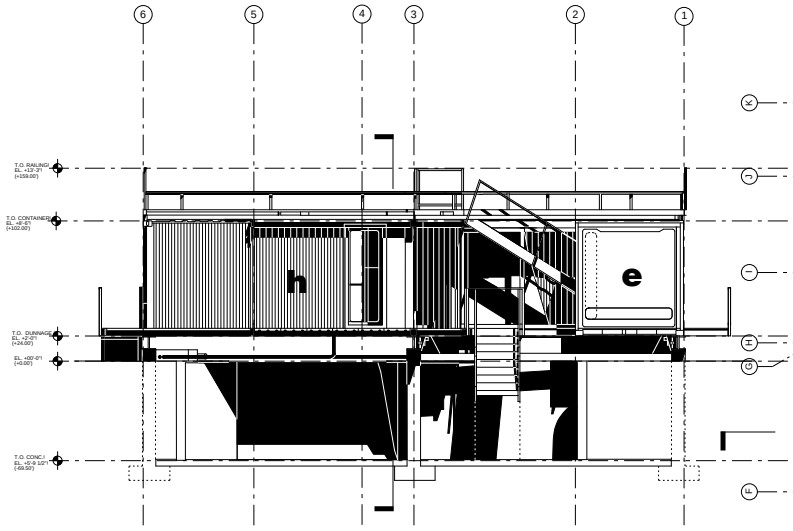
Size: 6 container units

Cost: $180,000

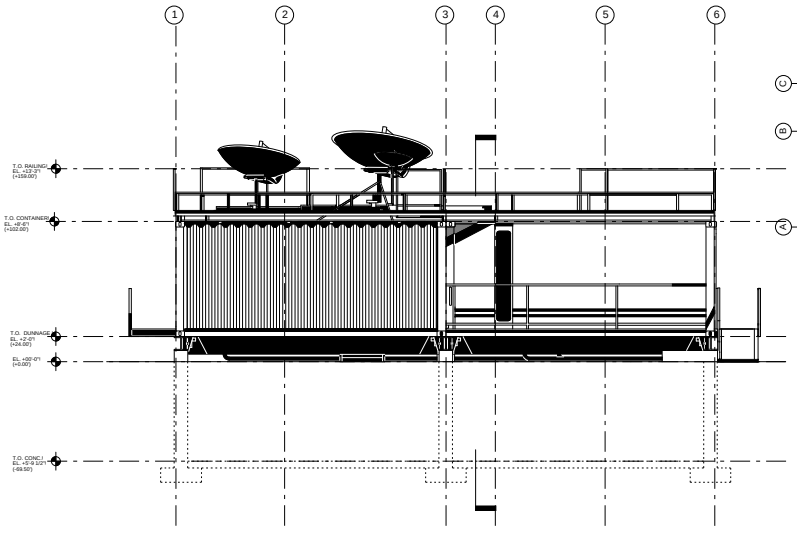
Completion: August 2000 (exhibition)

Notes: This demonstration of the PRO/con PACKAGE HOUSE system was designed to maximize the critical impact of the PRO/con idea. It features a loose "Venice Hospital" compositional arrangement with the loose or free space between the PRO/con units meandering from the front of the house to the back., with larger eddies that provide the living/family area overlooking the access up to the roofdeck and down the open garage below. The informality of the layout of the containers shows the dynamic possibilities of the residual spaces between, sized just beyond what would be necessary for mere circulation in each case in order to encourage an empowering engagement and use. In dramatic contrast to the highly specific internal configurations of the containers, designed to support particular activities, these loose spaces between are more than relief valves to the container's potentially rigid specificity; they are goads to creativity and self-expression.

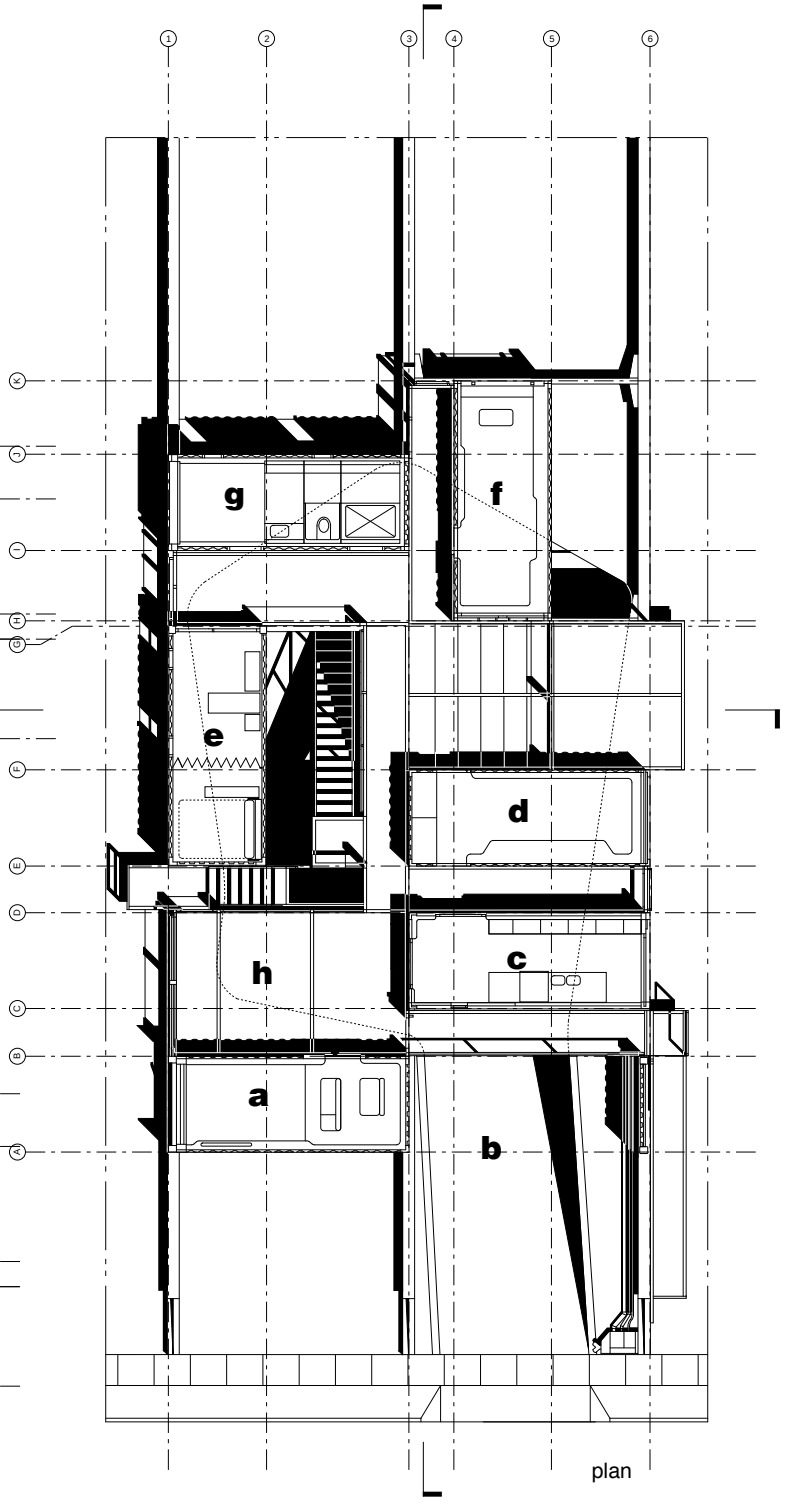
a. Disney entertainment PRO/con unit
b. down to parking
c. Kenmore kitchen PRO/con unit
d. Microsoft home office PRO/con unit
e. Sears bedroom PRO/con unit
f. Sears nursery PRO/con unit
g. Sears bathroom/dressing PRO/con unit
h. loose space between units



