



design elements

M2

design

The open tread mono-stringer is now an industry standard, due in no small part to Arden Architectural Staircases' optimising this design solution. The M2 open mono-stringer will maximise the open lines of sight and light penetration inherent in an open tread design.

The obvious features of this staircase style include a dramatic structural appearance with treads appearing to float over the central spine of the stairs. This effect is increased by the use of a "plate and gusset" tread support system rather than the more usual "folded tread plate" support system.

The choice of treads for the M2 is of particular importance. The mono-stringer's position underneath and away from the edges of the treads makes it retreat from view, and allows the impression of the staircase to be dominated by the treads themselves from all angles. The impression of the stringer is often further played down, through the choice of a dark or neutral pre-finish coat. Alternatively, one may choose to highlight its characteristics of strength and purity of line by choosing a more dramatic colour for its coating. Arden's customers frequently choose to complement the MS2 with a glass balustrade to maintain the translucent character of this staircase.

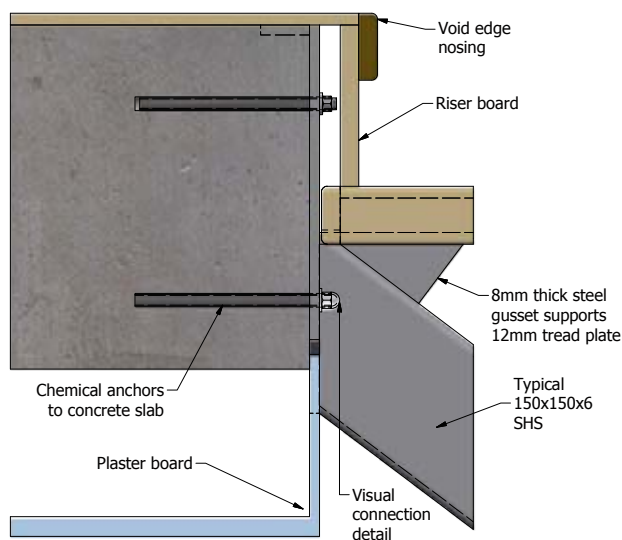
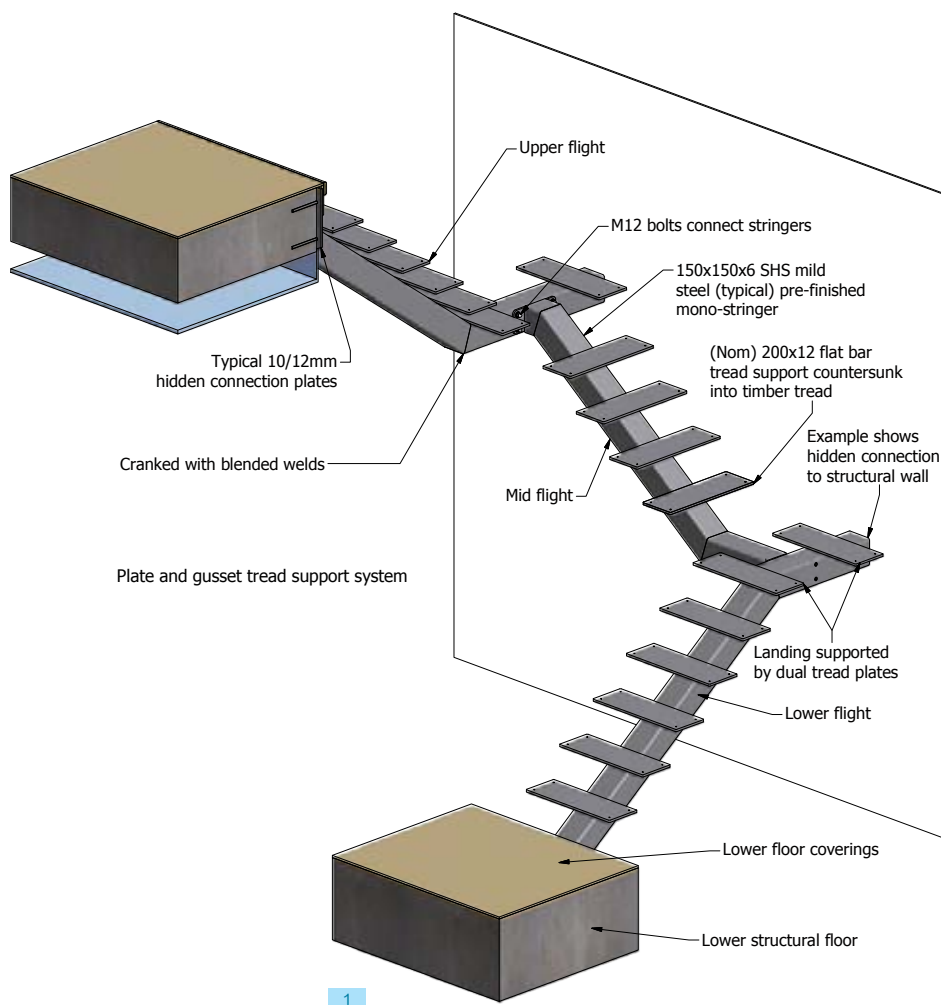
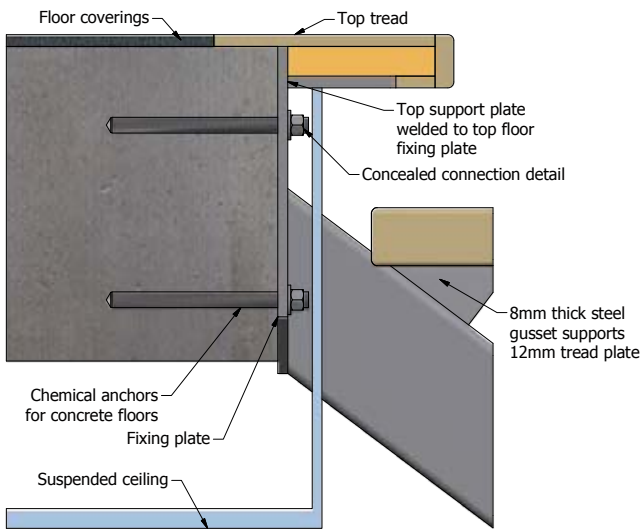


