RNAV-Pro Users Guide
(R-PUG)

Version 2.31

Flight Systems Laboratory

Flight Operations Simulation and Analysis Branch, AFS-440
Flight Technologies and Procedures Division
Federal Aviation Administration

RNAV-Pro Users Guide

Air Traffic Simulation, Inc.

HELP LINE: (405) 620-0809

Foreword

RNAV-Pro is a computer program that provides procedure developers with a screening model to aid in the development of RNAV routes. This screening model is not intended to serve as the final authority in RNAV route procedure design. RNAV-Pro should NOT be used as a substitute for other procedures, such as flight inspection, which are required in the RNAV route implementation process.

RNAV-Pro is a continually evolving product Software and user interface enhancements are frequently made to increase RNAV-Pro's utility. Consequently, display examples in this Users Guide may vary slightly from actual displays observed while accessing RNAV-Pro via the Internet.

Neither the Federal Aviation Administration (FAA) nor any other parties involved in the creation or distribution of this program take any responsibility for the correctness of the data entered into this model or for the applicability of this model to any specific case. It is the responsibility of the user to verify all data used by this model.

RNAV-Pro software and databases have been developed for use within the United States National Airspace System (NAS).Individuals requiring application software of a screening model outside of the NAS should contact Support@atsi.aero

Table of Content

1.0   Introduction

This RNAV-Pro Users Guide (R-PUG) is intended to assist users in the development and implementation of RNAV routes through the use of RNAV-Pro. The FAA's Flight Operations Simulation and Analysis Branch, AFS-440, at the Mike Monroney Aeronautical Center in Oklahoma City, Oklahoma, have developed RNAV-Pro. RNAV-Pro is the FAA's approved automation tool to evaluate key Area Navigation (RNAV) and Required Navigation Performance (RNP) route elements. These elements include Terminal Instrument Procedures (TERPS) Criteria Screening, Flyability Screening, DME/DME Screening, Radar Coverage Screening, Communication Coverage Screening, and Engine Out evaluation.

RNAV-Pro is a secured, Internet-based application located at: https://rnavpro.faa.gov/

To obtain a user name and password, please contact:

Flight Operations Simulation and Analysis Branch (AFS-440), Phone: (405) 954-7935

RNAV-Pro Help Desk, E-mail: Support@atsi.aero Phone: (405) 620-0809

1.2   Locating RNVA-Pro™

RNAV-Pro™ is located on the Internet at: https://fsl.faa.gov.The following RNAV-Pro™ Login Window appears when RNAV-Pro™ is accessed.

1.3   Logging into RNAV-Pro

Enter user name and password and press "Log In" at the RNAV-Pro™ Login Window to log in to RNAV-Pro™.

1.4   Logging Out of RNAV-Pro™

Complete the following procedure to log out of RNAV-Pro™:

● On the RNAV-Pro™ Menu Bar selects "File."

● On the File drop-down menu, select "Exit."

● The Logoff Window appears. Select the Log Off button. The Login Window appears, allowing login by you or others at a later time.

1.5   ICA Client File Security Window

This window may appear following the Login window and asks the user to choose from the following options:

● No Access: Allows no read or write access to the user's computer.

● Read Access: Allows only read access to the user's computer.

● Full Access: Flight plan information can be read from and resultant Results information written to the user's computer.

● Select "Full Access" and "Never ask me again for any application" then click "OK."
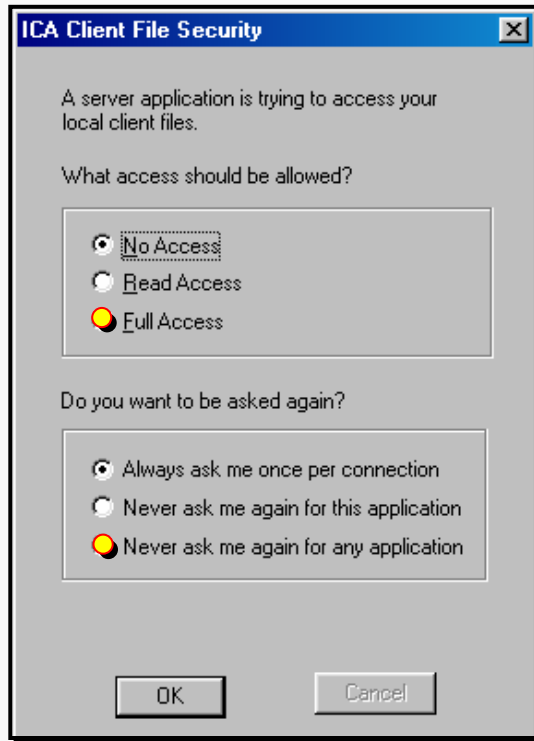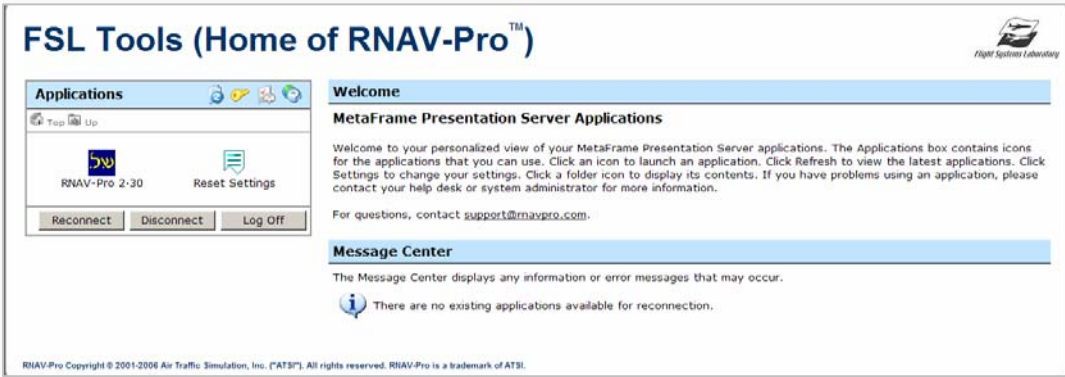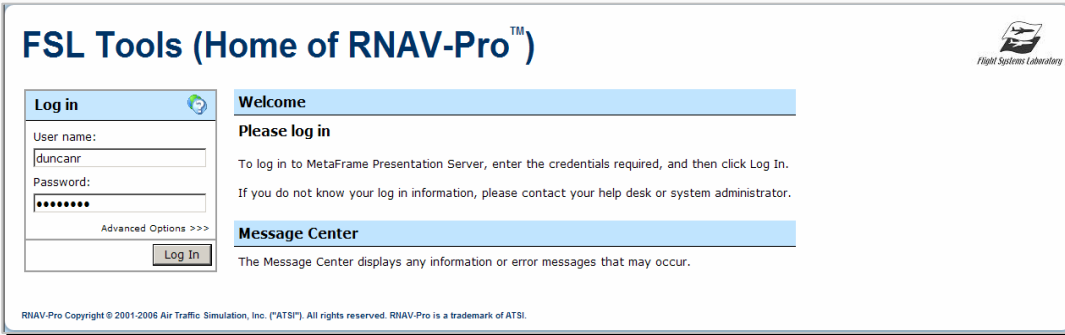
Figure 1-1: Log into RNVA-Pro™/ICA Client File Security

2.0   RNVA-Pro™ Layout

RNAV-Pro is layout with three major areas, Information Bar, DrawSpace™ Display, and Modules with Vertical tabs.

- Information Bar: This has a series of selectable drop-down menus, window and square buttons.

- DrawSpace™ Display Area: includes radial buttons, information windows, mileage scales, tool tabs, and snapshot feature.

- Modules with Vertical tabs: Modules are opened with drop-down menus or square buttons. There are four modules: Display Data, Simulations, Grid Evaluation, and TERPS.
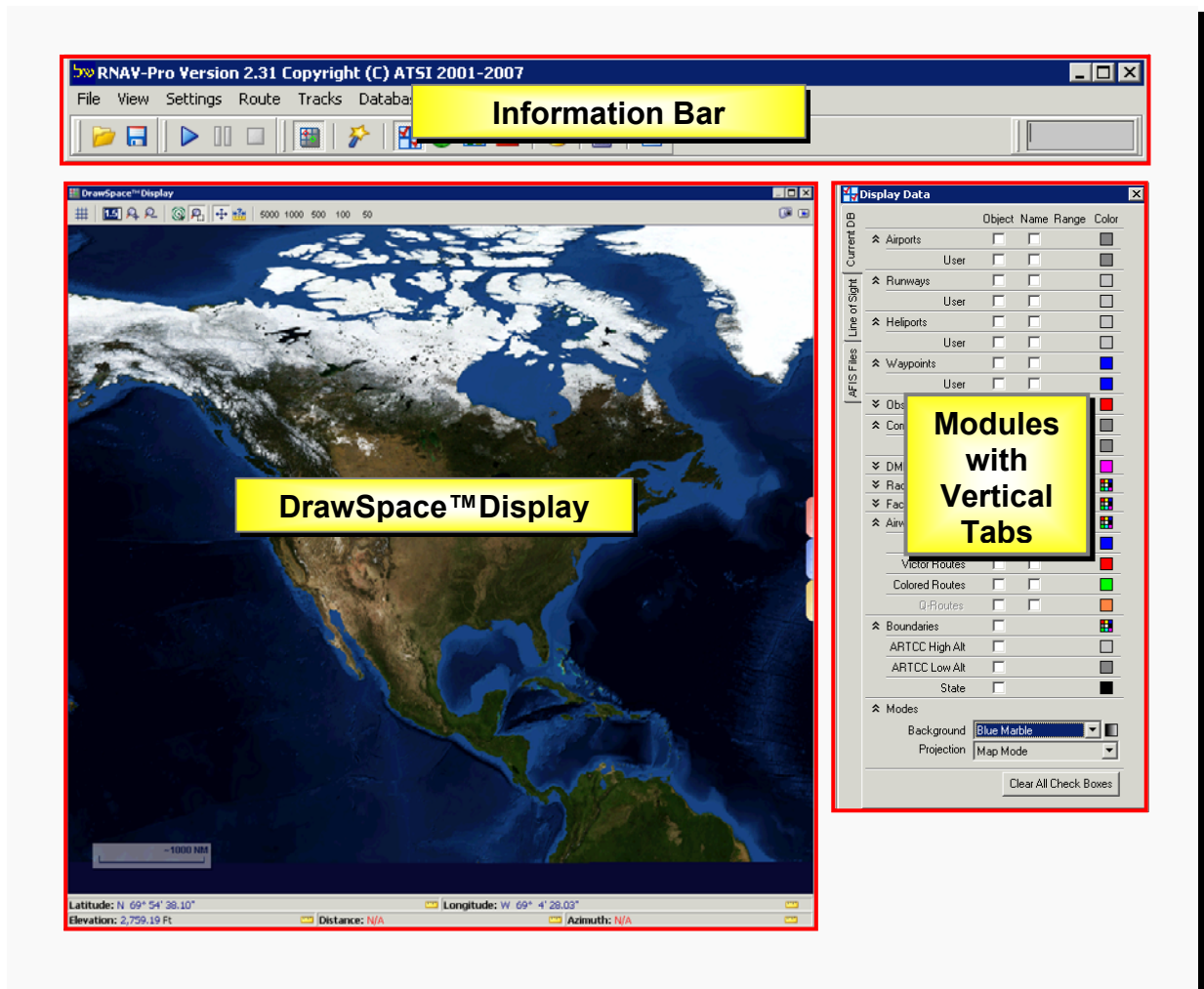
Figure 2-1: RNAV Pro Layout

3.0   Information Bar

The Information Bar has the following seven drop-down menus: File, View, Settings, Route, Tracks, Database, and Help.

3.1   File

This menu is used to and to exit RNAV-Pro, and capture screen shots.

Save DrawSpace Snapshot: Allows user to capture a screen shot of DrawSpace™Display.

Exit: Returns the user to the RNAV-Pro Applications Window.

3.2   View

This menu allows the user to manipulate the view and contains the following options:

DrawSpace™Display: Opens and closes the DrawSpace™Display area.

Display Data: Opens the Display Data Module, which allows the user select items to be displayed from the database such as airports, runways, waypoints, database obstacles, DMEs, radars, communications, airways, ARTCC boundaries, DTED, and sectional charts.

Simulations: Opens the Simulation Module, which inputs simulation information prior to running Flyability, DME, Radar, or Communications Screenings.

Grid Evaluations: Opens the Grid Evaluations Module to create/evaluate grid areas, evaluate a Line of Sight Grid analysis and view Service Volume Cross Sections.

TERPS: Opens the TERPS Module to generate TERPS/Engine-Out surfaces and evaluate surface penetrations.

User Data: Opens the User Data Module, which is used to add, edit, or delete a DME facility, radar site, radio communication station, or obstacle.

Geo Calculator: Allows the user to find Distance/Heading, Latitude/Longitude, Intersection, and calculate a conversion of distance, DMS, and weight.

Results: Provides results on Flyability Screening, DME Screening, Radar Screening, Communications Screening, and TERPS and DME Area Assessment.

Reset Window Position: Repositions DrawSpace™Display, modules, and toolbar to the proper alignment.

3.3   Settings

This menu allows the user to select the following options:

Reload: Reloads database settings, flight plans, simulation settings, and user settings.

Load Settings: Loads selected settings.

Save Settings: Saves previously loaded settings.

Reset to Default: Resets settings to default values.

3.4   Route

This menu allows the user to select the following options:

Route Wizard: Is a user-friendly method of creating a Flight Plan Data Input File (FPDIF).

Load Route(s): Loads or activates the flight plan data file.

Add Route(s): Allows user to load the flight plan data file.

Zoom Route(s): Centers around the loaded flight plan data file in the DrawSpace™Display area.

Batch Process Routes: Allows the user to load and process multiple the flight plan data files.

Edit Route: Allows the user to edit the flight plan data file.

Clear All: Clears all data in the flight plan data file.

3.5   Tracks

This menu allows the user to manipulate the appearance of tracks and has the following options:

Color: Changes the color of a flight track.

Width: Changes the width of a flight track.

Clear: Clears a flight track that has been run.

3.6   Database

This menu allows the user to select between the AVNIS or User databases.

AVNIS: This database is the Aviation Systems Standards Information System.

User: User Data is created and saved using the User Data Window.

3.7   Help

This menu allows the user to select the following options:

Interactive Briefing: Allows the user to access the Interactive Training.

User Manual: Allows the user to access the Users Guide.

Submit Report: Allows the user to submit a report to the FAA's Flight Operations Simulation and Analysis Branch identifying a problem that the user has encountered or offering a suggestion that will increase the utility of RNAV-Pro.

About: Provides RNAV-Pro Version, Release Date, Developer, and e-mail address
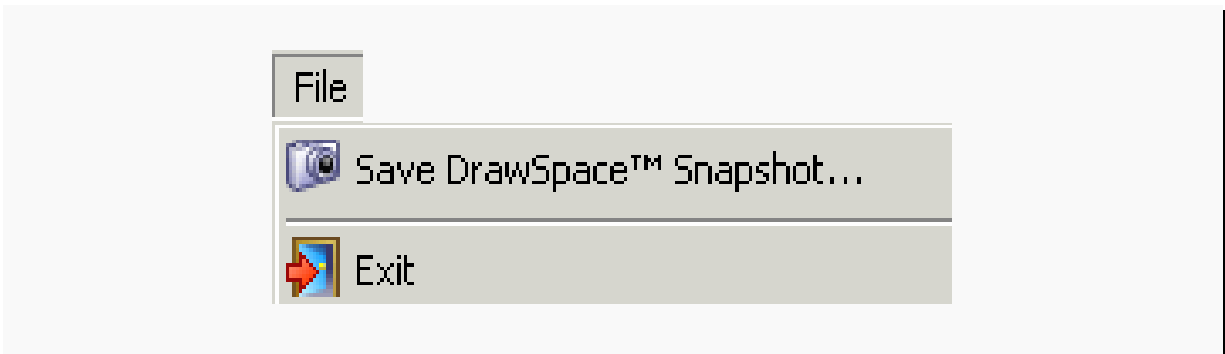
Figure 3-1: File
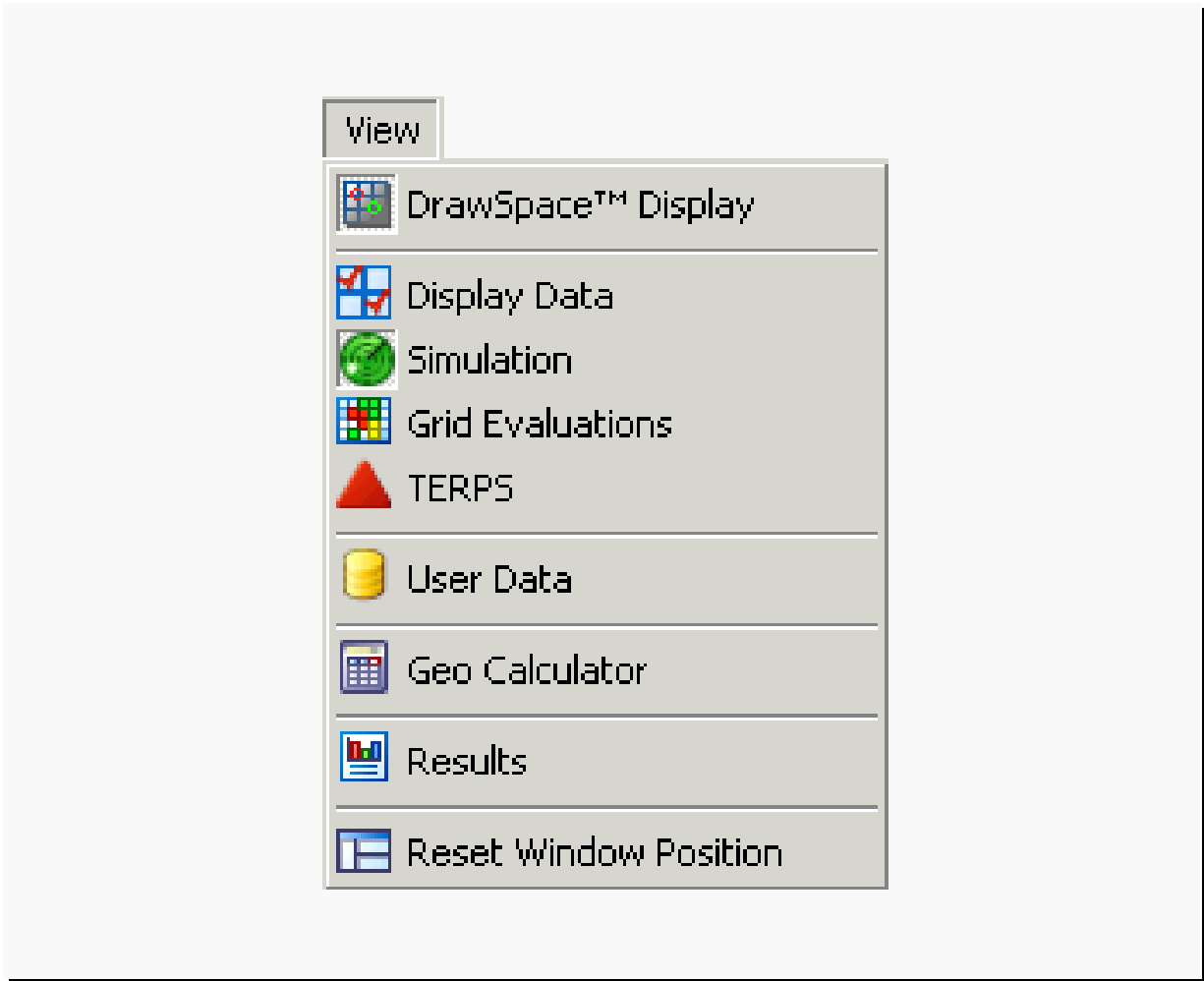
Figure 3-2: View
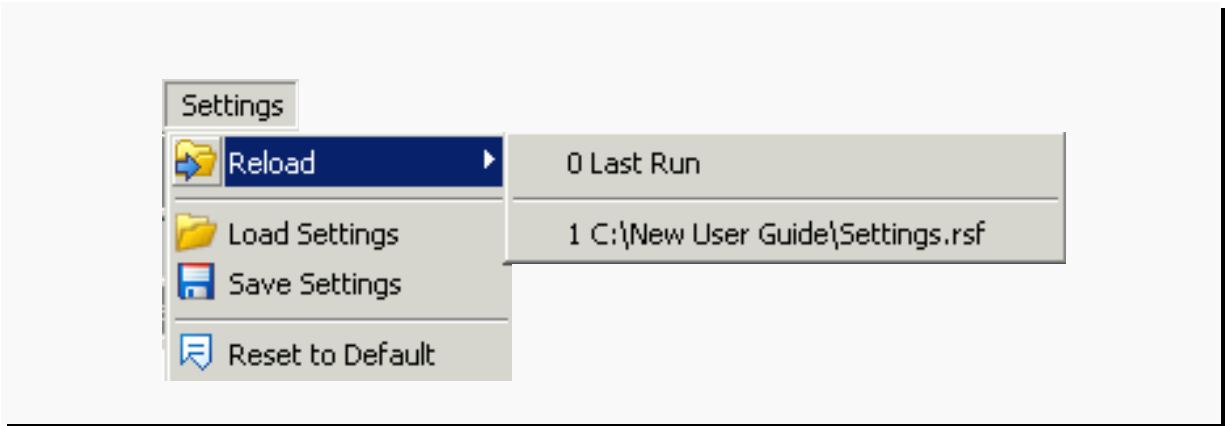
Figure 3-3: Settings
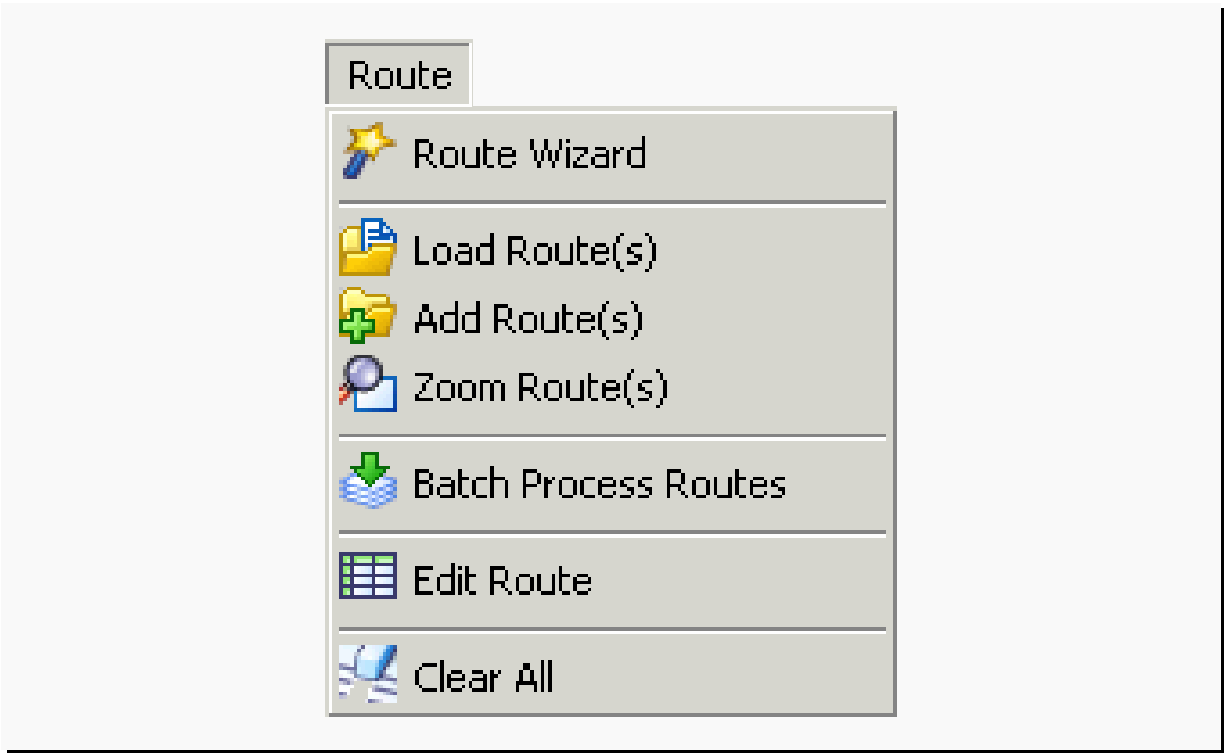
Figure 3-4: Route
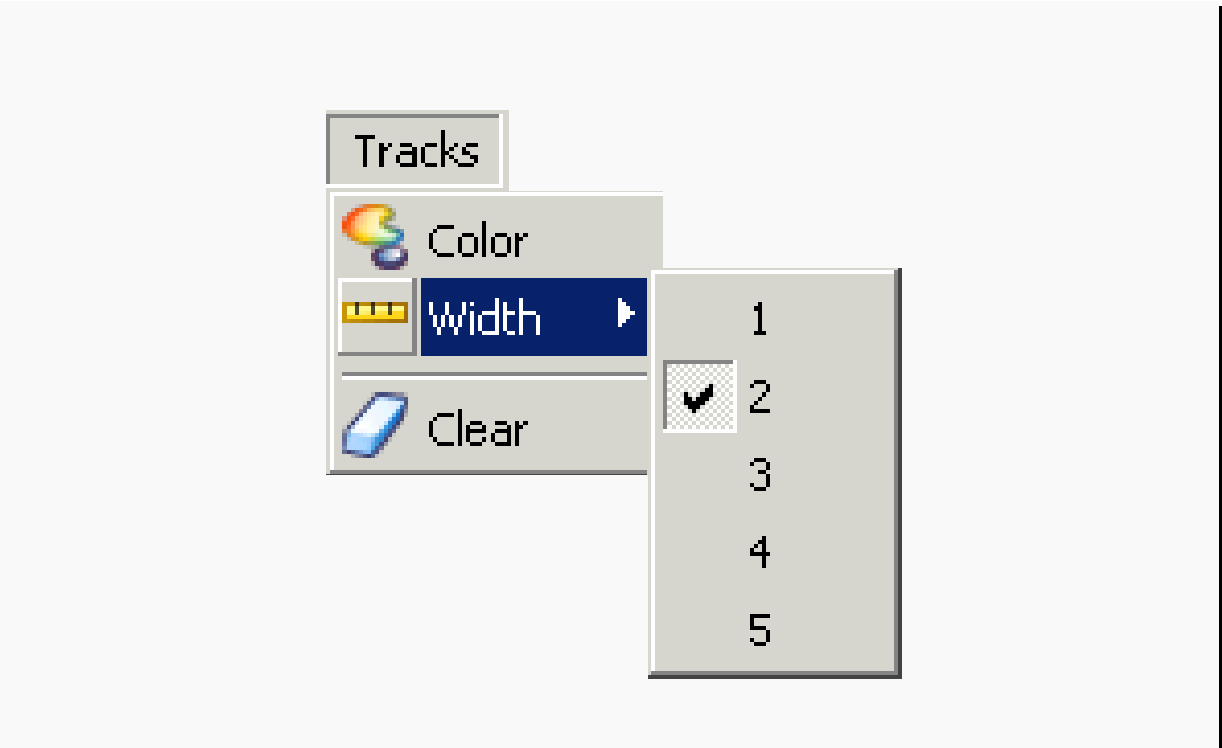
Figure 3-5: Track
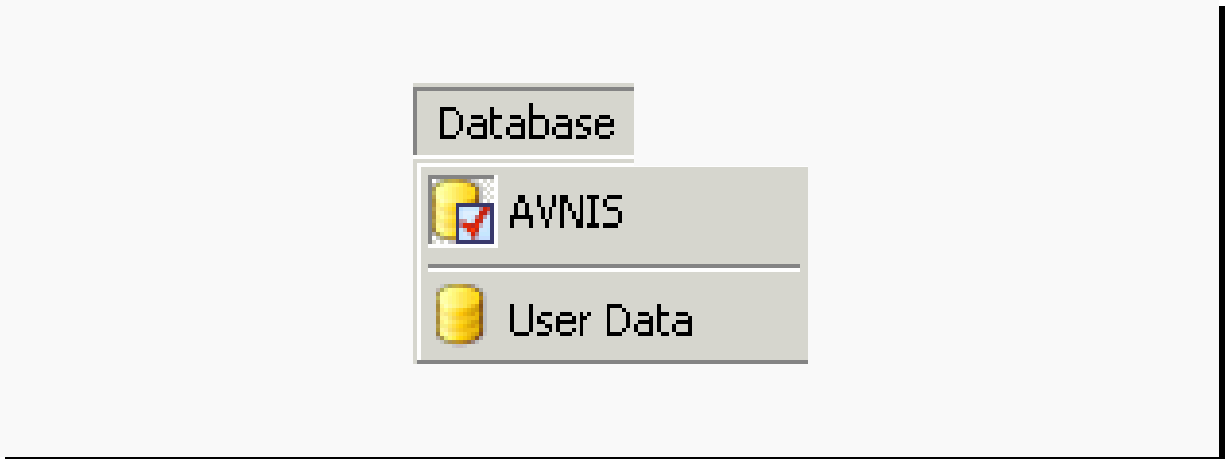
Figure 3-6: Database
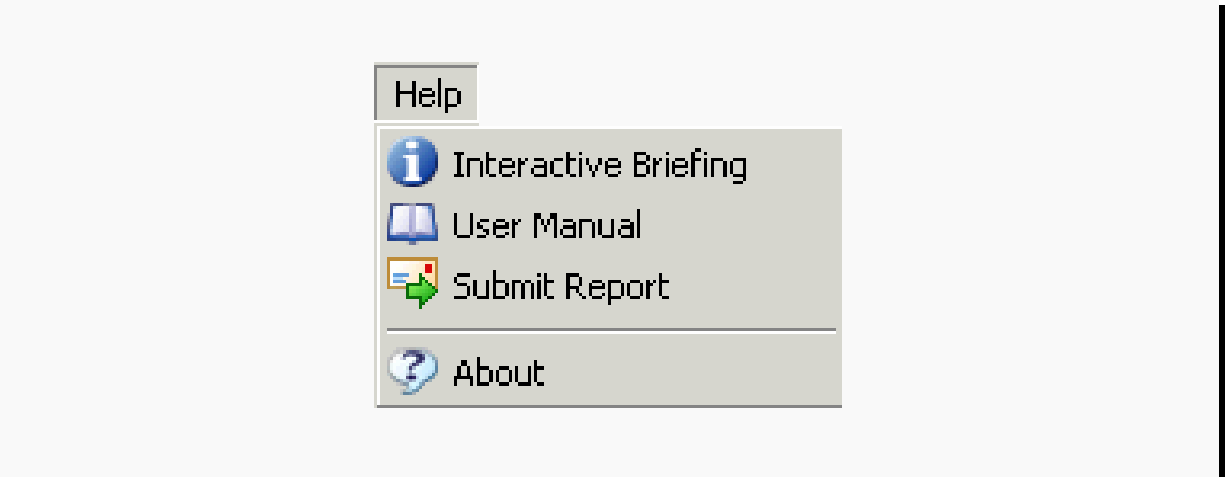
Figure 3-7: Help

3.8   Square Buttons

The Information Bar has 14 square buttons which include: Load Flights Plans & Settings, Save Settings, Run Simulation, Pause Simulation, Stop Simulation, DrawSpace™Display, Route Wizard, Display Data, Simulation, Grid Evaluations, TERPS, User Data, Geo Calculator, and Results.

Load Flights Plans & Settings: Displays the Open dialog box where saved flight plan tracks are stored.

Save Settings: Saves previously loaded settings.

Run Simulation: Initiates a flight track on a previously loaded route.

Pause Simulation: Stops flight track simulation momentarily until restarted with Run button.

Stop Simulation: Stops a flight track simulation.

DrawSpace™Display: Opens and closes the DrawSpace™Display.

Route Wizard: Opens the Route Wizard to create a Flight Plan Data Input File (FPDIF). Data required in the FPDIF is WP Name, WP Type, Lat/Lon, Altitude, IAS, Turn Type, Turn Direction, Leg Type, and CF Radial.

Display Data: Allows the user to select items to be displayed from the AVNIS and User database, DTED (Digital Terrain Elevation Data), and sectional charts.

Simulation: Opens the Simulation Module, which inputs simulation information prior to running Flyability, DME, Radar, or Communications Screenings.

Grid Evaluations: Opens the Grid Evaluations Module to create/evaluate grid areas, evaluate a Line of Sight Grid analysis and view Service Volume Cross Sections.

TERPS: Opens the TERPS Module to generate TERPS/engine-out surfaces and evaluate surface penetrations.

User Data: Opens the User Data Module, which is used to add, edit, or delete a DME facility, radar site, radio communication station, or obstacle.

Geo Calculator: Allows the user to find Distance/Heading, Latitude/Longitude, Intersection, and calculate a conversion of distance, DMS, and weight.

Results: Provides results on Flyability, DME, Radar, Communications, and TERPS Screening.

Route Wizard
DrawSpace™Display
Stop Simulation
Pause Simulation
Run Simulation
Save Settings
Load Flight Plans & Settings

Display Data
Simulation
Grid Evaluations
TERPS
User Data
Geo Calculator
Results
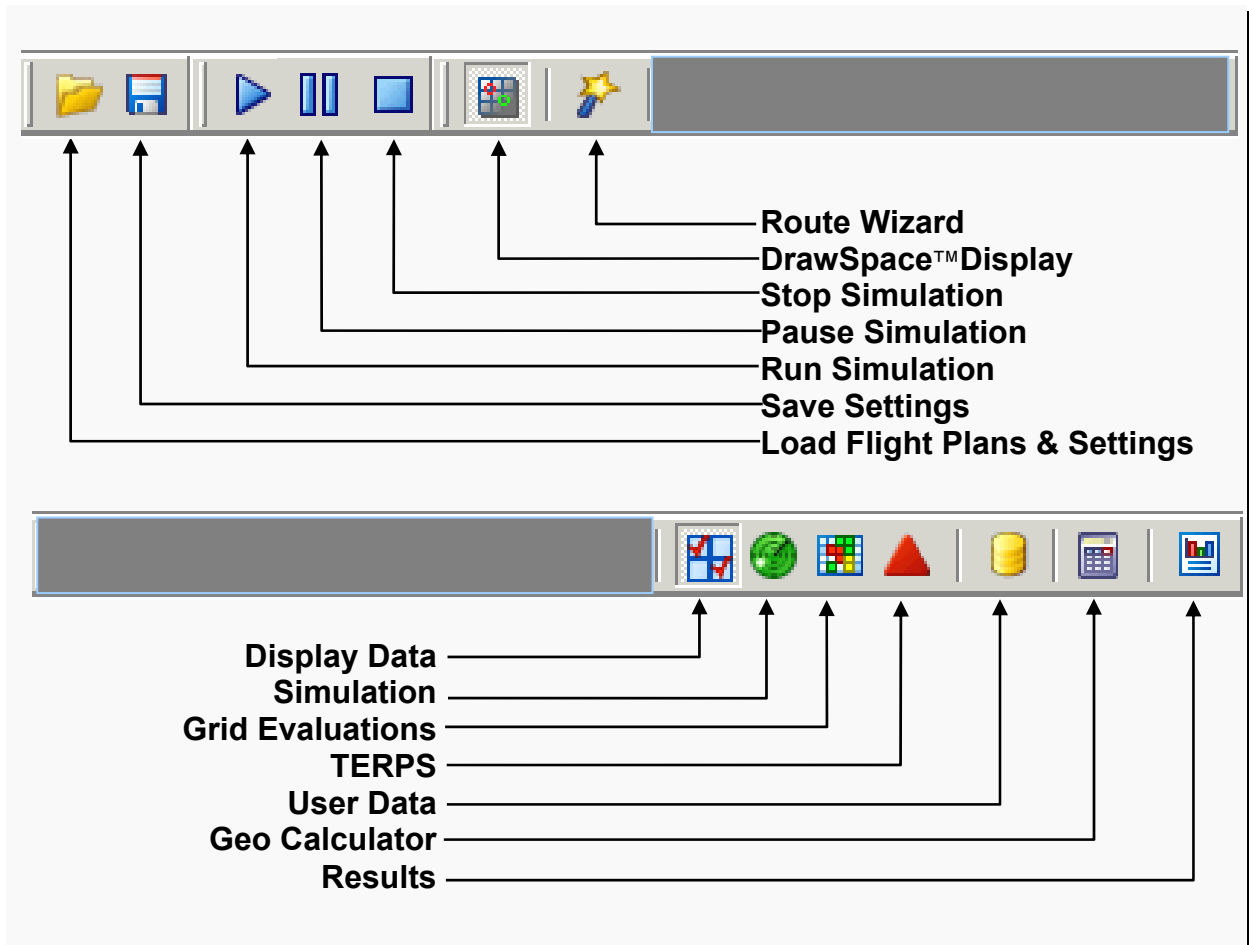
Figure 3-8: Square Buttons

4.0　　　　　DrawSpace™Display

The DrawSpace™Display includes radial buttons, latitude/longitude, elevation, azimuth/distance mileage scales, tool tabs, snapshot feature and toolbar. The DrawSpace™Display provides display information on:

● Toolbar: See paragraph 4.1 for details.

● DrawSpace™ Snap Shot: This is a screen capture tool, which allows the user to save the picture as a .jpg file or paste to a desired location.

● Red, Blue and Gold tabs: These three tabs open and close the Display Tool, Search Tool, and the Drawing Tool. They can also be opened and closed with the Open Display button ⊞ located in the upper right corner of the DrawSpace™Display.

● Mileage Scale: Displays a mileage scale in the DrawSpace™Display.

● Latitude: Latitude is displayed as the mouse rolls across the DrawSpace™Display.

● Longitude: Longitude is displayed as the mouse rolls across the DrawSpace™Display.

● Elevation: Elevation is displayed as the mouse rolls across the DrawSpace™Display, provided Digital Terrain Elevation data (DTED) has been loaded.

● Distance: Distance between two points is displayed provided the Distance/Azimuth tool ⚏ has been selected.

● Azimuth: Azimuth between two points is displayed provided the Distance/Azimuth tool ⚏ has been selected.

● Change Units: The DrawSpace™Display area have five Change Units 📏 which allow the user to select the desired unit of measurement.
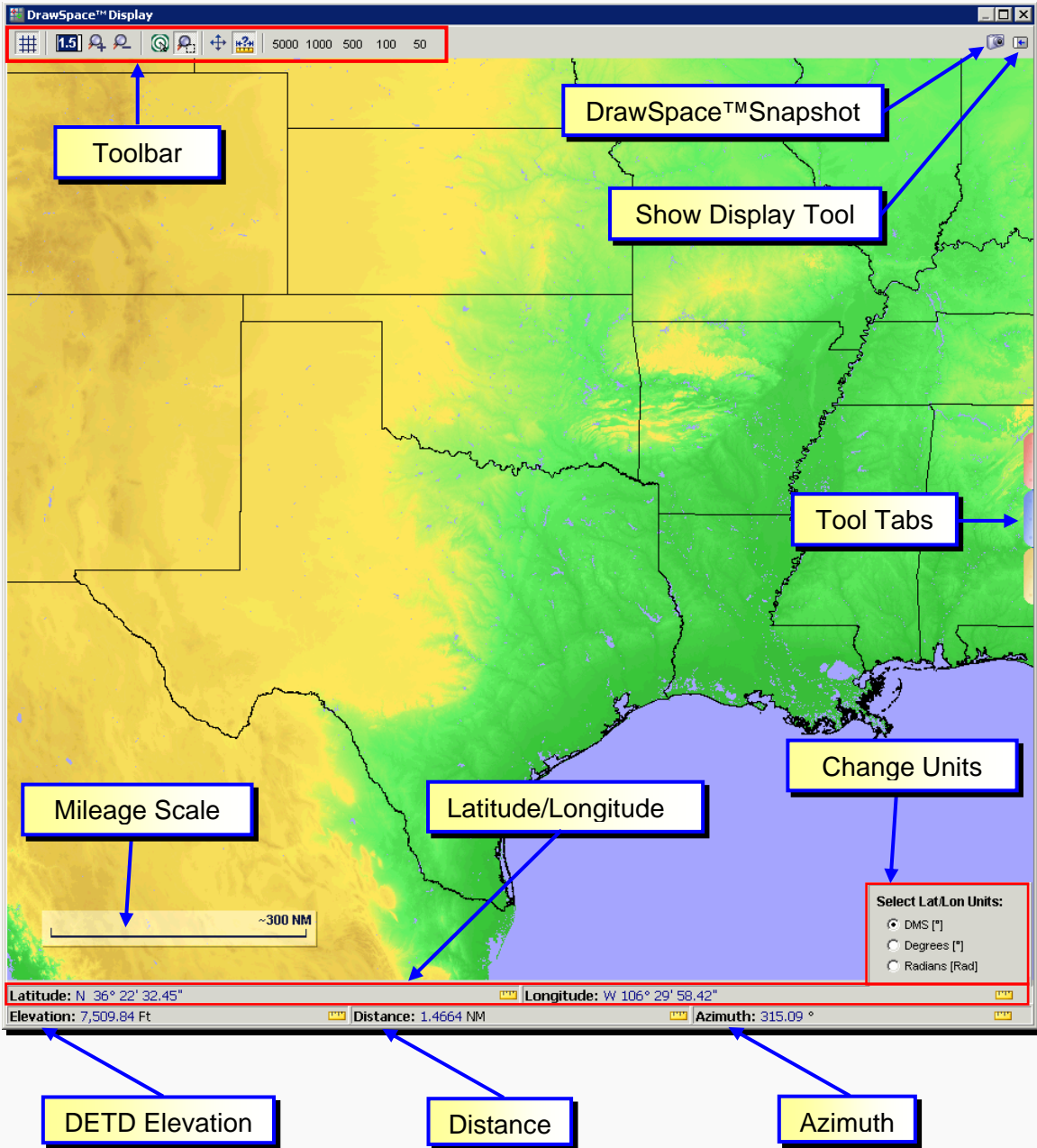
Figure 4-1: DrawSpace™Display Layout

4.1   Toolbar

The toolbar allows the user to: toggle grid visibility; adjust zoom magnification; zoom in and out; recenter the display; select a specific area to zoom; move the visible area; measure distance and azimuth; and zoom to 50, 100, 500, 1000, or 5000 nautical miles (NM). The toolbar includes the following:

Grid Visibility: A toggle button that displays latitude/longitude grid when selected.

Zoom Magnitude: Allows the user to input magnification values larger than 1.0 and used in conjunction with Zoom In and Zoom Out.

Zoom In: Allows the user to zoom in by a value entered in Zoom Magnitude.

Zoom Out: Allows the user to zoom out by a value entered in Zoom Magnitude.

Recenter: Allows the user to recenter the display via a left click of the mouse. This button toggles with the Area to Zoom button; the user must select one or the other.

Area to Zoom: Allows the user to zoom in to an area selected via a left click, hold, and drag of the mouse. This button toggles with the Recenter button; the user must select one or the other.

Moves the Visible Area: Allows the user to move the display the distance and direction specified via a right click and drag of the mouse. This button toggles with the Distance and Azimuth button; the user must select one or the other.

Distance and Azimuth: Allows the user to measures the distance and azimuth specified via a right click and drag of the mouse. This button toggles with the Moves the Visible Area button; the user must select one or the other.

