Get going with graders

This section explains how to set up and use Trimble Earthworks on a grader.

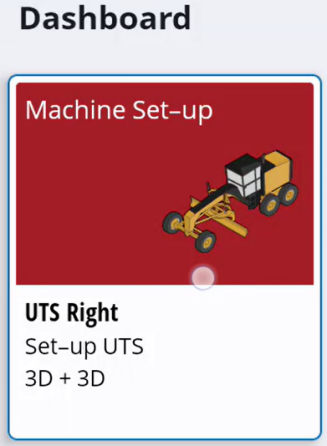
Watch an expert operator use Trimble Earthworks or check out the step-by-step instructions.

Set up a UTS

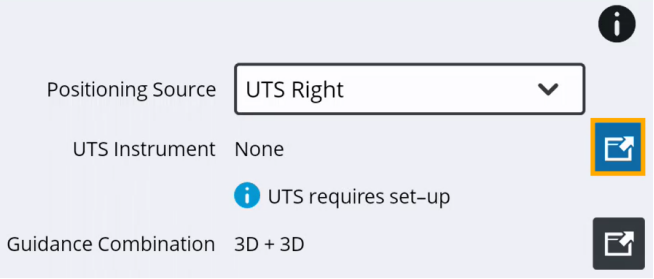
To grade with a high level of precision you need to connect a Universal Total Station (UTS) to the Trimble MT900 machine target on your machine. This will give you 3D guidance.

Step by step

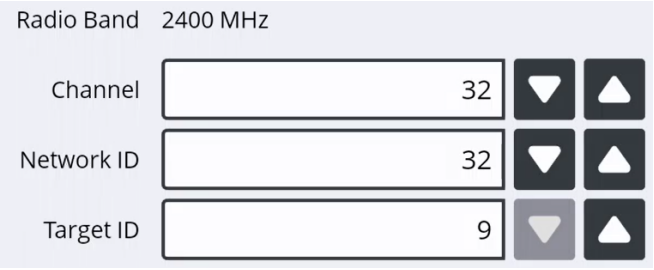
1. Tap the **Machine Set-up** tile on the Dashboard.



2. To set up the UTS, tap the new window icon for **UTS Instrument**.

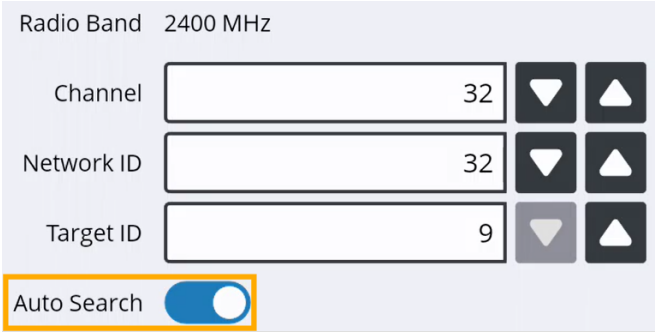


3. Specify your channel and Network ID.



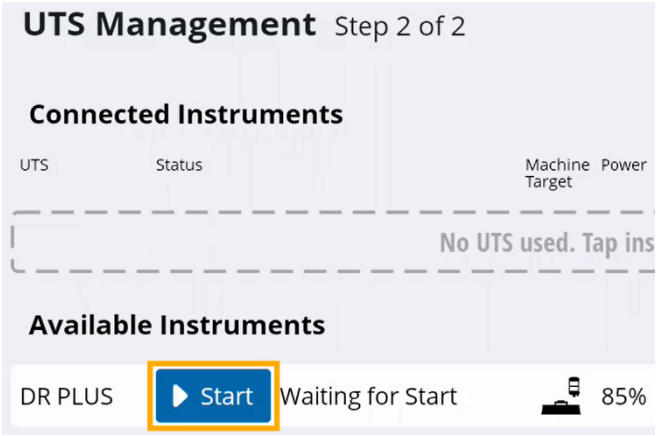
NOTE – The data in these fields needs to match what your UTS is set to.

4. To have the UTS and target automatically reconnect if they lose touch, switch on **Auto Search**.

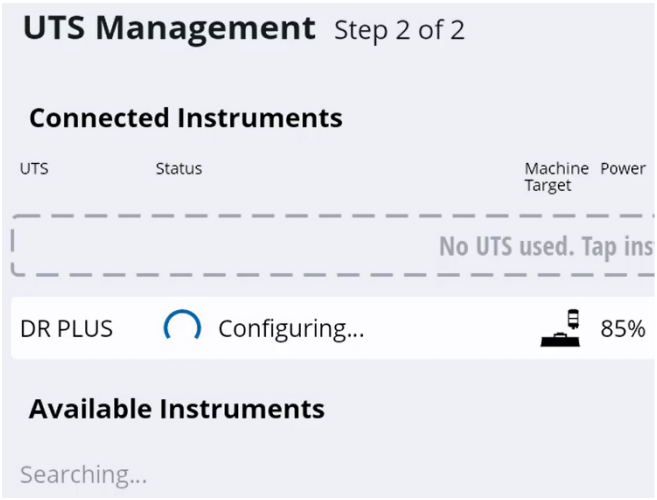


5. When you've specified your channels, tap **Next**.
6. Tap **Done**.
7. Under Available Instruments, tap **Start** beside the UTS you want to connect to.

NOTE – There might be more than one UTS on the site.

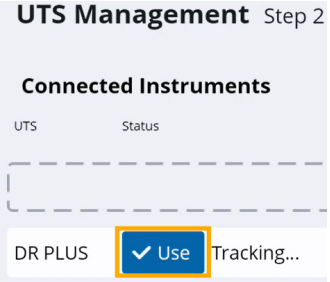


8. Wait for the UTS to connect to the Trimble MT900 machine target.



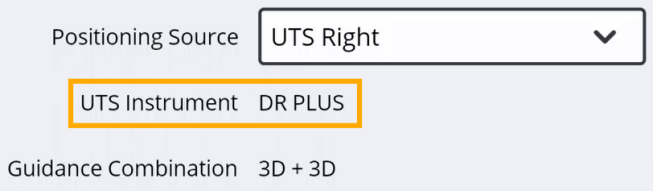
NOTE – When the UTS has connected it will say 'tracking'. This means the total station is tracking the target and it's available to use.

