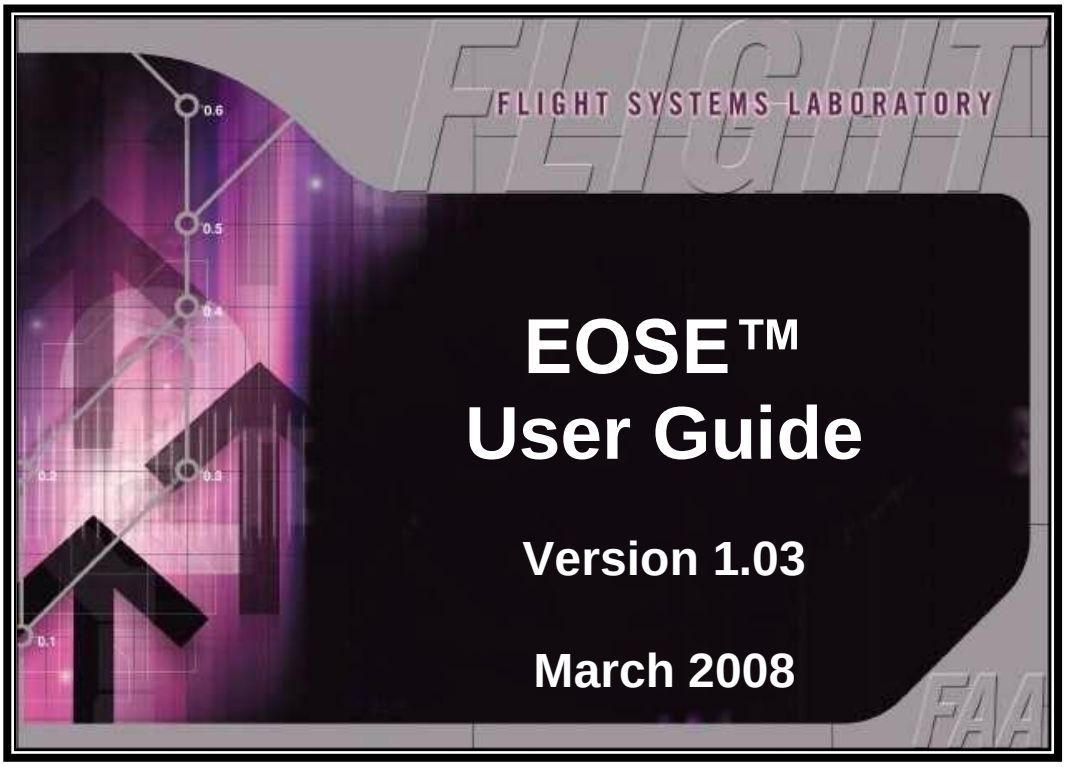


EOSE™ User Guide

Version 1.03

March 2008

Air Traffic Simulation, Inc.

EOSE™
Users Guide

Air Traffic Simulation, Inc.

HELP LINE: (405) 620-0809

Foreword

EOSE™ is a straightforward, yet robust, automation tool that uses up to date data for airports, runways, and level 1 DTED terrain data. It can be used in all phases of the development and evaluation of engine-out procedures and allows the user to easily design a procedure to fit specific and unique situation. The tool reduces the traditionally labor intensive process to a logical and easy process, it is highly flexible and allows the user to optimize the design by checking any desired “what if” scenario.

EOSE™ is a continually evolving product. Software and user interface enhancements are frequently made to increase EOSE™ utility. Consequently, display examples in this Users Guide may vary slightly from actual displays observed while accessing EOSE™ 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.

EOSE™ 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 Contents

1.0 Introduction

EOSE™ provides an automated and self-contained environment for engine-out procedures. The FAA's Flight Systems Laboratory Branch, AFS-450, at the Mike Monroney Aeronautical Center in Oklahoma City, Oklahoma, have developed EOSE™.

EOSE™ is a secured, Internet-based application located at: https://fsl.faa.gov

To obtain a user name and password, please contact:

Note:	Help Desk: E-mail: support@atsi.aero Phone: (405) 620-0809 Flight Systems Laboratory Branch (AFS-450) Phone: (405) 954-7935

1.2 Locating EOSE™

EOSE™ is located on the Internet at: https://fsl.faa.gov

The following Flight Systems Laboratory (FSL) Login Window appears when EOSE™ is accessed.

1.3 Logging into EOSE™

Enter user name and password and press "Log In" at the FSL Login Window to log in to EOSE™.

1.4 Logging Out of EOSE™

Complete the following procedure to log out of EOSE™:

- On the EOSE™ Menu Bar select "File."
- Open the File menu and select "Exit."
- The FSL 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."

1.6 EOSE™ Layout

EOSE™ is layout with three major areas, Menu Bar, DrawSpace™Display, and the Design Interface module which provide a user-friendly interface with the program.

- Menu Bar: This has a series of selectable drop-down menus and square buttons.
- DrawSpace™Display: includes a Toolbar, mileage scale and Data Bar.
- Design Interface: This module will help the user to set the parameters of the engine-out and Type 3 surface evaluations.

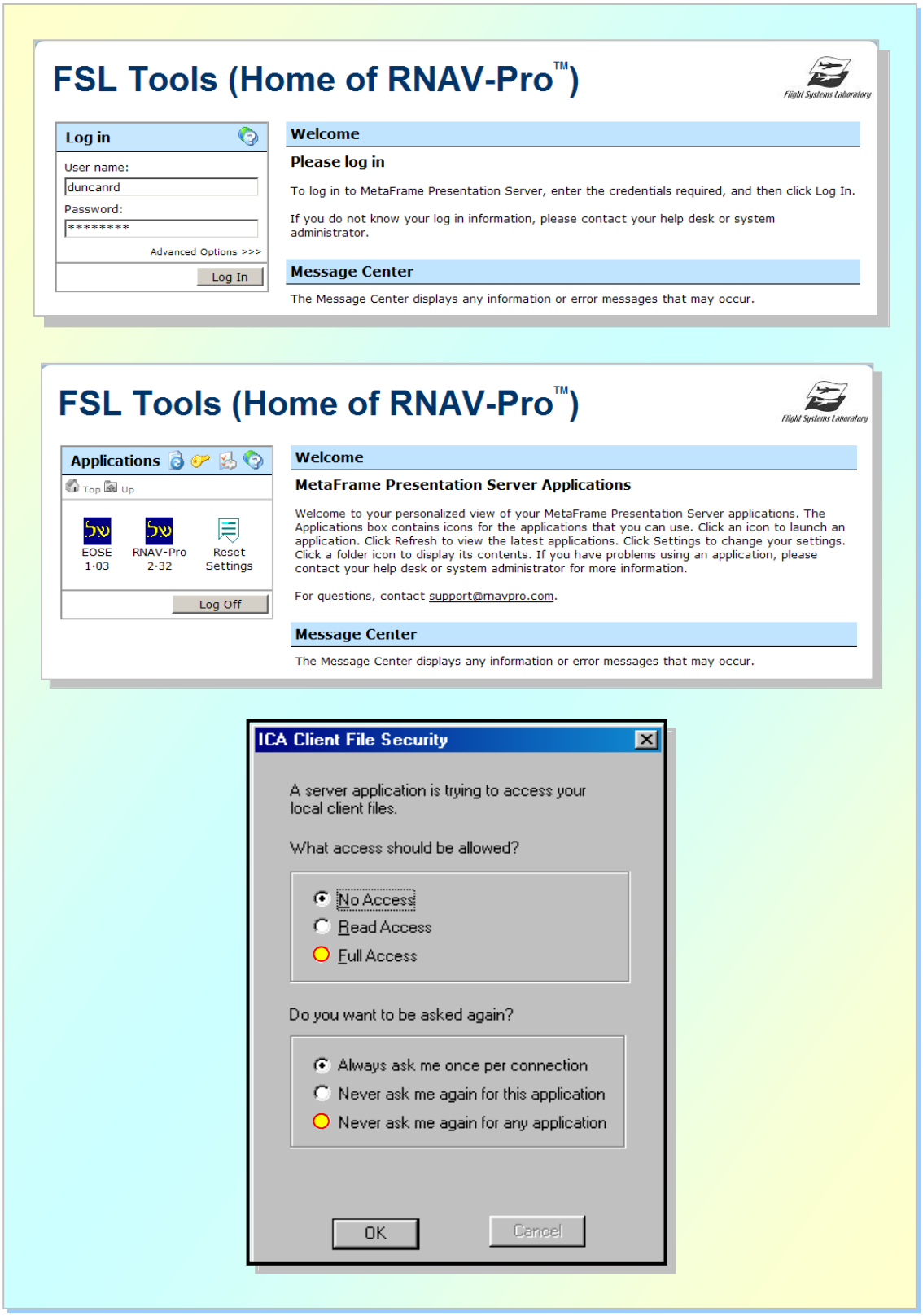


Figure 1-1: Log into EOSE™/ICA Client File Security

Figure 1-2: EOSE™ Layout

2.0 EOSE™ Menu Bar

The Menu Bar contains drop-down menus and square buttons which allows the user to maneuver through the software.

- File: The menu has six options which are:

New: Clears the DrawSpace™Display for a new evaluation.

Reload: Allows the user to reload last the last evaluation.

Load Settings: Opens folder to load a previously saved (.esf) file.

Save Settings: Saves EOSE™ settings as an (.esf) file.

Import Turn from RNAV-Pro Flight Plan: Allows the user to import a flight plan in a text (.txt) format.

Exit: Allow the user to close EOSE™.

- View: The menu has nine options which are:

Graphic Display: Opens the DrawSpace™Display when closed. See paragraph 3.0 for more detail.

Display Data: Opens and closes the Display Data tool. See paragraph 4.1 for more detail.

Search Data: Opens and closes the Search Data tool. See paragraph 4.2 for more detail.

Drawing Tool: Opens and closes the Drawing Tool. See paragraph 4.3 for more detail.

User Data: Opens the User Data module and allows the user to add user data to an evaluation. See paragraph 6.0 for more detail.

Geo Calculator: Contains a Geo calculator. See paragraph 7.0 for more detail.

Interactive Profile: Opens the Profile View in the DrawSpace™Display. See paragraph 5.2 for more detail.

Turns: Opens the “Turns” window in the Design Interface module. See paragraph 8.4.1 for more detail.

Results: Opens the “Results” window. See paragraph 10.0 for more detail.

- Database: Allows the user to select between two databases, the database selected will have the icon beside it.

AVNIS Database: Aviation System Standards Information System.

NACO Database: National Aeronautical Charting Office, AVN-500.

- Windows: This menu repositions the Menu Bar, DrawSpace™Display, and the Design Interface module into proper alignment.

Reset Windows: Realigns windows.

- Help: This Menu has links to an Interactive Briefing, User Manual and e-mail hyperlink.

Interactive Briefing: Activates the Interactive Training.

User Manual: Opens the EOSE™ Users Guide.

About EOSE™: Contains e-mail address, version and release date.

- **Square Button** functions are:

New: Clears the DrawSpace™Display for a new evaluation.

Load Settings: Opens folder to load a previously saved (.esf) file.

Save Settings: Saves EOSE™ settings as an (.esf) file.

Graphic Display: Opens the DrawSpace™Display when closed. See paragraph 3.0 for more detail.

Display Data: Opens and closes the Display Data tool. See paragraph 4.1 for more detail.

Search Data: Opens and closes the Search Data tool. See paragraph 4.2 for more detail.

Drawing Tool: Opens and closes the Drawing Tool. See paragraph 4.3 for more detail.

Interactive Profile: Activates the Profile View tab, which is located on the left side of the DrawSpace™Display. See paragraph 5.2 for more detail.

Turns: Opens the Turns window of the Engine-Out module. See paragraph 8.4.1 for more detail.

User Data: Opens the User Data window. See paragraph 6.0 for more detail.

Conversion Calculator: Contains a Geo calculator. See paragraph 7.0 for more detail.

Results: Opens the evaluation “Results” window. See paragraph 10.0 for more detail.

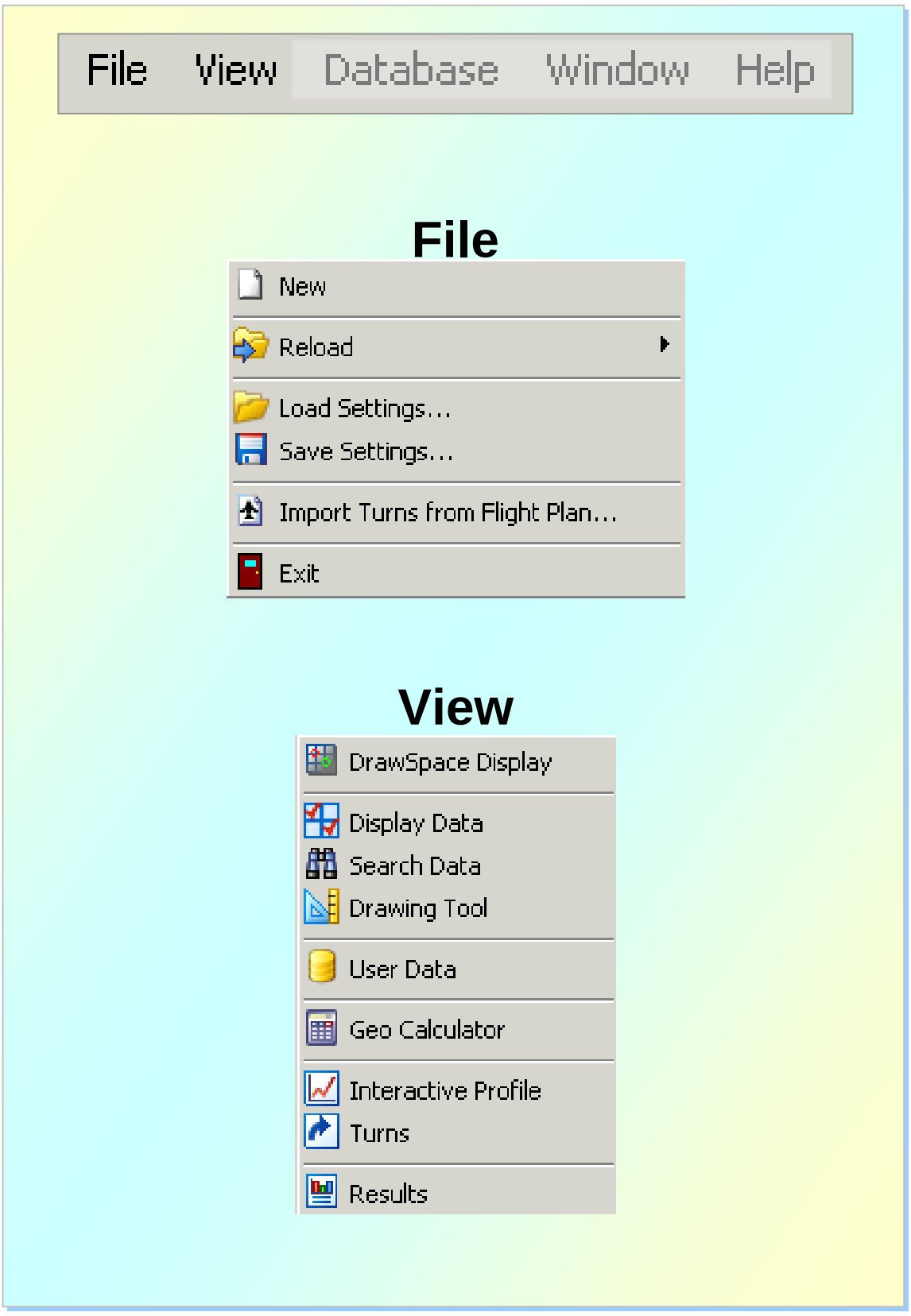


Figure 2-1: Menu Bar

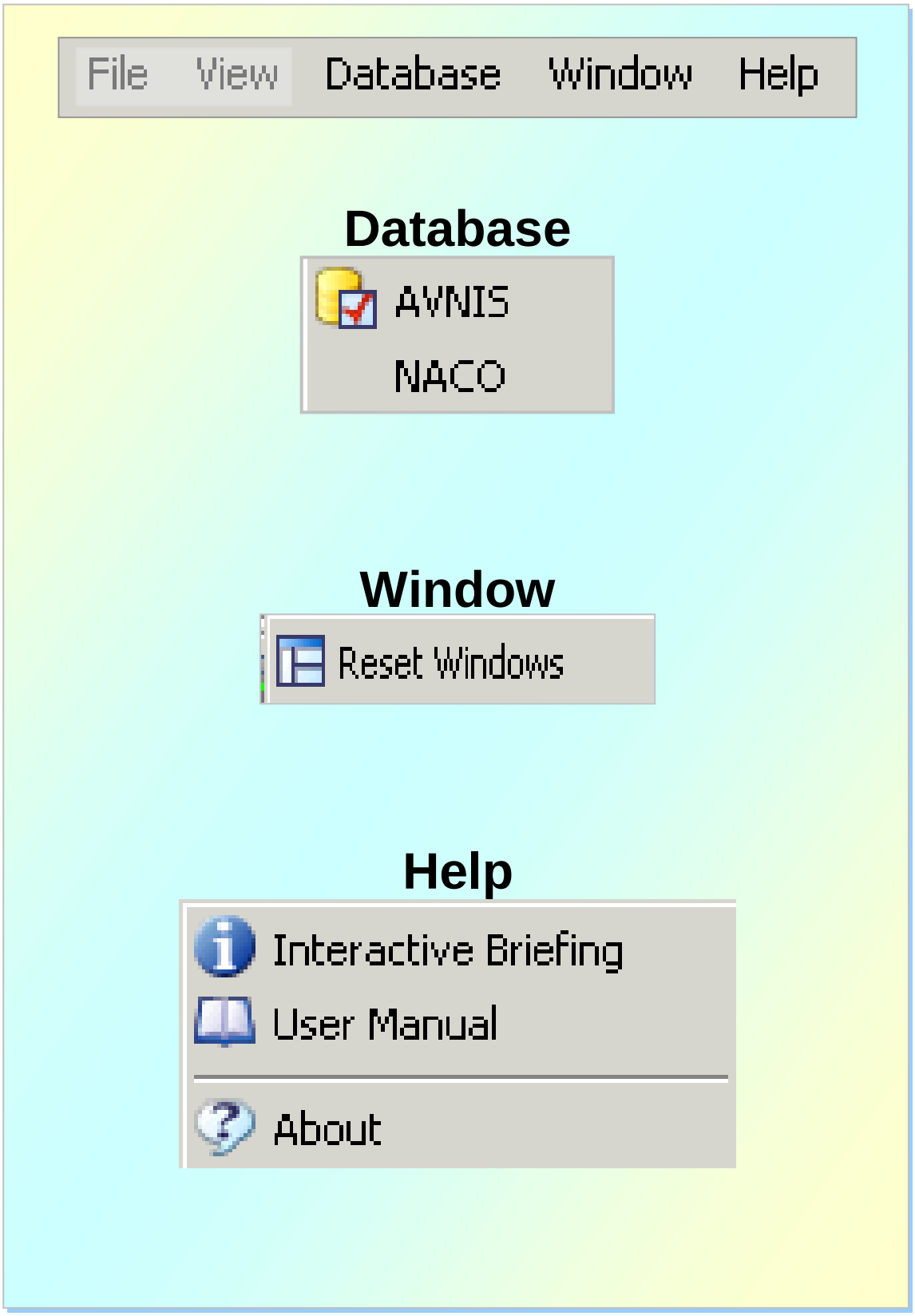


Figure 2-2: Menu Bar continued

3.0 DrawSpace™Display

The DrawSpace™Display includes a Toolbar which allows the user to maneuver around the DrawSpace™Display, and a data bar provides latitude/longitude, elevation, and distance/azimuth data.

- Toolbar: See paragraph 3.1 for more detail.
- Data Bar: See paragraph 3.2 for details
- Mileage Scale: Displays a mileage scale in the screen area.

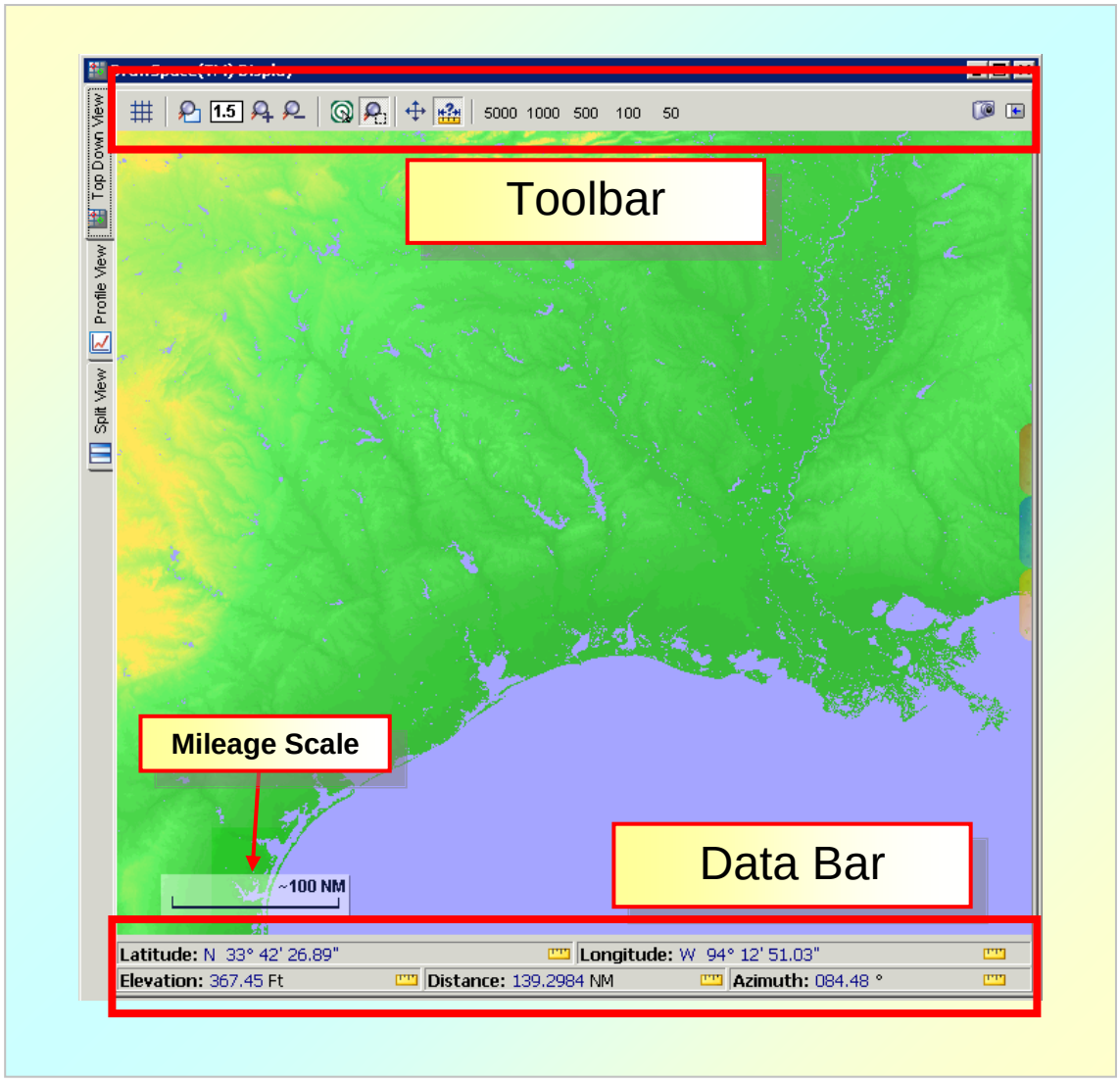


Figure 3-1: DrawSpace™Display

3.1 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 to working Area: Allows the user to zoom in or out to the working area.

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: A toggle button that when selected, recenters the display via a left click of the mouse.

Area to Zoom: A toggle button that when selected, zooms in to an area selected via a left click, hold, and drag of the mouse.

Moves the Visible Area: A toggle button that when selected, moves the display the distance and direction specified via a right click and drag of the mouse.

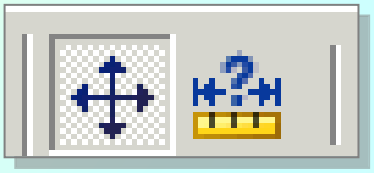
Distance and Azimuth: A toggle button that when selected, measures the distance and azimuth specified via a right click and drag of the mouse.

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

DrawSpace™ Snap Shot: This tool allows the user to take a picture of the screen area and save it as a File or Copy and Paste to a desired location.

Hide Tool Tabs: This icon closes the Display Data tool, Search Data tool and the Drawing Tool.

Left Mouse Functions



Right Mouse Functions

Recenter

Area to Zoom

If either Recenter or Area to Zoom is selected, the other button cannot be used. If one of these buttons is already selected, selecting the alternate button will toggle off the previously selected button. Pressing the Alt key in conjunction with a left click will perform the function associated with the non-selected button.

Move the Visibility Area

Distance Azimuth

If either Move the Visible Area or Distance and Azimuth is selected, the other button cannot be used. If one of these buttons is already selected, selecting the alternate button will toggle off the previously selected button. Pressing the Alt key in conjunction with a right click will perform the function associated with the non-selected button.