Figure 1. Structural configuration of an example M2 installation with plate and gusset tread support system.

Figure 2. Void edge mounting with semi-visual connection detail.

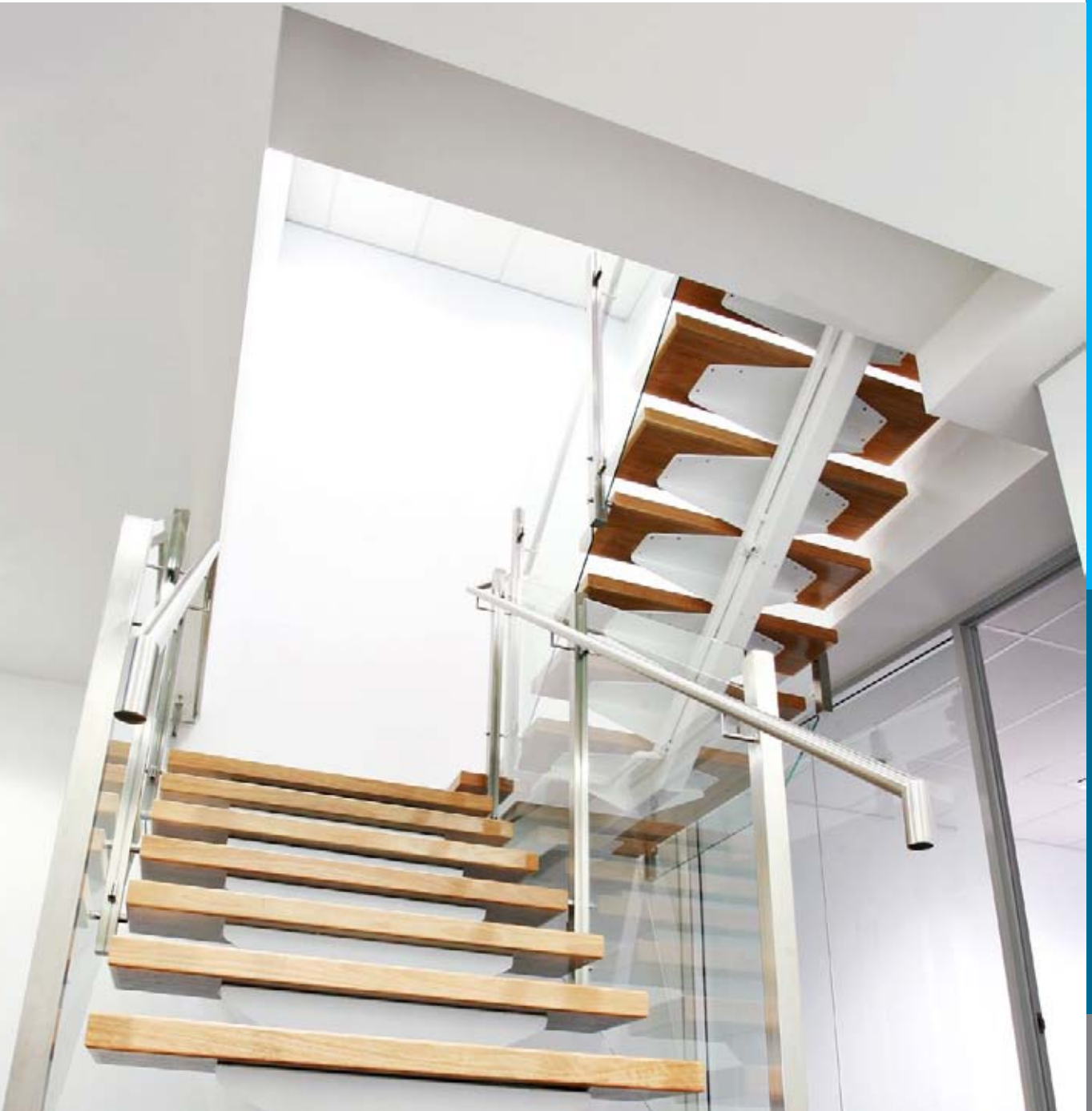


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As with all open staircases, the BCA rule on a gap of less than 125mm being required between the top of a tread and the underside of the tread above. Most modern staircases have a rise per tread of between 170mm and 190mm, thereby requiring a functional tread thickness of between 45mm and 65mm.

The tread solutions for open staircases applicable to the M2 are provided in Arden technical data sheet 'A.3 Treads'. The details illustrated draw upon these tread solutions.

Figure 3. Void edge mounting with concealed connection detail.

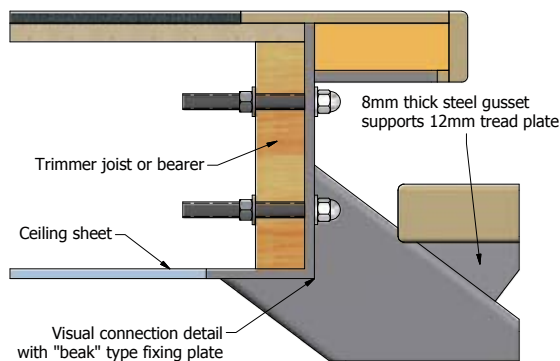


technical

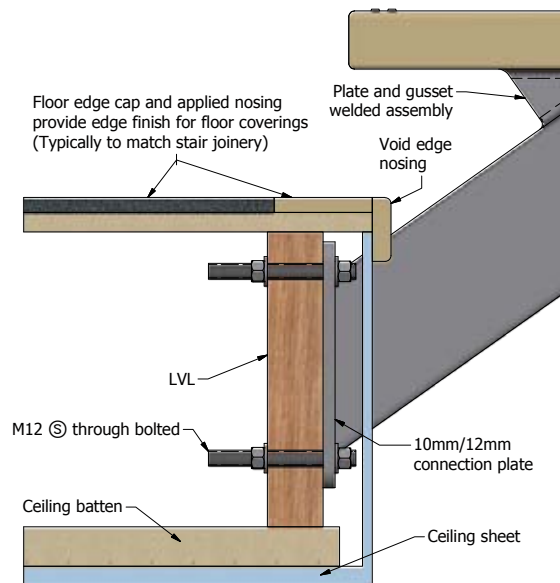
The core member of the MS2 is constructed from SHS or RHS mild steel sections of a size suitable for the required loads and spans. These sections are mitred and welded