

# MASHFLEX WIRE ROPE SAFETY BARRIER

## REVISION REGISTER

Revision	Description	Date
1	Issued for use.	25/3/2021
1 A	Conditions and manual updated.	27/10/2022

The MashFlex four wire rope system is a flexible barrier system 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.

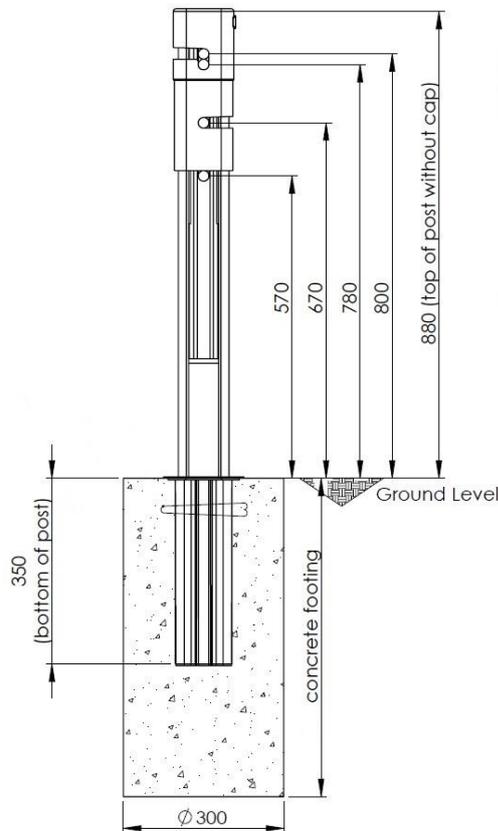
Note that the following related products have been installed on the Main Roads WA network:

- (i) Flexfence four wire rope system consisting of a barrier rated to test level NCHRP 350 TL 4 and a terminal accepted to NCHRP 350 TL 3,
- (ii) Flexfence four wire rope system consisting of a barrier and terminal rated to test level NCHRP 350 TL 3,
- (iii) Flexfence three wire rope system.

These systems were previously accepted by Main Roads. These systems are 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:

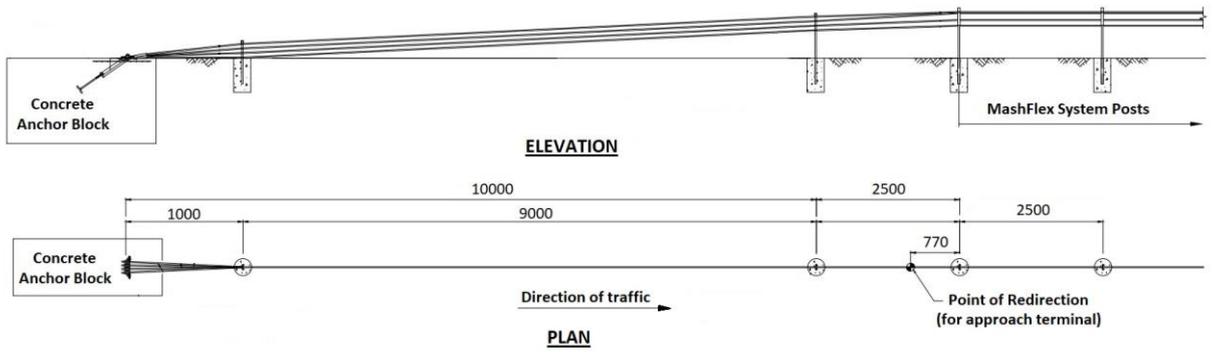


**MashFlex Wire Rope Barrier - Typical Cross Section**  
(refer to Supplier for post footing details)

# MASHFLEX WIRE ROPE SAFETY BARRIER



**Photograph of installed MashFlex Wire Rope Safety Barrier**



**MashFlex TL3 End Terminal  
(refer to Supplier for Concrete Anchor Block details)**



**Photograph of installed MashFlex TL3 End Terminal**

## MASHFLEX WIRE ROPE SAFETY BARRIER

<b>Ownership:</b>	Blue Systems Inc.
<b>Supplier:</b>	Ingal Civil Products 3 Temperley Close, Welshpool WA 6106 Ph: (08) 9452 9111 Fax: (08) 9358 9111 Website - <a href="http://www.ingalcivil.com.au/">http://www.ingalcivil.com.au/</a>
<b>Test Level:</b>	MASH TL 4 (barrier) MASH TL 3 (terminal).

