

# ENVI EX Tutorial: Using Vector, Annotation, and Feature Counting Tools

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# Using Vector, Annotation, and Feature Counting Tools

In this tutorial, you will use ENVI EX to display a QuickBird multispectral image on which you will create new vector and annotation layers and add vector records and annotation items. You will also use the Feature Counting tool to mark features and view a feature report.

## Files Used in This Tutorial

ENVI Resource DVD: Data\feature\_extraction


File	Description
qb_colorado	QuickBird multispectral image, Boulder, CO, USA, captured July 4, 2005
qb_colorado.hdr	Header file for above

QuickBird files are courtesy of DigitalGlobe and may not be reproduced without explicit permission from DigitalGlobe.

## Starting ENVI EX

- Windows Start menu: Select **Programs > ENVI EX > ENVI EX**.
- UNIX: Type `enviex` at the UNIX command line.

## Opening and Displaying an Image

1. Click the **Open** button  on the toolbar. The Open dialog appears.
2. Navigate to `Data\feature_extraction` and open `qb_colorado`.

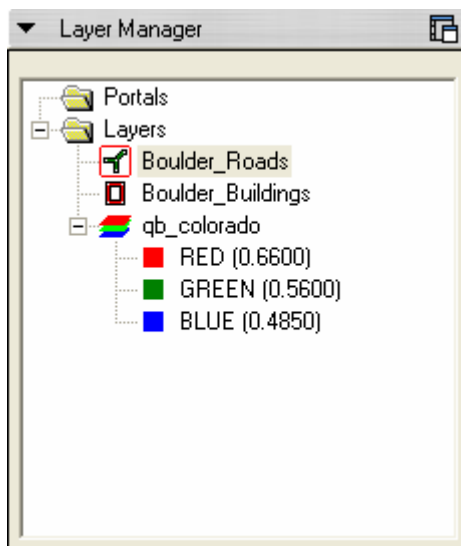
# Using the ENVI EX Vector Tool

In the following exercises, you will create two new vector layers, add and edit vector records, and save your changes.

## Creating Vector Layers


Create one vector layer for polygon records and one vector layer for polyline records. When working with vectors, you create separate layers for each vector record type. For example, if you create a polygon vector layer, it can only contain polygon records; it cannot contain point records.



1. From the menu bar, select **File > New > Vector Layer**. The Create New Vector Layer dialog appears.
2. Enter **Boulder\_Buildings** as the **Layer Name**.
3. Select the vector layer type **Polygon** from the **Record Type** drop-down list.
4. Select `qb_colorado` as the source file that defines the new layer's base projection.
5. Click **OK**. ENVI EX adds the new layer to the Layer Manager as the active vector layer. In cases where you have multiple vector layers loaded, only one layer at a time is the active layer.



6. To create a second new vector layer, right-click on the Layers folder in the Layer Manager and select **New > Vector Layer**.
7. Enter **Boulder\_Roads** as the Layer Name.
8. Select the vector layer type **Polylines** from the **Record Type** drop-down list..
9. Select `qb_colorado` as the source file that defines the new layer's base projection.
10. Click **OK**. ENVI EX adds the new layer to the Layer Manager. Now this layer is the active vector layer, and the Boulder\_Buildings layer is no longer the active layer.

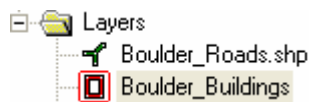
## Adding and Saving Vector Records


Since `Boulder_Roads` is the active layer, you'll add vector records to this layer first. When you added the new vector layer, the **Vector Create** button  was automatically selected on the toolbar.


1. In the Image window, draw polylines along any four roads in the scene. To draw polylines, click and release to follow the shape of the road.
2. To complete the polyline and accept it in the layer, press **Enter**.
3. Save the vector layer before you continue. Right-click on `Boulder_Roads` in the Layer Manager and select **Save As**. The Save As dialog appears with `Boulder_Roads` in the **File name** field.
4. Click **Save**.
5. Draw two polylines that are close together, but not touching each other.
6. Click the **Vector Join** button .
7. Select the one of the polylines you just drew.
8. Drag the cursor to the second polyline you drew to connect the two polylines.
9. Press **Enter** to complete the join.
10. Draw one more polyline.
11. Click the **Vector Edit** button .
12. Select the polyline you just created.
13. Right-click and select Properties. The Properties dialog appears. You can change the appearance of the polylines by choosing different settings in this dialog.
14. Close the Properties dialog.
15. With the polyline still selected, right-click and select **Delete**.
16. Save the layer. Right-click in the Image window and select **Save**.

