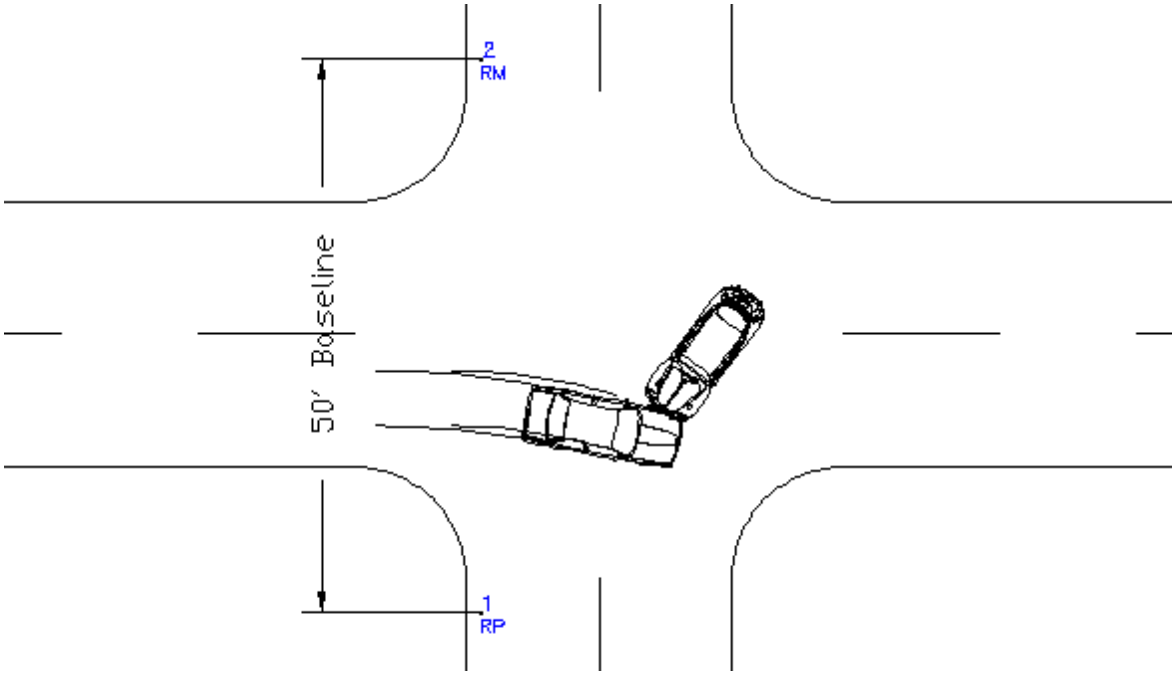
Tutorial: Measuring a Scene

Introduction

In this tutorial, we will be using the Total Station Demo mode to simulate measuring a scene in Evidence Recorder. The following figure illustrates the scene that you will be measuring.



Prepare the Scene by setting two Reference Points

While this tutorial will simulate measuring a real scene, please keep in mind your standard operating procedures for electronically measuring a scene using a total station.

1. *After setting up and leveling your total station on the tripod, set a PK Nail or other permanent marker at the reference point where your total station is set up over. (Point 1 in the above image)*

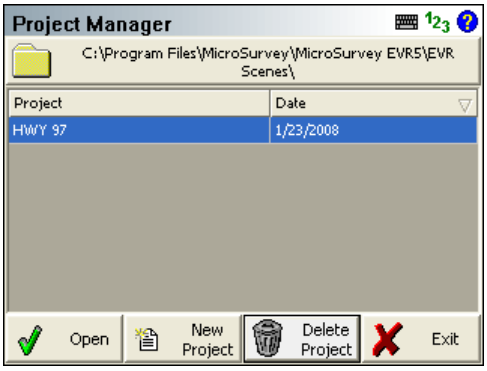
2. *Once your reference point is marked, lay out a tape to measure a 50', 100' or other length baseline from the total station – it is generally good practice to make this longer than the longest measurement you will need to record in your scene. This will typically go due North from the total station, but for safety reasons or depending on the scene you may opt to set the baseline in another direction. Then set another PK Nail or other permanent marker at the 50' or 100' etc mark, to be used as your backsight reference measurement point. (Point 2 in the above image)*

3. *With these two reference points marked, you are ready to begin.*

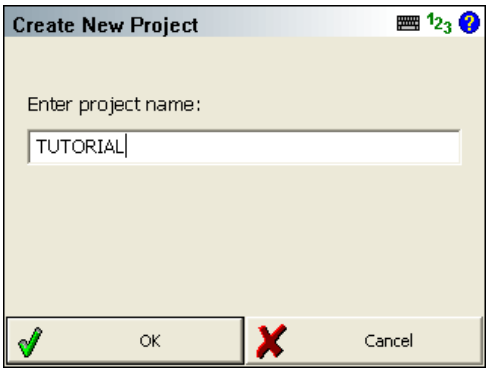
Starting the Evidence Recorder Project

Start FieldGenius by double tapping the **EVR 5** icon. Depending on the model of your data collector it will be on the Desktop or in the Start | Programs menu. If you are using the Tablet Edition on your desktop or laptop computer, it will be in the Start | All Programs | MicroSurvey | Evidence Recorder menu.