at the angle points into a continuous solid member. Support plates for the treads and landings are welded to the core. Mounting plates are also usually welded where required at this stage. On occasion instead of using mounting plates the stringer is welded directly to pre-existing steel structure on site.

While a mono-stringer generally only needs two support points per flight, it must be kept in mind that the supporting structure must provide rotational support as well as lateral and vertical support. On exceptionally long spans a central column support is a common solution to maintain a slim metal stringer line.

There are also two alternative tread support plate designs. Light duty stairs would use the folded tread plate design. Where high design loads or a wide flight is specified, a heavier gauge steel tread plate is called for. This would make a folded design impractical, and we would therefore recommend the use of the two piece orthogonal welded design.



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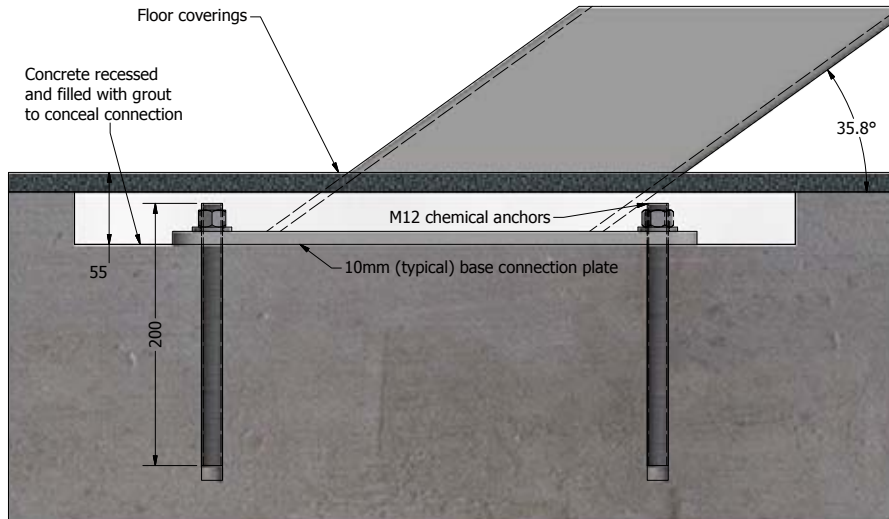


