

Degrees of Failure: Operation Breakthrough Housing Systems in Kalamazoo

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In the early 1970s the U.S. Department of Housing and Urban Development funded a massive program to encourage industrialization in the production of housing in the United States. Operation Breakthrough, as the experiment was named, began with lofty technical aspirations, but it ultimately revealed the risks of experimentation with low-cost housing. It proved very quickly to be an embarrassing failure and could not demonstrate the marketability of factory-produced housing methods. Certainly, technical challenges contributed, but the experiment's failure had much to do with aesthetic and social factors. This paper highlights a small piece of the Operation Breakthrough experiment to help explain its inadequacies. In particular, it examines the work of two housing manufactures, Levitt Building Systems, Inc. and Material Systems Corporation, which contributed houses to the prototype site in Kalamazoo, Michigan. While these manufacturers produced comparably scaled dwelling units, they took notably dissimilar approaches to design and production, and the fates of their efforts have proved to be starkly different.

In August 1971 George Romney, Secretary of the U.S. Department of Housing and Urban Development, foretold immense, rapid changes to housing and the housing industry in the United States. "I predict," he said, "that by 1980 two-thirds of all the housing built in this country will be basically factory made—either assembled components or complete systems."¹ The primary driver for this change would be a massive, government-funded experiment in the industrialized production of low cost housing. Romney's ambitious forecast for the program reflects lofty technical aspirations, but it also highlights a critical inattention to the risks of experimentation with low-cost housing. While HUD's experiment reasonably sought to capitalize on American ingenuity and industrial capability, it also reprised a social blindness to human concerns so often manifest in technically oriented mass-production housing schemes. Production

advances in low-cost housing can only succeed if the people they serve perceive, and receive, their benefits.

Operation Breakthrough, as HUD hopefully named its program, proved very quickly to be an embarrassing failure for the Nixon administration. By 1974, in fact, the administration had quietly withdrawn funding, effectively ending the program before its scheduled completion. Two years later, a summary report to Congress could affirm "that the program has not led to major changes in the housing industry."² Certainly, technical challenges contributed, but the experiment's failure had much to do with aesthetic and social factors. This paper highlights a small piece of the Operation Breakthrough experiment to help explain its inadequacies. In particular, it examines the work of two housing manufacturers, Levitt Building Systems, Inc. and Material Systems Corporation, which contributed houses to the prototype site in Kalamazoo, Michigan. While these manufacturers produced comparably scaled dwelling units, they took notably dissimilar approaches to design and production, and the fates of their efforts have proved to be starkly different.

In his post-mortem report to Congress, "Operation Breakthrough: Lessons Learned about Demonstrating New Technology," the US Comptroller General, Elmer B. Staats, asserted that the primary basis for failure of the program was that very few of the industrial methods used proved to be cost effective or marketable to renters or homebuyers.³ The report cited a host of factors, such as large-scale market forces, state-level and local code restrictions, and entrenched labor interests, that hindered the operation. However, it was clear that human factors, rather than macroeconomic or policy issues most strongly affected marketability of individual units on prototype sites. In its surveys of participating firms for the report, the Government Accountability Office found that "industrialized housing manufacturers encountered homebuyers prejudiced against prebuilt housing and found financial institutions reluctant to support experimentation with innovative construction methods."⁴ Particularly on suburban prototype sites, like in Kalamazoo, marketing proved to be challenging for firms that overtly showcased new industrial methods in their housing designs, or which produced houses that appeared expressly modern. In addition, firms that used untested building technologies exposed themselves to user complaints for problems that arose—often in very public forums because of the amount of national interest the program generated.