9. To confirm this is the UTS you want to use, tap **Use**.



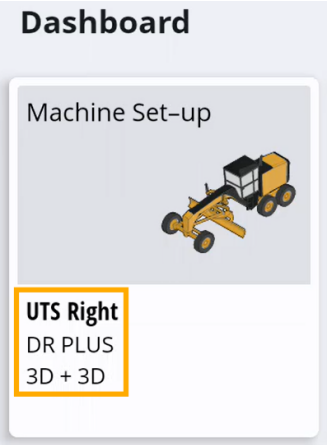
10. To go back to the Machine Setup screen, tap **Done**.

NOTE – You'll see which UTS you've selected in the UTS Instrument field.



11. To go back to the Dashboard, tap **Apply**.

NOTE – You'll see which UTS you've specified on the Machine Setup tile.



12. When you're ready to start grading, tap **Start**.

Bench the blade and UTS

Before you start grading for the day it's a good idea to bench the blade of your machine and a Universal Total Station (UTS) against a known elevation. This will give you confidence that everything is set up well before you start work and it will help you avoid rework.

Step by step

1. Spray-paint the exact elevation of a point on your site.

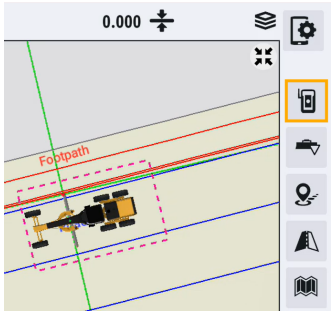
   > **NOTE –** You'll need to use this as a reference to bench your blade. Make sure you mark the actual elevation not the elevation of your design. You'll need to use a high precision instrument like a UTS. A GPS isn't accurate enough.

2. Drive your machine smoothly to the benchmark, keeping the blade as still as possible.
3. Put the blade tip on the mark.

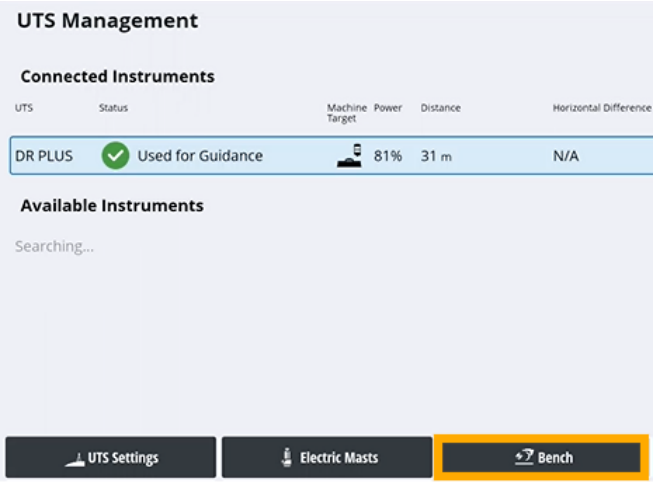
   > **NOTE –** This should be whichever side of the blade the mast is on.

> **TIP –** If your blade tip is worn, put the blade down a bit further in from the edge.

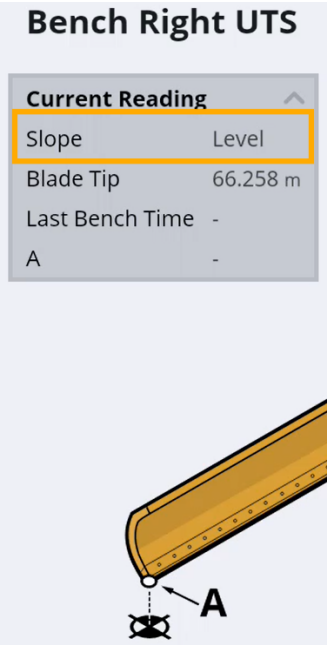
4. Tap the UTS icon.



5. Tap **Bench**.

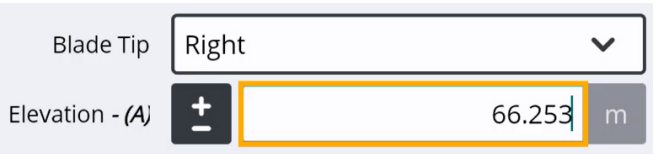


6. Get your blade slope as close to level as possible.



7. In the **Blade Tip** field, specify which side of the blade you're benching.

8. In the **Elevation** field, enter the actual elevation.



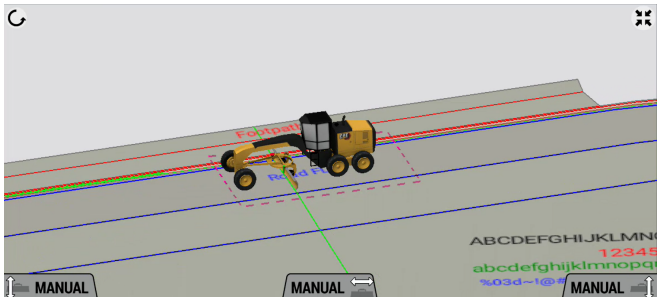
9. Tap **Bench**.
10. Tap **Done**.

Trimble Earthworks 2.23. Updated March 2026

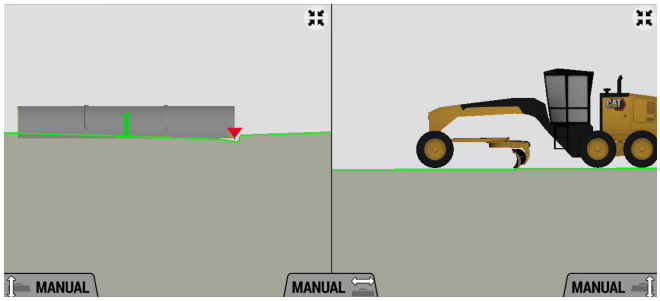
Set up your views

There are three sets of views in Trimble Earthworks:

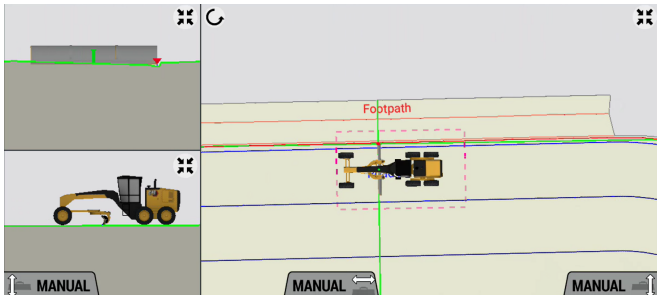
- One view



- Two view



- Three view

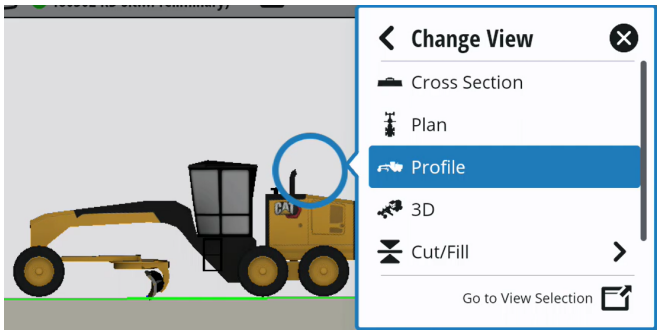


You can choose what you see in each view.