Figure 3-2: Toolbar: Recenter, Area to Zoom, Move the Visibility Area, and Distance & Azimuth

3.2 Data Bar

The Data Bar provides latitude/longitude and terrain elevation readout of the mouse location in DrawSpace™Display. It also provides Distance/Azimuth when the Distance and Azimuth tool is activated.

- Latitude: The latitude at the mouse location is displayed at the bottom of the DrawSpace™Display.

   "Select Units" window: Allows user to choose degrees minutes and seconds, degrees, or radians.

- Longitude: The longitude at the mouse location is displayed at the bottom of the DrawSpace™Display.

   "Select Units" window: Allows user to choose degrees minutes and seconds, degrees, or radians.

- Elevation: The elevation of the terrain at the mouse location, is displayed at the bottom of the DrawSpace™Display, provided Digital Terrain Elevation data (DTED) has been loaded.

   "Select Units" window: Allows user to choose feet or meters.

- Distance: Displays the distance between two points identified via a mouse click, hold, and drag provided the Distance and Azimuth toolbar button has been selected.

   "Select Units" window: Allows user to choose feet, meters, nautical miles and feet, nautical miles, or kilometers.

- Azimuth: Displays the azimuth (in degrees true) between two points identified via a mouse click, hold, and drag provided the Distance and Azimuth toolbar button has been selected.

   "Select Units" window: Allows user to choose feet or meters.

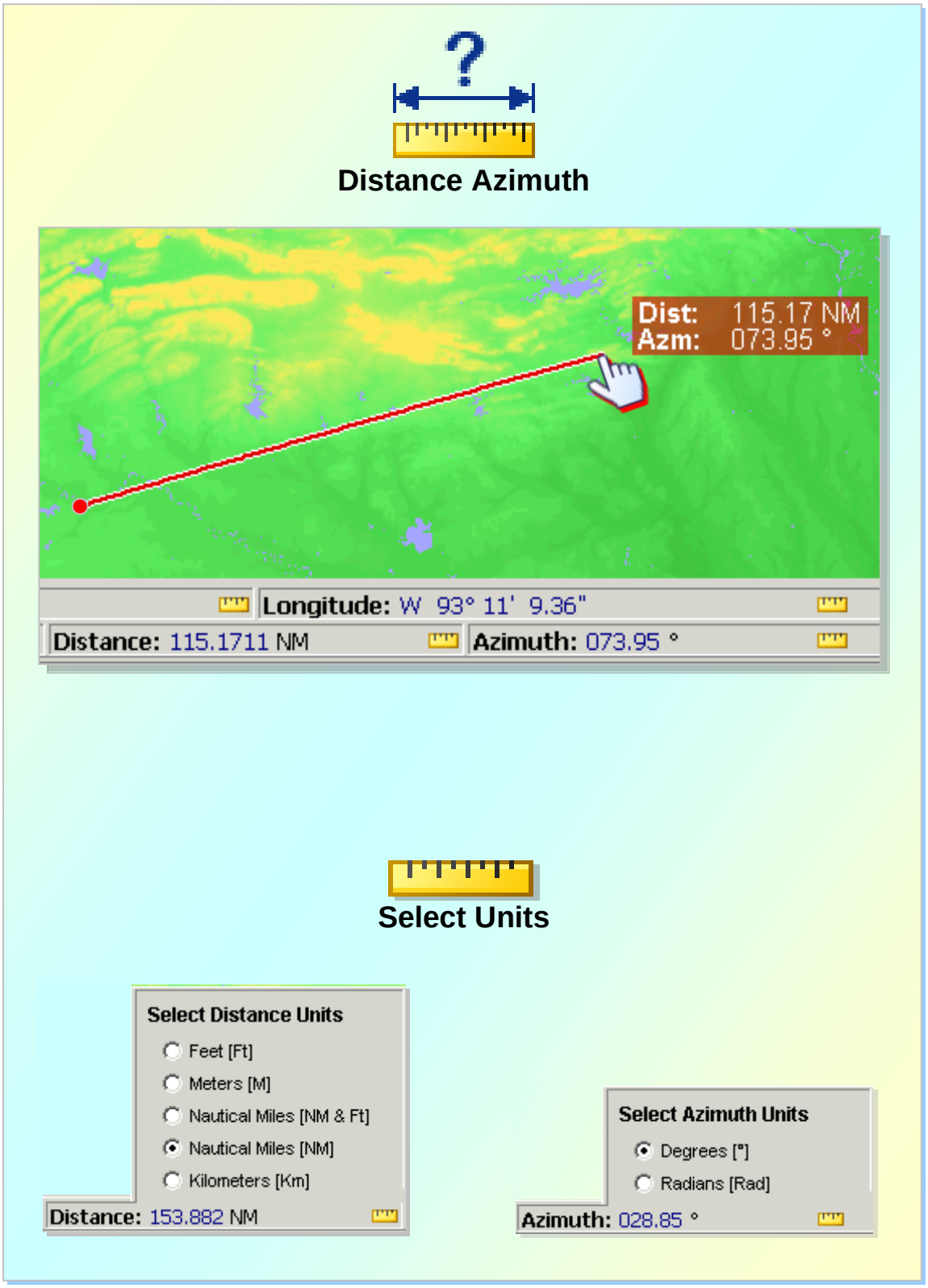


Figure 3-3: Select Units: Distance and Azimuth

4.0 Tool Tabs

There are three tool tabs on the right side of the DrawSpace™ Display. These tools allow the user to select and Display different types of aviation facilities (i.e., airways, airports, and DME facilities), Search for specific facilities (i.e., Dallas Love Field, Tulsa VORTAC, V-12, or Table Rock Heliport) and Draw in the DrawSpace™ Display.

- Display Data: The red, tab opens the Display Data tool.
- Search Data: The blue tab opens the Search Data tool.
- Drawing Tool: The gold tab opens the Drawing Tool.

4.1 Display Data

The Display Tool is used to display airports, runways, heliports, waypoints, obstacles, communications, DMEs, Radars, Facilities, Airways, Boundaries, and Modes. The user may select the following checkboxes to display/select up to four options for each item:

- 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.

- Airports: Allows the user to select and display airports in the AVNIS database and User Database. Three options are provided for each item: Object, Name, and Color. Rolling the mouse over the airport in DrawSpace™Display provides detail airport data.

- Runways: Allows the user to select and display runways in the AVNIS database and User Database. Three options are provided for each item: Object, Name, and Color. Rolling the mouse over the runway end in DrawSpace™Display provides detail runway data.

- Heliports: Allows the user to select and display heliports in the AVNIS database. Three options are provided for each item: Object, Name, and Color. Rolling the mouse over the heliport in DrawSpace™Display provides detail heliport data.

- Waypoints: Allows the user to select and display Waypoints in the AVNIS database. Three options are provided for each item: Object, Name, and Color. Rolling the mouse over the Waypoint in DrawSpace™Display provides detail data.

- Obstacles: This section is opened and closed with left mouse click on the double arrows. It allows the user to select and display obstacles listed in the AVNIS Database and User Obstacles database. Three options are provided for each item: Object, Name, and Color. Rolling the mouse over the obstacle in DrawSpace™Display provides detail obstacle data.

- Comm Stations: This section is opened and closed with left mouse click on the double arrows. It allows the user to select and display communications stations listed in the AVNIS database and User database. Four options are provided for each item: Object, Name, Range, and Color. Rolling the mouse over the comm. station in DrawSpace™Display provides detail comm. station data.

- DMEs: This section is opened and closed with left mouse click on the double arrows. It allows the user to select and display DME facilities listed in the AVNIS database and User database. Four options are provided for each item: Object, Name, Range, and Color. Rolling the mouse over the facility in DrawSpace™Display provides detail facility data.

- Radars: This section is opened and closed with left mouse click on the double arrows. It allows the user to select and display Radar facilities listed in the AVNIS database and User database. Four options are provided for each item: Object, Name, Range, and Color. Rolling the mouse over the site, in DrawSpace™Display provides detail radar data.

- Facilities: This section is opened and closed with left mouse click on the double arrows. It allows the user to select and display non-DME facilities listed in the AVNIS Database and User Obstacles database. Three options are provided for each item: Object, Name, and Color. Rolling the mouse over the facility in the DrawSpace™Display provides detail facility data.

- Airways: This section is opened and closed with left mouse click on the double arrows. It allows the user to select and display Air Traffic Service (ATS) routes (Jet Routes, Victor Routes, and Colored Routes) contained in the AVNIS database. Three options are provided for each item: Object, Name, and Color. Rolling the mouse along the route provides detail route data.

- Boundaries: This section is opened and closed with left mouse click on the double arrows. It allows the user to select and display high and low altitude ARTCC boundaries and State boundaries. Rolling the mouse over the ARTCC boundary provides detail data.

- Modes: This section is opened and closed with left mouse click on the double arrows. It allows the user to select backgrounds and projections for the display area.

    - Backgrounds which are available: No Background, DTED Terrain, Terrain & Water, Blue Marble, Sectional Chart, and Water

    - General Projections which are available:

        ◊ Plate Carrée Projection is also known as Equirectangular, Equidistant Cylindrical, Simple Cylindrical, or Rectangular. In this projection, the Polar Regions are less distorted in scale and area than they are in the Mercator projection. The grid cells are perfect squares.

        ◊ Miller Cylindrfical Projection is similar to the Mercator projection except that the Polar Regions are not as areally distorted. Meridians are parallel and equally spaced, lines of latitude are parallel, and the distance between them increases toward the poles. Both poles are represented as straight lines.

        ◊ Miller Equidistant is a projection that accurately preserves the distance between certain objects. Miller's cylindrical equidistant projections with standard parallels at N/S 37 deg 30 min provide minimal overall scale distortion when compared to other cylindrical equidistant projections.

        ◊ Robinson Projection is also called Orthophanic Robinson is a compromise projection used for world maps. Pseudo cylindrical. Meridians are equally spaced and resemble elliptical arcs, concave toward the central meridian. The central meridian is a straight line 0.51 times the length of the equator. Parallels are equally spaced straight lines between 38° N and S; spacing decreases beyond these limits. The poles are 0.53 times the length of the equator.

    - Conformal Projection which is available:

        ◊ Mercator projection was originally created to display accurate compass bearings for sea travel. Meridians are parallel to each other and equally spaced. The lines of latitude are also parallel but become farther apart toward the poles. The poles cannot be shown.

- Equal Area Projections which are available:

  - ◊ Tristan Edwards projection is a cylindrical equal-area projection with the standard parallels of N/S 37.383 degrees.

  - ◊ Eckert IV projection is an equal area projection used primarily for world maps. Parallels are unequally spaced straight lines, closer together at the poles. Meridians are equally spaced elliptical arcs. The poles and the central meridian are straight lines half as long as the equator.

  - ◊ Mollweide projection is also called Babinet, Elliptical, Homolographic, or Homalographic; it is an equal-area projection designed for small-scale maps. All parallels are straight lines, and all meridians are equally spaced elliptical arcs. The exception is the central meridian, which is a straight line. The poles are points.

  - ◊ Hammer-Aitoff projection is a modification of the Lambert Azimuthal Equal Area projection. The central meridian is a straight line half as long as the equator. The other meridians are complex curves, concave toward the central meridian and unequally spaced along the equator. The equator is a straight line; all other parallels are complex curves, concave toward the nearest pole and unequally spaced along the central meridian.

  - ◊ Sinusoidal projection is also known as Sanson–Flamsteed—as a world map, this projection maintains equal area despite conformal distortion. Alternative formats reduce the distortion along outer meridians by interrupting the continuity of the projection over the oceans and by centering the continents around their own central meridians, or vice versa. A pseudo cylindrical projection where all parallels and the central meridian are straight. The meridians are curves based on sine functions with the amplitudes increasing with the distance from the central meridian.

- Regional Projection which is available:

  - ◊ North America projection is an Albers Equal-Area Conic projection providing a relatively undistorted view of North America. It provides no distortion along the standard parallels of N 29 deg 30 min and N 45 deg 30 min.

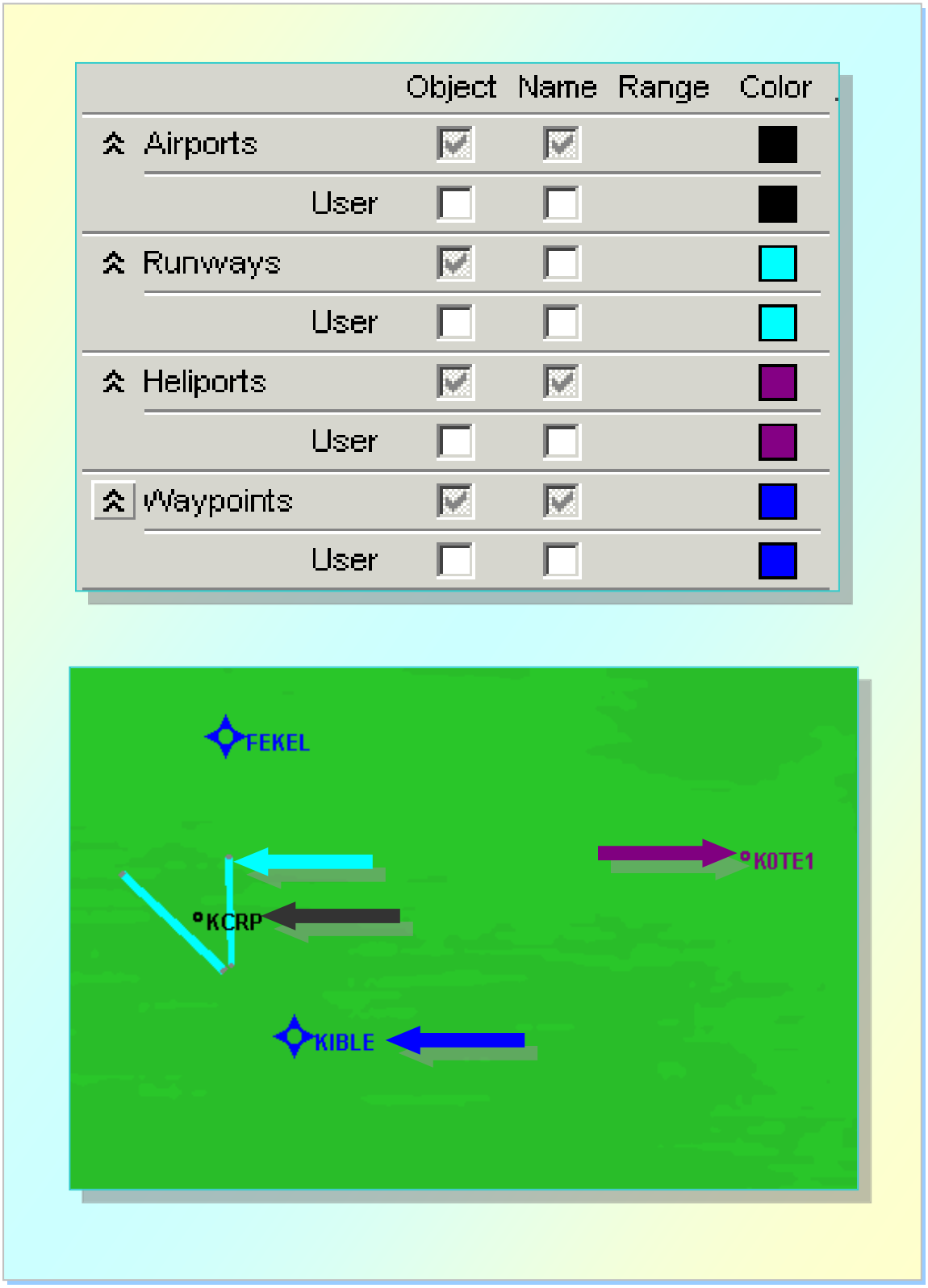


Figure 4-1: Airports, Runways, Heliports, and Waypoints

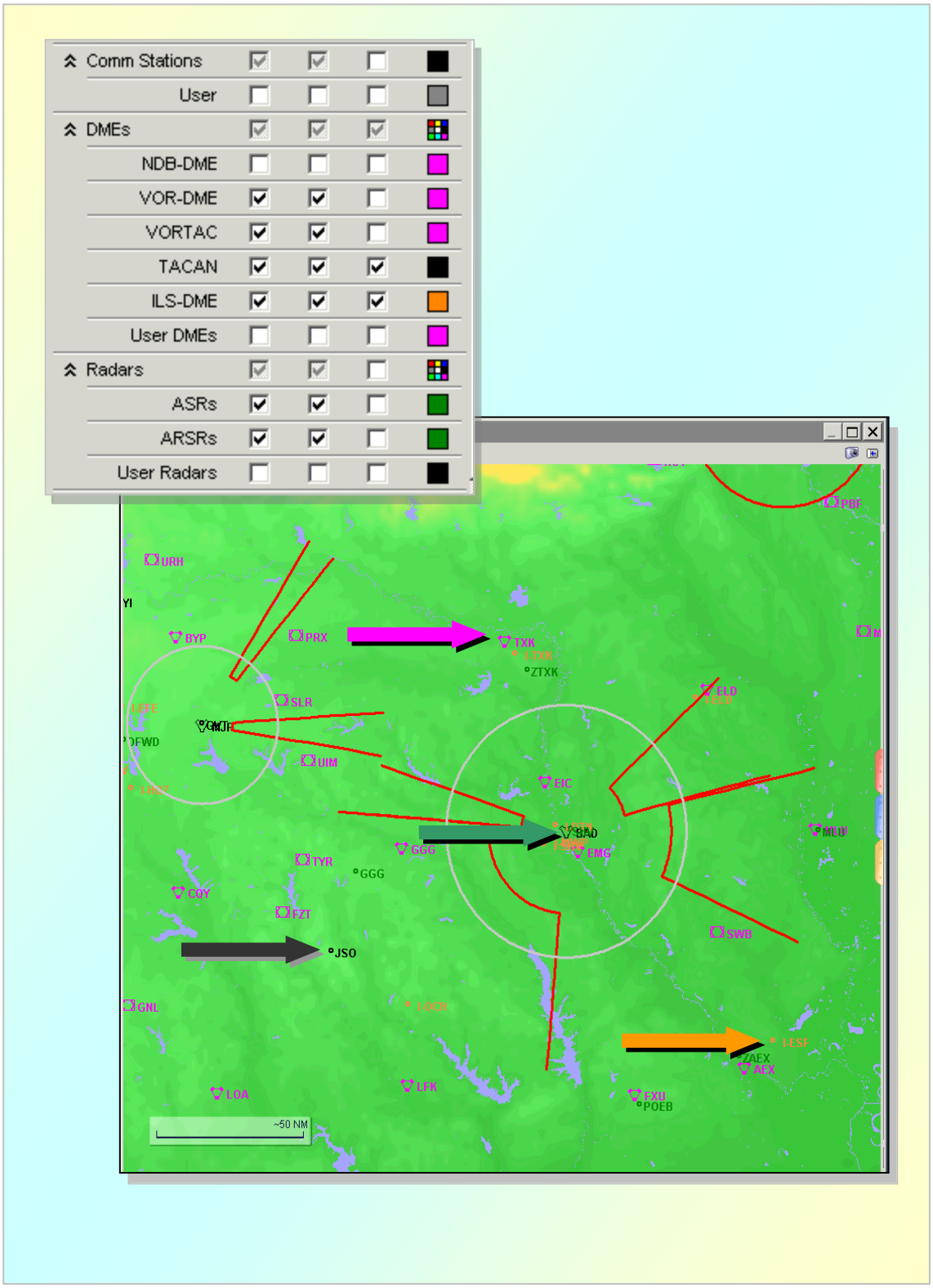


Figure 4-2: Comm Stations, DMEs and Radars

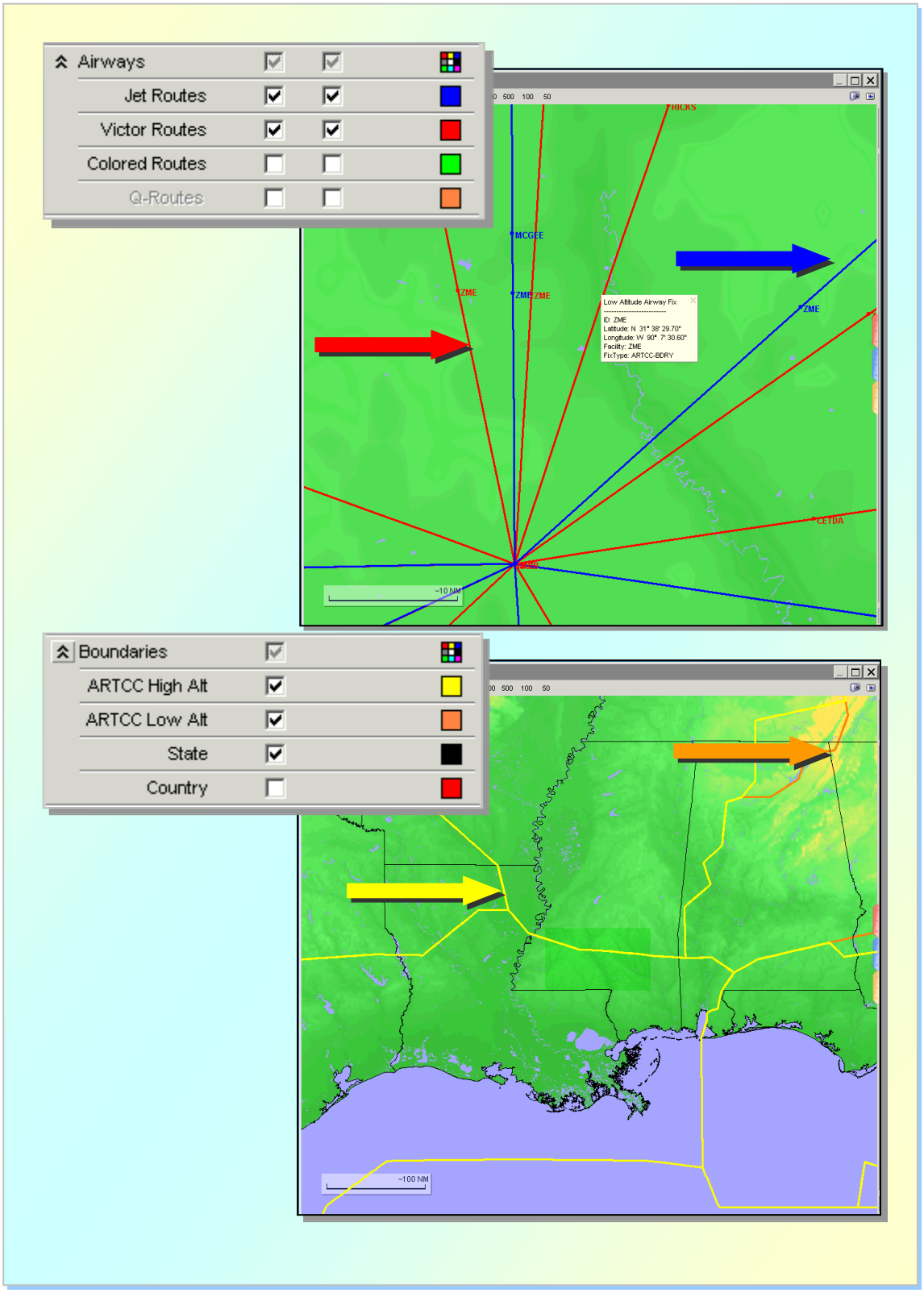


Figure 4-3: Airways and Boundaries

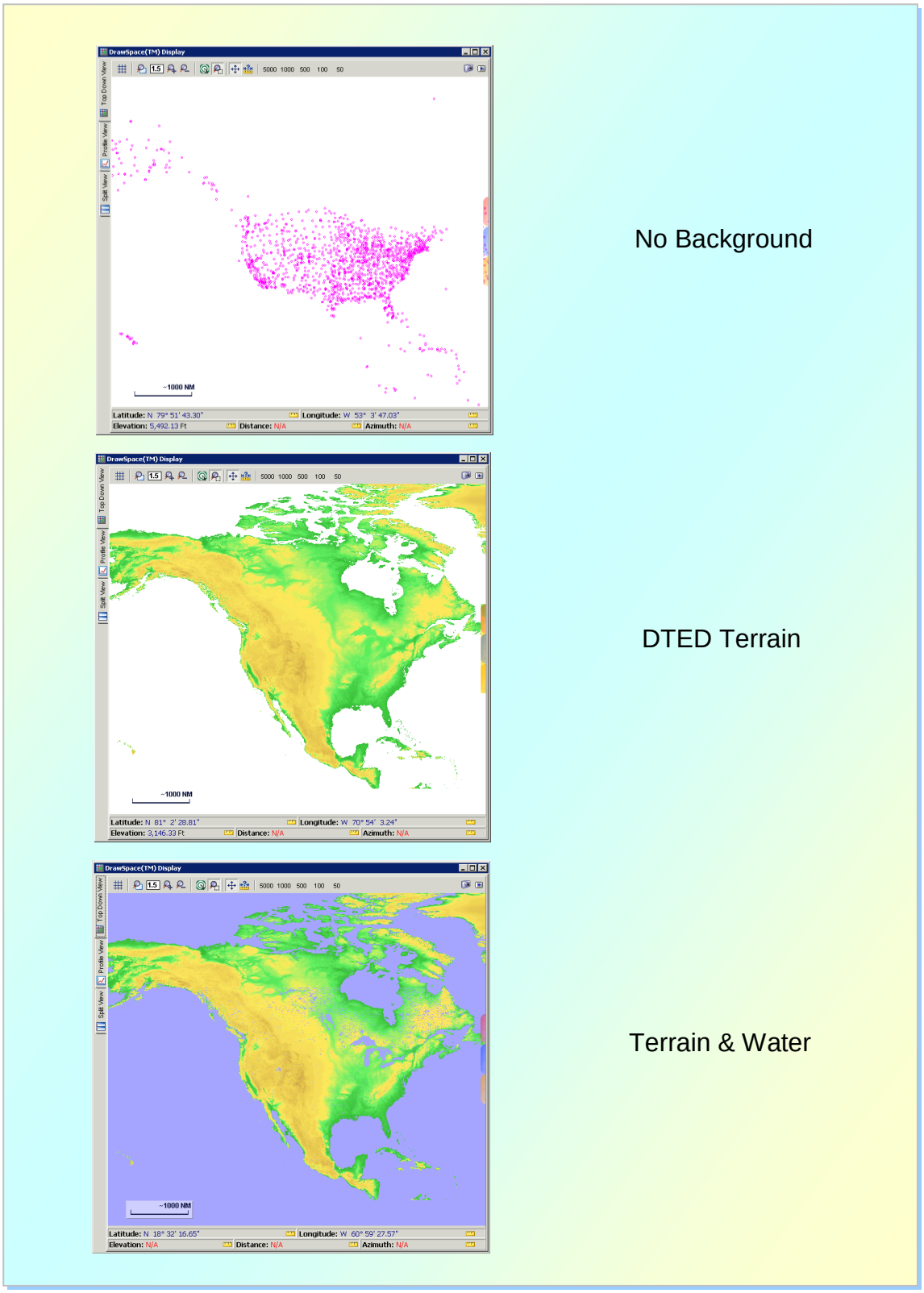
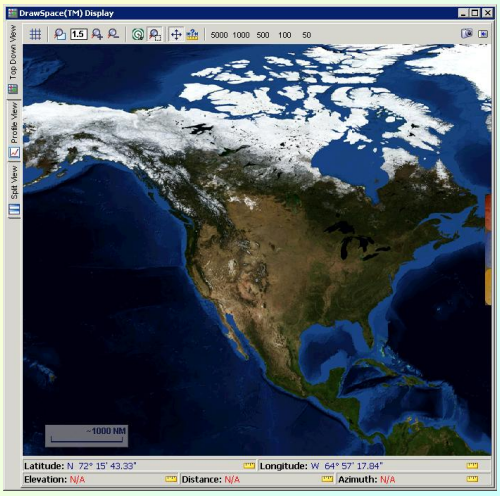
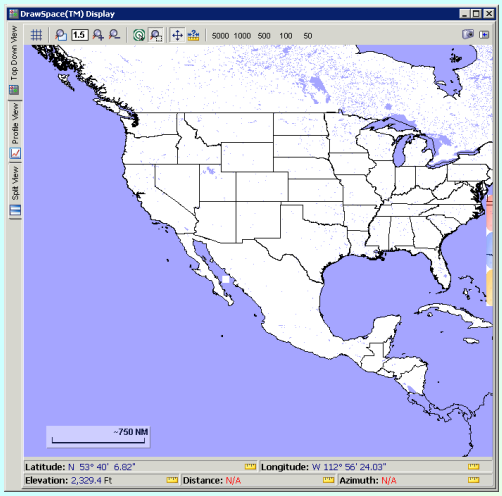