Zoom to x Nautical Miles: Zooms to display the selected distance of 5000, 1000, 500,100, or 50 nautical miles.
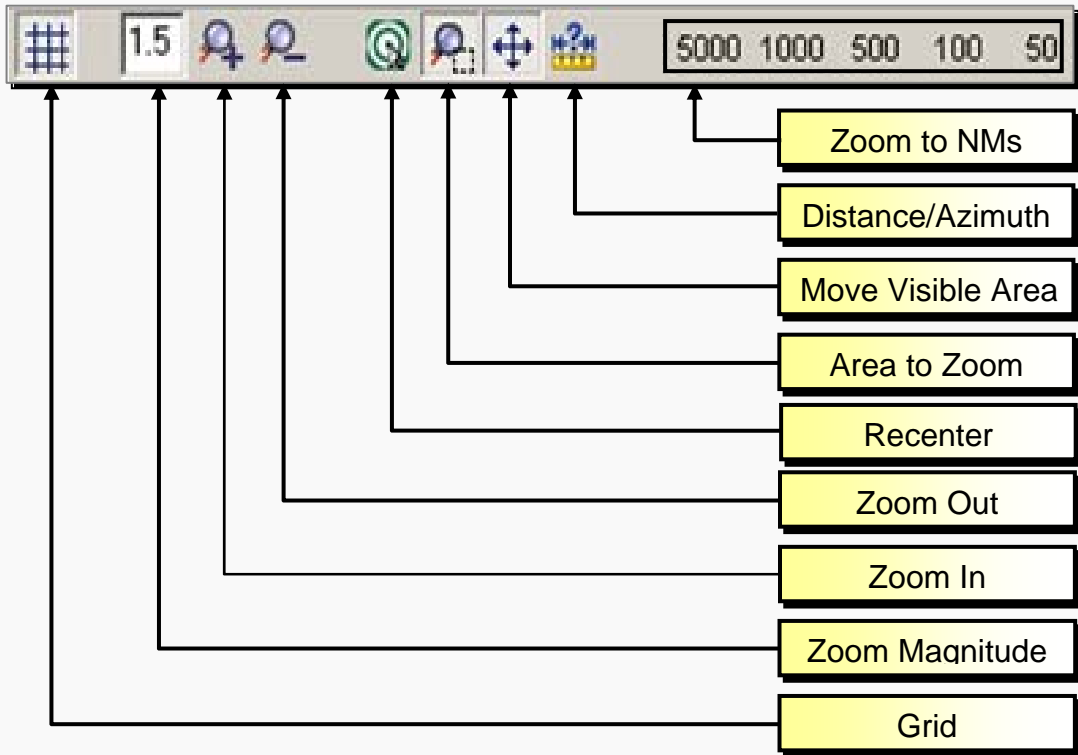
Figure 4-2: Toolbar

4.2　　　　Display Tool

- The Display Tool and Current DB tab, have duplicate functions (see Figure 4-3.) They are used to display the AVNIS database and allow the user to select choices of screen backgrounds. Left mouse click on the double arrows expand and collapse the section. Four checkbox columns are provided; Object Name, Range and Color.

- Object: Displays an item's location on the DrawSpace™Display.

- Name: Displays the name of the item on the DrawSpace™Display.

- Range: Shows the range coverage on the DrawSpace™Display. On DMEs facilities the service volume restrictions are shown.

- Color: Allows the selection of color for the related item.

- Airports: Allows the user to select and display airports in the AVNIS database and User Database.

- Runways: Allows the user to select and display runways in the AVNIS database and User Database.

- Heliports: Allows the user to select and display heliports in the AVNIS database.

- Waypoints: Allows the user to select and display Waypoints in the AVNIS database.

- Obstacles: Allows the user to select and display obstacles listed in the AVNIS Database and User Obstacles database.

- Comm Stations: Allows the user to select and display communications stations listed in the AVNIS database and User database.

- DMEs: Allows the user to select and display DME facilities listed in the AVNIS database and User database.

- Radars: Allows the user to select and display Radar facilities listed in the AVNIS database and User database

- Facilities: Allows the user to select and display non-DME facilities listed in the AVNIS Database and User Obstacles database.

- Airways: Allows the user to select and display Air Traffic Service (ATS) routes (Jet Routes, Victor Routes, Colored Routes, and Q-Routes) contained in the AVNIS database.

- Boundaries: Allows the user to select and display high and low altitude ARTCC boundaries and State boundaries.

- Modes/Backgrounds: Allows the user to select backgrounds and projections for the display area. The six background choices are:

  - No Background
  - DTED Terrain
  - Terrain & Water
  - Blue Marble
  - Sectional Chart
  - Water

- Modes/Projections: The four projection choices are: Angle, Distance, Map Mode and Mercator.

Note:	When the Display Tool is open, double clicking on the Red Tab will close the tool.

Figure 4-3: Display Tool

Allows the user to toggle between the Display Tool, Search Tool, and the Drawing

In addition to AVNIS data, User Airports, Runways, Heliports, and Waypoints are

Object Name Range Color

Four checkbox columns allow the user to select Object, Name, Range and

	Object	Name	Range	Color
☆ Obstacles	☐	☐		🟥
User	☐	☐		🟥
☆ Comm Stations				
User				
☆ DMEs				
NDB/DME				
VOR/DME	☐	☐	☐	🟪
VORTAC	☐	☐	☐	🟪
TACAN	☐	☐	☐	🟪
ILS/DME	☐	☐	☐	🟪
User DMEs	☐	☐	☐	🟪
☆ Radars	☐	☐	☐	🔳
ASRs	☐	☐	☐	🟥
ARSRs	☐	☐	☐	🟩
User Radars	☐	☐	☐	⬛

Non-DME facilities and LAAS are now

	Object	Name	Range	Color
☆ Airways	☐	☐		🔳
Jet Routes	☐	☐		🟦
Victor Routes	☐	☐		🟥
Colored Routes	☐	☐		🟩
Q-Routes	☐	☐		🟧
☆ Boundaries	☑			🔳
ARTCC High Alt	☐			⬜
ARTCC Low Alt	☐			⬛
State	☑			⬛
☆ Modes				

Background | Terrain & Water
Projection | Map Mode

DrawSpace Fade feature allows user to adjust the background

Clear All Check Boxes

Figure 4-4: Display Tool Cont'd
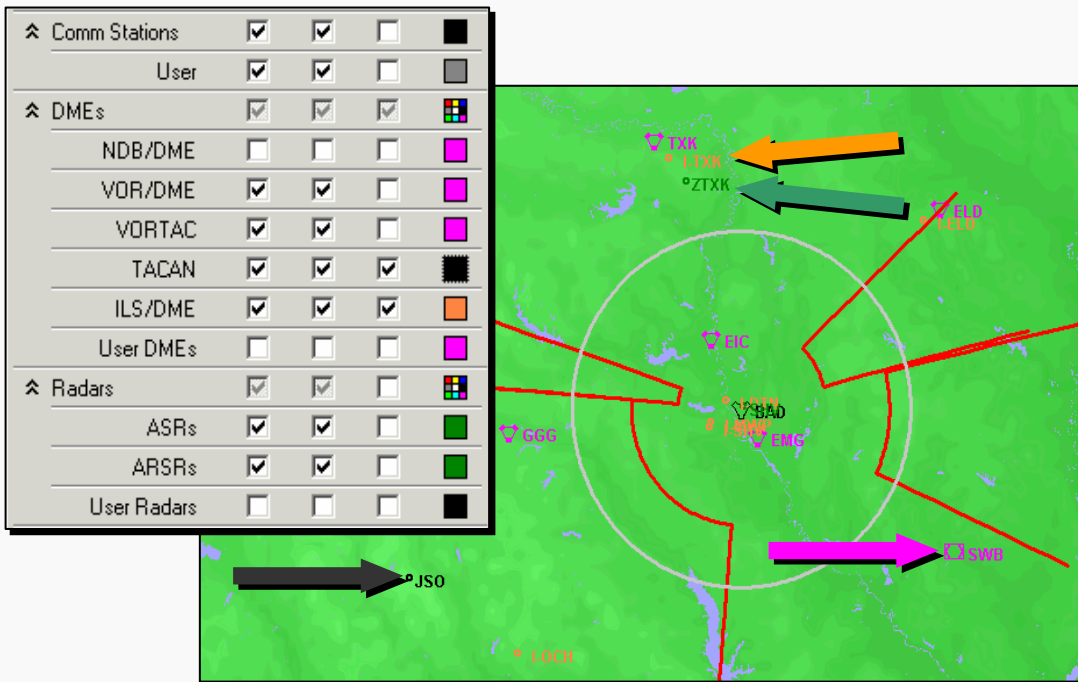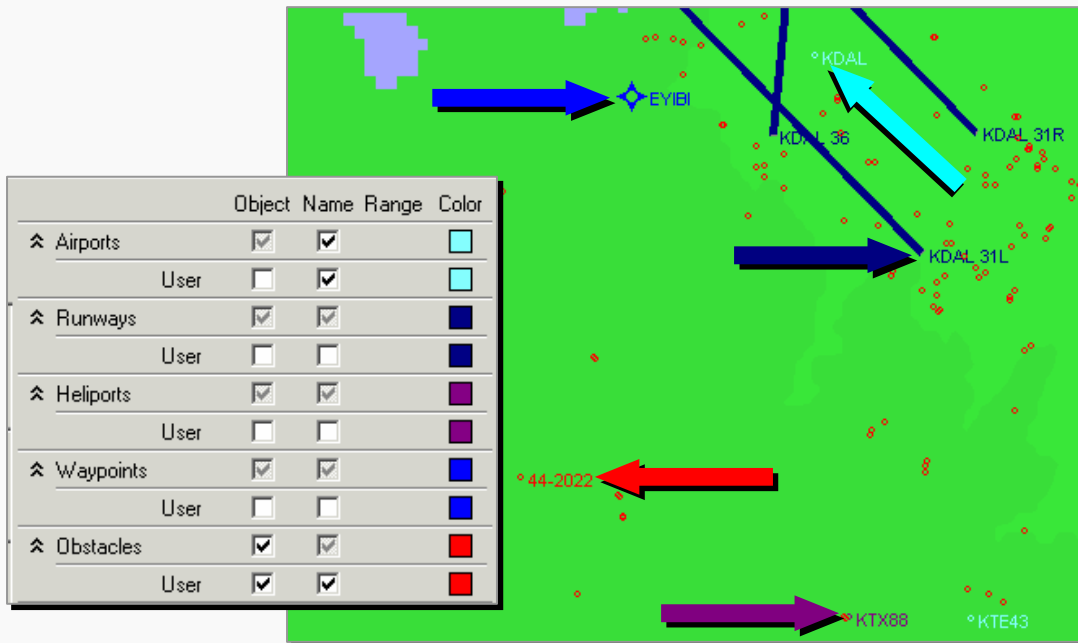
Figure 4-5: Display Tool (cont'd)
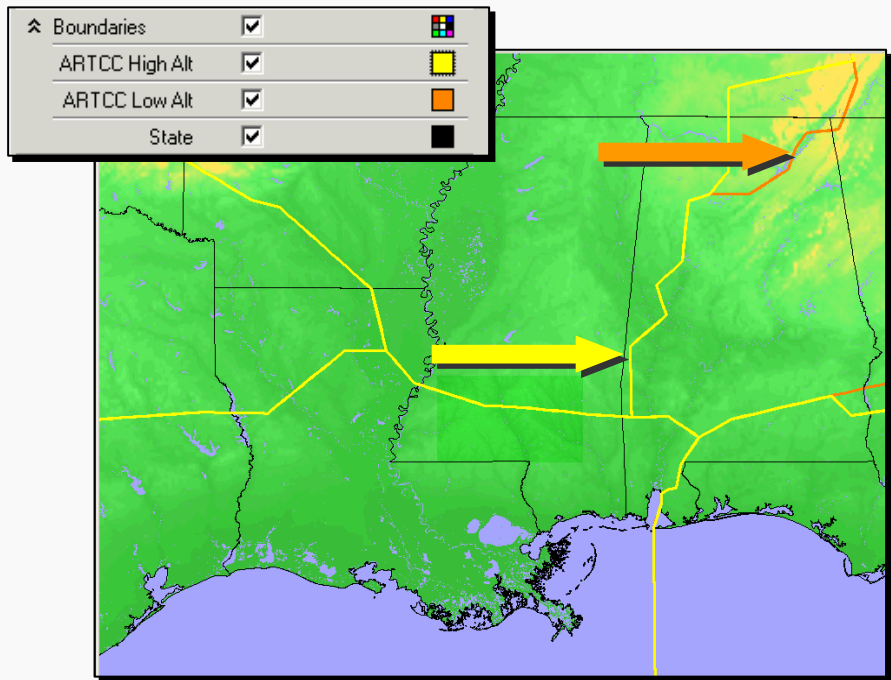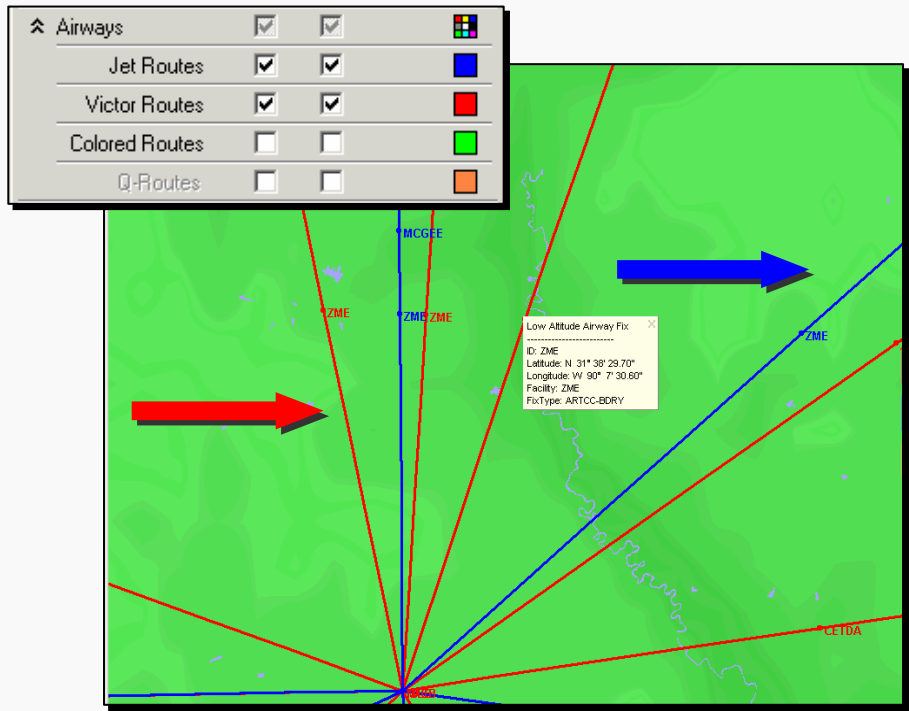
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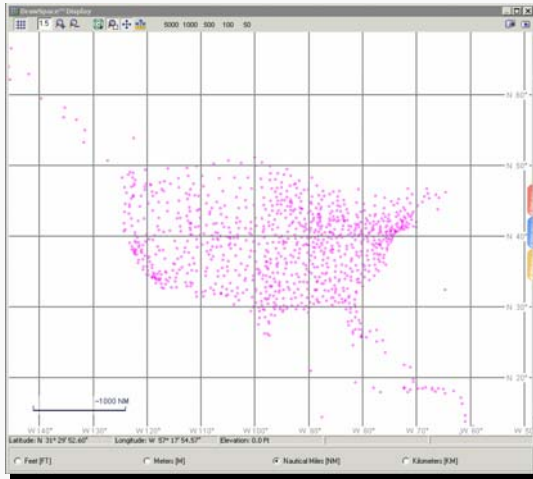
No Background
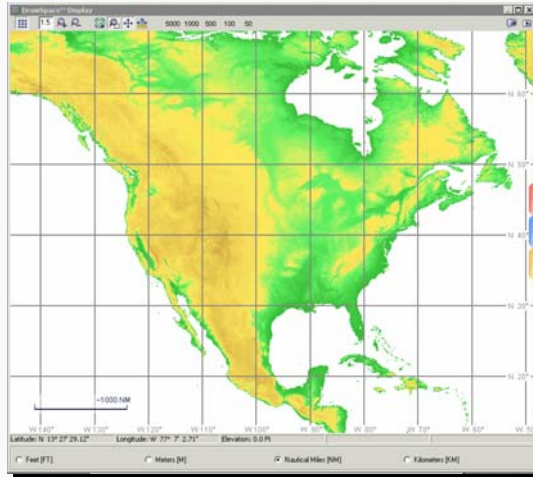
DTED Terrain
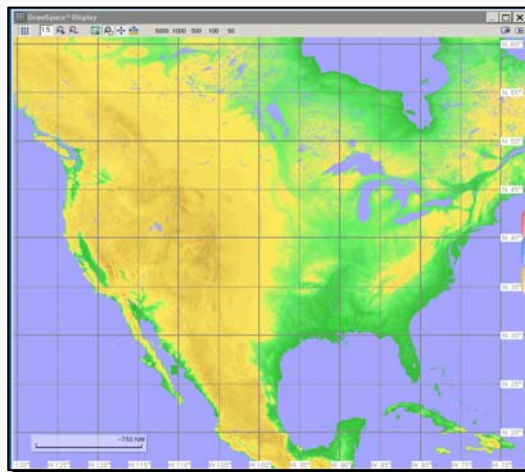
Terrain & Water

Figure 4-7: Display Tool (cont'd)
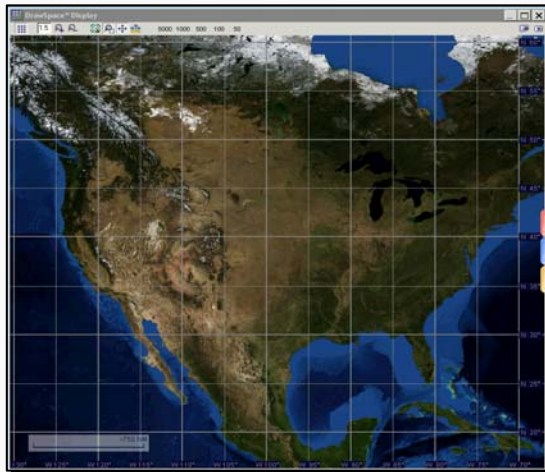
Blue Marble
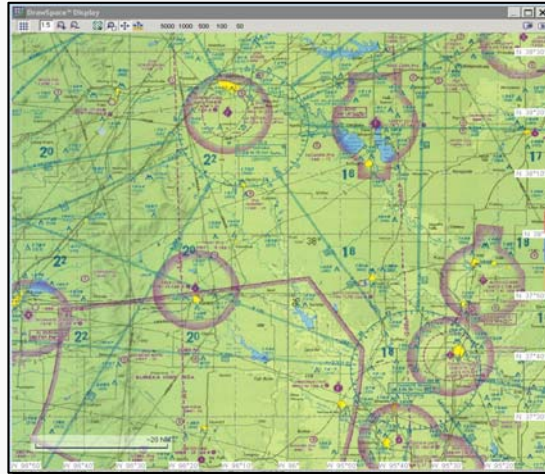
Sectional Chart
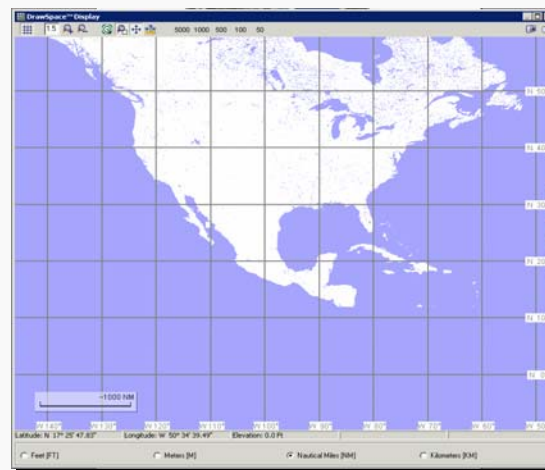
Water

Figure 4-8: Display Tool (cont'd)

4.3   Search Tool

The Search Tool is used to search for specific airports, runways, waypoints, DMEs, radars, and airways. The tool is opened and closed by clicking on the blue tab located on the right side of the DrawSpace™Display. When opened, the following fields are displayed:

- Search Request Window: Allow the user to supply a specific item description for which to search.

- Database checkboxes: Allows the user to select databases (Airports, Runways, Waypoints, DMEs, Radars, and Airways) in which to search for the item in the entry window.

- Search button: Initiates the search.

- Search Results window: This window has four columns which displays the results of the search. Left mouse click on each item provides the following functions:

- Item Name: Shows item location with a yellow circle on the DrawSpace™Display and provides tool tip information in the Search Results window.

 Recenter On: Shows item location with a yellow circle on the DrawSpace™Display and zooms to location.

 Draw Item: Shows item location with a yellow circle on the DrawSpace™Display and draws item.

 Erase Item: Erases item from DrawSpace™Display.

- Clear: Clears all the items in the Search Results window.

- Draw All: Displays all the items in the Search Results window on the DrawSpace™Display.

- List Drawn: Displays the items that have been selected from the results window to be drawn on the DrawSpace™Display.

- Erase All: Erases all items located on the DrawSpace™Display.

● ToolTip: Rolling mouse over the Item in the Search Results window provides the user detail data.

Note:	When the Search Tool is open, double clicking on the Blue Tab will close the tool.
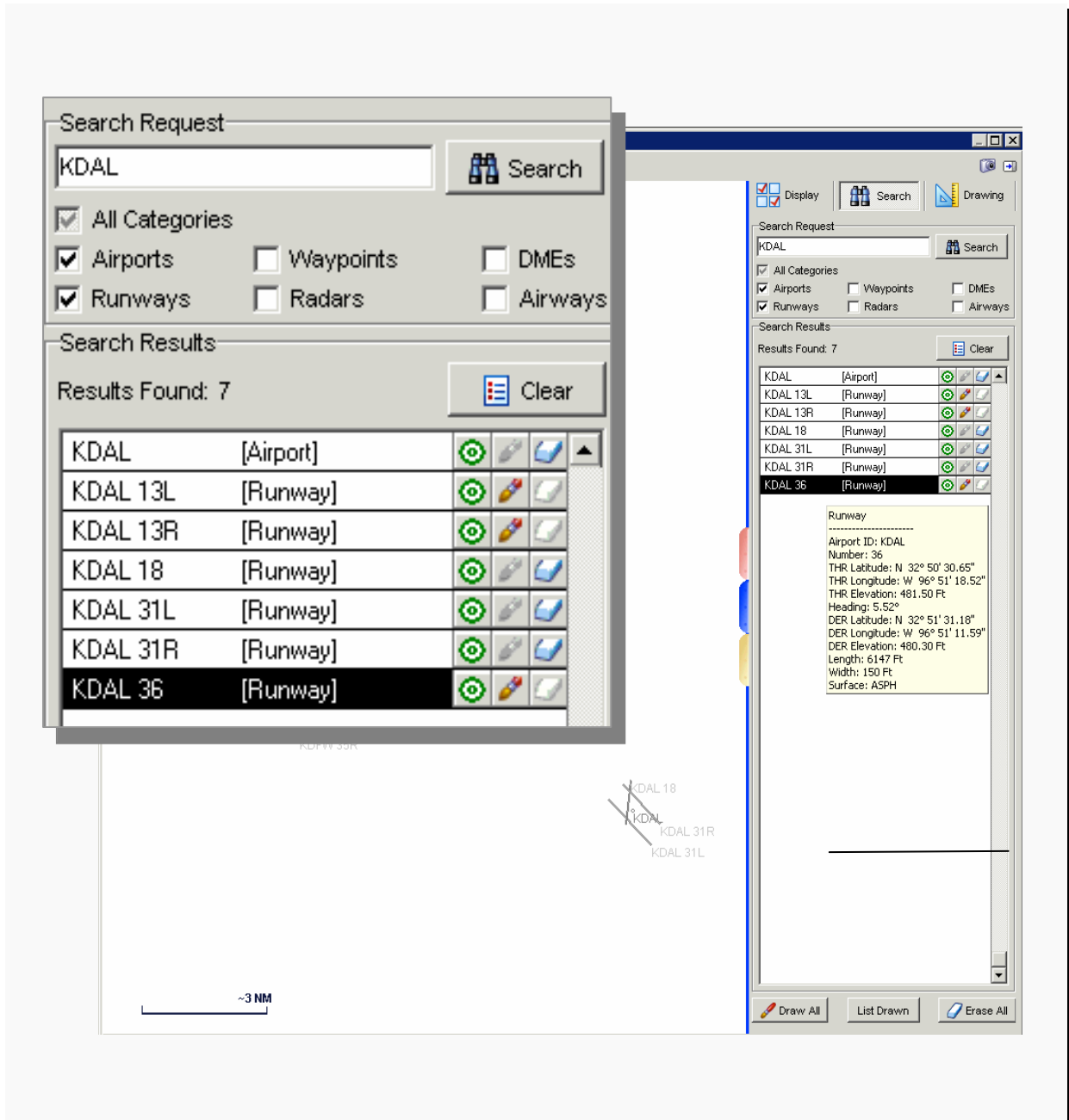
Figure 4-8: Search Tool

4.4   Drawing Tool

The Drawing Tool is used to search for selected airports, runways, waypoints, DMEs, radars, and airways. The tool is layout with Groups and Items which contain square button and checkboxes. The tool is opened and closed by clicking on the gold tab.

● Drawing Tool: Allow the user to manage the drawing files. Drawings may be saved in a file folder and are saved as .dso files. Drawing Tool square buttons include:

Clear All: Clears the current Groups and Items in the Groups window and the items window.

Open DrawSpace Object File: Opens previously saved data from Groups and Items windows.

Save to DrawSpace Object File: Saves data in the Groups window, Items window and on the DrawSpace™Display as a .dso file.

● Groups: The four square buttons allow the user to organize the drawing in the Groups window. Groups may be given a definitive name, and entire groups may be moved or deleted. When a Groups checkbox is selected, the items in that group will appear in the DrawSpace™Display. The functions of the Groups Square Buttons are:

Create New Group: Allows user to add a group to the Drawing Tool.

Rename Group: Allows the user to delete the group.

Delete Group: Allows the user to rename the group.

More Groups: Allows the user to move a group, drawn on the DrawSpace™Display a specified Distance and Bearing. The user can select of distance from the following options: nautical miles, feet, meters, or kilometers.

● Items: These square buttons allow the user to open the DrawSpace Item Editor to add new drawing shapes, and Edit or Delete the drawing shapes.

Add New Items to Group: Allows user to add a new draw shape to the Group via the DrawSpace Item Editor.

Edit Items: Allows the user to edit a specific drawing shape via the DrawSpace ItemEditor.

Delete Items from Group: Allows the user to delete a specific drawing shape from the selected group.

● To display the drawing on the DrawSpace™Display area, select the checkbox in the Groups window. The items in that group will appear.

● Edit Items: To modify an item, highlight the Group and Item in the windows and select the Edit square button. The will open the DrawSpace Item Editor.

● Delete Items from Group: To delete a group or item, highlight the group or item and click the Delete square button.

Note:	When the Drawing Tool is open, double clicking on the Gold Tab will close the tool.
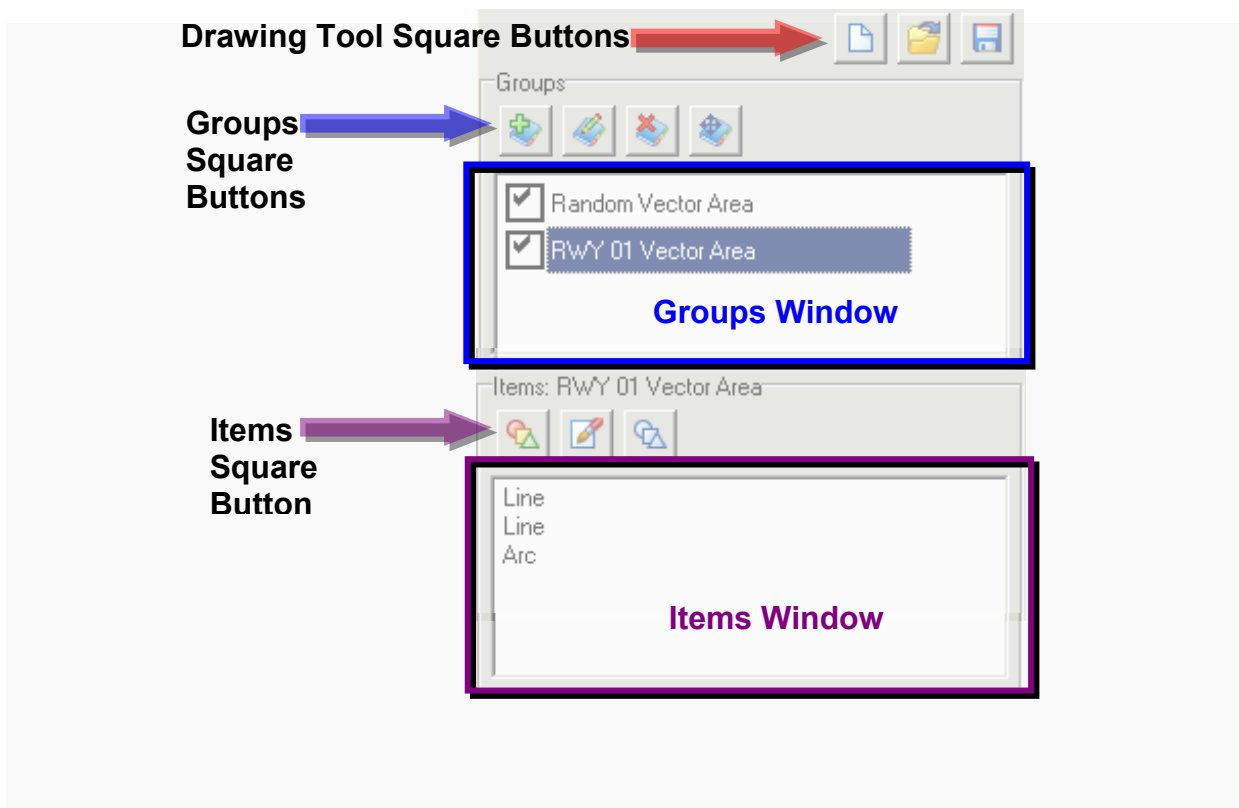
Figure 4-9: Drawing Tool

4.4.1 DrawSpace Item Editor

This Tool is used to add and edit drawing shapes in the DrawSpace™Display area. When the checkbox associated with the group is selected, the drawings from that group appear in the DrawSpace™Display area.

● Group: Allows the user to organize drawings into groups. Groups may be given a definitive name, and entire groups may be moved using the Move Group Tool. When the checkbox associated with the group is selected, the drawings from that group appear in the DrawSpace™Display.

  ○ Arc
  ○ Circle
  ○ Line
  ○ Point
  ○ Polygon
  ○ Polyline
  ○ Freeform
  ○ Text label

● Item Name: Allows user to name a drawing.

● Lat/Lon Square Button: Allows the user to click on a location of the DrawSpace™Display, the latitude and longitude of the selected location is the center point of an arc or circle, a point along a polygon or polyline, or the beginning or ending point of a line.

● Definition: A "Definition" only applies to a circle or an arc in the DrawSpace Item Editor. For a circle, the radius is required; for an arc, a radius and angle (start and stop points) are required.

● Style: Allows the user to assign a line type, color, and width, and fill feature for circles and polygons, also allows the user to enter text.

● Expanded Description: This feature is opened with a Windows style button, which allows the user to expand the description of the item. The expanded text appears in a ToolTip box on the DrawSpace™Display.

● Accept: Accepts the entries made and closes the Add New Items to Group.

● Cancel: Cancel entries and closes the Add New Items to Group.

📍 Add New Items to Group
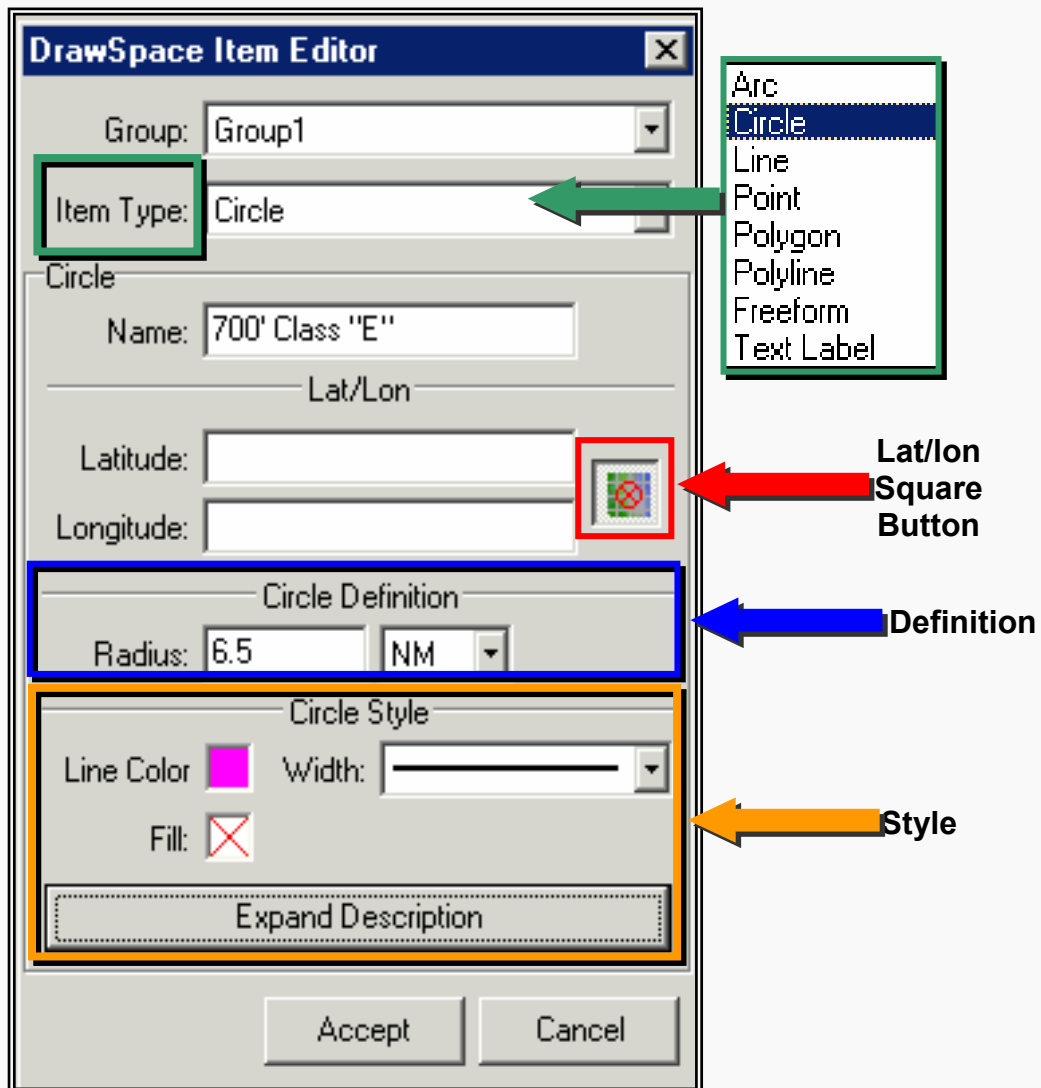
Figure 4-10: DrawSpace Item Editor
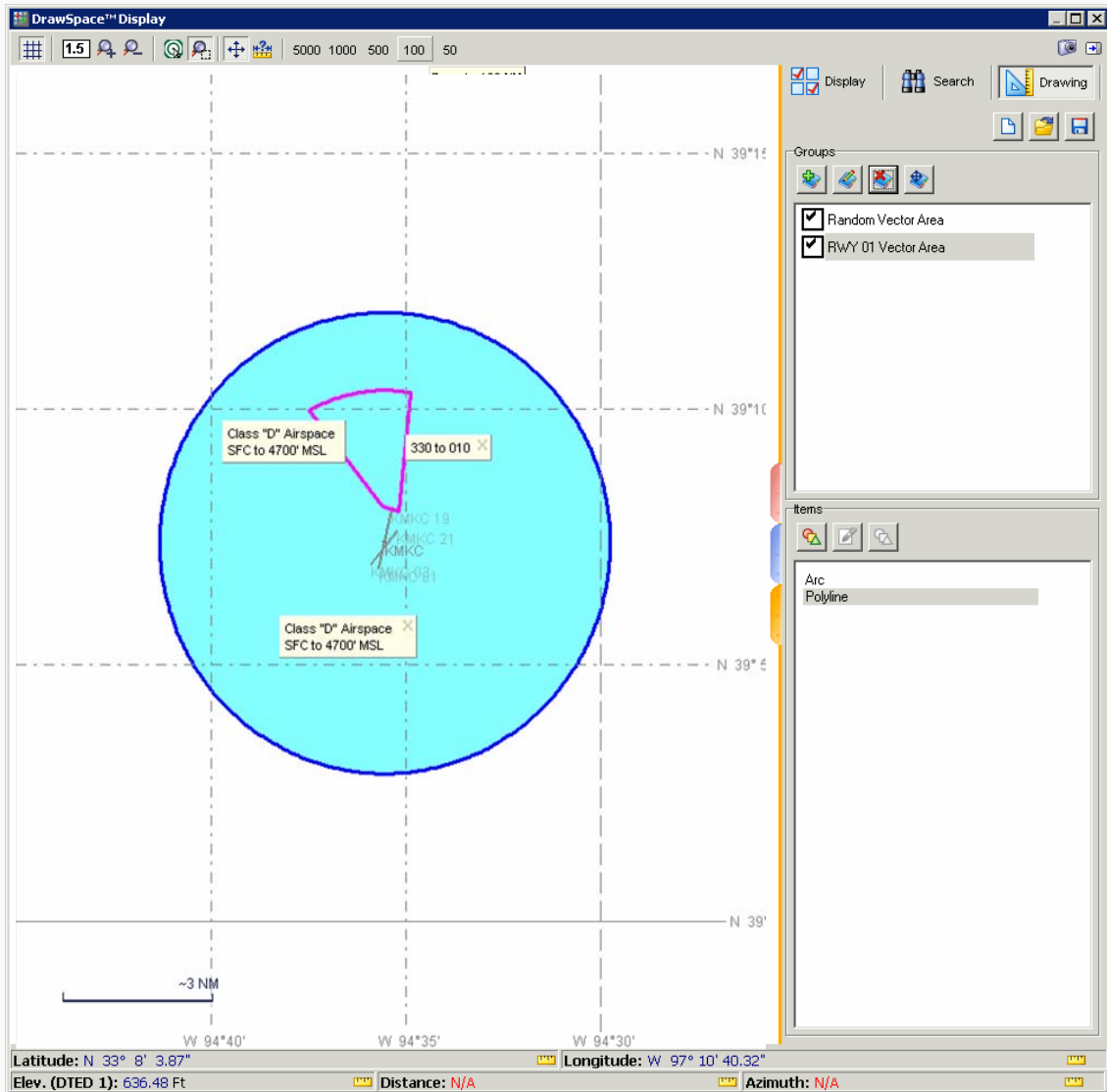
Figure 4-11: Drawing Tool Example
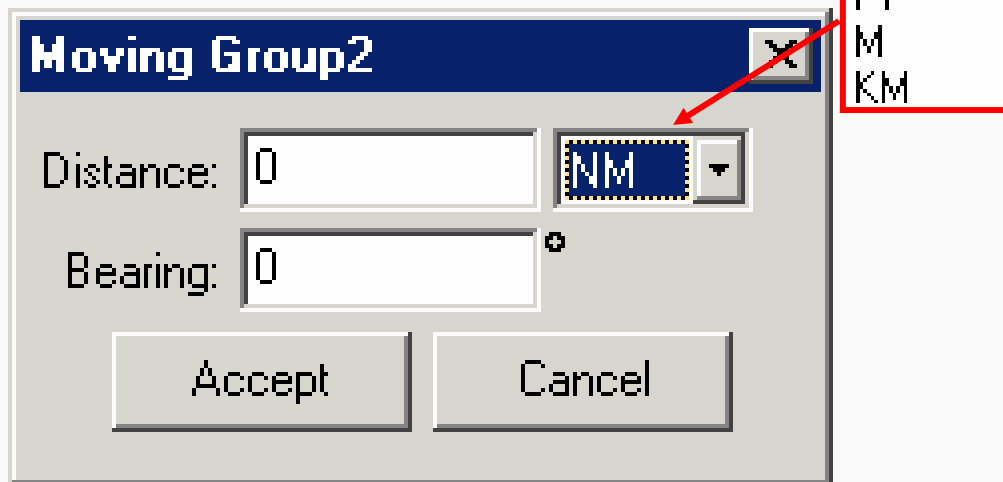
Figure 4-12: Drawing Tool Example

4.5 Keyboard /ToolTip//Mouse Functions

- Keyboard Functions

  ○ Ctrl Z This keyboard function is basically an undo zoom function in the DrawSpace™Display.

- ToolTip Functions

  ○ Move the mouse over the items in the DrawSpace™Display to generate ToolTip data. The ToolTip box displays relevant information regarding the item.

  ○ A Ctrl Left mouse click while displaying a ToolTip will lock the ToolTip into position on the DrawSpace™Display. To close the ToolTip click the X in the top right corner of the ToolTip.

- Mouse Functions

  ○ Zoom Window: Right Mouse Click over a DME facility opens a "Zoom" Window.

    ♦ Zoom/Recenter: Select the Lat/Lon Square Button then click on a location in the DrawSpace™Display, click on the "Zoom" button, to Zoom/Recenter location.

    ♦ DME Setting: Followed by facility name.

    ♦ Enable/Disable: This is a toggle switch to enable or disable the facility for a simulation.

    ♦ Edit DME: Opens an Edit Window which allows the user to convert the facility to a User facility.

  ○ If the Flight plan names too long to read in the Load Flight Plan window. The solution is to double mouse click on the Flight Plan Name, this will open the Flight Plan Editor and the entire Flight Plan Name can be read at the bottom of the editor.

  ○ When the Display Tool, Search Tool, and Drawing Tool are open, double clicking on the tools colored Tab will close the tool.

