Walk-in Slide: AU 2014 Social Media Feed

1. Click on the link below, this will open your web browser

http://aucache.autodesk.com/social/visualization.html

2. Use “Extended Display” to project the website on screen if you plan to work on your computer. Use “Duplicate” to display same image on screen and computer.

CO5712

Merging the Model with the Field:

3 Applications for Model-Based Layout & As-Builts

Scott Cloud & Shawn Mancill
Brasfield & Gorrie

+

Cathi Hayes & Carl Singleton
Leica Geosystems

Class summary

This class will explore the use of Autodesk Point Layout software on three (3) real-life construction projects each highlighting different workflows: as-built documentation, self-perform concrete layout, and a quality assurance application. Beyond the exciting use cases, learn how to add construction layout points from the perspective of a contractor who self-performs concrete. You will learn how to add control points for aligning model data in the office and in the field; add points to Revit families and other components; and sort, filter, and edit points. You will learn how to prepare data for the field inside of Revit software so that data flows efficiently into the Leica MicroSurvey Layout field software that controls the Leica iCON robot. You will also learn how to add as-built points and bring them back into Revit software to assess deviations in the field.

Key learning objectives

At the end of this class, you will be able to:

- Add project control points in Revit software with APL
- Add construction layout points to Revit software families
- Prepare points data, plan underlays, and reference models for the field
- Send as-built points from the field back into Revit

FIRM OVERVIEW

BRASFIELD & GORRIE

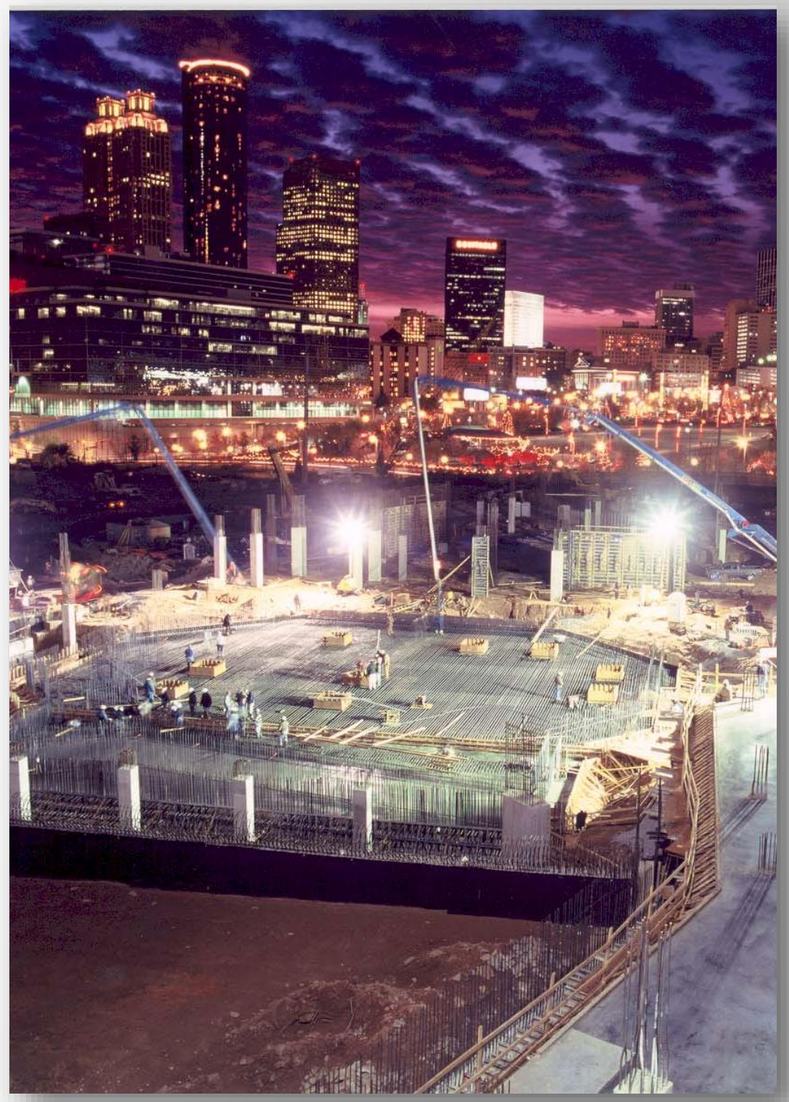
BRASFIELD & GORRIE, LLC

TRUE GENERAL CONTRACTOR

RESOURCES

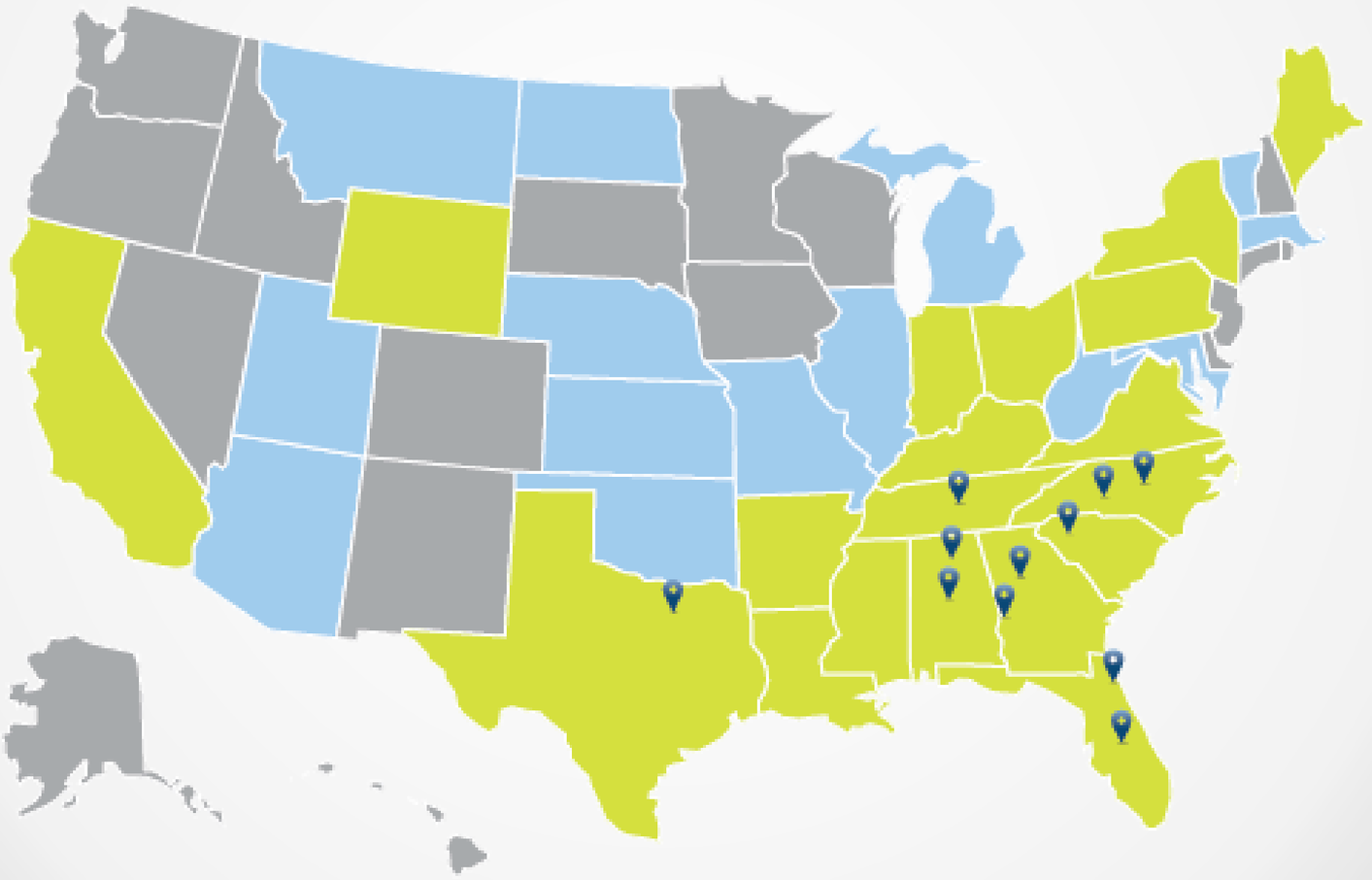
- 274 superintendents
- 144 Field Engineers
- 115 Foreman
- 1640+ Field Employees
- 4,000+ Equipment Fleet

5 million CY of concrete poured since 2003



BRASFIELD & GORRIE
GENERAL CONTRACTORS

WHERE WE WORK



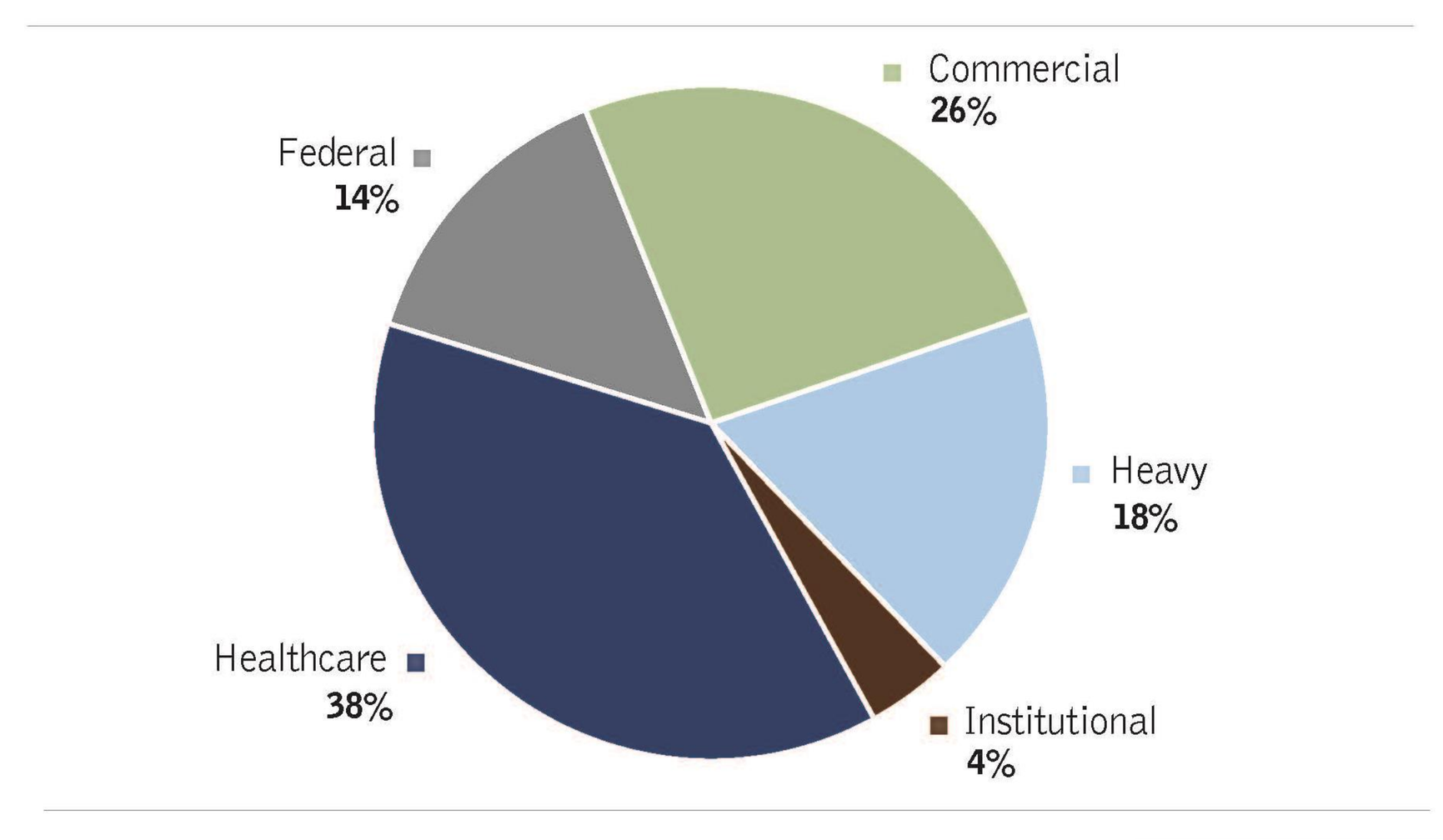
STATES

- CURRENT WORK
- PERFORMED WORK

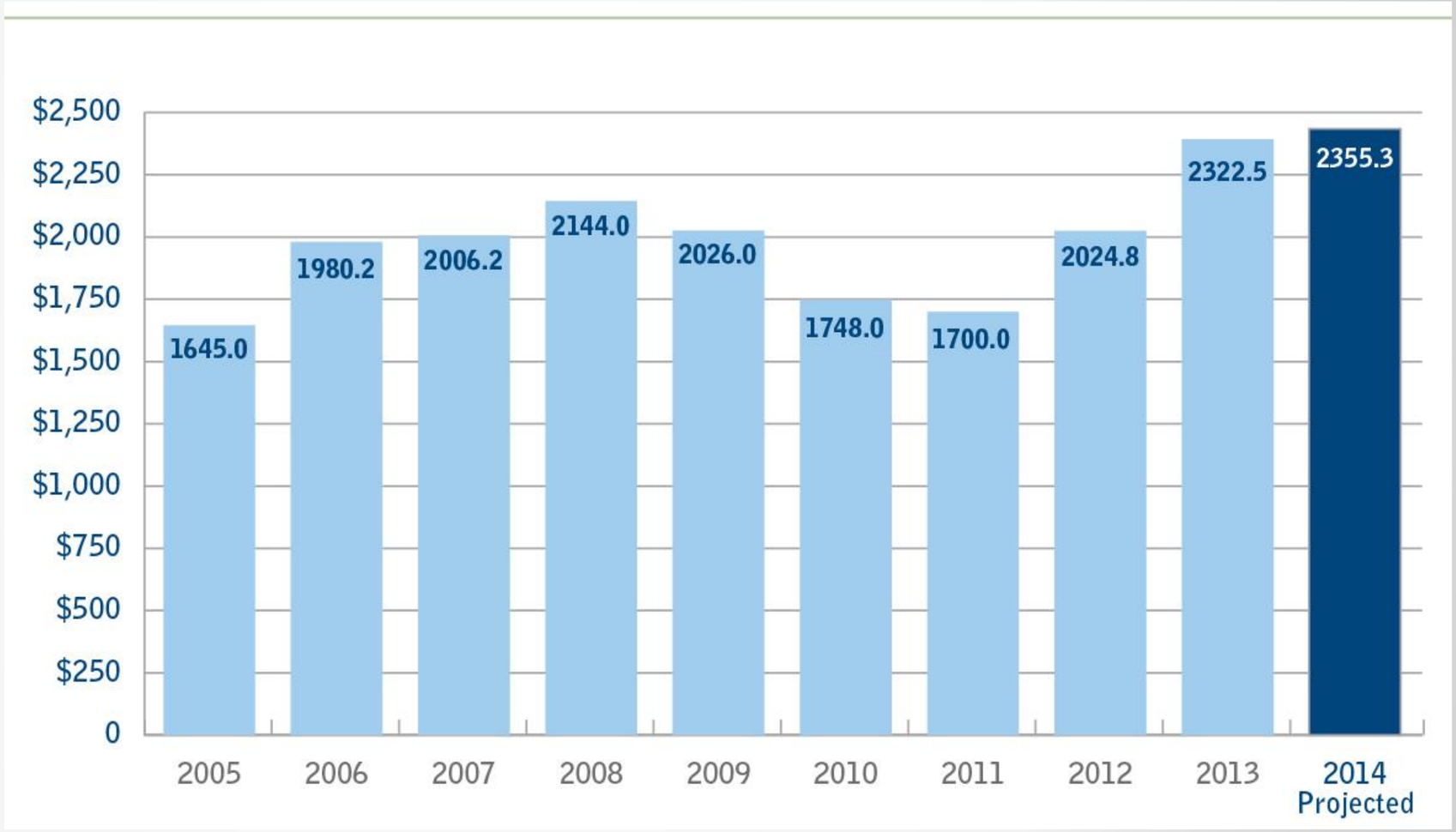
OFFICES

RALEIGH
NASHVILLE
ATLANTA
COLUMBUS
BIRMINGHAM
DALLAS
JACKSONVILLE
ORLANDO
HUNTSVILLE
CHARLOTTE
GREENVILLE

WORK MIX BY TYPE



GROSS REVENUES

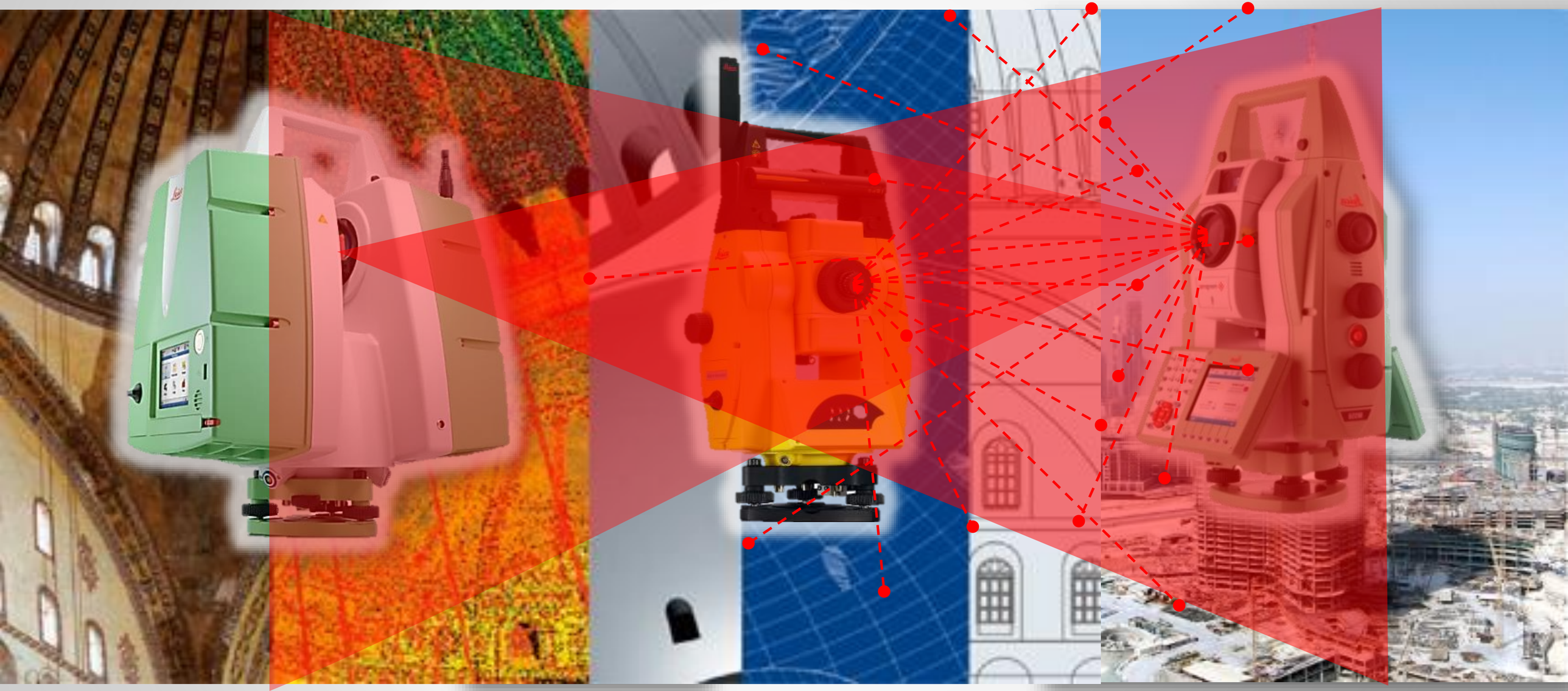


Leica Geosystems – Pioneers in Measurement Technology

Leica Geosystems: Mission

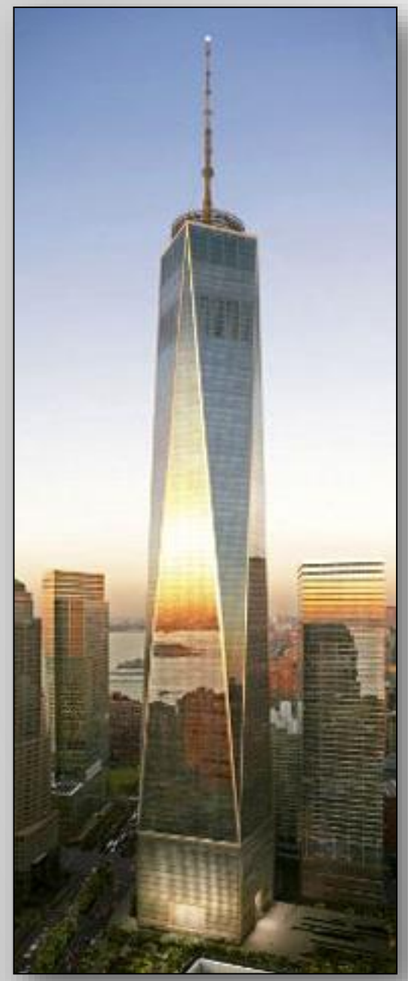
Our mission
is to be **the** #1 supplier
of innovative solutions
to capture, analyze and
present spatial information and
take BIM to the field with
positioning technology.

Leica: A Rich History in Building Construction

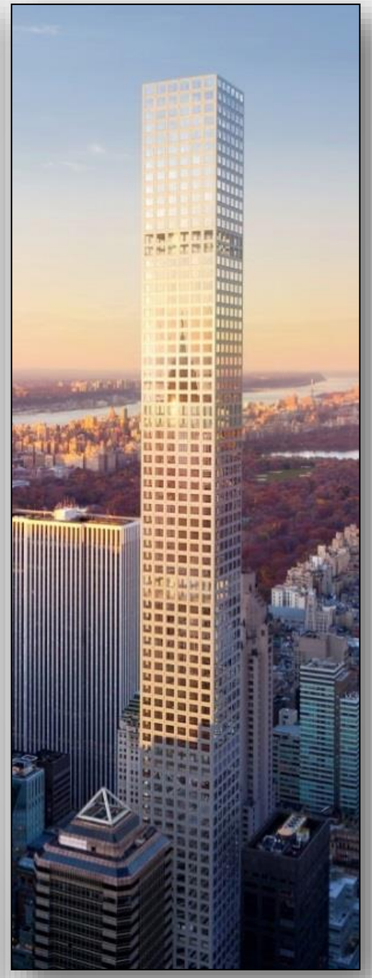


Leica Geosystems– Worldwide Trusted Brand

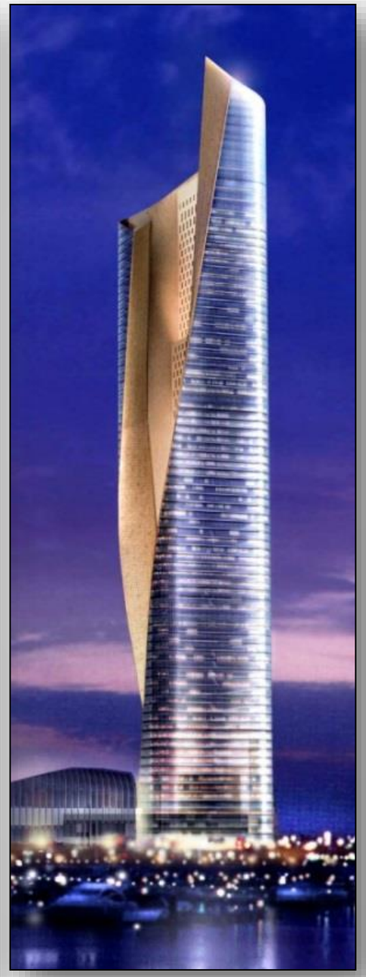
Building Tall and Straight Around the World



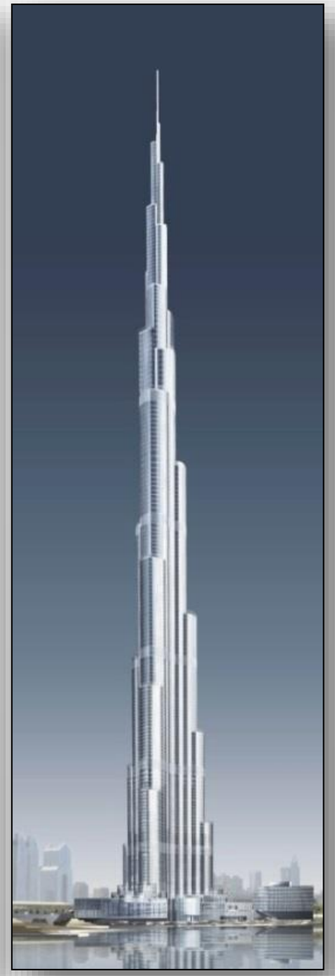
World Trade Center
Tower 1
541m



432 Park Ave
428m



Al Hamra
412m



Burj Khalifa
828m

Commerzbank Tower
300m

Q1 Tower Gold Coast
323m

HEXAGON

Leica Geosystems

- Hexagon – parent company of Leica Geosystems
- Hexagon has over 13,200 employees in more than 40 countries
- Net sales of about 2,400 MEUR (about 3 Billion US). Hexagon's share is quoted on the Stockholm stock exchanges.

Part of the Hexagon Family

Implementing APL

WHY

To merge the digital world with the physical
To eliminate duplicate efforts of “drawing” between the field and office and gain efficiency
To bring 3D visual abilities to layout process

KEY CONSIDERATIONS

1. Support utilization of current layout equipment
2. Keep responsibility for layout in the field, by Field Engineers
3. Integrate Field Engineers into VDC process

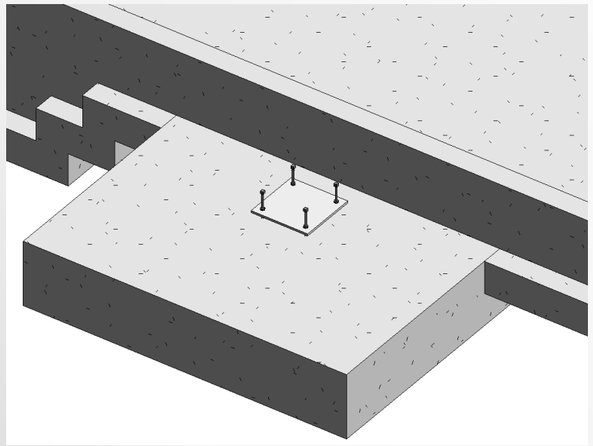
Bowen Administration Building

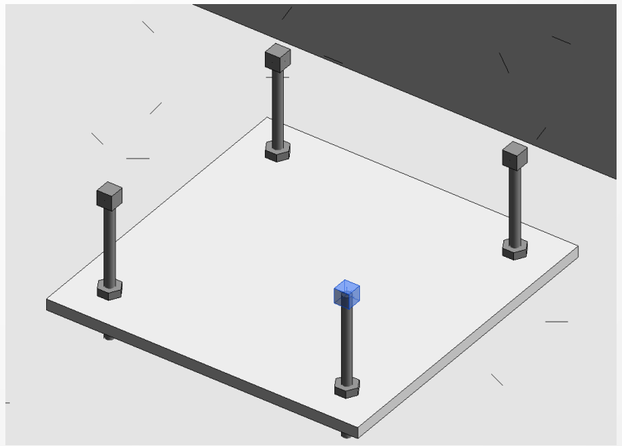
- Administration plant for Bowen Power Plant
- $10m Construction Budget
- 40,000 SF – 3 stories
- 13 month schedule

- First project / case-use for APL

APL – Autodesk Point Layout
Bowen Administration Building

- Anchor bolt back check using model and APL.
- Determined accuracy of points produced in Revit
- Validated calculated points from field engineer
- Overlaid as-built points with modeled points in Revit



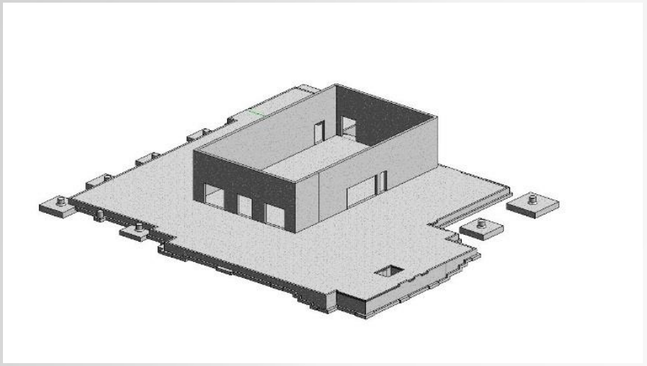


GTP
Duct Pt

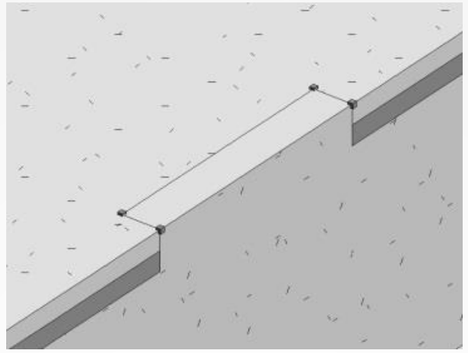
Generic Models (1) | Edit Type

Constraints	
Host	Footing-Rectangular-QTO :...
Offset	0' 9 1/2"
Moves With Nearby Eleme...	☐
BG Phase	
Construction	
BG Area	
BG Pour Sequence	
Dimensions	
Volume	0.00 CF
Identity Data	
Comments	
Mark	
Phasing	
Phase Created	Project Completion
Phase Demolished	None
Other	
PointRole	Stake Out
PointNumber	2120
PointElement	
PointDescription	Anchor Bolt

APL – Current Workflow

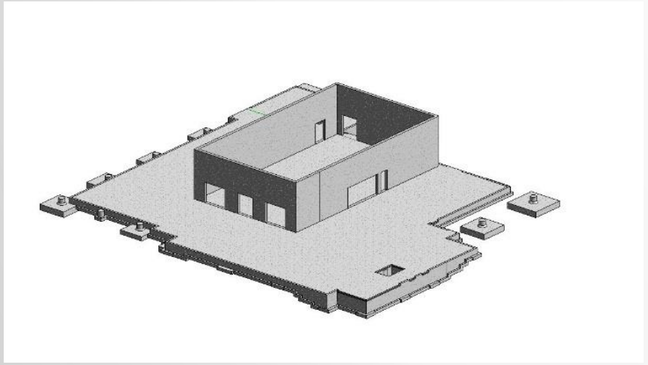


VDC Builds Model



VDC Applies Points

Field Engineer Performs Layout/ As-Built



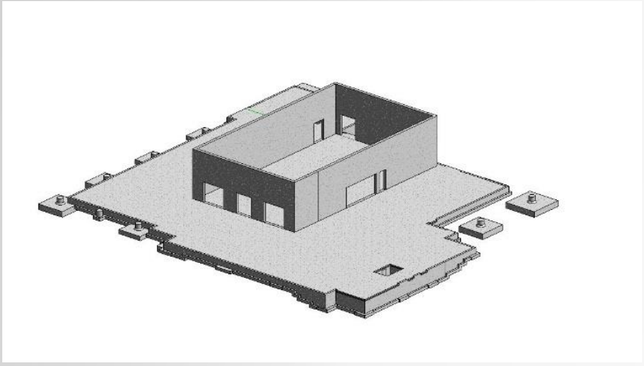
VDC Updates Model

POINT NU	Y	X	Z	DESCRIPTION
CP1	3.018904	19.27166	5.359375	Control Point
CP2	14.69078	-19.9992	5.395833	Control Point
DR1000	-9.14255	-0.04604	7.25	
DR1001	-9.14255	3.280481	7.25	
DR1002	-9.14255	-8.45007	7.25	
DR1003	-9.14255	-5.12851	7.25	
DR1004	15.19078	-8.41364	7.25	
DR1005	15.19078	-5.0825	7.25	
DR1006	15.19078	-0.05593	7.25	
DR1007	15.19078	3.271664	7.25	
DR1008	15.19078	8.093159	7.166667	
DR1009	15.19078	14.42271	7.166667	
CB2000	-8.13476	-19.9158	8.015625	
CB2001	14.19599	-19.9158	8.015625	
CB2002	14.19599	-19.9158	1.080987	
CB2003	-8.13735	-19.9158	1.078437	

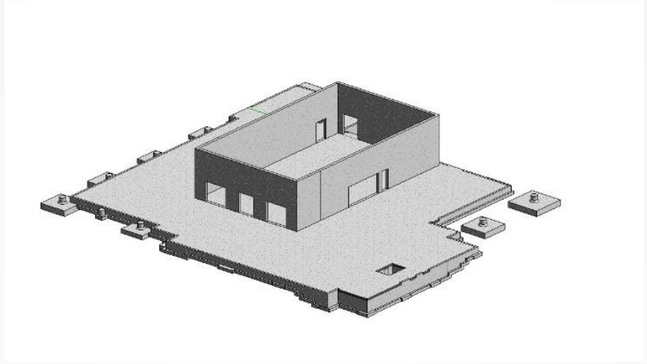
VDC Updates CSV

Process Repeats

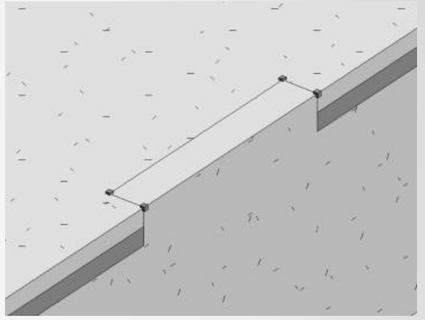
APL – Future Workflow



VDC/Self Perform Builds Model

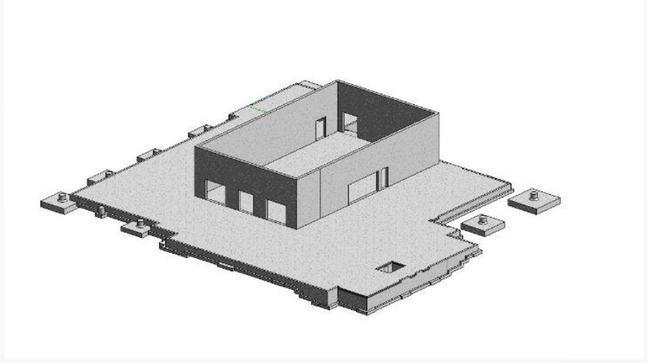


Field Engineer Scrubs/Checks Model



Field Engineer Applies Points

Field Engineer Performs Layout/ As-Built



Field Engineer Manages Model

Process Repeats

Emory Proton Treatment Center

“A concrete box in the middle of the city”

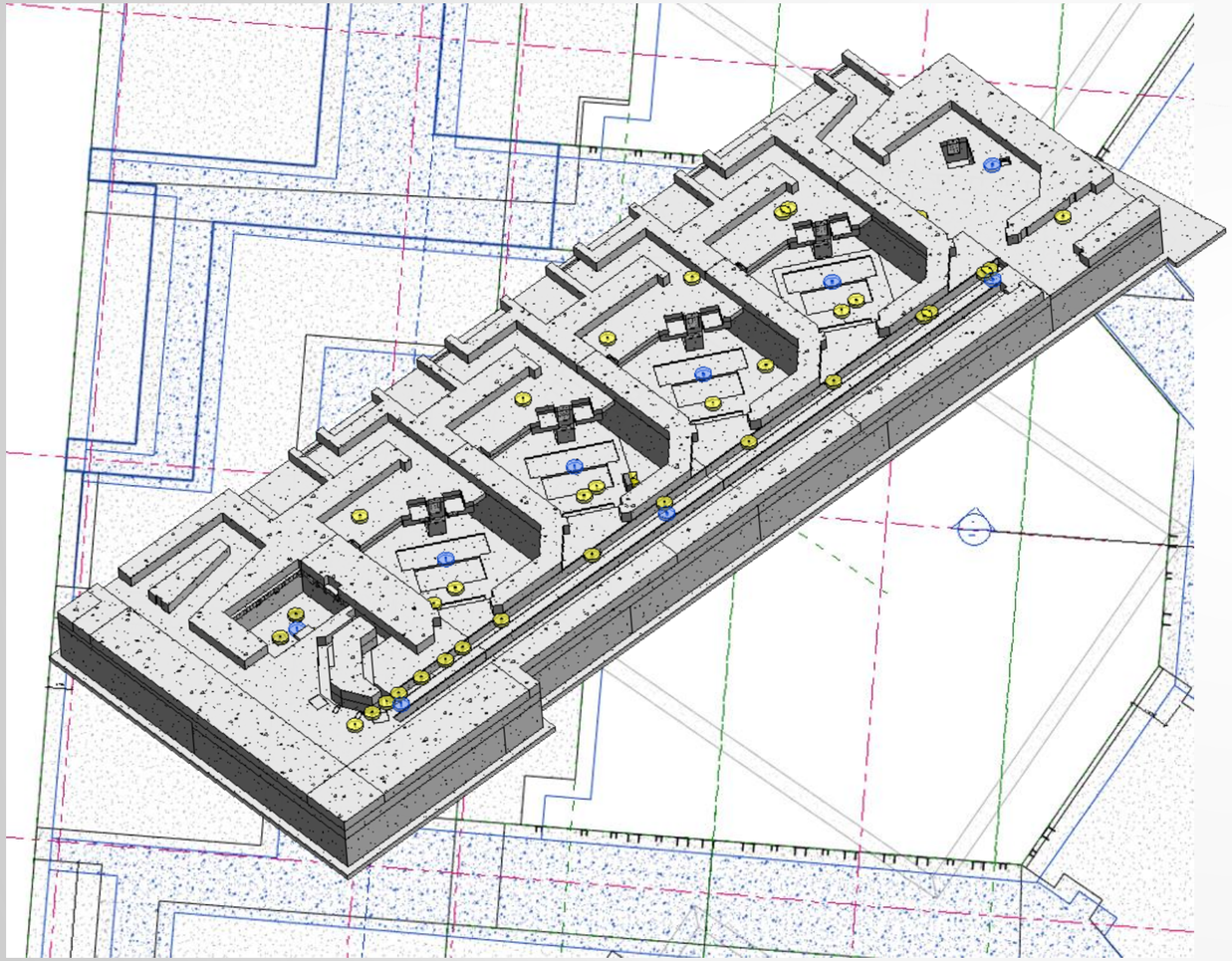
- $80m construction budget

- LDP – RFE = 22 months
- LDP – CO = 32 months
- LDP – 1st Patient = 38 months

VOA

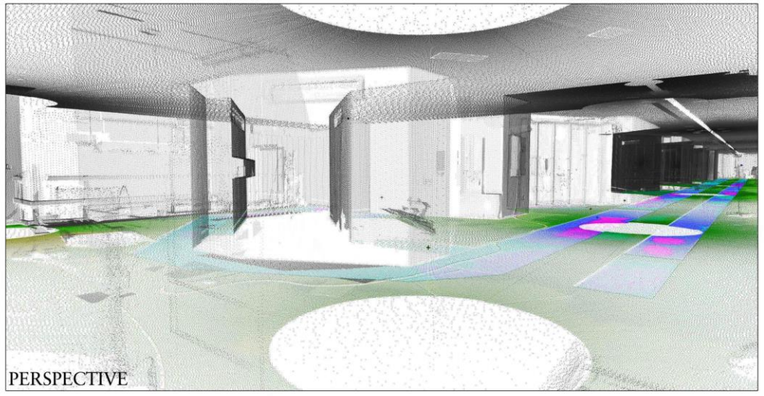
Emory Proton Treatment Center

“A concrete box in the middle of the city”

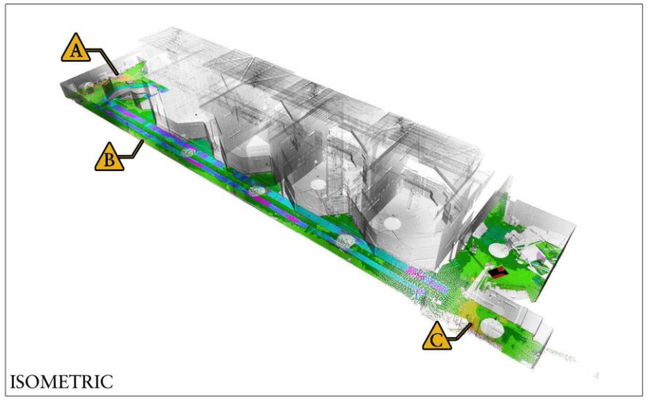


How was APL used?

- Hybrid Revit/APL & Carlson workflow from the Construction Concrete Model
- Utilized Revit/APL, Lecia MircoSurvey Layout, & Cyclone for as-builting & scanning post construction



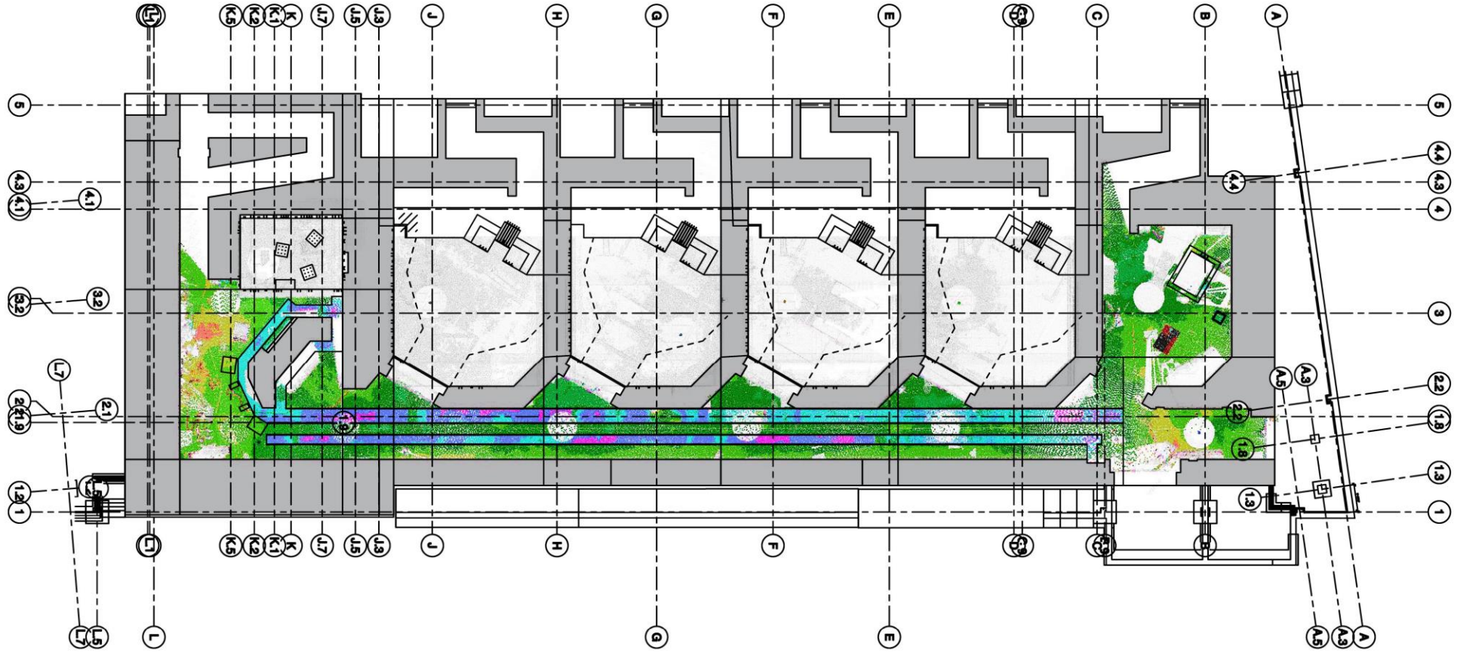
PERSPECTIVE



ISOMETRIC

1/4" DEVIATION BETWEEN COLORS

2.25	HIGH POINT
2.00	
1.75	
1.50	
1.25	
1.00	
.75	
.50	
.25	
.00	LOW POINT



FLOORPLAN

BRASFIELD & GORRIE GENERAL CONTRACTORS

Georgia Proton Treatment Center

3/32" = 1'-0"

Revisions
08/07/2014

SLAB DEVIATION DIAGRAM

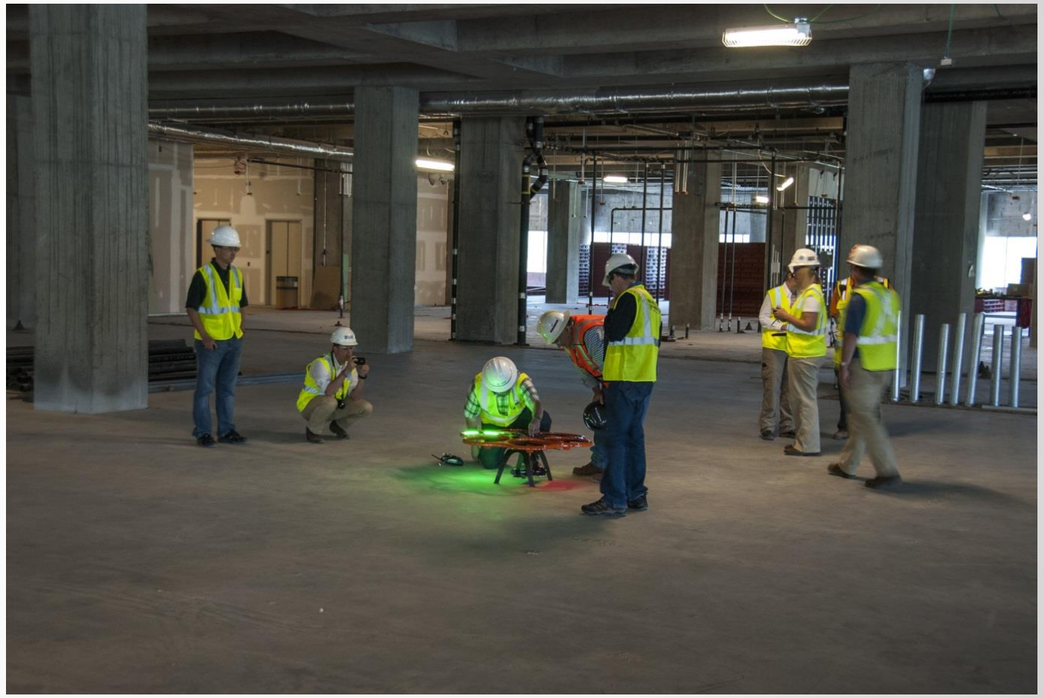
SD-1

Leica Geosystems

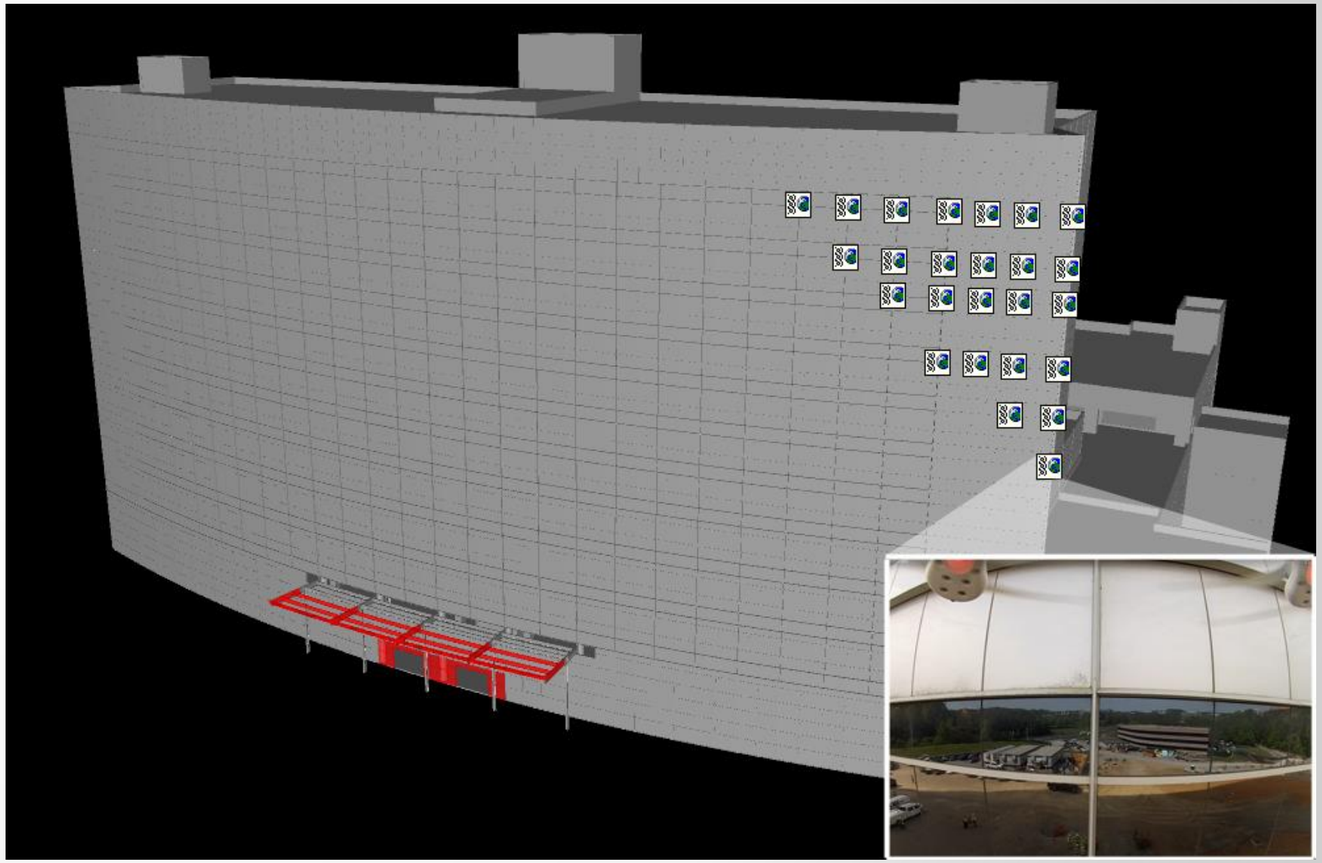
BSCI AUBURN®

BRASFIELD & GORRIE GENERAL CONTRACTORS

APL – Autodesk Point Layout
Grandview Hospital Completion
Adding Points and Pictures

