

X-PAD Ultimate FAQ Series

Matching record bearing along the East Section Line, at Ground

More FAQ's like this one are available here: [[X-PAD FAQ Series](#)]

Date: 2/14/2023

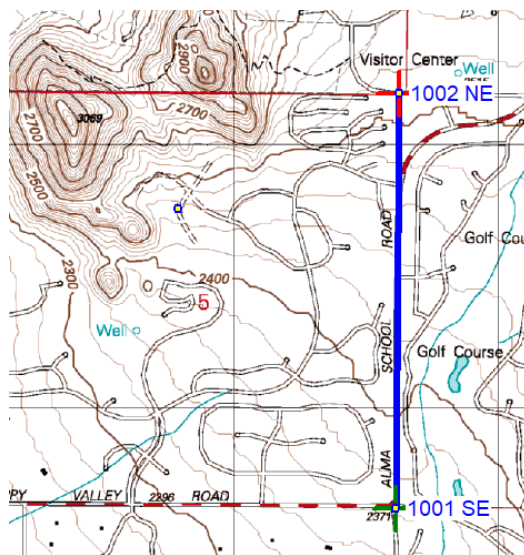
Filename:FAQ_XPAD_MatchingBearingAtGround_EastSectionLine_001.docx

Thesis

Step-by-step instructions for building a localization to match a specified bearing of the East section line from a previous survey, at Ground.

1

For this FAQ:



The record bearing distance is True North 5280 feet.

The measured bearing is N 00 02 21 W 5,151.536 feet; using SPC NAD83 AZ Central at Grid.

To match a previous survey, we would like to build a localization that results in a N 00 01 32 W bearing at Ground, with the SE corner matching assigned coordinates 10,000, 10,000.

Method

Make a new job in the local SPC with an appropriate GEOID:

Cartographic system

PROJECTION... PARAMETERS

Projection, Datum & Ellipsoid

Name: AZ83 - Central

Projection: Trans. Mercator

Datum: NAD83

Ellipsoid: GRS80

Tools Accept

2

Use a Rover to measure the found Southeast (1001) and Northeast (1002) corners of the section:

Edit point [1001]

COORDIN...	PROPERTI...	SP
Point	1001	
N	986825.392if	
E	718213.882if	
Z	2371.020if	
WGS84		
Geodetic coords	Latitude-Longitu	
Latitude	N 33°42'45.492427"	
Longitude	W 111°51'24.370375"	
Height	2275.943if	

Prev Next Accept

Edit point [1002]

COORDIN...	PROPERTI...	SP
Point	1002	
N	991976.923if	
E	718207.348if	
Z	2517.910if	
WGS84		
Geodetic coords	Latitude-Longitu	
Latitude	N 33°43'36.460465"	
Longitude	W 111°51'24.412349"	
Height	2422.990if	

Prev Next Accept

Points/Measurements/...

POINTS	MEASURE...	R
1002	N 991976.923if	
NE	E 718207.348if	
	Z 2517.910if	
1001	N 986825.392if	
SE	E 718213.882if	
	Z 2371.020if	

Topographic points: 2

Tools Add

Inverse from 1001 to 1002:

Quick distance

Point 1 1001

Point 2 1002

From first point

Compact

1001 - 1002

Distan...(Grid) 2D	5151.536if
	3D 5153.629if
Height diff.	146.890if
Bearing	N 0°04'21.6384" W
Slope	2.85%

←
🗑️ Clear
📄 Report

3

Build a 'Local – Single point' system. **From JOB: Coordinate System: GNSS Localization:** click on 'Local- Single point', choose 1001 as the **GNSS position**, the North reference does not matter, enter a **New point 1003** as the **Local point**:

Coordinate System

Local system-Single point

Local system-Single point

System type

No system
WGS84

Local - Single po... Details
< not defined >

Local - Site calib... Details
< not defined >

Cartographic sys... Details
AZ83 - Central (TM NAD83 GRS80)

Reference axis Details
< not defined >

2 Reference axis Details
< not defined >

GNSS Position

GNSS Point 1001

Latitude N 33°42'45.492427"

