INNOVAPANEL

5-Story Residential Feasibility Case Study

A lightweight structural wall strategy for high-performance buildings, apartments, and resilient housing.

Designed around 8 ft spans Ready Joist floor framing limits tributary gravity load to roughly 4 ft at exterior bearing walls.	80% solid wall target Impact glazing limited to 20% wall area preserves shear-wall continuity and load path.	High-performance shell MGO walls, MGO roof panels, MGO floor sheathing, and fire-rated floor underside create a resilient envelope.

Engineering Feasibility Summary

Based on the provided concept, InnovaPanel is a strong candidate for evaluation as the primary load-bearing exterior and/or corridor wall system in a five-story residential apartment building. The concept is materially different from a conventional SIP or non-structural insulated panel: the tested wall panel acts as a composite structural wall with axial, shear, and drift resistance. The proposed short-span cold-formed steel floor system further improves feasibility by keeping gravity reactions predictable and relatively low.

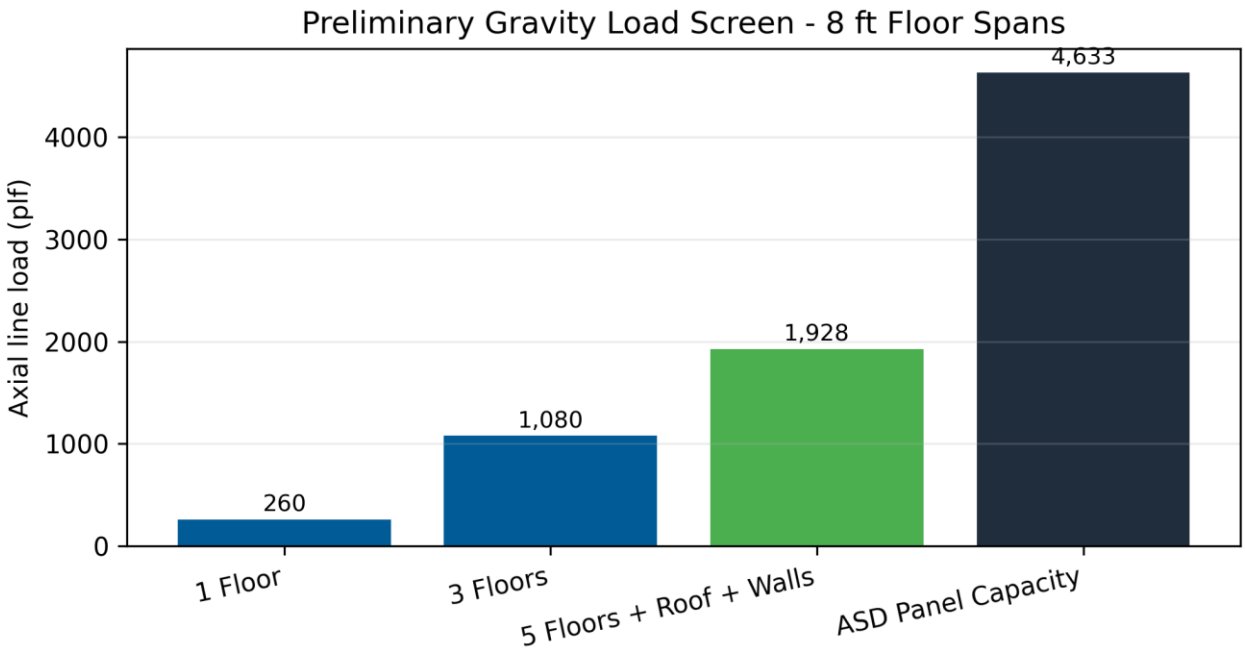
Concept Basis Used for Preliminary Screening

