



WikiHouse©

v3.0 DESIGN GUIDE

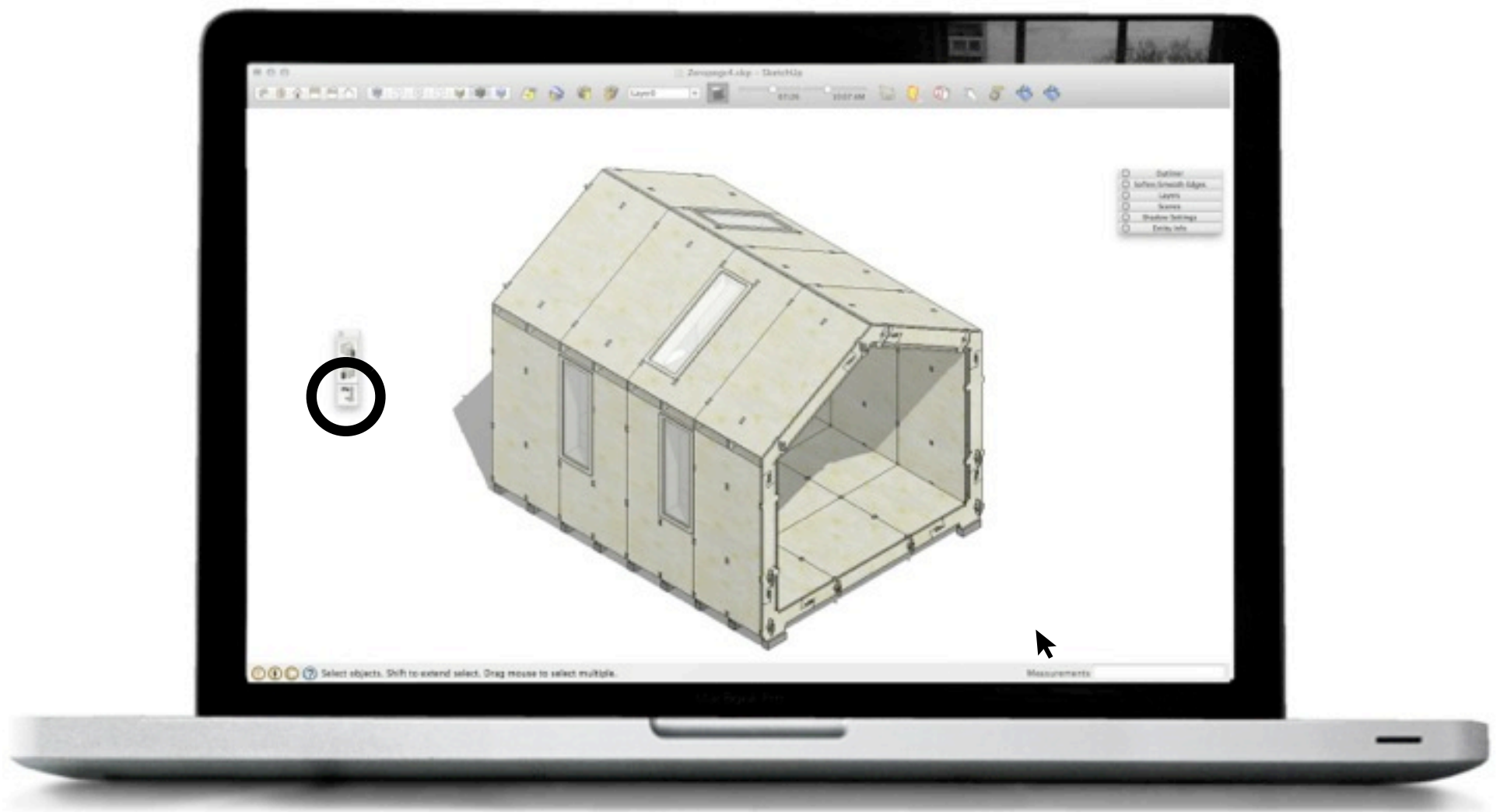
What is WikiHouse? WikiHouse is an Open Source construction set. The aim is to make it possible for everyone to share, download, adapt and ‘print’ their own houses which are low-cost, high-performance and suited to their needs, which they can quickly assemble without the need for conventional construction skills.

It is a way of bringing digital fabrication to housing: radically lowering the barriers of cost, time and skill and giving users the power to create places which are sustainable, sociable and resilient by investing their time and effort through the social economy as well as the monetary economy. In other words, though each step is small, the direction of travel is to gradually democratise the production of housing.

This design guide has an expiry date. The long-term ambition of the project is to collaboratively develop automated design tools, a design library and a fully integrated sharing platform; a wikipedia for ‘stuff’. Eventually a design guide should become unnecessary. In the meantime, here is some basic current information on how the system works (version 3.0) to help users, testers and co-developers to take it, use it and improve on it.

Wikihouse is a non-profit project, with all intellectual property shared in commons; owned by everyone. However it can – and should – be *used* by anyone, including professionals, but there are limitations. To find out more about licensing and the use of the WikiHouse trademark, click **here**.

DESIGNING IN SKETCHUP



The plugin

At present, WikiHouse uses SketchUp, simply because it is free and relatively easy to learn and use. The WikiHouse plugin can be downloaded from [here](#), install it into SketchUp to download, upload models. You will need to login using a google account. It also has a 'make this house' button, which will go into the model and generate cutting files. Please note this ruby plugin is in development – to find out more, or if you can help us improve it faster, please do join the WikiHouse software group.

