

# THE DONALDSON FUTURO

## Rescue, Relocation, and Restoration Challenges

Milford Wayne Donaldson

**ABSTRACT:** Space Age aesthetic was manifest in the 1960s and embodied in plastic, prefabricated houses. After several decades, the acquisition and restoration of Futuro houses can be a challenging process. The freedoms in the implied promise of the Futuro houses are tested against realities of logistical and building codes for which non-standard solutions are required.

**KEYWORDS:** San Diego; Stan Grau Collection; Space Age, Donaldson Futuro

**INTRODUCTION:** The year was 1969, and the lure of all these new plastic materials at the fingertips of a young architect were too strong to ignore. I had a love of other worldly pursuits after experiencing Neil Armstrong's and Buzz Aldren's live walk on the moon in 1969 and found Matti Suuronen's Futuro design something of a novelty as well as a personal pursuit. The tale that follows stands to showcase the unique perspective of the livable Futuro house and how it continues to provide enjoyment in the 21st century.

*Playboy* magazine called the Futuro a funhouse and that "It's a flying-saucer-shaped hideaway designed for whirlybird (helicopter) delivery and instant livability in any clime." "Buyers can choose from four exterior shades—blue, gold, green and white—that have been color coordinated with the interior." The magazine promoted the Futuro as the ultimate bachelor pad showing photographs of beaches, snow and tropical resorts, with romantic interiors.<sup>1</sup>

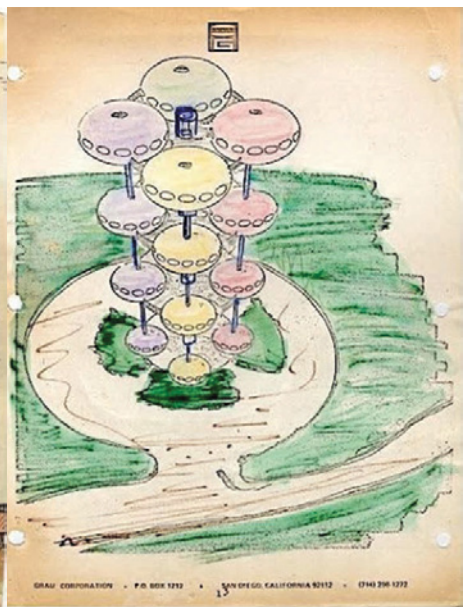
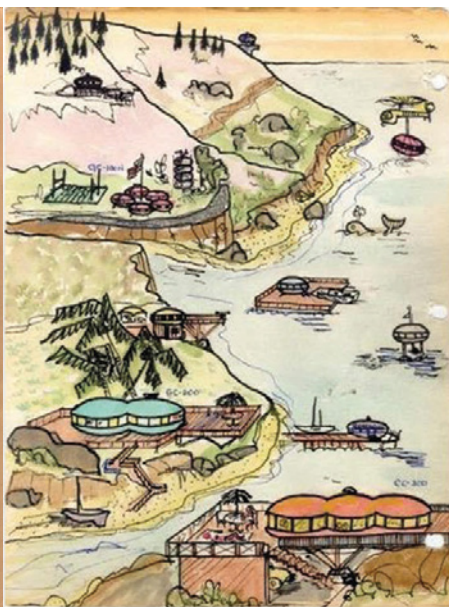
Join me on my journey to go boldly where no man has gone before, as my team and I faced challenges of designing, development, transporting, and restoring plastic materials, code compliance, and looking toward the future of preserving these unique cultural resources. The restored Futuro is listed on the National Register of Historic Places and as a California Historical Landmark on

the California Register of Historical Resources, officially known as the Donaldson Futuro. The official language on the plaque is the following:

*"The Donaldson Futuro is significant as an example of America's collective confidence as a leader in space flight, technological advancement, and economic prosperity. Designed by Finnish architect Matti Suuronen, this space-age home was the first Futuro to arrive in California, in 1969, and the only Futuro to obtain a building permit for residential occupancy. Its modern futuristic space-age design, materials, and workmanship retain a high level of integrity from its period of significance. The property is identified as the Donaldson Futuro in recognition of owners Wayne and Laurie Donaldson's extensive restoration effort that successfully preserved this fragile resource and raised the profile of early mid-century plastic buildings."*

