



**HUNSAKER  
& ASSOCIATES**  
IRVINE, INC.

## **Importing GIS / USGS Data into AutoCAD (Rev. 1)**

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GIS data is information that is tied to coordinates. It may be formatted in several different formats. Fortunately, AutoCAD Map has the ability to import and beautify most formats you will encounter.

Learning the concepts involved will allow you to look for ways to use the available information on the web and from clients. Consultants such as us need to be as sharp as possible when it comes to finding and using information.

In general, the steps to importing GIS linework data are simple:

- Import using Map->Tools->Import
- Flag import to use data available
- Flag import to translate coordinates
- Query as needed to new drawing to modify properties based on data

To import a raster image, use Map->Image->Insert. The tool will detect the positioning information for you.

The following sections will walk you through the steps involved.

### **Data available on the web**

It is not difficult to find GIS data on the internet. A few sites that are useful are:

- <http://data.geocomm.com/>
- <http://libinfo.uark.edu/gis/us.asp>
- <http://gis.ca.gov/data.epl>

The first site, Geo Community, is excellent for obtaining:

- USGS quad images (DRG's – Digital Raster Graphics)
- Aerial photos by quad area (DOQQ's)
- Digital Line Graphics of contours, street, and hydrologic features (DLG's)
- Digital Elevation Models (DEM's)

You can get some of the items free, and some you have to pay for. It is \$25 for 150mb of download. Each USGS quad is about 5 meg so you can get quite a lot for a moderate price.

The Geo Community site looks like this:



www.geocomm.com

**FREE** subscription to **GI**  
NO catch. NO charge. NO kidding!

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THE PREMIER ONLINE RESOURCE FOR GIS AND GEOSPATIAL DATA

National Elevation Dataset - Nationwide Bundle - [Click here](#)

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## USGS Digital elevation Models (DEM)

[> The DEM FAQ](#) > [DEM Status Graphic](#)



The USGS Digital Elevation Model (DEM) data files are digital representation information in a raster form. DEMs consist of a sampled array of elevation ground positions at regularly spaced intervals. These digital cartographic maps are produced by the U.S. Geological Survey (USGS) as part of the National Elevation Dataset (NED) and are sold in 7.5-minute, 15-minute, 2-arc-second (also known as 1:250,000 scale) units. The 7.5- and 15-minute DEMs are included in the large scale category while the 2-arc-second DEMs fall within the small scale category (also known as 1:50,000 scale).

- [NOTICE OF UPDATE TO USERS OF USGS SDTS I](#)
  - [NOTICE TO USERS OF USGS SDTS I](#)
  - [OUTLINE OF CHANGES IN DEM DATA](#)
  - [Join the USGS Hosted SDTS Mail](#)

**Why won't DEMs open in ArcView GIS?** - Please note, USGS DEM data updated last year (2001) may not open in ArcView GIS (or other programs). Unless the software you are using supports the new SDTS header. See <http://www.gisdatadepot.com/dem/sdts2dem.html>

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## GeoCommunity DEM Resources

- \*NEW\* [DOWNLOAD National Elevation Dataset \(NED\)](#) (Nov, 2002)
- [DOWNLOAD DEM DATA HERE](#) (using free or fast download options)
- [DOWNLOAD DEM2XYZN Translator](#)
- [DOWNLOAD SDTS2DEM Translators](#)
- Need entire State, County, or Nation-wide bundles? [PURCHASE State DEM Data](#)
- Help Resource [Everything you want to know about SDTS](#)
- [SDTS Translators](#) - a number of free downloads and utilities.
- [More DEM Data & Translator Providers](#) - get listed!
- [DEM Papers and Articles](#)
- [Raster Data Viewers](#)

## DEM Articles

You can see the USGS items on the left. Those are the links to get quad images, aerial images, and various line graphics.

## Data from outside consultants

The only data you should expect to see is from the ERSI products – ArcView/ArcInfo.

Those programs will usually produce:

- .e00 – ArcInfo Coverage file
- .shp – shape file

The interesting thing is that you will usually get three or four files for each shape file. Those extra files are databases of information about the linework in the shp file and are the key to making things look pretty and easy to use.

You use the same import methods for these types of files as for downloaded files.

## Data available from programs H&A has

We have a couple programs that provide information somewhat easier and cleaner than downloading from the web, they are:

- Aerials Express – this program brings up aerial photos for the LA area and lets you pick the area you want. It produces a world file for your coordinate system so you can bring the images created right into your drawing. Its images are very recent. Only downside is we have not purchased coverage for everywhere. So far away places will not be available. We have limited seats so ask out IT dept if you can have it installed if you need it. Otherwise, use someone leses computer to do it.
- Quads USA – this will create seamless USGS raster images with world files. This is easier than using downloaded maps, but again coverage is limited. This runs off the network so anyone can have this at their computer.
- Thomas Guide linework – we have the ability to create linework and text very quickly from Thomas Guide maps we have. This is somewhat new but eventually we will import everything and have a folder with maps ready to go. For now, you must request an area to be done.
- County parcel linework – we have figured out how to create linework of a few main counties easily. Again, this is a bit new so request the area needed.
- Keyhole software – this program is fun and amazing. You start with a globe and “fly” in with controls. It shows 3D terrain with aerial photos draped over. We have limited seats so you will have to ask who has this installed. The image quality produced is not as exact as other methods, but it is useful for getting an idea of the land around your project.

## Downloading and importing data

To focus on real data available, I have tabulated several sources of data and the information needed to import or use it.

Data Type	Where to get it	Format of Files	Coord System
USGS Quad Raster (DRG)	<a href="http://data.geocomm.com">http://data.geocomm.com</a>	.zip with .tif and .tfw	UTM NAD27
USGS Digital Elevation Model (DEM)	<a href="http://data.geocomm.com">http://data.geocomm.com</a>	.GZ - unzip two times to get .DDF files	7.5 min – UTM NAD 27 or 83 30 min – Lat/Long NAD 27 or 83 1 deg - Lat/Long NAD 27 or 83 Elev units are meters.
USGS Aerial Photos (DOQQ)	<a href="http://data.geocomm.com">http://data.geocomm.com</a>	.zip with .sid and .sdw	UTM NAD 27 or 83
USGS Contour Lines (Hypsography)	<a href="http://data.geocomm.com/drg/index.html">http://data.geocomm.com/drg/index.html</a> Browse to County, then pick Digital Line Graphics 24k	.GZ - unzip two times to get .DDF files	UTM NAD 27 or 83
Aerial Photos	Aerials Express program	.jpg with .jpw	Whatever you specified
Seamless USGS Quads Raster	Quads USA program	.tif with .tfw	Whatever you specified
Shape Files	Many places, even make your own from AutoCAD	.shp (and usually a few other files with it)	Must guess by who is providing it. Geo Community items will generally be UTM NAD 27 or 83

### Raster images – DRG's and DOQQ's

For raster images, they will not need to be modified. AutoCad can bring in most any image type. Tif, Jpg, and Sid files are the most common.