> **EXAMPLE –** You might want a Cross Section view on half the screen to check how close you are to grade. And you might like a Plan view on the other half to see how close you are to the lines you're working to.

Step by step

1. To choose what you see in a viewing pane, tap and hold anywhere inside the pane > Select **Change View** > Choose the view you want.

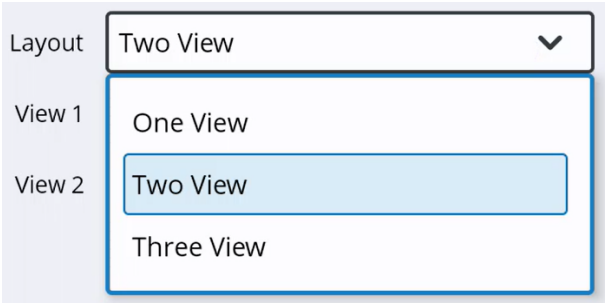


2. To choose what you see in each view set:

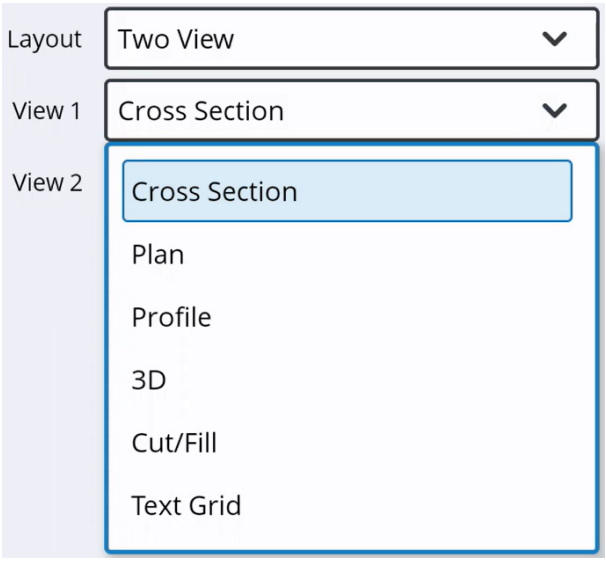
   a. Select the System Settings icon.

   b. Swipe down and tap **Layout**.

   c. Select **One View**, **Two View**, or **Three View**.



   d. Specify what you want to see in each view.



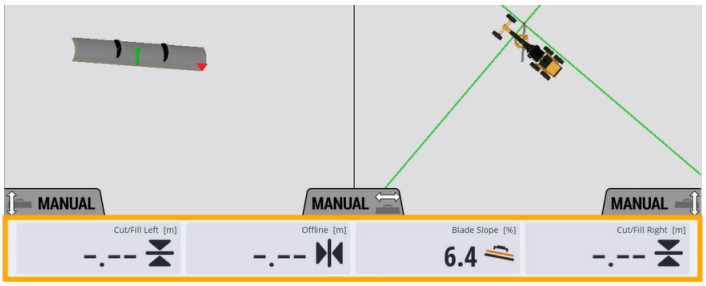
   e. Tap **Apply**.

3. Use one finger to move an image around within a viewing pane.

4. Use two fingers to swipe between the sets of views.

Set up the Text Ribbon

The Text Ribbon is a strip of options at the bottom of the Trimble Earthworks screen.



You can set it up to suit the way you work. This includes:

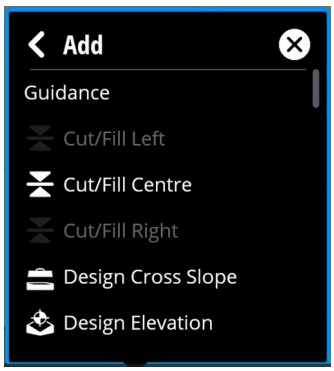
- adding your favorite options
- hiding the options you don't use often
- arranging your options in a way that works for you

> **EXAMPLE –** You might want the Blade Slope and Offline options in the middle of the ribbon and the Cut/Fill left and right options on either side.

Step by step

1. To set up your Text Ribbon, tap and hold anywhere on it.

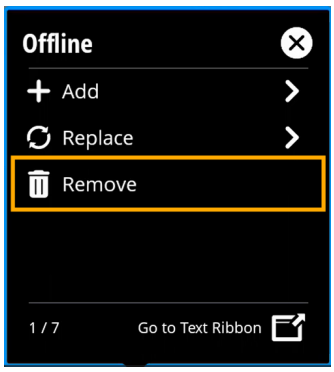
2. To select the options you want to see on the ribbon, tap **Add**.



> **NOTE –** An option will be greyed out if it's already showing on the ribbon.

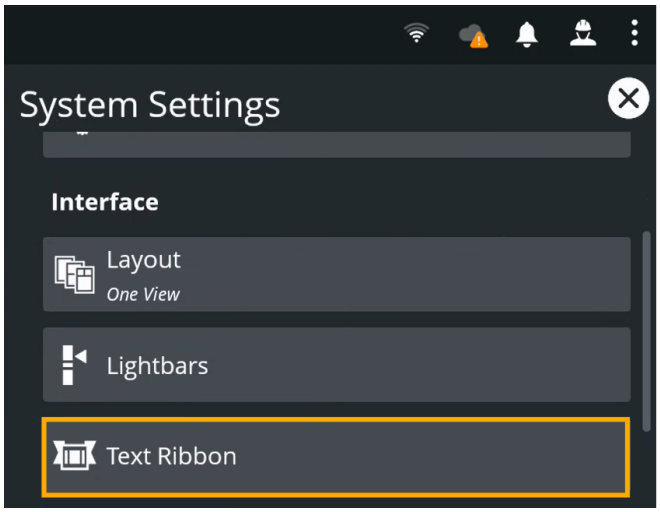
TIP – Swipe the ribbon left to see all the options that are set to show.