  ○ In the Simulation module Flight Plans tab and a flight plan is loaded in the DrawSpace™Display a double mouse click on the flight plan name in the Load Flight Plan Window will open the Flight Plan Editor.
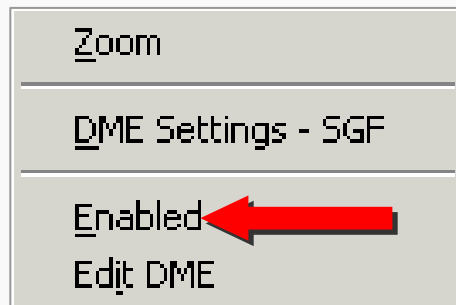
Zoom Window
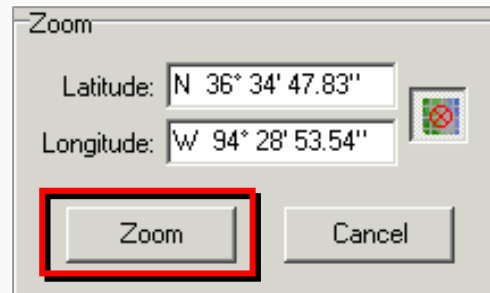
Zoom Window
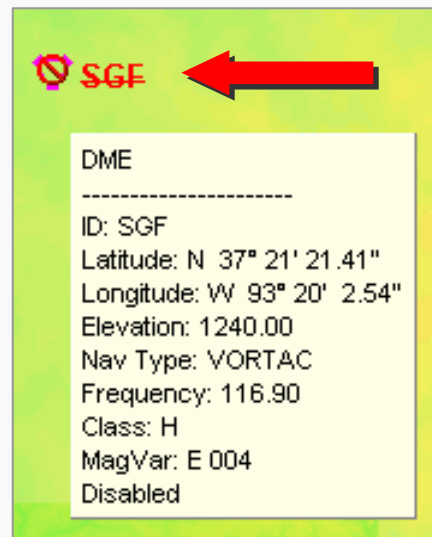
Item	Name & Description	Units
1	ID: Three Letter ICAO Identifier.	N/A
2	Latitude: Facility Location	N, Deg: Min: Sec.Sec *
3	Longitude: Facility Location	W, Deg: Min: Sec.Sec *
4	Elevation: Facility Elevation	Feet MSL**
5	Nav. Type: VOR, VOR/DME, VORTAC, etc.	N/A
6	Frequency: Facility frequency	N/A
7	Class: Terminal, Low, High etc.	N/A
8	MagVar: Magnetic Variation either East (E) West (W)	Degrees (Magnetic)
9	Disabled/ Enabled: Availability of facility for simulation.	N/A

* Hundredth of a second ** Nearest Hundredth

Figure 4-13: Mouse Function/Zoom Window
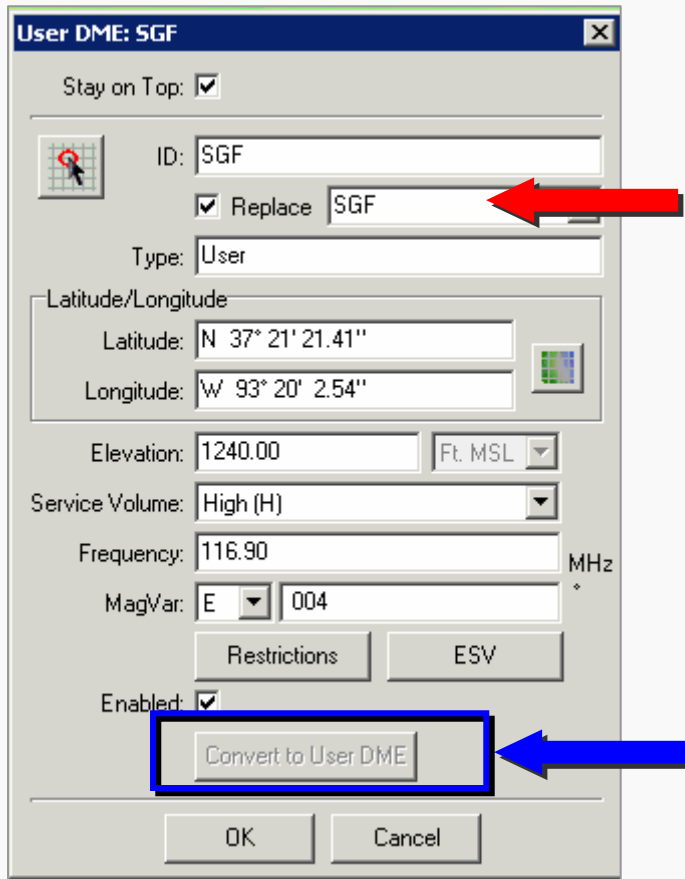
Figure 4-14: Mouse Function/Zoom Window Cont'd
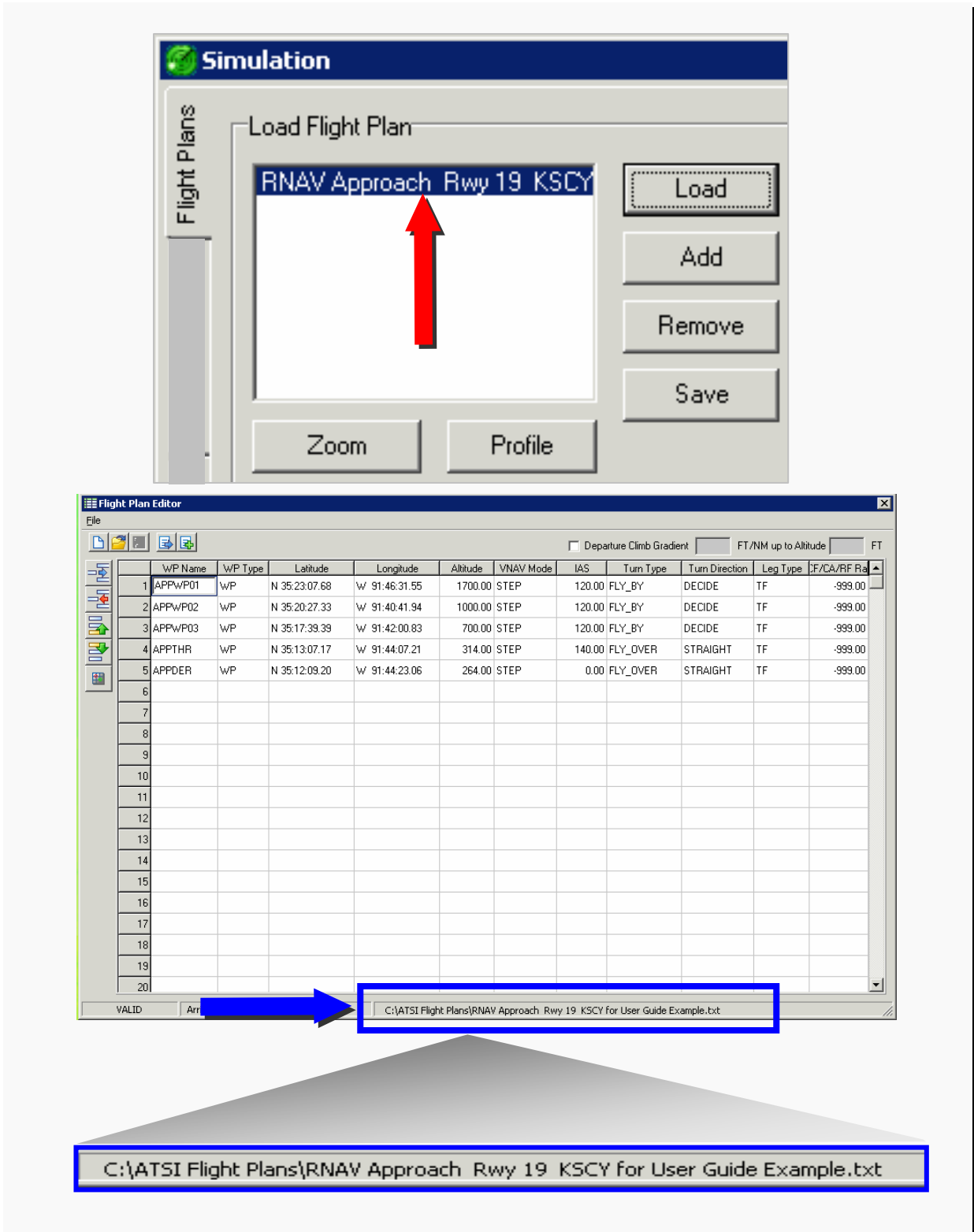
Figure 4-15: Mouse Function/Flight Plan Name

Runway

Airport ID: KFSM
Number: 25
THR Latitude: N 35° 20' 13.10"
THR Longitude: W 94° 21' 17.71"
THR Elevation: 443.70 Ft
Heading: 261.20
DER Latitude: N 35° 20' 0.99"
DER Longitude: W 94° 22' 53.13"
DER Elevation: 469.00 Ft
Length: 8000 Ft
Width: 150 Ft
Surface: ASPH
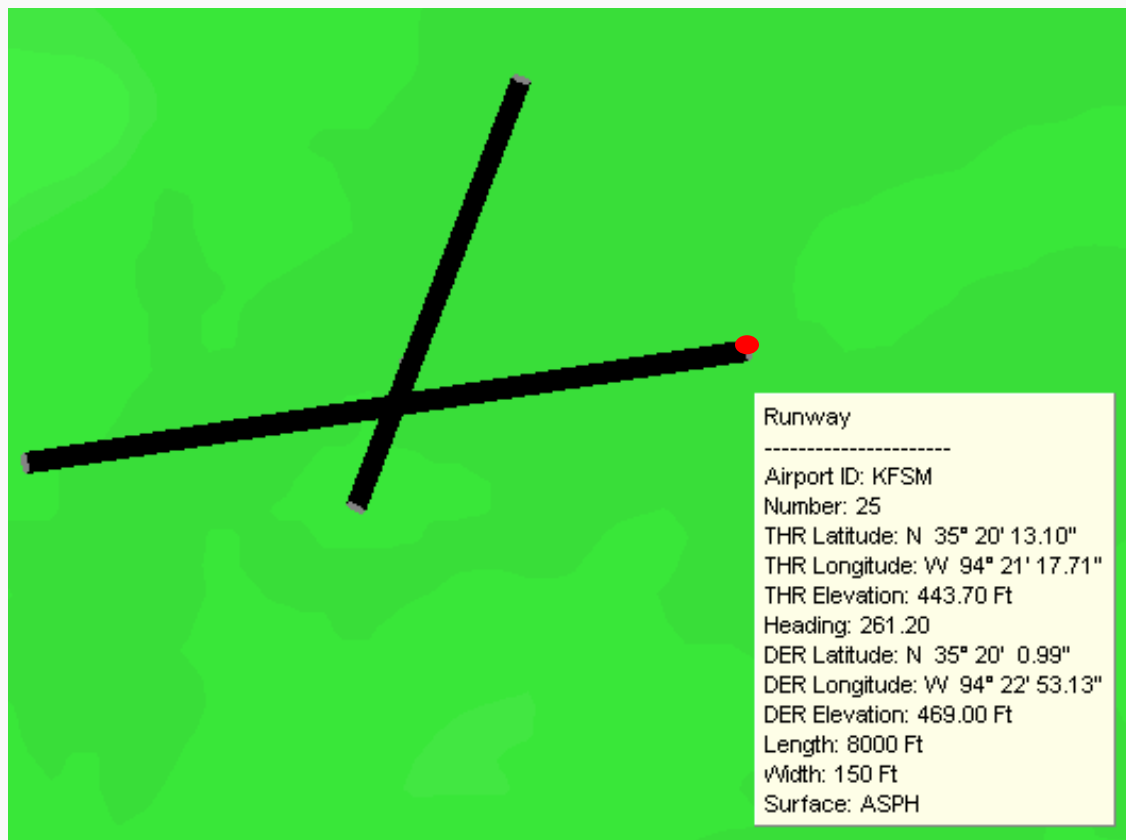
Item	Name & Description	Units
1	Airport ID: Four Letter ICAO Identifier.	N/A
2	Number: Runway Number	N/A
3	THR Latitude: Approach End of the Runway	N, Deg: Min: Sec.Sec *
3	THR Longitude: Approach End of the Runway	W, Deg: Min: Sec.Sec *
4	THR Elevation: Approach End of the Runway	Feet MSL**
5	Heading: Departure Heading (True)	Degrees**
6	DER Latitude: Departure End of Runway	N, Deg: Min: Sec.Sec *
7	DER Longitude: Departure End of Runway	W, Deg: Min: Sec.Sec *
8	DER Elevation: Departure End of Runway	Feet MSL**
9	Length: Runway Length, No Overruns/Displaced THR	Feet
10	Width: Runway width	Feet
11	Surface: Type of runway Surface	N/A

* Hundredth of a second ** Nearest Hundredth

Figure 4-16: ToolTip Runway End

WAYPOINT

- **ID**
- **Lat/Lon**
- **Type**

◇LAVAC

Waypoint

ID: LAVAC
Latitude: N 35° 19' 8.33"
Longitude: W 94° 9' 33.25"
Type: VHF

◇IXE

Airport ARP

- **ID**
- **Name**
- **Lat/Lon**
- **Elevation**

°KFSM

Airport

ID: KFSM
Name: FORT SMITH REGIONAL
Latitude: N 35° 20' 11.70"
Longitude: W 94° 22' 2.80"
Elevation: 469.00 Ft

ASR Radar Site

- **ID**
- **Name**
- **Type**
- **Lat/Lon**
- **Elevation**

°FSM

Radar

ID: FSM
Name:
Type: ASR
Latitude: N 35° 17' 46.98"
Longitude: W 94° 21' 18.58"
Elevation: 717.20 Ft

Figure 4-17: ToolTip

Figure 4-16: ToolTip Simulation Run
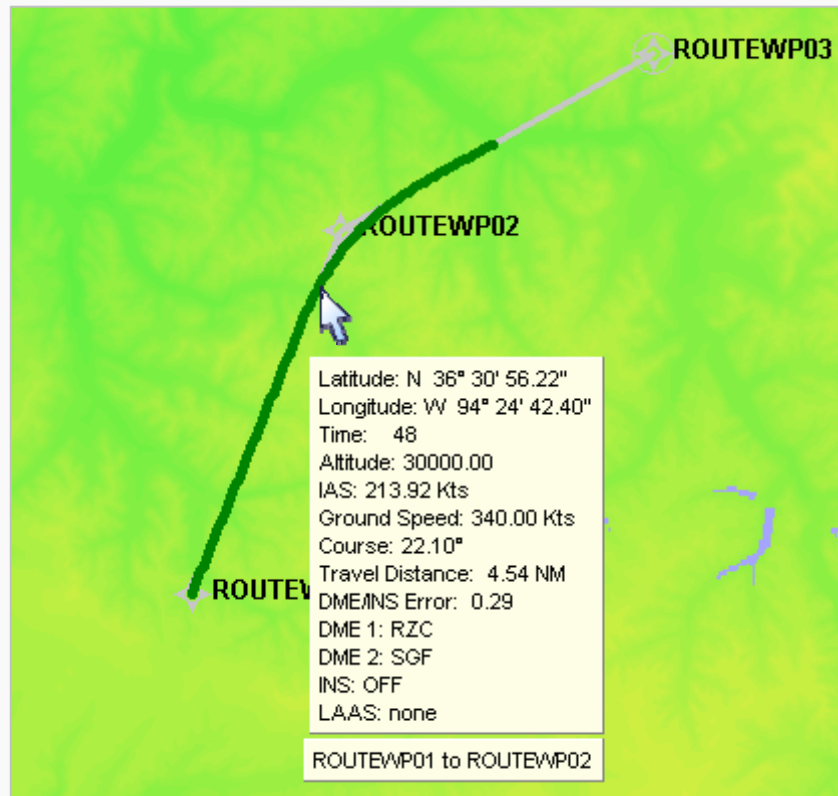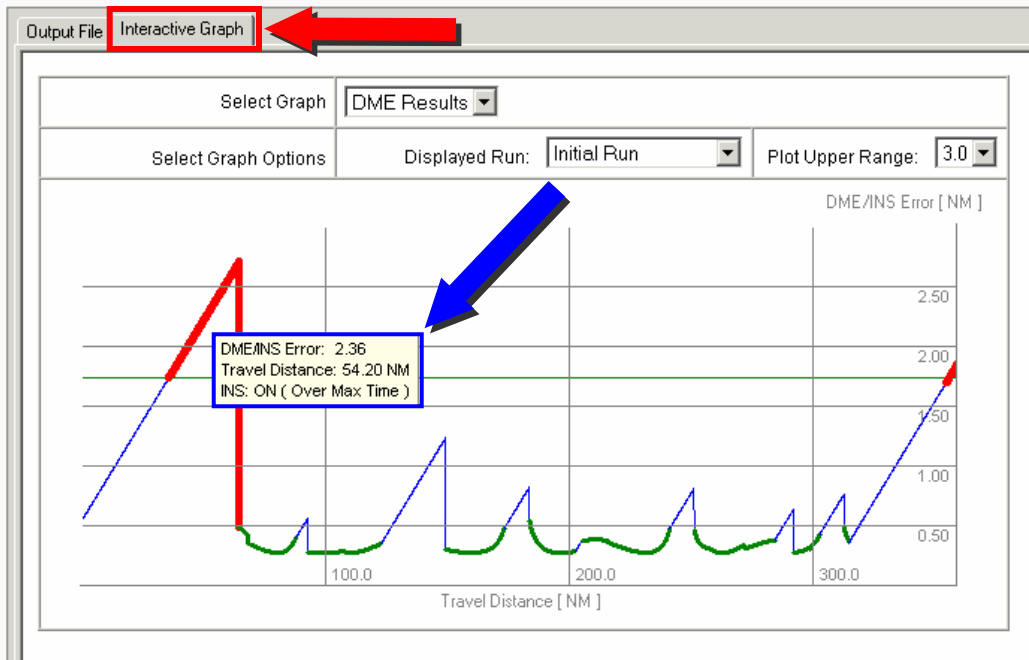
Item	Name & Description	Units
1	Segment: The position between two relevant points	N/A
2	Latitude	N, Deg: Min: Sec.Sec *
3	Longitude	W, Deg: Min: Sec.Sec *
4	Time: Simulation time at relevant point	Seconds
5	Altitude	Feet
6	IAS: Indicated Airspeed	Knots
7	Course: Ground Track (True)	Degrees
8	DME Error	Nautical Miles (RMS)
9	Travel Distance: Distance from simulation start	Nautical Miles
10	Bank Angle of Aircraft	Degrees

* Hundredth of a second

Figure 4-16: ToolTip Results Interactive Graph

5.0   Display Data

This module allows the user to display selected AVNIS database items, evaluate line of sight and load multiple post-flight-check files, using the following three tabs: Current DB tab, Line of Sight tab, and AFIS Files.

5.1   Current DB

The Current DB tab and the Display Tool, has duplicate functions. The Current DB tab is used to display the AVNIS database and allows the user to select choices of screen backgrounds. Left mouse click on the double arrows expand and collapse the section. Four checkbox columns are provided; Object Name, Range and Color. For Details see paragraph 4.2.
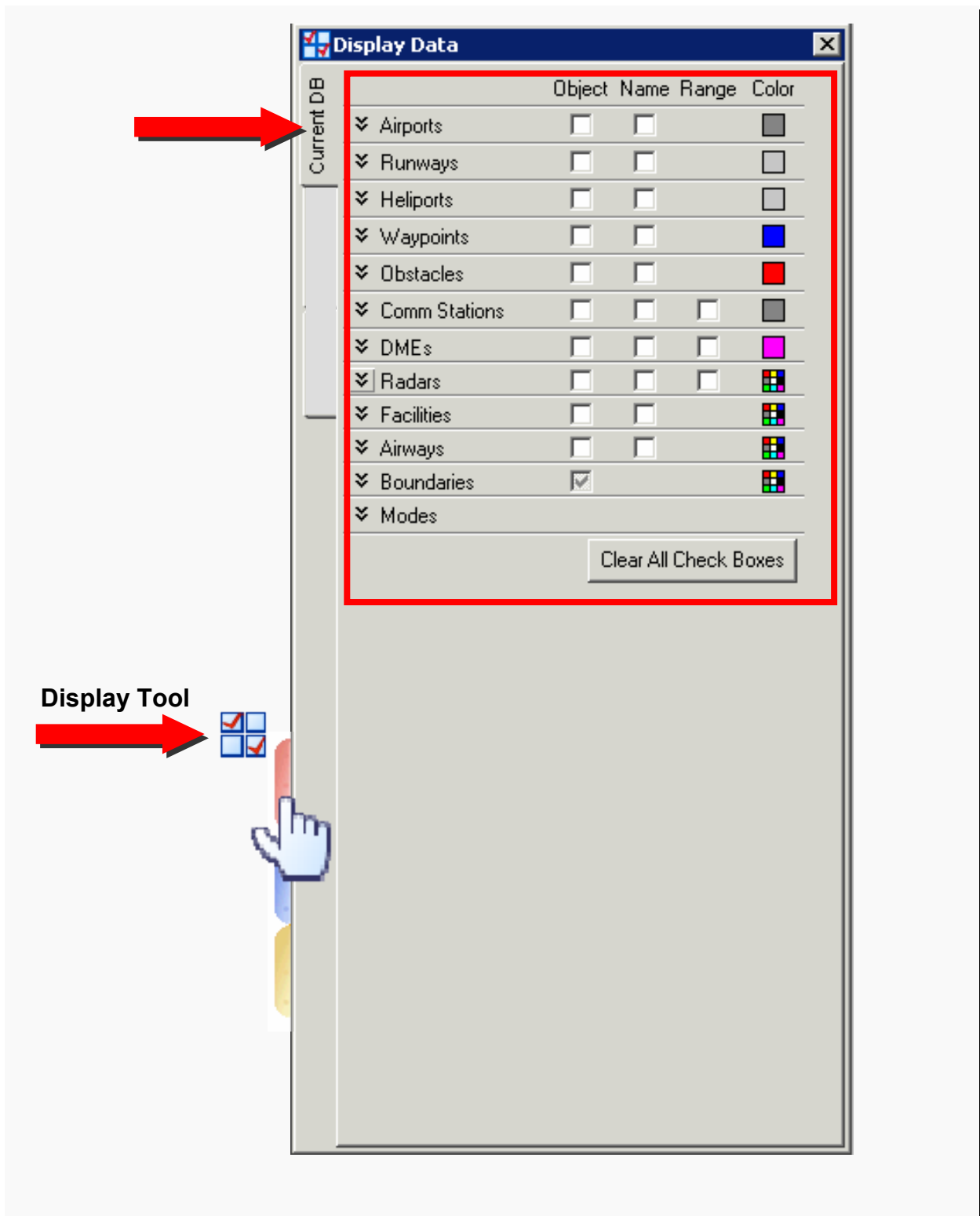
Figure 5-1: Current DB

5.2   Line of Sight

RNAV-Pro line of sight assumes a value for the Earth's radius that is 4/3 times the actual radius. This is done to account for the effect of the atmosphere on radio wave propagation. The Line of Sight tab allows the user to determine a line of sight between two latitude/longitude points and altitudes. It includes checkboxes and two Windows-style buttons:

● Point One/Point Two: Allows the user to define the two latitude/longitude points and altitudes with a mouse click in the DrawSpace™Display area. Latitude/longitude can be hand-entered.

● Check Line of Sight: Shows results on the DrawSpace™Display area in red or green and on the Line of Sight tab as a red box for below line of sight and green circle for above line of sight.

● View Graph: Shows results in a profile view. Mouse pointer gives altitude data.

● Clear: Clears the line of sight line from the DrawSpace™Display

Figure 5-2: Line of Sight
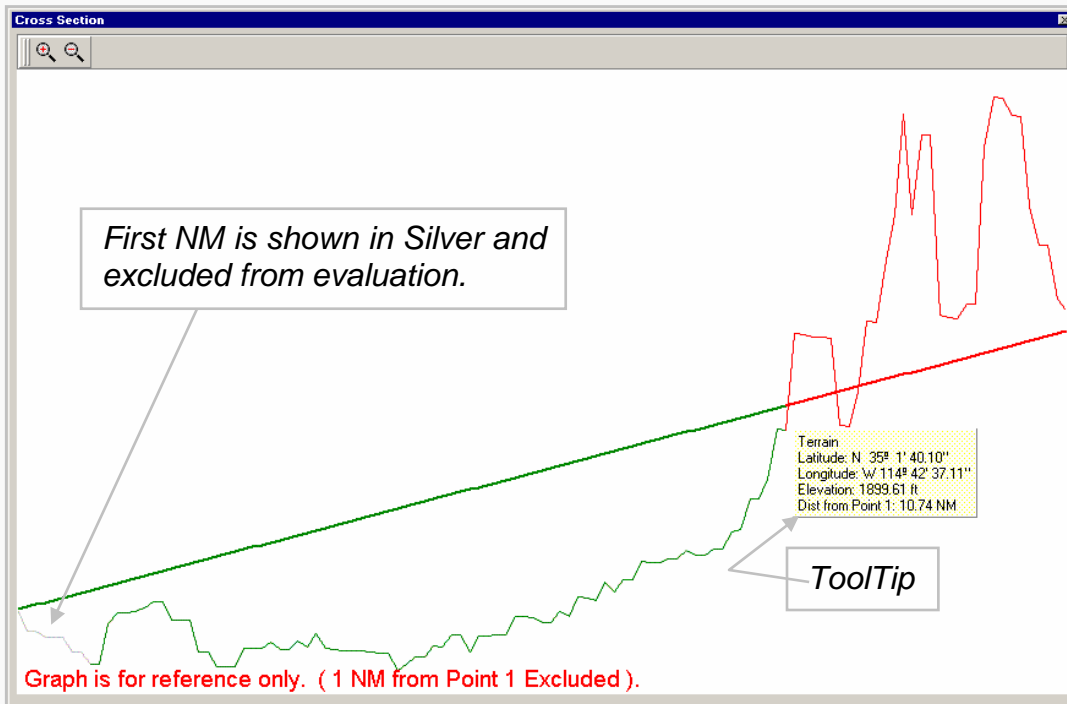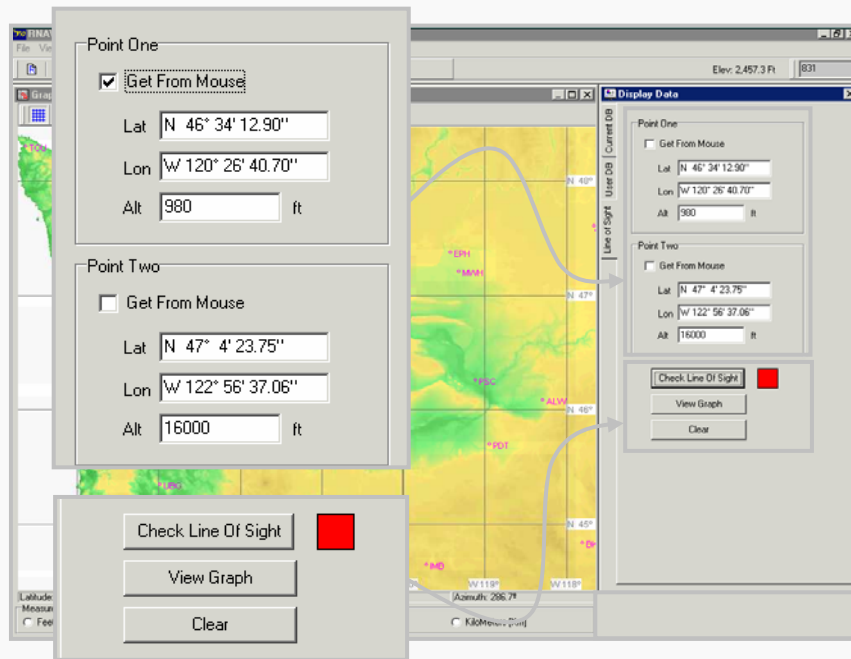
Figure 5-3: Line of Sight Cont'd

5.3　　　　　Draw AFIS Files

The Draw AFIS Files tab allows the user to load multiple post-flight-check files and color-code them for visual clarity and organization.

- The Draw AFIS tab contains the following fields and buttons:

    ○ File Name: Displays the name of the AFIS .cvs file.

    ○ Color: Opens the color palate for color choices.

    ○ Add: Allows the user to add post-flight-check files.

    ○ Remove: Allows the user to remove post-flight-check files.

    ○ Clear: Clears all data from the Draw AFIS Files tab window and the DrawSpace™Display.
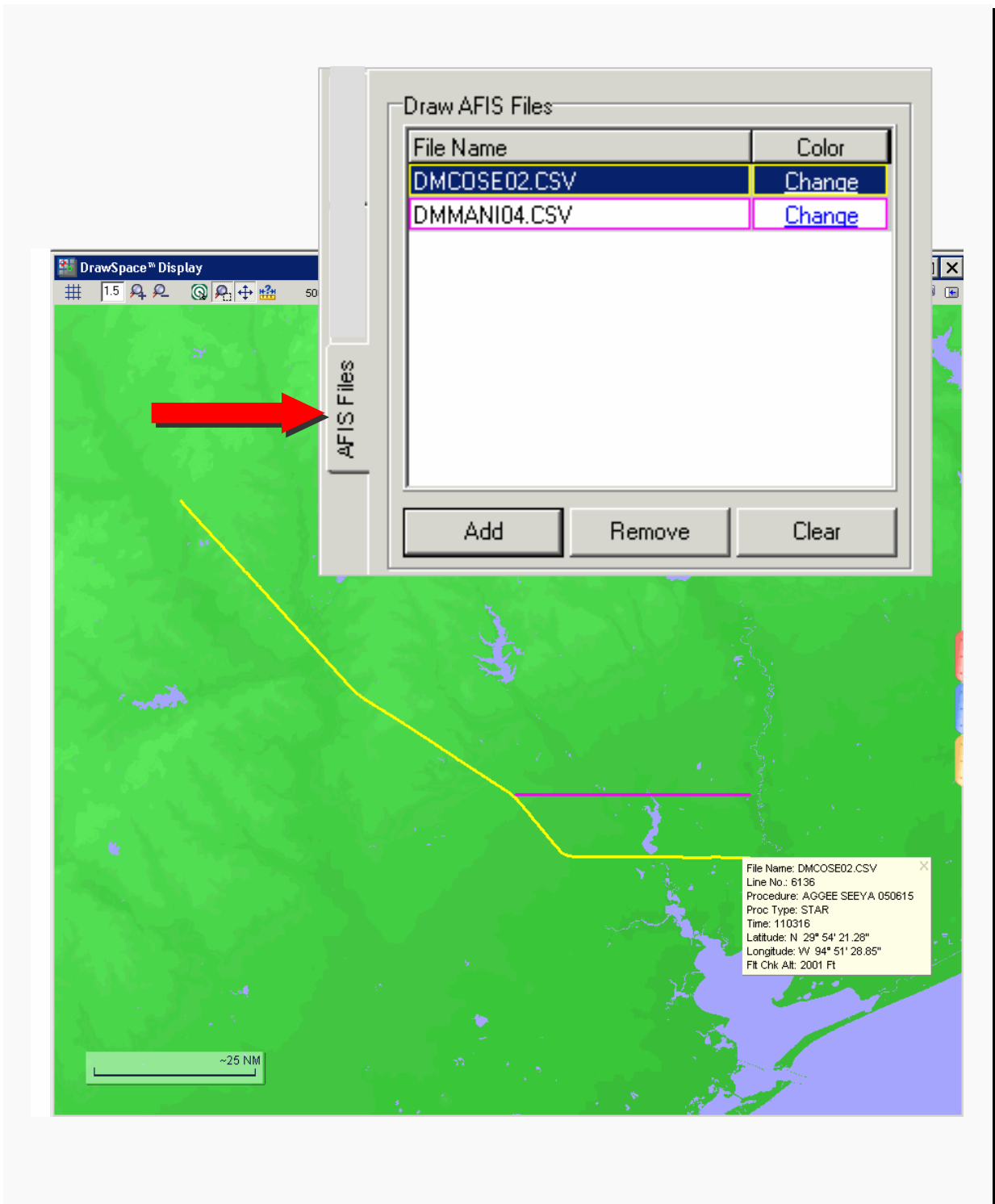
Figure 5-4: AFIS Files

6.0   Simulation

The Simulation module has five tabs provided to input simulation information prior to running. They are: Flight Plans, Simulation Settings, Flight Settings, DME Specific Settings and Run Output.

6.1   Flight Plans

This tab is used to Load, Add, Remove, and Save flight plans; and identify Aircraft Category and Wind factors for the simulation.

- The Load Flight Plan area includes the following Window-style buttons and checkboxes:

  - Load: Allows the user to load or activate a flight plan track.

  - Add: Allows the user to load an additional flight plan track.

  - Remove: Allows the user to remove a loaded flight plan track.

  - Save: Allows the user to save a flight plan.

  - Zoom: Centers the loaded flight plans in the DrawSpace™Display.

  - Profile: Opens a Cross Section window which allows the user to modify and save WP altitudes.

  - Aircraft Category: Allows the user to select aircraft approach categories A through E and B753 and B773.

  - Show Flight Plan WP Names: Displays flight plan waypoint names in the DrawSpace™Display.

  - Zoom when new flight is loaded: When flight plan is loaded, zooms to area in the DrawSpace™Display.

  - The Wind area allows the user to enter wind information to the following fields:

  - Constant Wind Velocity: Restricted to no greater than 30 KT. The user has four choices: Enter a value, Headwind Tailwind or Crosswind.

○ Variable Wind Velocity: The user enters the Altitude in feet, Velocity in knots and Direction in degrees (From).

Note:	When a flight plan is loaded in the DrawSpace™Display a double mouse click on the flight plan name in the Load Flight Plan Window Will opens the Flight Plan Editor.
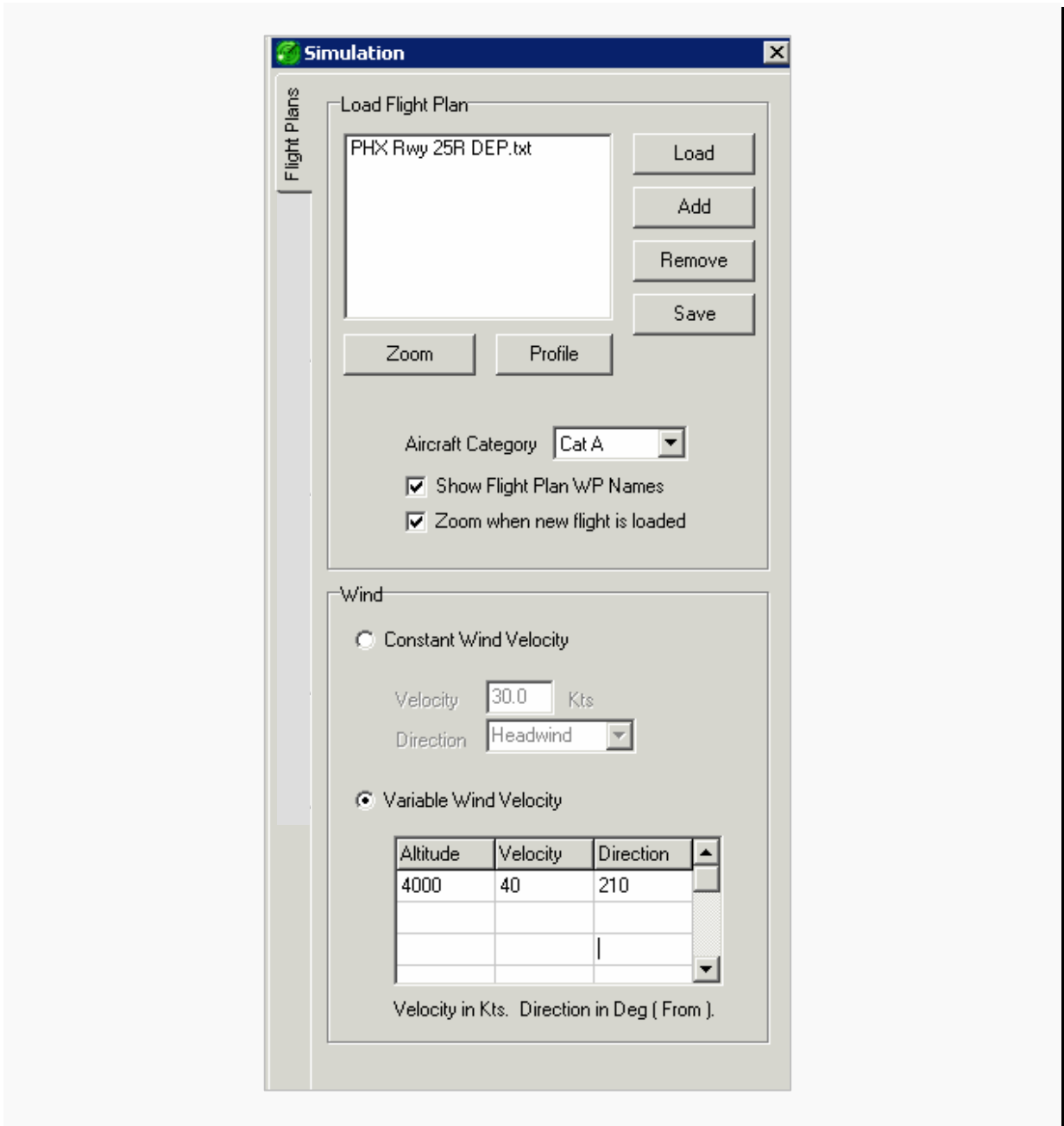
Figure 6-1: Flight Plans

6.2   Simulation Settings

This tab allows the selection of screening functions (Baseline Simulation Profiles and Screen Modes (Flyability, DME, Radars, Communications and LAAS) that the user desires.

● Baseline Simulation: The profiles drop-down menu allows the user to select a simulation. When any of the DME/DME/Inertial options are chosen, the program automatically checks DME frequencies, checks RNP edges, identifies DME gaps and fills them with ESVs, rechecks for low/terminal DMEs if required, rechecks ESVs, and assigns Flight Check DMEs. The DME/DME/Inertial options are shown below in Figure 6-2.

● Screen Modes: Include the following options:

○ Flyability Screen: The model determines flyability for the specified category/type of aircraft.

○ Use DTED: Elevation data is used for screening. It is suggested that the DTED checkbox be selected in most instances.

○ DME Screen: The user sets conditions, and the sophisticated Kalman Filter DME/DME screening model determines if sufficient DME availability exists.

○ Options:

♦ DME Types: Includes six checkboxes for selection of DME type.

♦ Use DOD Facilities Not in the NAS: Allows selection of DOD facilities for screening.

♦ Use Foreign Facilities: Allows selection of foreign facilities for screening.

♦ Disable Low/Terminal DMEs: Excludes use of low or terminal facilities for screening.

♦ Check DME Frequencies: Excludes the use of two facilities with a common frequency.

♦ Check RNP Edges for DMEs: Verifies coverage left and right of centerline. Geometry and DME solution pairs are checked at both edges ensuring DME coverage at all three points (left, right, and centerline). If geometry is not available, the program informs the user both graphically and in the Results Window.

♦ SID/STAR Type: Type A is DME/DME navigation only, and Type B is DME/DME and inertial navigation.

♦ Check Criticals: Following the initial run, subsequent runs determine which facilities are critical. Each subsequent run disables one DME to determine if the selected route is satisfactory with that DME removed from service. Critical DMEs are depicted on the Graphic Display in orange. (See Figure 6-3.)

♦ Allow Criticals: Result Summary indicates DME passed even though Critical DMEs are present. Used when screening arrivals and departures where critical DMEs are allowed.

♦ Recheck for Low/Terminal DMEs: When low or terminal facilities are part of the solution, this program automatically checks above the facilities for a solution using an appropriate facility (i.e., high facility). If no coverage is available at these higher altitudes, then the program informs the user of the problem and suggests a possible solution. This portion of the simulation run is depicted on the DrawSpace™Display in purple during the run only.

○ Radars Screen: Given conditions selected by the user, determines if sufficient radar coverage is available along the entire route of flight. The "User" checkbox is selected if the user has created a RADAR site.

○ Communications Screen: Given conditions selected by the user, determines if sufficient communications coverage is available along the entire route of flight. "Current DB" checkbox refers to the AVN database. The "User" checkbox is selected if the user has created a Communication site.

○ LAAS Screen: Given conditions selected by the user, performs a line of sight evaluation from all loaded LAAS Ground Facility (LGF) to the aircraft and determines a pass/fail result based on how many LGF were available during the route. (See Figure 6-4.)

Figure 6-2: Simulation Settings

Critical DMEs

Rechecking Low/Terminal DMEs

Figure 6-3: Simulation Settings Cont'd

6.1.2 LAAS Screen

The Local Area Augmentation System (LAAS) is an all-weather aircraft landing system based on real-time differential correction of the GPS signal. Local reference receivers are located around an airport at precisely surveyed locations. The signal received from the GPS constellation is compared to the surveyed location and sent to a central location at an airport. This data is used to formulate a correction message which is transmitted to users via a VHF Data Broadcast (VDB). A receiver on the aircraft uses this information to correct the GPS signals it receives. This information is used to create an ILS-type display for landing purposes.

- Coverage Volume: The LAAS Ground Facility (LGF) approach coverage volume is defined to be the volume of airspace where the LGF meets the signal strength, accuracy/integrity, continuity, and availability requirements of this specification. The LGF will provide the level of service necessary to support Category 1 operations to all runways at a given airport. The VDB is required to broadcast an omnidirectional signal to accommodate terminal and surface navigation, surveillance, and other users requiring Position, Velocity, and Time (PVT) information, but may be limited by the existence of terrain or obstacles on or around the airport.

- Approach Coverage Volume: When the installed on-channel assigned power is set to the lower monitor limit, the LGF shall meet the minimum field strength requirements for each Category 1 approach. See Figure 6-4.

- The approach and missed approached coverage volume shall be:

  ○ Approach:

    ♦ Laterally beginning at 450 ft each side of the Landing Threshold Point (LTP) or Fictitious Threshold Point (FTP) and projecting out ± 35° either side of the final approach path to a distance of 20 nm from the LTP/FTP.

    ♦ Vertically, within the lateral region, between 10,000 ft Above Ground Level (AGL) and the plane inclined at 0.9° originating at the LTP/FTP and down to 50 ft above the runway.

  ○ Missed Approach:

    ♦ Laterally ± 1.0 nm either side of the runway centerline from the approach end of the runway to 4.0 nm beyond the departure end of the runway.

♦ Vertically, within the lateral region, between 10,000 ft AGL and the plane inclined at 0.9° above the horizontal plane and passing 50 ft above the LTP/FTP level along a horizontal plane to the Flight Path Alignment Point (FPAP), then continuing along a horizontal plane inclined at 0.9°.

♦ Missed approach coverage may be affected by the siting of the VDB antenna.

Approach Coverage Requirement

FAA-E-2937
September 21, 1999

Plan View

Profile View
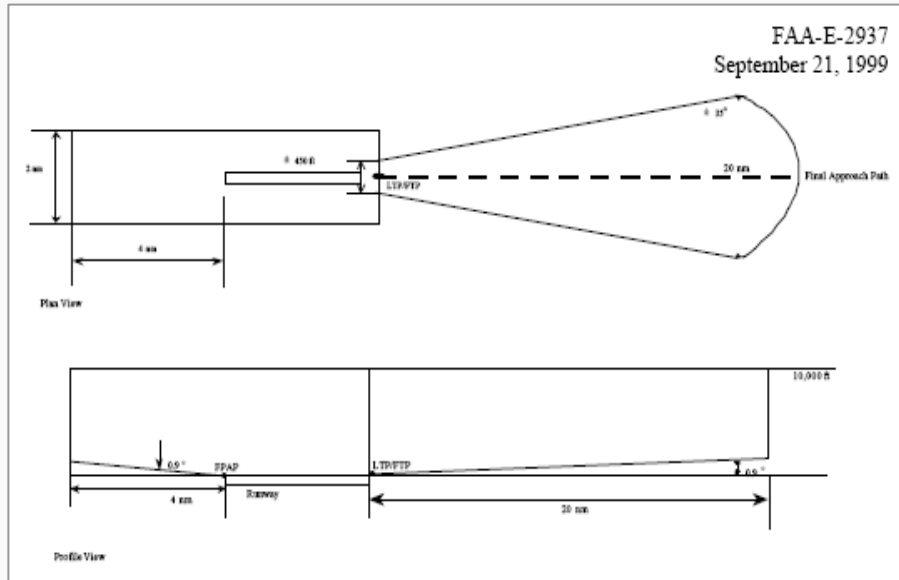
LAAS Ground Facility Coverage Volume
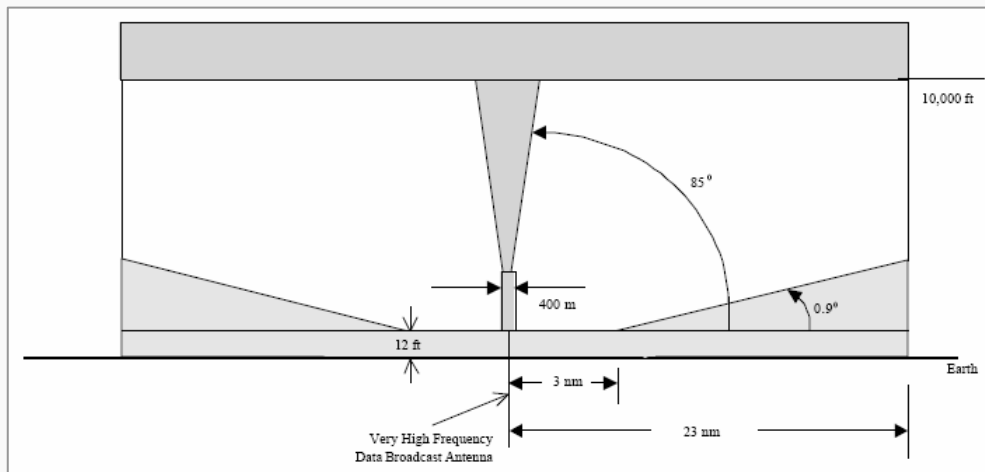
Figure 6-4: LAAS Ground Facility Requirements/Coverage
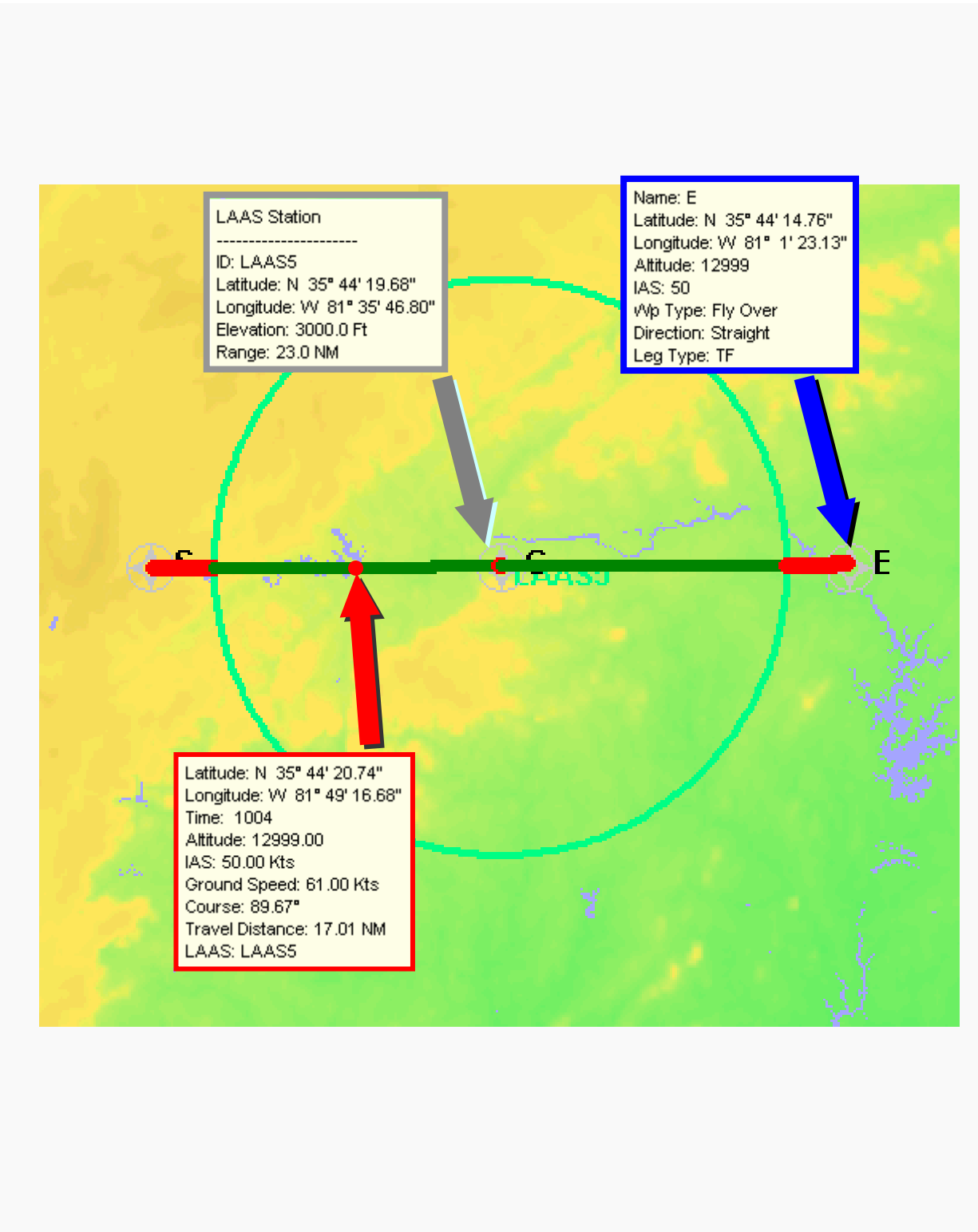
Figure 6-6: LAAS Simulation Settings ToolTips

6.3   Flight Settings

This tab allows the selection of screening functions (Climb Gradient, Ground Speed) the user desires, and provides a calculator to convert IAS to ground speed and vice versa.

