

# ***BLUEEYES-20***



***Sports cruisers and dinghies by Keith Callaghan***

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# BLUEEYES-20

*BLUEEYES-20* is one of a series of sports trailer-sailer designs ranging from 5.5 metres to 7 metres LOA. My design portfolio also includes high performance sailing dinghies.

*BLUEEYES-20* is designed for coastal and estuary cruising, where her fully retractable centreboard is a great benefit in shallow waters. She draws only 25cm with the board up. She is designed to conform to the EU Recreational Craft Directive, category C.

She is intended to be constructed using Epoxy/wood/glass composite techniques, giving a stiff, light and very low maintenance boat. There are 2 forms of construction:

1. Multi-chine construction from plywood panels. This form is available as a pre-cut kit of plywood parts from Jordan Boats Ltd.
2. Glass sheathed strip plank construction, with plywood topsides.

140kg of lead ballast is moulded into her fully retractable centreboard. Her empty weight is just 600Kg, the sailing displacement (with 2 crew) is 850kg, and the full towing weight, including trailer and cruising inventory, is about 1000Kg.

*BLUEEYES-20* was designed as a fast yet easily sailed coastal cruiser. She can be rigged for single handed sailing, with a self tacking, reefing foresail, and slab reefing on the mainsail. All control lines are led to the aft face of the coachroof, so there is no need to leave the cockpit whilst sailing.

The foresail incorporates a jib boom which enables a wide sheeting angle when off the wind. The foresail automatically goosewings when running before the wind. Foresail twist is perfectly controlled by use of a kicking strap on the jib boom. There is just a single jib sheet. Tacking is simply a matter of putting the helm down - no other action is required.

As you might expect with a lightly ballasted centreboarder, *BLUEEYES-20*'s stability characteristics are not like that of a Contessa 32. Nonetheless, she is self righting until her mast is below the water, even with 2 crew perched on the gunwhale, where they would exercise a negative effect on righting moment. The stability curve is shown elsewhere in these study plans. The centreboard is assumed to be locked fully down.

Uffa Fox was well known for saying, 'The only place that weight ever did any good was in a steamroller', and certainly at moderate angles of heel a ballast keel is just dead weight, adding little to the stability of the boat.

Because she is so light (her CHS empty weight is 600kg and her displacement/length ratio (DLR) is 106) she FLIES off the wind. She is a true planing cruiser, needing just a force 4 breeze on a reach to take off. At any speed she remains beautifully balanced and light on the helm.

I tend to emphasise the offwind performance in my description of BLUEEYES-20, because it is here that speed differentials with other boats are most marked. Even BLUEEYES-20 cannot plane to windward, so she is limited to her maximum displacement speed upwind. This maximum is the same for any boat of her waterline length, ie  $1.4 \times \text{the square root of the waterline (in feet)}$  = approx. 6.2 knots. (Handicapping systems weight waterline length very heavily for this reason).

A boat as light and “hydrodynamic” as BLUEEYES-20 will approach this max readily in smooth water in a force 3, or in conditions where you can keep her heeling to less than 15-20 degrees.

In rough water you have to use dinghy techniques to maximise speed made good to windward, but you have the advantage over a dinghy in that you can easily reef instead of having to spill wind from the sails. Reef early is the maxim if you want max speed to windward. BLUEEYES-20 only has 150kg of ballast - she can't be fastest boat on every point of sailing in all weathers, but she will hold her own in heavy airs to windward if sailed well. 20 knots of wind will be no problem, but 30 knots will require double-reefed main and reefed (furled) jib, and 4 blokes on the high side.

BLUEEYES-20 is really a big dinghy - have no delusions about this. There are a lot of compromises, of course. For example, BLUEEYES-20 has a more balanced heeled hull form than a dinghy, because inevitably she will not be sailing so upright to windward.

Being a dinghy in concept means (among other things) that BLUEEYES-20 is light. This brings numerous advantages - “trailersailability”, ease of handling afloat and ashore. No winches required for sail trimming, no excessive beef required to do anything on the boat - everything is light. She is a joy to sail, is highly manageable in all sailing conditions and genuinely has no vices whatsoever. I'm sure she will give her owner years of pleasure.

### **Towing Performance**

BLUEEYES-20's all-up towing weight is 1000kg, and its draft with centreboard raised is 25cm. This makes it a genuinely towable and launchable trailer-sailer.

Many so-called trailer-sailers of similar or smaller size will have a similar towing weight quoted in their sales literature, but the weight does not include the trailer! Their problems are generally twofold: they carry around too much ballast, and this is often external, necessitating several feet of water to launch in. I was amused to see the picture on the front of the book 'Trailer Sailing' by JC Winters (Adlard Coles, 1994). It showed a Volvo backing a Beneteau First 210 down a slipway on its trailer. If you line up the waterline of the boat with the back of the car, it is immediately apparent that the car would be completely immersed before the boat floated off its trailer. And I'm sure that the 210 on its trailer exceeds the Volvo's safe towing weight limit. E-mail me with your comments if I'm wrong.

## **Accommodation**

The standard layout has 3 berths: a double berth forward and one quarter berth. There is plenty of stowage space, and a Porta-Potti can be stored away under the cockpit sole.

## **Outboard Motor**

A 3.5hp or 4hp short shaft motor is recommended. Even the smaller engine will push the boat along adequately, and has the advantage of being lighter (13kg vs 21kg) and cheaper, but with no reverse gear.

