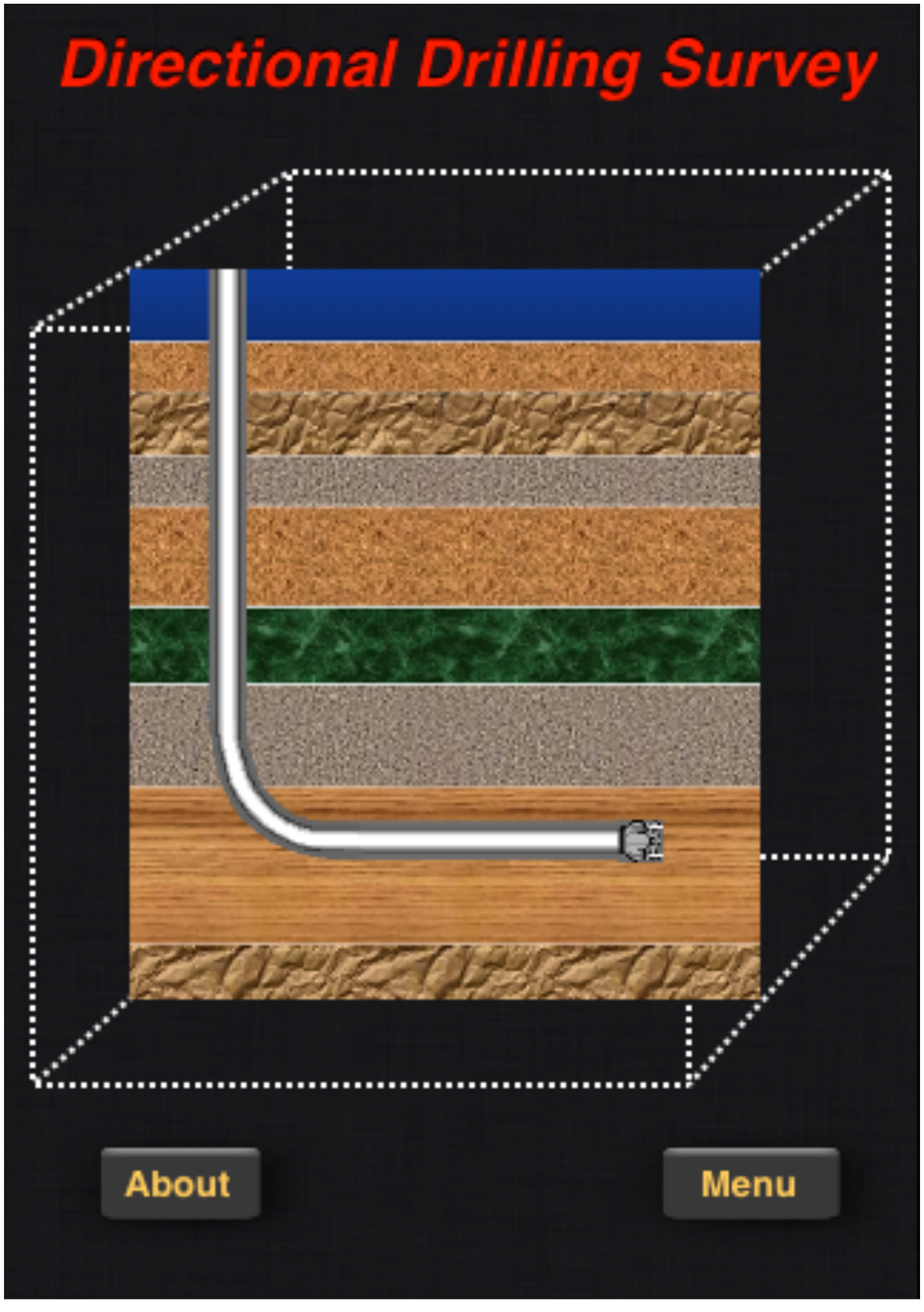


User Guide

Release 1.0

Introduction
Selecting Length Unit
Load/Save Data File
Well Planning
Tie-In & Survey Calc Method
Single Well Survey
Multilateral Wells
Methods & Formulas
About

Available on the App Store

www.wellcontrol.com.br

Introduction

The Directional Drilling Survey provides the control of directional drilling of oil wells with calculations and plotting of well planning and survey data in vertical and plan views to help technicians, drillers, toolpushers and engineers of petroleum industry.

Features:
1. Well Planning Definition: Multi-Sections (until 10)
2. Ability to work with multiple data files;
3. Directional Survey: Edit, Add, Insert and Remove Survey Data;
4. Calculations Methods:
   - Tangential
   - Balanced Tangential
   - Minimum Curvature
   - Radius of Curvature
   - Angle Averaging
5. Plotting in vertical view and plan view;
6. Ability to PRINT and send reports by email;
7. Survey Data Calculations in all methods simultaneously;
8. Formulas of Methods;
9. Ability to work with length units: foot and meter;
10. Vertical Section View in portrait and Plan View in landscape.
11. Ability to Multilateral wells survey (limited to 6 wells).
12. Ability to use Initial Vertical Section and Initial Azimuth to move the KOP to initial horizontal departure.
13. Ability to X-Y-Z Plotting of a single well or multi wells (limited to 6 wells).
14. Preview plotting when selecting data files.
15. Sharing data files with iCloud.

Our Portfolio on the App Store:

Well Control Simulator

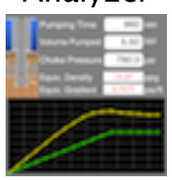
Drilling Simulator

Well Control Methods

Well Control Worksheets

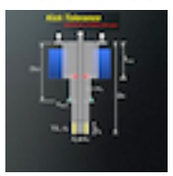
Leak-Off Test Simulator

Leak-Off Test Analyzer



Drilling Hydraulics

Kick Tolerance



Directional Survey

Drilling Cost

Visit our Website

Join to our group on LinkedIn

Oil & Gas

Join to our network on LinkedIn

View my profile on LinkedIn

Follow @wellcontroltech

Well Control

facebook

tumblr.

Selecting Length Unit

Select the length Unit: **Meter** (m) or **Foot** (ft) on the main menu

1. Data File on iCloud
2. Load Default Data
3. Screenshots for Default Data
4. Save As
5. Open File
6. Copying data file between iCloud and Local
7. iCloud Message

It's recommended first create a data file for work with this app => The "**Save**" button is enabled on views.
But this is unnecessary because this app uses data in the ram memory. The data can be saved on any time.

1. Check iCloud Configuration on Settings
2. **Documents & Data must be ON**

After create the first data file in iCloud:
Storage & Backup => Directional Survey

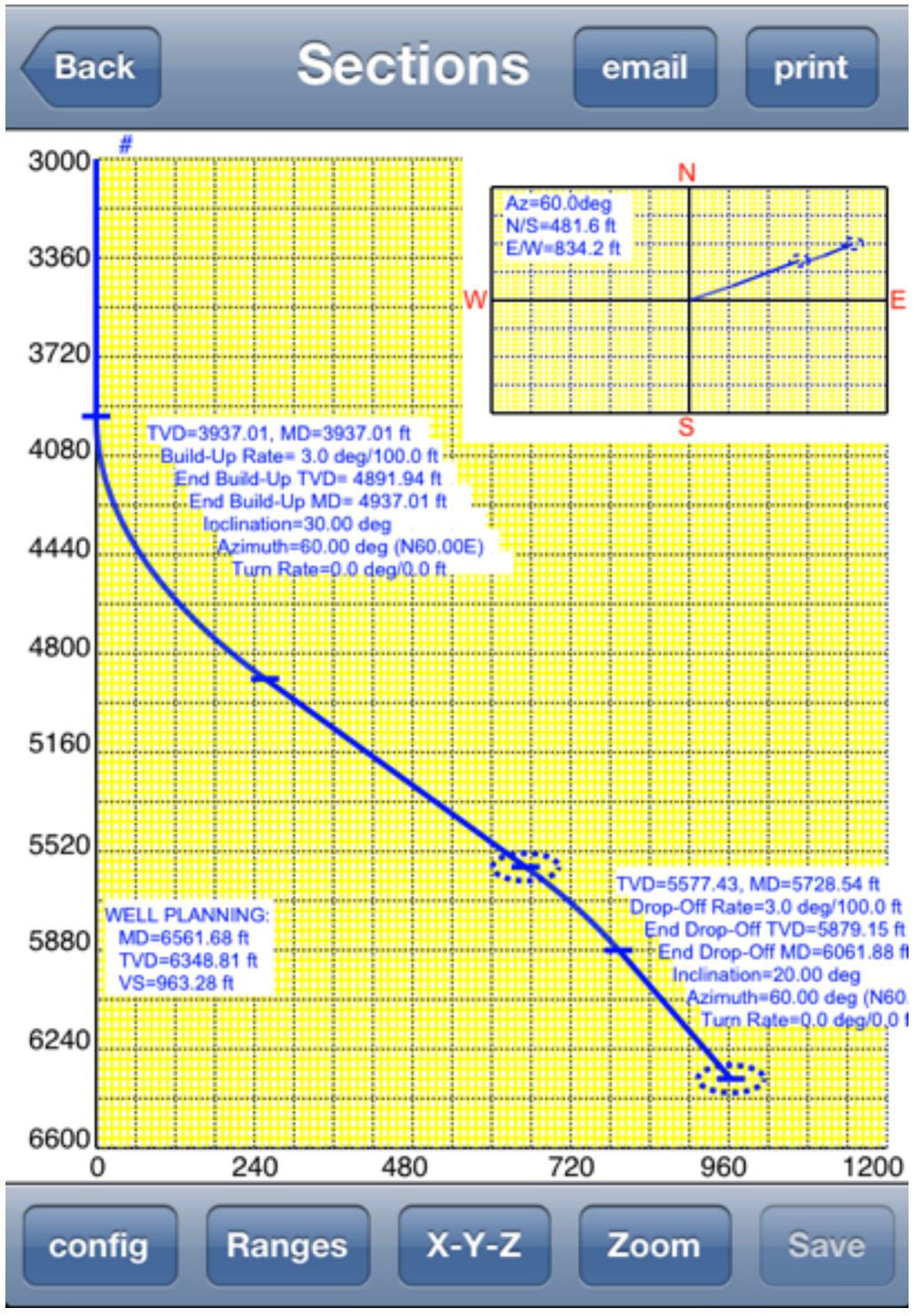
1. When TAP on “Load Default Data” the data are loaded in the RAM memory and shown in the graph X-Y-Z.
2. Note: No data file is created.

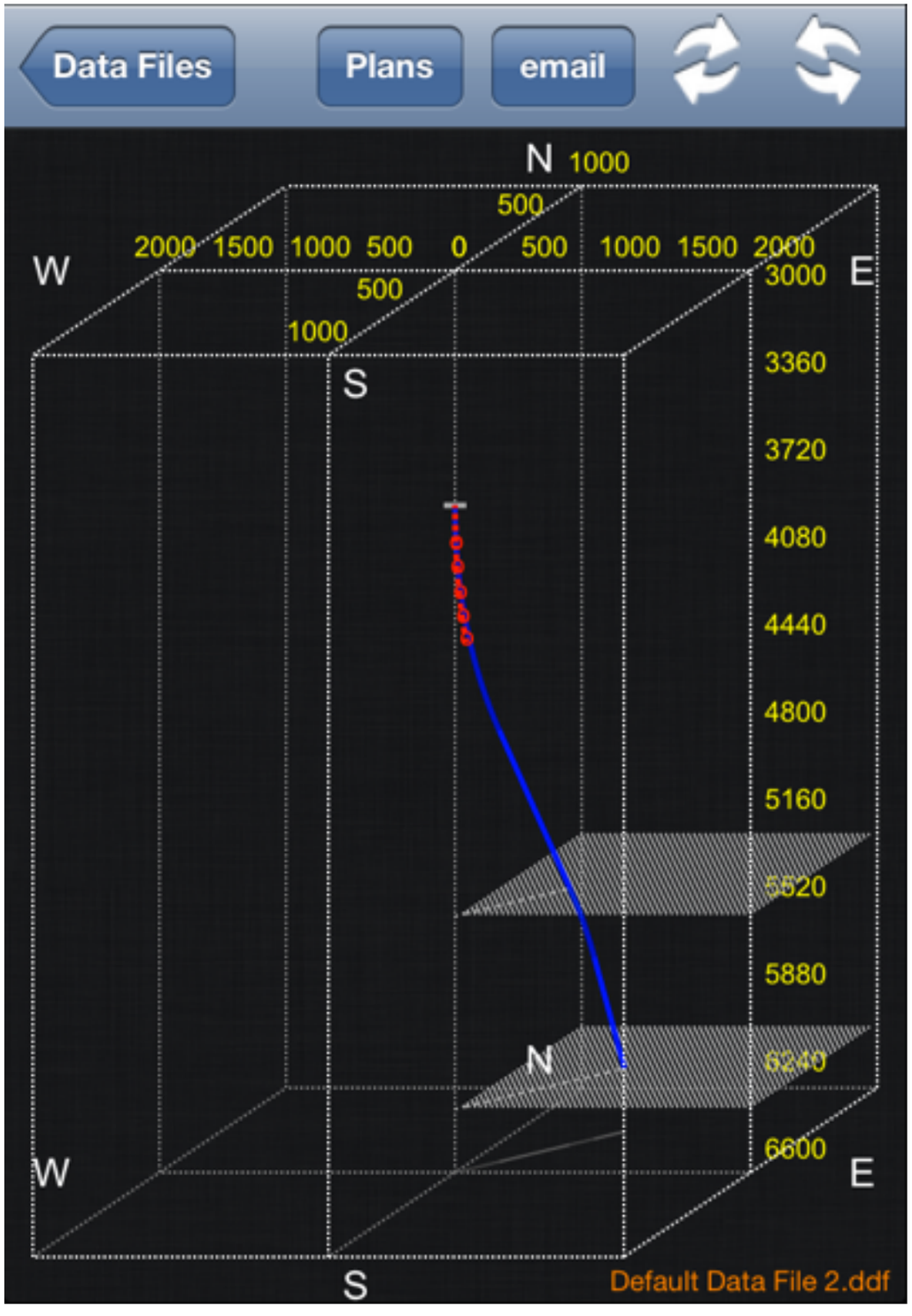
Kick Off Point = 3937.01 ft
Initial Departure = 0.00 ft
Initial Azimuth = 0.00 degree (N0.00E)
Initial N/S = 0.00 ft
Initial E/W = 0.00 ft

SECTION: 1
Initial TVD=3937.01 ft
Initial MD=3937.01 ft
Build-Up Rate= 3.0 deg/100.0 ft
End Build-Up TVD= 4891.94 ft
End Build-Up MD= 4937.01 ft
Inclination=30.00 deg
Azimuth=60.00 deg (N60.00E)
Turn Rate=0.0 deg/0.0 ft
End TVD = 5577.43 ft
End MD = 5728.54 ft
Horizontal Departure = 651.64 ft
N/S = 325.82 ft
E/W = 564.34 ft

SECTION: 2
Initial TVD=5577.43 ft
Initial MD=5728.54 ft
Drop-Off Rate=3.0 deg/100.0 ft
End Drop-Off TVD=5879.15 ft
End Drop-Off MD=6061.88 ft
Inclination=20.00 deg
Azimuth=60.00 deg (N60.00E)
Turn Rate=0.0 deg/0.0 ft
End TVD = 6348.81 ft
End MD = 6561.68 ft
Horizontal Departure = 311.64 ft
N/S = 155.82 ft
E/W = 269.89 ft

TARGET:
Measured Depth = 6561.68 ft
True Vertical Depth = 6348.81 ft
Vertical Section = 963.28 ft
Target Azimuth = 60.00 degree (N60.00E)
Target N/S = 481.64 ft
Target E/W = 834.22 ft


Back
Sections
email
print
3000
3360
3720
4080
4440
4800
5160
5520
5880
6240
6600
0
240
480
720
960
1200
N
W
E
S
Az=60.0deg
N/S=481.6 ft
E/W=834.2 ft
TVD=3937.01, MD=3937.01 ft
Build-Up Rate= 3.0 deg/100.0 ft
End Build-Up TVD= 4891.94 ft
End Build-Up MD= 4937.01 ft
Inclination=30.00 deg
Azimuth=60.00 deg (N60.00E)
Turn Rate=0.0 deg/0.0 ft
TVD=5577.43, MD=5728.54 ft
Drop-Off Rate=3.0 deg/100.0 ft
End Drop-Off TVD=5879.15 ft
End Drop-Off MD=6061.88 ft
Inclination=20.00 deg
Azimuth=60.00 deg (N60.
Turn Rate=0.0 deg/0.0 f
WELL PLANNING:
MD=6561.68 ft
TVD=6348.81 ft
VS=963.28 ft
config
Ranges
X-Y-Z
Zoom
Save


Data Files
Plans
email
N
W
E
S
1000
500
2000
1500
1000
500
0
500
1000
1500
2000
3000
3360
3720
4080
4440
4800
5160
5520
5880
6240
6600
Default Data File 2.ddf

1. When TAP on “Save As” the data that are loaded in the RAM memory are saved to data file named with the content of File Name TextBox.
2. Note: No data file is created.

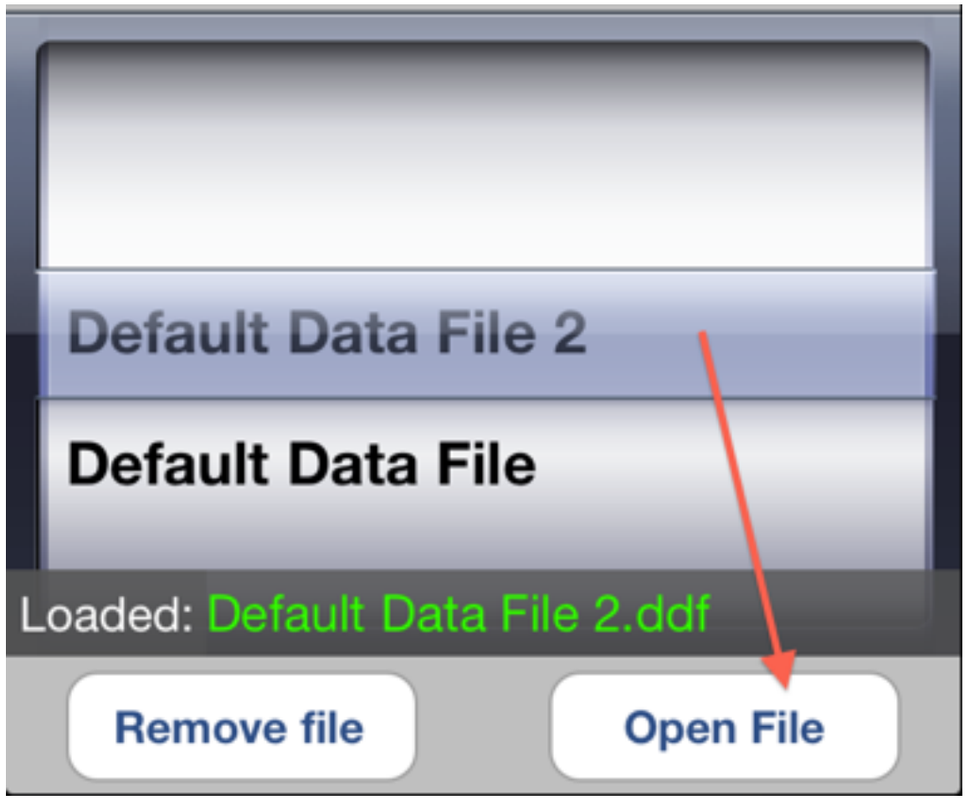
NOTES:

- When the text “Loaded” is “#”, the Ram Memory is loaded with Default Data.

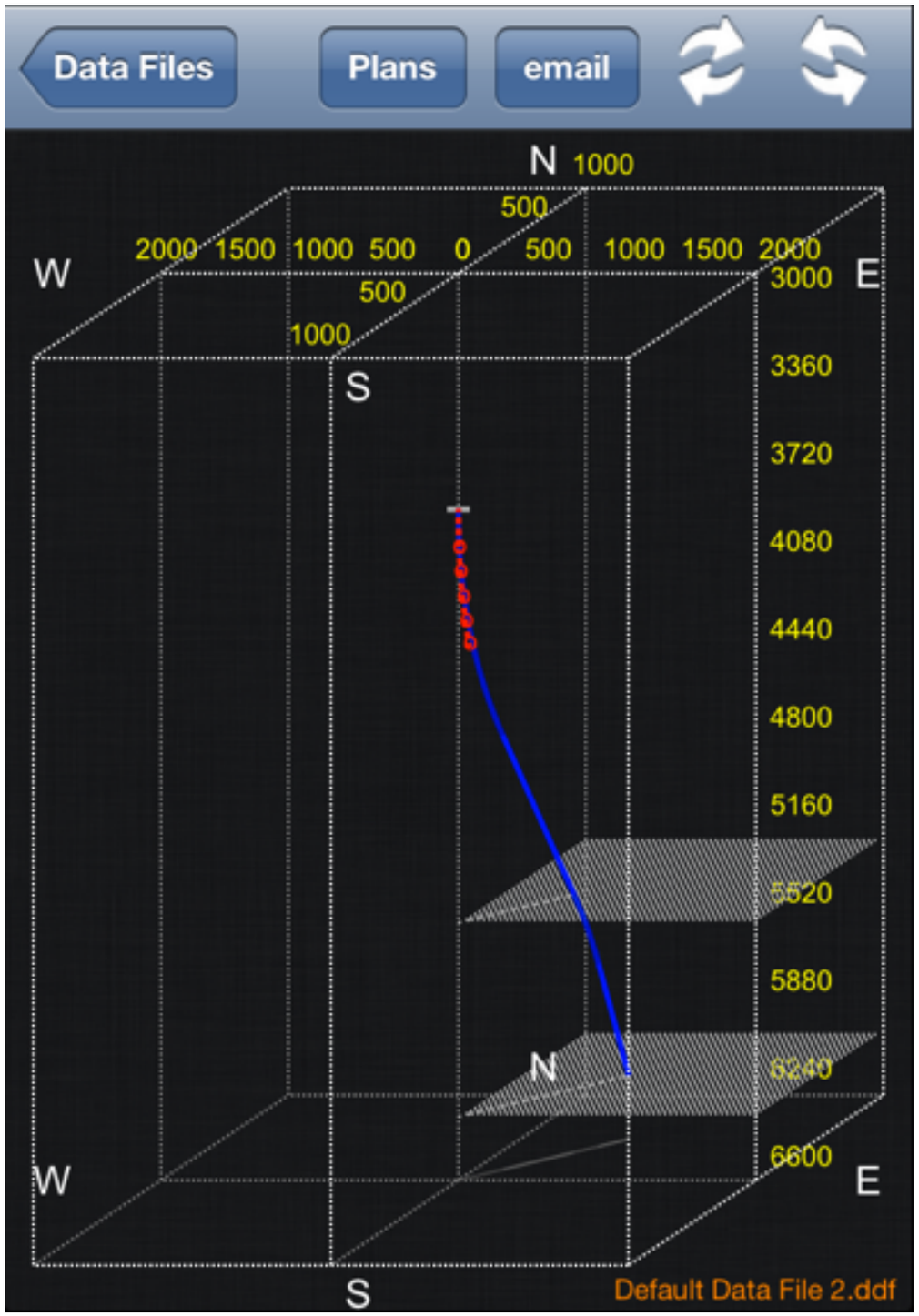
- Attention for “Replace if exists” option.

- Attention for “Include Data” option:
  ON - Save Well Planning + Survey Data table
  OFF - Save the Well Planning only

When TAP on “Open File” button, the data that are on the Data File Highlighted on Wheel are loaded in the RAM memory and can be saved with other file name.



After TAP on “Open File” button, show “X-Y-Z” view:



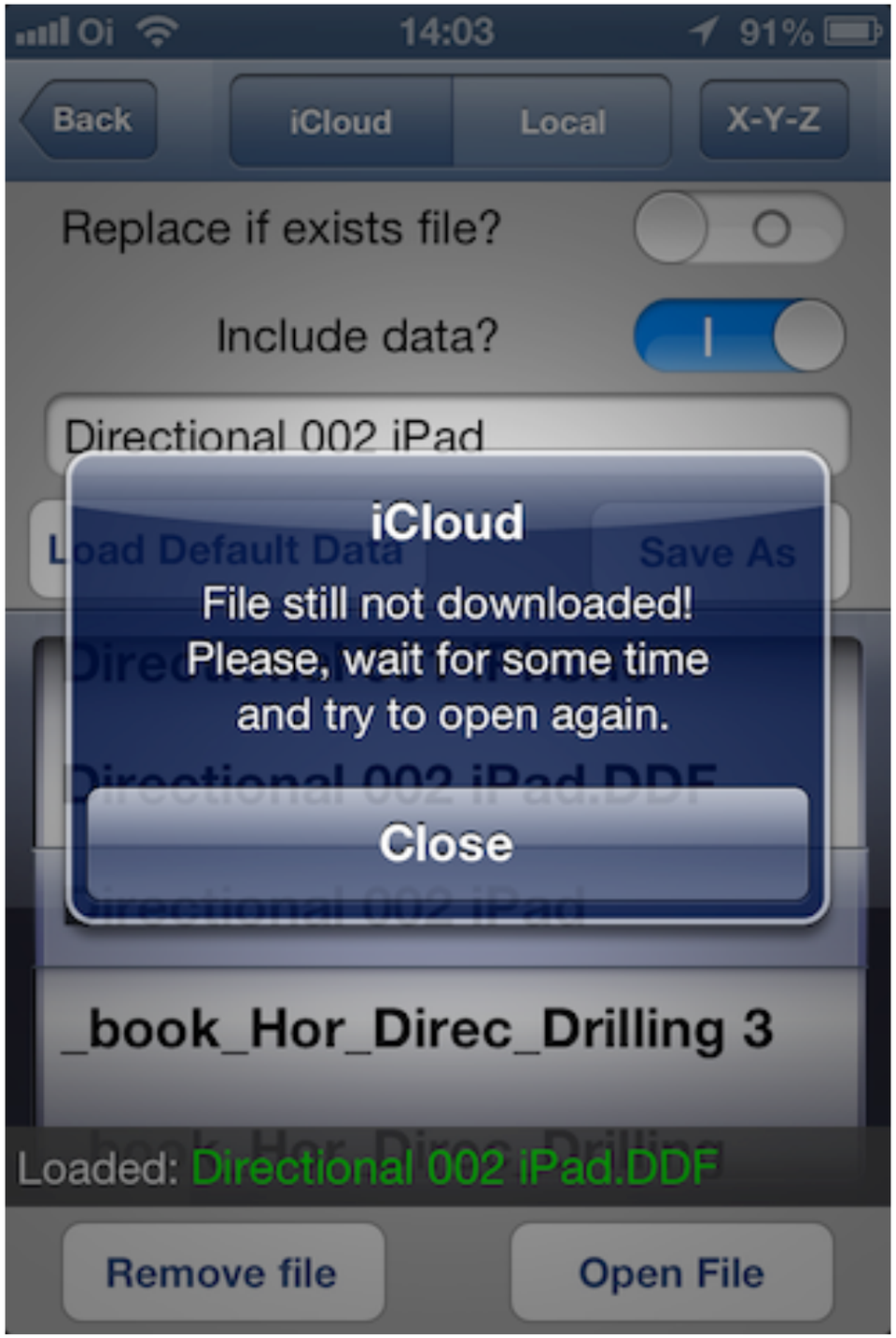
When TAP on “Open File” button, the data that are on the Data File Highlighted on Wheel are loaded in the RAM memory and can be saved with other file name.

Method to copy data file between iCloud and Local:
The user can open a data file on Local and after save it on iCloud or the opposite.

iCloud Message:

On the first time that the user taps on “Open File” button, the download of the data file is started from the iCloud to a local address with internal access only.
When the download is completed, it’s possible open the data file.

The user must be tap again on the “Open File” button for checking.
When OK, the data file is loaded in RAM memory and shown on the graph.



1. Well Planning
2. On Portrait Position – Vertical Section
3. On Landscape Position – Plan View
4. Well Config
5. Visual Options
6. Visual Option on X-Y-Z View
7. Using Initial parameters
8. Toolbar Buttons
9. Email and Print Buttons
10. Types of Wells with a single section
11. Types of Wells with multiple sections
12. Wells with multiple targets
13. Wells with multiple targets and different azimuths
14. Well with angle rate = 0 deg / 100 ft

The Well Planning uses Multiple Sections to build the well. (limited to 10 sections)

Initial Data:

Kick Off Point
Initial Departure
Initial Azimuth
Initial N/S

Previous Data:

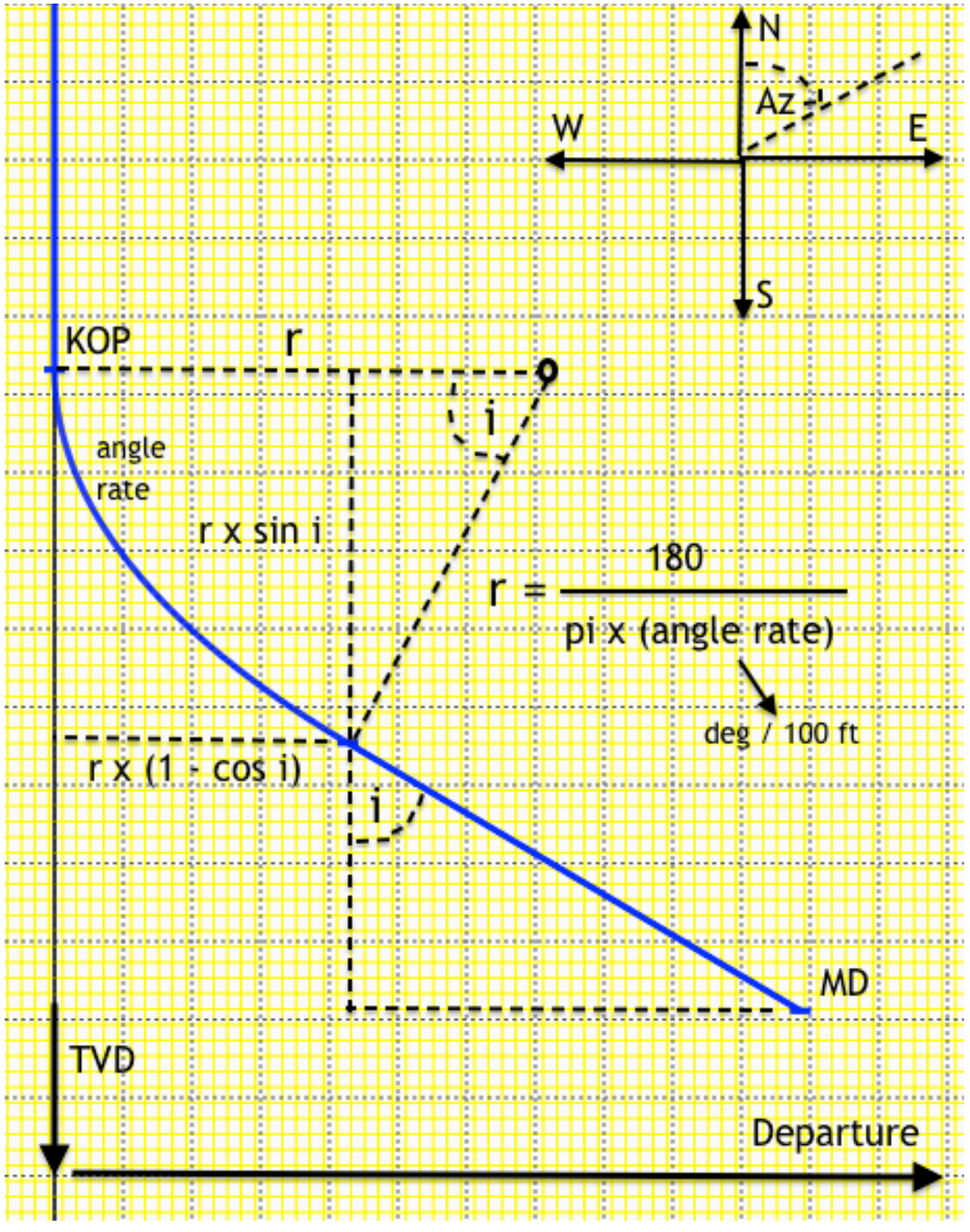
Initial Inclination
Initial TVD
Initial MD
Initial Azimuth
Initial N/S
Initial E/W

Section Parameters:

