

From Chassis to Foundation: The Evolution of Manufactured Housing and the Convergence of HUD and IRC Construction Standards

*An Industry White Paper on Regulatory Transformation, Engineering Adaptation,
and the Path Toward a Unified Factory-Built Housing Framework*

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Author's Note

This white paper was conceived and developed by Kenneth (Ken) Krantz, a construction industry professional whose career spans several decades of hands-on experience across residential, commercial, and specialty construction disciplines. While the author does not claim specific expertise in manufactured housing operations or modular construction as a practiced specialty, the analysis presented in this paper is rooted in a deep and practical understanding of how buildings are designed, engineered, built, and placed — knowledge accumulated over a career measured in decades, not years.

It is precisely that breadth of construction experience — an understanding of structural systems, foundation behavior, material performance, field assembly, and the practical realities of how buildings meet the ground — that informed the author's analysis of the manufactured housing industry's current transition. The insights offered here reflect the perspective of a construction professional who recognized the engineering and regulatory significance of the chassis elimination question and pursued it seriously.

The author also wishes to acknowledge that artificial intelligence tools were used as an aid in the research and drafting of this white paper. As with any such

assistance, all analytical conclusions, positions, and judgments expressed herein reflect the author's own knowledge and experience.

Readers with questions, corrections, or responses to the positions taken in this paper are welcome to direct their correspondence to the author directly.

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Abstract

This white paper examines the most consequential structural and regulatory transformation in the history of American manufactured housing: the elimination of the permanent chassis requirement under the 21st Century ROAD to Housing Act, signed into law on July 11, 2026. For more than five decades, the permanent steel chassis served simultaneously as the structural backbone of factory-built homes, the legal linchpin of their regulatory identity, and the principal mechanism by which manufactured homes were confined to personal-property financing, restricted zoning classifications, and limited mortgage access. The Act's redefinition of manufactured homes as structures built "with or without a permanent chassis" initiates an engineering, production, transport, and financing transformation of historic proportions. This paper traces the origins of the chassis requirement from the post-WWII mobile home era through the 1974 HUD Code, analyzes the parallel regulatory trajectories of HUD-code and IRC modular construction, details the engineering substitution challenges and solutions involved in chassis-free design, examines factory retooling and transport adaptation requirements, maps the financing and zoning implications of the shift, and presents a structured convergence timeline and stakeholder recommendations. The paper concludes that the successful execution of this transition has the potential to resolve the

structural financing inequities that have disadvantaged manufactured home buyers for generations and to position factory-built housing as the primary scalable response to the national housing shortage.

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Section 1: Executive Summary

The manufactured housing industry stands at a structural and regulatory inflection point without precedent since the passage of the National Manufactured Housing Construction and Safety Standards Act of 1974. The 21st Century ROAD to Housing Act — signed into law on July 11, 2026 — permanently eliminated the requirement that HUD-code manufactured homes be built on a permanent steel chassis, rewriting the foundational federal definition that had governed the industry for more than half a century. What follows is an era of engineering adaptation, production retooling, financing transformation, and regulatory convergence that will define the manufactured housing industry's competitive and social role for decades to come.

Key Findings at a Glance

- **The chassis requirement is gone.** The 21st Century ROAD to Housing Act (H.R. 6644), passed by the Senate 85–5 and the House 358–32, became law July 11, 2026, redefining manufactured homes as structures built "with or without a permanent chassis." This is the most significant statutory change to HUD manufactured housing law since 1974.

- **Engineering substitution is complex but solvable.** The permanent chassis performed four distinct structural functions — transport rigidity, floor load distribution, marriage wall alignment, and foundation interface — each of which must be replaced with an engineered alternative. The IRC modular industry has been solving analogous problems for decades using removable carrier frames, engineered floor cassettes, and direct foundation connections.
- **Financing access is the primary downstream benefit.** The chassis-personal property link was the central mechanism that locked manufactured home buyers into chattel loans at rates averaging 9.5% compared to 7.88% (today's rates) for real-property mortgages — a spread that adds approximately \$62,000 in additional interest on a \$125,000 loan over 25 years. Chassis-free homes on permanent foundations create a direct pathway to conventional mortgage financing.
- **Factory retooling requires deliberate capital investment.** Transitioning a mid-size manufactured housing plant to chassis-free production is estimated to require \$2M–\$8M depending on automation level, and introduces new logistics requirements around reusable carrier frames, floor cassette jigs, and foundation-interface quality controls.
- **HUD rulemaking is the critical path.** The Act mandates HUD to promulgate new construction and safety standards for chassis-free manufactured homes. Until that rulemaking is complete, lenders, states, and inspection agencies cannot fully operationalize the transition. The industry's near-term priority must be active, technically substantive engagement in that process.

Section 2: Historical Context — The Chassis Era (1940s–1974)

Origins in the Postwar Economy

The manufactured housing industry's origins lie not in housing policy but in transportation manufacturing. Following the conclusion of World War II in 1945, the United States faced an extraordinary convergence of pressures: millions of returning veterans requiring rapid housing, acute shortages of site-built construction capacity, and surplus industrial production infrastructure that had been retooled for wartime manufacturing. The trailer home — a lightweight, towable living unit evolved from the vacation and commercial trailers of the 1930s — offered an immediately deployable solution. Production could scale quickly in existing metal fabrication facilities, units could be delivered to any location with road access, and costs were a fraction of site-built alternatives.

The sociological profile of the early mobile home was as much vehicle as dwelling. Units were constructed on steel frames with integral axles, tow hitches, and road-legal running gear. Manufacturers advertised them as mobile, and early buyers moved them regularly — to follow employment, to access seasonal sites, or simply because mobility was seen as a feature rather than a limitation. Trailer parks emerged as a new land use typology, offering short-term land leases to mobile home occupants who retained the ability to relocate their units. The legal and regulatory apparatus that governed these structures reflected their vehicular origins: they were titled and taxed as personal property, insured under auto-adjacent policies, and subject to highway transport regulations rather than building codes.

The Chassis as Structural Identity

Throughout the 1950s and 1960s, as mobile homes grew in size — from 8-foot-wide single sections to 10-, 12-, and eventually 14-foot-wide units, and from 35 to 50 to 70 feet in length — the permanent steel chassis remained the defining structural element. Typically fabricated from 6- to 10-inch structural steel I-beams or C-channel sections welded into a perimeter frame, the chassis served as the assembly datum for all other structural elements. Floor joists bore directly on the chassis rails; wall framing was indexed to the chassis width; roof trusses spanned between walls established by chassis geometry. The hitch

assembly attached to the chassis nose; axle sets bolted to the chassis underbelly; the entire home was structurally dependent on the chassis from the first nail to the final delivery.

By the late 1960s, double-wide configurations — two separately chassis-mounted sections mated on site along a central "marriage wall" — expanded the available floor plan to 24 feet of width. The chassis alignment of both sections governed the precision of the marriage wall joint. This physical and structural dependency on the chassis was not merely engineering habit; it was the natural consequence of designing a housing unit that needed to function as a road vehicle during transport and as a dwelling after placement.

Safety Failures and Federal Intervention

The rapid growth of the mobile home industry through the 1960s occurred in a near-complete regulatory vacuum. There was no federal building code. State and local codes varied wildly or excluded mobile homes entirely. The consequences were severe: fire deaths linked to lightweight construction and inadequate egress; catastrophic wind damage from structures with minimal lateral bracing; structural failures from inadequate floor and roof load ratings. Congressional investigations documented a pattern of preventable casualties and consumer harm that the self-regulatory capacity of the industry had failed to address.

The National Manufactured Housing Construction and Safety Standards Act of 1974 — commonly referred to as the HUD Code after the administering agency — was Congress's response. It established the first federal preemptive building code for any category of residential construction in American history. The Act granted HUD authority to promulgate minimum construction and safety standards that would supersede all state and local building codes — a legal structure that remains unique to manufactured housing to this day.

Regulatory Milestone

1974 — National Manufactured Housing Construction and Safety

Standards Act: The first federal preemptive building code for any housing type in U.S. history. Established HUD as the administering authority. The Act codified the permanent chassis requirement as a definitional element of manufactured housing, reflecting the industry's vehicular origins and the enforcement continuity provided by factory-production inspection. Standards took effect June 15, 1976, at which point "mobile homes" produced under the new code became "manufactured homes."