The motor is mounted on an inboard transom and is directly in front of the rudder, ensuring excellent manoeuvrability both forward and astern. The motor is easily accessible, and can be raised out of the way when sailing.

## **BLUEEYES-20's Weights**

Here is a breakdown of BLUEEYES-20's weight:

<b>Item</b>	<b>Weight Kg</b>
Boat weight (empty)	600
Fuel, water, food	25
Cruising gear	45
Trailer	330
<b>TOTAL</b>	<b>1000</b>

Not included above are the outboard motor (21kg), anchor/chain (16kg) and personal clothing etc, which are stowed in the car boot when towing. The rig is actually light enough to tow behind a VW Golf or similar size car.

Fully detailed PLANS of [BLUEEYES-20](#), consisting of about 35 sheets, are available from the designer. Plans are available in electronic format, or printed on paper. The former is a cheaper option. See the BLUE LIGHTNING website for current prices. Build time for BlueEyes is approximately 40-50 man/weeks. **This is a considerable commitment of time and effort.**

Price includes royalty for one boat, and free of charge comprehensive support for you during the planning and building of your boat

### ***Support Policy***

- 1. Support is included as part of the package that you purchase with the boat plans.*
- 2. I will answer all reasonable questions about how to build my design. As the builder, you are responsible for acquiring sufficient general knowledge about boatbuilding before you start your project. Many good books and other sources of information are available, and I can recommend such information sources.*
- 3. The plans and other documentation that I supply are very detailed and contain a great deal of information. You do not get a step-by-step set of building instructions, however.  
It will be useful for you to go through the data thoroughly before you start the project. This will help to minimise mistakes and will speed up the actual construction. If you cannot find the answers in the documentation and drawings, I'm here to help, so please ask me.*
- 4. I will endeavour to respond promptly to your enquiries. However, I cannot undertake to be available at all times.*

### **Contact Information**

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# BLUEEYES 20

## STABILITY CURVES

180kg centreboard - fully down

Data computed from hull model ref BE20hw6d-15.srf, by Prosurf V3, from New Wave Systems Inc.

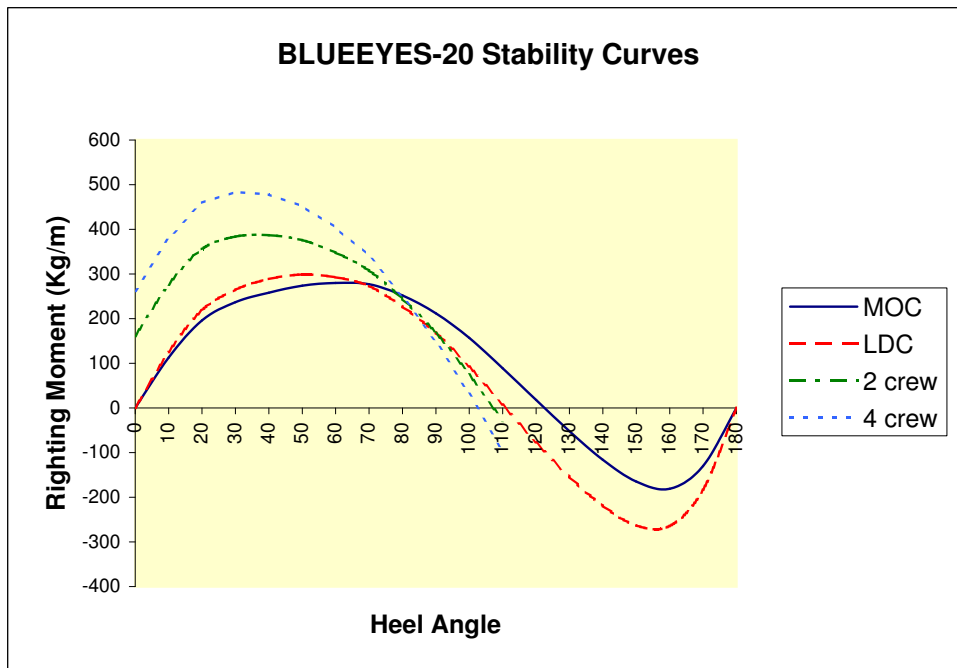
The data is computed in two conditions:

1. The Minimum Operating Condition (MOC) and
2. The Loaded Displacement Condition (LDC)  
- as defined in ISO 12217-2 Annex C.  
(EU Recreational Craft directive)

Base data used in Hydrostatic calculations:

	MOC	LDC
Weight	730kg	998kg
VCG	0.41m	0.51m

Heel Angle	Righting Moment (Kg/m)			
	MOC	LDC	2 crew	4 crew
0	0	0	161	262
10	113	125	276	380
20	196	219	356	460
30	237	265	384	484
40	258	289	387	478
50	274	299	376	452
60	280	293	348	404
70	277	273	308	341
80	252	227	244	250
90	212	168	168	149
100	157	93	75	32
110	89	7.5	-29	-96
120	18	-77		
130	-52	-154		
140	-116	-219		
150	-165	-263		
160	-181	-264		
170	-130	-183		
180	0	0		



