International Union of Operating Engineers

Local 49

Trimble Siteworks V1.8+

Field Reference Guide

2025

INDEX

Understanding Projects, Work Orders & Designs

When you first open Trimble Siteworks on your Data Collectors, on the Open Project page, you are asked to select a Project, Work Order & Design. Here are some definitions of each:

Projects:

Your Contractor can have multiple Construction Projects going on simultaneously. Each Project has unique coordinates (Northing, Easting & Elevation) as well as Site Layout. They need to be separated by creating a new project for each job site within your Data Collector.

Work Orders:

Work Orders are where Stored Points & Linework created from Points taken in the Field are located for a specific project you have opened. When creating a "New Project" you must create a new "Work Order". Typically, the first Work Order created is called "Blank". The Blank Work Order simply means there are no points or linework from points contained within it.

There is no limit to the number of Work Orders stored under a Project or how many points are contained within a Work Order. In fact, more Work Orders with specific names help keep things organized within your Project. Naming Work Orders specific to what they contain makes things easier to identify in the future. A naming convention that is recommended is "Project Name-What your Doing-Date Performed" (2024 49ers Ex Util 240610).

Once it is created and information is contained with a Work Order, it can be opened at any time and more information can be added to each individual work order.

If you are tasked with locating specific information on a project or performing a Field Topo, your GPS Manager only wants those specific points. Starting a new Topo without changing or creating a new Work Order, can create false reports for Volume Tracking. Start by creating a new Work Order and name specific to what is being accomplished. Once you have finished performing the task in the field, switch back to the "Blank" Work Order to de-clutter your screen.

Work Order Examples for a Project:

1. **Before Construction activities begin, Utility Locates are marked in the field. Before Construction activities begin and the locates are obliterated, storing points where Utility Locates are marked and coding the points specifically to the utility type. Later, if you switch back to this Work Order, you can walk to those locations with your Rover and hand dig to confirm locations (Example Name: 2024 49ers Exist Util 240610)**

2. **Before, during & after Construction activities have started, the Project Manager from your Company may request a Field Topo of the Project for Material tracking purposes. Creating a new Work Order and naming it specifically will help streamline the process and lead to less rework and better Volume Reports. (Example Name: 2024 49ers Topo 240611)**
3. **When Projects are completed or after an object is set to its permanent grade or elevation, your Contractor may want it's As Built Location. Creating a Work Order that only contains As Built points will make documentation easier. (Example Name: 2024 49ers As Built 240612)**

<u>Designs:</u>

If there is a Design under your project and it is current, you will want to choose it if applicable for your daily tasks. Inside the Design Folder, it can contain one, two or all 3 file types, they are as follows:

1. **.dxf file which is linework (buildings, curbs, centerlines, etc) which was matches Engineering Firm who Designed the project for their client.**
2. **.ttm file is the 3D surface file for your project. Having a .ttm file and with your Rover connected to the Data Collector, is how we get Cut/Fill information. TTM files can be either:**
    a. **Finished Grade (FG) – FG model does not factor in Section Thicknesses. Cut/Fill information would be to top of asphalt, concrete, topsoil, etc.**
    b. **Sub Grade (SG) – SG model does factor in Section Thicknesses. Generally, SG definition would be bottom of imported materials like Concrete, gravels, asphalt, etc.**
3. **.csv file is computed stakeout points from the office and are specific items that your Contractor/Superintendent wants staked in the field.**

A Design can also show you:

1. **Cut/Fill information for where you are currently standing when your Rover and Data Collector are connected.**
2. **Show you Project Boundaries**
3. **Project linework, etc.**

Common File Types & Extensions

SCS900 / Trimble Siteworks (Windows & Android)

1. **.csv = Common Control Point file (comma separated values)**
2. **.txt = Point/Control Point file**
3. **P, N, E, Z, D = common Control Point output format (P-Point Number, N-Northing, E-Easting, Z-Elevation, D-Description)**
4. **.cal = In Progress Calibration**
5. **.dc = Finished Calibration; also required within Business Center for Machine Control output**
6. **.ttm = Design Surface**
7. **.dxf = Design Linework**
8. **.xml – Project Configuration File (Entered when creating a New Project)**

GCS900

1. **.svd = Design Surface**
2. **.svl = Design Linework**
3. **.cfg = Calibration (for older Firmware Versions)**
4. **.cal = Calibration (for newer Firmware Versions or if using a Geoid)**

Earthworks

1. **.dsz = Surface & Linework File**
2. **.vcl = Surface & Linework File + 3D Linework**
3. **.cpz = Control Point File**
4. **.smz = Site Map from Trimble Business Center**
5. **.cal = Calibration**

Understanding Base Stations

<u>When to Program</u> - If a Base Station is programmed to a Control Point on a Base post/pole with your Data Collector and will be set up on the same exact Base post/pole every day thereafter, it only needs to be programmed to that Control Point once. At the end of each day, it can be powered down, taken down, and charged up at night. The next day, it can simply be set up on the same Base post/pole as the day before and powered back on, without having to Program it to the same Control Point daily.

However, if tomorrow it will be set up on a different Base post/pole or, brought to a different job site, it will need to be programmed to the Control Point for that Base post/pole with your Data Collector.

Rover & Data Collector Battery Management

Over time, Rover & Data Collector batteries lose charging capacity. Cold weather also affects batteries. Understanding this brief section can help make sure you have battery power at the end of the day, to store or stake that object and get the job done.

After you have connected your Rover & Data Collector to Base Station or the VRS Network, at any time thereafter, you can tap the Data Collector power button to put it to "sleep" and press and hold the Rover power button to power it off. Store the Rover, Rod & Data Collector out of the way of obstacles. When you need to use it later, start by powering on the Rover first and then tapping the Data Collector power button. Give it a few minutes and it will automatically connect the 2 devices, and you are ready to go.

Putting a Data Collector to "sleep" is not the proper end of day procedure!! The proper end of day procedure is to exit Trimble Siteworks and then power off the Windows or Android device. The is especially important if you store Rovers & Data Collectors inside of closed hard cases. They can heat up causing component failure and/or fires!!

Understanding Calibrations

Site Calibrations are the most important step when using GPS Equipment (Machines & Rovers) and tying into specific coordinate systems. They should be performed as precisely as possible. Skipping or rushing steps can cause unforced errors which can lead to rework and/or bad outputs.

There are two types of Calibrations described in this Reference Guide: Base Station or VRS Network Calibrations.

Base Station – If you create a new Project for a Base Station Calibration, complete it within specified tolerances and Tap "FINISH", it cannot be resumed or adjusted once accepted, unless you create a new Project and start all over again.

Also, you cannot connect your Rover with the VRS Network on this Project IF Calibrated with a Base Station.

VRS Network – If you create a new Project for VRS Network Calibration, complete it within specified tolerances, and Tap "FINISH", it also cannot be resumed or adjusted once accepted, unless you create a new Project and start all over again.

If you were to set a Base post/pole in the ground and measure a Control Point for a Base Station while in VRS, that Project can be utilized by either a Base Station or VRS Network.

Example Scenario – If a Job Site was calibrated with a Base Station, once projects are completed and finalized, the Base Station post/pole are also removed. 6 months down the road, if rework needs to be done on that job site with GPS Machines and/or Rovers, another Site Calibration would need to be performed.

If that same Project were Calibrated with VRS Network initially, we could show up, connect your Rover via VRS Network and be ready to work within minutes. If GPS Machines were needed, a Base post/pole could be set, a Control Point could be measured onto the post/pole while connected via VRS, a Base Station could be set up and programmed to that Control Point, to send corrections out to GPS Machines & Rovers.

Manual Enter/Edit Control Points

If you received a Control Point file and it was not in the standard *.csv file format or if you prefer to enter Control Points manually into your device, start by:

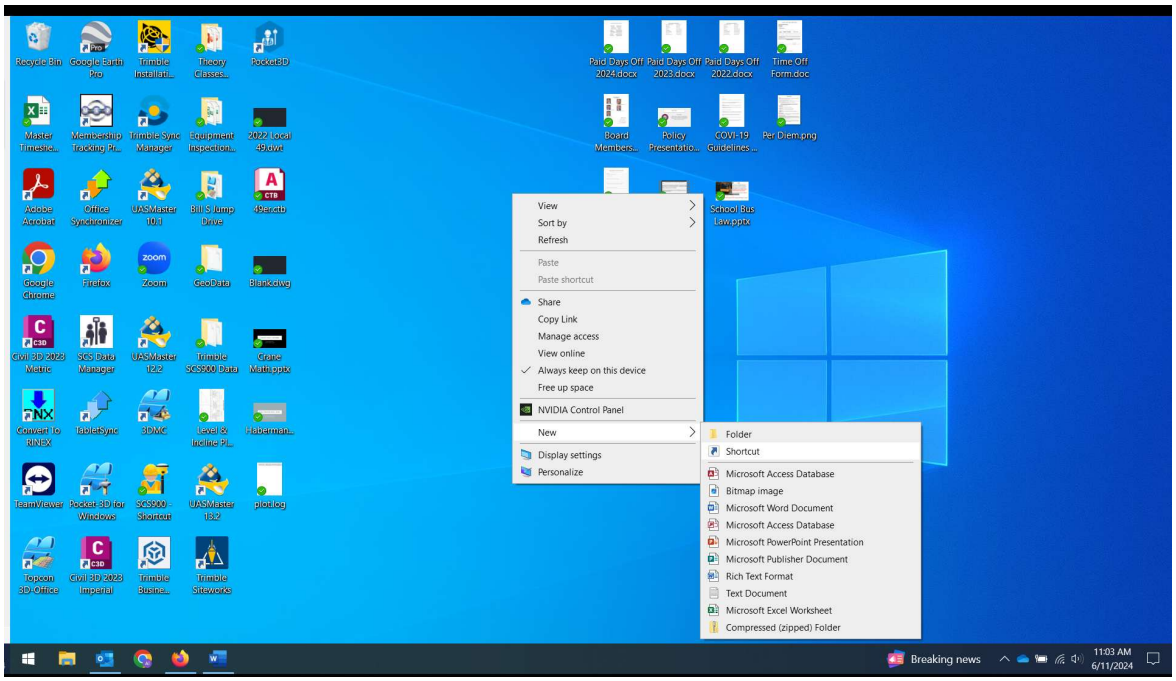
1. **Power on your device, open Siteworks and open the correct Project**
2. **Have the Control file opened or printed out**
3. **Tap the "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
4. **Tap "Data Management"**
5. **Tap "Point Manager"**
    a. **On the pop up, Tap "Enter / Edit Control Points"**
    b. **Point Manager page opens, Tap "ADD"**
    c. **Add New Point page opens, confirm these settings:**
        i. **Type – 3D Control Point (most common, if they do not have Elevations, choose 2D Control Point)**
        ii. **Point Name – enter a number for the Control Point**
        iii. **Point Code – CP (stands for Control Point or, enter a specific code)**
        iv. **Northing – enter the numeric Northing**
        v. **Easting – enter the numeric Easting**
        vi. **Point's Elevation – Key-in (most common)**
        vii. **Elevation – enter the numeric Elevation**
        viii. **NOTE: you must Tap "SAVE" before closing**
        ix. **Double Check entered information matches, Tap the "X" in the upper right-hand corner**
        x. **Point Manager page opens; you can either:**
            1. **Tap "ADD" and start back with Step 5ci above if you have more Control Points to enter, OR**
            2. **Tap "X" in the upper right-hand corner to return to the main screen**

Project File Locations on Windows & Android Devices

Windows Based Devices:

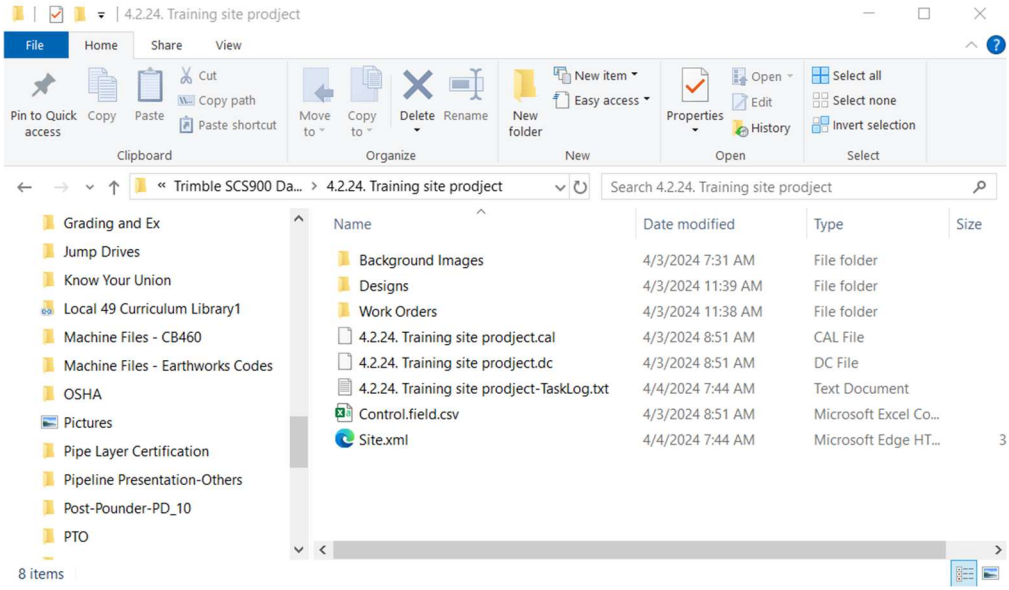
From the Desktop Main Screen, create a new "Shortcut" to easily browse to Project File Locations if one does not exist on your Desktop. Follow these steps:

