

**THE
ARCHITECTURAL
ANATOMY
OF A
TINY HOUSE ON
WHEELS**

A LOOK INTO THE QUALITY OF A
CAHILL WORKS HOME

THE SCIENCE OF THE BUILD

A home is more than an aesthetic; it is a complex assembly of systems designed to protect and perform. Understanding the quality of a Cahill Works Tiny House on Wheels requires looking into the architectural anatomy that ensures structural longevity, safety, and thermal efficiency.

The Foundation

The build begins with the **Trailer Frame**, an engineered foundation of **100% Tube Steel** for maximum torsional rigidity. Unlike C-channel frames, tube steel resists twisting under load. **Full-contact welds** ensure structural cohesion, fusing members into a solid, monolithic unit. By avoiding spot welds and bolts (which can weaken and become loose over time), Cahill Works provides a connection that withstands transportation vibrations while mitigating torsion.

The Thermal Envelope

The **Thermal Break** is the primary defense against energy loss and moisture. Because steel conducts heat 400x faster than wood, no part of the home's wood framing directly contacts the trailer's steel.

This begins by lining the trailer with **1/2" Foam Panels** (R-2) to reduce energy transfer. The subfloor is built with **2x6 Joists at 16" O.C.** (On Center) supporting **23/32" OSB TNG** (Oriented Strand Board, Tongue and Groove). While 24" spacing is standard for this thickness, our 16" O.C. layout provides superior support, reducing bowing and age-related creaks.

The subfloor frame and wall assembly are secured with **5/8" Bolts** run through the trailer frame. To ensure structural unity, Cahill Works employs **HTT5 Tension Ties** (heavy-duty hold-downs). These connectors link the vertical wall studs directly to the foundation bolts, creating a continuous load path that prevents the structure from shifting or lifting. To prevent these bolts from acting as thermal bridges, Cahill Works uses **Closed Cell Spray Foam (CCSF)** to eliminating the condensation that feeds mold spores.

Where the subfloor extends over the trailer steel, a high-density **Insulation Mat** is used. This mat acts as a structural insulator, providing high compression

resistance and low thermal conductivity. The final layer is **Sill Seal**, a compressive gasket (a material designed to be squashed between two surfaces to create an airtight and watertight seal) between the floor and wall plates. These materials, paired with **R-23 Rockwool**, create a complete Thermal Break.

The Roof Assembly

The roof uses **7/16" OSB sheathing** over **2x8 Rafters at 24" O.C.** to accommodate **R-30 Rockwool**. This system provides a live load capacity exceeding 130 lbs per square foot—7x stronger than standard residential requirements. Rafters are secured via **Hurricane Ties** (metal connector plates) or **TimberLok** (heavy-duty structural fasteners), when combined with frieze blocking (horizontal framing between rafters), creates a securely interlocked structure.

The roofing is **24 ga Steel PBR Panels** (Purlin Bearing Rib). This profile is engineered for higher wind loads and optimized moisture shedding compared to standard corrugated metal. This ensures the roof remains a rigid, weather-tight shield capable of withstanding the dynamic stresses of highway travel.

Rockwool: More than Insulation

Rockwool is a Mineral Wool Insulation made from volcanic rock spun into dense fibers. It is utilized for its thermal efficiency (insulation), acoustic density (noise reduction), and fire resistance. Unlike fiberglass, Rockwool is water-repellent and retains its shape without deflating or compressing over time, ensuring a permanent, mold-resistant insulation layer.

Advanced Moisture Management

Cahill Works utilizes **ZIP Sheathing** as both a structural panel and an integrated **Weather Barrier** (Weather Resistant Barrier or WRB). This creates a seamless, airtight seal that outperforms traditional house wraps. On the roof, we apply **SharkSkin Underlayment** for **100% full-coverage Ice and Water** protection.

The custom **Aluminum Windows** feature **Double Panes of Tempered Glass** pumped with **Argon** (an inert gas) for enhanced insulation. Each **Rough Opening (RO)** is taped and treated with **Liquid Sealant** (silicone)

before the window **flanges** are taped for a triple-redundant, waterproof installation. **CCSF** is used to fill the RO, which prevents drafts.

Floor and Cladding

The **Maple engineered hardwood** is over a **waterproof underlayment** to ensure durability and longevity. Exterior cladding includes **Steel or Cedar siding**, which are **WUI approved** (Wildland-Urban Interface) to provide fire resistance. The **Natural Cedar interior** walls serve a dual purpose: providing a signature aesthetic (looks and scent) while naturally regulating humidity and deterring pests.

Structural Cross-Section



The science of the build is found in the synergy of these systems. While the visual and olfactory aesthetics provide immediate comfort, it is this underlying framework that delivers true structural longevity. By looking beyond the finish, one finds a high-performance environment engineered to protect and perform.

Cahill Works

Tiny House on Wheels



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