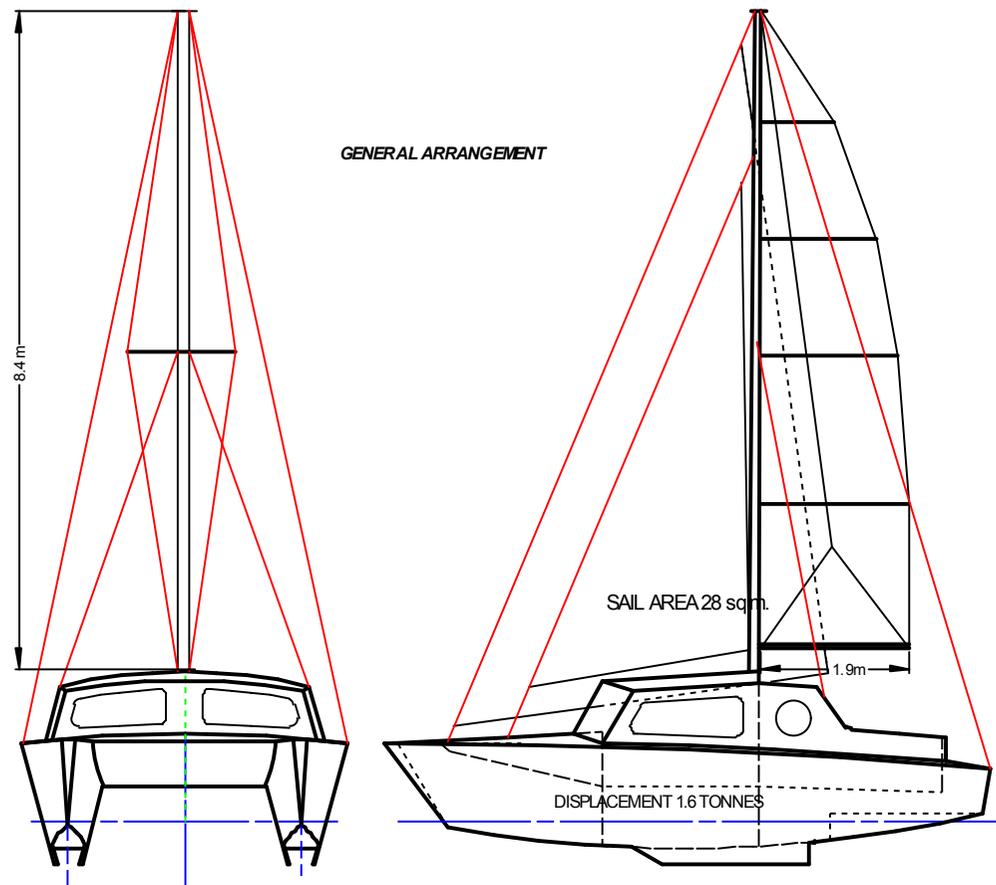


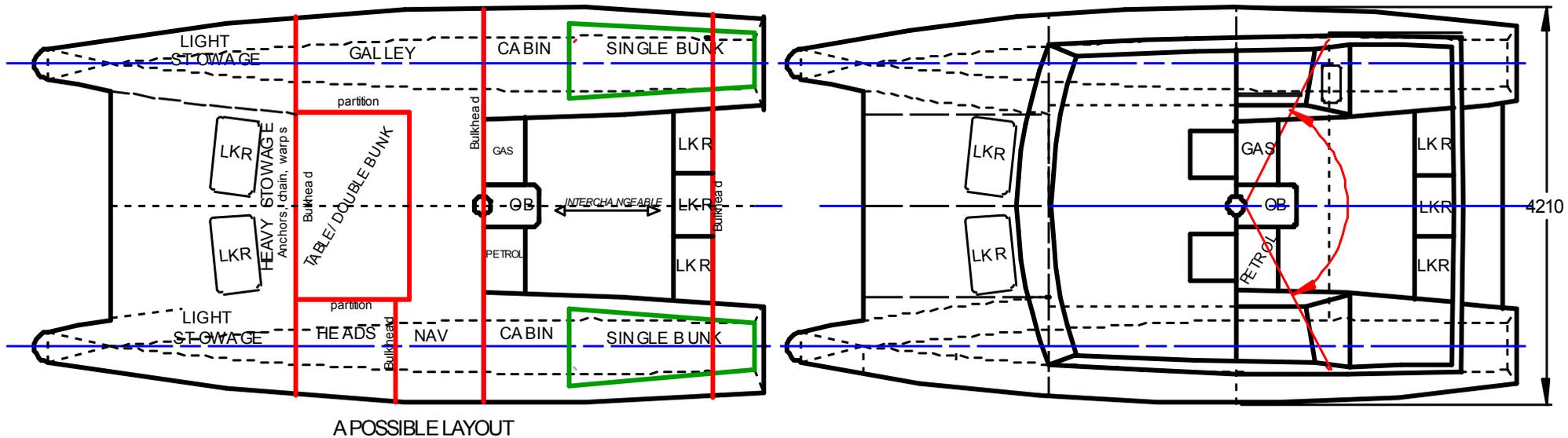
FELIX 26

A COASTAL CRUISING SAILING CATAMARAN WITH CUTTER RIG

A PUBLIC DOMAIN DESIGN FOR EXPERIENCED D.I.Y. BUILDERS OF SMALL BOATS by Bob Willcox rdwillcox@gmail.com
WITH UNIQUE QUICK ASSEMBLY FEATURE – you'll be afloat a lot sooner!



This is a line drawing design only. To be built at builder's own risk.
The CAD file can be emailed to users of DeltaCAD (Google it - US\$40) so they can develop their own variations.
DXF and DWG files also available but definition is not 100%.

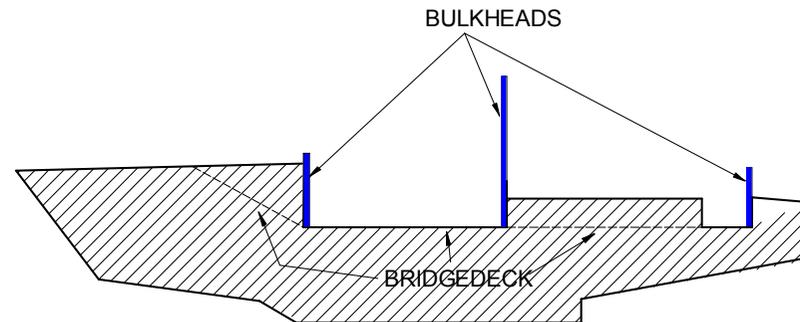


LOA 7.8m, LWL 6.4m, Beam 4.2m, 3m between hull centrelines

DESIGN POINTS

Felix has a unique 'quick assembly' feature which avoids the tedium of constructing and accurately aligning frames, a preliminary of customary boat construction where the frames are discarded later once they're no longer needed. If you choose to build her you will be afloat and sailing long before any other build-it-yourself coastal cruising catamaran with saloon.

Each hull is made from two side panels, an inner and an outer (also from bow, stern and sole panels). The hull panels are assembled on their sides on the floor. Afterwards they are stood on their keels. The bulkheads are then introduced located by the inner hull panels. *Easy! Simple! Quick!*



Felix will be a fastish cruiser with good elbow room in the cockpit and below. Every line in her design has a functional reason for being where it is, no styling has been added. Most striking are her flattie hulls, each one with two fixed, low aspect ratio keels to double the area of lateral resistance and the number of vortices yet still have a shallow draft. To keep construction simple these keels are part of the hull side panels. The high bridgedeck lessens slamming in heavy seas – no noisy, juddering halts to scare children and novices, to shake the rigging and to spoil sleep.

The bows are slim. The soles of the flattie hulls start at a point at the bows under the waterline and widen as they go aft. They stay wide towards the sterns to resist pitching including the rhythmic pitching alias 'nodding' alias 'hobby horsing' that is the nauseous curse of some catamarans, even a few modern ones.

The sterns end above the water line to avoid drag and to offer more buoyancy for extra dampening of pitching in heavy seas. No rudders are shown. My choice would be transom hung kick-ups. The sterns are so angled that when these rudders are fully down they will be semi-balanced, useful when sailing in strong winds under autopilot yet still give feedback when steering manually.

The foredeck is solid and provides anchorage for a forward forestay for ghosters. It is high for safer crewing and this height is carried aft along the side decks to give space below decks above a galley stove. Side decks are lower by the cockpit for easy access when a dinghy is alongside. All decks are cambered. All side decks are 0.3m wide.

