Mini Module Concept

Standards document - Rev 1B, October 2025

1. Overview

The Mini Module Concept aims to provide a small modular layout design that is easy to store, transport, set up and run trains.

The layout will consist of standard modules which will be laser cut from 6mm MDF (also known as Superwood). Standard straight modules would have a foot print of 500x350mm. Curve modules will cater for a 609.6mm (24”) outer radius. The same modules are used as a base for both N and HO/OO scale standards. Modules will rest on top of folding trestle tables as a leg system.

The concept is focused around building small modules that can be taken to various public venues to showcase the hobby.

2. Objectives

Primary Objectives

The primary objectives of the Mini Module Concept are as follows:

- **Small and light weight modules :** Encourage the building of small modules that are light weight thus making them easy to store, move and quick to set up to run trains.
- **Public display:** Make it easy to take modules into public spaces to showcase the hobby and the club
- **Encourage participation:** This modular system will hopefully encourage people to build modules and participate in helping to try to grow the hobby.

Secondary Objectives

The secondary objectives of the Mini Module Concept are as follows:

- **High Detail:** modules can be highly detailed without high cost as they are small.
- **Low cost:** Modules will be reasonably low cost compared to full sized modules as they require less materials to build them.
- **Easy entry into the hobby:** Due to the low cost of the system, it will easily allow new people to join the hobby and easily run trains. No expensive tools or skills are needed to build modules.
- **Potential Newsletter Articles:** As people build their modules they can document the process for Emrig newsletter articles.
- **Skill building:** The small size of the modules will hopefully encourage people to develop new modeling skills

3. Module construction standards

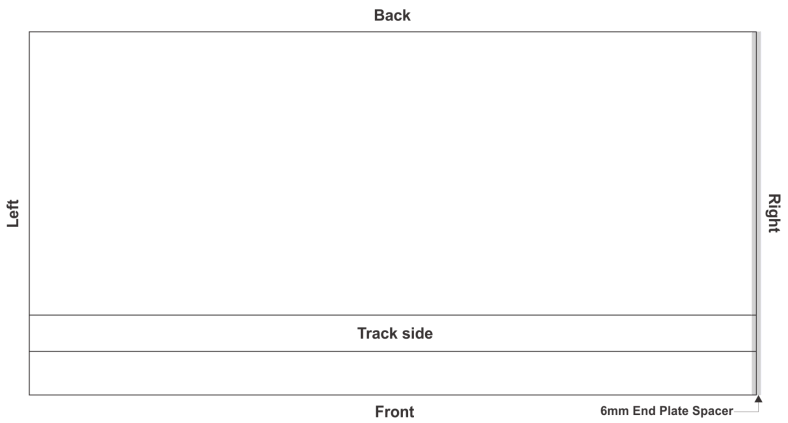
The following outlines the design standards for the Mini Module Concept.

Module construction

All modules will be laser cut from 6 mm MDF to ensure consistency between modules. Modules will be glued and bolted together. Once assembled the module should be painted with PVA paint (preferably flat black) to seal the module and prevent the module from absorbing moisture.

Module orientation

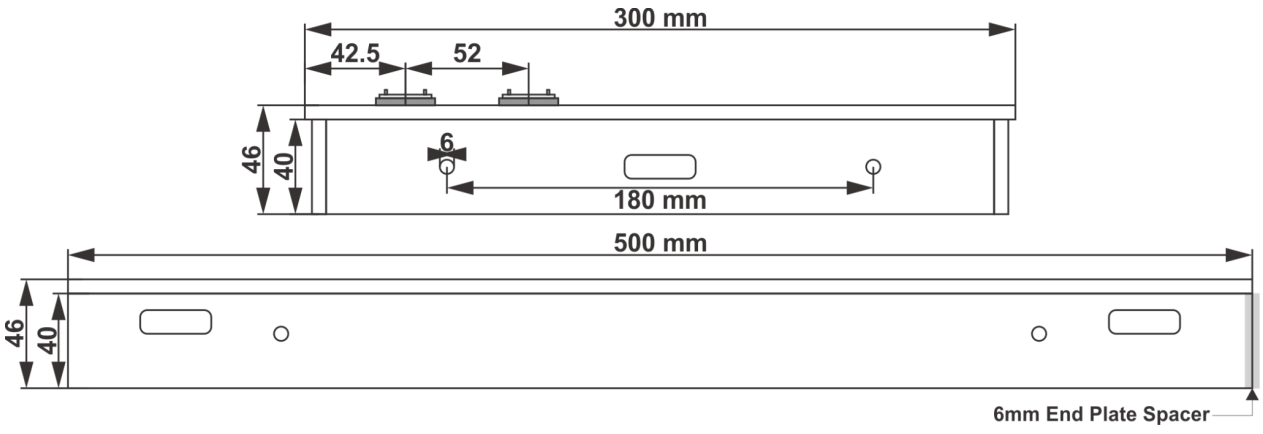
Front, rear, left and right refer to the module when looking at the module from the track side.