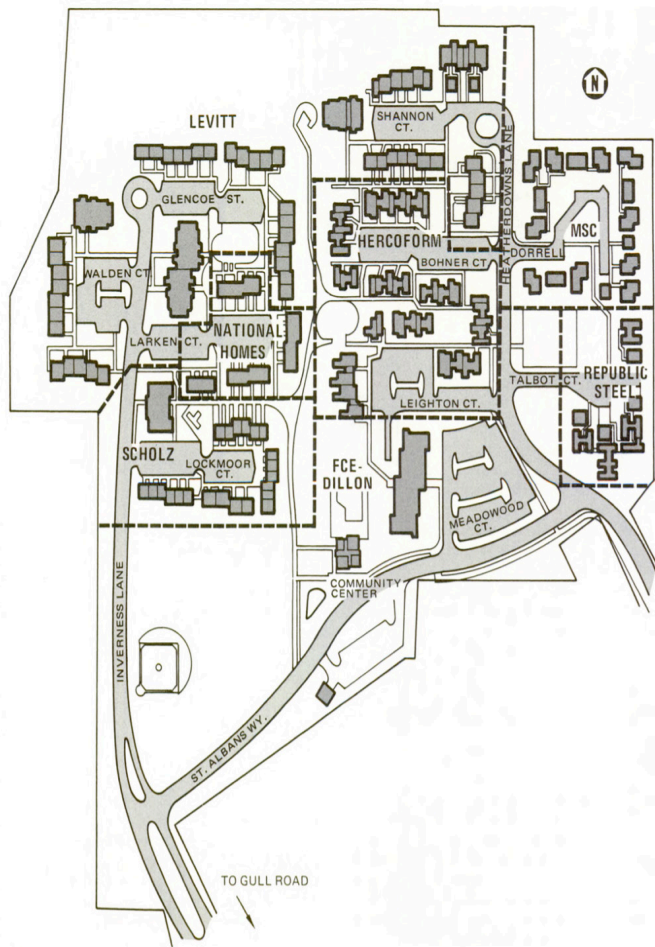


Figure 1: New Horizon Village final plan showing sites for the seven Housing Systems Producers that installed prototypes on the site. 1971. (source: United States, Dept. of Housing Urban Development, Feedback: Operation Breakthrough. Phase II Prototype Construction and Demonstration, Vol. 4 (Washington: U.S. Dept. of Housing and Urban Development, 1974) 28.)

New Horizon Village in Kalamazoo was one of the nine Operation Breakthrough prototype sites throughout the country, and it, like many of the others, provides a fascinating picture of the motivations behind the experiment, how the process unfolded, and how the buildings have aged over the last 45 years.⁵ As at other Operation Breakthrough sites, HUD hired a Prototype Site Planner—in this case the Chicago architecture firm Perkins & Will—to assure compliance with program objectives, interface with the local community, articulate goals specific to the local context, and coordinate site development and building construction at the site.⁶ Perkins & Will adopted early GIS software (SYMAP) and techniques to optimize site design and unit placement with an emphasis on “ecological considerations.”⁷ They also “worked closely with representatives of the community, which influenced the site design and helped to allay fears regarding the ‘government housing project.’”⁸ Tangible outcomes of these efforts included the preservation of existing natural features and reduction of building heights, but the main benefit was to demonstrate to the community that New Horizon Village was a cooperative venture, not merely a low-income housing experiment

imposed on Kalamazoo. Partly through efforts with city leadership and local civic groups, Perkins & Will designed a site that was both ecologically and socially progressive in terms of access to public transportation, the mix of housing types, and inclusion of public amenities for community gathering and recreation. These included a clubhouse, pool, sports field, and a number of small playgrounds. The effective site design has proved to be a long lasting benefit to the neighborhood that arose in Kalamazoo out of the Operation Breakthrough experiment; even now real estate literature describes the site as a “leafy... campus with extensive open space” and residents praise its friendliness and diversity.⁹

