Building a GIS from the Beginning: Part 1: Gathering your data

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Building a GIS Part 1

- Before you start
  - Determine
    - Type of Database
    - Feature Datasets
    - Types of Feature Classes
    - Projection to be used

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Building a GIS Part 1

Topics of discussion

- Determine type of database
- Parts of a database
- Data sources
- Creating a database
- Adding features to a database

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Projections

Represents how features from a round Earth are displayed on a flat map

3611 Projections around the world

- Universal Transverse Mercator
- State Plane Coordinate System
- Web Mercator
- See Attachment 1
  - Map of 5 state projection

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Universal Transverse Mercator

Universal Transverse Mercator

- Good for long distances
- North & South
- Zones 01 to 19 for USA

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State Plane Coordinate System

- State Plane Coordinate System
  - Good for Smaller more contained systems
  - 124 or 125 State Projections (NAD83)
  - East & West
  - WKID
    - Unique Identifier
    - See Attachment 2 WKID Codes

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Web Mercator

Good for large areas

Web mapping standard

One projection of the world

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Choosing an ArcGIS Database

Three standard types

- SDE Database
- File Geodatabase
- Personal Geodatabase

Each appears very similar in ArcCatalog and have similar functionality

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SDE Database

SDE Database

- Large Enterprise system
- Hardware requirements
- Multiple editors
- Allows links to many other systems

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File Geodatabase

- File Geodatabase
  - Small to massive Datasets
    - Up to 1 Terabyte
    - Single Editor
    - Read only features

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Personal Geodatabase

- Personal Geodatabase
  - Small to large datasets
    - Up to 1 Gigabyte
    - Single Editor

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Parts of a database: Database

Database

Structured set of data

- Features
- Relationships
- Tables
- Grids
- Photos
- Tins
- Etc.

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Parts of a database: Feature Dataset

- Feature Dataset
  - Groups related Feature Classes
    - Electric
    - Land base
    - etc…
  - Contains Projection information

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Parts of a database: Feature Class

- Groups similar types of features
  - Stores tabular and spatial information
  - Points
    - Transformers
    - Switches
  - Lines
    - OH Primary
    - UG Primary
  - Polygons
    - Parcels
    - Lakes

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Parts of a database: Feature Class

Field

- Column in the table of a table or feature
- Allows separation of individual Attributes
- Domains are assigned to Fields

  (Domains define what can be entered as an attribute)

Attribute

- A specific value entered in a field that helps define a feature

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Parts of a database: Feature Class

Subtype

Classifies specific features in a feature class

Assigned in ArcCatalog

Example:

- Transformers
  - Overhead
  - Underground
  - Step

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Parts of a database: Tables

Tables contain tabular data

Can be linked to features

- Requires a unique ID in both feature and table
  - One entry can be linked to multiple features
- Join
- Relate
- Relationship Class

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Join

Join performed in ArcMap in an MXD

Attribute must exist in both table and feature

Can update fields in a feature from join

Allows Search by Attribute of JOINED table

Allows Symbology based on attributes in JOINED table

Can JOIN to many tables or features

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Relate

Relate performed in ArcMap in an MXD

Allow you to see structured data using identify tool

Can RELATE many tables and features

Cannot update feature attributes on a relate

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Parts of a database: Domains

Domains are coded values in a database

Can be assigned to a Field in a Feature Class or Table

Controls what can be entered in as in an attribute in a field.

Example: Phase only allows

A, B, C, AB, AC, BC or ABC

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Parts of a database: Geometric Network

- Created in ArcCatalog
- Connects point and line features from a source to the end
- Think of it as a DOT to DOT puzzle

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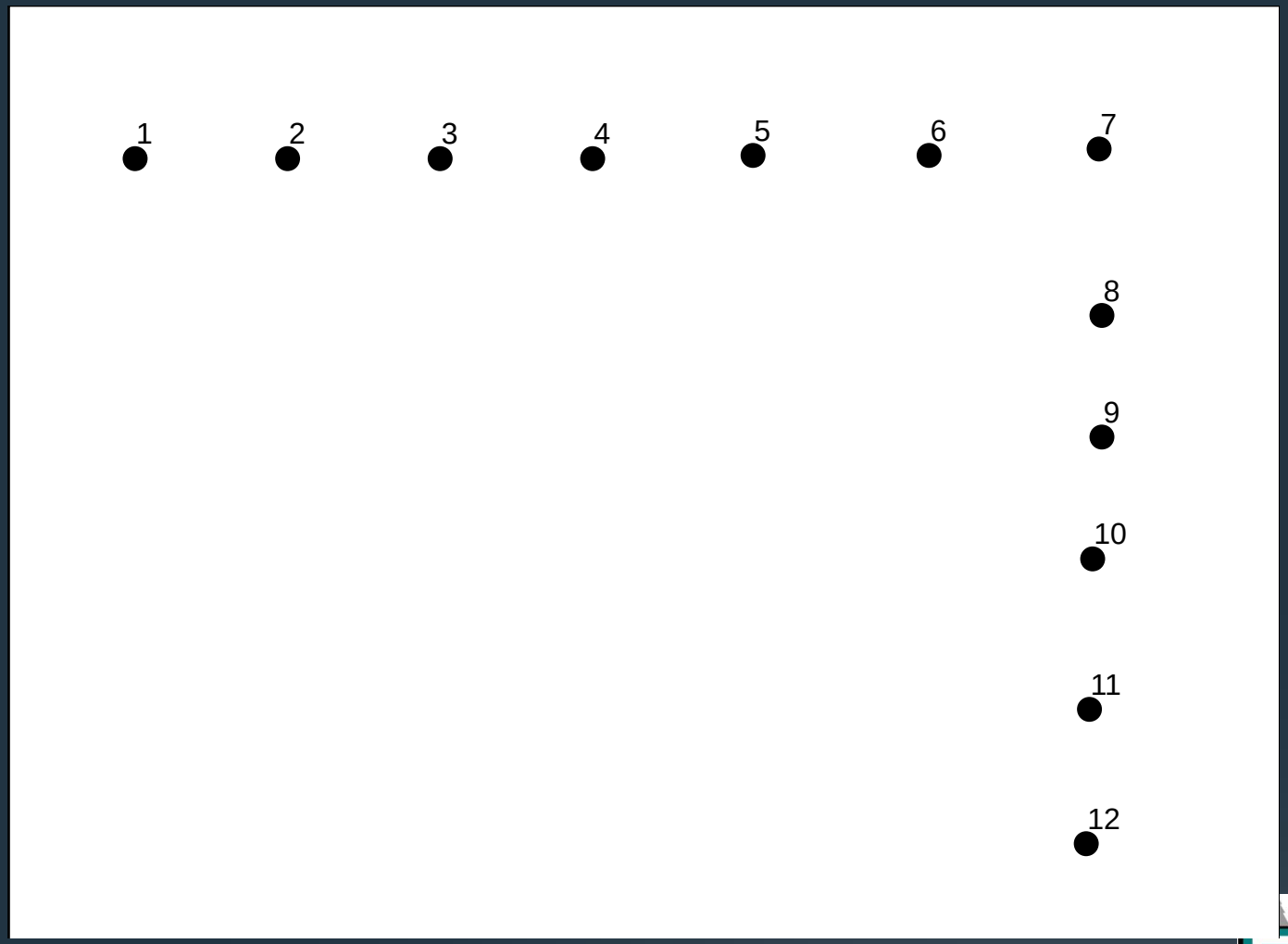
Parts of a database: Geometric Network



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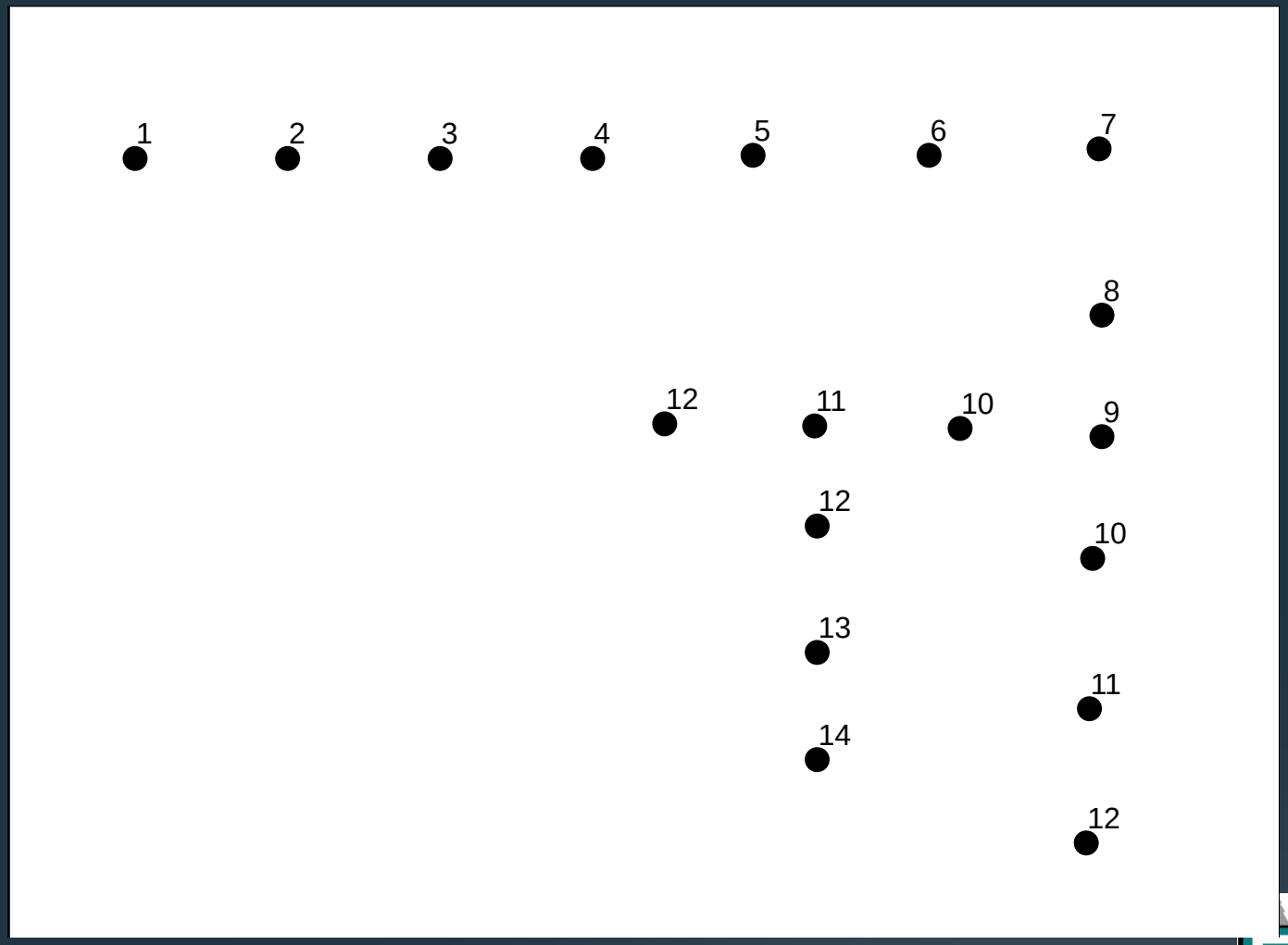
Parts of a database: Geometric Network



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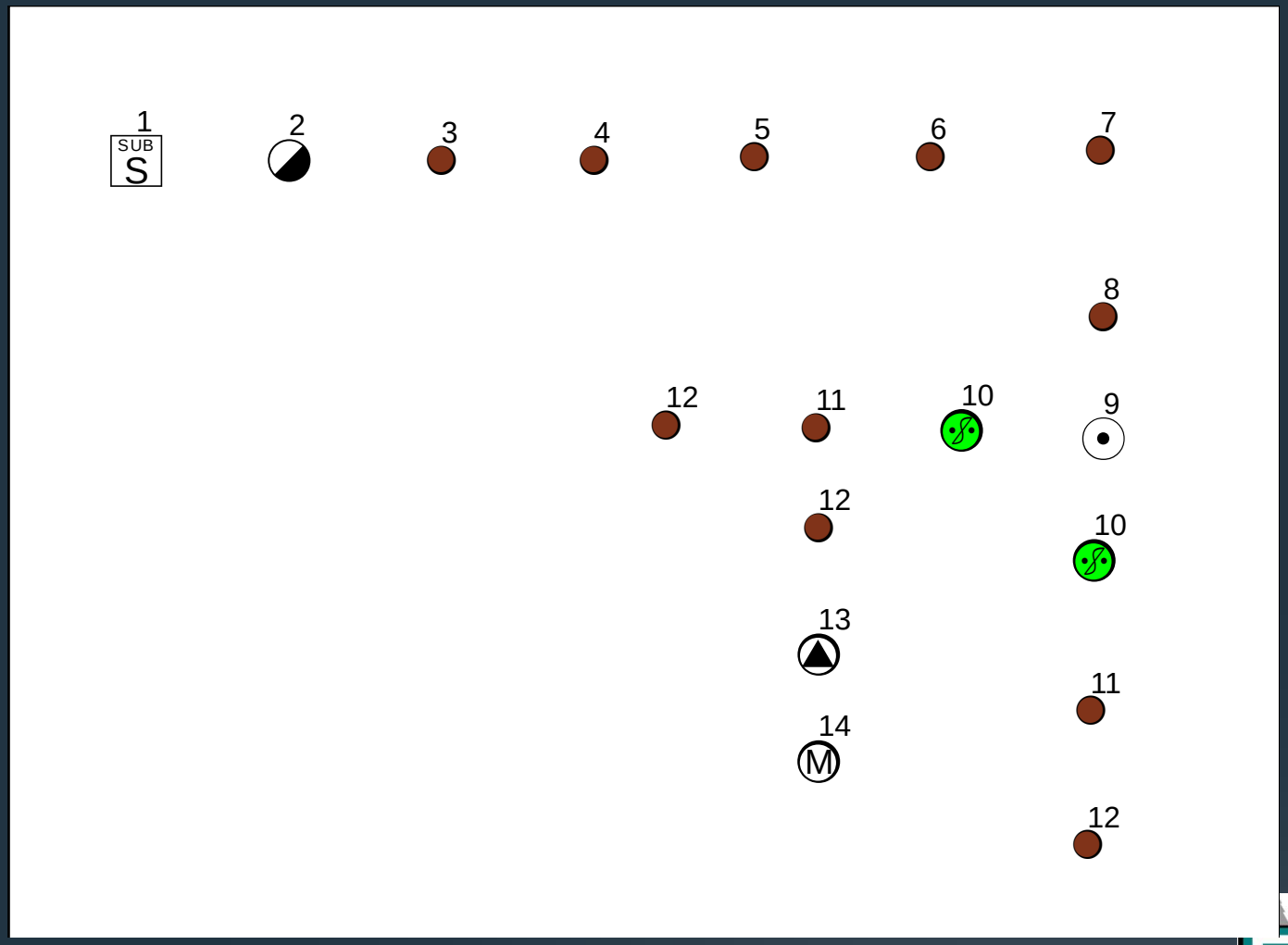
Parts of a database: Geometric Network



