

American Squalor: A Case Study in Combating Low-Quality Housing Construction

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ABSTRACT: Located in Northwest Arkansas, the City of Fayetteville is experiencing rapid population growth, resulting in increased housing development in denser urban areas. Often this housing is characterized by inappropriate materials, faulty design and construction practices, and lack of consideration for building lifespan or performance. These factors lead to rapid degradation of new construction, rendering new units incapable of addressing long-term housing demands. This paper provides context for Northwest Arkansas' current housing demands and impacts of attempts to respond to this demand with new supply. It presents a Case Study, couched in this context, of a regionally common building in typology (multi-unit housing) and structure (pre-engineered light wood framing), and it identifies the units' design, construction, and material flaws that led to its degradation. Further, it documents the implementation of a solution that addresses immediate deficiencies while proposing broader application of lasting, sustainable material applications. The production and consumption of low-quality, if efficient, materials systems for lagging housing supply is a consistent narrative thread through US history. That said, the current urgency of the housing crisis is uniquely exacerbated by the paired exigencies of population growth and climate change. More than ever, solutions are needed that efficiently meet demand while ameliorating the pressures wrought by a changing climate and swelling population.

KEYWORDS: Housing, Construction, Commodities, Biogenic Materials

INTRODUCTION

The City of Fayetteville, a typical mid-sized city located in Northwest Arkansas, has seen sustained population growth that continually exceeds available housing, driving up costs and disproportionately affecting the most marginalized and vulnerable groups. While the City's established goals support development of affordable housing, these efforts are hampered by failures in design, construction, and material systems. This paper expands on current responses to housing demands in Northwest Arkansas and presents a Case Study that highlights impacts of rapid, low-quality construction and proposes a solution that addresses issues of quality in American housing development.

Urban housing crises are legislated and financed, perhaps rightly, through an arithmetic lens: units of housing are added, subtracting from units of demand. But there are casualties of this reductive viewpoint; construction quality and sustainability agendas are occluded. The increased prioritization of affordability directly translates to low construction costs which are exacerbated by high material costs, labor shortages, and regulatory oversight. The result is a low initial investment that leaves little margin for design considerations and materials that are aligned with climatic concerns, labor skills sets, and regional resources. Lack of consideration for building lifespan leads to the deployment of ill-suited materials systems whose poor performance renders new units incapable of addressing long-term housing demands. Additionally, low-initial investment undermines a pillar of sustainability, reducing consumption through longevity, and causes rapid degradation creating unsafe living conditions. These causalities and effects of low-quality construction are outlined in the Case Study of a housing unit within a 2014 development, identifying design, construction, and material flaws that led to its degradation. Further, it documents the implementation of a solution that addresses immediate deficiencies while proposing broader application of lasting, sustainable material systems. What the case study proposes is a wholesale reconsideration of envelope materials that better considers the role of designers, the skillsets of builders, the regional availability of materials, and the rights of owners and occupants.

The case study residence is regionally common in typology (multi-unit housing) and structure (pre-engineered light wood framing). Its cementitious cladding systems, integral sheathing, and hydrocarbon-based moisture and thermal barriers are also characteristic of contemporary regional housing construction. Its exterior expression is that of trustworthy cladding types: stucco, lap siding, and brick masonry. What lurked behind the façade was a staggering failure of design and construction stemming from the prescribed materials systems. This paper will document the failures of this structure to both maintain its own constitution and to satisfy its impetus and primary charge – providing housing to meet rapacious demand.

1.0 CONTEXT: THE HOUSING DEMANDS AND SUPPLY OF NORTHWEST ARKANSAS

1.1 The need for housing

Like many metropolitan areas in the United States, Northwest Arkansas is experiencing sustained population growth. As is typical in mid-sized cities, the growth of the City of Fayetteville and surrounding region continually

exceeds available housing units, driving up costs and disproportionately affecting the most marginalized and vulnerable groups. While the City’s established goals support development of affordable housing and limiting suburban sprawl, these efforts are hampered by failures in design, construction, and material systems, reversing positive effects of new housing developments.