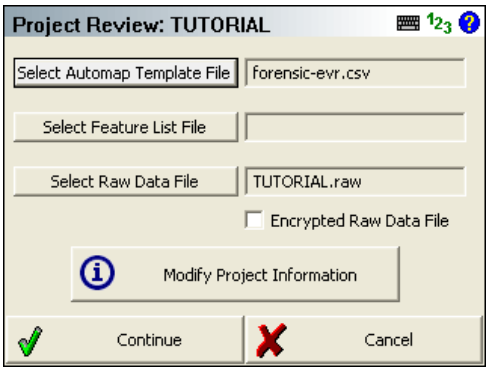
On the Project Manager screen, press the **New Project** button to create a new project.



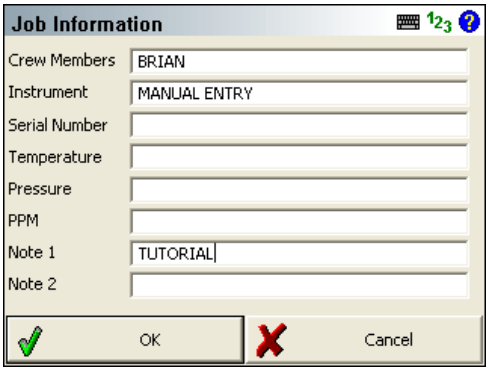
Name the project “TUTORIAL” then press **OK**.



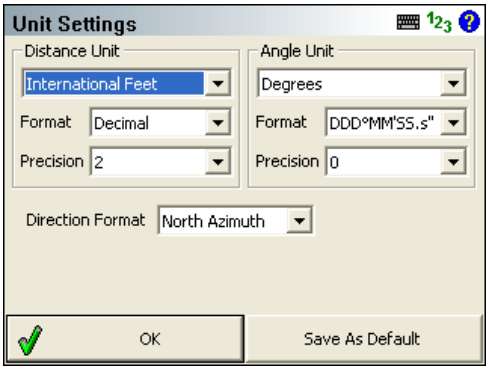
On the Project Review screen, press the **Modify Project Information** button.



Enter your project information then press **OK** to return to the Review Project screen, and then press **Continue**.



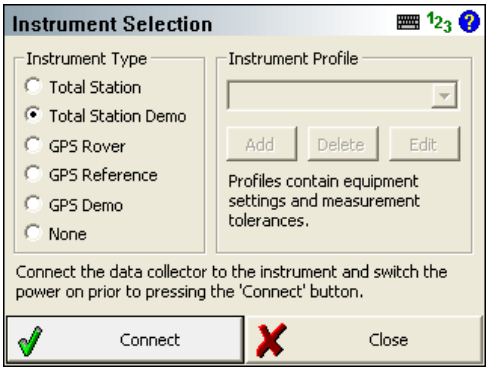
Set the project defaults as shown. Select International Feet (2 decimals precision), Degrees (DDD-MM-SS.s with 0 decimal precision), and North Azimuth then press **OK**.



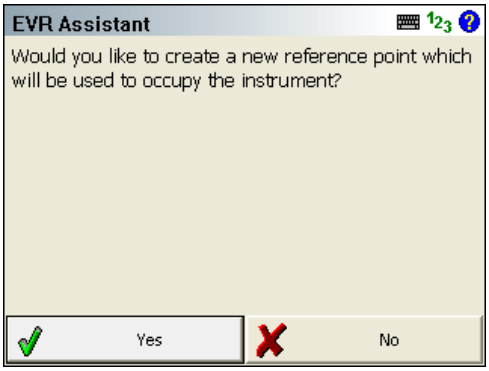
Occupying the Reference Point

On the Instrument Selection screen, select **Total Station Demo** then press **Connect**.

Typically you would select Total Station, and have Evidence Recorder communicate directly with your instrument, but for the sake of this tutorial we will use the Total Station Demo mode rather than connecting to an actual instrument. Although we will enter the shot data manually, the manual entries will simulate actual angles and distances being measured with your total station.



