

2.4 NORLIN ONE DESIGN BOAT CONSTRUCTION MANUAL

2023.2



Update Schedule

1	25.01.2023	Rudder weights amended to standard rudder
2	06.12.2023	Rudder maximum weight deleted Lifting eyes requirements added

1 GENERAL

1.1 DESIGN

The 2.4 Norlin One Design boat was designed by Peter Norlin as The Norlin Mark III.

The 2.4 Norlin One Design Boat is called the 2.4 NOD boat in this Construction Manual.

This Construction Manual shall apply when manufacturing 2.4 NOD boats after 2019-06-03.

1.2 AUTHORITY

The International 2.4mR Class Association (ICA) is the authority, which:

- administers the 2.4 NOD Accredited Builder agreement process
- assigns manufacturing rights for the 2.4 NOD boat to 2.4 NOD Accredited Builders
- terminates 2.4 NOD Accredited Builder agreements if required

1.3 2.4 NOD ACCREDITED BUILDER

2.4 NOD hulls including keels, decks and rudders shall only be manufactured by 2.4 NOD Accredited Builders.

Other components of the boat may be manufactured by other manufacturers. These products shall be certified by the Accredited Builder according to his own routines or by an official measurer. See below.

If the Accredited Builder is approved for World Sailing In House Certification (IHC), the builder shall certify his own products. The ICA Certification Form shall be used.

If the Accredited Builder is not approved for World Sailing In House Certification (IHC), the products shall be certified by measurement control made by an official measurer. The Accredited Builder shall pay the costs for this control. The ICA Measurement Report Form shall be used.

The Accredited Builder shall have a documented process with control stations, routines and checkpoints necessary to assure that the products comply with the Class Rules and this Construction Manual. This applies both to Accredited Builders approved and not approved for IHC.

1.4 DOCUMENTS

The following documents shall apply:

- Accredited Builder Agreement between the ICA and the Accredited Builder
- The 2.4 NOD Class Rules including references
- The 2.4 NOD Construction Manual

2 DRAWINGS

2.1 DIGITAL DRAWINGS

An Accredited Builder will receive an ICA data file describing the hull shell including deck, keel and standard rudder. From this data a plug can be produced by MNC technique from which the moulds can be manufactured. Moulds may also be manufactured directly from the data. Templates needed to check moulds and built hulls can be manufactured from the data in the same way.

2.2 2.4 NOD BOAT MOULDS

2.4 NOD boat mould manufacture alternatives:

- Purchase moulds from another Accredited Builder
- Purchase moulds from a previously Licenced Builder
- Manufacture moulds from an ICA certified 2.4 NOD boat

All 2.4 NOD boat moulds shall be approved by the ICA to 2.4 NOD Class Rules.

3 HULL

3.1 MATERIALS

The **hull** excluding fittings (“off the shelf products”) shall be built from Glass Reinforced Plastic. Aluminium or stainless-steel reinforcements are permitted where needed. Parts of the **hull** excluding hull shell and keel may also be made from aluminium or stainless steel.

3.2 CONSTRUCTION

The exterior **hull** mouldings shall weigh not less than 3.6kg/m^2 .

Where sandwich construction is used, the core material shall be of balsa, PVC or polyester or combinations thereof and shall be of density before lamination not less than 60kg/m^3 in average over a square with the sides 25mm.

The lay up of the **hull** shell lamination shall be in accordance with 2.4 NOD Class Rule D.2.3 (c) as approved by the ICA before the production starts.

The **hull** shall be manufactured from moulds in accordance with the ICA data file.

The assembling of **hull** and deck shall be made when the hull is placed in a jig or locked by templates to certify the correct beam at the sheer line and using a guiding template to locate the deck in correct position.

3.3 REQUIREMENTS OF THE CONSTRUCTION

HULL AND KEEL STIFFNESS

The **hull** and **keel** shall have such stiffness that when the **hull** is placed upside down and fastened on a rigid base the **keel** will not deflect from the centre plane of the boat more than 8mm when the **keel** is loaded by a horizontal load of 40kg perpendicular to the centre plane at a point in measurement section 2 placed 525mm from the baseline (see section 7.1 Dimensions). The deflection shall be measured when the load is increased from 10kg to 50kg.