In the cockpit someone 1.67m (5ft 6in) tall can see over the saloon. The aft cabins shelter the cockpit crew. The cockpit is clear for swift

single handing. The mast is on the saloon's aft bulkhead for the same reason, with halyard winches within reach from the cockpit and halyard cleats inside the cockpit. The boom does not obstruct the side decks. There are twin hatches to the saloon so one can either step straight down into the hulls or sit immediately at the saloon table. These hatches, rather than a central hatch-cum-door, also permit simple transfer of mast load to Felix's monocoque structure. The outboard can be positioned close to the centre of gravity.

Below decks the saloon has sitting headroom and the hulls have standing headroom. There is a 0.6m wide gangway between the hulls that doesn't intrude on the double bunk space. (Getting to the loo at night is easy.) Single bunks are aft in each hull.

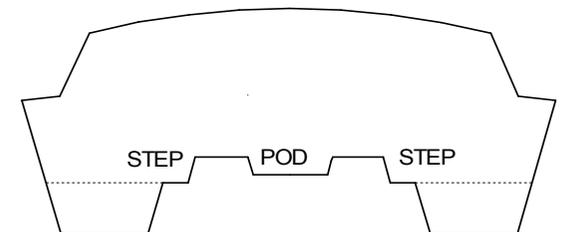
RIG

Rig is a personal thing. I suggest a mast about 9m high and a boom about 1.9m long. A high mast allows large ghosters and spinnakers to be set in light winds. One can always reef for strong winds but one cannot add mast height in light winds. A short boom keeps the side decks clear for easy and safe crew movement. Have an overlap between foresail and mainsail so that a decent 'venturi' gap can be developed with the sheets etc.

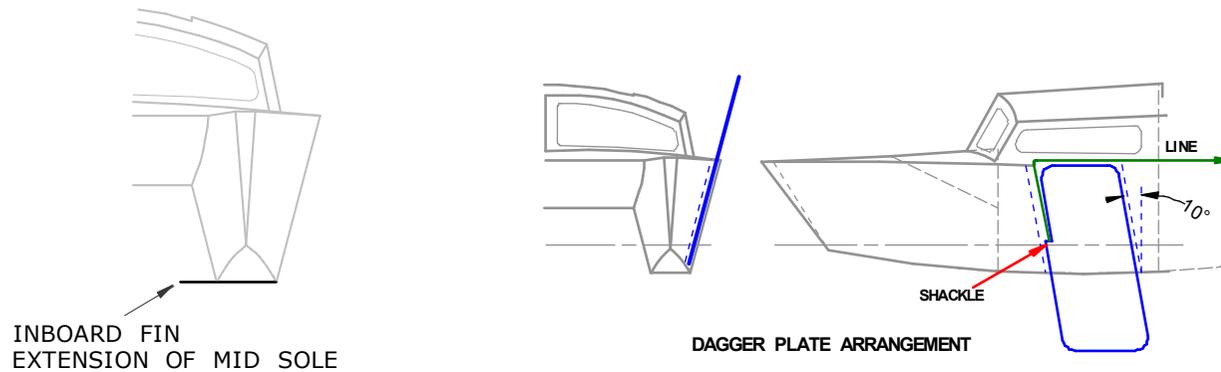
POSSIBLE MODIFICATIONS

The design shown is the basic one. Modifications are always possible with more money, material and effort. Extra sail area is feasible, say up to about 33m², more than this may be pointless. For more foot room under the saloon table a pod can be added under the bridgedeck stretching aft to the outboard pod but it may slam in a minor way in heavy seas. A nacelle would be better than a pod but more complex to build. The saloon roof can be raised for more headroom but this means more windage. A cockpit cuddy between the aft cabins is possible but again, more windage. (In bad weather I used to helm sitting in the saloon with my electric autopilot's remote control to hand, stepping out when the need arose knowing my course would be kept.)

Six adults rather than four will need a displacement of 2.2 tonnes which means slightly wider hulls to maintain bridgedeck height and a slightly wider beam so that these wider hulls don't impinge on the double bunk area. These extra widths will let the single bunks be converted to doubles by peeling strips off the inner hull sides which are then boxed in with matching bridgedeck strips. Doing this also provides earlier steps down into the hulls. Cruising will be a little slower and there will be minor slamming. Of course if one sails only in fair weather then none of these sailing disadvantages apply except the slightly slower speed, but the extra cost and effort of modifying will remain.



For an even shallower draft ...



BUILDING NOTES

Introduction

All Felix's panels are either flat or simple curved surfaces of slight curvature to keep construction easy. All curves are arcs of circles. She has no compound curves. When building her one should concentrate on her hulls being identical, fair and in true alignment. The rest of her need only look right to the eye.

POSSIBLE CONSTRUCTION SEQUENCE

Step 1. **Assemble hull panels.** Find a level floor. If it could scratch the panels put down hardboard sheets. Lay each hull's sides flat on the floor in pairs, inners on top of outers with stubby keels in line. Glue or pin in the stern and bow panels, ensuring the hull panels stay in line with each other whilst epoxy cures.

Step 2. **Fit hull soles.** With the hulls still on their sides, use spare timber to hold open the sides and entice in the soles. More timber can be used to prop up the panels to give room for working underneath. Stitch or pin along the soles in opposing pairs so that they are drawn gradually to their curved shapes. Finally glue them in place. Be generous with the epoxy fillets around the keels.

Step 3. **Strengthen Keels.** Turn hulls upside down and add shaped ply strips to keels to thicken and strengthen them. If you expect frequent grounding or beaching consider protecting them with stainless steel or hard wood shoes. Sheath the keels before fitting steel shoes, in fact sheath the keels whilst they are upside down whether they are to have shoes or not. (See *Sheathing* below)

Step 4. **Cut bulkheads** from plywood allowing for thicknesses of the hull panels. Mark out but do not cut out yet the gangway openings. Glue stringers onto each bulkhead as specified for locating the inner hull side panels and for supporting deck panels.

Step 5. **Insert bulkheads**. Stand the hulls upright and level on their twin keels. (They'll look too narrow.) Align them approximately. Offer up the bulkheads and entice them in. Pull open the inner hull sides until they're caught by all the bulkheads' temporary battens. Finalise the locating of bulkheads. The hulls will now have spread to their designed shapes and be more accurately aligned. Having checked the accuracy of the hull alignments and that the bulkheads are vertical then glue in the bulkheads – occasional pinning only may be necessary. You will now have your first glimpse of Felix's final shape. **WARNING: misalignments will be extremely difficult to correct after gluing.**

Step 6. **Glue inside the hulls**. Complete all joins inside the hulls.

Step 7. **Inspect so far**. Inspect all joins made so far, ensuring all fillets are very generous and with large radii wherever possible to avoid undue stress concentrations. Modify as necessary.

Step 8. **Fit bridgedeck**. Position bridgedeck panels with props and glue them in.

Step 9. **Cut out gangways** in the bulkheads. Epoxy the cut edges.

Step 10. **Start fitting out** while access is easy. Internal lockers, bunks, seating, etc, are all glued or screwed into place.

Step 11. **Fit decks**. Glue in all decks using pins sparingly to locate them.

Step 12. **Fit saloon sides**. Fit and glue saloon-cum-cockpit side panels.

Step 13. **Fit saloon roof**. Place saloon roof in position. It will need weighing down to achieve its curvature. Offer up the partitions between hulls and saloon and check they do quite reach the roof and that the roof will be a fair curve. Adjust as necessary. Glue partitions into position but NOT to roof. Glue the saloon roof first to saloon side panels, then to main bulkhead and finally to the partitions. Glue in the heads bulkhead.

Step 14. **Fit saloon front**. Glue saloon front panel.

Step 15. **Fit aft cabins**. Glue in aft cabin panels.

Step 16. **Fit out cockpit**. Fit out the cockpit including the outboard well and cover.

Shape bows. At any point after Step 5, make foam shapes to round off the bow panels and stick them on. *Suggestion* - use a plastic drain pipe of slightly larger diameter than the top of the bows and longer than the bow heights. Lightly grease it inside and expand foam in it. After the foam has set, cut off the excess foam at each end and push out the 'plug'. Slice this plug diagonally along its length to give two bow shapes which are then glued into place. After the glue has set, wash the foam shapes with detergent to get rid of the grease, shape and fair them with coarse sandpaper etc and smear them with resin fillers. End by give them a fine fairing ready for sheathing.

