HONEYCOMB VILLAGE : HOUSING FOR ONE MILLION PEOPLE

Abhishek Praveen Jadhav[1], Gaurav Dhanraj Ahire[2],

Abhishek Satish More[3]

[1,2,3] *Civil, Sandip Polytechnic,Nashik (India)*

ABSTRACT

We have designed housing for 1 million people in India. You might be asking yourself, once you see our pavilions and techniques we have developed to build a new sustainable industry you'll want to contribute. Honeycomb Village is light, modular, and affordable pavilions set on a raised platform to create a clean and healthy environment for people. This semi-permanent housing can be lifesaving, a stepping-stone for millions of people who need quality housing for a limited time anywhere in the world.

Keywords : Affordable, Modular, Sustainable, Semi-Permanent Quality Housing

Fig. No. 1

I. INTRODUCTION

We've placed self-supported tensile structures on a honeycomb platform. The raised floor (from Chip Fab design) integrates utilities below deck. The roofs harvest rainwater and capture sunlight to generate electricity (via photo-voltaic). Crucial to people's health is indoor plumbing and sanitary conditions on-deck. Inside each Community Pavilion is plumbing in bathrooms and kitchen. Bio-dig esters (located below deck) transform the contents of the sanitary system into cooking fuel, irrigation water, and fertilizer. All these standardized systems

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are combined into a sustainable model for both house and a village that's scalable.

Honeycomb Village is completely modular from set-up to dismantle from deck to roof, and no tools are required for assembly. After each use HV can be disassembled and packed into standard containers and shipped anywhere around the world. Sustainable, Modular, Safe, and Healthy: a recipe for promoting people's lives with dignity and we're here to prove it!

Some believe poverty is rooted in people, whether in slums or uprooted by disaster; people tainted by poverty will remain in chaos or homelessness. I believe there are thresholds throughout human history. Thresholds that bar many people from making significant changes in their lives.

One significant threshold is the barrier many people face in their lives to reach permanent housing from destitution or despair. From the lowest rungs this stretch is too great, the cost too high, the treadmill of life doesn't allow them to make ends meet, and battling unsanitary surroundings saps their health and will to do little more than let them survive, and for all-too-many, not even that.

Honeycomb Village can provide safe, efficient, and affordable housing to people in need or displaced by circumstances. They'll have a direct role raising pavilions in which they live and in-turn housing people around them. This constructive act may build skills, engender a sense of ownership and responsibility, and promote their contribution to society. The ultimate goal of improving surroundings is have people live investing their time, energy, and money in themselves. Self-worth may single most important stance against poverty. People who elevate themselves and clear that "threshold" of poverty in a few, smaller steps may lift society with them. A society that abandons its responsibility to promote a safe and healthy infrastructure will carry the reproductive weight of human neglect.

II.CONCEPT EXPLAINED

India's Ministry of Housing: Poverty Report* describes the multidimensional challenge of people trying to work themselves out of poverty and highlights the fact that **"Deprivations are Cumulative".** Honeycomb Village (HV) addresses this 3-legged stool of residential, occupational, and social vulnerable population through pavilions for housing, education, and medical services set on a raised platform to create a clean and safe environment. This is a solid "leg-up" for people at the lowest rungs of the ladder and relief from the "massive opportunity costs" slum living extracts from society every day. This global challenge is not specific to any country. We can demonstrate leadership through creating quality, safe and affordable semi-permanent housing and start a new housing industry. HV satisfies the most basic human needs and may provide a transitional solution for slums, disaster sites, humanitarian relief, or festivals and other short term needs with a mobility that allows us to ship this "village" anywhere in the world.

Internal migration in India, from small towns to big cities (Mumbai) the infrastructural stress of too few utilities for too many people is a crisis in the making for everyone. At the hub of this nexus and comprehensive to those three vulnerabilities can be a village of pavilions that house people and integrate their needs. From a range of Pavilion types, to sustainability utilities, to way finding system of paths and roadways for circulation, to the walk-off ramp and a clean platform all contribute to a quality of life with integrated essential elements in a

singular flexible design. To illustrate the importance of the raised platform let's start with circulation.

Around every Pavilion are paths made of the same modular hexagonal decks forming the continuous platform that steps/ramps up and down following the topography with plazas and openings for existing trees. Honeycomb Village has std. 8' wide paths. The village is gridded with secondary routes (E-W) and primary roads (N-S) for circulation. The E-W routes are 16' wide, and the N-S roads are a one-way network 32' wide. The roadways are for essential services that require vehicles for food distribution, ambulance/fire/police, and sanitary. Utilities run downhill in the space under the platform with regular access at points under the platform. Utilities use gravity by aligning pavilions in a row downhill from each other. Around HV is a Walk-Off Ramp. As people and vehicles traverse the rough/tacky surface of the ramp the dirt that is typically "tracked-in" is removed before entering the platform. Honeycomb Village is designed to be a clean living environment for a transitional time. This new industry integrating housing, medical, and occupational/educational services may be its most sustainable quality. A private/public partnership in HV may be a great investment of a society unto itself.

III.PROPOSED STRATERGY

This proposal is **Phase One** of Sunlight's strategy to build an integrated semi-permanent housing industry based on my experience developing the Nanotech industry in New York State. Many temporary housing solutions from pup tents to mobile homes require people to carry in every liter of water. Housing with plumbing, sanitary, electricity, and good circulation is essential. HV is designed to efficiently introduce and maintain a safe environment for populations at various scales and in a range of locations in India and around the world. The modular design allows wide variation that may span cultural conditions and the prototype will test and demonstrate.

Phase One: to complete the prototype (4 Months) of Honeycomb Village (outlined in the brief) to test manufacturing, assembly, use, portability, durability, effectiveness and efficiency of semi-permanent housing on a small scale

Phase Two: Continue to develop the vertical integration we have started with housing stakeholders from the client's perspective in partnership with both public and private realms on a medium scale deployment of 1,000 Pavilions.

Phase Three: to scale production of 10,000+ Pavilions in the succeeding years.

Sunlight based HV on modular Hexagonal Pavilions each enclosing ~166 sq. ft. Phase One will build 3 Pavilions of Honeycomb Village that include: 1 Community Pavilion, 1 Tele-Clinic, and 1 Forum Pavilion (Appendix C, Slides 8-9). These 3 Pavilions stand on a platform supported a few feet above the ground by a space frame. The pavilions are designed to be set-up without tools or fasteners so any 10 people in the world can, in a few hours with a little help, assemble a pavilion that sleeps 40 people. HV provides systems for generating and distributing water, sanitation, and electricity. One Community Pavilion (CP) accommodates ten people in each of 4 Living Pavilions that comprises a ring made of 6 hexagon-shaped pavilions with a 7th in the middle. Each Pavilion encloses 1,165 sq. ft. The other two Pavilions, Tele-Clinic, and Forum, utilize the modular quality to divide space according to their programmatic needs.

Brief on how the problem will be addressed. Descriptive in nature of the implementation strategy with emphasis on the core aspects of strategy. Details of how the implementation approach is innovative/superior as compared to existing approaches.

IV.HISTORY

Honeycomb Village was born in 2015. I was invited by the Massachusetts Institute of Technology- Media Lab to attend a 1 week conference in India. After the first week MIT-ML asked that I extend my stay to build Honeycomb Village. A year may be to short to realize a project of this magnitude, so I've committed to stay indefinitely. I brought a semi-permanent housing concept and the design to serve up to 1 million people for Kumbh Mela (the world's largest human gathering). Since the day I set foot in India, hundreds of people from students to professionals have volunteered their time and effort to work for change and have helped shape Honeycomb for uses that are most appropriate whether for Hindu Festivals, disaster relief, or internal migration.

A. Competition, Risks and Challenges

What other semi-permanent housing solutions are already available? From Pup-tent to mobile-homes when you need 1 liter of fresh water you have to walk and carry water back each time you run out. There are too few solutions that incorporate indoor plumbing, proper sanitary waste management, and sustainable utilities in an affordable solution. Most simply do not adequately provide necessary utility service.

We've detailed Honeycomb to be a safe and reliable platform. From careful drawings, to modeling site conditions, our efforts have been designed to document logistical steps from manufacturing through deployment.

The **challenge** of designing Honeycomb Village was to integrate all the basic services within each pavilion and throughout the village. Making a sustainable infrastructure affordable is meeting the challenge. The price estimate will be confirmed and economies of scale will bring them down. The raised platform is a proven solution in high-tech industries around the world. Data centers, ChipFab's, and other process industries have developed and tested the functionality of access floor services. But, how will these "high-tech" services work in housing? Therein lies some risk. To residents these utility lines are invisible. The utility infrastructure will only be accessible to platform maintenance staff of Honeycomb Village.

Critics say we risk not providing 100% utilities sustainably. We use the 80/20 rule throughout Honeycomb Village (HV). Rain Harvesting, PV's and bio-digesting are goals, not sole ideals. Locations will have some resources available. When there's no rain in Ujjain, trucks can deliver water and plug into the central water line of HV to top-off our tanks. When the Photo-Voltaic (PV) micro-grids supply is outstripped by demand our network is connectable to a central utility or generators to re-charge our batteries. We call it being pragmatic. Save where you can, use when you must. This dovetails with our approach to form a Public-Private-Partnership with institutions to promote sustainable utilities and a manageable infrastructure. Good housing design is applied to all components of HV for maintainability, fire-resistance, safety, and accessibility.

V. MATERIAL USED

We have been researching over the types of materials required, considering safety, aesthetic , life of material and ability to resist natural forces for betterment of people.

We are building walls of aluminum sheets so that the theft of things can be prevented and minimized, as we all know this material is hard for cutting and can resist wear and tear.

We are using Bamboo as most supportive material in this type of housing they work as horizontal and vertical spanners supporting walls .We are using tensile fabric for roofing, this material can be used and stretched anyhow as per need. We are having bio-degradable systems in our housing so that the sanitation problems are looked after and it is well treated. We are also using solar panels so that the house can generate its own electricity and don't need to depend on government resources. We are also treating water to make it safe for drinking as well as for other purpose. We are having rain water fetching roofs so that the house generates enough water for its needs. We are using Fiber glassed foam for the flooring purpose , which can resist fire upto certain limit considering it as factor of safety. All the material used above are chosen to be safest compared to any other material. This were tested before and were found to be satisfactory in technical terms of ability to resist wind load , strength , tension and various other tests.
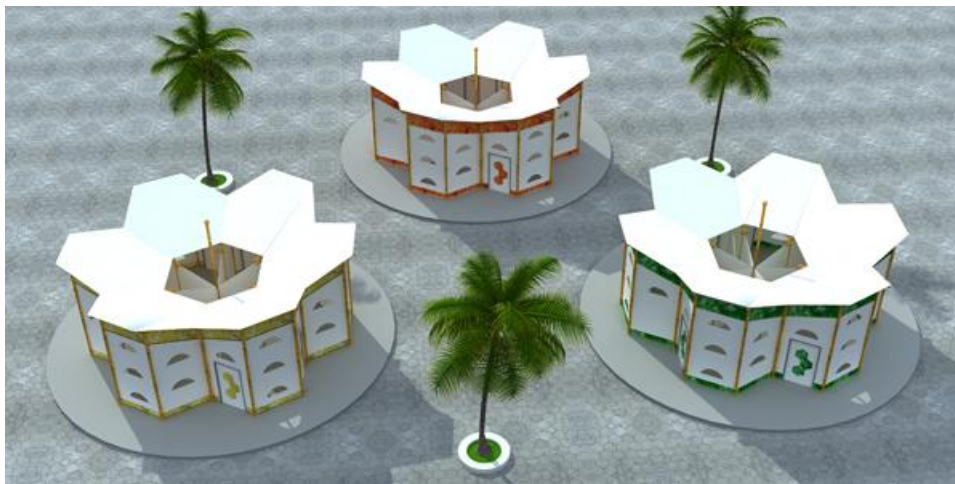

Fig. No. 2

VI.ENDORSEMENTS

Project / Career / Academic / Personal:

Dr. Ramesh Raskar- Associate Professor, Head of Camera Culture Group Massachusetts Institute of Technology- Media Lab

"Mr. Knox's expertise and experience in engineering, architecture, and urban design would be valuable in contributing to this year's success in Nashik. His design and architectural experience gives Mr. Knox a systematic understanding that will facilitate his teaching, mentor ship, and promote a design for temporary housing that may ultimately benefit people around the world.

Dr. Pankaj Parashar- MBBS, PhD Indian Institute of Technology, Delhi/ AIIMS New Delhi

"As a medical professional and medical technologist I see Honeycomb Village as a balanced environment for serving people's needs. Integrating Tele-Clinics and Educational Forums into the network of housing shows foresight that is essential to successful urban plan designed to lift people beyond their situation in life. The design of the structure is such that it is easy to maintain the necessary hygiene and sanitation in these pavilions of the Honeycomb Village, making them an ideal place for Tele-Clinic services. "

Aria Ohi, Mumbai India

When I first heard about the HoneyComb Village concept, I was amazed. I never imagined that this type of well-thought through "semi-permanent" housing concept is possible! In India, we have huge problems when it comes to housing for the poor. This type of concept could be an answer to our current situation. This model will not only provide housing to the poor but can actually build industry, create jobs and provide a stepping stone for them to reach permanent place to live. What I like the most about HV concept is it's architecture and color coding system. It's unique and easy to understand for both the literates and the illiterates, which is extremely important. This kind of housing concept should not only be looked at during some kind of disaster.

Christopher Hitchens- Author

"There are writers I admire for their sensitivity to the place and context in which they write. Scott has a similar understanding and command of the contemporary condition within his field and the historical applications. The proposals he has authored, his research and development, and his attention to detail show a strong commitment. I would recommend few candidates to contribute to the restoration of the Parthenon (knowing the Parthenon marbles from my own research and writing), but Scott is an exception. I can think of no better candidate and no better use of today's science and technology than in the service of such a noble cause."

Dr. Manolis Korres- Parthenon Head Architect, Committee for the Conservation of the Acropolis Monuments, Athens, Greece.

"Specifically, due to the position I have held for many years in connection with the Parthenon reconstruction I constantly receive visits and correspondence from individuals …who aspire to make a contribution to the work of the Parthenon. The volume of these requests is very high and given that the time that I can devote to them is limited I only concentrate on the ones that are most promising. Among those that I regard as the most serious proposals is the one submitted by American architect Mr. Scott B. Knox for the production of primary digital documentation of the Parthenon with actual on-location use of laser scanning techniques to produce a high-resolution three-dimensional computer model."…." I wholeheartedly support Mr. Knox, not only because I know precisely what useful purpose it will serve but also because, following a careful study of his accompanying documents, I concluded that both he and his associates have the required technical know how and the proper professional attitude. "

VII. CONCLUSION

Thus we conclude by saying that Honeycomb Village is a very efficient way of living and occupies very less space as well and also could be transported and set up at any place in few hours even by a non-technical person.

We also conclude that Honeycomb Village is a very modern construction method and is very useful at places where urgent housing for people is needed in less time like where flood occurs or earthquake. It is a cheap construction and the way finding system helps people to easily find their pavilion if they are lost or not able to remember their pavilion number. It eliminates the cost which is 20-25% of the buildings total cost by using space frame which helps support the base of the rooms and is a place for pipelines and electric wires fitting/transportation around the total area. It is built in such a way that there would be no traffic at all even if there is an accident or any other relevant problem. The whole Honeycomb Village can be folded up and put into containers and can be transported easily. In this whole housing scheme not even a single nut and bolt is used.

VIII. NEWS AND EVENTS

United Nations **International Council for Caring Communities** (March 1, 2016)

Google Moonshot, Bangalore. Mentor- Sr. Arch./Urban Designer (Oct. 2015)

INK Live, Mumbai Speaker Housing for 1M (Oct. 2015)

MIT-IIT Kumbathon Mentor- Sr. Architect/Urban Designer, Nashik (July 2015) Wolfram Mathematics Conference (2010), Wolfram Alpha Launch (2009), National BIM Conference (2007), National Building Museum (2001), U Penn Parametric Design Conference, (2002), World Monument Fund Contributor (2004), AIA-DC, NY Chapters (1998-2002). University of Illinois- Alternative Energy Conference (1991)

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