Using other software

Teams are using all kinds of software, especially in developing the first parametric scripts; such as Rhino and Grasshopper. Please do share these too in the groups, but if possible export to the SketchUp library as an exchange/sharing format.

Groups, Components and naming

The main important discipline in SketchUp is to rigorously group objects and make components.

Note that a components name in 'Entity Info' will become the part name labelled onto the piece. This document will give more information on part naming later.

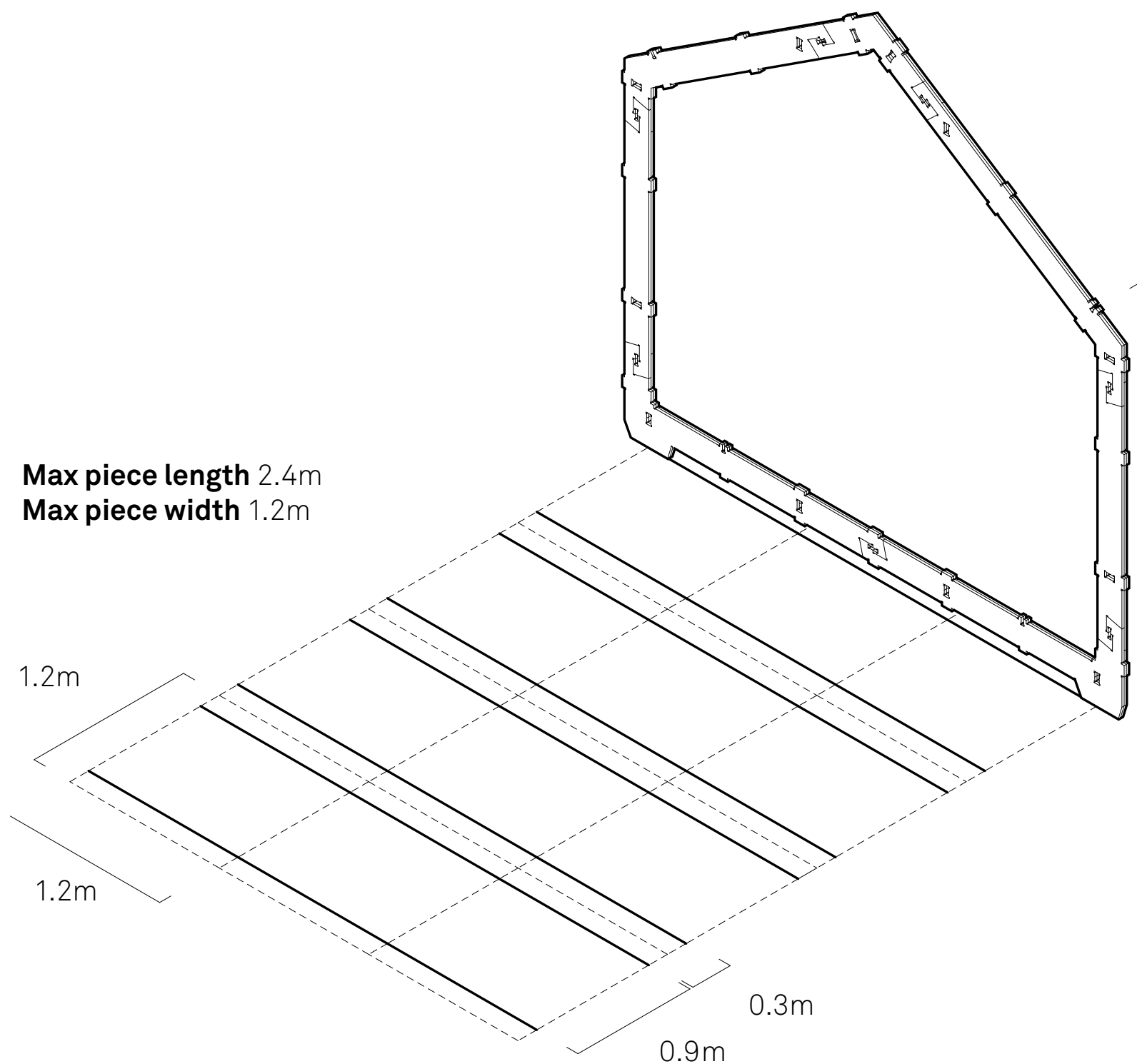
Uploading from Sketchup

When you upload in SketchUp, please set: Camera > Parallel projection then zoom extents (Shift + Z). Then click upload on the WikiHouse plugin toolbar.