Stiffening. If any additional stiffening is required after construction, either glue in hardwood stringers or expand foam in confined spaces.

Check for deck stiffness and, after launch, for any hull panels bulging inwards.

Sheathing. Finally, locally sheath parts of the hulls that may have to take knocks or abrasions, e.g., bows, keels, places where warps or fenders may rub, etc. Then completely sheath the hulls all over, perhaps also the undersides of the bridgedeck. Sheath with clear or coloured epoxy and lightweight woven glass or polyester cloth.

EXTRA NOTES FOR FOLLOWING LINE DRAWINGS...

Dimensions are in millimetres [mm].

Panel dimensions make no allowances whatsoever for material thicknesses.

For soles, decks including bridgedeck and saloon roof suggest 9mm thick ply. For hull and saloon sides 6mm ply. For bulkheads, bows and sterns, 12mm ply. Use thinner ply if you wish so long as you watch for flexing after launching and correct it with extra stringers or internal furniture or expanded foam in confined spaces.

You will be building a prototype. As with all prototypes you will come across a few errors as you go along. These can be caused by your own mistakes in previous construction steps or in the reading and translating of drawings, or by my mistakes at the design stage. Be prepared for these mistakes.

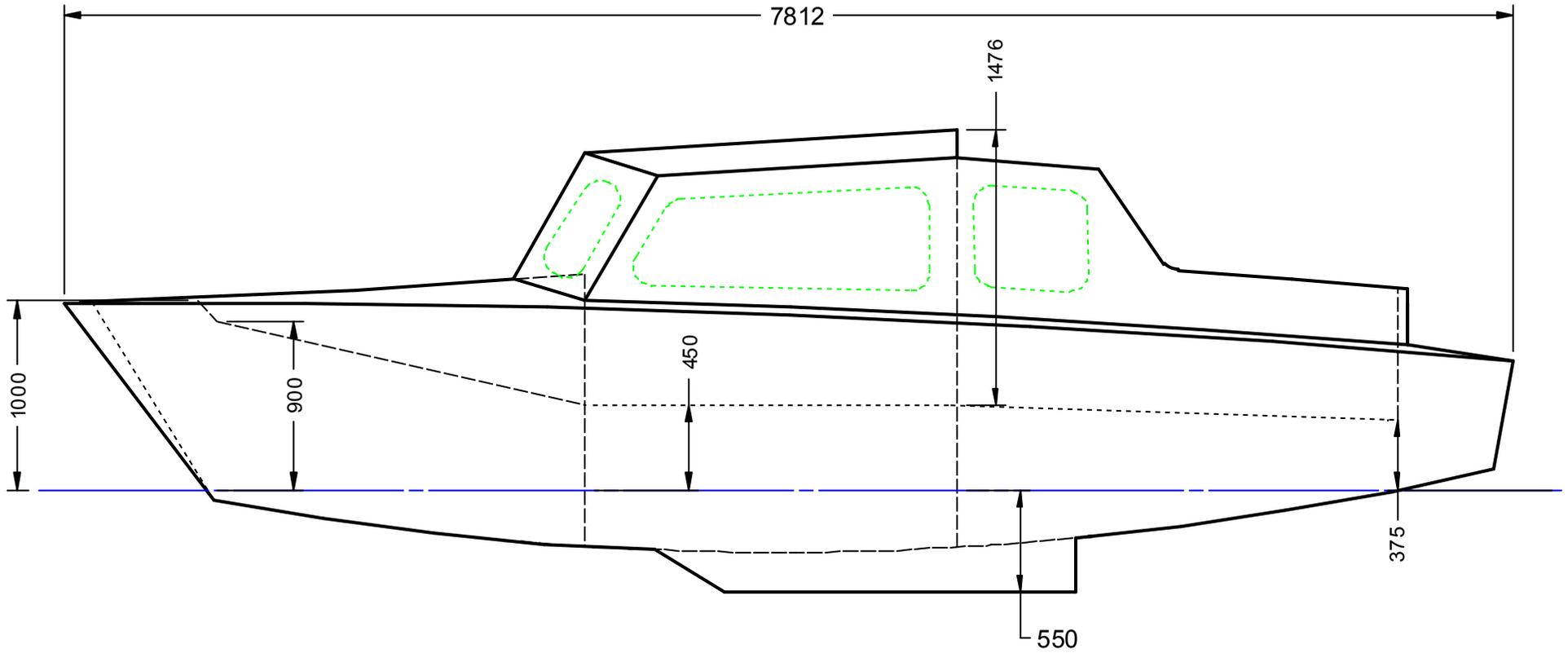
Apart from one catamaran, all my builds in the past were prototypes and I always hit mistakes. Before building the second prototype I built a scale model using thin balsa wood sheets, a practice I continued for subsequent prototypes. If nothing else the act of building a model cleared my mind on how construction should proceed. I found 1/20th scale was OK. I suggest you do the same at whatever scale suits you.

It will all probably take a lot longer to complete than you first thought.

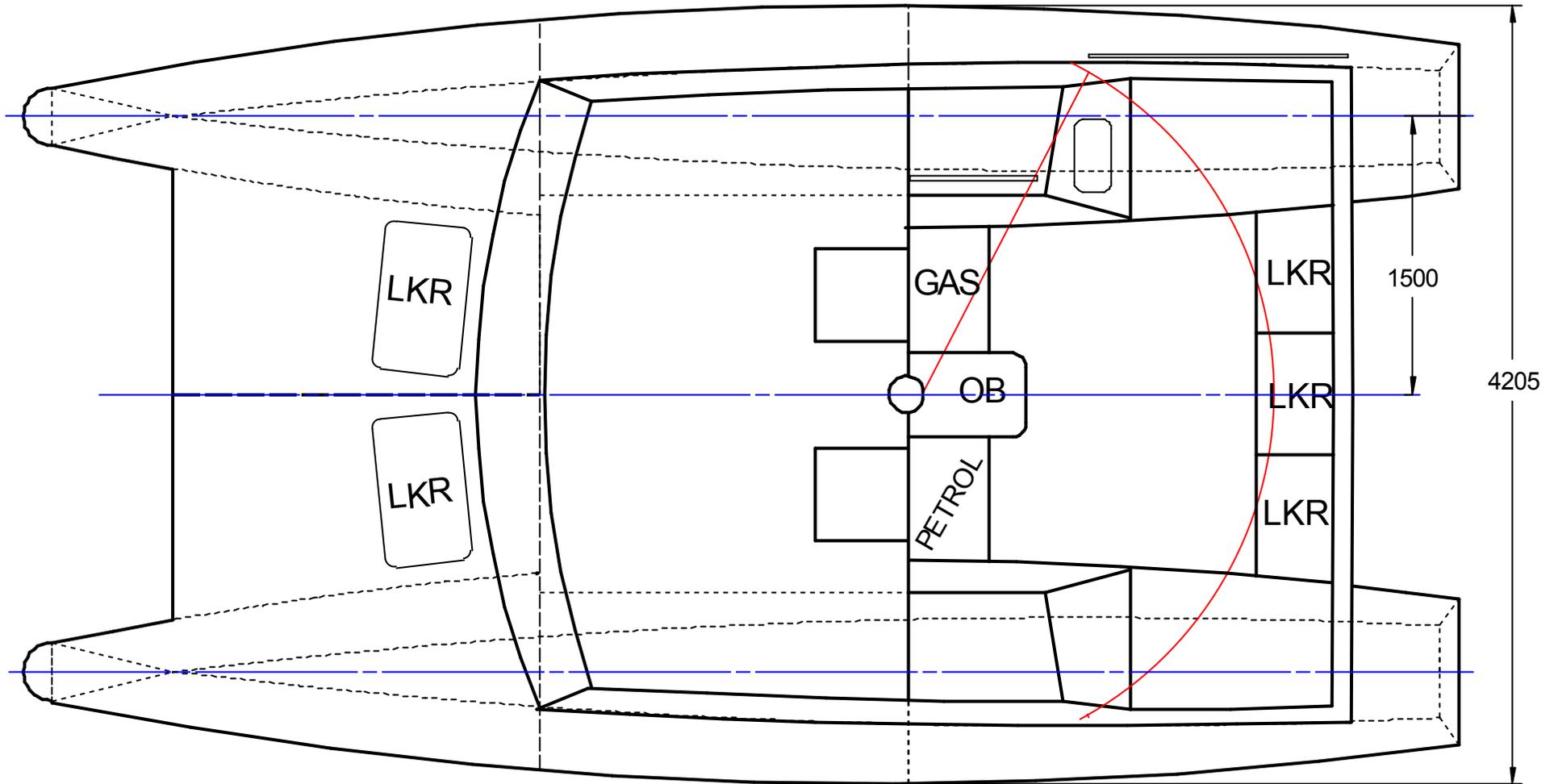
Start collecting clean, empty 4 pint plastic milk bottles with their screw tops still in place. Slice off a narrow side to leave you with a very useful open container with a handle underneath, suitable for holding and pouring catalysed epoxy liquid when applying same. You'll get through a lot of these containers as they're thrown away when no longer useable.