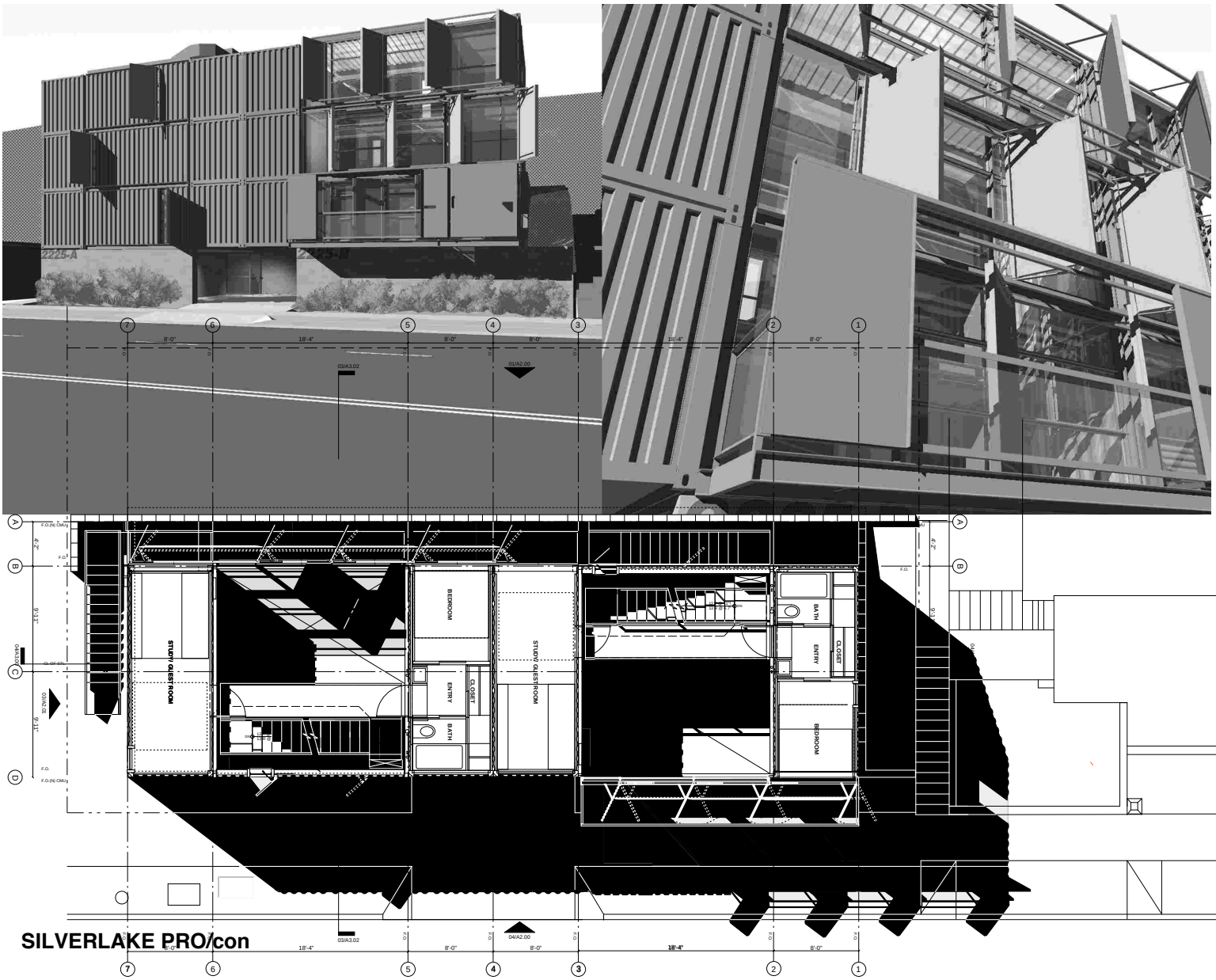
transverse section



street elevation



plan



SILVERLAKE PRO/con

Client: Jean Young Jones

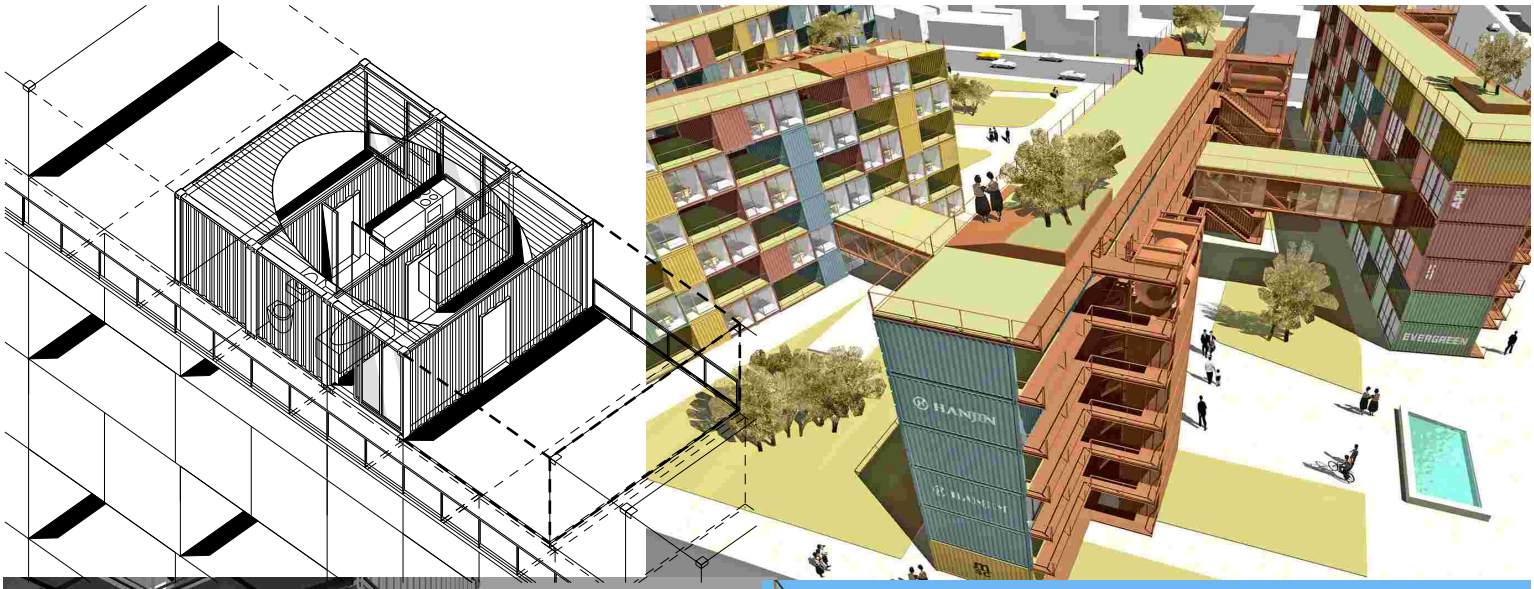
Program: Duplex residence; each unit with three small bedrooms, kitchen, media, library and central living atrium