CHAIN PLATE RIGIDITY

The chain plate construction shall have such a rigidity that the **mast** step displacement in vertical direction will not exceed 2.0mm when it is subjected to a vertical force of 200kg by a jack placed between the **mast** step fitting and a bar fastened to the shroud fittings in each end (the deflection of the bar must be known if the displacement is measured from it). The deflection shall be measured when the load is increased from 50kg to 250kg.

LIFTING EYES LOAD CAPACITY

Two lifting eyes and required reinforcements shall be laminated into the floor structure with a minimum total load capacity of 520kg. Lifting eye capacity to be measured with the boat suspended and loaded with additional weight to a minimum of 520kg total weight.

4 DECK

4.1 MATERIALS

The deck excluding fittings and breakwater shall be built from Glass Reinforced Plastic. Aluminium or stainless-steel reinforcements will be permitted where needed.

4.2 CONSTRUCTION

The exterior deck mouldings shall weigh not less than 3.6kg/m².

Where sandwich construction is used, the core material shall be of balsa, PVC or polyester or combinations thereof and shall be of density before lamination not less than 60kg/m³ in average over a square with the sides 25mm.

The lay up of the deck lamination shall be in accordance with 2.4 NOD Class Rule D.2.3 (c) as approved by the ICA before the production starts.

The deck shall be manufactured from moulds in accordance with the ICA data file.

5 BUOYANCY/BUOYANCY TANKS

5.1 CONSTRUCTION

Buoyancy/buoyancy tanks in accordance with the 2.4 NOD Class Rules.

6 SEAT

6.1 MATERIALS

According to section 3.1 Materials.

6.2 CONSTRUCTION

Seat in accordance with the 2.4 NOD Class Rules.

7 ASSEMBLED HULL

7.1 DIMENSIONS

The **keel** line shall be taken as the intersection line from transom to stem of the hull shell and the **hull** centre plane.

The measurement sections shall be taken as vertical, transverse planes at the following positions:

Section A: 300 mm aft of **hull datum point** as defined in 2.4 NOD CR D.2.5

Section 0: at the **hull datum point** as defined in 2.4 NOD CR D.2.5

Section 1: 700mm from **hull datum point** as defined in 2.4 NOD CR D.2.5

Section 2: 1350mm from **hull datum point** as defined in 2.4 NOD CR D.2.5

Section 3: 2100mm from **hull datum point** as defined in 2.4 NOD CR D.2.5

Section 4: 2988mm from **hull datum point** as defined in 2.4 NOD CR D.2.5

The baseline shall be on the centre plane of the **hull** at the following vertical distances:

- at the **hull datum point** as defined in 2.4 NOD CR D.2.5: 437mm from the **hull** shell
- at section 4: 400mm from the **hull** shell

DIMENSIONS – refer drawings J1, J3 & J4

	Minimum	Maximum
Hull length	4175mm	4183mm
Vertical distance from baseline to keel line		
at section A	481mm	483mm
at section 0	437mm	437mm
at section 1	118mm	120mm
at section 3	127mm	129mm
at section 4	400mm	400mm
Vertical distance from baseline to under-side of keel at section 2	576mm	578mm
Beam of hull at sheer line		
at section 0	536mm	542mm
at section 2	800mm	808mm
at section 4	302mm	309mm
Horizontal distance from the aft end of the hull to hull datum point	645mm	651mm
Horizontal distance from vertical section through hull datum point		
to fore end of mast spar hole at deck		2093mm
to aft end of shroud holes at deck	1902mm	
to forward end of shroud holes at deck		1982mm
Transverse distance between centres of shroud holes at deck and centre plane	240mm	268mm
Horizontal distance from the intersection of the forestay and the deck to forward end of hull	0mm	80mm
Keel girth at section 2		2752mm

TEMPLATES – refer drawing J2

The **hull** shall comply with the following hull templates:

- Section 0, 2 and 4 templates
- Stern section template

The **keel** shall comply with the following keel templates:

- Cross section 75 and 400 templates
- Underside keel template
- Trailing edge template

The **rudder** shall comply with the following rudder templates:

- Profile template
- Cross section 200, 400 and 600 templates
- Trailing edge template

The schedule of template compliance checks for prototype and new boats shall be in accordance with the ICA 2.4 NOD boat Inspection Plan.