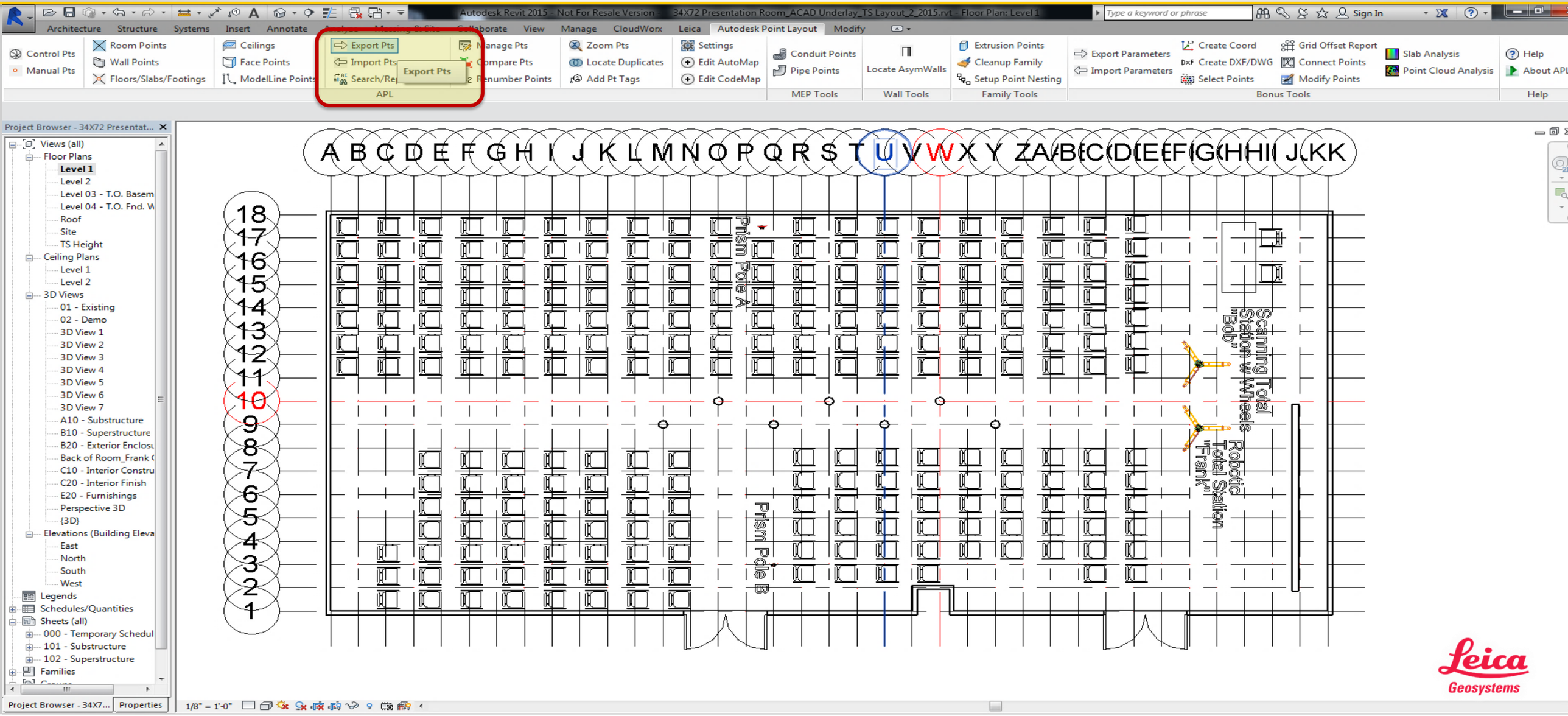


APL – Autodesk Point Layout
Grandview Hospital Completion
Adding Points and Pictures



Live Demonstration

Export Data: DXF and csv from Revit / APL



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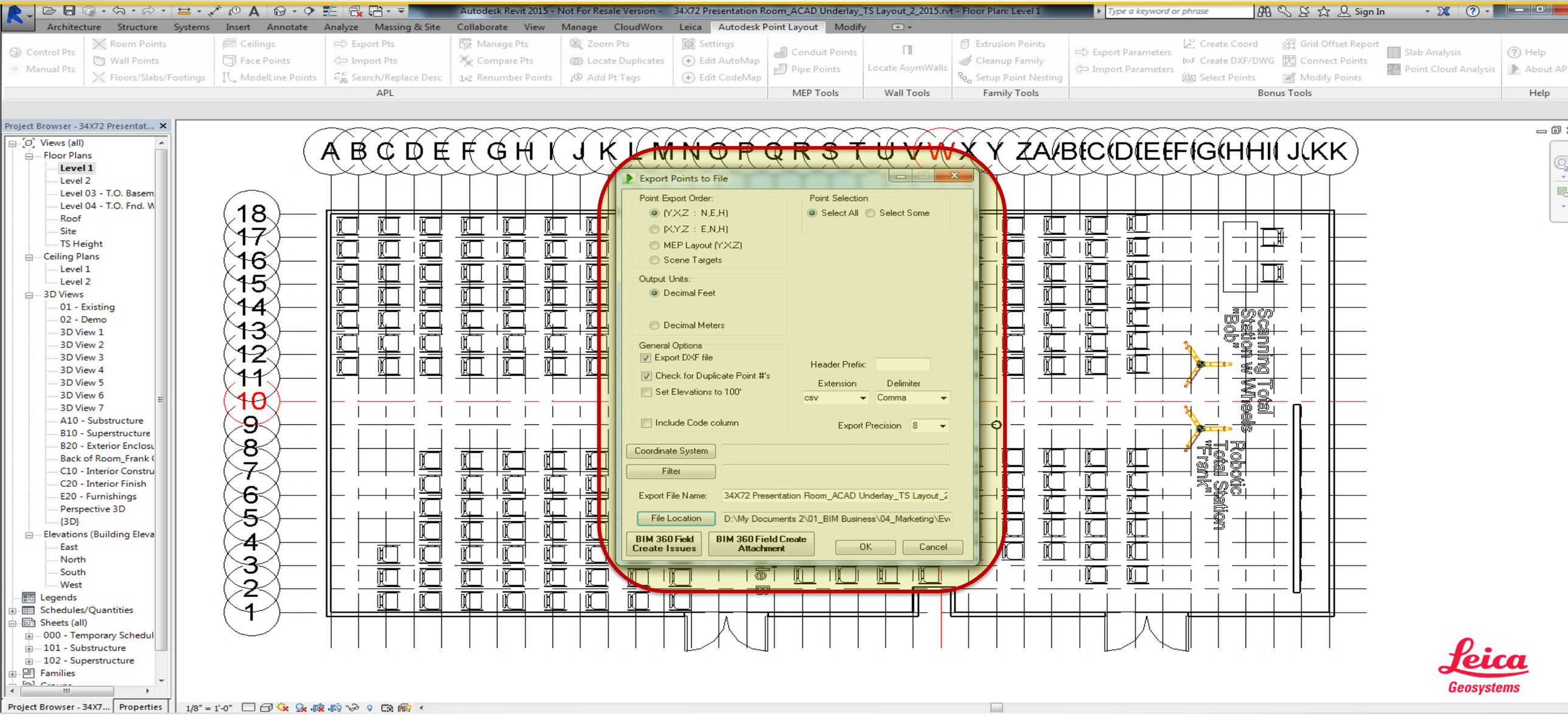
Export Data: DXF and csv from Revit



Leica Geosystems

Getting Points to the Field

iCON BIM
Robot 50/60

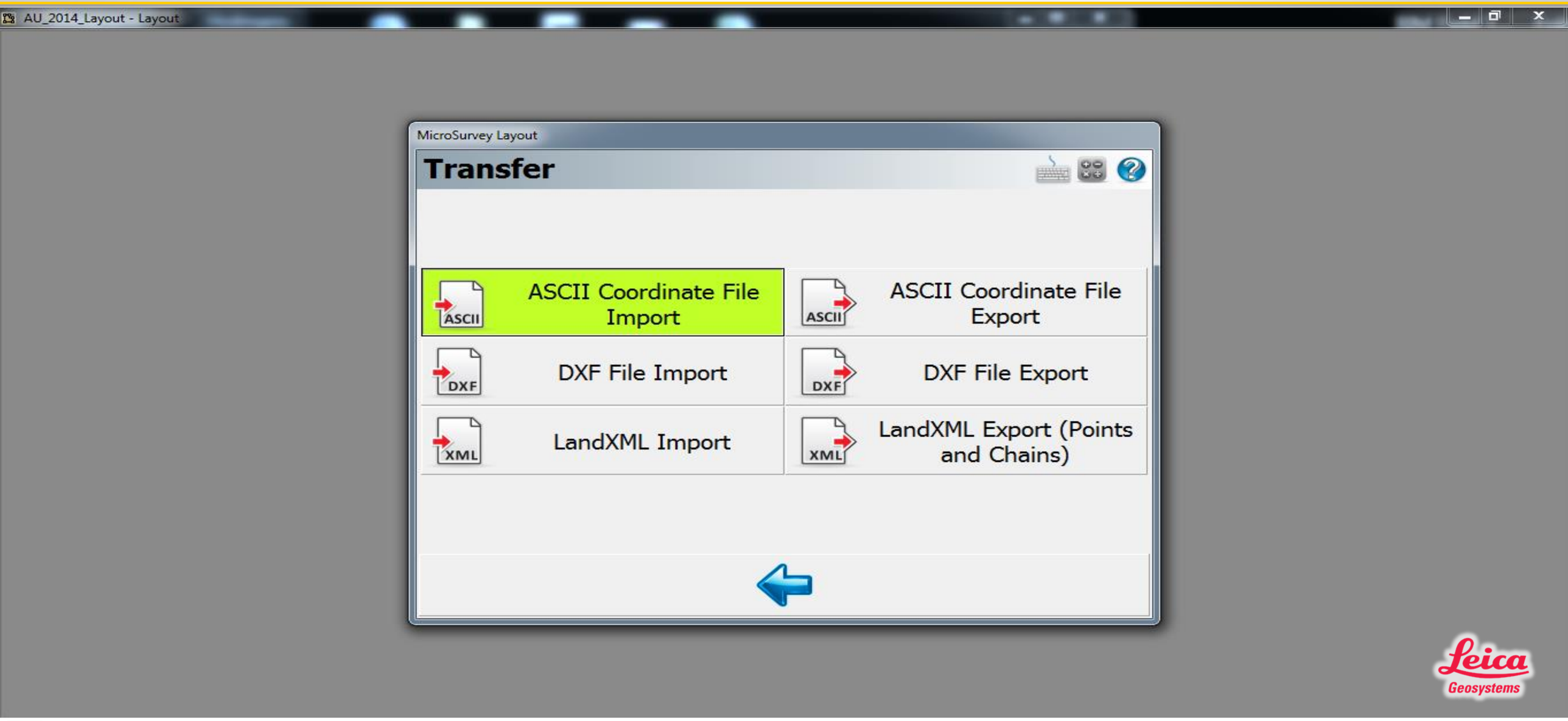
“Frank”

Nova MS 50

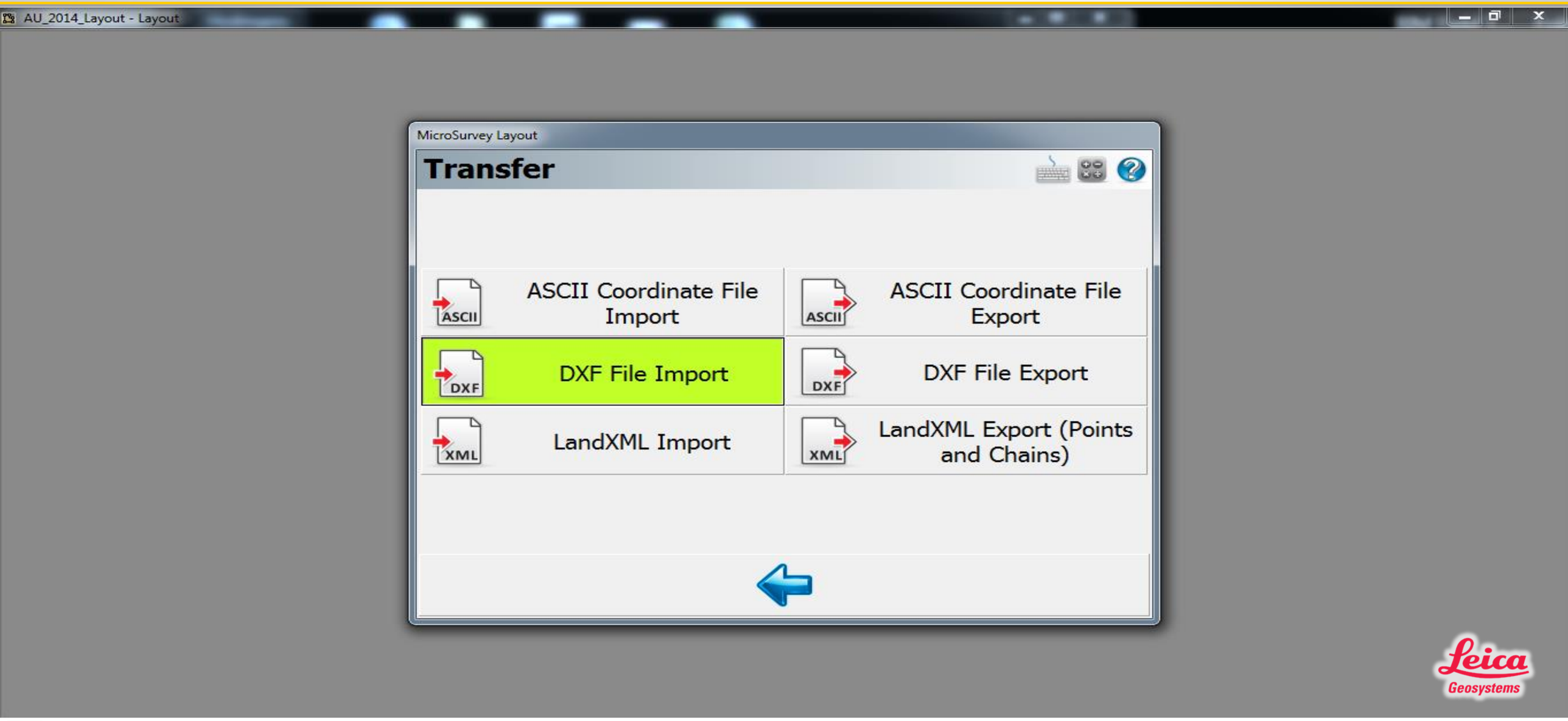
“BOB”

Leica Geosystems

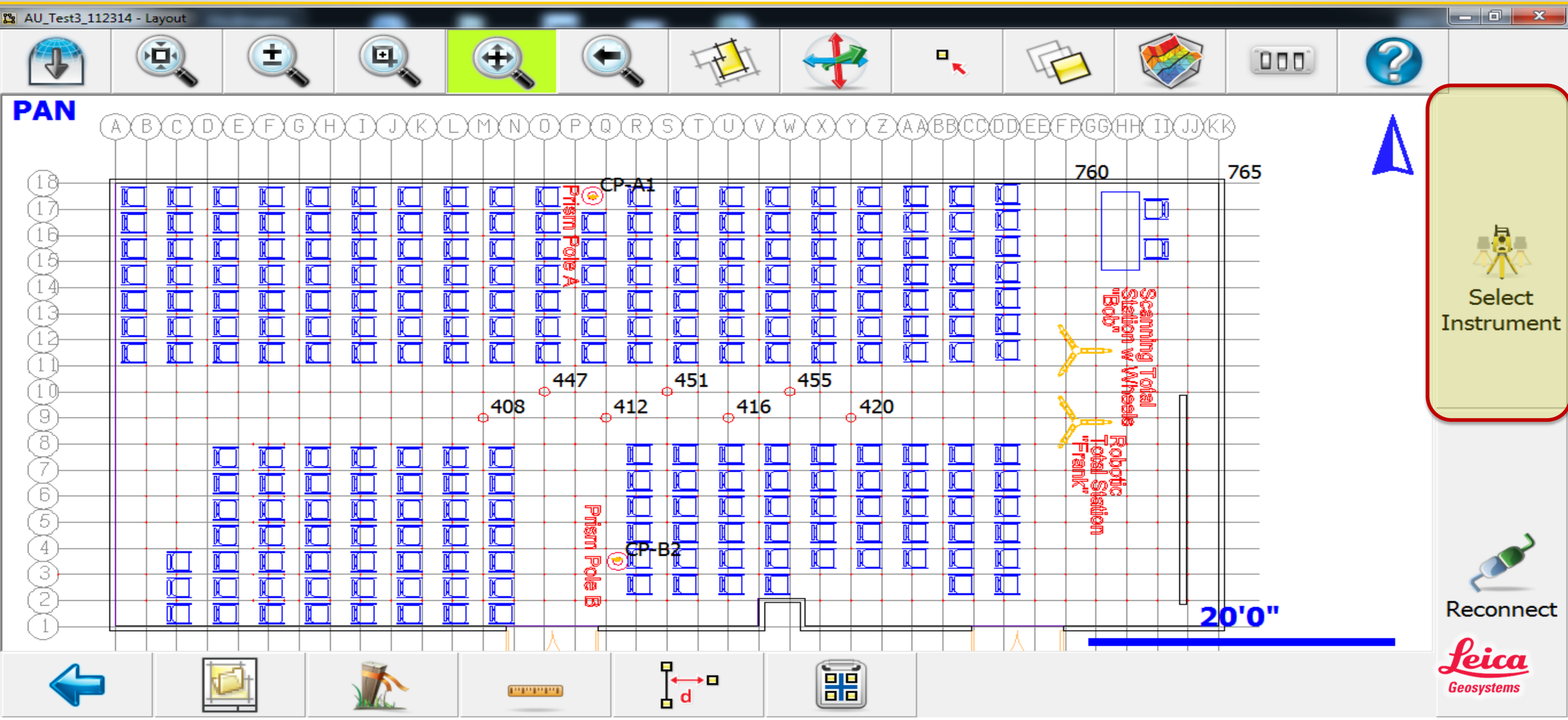
Open Data in Field Software: MicroSurvey Layout



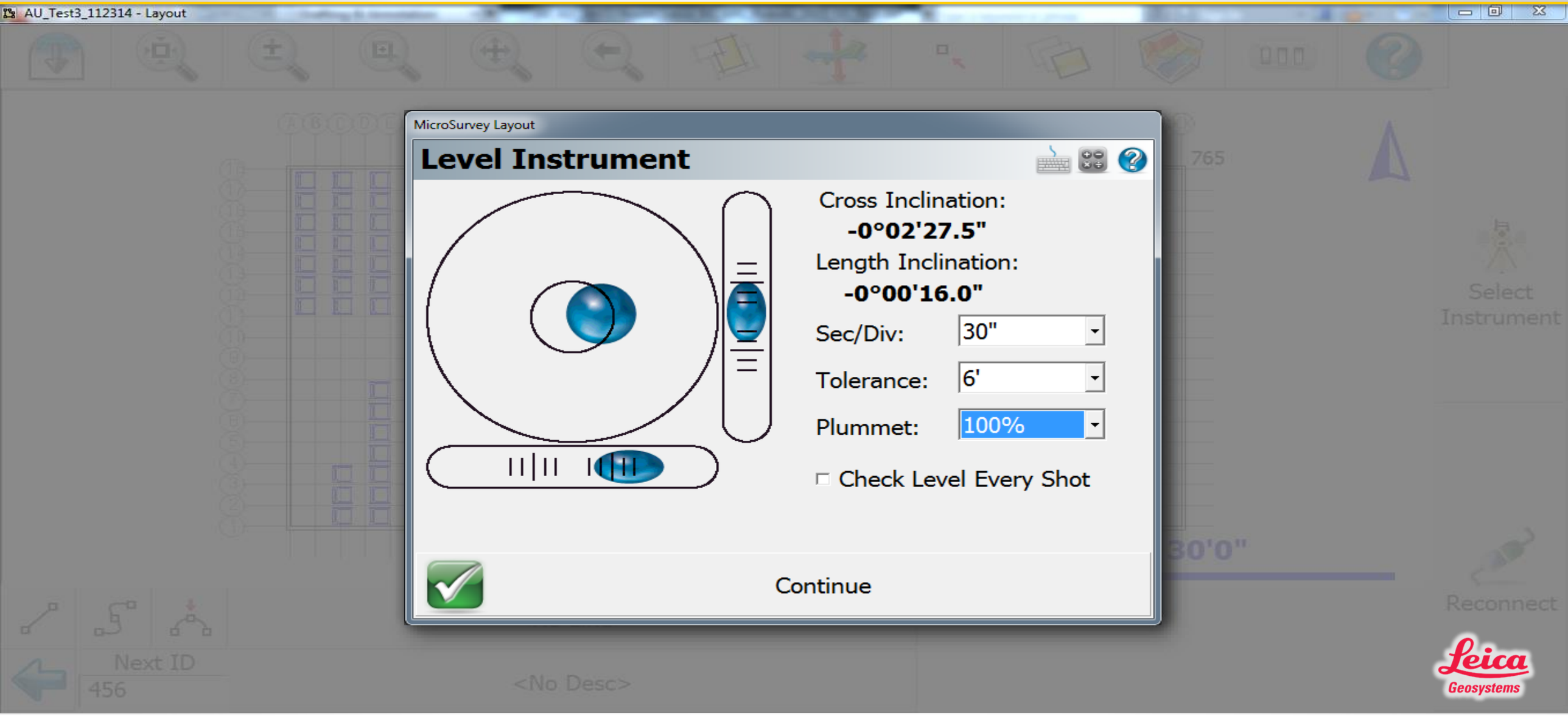
Open Data in Field Software: MicroSurvey Layout



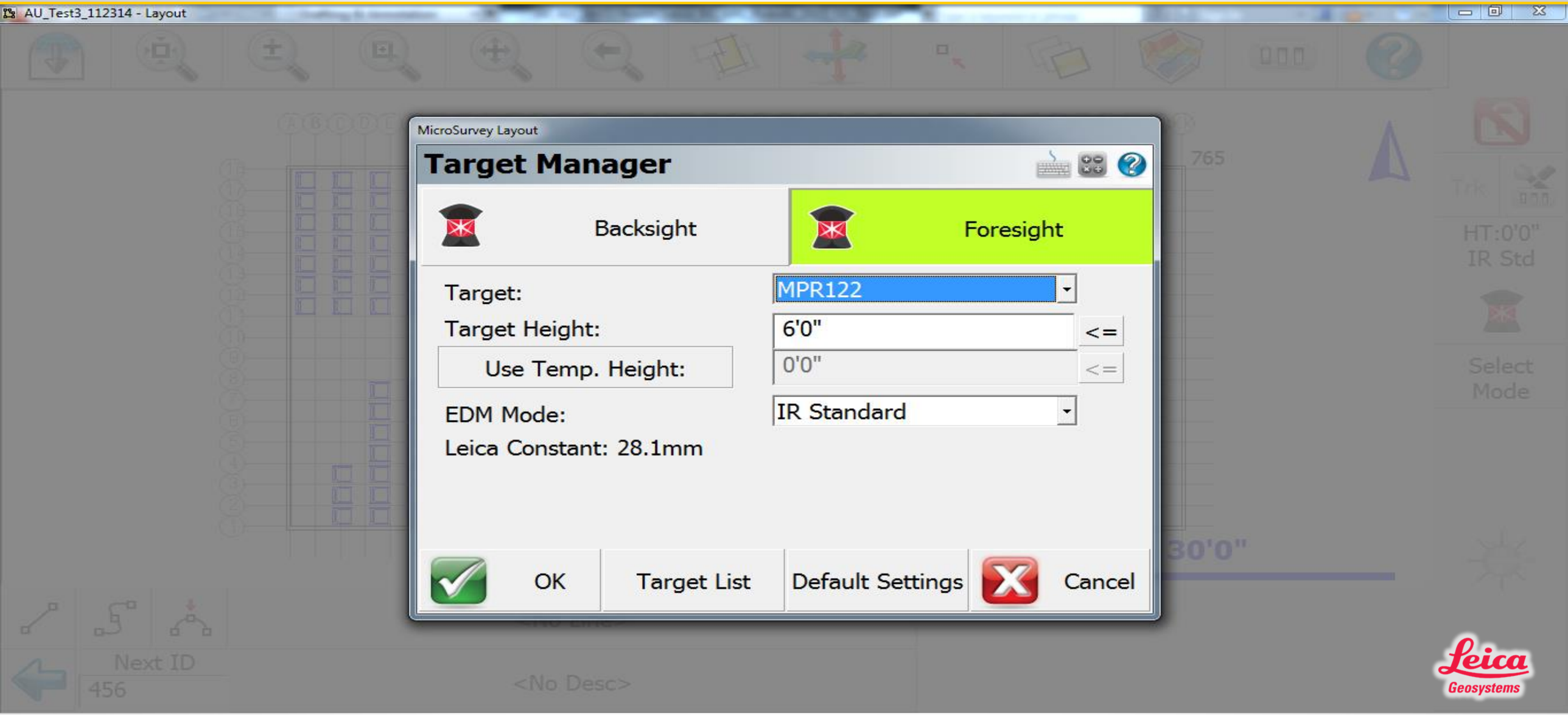
Open Data in Field Software: MicroSurvey Layout



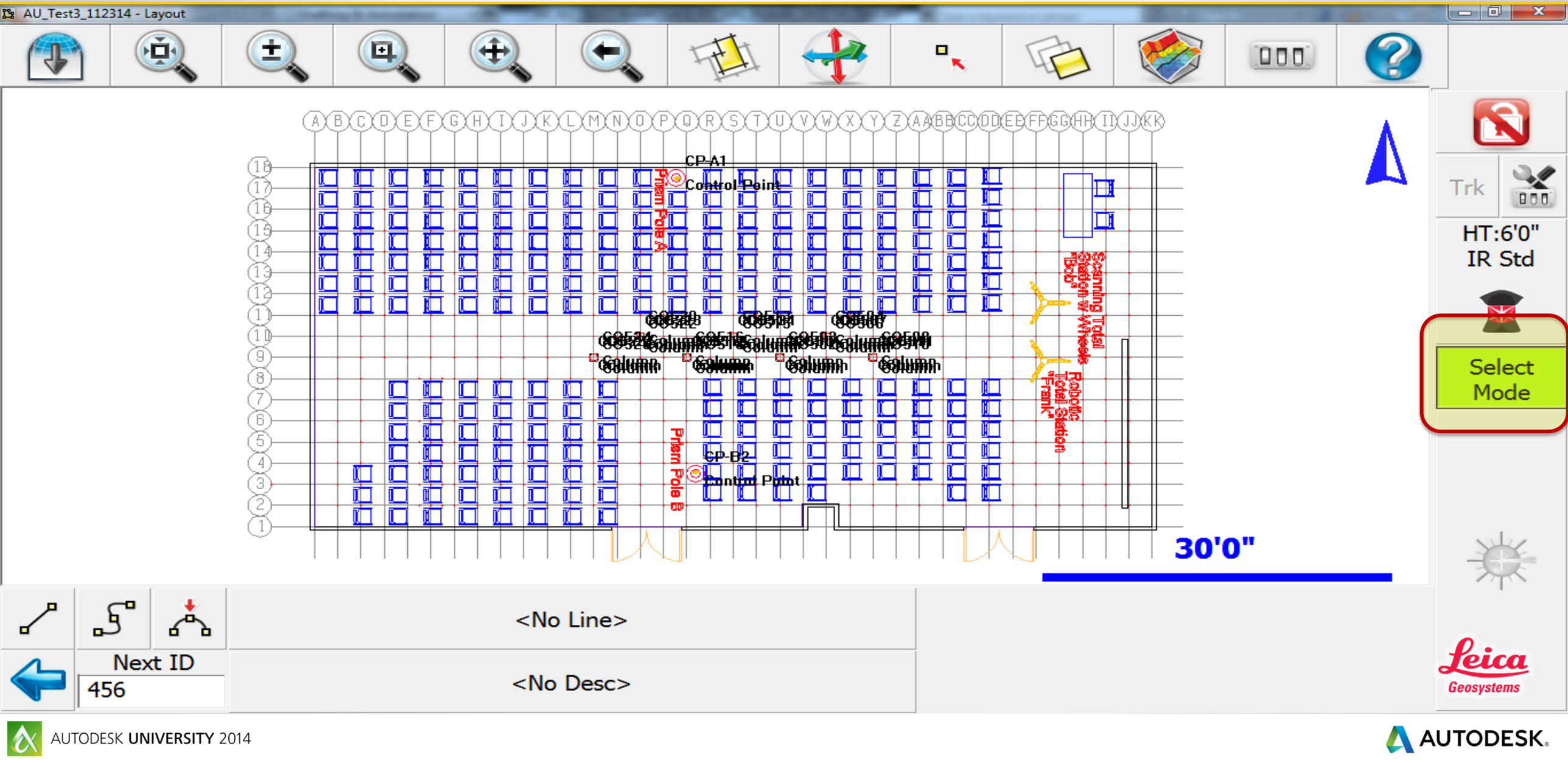
Connect to Robot: MS50 “BOB”



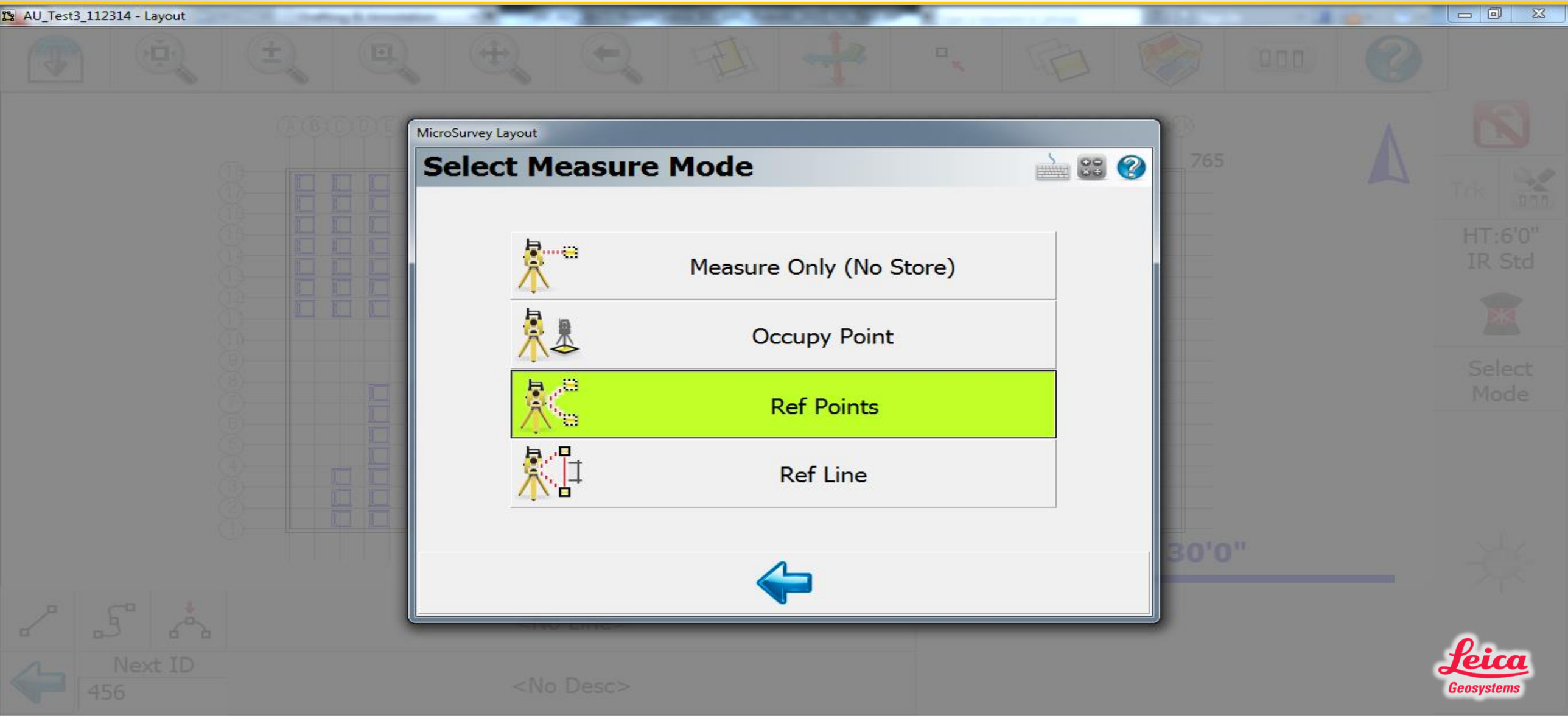
Connect to Robot: Select Measurement Type



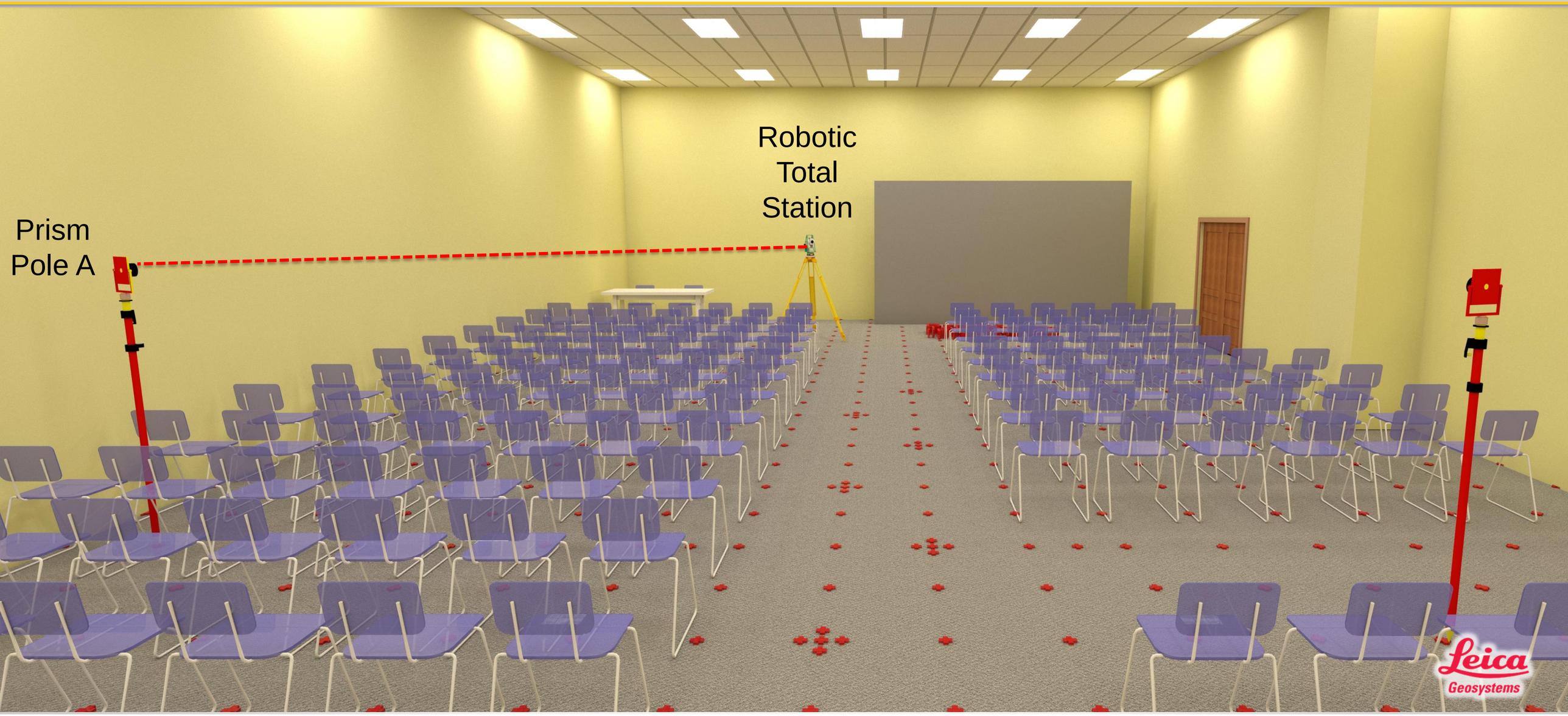
Orient Robot: Prisms & Control Points



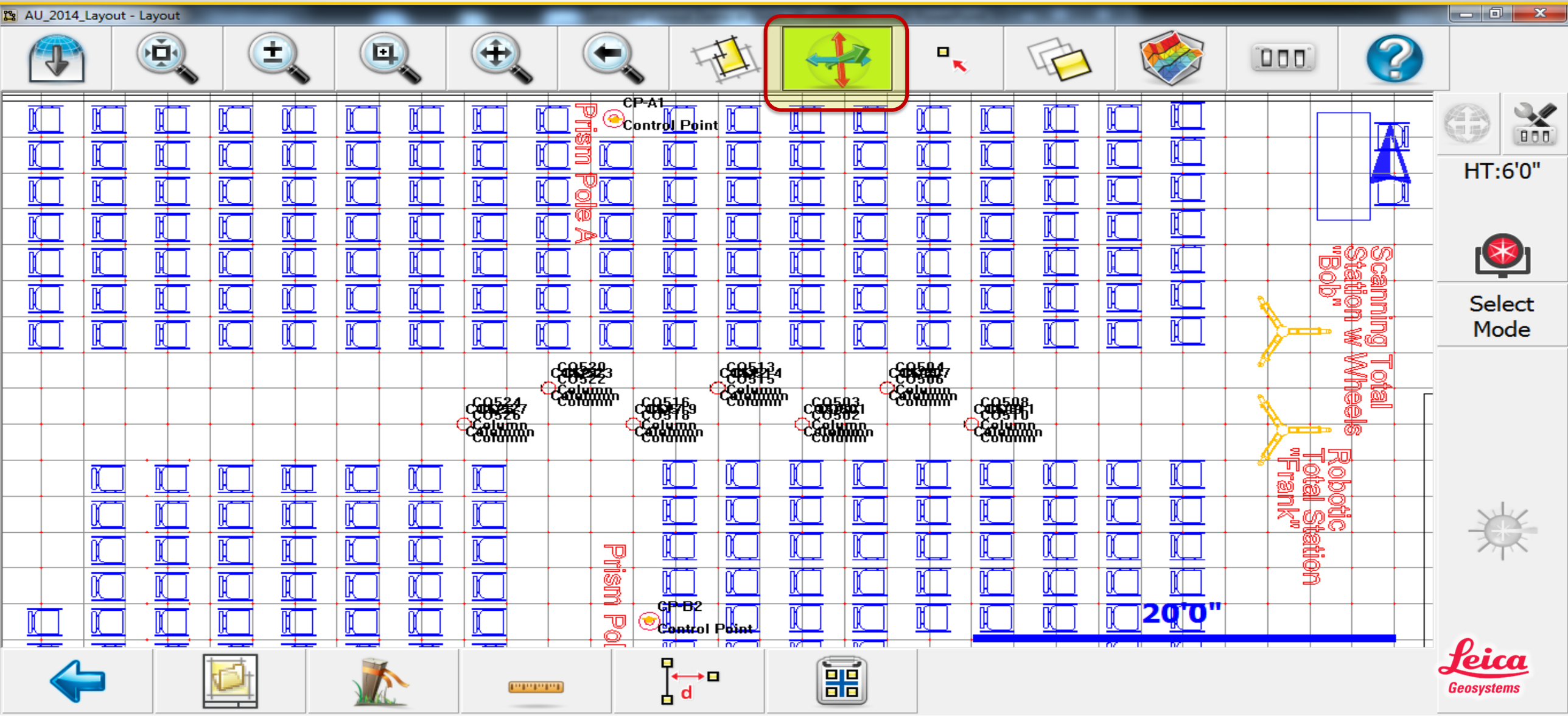
Orient Robot: Control Points



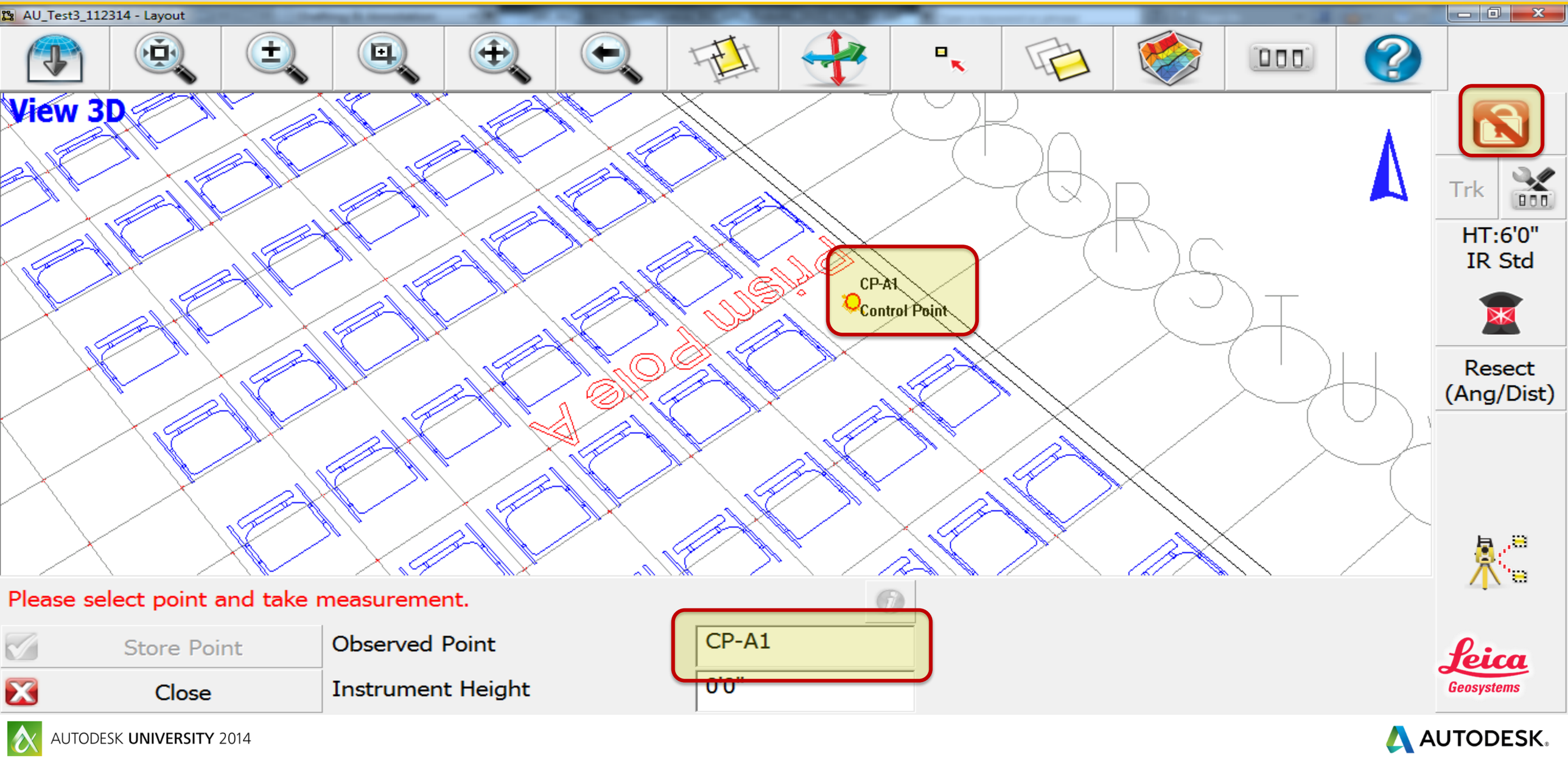
Step 1: Orient Robot Using Control Points



