
RALPH RAPSON'S GREENBELT: THE EVOLUTION OF A PROTOTYPE

FRANCISCO GOMES

University of Texas at Austin

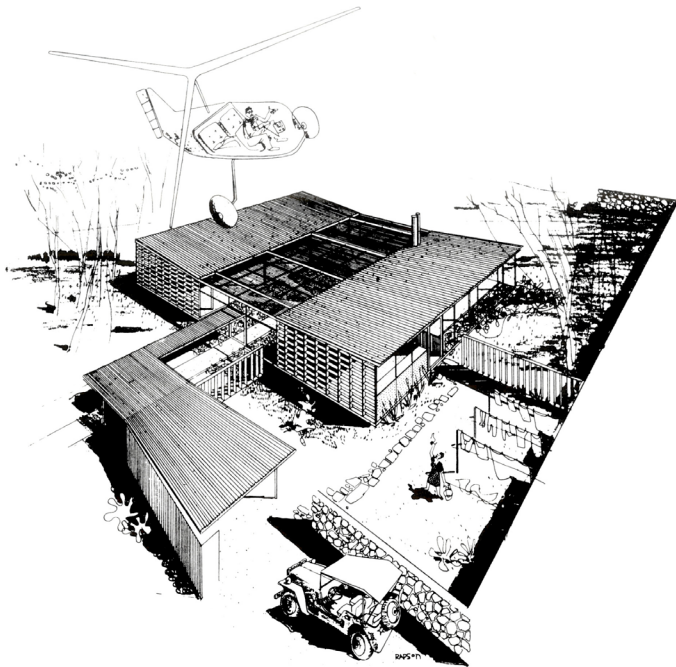


Figure 1. Ralph Rapson's 1945 rendering of the original Greenbelt design for the Arts & Architecture Case Study House Program

INTRODUCTION

In 2003, Ralph Rapson was one of 16 architects invited to submit designs for a prefabricated house competition in the Dwell Home Design Invitational – an event which contributed to a reviving contemporary public interest in modern prefabricated residential design. The clients for this house, Nathan and Ingrid Wieler, had approached Dwell magazine with their interest in building a modern house and purchased a wooded rural lot in the North Carolina Piedmont for the construction of the winning design submitted by Resolution: 4 Architecture. During the troubled realization of their house, Nathan Wieler began planning a business venture targeting the perceived market for modern prefabricated housing, and contracted with Ralph Rapson and Associates Inc. to further develop their competition submission as a marketable product.

The Rapson Greenbelt evolved from its origin in 1945 as Case Study House #4 published in John Entenza's *Arts & Architecture* magazine into a growing family of prototypical partially modular house designs marketed by Wieler LLC beginning in 2004. The designs are organized around a central day lit "greenbelt" space rendered with a glazed roof in the original Case Study project.

The contemporary development of this project describes a continually changing and ever more varied set of designs which illustrate the influence of regional modular manufacturing capabilities, cost implications of varying degrees of factory prefabrication, customer range and preferences, and site circumstances on the Greenbelt designs represented as prototypical. By Ralph Rapson's unexpected death in 2008 at the age of 93, the Greenbelt line included a range of prototypes from 570 to 2700 square feet including the Greenbelt Starter, Greenbelt 1, Greenbelt 1½, Greenbelt 2, Greenbelt Piloti, Greenbelt Walkout, and Greenbelt Townhouse. Although the Wieler LLC venture included land development and sales, as well as construction management, during this period only two Rapson Greenbelt houses were constructed: a site built house in New York, and a modular version in Maryland.

Design sketches by Ralph Rapson, design documents from Ralph Rapson and Associates Inc., modular manufacturer production drawings, internal notes from both marketing and implementation teams, and discussions with Nathan Wieler and Toby Rapson document many of the evolutionary forces on the designs.¹ Over four years and hundreds of customer inquiries, the Greenbelt family of prototypical designs grew four times larger than the number of built examples, suggesting that design and manufacturing strategies which facilitate customer customization and adapt to varied manufacturing capabilities are important characteristics for success in the contemporary modular residential market.

CASE STUDY HOUSE PROGRAM PRINCIPLES AS A STRUCTURE FOR ANALYSIS OF THE RAPSON GREENBELT

The role of the *Arts & Architecture* Case Study Houses in the development of American modernism and the evolution of architectural attention to the single family house has been extensively analyzed by others.² Though the houses themselves were influential, the Case Study House Program is also notable for the guiding prin-

principles Entenza outlined in his announcement of the program. This analysis of the WEILER endeavor, in general, and the design and implementation of the Rapson Greenbelt house, in particular, is organized around these same principles.

