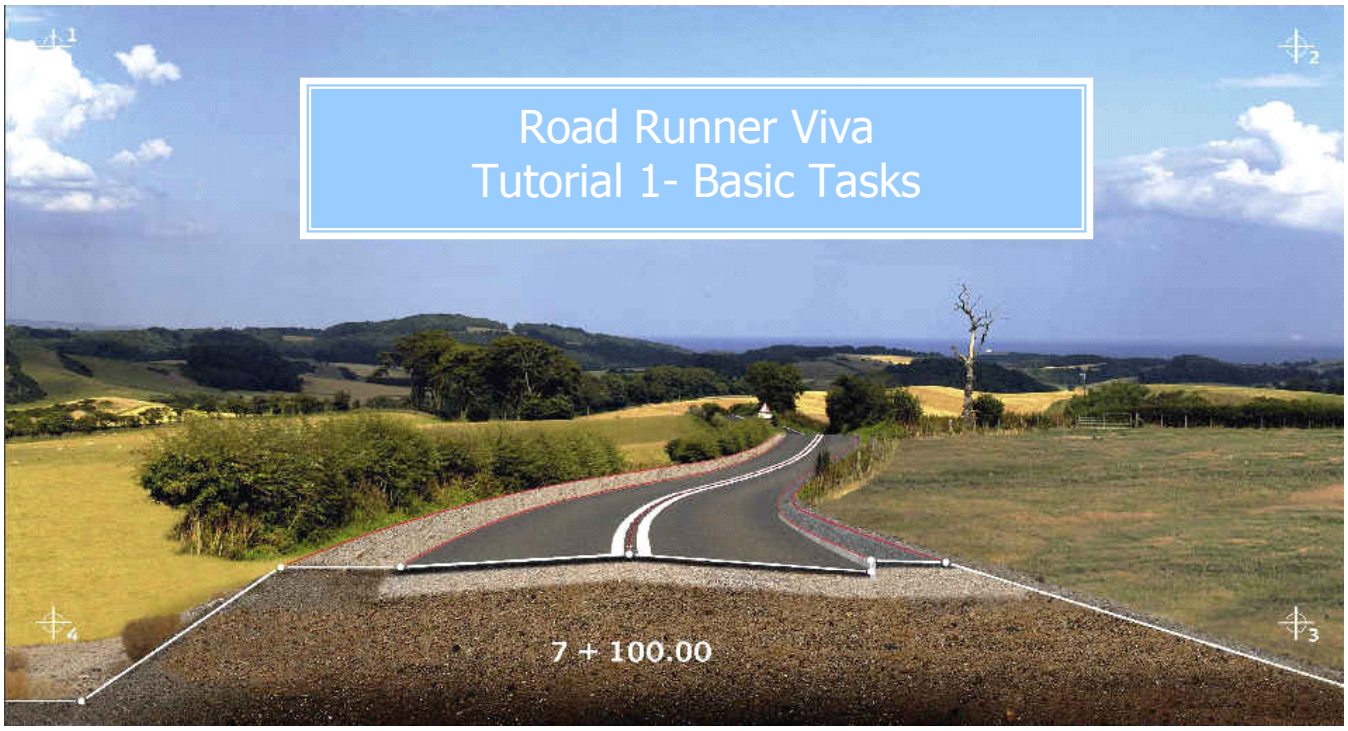
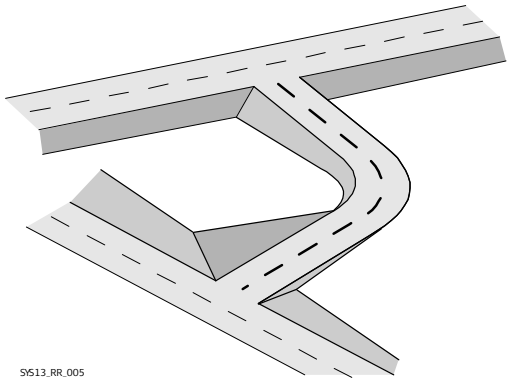
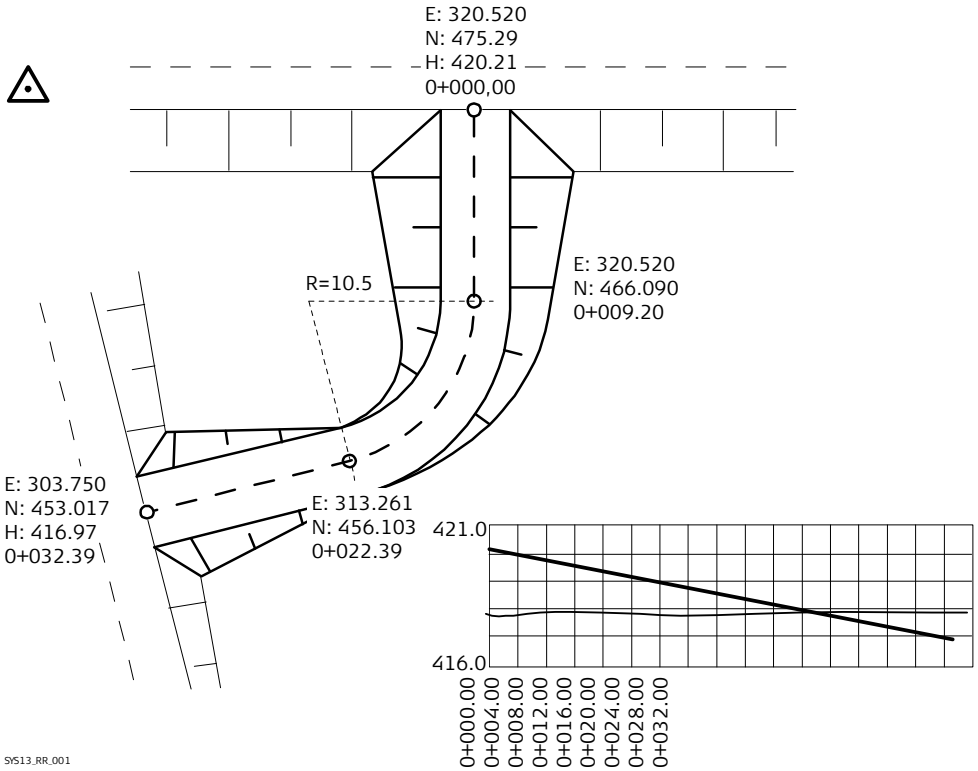