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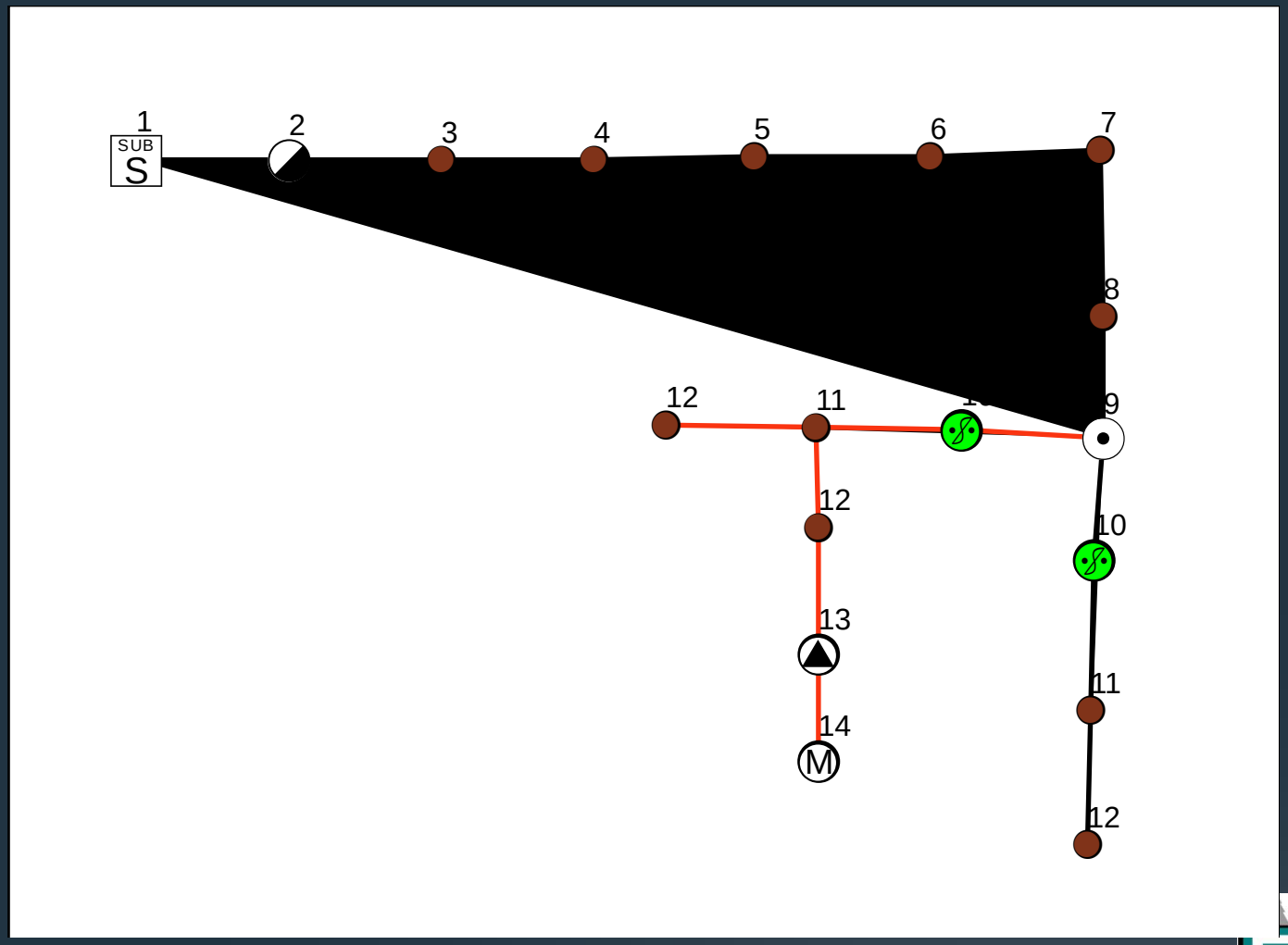
Parts of a database: Geometric Network



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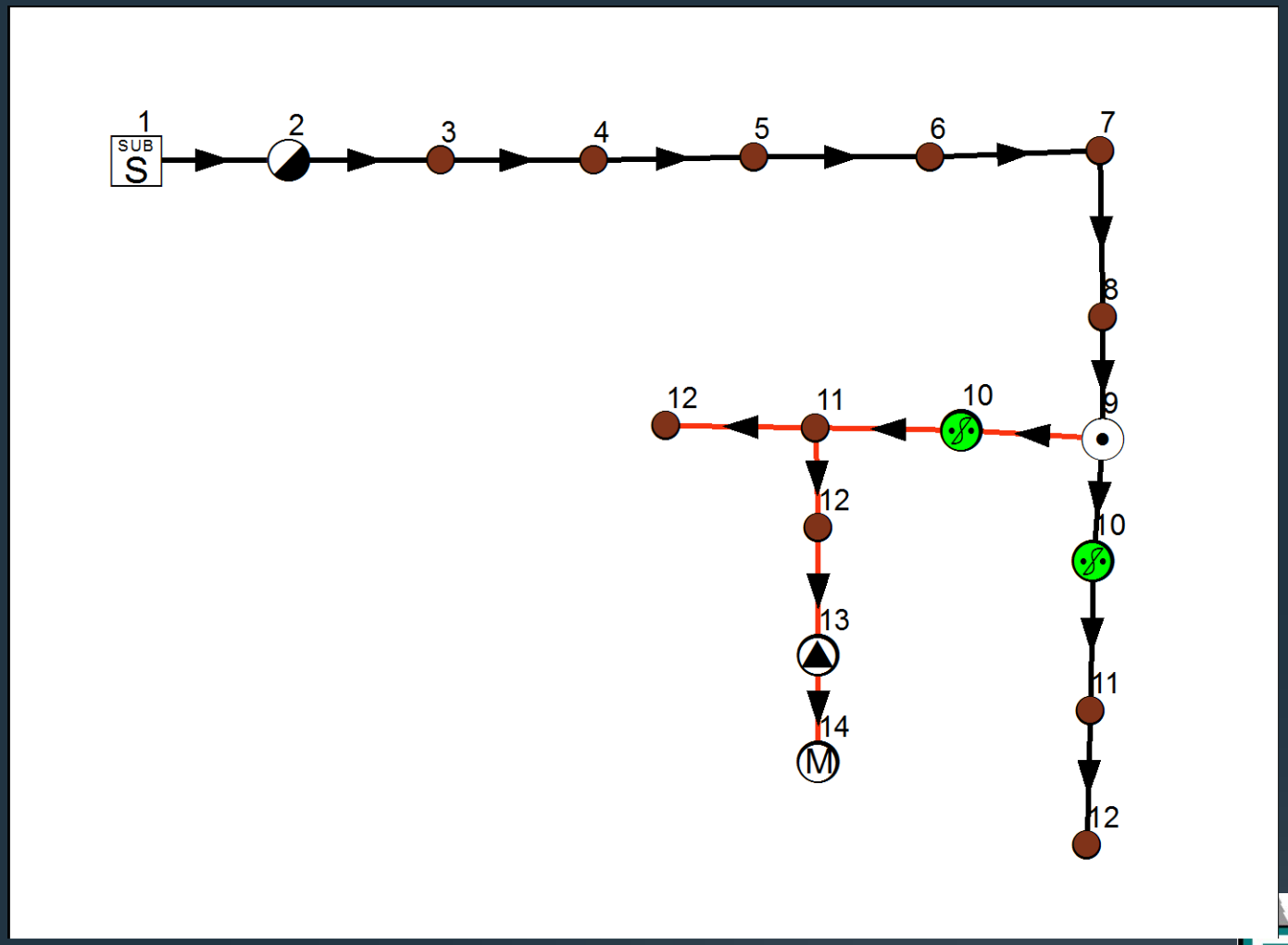
Parts of a database: Geometric Network



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Data Sources

Shapefile

Note: Shapefiles are cross platform and version compatible. However they have naming restrictions for fields limited to 10 Characters

AutoCad

Geodatabases

Tables

- Excel
- CSV or TAB delimited
- MS Access

Online Sources

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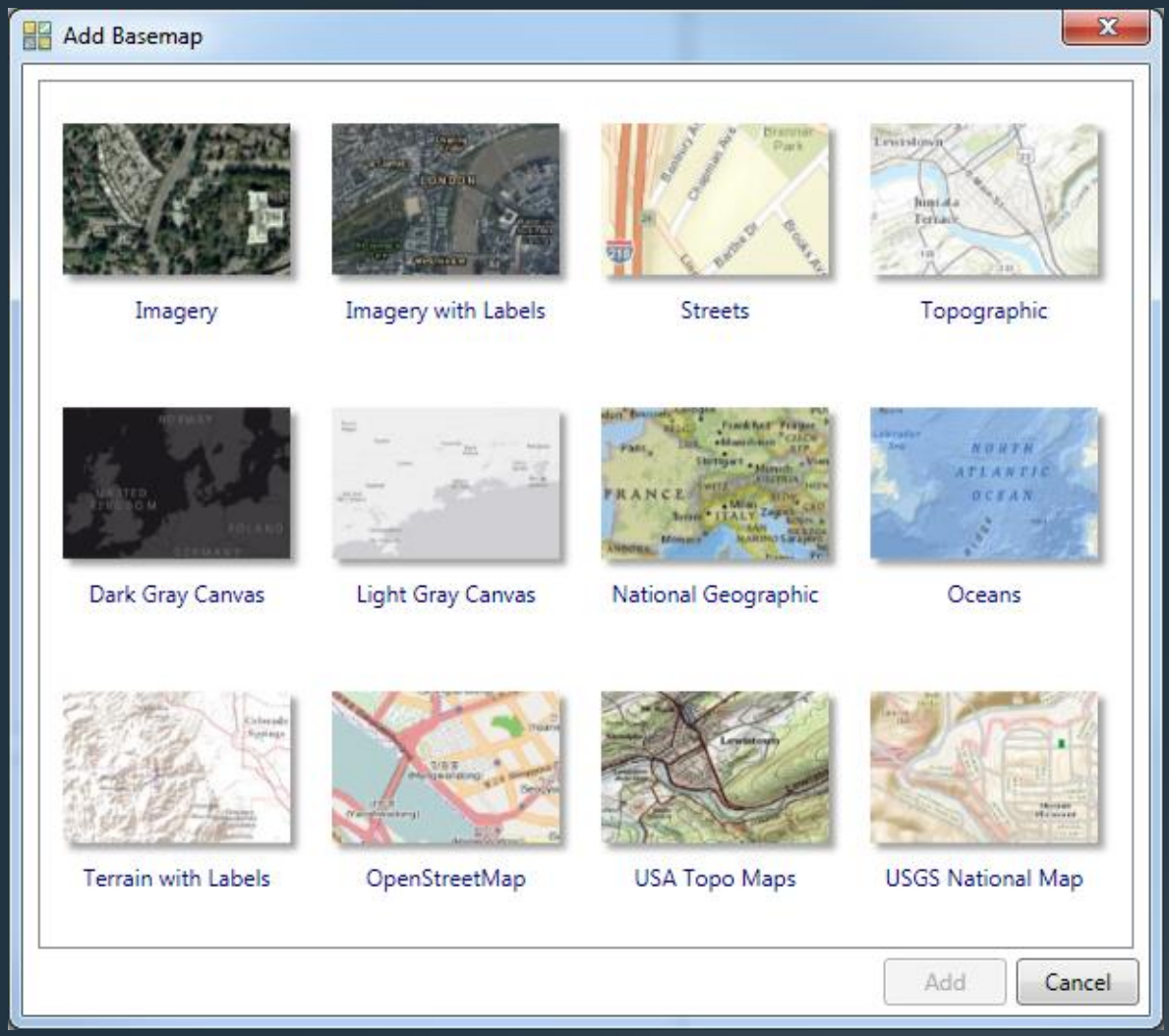
Data Sources: Online provided by ESRI



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Online Data provided by ESRI and other GIS users

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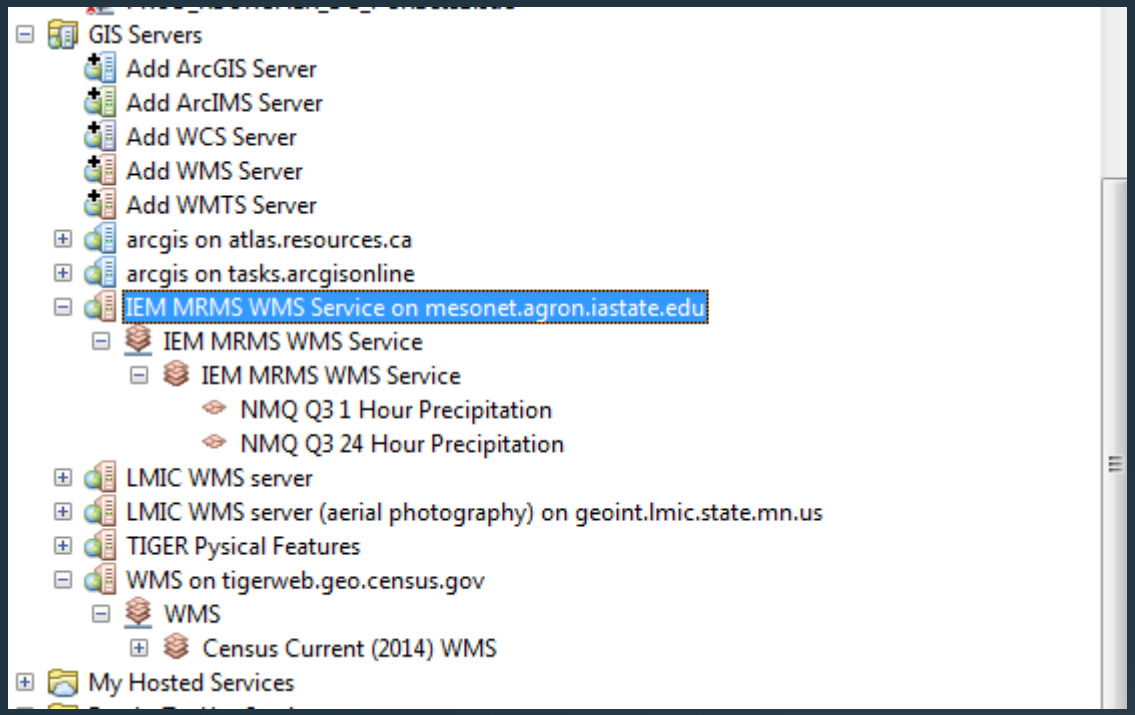
Online Data from GIS Servers



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Other data types supported

- DBMS
- Spreadsheets
- CAD
- Smallworld
- Images
- PDF

Live Demo portion ☺

- Demo
  - Create a database
  - Create and add features
- Best Practices
  - Use names that make sense
  - Avoid spaces or special characters
    - Other than underscore "_"
  - Avoid really long names

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Demo: Creating a Database

In ArcCatalog

Create the database

Create Feature Dataset(s)

Create or add Feature(s)

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Demo: Adding Features to a Geodatabase

Shapefile: Road centerlines provided by the state.
http://www.mngeo.state.mn.us/

AutoCAD: Parcel data provided by the county

Geodatabase: Electric Dataset provided courtesy of BENCO Electric Cooperative

Geometric Network: From Electric Dataset

Table: Comma Delimited table from contractor of Pole locations. See attachment 3

User: Manual roads created by the user

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In case of DEMO failure ☹

The following slides are the demo portion.