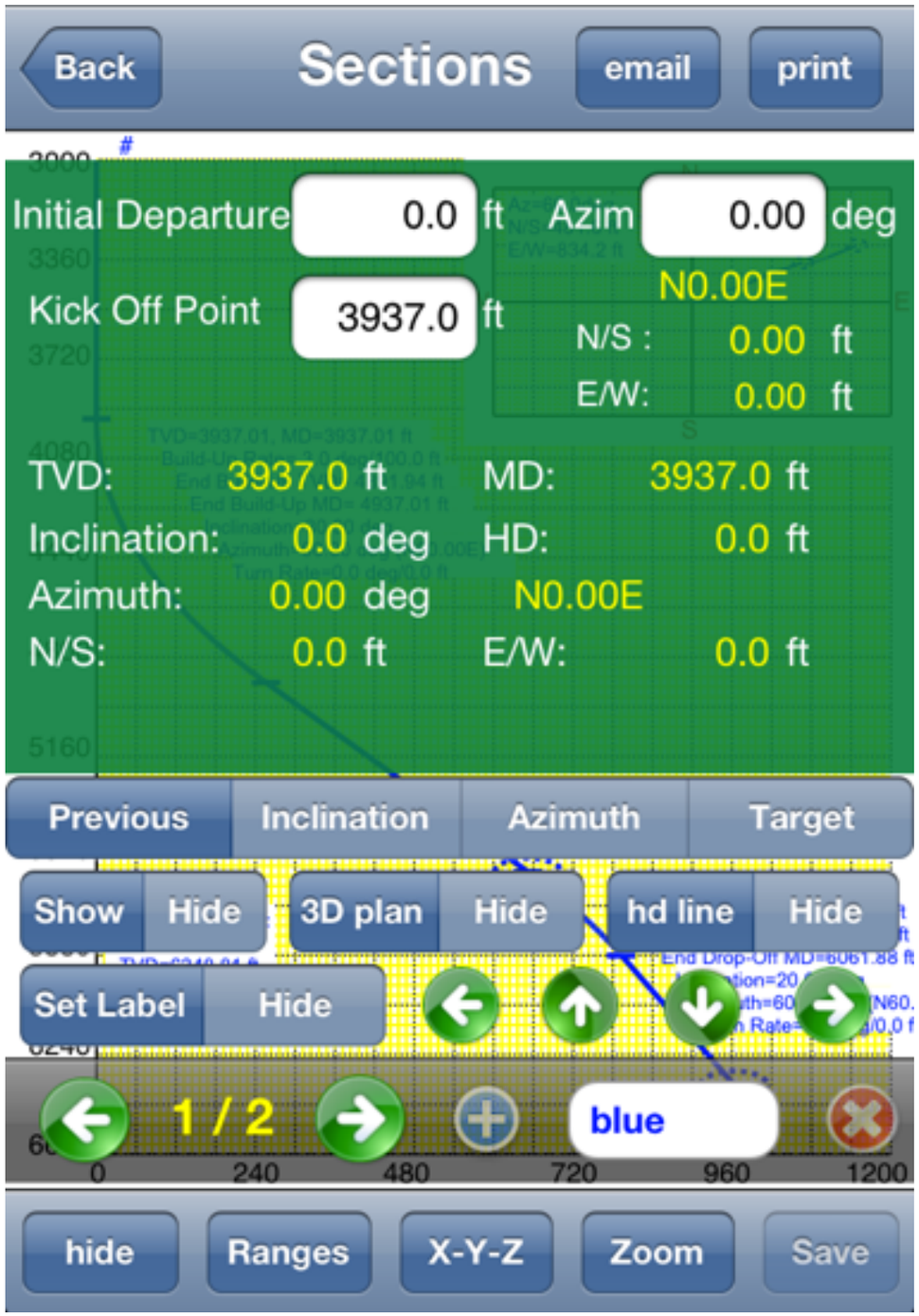
Build-Up Rate
End Build-Up TVD / MD
Inclination
Hold until TVD / MD
Horizontal Displacement
Azimuth
Turn Rate
Horizontal Departure
N/S
E/W

Target:

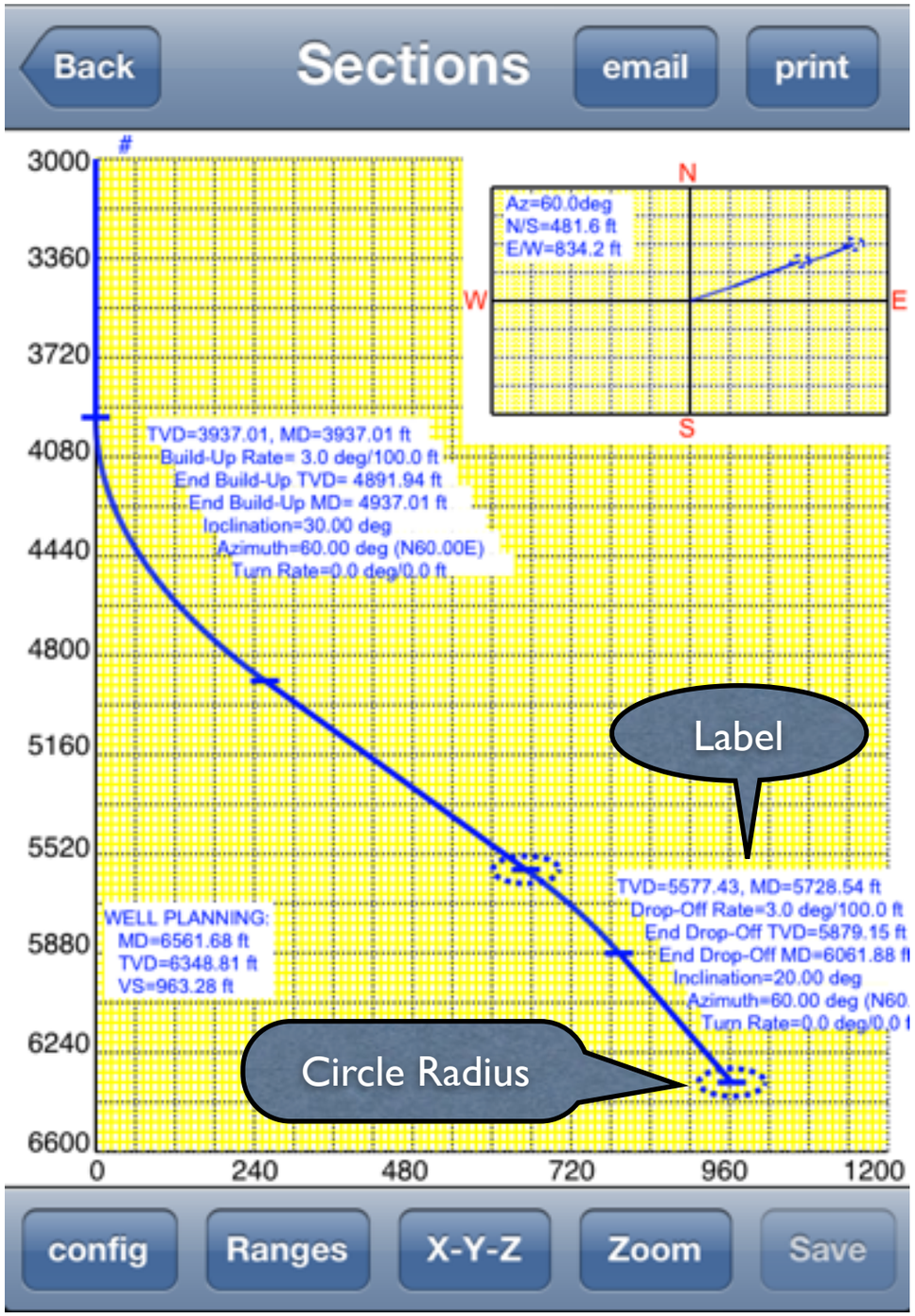
Target TVD
Target MD
Vertical Section
Target Azimuth
Target N/S
Target E/W



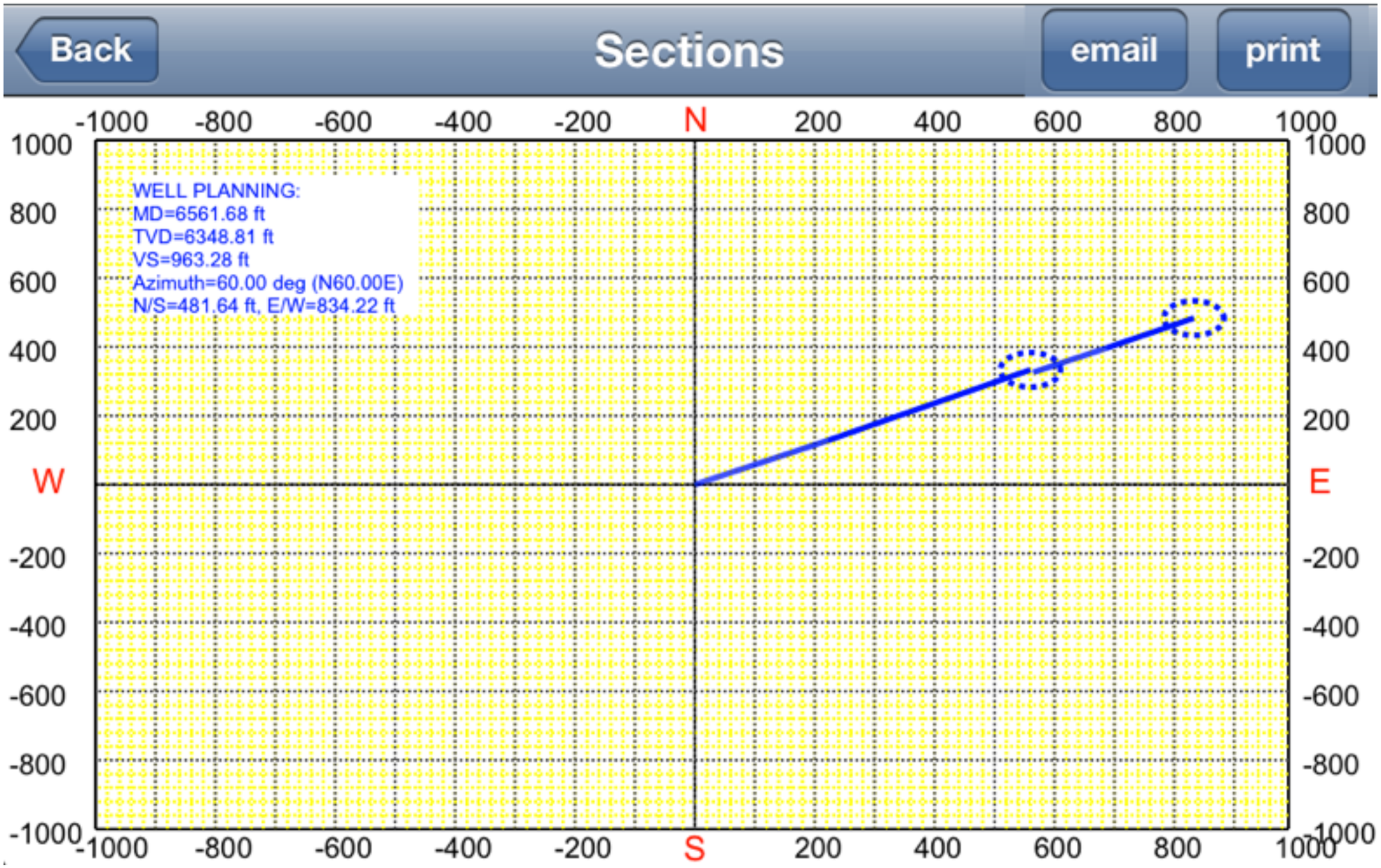
Important: **Use this position to edit parameters**



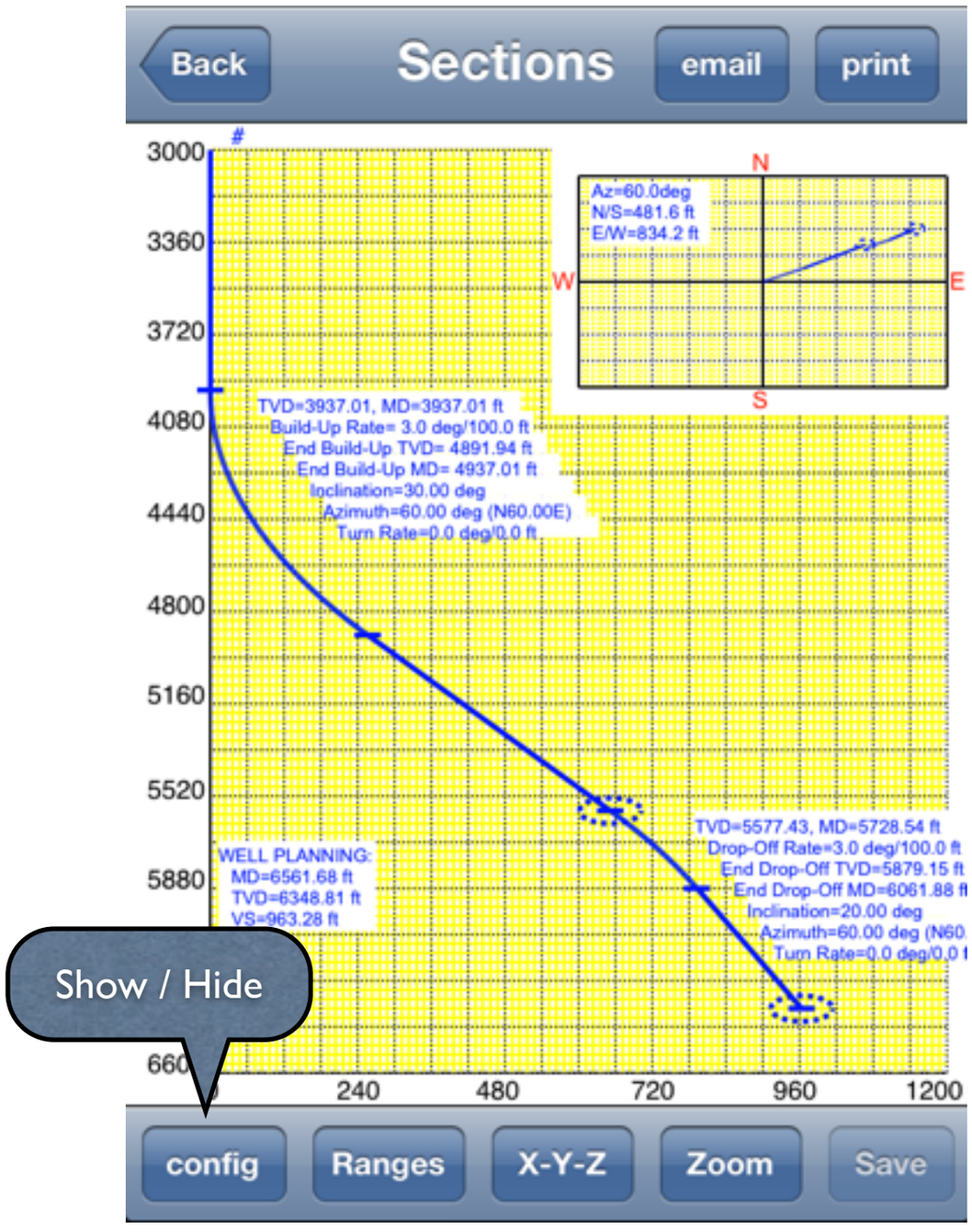
Show the Vertical View and Mini Plan View (optional)

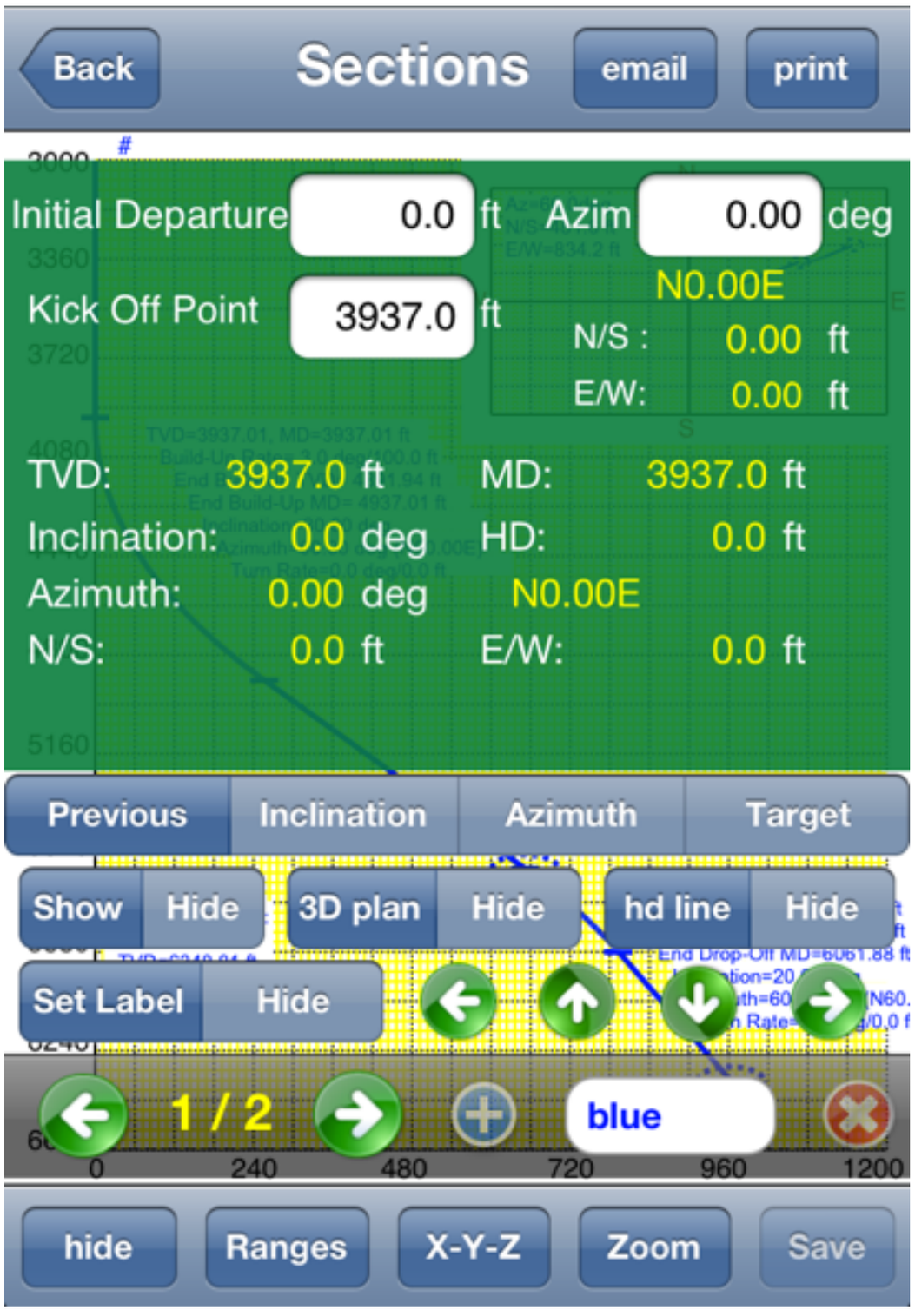


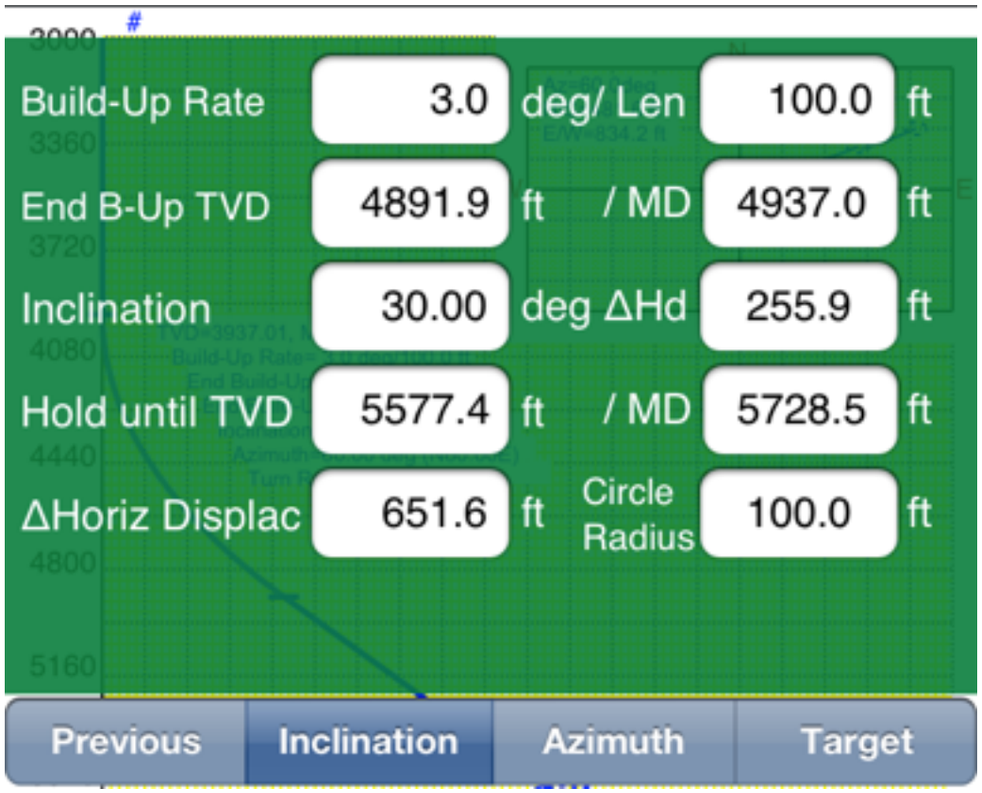
Show the Plan View



Tap on the options Previous, Inclination and Azimuth to edit parameters







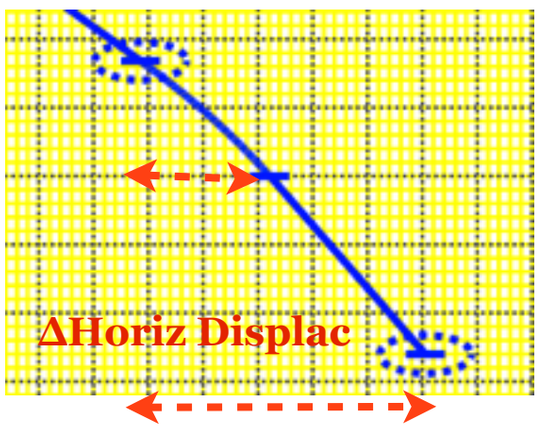
Build-up rate, deg/100 ft or deg/30 m

Note: If Inclination < Previous Inclination

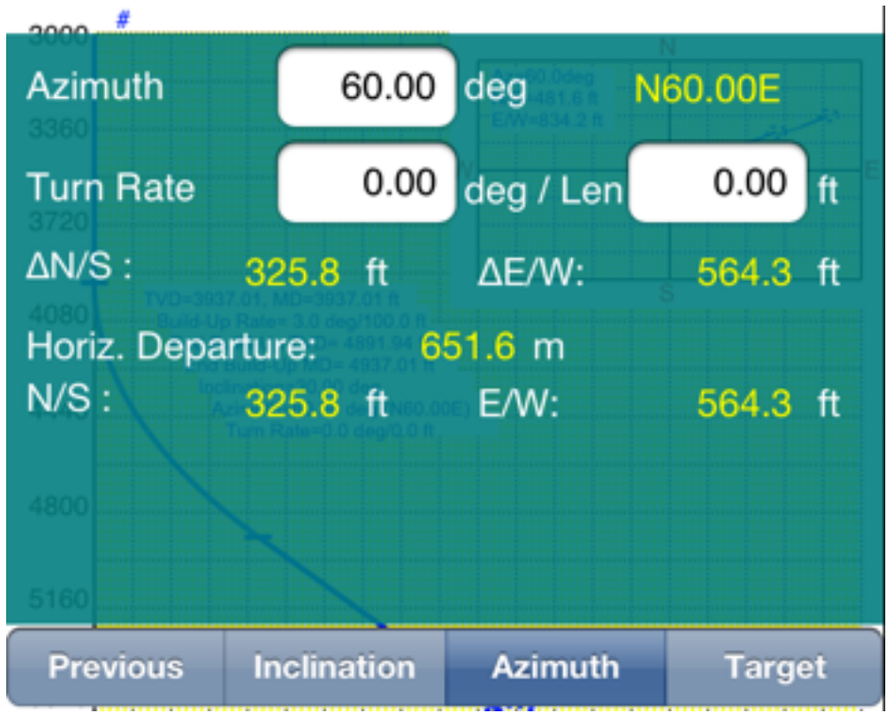
The terms changes to “Drop-Off Rate” and “End D-Off TVD”

ΔHD = Relative to Build-up/Drop-off

ΔHoriz Displacement = Relative to the section

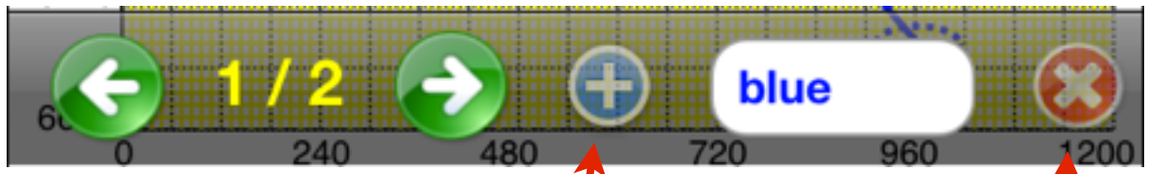


Azimuth: Set azimuth and turn rate (deg/100 ft, deg/ 30 m)



Target: Total Result of the well planning

Current / Total



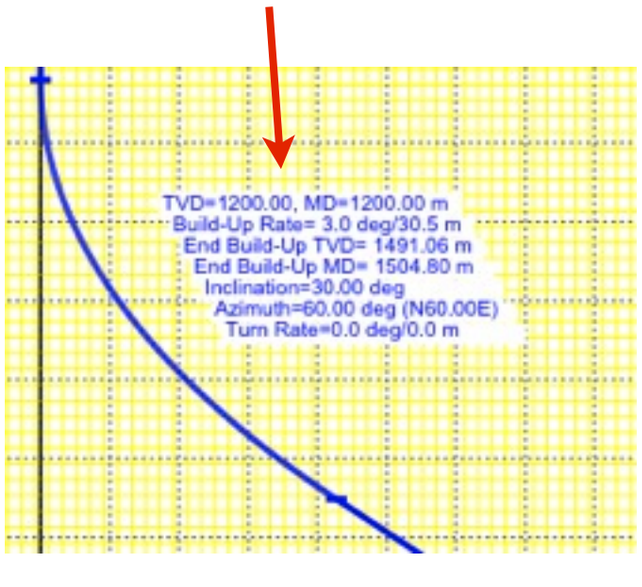
Add new section

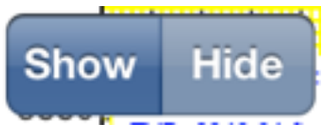
Remove section

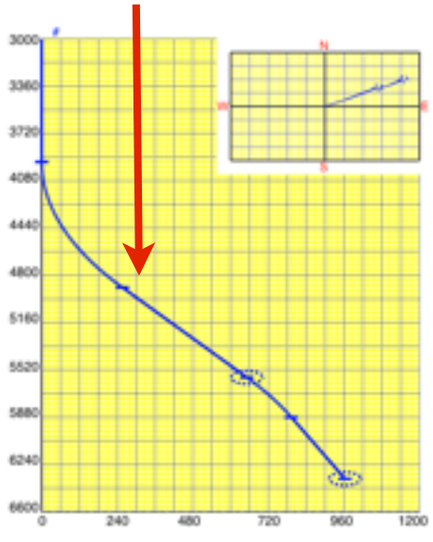
* This buttons are enabled for **Current = Total**