Next, you will make `Boulder_Buildings` the active layer and add records to it.


1. In the Layer Manager, right-click on the `Boulder_Buildings` layer and select **Set as Active Vector Layer**. The icon next to the layer name is outlined in red to indicate it is the active vector layer.



2. Click the **Vector Create** button .
3. In the Image window, draw polygons over one building in the scene. Click and release to follow the outline of a building in the image.
4. To complete the polygon and accept it in the layer, double-click, or press **Enter**.
5. Repeat this procedure five more times to create polygons over six buildings.

6. Group some of the polygons together.
7. Click the **Vector Edit** button .
8. Use **Ctrl**+click to select three of the polygons.
9. Right-click and select **Group**. You can ungroup the polygons by right-clicking again and selecting **Ungroup**.
10. Save the vector layer before you continue. Right-click on `Boulder_Roads` in the Layer Manager and select **Save As**. The Save As dialog appears with `Boulder_Buildings` in the **File name** field.
11. Click **Save**.

In the final steps for vectors, you will modify the placement of vertices for some of the polygons you created. The `Boulder_Buildings` layer is still active, so you will edit that one.

1. Click the **Vertex Edit** button .
2. Select a polygon.
3. Place the cursor over a vertex to move.
4. Click and drag the cursor to move the vertex to the new location. You can optionally use the up, down, left, and right keyboard keys to move the location one screen pixel in the direction of the arrow.
5. Release the mouse button to reposition the point or vertex.
6. Save the layer. Right-click in the Image window and select **Save**.
7. Remove the vector layers from the Image window. Right-click on `Boulder_Buildings` in the Layer Manager and select **Remove**. Repeat this step for `Boulder_Roads`.

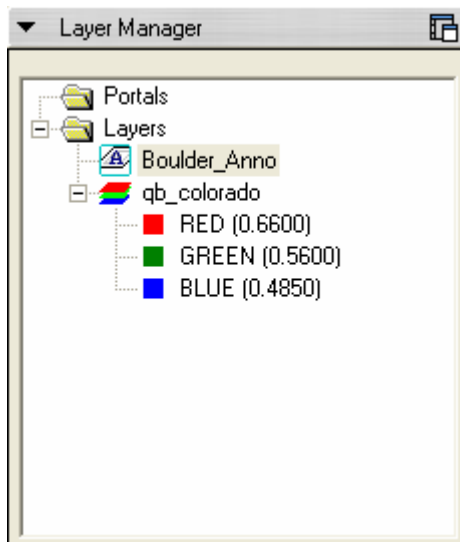
# Using the ENVI EX Annotation Tool

In the following exercises, you will create a new annotation layer, add and edit annotation items, and save your changes.


## Creating an Annotation Layer

In the steps below, you will create one annotation layer. Annotation layers and vector layers are different in that you can have multiple annotation item types within an annotation layer. A single annotation layer may contain a combination of text, polygon, symbol, and other annotation items.

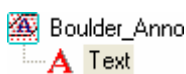
1. From the menu bar, select **File > New > Annotation Layer**. The Create New Annotation Layer dialog appears.
2. Enter **Boulder\_Anno** as the Layer Name.
3. Select **qb\_colorado** as the source file that defines the new layer's extents and map projection.
4. Click **OK**. ENVI EX adds the new annotation layer to the Layer Manager.



