T3RRA

Drain Design

October 2026

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Drain Design

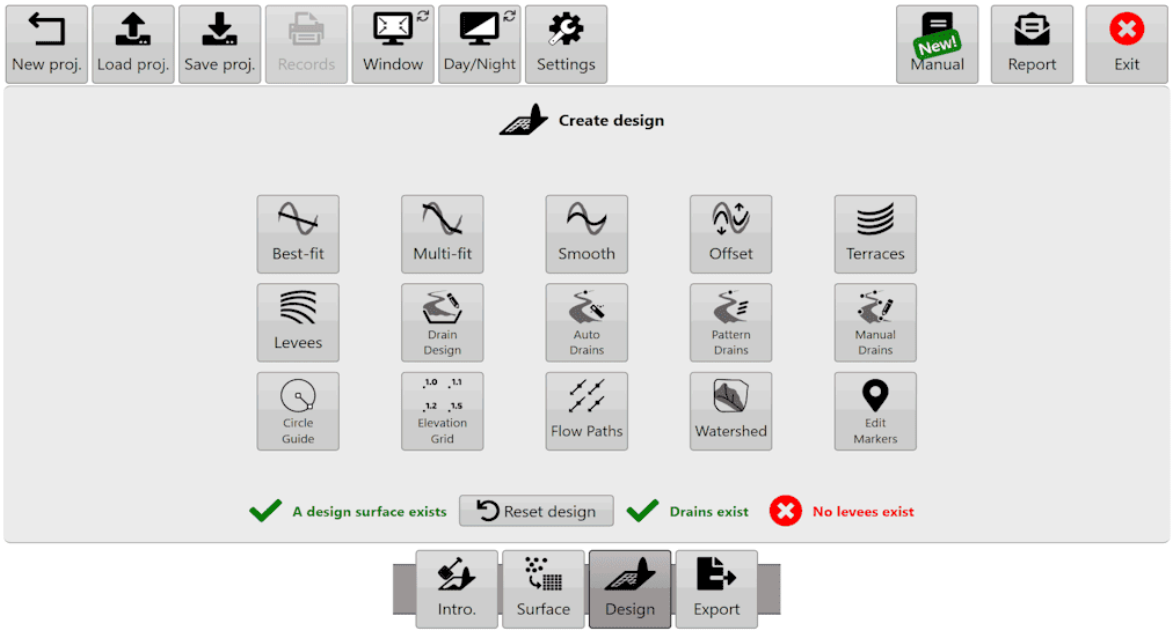


Prepare the drain paths

Create drain paths in any of these ways:

- Survey paths in the **Collection** wizard step.
- Import paths.
- Use the Auto drains tool.
- Use the Pattern drains tool.

Drain Design lets you choose the slope profile and cross section before "burning" (embedding) drains into the map for implementation.