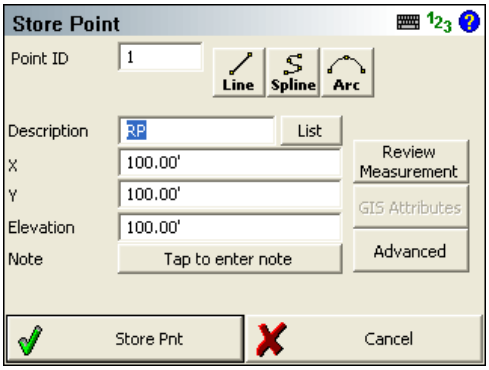
You will be asked if you would like to create a new point to occupy. Choose **Yes**.



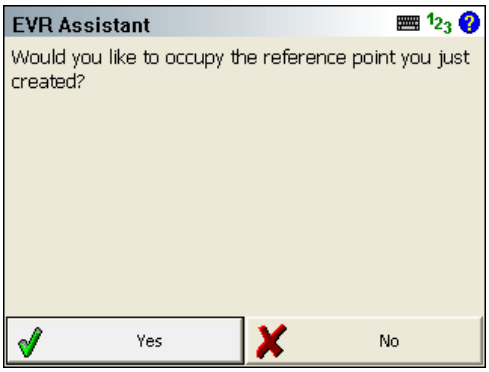
We will begin by assigning an assumed coordinate to the reference point. Create point number 1 at 100,100,100 with a description RP. Then press the **Store Point** button.

*Select **Yes** if you are asked if you want to add the description RP to your project automap library.*

This point represents the reference point where your total station would be set up over, which at a real scene should be marked by setting a PK Nail or other permanent marker.

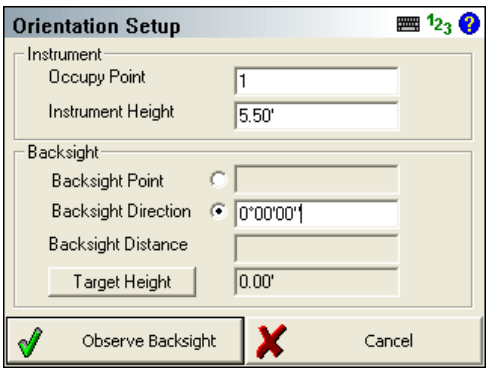


When it asks if you would like to occupy the new reference point, press **Yes**.



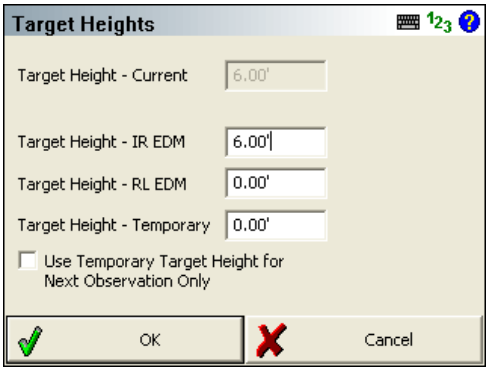
Set the Occupy Point to 1 and set the Instrument Height to 5.5'. *At a scene, be sure to measure your Instrument Height and enter that measured height here.*

Select Backsight Direction, and set the direction to 0 degrees to represent the backsight reference measurement point being directly North of your total station. *At a scene, be sure to enter the actual direction from your reference point to your backsight reference measurement point, since it may not always be due North.*

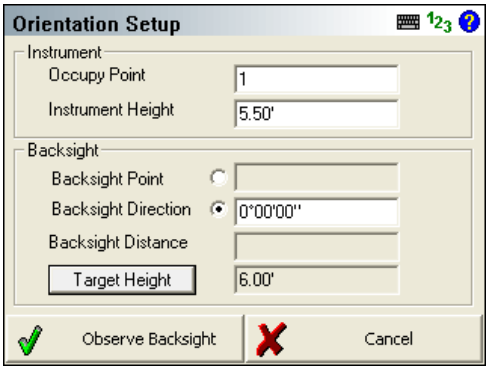


Then press the **Target Height** button.

Set the Target Height for IR EDM to 6', and then press **OK** to return to the Occupy Point screen. *At a scene, be sure to measure your Target Height and enter that measured height here.*

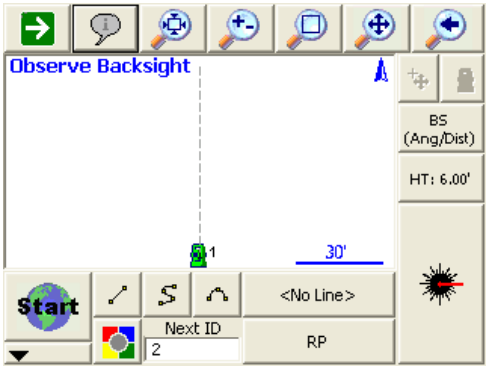


Press the **Observe Backsight** button to return to the Map Screen.