The Chassis as Codified Identity

The permanent chassis requirement embedded in the 1974 Act was not arbitrary. It served several simultaneous regulatory functions. It provided a uniform, inspectable structural element that In-Plant Inspection Agencies (IPIAs) could verify at the point of production. It provided continuity of identity for a dwelling that might be relocated — the chassis, bearing the HUD certification label, remained the physical record of code compliance regardless of where the home was placed. It enabled road transport without requiring secondary structural provisions, since the chassis was the transport structure. And it aligned with the industry's existing manufacturing paradigm, avoiding the economic disruption of requiring fundamental production changes from manufacturers that had been producing chassis-based homes for decades.

When the standards took effect on June 15, 1976, "mobile homes" produced before that date retained their pre-code identity; homes produced afterward under HUD Code standards were officially designated "manufactured homes." This terminology shift — codified in the Housing and Community Development Act of 1980 — was intended to distinguish the new safety-certified product from its predecessor. In practice, however, the physical characteristics of the chassis-based product changed little in the immediate post-Code years, and the social and financial stigma attached to the mobile home nomenclature proved durable regardless of the regulatory rebranding.

Section 3: The Regulatory Framework — HUD Code vs. IRC Modular

3.1 The HUD Code: Federal Preemption and Its Consequences

The HUD Code, codified at 24 CFR Part 3280, establishes a comprehensive federal construction and safety standard administered directly by the U.S. Department of Housing and Urban Development. Its preemptive character means that no state or local government may impose construction or safety standards on manufactured homes that differ from or are in addition to the federal standards — with limited exceptions for installation standards, which remain state-administered. This preemption is unique in American housing regulation; no other category of residential construction is governed by a federal building code that displaces state and local authority.

The HUD Code framework operates through a factory inspection regime. Each manufacturer must engage a HUD-approved In-Plant Inspection Agency (IPIA) to conduct ongoing inspections of the production process. Design approval is conducted through Design Approval Primary Inspection Agencies (DAPIAs), which review and approve home designs before production begins. Upon certification, each home receives a HUD Data Plate affixed inside the home containing critical information — wind zone rating (I, II, or III), thermal zone, roof load zone, serial number, and date of manufacture — and a HUD certification label (the "red tag") affixed to each transportable section. These documents are the primary record of HUD code compliance and are required for financing, insurance, and resale transactions.

Wind zone ratings under the HUD Code — Wind Zone I (standard), Wind Zone II (hurricane-coastal), and Wind Zone III (highest hurricane exposure) — establish minimum structural standards for wind resistance. Homes must be designed and certified for the wind zone of their intended installation location. Thermal zones similarly govern insulation and energy standards. These zoned standards allow national certification while accommodating regional climate variation — a

regulatory efficiency that the IRC modular system, which is state-administered, cannot replicate at scale.

3.2 IRC Modular Construction: State Administration and Site-Built Equivalency

The International Residential Code (IRC) modular pathway operates on an entirely different regulatory logic. There is no federal chassis requirement, no federal preemptive standard, and no HUD certification. Instead, modular homes are constructed to the building code of the state of destination — typically the IRC or a state-adopted variant — inspected by state-certified third-party inspection agencies at the factory, and treated as equivalent to site-built construction for virtually all regulatory purposes upon placement on a permanent foundation.

This site-built equivalency is the IRC modular pathway's defining advantage. Because a modular home is certified to the same building code as a site-built home in the state of installation, it is treated identically for zoning, financing, appraisal, and permitting purposes. It can be placed in any zone that permits site-built residential construction. It qualifies for conventional mortgage financing without special program requirements. Appraisers compare it to site-built homes rather than to other manufactured homes. It carries a real property deed from the moment of foundation placement.

The IRC modular pathway's disadvantages are equally significant. State-by-state code variation creates a fragmented market: a home certified for placement in one state may require redesign, re-engineering, and re-inspection for placement in another. The absence of federal preemption means manufacturers must navigate a 50-state matrix of code requirements, inspection agency relationships, and permit processes. Production costs are higher, customization requirements are greater, and the absence of the scale efficiencies available to HUD manufacturers limits price competitiveness. IRC modular homes typically cost 10–20% more to produce than comparable HUD-code homes precisely because of these regulatory overhead costs.

3.3 The "HUD Identity Trap"

The confluence of the chassis requirement, the federal preemptive regulatory structure, and the personal property financing paradigm created what this paper terms the "HUD identity trap" — a self-reinforcing system in which the chassis-based physical identity of manufactured homes produced a legal and financial classification that systematically disadvantaged buyers regardless of home quality, size, or placement permanence.

The mechanism operated as follows: because HUD-code homes were defined as structures "built on a permanent chassis" and were titled as vehicles in most states, they were classified as personal property rather than real property. Personal property classification meant chattel financing rather than mortgage financing, typically at interest rates 150–200 basis points higher than conventional mortgages. According to Urban Institute analysis of 2024 Home Mortgage Disclosure Act data, the median chattel loan rate for manufactured homes was 9.5%, compared to 7.88% for real-property manufactured home mortgages — a gap that adds approximately \$62,000 in excess interest on a \$125,000 loan over 25 years. Personal property classification also prevented appreciation in line with real estate values, since chattel-titled assets depreciate like vehicles rather than appreciating like real property.

Financing Disparity — Key Statistics

- Median chattel (personal property) loan rate for manufactured homes: **9.5%** (2024 HMDA data, Urban Institute)
- Median real-property manufactured home mortgage rate: **7.88%**
- Median site-built home mortgage rate: **6.63%**
- Excess interest cost on a \$125,000 chattel loan vs. real-property mortgage (25 years): **~\$62,000**
- Manufactured home loan denial rate: **nearly 60%** of applications, reflecting chattel loan pool concentration

- Share of manufactured home buyers using chattel loans: approximately **35%**; using mortgages: **44%**; using contract financing: **20%** (Pew Charitable Trusts, 2022)

3.4 Comparative Framework: HUD Code vs. IRC Modular

Dimension	HUD Code (Manufactured Housing)	IRC Modular (Factory-Built)
Code Authority	Federal (HUD) — preemptive national standard, 24 CFR Part 3280	State-administered — IRC or state code equivalent, no federal preemption
Chassis Requirement	Previously required; eliminated by 21st Century ROAD to Housing Act (2026)	Never required; sections transported on removable carrier frames
Foundation Options	Historically limited to pier-and-beam, ground anchor systems; chassis-free homes open full foundation range	Full range: slab, crawl space, perimeter stem wall, full basement
Zoning Treatment	Often excluded from standard residential zones by ordinance; treated as separate use category	Equivalent to site-built; placed in any residential zone permitting site-built construction
Financing Access	Predominantly chattel (personal property) loans; conventional mortgage limited by chassis/title classification	Conventional mortgage financing equivalent to site-built; Fannie/Freddie standard guidelines apply

Dimension	HUD Code (Manufactured Housing)	IRC Modular (Factory-Built)
Transport Method	Historically: home towed on own chassis as oversized vehicle. Post-2026: carrier frame transport for chassis-free units	Removable carrier frames on hydraulic trailers; classified as building module transport, not vehicle transport
Inspection Regime	In-Plant Inspection Agency (IPIA) — federally approved, factory-based; HUD Data Plate and certification label	State-certified third-party inspection agencies; state module label; local building department final inspection
Appraisal Methodology	Compared to other manufactured homes; limited comparable set; frequently appraised below cost	Compared to site-built homes; full comparable set available; real property appraisal methodology
Wind/Seismic Design	HUD Wind Zones I/II/III; national zoning map; federally prescribed standards	ASCE 7 / IRC wind and seismic maps; state-specific requirements; same standards as site-built
Energy Standards	HUD thermal zones (A/B/C); federal standard with periodic MHCC updates	State energy code (typically IECC); updated with each state code adoption cycle

Section 4: Engineering Anatomy — The Chassis-Based System

Understanding what the chassis-free transition requires demands a precise understanding of what the chassis-based system actually is and how it functions. The traditional HUD manufactured home is not simply a house placed

on a steel frame; it is an integrated structural system in which the chassis, the floor framing, the wall framing, and the transport axles are co-designed as a unified assembly. Each element depends on and references the others.

The Permanent Steel Chassis

The primary structural member in a traditional HUD manufactured home is the chassis — typically a pair of main longitudinal I-beams or built-up C-channels running the full length of the home (ranging from 40 to 80+ feet), spanned by lateral outrigger members at regular intervals. Main chassis beams are commonly 6-, 8-, or 10-inch structural steel sections, selected based on home span length, width, and design loads. The perimeter chassis frame integrates the hitch assembly at the front (tongue end) and provides attachment points for the running gear — suspension springs, axles, bearings, wheels, hubs, tires, and brakes — which bolt to the chassis underbelly and are removed or folded after installation in most cases.

