OpenRoads Designer User Manual

U.S. Department of Transportation
Federal Highway Administration

Chapter 3

FILE CREATION

2021 R2 Update 10 – Version 10.10.21.04 – WorkSpace 10.10V
December 2022

Chapter 3 File Creation

This chapter covers the creation and setup of New ORD Files.

TABLE OF CONTENTS

3A – New ORD File Creation Flow Chart 3-2

3B – Create a New ORD File 3-3

3B.1 Create a New ORD File – Non-ProjectWise Users 3-3
3B.2 Create a New ORD File - ProjectWise Users..... 3-5
3B.3 The Seed File 3-8

3C – ORD File Naming Conventions 3-9

3C.1 WFLHD ORD File Naming Convention 3-9
3C.2 EFLHD ORD File Naming Convention 3-9
3C.3 CFLHD ORD File Naming Convention 3-10
3C.4 ORD File Types 3-10
3C.4.a Survey ORD Files 3-10
3C.4.b Design ORD Files..... 3-11
3C.4.c Plan Sheet ORD Files 3-12
3C.5 Functional Design Area Code 3-14

3D – Setup a New ORD File 3-15

3D.1 Set the Coordinate System 3-16
3D.2 Reference in the Survey ORD Files and Design ORD Files..... 3-20
3D.3 Activate the Existing Ground Terrain Model 3-21
3D.3.a Creation of the 3D Design Model after Terrain Model Activation..... 3-22

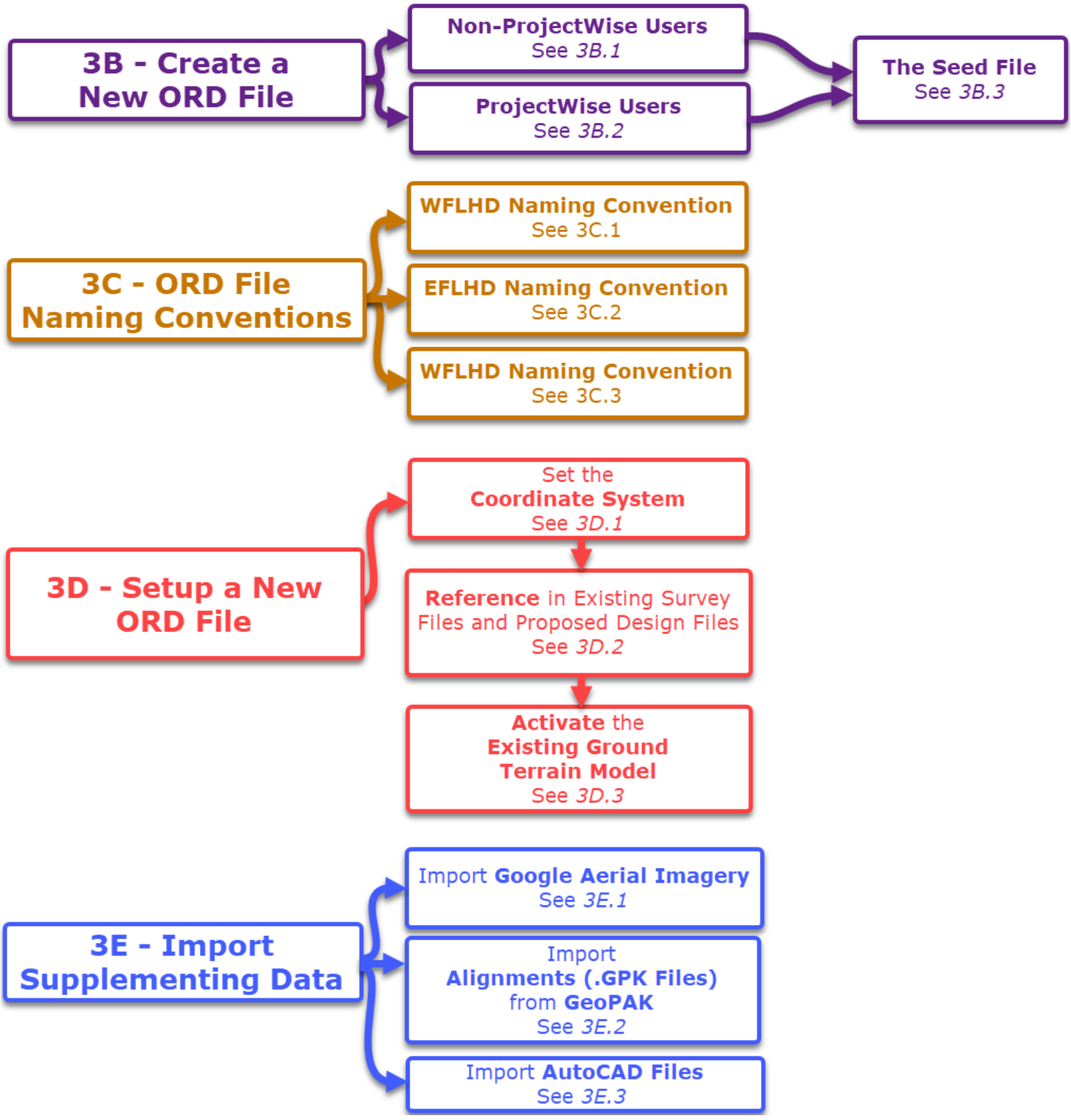
3E – Import Supplementing Data 3-23

3E.1 Import Google Earth Aerial Imagery 3-23
3E.2 Import Alignments (.GPK Files) Created in GEOPAK 3-33
3E.3 Import AutoCAD Files 3-35

3F – Naming Convention For Proposed ORD Features 3-36

3A – NEW ORD FILE CREATION FLOW CHART

This flowchart shows the processes involved for creating and setting up a new ORD File.



3B – CREATE A NEW ORD FILE

3B.1 Create a New ORD File – Non-ProjectWise Users

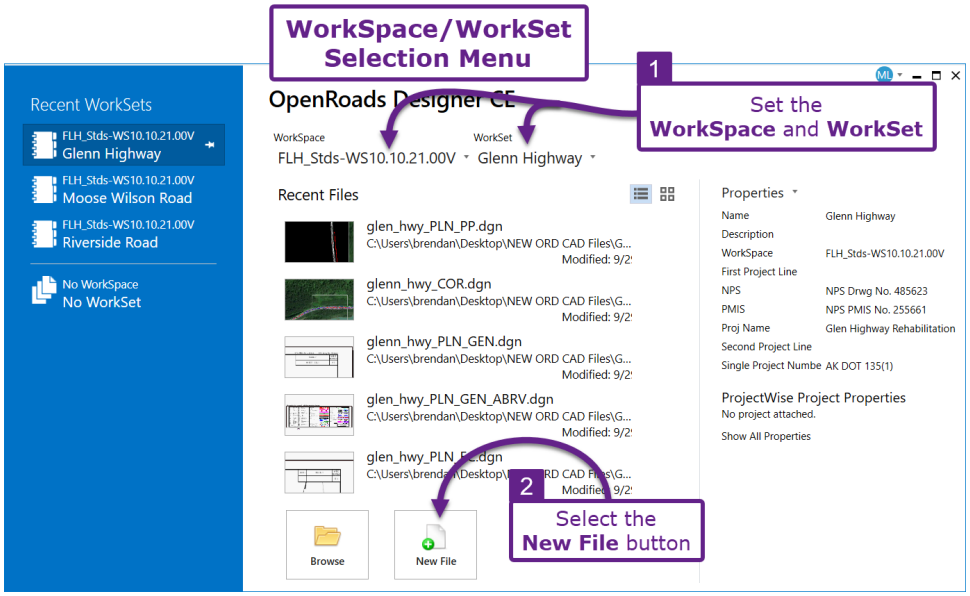
New ORD Files should be created from the **WorkSpace/WorkSet Menu.** Accessing the WorkSpace/WorkSet Menu is shown in *1A.1 Opening the Software and WorkSpace/WorkSet Menu*.

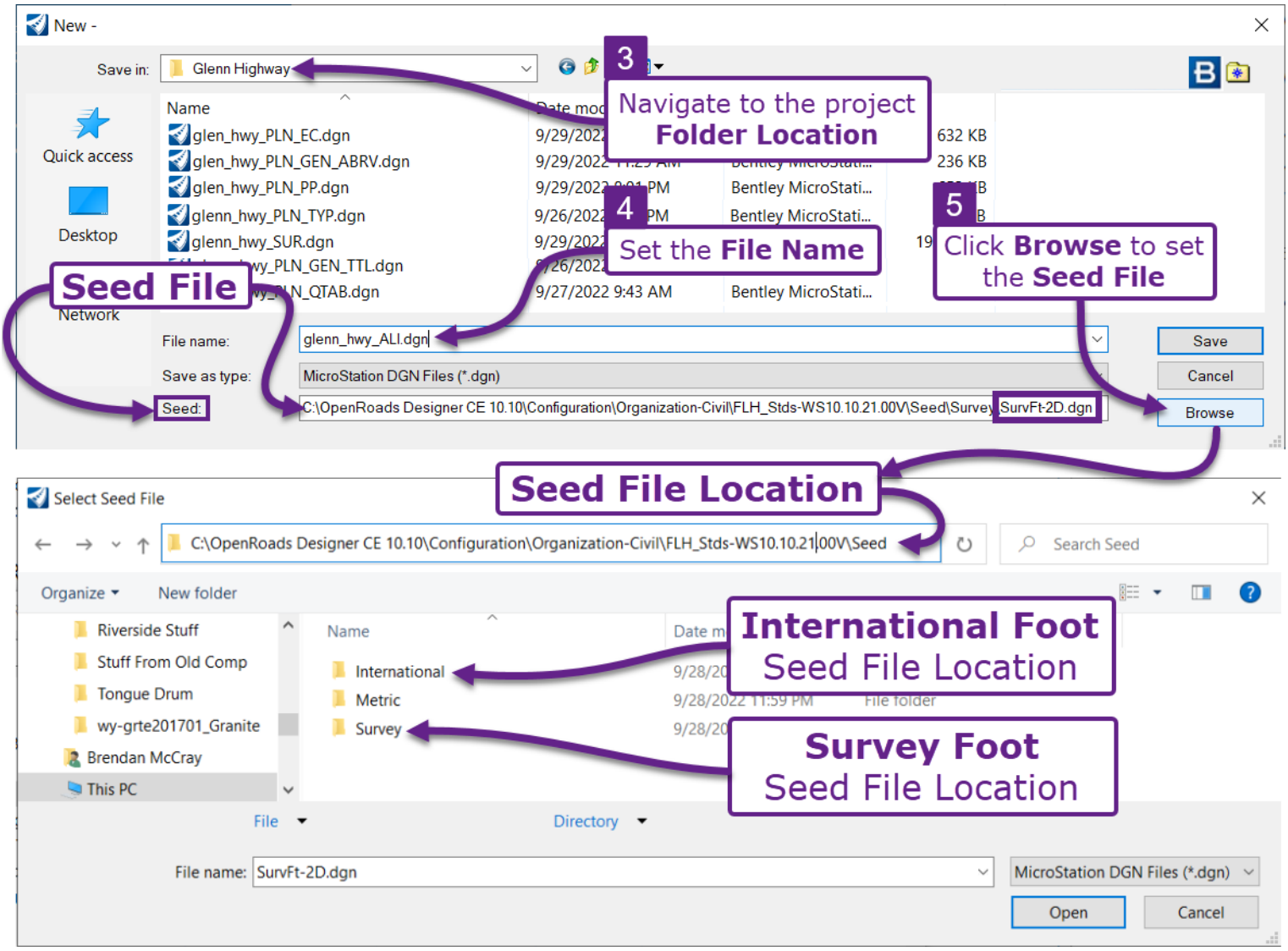
WARNING: The most important step in this procedure is setting the appropriate **Seed File** for the new ORD File, which is shown in step 5. The Seed File MUST correspond with the Survey Units used for the project (i.e., International Feet or Survey Feet). **If the WRONG Survey Units Seed File is used, then the NEW ORD File will NOT be in the correct geographic position. The Seed File CANNOT be changed after creation of an ORD File.**

Also, a Seed File can be 2D or 3D. If a 2D Seed File is selected, then the new ORD File will initially contain a *2D Design Model*. For a 2D Seed File, a *3D Design Model* is automatically created when the Existing Ground Terrain Model is *activated*. A 2D Seed File is appropriate for Corridor, 3D modeling, and conventional drafting applications because it can accommodate both 2D and 3D elements. In MOST situations a 2D Seed File should be selected.

If a 3D Seed File is used, then the ORD File initially contains a *3D Design Model*. Consequently, 2D (horizontal) drafting CANNOT be performed with a 3D Seed File. The 3D Seed File is very seldomly used. For more information on the Seed File, see *3B.3 The Seed File*.

1	Open the **WorkSpace/WorkSet Menu**. Ensure the **FLH WorkSpace** is shown in the WorkSpace drop-down. Expand the WorkSet drop-down and select the **project WorkSpace** to which the new ORD File should be assigned to. ***NOTE:*** If the project WorkSpace is NOT shown in the WorkSet drop-down, then create it using the process shown in *2D – Create a Project WorkSet – Non-ProjectWise Users*. ***NOTE:*** A new ORD File can also be created by selecting **File > New**. If this method is used, then the new ORD File is automatically assigned to the active WorkSpace and WorkSet. For more information on the WorkSpace and WorkSet, see *2B – Introduction to the WorkSpace and WorkSet*.
2	Select the **New File** button.





3	Navigate to the project **Folder Location** for placement of the new ORD File.
4	Assign the new ORD File a **File Name.** ***IMPORTANT:*** ORD Files MUST be named in accordance with the agency's **File Naming Convention**. See *3C – ORD File Naming Conventions*.
5	Assign the new ORD File the appropriate **Seed File.** See the ***WARNING*** on the previous page and *3B.3 The Seed File*. The *Seed File* must correspond to the project **Survey Units** (Survey Feet or International Feet). In most situations, a **2D Seed File** is used. Click **Browse** to navigate to the Seed File folder location. Seed Files are found in the **FLH WorkSpace**, in the following file location: C:\OpenRoads Designer CE 10.10\Configuration\Organization-Civil\FLH_Stds-WS10.10.21.00V\Seed\
6	Push the **Save** button to create the new ORD File.

3B.2 Create a New ORD File - ProjectWise Users

IMPORTANT: Before creating a new ORD File, ensure that that ORD Software is logged in and connected to ProjectWise server. See *2C - Working In and Outside Of ProjectWise*.

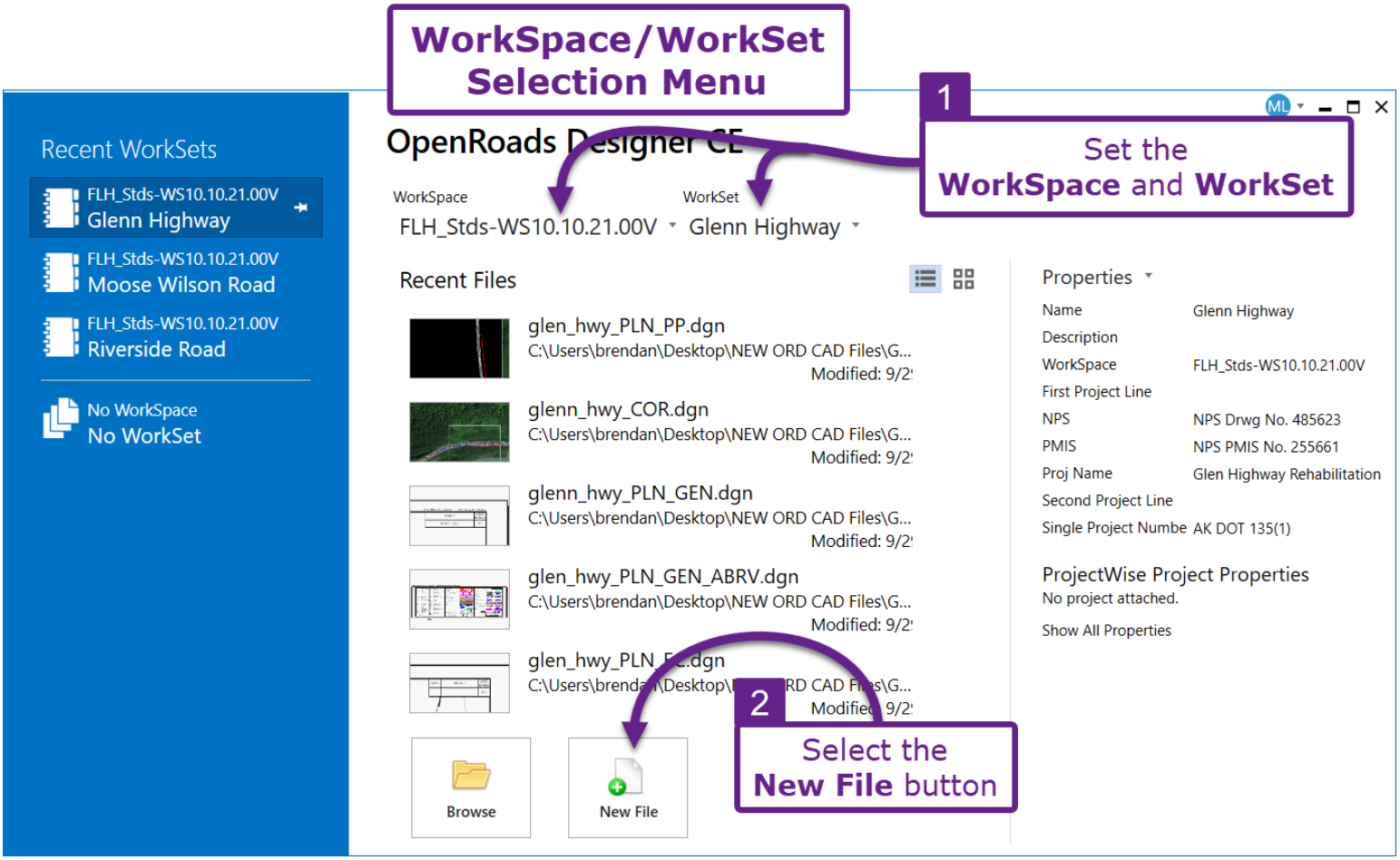
New ORD Files should be created from the **WorkSpace/WorkSet Menu.** Accessing the WorkSpace/WorkSet Menu is shown in *1A.1 Opening the Software and WorkSpace/WorkSet Menu*.