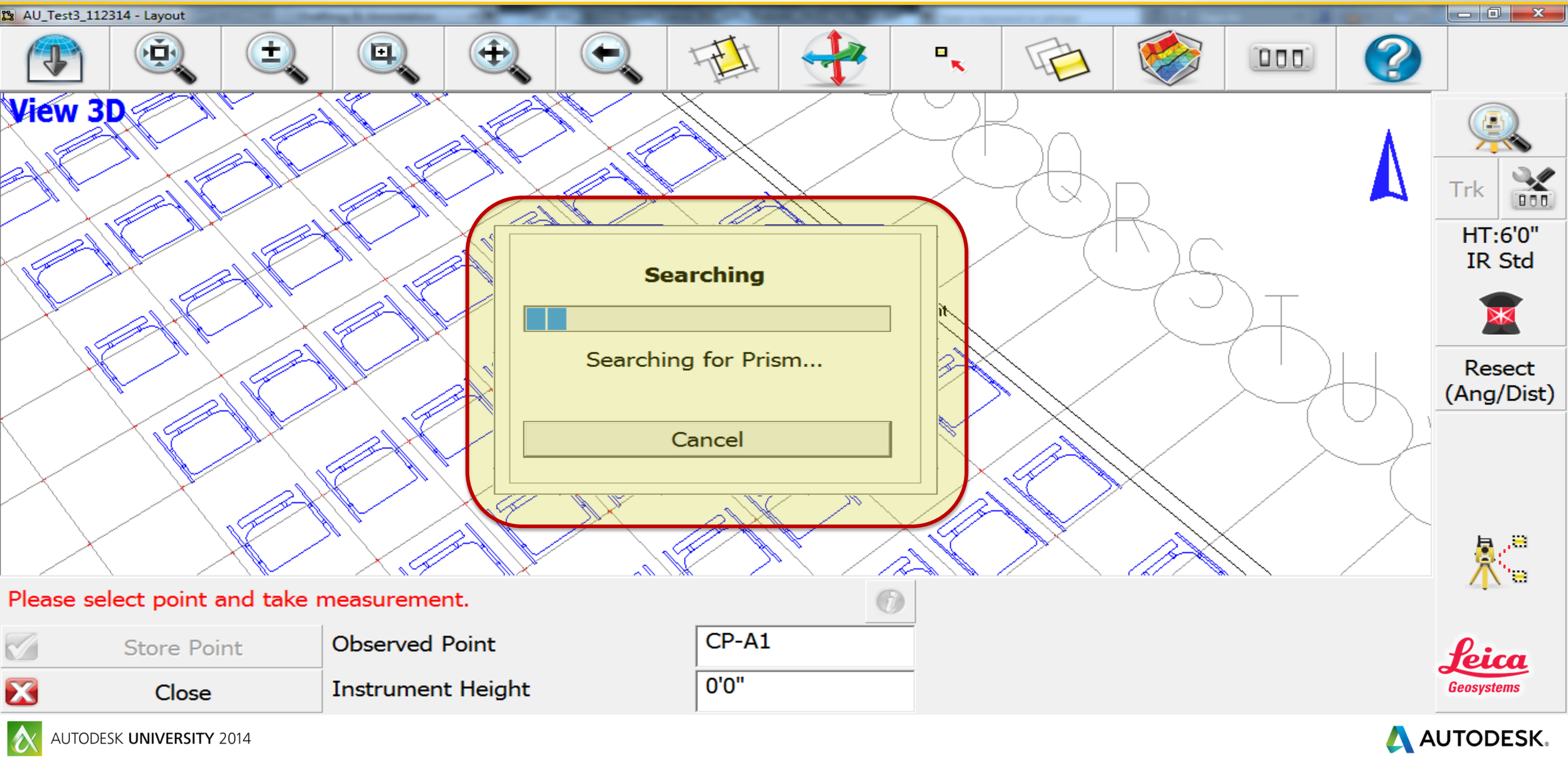
Orient Robot: Control Point A



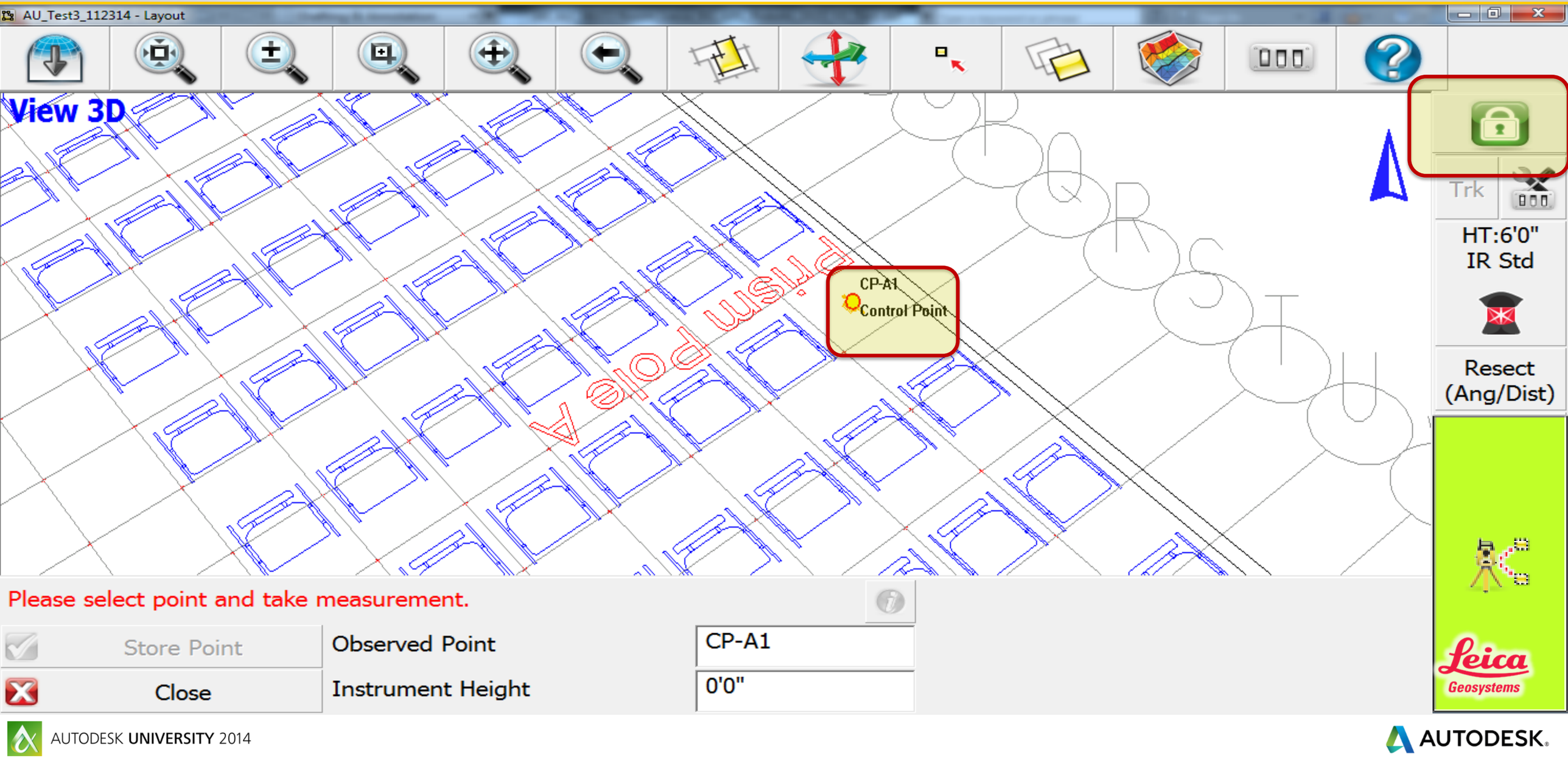
Orient Robot: Control Point A



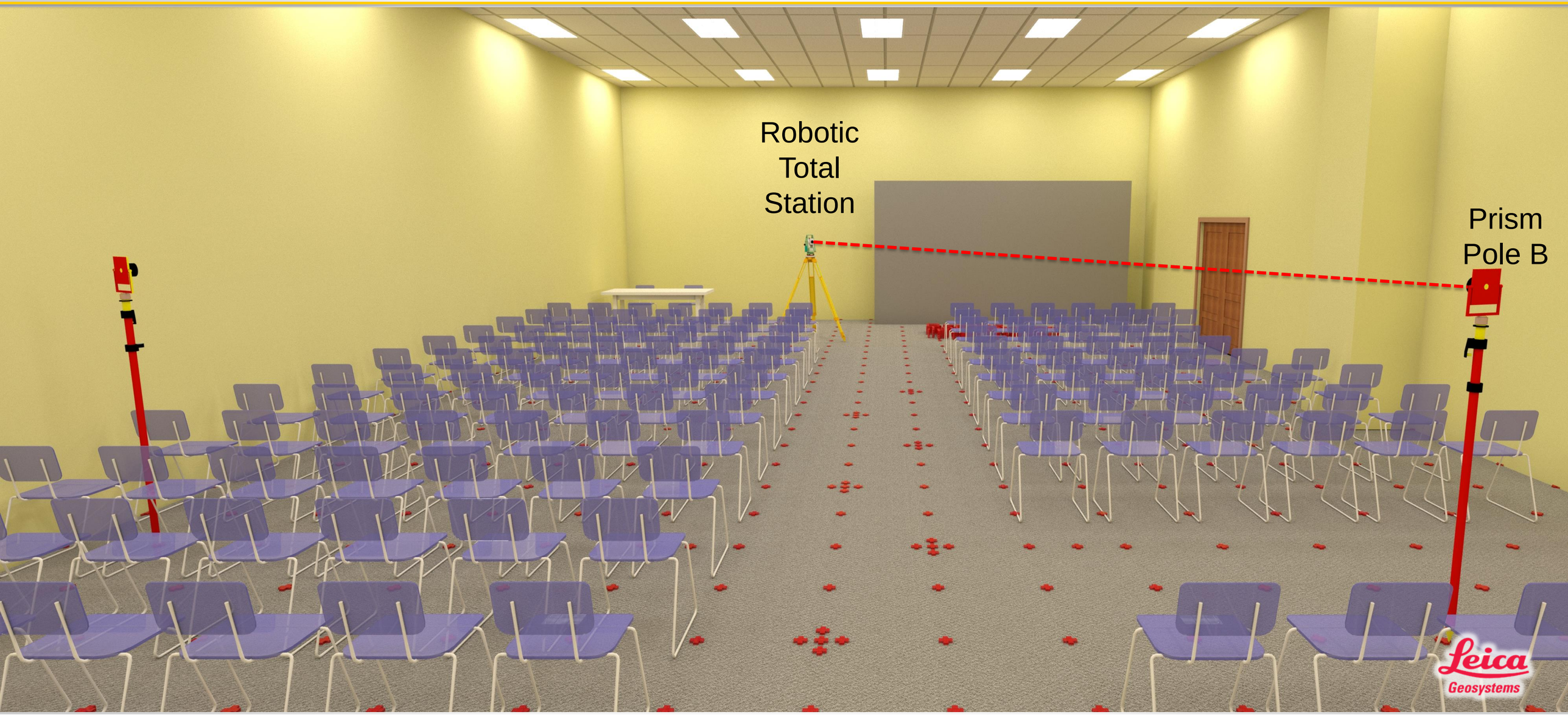
Orient Robot: Control Point A



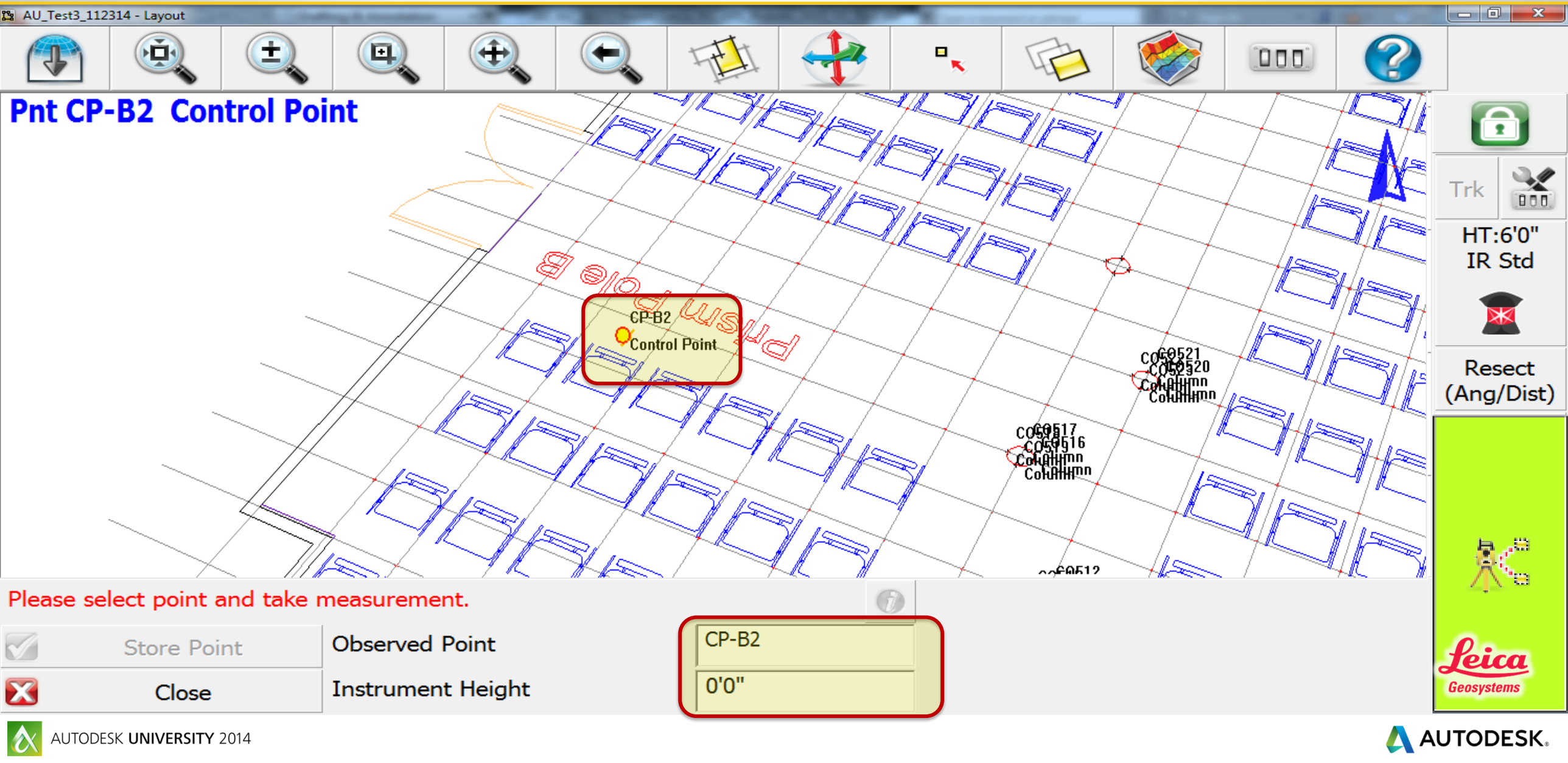
Orient Robot: Control Point A



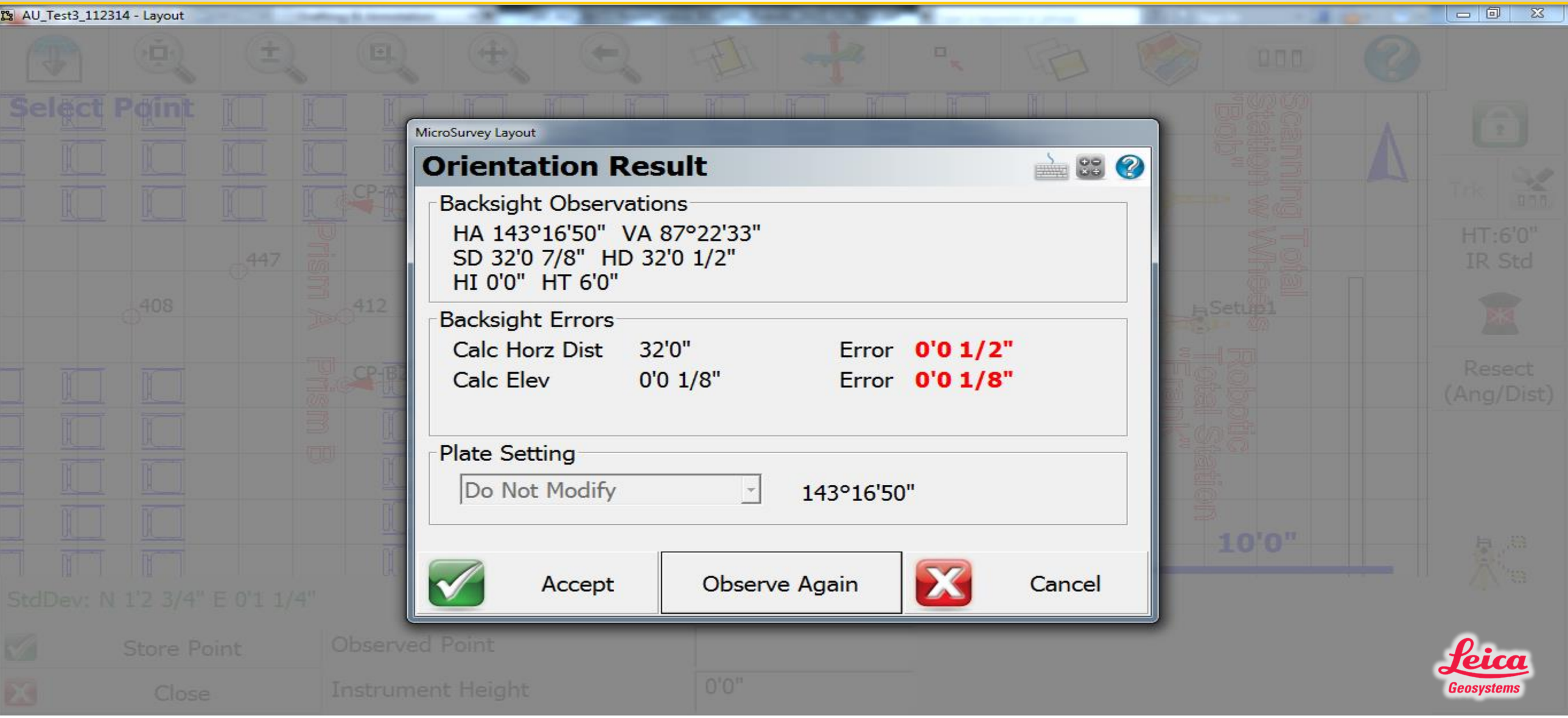
Step 1: Orient – Shoot Control Point B



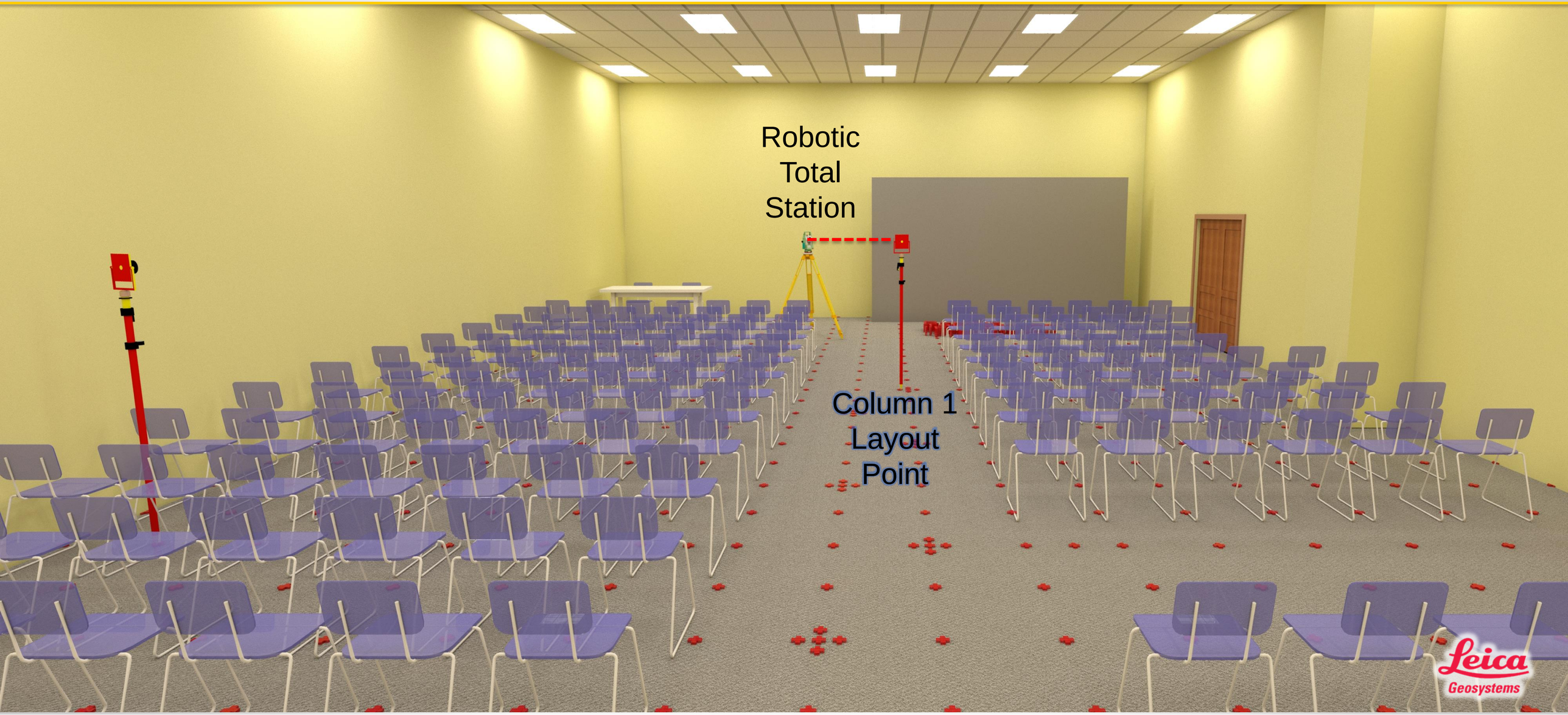
Orient Robot: Control Point B



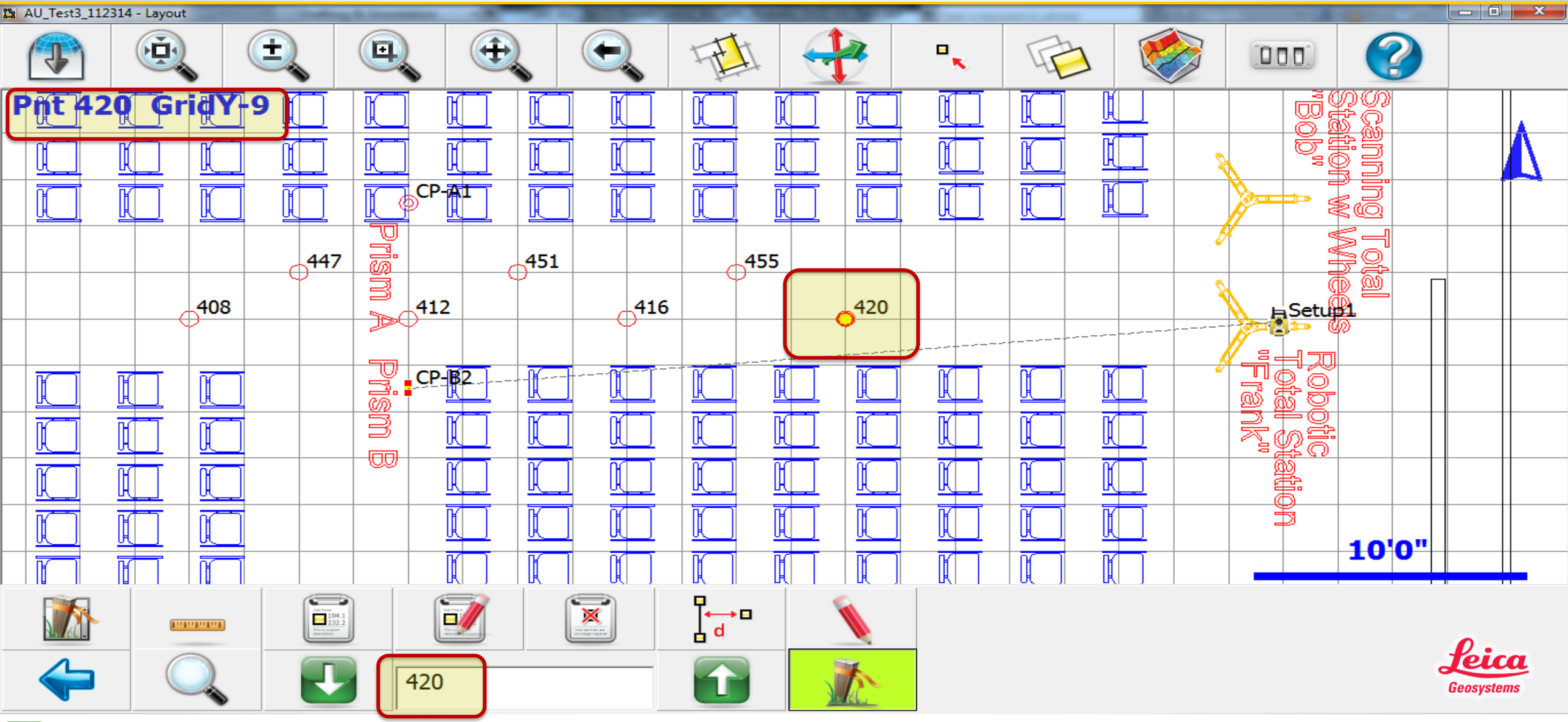
Orient Robot: Orientation Results



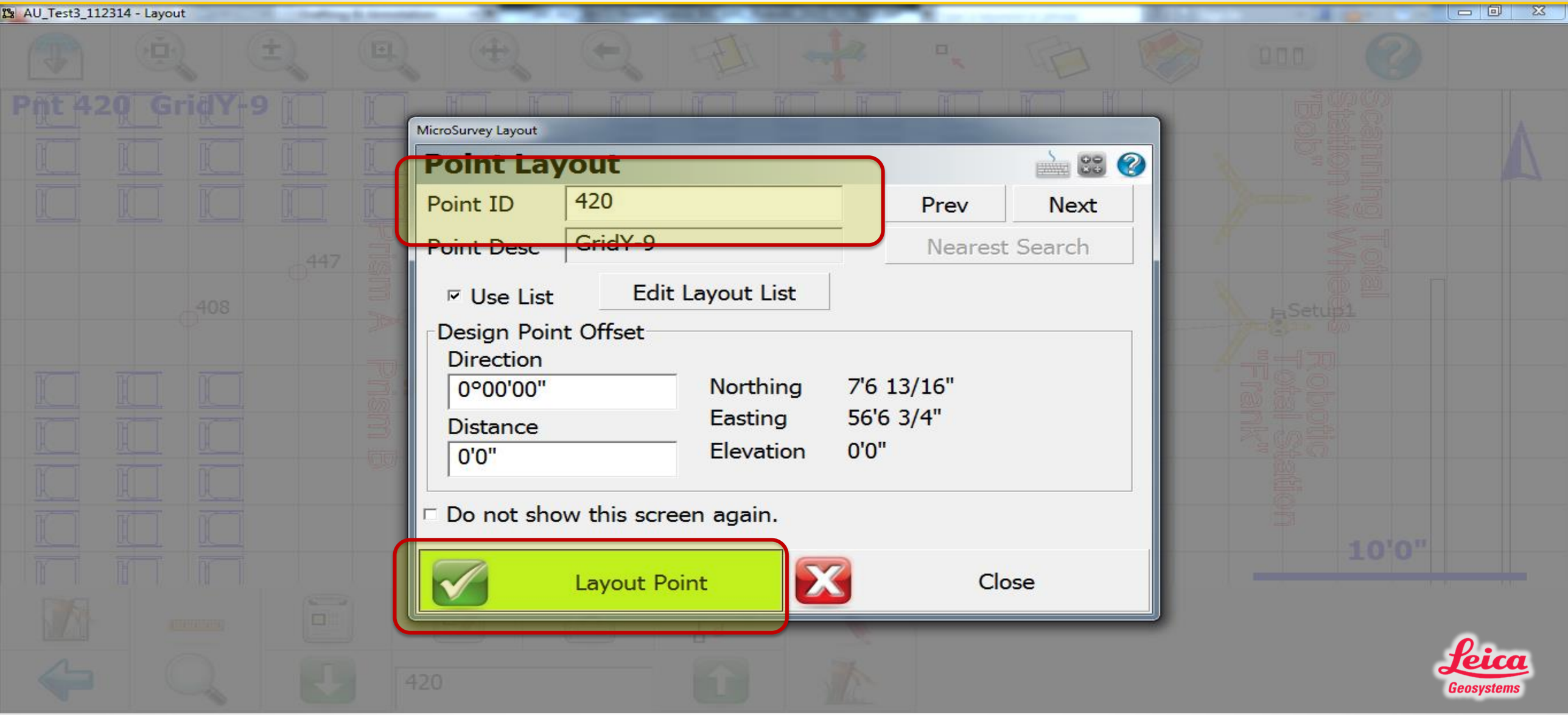
Step 2: Layout Point 1



Step 2: Layout Point 1



Step 2: Layout Point 1



Step 2: Layout Point 1

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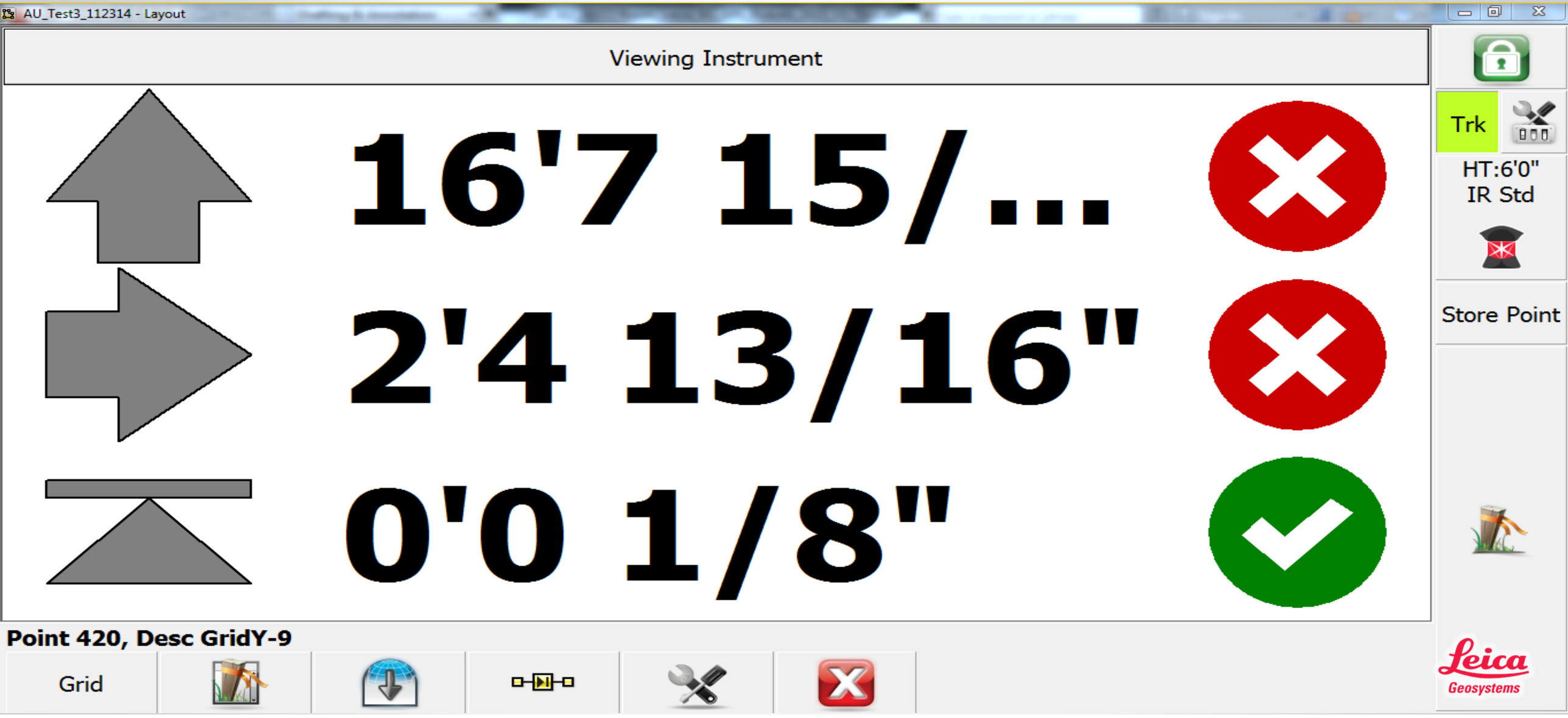
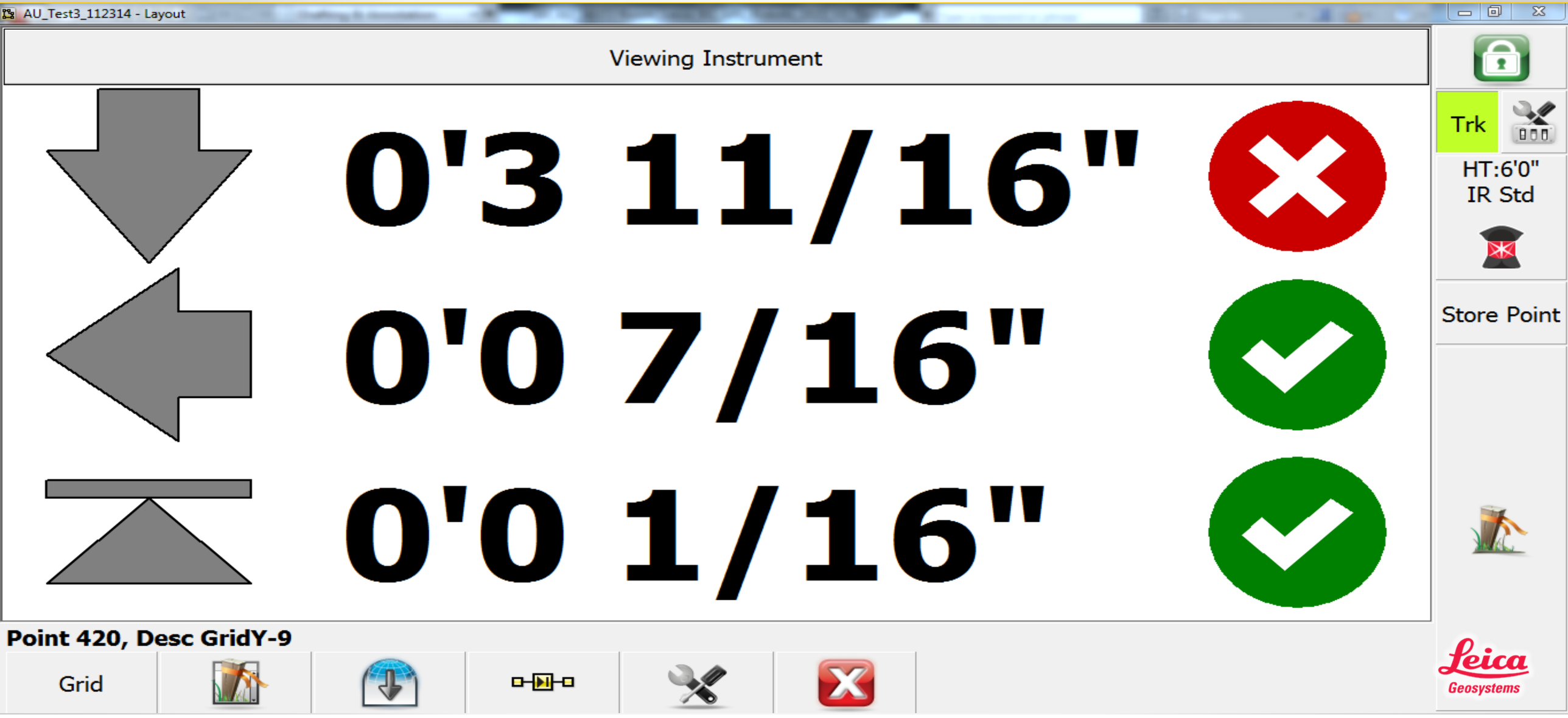
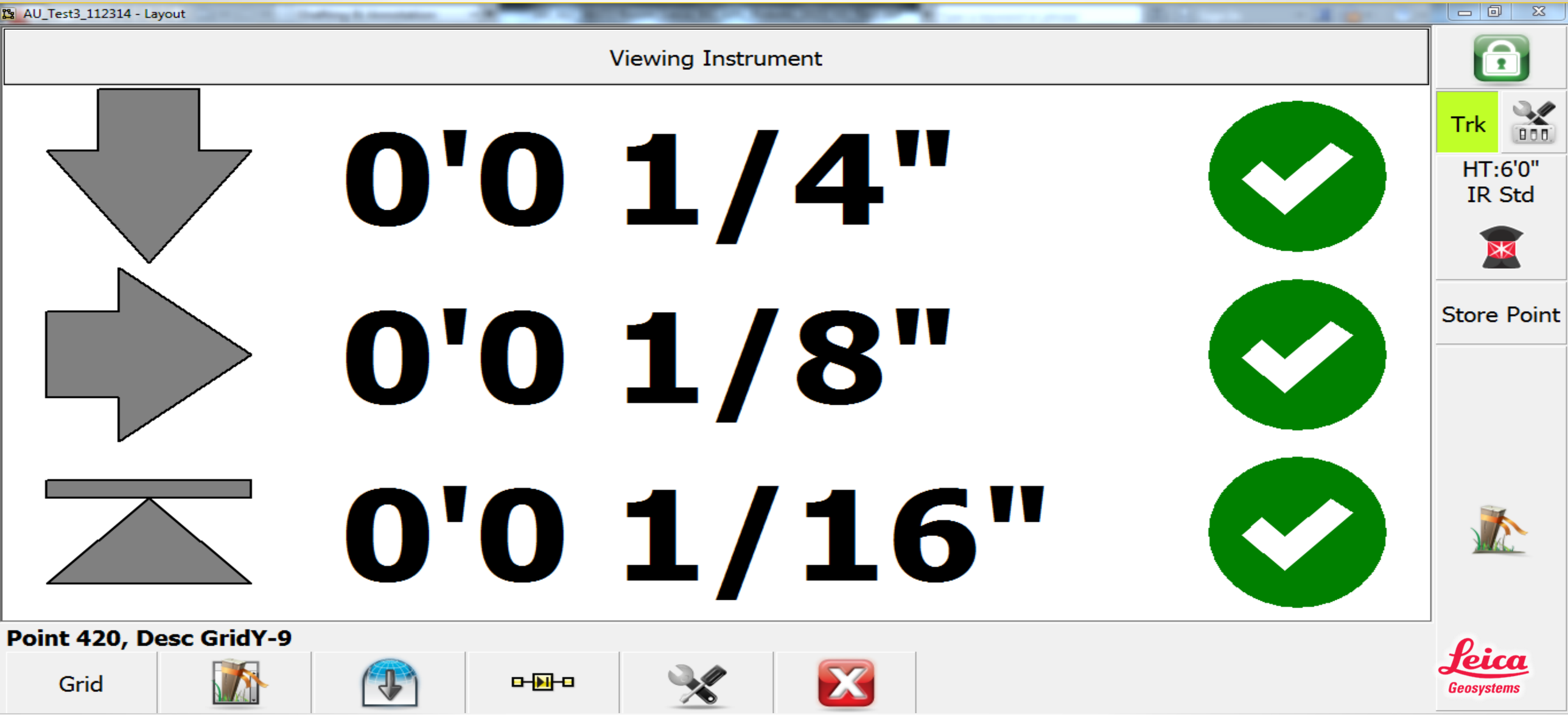