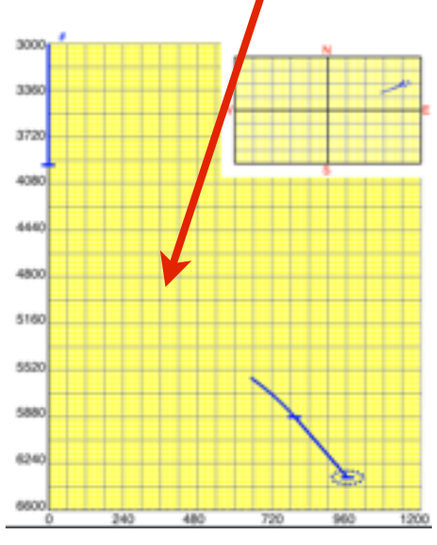
Select the line color

Move the position of the label on the graph

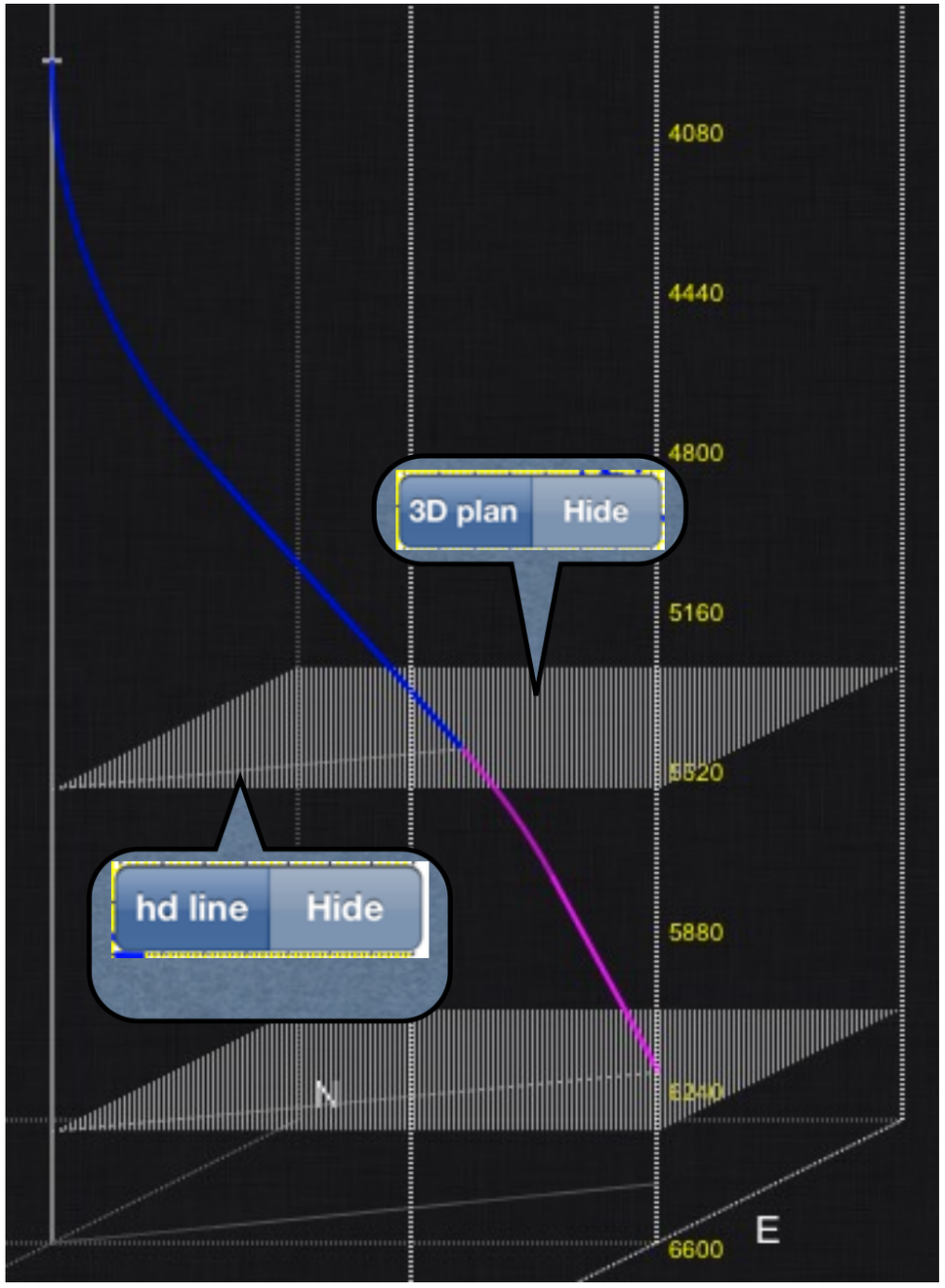


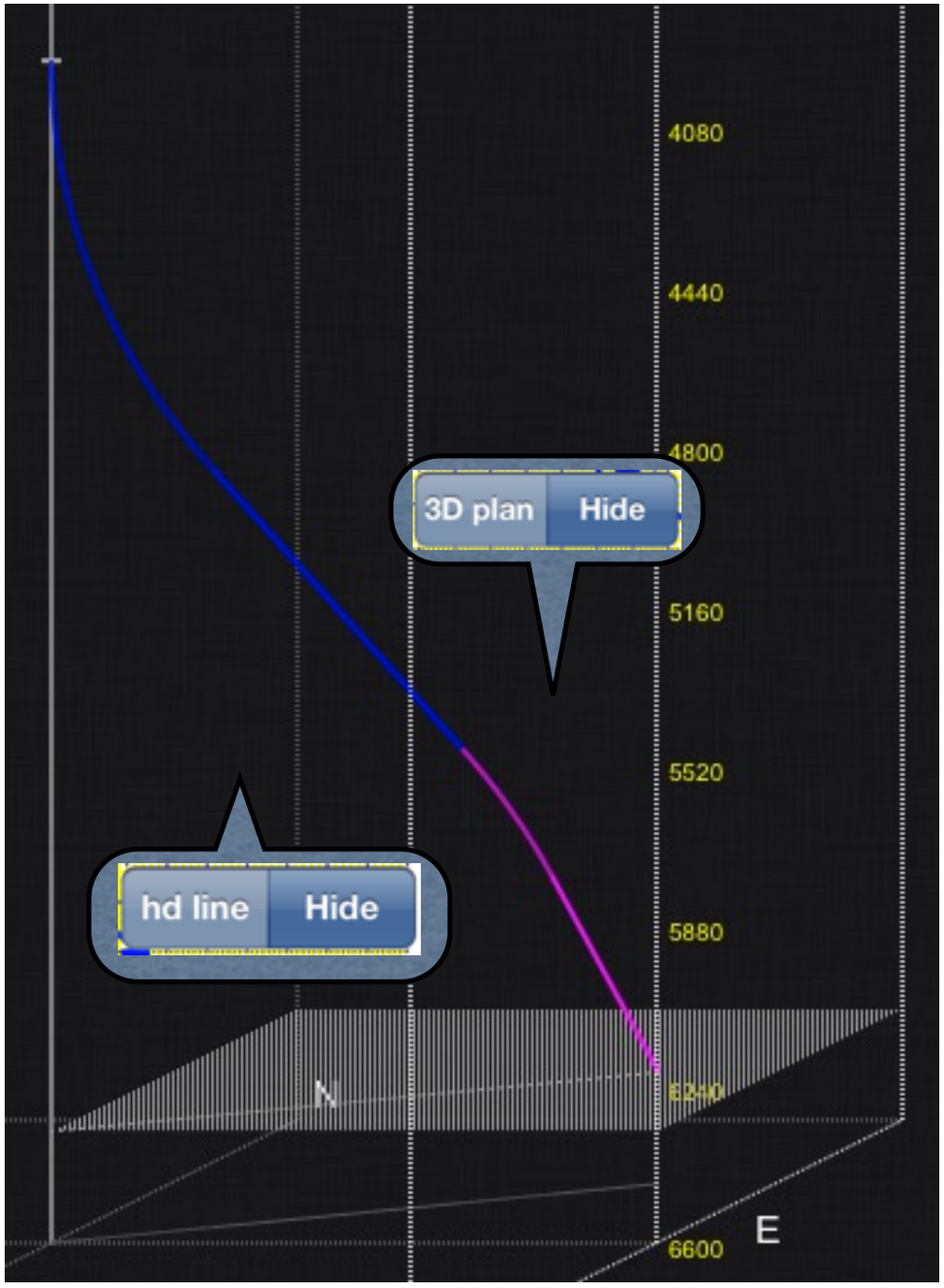


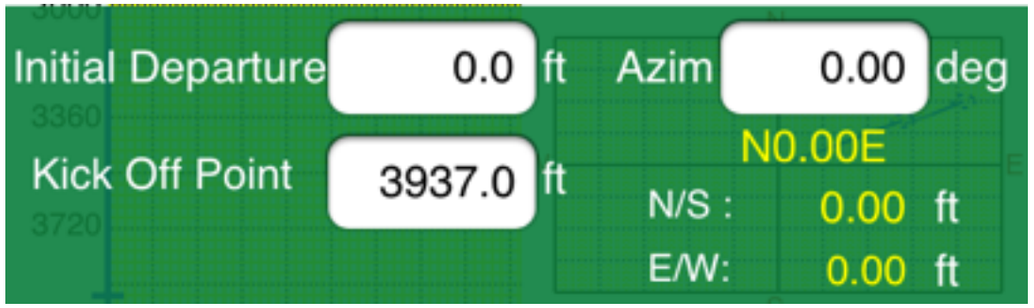


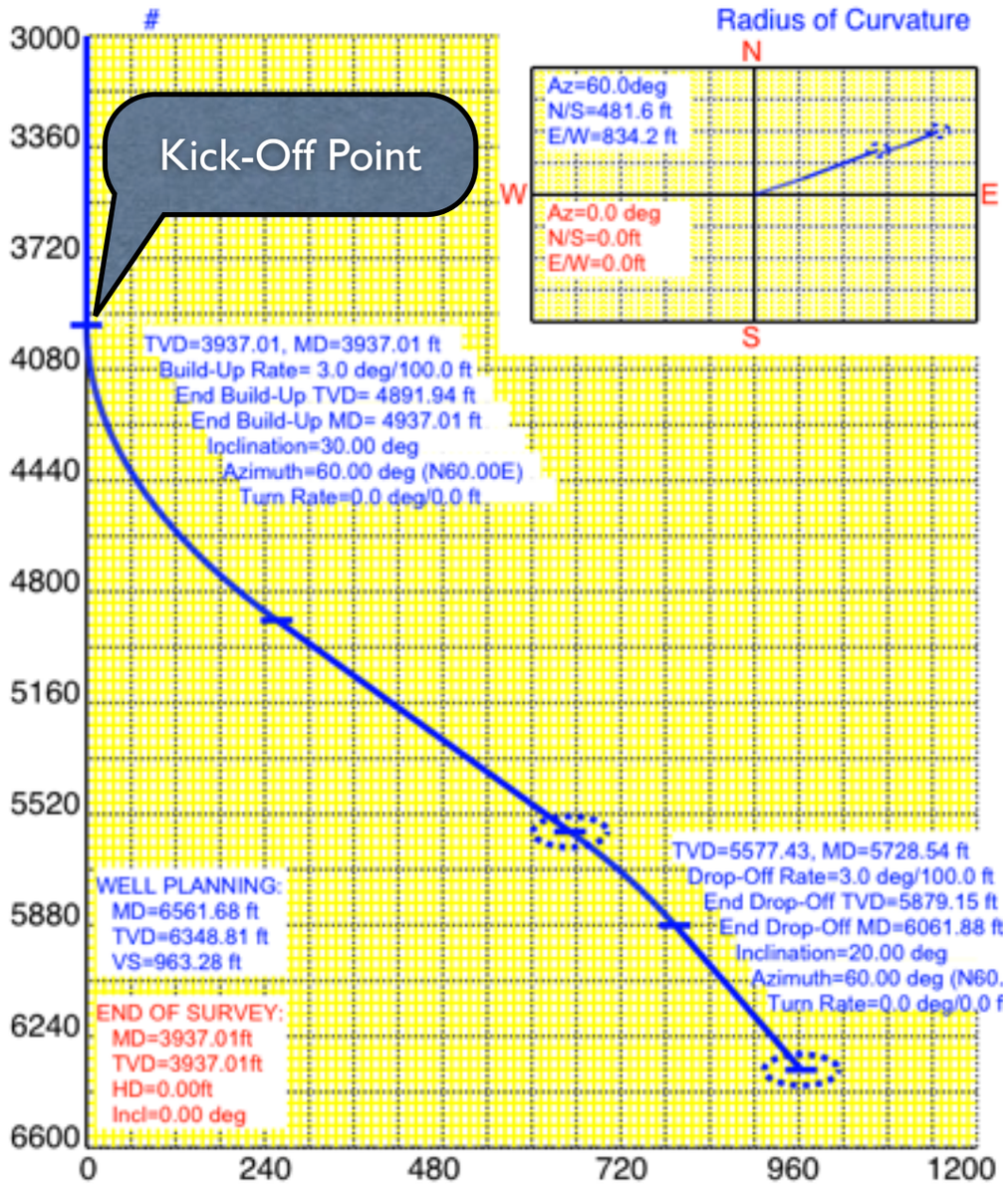


3D Plan and Horizontal Departure Line

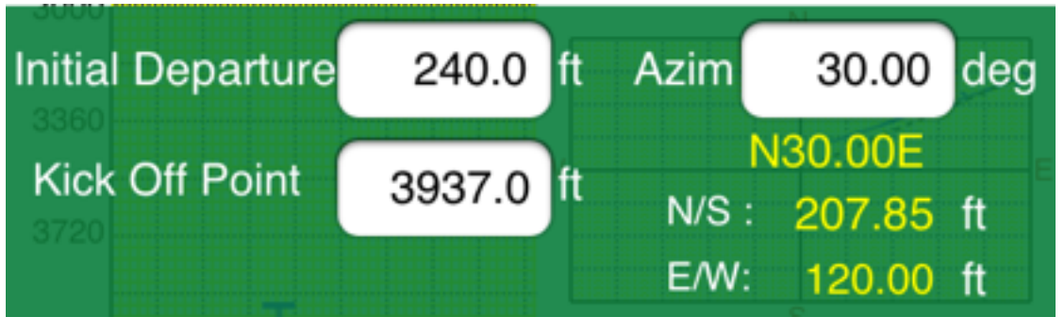


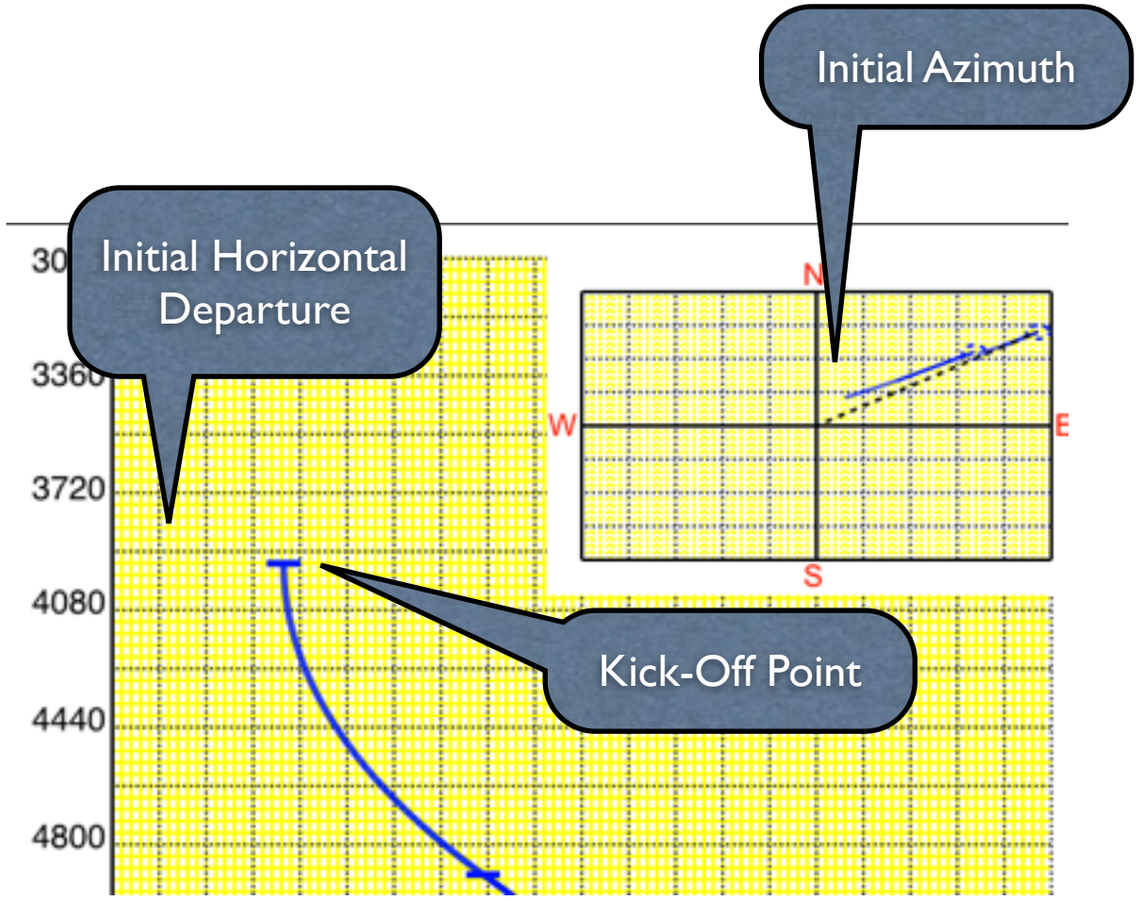




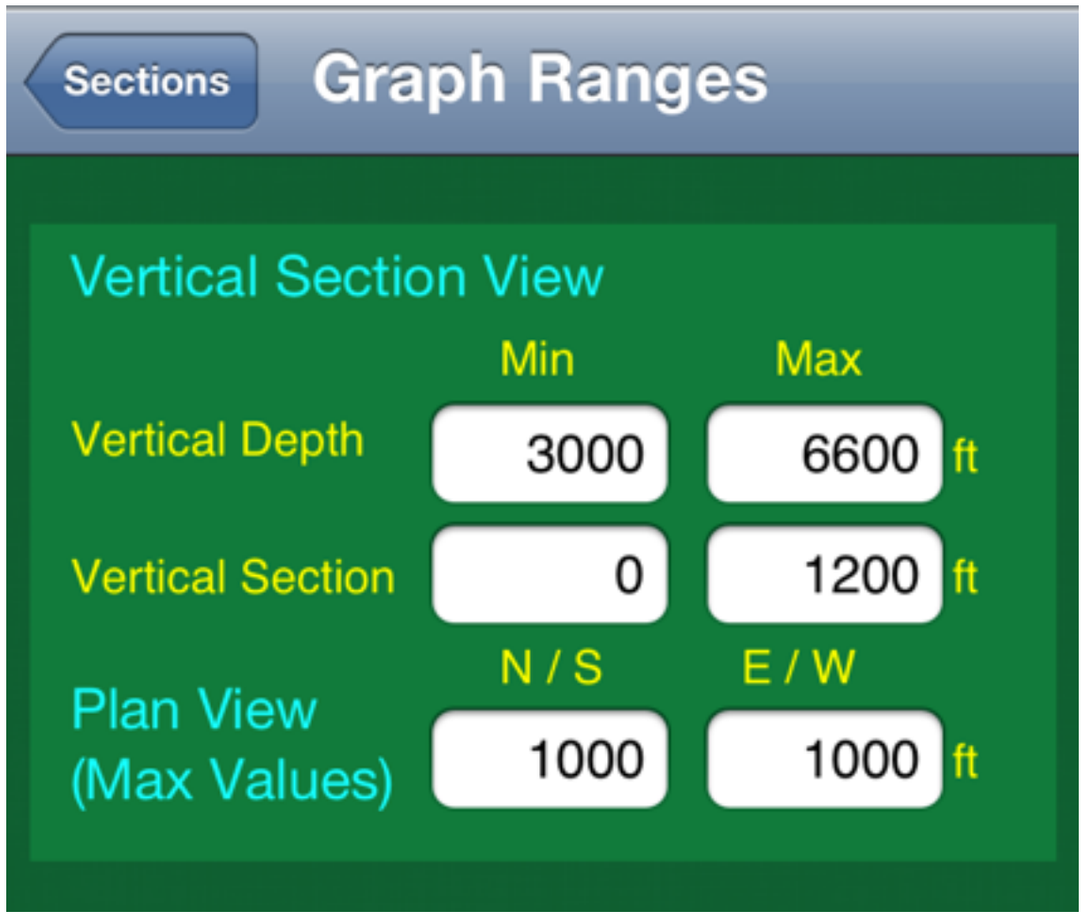


Initial Horizontal Departure
and **Initial Azimuth**
are useful to plot multiple wells

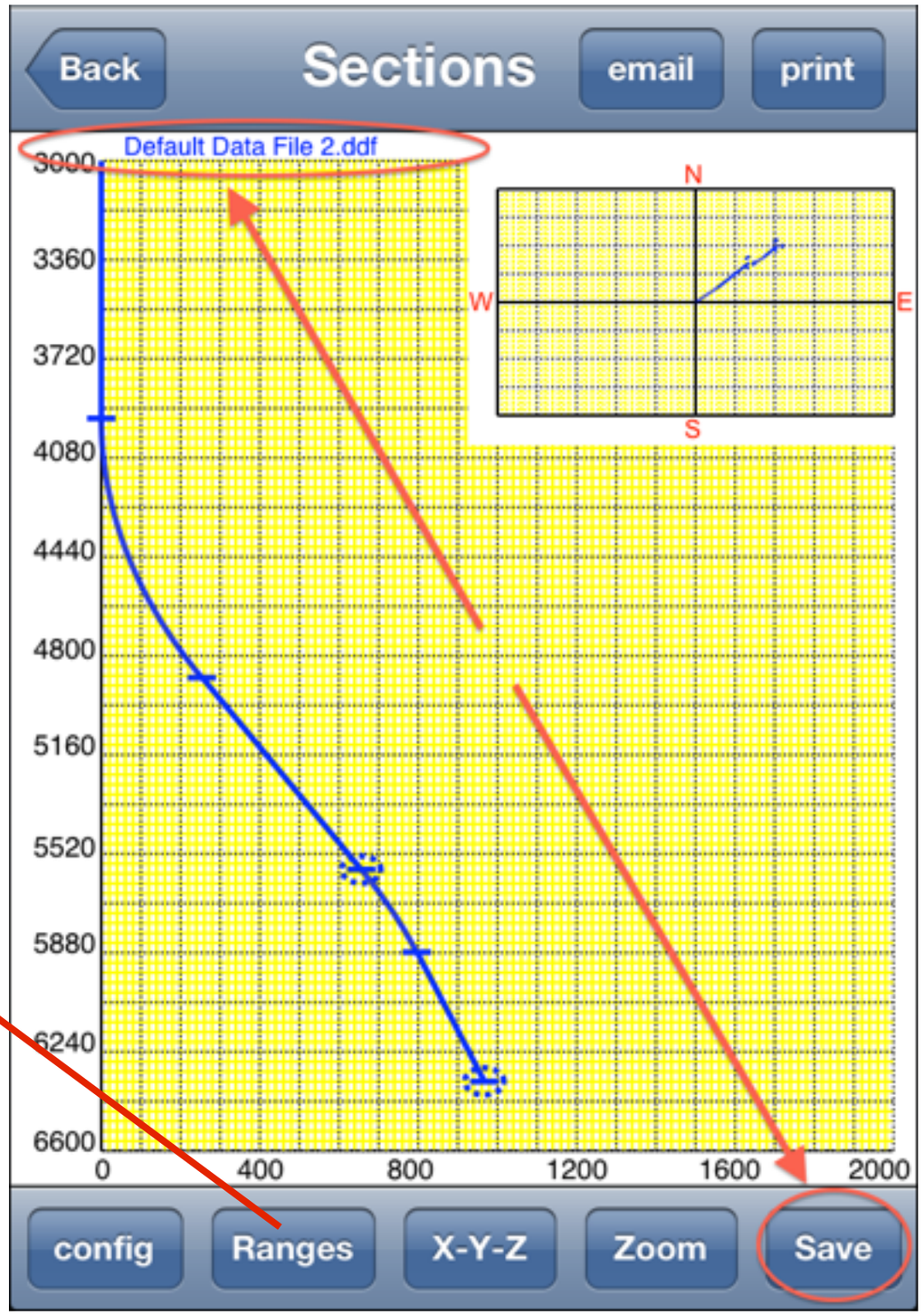




Graph Ranges



Save Button



Email: Attach the Well Planning Data and a screenshot

Data File: *Default Data File 2*

WELL PLANNING:

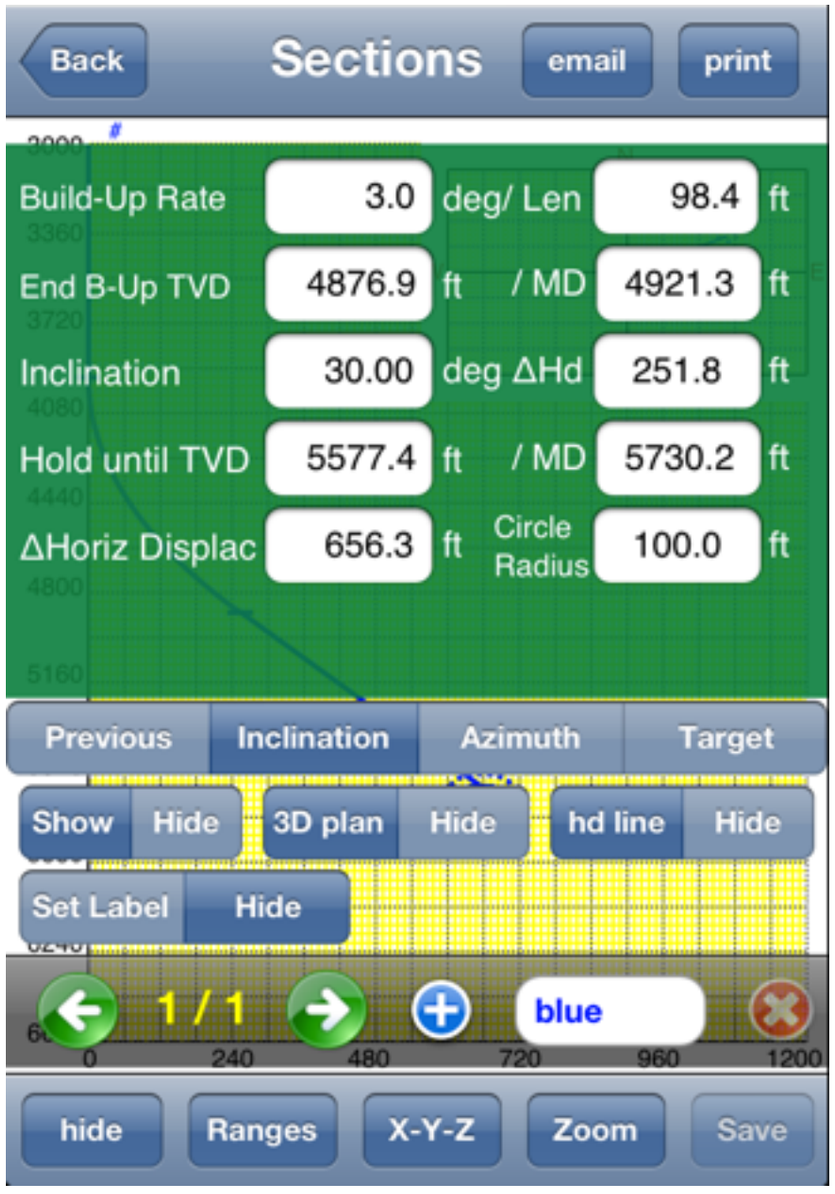
Kick Off Point = 3937.01 ft
Initial Departure = 0.00 ft
Initial Azimuth = 0.00 degree (N0.00E)
Initial N/S = 0.00 ft
Initial E/W = 0.00 ft

TOTAL SECTIONS: 2

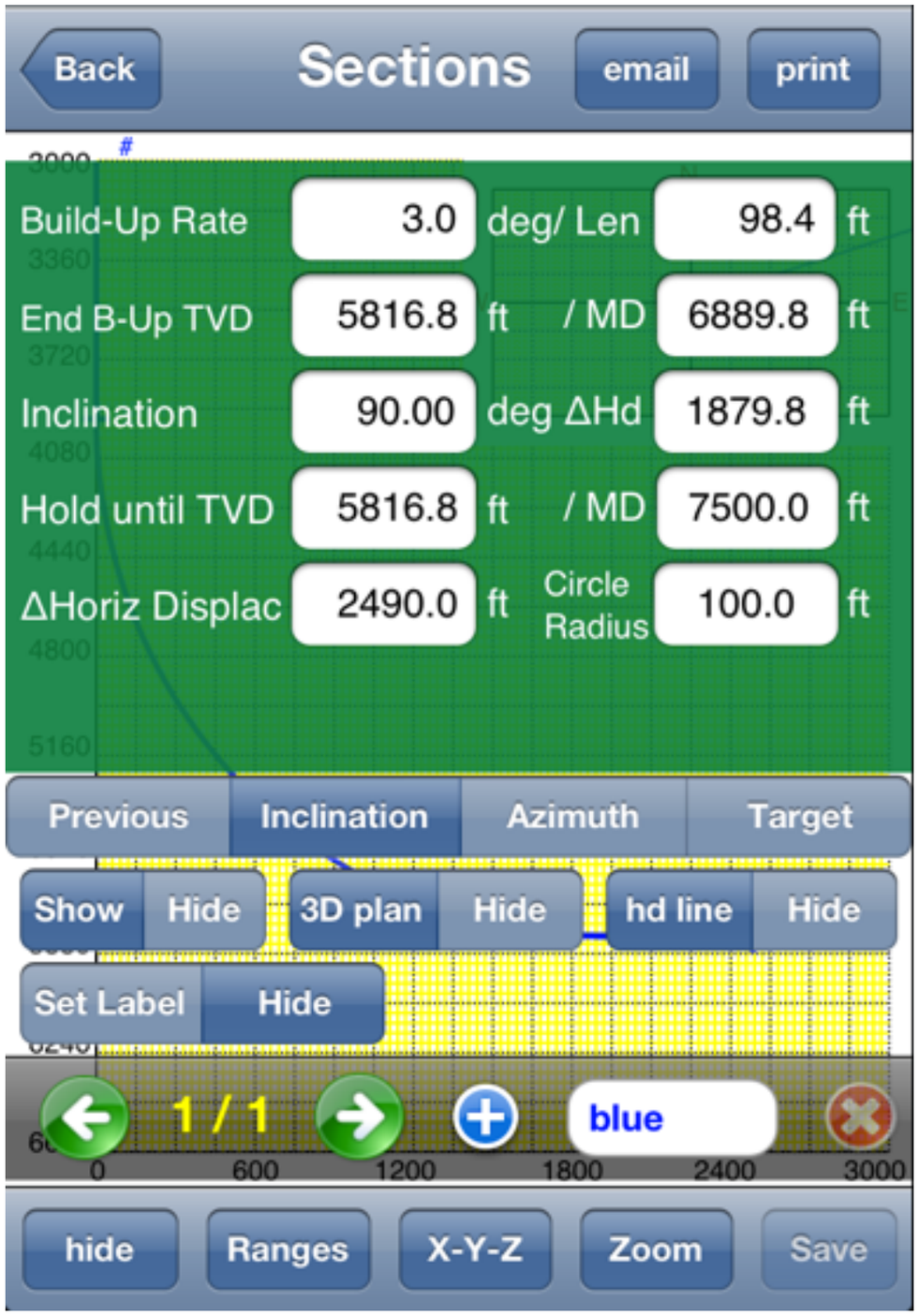
Print: Select the Air printer to print a screenshot

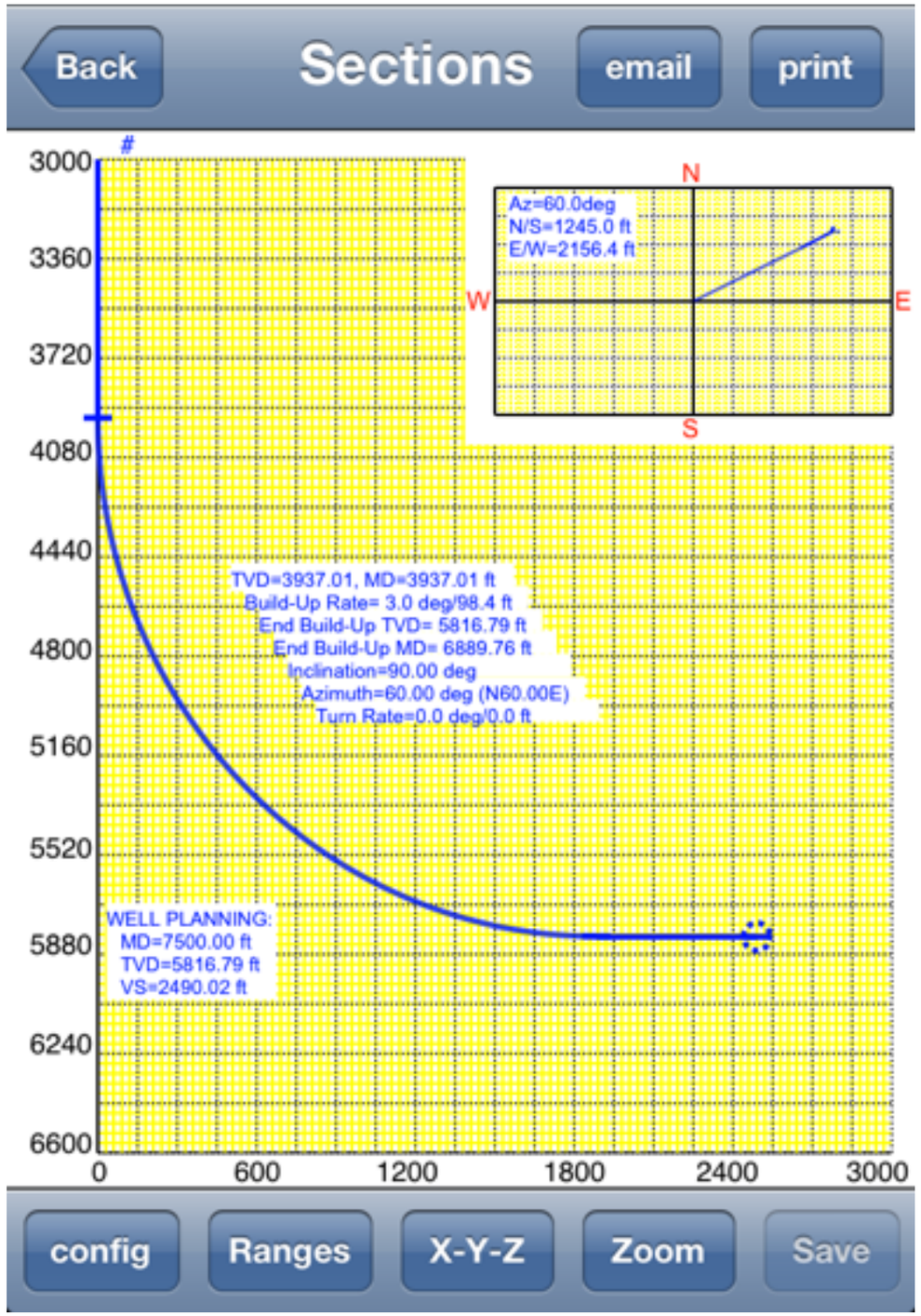
With the Multiple Sections Feature is possible to build any type of well

Use 01 section only for Wells type **SLANT** (inclination < 90 degree)



Use 01 section only for **Horizontal Well**
(inclination = 90 degree)

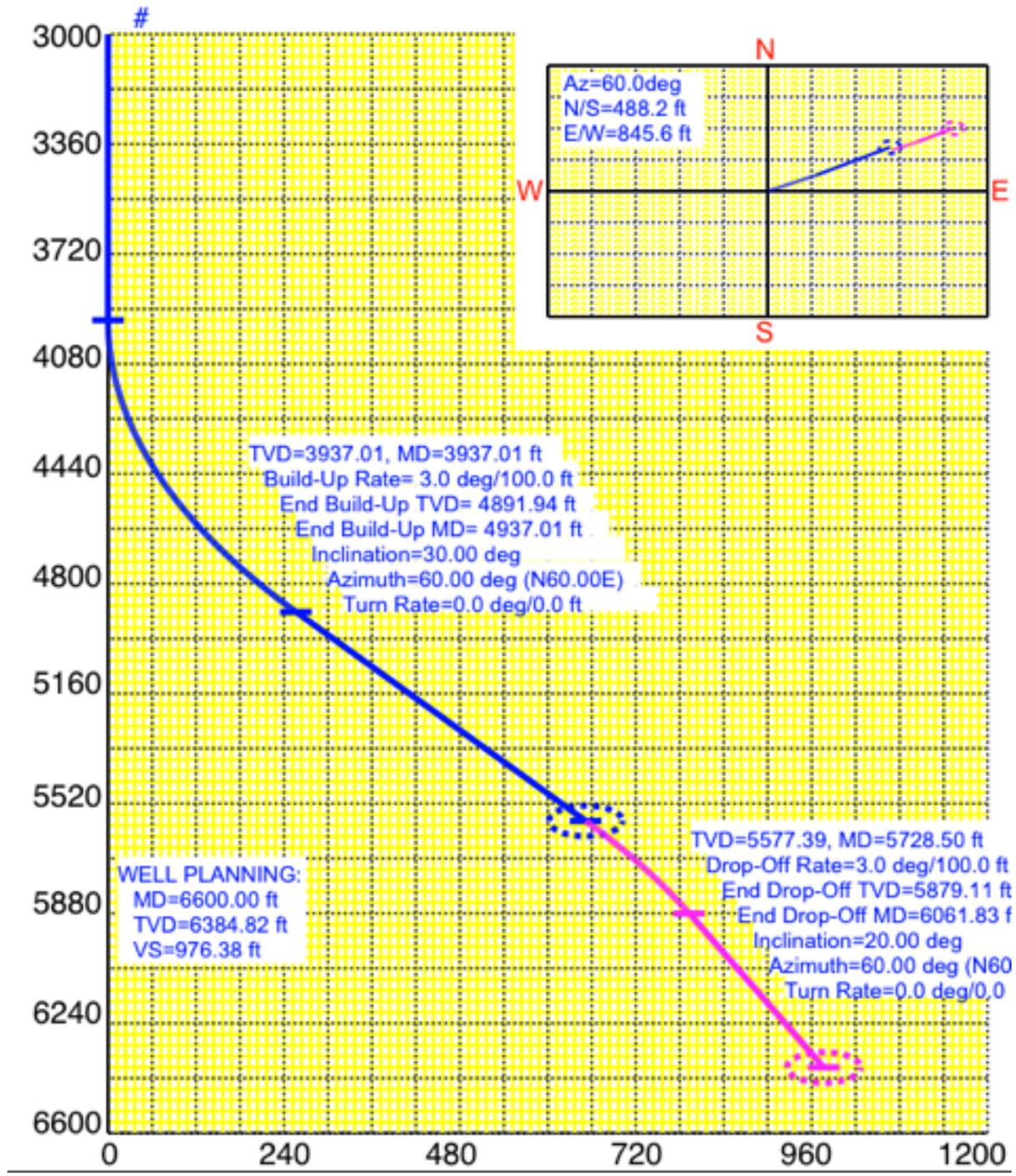




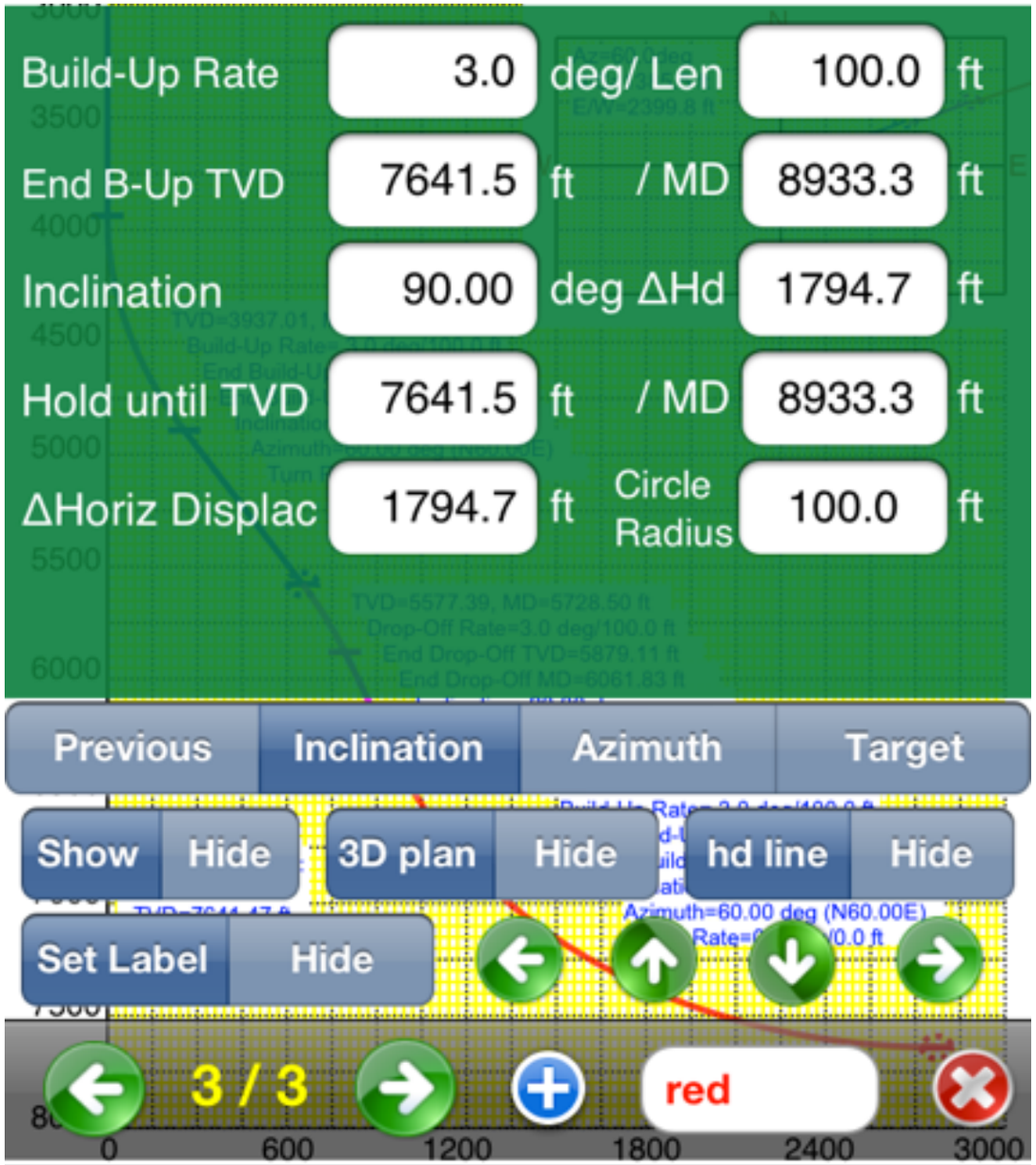
Use 02 sections for Wells Type **S-Curve**