The chassis performs its primary load-carrying role during transport: the entire dead load of the home — framing, roofing, insulation, interior finishes, mechanical systems, and all fixed equipment — rests on the chassis, which in turn transfers these loads through the axle systems to the road surface. The chassis also resists the racking and longitudinal flexure induced by road movement — acceleration, braking, cornering, and road surface irregularities. These transport loads are often more severe than the in-service gravity and lateral loads the home will experience on-site.

Engineering Note: Chassis Steel Dead Load

A standard 16×80 single-section chassis assembly — including main beams, outriggers, hitch assembly, and attachment hardware — adds approximately 3,000 to 5,000 pounds of steel dead load to the home. This dead load has historically been a significant contributor to transport cost (heavier loads require higher axle-weight permits and larger tow vehicles) and has

constrained the design envelope available for wall and ceiling height within legal transport height limits.

Floor System

The floor system in a chassis-based manufactured home is not a self-supporting structure. Floor joists — typically 2×6 or 2×8 dimensional lumber at 16 inches on center — bear directly on the top flanges of the chassis rails, transferring floor loads into the steel frame below. The floor decking (typically 5/8-inch or 3/4-inch oriented strand board) sits atop the joists. Because the chassis provides continuous bearing support along the full length of the home, the floor joists do not need to span the full width of the home as simple beams; they function as short spans between chassis rail supports. This dependency means the floor system has no independent load-carrying capability and cannot function as a structural diaphragm without the chassis.

In multi-section homes, the center beam — a heavier longitudinal chassis member at the marriage line — provides bearing for the marriage wall and supports floor loads from both sections at the centerline. The precise elevation and alignment of this center beam governs the geometry of the marriage wall joint and the final floor levelness of the assembled home.

Wall and Roof Framing

Wall framing in traditional HUD homes is typically 2×4 construction at 16 inches on center, with some manufacturers offering 2×6 exterior walls for enhanced insulation. Ceiling heights have historically been constrained to 7 feet 0 inches (or 7 feet 6 inches in some models) by transport height limits: the cumulative height of chassis depth (6–10 inches), floor framing (5.5–7.5 inches), wall framing (7 feet), roof framing, and roofing materials must fit within the standard oversize-load height limit of 13 feet 6 inches. This constraint has produced one of the most visually distinctive features of the HUD-code home — the relatively

low ceiling height and shallow roof pitch that distinguish it architecturally from site-built construction.

Roof systems are typically engineered truss assemblies, often with low-slope configurations (3:12 to 5:12 pitch) necessitated by transport height constraints. Lateral load resistance — wind racking forces — is provided by wall sheathing diaphragms and, in some cases, by the chassis frame acting as a rigid horizontal plane at the base of the wall system.

Anchoring and Foundation Interface

HUD-code homes are not bolted to their foundations in the manner of site-built homes. Instead, they are anchored through a system of steel straps that connect the chassis frame to ground anchors driven into the soil or embedded in concrete piers. The chassis serves as the structural intermediary between the home framing above and the ground anchorage below. Foundation systems — typically concrete piers supporting the chassis at specified bearing points, with perimeter skirting providing aesthetics and wind protection but not structural support — do not directly engage the home's framing. All gravity loads and uplift forces are transferred through the chassis to the anchor system.

Section 5: Regulatory Triggers for Change — Pressure Points (1990s–2025)

The elimination of the chassis requirement in 2026 was not an abrupt policy reversal. It was the culmination of more than three decades of accumulating pressure from housing finance data, advocacy research, GSE program development, federal housing shortage analysis, and legislative effort. Understanding the sequence of these pressures illuminates why the 2026 Act passed with such overwhelming bipartisan margins and why its implementation, while complex, enjoys broad industry and policy support.

The 1990s: The Financing Gap Becomes Visible

The 1990s produced the first systematic data documenting the wealth-building inequity created by chattel lending. As site-built home values appreciated steadily through the decade, manufactured homes financed as personal property followed a depreciation curve aligned with vehicle values rather than real estate values. Buyers who had invested their savings in a manufactured home found themselves in a deteriorating equity position relative to site-built homeowners — not because the physical quality of their homes was necessarily inferior, but because the legal classification of their homes as personal property placed them outside the real estate appreciation system entirely.

The MHCC and Slow-Moving Modernization

HUD's Manufactured Housing Consensus Committee (MHCC), established under the American Homeownership and Economic Opportunity Act of 2000, created the formal structure for ongoing HUD Code modernization. The MHCC — comprising representatives of manufacturers, installers, retailers, consumer advocates, regulators, and lenders — provides recommendations to HUD for code updates on energy efficiency, structural standards, accessibility, and installation. While the MHCC process has produced meaningful incremental modernizations, its consensus-based structure and HUD's administrative capacity constraints have made it a slow vehicle for fundamental change. Chassis reform, which would have required statutory action rather than rulemaking alone, lay outside the MHCC's effective scope until Congress acted.

GSE Duty to Serve and the Mortgage Access Programs

The 2008 Housing and Economic Recovery Act's Duty to Serve mandate, implemented by the Federal Housing Finance Agency (FHFA) beginning in 2018, required Fannie Mae and Freddie Mac to develop programs to extend conventional financing to underserved market segments including manufactured housing. In response, Fannie Mae launched the MH Advantage program and Freddie Mac launched CHOICE Home — both designed to make conventional mortgage financing available for manufactured homes that met enhanced design standards including site-built aesthetic features (higher roof pitches, larger eaves, garages, site-built-comparable materials).

These programs represented genuine progress but were constrained by the chassis requirement. To qualify, homes still had to be built on a permanent chassis; the programs layered aesthetic and design requirements on top of the existing chassis-based structural system. They could narrow the gap between HUD-code and site-built homes in appearance and financing access, but they could not eliminate it. The chassis remained both a physical constraint on design and a legal constraint on real property classification.

The Housing Shortage Context

By 2024, analyses by the National Association of Realtors, Freddie Mac, and Up for Growth estimated the U.S. housing deficit at between 4 and 7 million units. Factory-built housing — with its production speed, cost advantages, and quality-controlled manufacturing environment — was identified across the political spectrum as the most scalable near-term solution. The chassis requirement, identified as the primary structural barrier to manufactured housing's full participation in real estate finance, became a legislative target with genuine bipartisan urgency.

The 2025 Analytical Foundation

In the immediate pre-legislative period, the Urban Institute and National Housing Conference published analyses estimating that chassis elimination — combined with updated GSE guidelines — could unlock conventional financing for up to 500,000 additional households annually. These analyses were cited extensively in congressional testimony and provided the quantitative foundation for the legislative push. The combination of documented financing inequity, a national housing crisis, and a clear legislative remedy created the conditions for the lopsided bipartisan passage that followed.

The 21st Century ROAD to Housing Act (2026)

The 21st Century ROAD to Housing Act (H.R. 6644) merged the Senate's ROAD to Housing Act with the House's Housing for the 21st Century Act into a 57-section package representing the most significant federal housing legislation in decades. Among its manufactured housing provisions — grouped under Title III ("Manufactured Housing for America") — the Act rewrites the federal definition of a manufactured home to include structures "built with or without a permanent chassis." This single definitional change triggers a cascade of legal, regulatory, engineering, and financial consequences that will unfold over the next several years through HUD rulemaking and state-level implementation.

Legislative Record

Senate vote: 85–5 | **House vote:** 358–32 | **Signed/enacted:** July 11, 2026 (became law without presidential signature after ten-day constitutional period) | **Key chassis provision:** Housing Supply Expansion Act component (Tillis/Gallego/Tim Scott/Padilla) — "updates the federal definition of manufactured housing to eliminate the explicit requirement for a permanent chassis to reduce manufacturing costs and encourage innovation."

Section 6: Engineering the Chassis Removal — Structural Substitution

The elimination of the chassis requirement creates an engineering transition challenge that is substantial but tractable. The IRC modular industry has successfully resolved analogous structural problems for decades. The challenge for the manufactured housing industry is to apply those solutions within the cost and production-speed constraints that define the HUD market's value proposition. Each structural function previously performed by the permanent

chassis must be replaced with a specific engineered alternative; the chassis cannot simply be removed without substitution.

