

Scandinavian ESG LTD



Affordable Housing Framework
and Discovery

Scandi ESG provides a technology system and services that enable the sustainable construction of affordable housing around the world.

Developers, contractors, NGOs, and governments prefer the Scandi ESG System for its efficient, flexible, and scalable application to the sustainable construction of affordable housing. Scandi ESG LTD enables sustainable development through green building, local capacity building, design and a variety of value-added services to impact sixteen of the seventeen sustainable development goals - set by the United Nations.

Together, Scandi ESG LTD, developers, and contractors, can optimize their affordable housing projects through a single system to:

- Ensure access to adequate, safe, and affordable housing
- Provide access to sustainable infrastructure
- Reduce inequalities with local capacity building
- Preserve natural resources & reduce waste
- Support positive economic, social, & environmental links to sustainable urbanization

Ultimately, this integrated approach enables our customers to build safe, resilient and ecologically-friendly communities that foster a long-lasting impact environmentally, economically and socially for all.



Since its inception with we share a goal with the World Economic Forum:

"Our goal is to provide developers with a faster and more accessible way to build sustainable communities."

Scandinavian ESG Building System



We believe that sustainable communities transform lives

SYSTEM Components

Innovative Technologies

All-In-One Concrete Machine

Our proprietary machine is an all-in-one solution for concrete production on any job site. The portable machine can produce up to 25 m³ of concrete per hour, with vertical capabilities, at a variety of density settings and locations. These settings allow the machine to be used for a multitude of infrastructure and building applications across a project.

By producing the primary construction material on-site, developers and contractors can significantly reduce overall cost while exceeding the quality standards of most other construction technologies.

Proprietary Concrete

The CLC concrete produced by each machine easily flows into a monolithic formwork structure and cures to a workable condition within 24 hours. The end result is fire resistant, highly insulated, hydrophobic, and earthquake-resistant concrete structures. CLC concrete also eliminates the need for coarse aggregate, which further reduces the volume of raw materials required for production.

Modular, Lightweight, Formwork

A series of lightweight and interlocking formworks fit seamlessly into this systematized approach. By allowing houses to consist of a single monolithic structure, units feature greater durability, strength, water-resistance, and insulation than those constructed using traditional methods. Additionally, this formwork is recyclable and reusable hundreds of times, further offsetting waste and cost of materials for each housing unit



Figure 1.1



- 1.Slab Forming Teams
- 2.Slab Pouring Teams
- 3.Wall Forming Team
- 4.Wall Pouring Team
- 5.Removal & Cleaning Team
- 6.Roofing Teams
- 7.Finishing Teams

METHODOLOGY

A Scalable & Systemized Approach

Capacity Building

All construction operations are guided and standardized by an EchoStone Implementation Framework. This framework ensures the efficiency and quality of operations, outlines a “train-the-trainer” approach (Figure 1.1), and most importantly clearly states the requirements of creating a safe working environment for all employees. In collaboration with developers and contractors, this framework is fitted for each project and region, with our system technology as the foundation.

Economic Development

Better housing is known to generate greater economic growth, both through direct job creation in infrastructure and through the stimulation of secondary mortgage markets.

The EchoStone system maximizes the use of locally sourced labor and materials throughout the construction process. Additionally, all in-country operations are handled by development partners who provide local labor, knowledge, and market expertise.

Sustainable Impact

Each implementation of the EchoStone system requires a focus on impact. Working with developers and contractors, the EchoStone team provides a localized operations plan, technical support, and consulting services to promote efficiency and stimulate the housing value chain.

Although it is our focus, the EchoStone system is much more than green building. It promotes a demand for dignified affordable housing and produces structures that allow citizens to build financial security.

Cities around the world are growing exponentially, but such expansion comes with climate repercussions.



*Almost
3 million
metric tons of CO2
are emitted in its
manufacture each
year.*

*Overall, the
construction sector
represents
39%
of global greenhouse
gas emissions*

Innovation is needed to sustainably build the millions of homes needed around the world

As professionals, what do we want from innovative construction technologies and methods?

Reduce costs?

Improve quality?

Increase the speed of construction?

Improve sustainability and environmental performance?

Obtain favorable financing?

Start by understanding the housing value chain

Who are the stakeholders and what role do they play in supporting technology and innovation?

Technology Providers

Local Suppliers of Building Materials

Investors

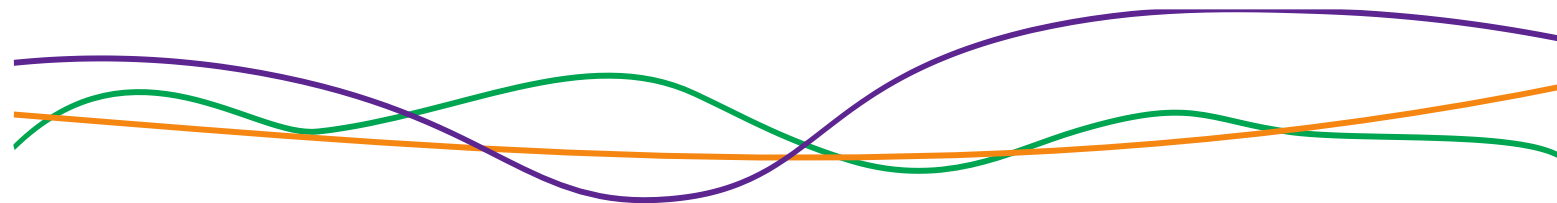
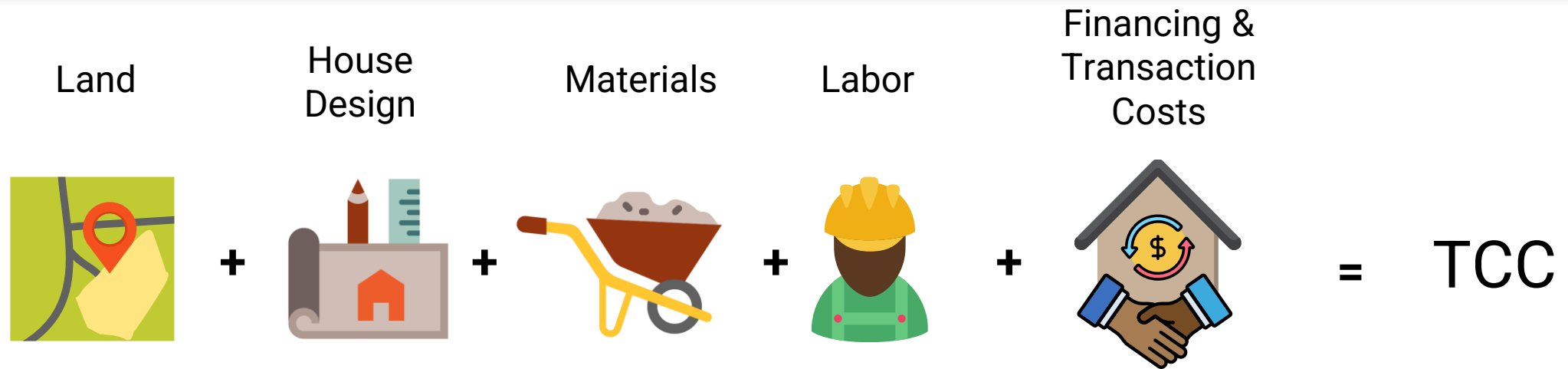
Banks

Mortgage Lenders

Governments

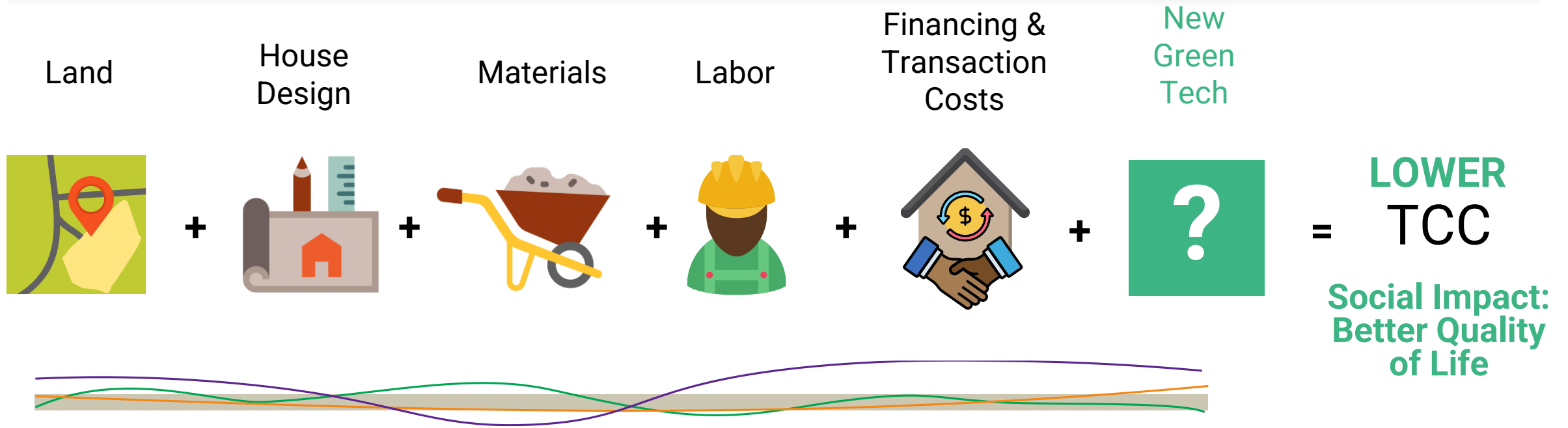
Developers and Subcontractors

Traditional variables that establish Total Construction Costs



Turbulence can affect Total Cost of project

New green technologies can help reduce cost turbulence



CIMAV Research: Hot Climate Projections to 2050 and the benefit of CLC Concrete

CIMAV results show that if the conventional concrete blocks continue to be used, the air conditioning energy requirements will increase to **49% for 2030** and **61% by 2050**.

According to CIMAV, if proposed **CLC** (cellular lightweight concrete) **could reduce energy consumption** between **15% and 28%**, and these saving rates would remain in the future. The results indicate that it is necessary to drive the adoption of lightweight materials, so the impact of energy use on climate change can be reduced.

CIMAV (Centro de Investigación en Materiales Avanzados) Research



Article

Design and Application of Cellular Concrete on a Mexican Residential Building and Its Influence on Energy Savings in Hot Climates: Projections to 2050

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Featured Application: A cellular concrete design for building walls to promote the reduction of heat transfer on the envelope and the energy-related CO₂ emissions without compromising the mechanical performance of the material.

Abstract: The thermal performance of economical housing located in hot climates remains a pending subject, especially in emerging economies. A cellular concrete mixture was designed, considering its thermophysical properties, to apply the new material into building envelopes. The proposed materials have low density and thermal conductivity to be used as a nonstructural lightweight construction element. From the design stage, a series of wall systems based on cellular concrete was proposed. Whereas in the second phase, the materials were analyzed to obtain the potential energy savings using dynamic simulations. It is foreseen that the energy consumption in buildings located in these climates will continue to increase critically due to the temperature increase associated with climate change. The temperatures predicted mean vote (PMV), electric energy consumption, and CO₂ emissions were calculated for three IPCC scenarios. These results will help to identify the impact of climate change on the energy use of the houses built under these weather conditions. The results show that if the conventional concrete blocks continue to be used, the air conditioning energy requirements will increase to 49% for 2030 and 61% by 2050. The proposed cellular concrete could reduce energy consumption between 15% and 28%, and these saving rates would remain in the future. The results indicate that it is necessary to drive the adoption of lightweight materials, so the impact of energy use on climate change can be reduced.

Keywords: cellular concrete; lightweight materials; thermal conductivity; electricity; dynamic simulation; housing; climate change

CLC - Cellular Lightweight Concrete



Cement

+



Sand

+



Water

+



Foaming Agent
Cellular Additives

The Scandi ESG Housing System

The Scandi ESG Housing System is composed of three main components:

Technology, Methodology, and Design & Planning.

Technology is the core component.

We provide developers and contractors with the education and training needed to seamlessly adapt and integrate our high-quality technology into their projects.



Transformative technology utilizes:

- Onsite (in-situ) mobile concrete CLC plant
- Lightweight & modular reusable formwork
- CLC “next generation” concrete
- Training and on-going support
- Uses local materials and labor

Machine

Enables mobile, rapid, and continuous production of CLC concrete on-site.



Formwork

Reusable up to 900 times – reducing the individual carbon footprint of each house.



Cellular Lightweight Concrete (CLC)

Accredited for strength, durability, and efficiency.



We bring the CLC concrete plant to you!

- Mobile CCL Plant
- Scalable to optimize efficiencies

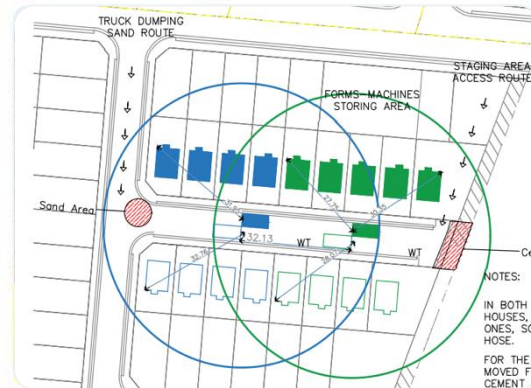


Design and Planning & On-going Support



1. Design & Planning

Formwork design and planning to optimize unit designs for efficiency and sustainability



2. Mobilization

Pre-mobilization workshops that include material staging plans, formwork cycle paths, and more



3. Training

Training and onboarding of all aspects of implementing the system, including best practices for machine operation, formwork setup and cleaning, and labor operations



4. Support

Ongoing support and maintenance through the life of the project, always serving as an extension of the customer's team

Scandi ESG Housing Technology Offers Many Benefits:

- Better quality and structurally more sound
- Reduced labor & material costs in the construction of the “concrete core and shell”
- Increase productivity (build high-quality, resilient, and sustainable structures in as little as 3 days)
- CLC Walls offers thermal insulation (CLC concrete is cooler vs. traditional)
- Hydrophobic - Prevents molding
- Fire-resistant and soundproofing qualities
- IFC EDGE Certified – 20% reduction (energy, water, CO²)
- Promotes sustainable development
- Access to Green Financing
- Utilizes transformative technologies to construct quality, structurally sound, affordable green homes
- Preserves real estate assets (developers, banks, and homeowner)
- Provides homeowners with more cash-flow to service debt

This is what affordable, sustainable Scandi **ESG** housing looks like at scale

(on two continents)



Concrete blocks losing favor

Traditional building methods, which typically involve the use of concrete blocks, are becoming increasingly expensive and inefficient. Additionally, these methods reduce quality, are less scalable and are more damaging to the environment. Modern technology and advanced machinery can help construction companies become more sustainable, efficient, and cost-effective. Projects can be completed faster and with less resources, while producing a higher quality, sustainable product.

With the EchoStone Housing System, the challenges of traditional construction can be overcome while simultaneously reducing the impact of economic turmoil. By utilizing innovative technologies and construction materials, our clients can create a complete high-quality walling system that is scalable and sustainable.

Traditional Block Construction:



Scandi ESG Housing System has overarching benefits beyond the core and shell works:

- 1) Electrical and plumbing first fixings are installed during the formwork operation, allowing the conduits and boxes to be installed prior to wall casting. In contrast, conventional block and plaster methods require the electrician and plumber to chisel the blockwork to chase the pipes, followed by extensive patching work afterward.
- 2) Build at Speed: Onsite concrete production with world-class formwork optimizes construction operations.
- 3) Build Superior: CLC Concrete create high-quality core and shell finishes that reduce material (up to 30%) and labor costs (up to 50%).
- 4) Build Sustainable: technology catalyzes sustainability performance and IFC EDGE certification through energy and carbon reduction.



Cost Comparison Examples: ES Housing System vs Traditional Block Construction

The Scandi ESG Housing System embodies a deep mission: to empower developers to build high-quality, affordable, and sustainable housing for those in need. By equipping developers with the tools and knowledge to build lightweight aerated concrete (CCL) insulated homes, we are committed to decreasing the carbon footprint of both the construction process and the resulting homes.



**This is how the
Scandi ESG Housing System
looks in operation**



Construction Technology



Lightweight and modular formwork

- Reusable hundreds of times
- Recyclable at end-of-life
- Enables speed and quality of construction
- Uses 100% local labor



Mobile Concrete (CLC) Machine

- On demand / continuous production
- Computer and data-driven
- Minimizes waste
- Uses local materials and labor

Local Labor & Materials



Affordable Housing Framework and Discovery

**Initial Questions and
How we can work together?**

ESG (Environmental, Social, and Governance) and sustainability aspects

- 1. What sustainable building practices and materials are being employed in the construction of the affordable housing units?
- 2. Is there a plan in place for energy-efficient systems, such as renewable energy sources or energy-efficient appliances?
- 3. How does the project address water conservation and waste management practices?
- 4. What measures are in place to promote social inclusivity within the affordable housing community?
- 5. Are there plans for green spaces, community gardens, or other environmentally friendly amenities?
- 6. How does the project contribute to or align with local and regional sustainability goals or initiatives?
- 7. Are there social impact assessments or plans to monitor the project's impact on the surrounding community?
- 8. What governance structures are in place to ensure ongoing adherence to ESG principles and sustainability goals?
- 9. Has the project undergone any third-party certifications related to sustainability, such as IFC EDGE Certification or other green building certifications?
- 10. How are stakeholders, including local residents, engaged in the decision-making process regarding sustainability aspects?

Affordable Housing Feasibility Study: How can we offer support?

- **1. *Executive Summary:***

- Brief overview of the proposed affordable housing project.

- Summary of key findings and recommendations.

- **2. *Introduction:***

- Background information on the need for affordable housing.

- Project objectives and scope.

- **3. *Market Analysis:***

- Demographic analysis of the target population.

- Current demand for affordable housing

- **6. *Legal and Regulatory Considerations:***

- Overview of relevant regulations and building codes.

- Land use and zoning compliance.

- Necessary permits and approvals.

- **7. *Technical Feasibility:***

- Assessment of the technical aspects of construction.

- Evaluation of sustainable and energy-efficient features.

- Infrastructure requirements.

- **8. *Risk Analysis:***

- Identification and assessment of project risks.

List of Pertinent Questions

Construction

Is concrete-based construction for housing is the norm?

Availability and cost of Ready Mix concrete

Access to core materials (cement, sand, water) with reliable supply chain

Updated building codes or government openness to modifications or exemptions to support innovative technologies

Sustainability/Planning/Design

Environmental Vulnerability - Climate change/natural cataclysmic events/natural disasters

Emission Standards support EchoStone machines

EDGE presence in market

Finance

Taxes/Duties/Import Fees

Currency Stability

Import Regulations

Repatriation of Funds

Ease of doing business/regulations/VISA

Cost Comparison Examples: ES Housing System vs Traditional Block Construction

Date: October 17, 2023
Client: Adom Estate Housing
Project: Mataheko
Drawing: Proposed Residential Building (2 bedroom), drawn by Engr. Anani, March 2023
 AFN Ventures Traditional estimate based on quantities from drawing and current market rates. Adom City Traditional estimate based on Adom City quantities and current market rates. EchoStone estimate based on quantities from drawing and current market rates.

Exchange USD to GHS \$ 11.00

Item	Description	Traditional Building Method Estimate by AFN Ventures				ECHOSTONE CLC Concrete w/ ES Fees	ECHOSTONE CLC Concrete Excludes ES Fees	Cost Savings (Increase) ES Concrete vs Traditional	Cost Savings (Increase) ES Concrete vs Traditional
		Quantity	Unit	unit Rate	Amount USD	Amount USD	Amount USD	Amount USD	% Change
A	Concrete works	10.00	m ³	136.36	1,363.64	654.55	654.55	709.09	52.0%
B	Reinforcement works	1.49	tons	1,090.91	1,628.73	1,697.41	1,697.41	(68.68)	-4.2%
C	Formworks/Labour	133.00	m ²	8.64	1,148.64	1,800.55	1,800.55	(651.91)	-56.8%
D	Blockwork / laying	284.00	m ²	12.73	3,614.55	2,389.27	2,389.27	1,225.27	33.9%
E	Plastering/patching work	516.00	m ²	3.18	1,641.82	54.55	54.55	1,587.27	96.7%
F	Screeding	101.00	m ²	5.45	550.91	259.09	259.09	291.82	53.0%
G	Electrical works	1.00	item	-	-	0.00	0.00	-	
H	Plumbing works	1.00	item	-	-	0.00	0.00	-	
L	EchoStone services, consumables, mobilization, training, and equipment rental					3,000.00	0.00	-	
TOTAL ESTIMATED COST					9,948.27	9,855.41	6,855.41	3,092.87	31.1%

Scope of Work:
 - Includes superstructure walls only.
 - Excludes all substructure works (foundation and slabs).
 - Includes elevated slabs and structural works for roof gutter and porch.
 - Excludes electrical and plumbing works.
 - Excludes window, door, roofing and all finishing works not noted.

Cost Comparison Examples: ES Housing System vs Traditional Block Construction

Rehoboth Social Housing - The Havens	
Comparing Costs: Conventional Block and Plaster Methods versus EchoStone Housing System	
Evaluation based on Quad #96: Drawings titled "2-Bedroom Residential Development" dated November 2021 and drawn by David Sackey	
Evaluation Date: June 9th 2023	

Construction Method:	Conventional Block & Plaster (Ghc)	Conventional Block & Plaster (USD)	EchoStone (Ghc)	EchoStone (USD)	Variance (GHC)	Variance (USD)
Walling Material Subtotal	\$ 132,741	\$ 12,067	\$ 93,093	\$ 8,463	\$ (39,648)	\$ (3,604)
Walling Labour Subtotal	\$ 52,238	\$ 4,749	\$ 25,000	\$ 2,273	\$ (27,238)	\$ (2,476)
Walling Equipment Subtotal	\$ -	\$ -	\$ 4,500	\$ 409	\$ 4,500	\$ 409
Additional Utilities and Finish works	\$ 9,610	\$ 874	\$ 900	\$ 82	\$ (8,710)	\$ (792)
Aercell	\$ -	\$ -	\$ 3,795	\$ 345	\$ 3,795	\$ 345
EchoStone Fee (Royalty)	\$ -	\$ -	\$ 66,000	\$ 6,000	\$ 66,000	\$ 6,000
Totals	\$ 194,588	\$ 17,690	\$ 193,288	\$ 17,572	\$ (1,301)	\$ (118)

Rate USD to GHC

11

Rehoboth Quad design includes 4 dwellings of 2BR/2B units of 70m2 each dwelling

Why wait? The future is now.

GET STARTED TODAY



We Believe Sustainable Communities Transform Lives.

We are looking for **like-minded partners** (*developers, engineers, contractors, government*) who want to **build better** (*safer, more efficient, higher-value*) sustainable communities more efficiently.

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