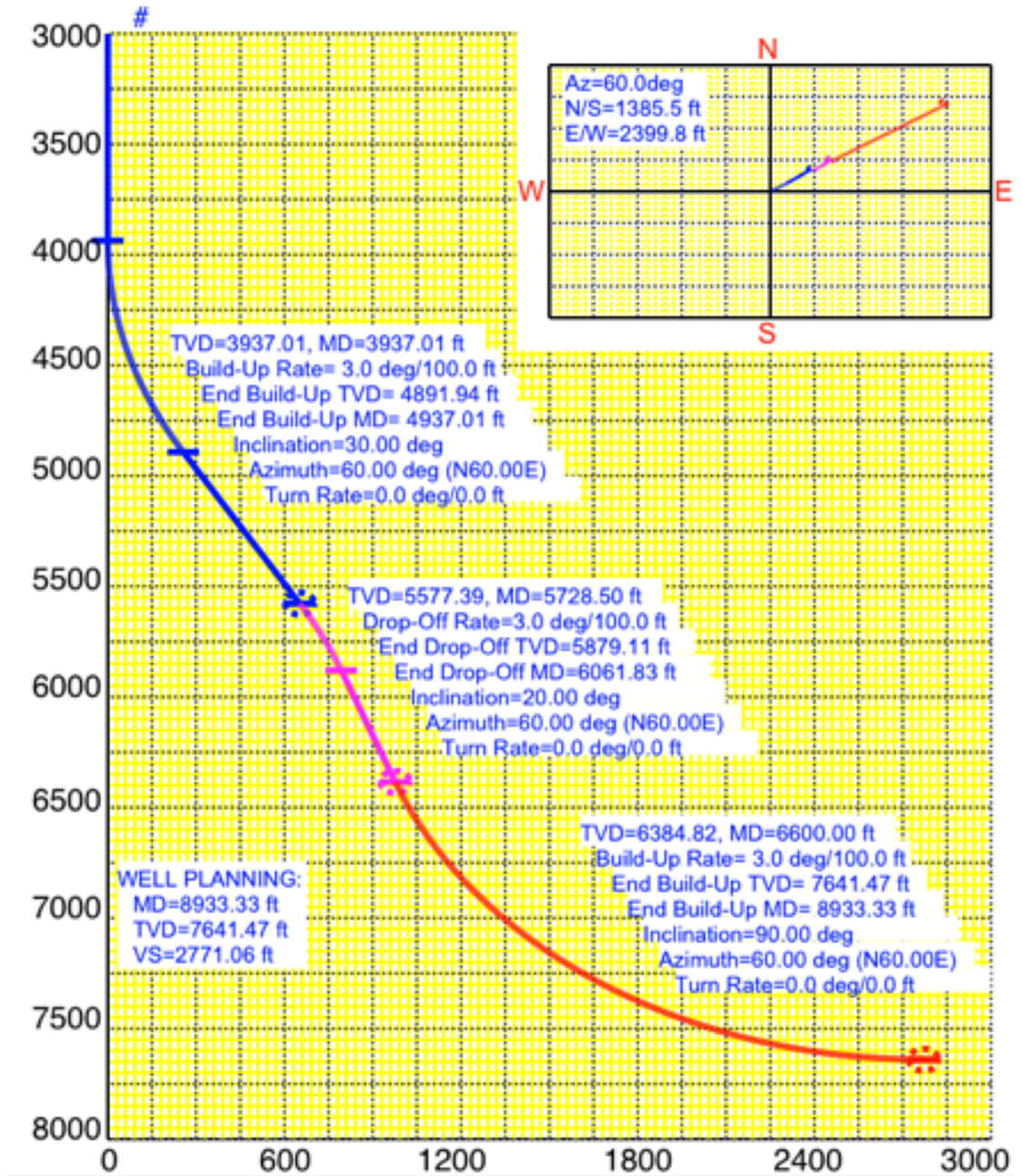
Build-Up Rate	3.0	deg/ Len	100.0	ft
End B-Up TVD	4891.9	ft	/ MD	4937.0	ft
Inclination	30.00	deg	ΔHd	255.9	ft
Hold until TVD	5577.4	ft	/ MD	5728.5	ft
ΔHoriz Displac	651.6	ft	Circle Radius	100.0	ft

Drop-Off Rate	3.0	deg/ Len	100.0	ft
End D-Off TVD	5879.1	ft	/ MD	6061.8	ft
Inclination	20.00	deg	ΔHd	140.7	ft
Hold until TVD	6384.8	ft	/ MD	6600.0	ft
ΔHoriz Displac	324.8	ft	Circle Radius	100.0	ft



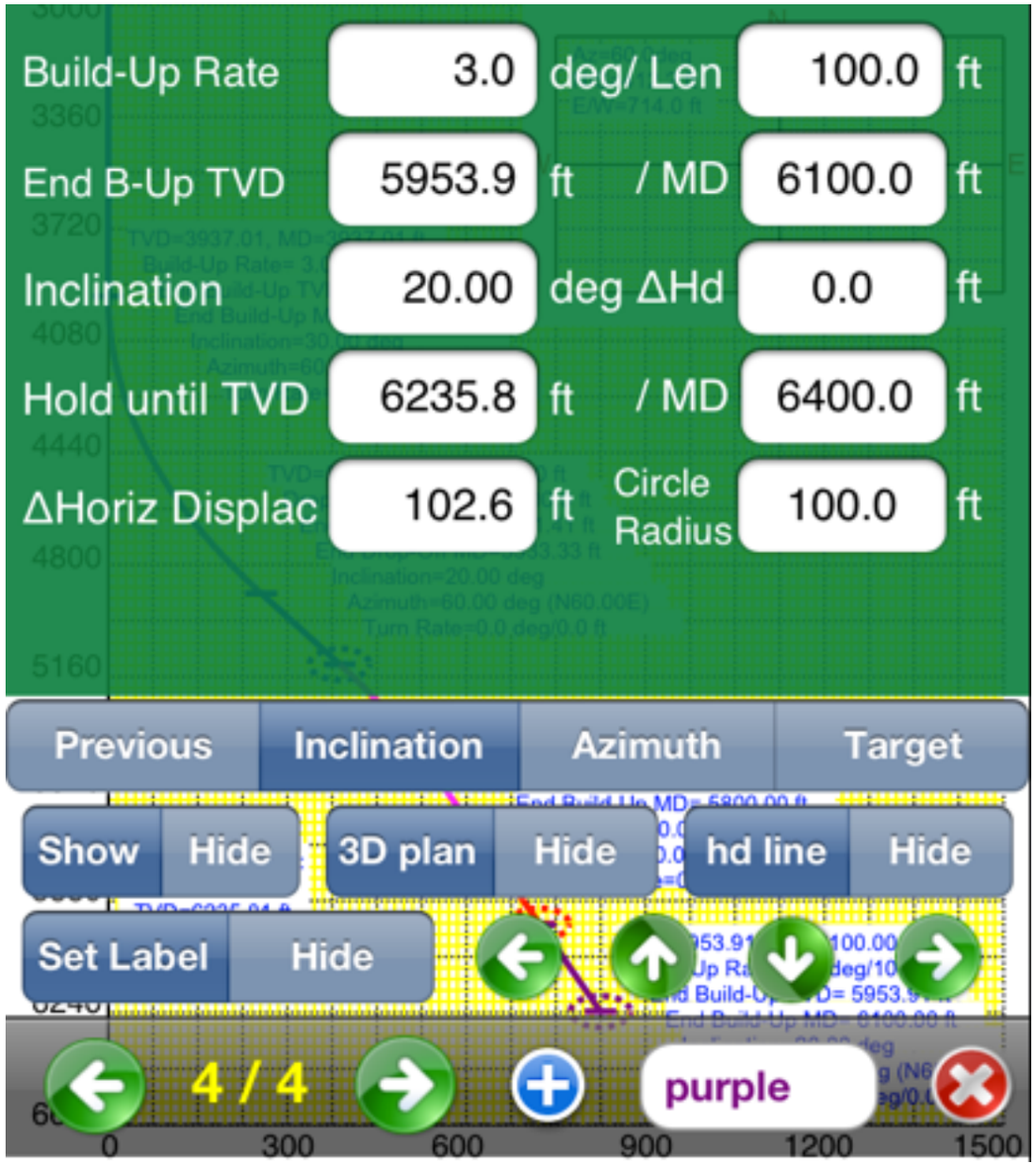
Use any section for Horizontal Type

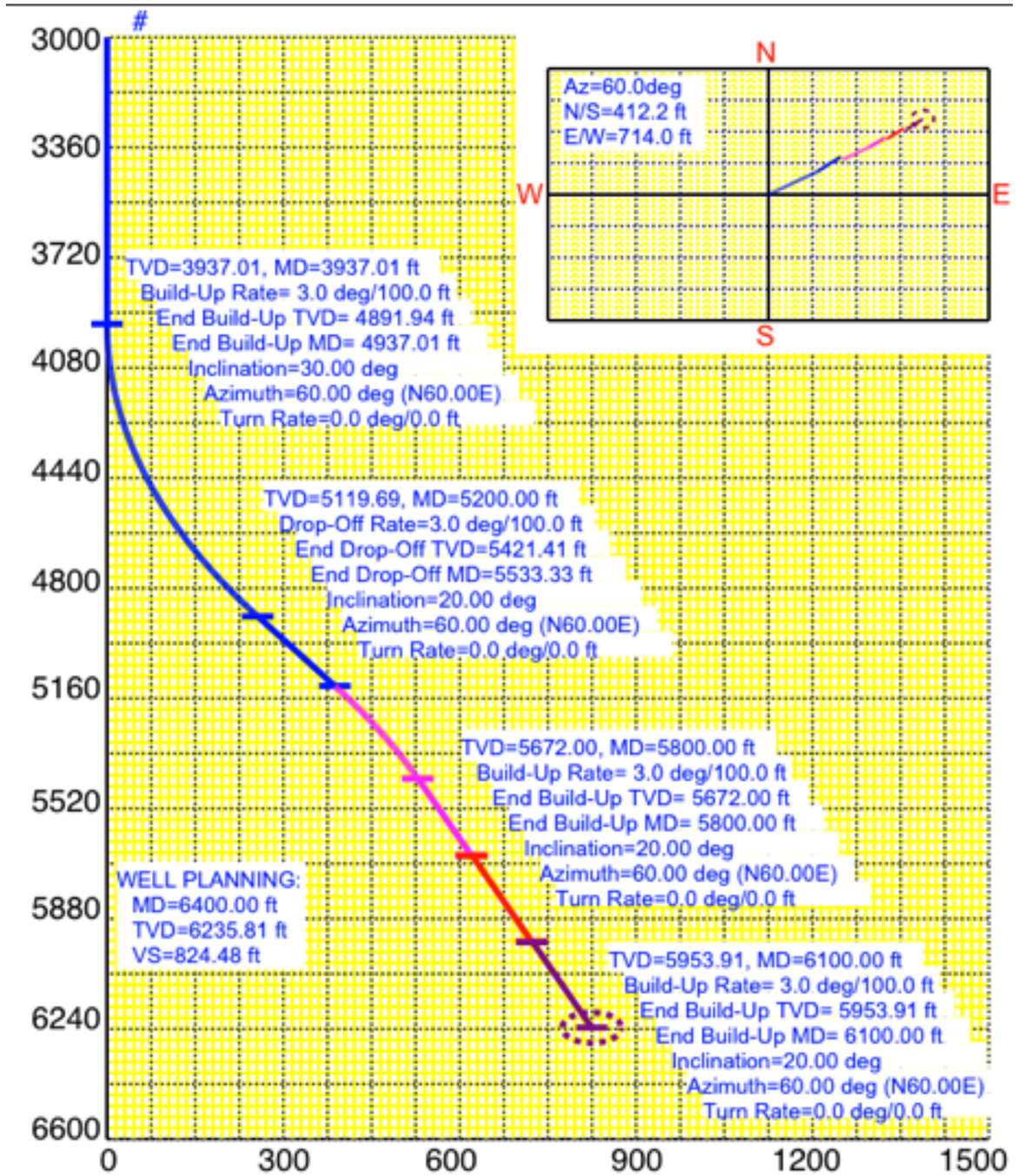




With the Multiple Sections Feature is possible to build any type of well.

This app is limited to 10 sections



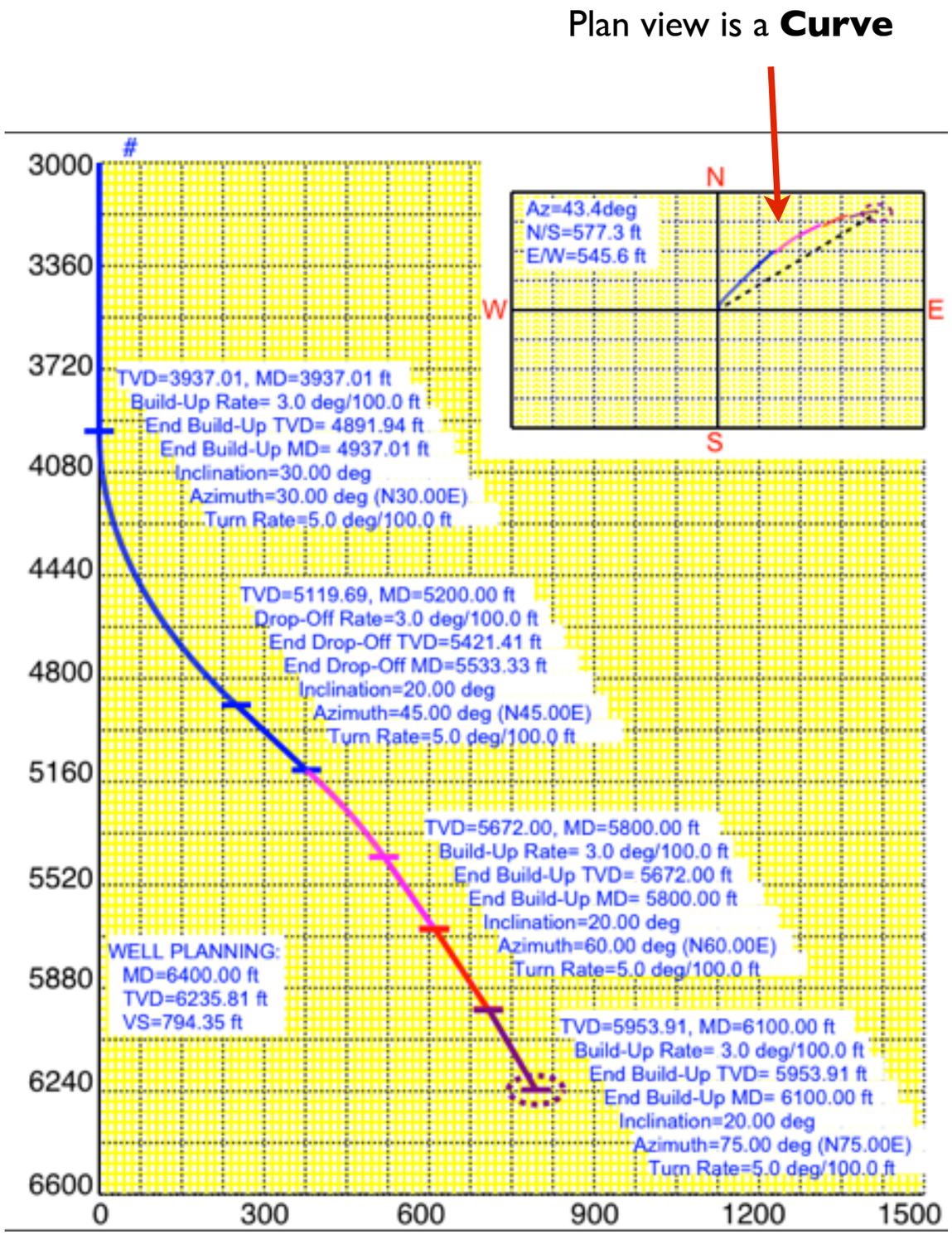


It is possible to set different azimuths and different turn rates for each section.

Exemple with 04 sections:

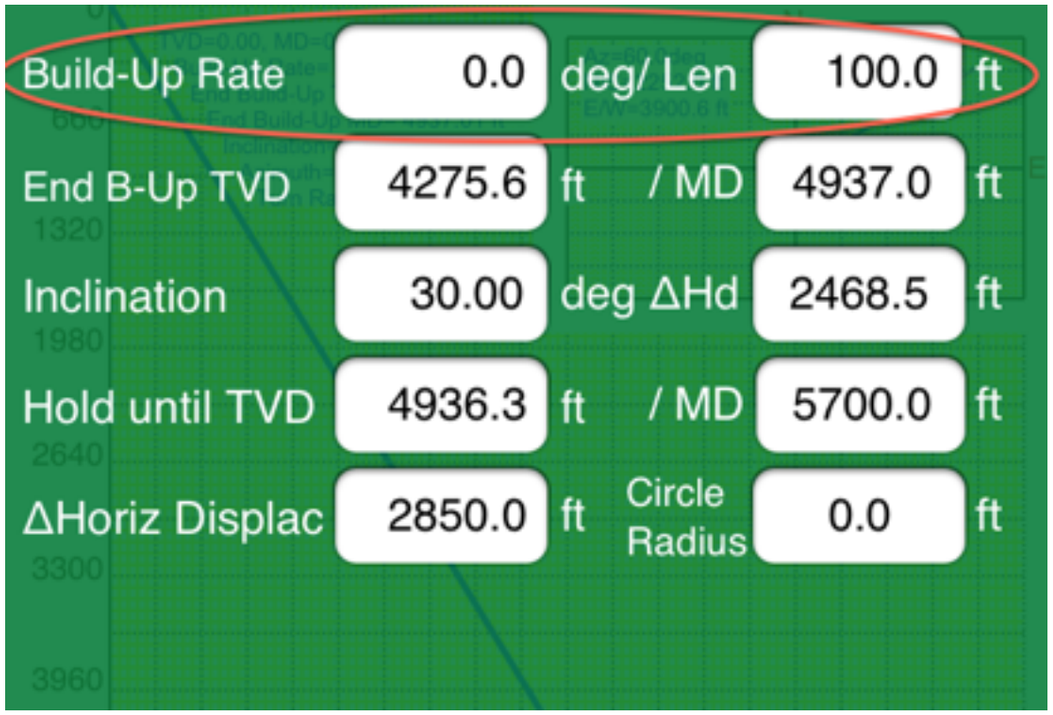
Initial Azimuth = 0 deg

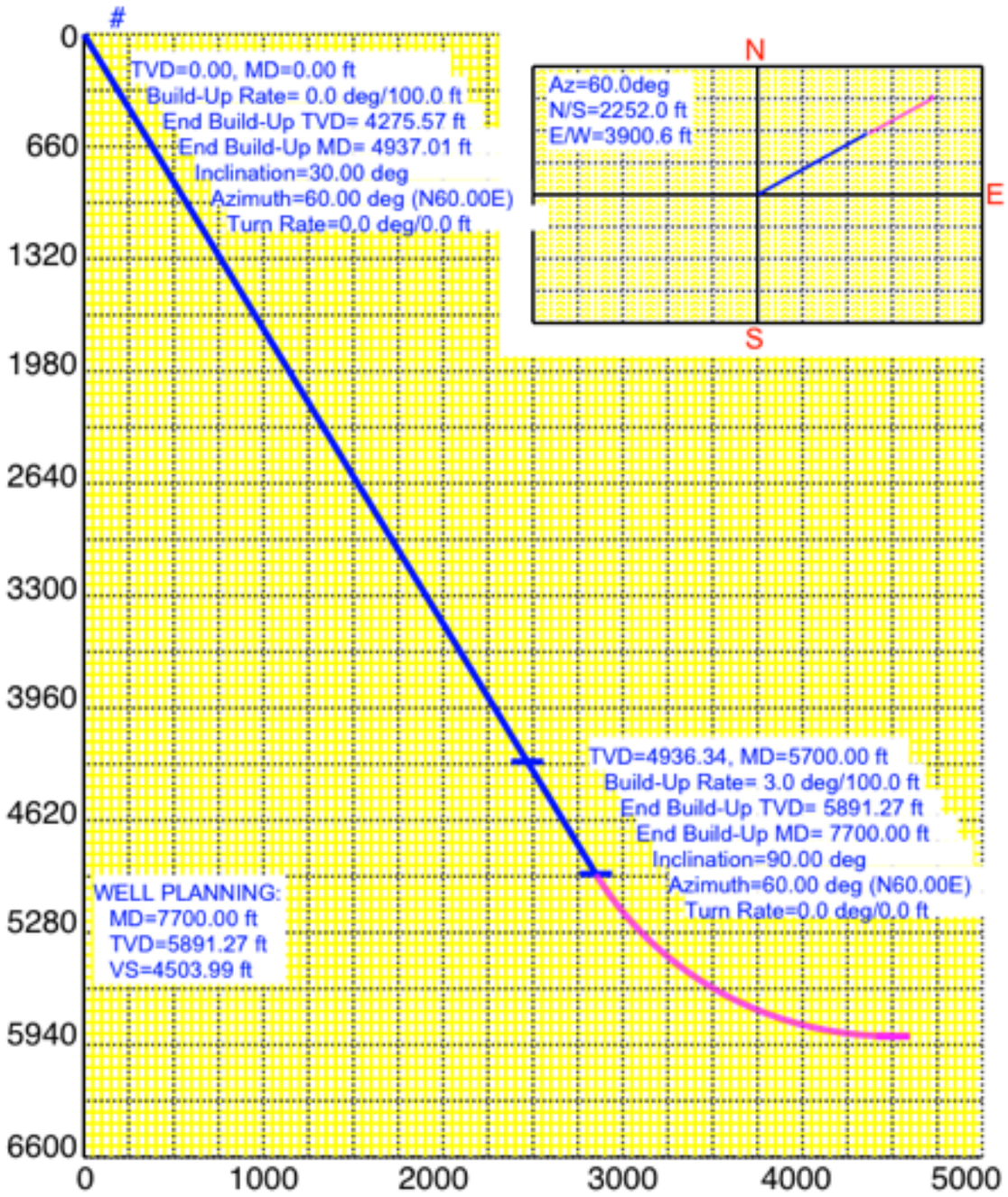
Azimuth 1 = 30 deg @ 3 deg / 100 ft
Azimuth 2 = 45 deg @ 4 deg / 100 ft
Azimuth 3 = 60 deg @ 5 deg / 100 ft



It is possible to set

angle rate = 0 deg / 100 ft





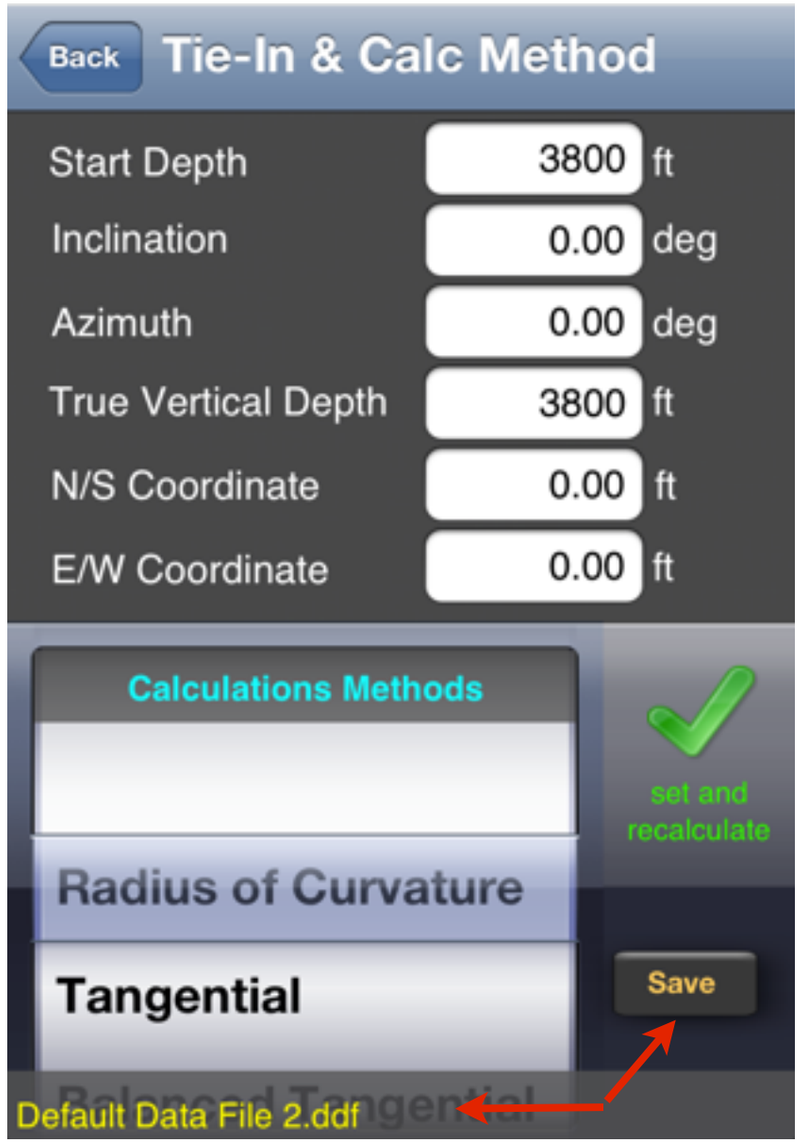
Tie-In - Term used in this app as the first survey data.

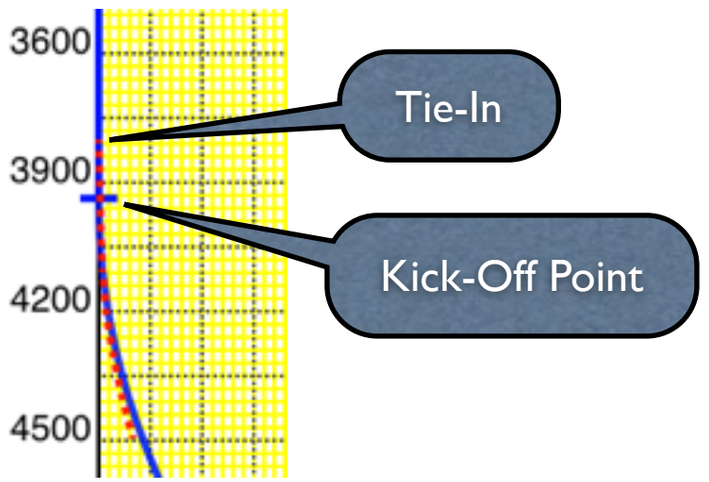
Use this menu item to set or edit the **Tie-In data** and to select the **survey calculation method**.

Tap on ‘set and recalculate’ button to set and to recalculate the survey table in RAM memory.

Tap on ‘Save’ button to save to data file

Note: The ‘Save’ button is enabled when a data file is selected only.





1. Single Well Survey
2. Calculation Methods
3. Adding Survey Data Item
4. Survey Data Table
5. Sending Survey Data Table by Email
6. Editing Survey Data Item
7. Removing Survey Data Item
8. Inserting Survey Data Item
9. Recalculating Survey Data Table
10. Plotting Survey Data
    - 10.1 On Portrait position - Vertical Section
    - 10.2 On Landscape position, Graph Ranges and Survey Recalculation
    - 10.3 Show/Hide Mini Plan View and Labels
    - 10.4 Plotting on X-Y-Z Views
    - 10.5 Plotting with additional points
    - 10.6 Sending Survey Data with Options
11. Exporting Survey Data Table by Email
12. Import / Export Survey Data Table using Mac version
13. Printing Survey Plotting

Before use this feature, selected a data file and set the well planning.

- Define the Tie-In. Use the Tie-In button to set or edit the Tie-In data.
(Term used in this app as the first survey data)

- Use the Data View to Add, Insert, Edit, Save and Remove Survey Data.

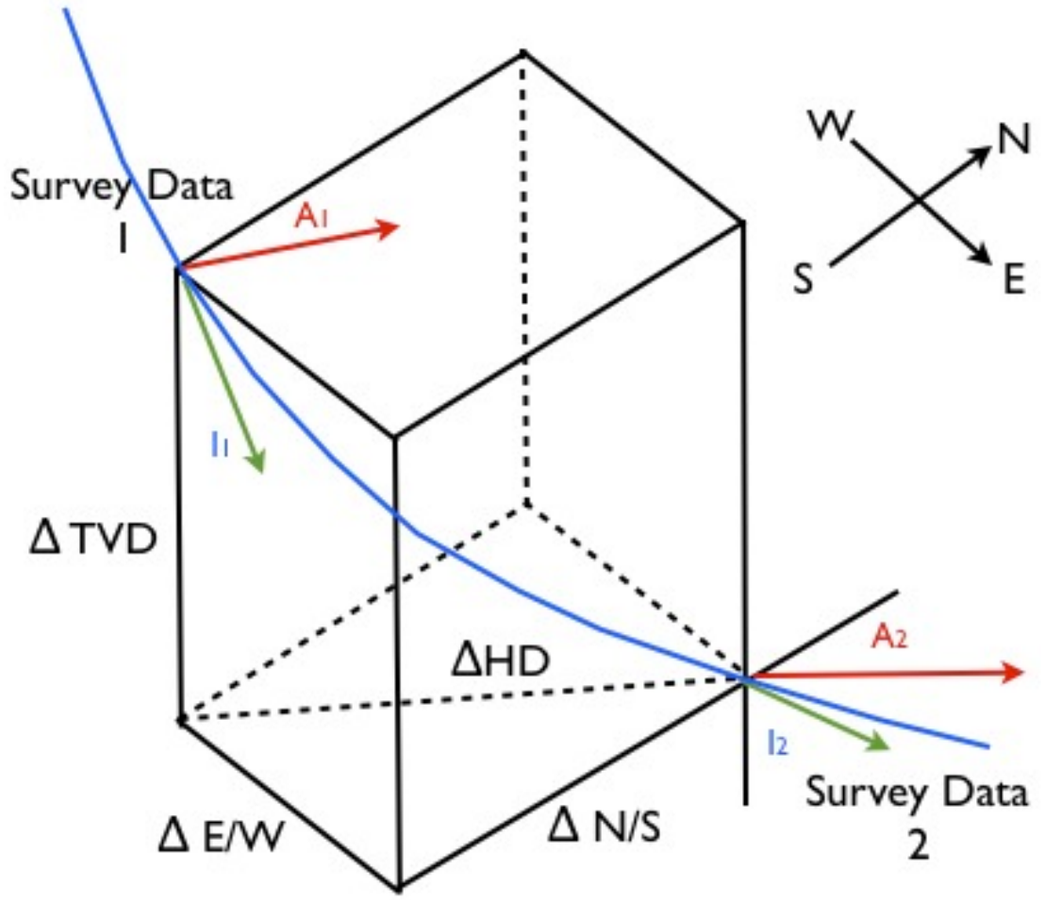
The survey data are plotted in Vertical Section when the iPad is on Portrait Position and Plan View on Landscape position.