Road Runner Viva
Tutorial 1- Basic Tasks
7 + 100.00

Basic Tasks Overview

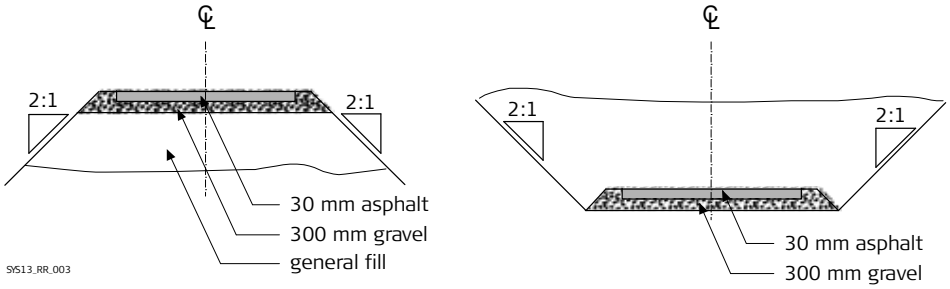
Description	
This tutorial guides you through some basic Road Runner Road tasks as you stake and check a bike path.	 SVS13_RR_005
Designed on a CAD System, the data for the bike path has been converted into the onboard format. The design is a short ramp that connects a road with an already existing part of the bike path.	
In this tutorial, you will learn how to: * Select your road job & the relevant data * Select the element to stake out * Stake out the centre line of the design * Find catch points for slopes * Check a road layer surface * Shift the design to fit the existing road level	
This chapter is separated into five exercises. You can work through the entire tutorial in one session or complete each exercise individually. The same Road Job is used in each exercise.	

Horizontal & Vertical Alignment in Plan View



This data represents the bike bath connecting two existing roads used in the tutorial. For TPS users the triangle in the NW corner is where you will set the instrument up.

Horizontal & Vertical Alignment in Cross Section View



The bike path changes from a fill to a cut. You will see two different cross sections depending on your location (chainage) along the alignment.

Exercise 1: Setting Up in the Required Area.

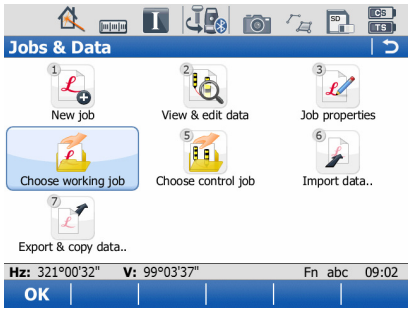
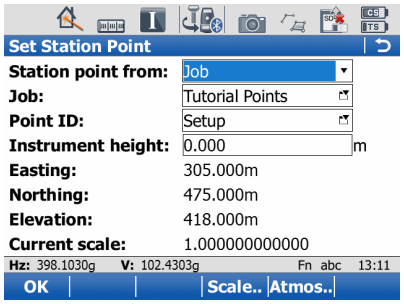
Description

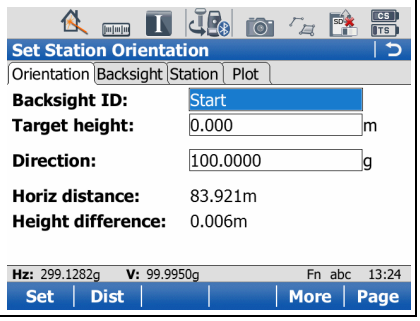
- This exercise includes a short description of how to setup the TPS or if you are using GPS you will define a local coordinate system (using QuickGrid). It is recommended to read the relevant chapters in the Leica Viva Technical Reference Manual if you need further guidance.

Uploading the data

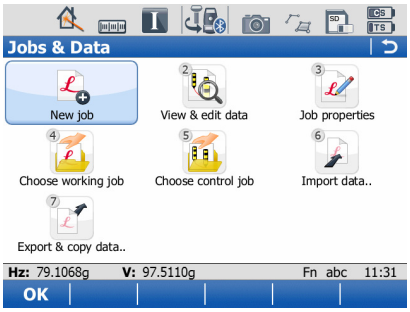
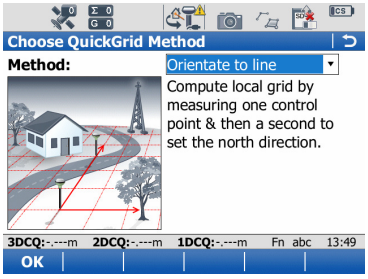
- This exercise uses the tutorial data which can be found on the SmartWorx Viva DVD in the Sample data folder... OR got to;
- http://myworld.leica-geosystems.com and navigate to **myTraining** and then select the product you are using.
- Copy Excercise1 data to the CF/SD card and into the folder \DBX\.