3. To hide any options you don't want to see, tap **Remove**.



4. Once you've chosen the options you want to see on the ribbon, drag and drop them into an order that works for you.

NOTE – You can also set up the Text Ribbon by tapping System Settings icon > **Text Ribbon** > **Edit**.



Machine setup tips

You can set your machine up however you like. But for the passes that matter—like when you're doing the final trim for a road—here are some key tips to achieve grade and avoid rework. These will give you the best results and reduce the number of passes you need to make.

Step by step

1. Center the A-frame of the machine and make sure the lift RAMs / hydraulic cylinders are vertical.

   NOTE – This mimics the position the machine was commissioned in, so it will be most accurate like this.

2. For the passes that matter, make sure the mast is at a 90° angle to the machine. This applies whether you're going uphill or downhill.

   TIP – Imagine there's a line between the center of your wheels. Make sure you keep the mast at a 90° angle to that.

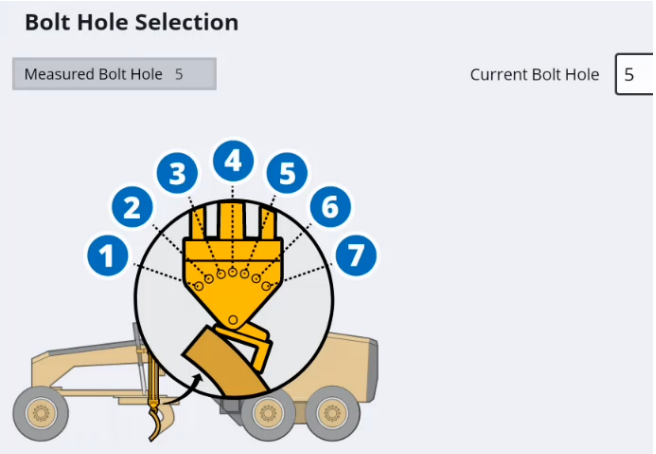
3. Have your mast / 3D tip as your leading edge.

   NOTE – You can have this as your non-leading edge, but for the passes that matter, this is where the system gets its information. So you don't want it working backwards.

4. If you adjust the bolt hole, make sure you update this in the Bolt Hole Selection screen:

   a. Tap the Work Settings icon.

   b. Tap Blade Manager.



   EXAMPLE – Instead of pitching your blade you can change the bolt hole to keep the mast at a 90° angle to the machine.

5. Zero the articulation of the machine.
6. Do a system sense check:

a. Make sure Trimble Earthworks matches two known Cut/Fill points:

> **EXAMPLE –** If you set your blade on finished level, the Cut/Fill points in the middle of the road you're finishing might be 110 mm and 117 mm. You can use these points to see how far below finished design level you are.

b. Activate Autos on your machine.

c. Drive your machine to the known Cut/Fill points you've marked on the ground.

d. Hover your blade above these marks.

> **NOTE –** The blade will be at finished design level.

e. Use a tape measure to see whether the distance on either side of the blade matches the true source (the UTS benchmarks you marked out earlier).

Follow a design line

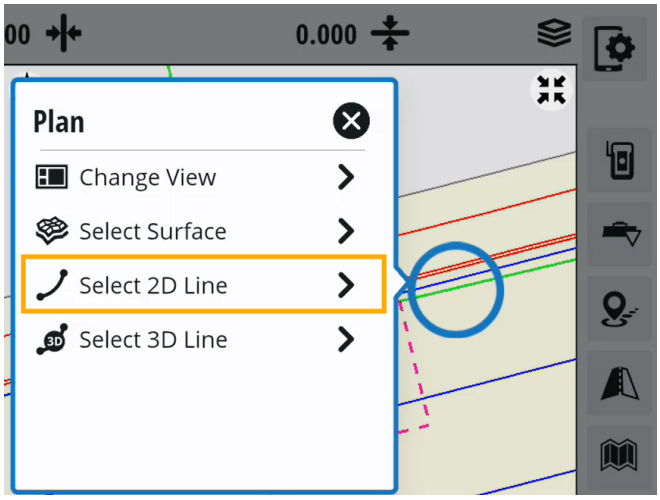
You can use Side Shift Autos to follow a line on a 3D design.

> **EXAMPLE –** You might want to follow a curb and channel line on a site.

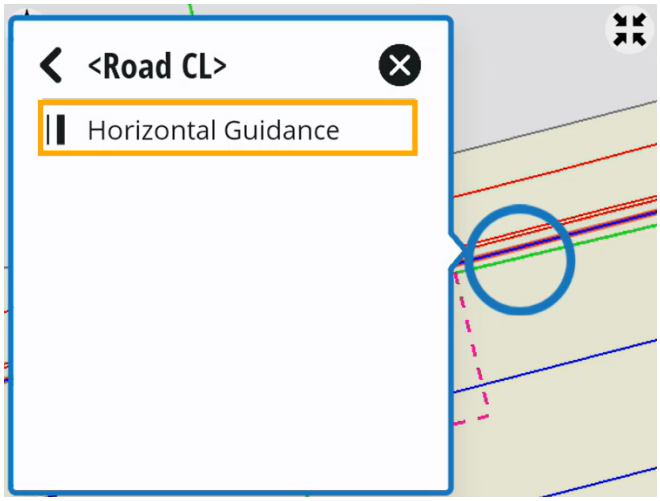
This feature useful for a range of tasks you'll need to do on a site. And it can help make sure you don't waste material, damage a curb, or do an overcut that's too wide.

Step by step

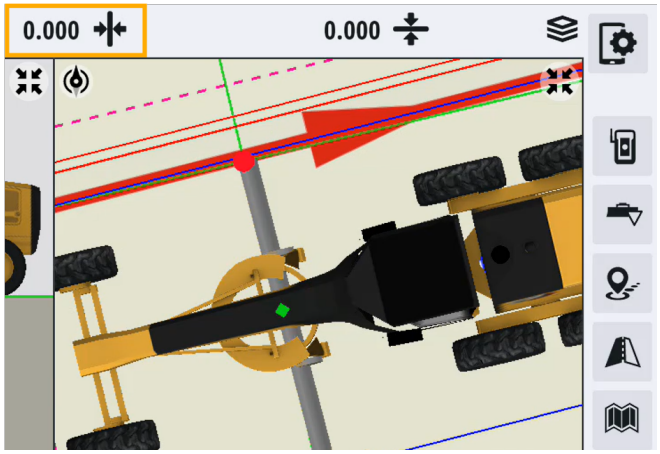
1. Tap and hold the line you want to follow > Tap **Select 2D line**.