The measurement mode button "BS (Ang/Dist)" indicates that we will be taking an Angle and Distance shot to the backsight.

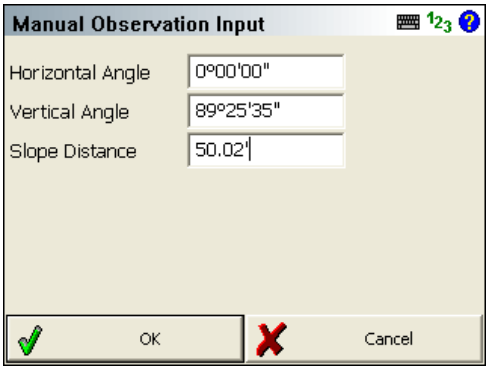
In other situations, if you want to shoot the backsight by angles only, press the measurement mode button to choose Angles Only instead of Angles & Distance.



From the map screen, press the Measure button (or your Enter key) to take the shot.

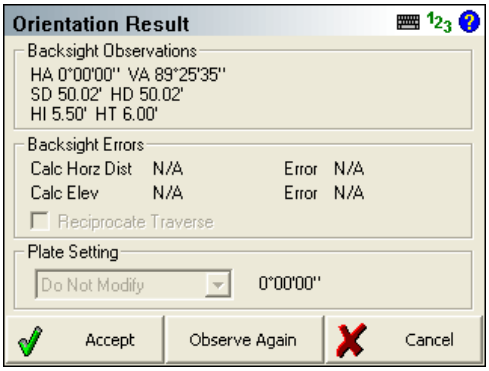
Normally this will trigger your instrument to take a measurement, but because you are in Total Station Demo mode it will prompt you to enter the angles and distance manually.

Enter a Horizontal angle of 0, a vertical angle of 89.2535 and a slope distance of 50.02. Then press OK.



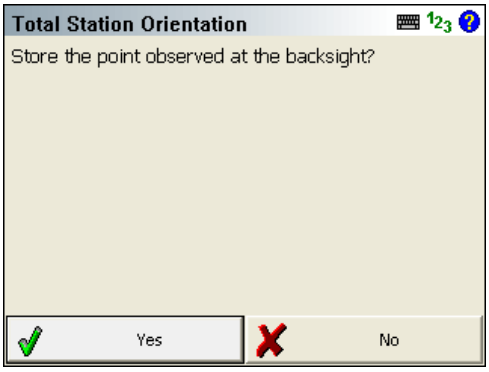
It will now let you review your backsight information. Ensure that your HI *(Height of Instrument)* and HT *(Height of Target)* were set correctly, and that the HD *(Horizontal Distance)* matches the baseline distance you set the reference points apart, within your acceptable tolerances.

When connected with your total station, you may be able to choose a Plate Setting option to zero your instrument onto the backsight point if your total station supports this ability.



Then press **Accept**.

When it asks if you would like to store the observed backsight point, press **Yes**.

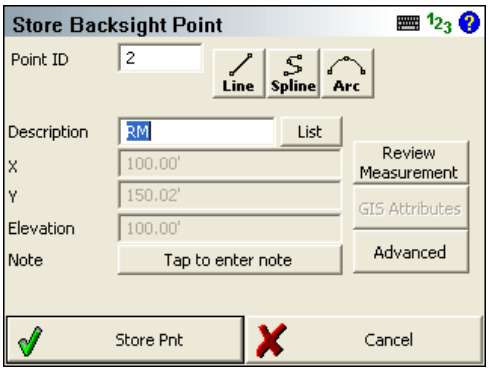


It will now ask for the point ID and description for the backsight point we just shot. Give it an ID of 2, and a Description of RM.

Note, you can not change the coordinates of any measured point.

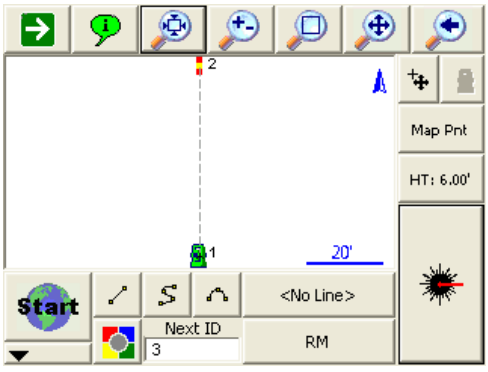
Then press **Store Point**.

*Select **Yes** if you are asked if you want to add the description RM to your project automap library.*



You will then be taken back to the map screen.

Press the Zoom Extents button to see the entire job so far. Because we have completed the setup process, you will now see an instrument icon displayed on the occupied reference point (1) and a prism pole icon displayed on the reference measurement backsight point (2).