Longitude W 111°51'24.370375"

Height 2275.943if

North reference Geodetic North

i Define a GNSS position in one of the following methods:
 - Measure a new GNSS position and assign a name to the point
 - Select an existing point with valid GNSS coordinates and assign a name to the point

Local coordinate

Local point 1003

N 10000.000if

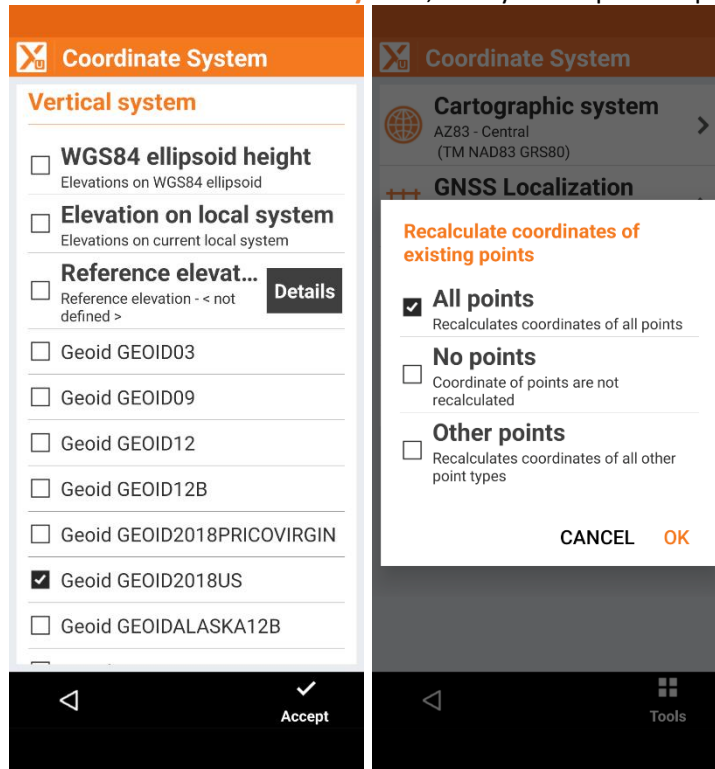
E 10000.000if

Z 2371.020if

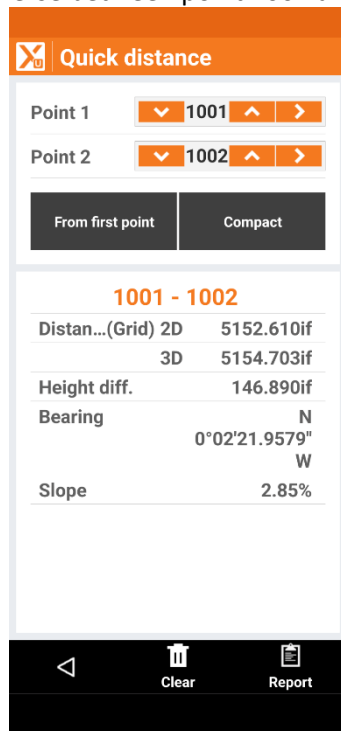
i Define the corresponding ground/grid coordinates in one of the following methods:
 - Select an existing point
 - Enter the coordinates and assign a name to the point

←
📏 Measure
→

Choose GEOID2018 for the **Vertical system**, finally recompute All points:

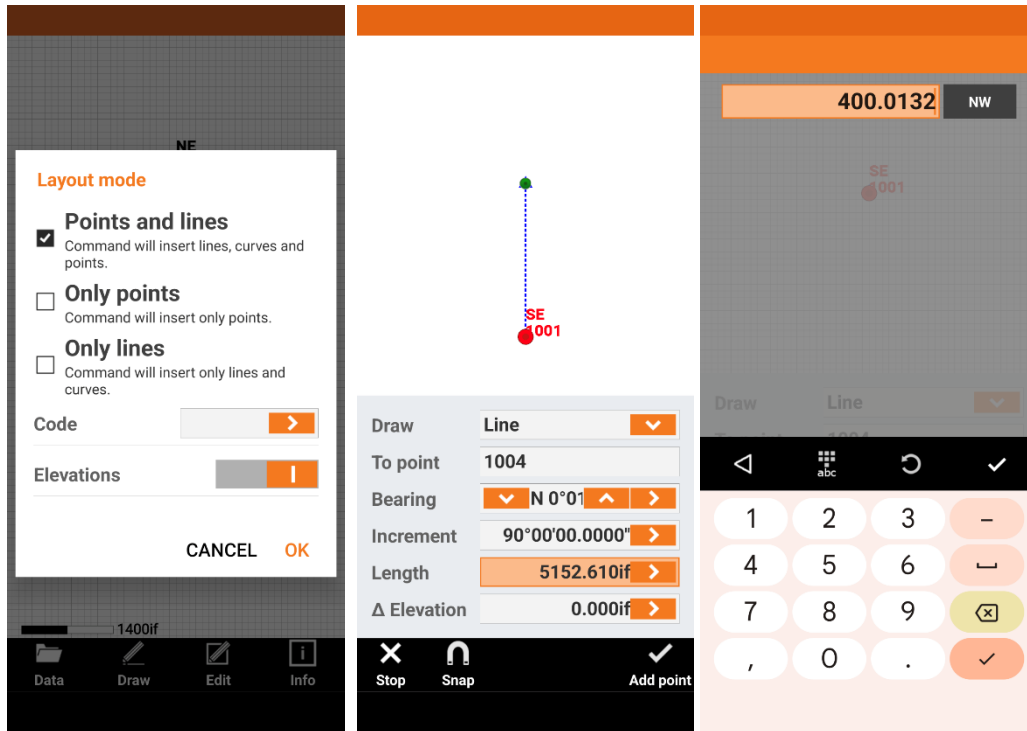


Next inverse between point 1001 and 1002:



Note that the 2D distance is **5152.610** feet (this is the correct Ground distance for site using the measured elevation at point 1001).

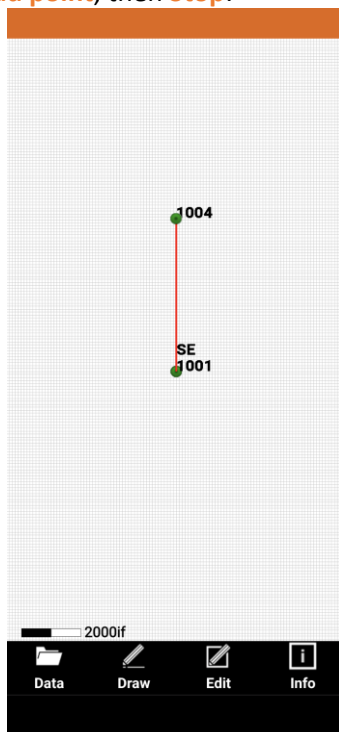
Go to CAD and use the **Draw: Layout tool** to compute a new point 1004, from PN 1003, at N 00 01 32 W 5152.610 feet:



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Hint: you can enter the **Bearing** as 400.0132 (the 4th quadrant NW, 0 deg 1 min 32 sec).

Click **Add point**, then **Stop**:



PN 1004 is now exactly the correct bearing and distance from 1001 and can be used as a target to rotate/scale point 1002.

Return to **JOB: Coordinate System: GNSS Localization** and switch the type to 'Local – Site Calibration'; click on Details, then + Add:

For the first point, choose **GNSS position 1001** and **Local coordinate 1003**:

Local system-Single point	Local system-Single point
GNSS Position	Local coordinate
GNSS Point: 1001	Local point: 1003
Latitude: N 33°42'45.492427"	N: 10000.000if
Longitude: W 111°51'24.370375"	E: 10000.000if
Height: 2275.943if	Z: 2371.020if
<p>i Define a GNSS position in one of the following methods:</p> <ul style="list-style-type: none">- Measure a new GNSS position and assign a name to the point- Select an existing point with valid GNSS coordinates- Enter the GNSS coordinates and assign a name to the point	<p>i Define the corresponding ground/grid coordinates in one of the following methods:</p> <ul style="list-style-type: none">- Select an existing point- Enter the coordinates and assign a name to the point
Measure	