Figure 4-4: No-Background/DTED Terrain/Terrain & Water



Blue Marble

Sectional Chart



Water

Figure 4-5: Backgrounds Blue Marble/Sectional/Water

4.2 Search Data

The Search Data tool is used to search for specific airports, runways, waypoints, DMEs, radars, and airways. The tool is opened 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 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:

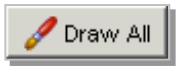
- Item Name: Shows item location with a yellow circle on the DrawSpace™Display and provides ToolTip information in the Search Results window.

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.

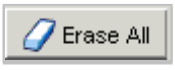
Erase Item: Erases item from DrawSpace™Display.

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

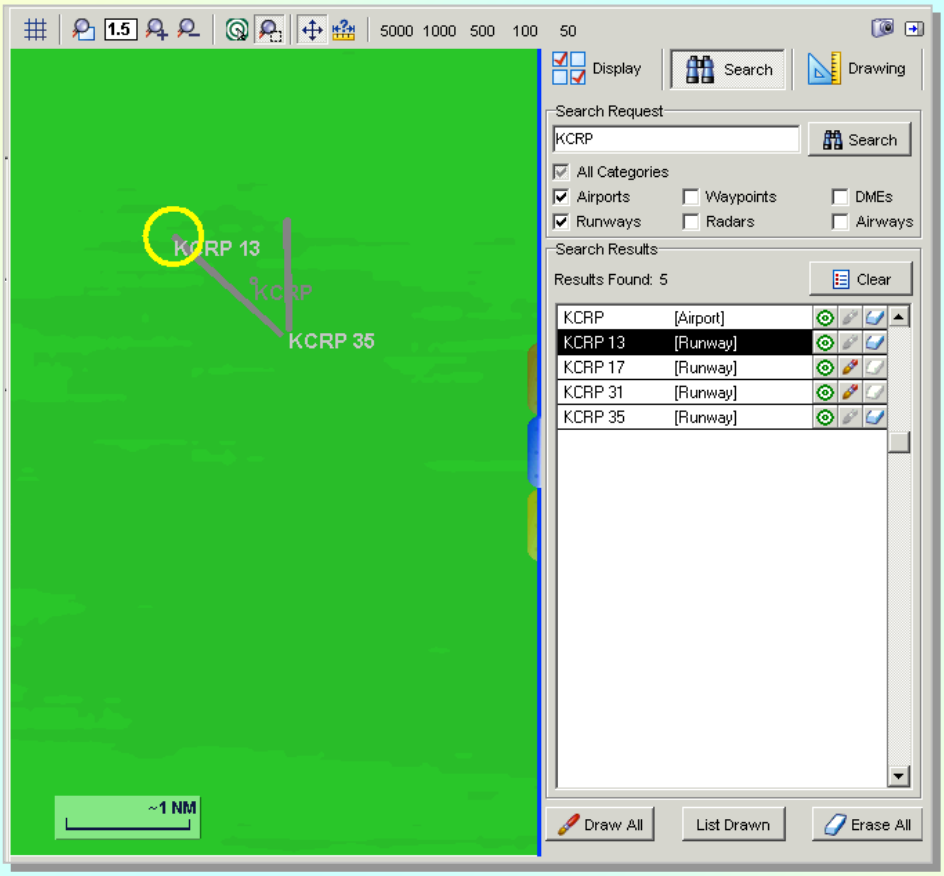


Draw All: Displays all the items in the Search Results window on the DrawSpace™Display.

List Drawn: Shows only items that have been drawn on the DrawSpace™Display and removes all items not drawn.



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



Yellow Circle: Left mouse click on “Draw Item” icon places a momentary circle around the item location.

Figure 4-6: Search Data

4.3 Drawing Tool

The Drawing Tool is used to draw item on the DrawSpace™Display. The tool is layout with Groups and Items which contain square button and checkboxes. The tool is opened by clicking on the gold tab.

- General: The three general square buttons 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 groups' 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: The three Items 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: Opens the DrawSpace Item Editor and allows user to add a new draw shape to the Group selected.

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

  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, first highlight the Group and Item in their windows and select the Edit square button. The DrawSpace Item Editor will open. This is the same window that was used to add the item originally. Modify the item; then, click the Accept button. The editor will close, and the modified item will appear in the DrawSpace™Display.

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

4.3.1 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.

- Item Type: The user has multiple drawing shapes from which to choose, they are, Arc, Circle, Line, Point, Polygon, Polyline, Freeform, and 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.

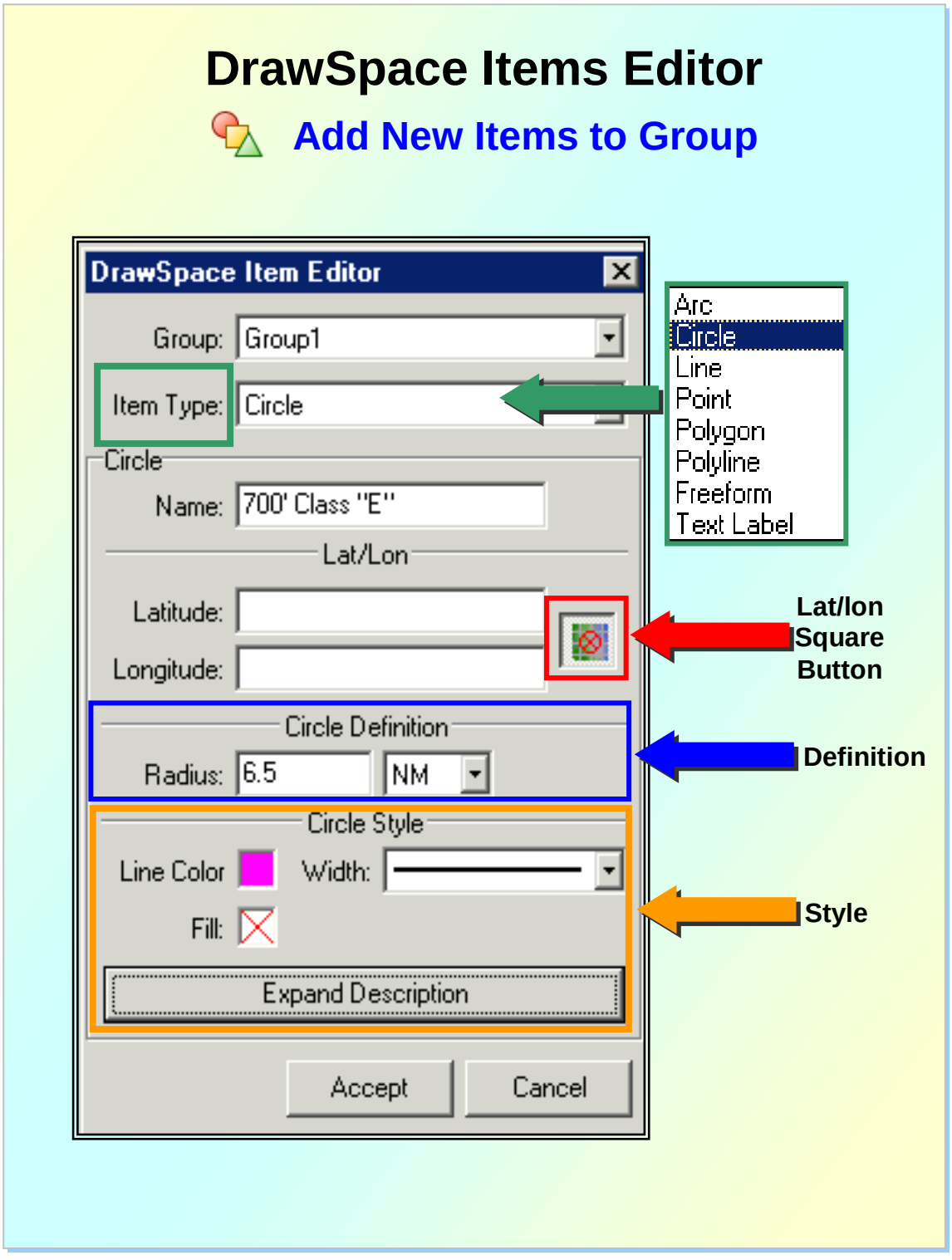


Figure 4-7: DrawSpace Item Editor/Add New Items to Group

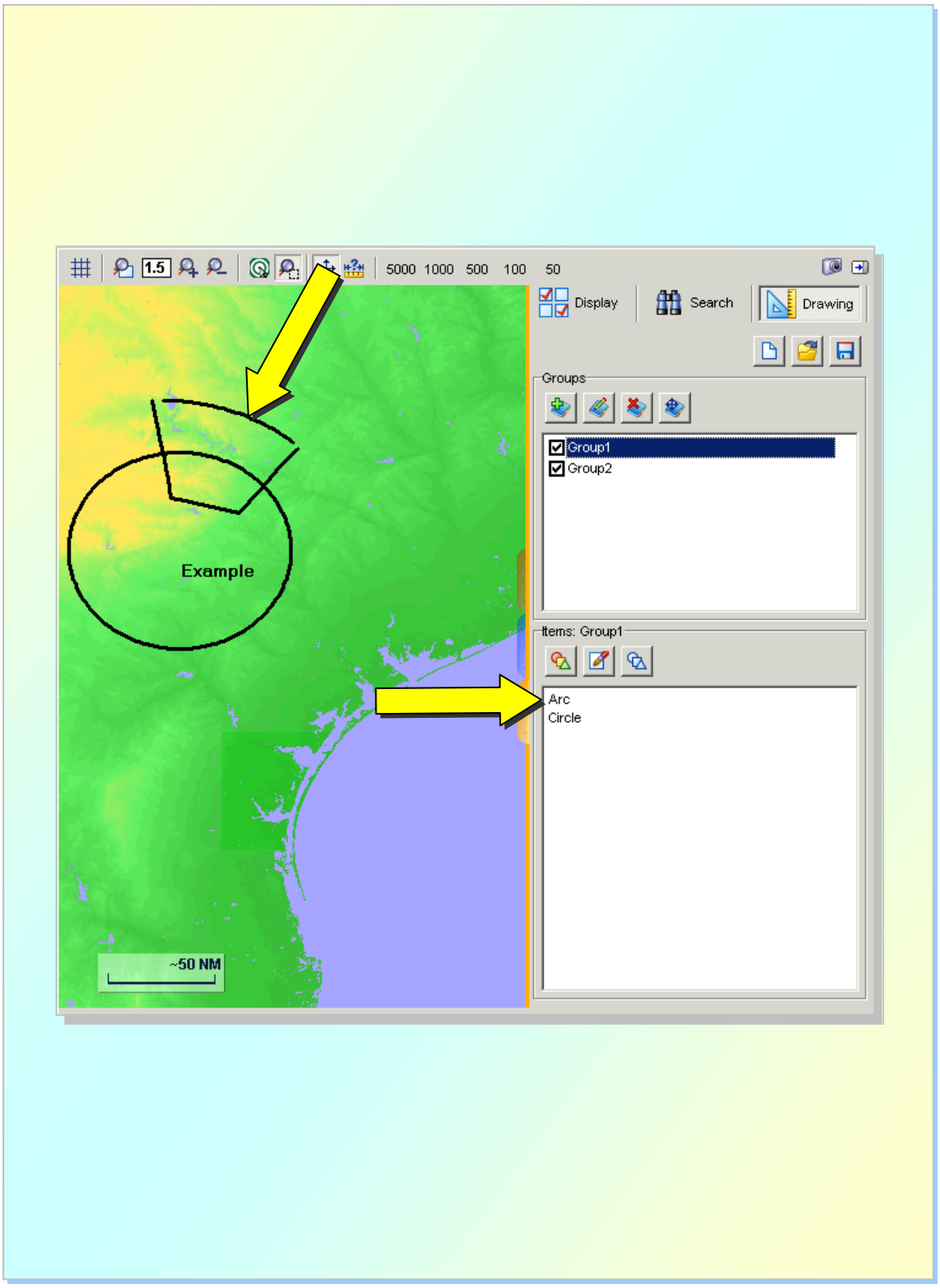


Figure 4-8: Example of Drawing Tool Items

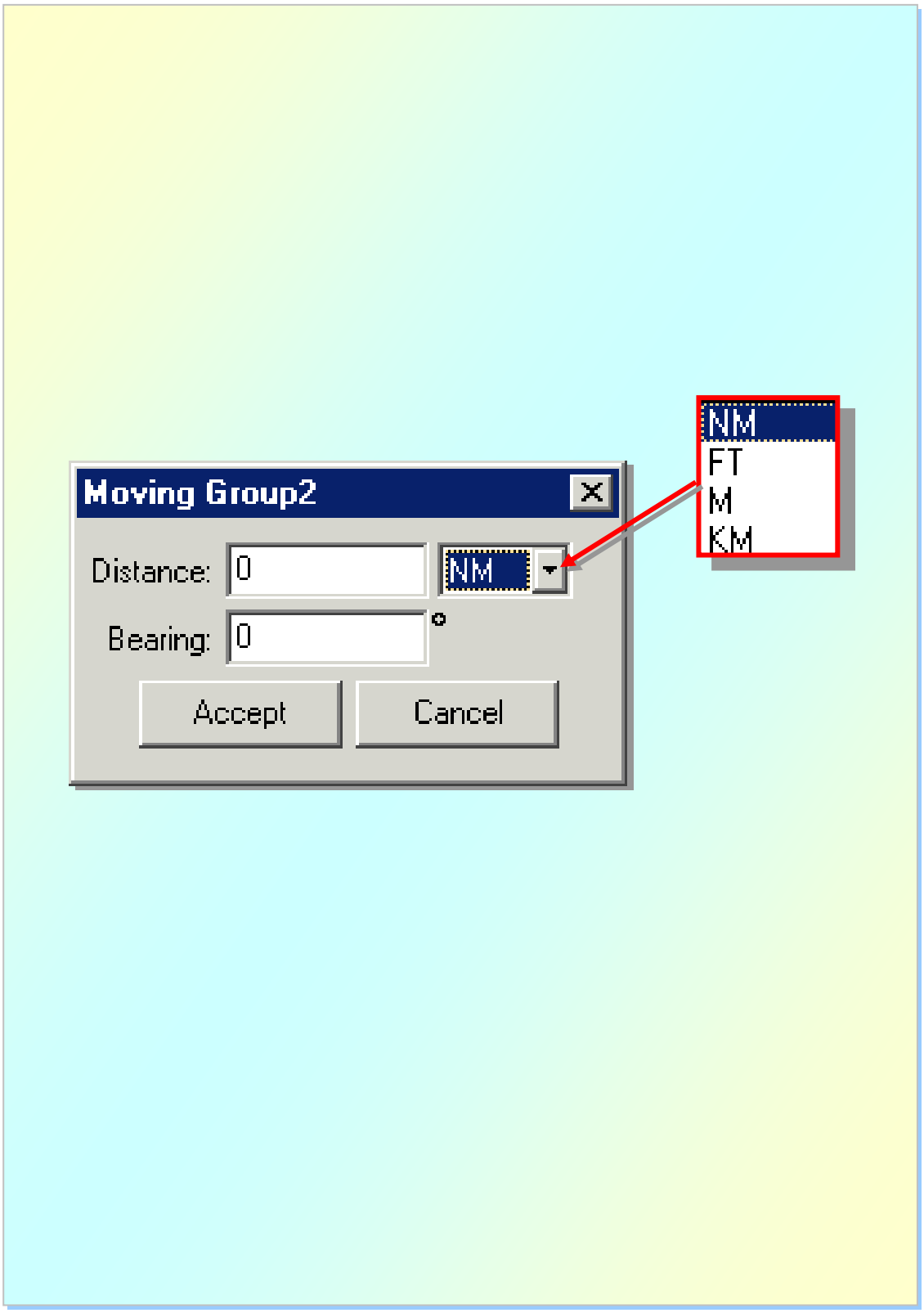


Figure 4-9: Moving Group window

5.0 View Tabs

There are three view tabs on the left side of the DrawSpace™Display. These tabs open and close a Top Down, Profile, and Split view in the DrawSpace™ Display.

5.1 Top Down View

The top down view is the same as the DrawSpace™Display. Toolbar Mileage Scale and Data Bar are contained in the Top Down View.

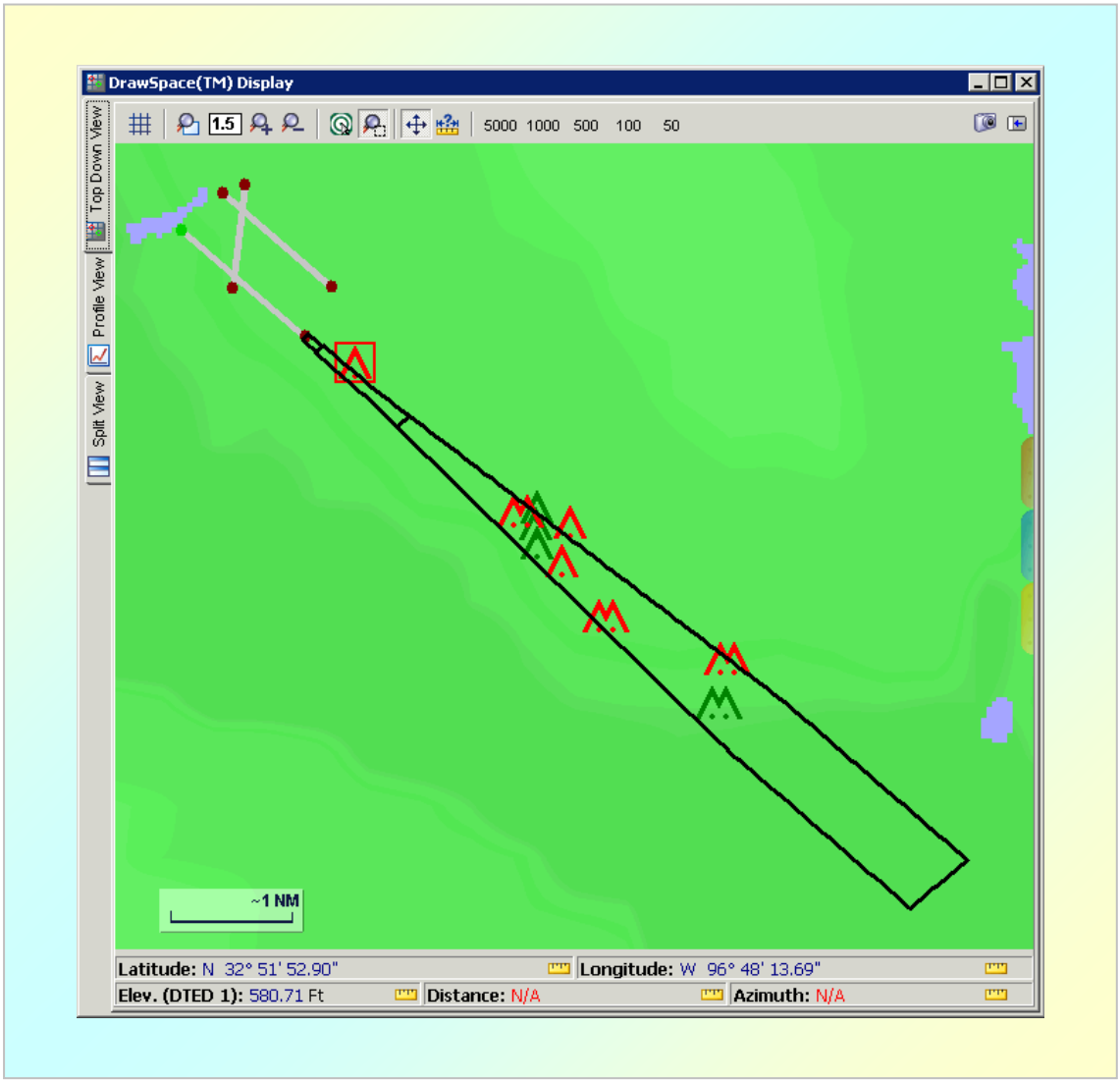


Figure 5-1: Top Down View

5.2 Profile View Tab

The Profile View has five areas: a Surface Slope window, Toolbar, Data Bar, DrawSpace™Display and an Aspect Slide Bar.

- Surface Slope window: Allows the user to set different slopes at specific points between DER and airport boundary. The square buttons in the window are:

Reset to Default Slope: Resets the slope to the default of 62.5:1 slope for the entire distance.

Add New Slope Change: Allows the user to add a vertical line at a specific point in the interactive window. Also adds the distance and slope to the "Distance/Slope" Columns to the right side of the interactive window.

Remove Slope Change: Remove a vertical line from the interactive window and removes the distance and slope from the "Distance /Slope" Columns.

Move Slope Change: Allows the user to grab the vertical line with the mouse and move the line to a new location. The data in the "Distance /Slope Columns" are also changed.

Distance: This window allows the user to enter a distance in feet.