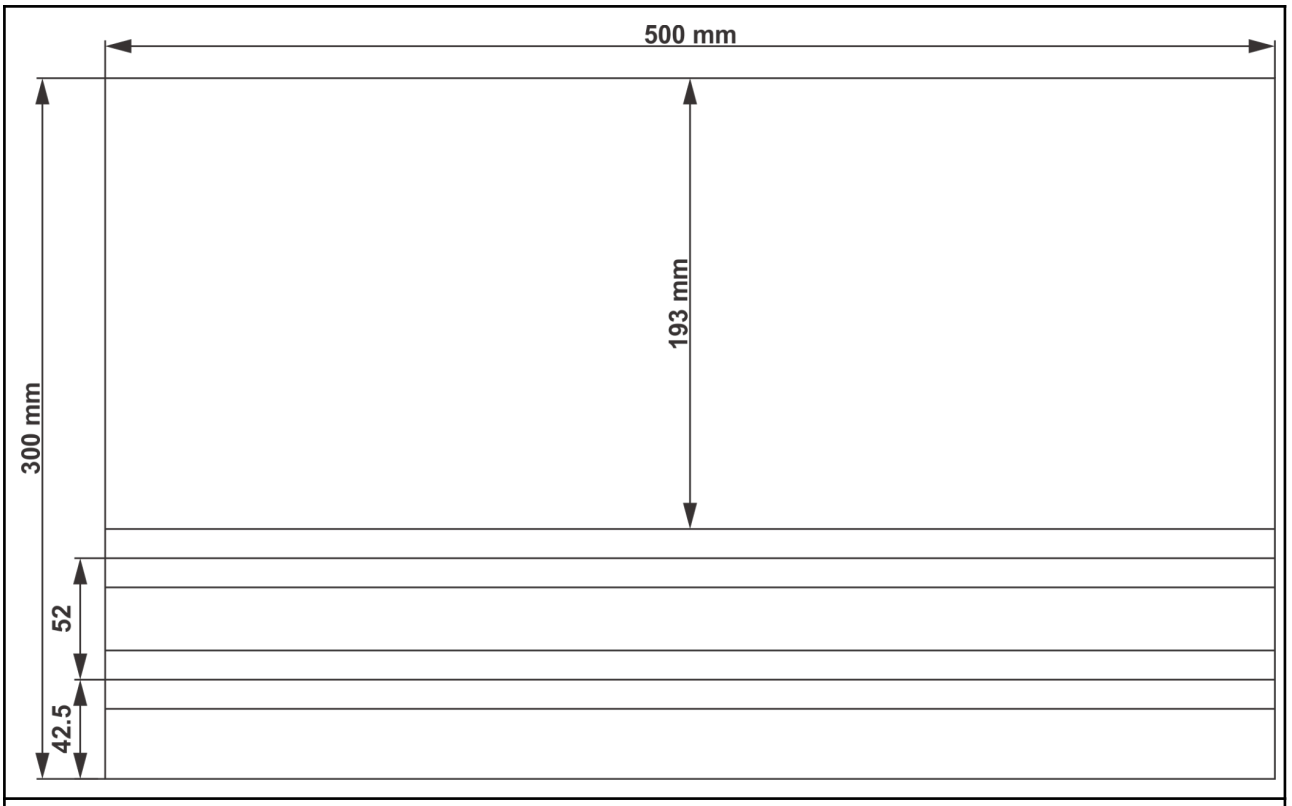
Drawing 1A: Straight module orientation diagram

Standard straight module dimensions

The following diagram shows the side profiles, footprint and critical dimensions for a standard straight module.