You must have either some kind of world file, which is a text file named .tfw or .jpw, or the image must contain the information telling the computer where it sits within a coordinate system.

If you do not have a world file, bring up the image in a text editor other than notepad. I use Textpad because it is ten times faster than notepad. Do a search for the words "zone", "datum", and "utm". That will typically find any georeferencing information.

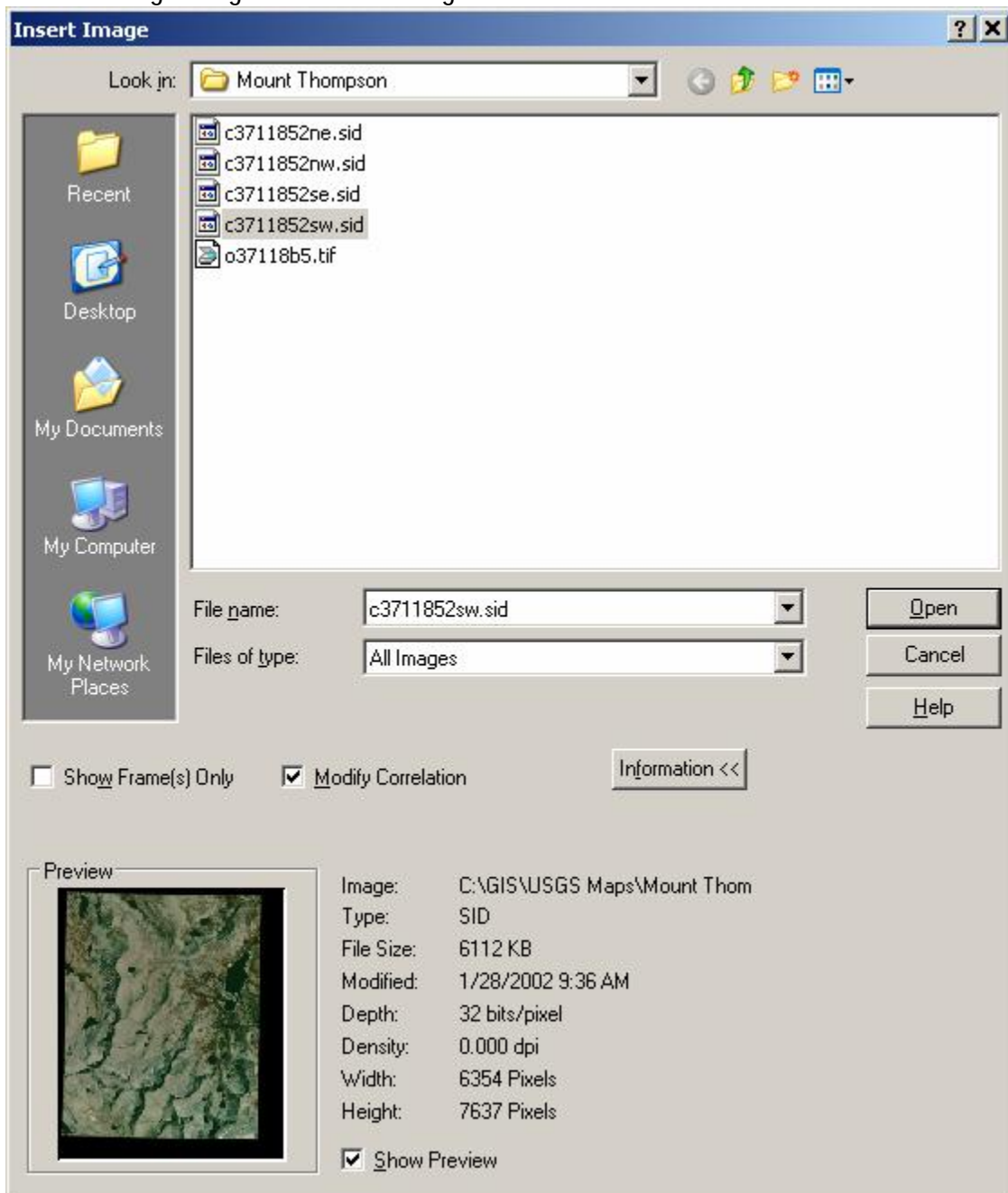
If you don't find it, you will have to align an image by hand. Hand aligning images is good for exhibits but be careful, other people might not know you did not use official information for setting the image.

Once you have downloaded an image and the associated coordinate information, use Map to bring in the images.

**Map->Image->Insert...**

It will automatically look for the world file information and use it so you just pick the image.

The following dialog is the insert dialog.



Be sure to check the Modify Correlation box. Pick Open and zoom extents.

## Line Data

While raster data is brought straight into AutoCad, line data starts out as several different file formats. The sequence to importing is as follows:

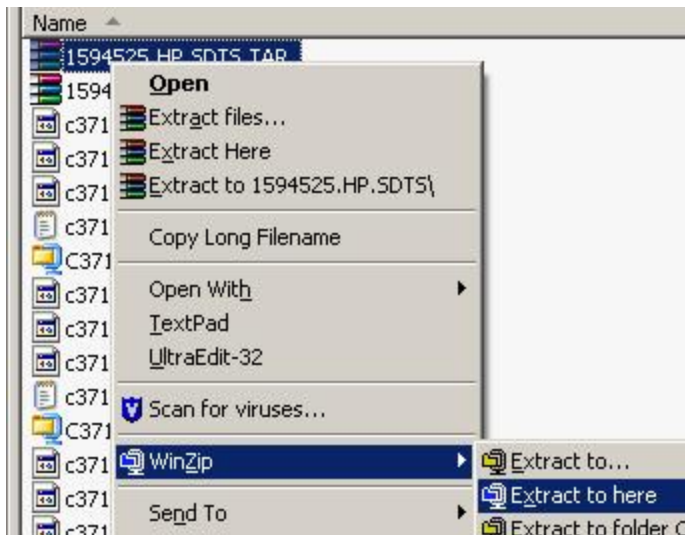
1. Download and unzip the data to a folder
2. Import the data into a blank drawing with the Map->Tools->Import... command
3. Query that information to the final drawing in order to get it to the right coordinates and displayed how you want.