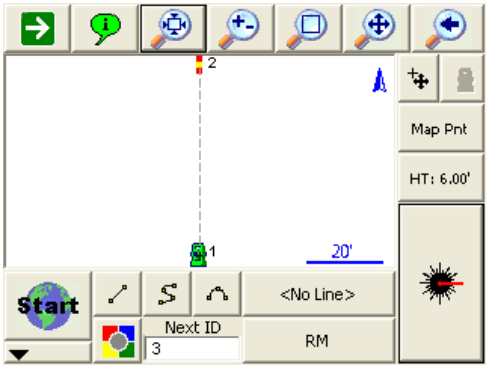
Measuring the Scene

Measuring Evidence Points (Without Linework)

Now that the reference point has been occupied and the reference measurement point observed, we can start measuring the evidence points.

At a scene, always ensure that your HT (Height of Target) is correct. If you need to change the Target Height, press the HT button to change it.

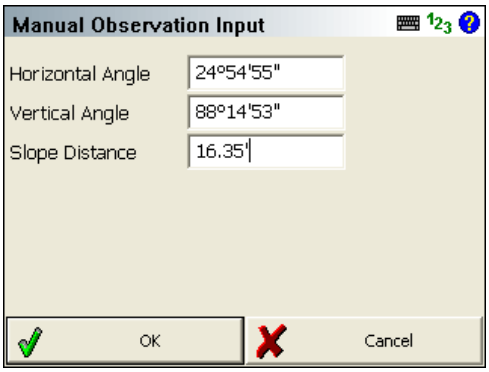
Press the Measure button (or your Enter key) to take the next shot.



Enter the following values, which will simulate taking a measurement with a total station. *At a scene, this screen will not appear – the values will come from your total station and you will automatically see the Store Point screen shown in the next step.*

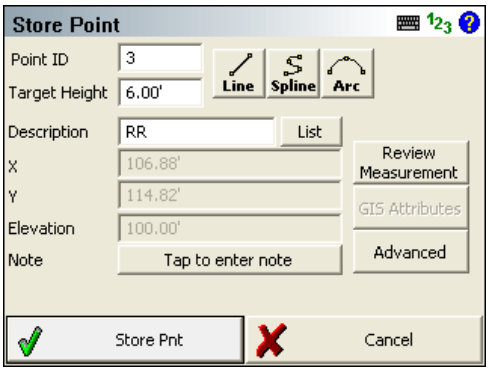
Horizontal Angle: 24.5455
Vertical Angle 88.1453
Slope Distance 16.35

Then press **OK**.



Ensure that Point ID = 3, Target Height = 6', set the Description = RR, then press the **Store Pnt** button to store this measured point.

*Select **Yes** if you are asked if you want to add the description RR to your project automap library.*

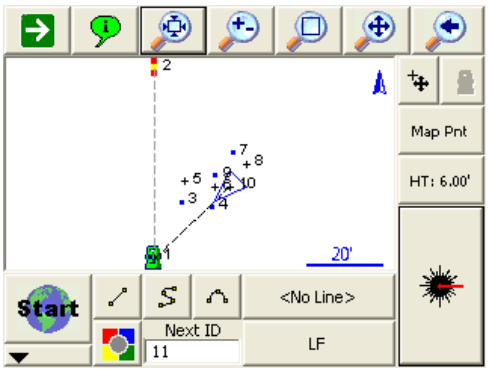


Now repeat this process for each of the other 7 tires:

Input Measurement Values			Store Point As		
Horizontal Angle	**Vertical Angle**	**Slope Distance**	**Point ID**	**Target Height**	**Description**
48.1536	88.3416	20.05	4	6.00'	RF
21.2603	88.4027	21.61	5	6.00'	LR
40.4404	88.4939	24.44	6	6.00'	LF
36.1917	89.1006	34.44	7	6.00'	RR

44.2519	89.1029	34.71	8	6.00’	LR
35.5452	88.5608	26.91	9	6.00’	RF
46.3415	88.5658	27.27	10	6.00’	LF

We have now picked up all 8 tires from the 2 cars.

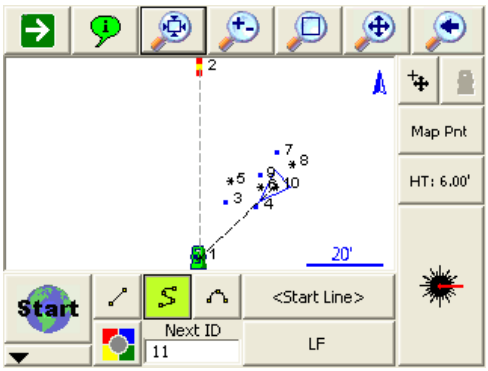


Measuring Evidence Points (With Linework)

Next let’s pick up the skid marks.