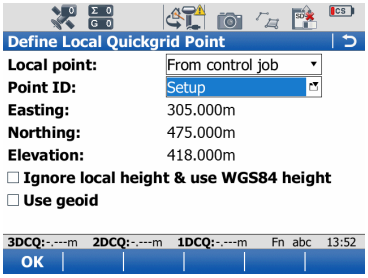
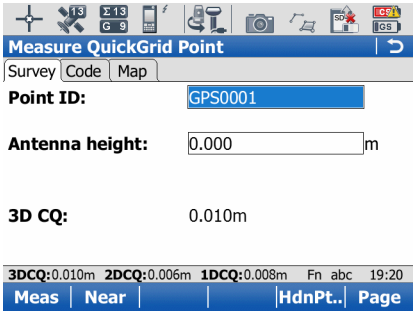
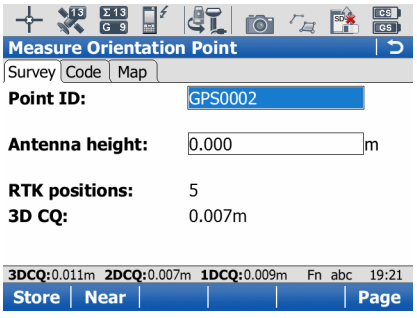
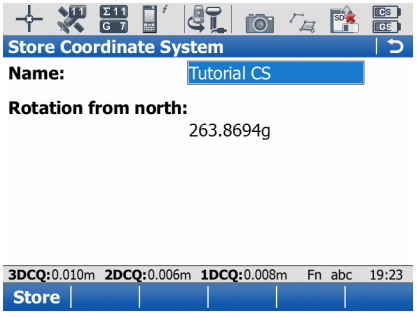
Setting up the TPS

	Description	
	Turn on the Leica Viva device you are using and go to **Jobs & Data › Choose working job** Select**: Tutorial Meas** Press **OK** Now set up the TPS in the upper left corner of your survey area. Press **Go to Work › Setup**	
	Select **Setup method: Set orientation**. Select **Station point from: Job** Select **Job: Tutorial Points**. Select **Point ID: Setup**. The coordinates of this point are: East=305, North=475, Height=418. Enter the instrument height **Instrument Ht:**. Press **OK**	
	Set Station Orientation Enter **Backsight ID: Start** Enter the reflector height **Reflector Ht:** Enter **Direction: 100.0000** if working with gon. Enter **Direction: 90** if working with degrees.	

	Aim the instrument in the direction of the start of the tutorial alignment (Chainage 0+000.00). Press **Set**	

Setting up the GPS

	Description	
	Turn on the Leica Viva device and go to **Jobs & Data › New job** Enter **Name: Tutorial Meas** Press **Store**	
	Define a local coordinate system by using a **one-step transformation** in **Determine Coordinate System** or use a **QuickGrid Method** such as **Orientate to Line**. Before you start with the definition of the new coordinate system for the tutorial, ensure the sensor is configured as a rover (refer to the Leica Viva Technical Reference Manual for further help).	
	Now go to **Go to Work › Survey+** Select **QuickGrid** Choose **QuickGrid Method** Select **Method: Orientate to line** Press **OK**	
	Define Local QuickGrid Point Select **Local point: From control job**	

	Select **Point ID: Setup** The coordinates of this point are: East=305, North=475, Height=418. Press **OK**	
	Measure QuickGrid Point Enter **Point ID: GPS0001** Stand over a point in the upper left corner of the survey area. Press **Meas**	
	Measure Orientation Point Enter **Point ID: GPS0002** Stand over a point where you would like to set the North direction. Press **Meas**	
	Store Coordinate System Enter **Name: Tutorial CS** Press **Store**	

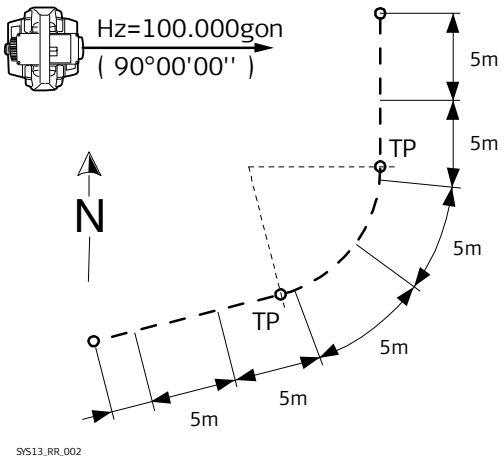
After completing this exercise you will have:

- a new working job called **Tutorial Meas**
- a TPS setup near the alignment
- and if you were using GPS you will have created a new and local coordinates system for your working job called Tutorial CS.

Exercise 2: Go to work and stake a stringline

Description

- In this exercise you will stake out the centre line of the bike path. A peg will be placed every 5 m's and one at each tangent point (ie. TP – Start/end point of an element). Staking the bike path centreline will provide an overview of where the path will run.



Pegs to be placed every 5 m and at each start/end element.

You will:

- Select the road data converted from the original CAD design data
- Choose a stringline to stake out (the bike path centreline) and
- Stake the pegs

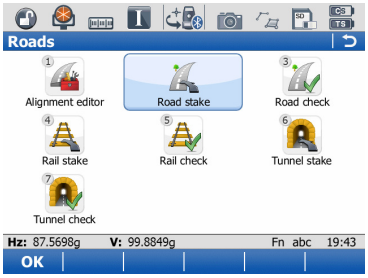
Preparation

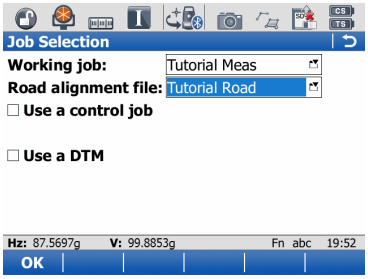
- To run this exercise you need an area of about 30 x 30 m and 10 stakes.