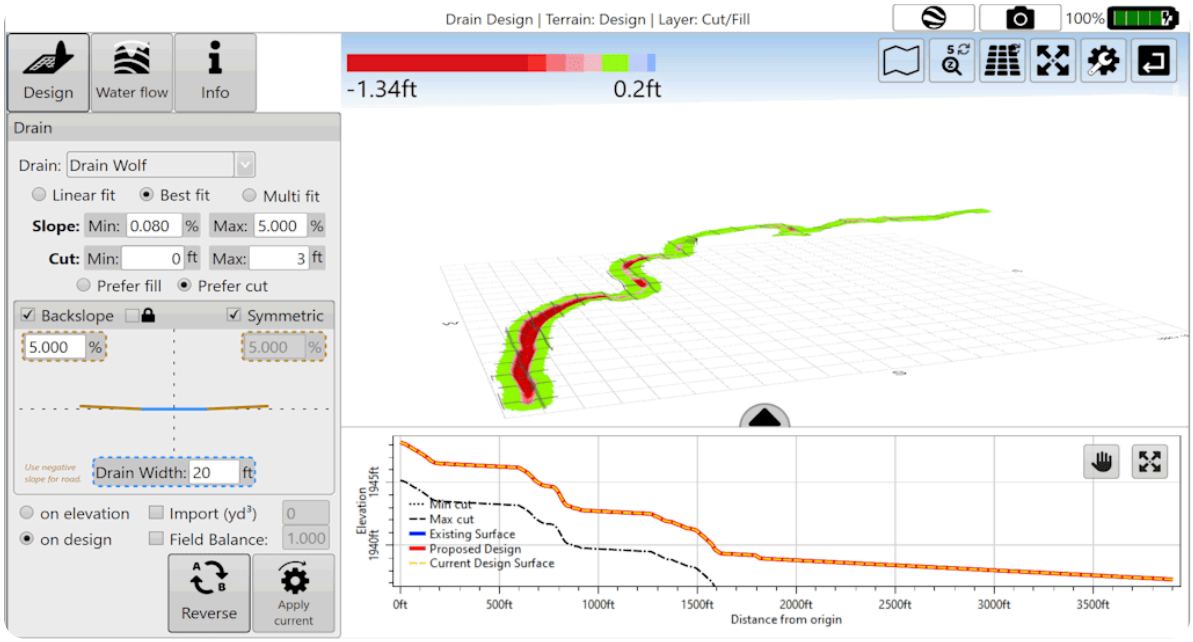


Create design wizard screen.

> **Note:** When both a surface and a drain exist, design the surface first, then the drain. To edit drain elevation data, return to the **Collect** wizard step and edit the drain line. Doing so loses the current project designs.

Select a drain to display its depth/elevation profile in the bottom-right plot; you may need to drag the chart up into view. Use **AB Reverse** so the drain falls from left to right in the profile chart. This makes the slope values positive and adjustments easier.

A negative backslope inverts the drain design, turning a drain path into a road.



Drain design pane and profile.

> **Note:** Positioning and laying out drain paths is not part of **Drain Design**. Adjust driven drains in the surfacing step, or adjust paths in auto drains/pattern drains.

Choose a fit mode

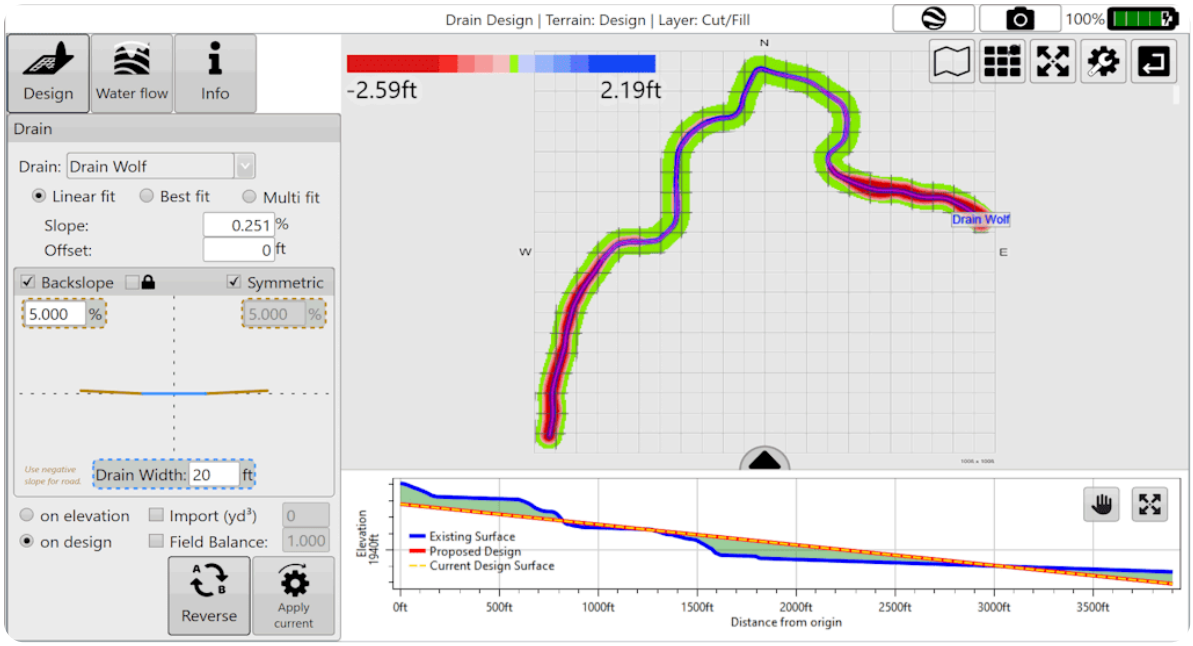
The three modes for applying drain designs and adjusting the drain path are **Linear fit**, **Best fit** and **Multi fit**.

Linear fit

Linear fit creates one straight plane along the drain path.