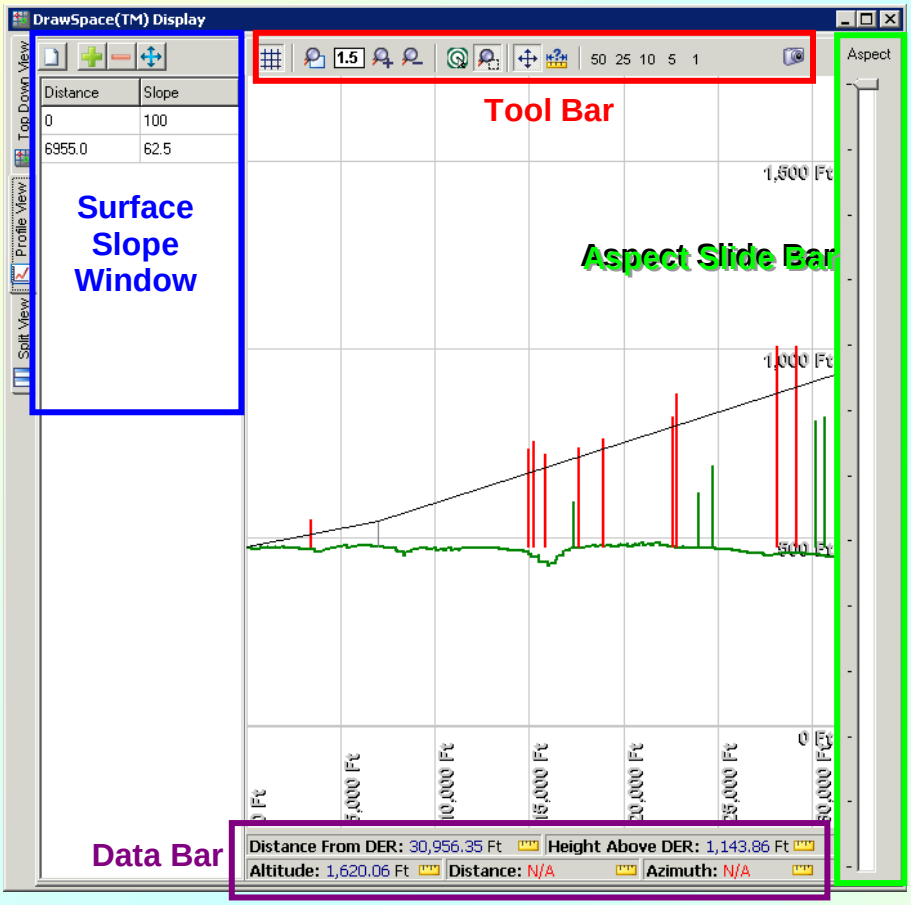
Slope: This window allows the user to enter a slope.

- Toolbar: This is the same Toolbar which is in the Top Down view. See paragraph 3.1 for more detail.

- Data Bar: This is the same data bar which is in the Top Down view. See paragraph 3.2 for more detail.

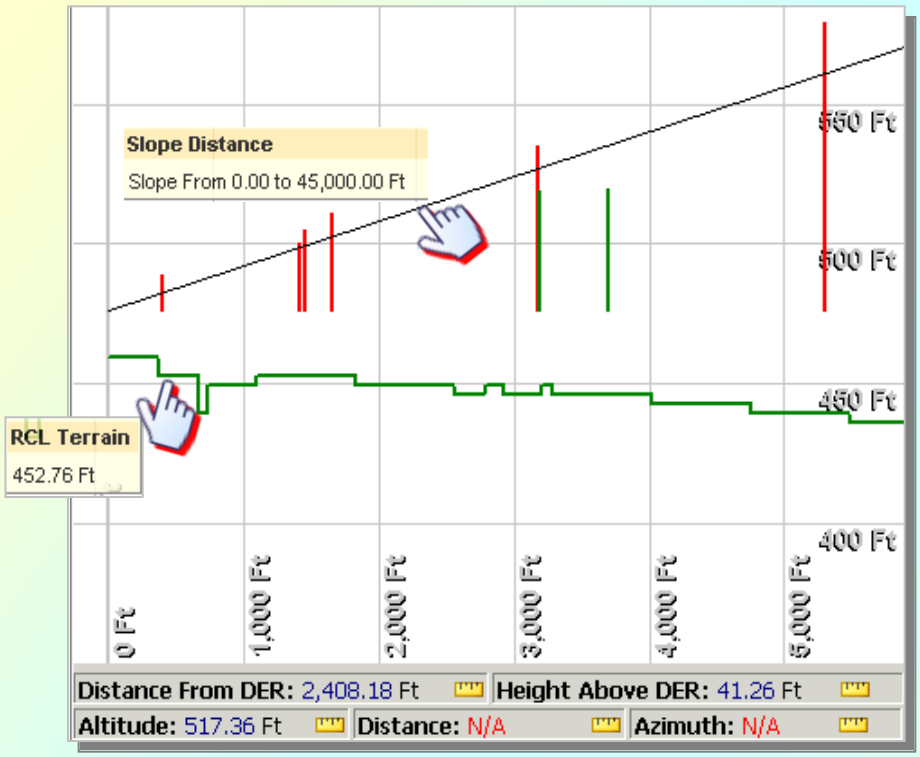
- Aspect Slide Bar: The slide bar controls the aspect ratio for the profile picture. The center position on the slide bar is a realistic representation of the slope and image, as you move up the scale the presentation of the slope and image are exaggerated.

- DrawSpace™Display: The grid in the display area represents distance and altitude. The vertical lines are distance and the horizontal lines are altitudes.



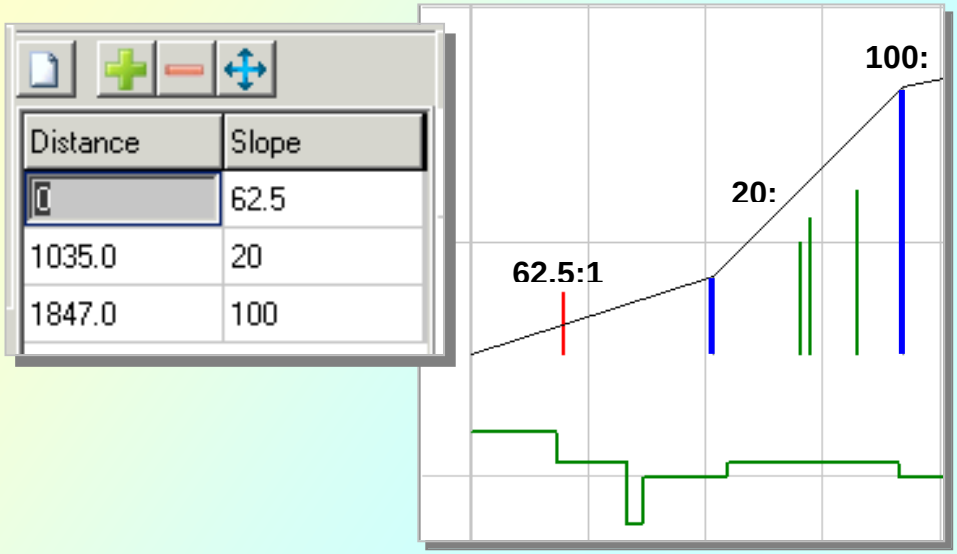
- The Toolbar is across the top of the window. See paragraph 3.1 for more detail.
- The Data Bar provides information as the mouse is moved within the DrawSpace™Display.
  - Distance to DER
  - Height Above DER
  - Altitude
- The Aspect Slide Bar provides a more useable presentation of the slope and images.

Figure 5-2: Profile View



- Distance: Vertical lines across the window are distances.
- Altitude MSL: Horizontal lines along the right side are altitude above DER.
- Terrain: Green line along the bottom terrain MSL.
- Penetrating Obstruction: Obstacles shown in red.
- Non-Penetrating Obstruction: Obstacles shown in green.
- Slope Distance: Black diagonal line across the window.
- Terrain ToolTip: Runway Center Line (RCL) terrain MSL.
- Slope Distance: The data is shown in the Data Bar at the bottom of the window. Distance from DER, Height Above DER, and Altitude.

Figure 5-3: Profile View cont'd



- Left mouse click “Add New Slope Change” Icon and select a location on the DrawSpace™Display with the mouse. This will add a new row to the Distance and Slope column.
- Enter values in the Distance and Slope windows.
- Left mouse click the Build button in the Design Interface Module.

Left mouse click “Remove Slope Change” Icon and click on the vertical line in the DrawSpace™Display with the mouse. This will delete the line and remove the data from the Distance and Slope column.

Left mouse click “Move Slope” Icon and click and drag vertical line to new location. This will update the data in the Distance and Slope window.

Figure 5-4: Profile View cont’d

5.3 Split View Tab

The Split View Tab displays both the Top Down View and the Profile View. All the features of the Top Down View and the Profile View are operational however the two windows operate independent of each other.

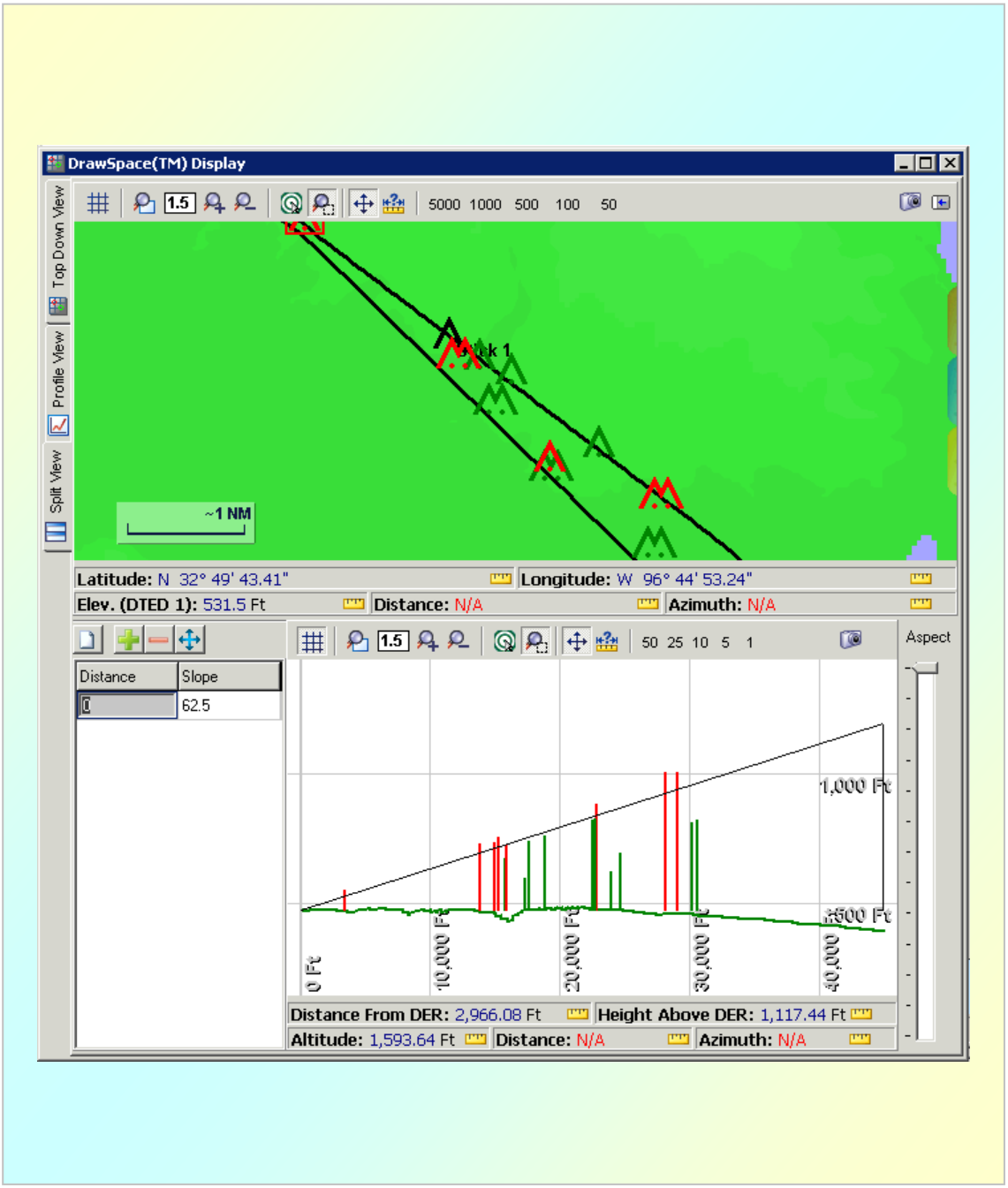


Figure 5-5: Split View

6.0 User Data

User Data allows addition of new items in an EOSE™ database or to modify items in the AVNIS database.

- **User Data** window allows the user to Add, Edit, Delete and Clear database EOSE™ users may build their own database add and modify airports, runways, DMEs, waypoints, obstacles, RADARs, and radios.

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.

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, and Radios.

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.

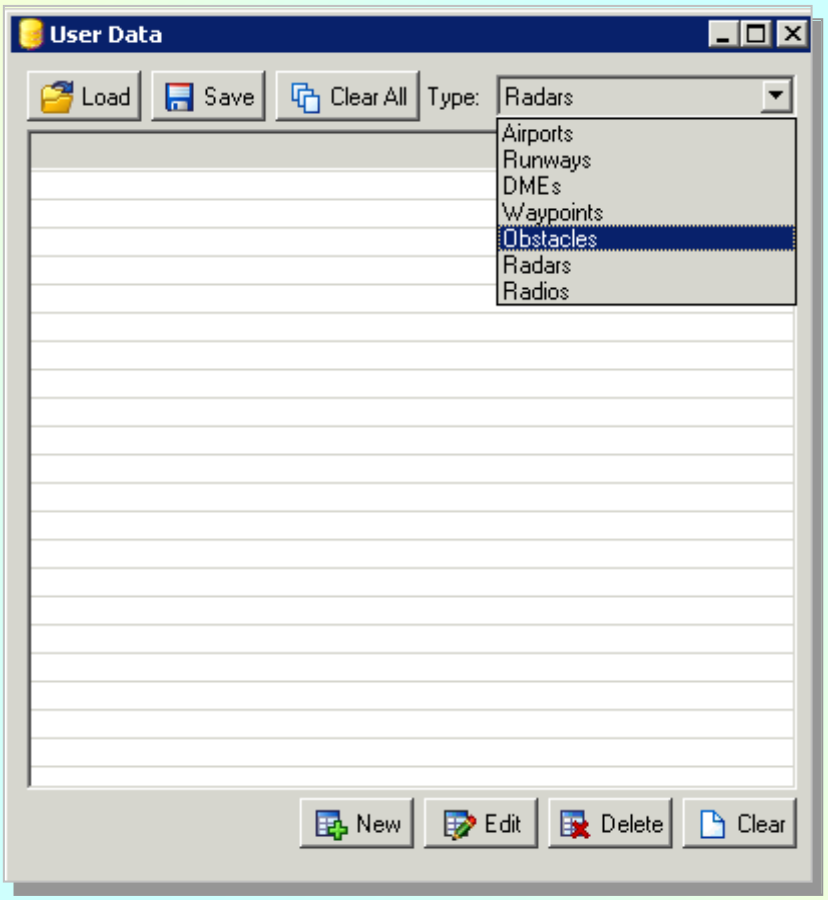


Figure 6-1: User Data Window

- New User Obstacle: Allows the user to add, edit, delete or clear an obstacle in user database and to modify DOF obstacle. The official DOF database is not actual modified, only EOSE™ database. The “New User” 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 a DOF obstacle from the DrawSpace™Display to be modified.

    - ID: The Digital Obstacle File (DOF) identification number assigned by NACO or user assigns a name for User Database obstacles.
    - Replace: Allows the user to replace or modify a DOF obstacle.
    - 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 the mouse.

    - Elevation: Obstacle elevation in feet MSL.
    - Accuracy Code: Allows user to enter Accuracy Code. See FAA Order 8260.19, Appendix 2, Obstacle Accuracy Standards, Codes and Sources for more detail.
    - 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.

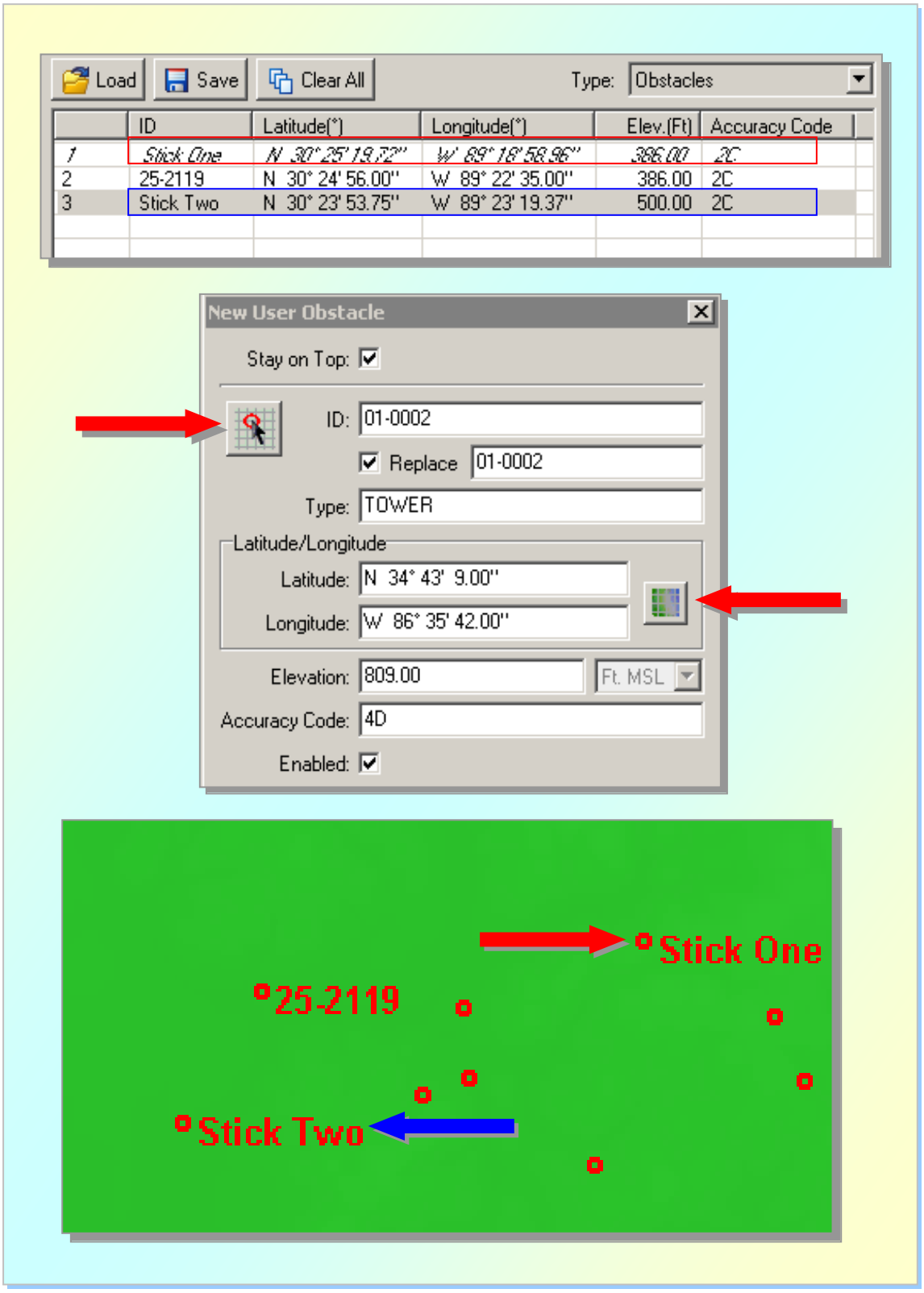


Figure 6-2: New User Obstacle window

- User Runway: Allows the user to modify a runway at an existing airport. The User Runway window functions are:

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

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

   Copy DrawSpace Item from Mouse: Use the following step:

    ◊ Open Display Data tool, and then select checkbox “Runways.”
    ◊ Open User Data Module.
    ◊ Open “Type” drop-down window then select “Runways.”
    ◊ Click “New” button to open the “User Runway” window.
    ◊ Select “Copy DrawSpace Item from Mouse.”
    ◊ In the DrawSpace™Display, mouse click on a runway end.
    ◊ All runway data is filled into the “User Runway” window.
    ◊ Modify the desired runway item.

  - Replace: Allows the user to select an existing runway, modify the runway data and use modified data in place of existing runway data.

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

  - Threshold Arrival/Departing End of Runway:

    ◊ Latitude/Longitude: The runway threshold latitude and longitude in degrees, minutes, seconds to the nearest hundredth.

    ◊ Elevation: Threshold elevation in feet MSL.

   Get lat/lon from DrawSpace: This button allows the user to select a location on the DrawSpace™Display with the mouse.

  - 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.

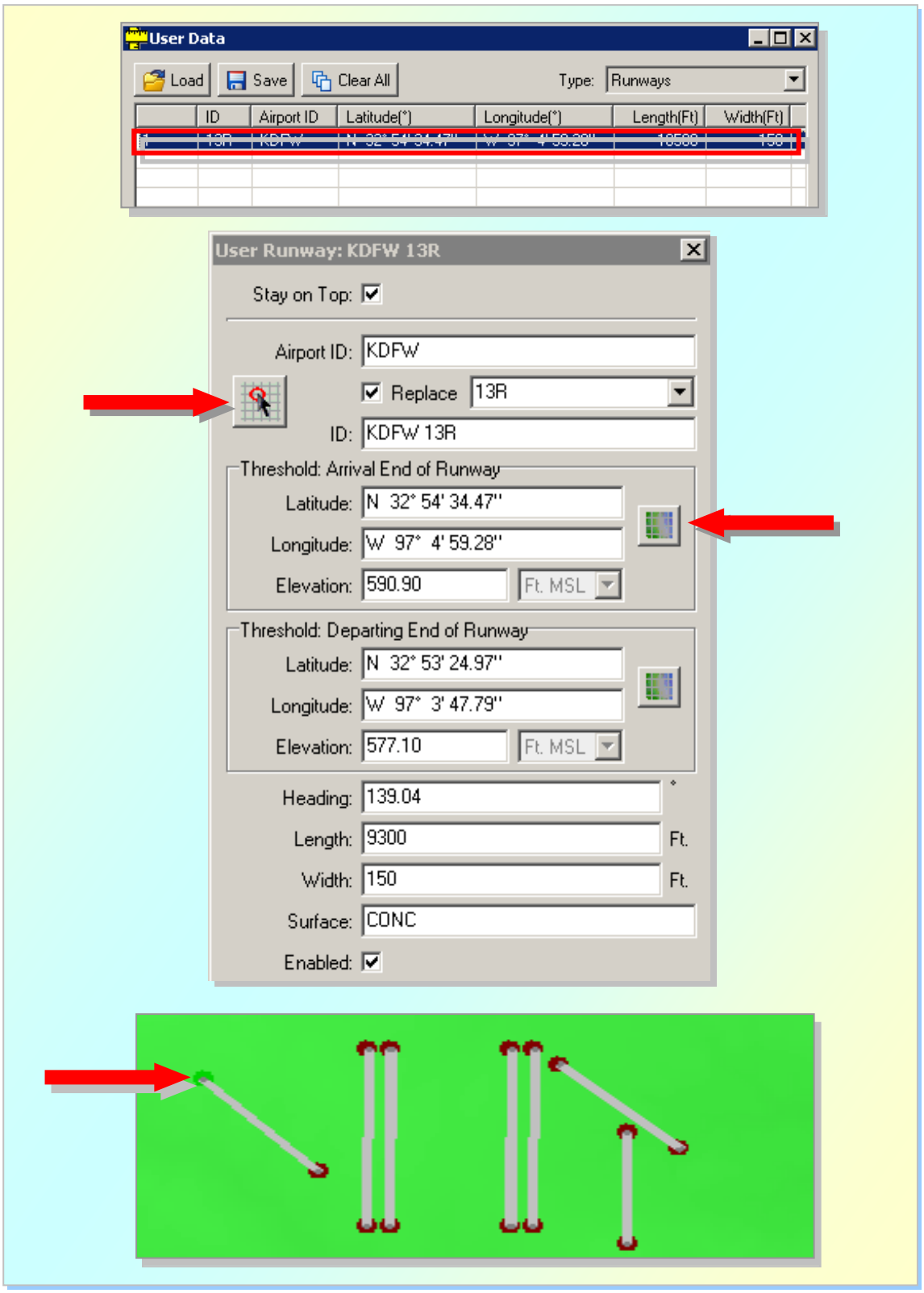


Figure 6-3: User Runway window

7.0 Geo Calculator

- Find Distance and Heading: Allows user to obtain a distance and heading from one point to another point. See Figure 7-1

- Find Latitude/Longitude: The user selects a point on the DrawSpace™Display with the mouse and entering a distance, and heading, the calculator provides the latitude and longitude. See Figure 7-2

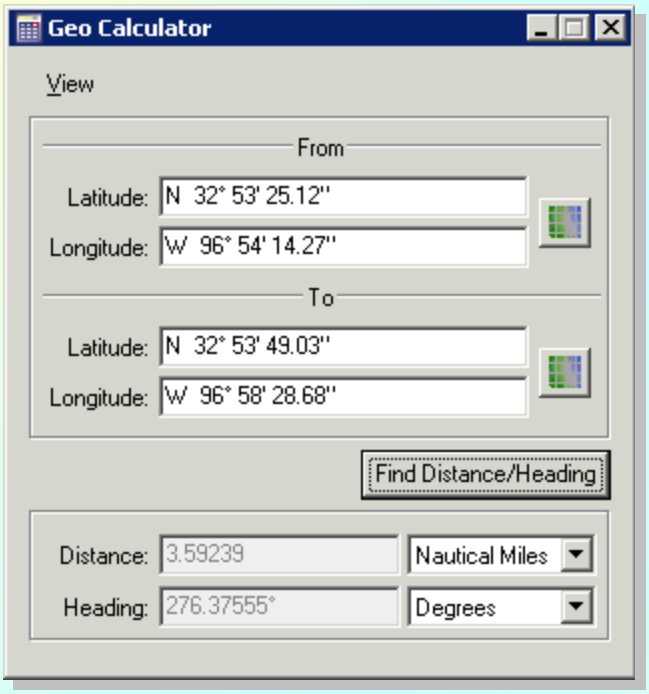
- Find Intersection: Allows the user to enter latitude/longitude to create intersecting line on the DrawSpace™Display, the calculator provides the latitude/longitude of the intersecting lines. See Figure 7-3

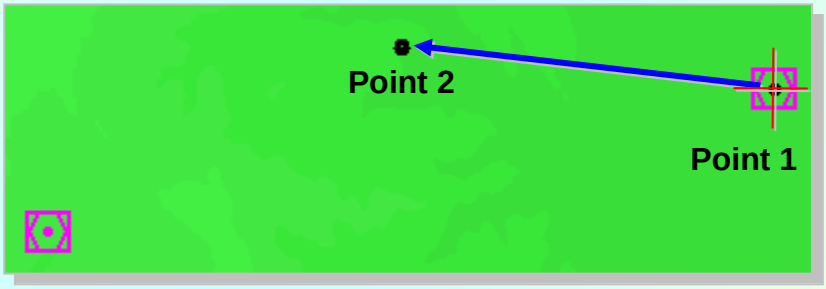
- Find Climb Gradient: Allows the user to enter a slope and the calculator provides the Climb Gradient, or visa versa. Entering a distance the calculator provides the altitude of the slope at that distance. See Figure 7-4

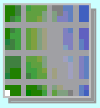
- Conversion: The Calculator converts the following:
  - Distances: Feet, Meters, Nautical Mile or Kilometers
  - Latitudes/Longitudes: DMS, Radians, or Degrees
  - Weight: Pounds, Kilograms or Mass

- Clear Current: Clears the data entered in the windows.