These slides were created in case there are issues performing a live demo or for the user to download the presentation from MWEUUG for future reference.

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Create the database: ArcCatalog

In ArcCatalog

Navigate to the folder you wish to create your database

Either create a new folder or right click on the folder you wish to create your database

Select New>Personal or File Geodatabase

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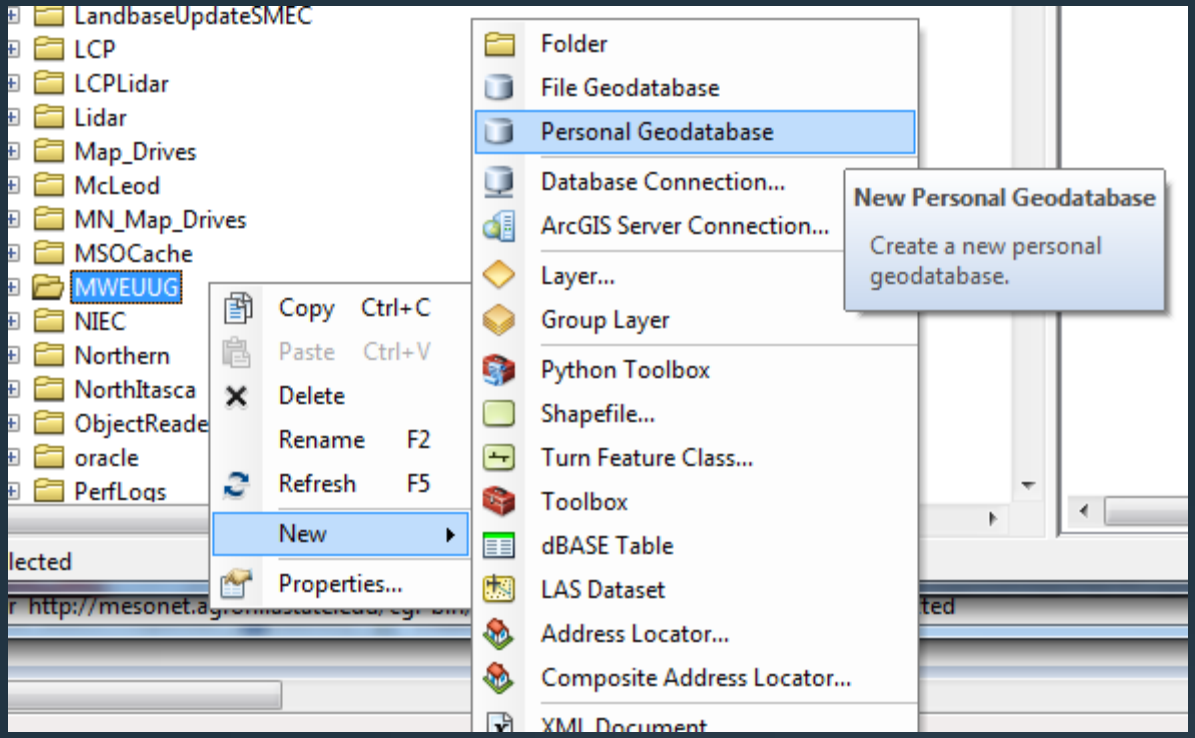
Create the database: ArcCatalog



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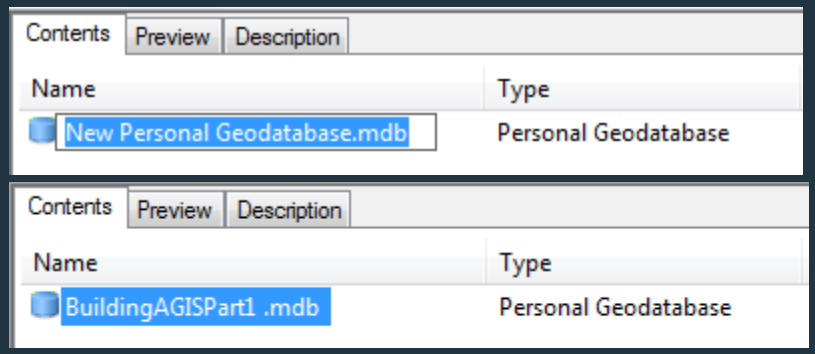
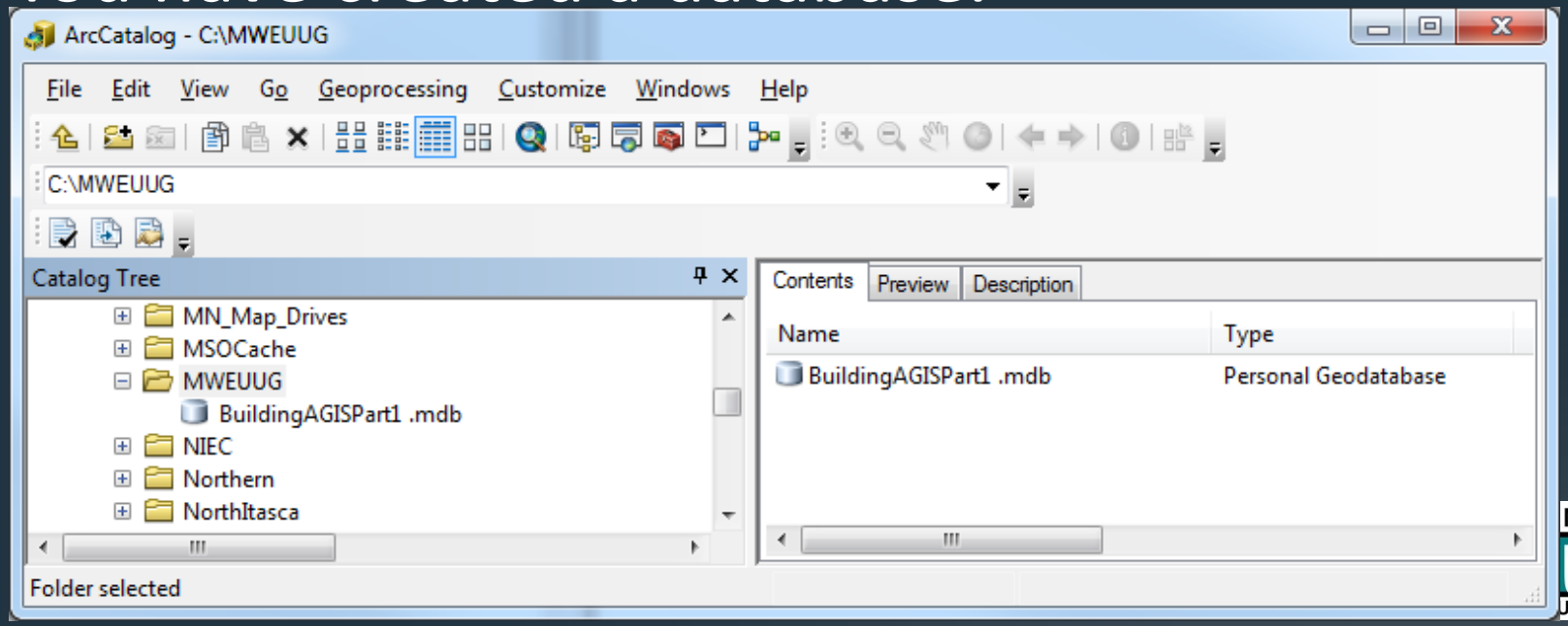
Name the Database: ArcCatalog

- Type in a name



You have created a database.



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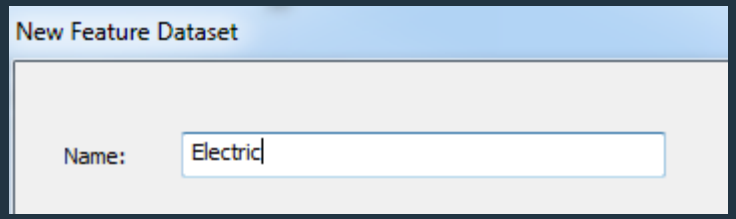
Create a Feature Dataset: ArcCatalog

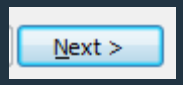
Right click on your database and select

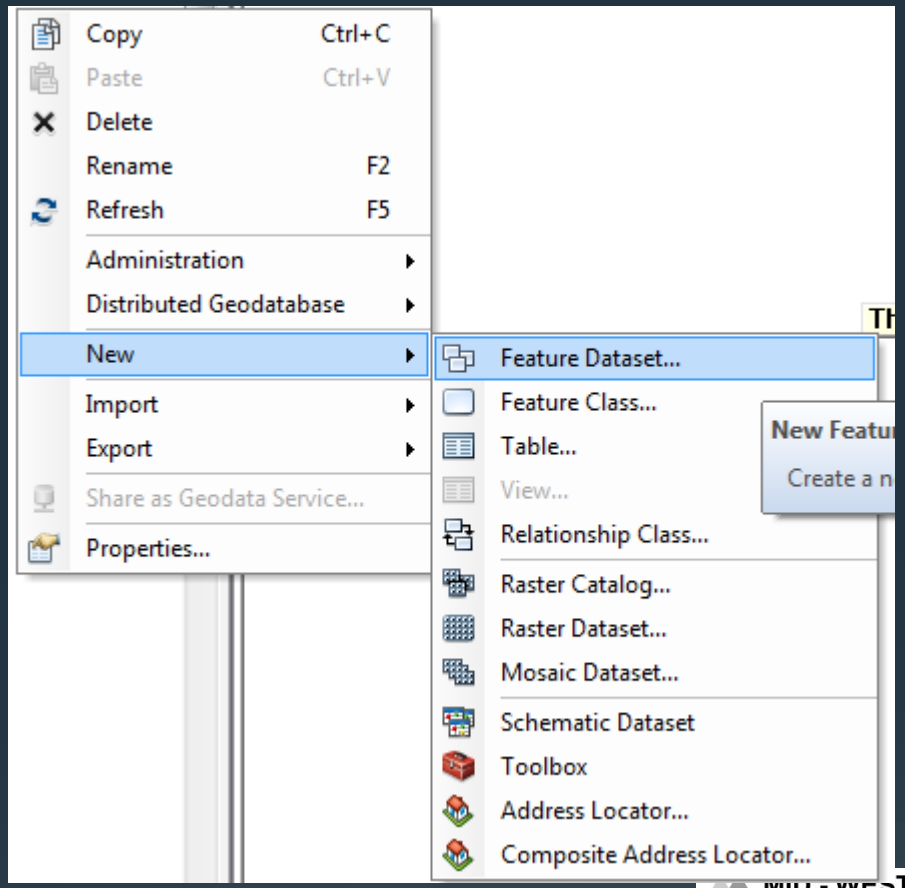
New>Feature Dataset

Give it a name



Click Next





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Feature Dataset: Select Projection

VERY IMPORTANT STEP

This needs to be correct. If your projection is the wrong one any data you add in the future may not line up where it is supposed to.

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Feature Dataset: Select Projection

VERY IMPORTANT STEP

- Previous projects you have used may appear in the Favorites.

You can select a favorite

You can navigate to a favorite

You can search by WKID code

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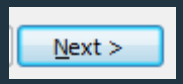
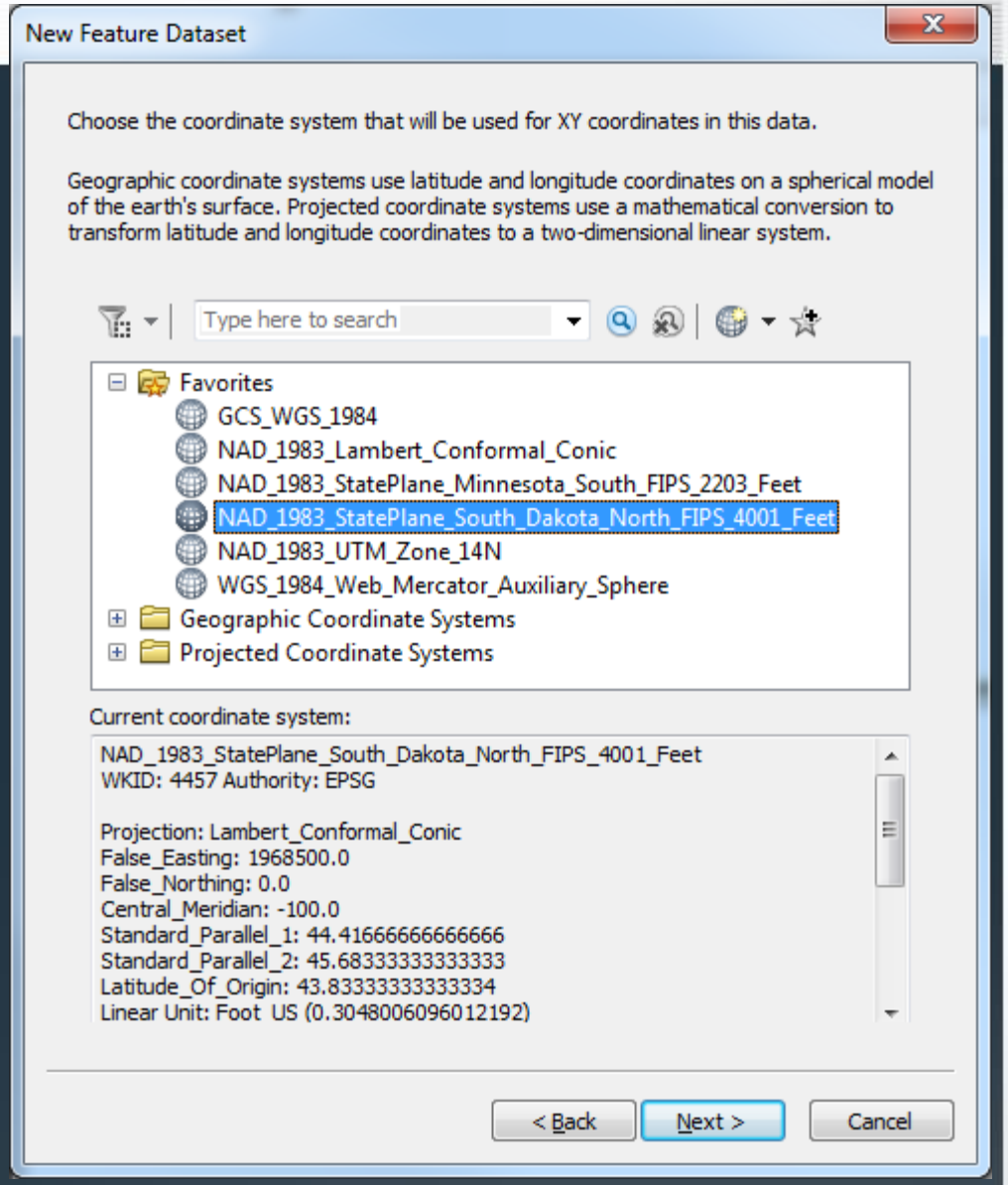
Feature Dataset: Select Projection