Slope sets the installation gradient so water flows in the intended direction.

Offset moves the drain vertically. A positive value raises it, producing fill along the entire drain. A negative value lowers the design height, producing a deeper cut drain.



Linear fit.

Best fit

Best fit adjusts the slope to try to follow the field's natural curve, similarly to multi-fit field design. The source also states: "Cutta Ditch".

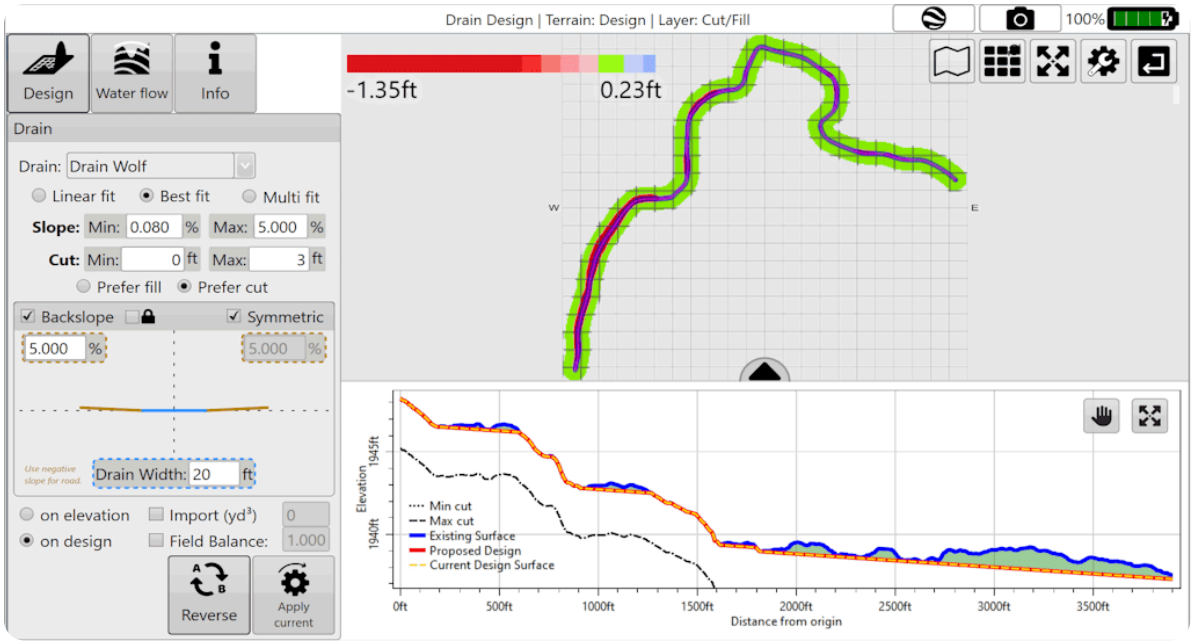
> ⓘ **Note:** Best-fit in drains is equivalent to Multi-fit in full field design. The naming incongruity comes from an attempt to match the John Deere SWP+ naming conventions. SWP+ is superseded by T3RRA Cutta and T3RRA Ditch.

Min. Slope is the lowest acceptable drain slope gradient.

Max. Slope is the highest acceptable drain slope gradient.

Min. Cut ensures that the design consistently cuts at least the specified amount.

Max. Cut limits the depth of the design cut so it never exceeds the specified maximum.



Best fit.

Multi fit

Multi fit uses both cut and fill to remove problem points of erosion and build-up. It is best suited to maintaining existing drains.