### Download and unzip the data to a folder

Pick on a link for the DLG files. Eventually, you will find download links for various kinds of information.

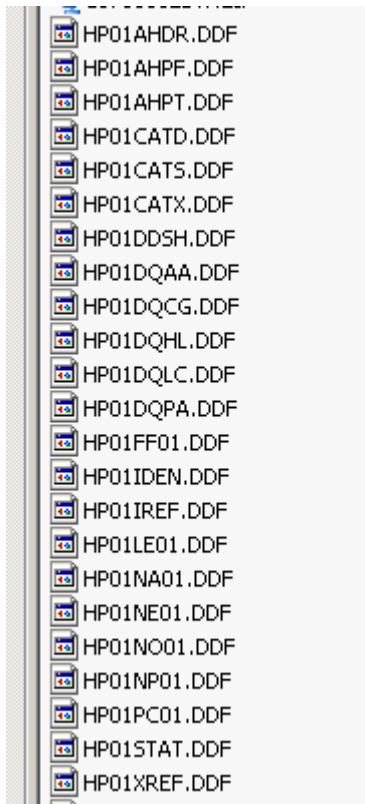
For this example, I downloaded hypsography or contour line data.

You will typically get a .gz or .zip file from most web sites. Both are just compressed file formats. Right click on either kind of file and pick "extract here".

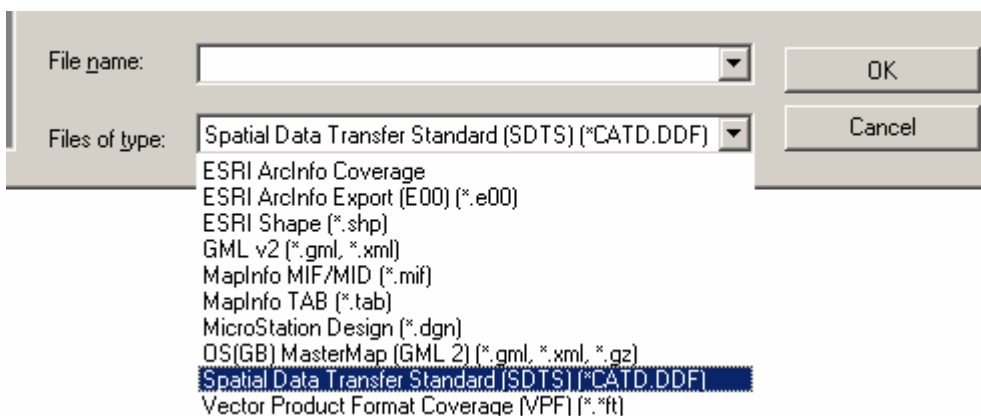


You may get another file such as a .tar. Just keep "extracting here" until you get a bunch of files instead of just one.

This is a list of the files obtained after unzipping:

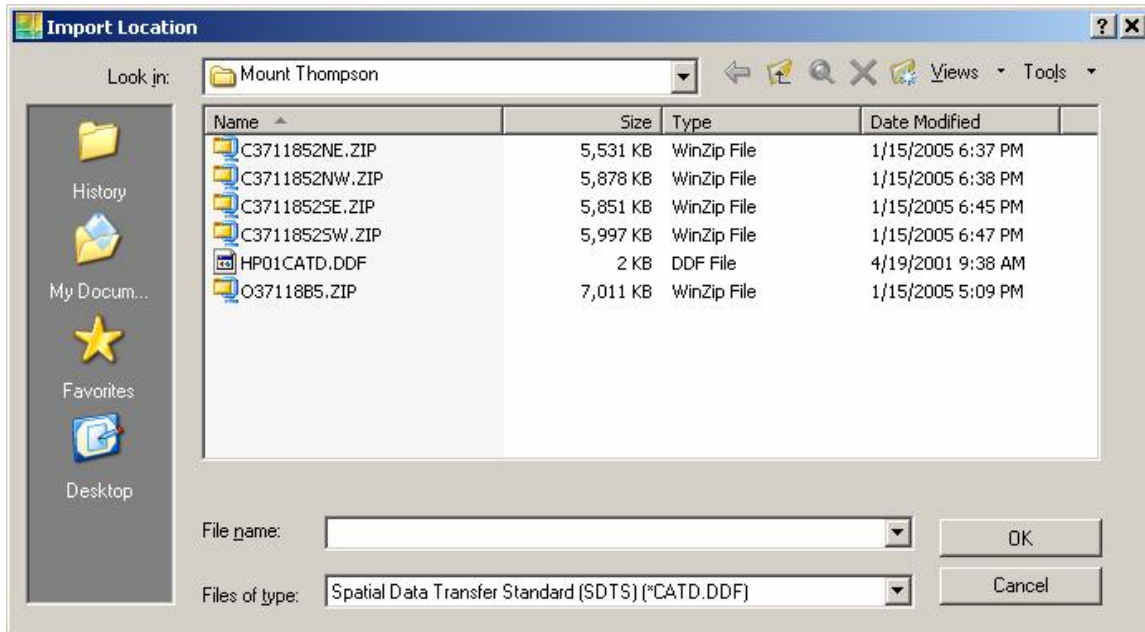


At first, you may not know what to do with the files. The way to figure this out is to run the Map->Tools->Import... command and see what it allows you to import.