Drawing 2A: Straight Module: End and Side Profile



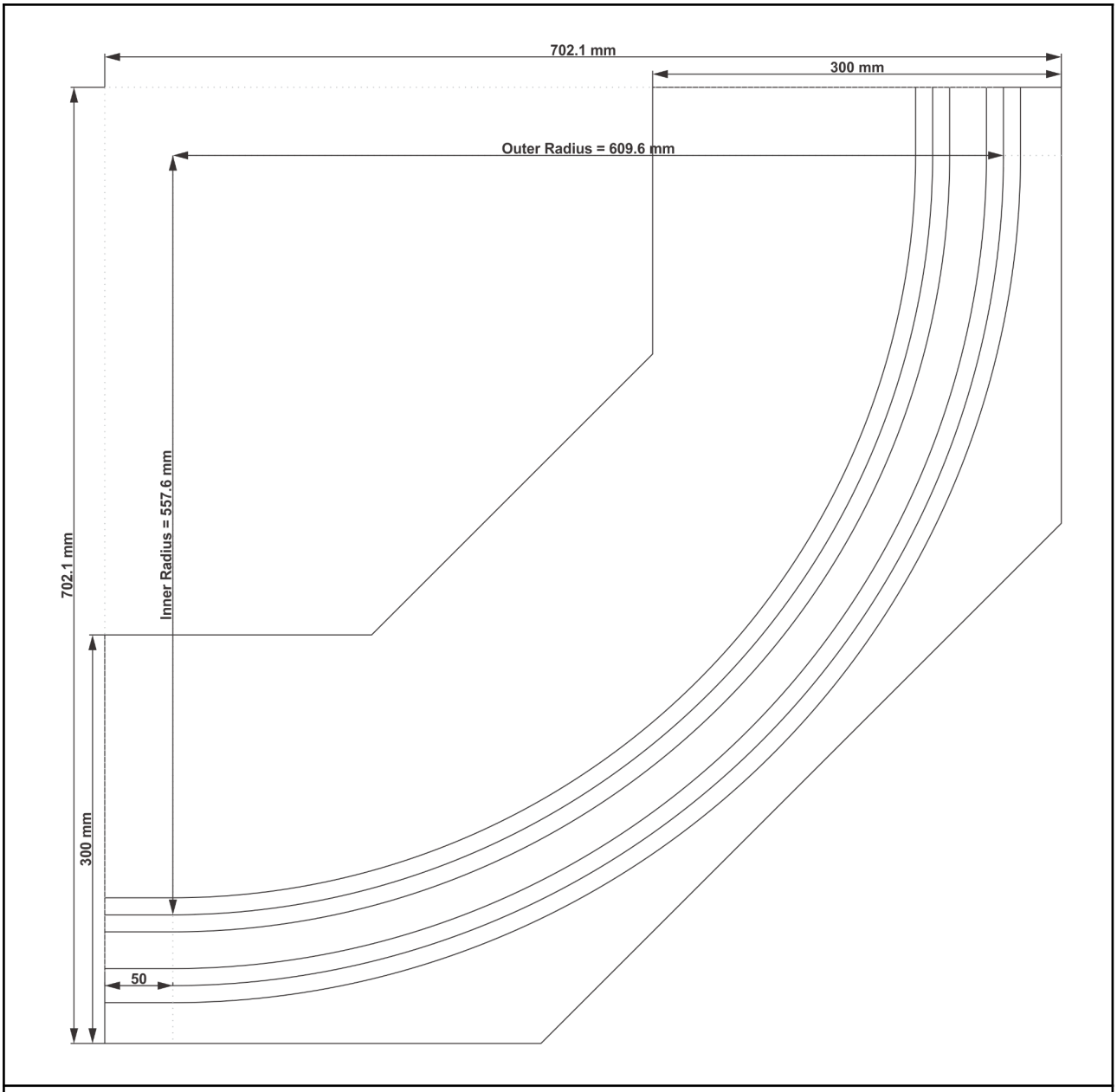
Drawing 2B: Straight Module: Top Profile (HO track spacing)

Note the 6mm End plate spacer will be on the right hand side of the module when the track is closest to the viewer. The spacer plate fills the gap between the end plates of two modules.

Curved module dimensions

The following drawing (Drawing 3) shows the footprint and critical dimensions for a curved module. Note that the end profile for the module is the same as the end profile for a straight module.

The first 50mm of track at each end of the module is straight before bending into the 609.6mm (24”) radius to allow for easier alignment of track between modules.