- Select Favorite
- Select Next

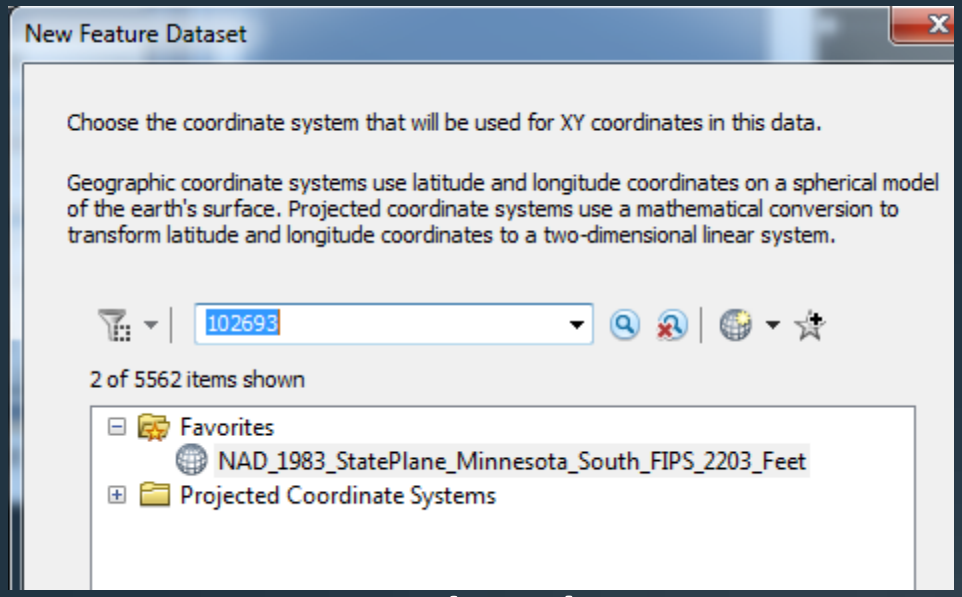




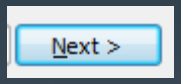
Feature Dataset: Select Projection

Search by WKID code

102691	NAD_1983_StatePlane_Minnesota_North_FIPS_2201_Feet
102693	**NAD_1983_StatePlane_Minnesota_South_FIPS_2203_Feet**
2254	NAD_1983_StatePlane_Mississippi_East_FIPS_2301_Feet
2255	NAD_1983_StatePlane_Mississippi_West_FIPS_2302_Feet



Select the projection and select next



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Feature Dataset: Select Projection

- Ignore Vertical Coordinate system unless you are intending to go forward with 3D
- Accept the default XY Tolerance
- You have created a Feature Dataset

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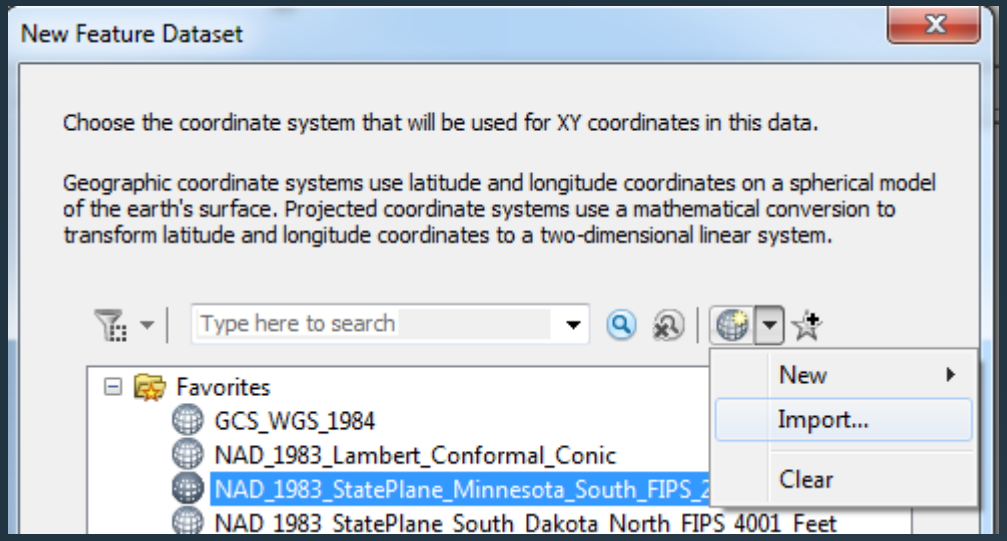
Create a Feature Dataset with parameters from another

Create a Land base Feature Dataset

When it asks for Projection select the Import option



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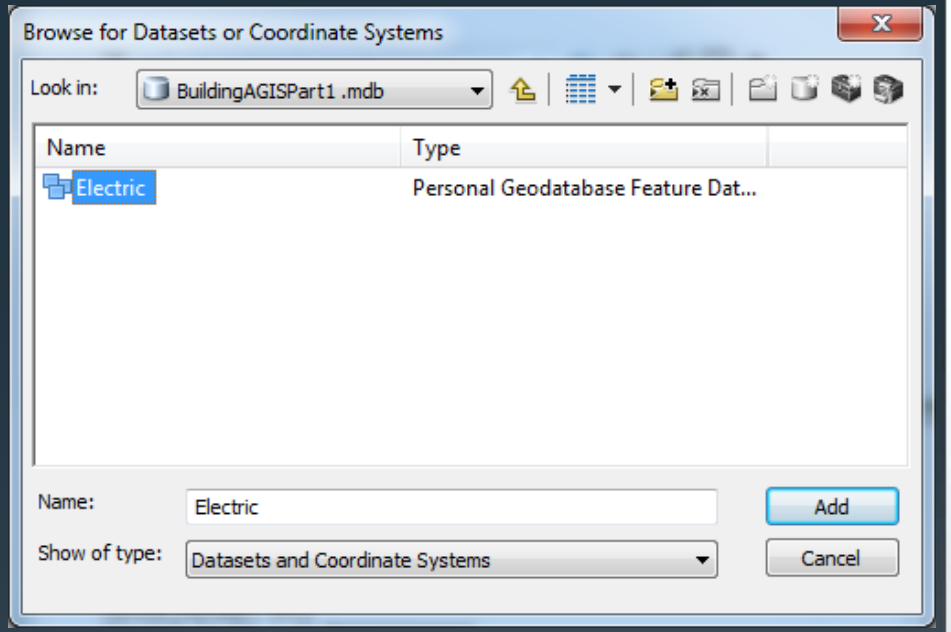
Create a Feature Dataset with parameters from another

Create a Land base Feature Dataset

When it asks for Projection select the Import option

Navigate to the first Feature Dataset and select Add

The projection from the selected Feature dataset will automatically be applied to the new



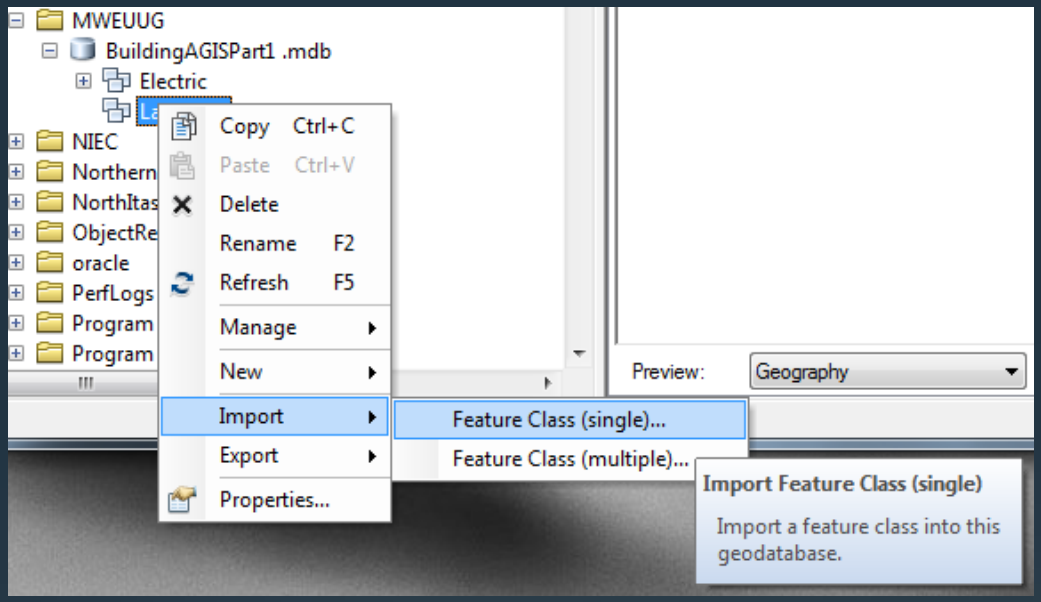
Add Shapefile: Road Centerlines

Method 1

Right click on your Land base Feature Dataset and select

Import

Feature Class(single)



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Add Shapefile: Road Centerlines

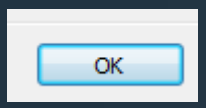
Method 1

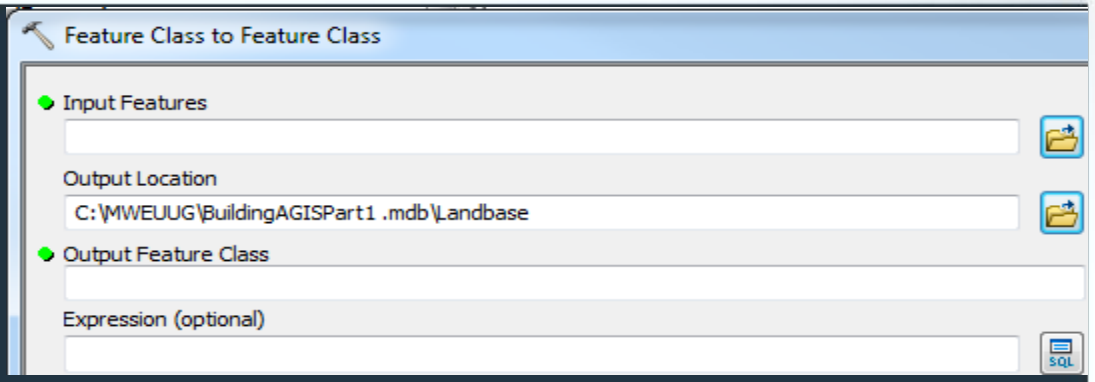
For input features
navigate to your
shape file and select
Add

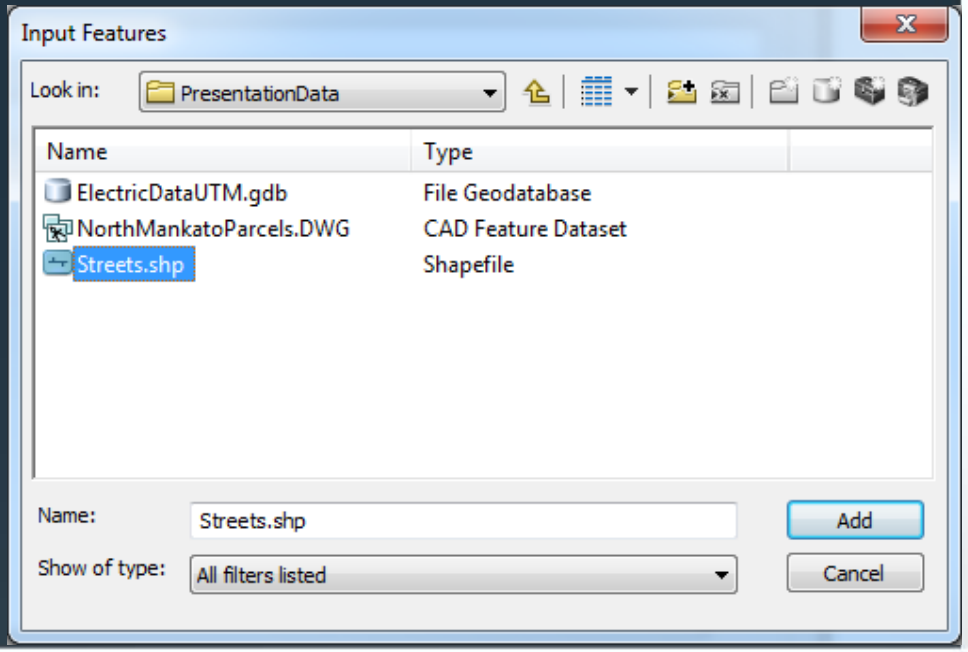
In Output Feature Class
give them a name

roads

Click OK





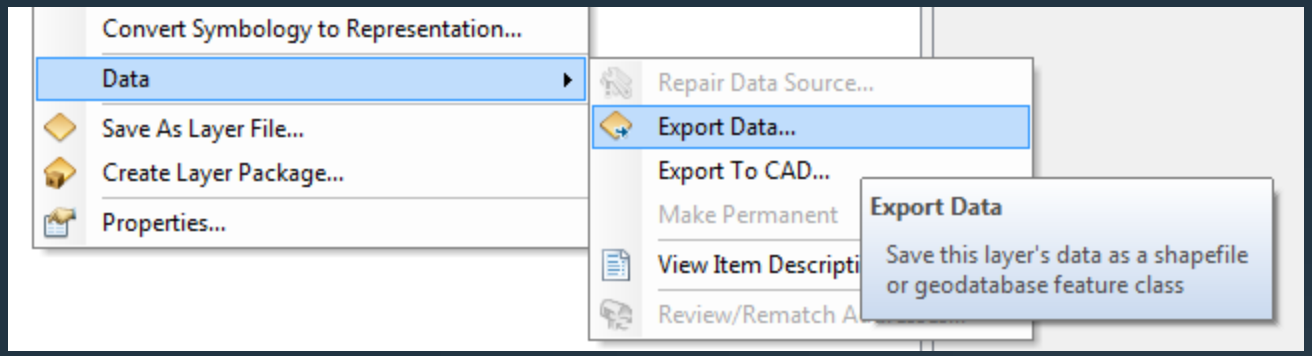


Add Shapefile: Road Centerlines

Method 2

Add your roads to ArcGIS

Right Click Data>Export Data



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Add Shapefile: Road Centerlines

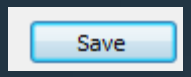
Method 2

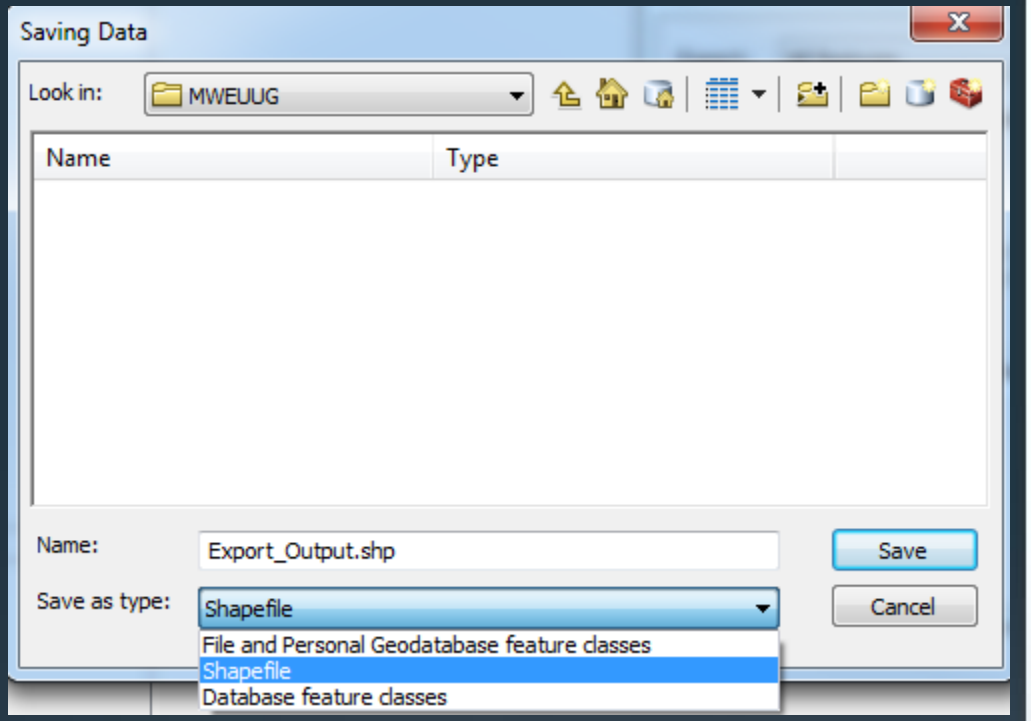
Navigate to your Feature Dataset and change the Save as type to