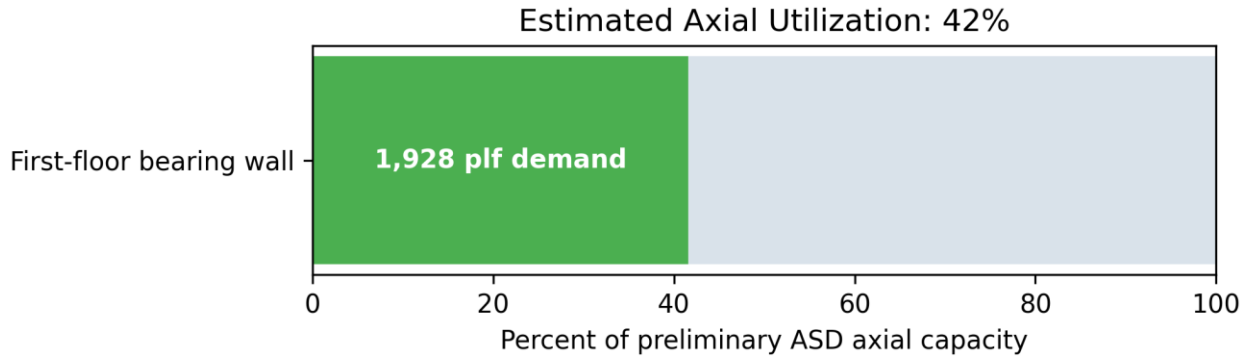
Design Input	Preliminary Assumption / Value
Building type	5-story residential apartments; modern square form
Floor framing	14 ga / 16 ga ClarkDietrich TradeReady / Ready Joist type floor system; 8 ft spans
Floor sheathing	3/4 in ResCom / MGO shiplap structural floor sheathing, final diaphragm rating by supplier/engineer
Ceiling/fire underside	Double 5/8 in Type X / firecode gypsum board below floor assembly
Roof system	8 in InnovaPanel MGO roof panels
Wind basis	150 mph design wind concept; final ASCE 7 pressures by project site/exposure
Openings	Impact-resistant glazing; no more than 20% wall area
Test-based InnovaPanel value used	ASD shear/axial screen: 4,633 plf derived from average ASTM E72 ultimate value with FS=3

Preliminary Gravity Load Calculation

With 8 ft floor spans, the exterior wall tributary width is approximately 4 ft. This is the key reason the five-story concept deserves serious engineering review.

Item	Calculation	Result
Floor service load	(25 psf dead + 40 psf live) x 4 ft tributary width	260 plf per floor
Roof service load	(12 psf dead + 20 psf roof live) x 4 ft tributary width	128 plf
Wall self-weight	10 psf x 10 ft story height x 5 stories	500 plf
First-story cumulative screen	5 floor levels + roof + wall self-weight	1,928 plf
Panel ASD comparison	Estimated demand / 4,633 plf preliminary panel value	42% utilization