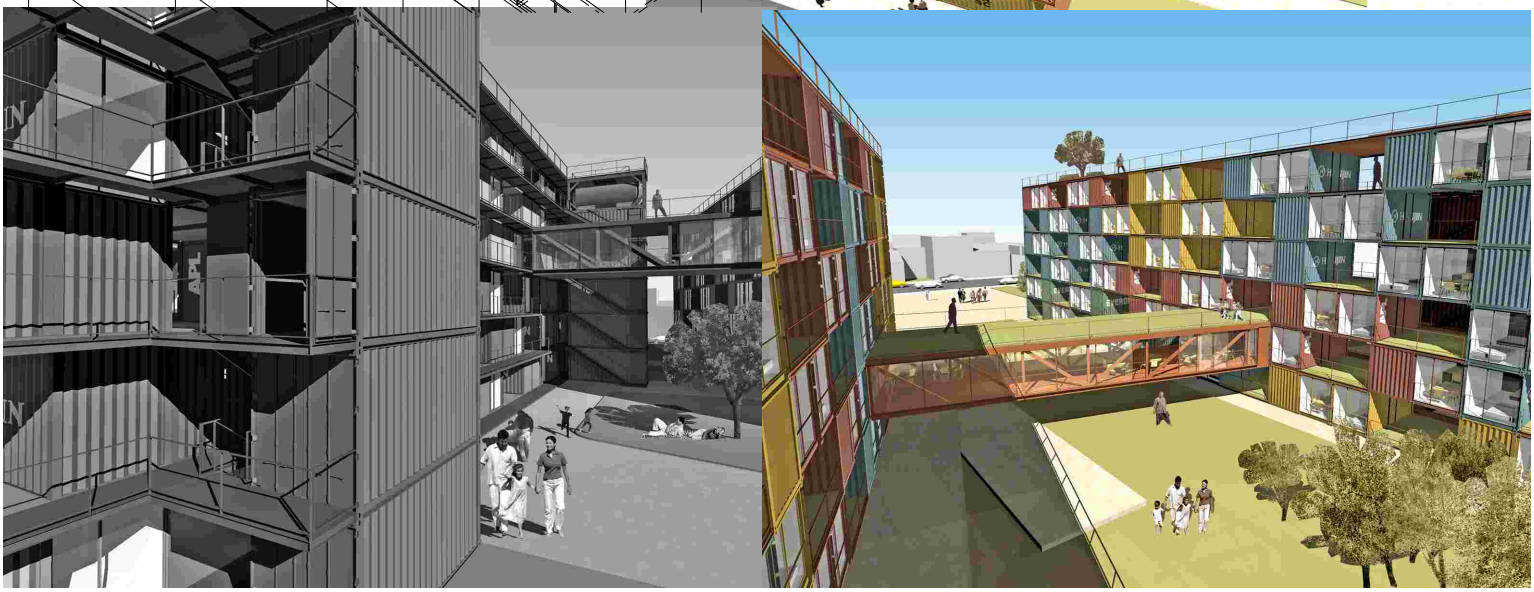
Size: 2,800 sq. ft.

Cost: $280,000

Completion: August 2001

Notes: This demonstration of the PRO/con housing system arranges twelve 20ft ISO shipping containers into four three-story stacks to create two, two bedroom apartment units. Each of the units is organized around a triple height space enclosed between the stacks, serving as the living room for the unit and, in the upper reaches, as the circulation area, transected by the stairs and catwalks that provide access to the containers. Per the PRO/con system, the containers house the dedicated program-specific functions of the apartment, such as kitchen, bath and bedroom. Also per the PRO/con system, the living space is left largely undefined spatially, awaiting empowering definition by the activities of its inhabitants. The living spaces and containers are oriented in opposite directions, with glazing on one side only, so that the building enjoys two different exposures. No additional structure is required to enable the containers to span over the parking at the base; the containers are rigidly joined at the corner fittings with proprietary connectors to create a composite beam, capable of spanning even greater distances than required here.





ELEMENTAL CHILE

Client: Elemental/Universidad Catolica de Chile

Program: Low income multi-family housing

Size: 1 city block

Cost: $500 (per unit)

Completion: November 2003

Notes: J,P:A refused to go along with the sponsor's poorly concealed interest in romantic yuppie loft style low-rise units that could be gentrified for the sponsor's friends, proposing instead a scheme using discarded 20' ISO containers in a Immeubles Villas type pattern with an actual demonstrated cost effectiveness for providing the maximum number of the necessary units for a verifiable low cost, without sacrificing the community spirit of the existing neighborhoods. This unique high-rise slab version of the PRO/con system is able to make community-scaled gestures from the aggregated container-sized modules. The Immeubles Villas type voids that are left in the layout in a wholly natural way per the PRO/con system are able to be used for future expansion or outdoor space at the upper levels of the slab. No additional framing is required except for the breezeways, which are hung from the corner fittings of the level they serve. Even the vertical circulation is supported by stacked containers—not inside, which would violate their structure, but between. The stacked containers supporting the stairs are then available also for community storage or micro-retail spaces.

MCLEOD RESIDENCE

Client: Whit and Kristy McLeod

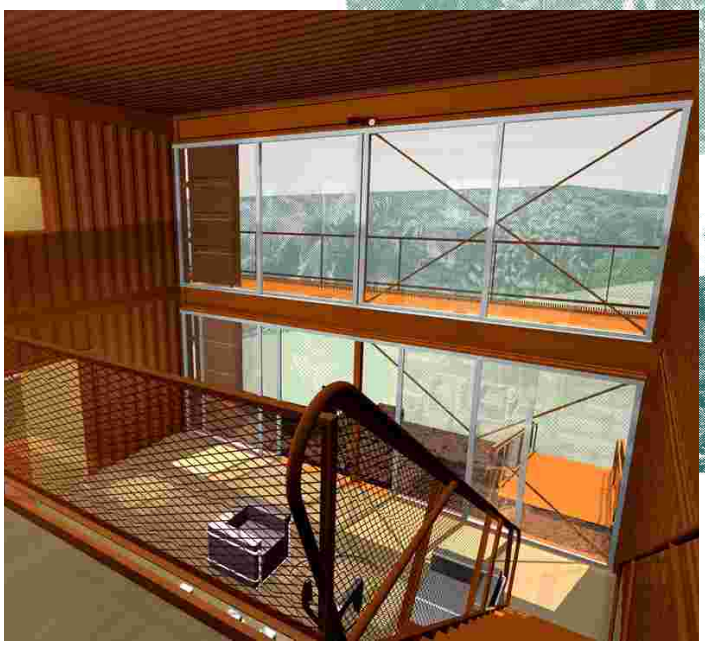
Program: Single family residence

Size: 1,650 ft2

Cost: $70,000

Completion: July 2005

Notes: An asymmetric doublestack six container PRO/con installation in Arcata, California for a well known custom furniture maker who works with recycled materials. In fact, the do-it-yourself spirit pervades the design for this project, from glazing systems to the mezzanine decking, all inspired by the unique skills of the owner/builder.