File and Personal Geodatabase feature class

Change the Name

Click Save





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Add AutoCAD: Parcel Data

Method 1 with AutoCAD

This method will preserve data if is available

Open the drawing in AutoCAD

Type

mapexport

The Export Location Dialog window will appear

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Add AutoCAD: Parcel Data

Method 1 with AutoCAD

This method will preserve data if is available

Open the drawing in AutoCAD

Type

mapexport

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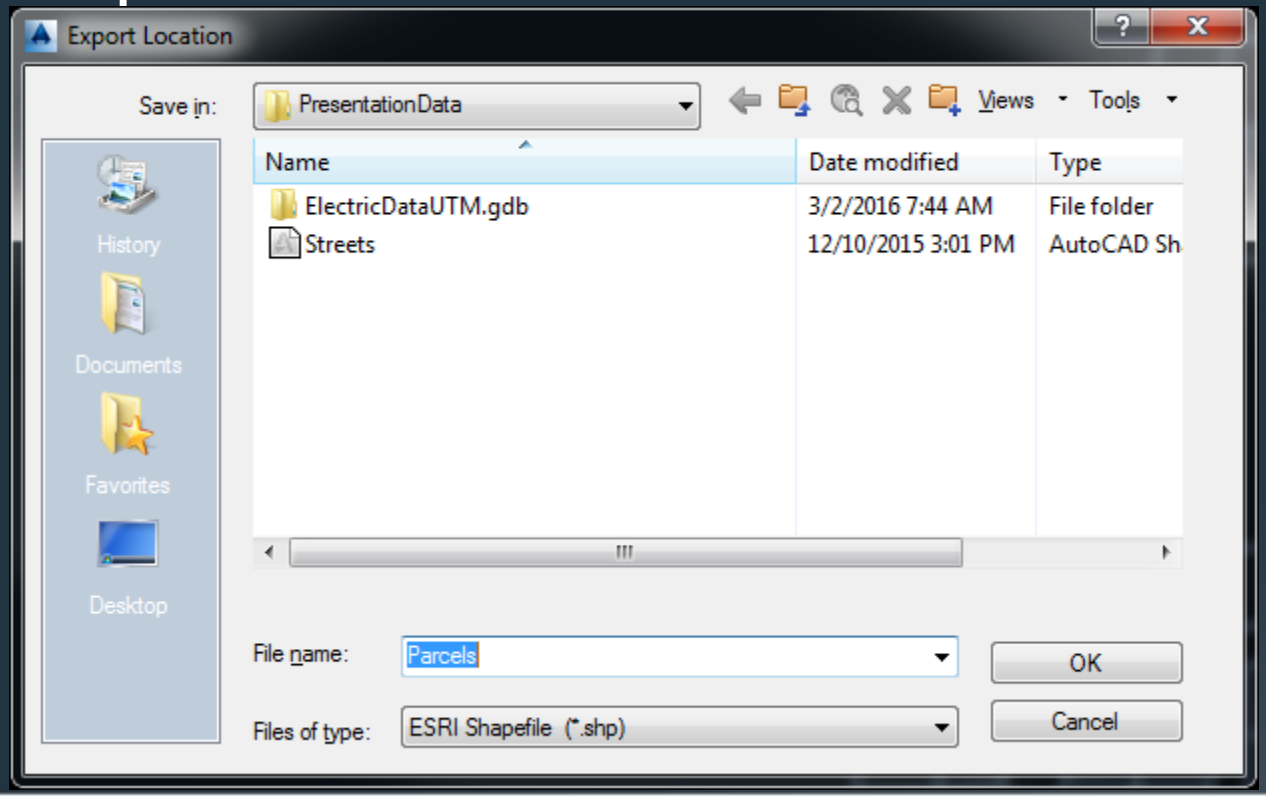
Add AutoCAD: Parcel Data

Method 1 with AutoCAD

Navigate to where you want to store the resultant Shapefile and name it



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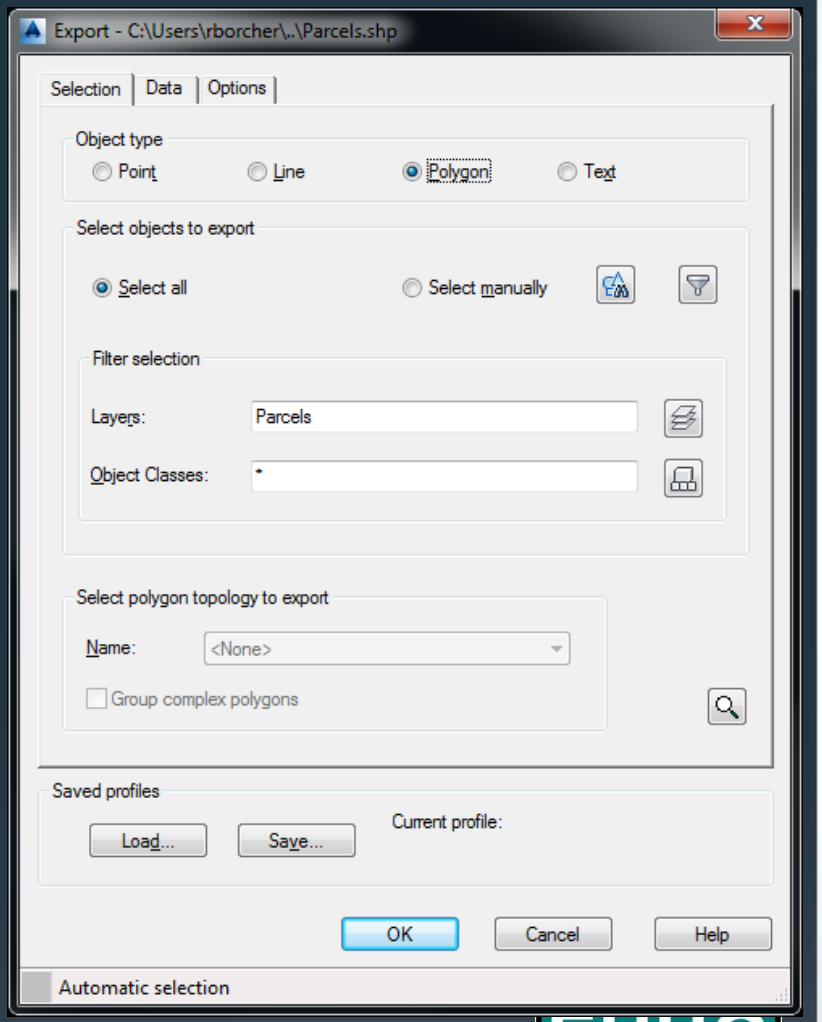
Add AutoCAD: Parcel Data

- Method 1 with AutoCAD
- Export Window
- Select Polygons for Object Type
- For layers select the AutoCAD layer in which your parcels are
- Click the Data tab



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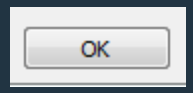
Add AutoCAD: Parcel Data

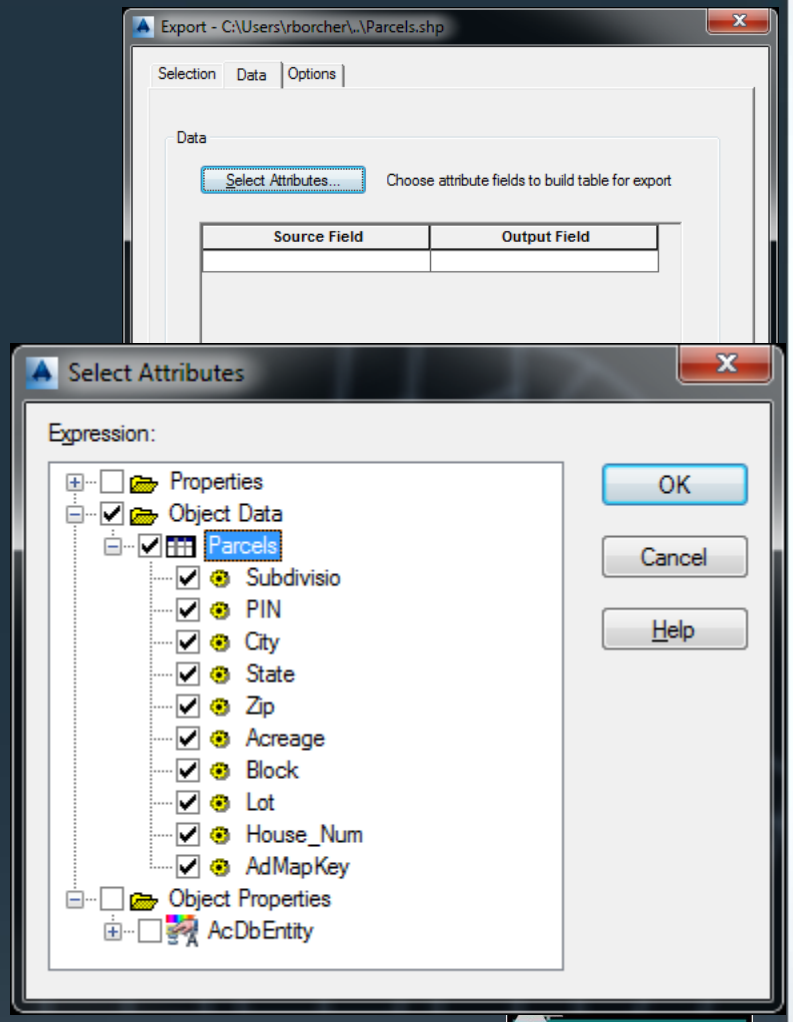
Method 1 with AutoCAD

Choose Select Attributes

Expand Object Data and choose the Fields you want to include.

Click OK 

Click the Options tab



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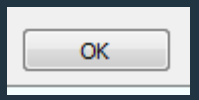
Add AutoCAD: Parcel Data

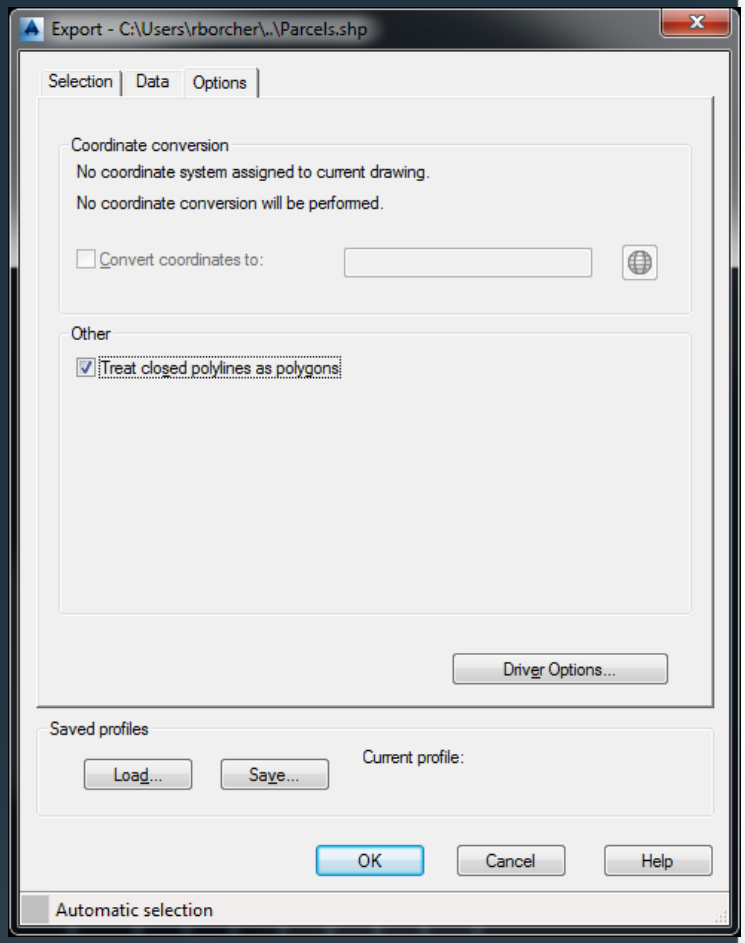
Method 1 with AutoCAD

Check the box to treat closed Polyline's as Polygons

Click OK 

AutoCAD will export your parcels

Add the shapefile to your database as before



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Add AutoCAD: Parcel Data

Method 2 with ArcGIS

You can open your DWG in ArcGIS

Open another feature to ensure your parcels are properly located

If they are you can export the parcels to your database just as you did your road centerlines

You will need to select just the parcels however

A AutoCAD drawing will have a number of features in as polygons

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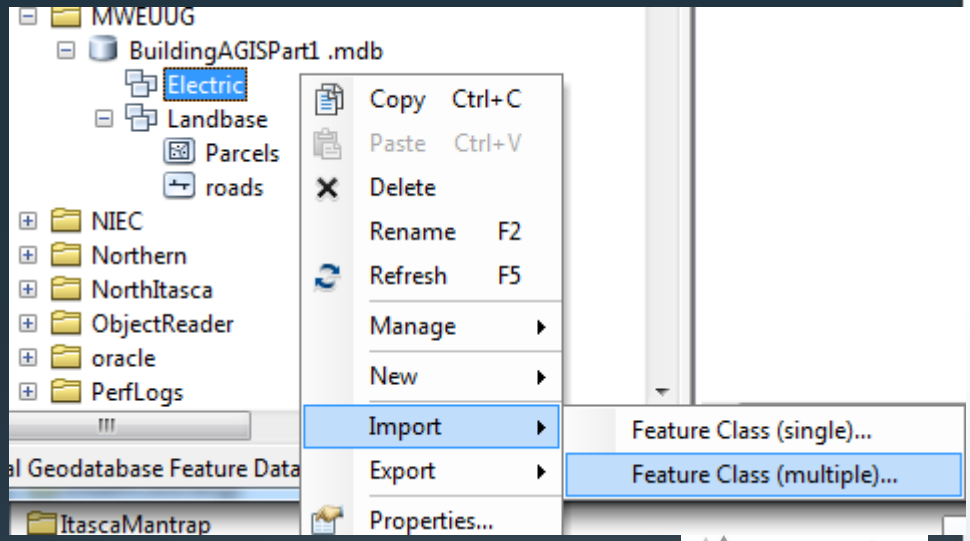
Add Geodatabase: Electric data from consultant