### BACKGROUND AND RESCUE OF THE DONALDSON FUTURO

The Futuro is a structural reinforced fiberglass polyester plastic portable home, meant to be easily moved, usually by helicopter, to a desired site. The final shape of the



01 Proposed design feature and uses for the Grauhaus. © Stan Grau Collection, undated.



02 Moving of the Futuro in San Diego, ca. 1969. © Stan Grau Collection, undated.



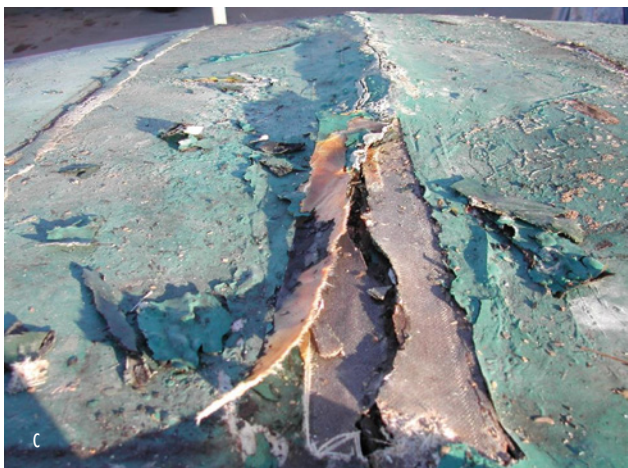
03 The Donaldson Futuro at the parking area behind the Design Center, San Diego. © M.W. Donaldson, September 2002

Futuro evolved into an ellipsoid shell as researched and developed by Polykem Oy (Ltd) to be potentially suited to serialized industrial production. The Finnish prototype measured 8.03m (26'-4") in diameter, 4.01m (13'-2") in height, 25 square meters (269 square feet) in floor area and weighed approximately 4,000 kg (8,800 pounds). The Finnish model was built in 16 sections, so could be easily transported and bolted together on site. The model also nested in an exposed metal ring once all the sections were bolted together.<sup>2</sup>

The production model that was built by FUTURO Corporation, headed by Leonard Fruchter in Philadelphia, Pennsylvania, under a U.S. license agreement, became an instant hit in the United States. The overall size was similar to the Finish prototype, but the floor area and weight were quite different. The partition walls radiate from the center fireplace. The USA model was delivered in two completed shell pieces and bolted together on site. The Finnish model also had a third row of windows at the dining area versus the two rows of windows for the American model. The interior of the Finnish model was all molded plastic including the seats, kitchen, and bathroom area. The American model was built more like a

traditional trailer with wood counters and built-ins covered with a plastic laminated top similar to Formica, shower unit and typical small appliances for the kitchen. The door to the Finnish model was centered beneath two windows, while in the American model it was directly underneath a window. Made entirely of fiberglass reinforced polyester plastic, a fairly inexpensive but durable material, the Futuro sold in the United States for between \$12,000 and \$14,000 (approximately \$99,000 today)<sup>3</sup>.

Mr. Stan Grau purchased a Futuro from the FUTURO Corporation and had it delivered to San Diego, California in 1969 [FIGURE 01]. Mr. Grau was to act as a salesman for Futuro Enterprises but soon discovered that he could improve on the prototype by providing operable rectilinear windows, and combine two or three Futuros for a larger home, as well as mid-rise condominiums.<sup>4</sup> He moved the Futuro around San Diego, loaning it on one occasion to the US Naval Training Center sited across the street from the USS *Recruit*, a land-based faux destroyer at 3/4 size and used for training purposes.<sup>5</sup> The Futuro finally landed in a parking lot behind the Design Center, 3601 5th Avenue, San Diego. It sat there for years, brush painted with a green latex paint, slowing deterioration [FIGURE 02].



