

STARTER 'CORE' HOUSE IMPLEMENTATION FOR FIJI

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Fiji has its share of housing problems much like the rest of the developing world. The particular problem in Fiji is a land issue due to ownerships of lands by native populations, private enterprise and the Fijian government. This intense web of ownership has led to extensive squatter settlements especially in the capital of Suva and a severe deficit of housing. Buildings materials for construction must also be considered when evaluating solutions to the current housing dilemma facing the Fiji. This paper will focus on incremental core approaches to starter homes as well as innovative material solutions, which could start at the community level and trickle down to individual homes.

The incremental strategy to starter houses is a relatively simple approach especially from a public housing standpoint for government. Instead of building a full house and 'complete' house the government can build a starter core house with the basics people need. This generally includes a basic sitting and sleeping area, bathroom and kitchen space. From here the family can extend the home as the family grows and changes. This incremental approach uses the existing knowledge that most Fijians have about basic home building techniques as well as allows the state to building houses quicker. The technique could be a 'win-win' scenario for both parties.

APPLYING 'CORE' HOUSE STRATEGY TO EXISTING HOUSING PROGRAMS

Many housing programs that the Housing Ministry is currently working on in Suva could apply some basic incremental core house techniques. I will use the Ministries Agriculture pilot program as an example of how the core starter house strategy can be easily implemented. Currently, a program to stimulate a move back to farming is being tested outside of the city. This program gives families a small 2 bedroom and one bath house with allotted farm space. By reducing in size of the house to 60% of the original footprint, the home is left with a core starter house (see Figure 1). Just a sleeping / living space, bathroom and kitchen are built with a small foundation where the original bedrooms were located. Now the families can move in and grow the home into the foundation. This also frees up money and time so that the Housing Ministry can

move on to house more families. The new core starter house is now 60% of the original size and costs around 10,000 FJD less to build than the original. This approach simple builds the necessary core and sanitary features families need and allows the family to extend and customize, as they seem fit. The Fijian culture is deeply rooted in building and adding on to living quarters is customary.



Figure 1 - Lomaivuna Agriculture House

A similar approach can be applied to the Yasiyasi housing project that the Housing Authority in Fiji are currently working on. The original design by the Housing Authority call for a very modest 2 bedroom house with kitchen, living space and private bath for approximately 33,000 FJD. In this example I will give two options for how a starter core house can be applied to this existing design. The first option is the smallest at 30% of the original house size (see Figure 2). Option 1, consolidates the house into the bare essentials of kitchen, bath and small living and sleeping space. As in the earlier agriculture example, a foundation is also constructed so the family

can extend their home later when it is necessary. This option brings the cost down to 10,000 FJD from 33,000 FJD.

Because option 1 has a smaller footprint than the original 2 bedroom house, the family actually has more room to customize the home to their liking. Many possibilities exist for the family. They can easily add an outdoor covered patio in front of the living room and still have room for two private bedrooms. Another option is 3 small private bedrooms. The family could even make a 2 story addition on the foundation doubling the area they have to build on. Because the floor plan is not dictated by fixed walls the family actually has more freedom and options with this small starter house.