The initial announcement of the Case Study House Program, while presented as a narrative, contains a series of principles which structured the investigation of the post-war house:³

1. *Realization*: The design proposals would be applied cases both buildable and subsequently built rather than only theoretical or represented.
2. *Commitment*: Reputable talented and demonstratedly practical architects would be commissioned by the publication, rather than compete, to create these family homes.
3. *Industry awareness*: The architects were expected to evaluate and exercise judgment on incorporating new or old products and systems of national manufacturers.
4. *Prototypicality*: The house designs were expected to allow repeated application and not be unique solutions tied to the circumstances of a single situation.
5. *Evaluation*: Entenza committed to the transparent evaluation of quality in the built case study houses. After being furnished under the direction of the author architects, each house was to be opened to the public and reported on in the publication.

Ralph Rapson was the youngest of the eight original architects commissioned to participate in this principled pursuit of “the good living environment.”⁴ Like the Case Study House Project, which anticipated that fluidity of means and methods might be necessary to achieve its objectives, the evolution of the Greenbelt from the original Case Study proposal to the *Dwell* competition entry through the many WIELER design versions illustrates an adaptive process of trial and adjustment. Although there are fundamental differences between the media generated venture of *Arts & Architecture* and the business goals of the WIELER for-profit startup, both shared the goal of developing and realizing innovative single-family housing scalable to a large market and suited to contemporary cultural conditions.

1. Realization

“We are ... proposing to begin immediately the study, planning, actual design and construction of eight houses ...”

“... it occurs to us that the only way in which any of us can find out anything will be to pose specific problems in a specific program on a put-up-or-shut-up basis.”⁵

The contemporary revival of the Greenbelt was spurred by the frustration Nathan and Ingrid Wieler experienced in searching for a contemporary house in the Triangle region of central North Carolina. Following a 2001 article in *Dwell* devoted to prefabricated residences, Nathan Wieler contacted Alison Arieff, the publication’s Editor in Chief, and plans were made to hold an architectural competition for the design of a modern prefabricated house on a budget

of \$200,000. With the competition plan announced, the Wielers purchased a hilly rural property outside Pittsboro, North Carolina for the project. Sixteen architects were selected to submit designs, and Ralph Rapson’s practice was included after he sent a note to *Dwell* endorsing the competition concept.

The majority of the Dwell House competitors were young practices, but the reputation Ralph Rapson carried from his involvement in John Entenza’s program in the 1940’s enhanced the credibility of the *Dwell* competition and linked it to the progressive agenda of post-war mid-century modernism. Ralph Rapson was very active in the production of the Greenbelt design, and Ralph’s son Toby also played an integral role as his practice partner. The Case Study reputation of Rapson that accompanied the Greenbelt design would later also play a significant role in the marketing of the Wieler Greenbelt houses. Although Nathan Wieler reported that he and Ingrid both had strong attractions to Rapson’s competition submission, the competition jury selected the design of Resolution: 4 Architecture.⁶

During the final stages of design and the long construction of the Dwell House, Nathan founded WIELER LLC with the goal of realizing modern prefabricated houses for like-minded people. As initially envisioned, WIELER would eventually grow to provide design, project management, contracting, land development, and sales brokerage services. Nathan Wieler had a successful history as a business entrepreneur and built a team of economic, marketing, graphic and web design, and construction management professionals accompanied by a series of consultants which included architects. Their goal was to realize an effective and profitable enterprise for making prefabricated modern single-family housing available to a large public audience. The different components of the WIELER endeavor experienced varied degrees of market acceptance, and some anticipated components of a vertically integrated delivery process, including the acquisition of modular manufacturing capabilities were put on hold when land sales surpassed sales of houses and design licenses.⁷

2. Commitment

“Eight nationally known architects, chosen not only for their obvious talents, but for their ability to evaluate realistically housing in terms of need, have been commissioned ...”

“Architects will be responsible to no one but the magazine”⁸

The Dwell House arose from a competition rather than a commission, but the parallels between the media sponsored *Arts & Architecture* program and the *Dwell* effort are considerable. Both involved an editor with a desire to proactively participate in the design and production of the American single-family house through built projects authored by significant contemporary architects, followed by a published exposition of the results.