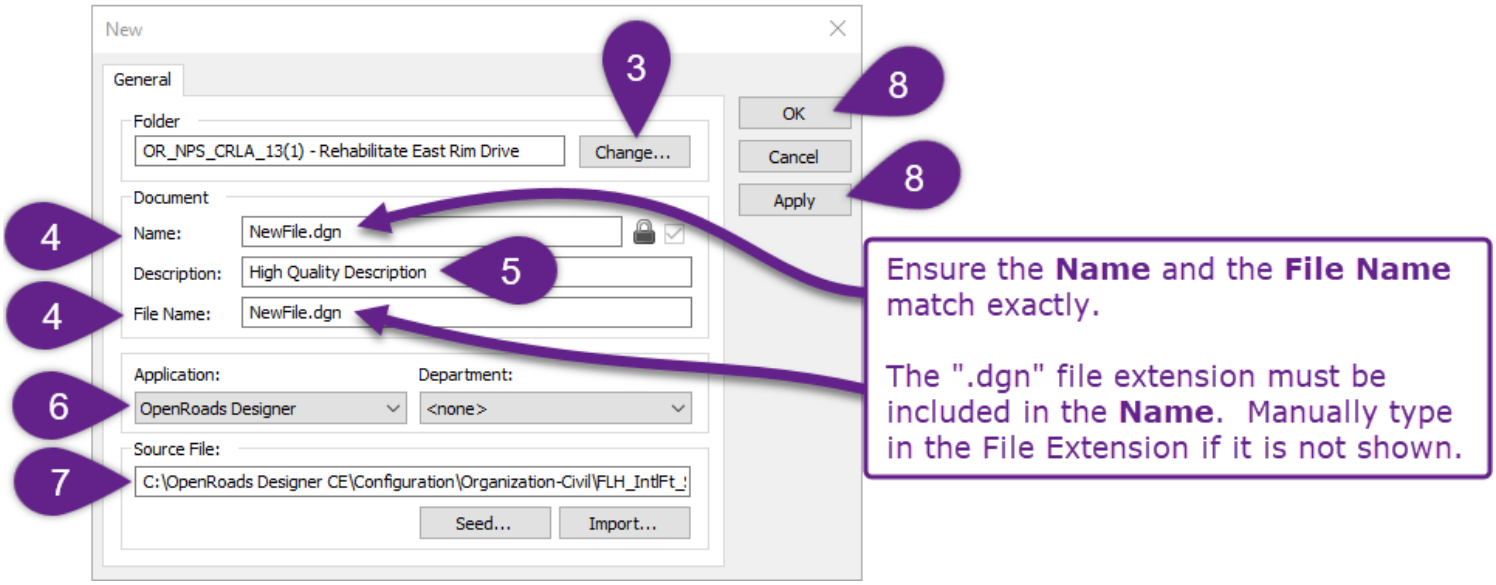
WARNING: The most important step in this procedure is setting the appropriate **Seed File (Source File)** for the new ORD File, which is shown in step 7. The Seed File MUST correspond with the Survey Units used for the project (i.e., International Feet or Survey Feet). **If the WRONG Survey Units Seed File is used, then the NEW ORD File will NOT be located in the correct geographic position. The Seed File CANNOT be changed after creation of an ORD File**

Also, a Seed File can be 2D or 3D. If a 2D Seed File is selected, then the new ORD File will initially contain a *2D Design Model* . For a 2D Seed File, a *3D Design Model* is automatically created when the Existing Ground Terrain Model is *activated*. A 2D Seed File is appropriate for Corridor, 3D modeling, and conventional drafting applications because it can accommodate both 2D and 3D elements. In MOST situations a 2D Seed File should be selected.

If a 3D Seed File is used, then the ORD File initially contains a *3D Design Model* . Consequently, 2D (horizontal) drafting CANNOT be performed with a 3D Seed File. The 3D Seed File is very seldomly used. For more information on the Seed File, see *3B.3 The Seed File*.

1	Open the **WorkSpace/WorkSet Menu**. Ensure the **FLH WorkSpace** is shown in the WorkSpace drop-down. Expand the WorkSet drop-down and select the **project WorkSpace** to which the new ORD File should be assigned to. ***NOTE:*** If the project WorkSpace is NOT shown in the WorkSet drop-down, then contact the Engineering System manager. ***NOTE:*** A new ORD File can also be created by selecting **File > New**. If this method is used, then the new ORD File is automatically assigned to the active WorkSpace and WorkSet. For more information on the WorkSpace and WorkSet, see *2B – Introduction to the WorkSpace and WorkSet*.
2	Select the **New File** button.





3	Assign the new ORD File to the appropriate Project *Folder*. Push the **Change...** button and navigate to the project folder.
4	Assign the new ORD File an appropriate **Name** and **File Name**. ***WARNING:*** The **Name** and **File Name** must exactly match. In the **Name** text box, the User is required to manually type in the ".dgn" file extension. ***IMPORTANT:*** ORD Files MUST be named in accordance with the agency's File Naming Convention. See *3C – ORD File Naming Conventions*.
5	Assign the new ORD File a **Description**. A brief Description will help other Users understand the contents of the ORD File. A Description for an ORD File named "id- a436805_hyd.dgn" that pertains to proposed culverts may be: "Alignments and profiles for all proposed culverts in the project."
6	Ensure the **Application** is set to "OpenRoads Designer. ***NOTE:*** The **Department** drop-down is not utilized. Ensure the **Department** is set to "<none>".
7	The **Source File** represent the **Seed File** too be used. By default, the Seed File is set to a 2D Seed File of the appropriate Survey Unit (i.e., Survey Feet or International Feet. The **Source File** only needs to be changed if the **3D Seed File** is to be used. For more information on the Seed File, see *3B.3 The Seed File*. If the **3D Seed File** needs to be used, manually alter the **Source File** text. Highlight the "2" in the **Source File** text, and replace it with a "3". For example, manually change: …Configuration\Organization-Civil\FLH_SurvFt_Standards-WS5.1V\Seed\SurvFt-**2**D.dgn to …Configuration\Organization-Civil\FLH_SurvFt_Standards-WS5.1V\Seed\SurvFt-**3**D.dgn
8	Push the **Apply** button. Push the **OK** button to create the new ORD File.

3B.3 The Seed File

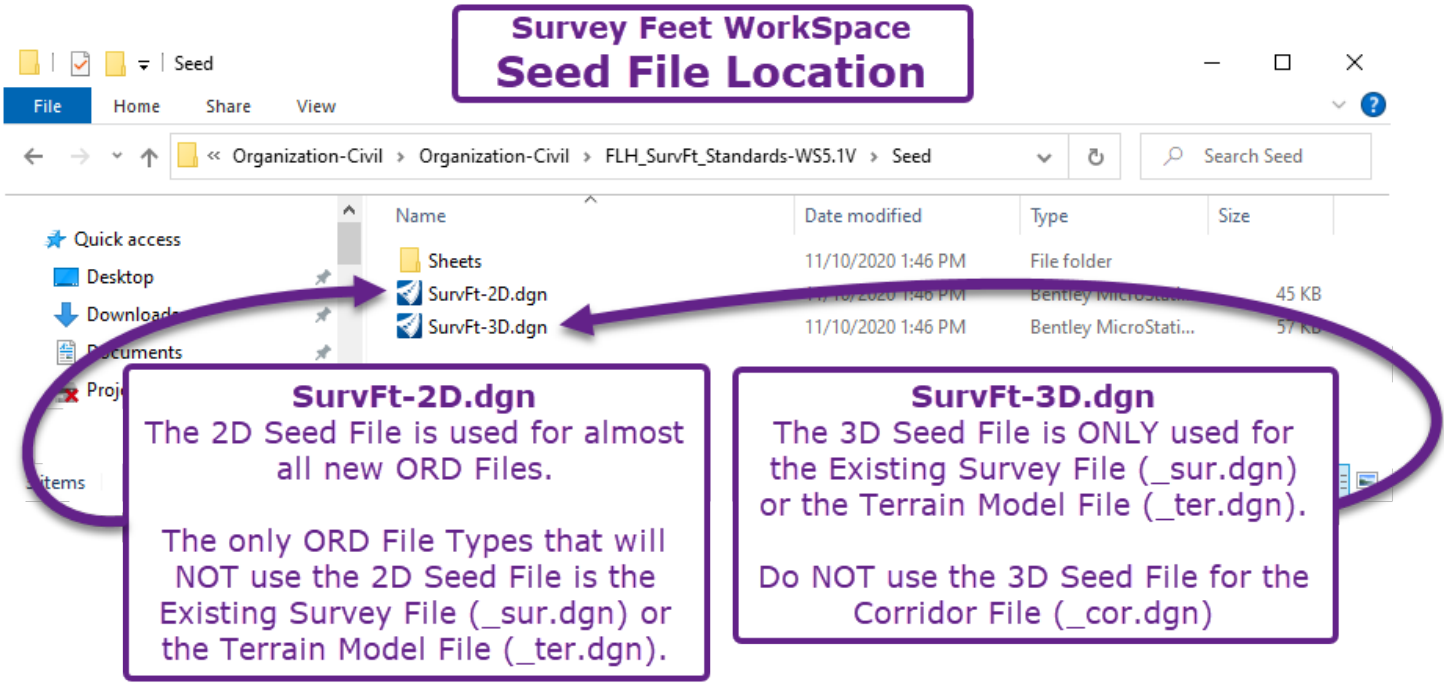
New ORD Files need to be created using the appropriate *Seed File*. A *Seed File* is a blank drawing that contains pre-configured geo-spatial settings relating to the project Survey Units (i.e., International Feet or Survey Feet).

Two factors influence the selection of the appropriate Seed File for a new ORD File:

1. The **Survey Units** used for the project. The **Survey Units** is either **Survey Feet** or **International Feet**. International Feet units are used in Arizona, Michigan, Montana, North Dakota, Oregon, and South Carolina. All other states use **Survey Feet.**

2. **2D or 3D Seed Files**. If a **2D Seed File** is used, then the ORD File initially contains a *2D Design Model* . If a **3D Seed File** is used, then ORD File initially contains a *3D Design Model* .

NOTE: 3D Seed Files are ONLY used for a few tasks, such as creating the Survey ORD File and the Proposed Terrain Model ORD File (see *Chapter 22 – Proposed Terrain Model Creation*). 2D Seed Files are used for all other ORD File Types. When in doubt, use the 2D Seed File. The appropriate 2D or 3D Seed File for all ORD File Types is listed in *3C.4 ORD File Types*.



Seed Files are located in the FLH WorkSpace in the following location:

…\OpenRoads Designer CE 10.10\Configuration\Organization-Civil\FLH_Stds-WS10.10.21.00V\Seed\

WARNING: The Seed File can only be specified during the File Creation process. Once an ORD File is created, the Seed File CANNOT be exchanged. If the incorrect Seed File is used, the geometric elements within ORD File will not align with the project survey Coordinate System – resulting in an ORD File that is NOT geo-referenced. **If the Seed File is set to the incorrect Survey Units, then the ORD File should be deleted.**

3C – ORD FILE NAMING CONVENTIONS

3C.1 WFLHD ORD File Naming Convention

The format for the WFL ORD File Naming Convention is:

Project Specific Prefix + ***File Type Suffix*** + ***Extension.***

Example Project File Name: *id-a2158061_pln_pp.dgn*

[Project Specific Prefix]	***_***	***[File Type Suffix]***	***.***	***[Extension]***
[id-a21158061]		[pln_pp]		[dgn]

Project Specific Prefix: The Project Specific Prefix for active WFLHD projects can be looked up on the FLH Website: https://highways.dot.gov/federal-lands/design/plan-prep-wfl-naming/active-project-prefixes

File Type Suffix: The File Type Suffix is determined by the ***ORD File Type*** (See *3C.4 ORD File Types*) and the ***Functional Design Area Code*** (See *3C.5 Functional Design Area Code*).

Extensions: The file extension corresponds to the software used to create a Project File. ORD Files have a [.dgn] file extension. Do NOT change the default file extension (i.e. DGN, DOCX, XSLX, or PDF).

3C.2 EFLHD ORD File Naming Convention

The format for the EFL ORD File Naming Convention is:
Section Number Descriptor + ***Project Number*** + ***File Type Suffix*** + ***Extension***.

Example Project File Name: *01_GRSM_126_MillCrk_pln_pp.dgn*

[Section Number Descriptor]	***_***	***[Project Number]***	***_***	***[File Type Suffix]***	***.***	***[Extension]***
[01]		[GRSM_126_MillCrk]		[pln_pp]		[dgn]

Section Number Descriptors: Represents the functional discipline of the ORD File. See the table to the right.

Project Number: The Project Number is the unique code assigned to all EFLHD projects.

File Type Suffix: The File Type Suffix is determined by the ***ORD File Type*** (See *3C.4 ORD File Types*)

Extensions: The file extension corresponds to the software used to create a Project File. ORD Files have a [.dgn] file extension. Do NOT change the default file extension (i.e. DGN, XSLX, or PDF).

EFL Section Number Descriptor	
Descriptor	**Discipline**
01	Highway Design
02	Survey
03	Hydraulics
04	Safety/Environmental
05	Geotechnical
06	Traffic/Pavement
07	Bridge
08	Construction
09	A&E (Consultant)

3C.3 CFLHD ORD File Naming Convention

(Place Holder)

3C.4 ORD File Types

In general, there are three ORD File Types that are used in a project:

- ***Survey* ORD Files** (See *3C.4.a*)
- ***Design* ORD Files** (See *3C.4.b*)
- ***Plan Sheet* ORD Files** (See *3C.4.c*)

For a visual representation of Project Organization and the Referencing interaction between ORD File Types – see *2F.1 Project Organization and Referencing Map for ORD Files*.

3C.4.a Survey ORD Files

Survey ORD Files contain the existing survey features, linework, and the Existing Ground Terrain Model.

Survey ORD Files are *referenced* into Design ORD Files and Plan Sheet ORD Files. Elements in the Survey ORD File should ONLY be modified by the Survey Department.

For more information on the Existing Survey File, see *Chapter 5 – Survey Process and Terrain ORD File Development*.

Existing Survey File Naming			
File Type	**File Suffix**	**Purpose and Contents**	**Seed File**
Survey	_sur.dgn	Existing survey terrain model and planimetric linework. Includes existing utilities, signage, and contours. Also includes surveyed points and break lines.	3D
Right of Way	e_row.dgn	Existing Right of Way linework. Includes Boundaries, Parcels, Section, Township and Range.	2D

3C.4.b Design ORD Files

Design ORD Files contain proposed design elements such as alignments, profiles, corridors, superelevation, cross-sections, quantities calculations, proposed terrain models, and 2D/3D linework.

Design ORD Files should NOT be used to create Plan Sheets. Instead, Design ORD Files should be referenced into Plan Sheets ORD Files.

WFLHD Users*:* Design ORD Files can be further classified by a *Functional Design Area* Code. The Functional Design Area Code pertains to the discipline (i.e., hydraulics, bridges) that the ORD File is used for. See *3C.5 Functional Design Area Code*.

Proposed Design File Naming			
File Type	**File Suffix**	**Purpose and Contents**	**Seed File**
Alignments	_ali.dgn	Proposed alignment and profiles. Contains the proposed mainline alignment and profile. Typically contains stationing and curve data annotations.	2D
Corridor	_cor.dgn	Proposed corridor modeling file. Contains proposed corridor model used to create cross sections. Also includes proposed linework – including edge of road and slope stakes (cut/fill).	2D
Civil Cell and Intersections	_cvc.dgn	Civil Cells, intersections, and approach road models to supplement the proposed corridor model (_cor.dgn). Contains proposed intersection alignments, profiles, and corridors models.	2D
Superelevation	_sup.dgn	Superelevation File Contains superelevation elements and calculations that are applied to the proposed corridor model (_cor.dgn)	2D
Cross Sections	_xs.dgn	Cross Section File. Contains cross section *Named Boundaries* and *Sheet Models*. Used to create Road Cross Section Sheets.	2D
Quantities	_qty.dgn	Quantity and Earthwork calculation file. Contains Named Boundaries for *Element Component* quantity calculations. Also contains *Cut and Fill Meshes* for earthwork calculations.	2D
Proposed Right of Way	_p_row.dgn	Proposed Right-of-Way file. Contains linework for the Proposed Right of Way.	2D

3C.4.c Plan Sheet ORD Files

Plan Sheet ORD Files are used to create bordered Plan Sheets (*Sheet Models*) that will be incorporated into the Plan Set.