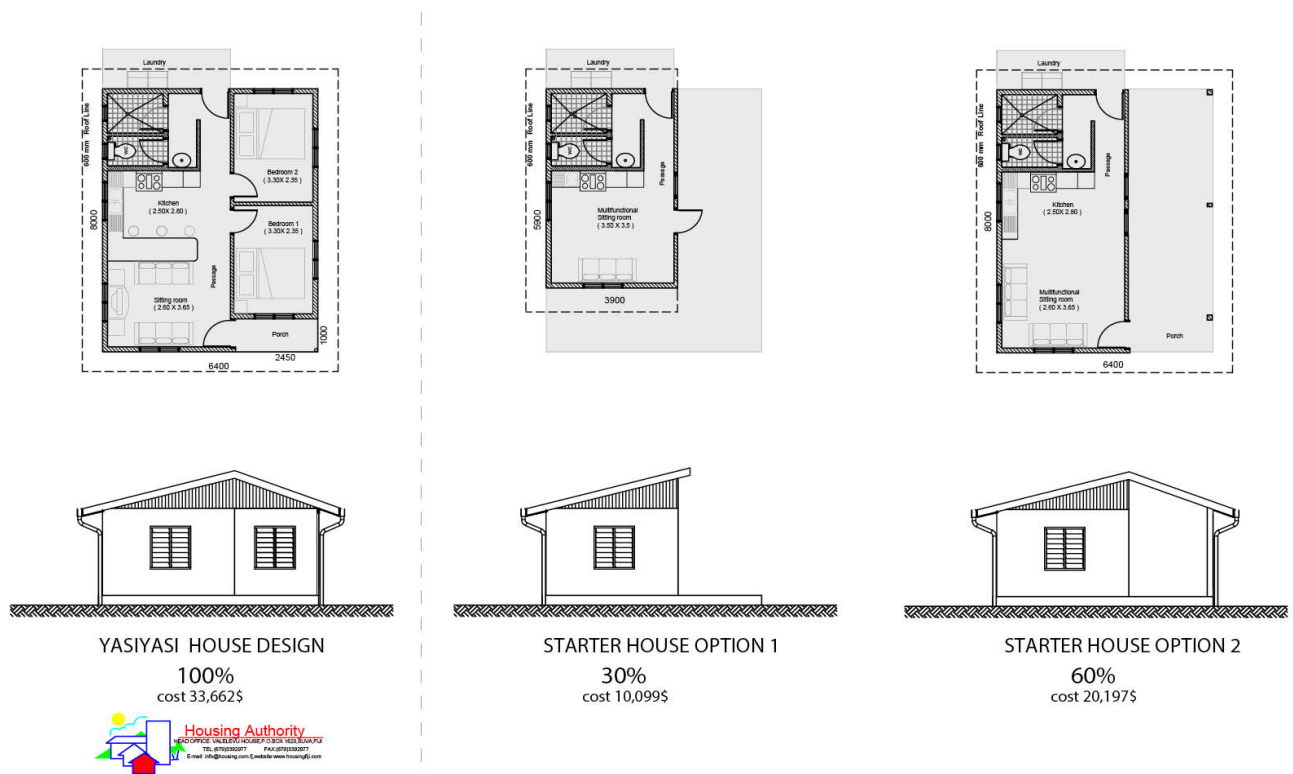


Figure 2 - Yasiyasi House, showing starter core options

Option 2 is different than option 1 because it builds both the roof and foundation for future building by the family. This example is 60% of the original planned house but makes it easier for

the family to enclose and extend the house into the built covered area (see Figure 2). Option 2 retains the same interior living, kitchen and bath area as the original house minus the private bedrooms. At around 20,000 FJD this example offers a nice middle ground to a starter home and makes extending quite easy due to the pre-constructed roof structure. Families can easily infill wall, door and window assemblies under the covered roof canopy.

All of the Options in modifying and extending the plan would give the family years to make these changes, allowing for families to save money for additions. Everything about the core house is time based. If the family starts with just a husband, wife and young child then 2 years later a second child is on the way, the family can start to think about extensions. They are not stuck with a fixed layout, the house becomes more dynamic as a tool for the families growth and size. This concept of growing as the family changes is key to the core house strategy. Families grow incrementally, so why cant the house also grow incrementally with the family.

