STATE OF CONNECTICUT

DEPARTMENT OF TRANSPORTATION

Section 1. Electronic Engineering Data (EED)

1.1. What is it?

DGN-MicroStation CAD file converted to .DXF format

ALG-InRoads geometry file converted to Land XML

DTM-InRoads digital terrain model converted to Land XML

1.2. Data Preparation

Detach any raster images from the MicroStation dgn file

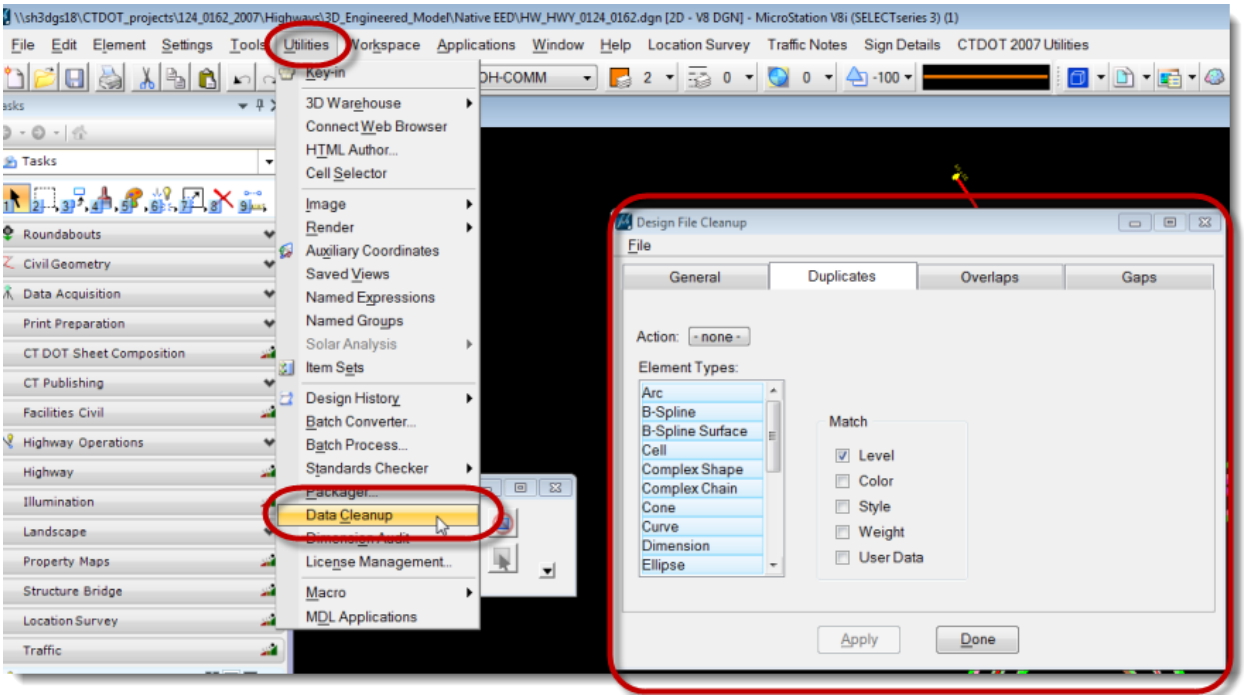
Detach any reference files, they will be converted separately

Delete any unnecessary design line work

Run Data Clean up to accomplish:

Delete any unnecessary levels

Delete any duplicate lines



1.3. Convert EED for Business Center

1.3.1 Convert DGN

Open the MicroStation file

Select File>Export>DGN, DWG, DXF

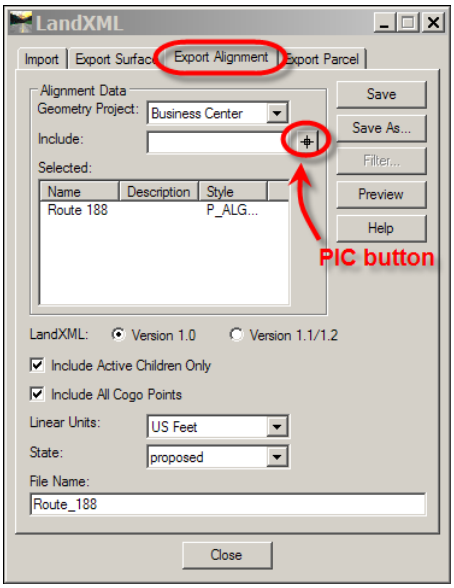
Select Save as Type: Autodesk(R) DXF Files (*.dxf)

1.3.2 Convert Alg

- Note: The alignments that you wish to export must be displayed in the MicroStation .dgn file.

In InRoads, Open the InRoads Alignment file (*.alg)

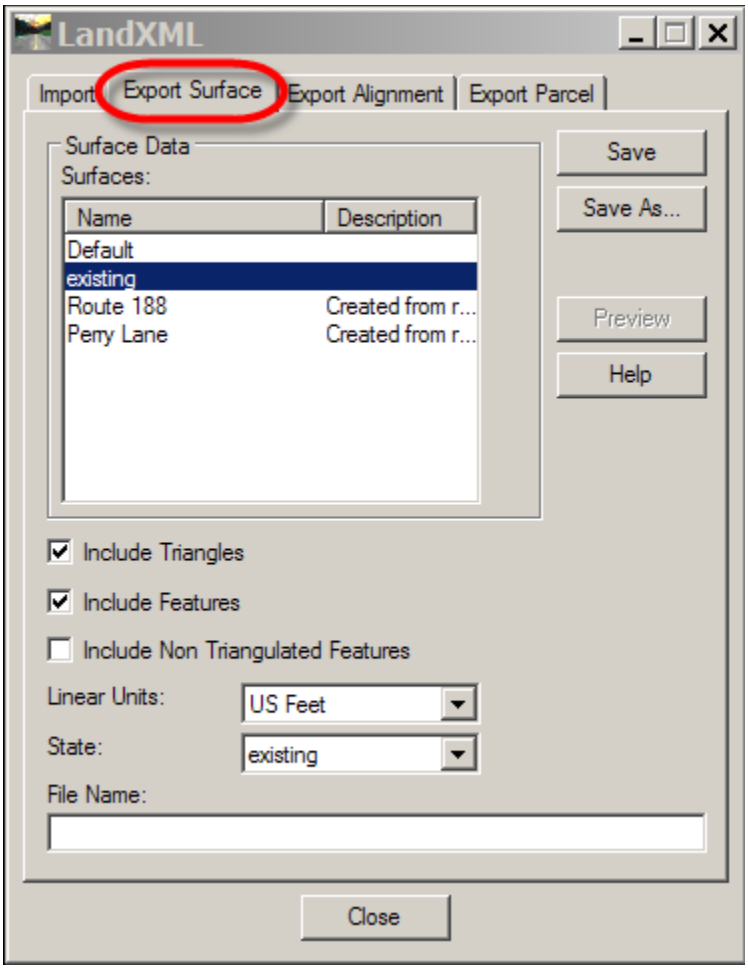
Select **File**>**Translators**> **Land XML Translator**



1) Select the **Export Alignment** tab
2) Select the .alg file under **Geometry Project**
3) Select the **PIC** button and graphically select a single alignment you wish to export:
4) Check **Version 1.0, Include Active Children**, and **Include all Cogo Points**
5) Select **Save As**, name the file (with alg in the file name, i.e. Main_Street_ALG) and note where the file is being saved to.
6) Repeat steps 5-7 for any additional alignments you wish to export.

1.3.3 Convert DTM

1) In InRoads, Open the InRoads Surface file(s) (*.dtm)
2) Select **File**>**Translators**> **Land XML Translator**