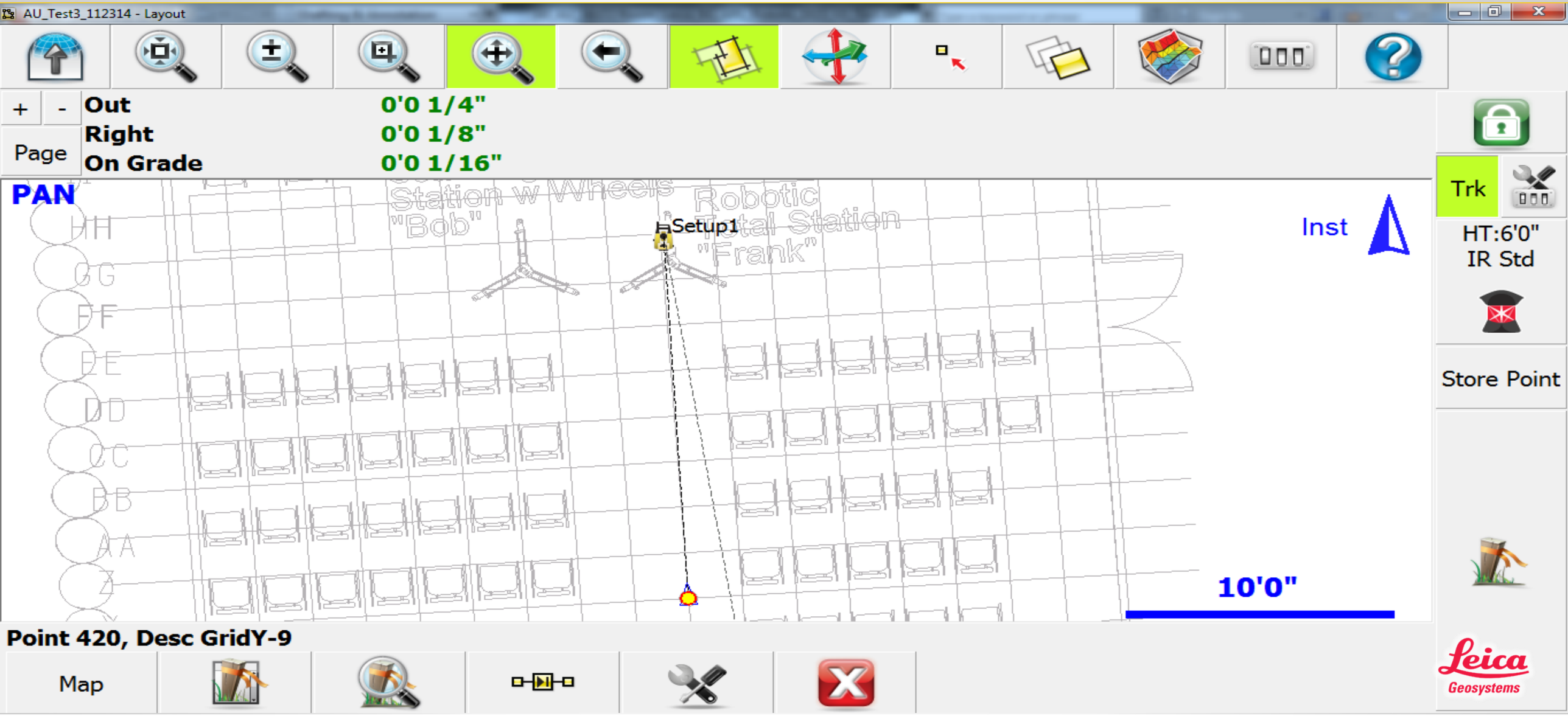
Step 2: Layout Point 1



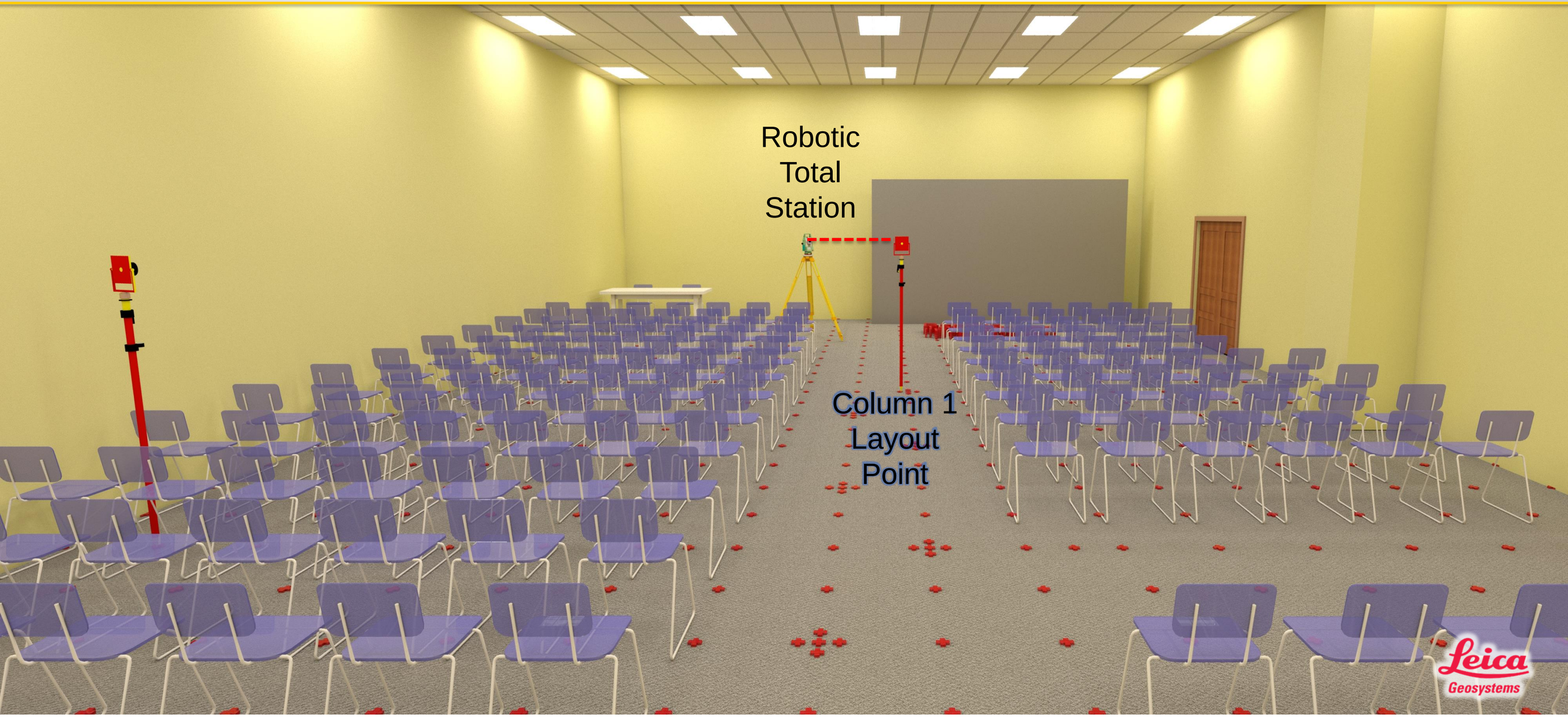
Step 2: Layout Point 1



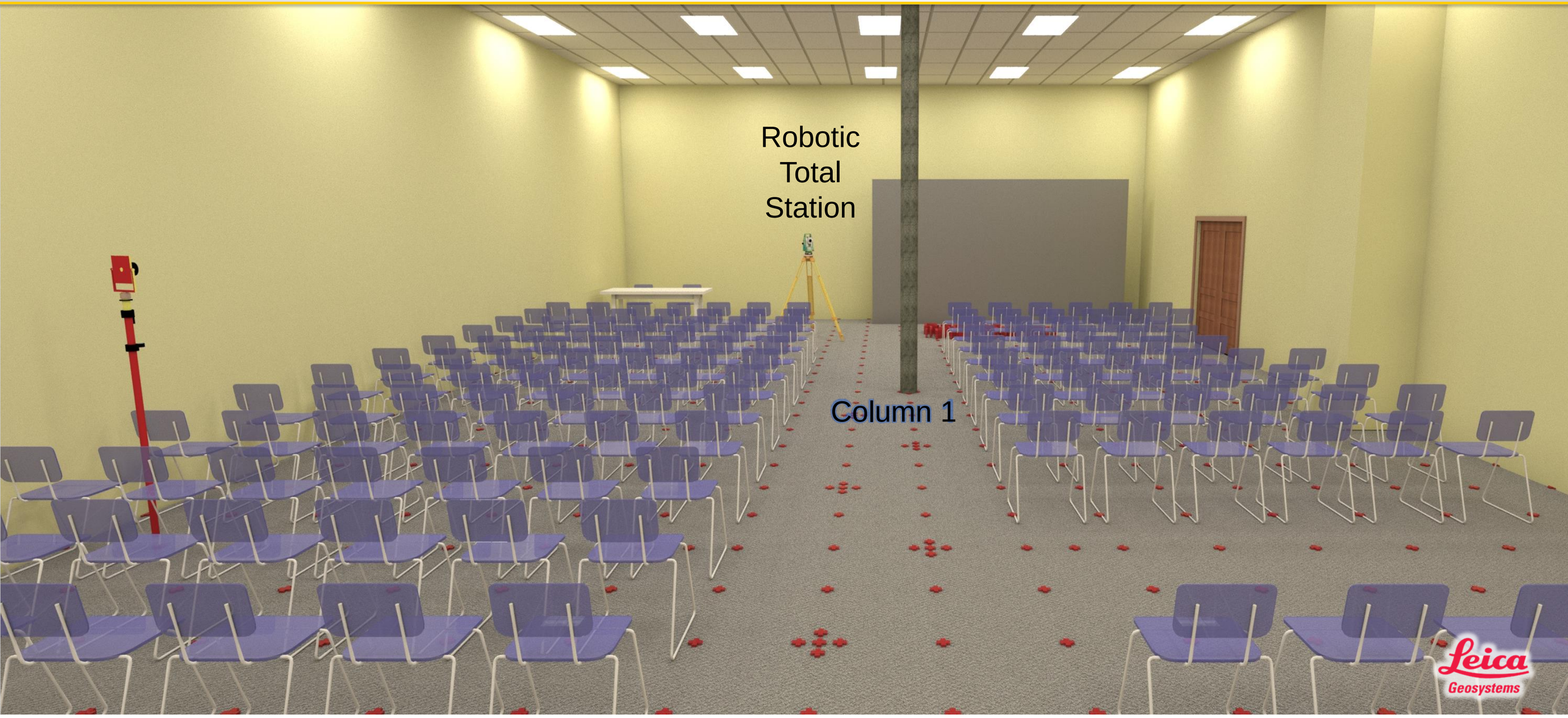
Step 2: Layout Point 1



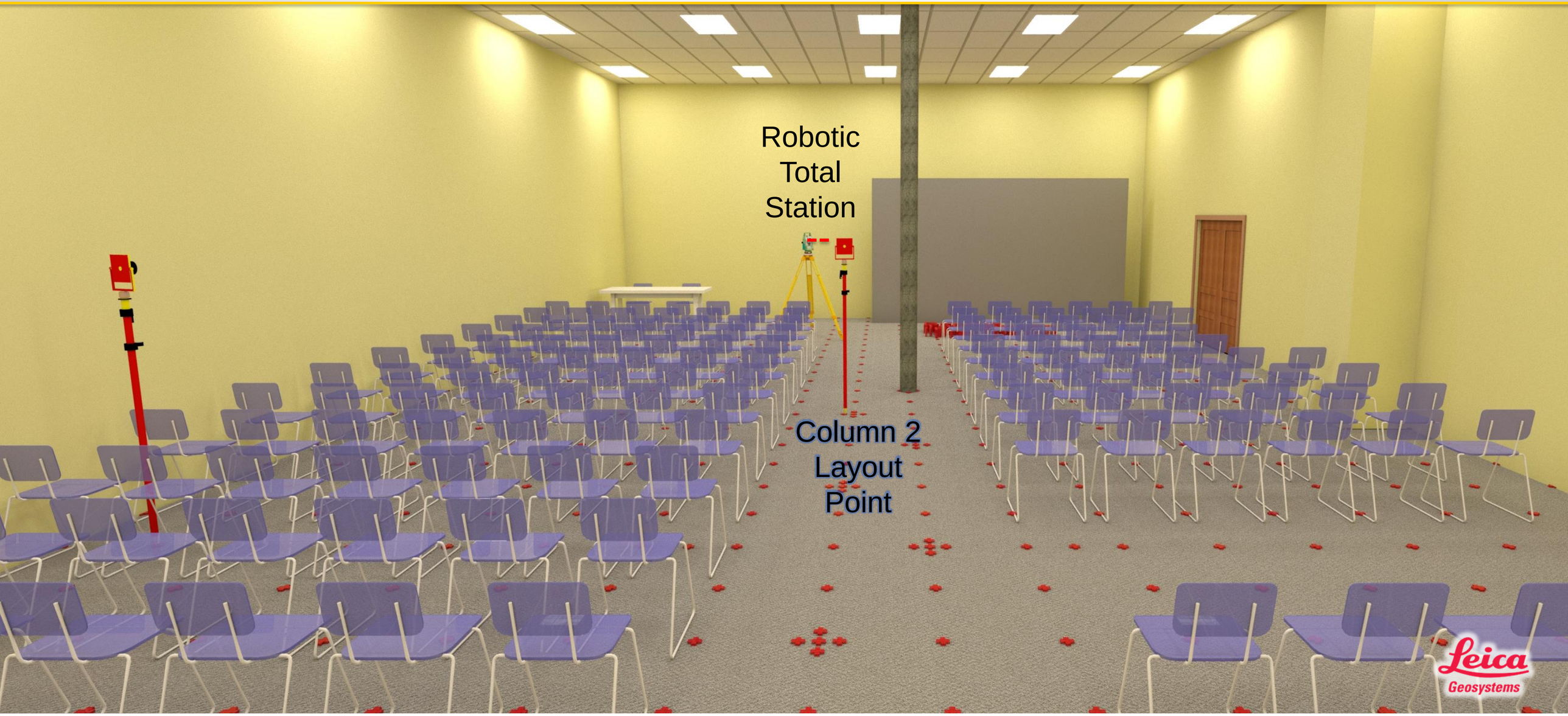
Step 2: Layout Point 1



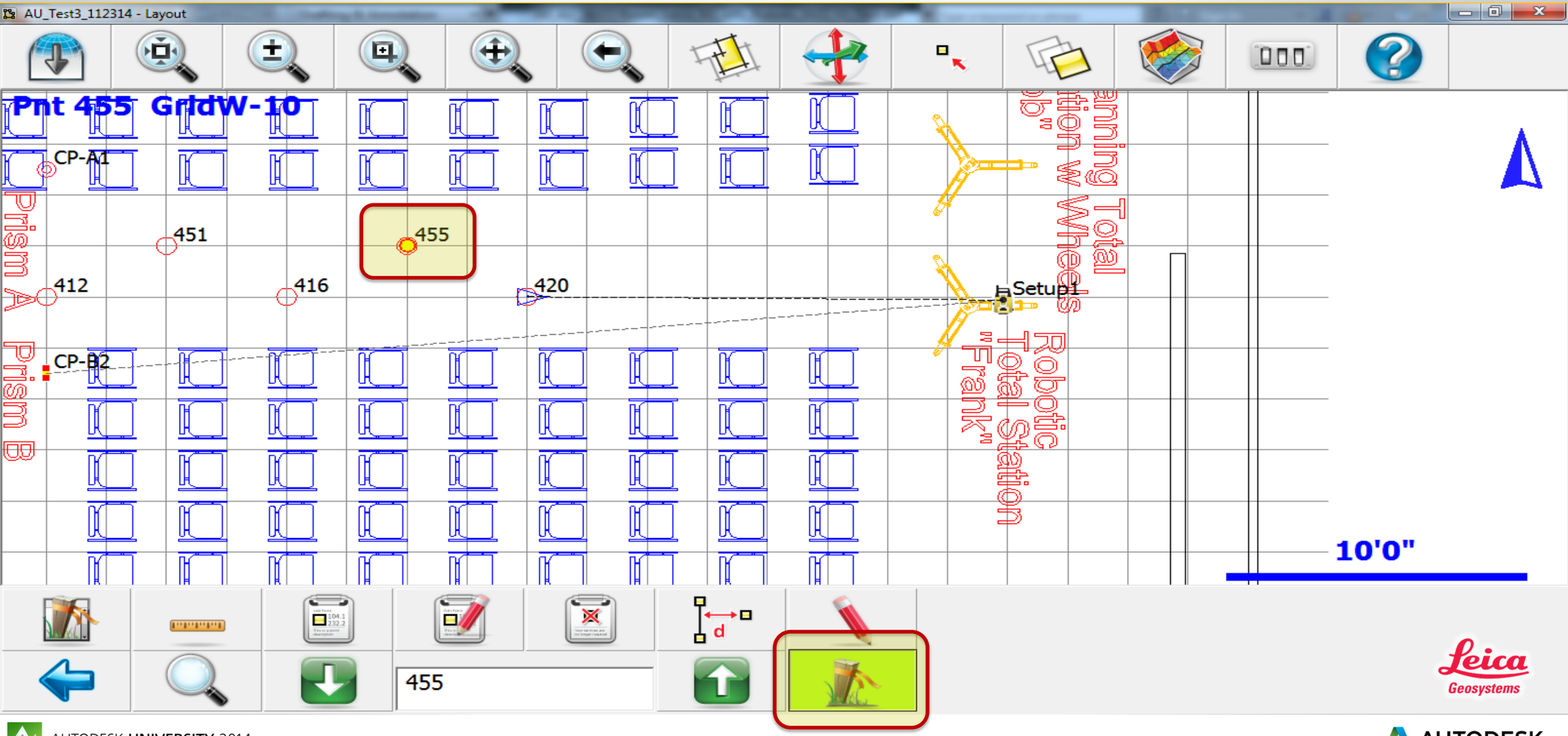
Step 3: Place Column 1



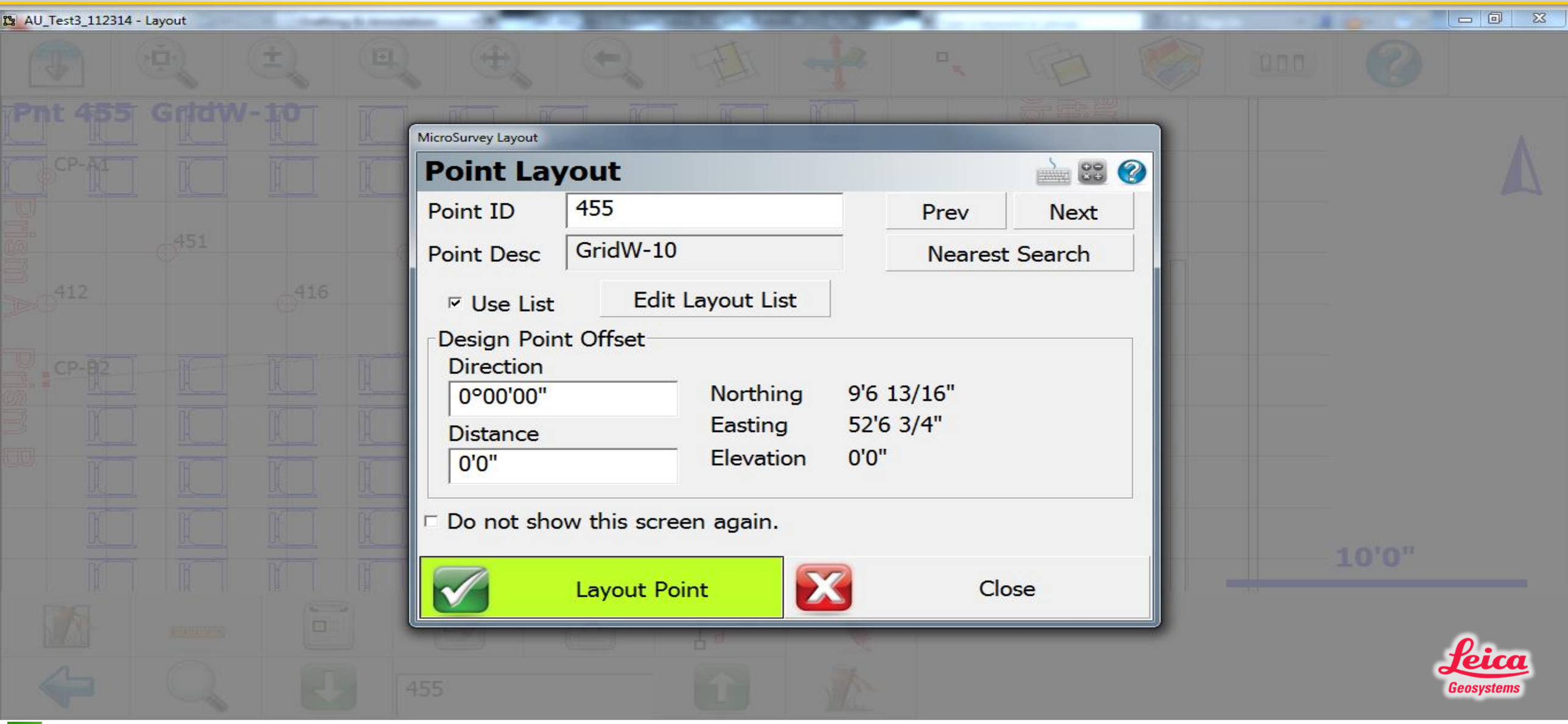
Step 4: Layout Point 2



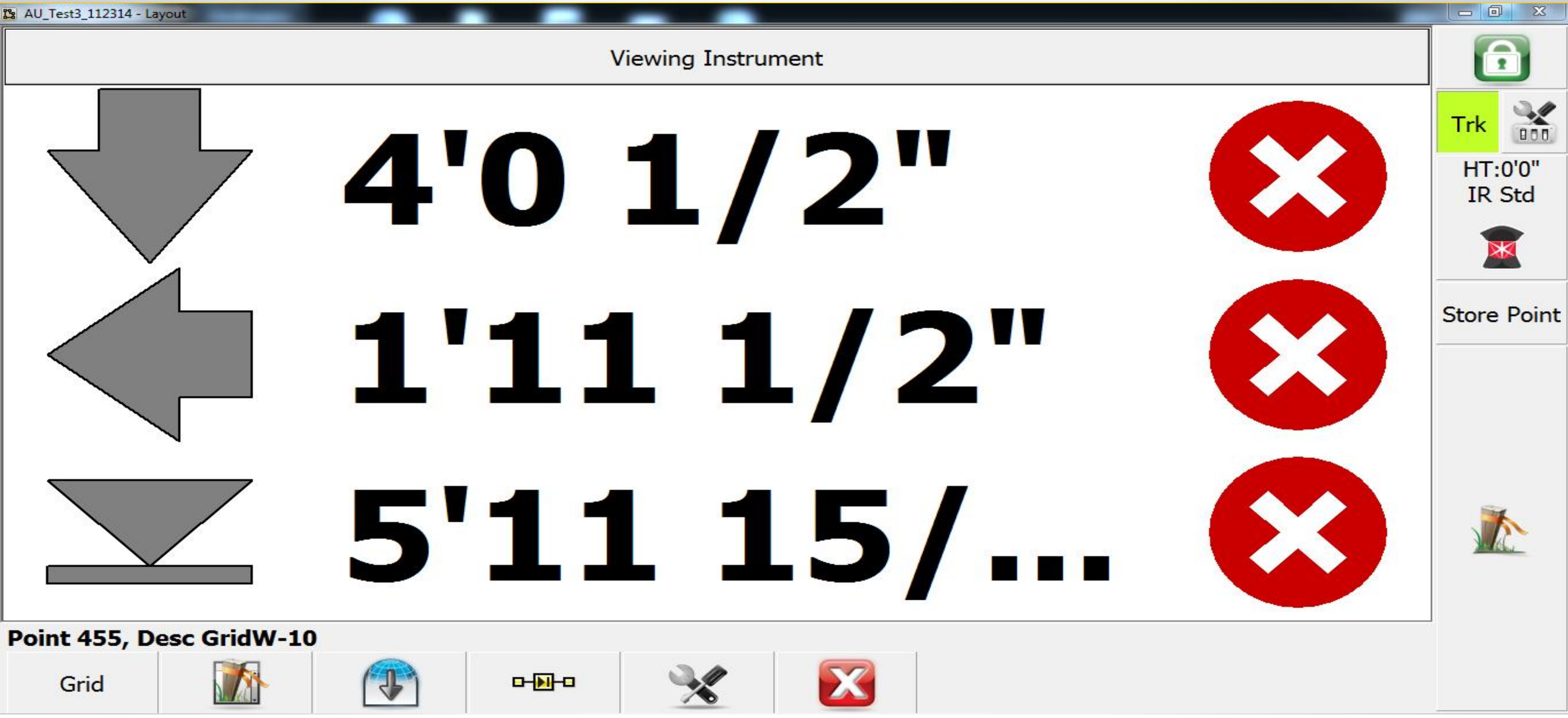
Step 4: Layout Point 2



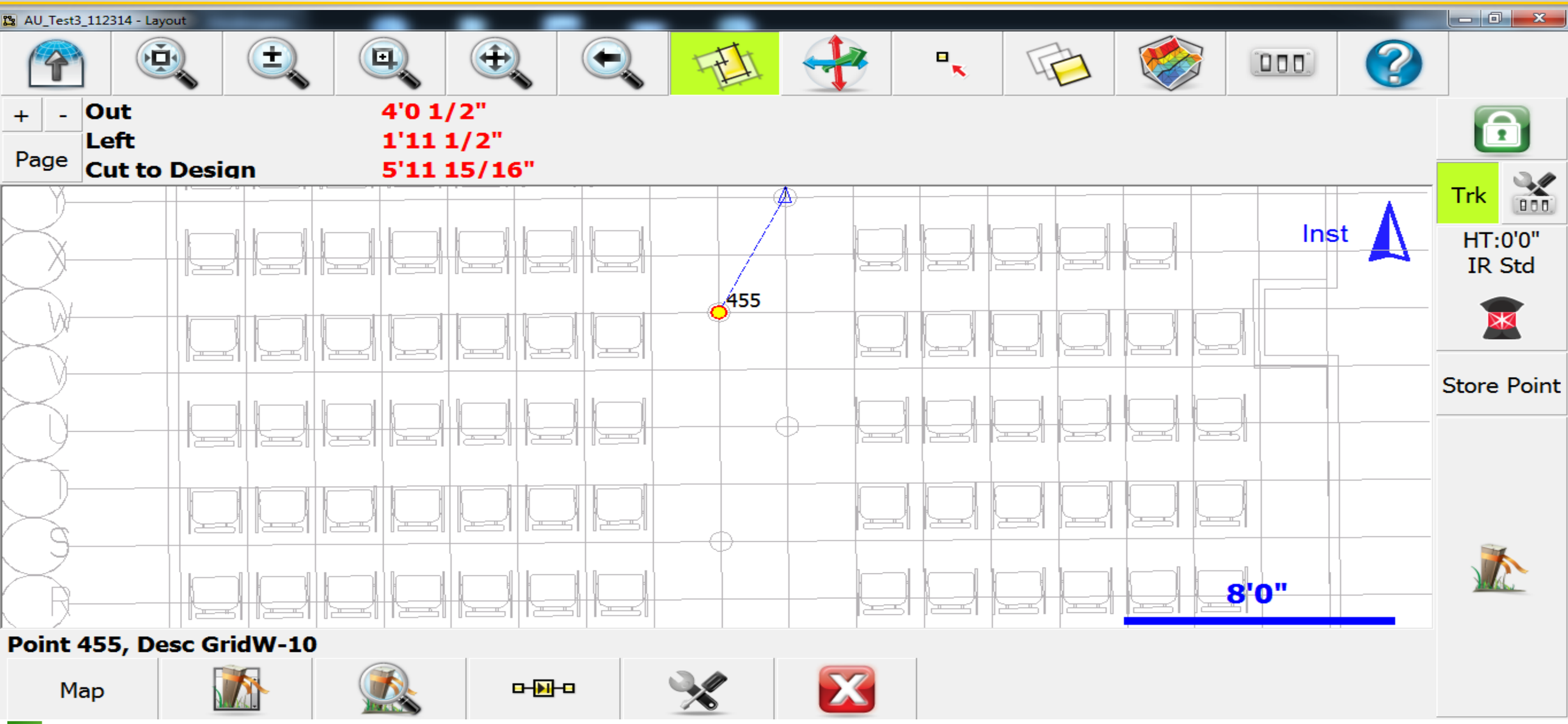
Step 4: Layout Point 2



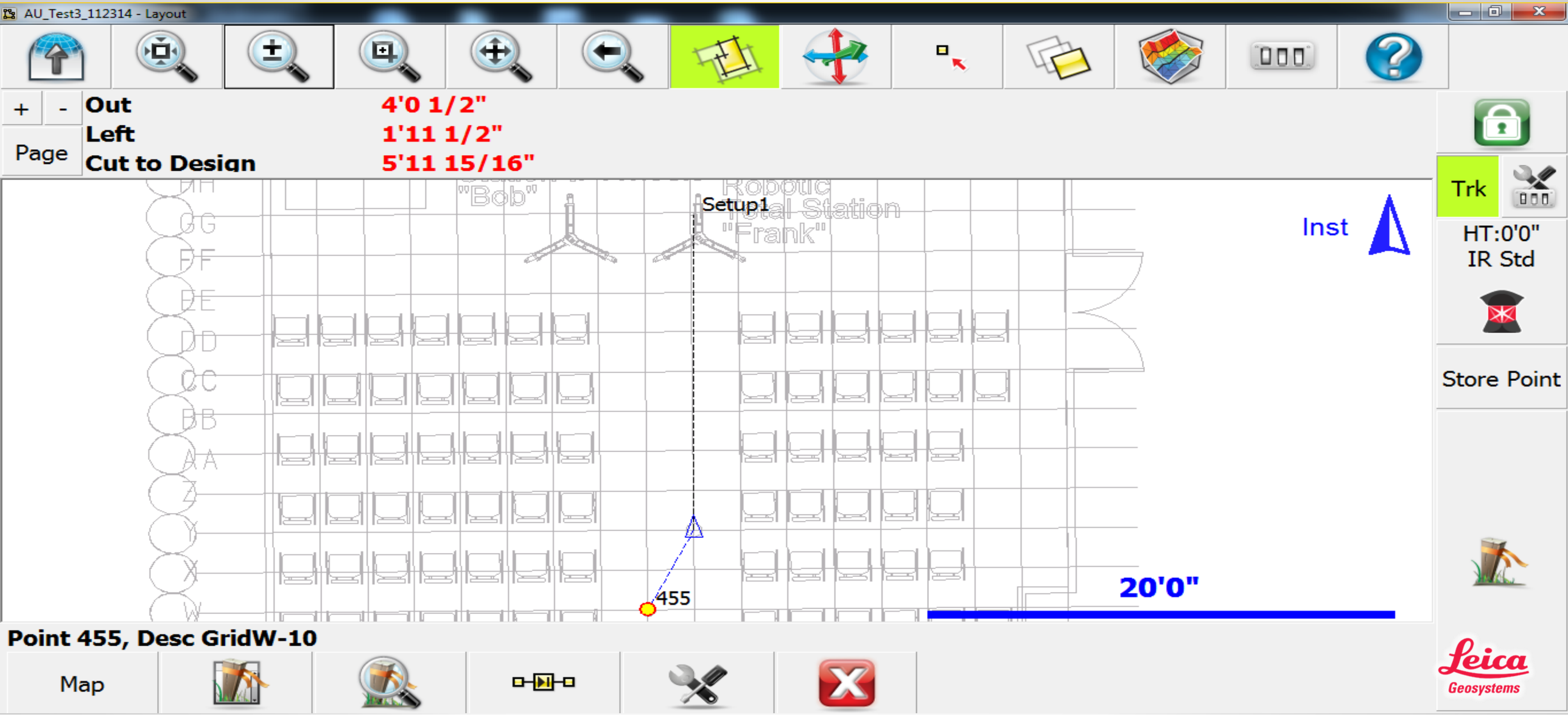
Step 4: Layout Point 2



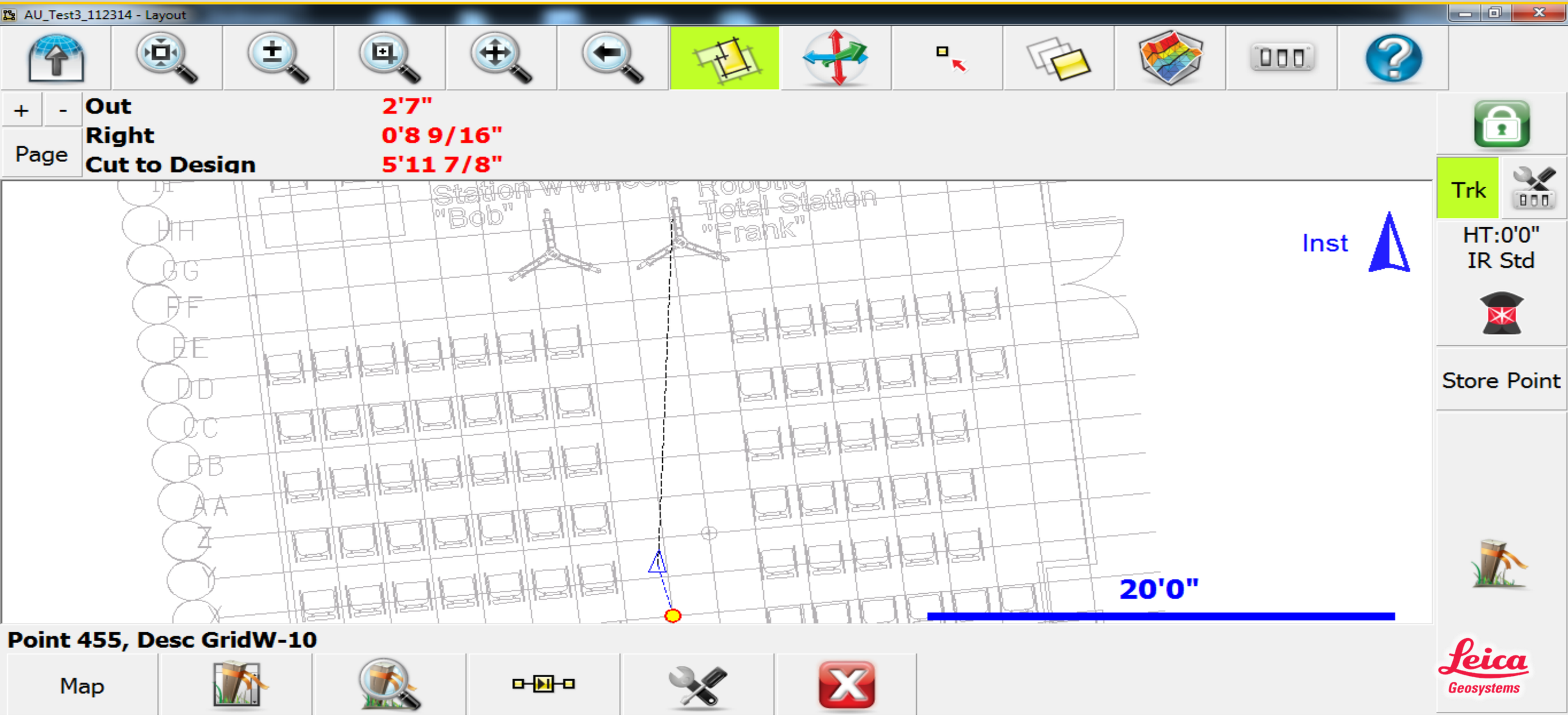
Step 4: Layout Point 2



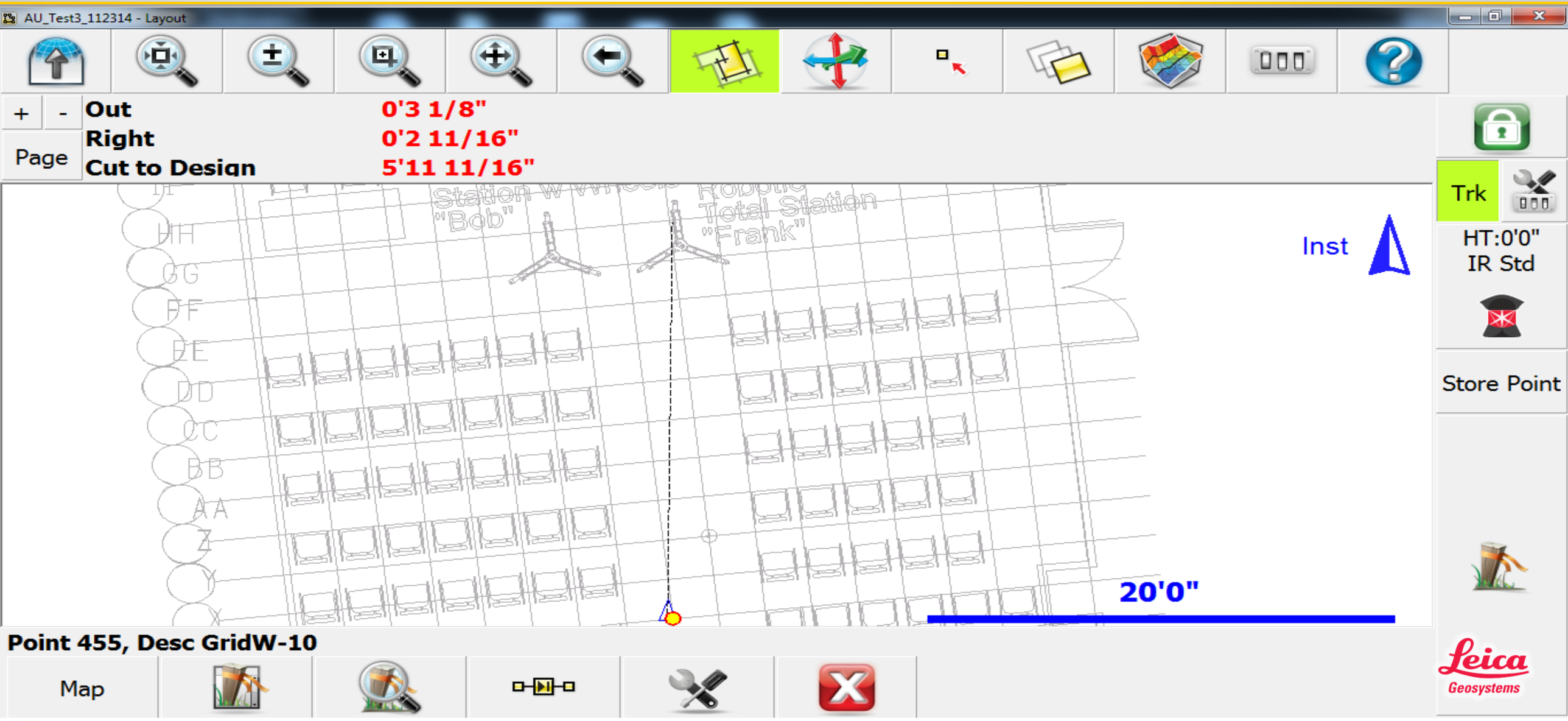
Step 4: Layout Point 2



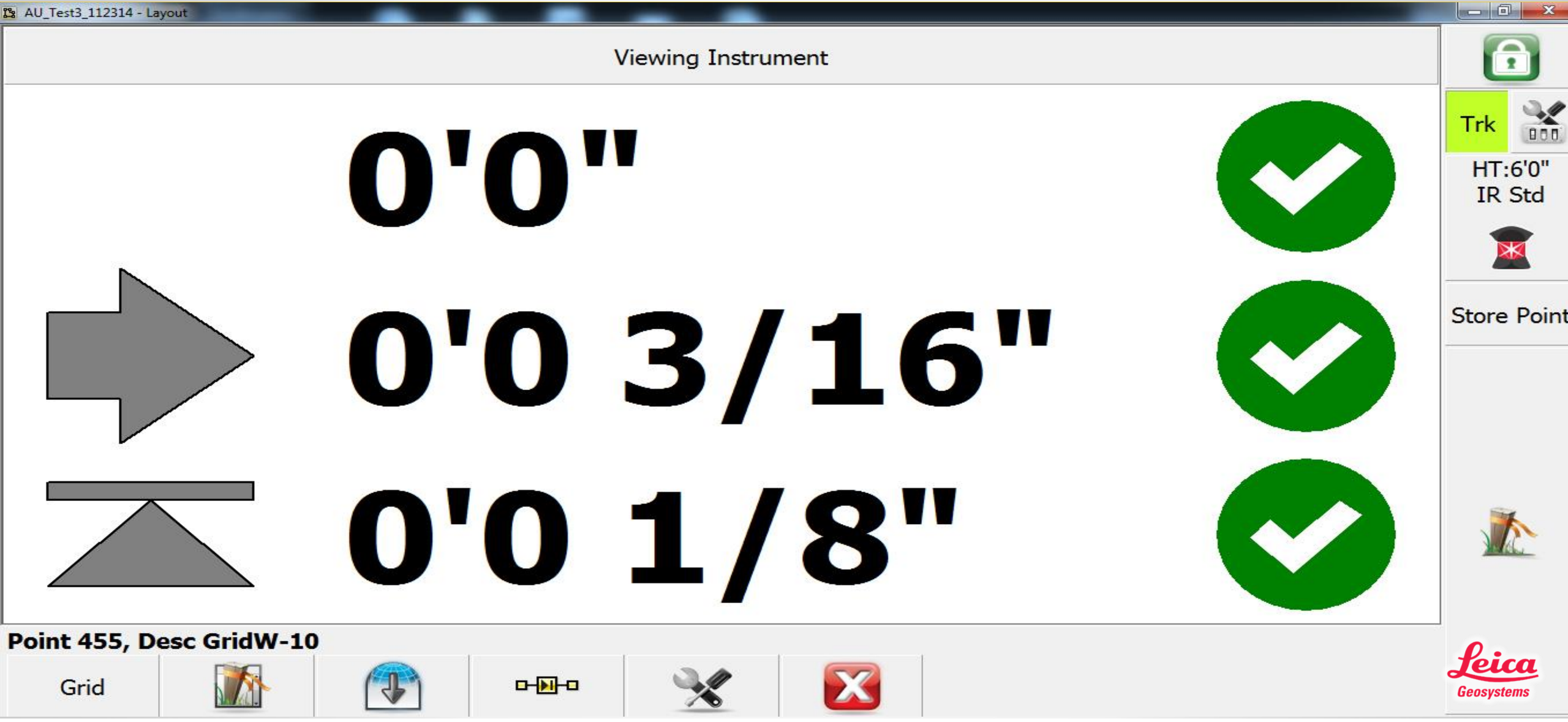
Step 4: Layout Point 2



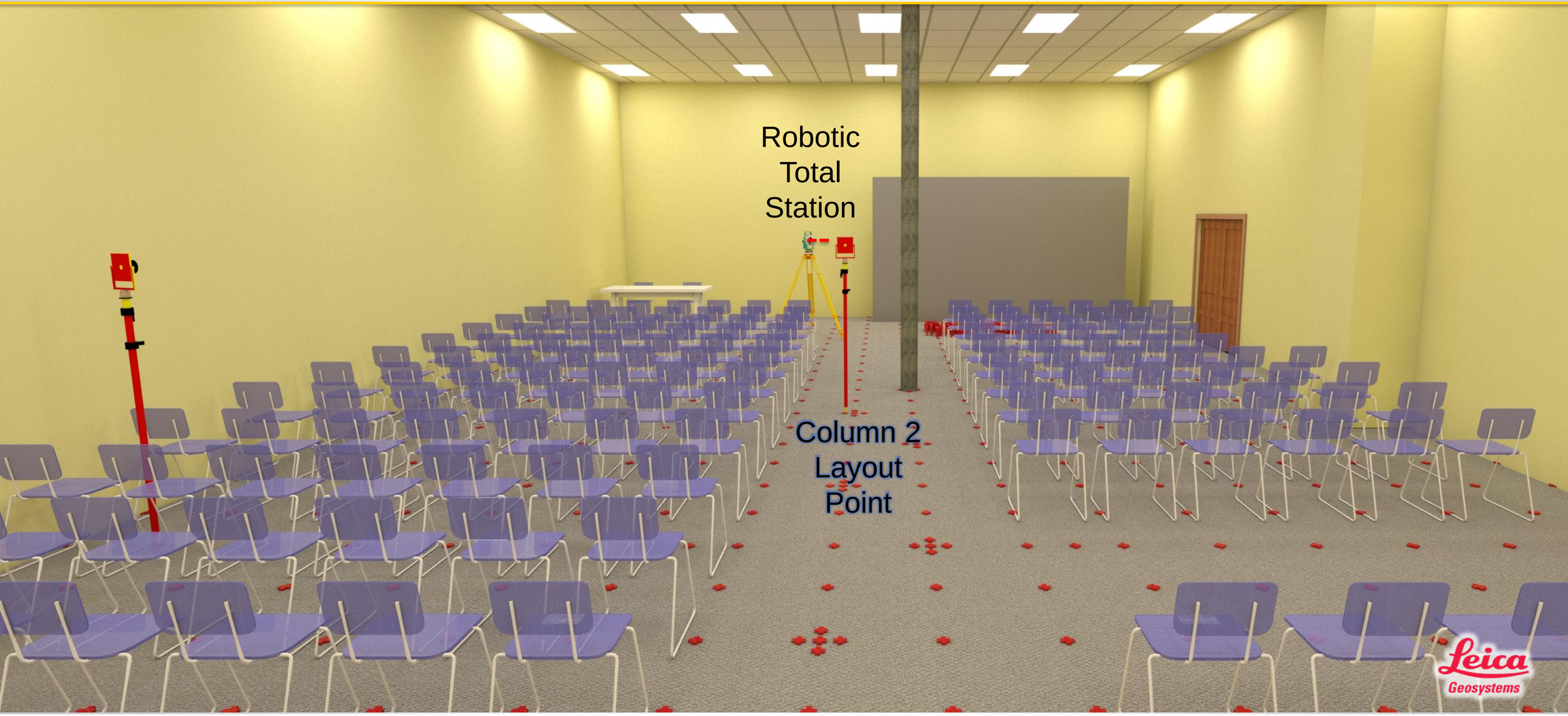
Step 4: Layout Point 2



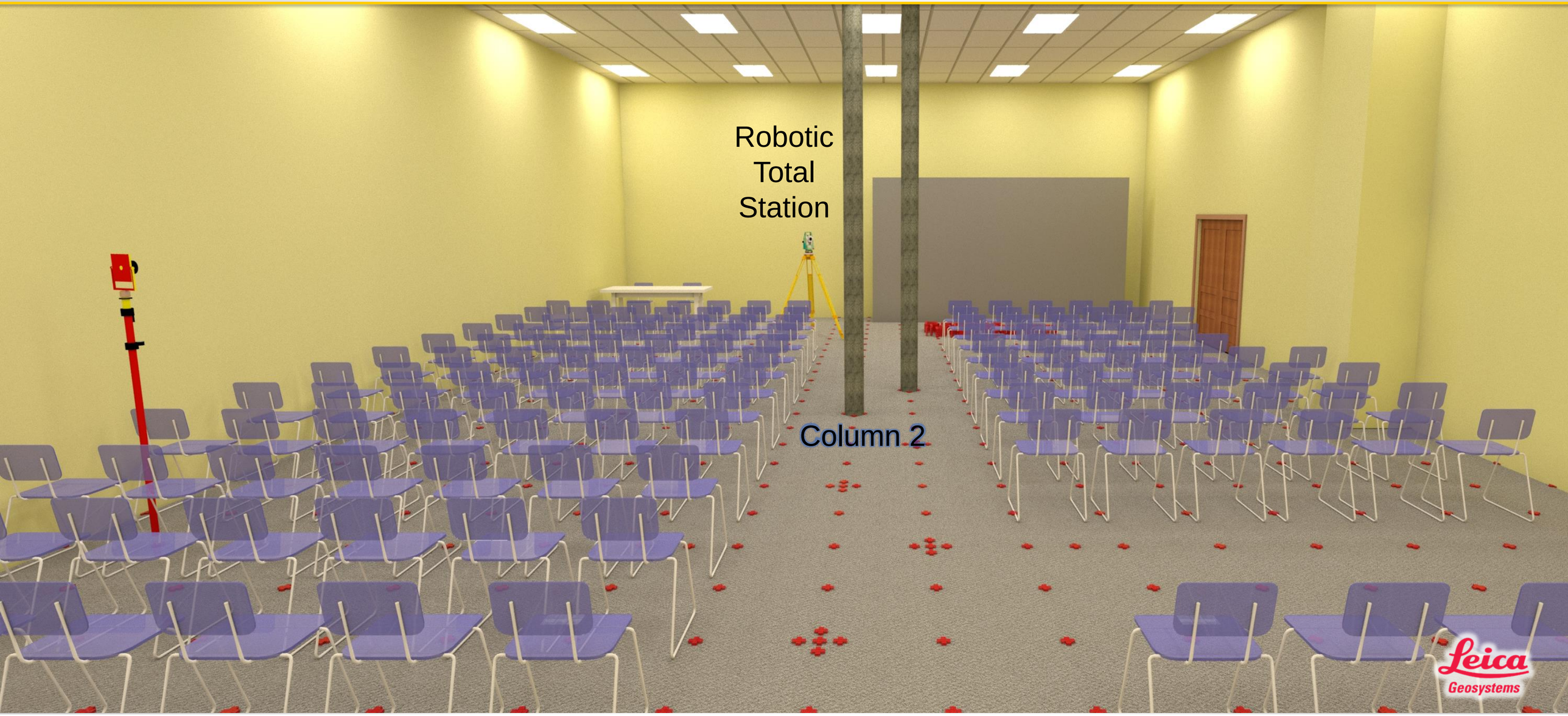
Step 4: Layout Point 2



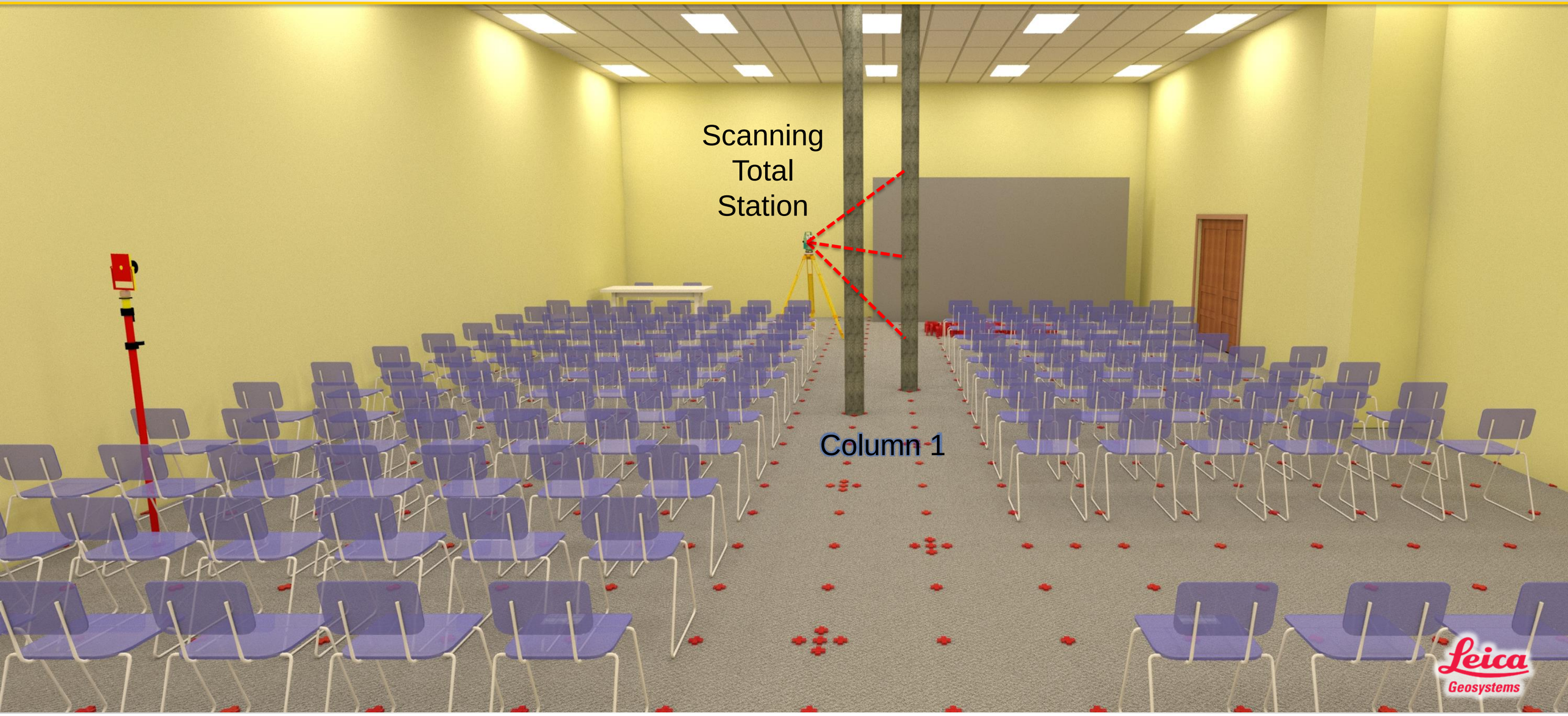
Step 4: Layout Point 2



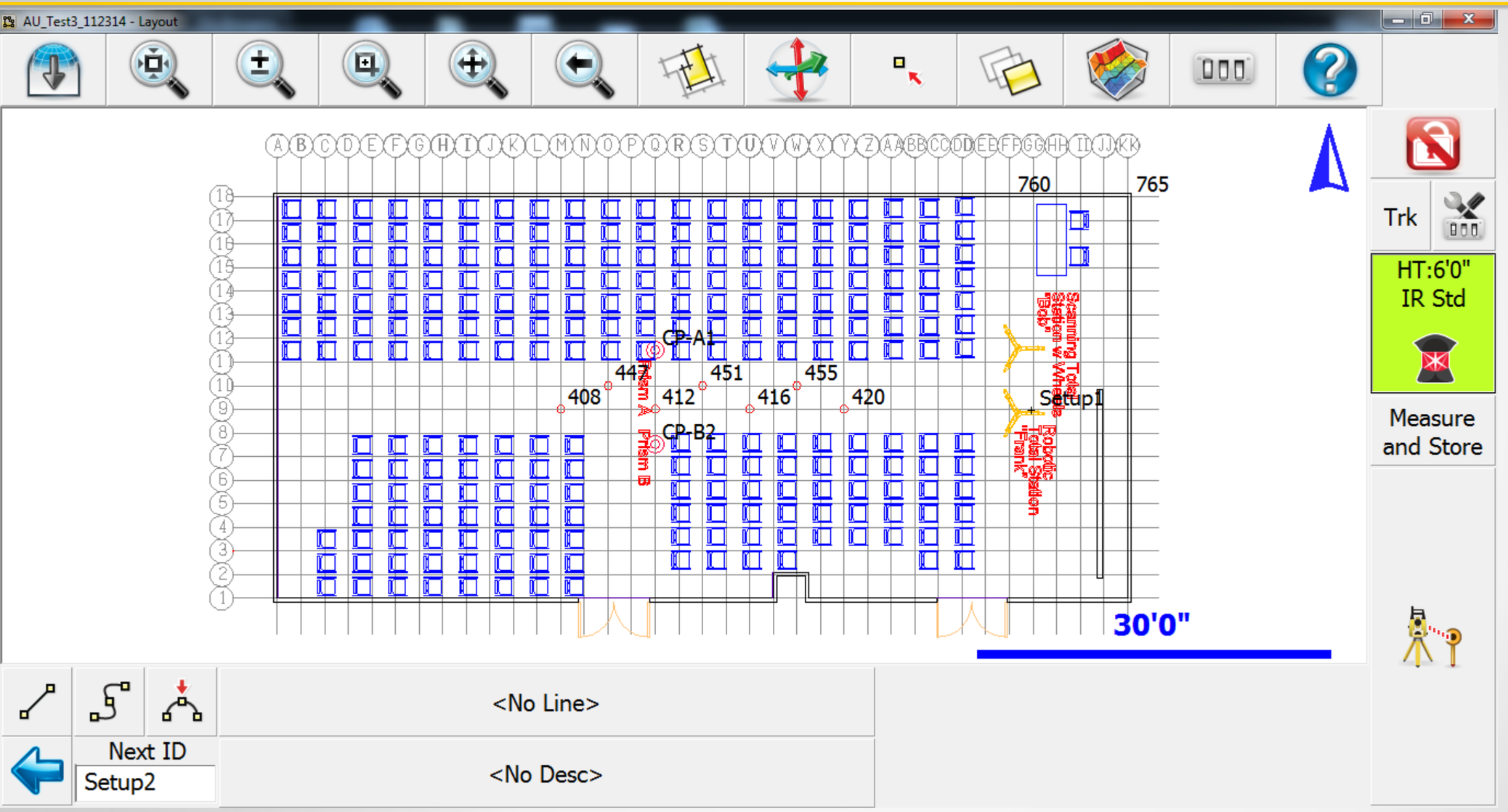
Step 5: Place Column 2



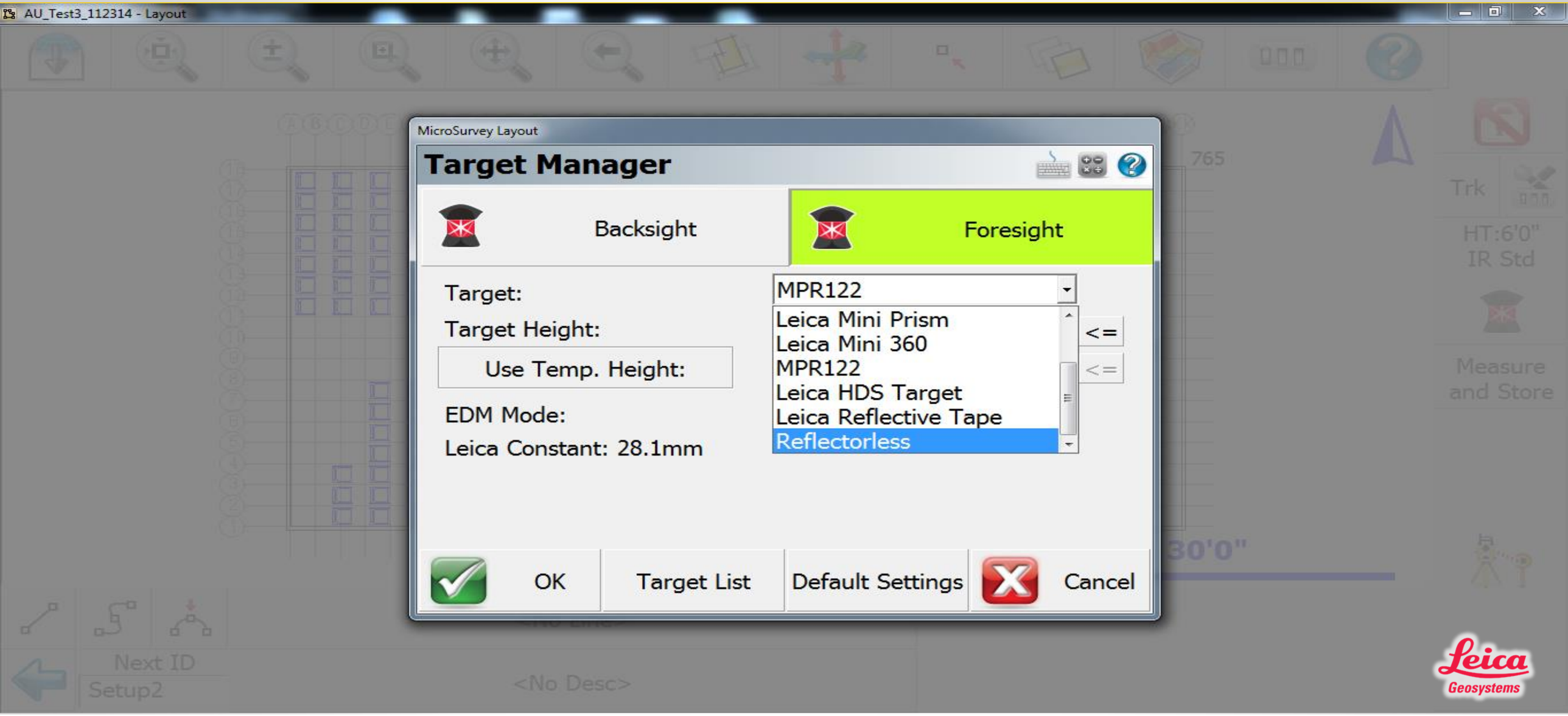
Step 6: Backcheck Column 1 – “BOB”



Step 6: Backcheck Column 1 – “BOB”



Step 6: Backcheck Column 1 – “BOB”