The population growth of Northwest Arkansas, a region consisting of Washington, Benton, and Madison Counties, has recently made the region the “nation’s 100th largest metropolitan area” (Northwest Arkansas Council 2023). With the population increasing by approximately 36 people per day, the Northwest Arkansas Council (n.d.) finds “the region needs to add 2,900 housing units a year” to keep up with demand. With only 1,400 housing units built between 2010 and 2016, Northwest Arkansas has added less than one housing unit for every 1.5 households in the area (Northwest Arkansas Council n.d.). The growth in population and lag in housing construction has exacerbated housing shortages by increasing demand and, therefore, increasing costs of both home sale prices and rent.

Adding to the complexity of Northwest Arkansas’ housing situation are economic factors. While 11% of the population of Northwest Arkansas are below the Federal Poverty Level, an additional 30% are below the ALICE threshold (United for Alice 2024). ALICE – Asset Limited, Income Constrained, Employed – accounts for households above the Federal Poverty Level but unable to achieve financial stability, being forced to choose between paying for necessities such as housing, childcare, or food. To accommodate the 41% of households in Northwest Arkansas below the ALICE threshold, “the region needs half of all new housing units to serve families that make less than \$78,000 a year” (United for Alice 2024, Northwest Arkansas Council n.d.).

As found in the National Low Income Housing Coalition’s (2023) *Out of Reach 2023* report, “the gap between wages and housing costs is largest for people of color.” With the growth of Northwest Arkansas’ population largely attributed to tens of thousands of incoming immigrants from El Salvador, the Marshall Islands, Mexico, and India finding work in the region’s booming industries, these populations are greatly impacted by the region’s need for affordable housing (Jordan 2021). Through a series of comprehensive plans, the City of Fayetteville, in Washington County has established six goals that address strategies for healthy, sustainable growth of the City. In 2018, the City 2040 Plan updated these goals with a particular focus on housing due to increased demand. In reference to the City 2040 Plan, the City explains:

...[W]ith the population of Washington County forecast to reach more than 500,000 by 2050 (from approximately 240,000 today), the city will continue to grow. To accommodate this growth, the City is looking at ways we can encourage the development of additional, affordable housing for new residents.... (City of Fayetteville n.d.)

In addition to establishing goals within the City 2040 Plan, the City of Fayetteville (n.d.) completed a survey with responses from over 900 residents, soliciting feedback specifically focused on housing. Within that survey, 55% of respondents disagree that there are enough housing options with the city.

1.2. Impacts of rapid development

As a response to mitigate housing shortages and increase affordable options in the City of Fayetteville and surrounding region, housing development has increased. However, the need to construct low-cost housing within short timeframes establishes conflicting priorities. The downward pressure of housing costs, coupled with an amalgamation of high commodity prices, high labor rates, and rapidity of construction, incentivize pursuit of progressively cheaper construction resulting in low-quality housing. Most new housing construction, especially in urban areas, is initiated by developers. Their pro forma driven approach makes cost the number one determinant of project viability.

It’s no secret that the price of new homes is increasingly out of reach for many Americans. Every year, builders are faced with unprecedented levels of new federal, state and local regulations as well as skyrocketing material costs and labor shortages. (Giannini 2020)

These factors impact project timelines and overall costs, leaving little margin for consideration of quality. Outside of their own cost-based interests, developers need to comply with guidelines and timeframes established by municipalities. Increased regulatory oversight has impacted developer’s bottom lines, creating significant delays or in some cases termination of work.

In Fayetteville, several developments have paused work – in some cases for years at a time. Developments, like those seen in Figure 1, sit partially completed and exposed to the elements for months or years on end. During this time, structured and material performance is comprised, and product warranties are voided. If work resumes, previously completed work is deconstructed and materials replaced, a process that further increases labor and material costs. In the Fayetteville area, as is the case in many mid-sized cities, there has been an increase in out-of-state developers of large multi-unit housing developments. While these developers bring with them knowledge and expertise, they also lack a vested interest in the area. What results are non-site-specific and non-regional-specific developments void of contextual responses through architectural massing or material.