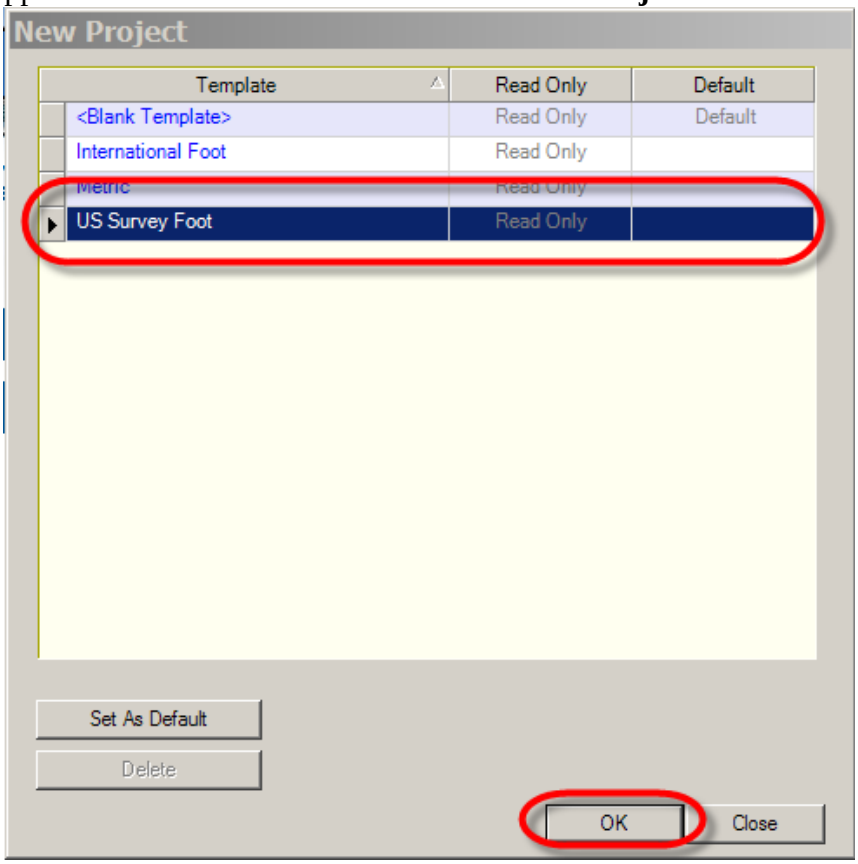


3) Select the **Export Surface** tab
4) Select the surface you wish to export
5) Select the **PIC** button and graphically select a single alignment you wish to export:
6) Check **Include Triangles** and **Include Features**
7) Set **Linear Units** to **US Feet**
8) Set **State** to **existing** for existing ground surfaces and to **proposed** for all design surfaces.
9) Select **Save As**, name the file (with dtm in the file name, i.e. Main_Street_DTM) and note where the file is being saved to.
10) **Repeat** steps 4-9 for any additional surfaces you wish to **expor**t.

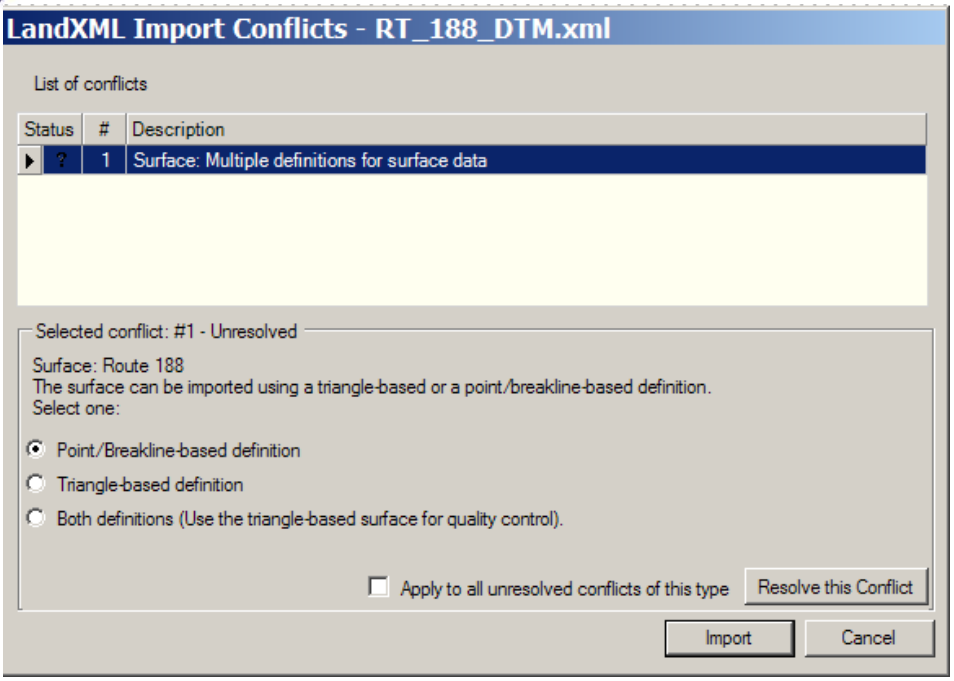
Section 2. Import EED into Business Center

Section 3. Creating Business Center Project

1) Open **Trimble Business Center**
2) In the upper left corner of the screen click **File>New Project**



3) Click **US Survey Foot or Metric** depending on the units of the project
4) Click **OK**
5) Click **File>Save Project As…**
6) Name the Project File
7) Next, **drag and drop** the electronic engineering data into BC one at a time
8) The file formats being imported into business center **must be .xml or, .dxf**
9) When bringing **surface files** into BC the software will prompt you to select a **definition** shown in the box below
10) Choose the first option>**Point/Breakline-based definition**

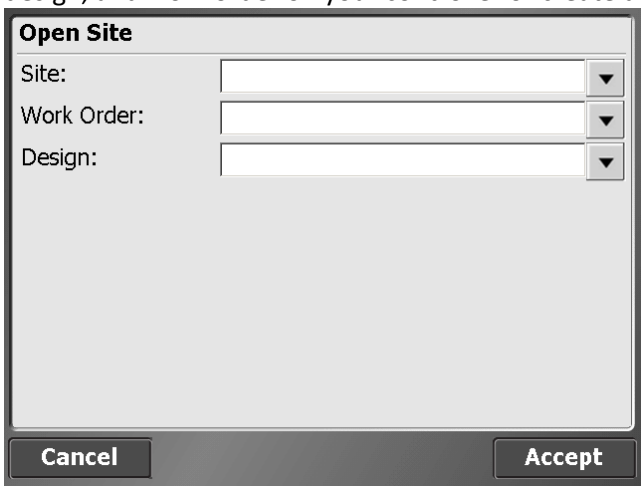


11) Next in the upper left screen select **View>View Filter Manager**
12) Click on the **small box** next to the list of imported files to view them
13) Next go to the upper right of the screen>**Field data**
14) **Select Job site manage**, see if there are any collectors available if not plug in data collector into PC and sync the device to the PC. (Instructions to sync using USB stick coming soon)
15) Next go to **Field data** tab
16) Open **Job Site Manager>create a job site**,
17) Name New Site
18) Select the **controller**
19) Click **OK**
20) Check **units** in the site name box and change if needed
21) **Site Calibration** will be added into the project after completed in the field
22) Next go to **Site map** and select the **survey ground file**. The view on the BC screen will, be the back ground on the handheld soon you will create the design map of the proposed work to be shown on the tablet.
23) Next click **close**
24) Next go to the **Field data** pull down and select **create jobsite design**
25) Click the **controller to assign to the project** if one does not exist one must be sync before continuing
26) Assign surface or InRoads alignment in the model section by clicking the **edit** button
27) Next go into the **design Map**
28) Click edit select the proposed line work you wish to view on the tablet in the field.
29) Next go to **Field Data** data pull down
30) Create a **work order**
31) Name the **work order by date and or activity**

32) Next copy the **entire project folder from the Trimble synchronizer file folder from the PC to the same folder in the hand held.**

Section 4. SCS900 software startup and calibration

1) Assemble GPS unit in the field
2) Turn on the GPS receiver
3) Turn on the controller device
4) Start the SCS900 software on your controller by tapping the Trimble SCS900 icon. The SCS900 software will start in the Open Site dialog where you can select an existing site, design, and work order on your controller or create a new one.

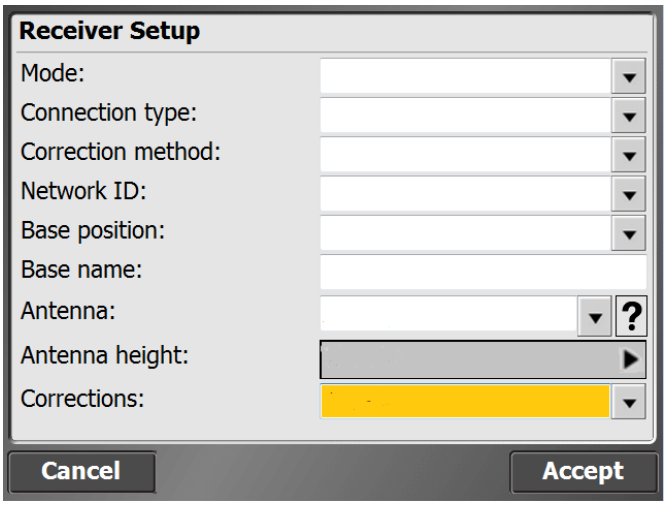


5) After clicking the Accept icon, the software will load your data and load the map view. If you have previously connected a rover receiver to the site base station, the software tries to automatically connect with the last used configuration.
6) If connecting for the first time follow the steps below
7) Click on **the GPS icon**

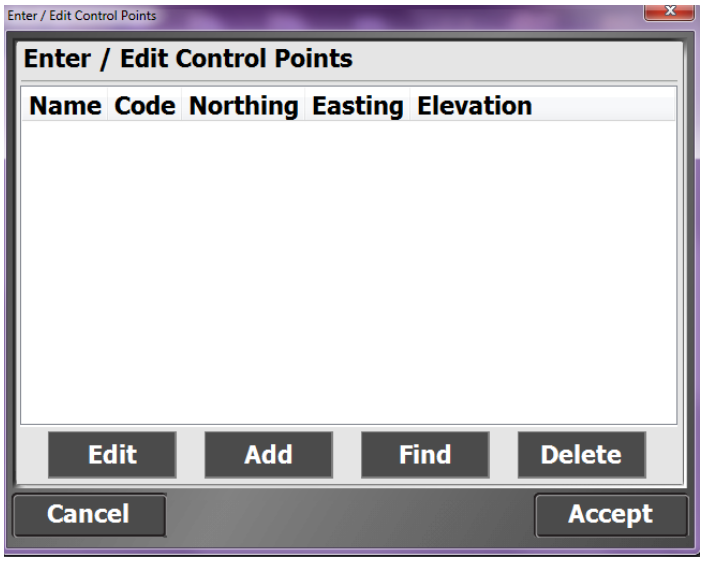
8) Click on "**Connect**" (receiver).