Clearance to templates shall be in accordance with the 2.4 NOD Class Rules.

7.2 FITTINGS

MANDATORY

Mandatory fittings in accordance with the 2.4 NOD Class Rules:

OPTIONAL

Other fittings and their positions are optional.

No fittings may be attached to the outside of the hull (this means that for example plastic flaps between hull and rudder are not allowed).

8 BALLAST

Ballast in accordance with the 2.4 NOD Class Rules.

9 RUDDER

9.1 MATERIALS

The **rudder** blade shall be made of one or a combination of the following materials: Glass Reinforced Plastic and polyurethane foam. The **rudder** stock shall be of stainless steel.

9.2 CONSTRUCTION

The **rudder** shall be manufactured from moulds in accordance with the ICA data file.

9.3 DIMENSIONS

The **rudder** shall comply with the templates under section 7.1 DIMENSIONS.

Any part of the **rudder**, measured athwart ships shall not exceed 38mm when the **rudder** extends beyond the aft end of the water line.

The **rudder** stock shall be a pipe of stainless steel with outer diameter of 25mm \pm 1mm and minimum wall thickness of 1mm.

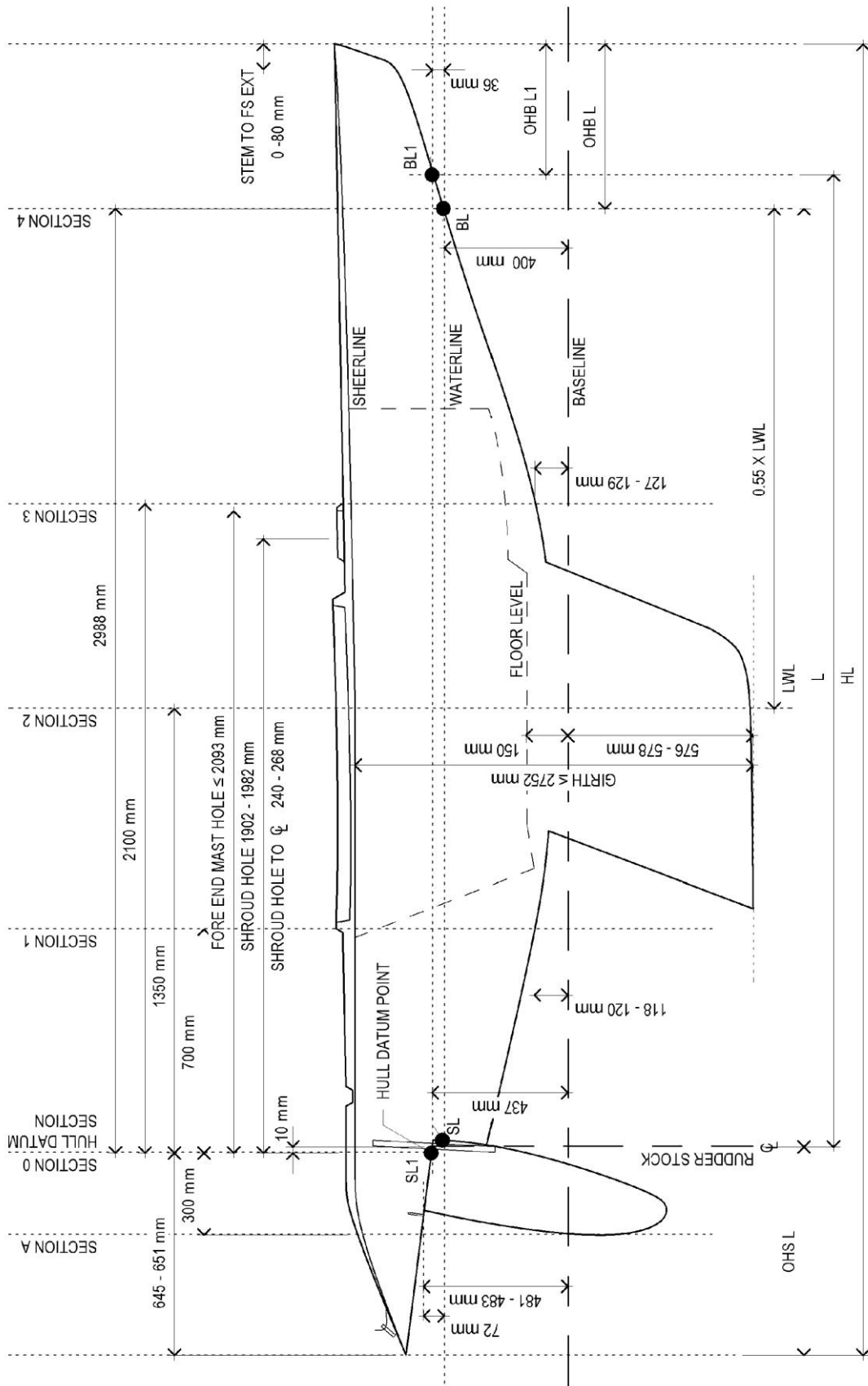
9.4 WEIGHTS

	minimum
Standard rudder including rudder stock	1.5kg

10 RIG

Rig in accordance with the 2.4 NOD Class Rules.