All Plans Sheets ORD Files contain "***_pln***" included in the File Name. Example Plan Sheet ORD File name:

*id-a2158061**_pln**_pp.dgn* OR *ak-r-izm7050901**_pln**_typ.dgn*

WFLHD Users*: Plan Sheet ORD Files* can be further classified according to the *Functional Design Area Code.* See *3C.5 Functional Design Area Code*.

BEST PRACTICES: Do NOT draw or place design elements in a Plan Sheet ORD File. The exception to this convention is the Typical Section file and files that show details. Linework elements used to create Typical Sections graphics are NOT referenced into other ORD Files. In general, if design or linework elements are to be referenced into other ORD Files, then a Design ORD File should be created.

Plan Sheet ORD Files should NOT be referenced into Design ORD Files or other Plan Sheet ORD Files.

Plan Sheet File Naming		
File Type	**File Suffix**	**Purpose and Contents**
General	_gen.dgn	Plan Sheets to create the *General Information* of a Plan Set. Typically includes the Title Sheet, Sheet Index, Vicinity Maps, and Material Sources. ***NOTE:*** All general sheets can be created in a single ORD file.
Typical Section	_typ.dgn	Plan Sheets to create the *Typical Sections* of a Plan Set. Linework for roadway typical section schematics are drawn in this ORD File.
Plan and Profile **or** **Plan and Plan**	_pp.dgn	Plan Sheets to create *Plan & Profile* or *Plan & Plan* sections in a Plan Set. Contains plan and profile drawing and sheet models. Also contains **Profile Annotations** including vertical curve labels, and grids lines. May also be used to create Plan and Profile sheets for intersections/approaches OR Plan and profile sheets needed for other functional areas.
Quantity Tabulation	_qtab.dgn	Plan Sheets to create the *Tabulation of [Plan Set Section] Quantities* sheets that may serve as the first sheet of a Section.
Erosion Control	_ec.dgn	Plan or Plan/Plan Sheets to create the *Soil Erosions and Sediment Control* Section of a Plan Set. Used to create linework for Erosion Control features - such as silt fence
Drainage Details	_hy.dgn	Plan Sheets to show Tables and create details found in the *Drainage Section* of a Plan Set.
Temporary Traffic Control	_ttc.dgn	Plan Sheets to create the *Temporary Traffic Control* Section of a Plan Set. Also used to create Temporary Traffic Control schematics, maps, line graphs, and linework.

Plan Sheet File Naming		
File Type	**File Suffix**	**Purpose and Contents**
Permanent Traffic Control	_ptc.dgn	Plan Sheets to create the *Permeant Traffic Control* Section of a Plan Set. Also used to create linework pertaining to proposed Permeant Traffic Control features – such as striping and signage.
Right of Way	_rw.dgn	Plan Sheets to create the *Right of Way* Plan Sets and Exhibits. ***NOTE:*** Proposed Right of Way linework is created in the _p_row Proposed Design File.
Landscaping	_lscp.dgn	Plan Sheets to create the *Landscaping* Section of a Plan Set. Also used to create linework and graphics pertaining to proposed landscaping features.
Miscellaneous	_misc.dgn	Plan Sheets to create the *Miscellaneous Details* Section of a Plan Set.
Wall	_wall.dgn	Plan Sheets to create the *Retaining Walls* Section of a Plan Set. May contain plan and profile drawing and sheet models for the proposed Wall Design. ***BEST PRACTICE:*** Create linework and models for retaining walls in a Proposed Design File.
Staging	_stage.dgn	Plan Sheets to create the *Staging* Section of a Plan Set. Also used to create linework pertaining to Staging features.
Demolition	_demo.dgn	Plan Sheets to create the *Demolition* Section of a Plan Set. Also used to create linework associated with existing feature removal and demolition.
Utilities	_ut_ [type].dgn	Plan Sheets to create the *Utilities* Sections Exhibits. An additional description should be used to denotate the utility type. An example for a utility plan showing fiber optic cable would be - *ut_fiber.dgn*
Standard Details	157-7	Standard Detail to be incorporated throughout a Plan Set. Standard Detail file names should not be changed.

3C.5 Functional Design Area Code

A *Functional Code* is used to further organize ORD Files by *Functional Area* or engineering discipline. The ***Functional Code*** is placed between the ***Project Specific Prefix*** and ***File Type Suffix***

An example *Proposed Design* File Name using a *Functional Code* may look like:

id-a2158061_geo_cor.dgn

[Project Specific Prefix]	***_***	***[Functional Code]***	***_***	***[File Type Suffix]***	***.***	***[Extension]***
[id-a21158061]		[geo]		[cor]		[dgn]

The "geo" functional code is used for *Geotechnical* design. For example, a retaining wall design would be placed in an ORD File with the "geo" functional code specified in the file name.

An example *Plan Sheet* File Name using a *Functional Code* may look like: *id-a2158061_hyd_pln_pp.dgn*

[Project Specific Prefix]	***_***	***[Functional Code]***	***_***	***[File Type Suffix]***	***.***	***[Extension]***
[id-a21158061]		[hyd]		[pln_pp]		[dgn]

The 'hyd" functional code is used for *Hydraulics* plan sheet production.

NOTE: Functional Codes are not required for the Highway Design functional area. If a functional code is NOT included in the file name, then the Highway Design functional area is assumed.

Functional Codes for File Names	
Code	**Functional Area**
(blank)	Highway Design and general use is implied by lack of Functional Code
_hyd	Hydraulics
_sur	Survey
_brd	Bridge
_geo	Geotechnical
_rw	Right of Way
_utl	Utilities

3D – SETUP A NEW ORD FILE

After creating an ORD File, the following three procedures should be performed immediately:

1. Assign the new ORD File to the appropriate **Coordinate System** (See *3D.1 Set the Coordinate System*) for ORD Files that need to be geo-referenced.

   NOTE: ORD Files used for detail drafting and typical sections do NOT require the Coordinate System to be set. In general, the Coordinate System must be set to ensure the ORD File is placed in the correct geographical location.

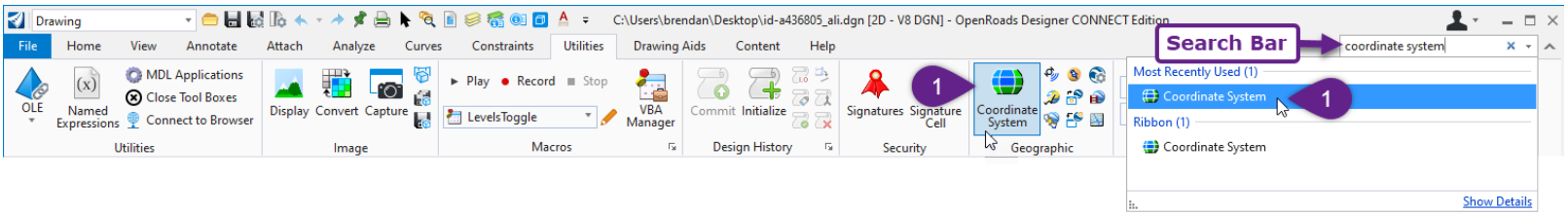
2. **Reference** the Survey ORD File and necessary Design ORD Files (See *3D.2 Reference in the Survey ORD Files and Design ORD File*).

3. **Activate** the Existing Ground Terrain Model (See *3D.3 Activate the Existing Ground Terran Model*)

3D.1 Set the Coordinate System

Before drafting or referencing other ORD Files into the new ORD File, set the project Coordinate System.

WARNING: The correct project Coordinate System needs to be selected in order for the graphical elements in the ORD File to be geo-referenced. If the appropriate Coordinate System is NOT set, then the ORD File will be in the wrong geographical location. If unsure about the Coordinate System, then locate the **Survey Information Cell** shown in the Survey ORD File. The Survey Information Cell is discussed in *5A.2 Review the Survey ORD File before Designing*.



1	From the Ribbon, select the *Coordinate System* tool: [***OpenRoads Modeling*** → ***Utilities*** → ***Geographic***]. ***TIP:*** Alternatively, access the *Coordinate System* tool through the **Search Bar** in the upper-right corner. In the Search Bar, type in in "Coordinate System".

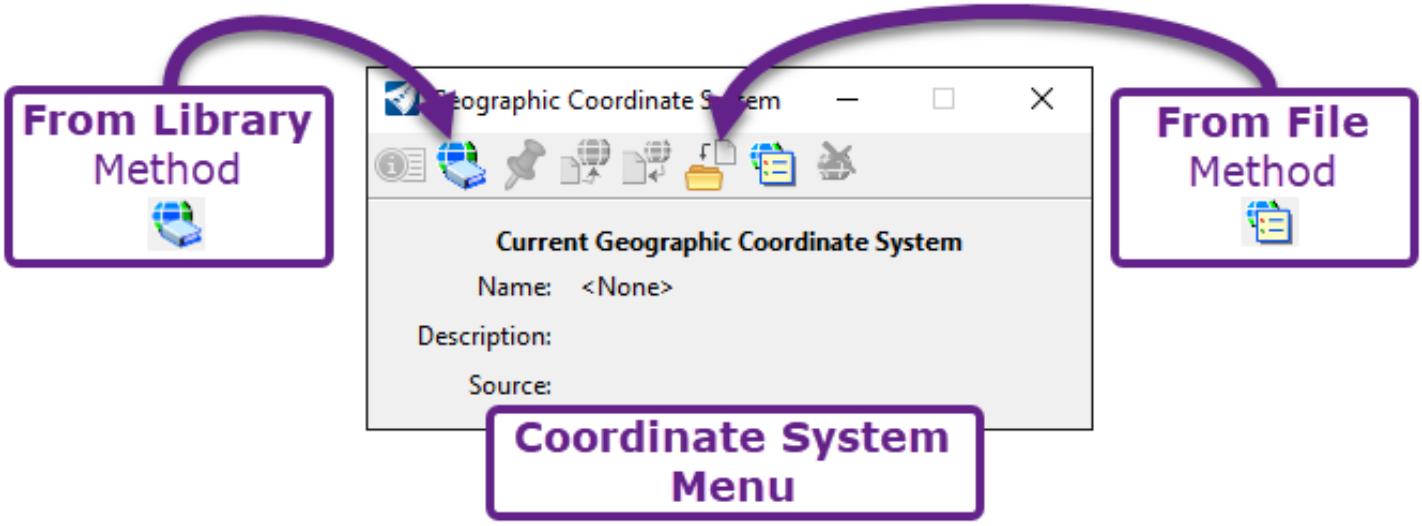
Within the *Coordinate System* tool, there are two methods for setting the project Coordinate System:

1. **From Library** – The project Coordinate System is selected from an extensive list of Coordinate Systems that are used around the world.

2. **From File –** The project Coordinate System is automatically matched from a different ORD File – such as the Survey ORD File.

BEST PRACTICE: Typically, the Survey ORD File is created before other files in the project are created. The Survey File should be set to the correct project Coordinate System. Use the **From File** method in and select the Survey File to set the Coordinate System for a new ORD File.

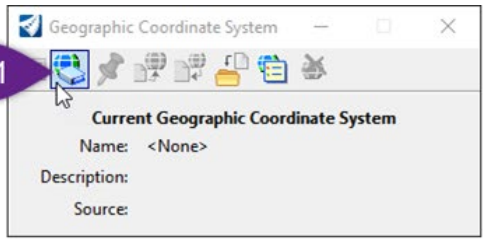
The **From Library** method should only be used when absolutely necessary. The **From Library** contains a list of hundreds of coordinate systems – many of which look identical but are actually slightly different. The **From File** method eliminates the risk of mistakenly selecting the wrong coordinate system.

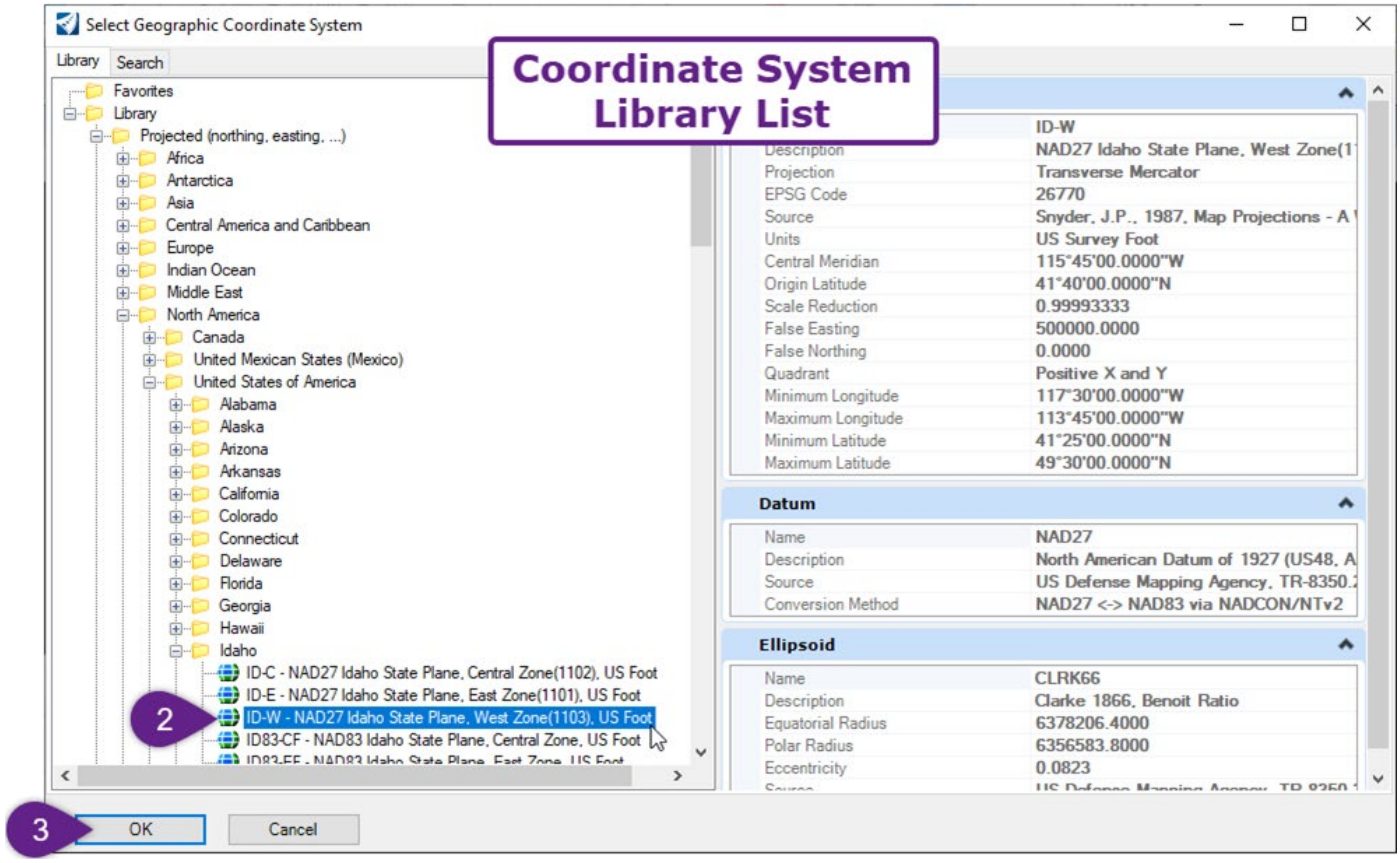


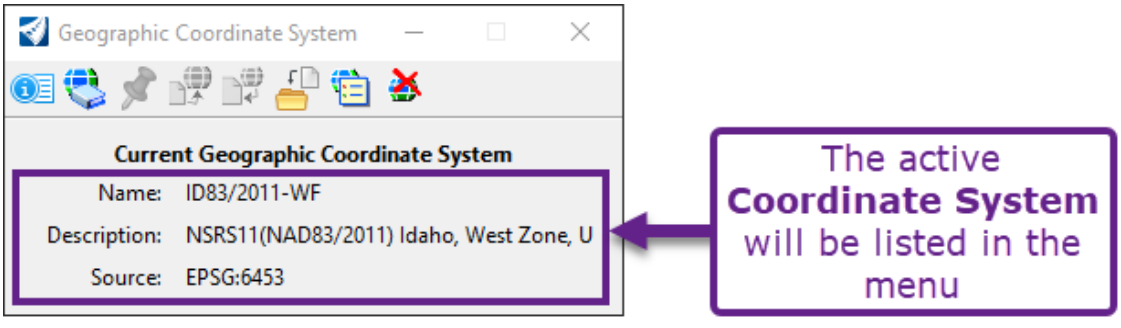
From Library method:

1	In the Coordinate System Menu, select the **From Library** button.
2	In the Library List, navigate to and select the project Coordinate System.
3	Select the OK button.

TIP: The project Coordinate System is specified in the Survey Information Cell found in the Survey ORD File. See *5A.2 Review the Survey ORD File before Designing*.