6.1 What the Chassis Was Actually Doing

The permanent chassis served four distinct and separable structural functions, each of which requires an independent engineering solution:

1. **Transport rigidity:** Resisting racking, longitudinal flexure, and torsional loads during road transport — the most severe structural loading condition the home experiences in its entire service life.
2. **Floor load distribution:** Providing continuous bearing support for floor joists, distributing gravity loads to the axle systems and, after installation, to the foundation pier points.
3. **Marriage wall alignment:** Providing a geometric datum — a known, fixed reference plane — for aligning and mating multiple sections on site.
4. **Foundation interface:** Serving as the structural transition element between the home's framing system and the ground anchors or pier caps, through which all gravity and lateral (wind, seismic) forces are transferred to the ground.

Engineering Principle

Removing the chassis is not simply a subtraction. Each function it performed must be replaced by an engineered alternative that meets or exceeds the structural performance requirements of HUD Code and, in the chassis-free context, the additional requirements of direct foundation connection. Failure to engineer each substitution explicitly will result in structural deficiency, transport damage, installation failure, or wind/seismic inadequacy.

6.2 Floor System Redesign

The most fundamental structural redesign required by chassis removal is the conversion from a chassis-bearing floor system to a self-supporting floor cassette. In the chassis-based system, the floor is not required to span independently because the chassis provides continuous bearing. In a chassis-free system, the floor must be capable of carrying its own gravity loads plus superimposed live loads across the full width of the section — typically 14 to 16 feet — while transferring those loads to discrete bearing points at the perimeter foundation or to a marriage beam at the center.

Engineered wood floor systems provide the primary structural solution. Options include cross-laminated timber (CLT) floor panels, structural insulated panels (SIPs) used as a combined structural and thermal floor system, and advanced LVL (laminated veneer lumber) or LSL (laminated strand lumber) rim board systems with engineered joist framing. Each of these systems is capable of providing the required floor rigidity and load-carrying capacity without the chassis rail as a continuous bearing element.

The perimeter load path must be explicitly designed in the chassis-free floor. Chassis rails previously provided a continuous steel bearing surface along the full length of each section; in the chassis-free floor, a continuous perimeter rim board and blocking system must distribute loads to the foundation bearing points. Deflection criteria — typically $L/360$ for live load and $L/240$ for total load — must be met using structural depth and material stiffness rather than chassis steel.

6.3 Transport Without a Chassis

The IRC modular industry has transported chassis-free housing sections for decades using removable steel carrier frames — a proven solution that can be adapted for chassis-free HUD manufactured homes. A carrier frame is a reusable steel sub-frame that attaches to the underside of a chassis-free home's floor

system at engineered bolt points, provides the structural rigidity required for road transport, interfaces with hydraulic lowboy or steerable trailer systems, and is removed by the installation crew after the home is placed on its permanent foundation. The carrier frame leaves with the delivery vehicle; it is not a component of the home.

For the carrier frame system to function correctly, the chassis-free floor must be designed with carrier frame attachment in mind from the beginning. Blocking, rim boards, and bolting patterns must be specified to transfer transport loads from the carrier frame into the floor diaphragm and back to the carrier frame at each support point. These attachment details are part of the "design-out" interface — the engineering language between the home's structure and the transport system — rather than incidental hardware.

Transport Height Dividend

Eliminating the permanent chassis removes 6 to 12 inches of structural depth from the bottom of the home. This depth reduction, within a fixed legal transport height envelope (13 feet 6 inches for most states), can be reallocated to increase wall height from the traditional 7 feet 0 inches to 8 feet 0 inches or even 9 feet 0 inches — an architectural transformation that directly addresses one of the most persistent visual markers distinguishing manufactured homes from site-built construction. Taller walls enable steeper roof pitches, expanded window heights, and conventional interior proportions that consumers and appraisers associate with site-built quality.

Transport permitting for chassis-free HUD sections will follow the modular transport model rather than the vehicle transport model. State DOT oversize load permits, route surveys, pilot car requirements, and curfew restrictions apply as with any oversized building section. Width limits (typically 14 feet standard, 16 feet with special permit), height limits (13 feet 6 inches in most

jurisdictions), and length limits (60–80 feet per section depending on state) govern the maximum section dimensions regardless of whether a chassis is present.

6.4 Foundation Interface Redesign

The most significant structural departure from traditional HUD practice is the direct connection between the chassis-free home's floor system and a permanent foundation. In chassis-based construction, the foundation — typically concrete piers — engaged the chassis rather than the home's framing. Wind uplift forces were resisted by straps connecting the chassis to ground anchors. Gravity loads traveled from the floor joists to the chassis rails to the pier caps. The home's framing was structurally isolated from the foundation by the chassis intermediary.

In a chassis-free system, the floor's perimeter rim board or sill plate must bear directly on and connect directly to the foundation. This connection must be designed to transfer all gravity loads (dead load, live load, roof loads through load-bearing walls) and all lateral loads (wind shear and seismic forces) between the home and the foundation. The full range of permanent foundation types becomes available:

- **Continuous perimeter stem wall** (poured concrete or concrete masonry unit): provides continuous bearing under the full perimeter, uniform elevation control, and perimeter lateral anchorage.
- **Slab on grade:** with embedded anchor bolts matching the home's perimeter bolt pattern; suitable for Wind Zone I and many Zone II applications.
- **Crawl space with perimeter foundation wall:** allows plumbing and mechanical access, provides thermal buffer in cold climates; standard IRC site-built practice.
- **Full basement:** newly feasible without the chassis depth conflict that previously made below-grade placement impractical; opens the

possibility of vertical living space expansion previously unavailable in HUD-code construction.

Anchor bolt design must translate HUD Wind Zone requirements — previously addressed through chassis strap-and-ground-anchor systems — into foundation anchor bolt sizing and spacing engineered for the specific wind zone and home geometry. Shear transfer at the foundation-to-sill-plate interface must be explicitly designed using shear wall calculations, rim board continuity, and anchor bolt placement that accounts for the full lateral load demand on each shear wall segment.

6.5 Multi-Section Mating Without Chassis Alignment

Double-wide and triple-wide homes present additional engineering challenges in the chassis-free context. In chassis-based construction, the marriage wall alignment was governed by the precise geometry of the chassis rails and the center chassis beam — both factory-fabricated steel elements with dimensional consistency that transferred directly to the site assembly. The chassis provided both a structural reference and a physical datum that set-crews used to align sections within acceptable tolerances before bolting marriage walls together.

In chassis-free construction, sections must be aligned using foundation bearing pads, laser leveling equipment, and engineered marriage beam splicing systems — methods standard in IRC modular installation but new to most HUD set crews. The marriage beam — an LVL or steel flitch plate member spanning across the marriage line, bolted to both sections' rim boards at the floor level and spliced at the ridge — provides the structural continuity that previously depended on chassis alignment. This member must be engineered for full tributary roof and floor loads without the chassis providing lateral rigidity during the assembly sequence. Roof ridge splice connections at the marriage line must similarly be engineered for full span loads and carry full documentation in the home's installation manual.

Section 7: Factory Retooling — Production Line Adaptation

Today's Chassis-Based Production Model

The contemporary HUD manufactured housing production line is optimized around the chassis as its central assembly datum. The production sequence in a typical facility begins with chassis fabrication or receipt from a steel supplier, proceeds through floor assembly directly on the chassis rails, and continues through wall framing, roof truss setting, exterior sheathing, and interior finish work — all with the chassis serving as the dimensional reference, the structural support, and the transport mechanism. At end-of-line, the completed home rolls to a transport staging area on its own chassis, receives its HUD Data Plate and certification label, and is shipped directly on the same chassis on which it was built.

Every jig, fixture, and assembly station on a chassis-based production line is indexed to the chassis geometry. Floor joist bearing locations are designed to land on chassis rails. Wall framing heights reference the chassis top-of-rail elevation. Marriage wall bottom plates bear on the center chassis beam. Electrical conduit, plumbing drain lines, and HVAC crossover ducts are routed through the chassis frame between the floor deck and the chassis rails. This level of integration means that retooling for chassis-free production is not a simple subtraction of one component — it is a redesign of the production process's foundational reference system.

Retooling Requirements

Transitioning to chassis-free production requires changes across every major production station:

- **Floor cassette assembly jigs:** Precision steel jigs replace the chassis as the assembly datum for floor system fabrication. These jigs must hold the floor cassette in plane, at the correct elevation, and to the dimensional tolerances required for carrier frame attachment and foundation

placement. They are analogous to the jig systems used in IRC modular production.