Find Distance and Heading





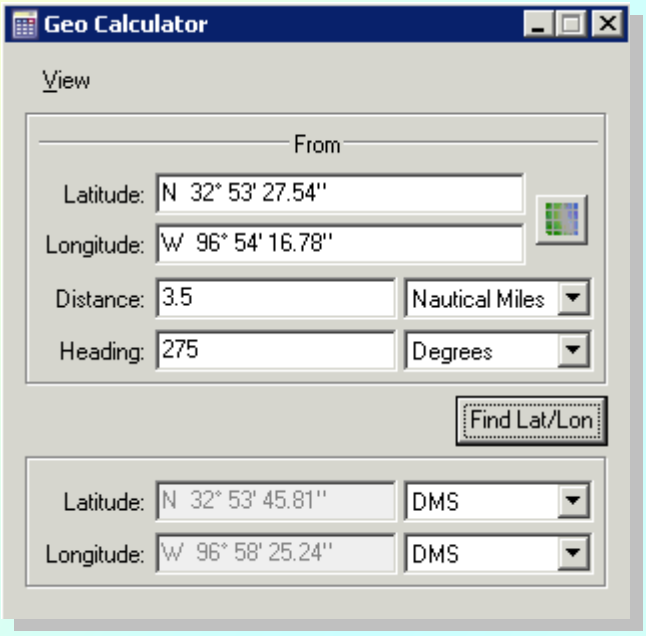


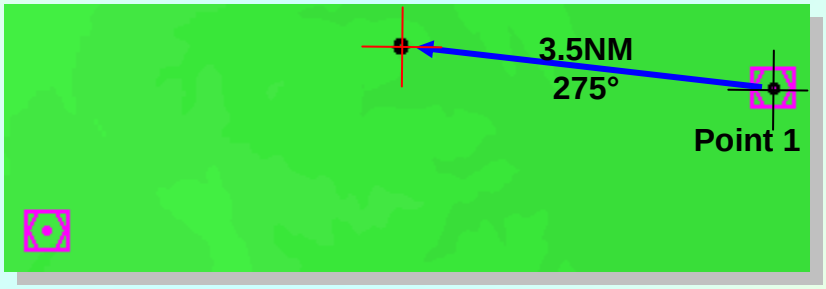
"Get Lat/Lon From DrawSpace"

- Select the "Get Lat/Lon From DrawSpace" icon and select two points on the DrawSpace™ Display with the mouse.
- Click "Find Distance /Heading" button.
- Answer provided in the Distance and Heading windows.

Figure 7-1: Find Distance and Heading

Find Lat/Lon

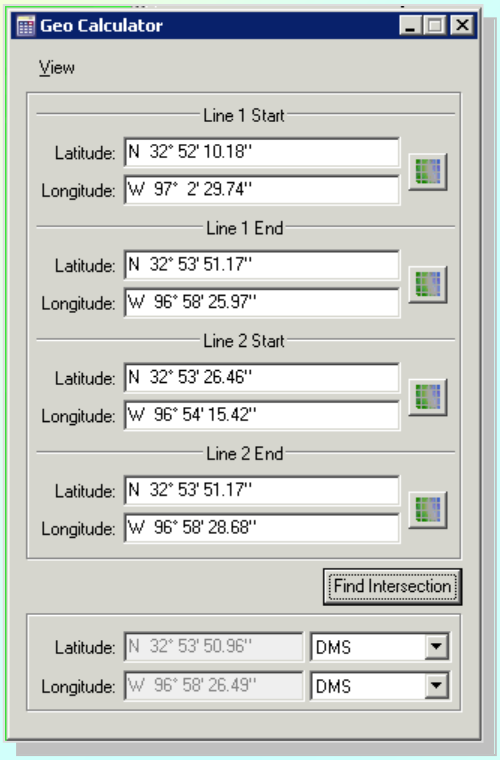


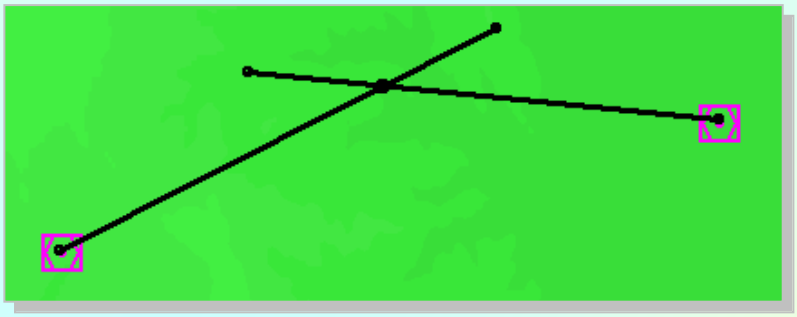


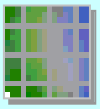
- Select the “Get Lat/Lon From DrawSpace” icon and select a point on the DrawSpace™ Display with the mouse.
- Enter a Distance and Heading in the appropriate windows.
- Click “Find Lat/Lon” button.
- Answer provided in the Latitude and Longitude windows.

Figure 7-2: Find Lat/Lon

Find Intersection







"Get Lat/Lon From DrawSpace"

- Select the "Get Lat/Lon From DrawSpace" icon and select four points on the DrawSpace™ Display with the mouse.
- Click "Find Intersection" button.
- Answer provided in the Latitude and Longitude windows.

Figure 7-3: Find Intersection

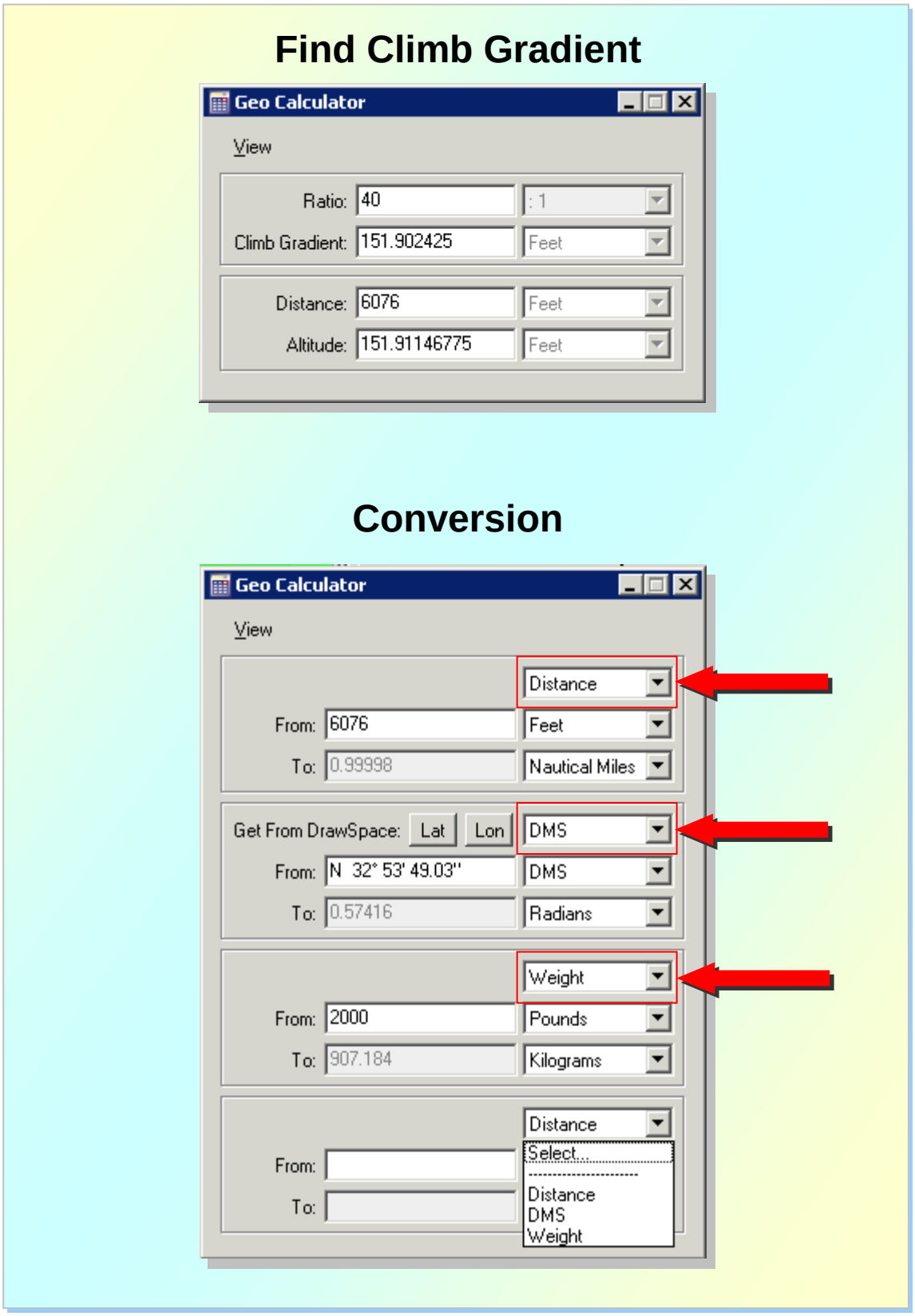


Figure 7-4: Find Climb Gradient and Conversion

8.0 Design Interface Module

This module will help set up the screening and airport/runway setting for the engine-out surface evaluation and Type 3 surface evaluations.

8.1 Data Screening Options

There are three databases available for the engine-out evaluation, they are:

- Obstacle (DB): This checkbox activates the Digital Obstacle File (DOF) database which contains all manmade obstacle considered by National Aeronautical Charting Office, AVN-500 to be significant to aviation.

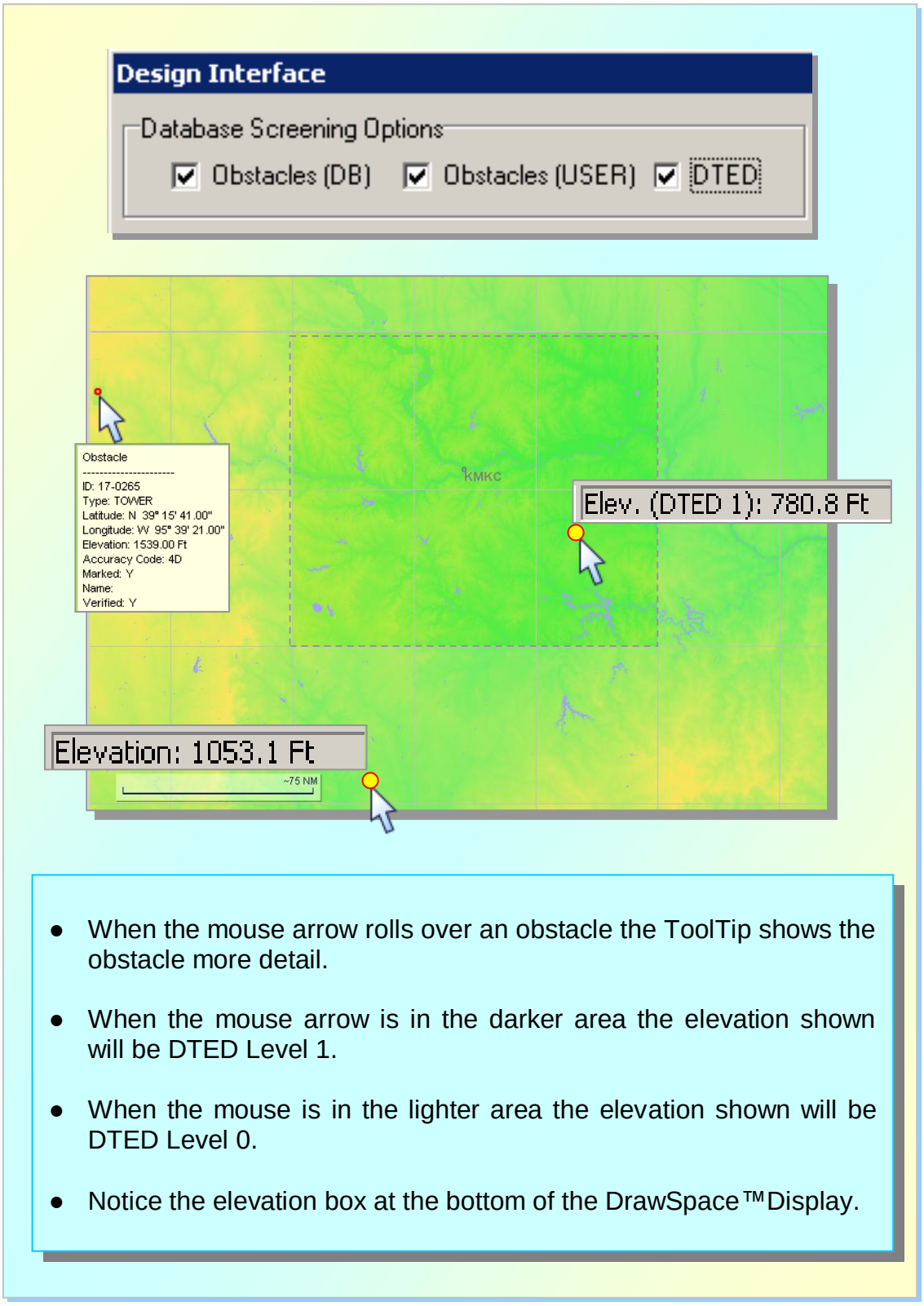
- Obstacle (User): This checkbox activates all manmade obstacles which have been created by the user. The User Data module is used to create, save, and modify obstacles; for details see paragraph 2.2.

- DTED: This checkbox activates the Digital Terrain Elevation Data (DTED). EOSE™ displays both DTED Level 0 and DTED Level 1. See Figure 8-1

    - When the user zooms into a distance of less than 50 miles, EOSE™ automatically changes to DTED level 1.

    - DTED Level 1 has a horizontal accuracy of 164' feet and 98 feet vertical accuracy or an Accuracy Code of 4E. See FAA Order 8260.19, Appendix 2, Obstacle Accuracy Standards, Codes and Sources for more detail.

    - As the mouse is moved over the DrawSpace™Display the terrain elevation is shown at the bottom of the screen. When mouse is displaying Level 1 data it will shows DTED 1 in parentheses.



- When the mouse arrow rolls over an obstacle the ToolTip shows the obstacle more detail.
- When the mouse arrow is in the darker area the elevation shown will be DTED Level 1.
- When the mouse is in the lighter area the elevation shown will be DTED Level 0.
- Notice the elevation box at the bottom of the DrawSpace™ Display.

Figure 8-1: Digital Terrain Elevation Data

8.2 Airport/Runway Settings

- Select Central Airport: This window allows the user to select Runway to be evaluated for possible obstacle penetration of the engine-out slope.

- Display DER: This window allows the user to set the distance to displace the DER.

    - A positive number/distance entered in the window will place the beginning point of the slope farther away from the runway end. See Figure 8-3.

    - A negative number/distance entered in the window will place the beginning point of the slope before the existing DER. See Figure 8-3

- DER MSL: The MSL terrain elevation of the slope starting point is automatically entered.

- Use Accuracy Code: The default accuracy code is 6E for any obstacle which has no accuracy code assigned. However most obstacles in the DOF have an accuracy code assigned.

- Interactive Airport Diagram window: This window allows the user to select a runway for the evaluation. ToolTip information is provided as the mouse rolls over the runway end.

- Next: Proceeds to the “Surface Settings” window.

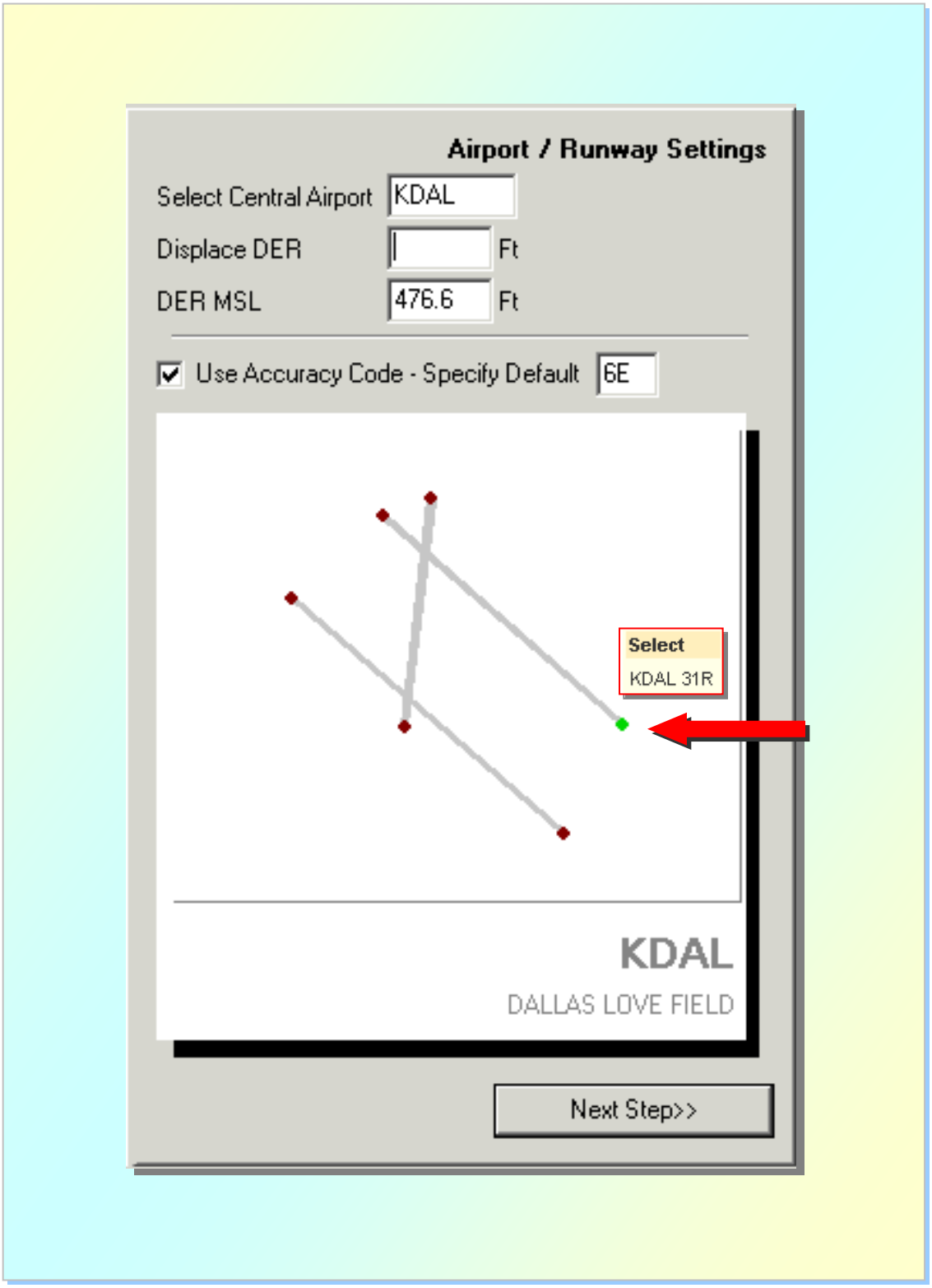


Figure 8-2: Airport/Runway Settings

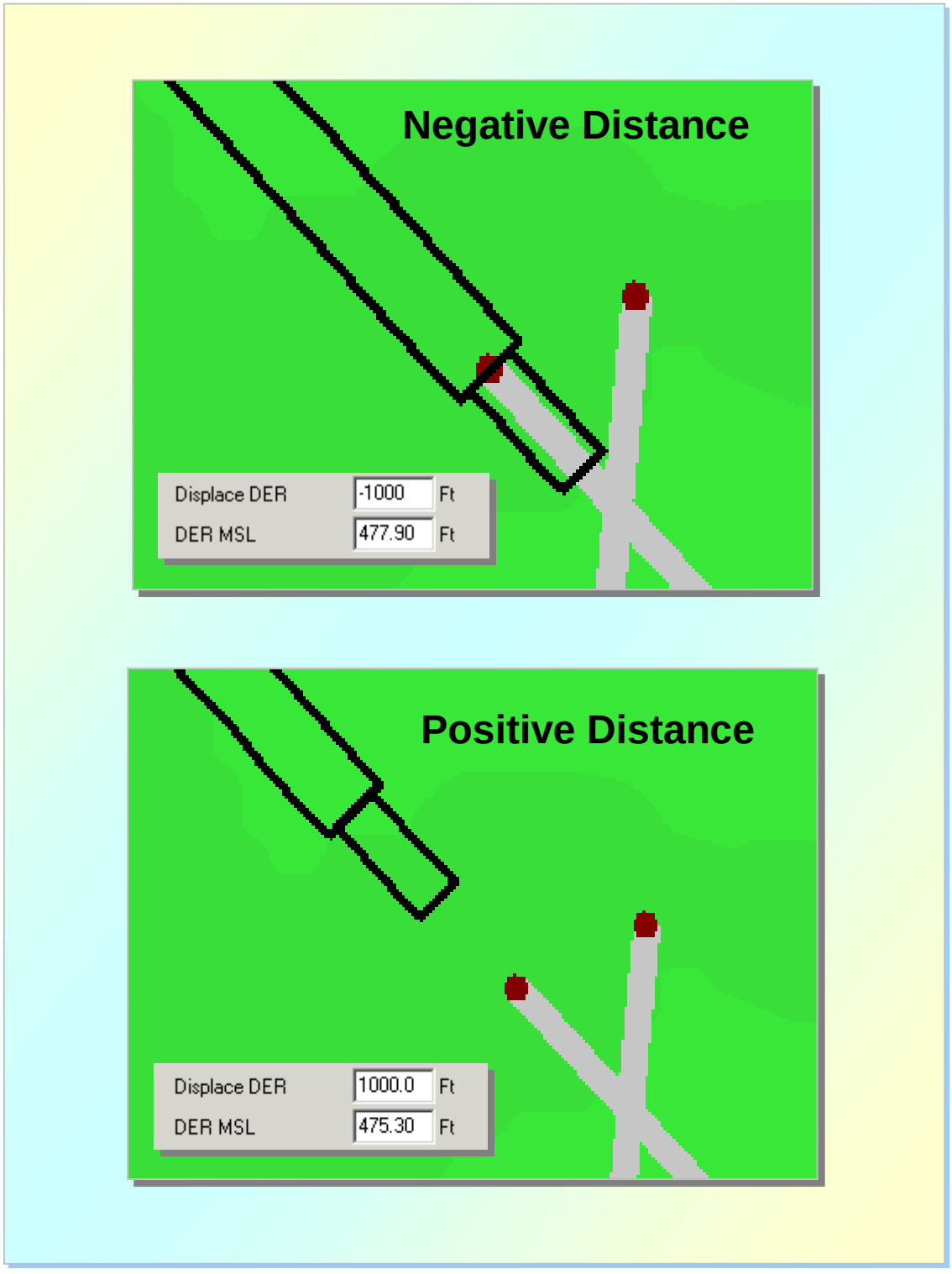


Figure 8-3: Displacement of DER

8.3 Surface Settings

The Surface Type radial buttons allow the user to choose either Engine-Out surface or Type 3 surface for an obstacle evaluation.

8.4 Engine-Out Surface

Engine-Out Surface: Allows the user to enter surface termination point, airport boundary data, wingspan width, surface slope, and turns to the Obstacle Accountability Area (OAA).

- Terminate Slope at Specified (Dist.): Sets the length of the OAA.

- Terminate Slope (Alt.): Allows the user to enter an altitude above the DER. The OAA length will be calculated based on the altitude multiplied by the slope.