● The Climb Gradient: Allows the user to set a climb gradient up to an altitude.

  ○ Set Climb Gradient of: Standard departure climb is 200 feet per nautical mile.

● The Ground Speed: Allows the user to set ground speeds.

  ○ Use Ground Speeds for Flight: When the checkbox is selected the user may set the speeds for the simulation.

  ○ Ground speeds shown are recommended for simulation runs when the checkbox is deselected.

  ○ Ground Speed Inputs: Allows the user to assign ground speed of choice.

  ○ Additional Departure Restriction: Allows the user to set airspeed out to a specific distance.

  ○ Calculate Indicated and Ground Speeds: Allows the user to calculate the conversion of IAS to ground speed or vice versa.

  ○ Uses ISA conditions: Indicates calculations are based on International Standard Atmosphere.
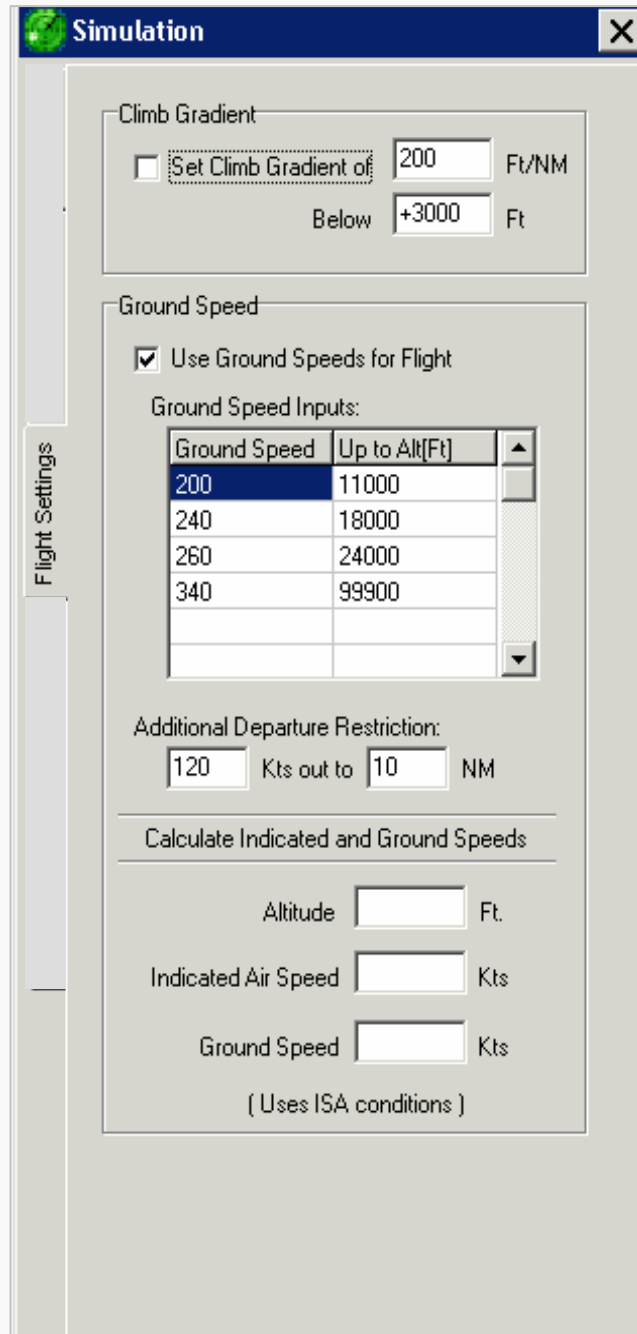
Figure 6-5: Flight Settings

6.4   DME Specific Settings

This tab is used to input DME Screening requirements and provide information on RNP values, flight modes, DME Screen settings, INS drift settings and flight check DME settings.

- Required Navigation Performance (RNP) Value area includes the following buttons and fields:

  - Radial buttons: Allow the user to select RNP values (0.3, 0.5, 1.0, 2.0, 4.0, or Auto 1.0/2.0).

  - Route Width: Displays route width based on RNP value selected.

  - Max Error: Displays the maximum allowed error.

- Flight Mode area includes:

  - Radial buttons: Allow the user to select the flight mode (Manual, Flight Director, and Auto Pilot).

- Screen Settings area includes the following fields and buttons:

  - Minimum Range from DME: Subsequent radial buttons, allows the user to select a minimum reception range from a DME. The default value is 3NM.

  - Allowed Gap Length: Displays the maximum allowable error in NMs.

  - Use SSV: If selected, applies Standard Service Volumes as specified in FAA Order 8260.19, Chapter 2, and Section 4. If a facility does not have a terminal, low altitude, or high altitude identification, then the DME is ignored during screening.

  - Use OSV: If selected, applies the Operational Service Volume as specified in FAA Order 8260.19, Chapter 2, and Section 4.

  - Test for ESV: If solution requires an Expanded Service Volume (ESV) automatically establishes an ESV and repeats the screening process to test the ESV.

- INS (Inertial Navigation System) Drift Settings: allows the user to control INS drift settings by the use of the following checkboxes and entry fields:

  - Allow INS Drift: Enables INS drift for flight simulation.

○ Drift: Allows the user to select the amount of drift.

○ Initial Drift (SID): Displays the maximum amount of drift for a Standard Instrument Departure (SID).

○ Initial Drift (STAR/Q-Rte): Displays the maximum amount of drift for a STAR and Q-route.

○ Max Allowed Drift Time: Displays the maximum amount of drift time.

○ Automatic Inertial if DME/DME Fails: Allows the program to solve for a DME/DME solution, including DME gaps, before it enables the simulator to solve with inertial drift.

● Flight Check DME Settings area includes the following checkboxes and buttons:

○ Automatically Select During Screen: Allows the program to automatically select and assign Flight Check DMEs during the screen.

○ Only Use Selected DMEs: Allows user to manually select the five DMEs for Flight Check.

○ Assign Flight Check DMEs: Displays DME Selection Screen.
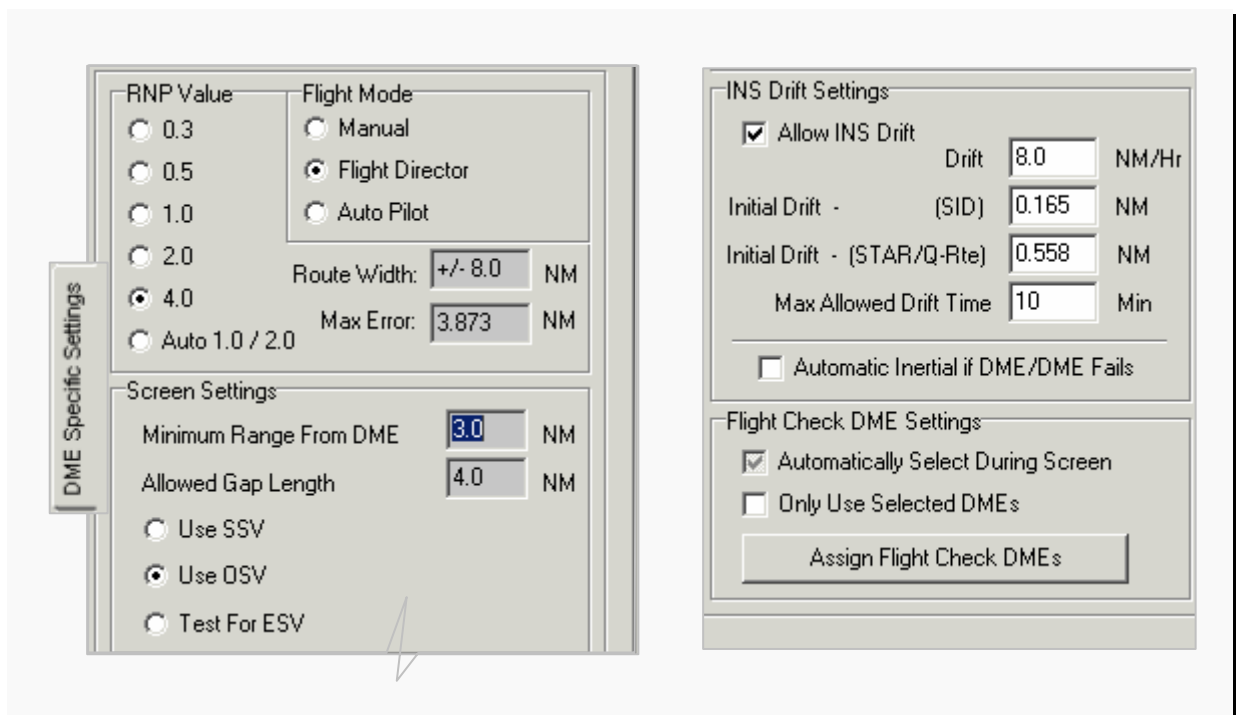
Figure 6-6: Flight Settings

6.5   Run Output

This tab allows the user to observe the simulation output as the simulation is run contains the following:

- DMEs Used & Status area: Shows the following program-supplied information:

    ○ Minimum MSL DMEs Available: Displays the minimum altitudes in feet on departures at which two DMEs are able to detect an aircraft and perform a DME/DME solution.

    ○ Solving With: Provides real-time information as route is screened. It identifies the DMEs, selected and the number of DMEs available for selection.

- DME/INS Errors area: Displays the following program-supplied information and allows the user to determine whether output is shown.

    ○ Actual: Provides real-time Navigation System Error (NSE) information as route is screened.

    ○ Max: Provides real-time NSE information as route is screened.

    ○ Max Allowed: Displays maximum allowed NSE (dependent on selected RNP value and flight mode).

- Don't Show Output (Fast Mode) or (Allow Breaks checkbox): Restricts viewing of the flight track in the DrawSpace™Display. Run time is much faster in this configuration.

- Run Time field: Displays time in minutes and seconds to run the simulation.

- Track Coloring Options area: Allows selection of track coloring through the use of radial buttons.

Note:	While INS drift is occurring, the upper right corner of the DME/INS Errors area displays an "INS" over a yellow circle as shown here.	

DMEs Used & Status

Minimum MSL DMEs Available `30000` Ft

Solving With

DXO
ROD

\# of Useable DMEs: 9

DME / INS Errors

Actual	Max	Max Allowed
`0.350` NM	`0.352` NM	`1.732` NM

☐ Don't Show Output (Fast Mode)
(or allow breaks)

Run Time `_____`

Run Output

Track Coloring Options

○ **Pass/Fail for All Screens**

◉ DME/INS Screen Results

○ Radar Screen Results

○ Comm Screen Results

○ LAAS Screen Results

Figure 6-7: Run Output

7.0   Grid Evaluations

This module has five tabs: Create Grid Areas, DME/DME Grid Analysis, Line of Sight Grid Analysis, Obs Grid Analysis, and SV Cross Sections. This module can be opened with the View drop-down menu or the Grid Evaluations square button.

7.1   Create Grid Areas

This tab allows the user to create a rectangle, circle, or non-uniform shape grid and a flight plan grid using the mouse or by specifying latitude and longitude in entry fields.

- Select Shape: Radial buttons define the type of grid to be created, Rectangle, Circle, Non-uniform shape or Flight Plan.

- Use Rectangle: When selected allows the user to define a rectangle grid area on the DrawSpace™Display using the following:

  - From Mouse: Allows the user to define an area clicking on a location on the DrawSpace™Display.

  - Grid Bottom Left: Allows the user to define the bottom left corner of a rectangular grid area on the DrawSpace™Display by inputting latitude and longitude coordinates.

  - Grid Top Right: Allows the user to define the top right corner of a rectangular grid area on the DrawSpace™Display by inputting latitude and longitude coordinates.

- Use Circle: When selected with a radial button and allows the user to define a circle grid area on the DrawSpace™Display using the following:

  - From Mouse: Allows the user to define the center of the circle by clicking on a location on the DrawSpace™Display area that will be used as the center of the circle.

  - Latitude/Longitude: Allows the user to define the center of the circle by inputting the desired latitude and longitude.

  - Grid Radius: Allows user to define a specific radius in nautical miles, feet, meters, or kilometers.

- Use Non Uniform Shape: When selected with a radial button and allows the user to define a polygon grid area on the DrawSpace™Display using the following:

○ From Mouse: Allows the user to define the polygon on the DrawSpace™Display. Once the From Mouse checkbox is selected it stays active throughout the creation of the polygon therefore the user should deselect the checkbox after defining the area.

○ Latitude/Longitude: Allows the user to define the polygon by inputting the desired attitudes and longitudes.

 Clear Shape: Deletes all Lat/lon in the boxes.

 Load from File: Loads a previously saved grid.

 Save to File: Saves created grid as a .csv file.

 Add Row: Allow the user to add row.

 Remove Row: Allow the user to remove row.

○ Show Grid Outline: Displays the grid outline on the DrawSpace™Display area.

● Use Flight Plan: When selected with a radial button and allows the user to define a grid area around the parameter of a FPDIP on the DrawSpace™Display using the following:

○ Select Flight Plan: This drop down window allows the user to select from loaded FPDIFs; the flight plan will be drawn on the DrawSpace™Display.

○ Flight Settings: This drop down window allows the user to select the appropriate RNP criteria.

● Grid Definition/Create Grid/Zoom/Clear All: Allows selection of grid intervals and units and activates creation or deletion of a grid using the following entry fields, radial buttons, and Windows-style buttons.

○ Lat Step: Allows user to enter desired intervals between parallels of latitude.

○ Lon Step: Allows user to enter desired intervals between meridians of longitude.
○ Units: Allows selection of meters, feet, or nautical miles for defining the grid.

○ Create Grid: Creates and displays the grid on the DrawSpace™Display.

○ Zoom: Allows the user to zoom in to the grid area on the DrawSpace™Display

○ Clear All: Erases the grid from the DrawSpace™Display.
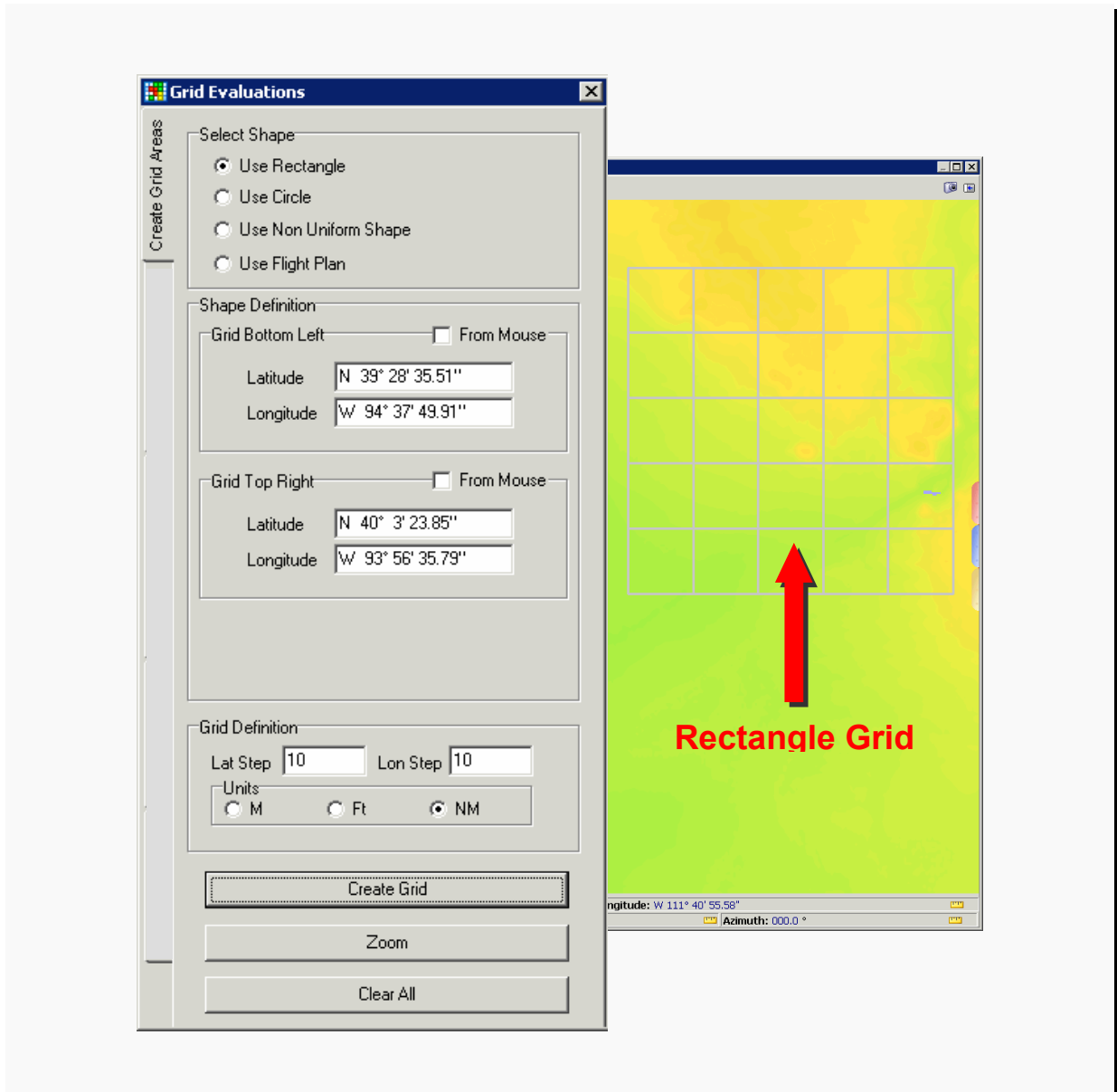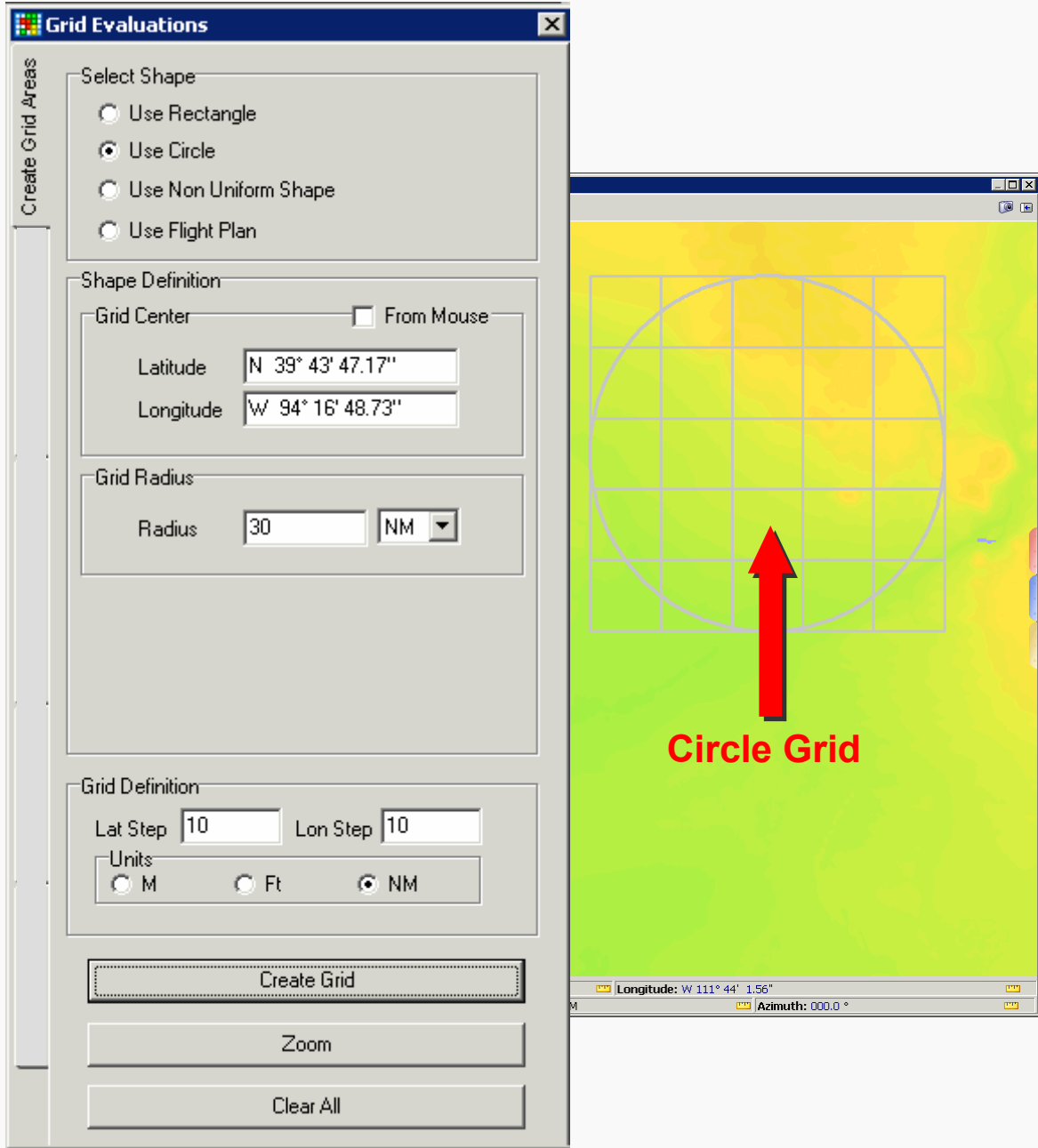

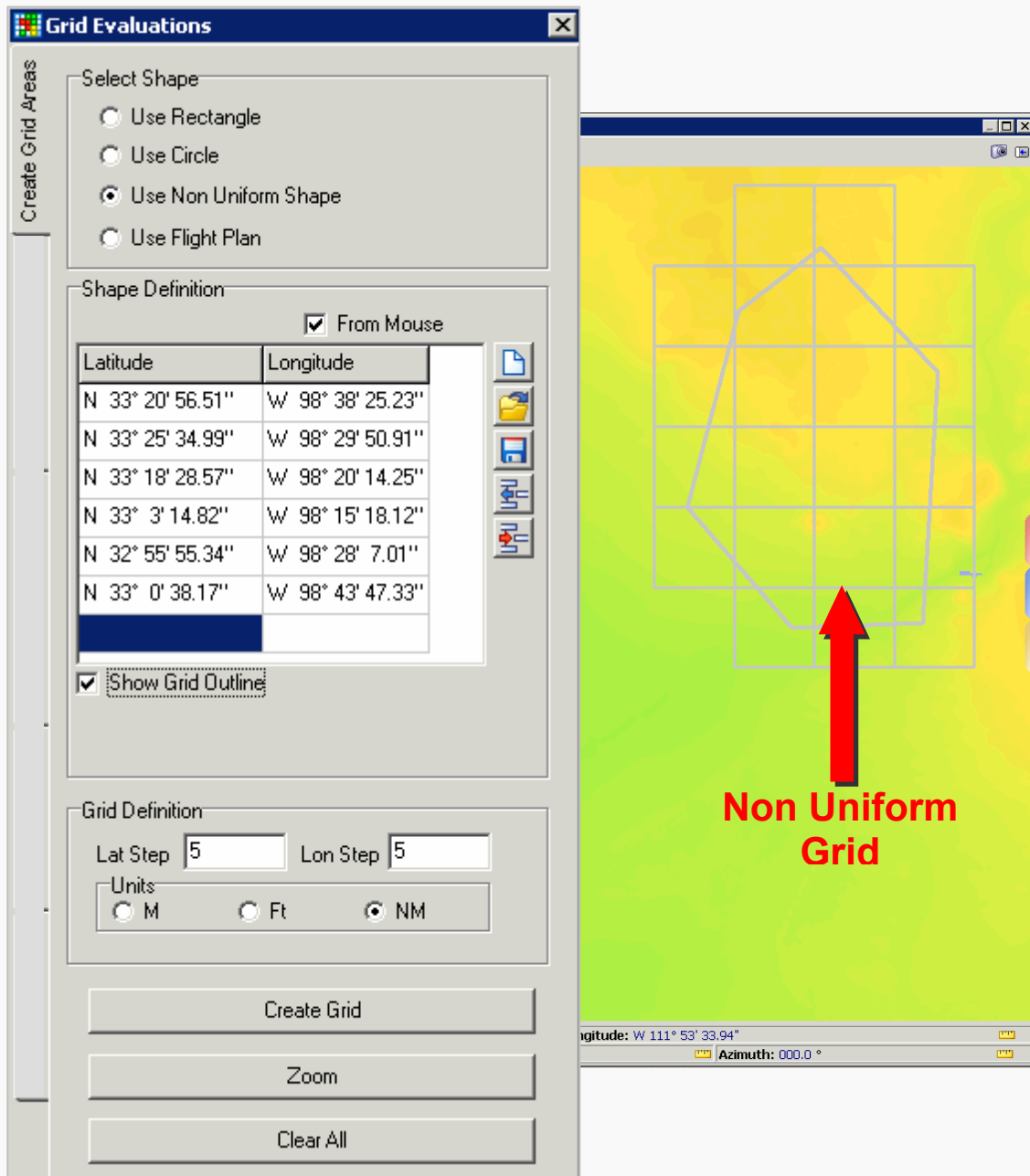Figure 7-1: Shape Definition/Rectangle

Figure 7-2: Shape Definition/Circle

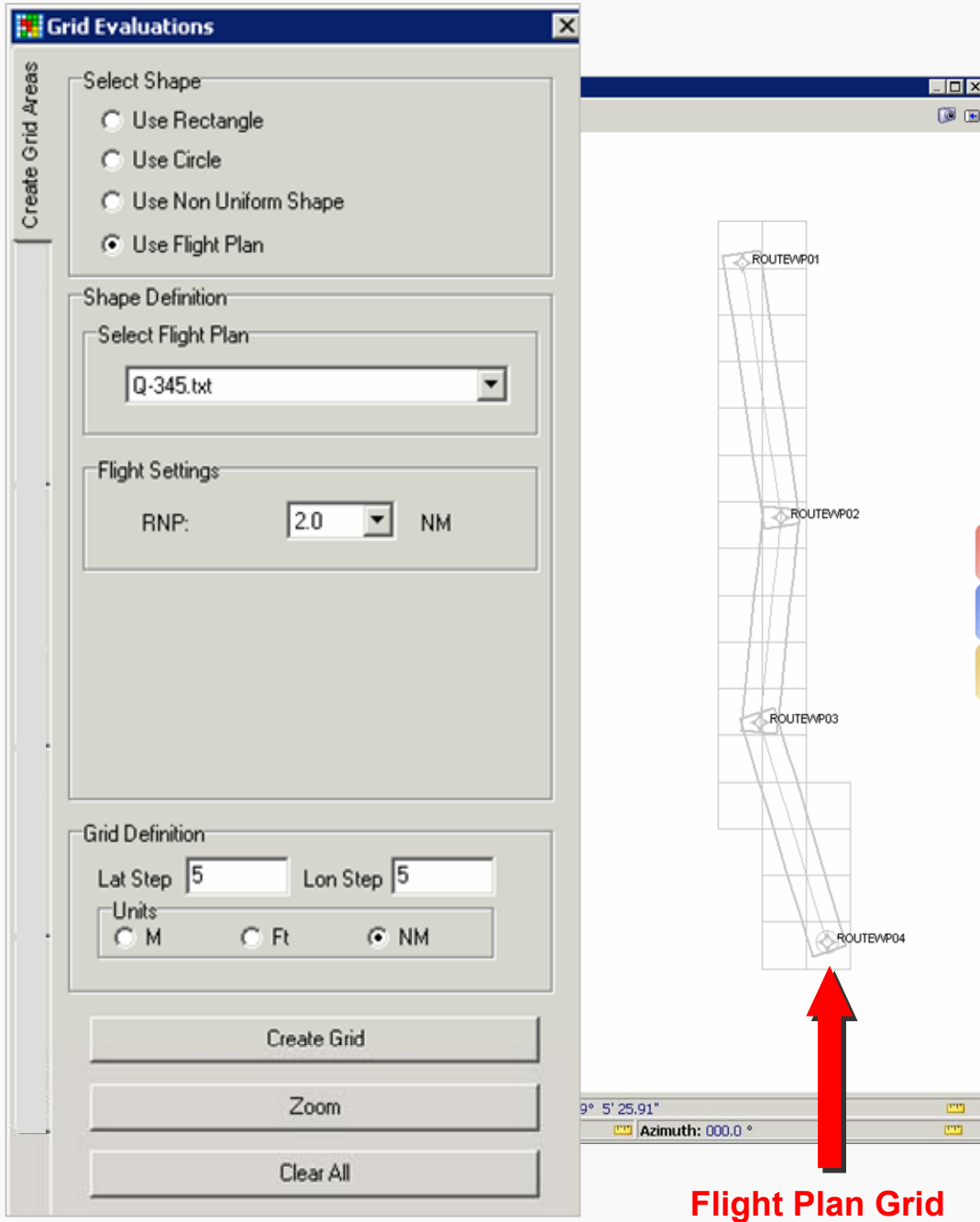Figure 7-3: Shape Definition/Non Uniform

Figure 7-4: Shape Definition/Flight Plan

7.2   DME/DME Grid Analysis

This tab allows the user, through various entry fields, checkboxes, and radial buttons, to conduct three types of DME grid analysis: Single Altitude Analysis, Scan for Minimum Passing Altitude, and Perform Multiple Altitude Slices.

- Evaluation Settings: may be defined by the user and include the following options:

  - Altitude: Automatically shows final altitude where DME coverage is reached and allows user to enter the altitude to be evaluated for Single Altitude Analysis.

  - DME Types: Includes checkboxes for selection of six DME types.

  - Check DME Frequencies: Excludes the use of two facilities with a common frequency.

  - Use DTED: Activates DTED.

  - Use DME Restrictions: Assigns DME restrictions to the NAVAIDs.

  - Check Maximum Possible ESVs: Assigns maximum ESVs to the all NAVAIDs within the grid area.

  - Disable Low/Terminal DMEs: Excludes Low/Terminal DMEs from the analysis.

- Single Altitude Analysis radial button: Allows the user to evaluate grid coverage at a single altitude.

  - Display Options: Allow user to display DME coverage options on the DrawSpace™Display area by selecting checkboxes.

    - Show Grid: N/A
    - Show All Coverage: Selects all check boxes.
    - No Coverage: No DME pairs indicated by red box.
    - 1 Pair Avail: Indicated by a yellow box.
    - 2 Pairs Avail: Indicated by a blue box.
    - 3+ Pairs Avail: Indicated by a green box.
    - Criticals: Indicated by a red X over any box.

- Scan for Minimum Passing Altitude: Radial button that allows the user to determine the minimum passing altitude for the entire grid area.

  - When Individual Cell Altitudes checkbox is selected the Minimum Passing Altitude will be provided for each cell in the grid area.

○ Altitude Step: Allows the user to select altitude increments (i.e., 500 feet, 1000 feet, etc) used during evaluations.

○ Consider Criticals Failure: The analysis continues until it finds an altitude that has redundant coverage.

○ Individual Cell Altitudes: Evaluates each individual grid cell to determine altitude of DME coverage and identify DME pairs. The Display Options provides color-coded Altitude data. The ToolTip box provides DME pairs data for individual cells.

Note:	If the Individual Cell Altitudes checkbox is NOT selected, then a scan for minimum passing altitude evaluation will determine the minimum altitude coverage for the entire grid area.

○ Allow Maximum Gap: The analysis will permit DME gaps up to the selected 4NM value. This option is not available if the Individual Cell Altitudes checkbox has been selected.

○ Display Options: When Individual Cell Altitude has been selected, checkboxes allow selection of display options. Individual cell results are displayed on the DrawSpace™Display area for the following groups if the checkboxes are selected:

♦ Show Grid : N/A
♦ Show All Coverage: Selects all check boxes.
♦ No Coverage: Indicated by a red box.
♦ Alt < 18000: Indicated by a green box.
♦ Alt > =18000: Indicated by a yellow box.
♦ Alt > 29000: Indicated by a brown box.
♦ Criticals: Indicated by an X over any of the colored boxes above except red.

● Perform Multiple Altitude Slices: Allows the user to select altitude parameters for evaluation using entry fields and Windows-style buttons.

○ Minimum Altitude: Sets minimum altitude to be evaluated.

○ Maximum Altitude: Sets maximum altitude to be evaluated.

○ Altitude Step: Selects altitude increment (500, 1000, etc.) to be used when evaluating from minimum to maximum selected altitude.

○ Display Options: Allow user to display DME coverage options on the DrawSpace™Display area by selecting checkboxes.

- ♦ Show Grid: N/A
- ♦ Show All Coverage: Selects all check boxes.
- ♦ No Coverage: No DME pairs indicated by red box.
- ♦ 1 Pair Avail: Indicated by a yellow box.
- ♦ 2 Pairs Avail: Indicated by a blue box.
- ♦ 3+ Pairs Avail: Indicated by a green box.
- ♦ Criticals: Indicated by a red X over any box.

- Evaluate: Windows-style buttons that starts the evaluation.

- Stop Evaluation: Windows-style button used to prematurely terminate an evaluation.

- Results: Windows-style buttons that shows Grid Assessment and allows user to save as a PDF file.

- Clear All: Windows-style buttons that erases all data from module and DrawSpace™Display area.
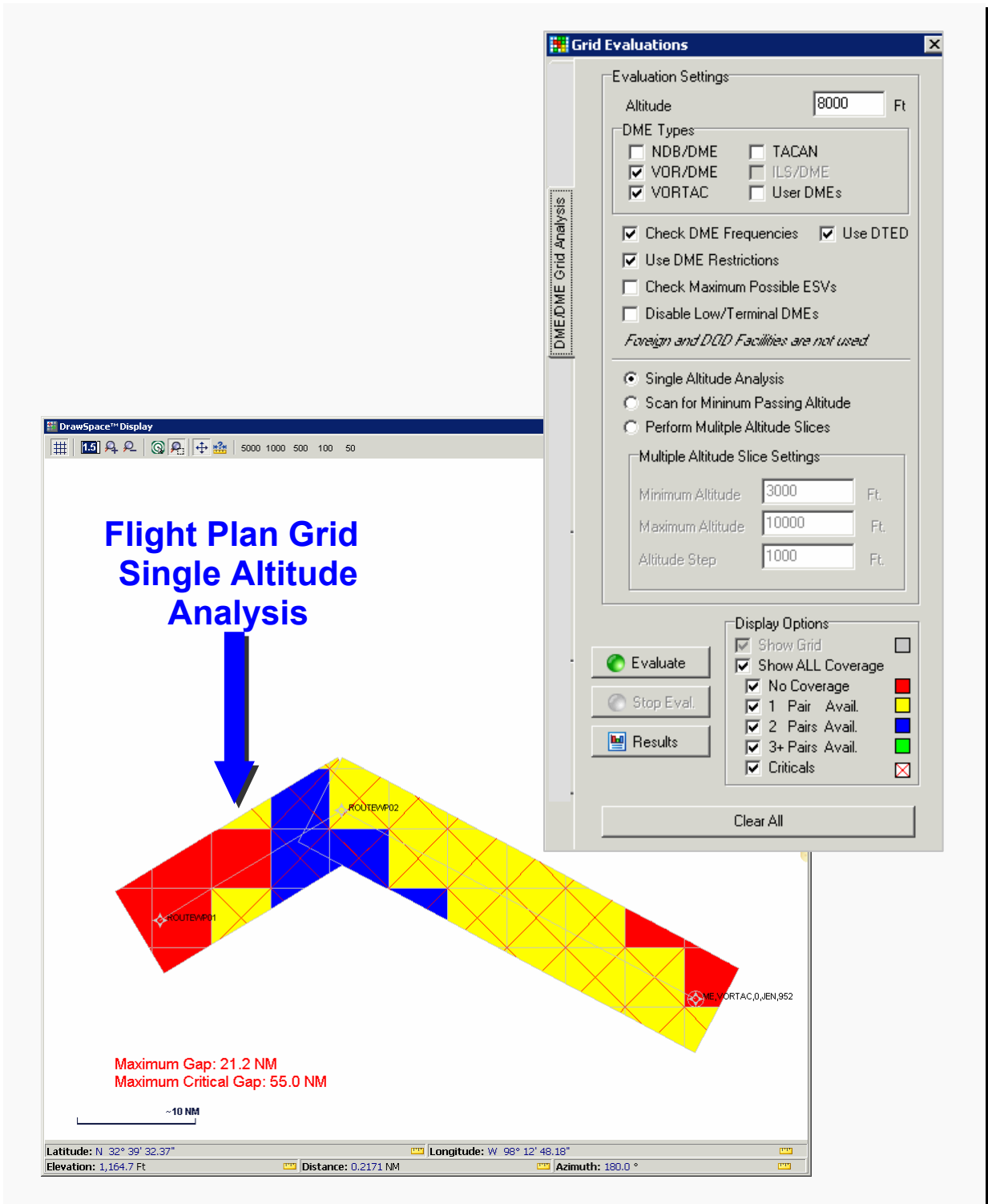
Figure 7-5: Scan Altitude Analysis

Figure 7-6: Scan for Minimum Passing Altitude/Individual Cell Altitude
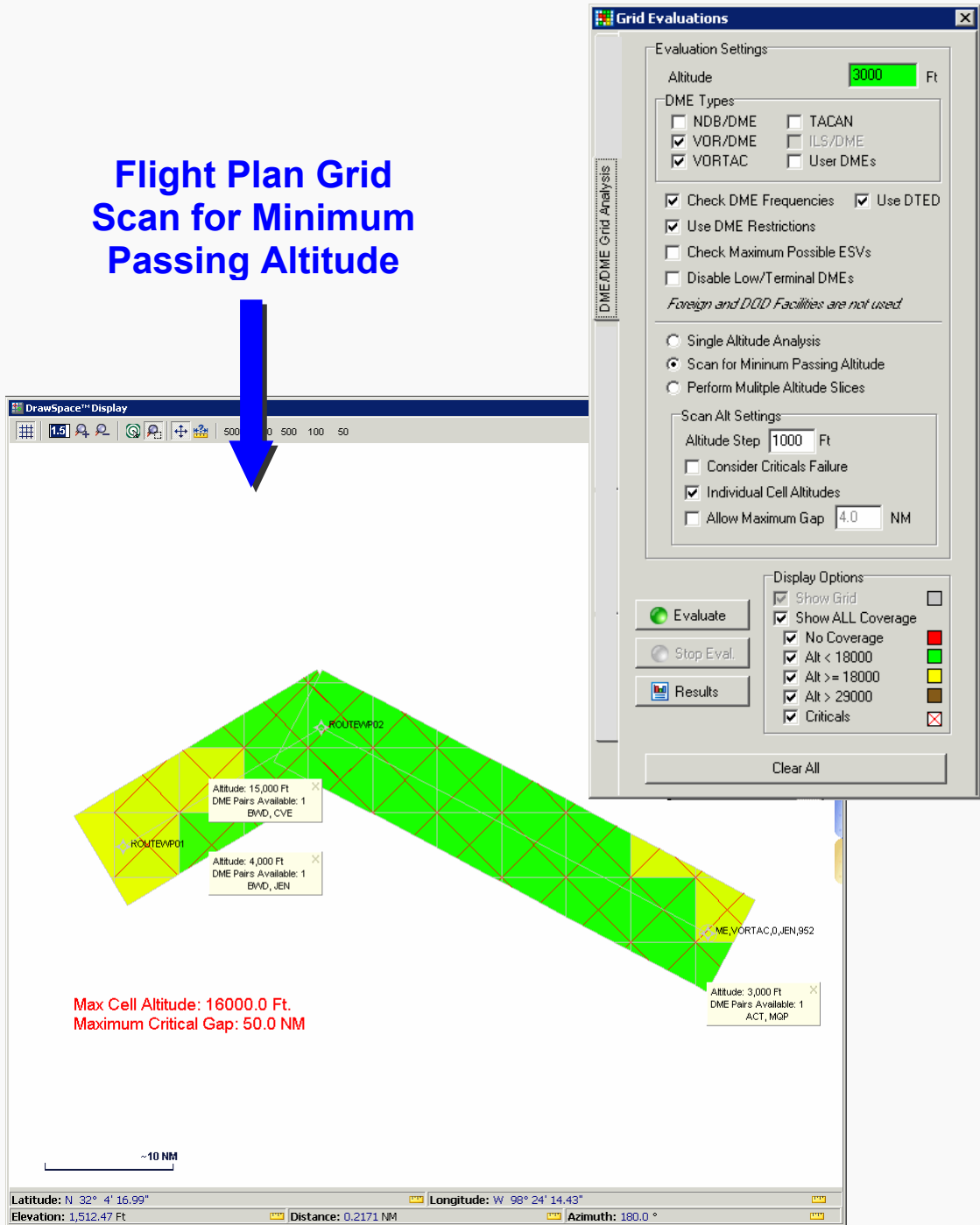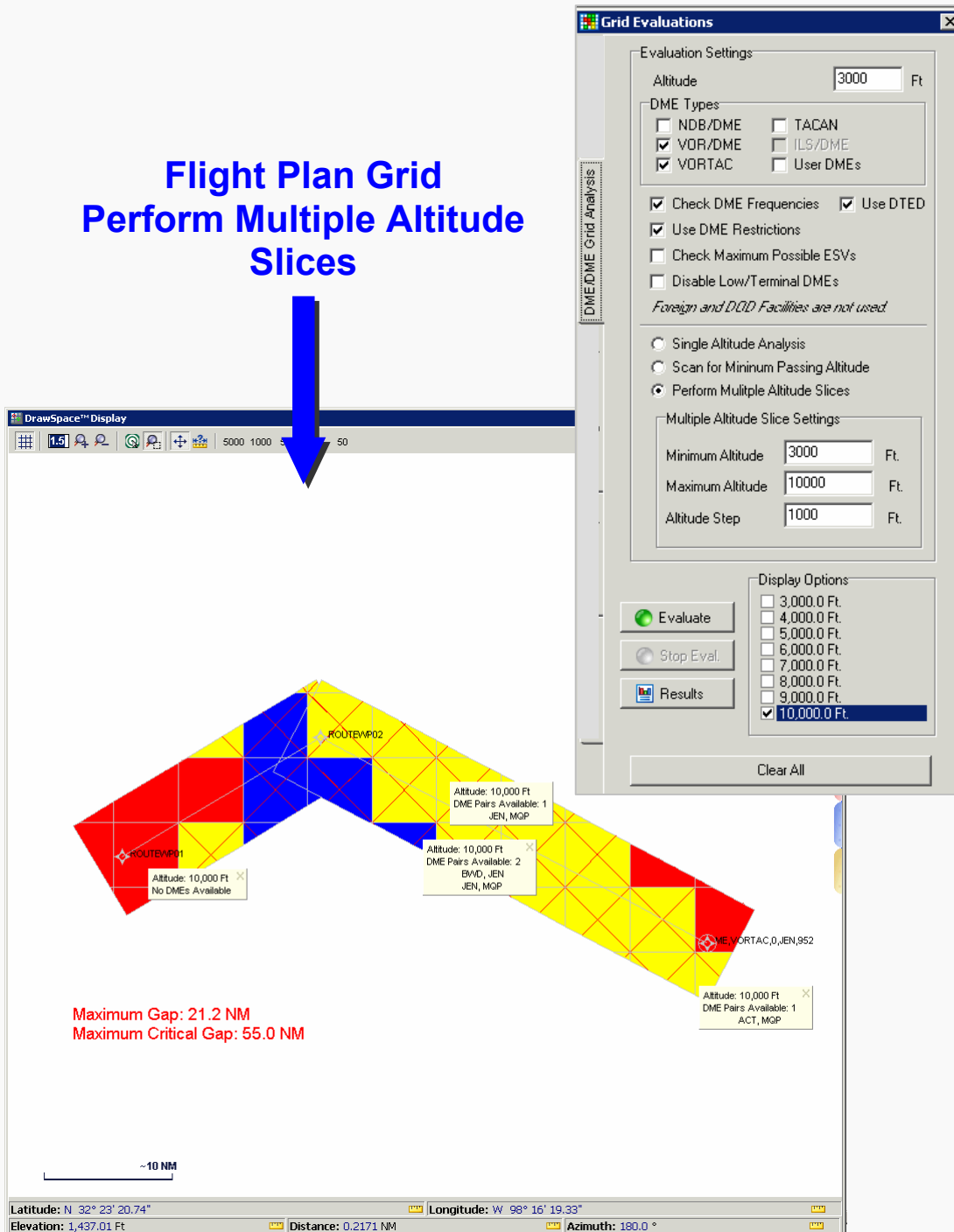
Figure 7-7: Perform Multiple Altitude Slices

7.3   Line of Sight Grid Analysis

This tab allows the user to evaluate a grid area to determine the line of sight within a grid from a single facility or radar site.