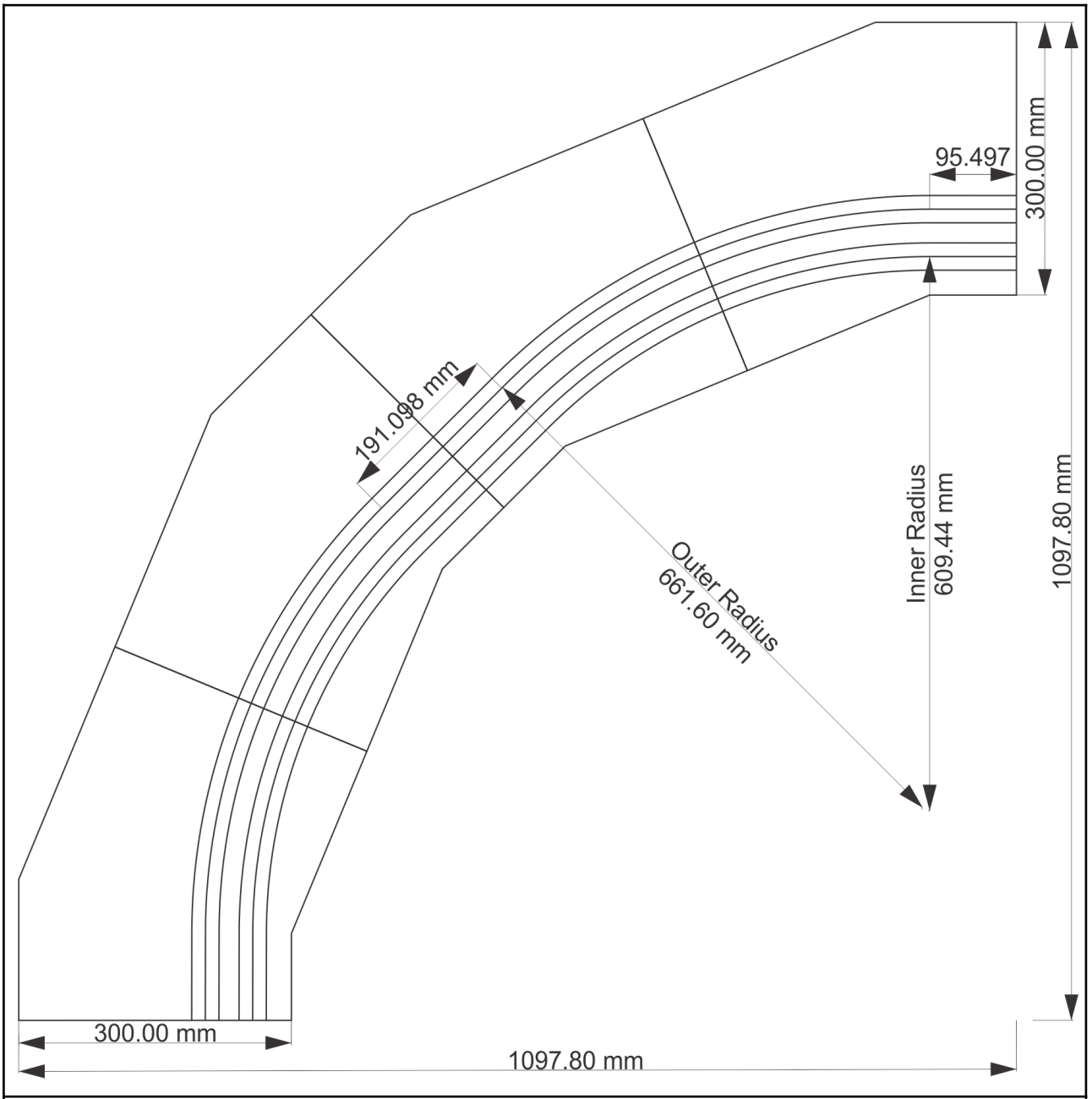
Drawing 3: Corner Module Top Profile

Inverse Curved module dimensions

Inverse curved modules allow for layout designs other than normal oval or square designs such as L-Shape, T-Shape, etc. Due to the size of the inverse curved modules, a single inverse curve module is made up of two separate but identical modules to allow for easier moving and storage of the modules. The design of these modules was dictated by the existing curve and straight modules.

The first ~95mm from each edge is kept straight before bending into the curve to allow for better connecting of modules and running reliability. The outer line maintains the minimum standard of a 609.6mm (24”) radius while the inner curve becomes a slightly bigger radius at 661.6mm (~26”).

The following drawing (Drawing 4) shows the footprint and critical dimensions for a curved module. Note that the end profile for the module is the same as the end profile for a straight module.



Drawing 4: Inverse Curve Module Profile

Connecting of modules

The end plate of all modules have got two 6 mm holes in the end allowing for modules to be bolted together. Standard 6 mm gutter bolts, wing nuts and washers can be used when joining modules.

Modules can also be clamped using small F-clamps, however this will require that the modules hang over the edge of the tables that they are resting on.

Permanent connection of modules

The permanent connection of multiple straight modules would be allowed. This would allow for fewer track and wiring connections as well as larger scenery sections to be built. Ideally no more than two straight modules would be connected thus making the total module size of 1000 x 300 mm.

If multiple modules are connected let the layout design coordinator know so that they can plan accordingly.

Module legs

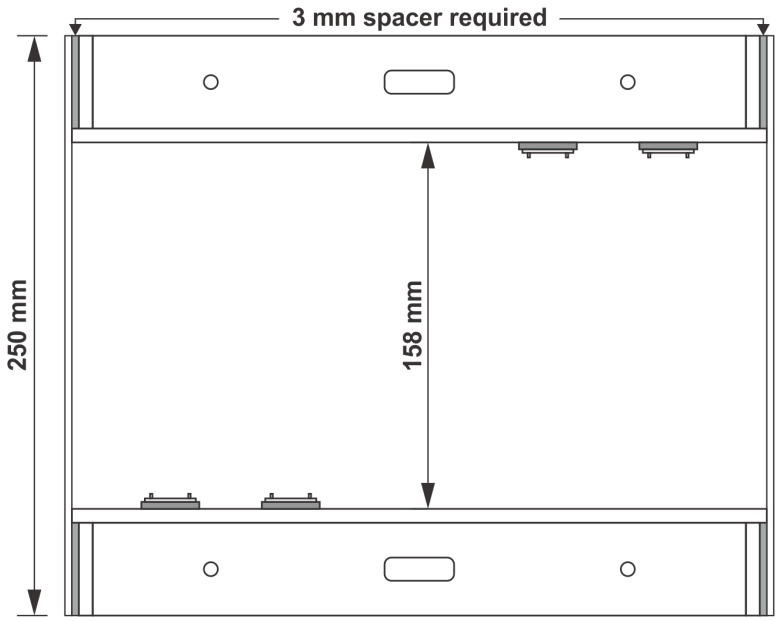
Modules will be placed on top of standard plastic folding trestle tables. These generally have a standard dimensions of 1800 x 700 x 740 mm. These types of tables are lightweight and easy to transport thus making them ideal for this application. The number of tables required will depend on the layout design used.

Drawing 5: Example of plastic folding tables

Module backdrops

If modules are fitted with backdrops the backdrop is to measure 500 mm long x 250 mm tall. A 3 mm spacer will be needed to allow the backdrop to sit flush with the back of the top of the module. Backdrops will be cut from 3mm MDF and have matching holes so that it can be bolted to the module

One advantage of the backdrops is they would allow for easy storage of modules in a box form. This would protect scenery on the module from being damaged while being stored and transported as per the following drawing.



Drawing 6: “Boxed” modules using backdrops as sides

Alternative module sizes

Alternate module sizes would be allowed as long as the modules still conform to the basic standards. Up to now standard modules have been used with an expansion module bolted to the side to allow for extra space for track or scenery.