Another important—and as it turned out socially progressive—aspect of the project was its financing. The Housing Site Developer that worked with Perkins & Will, Kalamazoo BREAKTHROUGH Housing Venture (KBHV), determined early on to administer the development as a housing co-op with monthly payments scaled by unit size and income.¹⁰ The co-op structure facilitated acquisition of construction funding and administration of mortgages for the developer, but over time it also helped forge a communal spirit among residents. This proved particularly helpful after serious and costly maintenance problems threatened the solvency of the community soon after the prototype site was fully occupied. At that time, despite the many technical issues they encountered in their individual homes, co-op members expressed great satisfaction with their neighbors, who formed a “a racially, economically, and chronologically integrated community.”¹¹ Tom Buckley, a reporter for the *New York Times* observed at the time that “although Operation Breakthrough was primarily a technical experiment, the residents of New Horizon Village believe that it has been most successful as a social experiment, and it is for that reason that they would hate to see it go under.”¹² This sort of constructive social experimentation was a largely unanticipated benefit of the program structure, which gave wide latitude to Prototype Site Planners but made only technical demands on manufacturers.

Given the scope and complexity of the Kalamazoo development, the project proceeded with remarkable amity, particularly in its relationship with the surrounding neighborhoods. This was largely to the credit of Perkins & Will, which had extensive experience locally, working with groups on complex public projects. Throughout the process they consulted closely with community members and cultivated friendly relationships with trade unions and the local press. Comparable groups seriously challenged progress at many of the prototype sites in other cities with protests, strikes, and unfavorable reporting.¹³ The project in Kalamazoo did not proceed without some internal friction, however. A fast track construction process adopted to keep the project on HUD’s ambitious timeline required some last-minute adjustments to the location of foundations on individual sites. Also, and more critically, site construction and installation of utilities encountered slowdowns as two of the housing producers determined in the midst of the project that their installations would not be economically feasible. They had to be replaced by HUD after site construction had already begun.

HUD ultimately engaged seven industrial firms to produce 245 prototype units on the 33.8 acre site.¹⁴ These ranged from single-family detached houses to a four-story mid-rise for elderly residents. As was typical for Operation Breakthrough installations, the companies collaborated with

the Prototype Site Planner to determine building-site relationships, but worked independently (in consultation with HUD and the National Bureau of Standards) to demonstrate knowledge of and commitment to project objectives in the areas of “quality, production, management, and marketing as well as technology.”¹⁵ All participants contributed toward the primary objective of Operation Breakthrough, which was “... the establishment of self-sustaining mechanisms for rapid, volume production of marketable [low income] housing....”¹⁶ These objectives addressed livability only tangentially in their emphasis on ‘marketing,’ but the dominant aim was always to find technical solutions for high volume production. Furthermore, because of the experimental nature of the operation, the guidelines did not actually require fulfillment of the project objectives, only “knowledge of” and “commitment to” them; thus, the prototypes varied widely not only in their adherence to project goals but also in their attention to tenant needs. According to HUD’s summary brochure, “Some systems were modifications of housing projects currently in use, and others were barely off the drawing board but showed great promise in design or materials.”¹⁷ Accordingly, most of the Housing Systems Producers at New Horizon Village concentrated almost exclusively on the technical aspects of their prototypes, and far less on making exterior massing, room configurations, or material details pleasing to potential buyers and tenants. The absence of livability criteria from the national project objectives, as well as the offhand suggestion that HUD would support untested prototypes showing promise in design or materials, implicitly sanctioned this orientation.

Although it is easy to speculate that this inattention to human factors had a big impact on the success of Operation Breakthrough, it is now difficult to demonstrate this comprehensively because HUD did little research on these aspects of the program. Although frank about the overall failure of the operation, and reflective on possible causes—technical, economic, and legal—HUD summaries and the Comptroller General’s report say almost nothing about architectural design, interior house configuration, the desires of home buyers and tenants, or their levels of satisfaction. The testing mechanisms and survey instruments used to analyze the operation focused on builders, developers, and manufacturers and addressed none of these issues, except participants’ general perception of “consumer acceptance” of industrialized housing.¹⁸ Clearly, though, neglect of consumer desires in the units produced by many of the manufacturers made marketability more challenging than it could have been. Economic failures, which HUD attributed both to production cost and marketability, seriously hampered development of Operation Breakthrough beyond the prototype phase and contributed to its eventual failure.¹⁹ By 1976 only 5 of the 22 manufacturers that participated in the program had been able to produce commercially viable systems, and even those did not manage to approach the levels of production that Romney had had anticipated five years earlier.²⁰