- **Structural floor panel production:** Integration of engineered wood floor systems — whether SIP panels, LVL-framed cassettes, or CLT panels — into the production sequence requires new material handling, fastening, and inspection procedures. These systems are heavier, stiffer, and dimensionally more demanding than the simple joist-and-decking assemblies of chassis-based floors.
- **Carrier frame inventory and logistics:** Reusable transport carrier frames must be purchased, inventoried, scheduled for delivery, and returned from installation sites — a reverse logistics operation with no equivalent in chassis-based production. A facility producing 500 homes per year will require a carrier frame fleet sized to the average transport and installation cycle time — typically 30 to 90 frames for a medium-volume plant.
- **Foundation-ready bottom plate design:** Perimeter sill plates must incorporate anchor bolt templates, pressure-treated or appropriately detailed bottom plates for direct foundation bearing, and weather-resistant sealing details. These are elements of the home's structure that must be incorporated in the factory, not on the installation site.
- **Marriage wall dimensional reconfiguration:** Marriage walls indexed to chassis rail tops must be redesigned to reference floor cassette edges — a dimensional shift requiring jig reconfiguration and re-engineering of marriage wall framing geometry throughout the product line.
- **Quality control for carrier-frame attachment:** New inspection protocols must be developed and implemented for verifying carrier frame bolt patterns, torque specifications, and load transfer adequacy at each carrier attachment point. These inspections must be incorporated into the IPIA's in-plant inspection program.

Capital Requirements and Transition Strategies

Full retooling of a mid-size manufactured housing plant producing 500 or more homes per year is estimated to require \$2 million to \$8 million in capital

investment, depending on the level of automation and the extent of line reconfiguration required. Smaller producers face proportionally higher per-unit costs for the same transition. Three transition strategies are available:

Strategy	Description	Advantages	Risks
Parallel Production	Run chassis-based and chassis-free lines simultaneously during transition period	Market continuity; learning period with no revenue disruption	High capital requirement; operational complexity; dual inspection protocols
Phased Retooling	Convert one product line at a time; maintain chassis production during phases	Manageable capital steps; allows market testing per product line	Extended transition period; may lag competitors who move faster
Greenfield Chassis-Free Plant	New facilities designed from ground up for chassis-free production	Optimal line configuration; no legacy constraints; full efficiency from opening	Highest upfront cost; longest time to market; no production during construction

Production Economics

Chassis-free floor systems will increase per-unit material cost compared to simple joist-on-rail assemblies, but eliminate the chassis steel cost — estimated at **\$800 to \$2,000 per unit** depending on home size and steel market conditions. Carrier frame transport, while adding reverse-logistics

overhead, may reduce per-shipment transport cost by reducing gross vehicle weight. The net production cost impact will depend heavily on material selection, production volume, and carrier frame utilization efficiency.

Section 8: Transport Evolution — From Road Vehicle to Building Module

The transport of a manufactured home has historically been one of the most visually distinctive and legally significant aspects of its existence. A chassis-based manufactured home traveling the interstate highway system on its own chassis — bearing an oversized-load flag and a transport axle assembly — is literally a vehicle for regulatory and insurance purposes. It is titled in most states as a motor vehicle or as a vehicle-derived personal property instrument. It is insured during transport under commercial auto or inland marine policies. It is escorted by pilot cars in the same manner as any other oversized highway load. This vehicular identity during transport has reinforced the vehicular legal identity of the home throughout its life, making it difficult to argue for real property reclassification when the home has demonstrably traveled public roads as a vehicle.

The Modular Transport Paradigm

IRC modular homes are transported in a fundamentally different legal and physical framework. A modular section is a building module — it is never titled as a vehicle, never classified as a motor vehicle for insurance or registration purposes, and never identified as a road vehicle by the transport permitting apparatus. The carrier frame that supports it during transport is a piece of equipment, not a vehicle component integrated into the building. After the section is placed on its foundation and the carrier frame is removed and driven

away, there is no vehicle associated with the home — only a building, sitting on a permanent foundation, identical in legal character to a site-built home that was framed stick by stick on the same lot.

This transport-classification distinction has significant downstream implications. The state DOT permits issued for modular transport are oversize load permits for "building modules," not vehicle registration documents. The transport carrier's liability insurance covers the structural integrity of the module during transport, but the module itself is not insured as a vehicle — it is insured as cargo. When the carrier frame is removed and the home is anchored to its foundation, the transport episode is legally complete and legally irrelevant to the home's future classification as real property.

State Transport Permit Landscape

One of the more complex near-term challenges of the chassis-free HUD home transition is the adaptation of state-by-state transport permit frameworks. Currently, most state DOT permit systems have two categories relevant to factory-built housing: manufactured home transport (chassis-based, permit issued for the home as vehicle or oversized tow) and modular transport (building module, oversized load permit for carrier-borne section). Chassis-free HUD homes will fit naturally into the modular transport category in states that have already developed modular transport permit frameworks. In states without developed modular transport infrastructure, new permit categories or explicit regulatory interpretations will be required.

The Act's implementation will create a transitional period during which the permit landscape is inconsistent across states. This patchwork risk — analogous to the state-by-state IRC code adoption patchwork that limits modular market reach — is one of the most concrete near-term regulatory challenges the industry must address through active engagement with state DOT and building code agencies.

Impact on Installation Crews

The set crew workforce — the specialized teams that transport, place, and install manufactured homes — is trained and equipped for chassis-based installation. Chassis-strap anchor systems, pier-and-beam foundation work, and marriage wall bolting referenced to chassis geometry are the core competencies of this workforce. Chassis-free installation requires a materially different skill set: anchor bolt alignment to foundation templates, rim board bolting to stem wall or slab, marriage beam splicing without chassis datum, and carrier frame removal sequencing that requires coordination with the foundation contractor. These competencies are analogous to IRC modular installation skills — a workforce segment that exists but is distinct from the HUD set crew community. Cross-training and certification programs will need to be developed and deployed at scale to support the transition.

Section 9: The HUD-to-IRC Convergence Timeline

PRE-CONVERGENCE ERA (1974–2000)

1974

National Manufactured Housing Construction and Safety Standards Act enacted — HUD Code established as the first federal preemptive building code for any housing type. Permanent chassis requirement codified as a definitional element of manufactured housing.

1976

HUD Code standards take effect on June 15. "Mobile homes" produced after this date become "manufactured homes." HUD certification label and Data Plate requirements established.

1980s

IRC modular industry develops as a parallel factory-built housing track — no chassis requirement, state-administered inspection, site-built equivalency for financing and zoning. The two tracks diverge in regulatory character and market positioning.

1990s

Chattel loan dominance: more than 80% of manufactured homes financed as personal property. Site-built home appreciation diverges sharply from manufactured home values. First systematic documentation of the wealth-building inequity created by chassis-linked personal property classification.

PRESSURE BUILDING (2000–2018)

2000

American Homeownership and Economic Opportunity Act directs HUD to modernize the HUD Code and improve financing access. MHCC established as the formal code modernization vehicle.

2008

Financial crisis collapses the manufactured housing chattel lending market; industry contracts sharply. FHFA begins examining GSE obligations to manufactured housing under the Duty to Serve framework.

2010

International Residential Code (IRC) becomes the dominant residential building code in most U.S. states, establishing the regulatory target for manufactured housing convergence and the baseline for modular equivalency.

2015–2018

Fannie Mae's MH Advantage and Freddie Mac's CHOICE Home programs launch — first GSE efforts to bring conventional financing to manufactured homes meeting enhanced design standards. Chassis requirement retained in both programs.

ACCELERATED CONVERGENCE (2018–2025)

2018

FHFA Duty to Serve mandate takes effect. GSEs required to expand manufactured housing financing. Initial MH Advantage and CHOICE Home loan volume begins.

2019–2022

HUD MHCC studies chassis-free pathways; industry working groups form. Congressional interest grows as federal housing shortage data becomes politically salient.

2022–2024

Federal housing shortage reaches 4–7 million unit deficit. Bipartisan consensus forms around factory-built housing as the primary scalable solution. Chassis requirement identified as the critical barrier to manufactured housing's full participation.

2024

Both chambers introduce companion legislation to eliminate chassis requirement. Urban Institute and National Housing Conference publish analyses estimating conventional financing access for up to 500,000 additional households annually upon chassis reform.

LEGISLATIVE INFLECTION POINT (2026)

June 2026

21st Century ROAD to Housing Act passes Senate 85–5 and House 358–32. Overwhelmingly bipartisan margins reflect the breadth of the housing supply consensus.

