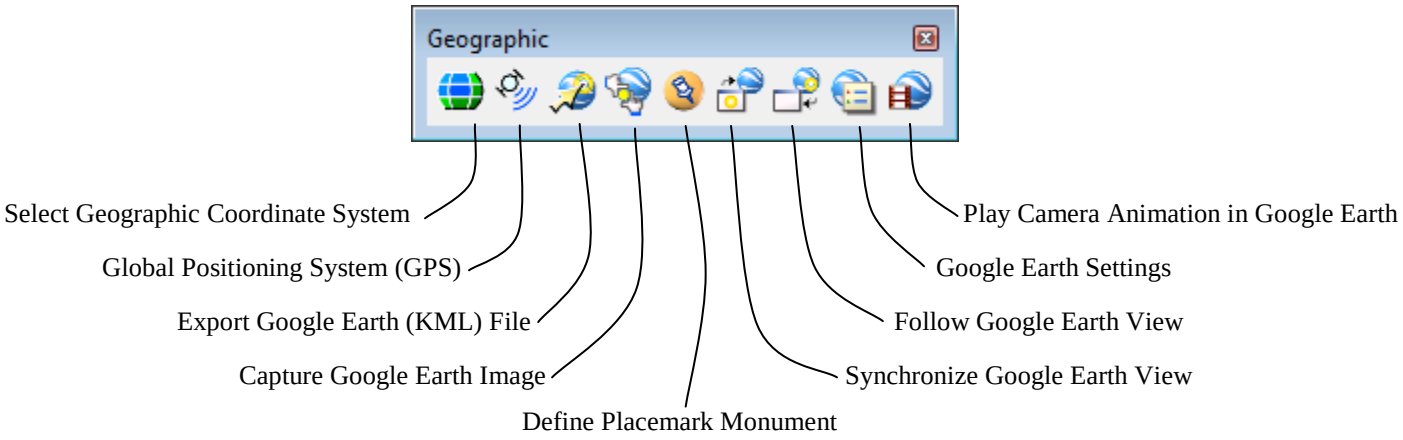
Chapter 1

Geographic Tools

1.1 Objectives

- Understand the use of the **Geographic Tools** and how they can be utilized in a MicroStation file.

1.2 Geographic Toolbar

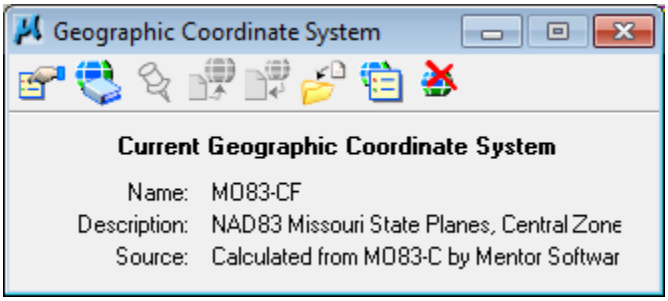


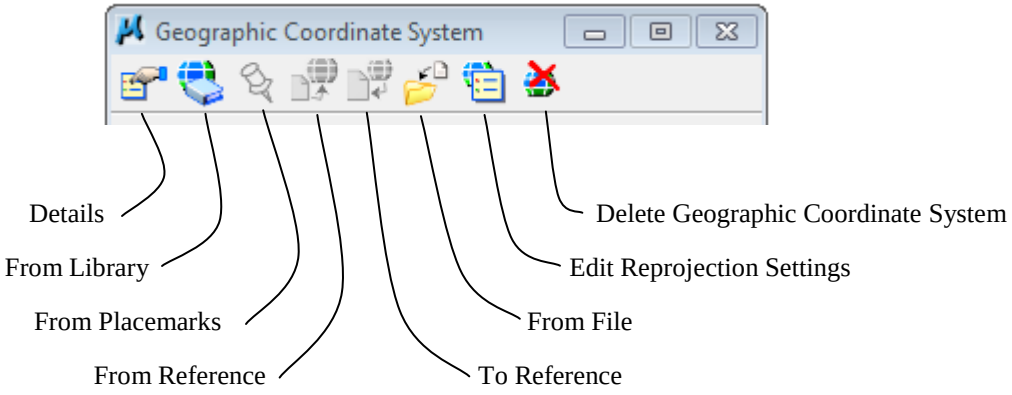
The **Geographic Toolbar** contains tools for interacting with a Global Positioning System (GPS) or Google Earth.

This toolbar can be accessed from the **Tools >> Geographic** pull down in MicroStation.

1.3 Select Geographic Coordinate System

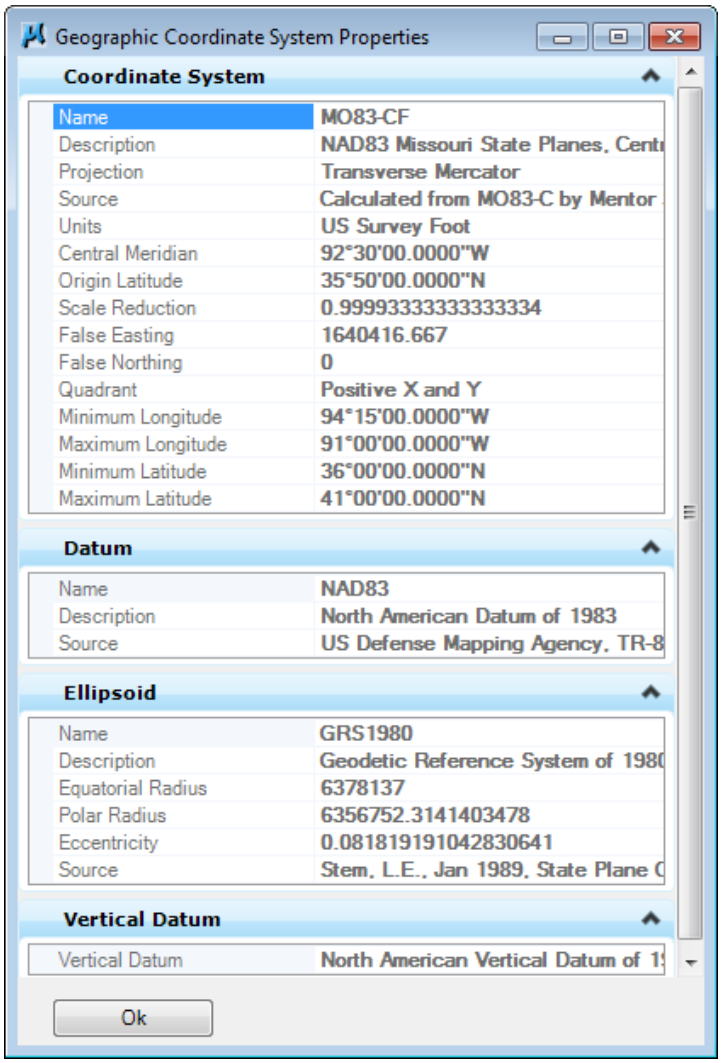
This tool is used to open the Geographic Coordinate System dialog, which is used to select a geographic coordinate system (GCS) from a library of predefined geographic coordinate systems.