Uploading the data

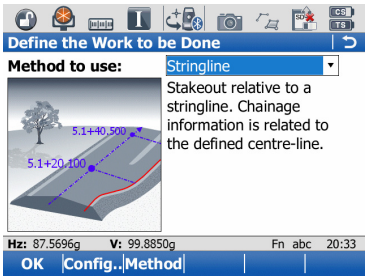
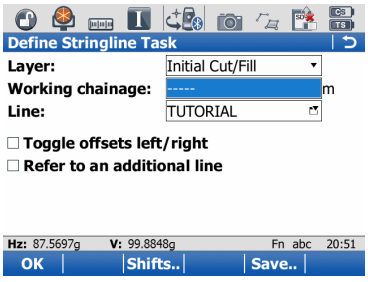
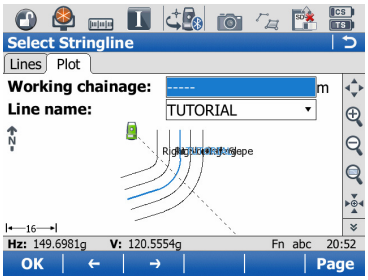
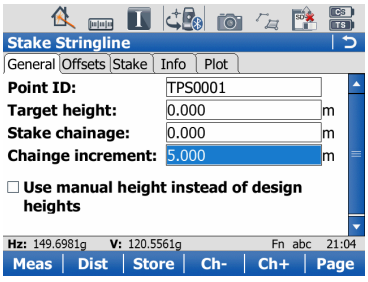
- This exercise uses the tutorial data which can be found on the SmartWorx Viva DVD in the Sample data folder... OR got to;
- **http://myworld.leica-geosystems.com** and navigate to **myTraining** and then select the product you are using.
- Copy Excercise2 data to the CF/SD card and into the folder \DBX\.

Choose Road Stake and the Road Data to Use

	Description	
	From the Main Menu got to Go to Work! › **Roads.** Select **Road stake** (stake out bike path centreline)	

	Select **Working job: Tutorial Meas** Select the **Road Alignment file: Tutorial Road** Press **OK**	

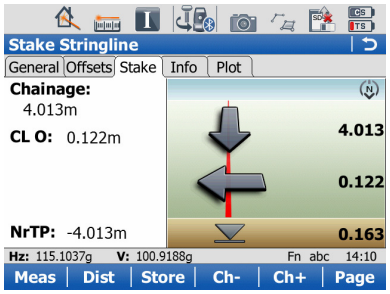
Stake a stringline

	Description	
	Select **Method to use: Stringline**. Press **OK**	
	Define Stringline Task Select **Layer: Initial Cut/Fill** RoadRunner can store different layers of a road. This makes it possible to store, for example, the final surface of the pavement as well as the surface for the first cut or fill. Select **Line: TUTORIAL**. Press on the **Line** list box and then in the **Select Stringline** panel toggle to the Plot view. Use the map tools to see the alignment clearly. Now click on the stringlines until you find **Tutorial**. You will see the selected line highlighted blue. The name of this line was defined during the LGO – Design to Field conversion or in the CAD package. Press **OK** Press **OK** Now you have selected the bike path centreline for staking out.	 
	Stake Stringline In the **General** page ensure you have the correct target/antenna height and then use the **Stake chainage** to define where you would like to start staking out along the alignment. Enter **Stake chainage: 0m** to begin at the start of the alignment.	

The **Chainage increment** value can be used to define how often you want to place a peg.

Enter **Chainage increment: 5m**

In the **Stake** page simply use the graphics to help find and stake your point. You can see the difference between the current position and the position to stake out.

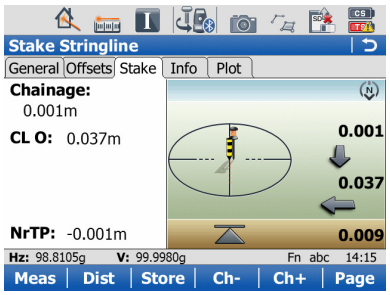


By default the navigation direction is configured **To alignment**. This means the direction arrows and delta values are relative to the alignment (the red line seen in the graphics). You can configure your prefered navigation directioni in the Road Configurations panel. Got to **Fn F2 Config.. – General – Navigation direction**.

When you are close to the stake point you will see the bulls eye appear.

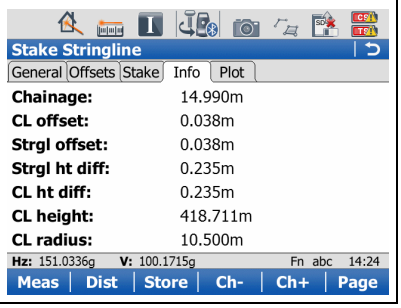
Bring the delta values to 0.0m

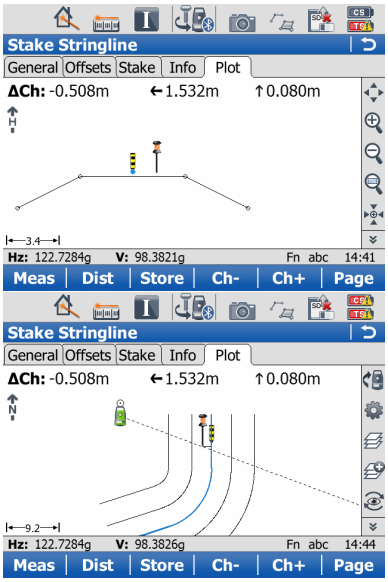
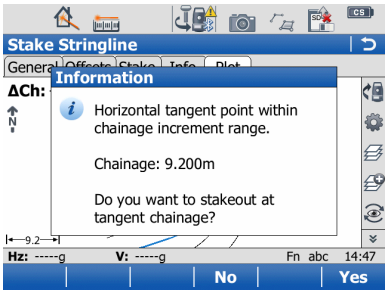
And mark the position with a stake!