9) The connection type will be "**wireless**" unless there is a physical wire connecting the tablet (control device) to the receiver.
10) **Next** the controller asks the **name** of the receiver, **select** from the scanned list
11) **Next** it will detect the receiver then ask how you want to connect

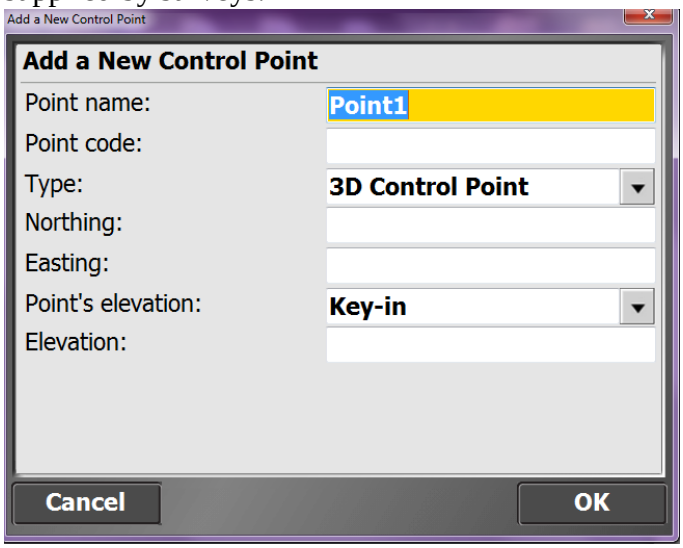
12) **Connect** the receiver to either a base RTK(via 900 megahertz radio in the receiver) or to (VRS/VRN) (Via the internet)



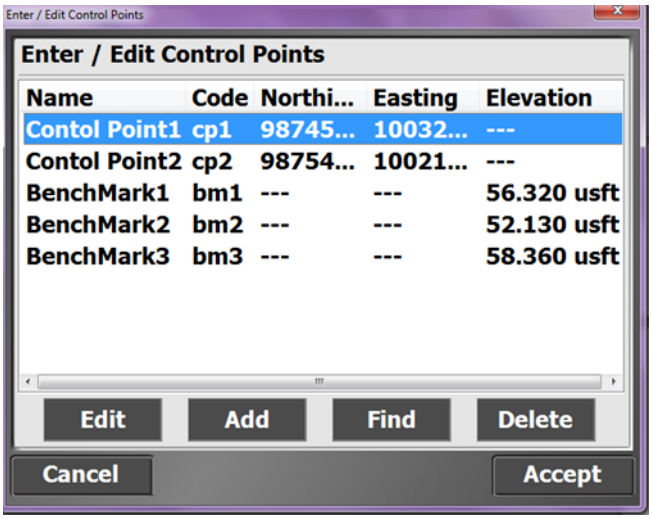
13) **Mode** will be set to either **Base** or **Rover**
14) **Connection Type** will be set to **Blue tooth** unless there is a cable
15) The **Blue tooth device** will be the **receiver name**
16) **Correction method** could be set to **internet** if using a **network solution** or **radio inside the receiver** if using a **RTK (base solution)**
17) **Server address** will be **acorn.uconn.edu** if using a **network solution** or will be set to the **base channel of choice.**
18) **Data stream** will be set to **VRN_CMRx** if using a **network solution** or a **specific base name** if using **single base solution**
19) **Antenna height** will be **6.563ft or 2m**.
When using a **base station or network solution** always check at least one point to verify accuracy before and after using the GPS unit.
20) The software will prompt you to calibrate
21) Go to the Enter /Edit control point list and review the control point and bench mark information that was pre-entered via .cvs file in the project folder



22) If there are no control points or bench marks go to the same Enter/Edit control point list and manually Add the information typically taken from the survey ground file or supplied by surveys.



23) If the site is not calibrated then software will prompt you to calibrate. Start by picking a control point either from the Enter/Edit control point list or from the graphics shown on the screen.



24) At this time the point needs to be located on the earth within the intended construction site and the equipment needs to be setup over the point and leveled before measuring the point

25) Repeat this operation for all the control points and bench marks once you in tolerance accept the calibration

26) Next go to the main window by clicking the 

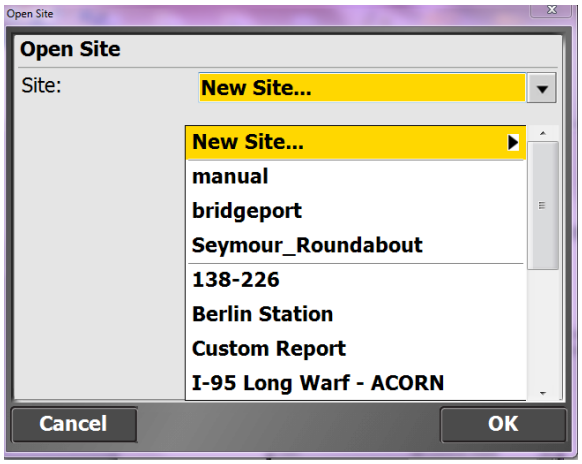
27) Click on **GPS** 

28) Click the **Recheck System** 

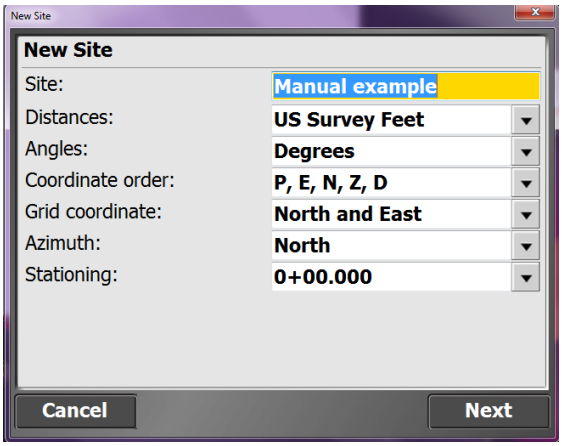
29) Next go to Point Name located at the top of the screen and choose a point to do a system recheck by setting the equipment over a known point and measure it, the system will tell you if you are in tolerance and that everything is go to go to work.

Section 5. Equipment Start up with no calibration use of state plane coordinate system and Geoid file

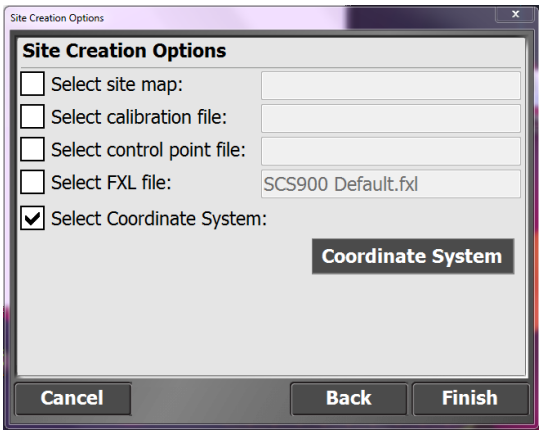
1) Within the scs900 software create a new site



2) Choose the settings for the new site and click next

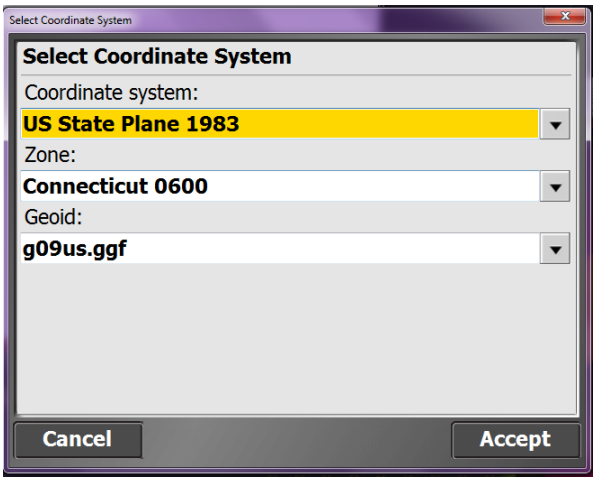


3) Next check Coordinate system box and then click on the Coordinate system option