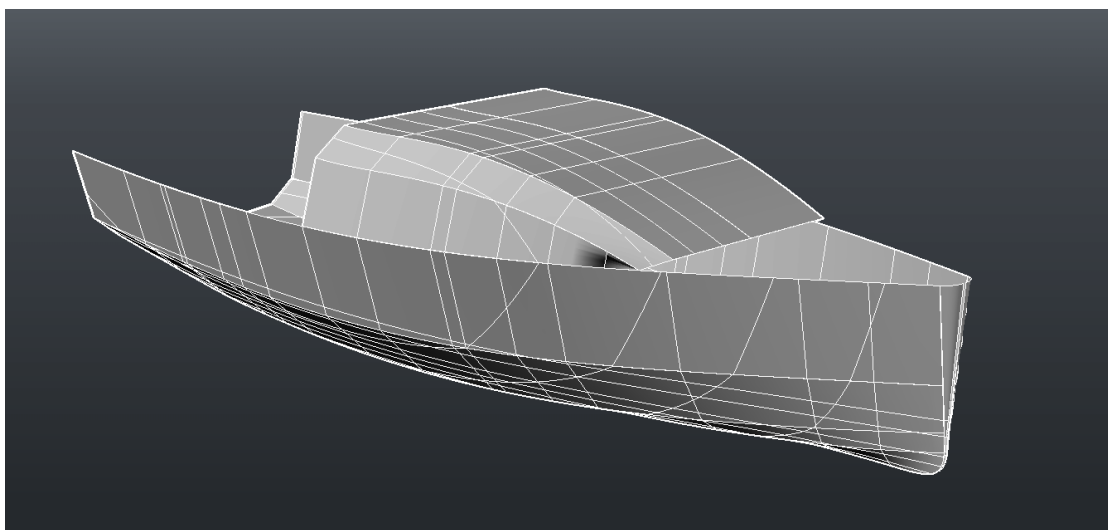
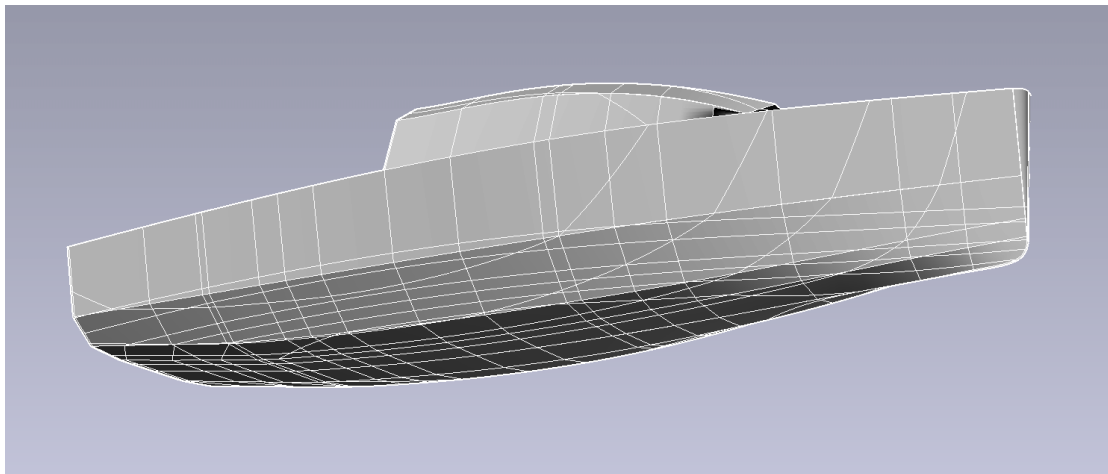
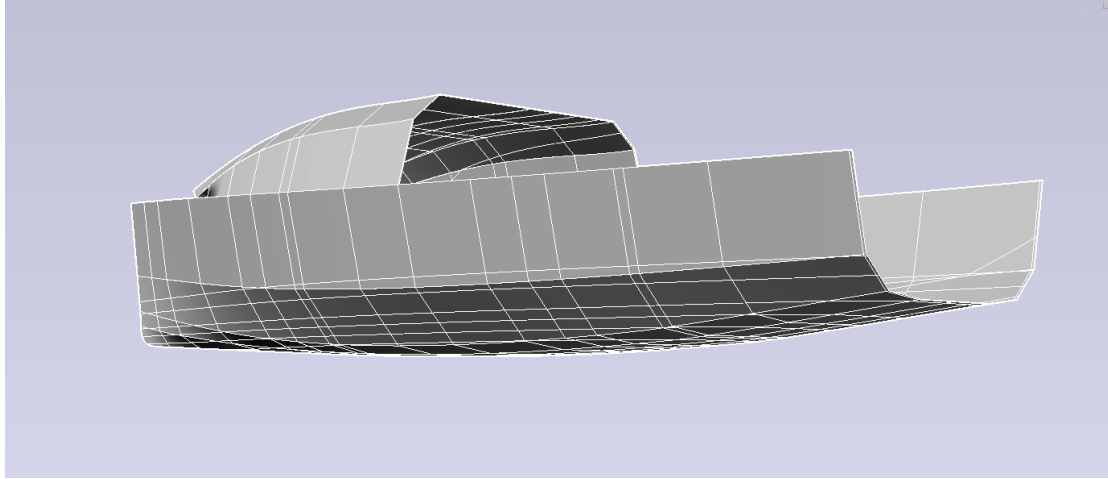
Notes:

Sea condition will significantly impact possibility of capsize.

Centreboard assumed to be locked fully down at all angles of heel.