In Kalamazoo, which was the first of the nine Operation Breakthrough sites to open for occupation, the marketing failure of the national project was not generally obvious at the outset. In fact, the units of all but one of the Housing System Producers managed to meet sales targets very quickly. The near failure of just one producer (Material Systems Corporation) on the prototype site, though, significantly affected the

viability of the whole development and required complicated financial adjustments until sale of the last units in early 1974, nearly three years after the first units in the development had been sold. Over the longer term, the cumulative effects of unanticipated maintenance problems, particularly in the units designed by Material Systems Corporation and Republic Steel, two especially experimental manufacturers, severely threatened the financial viability of the housing co-op that took ownership of the property.

Because residents of the Kalamazoo site considered it to be successful at the community scale—more successful than other Breakthrough sites in this regard—it provides a useful context in which to examine the impacts of individual housing prototypes at the site. The houses by Levitt Building Systems, Inc. and Material Systems Corporation provide an especially instructive contrast, particularly with regard to their attractiveness to and serviceability for tenants. According to HUD’s summary, Levitt’s units were the most appealing to potential tenants, while those of Material Systems proved least marketable both at the project inception and over time. The latter were gradually abandoned and finally torn down in 2013 (along with units produced by Republic Steel); the rest of the units on the site site, including the Levitt units, are still occupied.

Levitt Building Systems, Inc. constructed and finished its Operation Breakthrough houses as large modules in its Battle Creek, Michigan factory and shipped them to Kalamazoo by truck, a distance of 25 miles.²¹ The wood-framed component boxes “complete with electrical wiring, plumbing, appliances, interior painting, carpeting, and exterior siding” could be mounted quickly on concrete slabs or basement foundations and assembled in a range of single- and two-story unit configurations. According to HUD, they had “large open rooms with pleasant interior arrangements.”²² This interior flexibility made them more desirable than the units of other manufacturers on site, as did exterior features designed to obscure the factory-built boxes, such as projecting eaves (hinged for transport), slide-out bay windows, staggered placements, and varying rooflines.²³ Although the exterior aspect of the finished units was modest and without much architectural appeal, they used familiar cladding materials and were generally unobjectionable in form, avoiding “the boxy appearance usually associated with modular construction.”²⁴

Levitt based many of these design decisions on long experience with the production of low-cost housing. Although Levitt Building Systems was a brand new company, founded in 1970 specifically for production of Operation Breakthrough prototypes, it could rely on the experience of its parent company, Levitt and Sons, which had been one of the nation’s largest producers of conventionally built houses over the previous two decades. At the time of Operation Breakthrough, they could boast of a full marketing research staff and vast familiarity with community development, attesting that “it takes a good deal more than homes to make a community.”²⁵ They also had a long history designing houses using semi-industrial processes for mass production and rapid assembly. Although Levitt used Operation Breakthrough as an opportunity to test and refine aspects of their factory-built housing system and transportation strategies, its innovations remained modest and under tight control, which facilitated positive results.



Figure 2: Levitt Building Systems, Inc. brochure showing exterior and interior views of New Horizon Village townhouses. 1971. (source: <http://smg.photobucket.com/user/TrafficJam28/media/Levitt%20Building%20Systems/LBS02.jpg.html>)

