Carriageway, Shoulder and Verge Gradient

Road · https://mes100.com/docs/road-carriageway-shoulder-verge-gradient/

A road cross section in MiTS is built from road width elements on each side of the centreline: carriageway lanes, shoulder, verge, and optionally kerbs, drain reserves, a median and custom elements. Each element takes its cross slope from a different place. The carriageway and shoulder follow the superelevation along the road, while a verge keeps one fixed slope of its own. In this article we will go through where each gradient is set in MiTS 3 and later, and how the shoulder behaves on a curve.

This replaces the MiTS 2 arrangement, where the verge slope was a project parameter and could be calculated cumulatively from the shoulder slope. That option was removed in MiTS 3 (see Breaking Changes in MiTS 3): every verge now has its own cross slope, independent of the shoulder.

All cross slopes are entered in percent. The tooltips in MiTS describe the sign: a negative value means the slope points down.

Carriageway

The carriageway slope is the superelevation. Go to **Input > Super-elevation > Spread Input**:

- On a **Line** row (a straight), **Cross slope Rate, %** sets the normal crossfall, with separate **LHS** and **RHS** columns.
- On a **Curve** row, **Superelevation Rate, %** is determined by the superelevation table chosen in the parameters or the RHS property grid (6%, 8% or 10%). **Proposed Superelevation Rate, %** lets you override it for that curve.

Between a straight and a curve, MiTS develops the slope from the normal crossfall to the full superelevation over the transition.

A new horizontal alignment takes its normal crossfall from the Carriageway row of **Options > Project Settings > Road > Design > Road Width > BuiltIn Element Editor** (**Cross Slope, %**

column). Changing that default does not change roads already drawn; edit their Line rows instead.

Shoulder

Select the road width of the road and look at the **General** category of the RHS property grid:

- **Left Shoulder Cross Slope, %** and **Right Shoulder Cross Slope, %** set the normal shoulder slope for each side along the whole road.
- The **…** button beside each value opens a table of chainage sections, so a different shoulder slope can be applied between a start and an end chainage on that side. The slope changes to the section’s value at its start chainage and back to the normal slope at its end chainage.

New roads take the default from the Shoulder row of the BuiltIn Element Editor.

Shoulder on a curve

On a superelevated curve, the shoulder on each side reacts differently depending on whether it is on the high side (outside of the curve) or the low side (inside). Set this in **Options > Project Settings > Road > Design > Superelevation**:

Shoulder High side of Curve

- **Default Slope:** the shoulder keeps its own normal slope while the carriageway rotates. With **Use Max Rollover** on, MiTS limits the rollover, the algebraic difference between the carriageway slope and the shoulder slope, to **Maximum Rollover, %**: once the superelevation exceeds the shoulder slope by more than that amount, the shoulder rotates with the carriageway and keeps exactly that difference.
- **Follow Carriageway:** the shoulder takes the same slope as the carriageway through the curve.

Shoulder Low side of Curve

The low-side shoulder matters once the carriageway falls more steeply than the shoulder; otherwise the shoulder keeps its normal slope whichever option is chosen.

- **Default Slope:** the shoulder keeps its own normal slope, even when the carriageway is steeper, leaving a breakover at the edge of the carriageway.

- **Follow Carriageway:** the shoulder rotates together with the carriageway over the whole transition.
- **Breakover Removal:** the shoulder keeps its normal slope until the carriageway becomes as steep as the shoulder, then rotates with the carriageway. The shoulder is never flatter than the carriageway, so there is no breakover.

Verge, kerb, drain reserve and custom elements

A verge has a fixed cross slope of its own. It does not follow the superelevation or the shoulder. Select the verge and set **Cross Slope, %** under **Road Width** in the RHS property grid. Each verge can be set separately, so the left and right verges can have different slopes.

Custom road width elements work the same way. Kerbs and drain reserves are always flat (0%).

When a new verge or custom element is added, it takes its slope from the matching row of the **BuiltIn Element Editor** or the **Custom Element Editor** under **Options > Project Settings > Road > Design > Road Width**. Changing those defaults affects elements added afterwards; existing elements keep the slope they already have.

Median

A median is either **Flat** or set to **Follow Super Elevation**, which gives it the carriageway superelevation rate. Choose with **Median Gradient Option** in **Options > Project Settings > Road > Design > Superelevation**.

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