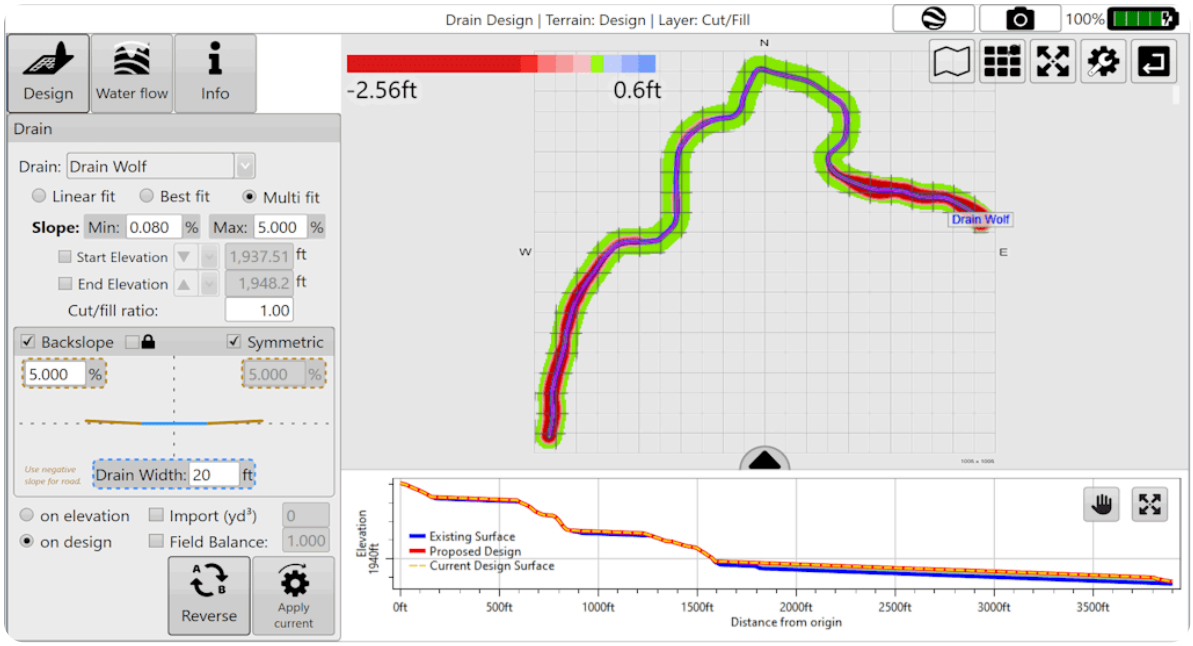
Min. Slope sets the minimum allowable slope gradient.

Max. Slope sets the maximum allowable slope gradient.

Start Elevation is the desired elevation at the beginning of the design (point A). Set it to be greater than, equal to, or less than the set value. The source describes this as adjusting the start elevation to be “no higher or lower than the set value”.

End Elevation is the desired elevation at the final design point (point B). Set it to be greater than, equal to, or less than the set value. The source describes this as ensuring the final elevation is “not higher or lower than the set value”.

> ⓘ **Note:** Multi fit tries to balance cuts and fills using the start and end elevations. If the design parameters cannot work, the message is “Model is too constrained”.