THE DESIGN DRAWINGS

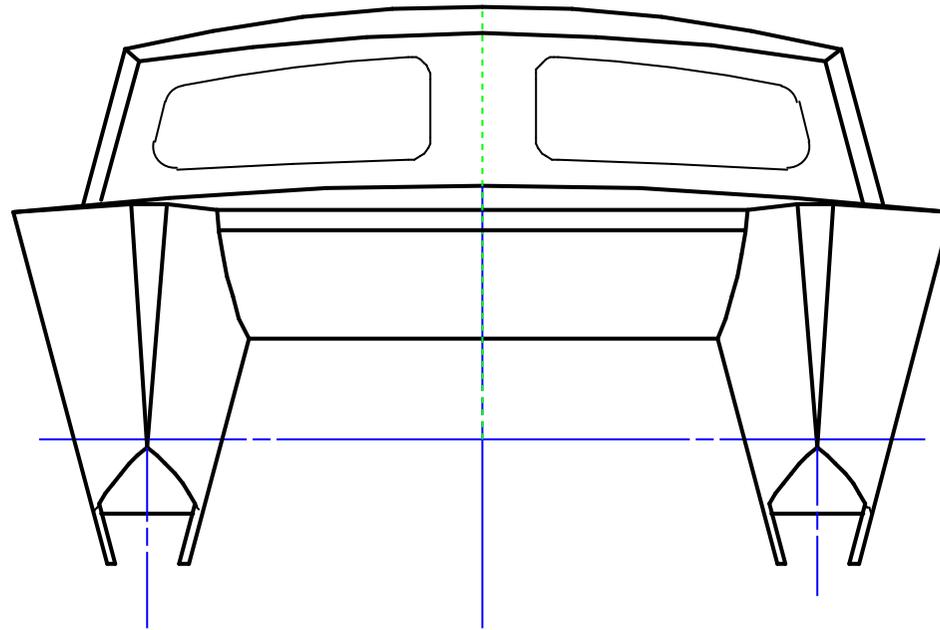
SIDE VIEW
showing clearances



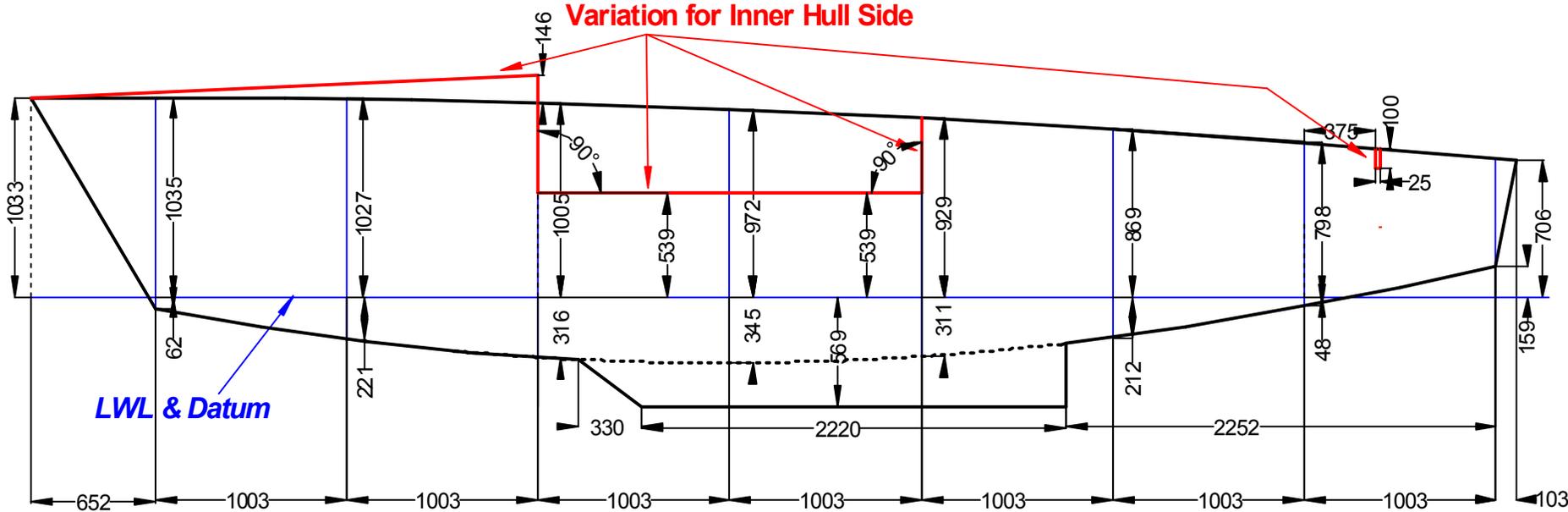
PLAN VIEW



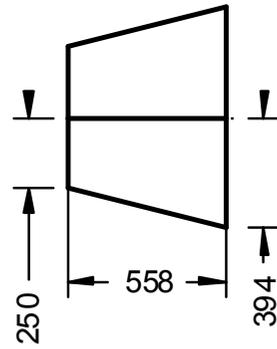
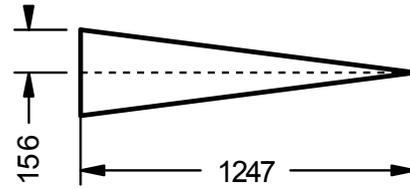
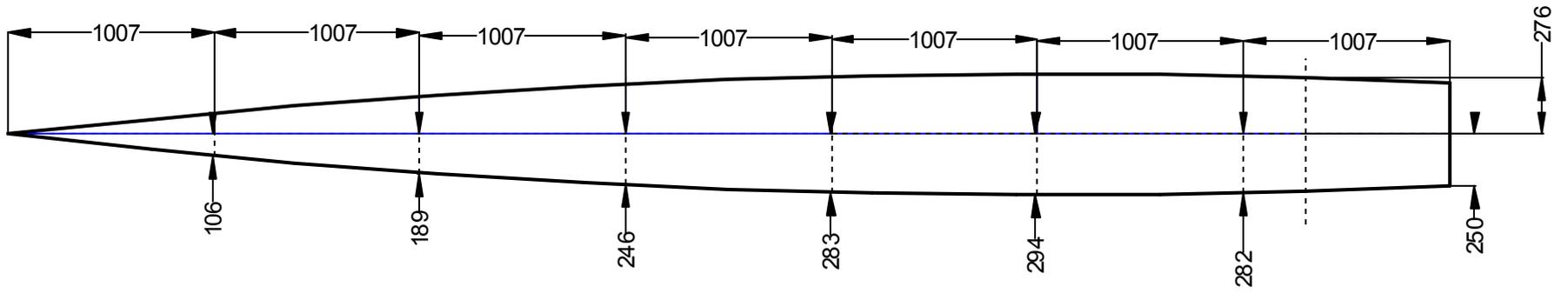
FRONT VIEW



