Military Tools for ArcGIS in ArcGIS Pro

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Get Started with Military Tools for ArcGIS in ArcGIS Pro

Military Tools for ArcGIS in ArcGIS Pro provides fundamental tools for coordinate conversion, distance and direction calculations, visibility analysis, and the creation of military symbols. It contains an add-in and geoprocessing toolbox.

Military Tools for ArcGIS in ArcGIS Pro supports ArcGIS Pro 1.4.

Installing the add-in

To install the Military Tools for ArcGIS in ArcGIS Pro Add-In:

1. Double-click the `MilitaryToolsforArcGISPro.esriAddinX` file in the `...\ArcGISPro\Addins` folder.
2. Click **Install Add-In**.
   Installation Succeeded window appears.
3. Click **OK**.
4. Open ArcGIS Pro.
   The **Military Tools** tab has been added to ArcGIS Pro.
5. Click the **Military Tools** tab to view the tools you installed as part of the add-in.

Installing the toolbox

To install the Military Tools toolbox for ArcGIS Pro:

1. Locate the Geoprocessing folder contained in the `...\ArcGISPro` folder.
2. Copy this folder including its contents locally.

   Caution: The entire contents of the Geoprocessing folder must be copied locally because the toolbox contains references to scripts and other data that are stored relative to the toolbox. If you are receiving an error such as **Script associated with this tool does not exist** when running a tool, check to ensure that the `layers`, `scripts`, and `tooldata` folders are located at the same folder level as the toolbox.
3. Open ArcGIS Pro.
4. In the **Project** pane, right-click **Toolboxes**, click **Add Toolbox**, navigate to the location on disk where you copied the Geoprocessing folder, and point to the toolbox file located inside.
5. Highlight the toolbox and click **OK** to add the toolbox to your project.

License: In order to use Military Tools for ArcGIS Add-In, or the Military Tools toolbox, both 3D Analyst and Spatial Analyst extensions need to be licensed.

Introduction to Coordinate Conversion

It is common for analysts to work across various systems that use different coordinate systems to pinpoint places on the Earth. For example, your coordinates may be Decimal Degrees (DD) and another system might require the same location using Military Grid Reference System (MGRS). Using Coordinate Conversion, you can input coordinates using one coordinate system and output to different coordinate systems in multiple notation formats.

Caution: Coordinate Conversion requires inputs to be in the Geographic Coordinate System World Geodetic System 1984 (GCS_WGS84).

Add a coordinate format

Coordinate Conversion converts coordinates to multiple coordinate notations.

1. Click the **Coordinate Conversion** button on the **Military Tools** tab.
   The **Coordinate Conversion** pane appears.
2. Click the **Add** button in the **Output** section.
   The **Add New Output Coordinate** window appears.
3. Choose a coordinate format from the **Category** list.
4. Examine the selected coordinate format on the **Formats** dialog box to verify the coordinates will display correctly.
5. Type a name for the coordinate format in the **Name** text box or accept the default.
   Since a given coordinate format can be displayed in several different notation styles, you can use the name to distinguish multiple notation styles of the same format.
6. Click **OK** to add the selected coordinate format to the **Output** section of the **Coordinate Conversion** pane.
   When you click the map using the **Map Point Tool** or paste a coordinate in the **Input** text box, the equivalent coordinate values appear in each of the output coordinate value rows of the table. You can add rows for multiple formats and customize how these formats are displayed.

Tip: Reorder the output coordinate format list by dragging the button to the far left of the row to its desired location.

Convert a coordinate

Coordinates can be converted interactively by clicking a point on the map, typing, or pasting coordinates into the input dialog. The converted coordinates can then be copied and used elsewhere.

Note: Add desired coordinate formats to the tool dialog before converting a coordinate.

1. Enter a location:
   - Click the **Map Point Tool** on the **Coordinate Conversion** pane and select a location on the map.
   - Type or paste coordinates into the **Input** text box and press **Enter**.

Customize a coordinate format

The default format for an output coordinate might not be exactly the way another system is designed to receive the information. You can customize the output formatting of converted coordinates, so they exactly match what another system or person needs.

1. Click the **Add** button in the **Output** section.
   The **Add New Output Coordinate** window appears.
2. Click a coordinate type from the **Category** list.
3. Click the drop-down arrow to expand the **Advanced** dialog.
4. In the **Advanced** dialog, insert or delete characters or spaces to change the way the coordinate is displayed. The Sample text in the dialog shows the changes as they are made.

   Note: For DD, DDM, and DMS, **0** represents a digit, whereas **#** represents a significant digit (not zero). For example, the default format for DD is Y0.0#####N X0.0#####E, which shows a minimum of one decimal point, but up to six significant digits. If you have an input coordinate of 45.002N, 40.300W it will default to 45.002N, 40.3W in the output because there is only one significant digit. If you customize the formatting to Y0.0000##N X0.0000##E in the **Advanced** dialog outputs would change to 45.0020N, 40.30000W.

