

PROJECT CASE STUDY

3.5 ft Modular 4-Sheet Mini Ramp

Design, fabrication, community build and deployment of a reusable event ramp



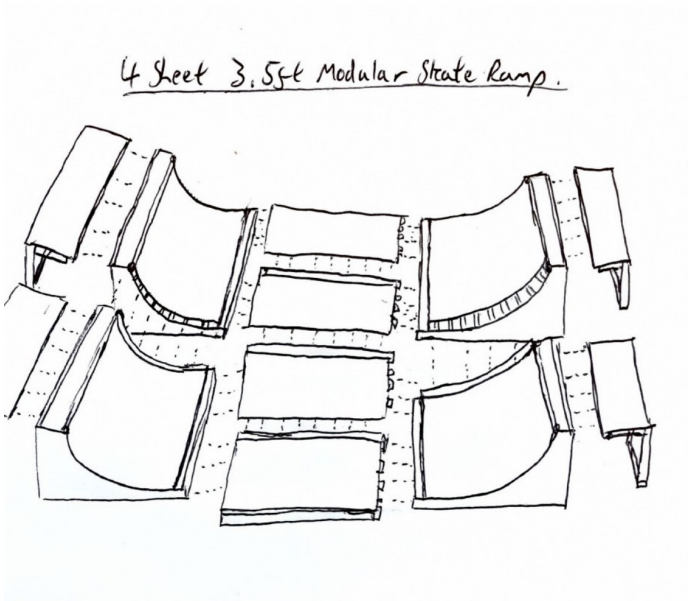
Completed ramp during the first build and test session, 26 September 2026.

8.22 × 4.76 m FOOTPRINT • 39.1 M²	3.5 ft RAMP HEIGHT • APPROX. 1.08 M	1.8 m TRANSITION RADIUS • APPROX. 6 FT
8 hours BUILD DAY • 19 VOLUNTEERS*	\$3,923 DOCUMENTED CASH SPEND	\$4,503 APPROX. FROM-SCRATCH BUILD*

* Build day excludes the design month, procurement, cutting, CNC work, pre-bending and storage preparation. From-scratch figure includes reused plywood at its planning replacement value and excludes labour.

Built as a reusable asset for free skate events across Canterbury, the ramp was designed to ride like a proper mini ramp while still breaking down into practical transport and storage modules. This case study focuses on what a project of this scale actually requires: geometry, materials, preparation, logistics, labour, safety planning and a crew able to assemble it repeatedly.

1. What was built



Original overall modular-ramp sketch. Four 2.4 m quarter-pipe modules, four flat-bottom panels and four removable rear platform sections form the complete ramp.

The completed ramp has two opposing 4.76 m-wide faces and a 2.4 m flat bottom. Each face separates into two 2.4 m quarter-pipe modules, allowing the structure to move, store and reassemble without permanently fixing the central seams.

Feature	As-built specification
Overall footprint	8.22 m long × 4.76 m wide (39.13 m²)
Ramp height	3.5 ft nominal; approx. 1.08 m to top of coping
Transition	1.8 m radius (approx. 6 ft)
Main modules	4 quarter-pipe modules at approx. 2.4 m wide each
Flat bottom	2.4 m long; 4 interlocking floor panels
Coping	Approx. 60 mm steel pipe with removable hook-bolt fixing
Platform system	Full removable top sheets with separate framed extensions
Transport height	1.937 m when a quarter module is tipped onto its flat rear face - under the 1.95 m door opening at Evil Genius, Ferrymead, preserving an indoor wet-weather setup option.

DESIGNED AROUND REPEAT DEPLOYMENT

The quarter modules, platform tops, flat-bottom panels and coping separate cleanly. The design work therefore covered the full cycle - build, setup, riding, packdown, transport and storage - rather than only the finished ramp.

2. The work before build day

The eight-hour build day was only the final assembly phase. Most of the risk was removed beforehand by turning the project into labelled, repeatable work packages.

Design month	Transition geometry, modular joints, CNC profile, material quantities, transport/storage concept and build-station layout were developed during the month before construction.
Supply day	A full Canterbury collection run gathered timber and plywood from Rangiora ITM, coping from Easysteel, fasteners from Blacks and Bunnings, and delivered transition sheets to Blink Design for CNC cutting.
Following evenings	Timber was cut to final lengths, checked, grouped and taped into numbered station packs. CNC-cut transitions were collected, sanded and sorted.
Build week	The 9 mm sheets were wet and pre-bent under weight. Parts, drawings, tools and station packs were prepared for parallel working.
Storage prep	A separate five-person morning cleared about 5 m at the front of a 40 ft container, including moving an existing 2 ft mini ramp out of storage.



Rangiora ITM timber and plywood collection.



CNC-cut transition profile at Blink Design.



9 mm transition sheets wet and pre-bent before build day.



Separate storage-preparation session.

PREPARATION IS PART OF THE BUILD

For a ramp this size, procurement, cutting, sorting, CNC work, pre-bending, transport planning and storage preparation need their own time and people. The visible assembly day is only one part of the workload.

3. Materials, backing and project cost

The figures below are the documented cash costs for the completed project. They include build-day trailer hire and volunteer refreshments, but not volunteer labour.