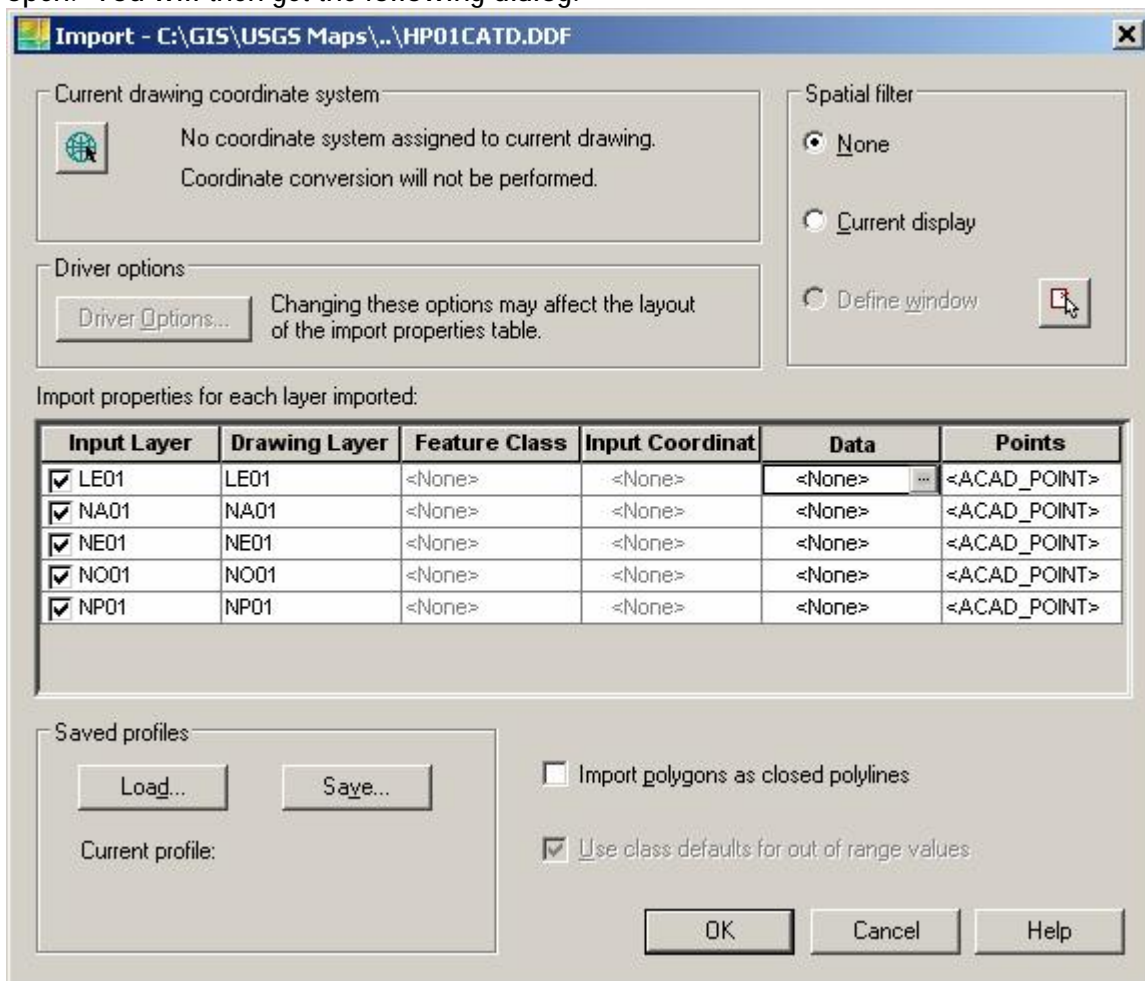


In this case, notice that it allows DDF files, and in particular, it wants the one ending in CATD.DDF. This is the "catalog" file for the many files we obtained.

This is typical for contour data, but also note that .e00 and .shp data is an option. Those are also very common.



When you pick the STDS option, it shows only the HP01CATD.DDF file. Pick it and pick open. You will then get the following dialog:



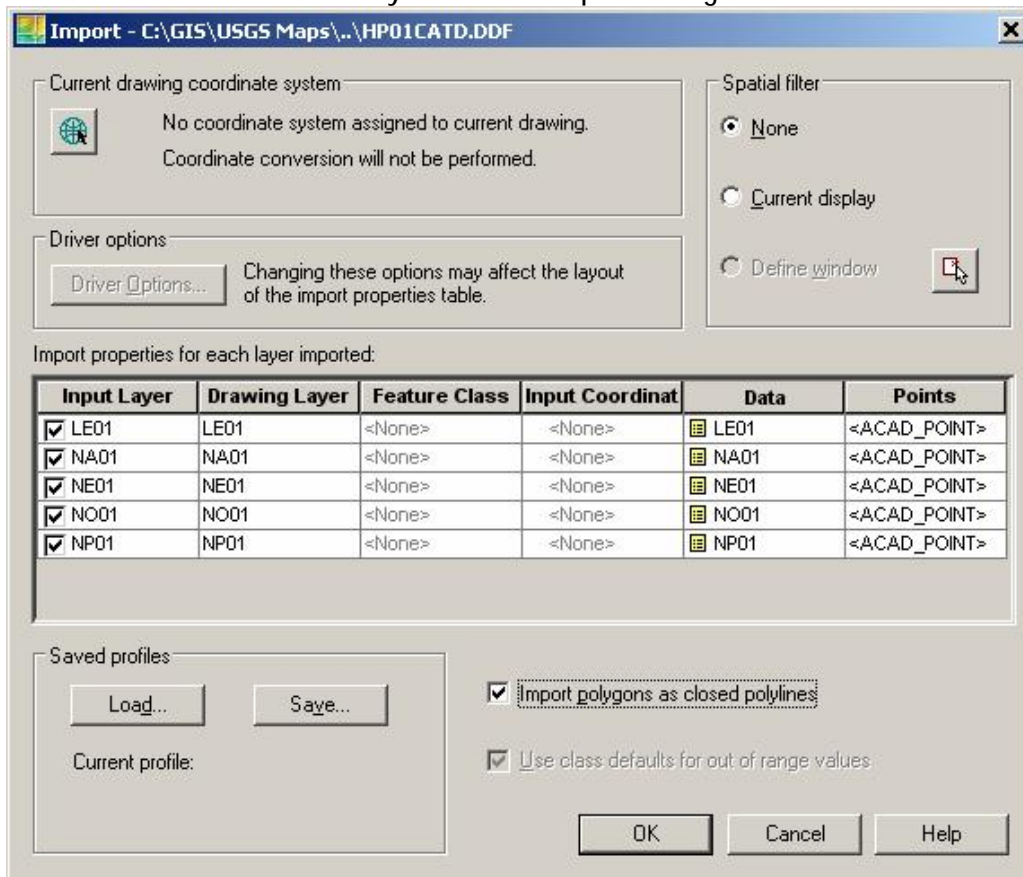


Note the Data column. In the past, you may not have done anything with it but now you will. Pick on the first item and pick the ... button.

