

# *Back to Earth: Earth Building in Aotearoa New Zealand 1945-65*

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*Earth, like timber, radically transformed the built landscape of Aotearoa New Zealand in the nineteenth century. Settlers from Europe brought earthen technologies which they adapted to suit the local environment, and earth buildings became an integral part of vernacular architecture. Although earth had fallen out of favour by 1925, it re-emerged after World War Two. In the housing crisis of post-war New Zealand, new developments in earth building offered a plausible solution for affordable housing, attracting commercial activity and government backing. By the late 1960s, however, the promise of a new vernacular tradition in earth had crumbled away.*

*This paper uses the concept of distance to discuss the story of earth in Aotearoa during the period 1945-65. Far from its origins in Europe, New Zealand earth building nevertheless had a shared heritage manifested in an international community of practice. Research and technological information circulated between Europe, North America and Australasia, contributing to the development of earth construction as a modern technology. While the distance of time might cast the once-common practice in an old-fashioned light, earth building remained a contemporary practice in Central Otago, and elsewhere in Aotearoa its post-war re-emergence was not a romantic revival, but an engagement with the modern technique of soil cement. Government support for earth construction in the national house-building programme offered potential for Aotearoa's mid-century movement to become a mainstream practice; however, this support was not sustained, and the distance between earth and mainstream construction opened up once more.*

*Keywords: Earth building; soil cement; rammed earth; pisé de terre; sun-dried bricks*

Earth is one of the oldest building materials and earth techniques have historically migrated from one country to another with the peoples who use them. In the early days of European settlement in the Americas and Australasia, earth construction became an integral part of vernacular architecture as settlers adapted European technologies to suit local environments. Information and ideas from Europe also informed local practice through texts such as those from Cointereaux's *École d'Architecture Rurale en pisé de terre*, widely disseminated from 1795 to 1840,<sup>1</sup> and Williams-Ellis's "Cottage building in cob, pisé, chalk and clay," published in London in 1919<sup>2</sup> and revised in 1947.<sup>3</sup>

Thus it was earth, as much as timber, that radically transformed the built landscape of Aotearoa New Zealand in the nineteenth century, and until sawn timber became widely available, earth buildings were an integral part of the vernacular architecture. Although earth construction fell out of favour—by 1925 it was all but non-existent, except in the southern province of Central Otago—it re-emerged after World War Two, when significant research on soil cement had been taking place in North America, Australia and Aotearoa. New Zealand faced a chronic housing shortage, and these developments in earth construction offered a plausible solution for affordable housing, attracting commercial activity and government backing. By the late 1960s, however, the promise of a new vernacular tradition in earth had crumbled away.

This paper uses the concept of distance as a way of thinking about the story of earth building in Aotearoa between 1945-1965. Far from its origins in Europe, New Zealand earth building nevertheless had a shared heritage that manifested itself in an international community of practice. Research and technological information circulated between Europe, North America and Australasia, contributing to the development of earth construction as a modern technology. While the distance of time might cast the once-common practice of earth building in an old-fashioned light, earth builders in Aotearoa were rarely backward-looking. In Central Otago it remained a contemporary practice; elsewhere, the post-war re-emergence of earth was not a romantic revival of earlier traditions, but an engagement with the modern technique of soil cement. For a time, the government was prepared to support earth building, through cheap loans and construction of state houses, and it seemed that the distance between earth and mainstream construction was closing. By 1960, however, this support was withdrawn and the distance opened up once more.

1 Louis Cellauro and Gilbert Richaud, "François Cointereaux's *École d'Architecture Rurale* (1790-91) and its Influence in Europe and the Colonies," *Architectural History* 49 (2006): 129-48.

2 Clough Williams-Ellis, *Cottage Building in Cob, Pisé, Chalk and Clay: A Renaissance* (London: Country Life, 1919).

3 Clough Williams-Ellis, John and Elizabeth Eastwick-Field, *Building in Cob, Pisé and Stabilized Earth* (London: Country Life, 1947).