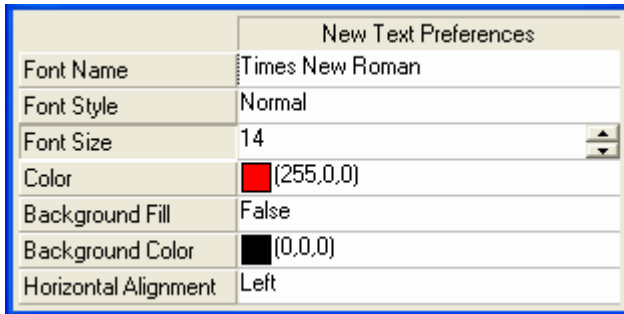
## Adding and Saving Annotation Items

In the steps below, you will add several types of annotation items. When you created the annotation layer, the **Text Annotation** button  was automatically selected.

1. In the Image window, find a park area in the scene to label, and click in it. The cursor turns into a vertical line, ready for you to enter text.
2. Type **Central Park** and press **Enter**. The annotation item is added to the Layer Manager under the annotation layer tree.




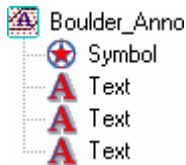
3. Change the preferences set for the text annotations you will add next. Click in the next park location to label, then right-click and select **Preferences**. The Preference dialog appears.



4. Change the **Font Name** to **Times New Roman** and the **Font Size** to **14**, then close the dialog.
5. Using the new preference settings, label two more items as text annotations.
6. Save the annotation layer before you continue. Right-click on `Boulder_Anno` in the Layer Manager and select **Save As**. The Save As dialog appears with `Boulder_Anno` in the **File name** field.
7. Click **Save**.


Next, you will add symbol annotations to the scene.




1. Click the **Symbol Annotation** button .
2. In the Image window, click and release at each location you want to add a symbol. The annotation items are added to the Layer Manager under the annotation layer tree.



3. With the annotation you just added still selected, click and drag it to a new location.
4. Save the layer. Right-click in the Image window and select **Save**.


Now add some arrow annotations.

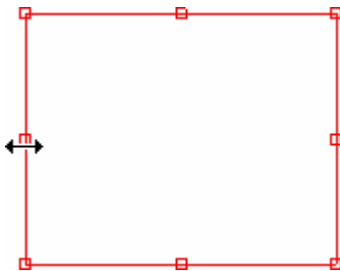
1. Click the **Arrow Annotation** button .
2. In the Image window, add two arrow items. To draw arrows, click and drag to draw an arrow. The annotation items are added to the Layer Manager under the annotation layer tree.
3. Change the appearance of the last arrow only. With the last arrow item still selected, right click and select **Properties**. The Properties dialog appears.

Arrow	
Show	True
Rotate with View	True
Line Color	 (255,255,29)
Line Style	
Line Thickness	2 
Arrow Heads	End
Arrow Head Size	15
Arrow Head Angle	30
Arrow Head Fill	Solid

4. Change the **Line Color** to **Yellow**, the **Line Thickness** to **2**, and the **Arrow Head Size** to **15**. Press **Enter** to accept the change to the arrow head size, then close the dialog.
5. Save the layer. Right-click in the Image window and select **Save**.


Next, add rectangles and resize them. Before you draw the rectangles, you will change the preferences.

1. Click the **Rectangle Annotation** button .
2. Right-click in the Image window and select **Preferences**. The Preferences dialog for rectangles appears.
3. Set the **Fill Interior** to **Solid**, then close the dialog.
4. In the Image window, add two new rectangles. The annotation items are added to the Layer Manager under the annotation layer tree.
5. Resize any of the rectangles you drew by clicking and dragging on the selection handles.



6. Save the layer. Right-click in the Image window and select **Save**.

In the final steps for annotations, you will rotate the image and the annotation items.

1. Click the **Rotate** button , then click and drag the cursor in a clockwise or counter-clockwise direction to rotate the image. The **Rotate To** drop-down list on the toolbar interactively reports the current degree of rotation.
2. Most annotation items (except text, symbol, and picture) rotate with the image. By default, text annotation and symbol items do not rotate with the image.



3. To change this setting, right-click on the text annotation item in the Layer Manger and select **Properties**. The Properties dialog appears. Change the **Rotate with View** value to **True**. You can change the **Rotate with View** value for any annotation item through the Properties dialog.