1. **Press and hold anywhere in the blue area of your screen for about 3 seconds, then release.**
2. **Tap "New" then Tap "Shortcut" (see image below)**



3. **Create Shortcut dialog box appears**
    a. **Tap "Browse"**
    b. **Tap "This PC"**
    c. **Tap "Windows (C:)"**
    d. **Tap "Trimble Synchronizer Data"**
    e. **Tap "PC"**
    f. **Tap "Trimble SCS900 Data"**
    g. **Tap "OK"**
    h. **The Create Shortcut dialog box reappears, Tap "Next"**
    i. **Leave the Default name of "Trimble SCS900 Data", Tap "Finish"**
4. **From the Desktop, Double Tap on the new folder you just created, "Trimble SCS900 Data"**

5. **When the folder opens, this is every "Project" on your Data Collector.**
6. **If you Double Tap on a Project, here is what you can find inside, see image below**



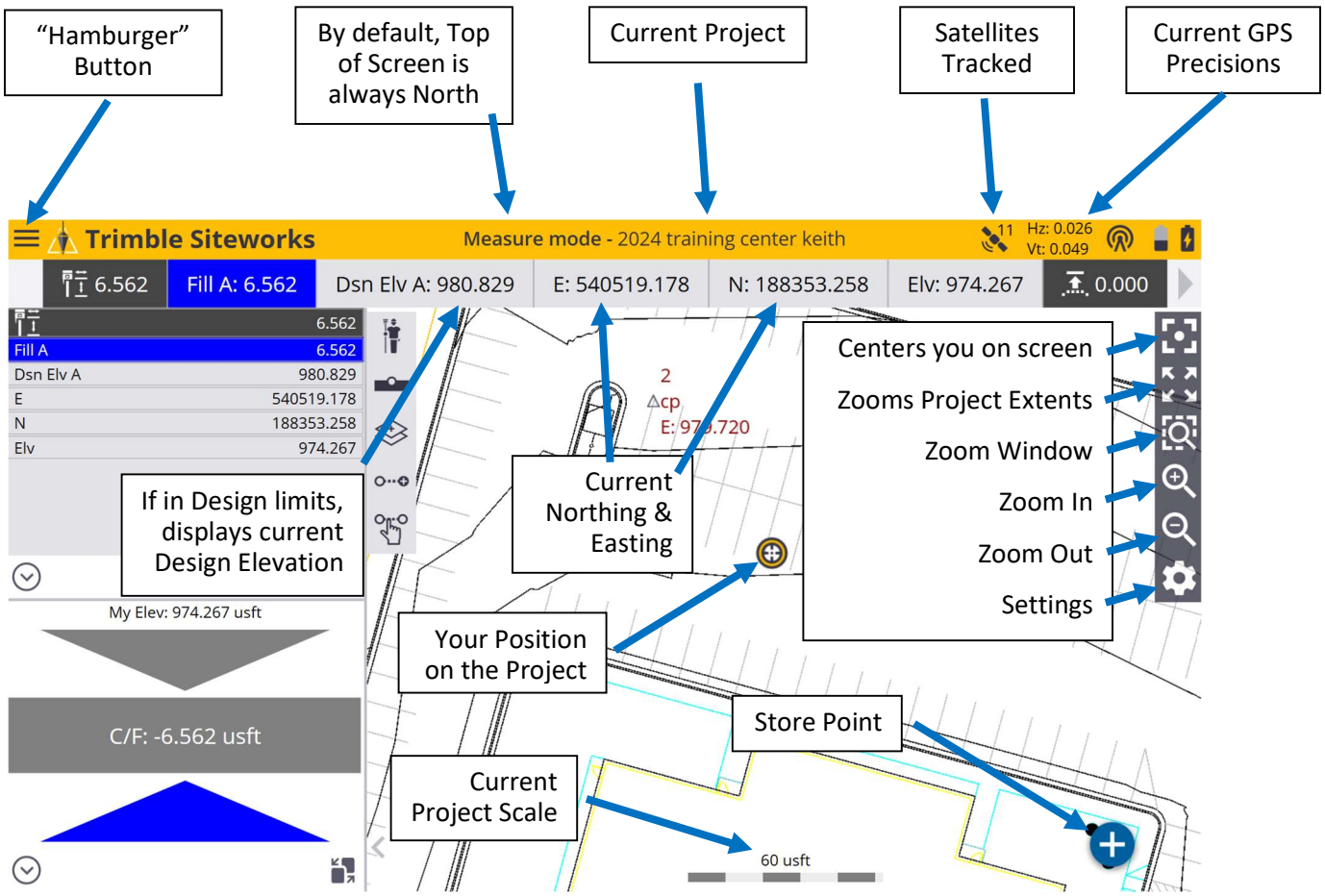
7. **If your Project was just created or has NOT been Calibrated, you will NOT see:**
    a. ***.cal file**
    b. ***.dc file**
8. **If you have not manually entered Control Points, you will NOT see:**
    a. **Control.field.csv file**
9. **If you Tap the "Designs" folder, it can contain 0-1000 Design Specific Folders.**
    a. **Each folder can 1-3 different files, they are:**
        i. **.dxf which is project linework**
        ii. **.ttm which is project surface definition**
        iii. **.csv which is project specific stakeout points**
10. **If you Tap the "Work Orders" folder, it can contain 0-1000 Project Specific Folders**
    a. **Each Folder contains:**
        i. **An "Output" Folder**
        ii. **.spj file that can be copied onto a jump drive. That file can then be dragged and dropped into Trimble Business Center. After doing so:**
            1. **All Points contained within the Work Order, will now be shown in Business Center**
            2. **Any field Linework points are also automatically drawn when imported**

Android Based Devices:

After powering on the Device and from the Main Screen:

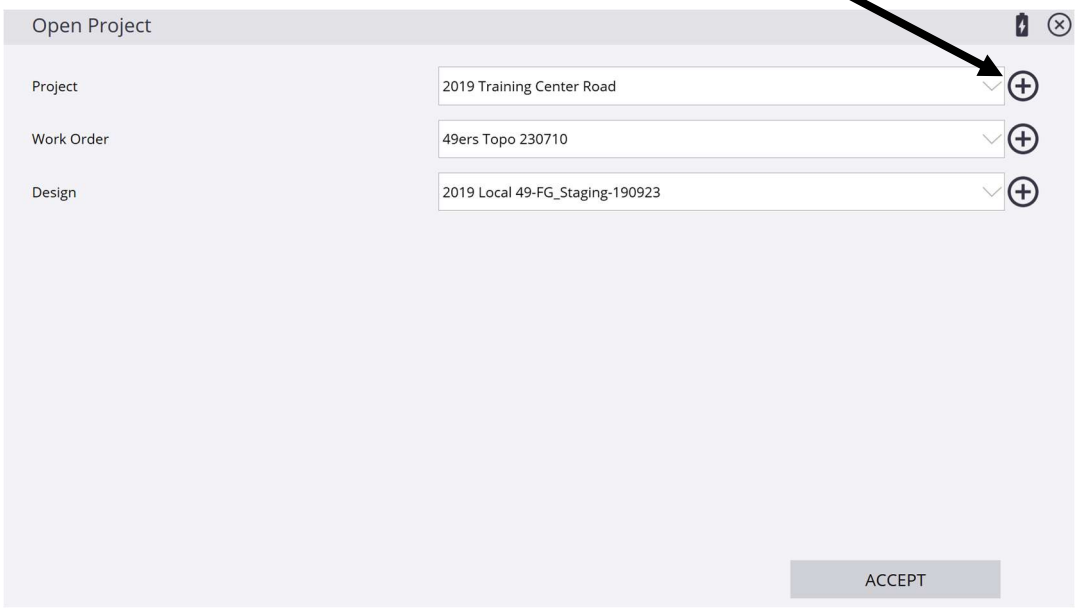
1. **Swipe Up on the screen and Tap "Files" folder**
2. **Swipe Up on the screen and under Storage Devices, Tap "Internal Storage"**
3. **Swipe Up on the screen, Tap "TrimbleSync"**
4. **Tap "Siteworks"**
5. **Tap "Data"**
6. **This is every "Project" on your Data Collector**
7. **If you "Tap" on a Project, here are the files and folders that can be contained inside:**
    a. **Work Orders Folder(s)**
        i. **Each Folder contains:**
            1. **A Folder that contains Outputted items**
            2. **.spj file that can be copied onto a jump drive. That file can then be dragged and dropped into Trimble Business Center. After doing so:**
                a. **All Points contained within the Work Order, will now be shown in Business Center**
                b. **Any field Linework points are also automatically drawn when imported**
    b. **Designs Folder(s)**
        i. **Each folder can 1-3 different files, they are:**
            1. **.dxf which is project linework**
            2. **.ttm which is project surface definition**
            3. **.csv which is project specific stakeout points**
    c. **Background Images Folder**
    d. **Site.xml File**
    e. **Control.field.csv – File (only created if control points are manually entered in Siteworks)**
    f. ***.dc File**
    g. ***.cal File (only created after the Project has been Calibrated)**
    h. ***.txt File**

Main Screen Layout

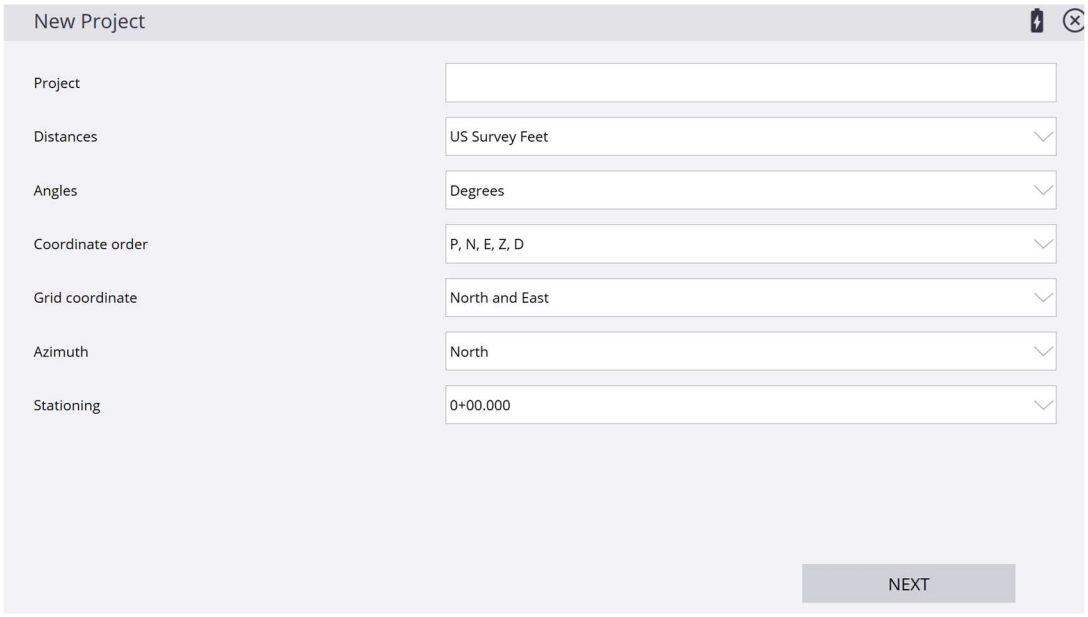


Creating a New Project for Base Station Calibration

1. **Power on your Data Collector and then open Trimble Siteworks**
2. **When the Open Project page opens, Tap the "Circled +" button to the far right of Project, see below**



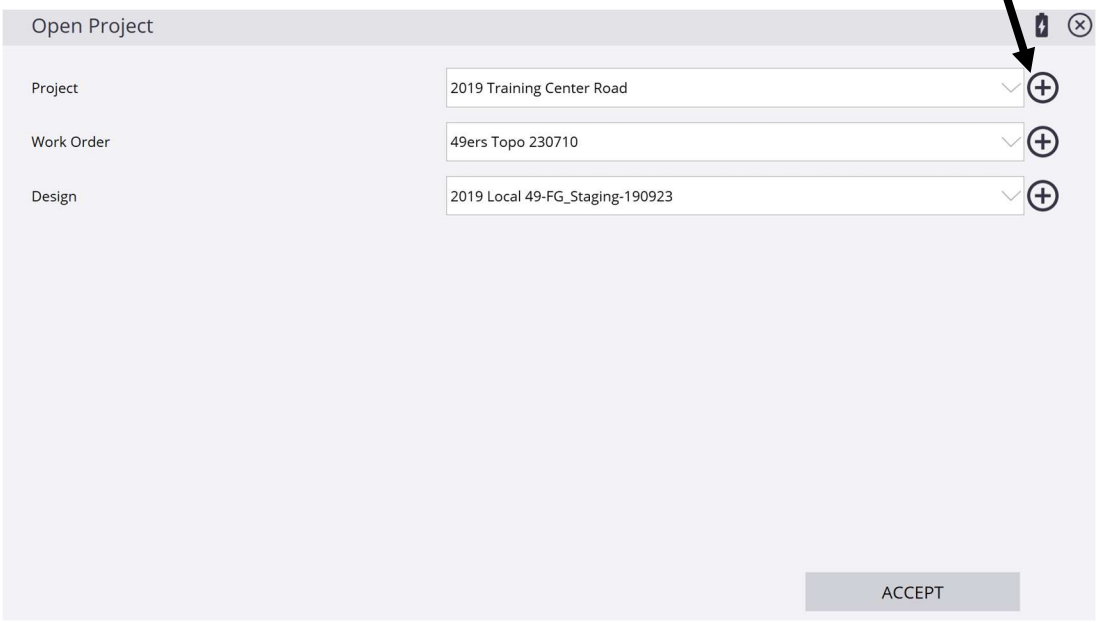
3. **New project page opens.**
    a. **To the right of Project, type in a job specific Name**
    b. **Confirm your settings match the image below**
    c. **Tap "Next"**