MOLOKAI PRO/con

Client: Dr. Richard and Kim Markham

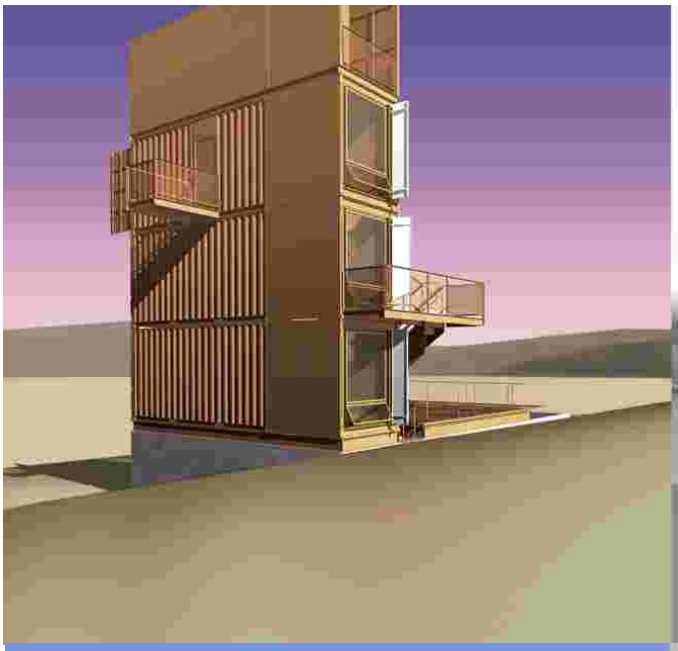
Program: Single Family Residence

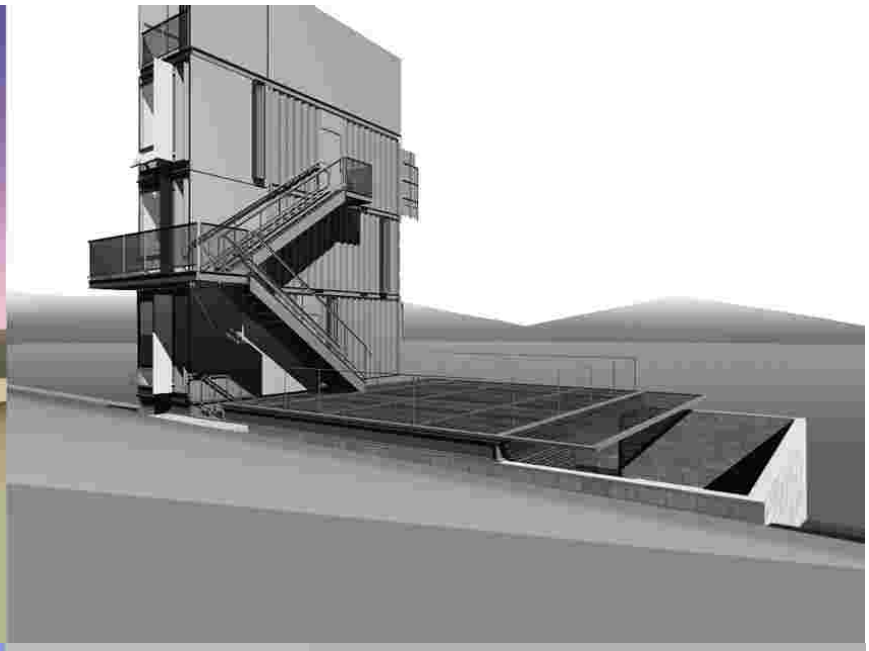
Size: 2,800 ft2

Cost: $320,000

Completion: February 2005

Notes: This project represents a rare use of 40' containers in the PRO/con system. Aside from this, though, the standard PRO/con diagram is scrupulously followed: a double stack of containers supporting between them the floor and roof of a larger central space. Since this installation is two stories, the containers is also support a mezzanine structure in this open middle space.





PRO/con DESERT HOUSES

Client: David Glean

Program: remote desert vacation house prototype

Size: various

Cost: $100,000 per unit

Completion: August 2003

Notes: two prototype PRO/con installations intended for remote desert sites off the grid demonstrate the tectonic range possible within the system and the extent to which conventional construction between the PRO/con units could vary without compromising the architectural integrity of the result.

HIGH SIERRA MOUNTAIN HUT

Client: University of California at Berkeley/The Wiener Family Fund

Program: Wilderness base camp/hostel/warming hut

Size: various

Cost: $80,000

Completion: December 2003

Notes: This structure is intended to stand forth on the site with utilitarian directness." Containers in triumphal arch formation provide the housing for the campers and shelter the community space under the vaulted space, anchored at each end with monumental wood fireplaces

PEARSON VACATION CABIN

Client: Scott and Andrea Pearson

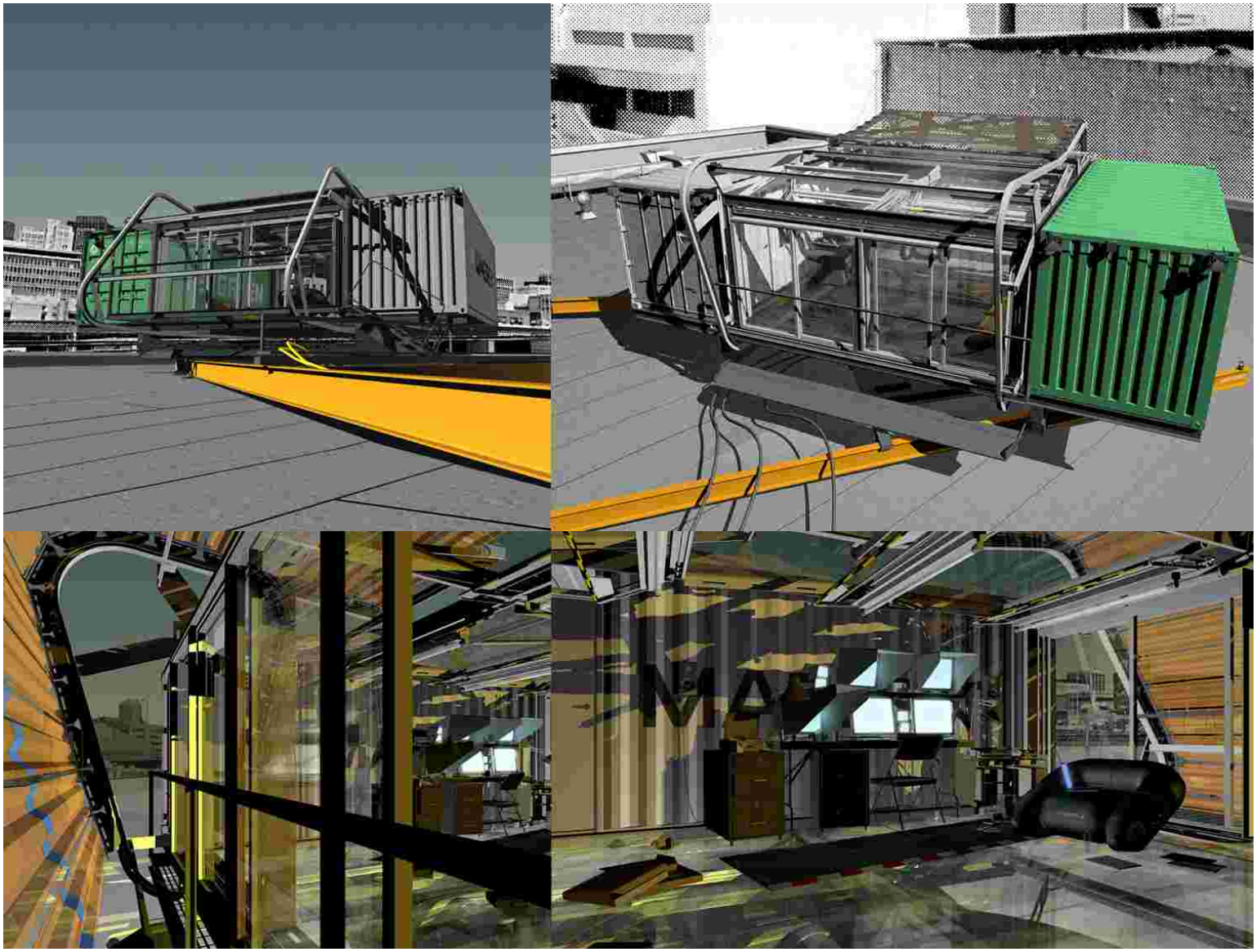
Program: vacation house; two bedrooms, kitchen, living, family

Size: 1,200 ft2

Cost: $150,000

Completion: January 2004

Notes: Classic two level PRO/con installation, off the grid, next to a ski slope. In this case the requisite sloped roof is hidden behind the upstanding placard parapet in order to preserve the architectural integrity of the triumphal arch composition.



P03.10/1:ROOFTOP DWELLING UNIT (RDU) PRO/con

Site: undisclosed rooftop in SoMa area of San Francisco

Program: single person residence: parasitic, surreptitious live work environment, with kitchen/bath and bedroom PRO/con units

Size: 720 sq.ft.