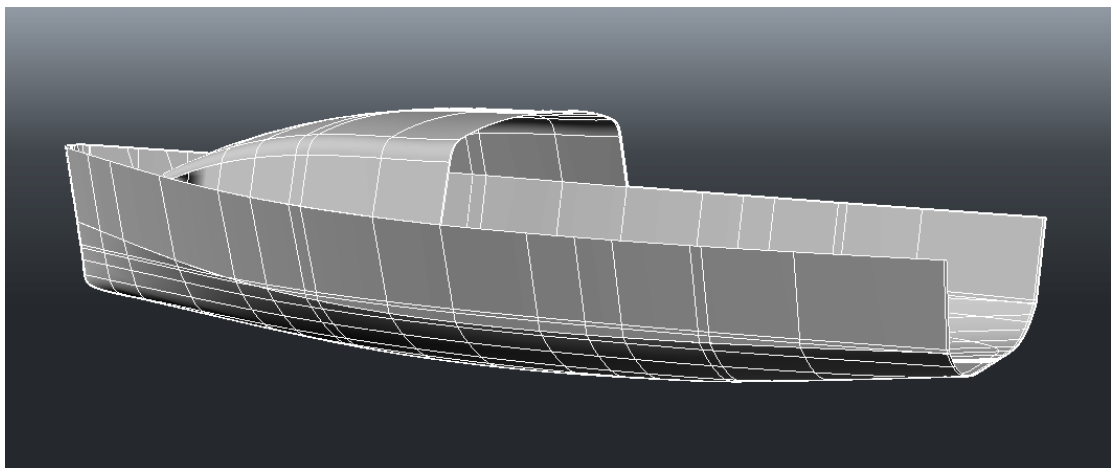
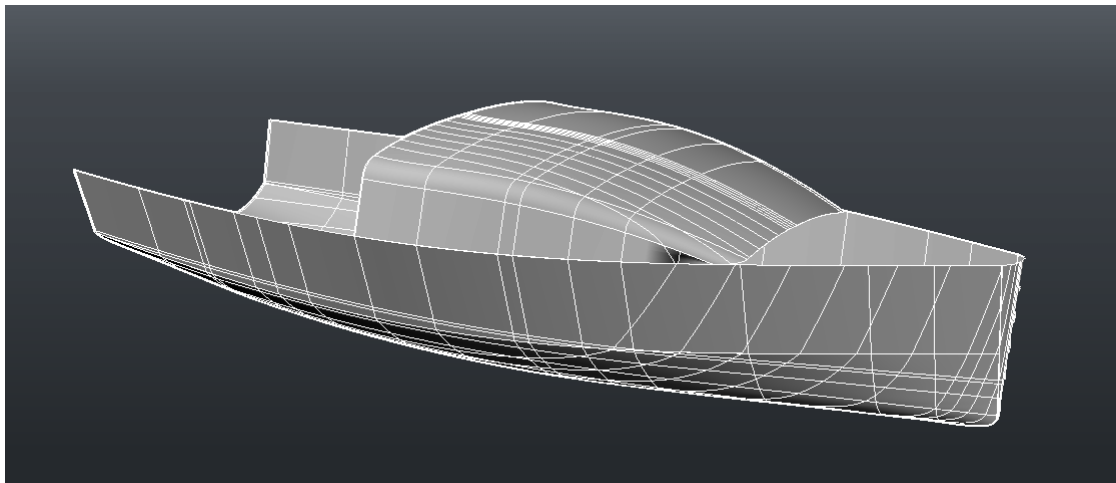
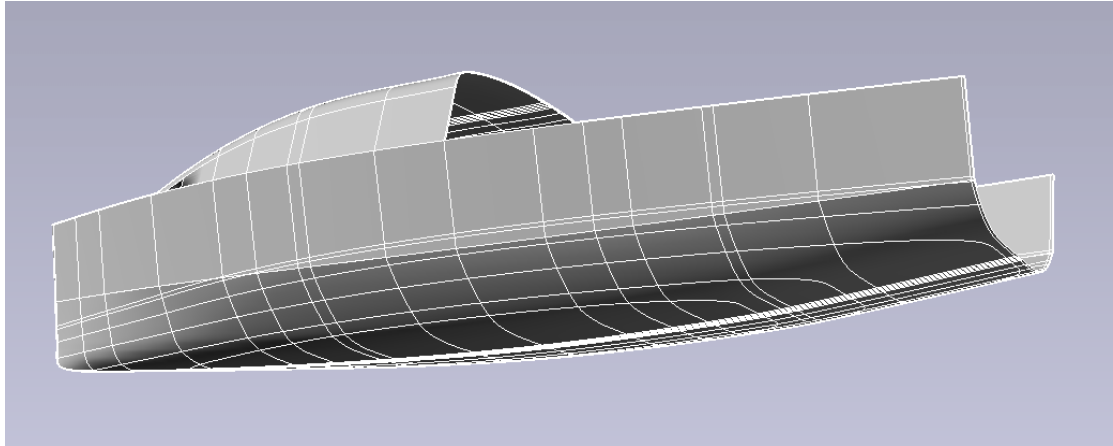
# **BLUEEYES-20**