- Distance to the Airport Boundary: Sets the distance in feet from the start of the OAA surface to a point where the minimum half width becomes 300 feet. See Figure 8-5 for more detail.

    - Left mouse click on blue hyperlink will open the “Surface View” window which shows a top down view of the OAA.

    - The distance between the DER and the airport boundary can be obtained from Airport Service or an Airport Layout Plan (ALP).

    - OAA criterion Reference FAA Advisory Circular AC No 120-91 Airport Obstacle Analysis, Paragraph 11.

- Add Half Wing Span to Surface Width: This checkbox allows the user to select an Airplane Design Group from the drop-down window below and add half the wingspan width to the OAA.

    - Airplane Design Group: This is a grouping of airplanes based on wingspan. Reference FAA Advisory Circular AC No 150/5300-13, Appendix 17.

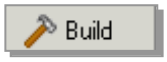
        ◊ Group 1 - up to but not including 49 feet
        ◊ Group 2 - 49 feet up to but not including 79 feet.
        ◊ Group 3 - 79 feet up to but not including 118 feet.
        ◊ Group 4 - 118 feet up to but not including 171 feet.
        ◊ Group 5 - 171 feet up to but not including 214 feet.
        ◊ Group 6 - 214 feet up to but not including 262 feet.

- Set Surface Slope: Opens Profile View Tab. See paragraph 5.2 for more detail.

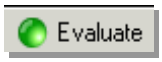
- Setup Turns: This hyperlink will open the Turns window and allow the user to establish turns within the OAA. See .4.1 for more detail.

- Move Obstacle to Worst Case Location: Once the OAA has been evaluated this checkbox moves all evaluated obstacles shown in the DrawSpace™Display to a worst case location.

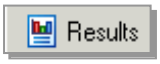
- Show Non-Penetrating Obstacle: Select this checkbox to show non-penetrating obstacles in OAA. The obstacles will be green and appear in the Top Down View area, Profile View area, and "Result" window.



Build Surface: Builds the OAA according to selected settings.



Evaluate Surfaces: Starts the evaluation of the OAA or Type 3 Surface.



Show Results: Opens the "Results" module. See paragraph 10.0 for more detail.

Previous Step: Returns to the "Airport/Runway Settings" window.

Profile: This button opens the Profile View Tab. See paragraph 5.2 for more detail.

- Surface Data: This data is located at the bottom of the "Design Interface Module." See Figure 8-4 As the user moves the mouse within the OAA in the DrawSpace™Display the following data is displayed:

    - Distance from DER: Provides the distance in feet from the DER to the mouse location. This data is only provided within the boundaries of the OAA.

    - Height Above DER: Provides the height in feet of the OAA surface above the DER, at the mouse location. This data is only provided within the boundaries of the OAA.

    - Surface MSL: Provides the height of the OAA surface in feet MSL, at the mouse location. This data is only provided within the boundaries of the OAA.

- Surface AGL: Provides the height of the OAA surface above ground level (AGL), at the mouse location. This data is only provided within the boundaries of the OAA.

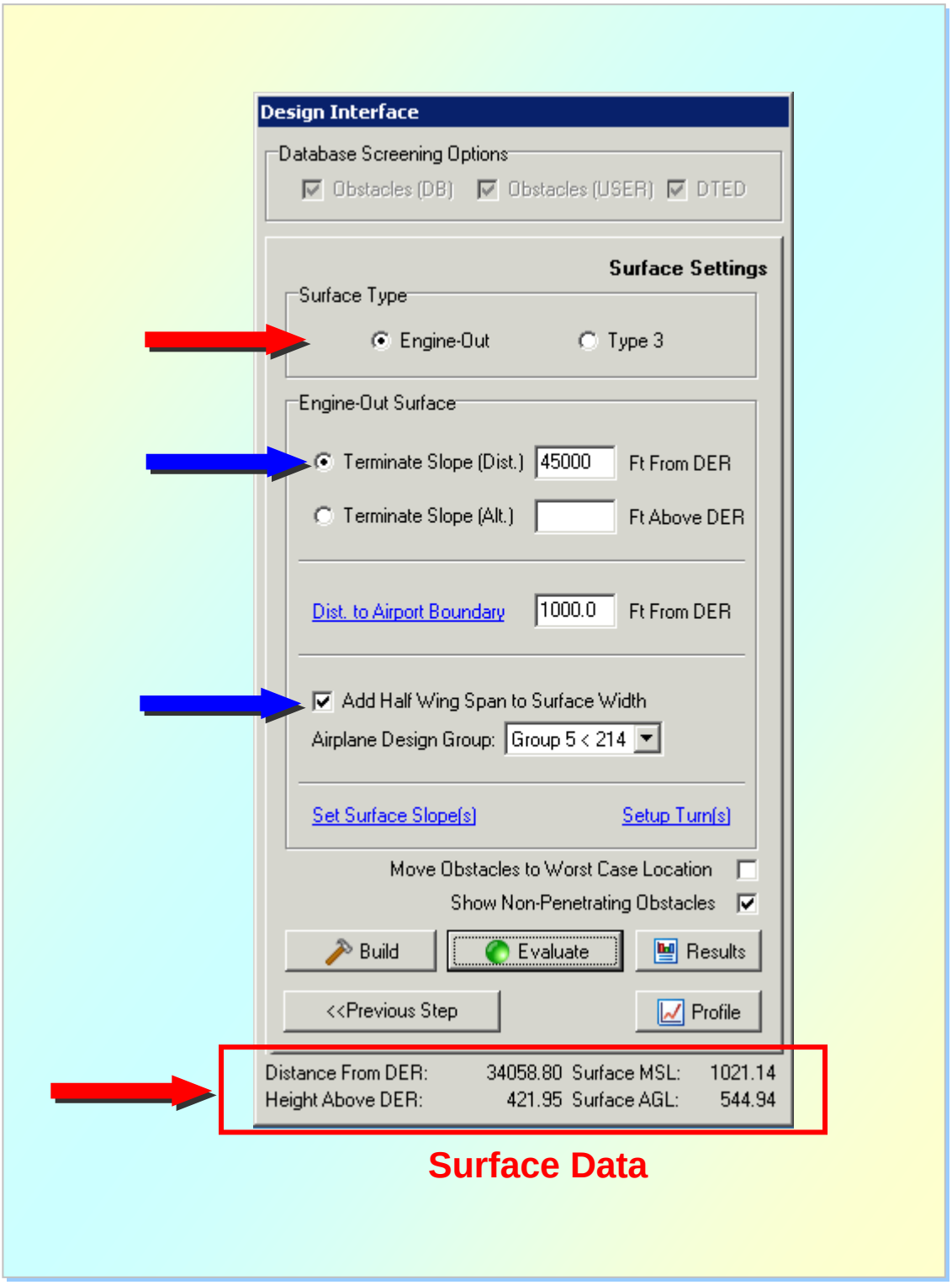


Figure 8-4: Surface Settings

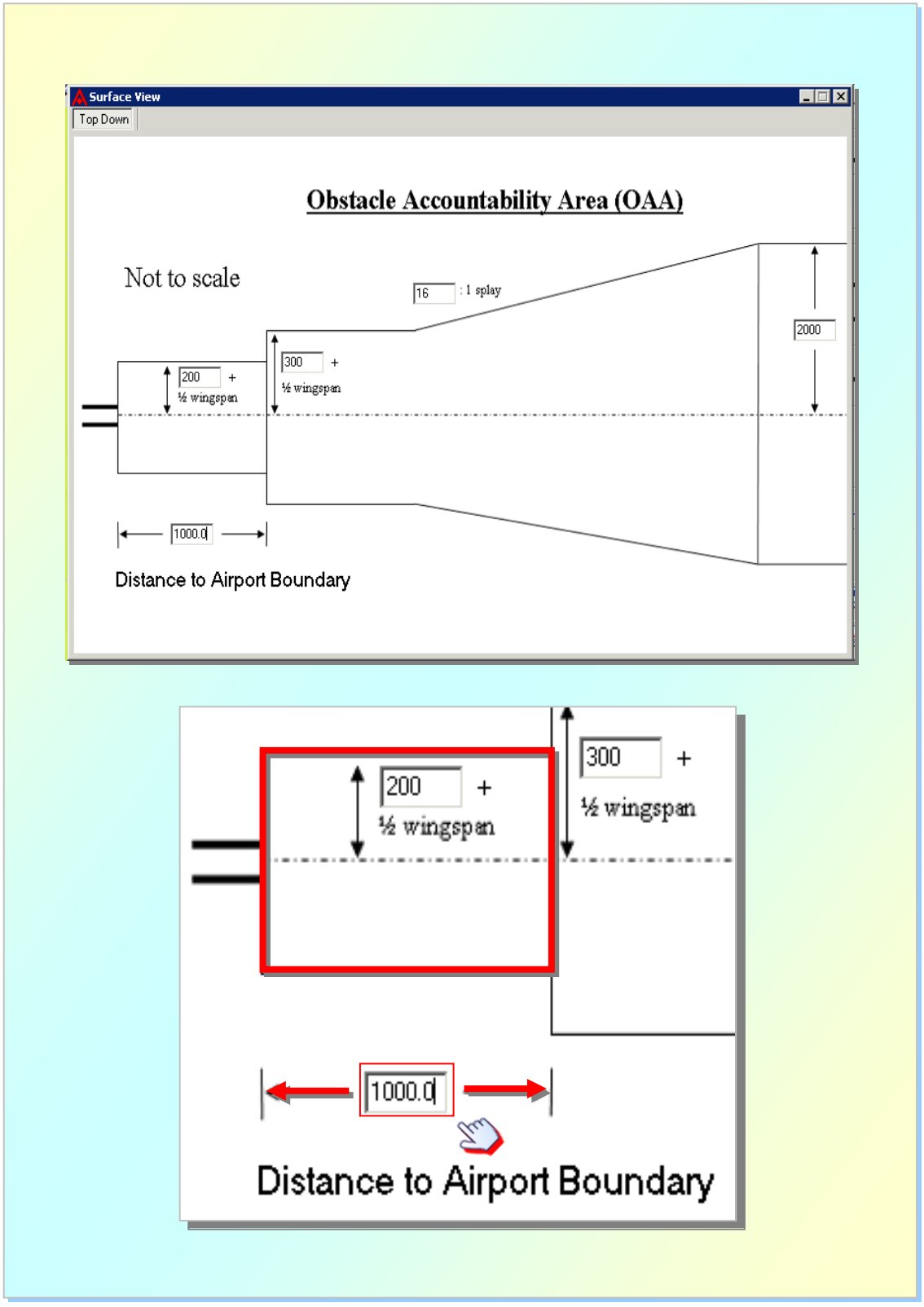


Figure 8-5: OAA, Distance to Airport Boundary

8.4.1 Turns

The Turns window and allow the user to establish turns within the OAA.

- Select Turn: Allows the user to select a turn and then to either establish or modify the turn settings.

 Add Turn: Allows the user to add turns to the surface.

 Remove Turn: Allows the user to remove turns from the surface.

 Import Turn from RNAV-Pro Flight Plan: Allows the user to import a flight plan in a text (.txt) format.

- Turn Start:
    - Dist. To Fly By Waypoint: Allows the user to specify the distance at which the turn will commence.
- Turn Amount: Three methods of identifying the direction of turn are:
    - Change in the Heading window: User enters 001° to 090° to specify the turn. A positive number represents a right turn; a negative number represents a left turn.
    - New Heading window: User enters a heading in degrees to specify the turn. Heading may be in True or Magnetic.

        Get Heading via Mouse Click: User selects a location on the DrawSpace™ Display with the mouse to specify the turn. Latitudes and longitudes are automatically entered in the lat/lon windows.
- Over Ride Default Turn Radius: This checkbox allows the user to modify the turn radius data.
    - Radius: Specified in nautical miles.
    - Speed: Specified in knots.
    - Bank Angle: Specified in degrees.
- Save: Saves the data entered in the Turn Settings window.
- Rebuild: Builds the turn in the DrawSpace™ Display.
- Close: Returns the user back to the Surface Settings window.

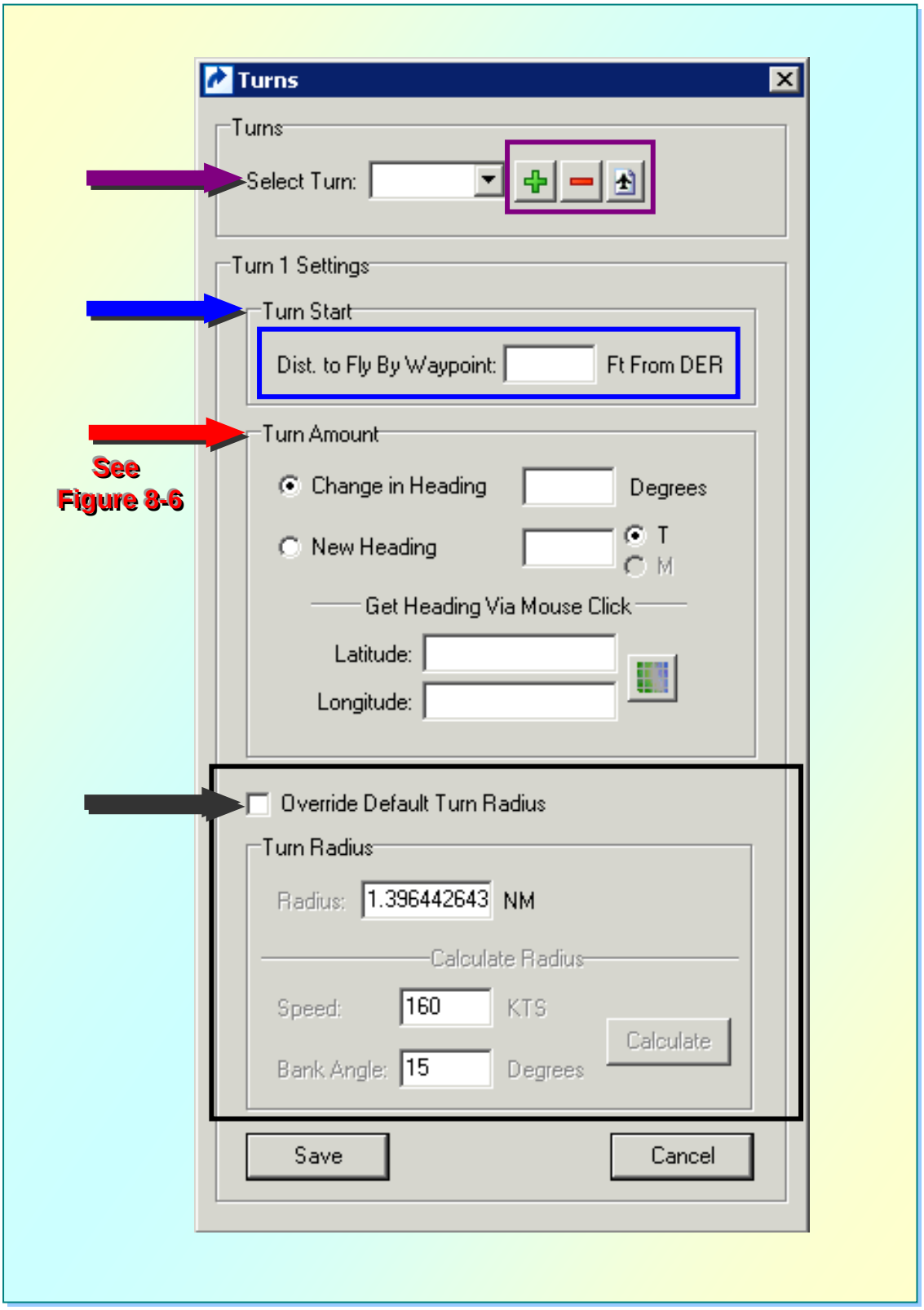


Figure 8-6: Turns

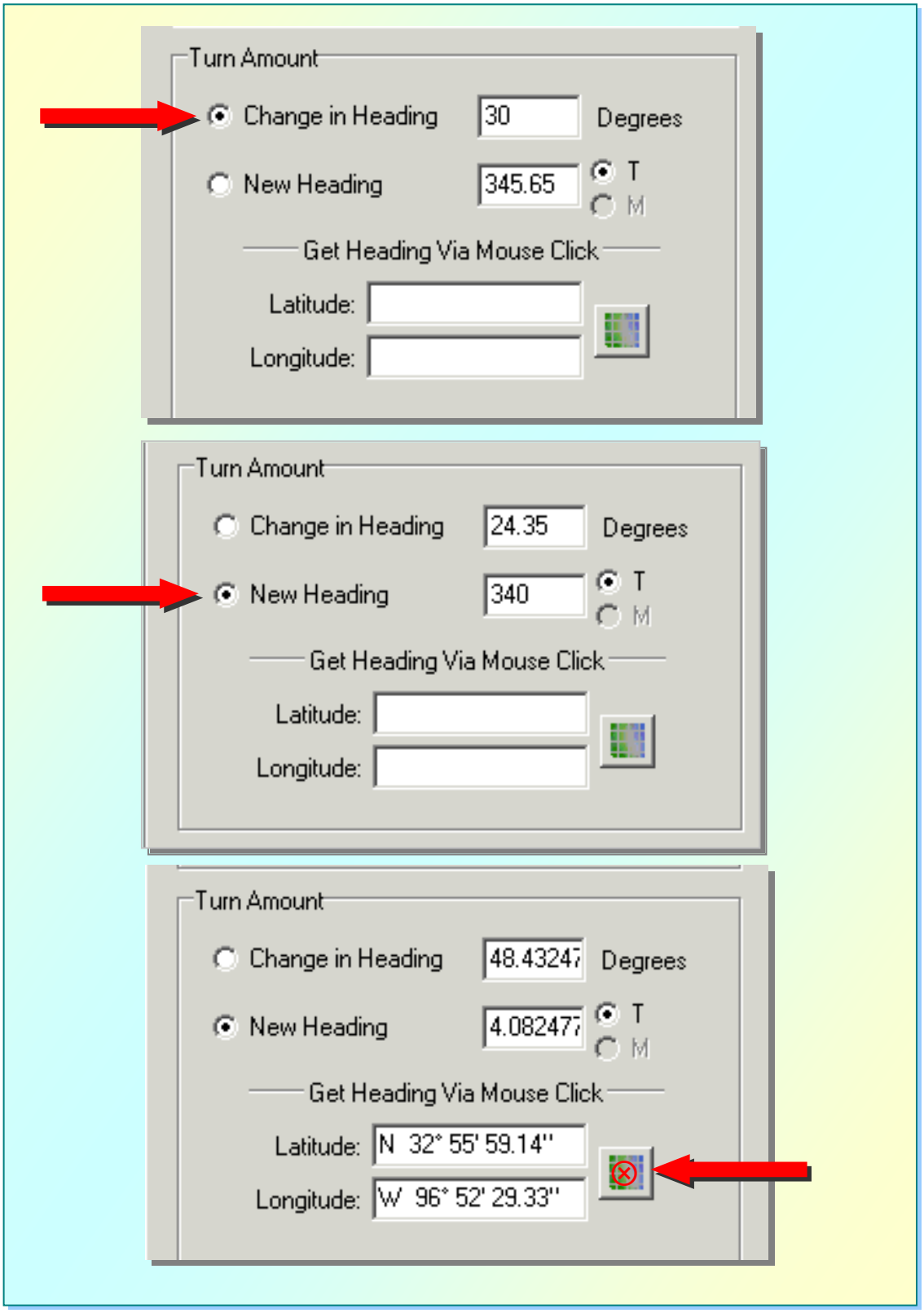


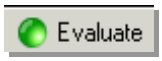
Figure 8-7: Turn Amount

8.5 Type 3 Surface

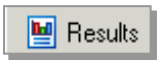
Type 3 Surface: The default surface settings for Type 3 are established from the criterion in FAA Advisory Circular AC No 150/5300-13, Appendix 2, and Figure A2-4 which has no secondary area. However, the user may define surfaces with both primary and secondary areas and establish both Along Track Slopes in the primary area and Cross Track Slopes in the secondary area. The example below defines an area with both a primary and secondary area.

- Initial Inside Width: The width of the primary area at the beginning of the surface.
- Initial Outside Width: The width of the primary area at the outer most point of the surface.
- Inside Splay Angle: The splay of the primary area.
- Outside Splay Angle: The splay of the secondary area.
- Maximum Inside Width: The width of the secondary area at the beginning of the surface.
- Maximum Outside Width: The width of the secondary area at the outer most point of the surface.
- Azimuth: The centerline of the surface area in degrees.
- Length: The length of the surface in feet.
- Along Track Gradient: The slope along the centerline of the surface.
- Cross Track Gradient: A slope perpendicular to the centerline, beginning at the edge of the primary area and terminating at the edge of the secondary area.
- Move Obstacle to Worst Case Location: Once the Type 3 surface has been evaluated this checkbox moves all evaluated obstacles shown in the DrawSpace™Display to a worst case location.
- Show Non-Penetrating Obstacle: Select this checkbox to show non-penetrating obstacles in Type 3 Surface. The obstacles will be green and appear in the Top Down View area, Profile View area, and “Result” window.

Build Surface: Builds the Type 3 surface according to selected settings.



Evaluate Surfaces: Starts the evaluation of the Type 3 surface.



Show Results: Opens the “Results” module. See paragraph 10.0 for more detail.

Previous Step: Returns to the “Airport/Runway Settings” window.

Profile: This button opens the Profile View Tab. See paragraph 5.2 for more detail.

- Surface Data: This data is located at the bottom of the “Design Interface Module.” See Figure 8-4. As the user moves the mouse within the Type 3 surface in the DrawSpace™Display the following data is displayed:
    - Distance from DER: Provides the distance in feet from the DER to the mouse location. This data is only provided within the boundaries of the Type 3 surface.
    - Height Above DER: Provides the height in feet of the Type 3 surface above the DER, at the mouse location. This data is only provided within the boundaries of the Type 3 surface.
    - Surface MSL: Provides the height of the Type 3 surface in feet MSL, at the mouse location. This data is only provided within the boundaries of the Type 3 surface.
    - Surface AGL: Provides the height of the Type 3 surface above ground level (AGL), at the mouse location. This data is only provided within the boundaries of the Type 3 surface.