This paper builds on the author's prior research into the historical incidence and location of New Zealand's earth buildings,<sup>4</sup> combining primary research with Heritage New Zealand's register of historic buildings, and a national survey of earth buildings conducted by Miles Allen.<sup>5</sup> To this data has been added information from international, national and regional archives, libraries and museums, university collections, local body records, and private collections. The author visited many of the houses discussed in this paper, and held informal interviews with current house owners and some of the original owners and builders.

4 Min Hall, "Earth and Straw Bale: An Investigation of Their Performance and Potential as Building Materials in New Zealand" (MArch thesis, Victoria University of Wellington, 2012).

5 Miles Allen, *Survey of Earth Buildings in New Zealand* (Auckland: Unpublished document held by EBANZ, 1991).

## North America and Australasia pre-1945

Sun-dried bricks, cob and pisé were all used by European settlers in North America and Australasia from the early nineteenth century.<sup>6</sup> In the United States, where adobe (sun-dried) bricks had been used in the southern states for centuries, pisé was rare, despite Cointereaux's influential texts. The first Williams-Ellis book had little effect on this, even though its publication was reported in newspapers all over the English-speaking world, including New Zealand, with pisé arousing the most interest from as far afield as Canada and Scandinavia.<sup>7</sup> During the Great Depression, however, engineers at the United States Department of Agriculture<sup>8</sup> and the South Dakota Agricultural Experiment Station began to test and analyse rammed earth walls (pisé), with and without the addition of cement.<sup>9</sup> This research continued during World War Two, and in 1941 the United States Bureau of Statistics published a report which, together with the previous publications, provided a solid platform for the research that would follow in England and Australasia after the war.<sup>10</sup>

6 Both sun-dried bricks and cob involved mixing wet clay with straw or native grasses. The mix was then placed in timber moulds to form bricks, or applied directly in layers to form cob walls. Pisé, involved ramming a damp earthen mix between timber boxing.

7 Williams-Ellis, *Building in Cob*, xi.

8 M. C. Betts, *Farmers' Bulletin No. 1500: Rammed Earth Walls for Buildings*, (Washington, D.C.: U.S. Department of Agriculture, 1937).

9 R. L. Patty, *Rammed Earth Walls for Farm Buildings* (South Dakota: South Dakota Agricultural Experimental Station, 1938).

10 Herbert Whittemore, et al., *Structural, Heat-Transfer, and Water Permeability Properties of Five Earth-Wall Constructions* (Washington: United States Department of Commerce, 1941).

11 Williams-Ellis, *Cottage Building*, 3.

12 Ted Howard, *Mud and Man* (Melbourne: Earthbuild Publications, 1992).

13 George Middleton, *Earth Wall Construction*,

Australian expertise in pisé, by contrast, was known internationally from early on. In the 1919 introduction to the first Williams-Ellis book, John St. Loe Strachey recalls being "lent the Farmer's Handbook of New South Wales, in which the State Government provides settlers with an elaborate description of how to build in Pisé."<sup>11</sup> In *Mud and Man*, Ted Howard outlines the evolution of all types of earth building in Australia, state by state, leading to the important work carried out by George Middleton at the Commonwealth Experimental Building Station in New South Wales, Australia, after World War Two.<sup>12</sup> Middleton's first bulletin on earth construction includes references to research papers and articles on pisé and other techniques written between 1920 and 1943 from Britain,

the United States, Rhodesia and Australia.<sup>13</sup> Distance was clearly no impediment to the continuing dissemination of earth-building knowledge.

1. *Pisé or Rammed Earth* (Sydney: Commonwealth Experimental Building Station, 1947), 22-23.

## Earth Building in Aotearoa pre-1945

Prior to European settlement in Aotearoa, Māori used earth in various ways, but not as a structural element in house building.<sup>14</sup> The European settlers who began arriving in the nineteenth century brought earth-building techniques including cob, sod, pisé and sun-dried brick.<sup>15</sup> These technologies were easily translated, and until sawn timber became widely available, earth buildings were an integral part of New Zealand's vernacular architecture.