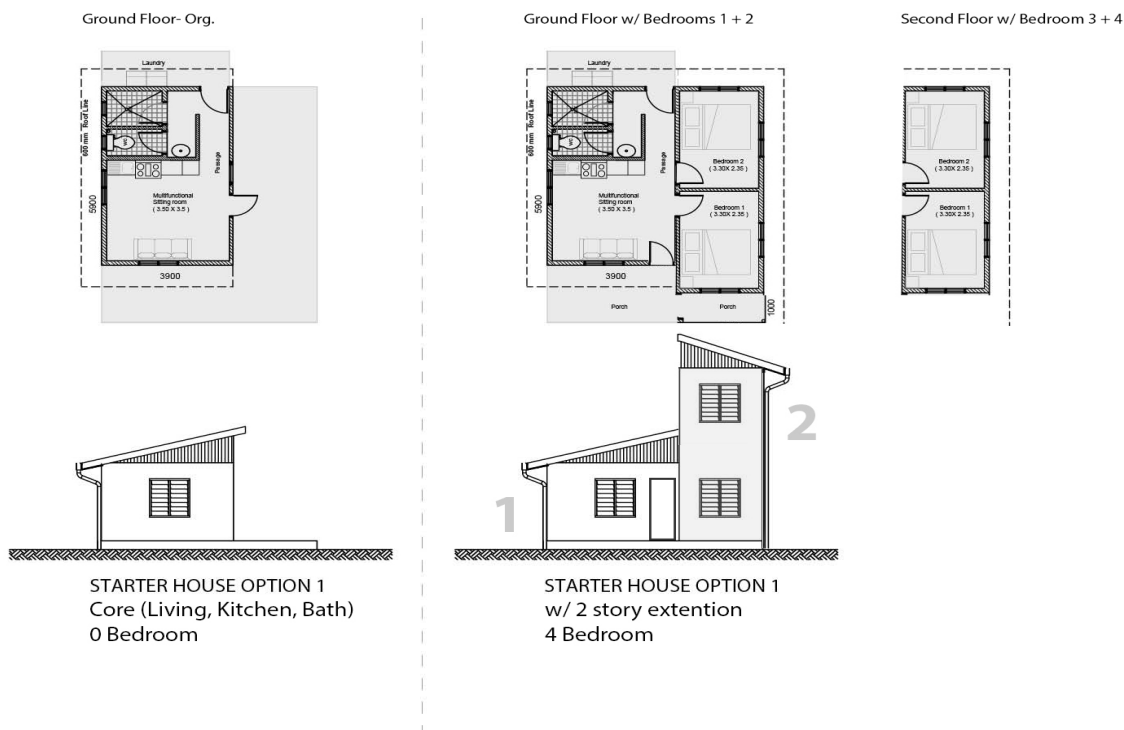


Figure 3 - Yasiyasi House, showing starter core then 2 story variant

Like Option 1 starter house, option 2 can be easily customized and extended by the family. In this case again the roof is already in place, which makes it easier for the family to extend but

also decrease some potentials. In this plan a 2 story addition is less probably because a gable roof is already in place. But, because its in place the family can choose how many rooms they want to add. Could be two standard size rooms like the original house had. The family could also do 3 very small rooms in order to create the utmost privacy for the occupants. One large bedroom could be introduced with a communal covered patio for enjoying natural breezes and climate off the living space. This would be a more shared living condition, which most Fijians are used to culturally. This large outdoor covered space could be used for drinking Kava (Figure 4, far right).