Cost area	NZD incl. GST
Rangiora ITM - timber and plywood	\$2,343.24
Blink Design - CNC cutting, consumables and replacement 18 mm sheet	\$725.65
Easysteel - coping steel	\$292.56
Blacks Fasteners	\$272.94
Bunnings - bits, drill bit and hook bolts	\$82.96
Hireace - trailer and insurance	\$65.00
Volunteer refreshments and site supplies	\$140.85
TOTAL CASH SPEND	\$3,923.20

APPROX. FROM-SCRATCH BUILD

\$4,503.20

Cash spend plus \$580 planning replacement value for reused plywood. Labour is not costed.

LOCAL CASH CONTRIBUTIONS

\$900

Will Bartlett \$800 + Tim Cunneen \$100. The remaining cash requirement was met by Duckewe.

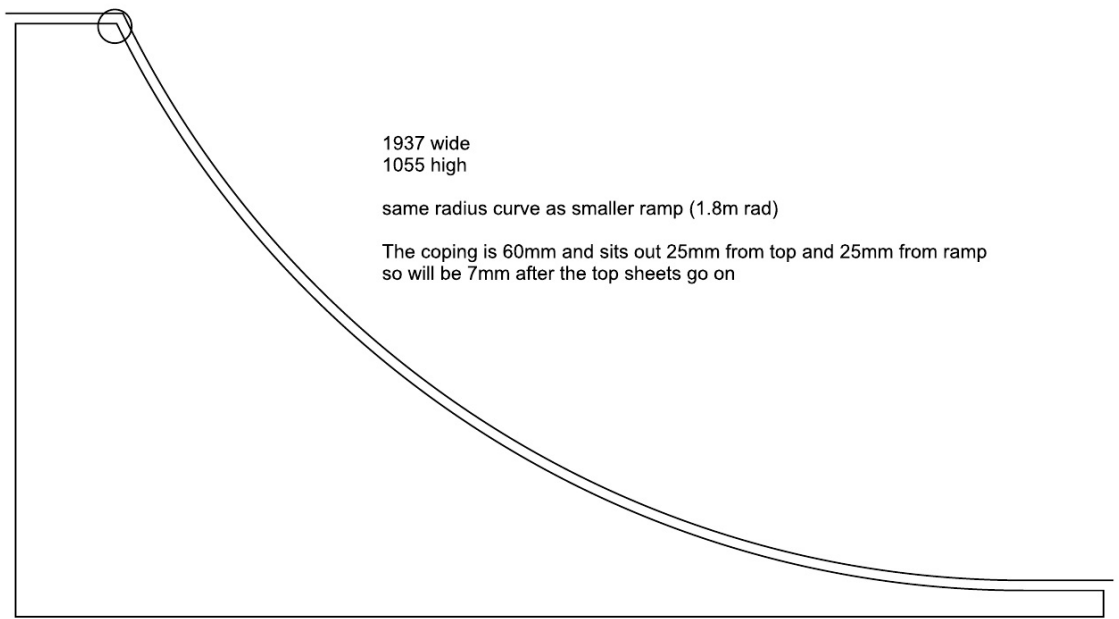


Bulk screws and frame fixings collected as part of the pre-build supply work.

Blink Design supplied an additional treated 18 mm sheet after one sheet broke during CNC cutting. Existing plywood stock reduced the immediate cash requirement, but its replacement value is included in the approximate from-scratch figure so the comparison is more useful to anyone budgeting a similar project.

4. Technical design - the transition system

The geometry was CNC-cut so that all eight 1.2 m structural bays shared the same 1.8 m transition. The production confirmation is reproduced at a useful scale because it is the clearest single reference for the profile.



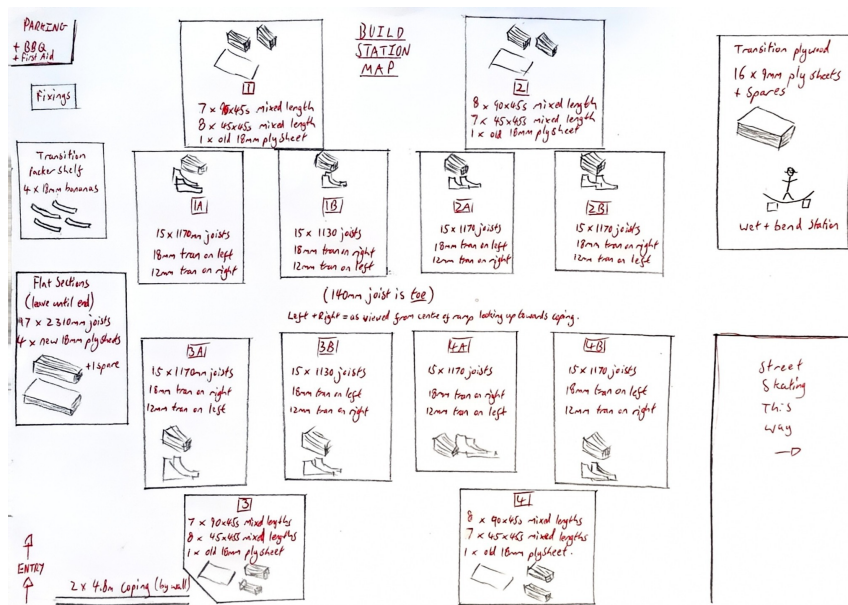
Blink Design CNC confirmation: 1,937 mm base width, 1,055 mm overall frame height, 1.8 m radius and coping relationship.

IMPORTANT VERTICAL DIMENSION

The CNC rib is 1,055 mm high overall, but the transition curve itself rises 1,010 mm. The remaining 45 mm is the flat toe/base section, matching the 45 mm floor-joist height. For anyone redrawing the profile, use the 1.8 m radius over a 1,010 mm vertical rise above that 45 mm base line.