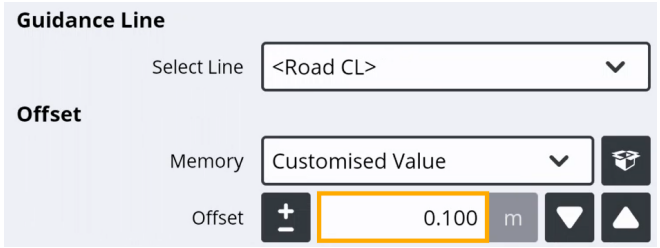
2. Tap **horizontal guidance**.



3. To shift left or right of the line, tap the horizontal offset icon.



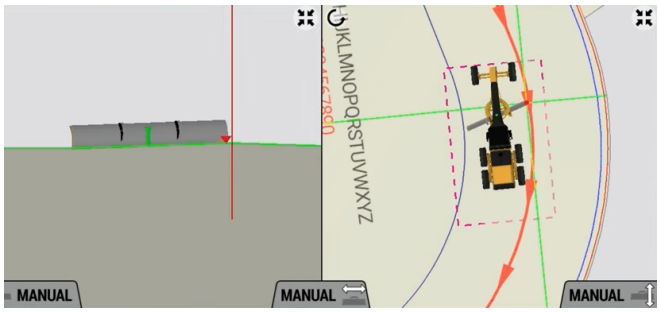
4. Enter an offset.



> **EXAMPLE –** If you're preparing the base for a curb and channel, you need to make sure you're wide enough for the curb machine, but not too wide or you'll waste material. You can use a negative offset of 300 mm to achieve this. And to make sure the machine doesn't damage the curb, you can apply a positive offset of 100 mm to the curb and channel line.

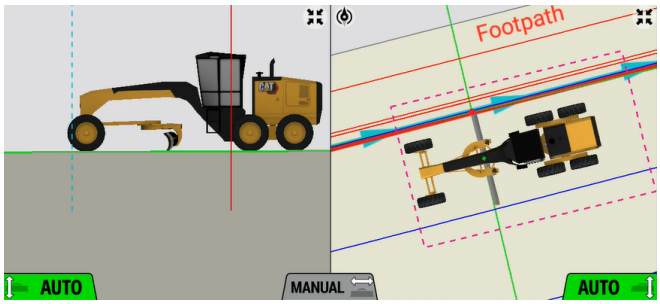
5. Tap **Apply**.

> **NOTE –** You'll see the line you selected highlighted in red in your viewing panes. This shows how far you are from the line you're working on.



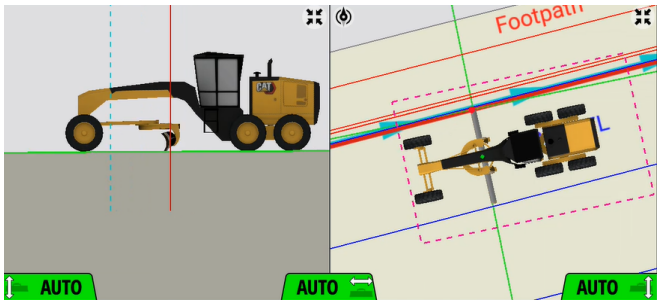
> **NOTE –** The arrows on the line face in the opposite direction of zero.

6. Engage at least one of your Depth Autos.

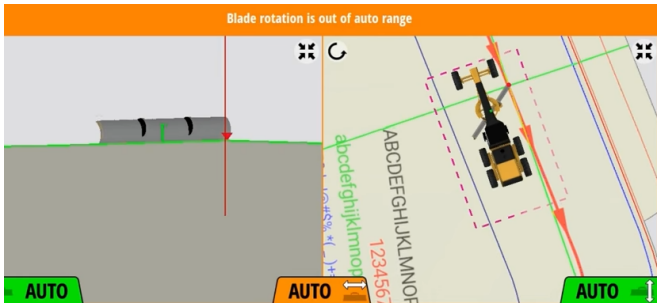


7. Engage Side Shift Autos.

NOTE – This saves you having to worry about steering the machine in a perfectly straight line.



NOTE – There's a blade rotation limit. If you go outside this, Side Shift Autos will disengage and you'll get a message to say the blade rotation is out of range.



TIP – Make sure you have the correct focus point on your blade.

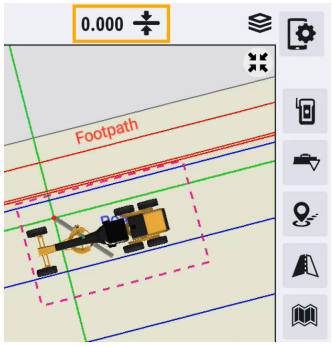
Manage compaction

When you're using a grader to build a layer on a road, the person preparing your data should give you a finished level for your design. You need to prepare the road surface for what goes under the finished layer. For this you'll use base course material (like crushed concrete).

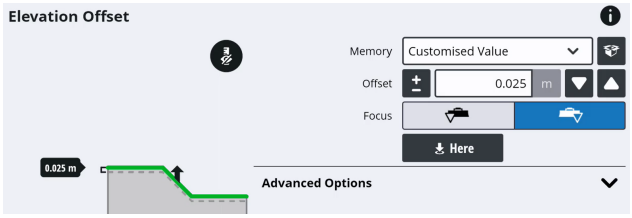
> **EXAMPLE –** You need to add a layer of base course and get it to finished level. If you're adding a 100 mm layer, you want your base course to be zero on your design when you're finished. You can't grade to zero because the rollers are going to roll the base course and then that's going to sink. So you'll have to redo it.
>
> Say you know from experience that the base course is going to sink about 25%. If you add a 100 mm layer, you'll need to add an extra 25 mm to combat this.
>
> You can use the Vertical Offset feature in Trimble Earthworks to achieve this.