You will open a form for giving information about your model, links to other information and a declaration of its current status (Not yet checked by an engineer / checked by an engineer / built or tested)

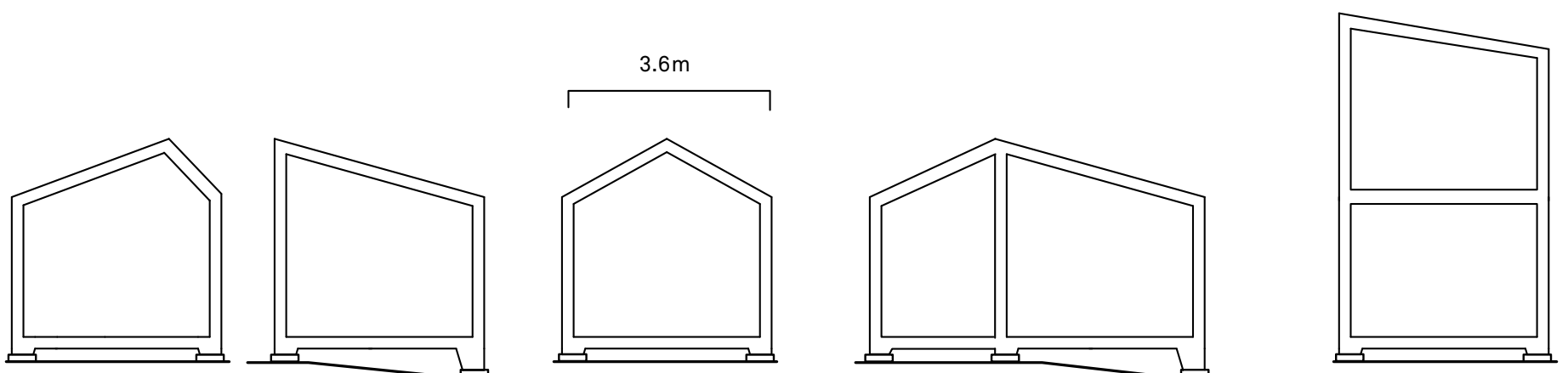
Please click [here](#) for full information on modelling standards, workarounds etc.

BASIC STRUCTURAL GRID

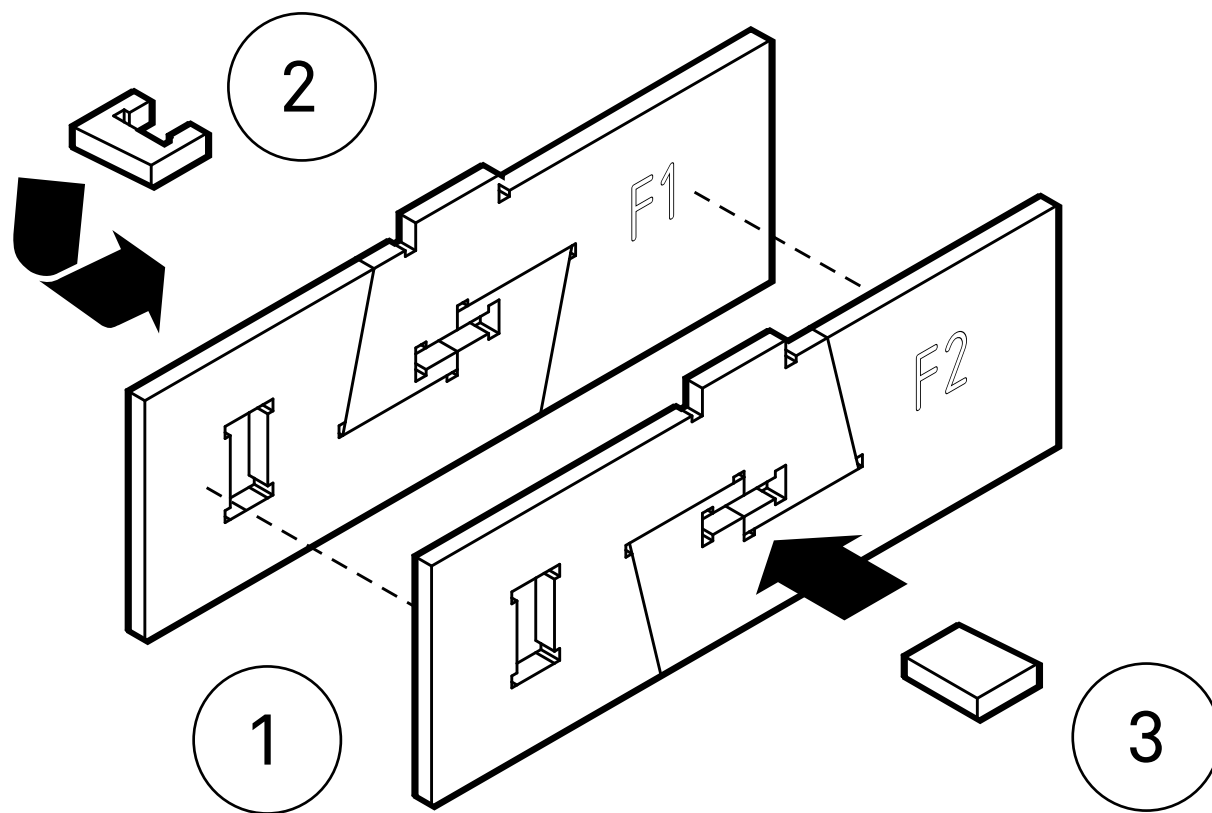


Open standards

WikiHouse does not need to have a single structural grid, but in most countries, sheet materials come in 1200mmx2400mm sheets, or similar, so the basic structural grid is based on that to achieve the maximum efficiency. The system is based on a sequence of frames placed at 900mm and 300mm (alternating) intervals. The length of a WikiHouse is, in theory unlimited, and the roof profile can take almost any shape within reason, but the maximum room span is 3.6m at present. Spans can be combined horizontally. In principle the system can support two storeys, though this has yet to be tested.