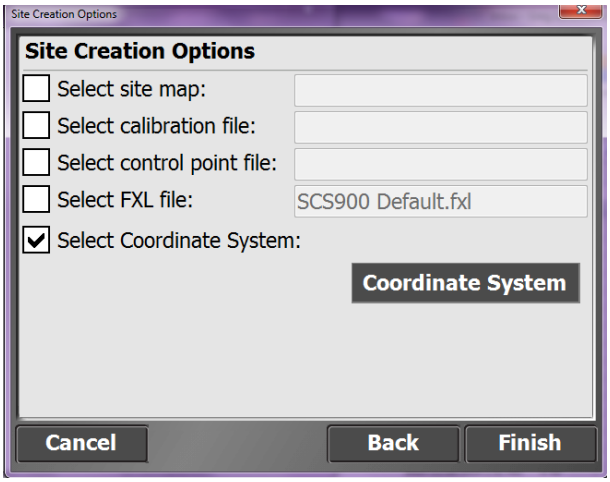
4) Next choose the Coordinate system, Zone and Geoid file

5) Click Accept



6) Next select the Site Creation Options you have data available

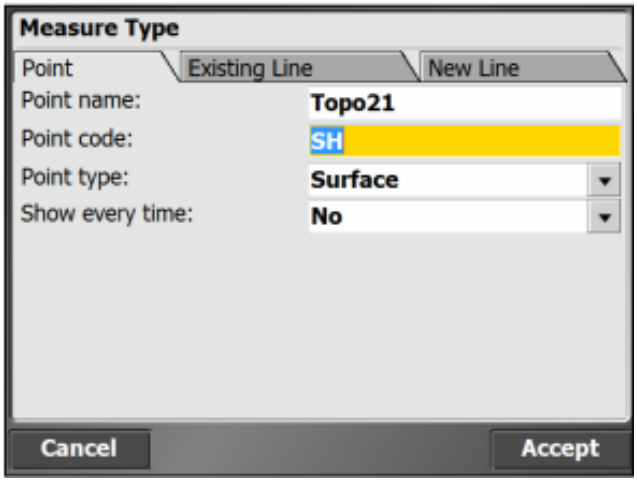
7) Click Finish and Start measuring



Section 6. Measuring a surface or a feature

1. If the software is no tin Measure mode, tap the Home menu and then tap Measure.

2. Tap the icon highlighted above to choose between point and line and surface and non-surface
   feature to be measured:



3. You can also enter a point name (will be automatically incremented) and point code. The status bar icon changes depending on what kind of point or line you choose to measure:

Icon		Definition
	Surface Point	Elevation is used to create a terrain model.
	Feature Point	Elevation is not used to create a terrain model.
	Feature Line or Area	Elevation is not used to create terrain model.
	Breakline, Volume Boundary, or Outer Boundary	Elevation is used to create a terrain model.

To create an outer boundary, volume boundary, or surface points to add to an existing line, select

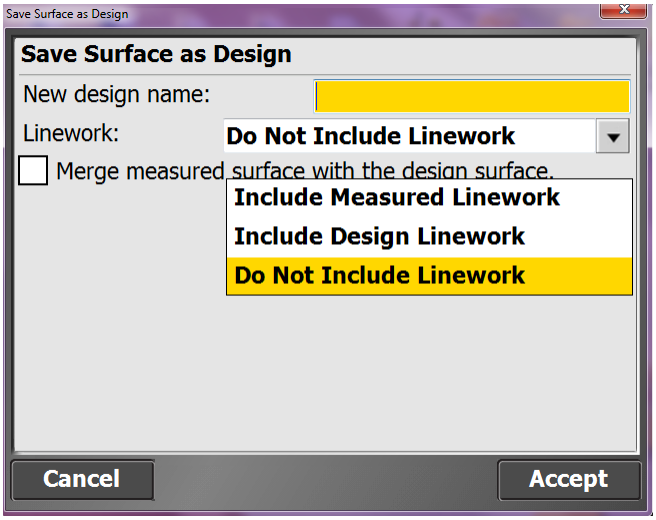
the correct line type. Once a surface is measured, you can save the surface as a design and then
preform a material thickness check.

Section 7. To save the surface as a design:

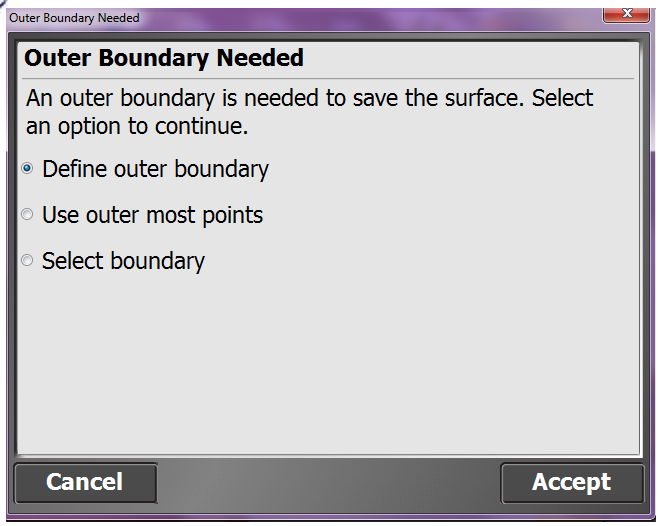
1. From the Home menu, tap Import/Export.

2. Tap Surface as Design

3. Name the design
4. Include Measured Linework
5. Do not merge surface with design surface unless you understand what you are doing.
6. Click Accept



7. Choose the outer boundary you have available any of the three options will work.



8. Click Accept

Section 8. Create Record .txt file for reporting using SCS report utility-64

The following work flow shows how to bring field collected data into the office software. This will enable the engineer to generate reports as well as future electronic surfaces created from work order surface data. These surfaces will be used for cut / fill checks as well as volume computations generated from a surface to surface volume quantity. The two software being discussed are Trimble SCS900 which is a Site based software and Trimble Business Center which is the office based software.

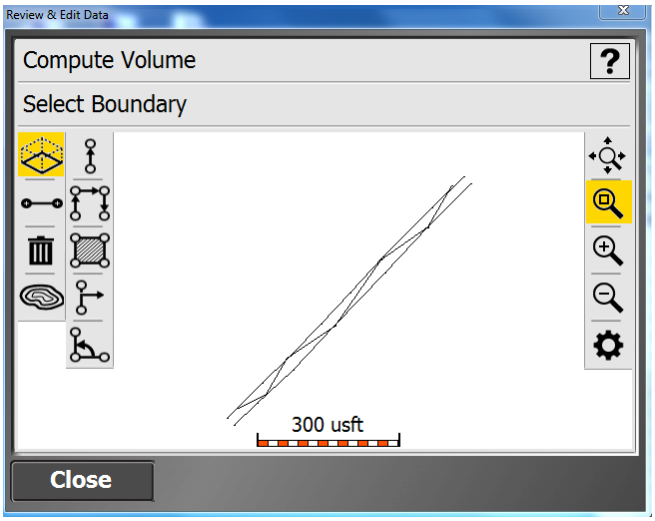
SCS900 COGO

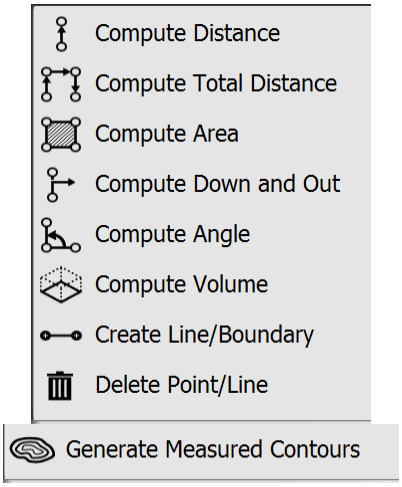
Complete the field data collection. If you are using SCS900 3.0 or newer follow these steps.