- Use the Range button to define the range to the graph.

- Use the Recalc button to select a method to recalculate the survey table.

  - Tangential
  - Balanced Tangential
  - Minimum Curvature
  - Radius of Curvature
  - Angle Averaging

- Use the Table button to show the survey table.



ΔHD = Horizontal Displacement between stations

1) TANGENTIAL:

Δ N/S = ΔMD x sin (I2) x cos (A2)
Δ E/W = ΔMD x sin (I2) x sin (A2)
Δ TVD = ΔMD x cos (I2)

DOG LEG SEVERITY (degree/100ft)
DLS= 100÷{MD x [sin(I1) x sin(I2) x (sin(A1) x sin(A2) + cos(A1) x cos(A2)) + (cos I1 x cos I2)]}

2) BALANCED TANGENTIAL:

Δ N/S = ΔMD/2 x [sin (I1) x cos (A1) + sin (I2) x cos (A2)]
Δ E/W = ΔMD/2 x [sin (I1) x sin (A1) + sin (I2) x sin (A2)]
Δ TVD = ΔMD/2 x [cos (I1) + cos (I2)]

3) MINIMUM CURVATURE:

Δ N/S = ΔMD/2 x [sin (I1) x cos (A1) + sin (I2) x cos (A2)] x RF
Δ E/W = ΔMD/2 x [sin (I1) x sin (A1) + sin (I2) x sin (A2)] x RF
Δ TVD = ΔMD/2 x [cos (I1) + cos (I2)] x RF

B = acos [cos(I2-I1) - (sin(I1) x sin(I2) x (1 - cos(A2 - A1))] (in radians)
RF = 2/B x tan(B/2)

4) RADIUS OF CURVATURE:

Δ N/S = [ΔMD x (cos(I1) - cos(I2)) x (sin(A2) - sin(A1))] / [(I2 - I1) x (A2 - A1)]
Δ E/W = [ΔMD x (cos(I1) - cos(I2)) x (cos(A1) - cos(A2))] / [(I2 - I1) x (A2 - A1)]
Δ TVD = ΔMD/2 x [sin(I2) - sin(I1)] / (I2 - I1)

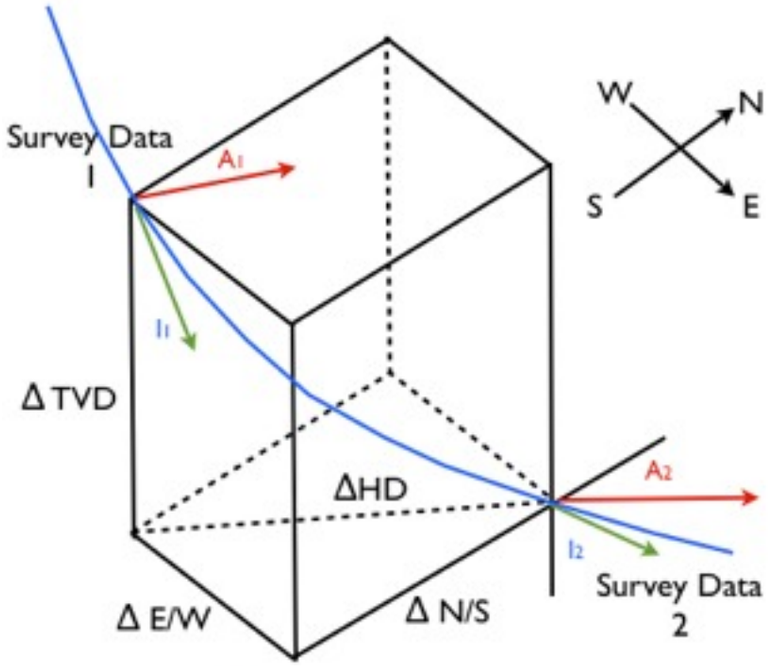
Angles in radians. A(deg) x PI / 180 => radian

DOG LEG SEVERITY (degree/100ft):

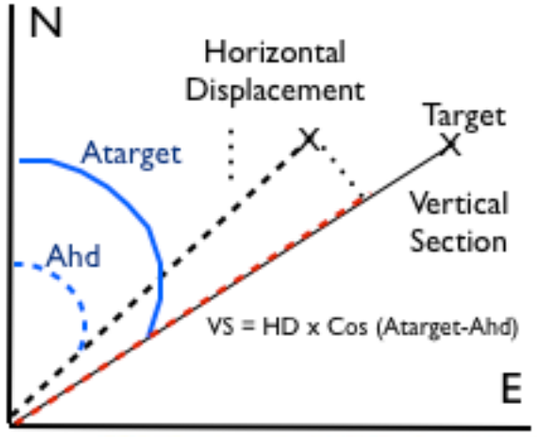
DLS = {acos [cos(I1) x cos(I2) + (sin(I1) x sin(I2) x cos(A2 - A1))] x (100 ÷ MD)

5) ANGLE AVERAGING:

Δ N/S = ΔMD x sin((I1+I2)/2) x cos((A1+A2)/2)
Δ E/W = ΔMD x sin((I1+I2)/2) x sin((A1+A2)/2)
Δ TVD = ΔMD x cos((I1+I2)/2)



For All Methods:
ΔHD = Square Root [(Δ N/S)^2 + (Δ E/W)^2)]



HD = Square Root [(N/S)^2 + (E/W)^2)]
Vertical Section = HD x Cos (Atarget - Ahd)

Dog Leg Severity is calculated on two methods only:
- Tangential
- Radius of Curvature

Equivalent Terms used in this app:
- Horizontal Displacement
- Horizontal Departure
- Closure Distance

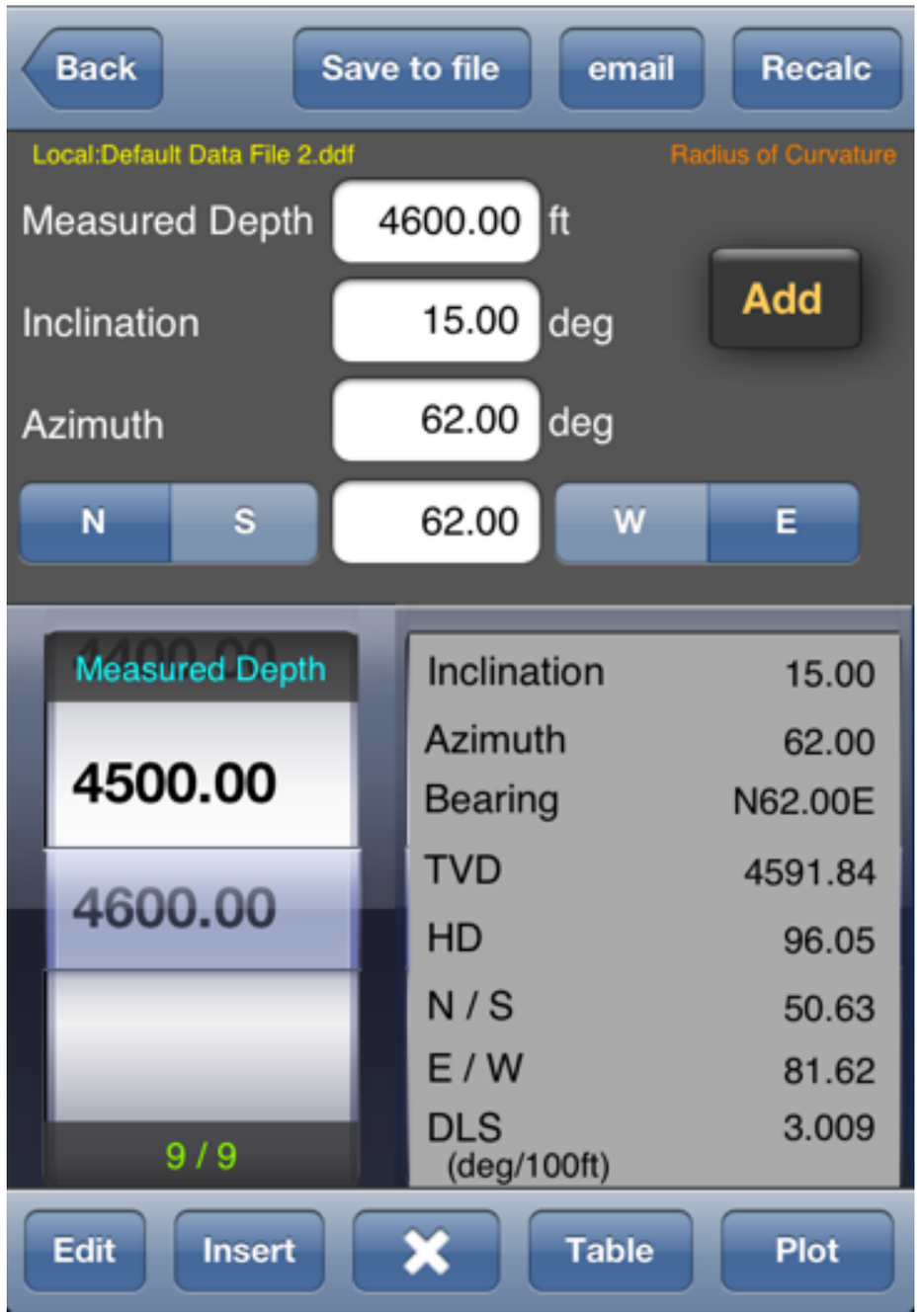
1. Use the textbox to enter survey data.
2. After edit the Azimuth, tap "DONE" key to show the Bearing, for example: Azimuth = 62 => Bearing = N 62 E
3. Enter MD, Inclination and Azimuth in each textbox and tap the "**Add**" button.
4. For example, enter the follow survey data:

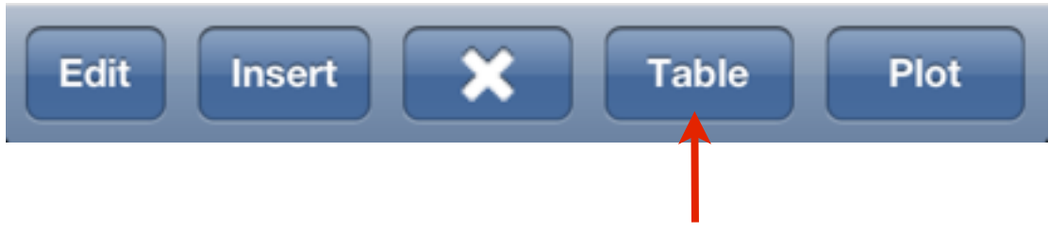
Items	MD ft	Inclination deg	Azimuth deg
1	3800.00	0.00	0.00
2	3900.00	1.00	50.00
3	4000.00	3.00	52.00
4	4100.00	5.00	54.00
5	4200.00	7.00	56.00
6	4300.00	9.00	58.00
7	4400.00	10.00	60.00
8	4500.00	12.00	61.00
9	4600.00	15.00	62.00

Attention:

Use the '**Save to file**' button on toolbar to save to the data file after editing.

Note: The 'Save to file' button is shown when a data file is selected only.





Use the "Table" button to show the Survey Table.

Back **Survey Data**

Items	MD ft	Inclination deg	Azimuth deg	Bearing deg
1	3800.00	0.00	0.00	N0.00E
2	3900.00	1.00	50.00	N50.00E
3	4000.00	3.00	52.00	N52.00E
4	4100.00	5.00	54.00	N54.00E
5	4200.00	7.00	56.00	N56.00E
6	4300.00	9.00	58.00	N58.00E
7	4400.00	10.00	60.00	N60.00E
8	4500.00	12.00	61.00	N61.00E
9	4600.00	15.00	62.00	N62.00E

Total: 9

Use the "arrows" to move the columns or rows.

Items	MD ft	TVD ft	HD ft	V Section ft
1	3800.00	3800.00	0.00	0.00
2	3900.00	3899.99	0.85	0.69
3	4000.00	3999.93	4.27	4.14
4	4100.00	4099.68	11.22	11.06
5	4200.00	4199.13	21.65	21.47
6	4300.00	4298.15	35.55	35.37
7	4400.00	4396.78	52.01	51.87
8	4500.00	4494.94	71.04	70.95
9	4600.00	4592.17	94.34	94.29

Items	MD ft	N / S ft	E / W ft	DLS deg/100ft
1	3800.00	0.00	0.00	0.00
2	3900.00	0.77	0.36	1.00
3	4000.00	2.96	3.07	2.00
4	4100.00	7.16	8.64	2.00
5	4200.00	13.15	17.20	2.01
6	4300.00	20.73	28.87	2.02
7	4400.00	29.23	43.02	1.05
8	4500.00	38.63	59.63	2.01
9	4600.00	49.77	80.14	3.01

Use the "Email" button to send the 'Well Planning', the 'Survey Table' and the 'Screenshot'.

Data File: *Example 01.ddf*

WELL PLANNING:

Kick Off Point = 3937.01 ft
Initial Departure = 0.00 ft
Initial Azimuth = 0.00 degree (N0.00E)
Initial N/S = 0.00 ft
Initial E/W = 0.00 ft

TOTAL SECTIONS: 2

SECTION: 1
Initial TVD=3937.01 ft
Initial MD=3937.01 ft
Build-Up Rate= 3.0 deg/100.0 ft
End Build-Up TVD= 4891.94 ft
End Build-Up MD= 4937.01 ft
Inclination=30.00 deg
Azimuth=60.00 deg (N60.00E)
Turn Rate=0.0 deg/0.0 ft
End TVD = 5577.43 ft
End MD = 5728.54 ft
Horizontal Departure = 651.64 ft
N/S = 325.82 ft
E/W = 564.34 ft
Target Azimuth = 60.00 degree (N60.00E)
Target N/S = 481.64 ft
Target E/W = 834.22 ft

SECTION: 2
Initial TVD=5577.43 ft
Initial MD=5728.54 ft
Drop-Off Rate=3.0 deg/100.0 ft
End Drop-Off TVD=5879.15 ft
End Drop-Off MD=6061.88 ft
Inclination=20.00 deg
Azimuth=60.00 deg (N60.00E)
Turn Rate=4.0 deg/100.0 ft
End TVD = 6348.81 ft
End MD = 6561.68 ft
Horizontal Departure = 311.64 ft
N/S = 155.82 ft
E/W = 269.89 ft

TARGET:
Measured Depth = 6561.68 ft
True Vertical Depth = 6348.81 ft
Vertical Section = 963.28 ft
Target Azimuth = 60.00 degree (N60.00E)
Target N/S = 481.64 ft
Target E/W = 834.22 ft

END OF SURVEY:

Tie-In Depth= 3800.00 ft
Measured Depth = 4600.00 ft
True Vertical Depth = 4591.40 ft
Horizontal Departure = 97.80 ft
Inclination = 15.00 degree
Azimuth = 62.00 degree (N62.00E)
N / S = 51.90 ft
E / W = 82.90 ft

Nr.	M.Depth ft	Inclination degree	Azimuth degree	Bearing	TVD ft
1	3800.00	0.00	0.00	N0.00E	3800.00
2	3900.00	1.00	50.00	N50.00E	3899.99
3	4000.00	3.00	52.00	N52.00E	3999.93
4	4100.00	5.00	54.00	N54.00E	4099.68
5	4200.00	7.00	56.00	N56.00E	4199.13
6	4250.00	8.30	57.20	N57.20E	4248.68
7	4300.00	9.00	58.00	N58.00E	4298.10
8	4400.00	12.00	61.00	N61.00E	4396.30
9	4600.00	15.00	62.00	N62.00E	4591.40

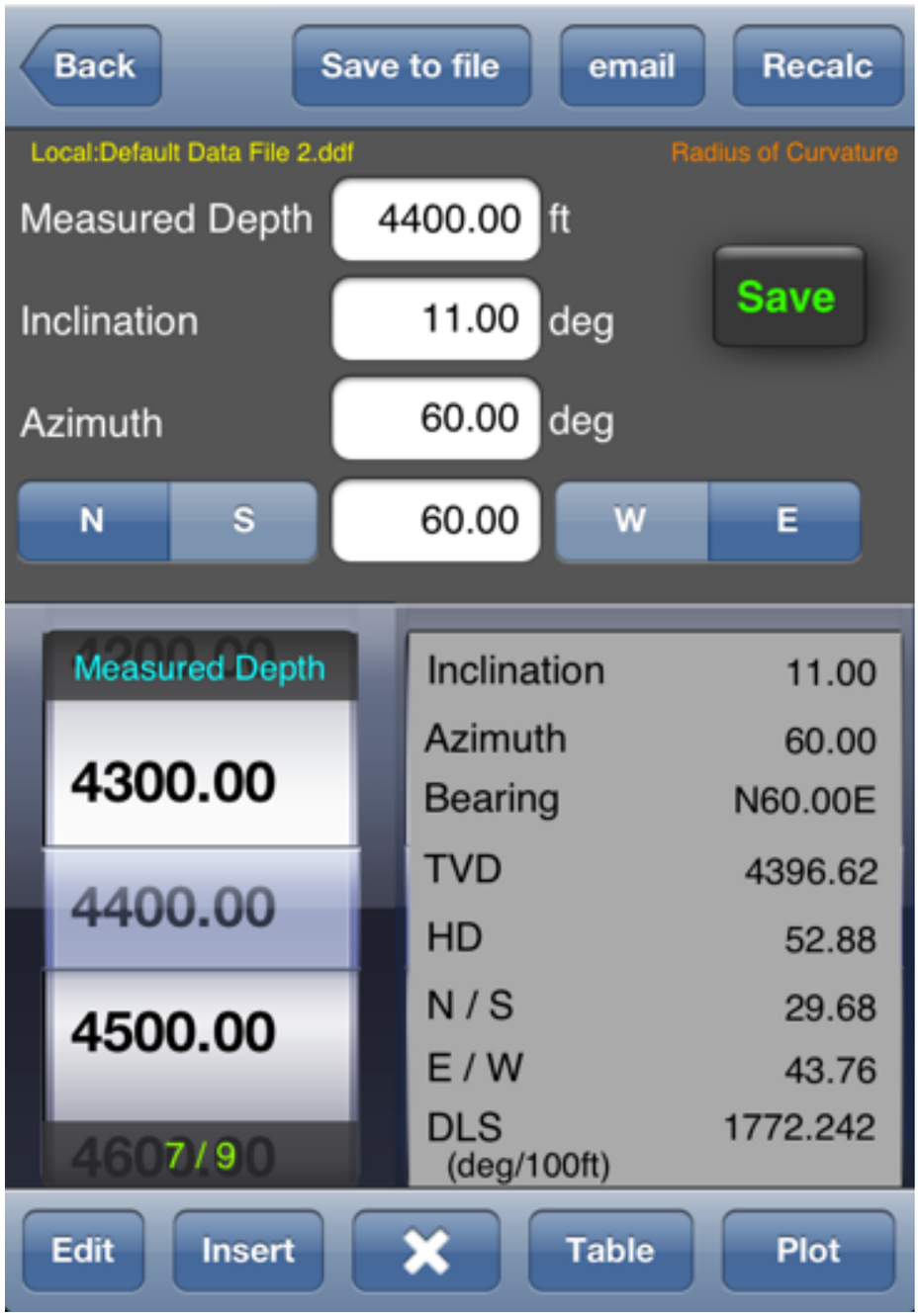
HD ft	VSect ft	N/S ft	E/W ft	DLS deg/100ft
0.00	0.00	0.00	0.00	0.0000
0.85	0.69	0.77	0.36	1.0000
4.27	4.14	2.96	3.07	2.0009
11.22	11.06	7.16	8.64	2.0046
21.65	21.47	13.15	17.20	2.0106
28.30	28.12	16.82	22.76	2.6194
35.50	35.33	20.70	28.90	2.0190
54.70	54.58	30.40	45.40	2.5050
97.80	97.74	51.90	82.90	2.0180

Items	MD ft	N / S ft	E / W ft	DLS deg/100ft
1	3800.00	0.00	0.00	0.00
2	3900.00	0.77	0.36	1.00
3	4000.00	2.96	3.07	2.00
4	4100.00	7.16	8.64	2.00
5	4200.00	13.15	17.20	2.01
6	4300.00	20.73	28.87	2.02
7	4400.00	29.23	43.02	1.05
8	4500.00	38.63	59.63	2.01
9	4600.00	49.77	80.14	3.01

Attention: Use the '**Save to file**' button on toolbar (TOP) to save to the data file after editing.

1. Roll up/down the wheel and stop on item selected and tap on 'Edit' button on toolbar.
2. The textbox are filled with items of survey.
3. The 'Add' button change to 'Save' button.
4. Edit the parameters, for example change inclination from 10 to 11 deg, and tap on 'Done' button.
5. Tap on "Done" key after edit each parameter to calculate survey.
6. Tap on 'Save' button (green text).

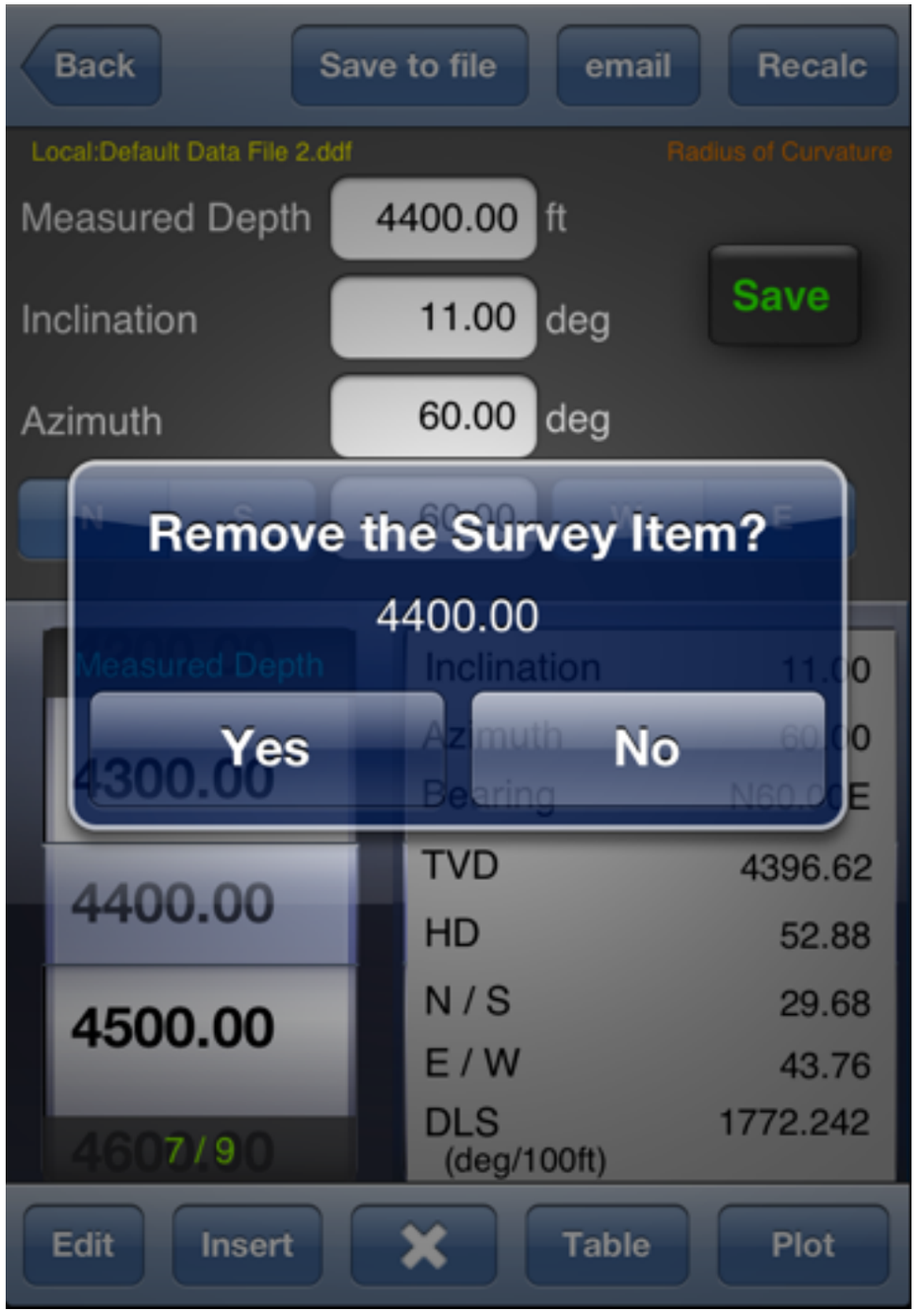
7. The 'Save' button return to 'Add' button.
8. The survey values are updated.
9. Roll up/down the wheel and repeat for other item.

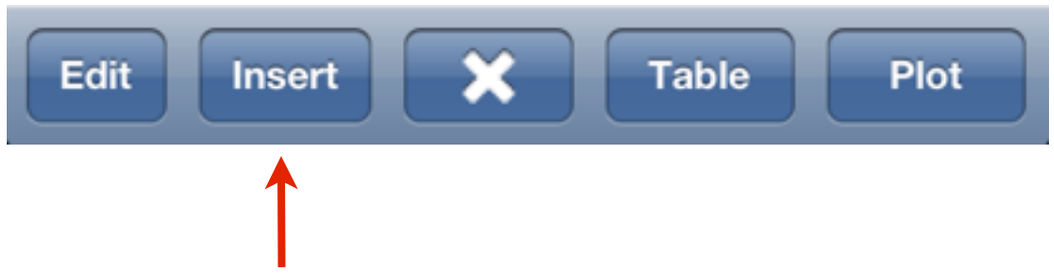


Remove Item button

1. Roll up/down the wheel and stop on item selected and Tap on ‘Remove Item’ button.
2. Tap YES button on popup.
3. The wheel go to the next item.
4. Roll up/down the wheel and repeat for other item.

Attention: Use the ‘**Save to file**’ button on toolbar (TOP) to save to the data file after editing.

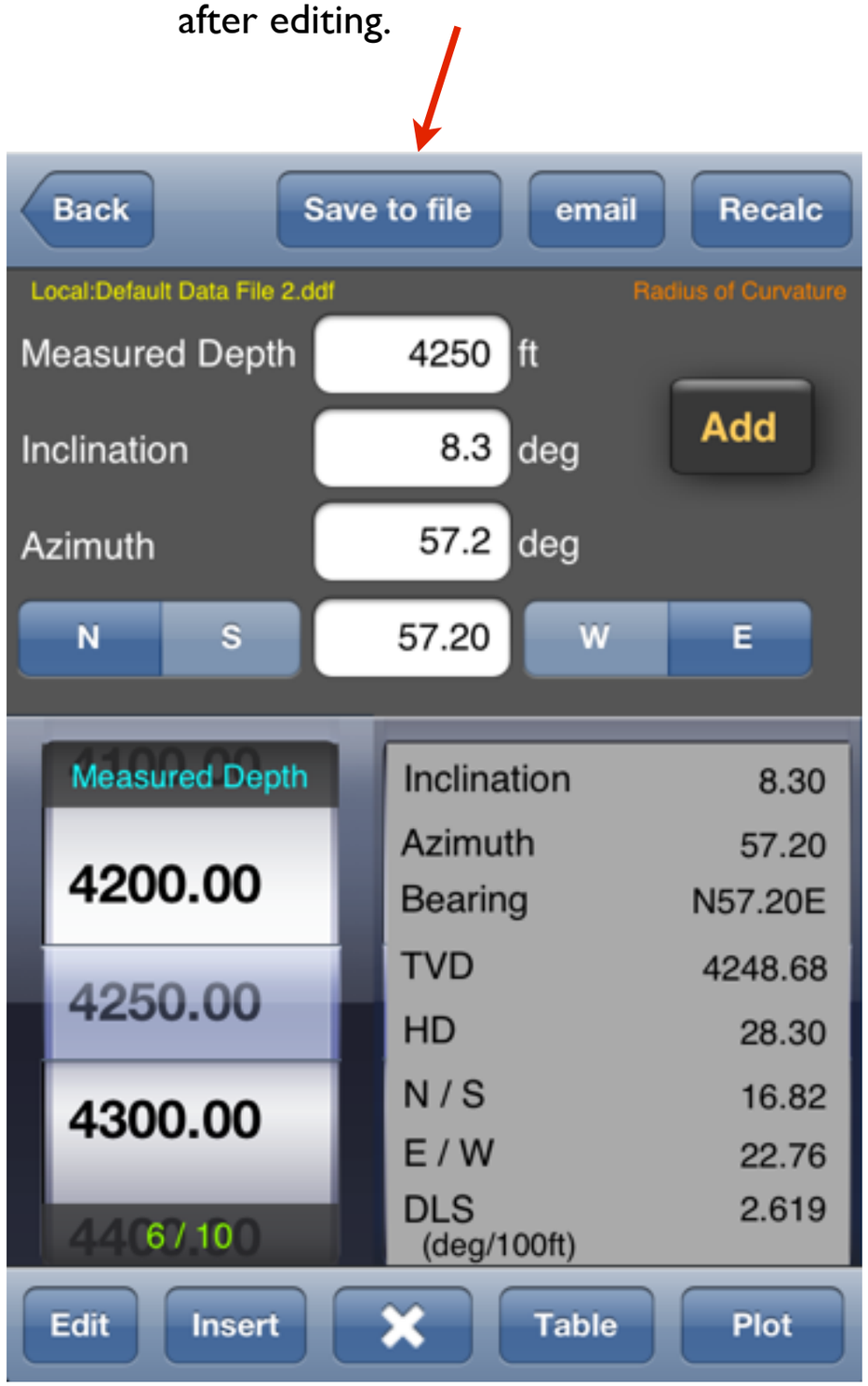




Insert Item button

1. Roll up/down the wheel and stop on item for insert before.
2. Enter parameters of survey.
3. Tap on 'Insert Item'.
4. For example: Move to 4300 ft, enter MD = 4250 ft, Inclination = 8.3 deg and Azimuth = 57.2. Tap "Done" button and tap on 'Insert' button

Attention: Use the '**Save to file**' button on toolbar (TOP) to save to the data file after editing.