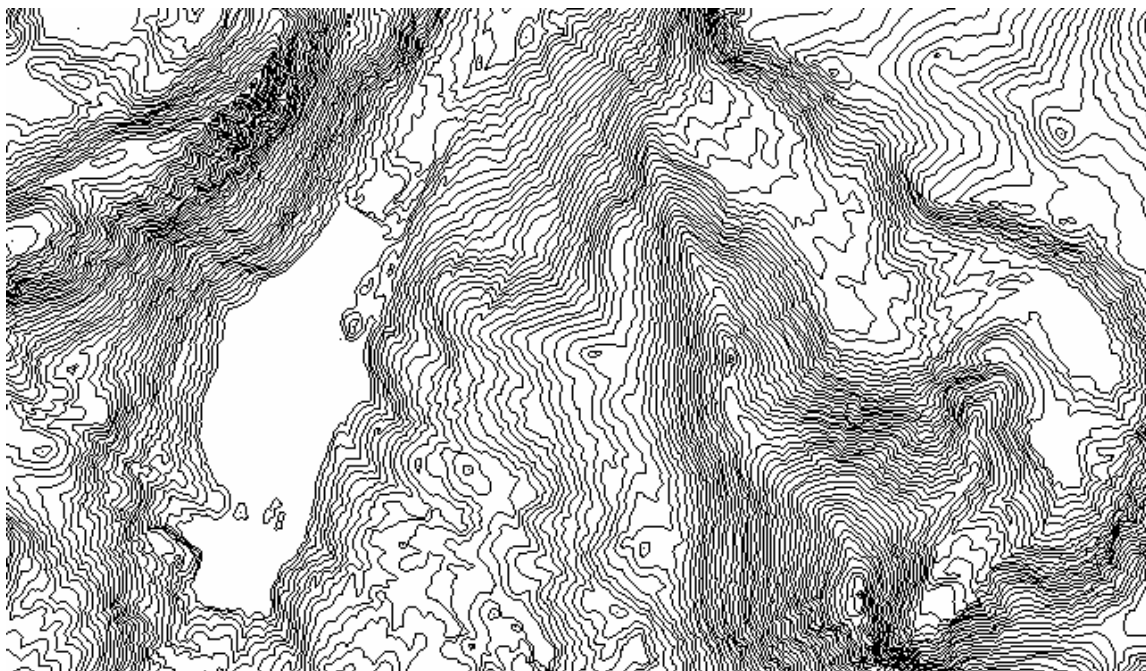
Pick the Create Object Data option



Pick ok. Do the same for every row in the Import dialog.



Pick the Import polygons as closed polylines option.  
Pick ok and wait for the data to be imported. Zoom extents.



The open spot above is South Lake. It is an excellent fishing lake at about 9,000 feet elevation in the Sierra Mountains near Bishop.

The linework will be 2D polylines. It will have object data attached to it. Check what is available with the Map->Object Data->Edit Object Data command.  
Pick a contour and you will see this:

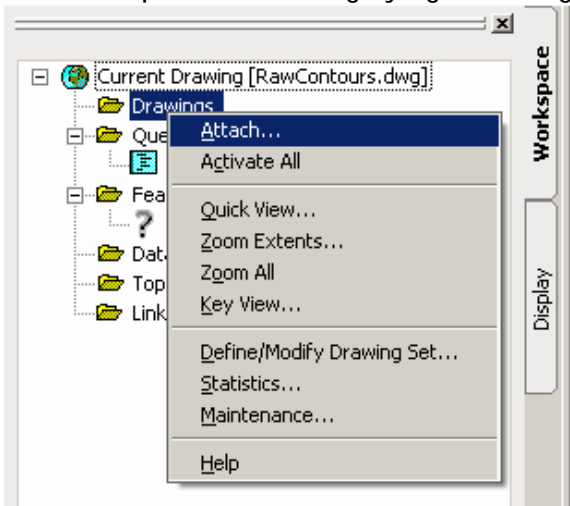
 A screenshot of the 'Edit Object Data' dialog box in AutoCAD. The dialog box has a title bar with the text 'Edit Object Data' and a close button. It contains several fields and buttons:
 

- 'Table:' dropdown menu set to 'LE01'.
- 'Nested Data' checkbox checked.
- 'LWPOLYLINE' dropdown menu.
- 'Object Data Field:' and 'Value:' labels.
- A list box containing the following items: AMENDED (highlighted), APPROXIMATE, BEST\_ESTIMATE, DEPRESSION, ELEVATION (with value 11240.00), ENID (with value N001\_641), ENTITY\_LABEL (with value 0200200), FILL, and GLACIER\_OR\_SNOW.
- Navigation buttons: Next, Prior, First, Last.
- 'Record #: 1 of 1' indicator.
- 'Name:' field containing 'AMENDED'.
- 'Value:' empty text field.
- Buttons: Select Object <, Insert Record, Delete Record, OK, Cancel, Help.

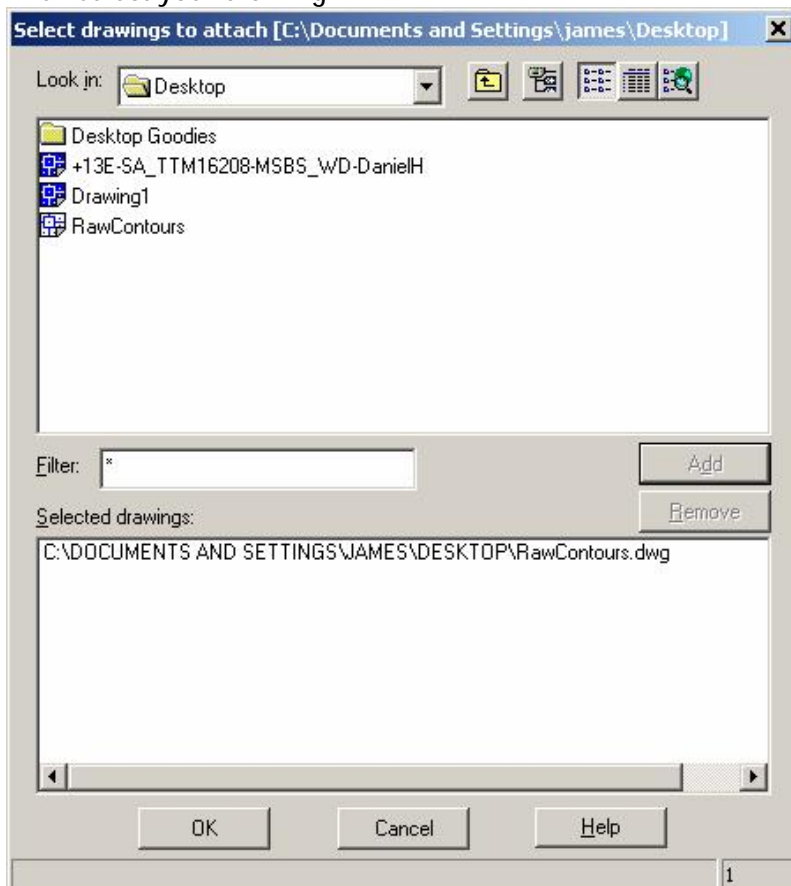
Note that we are in luck, there is data available for the elevation of the polyline, even though the polylines themselves are at 0.0 z value. We will use this to make 3D contours!