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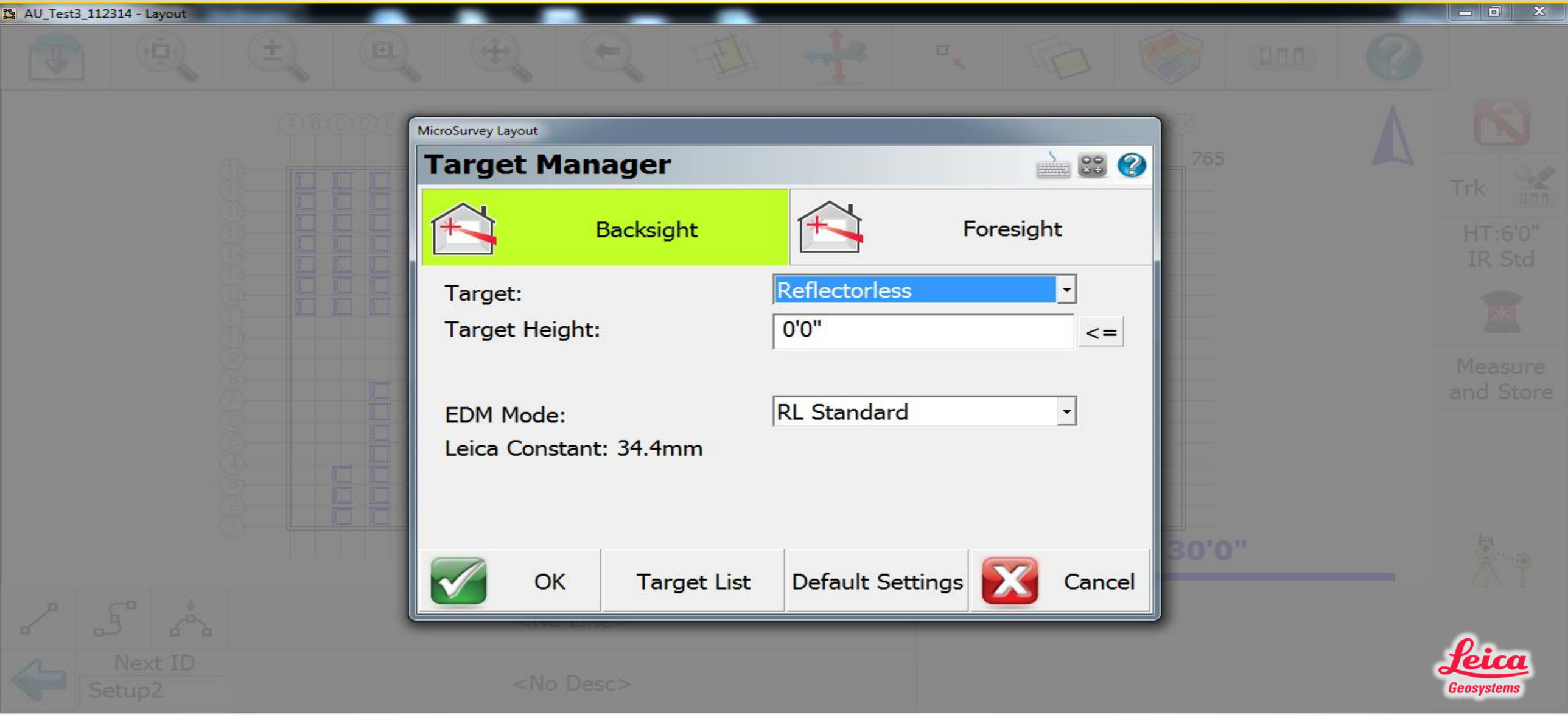
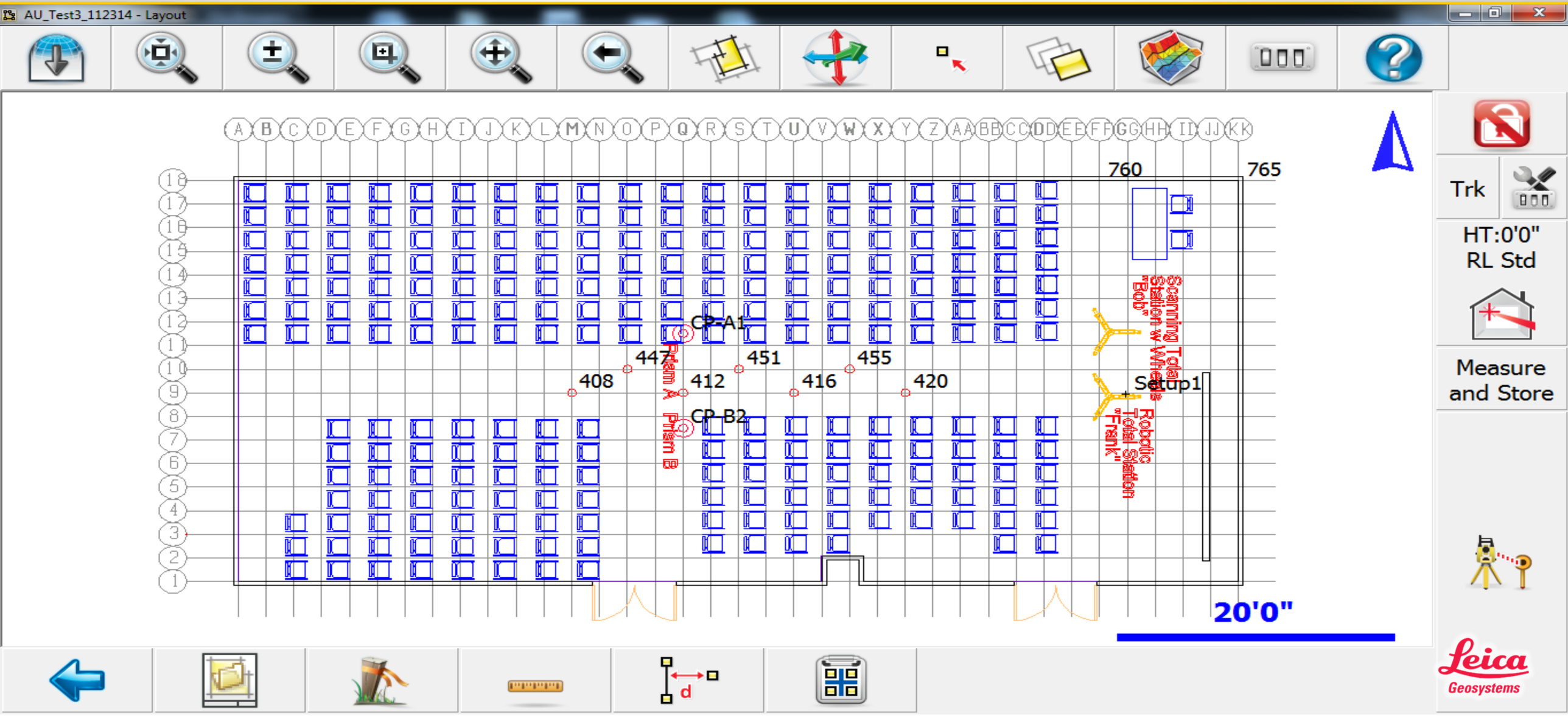
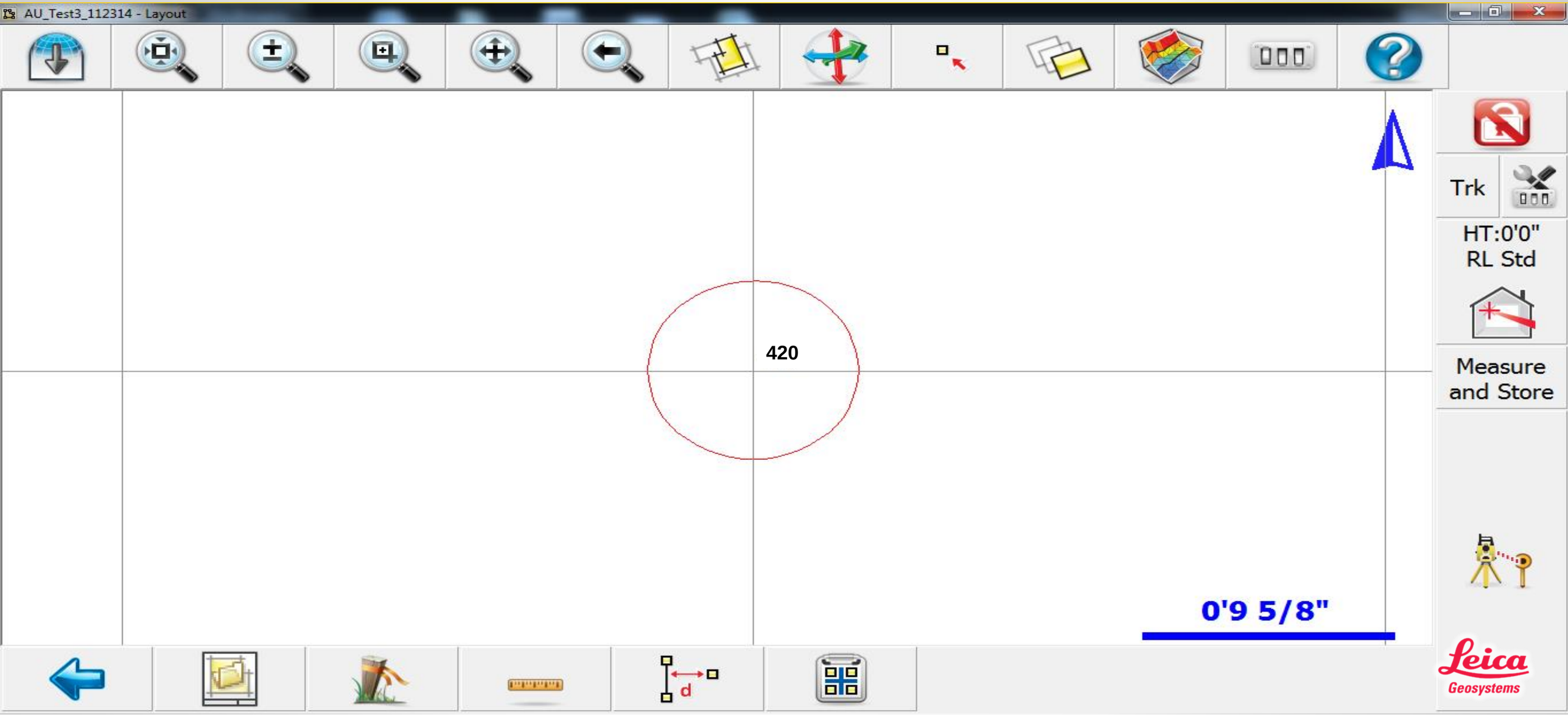


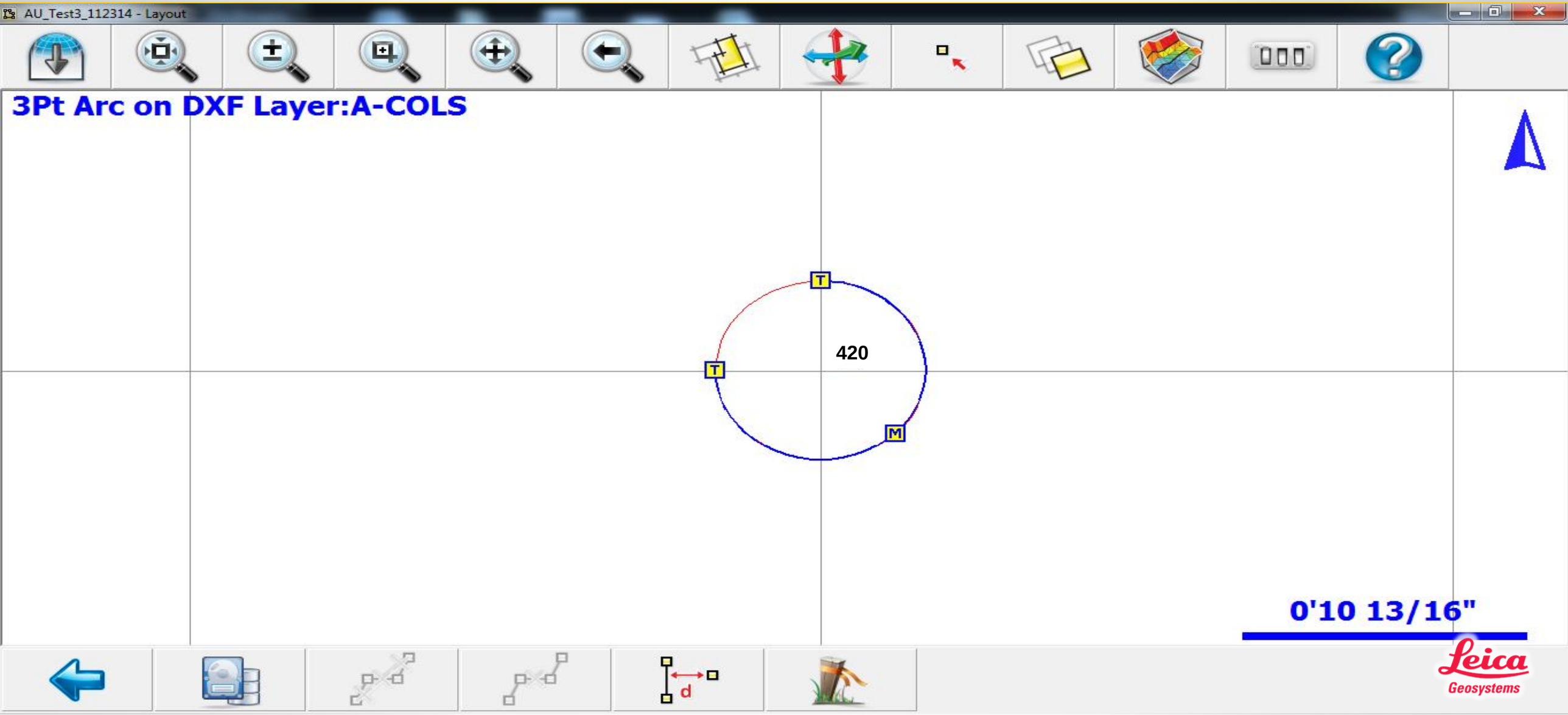
Step 6: Backcheck Column 1 – “BOB”



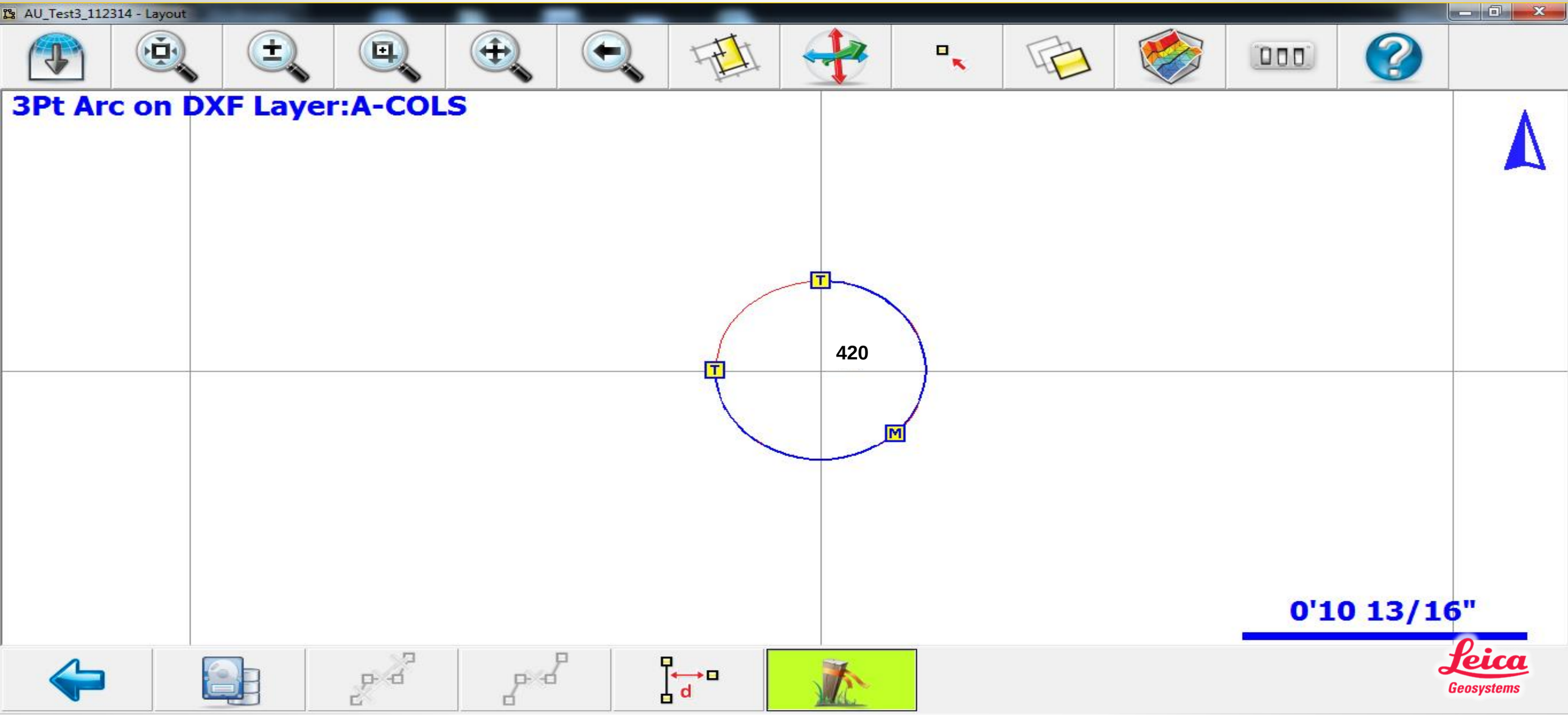
Step 6: Backcheck Column 1 – “BOB”



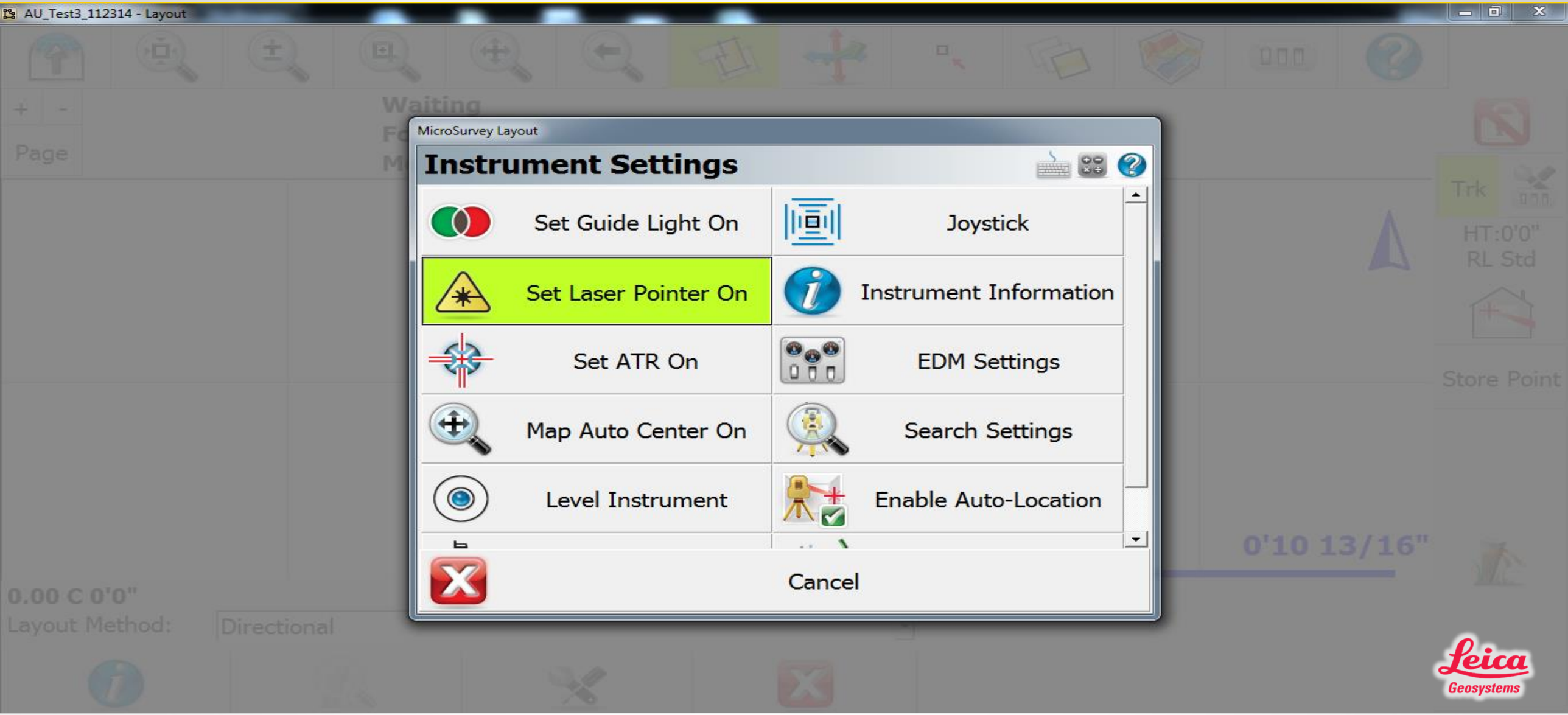
Step 6: Backcheck Column 1 – “BOB”



Step 6: Backcheck Column 1 – “BOB”



Step 6: Backcheck Column 1 – “BOB”



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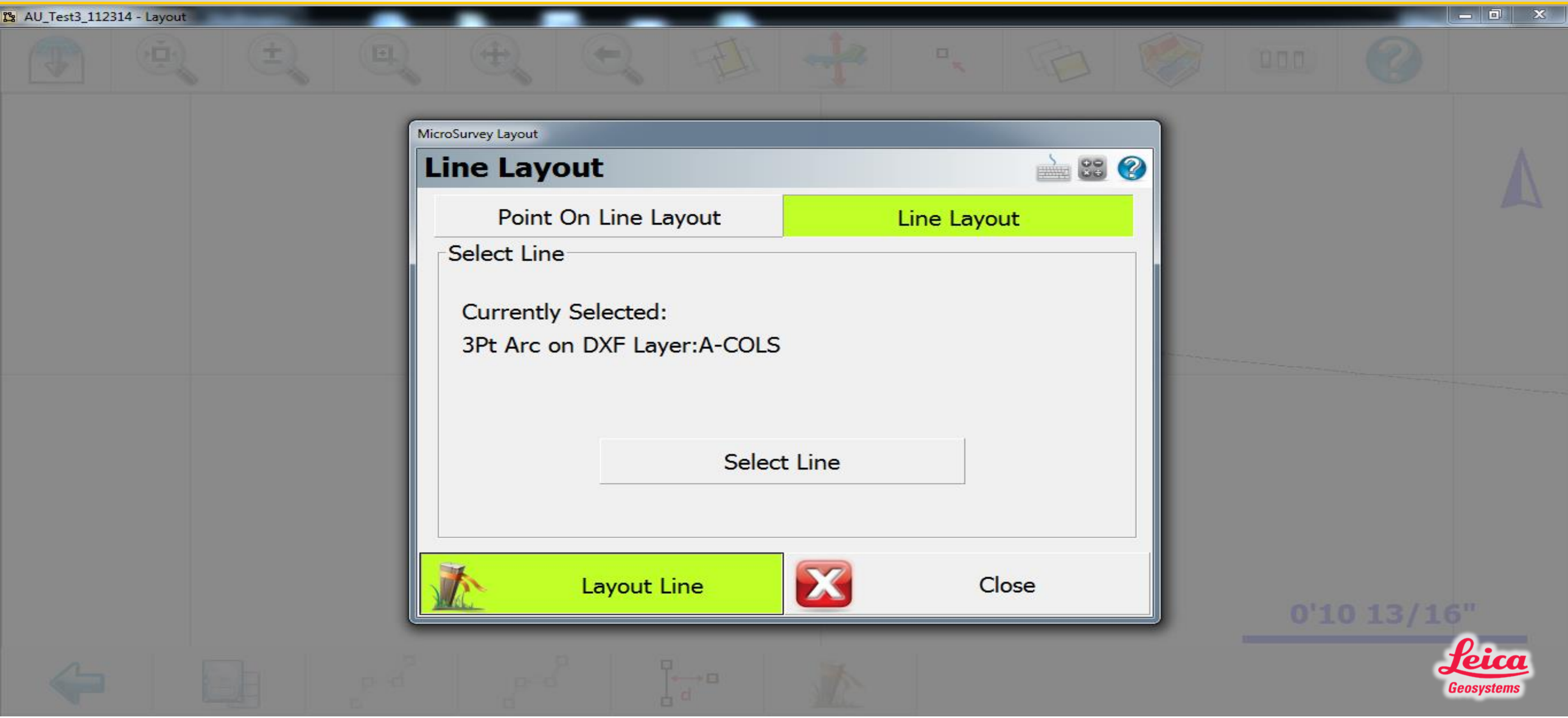
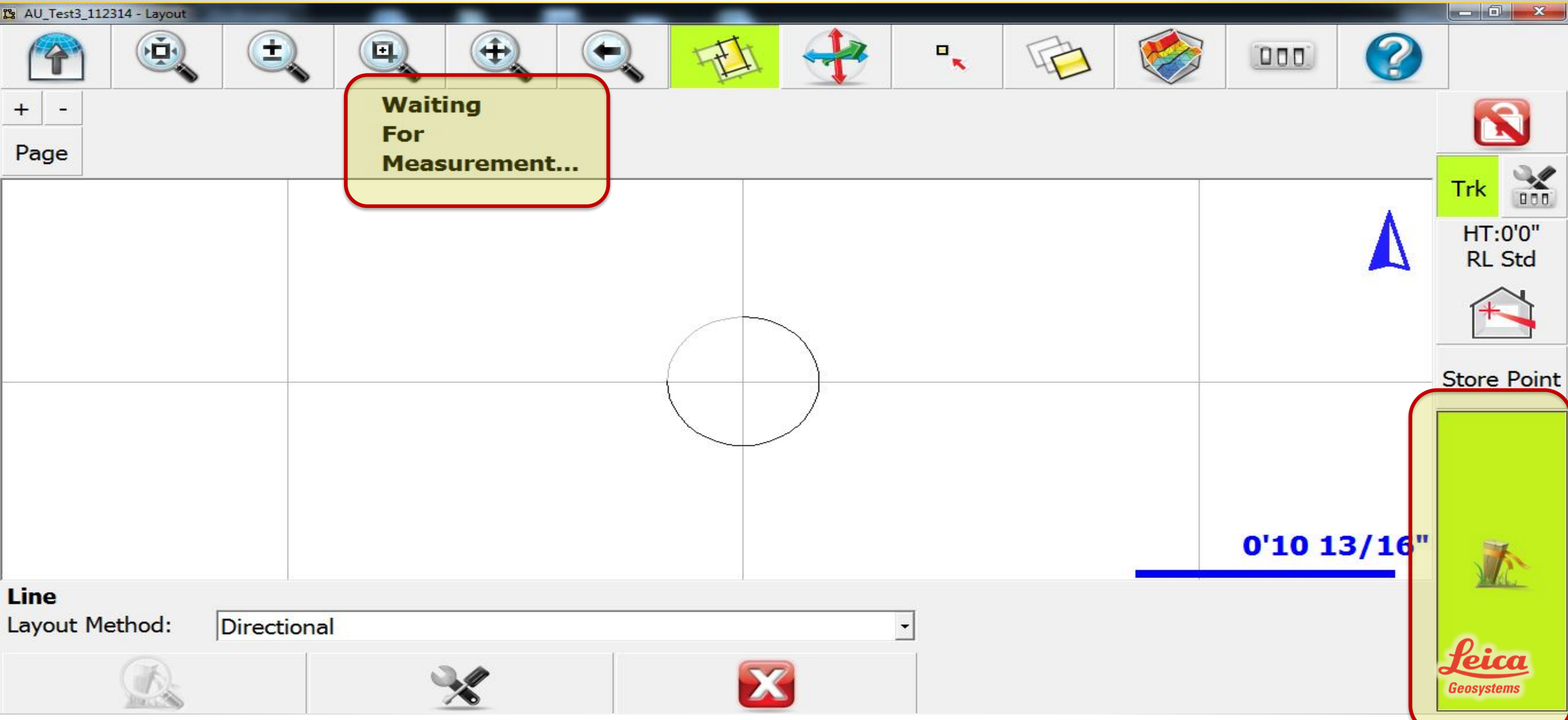
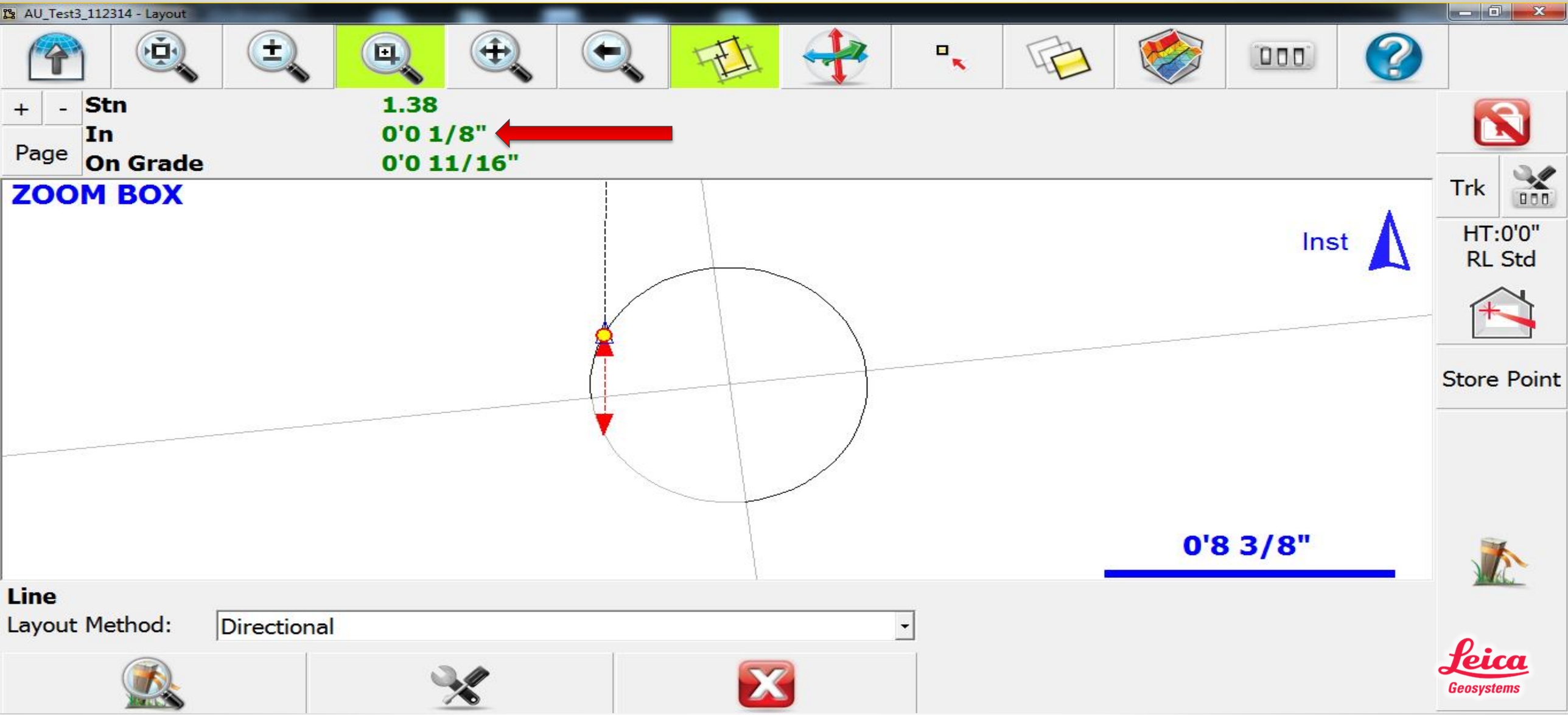


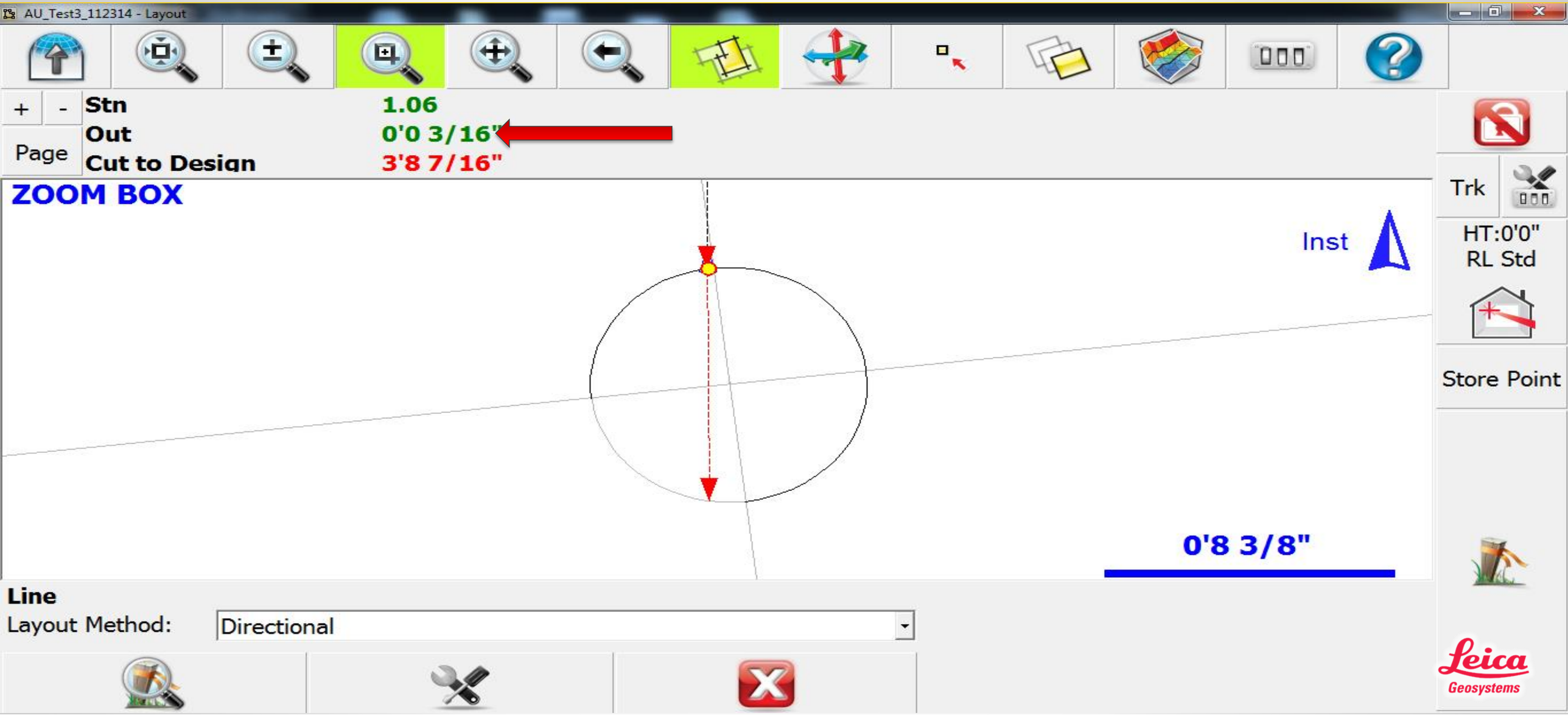
Step 6: Backcheck Column 1 – “BOB”



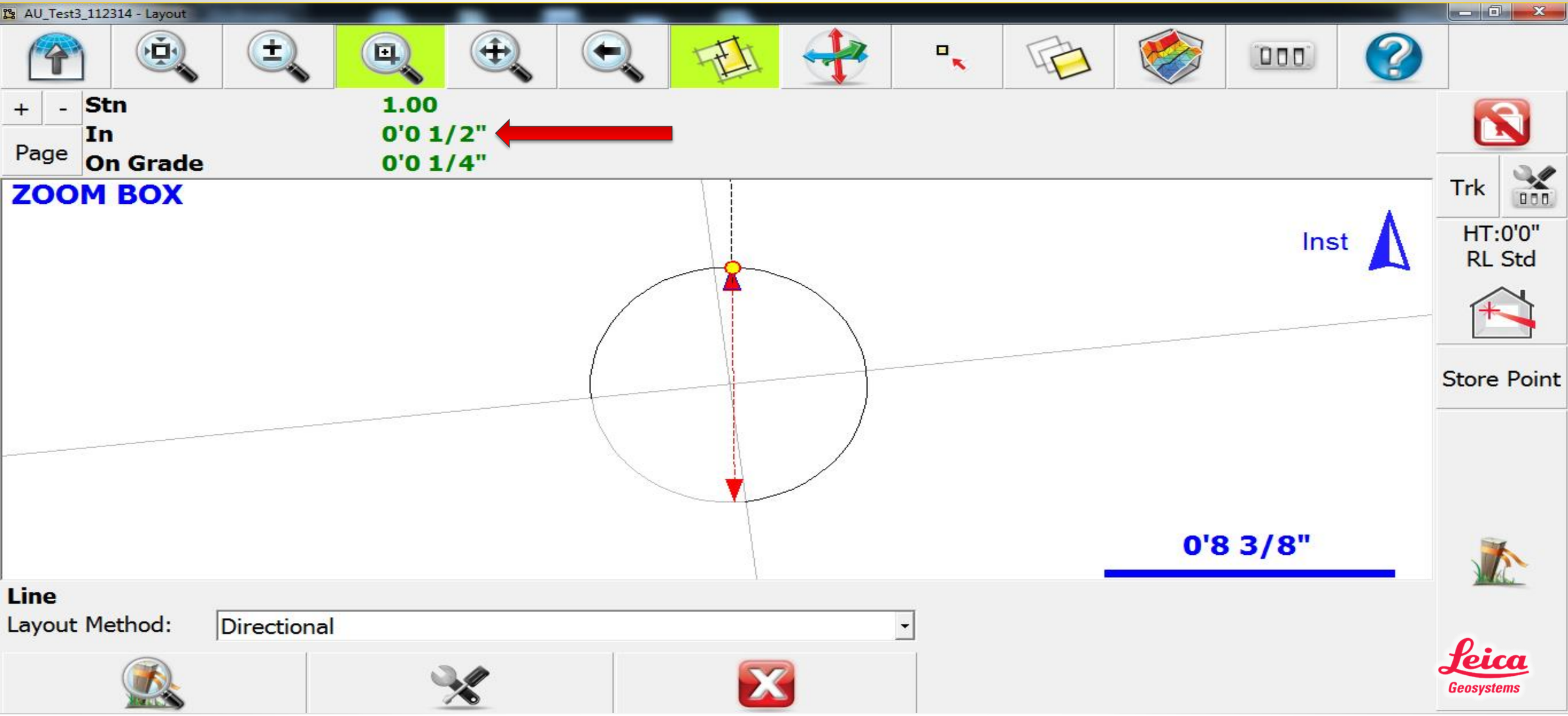
Step 6: Backcheck Column 1 – “BOB”



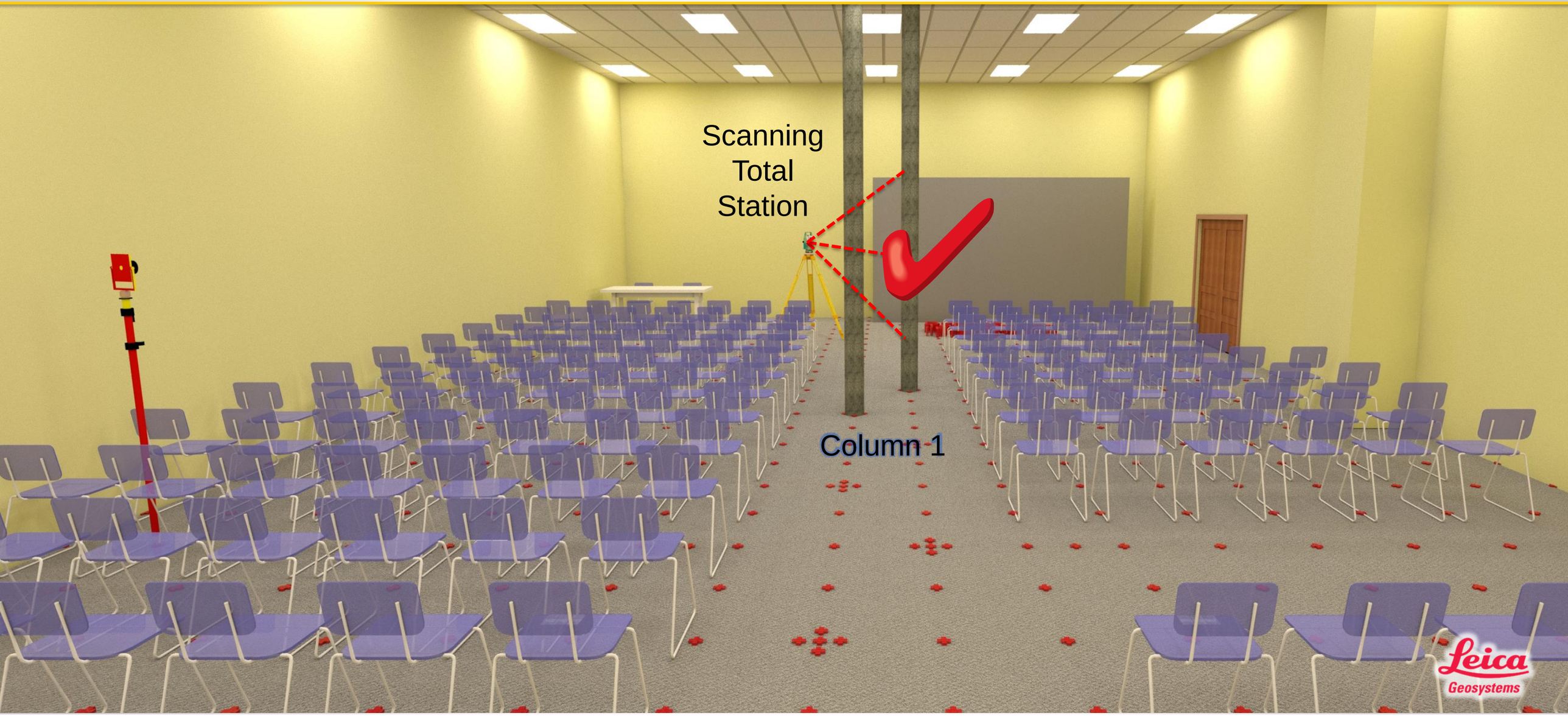
Step 6: Backcheck Column 1 – “BOB”



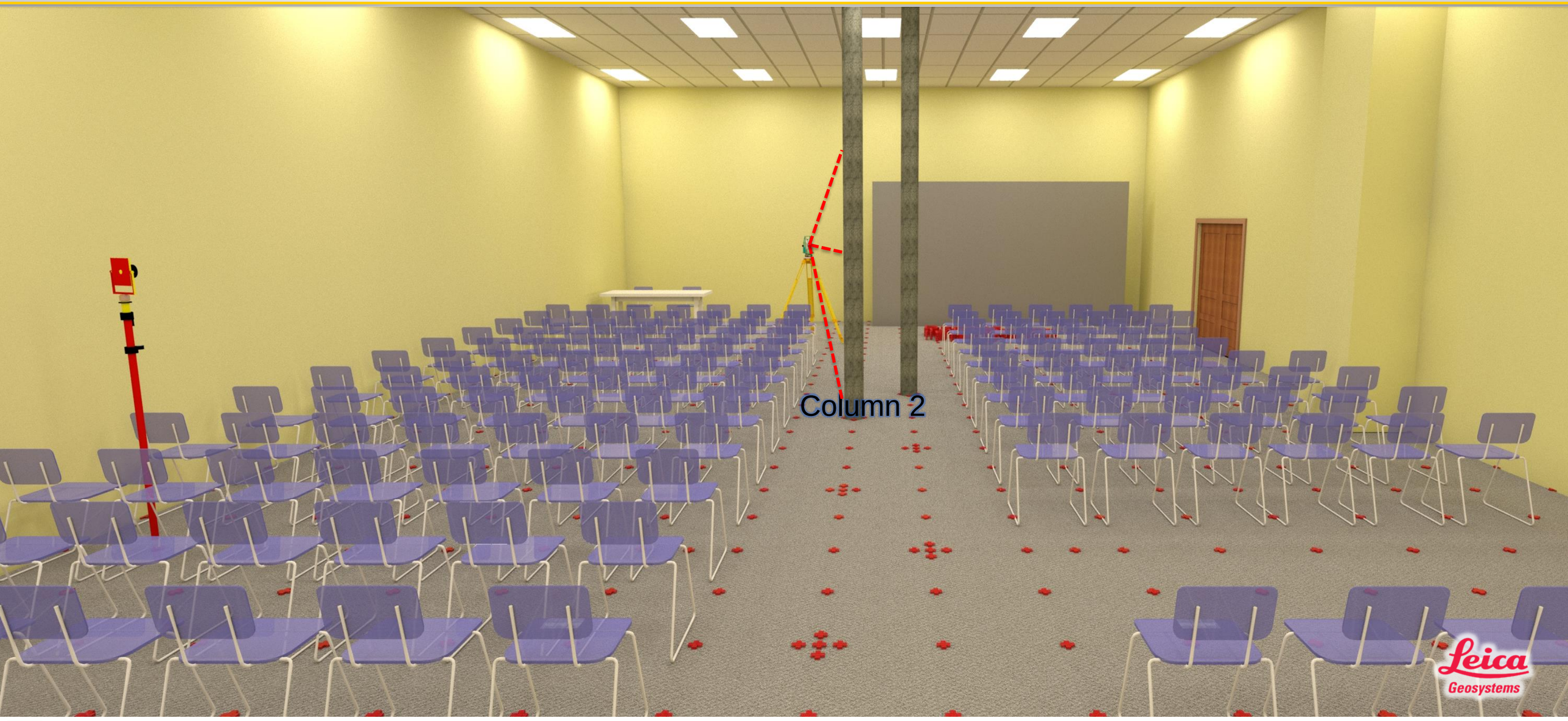
Step 6: Backcheck Column 1 – “BOB”



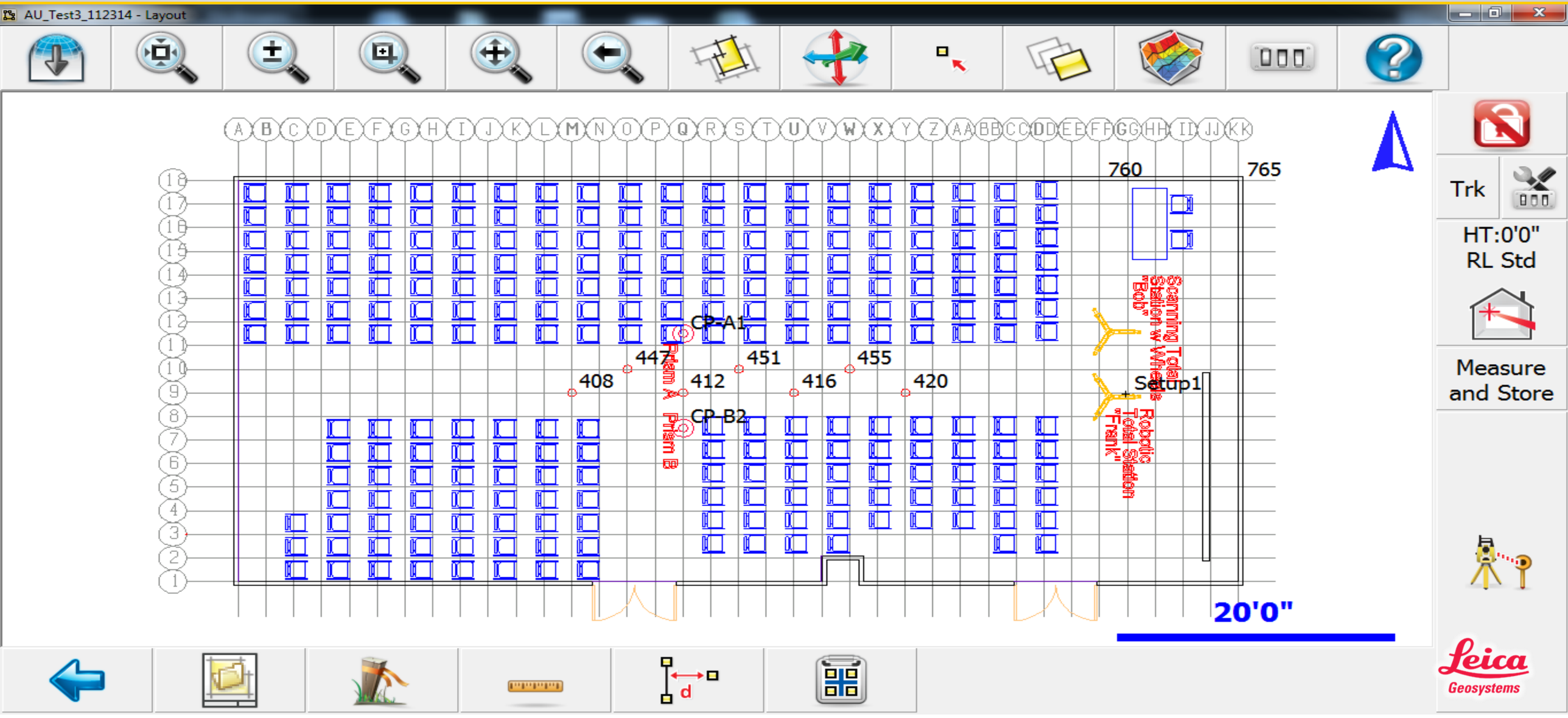
Step 6: Backcheck Column 1 – “BOB”



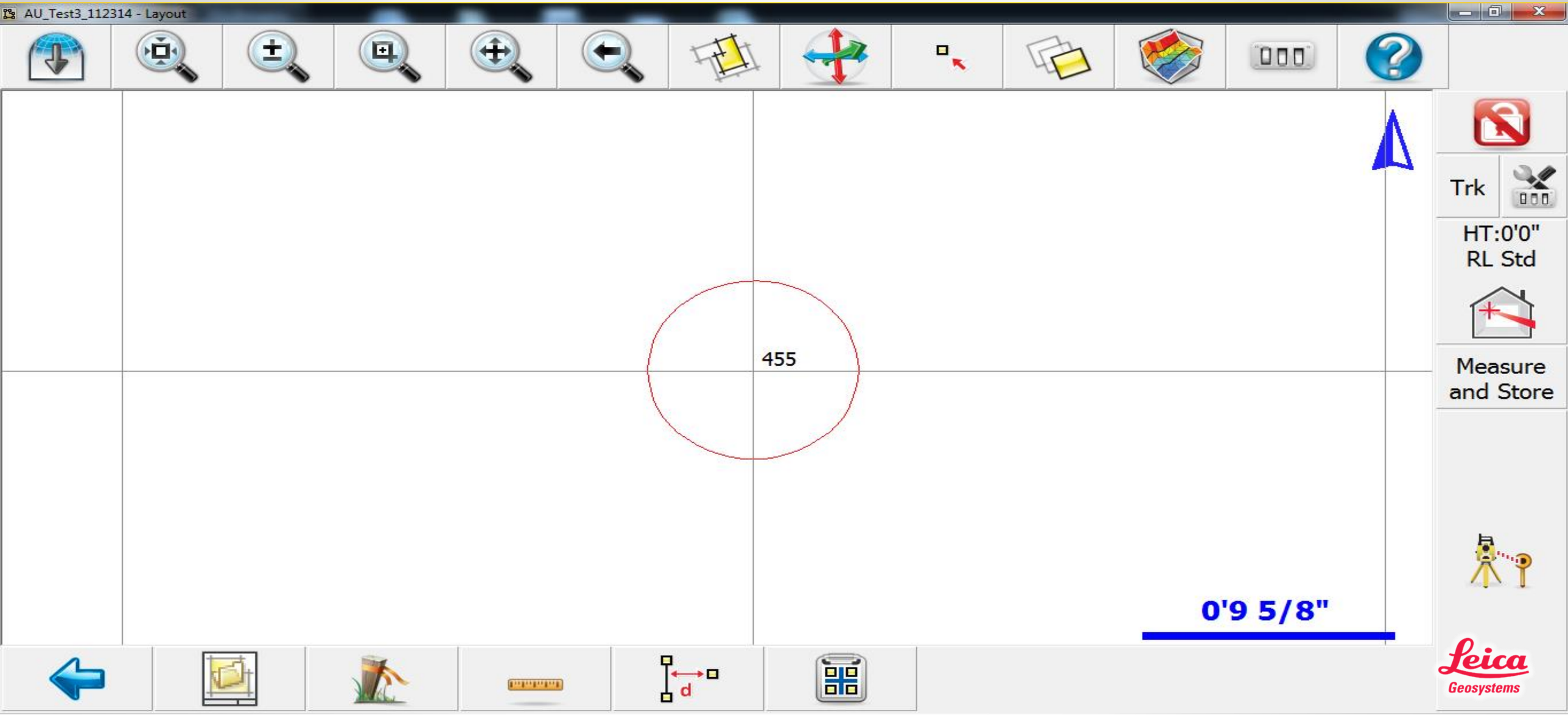
Step 7: Backcheck Column 2 Location



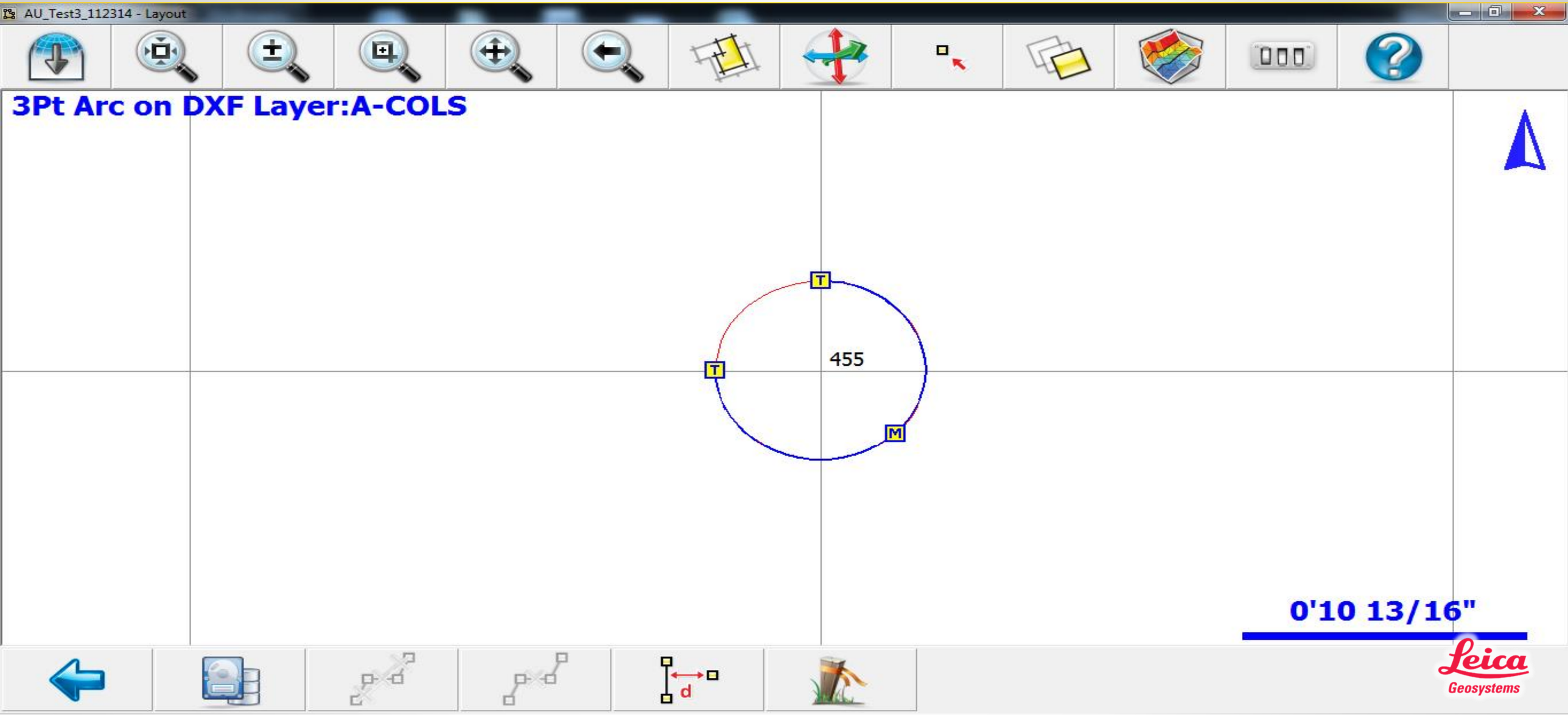
Step 7: Backcheck Column 2 – “BOB”