Press the Curvy Line button to start drawing a new curvy line. You will see the “No Line” button change to “Start Line”.

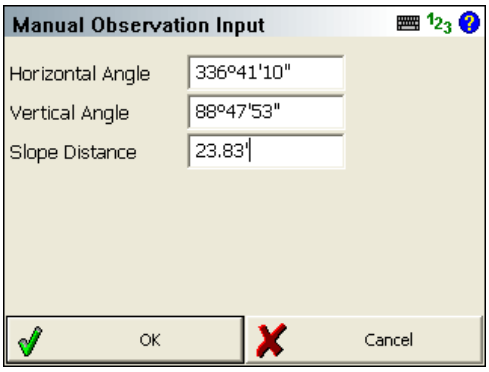
Press the Measure button (or your Enter key) to take the next shot.



Enter the following measurement values:

Horizontal Angle = 336.4110
Vertical Angle = 88.4753
Slope Distance = 23.83

Then press **OK**.

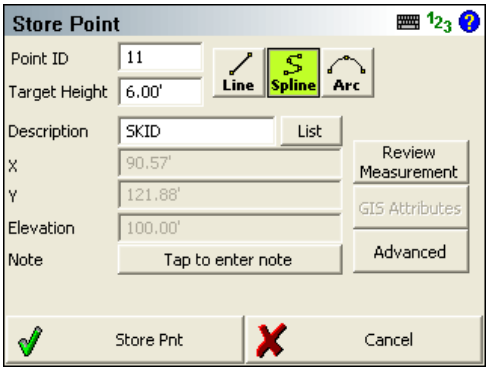


It will now ask for the point ID and description for the point we just shot.

Point ID = 11
Target Height = 6.00'
Description = SKID

Then press **Store Point**.

*Select **Yes** if you are asked if you want to add the description SKID to your project automap library.*



Now repeat this process for each of the other measurements along the first skid line:

Input Measurement Values			Store Point As		
Horizontal Angle	**Vertical Angle**	**Slope Distance**	**Point ID**	**Target Height**	**Description**
354.5016	88.4025	21.60	12	6.00'	SKID
15.0102	88.3835	21.11	13	6.00'	SKID

Now that you are done drawing the first skid line, press the S Curvy Line button to end the current line. On your map screen, you will see the "SKID:1" button change to "No Line".

Now repeat this process for each of the other skid lines:

Input Measurement Values			Store Point As		
Horizontal Angle	**Vertical Angle**	**Slope Distance**	**Point ID**	**Target Height**	**Description**
PRESS S TO START A NEW CURVY LINE					
353.0027	88.4203	22.05	14	6.00'	SKID
12.3922	88.4121	21.86	15	6.00'	SKID
31.3625	88.4531	23.08	16	6.00'	SKID
PRESS S TO END THE CURRENT LINE (SKID:2) THEN PRESS S TO START A NEW CURVY LINE					
330.4759	88.3106	19.34	17	6.00'	SKID
353.1659	88.1634	16.62	18	6.00'	SKID
19.3441	88.1444	16.33	19	6.00'	SKID
PRESS S TO END THE CURRENT LINE (SKID:3) THEN PRESS S TO START A NEW CURVY LINE					
350.5744	88.1926	17.09	20	6.00'	SKID
16.2127	88.1855	17.01	21	6.00'	SKID
39.3313	88.2930	19.00	22	6.00'	SKID
PRESS S TO END THE CURRENT LINE (SKID:4)					

Your scene should now look like the following.

Use the Zoom and Pan buttons to get a closer look at your measured evidence points.

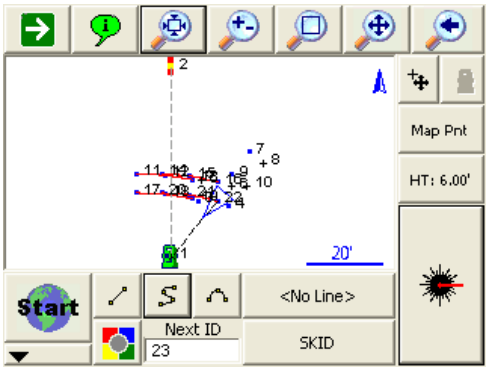
 Zoom Extents

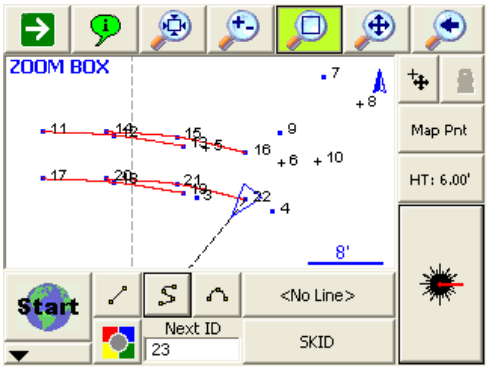
 Zoom In/Out

 Zoom Window

 Pan

 Zoom Previous





As an additional exercise, you can use the following measurement values to simulate measuring the road. *Notice that halfway through the descriptions switch from EP to CL.*