*Multi-chine version*



# BLUEEYES-20

*Strip plank version*





Sail area: 20 sq m (215 sq ft) + asymmetric

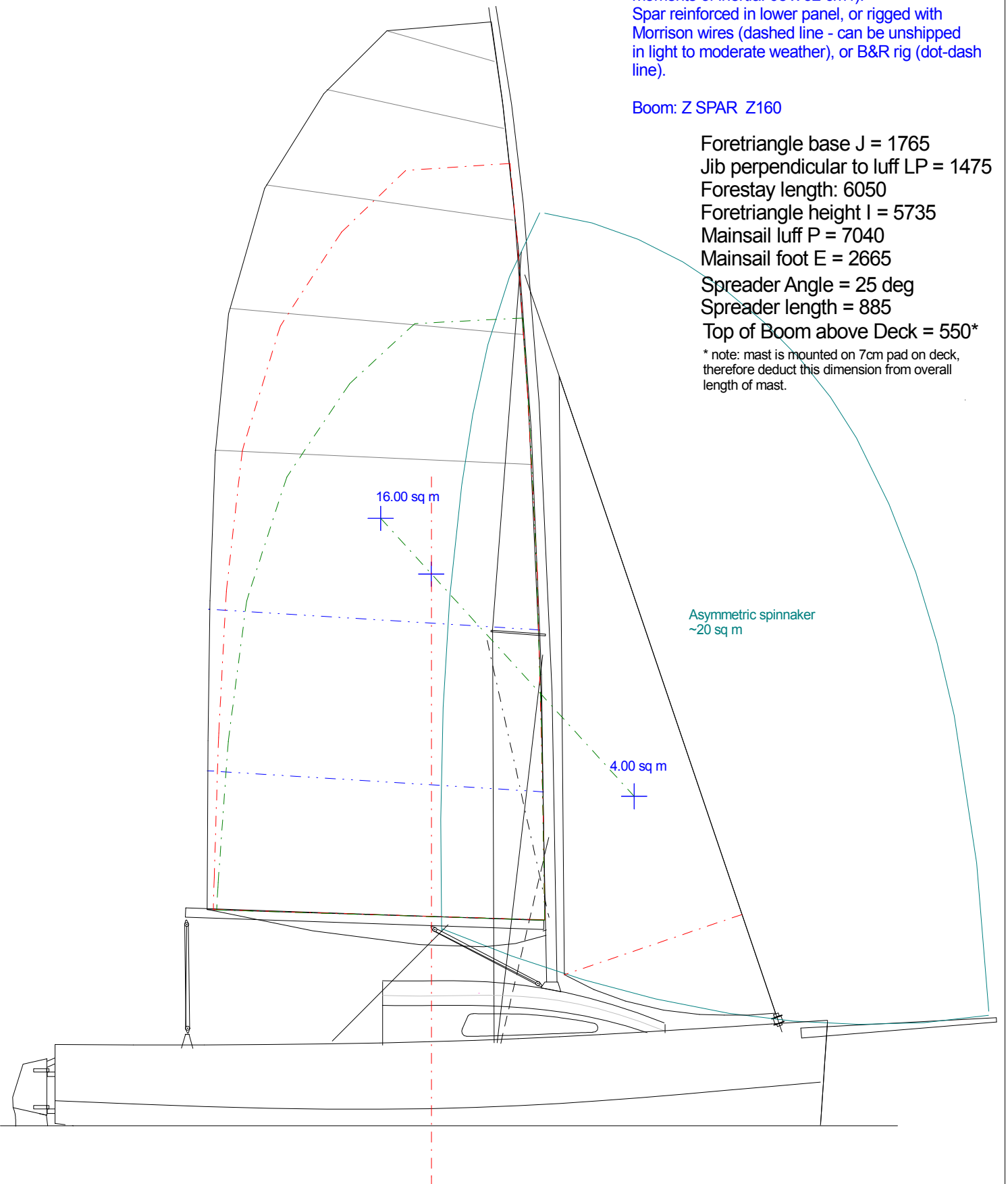
Recommended mast: Z SPAR Z170 (98 x 68mm, moments of inertia: 68 x 32 cm<sup>4</sup>).

Spar reinforced in lower panel, or rigged with Morrison wires (dashed line - can be unshipped in light to moderate weather), or B&R rig (dot-dash line).

Boom: Z SPAR Z160

Foretriangle base J = 1765  
Jib perpendicular to luff LP = 1475  
Forestay length: 6050  
Foretriangle height I = 5735  
Mainsail luff P = 7040  
Mainsail foot E = 2665  
Spreader Angle = 25 deg  
Spreader length = 885  
Top of Boom above Deck = 550\*

\* note: mast is mounted on 7cm pad on deck, therefore deduct this dimension from overall length of mast.