Element	Build detail
Per 1.2 m bay	14 × 90x45 framing members + 1 × 140x45 toe runner
Side ribs	Nominal 18 mm structural outer side and 12 mm inner side
Coping pocket	Two framing members define the coping area; coping is fitted before the riding-surface sheets
Surface seam	1B/3B carry a 40 mm overhang; 2A/4A receive it on removable curved packer shelves
Packer shelf	Two layers of 18 mm curved packers inside each receiving transition, fitted between joists

The site was laid out as an exploded version of the finished ramp. Stations 1A through 4B were marked on the concrete in their final relative positions, with platform packs behind the matching transitions and separate areas for wet plywood, flat-bottom parts, fixings, coping and packer strips.



Hand-drawn station map used to organise the build area and pre-sorted component packs.

ACTUAL BUILD WINDOW

VOLUNTEERS ACROSS THE DAY

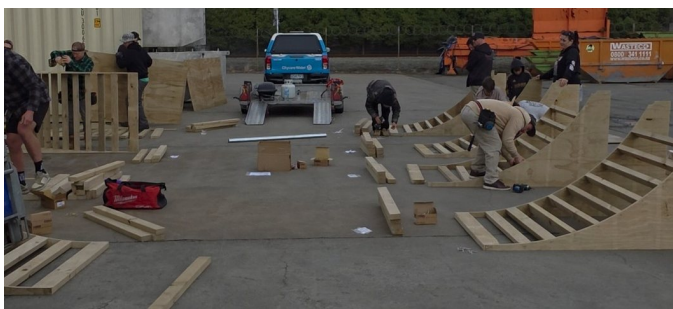
PRESENT START-TO-FINISH

EXPERIENCED BUILDERS

QUALIFIED BUILDERS

INJURIES

Surface fitting was the slowest physical stage. The most effective arrangement was several people holding a wet 9 mm sheet firmly into the curve while two people worked from the sides with timber tapping blocks and sledges, progressively seating the edges before the sheet was fixed off.



Transition modules assembled in parallel.



Platform-extension frames built alongside the ramp sections.

6. Critical assembly sequence

This is not the complete construction manual, but these are the points that most depend on being done in the right order. The annotated build sheets in the appendix show the detail used on the first assembly.

Step	Key instruction
1	Build the eight 1.2 m transition bays first. Check side-rib orientation before framing: the two 12 mm faces meet inside each 2.4 m quarter to create a permanent 24 mm spine; 18 mm faces remain at the far outside edges and later meet at the temporary centre joint between the 2.4 m quarters.
2	Keep every joist on its pre-marked location and flush with the transition edge. Matching joist lines across every module are crucial because the finished surface is string-lined and screwed into those joists later. No joist should sit proud. Use a coping offcut to set the upper transition joist below the coping and the rear coping joist tight behind it.
3	Join each A/B pair into four 2.4 m quarters. The two 12 mm faces form the permanent 24 mm centre spine. Use substantial fixing through the framing at the join and short screws low down through the mating rib faces; this spine carries significant shear when a quarter is lifted from its outer ends.
4	Fit the curved packer shelves to 2A and 4A before the larger sections are bolted together. Doing this early keeps impact-driver access clear.
5	On flat, level ground, bolt Quarter 1 to 2 and Quarter 3 to 4. The adjacent 18 mm faces create a temporary 36 mm spine. Align the transitions carefully before tightening the centre bolts.
6	Drill and fit the coping before installing the final top-back joist. That joist restricts drill access to the rear coping member. Once the coping holes are complete, install the final joist; if the outside sheet edge cannot be reached, angle the screws in. The first build also required the hook bolts to be shortened with a grinder so the nuts could be removed cleanly beside the rear joist.
7	Fit the riding surface from left to right. On each face work 1A → 1B → 2A → 2B (and 3A → 3B → 4A → 4B). The 1B/3B sheet overhangs into the receiving joint; do not screw the bottom layer of that overhang across into 2A/4A or the modules cannot later separate. Measure the receiving sheet before cutting - about 40 mm was removed on the first build, but the actual seam should govern the cut.
8	Dry-fit platform tops before final trimming. Cut the bevelled coping edge first, then establish final width. Follow the labelled packs for the shorter framing in 1B/3B and use the shorter 90x45 support in 2A/4A to form the receiving lip that ties Platform 1 to 2 and 3 to 4.
9	Build the flat bottom last. Once both riding-surface layers are fitted and screwed off, mark 45 mm back from the end of the toe, string-line the full width and set the saw to about 18 mm depth so only the ply overhang is cut. Lay the floor left-to-right to the flat-section plan; trim the third panel to match the 2A/4A receiving seam and shorten the 2,310 mm floor joists only if required for a flush toe fit.

REFERENCE DRAWINGS

See Appendix A1-A6 for the transition-joist, surface/bolting, packer-shelf, platform, flat-bottom and build-station drawings used during the first build.

7. What carried forward from the first build

The first complete assembly was also the first full-scale test of the modular details. The main geometry worked as intended; the useful notes are mostly about setup, coping and how to make the next build easier.



Surfacing one ramp face with coping already installed.



Multiple stations progressing in parallel.