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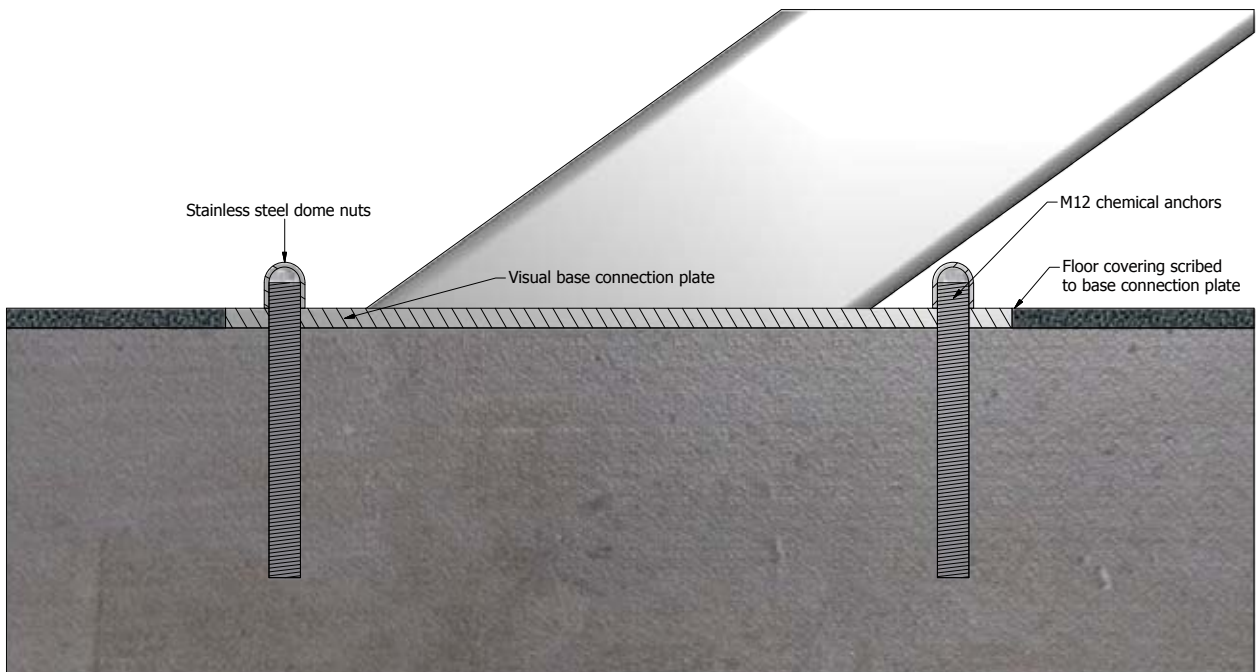


Figure 4. "Beak" type connection detail, suitable for when the top termination of the nosing line must be situated relatively close to the void-edge. This may come about due to constraints on the total going allowed for the staircase, or due to thin structural floors requiring some form of under-slab fixing.

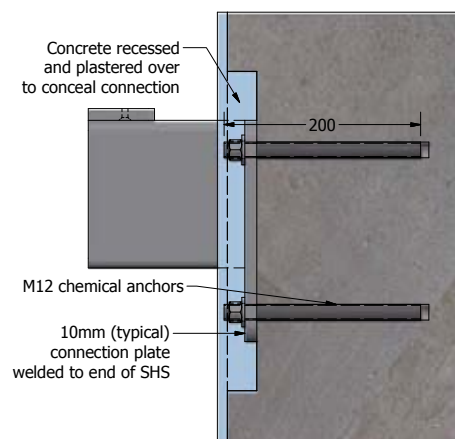
Figure 5. Bottom mounting to timber floor void edge.



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Figure 6. Concealed floor fixing detail. The entire fixing assembly is recessed below the finish floor surface so that the line of the stringer 'vanishes' into the floor coverings.