Step by step

1. Tap and hold the elevation offset icon.

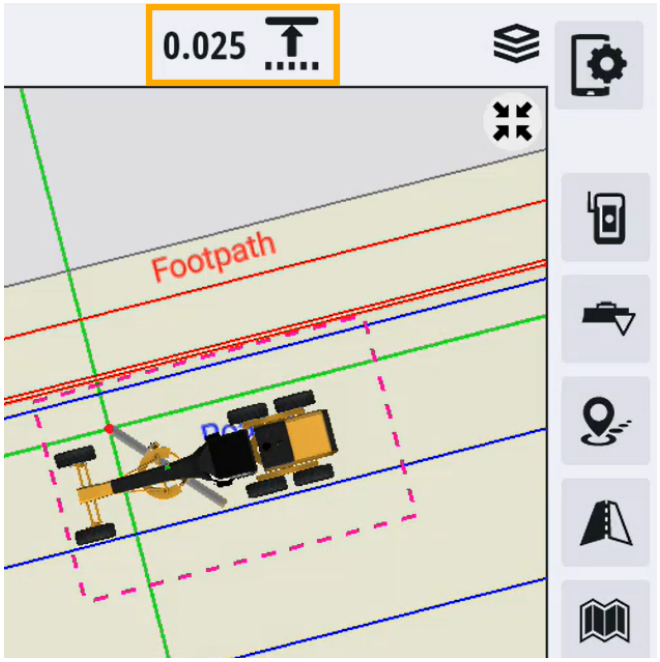


2. Use either of these methods to specify your offset:
   - Enter the amount you want to offset.
   - Drag the green line.



> **TIP –** If you often use the same offset, you can save it so you don't have to keep specifying it. You can save multiple offsets and easily cycle through these.

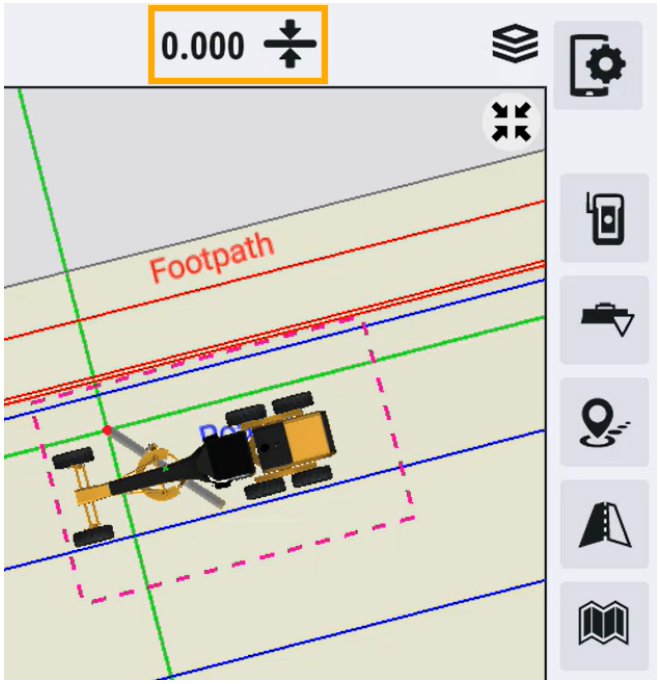
3. Tap **Save**.
4. Tap **Apply**.
5. Lay your base course.
6. As trucks bring gravel in, you can grade that out at the offset you've specified (+25 mm).



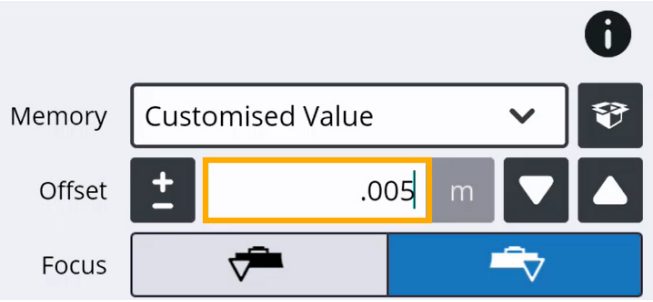
7. Wait while the rollers compact the surface.

> **NOTE –** It should be fairly close to finished design (zero mm) when they've done this.

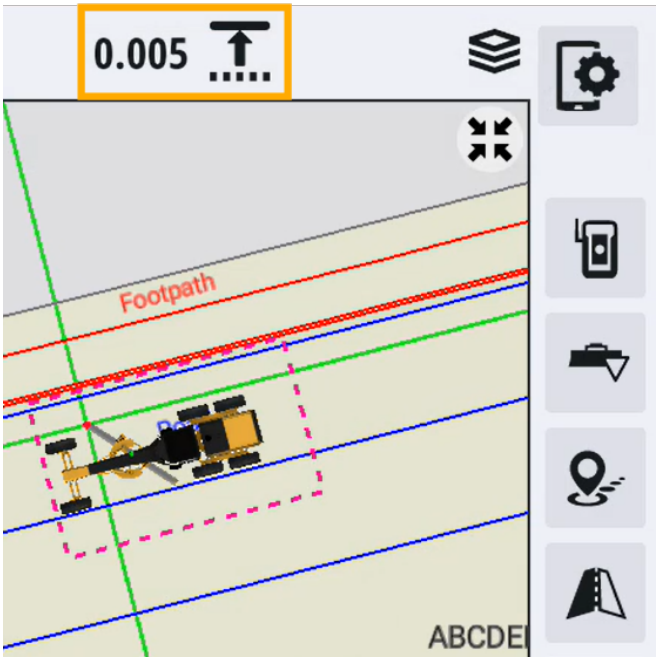
8. Tap the elevation offset icon to return to zero.



9. Specify a smaller offset (say 5 mm high).



10. Do your final trim at this offset.



NOTE – You should have achieved the correct level for your design.

11. Wait while the rollers do their final compaction.

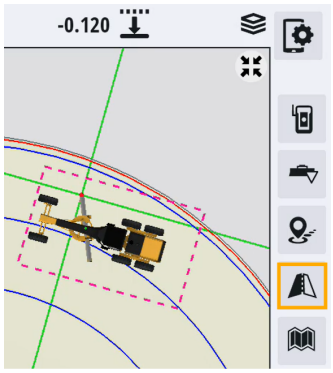
Shape a crown

You can use the Lane Guidance feature in Trimble Earthworks to shape a transitioning grade (like the crown of a road, an invert, a shoulder, or a batter). This involves specifying the lines you want to grade within.

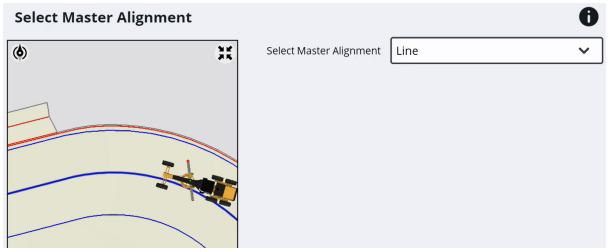
Once you've done this you don't have to worry about keeping your machine perfectly straight when you grade. When you activate Lane Guidance, Trimble Earthworks will make sure your machine follows the surface between the lines you've specified. This makes it quicker and easier to define grade transitions because you don't have to go back and start again if you make a mistake.