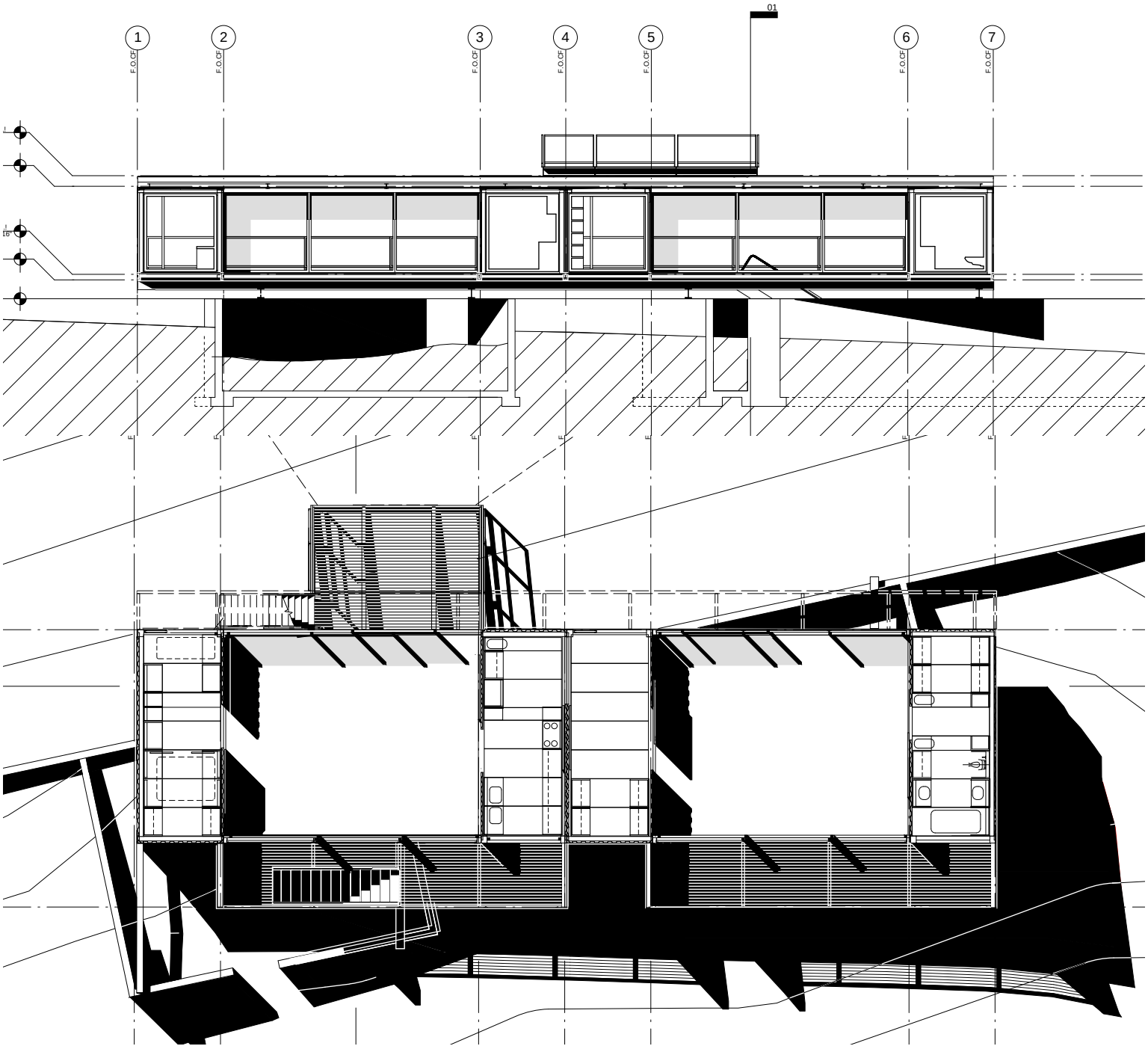
Cost: $100,000

Completion: Winter 2004 (design)

Notes: PRO/con units housing bedroom and kitchen/bath with fully glazed steel framed living/working space-between; fully encircling translucent and opaque segmented track mounted sunshade; slewing ring on steel dunnage

Project Text: This residence for a software developer (computer hacker) is sited in the undiscovered rooftop landscape of San Francisco's "multi-media gulch," a neighborhood of the South of Market (SOMA) area.

The fully pre-fabricated unit will be delivered to the site by Skycrane helicopter and placed upon an arrangement of steel dunnage, like that used to anchor billboards. This dunnage transfers the loads of the new structure to the host building's structural hardpoints. A rotating subframe and slewing ring assembly rests immediately upon this anchoring, stabilizing dunnage and, in turn, supports the basic PRO/con module of two containers. The living and working space is glazed on all free sides (including acrylic plank flooring), using an orbiting track and rolling screen assembly for flexible sun and privacy control.



P05.02/1:YUCCA VALLEY PRO/con

Site: on existing cmu "ruins' on sloping terrain in the middle of nowhere

Program: vacation residence: PRO/con units, housing bedroom suite, kitchen, library/office; living space in fully glazed space between; traveling roof deck; all arranged on dunnage above existing ruined basement walls

Size: 1,600 sq.ft.