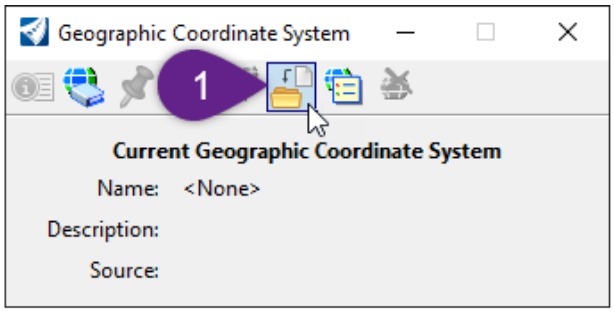


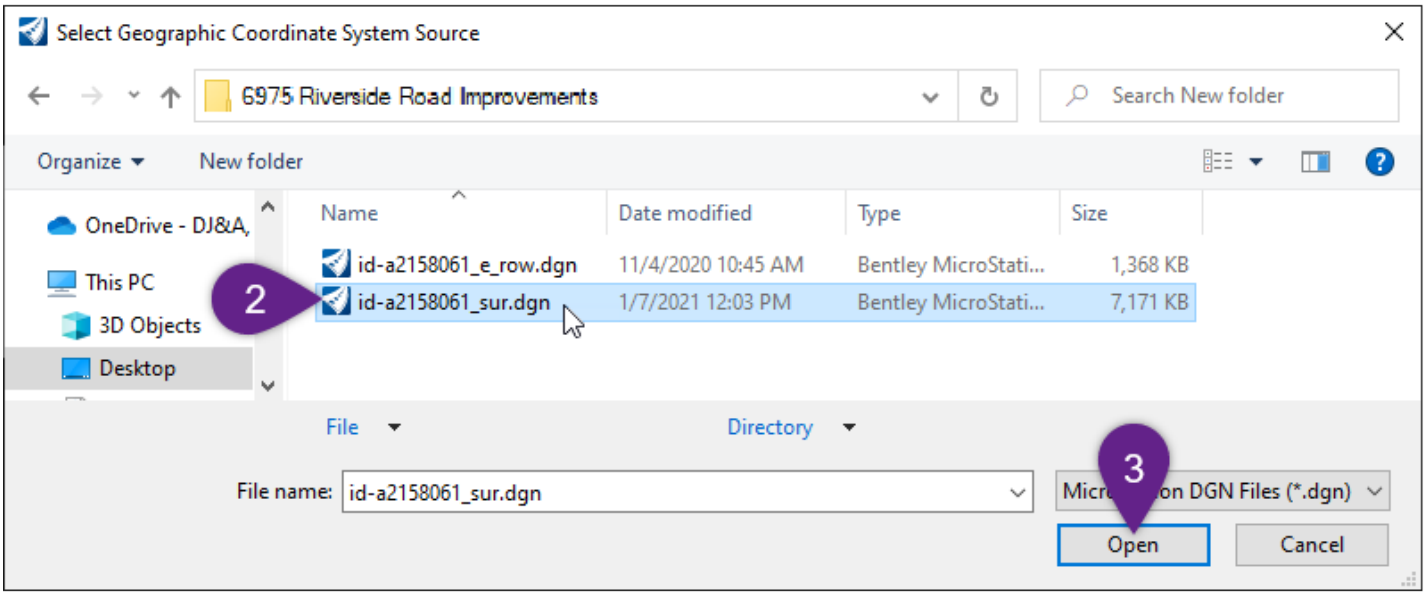


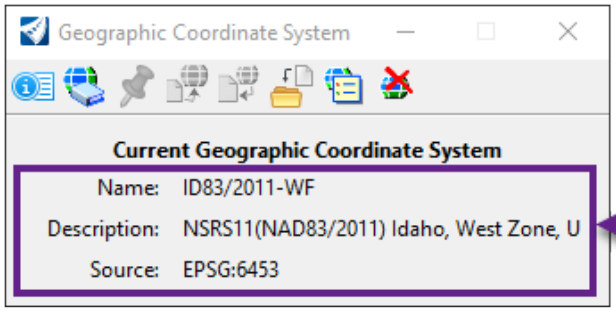


From File method:

1	In the Coordinate System Menu, select the **From File** button.
2	Select the ORD File that will be used to match Coordinate Systems. ***NOTE:*** Use only an ORD File that is known to contain the correct project Coordinate System, such as the Survey ORD File.
3	Select the Open button.

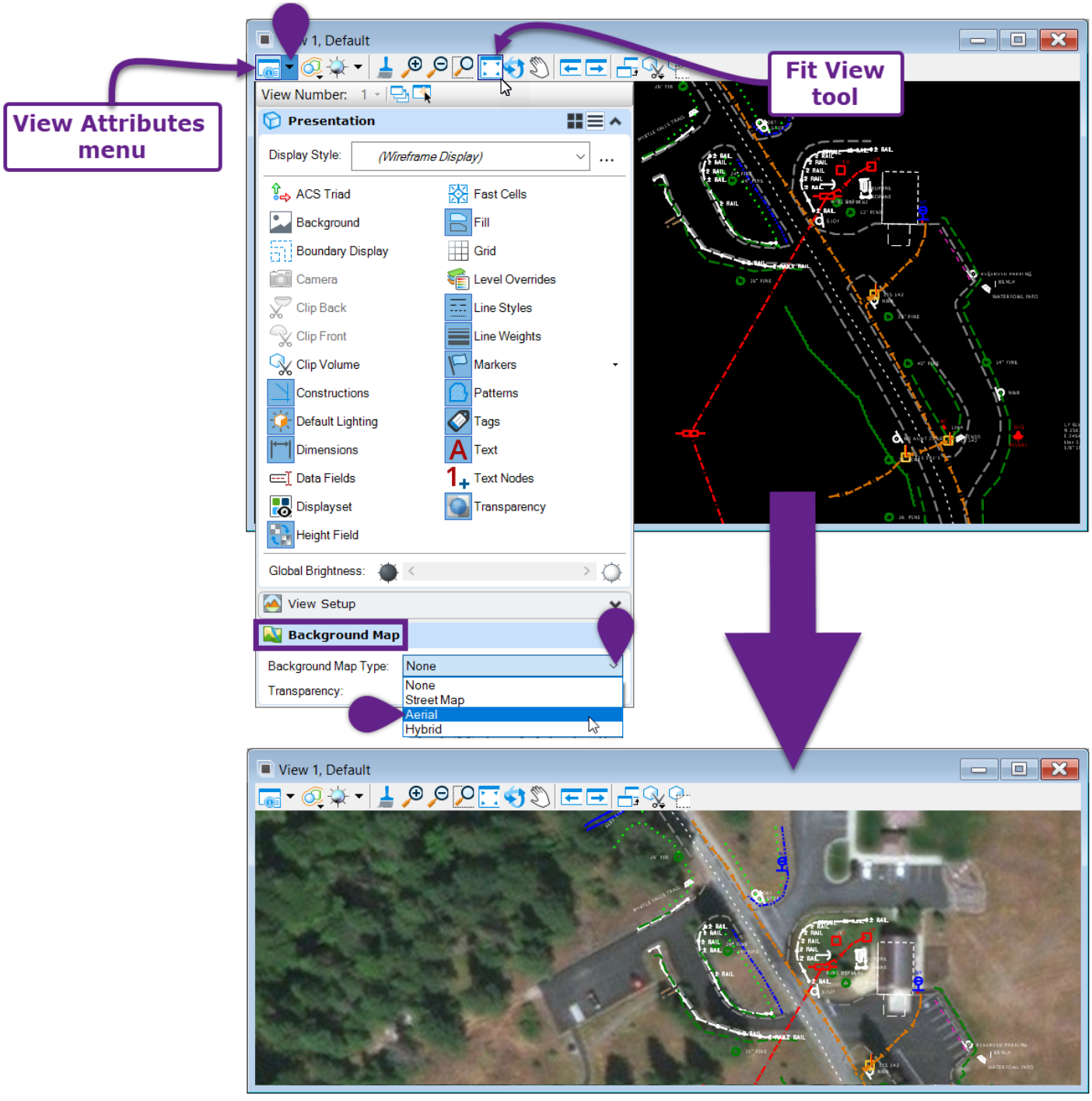






The active **Coordinate System** will be listed in the menu

Coordinate System Confirmation: The User can confirm the proper Coordinate System is set by toggling ON the *Background Map.* Simply, open the *View Attributes* and change *Background Map Type* to *Aerial.* If the *View* window is positioned in the geographical vicinity of the project, then the aerial should align with the Survey ORD File and other Design ORD Files.



3D.2 Reference in the Survey ORD Files and Design ORD Files

After the Coordinate System has been set, other ORD Files can be Referenced into the new ORD File. The procedure for referencing an ORD File is shown in *1E.1 Create a Reference – Workflow*.

The Survey ORD File must be referenced to show existing features and Existing Ground Terrain Model. Design ORD Files are Referenced in to show proposed features.

For an overview of how different ORD Files are arranged and Referenced in a typical project, see *2F.1 Project Organization and Referencing Map for ORD Files*.

Survey ORD Files
- Existing Survey File
- Existing Right-of-Way File
- Existing Ground Terrain Model File

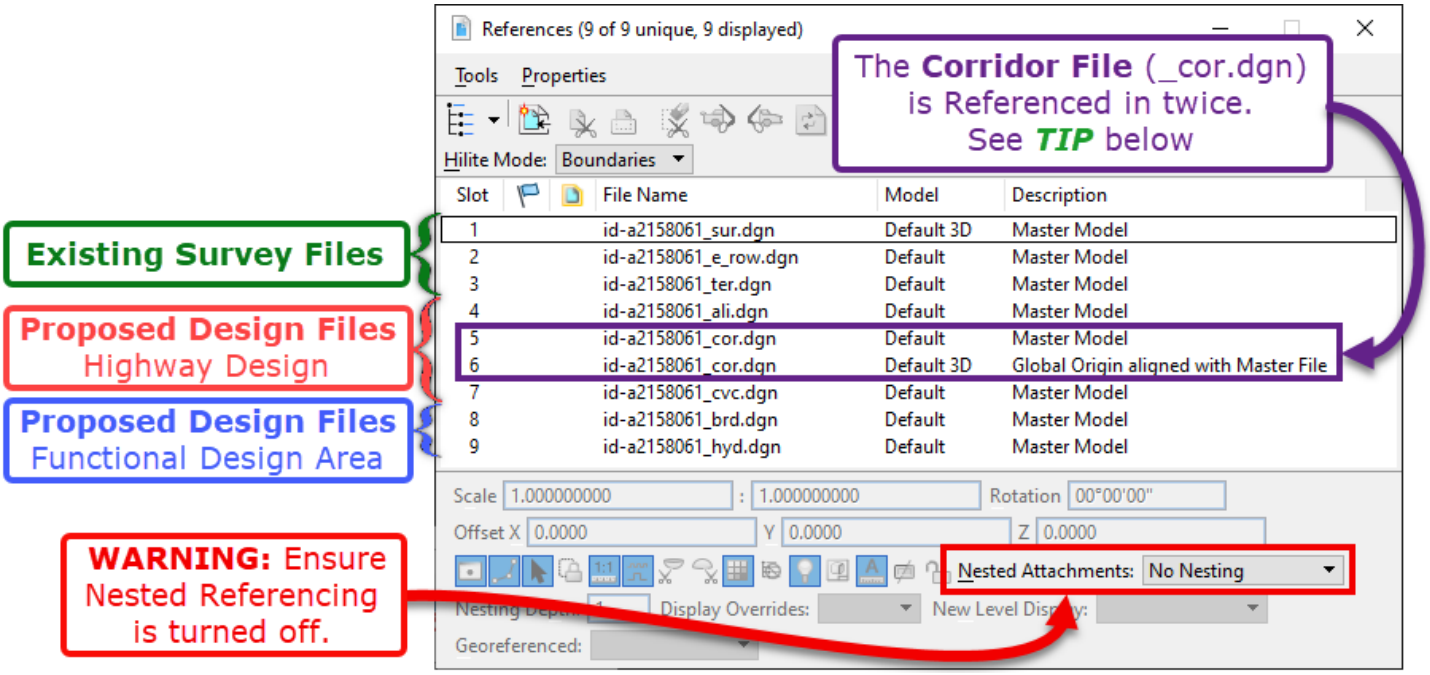
Design ORD Files
- Alignment File [*Highway Design*]
- Corridor File [*Highway Design*]
- Bridge Design [*Functional Design Area*]

The Survey and Design ORD Files listed above are used to show all existing features and proposed road work. Other additional Design ORD Files may need to be referenced into to show other design features.

WARNING: *Nested Referencing* should be turned OFF when referencing files into a new ORD File. For more information on Nested Referencing, see *1E.4 Nested Attachments in Drawing Models and Sheet Models*.

The graphic below shows the References Manager used in an example Road Plan and Profile *Plan Sheet ORD File*.

For an overview of the Reference Manager and how to Reference an ORD File, see *1E – References*.



TIP: To correctly display Clipped Corridor linework (i.e., clipped linework around intersections or approaches), then the 3D Design Model (Default 3D) has to be Referenced in addition to the 2D Design Model (Default). In this case, the Corridor File (_cor.dgn) is Referenced twice to show both Models. See *9G.10.b Displaying Corridor Clipping References - WARNING*

3D.3 Activate the Existing Ground Terrain Model

After the Survey ORD File has been Referenced into the new ORD File, the Existing Ground Terrain Model should be immediately *Activated.*

An ORD File may contain many Terrain Models; however, only one Terrain Model can be active at a given time. In almost all situations, the Existing Ground Terrain Model should be the active Terrain Model.

The Existing Ground Terrain Model must be active in order to display the existing ground profile line in the Profile Models . Also, the End Condition Points for a Corridor will seek out the *Activated* Terrain Model.

Activate a Terrain Model with the Pop-Up Icon Menu:

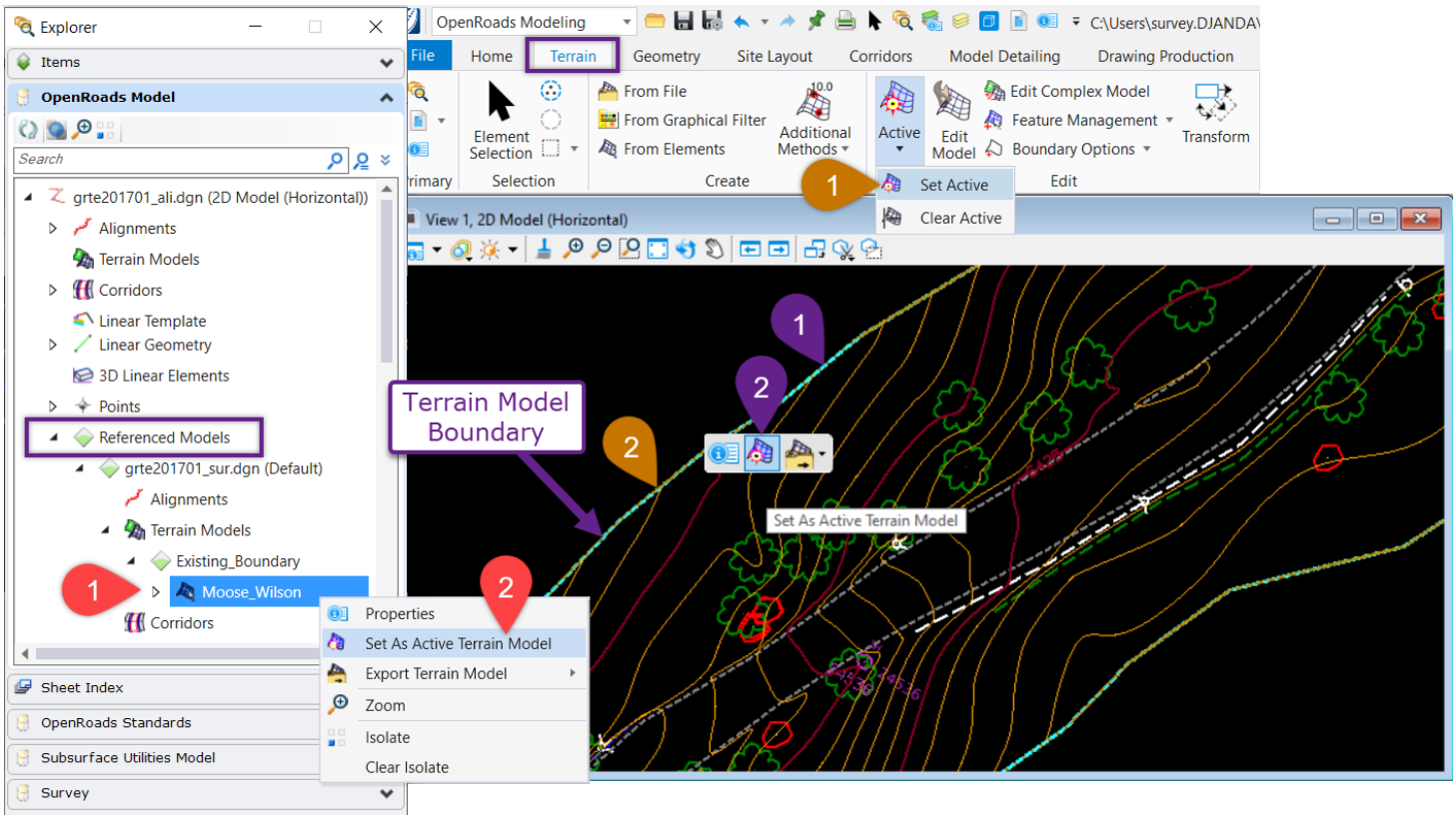
1	Left-Click and hover over the Terrain Model with the mouse cursor until the *Pop-Up Icon Menu* appears.
2	In the *Pop-Up Icon Menu*, select the *Set As Active Terrain Model* tool .