04 a - d The Futuro at the San Diego Boat Yard, damages before restoration (a) removal of green latex paint, (b) cracks and poor condition of the yellow gel coat, (c) delamination and material loss on the exterior surface, (d) removed portion from the roof area showing the rigid foam and GRP laminate. © M.W. Donaldson, October-December 2002

New owners purchased the Design Center in 2002 and tried to demolish the Futuro, but only cracked a side and busted out two temporary glass windows [FIGURE 03]. In the end, I purchased the Donaldson Futuro for \$15,000, but had to move it within a week. Not knowing where to move it, I asked Corky McMillan, developer for the Naval Training Station (Liberty Station) who granted permission to move it to the Naval Training Center, as I was his architect for the current restoration following the base closure years before.<sup>6</sup> However, this was not popular with the City of San Diego, who still owned the Naval Training Center and asked Mr. McMillan to move it off the property.<sup>7</sup> It was moved to the San Diego Boat Yard off of Mission Gorge Road, east of San Diego to have the exterior restored while I looked for property. After all, the Donaldson Futuro is built more like a boat than a house.

### THE RESTORATION OF THE EXTERIOR OF THE DONALDSON FUTURO

The decision was made to restore the exterior, make it structurally sound, and provide the necessary support for the move. Upon removing the green latex paint, the original Harvest Gold color could be seen in very poor condition, having been heavily sanded to apply the latex paint.<sup>8</sup> The original gel coat on the Donaldson Futuro was a high performance polyester resin used in boats with excellent handling characteristics, superior UV resistance, flexibility,

and reduced emission. The gel coat was badly damaged from exposure, especially on the top half, having had no maintenance for years. There was a large section at the top slowly deteriorating, including the fiberglass and the polyurethane foam interior [FIGURE 04 a-d].

The restoration process, after several trials and errors was as follows:

- Starting with the original yellow gel coat, covered by green latex paint. Grind down with 30 and 60 grit sandpaper to remove paint and determine how much cracking was present in the original gel coat [FIGURE 04b].
- An area of about 2.44m (8 feet) in diameter on the top of the Futuro had to be removed because it was so badly deteriorated. New fiberglass was added to repair the deteriorated roof section as well as at several window locations to secure the new rings for the acrylic windows.
- The fiberglass was Owens-Corning 2415, 2.4 oz, 1 1/2 mat. Two fiberglass mats were used 18/15 @ 90 degrees and 17/08 bi-directional @ 45 degrees.
- All flare-in, or a gradual widening of repairing with glass fiber, was done with Dyna-glass. Some of the resin-based filler had embedded chopped fibers. Sand as needed to a smooth surface.
- Went over all the areas with Duratec, a resin-based polyester.
- Used a skim-coat of Poly-fare, and sanded down to a "feather."



05 a-b One of the steel leg supports showing the typical extreme rust at the connection point (a) and (b) exterior of the Futuro near to top of the door opening where the top and bottom halves are joined. The vertical joint was where the two halves were connected with bolts. © M.W. Donaldson, December 2002



06 a-b Moving the Donaldson Futuro along Interstate 15 blocking traffic (a) and up State Highway 243 to Pine Cove passing through Mountain Center (b), accompanied by California Highway Patrol officers. © J. Guevara, December 8, 2004 and M.W. Donaldson, December 8, 2004

- Applied high-build epoxy primer (up to 3 coats or more applied).
- 100 – 120 grit sanding.
- Standard Epoxy coat applied, 220 grit sanding.
- Applied top coat of Sterling linear-polyurethane
- Applied Awlgrip #545 Tint using 37.9-45.5 l (10-12 gallons). This was the actual paint, minimum five coats "Futuro Covering and Repair Process including Materials Specifications."<sup>9</sup>

The exterior restoration took from December 2002 until December 2003. During this time, the rusted 3.18 mm (1/8") thick-walled steel leg supports were replaced in-kind with 6.35 mm (1/4") thick-walled stainless-steel supports following a structural analysis for wind and snow loads. One half of the Donaldson Futuro had separated and needed to be slowly jacked into place over a five-month period. After the damaged sections were repaired with new fiberglass, the rusted bolts were replaced with new stainless-steel bolts, and the two halves at the bottom were pulled back together. The top half was permanently sealed together with fiberglass. However, new fiberglass and a cellular polyurethane 76.2 mm (3") core was used to restore the top of the Donaldson Futuro. During this time, a friend in Australia sent an original window from his Futuro so I could duplicate the exact size, approximately 0.61 m x 1.22 (2 x 4 feet), oval shaped with a 76.2 mm (3") rise in the middle<sup>10</sup> [FIGURE 05 a-b].