Despite the presence of out-of-state developers, contractors are still reliant on the skills and size of the regional workforce. Due to the pandemic and a decreased interest in manual labor, construction trades are experiencing shortages in labor.

[L]abor shortages have been attributed as the greatest contributor to the overall construction costs of new housing units (Giannini 2020).

With labor shortages come delays, rushed timelines, and faulty construction due to a lack of skilled labor. Those willing to work despite increased time pressures and small margins are inexperienced and lack knowledge of proper installation methods.



Figure 1: Incomplete multi-family construction on indeterminate hiatus in Northwest Arkansas. While they have latent potential for completion, the low-quality materials deployed cannot withstand long-term exposure. Source: (Author 2023)

The dramatic increase in labor costs resulting from labor shortages consumes a greater percentage of overall project budgets, limiting available costs for design services and materials and causing an abandonment of sustainability goals. Design decisions inclusions of material selection are heavily regulated through the City's guidelines and based on accepted practice rather than resiliency, longevity, and regional sourcing. The dominance of integral sheathing and cementitious cladding syndicates leaves designers with little apparent choice in choosing materials systems that are matched to the climatic, ecological, and economic contexts of their region. Their proprietary assembly methods impose processes on builders who may or may not have the requisite training or know-how for their effective installation. Due to inexperienced installation practices and lack of code knowledge, contractors have the ability to void product warranties, leaving the cost burdens of faulty construction on the owners. Additionally, irremediable chemical installation processes leave owners without the right or ability to repair them.

Rapid growth of housing causes low initial investment resulting in low-quality construction and short-term lifespans of housing. Despite the desire for additional affordable housing options, of the 900 City of Fayetteville residents who responded to the survey, 43% have a less positive perception of infill housing after experiencing it in their neighborhoods (City of Fayetteville n.d.). This can be attributed to associations with low-quality, low-investment developments including non-contextual responses, delays and disturbances in construction, and use of perishable materials. A casualty of the housing crisis is overlooking the factors of quality construction that firstly, address long-term viability of development and, secondly, consider the role of housing in the carbon sequestration and use of regional materials.

1.3 Why development does not equal housing

Despite the increase in development as a response to housing shortages, completed housing units added to the market do not always reduce units of demand. Due to variations in use or issues with construction quality, not all newly developed units contribute to resolving housing shortages in the long-term. Although occupied, some housing units are used for short-term rentals, obviating their ability to contribute to available housing stock, while others see a rapid degradation due to low-quality construction and materials, rendering the units unoccupiable within a decade of completion.

In sports-centered college towns like Fayetteville, game-day houses – or second homes purchased by fans or alumni to be used during football season – and “short-term rentals are destabilizing housing markets, fueled by wealthy fans and investors” (Salerno 2023). Despite the economic benefits of short-term rentals to college town, the hotel-like use of residences increases rent and housing costs, decreases investment in neighborhoods, encourages deferred maintenance of properties, and leaves neighborhoods vacant for most of the year. To combat this, Fayetteville enacted legislation in 2021 capping Type II short-term rentals, those without a full-time resident, “at 2% of all dwelling units in the city,” equating to approximately 900 units (Ryburn 2023). Despite the cap and required licenses and permits, a portion of new or recent developments meant to contribute to viable housing stock to the City were becoming short-term rentals. Seeing the increase of short-term rentals as counter to their goals, in July of 2023 the City of Fayetteville’s Council lowered the cap to 475 and by December of 2023, the cap was reached (Ryburn 2023). Although the City has made progress in regulating these properties, game-day houses used by their owners and illegal short-term rentals still pose a threat to combating the housing shortage in Fayetteville.