Activate a Terrain Model with the Ribbon:

1	Left-Click on the *Set Active* tool under the *Active* dropdown.
2	*Prompt: Locate Terrain Model to set as Active* – Left-Click on the Terrain Model to complete the command.

Activate a Terrain Model with the Project Explorer:

1	Locate the Terrain Model in the Project Explorer.
2	Right-Click on the Terrain Model and select the *Set as Active Terrain Model* option.



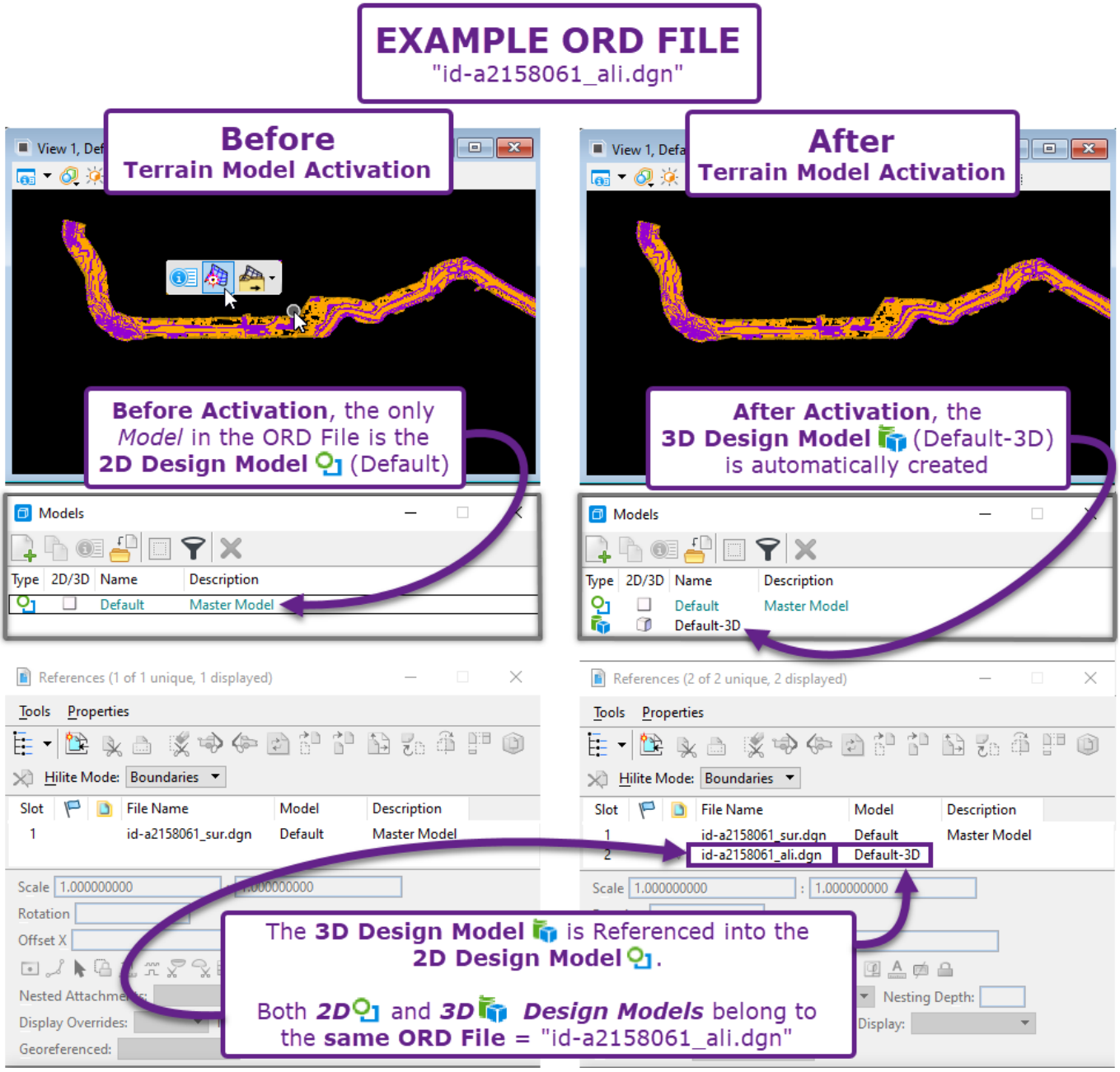
3D.3.a Creation of the 3D Design Model after Terrain Model Activation

Initially, a new ORD File will only contain the *2D Design Model*. When a Terrain Model is *Activated*, the software automatically creates a *3D Design Model*.

This process occurs because the new ORD File is initially a 2-dimesonal space. A 3-dimensional space is needed to interact with the *Activated* Terrain Model.

After the Terrain Model is activated, the newly-created *3D Design Model* is automatically Referenced into the *2D Design Model*. This is awkward because it appears that the ORD File is Referencing itself. However, the *3D Design Model* reference is used to display "flattened" 3D elements in the *2D Design Model*.

BEST PRACTICE: After activating the Terrain Model, turn OFF the display of the *3D Design Model* reference in the *2D Design Model*.



3E – IMPORT SUPPLEMENTING DATA

3E.1 Import Google Earth Aerial Imagery

The procedure in this section explains how to import a Google Earth aerial into the new ORD File. Additional procedures for importing georeferenced rasters is shown in *24B – Import Georeferenced Aerials (Rasters and .ECW)*.

PLAN SHEET PRODUCTION WARNING: The User will have very little control of the brightness and contrast of the resulting Google Earth aerial image, which makes this procedure of limited use for display in plan sheets. The resulting Google Earth aerial image is actually a *Mesh* element, which does not allow for direct visual adjustments. The resulting aerial image is intended for a design backdrop, instead of for use in plan sheets.

TIP: The *Background Map* feature (located in the *View Attribute* menu) can be used to quickly display aerial imagery provided by Bing. See *1B.5 – The Background Map*. The following procedure for importing Google Earth imagery is more complicated and time consuming. This procedure should only be performed if specifically required to view aerial imagery provided by Google – for example to view a historical aerial.

GOOGLE EARTH WARNING: The current version of Google Earth Pro is NOT compatible with the ORD Software. A previous version of Google Earth has to be installed on the User's machine to perform the following workflow. Install and use the "v7.1.8.3036" version of Google Earth Pro to perform the following procedure: https://support.google.com/earth/answer/168344?hl=en

WARNING: Before this procedure can be performed, it is necessary to set the ORD File to the correct Coordinate System. See *3D.1 Set the Coordinate System*.

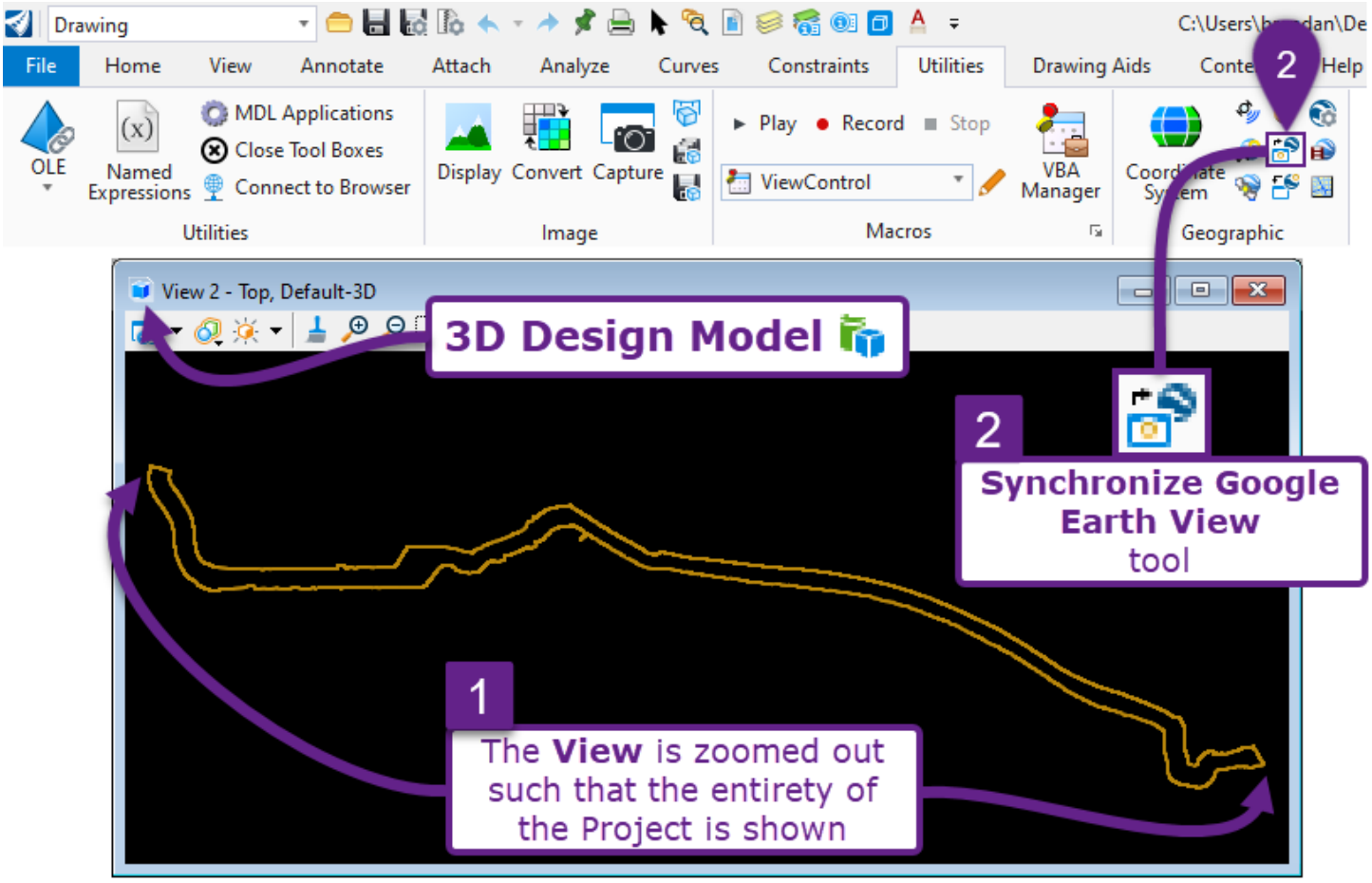
WARNING: This procedure can ONLY be performed in a *View* window displaying the *3D Design Model* . Before performing this procedure, ensure the *View* is NOT displaying the *2D Design Model* .

NOTE: If the ORD File is newly-created, it will not contain a *3D Design Model* until a Terrain Model is activated.

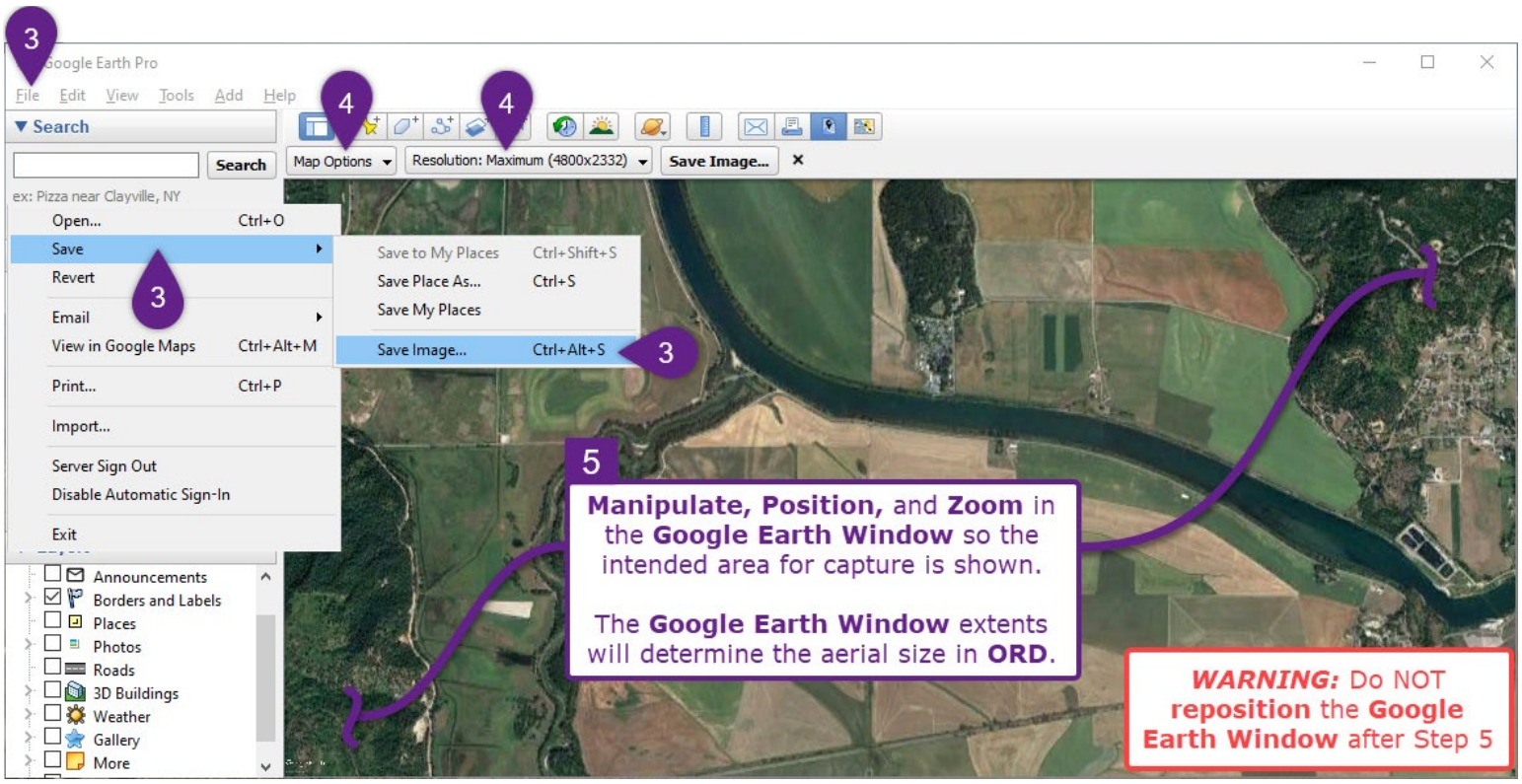
Google Earth Tool		Description
	**Open Location in Google Maps**	When this tool is used, Google Maps is automatically opened in Internet Explorer. The location shown in Google Maps window will correspond with the position of the *View* in the ORD Software.
	**Synchronize Google Earth View**	When this tool is used, Google Earth Pro is automatically opened. The location shown in the Google Earth window will correspond with the position of the *View* in the ORD Software
	**Follow Google Earth View**	When this tool is used, the *View* position in the ORD Software is automatically re-positioned to correspond with the location shown in Google Earth.
	**Capture Google Earth Image**	When this tool is used, the aerial imagery displayed in the Google Earth window is automatically imported into the current ORD File. This tool is covered extensively in the following workflow.
	**Export Google Earth File**	When this tool is used, the linework displayed in the current ORD File is exported as a Google Earth .KMZ File. See *24D – Create a Google Earth KMZ from an ORD File*.
	**Google Earth Settings**	Used to alter settings related to the **Capture Google Earth Image** and **Export Google Earth File** tools.

Ribbon Location for Google Earth Tools: Drawing workflow → Utilities tab → Geographic panel.