## THE RELOCATION

A remote site was finally selected in Pine Cove, a small community about five miles north of Idyllwild in the San Jacinto Mountains at 1,981 m (6,500 feet) elevation. It was approximately 3,035.14 square meters (3/4 acre), a flag lot on large rock outcropping. Investigations were made with Erickson Air Crane of Central Point, Oregon, since the Donaldson Futuro was too heavy to be lifted by standard helicopters. Once I sent a photo, I knew they questioned my seriousness! But they were patient and explained that the cost would be astronomical, and that I would need a permit to pass over any federal or state highway and stop traffic. Along with a myriad of other permits, and given the altitude of the location, they highly recommended to move the Donaldson Futuro by road.<sup>11</sup>

The Donaldson Futuro was finally moved on December 8, 2004, under a boat permit since early visits with the Riverside County Building and Safety Department had certain requirements for moving a house onto a vacant lot that had not yet been satisfied.<sup>12</sup> The 209 km (130-mile) journey up Interstate 15 from San Diego, complete with a highway patrol escort, proved to be more challenging than initially thought [FIGURE 06 a-b]. It was moved as a single structure since it was advised to not separate the Donaldson Futuro on the basis that it may not easily go back together, especially after the restoration of the exterior.<sup>13</sup> Being 8.03 m (26'-4") in diameter it took

up three lanes of Interstate 15 and hung over the mountain road, clearing one area between two trees by only 76.2 mm (3"). Although the route was carefully planned by Larry Wood of the San Diego Boat Yard, who was also the driver, it was still an adventure.<sup>14</sup>

The Donaldson Futuro finally arrived on site late in the day, in 1°C (34°F) cold and fog. The crane had problems getting up the hill to Pine Cove in the snow and, at one point, almost quit. However, the power and telephone lines had to be dropped for the lift, and the neighbors were without power and a land line. Finally, the crane dodged trees and lowered the house but had to stop because the crane operator could not see the end of the crane boom over the rock outcrop. The Donaldson Futuro weighed 5,500 kg (11,900 pounds) with the support structure, so the crane operator stopped five feet short and would not override the computer.<sup>15</sup> Getting five people on each leg, it was swung slowly onto the previously designed and constructed 2,068 N/square cm (3000 psi) concrete foundations, in the dark at 11:30 p.m.

## RESTORATION OF THE DONALDSON FUTURO ON THE HILL

Moving the Donaldson Futuro was only the beginning of its restoration. The unrestored interior had suffered the loss of the majority of the asbestos popcorn ceiling, damage to the wood floor and portions of the steel substructure supporting the floor and tying into the exterior leg supports [FIGURE 07 a-b]. None of the original bubble windows remained [FIGURE 08].

The original kitchen range and built-in seating area, as well as all of the interior fixtures, cabinetry, shelves, and center console were still in the Donaldson Futuro. The coffee tables, when pushed together next to the seating area, would form sleeping areas, and the dining table was extant and in reasonable shape. The only items missing were the dining chairs.

The acrylic bubble windows were custom made at Planet Plastics in Corona following the design of the original window sent from my friend in Australia. The window prototype was very flimsy and severely crazed, so it was decided to use 6.35 mm (1/4") Plexiglass acrylic instead. The windows were recommended to be heated and air-blown rather than formed over a mold so there would be no distortions [FIGURE 09a].<sup>16</sup> Using automobile windshield technology, a special H-shaped neoprene gasket was designed by Donaldson with a zipper type insert to hold the windows in place. A mockup of the window opening was made and taken to Planet Plastics for their fitting of the acrylic window [FIGURE 09b].