Observation	Next-time action / conclusion
Ride response	The 3.5 ft / 1.8 m transition is fast and whippy. Experienced adult skaters testing it on the day responded positively.
Coping	Transition-side position is good; the platform side sits a couple of millimetres lower than preferred. Small packers under the coping will fine-tune this on the next setup.
Centre seams	Three M10 bolts per centre seam proved rigid enough on the completed build.
4B coping end	An additional hook bolt was useful where the end of the coping wanted to lift.
Platform tops	Keep the final full-sheet removable platform arrangement; it is stronger and simpler than leaving a narrow permanent strip on the quarter.
Packdown	Accessible seams and removable coping fixings made teardown straightforward.

VOLUNTEER BUILD PLANNING

Good weather, a realistic programme, a strong Plan B and a few experienced station leaders matter more than simply maximising headcount. Keep water, sun protection and appropriate PPE available; match people to jobs they are comfortable doing; rotate people before fatigue becomes a problem. A useful rule of thumb is simple: when the fun stops, stop.

8. Transport, storage and repeat deployment

The ramp is an event asset rather than a permanent installation. The structural modules, floor panels, platform tops and coping all separate for load-out.



Timber and component transport during the project.



Temporary storage in the empty 20 ft container after the first build.

Transport option	Practical load plan
Four standard 1.2 × 2.4 m single-axle trailers, or four trips with one trailer	Each load carries 1 × 2.4 m quarter-pipe module, 1 × flat-bottom section and 1 × 2.4 m platform section. Two of the four loads also carry one 4.8 m coping length. Plan around the full 2.4 m module length.
Caged trailer	A quarter module can travel on an angle where the trailer, tow vehicle and local rules allow. Use multiple independent rated tie-downs, check vehicle/trailer clearance and re-check the load after moving off.
Two large flatbeds	The design also allows the ramp to be split across two larger flatbed trailers. Suitable flatbeds were less readily available and more expensive to hire locally, but they reduce the number of individual loads.
Manual handling	Treat each 2.4 m quarter as a team lift. Four strong adults is the lower practical limit observed; six adults makes the lift comfortable. Do not plan around a two-person lift.

- A quarter module tipped onto its flat rear face measures about 1.937 m high. This sits below the 1.95 m door opening at Evil Genius, Ferrymead and keeps an indoor wet-weather setup possible.
- A separate five-person session prepared space in the 40 ft storage container. Because the first build ran late, the completed ramp was temporarily packed into the empty 20 ft container instead.

PUBLIC-FACING SETUPS ARE SITE-SPECIFIC

The ramp drawings describe the structure, not the complete event environment. For public use, the final configuration should be assessed for the venue, users and conditions - including access, fall edges, spectator separation, supervision, surface condition, weather and whatever additional controls are appropriate to that site.

9. If you are planning a similar build

A project like this is achievable with ordinary timber-framing tools and a well-organised crew, but the useful planning unit is the whole project - not only the day the ramp gets screwed together.

Phase	Allow for
Design	Final geometry, coping/platform relationship, modular seams, transport dimensions, storage and how the ramp will assemble and separate repeatedly.
Fabrication	CNC or accurate rib cutting, supplier lead times, spare material for breakage, and a final cut schedule that matches the station packs.
Preparation	Cutting and labelling timber, sorting station packs, sanding CNC parts, pre-bending surface sheets, checking special-length members and preparing the storage/load-out area.
People	A few experienced leaders spread across clear stations. Mixed experience works well when parts are labelled and each group has a drawing and a defined task.
Build day	More time than the framing alone suggests. Surface bending, alignment, lifting and careful sequencing are likely to control the programme.
Weather and backup	Have a wet-weather option and a realistic Plan B for an incomplete build, including secure overnight storage and a clear point at which the team can stop without creating a problem.
Logistics	Collection vehicle/trailer, unloading help, lifting crew, transport route, dry storage, packdown sequence and the next deployment should all be considered before construction begins.
Budget	Documented cash spend here was \$3,923.20; the approximate from-scratch project basis was \$4,503.20 before valuing labour.



Early build-day layout: component piles and station areas before assembly.