Save the drawing with the freshly imported contours to your C drive and close it. Open a new drawing and display the Map workspace with Map->Utilities-> Workspace.

Attach the previous drawing by right clicking on the Drawings item, pick Attach...

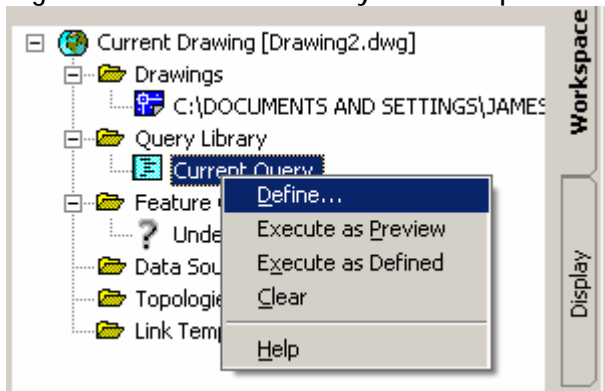


Then select your drawing.

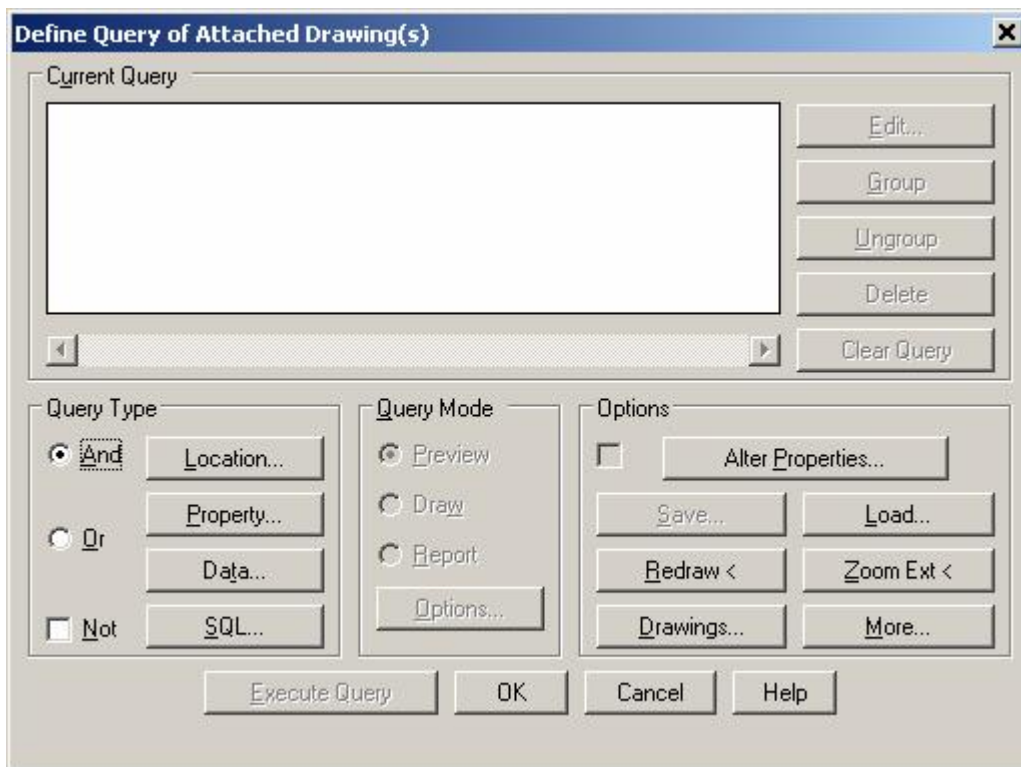


You will see it attached.

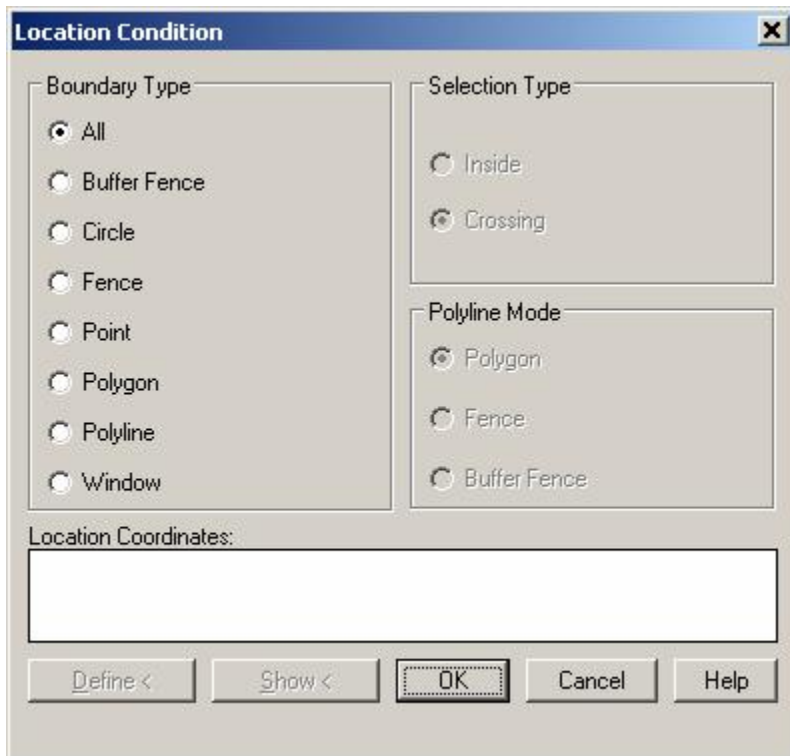
Right click on Current Query item and pick Define...