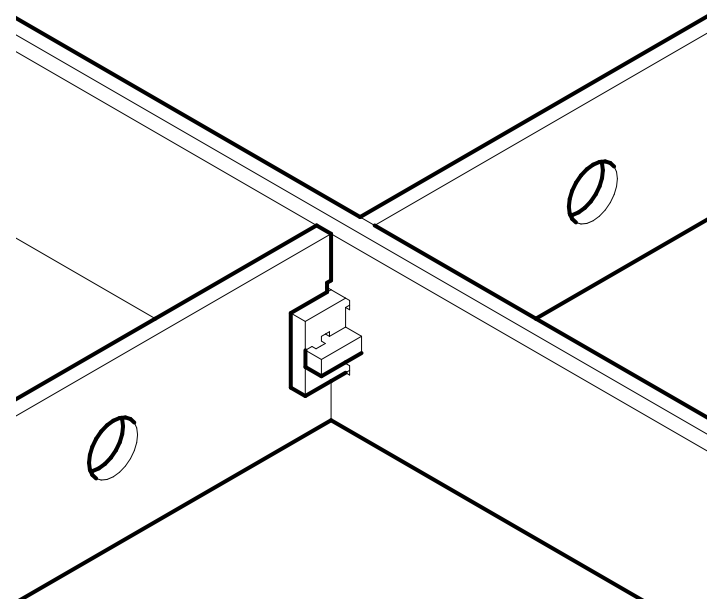
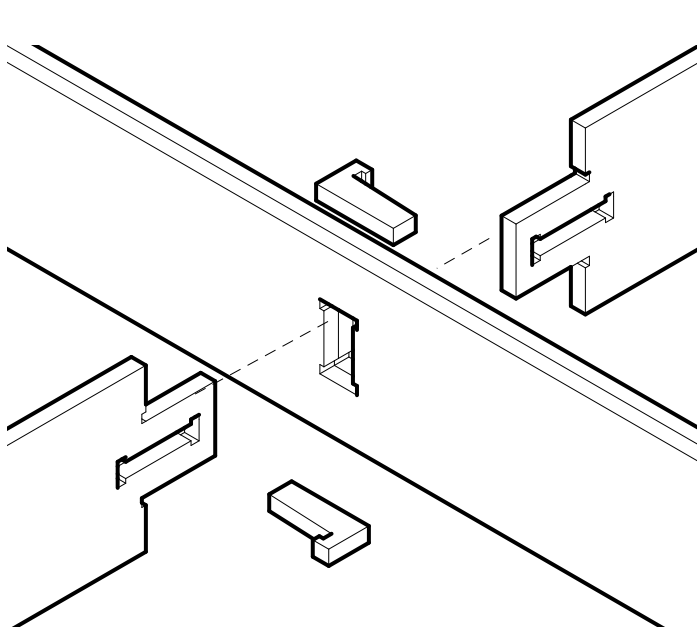


JOINTS



S-Joint

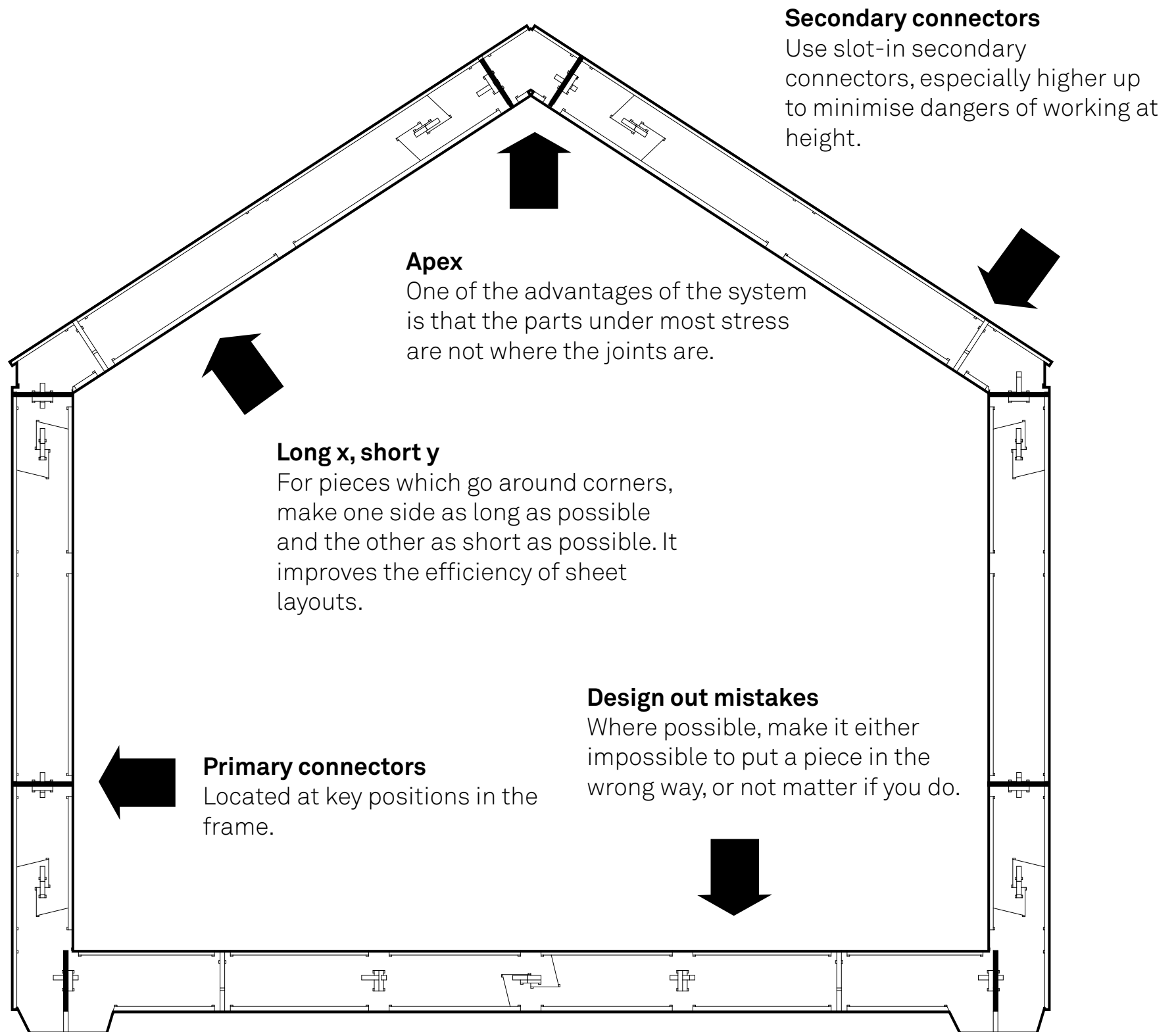
The S joint is a development of the traditional scarf joint, found even in medieval Japanese joinery. It allows the frames to 'pull' together.