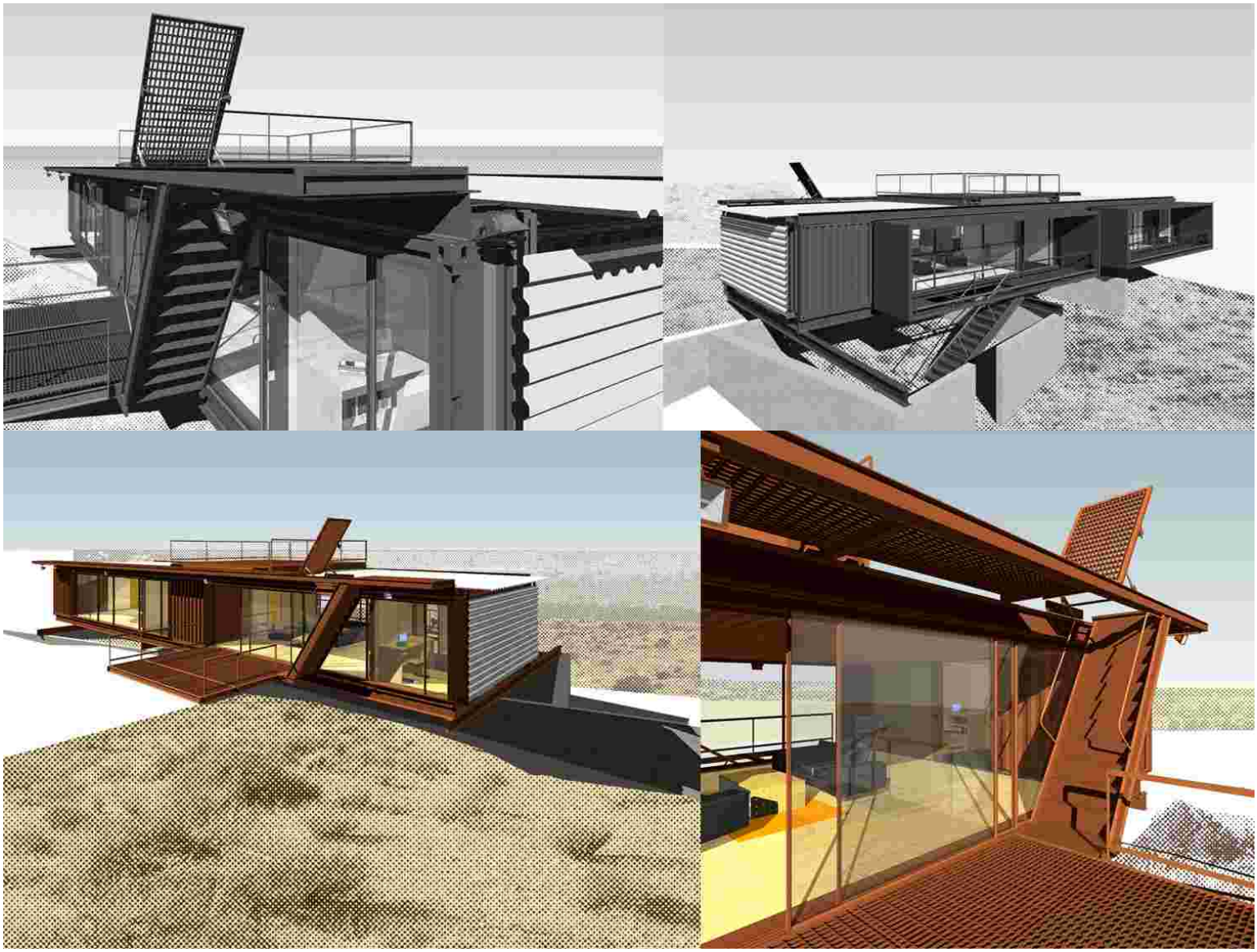
Cost: $200,000

Completion: Winter 2005 (design)

Notes: PRO/con units; weathering steel framing and dunnage; existing cmu "ruin" foundation walls; double glazed G+U sliding door system; weathering steel stairs, railings, decks sunshade structures; painted corrugated metal exo-skin sunshade surface

Project Text: The first decision was to leave the new house out there in its exposed portion of the site, doing nothing to tie it in to the landscape or mitigate its presence. Access to the site is by a seasonal trail, a dirt road that wears out and wanders, and the parking area is just where the four-wheel-drive vehicles stop driving. The advertising principal enjoys the authenticity it earns for his Land Rover.

This is more than value engineering, though. It is a statement of opposition to the environmentally expensive comforts of Palm Springs. The clients want to know they are no longer in town when they occupy



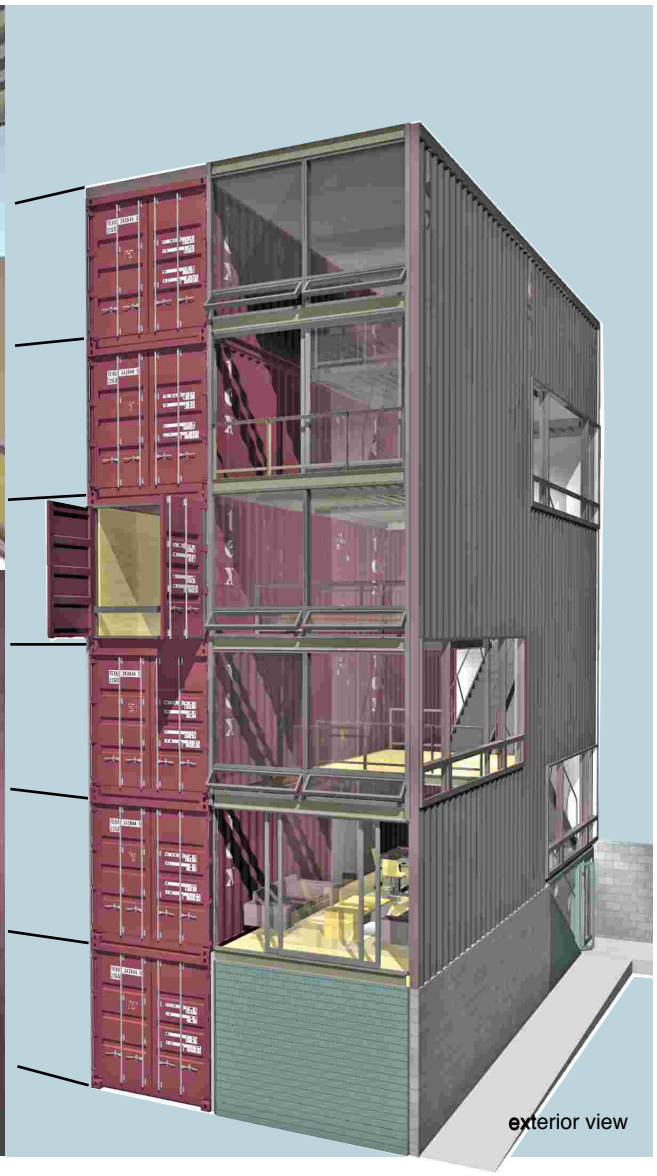
this outpost. They want to be in the desert, with nothing around, nothing to do but service the solar collectors and traverse the roof on the rolling deck. The program includes an office space, as well as living and sleeping areas, a kitchen and dining area, but the office is not connected to the mother ship. It has computers, but no internet connection. The clients of course have cell phones, so the fact that there is no land line is less remarkable, but it helps emphasize that they are away.

This particular version of the PRO/con system embodies the system's mobility, flexibility and discipline. The containers arrive at the site with their program elements already built in; typically those with more exacting constructional requirements that benefit most from construction in a factory setting, such as the bathroom and kitchen.

The containers provide the primary vertical structure and are consequently highly structured spatially. Spanning between the widely spaced containers is the site-assembled horizontal structure, which provides the floor and ceiling of larger open areas. These open areas are more loosely programmed for living and sleeping. This system of "loose modularity" makes possible a greater range of spatial dimensions than would be possible in a system based solely on containers, yet retains the discipline inherent in the module by maintaining a strict proportional affiliation between the two types of space. Special features and modifications that adapt the standard model to the extreme desert environment include deep glazing hoods on the south elevation and a loose vented exoskin that prevents sunlight from striking the surface of the container.