In scenarios where development has produced the addition of housing units for Fayetteville residents, unforeseen issues resulting from incorrect construction methods and shoddy materials still may impede long-term housing gains. In Fayetteville, several developments constructed within the past ten years are nearing condemnable standards due to significant construction-related issues. Low-quality construction and inadequate installation and detailing of materials has allowed for water infiltration, comprising cladding and structural systems, inducing rot, and increases rates of decay. Seen in Figure 2, a development of 110 units completed in 2015 has visibly failing stucco and removed cladding. It is currently undergoing significant repairs, rendering some of the units unoccupiable. Another Fayetteville development completed in 2014 consists of five units, one of which is the subject of the following Case Study. Of these five units, only two are currently occupied – with the unoccupied units

consisting of a game-day house, a vacant long-term rental in between tenants, and a vacant long-term rental undergoing significant repair. Although the two occupied units are currently in use by their owners, both were also subject to notable repairs due to faulty construction, rendering the units partially unlivable for a period of time. With issues stemming from initial design and construction – including use of cementitious materials and proprietary systems, voids of warranty due to incorrect detailing, and improper installation methods – homeowners investing in these Fayetteville developments are unable to maintain their properties. Instead, they become responsible for taking on serious repairs with exorbitant costs to remedy faulty construction or allowing further degradation due to cost limitation, resulting in unusable housing stock.



Figure 2: (Left) Envelope failures of typical new, market-rate housing construction in Fayetteville, Arkansas. Even when these failures permit continued occupancy of the structure, they degrade its value potential and portend more significant failures in the future. (Right) A typical, poorly constructed housing structure undergoing invasive repairs. The rapidity of construction, coupled with low-grade materials, catalyses building failures and triggers the need for repairs. This incurs extra expense, pauses revenue generation for the development’s owners, and takes an otherwise beneficial housing unit off the market. Source: (Author 2023)

2.0 CASE STUDY

2.1. Purpose

To better illustrate the central issues brought forward by this paper, a Case Study is presented. The seriousness of the housing crisis is highly visible, and, though it may not be thoroughly understood, its existence is well documented. Often presented as a statistical or broadly demographic issue, the discussion occludes the small-scale decisions and processes at its core. The purpose of this Case Study is to give a ‘face to the name’; it elucidates the nuanced ways in which a single structure fails to meet its most fundamental obligations, not least of which is to provide some measure of relief from the crisis. Though the Case Study is focused on a single subject, its purpose is to provide a representative study of – and strategies for – the failures found across the region.

2.2. Case study setup

The subject of this Case Study is a fitting specimen for this task. It typifies the size, style, and level of quality found among contemporaneous housing construction in the region. The demonstrable failures of the Case Study subject are, unfortunately, also representative. These characteristics make it an apt focus of study, especially when considering that its most unique aspect is manifest in the strategies employed to mitigate its failures, providing a broadly applicable framework for its myriad peers.

The subject is a duplex (a pair of attached single-family homes) within the city limits of Fayetteville. At the time of writing, the building has been in service for just under 10 years, passing hands from several homeowners and renters. Its two units are part of a 5-unit development occupying a corner lot in a rapidly developing, highly trafficked part of the city. Each structure is three stories, wood-framed, and initially clad in various configurations of stucco (i.e., portland cement plaster), brick, and cement board.

Though they vary in size and configuration (two duplexes and one single-family unit), the three structures were built simultaneously by the same development and construction firms, employing the same framing and envelope systems. In turn, all three buildings have been subject to the same failures, and the varying actions in response provide further validation for the Case Study. One building has not been mitigated, providing a “control” for the Case Study subject. The third building went through a mitigation process, albeit one whose strategy was fundamentally different from that of the Case Study. There, only the most superficially obvious issues were addressed, and the affected building envelope components were replaced in-kind. While not serving as another unadulterated “control”, this structure represents an alternative future for the Case Study subject, where less consideration led to matter-of-course strategies.

2.3. The problem

The subject house exhibited evidence of significant design and construction flaws early in its life. Symptoms included water infiltration around windows, sagging and damp interior finishes, and bulk flooding during heavy rain events. Mostly occupied by renters, occupants had neither the tenure nor investment to fully appraise the severity of the issues. For they went unmitigated until the original developer/owner sold the property to an owner-occupant.