Primary connectors

The main connectors slot in and, likewise, use pegs to tighten the structure. Note that the holes are sized so the pegs can be put in either way around. Further to this there are secondary connectors (which just slot in) and the panels themselves, all of which provide additional bracing.

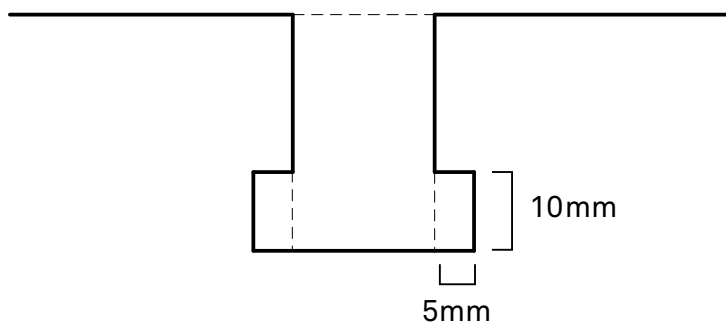
DESIGNING FRAMES



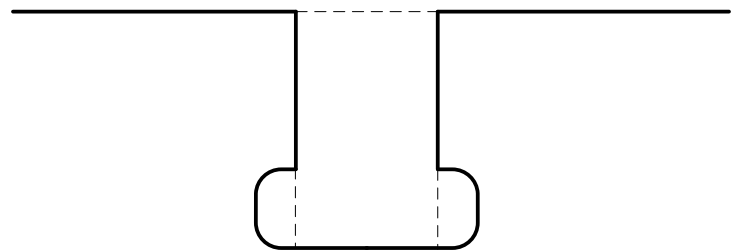
Frame

One of the frustrating things about designing frames in SketchUp is that as you do it, you get a strong sense that the rules are repetitive, and the process could be automated / scripted. For now, the above rules of thumb are useful in positioning S-joints and primary connectors around the frame profile.