July 11, 2026

Act becomes law without presidential signature under the Constitution's ten-day rule. Manufactured home redefined: "built with or without a permanent

chassis." HUD rulemaking mandate established. Most significant statutory change to manufactured housing law since 1974.

POST-CONVERGENCE TRANSITION (2026–2030+, PROJECTED)

2026–2027

HUD publishes Advance Notice of Proposed Rulemaking (ANPRM) for chassis-free construction and safety standards. Industry comment period. State agencies begin transport permit framework adaptation processes.

2027–2028

HUD Proposed Rule published. Pilot programs for chassis-free HUD homes launched in select states with advanced foundation and inspection infrastructure.

2028

Projected: First chassis-free HUD-certified homes produced and placed on permanent foundations. GSE conventional financing guidelines updated to accommodate chassis-free HUD homes meeting real property criteria. IPIA inspector training programs launched.

2028–2030

State-by-state transport permit adaptation; set crew retraining; IPIA certification for chassis-free inspection protocols. Appraiser training programs developed for chassis-free HUD comparable selection.

2030 and Beyond

Projected market normalization: chassis-free HUD homes gain appraisal parity with IRC modular and site-built homes. Chattel loan dependency declines. Manufactured housing integration into residential zoning expands. Factory-built housing emerges as the primary scalable response to the national housing shortage at meaningful scale.

Section 10: Financing and Appraisal Implications

No aspect of the chassis-free transition carries greater long-term consequence for manufactured housing buyers than its financing and appraisal implications. The chassis was not merely an engineering feature; it was the legal mechanism through which manufactured homes were classified as personal property, confined to chattel lending, excluded from conventional mortgage programs, and systematically undervalued in the appraisal market. Removing the chassis removes the physical basis for that classification — though regulatory and procedural changes must follow before the financial transformation becomes real.

Personal Property vs. Real Property: The Classification Threshold

The distinction between personal property and real property in the context of manufactured housing is not merely academic; it is the line between two entirely different financial systems. A home classified as personal property is financed like a vehicle: shorter loan terms (15–20 years rather than 30), higher

interest rates, fewer consumer protections, and a depreciation trajectory that destroys rather than builds equity. A home classified as real property is financed like a house: 30-year terms, conventional mortgage rates, Fannie Mae and Freddie Mac eligibility, full consumer protection under RESPA and TILA-RESPA, and an appreciation trajectory that builds generational wealth.

The threshold for real property classification varies by state but generally requires: (1) placement on a permanent foundation; (2) title elimination — conversion of the vehicle title to a real property record; and (3) affixation documentation demonstrating the home is permanently attached to the land. Chassis-based homes faced practical barriers to meeting these criteria even when nominally placed on permanent foundations, because the chassis's continuing vehicular identity complicated title elimination in many states. A chassis-free home with no vehicular components — built on and connected directly to a permanent foundation, with a sill plate rather than a chassis as the foundation interface — has a materially cleaner path to real property classification.

Conventional Mortgage Access

Fannie Mae and Freddie Mac both require real property classification as a threshold condition for conventional mortgage purchase. For chassis-free HUD homes that meet real property criteria in their state of placement, the barriers to conventional financing are substantially reduced. The existing MH Advantage and CHOICE Home frameworks — which already contemplated enhanced-design manufactured homes and developed conventional mortgage guidelines for them — can serve as a bridge while HUD rulemaking is completed and lenders develop specific underwriting guidelines for chassis-free HUD homes.

The critical near-term task for the GSE programs is to update their eligibility frameworks to explicitly include chassis-free HUD-certified homes that meet permanent foundation and title elimination requirements — without waiting for full HUD rulemaking to complete. This update does not require new law; it requires guideline revision within the existing GSE regulatory authority.

Appraisal Transformation

One of the most persistent financial disadvantages of the manufactured housing market has been the appraisal gap — the tendency of manufactured homes to appraise below the cost of construction and below comparable site-built homes, partly because the pool of available comparable sales consists disproportionately of other manufactured homes rather than site-built homes. This self-referential comparable pool has limited appreciation and constrained the ability of manufactured home buyers to build equity.

Chassis-free HUD homes on permanent foundations — particularly those designed with site-built aesthetic features enabled by the removal of chassis height constraints — can be compared to site-built and IRC modular homes using standard appraisal methodology. This shift in comparable selection is arguably the single most powerful financial mechanism unleashed by chassis elimination. Appraiser training programs that help licensed appraisers identify appropriate comparables for chassis-free HUD homes, and that provide the regulatory and technical context needed to treat them as equivalent to site-built construction, are an essential component of the transition infrastructure.

Chattel Lending's Continuing Role

Chattel lending will not disappear with the chassis. For manufactured homes placed in land-lease communities — where the homeowner does not own the land — real property title elimination is typically impossible, and chattel or home-only loans remain the primary financing mechanism. This segment of the market, which includes a significant share of manufactured housing's lowest-income buyers, will continue to require a functioning personal property lending market. The chassis-free transition should not be understood as a displacement of chattel lending but as an expansion of real property financing access for the substantial subset of manufactured home buyers who own or purchase the land on which their home is placed.

Section 11: Zoning and Land Use Implications

The Visual Pretext for Exclusion

Exclusionary zoning against manufactured housing has taken many forms over the past 50 years: outright prohibition in residential zones, minimum square footage requirements that excluded smaller manufactured homes, aesthetic standards specifying roof pitch and exterior material requirements that chassis-based design could not meet, and design standards that explicitly or effectively required "site-built appearance." Courts and HUD have at various times found these exclusions legally problematic, but the chassis-based design constraints that produced the distinctive low-roofline, narrow-eave, single-pitch aesthetic of traditional manufactured homes gave exclusionary ordinances a plausible engineering pretext: they were regulating appearances, not discriminating against a housing type.

Chassis-free design eliminates that pretext. Without the chassis depth consuming the transport height envelope, manufacturers can produce homes with 8- and 9-foot ceilings, 6:12 to 8:12 roof pitches, wider eaves, conventional window proportions, and full-perimeter foundation profiles that are architecturally indistinguishable from site-built homes. When a chassis-free HUD-certified home sitting on a continuous perimeter stem wall with a conventional foundation appearance cannot be visually distinguished from a site-built or IRC modular home, the aesthetic basis for zoning exclusion evaporates.

Fair Housing Implications

HUD has previously argued, in administrative and legal contexts, that aesthetic-based zoning exclusions targeting manufactured housing may constitute discriminatory exclusion under the Fair Housing Act, given the demographics of manufactured housing occupants — who are disproportionately lower-income, rural, older, and include higher shares of

minority homeowners than site-built housing markets in comparable geographies. Chassis-free design removes the engineered basis for visual distinction, strengthening the Fair Housing Act argument against aesthetic exclusion by eliminating its technical justification.

Accessory Dwelling Units

One of the most immediately promising land use applications for chassis-free HUD manufactured homes is the accessory dwelling unit (ADU) market. ADUs — secondary dwelling units on single-family lots — have been legalized and encouraged at the state level across much of the country as a relatively low-disruption tool for adding housing supply in existing neighborhoods. However, many ADU programs explicitly or effectively require IRC-code-compliant construction, excluding HUD-code manufactured homes because of their chassis-based classification and the visual incompatibility of traditional manufactured home design with residential neighborhood aesthetics.

A chassis-free HUD-certified home — small in footprint, factory-built for quality and speed, placed on a permanent slab or stem wall foundation, with conventional ceiling heights and roof pitch, and eligible for real property financing — is an ideal ADU solution. The factory production advantages (weather-independent construction, quality control, production speed) are particularly valuable in the ADU context, where site access for traditional construction is often constrained and where construction time minimizes disruption to the primary residence occupants.

Section 12: The Path Forward — Industry Recommendations

The following recommendations are addressed to distinct stakeholder groups whose coordinated action will determine whether the legislative opportunity

created by the 21st Century ROAD to Housing Act is translated into lasting housing system transformation.

For Manufacturers

- Begin engineering review of chassis-free floor system options immediately, parallel to — not contingent on — the completion of HUD rulemaking. The engineering solutions are known; the regulatory framework will follow. Manufacturers who begin engineering development now will have a significant competitive advantage when HUD rulemaking creates a certified pathway.
- Pilot one product line for chassis-free production before HUD rulemaking completes — in coordination with a willing IPIA and under applicable state building code authority if necessary — to develop production process knowledge and identify design-out issues before they are encountered at scale.
- Invest in carrier frame inventory and develop relationships with set crew contractors willing to develop chassis-free installation competencies. The installation supply chain is a critical path item; manufacturers who lead this development will build durable competitive advantage.
- Engage actively and technically in HUD's ANPRM and proposed rulemaking comment periods. The chassis-free standards HUD promulgates will govern the industry for decades; manufacturers have the engineering knowledge necessary to shape those standards toward practical, cost-effective, and structurally sound outcomes.