● Select Data Source: Radial buttons allow the user to select Communication Database, Radar Database or Single Facility for the line of sight evaluation.

  ○ Communication Database: Checkboxes allow the user to select Current DB (Database) and User database.

  ○ Radar Database: Checkboxes allow the user to select ARSR, ASR, and User radar for the line of sight evaluation.

Note:	This RNAV-Pro line of sight assumes a value for the Earth's radius that is 4/3 times the actual radius. This is done to account for the effect of the atmosphere on radio wave propagation.

  ○ Single Facility: Allows user to select a single facility with the mouse for the line of sight evaluation.

    ♦ From Mouse: Allows the user to define the two latitude/longitude points and altitudes of the facility with a mouse click in the DrawSpace™Display.

    ♦ Altitude Step: Allows the user to select altitude increments (i.e., 500 feet, 1000 feet, etc) used during evaluations.

  ○ Display Options: checkboxes allow selection of display options. Individual cell results are displayed on the DrawSpace™Display for the following groups if the checkboxes are selected:

    ♦ Show Grid
    ♦ Show All Coverage
    ♦ No Coverage: Indicated by a red box.
    ♦ Alt < 18000: Indicated by a green box.
    ♦ Alt >= 18000: Indicated by a yellow box.
    ♦ Alt > 29000: Indicated by a brown box.

● Evaluate: Windows-style button that starts the evaluation.

● Stop Evaluation: Windows-style button used to prematurely terminate an evaluation.

- Results: Windows-style button that shows Grid Assessment and allows user to save it as a PDF file.

- Clear All: Windows-style button that erases all data from module and DrawSpace™Display area.
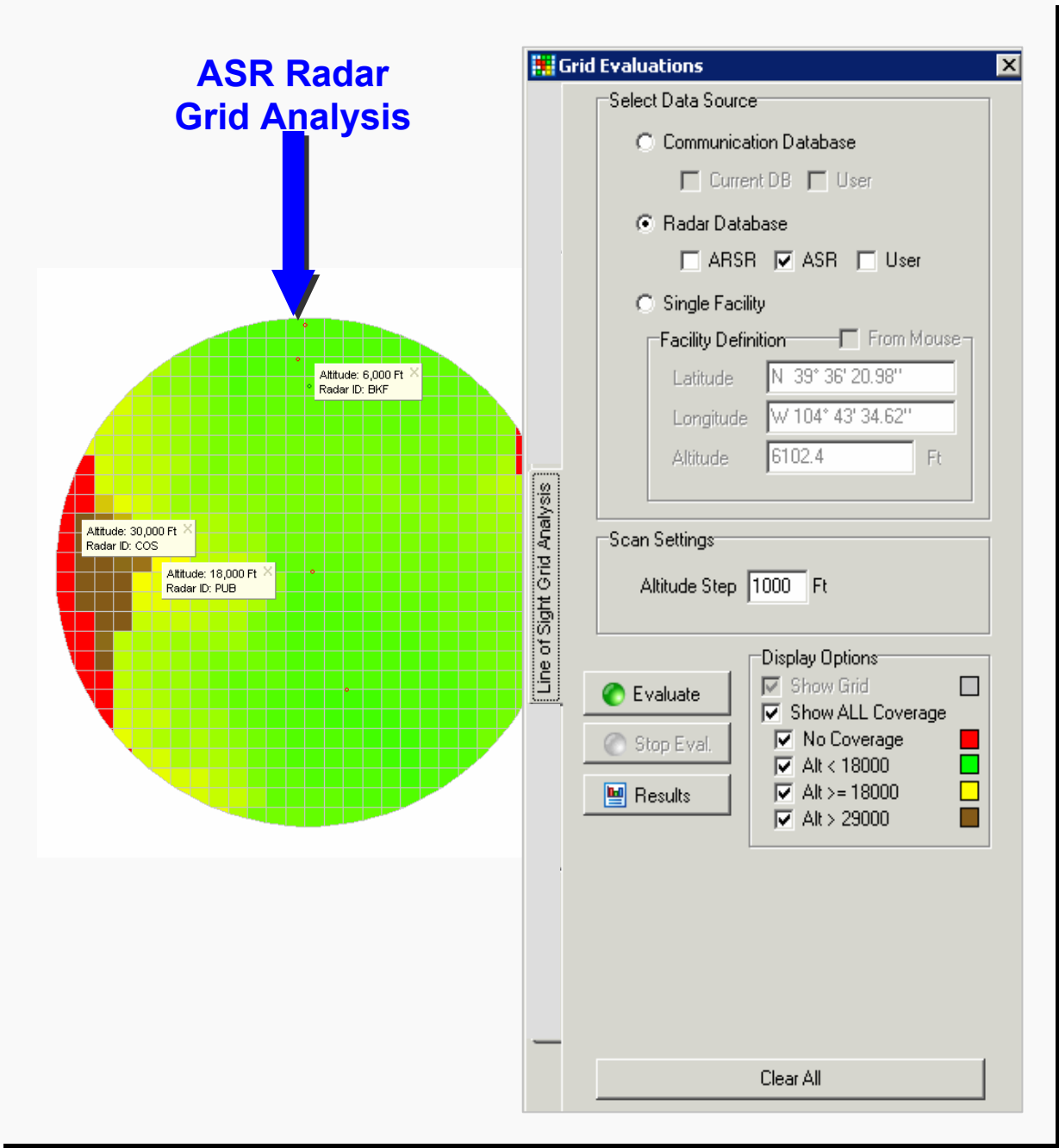

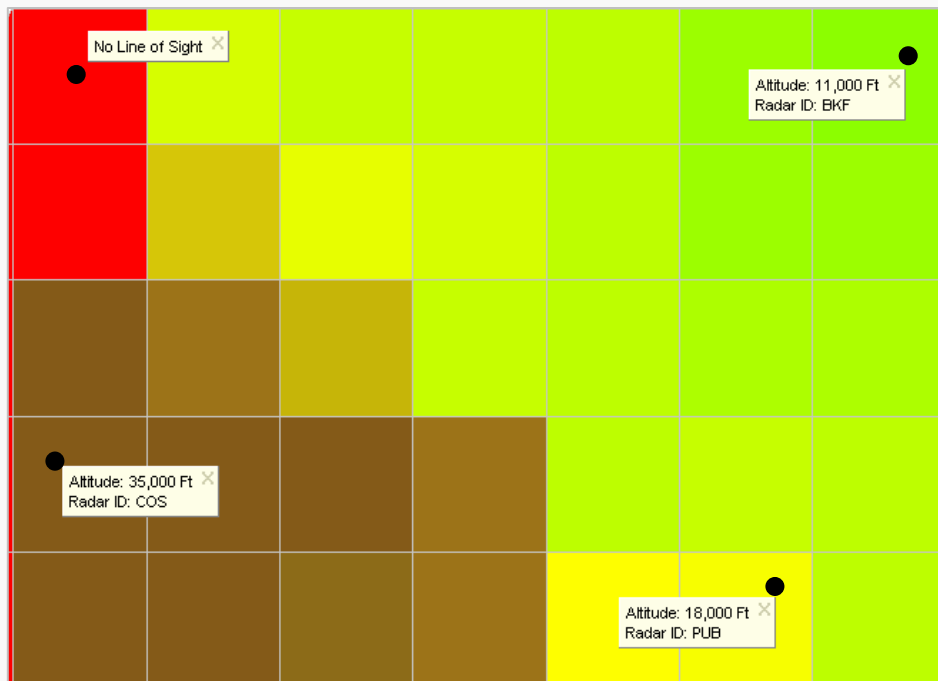Figure 7-8: Line of Sight Grid Analysis/ASR Radar Database

Figure 7-9: Line of Sight Grid Analysis/ASR Radar Database/Close-up
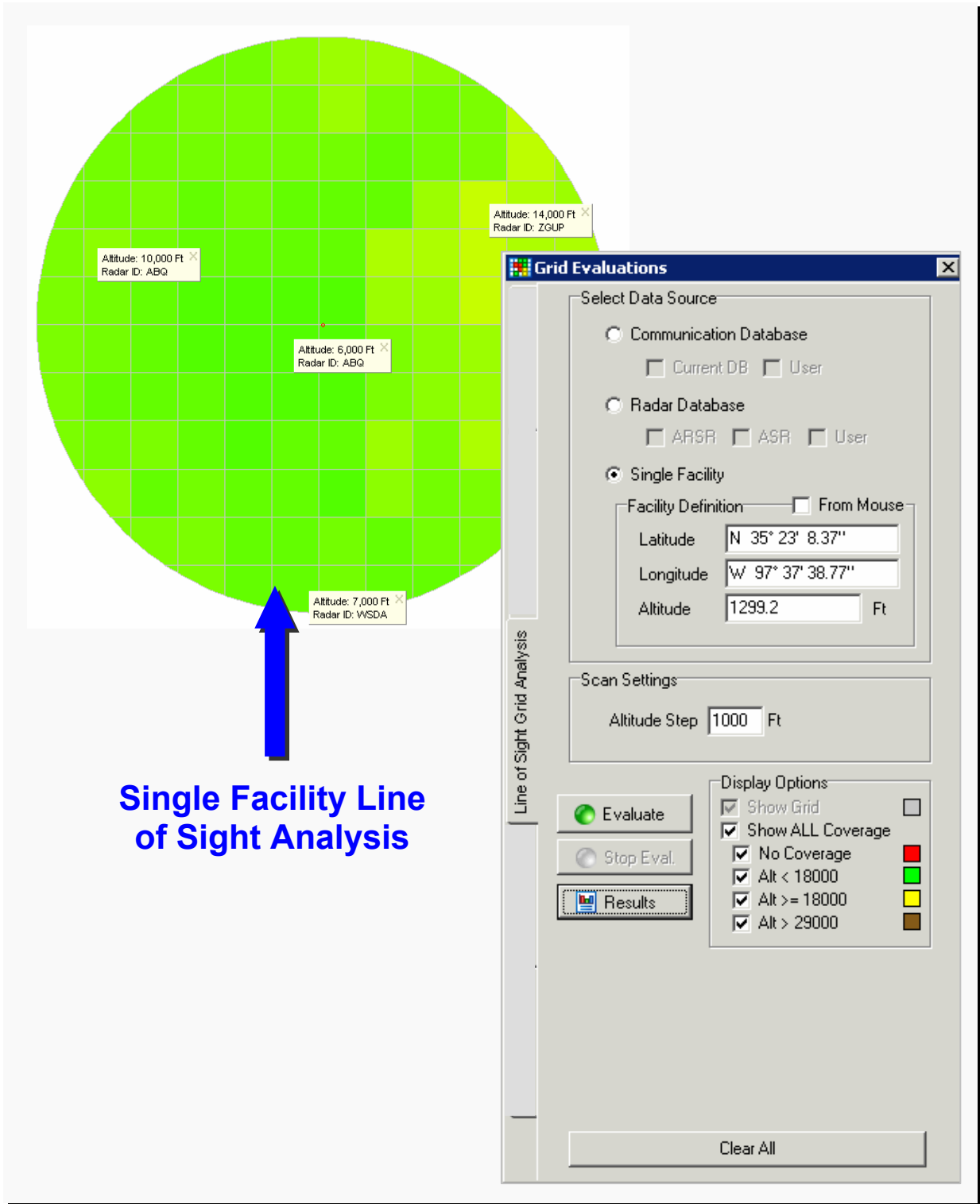
Figure 7-10: Line of Sight Grid Analysis

7.4   Obs Grid Analysis

This tab allows the user to evaluate a grid area to determine the highest obstacle within a grid or the highest obstacle in each cell of the grid.

- Evaluation Settings: Checkboxes and radial buttons allow the user to set the options of an analysis.

  - Data Screening Options:

    - ♦ User Accuracy Code: Allows the user to apply the FAA Accuracy code to the analysis. For more details on Accuracy Code see FAA Order 8260.19 Chapter 2, Section 11 Obstacle Data and Appendix 2.

    - ♦ Obstacle (DB): Allows the user to evaluate obstacles listed in the AVNIS Database.

    - ♦ Obstacle (User): Allows the user to evaluate obstacles listed in the User Obstacles database.

    - ♦ Terrain: Radial buttons allow the user to choose DTED Level 0 Max or DTED level 1.

    - ♦ Scan for Highest Obstruction: Scans all obstacles within the grid boundary and displays the highest obstacle on the DrawSpace™Display.

    - ♦ Scan for Highest Obstruction in Each Cell: Scans all obstacles within the grid boundary and displays the highest obstacle within each individual cell on the DrawSpace™Display.

- Evaluate: Starts evaluation.

- Stop Evaluation: Stops Evaluation.

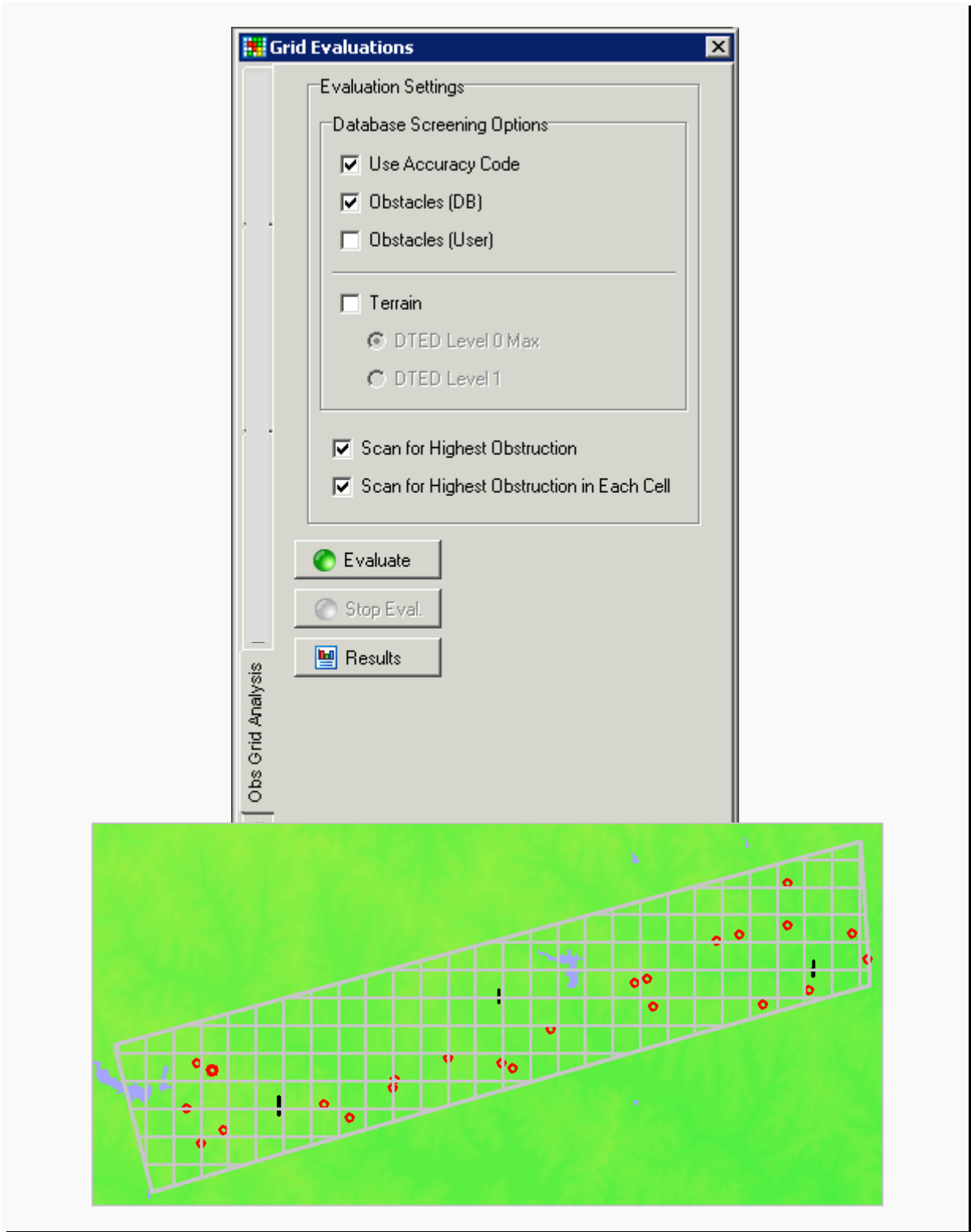- Results: Provides a .pdf file of the evaluation which may be saved by the user.

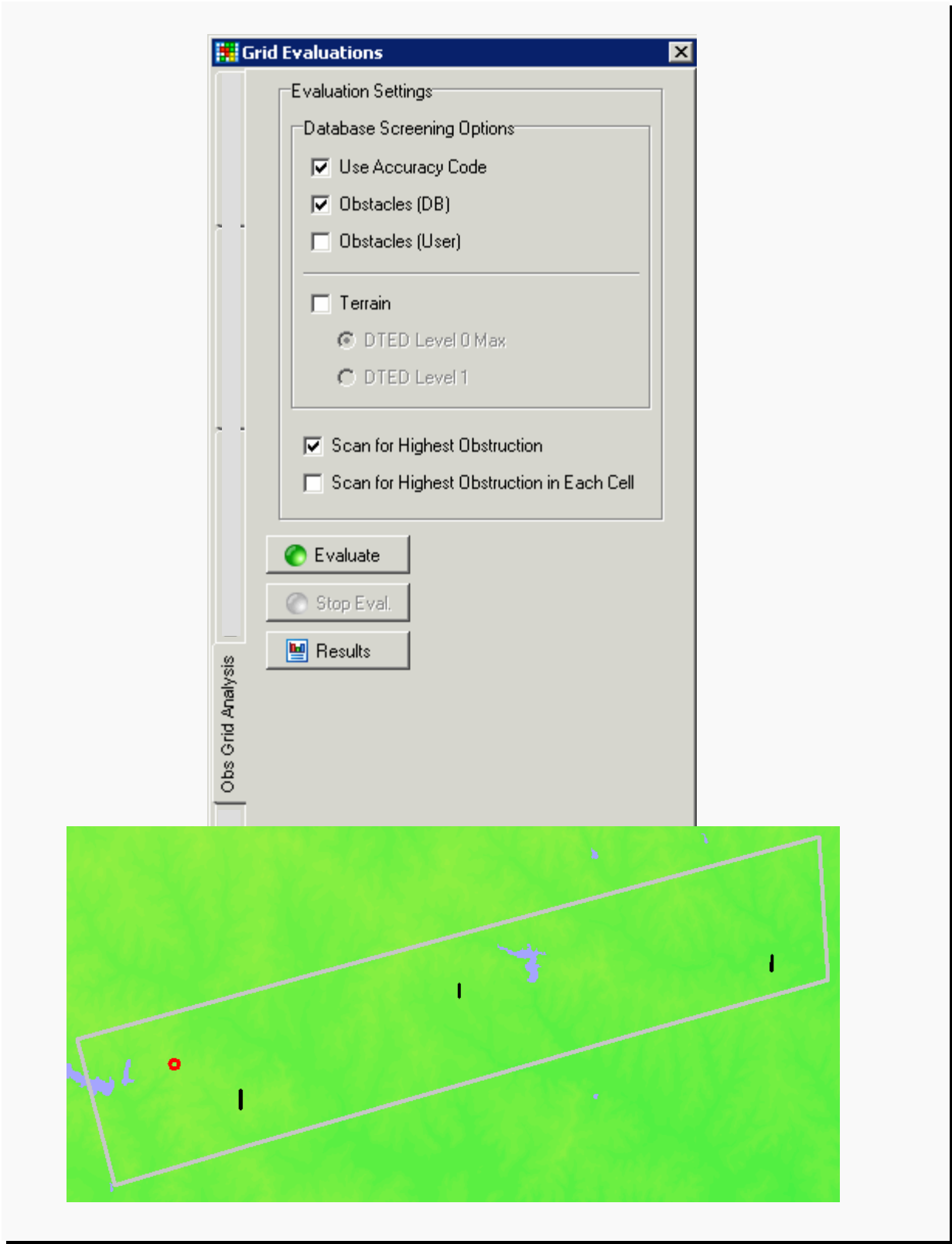Figure 7-11: Obs Grid Analysis/Scan for Highest Obstruction in Each Cell

Figure 7-12: Obs Grid Analysis/Scan for Highest Obstruction

7.5   SV Cross Section

This tab allows the user to specify facility and service volume options using a checkbox, entry fields, radial buttons, and a Windows-style button.

● Facility: Allows the user to select NAVAIDs via the mouse to click on the location of the NAVAIDs on the DrawSpace™Display area or type the lat/lon directly into the entry field to establish the location by lat/lon.

● Service Volume: Radial button that defaults to the service volume (terminal, low altitude, or high altitude class service volume) of the selected facility.

● Terrain: Allows the user to activate the terrain option within the cross section display of this tab using a checkbox, entry fields, and a Windows-style button.

    ○ Azimuth: Allows the user to specify 360 degrees of azimuth from which to view the cross section. The specific degree entered in the azimuth window is the azimuth of the right side of the cross section.

    ○ Load DTED: Activates DTED.

    ○ Use: Displays the cross section.

    ○ Use for Evaluation: Allows DTED readout of azimuth, altitude, and line of sight function within the Cross Section Window.

● Cross Section Window: Is interactive with the mouse and displays line of sight, altitude, and range.

    ○ Zoom In/Out: Allows the user to zoom in or out within the Cross Section Window.

    ○ Visible: Provides line-of-sight information (Yes/No).

    ○ Altitude: Provides altitude in MSL.

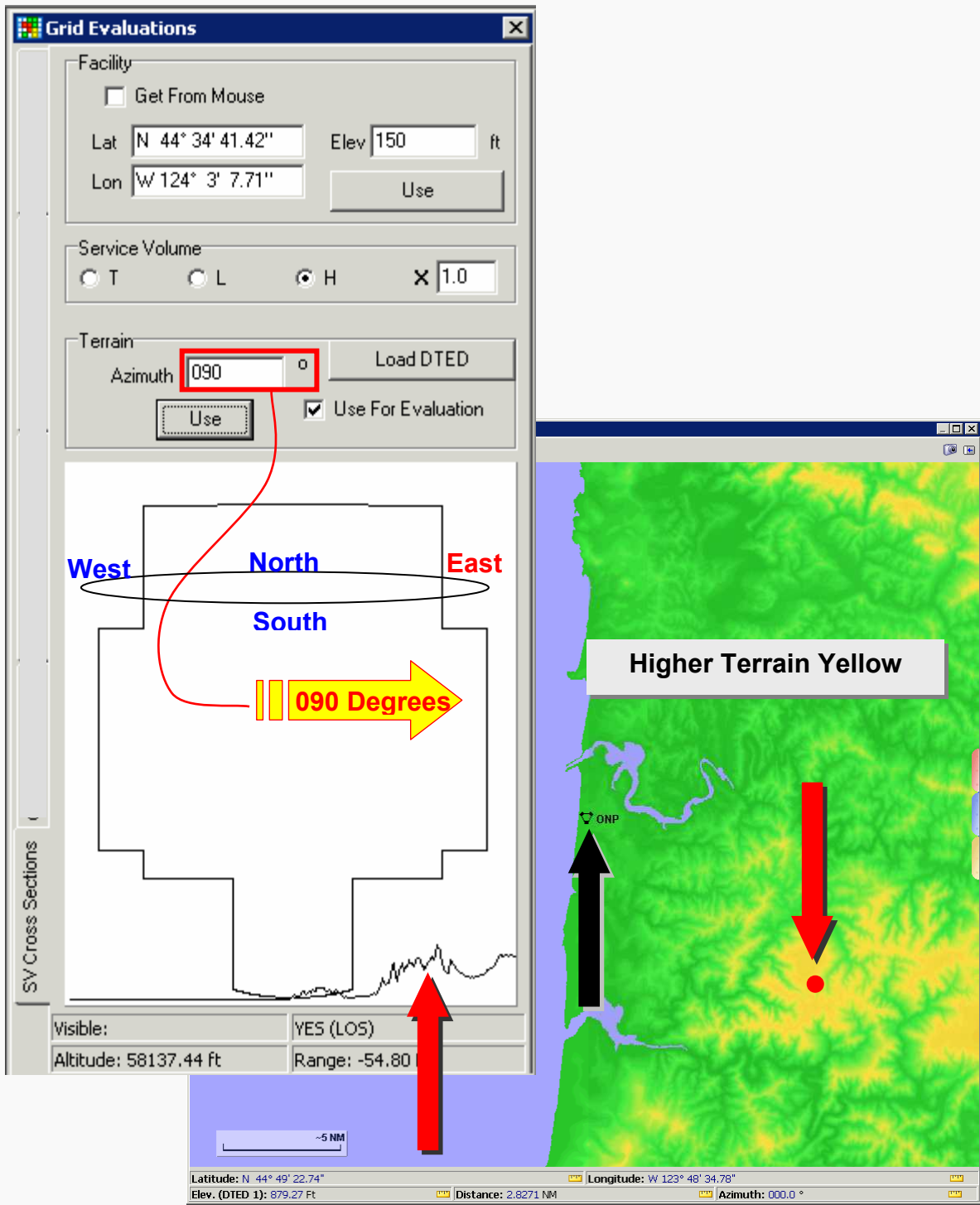   ○ Range: Provides distance from the NAVAIDs.

Figure 7-13: SV Cross Section

8.0　　　　TERPS

This module draws and evaluate TERPS surface for RNAV departures, RNAV approaches,　Q-Route, engine out surfaces and draws generic type-three surfaces.

● A flight plan must be loaded for RNAV departures, RNAV approaches and Q-routes on the DrawSpace™Display prior to generating and evaluating the TERPS surfaces. Engine-out surfaces and Type 3 surfaces do not require flight plan prior to use.

　　○ Generation a flight plan: The user may generate a flight plan manually (See par. 9.0) or via the Route Wizard (See par. 10.0).

　　○ Load the flight plan: The user may load the flight plan using or the "Load" feature in the "Route" drop down menu (See par. 3.4) or via the Simulation Module; Flight Plans tab (See par. 6.1).

● Obstacles that penetrate the TERPS surface appear red; obstacles that do not penetrate appear green. The controlling (critical) obstacle is circled on the display to make it easily identifiable.

8.1　　　　Global Settings

This tab selects flight plans, database options, and runways for the TERPS evaluation.

● Select Flight Plan: When more than one flight plans has been loaded, this drop-down menu allows the user to select which flight plan to use.

● Screening Database Options: Allows the user select a choice of databases for screening.

　　○ Obstacles (DB): AVNIS database.
　　○ Obstacles (User): User input database.
　　○ Terrain: DTED Level 1.

● Airport Runway Selection: Allows the user select an Airport and Runway for screening.

　　○ Select Airport: Enter the ICAO four letters ID for the airport.
　　○ Select Runway: Open drop down window and select desired runway.
　　○ Use For Departure: Defines the type of screening procedure.
　　○ Use For Approach: Defines the type of screening procedure.

● Selected Runways: Displays selected runway for departure or approach.

○ Departure: Displays which airport/runway was selected.

○ Approach: Displays which airport/runway was selected.

○ TCH: Allows the user to input Threshold Crossing Height (TCH) in feet. The default setting is 50 feet.
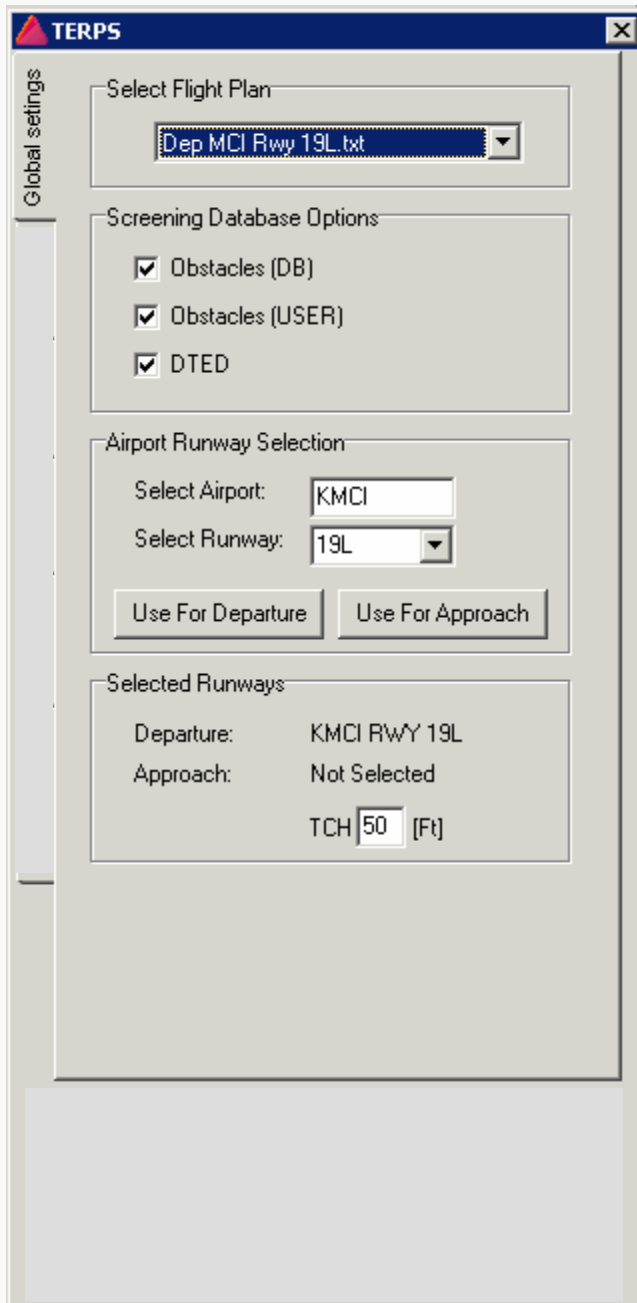
Figure 8-1: Global Settings

8.2 Departure

This tab allows user to generate and evaluate Departure TERPS surfaces.

- 8260.40B FMS Departure.

    - Generate Surfaces: Generates TERPS surfaces on the DrawSpace™Display.

    - Evaluate Departure: Evaluates TERPS surfaces for penetrations.

- 8260.44A RNAV Departure.

    - Generate Surfaces: Generates TERPS surfaces on the DrawSpace™Display.

    - Evaluate Departure: Evaluates TERPS surfaces for penetrations.

- 8260.3 Diverse Departure Volume 4

    - Generate Surfaces: Generates TERPS surfaces on the DrawSpace™Display.

    - Evaluate Departure: Evaluates TERPS surfaces for penetrations.

    - Mountainous Area: Allows evaluation to be conducted using mountainous Required Obstacle Clearance (ROC).

    - DER crossing height: Allows user to set crossing height at Departure End of Runway (DER).

    - ICA Length: Allows user to set the length of the Initial Climb Area (ICA).

- Clear Surfaces: Clears TERPS surfaces and obstacles from the display.

- Show Surfaces: Draws the primary and secondary TERPS surfaces in the DrawSpace™Display area.

- Show Surface Alt: Displays the TERPS surface altitude and the altitude of terrain when the user positions the mouse over the TERPS surface.

    - Surface MSL: Provides MSL altitude of the TERPs surface.
    - Surface AGL: Provides AGL altitude of the TERPs surface.
    - DTED Level 1: Shows elevation of terrain in MSL. The accuracy Code is 4E.
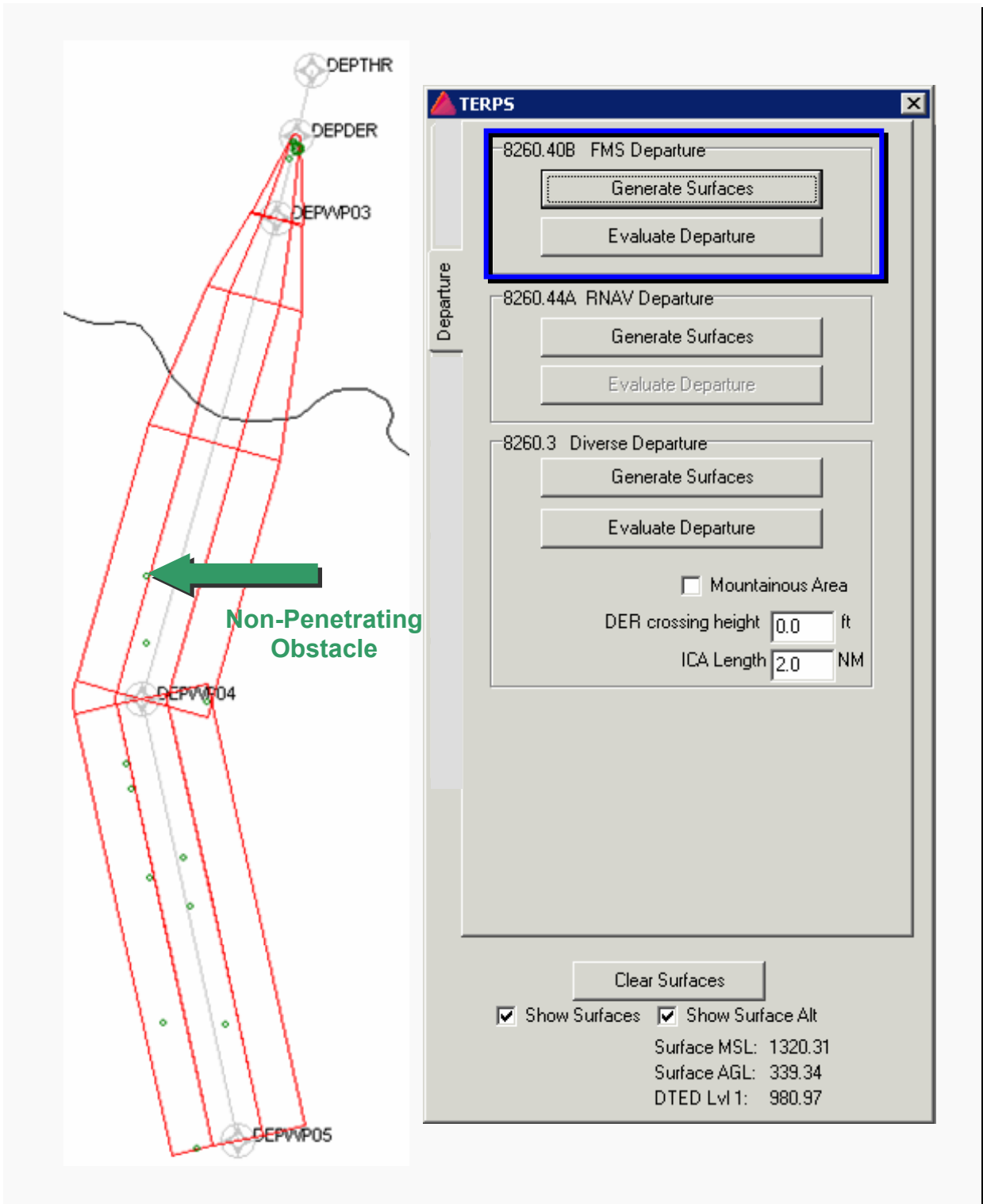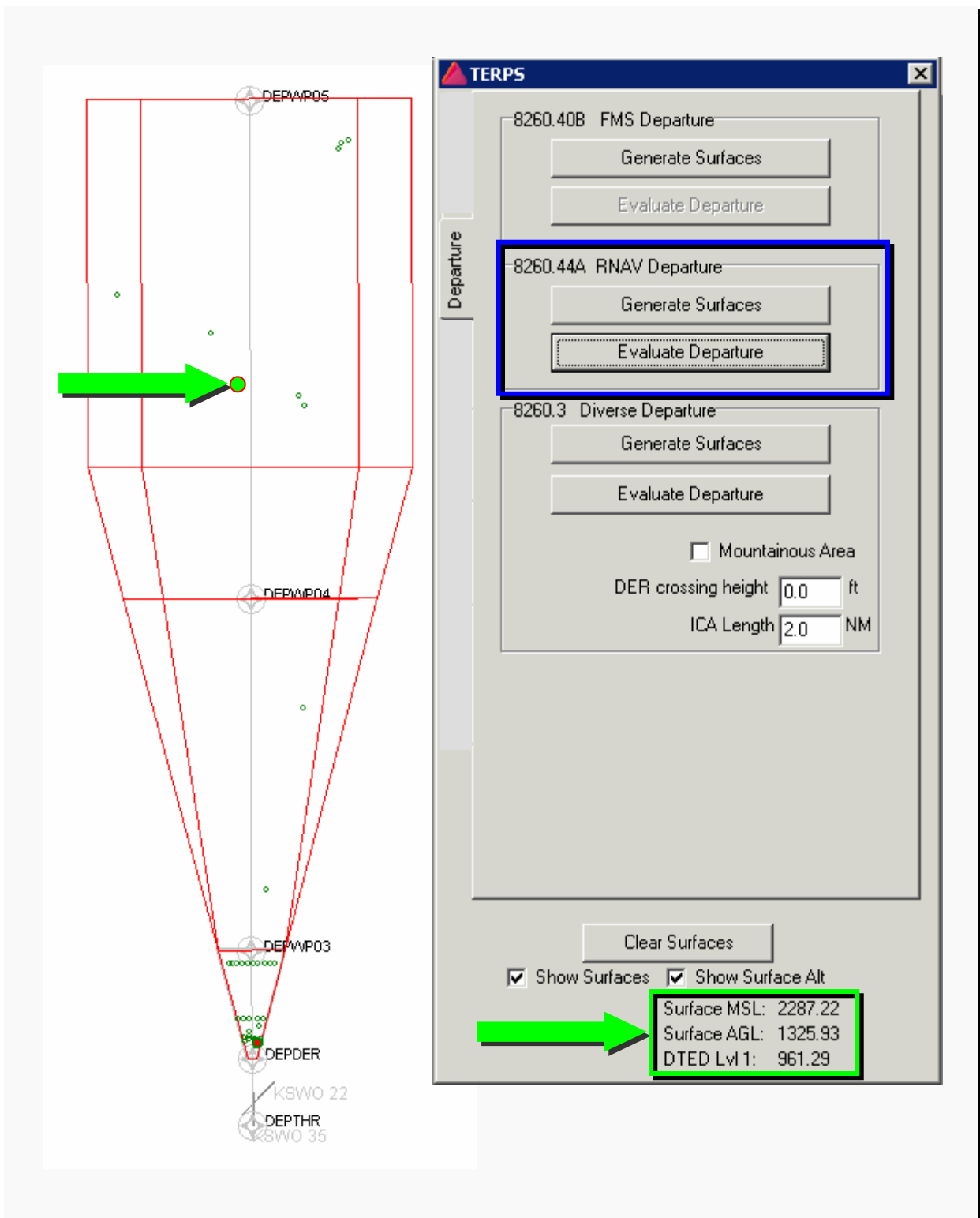
Figure 8-2: 8260.40B FMS Departure
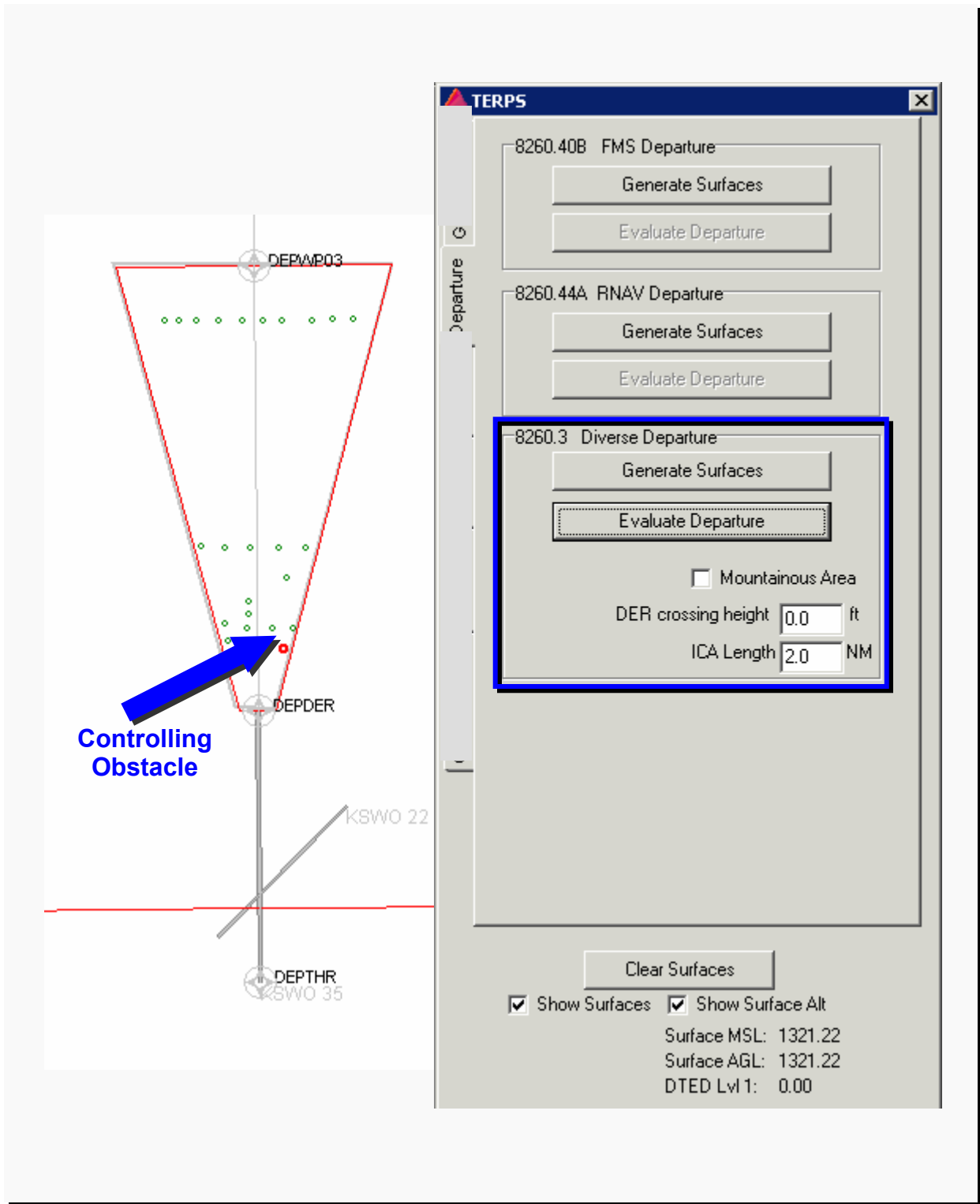
Figure 8-3: 8260.44A RNAV Departures

Figure 8-4: 8260.3, Diverse Departure/Volume 4

8.3   Approach

This tab allows user to select FAA Order 8260.48 RNAV Approach criteria, FAA Order 8260.50 WAAS LPV Approach criteria, or FAA Order 8260.51 RNP Approach criteria for the evaluation.