For the second point, choose **GNSS position** 1002 and **Local coordinate** 1004:

Local system-Single point

GNSS Position

GNSS Point: **1002**

Latitude: **N 33°43'36.460465"**

Longitude: **W 111°51'24.412349"**

Height: **2422.990if**

i Define a GNSS position in one of the following methods:
 - Measure a new GNSS position and assign a name to the point
 - Select an existing point with valid GNSS coordinates
 - Enter the GNSS coordinates and assign a name to the point

Local system-Single point

Local coordinate

Local point: **1004**

N: **15152.609if**

E: **9997.702if**

Z: **2371.020if**

i Define the corresponding ground/grid coordinates in one of the following methods:
 - Select an existing point
 - Enter the coordinates and assign a name to the point

◀ Measure ▶

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Uncheck both the **V** boxes then click next:

Local system-Multi points

<input checked="" type="checkbox"/> H 0.000if	1001 - 1003
<input type="checkbox"/> V ---	Lat. N 33°42'45.49242... Lng. W 111°51'24.3703... H 2275.943if
<input checked="" type="checkbox"/> H 0.000if	1002 - 1004
<input type="checkbox"/> V ---	Lat. N 33°43'36.46046... Lng. W 111°51'24.4123... H 2422.990if

Method: **Barycentric**

Scale: **Conformal (scaled)**

Calculation completed.
Scale factor: 1.00020855

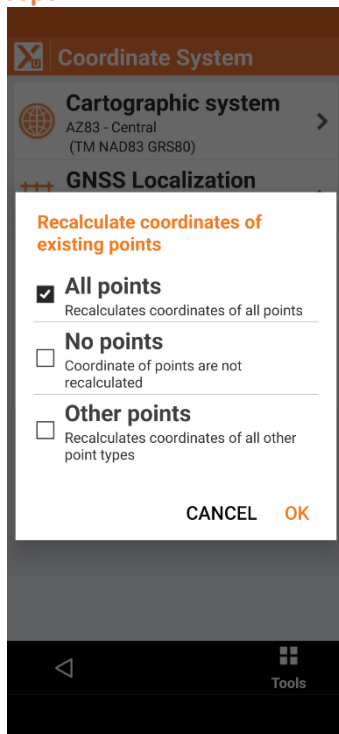
◀ Tools + Add ▶

Choose **GEOID 2018**:



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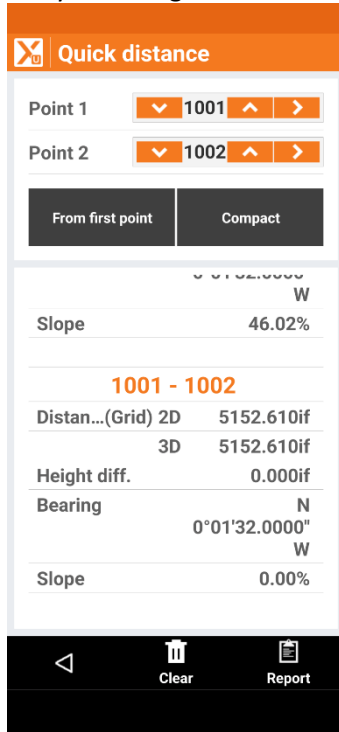
Click **Accept**:



Select **All points**, then click **OK**.

You now have a coordinate system that is at Ground, matching the desired bearing.

Check this by inverting from 1001 to 1002:



The screenshot shows the 'Quick distance' interface with the following data:

Field	Value
Point 1	1001
Point 2	1002
From first point	Compact
Slope	46.02%
1001 - 1002	
Distan...(Grid) 2D	5152.610if
3D	5152.610if
Height diff.	0.000if
Bearing	N 0°01'32.0000" W
Slope	0.00%

The bearing and distance are exactly as desired.