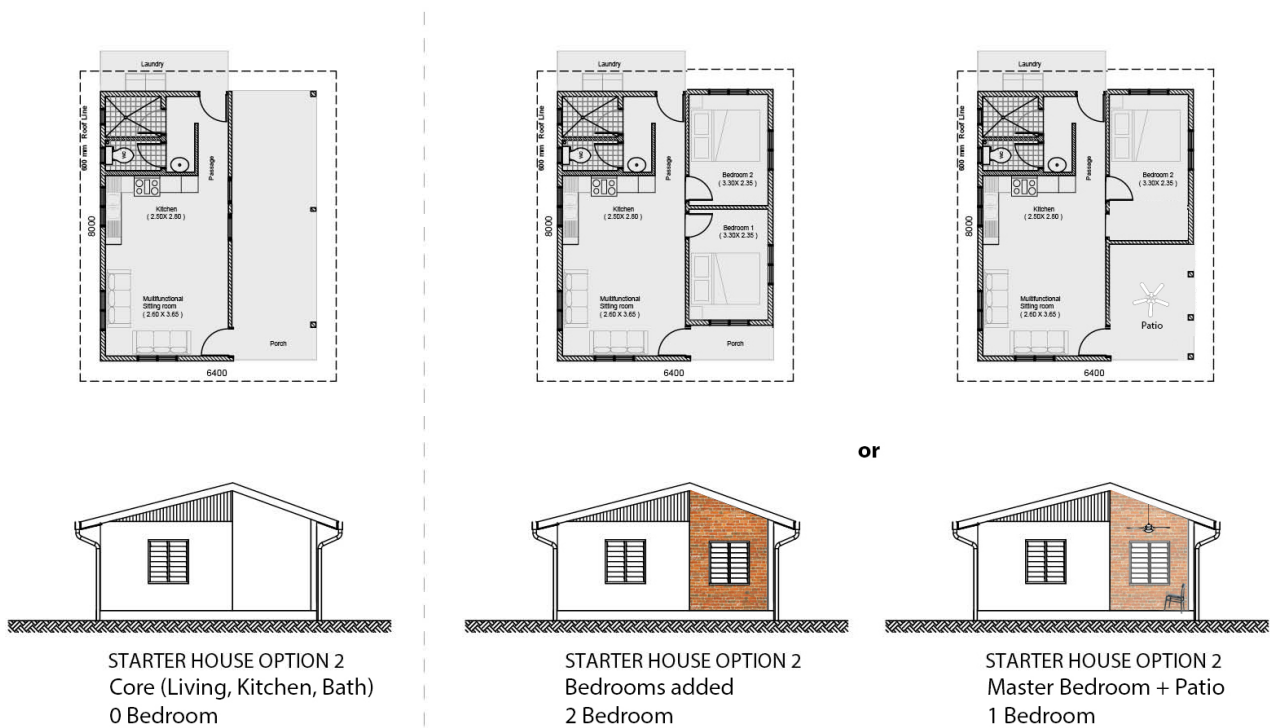


Figure 4 - Yasiyasi House, showing starter core then 2 bedrooms added. Far right, Bedroom/Patio

It seems that if the Ministry of Housing would incentivize households to build more vertically, then smaller lot sizes could be acceptable. In example, the smallest size lot in Fiji is

currently 250 meters squared in size. What if this lot size was halved to say 125 meters squared? This would automatically help some of the land issues Fiji faces while allowing for a higher density and more houses to handle Fijian families. That is why Option 1 house with a very small core starter house and a 2 story addition done by the family could be most beneficial. The HA and Housing Ministry could incentivize timber to make it more affordable to build 2 story structures. Obviously safety would have to take priority as well. This would mean that the Building codes and guidelines would have to also reflect a pro 2 story attitude (figure 3).

MATERIAL METHODS TO BUILD INCREMENTALLY

To make this core incremental building strategy viable, easier methods of dealing with materials would need to be considered. Before, we looked at an existing house, which was modified to demonstrate how a core house was possible. But, even more could be done in regards

MATERIALS INCREMENTALIZE IT



Material: **Concrete Block**
 Cost: \$\$\$
 (\$900 / m2)
 Source: Local + Import, Made in Fiji
 Disaster Resilient: Good* (depending on construction techniques)
 Embodied Energy: 0.67 (MJ/kg) cmu
 Incrementability: Difficult (cutting concrete is expensive + difficult)



Material: **Timber** (Pine)
 Cost: \$\$
 (\$600 / m2)
 Source: Local, Made in Fiji (reforesting for harvest is ideal)
 Disaster Resilient: Good* (depending on construction techniques)
 Embodied Energy: 10.0 (MJ/kg)
 Incrementability: Easy (modification is easy)

Figure 7 - Wood Vs. Timber Construction to the house design, material selections, joinery techniques and building code.