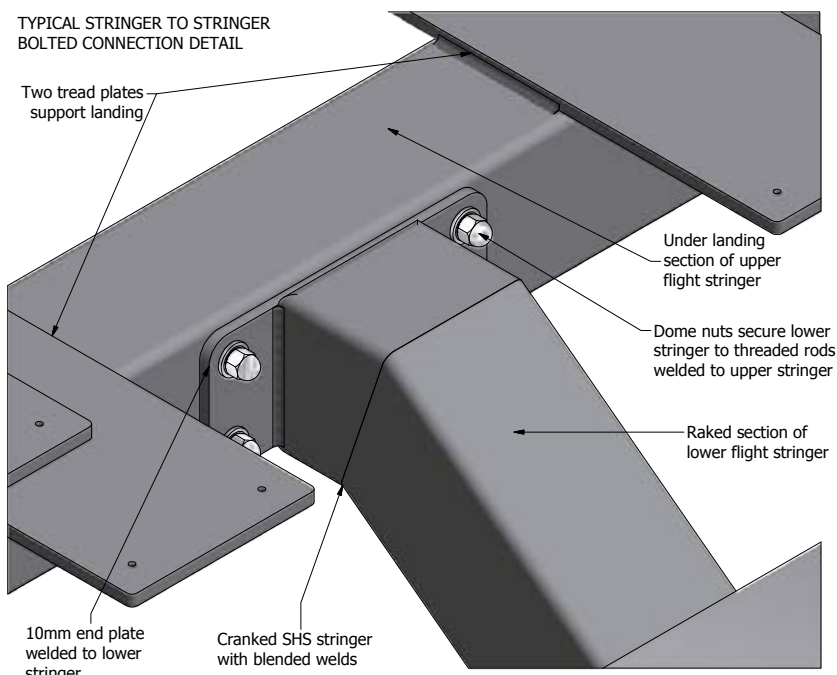
Figure 7. Visual floor fixing. Stainless steel dome nuts and pre-finished fixing plate employed with radiused corners employed to create an attractive fixing detail.

Figure 8. Secret wall fixing using recessed fixing plate concealed behind wall finish. The effect of a stringer 'penetrating' the wall finish surface is most attractive.

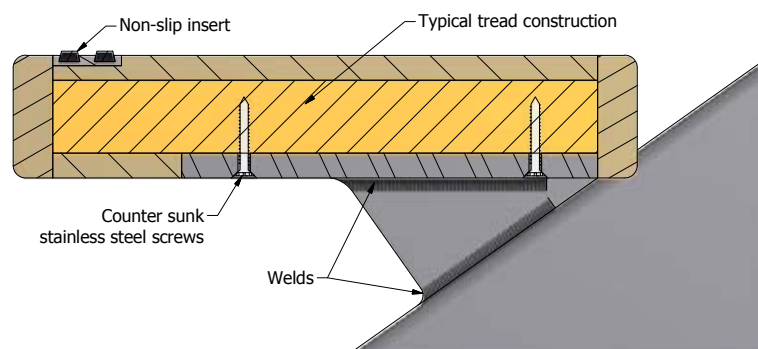
Figure 9. Typical bolted stringer to stringer connection detail.

Figure 10. Isometric view of plate and gusset style tread support.

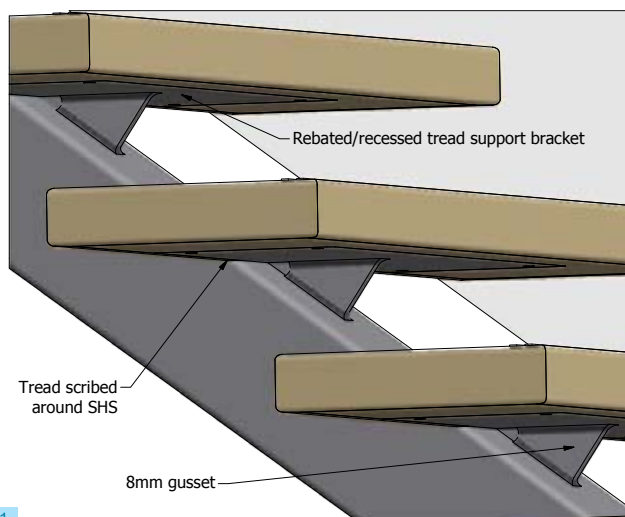
Figure 11. Cross section of composite tread with plate and gusset support.