4. Save the layer. Select **File > Save**.


5. Remove the layer from the Image window. Right-click on Boulder\_Anno in the Layer Manager and select **Remove**.
6. In the **Rotate To** drop-down list, select **0** degrees.

# Using the ENVI EX Feature Counting Tool

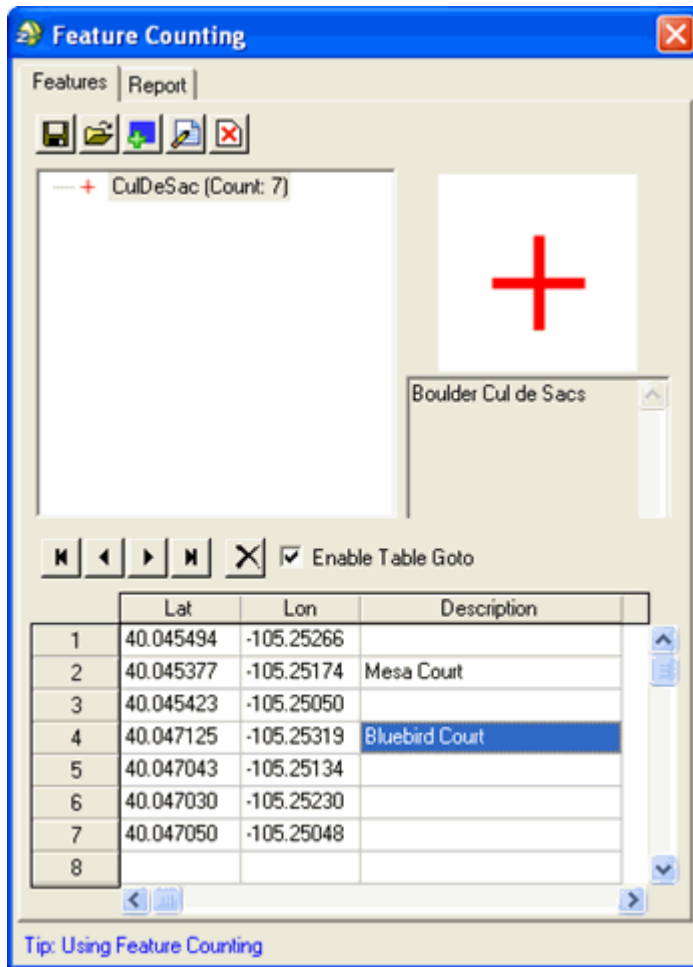
In this exercise, you will mark features using the Feature Counting tool. You can create multiple feature types to separate marked features into groups. After you have marked features, you will view the Feature Report and save it as a text file.

## Marking Features



In the following steps you will mark cul de sacs in the scene.

1. Click the **Feature Counting** button . The Feature Counting dialog displays.
2. Right-click on `Feature_1` and select **Edit Properties**. The Properties dialog displays.
3. Enter **CulDeSac** for the **Name** (do not use spaces).
4. Enter **Boulder Cul de Sacs** for the **Description**.
5. Click **OK**.
6. Move the Image window view to the lower-left corner.
7. In the Image window, click to mark cul de sacs in the scene. For each feature you mark, ENVI EX adds a row to the Feature Counting dialog. One Feature Counting layer is added to the Layer Manager category; all features you mark are included in that layer.

8. Add more information to some of the marked features. In the Feature Counting dialog, double-click in the **Description** field and enter a description. Press **Enter** to accept the description.



## Creating a New Feature Type and Marking Features

1. In the **Features** tab, click the **Add Feature Type Properties** button . ENVI EX adds a new feature type to the list, named `Feature_2`.
2. Select the new feature name and click the **Edit Feature Type Properties** button . The Properties dialog appears.
3. Enter **Parks** for the **Name**.
4. Enter **Boulder Parks** for the **Description**.
5. Click **OK**.
6. Move the Image window view to find an area that has open areas.
7. In the Image window, click to mark a few parks in the scene.
8. Add more information to one of the marked features. In the Feature Counting dialog, double-click in the **Description** field and enter a description. Press **Enter** to accept the description.

