

Safence™ Wire Rope System

Technical Data

Dynamic Deflection

Post spacing has a direct bearing on the dynamic deflection of any non-rigid safety barrier and altering the post spacing is the accepted practice of managing the deflection.

Safence™ has been crash tested to NCHRP350 test Level 3 using a 2.5m post spacing and as a result Transit NZ has approved post spacings of 2.0m, 2.5m and 3.0m.

Computer simulated dynamic deflections for a range of post spacings have been tabulated. The simulations were part of the design process for the **Safence™** system and can be compared with the actual results from full scale crash tests. The test results were used to tabulate allowable dynamic deflections.

Post Spacing (m)	Deflection (m) (NCHRP350 TL3 conditions)
1.0	1.5
1.5	1.7
2.0	1.9
2.5	2.2
3.0	2.5
3.5	2.8
4.0	3.2

Post spacing at 2.0m, 2.5m and 3.0m are the only post spacings currently approved for use on the Transit NZ State Highway network.

Median Applications

Safence™ has been successfully installed in both verge and median applications. A median application is where **Safence™** is used most commonly. The available median width will influence the allowable deflection and consequently the post spacing.

Bridge Applications

Safence™, or in fact any wire rope safety barrier, is not recommended for use on bridges or as a bridge approach system. Appropriate alignments need to be considered where **Safence™** interfaces with semi-rigid and rigid systems that connect to bridge barriers and parapets or piers.

Horizontal Curves

- Generally a minimum radius of 600 metres for horizontal curves is recommended.
- For fences with less than 600m radii, post spacing needs to be reduced to minimise the lateral force on the posts.

Curve Radii	Post Spacing
105	Max 1.5m
200	Max 2.0m
250	Max 2.5m
300	Max 3.0m

Vertical Curves

- Sag vertical curves less than 3000 metre radius present practical problems with the seating of wire ropes in posts and the natural catenary of the wire ropes at design tension. In general, vertical curves should be greater than 3000m radius.
- Crest vertical curves are subject to wire ropes dropping to ground in the event of an impact causing loss of enough posts to allow the natural catenary to be equal to the chord height.

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Footing and Anchor Specification

- Size of footings and concrete specification is site dependent.
- CSP Pacific, upon submission from the contractor of appropriate formation geometry and bearing capacity details, will nominate appropriate footing sizes and concrete requirements. Information required is soil bearing capacity and embankment slope (if appropriate).

Installation Equipment

- Tooling for on site swaging and tensioning equipment is the property of CSP Pacific.
- Equipment will be delivered to site for a duration reasonable to complete installation.

Anchor Blocks

- Individual fences have anchor blocks at ends only.
- The anchor block has been designed as a mass concrete gravity block.
- The dimensions are very important to the system performance.
- Any changes to the size of the anchor block must be referred to CSP Pacific for verification.
- The anchor bracket is cast-in at a specific critical angle to the R.L. per our drawings.

- Concrete strength is to be a minimum of 25 Mpa at 28 days.
- Ropes can in fact be fully tensioned after 7 days curing.

Anchor Brackets

- Anchor brackets are designed and full scale crash tested to release the wires in the event a vehicle is snagged under the end of a fence.
- The angle and R.L. is critical to the performance of the system.

Safety Check Ropes

- One end has a reeve for fitting onto the main ropes prior to the swaging of end fittings.
- The other unreeved loop end is joined to the anchor bracket using bow shackles.
- Check ropes limit the travel of the main ropes when released in the event of an end bay impact.

Footings

- Typically, an allowable soil bearing pressure for road base courses will be of the order of 172 kPa. The client is to satisfy themselves that the ground in which the fence post footings are to be cast is of such strength or advise CSP Pacific of the actual strength. Based on 172kPa soil bearing capacity the recommended footing size is 350mm diameter by 600mm deep using 20 MPa concrete and one top rebar spiral ring with 50mm cover. If the client can confirm the actual bearing capacity then we can offer a particular footing size for the proposed site.

Sleeves for Posts

- Extruded rigid PVC sleeves with bases are used to form post recesses in footings.
- The use of plastic sleeves reduces footing construction time and consequently traffic management costs.
- These plastic sleeves will be supplied as either 450mm long for pavement R.L. installations or as 580 mm long for 130mm high curb R.L. installations.
- Purchaser is to advise choice prior to ordering.

Posts

- While the standard arrangement is to fit posts loose in the plastic sleeves as cast into the concrete footings, other options need to be assessed on some sites.
- Where posts on base plates are needed these are to be spaced at 1m centres.

End Fittings

- Stainless steel sleeves - or end fittings - are swaged onto the ends of the main wire ropes. Instruction as to the appropriate use of the swaging equipment is



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mandatory to the satisfactory accomplishment of that task. CSP Pacific will provide the training.

Wire Ropes

- The main wire ropes are pre-stretched at the factory to 165 tonne proof load. As a result there is no tendency to flail or fly away when cut other than the weight of the rope falling.

Turnbuckles

- Tension bays require minimum 1.4m to fit rigging and tensioning unit.
- Care should be taken to avoid damage to threads and the turnbuckles which might prevent easy and effective tensioning of the system.