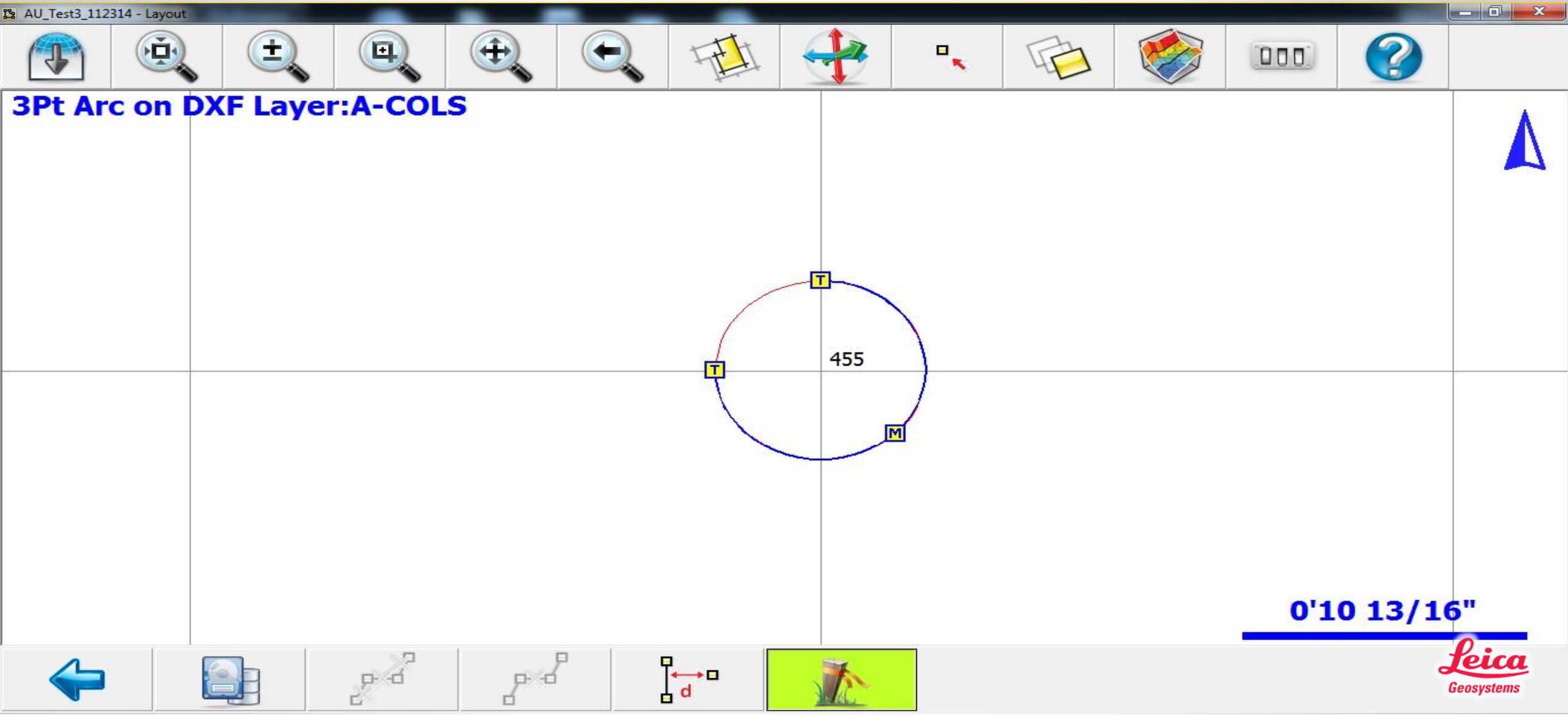
Step 7: Backcheck Column 2 – “BOB”



Step 7: Backcheck Column 2 – “BOB”

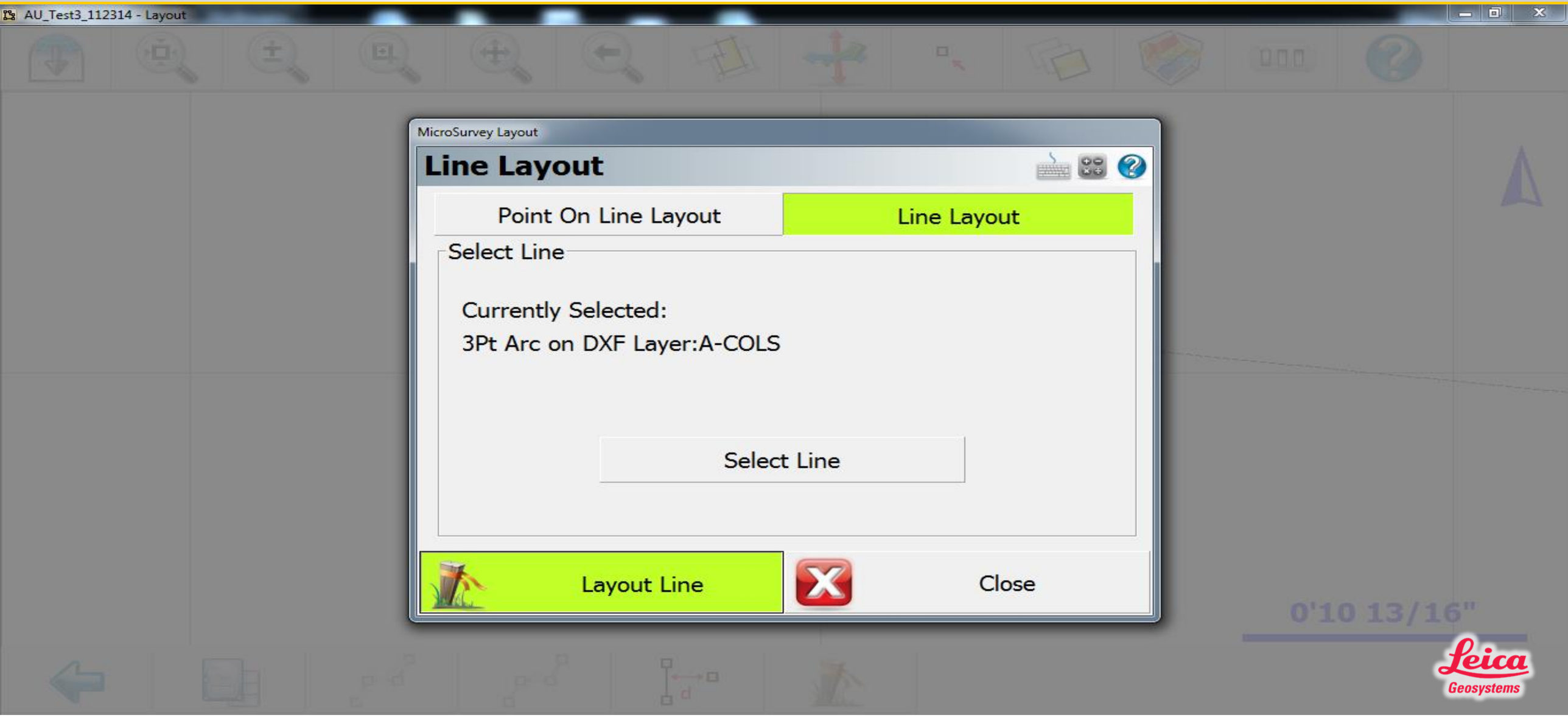


Step 7: Backcheck Column 2 – “BOB”

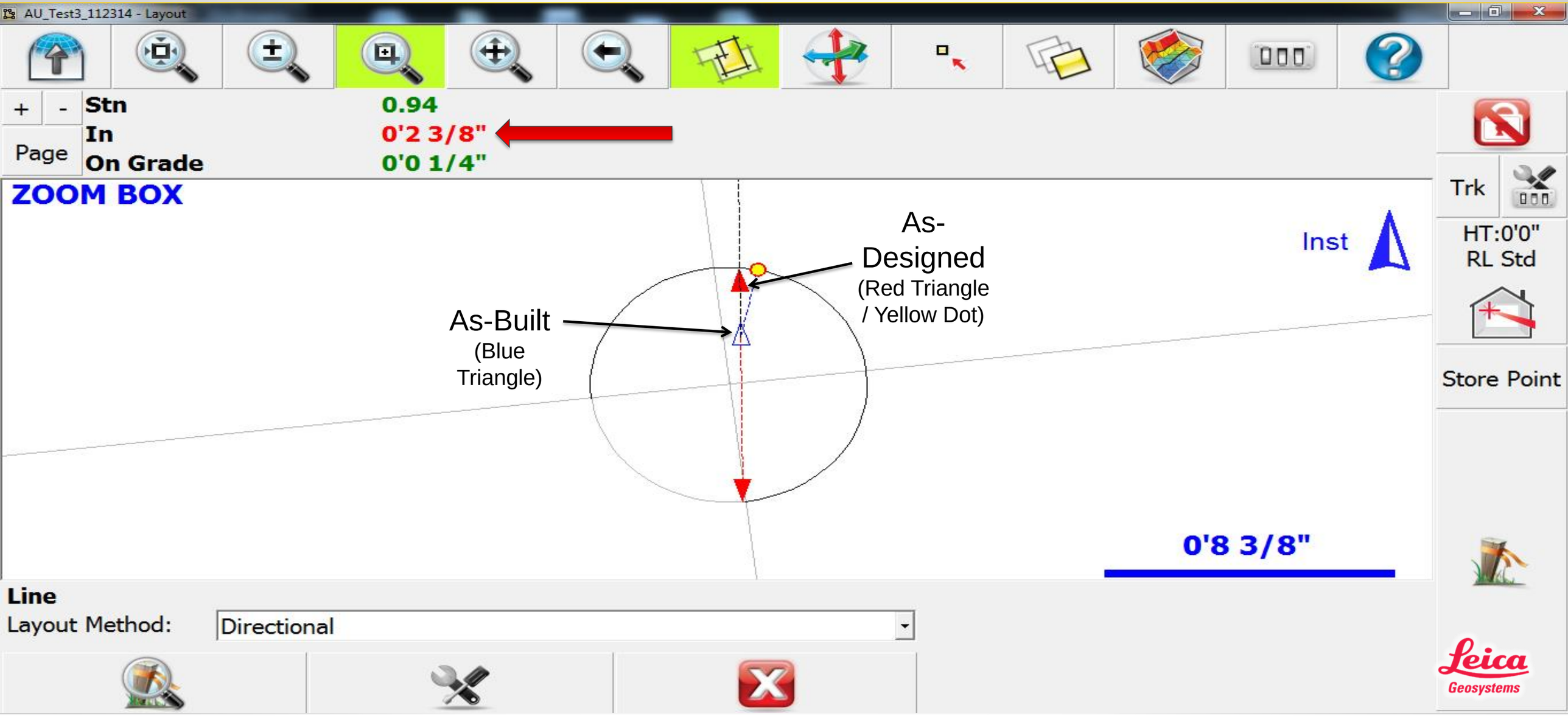


AUTODESK.

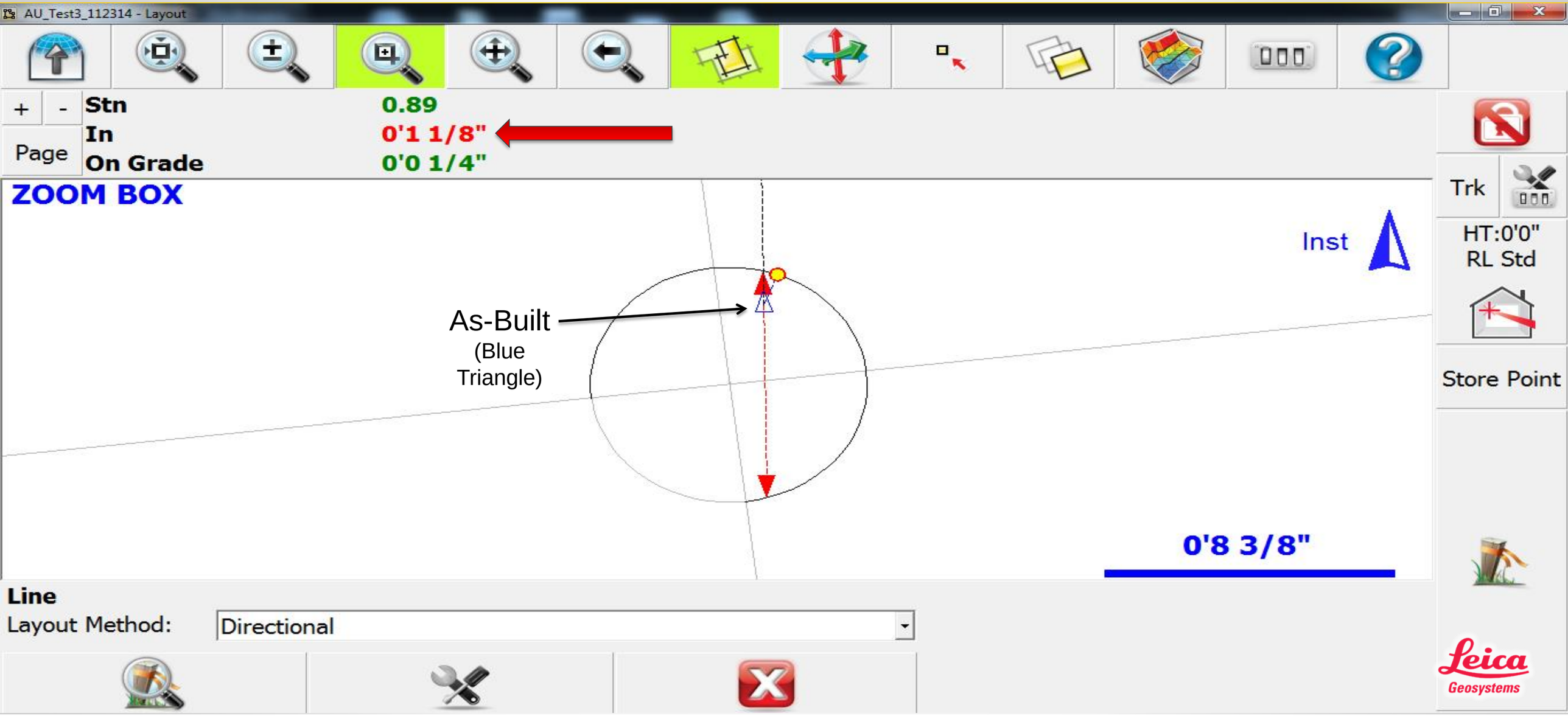
Step 6: Backcheck Column 1 – “BOB”



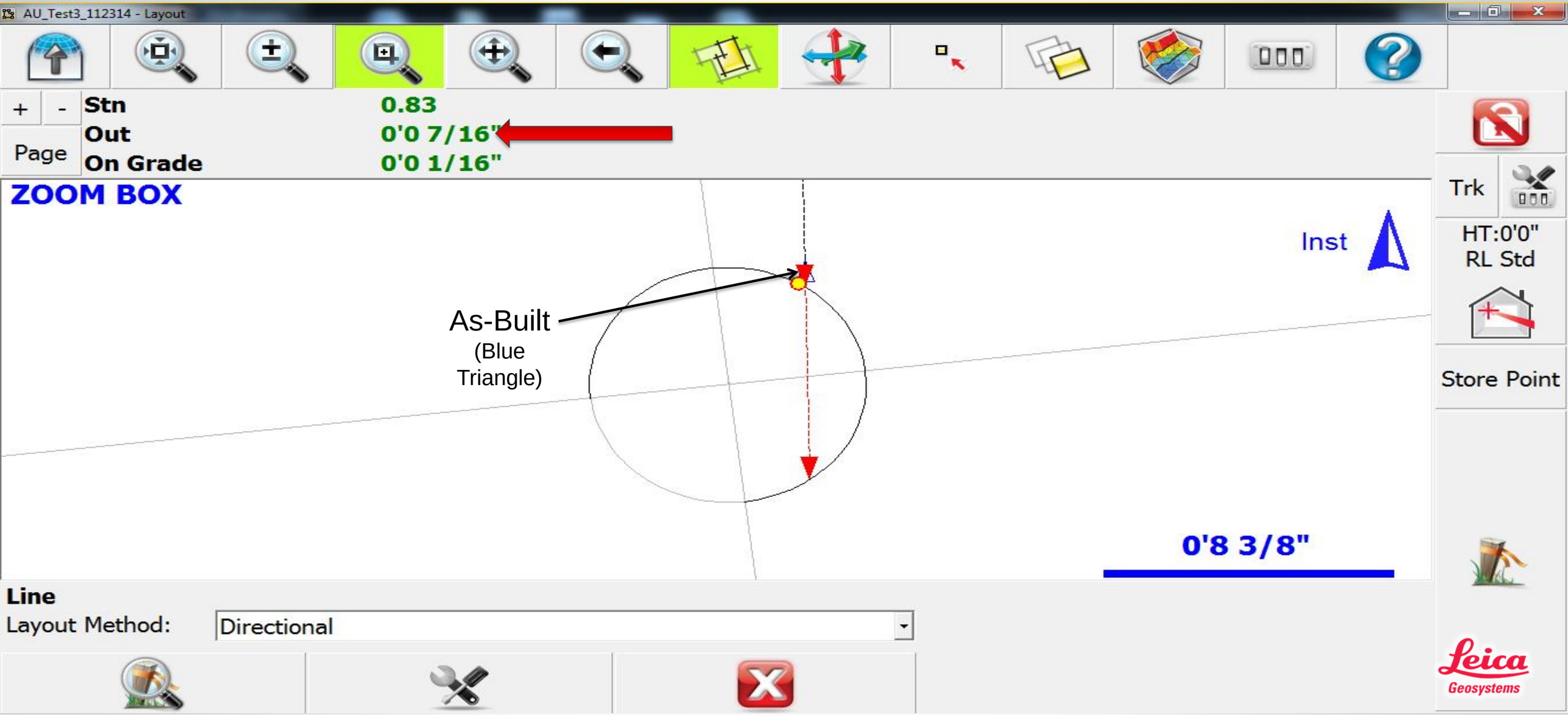
Step 7: Backcheck Column 2 – “BOB”



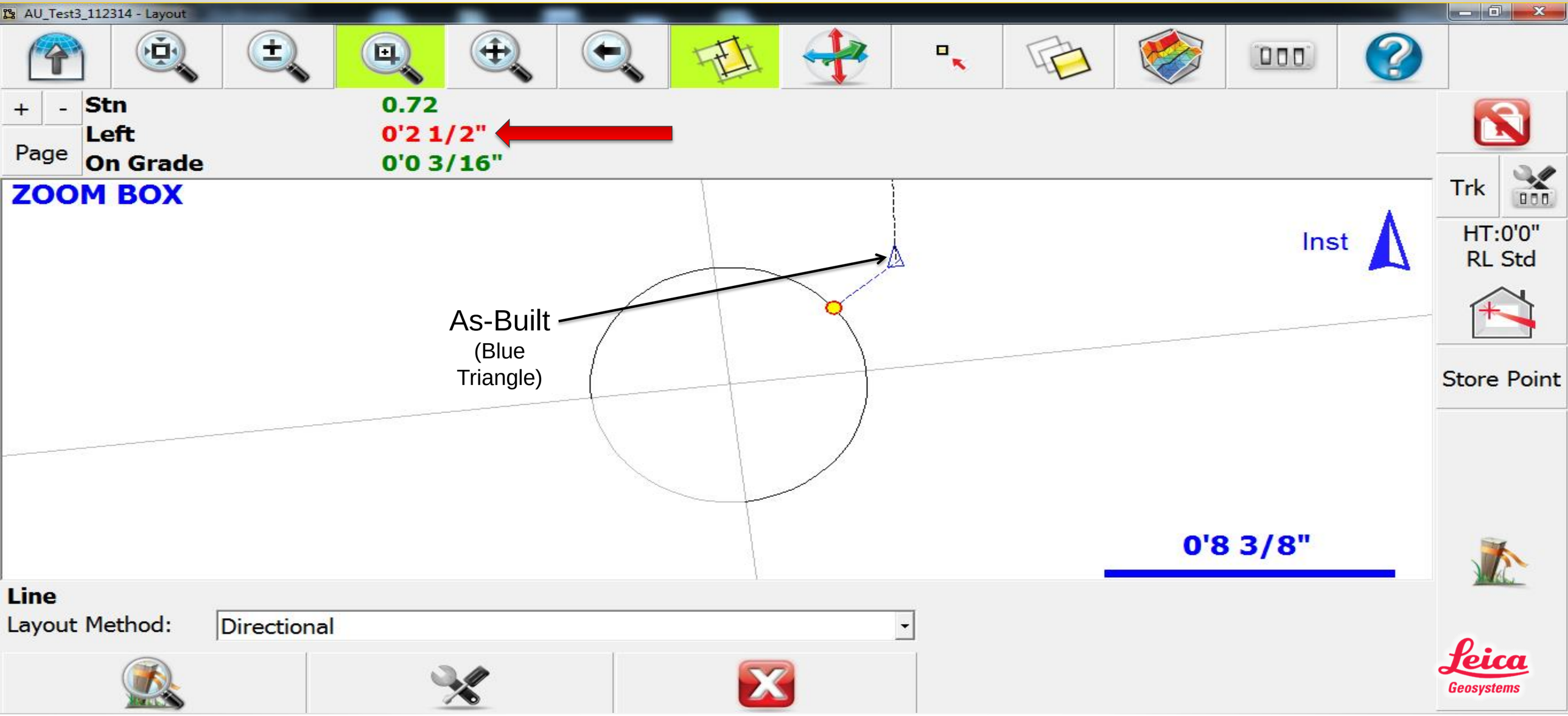
Step 7: Backcheck Column 2 – “BOB”



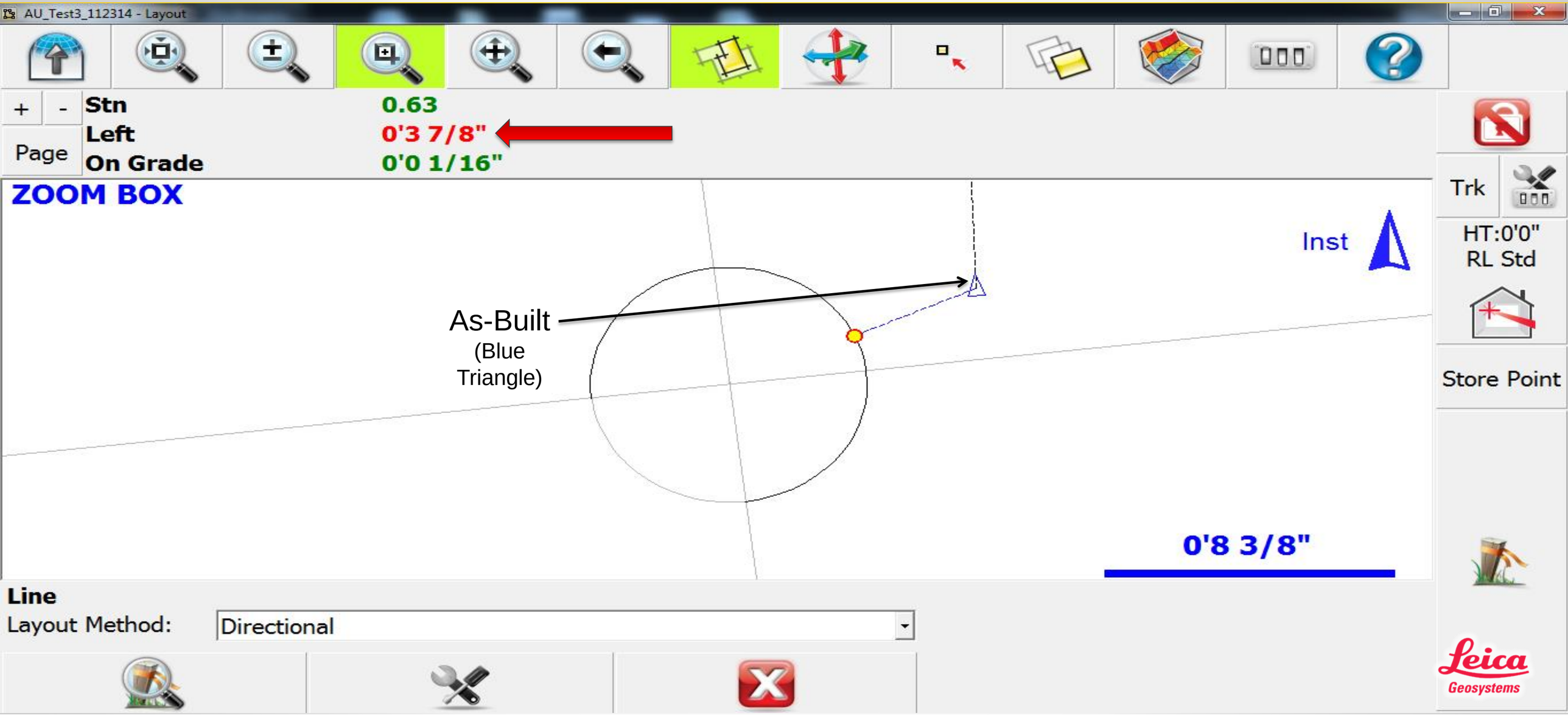
Step 7: Backcheck Column 2 – “BOB”



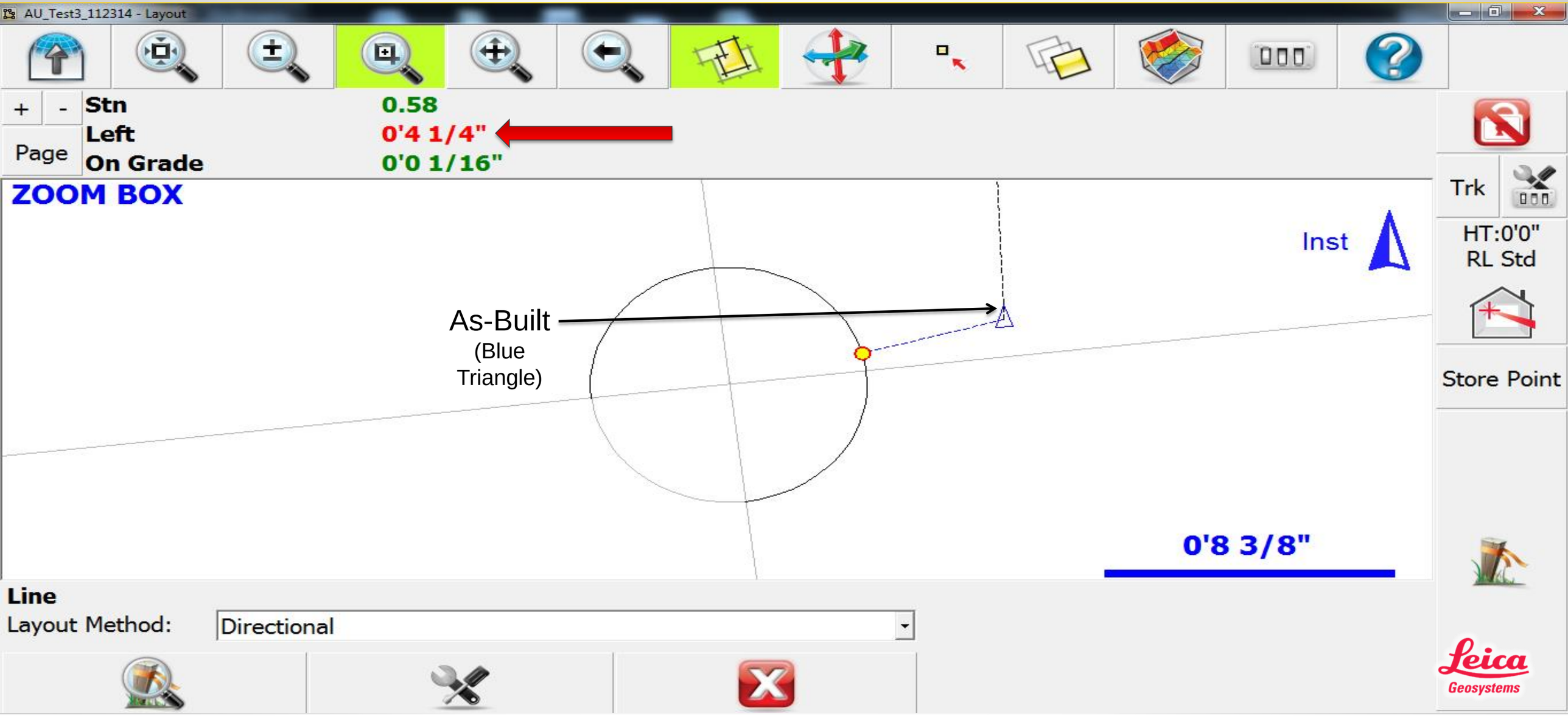
Step 7: Backcheck Column 2 – “BOB”



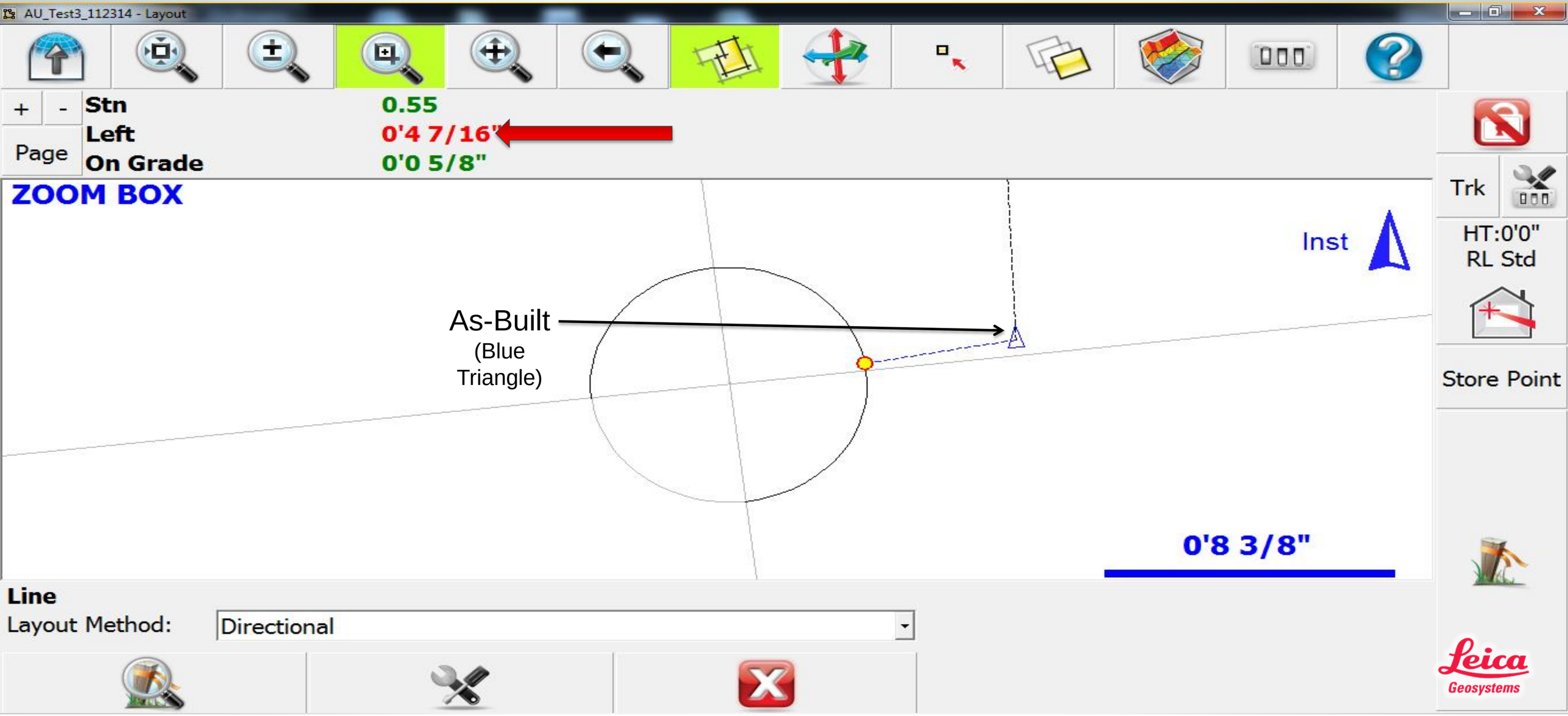
Step 7: Backcheck Column 2 – “BOB”



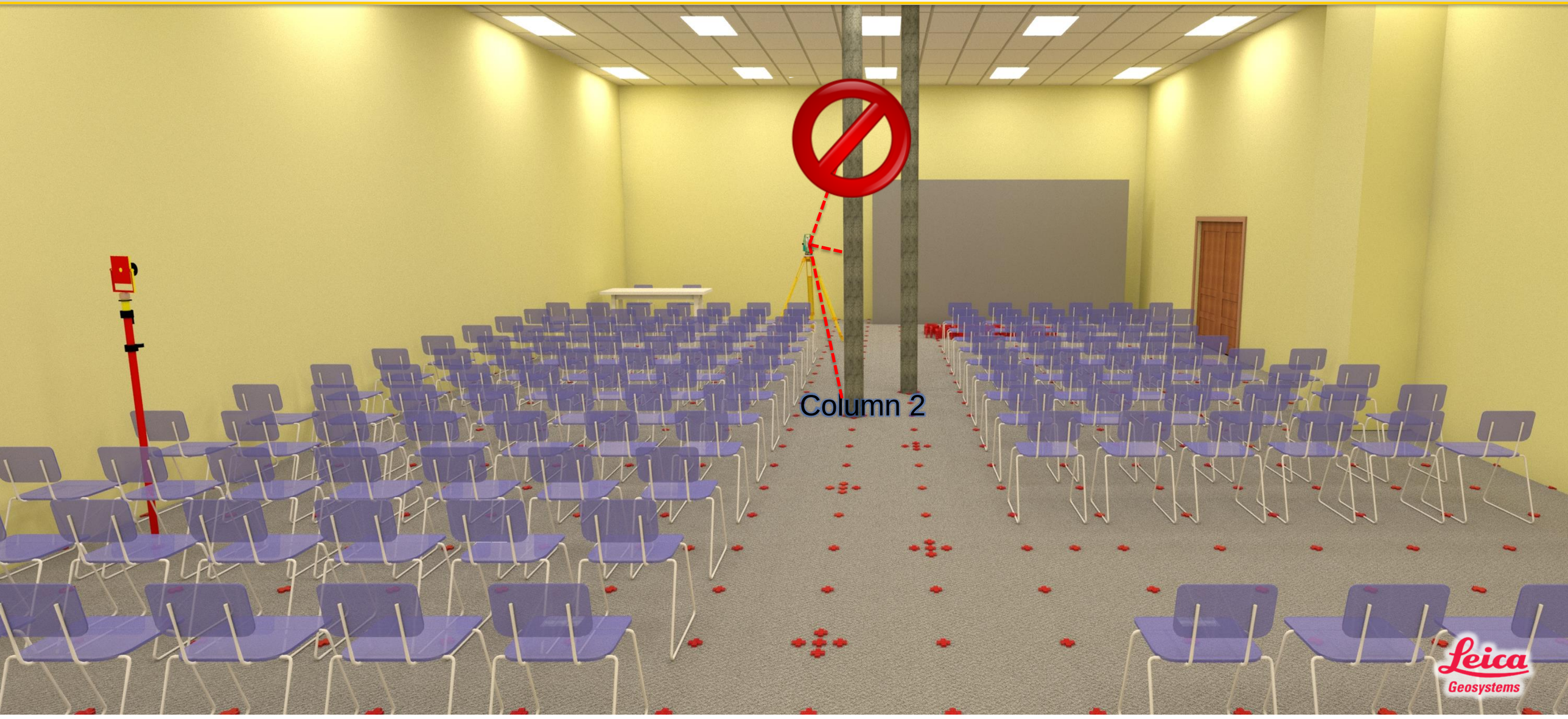
Step 7: Backcheck Column 2 – “BOB”



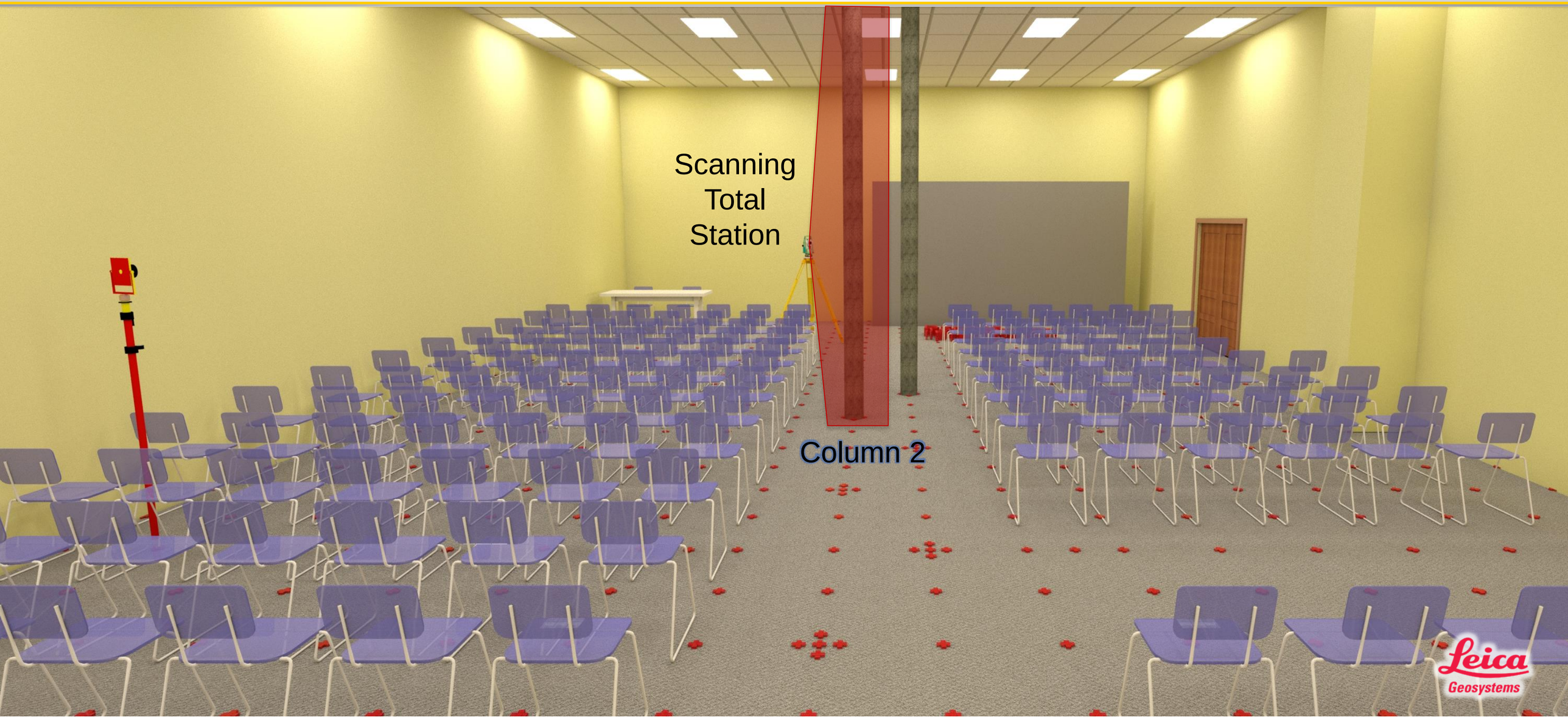
Step 7: Backcheck Column 2 – “BOB”