interior view


interior view


exterior view

12th STREET ROWHOUSE TOWNHOME PROTOTYPE

Client: Dr. Richard and Kim Markham

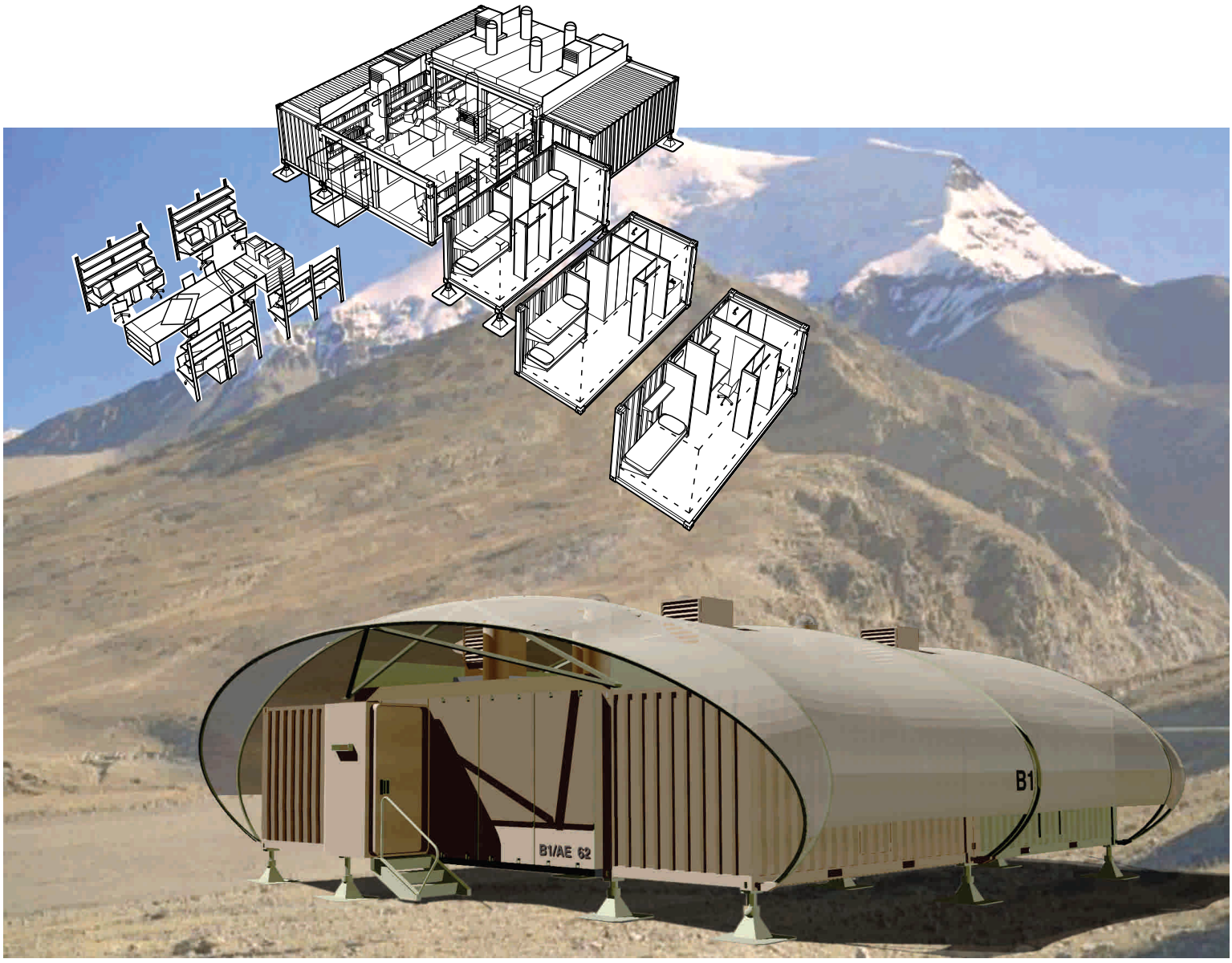
Program: Multi-family townhome residences/masterplan; each unit with open living loft, kitchen and three bedrooms

Size: 1,800 sq.ft. each, final build-out of twenty-two units

Cost: $200,000

Completion: June 2003

Notes: Rowhouse application of PRO/con system (end unit shown). A stack of six ISO 20' containers, two deep, provides the program-specific areas and the primary structure, while a lightweight steel lean-to structure along side fills out the lot with an open volume of enclosed space into which mezzanine platforms are slung, stepping up the face. In this configuration the PRO/con system has been disposed in a classic servent/served partis, with the slung platforms acting as a free section volume served by the stacked containers.



PRO/CON MIL

Client: U.S. Army Transportation Command

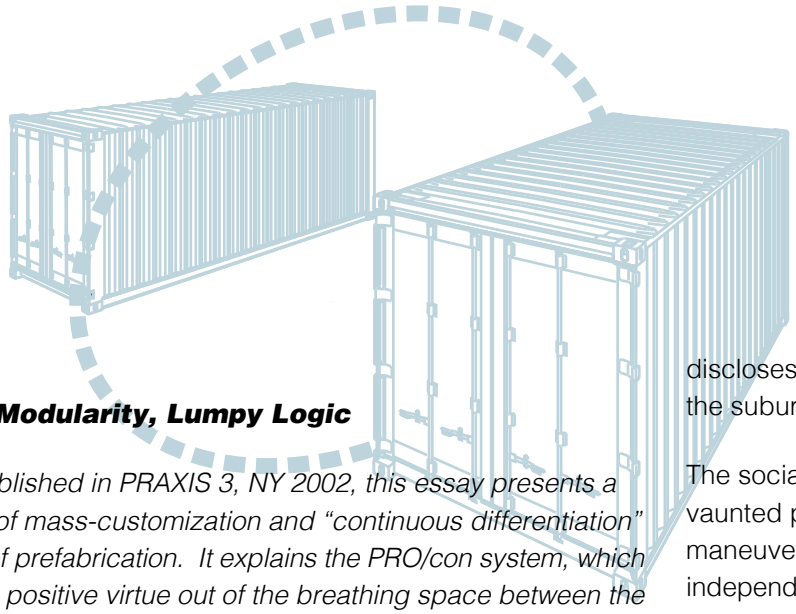
Program: Secure remote temporary modular housing

Size: varies

Cost: $100,000/module

Completion: September 2003

Notes: Requested proposal for adaptation of PRO/con system to the specialized needs of the US military, in particular the housing of civilian contractors (engineers) in remote, inhospitable sites: “The container at the heart of the PRO/con system is built to withstand tremendous abuse, but was never intended to face the sort of environment it might face in service in Afghanistan. The modified PRO/con system addresses this problem in several ways. An additional layer of thin plate steel is added on the inside face of the insulation, for example, which acts together with the container’s own walls like spaced armor, to dissipate the energy of projectiles between the two layers. The panels that clad the larger workspaces (between the containers) are similarly constructed as a steel/foam sandwich. Additionally, all exterior windows are eliminated and exterior doors are equipped with armored vestibules. Escape hatches are located in the floor of each PRO/con unit. Grenade skirts protect the crawl space beneath the structure (to which the escape hatches lead) when the structure is set on its leveling jacks. A parasol/sunshade structure doubling as a grenade screen is provided over the whole installation.



Loose Modularity, Lumpy Logic

[First published in PRAXIS 3, NY 2002, this essay presents a critique of mass-customization and "continuous differentiation" modes of prefabrication. It explains the PRO/con system, which makes a positive virtue out of the breathing space between the modules, as a less repressive alternative]

Americans are historically a mobile people. Space defines them; as the storied vastness was consumed by their transit, and transformed from a real frontier to an abstract framework, mobility hardened into cityscapes and highway systems. But the perfected dimension of American mobility, the remainder and memory of the pioneer's original experience of space, is the frozen muzak of the suburb. This sprawling landscape represents America's efforts to invent its own ideal geography. The grids and cul-de-sacs map out a carefully engineered, artificial landscape that harbors, in the tug-o-war between individualism and conformity, the genetic material of the national character.

The suburb's emphatically vague occupation of space recalls the more heroic indeterminacy of the frontier. The unavoidable isolation of those wide-open spaces survives in the suburb's use of space for separation rather than containment. Though considered wasteful, the tracts cultivate this isolation no less intensely or purposefully than agronomy husbands its acres or urban speculation wrings the last rentable square foot from awkward sites. The yards, setbacks and easements, verges and parking lots and driveways and sidewalks are emphatically useful, places for the ceaseless motion that asserts — and thenovercomes — this separation. The traffic across these spaces discloses a productive looseness of fit in the planned life of the suburb that delivers a complex bounty.

The social effect of this spatial isolation varies between a vaunted privacy and discouraging anomie. Since this maneuvering room does not necessarily offer any independence or real freedom, the privacy it offers is tinged with an offsetting restraint. The issue of "fit" then has a different valence from this perspective; conformity to the character of the neighborhood and subordination to the spatial organization of the tract grow from social pressures as well as from the tract's provenance as a mass-produced, factory-built environment. When the fit becomes tighter and attention is focused on the featured objects that serve as counters in the well-regulated game of keeping-up-with-the-Jones's, the shrinking interstitial spaces subtly shift roles. The systemic homogeneity of the mass produced pieces on the factory-built game board transforms space into spacing, and the vague areas of the yards and setbacks are drafted as cordons sanitaire, carefully signifying ownership and control, rather than freedom.

The success of mass production, with its multivalent insistence on *fit* — the consumer to product, and product to assembly line — resists the proliferation of choice. While suburban tracts have traditionally offered a range of "models," distinguished by simplistic variations in "style" and floor plan, the extent of this variety has been less than satisfying. To realize the economic benefits of a wider product line, and liberate the potential variety buried within mass production's own proven manufacturing formula, the idea of modular construction has been advanced.