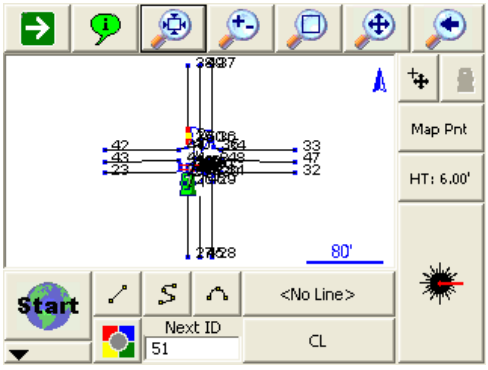
Input Measurement Values			**Store Point As**		
Horizontal Angle	**Vertical Angle**	**Slope Distance**	**Point ID**	**Target Height**	**Description**
PRESS TO START A NEW STRAIGHT LINE					
278.2146	89.4059	90.35	23	6.00’	EP
319.0447	88.2111	17.40	24	6.00’	EP
PRESS TO SWITCH FROM STRAIGHT LINE TO 3-POINT ARC					
337.0411	87.2505	11.10	25	6.00’	EP
NOTICE THAT IT AUTOMATICALLY RETURNS TO STRAIGHT LINE					
336.0641	81.4305	3.47	26	6.00’	EP
181.0352	89.3703	74.87	27	6.00’	EP
PRESS TO END YOUR CURRENT LINE (EP:1) ***PRESS TO START A NEW STRAIGHT LINE***					
163.1141	89.3801	78.20	28	6.00’	EP
82.0528	88.4443	22.83	29	6.00’	EP
PRESS TO SWITCH FROM STRAIGHT LINE TO 3-POINT ARC					
68.1218	88.5731	27.51	30	6.00’	EP
NOTICE THAT IT AUTOMATICALLY RETURNS TO STRAIGHT LINE					
68.0305	89.1107	35.16	31	6.00’	EP
83.1329	89.4434	111.39	32	6.00’	EP
PRESS TO END YOUR CURRENT LINE (EP:2)					

PRESS TO START A NEW STRAIGHT LINE					
71.2619	89.4516	116.68	33	6.00’	EP
41.1657	89.2513	49.43	34	6.00’	EP
PRESS TO SWITCH FROM STRAIGHT LINE TO 3-POINT ARC					
32.3039	89.2350	47.52	35	6.00’	EP
NOTICE THAT IT AUTOMATICALLY RETURNS TO STRAIGHT LINE					
25.3721	89.2707	52.28	36	6.00’	EP
10.1428	89.4629	127.17	37	6.00’	EP
RESS TO END YOUR CURRENT LINE (EP:3) ***PRESS TO START A NEW STRAIGHT LINE***					
359.2147	89.4616	125.15	38	6.00’	EP
358.1835	89.2333	47.16	39	6.00’	EP
PRESS TO SWITCH FROM STRAIGHT LINE TO 3-POINT ARC					
353.5048	89.1721	40.31	40	6.00’	EP
NOTICE THAT IT AUTOMATICALLY RETURNS TO STRAIGHT LINE					
342.5657	89.1545	38.85	41	6.00’	EP
292.3344	89.4215	96.80	42	6.00’	EP
RESS TO END YOUR CURRENT LINE (EP:4) ***PRESS TO START A NEW STRAIGHT LINE***					
285.4230	89.4129	92.86	43	6.00’	CL
335.3731	88.5744	27.61	44	6.00’	CL
RESS TO END YOUR CURRENT LINE (CL:1) ***PRESS TO START A NEW STRAIGHT LINE***					
171.5602	89.3716	75.61	45	6.00’	CL
73.3030	87.2445	11.08	46	6.00’	CL
RESS TO END YOUR CURRENT LINE (CL:2) ***PRESS TO START A NEW STRAIGHT LINE***					
77.1140	89.4451	113.43	47	6.00’	CL
52.2207	89.1815	41.18	48	6.00’	CL
RESS TO END YOUR CURRENT LINE (CL:3) ***PRESS TO START A NEW STRAIGHT LINE***					
4.5045	89.4619	125.59	49	6.00’	CL
12.4059	89.2426	48.32	50	6.00’	CL
PRESS TO END YOUR CURRENT LINE (CL:4)					

We have now completed measuring all of the evidence points for this scene, and it should look like the following.