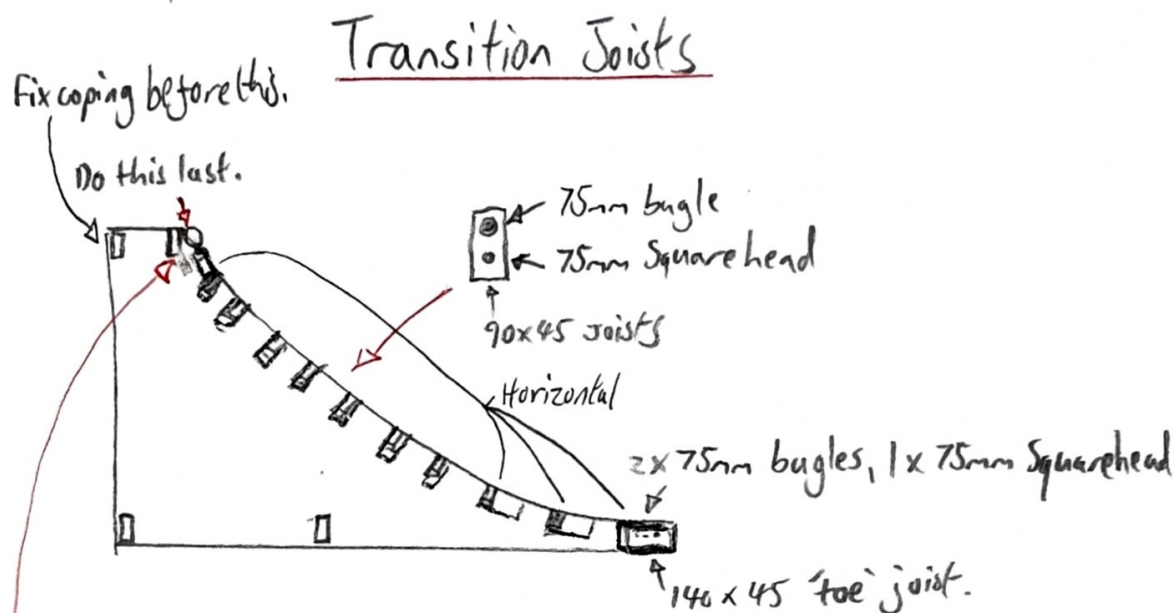
Resource expectation from this build

- Design:** roughly a month of development before construction.
- Procurement:** one full supply day plus a second CNC collection trip.
- Preparation:** several evenings of cutting/sorting, plus separate sanding, pre-bending and storage sessions.
- Build:** 19 volunteers across the day, 11 start-to-finish, approximately 8 hours.
- Packdown:** separate from the build window and designed to be repeatable.

TECHNICAL NOTE

This case study records the completed Duckewe ramp and the process used to build it. It is a practical reference, not certified engineering documentation. Anyone reproducing the design should verify the structure, loading, site conditions, local requirements and final public-use controls for their own project.

Appendix A1 - Transition joists



- ① Fix joists at marked locations
 - 14 x 90x45s
 - 1 x 140x45 toe.
- ② Rest 1.7m test coping in coping notch.
Fix joists flush to coping as shown above.

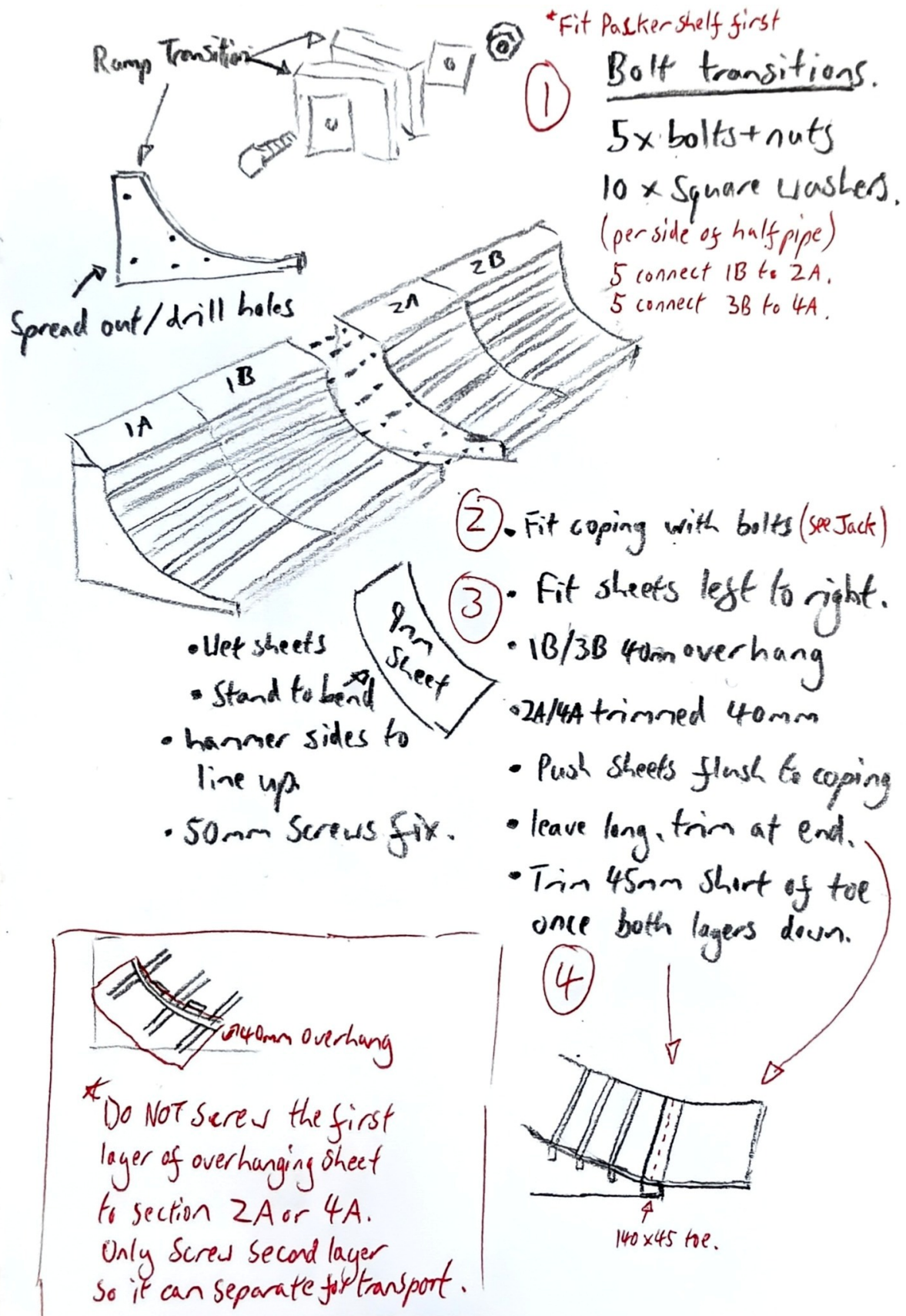
Notes



- Joists must sit flush with ply transition, not proud.
- Use one bogle one square head per joist. Two boggles for toe.
- Place transition joists at pre-marked locations.