## CODE COMPLIANCE CHALLENGES AND SOLUTIONS FOR THE DONALDSON FUTURO

The final construction documents were completed by the author on March 24, 2004,<sup>17</sup> and finally approved for construction on August 7, 2007.<sup>18</sup> Subsequent inspections and code compliance issues followed as all work was required to "comply with currently adopted Uniform Building Code, Uniform Plumbing Code, Uniform Mechanical Code, National Electric Code, and Ordinance 457 by the County of Riverside."<sup>19</sup> One outstanding challenge was that the Donaldson Futuro was only 48.30 square meters (520 square feet) total area, and the building ordinance for the County of Riverside required an 74.32 square meters (800 minimum square footage). A separate building, a Family Room, was designed and attached to the Donaldson Futuro with a covered walkway. Later in the inspection cycle this condition was removed as the Donaldson Futuro was built in 1969 as a residence.<sup>20</sup> The occupancy permit was obtained on February 4, 2009, after the lot merger for the septic and leach lines were approved.<sup>21</sup>

The structural analysis was performed by Eric Stover of LZA Technology based on shell design. The calculations were based on the 2001 California Building Code and the 1997 Uniform Administrative Code since the Donaldson Futuro was not a qualified historic structure at the time and could not take advantage of the California Historical Building Code. It was shown that the Donaldson Futuro could support a total snow load of 2,623 kg (5,783 pounds) when code only required 1,424 kg (3,140 pounds).<sup>22</sup> Additional analysis was supplemented by the theories found in *Elementary Statics of Shells*.<sup>23</sup> Wind and seismic load resistance were almost twice as that required by code. Overall, the Donaldson Futuro is very strong due to its egg-like double-curved shape. Similar calculations for the Finnish Futuro can be found in the publication *Kunststoffbauten: Teil 1 – Die Pioniere*.<sup>24</sup>

Because of the high threat of fires, it was required that a fire truck be able to get within 15.24 m (50') of the structure to fight a fire caused by the residence.<sup>25</sup> This was impossible due to the constraints and height of the site. In addition, the nearest fire hydrant was 60.05 m (197 feet) from the property and could not be used to fight a fire at this location.<sup>26</sup> The County also wanted a Type A fire resistive roof but had a difficult time determining where the roof began, and the exterior walls finished. They also wanted the bottom of the Donaldson Futuro to be fire protected but could not find a code reference that noted that the bottom of a structure needs to be protected.<sup>27</sup>

Complying with state mandated Title 24 Certificate for Energy Compliance for Residential was challenging, mostly due to the form that was required to be filled out.



07 a-b Portion of the interior, near a window opening showing the fiberglass and uncured reddish polyester (a). This continues to be an ongoing problem as it leaches through the finish paint surface and acoustical ceiling. © M.W. Donaldson, December 2002. (b) Original linoleum floor at the kitchen area. This floor was badly damaged but was restored and the original pieces under the current linoleum floor that closely matches the original in color and texture. © M.W. Donaldson, August 15, 2006



08 Interior of the Futuro showing the interior damages, missing windows and bench seat sitting area. © M.W. Donaldson, August 15, 2006



09 a-b (a) Sample of the heated and blown acrylic window with a 3" (76.2 mm) curvature at Planet Plastics, (b) Installing the acrylic window in a mock-up frame. © M.W. Donaldson, May 22, 2003



10 Donaldson Futuro with the hinged downward opening door with integral stairs in summer.  
© P. Kozal, March 26, 2018

For instance, there are different values for the walls versus the roof, and, as mentioned before, where does one end and the other begin? Located at 1,981 m (6,500 feet) elevation also was a challenge due to extreme high winds and cold temperatures with many days below freezing. However, the Donaldson Futuro is tightly sealed with no heat loss from air leakage; the fiberglass and cellular polyurethane sandwich construction, overall 89 mm (3.5") thick, had a U-factor of R-35 (Code requires R-30), and the walls had a U-factor of R-46 (Code requires R-19); and the windows were only 15 percent of the exterior surface.<sup>28</sup> Although a new heating and cooling system was installed, the Donaldson Futuro was in full compliance without any exterior modifications.