1. Go to 

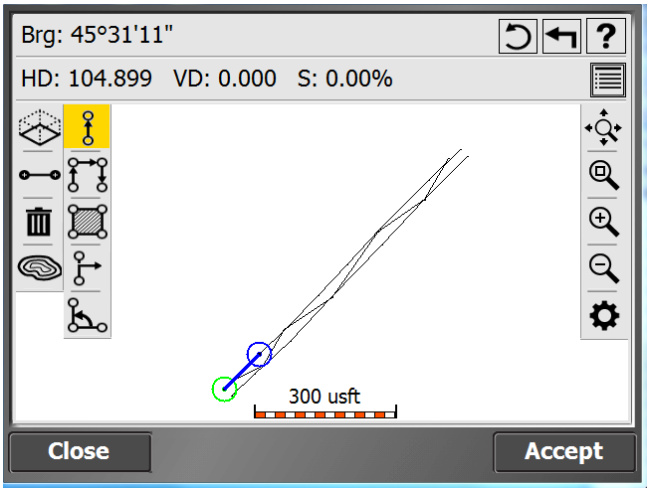
2. Next select 

3. Click the Black  and review the options

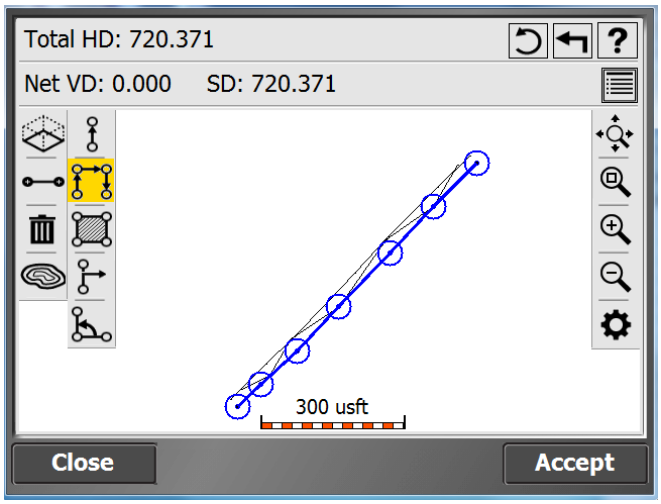




4. Compute Distance will give the segment length shown below



5. Compute total distance will give the entire length
6. Click on the line and select which measurement, in this clip we choose BCLC

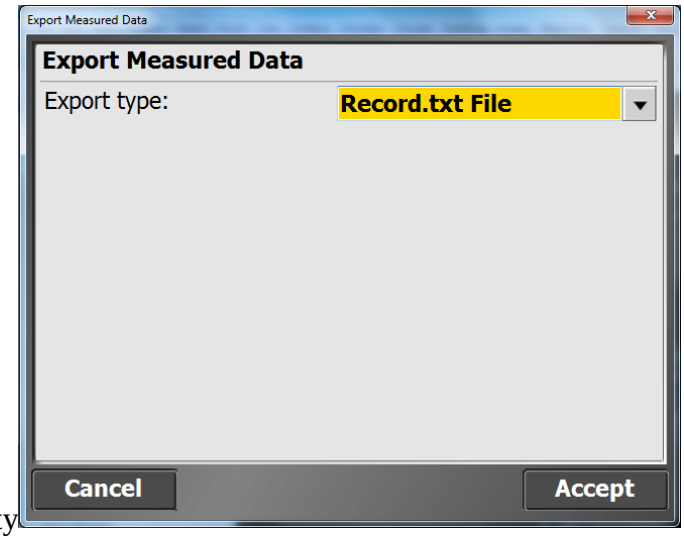


7. Next click Accept and the information get stored in the Record.txt file later brought into the Report Utility.
8. Click close

Import/Export and Measured Data

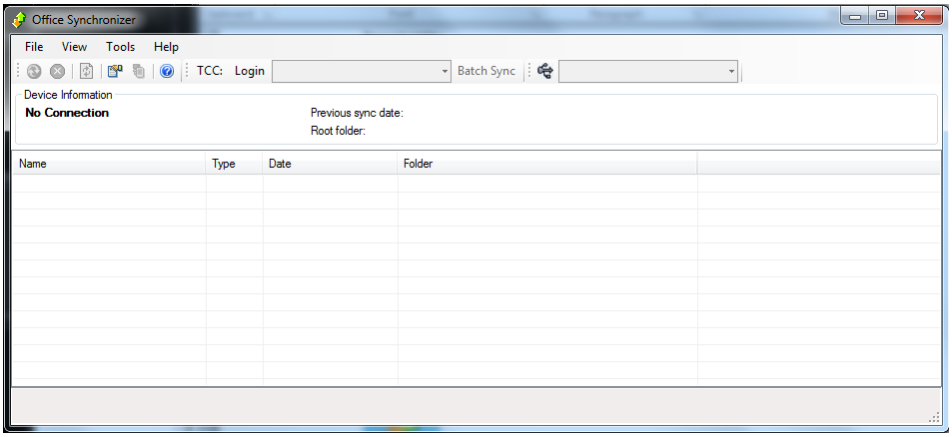
9. Go to 

10. Next go to Measured Data 

11. Select Record.txt file shown below and click Accept, this will be used in the SCS Report Utility 

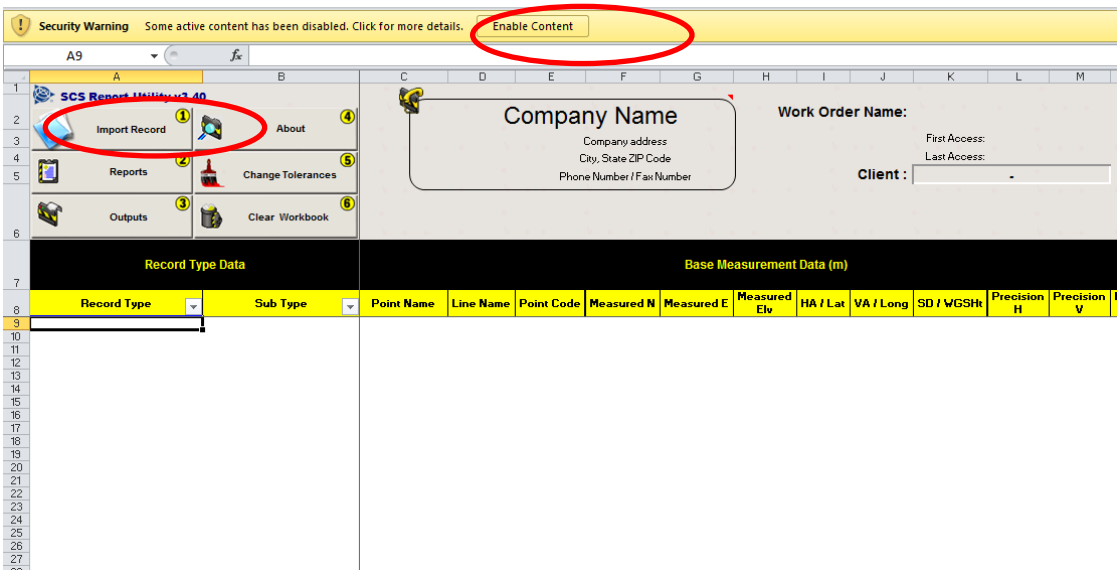
Office Synchronizer

12. Place the flash drive provided into the tablet or data collector and open the Office Synchronizer



SCS Report Utility

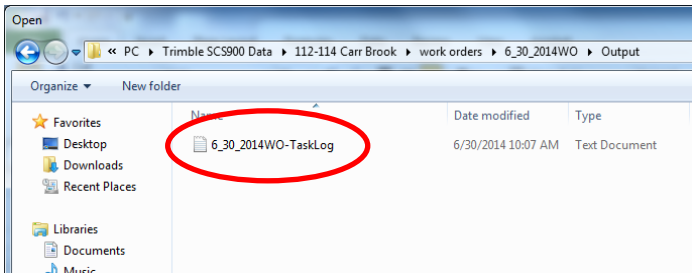
13. After the synch is complete open the scs report utility 

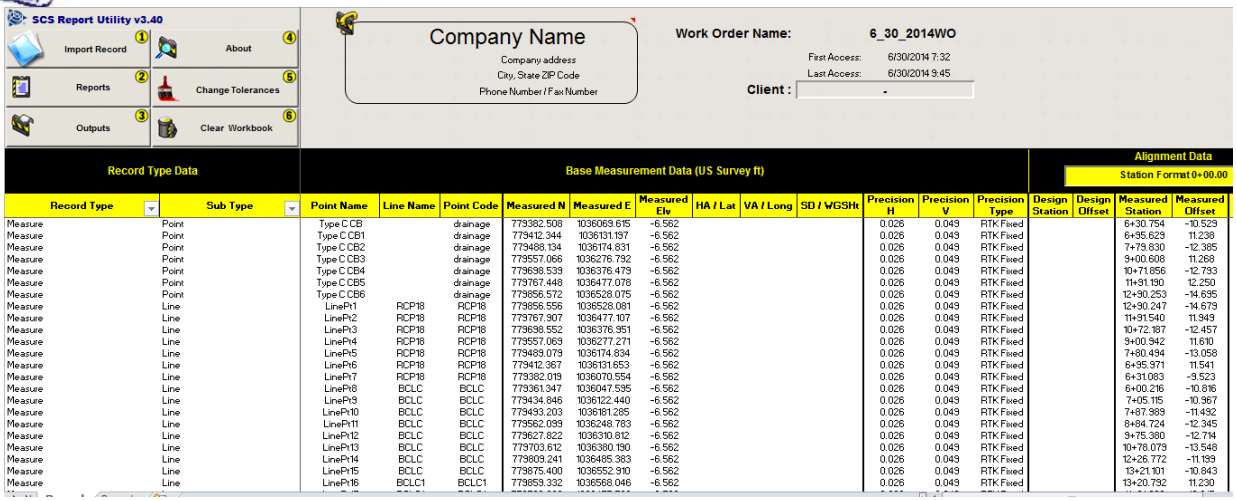


14. First click the **Enable Content**

15. Next **Import Record**

16. Browse to the C:/Trimble Synchronizer Data folder /PC/Trimble SCS900 Data/the project folder Work orders/Output and select the **Task log text file** and click open