CUTTING + OFFSETS



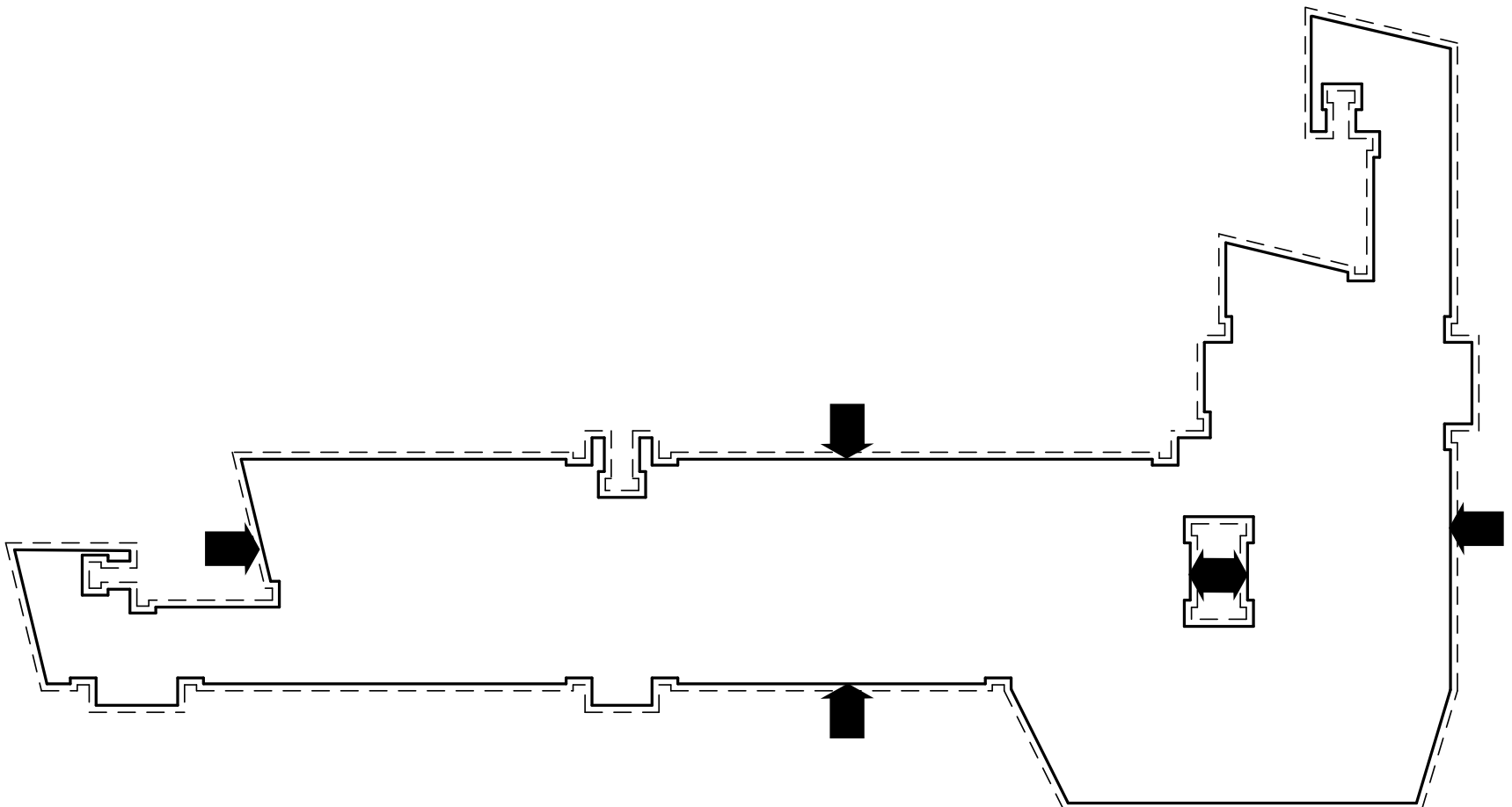
IN MODEL



AS CUT

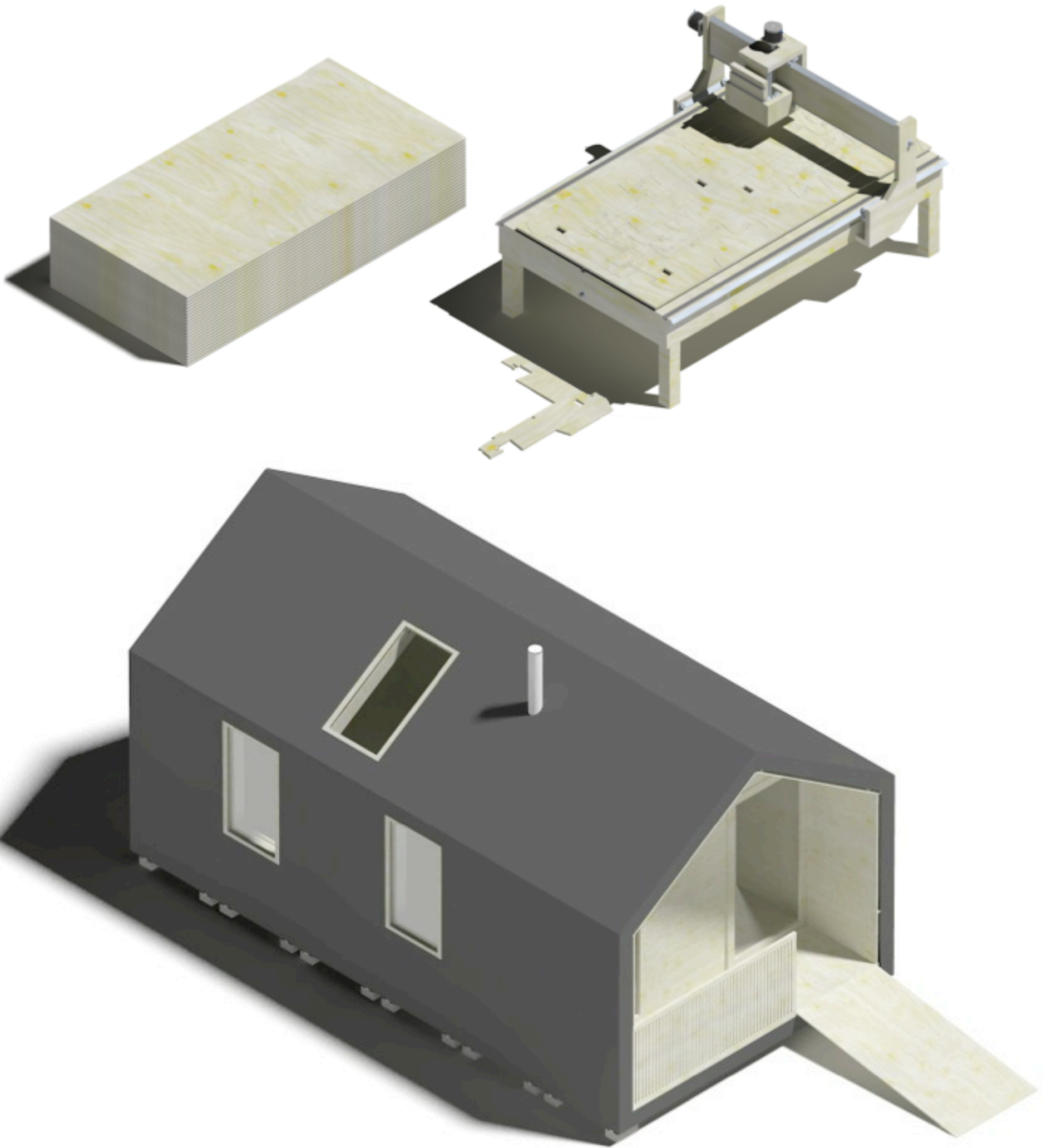
Dogbones

To allow for different sizes of milling piece (typically between 6mm and 9mm) put in dogbones to allow full internal 90 degree angles. Curves tend to be memory intensive and slow, so just draw 10mm x 5mm rectangles and the CNC machine will infer the rest.