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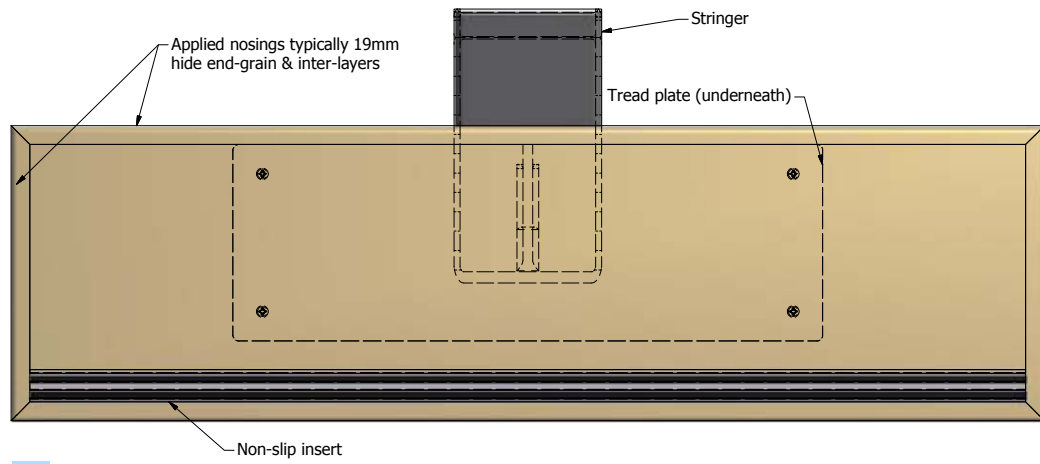
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C4 balustrade
join connected
to tread ends





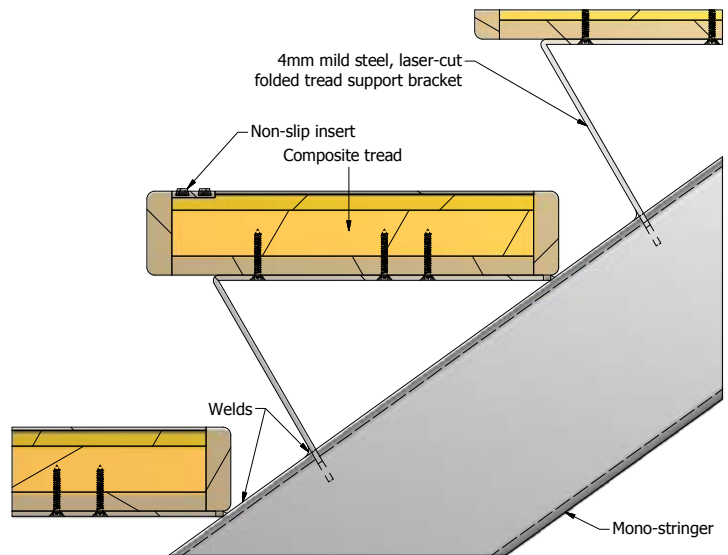
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Figure 12. Top view of composite tread with plate and gusset support.

Figure 13. Cross section of composite tread with folded plate tread support.

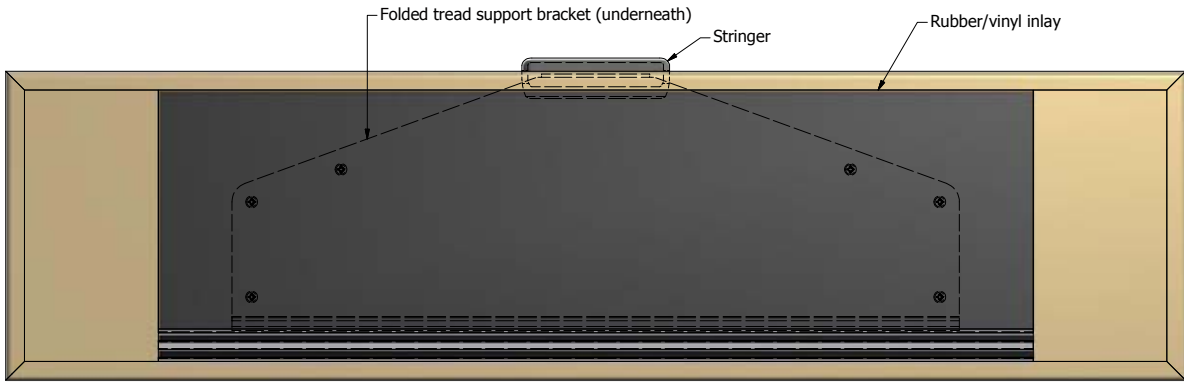
Figure 14. Top view of composite tread with folded plate tread support.

Figure 15. Landing for plate & gusset style mono.