   Note: Letters and spacing also change the display of the output coordinates. For example, the default output format for MGRS coordinates looks like this: 11SMU4217517182. However, you can add spaces, like this: 11S MU 42175 17182, or you can format it to drop the Grid Zone Designator by removing the letter Z, so the output will look like this: MU4217517182.

5. Type a name or accept the default for the coordinate format in the **Name** box.

   Note: All format names need to be unique.

6. Click **OK**.

Change the displayed input coordinate format

The **Input** dialog and the coordinate **List** can be changed to display a number of predefined coordinate formats.

1. Click the **Edit Properties** button in the **Input** section.
   The **Edit Properties** window appears.
2. Click the **Display Coordinate** drop-down list and select the desired format.
3. Optionally, check the **Display Ambiguous Coordinates** dialog to display ambiguous coordinates.
   The **Display Ambiguous Coordinates Dialog** allows the user to choose whether their ambiguous coordinates are in **Lat/Lon** or in **Lon/Lat**.
4. Click **OK**.
5. Click the **Map Point Tool** button and move the mouse to a location on the map. The **Input** coordinate values and the coordinate **List** will be displayed using the new coordinate format.

Copying coordinates

Different workflows require analysts to copy single coordinates, multiple coordinates, or specific components of a coordinate to be used in various applications.

- Click the **Copy** button beside the output coordinate row to copy a coordinate.
- Click the **Copy All** button in the **Output** coordinate section to copy all coordinates.
- Click the **Expand** button in the coordinate row and then click the **Copy** button to copy a component of the coordinate.
- Select a coordinate in the **List** section, then right-click the coordinate and select **Copy** to copy a single coordinate from the **List**.
- Right-click a coordinate in the **List** section, then select **Copy All** to copy all of the coordinates in the **List**.

Adjust the output format

The display of an output format can be changed or removed.

1. In the **Output** section, right-click an output format and click **Configure**.
2. In the **Edit Output Coordinate** window, change the **Category** of output coordinate or click **Advanced** and change the formatting of the output coordinate.
3. Click **OK**.

Note: To remove an output format, right-click it and click **Delete**.

Import Coordinates

Tabular coordinates can be imported into the Coordinate Conversion pane.

1. Click the **Import** button on the **Coordinate Conversion** pane.
2. Navigate to a .csv file containing coordinates, and click **Open**.
   The **Select Fields** dialog will appear.
3. Use the **X Field (Longitude)** drop-down to choose the field from the .csv that contains the coordinates to be imported.
4. Optionally, check the **Use two fields** check box if your coordinates are in two separate fields. Use the **X Field (Longitude)** drop down to select the X value (longitude) field and use **Y Field (Latitude)** drop down to select the Y value (latitude) field.
   The **Y Field (Latitude)** field with be grayed out, until the **Use two fields** check box is marked
5. Click **OK**. The imported coordinates will appear on the map and in the **List** section.
   After points are imported, they are placed in the list in reverse order of they were listed in the input. This means that the first row from the input is the bottom entry in the list.

Export Coordinates

Coordinates can be collected from the map and exported as a feature class, shapefile, CSV, or KML.

1. Click the **Map Point Tool** on the **Coordinate Conversion** pane.
2. Select a location on the map. Coordinates will automatically be added to the **List**.
3. Optionally, click the **Edit Properties** button to change the display input to a predefined format.
4. Click the **Export** button on the **Coordinate Conversion** pane to export the collected coordinates as a feature class, shapefile, KML, or CSV.
   To export as a feature class an existing geodatabase must be selected. To export as a shapefile, use the drop-down on the bottom of the **Select ouput** dialog to select `Shapefile`.

Supported notation formats

A number of formats are supported for reading and writing coordinate locations from a text string using Coordinate Conversion.

Note: The examples and explanations use the following syntax:

- `|` means "or". For example, `+ | -` means you can use either the `+` or `-` character.
- `[ ]` denotes a choice list. For example, `[ + | - | N | S]` means you can use either a `+`, `-`, `N`, or `S` character.
- `< >` denotes a value.

Degree-based formats

- Both <longitude/latitude> and <latitude/longitude> are supported.

  Note: If the coordinate is entered in <longitude> <latitude> order and no hemisphere abbreviation (i.e. N, S, E, W) is specified and the <longitude> value is less than 90 the value will be interpreted as <latitude> <longitude>.

- When entering invalid values for type DMS or DDM of 60 or greater, for minutes or seconds, the value is mathematically corrected (i.e. a value of 80 seconds becomes 1 minute 20 seconds).