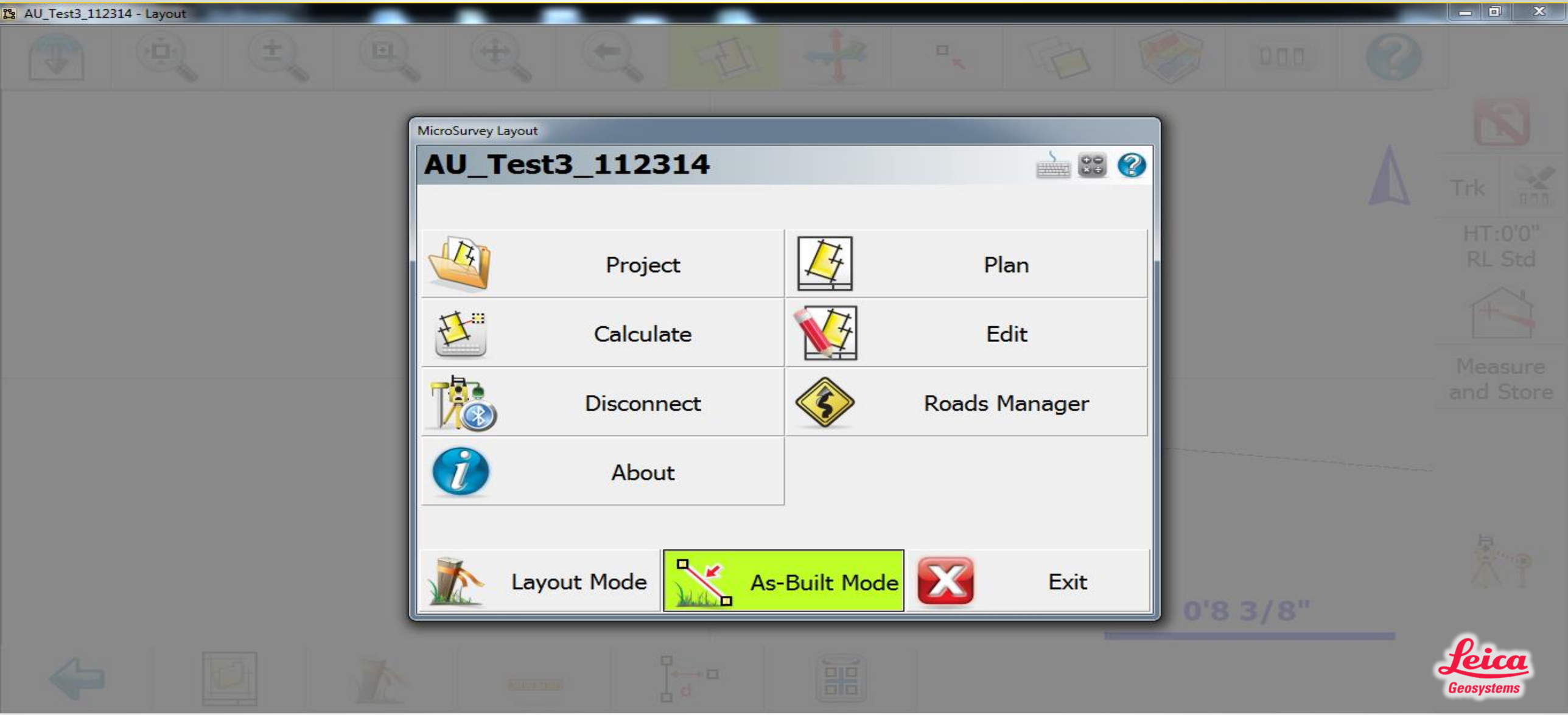
Step 7: Backcheck Column 2 Location



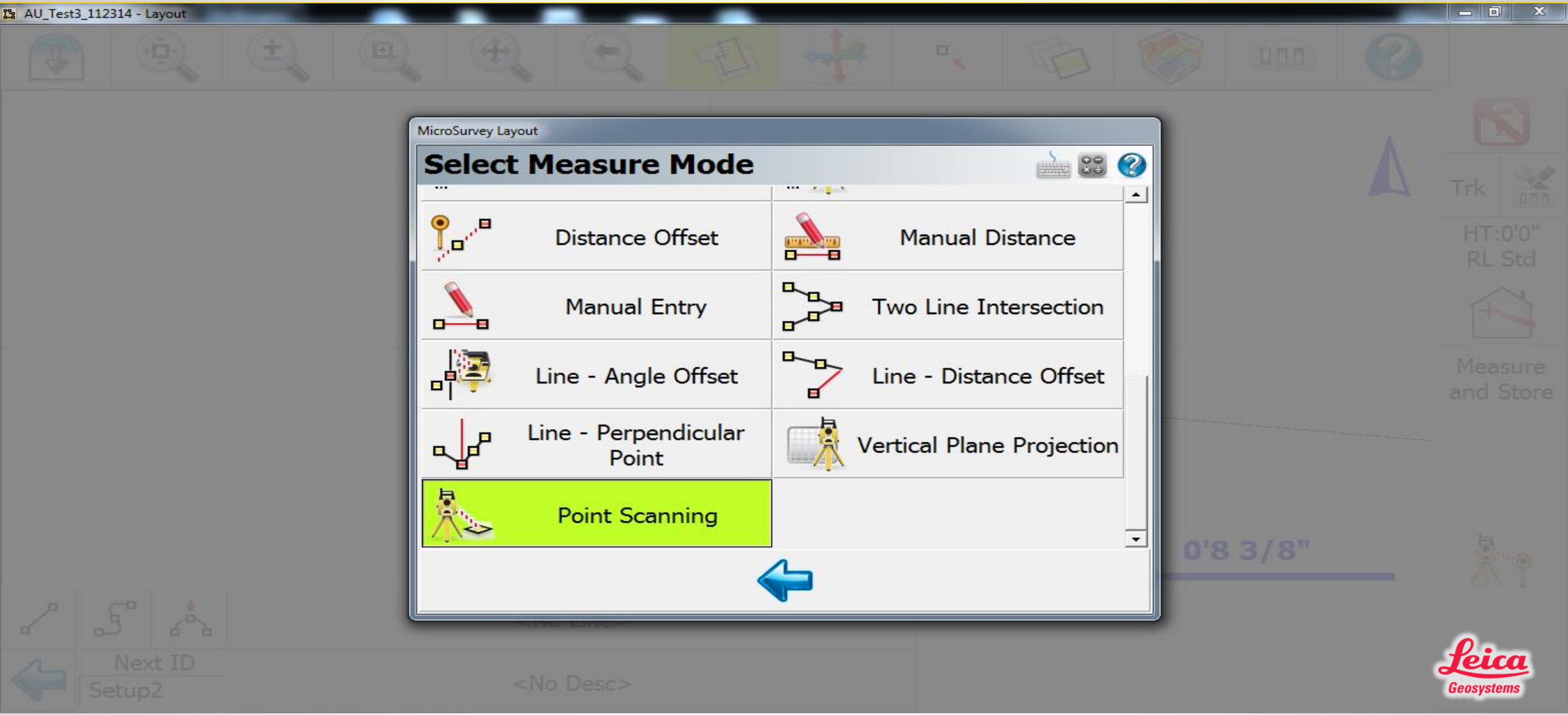
Step 8: Scan Column 2



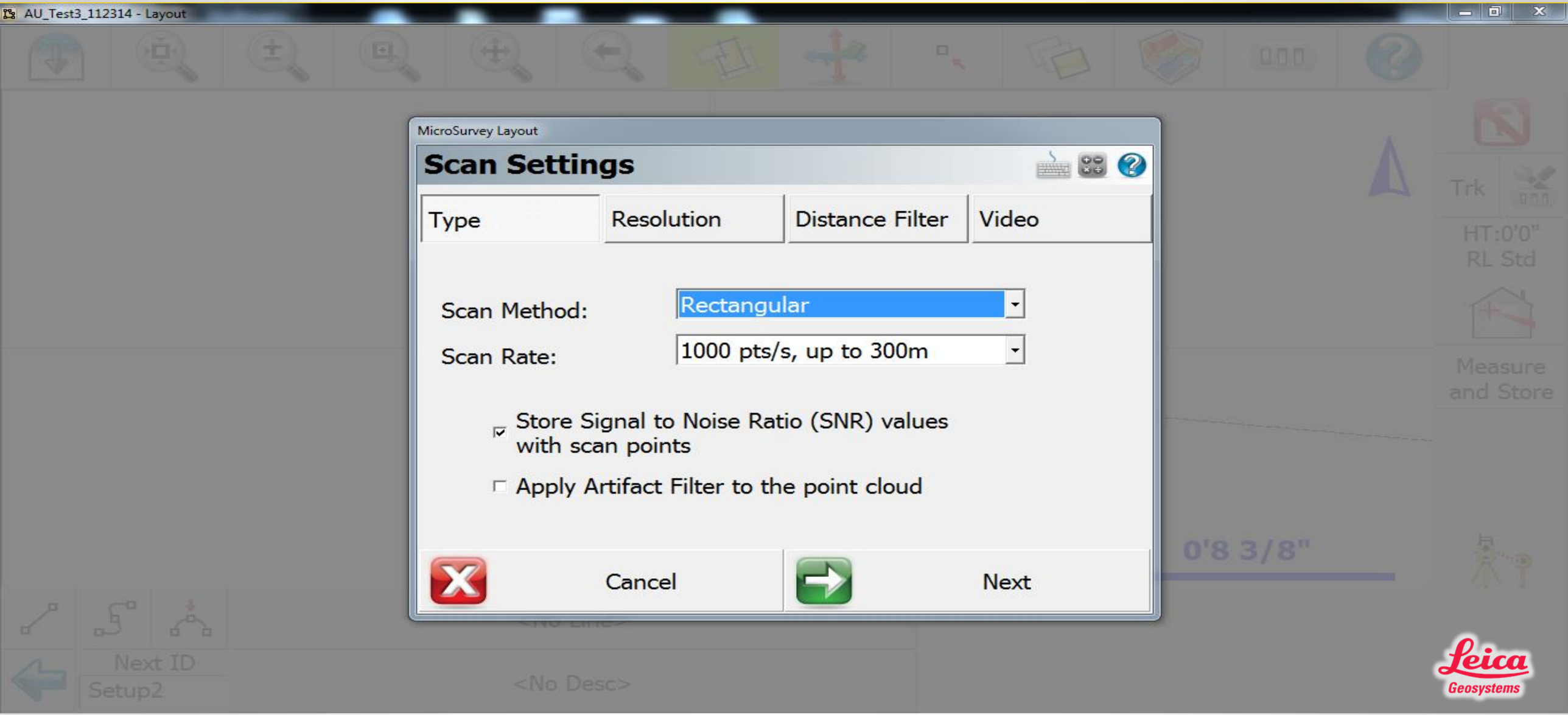
Step 8: Scan and Roundtrip Data



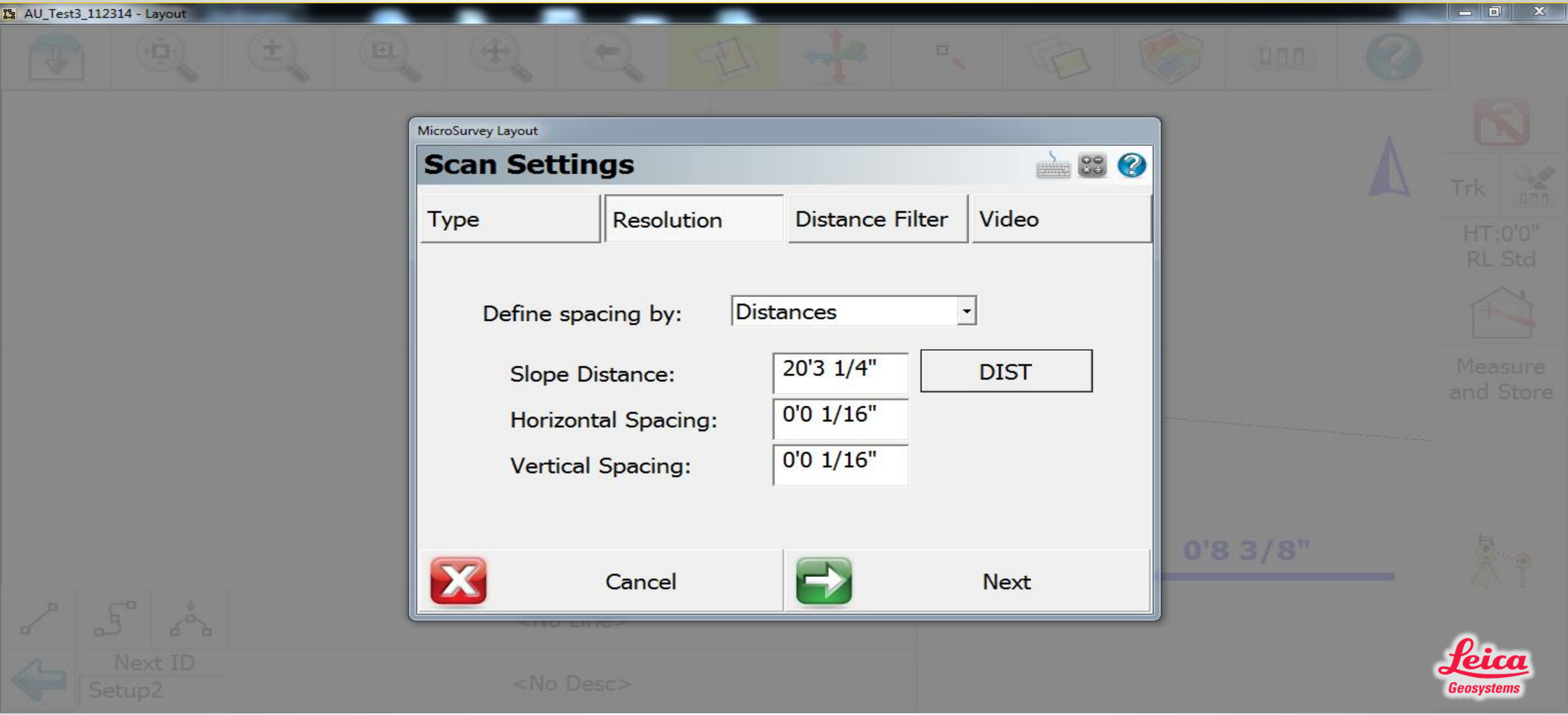
Step 8: Scan and Roundtrip Data



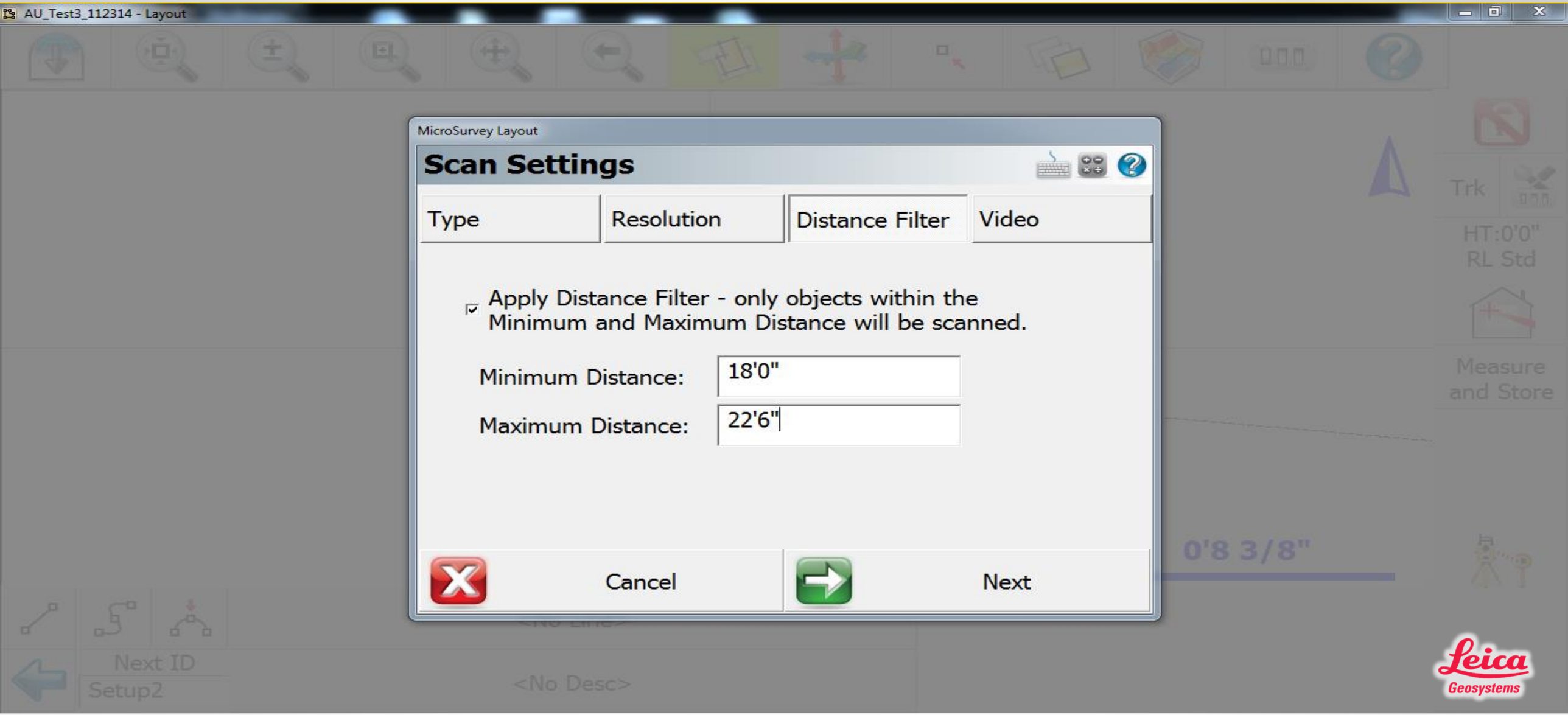
Step 8: Scan and Roundtrip Data



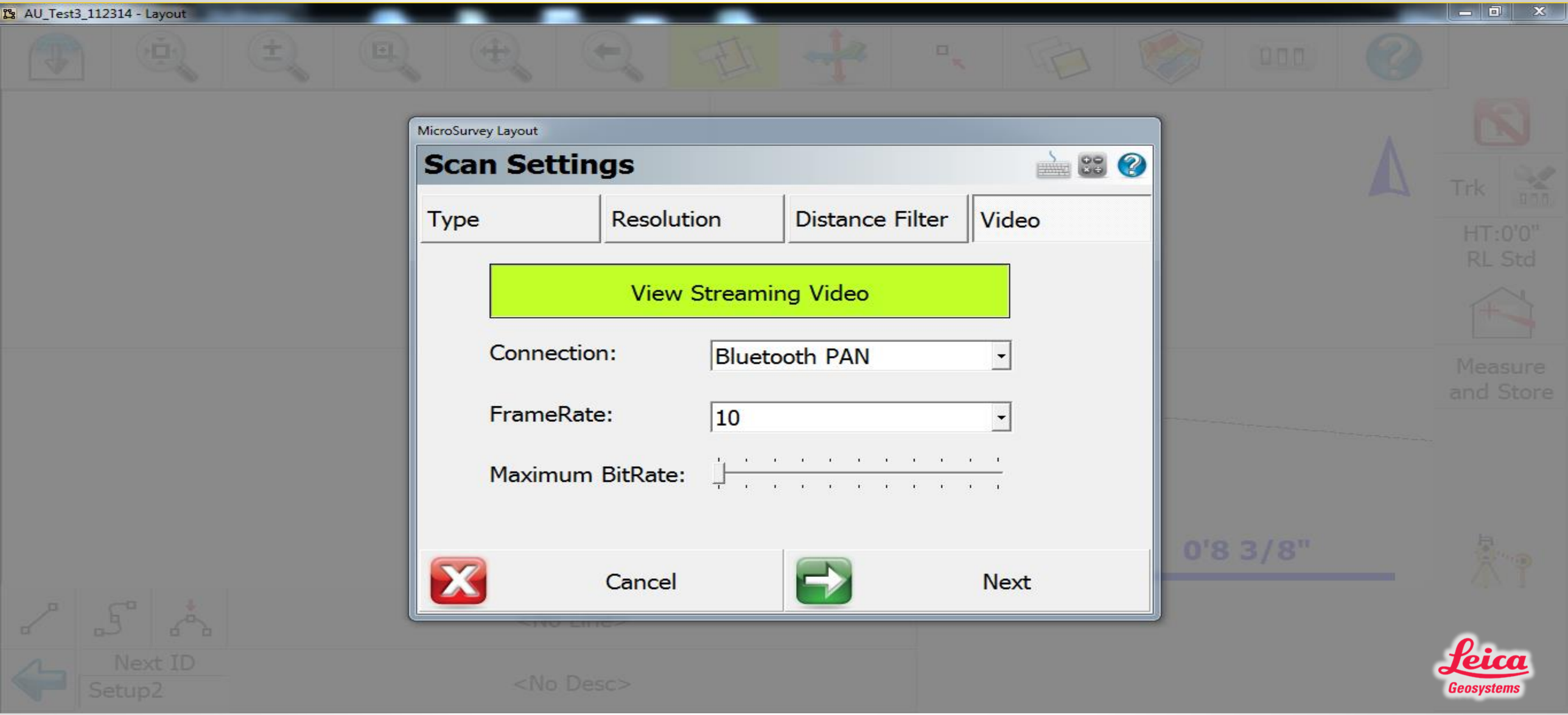
Step 8: Scan and Roundtrip Data



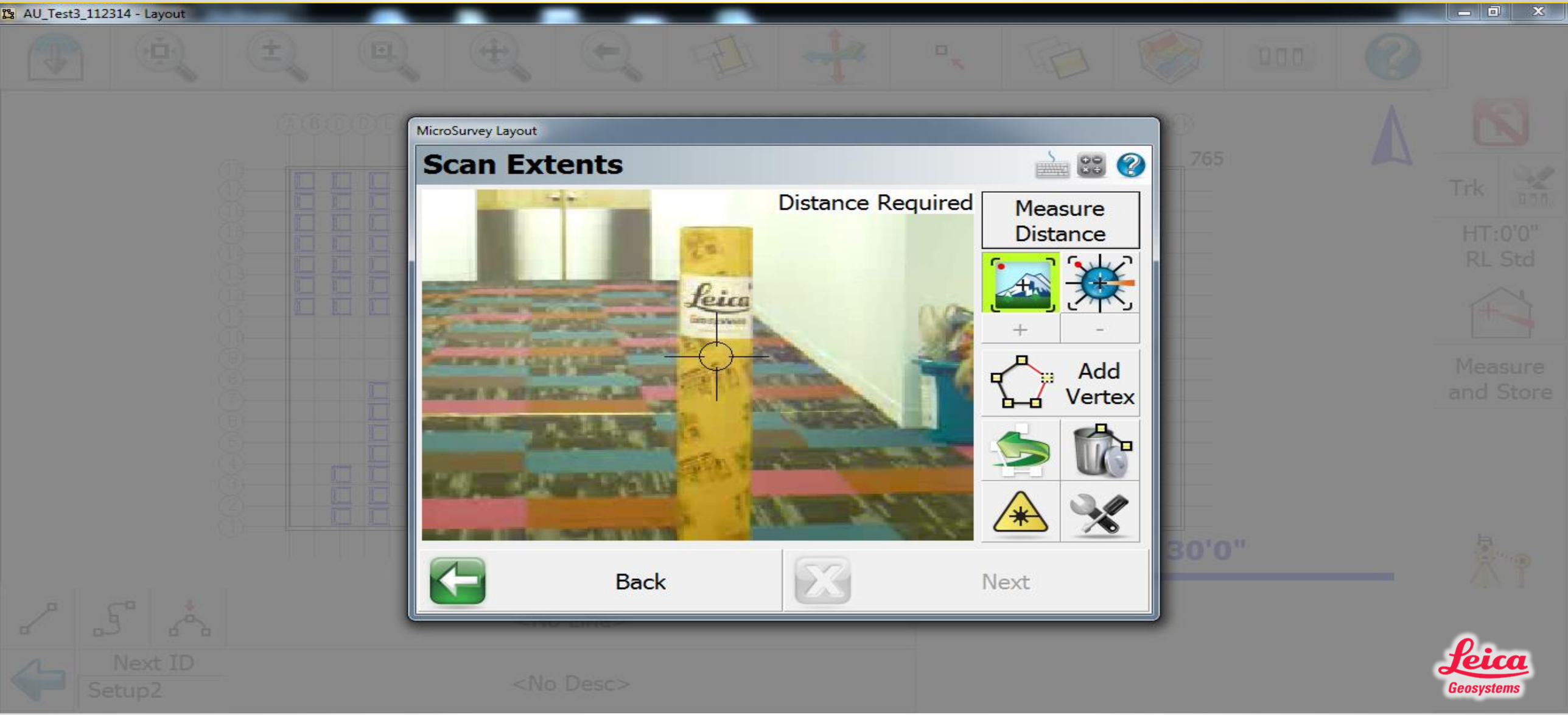
Step 8: Scan and Roundtrip Data



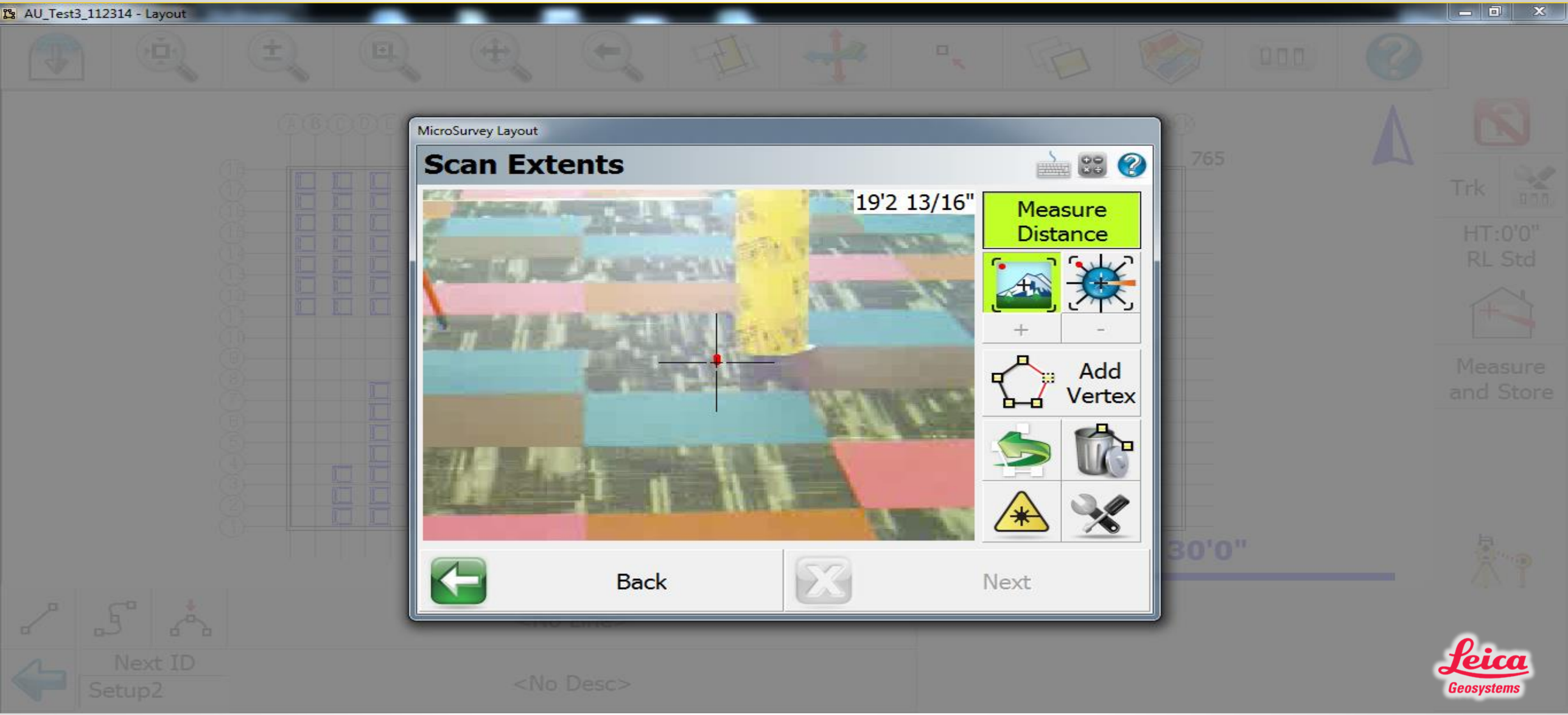
Step 8: Scan and Roundtrip Data



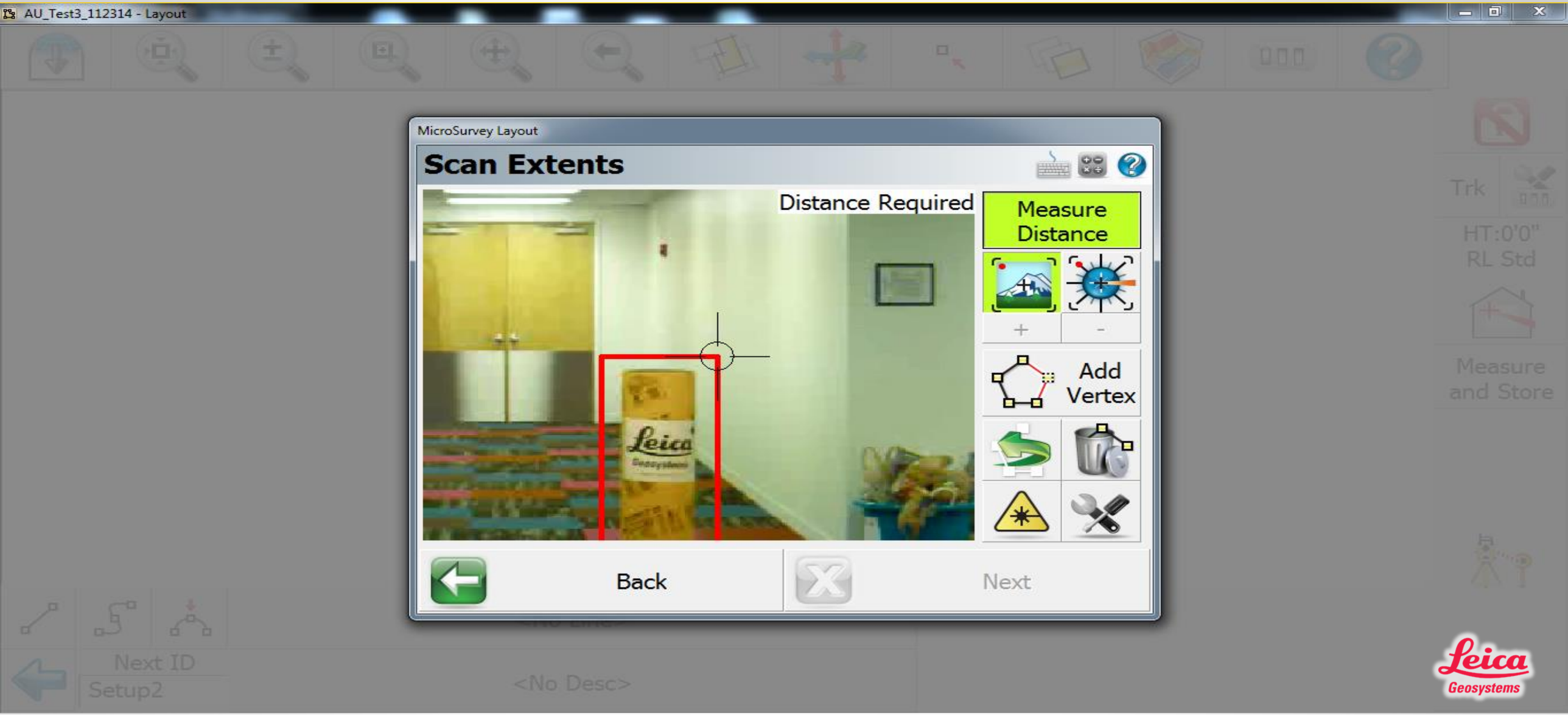
Step 8: Scan and Roundtrip Data



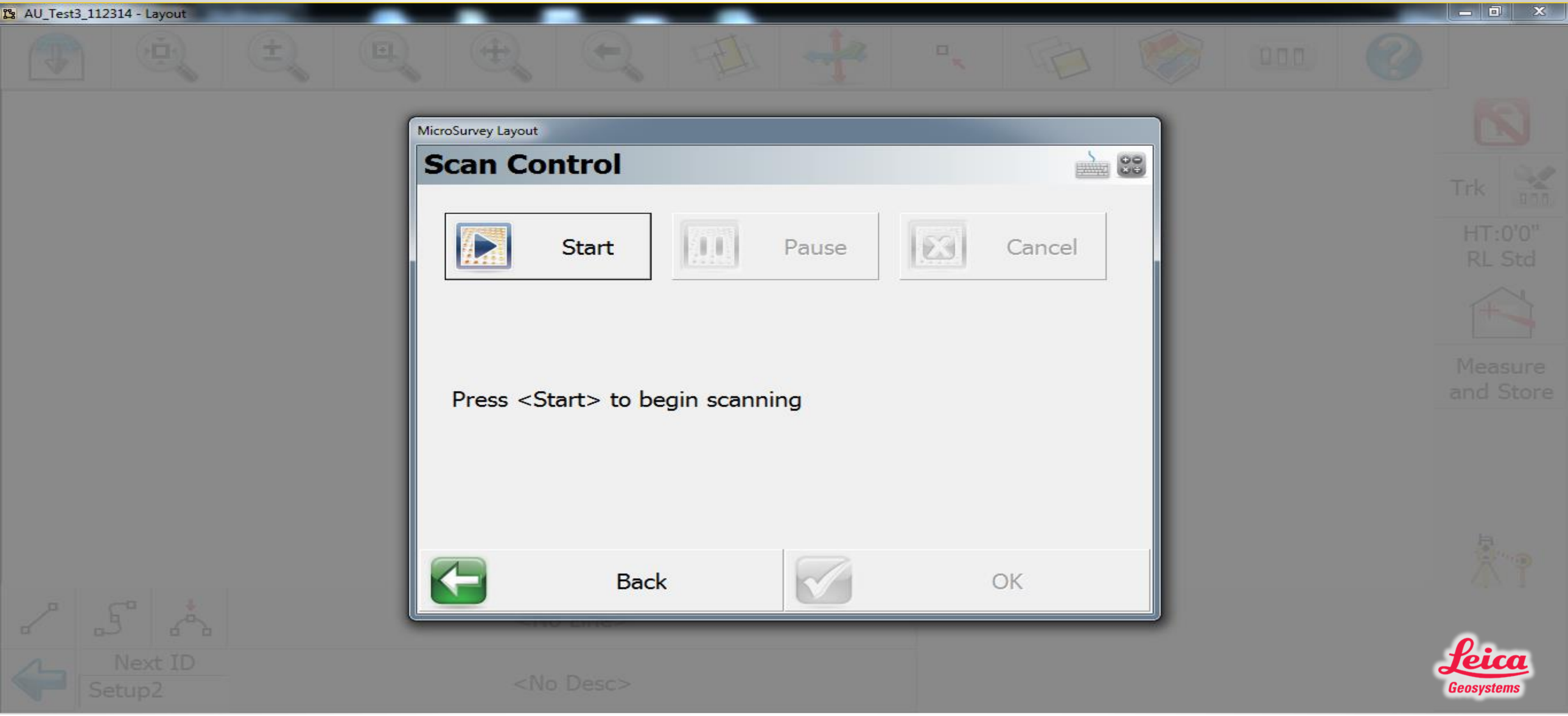
Step 8: Scan and Roundtrip Data



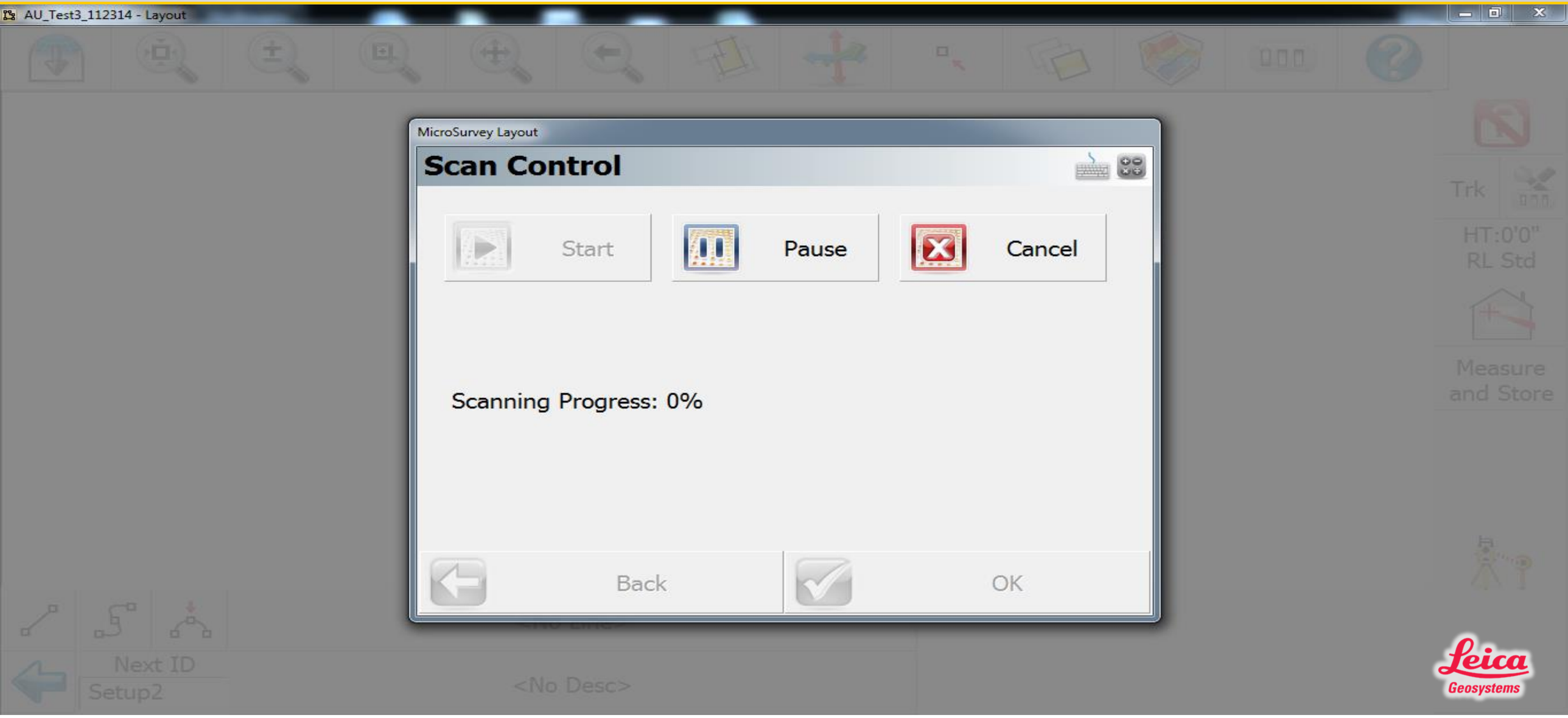
Step 8: Scan and Roundtrip Data



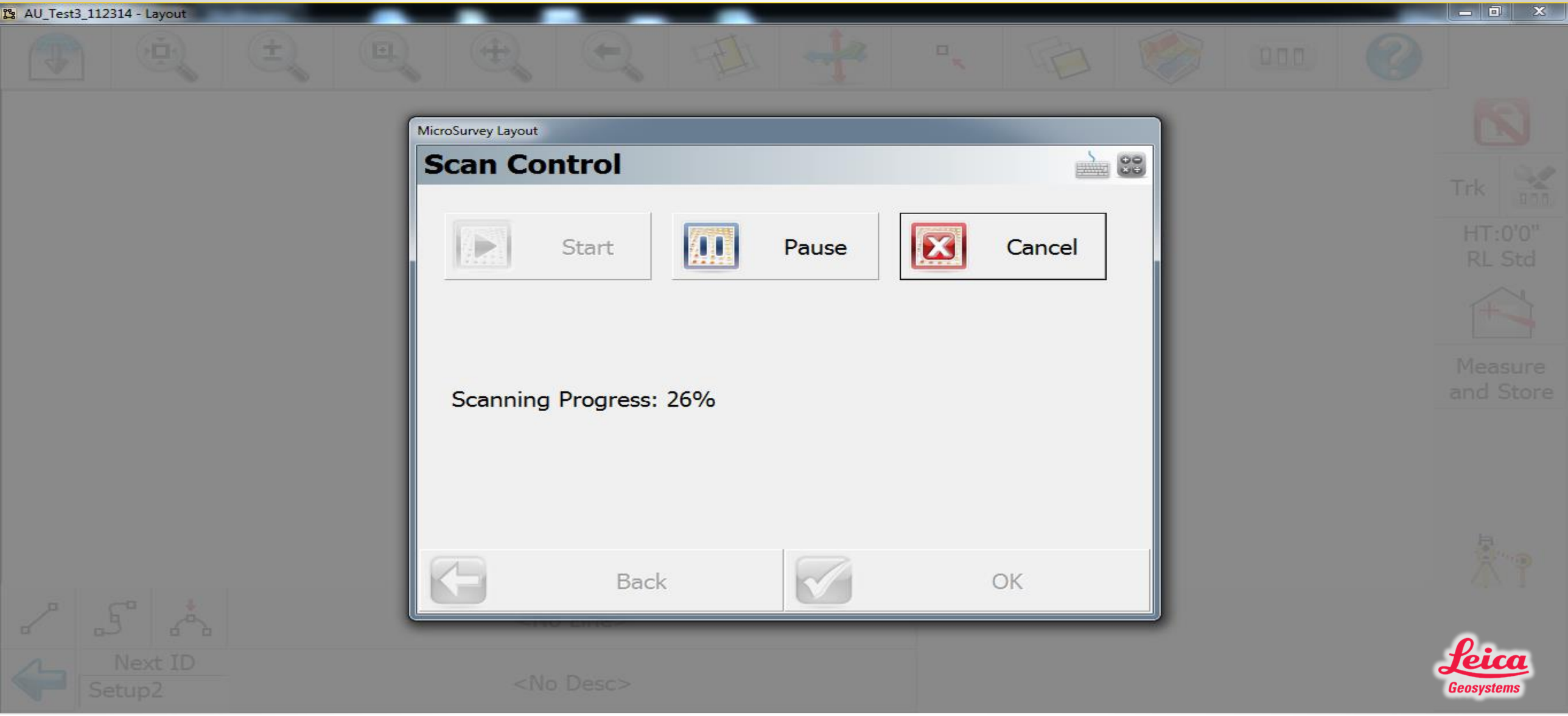
Step 8: Scan and Roundtrip Data



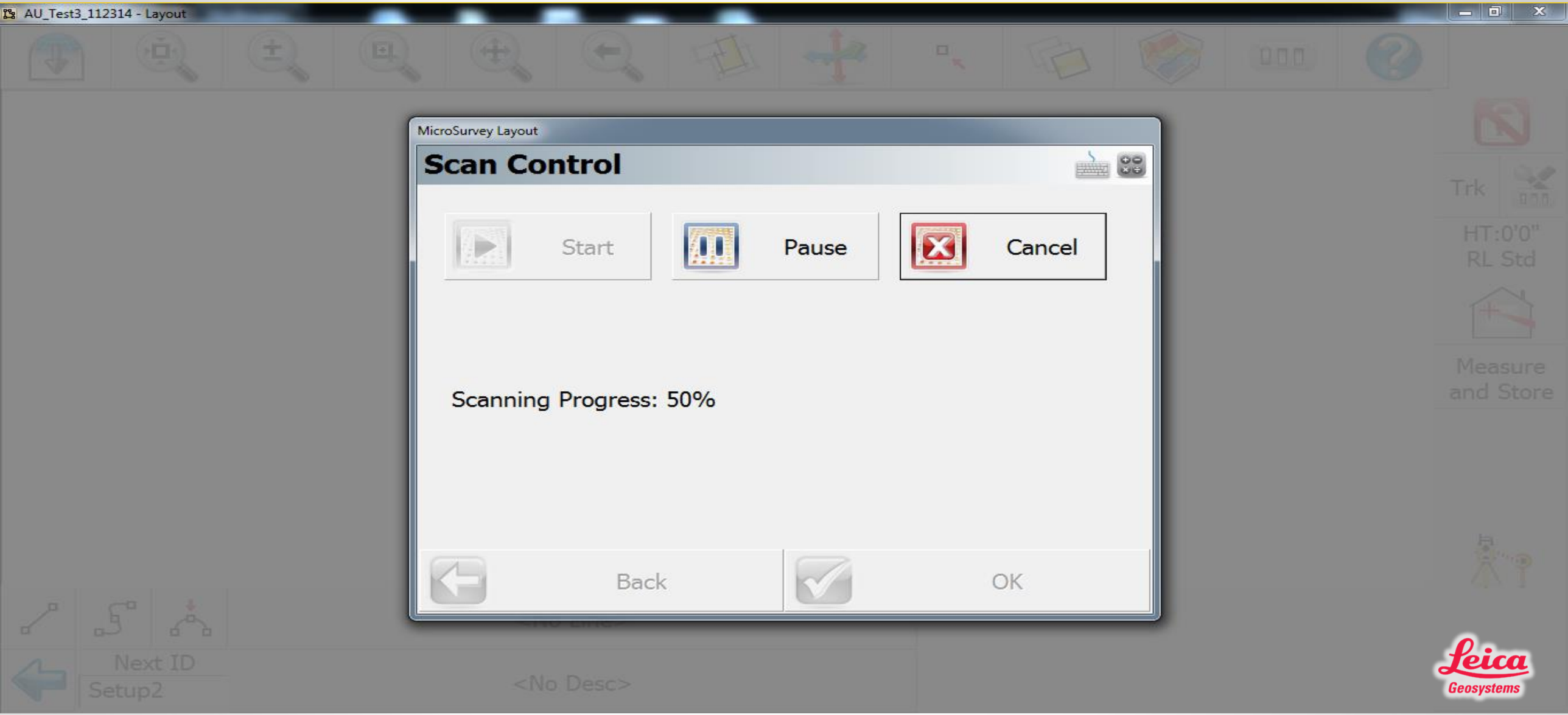
Step 8: Scan and Roundtrip Data



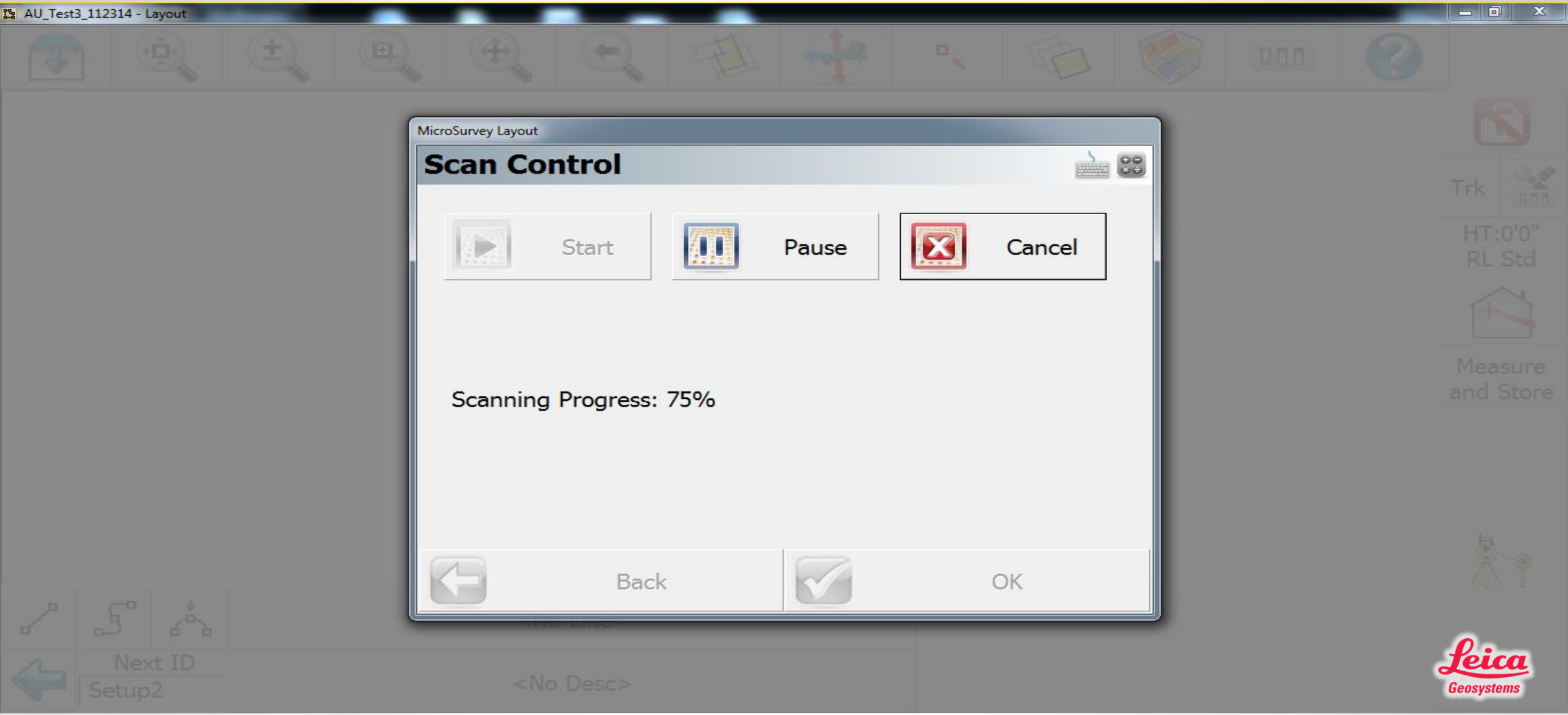
Step 8: Scan and Roundtrip Data



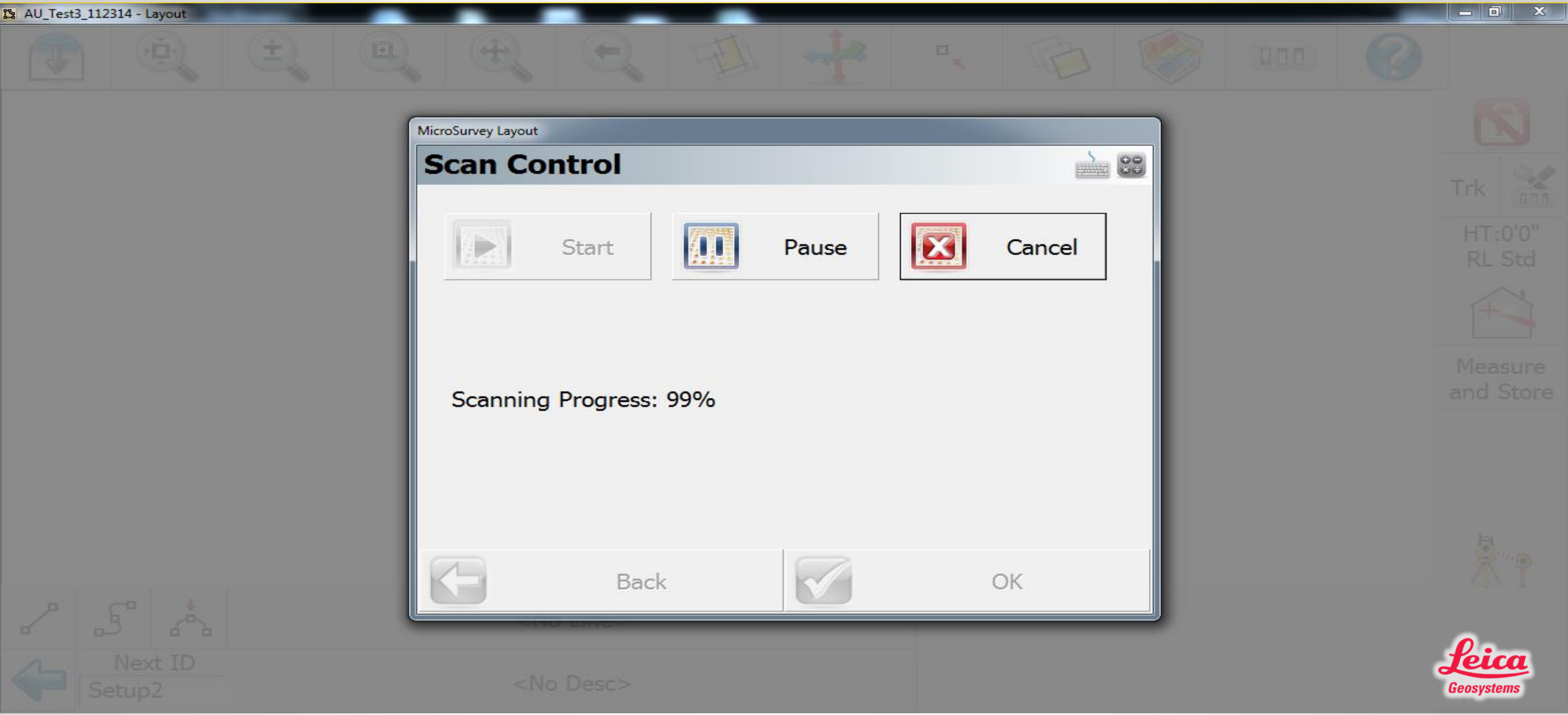
Step 8: Scan and Roundtrip Data



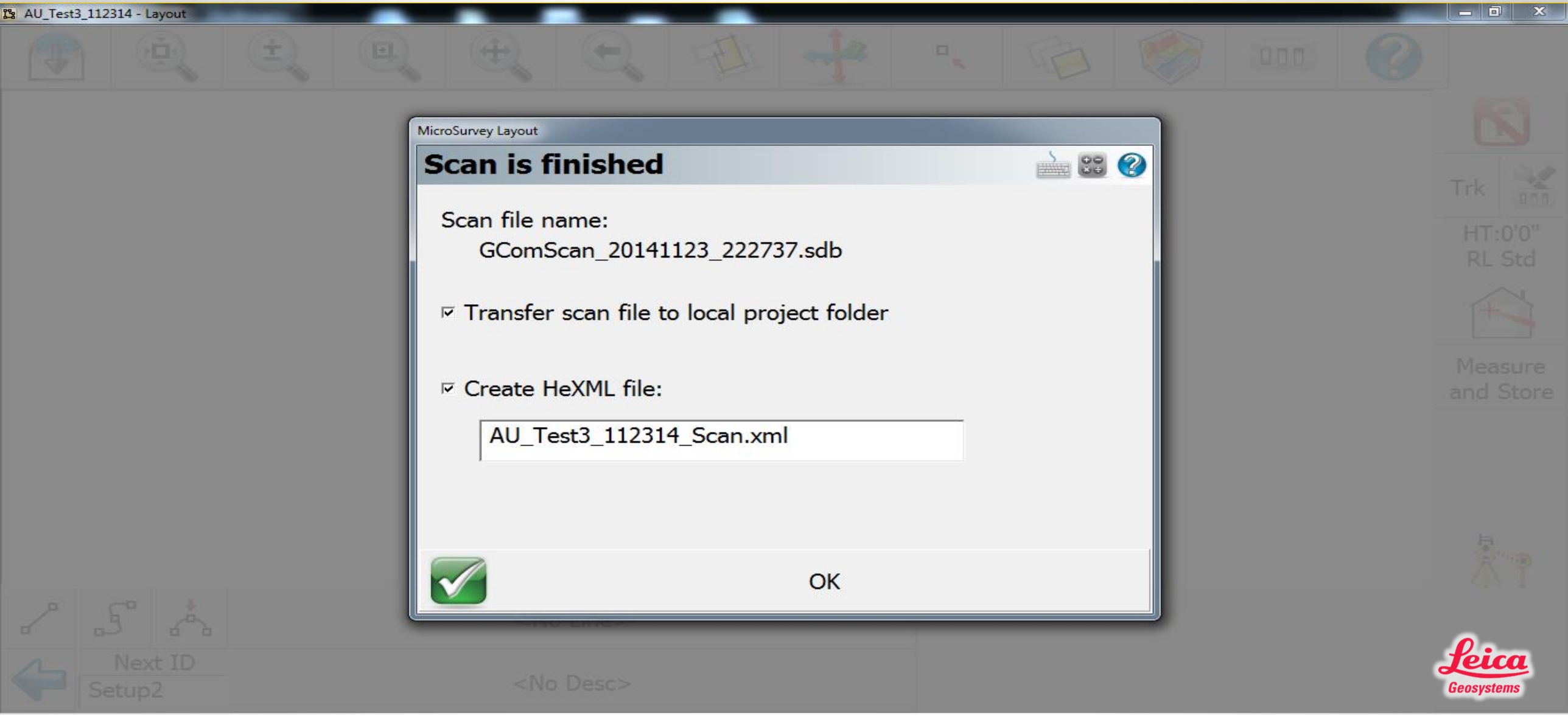
Step 8: Scan and Roundtrip Data



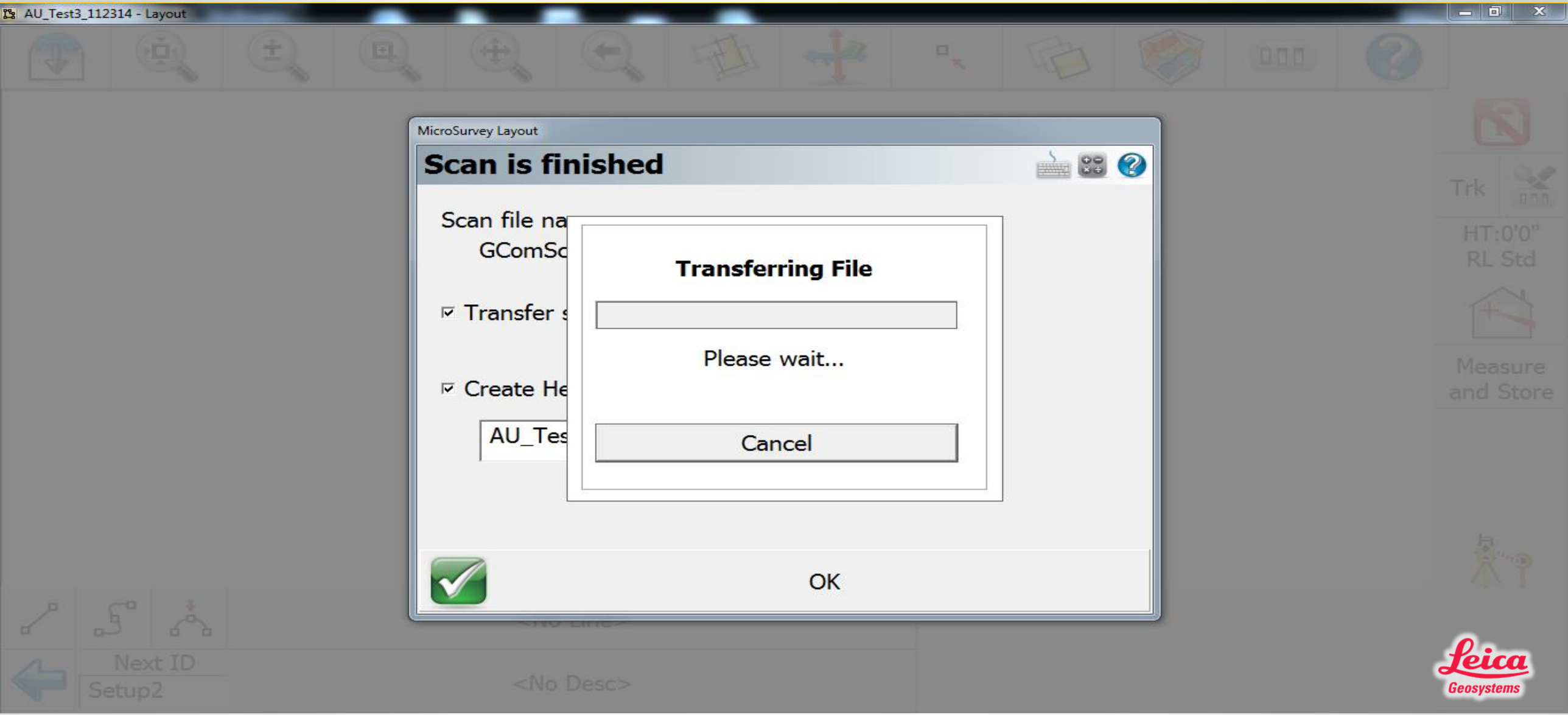
Step 8: Scan and Roundtrip Data



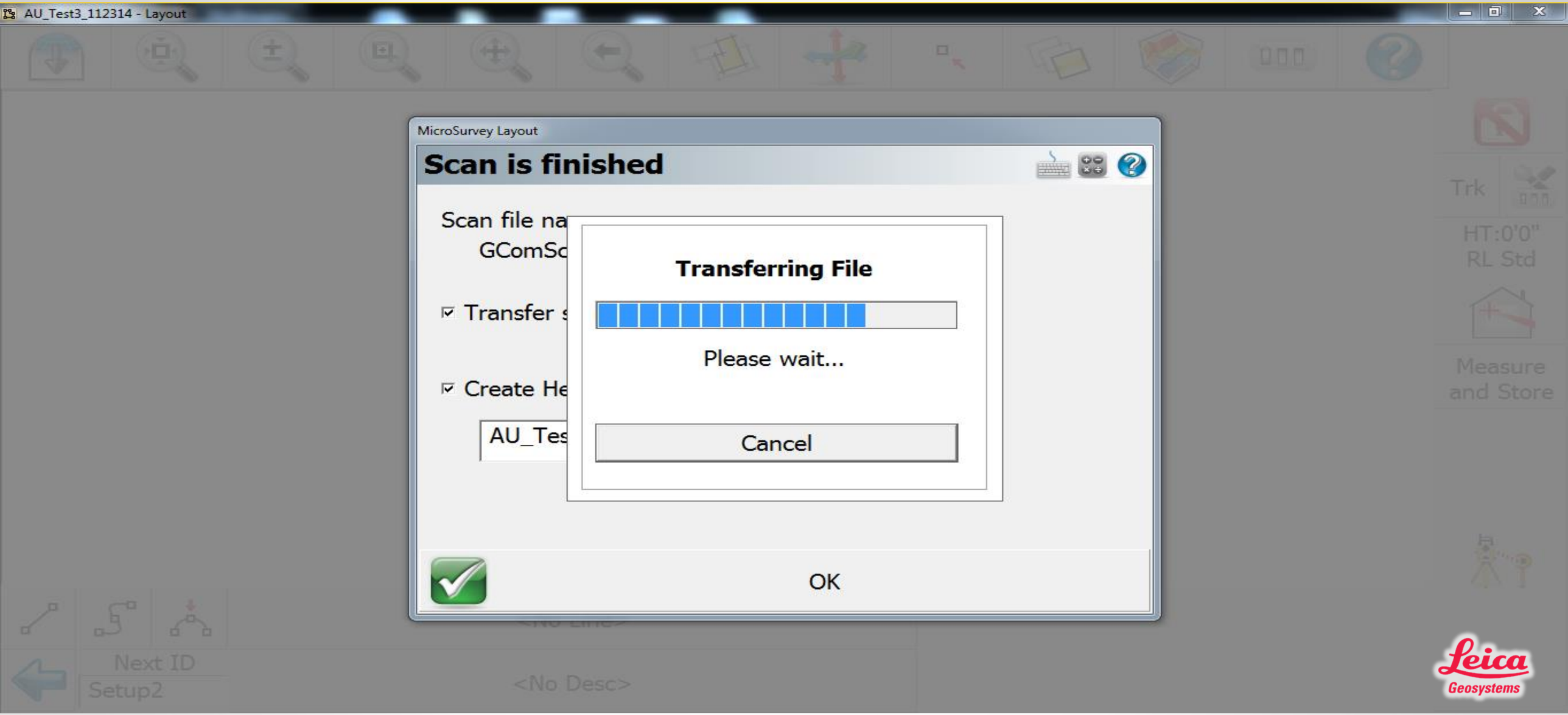
Step 8: Scan and Roundtrip Data