During the period *Arts & Architecture* began the Case Study House Program, American industry was seeking markets for its newly avail-

RALPH RAPSON'S GREENBELT

able postwar production capacity, and was actively advertising as well as sponsoring architectural competitions and design prize programs to develop and expand the construction market. The January 1945 issue of *Arts & Architecture* containing Entenza's announcement of the Case Study House Program also included dozens of advertisements and two industry sponsored competition announcements. In this context of industry sponsored competition, Entenza's faith in the commissioned group of architects to deliver relevant designs prior to any knowledge of the proposals was significant.

Similarly, *Dwell* curated a group of architects through Editor in Chief Arieff, who had extensive knowledge of contemporary architects active in prefabricated construction systems from her research for the book *PREFAB*, published in 2002. Notably, *Dwell* acquired a committed client (Nathan and Ingrid Wieler) and with them the means for building a house before soliciting architectural designs rather than relying on *Arts & Architecture* assumption that public interest in the published designs would emerge.⁹

WIELER's contract with Ralph Rapson and Associates Inc. for the development and use of the Greenbelt was a combination of payment for design work as it was undertaken and additional payments based on houses and design licenses sold to WIELER customers. From the outset, WIELER planned to commission multiple architects to create a broad range of modern house types and sizes, and intended that the agreement with Rapson would serve as a model for future architectural contracts with others. Internal business plans highlighted this intent to realize a broad catalog of designs and preliminary talks

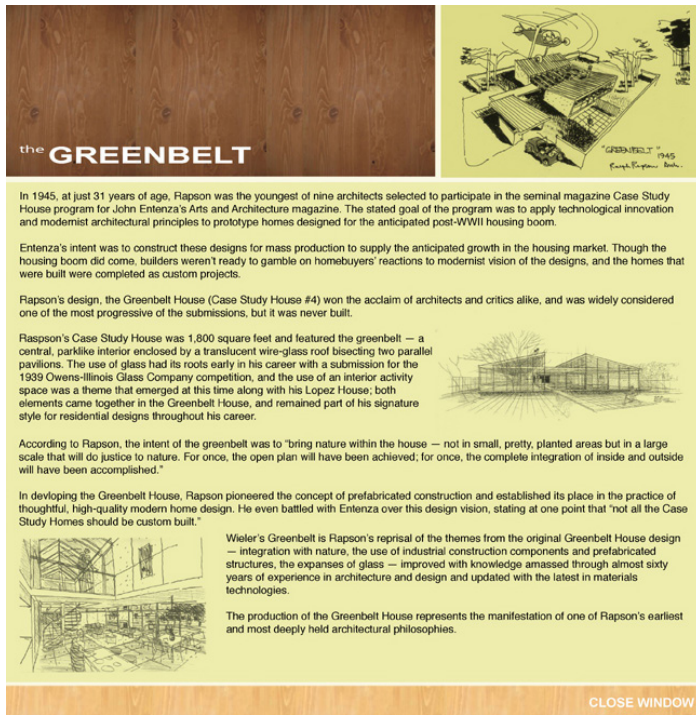


Figure 2. Preliminary page design for the Wieler LLC website highlighting the Case Study House history of the Rapson Greenbelt

were undertaken with owners of the intellectual property of Neutra and Eichler, as well as several noted contemporary architects, but during its active early years (2003-2007) the WIELER team focused on the development of the Rapson Greenbelt.

3. Industry Awareness

*"And we must repeat again that these materials will be selected on a purely merit basis by the architects themselves. We have been promised fullest cooperation by manufacturers of products and appliances who have agreed to place in the hands of the architects the full results of research on the products they intend to offer the public."*¹⁰

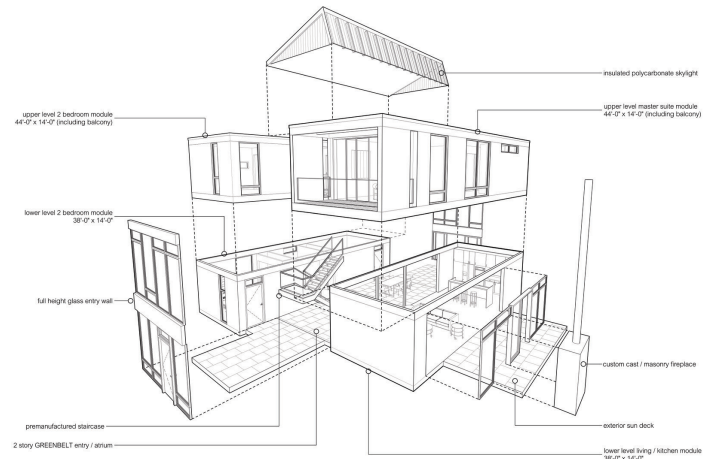


Figure 3. Axonometric by Ralph Rapson and Associates illustrating the modules and other major components of the Greenbelt 2