The new owners immediately recognized that the water-based issues presenting themselves could portend more widespread, insidious failures in the building's structure and envelope. Contracting with a mitigation firm, infrared scanning revealed extensive moisture within the exterior walls. To corroborate these findings, the firm conducted selective demolition of interior finishes at critical, susceptible junctures. They removed gypsum board near window jambs and wood trim at the sills to conduct a visual inspection of the wall cavity. What they found provoked the subsequent two processes. First, large areas of gypsum board and flooring were removed to expose affected areas in the wall and floor cavities, respectively. Following this, the mitigation firm dried the cavities, removed the propagation of mold, sanitized them against further mold growth, and ran air scrubbers within the space for several days, eliminating airborne spores. Beyond reinstallation of interior finishes, what remained after stabilizing moisture and mold spread was to grapple with the compromised structure.

In assessing the structure's integrity from the interior, the extent and severity of the damage left even erudite contractors shocked. Critical studs at window edges were left rotted and friable along their length and at their bases – precisely where the walls' weight from above aggregated (Figure 3). The plywood sheathing, attached to the studs' exterior, was in some places so badly rotted that it had dissolved into flakes mounded at the bottom of wall cavities. The most deleterious, if not readily visible, damage was to the metal lath mesh, whose sole task was to support the cementitious stucco on the exterior. In places, all that remained of the lath was its imprint on the interior side of the stucco – a shadow of something long rusted away by moisture. While the stud and sheathing degradation presented existential risks for the structure, the more consequential issue was the absence of metal lath: thousands of tons of the cementitious stucco could at any moment slough off onto unsuspecting bystanders. The extent of the damage made two facts evident: that a significant amount of the structural components needed to be replaced, and that doing so would require removal of all exterior cladding.



Figure 3: Water infiltration through the cladding and windows likely occurred for the life of the building. The polyurethane insulation is largely removed in this image to expose rotting structure, but its presence would have trapped the water, encasing susceptible wood members. Blackened structural members were completely friable; the material in this image was easily crumbled by hand. Sheathing and metal lath had completely disintegrated prior to demolition of the exterior cladding, making plain both the magnitude of the issue and the dangers it presented to human health and safety. Source: (Author 2023)

Clearly, exterior cladding dependent on failing structure could not be kept in place. More, cladding dependent on structure of indeterminate solvency needed to be removed, if only to determine the status of the structure behind. The decision was made to remove all cladding from the structure, including brick veneer, stucco, and cement board. In doing so, the windows would also be removed, though they could be returned to their openings. New cladding would be installed following structural repairs, but its type and configuration would be dependent on identification of the sources for the offending failures. In effect, removal of the cladding was a forensic exercise, permitting identification of the design and constructive failures that catalyzed the damage.

From a technical standpoint, the building envelope and structure issues stemmed from a litany of detail failures. The integrated sheathing, a materials system designed to act as both structure and water-resistive barrier, proved the venue for many of these. By itself not problematic, three systemic installation errors caused widespread failures in the sheathing. For one, the nails used to attach the sheathing to the studs were universally over-driven. At each nailing point, the nail head breached the integrated sheathing's weather-resistive barrier, creating a pathway for water to reach the moisture-sensitive wood composite beyond. The building code and the manufacturer requirements indicated about 88 nails per sheet, and, with an estimated 200 sheets distributed across the structure, this error created 17,600 opportunities for water infiltration. A second failure occurred at the seams between sheathing panels, where the proprietary sealant tape was not adequately adhered, permitted more water intrusion at the panels' vulnerable edges (Huber sheathing 2023, 17-19). The third sheathing-based failure arose from the improperly installed stucco cladding. Both the building code and the manufacturer instructions expressly required

an additional layer of weather protection between the sheathing and the stucco, and this was not installed, reducing the system's effectiveness (Huber stucco 2023, 1). Moreover, the nails used to attach the stucco's metal lath were too long, fully penetrating the sheathing and creating a moisture pathway into the cavity, and they did not have a "furring" head, as required by the manufacturer, to suspend the metal lath away from the sheathing. The stucco application itself was thinner than the 3-layer, 22mm (7/8 in)-thick requirement stipulated by standards (Melander 2003, 18-22). Its thinness permitted more rapid water propagation through the assembly and greater chances of a water-logged cladding. Once there, the absorbed water had several options for penetrating the barrier (Figure 4).