Offsets

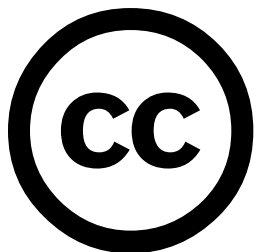
In computer world, two connecting pieces are infinitely close to each other. Reality, obviously doesn't work like that – tolerances are needed, and are put in by offsetting edges inwards. Eventually this should be automated, but for now it is necessary to do it manually. Offset amounts vary depending on material and climate, but 0.1mm-0.3mm offsets are typical. Too tight, and the structure will be very hard to put together. To test your offsets, download and adapt [the Wikihouse test cutting / calibration piece](#).



Other house systems

Solutions / specifications for other house systems such as cladding, services, insulation etc are currently in development. In the google groups there is a spreadsheet with shared costings and specifications. [Click here to view it.](#) If you are building a project, please create a new sheet and share your spec / costings.

LICENSING & LIABILITY



WikiHouse Hardware License

WikiHouse hardware (design files and any associated instructions) are currently published and shared under Creative Commons non-commercial license. This does not mean that they cannot be used by professional designers and makers, it simply means you can only use them to make houses procured for the primary purpose of having as a place to live, not as an asset to sell or rent. This is currently under discussion, please contact us if you have questions or concerns. **More >**

WikiHouse Software License

WikiHouse software is published in the Public Domain under the Ampify Unlicense. This means there are no restrictions limiting its use. **More >**

WikiHouse Name & Logo

Only the WikiHouse name and logo is protected, which just allows us to say what is and isn't part of the WikiHouse project. You may use the WikiHouse logo for reference, but you may not call your project a WikiHouse project with requesting license to do so. In future we plan for even the WikiHouse trademark to open to all under a community charter signup.

DECLARATION + DISCLAIMER

By downloading / uploading models to WikiHouse you accept / declare:

1. **Liability Waiver** All information shared over www.wikihouse.cc is used entirely at your own risk. Although users must always honestly declare the extent to which designs have been checked, tested and used, all users must agree to use the system with caution, to fulfil all required safety checks and legal measures in their jurisdictions and that neither WikiHouse nor team members can be held liable for injuries connected to using the information on this site.

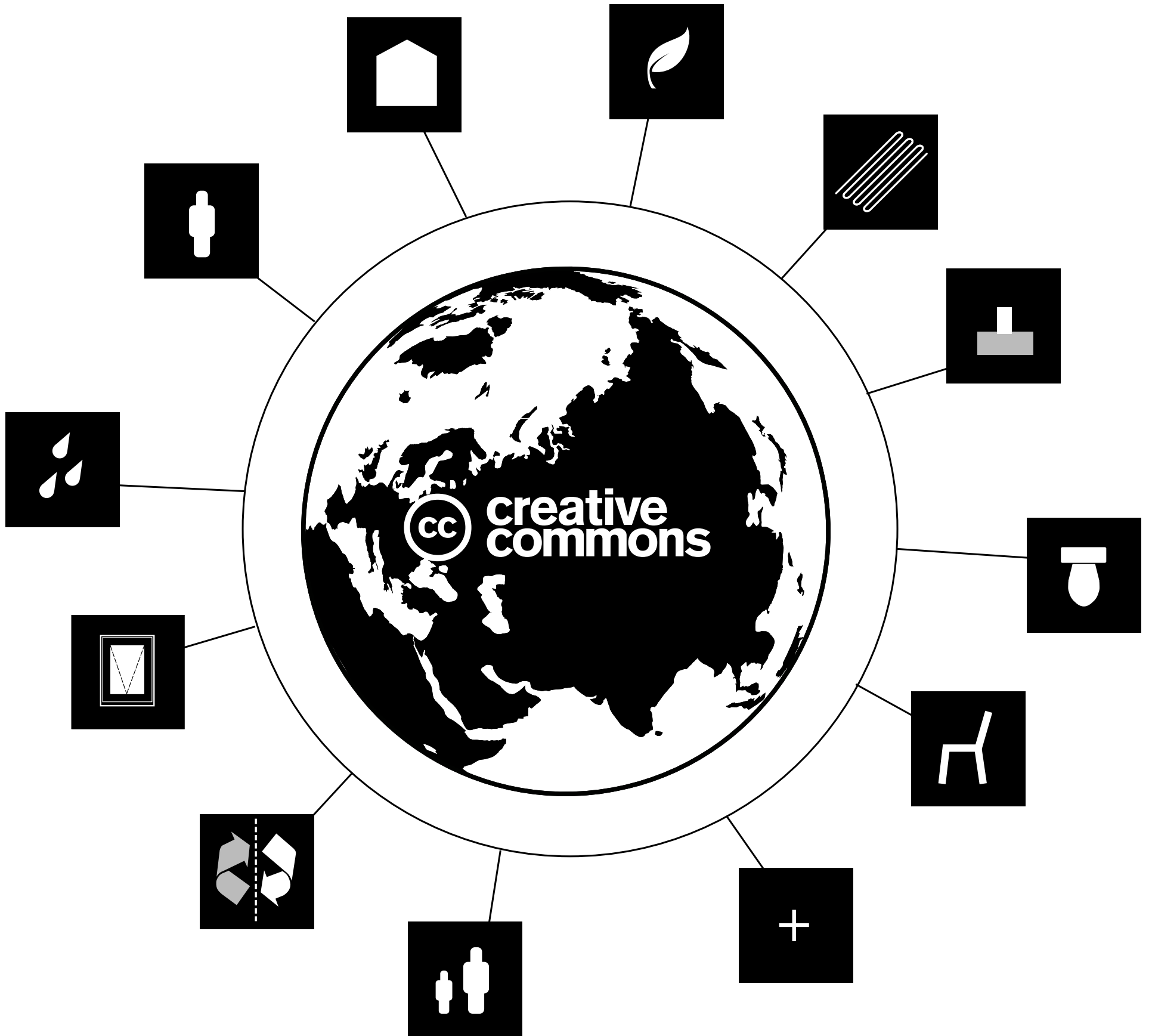
2. **Rights** By uploading content to WikiHouse you declare that you own all the rights to that content, and are not infringing anyones patent / copyright.