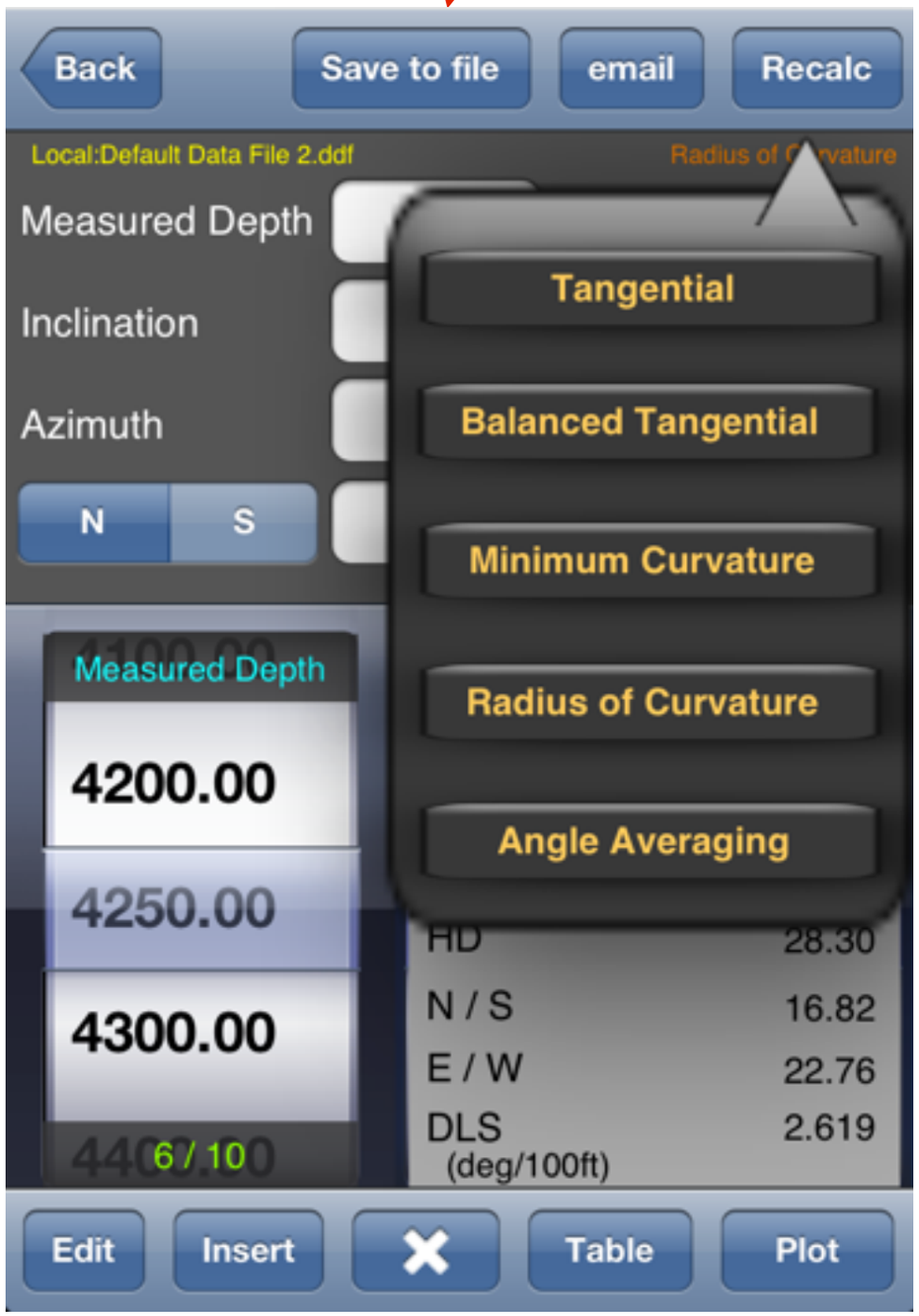


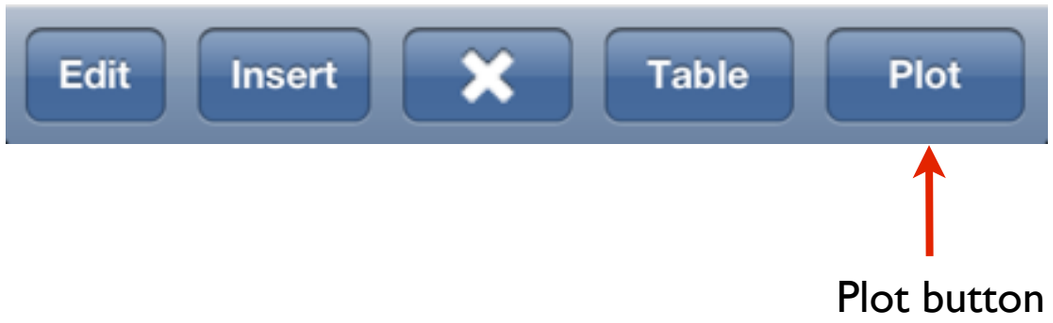
Attention: Use the '**Save to file**' button on toolbar (TOP) to save to the data file after editing.

1. Use the 'Recalc' button to select the method to calculate the survey data table:

   - Tangential
   - Balanced Tangential
   - Minimum Curvature
   - Radius of Curvature
   - Angle Averaging

2. It's recommended to recalculate after editing survey data items.

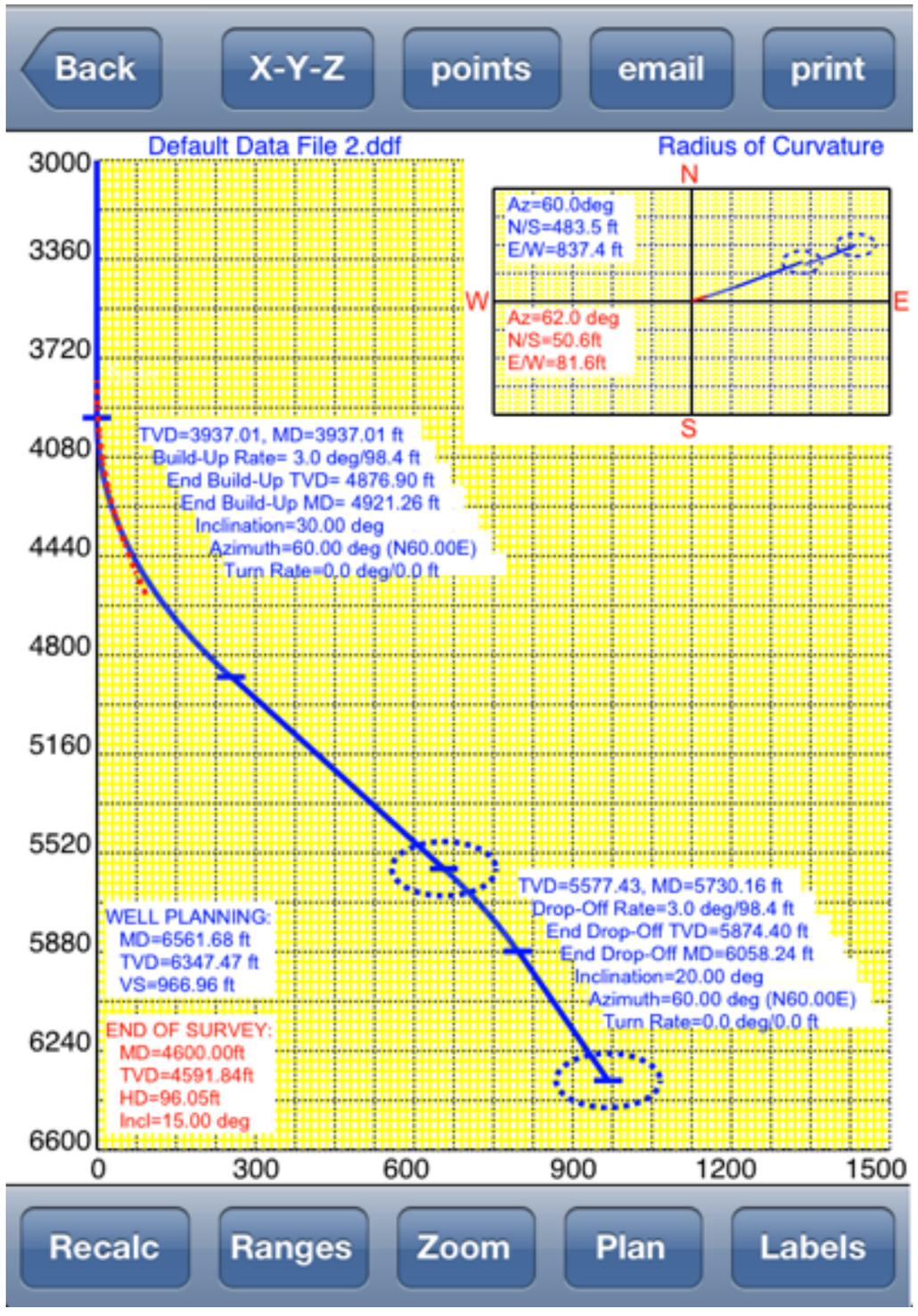




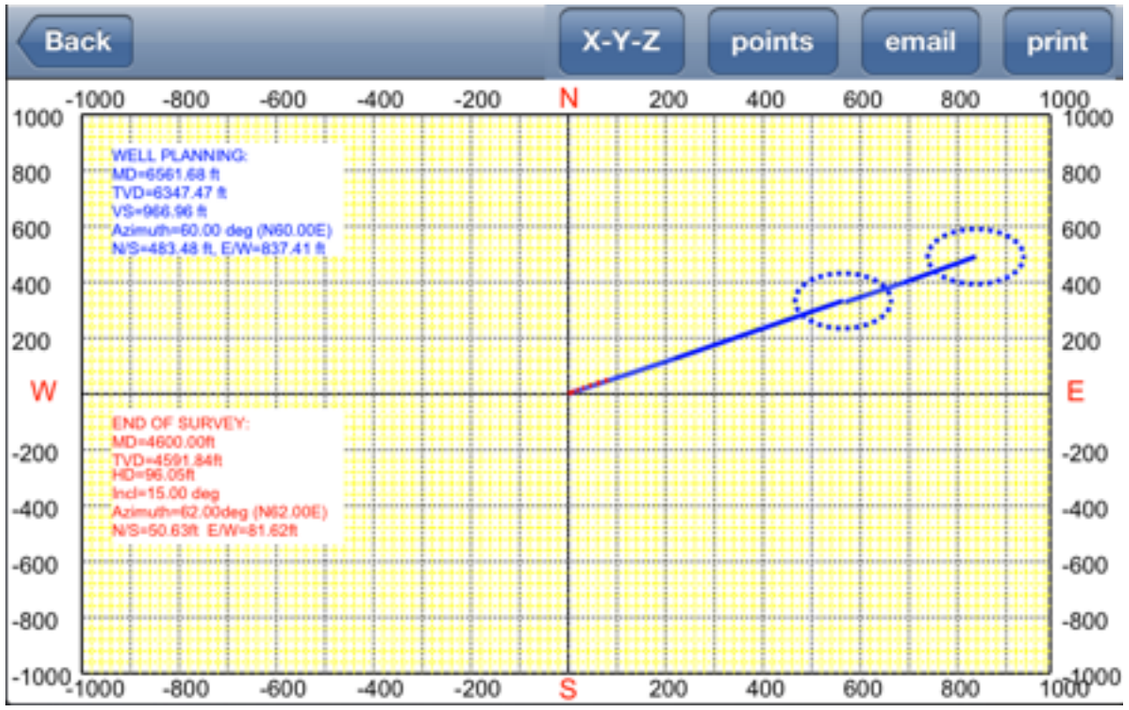
Features

1. Plot Vertical Section on portrait position
2. Plot Plan View on landscape position
3. Recalc with Survey Calculation Methods
4. X-Y-Z View with four rotations (90 degrees)
5. Zoom View
6. Show/Hide Mini Plan View
7. Show/Hide Labels
8. Send screenshoot by email
9. Print screenshoot

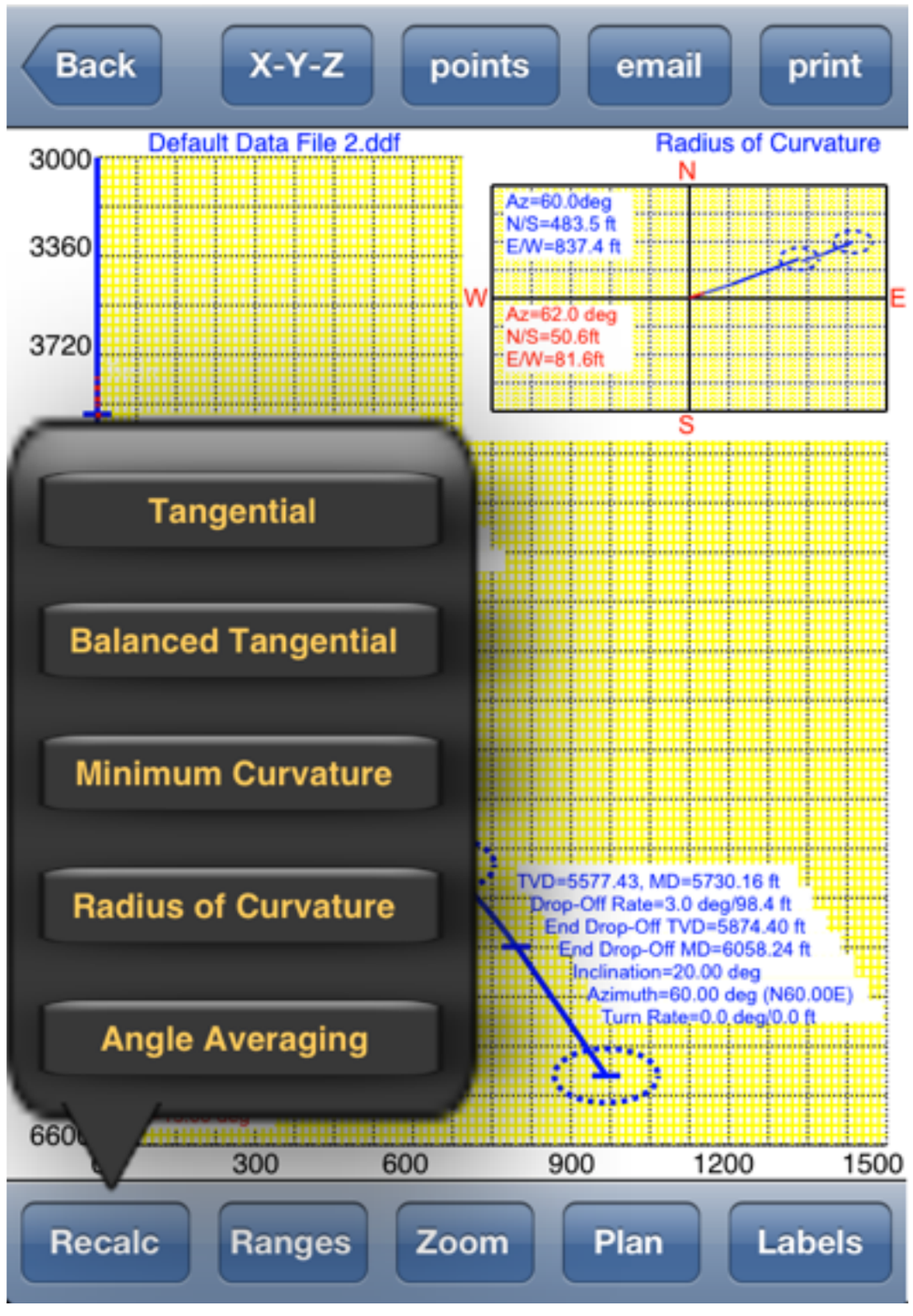
Plot Vertical Section on portrait position



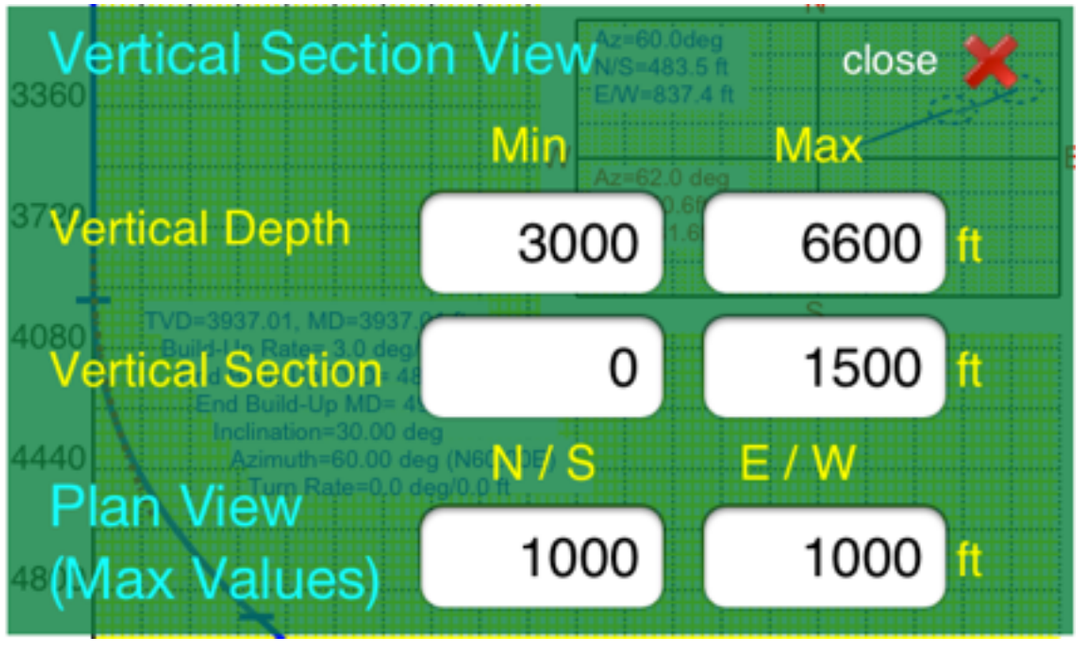
Plot Plan View on landscape position



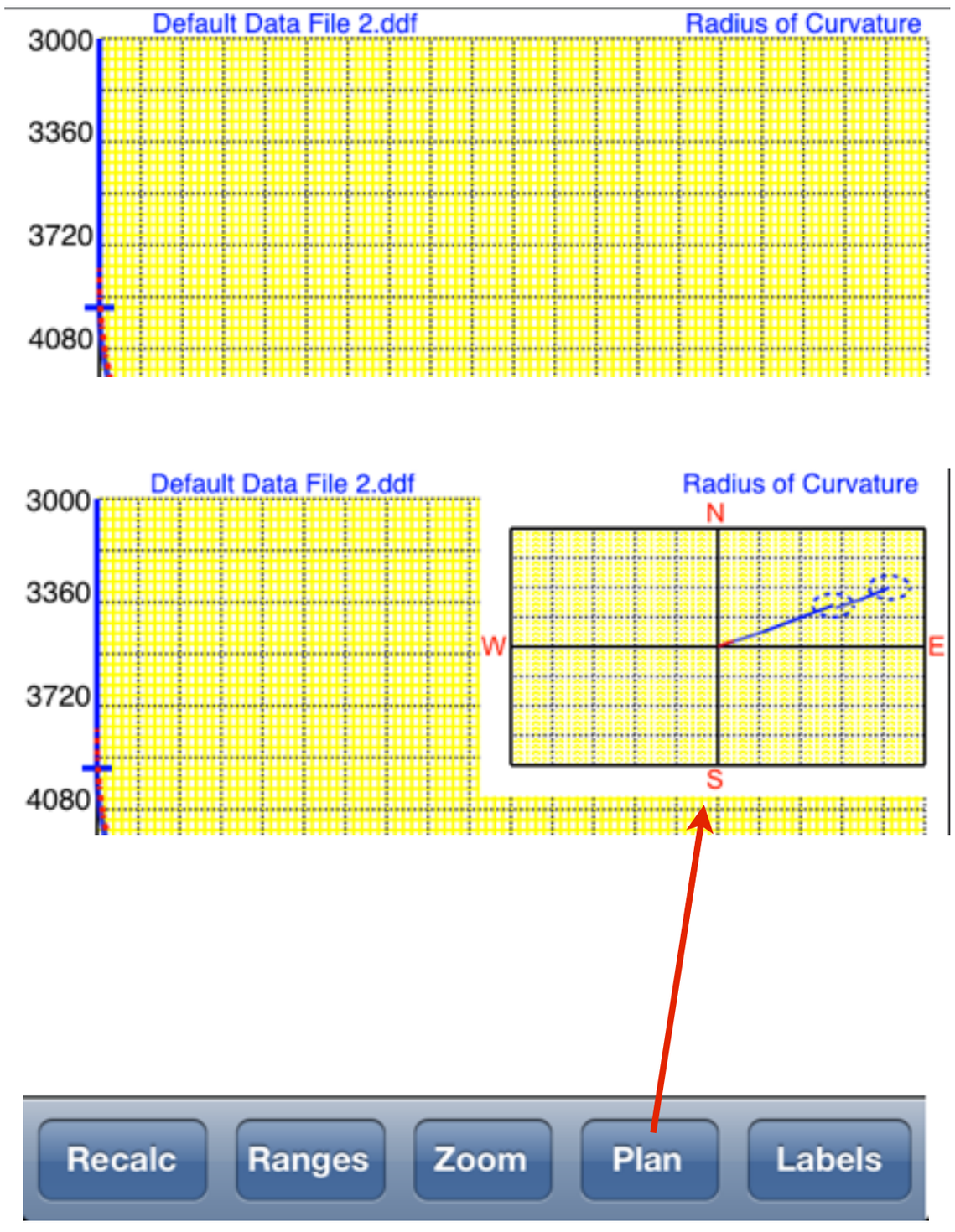
Use ‘Recalc’ button to Recalculate Survey Data



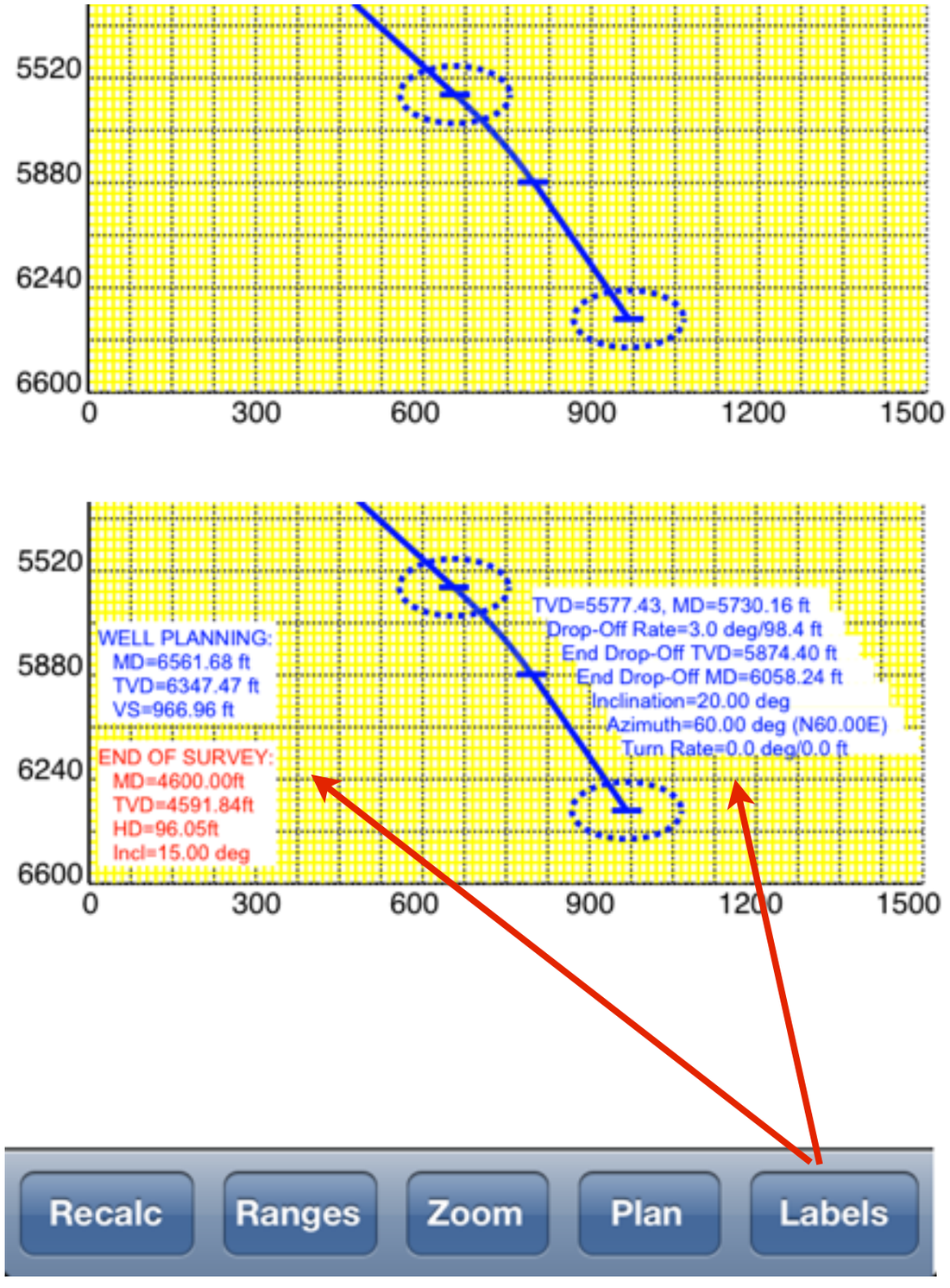
Use ‘Ranges’ button to set ranges for graph



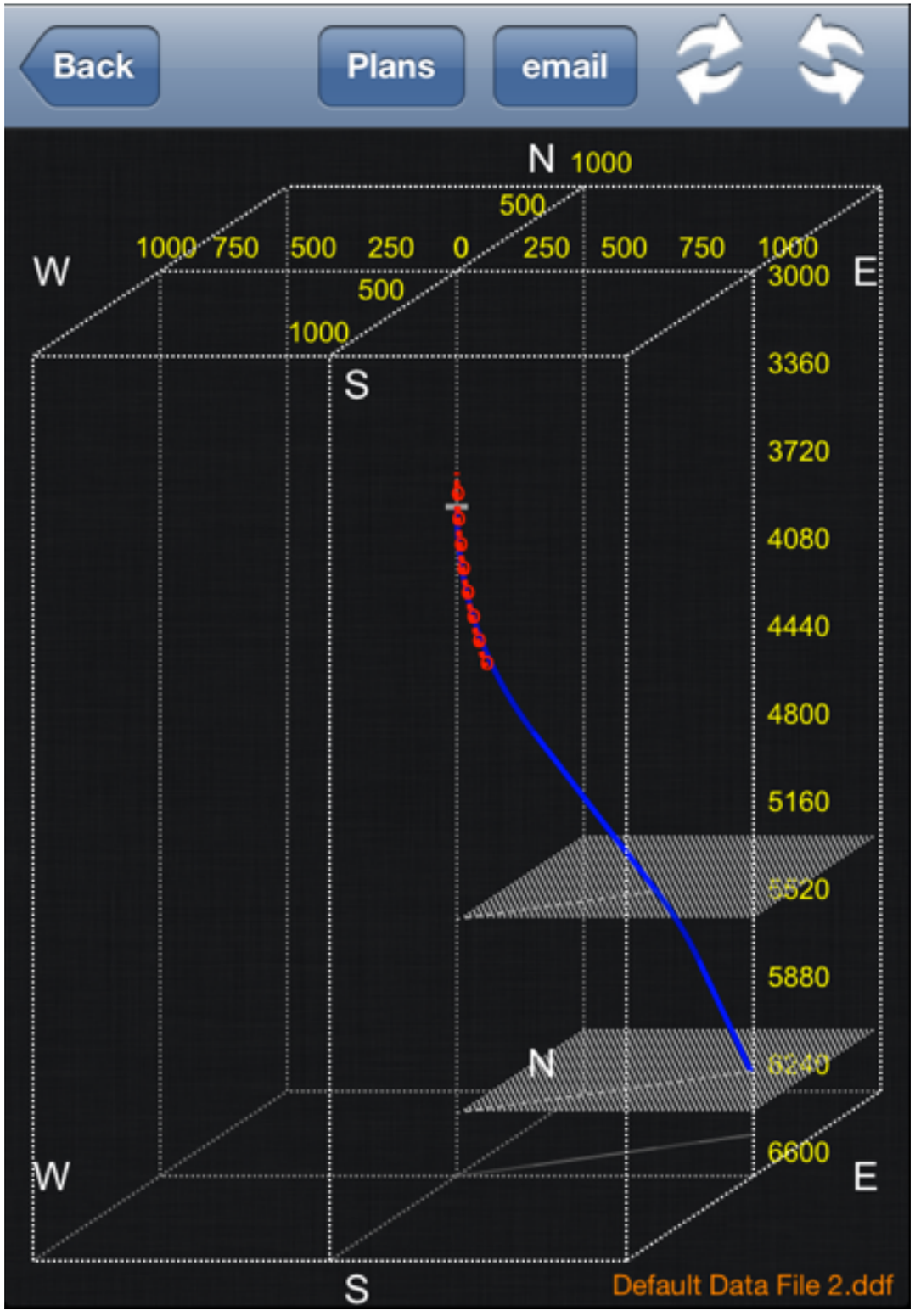
Use ‘Plan’ button to Show/Hide Mini Plan View