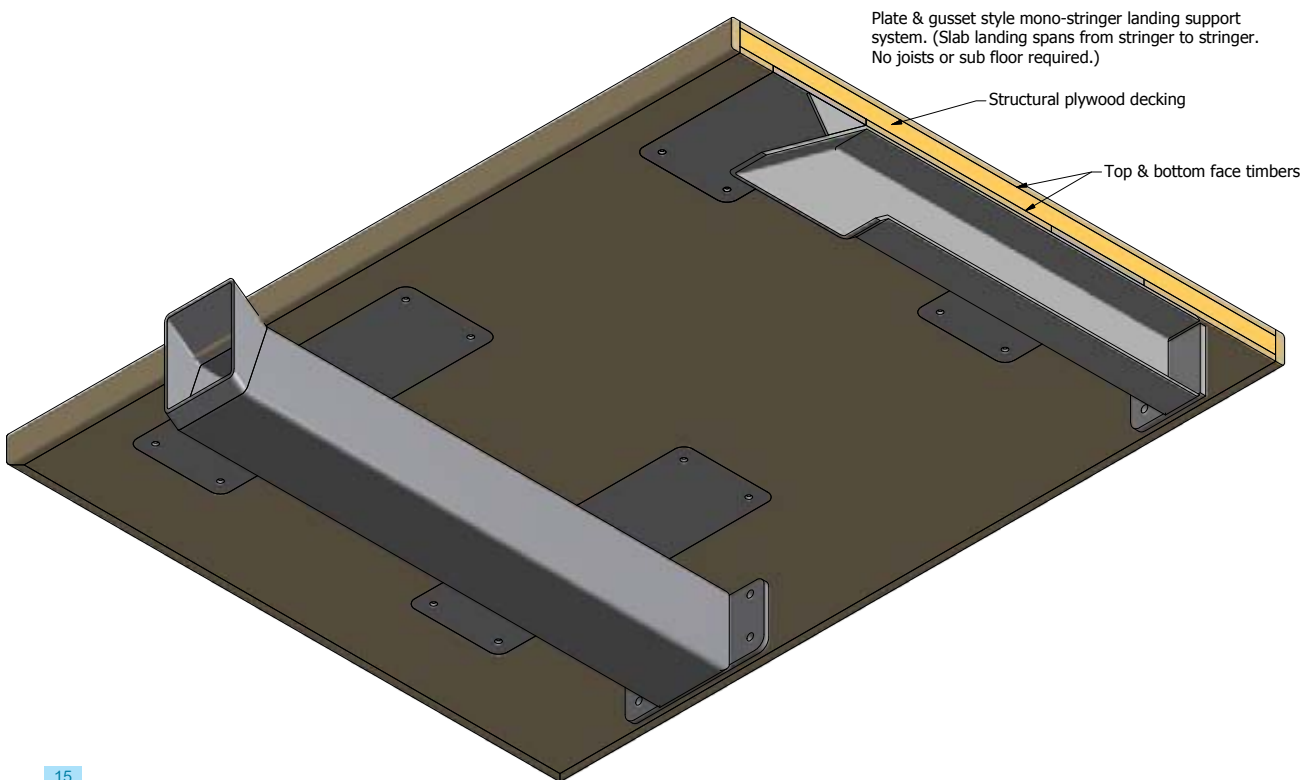
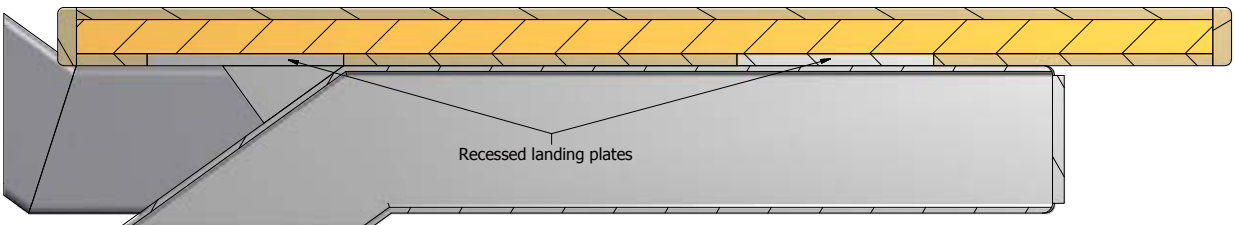