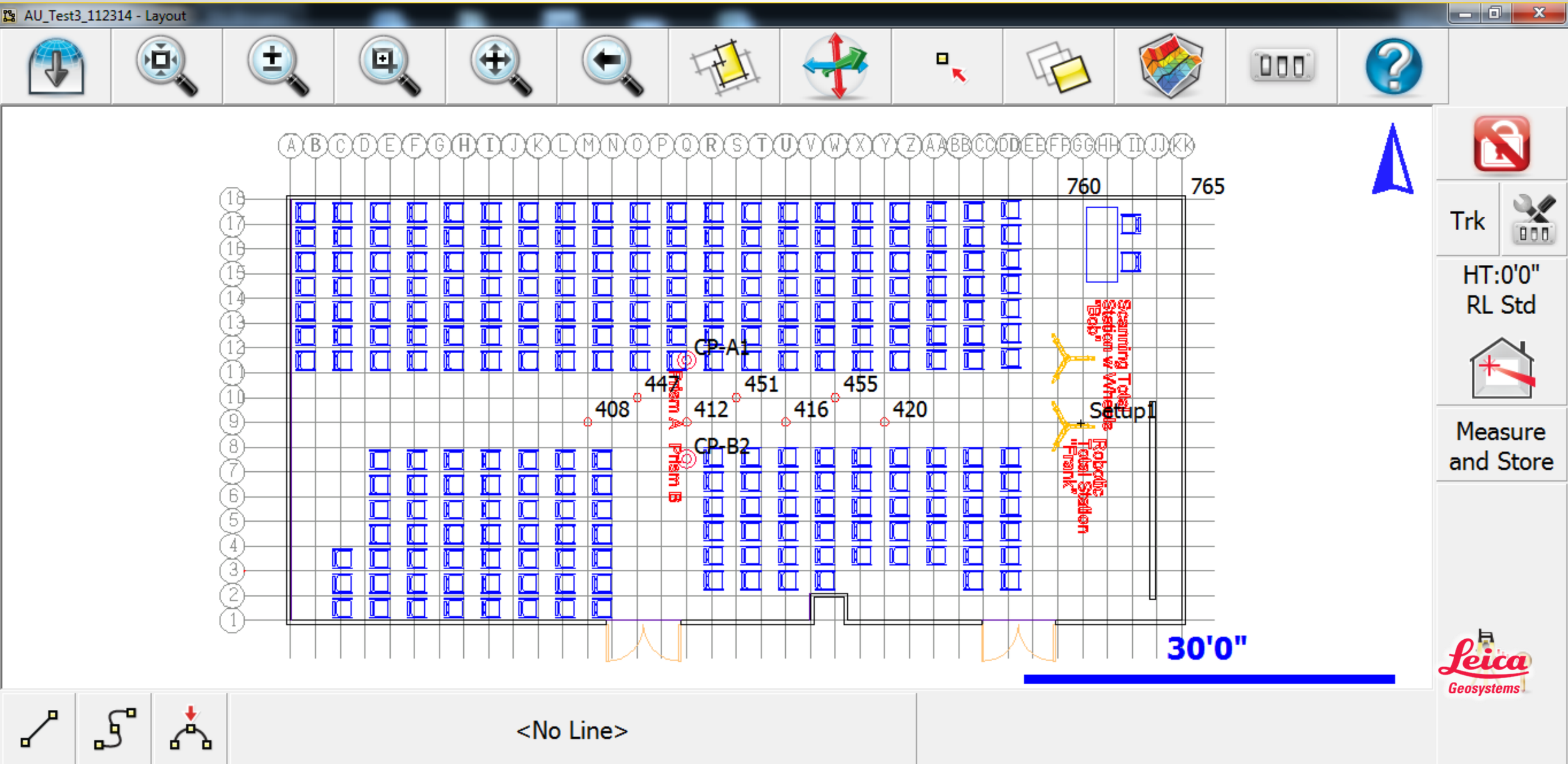
Step 8: Scan and Roundtrip Data



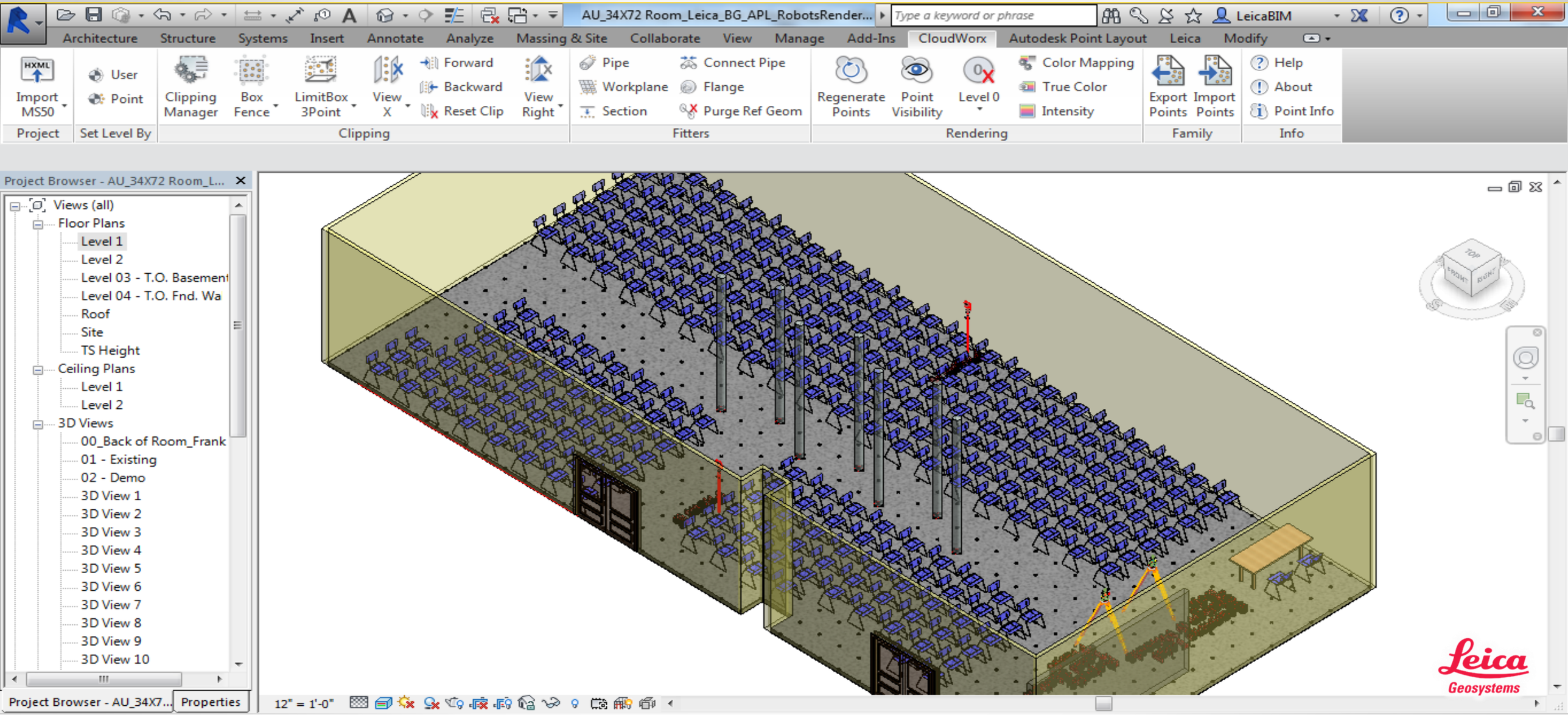
Step 8: Scan and Roundtrip Data



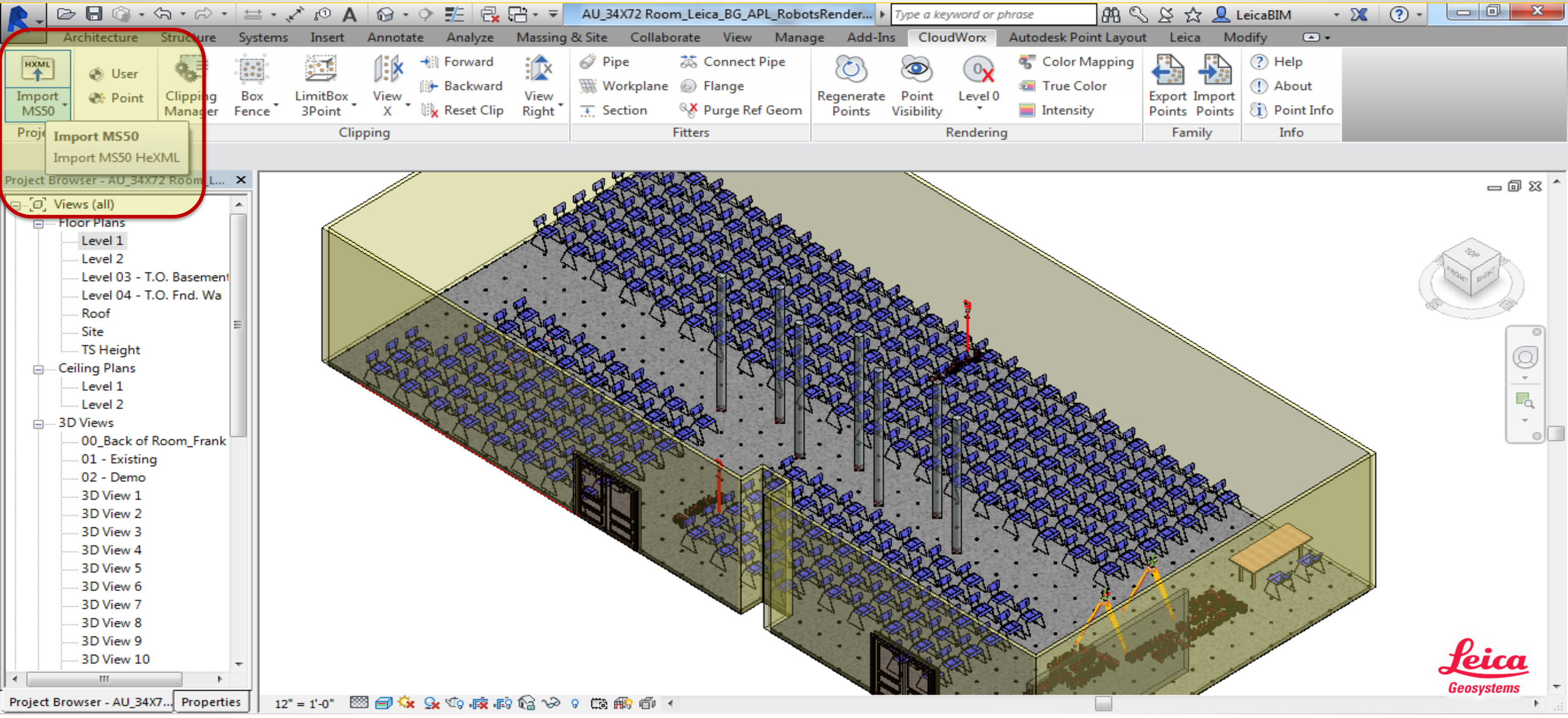
Step 8: Scan and Roundtrip Data



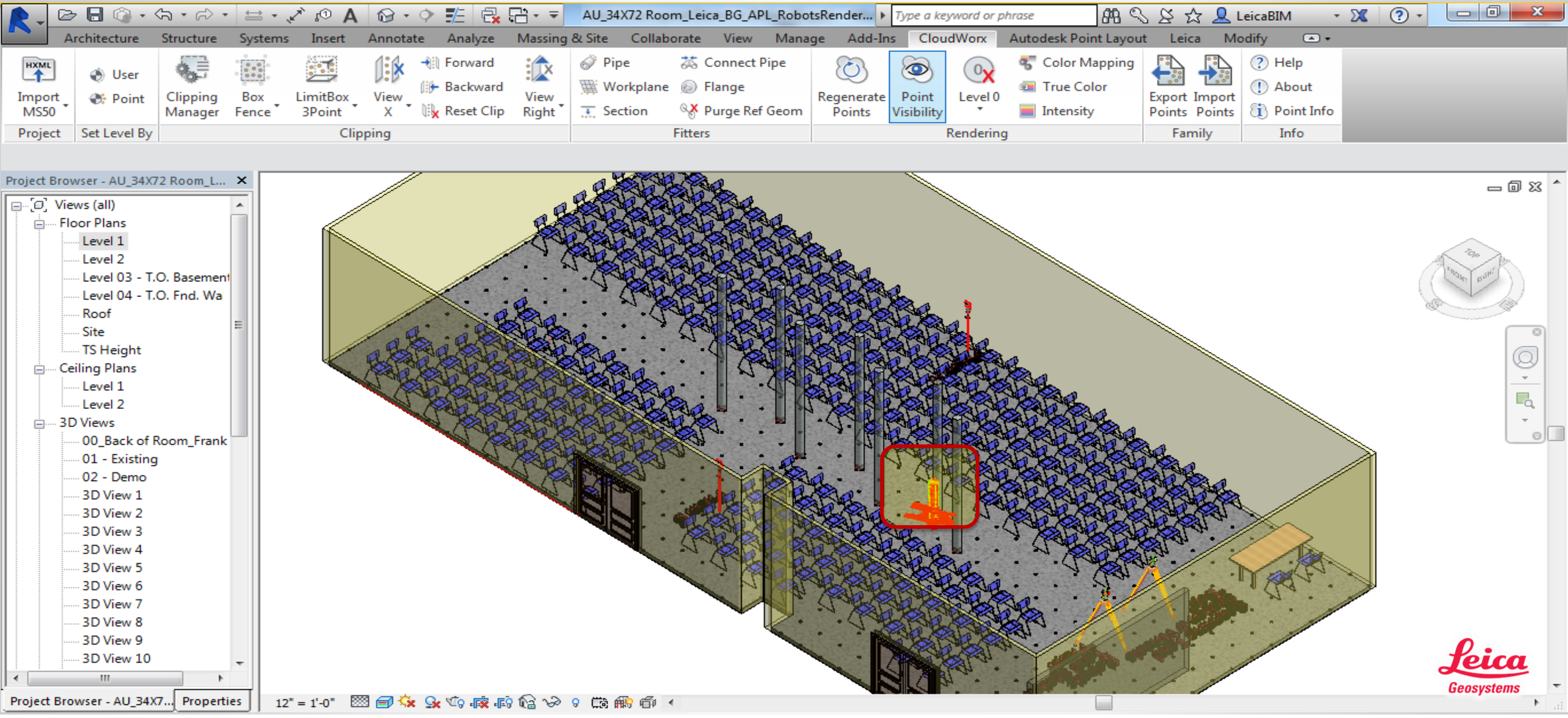
Step 8: Scan and Roundtrip Data into Revit



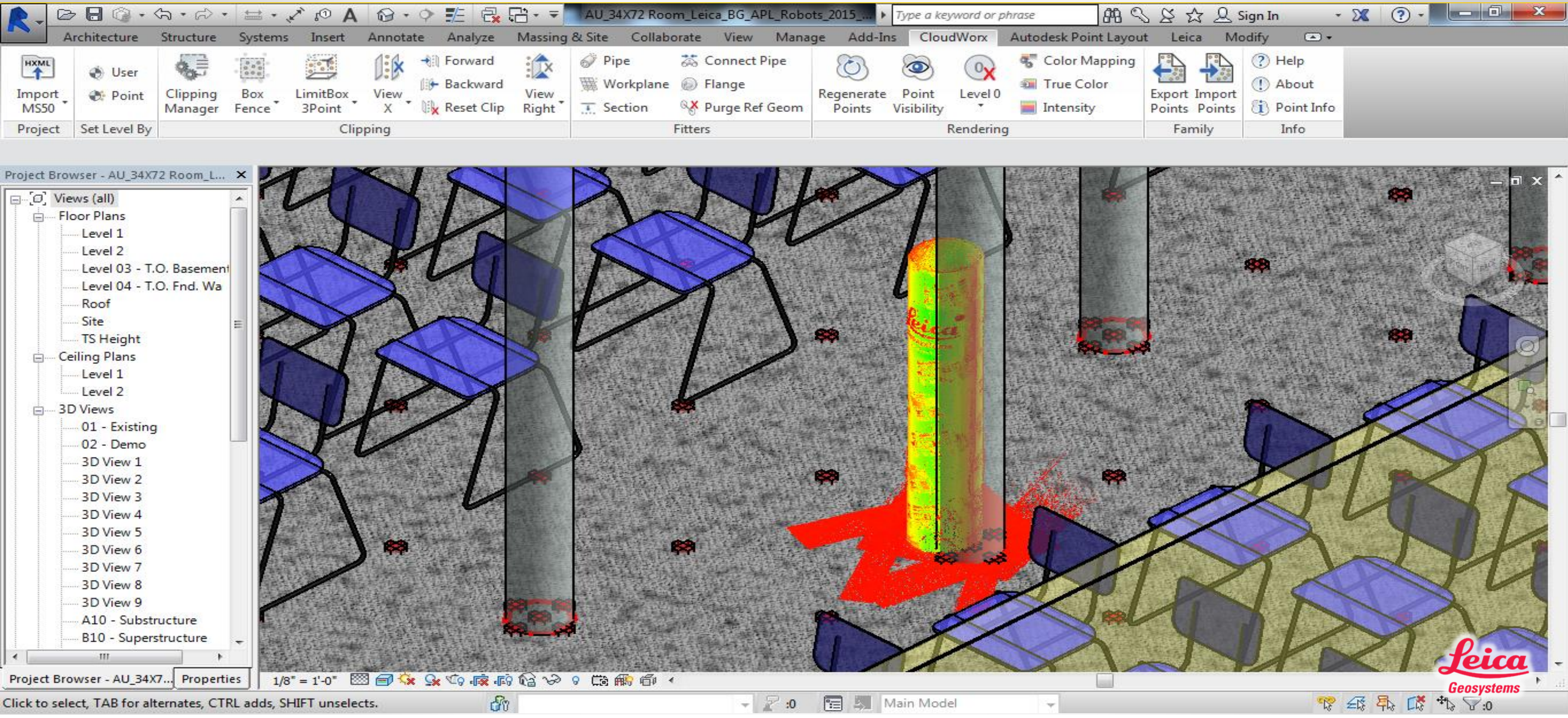
Step 8: Scan and Roundtrip Data into Revit



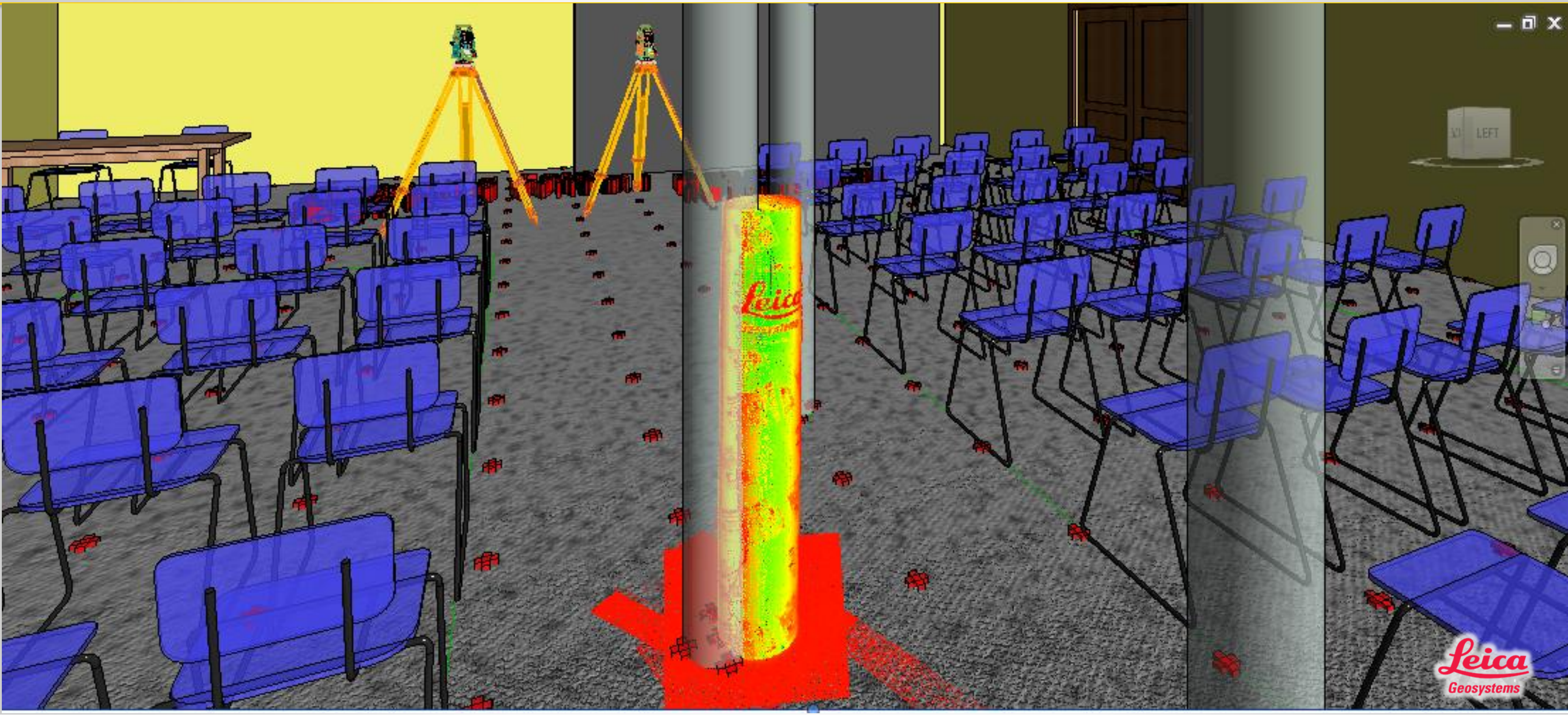
Step 8: Scan and Roundtrip Data



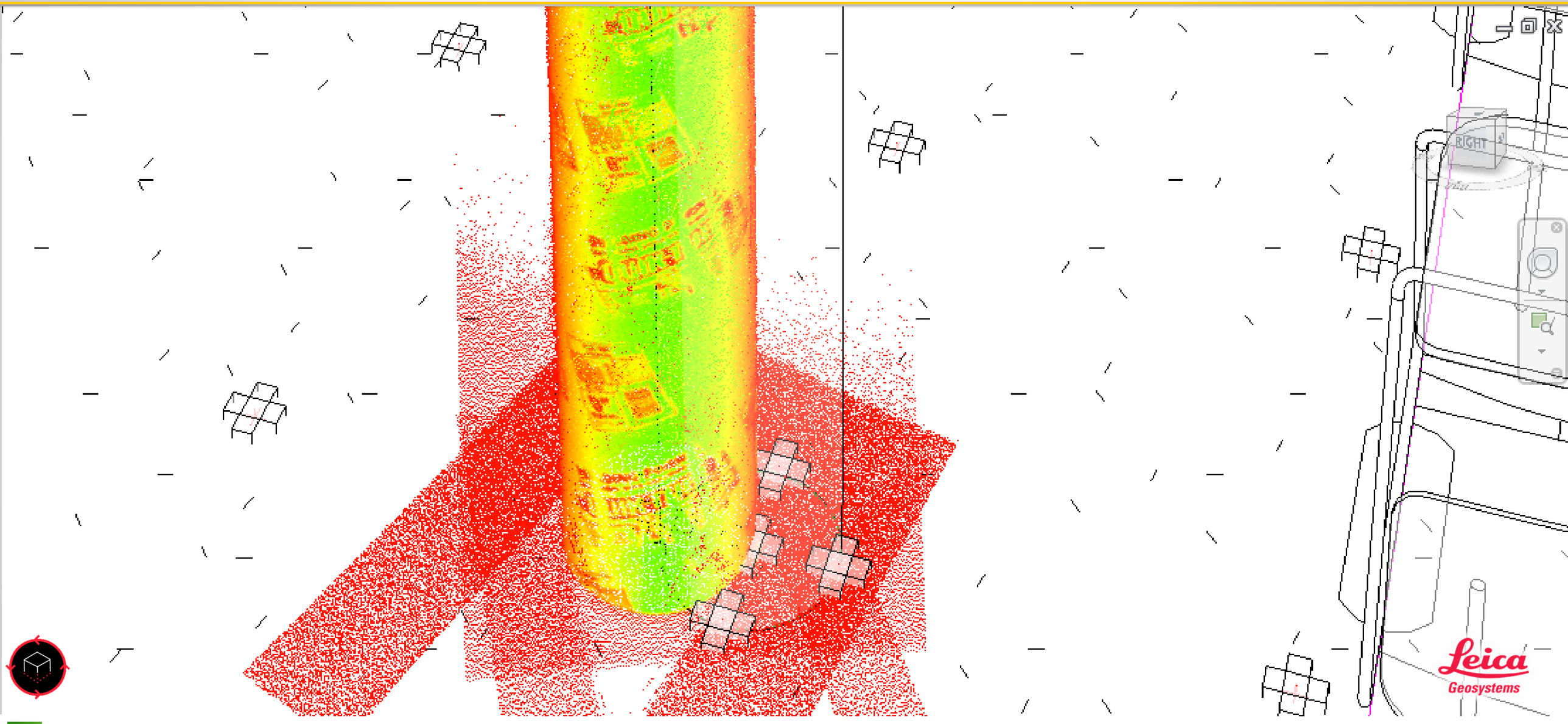
Step 8: Scan and Roundtrip Data



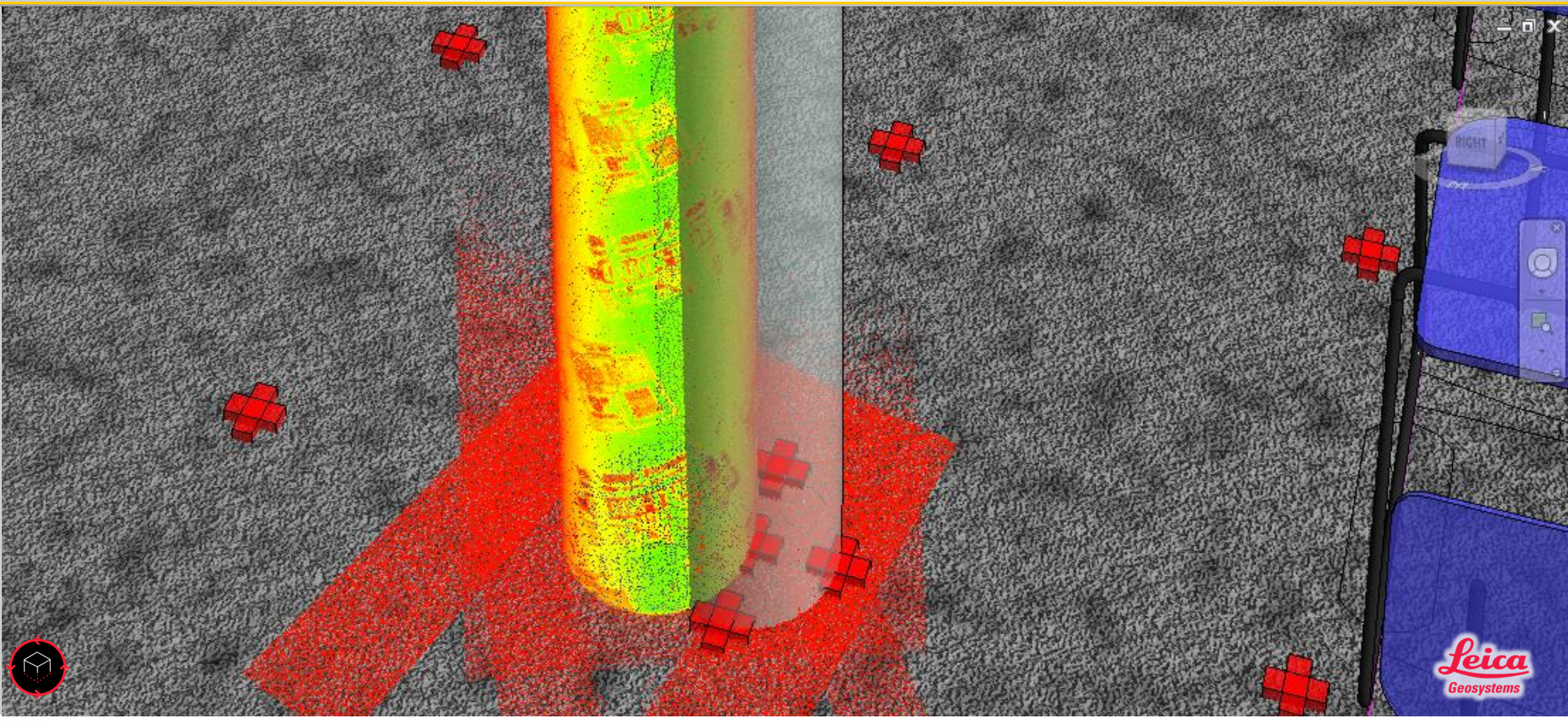
Step 8: Scan and Roundtrip Data



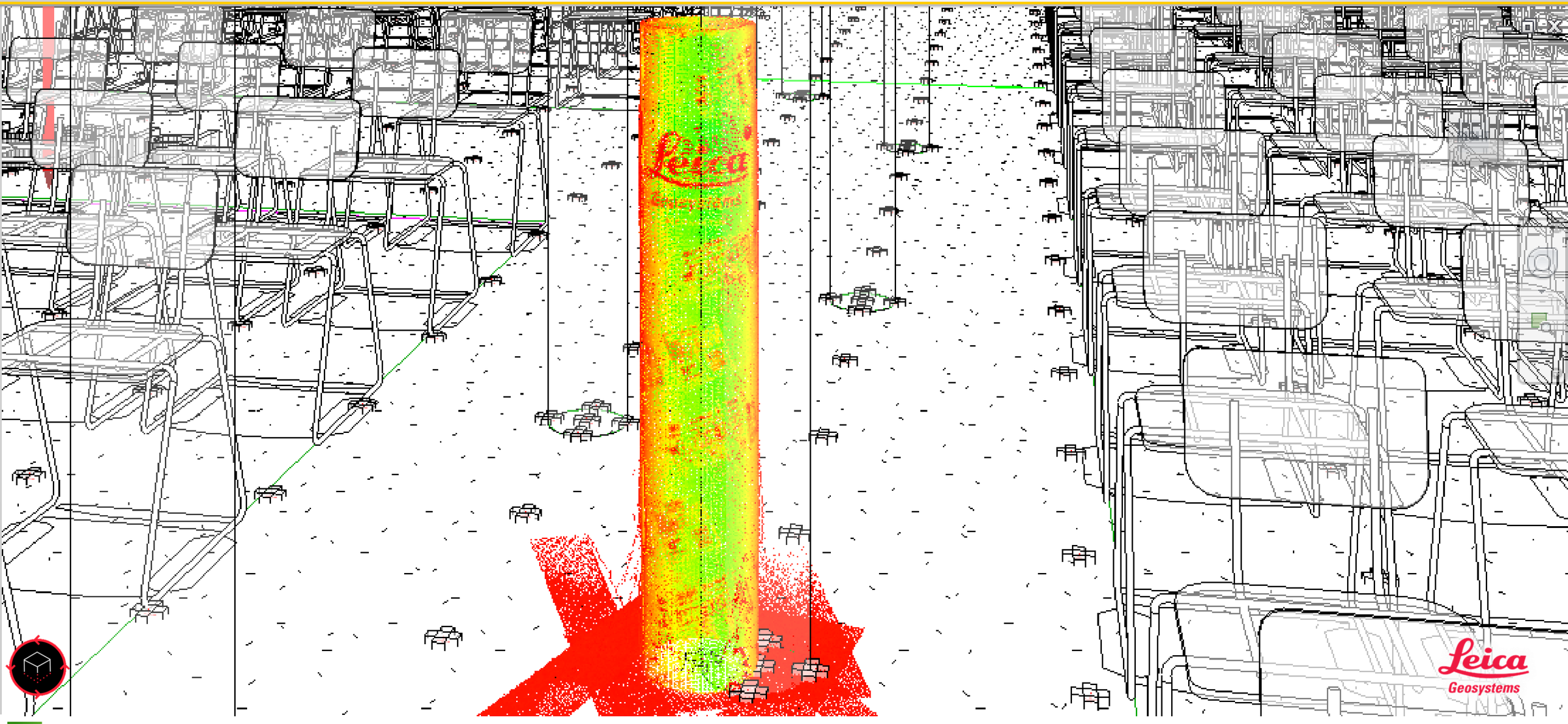
Step 9: Import Scan into Revit – Auto Oriented and Registered



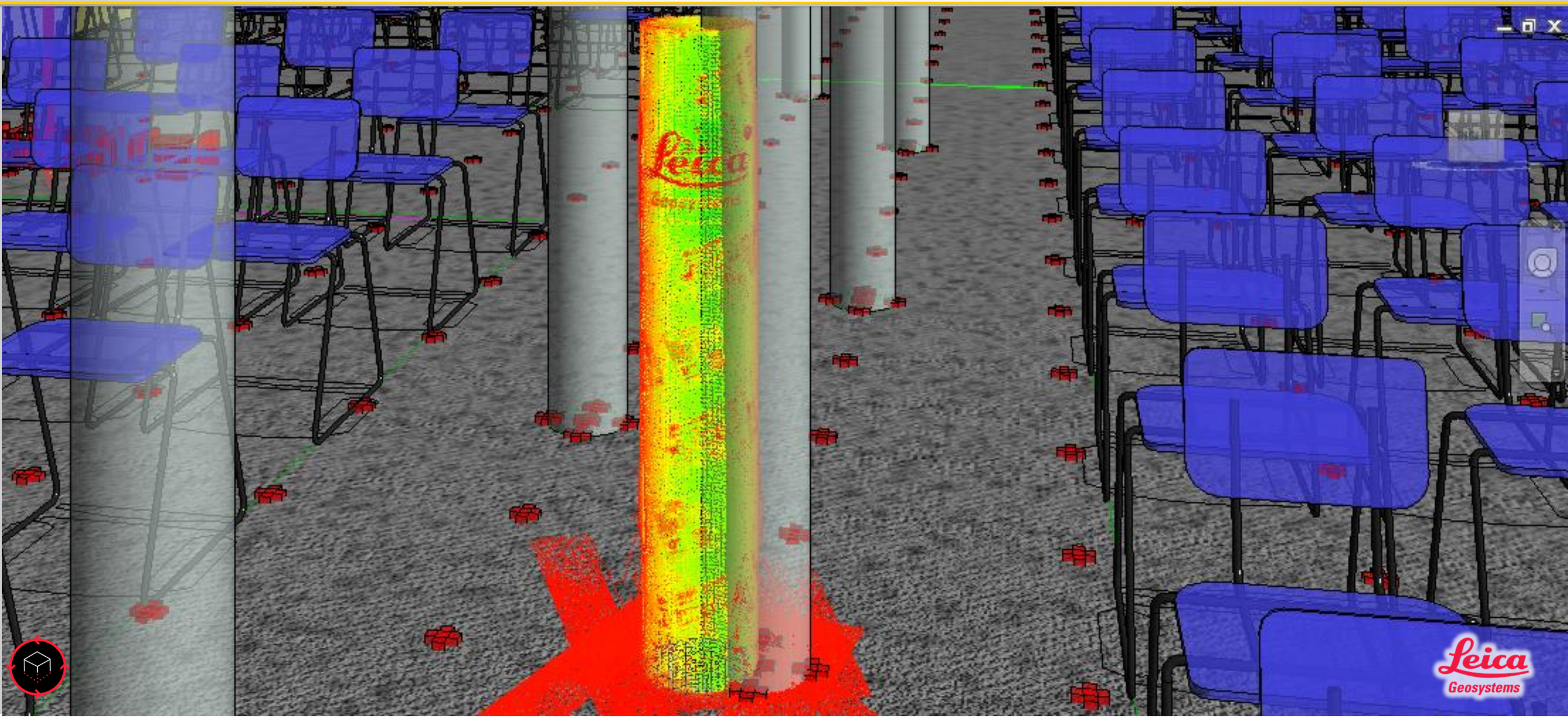
Step 9: Import Scan into Revit – Auto Oriented and Registered



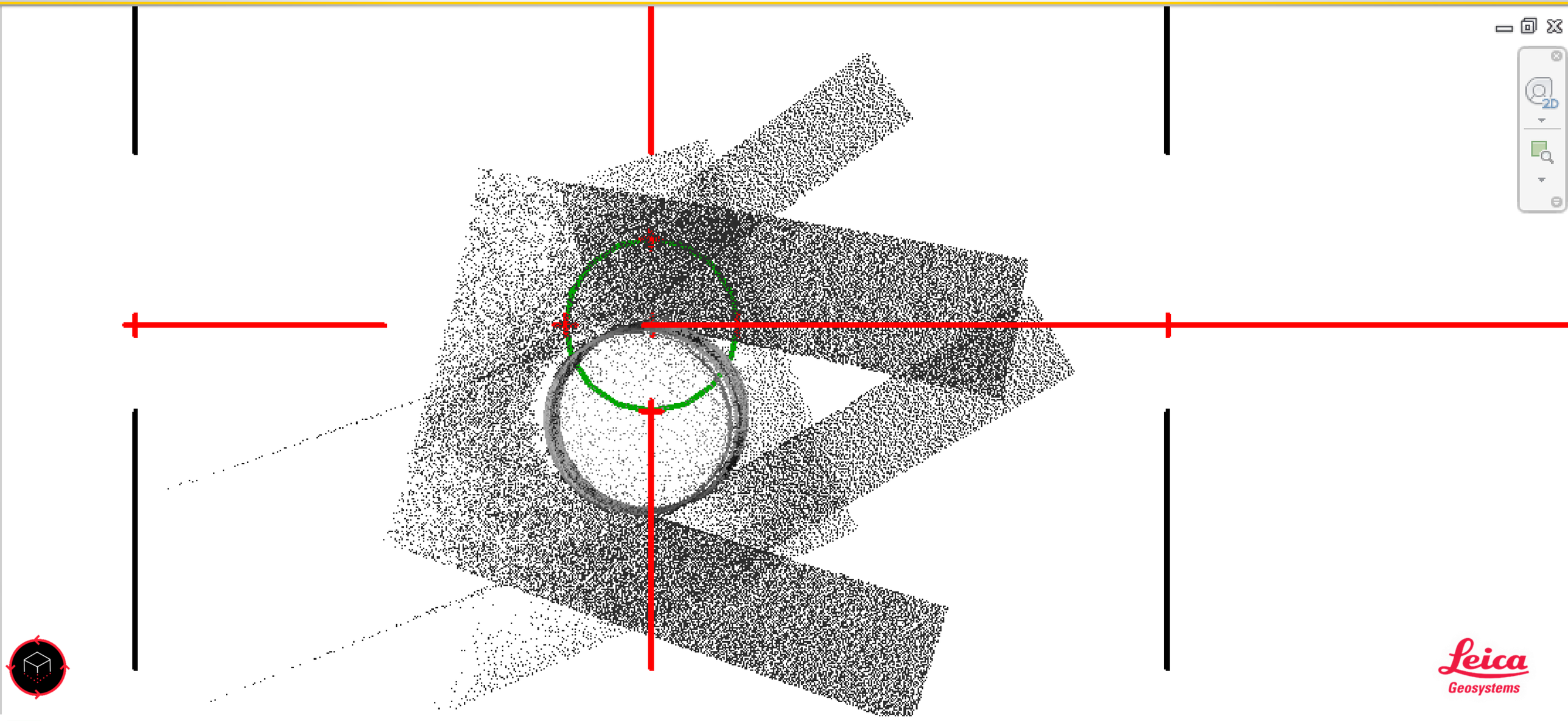
Step 9: Import Scan into Revit – Auto Oriented and Registered

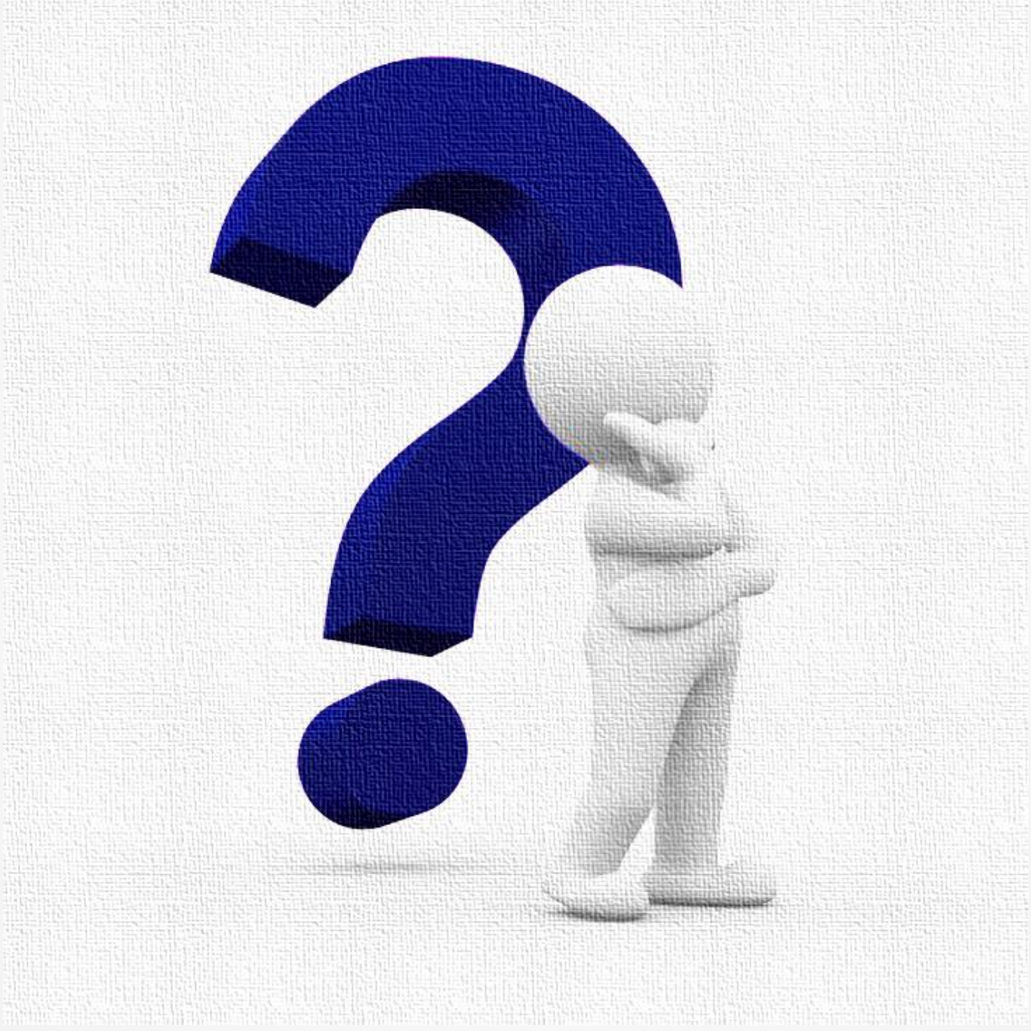


Step 9: Import Scan into Revit – Auto Oriented and Registered



Step 9: Import Scan into Revit – Auto Oriented and Registered





Session Feedback

- Via the Survey Stations, email or mobile device
- AU 2015 passes given out each day!
- Best to do it right after the session
- Instructors see results in real-time

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