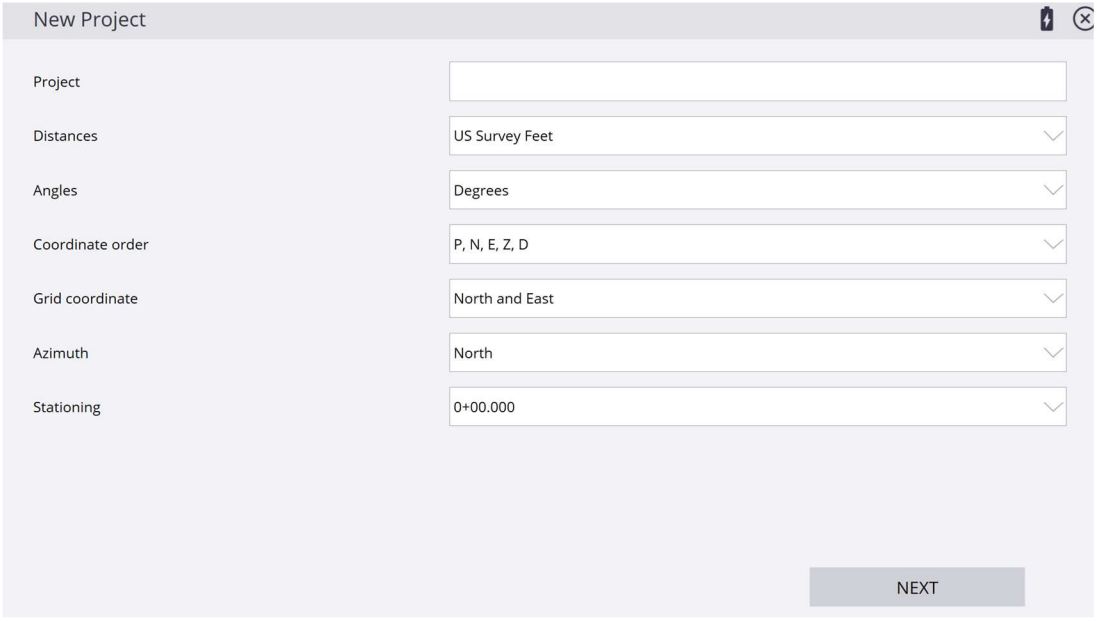
4. **Project Creation Options page opens. Check the boxes that apply if you have:**
    a. **A project map, then browse to the location.**
    b. **A calibration file, then browse to the location.**
    c. **Control point file, then browse to the location.**
    d. **FXL file, then browse to the location.**
    e. **Coordinate System is generally used for VRS connections but can be set for Base Station calibrations. You would need to know what County the Project will be located in.**
    f. **Tap "FINISH"**
5. **On the Open Project page, you MUST create a Work Order. Tap the "Circled +" to the far right of Work Order**
    a. **New Work Order page opens, type in a name for the Work Order**
    b. **Tap "FINISH"**
6. **Open Project page reopens, if you have a Design, select it. If not, choose (No design needed). Tap "ACCEPT"**
7. **Receiver Setup page opens, Refer to "Site Calibration with Base Station."**

Creating a New Project for VRS Network Calibration

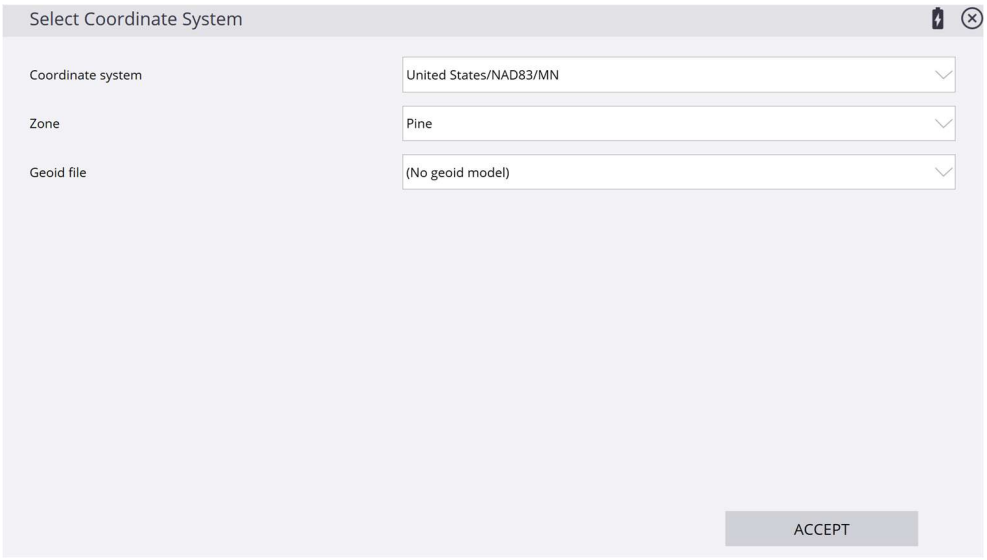
1. **Research and find out what County your New Project is located within.**
2. **Open Siteworks, when the Open Project page opens, Tap the "Circled +" button to the far right of Project, see below**



3. **New project page opens.**
    a. **To the right of Project, type in a Job specific Name**
    b. **Confirm your settings match the image below**
    c. **Tap "Next"**



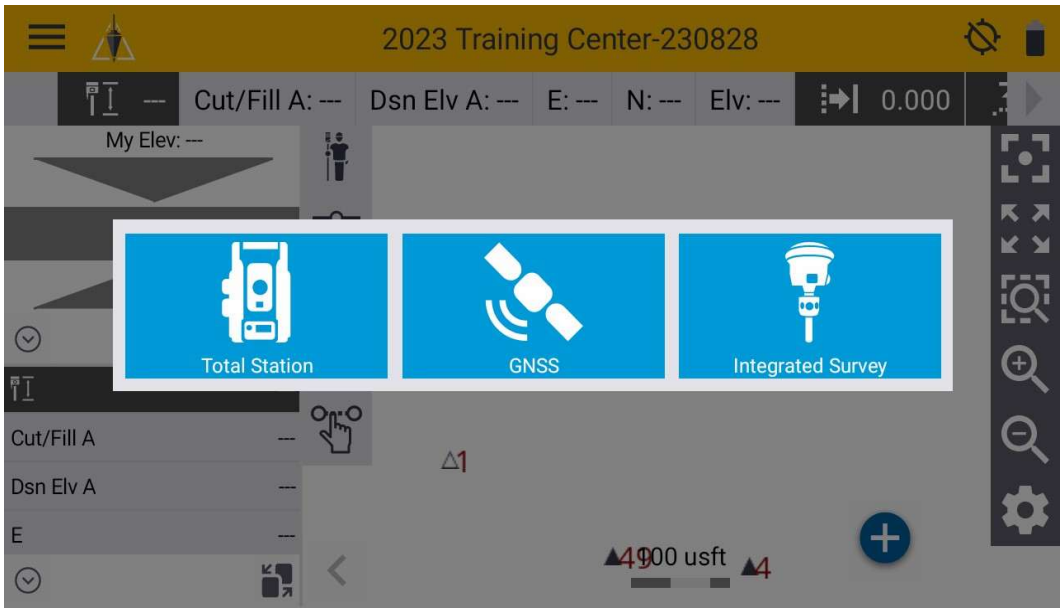
4. **Project Creation Options page opens. check the boxes that apply if you have:**
    a. **A project map, then browse to the location**
    b. **A calibration file, then browse to the location**
    c. **Control point file, then browse to the location**
    d. **FXL file, then browse to the location**
    e. **CHECK the "Select Coordinate file" box, then:**
        1. **Tap "COORDINATE SYSTEM"**
        2. **Coordinate system is "United States/NAD83/MN"**
        3. **The Zone is the County in which your project is located within, select that County**
        4. **Geoid file:**
            a. **"Minnesota GEOID18 (g18-mn.ggf)", or**
            b. **"Minnesota GEOID12B (g12b-mn.ggf)**
            c. **If these files do not exist, choose (No geoid file)**
        5. **Tap "ACCEPT", see below**



5. **Project Creation Options pages opens, Tap "FINISH"**
6. **Open Project page opens; you MUST create a Work Order. Tap "Circled +" to the far right of Work Order**
    a. **New Work Order page opens, type in a name for the Work Order**
    b. **Tap "FINISH"**
7. **Open Project page opens, if you have a Design, select it. If not, choose (No design needed). Tap "ACCEPT"**
8. **Receiver Setup page opens, Refer to "Site Calibration with VRS Network"**

Site Calibration with Base Station

1. **Before continuing, you need to have:**
    a. **Data Collector on, Siteworks open and in the correct Project, Work Order & Design**
    b. **Control point coordinates manually entered or imported into Project file**
    c. **Have a Base Station post/pole set firmly in the ground**
    d. **If using a Zephyr Antenna, confirm the exact type by looking where it threads onto Base post/pole before mounting.**
    e. **Have Base Station set up on post/pole, wires connected and powered on**
        i. **Yellow cable is for Zephyr to Base Radio**
        ii. **Black cable is for use with Dog-Bone Radio Antenna to Base Radio**
    f. **Be within Bluetooth range of your Base Station with your Data Collector**
2. **Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines),**
3. **Tap "Project Setup"**
4. **Tap "Connect Device"**
5. **On the pop up, Tap "GNSS", see below**



6. **On the Receiver Setup page, confirm these settings:**
    a. **Mode – Base**
    b. **Connection Type – Bluetooth**
    c. **Bluetooth Device – On the Back/Bottom of Device you will see SPS85* or R750 for Model & the last 4 digits of Serial Number. If you do not see your Device in the list, Tap icon and it will scan for nearby Devices**
    d. **Correction Method – Radio in Receiver**

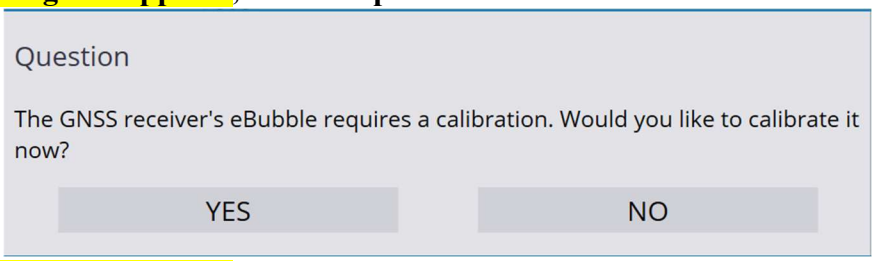
e. **Network ID – Standard practice is if the first letter of your Company starts with A, use Channel 1; B use Channel 2; C use Channel 3 and so on.**
    i. **Once you set the Channel it will scan to see if that Channel is being used by another Contractor in the neighborhood. DO NOT SKIP this process, unless you like to do things over!!! If the Channel is being used, you can then use Channels 27-40.**
    ii. **Remember the Channel you set, as Rovers and Machines on that Job, need to connect to that Channel for a Correction Source**
f. **Base position – Unknown position for Projects that have not yet been Calibrated**
g. **Base Name – use your Company Name**
h. **Antenna – is only an option if using a Zephyr Antenna – it is shown on the bottom of the Antenna, where it threads onto the base post/pole**
i. **Antenna height – 0.000 usft (Bottom of antenna)**
    i. **Measure Method – Bottom of antenna (for Zephyr Antennas)**
        1. **For Rovers with Base code, it could be either Bottom of Antenna or Bottom of Quick Release**
    ii. **Vertical Height – 0.00 usft**
    iii. **Tap "ACCEPT"**
j. **Elevation Mask – 10 (default setting)**
k. **Corrections – CMRx**
l. **Tap "ACCEPT"**

7. **Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines), then Tap "Project Setup" then Tap "Connect Device"**
8. **On the pop up, Tap "GNSS"**
9. **Receiver Setup page opens, confirm these settings:**
    a. **Mode – Rover**
    b. **Connection Type – Bluetooth**
    c. **Bluetooth Device - On the Back/Bottom of Device you will see SPS98* or R780 for Model & the last 4 digits of Serial Number. If you do not see your Device in the list, Tap**  **icon and it will scan for nearby Devices**
    d. **Correction Method – Radio in Receiver**
    e. **Network ID – the Channel you selected in the previous section (1-40)**
    f. **Connected to Base – what you named it in the previous section**
    g. **Using Quick Release – select "Yes" if have; if not, select "No", see image**

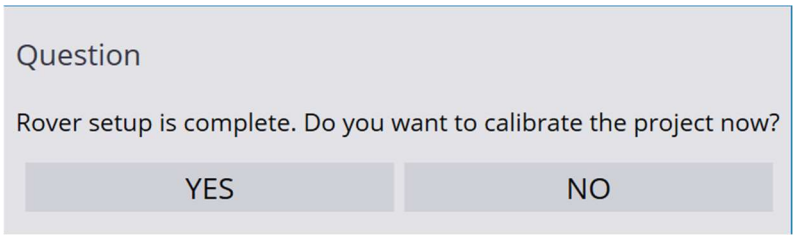
    h. **Enable Tilt Compensator – either select "Yes" or "No"**
    i. **Antenna Height – 6.562 usft (which is 2 meters converted to usft)**

j. **When everything looks good, Tap "ACCEPT"**

10. **If this dialog box appears, either Tap "YES" to calibrate now or "NO" to bypass**