Step by step

1. Tap and hold the Lane Guidance icon.

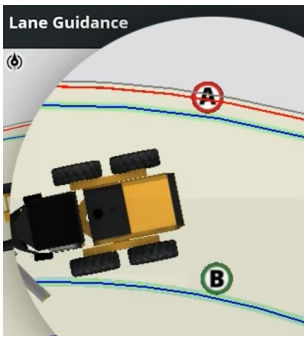


2. Use either of these methods to specify the master alignment:
   - Tap a line on the screen.
   - Choose an option in the **Select Master Alignment** field.



> **NOTE –** Your master alignment needs to run parallel to your A and B lines.

3. Tap **Next**.
4. Choose the surface you want to project:
   a. Tap a line on the screen to specify your **A** line.
   b. Tap a line on the screen to specify your **B** line.

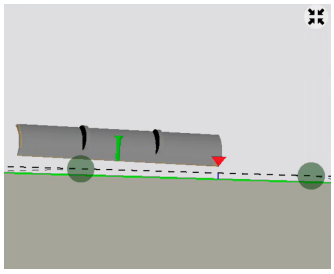


TIP – Use two fingers to zoom in and out.

NOTE – Lane Guidance will extend the surface between your A and B line forever.

5. To activate Lane Guidance, tap **Apply**.

NOTE – The green dots show your A and B lines.



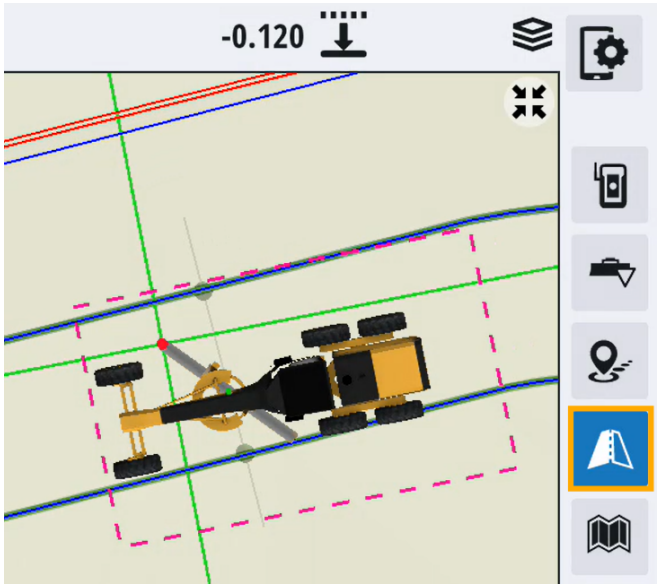
6. Start pushing your material over the crown line.

NOTE – If you cross the centre line with the middle of your blade the machine won't drive to the grade on the other side of the line.

7. Move the machine to the other lane of your road.

8. To swap lane guidance to the other side of your center line, tap the Lane Guidance icon.

NOTE – This will deselect the first lane.



9. Tap the Lane Guidance icon again.

   NOTE – Lane Guidance will automatically detect the surface under the machine.

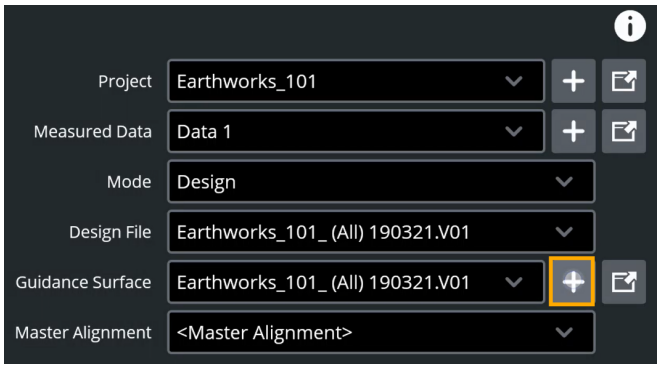
10. Reverse the machine into position for the next cut.
11. Activate Autos and start grading!

Create a design

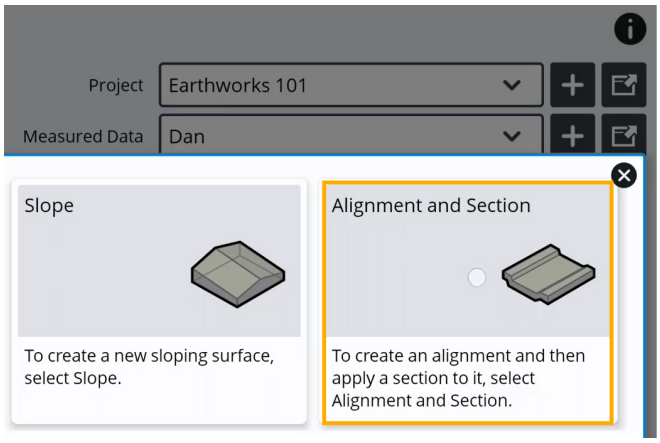
If you need to finish a road but you don't have a design, you can create your own one using the Infield Designs feature in Trimble Earthworks. And you can save the design you create in case you need to use it again.

Step by step

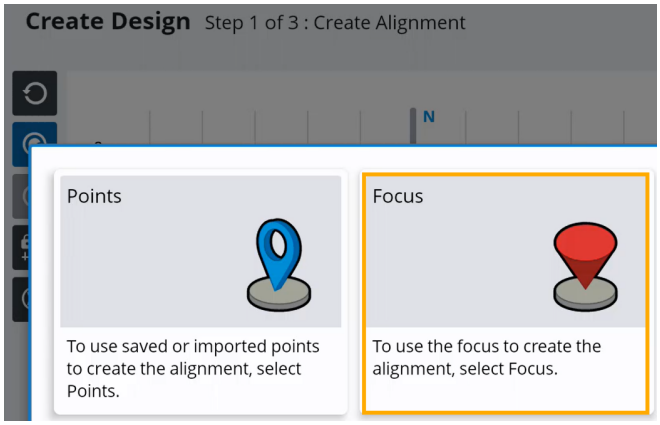
1. Tap and hold the **Job Setup** tile.
2. Tap the add icon beside the Guidance surface field.