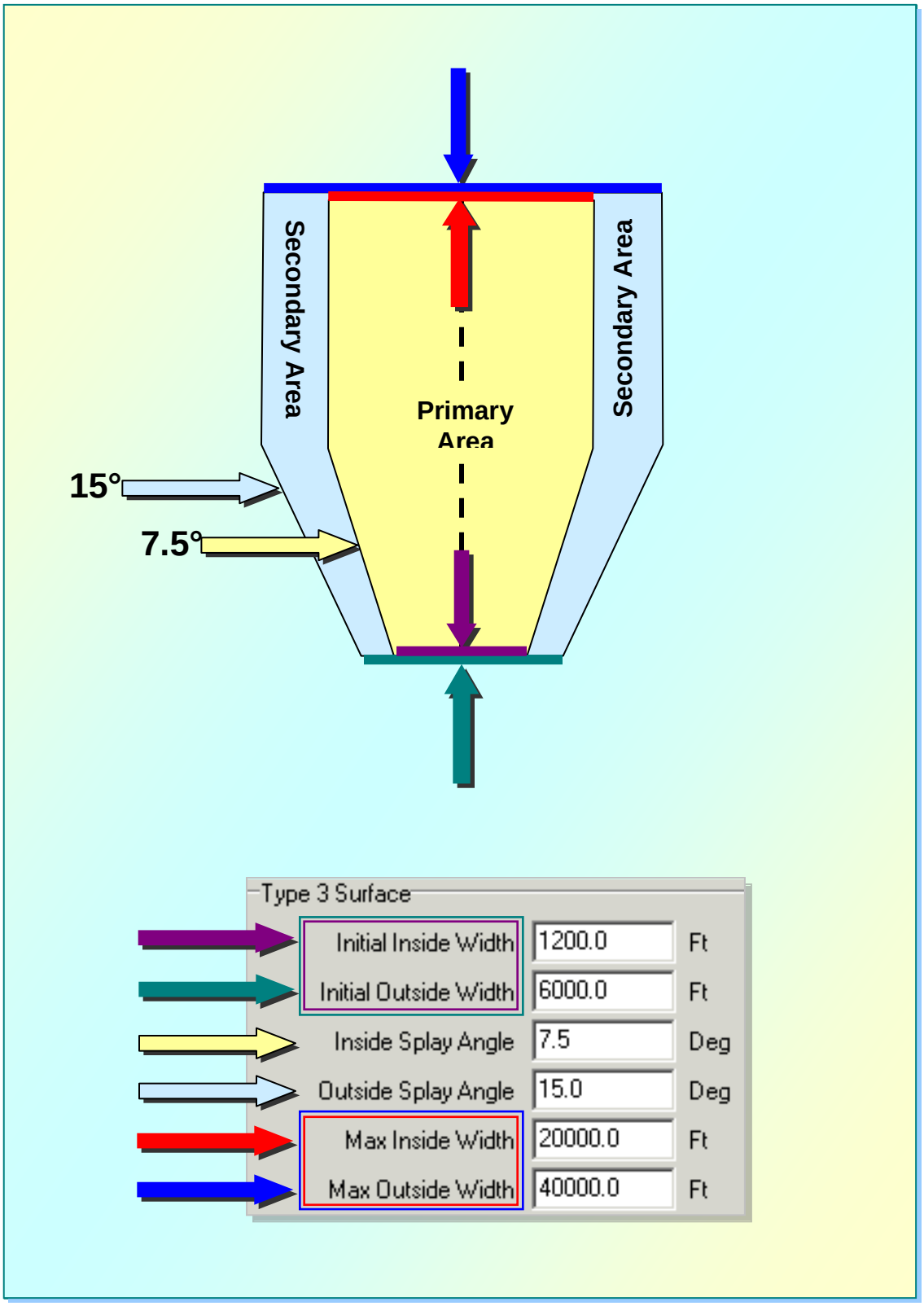


Figure 8-8: Type 3 Surface Settings

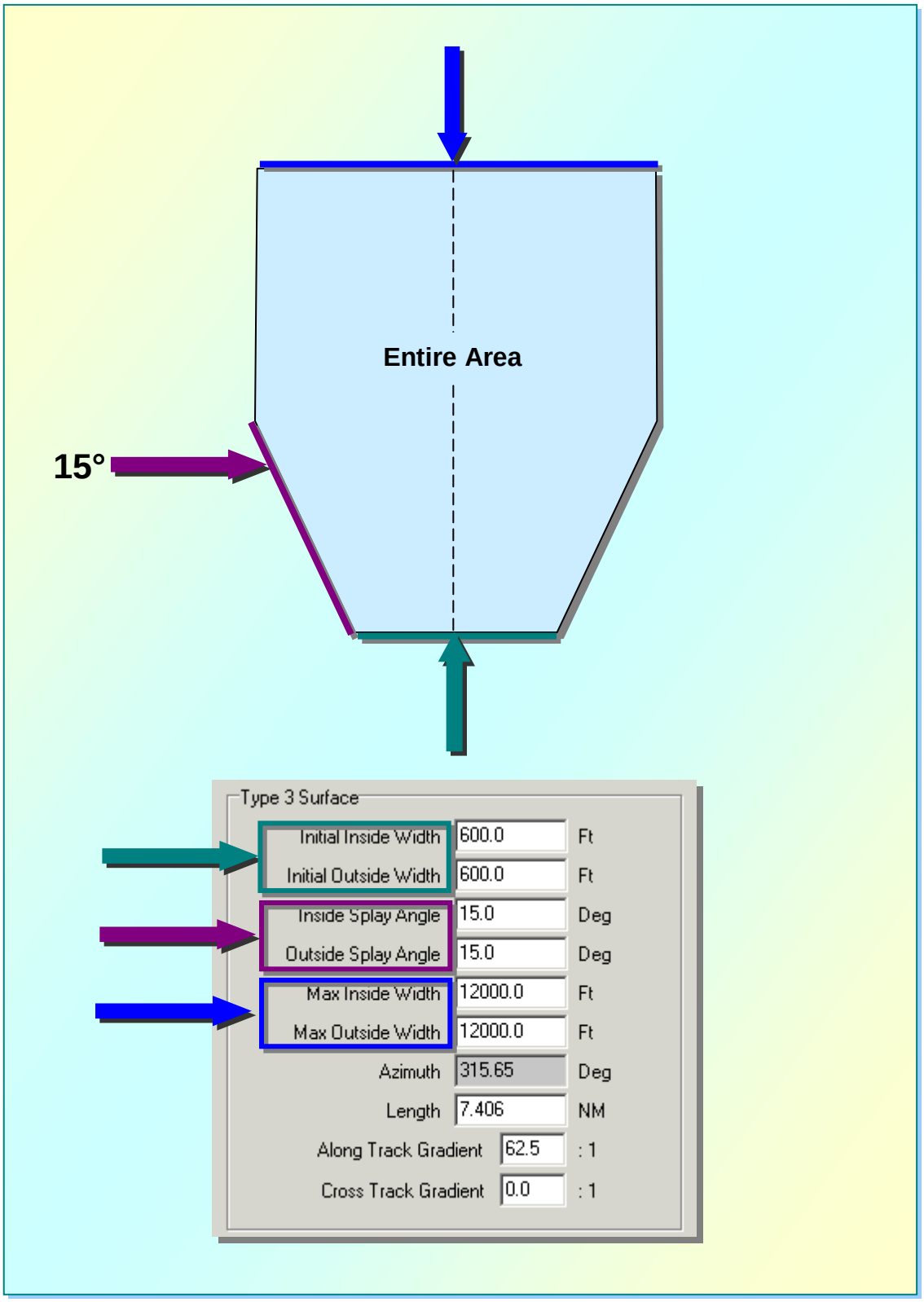


Figure 8-9: Type 3 Surface, Default Settings, One-Engine Inoperative OIS

9.0 Keyboard / Mouse /ToolTip Functions

Keyboard Functions

- Ctrl+Z function is basically an undo zoom function in the DrawSpace™Display.

- When working in the Design Interface module press Enter on the keyboard at any time to build surfaces and perform an evaluation.

- When working in Turns window press Enter on the keyboard at any time to save current information. Press Enter on the keyboard a second time to rebuild the surfaces.

Mouse Functions

- Double mouse click the Display Data tab, Search Data tab, and Drawing Tool tab to close.

ToolTips

- The ToolTip box displays relevant information regarding the item.

- Move the mouse over the items in the DrawSpace™Display to generate ToolTip data.

- 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.

- Multiple Item Tooltips: When “Items” is displayed on the left side of the ToolTip it indicates there are multiple items overlaying each other. Use the mouse wheel to display the scroll through the additional items.

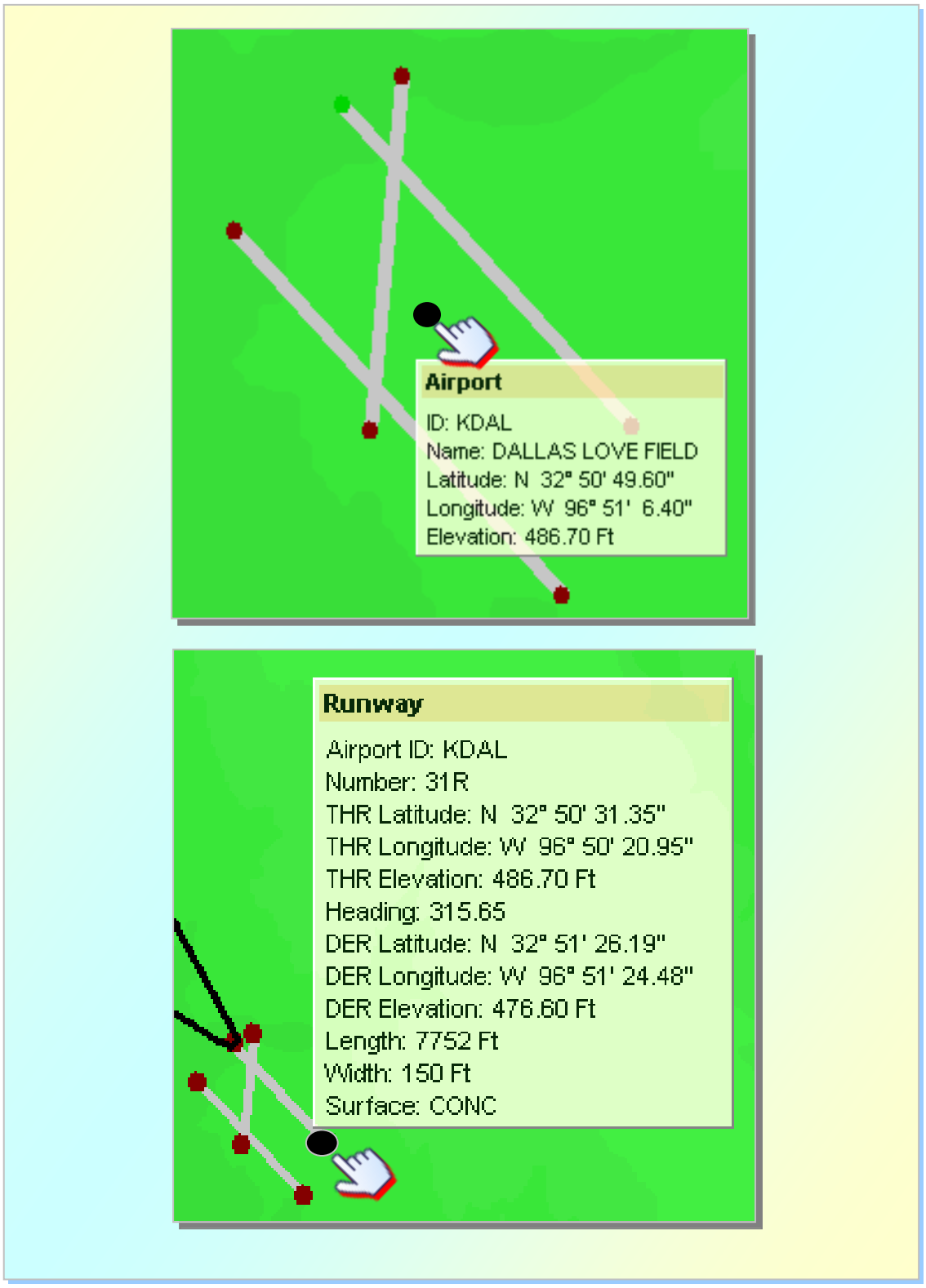


Figure 9-1: ToolTip Data

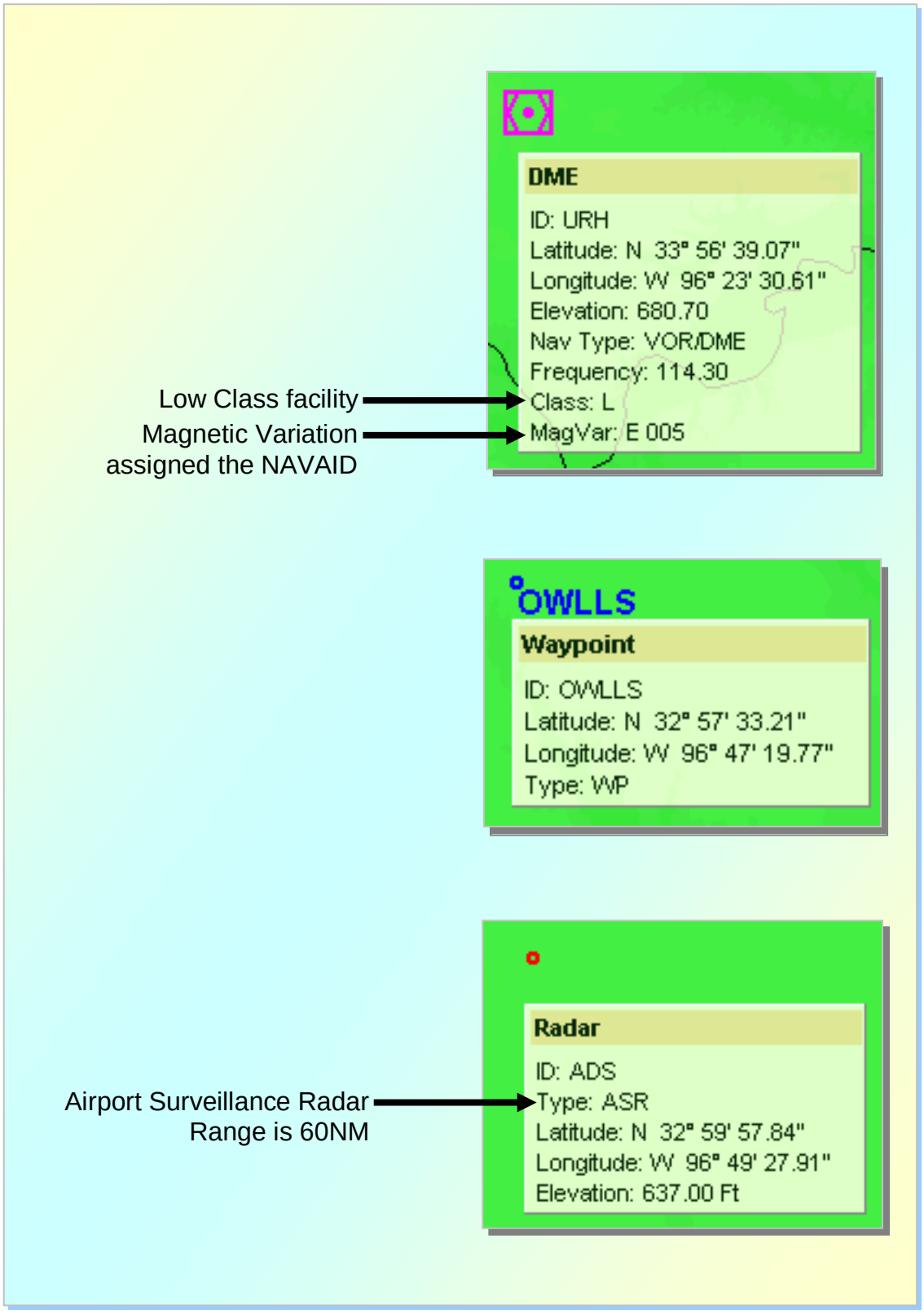


Figure 9-2: ToolTip: Waypoints, Obstacles DMEs and RADARs

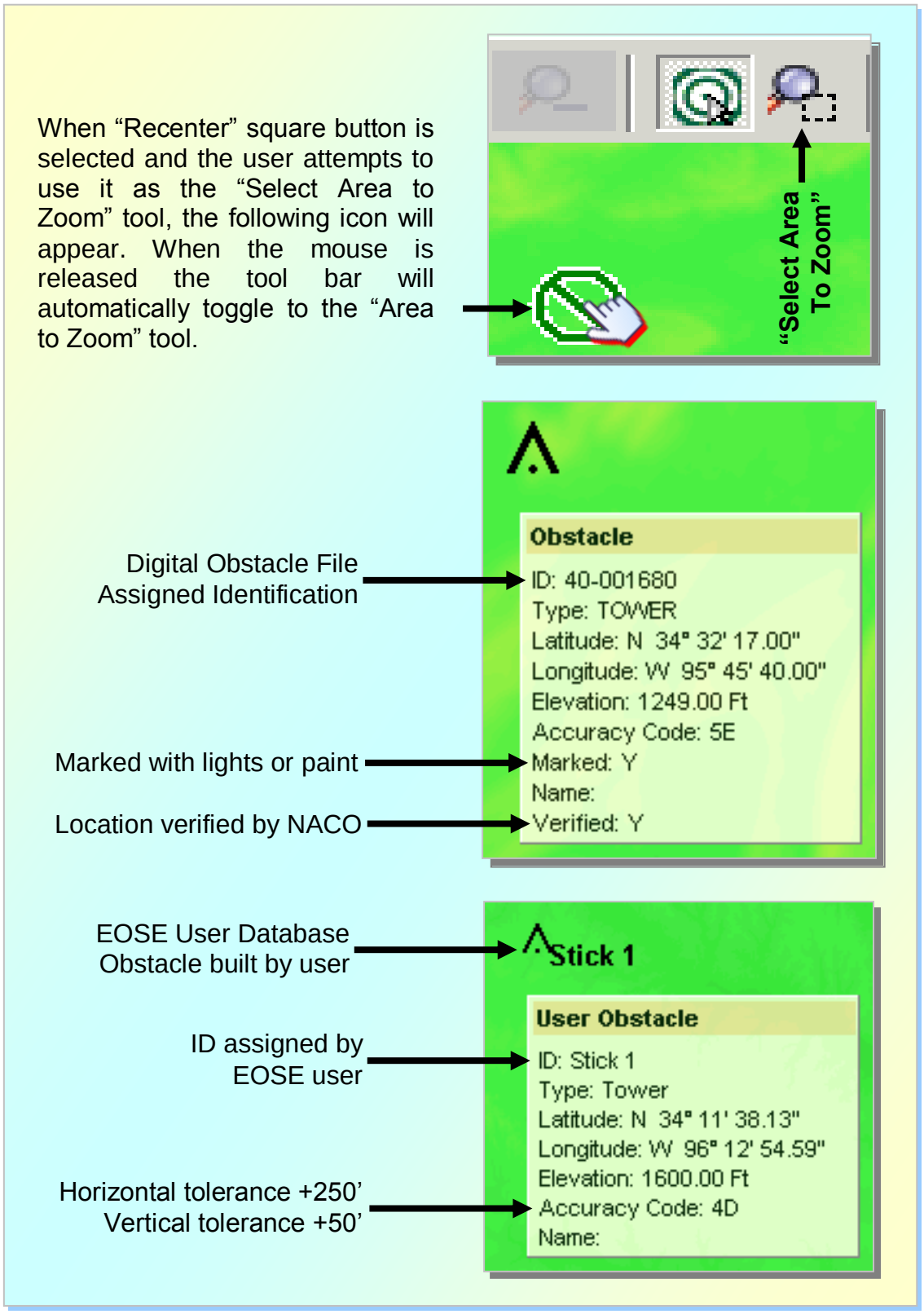


Figure 9-3: Mouse Function and ToolTips

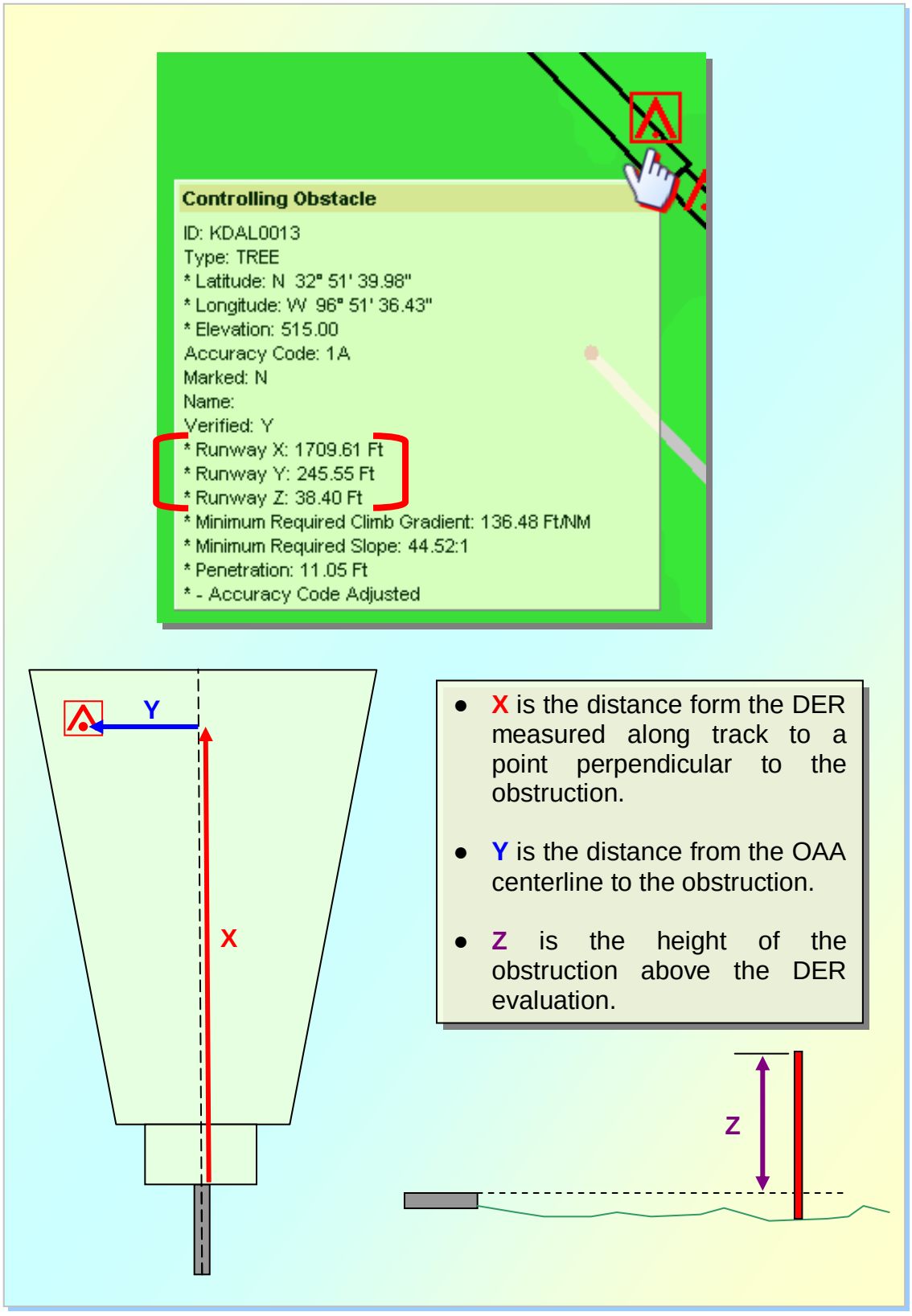


Figure 9-4: ToolTip Continued

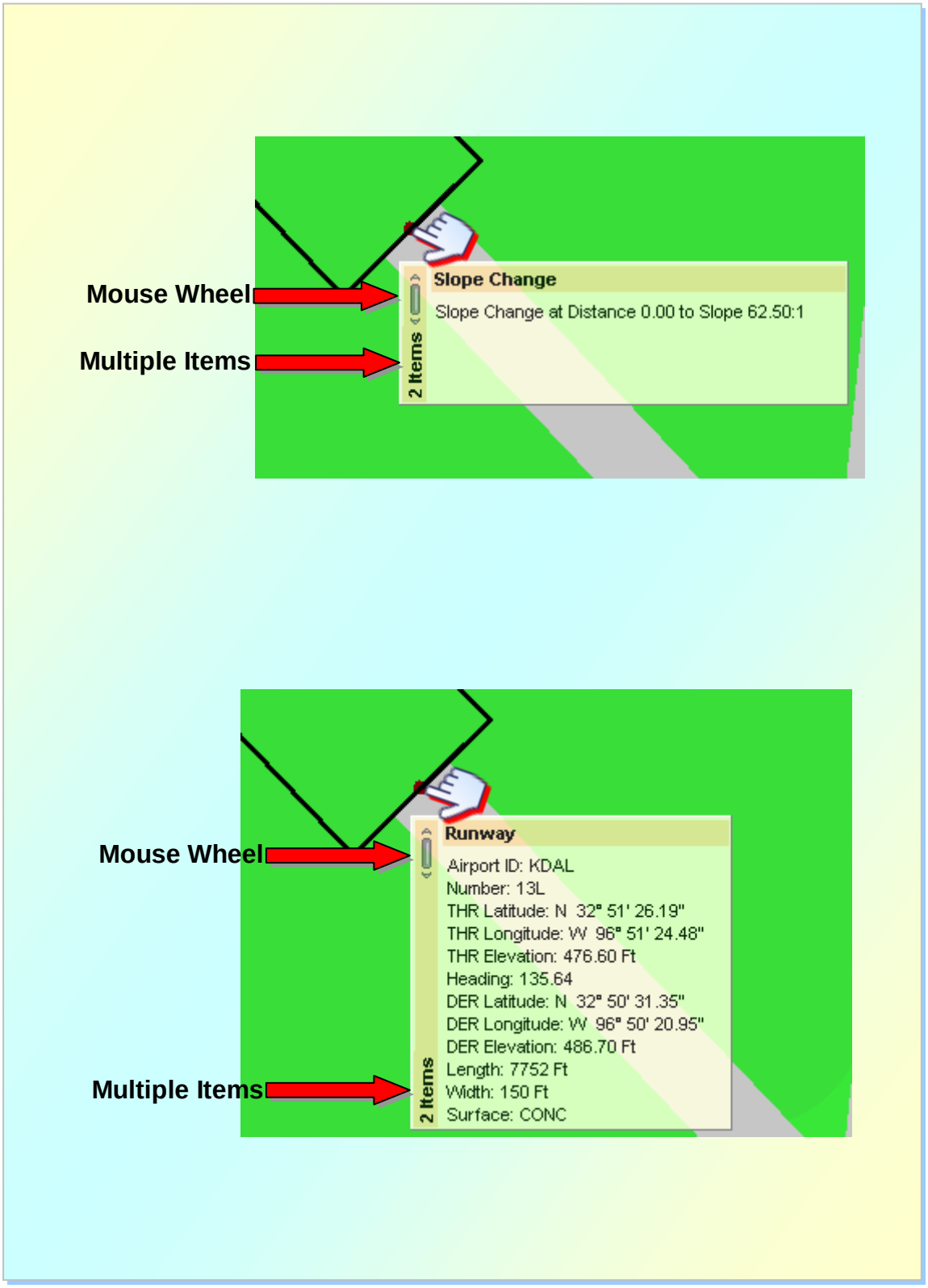


Figure 9-5: Multiple Items ToolTip

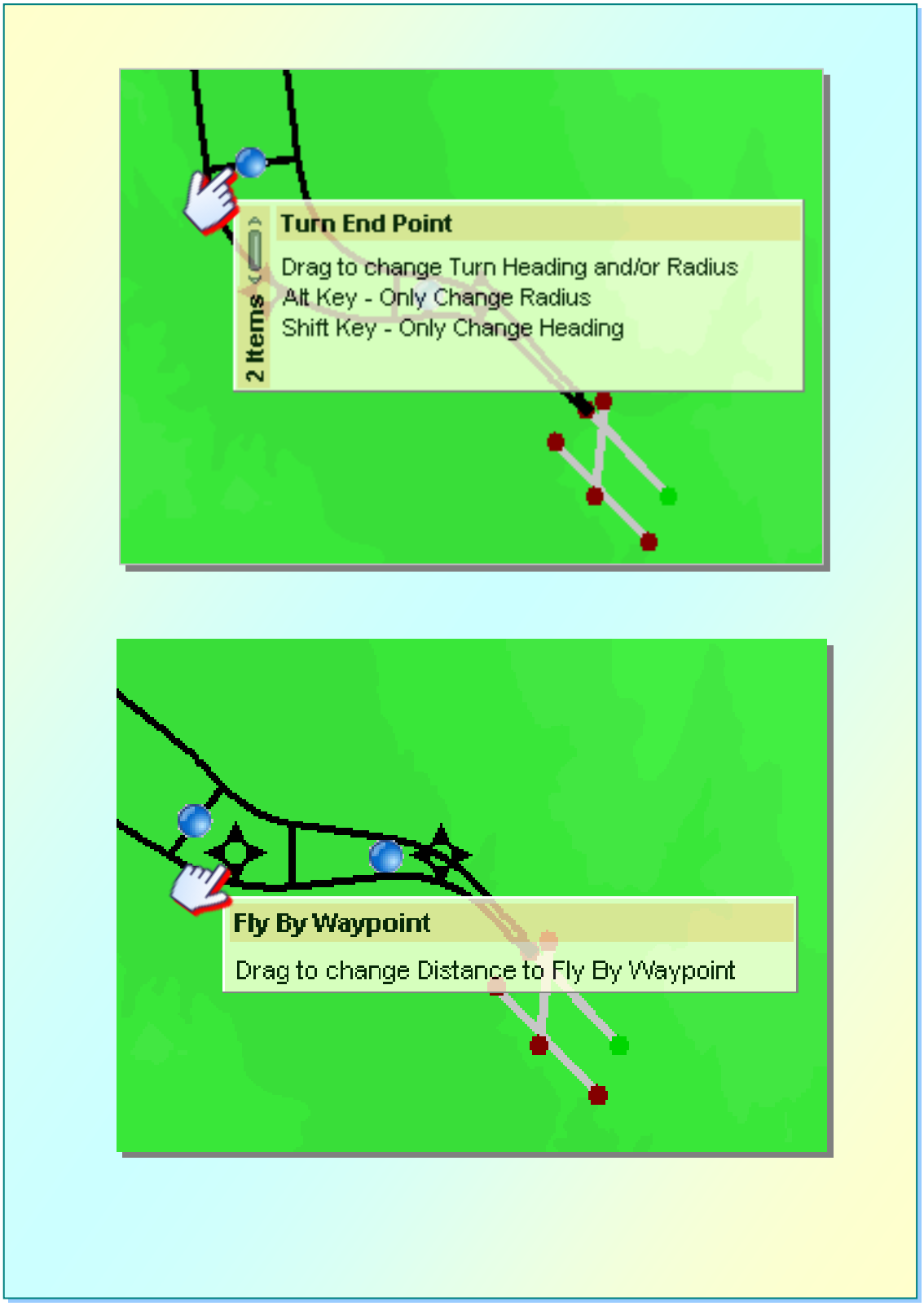


Figure 9-6: Mouse Function / ToolTip, Move Turning Point or Waypoint

10.0 Results

At the conclusion of the evaluation the “Results” (PDF) window will open to provide the user with the “Results” formatted as a PDF. The user also has the option to view the result in an interactive format on the DrawSpace™Display and Design Interface module.