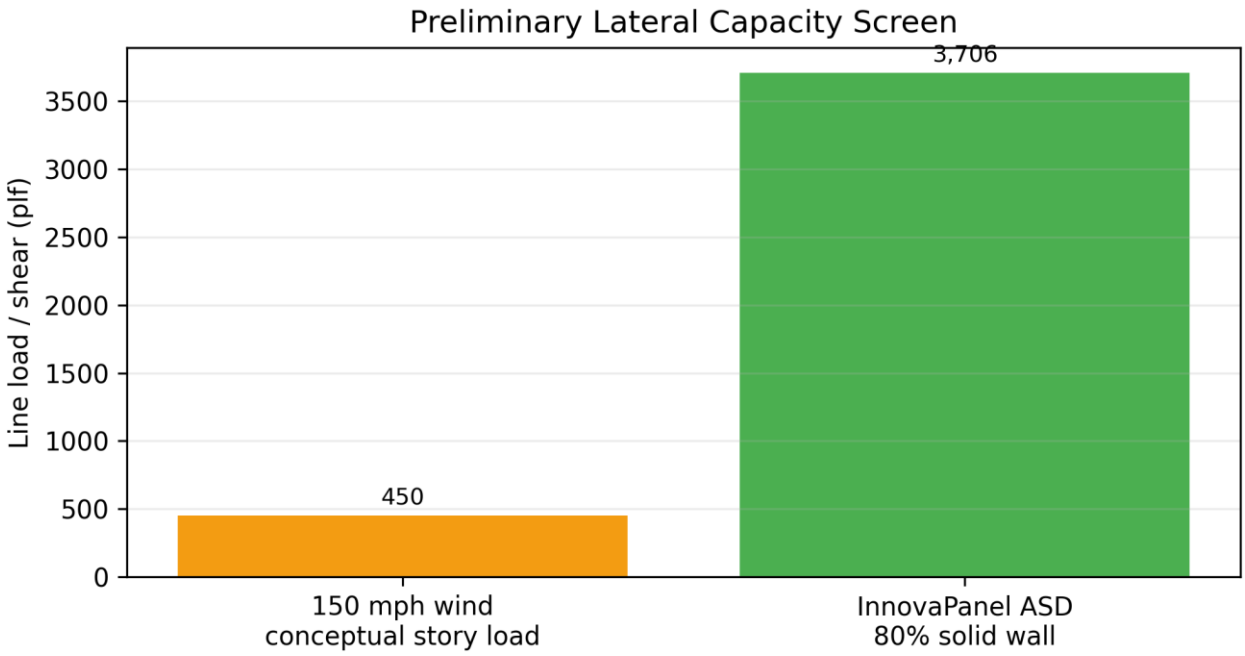




Preliminary 150 mph Lateral Load Screen

For a concept-level comparison, a 150 mph wind produces a raw velocity pressure q = 0.00256V^2 = approximately 57.6 psf before project-specific ASCE 7 coefficients, exposure, height, enclosure classification, internal pressure, and component/cladding effects. For a simplified story screen, using a 45 psf service-equivalent wall pressure over a 10 ft story creates about 450 plf of story line load. With only 20% openings, the remaining 80% solid wall provides roughly 3,706 plf of preliminary ASD shear capacity before project-specific reductions. This indicates that global lateral strength may be feasible, while overturning, hold-downs, diaphragm transfer, and connection detailing will likely govern.

Item	Calculation	Result
Raw 150 mph velocity pressure	0.00256 x 150^2	57.6 psf
Simplified story load screen	45 psf x 10 ft story height	450 plf
Effective solid-wall capacity	4,633 plf x 80% solid wall factor	3,706 plf
Capacity / demand screen	3,706 / 450	8.2x conceptual story screen



How InnovaPanel Works as a Structural Load-Bearing System

Composite compression wall, not a loose panel

The MGO faces, EPS core, and internal reinforcement work together as a wide composite compression element. Instead of concentrating all gravity load into isolated studs, the wall section can distribute load across the panel width when connections and bearing details are engineered correctly.

Stressed-skin shear wall behavior

The MGO facings act as continuous skins that resist in-plane tension/compression and transfer shear. The core stabilizes the skins and helps maintain separation, increasing stiffness and reducing drift.

Box-section wall efficiency

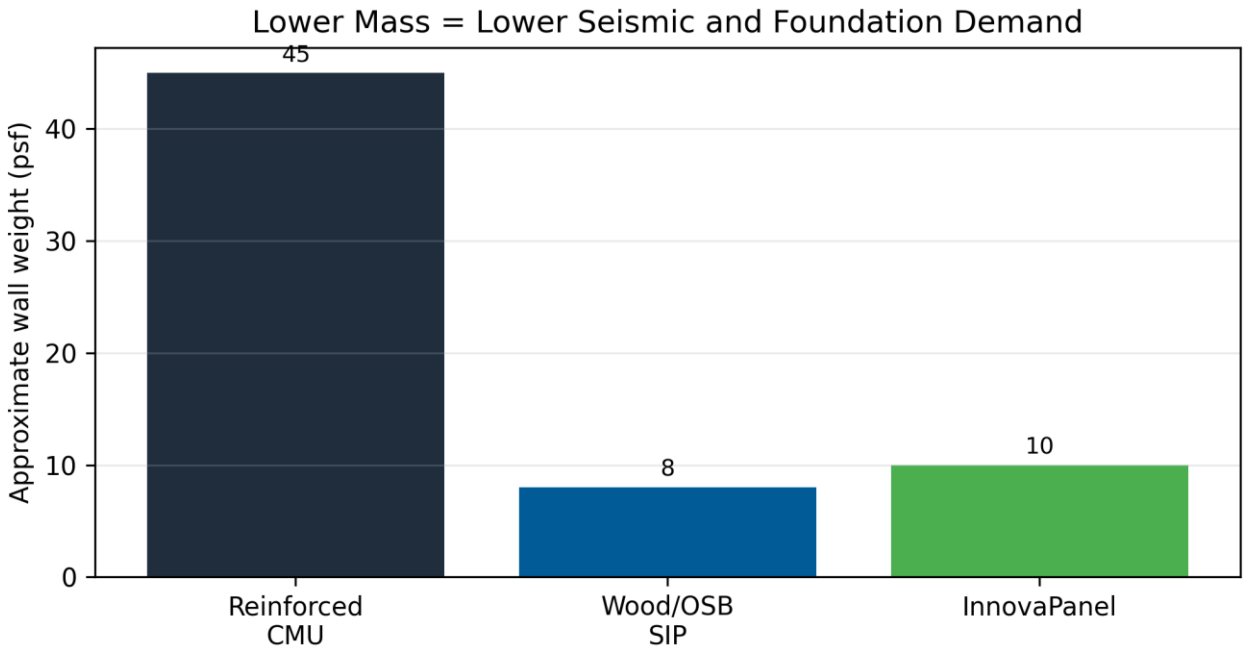
Separating the structural skins through the core increases section depth and improves stiffness-to-weight performance. This is the same principle used in box beams, torsion boxes, and other lightweight composite structures.