Asymmetric spinnaker  
~20 sq m

4.00 sq m

16.00 sq m

1 mm = 40 mm

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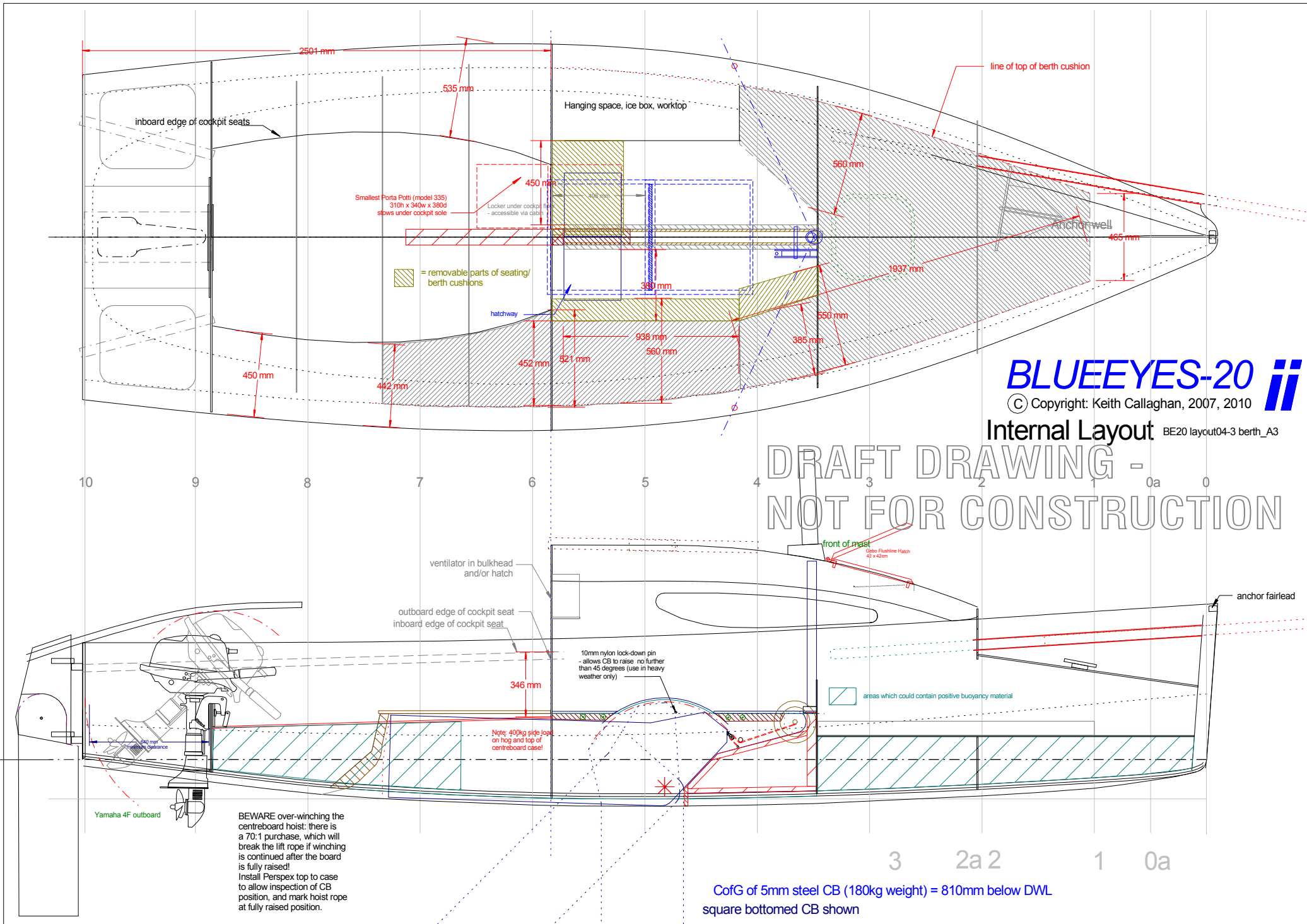
**SAILPLAN - SLOOP**

BE20 splan10.skf

**BLUEEYES-20**

As BE splan09, but longer  
foot on mainsail - 16 sqm

be20-11w00-14



**BLUEEYES-20**   
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Internal Layout BE20 layout04-3 berth\_A3


DRAFT DRAWING -  
 NOT FOR CONSTRUCTION

BEWARE over-wincing the centreboard hoist: there is a 70:1 purchase, which will break the lift rope if wincing is continued after the board is fully raised!  
 Install Perspex top to case to allow inspection of CB position, and mark hoist rope at fully raised position.

CofG of 5mm steel CB (180kg weight) = 810mm below DWL  
 square bottomed CB shown

This CB is 40mm wider than BSK version

 = removable parts of seating/berth cushions

 areas which could contain positive buoyancy material

Note: 400kg side load on hog and top of centreboard case!

10mm nylon lock-down pin - allows CB to raise no further than 45 degrees (use in heavy weather only)