For Regulators (HUD, State Agencies)

- Prioritize the development of clear, nationally consistent chassis-free transport classification rules in coordination with state DOT agencies. A 50-state patchwork of transport permit categories will create market fragmentation that slows the transition and adds cost without adding safety.
- Develop and fund IPIA inspector training and certification programs for chassis-free inspection protocols as an early rulemaking priority, before chassis-free production begins, so the inspection infrastructure is ready when the first chassis-free homes are produced.
- Align new HUD chassis-free standards with IRC modular inspection procedures where technically appropriate. Divergence between HUD and IRC inspection requirements for structurally equivalent systems serves no safety purpose and adds regulatory overhead that limits the cost-competitiveness of chassis-free HUD homes relative to their IRC modular alternatives.
- Establish a pilot program allowing chassis-free HUD homes to be produced and placed before final rulemaking is complete, under engineering-based interim standards, to develop real-world performance data that can inform the final rule.

For GSEs and Lenders

- Update conventional mortgage eligibility guidelines to include chassis-free HUD homes on permanent foundations meeting real property criteria — without waiting for full HUD rulemaking. Use the existing MH Advantage and CHOICE Home frameworks as a bridge, extending real property mortgage eligibility to chassis-free HUD homes that meet permanent foundation and title elimination requirements.

- Develop appraiser training programs for chassis-free HUD home comparable selection. The appraisal community needs guidance on how to identify site-built and IRC modular comparables for chassis-free HUD homes, and how to apply the standard site-built appraisal methodology to a new category of home that is legally and physically equivalent to site-built construction.
- Maintain and strengthen the chattel lending market for land-lease placements. The financing transformation made possible by chassis removal should not come at the cost of eliminating the only financing available to the most economically vulnerable segment of manufactured housing buyers.

For Developers and Builders

- Evaluate chassis-free manufactured homes as a cost-competitive alternative to IRC modular in markets where delivery cost, production speed, and national code uniformity are key variables. The HUD Code's national preemptive character — which eliminates the state-by-state code variation that limits IRC modular market reach — will be a significant structural advantage for chassis-free HUD homes in multi-state deployment strategies.
- Engage with set contractors now on foundation-ready installation capability development. Developers planning to incorporate chassis-free HUD homes into their project pipelines will need a capable installation contractor base — and that base will not develop without developer-side market signals and partnership investment.

For Policymakers

- Fund HUD rulemaking with dedicated appropriations to accelerate the timeline. The Act's rulemaking mandate creates the legal obligation; funding determines the speed. Every month of rulemaking delay is a month that the financing transformation enabled by chassis elimination is deferred.
- Incentivize state adoption of uniform transport permit frameworks for chassis-free sections, potentially through FHWA administrative guidance or through model legislation developed collaboratively with NCSL and state DOT associations.
- Include chassis-free manufactured housing explicitly in ADU, missing middle, and workforce housing policy frameworks at the federal, state, and local levels. The policy ecosystem that supports housing supply expansion needs to be updated to reflect the new reality of chassis-free HUD homes as full participants in the residential construction market.

Section 13: Conclusion

The manufactured housing industry is undergoing the most significant structural and regulatory transformation since the passage of the National Manufactured Housing Construction and Safety Standards Act of 1974. That Act created the regulatory framework that defined the industry for more than half a century — including the permanent chassis requirement that became simultaneously its structural identity, its legal classification, and its financial constraint. The 21st Century ROAD to Housing Act of 2026 has dismantled that constraint with the force of law, opening a path that the industry, the regulatory apparatus, the financial system, and the land use framework must now collectively navigate.

The chassis was never, in principle, a feature of good housing. It was a regulatory artifact — a practical solution to the engineering problem of transporting a dwelling on public roads, enshrined in law because it provided a convenient point of inspection and enforcement continuity. Over time, as the industry's products grew in size and permanence and as the aspiration of manufactured home buyers shifted from mobility to stability and equity, the chassis became less a feature and more a constraint: a structural commitment to vehicular identity that foreclosed full participation in the real property system.

Chassis-free HUD manufactured homes represent the convergence of two parallel factory-built housing traditions that have existed in productive tension for more than four decades. The HUD tradition brought national scale, production efficiency, a uniform federal standard, and a cost point accessible to lower- and moderate-income buyers. The IRC modular tradition brought structural rigor equivalent to site-built construction, financing access, appraisal parity, and zoning inclusion. Neither tradition, on its own, was capable of fully addressing the national housing shortage — one lacked the financial infrastructure, the other lacked the scale. The convergence of these traditions, enabled by the elimination of the chassis requirement, creates the possibility of a factory-built housing system that is simultaneously national in scale, site-built in structural and financial equivalency, and accessible in cost to the buyers who need it most.

Whether that possibility is realized depends on execution. The engineering challenges are real but solvable. The production retooling is expensive but manageable. The regulatory adaptation is complex but precedented — the IRC modular industry has navigated analogous transitions. The financing transformation is profound but clearly directed. The industry's ability to execute this transition — across engineering, production, transport, regulation, and financing — will determine whether the legislative moment of July 11, 2026, translates into lasting housing opportunity for the millions of Americans who have been underserved by both the factory-built and site-built housing markets for too long.

The convergence of HUD and IRC construction pathways is not the end of manufactured housing's distinct identity — it is the beginning of manufactured housing's full participation in American residential life.

Appendices

Appendix A: HUD Code vs. IRC Modular — Comprehensive Comparison

Category	Dimension	HUD Code (Manufactured)	IRC Modular (Factory-Built)
Regulatory	Code Authority	Federal (HUD) — preemptive, 24 CFR 3280	State building code (IRC or state variant)
	Federal Preemption	Yes — supersedes state/local building codes	No — state and local codes fully apply
	Inspection Authority	HUD-approved IPIA (In-Plant Inspection Agency)	State-certified third-party inspection agency
	Design Approval	DAPIA (Design Approval Primary Inspection Agency)	State plan review or state-approved agency
	Certification Label	HUD certification label ("red tag") + Data Plate	State modular label; local

Category	Dimension	HUD Code (Manufactured)	IRC Modular (Factory-Built)
			building permit final
Structural	Chassis Requirement	Eliminated (2026 ROAD to Housing Act)	Never required
	Foundation Options	Now: full range (slab, crawl, stem wall, basement)	Full range always available
	Wind Design Standard	HUD Wind Zones I / II / III	ASCE 7 wind maps; IRC Chapter 3
	Energy Standard	HUD Thermal Zones A / B / C; MHCC-updated	State-adopted IECC edition
Financial	Property Classification	Historically personal property; chassis-free enables real property	Real property upon foundation placement
	Financing Type	Chattel loans (historically dominant); conventional mortgage pathway opening	Conventional mortgage; same as site-built
	GSE Eligibility	MH Advantage / CHOICEHome (enhanced programs); expanding	Standard Fannie/Freddie guidelines
	Appraisal Comparable Pool	Historically MH-only; chassis-free enables site-built comparables	Site-built comparable pool; full parity

Category	Dimension	HUD Code (Manufactured)	IRC Modular (Factory-Built)
Land Use	Zoning Treatment	Often separately zoned or excluded; improving with chassis-free design	Equivalent to site-built; any residential zone
	ADU Eligibility	Historically limited; chassis-free may unlock in many jurisdictions	Generally eligible under state ADU laws
Transport	Transport Classification	Historically vehicle transport; chassis-free: building module transport	Building module transport (oversize load)
	Carrier System	Chassis-free: removable carrier frame (same as modular)	Removable carrier frame; hydraulic trailer

Appendix B: Chassis Removal Engineering Checklist

FLOOR SYSTEM

- ☐ Select self-supporting floor system (CLT, SIP floor, LVL/LSL cassette, or advanced engineered wood)
- ☐ Design perimeter rim board and blocking for continuous bearing at foundation contact points
- ☐ Verify floor deflection criteria: L/360 live load, L/240 total load across full section width
- ☐ Design carrier frame attachment bolt patterns into floor cassette perimeter framing
- ☐ Specify pressure-treated or code-compliant bottom plate for direct foundation contact