SCS Report Utility v3.40

Import Record (1) | About (4)
Reports (2) | Change Tolerances (5)
Outputs (3) | Clear Workbook (6)

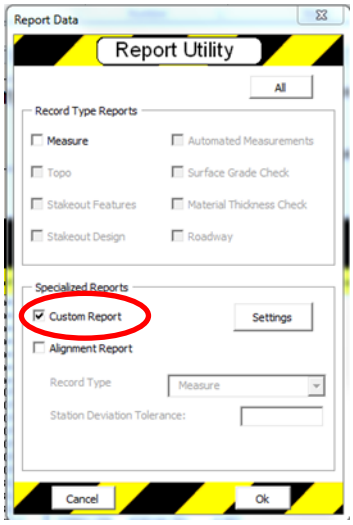
Company Name
Company address
City, State ZIP Code
Phone Number / Fax Number

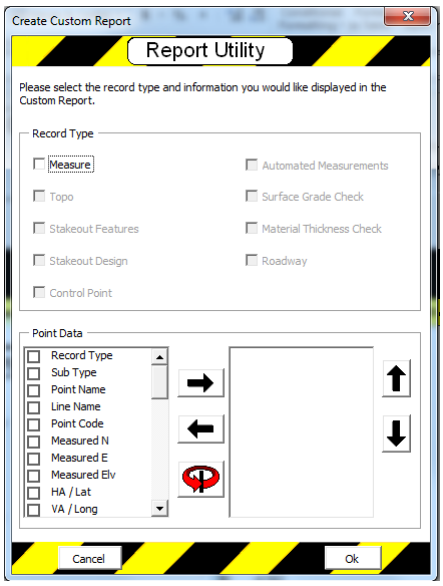
Work Order Name: 6_30_2014WO
First Access: 6/30/2014 7:32
Last Access: 6/30/2014 9:45
Client : -

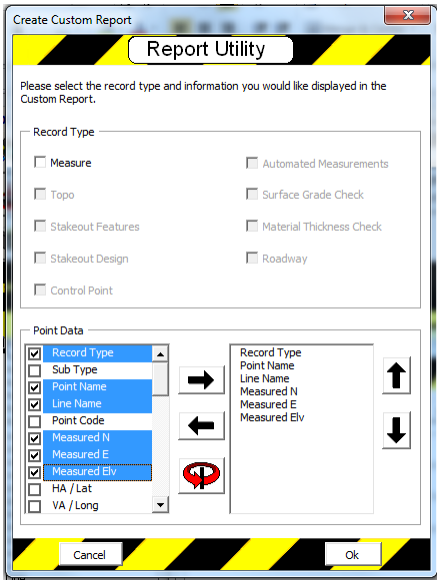
Record Type Data		Base Measurement Data (US Survey ft)												Alignment Data			
														Station Format 0+00.00			
Record Type	Sub Type	Point Name	Line Name	Point Code	Measured N	Measured E	Measured Elv	HA / Lat	VA / Long	SD / WGSHt	Precision H	Precision V	Precision Type	Design Station	Design Offset	Measured Station	Measured Offset
Measure	Point	Type C CB		drainage	779382.508	1036069.615	-6.562				0.026	0.049	RTK Fixed			6+30.754	-10.529
Measure	Point	Type C CB1		drainage	779412.344	1036131.197	-6.562				0.026	0.049	RTK Fixed			6+35.629	11.238
Measure	Point	Type C CB2		drainage	779488.134	1036174.831	-6.562				0.026	0.049	RTK Fixed			7+79.830	-12.385
Measure	Point	Type C CB3		drainage	779557.066	1036276.792	-6.562				0.026	0.049	RTK Fixed			9+00.608	11.268
Measure	Point	Type C CB4		drainage	779636.539	1036376.479	-6.562				0.026	0.049	RTK Fixed			10+71.856	-12.793
Measure	Point	Type C CB5		drainage	779767.448	1036477.078	-6.562				0.026	0.049	RTK Fixed			11+91.190	12.250
Measure	Point	Type C CB6		drainage	779856.572	1036528.075	-6.562				0.026	0.049	RTK Fixed			12+90.253	-14.695
Measure	Line	LinePt1	RCP18	RCP18	779856.556	1036528.081	-6.562				0.026	0.049	RTK Fixed			12+90.247	-14.679
Measure	Line	LinePt2	RCP18	RCP18	779767.907	1036477.107	-6.562				0.026	0.049	RTK Fixed			11+91.540	11.949
Measure	Line	LinePt3	RCP18	RCP18	779636.552	1036376.951	-6.562				0.026	0.049	RTK Fixed			10+72.187	-12.457
Measure	Line	LinePt4	RCP18	RCP18	779557.069	1036277.271	-6.562				0.026	0.049	RTK Fixed			9+00.942	11.610
Measure	Line	LinePt5	RCP18	RCP18	779483.079	1036174.834	-6.562				0.026	0.049	RTK Fixed			7+80.434	-13.058
Measure	Line	LinePt6	RCP18	RCP18	779412.367	1036131.653	-6.562				0.026	0.049	RTK Fixed			6+95.971	11.541
Measure	Line	LinePt7	RCP18	RCP18	779382.019	1036070.554	-6.562				0.026	0.049	RTK Fixed			6+31.083	-9.523
Measure	Line	LinePt8	BCLC	BCLC	779361.347	1036047.535	-6.562				0.026	0.049	RTK Fixed			6+00.216	-10.816
Measure	Line	LinePt9	BCLC	BCLC	779434.846	1036122.440	-6.562				0.026	0.049	RTK Fixed			7+05.115	-10.967
Measure	Line	LinePt10	BCLC	BCLC	779493.203	1036161.285	-6.562				0.026	0.049	RTK Fixed			7+87.393	-11.492
Measure	Line	LinePt11	BCLC	BCLC	779562.099	1036248.783	-6.562				0.026	0.049	RTK Fixed			8+84.724	-12.345
Measure	Line	LinePt12	BCLC	BCLC	779627.822	1036310.812	-6.562				0.026	0.049	RTK Fixed			9+75.380	-12.714
Measure	Line	LinePt13	BCLC	BCLC	779703.612	1036380.190	-6.562				0.026	0.049	RTK Fixed			10+78.079	-13.548
Measure	Line	LinePt14	BCLC	BCLC	779809.241	1036485.383	-6.562				0.026	0.049	RTK Fixed			12+26.772	-11.199
Measure	Line	LinePt15	BCLC	BCLC	779875.400	1036552.910	-6.562				0.026	0.049	RTK Fixed			13+21.101	-10.843
Measure	Line	LinePt16	BCLC1	BCLC1	779853.332	1036568.046	-6.562				0.026	0.049	RTK Fixed			13+20.792	11.230

Section 9. Custom Reporting

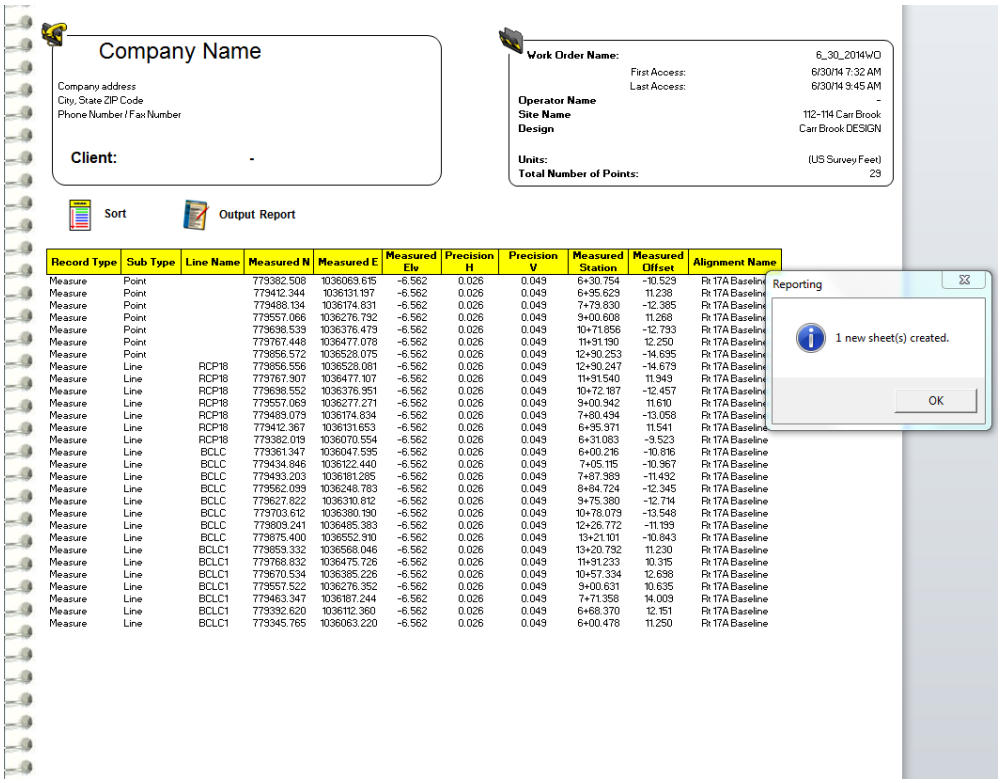
17. Go to Custom Reports and select what you want to display