4. Track standards

Both HO and N scale will have a double track on the module so the multiple trains can easily be run in all configurations. Note the following track standards.

General track standards

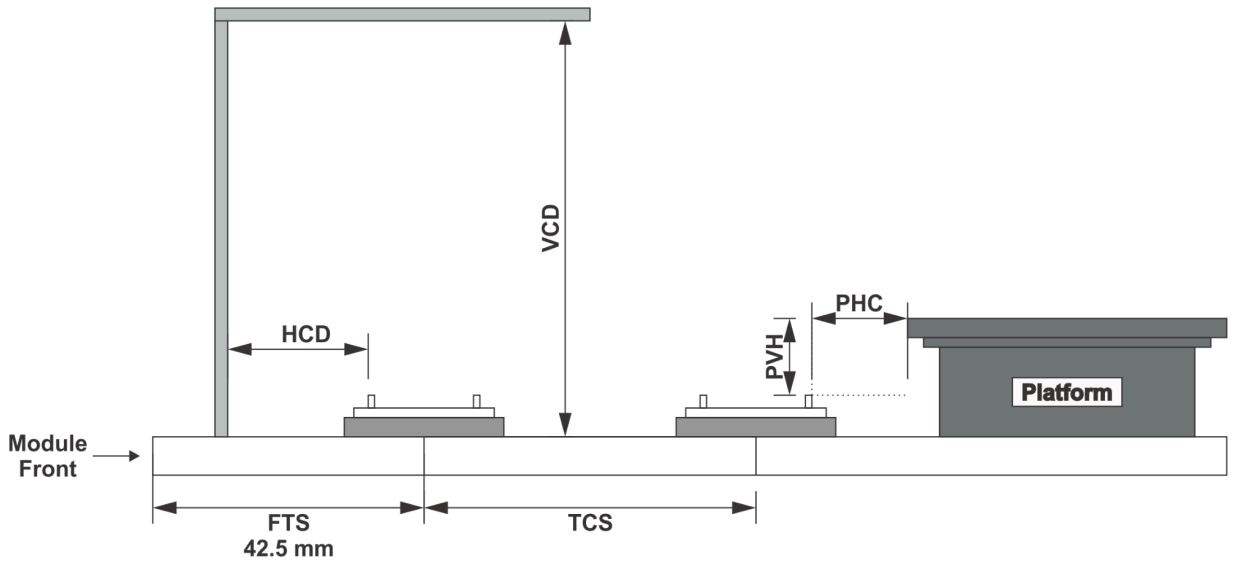
	HO / OO	**N**
Track	Nickel Silver* Code 100	Nickel Silver* Code 80
Number of mainline tracks	2	2
Road bed thickness	3 mm	3 mm
Distance from the front of the module to center of first track	42.5 mm	42.5 mm
Spacing between track centers	55 mm	32 mm
Outer Radius on curve modules	609.6 mm (24”)	609.6 mm (24”)

	HO / OO	N
Inner radius for curves modules	557.6 mm	577.6 mm
Minimum point / turnout size	Peco Small**	Peco Small
Recommended point / turnout size	Peco Medium	Peco Medium

* - Track must be Nickel Silver. Track such as Lima set track is not permitted.
**- Lima or other smaller radius points will not be permitted

Clearances

The following clearances should be observed when building modules



Drawing 7: Track Clearance Diagram

	HO / OO	N
FTS - Front of module to center of first track	42.5 mm	42.5 mm
TCS - Track spacing between track centers	52 mm	32 mm
HCD - Clearance from rail to any horizontal object	22 mm	?
VCD - Vertical minimum clearance from top of module to underside of tunnel or bridge	65 mm	48 mm
PVH - Height from the top of the rail to the top of a platform	12mm	6 mm
PHC - Clearance from outside of the rail to the edge of a platform	15mm	?

Connection of tracks between modules

The connection of tracks between modules will be done with a butt joint method. This means that the tracks will need to be cut flush at the end of each module so that they can align with the next adjacent module.

5. Wiring standard

The following outlines the wiring standards for modules

Track wiring standard

Track will be wired for DCC control only. This will minimize the amount of wiring needed between modules.

Track Power Bus

The basic wiring between the ends of adjacent modules or sets of modules shall consist of two wires, 1.5mm^2 each in size which will be plug-coupled at each end. Rails are color coded as follows:

- Front Rail - Red (rail(s) closest to the front edge of the module)
- Back Rail - Black

The Track bus should be placed towards the front of the module underneath the track.

Track Feeders

The feeds between the Power Bus and the rails should be made with a wire size of between 0.2 - 0.5mm^2 wire. Color coding must follow as per the power bus above. If tracks on the module are joined using rail joiners, each individual rail must get its own feed to the power bus regardless of length of the track. This ensures better track power across the module.

Track Power bus plug connections

Standard XT60 connector plugs will be used between the modules. These are available from a number of different electronic retailers and are commonly used in Radio Controlled and 3D printing spaces.