The data seen on the **Info** page is user defineable!

For example perhaps it is required to write the centreline radius on each stake, this is just one of many values you can make available in the **Info** page, just add it! Got to **Fn F2 Config.. – Info** and choose where on the screen you want to display what information.



	Look in the **Plot** page. This page gives you a graphic representation of the cross section at the current chainage and your position relative to it. The plot page also displays the difference between the measured point and the position to stake-out. Change the view using the Map tool bar to plan view if you prefer. 	
	Simply press **Store** to store the position of the staked point	
	Press **Ch+** to increase the current chainage by the defined chainage increment. Press **Ch+** to increase the current chainage by the defined chainage increment again. A message box comes up telling you that there is a horizontal tangent point, the start point of the curve, within the chainage increment range. Press **Yes** to stake out the tangent points. Stake out the next point at chainage 5.000.	
	Stake out all of the points and tangent points along the centre line until the end of the alignment.	

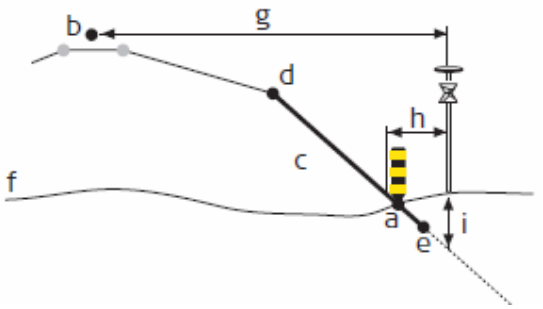
After completing this exercise you will have:

- Learnt how to stake a stringline (bike path centre line)

Exercise 3: Staking Out Slopes

Description

- In practice before staking out the bike path slope the bike path surface could have already been built up/down to the design level. In this case the slopes already exist, but it is likely they would have been constructed roughly and not to design.
- In this exercise we will stake out a point on the design slope which will indicate where to shift soil up/down according to the design slope. This stake point is known as the catch point and is the point where the natural surface intersects the design slope (see diagram below).



a) Catch point
b) Centreline
c) Slope to stake out
d) Hinge point = left stringline
e) Second / right stringline
f) Natural surface
g) **CL offset**
h) Δ **offset**
i) Δ **height**

- For our exercise we don't actually have a bike path surface already built up/down so to help paint a clearer picture for ourselves about where the design slope should be, we will first and quickly stake out a few hinge points (ie. the outer most edge of the bike path surface before the slope starts) using the same principles as exercise 2.

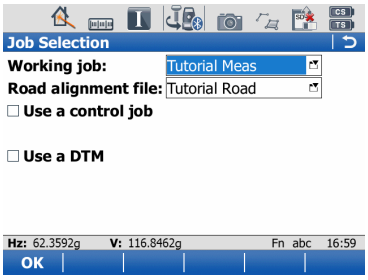
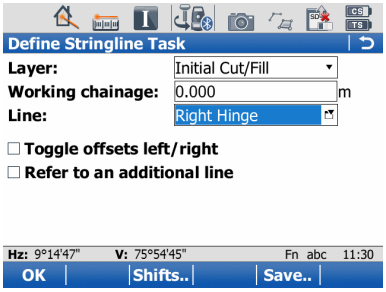
Preparation

- To run this exercise you need an area of about 30 x 30 m and 10 stakes. Where possible working on a slope will also help to create a clearer picture of what you are doing.

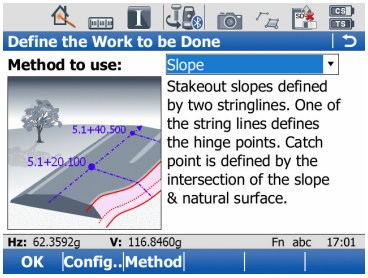
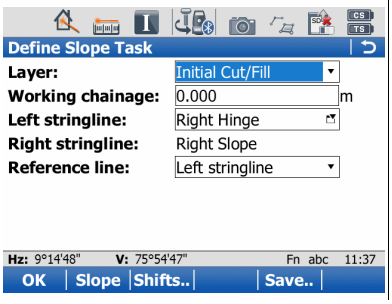
Uploading the data

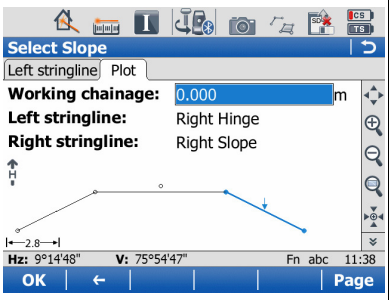
- This exercise uses the tutorial data which can be found on the SmartWorx Viva DVD in the Sample data folder... OR got to;
- http://myworld.leica-geosystems.com and navigate to **myTraining** and then select the product you are using.
- Copy Excercise3 data to the CF/SD card and into the folder \DBX\.

