

SENTRYLINE-M – 4 WIRE ROPE SAFETY BARRIER

REVISION REGISTER

| Revision | Description | Date |
|----------|-------------------|------------|
| 1 | Issued for use. | 25/3/2021 |
| 1A | Supplier updated. | 12/01/2024 |

The Sentryline-M four wire rope system is a flexible barrier system accepted for use by Main Roads. The Sentryline-M terminal end (a gating terminal that does not “release” the wire ropes when impacted) is accepted for use by Main Roads. The system consists of a barrier that is accepted to test level MASH TL 4 and a terminal that is accepted to test level MASH TL 3.

Note that the Sentryline II four wire rope system was previously accepted by Main Roads, but is no longer accepted for new installations.

Main Roads experience is that wire rope barriers have high ongoing maintenance costs, so from an asset management perspective they are not preferred.

Images:



Photograph of Sentryline-M wire rope safety barrier installation.

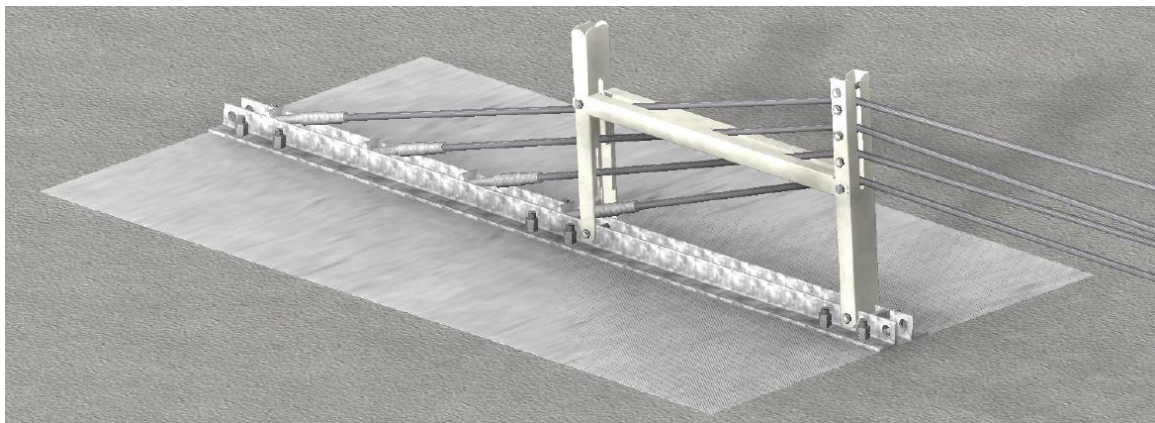
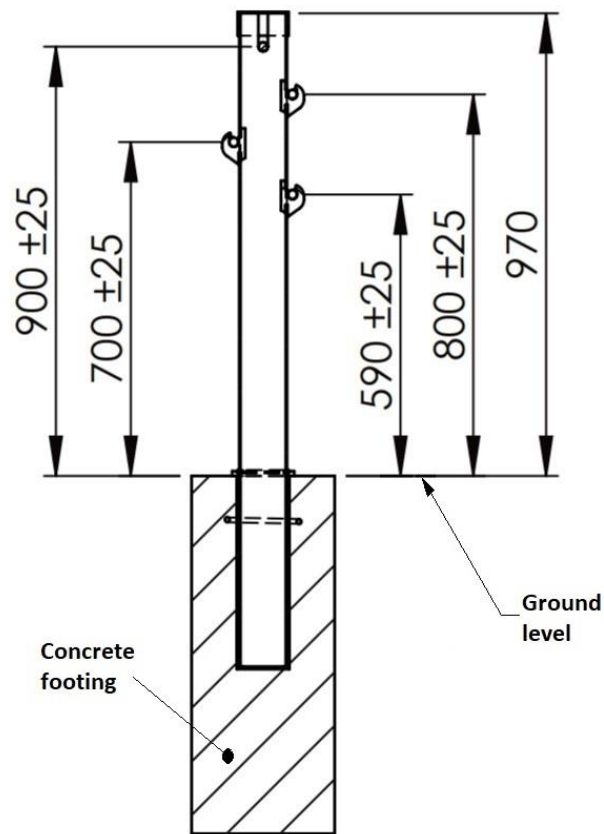
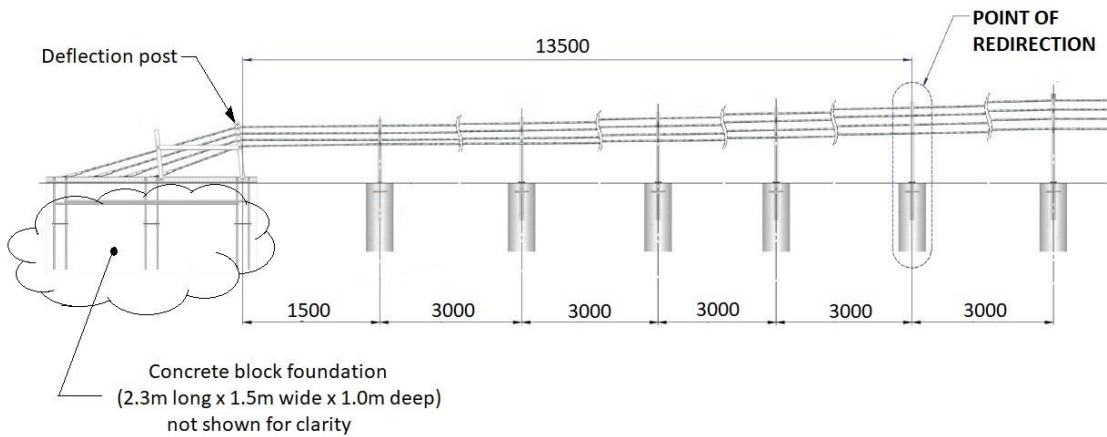