There is a pre-conceived notion in Fiji and in other parts of the world that concrete is stronger than timber construction. While this could be true it very much depends on the

construction techniques that are utilized with both systems. If timber construction is cross braced properly creating moment frame type connections, its hard to say timber is any less strong than concrete. Another factor of material selection in Fiji is the overall cost of materials. Cement is actually produced in Fiji, but there is only one concrete plant on the island and is not running well anymore. This has lead to an increase in import of Portland cement, making concrete production much more expensive in recent years (Figure 7).

Responsibly using materials available should also be a priority to both the government and homeowners. Currently, concrete is expensive and relies to heavily on imported cement. A good alternative is timber because it is less costly and readily grown and available in Fiji. The larger question with the timber revolves around if it is being harvested in a sustainable manner. If it is being clear cut and not replanted then it does not make sense to use timber. The goal should be to make cedar and mahogany the most sustainable product available. This way the environment wins and the costs are less than the now more conventional CMU construction.

As stated earlier some incentives could be put in place to make timber the more clear choice. An interesting middle ground between the two could also be a ferro-cement hybrid systems which the Housing Department and Ministry is already looking into (Figure 8). This product, which is currently only being handled by Wade Evans of HOPE Fiji, takes elements of timber-framed construction and mixes it with the strength and appearance of concrete. The end results give Fijian families the concrete aesthetic and combined strength of timber and cement they are most interested in.



“It’s not a high skill technology [Ferro cement], so for Fiji, that’s quite ideal”

Wade Evans
HOPE Fiji (Housing Options Production Enterprize)

CONSIDERATIONS
Hybrid of Timber + Concrete Construction
Up to 50% savings compared to concrete block.
Quicker installation compared to concrete block labor
Less overall Concrete is used with Ferro cement, which reduces the demand on both local production and expensive imports



Figure 8 - Ferro cement, HOPE Fiji

The Housing Authority and Ministry could think about building concrete block core starter houses for families that could easily handle timber extensions. Very simple concrete extrusions could be left on the exterior of the finished core (Figure 9). These extrusions could allow for easy bolt connections so homeowners could add structural timber elements later. A very simple set of material connections or joinery techniques could make extending the house much easier and safer for families that are ready to grow.