8.3.1   8260.48 RNAV Approach

This radial button allows user to select FAA Order 8260.48 RNAV Approach criteria, generate and evaluate the surfaces for penetration.

● An approach flight plan must be loaded and Global Settings set prior to generating the TERPS surfaces (See R-Pug par 8.0 and 8.1).

● Generate Surfaces: Generates the TERPS surfaces. The TERPS surfaces must be generated on the DrawSpace™Display prior to selecting "Evaluate Approach."

● Evaluate Approach: Evaluates the TERPS surfaces for man-made obstacle and terrain penetrations.

● Clear Surfaces: Clears TERPS surfaces and obstacles from the DrawSpace™Display.

● Show Surfaces: Draws the primary and secondary TERPS surfaces on the DrawSpace™Display.

● Show Surface Alt: Displays the TERPS surface altitude and the altitude of terrain when the user positions the mouse over the TERPS surface.

   ○ Surface MSL: Provides MSL altitude of the TERPS surface.
   ○ Surface AGL: Provides AGL altitude of the TERPS surface.
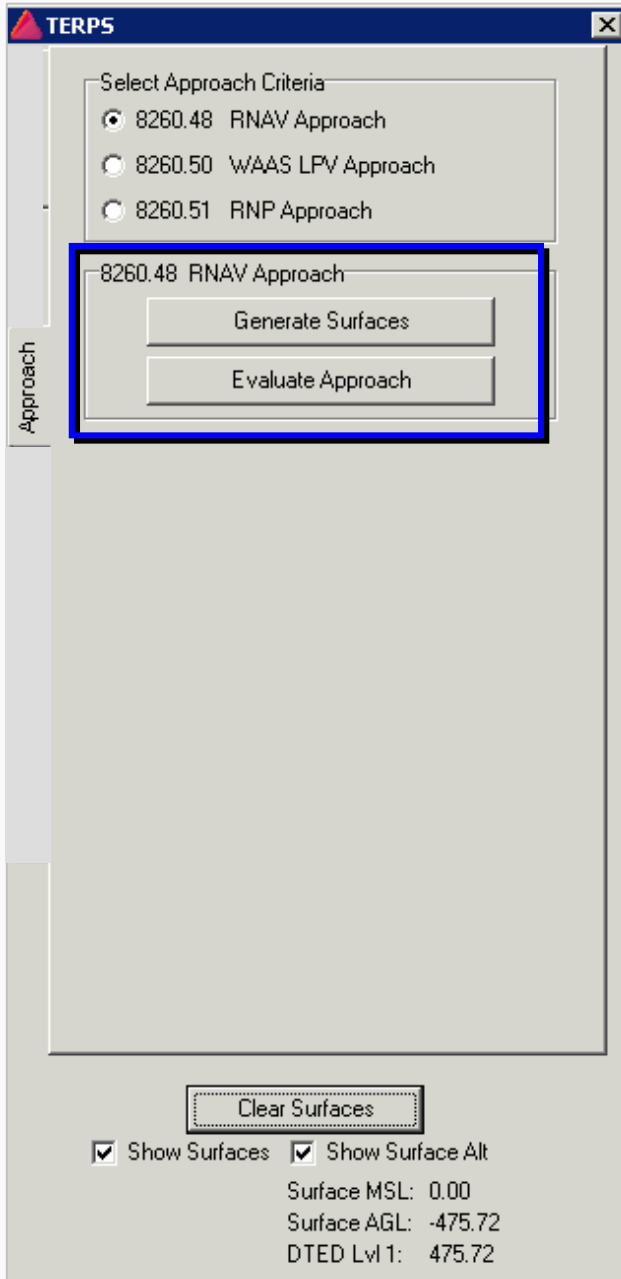   ○ DTED Level 1: Shows elevation of terrain in MSL. The accuracy Code is 4E.

8260.48

Figure 8-5: Approach 8260.48 RNAV Approach

8.3.2 8260.50 WAAS LPV Approach

- Allows the user to generate/evaluate the surfaces for penetration of man-made obstacle and terrain. An approach flight plan must be loaded prior to generating the TERPS surfaces (See R-PUG, par 8.0 and 8.1).

- Input Conditions:

  ○ HAT: User selects appropriate HAT based on FAA Order 8260.50, par 2.4 and associated tables.

  ○ Aircraft Category: User selects appropriate aircraft category based on FAA Order 8260.50, par 2.4 and associated tables.

  ○ Select Aircraft Type: Provides the approximate Glidepath to wheel height requirements for TCH. For more details see FAA Order 8260.50, par. 2.5, Threshold Crossing Height.

  ○ Glide Slope: User selects appropriate GS based on FAA Order 8260.50, par. 3.2 and associated formulas.

- Generate Surfaces: Generates the approach surfaces on the DrawSpace™Display.

- Evaluate Approach: Evaluates the TERPS surfaces for penetration of man-made obstacle and terrain.

- Display/Hide Specific Surfaces: Allows the user to display the GQS and OFZ on the DrawSpace™Display.

- Decision Altitude: The Decision Altitude is automatically calculated when the surface area is drawn in the DrawSpace™Display.

- Clear Surfaces: Clears surfaces and obstacles from the DrawSpace™Display.

- Show Surfaces: Draws the primary/secondary surfaces on the DrawSpace™Display.

- Show Surface Alt: Displays the TERPS surface altitude and the altitude of terrain when the user positions the mouse over the TERPS surface.

  ○ Surface MSL: Provides MSL altitude of the TERPs surface.
  ○ Surface AGL: Provides AGL altitude of the TERPs surface.
  ○ DTED Level 1: Shows elevation of terrain in MSL. The accuracy Code is 4E.
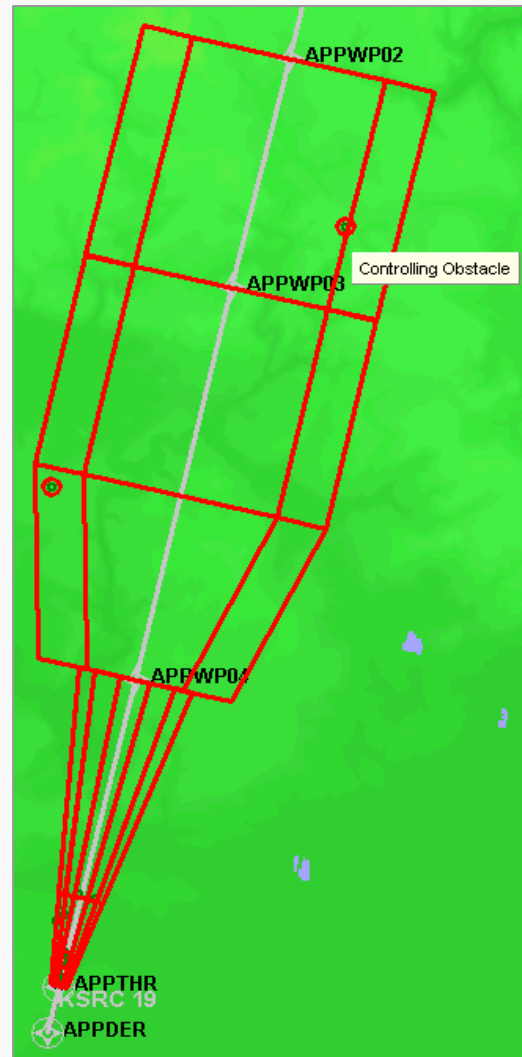
8260.50

Figure 8-6: Approach 8260.50 WAAS LPV Approach

8260.50

Input Conditions

HAT   250

Aircraft Category   D & E

Select Aircraft Type

Glideslope   3.0 deg

HAT	**Aircraft Category**	**Glideslope**
250	A (80 knots or less	3.0 deg
250	A (81 - 90 knots)	2.75 deg
270	B	3.0 deg
300	C	3.5 deg
350	D & E	Type user defined

Representative Aircraft Type

Representative Aircraft Type

Aircraft Types

- ⊙ Group 1: General aviation, Small communters, Corporate turbojets, T-37, T-38, C-12, C-20, C-21, T-1, Fighter Jets
- ○ Group 2: F-28, CV-340/440/580, B-737, C-9, DC-9, C-130, T-43, B-2, S-3
- ○ Group 3: B-727/707/720/757, B-52, C-132, C-141, C-17, E-3, P-3, E-8
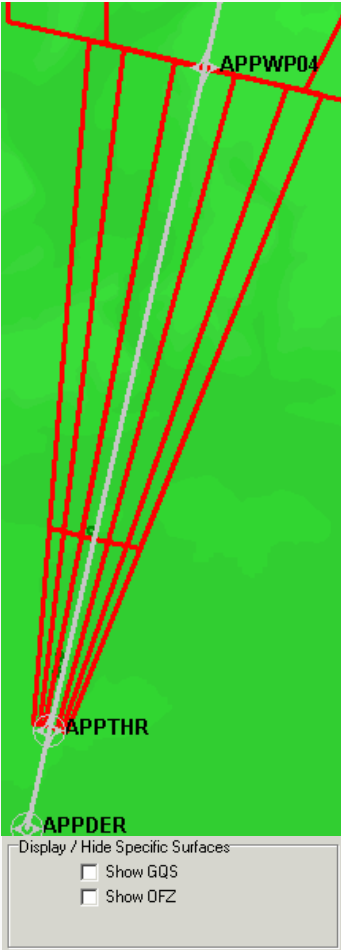- ○ Group 4: B-747-767-777, L-1011, DC-10, A-300, B-1, KC-10, E-4, C-5, VC-25

Figure 8-7: Approach 8260.50 WAAS LPV Approach Cont'd
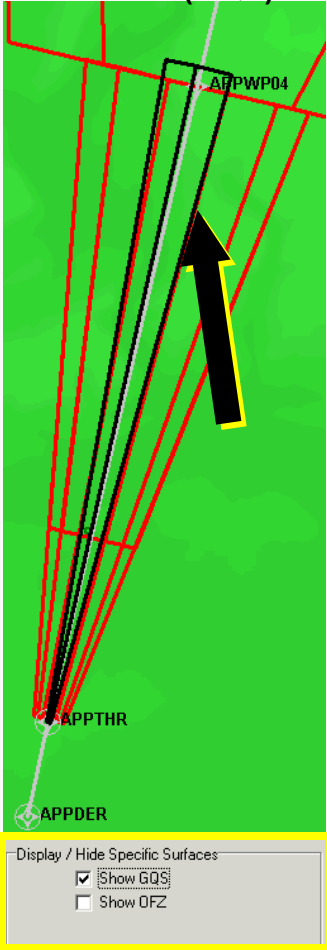
8260.50

Display / Hide Specific Surfaces

☐ Show GQS

☑ Show OFZ

**Shows No
Specific Surface**

**Shows Glidepath
Qualification
Surface (GQS)**
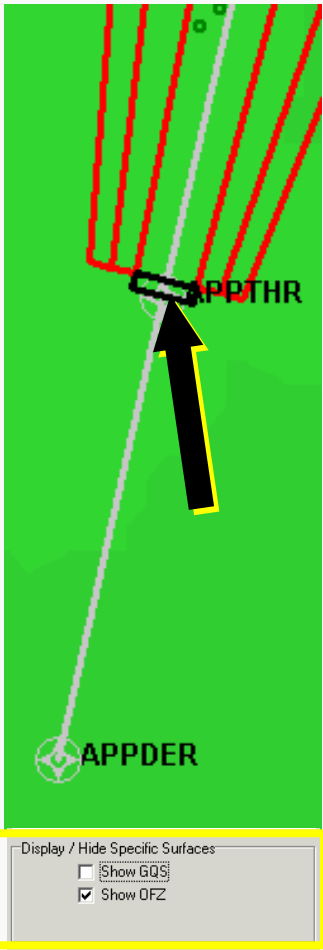
**Shows Obstacle
Free Zone (OFZ)**

Figure 8-8: Approach 8260.50 WAAS LPV Approach Cont'd

95

8.3.3   8260.51 RNP Approach

- Allows the user to generate/evaluate the surfaces for penetration of man-made obstacles and terrain. An approach flight plan must be loaded prior to generating the TERPS surfaces (See R-PUG, par 8.0 and 8.1).

- Input Conditions:

  ○ Initial RNP: User selects appropriate RNP value in accordance with FAA Order 8260.51.

  ○ Intermediate RNP: User selects appropriate RNP value in accordance with FAA Order 8260.51.

  ○ Final RNP: User selects appropriate RNP value in accordance with FAA Order 8260.51.

  ○ Glide Slope: User selects appropriate GS based on FAA Order 8260.51, par. 4.3 and 4.5.3

- Generate Surfaces: Generates the approach surfaces on the DrawSpace™Display.

- Evaluate Approach: Evaluates the TERPS surfaces for penetration of man-made obstacle and terrain.

- Display/Hide Specific Surfaces: Allows the user to display the Final Surfaces, Level Surfaces and the OCS on the DrawSpace™Display.

- Decision Altitude: The Decision Altitude is automatically calculated when the surface area is drawn in the DrawSpace™Display.

- Clear Surfaces: Clears TERPS surfaces and obstacles from the DrawSpace™Display.

- Show Surfaces: Draws the primary and secondary TERPS surfaces on the DrawSpace™Display.

- Show Surface Alt: Displays the TERPS surface altitude and the altitude of terrain when the user positions the mouse over the TERPS surface.

  ○ Surface MSL: Provides MSL altitude of the TERPs surface.
  ○ Surface AGL: Provides AGL altitude of the TERPs surface.
  ○ DTED Level 1: Shows elevation of terrain in MSL. The accuracy Code is 4E.

8260.51

Figure 8-9: Approach 8260.51 RNP Approach

8260.51

Input Conditions

Initial RNP   1.0 NM (0.93K)

Intermediate RNP   1.0 NM (0.93K)

Final RNP   0.3 NM (0.00K)

Glideslope   2.75 deg

Initial RNP
Intermediate RNP
Final RNP

1.0 NM (0.93K)
0.3 NM (0.00K)
0.5 NM (0.56K)
1.0 NM (0.93K)
Type user defined

Glideslope

3.0 deg
2.75 deg
3.0 deg
3.5 deg
Type user defined

Figure 8-10: Approach 8260.51 RNP Approach Cont'd

8260.51
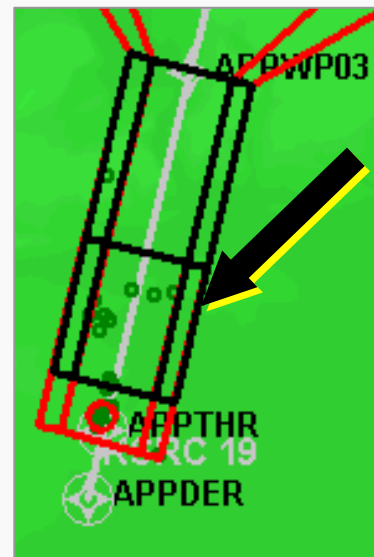
Figure 8-11: Approach 8260.51 RNP Approach Cont'd

8.4   En-Route

This tab allows user to select FAA Order 8260.3 Chapter 15 RNAV En-route criteria for evaluation. The user must load a departure flight plan (FPDIF) prior to generating the TERPS surface or evaluating the surface.

● An en-route flight plan must be loaded on the DrawSpace™Display prior to generating or evaluating the TERPS area.

    ○ Generation an en-route flight plan: User may generate the flight plan manually (See R-Pug par. 9.0) or via the Route Wizard (See R-Pug par. 10.0).

    ○ Load the flight plan: The user may load the flight plan using or the "Load" feature in the "Route" drop down menu (See R-Pug par. 3.4) or via the Simulation Module; Flight Plans tab (See R-Pug par. 6.1).

● Generate Surfaces: Generates the TERPS surfaces.

● Evaluate En-Route: Evaluates the TERPS surfaces for man-made obstacle and terrain penetrations.

● Clearance or Penetration: The clearance height between the obstacle and the TERPS surface or the number of feet in which the obstacle penetrates into the TERPS surface. The clearance/penetration is only displayed if an evaluation of the TERPS area has been requested.

● Clear Surfaces: Clears TERPS surfaces and obstacles from the display.

● Show Surfaces: Draws the primary and secondary TERPS surfaces in the DrawSpace™Display area.

● Show Surface Alt: Displays the TERPS surface altitude and the altitude of terrain when the user positions the mouse over the TERPS surface.

    ○ Surface MSL: Provides MSL altitude of the TERPs surface.
    ○ Surface AGL: Provides AGL altitude of the TERPs surface.
    ○ DTED Level 1: Shows elevation of terrain in MSL. The accuracy Code is 4E.

8260.3

Figure 8-12: En-Route

101

8.5　　Engine Out

This tab allows user to generate and evaluate engine-out surfaces. The user must first build and load a departure FPDIP before evaluating the engine out surface.

- Global Settings: The user must set the Screening Database Options and select an Airport Runway Selection before generating the surface and evaluating the engine out surface. See paragraph 8.1.

- Criteria: The user may select FAA or ICAO engine-out surfaces.

- Date Certified: The drop-down menu allows selection of one of three certification dates.

- Total Engines: Allows user to evaluate two, three, or four engine aircraft.

- Maximum Altitude: Engine-out criteria are normally evaluated up to an altitude of 1500 feet.

- Generate Departure: Generates the departure surface. The surface must be generated on the DrawSpace™Display prior to selecting "Evaluate Departures."

- Evaluate Departures: Evaluates the departure surface for man-made obstacle and terrain penetrations.

- Clear Surfaces: Clears TERPS surfaces and obstacles from the display.

- Show Surfaces: Draws the primary and secondary TERPS surfaces in the DrawSpace™Display area.

- Show Surface Alt: Displays the TERPS surface altitude and the altitude of terrain when the user positions the mouse over the TERPS surface.

  - Surface MSL: Provides MSL altitude of the TERPs surface.
  - Surface AGL: Provides AGL altitude of the TERPs surface.
  - DTED Level 1: Shows elevation of terrain in MSL. The accuracy Code is 4E.

Engine Out

Controlling Obstacle

Tool Tip

Figure 8-13: Engine-Out

8.6   Generic Type 3

This tab allows user to create a trapezoid with any dimensions.

- Three radial buttons allow the user to select between they are:

  - New: Allows the user to create a new trapezoid.
  - Edit: Allows the user to edit an existing trapezoid.
  - Remove: Allows the user to remove an existing trapezoid.

- The Initial Location Condition allows the user to establish the begin point and altitude of the trap.

  - The "Get Lat/Lon/Alt From Mouse" checkbox allows the user to define the two latitude/longitude points and altitudes with a mouse click in the DrawSpace™Display.

  - Latitude may be select with the mouse or hand-entered.

  - Longitude may be select with the mouse or hand-entered.

  - Initial Altitude can be may be select with the mouse or hand-entered.

- Surface Shape Definition allows the user to define specifics' of the trapezoid. See Figure 8-14 for identification of each surface.

- Accept: Once trapezoid dimensions are entered this button will display the trap in the DrawSpace™Display.

- Remove: Allows the user to remove the data from the module and the DrawSpace™Display.

- Clear Surfaces: Clears surfaces and obstacles from the DrawSpace™Display.

- Show Surfaces: Draws the surfaces in the DrawSpace™Display.

- Show Surface Alt: Displays the surface altitude and the altitude of terrain when the user positions the mouse over the surface.

  - Surface MSL: Provides MSL altitude of the surface.
  - Surface AGL: Provides AGL altitude of the surface.
  - DTED Level 1: Shows elevation of terrain in MSL.

Generic Type 3 Surfaces

Max Outside Width

Max Inside Width

Along Track Gradient

Initial Inside Width

Initial Splay angle

Outside Splay angle

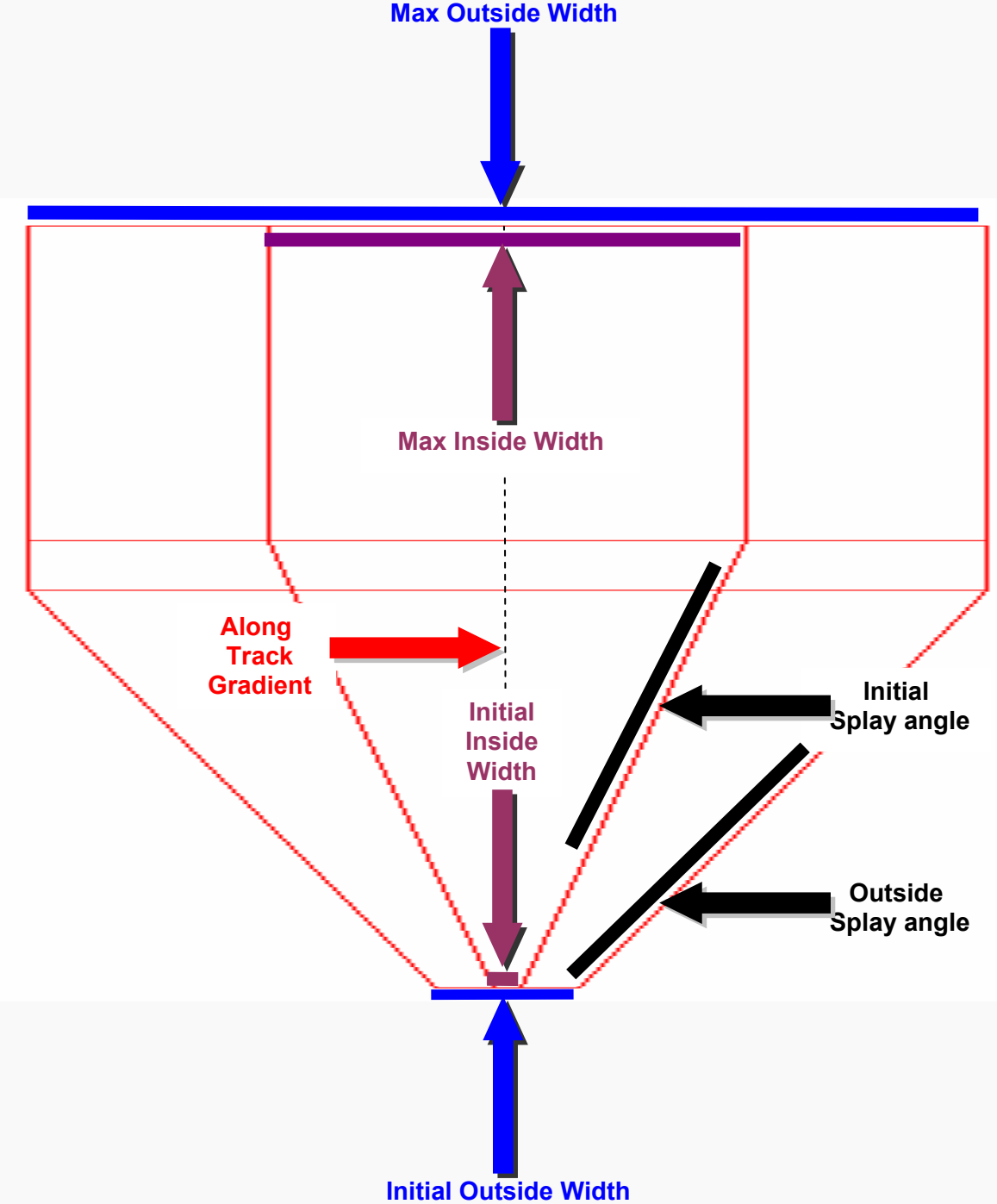**Initial Outside Width**

Figure 8-14: Generic Type 3 Surface

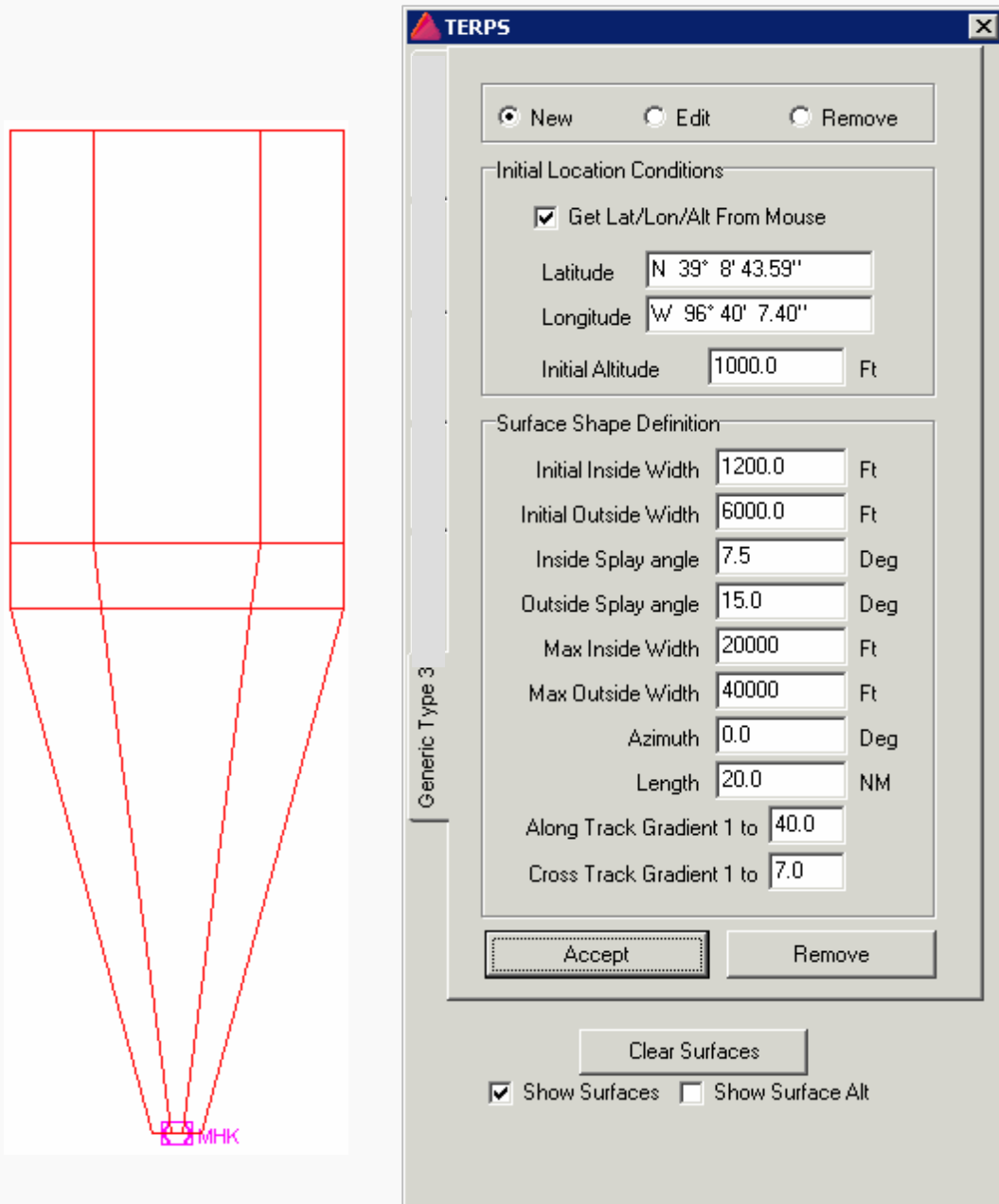# Generic Type 3 Surfaces

Figure 8-15: Generic Type 3 Surface Cont'd

9.0   Manually Creating a Flight Plan

RNAV-Pro requires the user to provide a flight plan via a Flight Plan Data Input File (FPDIF) when conducting screening. The FPDIF is stored in a text file. Fields should be tab-delimited (i.e., separated by tabs) with a carriage return entered following each line (including the final entry). (See Table 9-1 and Table 9-2)

9.1   Manually Editing a Flight Plan

The FPDIF is a text file (see Table 9-1). Manual modification of an FPDIF may be performed using any text editor (e.g., Notepad, WordPad).

Table 9-1

Column #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	THR	WP	N	36:04:31.20	W	115:10:13.29	2200	VNAV	0	FLY_OVER	DECIDE	TF	-999	NONE
	DER	WP	N	36:05:58.76	W	115:09:23.18	2235	VNAV	160	FLY_OVER	DECIDE	CF	261.40	NONE
	WP3	WP	N	36:06:53.45	W	115:08:51.98	3100	VNAV	220	FLY_OVER	DECIDE	TF	-999	NONE
	WP4	WP	N	36:06:17.66	W	115:28:18.11	4000	VNAV	250	FLY_BY	DECIDE	TF	-999	NONE
	WP5	WP	N	36:35:14.07	W	115:32:09.49	6000	VNAV	250	FLY_BY	DECIDE	TF	-999	NONE
	WP6	WP	N	36:31:49.14	W	115:26:08.73	7000	VNAV	250	FLY_OVER	DECIDE	TF	-999	NONE

Table 9-2

Col. #	Description	Units	Comments
1	WP Name	N/A	The name displayed when selecting "Show WP Names" in the Display Tab.
2	WP (placeholder)	WP, IF, VM	Standard WP - **WP**, Initial Fix - **IF**, Manual Termination - **VM**
3	N/S Hemisphere	N/A	Options: **N** - North, **S** - South.
4	WP Latitude	Deg:Min:Sec.hSec	Latitude degrees must be designated using 2 digits (e.g., 38:12:34.32).
5	E/W Hemisphere	N/A	Options: **E** - East, **W** - West.
6	WP Longitude	Deg:Min:Sec.hSec	Longitude degrees must be designated using 3 digits (e.g., 098:12:34.32, not 98:12:34.32).
7	WP Altitude	Feet	Example: FL240 would be entered as 24000.
8	VNAV Logic	N/A	Method aircraft used to arrive at this WP. Options: **STEP** - Will STEP to altitude. **VNAV** - Will VNAV to altitude.
9	IAS	Knots	Required Indicated Airspeed at WP.
10	WP Type	N/A	Options: **FLY_BY** or **FLY_OVER**.
11	Turn Direction Switch	N/A	Direction aircraft must turn at this WP to get to the next WP. Options: **LEFT** - Force a left turn at the WP. **RIGHT** - Force a right turn at the WP. **DECIDE** - The FMS will select a turn direction that will result in the shorter turn. **NONE** - Do not turn.
12	RNAV Leg Type	N/A	From this WP, use this leg type to arrive at the next WP. Options: **CA** - Course to an altitude. **CF** - Course to a fix. **DF** - Direct to a fix. **TF** - Track to a fix. **VA** - Heading to an altitude. **FA** - Fix to an altitude.
13	Course to a Fix Value	Degrees.hDegrees*	If a CF leg is selected, the CF course MUST be given. Enter –999 for other leg types.
14	Segment	N/A	Options: **INITIAL, INTER, FINAL, NONE**.

*Hundredth of a second

10.0   Route Wizard

The Flight Plan Wizard is a user-friendly method of creating an FPDIF. Open the "Route Wizard" with "Route" drop-down menu or the "Route Wizard" square button.

10.1   Layout of Route Wizard

- File: This menu has two functions they are:

  - Clear: This function clears all entries in the Wizard and off of the DrawSpace™Display.

  - Exit: Closes the Route Wizard.

- View: This menu has five functions they are:

  - Menu: This is an active Menu which shows progress as each step is accomplished.

  - Progress: This is a slide bar which shows approximate percentage of completion of the task.

- Warnings: The Wizard has warning notes when incorrect actions are taken.

  - Advanced: This feature allows the user to input precise bearings and distances in place of using mouse click.

  - Always On Top: This feature will keep the Route Wizard window on top of all other windows opened.
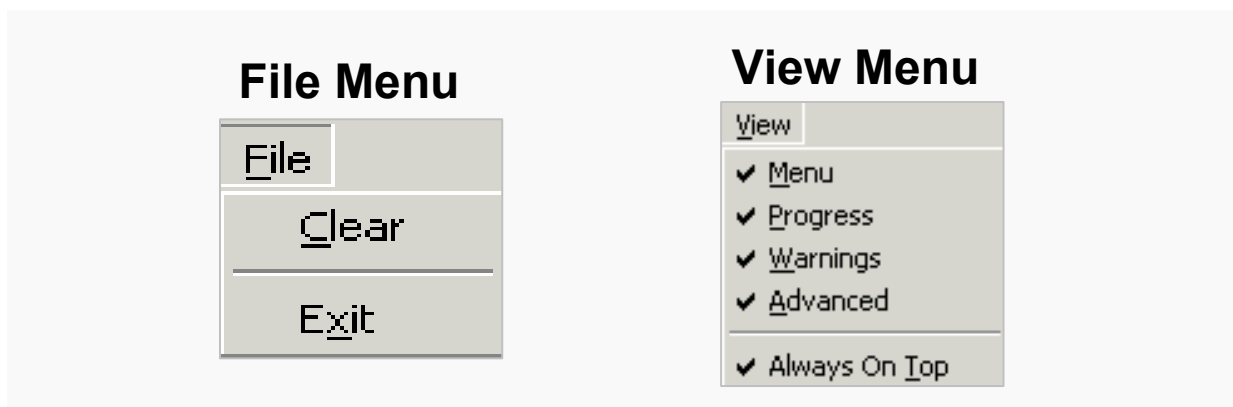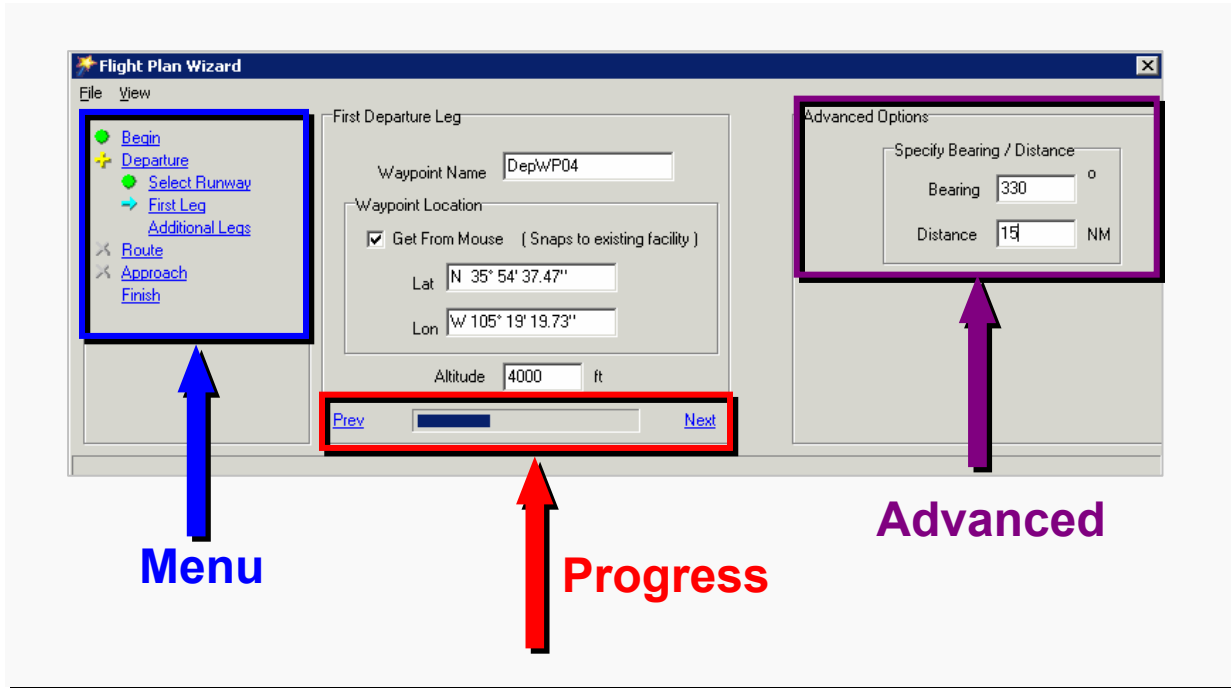

Figure 10-1: Route Wizard Menus

Figure 10-2 Route Wizard Menus Cont'd

10.2   Begin Flight Plan Wizard

When the Flight Plan Wizard Module appears, select the appropriate checkbox for the segments (i.e., Departure, Route, and/or Approach) that are to be included in the flight plan; then, click "Next."
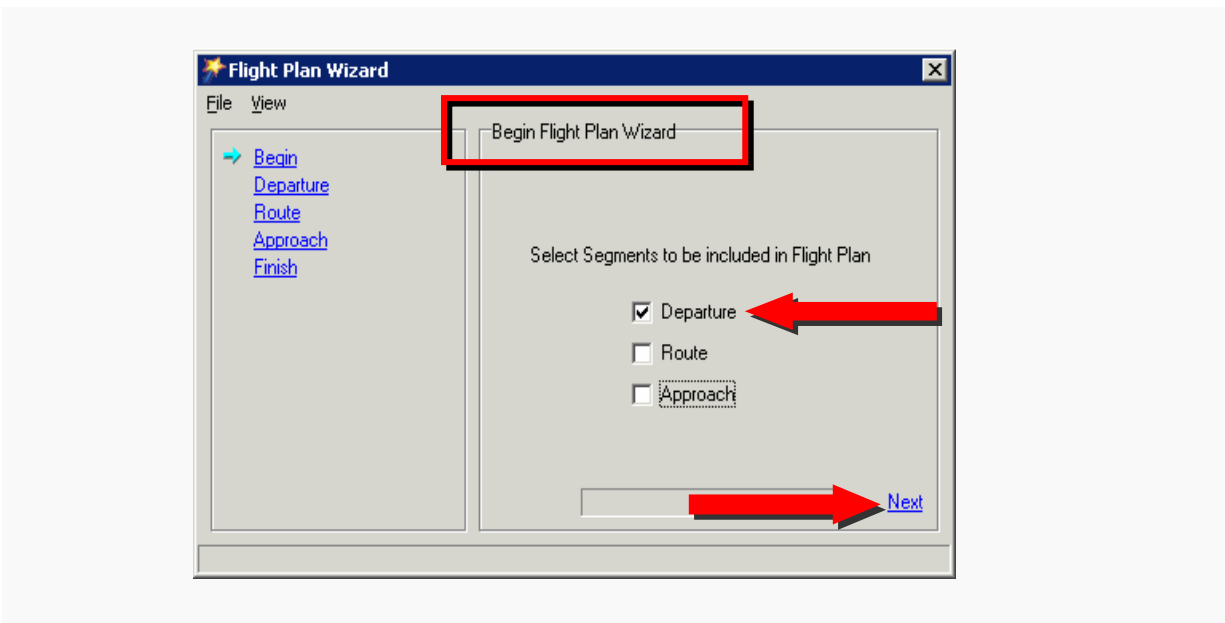
Figure 10-3: Begin Flight Plan Wizard

10.3 Select Departure Runway

This area appears in the Flight Plan Wizard Module.

● Using the Airport drop-down menu, select the desired airport four-character designation and press the Enter key. Pressing Enter or clicking "Zoom" will zoom to the selected airport location on the DrawSpace™Display.

● Using the Runway drop-down menu, select the runway desired.

● In the Initial Climb Altitude entry field, enter the desired initial climb altitude and press the Enter key.

● Select "Next."
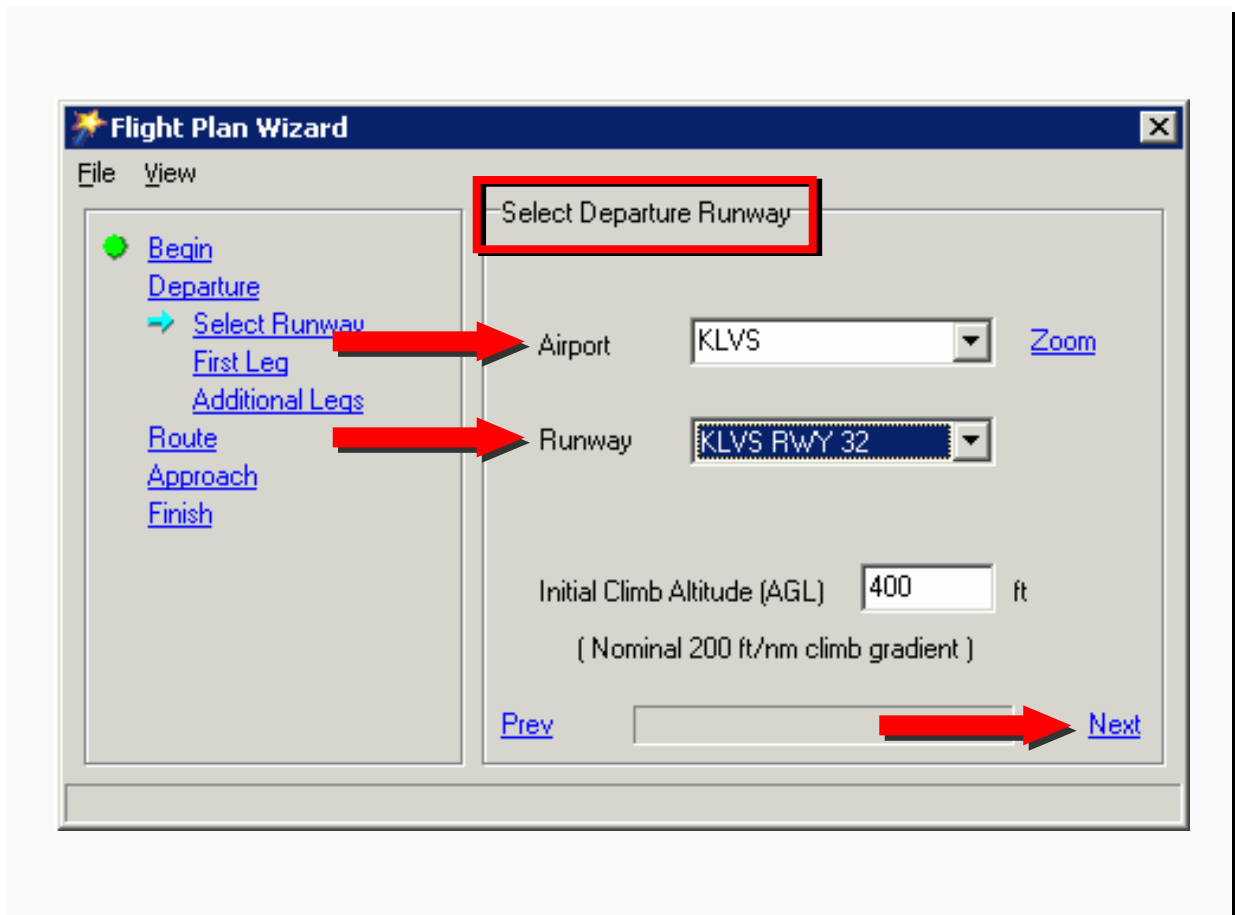
Figure 10-3: Select Departure Runway

10.4 First Departure Leg

This area appears in the Flight Plan Wizard Module.