Material Systems Corporation, by contrast, entered Operation Breakthrough with a much more aggressive program of innovation. HUD's analysis contends that they "produced the most unusual dwellings on site from the standpoint of innovative materials and fabrication methods."²⁶ Central to their housing projects on six of the Operation Breakthrough sites was a proprietary load-bearing wall and roof system composed of molded and fused panels of "synthetic fiber and polyester resin."²⁷ Material Systems produced the panels in their Escondido, California factory and shipped them by rail to their plant in Indianapolis for assembly into units. They then delivered the units by truck to the various Operation Breakthrough building sites. The house designs, unlike those of Levitt, did not at first mask their factory-produced character. Their simple, aggressively geometrical appearance and flat roofs projected a sense of newness that contrasted with many of the other prototypes, particularly those by Levitt. Material Systems initially finished the exterior walls with a spackle skim coat and thick paint (over

the objections of the paint manufacturer and the National Bureau of Standards). This preserved the smoothness of the underlying panels, but the paint quickly blistered and peeled, so Materials Systems had to re-cover the exterior panels with plywood and textured stucco.²⁸ Some of the houses were later clad with aluminum siding molded in a traditional clapboard pattern. The flat roofs leaked from the outset, and the company had to rebuild them completely before occupancy, using wood joists, plywood, and built up roofing.²⁹ A HUD summary mildly assessed the failures of the Material Systems houses, explaining "that the problems met could be attributed directly to the experimental nature of the design, which was truly novel and untried in most respects."³⁰ In the end, many of the novel and architecturally distinctive features had to be masked, repaired, or replaced, simply to make the houses habitable. This significantly delayed occupancy and jeopardized the financial viability of the housing co-op.

Although the Material Systems houses manifested problems acutely from the beginning, many units in the development caused further trouble over time. By 1974, just three years after initial occupancy, members of the co-op worried about insolvency, mainly because of unexpectedly "high maintenance costs of the experimental housing."³¹ In the *New York*



Figure 3: Material Systems Corporation houses, assemblies, and materials for Operation Breakthrough. 1972. (source: United States, Department of Housing and Urban Development, Operation Breakthrough (Washington: U.S. Dept. of Housing and Urban Development, 1972) 20.)

Times article mentioned earlier, residents of houses built on the site by Republic Steel complained of “unusually troublesome technical problems” including leaks, rust and “fierce” “groaning of the roof” from temperature changes.³² The new director of Operation Breakthrough, Joseph Sherman, who had taken over after Romney’s resignation in 1973, minimized the group’s claims, asserting dismissively that technical problems were “anticipated in a pilot project of this type.”³³ While this was no doubt true from the point of view of the project administrators and manufacturers of prototypes; residents did not seem to have anticipated the extent of the technical problems they would have to endure.

Over the following decades, the Material Systems and Republic Steel houses proved to be particularly troublesome and gradually fell into

disrepair. A local news story reported that they suffered from “insulation, mold, water and other problems.” “They just weren’t built for Michigan,” the New Horizon Village property manager explained. Most of the houses built by Material Systems and Republic Steel on the site were abandoned, boarded up and left to deteriorate by the late 2000s. In 2013 the community sought a grant to fund their demolition. In a letter of support for the effort, a local resident summarized feelings toward the buildings: “The buildings are unsightly and cannot be rehabilitated due to the way they were constructed...,” she said, “I do not want to live next door to these blighted units.”³⁴ A state program to eliminate blight funded their removal later that year, and the site awaits construction of new houses in 2017.³⁵

With repairs and remodels, the remaining Operation Breakthrough units in the development have remained habitable and are now under control of the LIFT Foundation, a local non-profit focused on low-income housing. Just over half of the original site was renovated in 2014 with \$18



Figure 4: Material Systems Corporation houses (background) in Kalamazoo soon before demolition. 2013. (source: http://www.mlive.com/news/kalamazoo/index.ssf/2013/07/new_horizon_village_blight.html)

million in HUD and Michigan State Housing Development Authority funds and is now called New Village Park. According to LIFT, New Village Park “represents the preservation and comprehensive rehabilitation of 152 units of family housing with spacious floor plans, central air-conditioning, and full basements.” The completed project received LEED-For-Homes Silver certification. The New Village Park website homepage prominently features rehabilitated Levitt units overlaid with a banner proclaiming “Exceptional Rental Residences Surrounded by Extensive Open Green Spaces.”³⁶ In early 2016 LIFT received an additional \$9.2 million grant from the Michigan State Housing Development Authority to renovate the remainder of New Horizon Village. It will be re-named Heather Gardens once the project is complete, effectively wrapping up the Operation Breakthrough experiment in Kalamazoo.