Upon consultation with the Riverside County Fire Department they agreed to allow a sprinkler system to be installed meeting NFPA 13D.<sup>29</sup> That was simple enough except the California Department of Forestry and Fire Protection does not allow the use of the water supply system, as it is required in times of emergencies when fighting a fire nearby.<sup>30</sup> Further research led to a stand-alone pressurized 300 gallon water tank system completely off the power and water grid called The D System by Home Fire Sales Inc..<sup>31</sup> The sprinkler system was installed neatly by Advanco Fire Protection.<sup>32</sup> It was decided to not install the metal fireplace that sat on the original circular storage console, due to the extremely high fire threat according to the United States Forest Service. The opening now has a bubble skylight, and the fireplace is stored on site.

Exiting the Donaldson Futuro became a challenge with the County of Riverside Department of Building and Safety. The County wanted a regular wooden door enclosure structure to be constructed on the ground and the plastic Futuro door to be permanently fixed in an open position. The Inspector, however, was very gracious and came up to try the counter-balanced door as he exited the Donaldson Futuro. He was satisfied that the door was safe and easy enough to open in case of an emergency [FIGURE 10].



11 Installation of the zipper gasket pull-ring. © M.W. Donaldson, November 13, 2008

The other challenge for exiting was that a person needs to go through a window or a door straight from the bedroom directly to outside.<sup>33</sup> The window area met code for the size of the opening. However, the windows in the bedroom, as installed, are fixed, so the code was mitigated by providing a pull-ring wire that would release the zipper insert, and the windows could then be easily pushed out [FIGURE 11].

The septic and sewer system were not possible to install on the property, because it was one large outcropping of rocks and offered no place to put the leach lines.<sup>34</sup> A neighbor was nice enough to sell me a small portion of his property to install the leach lines and allow the contractor to install them. However, a lot tie agreement had to be filed and approved by the County of Riverside Department of Building and Safety.<sup>35</sup> This process required a complete topographic map and verification of both of the property's boundaries. In the process, since the property was a flag lot, surrounded by seven properties it was discovered that most of the property stakes were in the incorrect location.<sup>36</sup> An encroachment permit also had to be filed for transitioning the driveway onto Big Rock Road.<sup>37</sup> The entire process took years to approve since the surveyor's work was questioned by the other residents surrounding the Donaldson Futuro lot.

By 1973, the Donaldson Futuro and its plastic brethren were no longer in production due to the Organization of the Petroleum Exporting Countries (OPEC) induced oil crisis, when motorists lined up for fuel and petroleum prices rocketed.<sup>38</sup> Plastic was no longer cheap, nor competitive with wood or metal as an architectural material. "Embargo or no, the Futuro came with some built-in problems. It was small, oddly shaped, and expensive. Critics called it 'the Mercedes-Benz' of prefabricated houses."<sup>39</sup>

## IN THE END

The process was one of research, discovery, and finally successful restoration and code compliance [FIGURES 12, 13, 14, 15]. It was a long journey, full of surprises and challenges, and it's



12 Living Room showing original fixtures and furniture. © P. Kozal, March 26, 2018



13 Dining area showing original dining table and coffee table © M.W. Donaldson, December 28, 2018



14 Interior of the restored Futuro showing the kitchen and central console. © P. Kozal, March 26, 2018



15 Bedroom showing under bed storage. © P. Kozal, March 26, 2018

no wonder that many of the Futuros throughout the world are in dire shape. The concepts of ease of relocation, little or no maintenance because it was plastic, and the early salesmanship of meeting the regular codes all proved to be a challenge. The lack of expertise on restoring plastic materials and the amount of experimentation with each step also became not only a challenge but expensive. However, in the long run, the adventure was a myriad of discoveries, solving the challenges with clever solutions and just a bunch of fun along the way. The lessons learned have been carefully cataloged and should be of use to people in the future who may want to rescue, relocate, or restore a Futuro.