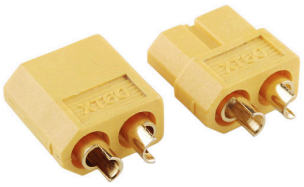


Diagram 8A: XT60 Connectors (Pair)	**Diagram 8B: XT60 Male Connector**	**Diagram 8C: XT60 Female Connector**

The positive terminal (flat side) on the connector will be soldered to the red power bus wire. The negative terminal (angled side) will be soldered to the black power bus wire.

Note the following layout for the connectors on the module:

- The male connector will be on the left hand side of module
- The female connector will be on the right hand side of module

Connecting to the DCC system

Unless otherwise specified a Digitrax DCC system will be used to provide power to the track. Track power will be fed to the layout via a pair of the above mentioned XT60 connectors that are wired back to back. These will then be connected to the track power bus between two modules.

A separate programming track can be made available on a micro module to allow for loco programming to be done off the layout.

Due to the low profile of the modules, it is not possible to mount the Digitrax UP panels to the modules. The UP panels can be mounted into boxes and then clamped to the corner of the tables that the modules are placed on. Alternatively infrared receivers or a Wifi receiver (Raspberry Pi system) can be used for control.

Auxiliary Bus Wiring Standard

The auxiliary power bus is an external cable used to carry power for lighting, animation, or other non-track options. This bus will be 12V DC only. If lower voltages are required it is up to the module owner to make sure that the voltage is rectified and stepped down for their devices as needed.

The basic wiring between the ends of adjacent modules or sets of modules shall consist of two wires, 1.5mm^2 each in size which will be plug-coupled at each end. Bus wires are color coded as follows:

The same XT60 connectors will be used as for the Track Power bus. The positive terminal (flat side) on the connector will be soldered to the Orange power bus wire. The negative

terminal (angled side) will be soldered to the Blue power bus wire.

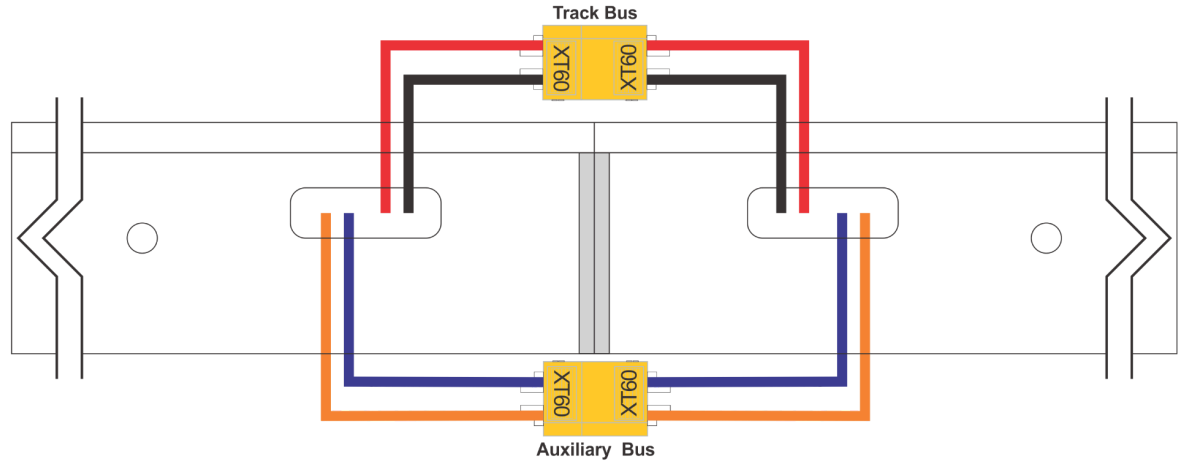
Note the following layout for the connectors on the module:

- The male connector will be on the left hand side of module
- The female connector will be on the right hand side of module

The Auxiliary Bus should be placed towards the back of the module away from the track.