While the Operation Breakthrough experiment did not bring about a new era of factory built housing in the US, it yielded useful information about how housing, especially for low-income residents, should and—mostly—should not be developed. Comprehensive planning focused on ecological factors, sensitivity to local communities, creative financing that encouraged cooperation for mutual benefit, effective shared use of public green space, and so on, all proved to be effective parts of a

largely inadvertent social experiment at the Kalamazoo site. HUD and the Government Accountability office did not focus extensively on these benefits in their evaluation of the program, because their concern was to account for the failures of Operation Breakthrough’s primary objectives; however, long-term goodwill and a small amount of favorable press did disseminate the message. More pertinently, Levitt Building Systems showed that well-tested technical strategies backed by marketing experience and community level planning can counteract some of the risks of experimenting with low-income housing. While their factory-built townhouses were not remarkable architecturally, they were at least visually unobjectionable. Their flexible and varied interior planning and serviceable finishes, however, made them very appealing to potential residents, who were eager to rent them. In the longer term, carefully resolved detailing prevented or forestalled maintenance problems. Material Systems Corporation, by contrast, showed that striking architectural appearance, advanced assembly methods, and innovative use of material are of almost no benefit without well-tested, functional detailing, particularly in the straightened circumstances of the people using government supported housing. The failure of these units overshadows the modest successes of other aspects of the Operation Breakthrough experiment in Kalamazoo, and they point to important lessons not mentioned in HUD’s self-assessment.



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Figure5: Levitt Building Systems, Inc. townhouses in their current state, after remodeling. 2016. (source: <http://newvillagepark.com>)

The most important of these lessons is that producers of low-cost factory-built housing must prioritize the needs and tastes of clients and consider their vulnerability to problems that might arise. This is particularly true for low-income residents.³⁷ Operation Breakthrough's heavy emphasis on factory production and permissiveness toward virtually untested technologies yielded useful information for manufacturers, but at New Horizon Village it greatly inconvenienced some residents and exposed the entire community to serious financial risk.

ENDNOTES

1. United States, Department of Housing and Urban Development, *Operation Breakthrough* (Washington: U.S. Dept. of Housing and Urban Development, 1972), 1. See also, Augusta Pearl, "First Operation Breakthrough Project Completed: Horizon Village, Kalamazoo, Michigan," *Journal of Housing*, No. 4: May 1972, 166.
2. Elmer B. Staats, "Operation Breakthrough: Lessons Learned about Demonstrating New Technology, Report to the Congress," PSAD-76-173: B-11,860, November 2, 1976, ii.
3. Staats, "Lessons Learned," document resume, NP.
4. Staats, "Lessons Learned," 4.
5. Other Operation Breakthrough sites were in Indianapolis, Indiana; Jersey City, New Jersey; King County, Washington; Macon, Georgia; Memphis, Tennessee; Sacramento, California; Seattle, Washington; and St. Louis, Missouri.
6. Numerous publications at the time referred to Perkins & Will as a Michigan-based firm. Although the company did work in Michigan, notably the Crow Island School and housing for Ford's Willow Run plan, it was founded and based in Chicago.
7. United States, Dept. of Housing Urban Development, *Feedback: Operation Breakthrough. Phase II Prototype Construction and Demonstration*, Vol. 4 (Washington: U.S. Dept. of Housing and Urban Development, 1974), 26.
8. United States, *Feedback*, Vol. 4, 27.
9. Lockhart Management & Consulting, "New Village Park", accessed January 5, 2017, lmc-mi.com/property/new-village-park. ApartmentRatings.com, "New Horizon Village," last modified March 11, 2004, http://www.apartmentratings.com/mi/kalamazoo/new-horizon-village_616381382849001/review-199683/
10. These included both market rate and subsidized units. A 1972 article on New Horizon Village credits the development with a broad diversity of inhabitants whose household incomes ranged from \$2000 to \$50,000. Monthly payments for units, which included maintenance and all utilities except electricity ranged from a subsidized rate of \$105 to an unsubsidized rate of \$307. Pearl, "First Operation Breakthrough Project Completed," 167, 168.
11. Tom Buckley, "Money Problems Beset Co-op of Factory-Built Houses in Michigan," *New York Times*, July 13, 1974, 54. This article was syndicated and appeared in newspapers under various titles throughout the country over the following months. For example: "Experimental Village Social Success, Financial Disaster," *The Raleigh Register*, September 6, 1974, 11; "Government Delay May Force Project into Bankruptcy," *Arizona Republic*, September 15, 1974, 111.
12. Buckley, "Money Problems," 54.
13. Community opposition in King County, Macon, Seattle, and labor union strikes in Indianapolis, Jersey City, Memphis, St. Louis, Sacramento, and Seattle (not all directly against Operation Breakthrough specifically) slowed work at most of the prototype sites.