ventilator in bulkhead and/or hatch

outboard edge of cockpit seat  
 inboard edge of cockpit seat

Yamaha 4F outboard

inboard edge of cockpit seats

Hanging space, ice box, worktop

line of top of berth cushion

Anchor well

anchor fairlead

hatchway

Smallest Porta Potti (model 335) 310h x 340w x 380d stows under cockpit sole

Locker under cockpit - accessible via cabin

front of mast  
 Cabo Flushline Hatch 42 x 42cm

10 9 8 7 6 5 4 3 2 1 0a 0

3 2a 2 1 0a

2504 mm

535 mm

450 mm

442 mm

452 mm

821 mm

938 mm

560 mm

450 mm

420 mm

380 mm

560 mm

560 mm

385 mm

42 x 42cm

3

2a 2

1

0a

1937 mm

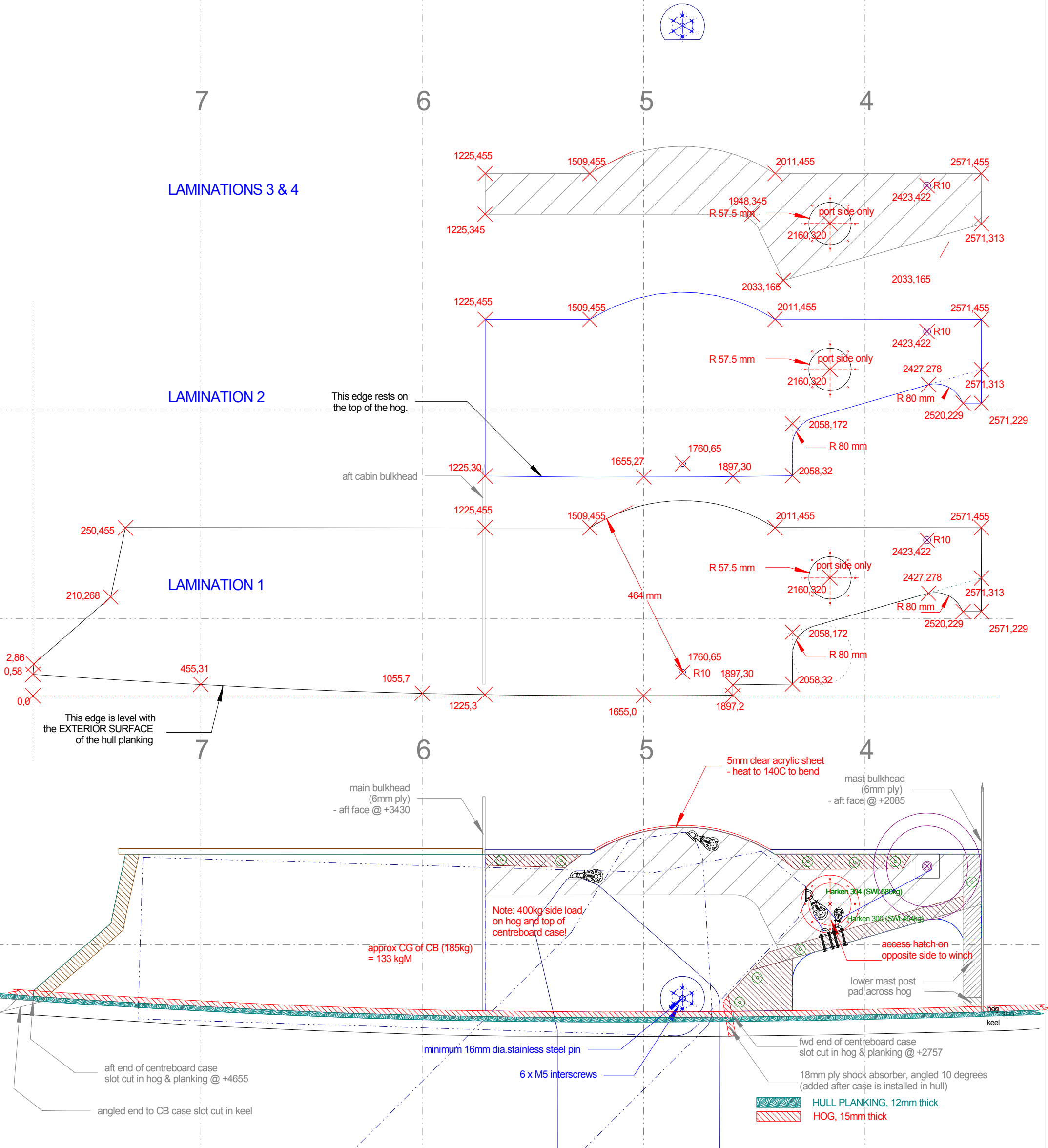
465 mm

LAMINATION 5

LAMINATIONS 3 & 4

LAMINATION 2

LAMINATION 1



This edge is level with the EXTERIOR SURFACE of the hull planking

This edge rests on the top of the hog

aft cabin bulkhead

main bulkhead (6mm ply) - aft face @ +3430

mast bulkhead (6mm ply) - aft face @ +2085

Note: 400kg side load on hog and top of centreboard case!

approx CG of CB (185kg) = 133 kgM

fwd end of centreboard case slot cut in hog & planking @ +2757  
18mm ply shock absorber, angled 10 degrees (added after case is installed in hull)