1.3.1 Details

This tool opens the Geographic Coordinate System Properties dialog box. It is used to display the properties of a geographic coordinate system (GCS) that is attached to the MicroStation file.



1.3.2 From Library

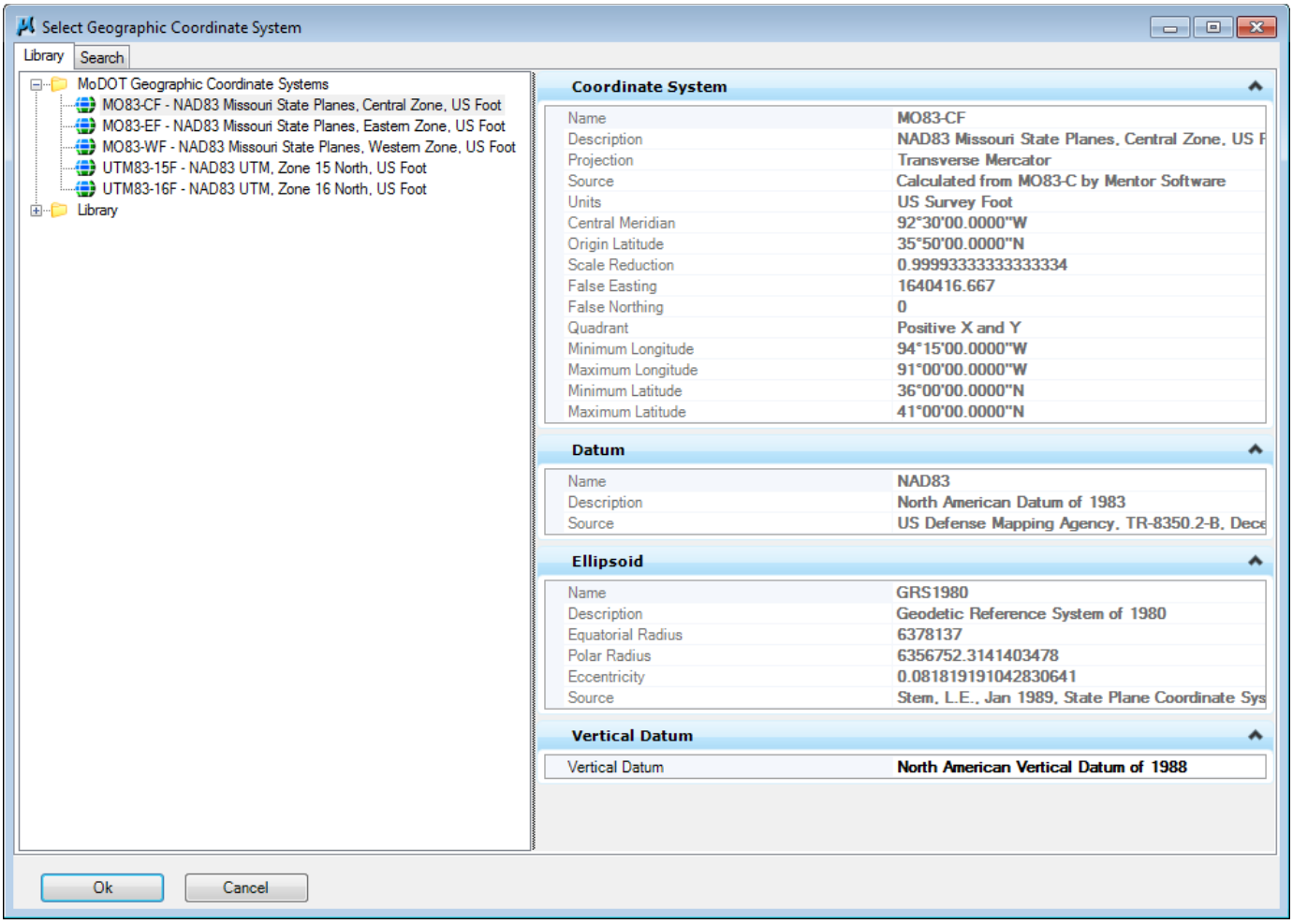
This tool is used to select a geographic coordinate system (GCS) from MicroStation's library of predefined geographic coordinate systems.

This is useful when:

- Existing data was drawn in a geographic coordinate system (for example a state plane or country grid coordinate system) and you want to make MicroStation aware of that GCS.
- Data is correctly drawn in one specified GCS, but you want to reproject that data to a different GCS.
- You want to designate the GCS for a new design file.

CADD Support has helped eliminate the confusion of which GCS to select from the predefined library. We have provided a group called ***MoDOT Geographic Coordinate Systems*** which contain the most commonly used coordinate systems for MoDOT projects.

Now since most projects use an modified coordinate system instead of the standard coordinate system, you will need to copy and modified the standard coordinate system to match the applied projection factor (grid to ground factor) for the project.



1.3.3 From Placemark

This tool allows you select a GCS defined by placemarks when using structure-centric coordinate systems. Geographic placemarks, cells containing a name, longitude, latitude, and altitude, indicate the geographic positioning of your design. The longitude, latitude, and altitude fields specify the geographic position relative to the WGS 84 datum, which is the datum reported by GPS devices and also used by Google Earth. The corresponding position in the design file is specified by the placement point of the cell. The scale and rotation of the cell does not affect its meaning as a geographic placemark.

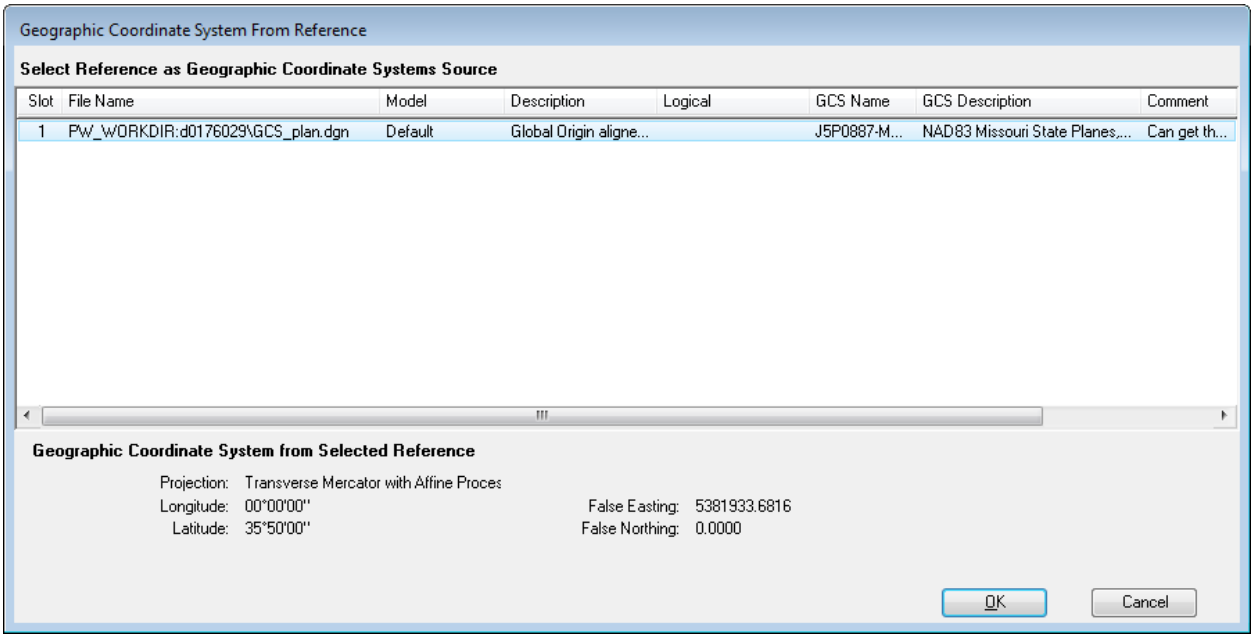
At least two placemarks are required to calculate this GCS and should span the entire range of interest. Placemarks are created using the Define Placemark Monument tool.