Working build sheet used to position and orient the transition framing. The pre-marked joist locations were important because the surface screw lines needed to land on matching framing across every modular section.

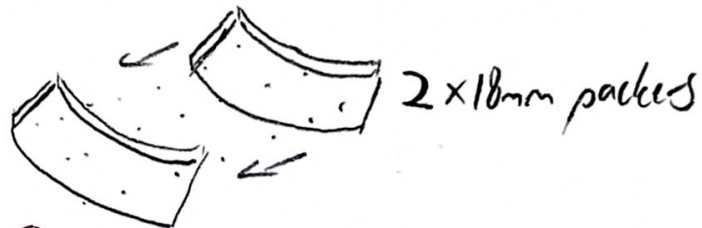
Appendix A2 - Bolting transitions & fitting the riding surface



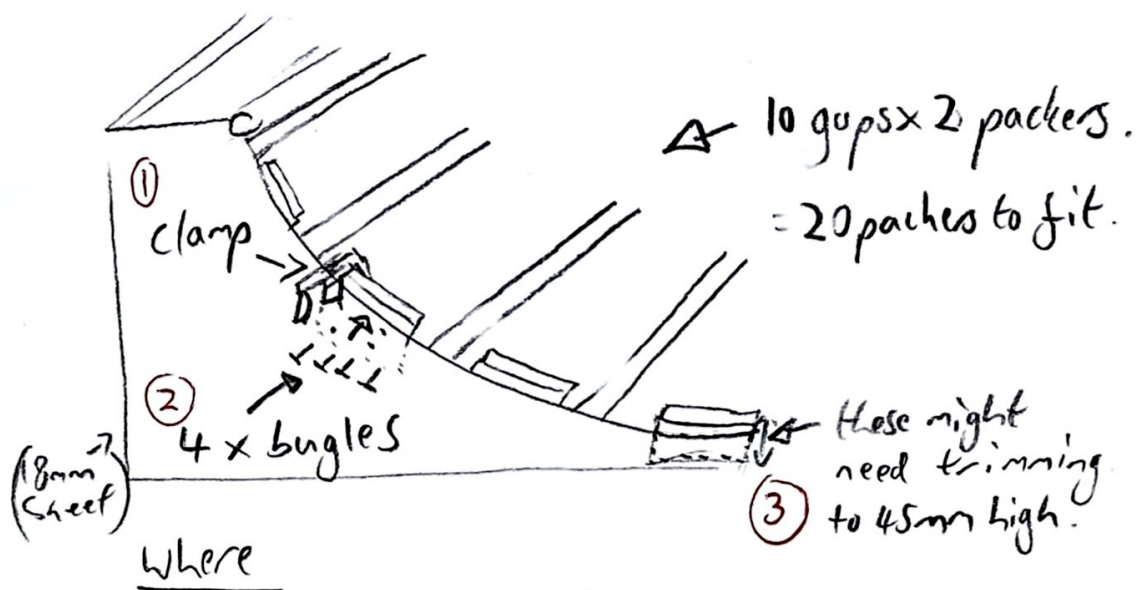
Working sequence for the centre joins, coping and two-layer riding surface, including the modular 40 mm overlap. The bottom layer of the overhang remains free across the temporary centre join so the ramp can separate again for transport.

Appendix A3 - Transition overlap packer shelves

Packer strips for ramp surface overlap shelf



(1A) Measure gaps + cut to length



* Section 2A inside of 18mm sheet between joists.

