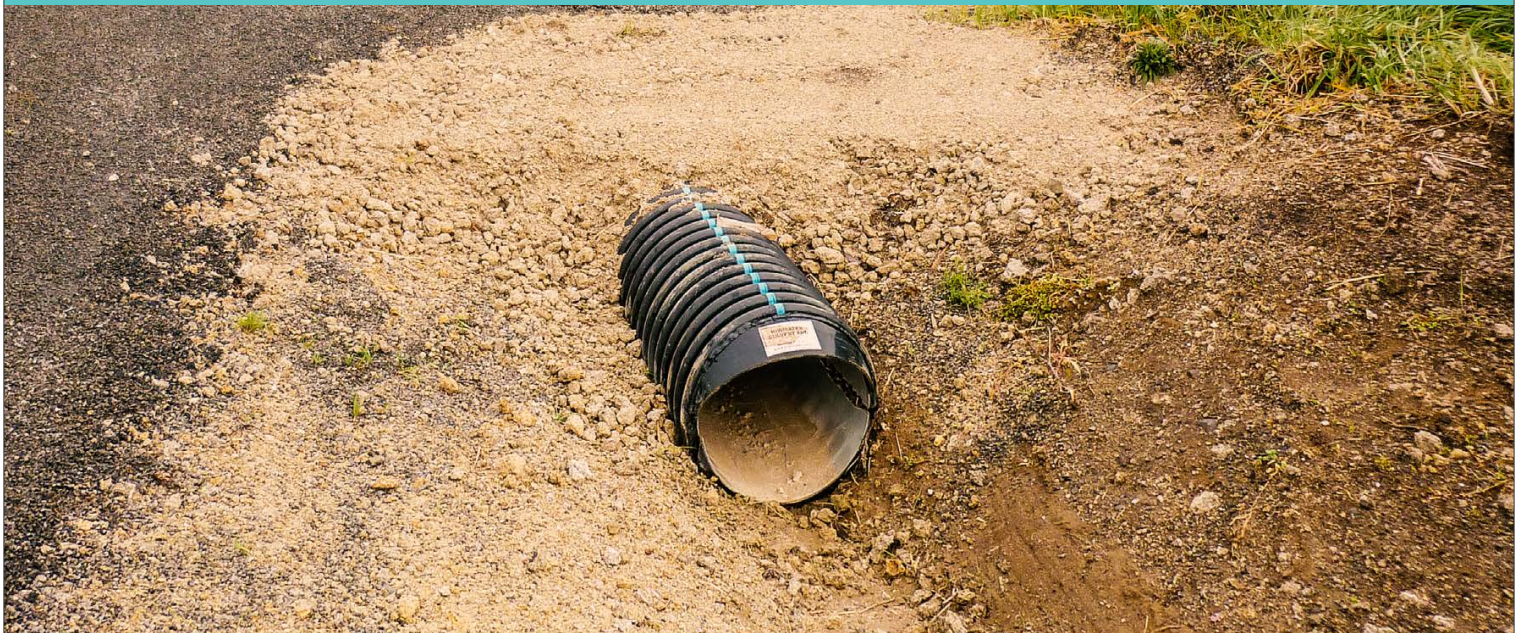


# KiwiSafer™ Culvert End

A world first in New Zealand, the KiwiSafer™ Culvert End significantly reduces the severity of the culvert crash impact.



TECHNICAL GUIDE: **PF10.2**

## Applications

Eliminates the snagging hazard of blunt or sloped culvert ends.

## Product Attributes

Deformable culvert safety end provides a traversable surface

The only culvert safety end performance tested

Quick installation with little heavy machinery required

Easily fits to CivilBoss, concrete and corrugated metal culverts

Cost effective solution for culverts less than 600 mm diameter.

## Approvals/Standards

NZTA accepted

AASHTO MASH compliant for TL-2 (70 km/h) & TL-3 (100 km/h)

NZ Patent No: 583493

## Quality

ISO 9001:2008 Quality Management Standard

# Introducing the NZTA accepted Kiwisafer™ Culvert End.

## The ideal solution for addressing Culvert End hazards.

### Features

- Significantly reduces culvert crash impact severity.
- Cost saving wingwall alternative.
- Eliminates snagging hazards.
- AASHTO MASH compliant for TL-2 (70 km/h) and TL-3 (100 km/h).
- Cost effective treatment for culverts less than 600 mm diameter.
- Available for culverts from DN225 mm to DN450 mm.
- NZTA accepted.
- Easily fits to CivilBoss, concrete and corrugated metal culverts.

The Kiwisafer™ Culvert End is a world first in New Zealand (NZ Patent No: 583493) which significantly reduces the severity of the culvert crash impact. The Kiwisafer™ Culvert Ends is the only MASH performance tested and compliant culvert safety end. Performance is achieved through a deformable culvert safety end that provides a traversable surface and eliminates vehicle snagging hazards of blunt or sloped Culvert Ends.

### Cost Efficient

Manufactured using corrugated plastic pipe, Kiwisafer™ Culvert End offers a significant cost effective Culvert End solution as it is quick to install and requires less heavy machinery.

### Compliance Testing

- The Kiwisafer™ Culvert Ends has been tested to AASHTO MASH TL-2 (70 km/h) and TL-3 (100 km/h) for the critical vehicle (1100 kg), by an FHWA approved test facility.
- The culvert safety end performed predictably and within the preferred limits for occupant impact velocities and accelerations.
- The test vehicles' steering and suspension remained operational following the impacts.

**Note:** Crash impacts that differ from the test condition parameters may have different results than those of the compliance tests.

### Product range

Kiwisafer™ Culvert Ends are available in the following sizes:

**TABLE 1** Kiwisafer™ sizes

Code	DN (mm)	OD (mm)	ID (mm)	Length (mm)
Kiwisafer225	225	259	220	1500
Kiwisafer225CON*	225	259/279**	220	1500
Kiwisafer300	300	353	305	2000
Kiwisafer300CON*	300	353/373**	305	2000
Kiwisafer375	375	442	383	2000
Kiwisafer450	450	530	459	3000

**Note:**

375 mm and 450 mm Kiwisafer™ fit both CivilBoss and concrete culverts.

\*Includes attached bush to match concrete pipe OD

\*\*OD of Bush fixed to Kiwisafer™

**TABLE 2** Joining Kiwisafer™ to a concrete culvert pipe spigot end requires a coupler

Coupler Code	Concrete Pipe (mm)		Kiwisafer™ (mm)	
	DN	OD***	DN	OD
KiwisaferC225	225	282/295	225	259/279**
KiwisaferC300	300	367/370	300	353/373**
KiwisaferC375	375	444/445	375	442
KiwisaferC450	450	534/530	450	530

**Note:**

Kiwisafer™ will fit into the concrete pipe collar without a joining coupler.

\*\*OD of Bush fixed to Kiwisafer™

\*\*\* North Island VCT Pipe OD / South Island Spun Pipe OD

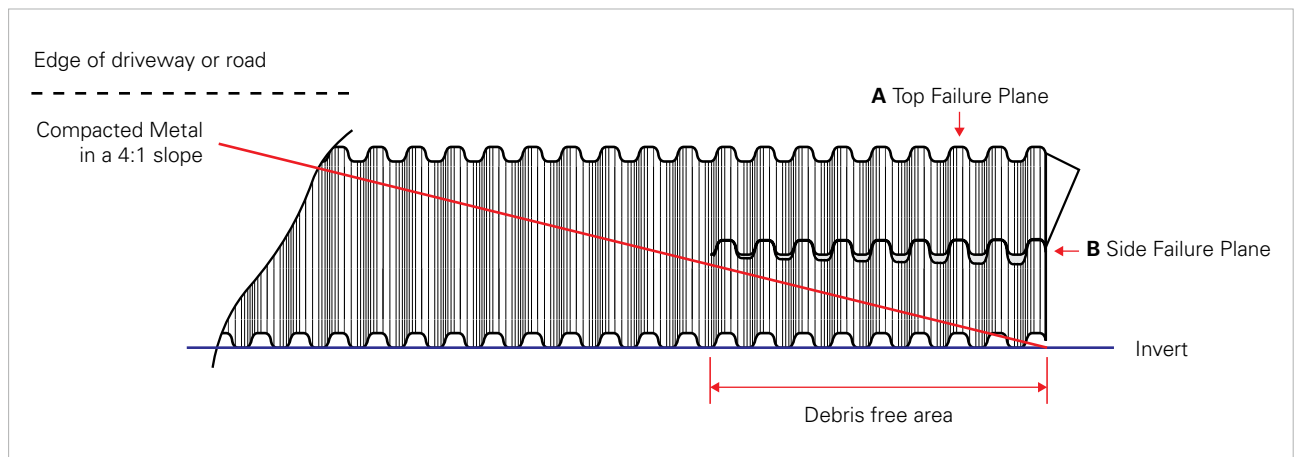


FIG. 1 Kiwisafer™ side view

### Installation

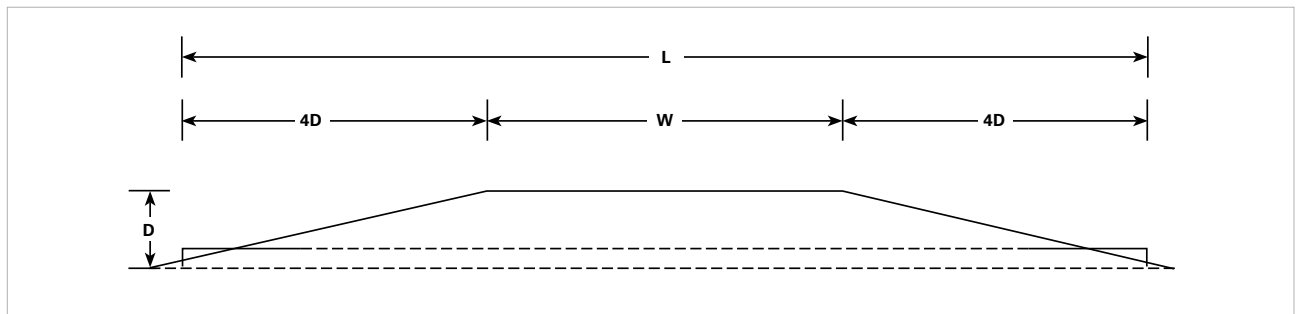
The Kiwisafer™ Culvert Ends ability to reduce the severity of crash impact is greatly dependent on the way it is installed, and it is crucial that it be installed correctly.

Please carefully read and understand the following installation instructions before installing Kiwisafer™ Culvert Ends.

- Requirements for the installation of buried flexible pipelines are given in AS/NZS 2566.2:2002.
- Refer to the CivilBoss Installation details (D3.1 CivilBoss Twin Wall Polypropelene Pipe) if extending the length of the Kiwisafer™.

### New or Retrofit installation:

1. Check the size and material of the new or existing culvert pipe.
2. Select the components required from Tables 1 to 3.
3. Measure the length of the invert to ensure a minimum 4:1 slope is constructed as per Figs. 1 and 2. If the standard Kiwisafer™ is not long enough, you may need to arrange additional concrete or CivilBoss pipes to suit.
4. Make sure that the Top Plane (*above the brow*) is in the 12 o'clock position (*see Fig. 1 Point A*). The top failure plane is generally located on the longitudinal strip on the culvert safety end.
5. The Culvert End slope should be graded to 4:1 (*horizontal/vertical*) or flatter. The 4:1 slope can be constructed through grading a sloping surface that runs from the Kiwisafer™ end invert through the end of the side failure plane to the edge of the driveway or road. (*See Fig. 1*).
6. It is important to ensure that all material that could interfere with the deflection of the Side Planes be cleared away.
7. The required installation length of culvert including culvert safety ends is shown in Fig. 3. The installation length of culvert required will be the overall length less the length of the Kiwisafer™ culvert safety ends. (*See Table 1*)
8. The Kiwisafer™ Culvert End is stocked in standard lengths (*See Table 1*) but can be manufactured in longer lengths of CivilBoss as a special order.



**FIG. 2** Required length of culvert for installation

**The overall length may be determined by:**

$$L = W + [ N \times (4 \times D) ]$$

**Where:**

L = length of culvert including two safety ends in metres

W = width of road or driveway, shoulder edge to shoulder edge in metres

N = number of safety ends, generally there are two ends per installation

D = vertical depth of culvert in metres, from invert to road surface



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