“Many fans see the Futuro as nostalgia—a spaceship fit for Barbarella, with smooth, sybaritic curves. The Futuro provides a mid-60s vision of the future that was already falling out of touch with the zeitgeist by 1968—more Dean Martin and Hugh Hefner than Crosby Stills and Nash—and certainly out of line with the Mothers of Inventions song ‘Plastic People.’ (*“I’m sure that love...will never be... a product of...plasticity”*).”<sup>40</sup>

The Futuro is an important part of architectural and social history. What the Futuro represents is an optimistic vision of a future that never came to pass, when families

would live in lightweight, inexpensive, durable, and easy-to-clean plastic houses they could move whenever the family moved. “Fans believed the Futuro would make these dreams come true.”<sup>41</sup> Many of these dreams came alive during the process of rescuing the Donaldson Futuro, and everyone involved was proud of their work along the way. Throughout the whole project, I was accompanied by my wife, Laurie, who was a trooper during the restoration. She loves the Donaldson Futuro, having given so much of her life’s energy to its move and restoration [FIGURE 16]. Her stories still bring laughter to family and friends as she reminisces about them time and time again. We love our Donaldson Futuro.

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16 Typical snow at the Donaldson Futuro in the winter. © M.W. Donaldson, December 3, 2009

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**Milford Wayne Donaldson** is the president of award-winning Architect Milford Wayne Donaldson, FAIA, Inc. since 1978 specializing in historic preservation. Mr. Donaldson authored a course *Plastics in Architecture* at California State Polytechnic University, San Luis Obispo, California from 1970-1972 and built the prototype of the Poly-Pod System with Elbert Speidel in 1972. He co-authored *The Final Mission Preserving NASA's Apollo Sites* discussing the importance of plastics in the space program. Mr. Donaldson served as the California State Historic Preservation Officer and as the Chairman of the Advisory Council on Historic Preservation appointed by President Barack Obama.