3. Tap the **Alignment and Section** tile.



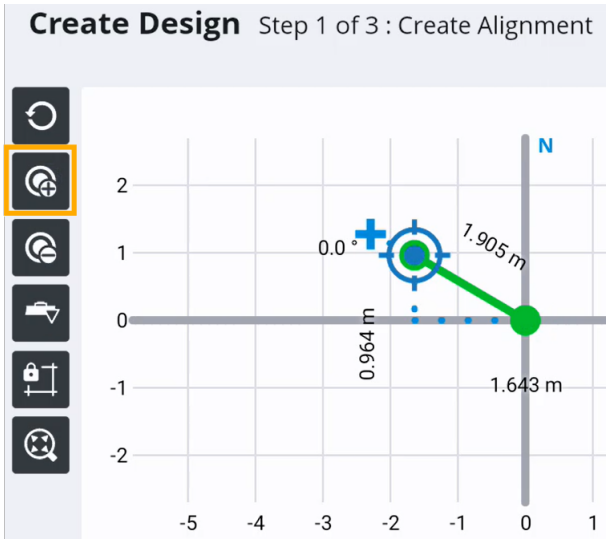
4. Tap the **Focus** tile.



5. Create your alignment:

   a. Tap the focus icon to specify which side of your blade you want to take the point on.

   b. Tap the Add point icon.

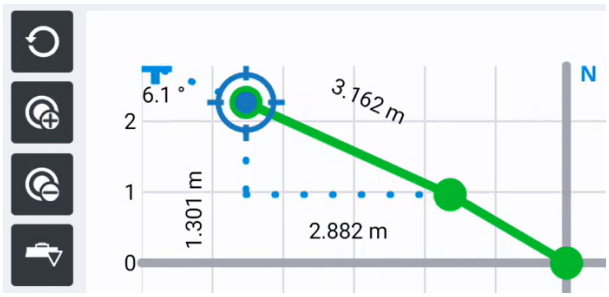


   c. Drive your machine to where you want to take the first point for your design.

   d. Gently set your blade tip above the ground so it skims the surface.

   e. Drive your machine to where you want to take the next point.

   f. Tap the Add point icon.

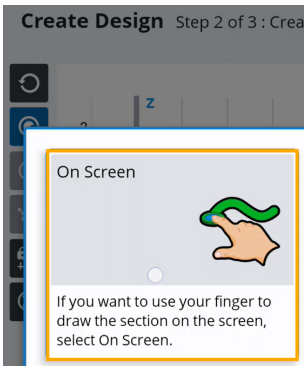


> **TIP –** If you're building a straight road you just need a point on each end of the road.
>
> If you're building a curved road, drive the machine in an arc with the blade tip just above the ground and take a point every few seconds.

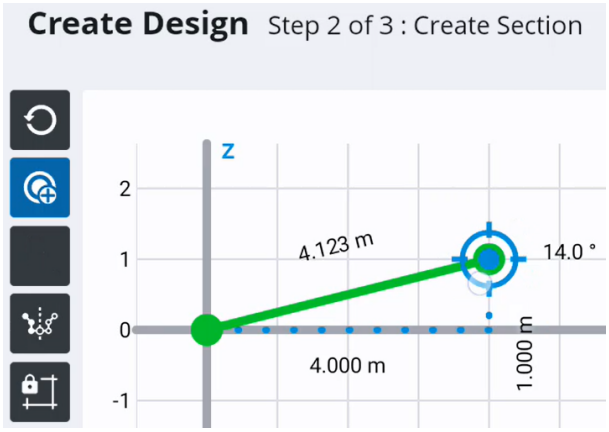
g. When you get to where you want your road to finish and you've taken your last point, tap **Next**.

6. Create your section:

a. Tap the **On Screen** tile.

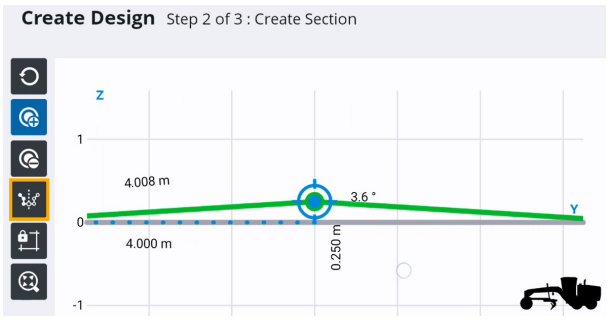


b. Draw the shape of the first lane for your road on the screen.

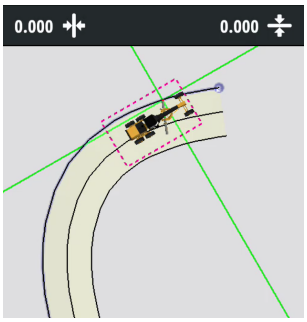


> **EXAMPLE –** You might want your road to be 4 meters wide.

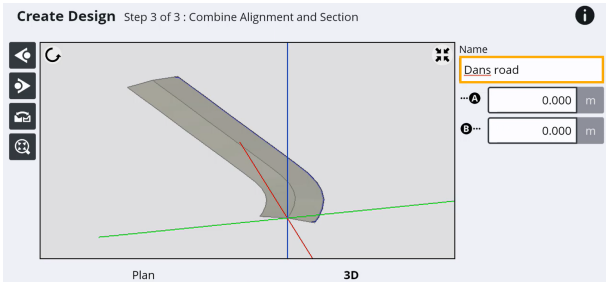
c. To mirror what you've drawn for the other lane of your road, tap the mirror icon > Tap **Mirror from End**.



d. When you're happy with the design you've created, tap **Next**.



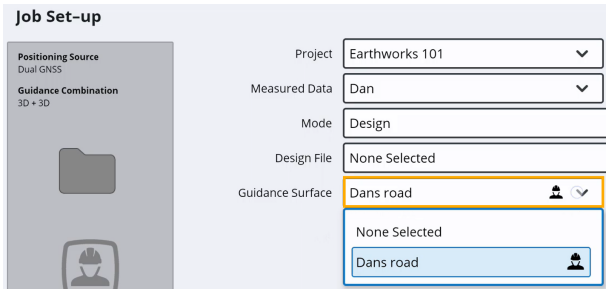
e. Enter a name for your design.



TIP – This is useful if you want to reuse it.

f. Tap **Apply**.

NOTE – Your design will be available from the Guidance Surface field on the Job Setup screen.



7. Start building your road!