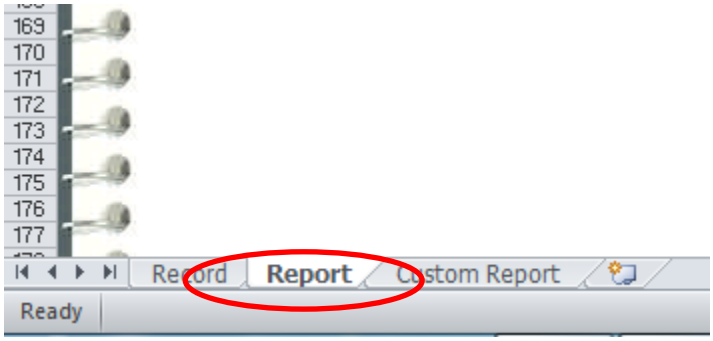


18. Click OK



Record Type	Sub Type	Line Name	Measured N	Measured E	Measured Elv	Precision H	Precision V	Measured Station	Measured Offset	Alignment Name
Measure	Point		779382.508	1036069.615	-6.562	0.026	0.049	6+30.754	-10.529	Rt 17A Baseline
Measure	Point		779412.344	1036131.197	-6.562	0.026	0.049	6+95.629	11.238	Rt 17A Baseline
Measure	Point		779488.134	1036174.831	-6.562	0.026	0.049	7+79.830	-12.385	Rt 17A Baseline
Measure	Point		779557.066	1036276.792	-6.562	0.026	0.049	9+00.608	11.268	Rt 17A Baseline
Measure	Point		779698.539	1036376.479	-6.562	0.026	0.049	10+71.856	-12.793	Rt 17A Baseline
Measure	Point		779767.448	1036477.078	-6.562	0.026	0.049	11+91.190	12.250	Rt 17A Baseline
Measure	Point		779856.572	1036528.075	-6.562	0.026	0.049	12+90.253	-14.695	Rt 17A Baseline
Measure	Line	RCP18	779856.556	1036528.081	-6.562	0.026	0.049	12+90.247	-14.679	Rt 17A Baseline
Measure	Line	RCP18	779767.907	1036477.107	-6.562	0.026	0.049	11+91.540	11.949	Rt 17A Baseline
Measure	Line	RCP18	779698.552	1036376.951	-6.562	0.026	0.049	10+72.187	-12.457	Rt 17A Baseline
Measure	Line	RCP18	779557.069	1036277.271	-6.562	0.026	0.049	9+00.942	11.610	Rt 17A Baseline
Measure	Line	RCP18	779489.079	1036174.834	-6.562	0.026	0.049	7+80.494	-13.058	Rt 17A Baseline
Measure	Line	RCP18	779412.367	1036131.653	-6.562	0.026	0.049	6+95.971	11.541	Rt 17A Baseline
Measure	Line	RCP18	779382.019	1036070.554	-6.562	0.026	0.049	6+31.083	-9.523	Rt 17A Baseline
Measure	Line	BCLC	779361.947	1036047.595	-6.562	0.026	0.049	6+00.216	-10.816	Rt 17A Baseline
Measure	Line	BCLC	779434.846	1036122.440	-6.562	0.026	0.049	7+05.115	-10.367	Rt 17A Baseline
Measure	Line	BCLC	779493.203	1036181.285	-6.562	0.026	0.049	7+87.989	-11.492	Rt 17A Baseline
Measure	Line	BCLC	779562.099	1036248.783	-6.562	0.026	0.049	8+84.724	-12.345	Rt 17A Baseline
Measure	Line	BCLC	779627.822	1036310.812	-6.562	0.026	0.049	9+75.380	-12.714	Rt 17A Baseline
Measure	Line	BCLC	779703.612	1036380.190	-6.562	0.026	0.049	10+78.079	-13.548	Rt 17A Baseline
Measure	Line	BCLC	779809.241	1036485.383	-6.562	0.026	0.049	12+26.772	-11.199	Rt 17A Baseline
Measure	Line	BCLC	779875.400	1036552.910	-6.562	0.026	0.049	13+21.101	-10.843	Rt 17A Baseline
Measure	Line	BCLC1	779859.332	1036568.046	-6.562	0.026	0.049	13+20.792	11.230	Rt 17A Baseline
Measure	Line	BCLC1	779768.832	1036475.726	-6.562	0.026	0.049	11+91.233	10.315	Rt 17A Baseline
Measure	Line	BCLC1	779670.534	1036385.226	-6.562	0.026	0.049	10+57.334	12.698	Rt 17A Baseline
Measure	Line	BCLC1	779557.522	1036276.352	-6.562	0.026	0.049	9+00.631	10.635	Rt 17A Baseline
Measure	Line	BCLC1	779463.347	1036187.244	-6.562	0.026	0.049	7+71.358	14.009	Rt 17A Baseline
Measure	Line	BCLC1	779392.620	1036112.360	-6.562	0.026	0.049	6+68.370	12.151	Rt 17A Baseline
Measure	Line	BCLC1	779345.765	1036063.220	-6.562	0.026	0.049	6+00.478	11.250	Rt 17A Baseline

19. Next go to the Report Tab at the bottom of the report utility



20. Copy and paste the computed value generated from the COGO section of SCS900

Compute Total Distance

Date	6/30/2014
Time	10:07:11 AM
Description	Compute Total Distance
Total HD	720.371 usft
Total SD	720.371 usft
Net VD	0.000 usft

21. If Business Center is open the project area use the snipping tool to take a graphical snap shot of the CAD graphics and copy/paste into the report utility

Record Type	Sub Type	Line Name	Measured N	Measured E	Measured Elv	Precision H	Precision V	Measured Station	Measured Offset	Alignment Name
Measure	Point		779382.508	1036069.615	-6.562	0.026	0.049	6+30.754	-10.529	Rt 17A Baseline
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Measure	Point		779557.066	1036276.792	-6.562	0.026	0.049	9+00.608	11.268	Rt 17A Baseline
Measure	Point		779638.539	1036376.479	-6.562	0.026	0.049	10+71.856	-12.793	Rt 17A Baseline
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Measure	Line	BCLC	779434.846	1036122.440	-6.562	0.026	0.049	7+05.115	-10.967	Rt 17A Baseline
Measure	Line	BCLC	779493.203	1036181.285	-6.562	0.026	0.049	7+67.389	-11.432	Rt 17A Baseline
Measure	Line	BCLC	779562.099	1036246.783	-6.562	0.026	0.049	8+84.724	-12.345	Rt 17A Baseline
Measure	Line	BCLC	779627.822	1036310.812	-6.562	0.026	0.049	9+75.380	-12.714	Rt 17A Baseline
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Compute Total Distance

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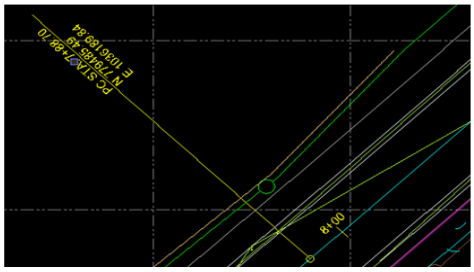


22. Save as Adobe PDF and attach into your DWR in Site Manager

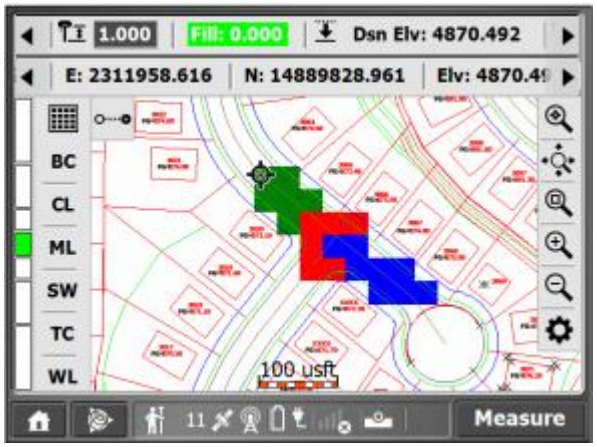
Section 10. Checking a grade/elevation

Measure a surface point at a location where you want to view and record the difference in elevation between the design surface and the actual ground.

1. If not in **Measure mode**, tap the **Home** button and then tap **Measure**.
2. Tap **Measure** to record a **surface point** and the **cut/fill value** at that location.