The *Dwell* Home Design Invitational competition and the subsequent realization of the winning entry, like the *Arts & Architecture* program, sought to integrate the materials and products produced by manufacturers of the contemporary building industry, many of whom also purchased advertising in the publication. Nearly half of the sponsored products involved in the *Dwell* House project were not directly applicable to building construction but instead were furnishings or fixtures advertised in *Dwell*.¹¹ Twenty-five companies, including Loewen, Kohler, Neoporte, Jenn Air, and Caesarstone, donated or substantially discounted their product for the construction and furnishing of the Resolution: 4 Architecture designed *Dwell* Home. Other companies such as Volkswagen, Bang & Olufsen, and Birkenstock also made donations and were featured in project photography and other publicity after the house was complete. The WIELER marketing team sought to extend many these product ties with negotiated "preferred provider" product tie-ins and discounts for potential clients in an effort to provide additional value to its clients.

Because of the prefabrication mandate of the *Dwell* competition, most designs were shaped by panelized or modular (box) methods of market proven prefabrication, though the markets these methods served at the time generally did not offer many modern house designs. The different construction methods proposed for the original

Arts & Architecture and the *Dwell* version of the Greenbelt were reflected in substantial design contrasts. The expression of the original Greenbelt house was defined by its construction: a modular frame and panel system in which solid surfaces were fitted between the narrow profile exposed steel frames. Although both houses shared the defining sky lit interior greenbelt flanked by living and sleeping spaces they looked markedly different. Both designs are defined by the scale of constructional unit as it arrived to the site: the newer design expressed the individual module boxes even delineating the seam between two stacked boxes with contrasting trim, while the modularity of the original design was resolved at the scale of the frame and panels from which it was constructed.

Despite their differences, a closer look at the atrium and storage details of the later Greenbelt designs show the influence of the original Greenbelt's construction methods and expression on the later WIELER Greenbelt designs.

The massing of the two-story Greenbelt was clearly derived from the box dimensions available with modular construction, which are determined by road transportation regulations. Meetings and site visits to several modular factories which were pricing the project were made in 2003 and 2004 to coordinate the individual factory's capability with the evolving Greenbelt designs. As the WIELER Greenbelt was developed, however, the construction method for the central atrium was debated. The Design Development drawings issued by Ralph Rapson and Associates in 2004 specified modular box construction for only the side volumes, leaving the atrium end walls and roof to be constructed on site. An exploded axonometric included in the Design Development drawings of the Greenbelt 2 (Figure 5) illustrates the contrast between an expression of clad surfaces at the wood-frame modules and an exposed frame and infill condition at the atrium end walls and roof. However, it was the extensive dependence on site construction which led to substantial cost overruns on the Resolution 4: Architecture Dwell Home and the WIELER team was determined to constrain the target price for their product. The atrium roof of the second constructed Greenbelt, located on the Maryland shore of the Chesapeake Bay was made as a single module and the atrium end walls were factory panelized. These changes, made with design guidance from the Rapsons, included bottom chord struts on the atrium roof and substantial trimmed surfaces between glazing panels in end walls of the atrium, both quite different in appearance from the Rapson's earlier designs.¹²

The articulation of storage closets as unitized wardrobe elements in the WIELER Greenbelt also recalls original spatial strategies of the Greenbelt. Spatial enclosure in the original 1945 Greenbelt published in *Arts & Architecture* is characterized by solid panels and volumes floating within a field of space defined by vertical grid elements and an overhead roof surfaces. In the WIELER Greenbelt, the walls of the side modules form typical closed corner conditions, but many of the closets are treated as free-standing volumetric wardrobes within their host space in a manner which recalls the solid storage and bath volumes in the original Greenbelt.

Although the proposed construction methods are different and influential in the design expression in both the *Arts & Architecture* Greenbelt and the WIELER Greenbelt, the primary organization, the initial proposal for construction of the atrium, and the even the closet strategy of the later designs illustrate conceptual links to the principles of the original Greenbelt.