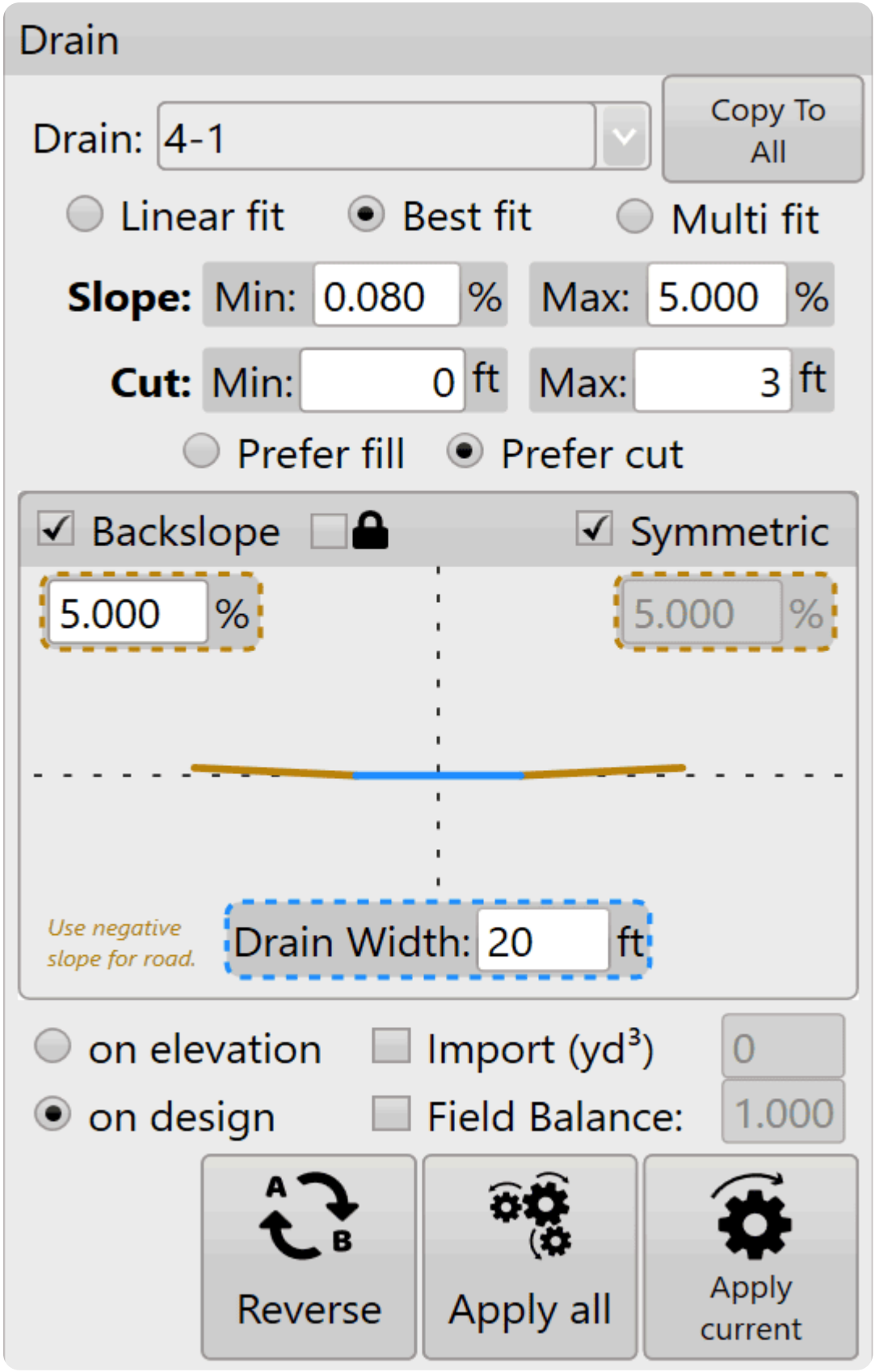


Multi fit.

General settings

The general settings are available in all drain design modes.

For the definition of **Cut/Fill ratio**, refer to the appendix. The following settings and buttons are the same in all three Drain Design modes.



Settings shared by all three modes.

Copy To All copies the selected drain's settings to every other drain in the project. Use it to save time when drains need similar parameters.

Backslope (batter) is the gradient of the drain walls. Higher values produce a sharper drop into the drain. Leave the **Backslope** box unchecked if no backslope is wanted. Enter a negative value to make a road.

Symmetric mirrors the batter design when checked. When unchecked, the batter slope on each side can be adjusted independently.

Lock Backslope is mainly intended for drain lines, not full surfaces. It ignores the surface and creates backslopes to their maximum extent. The drain bottom is always burnt in regardless of surface elevation: for example, offsetting a drain up 5m still burns in a drain bottom whether Lock Backslope is on or off.

Drain Width sets the width of the drain bottom, which is always horizontal. For a defined non-zero bottom cross slope, manually set the implement's cross slope control during the **Implementation** stage.

Cut/fill ratio compensates for soil compaction characteristics.

Apply All applies every drain in the field, rather than only the selected drain.

Choose **on elevation** or **on design** to select the elevation profile used to calculate the designed surface. For example, if one drain needs a different design, first apply the design **on elevation** to All. Then select that drain from the drop down and apply its different design **on design** to that drain alone.

> ⓘ **Note:** Designing on a design continues to lower the drain surface.

Reverse reverses the profile display and the drain direction used for calculations. This affects the design because the software always tries to slope the design from left to right. It is useful when a drain was surveyed from low to high elevation.

Press **Apply All** (three cogs) to apply all drains at once.

Press **Apply** (one cog) to apply only the selected drain.

After editing drains in the surveying step, return to the **Design** wizard step to create a new drain design. If both a surface and a drain exist, design the surface first, then the drain.

Implement or export

Designing and applying a drain embeds (“burns”) it into the field surface model. You can then implement it like a normal field design. With a constant-depth drain cutting implement, you may only need the paths for guidance, not the depth profile or elevation control. In that case, you need not create a drain profile unless you want to examine the drains' effects in the rainfall simulation.

Optionally, use the wizard screen's Export button to export drain paths as an RCD folder structure (JD Guidance lines). Exported ditch track guidance lines can steer the tractor along the correct path to remove wet areas accurately and efficiently; John Deere AutoTrac™ is required.

Watch the video on Drain Design Tools.