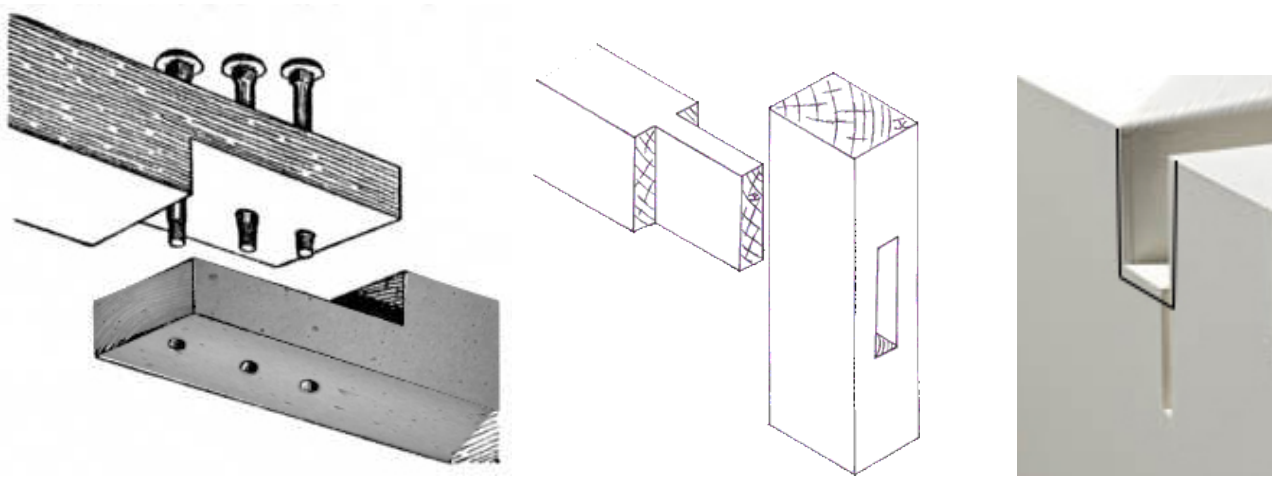


Figure 9 - Possible concrete / timber connections for extensions off starter core house. Far right, Concrete Notch

Even casting indentions into the concrete structure would make places wood beams into the concrete much easier (Figure 9, right). Instead of relying solely on a mechanical connection, the joint uses weight and gravity to sit within a prescribed notch. These predetermined points would be designed to take the load of new extensions to the core while providing a strong system to build on all sides of the core. Even though the notches in the concrete structure would be predetermined, the family would have much design freedom when designing new spaces around core. Though when joining wood to concrete one must always remember that wood will act as a sponge act absorb the concretes moisture. Special fitting in steel, rubber or PVC will be necessary to keep the two materials from touching. Casting steel brackets into the concrete core could be the most beneficial to adding timber beam elements. Simple steel brackets with predrilled bolt holes could be easily attached when casting concrete starter core. These again would act as a way to adhere structural elements to the core.

The starter core house to some degree has already been tested in Suva with successful outcomes. In the 1960's or 1970's the Housing Authority built prefabricated concrete two story low-income houses (figure 10). These small houses were not designed for extension but have worked pretty well as started homes. Most of the small homes have been extended and modified with some fantastic results. The original house was a living space, bathroom and kitchen with 2 small bedrooms above. We could imagine the HA building a similar program now but maybe this time no bedrooms would be added. You could assume the same level of extensions would occur, resulting in the family producing the private bedrooms off of the essential sanitary features.



Figure 10 - 60's Core House

Some of the house have been modified by the owners themselves and some by the help of contractors. By the building guidelines when the houses are attached it is necessary that all the neighbors build the additions at the same time, and the architectural language remains consistent. Though, this approach is usually at a higher cost to the homeowner due to having to hire a private contractor. It would be interesting to test a similar program with smaller detached house with easy to extend attachments and see how the families modify and extend on their own. Design guidelines could be put in place to keep materials and the new architectural design more consistent. This is done in Europe and the U.S. when a community wants the neighborhood to remain similar without ad hoc new constructions, which could take away from the overall aesthetic.

The building code and Town Planning guidelines could also become a prominent actor in facilitating the use and implementation of core homes and the extensions they require. The building code could offer an entire section devoted to safe and structural ways on how to properly extend the house. Currently, people are just informally adding on to their homes without the proper support from the government. If the government legalized this approach than the results would be beneficial to both homeowners and the state. It would offer homeowners a easy to follow guideline for building themselves while relieving the government of needing to spend more money on larger homes. The government could move on to build more starter core home while knowing that the families were using design and structural guidelines to extend.

Overall, putting in place the adequate information and support for building extensions from core homes in the Building code and Town Planning act could be the greatest assistance to Fijian families. This would legitimize and legalize the approaches they are already taking in extending their homes. It would also be freeing to the government because they can take the excess money put into more intense starter houses and build more core houses. The legislation and codes could help dictate some architectural schemes while allowing families the time and freedom to adapt their homes as they see fit. Pilot programs could be started that at first just simple modify existing new home design the state is currently working on. These are fairly simple ideas that were mention earlier in this paper. It would give the state real numbers and success rates for how the core program could grow into a much more unique enterprise. Eventually, the state could move into a more holistic package of what the starter core house could look like and how it could perform. Some of the suggestions in this paper would hopefully help create a base of how the core house could start to be realized. More families will benefit in the governments support because ultimately more families will be served in the overall housing allocation process.