- Method 1 (preferred)
- Navigate to your database in ArcCatalog
- Right Click on the Feature Dataset you want to put your data in
- Choose Import>

Feature Class (multiple)



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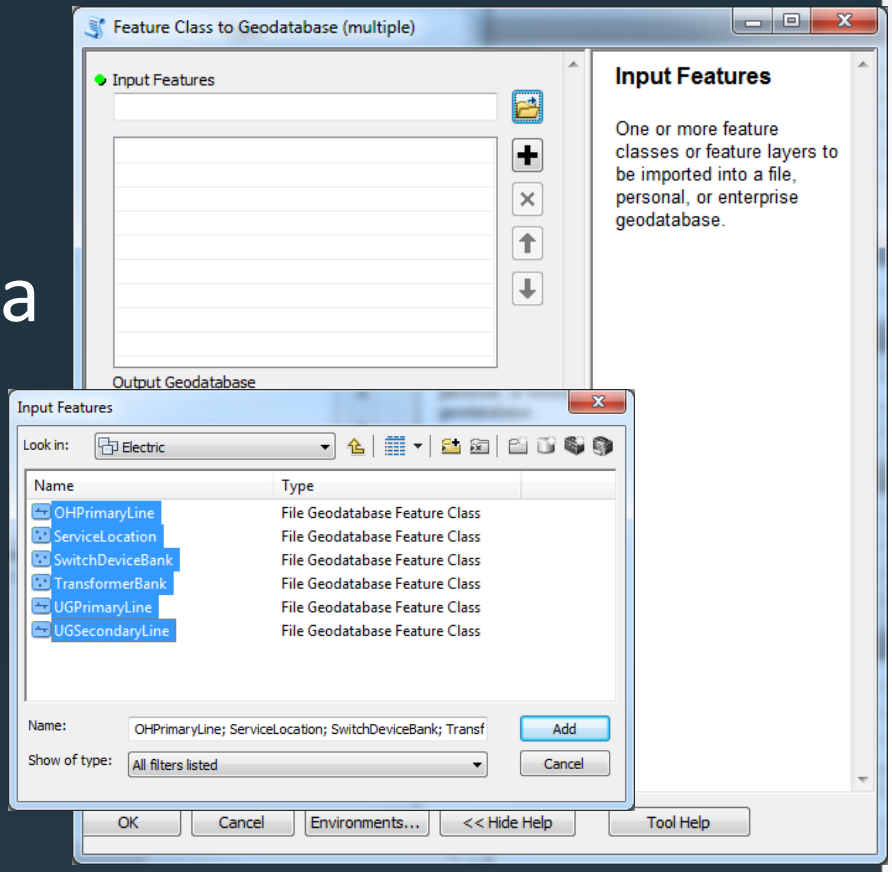
Add Geodatabase: Electric data from consultant

- Method 1 (preferred)
- At Input Features you navigate to your new data
- Select your features
- Click Add



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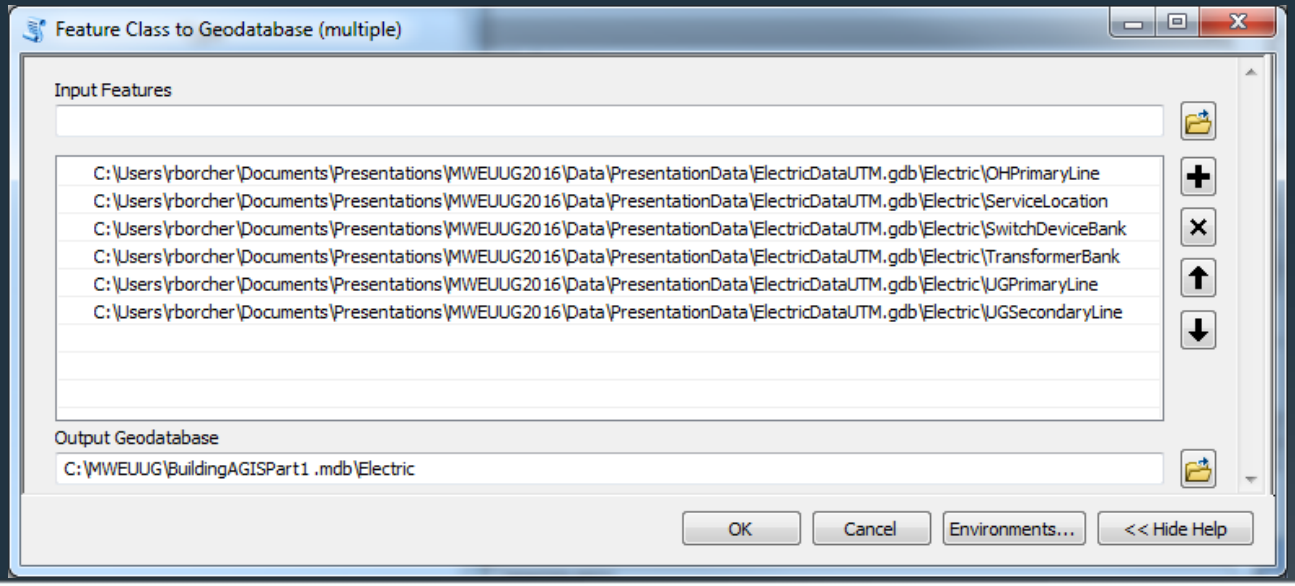
Add Geodatabase: Electric data from consultant

- Method 1 (preferred)
- They should appear one per line as below
- Confirm the output Geodatabase
- Click OK



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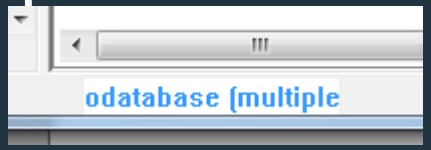
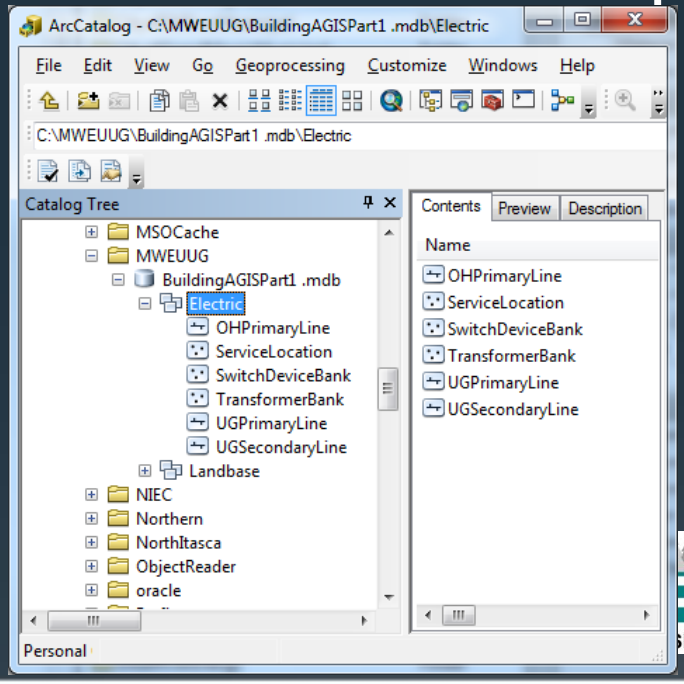
Add Geodatabase: Electric data from consultant

- Method 1 (preferred)
- A little window should appear with scrolling text to indicate it is working



- For very small amounts of data this will happen very fast
- You can open your database to confirm the features have arrived



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Add Geodatabase: Electric data from consultant

- Method 1 (preferred)
- This method is preferred because
- It creates/transfers new domains to the new database
- It maintains subtypes
- It automatically projects your data as it is being imported

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Add Geodatabase: Electric data from consultant

- Method 2 (basic use only)
- Open your feature in ArcMAP
- Right click on it and select Data>Export Data
- Navigate to your database
- Name the feature and select OK
- This method will NOT transfer/preserve Subtypes or Domains
- Best used for new basic features that do have domains or subtypes

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Add Geodatabase: Electric data from consultant

- Method 3 (NOT RECOMMENDED)
- Simply go to your database source and copy the features
- Paste them into your Feature Dataset
- Not recommended because it will create new Domains with a 1 after them (example Phase1)
- WILL NOT work if the projections are different
- However, if you are populating a new blank database this method if very good

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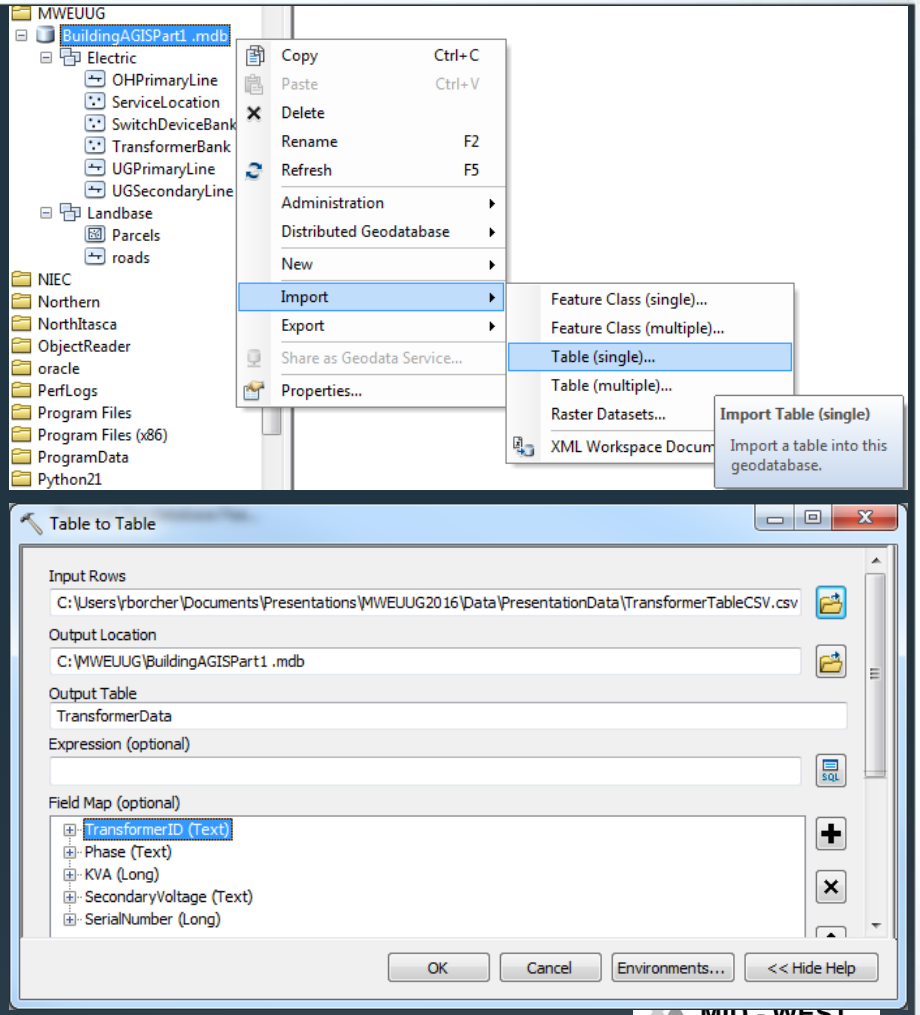
Add Table: Transformer data from billing

- Method 1 in ArcCatalog
- Right click on your database and select

Import>Table (Single)

Select your Table

Give it a name and hit OK



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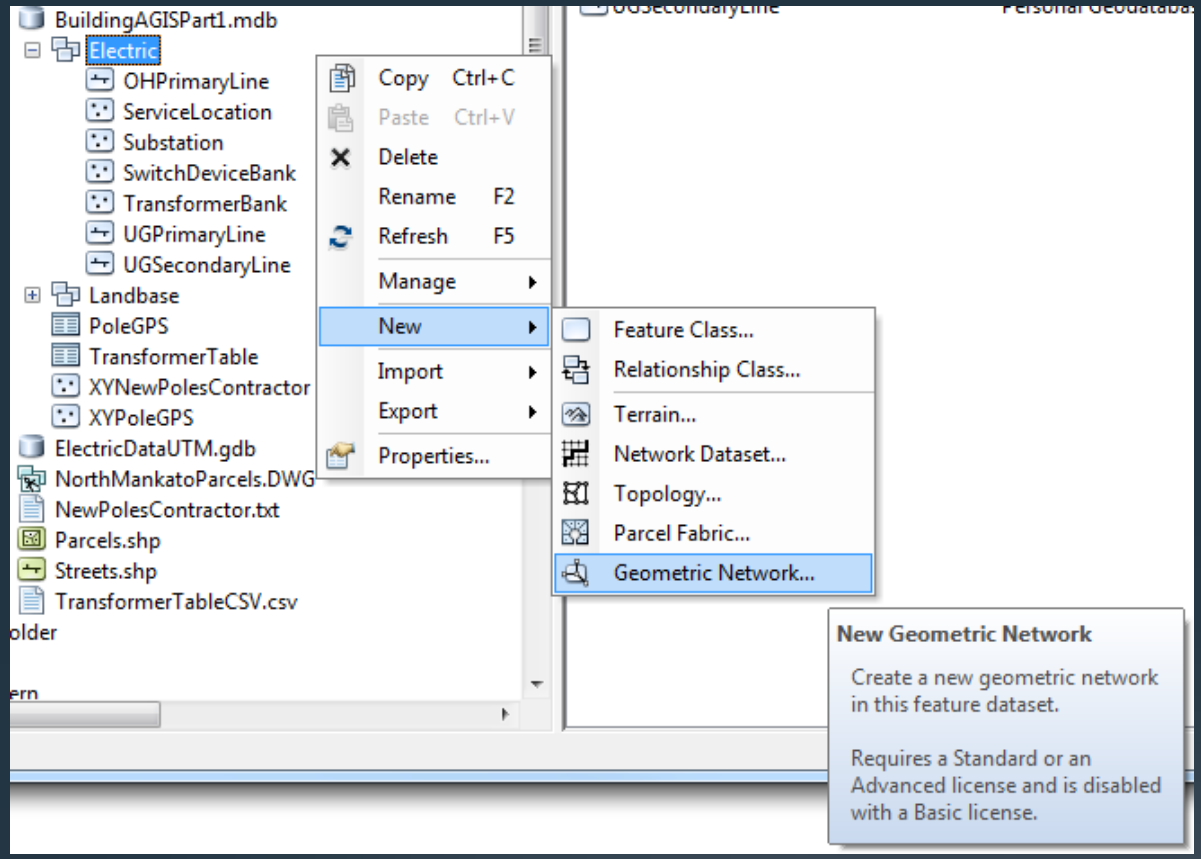
Build Geometric Network