A Geographic Coordinate System calculated from placemarks is only as accurate as the placemark data used to calculate it. If you use a calculated GCS to reference other geolocated designs, errors could be cumulative. Therefore, treat measurements between features in referenced designs as approximate.

1.3.4 From Reference

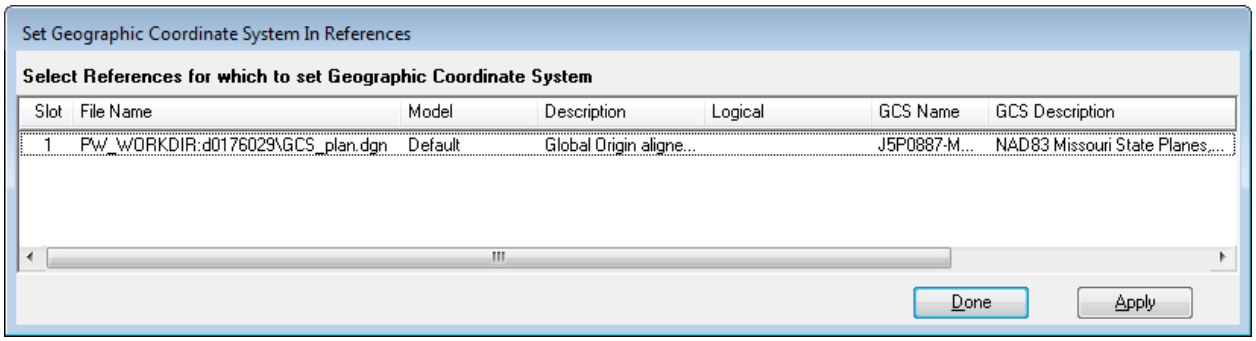
This tool is used to assign the GCS of an attached reference to the active model. You can use references to orient your active model when the attached reference has a standard GCS specified and has not been scaled or rotated, or when a reference with a computed Azimuthal Equal Area GCS is attached without scaling (it can be moved and/or rotated).

If a geographic coordinate system, with an attached reference, has a geographic referencing mode turned on, the reference cannot be used as a source for the GCS. Its position is calculated from its GCS and the active model´s current GCS so selecting it as a source will not change the current GCS. The Comment column provides the reason a particular attachment cannot be used as a GCS source.



1.3.5 To Reference

This tool is used to set the geospatial coordinate systems (GCS) of attached references based on the GCS of the active model. If the GCS is selected from the standard library, it can be used to set the GCS for coincident, unscaled, and unrotated reference attachments. If the GCS is calculated from placemark monuments, it can be used to set the GCS for unscaled references.

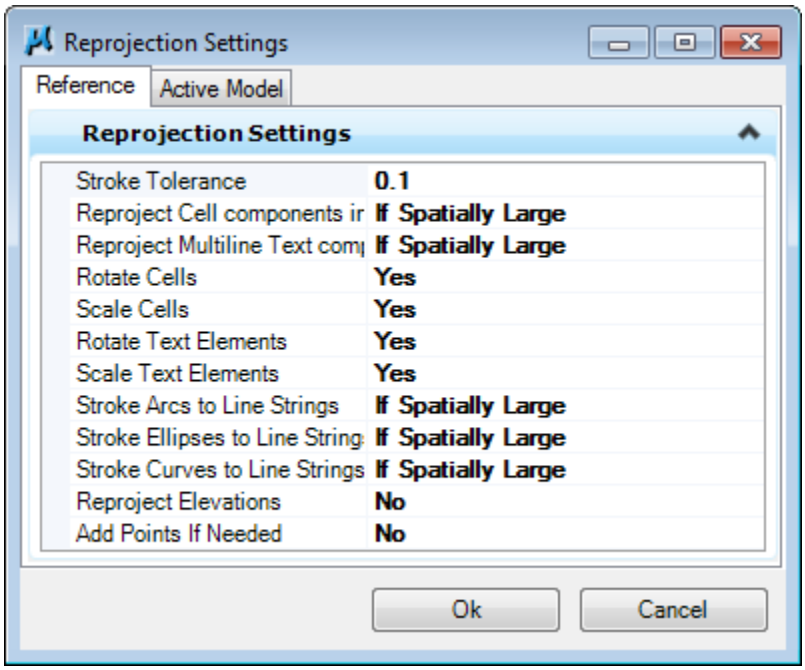


1.3.6 From File

This tool allows you to apply a GCS from a model in another design file to your current file, even if it is not attached as a reference.

1.3.7 Edit Reprojection Settings

This tool is used to specify the settings for reprojection. The tabs let you set the reprojection settings differently for references and for the active model.



1.3.8 Delete Geographic Coordinate System

This tool deletes the geographic coordinate system attached to a MicroStation file.

It does not delete the geographic coordinate system from the MoDOT Geographic Coordinate Systems library or the MicroStation predefined library.

1.4 Global Positioning System (GPS)

This tool is used to access a Global Positioning System (GPS) connected to your computer.

This tool will not be covered in detail in this class.

1.5 Export Google Earth (KML) File

This tool is used to export MicroStation geometry into a file format (KML) that Google Earth can use to see the MicroStation geometry.

The settings that affect the export of a model are contained in the Google Earth Tools Settings dialog.

The geometry is exported as WYSIWYG (what you see is what you get). That is, the view attributes and level settings are taken from the active view. If Render Mode is set to From View, in the Google Earth Export Settings dialog, then the display mode also is taken from the active view. It is, therefore, important to set up the view as you would like it to display in Google Earth. Output should be minimized to include only necessary data. The display of unnecessary levels should be turned off. If text and dimensions are to be excluded from the output file then their view attributes should be disabled.

Typically, Wireframe display mode is appropriate for 2D models, while for most 3D models it is desirable to set the output display to Smooth.

1.6 Capture a Google Earth Image

This tool will capture a Google Earth image that can be utilized in a MicroStation file. You can only use this option in a 3d MicroStation file.

This tool will not be covered in detail in this class.

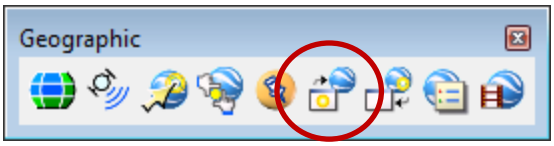
1.7 Define Placemark Monument

This tool is used to associate a geographical location to a Monument point in a model.