Before staking the slope

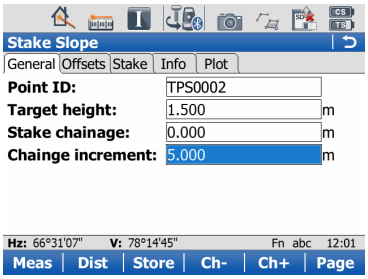
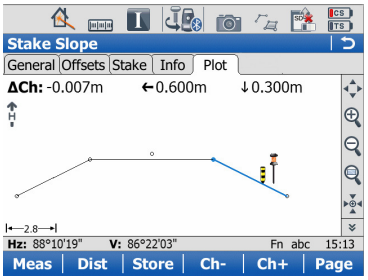
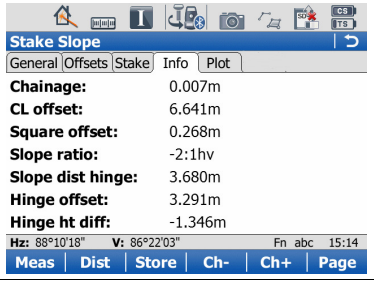
	Description	
	Ensure you have the same setup as in Exercise 1. From the Main Menu got to Go to Work! > **Roads.** Select **Road Stake** Select/create **Working job: Tutorial Meas** Select **Road alignment file: Tutorial Road** Press **OK**	
	Now using the same principles as Exercise 2 do the following steps. Define the Work to be Done - **Method to use: Stringline** Define Stringline Task - **Layer: IntialCut/Fill**, **Working chainage: 0.000m**, **Line: Right Hinge** Now stake the first 5 points along this stringline with a stake increment of 5m (this will include one tangent point).	

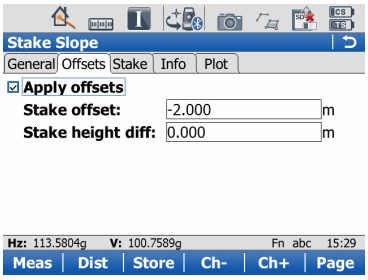
Staking the slope

	Description	
	Continue working with the same Road job. Select **Method to use: Slope**	
	Select **Layer: Initial Cut/Fill** Enter **Working chainage: 0.000m**	

	Select **Left stringline: Right Hinge**. Press on the list box to use the Plot view in the Select Slope panel to easily touch on the slope you wish to use. The **Right stringline** value will automatically update. Leave **Reference line: Right Slope** Press **OK** Press **OK** You have now selected the right slope of the bike path for staking out.	

Staking the catch point

	Description	
	In the **General** page ensure you have the correct target/antenna height and then use the **Stake chainage** to define where you would like to start staking out along the alignment. Enter **Stake chainage: 0.000m** to begin at the start of the alignment. The **Chainage increment** value can be used to define how often you want to place a peg. Enter **Chainage increment: 5.000**	
	Now go to the **Plot** page, it shows the measured position in relation to the cross section at the current chainage. Change the view using the Map tool bar to plan view if you prefer.  Bring the delta values to 0.0m Once you are close enough to the point, stake the position of the catch point!	
	Go to the **Info** page, this shows all the information to be left on the peg for the machine operators who actually build the slope. This page is user defineable. So, if you are used to seeing the displayed values in a different sequence or want to see other items simply select them in the **Configuration** panel (**Fn Config**)!	
	Simply press **Store** to store the position of the staked point	

	Depending on the workflow you favour you can now either stake all catchpoints on one side of the centre line or flip between the right and left slope of the cut. • To continue on one side of the road simply press **Ch+** to increase to the next chainage. • To change to the left slope simply return to **Define Slope Task** and define the **Left stringline: Left slope** and the **Right stringline:** should be **Left Hinge**	
	Continue staking out the other catch points each 5 m by using **Ch+** Stop and read any warning messages regarding you position carefully. Make sure you understand what they mean. For example maybe you have measured a point above the hinge point. In this case you will see a message **Warning:** The current position is above the hinge point of the fill slope.	
	Look in the **Offsets** page, in here is the option to enter values for how far from the slope you may want to place a peg. This is helpful when you want to stake a point at a safe distance from any people or machines already working on the slope.	

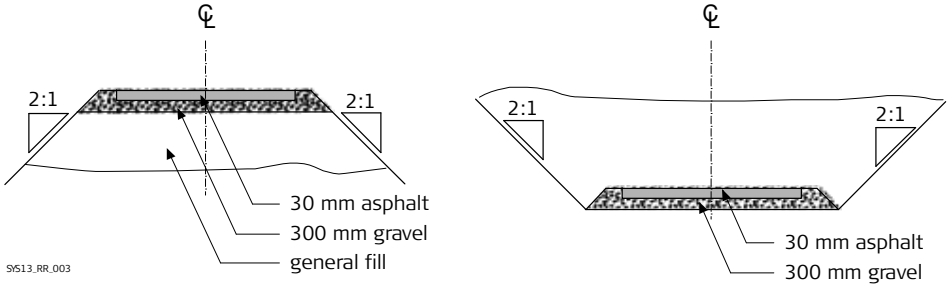
After completing this exercise you will have:

- Staked the right hinge stringline and
- Learnt how to stake a slope (the bike path left slope)

2. Exercise 4: Checking Road Layer Surface

Description

- A common task on construction sites is the as-built check of the work already completed. RoadRunner offers you for each stake out method an equivalent check method. The main difference between stake out and check, is that checks are based on random chainages. Therefore no **Stake** page exists for the check methods. In this exercise you will check the 300mm gravel layer of the street.



- When doing checks with the **Layer** method, RoadRunner automatically detects the relevant part of the layer to check the measured position against. In **Road Configuration**, **Quality Control** page you can choose if a warning should appear as soon as a point outside the defined tolerance is stored.