14 William J. Phillips, *Maori Houses and Food Stores* (Wellington: Government Printer, 1952), 24, 28, 70.

15 Jeremy Salmond, *Old New Zealand Houses* (Auckland: Heinemann Reed, 1986), 36.

Earth building was more prevalent in the South Island than the North, particularly in less forested regions like Central Otago and Canterbury. Regional differences developed as a consequence of soil type, climate and the prior experience of builders. In the dry climate of Central Otago, sun-dried bricks were used for all manner of buildings, from houses to hotels. The technique may have come with the first British settlers, or from America or Australia during the 1860s gold rush.<sup>16</sup> Further north, in Canterbury, Marlborough and Nelson, cob was the predominant method. Pisé was less common overall; Pompallier House, built by French missionaries in 1842 (fig. 1), is one of the few surviving pisé buildings of the pre-1945 era, and also one of the oldest buildings in the country.<sup>17</sup>

16 Salmond, *Old New Zealand*, 45.

17 Salmond, *Old New Zealand*, 43.



Figure 1. Pompallier House, Russell, New Zealand, 1842, designed by the architect Louis Perret. (Photograph by author, 2009.)

As the twentieth century progressed, building in earth steadily declined, and by 1925 it was almost non-existent, except in Central Otago. In a 1921 newspaper article, local engineer J.R. Marks discussed the suitability of earth construction to the dry climate and went on to provide brief instructions on how to build with “dry cob” (pisé), wet cob and sun-dried brick.<sup>18</sup> Nearly twenty years later, the Otago Daily Times (ODT) reported that Mr Jack Haig of Lauder had been “making [sun-dried] bricks and building houses for 40 years.”<sup>19</sup> But although earth building appears to have ceased in other parts of Aotearoa, it was not forgotten. When Williams-Ellis’ *Building in Cob* was published in 1947, more than a dozen local newspapers published extracts. Significantly, the book included a section on soil cement, a technology that would play an important part in the next chapter of New Zealand’s earth-building story.

18 J.R. Marks, “Cob or Earth Building,” *Alexandra Herald and Central Otago Gazette*, June 22, 1921, <https://paperspast.natlib.govt.nz/newspapers/AHCOG19210622.2.16>.

19 “Bright Future for Central Otago Industry,” *Otago Daily Times*, June 23, 1947, <https://paperspast.natlib.govt.nz/newspapers/ODT19470623.2.69>.

## Earth Building in Aotearoa 1945-65

After World War Two, the New Zealand Government set about reinstating the pre-war housing programme, set up in 1936 in response to a chronic housing shortage, which had worsened during the war years. Thousands of houses were built all over Aotearoa in the following two decades, some of them out of earth. Initially, many were financed by cheap loans from the State Advances Corporation (SAC), or built as state rental houses under the auspices of the Housing Division of the Ministry of Works, but a change of government in late 1949 saw the increasing involvement of the private sector.<sup>20</sup> This would impact the incidence of earth building.

20 Ben Schrader, *We Call It Home* (Auckland: Reed, 2005), 34-44.

The government expressed openness to “new materials and systems of construction that may be useful in speeding up the supply of houses, or in reducing costs.”<sup>21</sup> To that end, several earth-building techniques were investigated. From 1947-49, newspapers reported on the progress of sun-dried brick houses being built for the Housing Division in Central Otago, and plans to experiment with rammed earth and soil cement blocks in Wellington, Napier and Nelson. In early 1948 the *Gisborne Herald* reported that “Drawings and specifications are ready for the [Housing Division] Department’s first experimental rammed earth dwellings.”<sup>22</sup> Later that year the *Bay of Plenty Times* reported on progress: “it is easy enough to plan the building of a rammed earth house. The difficulty lies in persuading a contractor to do the job.”<sup>23</sup> Officials expected that rammed earth houses would cost more than ordinary houses, but if the ramming process were automated, costs would be reduced.<sup>24</sup>

21 Cedric Firth, *State Housing in New Zealand* (Wellington: Ministry of Works, 1948), 44.

22 “Rammed Earth,” *Gisborne Herald*, February 21 1948 <https://paperspast.natlib.govt.nz/newspapers/GISH19480221.2.34>.

