False Impressions: Steel Guardrails and Safety

By Julian Chisnall and Rob. Merrifield
Low Volume Roads Workshop
Nelson
18-20 July, 2007
Key Findings of 2006 Survey:

- High incidence of critical defects.
- Acceptance and maintenance inspections not noticing defects.
- Lack of specialist expertise at all levels.
- Lack of funding.
A well built energy absorbing terminal (ET2000).
When it all works ...
When it doesn’t work ...
When it might work, if you are lucky ...
(The last car to crash missed it entirely.)
Designs may not meet Transit’s requirements but are fit for their purpose where they are.
Terminals need not be expensive

*Buried-in-Backslope Anchor*

Cost-effective, low maintenance, and sadly under-used by designers.
The Basic Layout

*Where is protection needed?*

The **Length of Need** must protect the hazard fully.

Refer Transit State Highway Geometric Design Manual, Fig 7.4, pg 7-6
Is the Length of Need fully protected?

*Clearly not!*

*Terminal is located here.*
Grading around terminals

**PREFERRED GRADING**

**ALTERNATIVE GRADING**

*The preferred grading layout should be used wherever practical. However, because of site limitations, when upgrading an existing terminal with a crashworthy terminal meeting NCHRP Report 350 criteria, the alternative grading layout may be used.*

Not to Scale

**FIGURE 8.2 Grading for non-flared guardrail end treatment**
Think About Why

Check the grading behind the terminal
Think About Why

Barriers are for protection, so install them in the right place, in the right way.
Check for Conflicts
This is a remarkably common sight!
Think about both ends of guardrails

*Only the terminal at the far end is anchored.*

*How is the rail going to develop any tension?*
A quick summary, so far:

- 40% of the defects found in last year’s survey can all be fixed easily and quickly.

- Half of these are critical to the effective performance of installations.

- What is to be done with other, costlier to fix defects?
Critical defects that are easy to fix:
*Anchor cables are slack and scour damage.*
Critical defects that are easy to fix:
Washers on the traffic face of the rail – remove them!!
Critical defects that are easy to fix:
Watch for “Terminal-specific” parts.
Critical defects that are easy to fix:
*Locking bar not fully turned and locked.*
Critical defects that are easy to fix:
*No post bolts at post #1*
Critical defects that are easy to fix:
*Loose splice bolts at lap joints*
Critical defects that are easy to fix:

*Rust should never get this bad*
Another very common defect that is easy to fix:
*Posts not properly backfilled and ground compacted.*
What is wrong in design:
2 fatalities at this site
What is wrong in design:
Did anyone ask if the gate (behind 4WD) could be moved?
Maintenance:

Guardrails and terminals are structures.

Manage, inspect systematically, and maintain as for bridges and other structures.

Use trained staff.

Use checksheets for terminals and guardrails as provided by manufacturers.

Manufacturers run training courses – just ask.
What is bad?

- High incidence of critical deficiencies and defects.
- Maintenance inspections are not noticing deficiencies.
What is good?
What some authorities are doing...

- Risk analysis during evaluation of options.
- Prioritisation of remedial work.
- Formal policies for design, approvals and acceptance.
Key Deficiencies

**Problem**
- Lack of specialist expertise at all levels
- Lack of funding (Minor Works funds are under very great pressure for new works)

**Possible Solutions**
- Provide training.
- Need for systems.
- Do as much remedial work as possible using Traffic Services allocations.
What we should not be building:
No run-off area, far too low relative to traffic lanes, and many design & assembly errors.
Contact us:
Julian Chisnall
julian.chisnall@landtransport.govt.nz

Or

Rob. Merrifield
rob.merrifield@landtransport.govt.nz