Placemark monuments are simply cells named “KmlPlacemark” with enter-data fields that display the name, longitude, latitude, and altitude of the monument. The origin of the cell represents the location of the placemark in the model. Multiple placemarks may be entered, and you can use the Active Scale setting to control the size of the placemark cells.

This tool will not be covered in detail in this class.

1.8 Synchronize Google Earth View



This tool is used to have Google Earth navigate to the current MicroStation view. If Google Earth is not open when the tool is used, it will be opened automatically.

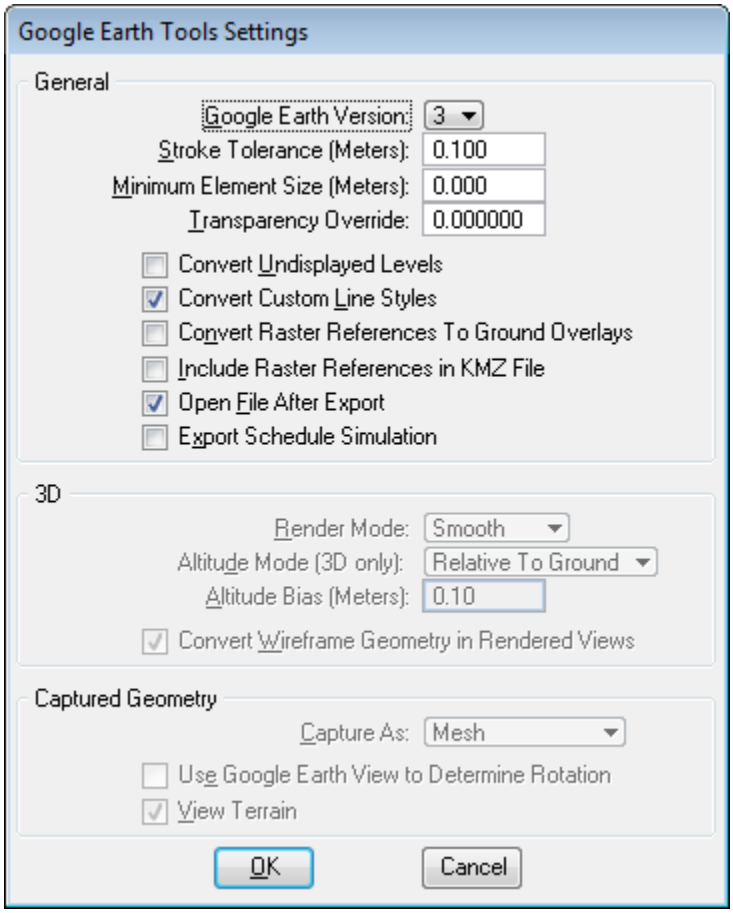
As Google Earth supports only a limited camera model with a fixed lens length and restricts the camera to pointing downward only, the Google Earth views will not always match the MicroStation view exactly, but should provide a relatively good approximation for most views.

1.9 Follow Google Earth View

This tool is used to match the active MicroStation view to the current Google Earth view location. This tool works only if the model's view location is geographically close to the current Google Earth location.

1.10 Google Earth Tool Settings

This tool is used to control the settings and operation of the Google Earth tools. These options determine how the KML gets created from the MicroStation drawing and if Google Earth opens after exporting the MicroStation geometry to the KML file.



1.11 Play Camera Animation in Google Earth

This tool is used to play a camera animation in Google Earth. Camera animations only, are supported.

After you have created a camera animation, you need only to geo-locate your model in some way, such as by defining a Placemark. There is no need to export geometry to Google Earth.

This tool will not be covered in detail in this class.

1.12 Example 1-1

This example will show the process of creating a custom GCS with the projection factor (grid to ground factor), attaching the custom GCS and exporting the MicroStation geometry to a file format (KML) that Google Earth can use to visualize the geometry.

Information about this project:

- MicroStation geometry was placed using Missouri State Plane coordinates
- Project is located in the Missouri State Plane "Central" Zone
- Projection factor (grid to ground) for this project is **1.000093492**

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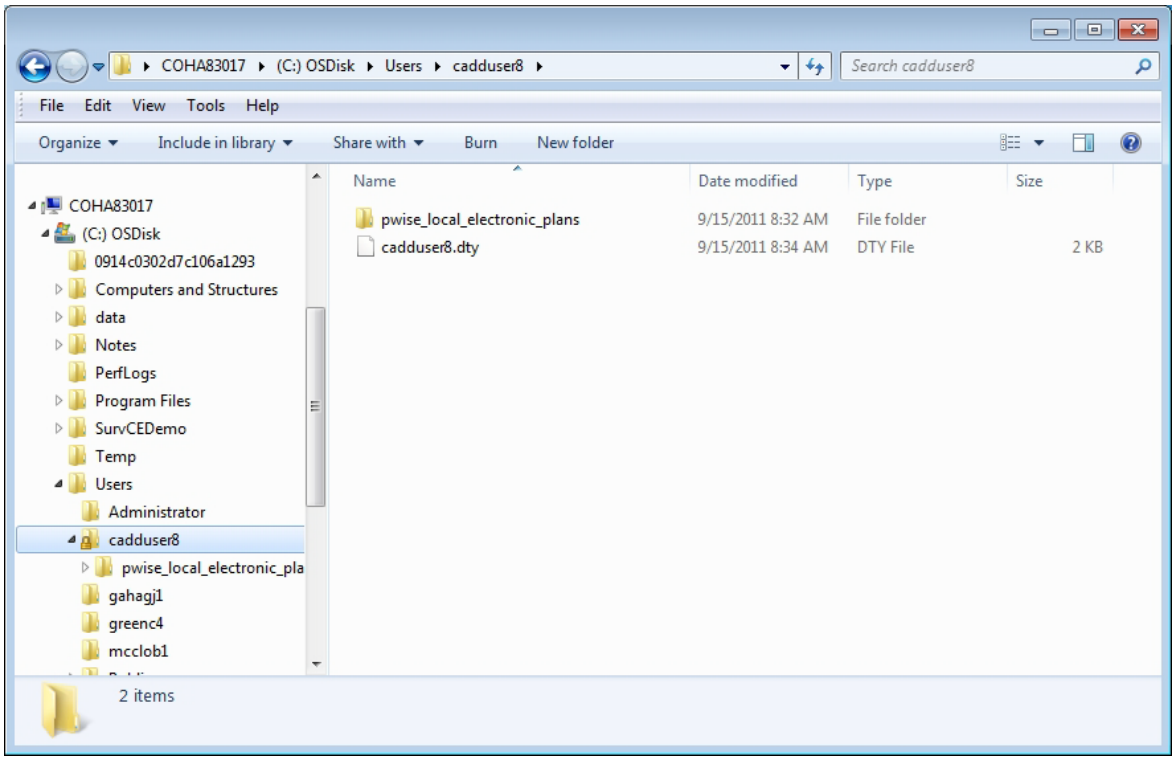
1. Open Windows Explorer and navigate to the following location:
   C:/Programs Files/Bentley/MicroStation V8i (SELECTseries)/Map/coordinate/seed