23 “Experimental House Construction,” *Bay of Plenty Times*, October 4, 1948, <https://paperspast.natlib.govt.nz/newspapers/BOP19481004.2.41>.

24 Bay of Plenty Times, “Experimental House.”

Presumably the procurement problems were not resolved, as no evidence has been found that any of these “experimental” houses were built.

Whatever the outcome, the government’s investigations in 1947-49 reflected a new and growing interest in earth, in both public and private sectors. Independent research was already underway, and this would contribute to the development of a mid-century earth-building movement based on soil cement, rammed earth, and sun-dried brick.

Aotearoa’s modern era of earth building began, almost simultaneously, in two locations in the South Island — Christchurch, and Riverside Community, near Nelson— followed by other locations in the North Island, notably at Wainuiomata, near Wellington. A lecturer in soil mechanics at Canterbury University College, Christchurch, P.J. (Pip) Alley, began testing the Canterbury loess for soil cement wall construction in 1948, publishing the results the same year.<sup>25</sup> He was familiar with the existing overseas research, and his own closely paralleled that of Middleton in New South Wales. Middleton’s bulletins and Alley’s papers and articles informed the design and construction of soil cement houses built in Aotearoa between 1947 and 1965. Williams-Ellis’ *Building in Cob*, with its section on soil cement, was also available.

25 P.J. Alley, “Loess in Soil Cement Mixtures,” *New Zealand Engineering* (1948): 47.

No evidence has been found to suggest that Alley was involved in the early government projects, although the *Bay of Plenty Times* article mentions the government having access to the research being carried out in Australia.<sup>26</sup> By the early 1950s, however, Alley’s expertise was well known and sought out by those who wanted to build in soil cement.

26 Bay of Plenty Times, “Experimental House”

In Christchurch, Alley’s 1948 test results attracted the interest of local architect E.C.R. Anderson. In Alley’s words, “a real life architect stepped out of the blue and asked for information which would enable him to construct, at his own expense, a house in soil cement.”<sup>27</sup> The Anderson house in Makora Street, Christchurch, was constructed in 1948 to a simple L-shaped plan with generous eaves. The 200mm-thick walls, tied together with a reinforced concrete bond beam, performed remarkably well in the Canterbury earthquakes of 2010 and 2011.<sup>28</sup>

27 P.J. Alley, “A Soil Cement House,” *New Zealand Engineering* (July 15 1949): 558-59.

Alley worked hard to promote and advance the use of soil cement construction. He disseminated his knowledge via professional journals and newspapers, attended trade fairs, and assisted prospective house builders by assessing the suitability of their soils and advising them how to proceed. Alley objected to “our native forests being turned into making weatherboards

28 Hugh Morris and Richard Walker, “Observations of the Performance of Earth Buildings Following the February 2011 Christchurch Earthquake,” *Bulletin New Zealand Society for Earthquake Engineering* 44, no. 4 (2011) 358-67.

and studs for thousands of ‘boxes;’ and argued for soil cement as a viable and longer-lasting alternative.<sup>29</sup> As a result interest in soil cement grew, and during the 1950s and 1960s eleven soil cement houses were built in and around Christchurch. Most were built by their owners, proving Alley’s point: “In these times of high costs, many people are desperate for a house, and there is no reason why a young married couple should not be able to build a house in their spare time, provided occasional help is forthcoming from friends and relatives.”<sup>30</sup>

It was not only young married couples who were attracted by the do-it-yourself aspect of earth construction. Riverside Community was founded in 1941 by Christian Pacifists.<sup>31</sup> During World War Two most of the Riverside men were imprisoned as conscientious objectors, and on their release they returned to their rural homes, which consisted of sheds, huts and tents. Unlike returned servicemen, they did not have access to cheap loans, and this lack of money made earth particularly attractive when it came to building the community’s first permanent house in 1947. The labour-intensive nature of earth building was not an obstacle; the lack of finance was more than made up for by a strong work ethic, fuelled by a vision of a new community-based way of life.<sup>32</sup>