- ☐ Incorporate anchor bolt template into bottom plate for foundation pre-drilling coordination
- ☐ Design plumbing, electrical, and HVAC crossover routing for chassis-free (no below-deck chassis void space)

TRANSPORT SYSTEM

- ☐ Specify carrier frame type, span, and load capacity for each home model
- ☐ Verify carrier frame attachment detail matches floor cassette bolt pattern and blocking
- ☐ Confirm transport envelope (width, height, length) within state DOT permit limits for intended delivery routes
- ☐ Verify that chassis-free height reduction enables wall height upgrade within transport envelope
- ☐ Develop carrier frame removal sequencing protocol for installation crew
- ☐ Confirm transport insurance and warranty coverage for carrier frame (non-chassis) transport model
- ☐ Coordinate with state DOT for applicable transport permit category (modular vs. manufactured)

FOUNDATION INTERFACE

- ☐ Select foundation type (slab, crawl space, stem wall, basement) appropriate for site conditions and wind zone
- ☐ Design anchor bolt size and spacing for HUD Wind Zone requirements (I, II, or III)
- ☐ Design shear wall layout for lateral wind and seismic load transfer at foundation interface
- ☐ Coordinate anchor bolt template with foundation contractor before pour
- ☐ Specify sill plate-to-foundation connection detail (anchor bolt, sill sealer, moisture barrier)

- ☐ Document foundation requirements in installation manual for IPIA review and site contractor use

MULTI-SECTION MATING (DOUBLE-WIDE / TRIPLE-WIDE)

- ☐ Design marriage beam (LVL or steel flitch plate) for full tributary floor and roof loads at marriage line
- ☐ Specify marriage beam splice detail and bolting pattern for site connection
- ☐ Design roof ridge splice at marriage line for full span loads
- ☐ Develop section alignment protocol using foundation bearing pads and laser leveling (without chassis datum)
- ☐ Document marriage wall connection sequence and torque specifications in installation manual
- ☐ Coordinate section delivery sequencing with carrier frame removal timing

Appendix C: Key Legislative and Regulatory Milestones (1974–2030)

Year	Milestone	Significance
1974	National Manufactured Housing Construction and Safety Standards Act	First federal preemptive building code for any housing type; chassis requirement codified
1976	HUD Code takes effect (June 15)	"Mobile homes" become "manufactured homes"; HUD label and Data Plate requirements begin
1980	Housing and Community Development Act	Codifies "manufactured home" terminology in federal law
2000	American Homeownership and	Directs HUD Code modernization; establishes MHCC framework

Year	Milestone	Significance
	Economic Opportunity Act	
2008	Housing and Economic Recovery Act (HERA)	Establishes Duty to Serve mandate for GSEs; FHFA authority expanded
2015	Fannie Mae MH Advantage launch	First GSE conventional mortgage program for manufactured homes with site-built design features
2018	FHFA Duty to Serve takes effect; Freddie Mac CHOICE Home launch	GSEs operationalize manufactured housing financing expansion programs
2024	Urban Institute / National Housing Conference analyses on chassis reform	Quantified conventional financing access potential: up to 500,000 additional households annually
July 11, 2026	21st Century ROAD to Housing Act enacted	Chassis requirement eliminated; manufactured home redefined "with or without a permanent chassis"
2026–2027 (projected)	HUD ANPRM for chassis-free standards	Industry comment period opens; formal rulemaking process begins
2027–2028 (projected)	HUD Proposed Rule published	Draft chassis-free construction and safety standards available for final comment
2028 (projected)	First chassis-free HUD homes certified and placed	Historic first: HUD-certified manufactured homes on permanent foundations without chassis

Year	Milestone	Significance
2028 (projected)	GSE guideline update for chassis-free HUD homes	Conventional mortgage financing available for qualifying chassis-free manufactured homes
2030+ (projected)	Market normalization	Appraisal parity, zoning inclusion, and conventional financing become standard for chassis-free HUD homes

Appendix D: Glossary of Key Terms

Carrier Frame: A reusable steel sub-frame used to transport a chassis-free manufactured or modular home section. The carrier frame attaches to the home's floor system at engineered bolt points, interfaces with transport trailer systems, and is removed by the installation crew after the home is placed on its permanent foundation. Unlike a chassis, the carrier frame is not a component of the home — it is a transport tool that is returned to the factory or transport contractor after each delivery.

Chattel Loan (Home-Only Loan): A personal property loan used to finance a manufactured home that is titled as personal property rather than real property. Chattel loans typically carry higher interest rates, shorter terms, and fewer consumer protections than real property mortgages. The median chattel loan rate for manufactured homes in 2024 was approximately 9.5%, compared to 7.88% for real-property manufactured home mortgages.

Chassis (Permanent Steel Chassis): The fabricated rigid steel substructure on which a traditionally manufactured home is constructed. Typically composed of longitudinal I-beams or C-channels and lateral outrigger members, the chassis provides structural support during transport and serves as the foundation interface for chassis-based homes. The 21st Century ROAD to Housing Act (2026)

eliminated the requirement that HUD-code manufactured homes be built on a permanent chassis.

DAPIA (Design Approval Primary Inspection Agency): A HUD-approved entity that reviews and approves manufactured home designs before production begins. The DAPIA verifies that the design meets HUD Code requirements and issues design approval for each home model. All manufactured homes must be produced under a DAPIA-approved design.

Data Plate: A certificate affixed inside each HUD-code manufactured home (typically in a kitchen cabinet or electrical panel) containing the home's HUD certification information, including wind zone rating, thermal zone, roof load zone, serial number, and date of manufacture. The Data Plate is a required document for financing, insurance, and resale transactions.

HUD Code: The National Manufactured Housing Construction and Safety Standards (24 CFR Part 3280), administered by the U.S. Department of Housing and Urban Development. The HUD Code is a federal preemptive building standard — the only federal building code for any category of residential construction in the United States — that supersedes state and local building codes for manufactured homes.

IRC (International Residential Code): The model residential building code published by the International Code Council (ICC), adopted with local amendments by most U.S. states. IRC governs site-built single-family and two-family residential construction. IRC modular homes are factory-built homes constructed to the IRC (or state-adopted equivalent) of the state of destination, inspected at the factory by a state-certified third-party agency, and treated as equivalent to site-built construction for all regulatory purposes.

IPIA (In-Plant Inspection Agency): A HUD-approved entity that conducts ongoing inspections of manufactured home production facilities to verify compliance with HUD Code construction standards. The IPIA inspects production processes, materials, and completed homes before the HUD

certification label is affixed. Each manufactured home production facility must be monitored by a HUD-approved IPIA.

Marriage Wall: The shared interior wall between two sections of a multi-section (double-wide or triple-wide) manufactured home. The marriage wall is constructed in both sections at the factory and mated on-site during installation. In chassis-based construction, the chassis geometry governs the alignment and mating of marriage walls. In chassis-free construction, marriage wall alignment requires engineered marriage beam systems and foundation-referenced alignment procedures.

MHCC (Manufactured Housing Consensus Committee): A federal advisory committee established under the American Homeownership and Economic Opportunity Act of 2000 to provide recommendations to HUD for updates to the HUD Code. The MHCC is composed of representatives of manufacturers, installers, retailers, consumer advocates, regulators, and other stakeholders, and meets periodically to develop consensus-based code modernization recommendations.

Personal Property: The legal classification of a manufactured home when it is titled as a movable asset — analogous to a vehicle — rather than as real estate. Personal property classification results in chattel financing, higher interest rates, and exclusion from conventional mortgage programs. The chassis-based identity of traditional manufactured homes was the primary mechanism linking manufactured homes to personal property classification.

Real Property: The legal classification of a home that is permanently affixed to land and titled as real estate. Real property classification enables conventional mortgage financing, Fannie Mae and Freddie Mac eligibility, standard appraisal methodology using site-built comparables, and appreciation as part of the real estate market. Chassis-free manufactured homes on permanent foundations with title elimination can qualify as real property under applicable state law.

Wind Zone (HUD): One of three geographic categories used in the HUD Code to specify minimum wind resistance design requirements for manufactured

homes: Wind Zone I (standard, 70 mph design wind speed), Wind Zone II (hurricane-coastal areas, 100 mph), and Wind Zone III (highest hurricane exposure areas, 110 mph). Wind zone requirements govern structural design, anchoring systems, and glazing specifications. Each manufactured home must be certified for the wind zone of its intended installation location.

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