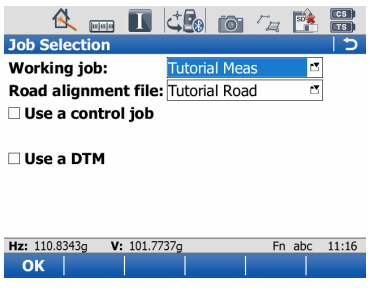
Preparation

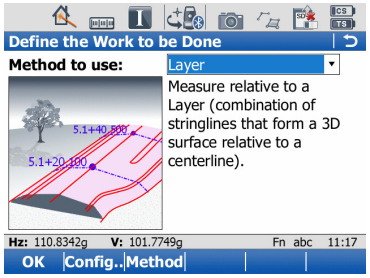
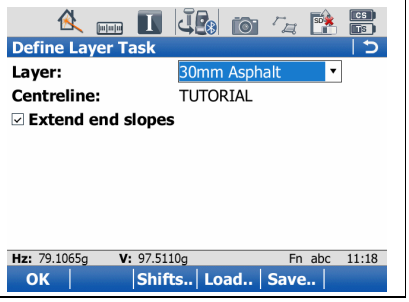
- To run this exercise you need an open space of about 30 x 30 m, 10 stakes.

Uploading the data

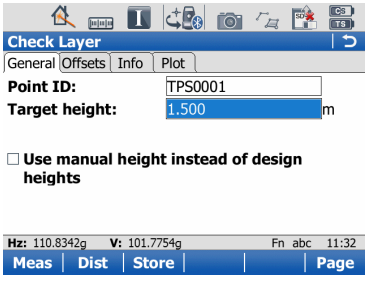
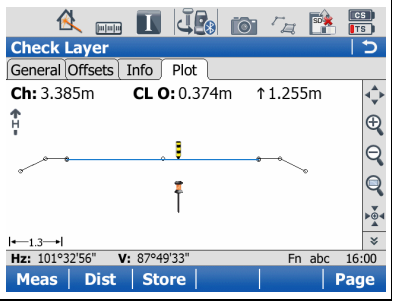
- This exercise uses the tutorial data which can be found on the SmartWorx Viva DVD in the Sample data folder... OR got to;
- http://myworld.leica-geosystems.com and navigate to **myTraining** and then select the product you are using.
- Copy Excercise4 data to the CF/SD card and into the folder \DBX\.

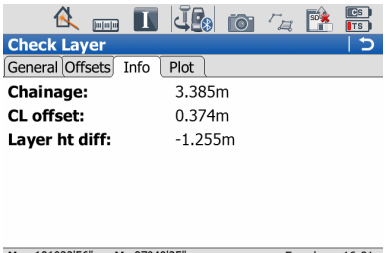
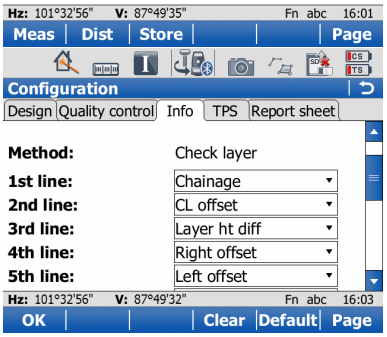
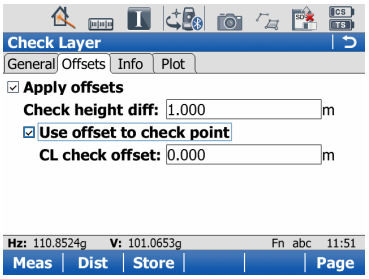
Choose Road Check and the data to use

	Description	
	Ensure you have the same setup as in Exercise 1.	
	From the Main Menu go to **Go to Work! › Roads.** Select **Road Check** Select/create **Working job: Tutorial Meas** Select **Road alignment file: Tutorial Road** Press **OK**	

	Define the Work to be Done. Select **Method to use: Layer** Press **OK**	
	Define Layer Task. Select **Layer: 300mm Gravel** Leave **Extend end slopes** ticked. This extends the slope location beyond the design if you measure a point outside of the design.	

Checking the layer

	Description	
	In the **General** page ensure you have the correct target/antenna height In case the points which require checking must be done at a certain chainage, then it is better to use **Road Stake › Method to use: Layers.** This method will let you define the chainage.	
	Go to the **Plot** page. In the cross section view the **Plot** page best shows the measured position relative to the design cross section at the current chainage. Change the view using the Map tool bar to plan view if you prefer. 	

	Now go to the **Info** page. Imagine in addition to the values displayed on the **Info** page you are also interested in the offset from the right and left stringlines.	
	The **Info** page is user definable so press **Fn Config** and choose **Right offset** and **Left offset** so they are displayed in the **Info** page.	
	Finally explore the **Offsets** page and in particular the option to enter a **Check height diff**. When you use a **Check height diff** value you offset the design height for the whole layer. Set the **Check height diff** to 1.000m Now measure a point in the **Plot** page. Notice how the delta height now displays the difference between the measured point height and the layer design height including the **Check height diff**.	

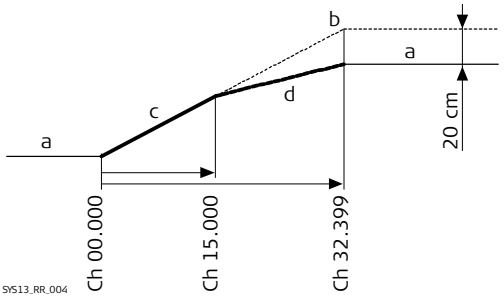
After completing this exercise you will have:

- Checked your measured points against the design layer
- Defined extra information to be displayed in the **Info** page and
- Explored using Offsets within Check Layer

3. Exercise 5: Shifting Design to Fit Existing Road Level

Description

- Whilst staking out a new section of bike path you notice further ahead that where you need to match into the existing bike path the level is 20cm lower than it appears in the design you received. If you continue according to design there will be a step created when you meet the old bike path. The newly constructed section of bike path is nearly half finished and the construction team do not want to tear up the previous 15 meters of gravel they laid. To deal with such a common construction problem Roadrunner offers the ability to shift the remainder of the design so a smooth transition between the new and existing bike path is achieved.
- In the following exercise you will shift the design using the **Stake – Crown** method. At chainage 15.000m the vertical shift will be 0.00m, as at this point the road has already been constructed according to the original design (c). Then a linear shift will be applied so that at the end chainage the vertical shift is -20cm. This will ensure a smooth transition (d) from the already constructed part of the bike path (c) to the point where we match back into the old bike path.