Image of Sentryline-M end terminal.

SENTRYLINE-M - 4 WIRE ROPE SAFETY BARRIER



Typical cross section of Sentryline-M through post.



Detail of Sentryline-M end terminal

Owner: CSP Pacific

Supplier:

Safe Direction Pty Ltd
 5 Simpson Close, Smeaton Grange, NSW 2567
 Ph: (02) 4648 0394
 Website - <http://www.safedirection.com.au/>

SENTRYLINE-M - 4 WIRE ROPE SAFETY BARRIER

Test Level: MASH TL 4 (barrier)
MASH TL 3 (terminal).

Accepted Barrier Configuration:

- Post spacing of 2.0 m or 3.0 m, four wire ropes located at heights of 900 mm, 800 mm, 700 mm and 590 mm.
- Ropes at a nominal 25 kN tension.
- Installed with cast in-situ concrete footings.

Note that to avoid the cast in-situ concrete footings clashing with underground services the spacing of barrier posts may be reduced. Post spacing may not be increased above 3.0m.

Design Considerations:

Design should be undertaken in accordance with relevant manuals (Sentryline-M Wire Rope Barrier - Product and Installation Manual – version dated December 2020 and Sentryline-M Wire Rope Terminal End - Product and Installation Manual – version dated June 2020) provided by the Supplier.

Deflection:

3.02 m under MASH TL 4 conditions (10000 kg vehicle at 90 km/h impacting at 15 degrees, post spacing 3.0 m).

3.02 m under MASH TL 3 conditions (2270 kg vehicle at 100 km/h impacting at 25 degrees, post spacing 3.0 m).

2.14 m under MASH TL 3 conditions (2270 kg vehicle at 100 km/h impacting at 25 degrees, post spacing 2.0 m).

It is not accepted that the Sentryline-M Wire Rope Barrier installed with reduced post spacing can be used to reduce deflection.

Note that these deflections were measured in crash tests performed under controlled conditions. The deflection measured is the horizontal offset between the traffic face of the barrier measured prior to and during vehicle impact. Designers should be aware that the deflection figure published as a test result may not be the deflection value achieved in the field for all impacts by errant vehicles.

Working Width:

3.05 m under MASH TL 4 conditions (10000 kg vehicle at 90 km/h impacting at 15 degrees, post spacing 3.0 m).

3.02 m under MASH TL 3 conditions (2270 kg vehicle at 100 km/h impacting at 25 degrees, post spacing 3.0 m).

2.14 m under MASH TL 3 conditions (2270 kg vehicle at 100 km/h impacting at 25 degrees, post spacing 2.0 m).

Deflection Correction Factors:

In the Sentryline-M Wire Rope Barrier - Product and Installation Manual, Curve Multiplying Factors for the deflection and working width are provided where the barrier is installed on a convex curve and/or lengths greater than 200 m. The correction factors for radius 1500 m+ should be applied when the Sentryline-M barrier is installed on a straight.

SENTRYLINE-M - 4 WIRE ROPE SAFETY BARRIER

Footings

In the Sentryline-M Wire Rope Barrier - Product and Installation Manual the concrete footings for each post are specified as 300 mm dia, 750 mm deep when the barrier is installed into full depth (i.e. 750 mm or thicker) AASHTO Standard Soil (i.e. CBR > 60).

For installations in WA, these soil conditions are unlikely to be present. Given recent instances of wire rope barrier failures in WA due to inadequate concrete footings, Main Roads requires that geotechnical investigations be undertaken and site specific foundations designed for all Sentryline-M installations.

Minimum Length:

185 m (excluding terminal ends).

Length of Need:

The beginning of the length of need of the barrier commences 13.5m from the deflection post which is at the 5th post starting from the anchor.