- Right click on Feature Dataset and select New>Geometric Network



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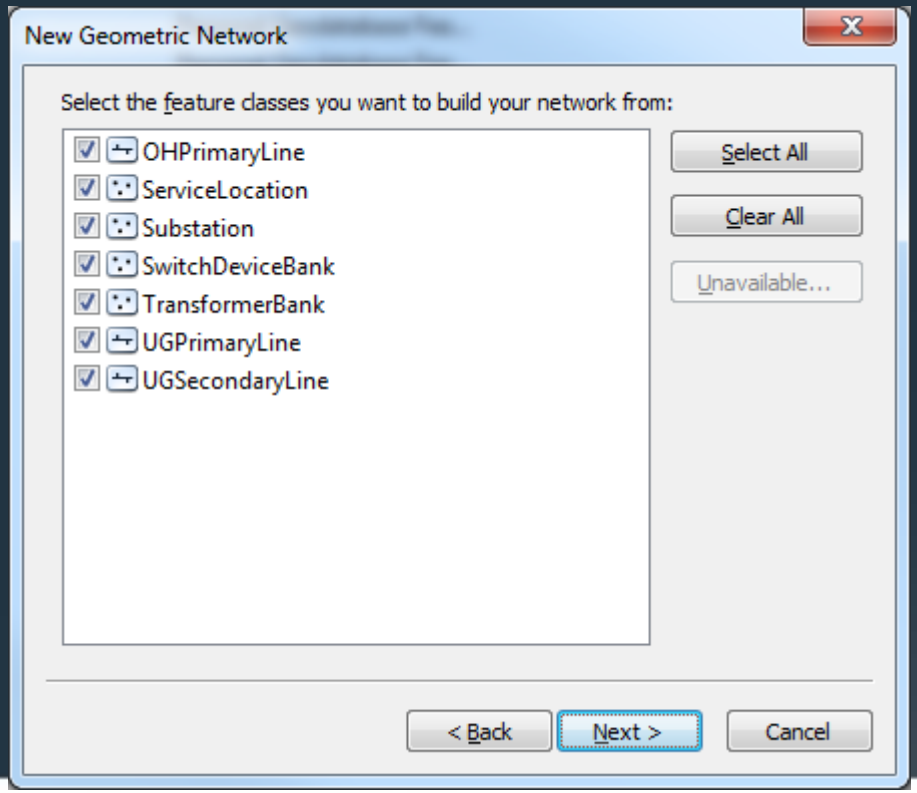
Build Geometric Network

- Enter the name for network or use default
- Click Next
- Select features to be included and click Next



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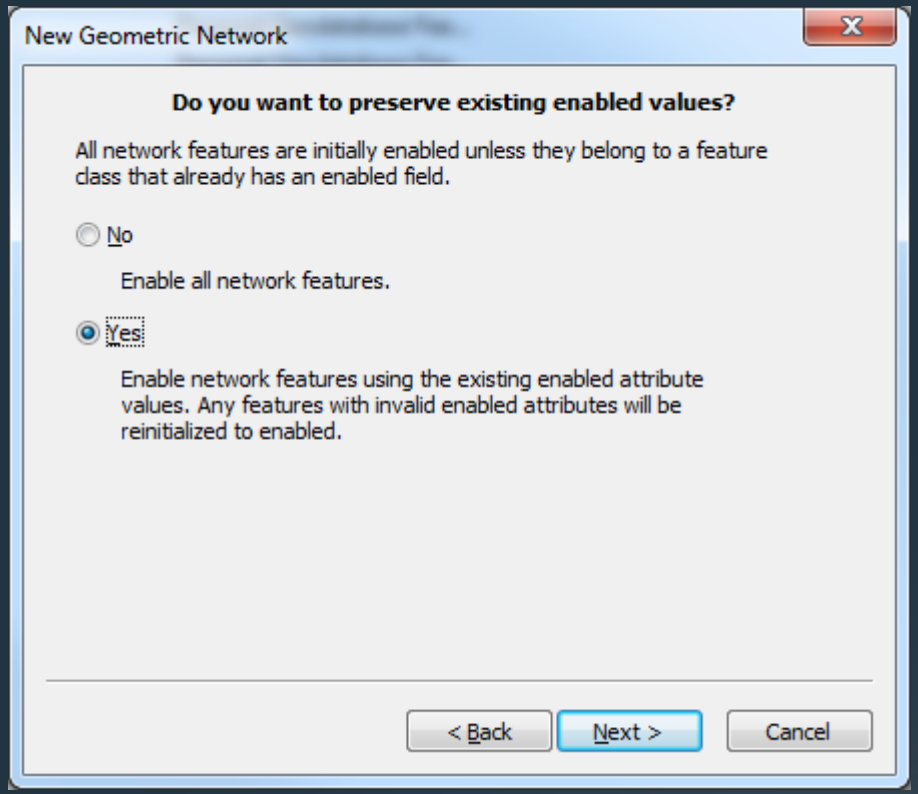
Build Geometric Network

- Select Yes to Enable network Features



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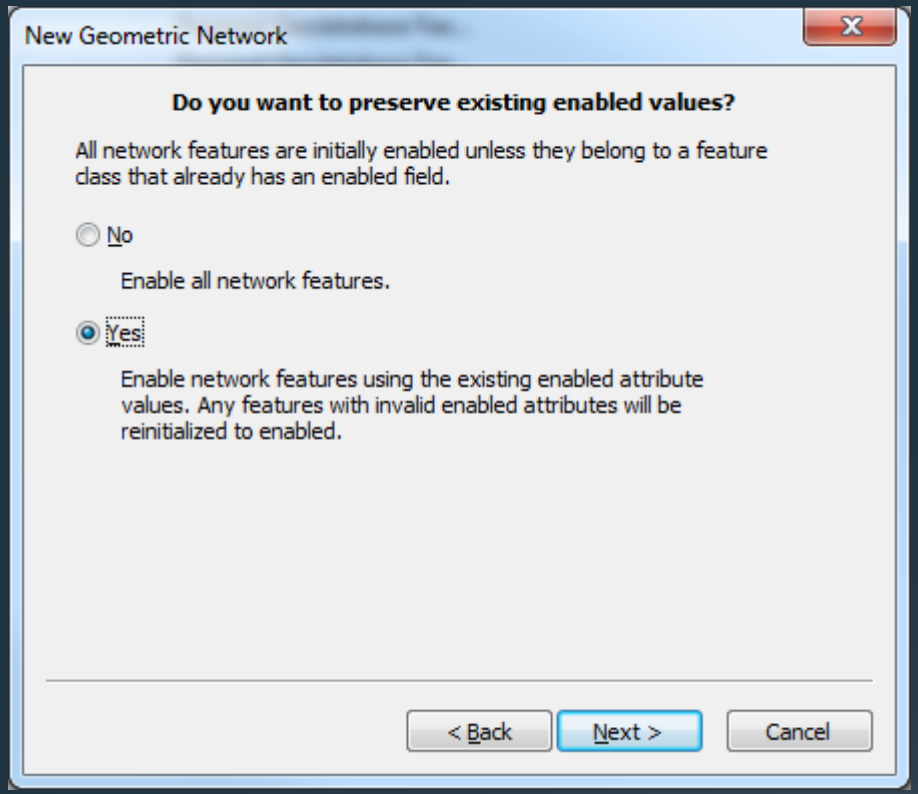
Build Geometric Network

- Select Yes to Enable network Features



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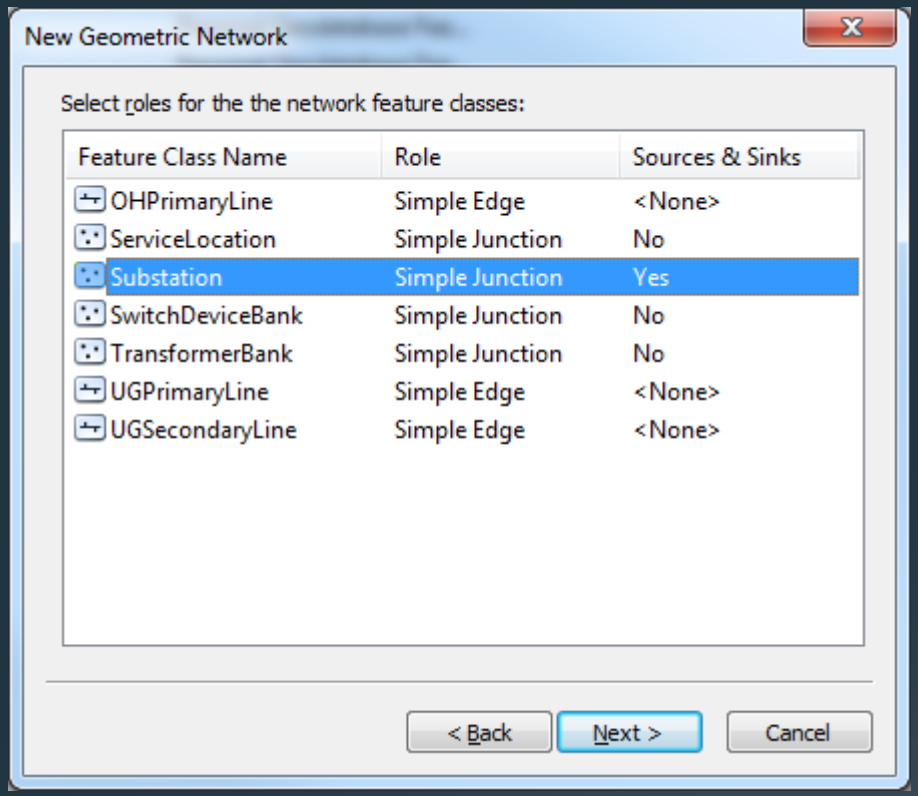
Build Geometric Network

- Select Substations as the Source Yes
- Select next twice and your network is built



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Add Table: Transformer data from billing

- Method 1
- Automatically assigns a unique ObjectID
- Can now be edited in ArcMAP
- Can be used in Relationships
- Fields can be assigned Domains
- Can be SubTyped
- Can be imported from
  - ArcGIS Database
  - MS Excel or Access
  - Tab or Comma delimited text files

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Add Table: Transformer data from billing

- Method 2 in ArcMap
- Add your table to ArcMap
- Right click on it and export it to your database

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Create Feature: Poles from Contractor

Method 1 (preferred)

The table with your Pole locations can be any Table format

It may look something like this when opened in Excel

	A	B	C	D	E
1	PoleNumber	PoleHeight	Notes	Xing	Ying
2	Pole546	30 Foot		-94.06958398	44.17936917
3	Pole455	30 Foot		-94.06935258	44.18065823
4	Pole458	35 foot	Tap West, fuse west	-94.06958637	44.17978662
5	Pole546	30 Foot		-94.06955249	44.18024827
6	Pole628	30 Foot		-94.07080543	44.17978286
7	Pole623	30 Foot		-94.06957648	44.17805703
8	Pole624	30 Foot		-94.06957893	44.17848602
9	Pole625	30 Foot		-94.06958136	44.17891015
10	Pole626	30 Foot	Rotten	-94.07019357	44.17978251
11	Pole637	30 Foot		-94.06782113	44.18250713
12	Pole644	30 Foot		-94.06805872	44.18212101
13	Pole643	30 Foot		-94.06837194	44.18177171
14	Pole642	30 Foot		-94.068714	44.18139108
15	Pole641	30 Foot		-94.06905144	44.18101559
16	Pole636	30 Foot	Riser	-94.06775405	44.18287198

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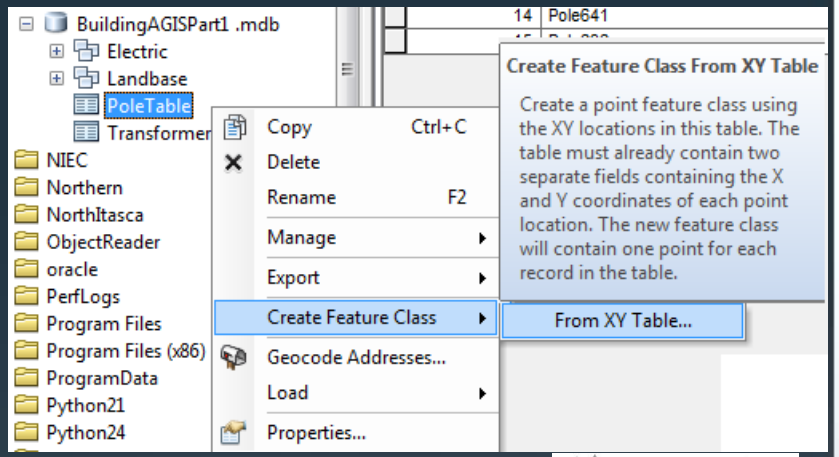
Create Feature: Poles from Contractor

Method 1 (preferred)

In ArcCatalog navigate to the location of the table

Right click on the Table and select

Create Feature Class> From XY Table



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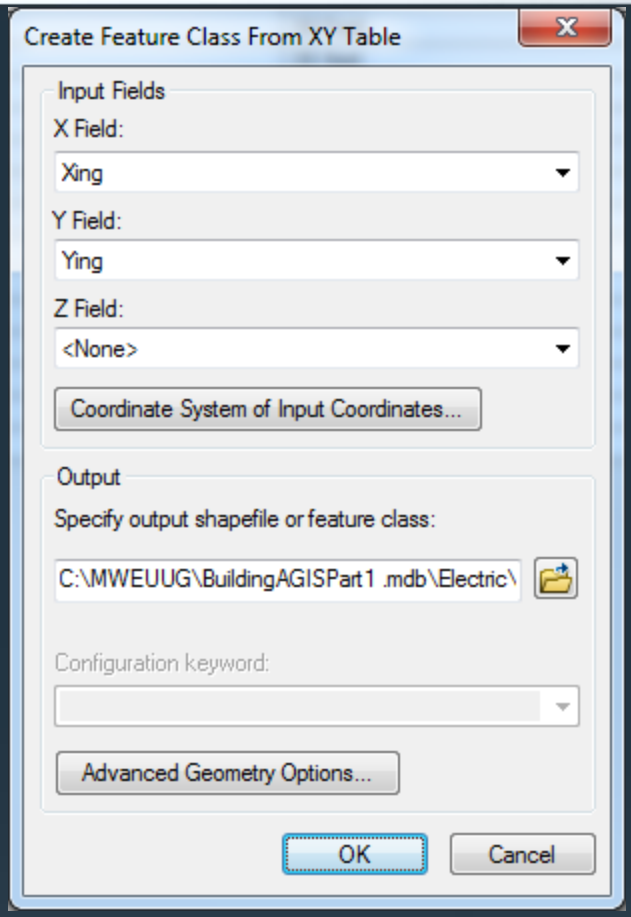
Create Feature: Poles from Contractor

Method 1 (preferred)

Choose the proper X and Y fields

Specify output shapefile or feature class. You can select to put it in your database