9. Save the data. Click the **Save Features** button . The Save Features dialog appears.
10. Enter a path and the filename **Boulder\_Features.dbz**, then click **OK**.
11. Remove the layer from the Image window. Right-click on **Feature Counting** in the Layer Manager and select **Remove**.

## Restoring the Feature Count Data





In this section, you will restore the feature counting layer you created and saved. The `qb_colorado` image should still be loaded.

1. In the Feature Counting dialog **Features** tab, click the **Restore Features** button . The Restore Features dialog appears.
2. Select the `Boulder_Features.dbz` file you saved.
3. Click **Open**. ENVI EX opens the feature counting layer and displays the data in the Image window. The rows of the Feature Counting dialog show the feature data.

## Jumping to Features in the Scene

If you marked many features in a scene, you can click on a row in the Feature Counting dialog to jump to that feature.

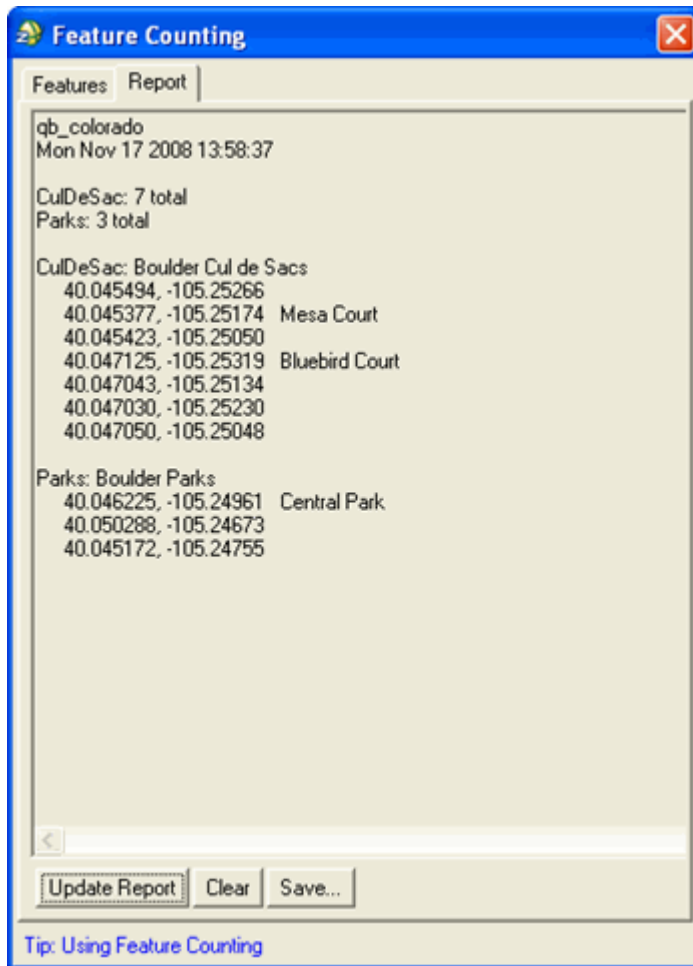
Go to a feature using one of the following:

- With the **Enable Table Goto** check box enabled, click on a row in the data table to go to that feature (if you do not want to go to a feature whenever a row is selected, disable the check box).
- Click on the **Jump to First Feature** button  to go to the first feature listed in the data table.
- Click on the **Jump to the Previous Feature** button  to go to the feature listed above the currently selected feature in the data table.
- Click on the **Jump to the Next Feature** button  to go to the feature listed below the currently selected feature in the data table.
- Click on the **Jump to Last Feature** button  to go the last feature listed in the data table.

ENVI EX centers the Image window over the selected feature.

## Viewing and Saving the Feature Count Report

1. In the Feature Counting dialog, select the **Report** tab.
2. Click **Update Report**. The tab is updated with information about all features types that were marked. To clear the report data, click **Clear**.



3. Click **Save** to save the report as a text file. The Save Feature Counting Report dialog appears.
4. Enter a location and the filename **Boulder\_Features.txt**, then click **OK**.

When you have completed the exercises in this tutorial, close ENVI EX. From the menu bar, select **File > Exit** and click **OK**.