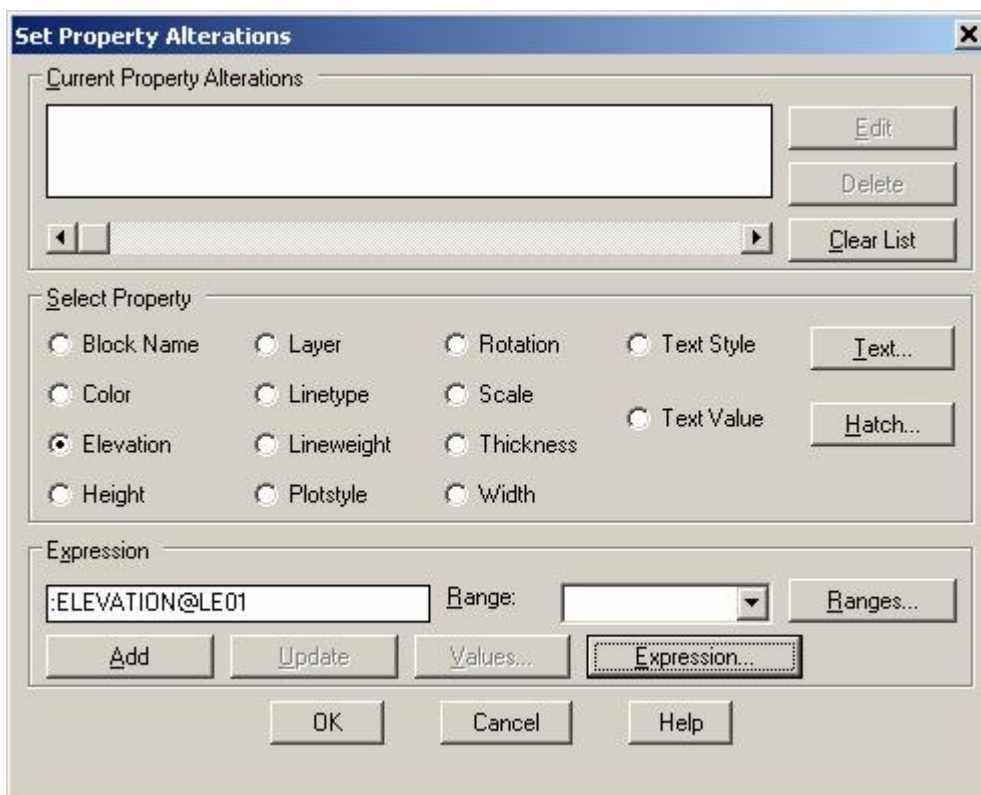
What we are going to do is import in the contours and use the object information to modify the Z value of them in the process.



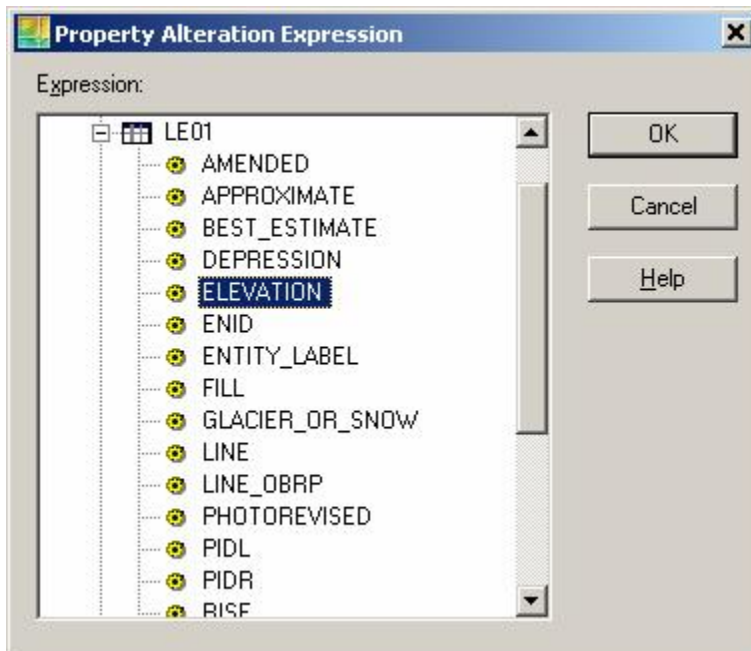
Pick the Location button and select All.



Pick the Alter Properties button and pick Elevation

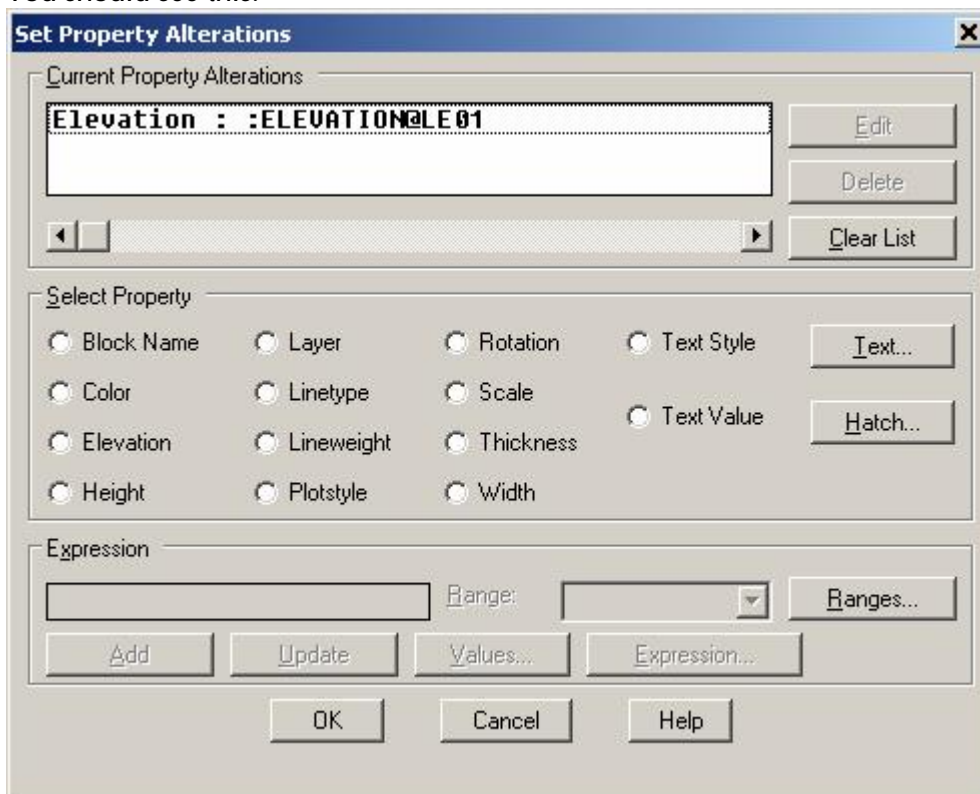


Then pick the Expression button and select the item as follows.