### Accepted Configuration

- Post spacing of 2.5 m or 3.0 m, wire ropes located at 570, 670, 780 and 800 mm above ground. The barrier configuration accepted to test level MASH TL 3 and TL 4 includes stiffening plates and reo bars that are welded to the posts.
- Installed with cast in-situ concrete footings.
- Nominal rope tension of 25 kN for an ambient temperature of 20°C.

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 3.0 m.

### Design Considerations:

Design should be undertaken in accordance with relevant design manuals (MashFlex Wire Rope Safety Barrier Product Manual - version "Release 02/22") provided by the Supplier.

### Deflection:

2.19 m under MASH TL 3 conditions (2270 kg vehicle at 100 km/h impacting at 25°, post spacing 2.5 m).

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

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

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

It is not accepted that a single length of MashFlex Wire Rope Safety Barrier installed with a combination of 2.5 m and 3.0 m post spacing.

Note that these deflections were measured in crash tests performed under controlled conditions. The deflection recorded 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:

2.19 m under MASH TL 3 conditions (2270 kg vehicle at 100 km/h impacting at 25°, post spacing 2.5 m).

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

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

### **Deflection Correction Factors:**

In the MashFlex Wire Rope Safety Barrier Product Manual, correction factors for the deflection and working width are provided where the barrier is installed on a convex curve and/or lengths greater than 200m. The correction factors for radius 750m+ should be applied when the MashFlex Wire Rope Safety Barrier is installed on a straight.

### **Footings**

In the MashFlex Wire Rope Safety Barrier Product Manual the concrete footings for each post are specified as 300 mm dia, 600 mm deep when the barrier is installed into "Standard Soil" and as 300 mm dia, 750 mm deep when the barrier is installed into "Weak Soil".

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 MashFlex installations.

### **Minimum Length:**

188m (excluding terminal ends).

### **Point of Redirection:**

The leading and trailing point of redirection is shown in the MashFlex TL3 End Terminal image (refer page 2).

### **Offset from Kerbing:**

It is preferred that the MashFlex Wire Rope Safety Barrier is not installed behind kerbs. Where this cannot be avoided, the following advice is provided:

- 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.

### **Height behind Kerbing:**

It is preferred that the MashFlex Wire Rope Safety 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.

### **End Treatments:**

The MashFlex TL3 End Terminal is a gating end terminal, which complies with MASH TL3. This is a non-releasing end terminal. When the MashFlex TL3 terminal is impacted (as either an approach or departure terminal) the wire ropes remain attached to the anchor block and the wire rope safety barrier retains some capacity for secondary impacts.

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

Note that a MashFlex Standard End Terminal (refer drawing WR-MF-55 in the MashFlex Wire Rope Safety Barrier Product Manual) is also manufactured, but is not accepted for use by Main Roads.

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### **Delineators:**

At all locations where a MashFlex Wire Rope Safety Barrier is installed post caps are to be marked with a 100 mm (wide) x 50 mm (high) Class 1A reflective tape. Post caps 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 a 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/hr) but is not desirable.
- Refer to Main Roads Standard Drawing 9331-0376 for kerb types.
- Shall not be used on horizontal curves less than 200 m. On convex curves increased dynamic deflection may occur.
- Shall not be used on either crest or sag curves with a K value less than 30.
- Note that for this system there are no “intermediate anchors” and that anchorage is provided by installation of separate barrier lengths with overlaps. Main Roads WA limits the length of barrier between terminals to 1000 m.

### **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.

### **References**

MashFlex Wire Rope Safety Barrier Product Manual - version “Release 02/22”

Refer to website: <https://www.ingalcivil.com.au/products/road-safety-barriers>

Refer to Main Roads file 20/7057.