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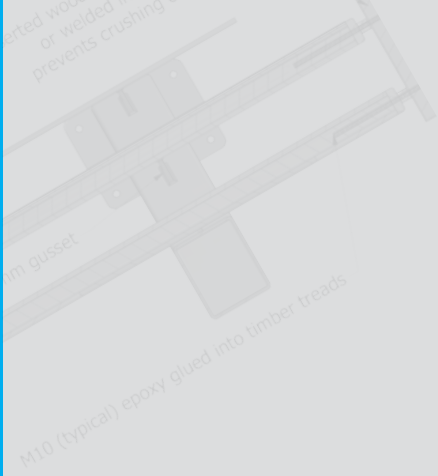
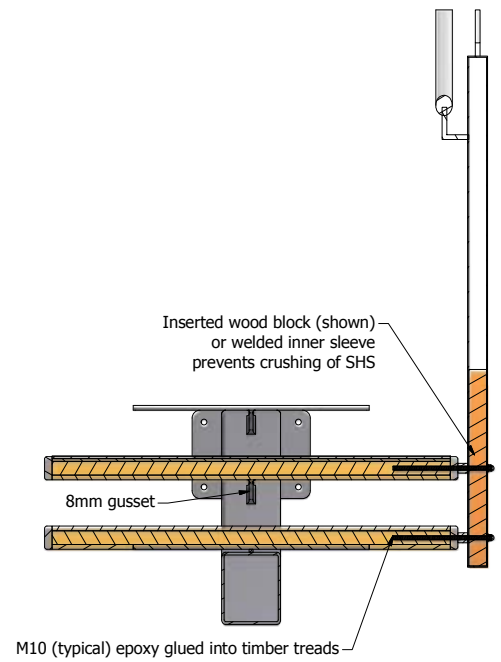
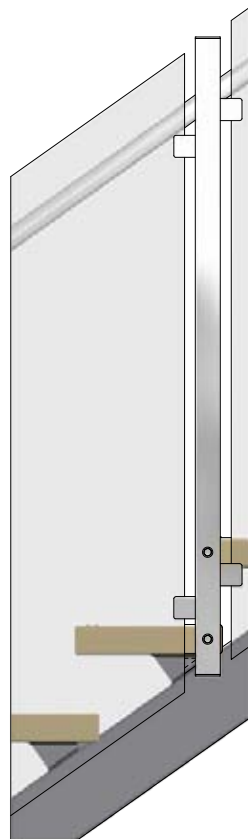
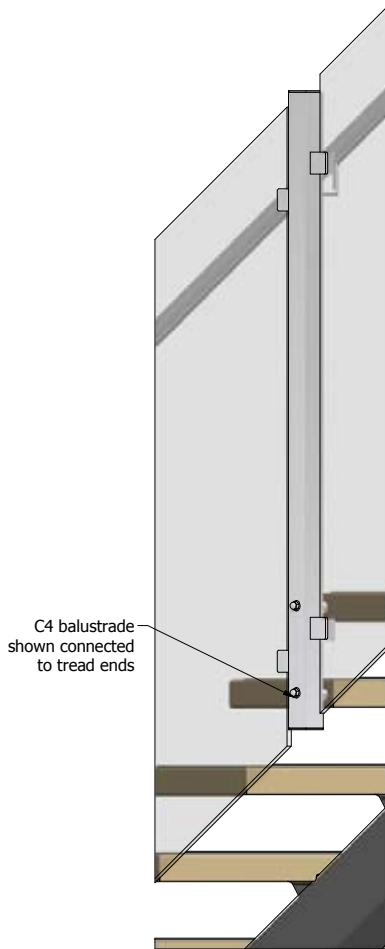


Figure 16. Face-fixed balustrade (see the Arden technical data sheet 'C4' for details) mounted to the side face of treads. A variety of balustrade styles may be applied to the M2, but face-fixed glass panel balustrade is particularly suitable for enhancing the light-maximisation and openness inherent to the M2.





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compliance

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Key

- full compliance with the code
- ◐ can comply
- ⊘ does not comply
- not applicable to this element

Code	Title	Applicability
BCA	The Building Code of Australia	●
AS NZS 1170.1-2002	Structural Design Actions – Permanent, imposed and other actions	●
AS 1288-2006	Glass in Buildings. Selection and installation.	○
AS NZS 1554.1-2004	Structural steel welding - Welding of steel structures	●
AS 1554.6-1994	Welding stainless steels for structural purposes	●
AS NZS 4586-2004	Slip resistance classification of new pedestrian surface materials	◐
AS 1428.1-2009	Design for access and mobility	⊘
AS 1657-1992	Fixed platforms, walkways, stairways & ladders. Design, construction and installation	●

design note

For all commercial applications, it is important that sufficient space for the stairwell cavity be allowed to satisfy Australian Standards and BCA requirements.

The footprint is primarily driven by the floor to floor rise, as well as the staircase configuration chosen. However, stringer and balustrade style design may increase the amount of space required. Allowing too small a cavity can restrict the design options of the staircase. Also, points at where the staircase interacts with other structures are best addressed early in the design cycle.

Consultation with Arden early on will help ensure that these design issues can be addressed in a cost-effective manner.

www.arden.net.au

phone (07) 3267 6100 | fax (07) 3267 6500 | email admin@arden.net.au

Office & factory: 46 Radley Street Virginia Qld 4014 Australia Postal address: PO Box 317 Virginia Qld 4014 Australia

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