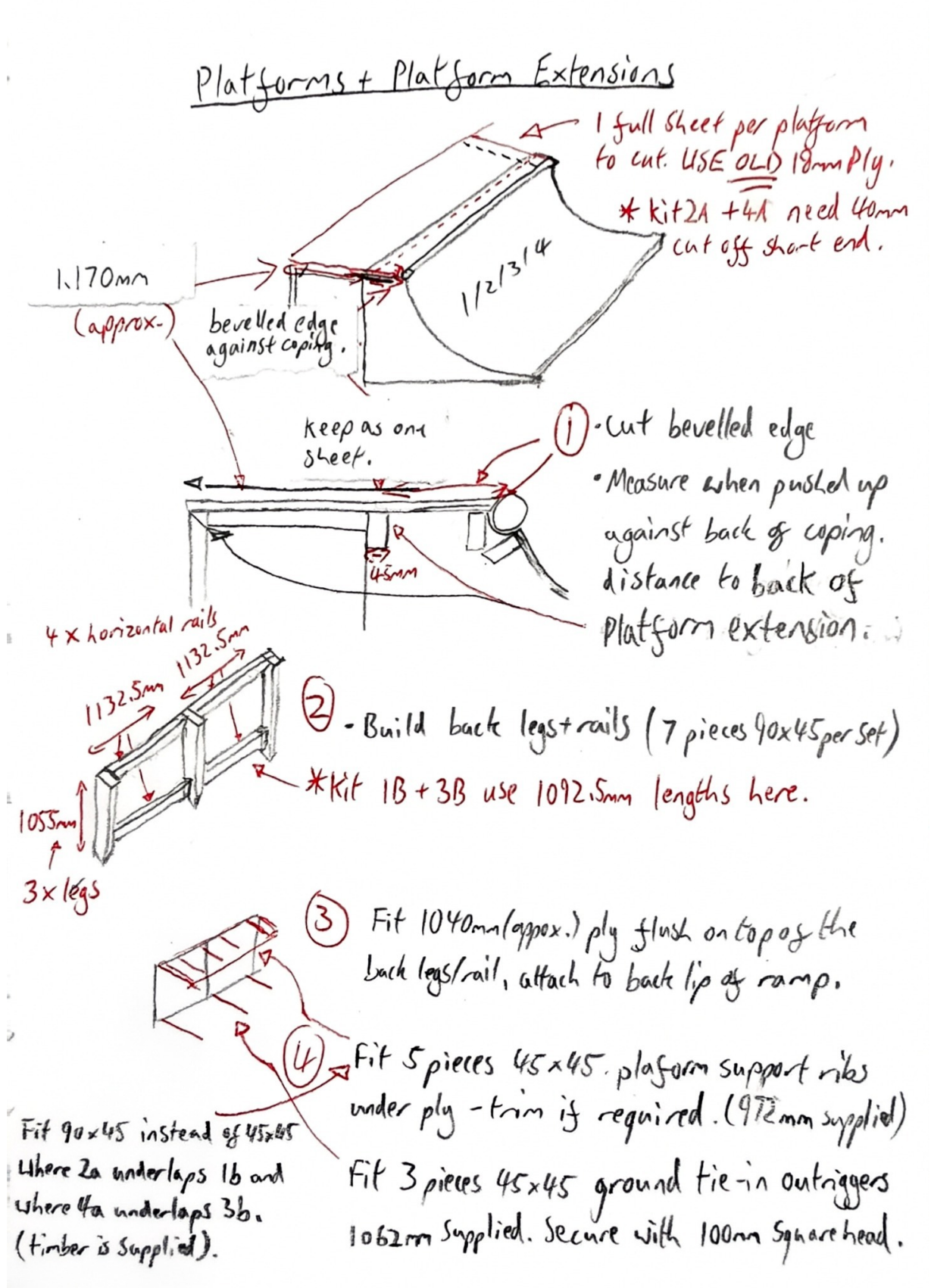
* Section 4A inside of 18mm sheet between joists.

Why

Stops 9mm overlapped riding surface flexing between joists.

The receiving shelves are fitted inside Sections 2A and 4A between joists. Two layers of curved 18 mm packer material support the overlapped riding surface without turning the temporary module join into a permanent fixing.