4. Prototypicality

*"Each architect takes upon himself the responsibility of designing a house which would, under all ordinary conditions be subject to the usual (and sometimes regrettable) building restrictions. The house must be capable of duplication and in no sense be an individual 'performance'."*¹³



Figure 4. The range of Greenbelt house variants illustrated on the WIELER website in 2007

The goal of the *Arts & Architecture* program was to advance the state of the single family house through design that could be repeated. The standardization of the WIELER Greenbelt houses, however, was challenged from the earliest expressions of interest

RALPH RAPSON'S GREENBELT

by WIELER clients. While the land development arm of WIELER had plans to build speculative iterations of a number of the house designs, most early clients were interested in the Greenbelt designs for particular lots they owned or were actively seeking. The response to initial publicity came from a very wide geographic range in the US and Canada, and the standard WIELER package for both a delivered house and a design license (for those clients interested in contracting their house construction without WIELER) included client customization consultation with Ralph Rapson and Associates through the WIELER staff.¹⁴

Three types of variation were introduced to allow house customization. First, an ever expanding range of Greenbelt house types of different sizes were created, with the genesis of new versions often spurred by requests of specific clients. These variations were incorporated into WIELER's public marketing material. Second, different spatial layouts for the side modules alongside the greenbelt were inventoried and drawn to help WIELER project managers guide clients to appropriate possibilities. These variations were produced over time in response to client requests and illustrate that the most requested changes involved kitchens, utility rooms, pantries and other building service intensive components of the floor plan. Third, though not fully realized, WIELER intended to expand the house range with the designs of other architects to provide additional house concepts to the individual client, but also to populate WIELER land development projects with a variety of house types and avoid excessive repetition within a single development.

The two story *Dwell* competition house design was named the Greenbelt 2 and this house, along with a single level variant called the Greenbelt 1, were the original house designs introduced, publicized, and used for soliciting investment funding by WIELER. Pricing, material specifications, client coordination protocols, and construction schedules were initially developed on the basis of these two house designs. As discussions with interested clients began, specific client desires for floor area and room type, as well as the circumstances of particular sites generated adjustments to the Greenbelt 1 and 2 designs. When more comprehensive design changes were requested, the resulting designs were evaluated by the WIELER team as potential new Greenbelt products and several of these designs were formalized, named, and added to the marketing materials as additional product options.¹⁵

The *Dwell* competition criteria included a very low cost target and subsequent publicity of the project in the magazine did not fully disclose the actual costs of the project (or the value of the donated products). WIELER's pricing strategy was modeled on automotive sales, with a publicized base model cost that could be supplemented with option packages. The Greenbelt Starter was subsequently created to ensure there was a Greenbelt product suited to the lowest cost segment of the new home market. Nathan Wieler's emailed response to the first Rapson sketches for this house, "could this be our \$100K house?", illustrate the desire for this product for market penetration.

Other variants, such as the Greenbelt 1½ and the Greenbelt Walkout evolved from the circumstances of particular client sites. For example, the Greenbelt Piloti was initially designed by Rapson as a modification of the Greenbelt 1 for a specific client with a lot situated next to a rural airstrip in North Carolina. The elevated living spaces provided shaded parking below as well as desired views of the airstrip activity. There were also other Greenbelt house variations produced for various clients, such as the Greenbelt Courtyard and Greenbelt Basic, which were not publicized in the WIELER marketing material.



Figure 5. Internal document produced by Ralph Rapson and Associates illustrating module component variations to further customize the Greenbelt house types

Despite the range of variations, most clients were interested in the Greenbelt 1 and 2 designs. Because customization was encouraged by the package marketed by WIELER, customers asked for changes – most often in the living and service space configurations. With the stair of the Greenbelt 2 within the atrium, variations of the module layouts for both the Greenbelt 1 and 2 were easily interchanged, and the Rapsons produced a set of module layouts (Figure 7) for use by the management team in speaking with clients about customization options. Substitution packages for materials and fixture selections were also drafted to allow standardized upgrade options to be priced and marketed. These finish and fixture packages were particularly challenging to specify because each module factory had an existing supply chain and delays in acquiring elements outside of their predictable supply systems carried the potential to slow the production of their high fixed cost facilities.¹⁶

The final element of the planned product – additional house designs by other architects – was never fully realized due to the low number of house construction contracts attained. However, specific negotiations with architects occurred, and design and licensing terms with firms including Resolution: 4 Architecture and Gomes + Staub were drafted.

5. Evaluation

*"All eight houses will be opened to the public for a period of from six to eight weeks and thereafter an attempt will be made to secure and report upon tenancy studies to see how successfully the job has been done."*¹⁷

The genesis of WIELER was Nathan Wieler's frustration as the client of the *Dwell* house, and his belief that the modern prefabricated house market could be better served. Because few houses were realized the types and subjects of evaluation within WIELER markedly differ from descriptive narrative evaluations of the case study houses published in *Arts & Architecture*.