The software draws a box of the size that you specify around every recorded point so you can view where at a is missing.
As you move around, the values in the boxes at the top of the screen update.
Once appoint is recorded, a colored box appears around it, showing it as in tolerance (green),cut required (red),or fill required (blue).
To change the cut/fill tolerances:

1. **Tap** the Trimble icon menu and then tap Settings/Measure Settings.
2. **Enter** the required tolerances and then tap **Accept.**



Tip– If a gray box appears, tap the zoom window icon and draw a box around the area of the gray box. Gray boxes appear when the map is zoomed out too far to see the colored boxes at the specified resolution.

If no boxes appear, tap  from the tool bar on the right. Ensure that the Coverage Grid check
Box and the Cut/Fill option are selected. You can also change the grid size.

Section 11. Checking material thickness

The typical procedure for checking a material thickness is:

1. **Measure** the existing surface before laying the material.
2. **Save** the measured surface as a design.
3. **Create a new work order** and then **select** the saved design as the design.
4. Lay the new material.
5. **Check** the material thickness.

If the current material thickness is too thin, a blue square appears to show that more "fill" material is required. If the current material thickness is too thick, a red square appears to show that material is required to be "cut" away. If the current material thickness is within a specified tolerance, a green square appears to show that no action is required.

1. If not in **Measure mode**, tap the **Home button** and then tap **Measure**.
2. **Tap** the Trimble icon menu and then select Settings/Measure Settings.
3. Enter the required **thickness** as a surface **offset** (you can change tolerances here too).
4. **Tap Measure** to record appoint and the cut/fill value at that location.

As you move around, the values in the boxes at the top of the screen update; the thickness of the
Material is shown in the Thickness box.
Once appoint is recorded, a colored box appears around it showing whether it is within the tolerance range or whether more or less material is required.

Tip– If a gray box appears, tap the zoom window icon and draw a box around the area of the gray box. Gray boxes appear when the map is zoomed out too far to see the colored boxes at the specified resolution.

If no boxes appear, tap  from the tool bar on the right. Ensure that the Coverage Grid check
Box and the Cut/Fill option are selected. You can also change the grid size.

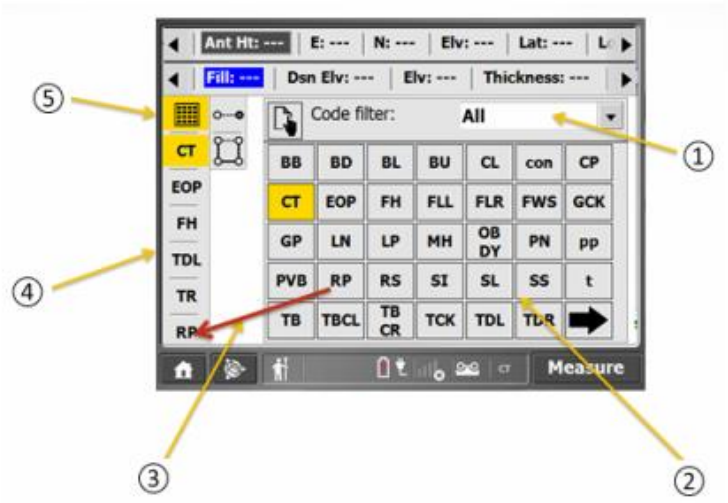
Section 12. Measuring with feature codes – Advanced Measurement module required

The software can use feature codes to record data onsite. Create and customize the feature code
library using the Feature Definition Manager of the Business Center – HCE software.
The feature code defines if a point, line, or break line is measured. The following classes of feature
codes are available:

Feature code class	Definition
	Point feature, but no surface feature.
	Line feature, but no surface feature.
	Point feature and surface point.
	Line feature and breakline.
	Feature contains optional or compulsory attributes.

The currently selected feature code and its class can be identified in the status bar. To select and

Manage feature codes in the field ,tap 



Select this option...	to...
①	filter by group or category.
②	toggle to the Grid view.
③	drag code to the Quick Select list.
④	select from the Quick Select list.
⑤	select a feature code.

To select a feature code, either tap on one of the buttons in the Quick Select list or select a feature
Code from the Grid view. The Grid view enables you to measure data without seeing the map.
Instead you have up to 34 codes to choose from with a single tap.

Both the Grid view and the Quick Select list selection enable you access feature codes quicker by
Filtering feature codes by group and category. Groups and categories must be defined in the Feature Definition Manager in the office.

A category is a class of related feature codes, for example, vegetation. For certain measurements or
tasks, you might want to group feature codes from different categories into a group for faster
access.

With each feature code, different attributes can be stored, which enables you to describe a recorded point or line with more information. Attributes need to be setup in the Feature Definition Manager and cannot be changed or created in the field.

Different properties can be applied to each attribute, for example, if it is optional or compulsory to fill out this attribute, which values are required forth is attribute, the permitted length of the text string that you can enter, or available items in a drop-down list.

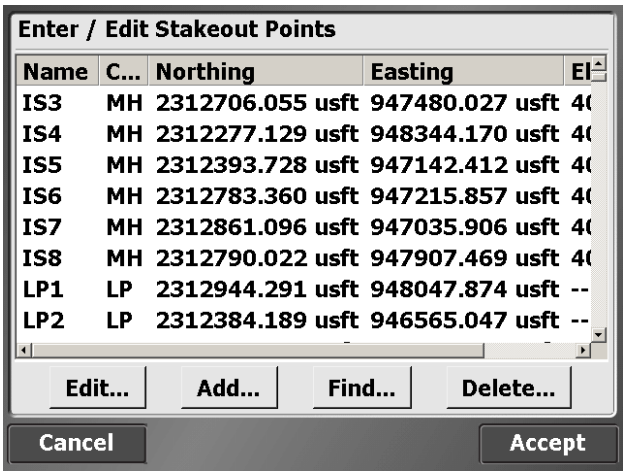
Photos

Photos can be attached as an attribute using the internal camera of your site controller.
The pictures are geo tagged using the position of the internal GPS of the device or the position of an
external SPS GPS receiver, if available. Photo attributes are setup in the Feature Definition Manager.

Section 13. Enter/Edit Stakeout Points

Use this feature to retrieve a list of all stakeout points in the currently loaded design. Tap Edit, Add,

or Find to make changes or to completely delete the point.



Section 14. Compute Volumes

Use the Compute Volume option to calculate a volume from the data you have measured. Three types of volumes can be calculated:

- To a design surface
- To an entered elevation
- To a surface created by the volume boundary (stockpile/excavation volume)

From the Review & Edit Data menu, (see page 53), tap Contour Measured Surface to view contours based on the surface you have measured. This is a useful tool to check for any major errors. The contours highlight any elevation errors in the data.

1. In the Elev. Interval field, enter a contour interval and then press Enter.
2. Tap the Compute Volume icon.
3. Tap on the boundary of the area for which you want to calculate the volume and then tap OK.

4. Select the type of volume to compute:
    1) The volume from the surface you have measured to the design surface.
    2) The volume to a user-defined elevation.
    3) The volume of a stockpile/depression.
    4) The following screen shows the result of the volume calculation. A depression or shrinkage factor can be entered to accommodate for material expansion or shrinkage.

The results of the calculation are stored in the site report using the name of the volume boundary.

Section 15. Review & Edit Data

Use this feature to delete points you may have incorrectly measured. You can also use this feature
to calculate volumes of any surfaces that you have measured.
It also enables you to display contours of the surface, which serves as a quick check that you have
correctly collected data.

From the COGO menu, tap Review & Edit Data. 

The Review and Edit Surface screen has a list of icons on the left side, which represents all the available functions:
Icon Description
Compute Volumes
Create Line/Boundary
Delete Point/Line
Generate Measured Contours
Delete Measured Points and Lines
Compute Distance
Compute Total Distance
Compute Area

Icon Description

Compute Down and Out from Line
Compute Angle
Icon Help
To undo an action, tap .

Create Points/Arcs 

Use the Create Points/Arcs option to create design data in the field. You can create new points relative to other points and lines in the work order or in the current loaded design.

From the COGO menu, tap Create Points/Arcs . 

A variety of functions is available in the bar on the left:
Icon Description

 Create a Radius Point for an arc.

 Create Offset Points from a line.

 Create an offset point at a certain station.

 Create a mid-point of a line or arc.

Icon Description

Subdivide a line or arc in segments.

 Create a point at a distance and bearing.

Enter the coordinates of a stakeout point.

 Create points at the end of a line or arc.

 Free Point Pick.

 Toggle display bar.

 Create a point at the intersection of a line.

 Tells you In and Out of a point from the Line.

 Delete Points and Lines.

 Create an arc from three points or two points and radius.

 Create a new line from two points.

 Icon help.

The points can be stored as stakeout points or as measured points. A surface can be generated from
measured points, which you can export to the GCS900/Accugrade Grade Control Systems for machine guidance.

Section 16. Precision GNSS control icons

When using the internal GPS or while connected to an external SPS receiver, an icon panel appears

at the bottom of the screen. The display swaps permanently between the following two panels: