



Magnet **Construct** Building Construction – Introduction LN-150



Position 
Partners

Shaping New Dimensions

Foreword

This document has been produced by Position Partners whose combined experience in surveying and civil engineering stretches over many decades. We acknowledge the contribution of customers in assisting us with the feedback that has aided in the development of this course.

This guide is designed to provide the user with an understanding of the requirements and settings used to create a job with LN Series and Magnet Construct to conduct field set out from imported data.

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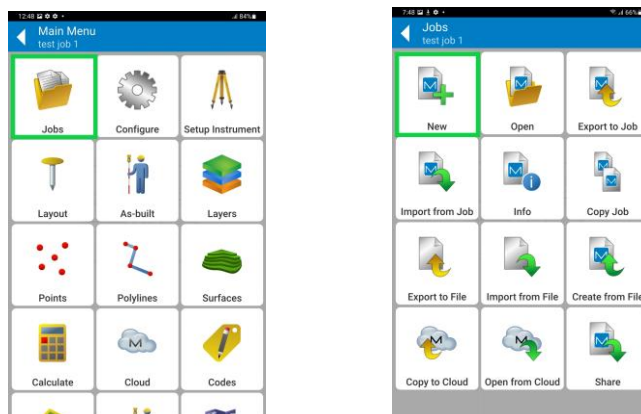
Shaping New Dimensions

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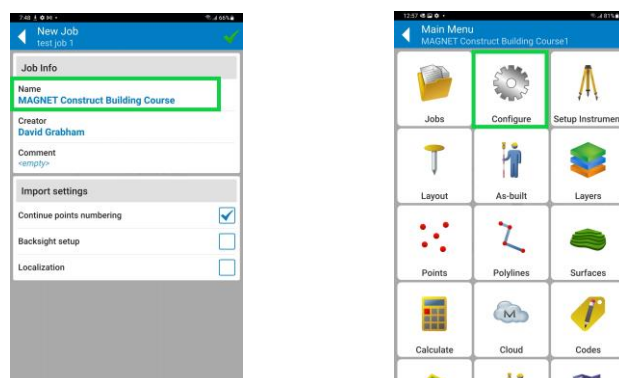
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Create a New Job in Magnet Construct

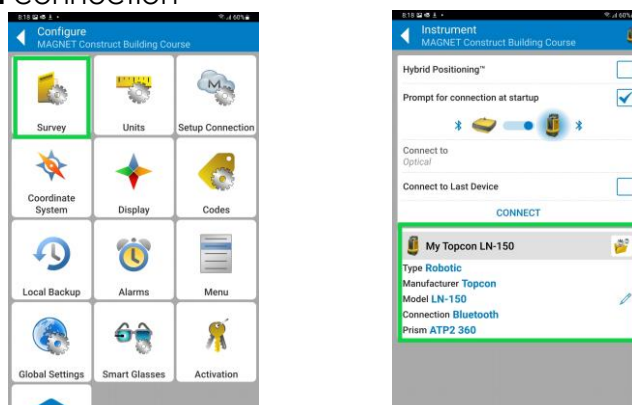
1. Open the **Magnet Construct App** on your device. An Android device must be running Android v.6 operating system or later to be compatible.
2. Once on the Magnet Construct main home screen, select the **Job icon**. Once on the job screen, select the **New Job icon**



3. On the new job screen, enter in a **name** for the job. Once a name has been entered, select the **tick button** in the top right. Select the **'Configure'** icon.

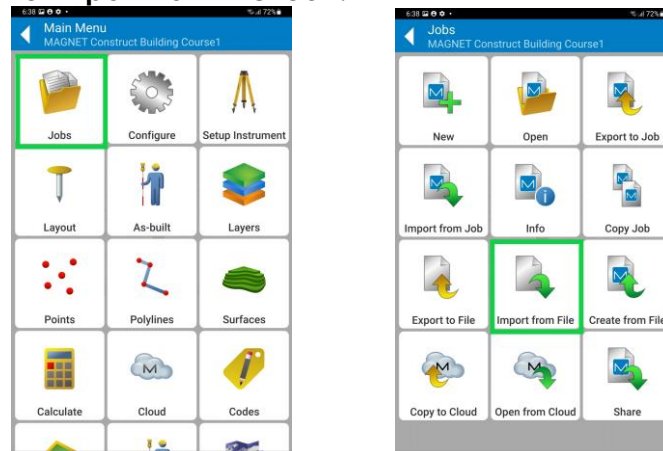


4. Select the **'Survey'** icon. Be sure that the optical configuration is set to **LN series via Bluetooth** connection

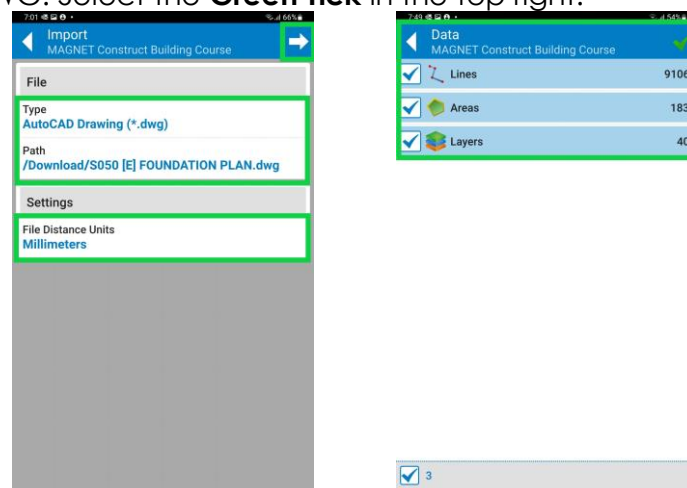


Import Design Data into the Job

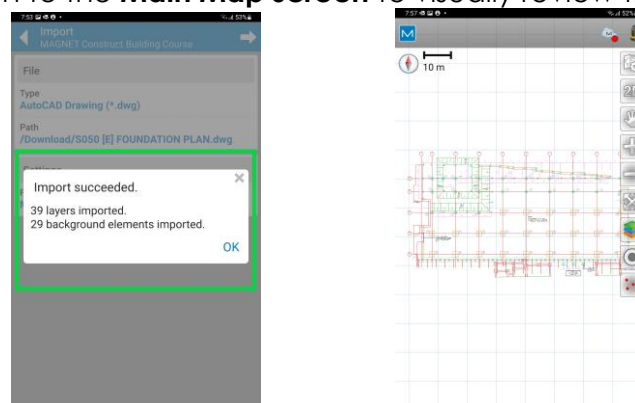
1. Now back on the Magnet Construct home screen, select the **Jobs icon**. On the Jobs screen, select the **Import from File icon**.



2. On the Import screen, ensure the **File** is set to **AutoCAD Drawing (.dwg)**, select the **Path** to find the file, and the **File Distance Units** are set. Select the **Next (arrow) button**. The **Data** screen will show the user how many points, lines, layers, and surfaces there are in the data DWG. Select the **Green Tick** in the top right.



3. Confirmation of the **successful data upload** will be shown to the user. Select **OK**. The user will be taken to the **Main Map screen** to visually review the imported DWG.

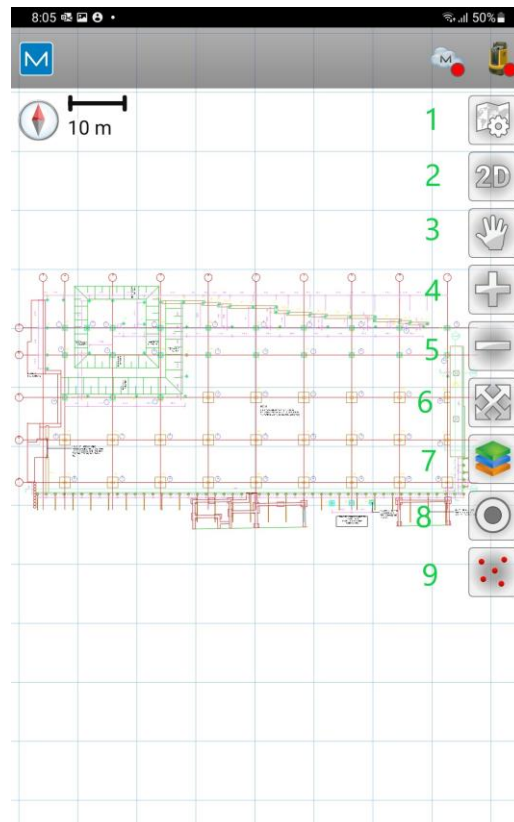


MAGNET Construct Map Features

Main Map Walkthrough

The **Main Map is the default** screen for the MAGNET Construct App.

The **map menu** items on the **right-hand side of the screen** allow functions to be performed within the Map Screen and have Quick Access to features within the software. To press-and-hold the menu item will bring up 'help text' to show its function.

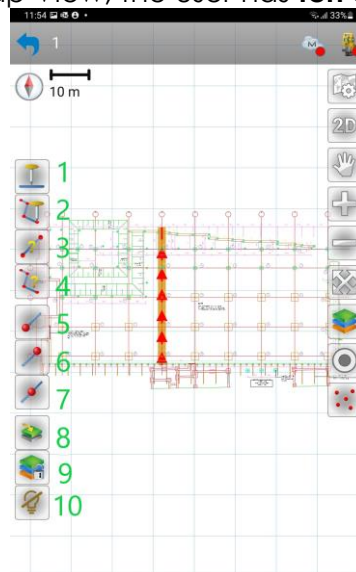


1. The **Map Properties** allows the user to define what they see on the map screen at any given time. This may include the point names, heights, staked points, surfaces and many other options are available.
2. **2D/3D Toggle Switch** can be used to swap between the 2 dimensional and 3 dimensional views within the Map view.
3. **Switch Camera Mode** will swap between dragging the screen and rotating the screen.
4. **Screen Zoom In** allows the user to zoom in on the map to pick out points and lines more accurately from the Map View. This can also be done at any time by **pinching the touch screen** to zoom and expand the view.
5. **Zoom Out** performs the opposite function to Zoom In.

6. **Zoom to ALL Data** function will bring all the design data held within the job to be centred on the screen with one touch.
7. **Design Layers** function allows quick access to the design layers. Here the user can turn layers on and off on the map view by highlighting, or un-highlighting the green icon on the left. This screen also allows the user to **add new** layers into the design by using the **Blue +** in the bottom right, **edit existing** layers within the design and **delete existing** layers from the design.
8. **Joystick** allows the user to rotate the instrument from the tablet to acquire a lock on the prism.
9. **Edit Points** allows the user to quickly enter the edit points menu to add, remove or edit points in the data. This also allows access to the **display settings**, the multi-colour star in the top right corner.

Selected Line Action Menu

When a line is selected in the Map View, the user has **ten actions to choose from**.



1. **Stake Line** – Selecting this option will allow the user to stake the line being given direction right/left, in reference to the arrows on the line.
2. **Layout Points on a Line** – Allows the user to layout points either selected by code string from the line list, or from the Map.
3. **Calculate Line Length** – This allows the user to gain information about the direction of the line, the length of the line, and height of the line if this has been applied.
4. **Create a Line Report** – This option creates a line report breaking up the different segments of the line.
5. **Create Start Point** – This will create a point at the start of the line that will then exist in the data for future reference and can also then be laid out as a point.
6. **Create End Point** – This will create a point at the end of the line that will then exist in the data for future reference and can also then be laid out as a point.
7. **Create Mid-Point** - This will create a point at the mid-point of the line that will then exist in the data for future reference and can also then be laid out as a point.
8. **Move Selection to Layer** – This will allow the user to add the selection into a different layer within the design. The layer list will appear when this is selected.
9. **Lock Selected Layer** – This will 'lock' the layer to which the selected line or point is in. This will mean that the layer cannot be turned off in the Map View.
10. **Hide Selected Layers** – This will turn off the selected layer in the Map Screen. The layer can be turned back on at any time from the 'Layers' Tab on the opposite side of the Map screen.

Instrument Setup LN

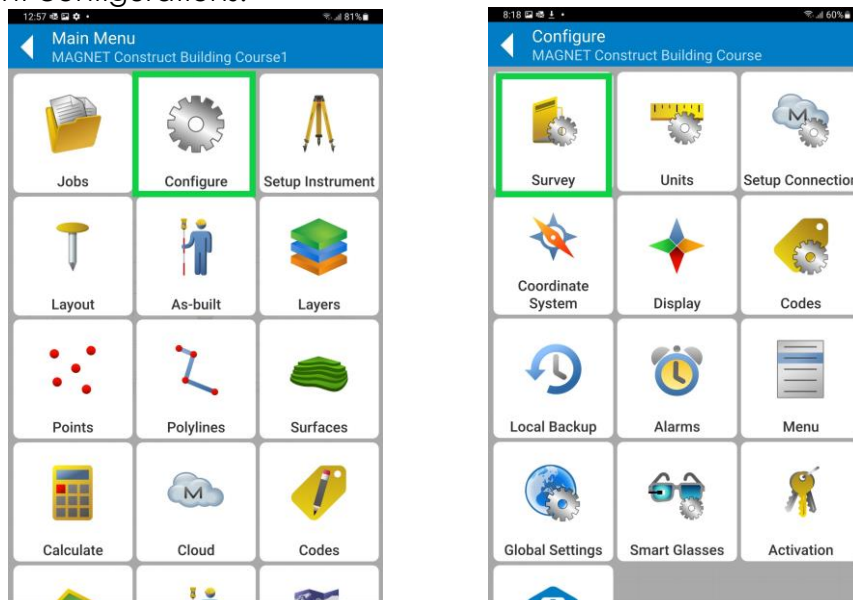
Setup Best Practice

1. Positioning the instrument onsite requires some consideration
 - a. To be **clear** of plant and people as much as possible
 - b. Position must have **line-of-sight** to the **survey control**
 - c. Position must also have **line of sight** to the **area to be set out**
2. Placing the **tripod in firm ground** and applying pressure to the legs, keeping the **plate of the tripod as level as possible**
3. Fix the **LN** onto the tripod via the **tripod screw**, keeping one hand on the instrument until it is secured in place.
4. Place a fully **charged battery** into the **LN**, press the green power button, and allow the instrument time to self-level. The instrument will spin 180 deg to check its level, and then spin back home when complete.
5. Press the Green '**Power**' button and the **instrument will self-level**

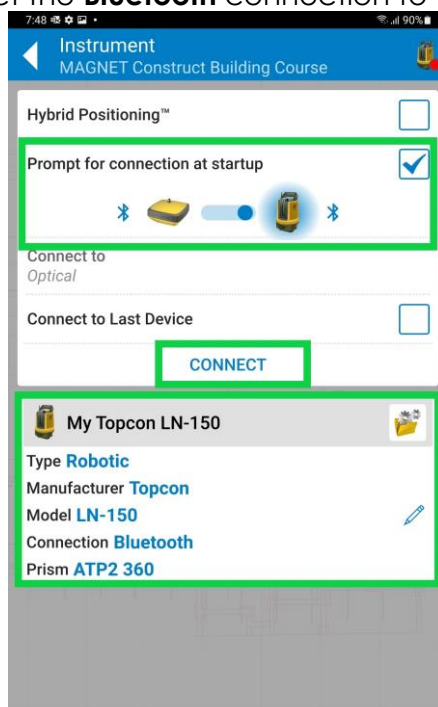


Connect to LN via Bluetooth

1. Once you have completed this setup routine, using the **Magnet Construct App** on the tablet, from the main screen select **Configure** and **select Survey** to set the Bluetooth instrument configurations.



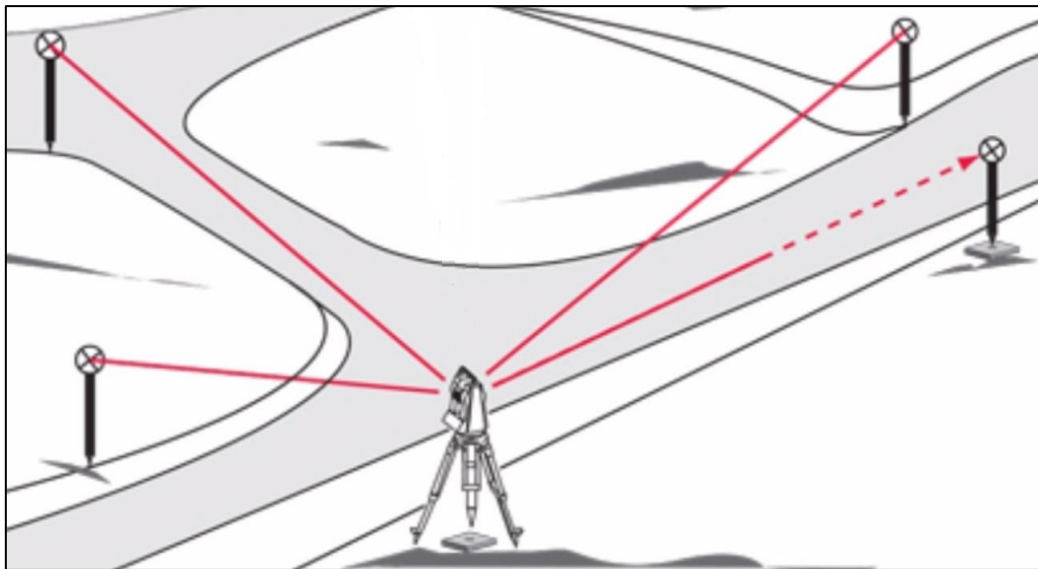
2. The user can then select the **Bluetooth** connection to the Topcon LN-150. **Connect.**



Set Up Anywhere (Resection)

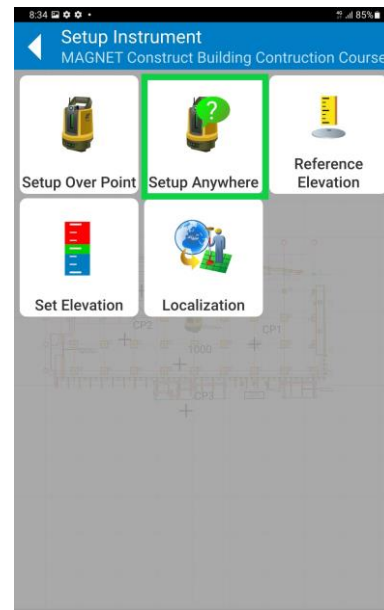
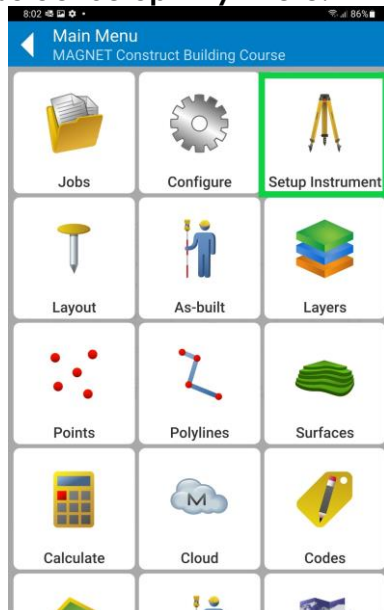
Best Practice

- **Use 3 control points** in the resection with a 4th control point as a check shot.
- **Visual line of sight** between occupation point and all control points.
- Instrument is setup **within the boundary** of your resection control points.
- All observations should be taken in a clockwise direction.
- Observe the longest distance first as this has least amount of angular error.
- Height of survey pole needs to be known.
- **The instrument height is zero.**
- The instrument **does not** need to be centred over a known control point.
- The instrument needs to be levelled before taking any observation.

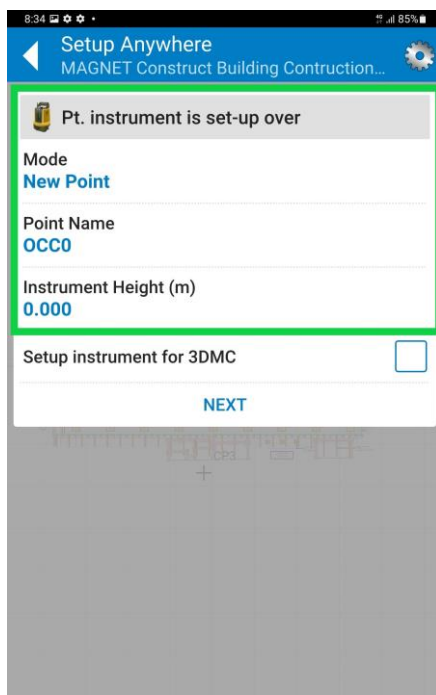


Setup LN via Set Up Anywhere (otherwise known as a Resection).

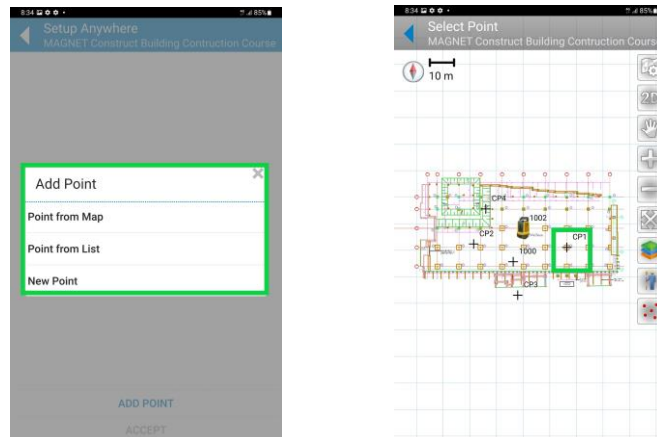
1. From the home screen, select the **Setup Instrument icon**, and then from the setup screen, select **Setup Anywhere**.



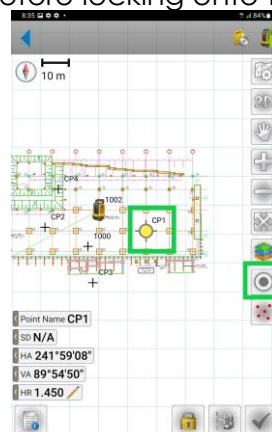
2. On the 'setup anywhere' screen, enter in a **Name** for the **Point Name (OCC??)**. This name is usually something relevant to the users initials or the current date along with the instrument setup number. For the *HI* (height of instrument) value, always ensure this is **0.000m**.
Select **Add Point**.



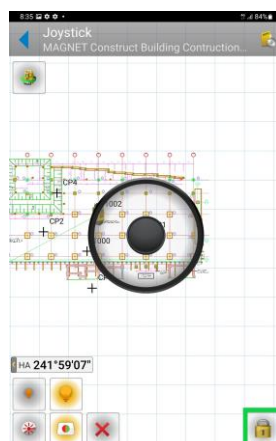
- Specify how you would like to select the point that is to be used as the first point in the resection. Most commonly, the point will be added using **Point From Map**. **Select** the point from the **Map** screen, in this example we are starting with **CP1**.



- The **selected point will be highlighted yellow**. Be sure that the **Prism Pole height** is set correctly in the bottom left. The user will select the remote control to drive the instrument to their location before locking onto the prism.



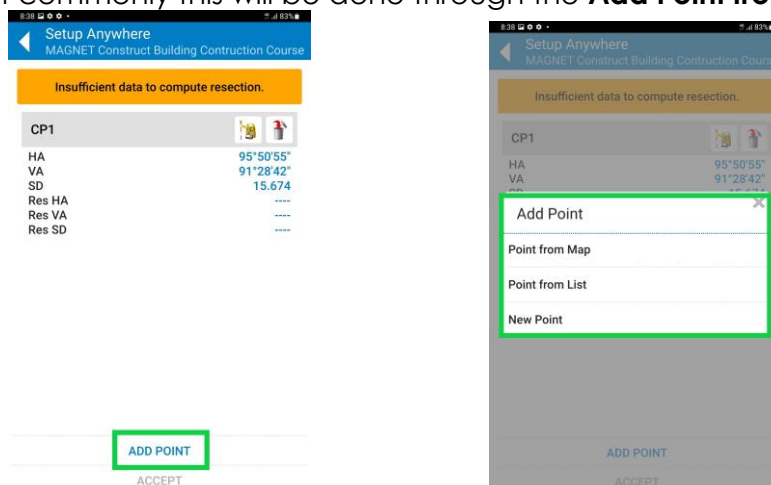
- The user must then use the **remote control** to drag the instrument around to their location to lock onto the prism. When the instrument is facing the user, select the **Lock** button in the bottom right. This will start the search for the prism, and once found, will lock on automatically.



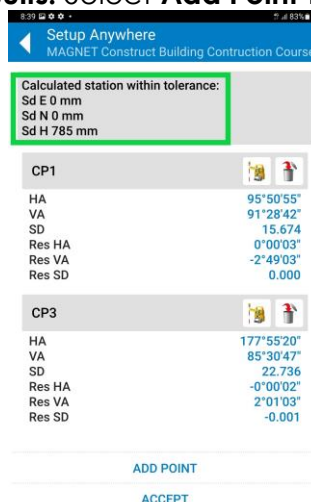
6. Once the user is stationed over the control point, check that the **pole bubble** is centred and accurate. Once ready, measure the control point by selecting **the green tick** bottom right.



7. After measuring the first point, the user will select **Add point**. The user will then again select the method to specify the next point to be measured onsite. Most commonly this will be done through the **Add Point from Map** option.



8. User will use the same routine as in point 6 above, to select the control point and measure the control point. After 2 points have been recorded the user will be given some **calculated station results**. Select **Add Point** to measure the 3rd resection point.



9. After the 3rd point has been measured, the results screen will indicate the accuracy obtained during the resection. If the accuracy is in tolerance of the set-out requirements of the job, select **Accept**.

Setup Anywhere
MAGNET Construct Building Construction Course

Calculated station within tolerance:
Sd E 2 mm
Sd N 2 mm
Sd H 740 mm

CP3

HA	177°55'20"
VA	85°30'47"
SD	22.736
Res HA	-0°00'14"
Res VA	1°20'49"
Res SD	0.002

CP2

HA	250°25'12"
VA	85°02'26"
SD	20.286
Res HA	0°00'14"
Res VA	1°30'43"
Res SD	-0.001

ADD POINT

ACCEPT

10. **Confirmation of the OCC** (occupied point) being stored will be shown. Select **OK**. The user will be taken back to the **Main Map Screen** of the App to begin set out.

Setup Anywhere
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Occupation point "OCC0" has been stored.

CP3

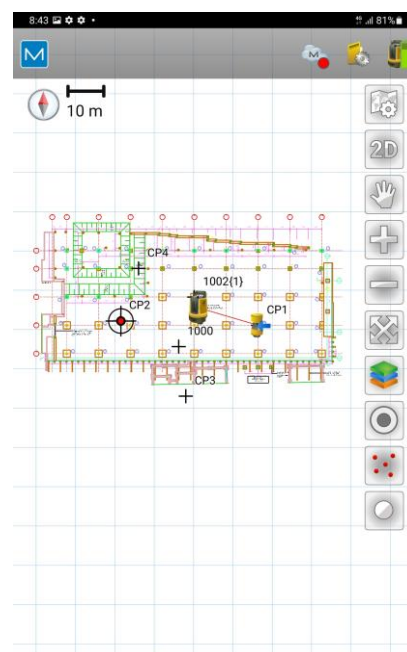
HA	177°55'20"
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CP2

HA	250°25'12"
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ADD POINT

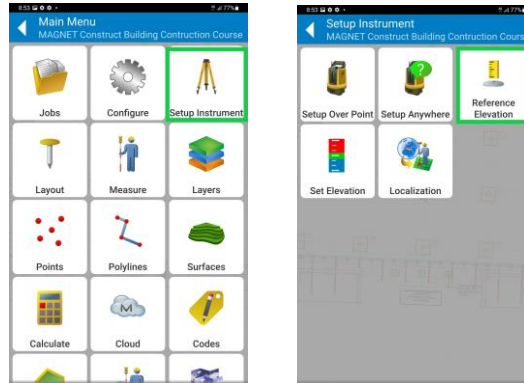
ACCEPT



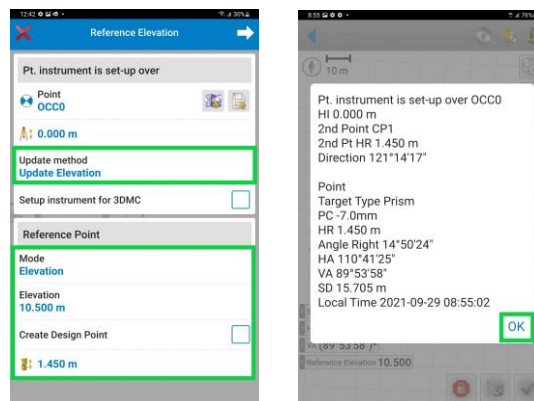
Reference Elevation Routine

After a resection performed and accepted, an onsite Benchmark can be measured to set the height of instrument in reference to that benchmark height. This routine will then give the user their current RL onscreen using the benchmark as the height reference.

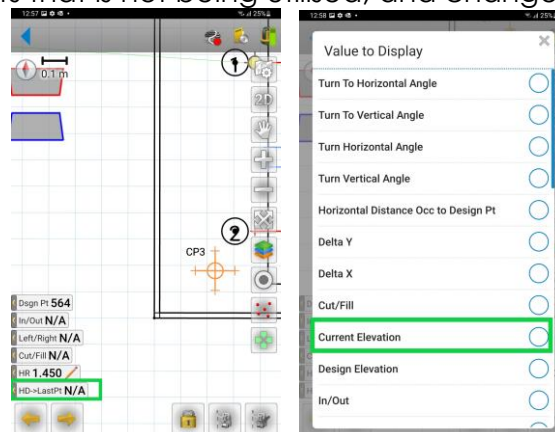
1. Select **Setup Instrument** & Select **Reference Elevation**.



2. Using the **same Occupation Point** as was set in the resection use the update method of Update Elevation and change the mode from Point to Elevation. Input the RL of the benchmark that is being measured and set the correct Prism Pole Height. The **results and information** of the updated elevation routine will be shown, select **OK**.



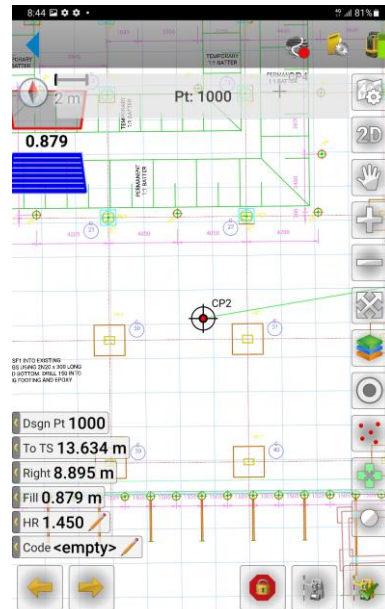
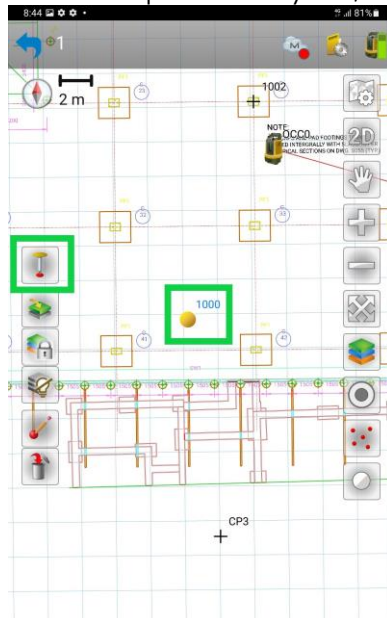
3. To now **view the current elevation** when staking out a point, press and hold one of the information bars that is not being utilised, and change it to **Current Elevation**.



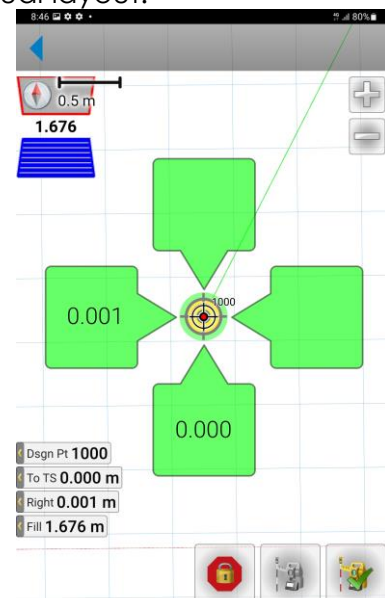
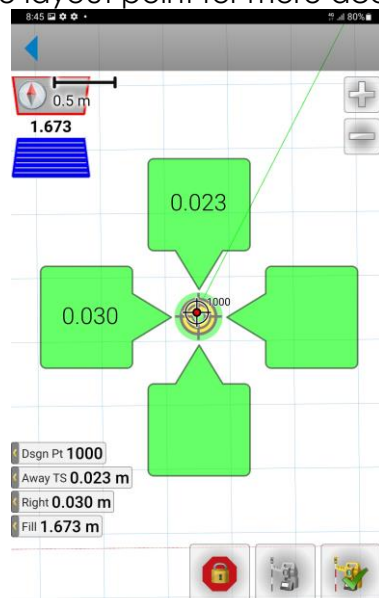
Layout

Layout Design Points

1. On the map screen, select a **Point** in the map to layout and select the **Stake** action. When locked onto the prism, the user will be given the **To/From TS & Right/Left** to guide the user to the point to layout, all in relation to the LN instrument.

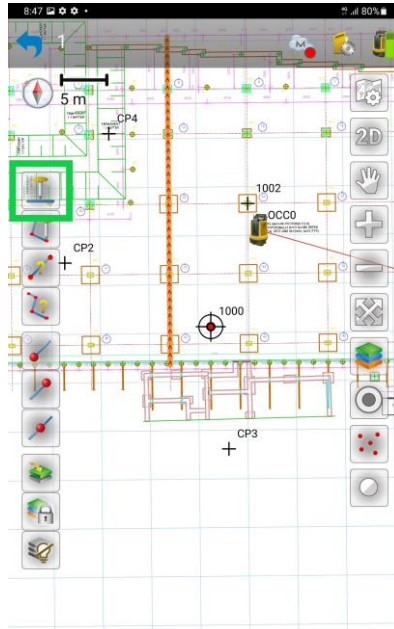


2. The screen will enter **high precision mode** when the user gets within a set tolerance of the layout point for more accurate and visual layout.



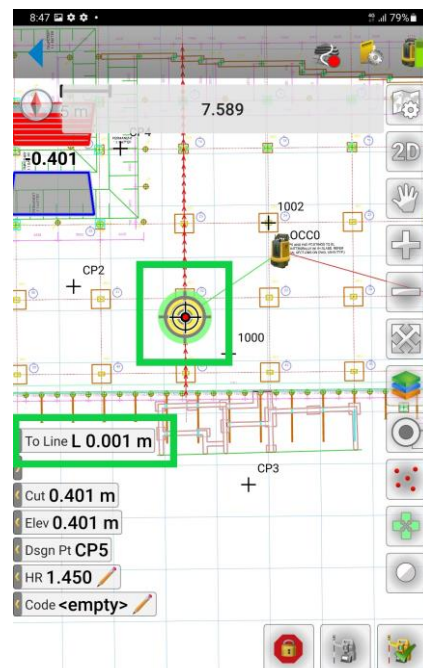
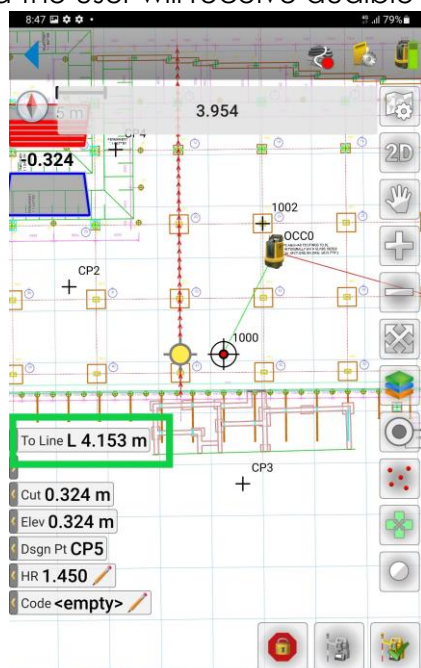
Layout Design Lines

1. From the Map screen, select the **design line to layout**. The user will see arrows on the selected line which give the line a direction. This allows the user to have a **reference** to move **right or left** as instructed to find the line. To Layout the point, select the '**Layout Line**' action button.



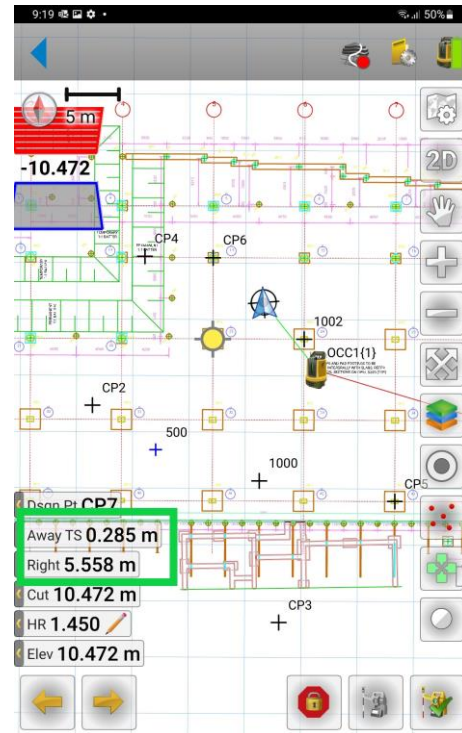
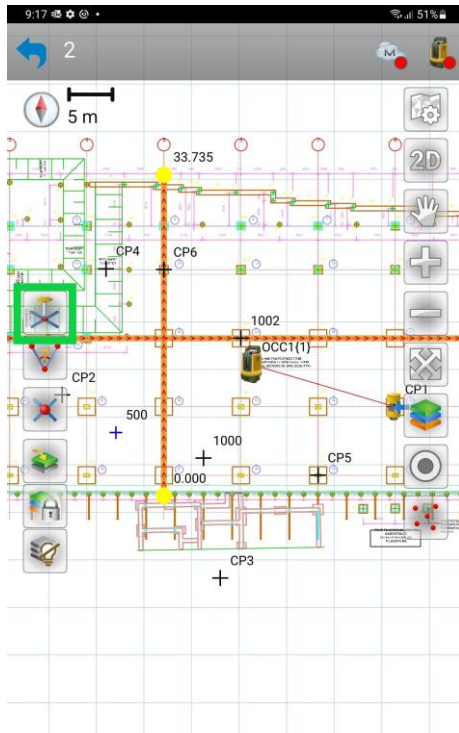
2. On the layout screen, once locked onto the prism the user will be given direction in relation to the arrows on the line, in this example, the user needs to **move 4.153m left** to be on the line.

When the user is within a set tolerance of the design line, the **target will turn green**, and the user will receive audible tones.



Layout Intersecting Design Lines

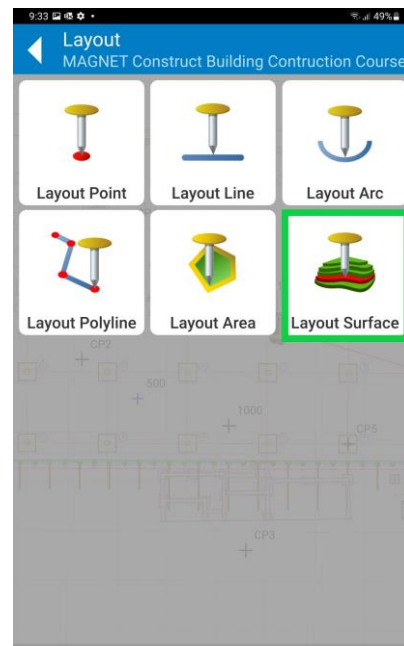
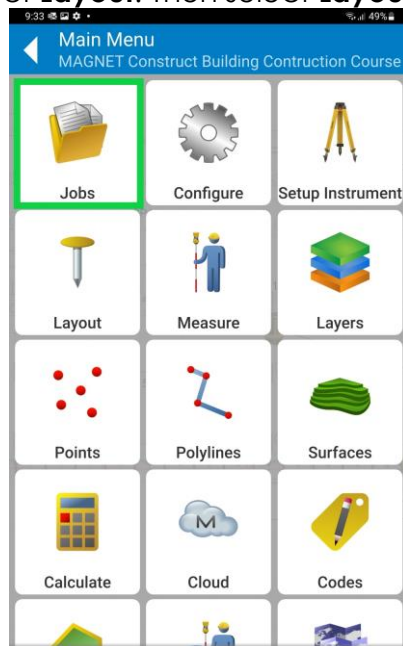
1. From the main Map screen, **select 2 line to find the intersecting point** of those design lines. MAGNET Construct will then be **directing the user** to the intersection of the design in the same way as layout point.



Stake Elevation

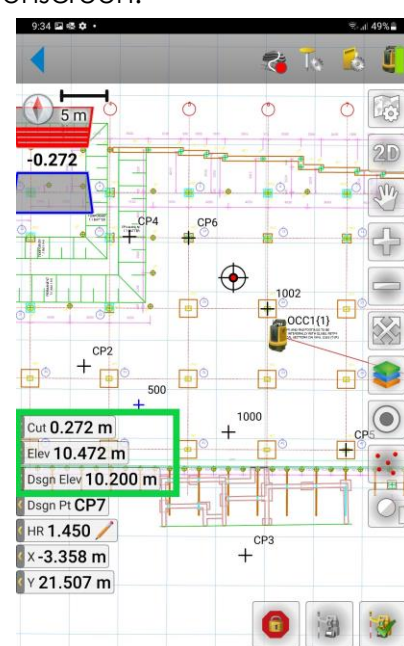
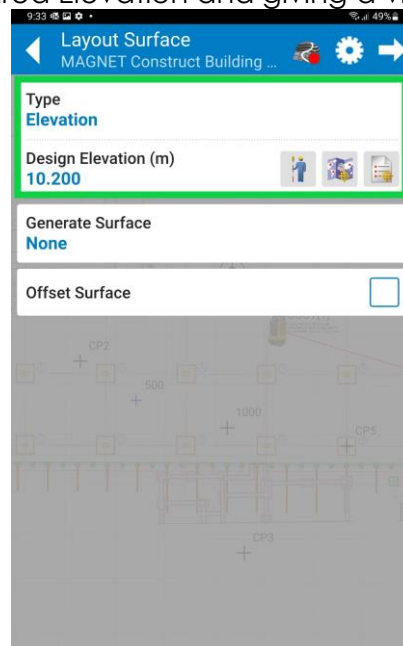
Once the height has been set for the instrument, through a Set Up Anywhere routine or using the Reference Elevation Setup Routine, the user then has the option to layout an elevation. When there is no DTM available in the data, this can be useful to obtain a cut/fill using your current elevation, against an input elevation.

1. Select **Layout**. Then select **Layout Surface**.



2. Toggle type from 'Surface' to '**Elevation**'.

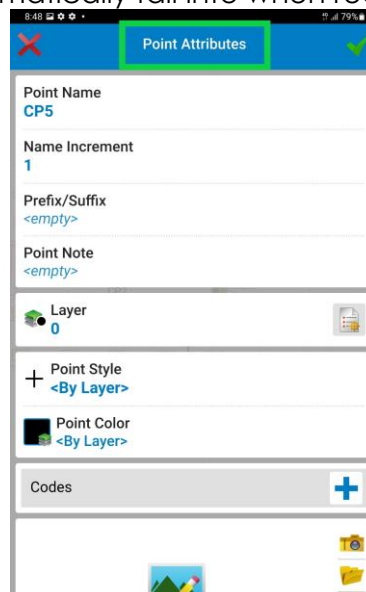
Input the required RL, in this example the user is staking out the FFL of a slab known to be at **RL 10.200m**. The software will then be comparing your Current Elevation, to this Desired Elevation and giving a visual Cut/Fill onscreen.



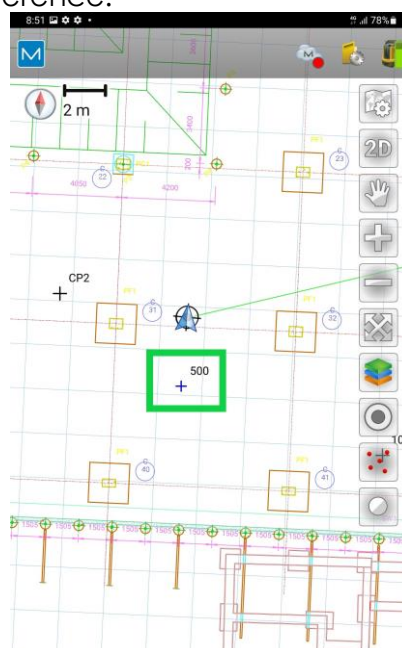
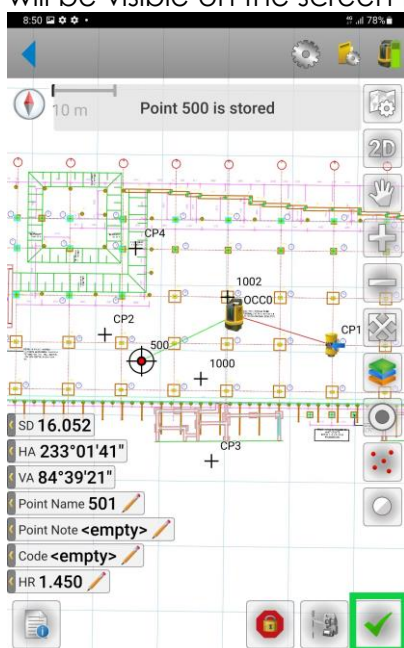
Measure – As-Builts

The Measure feature is used to pick up points, lines, or assets in the field to measure and record their locations for design purposes, or to find the asset in the ground after installation.

1. Select **'Measure'**. The **Points attributes** screen allows the user to then set the attributes of the measurement that is going to be recorded. This also allows the user **to create a new layer** that the measured point will automatically fall into when recorded.



2. When the user is located on top of the asset with the bubble on the pole level, the user can lock onto the prism and select **'Measure'**. The point that has been recorded and will be visible on the screen for future reference.



FAQ's

1. My Set Up Anywhere (Resection) has errors of greater than my required tolerance for the set out. What should I do?

The residual easting and northing error in your resection should not be greater than the set tolerances for the project or activity. As a general guide these errors should be sub 5mm for construction.

Doing your resection again and minimising as much error as possible is suggested if residual errors are too high. Taking your time with the resection set up and minimising any error in recording your points can reduce the residual error.

These errors might also be high due to using inaccurate control points in your resection.

2. When I perform a resection, I get an error message '*unable to compute instrument location*'. What does this mean?

'*Insufficient data to compute instrument location*' is the systems safeguard against setting up incorrectly and allowing incorrect set out onsite.

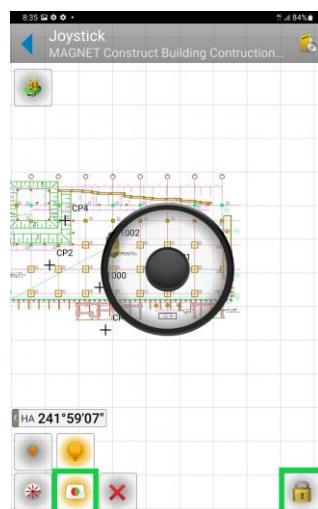
This error occurs when the points that have been measured do not match the distance and angle measurements being computed off the digital plan.

You may have selected the wrong point off the map view. Be sure that the control points or grid line intersections that you measure onsite correspond to the same point on the plan.

3. The red and green guide lights are no longer visible on the LN. How do I turn them back on in Magnet Field?

The red and green guidelights can turn off when changing jobs or after a period to save on battery power.

Navigate to the Remote-Control Screen, and select the Red/Green 'Point Guide On Button'



4. We have a Tokara Support Subscription with Position Partners and have an updated or new drawing we would like uploaded onto our controller. How do we go about having this uploaded while we are onsite?

You can call our Supports Service on 1300 867 266 and follow the prompts. When speaking to our support staff, they will ask you to email the .dwg file to:

NSW - nswsupport@positionpartners.com.au

ViC, NT, SA & TAS - vicsupport@positionpartners.com.au

QLD - qldsupport@positionpartners.com.au

WA - wasupport@positionpartners.com.au

From there, our team will ask you to leave your controller switched on and will remotely upload your drawing into a new job file for you to keep you productive onsite.