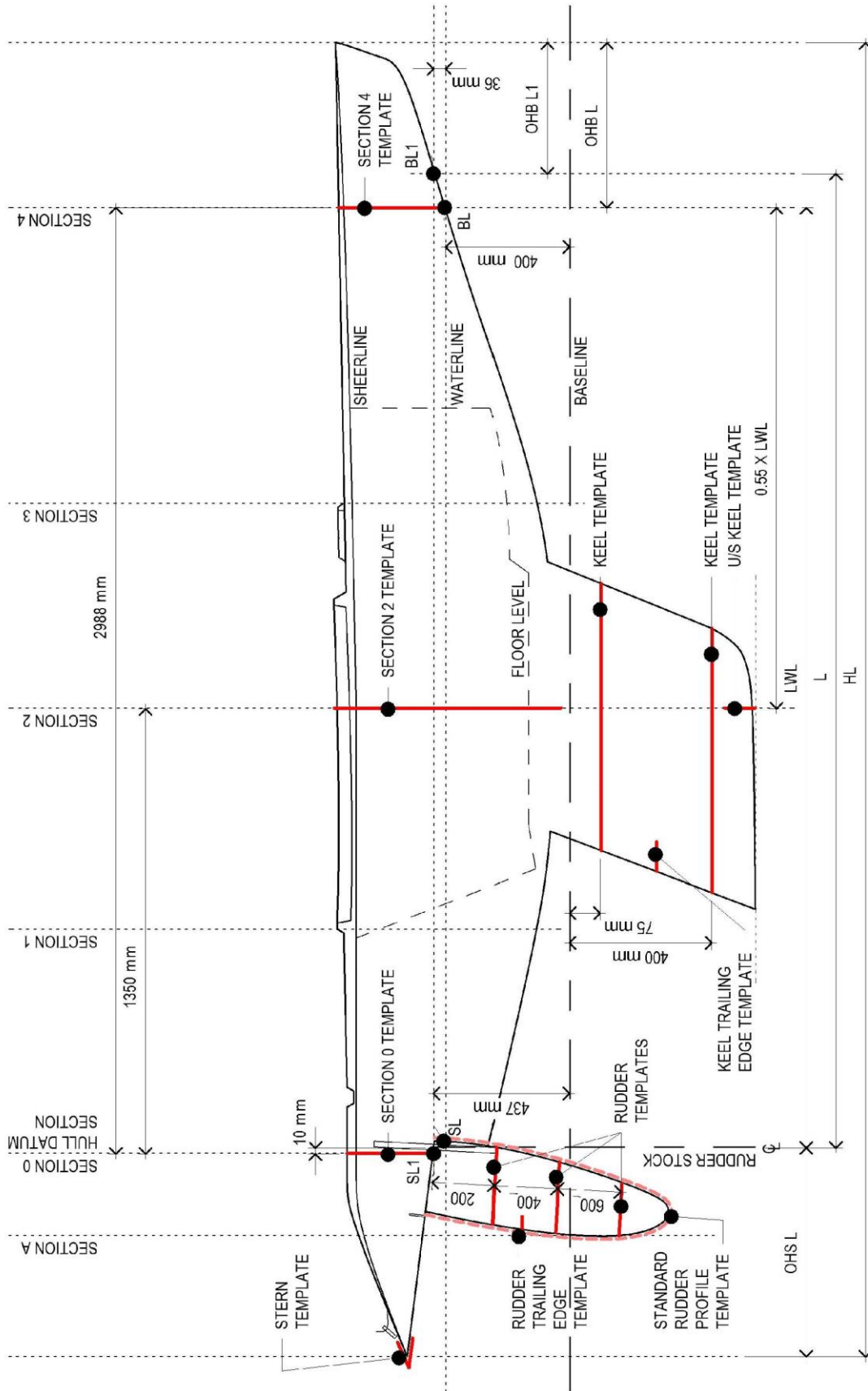
DRAWING J1



J1 2.4 NOD BOAT 2022

MEASUREMENT SECTIONS
ASSEMBLED HULL DIMENSIONS

