

technical memorandum

Installation & maintenance of M19 3-Bolt Shear Base lighting columns

TM-2007

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Purpose

To advise on the required practice for installation and maintenance of M19 3-Bolt Shear Base lighting columns to ensure safe operation.

Background

Shear base (or slip base) lighting columns are an acknowledged passively safe (or frangible) system for lighting column support and an effective way to reduce the risk of severe injury to vehicle occupants. When impacted, the column almost instantaneously fails and detaches at the base, allowing the vehicle to pass by with a low loss of speed. Lighting columns will normally fall back over the impacting vehicle, falling approximately in the original position, as shown in Figure 1 below.

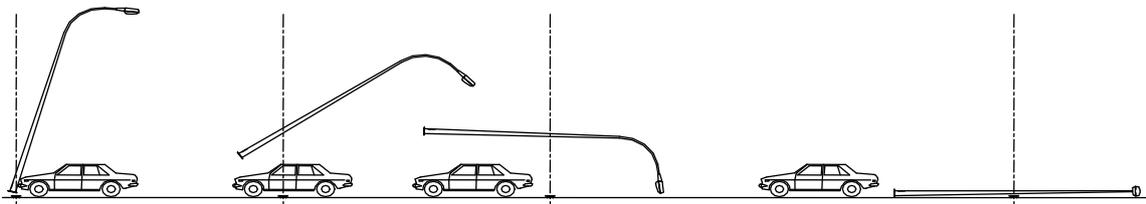


Figure 1 Shear base column behaviour in an impact

The M19 3-Bolt Shear Base lighting column is a commonly installed public domain system originally accepted for installation on state highways under Transit NZ Specification M19, hence the name.

To ensure that any shear base system performs in the designed manner when impacted by an errant vehicle, it is crucial that the system is installed correctly, particularly in regard to ground stub height and bolt torque (refer Figure 2 and “Required Installation Practice” overleaf).

Incorrect installation or maintenance practices can create a hazard with the risk of the errant vehicle snagging on the exposed sign support. This can cause rapid, uncontrolled deceleration leading to fatality or serious injury.

Manufacturers of M19 3-Bolt shear base lighting columns accepted for installation on the State highway network are listed in Appendix A of NZ Transport Agency Specification M26. An exploded view of a typical M19 3-Bolt shear base system is shown in Figure 5 overleaf.

Required Installation Practice

Alignment of the shear base flange to the traffic flow should be as per diagram 2 below, with the ground stub corrected levelled relative to the surrounding ground as shown in Figure 3 below. Ensure that the flange is level.

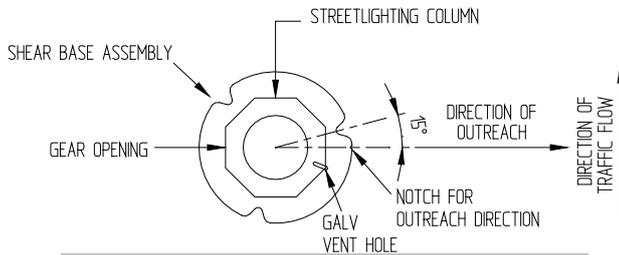


Figure 2 Correctly orientation of shear base relative to traffic

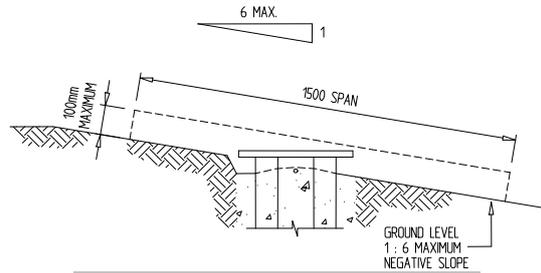


Figure 3 Maximum height of ground stub

The ground stub should be backfilled with concrete to the outside ground level using 17.5 MPa concrete. To delay corrosion concrete can be put on the inside of the ground stub. However, if concrete is placed inside the ground stub, it is very important that the level should be just below the drainage holes near the top of the stub, with the top moulded to aid in water drainage. This prevents water from permanently sitting inside the stub, leading to accelerated corrosion – see Figure 4 below.

Ensure that the top face of the flange is cleaned of any concrete following pouring.

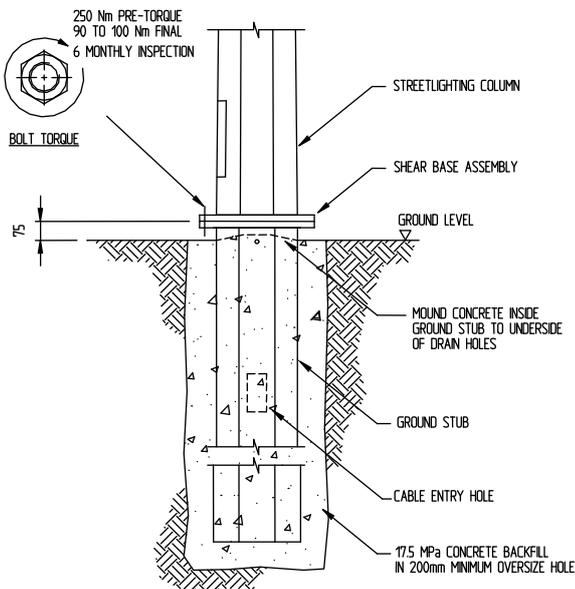


Figure 4 Typical cross-section of M19 3-Bolt shear base system

Position the tab washers on the lower flange and ensure that the tabs are correctly engaged inside the inner edge of the flange. This is critical to the functioning system.