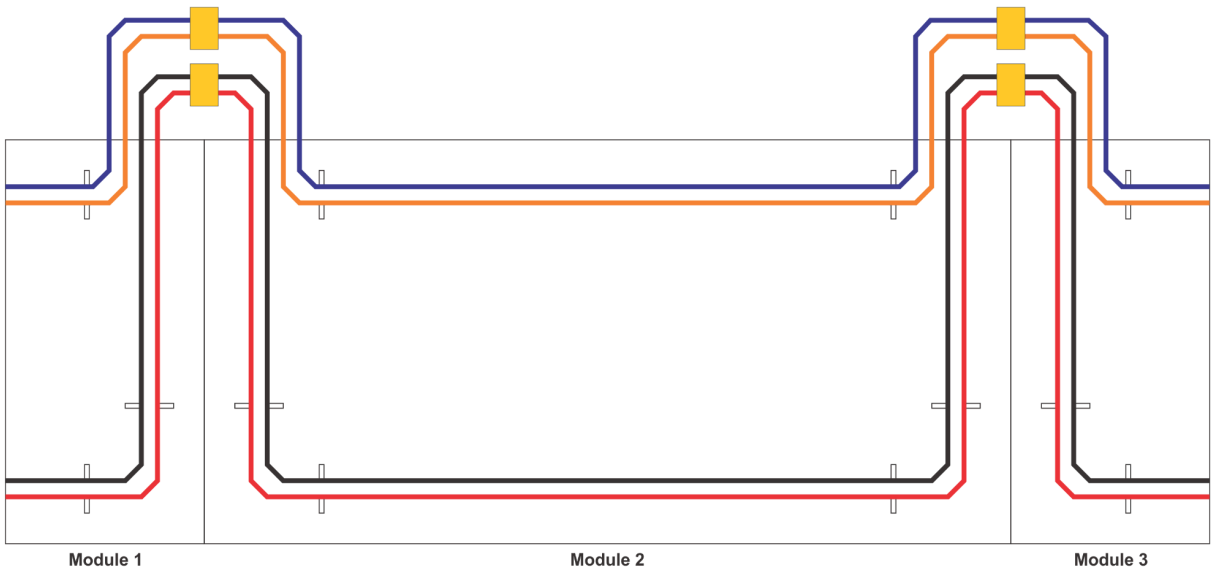
Wire layout and routing

To make it easier to connect the wiring between modules, the plugs and wires will exit the module on each end of the through a hole on the side of the module.



Drawing 9A: Drawing to show wires exiting at the ends of two modules

Provision has been made on the module to help keep wiring tidy under the modules. The following drawing shows the suggested wiring layout.



Drawing 9B: Suggested wiring layout

6. Paint standards

The following standards should be adhered to in order to make the layout look like a cohesive unit.

6.1 Fronts of modules

The faces of the modules should be painted with matt black PVA (or similar). This enables quick touching up at exhibitions and other venues as well as giving a cohesive layout appearance.

6.2 Back of backdrops

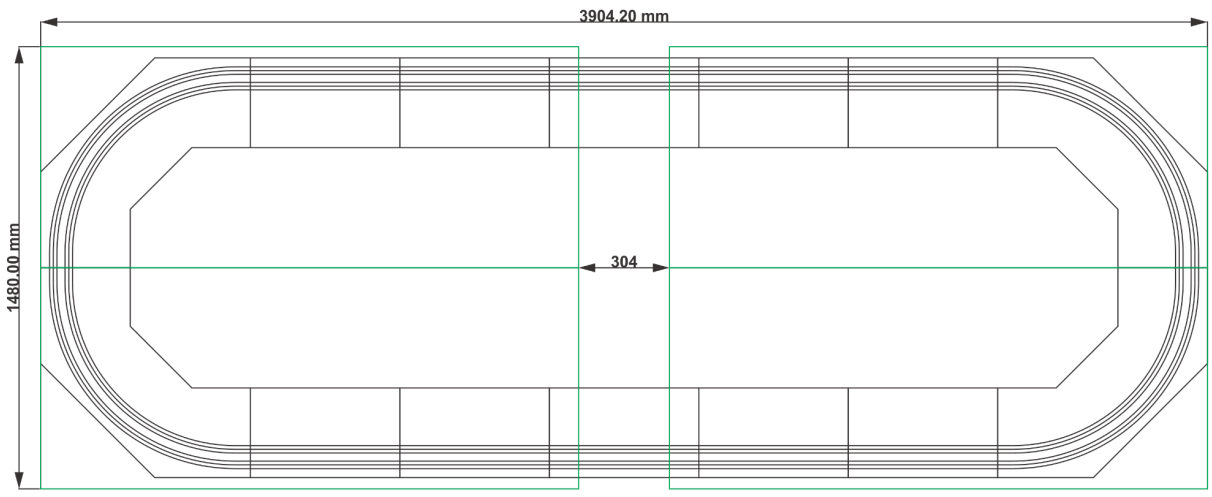
The backside of backdrops (i.e inside of the layout) should be painted with matt black PVA paint (or similar). This helps to create a more finished and cohesive look to the layout when displaying at public events.

