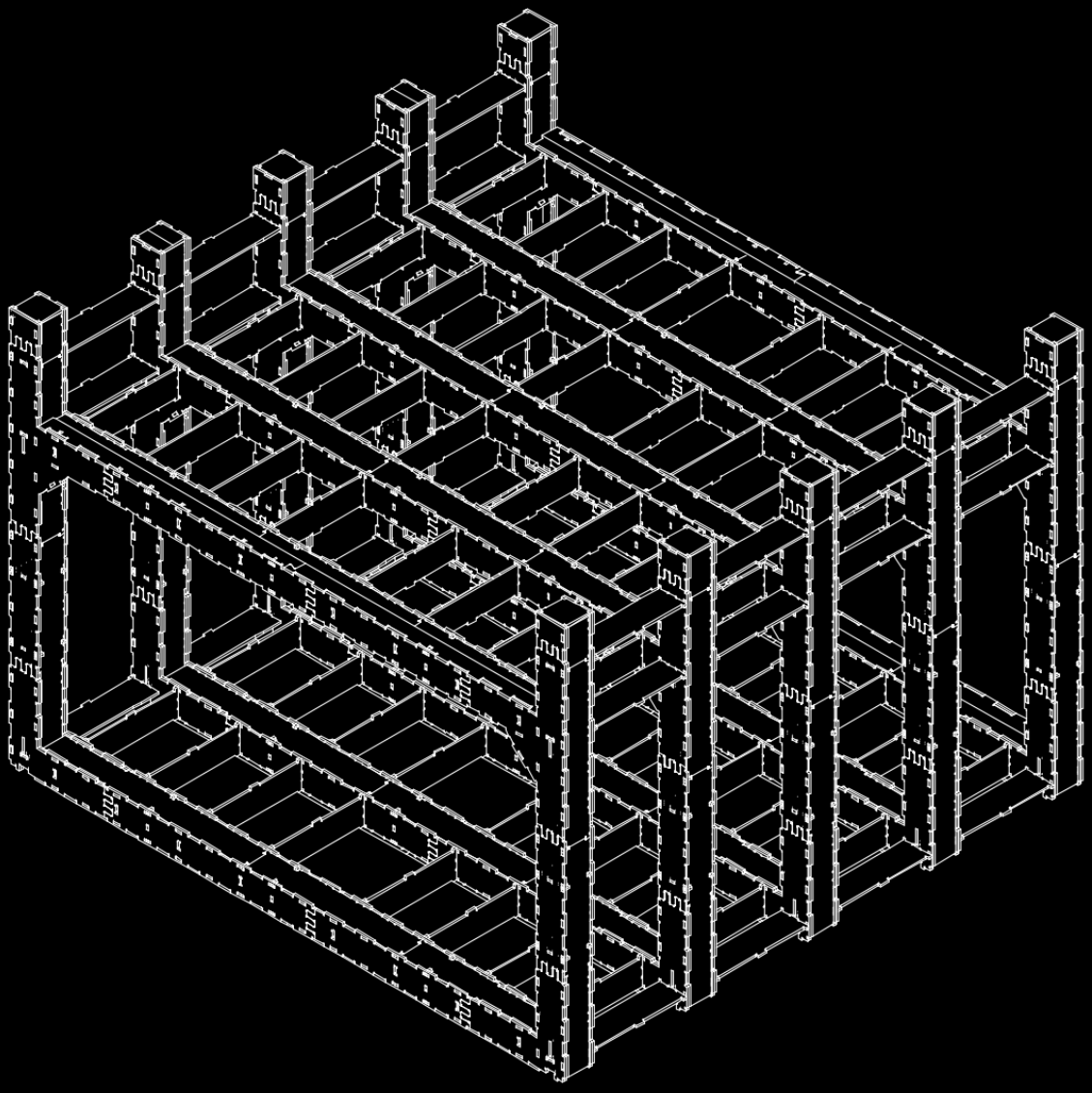


Realisation

Master of Architecture
(ARB/RIBA Part 2)

UCA Canterbury
School of Architecture
2018/19

1806278

CONTENTS

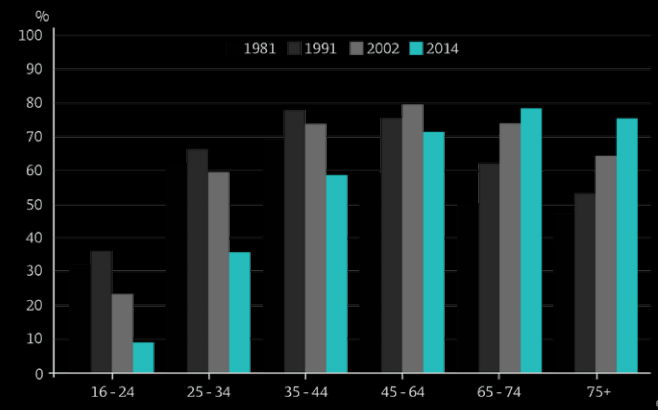
PLEASE SEE A5 CONSTRUCTION MANUAL AFTER

THESIS 01 PROJECT BACKGROUND

Re-establishing the social network

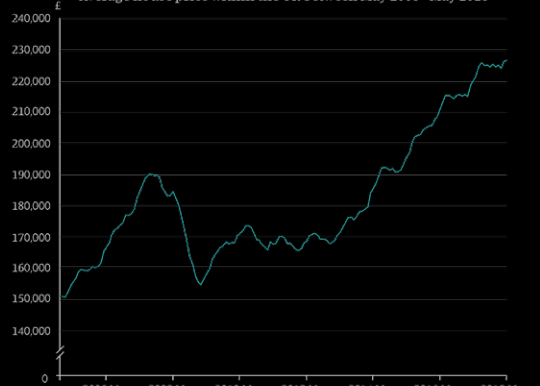
My Thesis 01 project argues the current UK generation, living within a Digital Revolution that offers infinite opportunities for social exchange, knowledge transfer and social mobility, paradoxically is experiencing alarming statistics of social and economic division, loneliness and isolation. Whilst feelings of disfranchisement and disempowerment grow, alongside unaffordable contexts, the social animal is struggling to keep pace with evolutionary demands. Exploring Co Habitation, Co-living and Co-Working models, has led to an opportunity to create a stronger community. The mass disposal of M.O.D Barrack sites within our cities provides the potential canvas for beginning to explore the formation of a societal shift.

Average home ownership age within the UK between 1981-2014



(The Guardian)

Average house price within the UK between May 2006 - May 2018



(Nationwide)

Number of loans granted from the banks within the UK between 1980 - 2015

(Nationwide)

Research into the UK's current housing affordability.

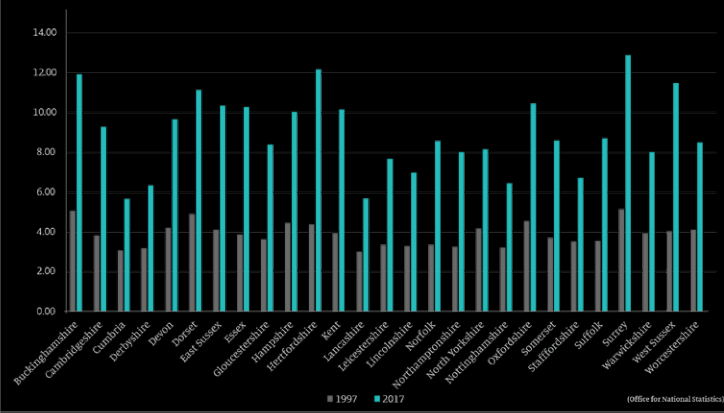
The first graph highlights from May 2004 till May 2018 house prices increased over the years with a starting of £150,000 to nearly £230,000, with expectations to increase more. Even though there was a drop-in house prices in 2008 (due to the financial recession), it is important to note the price of houses has been growing since. One reason why house prices have increased is due to houses not being built quick enough to meet demand. Shelter (2016) notes several reasons as to why this may occur, they claim a lack of available land, low government investment or regulations preventing people building on green space.

Yet, whilst the increased of house prices occurred, there is a pattern of different age groups and those who are homeowners. From 1981, buying a house and becoming a homeowner was more accessible than 2014, from the graph we can notice a pattern that since 1981 to 1991 there was an increase in homeownership for all ages 16-75+, one reason for this was due to the introduction of increased loans from the banks. Yet, after 2002 the pattern starts to decrease for younger people buying homes, with those 16-24 and 25-34 being most affected. This is a continuous pattern until 2014 with a drop of more than half of 16-24-year-olds not buying a house since 2002 and nearly half for 25-34-year old. Whilst those at 65+ buying a house is still continuing to increase. Therefore, it seems for the younger generation buying a home is only getting more difficult- with the average first-time buyer buying their house in their thirties compared to 1960s first-time buyer at 23 year olds (Express, 2018)

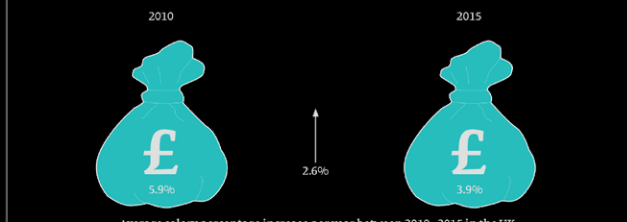
During the mid-80s loans from the banks were at its highest. This peak led to affordability for people to become homeowners. Yet because banks were lending so many loans, when it came to people having to pay back the loans they could not afford to do so because banks only kept increasing the rate of interest on the loans due to housing market inflation rates. Although, rates went up and the hourly wage did too, the pace of the rates were not matching- rates were higher than the percentage increase of wages, this is one of the reasons as to why the recession occurred. As a consequence, after the post-crash the amount of loans has decreased from the mid-80s (roughly over 600,000 loans) to nearly 300,000 in 2015.

The last two graphs focus on the annual wages and house prices. Even though the median quartile income to house prices is 12 times higher, those at low quartile the price of houses was even more than 12 times higher. Therefore, highlighting how housing is even more difficult for those on low income. Even though the hourly wage percentage per year has increased, again, house prices are constantly increasing more- housing is becoming more and more less affordable.

Ratio of median house price to median gross annual (where available) workplace-based earnings by county, England, 1997 to 2017



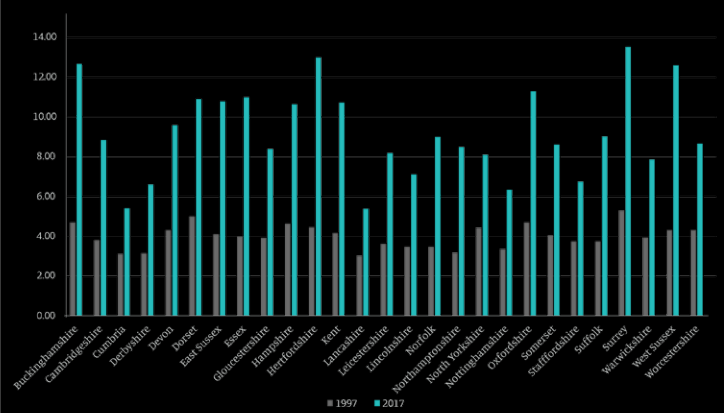
(Office for National Statistics)



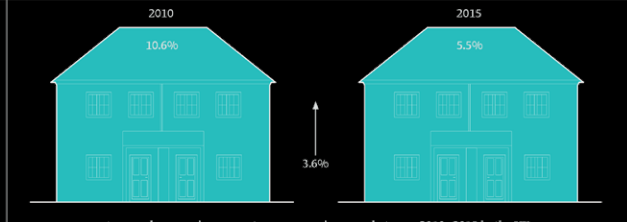
Average salary percentage increase per year between 2010 - 2015 in the UK

(Office for National Statistics)

Ratio of lower house price to lower gross annual (where available) workplace-based earnings by county, England, 1997 to 2017

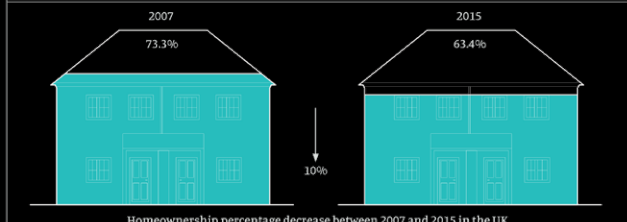


(Office for National Statistics)



Average house price percentage per year increase between 2010 - 2015 in the UK

(Office for National Statistics)



Homeownership percentage decrease between 2007 and 2015 in the UK

(The Institute of Fiscal Studies)

Over 52% of parents have had a problem with lonliness

(British Red Cross and Co-op)

50% of disabled people will be lonely on any given day

(Sense)

1 in 3 people aged 75 and over say feelings of loneliness are out of their control

(Independant Age)

58% of migrants and refugees in London describe loneliness and isolation as their biggest challenge

(The Forum)

43% of 17-25 year olds using Action for Children services experienced problems with loneliness

(Action for Children)

Over 9 million adults are often or always lonely

(British Red Cross and Co-op)

Research into loneliness within the UK's society today.

Statistics provide evidence for loneliness, over 9 million adults are often or always lonely (British Red Cross and Co-op)- around 14% of the population. With such a rise this has even led the government to respond . In mid-January 2018 London appointed a "minister of loneliness"— the first European nation do so.

Various members of society are affected by loneliness. The U.K.'s Office for National Statistics(ONS) found that 16 to 24 year-olds reported feeling more lonely than pensioners between the ages of 65 to 74. Technology, like the internet, is seen as a source of isolation for young people. The graph to the right supports the high rate of loneliness, roughly 46% of adults the equivalent to 23 million people (Statista, 2016) feel 'often, sometime of the time or occasionally' lonely. Data shows that amongst the adult population in Britain the poor, unemployed, disabled and migrant populations tend to suffer most from loneliness and isolation—and typically struggle to access adequate support.

There are multiple reasons as to why people feel alienated, sociological and economical aspects are key reasons. The Coop Trapped Bubble Report state four aspects that can affect the individual and trigger isolation:

1) Sense of self, health, income, energy, confidence, emotions, perceptions- how people perceive themselves, for example, someone of low income may see themselves at the bottom of society as their jobs are not regarded as the 'best' due to the type of work and income society has labelled, creating a negative perception of themselves.

2) Friends and acquaintances, family, colleagues- close-knit bonds can create stability and support for individual.

3) Social activities, funding cuts, statutory services, transport, neighborhood safety- government influence, what is being spent on communities?

4) Social and cultural norms, work/life balance, stigma, digital age, insular communities, political landscape, financial hardships- societies expectations, is there a good support network in the community for the individual.

This research clearly identifies that loneliness is growing problem that needs to be addressed within the UK today.

Disconnected communities could be costing the UK economy £32 billion per year

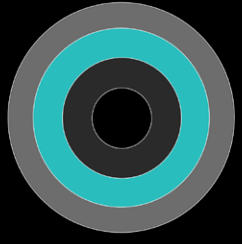
(Big Lunch)

1 in 10 doctors questioned reported seeing between six and ten lonely patients a day.