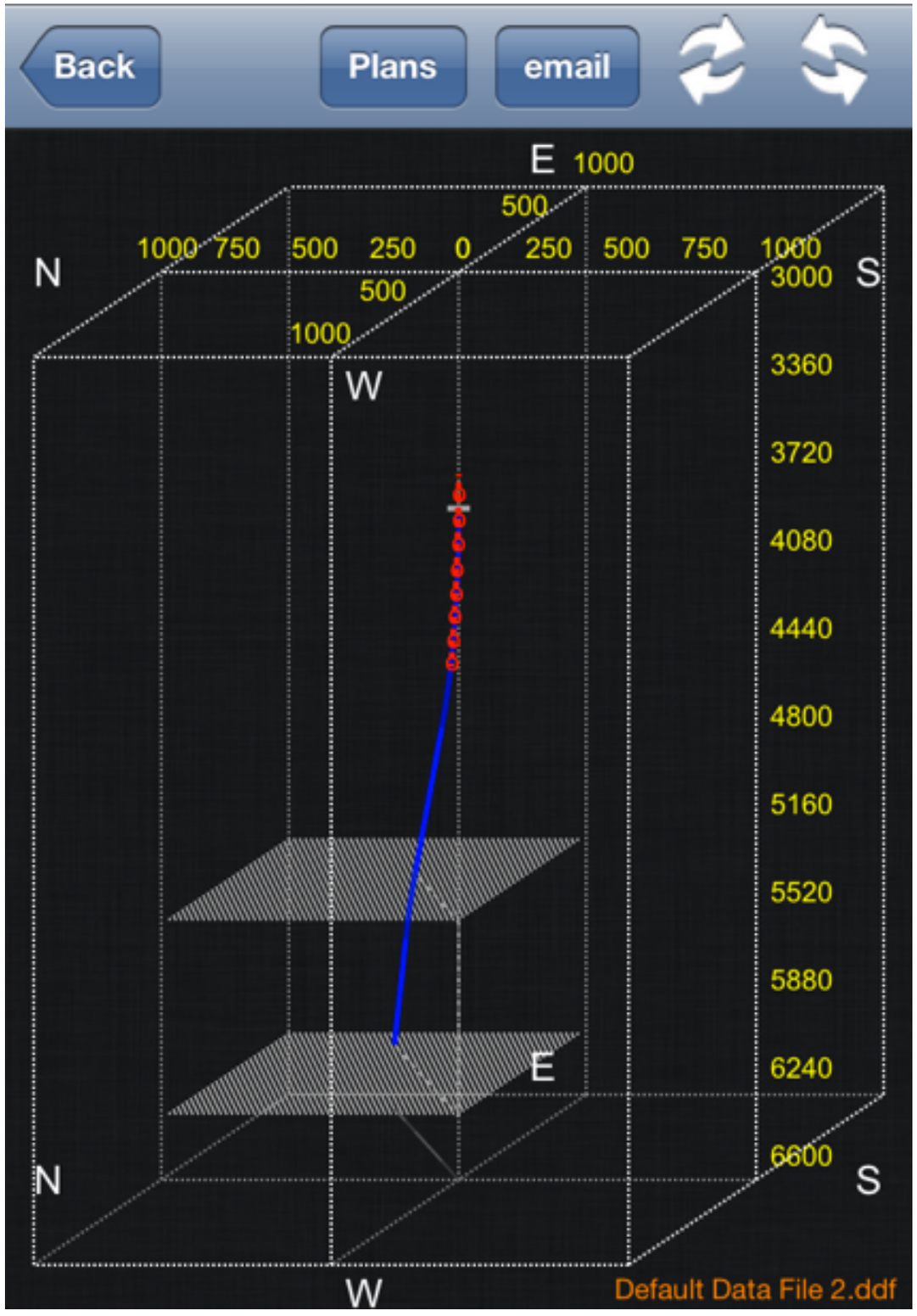
Use ‘Labels’ button to Show/Hide Labels

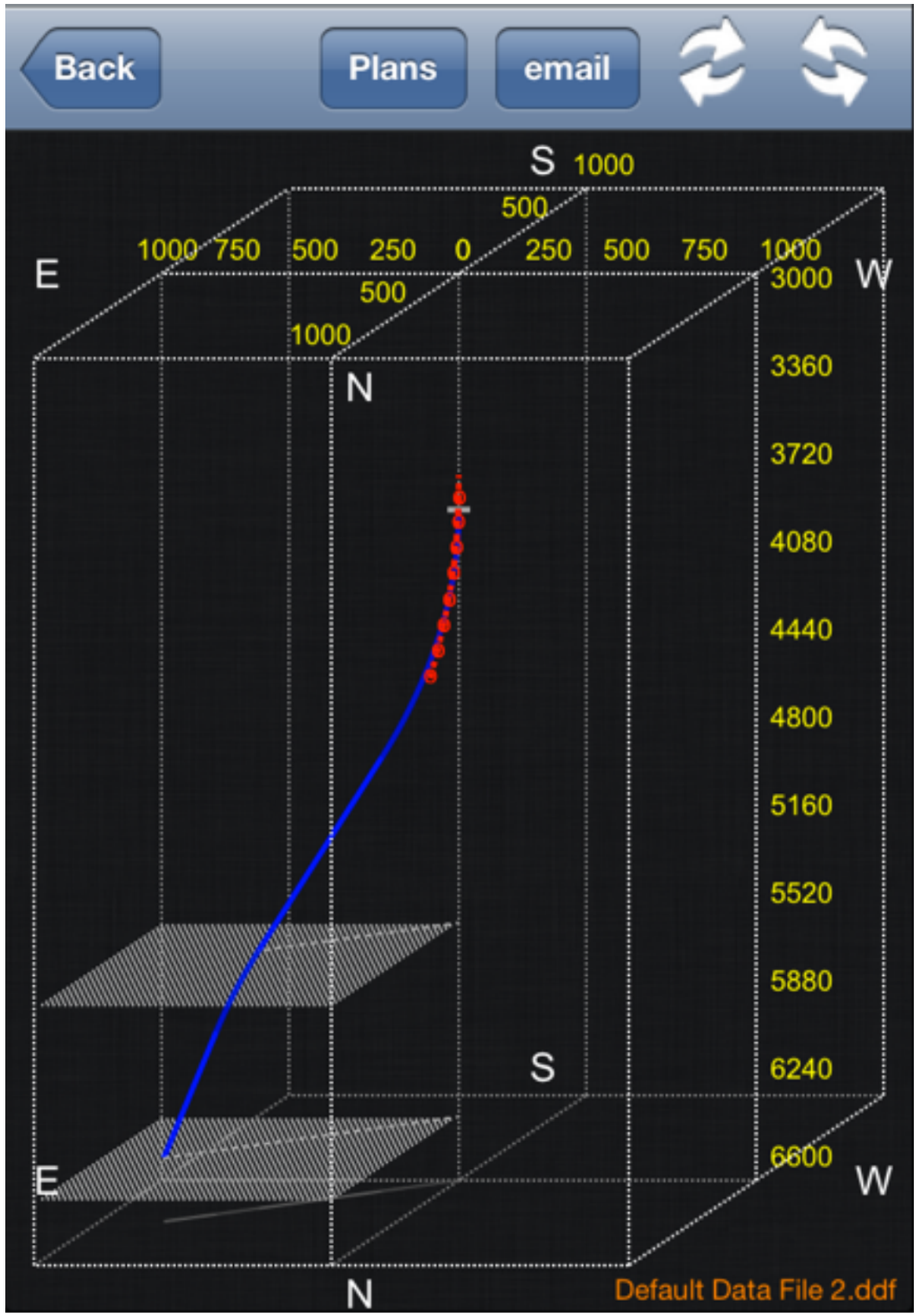


Use ‘X-Y-Z’ button to Show X-Y-Z Views



Use ‘Rotation’ buttons to rotate 90 degree




Back
Plans
email
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1000 750 500 250 0 250 500 750 1000
E
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5520
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6240
6600
S
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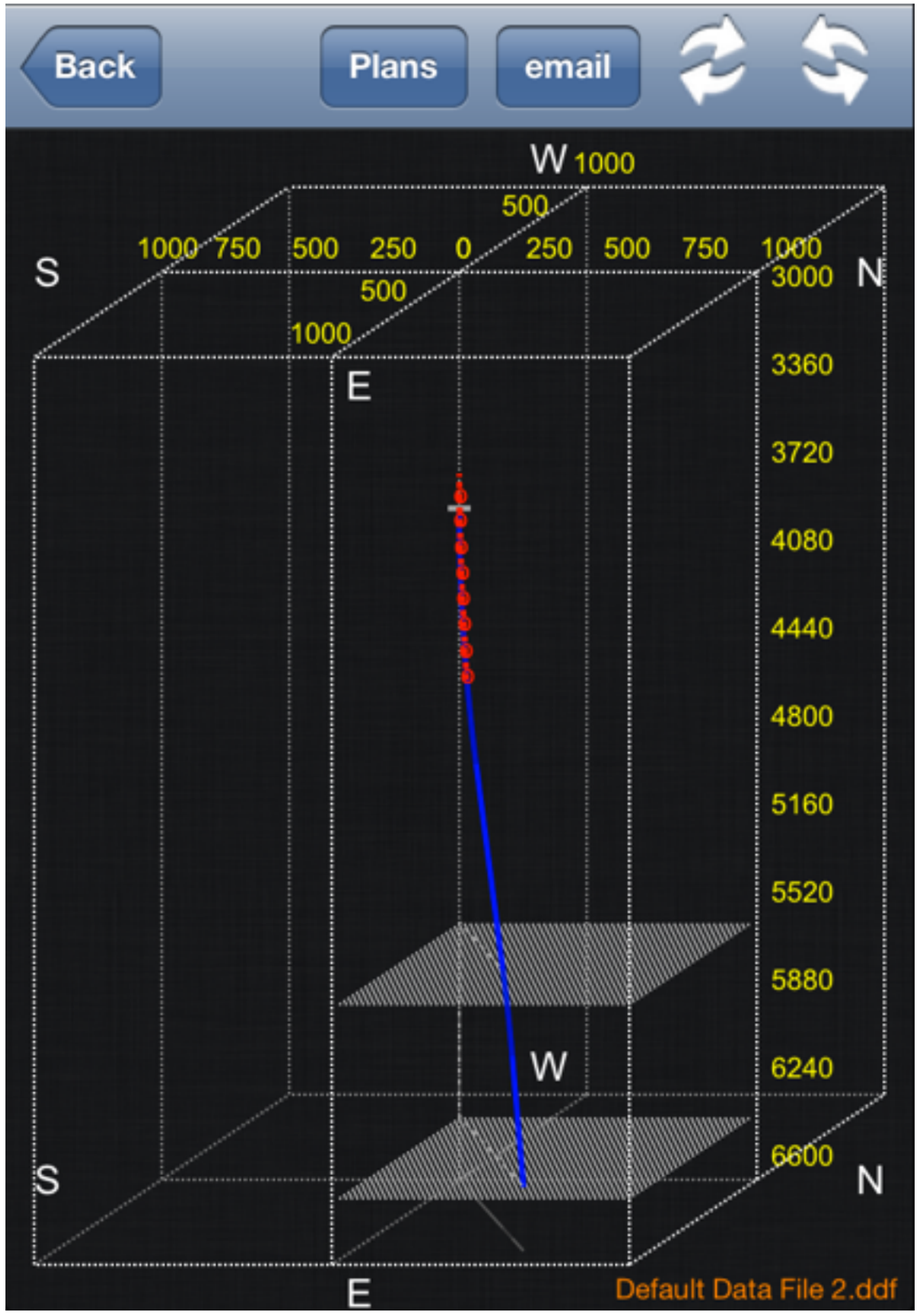
N
W
Default Data File 2.ddf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Plans
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6600
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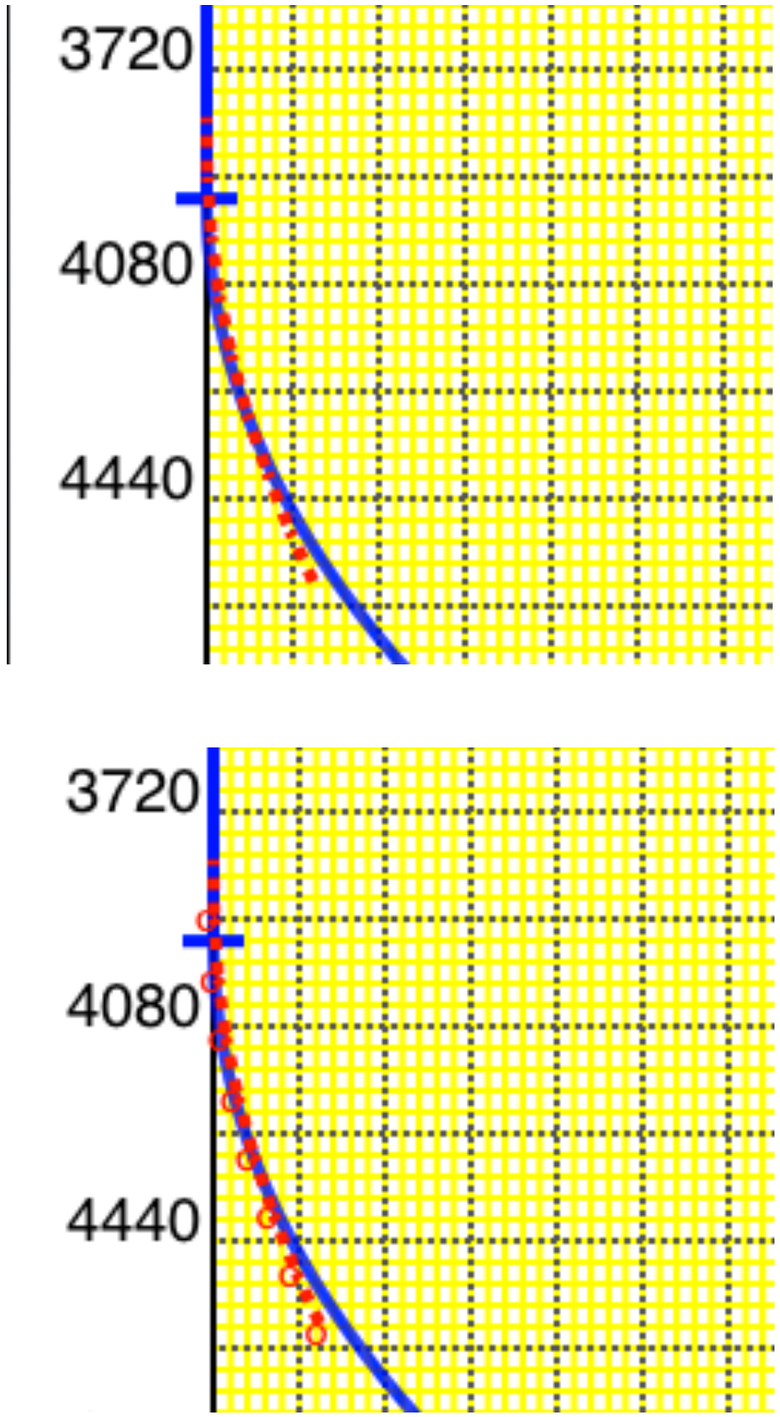
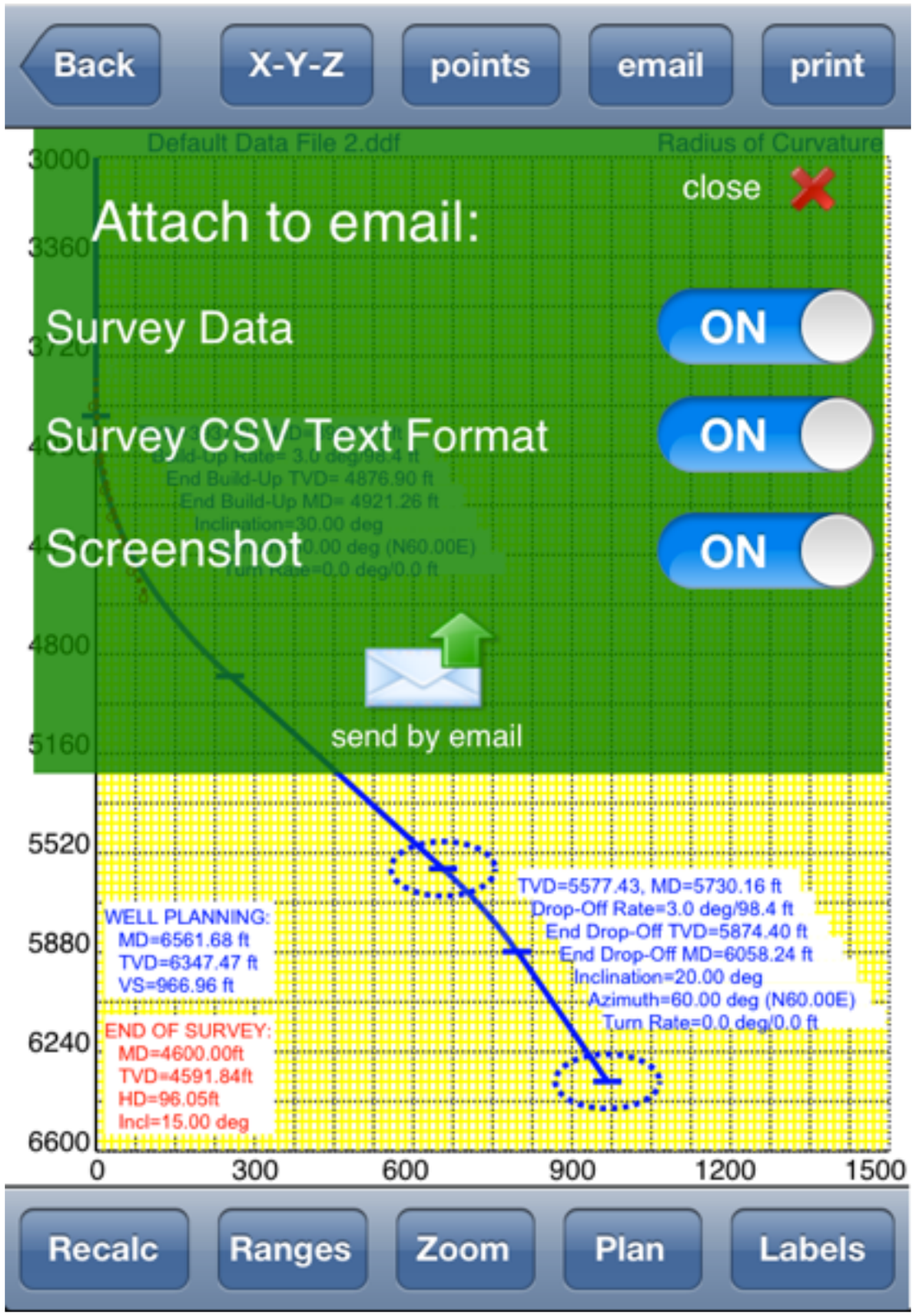
Default Data File 2.ddf

Use ‘Points’ button to Show/Hide points on graph



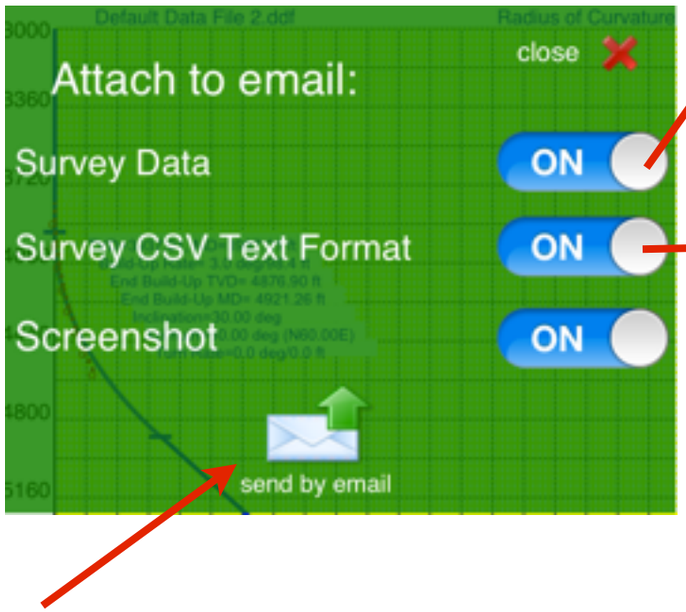
Use ‘email’ button to send survey data with options



Use the '**email**' button to send:

- 'Survey Data Table'
- Survey CSV Text Format
- Screenshot

Nr.	M.Depth ft	Inclination degree	Azimuth degree	Bearing	TVD ft	HD ft	VSect ft	N/S ft	E/W ft	DLS deg/100ft
1	3800.00	0.00	0.00	N0.00E	3800.00	0.00	0.00	0.00	0.00	0.0000
2	3900.00	1.00	50.00	N50.00E	3899.99	0.85	0.69	0.77	0.36	1.0000
3	4000.00	3.00	52.00	N52.00E	3999.93	4.27	4.14	2.96	3.07	2.0009
4	4100.00	5.00	54.00	N54.00E	4099.68	11.22	11.06	7.16	8.64	2.0046
5	4200.00	7.00	56.00	N56.00E	4199.13	21.65	21.47	13.15	17.20	2.0106
6	4250.00	8.30	57.20	N57.20E	4248.68	28.30	28.12	16.82	22.76	2.6194
7	4300.00	9.00	58.00	N58.00E	4298.10	35.50	35.33	20.70	28.90	2.0190
8	4400.00	12.00	61.00	N61.00E	4396.30	54.70	54.58	30.40	45.40	2.5050
9	4600.00	15.00	62.00	N62.00E	4591.40	97.80	97.74	51.90	82.90	2.0180

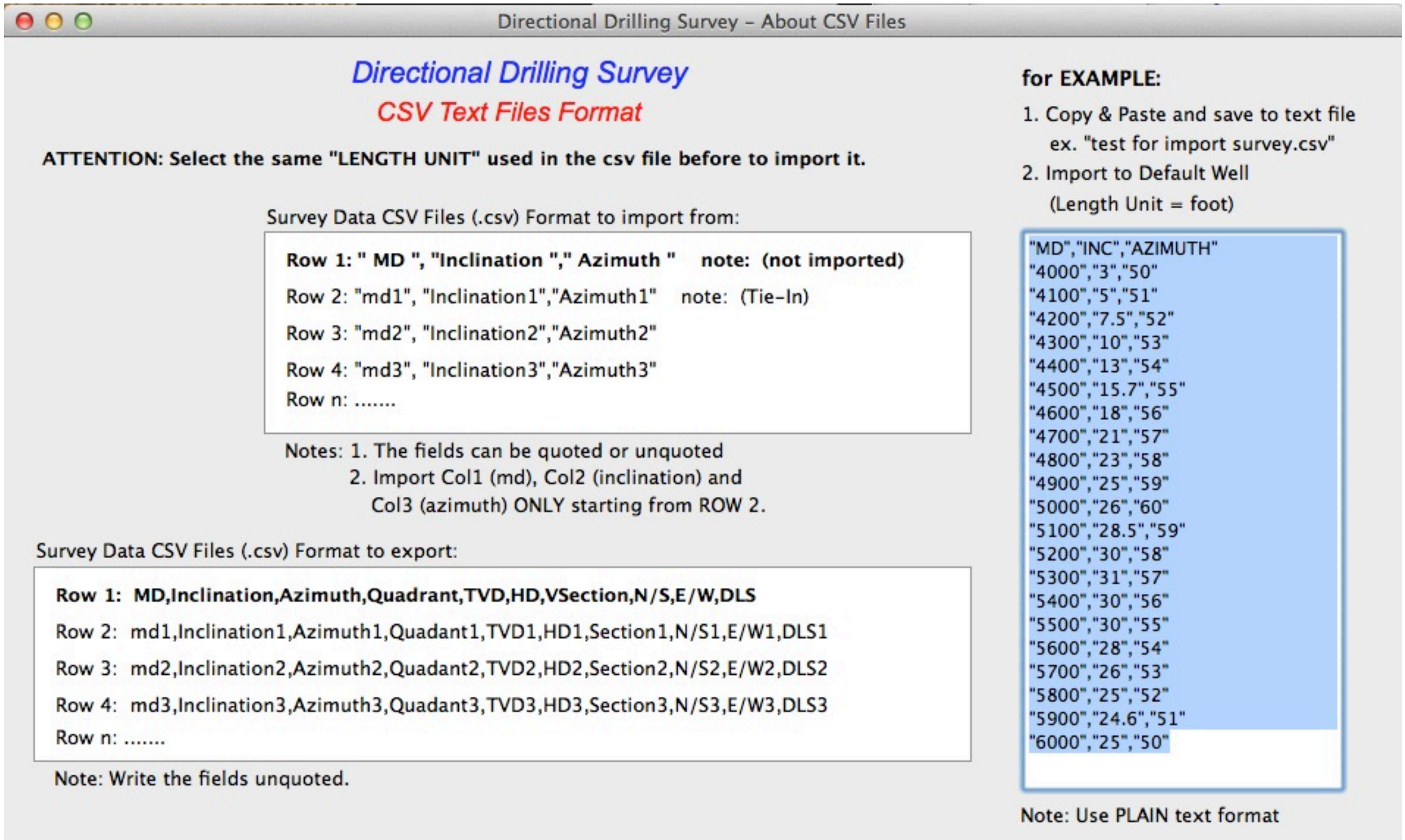


SURVEY DATA CSV TEXT FORMAT:
MD,Inclination,Azimuth,Quadrant,TVD,HD,V Section,N/S,E/W,DLS
3800.000000,0,0,N0.00E,3800.000000,0.000000,0.000000,0.000000,0.000000,0.000000
3900.000000,1,50,N50.00E,3899.994629,0.845214,0.692359,0.766025,0.357203,1.000001
3999.999756,3,52,N52.00E,3999.928467,4.265390,4.138990,2.962097,3.069126,2.000915
4100.000000,5,54,N54.00E,4099.679688,11.220672,11.061934,7.159717,8.639557,2.004558
4200.000000,7,56,N56.00E,4199.127441,21.654682,21.473984,13.154634,17.201187,2.010588
4250.000000,8.3,57.2,N57.20E,4248.681152,28.298033,28.118067,16.818521,22.757767,2.619417
4300.000000,9,58,N58.00E,4298.100098,35.500000,35.329811,20.700001,28.900000,2.019000
4400.000000,12,61,N61.00E,4396.299805,54.700001,54.579338,30.400000,45.400002,2.505000
4600.000000,15,62,N62.00E,4591.399902,97.800003,97.737480,51.900002,82.900002,2.018000

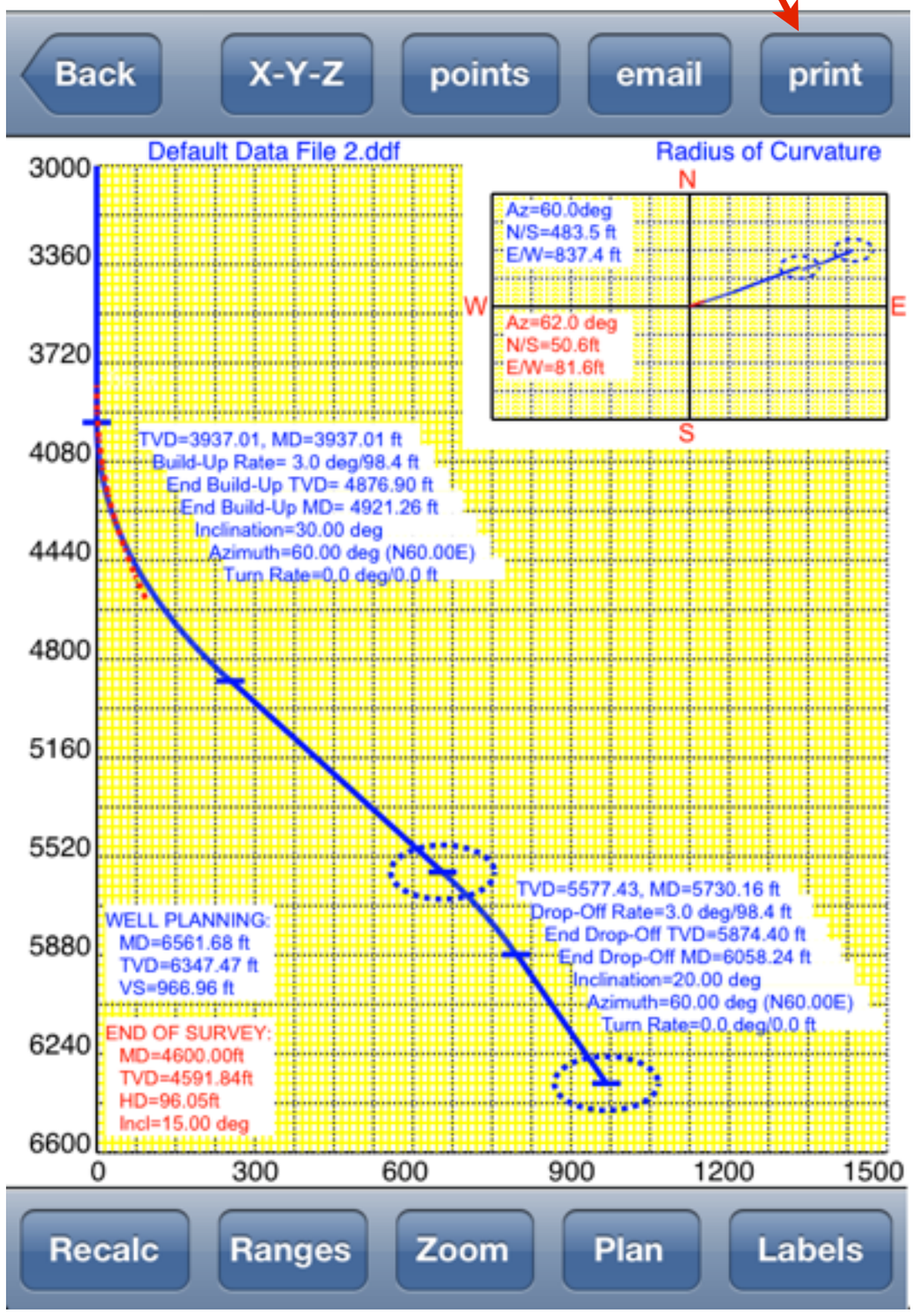
1. Create a file with PLAN text format
2. Use Copy & Paste on editing it.
3. Save it.

Notes:
- If you wish use it to import on the app "*Directional Drilling Survey* ***for Mac***",
Save it with suffix **'.csv'**

- Use the app "*Directional Drilling Survey* ***for Mac***" to import Survey Data (MD, Inclination, Azimuth) on CSV Text Format from any source and get the same data file using **iCloud on iPhone, iPod Touch or iPad**.



Print button



Print: Select the Air printer to print a screenshot

1. Selecting Data Files to Plotting
2. Setting Ranges for Graph
3. Multilateral Wells - On Portrait Position
4. Multilateral Wells - On Landscape Position
5. Multilateral Wells on X-Y-Z Views
6. Show/Hide Mini Plan View
7. Sending Multilateral Wells by Email
8. Printing Multilateral Wells

Use this feature to plot until six wells.

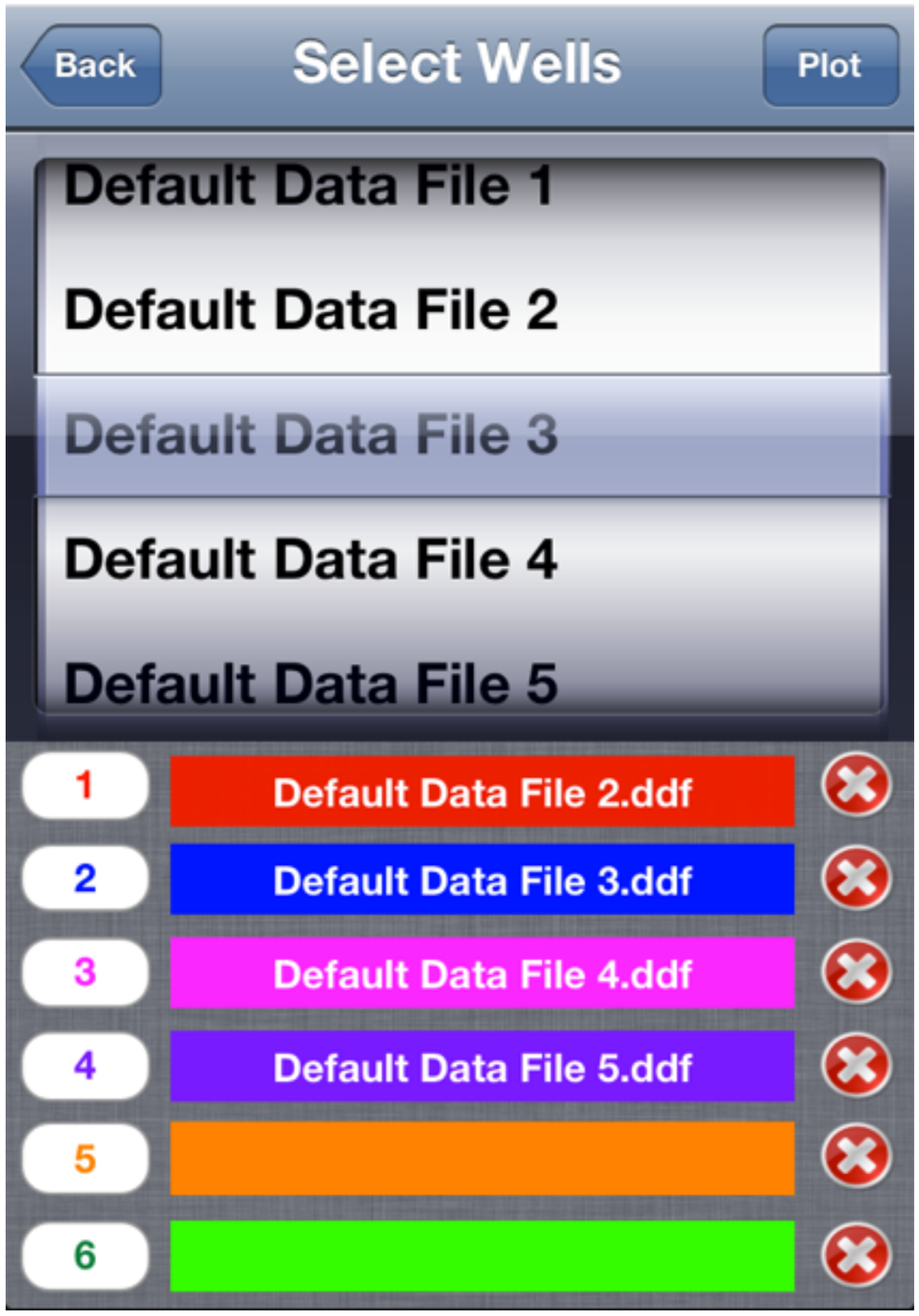
Note: The wells must be located in LOCAL.

- Roll up/down the wheell and stop on selected

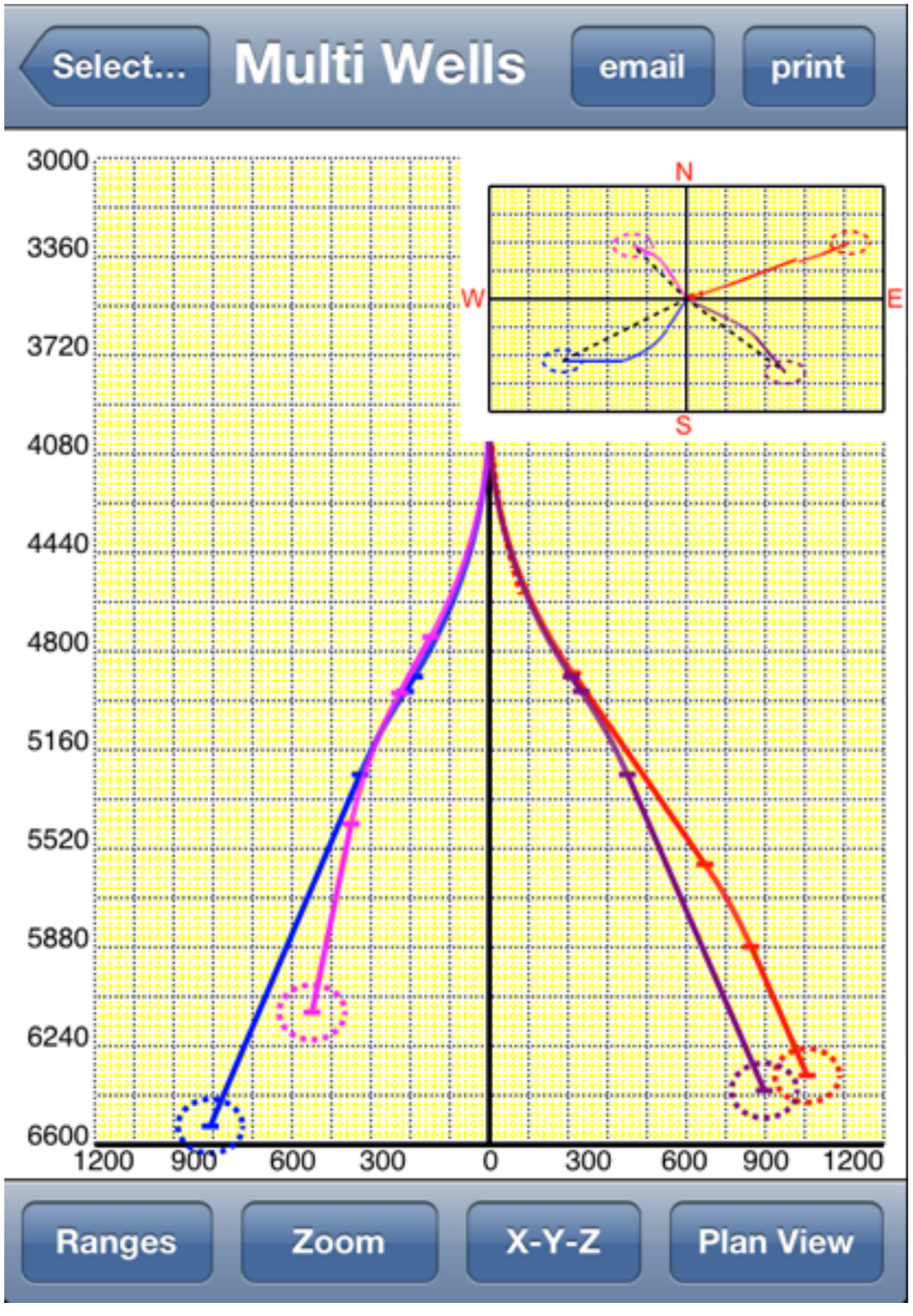
- Tap on ‘Set’ button (numerical)

- Tap on button to remove a item.