Offset from Kerbing:

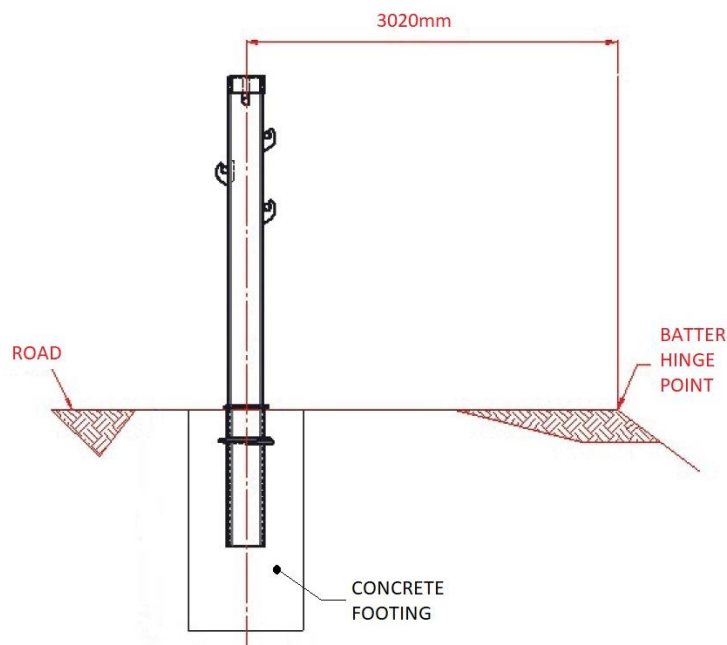
- Only mountable type kerbing should be used and the centreline of the post placed 450 mm from the face of the kerb to minimise nuisance impacts. Locations offset further from the kerb are not preferred because of the possibility of vehicle either vaulting the barrier or not being redirected by the barrier.
- If semi-mountable kerbing is used then offset to the centreline of post is 380 mm.
- Locations offset further from the kerb are not preferred because of the possibility of vehicle either vaulting the barrier or not being redirected by the barrier.

Height behind Kerbing:

It is preferred that the Sentryline-M Wire Rope Barrier is not installed behind kerbs. Where this cannot be avoided designers should seek advice from the supplier regarding the appropriate wire rope heights and footing and anchor block levels.

Offset from Batter Hinge Point:

The Sentryline-M Wire Rope Barrier - Product and Installation Manual includes the following figure as the recommended configuration to provide sufficient support during impact



SENTRYLINE-M - 4 WIRE ROPE SAFETY BARRIER

End Treatments:

The barrier comes with its own gating end treatment, Sentryline-M End Terminal which complies with MASH TL 3.

As a gating terminal, a runout area shall be provided, 18.5 m downstream and 6 m laterally from the point of redirection.

Delineators:

For all installations, delineation of the Sentryline-M barrier is to be provided by posts marked with a 50 mm (wide) x 150 mm (high) Class 1A reflective tape. Posts to be marked at suitable intervals based on post spacing to approximate 25 m intervals between markings.

Limitations:

- The cross slope shall be not greater than 10% for the area between the edge of travelled way and the barrier, and the area immediately behind the barrier for the width of the deflection.
- Preferably should not be installed behind kerbs. If kerbing is required then the only acceptable kerbing is mountable Type A 100 mm in high-speed situations.
- Semi-mountable kerbs may be acceptable in lower speed environments (< 70 km/h) but are not desirable.
- Refer to Main Roads Standard Drawing 9331-0376 for kerb types.
- Shall not be used on curves less than 200 m radius. On convex curves increased dynamic deflection may occur
- Shall not be used on either crest or sag curves with a K value less than 24.

Intermediate Anchors:

In the Sentryline-M Wire Rope Barrier - Product and Installation Manual intermediate anchors are referred to. Note that for this system there are no "intermediate anchors" and that anchorage is provided by installation of separate barrier lengths with overlaps.

The Sentryline-M Wire Rope Barrier - Product and Installation Manual limits the length of barrier between terminals to 1000 m.

The Sentryline-M Wire Rope Barrier - Product and Installation Manual contains a detail of the intermediate anchor titled "Sentryline-M Terminal End – Overlapping Detail". This detail shows the distance between the overlapping barriers as 400 mm. This is not accepted by Main Roads. The distance between overlapping barriers should be at least 3.0 m (i.e. the test deflection).

Joining Wire Ropes

The Sentryline-M Wire Rope Barrier - Product and Installation Manual includes a method of joining sections of wire ropes using a swaged coupling system. For installations in WA, only a mechanically swaged coupling system shall be used.

Parts to be Replaced after Impact:

Damaged posts, damaged cables, post caps and any other system componentry.

Parts Typically Re-Useable after Impact:

Wire Rope. Unless strands are damaged then they must be replaced.

SENTRYLINE-M - 4 WIRE ROPE SAFETY BARRIER

References:

Sentryline-M Wire Rope Barrier - Product and Installation Manual. – version dated December 2020

Sentryline-M Wire Rope Terminal End - Product and Installation Manual – version dated June 2020

Refer to website: <http://www.safedirection.com.au/>

Refer to Main Roads file 20/4018.