(Campaign to end loneliness)

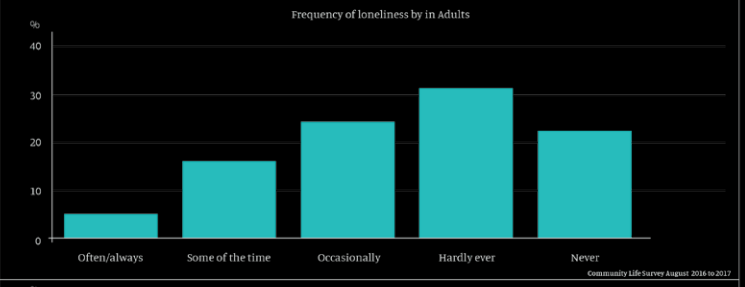
Loneliness costs UK employers £2.5 billion per year

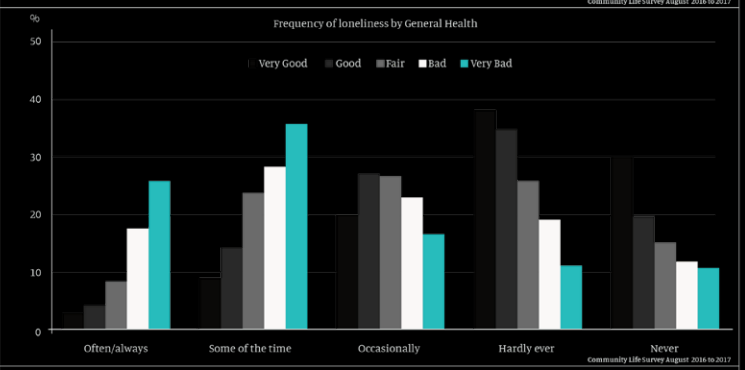
(Co-op)

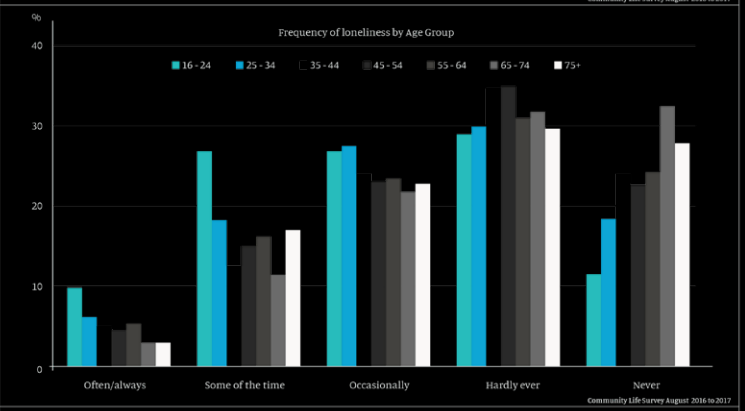


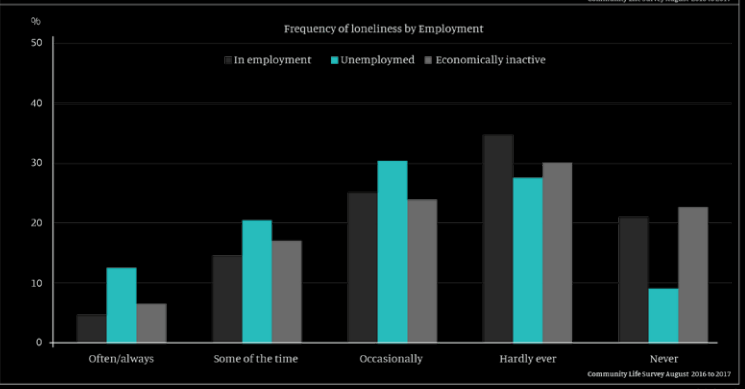
- Sense of self, health, income, energy, confidence, emotions, perceptions
- Friends and acquaintances, family, colleagues
- Social activites, funding cuts, statutory services, transport, neighbourhood safety
- Social and cultural norms, work/life balance, stigma, digital age, insular communities, political landscape, financial hardships

(Coop Trapped Bubble Report)









Department for Communities and Local Government Technical housing standards - nationally described space standards

Number of bedrooms (b)	Number of bed spaces (persons)	1 storey dwellings	2 storey dwellings	3 storey dwellings	Built in storage
1b	1p	39 (37)			1.0
	2p	50	58		1.5
2b	3p	61	70		
	4p	70	79		2.0
3b	4p	74	84	90	
	5p	86	93	99	2.5
	6p	95	102	108	
4b	5p	90	97	103	
	6p	99	106	112	
	7p	108	115	121	3.0
	8p	117	124	130	
5b	6p	103	110	116	
	7p	112	119	125	3.5
	8p	121	128	134	
6b	7p	116	123	129	
	8p	125	132	138	4.0

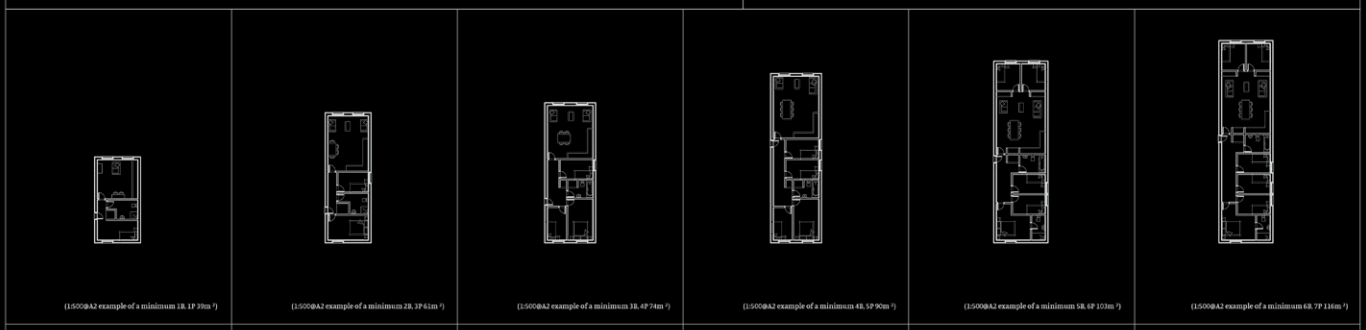
Exploration into how much space humans need to live.

Continuing from the previous pages of the UK's housing markets and affordable housing, this page explores the current spaces set out by the UK's Technical Housing Standards. The table shows the minimum area in m^2 needed to be provided by a new development to meet building regulations. The standards also supply information on minimum room widths and minimum ceiling heights.

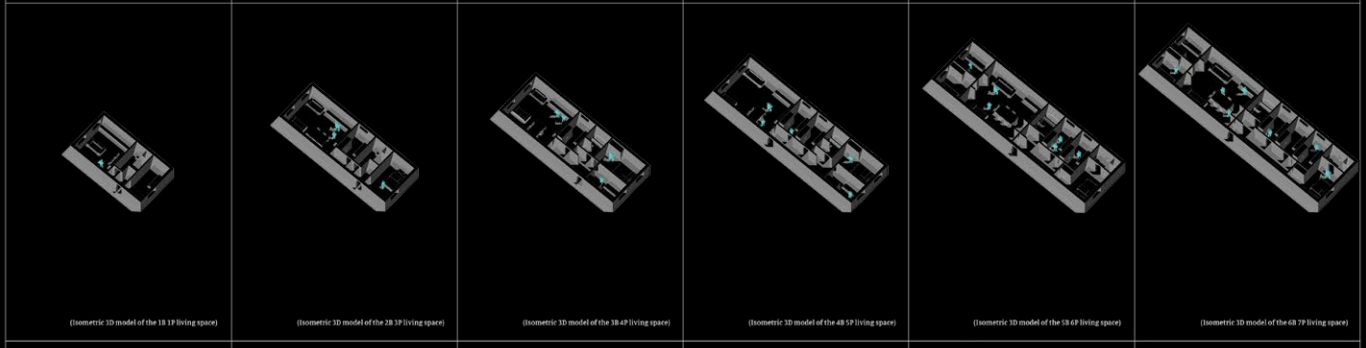
This exploration focuses upon the 1 storey dwelling and a sample plan and model for each. In doing so there is a fictional sense of space. The standards are in place to deliver a quality of space as it has a direct link health and to ensure the necessary utilities are provided for living. Furthering this notion of space, this exploration tests boundaries of how much space do we need?

The testing begins with the private bedroom for a single person. The new space provides enough space for a single bed, a small cupboard and enough space to turn. Can a room still provide its purpose, of being a space to sleep, without meeting the specified space standards? After creating a 2m x 2m room, the plan is rotated four around a central space, where the access will follow. The 'pod like rooms' are then pushed apart by 1m to create an access to this space. Once this tartan grid was inserted, tightly compacted spaces are plugged into it to create the utilities that a home would need. The total space for 4 single bedrooms totaled $50m^2$. For 4 people the space required by the standards is $74m^2$ and for 4 bedrooms 5 people $90m^2$. This testing has reduced the total m^2 set out by the standards, whilst also providing the bare minimum for a home. Testing further explores extra levels, adding circulation cores for stacking, and expands upon the singular plane. It can be argued the quality of space has been drastically compromised through this process, but provides the required minimum space needed for survival with the benefit of a reduction in material costs.

The Biennale Venice study visit in the summer gives an insight into 'free space', a term used heavily throughout the world today and has a direct link to this page. The Switzerland pavilion explores domesticated spaces. Throughout this pavilion the sense of space provokes feelings of comfortability, tightness, spaciousness and the stupendous. Whereas the Nordic Countries pavilion provides comfortability with nature and spaciousness.



(1:500@A2 example of a minimum 1B, 1P 39m ²) (1:500@A2 example of a minimum 2B, 3P 61m ²) (1:500@A2 example of a minimum 3B, 4P 74m ²) (1:500@A2 example of a minimum 4B, 5P 90m ²) (1:500@A2 example of a minimum 5B, 6P 103m ²) (1:500@A2 example of a minimum 6B, 7P 116m ²)



(Isometric 3D model of the 1B 1P living space) (Isometric 3D model of the 2B 3P living space) (Isometric 3D model of the 3B 4P living space) (Isometric 3D model of the 4B 5P living space) (Isometric 3D model of the 5B 6P living space) (Isometric 3D model of the 6B 7P living space)

(1:200@A2 - breaking space standards, private space 1b 4m ²) (1:200@A2 - plugging 4 private spaces together 4b 16m ²) (1:200@A2 - Adding circulation space 4b 16m ²) (1:200@A2 - Adding social living spaces 4b 50m ²) (1:200@A2 - Adding social living spaces 4b 50m ²) (1:500@A2 - Testing 4 blocks connected 16b 280m ²)

(Biennale Venice Study Visit) (Biennale Venice Study Visit) (Biennale Venice Study Visit) (Biennale Venice Study Visit) (Biennale Venice Study Visit) (Biennale Venice Study Visit)

Research into Ministry of Defence sites closing.

Headlined across both national and local news industries is the UK's plans to close 68 Ministry of Defence sites. The closure will save the country £3billion in running costs by 2040.

The 'A Better Defence Estate Nov 2016' shows the foreclosure of these sites and the map indicates where these sites are located. The strategy states that 91 of the most expensive running sites will be closed, implying due to running costs of the existing infrastructure.

The strategy is to sell the land to developers and predicts 55,000 new homes to help parliament meet the current housing demands.

ARMY BARRACKS

01) Buckley Barracks (Hullavington Airfield) 2016
02) Chalgrove Airfield 2016
03) Copthorne Barracks 2016
04) Somerset Barracks 2016
05) Abercorn Barracks 2018
06) Craigiehall 2018
07) Catterick Town Centre Parcel 2018
08) Harden Barracks (Duchess Of Kent Psychiatric Hospital) 2018
09) Burgoyne Barracks 2019
10) Claro Barracks 2019
11) Fitzwygram House (Royal Army Veterinary Corps Centre) 2019
12) Commander and Staff Trainer (North), Catterick 2020
13) Calvary Barracks Hounslow 2020
14) Kneller Hall 2020
15) Parsons Barracks Donnington 2020
16) Prince William Of Gloucester Barracks 2020
17) St George's Barracks North Luffenham 2021
18) Venning Barracks 2020
19) Middlewick Ranges 2020
20) Chilwell Station 2021
21) Queen Elizabeth Barracks 2021
22) Sir John Moore Barracks Winchester 2021
23) Towthorpe Lines 2021
24) Thornehill Barracks 2021
25) Clive Barracks 2022
26) Fulwood Barracks 2022
27) Kinnegar Logistic Base 2022
28) Meadowforth Barracks (HQ 51 Highland Brigade) 2022
29) Redford Cavalry Barracks 2022
30) Redford Infantry Barracks 2022
31) Dale Barracks 2023
32) Aldershot Distribution Outlet 2024
33) Cawdor Barracks 2024
34) Leighton House (AOSB Westbury) 2024
35) Southwick Park 2025
36) Brecon Barracks 2027
37) Beachley Barracks 2027
38) Invicta Park Barracks 2027
39) MOD Woodbridge (Rock Barracks) 2027
40) St David's Barracks 2028
41) Vauxhall Barracks 2028
42) Woolwich Station 2028
43) Buckley Barracks (Hullavington Barracks) 2029
44) Dalton Barracks including Abingdon 2029
45) Azimghur Barracks 2031
46) Carver Barracks 2031
47) Dishforth Barracks 2031
48) Imphal Barracks 2031
49) Robertson Barracks 2031
50) Fort George 2032
51) Glencorse Barracks 2032

RAF BARRACKS

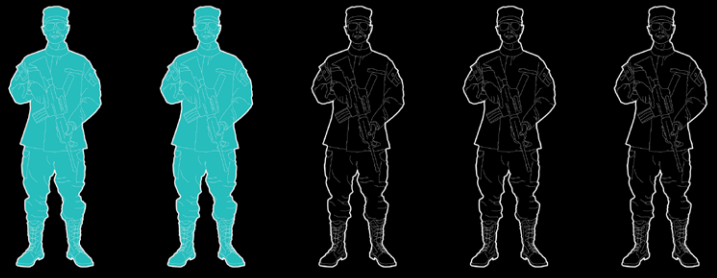
52) Swansea Airport 2016
53) Moat House 2017
54) Newtonards Airfield 2018
55) RAF Henlow Technical Site and Airfield 2020
56) 1300 Parkway Bristol 2020
57) RAF Barnham 2020
58) RAF Mildenhall 2022
59) RAF Halton Airfield 2022
60) RAF Molesworth 2023
61) RAF Alconbury 2023

NAVAL BARRACKS

62) Royal Marines Condor 2020
63) HMS Nelson Wardroom 2021
64) Royal Marines Stonehouse 2023
65) The Royal Citadel 2024
66) HMS Sultan 2026
67) Chivenor Airfield and Barracks 2027
68) Norton Manor Camp 2028

£140 Million running costs over 10 years rising to nearly £3 Billion in total 2040

(A Better Defence Estate Nov 2016)



Over 40% of built assets are over 50 years old and will need maintenance

(A Better Defence Estate Nov 2016)