14. FCE-Dillon; Hercoform Marketing, Inc.; Levitt Building Systems, Inc.; Material Systems Corporation; National Homes Corporation; Republic Steel Corporation; and Inland Scholz, Inc.
15. United States, *Operation Breakthrough*, 14.
16. United States, *Operation Breakthrough*, 11.
17. United States, *Operation Breakthrough*, 14.
18. See Staats, "Lessons Learned," 43, 44, 50, 58, 59. 54% of conventional builders and manufacturers said that consumer acceptance of industrialized methods was at least a moderate problem. In fact, this group considered consumer acceptance to be the most significant barrier to success in the production of industrialized housing, ahead of transportation costs and material costs. Industrialized housing manufacturers, on the other hand, found this to be a much less significant concern (26%), well behind building codes, permitting and acquiring financing.
19. Staats, "Lessons Learned," 1.
20. Staats, "Lessons Learned," 17.
21. They also shipped similar units by rail to King County, Washington, a distance of 2200 miles.
22. Levitt produced 83 units in 11 configurations at New Horizon Village. United States, *Feedback*, Vol. 4, 40.
23. United States, *Feedback*, Vol. 4, 40.
24. United States, *Feedback*, Vol. 4, 29.
25. Levitt Building Systems, Inc., "Levitt Presents a New Technology in Home Building," company brochure, 1971.
26. United States, *Feedback*, Vol. 4, 30.
27. This was similar to fiberglass. Pearl, "First Operation Breakthrough Project Completed," 167.
28. Material Systems also had to deal with quality control issues and transport damage in its Kalamazoo units (problems largely resolved in the slightly later installation of units in King County, Washington).
29. United States, *Feedback*, Vol. 4, 38.
30. United States, *Feedback*, Vol. 4, 38.
31. Buckley, "Money Problems," 54.
32. Buckley, "Money Problems," 54.
33. Buckley, "Money Problems," 54.
34. Emily Monacelli, "Federally funded Kalamazoo apartments that 'have not stood the test of time' to be demolished," mlive.com, last modified July 13, 2013, http://www.mlive.com/news/kalamazoo/index.ssf/2013/07/new_horizon_village_blight.html.
35. Bryan Bennett, "New Horizon Village Makeover to be Completed with \$9M from the State," mlive.com, last modified March 24, 2016, http://www.mlive.com/news/kalamazoo/index.ssf/2016/03/post_449.html.
36. "New Village Park", accessed January 5, 2017, <http://newvillagepark.com>.
37. Andres Duany, Elizabeth Plater-Zyberk, and Jeff Speck argued in 2000 that the poor had been subject "fifty years of architectural and planning experimentation," prompting them to institute "Rule #1 of public housing," "Don't experiment on the poor." Andres Duany, Elizabeth Plater-Zyberk, and Jeff Speck, *Suburban Nation: The Rise of Sprawl and the Decline of the American Dream* (New York: North Point Press, 2000) 53.