Decimal Degrees (DD)

Input formats:

- <latitude> <coord-pair-separator> <longitude>
- <longitude> <coord-pair-separator> <latitude>

latitude	[+ | - | N |S]<DD.dd>[+ | - | N | S]	Case is ignored
longitude	[+ | - | E | W]<DDD.dd>[+ | - | E | W]	Case is ignored
coord-pair-separator	[space | / |\ || |, |; |:]	Can be more than one separator, for example, comma space, space space

Latitude <`DD.dd`> and longitude <`DDD.dd`> values can be formatted as:

- <degrees> [<decimal>] <fraction of degree> [<degree-mark>]

degrees	0 to 90 (latitude) 0 to +180 and 0 to -180 (longitude)
decimal	[. | , | :] Note: the Operating System Region decimal symbol must be changed to match. When using `,` or `:` as decimal symbol, these symbols can't be used as the <coord-pair-separator>.
fraction of degree	0 to 99
degree-mark	Degree Sign ° (U+00B0) Ring Above ˚ (U+02DA) Masculine Ordinal Indicator º (U+00BA) Circumflex Accent(Caret) ^ (U+005E) Tilde ~ (U007e) Asterisk * (U+002A)

Note: Degree mark can be omitted.

Degrees Decimal Minutes (DDM)

Note: You cannot have multiple +/-signs within the DD MM SS.sss format.

Input formats:

- <latitude> <coord-pair-separator> <longitude>
- <longitude> <coord-pair-separator> <latitude>

latitude	[+ | - | N | S]<DD MM.mmm>[+ | - | N | S]	Case is ignored

longitude	[+ | − | E | W]<DDD MM.mmm>[+ | − | E | W]	Case is ignored
coord-pair-separator	[space | / | \ | | | ,]	Can be more than one separator, for example, comma space, space space

Latitude <DD MM.mmm> and longitude <DDD MM.mmm> values can be formatted as:

- <degrees> [<degree-mark>] [<separator>] <minutes> [<decimal>] <fraction of minute> [<minute-mark>]

degrees	0 to 90 (latitude) 0 to +180 and 0 to -180 (longitude)
degree-mark	Degree Sign ° (U+00B0) Ring Above ˚ (U+02DA) Masculine Ordinal Indicator º (U+00BA) Circumflex Accent(Caret) ^ (U+005E) Tilde ~ (U007e) Asterisk * (U+002A)
separator	[space | underscore | hyphen]
minutes	0 to 59
decimal	[. | , | :] Note: the Operating System Region decimal symbol must be changed to match. When using , or : as decimal symbol, these symbols can't be used as the <coord-pair-separator>.
fraction of minute	digits
minute-mark	Minute Sign ' (U+2032) Apostrophe ' (U+0027)

Note: Degree mark can be omitted.

Degrees Minutes Seconds (DMS)

Note: You cannot have multiple +/-signs within the DD MM SS.sss format.

Input formats:

- <latitude> <coord-pair-separator> <longitude>
- <longitude> <coord-pair-separator> <latitude>

latitude	[+ | − | N | S]<DD MM SS.sss>[+ | − | N | S]	Case is ignored
longitude	[+ | − | E | W]<DDD MM SS.sss>[+ | − | E | W]	Case is ignored
coord-pair-separator	[space | / | \ | | | ,]	Can be more than one separator, for example, comma space, space space

Latitude <DD MM SS.sss> and longitude <DDD MM SS.sss> values can be formatted as:

- <degrees> [<degree-mark>] [<separator>] <minutes> [<minute-mark>] [<separator>] <seconds> [<decimal>] <fraction of second> <second-mark>

degrees	0 to 90 (latitude) 0 to +180 and 0 to -180 (longitude)
degrees-mark	Degree Sign ° (U+00B0) Ring Above ˚ (U+02DA) Masculine Ordinal Indicator º (U+00BA) Circumflex Accent(Caret) ^ (U+005E) Tilde ~ (U007e) Asterisk * (U+002A)
separator	[space | underscore | hyphen]
minutes	0 to 59
minute-mark	Minute Sign ′ (U+2032) Apostrophe ' (U+0027)
seconds	0 to 59

decimal	[. | , | :] Note: the Operating System Region decimal symbol must be changed to match. When using , or : as decimal symbol, these symbols can't be used as the <coord-pair-separator>.
fraction of second	digits
second-mark	Quotation Mark " (U+0022)

Military Grid Reference System (MGRS)

Given the MGRS coordinate, ZZBGGEEEEENNNNN, the various coordinate components are:

- ZZ: UTM Zone
- B: Latitude Band
- GG: Letters representing a 100K grid square (Universal Polar Stereographic area for polar regions)
- EEEEE: X Coordinate (Easting)
- NNNNN: Y Coordinate (Northing)

Note: Together, the first three letters, ZZB, are sometimes called the Grid Zone Designator

Spaces are allowed on input to Coordinate Conversion between the Grid Zone Designator (ZZB), 100K grid square (GG), Easting (EEEEE), and (Northing). The number of digits used for eastings and northings must match. For example, all of the following inputs are equivalent:

- `11SWC8081751205`
- `11S WC8081751205`
- `11S WC 8081751205`
- `11S WC 80817 51205`

MGRS Coordinates may be rounded to reflect lesser precision. For example:

- `11SWC8081751205` is at one-meter refinement.
- `11SWC80815120` is at 10-meter refinement.
- `11SWC808512` is at 100-meter refinement.
- `11SWC8051` is at 1,000-meter refinement.
- `11SWC85` is at 10,000-meter refinement.
- `11SWC` is at 100,000-meter refinement.

Coordinate Conversion only supports MGRS in New Style lettering scheme based on WGS 1984.

Note: Coordinate Conversion does not support MGRS in the polar regions (i.e. North of 84 degrees North and South of 80 degrees south).

United States National Grid (USNG)

The USNG coordinate notation format is a simplified version of MGRS based on the United States National Grid. The components, space formatting, and precision follows the conventions of MGRS, which is explained above for reference.

Note: Coordinate Conversion does not support MGRS in the polar regions (i.e. North of 84 degrees North and South of 80 degrees south).

Universal Transverse Mercator (UTM)

The Universal Transverse Mercator system is a specialized application of the transverse Mercator projection. The globe is divided into 60 north and south zones, each spanning 6° of longitude. Each zone has its own central meridian. Zones 1N and 1S start at 180° W. The limits of each zone are 84° N and 80° S, with the division between north and south zones occurring at the equator.

Given the UTM coordinate, ZZB EEEEEE NNNNNNN, the various components are:

- ZZ: UTM Zone
- B: Latitude Band (Coordinate Conversion uses a latitude band and not N or S to represent a North or South UTM zone)
- GG: Letters representing a 100K grid square (Universal Polar Stereographic area for polar regions)

- EEEEEE: X Coordinate (Easting)
- NNNNNNN: Y Coordinate (Northing)

To input a UTM coordinate to Coordinate Conversion, spaces must be embedded between the UTM Zone/Latitude Band (ZZB), the Easting (EEEEEE), and Northing (NNNNNNN) components, and must be listed in this order: ZZB EEEEEE NNNNNNN, for example, 11S 369420 3763875.

Introduction to Distance and Direction

Analysts need to understand and visualize basic information about places and objects of interest, for instance, the distance between two geographic locations or the range of a weapon system. Using Distance and Direction you can draw geodetic lines, circles, ellipses, and range rings to visualize relevant information. You can use created graphics for further analysis and planning by saving the graphics to feature classes, shapefiles, and KMZ (compressed Keyhole Markup Language) files.

Change the display of input coordinates

Use the Edit Properties button to change the display of input coordinates.

1. Click the **Edit Properties** button.
   The **Edit Properties** window appears.
2. Click the **Display Coordinate** drop-down list and select a display coordinate format.
3. Click **OK**.
4. Use the **Map Point Tool** to select a location on the map.
   The input box will display the selected coordinate format.

Create lines interactively

Click on the map to create geodetic, great elliptic, or loxodrome lines.

1. Click the **Lines** tab.
2. Click the drop-down list to choose a line type. Line types include: **Geodesic**, **Great Elliptic**, and **Loxodrome**.
3. Use the **Distance/Length** drop-down menu to change the unit of measure.
4. Use the **Angle** drop-down menu to change the unit of measure.
5. Click the **Map Point Tool**.
6. Click a location on the map to designate the line starting point.
7. Click a second point on the map to designate the line ending point.
   A graphic line is created with the line's distance and direction.
8. Click the **Save As** button to export the line graphics to a file geodatabase, shapefile, or KML (compressed Keyhole Markup Language).
9. Optionally, click **Clear Graphics** to remove the graphics from the map.

Create lines from known coordinates

Use known coordinates to create geodesic, great elliptic, or loxodrome lines.

1. Click the **Lines** tab.
2. Click the drop-down list to choose a line type. Line types include: **Geodesic**, **Great Elliptic**, and **Loxodrome**.
3. Type or paste coordinates in the **Starting Point** dialog.
4. Type or paste a coordinates in the **Ending Point** dialog.
5. Press the **Enter** key.

Create lines from distance and bearing

Create lines using distance and bearing.