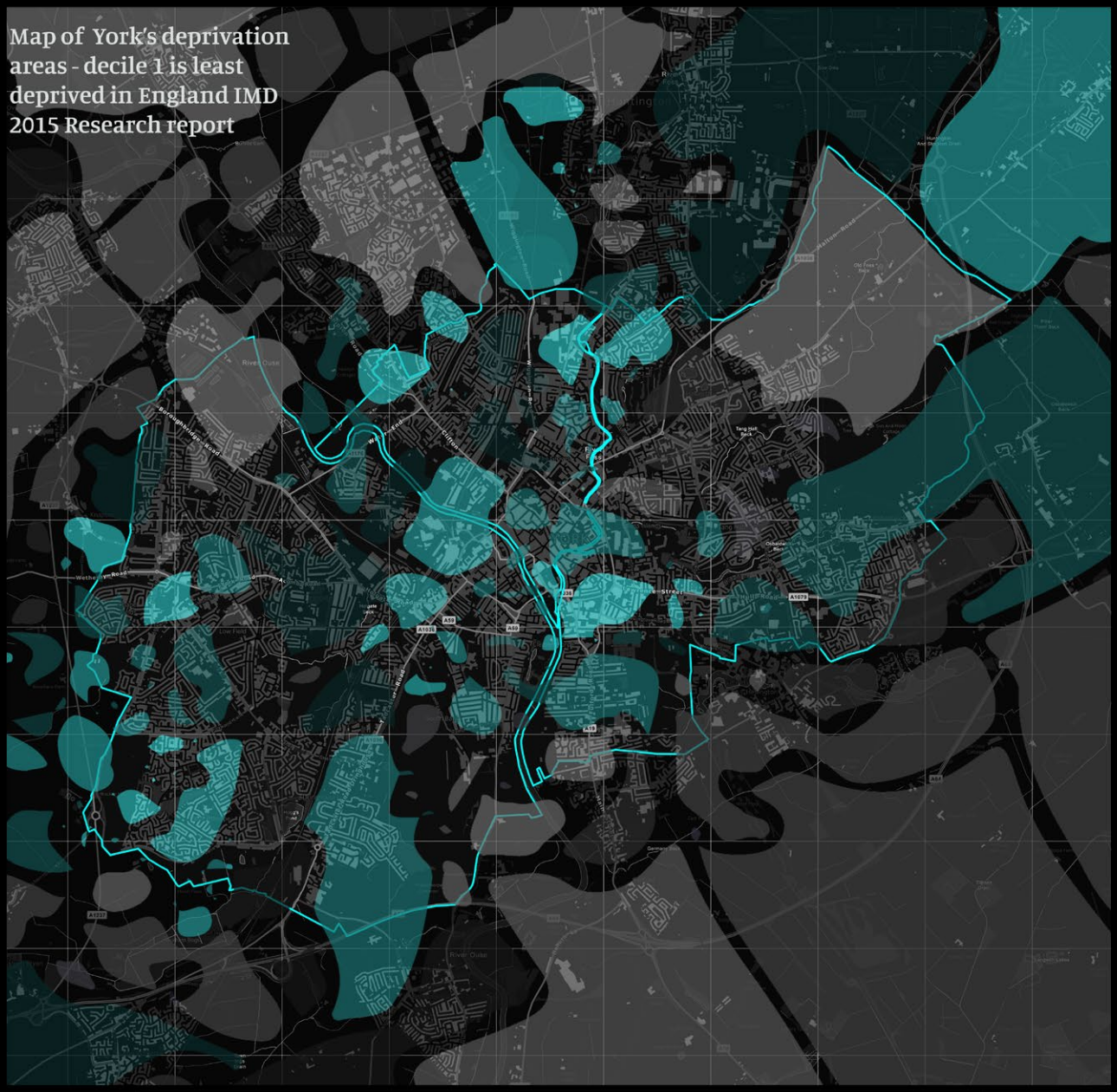
91 of the UK's most expensive sites will be closed by 2040

(A Better Defence Estate Nov 2016)

Scale 1:20000

0 200 400 600 800 1000 1200 1400 1600 1800 2000 m

Projection: British National Grid



970 new homes built in 2017.
(York Press 2017)

90 affordable homes built in 2017.
(York Press 2017)

573 assessed need of affordable homes needed per year in York.
(York Press 2017)

Rated greatest inequality between the well-off and the badly-off of any city in the North of England.
(York Press 2017)

1,400 homes to be built on 2 Ministry of Defense sites: Imphal Barracks and Queen Elizabeth Barracks.
(York Press 2018)

769 homes at Impahal Barracks to the south of York, by 2031.
(York Press 2018)

623 homes at Queen Elizabeth Barracks to the north of York, by 2031.
(York Press 2018)

York's rough sleepers increased by 61% in the last year.
(Ministry of Housing, Communities & Local Government 2018)

7,288 one parent households in York 2011.
(Office for National Statistics 2011 Census)

70% single parents living in poverty.
(City of York Child Poverty Strategy 2011 – 2020)

8.4% of pupils 2011/2012 reported feeling 'often' feeling lonely in Primary school.
(City of York Council 2012)

8.4% of pupils 2011/2012 reported feeling 'often' feeling lonely in Primary school.
(North Yorkshire Older People's Partnership Board 2013)

Research into housing and lonlieness in York.

After analysis and exploring key spaces within the Imphal Barracks, this page analyses information on the City of York. The map above highlights the stark inequality within York. It highlights deprived areas and ranks them against the UK, clearly illustrating an inequality throughout York.

The City of York Child Poverty Strategy approximates 70% of single parents are living in poverty. This suggests an approximation of 5,101 people, in York, live in poverty. Furthermore, during 2017 970 new homes were built, but under 10% of them were affordable. The Prime Minster (2018) claims York has not had a Local Plan for over 50 years (Guardian). The City of York Council submitted its proposal (May 2018) for the City's local plan which is to be implemented in 2019.

The information gathered, alongside rising homelessness statistics, an aging isolated population, and a potential site gives an opportunity for a co-living model to implemented as a strategic intervention for the populous of York.

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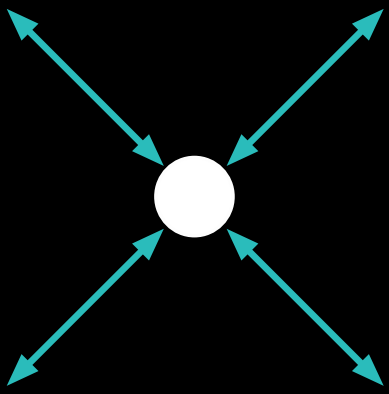
Affordability



Change with circumstances

Promote social interaction

THESIS 01 CONCLUSION

Core concepts

Through the exploration of sites, deprivation maps, explorations into spaces and the technical space standards has concluded with a site, The Imphal Barracks York, as a site location to explore a technology that can deliver the core concepts driving the Thesis argument. The technology must deliver on; Affordability, Flexibility, Promoting Social Interaction.

RESEARCH INTO OFFSITE MANUFACTURING

Image source: WeberHaus

Image source: WeberHaus

Image source: WeberHaus

Image source: WeberHaus

Image source: WeberHaus

Image source: WeberHaus

Precedent - WeberHaus

Off-site home manufacturing

WeberHaus is one of many offsite modular home construction companies I have researched and explored. The company uses a 'conveyor belt' system to produce each component part that is assembled offsite in a factory and then craned onto site. One quote being 'you can now get a home that looks like it has been designed by an architect… without the architect.' The advantages of choosing this system would be a highly U-valued home in a fast time, at a high quality. However, this comes with an extra cost. Due to the extra cost, an alternative method of construction was researched and explored as the extra cost conflicts with my running Thesis argument.

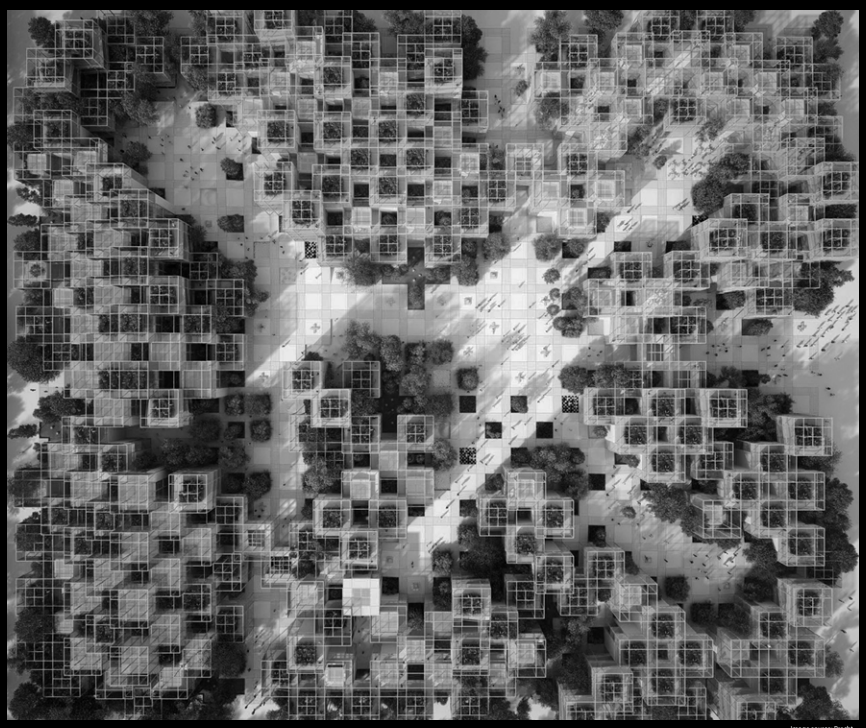


Image source: Precht

Image source: Precht

Image source: Precht

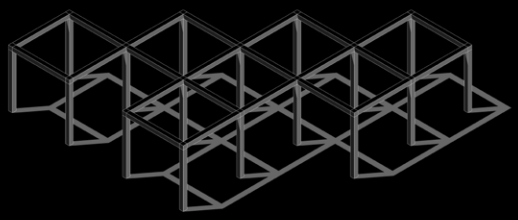
Image source: Precht

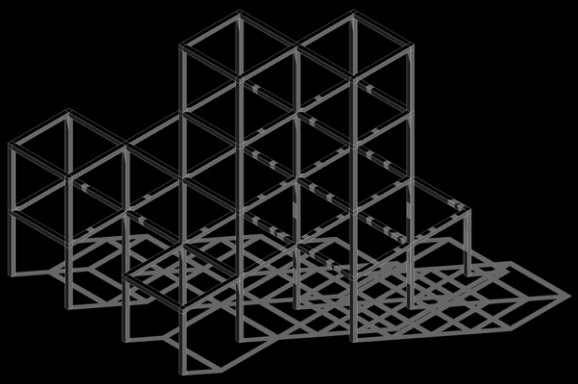
Image source: Precht

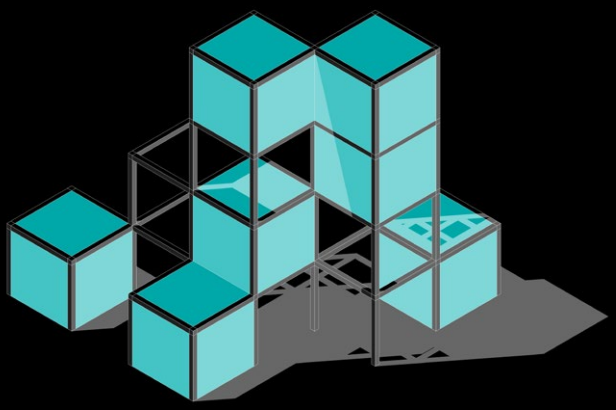
Precedent - Precht Studio

Combining frame & offsite panels

Furthering the research into offsite manufacturing the next precedent Precht Studio. The two separate schemes deliver two different projects on two different levels. The first is a masterplan competition entry, which uses timber frames with a panelling system which allows for flexibility within each of these frames. The second is furniture in a café. This project however delivers the same principles of the frame structure with storages slotted and easily moveable within this structure. The combination of both offsite manufacturing and an onsite frame would reduce the total costs on site, however would be still more expensive than onsite building. However, should something on site go wrong, this would result in a higher cost than an offsite construction method. This then led to the technology needing to do more than allowing the responsibility of the build to be at the hands of highly skilled people, thus reducing costs due to labour or company responsibilities.







Exploration

Framing and offsite panels

RESEARCH INTO 70’S MODULAR SELF-BUILD

Image source: AJ

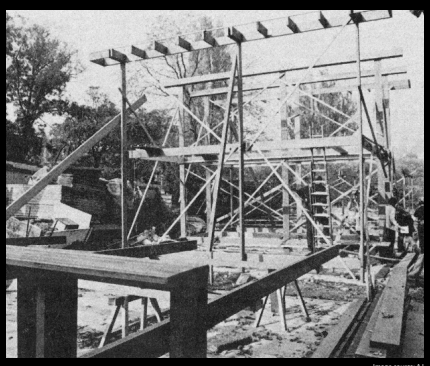


Image source: AJ

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Precedent - Walter Segal

Low skilled modular self build

Researching Walters Way in Lewisham allowed the technological concept to develop past the previous precedent studies. Walter Segal designed a self-build modular system that allowed low skilled people to build their own homes at an affordable price. When interviewed the residents of Walters Way says there is a strong feel for community as most of the residents are still living there after starting to build phase one in 1979. Alice Graham, a resident and guardian writer said, 'We leave the doors open, the children play in the street and run from house to house.' The residents were given a manual with instruction of materials they could all purchase from their local DIY supplier, Perkins. They then constructed their homes together in their spare time as some worked taking a total time of 2 years to build. There is still a distinct sense of self identity per home as the inhabitants have shaped it to their needs and personal styles. Both phases provided 27 affordable homes, that can be expanded when needed, enabled low skilled people to gain a craft skill and created a sense of community.