7. Scenery standards

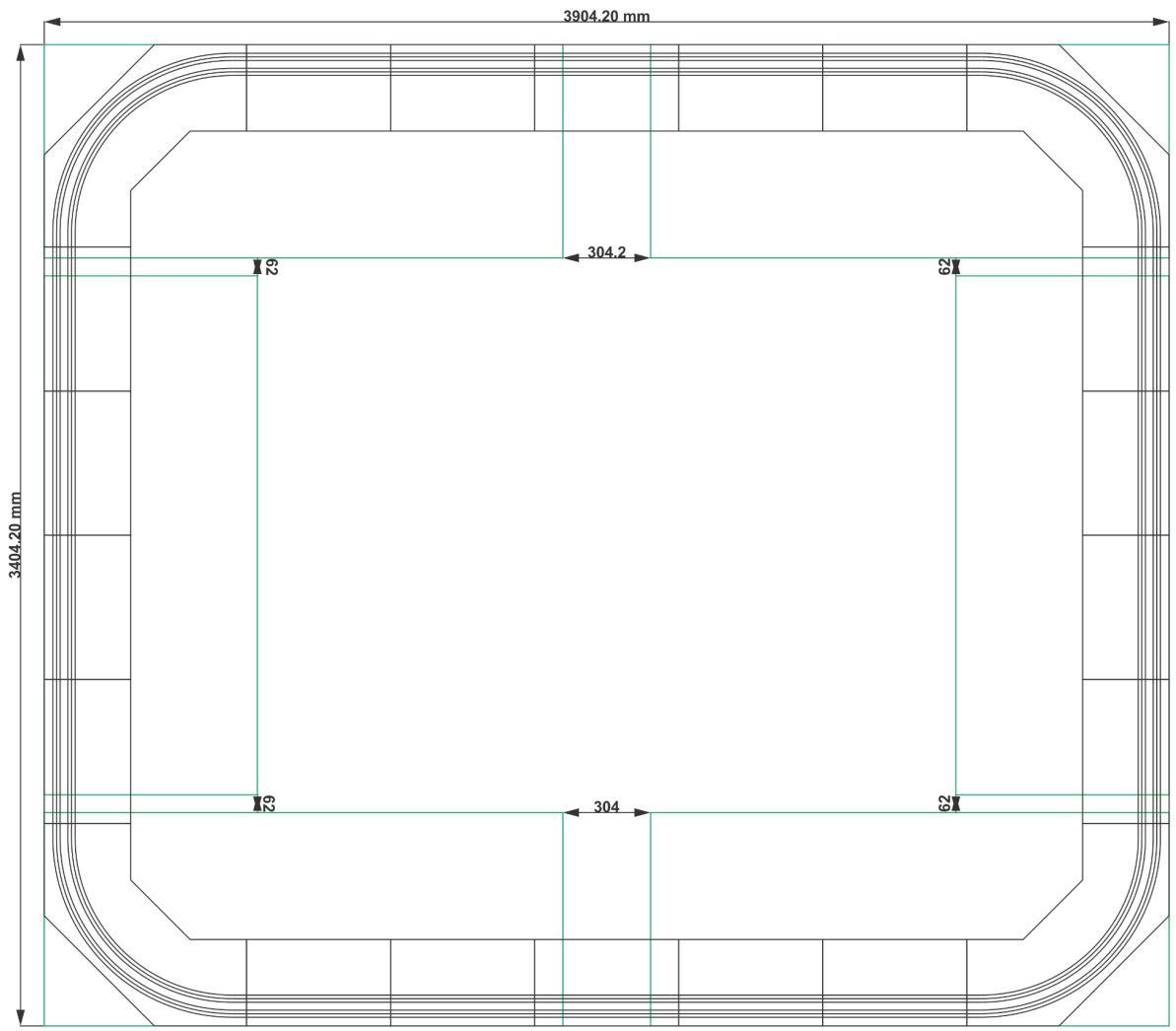
All scenery can be built free form to the modules owners taste as long as the clearances above are met. Scenery is not limited to any one theme or region.

8. Potential Layout design iterations

The following drawings show potential layout designs and their requirements for modules. Other design options are possible but are beyond the scope of this document. Diagrams are based on tables that are 1800 x 740 mm in size



Drawing 10A: 4 Table setup Requires 10 straight modules and 4 curved modules



Drawing 10B: 6 Table setup Requires 18 straight modules and 4 curved modules

9. Module ownership, maintenance and storage

Modules will be owned by individual members. As such the maintenance and storage is the responsibility of the individual who owns the module.

It is however suggested that the club owns four corner modules as these will commonly be used in all setups of a layout. Club members can be approached to build and maintain the corner modules on behalf of the club.

10. Maintaining the standards

With any type of modular layout that is used in a club environment it is critical that standards are maintained. As such the committee or the appointed person will hold inspections prior to new modules being included in live running sessions. This will reduce problems during setup and running at public events.

10.1 Changes or additions to the standards (Works Orders)

From time to time it may be necessary to make small changes to the standard for a variety of reasons as the standard grows.

To ensure that these changes are carried out on all existing modules, a Work Order can be issued. The Work Order will serve as formal notice to all existing module owners so that their modules can conform to the updated standard. Work Orders should include information on why the change needs to be made, included the new details as set out in the standards document and included a reasonable timeline in which the changes need to be made.

The issuing of Work Orders should be carefully considered so as not to cause major changes to existing modules.

11. Potential drawbacks with the concept

As with all concepts there are some potential drawbacks with the concept. These could include:

- The small radius on the curves may not allow larger locos to be run.
- Limited running options as the layouts that are built will generally be small.
- Due to the small size of the modules there will be multiple track and wire joints.
- Modules should be constructed out of a harder material such as plywood. However these modules are not expected to have an extremely long lifespan.
- Module lengths are not optimized to standard flex track sizes. This may result in a small amount of waste.
- Not all fold up tables are created equally, especially in terms of height. As far as possible a standard table will need to be used
- The layout is not at an ideal viewing or operational height. While this is not ideal from a modeling perspective, it does have advantages that small children will be able to view the layouts easier in public spaces.
- Some scenery elements such as rivers may be difficult to incorporate due to the low profile of the modules. While there are options these would need to be explored on a case by case basis.
- Digitrax Universal Panels (UP3 or UP5) can not be mounted onto the modules due to the low profile of the modules. A possible workaround for this would be to mount the UP panels into boxes that are then clamped to the tables that the modules are placed on. Alternatively infrared receivers can be used.

12. Change Log

The following documents major changes to the standard.

Date	Change description
March 2025	● Change Log added - Introduction of change log ● Addition of inverse corners
October 2025	● Introduction of Works Orders (Section 10.1) ● Standardizing back of backdrops paint colour (Section 6.2)