Press the Zoom Extents button to see the entire job so far.

At a scene, you will very likely measure many more evidence points than in this simple example.

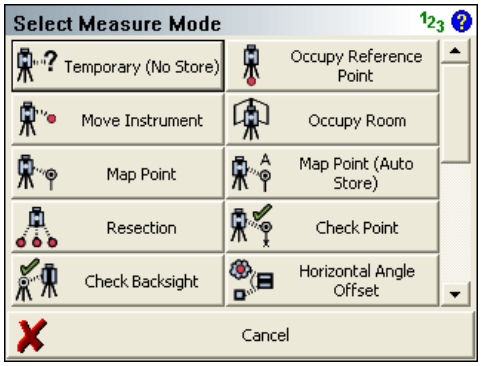


Check your Backsight Reference

Before moving your instrument, taking down your instrument, if you suspect something may have happened to the instrument, or even just periodically throughout your scene measurement, you should check the backsight measurement. Checking your backsight will catch any situations such as if the total station has been bumped or moved or if it has settled into unstable ground.

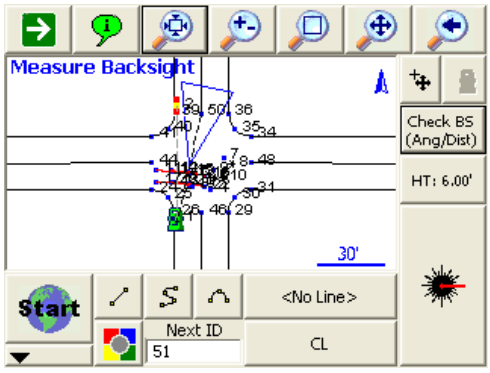
Click on the Measurement Mode button (it currently says **Map Point**) to open the Select Measure Mode screen.

Then press the **Check Backsight** button



At a scene, take your prism pole back to the reference measurement point and sight it.

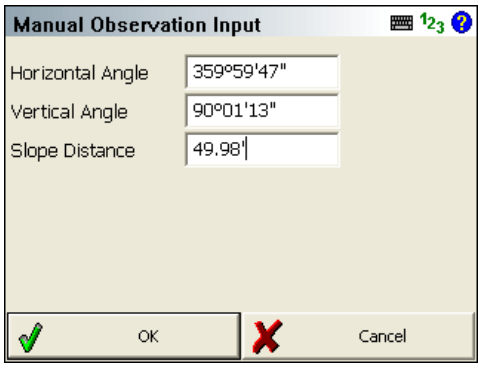
Press the Measure button (or your Enter key) to take the measurement.



Enter the following measurement values:

Horizontal Angle = 359.5947
Vertical Angle = 90.0113
Slope Distance = 49.98

Then press **OK**.

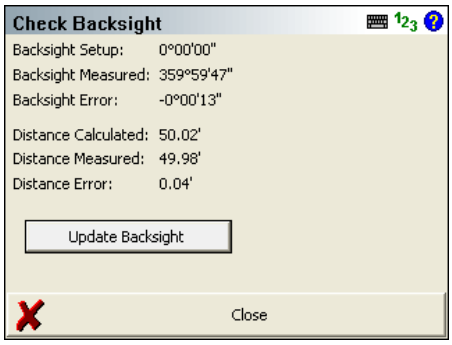


Ensure that your Backsight Error and Distance Error are within your desired tolerances.

If nothing has happened to upset the total station's backsight reference, then the check backsight measurement errors should be very close to zero. In this case, they are good.

Generally speaking, a Backsight Error of more than about 1 minute (00°01'00") indicates that something has happened to upset the total station's backsight reference – even if the Distance Error is very low. Over a distance of 100', a 00°01'00" angle represents a distance of 0.03' or about half an inch.

Press the **Close** button.



The Check Backsight results are always recorded into the RAW file, so they are there for later scrutiny if necessary.

If the backsight error is significant, you may opt to re-measure any evidence points that are in doubt. While determining which evidence is questionable is up to your judgment call (or ultimately, perhaps, a judge's), the best way to really guarantee that the measurements are valid and will not be questioned in court is to re-measure everything that was measured since your last backsight observation. ***This is why quick periodic backsight checks can prove to be invaluable!***

Summary

Congratulations! You have now used Evidence Recorder to simulate measuring a scene. You occupied a reference point, measured your backsight reference measurement point, measured several evidence points including drawing linework at the scene, and checked the backsight measurement.

For more advanced features such as moving your instrument to a new reference point for measuring large scenes, or using the various other scene measurement tools, please refer to your Evidence Recorder manual.