1. Click the **Lines** tab.
2. Click the drop-down list to choose a line type. Line types include: **Geodesic**, **Great Elliptic**, and **Loxodrome**.
3. Click the **From** drop-down list and select **Distance and Bearing**.
4. Type or paste a coordinate in the **Starting Point** dialog or use the **Map Point Tool** to set a start point.
5. Select the desired unit of measure from the **Distance/Length** drop-down and enter a value.
6. Select the desired unit of measure from the **Angle** drop-down and enter a value.
7. Press the **Enter** key.
8. Click the **Save As** button to export the line graphics to a file geodatabase, shapefile, or KMZ (compressed Keyhole Markup Language).

   Note: Clicking the **Clear Graphics** button removes all the graphics from the map created with this tab.

Create circles interactively

Interactively create circles by clicking on the map.

1. Click the **Circles** tab.
2. Click the **From** drop-down menu to choose a drawing method. Choose between **Radius** or **Diameter**.
3. Select a unit of measurement from the drop-down menu for **Radius/Diameter**
4. Click the **Map Point Tool** and select a center point.
5. Use the cursor to select the size of the circle and click to draw the circle.
   A graphic circle is displayed.
6. Click the **Save As** button to export the circle graphics to a file geodatabase, shapefile, or KMZ (compressed Keyhole Markhole Language).

   Note: Clicking the **Clear Graphics** button removes all the graphics from the map created with this tab.

Create circles from known coordinates

Use known coordinates to create circles from a known radius or diameter.

1. Click the **Circle** tab.
2. Click the **From** drop-down menu and choose **Radius** or **Diameter**.
3. Type or paste coordinates in the **Center Point** dialog.
4. Type or paste a distance in the **Radius / Diameter** dialog.
5. Press the **Enter** key.

Create circles using a speed and time

Create circles to identify potential locations for moving objects using a center point and time.

1. Click the **Circle** tab.
2. Click the **From** drop-down menu and choose radius or diameter.
3. Type or paste a coordinate in the **Center Point** section or use the **Map Point Tool** and click a location on the map
4. Click the **Distance Calculator** drop-down arrow.
5. Use the **Time** drop-down to select a unit of measure.
6. Type a rate of time in the **Time** section.
7. Use the **Rate** drop-down to select a unit of measure.
8. Type a rate of travel value in the **Rate** section.
9. Press the **Enter** key.

Create ellipses interactively

Interactively create ellipses.

1. Click the **Ellipse** tab.
2. Click the **Ellipse Type** drop-down and select between **Semi** or **Full**.
3. Set the unit of measure in the **Axis** section.
4. Set the unit of measure in the **Orientation** section.
5. Click the **Map Point** tool and select a center point on the map
6. Use the cursor on the map to designate the ellipses major axis and click to accept.
7. Use the cursor on the map to designate the ellipses minor axis and click to accept.
   A graphic ellipse is displayed.
8. Click the **Save As** button to export the ellipse graphics to a file geodatabase, shapefile, or KMZ (compressed Keyhole Markup Language).

   Note: Clicking **Clear Graphics** will remove all the graphics from the map that were created with this tab.

Create ellipses from known values

Use known coordinates to create ellipses.

1. Click the **Ellipse** tab.
2. Click the **Ellipse Type** drop-down and choose between **Semi** or **Full**.
3. Set the unit of measure in the **Units** drop-down menu in the **Axis** section.
4. Set the unit of measure in the **Units** drop-down menu in the **Orientation** section.
5. Type or paste coordinates in the **Center Point** dialog.
6. Type or paste a value in the **Major** dialog in the **Axis** section.
7. Type or paste a value in the **Minor** dialog in the **Axis** section.
8. Type or paste a value in the **Angle** dialog of the **Orientation** section.
9. Press the **Enter** key.

Create range rings interactively

Interactively create range rings.

1. Click the **Rings** tab.
2. Check the **Interactive** box.
3. Optionally, type a value in the **Number of Radials** section.
4. Click the **Map Point Tool** tool.
5. Click on the map to designate the center point.
6. Move the cursor to select the diameter of the next ring and click to create it. Add rings as necessary and double-click to finish. Graphic range rings are displayed.
7. Click the **Save As** button to export the range ring graphics to a file geodatabase, shapefile, or KMZ (compressed Keyhole Markup Language).
8. Optionally, click **Clear Graphics** to remove the graphics from the map.

Create range rings using a set ring number and distance

Create range rings with a set number of rings at a specified distance.

1. Click the **Rings** tab.

   Note: Ensure the **Interactive** box is unchecked.

2. Type a value in the **Number of Rings** section.
3. Type a value in the **Distance Between Rings** section.
4. Use the drop-down menu to set the unit of measure.
5. Type the desired **Number of Radials**.
6. Click the **Map Point Tool**.
7. Click a location on the map to designate the center point.
8. Press the **Enter** key.
   Graphic range rings are displayed.