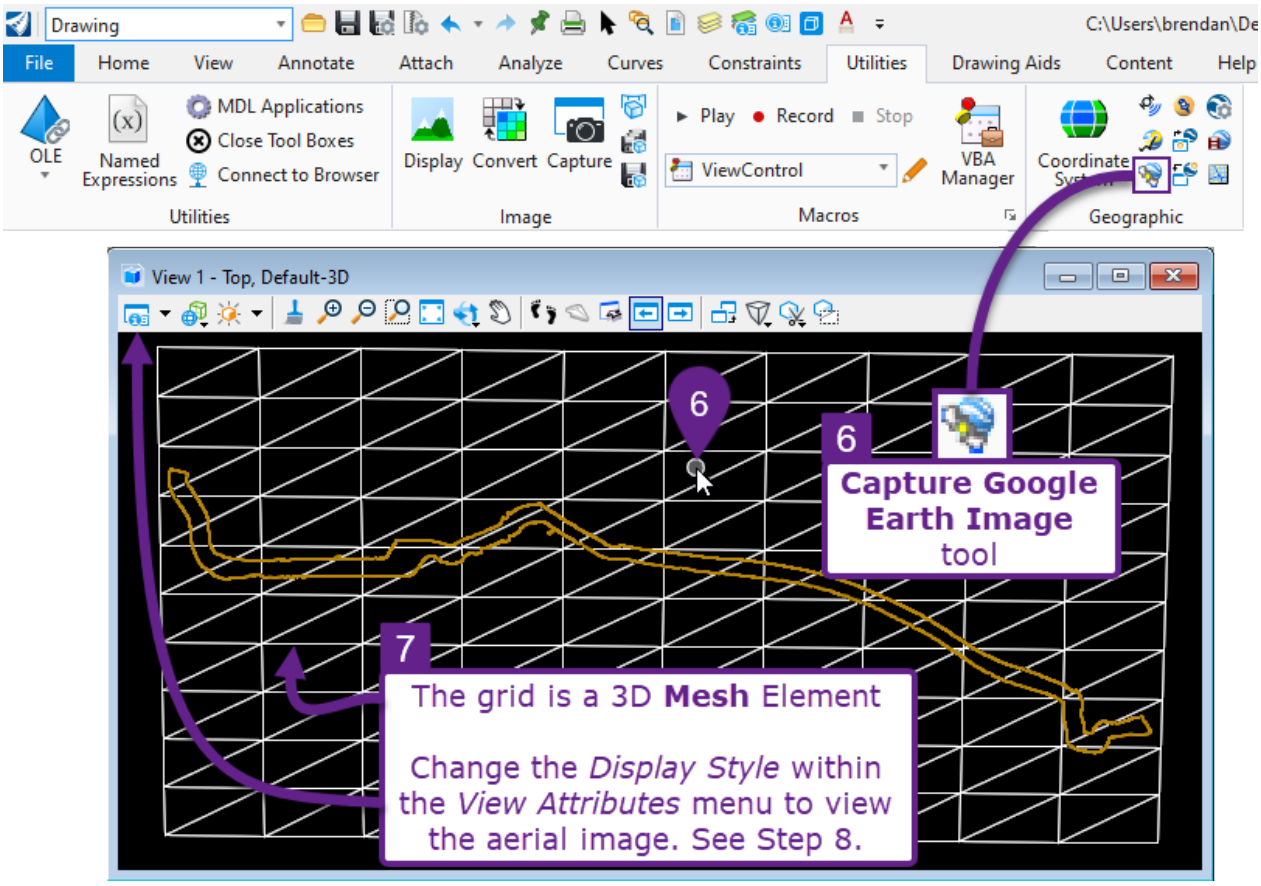
IMPORTANT: Before initiating this workflow, open the Google Earth software. Both the Google Earth and ORD software should be running side by side for this workflow. See ***GOOGLE EARTH WARNING*** on the previous page.



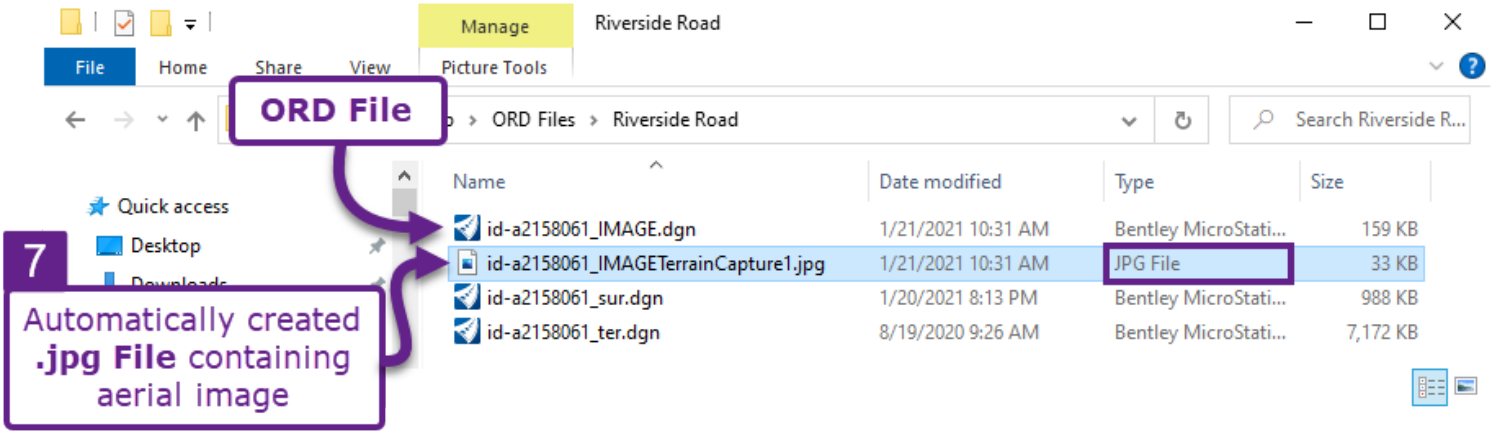
1	In a *View* window showing the *3D Design Model*, zoom out so the entire area to be included in the aerial is shown.
2	Select the *Synchronize Google Earth View* tool from the ribbon. Ribbon Location: **Drawing** workflow → **Utilities** tab → **Geographic** panel. This tool will automatically position the Google Earth window in the *approximate* area displayed in the *3D Design Model* View. If Google Earth Pro is not already opened, the tool has to be clicked twice.

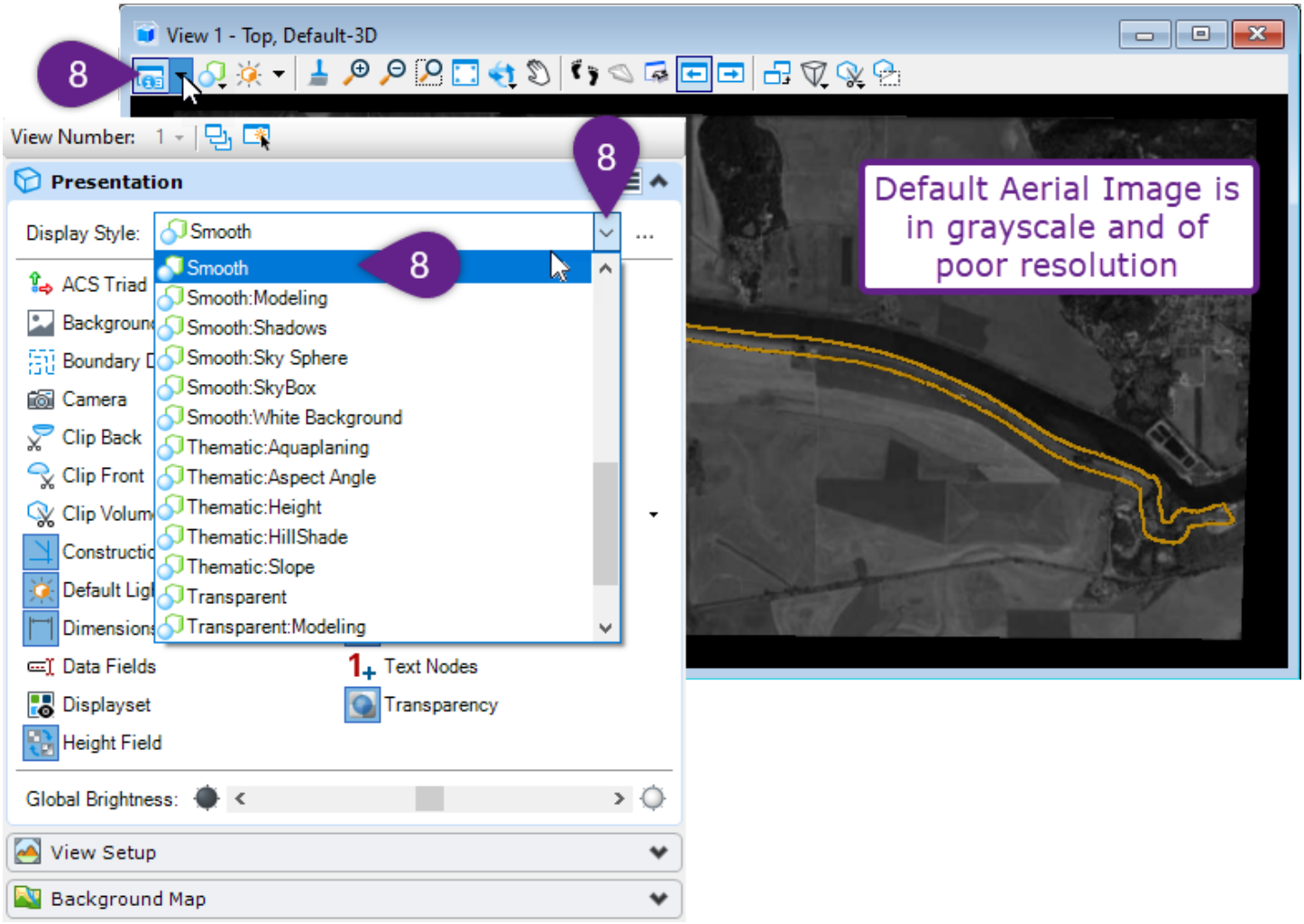


3	**Within Google Earth Pro:** In the upper-right corner, go to: **File** → **Save** → **Save Image...** After this step, a ribbon with Save options will appear at the top of the Google Earth window. ***NOTE:*** When this ribbon appears, the vertical extent of the Google Earth window is slightly reduced. This step has to be performed before the *Capture Google Earth Image* tool is used in Step 6. If this step is performed after Step 6, the resulting aerial imagery in the ORD Software will be distorted because the vertical resolution will not align.
4	**Within Google Earth Pro:** Modify the Save options in the ribbon: In the **Map Options** dropdown: Uncheck all boxes. In the **Resolution** dropdown: Change the resolution to *Maximum.* Do not select **Save Image...** in this step.
5	**Within Google Earth Pro:** Manipulate and position the Google Earth Pro window so that the intended capture area for the project is shown. **DO NOT REPOSITION THE GOOGLE EARTH WINDOW FOR THE REST OF THE PROCEDURE.** ***NOTE:*** The ORD Software will capture the exact area shown in the Google Earth Pro window – not the area that is shown in the ORD Software at the time of capture.



6	**Within the ORD Software:** Select the Capture Google Earth Image tool. Ribbon Location: **Drawing** workflow → **Utilities** tab → **Geographic** panel. *Prompt: Capture Google Earth Image > Enter datapoint to capture the current Google Earth View.* – Left-Click in the *3D Design Model* View to capture the aerial shown in Google Earth Pro.
7	After Step 6 is performed, a white grid will be created in the *3D Design Model* View. The rectangular extent of this grid exactly aligns with the Google Earth Pro window. Additionally, a *.jpg* image file is automatically placed in the same folders as the ORD File. The *.jpg* image file will have the same name as the ORD File with "TerrainCapture1" added to the end.

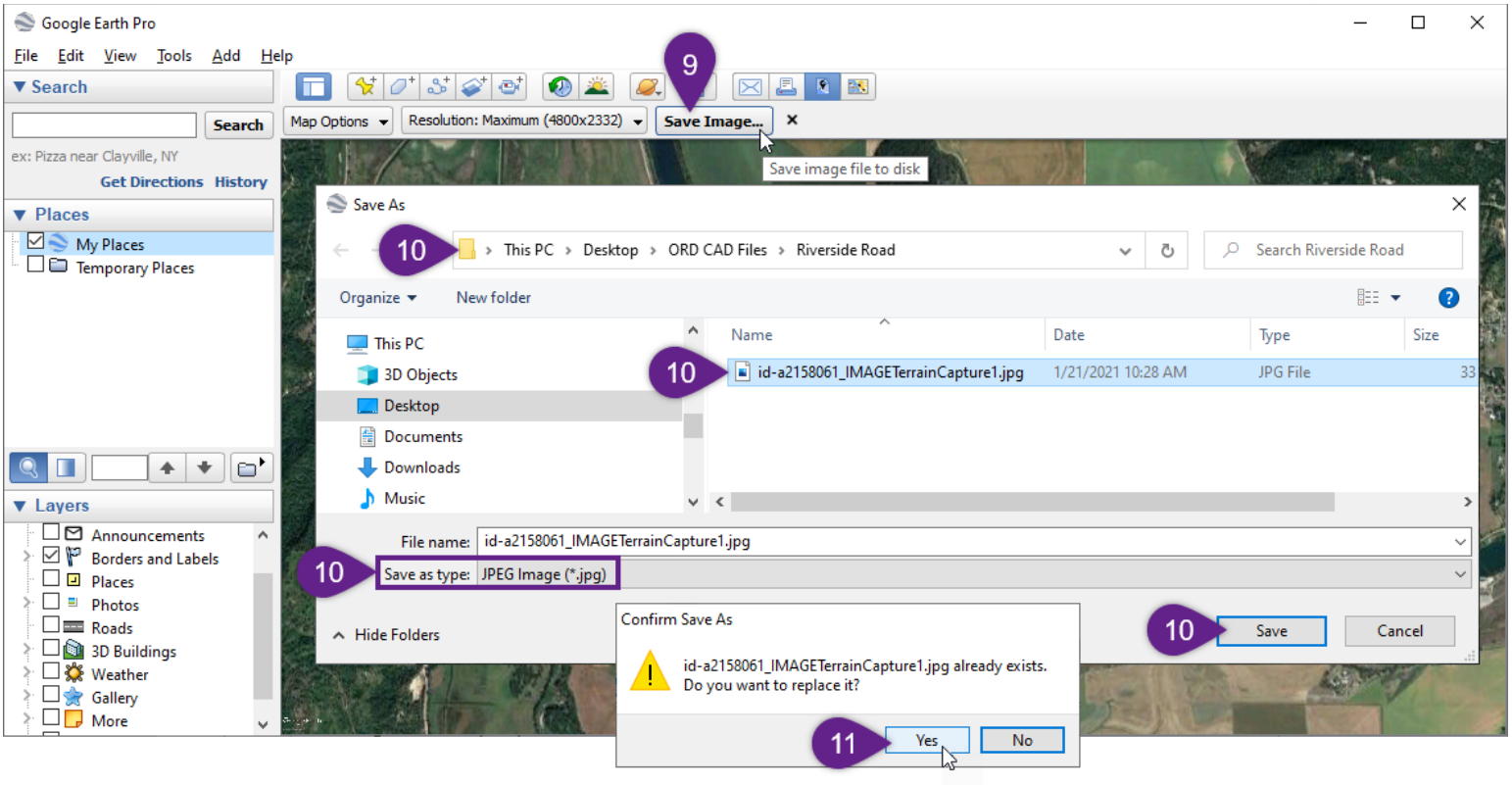




8	To show the aerial image, change the *Display Style* of the *3D Design Model* View. The *Display Style* must be set to *Smooth*. **View Attributes** → **Display Style** → **Smooth**. The white grid is actually a *Mesh* element. The *Mesh* element is NOT "flat". It is a 3D element that contains elevation data provided by the Google. ***TIP:*** A *Terrain Model* can be created from the *Mesh* element by using the *From Elements* tool. Also, the aerial image is NOT "flat". It is draped atop of the 3D *Mesh* element. The aerial imagery and 3D *Mesh* element are considered a singular element entity by the ORD Software. The source of the default aerial imagery is the *.jpg* file shown in Step 7.

By default, the aerial imagery is shown in grayscale. This is a limitation of the ORD Software, and CANNOT be rectified with a setting change.

Also, the resolution of the default aerial imagery is poor. To rectify these two shortcomings, a custom image will be saved from Google Earth and will replace the *.jpg* file (shown in Step 7) that is tied to the *Mesh* element.



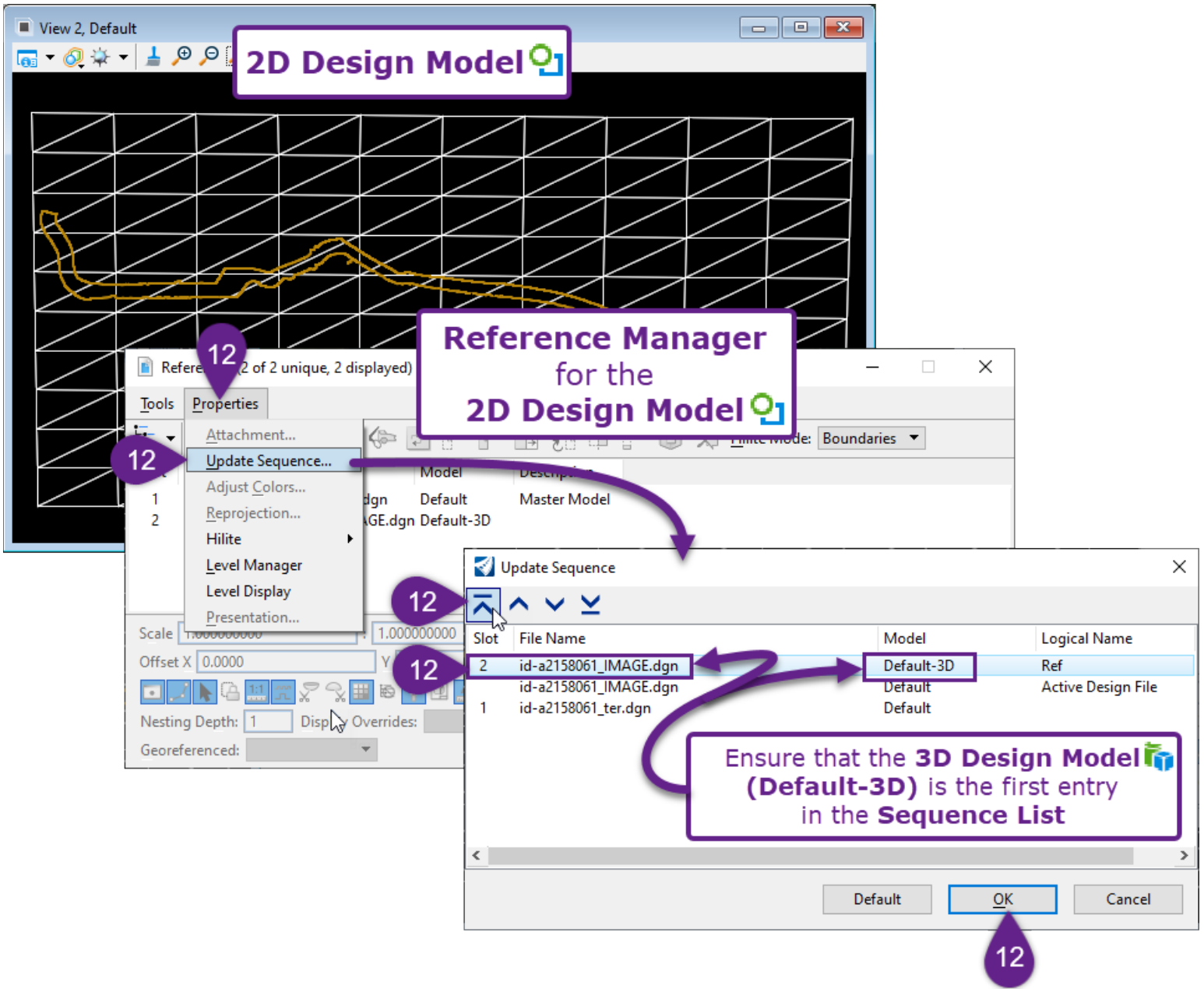
9	**Within Google Earth Pro:** Select **Save Image...** from the Save options ribbon. ***WARNING:*** If the position of the Google Earth window has changed since using the *Capture Google Earth Image* tool in Step 6, then the aerial imagery will be distorted after this step.
10	Navigate to the project folder. Ensure the *Save as type* is set to *JPEG Image (*.jpg)*. Left-Click (highlight) the default aerial image (in this case "id-a2158061_IMAGETerrainCapture1.jpg") Click the *Save* button
11	When prompted to replace the current image file – Click the *Yes* button.