Unlike many modern prefab ventures which are centered on an architect trying to generate a market for his or her design production, WIELER was directed and funded by experienced business leaders with marketing expertise. Internal evaluations focused on market perception, management and delivery systems, cost control, and the production of value – with a clear belief that the lifestyle supported by modern design was a substantial part of that value. These evaluations shaped the development of Greenbelt design.

From a construction perspective, differences in cost between modular and site-framed construction techniques were examined by WIELER. Like the *Dwell* house and many other modern modular examples, portions of the house such as the exterior siding were field installed in order to use materials or techniques outside the normal methods of the factory. As site mobilization of additional subcontractors was required, potential cost advantages of prefabricated construction were diminished. Comparative pricing was solicited from multiple modular factories, SIP panel manufacturers, and general contractors by the WIELER team during the development of the Greenbelt designs and the differences between the in-place completed cost of partially modular and full site built construction methods in the mid-Atlantic region were not significant.¹⁸

The value of shorter delivery time, however, was a definitive advantage in terms of market reception as well as extension of the available geographic range for the product. Both advantages were evident in the Greenbelt 2 built in Maryland, which was constructed by WIELER LLC as the general contractor. In 2004, WIELER also added an experienced builder to its staff to both inform the delivery methods and qualify the company for state General Contracting licenses – a qualification that allowed WIELER to control quality and receive construction overhead and profit revenue. With construction contracting in-house, modular construction also aided management because the modules could be manufactured locally and the modular manufacturer's shop drawings and internal trade coordination of the factory built portions of the house reduced the amount of subcontractor management provided by WIELER.

From an economic perspective, WIELER experienced far greater sales and profits from the growing land development arm of company. The initial intent was that the land development would provide sites for communities of the Greenbelt and other houses, but the buyers of both lots and entitled developments were not the same population as those interested in the modern house products developed by WIELER.

CONCLUSION: PROTOTYPE AND CIRCUMSTANCE

The balancing of prototypical elements with responses to the particular circumstances of an individual project was a central issue in the development of the Ralph Rapson Greenbelt designs marketed by WIELER. The idea of the standardized efficient industrial product was challenged both by negligible cost advantages and client desires for customization.

WIELER cost estimates indicated that even in its most prefabricated version, the portion of a Greenbelt built in the factory comprised less than half of the total construction costs. As additional elements such as exterior siding, roof membranes, decks and other elements were built outside the factory package, this ratio declined further.

WIELER marketing strategies which emphasized customization attracted clients from the custom designed housing market typically served by architects, and ability to achieve these customizations were an important component of attracting customers. Achieving customization for each Greenbelt house was time and management intensive but also funded the development of considerable variations of the Greenbelt design.

Ironically, the land development efforts of WIELER, which are by definition intimately tied to the physical and regulatory circumstance of a particular place (and for which Ralph Rapson also did design work) became the most successful element of the WIELER enterprise. Simultaneously, the prototypical Greenbelt house evolved into a family of differentiated designs through which responses to the circumstances of the individual client's site, use, budget, and self-image could be constructed.

ENDNOTES

1. Gomes + Staub PLLC, *1249:Wieler Modern, 1270:Wieler Consulting, 1289: Wieler Topographic* (Raleigh, North Carolina: 2002-2009 project files).
2. Esther McCoy, *Case Study Houses: 1945-1962* (Los Angeles: Hennessey & Ingalls, 1977), 1-10.
3. John Entenza, "Announcement: The Case Study House Program," *Arts & Architecture*, January, 1945, 37-41.
4. Entenza, 37-41.
5. Entenza, 37-41.
6. Allison Arieff, "Prefab, Proven," *Dwell*, December, 2004, 112-122.
7. Gomes + Staub, 2002-2009 Wieler project files.
8. Entenza, 37-41.
9. Arieff, 112-122.
10. Entenza, 37-41.
11. Gomes + Staub, 2002-2009 Wieler project files.
12. Wieler, *Chesapeake Bay Greenbelt Images*, <http://wieler.com/homes/featured-projects/chesapeake-bay/images/> (June 23, 2012)
13. Entenza, 37-41.
14. Gomes + Staub, 2002-2009 Wieler project files.
15. Gomes + Staub, 2002-2009 Wieler project files.
16. Gomes + Staub, 2002-2009 Wieler project files.
17. Entenza, 37-41.
18. Gomes + Staub, 2002-2009 Wieler project files.