HULL PLANKING, 12mm thick  
HOG, 15mm thick

aft end of centreboard case slot cut in hog & planking @ +4655

angled end to CB case slot cut in keel

minimum 16mm dia. stainless steel pin

6 x M5 interscrews

access hatch on opposite side to winch

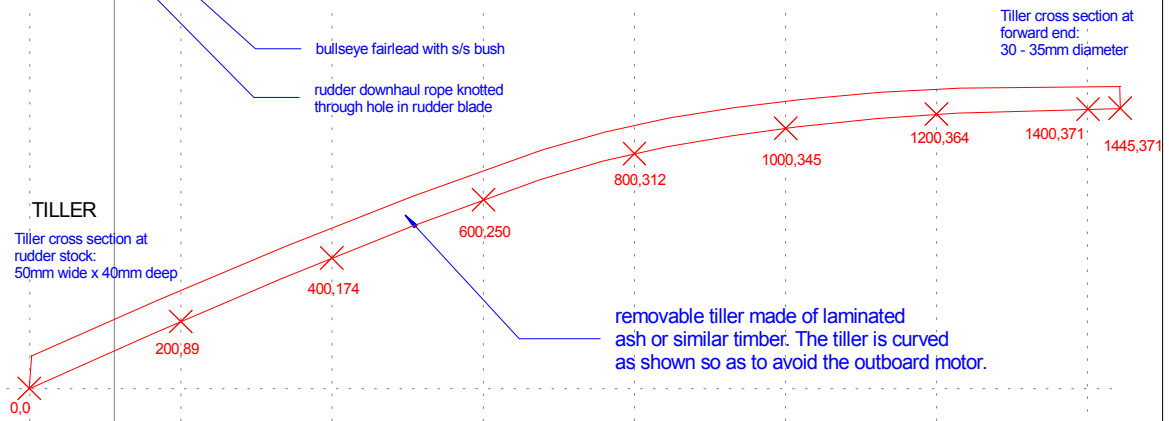
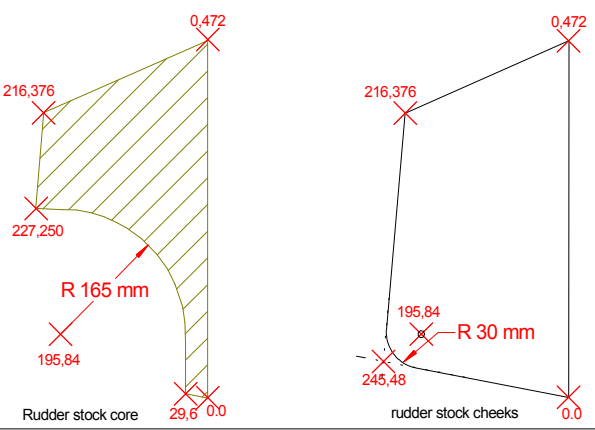
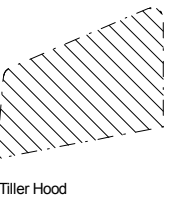
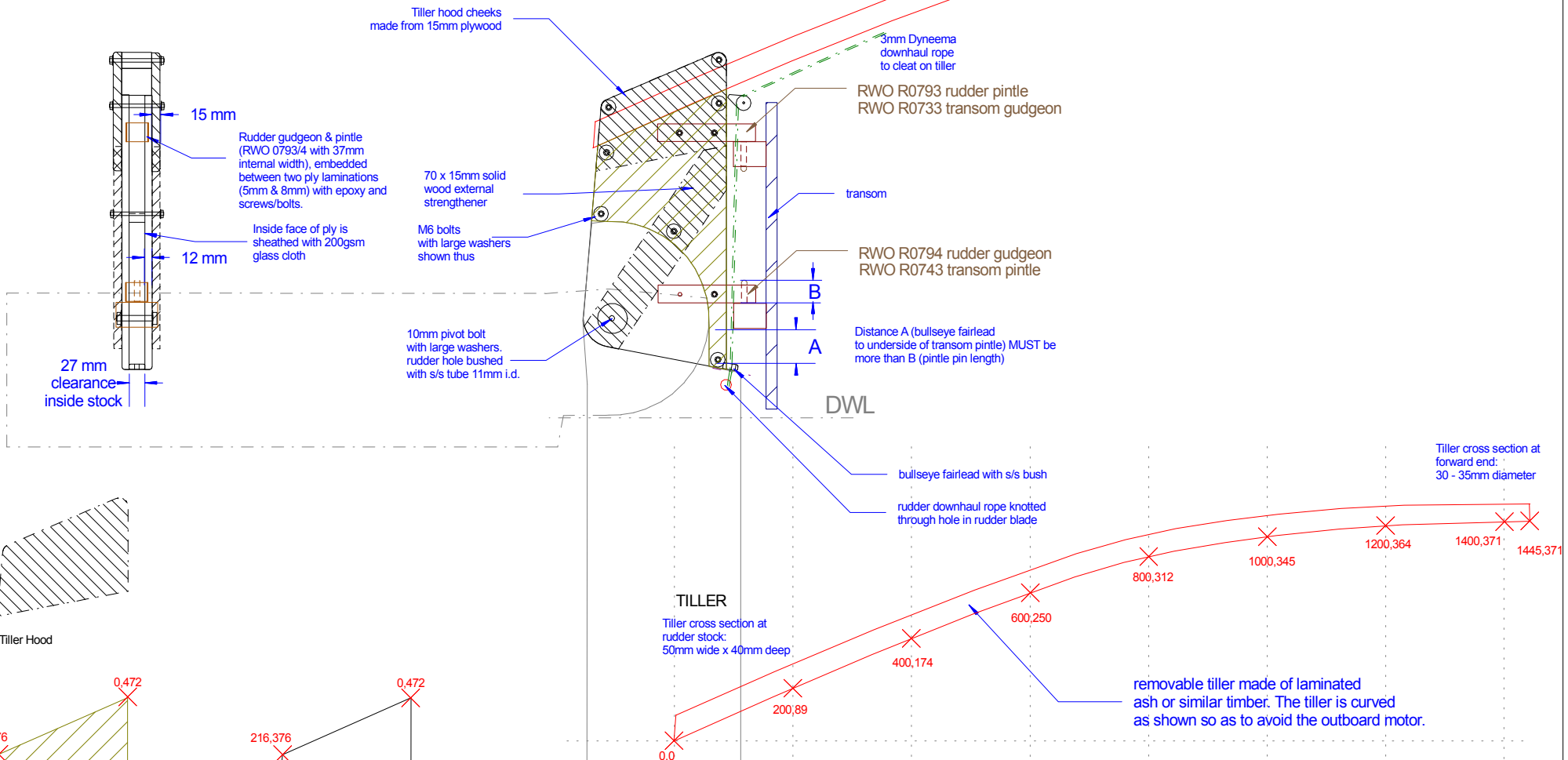
lower mast post pad across hog

hog skin

keel

Front elevation

Side elevation



Rudder:  
36% of CB area  
Rudder draft: 850mm  
rudder foil section:  
NACA0010 (27mm thick)

# BLUEEYES-20

## RUDDER STOCK & TILLER

Scale 1 mm = 10 mm

BE20 rudder01.skf  
Printed 16/08/2011 14:06

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