



EARTHWORKS

Narrow Verges - Falls Down Embankment Slopes

0600.002

Issues

Creating more traffic capacity by adding running lanes without acquiring additional land restricts the space available for earthworks, drainage, verge infrastructure etc.

Typical design solutions are the steepening of earthworks slopes and/or a reduction in verge or berm widths.

These design features may compromise safety.



Mitigation

Design

Ideally the solution would be to obtain additional land by agreement, avoiding the need for statutory orders that can significantly delay scheme implementation. Frequently this will not be feasible because of the adjacent land use and occupation. Another possibility is to consider some element of terracing using localised vertical retention of the earthworks in order to allow for verge provision. However, this can potentially result in a greater fall risk at the vertical edge, requiring further prevention measures.

Construction

Once construction is underway the options become greatly reduced. Modularised ERA components could include full edge protection pre-installed. Alternatively, a length of vertical retention could be constructed as described above for Design.

Maintenance / Operations

In the case study opposite it became apparent that the open nature of the fence to protect pedestrians left a residual risk of people climbing through.



The solution at that stage was to add mesh infill to the fencing and add warning signs to highlight the hazard, particularly in hours of darkness.

LINKS

<https://www.hse.gov.uk/construction/safetytopics/falls.htm>

Case Study

On a Smart Motorway project the most critical locations are frequently around Emergency Refuge Areas. The example in these photographs shows how despite the embankment being steepened there has been negligible residual width in which to install the vehicle restraint system and the protective fence for pedestrians at the slope edge.



Examples of Significant Risks

Activity or Incident	Risk	Persons Affected	Likelihood / Severity
Emergency breakdowns	Fall from height at ERA	Road users	L: Medium S: High
Access for inspection and maintenance	Fall from height at ERA	O&M personnel	L: Low S: High
Access for inspection and maintenance	Struck by vehicle whilst accessing equipment in verge	O&M personnel	L: Medium S: Very High



Please submit any feedback, examples of similar issues, or best practice to:
Chair of the PDWG Whole Life Design Task Group Andrew.Finch@Jacobs.com

LEAN	Material Reduction	Alternative Materials	Reduced Plant	Alternative Plant	Reduced Labour	Reduced Land	Reduced Transportation	Improved end user benefits	Reduced Activity Duration	Reduced Defects	Reduced Reportable Accidents
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