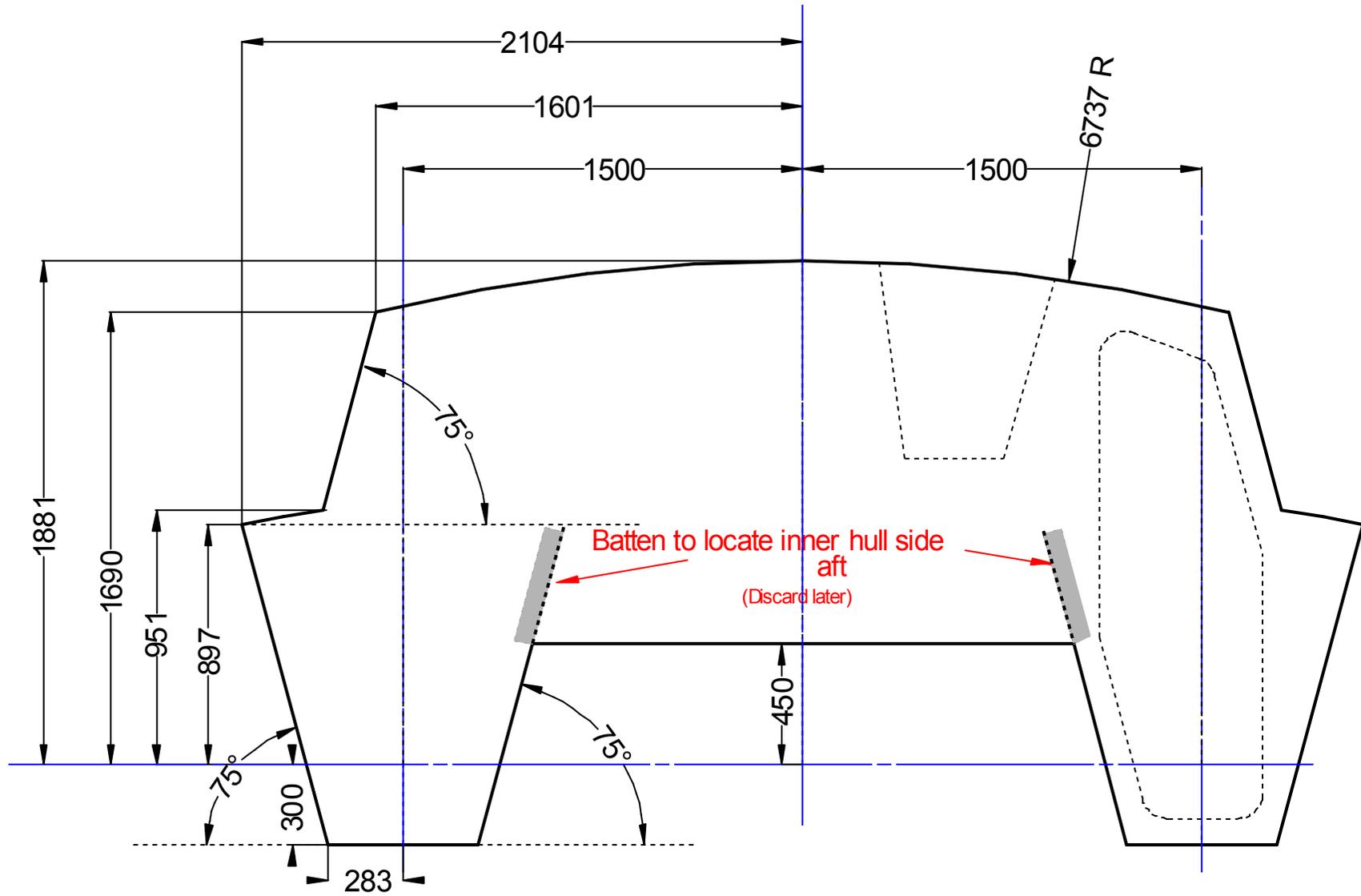
HULL SIDE PANELS



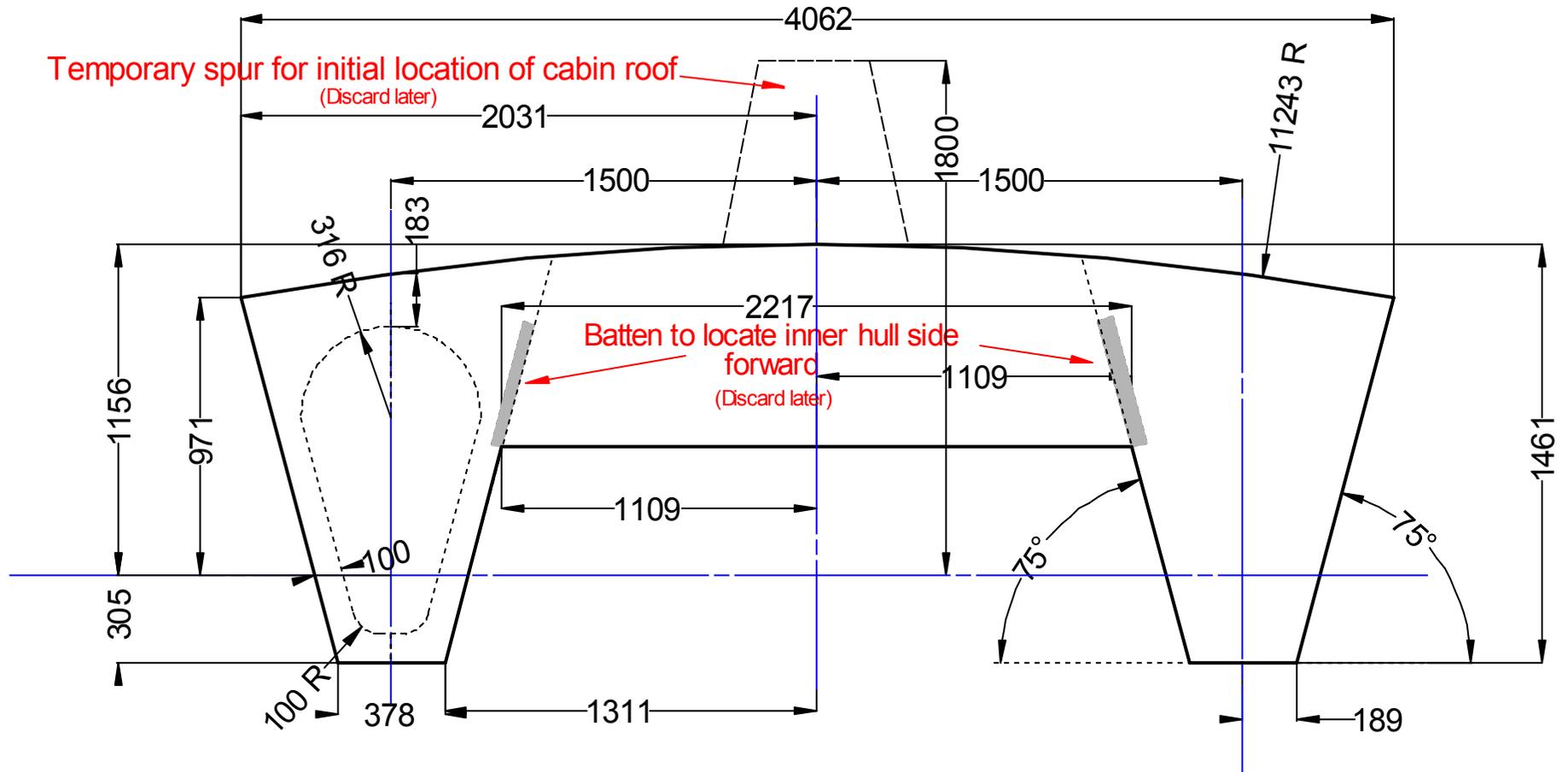
HULL SOLE, BOW & STERN PANELS



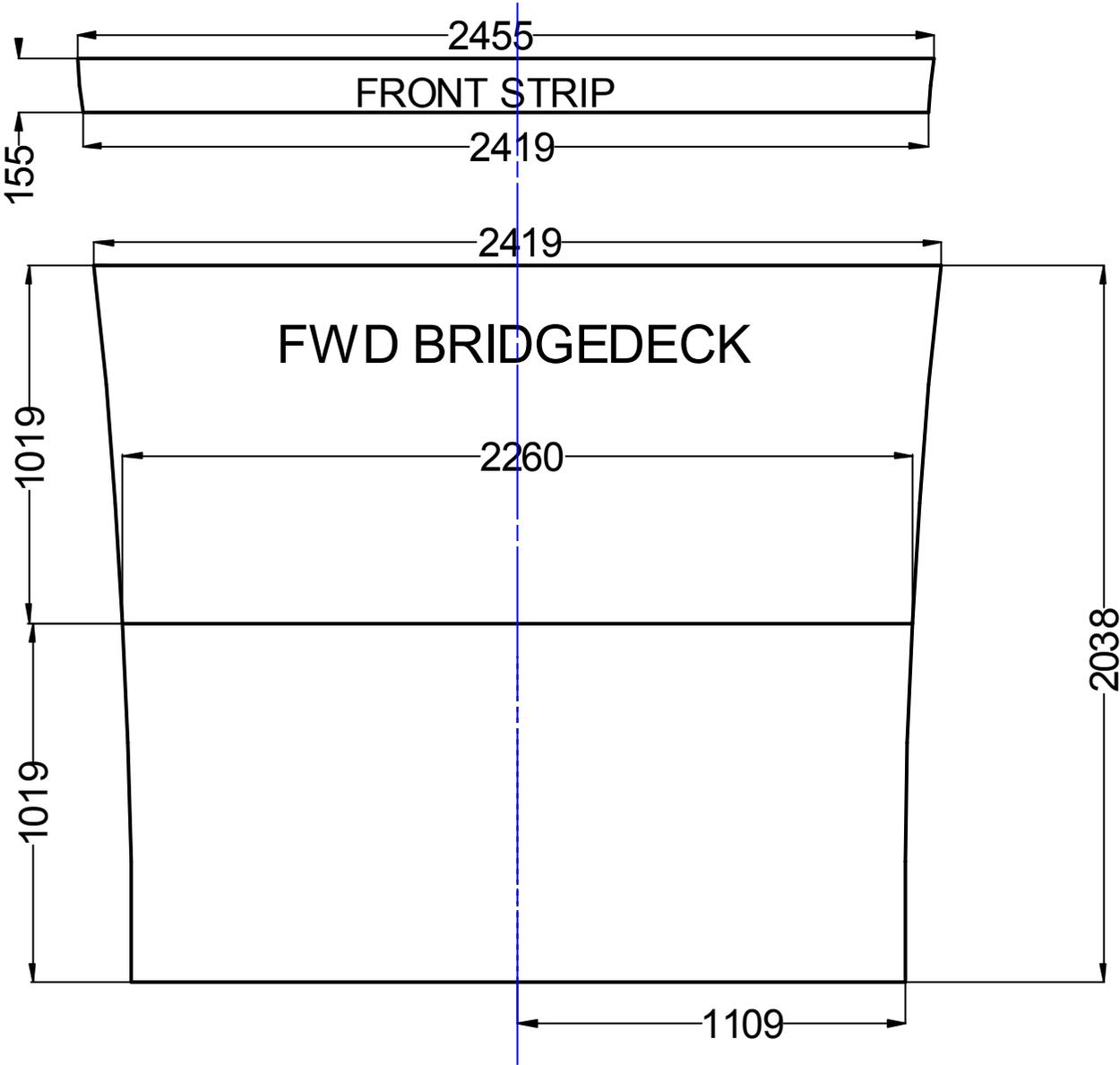
MAIN BULKHEAD PANEL