   Copy the file named ***seed.dty*** and place it under:
   C:/users/cadduser##/seed.dty

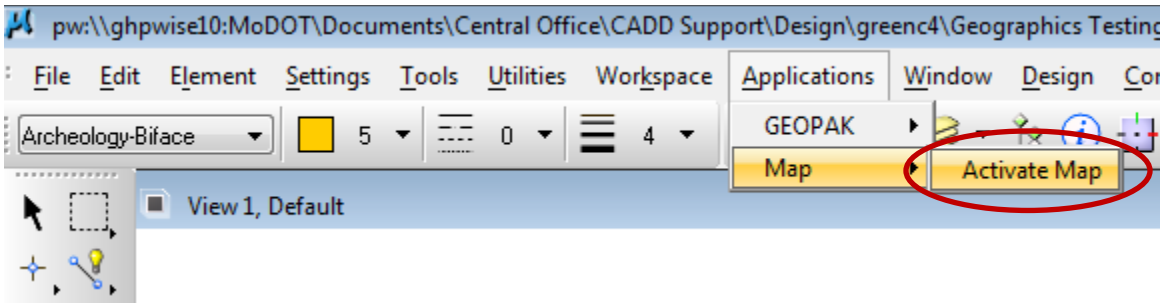
   Rename the copied seed file to your user id.
   Example = cadduser##.dty



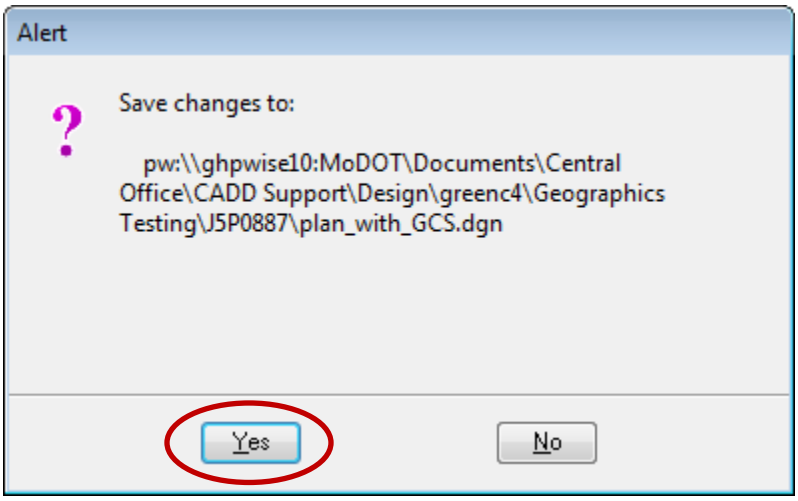
2. In ProjectWise, open the following MicroStation file:

   pwname:\\MoDOT\Documents\District CADD\Design\cadduser##\J5P0887\Plan_J5P0887.dgn

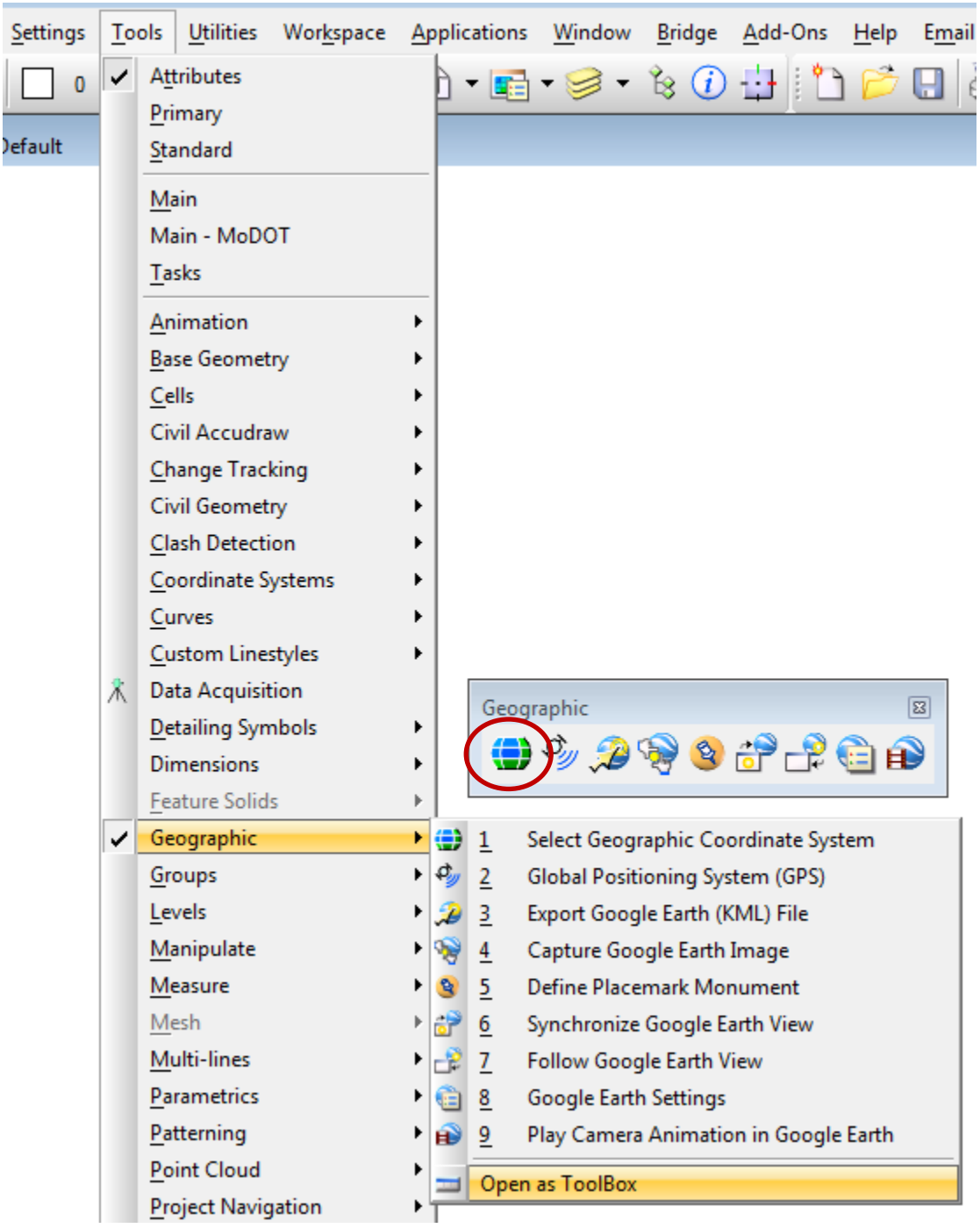
3. Go to the **Applications** pull down and activate **Bentley Map**. This needs to be done for us to be able to edit the geographic coordinate system (GCS) and apply the appropriate projection factor to it later on.