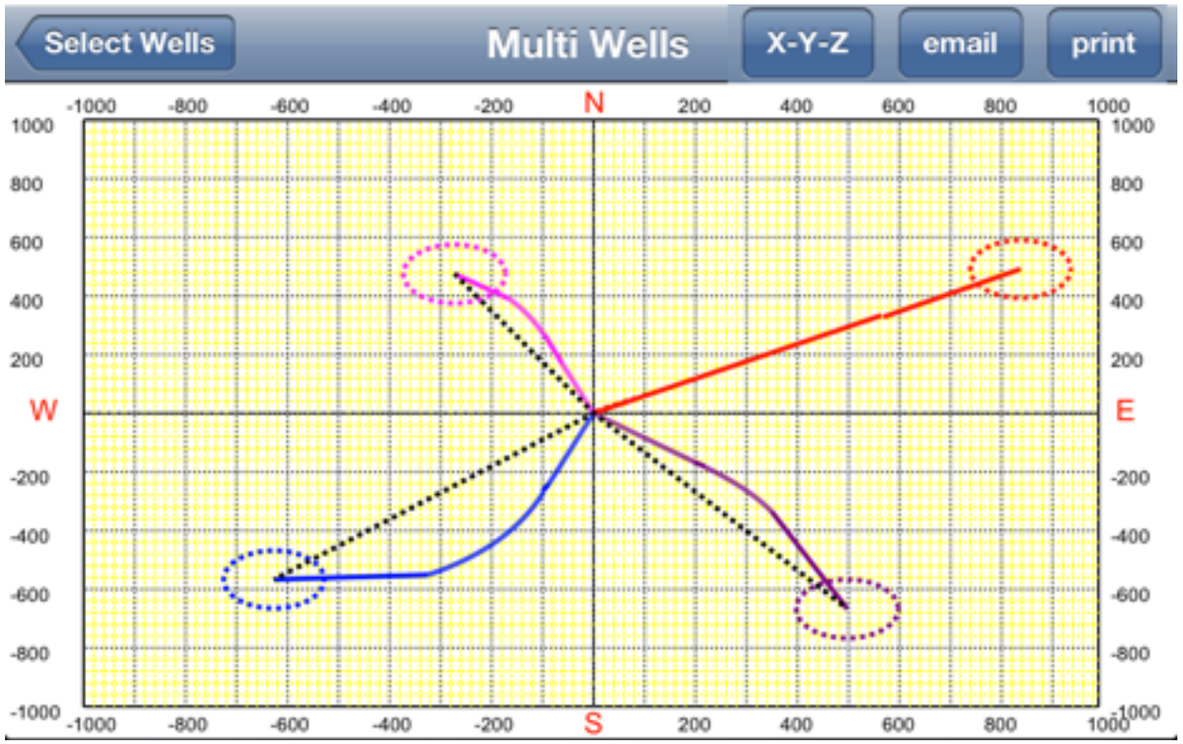
Tap on ‘**Plot**’ button



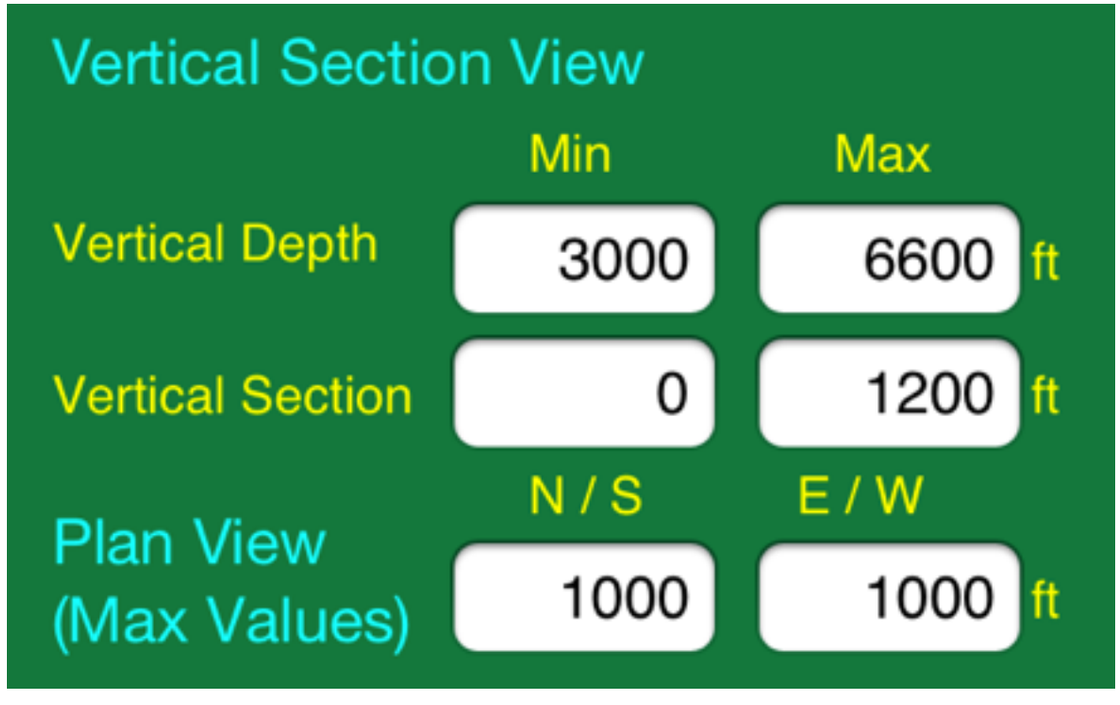
Plot Vertical Section on portrait position



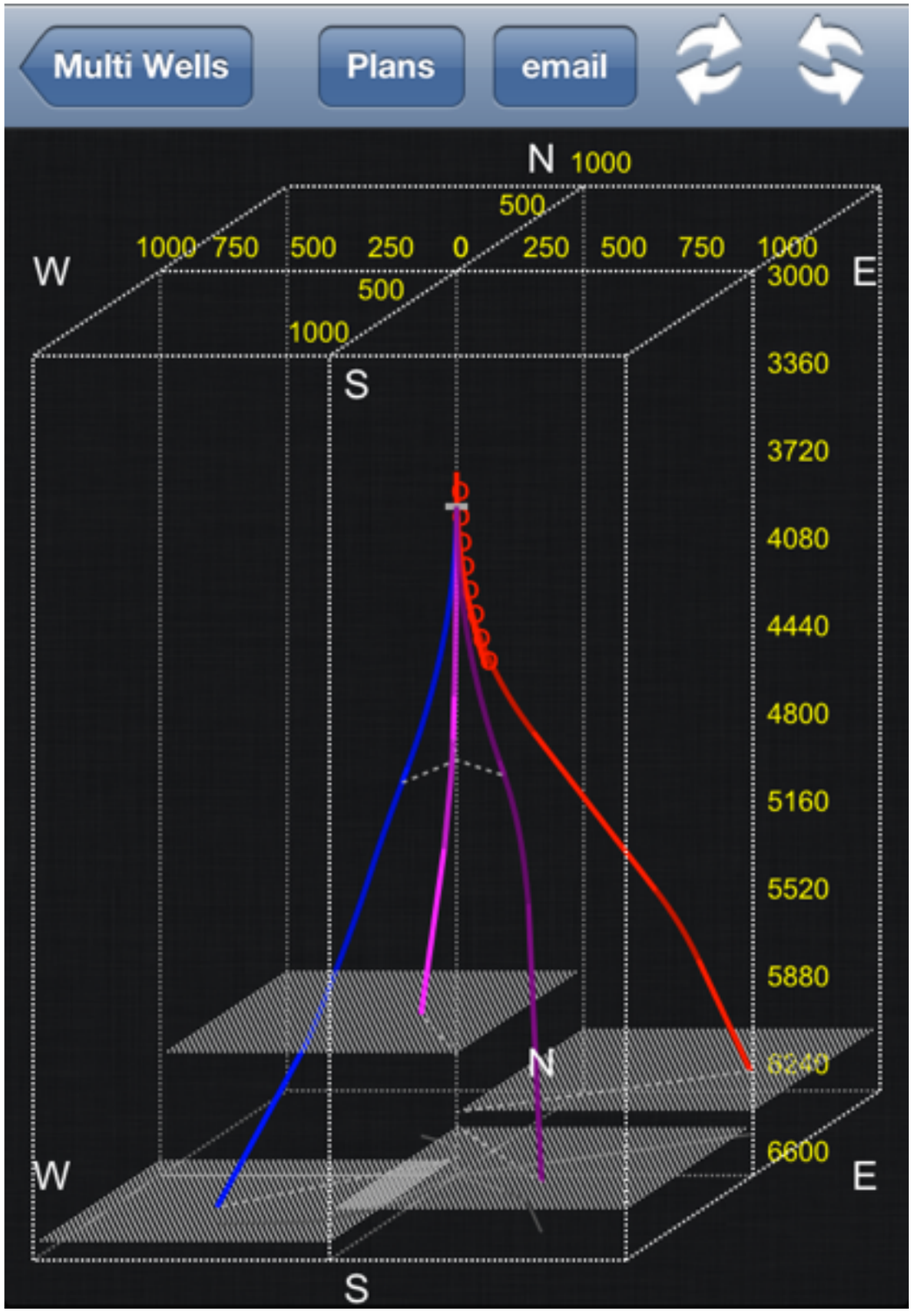
Plot Plan View on landscape position



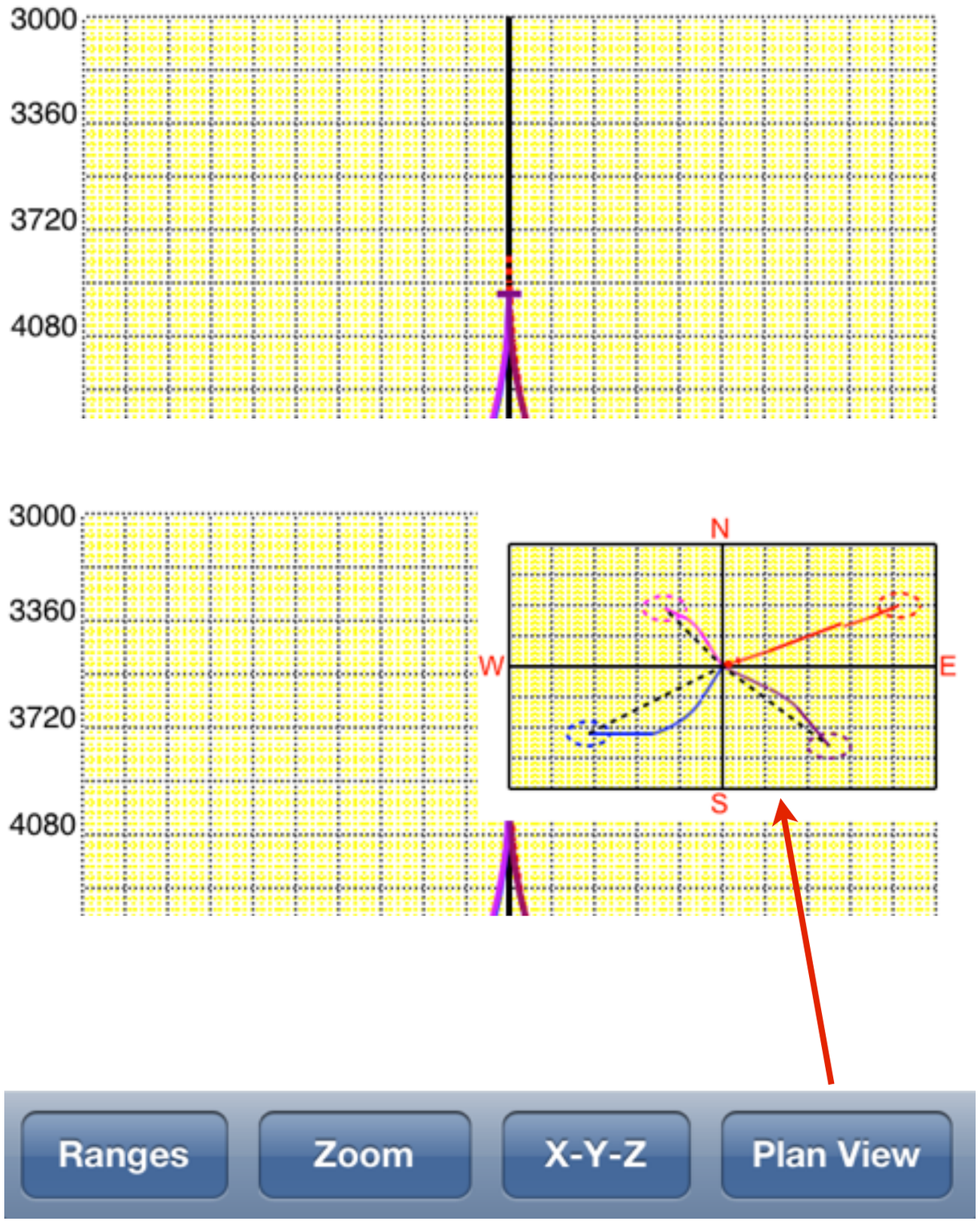
Use ‘Ranges’ button to set ranges for graph



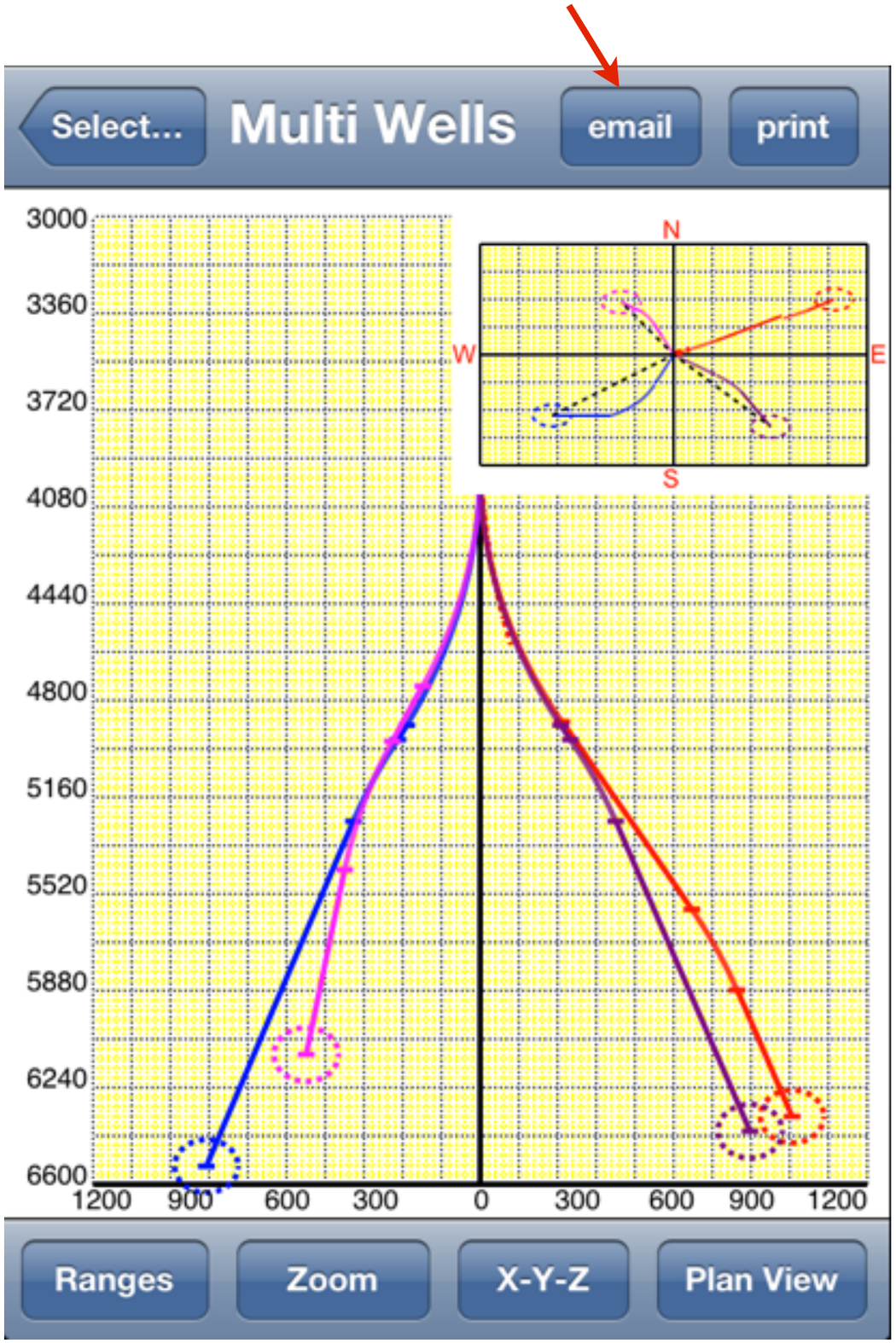
Use ‘X-Y-Z’ button to Show X-Y-Z Views

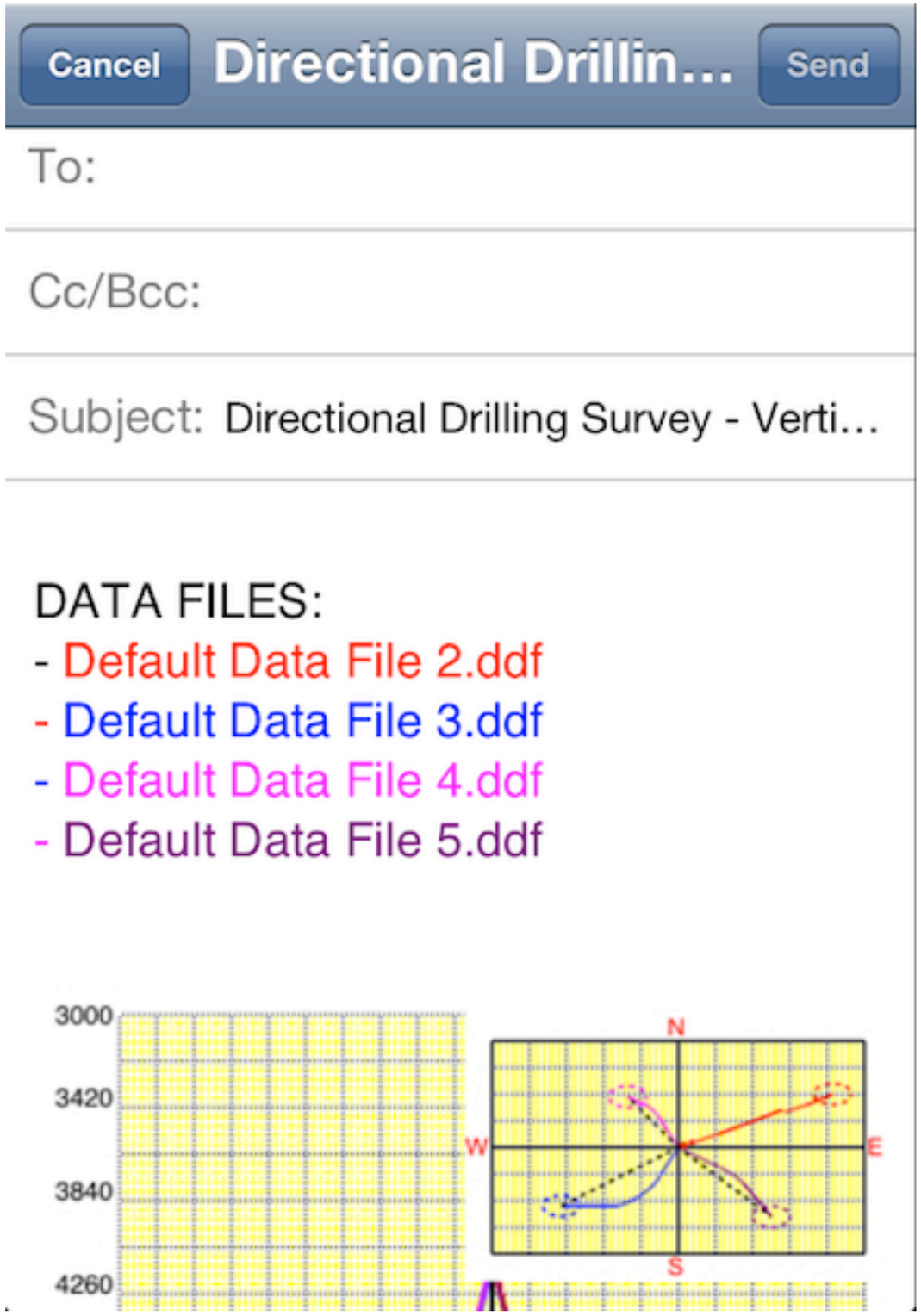


Use ‘Plan’ button to Show/Hide Mini Plan View

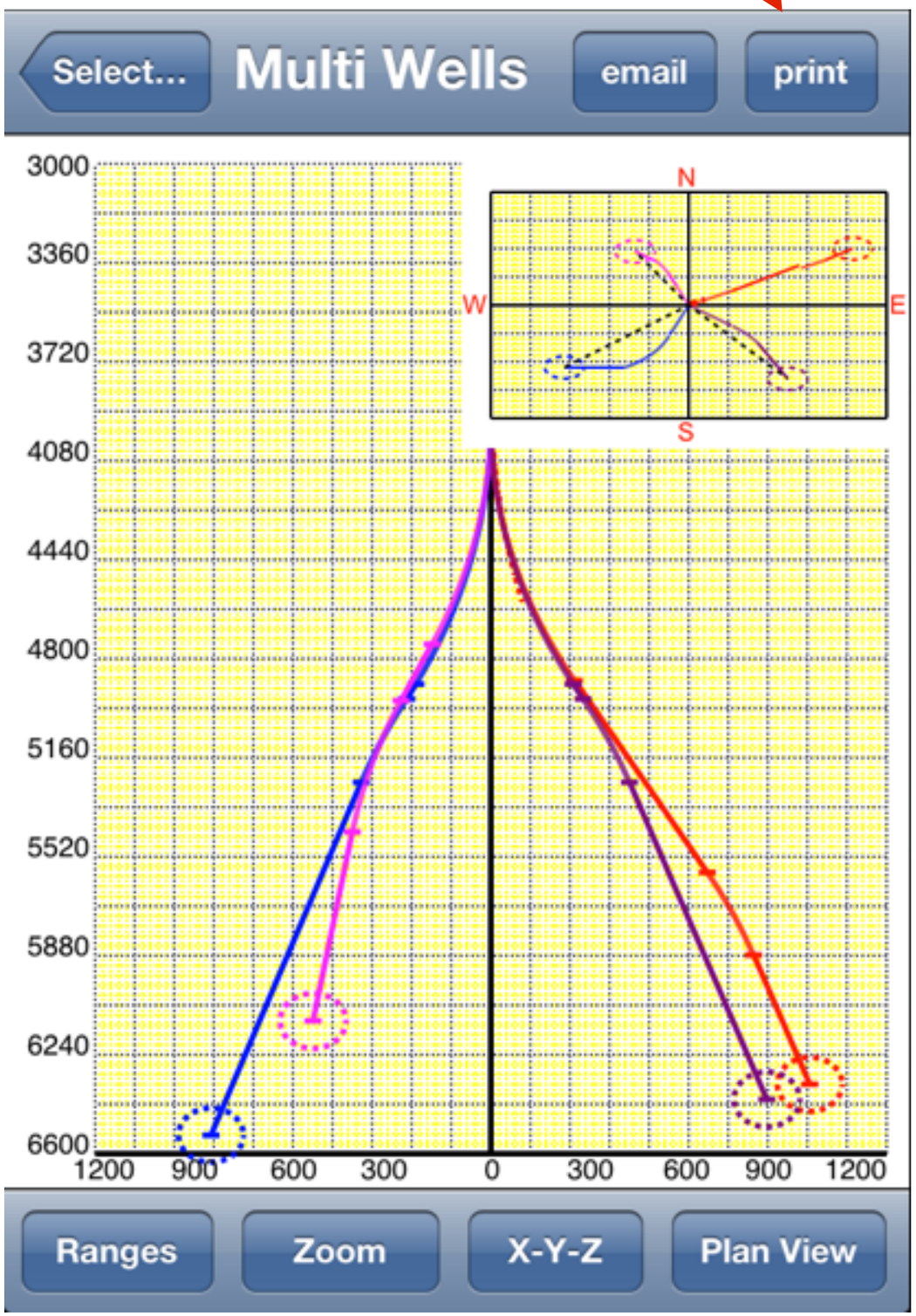


Use the 'email' button to send a screenshoot by email





Use the 'print' button to print a screenshoot

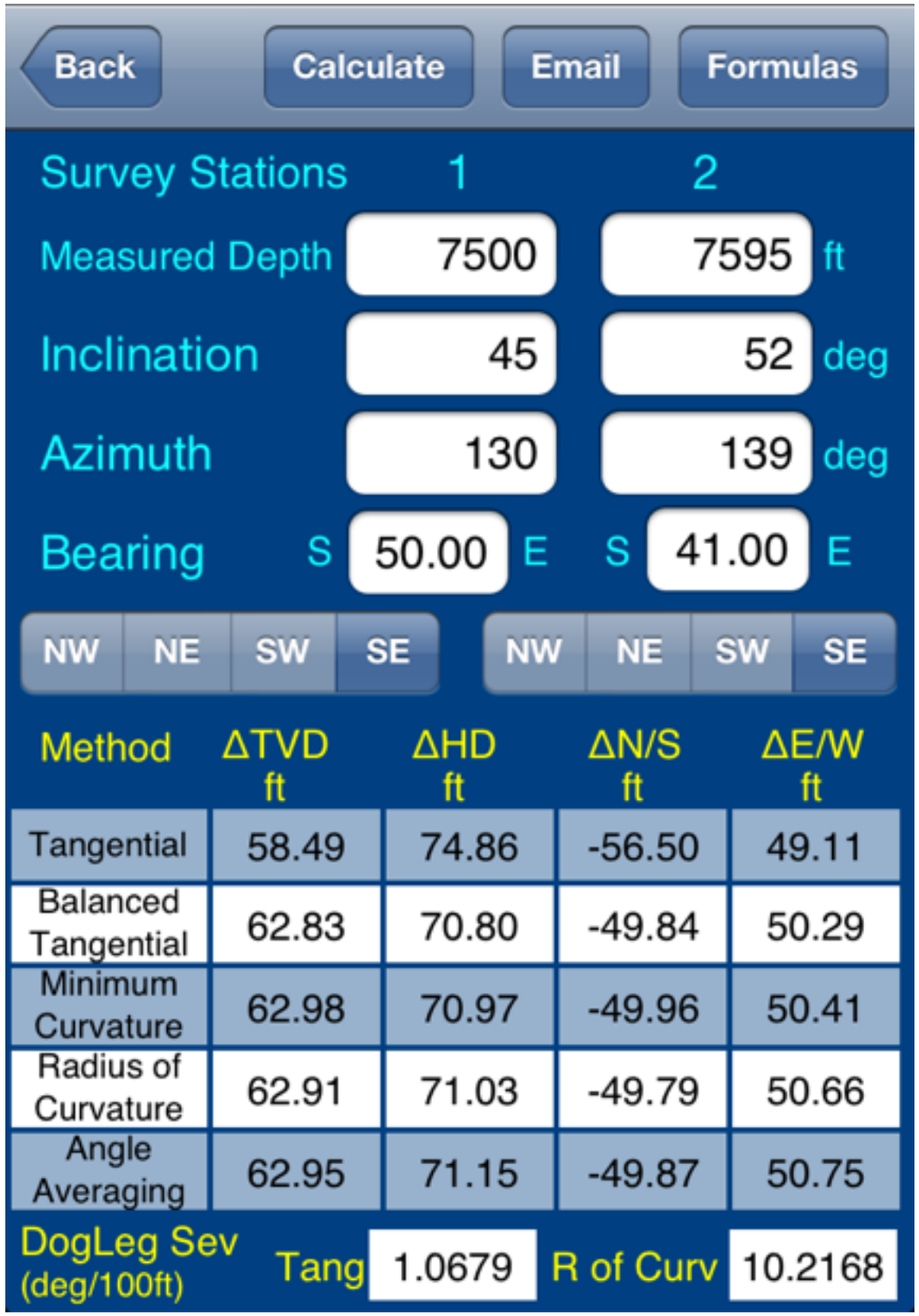


Print: Select the Air printer to print a screenshot

Use this View to calculate survey between two stations.

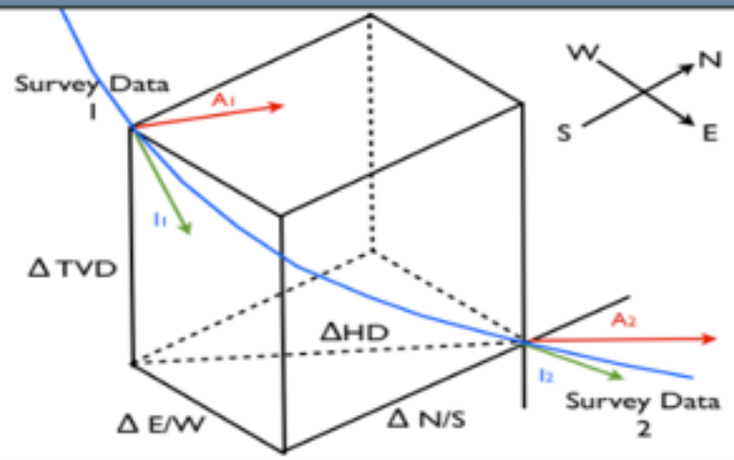
Enter Survey Data 1 and 2 and Tap on 'Calculate' button.

- Tangential
- Balanced Tangential
- Minimum Curvature
- Radius of Curvature
- Angle Averaging



Back

Formulas of the Methods

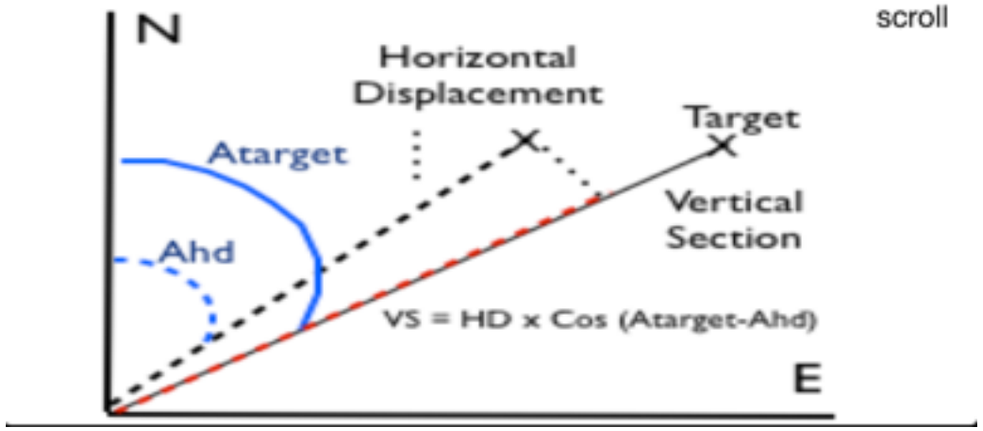


1) TANGENTIAL METHOD:

Δ N/S = ΔMD x sin (I2) x cos (A2)
Δ E/W = ΔMD x sin (I2) x sin (A2)
Δ TVD = ΔMD x cos (I2)

Δ HD = Square Root [(Δ N/S)^2 + (Δ E/W)^2)]
Note: Applied to all the Methods

scroll



2) BALANCED TANGENTIAL METHOD:

Δ N/S = ΔMD/2 x [sin (I1) x cos (A1) + sin (I2) x cos (A2)]
Δ E/W = ΔMD/2 x [sin (I1) x sin (A1) + sin (I2) x sin (A2)]
Δ TVD = ΔMD/2 x [cos (I1) + cos (I2)]

Δ HD = Square Root [(Δ N/S)^2 + (Δ E/W)^2)]

3) MINIMUM CURVATURE METHOD:

Δ N/S = ΔMD/2 x [sin (I1) x cos (A1) + sin (I2) x cos (A2)] x RF
Δ E/W = ΔMD/2 x [sin (I1) x sin (A1) + sin (I2) x sin (A2)] x RF
Δ TVD = ΔMD/2 x [cos (I1) + cos (I2)] x RF

B = acos [cos(I2-I1) - (sin(I1) x sin(I2) x (1 - cos(A2 - A1))] (in radians)
RF = 2/B x tan(B/2)

4) RADIUS OF CURVATURE METHOD:

Δ N/S = [ΔMD x (cos(I1) - cos(I2)) x (sin(A2) - sin(A1))] / [(I2 - I1) x (A2 - A1)]
Δ E/W = [ΔMD x (cos(I1) - cos(I2)) x (cos(A1) - cos(A2))] / [(I2 - I1) x (A2 - A1)]
Δ TVD = ΔMD/2 x [sin(I2) - sin(I1)] / (I2 - I1)

DOG LEG SEVERITY (degree/100ft):
DLS = {acos [cos(I1) x cos(I2) + (sin(I1) x sin(I2) x cos(A2 - A1)]} x (100 ÷ MD)

5) ANGLE AVERAGING METHOD:

Δ N/S = ΔMD x sin((I1+I2)/2) x cos((A1+A2)/2)
Δ E/W = ΔMD x sin((I1+I2)/2) x sin((A1+A2)/2)
Δ TVD = ΔMD x cos((I1+I2)/2)

About

This app was developed based on existing spreadsheets. There was no comparison with any other software.

Our goal was to create a low-cost application with the help of experts to share with directional drilling engineers, technicians, drillers and students.

You can contribute with suggestions for improvements, correcting the translation to english, reporting bugs and spreading it to your friends.

Please visit our support url and see other applications for Oil & Gas for iPhone, iPod Touch, iPhone and Mac OS X.

Contact:
contact@wellcontrol.com.br

Support URL:
http://www.wellcontrol.com.br