Figure 4: Stucco (i.e., portland cement plaster) comprised the plurality of facade materials. Its installation did not adhere to requirements established by building code and standards, dooming the defenseless wood structure behind. In the left image, damaged sheathing is exposed beneath the stucco. Where the yellow polyurethane insulation is visible, the sheathing has completely disintegrated. Source: (Author 2023)

Outside of the sheathing and stucco, two other components enabled degradation of the structure. Extensive water infiltration around windows resulted from the lack of metal flashing at the window head. But for the stucco cladding, this might not have been such a damaging misstep; the stucco collected and channeled water to the window head, where it found pressure relief by dropping into the opening around the window. A more standard, thicker application of stucco could have prevented water propagation through material. Still, the inclusion of metal flashing would have been standard practice. Exacerbating damage from the inevitable presence of water in the cavity, polyurethane spray foam insulation within the wall cavities trapped liquid water against the interior-facing, uncoated face of the sheathing as well as the wood studs. If, as building envelope Joseph Lstiburek notes, the fundamental job of a building envelope is to 'keep the outside out and the inside in', all the failures of the sheathing, cladding, windows, and installation conspired to create the polar opposite conditions: the envelope invited the 'outside' and 'inside' to mingle somewhere between (Lstiburek 2018, 62).

Grotesque as they were, the most unsettling observation of the Case Study's technical failures was their pervasiveness. That they were so consistently expressed points to systemic issues beyond the execution of material assembly. Coordination, communication, and evaluation of limitations, among other processes undergirding the building's formation, were fundamentally absent or corrupted. Of all the parties involved in completing the building, none carry complete, unequivocal culpability. That said, systemic failures are identifiable. The architect(s) who created the construction documents did not successfully communicate passable details. Whether they were correct and not communicated, incorrect and communicated, incorrect and not communicated, critical details were not considered in construction. Regardless, this pivotal information exchange was aborted when, evidently, it was most needed: to save costs, the developers released the architects before the start of construction, arrogating the critical tasks of construction administration. The contractor's work was without oversight, and the project contained little incentive for oversight. This allowed otherwise minor issues to metastasize. For example, avoiding over-driven sheathing nails would require a simple change to a crew's nail gun settings. In the absence of that change, what would have been a minor issue recurred – 17,600 times.

Even with adequate oversight, the project's contractors were not well-positioned to create a high-quality product. Regional market forces had stretched the capacity of construction labor, adding pressure to complete the project rapidly and placing unskilled laborers in positions requiring significant skill and experience. More than that, the envelope materials systems selected for the project were as demanding of precision as they were unforgiving of error. For example, the integrated sheathing system required the use of both a proprietary seam tape and a proprietary tool to apply the tape. These narrowly defined methods, ostensibly meant to speed construction and reduce costs, pushed the contractors to the limits of their skillsets. And, as the seam tape could not be removed and re-applied, errors were irreparable without significant interruption. This characteristic, an inability to unwind installation processes, was endemic in the materials processes throughout the project. Adhesive or fluid-applied methods of sheathing tape, stucco, spray insulation, and brick veneer, among others, could not be corrected nor modified once stuck, hardened, or cured.

The same 'one-way street' characteristic that colored the contractors' work precipitated the need for complete demolition of the cladding and sheathing to make structural repairs. The installed systems did not permit temporary

removal for minor investigations, let alone re-installation after repair. Because of this, nearly 76 m³ (about 100 cubic yards) of construction waste was generated. That said, “waste” should not be reduced to an anonymous volume of material. It was the wasted labor of many hands who dedicated some portion of their lives to the project’s realization. It was the wasted liquidity of capital and resources that could no longer be leveraged for housing. And it was the wasted embodiment of greenhouse gasses generated in the materials’ manufacture and logistics. Still, while this evaluation was an indictment of the decision-making culminating in extensive demolition, it also served as a roadmap for developing a strategy to advance the project.