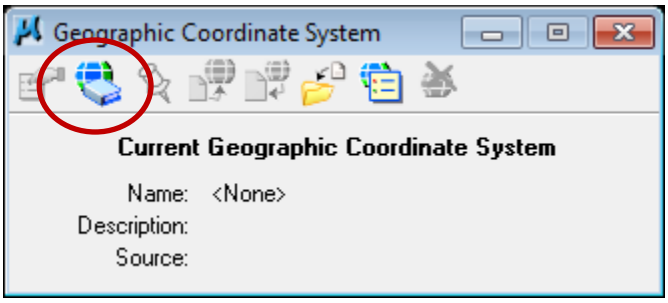
4. Click **Yes** when you get the prompt to save the changes to the file.



5. Load the **Geographics** tool box under ***Tools*** >> ***Geographic*** and choose the **Select Geographic Coordinate System** tool.



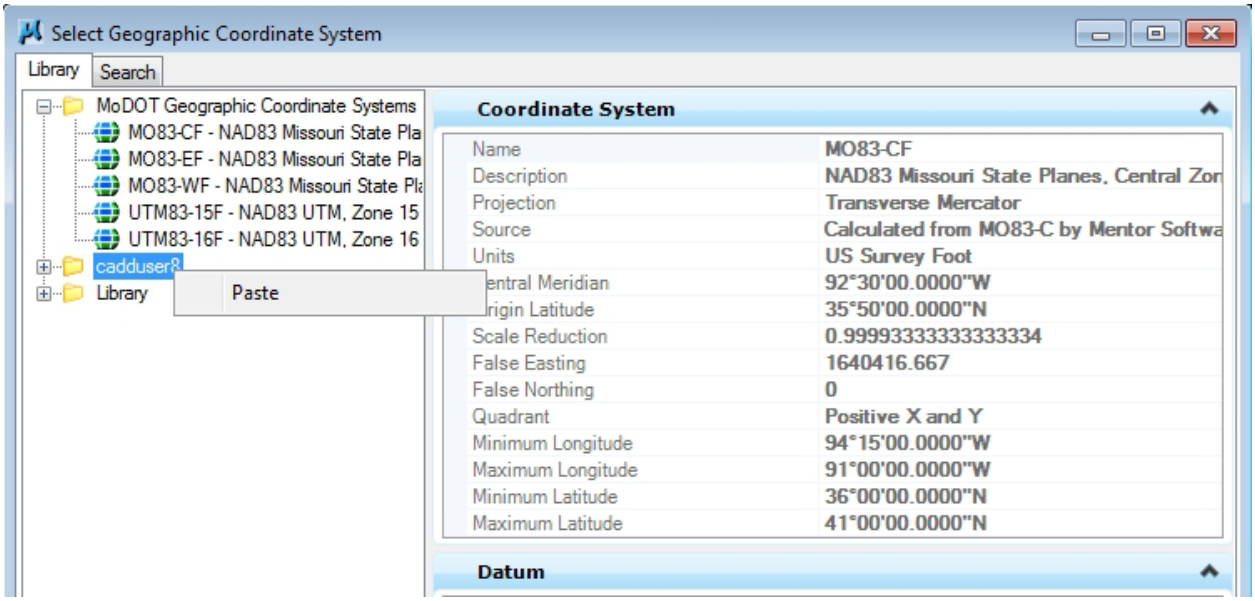
6. Click on the **From Library** option in the Geographic Coordinate System dialog.



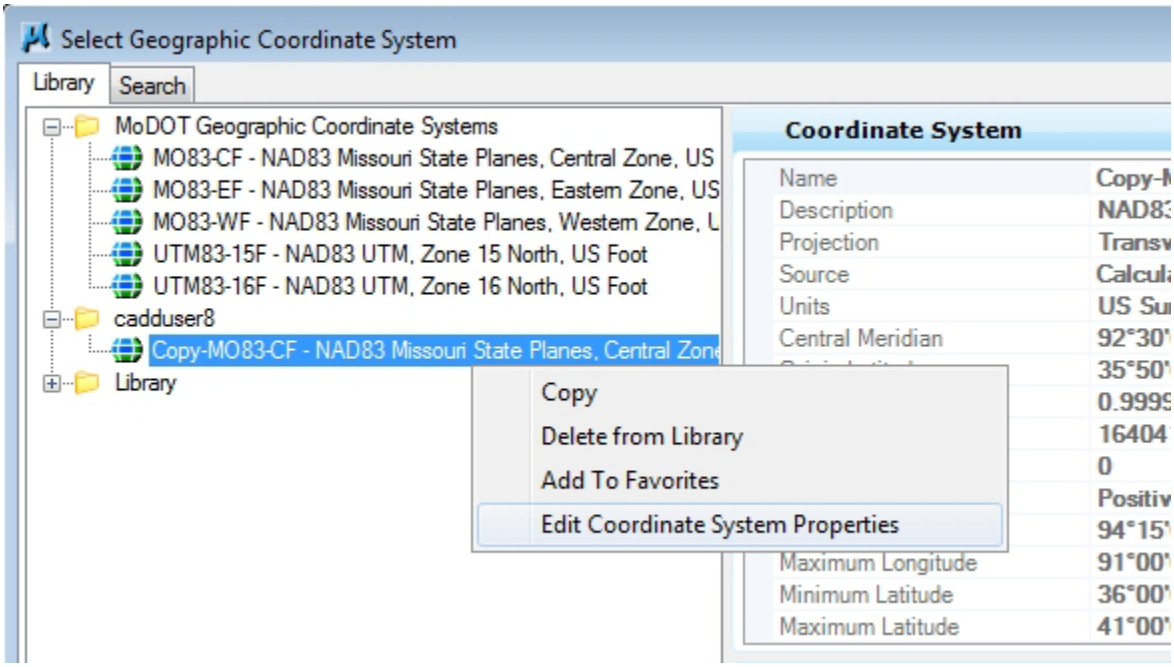
7. Under the **MoDOT Geographic Coordinate Systems** folder, right click over the **Central Zone** System and select the **Copy** option.

   Now right click over your **user id** folder ***(cadduser##)*** and **Paste** the coordinate system.

   This needs to be done so you can edit the coordinate system and apply the grid to ground factor for the project you are working on.