Introduction to Visibility

Visibility takes into consideration what can be seen by an observer from a given location. Analysts use key terrain, observation posts, and other locations to assess capabilities (what can be seen) and vulnerabilities (what cannot be seen). The Visibility tools use elevation data paired with observer information to produce linear line of sight (LLOS) and radial line of sight (RLOS) information.

Create linear lines of sight

You can create linear lines of sight (LLOS) by specifying observer and target locations. You can use one or multiple observers and one or multiple targets to analyze lines of sight.

1. Click the **LLOS** tab.
2. Add an elevation surface to the map.

   Note: The surface data may be a raster, image service, or mosaic dataset.

   Caution: The input surface data must be in a projected coordinate system.
3. Click the **Input Surface** drop-down to choose an elevation surface from the **Table of Contents**.
4. In the **Offsets** section, input **Observer** and **Target** heights and specify the unit of measure.
5. Type, or paste in coordinates to designate one or more observer locations or use the **Observer Map Point Tool** and click on the map.
   Observer points are marked with blue circles.
6. Type, or paste in coordinates to designate one or more target locations or use the **Target Map Point Tool** and click on the map.
   Target points are marked with red squares.
7. Click **OK**.
   If the target is visible from an observer it will be colored green. If the target is not visible from an observer it will be colored red. Sections of the line between the observer and target that are visible will be green. Sections of the line that are not visible will be red. Visible targets will have a numeric label showing how many observers can see them. White sight lines are created between observers and targets that have visibility, black sight lines are created between observers and targets that do not have visibility.

   Note:
   - You can refine the analysis by changing offset heights or adding observers or targets.
   - **Cancel** removes the observer and target coordinates.

Creating radial line of sight

Radial Line of Sight (RLOS) shows terrain visibility from a location using given observer information.

1. Click the **RLOS** tab.
2. Add an elevation surface to the map.

   Note: The surface data may be a raster, image service, or mosaic dataset.

   Caution: The input surface data must be in a projected coordinate system.

   Caution: The use of a global or large area extent image service will result in excessive processing time. It is recommended to use a local dataset or a small area extent image service.
3. Click the **Input Surface** drop-down to choose an elevation surface from the **Table of Contents**.
4. Type or paste coordinates to designate one or more observer locations, or use the **Observer Map Point Tool** and click on the map.
   Observer points are marked with blue circles.
5. Check the **Symbolize Non-Visible Data in Output** box to symbolize non-visible areas in red; otherwise the output will only show areas that are visible.
6. You can change the following settings by clicking on **Observer Options** or accept the defaults:
   - Type an offset height in the **Observer** section.
   - Type an offset height in the **Surface** section.
   - Click the drop-down list to specify the offset units.
   - Type a minimum and maximum linear **Distance** for the analysis.

     Note: The units for linear distance are the same units specified for the offset.
   - Type limits to the observer's **Horizontal** field of view.
   - Type limits to the observer's **Vertical** field of view.
   - In the **Field of View** section, click the drop-down list to specify the angular units for the field of view.
7. Click **OK** to calculate visibility around the observers.
   A new polygon layer is added to the map each time you run the analysis. Areas visible from an observer are shown in green. If an area is visible from more than one observer, it will be shown with a unique value indicating how many of the observers can see it.

Note:

- You can refine your analysis by changing the observer offsets heights or fields of view.
- **Cancel** removes the observer coordinates from the tool.

Introduction to Military Symbol Editor

In support of military operations and planning, the military uses standard map symbols to visualize the battlefield. These symbols represent military units, equipment and installations, along with tactical graphics to show military operations, boundaries or other special designations. The symbols are also color coded to represent friendly, enemy, or neutral entities. The Symbol Editor tools support the United States Military Standard 2525 for Joint Military Symbology, specifically, MIL-STD-2525D and MIL-STD-2525B Change 2. Using the Symbol Editor, analysts can create, edit and publish military overlays that are compliant with the standard.

The Military Symbol Editor is presented as an Add-In for ArcGIS Pro for quickly creating military overlays using MIL-STD-2525D and MIL-STD-2525B Change 2. The Add-In is used to search for basic symbols, modify attributes, previewing complete military symbols and saving favorites. These military symbols can be added to the map by clicking on the map or entering coordinates.

Updating the installed .stylx files

During installation of ArcGIS Pro, two .stylx files are installed that allow the Military Symbol Editor to draw and label military symbols. As an alternative to using those files, there are additional files that can be used to further increase the scope of labeling functionality the Military Symbol Editor offers.

Note: The following steps will require administrator permissions.