● Check the "Get From Mouse" box.

● Click on the desired position of the first departure leg on the DrawSpace™Display. The latitude/longitude of the selected position appears in the Flight Plan Wizard.

● Module. The waypoint name, latitude, longitude, and altitude can be modified if desired.

● Select "Next." The waypoint is connected to the departure leg as shown in the following figure.
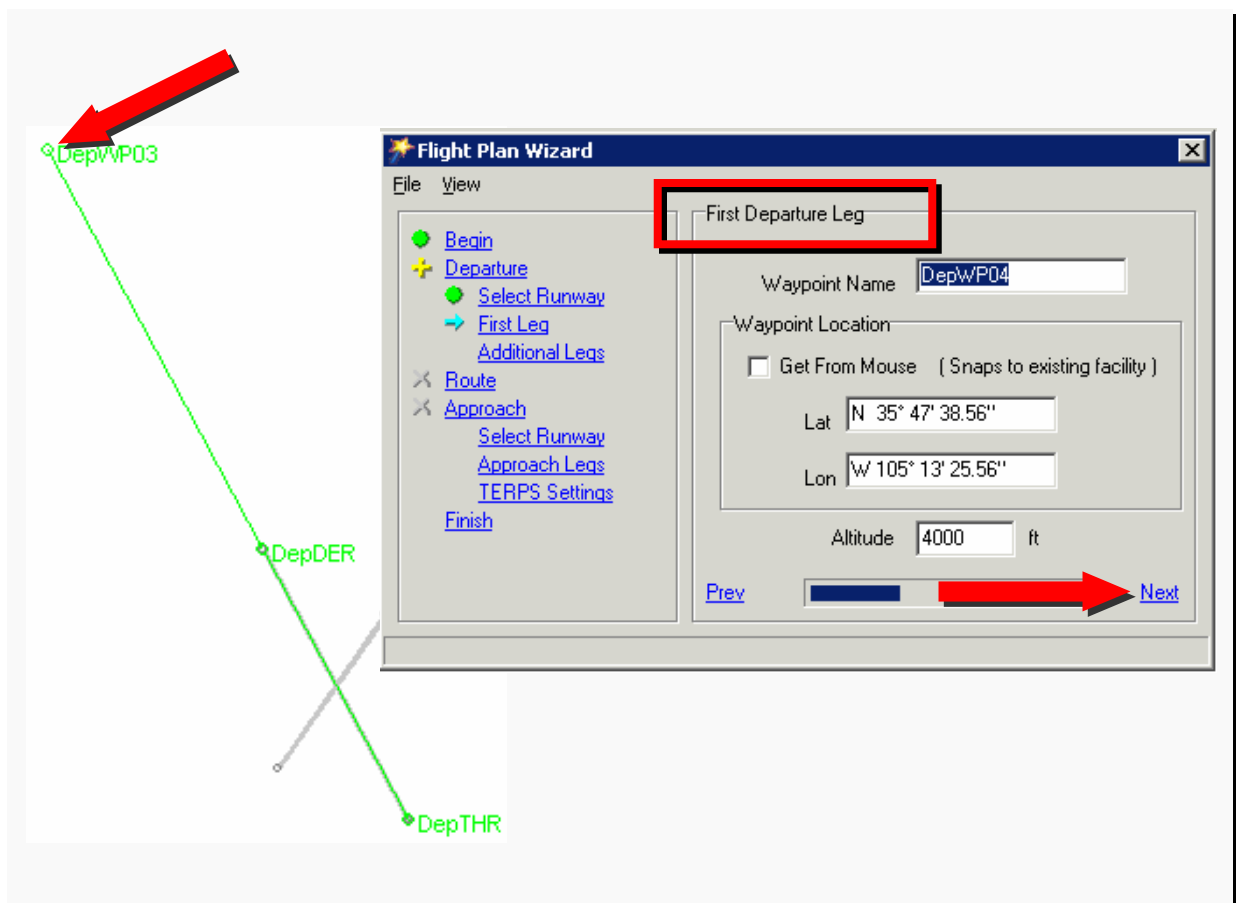
Figure 10-4: First Departure Leg

10.5   Advanced Options

● The waypoint from the first departure leg is now connected to the departure runway. The Additional Departure Legs area appears.

● To access advanced options, click on the View drop-down menu.

● Select "Advanced." An Advanced Options area appears in which waypoint bearing (with respect to true north) and distance from the previous waypoint can be manually selected.

● When finished, select "Next."
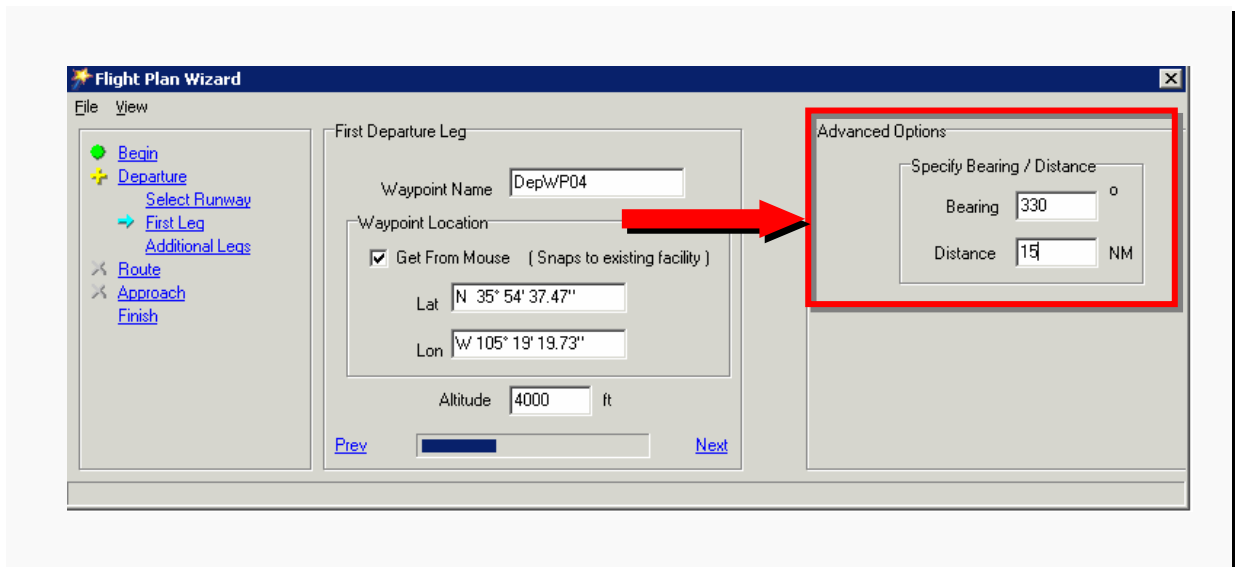
Figure 10-5: Advance Options

10.6   Additional Departure Legs

The Additional Departure Legs area appears. Use the mouse to select any additional departure legs desired in the DrawSpace™Display.

- Mouse Mode Radial Buttons: allow the user to add a new waypoint to the list, select a waypoint that has been drawn on the display, or edit a waypoint after selecting it on the display. Each mouse click adds additional waypoints to the Departure entry field.

- Edit Waypoint: Allows the user to set the name, latitude, longitude, speed, and altitude for each waypoint using their respective entry fields.

- Up and Dn (next to the Departure Entry field): Allow the movement of selected waypoints up and down in the list of waypoints.

- When finished, select "Next."
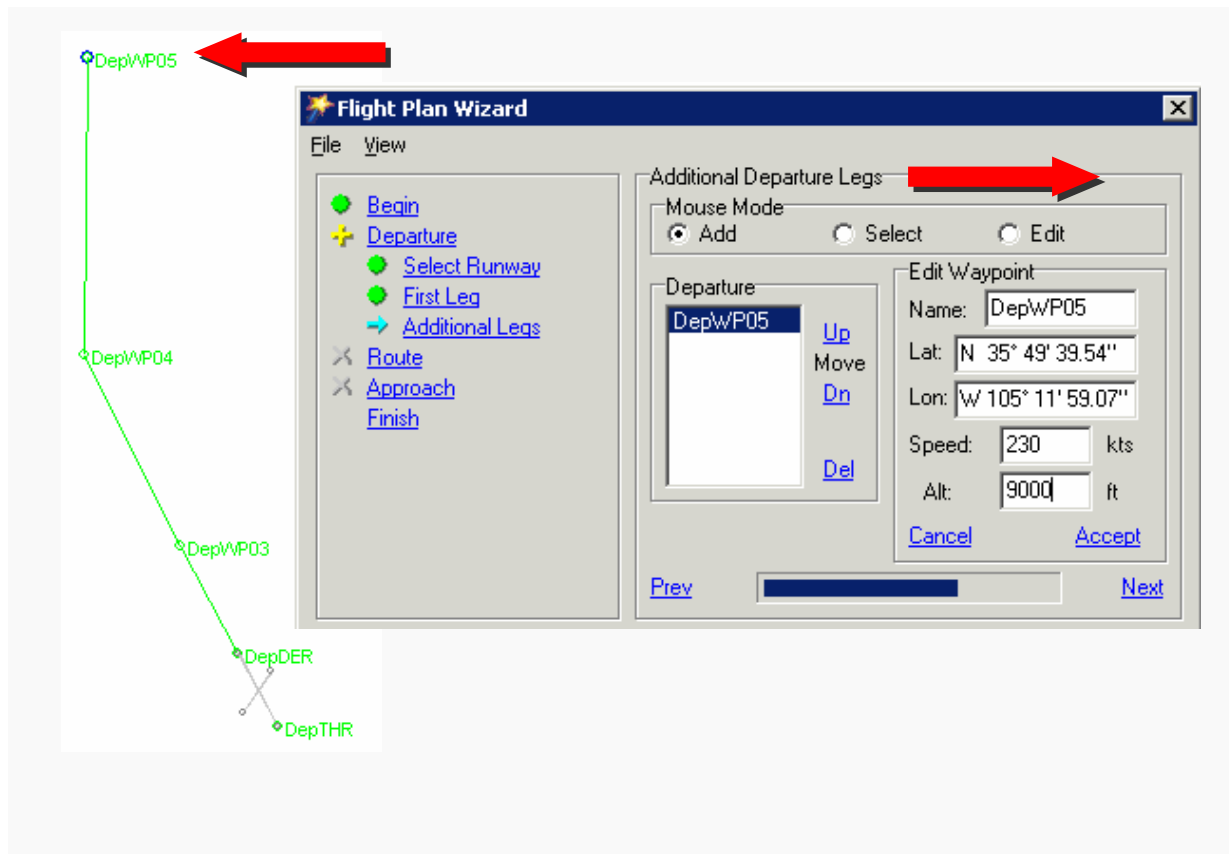
Figure 10-6: Advance Options

10.7   Finish Flight Plan

Upon completion of departure legs, the Finish Flight Plan area appears. Three options are included in the Finish Flight Plan area:

● Generate Flight Plan: Allows the user to name and save the route just created via the Wizard.

● Close Wizard: Allows the user to close the Flight Plan Wizard Module.

● Reset Wizard: Allows the user to reset the Wizard. The following actions will occur:

  ○ Clears Flight Plan Wizard box area entries
  ○ Returns to the Flight Plan Wizard Module
  ○ Clears the route drawn in the DrawSpace™Display

Note:	Route and Approach were not selected in this example. Therefore, the window proceeds from "Departure" directly to "Finish."
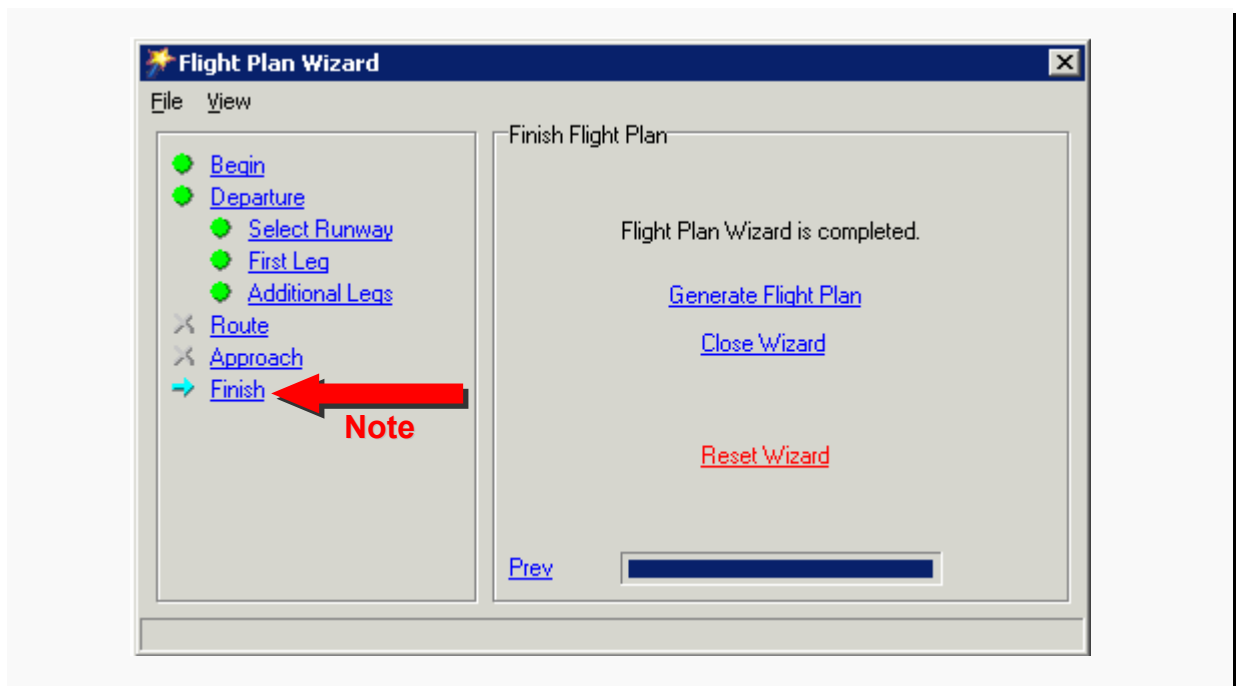
Figure 10-7: Finish Flight Plan

10.8   Generate Flight Plan

● Save As: This box allows the user to select the location, name, and type of file that has been created by the Wizard.

  ○ Save in: Select the subdirectory to save the flight plan.
  ○ File name: Enter the desired name of the flight plan.
  ○ Save as type: Enter the file type as a ".txt" extension.
  ○ Save: Save the file.
  ○ Cancel: Cancel the action.

● Reset Wizard: Select this after saving the flight plan. The Flight Plan Wizard will then be ready for a new flight plan.

● Close Wizard: Closes the Wizard without clearing any data from the Flight Plan Wizard.

11.0　　　　Flight Plan Editor

The Flight Plan Editor Module is a.k.a., Route Editor or Editor. The Flight Plan Editor is a user-friendly method of modifying FPDIFs, but it is typically more cumbersome than to simply edit FPDIFs manually as described in paragraph 9.1.

- Use the "Route" drop-down menu to open the Flight Plan Editor, and then select "Edit Route".

- Use either the drop-down menu or square button to load a flight plan.

- The selected flight plan is now loaded into the Flight Plan Editor.

- The Flight Plan Editor has ten Square Buttons; their functions are:

New: Creates a new flight plan on the editor.

Open: This feature opens "Open Flight Plan" window which allows the user to load an existing FPDIF.

Save: Saves a flight plan which is loaded in the "Flight Plan EDITOR".

Load for Simulation: Loads the flight plan on to the DrawSpace™Display.

Add to Simulation: Adds the flight plan to the "Flight Plans tab" of the "Simulation Module".

Insert Row: Inserts new rows in the flight plan.

Delete Row: Deletes a row.

Move Row Up: Moves the selected row up.

Move Row Down: Moves the selected row down.

 Get Lat Lon From DrawSpace: Allows the user to modify or add latitude and longitude coordinates using a mouse click in the DrawSpace™Display.

- The user can select fields to modify within the FPDIF. Fields without drop-down menus (i.e., WP Name, Lat, Lon, Alt, VNAV Mode, IAS, Turn Type, Turn Direction, Leg Type, CF Radial) are modified by clicking on the item to be changed. The user may then type in the desired information and press Enter.

- Fields with drop-down menus (i.e., WP Type, VNAV Mode, Turn Type, Turn Direction, Leg Type) are changed by selecting the desired information in a drop-down menu.

- Items highlighted in red must be modified.

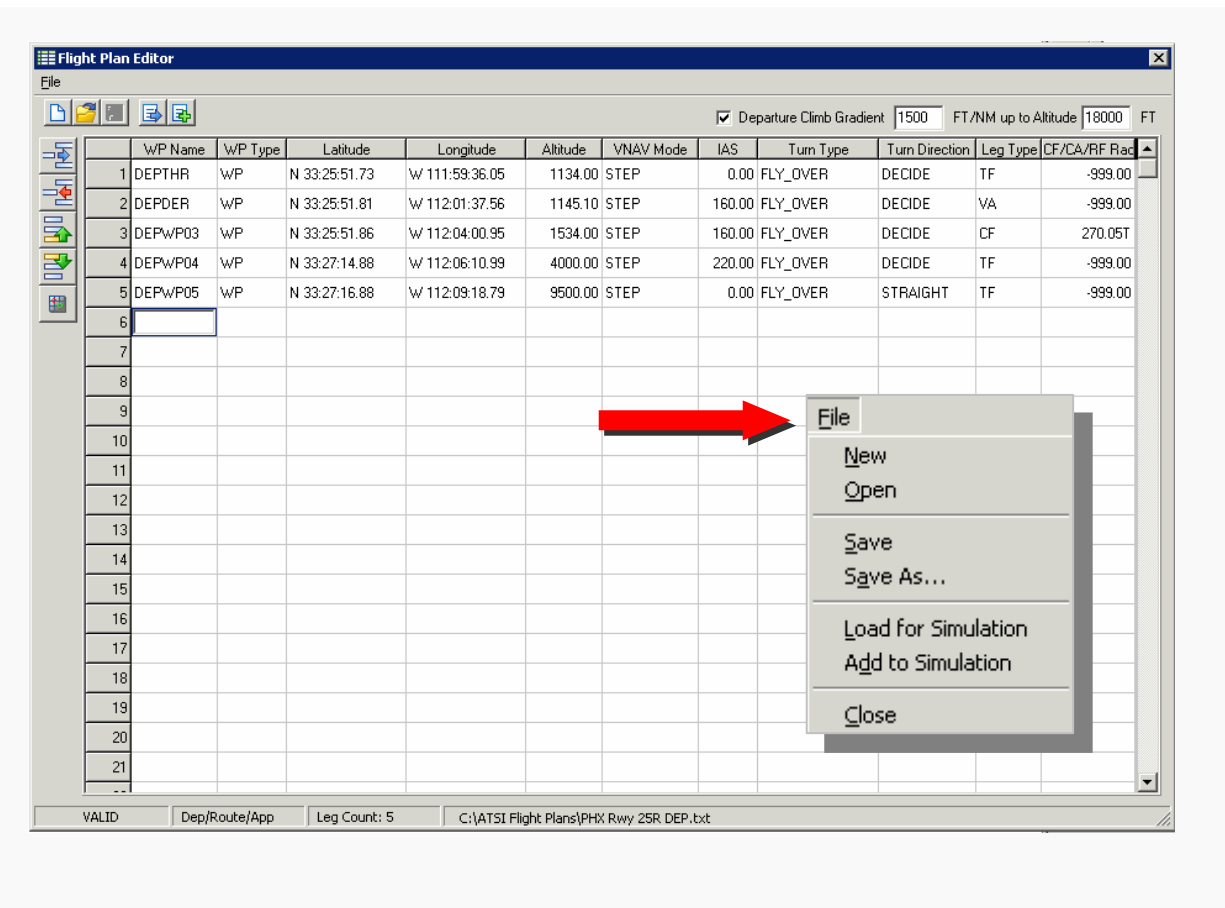- Items highlighted in blue should be modified.

Figure 11-1: Flight Plan Editor

12.0   Route Batch Process Wizard

The Route Batch Process Wizard is a user-friendly method of running multiple simulations. Open the "Batch Wizard" with "Route" drop-down menu. When running batch simulations, group Q-routes with Q-routes and SIDs with SIDs. Also, the SIDs should be off the same airport.

- File: This menu closes the wizard.

- Simulation Settings: This tab allows the user to select multiple flight plans, set baseline settings and assign directory to save results as .csv and .pdf files.

    ○ Flight Plans

        ♦ Add: Allows the user to load an additional flight plan track to the Flight Plan window.

        ♦ Remove: Allows the user to remove the flight plan which is highlighted in the Flight Plan window.

        ♦ Clear: Allows the user to clear all light plans from the Flight Plan window.

    ○ Baseline Simulation Profile: Allows the user to select the appropriate simulation profile for the evaluation.

    ○ Output Settings: Allows the user select a location to save results of the simulation.

    ○ Additional Tag to Add to Results: Allows the user to add a descriptive tag to the Results.

- Perform Simulation:

    ○ Start Simulation: Starts Simulation.

    ○ Stop Simulation: Stops Simulation.

    ○ Flight Plan Progress window: Provides the user information on which simulation is running, run time, and if the simulation passed or failed.

- Route Batch Process Window: The flight track of the simulation which is being processed is shown in the window. Tool tip information is provided.
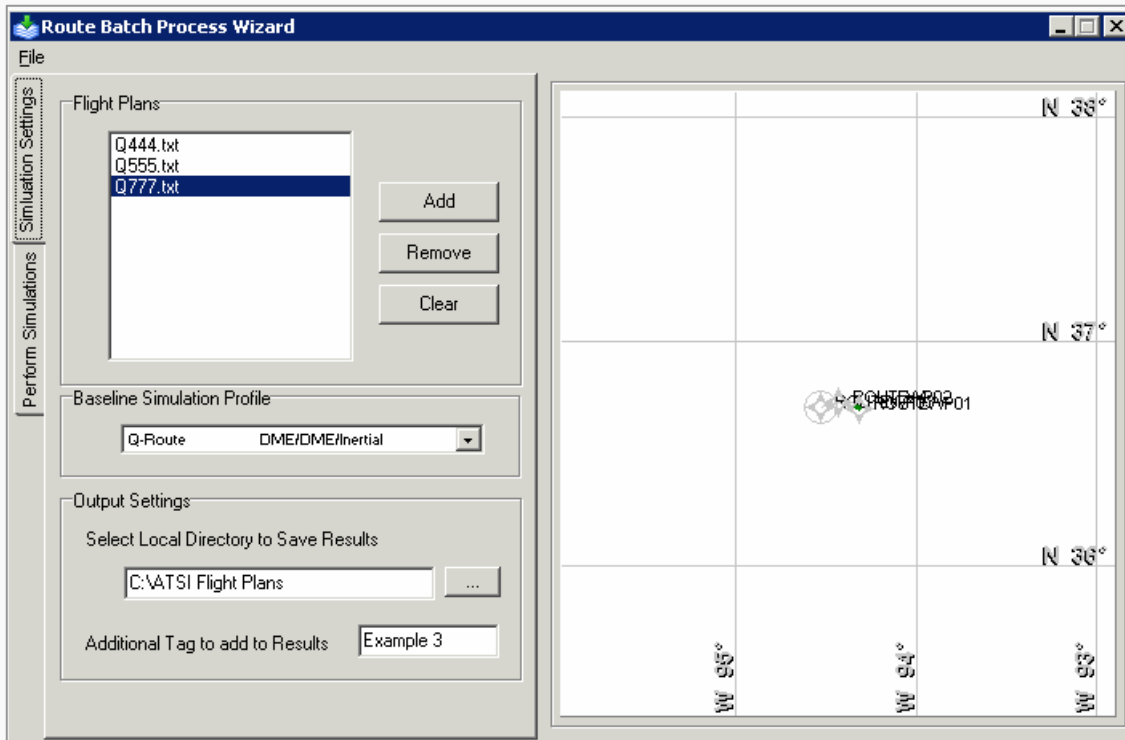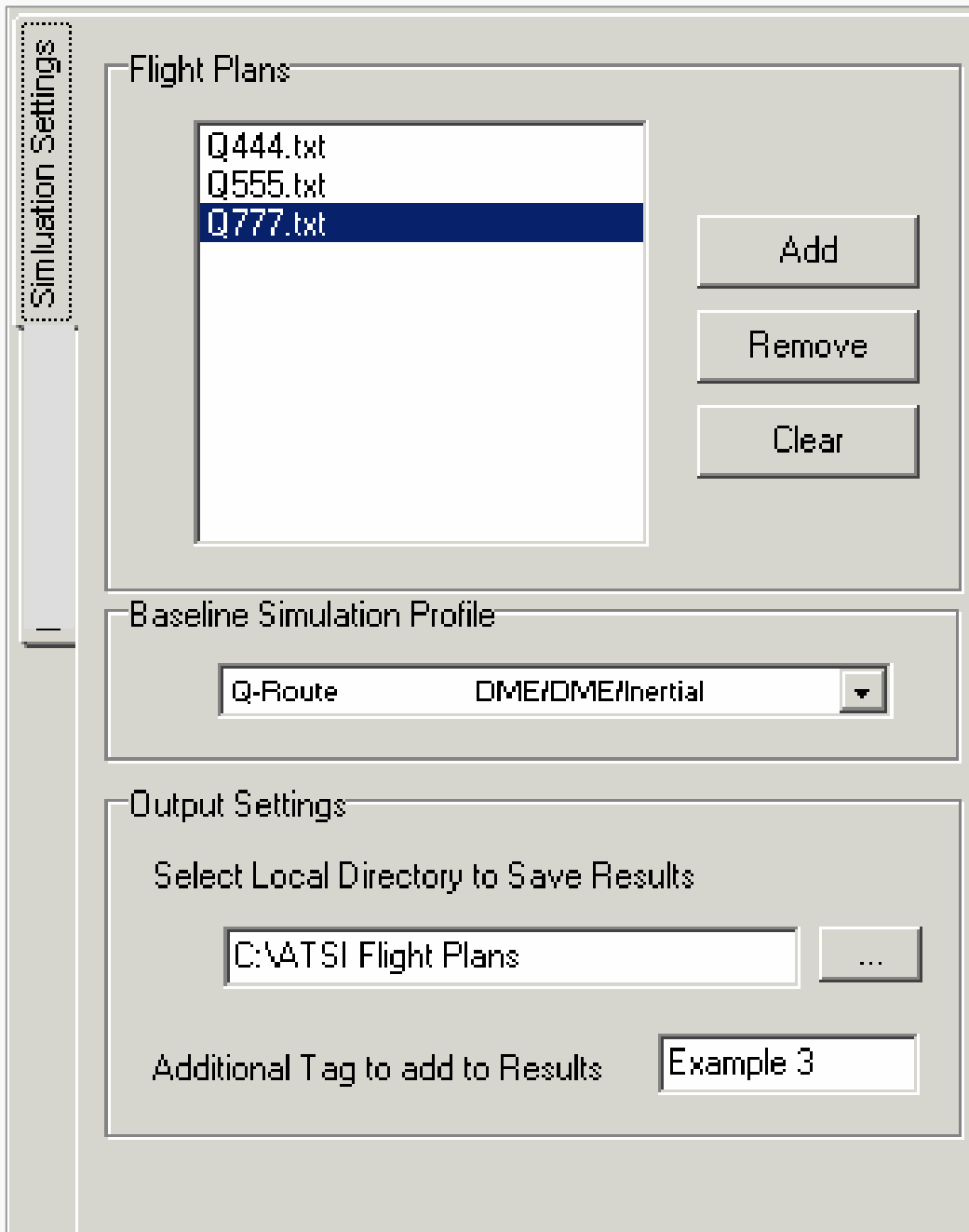
Figure 12-1: Route Batch Process Wizard
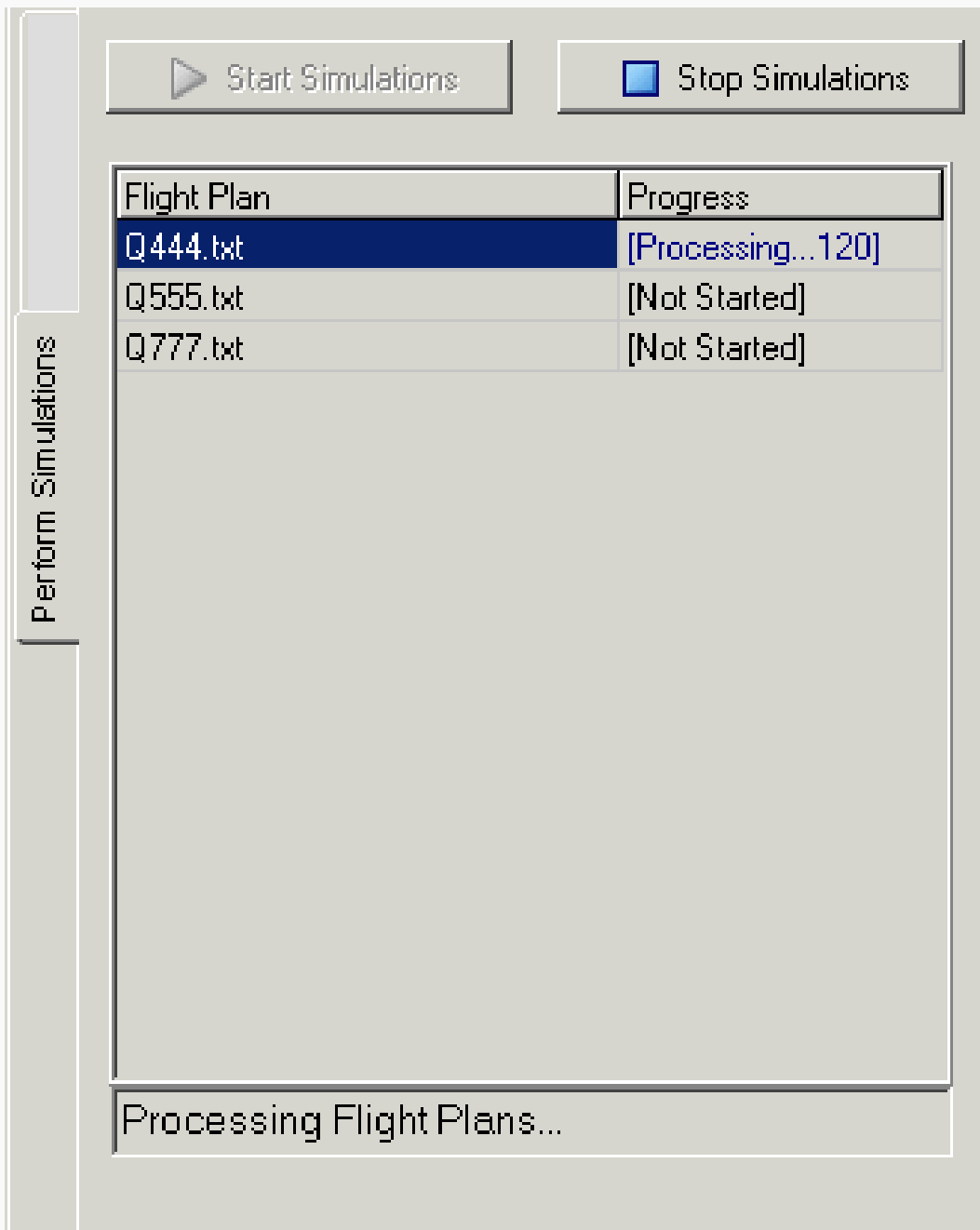
Figure 12-2: Route Batch Process Wizard Cont'd

Figure 12-3: Route Batch Process Wizard Cont'd

13.0   User Data

This module allows the user to Add, Edit, Delete and Clear items from the database.

Load: Opens a 'Load User Database' window to upload previously saved items in the user database.

Save: Opens a 'Save User Database' window to save an item to the user database. The data is saved as an .udt file.

Clear All: Clears all data from User Data window and the DrawSpace™Display.

Type: This drop-down menu allows the user to select the type data to add, edit or delete. Options include Airports, Runways, DMEs, Waypoints, Obstacles, Radars, Radios, and LAAS.

New: Opens a "New User" window and allows user to add an items to the user database.

Edit: User highlights an item in the User Data window then clicks the Edit button to edit an item.

Delete: User highlights an item in the User Data window then clicks the Delete button to delete an item.

Clear: Clears items from the "User Data window and the DrawSpace™Display.
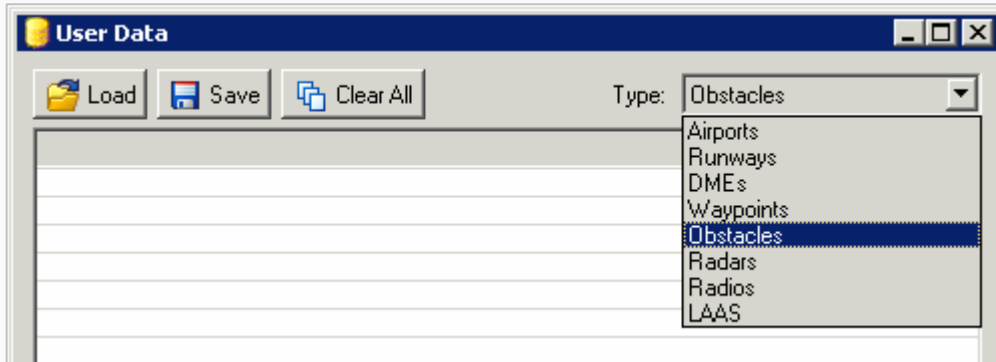
Figure 13-1: Type Drop-Down Menu
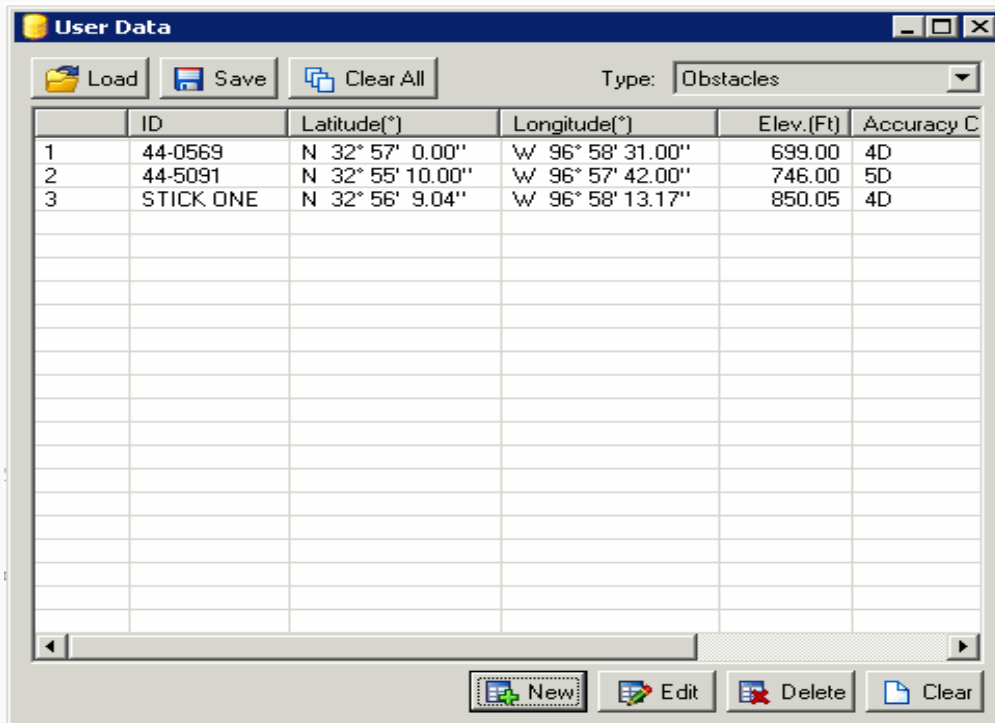
Figure 13-2: User Data Window showing two AVNIS obstacles and one User obstacle

13.1 Add/Edit Obstacle

This feature allows the user to add a new obstacle or edit an existing obstacle in the AVNIS database. The New User Obstacle window functions are:

Stay on Top: This checkbox will keep the "New User Obstacle" window on top of other windows which are opened.

 Copy DrawSpace Item from Mouse: Allows user to select an AVNIS obstacle from the DrawSpace™Display with mouse click on the obstacle location. All data will automatically be filled into the New User Obstacle window.

ID: DOF obstacle ID or user assigns a name for User Database obstacles.

Replace: Replaces the AVNIS obstacle with the modified data.

Type: Describes the type of obstacle i.e. tower, building, smoke stack, or pole.

Latitude/Longitude: Allows Lat/Lon entry via mouse or keyboard.

 Get lat/lon from DrawSpace: Allows user to select a location on the DrawSpace™Display with a mouse click. This function only enters lat/lon data, other data must be entered by user.

Elevation: Obstacle elevation in feet MSL.

Accuracy Code: Allows user to enter Accuracy Code. More details on Accuracy Code in FAA Order 8260.19, Appendix 2.

Enable: Enables or disables the program from using the obstacle in the evaluation. If an item is disabled it will appear in the User Data Window in italics.

ToolTip: Rolling mouse over the Obstacle provides the user detail obstacle data.
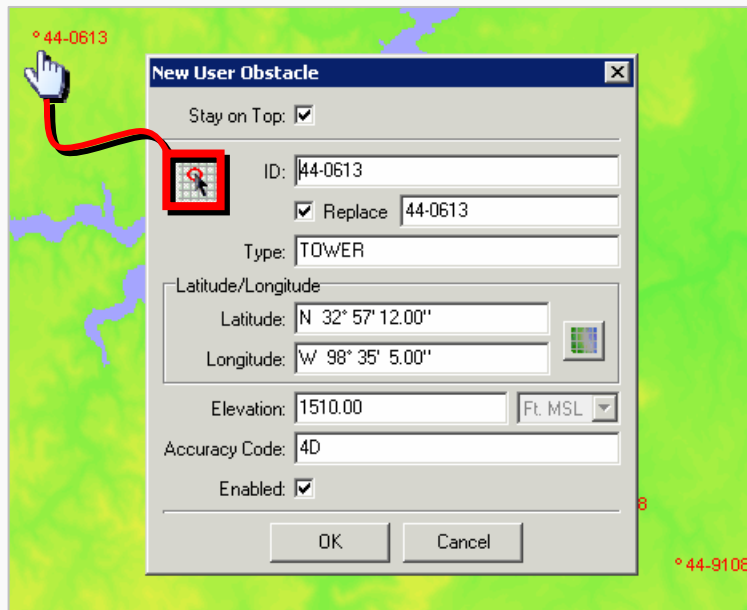
Figure 13-3: Select Obstacle from AVNIS database with mouse
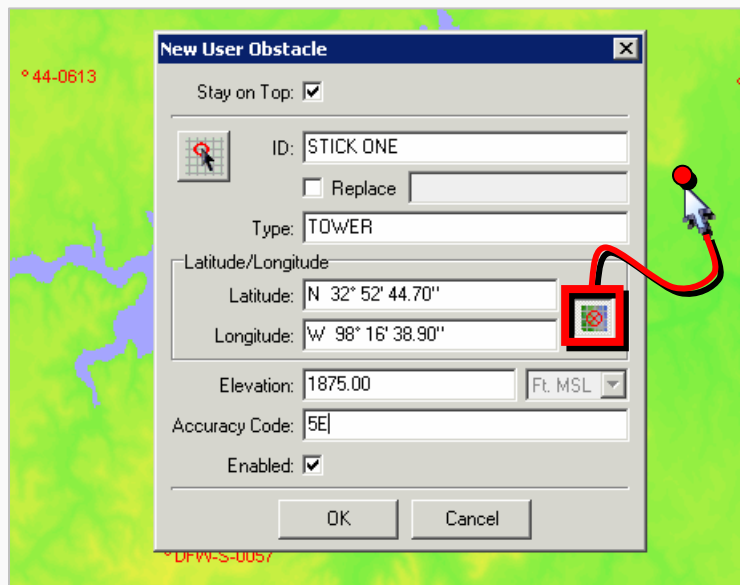
Figure 13-4: Select Latitude/Longitude location with mouse

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13.2　　　　Add/Edit Runway

This feature allows the user to add a new runway or edit a runway at an existing airport. The User Runway window functions are:

Stay on Top: This checkbox will keep the "New User Runway" window on top of other windows which are opened.

Airport ID: The four-letter ICAO airport identifier is entered here.

13.3　　　　Copy DrawSpace Item from Mouse

Copy DrawSpace Item from Mouse: Allows user to select an existing runway from the DrawSpace™Display with a mouse click on the approach end of the runway. All data will automatically be filled into the New User Runway window.

Replace: Allows the user to use modified data in place of existing runway data.

ID: The four-letter ICAO airport identifier and runway number.

Auto Calculate: This checkbox is associated with three areas "Threshold Approach End of Runway", "Threshold Departure End of Runway", and "Heading/Length" it allows the user to enter data in any of the two areas and the third area will be automatically calculated.

The Auto Calculate checkbox MUST be DESLECTED before data can be edited.

Elevation: Threshold elevation in feet MSL.

13.4 Get lat/lon from DrawSpace

Get lat/lon from DrawSpace: Allows user to select a location of the runway thresholds on the DrawSpace™Display with a mouse click. This function only enters lat/lon data, other data must be entered by user.

Heading: The runway heading in degrees to the nearest hundredth.

Length: Runway length in feet.

Width: Runway width in feet.

Surface: Type of surface such as concrete, asphalt, grass, dirt, or water.

Enable: Enables or disables the program from using the runway data in the evaluation.
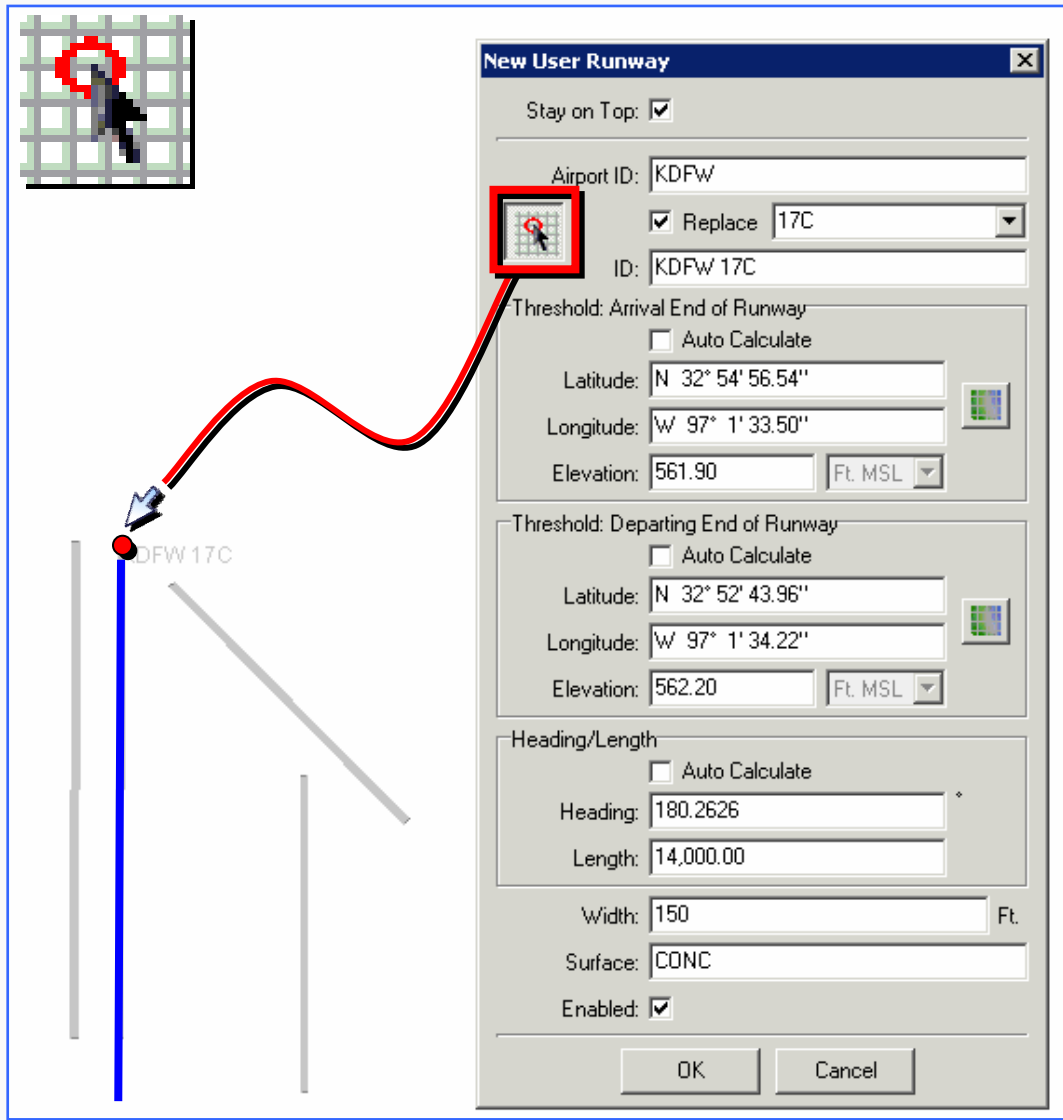
- Select "Copy DrawSpace Item from Mouse."
- Mouse click on approach end of the runway.
- All existing runway data is entered in windows.
- Deselect "Auto Calculate" checkbox and make modifications.
- Click "OK".
- Click "OK" the runway will appear in the DrawSpace™Display.