Appendix A4 - Platforms & platform extensions

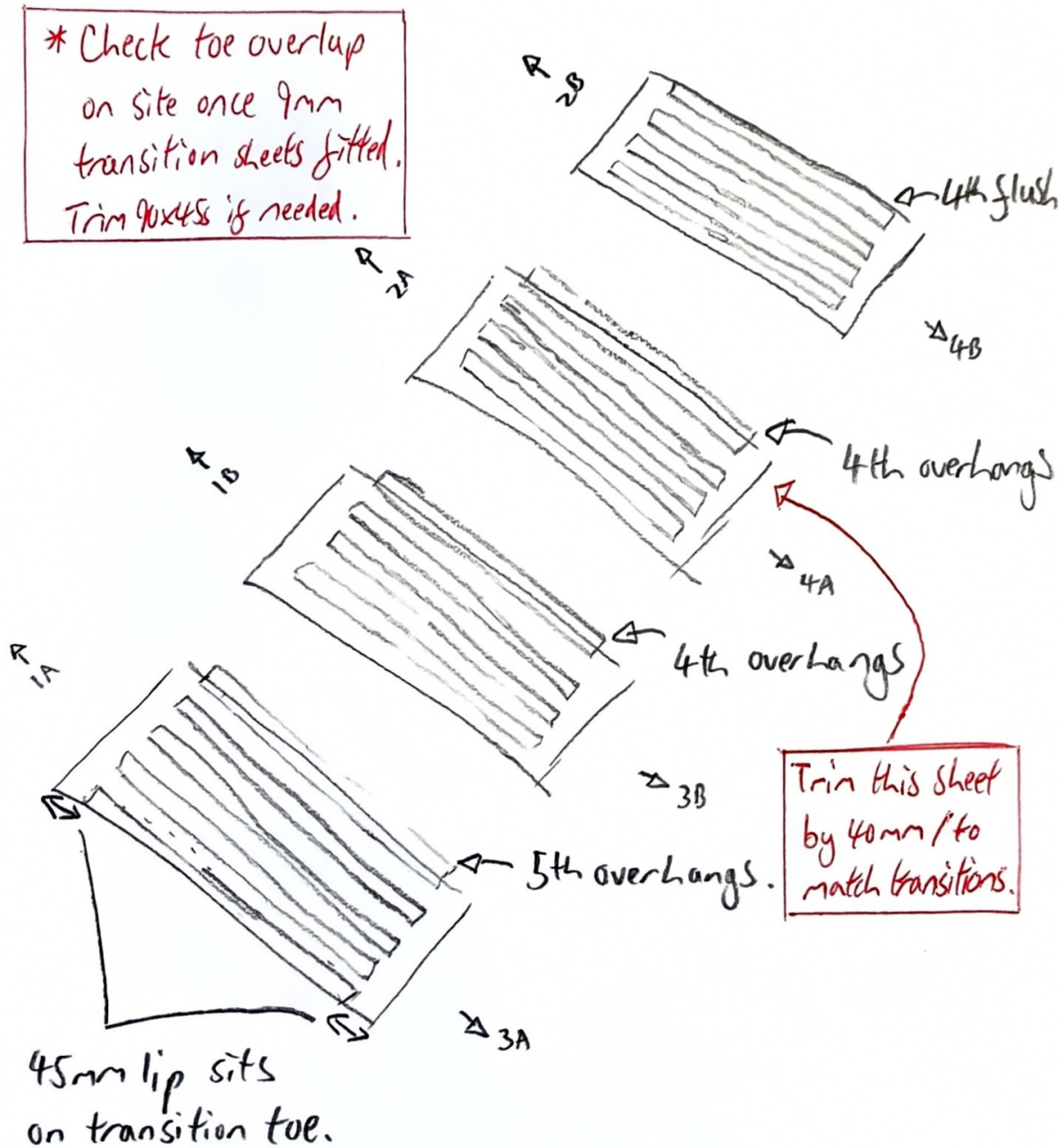


Working platform-extension sheet. The final as-built arrangement keeps one full removable plywood top per platform. Use the case-study dimensions for the confirmed 972.5 mm 45x45 support ribs, 1,062.5 mm outriggers and the two 927.5 mm 90x45 receiving-edge supports.

Appendix A5 - Flat-bottom section

Do not complete until transitions assembled, check fit first.

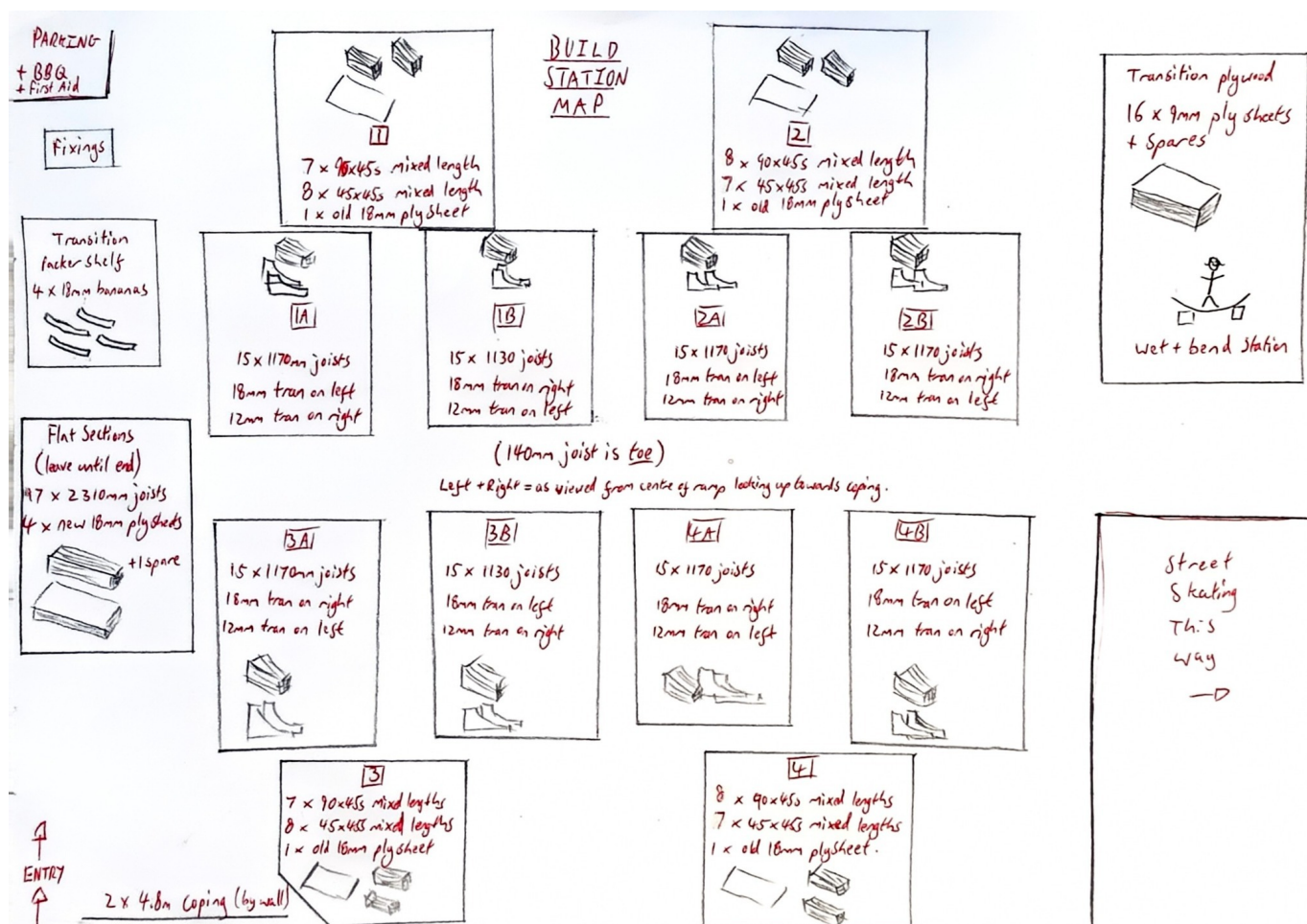
Flat Section



- 2310mm 90x45s span between the $\frac{1}{4}$ ramps.
- 18mm full ply sheets overlap on top.

The floor is deliberately completed after both ramp faces are surfaced so the toe overlap can be measured from the actual assembled structure. The receiving floor panel follows the same 40 mm seam logic as the transition above it.

Appendix A6 - Build-station map



The build site was laid out as an exploded version of the ramp. Numbered transition and platform packs were placed beside the matching station, with wet plywood, flat sections, coping, packers, fixings and first aid kept in separate marked areas.