1. Locate the two files `mil2525c_b2.stylx` and `mil2525d.stylx` found in the `..\ArcGISPro\Resources\Dictionaries` folder.
2. With ArcGIS Pro closed, navigate to the `Dictionaries` folder in the ArcGIS Pro install location. For a typical install, this will be `..\Program Files\ArcGIS\Pro\Resources\Dictionaries`. Inside of the `Dictionaries` folder there are two folders, `mil2525c_b2` and `mil2525d` the new .stylx should replace the existing .stylx in the folder of the same name.
3. Start ArcGIS Pro, and begin using the Military Symbol Editor.

Open the Military Symbol Editor and Choose Symbol Standard Settings

Before you begin creating symbols , open the Military Symbol Editor and set the desired symbol standard .

1. In **ArcGIS Pro**, click the **Military Tools** tab.
2. Click the **Military Symbol Editor** button.

   The Military Symbol Editor pane opens.
3. Set the desired standard using the **Settings** hyperlink at the bottom of the pane. The default symbol setting is **MIL-STD-2525B Change 2**, but the Add-In can also be set to **MIL-STD-2525D**.

Search for a symbol

The first step in creating a military symbol with the **Military Symbol Editor** is to search for a symbol.

1. In the **Military Symbol Editor** pane, on the **Search** tab, type a keyword in the **Search** box and click enter to find the symbol you want (e.g. type "Infantry" to find infantry-related symbols).
2. Optionally, refine your search by typing other keywords (e.g. type "armor" after infantry to find armored infantry symbols). To preview a symbol, click on that symbol in your search results.
3. Optionally, search for a symbol by typing the symbol identification code (SIDC) of a symbol. You can type the complete SIDC or part of one.

   Once you receive the results of your search, find and click on your desired symbol.
4. If you are using the **Military Symbol Editor** without the **Military Overlay** template, you will receive an **Add-In Disabled** dialog asking you to add a layer package to your project. Click **Yes** to add the layer package to your project. This is where the symbols you design will be stored as features when you add them to the map.
5. Click the forward button. Alternatively, if you do not wish to customize the symbol with amplifiers, modifiers, or labels, you can click the **Add Favorite** or **Add To Map** buttons.

Customize a symbol

The next step in creating a military symbol with the **Military Symbol Editor** is to modify the symbol you found by searching.

1. After you select a symbol in the Military Symbol Editor, click the **Symbol** tab or the forward button.
2. Click the drop-down lists to set the **Identity/Affiliation**, **Status**, **TF**, **FD**, **HQ**, **Echelon**, **Context**, **Modifier 1**, and **Modifier 2** modifier attributes.

   The number of drop-down lists depends on the symbol you selected.
3. Click the forward button. Alternatively, if you do not wish to customize the symbol with labels, you can click the **Add Favorite** or **Add To Map** buttons.

Customize labels

The next step in creating a military symbol with the **Military Symbol Editor** is to add labels to the symbol.

1. After you've customized the symbol in the Symbol tab, click the **Label** tab or the forward button. Alternatively, skip directly to the Label tab from the Search tab by clicking on the Label tab.
2. Set any of the labels in the text boxes. The text modifier attributes include **Date/Time Valid**, **Date/Time Expired**, **Speed**, **Unique Designation**, **Reinforced**, **Staff Comments**, **Additional Information**, and **Higher Formation**.

   The number of text modifiers depends on the symbol you selected.
3. Click the **Add Favorite** or **Add To Map** buttons. Alternatively, if you want to add the symbol to a specific location based on coordinates, click the forward button.

Add a symbol to the map

1. After you've selected and customized a symbol in the Military Symbol Editor, click **Add to Map** to add the symbol to the map. This button appears in the Search, Favorites, Symbol, and Label tabs.
2. Click the location on the map where you want to add the symbol. If the symbol is for a point feature, the feature is added where you clicked. If the symbol is for a line or area feature, the first vertex is added. Click to add additional vertices. Double-click to finish the feature.
3. Optionally, after you've selected a symbol in the Military Symbol Editor, click the **Enter Coordinates** tab to add the symbol at a particular coordinate location.
4. Type or paste a coordinate value in the **Coordinates** box. NOTE: The Coordinates box accepts coordinates in a variety of formats, including DD, DMS, MGRS, and UTM.
5. If the symbol is for a line or area feature, press the **Enter** key and continue adding coordinates.
6. Click **Add Coordinates to Map**. The symbol is added to the map at the coordinates you specified.

Modify symbols on the map

In addition to searching for new symbols in the Military Symbol Editor, you can design symbols that are already on the map by selecting them in the **Modify** tab.