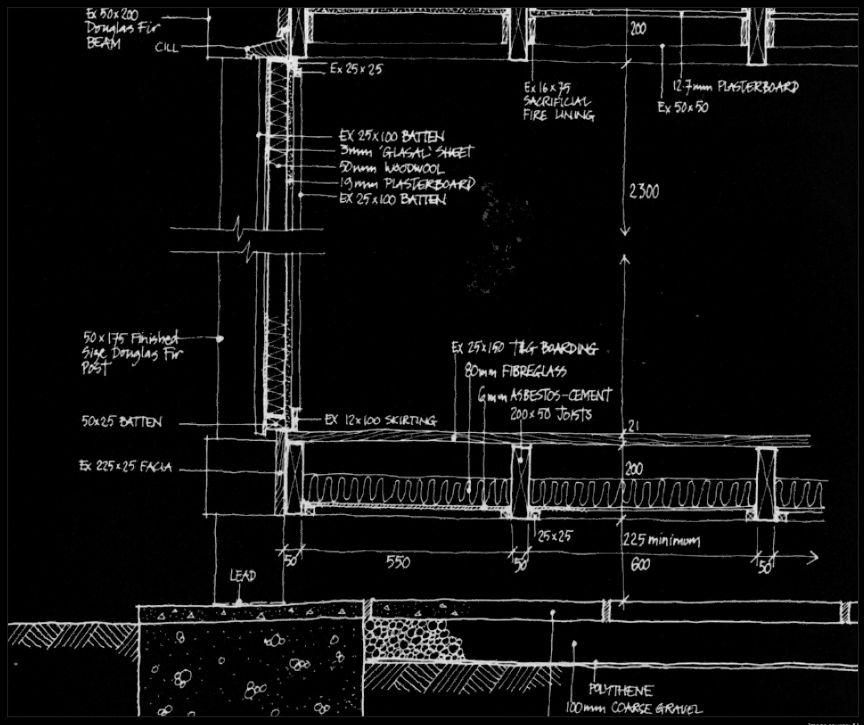
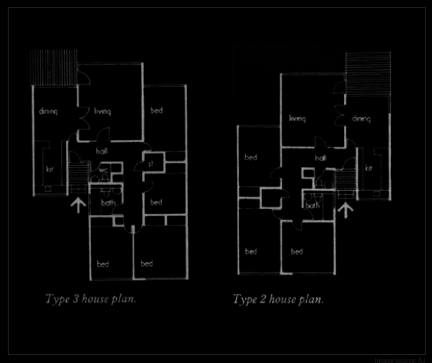


Image source: AJ



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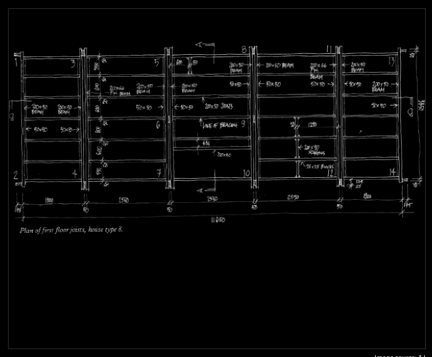
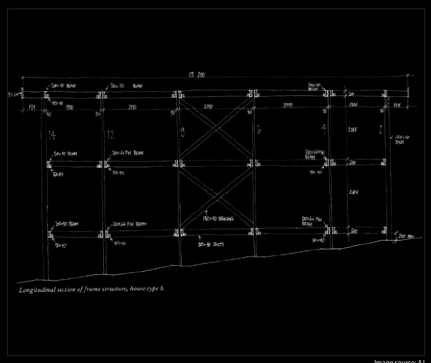
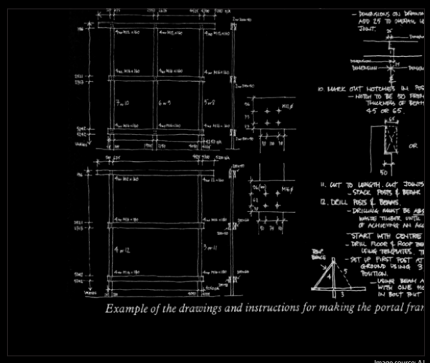

Plan of first floor joists, house type E.
Image source: AJ


Longitudinal section of frame structure, house type E.
Image source: AJ


Example of the drawings and instructions for making the portal fra
Image source: AJ

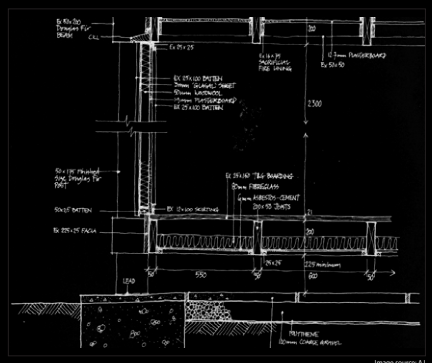
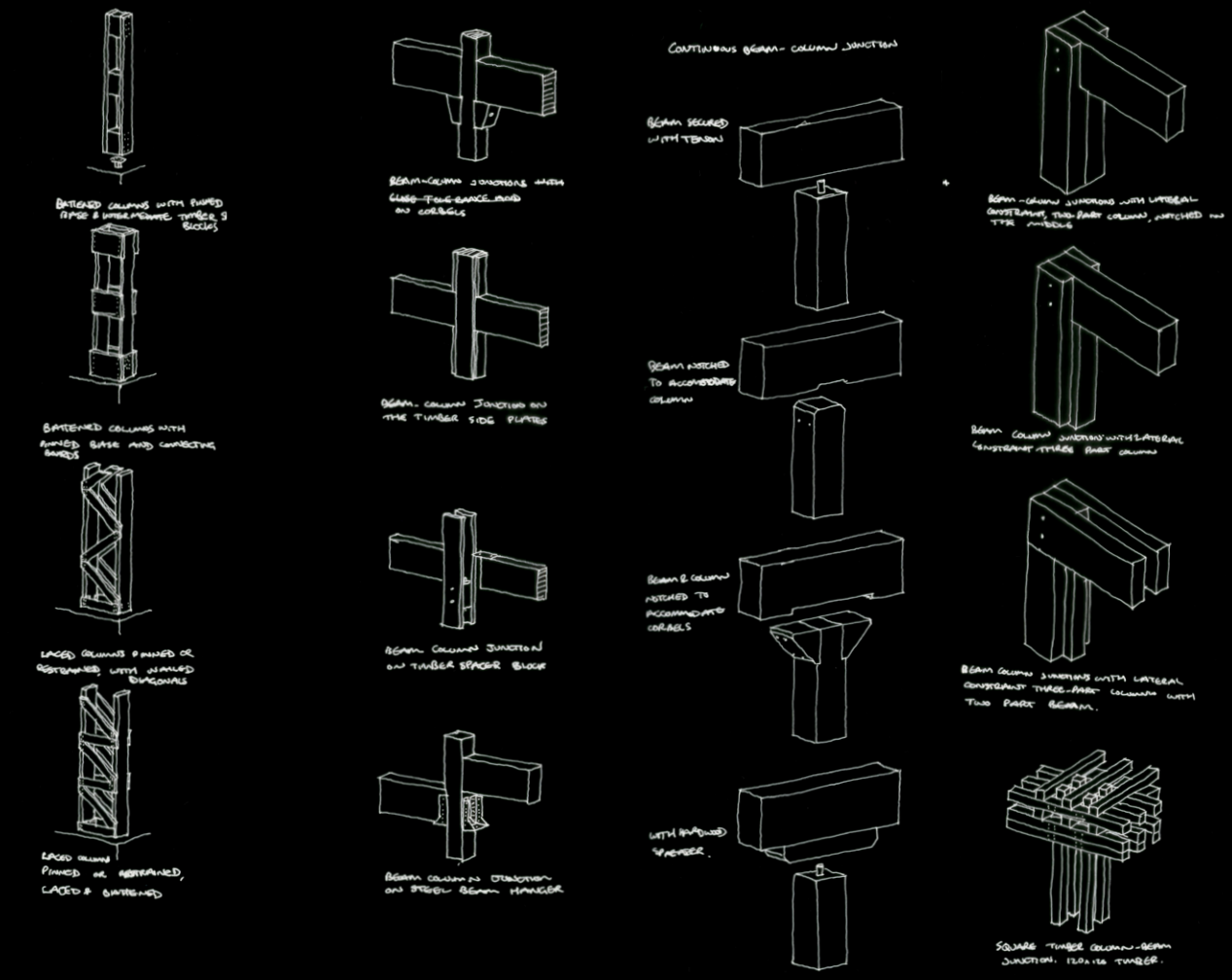
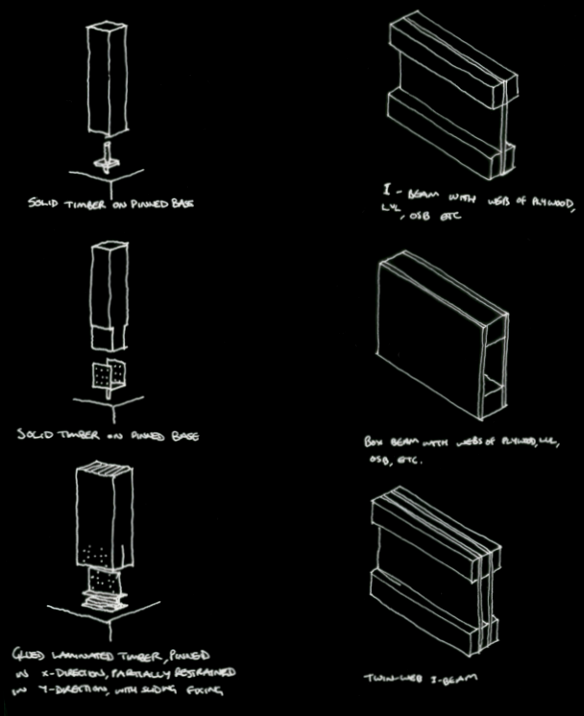


Image source: AJ

Walter Segal's drawings

Collection of drawings from the AJ

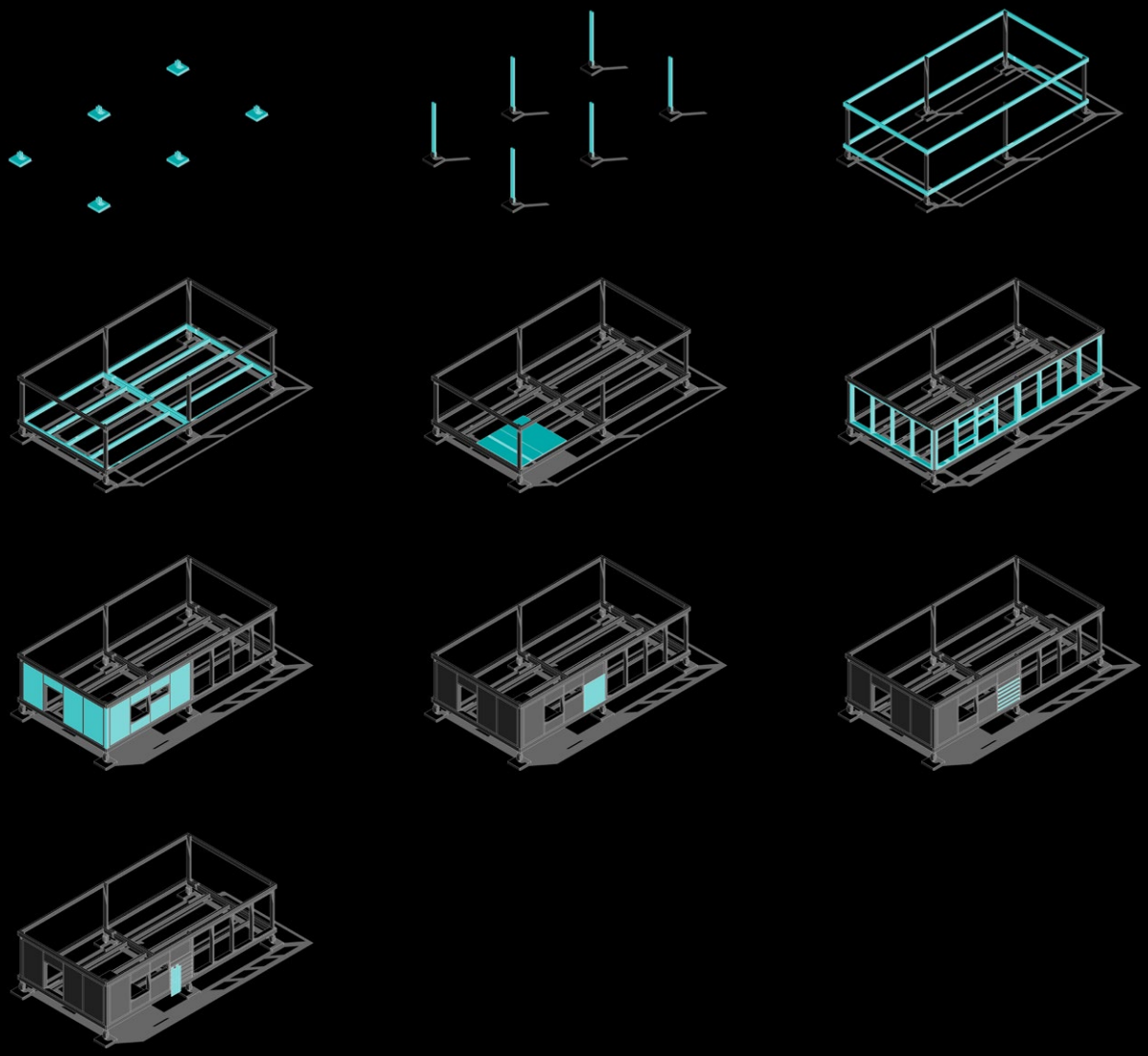




Timber construction details

Exploration of timber joins

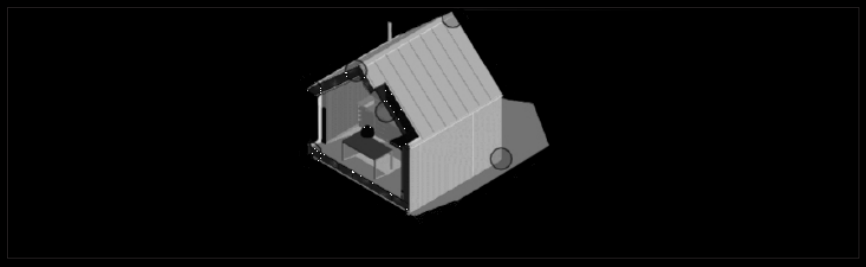
I researched in the Timber Construction Manual by Hertzog and De Meuron and online for various ways of developing upon precedent study Walter Segal. My sketches show a variety of thoughts and joins that could be useful for developing my modular home for my Thesis project.



Exploration of self-build

Testing an expandable frame

RESEARCH INTO WIKI HOUSE CONSTRUCTION



Design to lower thresholds

Design to continuously lower barriers of time, cost, risk, skill, energy, waste, and carbon at every stage.

Modular

Bake knowledge and complexity into pre-manufactured components that are simple and predictable to fit together.

Design for disassembly

Wet-trades are messy, inconsistent, slow and impossible to disassemble. Most parts should slot, click, staple, tape, or be bolted or screwed together.

'Poka Yoke'

Also known as 'mistake-proofing'. Design parts such that it is physically impossible to assemble them incorrectly.

Tagging

Tag parts such that they can be sorted, assembled or maintained without needing to refer to drawings very often. Think 'building by numbers' (or colours).

Start somewhere

No one can solve everyone's problems. Design something that works where you are, then share so others can adapt it for their own economy, climate and culture. Like Darwin's finches.

Open and interoperable

Be as product-agnostic and provider-agnostic as possible, so you can switch-out for an alternative product or company if required. We call this an 'open chain'.

Design for inclusion

Never stop looking for ways in which age, race, gender or disability might be barriers, and try to design them out.

Design-out hazards

As far as possible, try to design-out any risks to people's safety, health and wellbeing at all stages of a building's life – from making to use to disassembly.

Superpower the users

'If you can't mend it, you don't own it'. Afford as much understanding and power as possible to the end users, from procurement to maintenance to electricity. Democracy is a

Share global, manufacture local

Instead of manufacturing one-size-fits-all products in large, centralised factories, use local, flexible microfactories. 'It is easier to ship recipes than cakes and biscuits' – Keynes

Use as few unique materials and methods as possible

Complexity raises exponentially with each additional material or procedure.

Precision-as-standard

All components should be made to sufficient precision so when assembled the building is consistently straight and accurate, so other components fit without needing to be measured and cut on site.

Design in 'canaries'

Build-in visible 'tells' or indicators that clearly show if something is incorrectly assembled, missing or not working properly.

Design-out dependencies

Separate-out (or avoid) any task that can cause knock-on delays to other tasks if it is not done on time, especially if it needs to be done by others.

'Kaizen'

Kaizen means continuous incremental improvement, driven by encouraging everyone working at any point in the supply chain to suggest small updates to make the process better.

Open source

'Be lazy like a fox' – Linus Torvalds. Share common solutions for others to freely adapt and improve. This way, we all benefit from a huge R&D community, where no problem needs to be solved twice. No one ever owned the IP for bricks.

Design for a circular economy

Use parts that can be reused, fully recycled or burned in place of other fuels (without toxic emissions).

Design for the 'new normal'

Avoid design which would be considered 'alternative', 'boutique' or only for the rich or poor. Instead, design products that most people would consider desirable and affordable.

Image source: Wikihouse

Image source: Wikihouse

Image source: Wikihouse

Image source: Wikihouse

Precedent - WikiHouse

CNC milling on structural plywood

Post exploring 70's architecture, the technology has continued into a present/future technology. The themes explored within Walters Way of; self-build for low skilled persons, modular, expandable, affordable, learning a skill and creating a community led the technology to researching all of this in a digital craft, as the Thesis argues we are in a digital revolution. The WikiHouse construction method allows structural plywood, which is recyclable, lasts for at least 60 years (meeting The Homes for Life Policy, UK), to be cut from a CNC milling machine and constructed by an individual or collective within days. The precision of CAD and the accuracy of the milling machine means less skill is needed by the individual. In addition, from creating a frame solely of structural plywood and no nails, the cost of labour or company responsibility is eradicated lowering the cost of the construction. WikiHouse is a free knowledge platform offering the construction details freely via the website. This further aids the Thesis exploration and contributes greatly to the Thesis.


Image source: WikiHouse


Image source: WikiHouse


Image source: WikiHouse


Image source: WikiHouse


Image source: WikiHouse


Image source: WikiHouse


Image source: WikiHouse

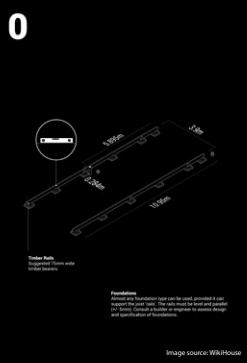

Image source: WikiHouse


Image source: WikiHouse

Precedent - WikiHouse

WikiHouse typologies

The research deepens into the types of frames and homes that have been explored by WikiHouse. At the beginning of the year there were 5 alternative frames that had been built around the world and finished into homes, one being in the UK, another being in new Zeeland. The UK 'Farm House' was the first two storey building to be completed in the UK. Since then, exhibition spaces and homes have been made to promote the use of this new technology and a collection of named engineers have started funding and sponsoring the R&D parent company to WikiHouse. The 3 images at the top of this page show different sized dwelling units varying in cost. The top left image is a 39m2 single floor unit that costs approximately £45,000. The middle image is a 50m2 single floor unit with higher specifications costing £75,000. The top right image a concept of a 3 storey town house estimated at £150,000.



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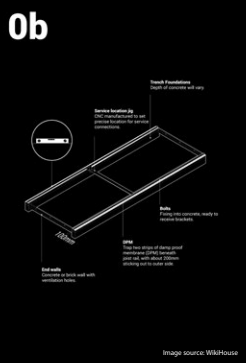

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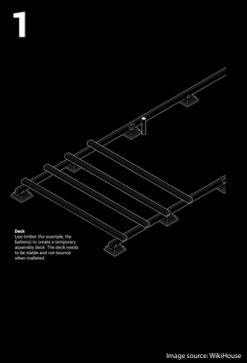

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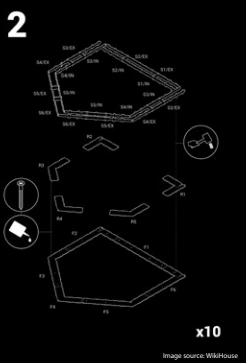

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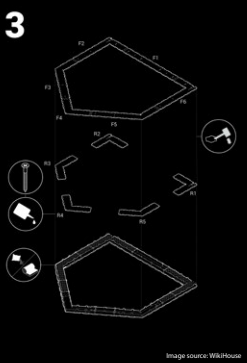

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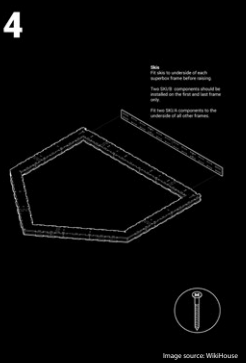

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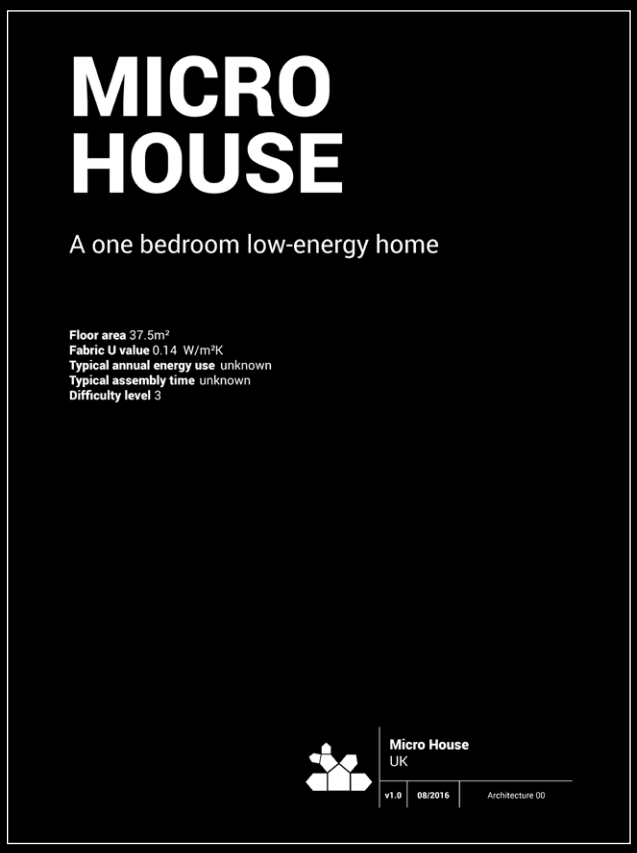


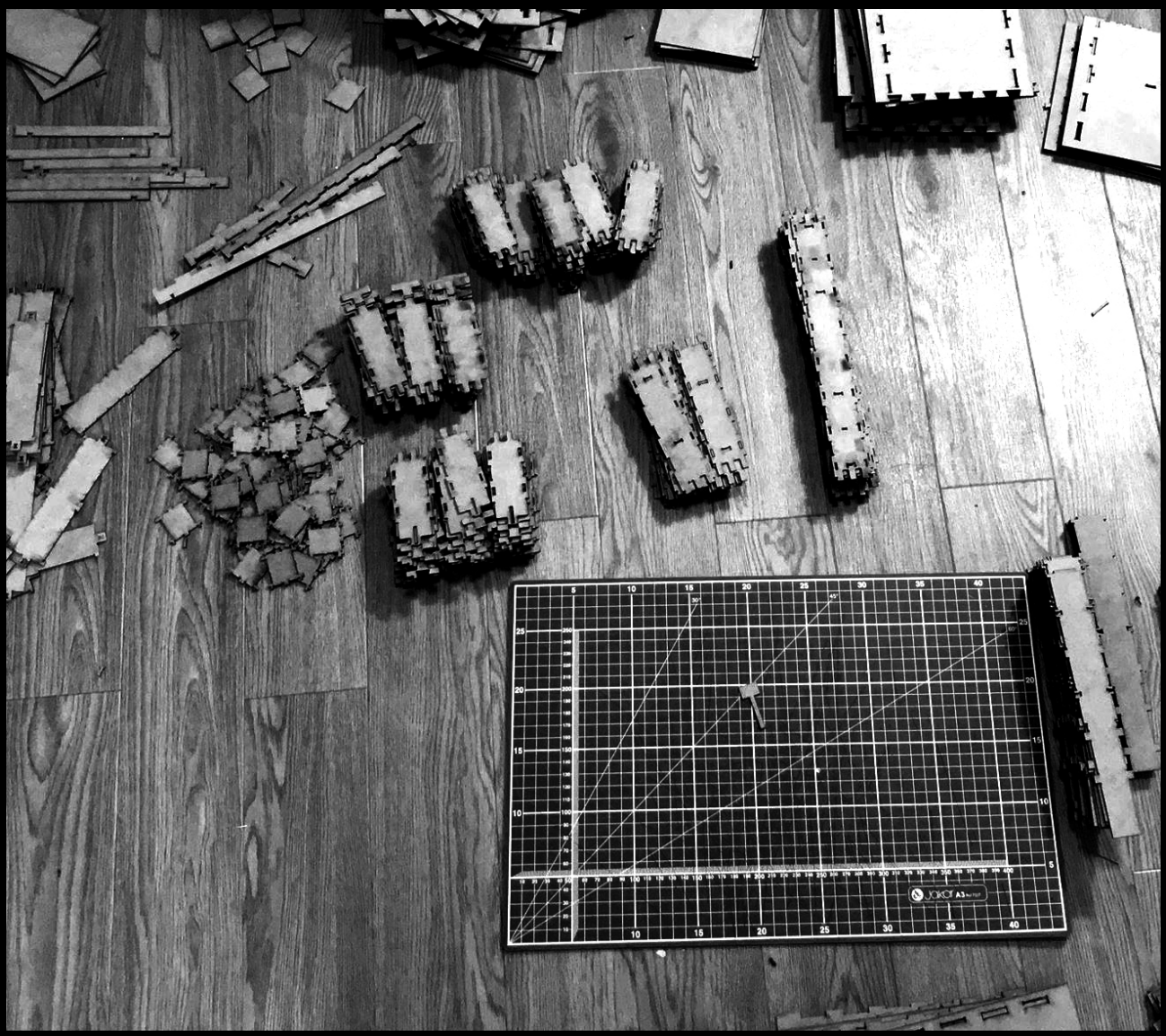
Image source: WikiHouse

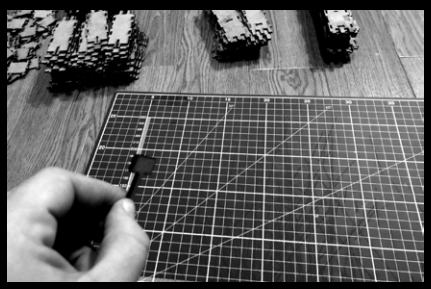
Precedent - WikiHouse

Construction manual

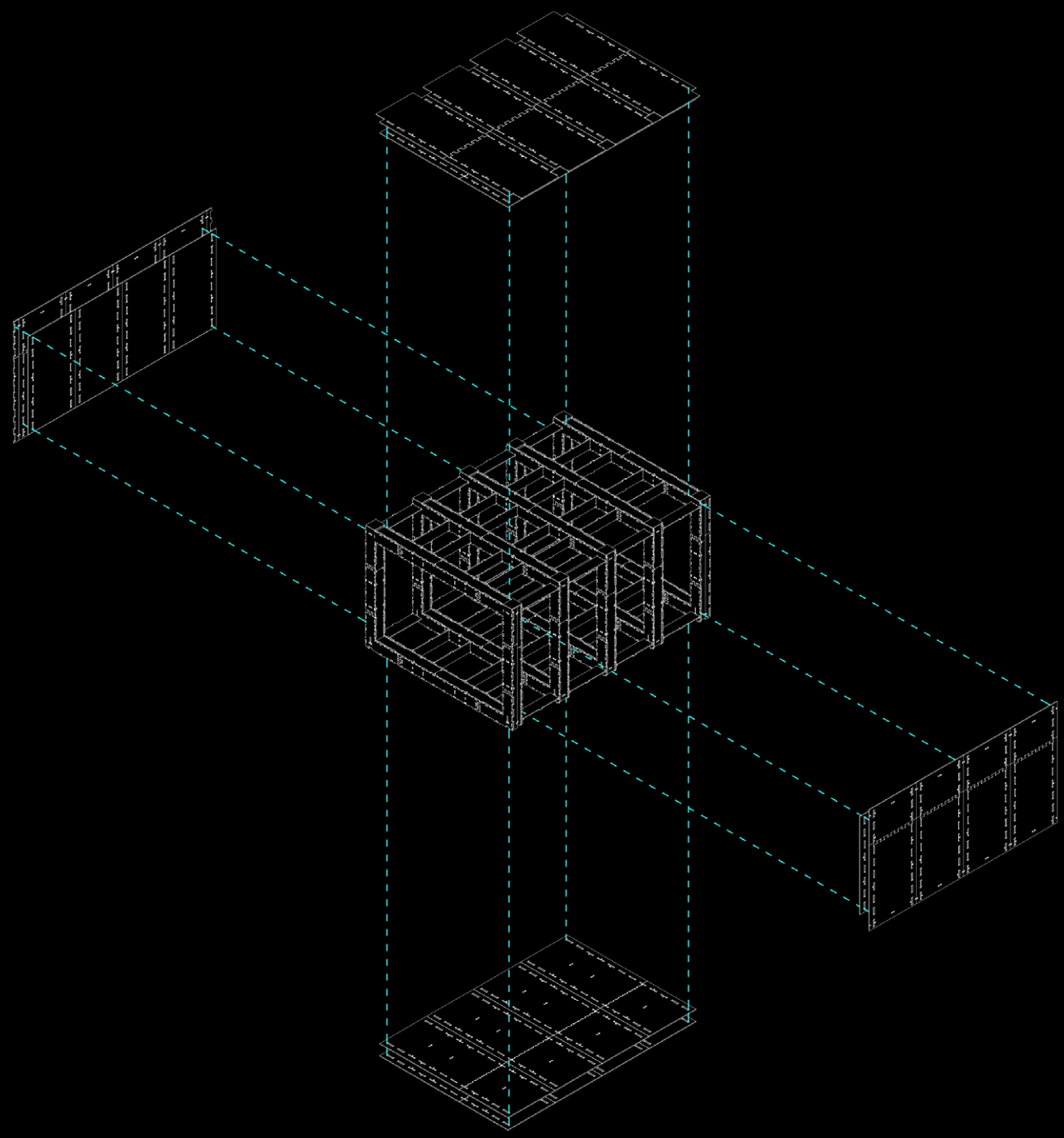
The 39m2 single floor dwelling unit has available downloads via the WikiHouse website. The downloads consist of; a 3D model for the chasis, a 3D model for the finished product, a construction manual, labelled pieces and more. By being able to explore a real project freely from WikiHouse, I have been able to test and develop this technology for my Thesis project that delivers my designed units which I have designed to expand upon a persons' needs. My technology submission consists of an A3 portfolio of research, testing and exploration and an A5 complete instruction manual for my designed building, inspired by the WikiHouse manual. This is also submitted to WikiHouse.

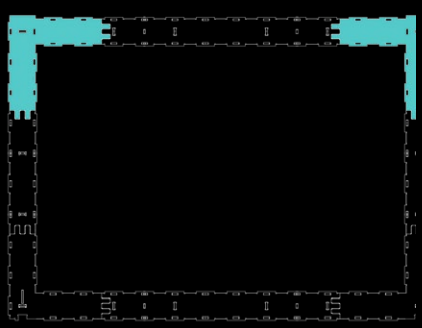
TESTING MY OWN 'WIKIHOUSE' FRAME

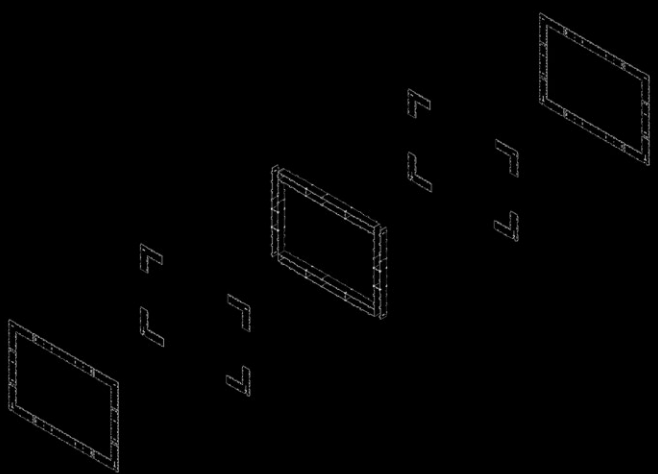


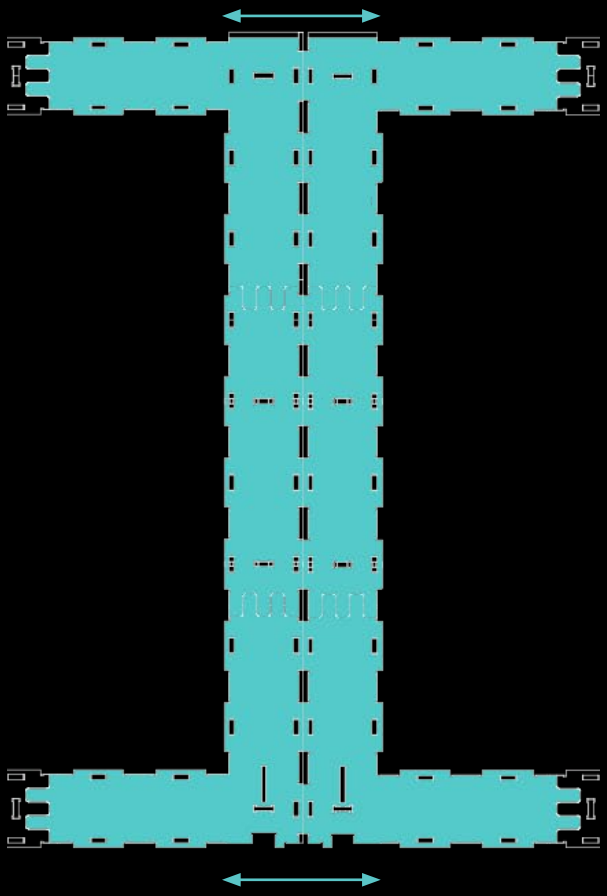


Frame testing & building





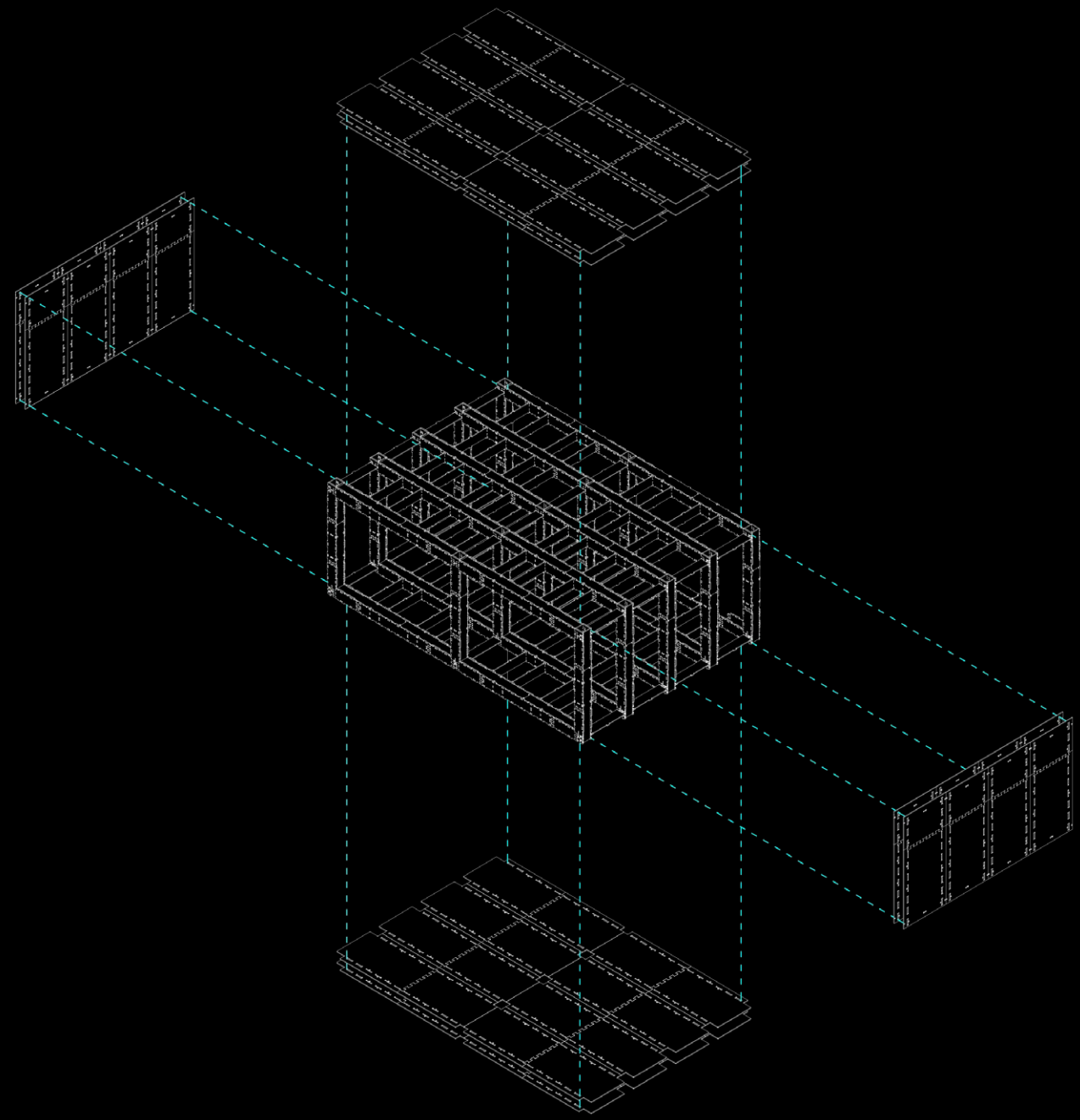


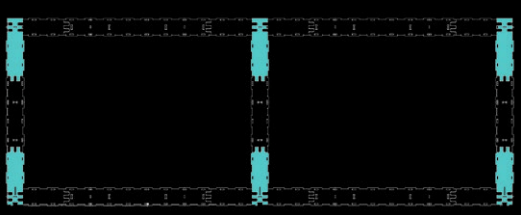


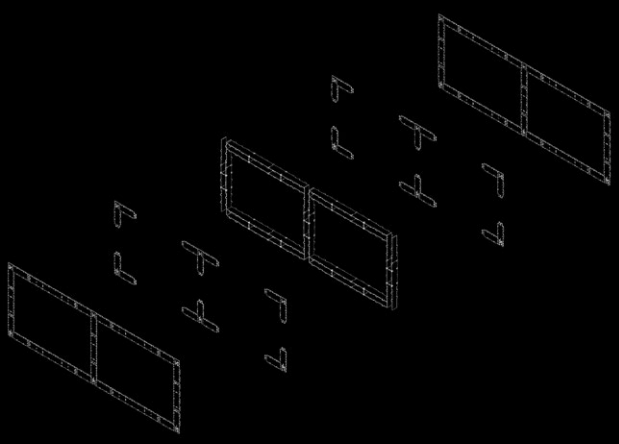
Test 1

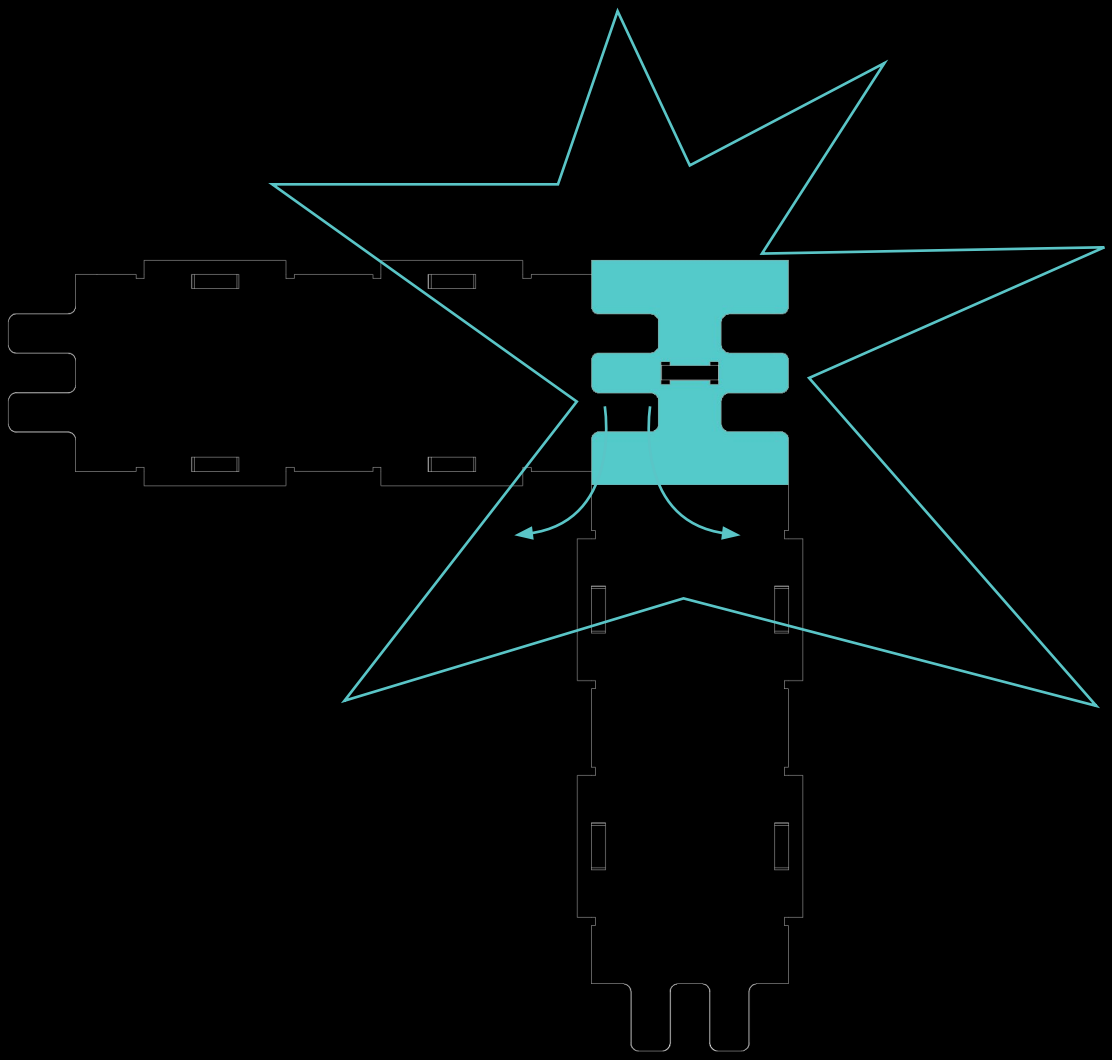
Horizontal expansion

The first test was to essentially develop a flat building envelop that could expand horizontally. The box columns and beams were 300mm x 300m to allow for structural rigidity for the potential for roof gardens/roof walking. The frame provided the potential to expand in the Z plane, however if required to expand in the Y plane, the building would have internal openings of 1000mm with 600mm wall thicknesses, which felt uncomfortable inside. In addition to being spatial inefficient, this frame would be inefficient in materials and require more structural plywood for the build.





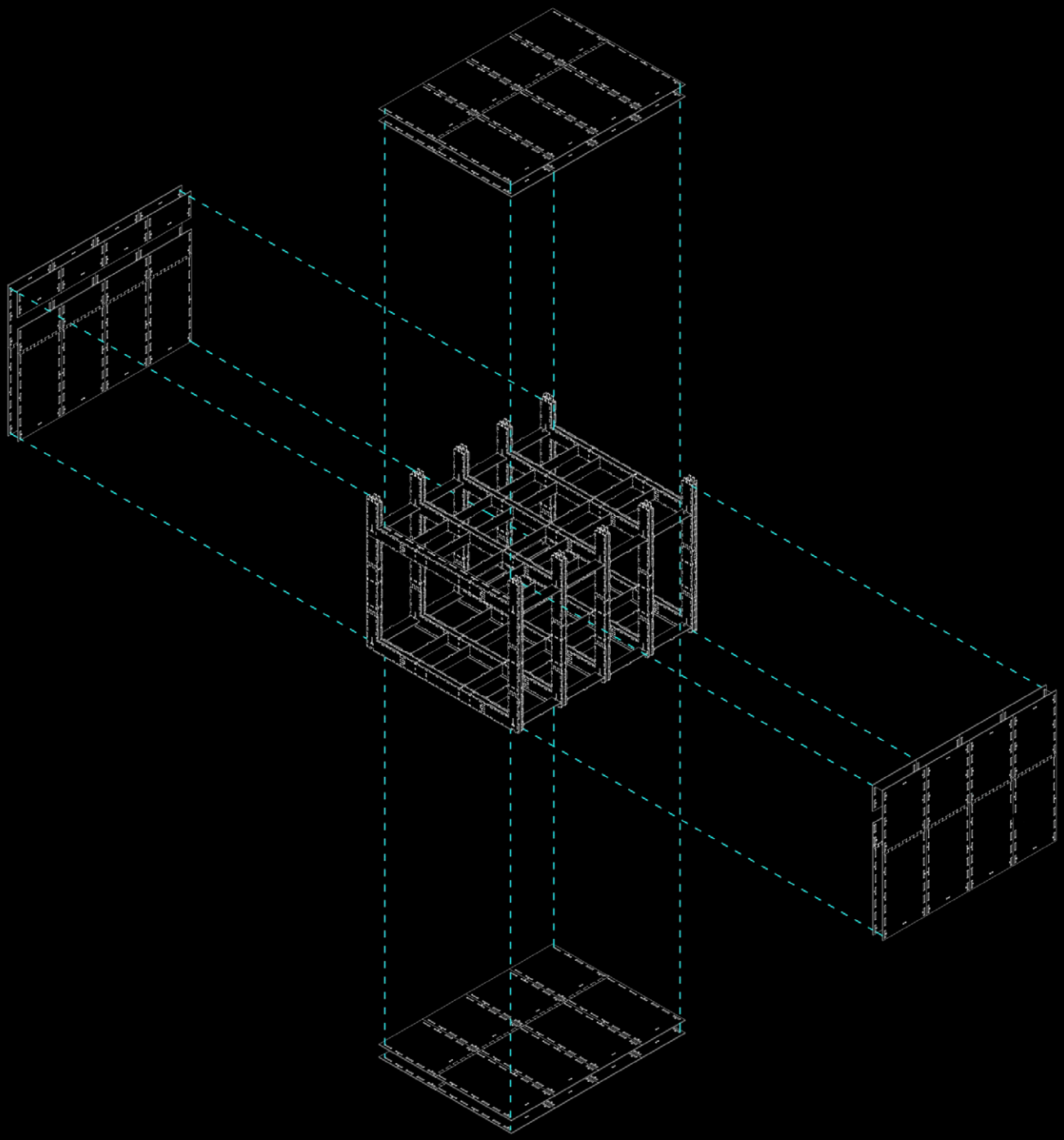


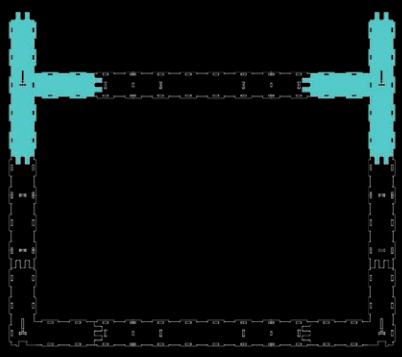


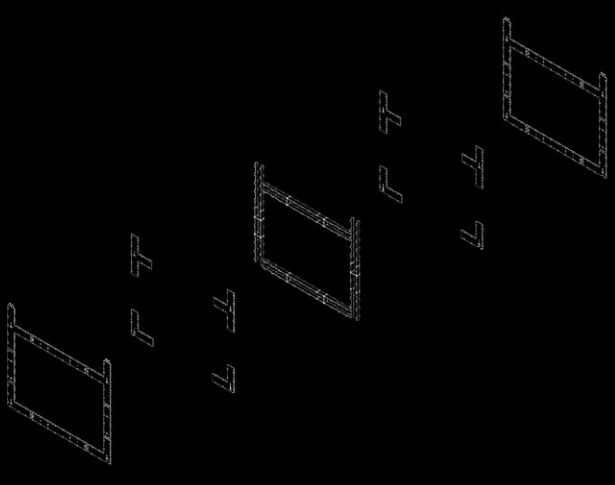
TEST 2

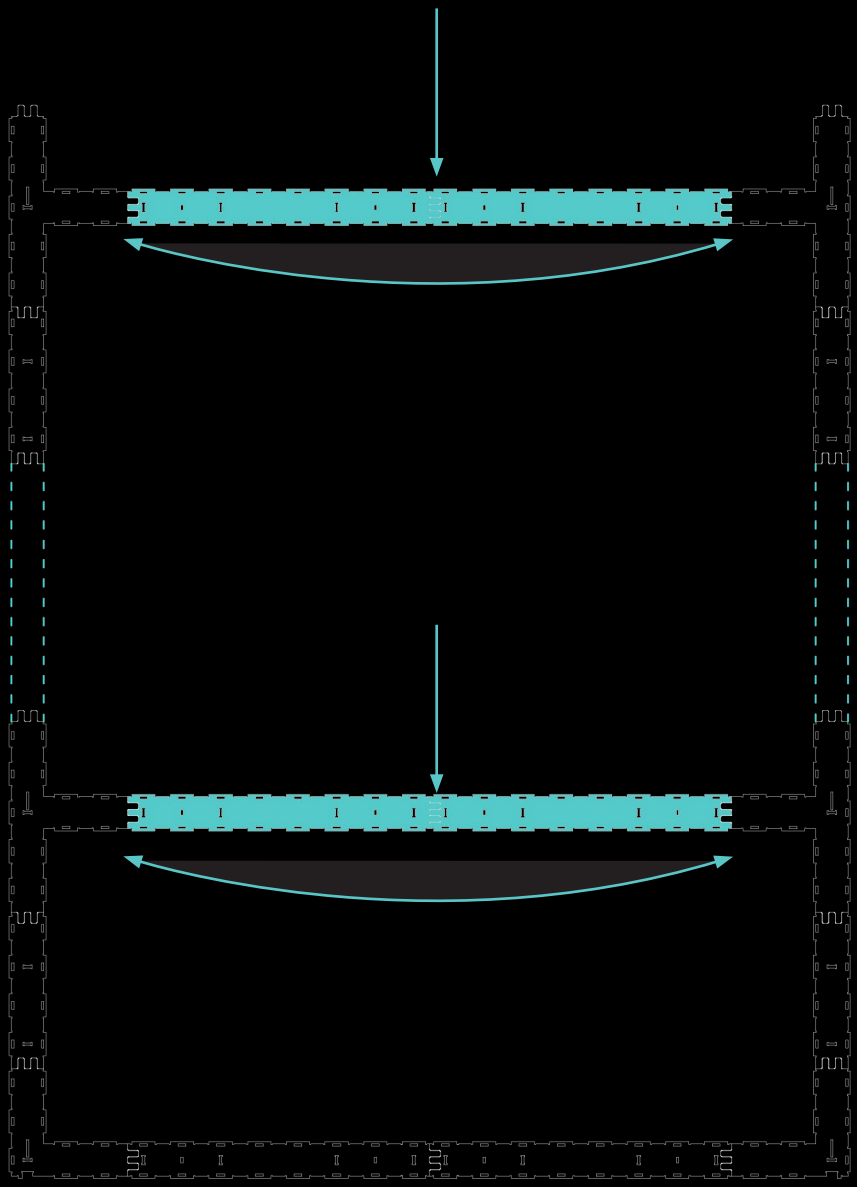
Horizontal expansion

The second test was in the same fashion as test 1, in being able to horizontally expand. I have designed a custom corner piece to allow for expansion in the Z and Y planes, as an when needed. Although it worked, as seen in the model images (Page 27), the issue surrounding this frame was corner connections. The bespoke piece leaves approximately 100mm for the corner connection from Z to Y. With a force on top, such as a garden, or person standing, the risk of snapping to these pieces was too high to feel secure with this design.







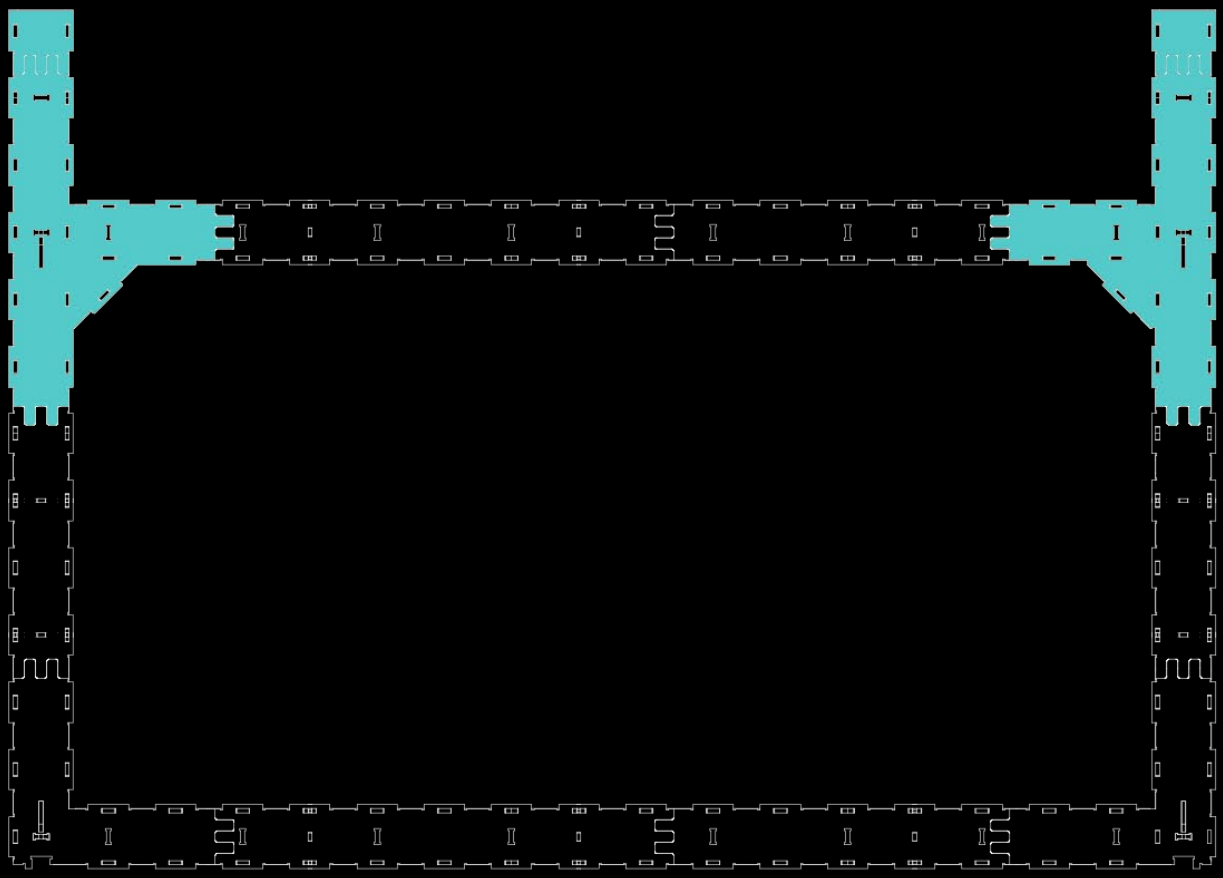


Test 3

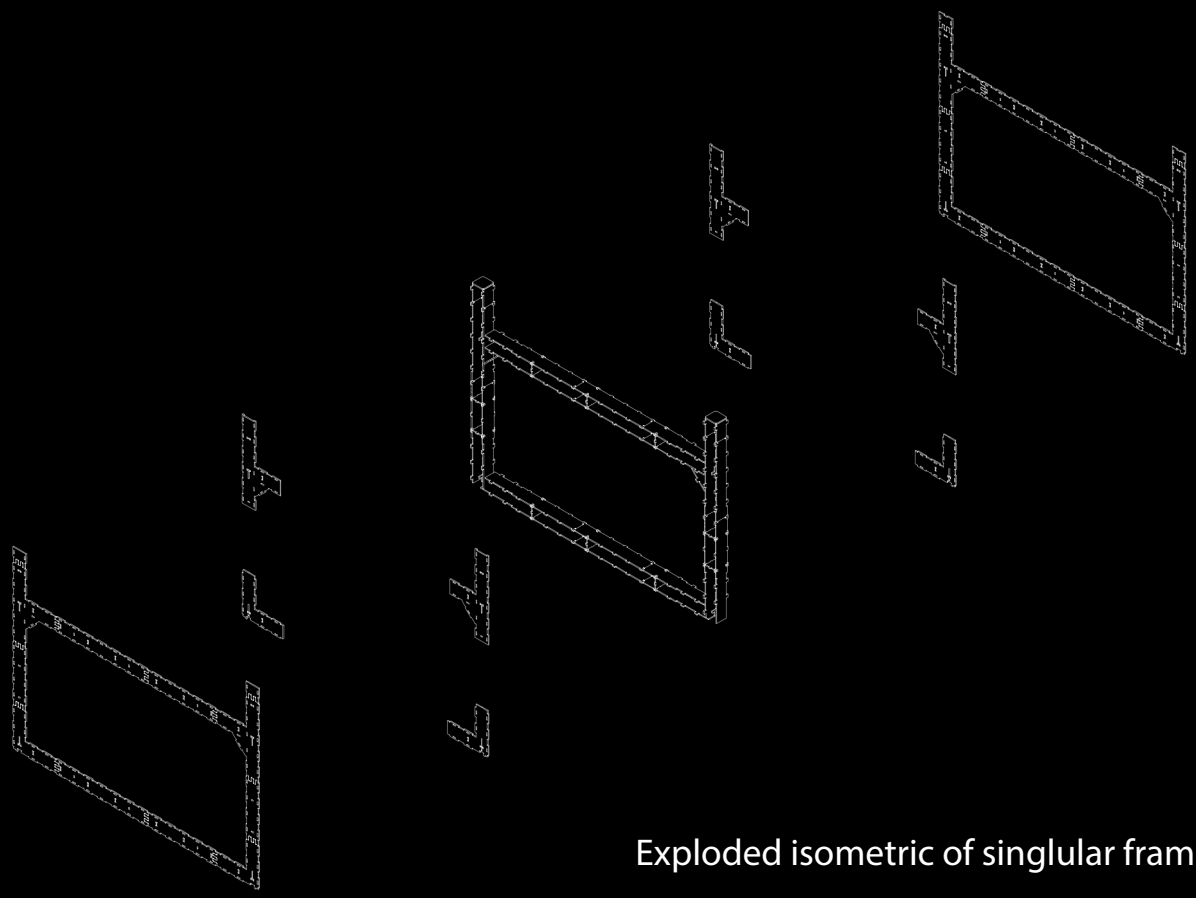
Vertical expansion

The third test developed as a result of the first two test and in addition to the Thesis design project. The decision to expand vertically as opposed to horizontally allowed for an exposed piece to be placed at the top of the building, that could act as a parapet/balcony for a roof garden. Although this test met all of the requirements of the new design, when used for a public building, which is bigger in width in the Thesis project, it has a greater chance of bending and snapping due to greater load forces on top.

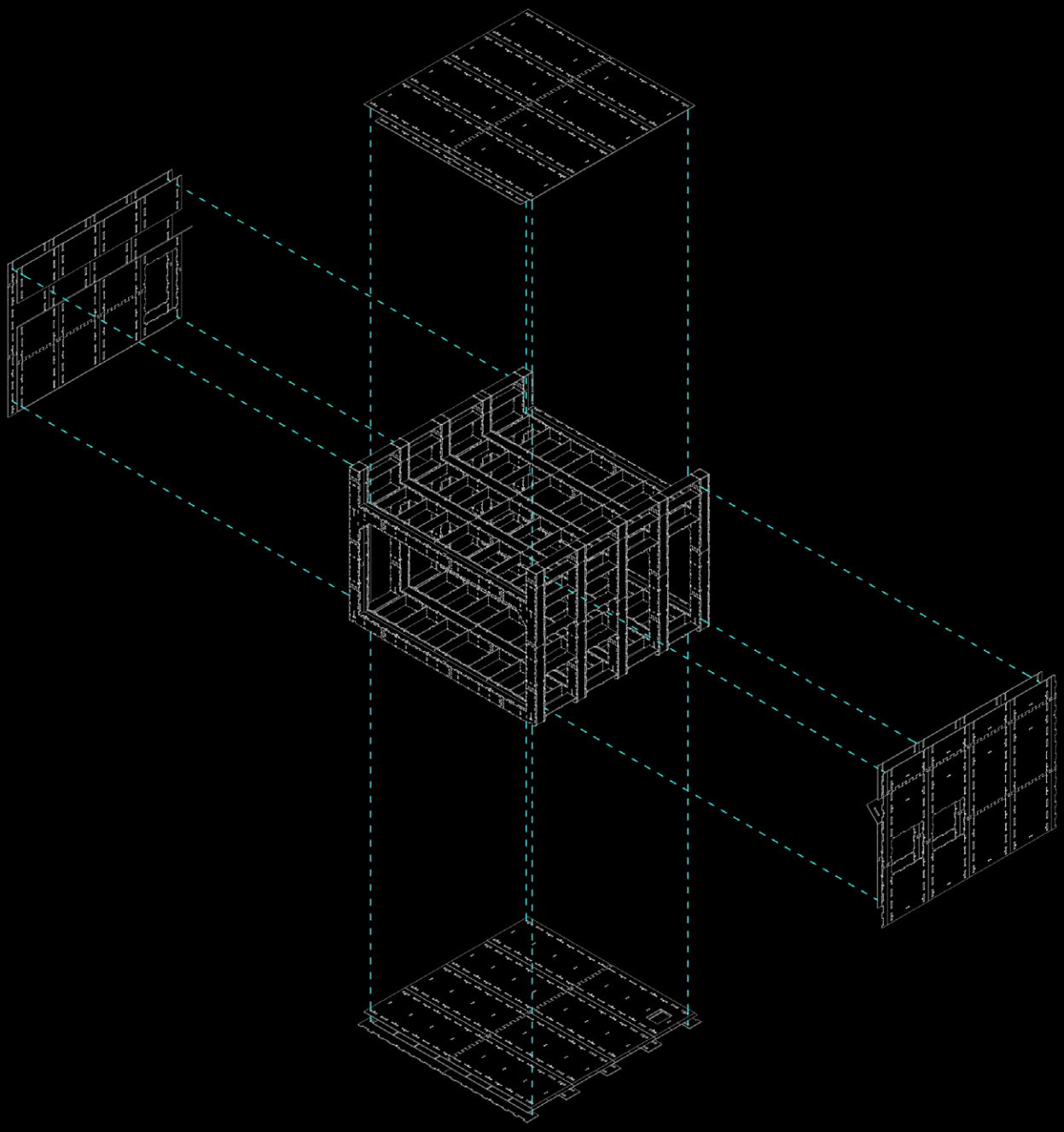
FINAL FRAME



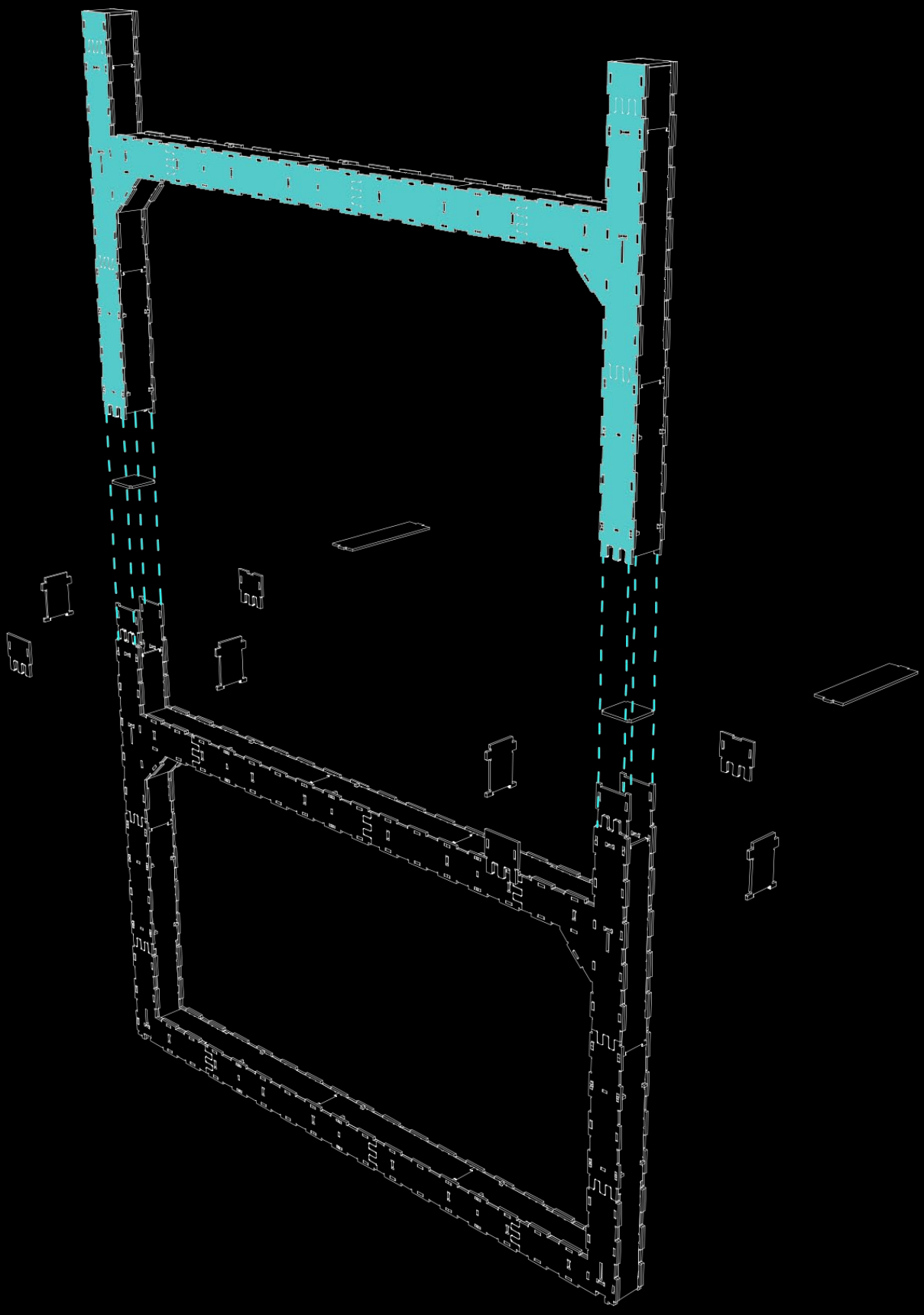
Frame elevation - 2400mm by 5000mm internal



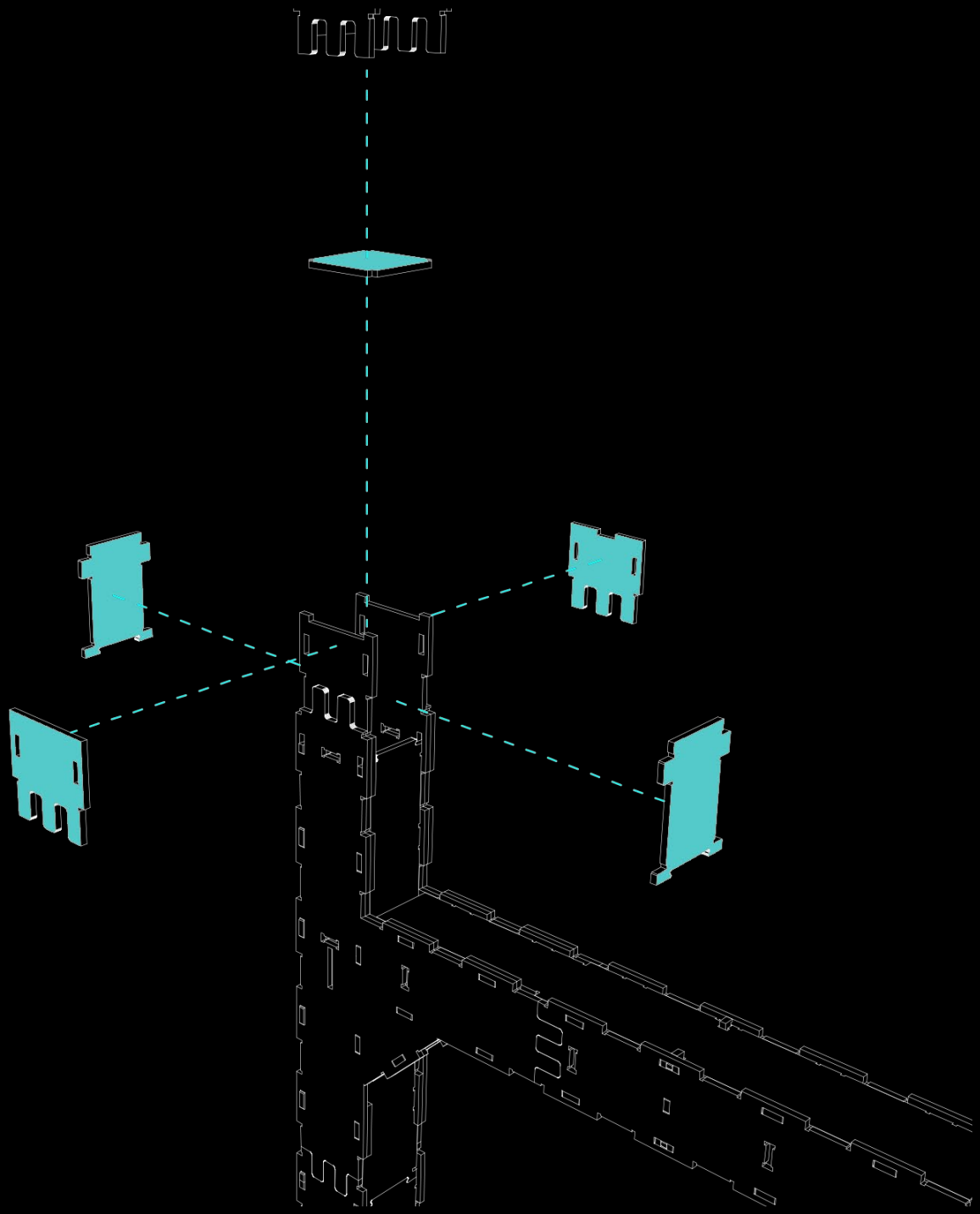
Exploded isometric of singlular frame



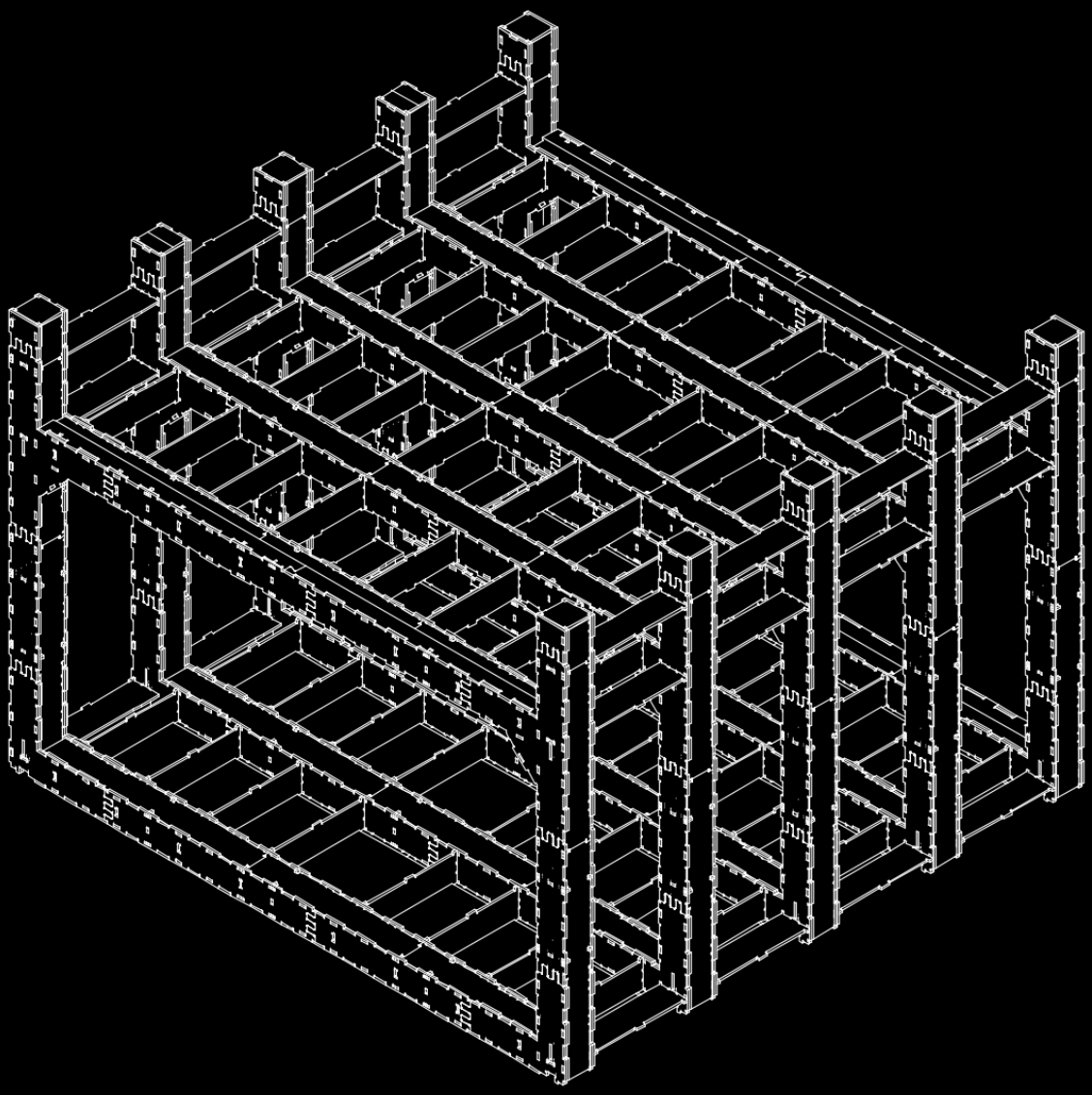
Exploded isometric of frame detail



Exploded isometric explaining expansion detail



Exploded isometric explaining expansion detail



Final developed frame

Explanation

The final developed frame, used in my Thesis project, shows how the researched, testing and exploration has led to a completed frame. The exploded detail isometrics show the component parts I have designed, through the WikiHouse technology, and how the small component sizes allow for minimal work when striping back the zinc panels and cutting the water barrier, to allow for the vertical expansion. In addition to the minimal stripping of the external components upon the frame, the frame itself shows a developed corner piece internally to allow for the extra support once a greater span is used, within the larger public spaces.

157 x (1200mm x 2440mm x 18mm)
STRUCTURAL PLYWOOD SHEETS

REFLECTION

Please read A5 booklet after

When reflecting upon the exploration of the WikiHouse technology, I can now understand things that I would have done differently. For example, the number of sheets used is not as efficient as it could be. There a couple of structural plywood sheets with spaces on, which would be wasted. However, as the testing deepened I was able to recognise this initial missed judgement and the final frame attempts to minimalise this. Given more time I would have liked to reduce this further. Overall, I feel confident with a technology unknown before the exploration, however will look to continue this current understanding as the fast pace of technology develops I feel this will too. I feel it is rightly suited to my Thesis masterplan project, showing how the micro and macro scales can influence one another.

BIBLIOGRAPHY

Page 9 - Image sources: https://www.weberhaus.co.uk/

Page 14 - Image sources: https://www.precht.at/

Page 17 & 18 - Image sources: https://www.ajbuildingslibrary.co.uk/projects/display/id/2011

Pages 23, 24 & 25 - https://www.wikihouse.cc/