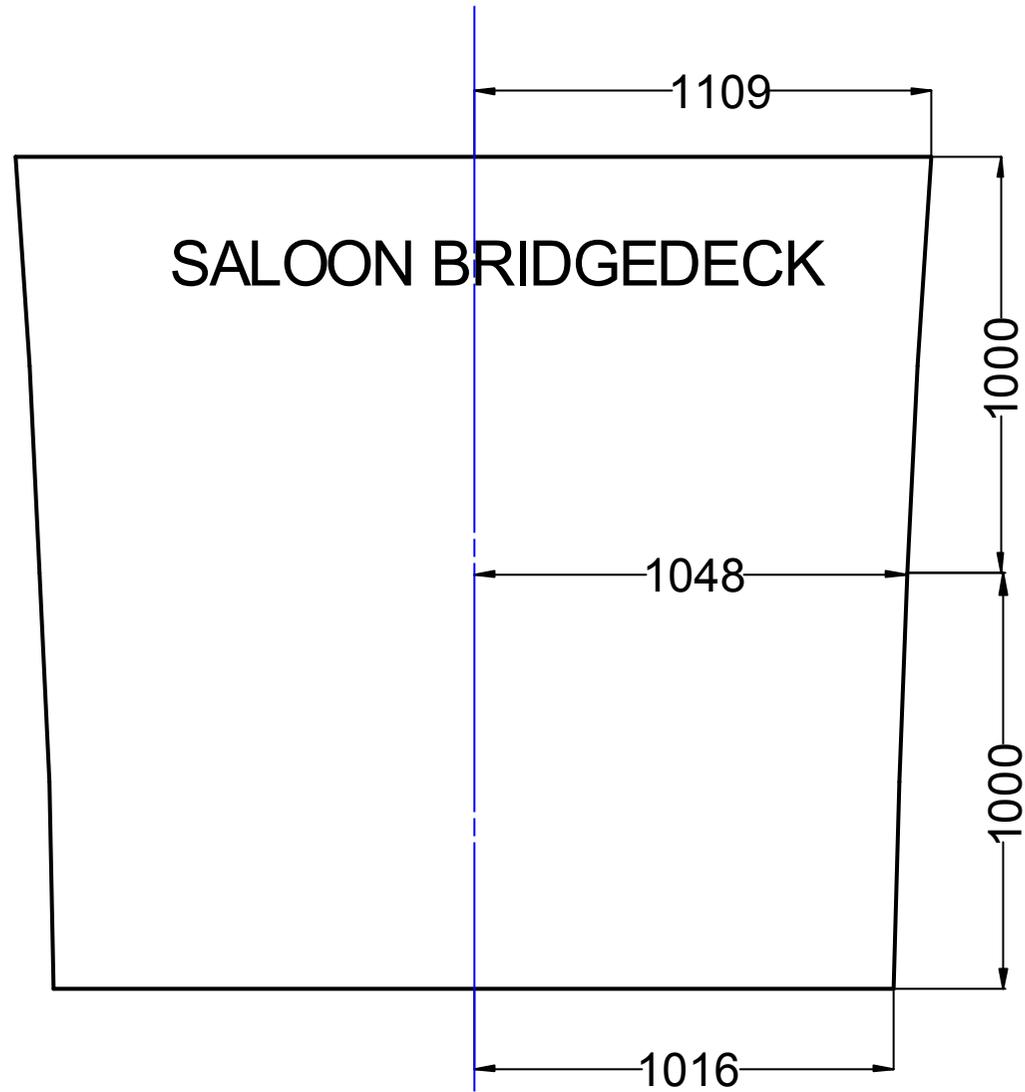


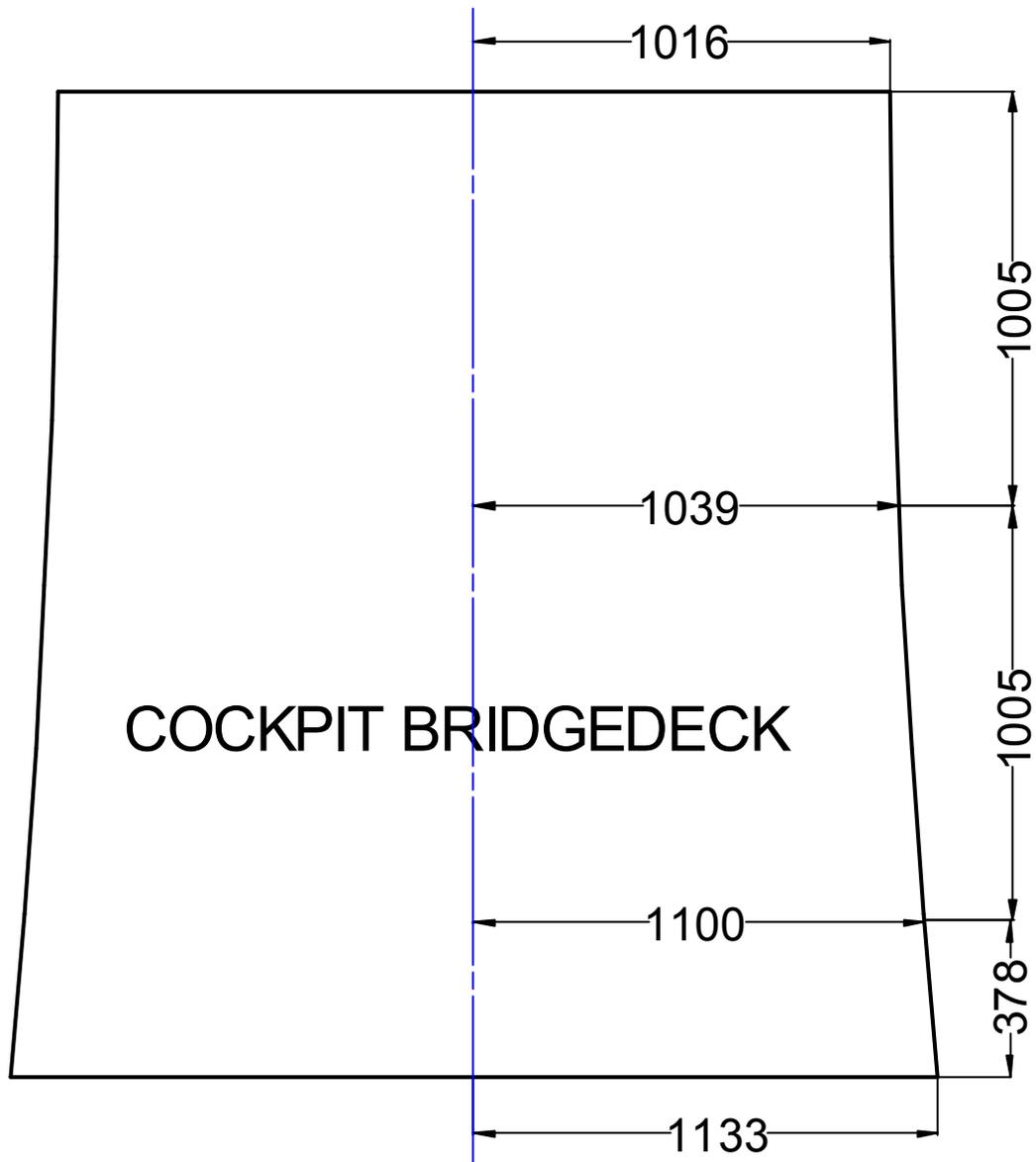
FORWARD BULKHEAD PANEL



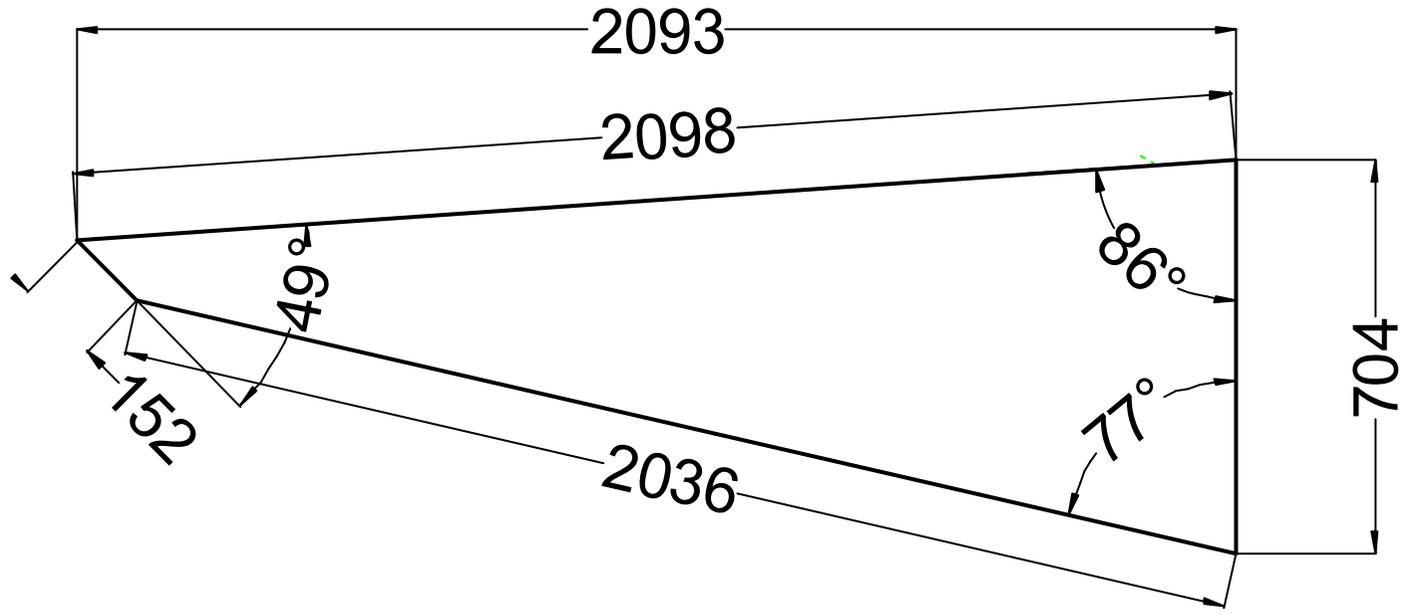
BRIDGEDECK PANELS







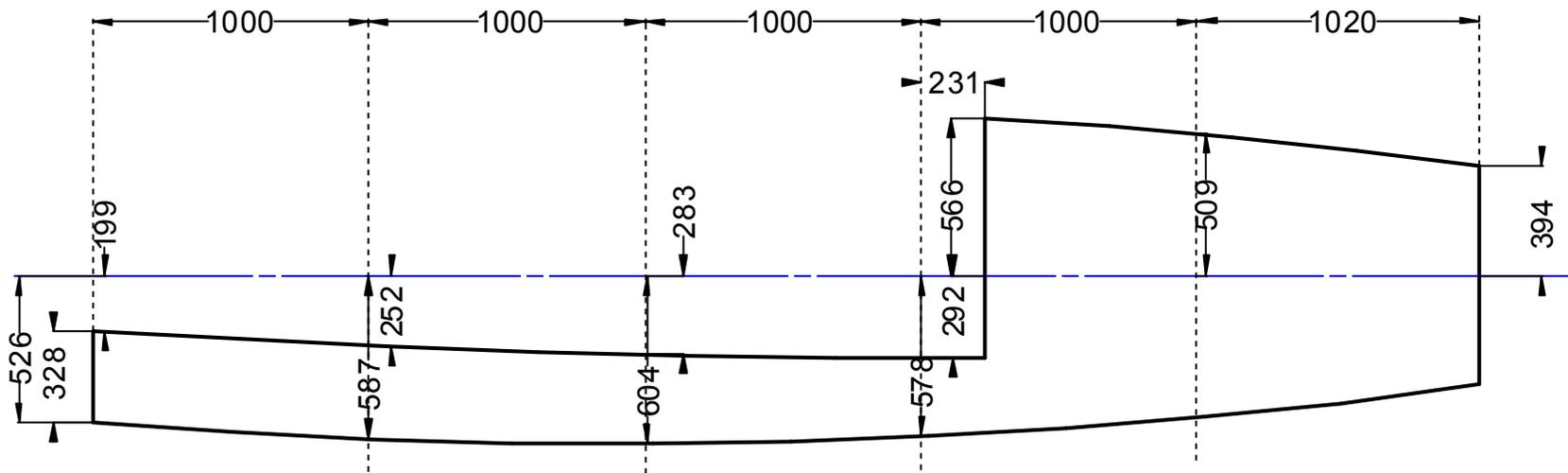
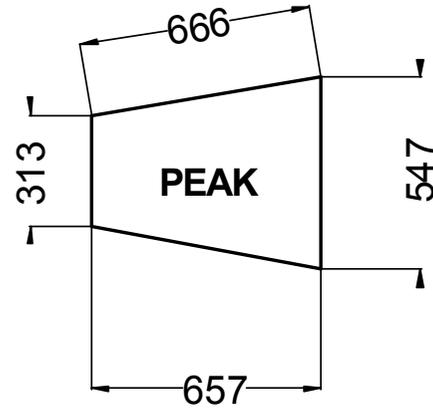
DIVIDER & DECK SUPPORT PANELS X 3
TO GO BETWEEN FORWARD BRIDGEDECK AND FOREDECK ALONG CENTRE
TO GIVE 2 x ANCHOR, CHAIN & WARP LOCKERS