2.4. The solution

Ameliorating the building structure and façade could not include a re-introduction of the initial materials systems and processes, lest the building (and its owners) suffer the same consequences in the future. Instead, identification of the governing constraints made clear by the initial systems provided a framework for four sequential, strategic objectives. First, new envelope components would be solid-state, with no fluid applications and limited adhesives. Intending to inoculate the building of the conditions present in its initial façade, solid materials would permit repair and reconfiguration of the envelope both during construction and throughout the life of the building. The second objective was a corollary of the first. The irony of solid-state envelope materials is that they enable the flow of fluids by creating well-defined voids. In contrast with the initial cladding, the new cladding solution would be a rainscreen system, permitting liquid water and air to flow in- and out of a defined air space. Per typical rainscreen performance, it would prevent water from pooling and give it an opportunity to escape or dry out.

The third objective also related to the first. To reduce the already prodigious carbon footprint of the building (owing mostly to the waste material), the cladding system would avoid a hydrocarbon-based material palette in favor of biogenic materials. This happens as a matter of course; the flexible plastics and mutable cement of the initial cladding were hydrocarbon-based. The new solution would include wood boards over rigid furring. Furthering the embodied carbon agenda, the wood would be specified as Southern Yellow Pine, a regionally available species. And, to avoid the introduction of harmful chemicals at sites of production or construction, the wood would be treated with a thermal modification process in lieu of the chemical-heavy pressure treatment process.



Figure 5: On the left, the non-adhesive, weather-resistive barrier and furring await coverage by the wood rainscreen. On the right, a corner perspective image of the completed building. Source: (Author 2023)

The fourth objective further capitalized on the previous three objectives and was based on a realistic assessment of labor limitations. Where the initial cladding system had three distinct material systems (stucco, cement board, brick veneer), the new solution would employ one: a vertically oriented wood rainscreen. The impetus for this objective was found in envelope failures based on complicated installation processes. The three-material initial cladding required divergent skilled labor groups, clear communication among these groups, and careful detailing where the materials interfaced. A single material strategy obviated these requirements, permitting the installation team to focus on achieving quality with fewer complications and decision points (i.e., opportunities for failure).

The established strategic objectives yielded a singular, feasible solution that met the performative and constructive imperatives of the project. Following cladding demolition and structural stabilization, new, non-integrated sheathing was installed. Over this, a vapor-permeable, non-adhesive weather resistive barrier was installed, followed by horizontal cellular furring strips. Thermally-modified, 19mm x 140mm (nominal 1x6), Southern Yellow Pine boards were then attached in a vertical orientation using stainless steel screws. The simplicity of this installation process provided two significant benefits for the project: the system could be accurately installed regardless of the laborer’s skill level, and the system could be deconstructed with the same level of skill and simplicity. Most importantly, the new solution acutely avoided the sources of failure found in the initial scheme, ensuring that the catastrophic damage wrought by that flawed system could not recur.

CONCLUSION

The housing crisis in Northwest Arkansas is the result of several converging factors. Housing quality, typically suppressed by labor costs, is an often-overlooked driver in reducing housing availability, and it is at its most severe when systemic building failures remove units from the housing pool. That said, the present scenario is not without precedent. Ever the economy-driven society, the history of construction in the US is a narrative of suppressing costs

to meet demand, where social, ecological, and qualitative concerns are collaterals. What makes this moment in history different are the global, self-perpetuating exigencies of population growth and climate change. We can scarcely afford to build things that won't last. Still, an insidious, positive feedback loop continues to push quality down, exacerbating issues of climate change and providing scant solutions to it. It is a wicked problem, and blame can no more be cast on consumers than it can the architects, builders, product suppliers, or authorities that have greased the tracks of this downward slide. That said, because of their central position in the formation of buildings, it is incumbent on architects to develop and provide solutions to abate the issues plaguing housing in America.

What is presented in the Case Study is not a broad solution but one that intentionally targets a blind spot in efforts to increase housing affordability. And it is not a generically "green" approach to mitigating climate impacts, but rather one that seeks solutions based in the realities of material and labor availability. The materials systems deployed enable a resilient structure couched in the sentiments of *Design for Deconstruction* and *Right to Repair*, methods for increasing the useful life of the structure. Finally, it posits that the uniquely American struggle for efficient construction can be leveraged towards housing and climate strategies, given the will to imagine longevity as a goal.

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