11. **If this dialog box appears, and you are ready to start Calibrating, Tap "YES"**



a. **If you accidentally Tapped "NO" and are ready to Calibrate, go to:**
   i. **"Hamburger" the three lines in the upper-left hand corner**
   ii. **"Project Setup"**
   iii. **"Project Calibration"**

12. **The Project Calibration page opens, Tap**  **near the upper left-hand side**
   a. **The Select Point page opens; you can do one of the following:**
      i. **Type the Point name in by tapping inside the blank space**
      ii. **Tap on a Control Point on the Map Screen**
      iii. **Tap**  **icon**
         1. **Then Tap on the Control Point**
         2. **Tap "ACCEPT"**
   b. **When you have chosen a Control Point, it should have a Blue Circle around it. Before continuing, make sure you:**
      i. **Have the bipods attached to your Rover Pole**
      ii. **Walk to this Control Point in the field**
      iii. **Center the tip of your Rod on the Control Point**
      iv. **Using the bipods, level up your Rod**
      v. **Tap "SELECT" to continue**
   c. **Static Mode Setting page opens,**
      i. **Measure Method – if using Quick Release, choose "Bottom of Quick Release"; if not, choose "Bottom of Antenna"**
      ii. **Vertical Height – 6.562 usft**
      iii. **Horizontal Tolerance – 0.082 usft (default tolerance)**
      iv. **Vertical Tolerance – 0.082 usft (default tolerance)**
      v. **Minimum Measuring Time – 120**
      vi. **Time Unit – Seconds**

vii. **Before Starting this process:**
   1. **Confirm all Settings above**
   2. **Double Check your Rod is level**
   3. **If windy, keep hands near pole to prevent tipping**
   4. **When ready, Tap "Start"**
   5. **Static Management page opens. It will display Expected and Current Precisions. As the timer counts, you can watch your Current Precisions get smaller or tighter, see image below**

viii. **When the timer reaches its target time, Project Calibration page reopens:**
   1. **Near the top of the page, it says "3 or more Control Points are required….." (occupying 4 Control Points is common)**
   2. **Start back on Set 10a above until you have occupied all Control Points in the field, then go to Step 3 below**
      a. **Note: for smaller projects without Surveyor Control Points and/or Engineering files, a 1-point Calibration may be sufficient (this is NOT a common process), Tap "FINISH"**
      b. **Info pop-up box opens "Accept Calibration? The calibration cannot be resumed or changed once accepted." Tap "Yes"**
      c. **Info pop-up opens, "3 or more Control Points are required….." Tap**
      d. **Info pop-up box opens "Calibration complete" Tap "OK"**
      e. **Question pop-up box opens "Do you want to save the base station as a control point?" Tap "YES"**
   3. **When you have finished occupying all your Control Points, confirm there is a Green Checkmark at the top of the page.**

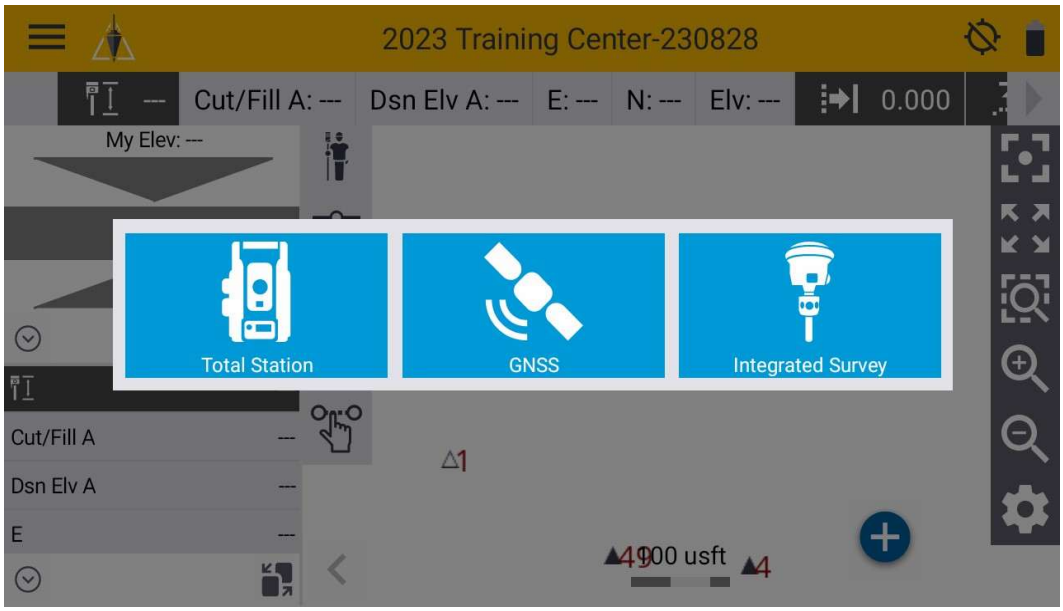
This confirms you have performed the Calibration successfully within tolerances. Follow these steps:

a. **Tap "FINISH"**
b. **Info pop-up box opens "Accept Calibration? The calibration cannot be resumed or changed once accepted." Tap "Yes"**
c. **Info pop-up box opens "Calibration complete" Tap "OK"**
d. **Question pop-up box opens "Do you want to save the base station as a control point?" Tap "YES"**

4. **Your Project is now Calibrated.**

Site Calibration with VRS Network

1. **Before continuing, you need to have:**
    a. **Data Collector on, Siteworks opened, and in the correct Project, Work Order & Design**
    b. **Data Collector needs to be connected to the Internet via hotspot or internal data plan**
    c. **Control point coordinates manually entered or imported into Project file**
    d. **Have a VRS Username & Password**
        i. **If not, you can Register for one for FREE**
            1. **It takes a few days to complete**
            2. **VRS User & Pass should not be used for multiple Data Collectors, they should be unique for each Data Collector**
        ii. **http://mncors.dot.state.mn.us/Default.aspx**
2. **Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
3. **Tap "Project Setup"**
4. **Tap "Connect Device"**
5. **On the pop up, Tap "GNSS", see below**

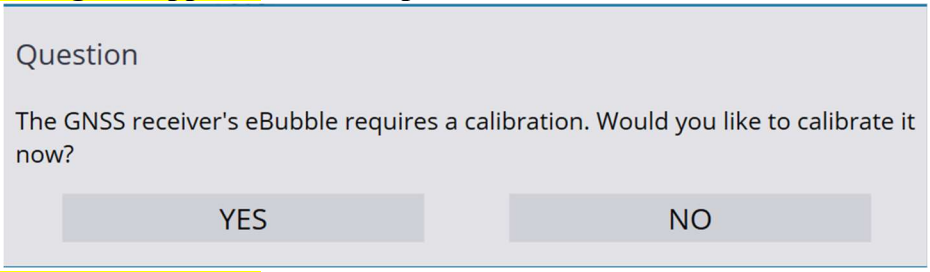


6. **On the Receiver Setup page, confirm these settings:**
    a. **Mode – Rover**
    b. **Connection Type – Bluetooth**
    c. **Bluetooth Device – On the Back/Bottom of Device you will see SPS98* or R780 for Model & the last 4 digits of Serial Number. If you do not see your Device in the list, Tap icon and it will scan for nearby Devices**

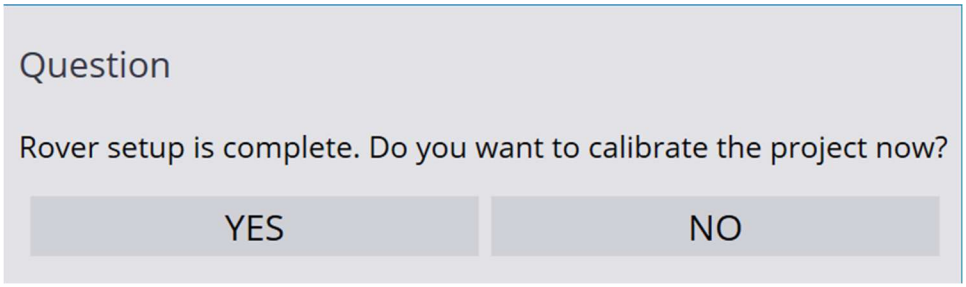
d. **Corrections Method – Internet**
    iii. **Server Address – mncors.dot.state.mn.us**
    iv. **Port number – 9000**
    v. **Username – (specific per Device)**
    vi. **Password – (specific per Device)**
        1. **Data Stream – CMRx NAD83 (2011)**
        2. **Tap "ACCEPT"**
e. **Using Quick Release – select "Yes" if have; if not, select "No", see image**

f. **Enable Tilt Compensator – either select "Yes" or "No"**
g. **Antenna Height – 6.562 usft (which is 2 meters converted to usft)**

7. **When everything looks good, Tap "ACCEPT"**
2. **If this dialog box appears, either Tap "YES" to calibrate now or "NO" to bypass**



3. **If this dialog box appears, and you are ready to start Calibrating, Tap "YES"**



a. **If you accidentally Tapped "NO", go to:**
    i. **"Hamburger" the three lines in the upper-left hand corner**
    ii. **"Project Setup"**
    iii. **"Project Calibration"**

4. **The Project Calibration page opens, Tap**  **near the upper left-hand side**
    a. **The Select Point page opens; you can do one of the following:**
        i. **Type the Point name in by tapping inside the blank space**
        ii. **Tap on a Control Point on the Map Screen**
        iii. **Tap**  **icon**

1. **Then Tap on the Control Point**
2. **Tap "ACCEPT"**

b. **When you have chosen a Control Point, it should have a Blue Circle around it. Before continuing, make sure you:**
   i. **Have the bipods attached to your Rover Pole**
   ii. **Walk to this Control Point in the field**
   iii. **Center the tip of your Rod on the Control Point**
   iv. **Using the bipods, level up your Rod**
   v. **Tap "SELECT" to continue**

c. **Static Mode Setting page opens,**
   i. **Measure Method – if using Quick Release, choose "Bottom of Quick Release"; if not, choose "Bottom of Antenna"**
   ii. **Vertical Height – 6.562 usft**
   iii. **Horizontal Tolerance – 0.082 usft (default tolerance)**
   iv. **Vertical Tolerance – 0.082 usft (default tolerance)**
   v. **Minimum Measuring Time – 120**
   vi. **Time Unit – Seconds**
   vii. **Before Starting this process:**
      1. **Confirm all Settings above**
      2. **Double Check your Rod is level**
      3. **If windy, keep hands near pole to prevent tipping**
      4. **When ready, Tap "Start"**
      5. **Static Management page opens. It will display Expected and Current Precisions. As the timer counts, you can watch your Current Precisions get smaller or tighter, see image below**

   viii. **When the timer reaches its target time, Project Calibration page reopens:**

1. **Near the top of the page, it says "3 or more Control Points are required….." (occupying 5 Control Points is recommended)**
    a. **Long linear Road jobs should have 1 Control Point/Road Mile. Ex - 10 miles = 10 Control Points**
2. **Start back on Set 10a above until you have occupied all Control Points in the field, then go to Step 3 below**
    a. **Note: If you choose to use a GEOID file and want to just do a 1-point Calibration, Tap "FINISH"**
    b. **Info pop-up box opens "Accept Calibration? The calibration cannot be resumed or changed once accepted." Tap "Yes"**
    c. **Info pop-up opens, "3 or more Control Points are required….." Tap**
    d. **Info pop-up box opens "Calibration complete" Tap "OK"**
3. **When you have finished occupying all your Control Points, confirm there is a Green Checkmark at the top of the page. This confirms you have performed the Calibration successfully within tolerances. Follow these steps:**
    a. **Tap "FINISH"**
    b. **Info pop-up box opens "Accept Calibration? The calibration cannot be resumed or changed once accepted." Tap "Yes"**
    c. **Info pop-up box opens "Calibration complete" Tap "OK"**
4. **Your Project is now Calibrated**

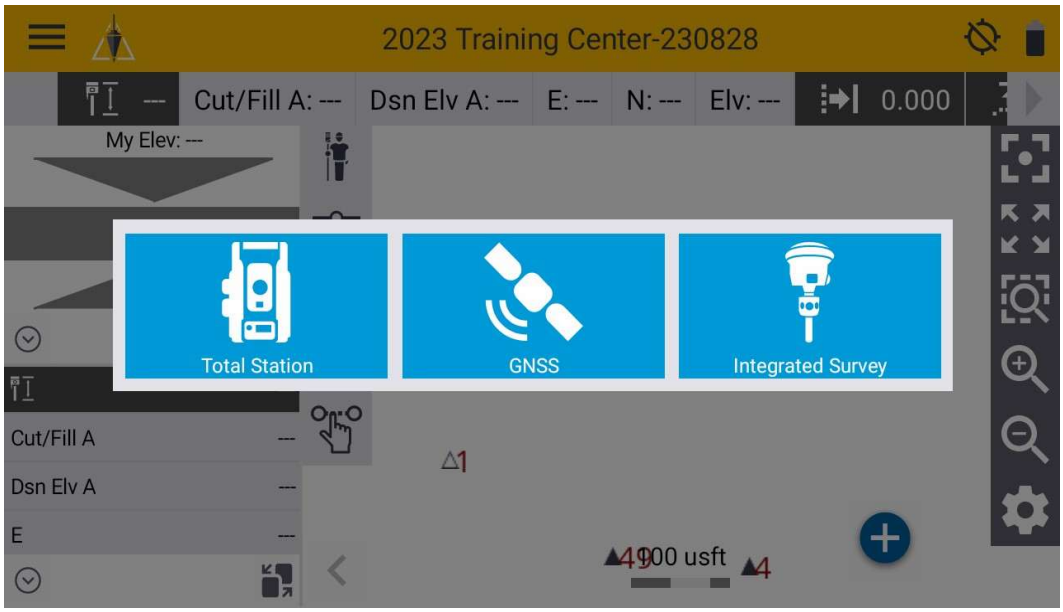
Connecting Rover to a Base Station

1. **Before continuing, you need to have:**
    a. **Data Collector on, Siteworks opened, and in the correct Project, Work Order & Design**
    b. **The Channel # the Base Station is sending Corrections out on**
    c. **Make sure the whip antenna is screwed into the Rover head**
2. **Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
3. **Tap "Project Setup"**
4. **Tap "Connect Device"**
5. **On the pop up, Tap "GNSS"**
6. **Receiver Setup page opens, confirm these settings:**
    a. **Mode – Rover**
    b. **Connection Type – Bluetooth**
    c. **Bluetooth Device - On the Back/Bottom of Device you will see SPS98* or R780 for Model & the last 4 digits of Serial Number. If you do not see your Device in the list, Tap icon and it will scan for nearby Devices**
    d. **Correction Method – Radio in Receiver**
    e. **Network ID – the Channel you selected in the previous section (1-40)**
    f. **Connected to Base – what you named it in the previous section**
    g. **Using Quick Release – select "Yes" if have; if not, select "No", see image**

    h. **Enable Tilt Compensator – either select "Yes" or "No"**
    i. **Antenna Height – 6.562 usft (which is 2 meters converted to usft)**
    j. **When everything looks good, Tap "ACCEPT"**
7. **A pop-up may ask either of these questions below:**
    a. **If the Project is Calibrated – you should Check into a Control Point, Tap "YES", or**
    b. **If the Project is NOT Calibrated – would you like to perform a Calibration. If ready, Tap "Yes"; if not, Tap "No"**
8. **Your Rover is now Connected to the Base Station**

Connecting Rover to the VRS Network

1. **Before continuing, you need to have:**
    d. **Data Collector on, Siteworks opened, and in the correct Project, Work Order & Design**
    e. **Data Collector needs to be connected to the Internet**
    f. **Have a VRS Username & Password**
        i. **If not, you can get started here to get registered for free**
            1. **It takes a few days to complete**
            2. **VRS User & Pass should not be used for multiple Data Collectors, they should be unique for each Data Collector**
        ii. **http://mncors.dot.state.mn.us/Default.aspx**
2. **Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
3. **Tap "Project Setup"**
4. **Tap "Connect Device"**
5. **On the pop up, Tap "GNSS", see below**



6. **On the Receiver Setup page, confirm these settings:**
    g. **Mode – Rover**
    h. **Connection Type – Bluetooth**
    i. **Bluetooth Device – On the Back/Bottom of Device you will see SPS98* or R780 for Model & the last 4 digits of Serial Number. If you do not see your Device in the list, Tap icon and it will scan for nearby Devices**
    j. **Corrections Method – Internet**
        i. **Server Address – mncors.dot.state.mn.us**
        ii. **Port number – 9000**
        iii. **Username – (specific per Device)**

iv. **Password – (specific per Device)**
    1. **Data Stream – CMRx NAD83 (2011)**
    2. **Tap "ACCEPT"**

k. **Using Quick Release – select "Yes" if have; if not, select "No", see image**

l. **Enable Tilt Compensator – either select "Yes" or "No"**
m. **Antenna Height – 6.562 usft (which is 2 meters converted to usft)**
n. **When everything looks good, Tap "ACCEPT"**

5. **One of many pop-up boxes may appear, they might ask:**
    a. **Would you like to Calibrate the Receivers ebubble? Either Tap"Yes" to calibrate, or Tap "No"**
    b. **Would you like to perform a Site Calibration? Either Tap "Yes" to calibrate now, or Tap "No" to calibrate later**
    c. **It is recommended that you recheck the system setup? Either Tap "Yes" and select the Control Point you want to stakeout, or Tap "No"**
6. **Your Rover & Data Collector should now be connected to the VRS Network**

Measuring a Control Point on Base Post/Pole using VRS

After performing a Site Calibration using the VRS Network, we can now measure a Control Point on a Base post/pole for the Base Station to be set up on. Start by:

1. **Turn Data Collector on, Siteworks opened, and in the correct Project, Work Order & Design**
2. **Have a Base post/pole set firmly in the ground**
3. **Remove the Rover from GPS Rod**
4. **Unscrew quick release if one is screwed onto Rover head.**
5. **Screw Rover head onto Base post/pole**
6. **Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
7. **Tap "Measure"**
8. **Tap "Measure Control Point"**
9. **In the bottom right-hand corner of the screen, Tap** 
10. **Measure Control Point page opens, confirm:**
    a. **Point name – enter a numeric value**
    b. **Point Code – enter a description (Base Post CP)**
    c. **Tap "ACCEPT"**
11. **Static Mode Settings page opens, confirm:**
    a. **Measure Method – Bottom of Antenna (if quick release is removed)**
    b. **Vertical Height – 0.00 usft (Base post/pole height shall be 0.00 usft)**
    c. **Horizontal Tolerance – 0.082 usft (default tolerance)**
    d. **Vertical tolerance - 0.082 usft (default tolerance)**
    e. **Measuring Time – 300**
    f. **Time Unit – Seconds**
    g. **Confirm settings above and when ready, Tap "Start"**
    h. **Static Management page opens. It will display Expected and Current Precisions. As the timer counts, you can watch your Current Precisions get smaller or tighter**
    i. **When the timer reaches the Target time, the Control Point is stored, and it brings you back to the main screen.**
    j. **Tap "Hamburger" button in the upper left-hand corner of the screen, then Tap "Measure"**
    k. **You now have a Control Point for the Base Station on the Base post/pole**
    l. **Remove Rover head from Base post/pole and set rod height to 6.562 usft**
    m. **To program a Base Station to this Control Point, reference "Programming Base Station to Control Point" in this reference guide**

Programming Base Station to Control Point

1. **Once you have successfully:**
    a. **Measured a Control point for the Base post/pole in Data Collector**
    b. **Set your Base Station up on the Base post/pole with cables connected**
    c. **Have your Base Station powered on**
    d. **Have your Data Collector powered on, Siteworks open and in the correct Project, Work Order & Design**
    e. **Be within Bluetooth range of Base Radio with Data Collector**
2. **Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
3. **Tap "Project Setup"**
4. **Tap "Connect Device"**
    a. **If your Rover & Data Collector are connected, a pop-up appears asking "would you like to stop the current connection", Tap "Yes"**
    b. **If another pop-up appears, Tap "GNSS"**
5. **On the Receiver Setup page, confirm these settings:**
    a. **Mode – Base**
    b. **Connection Type – Bluetooth**
    c. **Bluetooth Device – On the Back/Bottom of Device you will see SPS85* or R750 for Model & the last 4 digits of Serial Number. If you do not see your Device in the list, Tap**  **icon and it will scan for nearby Devices**
    d. **Correction Method – Radio in Receiver**
    e. **Network ID – Standard practice is if the first letter of your Company starts with A, use Channel 1; B use Channel 2; C use Channel 3 & so on.**
        i. **Once you set the Channel it will scan to see if that Channel is being used by another Contractor in the neighborhood. DO NOT SKIP this process, unless you like to do things over!!! If the Channel is being used, you can then use Channels 27-40.**
        ii. **Remember the Channel you set, as Rovers and Machines on that Job, need to connect to that Channel for a Correction Source**
    f. **Base position – Control Point**
        i. **Select Point page opens, you can either tap on the point or type the point name in, Tap "SELECT"**
    g. **Base Name – use you Company Name**
    h. **Antenna – is only an option if using a Zephyr Antenna – it is shown on the bottom of the Antenna, where it threads onto the base post/pole**
    i. **Antenna height – 0.000 usft (Bottom of antenna)**
        i. **Measure Method – Bottom of antenna (for Zephyr Antennas)**
            1. **For Rovers with Base code, it could be either, Bottom of antenna OR, Bottom of Quick Release**

ii. **Vertical Height – 0.00 usft**
iii. **Tap "ACCEPT"**

j. **Elevation Mask – 10 (default setting)**
k. **Corrections – CMRx**
l. **Tap "ACCEPT"**

6. **The Base Station should now be sending syncing & transmitting corrections for GPS Machines and Rovers to receive corrections on the set Channel above.**

Staking Out Points & Lines

1. **Before continuing, make sure you have:**
    a. **Powered on your Device and Open Trimble Siteworks**
    b. **Be in the correct Project, Work Order & Design**
    c. **Rover & Data Collector connected to a Base Station or VRS Network**
2. **Press & Hold Method from Main Screen**
    a. **Press and hold on a Line or Point for point for approx. 2 seconds**
        i. **If you are not zoomed in enough before pressing and holding an object and there are multiple lines and/or points close to one another, a pop-up box may appear, tap on the object you want to stake.**
    b. **The Line or Point information pop-up appears, Tap either:**
        i. **"Stake Line"**
            1. **The line will now be bold and have arrows point the direction that the station values are increasing.**
            2. **On the Top Information Bar on your screen:**
                a. **Dsn Sta: – how far you are from begin/end of line**
                b. **Cut/Fill: – only gives values if line is elevated**
                c. **Dsn Elv: – only gives values if line is elevated**
                d. **Sta: – your current position on the line**
                e. **Off: - Left of line is negative (-) value; right of the line is positive (+) value**
            3. **When you have finished staking of line:**
                a. **Tap "Hamburger"**
                b. **Tap "Measure"**
        ii. **"Stake Point"**
            1. **There will now be a line from where you are to the stakeout point.**
            2. **On the Information Bar on your screen:**
                a. **Cut/Fill A: - how many feet you are above or below the points elevation**
                b. **Dsn Elv: - the points elevation**
                c. **Elv: - the elevation of the bottom of your Rover Rod**
                d. **Go *: tells the compass direction you need to travel to find the stakeout point.**
                    i. **When you within a 5' radius of the point, you will see this, to stakeout the point precisely**

ii. **When the symbol shows 0.00's, or close to it, you are directly on top of that point.**

3. **When you have finished staking of point:**
    a. **Tap "Hamburger"**
    b. **Tap "Measure"**

Staking a Line between 2 or more Points

1. **Before continuing, make sure you have:**
    a. **Powered on your Device and Open Trimble Siteworks**
    b. **Be in the correct Project, Work Order & Design**
    c. **Rover & Data Collector connected to a Base Station or VRS Network**
2. **From the main screen, store 2 or more points on the objects you want to Stakeout, by tapping the  , near the bottom right-hand corner of screen.**
3. **When you are ready to Stake out a line between at least 2 stored points, Tap "Hamburger"**
4. **Tap "Stake"**
    a. **Select Object page opens, press this symbol  **
    b. **Define New Line page opens, Tap on one of the Points you stored. When selected, a blue circle appears around it**
        i. **If you selected the wrong point, Tap this symbol  to undo**
    c. **Tap the other Points to establish a blue line between points**
    d. **When finished creating a blue line, Tap "ACCEPT"**
    e. **Select Object page opens, your Line is now bold with arrows showing you which way your stationing values are increasing**
        i. **If you want the arrows to be reversed, Tap this symbol  **
    f. **Tap "ACCEPT"**
    g. **On the Top Information Bar, you will see:**
        i. **Dsn Sta: – how far you are from begin/end of line**
        ii. **Cut/Fill A: – Elv: – Dsn Elv: - = Fill; + = Cut**
        iii. **Dsn Elv: – straight grade elevation at your current station**
        iv. **Sta: – your current position on the line**
        v. **Off: - Left of line is negative (-) value; right of the line is positive (+) value**
    h. **When you have finished staking:**
        i. **Tap "Hamburger"**
        ii. **Tap "Measure"**

Storing Points for Stockpile Topo & Volume Reports

1. **Once you have successfully:**
    a. **Power on your Device and open Trimble Siteworks**
    b. **Rover & Data Collector connected to a Base Station or VRS Network**
2. **Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
3. **Tap "Project Setup"**
4. **Tap "Change Project"**
5. **Open Project page opens, confirm:**
    a. **Project – choose the correct Project**
    b. **Work Order - Tap "Circled +" to the far right of Work Order**
        i. **New Work Order page opens, type in a name (Example Name – "Project name Task Date" 49ers Topo 240614)**
        ii. **Tap "FINISH"**
    c. **Design – if you have one, select it or choose (No design needed)**
    d. **Tap "ACCEPT"**
6. **From the main screen, Tap** 
    a. **Measure Type page opens**
    b. **Tap "New Line" tab**
        i. **Line Name – you can choose a specific name or use default name**
        ii. **Line Type – Volume Boundary (for Stockpiles)**
        iii. **Tap "ACCEPT"**
7. **Start by storing points at the toe of the stockpile by pressing the**  **, near the bottom right-hand corner of the screen.**
    a. **Every time you store a point, a volume boundary line will trail you.**
    b. **NOTE: You want to store points at high & low elevations, as well as horizontal angle points. Remember to store shots closer together when going around radiuses, as the computer will draw a straight line from point to point.**
8. **Store your last point, just short of where you began the volume boundary line.**
9. **Tap** 
    a. **Measure Type page opens**
    b. **Tap "Point" tab**
        i. **Point name – 1000 (or next available point)**
        ii. **Point Code – Stockpile**
        iii. **Point Type – Surface**
        iv. **Show Every Time – No (choose this option when the Point Code will always be the same and Measure Type will not appear every time you want to store a point)**

1. **If you chose "No" and want to change the Point Code, from the main screen, Tap "Hamburger", then Tap "Measure"**

v. **Tap "ACCEPT"**

vi. **You will see your Volume Boundary Line automatically closed**

c. **Climb the Stockpile and store points by pressing  , at high & low elevations, as well as horizontal angle points.**

d. **When you have finished storing points on the Stockpile:**

i. **Tap "Hamburger"**

ii. **Tap "COGO"**

iii. **Tap "Review & Edit Data"**

1. **In the left Map screen, press the Volume Boundary line you created, when selected, it will turn blue**
2. **On the upper right-hand side, if you press the  left of Stockpile, you can choose:**
    a. **Stockpile – choosing this option lets you know how many cubic yards are in a stockpile of dirt**
    b. **Measured to entered elevation – choosing this option lets you know how many cubic yards are above & below a user entered elevation**
    c. **Measured to design – if you are in a Design and have one selected, this option will tell you how many cubic yards are above or below the design.**
3. **You have the option of applying expansion or shrinkage factors. For Stockpiles, 0.00% expansion or shrinkage factors**
4. **Tap "ACCEPT"**
5. **Save Computation page opens and lets you know cubic yardage volumes per selection choice.**
    a. **Take a picture of the report to email/text the information to your Foreperson/Superintendent**
6. **Tap "X" in the upper right-hand corner of screen**
7. **Tap "X" in the upper right-hand corner of screen**

Export Measured Data to Device or USB Drive

Once you have completed a Field Topo and want to transfer the information to either your Device or USB Drive, we can do so through Siteworks. To do so, start by inserting the USB Drive into the Device, then go to:

1. **You need to be in the correct Work Order that contains the points that are to be exported. To confirm you are, go to:**
    a. **Tap the "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
    b. **Tap "Project Setup"**
    c. **Tap "Change Project"**
    d. **Open Project Page opens, select the correct Work Order that contains the point information to be exported, Tap "ACCEPT"**
2. **Tap the "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
3. **Tap "Data Management"**
4. **Tap "Export Measured Data"**
5. **Export Measured Data page opens, confirm these settings:**
    a. **Export Type – CSV File (most common file format, CSV=comma separated values)**
    b. **Coordinate Order – P, N, E, Z, D (most common file format, P=Point number, N=Northing, E=Easting, Z=Elevation, D=Description, each value is separated by a comma (csv file))**
    c. **Include QA Data – No (unless requested)**
    d. **Include Control Points – No (unless requested)**
    e. **Include FXL Attributes – No (unless requested)**
    f. **File location – can be either Device or USB Drive**
    g. **File Name – by default, it names it the same as the Work Order, you can change the name if you like.**
    h. **Double check the settings above and if ready, Tap "ACCEPT"**

Staking a Line with Horizontal Offset

1. **Before continuing, make sure you have:**
    a. **Powered on your Device and Open Trimble Siteworks**
    b. **Be in the correct Project, Work Order & Design**
    c. **Rover & Data Collector connected to a Base Station or VRS Network**
2. **Press & Hold Method from Main Screen**
    a. **Press and hold on the Line for approx. 2 seconds**
        i. **If you are not zoomed in enough before pressing and holding an object and there are multiple lines and/or points close to one another, a pop-up box may appear, press on the object you want to stake.**
    b. **The Line information pop-up appears, Tap "Stake Line"**
        i. **The line will now be bold and have arrows pointing in the direction that the station values are increasing.**
    c. **Tap**  **symbol**
    d. **Stakeout Line Settings page opens, confirm these settings:**
        i. **Horizontal Offset: enter the offset, then choose to the Left or Right**
        ii. **Vertical Offset: if want, enter offset, then choose Above or Below**
        iii. **Stakeout Elevation, there are multiple choices:**
            1. **Ignore Elevation – if do not want Elevations**
            2. **Design Elevation at Line – only an option if a Design was selected, gives you Cut/Fill info of the line, from its original position.**
            3. **Design Elevation at Offset – only an option if a Design was selected, gives you Cut/Fill info of the line, at the offset distance, not from its original position**
            4. **Keyed in Elevation – allows you to enter a predetermined Elevation**
        iv. **Line Start Station – 0+00.000 is default or enter a new station**
        v. **Station interval – 32.808 usft is default or enter a interval**
        vi. **Auto Advance – To next station is default or chose another option**
        vii. **Create Tangent/Corner Points – No is default, or chose Yes**
        viii. **When ready, Tap "ACCEPT"**
    e. **The main screen reappears; a new bold line appears with arrows at the offset distance. On the Top Information Bar on your screen:**
        i. **Dsn Sta: – how far you are from begin/end of line**
        ii. **Cut/Fill: – only gives values if chose Elevation option**
        iii. **Dsn Elv: – only gives values if chose Elevation option**
        iv. **Sta: – your current position on the line**

v. **Off: - Left of line is negative (-) value; right of the line is positive (+) value**

f. **When you have finished staking:**
   i. **Tap "Hamburger"**
   ii. **Tap "Measure"**

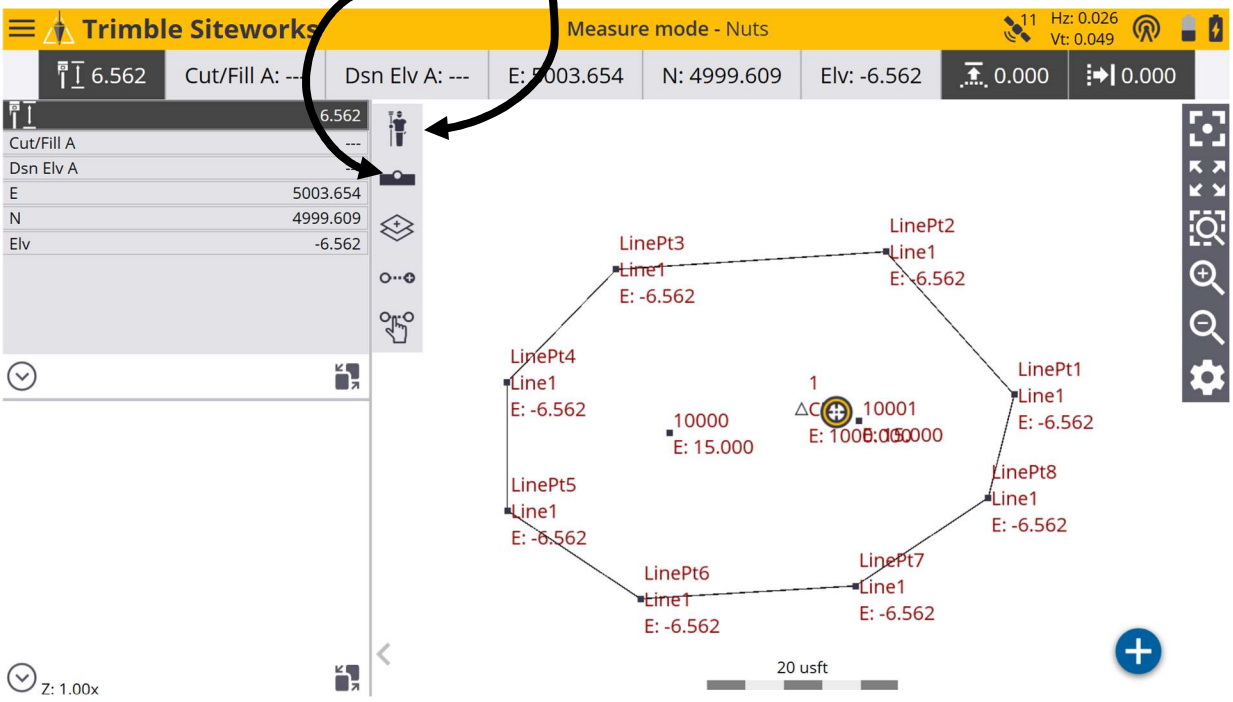
Staking Catch Points of Elevated Lines

1. **Before continuing, make sure you have:**
    a. **Powered on your Device and Open Trimble Siteworks**
    b. **Be in the correct Project, Work Order & Design**
    c. **Rover & Data Collector connected to a Base Station or VRS Network**
2. **A catch point is where proposed construction ties into the existing ground. This can be a proposed ditch bottom that you want to know exactly where the backslope ties into the existing ground. We can enter the backslope ratio in 3 different formats:**
    a. **Rise:Run – Example 1:5**
    b. **Run:Rise – Example 5:1**
    c. **Percentage – 20%**
3. **You can do this process with either:**
    a. **Elevated Lines within your Design, or**
    b. **Store 2 points and then Stake a Line between the points**
4. **Tap "Hamburger"**
5. **Tap "Stake" and either:**
    a. **Tap the Elevated Line and it turns bold and shows Stationing arrows, or**
    b. **Tap**  **to define a line between 2 or more points**
    c. **NOTE which direction your arrows are pointing to know if your Catch Point will be either Left or Right of the Line**
6. **For Stake Method, change it to "Catch Point"**
7. **Tap "ACCEPT"**
8. **Define Side Slopes page opens.**
    a. **You can choose to have 3 different options checked:**
        i. **Cut & Fill slopes on (most common option)**
        ii. **Just Cut slopes on, or**
        iii. **Just Fill slopes on.**
    b. **Confirm the current setting by tapping**  **and choosing one of the following:**
        i. **Rise:Run**
        ii. **Run:Rise**
        iii. **Percentage**
        iv. **Degrees (least common option)**
    c. **After selecting from above, enter the correct values in**
    d. **Then choose either Left or Right of the Line**
    e. **Tap "ACCEPT"**
9. **The main screen reappears, and a gray line appears perpendicular to the line, in the direction you choose.**

10. **You want to walk perpendicularly away from the line, following the light gray line, with your Rod held just above ground level. While walking, keep your eye on the Cut/Fill values. When your Rod is resting on the ground, and with a Cut or Fill as close to 0.00' as possible, this is the "Catch Point" of the stakeout line, for your current position.**
11. **You can continue working your way along the stakeout line to different stations, staking Catch Points perpendicular, in the direction you chose.**
12. **When finished staking Catch Points along the line, Tap "Hamburger"**
13. **Tap "Measure"**

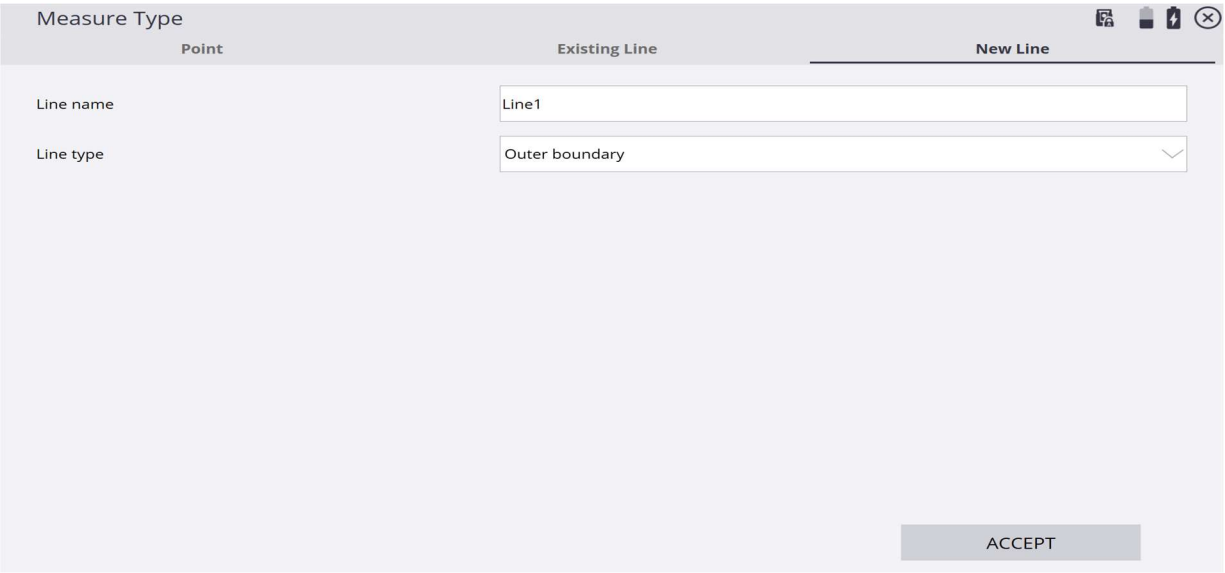
Design Surface from Field Topo Shots

1. **Before continuing, make sure you have:**
    a. **Powered on your Device and Open Trimble Siteworks**
    b. **Be in the correct Project, Work Order & Design**
    c. **Rover & Data Collector connected to a Base Station or VRS Network**
2. **From the Main Screen, Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
    a. **Tap "Project Setup" then Tap "Change Project"**
    b. **On the Open Project page, create a New Work Order by tapping on the "Circled +" on the far-right side of Work Order**
    c. **New Work Order page opens, your work orders specific like job name-Topo-todays date (Ex- Bear Creek Topo 231004), Tap "FINISH"**
    d. **If you have a Design, choose one or (No Design Needed), Tap "ACCEPT"**
3. **From the Main Screen, Tap the "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
    a. **Tap "Measure"**
4. **Start by Defining an Outer Boundary for your Design, to do so:**
    a. **Tap "Measure Method", on the pop-up Tap "Standing"**
    b. **Tap "Measure Type" button**



    c. **Measure Type page opens, Tap "New Line" tab near the upper right-hand corner, see below**
        i. **Line Name you can change or leave as the default "Line1" name**

ii. **Line Type – choose "Outer Boundary", Tap "ACCEPT" see below**



d. **Walk to where you want to start defining your Outer Boundary, level the rod and Tap the "Circled +" button near the bottom right-hand corner of screen.**
   i. **It stores the point location and starts to draw a Boundary Line.**
   ii. **Continue storing points around your Projects Outer Boundary by leveling your Rod and Tap the "Circled +" in the bottom right-hand corner of screen.**
      1. **When storing shots for Outer Boundaries and Site Topos, make sure to account for the high and low points, angles and corners for best accuracies.**
   iii. **Stop short of where you began the Outer Boundary line and store a point**
      1. **Tap "Measure Type" button**
      2. **Tap on the "Point" tab**
         a. **Point name should be numeric values (Ex-1000)**
         b. **Point code is a description of what you are shooting**
         c. **Point type should be Surface**
         d. **Show every time choose either:**
            i. **"Yes" if you want change point descriptions individually per point taken, OR**
            ii. **"No" if the point description will not change**
         e. **Tap "ACCEPT"**
      3. **Start storing points within your Outer Boundary.**
         a. **Make sure your Rod is level, then Tap "Circled X" in bottom right-hand corner**

e. **When you have finished storing points inside the Outer Boundary:**
   i. **Tap the "Hamburger" button**

ii. **Tap "Data Management" then Tap "Surface As Design"**
    1. **Save Surface as Design page opens**
    2. **Name the Design (EX – FG Parking lot-231004)**
    3. **Linework choose "Include Measured Linework"**
    4. **Tap "ACCEPT"**

f. **The surface has been created, we now need to select it, go to:**
    i. **Tap "Hamburger"**
    ii. **Tap "Project Setup" then Tap "Change Project"**
    iii. **For Design, select the Design you just created**
    iv. **Tap "ACCEPT"**

g. **To turn on Contours for the new Design, Tap** 
h. **Map Options page opens, Tap the "Design" tab at the Top**
i. **Tap on the "Design Contours" box to place a checkmark.**
j. **Contour Interval by default is 3.000 usft.**
    i. **Typical Contours interval on plans is 1.00 usft spacing.**
    ii. **Note: If your sight is flat, changing the value to 0.50 usft spacing will help you see more contour movement.**
k. **When finished, Tap "ACCEPT" to get back to the main screen.**

Export Data for Machine or Rover Files

1. **Whether you created a Design from Topo Points or have a Surface on your Data Collector and want to create files for Machines, we can do this in the field, from your Data Collector**
2. **Before continuing, make sure you are in the correct Project, Work Order and Design.**
3. **Tap the "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
    a. **Tap "Data Management" then Tap "Export to Machine"**
    b. **Export to Machine page opens, confirm:**
        i. **Export data type can be multiple types:**
            1. **Surface – a surface that was created in the office**
            2. **Measured Linework – linework from field topo**
            3. **Design – created from points & lines in the field**
            4. **Calibration – sends just the calibration file**
            5. **Measured Points – just points taken in the field**
        ii. **Machine control device can be multiple types**
            1. **CB430/CD700 – older GCS900 machine file creation (does not work very good)**
            2. **CB450/CB460 – newer GCS900 file creation**
            3. **Earthworks – Touchscreen Tablet file creation**
        iii. **Project**
            1. **Choose the Project that contains the files to be exported**
        iv. **Select Design**
            1. **If the Project has multiple designs, choose the correct one**
        v. **File location is either:**
            1. **USB Drive - most common option chosen, OR**
            2. **Device – saves to Data Collector**
        vi. **Once your settings are correct:**
            1. **If output is USB Drive, make sure it is in the Data Collector**
            2. **If output is Device, make sure you remember where you are storing the files**
            3. **Tap "ACCEPT"**

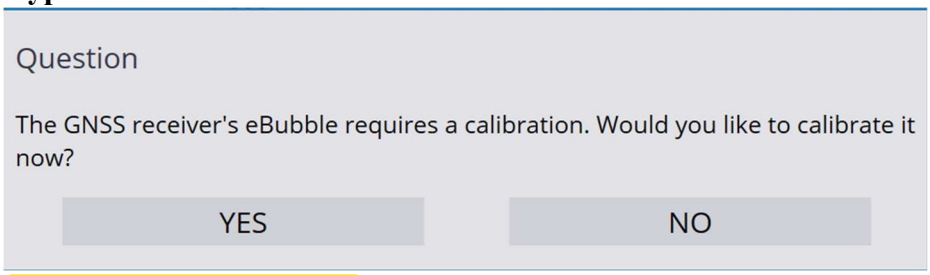
Turning On Emulated Receivers and Instruments

Turning on Emulated Receivers and Instruments allows you to emulate being connected to a Rover or Instrument, without being connected. Allowing you to simulate field scenarios with being in the field.

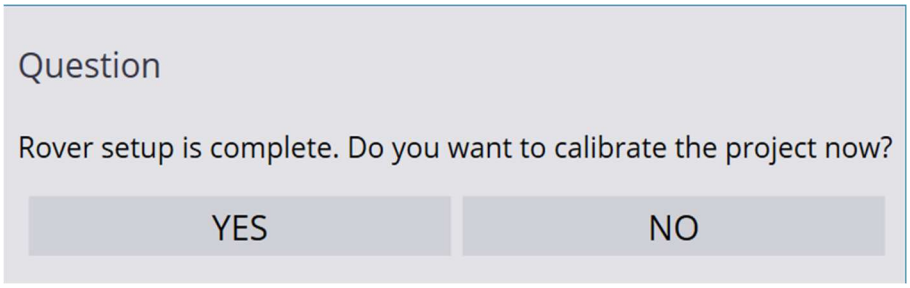
1. **Before continuing, make sure you have:**
    a. **Powered on your Device and Open Trimble Siteworks**
    b. **Be in the correct Project, Work Order & Design**
2. **From the Main Screen, Tap "Hamburger" button in the upper left-hand corner of the screen (the three stacked lines)**
3. **Tap "Settings" then Tap "Advanced Settings"**
    a. **Setting page opens, tap the box for "Enable Emulated Receivers and Instruments". A check now appears.**
    b. **Tap "ACCEPT"**
4. **Tap "Hamburger" button in the upper-left corner of the screen (the three stacked lines)**
5. **Tap "Project Setup" then Tap "Connect Device"**
    a. **If you were previously connected to a device, on the pop up, Tap "YES"**
6. **On the pop up, Tap on the device you want to Emulate (Total Station, GNSS or Integrated Surveying)**
7. **To the right of Connection Type (GNSS or Integrated Surveying) or Brand (Total Station), you now have Emulator options.**

New VRS Project from PDF Grading Plan

1. **Start by "Creating a New Project for VRS Network Calibration" from above**
2. **If there are not any Surveyor Control Points, look closely at your PDF Grading plans. Look for existing objects that show up on the PDF and in the field. Preferably with an Elevation associated with said object. Examples would be:**
    a. **More precise options:**
        i. **Top Back Curb at a corner**
        ii. **Concrete sidewalk corner or intersections**
    b. **Less precise options:**
        i. **Manholes**
3. **Connect to your Rover via VRS connection.**
    a. **If this dialog box appears, either Tap "YES" to calibrate now or "NO" to bypass**



    b. **If this dialog box appears, and you are ready to start Calibrating, Tap "NO"**



4. **With the bipods attached and the point on the bottom of your rod, walk to the object that appears both in the field and on your PDF Grading Plans.**
5. **Level your rod on the object using the bipods.**
6. **Tap "Hamburger", then Tap "Measure Control Point"**
    a. **Near the bottom right-hand corner, Tap** 
    b. **Measure Control Point page opens, manually edit these values:**
        i. **Point Name – (numeric value)**
        ii. **Point Code – (point description)**
        iii. **Tap "ACCEPT"**
    c. **Static Mode Settings page opens, confirm these settings:**

i. **Measure method – if using Quick Release, choose "Bottom of Quick Release"; if not, choose "Bottom of Antenna"**
ii. **Vertical height – 6.562 (typical rod height)**
iii. **Horizontal tolerance – 0.082 usft (default setting)**
iv. **Vertical tolerance – 0.082 usft (default setting)**
v. **Minimum measuring time – 120 (typical for Control)**
vi. **Time unit – Seconds**
    1. **Before continuing, confirm your Rod is still level, and you are still centered on the object you are trying to occupy.**
    2. **If windy, keep hands near pole to prevent tipping**
vii. **Tap "Start"**
    1. **Once the timer finishes, a Control Point is stored, and the software takes you back to what looks like is the Main Screen.**
viii. **Tap "Hamburger" then Tap "Measure"**

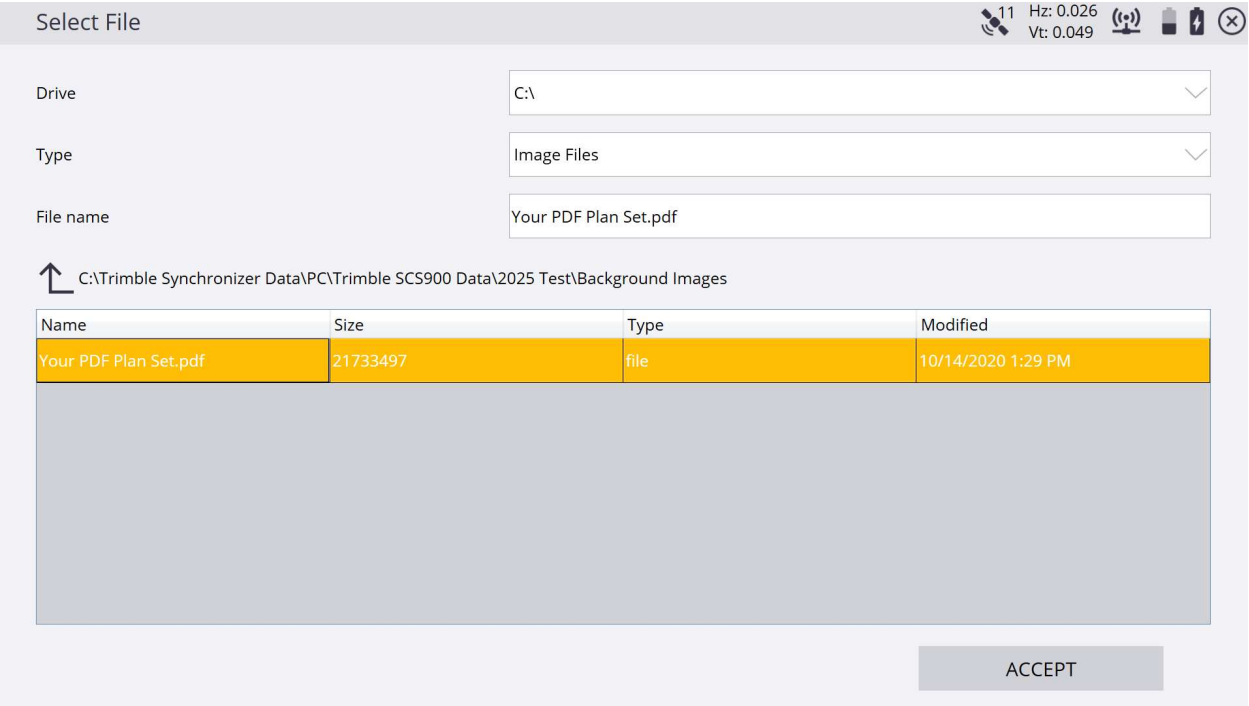
7. **Do not move the Rover Rod from the object you are occupying**
8. **Tap "Hamburger", Tap "Data Management" then Tap "Point Manager"**
    a. **On the pop-up, Tap "Enter/Edit Control Points"**
    b. **Select the Control Point you just measured, then Tap "EDIT"**
        i. **Change the Elevation of the Control point to match the PDF Plan Elevation.**
        ii. **You MUST Tap "Save" after making changes**
        iii. **Tap the "Circled X" in the upper right-hand corner of the screen**
        iv. **Tap the "Circled X" in the upper right-hand corner of the screen**
9. **From the Main Screen, Tap "Hamburger", Tap "Project Setup", then Tap "Project Calibration"**
10. **The Project Calibration page opens, Tap**  **near the upper left-hand side**
    a. **The Select Point page opens; you can do one of the following:**
        i. **Type the Point name in by tapping inside the blank space**
        ii. **Tap on a Control Point on the Map Screen**
        iii. **Tap**  **icon**
            1. **Then Tap on the Control Point**
            2. **Tap "ACCEPT"**
    b. **When you have chosen a Control Point, it should have a Blue Circle around it. Before continuing, make sure you:**
        i. **Make sure the Point of the Rod is still centered on the object you occupied earlier**
        ii. **Make sure you Rod is still level**
        iii. **Tap "SELECT" to continue**
    c. **Static Mode Setting page opens,**
        i. **Measure Method – if using Quick Release, choose "Bottom of Quick Release"; if not, choose "Bottom of Antenna"**

ii. **Vertical Height – 6.562 usft**
iii. **Horizontal Tolerance – 0.082 usft (default tolerance)**
iv. **Vertical Tolerance – 0.082 usft (default tolerance)**
v. **Minimum Measuring Time – 120**
vi. **Time Unit – Seconds**
vii. **Before Starting this process:**
    1. **Confirm all Settings above**
    2. **Double Check your Rod is level**
    3. **If windy, keep hands near pole to prevent tipping**
    4. **When ready, Tap "Start"**
    5. **Static Management page opens. It will display Expected and Current Precisions. As the timer counts, you can watch your Current Precisions get smaller or tighter, see image below**