Position the pre-assembled pole over the ground stub flange, ensuring that the tab washers are not knocked out of alignment.

Terrain in the vicinity of the shear base ground stub must be graded to allow a vehicle to pass over the stub without interference, and also to avoid the vehicle becoming airborne prior to impacting the column. Generally a negative slope of 1:6 should not be exceeded. The ground stub should not protrude more than 75mm on

horizontal ground conditions or 100mm above the ground line over a horizontal span of 1.5m – see Figures 3 and 4 above.

The M24 x 110mm bolts must be greased with a suitable lubricant before torquing. Acceptable lubricants include Loctite™ Heavy Duty Anti-seize, Loctite™ Silver Grade Anti-seize, and Holts Lube. All parts of the thread are must be coated with lubricant (For easy installation insert the bolts so that the nuts are facing upwards, refer Figure 4).

The M24 x 110mm bolts are to be tightened to 250Nm minimum torque, then slackened off and re-torqued to between 90Nm and 100Nm immediately or, at the very least, before the road is opened. If the bolts are left tighter than 90Nm to 100Nm, the shear base will not perform as required in the event of being struck. Correct alignment of all components should be checked at this stage. Use of locknuts is permitted.

The shear base connection must be inspected every 6 months, or after significant weather events (severe wind speeds). Each bolt is to be removed, checked for condition (fatigue cracking, corrosion etc.) and then re-installed as per the above assembly notes. If there is any sign of fatigue damage to the bolt, the bolt must be replaced. Adequate column support must be provided or baseplate clamps used during the inspection process.

Endorsed by: National Manager Traffic & Safety

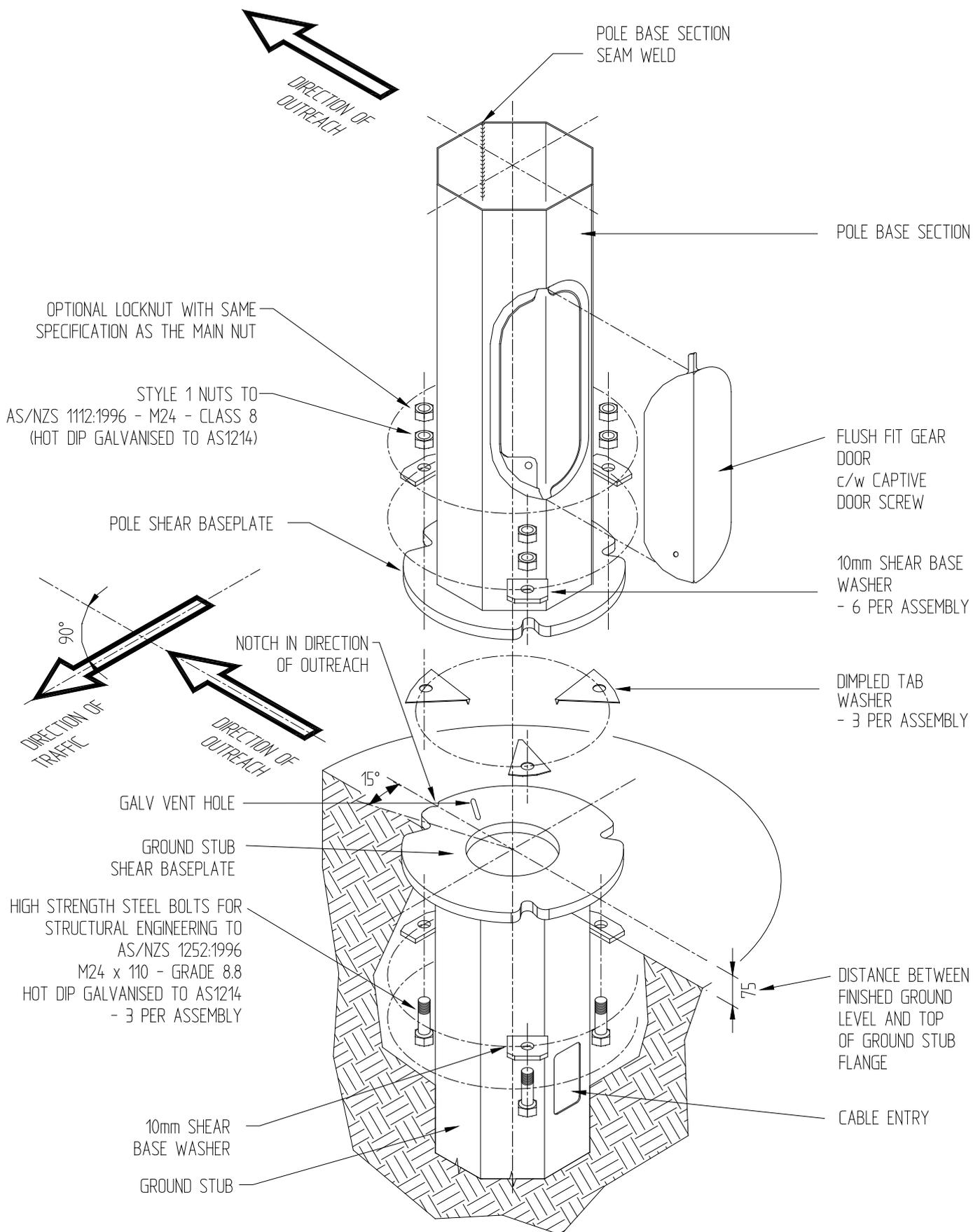


Figure 5 Exploded view of typical shear base column components

(All diagrams reproduced with permission)