FOREDECK PANEL

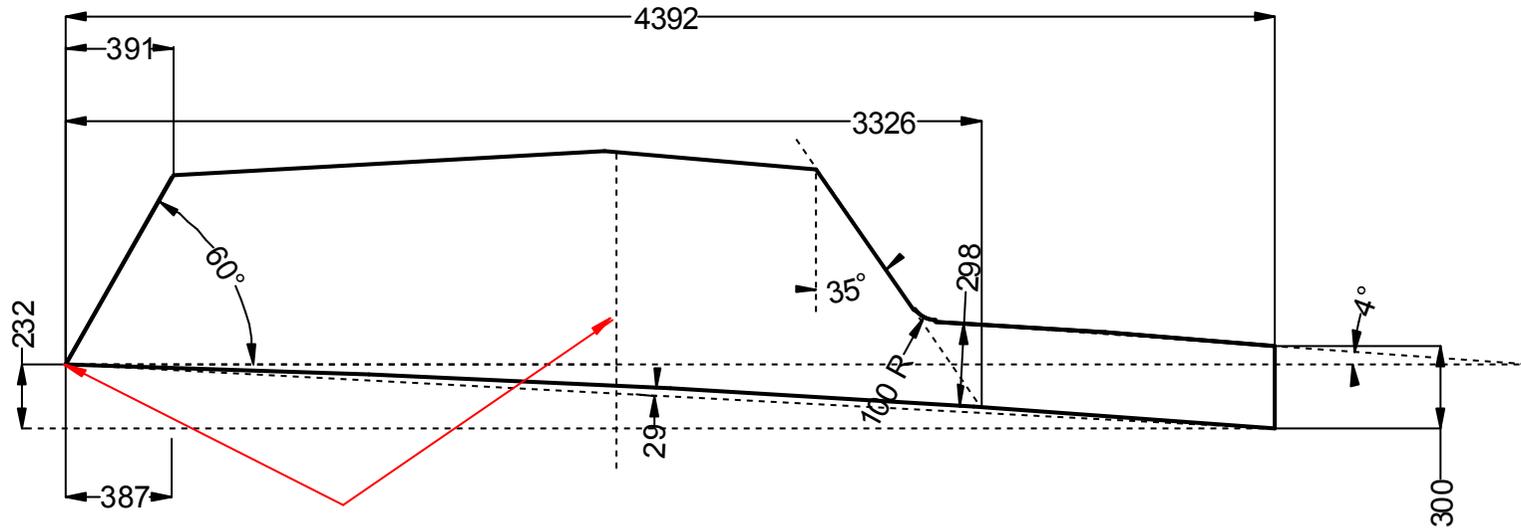


SIDE DECK PANELS

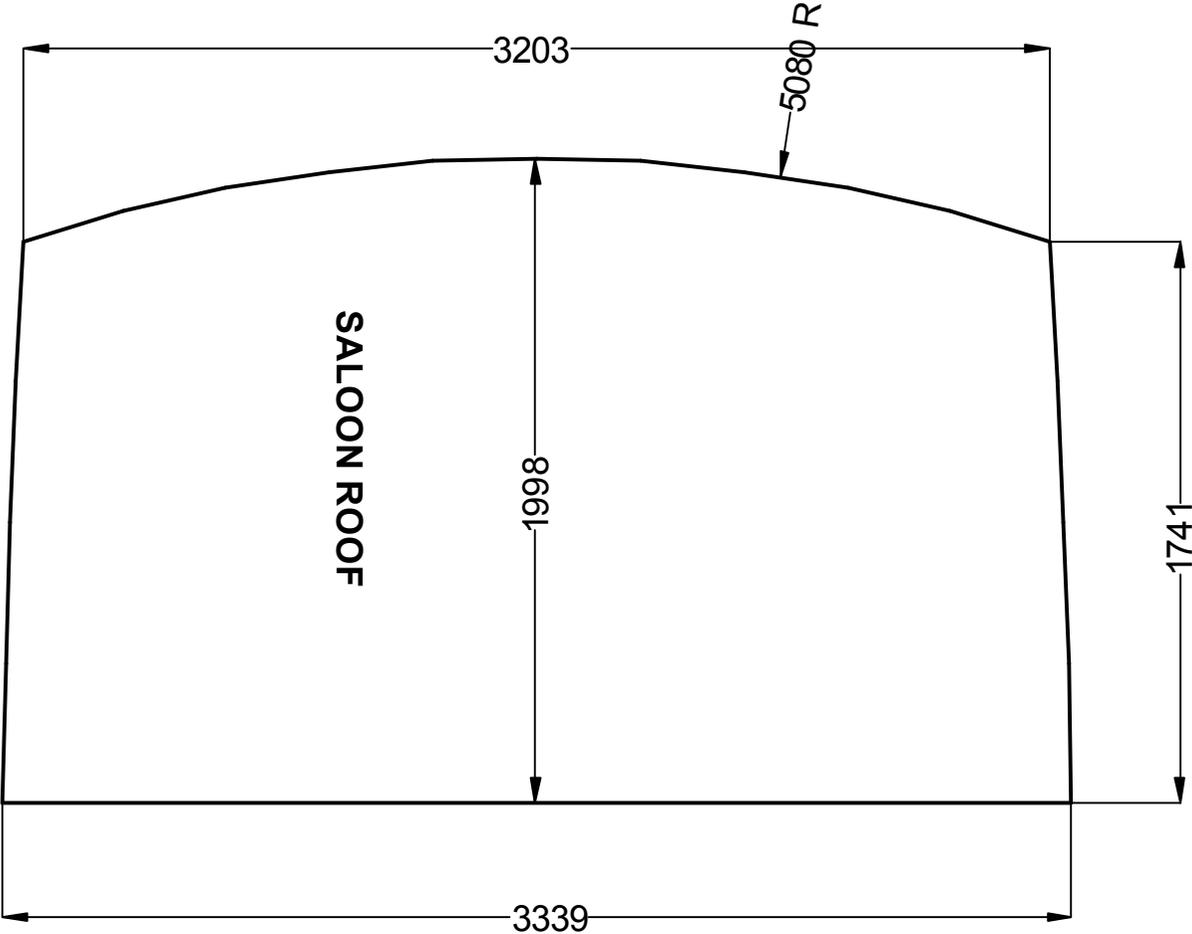


SIDE & AFT DECK (Aft deck covers aft bunk & is cockpit seat.)

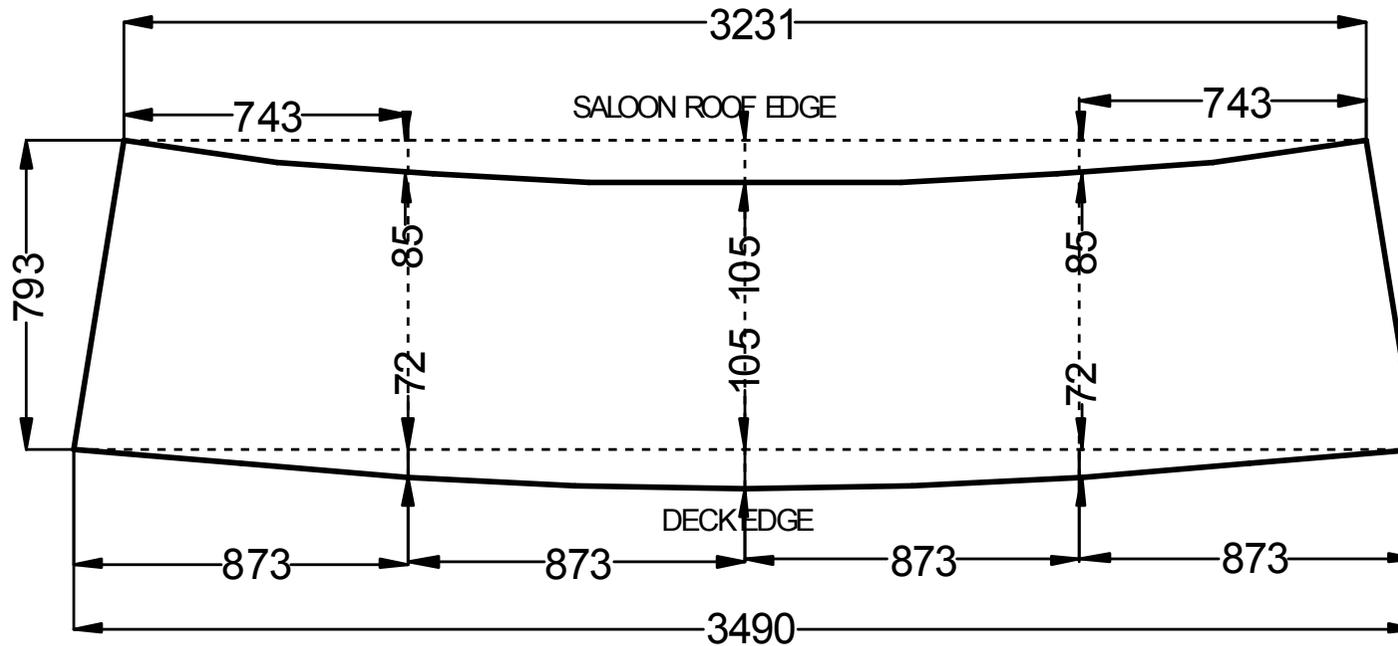
SALOON & COCKPIT SIDE PANELS



SALOON ROOF PANEL



SALOON FRONT PANEL



This is a conic projection on which I'm a little rusty. Suggest you try it out in hardboard first, just in case!

Once all the above panels have been assembled, the remaining panels for closing off the aft single cabins and installing cockpit lockers are all simple flats and can be measured off the construction so far.

I don't plan anymore updates unless someone discovers a design error.