Alley’s influence is not evident in the first two Riverside houses, neither of which included cement in the mix, but the builders were probably informed by Middleton’s 1947 bulletin. In her history of Riverside, Lynn Rain writes that one of the builders “read up” about rammed earth in “an Australian book.”<sup>33</sup> A copy of the bulletin remained in the community’s possession in 2010, and its detailed drawings and specification would have been invaluable.<sup>34</sup> Alley did eventually test the Riverside material, concluding that more than 10 percent cement was required.<sup>35</sup> Three further rammed earth houses, a large workshop and a substantial hall, all built between 1952 and 1965, used cement in the mix.

By contrast, it was first-hand experience of earth buildings while on active service during the war that influenced David Jones’ decision to build in earth on his return to Whanganui, in the North Island. He saw the advantages of earth houses as “their low costs, low maintenance, excellent thermal properties, low insurance rates, almost totally fire proof, borer and termite proof and resistant to small arms fire and fragments from shells and mortars.”<sup>36</sup> Safely distant from the latter, and confronted by the building material shortages of post-war Aotearoa, Jones constructed a number of earth buildings between 1948

29 P.J. Alley, “Soil Cement House Construction,” *New Zealand Engineering* (August 1952): 290-95.

30 Alley, “Soil Cement,” 292.

31 Lynn Rain, *Community: The Story of Riverside* (Nelson: Riverside Community Trust Board, 1991), 12.

32 Rain, *Community*, 31.

33 Rain, *Community*, 30.

34 Middleton, *Earth Wall*.

35 Alley, “Soil Cement,” 294.

36 David Jones, *Nga Whare Uku: The Houses of Earth and How to Build Them* (Whanganui: David Jones, 1991).

37 Miles Allen, *Out of the Ground* (Palmerston North: The Dunmore Press, 1997), 24.

and 1960. In Gisborne, Philip Fischbach also cited wartime experiences of earth buildings as the reason for building his own home in earth in 1949.<sup>37</sup>

The most ambitious earth-building venture of the mid-century era took place in Wainuiomata, which was experiencing a period of sustained growth driven by new affordable housing.<sup>38</sup> John Anker, also a returned serviceman, read of Alley's research and saw a commercial opportunity in soil cement technology. He and brothers Peter and Chris began by building houses for their own families, which allowed them to develop a construction method suitable for building soil cement houses on a commercial scale.<sup>39</sup> They formed a company, Terracrete Constructions Limited, designed and patented machinery for wall placement, and devised a method that they believed could compete with the prevailing timber framed construction.<sup>40</sup>

The overall Terracrete system comprised reinforced concrete columns, 200mm infill walls of soil cement on concrete foundations, and a reinforced concrete bond beam. Unlike other soil cement systems, where window and door frames were built in as the wall building progressed, Terracrete walls were rammed to their full height, with openings cut out by chainsaw once the bond beam had cured and before the walls set too hard (fig. 2). This innovation sped up construction time. Like all soil cement houses of the era, the exterior finish was painted cement plaster, which meant that the houses merged seamlessly into their neighbourhood.<sup>41</sup>

The Ankers built fifteen soil cement houses in Wainuiomata between 1952 and 1960, the most significant of which are the six

38 Chris Maclean, "Wellington places - Eastern ranges," *Te Ara - the Encyclopedia of New Zealand*, <http://www.TeAra.govt.nz/en/wellington-places/page-12>.

39 Min Hall, "Mid-century Earthen Architecture in Aotearoa New Zealand – A New Vernacular?" in *Vernacular and Earthen Architecture: proceedings of SoSTierra 2017*, ed C. Mileto et al., (Valencia, Spain, 2017), 138.