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- 3 Bergdoll, Barry; Christensen Peter, *Home Delivery, Fabricating the Modern Dwelling*, The Museum of Modern Art, New York. 2008, p. 140.
- 4 Grau, Stan to Nicole, architect at Architect Milford Wayne Donaldson FAIA. Email: August 28, 2003. "In comparison, I am quite embarrassed with having sent you my pathetic bundle of scraps. After 30 years you'd think I'd have a bookcase laden with classy memoria, but 3 years ago I got married, whittled my possessions (mostly junk) to near nothing and moved to Hawaii. 'Twas a wonderful stroke of luck, having Wayne stumble across the round house and becoming obsessed with it...like me."
- 5 Personal conversation with Stan Grau, August 20, 2003. Stan Grau was never the "owner" of the Futuro, more of a broker for the FUTURO Corporation. After the City made him move it several times it ended up behind the Design Center in San Diego in 1977. In 1972 the FUTURO Corporation went out of business and Stan came up with his own version called the Grauhaus. It also failed and I became the first official "owner" as a resident when I obtained an occupancy permit. It was sold to me as an object by the new owners of the Design Center.
- 6 McDonald and Jarmusch
- 7 Personal conversation with Mr. McMillan, December 2, 2002.
- 8 Buck, Susan, Conservator, "Futuro House, Paint Cross-Section Microscopy" Historic Paint and Architectural Services, a Division of West Communications Inc., Newton, MA. July 14, 2003.
- 9 Wood, Larry, "Futuro Covering and Repair Process including Materials Specifications." San Diego Boat Movers, San Diego, CA. December 2002-December 2003.
- 10 McNeil Email: November 3, 2003; McNeil, Paul, Alternative Artist, Surfer. [Paulie@paulmcneil.com](mailto:Paulie@paulmcneil.com)
- 11 Erickson Air Crane, Central Point, Oregon. Maximum lifting capacity: 25,000 pounds. [www.erick-aircrane.com](http://www.erick-aircrane.com)
- 12 Miller, Jim, Inspector, Department of Building and Safety, Riverside County, CA, "Residential Building Permit No: BRS040340." December 5, 2003.
- 13 Email from Cora Geissel, owner of a Futuro, Berlin, Germany to Paul McNeil dated March 15, 2004
- 14 Wood, Larry. Wood programmed a route for travel and produced a map to obtain a permit to move the Futuro as a boat. The route left the San Diego Boat Yard in San Diego, onto Interstate 15 turning off onto State Highway 79 going east, State Highway 74 going north, and finally to State Highway 243. By lowering the Futuro to 18" from the roadway, it fit under the freeway overpasses and no utility lines had to be moved.
- 15 Personal Conversation with Joe Sanderval, Marco Crane and Rigging Company, Santa Fe Springs, CA. December 8, 2004.
- 16 Planet Plastics Co. Chino, CA, visitation May 16, 2003.
- 17 Sawasaki, Stuart, Project Architect, "Futuro Home Relocation Drawings," Architect Milford Wayne Donaldson FAIA, 530 Sixth Avenue, San Diego, CA. March 24, 2004, 16 pages.
- 18 Lyman, Bob, "Permit No.: BRS040340 Application for Land Use Review, Itemized Accounting," Land Development Departments, County of Riverside, August 7, 2007.
- 19 Bylund, Lloyd, Plan Checker, Department of Building and Safety, Riverside County, CA, "Plan Check Corrections, Residential Building Permit No: BRS040340." December 16, 2003.
- 20 Bylund, Lloyd, Plan Checker, Department of Building and Safety, Riverside County, CA, "Plan Check Corrections, Residential Building Permit No: BRS040340." December 16, 2003.
- 21 Bylund, Lloyd. "For this review, the area of the Family Room is 288 square feet (12 feet by 24 feet measured outside wall to outside wall). The area of the Futuro home is 531 square feet (3.14 x 169 = 530.66, round up to 531), for a total dwelling area of 819 square feet. You may correct your plans accordingly. There (sic This) is a considerable variance." December 16, 2003.
- 22 Stover, Eric Christain, Registered Professional Engineer, "Structural Calculations for Futuro House Relocation, Idyllwild, CA County of Riverside." LZA Technology, June 30, 2004.
- 23 Pflugger, Alf, *Elementary Statics of Shells*, McGraw-Hill Book Company, 1961.
- 24 Gensel, Elke and Pamela Voigt, *Kunststoffbauten: Teil 1 – Die Pioniere*, Fomell, Bauhaus-Universität, Weimar, Germany. 2005, pg. 144.
- 25 Riverside County Fire Department in Cooperation with California Department of Forestry and Fire Protection.
- 26 Dillman, Doris. Dillman, Dora, Project Manager Futuro Relocation, Idyllwild, CA. [Dd@idyllwild.com](mailto:Dd@idyllwild.com) Email September 5, 2003.
- 27 Miller, Jim, Department of Building and Safety, Riverside County.
- 28 Moya, Craig J., Title 24 Report for Futuro Home, 52895 Big Rock Road, Pine Cove, CA 92549" Engineered Systems, San Diego, CA. February 2, 2004.
- 29 Donaldson, Milford Wayne, "Plan Check Corrections." Letter to Captain Steven Diaz, CDF Riverside Unit, Riverside County Fire. February 23, 2004.
- 30 Riverside County Fire Department in Cooperation with California Department of Forestry and Fire Protection, "Inspection Record," August 18, 2006.
- 31 Home Fire Sales Inc. The D System
- 32 Holland, Chris, Advanco Fire Protection, Ontario, CA., April 26, 2004.
- 33 Miller, Jim, Department of Building and Safety, Riverside County
- 34 Lind, Dan, "Futuro Septic and Sewer Design," Inland Foundation Engineering Inc., San Jacinto, CA June 15, 2004.
- 35 Lind, Dan, "Futuro Septic and Sewer Design," Inland Foundation Engineering Inc., San Jacinto, CA June 15, 2004.
- 36 Holt, J. C., Land Surveyor, "Lot Line Adjustment No. 1515, Riverside County, September 8, 1982." March 19, 2003.
- 37 County of Riverside, State of California Transportation Department, "Encroachment Permit Nbr: R08-09-0024, September 4, 2008.
- 38 Home
- 39 Weinstein, Dave, "Falling for a Futuro" CA Modern, Winter 2007, p. 12.
- 40 Weinstein, Dave, "Falling for a Futuro" CA Modern, Winter 2007, p. 29.
- 41 Weinstein, Dave, "Falling for a Futuro" CA Modern, Winter 2007, p. 11.