3. **Complaints** In the event that you consider any information / commentary shared on wikihouse.cc as defamatory, you must contact the team directly to investigate, and if your complaint is justified, to remove that content.

FUTURE DEV GOALS



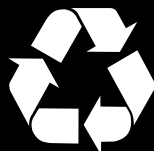
Full information on open development challenges will be shared by the WikiHouse community, but as an overview, they fall into three overlapping categories: design automation software (lowering thresholds of time, cost and skill in designing for each need / context), hardware (physical structures) and the sharing platform (a construction wiki and easy to use community collaboration platform. If you think you have the skills to achieve or contribute to any aspect of these goals / milestones, please join the community groups.



10 DESIGN PRINCIPLES



1. 'BE LAZY LIKE A FOX'. Don't reinvent the wheel. Copy, adapt, give credit, share. (Thanks Linus Torvalds & Eric S Raymond)



2. OPEN MATERIALS

Cheap, abundant, low carbon materials.

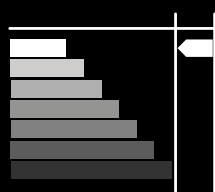


3. DESIGN TO LOWER THE THRESHOLD. Cost / time / skill. That's when design is disruptive.



4. DESIGN LOCAL, SHARE GLOBAL

You don't need to solve everyone's problems. Design for your needs, then share.



5. RESPECT RESOURCES

Hardware should be as efficient as possible in its use of energy, water and resources.

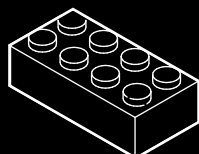


6. INCLUSIVE + SAFE

Maximise the safety, security and health (both mental and physical) of the users at all stages of the structure's life



7. OPEN STANDARDS Always share and make shareable.



8. DESIGN FOR DISASSEMBLY The easier to dismantle structures or replace individual parts, the better.



9. DESIGN FOR MISTAKES Make it hard to get wrong, or not matter if you do.



10. "IT IS EASIER TO SHIP RECIPES THAN CAKES AND BISCUITS"

- John Maynard Keynes

ABOUT US

00 ('zero zero') is a collaborative design studio of architects, programmers, technologists, social scientists and urban designers practicing design beyond its traditional borders.

We work with individuals, governments, corporations and communities to solve problems, anticipate change, and design deeply successful platforms and places. Throughout, our aim is to reach beyond the design of objects themselves to the social, economic and environmental systems behind them.

www.architecture00.net

Espians are an informal international network of coders, visionaries and creatives.

www.espians.com

Momentum structural engineers. Innovative structural engineers whose projects range from unusual architectural forms to large-scale residential developments. From timber-framed structures to sustainable educational spaces, from adaptable theatres to spectacular stage sets, from state-of-the-art sport and commercial facilities to contemplative gallery environments.

www.momentumengineering.com

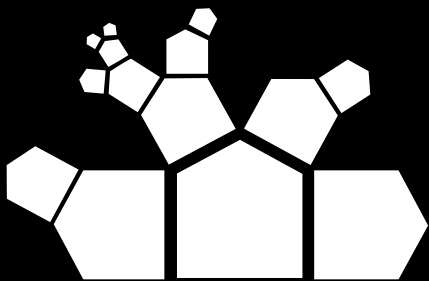
TEAMS

WikiHouseNZ is a project led by spacecraft, a non-profit developing low cost construction methods in the wake of the Christchurch earthquake.

<http://thinkradical.net/>

WikiHouseRIO is a project led by Dharma and Brazilintel, setting up a community making factory in one of Rio's favelas.

<http://wikiuserio.cc/>



WikiHouse^{cc}

www.wikihouse.cc
www.architecture00.net

[Click here to **contact us**](#)

[Click here to **donate**](#)

[Click here to **join the community workspace**](#)