40 "Clay-Cement Revives Ancient Building Styles," *Evening Post*, Wellington February 2, 1958

41 Hall, *Mid-century*, 138.

42 Hall, *Mid-century*, 138.

Figure 2. Photographs of the Terracrete system. Photos from "Clay-Cement Revives Ancient Building Styles," *Evening Post* (Wellington), February 2, 1958.





state rental houses built in a row on the main street in 1958.<sup>42</sup> In their advertising, they emphasised the financial advantages of building in soil cement—low building and heating costs, investment security—as well as its longevity, fire-resistant properties, and thermal qualities (fig. 3). What seemed a promising venture was, however, short-lived. According to Allen, “Although Terracrete successfully built houses slightly cheaper than their competitors, their contract [with SAC] was not renewed.”<sup>43</sup> He suggests that the government was more interested in promoting the use of timber from its own forests than supporting the commercialisation of soil cement. In any case, demand fell away, and after 1960 the Ankers resumed conventional building practices.<sup>44</sup>

43 Allen, *Out of the Ground*, 26.

44 Hall, *Mid-century*, 139.

Meanwhile, in Central Otago, building in earth continued. There was interest in expanding the use of sun-dried brick,

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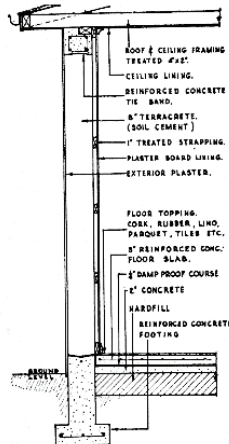


Figure 3. Terracrete advertisement from *Parade of Homes: Official Guide* (Wainuiomata: Wainuiomata Parade of Homes Organising Committee, 1958), 10.

which coincided with the government's commitment to trialling alternative construction methods for its housing programme. A 1947 ODT article included photographs of a recently completed house, and outlined a proposal from Jack Haig to pre-manufacture sun-dried bricks for sale, avoiding the time-consuming process of making them on site before construction could begin.<sup>45</sup> Two years later, the same newspaper reported that: "quite a number of houses have been built of local sun-dried brick in the past few years, and at present there are three of this type under construction in Alexandra, two for the State Housing Department and the third for a retired farmer."<sup>46</sup> Haig worked with his sons, and nephew Tom Haig, who carried on making and building in sun-dried brick in and around Alexandra over the next decade. As in Wainuiomata, the painted cement plaster finish makes it difficult to identify houses of this period as earth; their style is very much typical of the day, and cement plaster was also used on timber framed houses as a stucco.

45 Otago Daily Times, "Bright Future."

46 "Plans and Preparations," *Otago Daily Times*, April 2, 1949, <https://paperspast.natlib.govt.nz/newspapers/ODT19490402.2.142>.

## Discussion

The idea of distance highlights the key factors at play in the rise and fall of earth building in Aotearoa between 1945 and 1965. Despite New Zealand's distant geographic location, the circulation of international research and information played an important part, especially after World War Two, when the government became interested in experimenting with earth, and Alley began investigating soil cement. Alley's work coincided with that of Middleton in neighbouring Australia, but it is unclear if there was any collaboration. Middleton continued his research into the 1970s, and became acknowledged as an international authority on earth construction,<sup>47</sup> while Alley appears to have been largely unrecognised outside Aotearoa. Although he continued to advise people interested in earth building into the 1970s, his research stopped in the late 1950s,<sup>48</sup> at the same time as the government stopped supporting earth construction.

47 Howard, *Mud and Man*, 32.

48 Jennifer Dann, "Twelve Questions: Graeme North," *New Zealand Herald*, January 14, 2016, [https://www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=11573328](https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11573328).