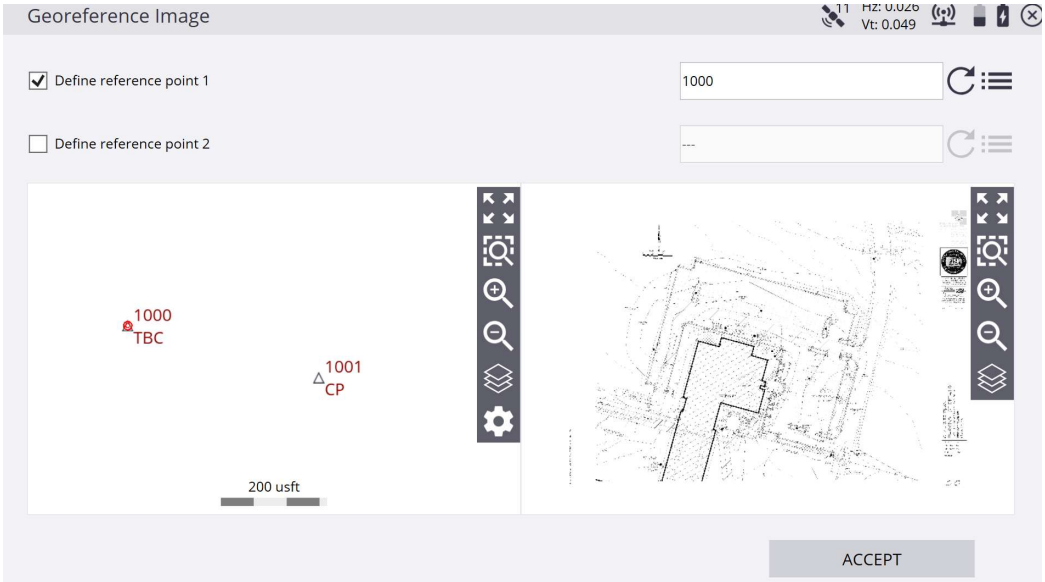
viii. **When the timer reaches its target time, Project Calibration page reopens:**
    1. **Near the top of the page, it says "3 or more Control Points are required….." (occupying 5 Control Points is recommended)**
    2. **Tap "FINISH"**
        a. **Info pop-up box opens "Accept Calibration? The calibration cannot be resumed or changed once accepted." Tap "YES"**
        b. **Info pop-up opens, "3 or more Control Points are required….." Tap "YES**
        c. **Info pop-up box opens "Calibration complete" Tap "OK"**
    3. **Your Project is now calibrated, coordinates are relative, and elevations reflect your PDF Grading Plans.**

Inserting a PDF Background Image in Siteworks

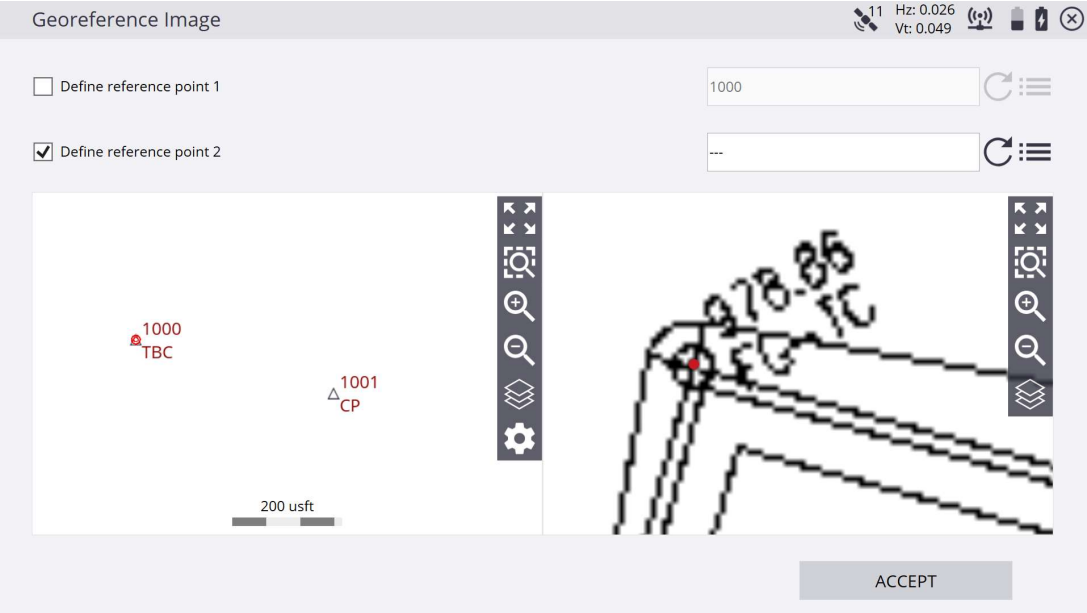
1. **Before continuing, these instructions are for Siteworks V1.8 or newer.**
    a. **Older versions of the software may vary from the instructions below**
2. **For best results, the PDF Plans shall be the originals and not scanned paper plans from a printer.**
3. **Have Siteworks open, be in the correct Project, Work Order, and Design**
4. **Have your Rover Connected to either a Base Station or the VRS Network**
5. **Before continuing, make sure you have the PDF Plans to be imported stored Data Collector.**
    a. **They need to be stored in the Backgrounds Images folder, within your Project.**
        i. **The instructions below will be from having them stored in the Background Images folder.**
            1. **They can be imported from a jump drive (not described in these instructions)**
    b. **Know which page will be imported if a multiple page PDF Plan Set.**
6. **You will be to do some field research before continuing. you need to find 2 objects that exist not only in the field, but also on the PDF plan set. Examples would be:**
    a. **More precise options:**
        i. **Top Back Curb at a corner**
        ii. **Concrete sidewalk corner or intersections**
    b. **Less precise options:**
        i. **Manholes**
    c. **Note: If you just completed "New VRS Project from PDF Grading Plan", that Control Point WILL work for 1 of the 2 points needed.**
7. **Once you have identified the coordinating field and PDF plan objects needed, walk to their locations in the field and store them as Control Points.**
    a. **Tap "Hamburger" then Tap "Measure Control Point"**
    b. **When finished measuring Control points, Tap "Hamburger" then Tap "Measure"**
8. **After storing the 2 field locations that appear on the PDF Plans, Tap** 
9. **Map Options page opens, Tap on the "Images" tab near the top**
    a. **Tap the box to the left of "Display background image"**
    b. **Tap the**  **to the far right of "Background Image"**
    c. **Select File page opens. If you stored the PDF Plans in the Background Images folder within your Project folder, confirm these settings on the below image, then Tap on "Your PDF Plan Set", then Tap "ACCEPT"**



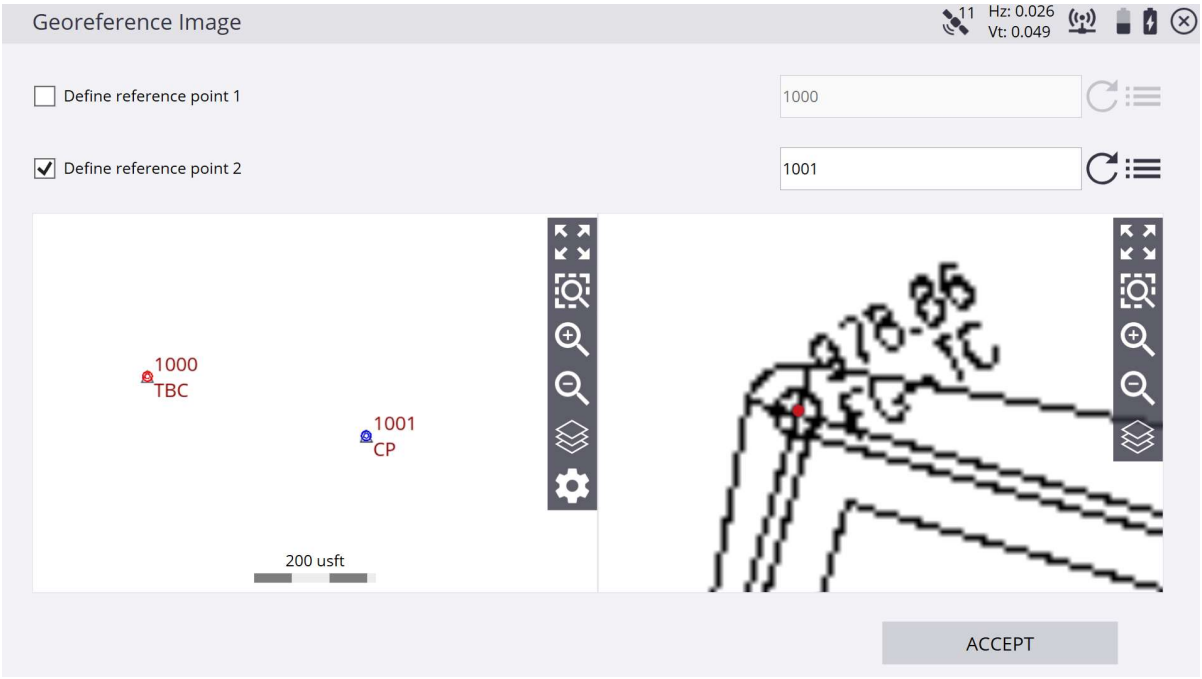
d. **PDF Import page opens, confirm:**
    i. **Using the arrows near the upper right to choose the page you want to import.**
    ii. **Resolution – High (shows plan text best)**
    iii. **When ready, Tap "Import"**
e. **On the pop-up Question, Tap "YES"**
f. **Georeference Image page opens, follow the steps below:**
    i. **Define reference point 1 box is checked**
    ii. **You must Tap a control point on the bottom left map screen, see image below (Control Point 1000 is now selected in red)**



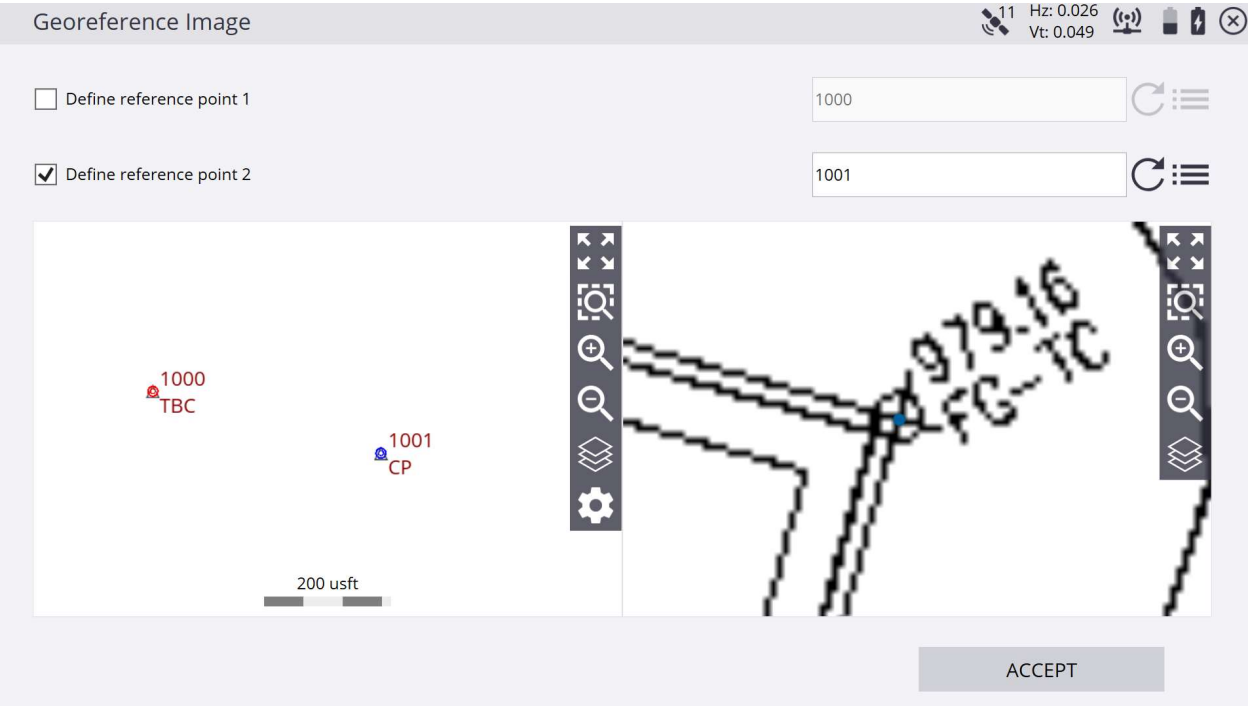
iii. **The software then wants you to select the corresponding location of the matching control point on the bottom right map screen, the PDF Plan set. Zoom in and pan around to find the corresponding location of the Control point. Click on that spot, the software drops a red dot, see image below**



iv. **The software then advances you to "Define reference point 2" in which you need to Tap on the next Control Point on the bottom left map screen, see image below (Control Point 1011 is now selected in blue)**



v. **The software then advances to select the corresponding location of the matching control point on the bottom right map screen, the PDF Plan set. Zoom out. Zoom in and pan around to find the corresponding location of the Control point. Click on that spot, the software drops a blue dot at that location, see image below**



vi. **Before continuing, on the bottom right map screen, zoom in & out and confirm the red and blue dots are where you want them to be.**

vii. **Once confirmed, Tap "ACCEPT"**

viii. **Map Options page opens:**
   1. **Confirm the transparency you want (can be changed if to light or dark)**
   2. **Tap "ACCEPT"**

ix. **The software opens back to the Main Screen, confirm things are lined up the way you wanted.**
   1. **If you want the transparency lighter or darker or to turn off the PDF Plan set, Tap** 
   2. **Tap "Images" tab near the top**
      a. **You can change the transparency %, OR**
      b. **Turn off the PDF Plan set by unchecking "Display background image"**
      c. **Tap "ACCEPT" to get back to the Main Screen**