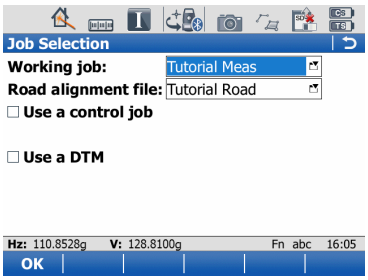


a) Existing road level
b) Original design
c) Already built
d) Shifted design, with 0cm vertical shift at chainage 15.000 and -20cm at chainage 32.399.

Uploading the data

- This exercise uses the tutorial data which can be on the SmartWorx Viva DVD in the Sample data folder... OR got to;
- http://myworld.leica-geosystems.com and navigate to **myTraining** and then select the product you are using.
- Copy Excercise5 data to the CF/SD card and into the folder \DBX\.

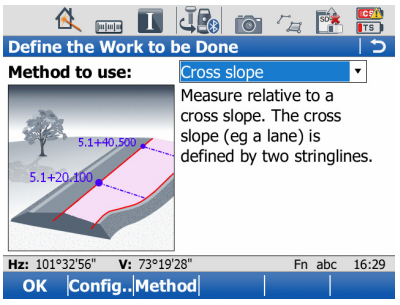
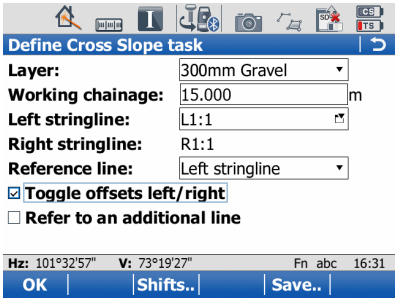
Selecting the Road job

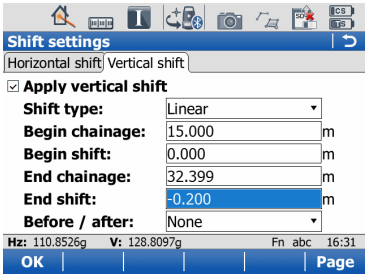
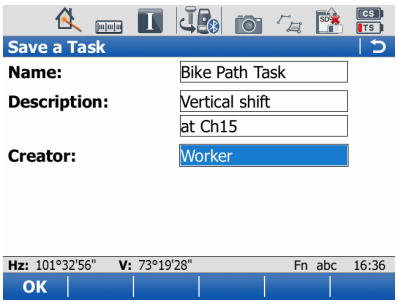
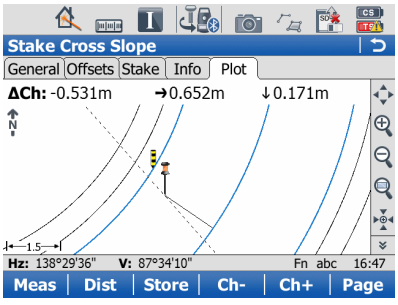
	Description Option 1 - Continuing with Exercise 1	
	Ensure you have the same setup as in Exercise 1.	
	From the Main Menu got to **Go to Work! › Roads.** Select **Road Stake** Select/create **Working job: Tutorial Meas** Select **Road alignment file: Tutorial Road** Press **OK**	

Define the Work to be Done

When defining the work to be completed, you will also find out where to Save/ Load a Task.

What is a Task? Often when working on a construction site, it is not possible to finish the survey work required in one go. In this case when you return to site at another time, RoadRunner makes it easy to load a previously saved task which may contain special settings such as a shift, working chainage, selected layer and or selected line. This also makes it possible to prepare the tasks in the office, where all the paper plans, CAD drawings, recent updates and a good cup of coffee are available.

	Description	
	Define the Work to be Done. **Method to use: Cross Slope** Press **OK**	
	Define Crown Task Select **Layer: 300mm Gravel** Enter **Working chainage: 15m** Select **Left stringline: L1:1** Leave **Reference line: Left stringline** Tick **Toggle offsets left/right** This function will allow you to stake out along the bike path according to the stringline you are closest to.	

	Press **Shifts.** Leave **Horizontal shift unticked** and go to the **Vertical shift** page. Select **Apply vertical shift**. The 20 cm difference should be distributed linearly. Starting at chainage 15m the shift is 0cm, and then ending at chainage 32.399m the shift will be -20cm. Leave **Before/After: None** We do not want to do anything with the design before or after the chainage interval we just entered. Press **OK**	
	A shift clearly shows how the same design in a road job can be staked out in different ways. If you want to save how this crown is staked out based on the options seen in this panel you can **Save** a task and then **Load** it next time you return to site. Save a task and when finished press **OK** Press **OK**	
	The staking out of a cross slope works the same way as for slopes and stringlines. Move left and right of the centreline to see the peg and direction values update. The peg will always be calculated so that it is located on the nearest stringline to your last measurement. Continue staking out the cross slope until you have a clear understanding of how the bike path looks.	

After completing this exercise you will have:

- Staked out a Crown (the bike path) and
- Created a **Task** so that you could store and stake a vertical shift applied to your original design. Remember this shift will only be applied to the original design based on the shift values you entered. If you want the original design it is still available, simply do not use shift values.