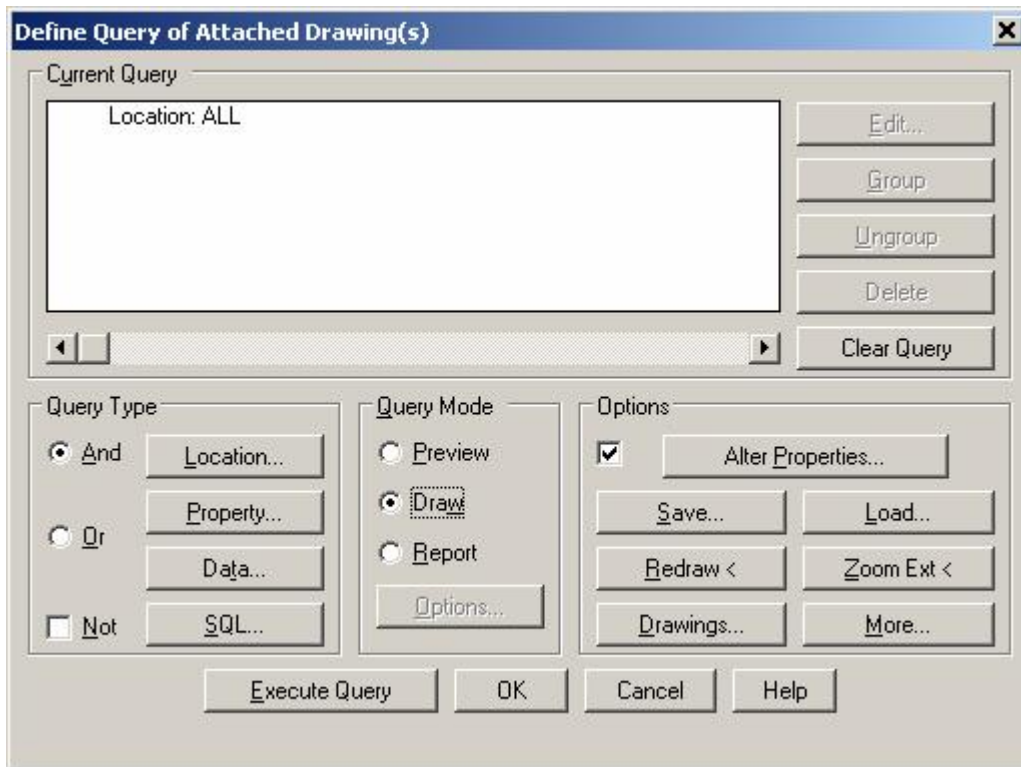


Then pick OK and Add.

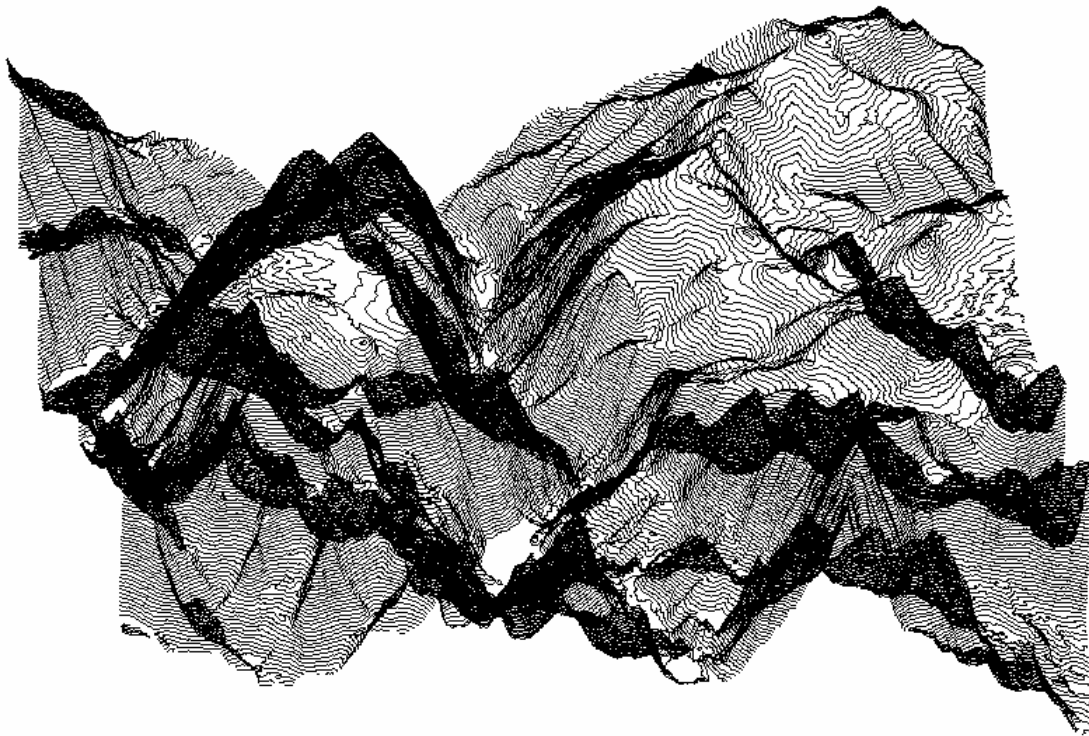
You should see this:



Then pick the draw option and Execute Query button.



Zoom extents and use 3D orbit to view the 3D results:



You could use the polylines to make a surface if desired.

The important thing to understand is that you need to import the object data with anything you are importing. Then use that data during a query to modify properties.

One common situation is to get a shape file of vegetation types. In that case, you would import the data, then use the vegetation type field to set the layer of the imported items. You can also use the Text... button to create text at the centroids of the areas. Use the Expression... button to tell it what data to use for the text value and run the query.

The idea is to know how to look for provided data and use it somehow in the import.

You have to try it a few times to get comfortable with it.