1. Navigate to the **Modify** tab and use the **Select** tool to select a feature on the map. The feature should appear in the tab.
2. Click the Forward button to go to the Symbol tab, where you can use the Add to Map and Favorites buttons, and edit the symbol elements. Alternatively, you can click on the Symbol or Label tabs to customize the symbol and add it to the map.

Add a symbol to favorites

When you are ready to save a customized symbol in the Add-In, you can use the **Add to Favorites** button. Once you click on this button, navigate to the Favorites tab, where you can view your list of favorites. You can use the favorites as a palette from which to select symbols to add to the map, and you can also export the favorites to a file to share with others.

1. After you've selected a symbol in the Military Symbol Editor, click the **Add Favorite** button.
2. Click the **Favorites** tab. You should see the symbol in the favorites box. You can also use the search bar to find specific symbols in your favorites.
3. Optionally, define other symbols that you will need. Add each one to your favorites.
4. Optionally, click a symbol in your favorites and click on the **Delete** button if you wish to remove symbols from your favorites.
5. Click a symbol in the favorites box, and click the **Add to Map** button to add it to the map. If you would like to edit the symbol, click the forward button, which will take you to the Symbol tab.

Share and import favorites

You can export your favorites to a file to share with others. You can also import a favorites file created by someone else from their favorites.

1. After you've created one or more symbols and added them to your favorites, click the **Favorites** tab.
2. Click the **Save As** button on the Favorites tab.
3. Navigate to a location where you have write-access.
4. The default file name is "favorites.json" - optionally, change the name, but keep the ".json" suffix.
5. Click **Save**.
6. After you've received a favorites.json file and saved it to a location where you have write access, click the **Favorites** tab.
7. Click the **Import** button on the Military Symbol Editor.
8. Navigate to a location where you saved the favorites.json file.
9. Click the favorites.json file.
10. Click **Open**. The new favorites should be added to your favorites.

Introduction to Military Tools toolbox

The Military Tools toolbox provides a collection of geoprocessing tools that enable the automation of analytical processes and workflows for determining location, distance, range, and visibility.

The Conversion toolset supports the conversion of coordinate values between multiple coordinate formats. The Conversion toolset also allows the creation of points, polylines, polygons, lines of bearing, 2-point lines, and ellipses from tabular coordinate values. The Distance and Direction toolset supports the creation of range rings using different input methods. These tools work in projected and geographic coordinate systems and support planar and geodetic outputs. The Visibility toolset supports linear and radial visibility analysis on raster surfaces, as well as the identification of highest and lowest locations.

Toolset	Description
Conversion	Provides tools to create features from coordinates in tabular form.
Distance and Direction	Provides tools to create range rings from an interval or a minimum and maximum distance.
Visibility	Provides tools to better understand how the terrain affects relationships between observer and target positions.

An overview of the Conversion toolset

The Conversion toolset contains tools to create features from coordinates in tabular form, such as polygons, lines of bearing, ellipses, and points.

Tool	Description
Convert Coordinates	Converts source coordinates in a table to different coordinate formats.
Table to 2-Point Line	Creates a line feature from a start point and an endpoint.
Table to Ellipse	Creates ellipse features from tabular coordinates and input data values.
Table to Line of Bearing	Creates lines of bearing features from tabular coordinates.
Table to Point	Creates point features from tabular coordinates.
Table to Polygon	Creates polygon features from tabular coordinates.
Table to Polyline	Creates polyline features from tabular coordinates.

An overview of the Distance and Direction toolset

This toolset allows analysts to create range rings from an interval or a minimum and maximum distance.

Tool	Description
Range Rings (from Interval)	Create a concentric circle from a center, with a number of rings, and the distance between rings.
Range Rings from Minimum Maximum	Create two range rings from a center with a minimum and maximum range.
Range Rings from Minimum Maximum Table	Create two range rings from a center with a minimum and maximum range from a table.

An overview of the Visibility toolset

This toolset allows analysts to better understand how the terrain affects relationships between observer and target positions.

Tool	Description
Add LLOS	Adds `height` field to observer and target point features before they are used in Linear Line of Sight.
Add RLOS Observer Fields	Adds the required visibility modifier fields to a point feature class for use in Radial Line of Sight.
Find Local Peaks	The number of peaks to find within the Area of Interest. The number of peaks returned may be less than the input value depending on the number of peaks in the area. You must enter a whole number.
Highest Points	Finds the maximum elevation value of a surface within a defined area.
Linear Line of Sight	Creates a line drawn between two points, an origin and a target, that is compared to a surface to show whether the target is visible from the origin and, if it is not visible, where the view is obstructed.
Lowest Points	Finds the minimum elevation value(s) of a surface within a defined area.
Radial Line of Sight	Creates a viewshed by finding the locations visible from one or more specified observer locations.