Top Down View Interactive Results

- The result of the evaluation shows penetration of the surface in red and Non-penetrating obstacle within the surface in green.

- Moving the mouse within the DrawSpace provides Lat/Lon and DTED information in the Data Bar at the bottom of the DrawSpace.

- Rolling the mouse within the Engine Out surface or Type 3 surface provides information in the Surface Data of the Design Interface module. See paragraph 8.5 and 8.4 for more detail about Surface Data information.

Profile View Interactive Results

- The result of the evaluation shows penetration of the surface in red and Non-penetrating obstacle within the surface in green.

- Moving the mouse within the DrawSpace provides Distance from DER, Height About DER, and Altitude information in the Data Bar at the bottom of the DrawSpace.

- Rolling the mouse within the DrawSpace provides information in the Surface Data of the Design Interface module. See paragraph 8.5 and 8.4 for more detail about Surface Data information.

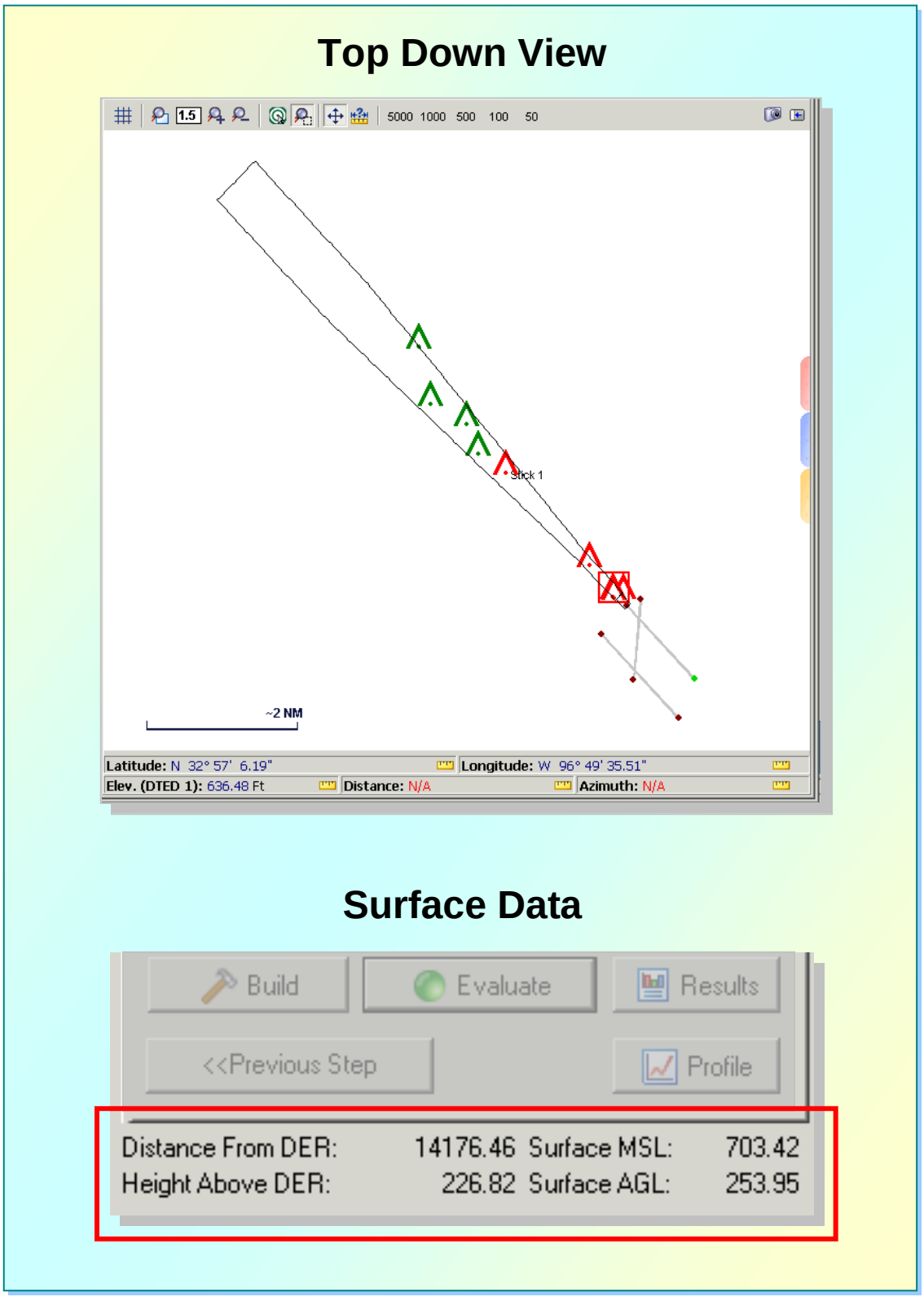


Figure 10-1: Top Down View Interactive Results

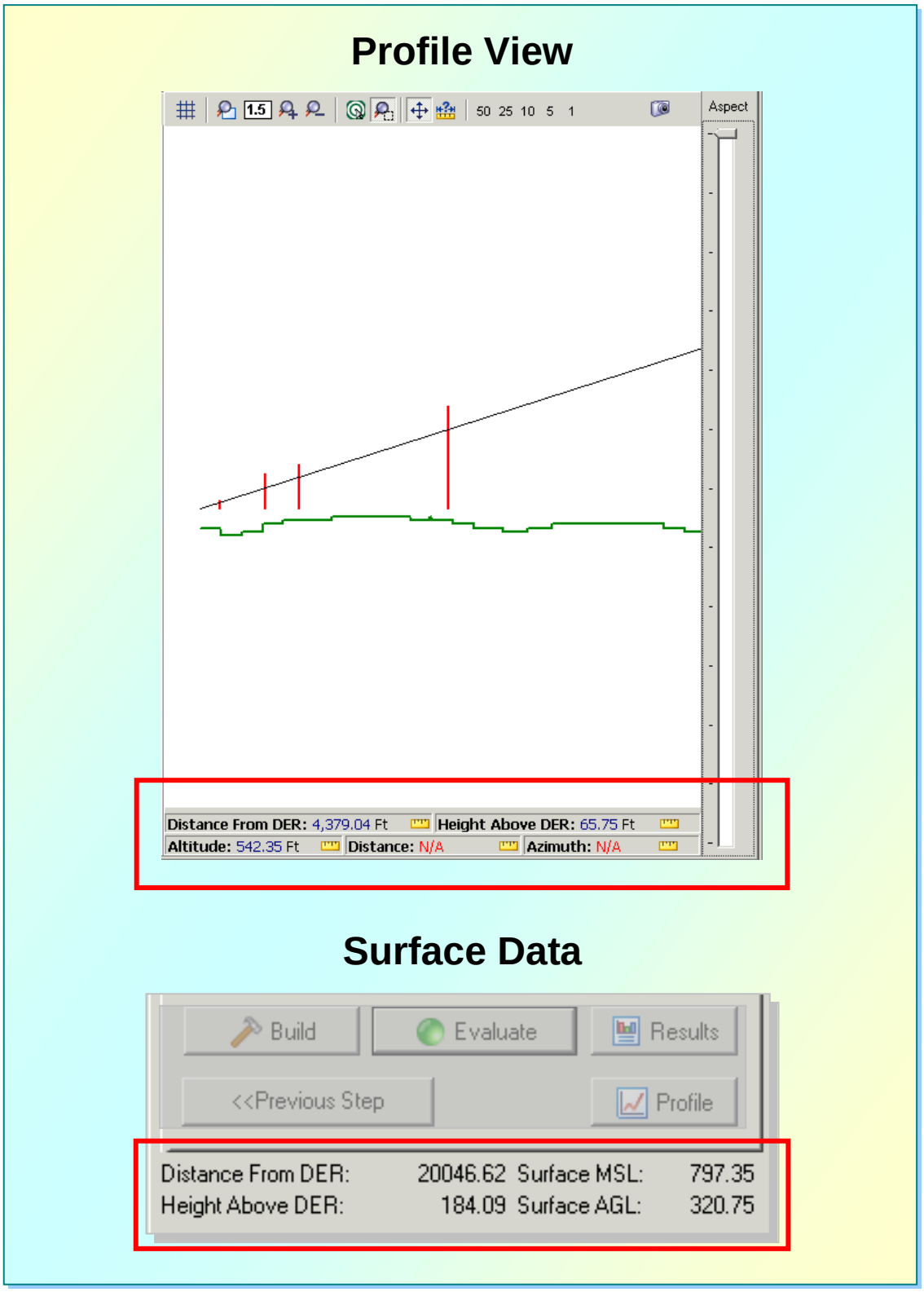


Figure 10-2: Profile View Interactive Results

Result is created as a pdf document, it contains the following parts:

- File: This drop-down menu has the following options:
    - Open: Allows user to open a previously Saved HTML file.
    - Save: Opens a “Save As” window which allows user to save the “Results” as an HTML file.
    - Export as CSV: Opens an “Evaluation Results” window which allows the user to export results as a CSV file.
    - Print Setup: Opens a “Page Setup window for the printer.
    - Print Preview: Opens a “Print Preview” window.
    - Print: Opens a “Print” window.
    - Close: Closes the “Result” window.
- General Information section contains the following items:
    - User Name: User name is entered.
    - Software: Name of the software is entered.
    - Version: Software version which ran the evaluation is entered.
    - Date: Date of the evaluation is entered.
    - Time: Time the evaluation was run is entered.
    - Airport: Central Airport name is entered.
    - AVNIS Database: Current date of the database.
    - User Database: Date database built by the EOSE user.
    - DYTED Level 1: Current date of the database.
- Engine-Out Results section contains the following items:
    - Departure: Airport name and runway.
    - Surface Type: Engine-Out or Type 3.
    - Minimum Required Climb Gradient: Climb Gradient to clear the controlling obstacle.
    - Accuracy Code: Applied or Not Applied.
    - Default Accuracy Code (when N/A): 6E

- Airplane Design Group: The selected Airplane Design Group.
- Distance to Airport Boundary: The distance assigned by the user or the default distance of 1000 feet.
- DER Displacement: N/A or displacement value is entered.
- Slopes Used: Slope defaults to 62.5:1 beyond airport boundary.
- Turns: None or if applied turn data is entered.
- Surface Termination: Specific data is entered.
- Controlling Obstacle: The controlling obstacle details are listed. Penetration is listed in red.
- DrawSpace™Display snapshot of the Top Down and Profile view showing obstacle results.

- Relevant Obstacles contains the following items:
  - Obstacle ID: The DOF identification number is listed or if the obstacle is from the User Database it will show the name given to the obstacle by the user.
  - Latitude/Longitude: Displays the latitude/longitude of the obstacle location.
  - Elevation (MSL): Displays the elevation of the obstacle in MSL.
  - Type/ Accuracy Code: Displays the type of obstacle and the accuracy code.
  - Along Track Distance: The distance from the DER along the centerline of the OAA to a point perpendicular to the obstacle is shown in feet and tenth.
  - Available Runway Length: This window shows two distances, THR (approach end of runway) and DER (Departure End Runway)
    - ◊ THR: The distances available for departure roll from the approach end of the runway. Aircraft rotation at this distance and a climb gradient as shown in the “Required Slope/Climb Gradient” column will clear the obstacle.

        - ◊ DER: If DER is zero the entire runway length is available for departure. Unavailable runway distance is shown as a negative number.

    - Clearance: This window shows distance in either green or red.

        - ◊ Numbers in Green: The obstacle does not penetrate the engine-out slope. The distance the obstacle is below the slope.

        - ◊ Numbers in Red: The obstacle penetrates the engine-out slope. The number of feet the obstacle penetrates the engine-out slope.

    - Required Slope/ Climb Gradient: This is the required climb gradient or the slope need to clear the obstacle, if aircraft rotation meet requirements in the “Available Runway Length” column

    - Along Track Distance Note: Based on the obstacle accuracy code the software moves the obstacle to the closest point and adds the additional height to the obstacle to create a worst case scenario.

    - Available Runway Length Note: The runway length required will only ensure clearance of the specific obstacle shown in that row.

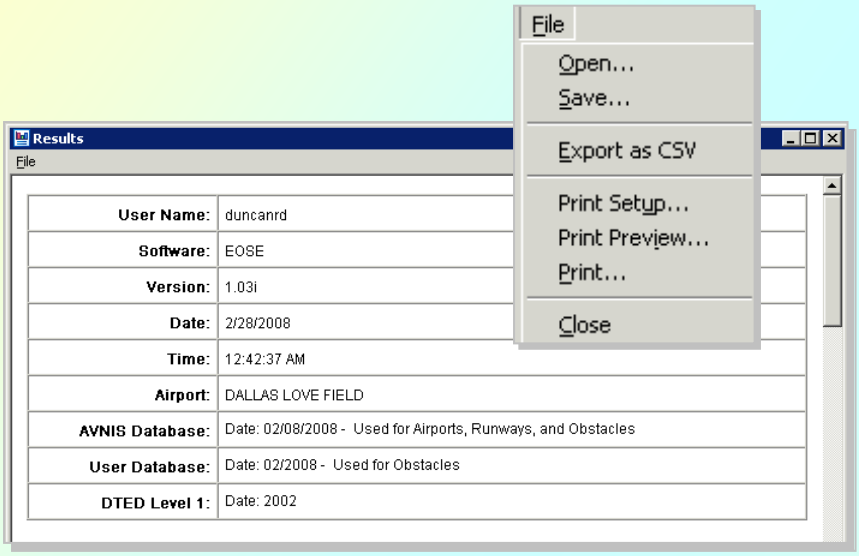
- User Obstacle contain the following items:

    - Obstacle ID: Name given to the obstacle by the user.
    - Latitude/ Longitude
    - Elevation: Enter in feet MSL.
    - Type: Describes the type of obstacle i.e. (Tree, Building, or Tower.)
    - Replaces: None unless obstacle replaced then DOF ID entered.

- Disabled Obstacles contain the following items:

    - Obstacle ID: Name given to the obstacle by the user.
    - Latitude/ Longitude
    - Elevation: Enter in feet MSL.
    - Type: Describes the type of obstacle i.e. (Tree, Building, or Tower.)
    - Database Type: AVN

File Menu and General Information



Engine Out Results

Engine Out Results:	
Departure: KDAL 31R	
Surface Type:	Engine-Out
Minimum Required Climb Gradient:	339.9 Ft/NM (Slope: 17.9:1)
Accuracy Code:	Applied
Default Accuracy Code (when N/A):	6E
Airplane Design Group:	Group 5 < 214
Distance to Airport Boundary:	1000.0 Ft
DER Displacement: **DER Elevation:**	1000.0 Ft 475.30 Ft
Slopes Used:	Starting Distance: 0.0 Ft Slope: 62.5:1
Turns:	Distance to Fly By Wapoint: 10,000.0 Ft Change in Heading: 30.00 Degrees New Heading: 345.65 Degrees Turn Radius: 1.4 NM
Surface Termination:	Terminate Slope (Dist.): 45000 Ft
Controlling Obstacle:	Obstacle: KDAL0013 Latitude: N 32° 51' 40.13" Longitude: W 96° 51' 36.59" Elevation (MSL): 512.00 Ft Type: TREE Penetration: 28.3 Ft

Figure 10-3: File Menu, General Information, and Engine Out Results

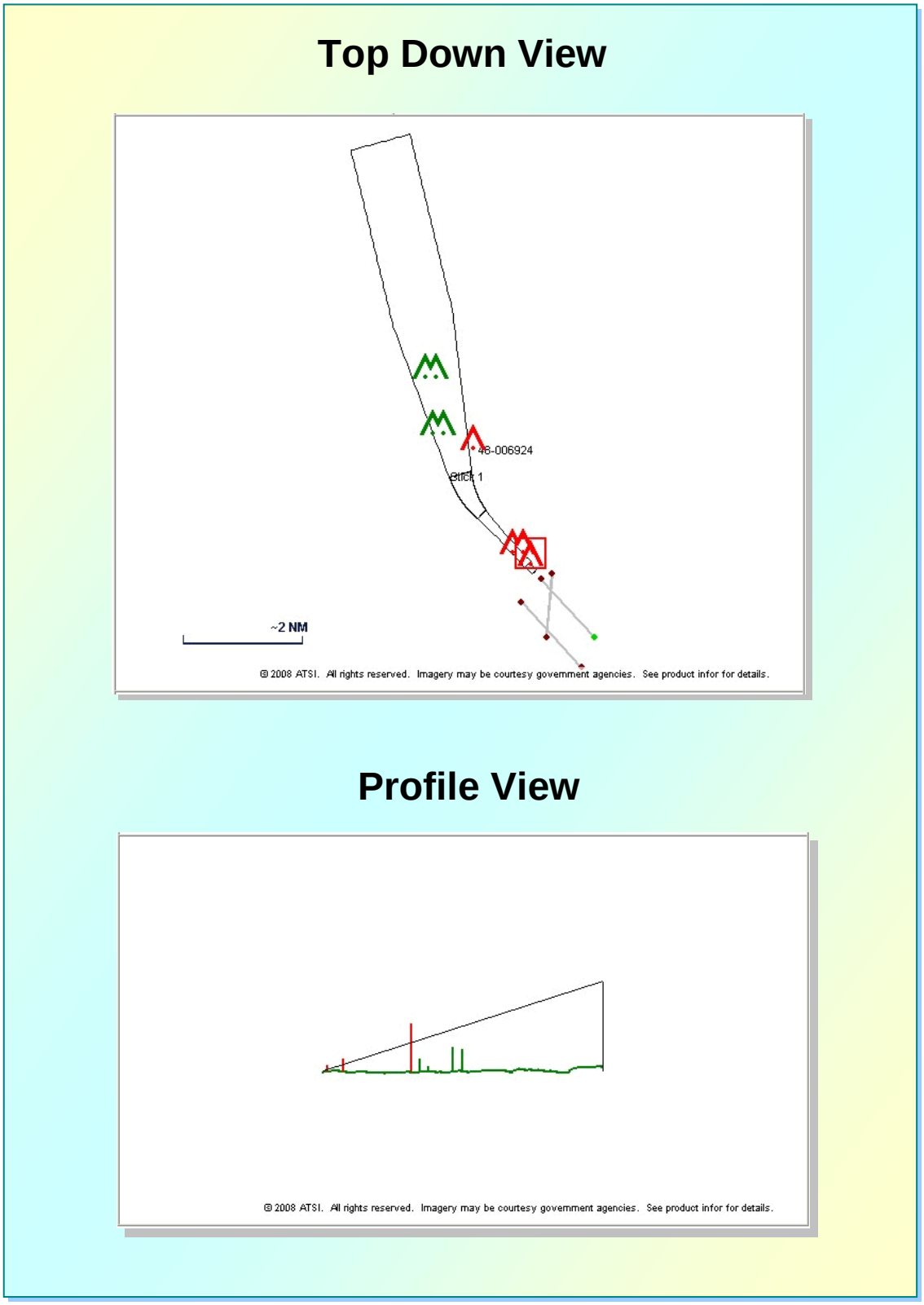


Figure 10-4: Top Down View and Profile View

Relevant Obstacles

Relevant Obstacles

Obstacle ID	Latitude / Longitude	Elevation (MSL)	Type / Acc. Code	Along Trk Dist* (Lat Dist*)	Avail Rwy Length (Reduction Amt) **	Penetration (+) Clearance (-)	Required Slope / CG
KDAL0013	N 32° 51' 40.13" W 96° 51' 36.59"	512.0 Ft	AVN TREE 1A	709.6 Ft (245.6 Ft)	5980 Ft (1772 Ft)	28.3 Ft	17.9:1 / 340 Ft/NM
48-006924	N 32° 53' 30.00" W 96° 52' 46.00"	600.0 Ft	TOWER User Replaces: 48-006924	13376.4 Ft (1322.8 Ft)	0 Ft (10042 Ft)	160.7 Ft	35.7:1 / 170 Ft/NM
48-014834	N 32° 51' 56.93" W 96° 51' 59.47"	562.0 Ft	AVN TOWER 1A	3288.1 Ft (37.0 Ft)	5434 Ft (2318 Ft)	37.1 Ft	36.7:1 / 166 Ft/NM
48-006922	N 32° 54' 25.00" W 96° 53' 46.00"	610.0 Ft	AVN BRIDGE 4D	20619.7 Ft (1712.9 Ft)	7752 Ft (0 Ft)	-145.2 Ft	111.6:1 / 54 Ft/NM
48-004878	N 32° 54' 44.00" W 96° 53' 32.00"	594.0 Ft	AVN BLDG 5D	21934.1 Ft (77.7 Ft)	7752 Ft (0 Ft)	-182.2 Ft	130.0:1 / 47 Ft/NM
48-014659	N 32° 53' 35.92" W 96° 53' 24.17"	563.0 Ft	AVN TOWER 1A	15582.6 Ft (1138.5 Ft)	7752 Ft (0 Ft)	-158.6 Ft	171.8:1 / 35 Ft/NM
48-006926	N 32° 53' 49.00" W 96° 53' 29.00"	460.0 Ft	AVN TOWER 4D	16735.4 Ft (1213.8 Ft)	7752 Ft (0 Ft)	-233.1 Ft	482.3:1 / 13 Ft/NM

User Obstacles

User Obstacles

Obstacle ID	Latitude	Longitude	Elevation (MSL)	Type	Replaces
Stick 1	N 32° 53' 5.15"	W 96° 53' 18.38"	710.00 Ft.	Tower	[None]
48-006924	N 32° 53' 30.00"	W 96° 52' 46.00"	600.00 Ft.	TOWER	48-006924

Disabled Obstacles

Disabled Obstacles

Obstacle ID	Latitude	Longitude	Elevation (MSL)	Type	DB Type
48-006924	N 32° 53' 30.00"	W 96° 52' 46.00"	575.00 Ft	TOWER	AVN

Figure 10-5: Obstacles