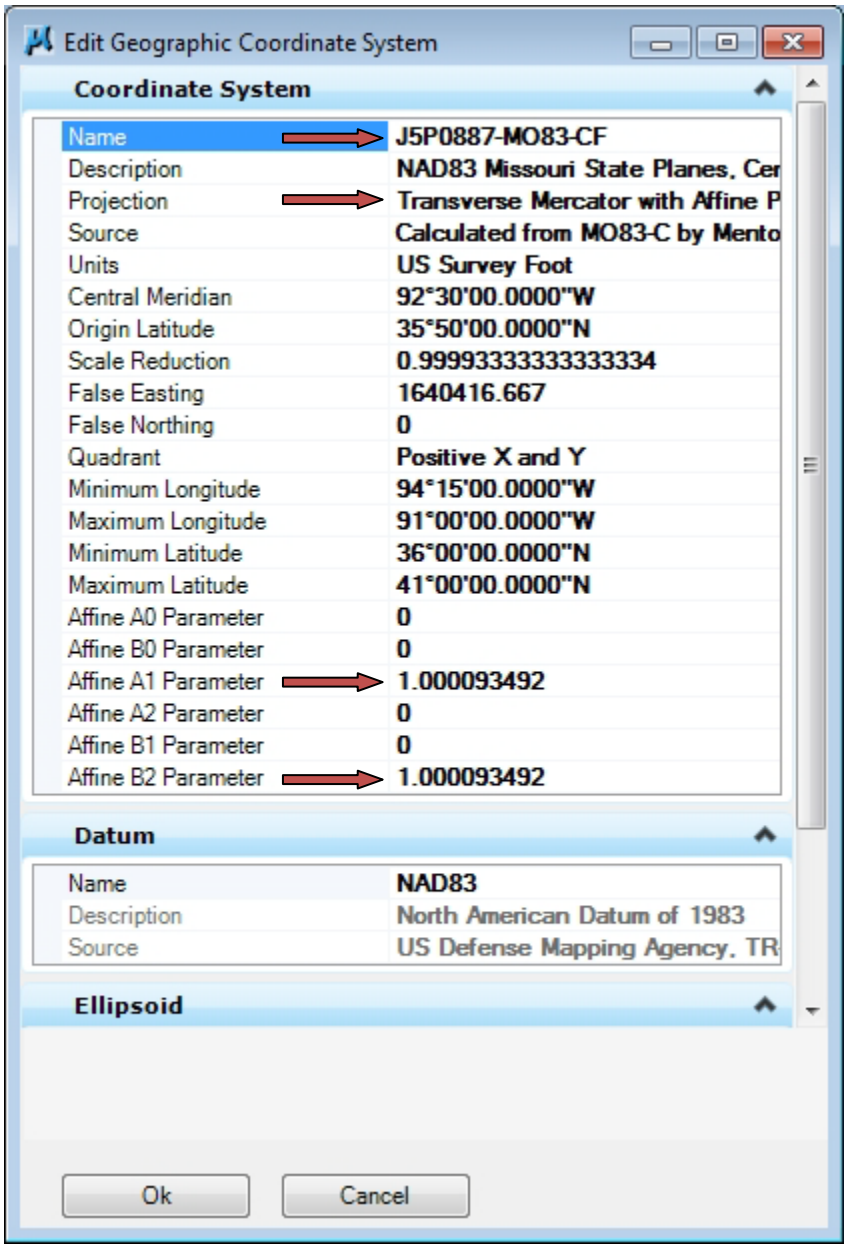
8. Right click over the coordinate system under the cadduser## folder and select the **Edit Coordinate System Properties** option.



9. In the **Edit Geographic Coordinate System** dialog, we will need to edit some items.

   Edit the following items:

   Name – whatever you wish to rename the system to
   Projection – Transverse Mercator to Transverse Mercator with Affine Processor
   Affine A1 Projector – input the grid to ground factor
   Affine B2 Projector – input the grid to ground factor

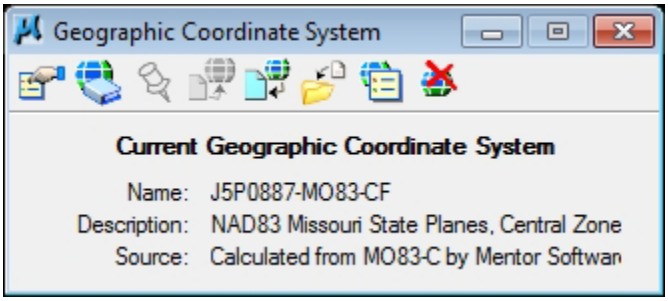


   Once those items have been edited, click **OK**.

10. You have now successfully created a custom geographic coordinate system that can be used on any dgn file.

    To apply the custom GCS, select the system and click **OK**.

    You will now see the GCS applied to the dgn file.



    Save the changes to the DGN file.

1.13 Example 1-2

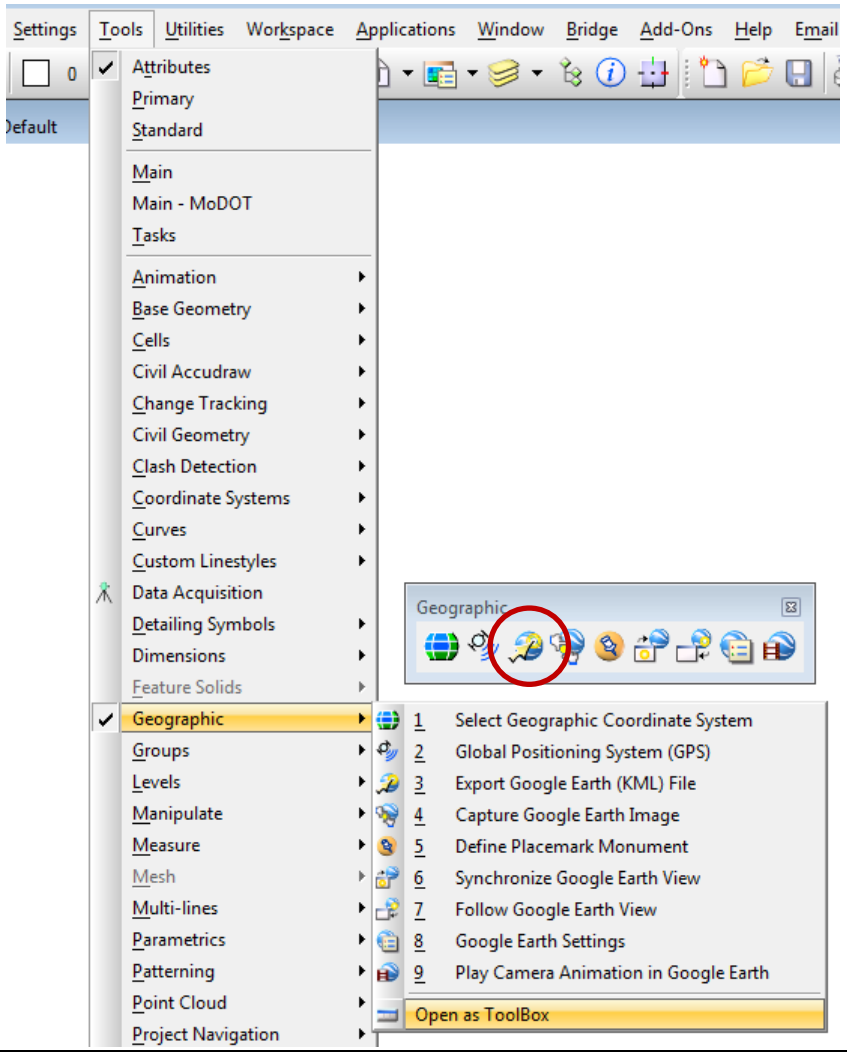
Once a coordinate system has been applied to a dgn file, you can use the Geographic tools in MicroStation to create a KML file which can be used in Google Earth to show the MicroStation geometry and graphics over the top of Google Earth imagery.

Note: Make sure Google Earth is installed on your machine prior to doing this operation.

1. In ProjectWise, open the following MicroStation file:

   pwname:\\MoDOT\Documents\District CADD\Design\cadduser##\J5P0887\Plan_J5P0887.dgn

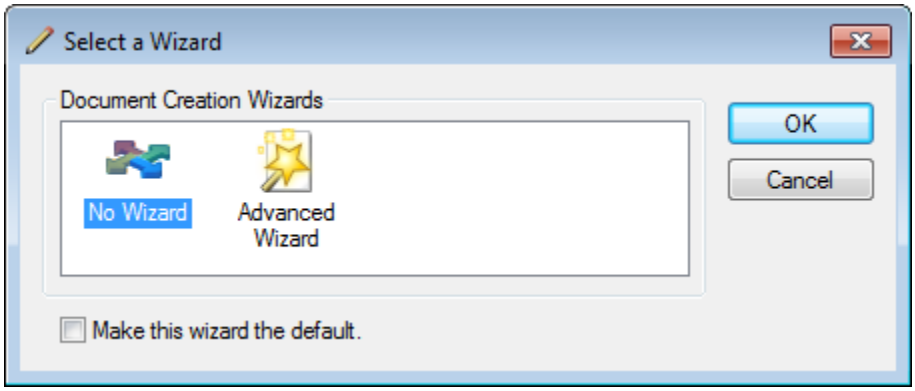
2. Load the **Geographics** tool box under ***Tools*** **>>** ***Geographic*** and select the **Export Google Earth (KML) File** tool.

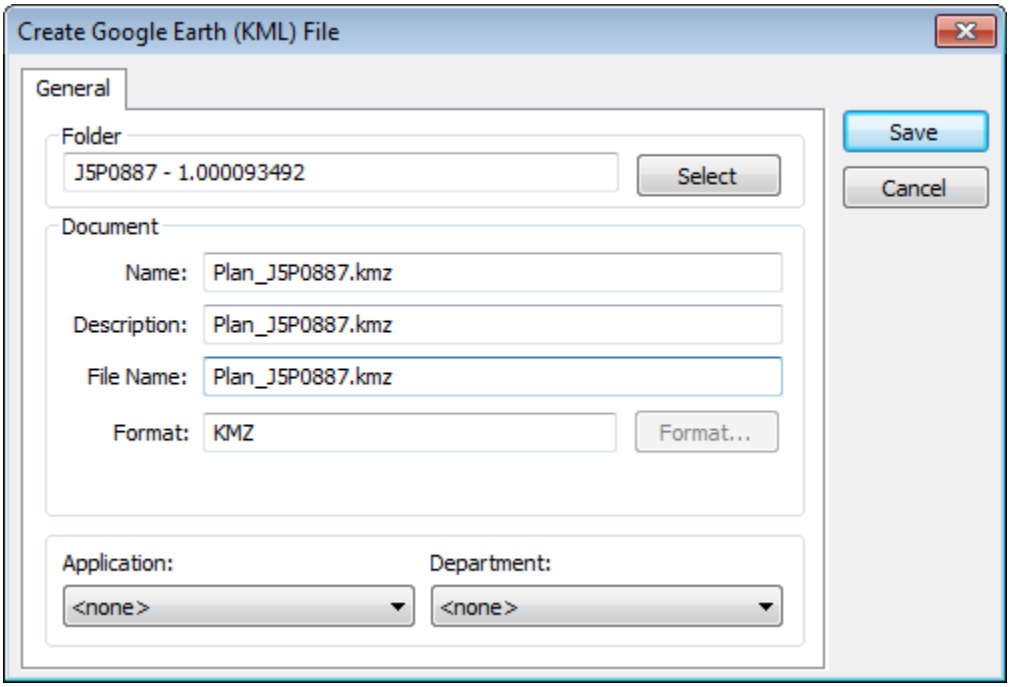


3. You can create the KML file inside or outside of Projectwise. We will store the file inside ProjectWise for this example.

   Note: You can always export the KML file out of ProjectWise if necessary.

   Select **No Wizard** and then store the KML file to the desired folder in ProjectWise. Make sure the Name and File Name are the same.





   Save the KML file.

4. Once you click the **Save** icon, ***leave the computer alone***.

   The conversion of the MicroStation file to a KML file may take a little time, depending on how large the microstation file is. When the KML is created, Google Earth will also open and zoom in to the area for the project according the view constraints of the MicroStation file.

Tips:

KML files can be used by anyone that has Google Earth install on their machine.

When using Google Earth tools, levels and reference files can be turned off/on in the KML file. This is similar to how geometry can be displayed or not displayed in a dgn file.

1.14 Exercise 1-1

Information about this project:

- MicroStation geometry was placed using Missouri State Plane coordinates
- Project is located in the Missouri State Plane "Central" Zone
- Projection factor (grid to ground) for this project is **1.0001086**

1. In ProjectWise, open the following MicroStation file:

   pwname:\\MoDOT\Documents\District CADD\Design\cadduser##\J5P0649\Plan_J5P0649.dgn

2. Since the **DTY** file is already created from the previous example, we don't need to through the steps of copying and renaming it.

   Go to the **Applications** pull down and activate **Bentley Map**. This needs to be done for us to be able to edit the geographic coordinate system (GCS) and apply the appropriate projection factor to it later on.

3. Load the **Geographics** tool box under ***Tools*** >> ***Geographic***.
   Choose the **Select Geographic Coordinate System** tool.

4. Click on the **From Library** option in the Geographic Coordinate System dialog.

5. Under the **MoDOT Geographic Coordinate Systems** folder, right click over the **Central Zone** System and select the **Copy** option.

   Now right click over your **user id** folder ***(cadduser##)*** and **Paste** the coordinate system.

   This needs to be done so you can edit the coordinate system and apply the grid to ground factor for the project you are working on.

6. Right click over the coordinate system under the cadduser## folder and select the **Edit Coordinate System Properties** option.

7. In the **Edit Geographic Coordinate System** dialog, we will need to edit some items.

   Edit the following items:
   Name – whatever you wish to rename the system to
   Projection – Transverse Mercator to Transverse Mercator with Affine Processor
   Affine A1 Projector – input the grid to ground factor
   Affine B2 Projector – input the grid to ground factor

   Once those items have been edited, click **OK**.

8. Apply the geographic coordinate system by selecting the system and click **OK**.

   You will now see the GCS applied to the dgn file.

   Save the changes to the DGN file.

9. Now we can go through the steps of creating the KML file so we can view MicroStation geometry in Google Earth.

   Load the **Geographics** tool box under ***Tools*** >> ***Geographic***.
   Select the **Export Google Earth (KML) File** tool.

10. Store the file inside ProjectWise for this exercise.

    (**Note:** You can always export the KML file out of ProjectWise if necessary.)

    Select **No Wizard** and then store the KML file to the desired folder in ProjectWise. Make sure the Name and File Name are the same.

    Save the KML file.

11. Once you click the **Save** icon, ***leave the computer alone*** and let MicroStation process the file over into a KML file.

    When the KML is created, Google Earth will open and zoom in to the area for the project according the view constraints of the MicroStation file.