Figure 13-5: Select Arrival Threshold Latitude/Longitude location with mouse
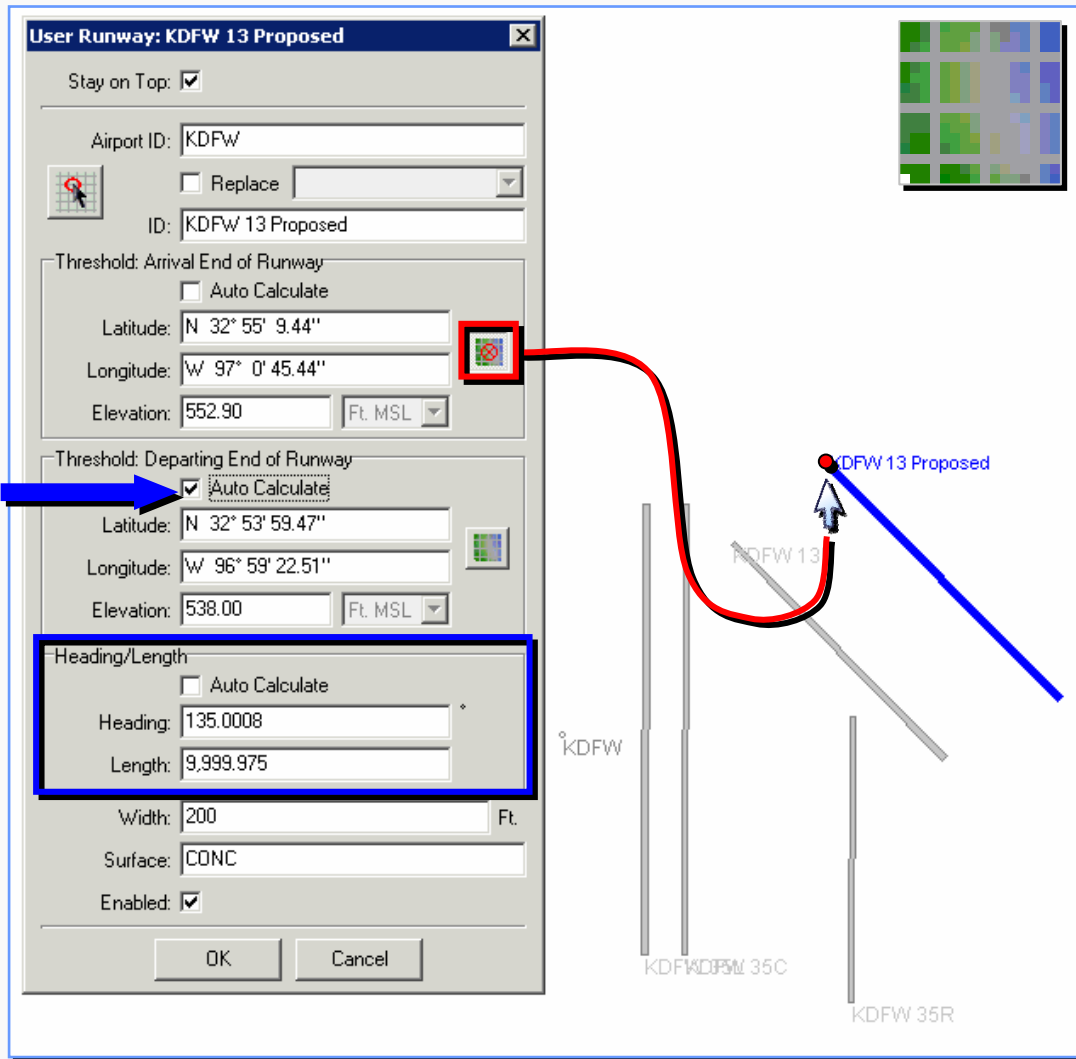
- Select "Get Lat/Lon from DrawSpace."
- Mouse click on proposed location of approach end of runway.
- Check "Auto Calculate" "Threshold Departure End of Runway.
- Enter "Heading/Length" data.
- Enter other data in appropriate windows.
- Click "OK" the runway will appear in the DrawSpace™Display.

Figure 13-6: Select Arrival Threshold Latitude/Longitude location with mouse

14.0　　　　Steps for Running a Simulation

Complete the following steps to run a simulation for DME Screen, Radar Screen, Communications Screen, and LAAS Screen. It is not necessary to run a simulation prior to evaluating TERPS surfaces for obstacle penetrations.

14.1　　　　Load, Settings, and Run

Step 1 - Load FPDIF

● Open "Route" drop-down menu and select "Load" which opens the Open File dialog box. In the "Look In" window, select a text file (e.g., Q444.txt) from the dialog box. You may also type the file name into the File Name entry area. See Figure: 14-1.

Step 2 - Setting Parameters for Simulation

● Select the Simulation module, Flight Plans tab and set the Aircraft Category and Wind parameters.

● Select the Simulation Settings tab and set the Baseline Simulation Profiles, and if desired:

○ Select the Radar Screen checkbox and the type of radar site to be evaluated.

○ Select Communication Screen checkbox and the type of communication station to be evaluated.

○ Select LAAS Screen checkbox and change the Baseline Simulation Profile to User Defined and deselect DME Screen.

● Select the Flight Settings tab and set Climb Gradient if appropriate.

● Select the DME Specific Settings tab and assign specific DME facilities or allow the program to select the facilities to be used.

● Select Run Output tab and choose Track Color Options.

Step 3 – Run Simulation

● Start the simulation with the "Play" square button. The "Pause" and "Stop" square buttons become activated.
●

14.2   Simulation Output

Information Bar

● During the Simulation run the "Run Time" window on the right side of the Information Bar will increase incrementally (in seconds) until the simulation has completed.

DrawSpace™Display

● The colored flight track is initiated and proceeds along the selected route.

● DME Track Colors: When DME Screening has been selected the track colors pertain to the DME screen only. The colors are:

   ○ Blue: INS drift model is being used for calculations instead of DMEs since less than two DMEs are available.

   ○ Green: DME Screening values are within acceptable limits.

   ○ Red: Screening values (calculated from INS drift or DMEs) exceed maximum error allowed.

   ○ Orange: Indicates the segment where a Critical DME exists.

   ○ Purple: Indicates the simulation is reevaluating the track excluding Low and Terminal facilities.

● Flyability/Radar/Communications Track Colors: When these screening have been selected (without DME Screening), the track color display is Blue.

● LAAS Track Colors: When the route progresses through the use of a color-coded flight path.

   ○ Red: If no LAAS facilities are available, the flight path is a red line.

   ○ Green: If at least one LAAS facility is available, the flight path is green.

● Clear Track Colors: Select "Tracks" drop-down menu and the "Clear" button.

Simulation Conclusion

- At the conclusion of the simulation run an RNAV-Pro "Results" PDF file appears.

- Following the route run, select "Clear" from the Tracks drop-down menu. This erases the track currently displayed.

- If clearing the route is also desired, select "Clear All" from the Routes drop-down menu to clear the route currently displayed.
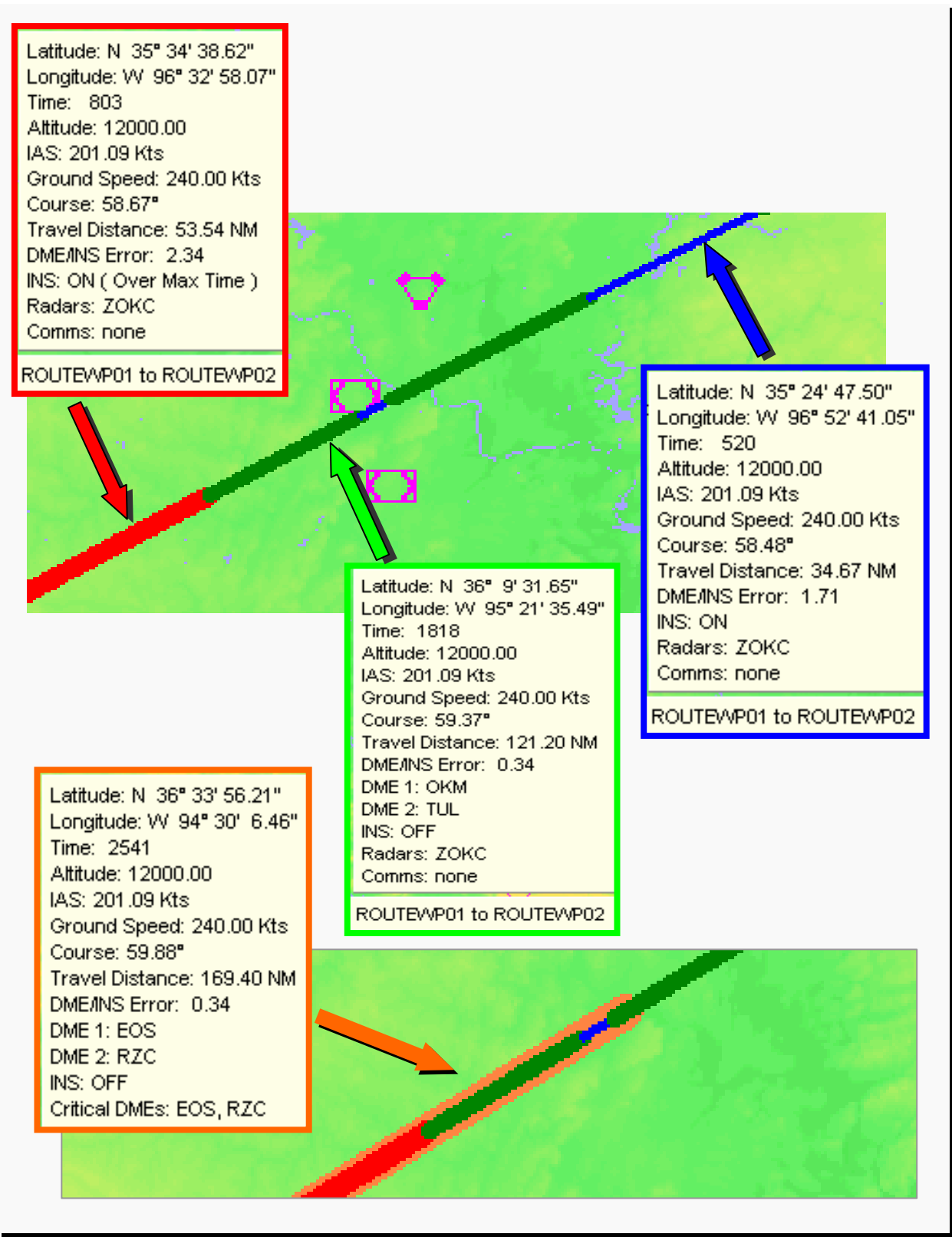
Figure 14-1: DME Screening Track Colors

15.0   RNAV Pro™ Results

A Result is automatically generated when a flight plan is run by RNAV-Pro. The Results is also obtained by pressing the Results square button in the Information Bar.

15.1   Results Content

The Results includes selections for: General Information and Results Summary, Flight Plan, Flyability, DME/DME, Radar Analysis, Communications Analysis, and TERPS Analysis. The Results provides detailed information for the types of screening conducted appears at the completion of a simulation/evaluation and is produced as a PDF file.

15.1.1   General Information and Results Summary

This page gives the basic information for the each types of screening conducted: Flyability, DME Screening, Radar Screening, Communications Screening, and TERPS Evaluation.

- User Name: User Name is assigned automatically.
- Project Name: User assigns name of project before saving file.
- Software: RNAV-Pro
- Version: 2.30
- Date/Time: Automatically assigns time the simulation is run.
- Input File: Location of saved FPDIF. Click on file name, links to the Flight Plan page.
- Databases: AVNIS/User
- DTED Date: Date of the DTED used for the simulation.

The Results Summary information provides easy-to-interpret initial results. In the Results Summary window a left mouse click on the simulation type hyperlinks to that section. Each section provides a Return to Summary option.

 Green circle: Signifies that results for this screen were within acceptable limits. "Please Check DME Results" also appears to the right of the circle if critical DMEs have been identified.

 Red square: Signifies that results for this screen were out of tolerance (i.e., screen failed). "Please Check xxx Results" appear to the right of the square on all failures.

 Gray Question Mark: Indicates that screening for this element was not requested;

Figure 15-1: General Information and Results Summary

15.1.2   DrawSpace™ Display Snapshot

This page shows a picture of the DrawSpace™ Display area at the completion time of the simulation run and TERPS evaluation.
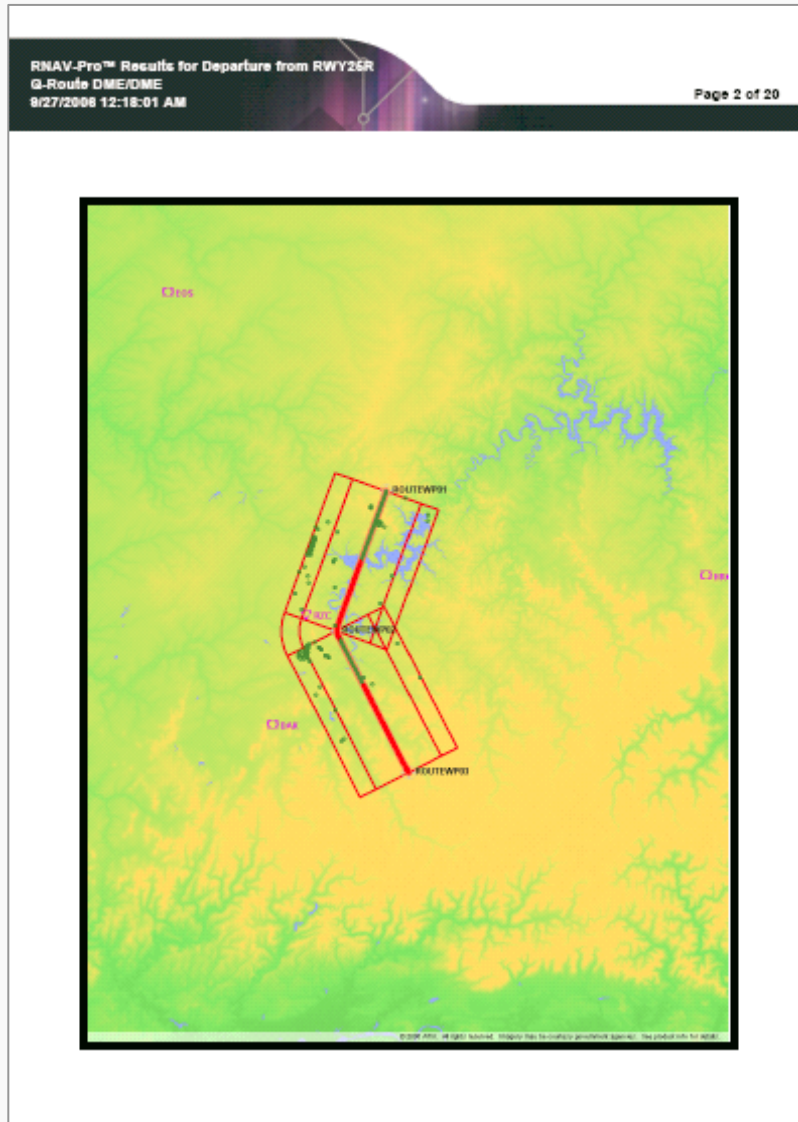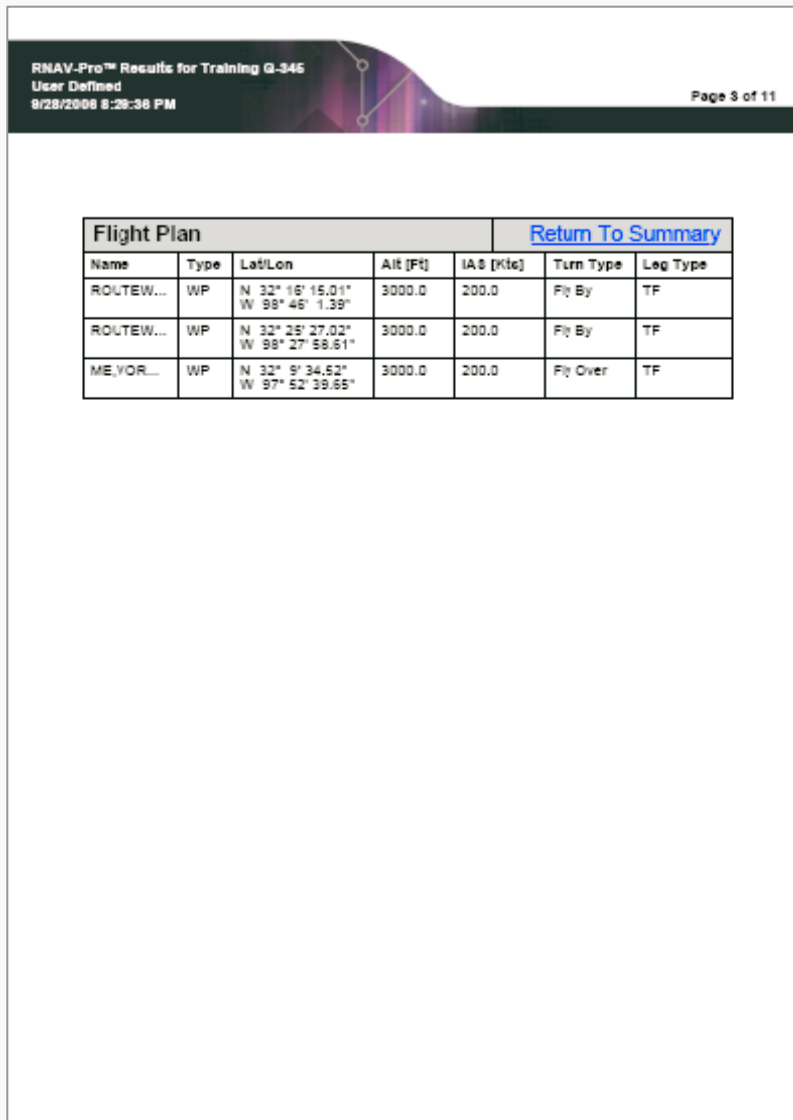
Figure 15-2: DrawSpace™ Display Snapshot

15.1.3   Flight Plan

The Flight Plan page provides the Flight Plan Data Input File (FPDIF). A hyperlink back to the Result Summary page is provided.
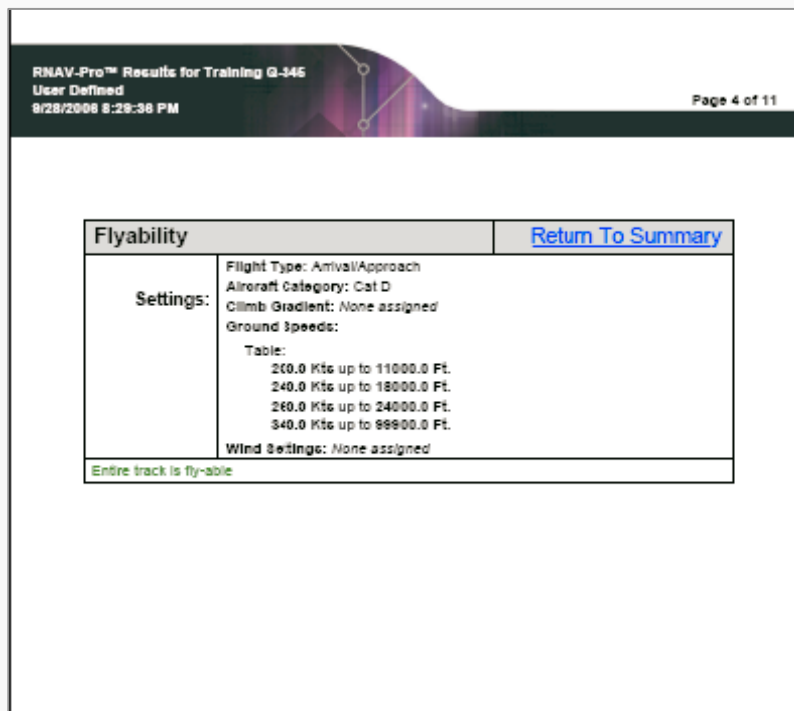
Figure 15-3: Flight Plan

15.1.4 Flyablity

The Flyablity page gives the basic information on the simulation setting, Flight Type, Aircraft Category, Climb Gradient, Ground Speeds, and Wind Settings.

The resulting text under the Flyability appears in green or red and includes remarks on the flyability of the route. It also identifies problems (errors or warnings) associated with the aircraft's flight.

- Green: No discrepancies (i.e., entire track is flyable) or minor discrepancies (i.e., required IAS at waypoint could not be reached or altitude at waypoint was too low) were noted that did not cause termination of the flight.

- Red: Major discrepancies (i.e., the route was not deemed flyable) were noted that caused termination of the flight.

Figure 15-4: Flyability

15.1.5　DME/DME

The results are provided in three forms: text, table, and graph.

● Settings: The text includes the specific details selected for the analysis.

● Total Number of DMEs Used: DMEs are sequenced in the order of their initial detection.

● Available DMEs: All DMEs that are available on the screen are shown.

● Explanation of the DME results: Texts in green stating no discrepancies or minor discrepancies were noted that did not cause termination of the flight. Texts in red stating

● Major discrepancies were noted that caused termination of the flight.

● DME Graph: Shows visual depiction of the explanation stated above.

DME/DME — Return To Summary

Settings:	RNP: 2.0
	Flight Mode: Manual
	Line of Sight (DTED): Evaluated
	DME Restrictions: Evaluated
	Inertial Drift: Enabled
	Initial Drift: 0.558 NM
	INS Drift Rate: 8.000 NM/Hour
	Range Mode: OSV
	Co-Frequencies: Evaluated
	RNP Edges: Evaluated
	Min DME Range: 3.0 NM
	DME Types: VOR/DME , VORTAC , TACAN , and User
	Critical DMEs: Allowed
	DOD Facilities: Not Included
	Foreign Facilities: Not Included
	Low & Terminal DMEs: Included
	Flight Check DMEs: Selected
	Higher Altitudes: Evaluated

Total Number of DMEs Used: 2

Maximum DME Error: 1.067 NM. 2 Critical DMEs were found.

Available DMEs: MQP, JEN
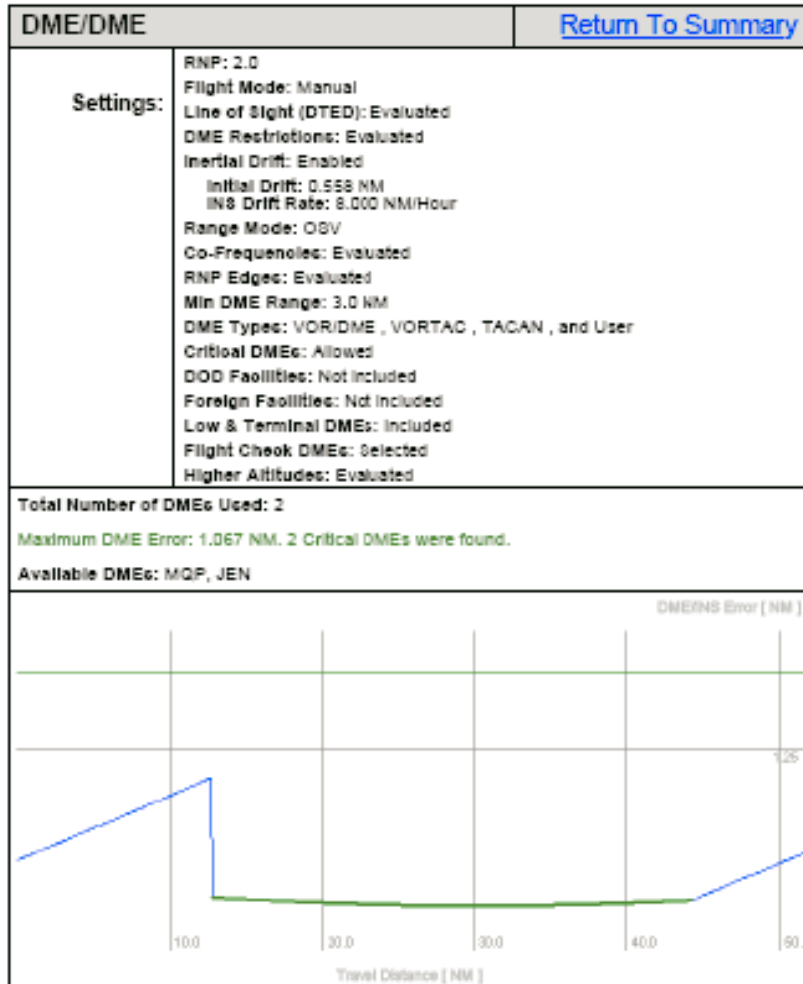

Figure 15-5: DME/DME

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- DMEs Used: The table includes specific details about each DME used in the analysis.

- Name: Includes three-letter identifiers listed in the order of their initial detection.

- Location: Latitude/Longitude in degrees:minutes:seconds.hundredths of seconds.

- SV/Range (Service Volume Range): Terminal, low, or high.

- Source: Indicates either AVN database or User database.

- Critical: Specifies, "YES" if the DME is critical, "NO" if it is not critical, or "N/A" if critical analysis was not requested. The DME is determined to be critical if removing it from service causes a DME screen to exceed the maximum allowable error.

- Err. [NM]: Specifies the maximum error obtained during DME Screening when this DME was removed for critical screening analysis. "N/A" signifies that critical analysis was not requested.

- Status: Specifies whether the DME is to be enabled or disabled during the screening process. The status is initially set to "Enabled" and can only be disabled by the user toggling DMEs within this column. For example, the user can toggle specific DMEs from "Enabled" to "Disabled" and rerun the screen. This yields new results and a modified DME table by ignoring those DMEs that have been disabled and possibly adding DMEs into the analysis that did not appear in the previous run.

- Time: The percentage of total flight time that the DME was used in the analysis.

- Distance: The percentage of the total distance that the DME was used in the analysis.

DMEs Used

#	Name	Lat/Lon	Range	Source	Critical	Err. [NM]	Status	Time	Distance
1	JEN	N 32° 9' 34.52" W 97° 52' 39.65"	L	Database	YES	2.620	Enabled	61.0 %	61.1 %
2	MQP	N 32° 43' 34.25" W 97° 59' 50.79"	H	Database	YES	2.620	Enabled	61.0 %	61.1 %

Figure 15-6: DMEs Used

- Flight Check DME Selection: All selected Flight Check DMEs are listed. DMEs that are considered to be Required and Alternate facilities are shown.

Flight Check DME Selection

Distance [NM]	Selected DMEs (Required)					Alternate
0.0	EOS	RZC	DAK			

Figure 15-7: Flight Check DME Selection

- Inertial Drift Segments: Indicates the start and stop location in latitude/longitude, the length of drift in nautical miles, and available DME facility with "from" and "to" locations in latitude and longitude.

Inertial Drift Segments

#	Start Location	End Location	Length [NM]
1	N 32° 16' 15.10" W 98° 46' 1.22"	N 32° 22' 49.16" W 98° 33' 9.23"	12.7
	VOR: BWD	Available from N 32° 16' 15.10" W 98° 46' 1.22" to N 32° 22' 49.16" W 98° 33' 9.23"	
	VOR: MQP	Available from N 32° 20' 12.73" W 98° 38' 16.28" to N 32° 22' 49.16" W 98° 33' 9.23"	
	VOR: JEN	Available from N 32° 20' 17.89" W 98° 38' 6.16" to N 32° 22' 49.16" W 98° 33' 9.23"	
2	N 32° 13' 0.18" W 98° 0' 14.16"	N 32° 9' 34.64" W 97° 52' 39.90"	7.3
	VOR: JEN	Available from N 32° 13' 0.18" W 98° 0' 14.16" to N 32° 9' 34.64" W 97° 52' 39.90"	
	VOR: MQP	Available from N 32° 13' 0.18" W 98° 0' 14.16" to N 32° 9' 34.64" W 97° 52' 39.90"	

Figure 15-8: Inertial Drift Segments

- DME Coverage Gaps: Indicates the start and end location in latitude/longitude and the length of the gap in nautical miles.

DME Coverage Gaps			
#	Start Location	End Location	Length [NM]
1	N 36° 20' 34.29" W 93° 59' 48.55"	N 36° 11' 55.35" W 94° 2' 39.41"	9.2
2	N 36° 6' 49.57" W 93° 59' 25.55"	N 35° 57' 10.38" W 93° 53' 19.80"	10.8

Figure 15-9: DME Coverage Gaps

- Cumulative Critical Gaps: Indicates the start and end location in latitude/longitude and the length of the gap in nautical miles.

Cumulative Critical Gaps			
#	Start Location	End Location	Length [NM]
1	N 36° 28' 21.91" W 93° 56' 19.28"	N 35° 57' 10.38" W 93° 53' 19.80"	34.0

Figure 15-10: Cumulative Critical Gaps

- User DMEs: Are shown when created and include Name, Lat/Long, and Range (Service Volume), Elevation, Frequency, Replaces (facility) is replaced) Status, and all Restrictions (showing bearing, distance and altitudes).

User DMEs							
#	Name	Lat/Lon	Range	Elevation [Ft]	Frequency	Replaces:	Status
1	PXR	N 33° 25' 58.87" W 111° 58' 12.72"	H	1182.2	115.60	PXR	Not Used
	Restriction:	Bearing [True]: 27.0° to 46.0° Bearing [Mag]: 15.0° to 34.0°			Distance: Beyond 33.0 NM Altitude: Below 10000.0 Ft.		
	Restriction:	Bearing [True]: 102.0° to 112.0° Bearing [Mag]: 90.0° to 100.0°			Distance: Beyond 15.0 NM Altitude: Below 8000.0 Ft.		

Figure 15-11: User DMEs

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15.1.6   Radar Analysis

Radar Analysis is shown in graphic form. Distance (as the simulation travels) in nautical miles is plotted on the x-axis, and the y-axis displays the number of radars providing coverage for the flight.

● Green: Indicates screening is within tolerance (i.e., one or more radars are within range).

● Red: Indicates screening is out of tolerance (i.e., no radars are within range).

● Blue: When Radar Screening has been selected (without DME Screening), the track color on the DrawSpace™ Display area will be blue, indicating that screening has been performed.

Figure 15-12: Radar Screen Results

15.1.7   Communication Analysis

Communication Analysis is shown in graphic form. Distance (as the simulation travels) in nautical miles is plotted on the x-axis, and the y-axis displays the number of communications facilities providing coverage for the flight.

- Green: Indicates screening is within tolerance (i.e., one or more radios are within the coverage area).

- Red: Indicates screening is out of tolerance (i.e., no radios are within the coverage area).

- Blue: When Communication Screening has been selected (without DME Screening), the track color on the DrawSpace™ Display area will be blue, indicating that screening has been performed.
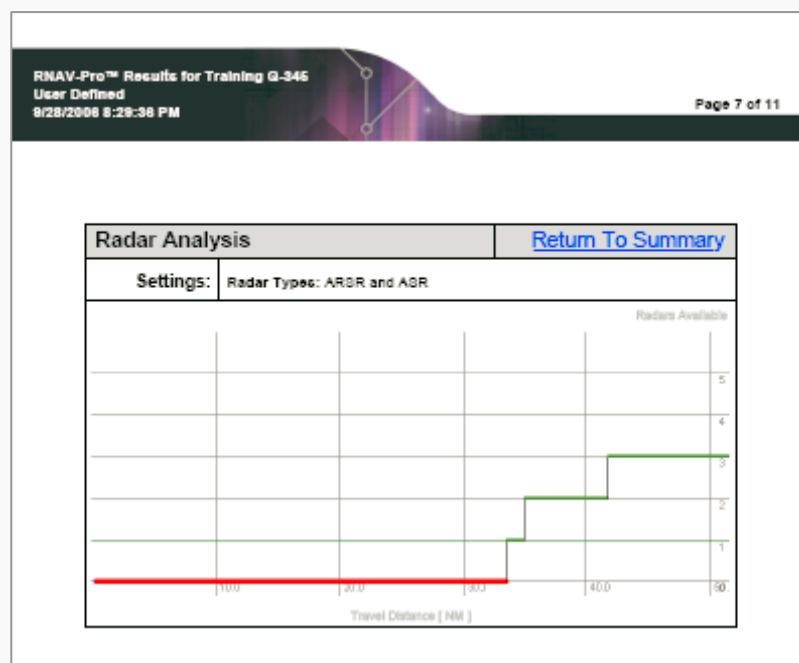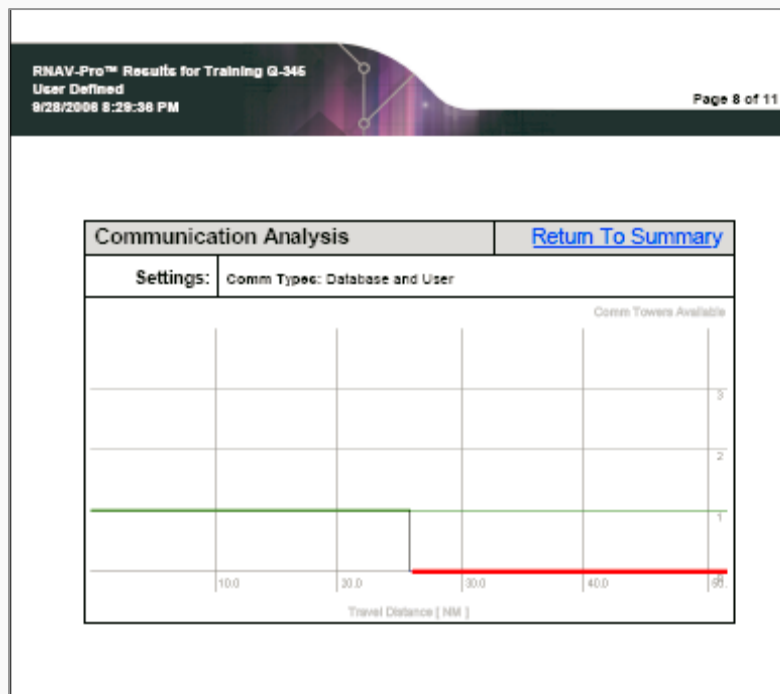

Figure 4-13: Communications Screen Results

15.1.8   TERPS Analysis

Includes the procedure name, minimum climb required, and controlling obstacles.

● Procedure name: FMS Departure followed by the associated airport and runway.

● Minimum Required Climb Gradient: Indicated in feet per nautical mile and slope required to ensure obstacle clearance.

  ○ Green: N/A (not applicable). Indicates there are no TERPS penetrations.
  ○ Red: Indicates there is a TERPS penetration

● Controlling Obstacle:

  ○ Terrain or Man-Made: If the controlling obstacle is man-made, the structure ID number will be entered.

  ○ Latitude/Longitude: Obstacle in degrees: minutes: seconds. Hundredths a second.

  ○ Elevation [MSL]: Obstacle is depicted in feet and hundredths of a foot.

  ○ Type: Tower, pole building, smoke stack, etc.

  ○ Clearance or Penetration: For an obstacle that does not penetrate the TERPS surface, the word "Clearance" and associated height (in feet) is green. For an obstacle that penetrates the TERPS surface, the word "Penetration" and associated height (in feet) is red.
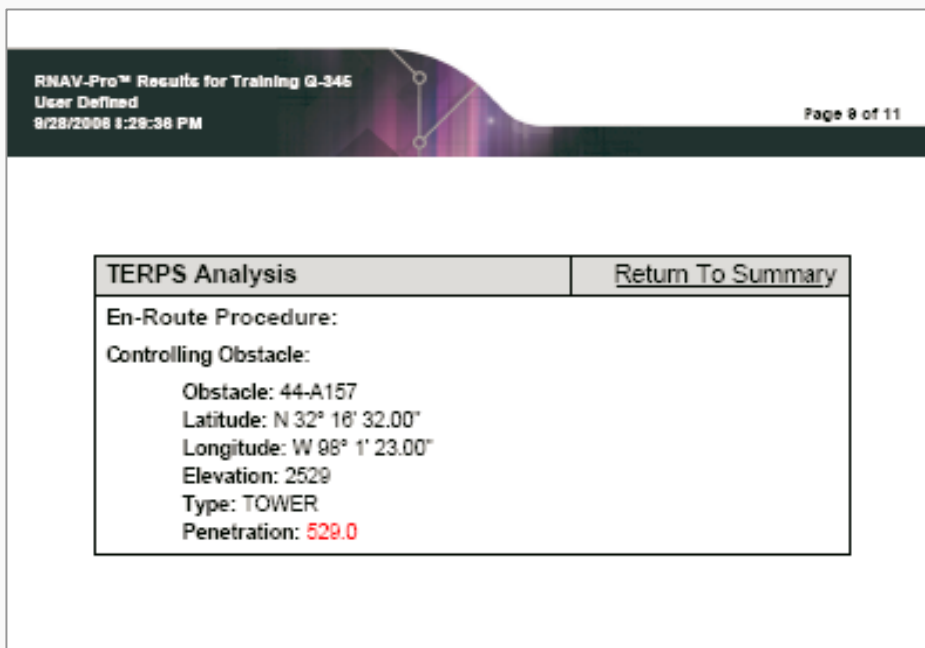
Figure 15-14: TERPS FMS Departure Screen Results

15.1.9   TERPS Analysis, Relevant Obstacle:

- Obstacle ID: Terrain or DOF number for man-made obstacle.

- Latitude/ Longitude: Obstacle in degrees: minutes: seconds. Hundredths of a second.

- Elevation (MSL): Obstacle in feet and hundredths of a foot.

- Type: A descriptive name of the type of man-made obstacle.

- Clearance or Penetration: For an obstacle that does not penetrate the TERPS surface, the word "Clearance" and associated height (in feet) is green. For an obstacle that penetrates the TERPS surface, the word "Penetration" and associated height (in feet) is red.

TERPS Analysis | Return To Summary

Relevant Obstacles

#	Name	Lat/Lon	Elevation [Ft]	Type	Clearance [Ft]
1	44-4632	N 32° 22' 21.00" W 98° 45' 12.00"	1749.00	STACKS 2	574.38
2	44-E378	N 32° 20' 48.49" W 98° 42' 51.21"	1803.00	TOWER	197.00
3	DPW-S-0036	N 32° 14' 50.30" W 98° 44' 20.70"	1505.00	SPOT	495.00
4	44-1942	N 32° 12' 42.00" W 98° 39' 45.00"	1852.00	TOWER	592.25
5	44-6553	N 32° 12' 51.00" W 98° 40' 33.00"	1589.00	TOWER	755.82
6	44-D920	N 32° 13' 41.19" W 98° 41' 24.21"	1777.00	TOWER	275.71
7	44-A251	N 32° 29' 13.00" W 98° 33' 17.00"	1760.00	TOWER	623.29
8	DPW-S-0041	N 32° 20' 12.20" W 98° 29' 19.90"	1710.00	SPOT	290.00
9	44-2119	N 32° 18' 7.00" W 98° 29' 38.00"	1800.00	TOWER	589.18
10	44-4977	N 32° 18' 11.00" W 98° 29' 36.00"	1887.00	TOWER	491.54
11	44-A208	N 32° 30' 17.00" W 98° 24' 35.00"	1307.00	TOWER	1094.39
12	44-3229	N 32° 22' 44.00" W 98° 25' 1.00"	1854.00	TOWER	146.00
13	44-8810	N 32° 22' 46.00" W 98° 24' 58.00"	1992.00	TOWER	8.00
14	44-5781	N 32° 15' 3.00" W 98° 9' 35.00"	1801.00	TOWER	399.00
15	44-A771	N 32° 18' 57.92" W 98° 9' 39.03"	1453.00	TOWER	547.00
16	44-8521	N 32° 19' 13.00" W 98° 18' 21.00"	1770.00	TOWER	230.00
17	44-8648	N 32° 15' 34.00" W 98° 8' 22.00"	1619.00	TOWER	381.00
18	44-D280	N 32° 17' 12.90" W 98° 8' 4.03"	1527.00	TOWER	473.00
19	44-E004	N 32° 17' 9.70" W 98° 7' 33.97"	1511.00	TOWER	489.00
20	44-E438	N 32° 17' 21.18" W 98° 11' 39.80"	1630.00	TOWER	370.00

Figure 4-13: TERPS FMS Departure Screen Results

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16.0   Submit Reports

The Submit a Report option from the Report drop-down menu allows the user to submit a report to the FAA's Flight Operations Simulation and Analysis Branch in order to; identify a problem that the user has encountered with RNAV-Pro or offer a suggestion that will increase the utility of RNAV-Pro.

● Step 1: Supply User Information: Fill in all user information requested. This allows us to contact you if more information is needed.

● Step 2: "Suggestion/ Problem": Indicate whether this report is a "Suggestion" or a "Problem." In the space provided, describe, in detail, any comments that you might have. If this report is being submitted due to a problem, please provide all information regarding the exact conditions which led to the problem, including, but not limited to:

  ○ Any and all non-default conditions (i.e. category of aircraft, wind values, etc.)

  ○ Types of screening that were used (DME, Radars, Communications, TERPS, etc.)

  ○ If DME screening was used, all information that is relevant (i.e. minimum altitude for DME check, assigned.

  ○ The information you provide will be used to recreate the problem so that a solution can be found.

       Step 3: If a problem has occurred during a specific input file, please provide it here. The contents of the input file will be copied directly into the file specified in Step 4.

● Step 4: Specify a path where this report can generate an output file. The file name has already been generated for you.

● Step 5: Please Create an Email and attach the generated report file. Please send email to mail to:brad.nelson@faa.gov.
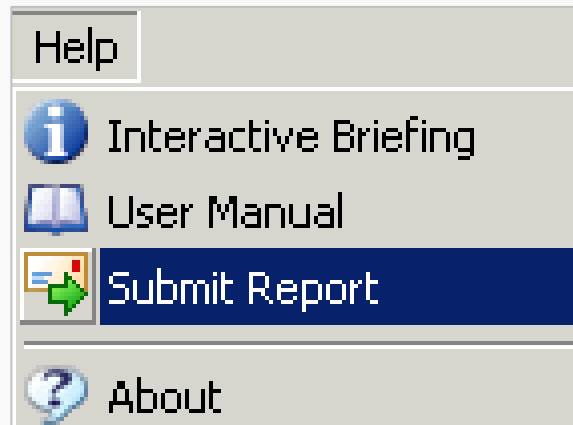
Figure 16-1: Submit Reports