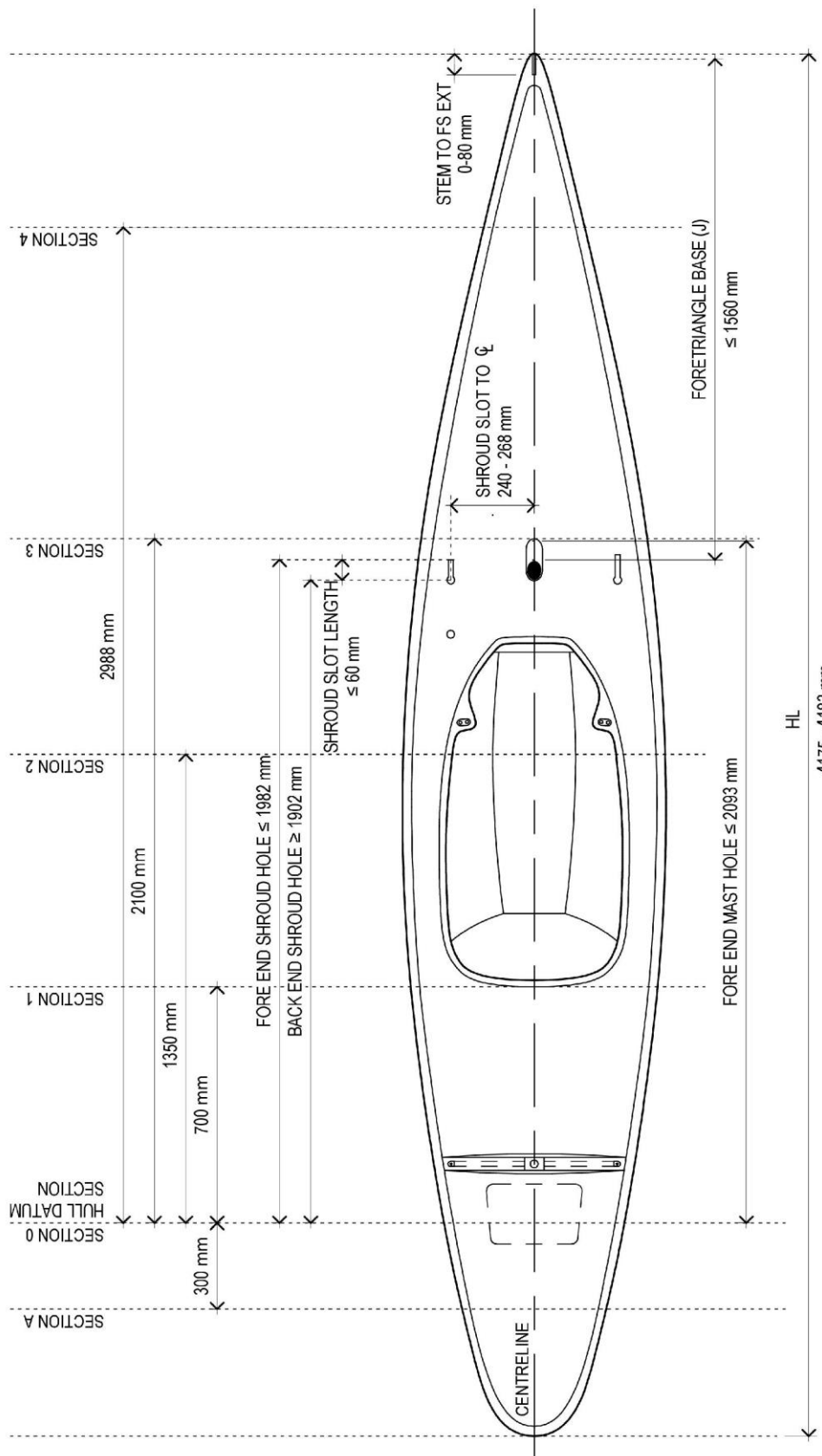
DRAWING J2



J2

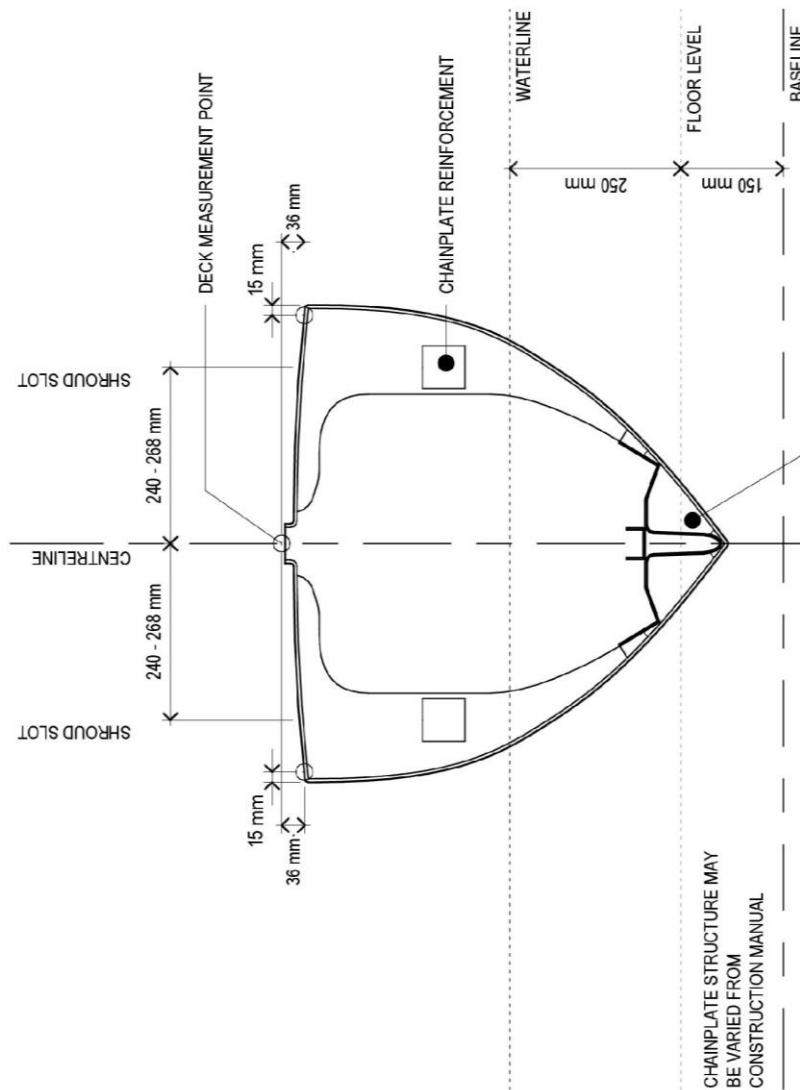
2.4 NOD BOAT 2022
TEMPLATES

DRAWING J3



J3
2.4 NOD BOAT 2022
DECK LAYOUT

DRAWING J4



J4 SECTION

2.4 NOD BOAT 2022