The desperate need for housing, coupled with material shortages after World War Two, motivated both building professionals and individuals to turn to earth. This reflects a common tendency to look back to earth in times of need. In *Building in Cob*, Williams-Ellis noted that the international demand for his book was "clearly attributable to history repeating itself," and went on to compare the similar conditions in 1919 and 1947, namely a severe shortage of building materials.<sup>49</sup> Ashley

49 Williams-Ellis, *Build in Cob*, xi.

Gramlich similarly identifies “the Jefferson Era” following the American War of Independence, and “the Great Depression,” as periods where interest in pisé and soil cement occurred in the United States.<sup>50</sup> However, just as in the United States, when financial circumstances and material supply chains improved, New Zealanders reverted to mainstream practice and building in earth declined again.

The reason that the government’s 1948 proposal to build experimental houses in rammed earth got no further than the drawing board was reportedly the difficulty in “persuading a contractor to do the job.”<sup>51</sup> Williams-Ellis, who was visiting Aotearoa while the project was being mooted, used the opportunity to promote the use of pisé in an address to the New Zealand Institute of Architects.<sup>52</sup> In response, the assistant director of housing, Mr R. Hammond, said that “if we adopted [Williams-Ellis’] recommendations we would have but a quarter of the houses we have built,” and that the department had prepared plans for pisé houses but it was very expensive.<sup>53</sup>

This reflects something that had played a part in the earlier decline of earth building in Aotearoa: its slow, labour-intensive process, comparing unfavourably to timber house-building. Within a decade, the Ankers’ Terracrete system solved these issues of time and cost, and gained them a chance in the affordable housing market; but by the time they had perfected their technology, the post-war house-building machine had geared up and thousands of timber-framed houses were being built all over Aotearoa. It was in the government’s interest, as owner of the forests, to promote homegrown timber over other materials, and it was also influenced by a powerful construction industry lobby led by Fletcher Construction, New Zealand’s largest building firm.<sup>54</sup> Fletchers not only built with timber, they were also involved in timber processing, using logs purchased from the state-owned forests. Timber’s dominance was further strengthened by the successful development of treatment processes during the 1950s.<sup>55</sup>

When the government withdrew its support for Terracrete by not renewing the SAC contract, there was insufficient interest from the private sector to sustain the business. The public could not get past seeing earth building as old-fashioned, despite the Ankers having solved the issues of time and cost, and no matter how hard they tried to present soil cement as a modern material with equivalent or superior attributes to mainstream timber construction.<sup>56</sup>

50 Ashley Gramlich, “A Concise History of the Use of the Rammed Earth Building Technique Including Information on Methods of Preservation, Repair and Maintenance” (MSc thesis, University of Oregon, 2013), 1-2.

51 “Experimental House,” *Bay of Plenty Times*.

52 “Variety Tedious,” *Gisborne Herald*, January 30, 1948, <https://paperspast.natlib.govt.nz/newspapers/GISH19480130.2.26>

53 “Critic Assailed,” *Gisborne Herald*, January 30, 1948, <https://paperspast.natlib.govt.nz/newspapers/GISH19480130.2.99>

54 Schrader, *Call it Home*, 89.

55 Richard Wolfe *Remember When: Our New Zealand 1900-1999* (Auckland: Cumulus, 1999).

56 Maureen Anker, 2017, interview with Min Hall, 19<sup>th</sup> June 2017.

## Conclusion

The mid-century “looking back” to earth did not mean returning to some distant past. Building in sun-dried bricks had remained part of the Central Otago vernacular; when the Haigs began building on a bigger scale, they were simply continuing with a well-known material and method, entirely suitable to the region’s climate. Other proponents of earth construction were using soil cement, developed through new scientific research. Yet too many people still perceived building with earth—in any way—as a retrograde step. Perhaps it was too soon, or perhaps it did take a kind of distance to appreciate anew what earth had to offer. For returning soldiers such as Jones and Fischbach, leaving New Zealand and seeing earth building in a different environment allowed them to see earth with fresh eyes, and embrace its contemporary potential. However, it was the lengths the government would go to solve the housing crisis that offered the greatest potential for Aotearoa’s mid-century movement to grow. When support for earth building in the national house-building programme was withdrawn, the distance between earth and mainstream construction expanded once more.