Press the Coordinate System of Input Coordinates button



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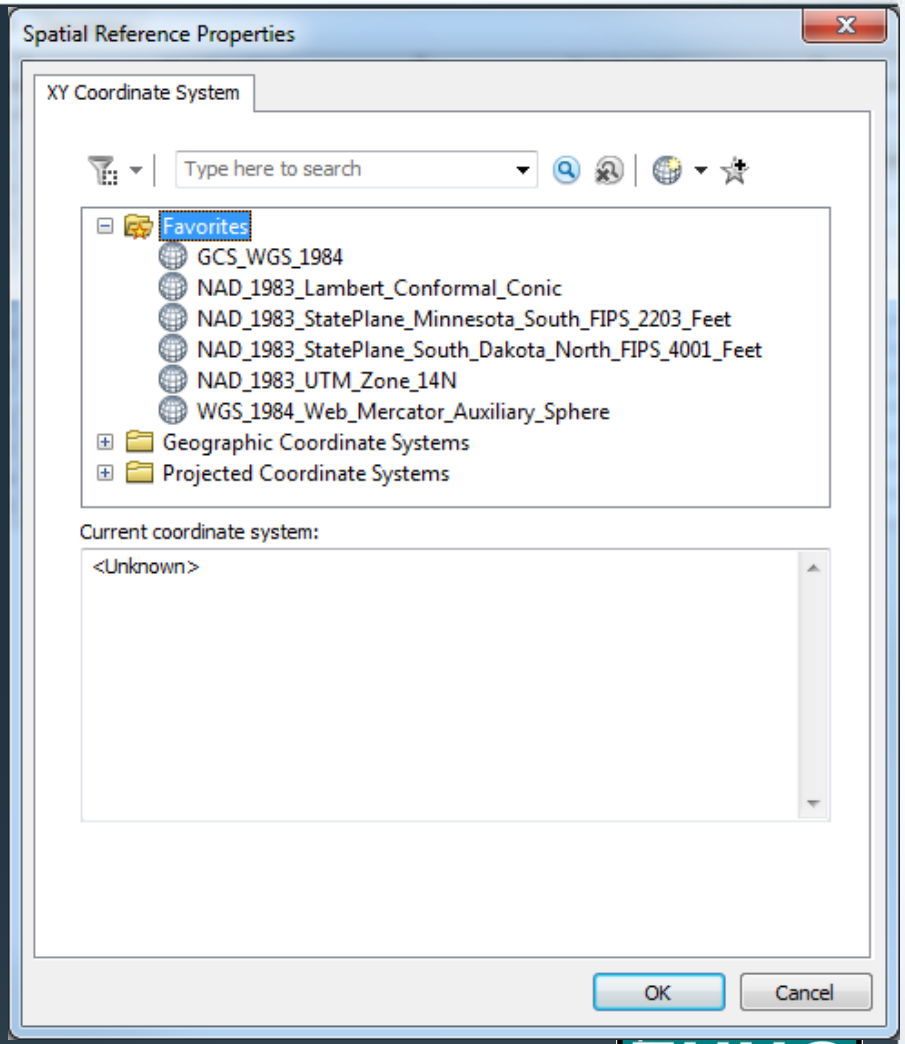
Create Feature: Poles from Contractor

Method 1 (preferred)

If the XY are in the same format as the example select GCS_WGS_1984

Or WKID 4326

Hit OK



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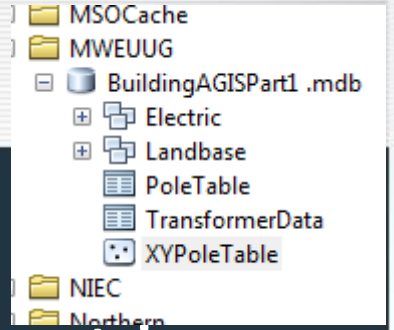
Create Feature: Poles from Contractor



Method 1 (preferred)

The new Pole Feature Class was created (not in a Feature Dataset) as a point feature called XYPoleTable.

Now import it into the Feature Dataset where you want it. You will have to use a different name then the point feature it created

After verifying new feature is correct you can delete the XYPoleTable

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Create Feature: Poles from Contractor

Method 1 (preferred)

Benefits of this method is that you can now use the original pole table as a data table for the poles

Field names are preserved

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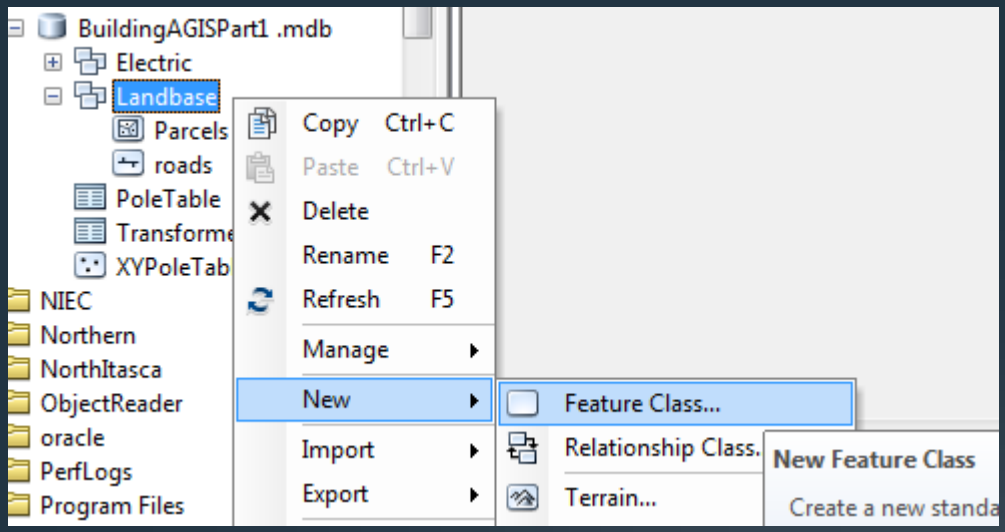
Create Feature: Manually Created Feature Class

In ArcCatalog

Right click on the Feature Dataset you want to create your new empty feature and select

New> Feature Class



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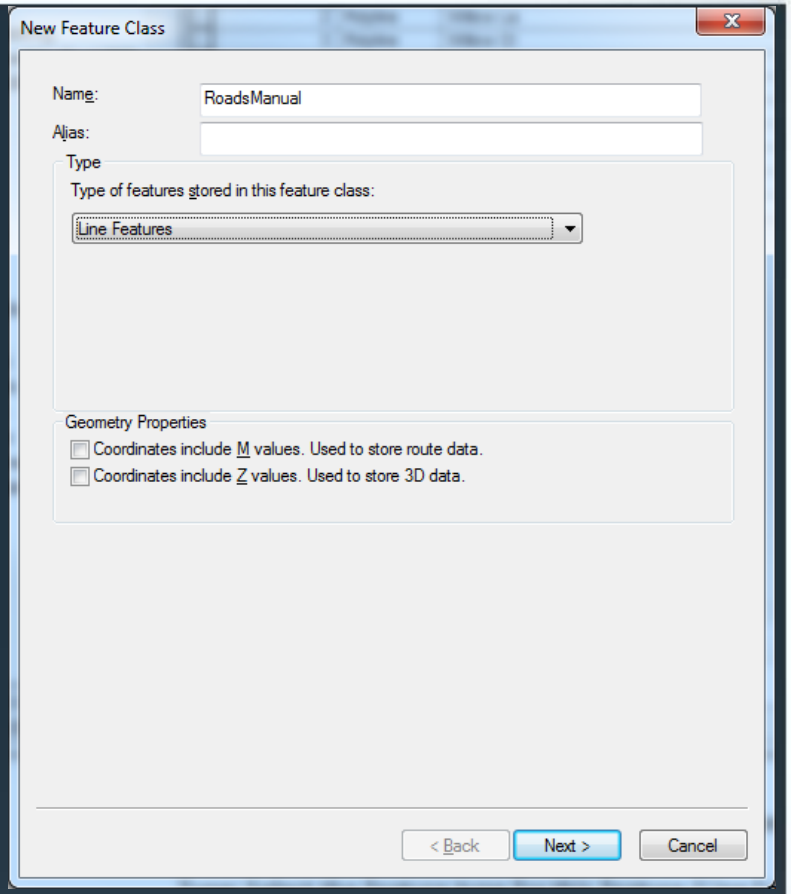
Create Feature: Manually Created Feature Class

- Enter the name for your new Feature Class
- Alias will be automatically populated with Name
- Select the type of feature
  - Point
  - Line
  - Polygon
- Click next



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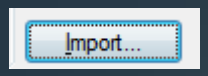
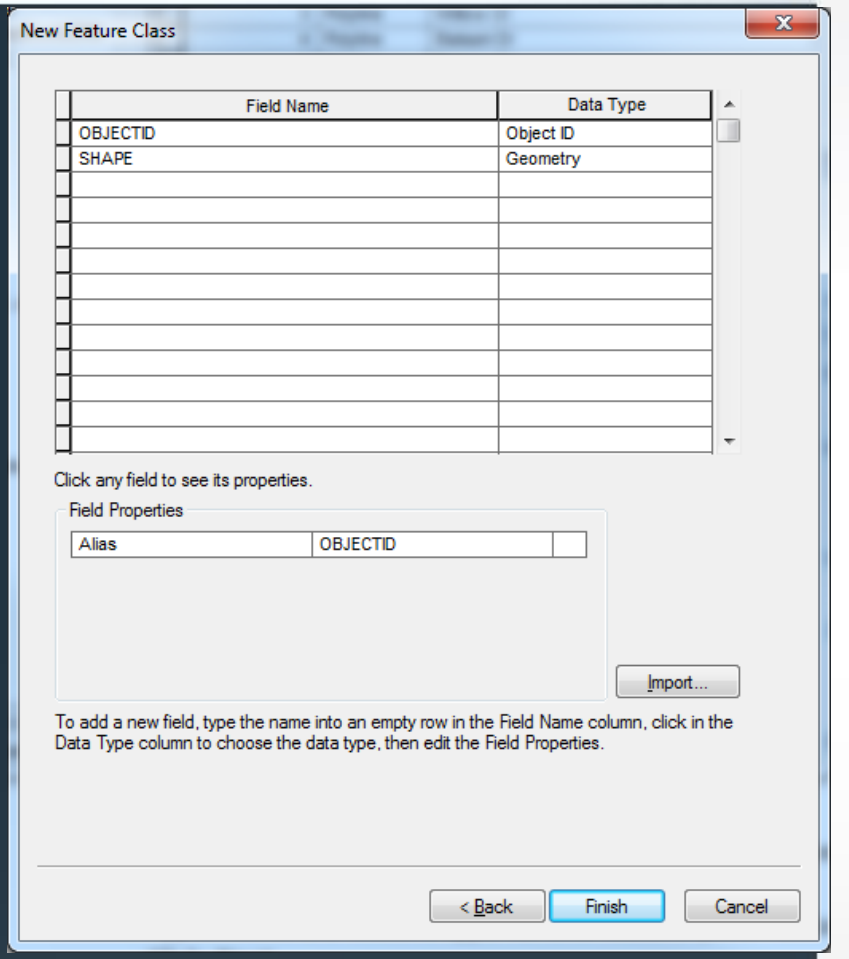
Create Feature: Manually Created Feature Class

In the New Feature Class window will be OBJECTID and Shape. These are default Fields and cannot be changed.

You can enter any Field names that you want and determine a data type

OR Click the Import Button





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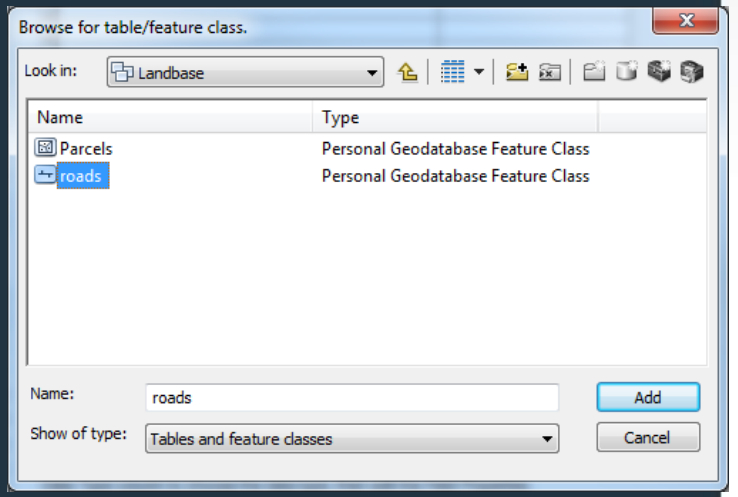
Create Feature: Manually Created Feature Class

By using Import you can create a new Feature Class based on an existing Feature Class complete with SubTypes and Domains

Navigate to the Feature Class you want to emulate and click the Add button



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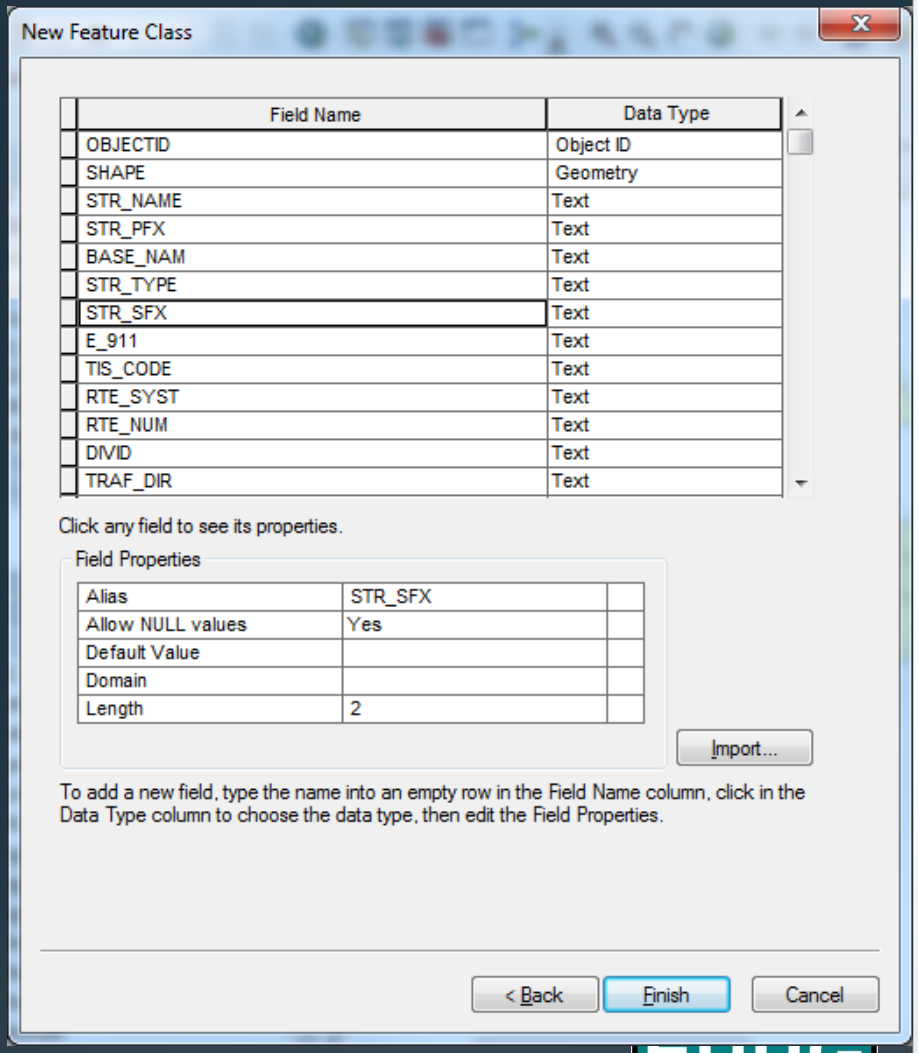
Create Feature: Manually Created Feature Class

When you click the finish button your new feature classs will be ready



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Create Feature: Manually Created Feature Class

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