Modularization is a matter of the spacing and relative fit of the components to each other and to the overall intention — a natural consequence of the spirit of the tracts — and its development has paced that of the tracts. From the ready-cut housing that supported Western expansion at the turn of the century to the development of the 4x8 prefabricated panel that has propagated the American suburb since the 1940s, the dream of the factory-made house has been largely advanced through the agency of the module. However, despite the continued proliferation of modular units in construction, very few examples have been considered successful by both the market and by architects. (1) Most efforts struggle explicitly against this perception, attempting to address the limitations of overly rigid systems with a factory-determined flexibility or mass-produced open-endedness — and consequently have been overwrought or undercooked. Either the module progressively shrinks, multiplying itself to cover every possibility, or it becomes increasingly specific in order to gain absolute control over a much more restricted universe. In either case, the expectations trend towards ever-greater levels of neatness and perfectibility.

The curve of desire sketched out in these trends culminates in the possibility of "mass-customization," (2) Mass customization combines the economic benefits of mass production with custom fabrication's opportunity to "have it your way." Two strategies for achieving this convergence have emerged: in the first, sometimes referred to as "built-to-order," a wider than usual (but still finite) array of menu-driven choices about different aspects of the product is offered to the customer, who can mix and match among them according to certain rules. In the second case, the "choices" become more autographic through technology that translates the customer's random or gestural commands directly into "unique" components within a standardized framework; typically this has been interpreted formally rather than in terms of performance (except where issues of fit are concerned, like sports equipment). As introduced into housing and architecture, proposals for mass customization have slighted the former model in favor of the latter, lately deploying digital technology in the name of "continuous differentiation" to pursue a vanishingly fine modularity. Despite architecture's avowed interest in empowering the user, control of this modularity has remained firmly in the hands of the architects, however, so the chief beneficiary of such "customization" has been the designer, rather than the user. The key advantage of the advanced technology of mass-customization has in fact been greater freedom in the design process, rather than more flexibility or open-endedness in the finished product.

With respect to flexibility and open-endedness, architecture's *intellectual* borrowings have tended to follow an opposite path to practice's technical foraging. As technology permits more precise control over the process of design, architecture has become increasingly interested in thinking that promotes the maneuvering room and loose fit that runs counter to this imperious exactitude. With each wave of technology a new "ism," with a corresponding design methodology, finds its way into the conversation; each outdoing its predecessor in its liberation bona fides. Thus the introduction of structuralism's liberating objectivity and rigor into architectural discourse was shown by post-structuralism's deconstructive

practice to harbor repressive hierarchical structures, while deconstruction in turn has been forced to face the fact that a hierarchy reversed is still a hierarchy. More recently, the possibility of a permanent state of "undecideability" has been raised in order to prevent the promiscuous web of relations uncovered by deconstruction from settling into a rigid structure. This progressive loosening suggests that the problem lies where purpose and freedom collide. A design methodology that can accommodate the force of necessity (function, program), without becoming repressive of the other, unforeseen purposes and activities, has become the stated goal of practice-oriented discourse.

Gilles Deleuze's "image of thought" has lately been influential in architecture theory because of its joyous recognition of the intractability of this problem. (3) Insisting that only the truly *new* thing can avoid entanglement in a necessarily repressive web of fixed relations, he rejects the possibility for real creativity anywhere but the purely aleatory. Unlike the proponents of structuralism or deconstruction, Deleuze studiously avoids the promulgation of any clear methodology. Yet, aided by his familiar-seeming terms and abetted by the advent of digital muscle, architects have attempted to forge their own, based on these ideas. Despite the impressive complexity of the results, these efforts (as with all digital production, however fine the "resolution") remain approximations of the actualized virtuality Deleuze holds as the strictly un-seekable goal of such production. Like the attempts to define a perfectly general modularity, attempts to create an open-ended "event" space through imaginative "cross-programming," elaborate diagramming, or involved mapping strategies cannot escape the finite limits of practice: mere complexity does not equal true indeterminacy. And like the deployment of an increasingly fine modularity, the application of exotic software to the task of creating an "other" formalism of continuous differentiation, however "smoothly" flexible or alien, cannot prevent the results from merely introducing (newly) prescriptive patterns of occupation. (4)

In fact, among all realms of production, architecture is already the most definitively indeterminate. Beyond its institutional identity in the hazy ground between a difference-from-building and a difference-from-art, architecture is ultimately conjured from thin air; no more substantial and determinate than the space it figures. Space is the ultimate seat of freedom, and most of architectural history has been spent vainly trying to control it. Space itself is uncontrollable, "smooth" in Deleuzian parlance. For this reason, design, of whatever intentionality, must result in less freedom. Yet architects cannot give up design, just as clients cannot give up expectations of fit. And neither can avoid confronting the economic reality of the market and its bias toward mass production.

With the assurance of architecture's ultimately unavoidable indeterminacy, a strategy of loose modularity can be proposed that supports a program of liberation from within the mass production ethos. Such a surprisingly direct expression of the multiplicity, and its technological extension into the machinic, (5) challenges both the creeping absolutism of systems of "customization" that rely on continuous differentiation, and the fixed universe of those that permit choice only within the parameters of a proprietary menu. A loose modularity preserves openness by admitting un-

mandated difference, through the choice, arrangement, extent and variety of the highly factored, but non-proprietary modules. Mostly, though, this freedom is an effect of the undetermined space around and between those modules. In contrast, most programs of mass-customization that promote continuous differentiation eliminate this interstitial space entirely, and with it the literal and conceptual room to maneuver. If freedom is a function of these spaces — Deleuze's lines of flight leak out here (6) — then systems that factor it out are free only in their initial determination and must be un-free thereafter. For all of their flowing forms, continuously differentiated spaces describe a prescriptive and thus ultimately static environment with no possibility of post-construction alteration or customization. A system of loosely arranged, discrete modules, on the other hand, describes a spatial porridge of continuing possibility that encourages change over time. This underscores another chief difference between the two approaches: unlike proposals for mass customization that understand the home's uniqueness to be primarily formal, loose modularity pins that uniqueness almost entirely on performance. The resulting "homeliness" of the lumpy proposal is a better expression of real domestic value, transforming the meaning of "homely" from ugly to comfortable, if not beautiful.

In such a "lumpy" system, the most difficult, complex elements are fabricated in the factory, while the rest is left for assembly in the field. Rather than the vain wish of a seamless continuum from the factory to the finished installation, lumpiness allows gaps to remain that permit literal and conceptual movement during design, construction, and post-occupancy. The factory-produced modules maximize the quality control and cost-effectiveness afforded by their origin, while their self-sufficiency eliminates all but the most rudimentary impediments to their continual recombination and rearrangement. Since the interstitial spaces are filled on site, according to project requirements, they remain technically independent of the factory-produced lumps; this "secondary" construction can adjust to accommodate the relative permanence of the particular arrangement. The indeterminate character of the matrix of gaps distinguishes the lumpy strategy from other approaches to modularity and mass customization.

Lumpiness avoids an extreme adherence to a mantra of systematized flexibility that would inevitably become as stifling and inflexible as the form-based efforts of continuous differentiation or the finite palette of the "built to order" equivalent. Instead it offers a challenge to work with the leftover spaces, in the loose fit between and around the lumps. Consequently, a lumpy system has no expectations for completeness that the user must either fail or chafe against; it does not view the house as a finished product, but as a continuously negotiated collection of products and their accommodation. The "customization" is not exhausted in the initial purchase or fabrication — or design — however unique, but continues through the transformation of the initial choice in the "mass" of choices that come after. And by such continual transformation, the freedom of the wide-open spaces that exists otherwise only in memory, is reawakened in the tighter spaces between. This is what remains for the architect; lumpiness allows her to work with it.