Ready Joist + MGO deck synergy

Short-span cold-formed steel joists deliver gravity loads at predictable bearing lines. The MGO shiplap floor sheathing can be developed as a diaphragm/subdiaphragm, subject to fastener testing, diaphragm values, and engineer-approved detailing.

Why This Matters Compared with Reinforced Masonry

Design Issue	Reinforced CMU Approach	InnovaPanel Case-Study Advantage
Dead load	Typically 40-50 psf wall weight	Approx. 8-12 psf wall weight; lower seismic mass and foundation demand
Thermal shell	Requires added insulation and furring	Structure + insulation + sheathing/substrate in one assembly
Labor	Block laying, grout, rebar, curing, scaffolding	Panelized installation reduces skilled masonry labor demand
Storm design	Strong but heavy; openings and reinforcement drive detailing	High stiffness, impact glazing strategy, continuous load path, reduced overturning mass
Speed	Weather and trade sequencing sensitive	Precut, numbered, repeatable installation for apartments and production housing



Required Engineering Path Before Permitting

- Project-specific ASCE 7 wind analysis for 150 mph exposure, enclosure classification, roof zones, and component/cladding pressures.
- Full axial load schedule by wall line, including live-load reduction where permitted, bearing length, eccentricity, and cumulative load effects.
- Floor diaphragm design using the specific MGO shiplap sheathing, fastener schedule, blocking, chord/collector forces, and drag struts.
- Connection testing/details for floor-to-wall, panel-to-panel, roof-to-wall, hold-downs, anchors, splines, and concentrated loads around openings.
- Fire-resistance assembly documentation for bearing walls, floor/ceiling assemblies, shafts, corridors, and exterior wall rating requirements.
- Openings and shear pier design confirming the 20% maximum glazing strategy by elevation and wall line.
- Progressive load path review for balconies, stair/elevator cores, corridors, MEP penetrations, and discontinuous walls.

Applicability Beyond Five Stories

The same design logic scales down very well to single-family homes, townhomes, ADUs, low-rise apartments, coastal housing, hotels, workforce housing, and repeatable multifamily plans. The strongest use case is a clean, regular building form with aligned openings, short floor spans, continuous bearing walls, and a direct roof-to-foundation load path.

Source Notes and Engineering Caution

This document is a preliminary feasibility case study, not a sealed structural design. The InnovaPanel values are based on prior ASTM E72 test summaries provided by InnovaPanel. ClarkDietrich publishes TradeReady steel joist span/load tables and product data; final joist selection must use the latest ClarkDietrich tables and project loads. Industry SIP references show that ASTM E72 test data and evaluation reports are commonly used to support engineered SIP design values, but project-specific code approval is still required.

Key external references reviewed: ClarkDietrich TradeReady Steel Joist product information and load tables; ClarkDietrich 2024 floor joist span table notes; CED Engineering SIP residential wall system summary; Insulspan SIP design charts/evaluation report examples.