After completing Steps 9-11, the default aerial image – which is in grayscale - will be replaced by a high resolution, color aerial image. Exit out of the ORD Software and reopen the ORD File to view the new colorized aerial image.

Viewing the Aerial Image in the *2D Design Model* :

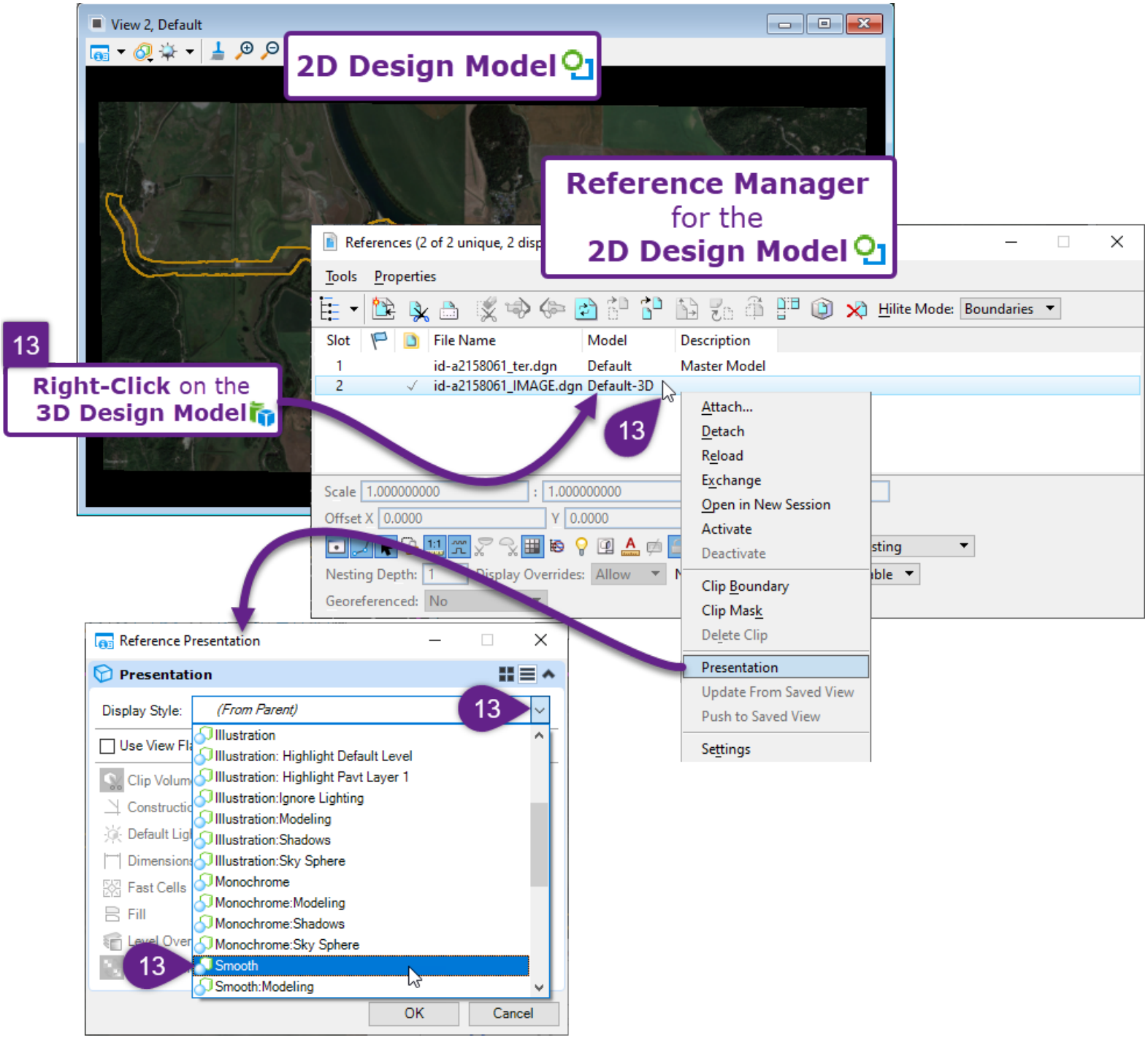
When viewing the aerial image from in the *2D Design Model* , it will cover up all linework and graphical elements. Rectify this by re-ordering the *Referencing Sequence* found in the Reference Manager.
NOTE: The Referencing Sequence is discussed in *1E.7.b Update Sequence (Reference Layering)*.

12	Open and activate a *View* window showing the *2D Design Model* . Open the Reference Manager: Go to **Properties** → **Update Sequence**. Move the *3D Design Model* to the top of Sequence List. Push the OK button



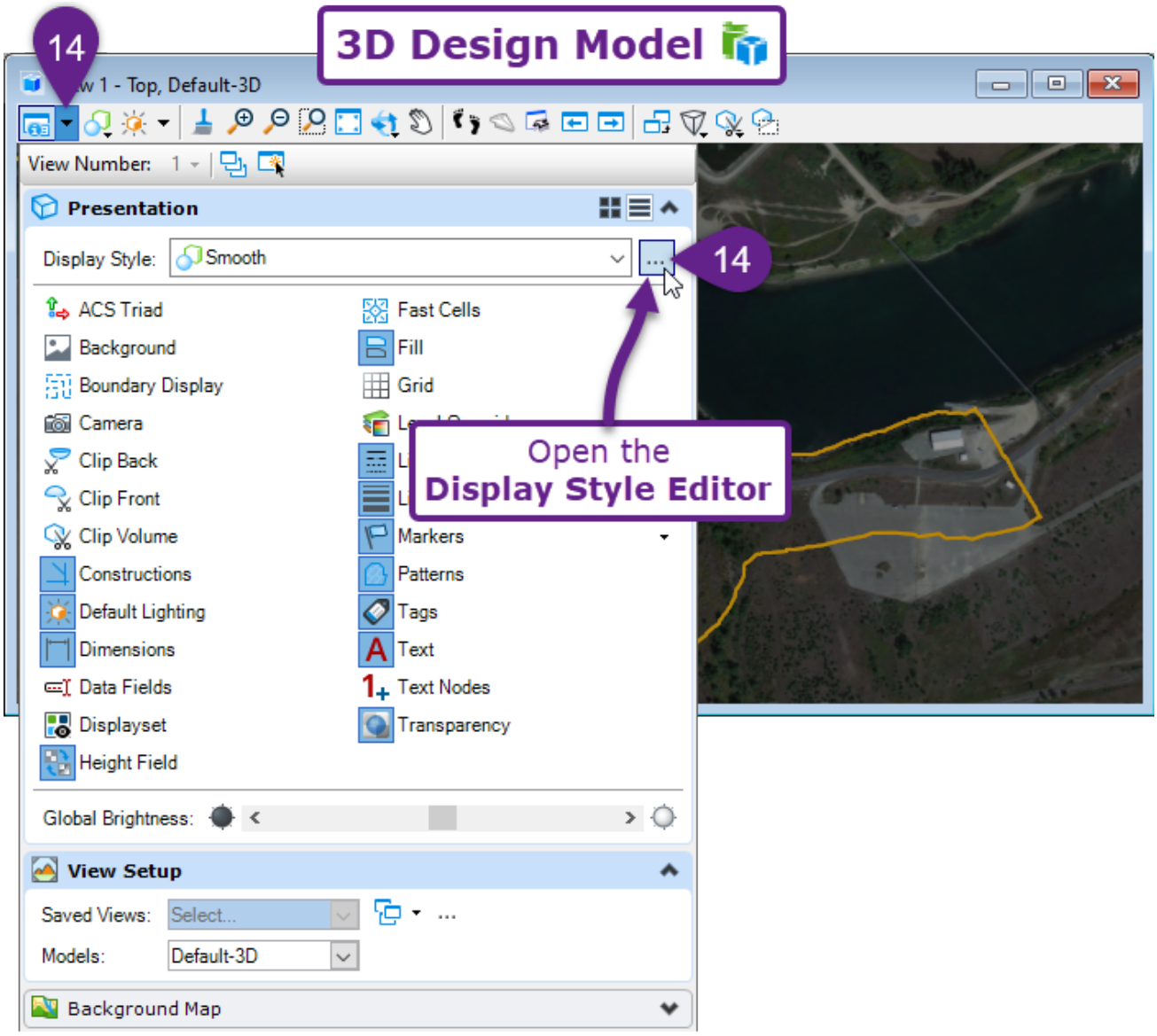
Manipulate the Brightness of the Aerial Image in the *2D Design Model* :

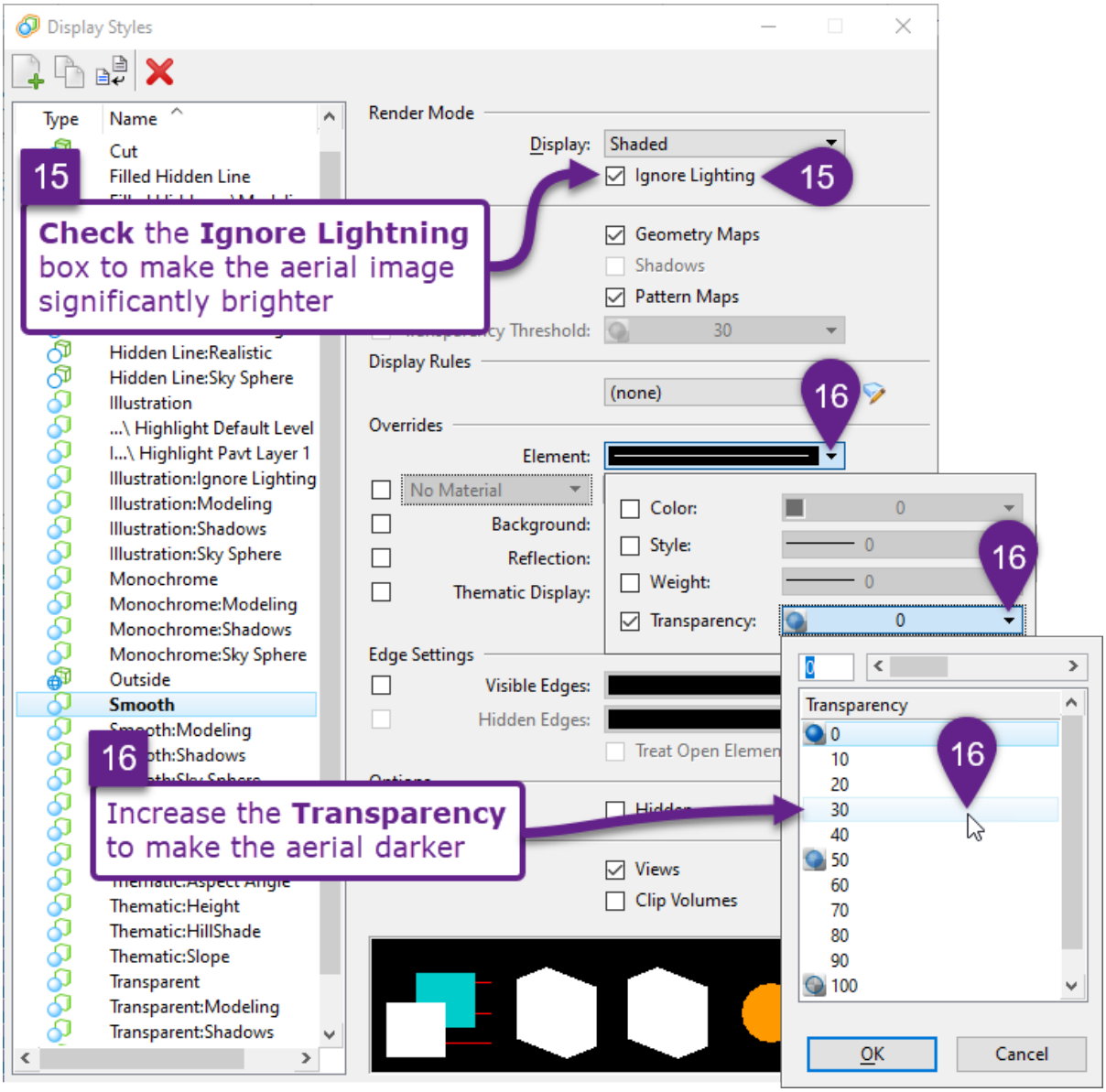
13	To manipulate the brightness and contrast of the aerial image in the *2D Design Model* : In the Reference Manager, Right-Click on the *3D Design Model* reference and select **Presentation**. Change the *Display Style* from "*(From Parent)*" to "*Smooth*" ***NOTE:*** The brightness and contrast of the aerial image CANNOT be adjusted directly. Instead, the *Display Style* of the *3D Design Model* is manipulated to achieve the desired brightness settings.

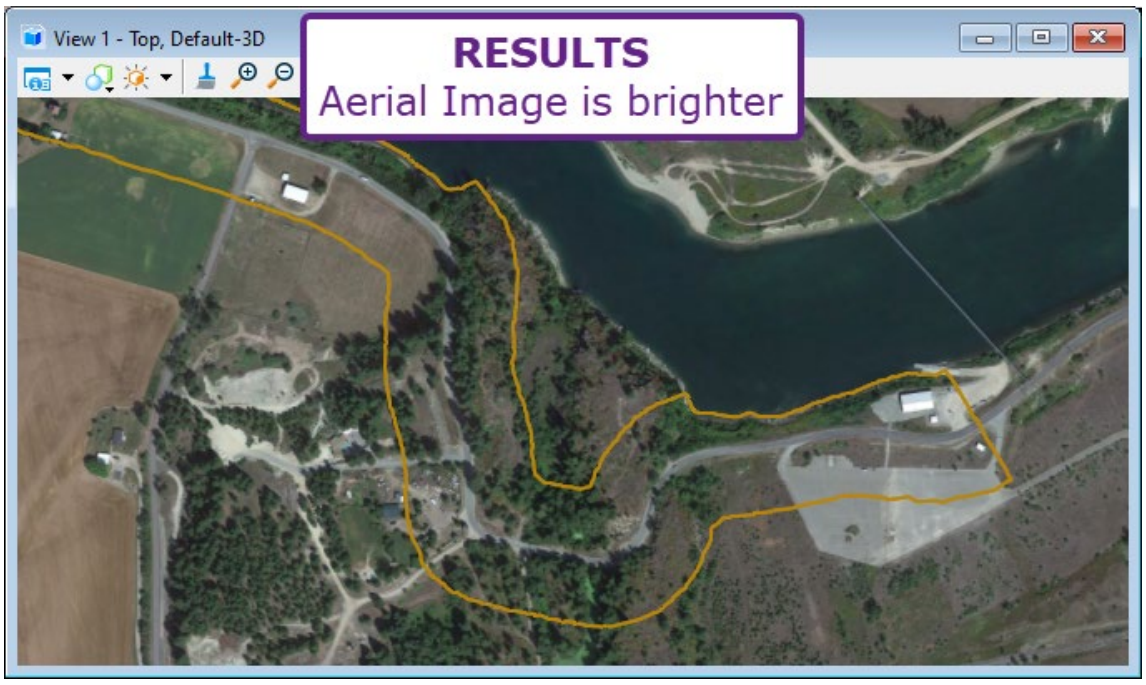


Manipulate the Brightness of the Aerial Image in the *3D Design Model*:

14	Open a *View* displaying the ***3D Design Model*** From the *View Attributes Menu*, open the *Display Style Editor.*



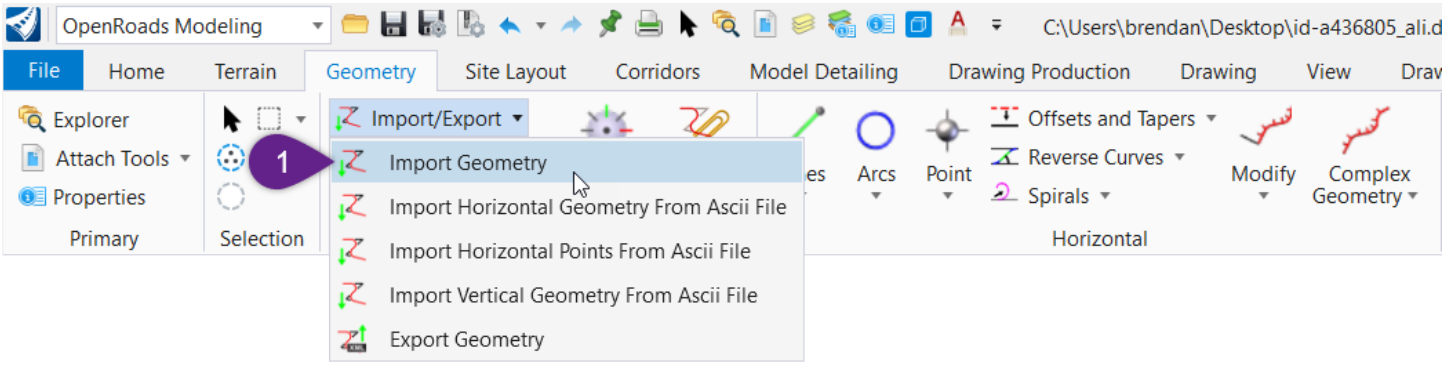

Display Styles
Type
Name
Cut
Filled Hidden Line
Hidden Line:Realistic
Hidden Line:Sky Sphere
Illustration
...\ Highlight Default Level
I...\ Highlight Pavt Layer 1
Illustration:Ignore Lighting
Illustration:Modeling
Illustration:Shadows
Illustration:Sky Sphere
Monochrome
Monochrome:Modeling
Monochrome:Shadows
Monochrome:Sky Sphere
Outside
Smooth
Thematic:Height
Thematic:HillShade
Thematic:Slope
Transparent
Transparent:Modeling
Transparent:Shadows
15
Check the Ignore Lightning box to make the aerial image significantly brighter
Render Mode
Display:
Shaded
Ignore Lighting
15
Geometry Maps
Shadows
Pattern Maps
30
Display Rules
(none)
16
Overrides
Element:
No Material
Background:
Reflection:
Thematic Display:
Color:
Style:
Weight:
Transparency:
0
16
Edge Settings
Visible Edges:
Hidden Edges:
Treat Open Elemen
16
Increase the Transparency to make the aerial darker
Views
Clip Volumes
Transparency
0
10
20
30
40
50
60
70
80
90
100
16
OK
Cancel

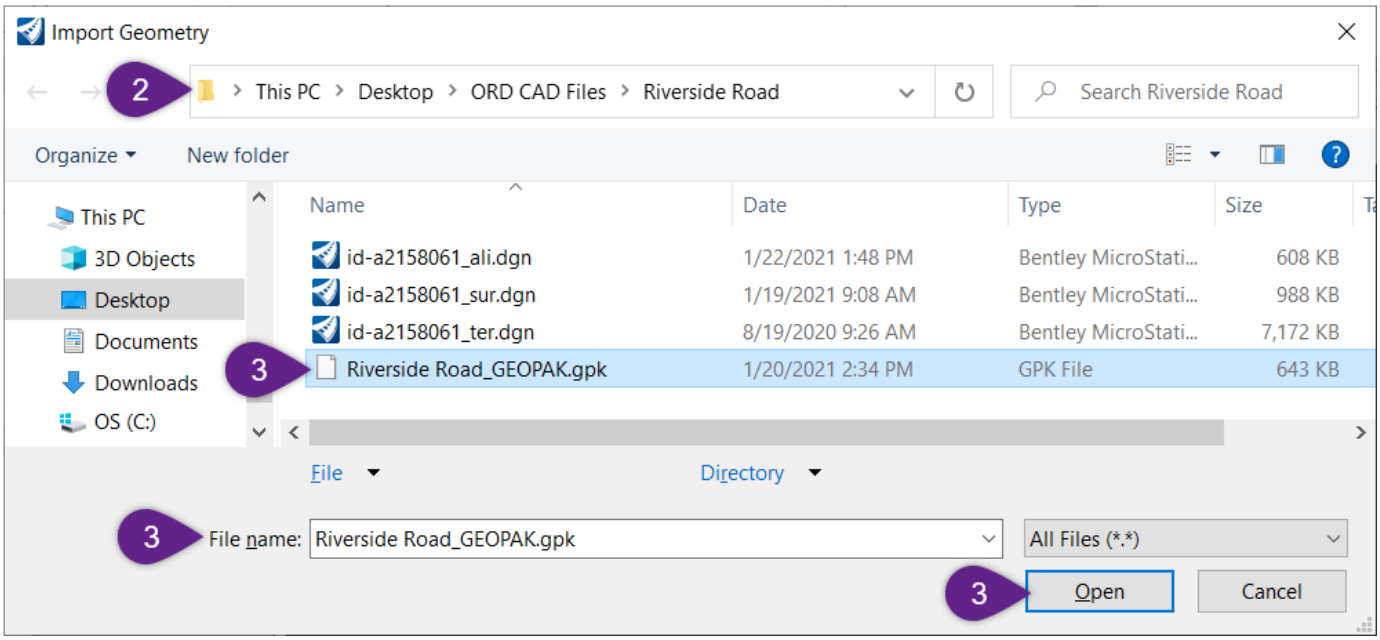

View 1 - Top, Default-3D
RESULTS
Aerial Image is brighter

3E.2 Import Alignments (.GPK Files) Created in GEOPAK

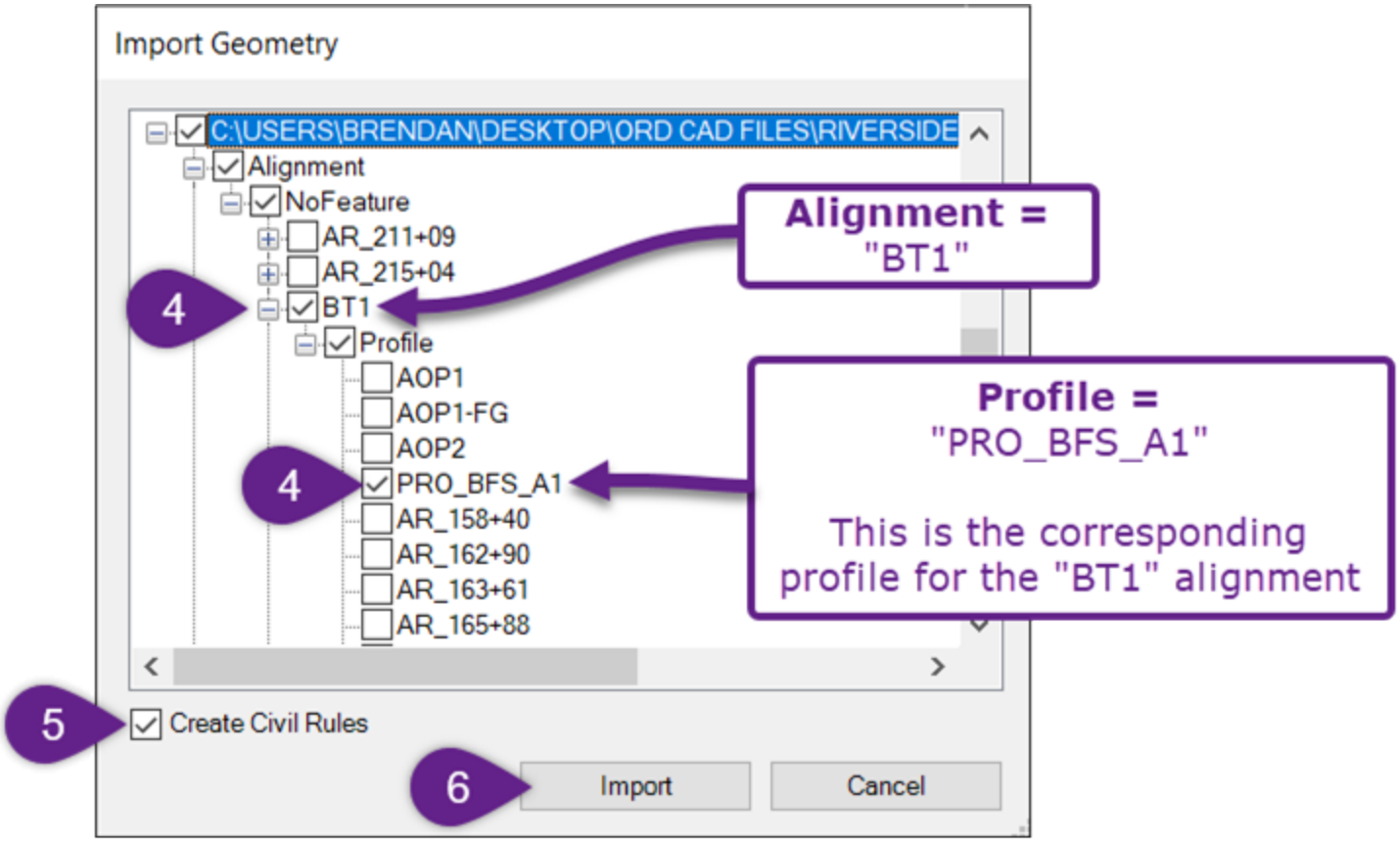
The *Import Geometry* tool is used to import alignments and profiles created in legacy versions of the ORD software – such as GEOPAK and InRoads. Before this workflow is performed, ensure that the Coordinate System has been set. See *3D.1 Set the Coordinate System*.

In this workflow, an alignment and profile created in GEOPAK is imported into the ORD File. The name of the alignment is "BT_1" and the corresponding profile is named "PRO_BFS_A1".





1	Select the *Import Geometry* tool from the ribbon. Ribbon Location: **OpenRoads Modeling** workflow → **Geometry** tab → **General Tools** panel.
2	Navigate to the folder location for the .GPK File to be imported.
3	Highlight the .GPK File (in this case "Riverside Road_GEOPAK.gpk) and push the *Open* button.



NOTE: When Alignment and Profiles are imported through this method, they will NOT contain a *Feature Definition*. Be sure to apply a Feature Definition to both the Alignment and the Profile (contained in the *Profile Model*). The alignment and profile should be placed on an *Alignment Feature Definition* (i.e., Baseline, Baseline – Alt 1, etc..). To assign the Alignment/Profile a Feature Definitions, see *7B.3.b Change Feature Definition with Set Feature Definition Tool*.

4	CHECK the boxes of the Alignments and Profiles to import. ***NOTE:*** Profiles can be found in the dropdown of each Alignment. Import only the Profile that corresponds to the selected Alignment.
5	If the *Create Civil Rules* box is CHECKED, then the alignment will be created as an EDITABLE *Complex Element*. The alignment will contain Civil Rules, which means the alignment contains manipulators – such as grips to perform grip edits. For more information, see *7C.2 Civil Rules* If the *Create Civil Rules* box is UNCHECKED, the alignment will be UNEDITABLE. The alignment will NOT contain Civil Rule Manipulators. The User will be unable to perform edits – such as grip-edits. ***TIP:*** Use the *Simplify Geometry* tool to restore *Civil Rules* to a uneditable Alignment.
6	Push the Import Button

3E.3 Import AutoCAD Files

Reference AutoCAD Files :
AutoCAD Files (.DWGs) can be *Referenced* into an ORD File with the *Attach Reference* tool. The process of referencing an AutoCAD Files is performed exactly the same as referencing another ORD File. See *1E.1 Create a Reference – Workflow*.

WARNING: Occasionally, AutoCAD Files use INCHES for the master units. For example, AutoCAD Files containing architectural building plans are often drawn in inches. These AutoCAD Files may be enlarged by a scale factor of 12 when referenced into ORD File. User the *Scale* tool to reduce the size of a inch unit file by a factor of 0.083333. See *1E.6.c Scale a Reference*.

After an AutoCAD File is referenced into an ORD File, it can be manipulated and scaled in the *Reference Manager* in the same fashion as a refenced ORD File. See *1E.5 Manipulating References (Move, Rotate, and Scale)*.

Merge AutoCAD Files into the ORD File:
Once an AutoCAD File (.DWG) is referenced into an ORD File, the *Merge Into Master* tool can be used to import the contents of the AutoCAD File directly into the ORD File. After the *Merge Into Master* tool is used, the AutoCAD linework and text can be directly edited and manipulated. For more information, see *1E.7.a Merge Into Master tool (Import Reference into Current ORD File)*.

When the *Merge Into Master* tool is used, simple AutoCAD linework – such as Lines and Arcs – will be converted into similar *MicroStation Elements*. AutoCAD elements that are comprised of a series of lines and arcs will be converted into MicroStation *Line String* elements.

WARNING: If AutoCAD linework is subject to change, then the *Merge Into Master* tool should NOT be used. For example, if an AutoCAD File is needed to simply display architectural building linework, then it is advantageous to leave the AutoCAD File as a *Reference*. If left as a *Reference*, then a dynamic link is maintained to the AutoCAD File. Any changes or updates to AutoCAD File will be reflected in the ORD File.

Civil Data Loss From AutoCAD Files with 3D Features
Typically, simple AutoCAD elements – such as lines, arcs, and texts – are referenced, displayed, and merged into an ORD File with no issues. However, AutoCAD elements that contain intelligent and 3D features – such as Alignments, Profiles, Corridors, Surfaces, Feature Lines, Blocks, and COGO Points – may behave erratically when referenced into and ORD File. It is common for AutoCAD 3D elements to be "flattened" and appear distorted when referenced into OpenRoads Designer.

AutoCAD 3D Features may be visualized better if they are referenced into the *3D Design Model*  of an ORD File. The "Modelspace" in AutoCAD is a 3-dimensional space, which is similar in concept to the *3D Design Model*  of an ORD File. 3D AutoCAD elements may behave more predictably if they are referenced into the *3D Design Model*  .

Display and Print of AutoCAD Elements:
The most significant challenge when working with AutoCAD Files is getting AutoCAD linework and text to plot, print, and display correctly. AutoCAD elements will retain symbology properties (Layer, Color, Line Style, and Weight) that were applied to them in AutoCAD.

AutoCAD elements are likely found on Layers that are NOT recognized by FLH Pen Tables. In other words, the FLH Pen Tables have no effect on the printed display of AutoCAD Elements. The Levels imported from AutoCAD may need to be altered for compatibility with the FLH Pen Table. Modifying Levels is accomplished in the Level Manager. See *1G.5 Level Manager*. The FLH Pen Table is discussed in *19D – The FLH Pen Table, Custom Levels, and AUX Levels*.

3F – NAMING CONVENTION FOR PROPOSED ORD FEATURES

Alignments, Profiles, Corridors, and Terrain Models should be assigned an appropriate name that adheres to the naming convention discussed in this section.

IMPORTANT: Names assigned to proposed ORD features are shown in the *Physical Data*, which is used for construction staking. Assign logical names so construction contractors and surveyors can identify the proposed feature within the *Physical Data* files.

NOTE: This naming convention may be modified to better describe the proposed features unique to the project.

The name of a feature consists of three descriptors: the ORD Entity Type, Feature Type, and an Identifier.

Example Feature Name: *ALI_APPR_Maple*

[ORD Entity Type]	**_**	***[Feature Type]***	**_**	***[Identifier]***
[ALI]		[APPR]		[Maple]

This feature would be used to represent a *Horizontal Alignment* [ALI] for an *Approach Road* [APPR] with the real-world name: *Maple Street* [Maple] .

An Alignment typically has a corresponding Profile and Corridor. The name for the Alignment, Profile, and Corridor should be identical, but contain different prefixes to identify the element type. For example, the ORD Entities that represent the mainline of "Riverside Road" would be named:

ALI_MAIN_Riverside	(Horizontal Alignment name)
PRO_MAIN_Riverside	(Vertical Profile name)
COR_MAIN_Riverside	(Corridor name)

ORD Entity Type: The ORD Entity Type is used to readily identify the type of ORD Element that a feature represents. The ORD Entity Types are limited to: Alignments, Profiles, Corridors/Linear Templates, and Terrain Models. The ORD Entity Type should be typed in ALL CAPS.

ORD Entity Type Descriptors	
ORD Entity Type	**Description**
ALI	Horizontal Alignment
PRO	Vertical Profile
COR	Corridor Model or Linear Template Model
TER	Terrain Model

Feature Type: The Feature Type is used to classify the feature. The table below lists some common Feature Types. The User may create a custom Feature Type identifier, if one cannot be found in the table below. The ORD Feature Type should be typed in ALL CAPS and should be 4 letters or less.

Feature Type Descriptors	
Feature	**Description**
MAIN	Mainline Roadway
APPR	Approach Roads
DRWY	Driveway
PARK	Parking Lot
HYDR	Hydraulic/Drainage Features
CULV	Culvert
DTCH	Ditch
WALL	MSE Wall
DETR	Temporary Diversions/Detours
CURB	Curbing
SDWK	Sidewalk

Identifier: The Identifier relates directly to the real-world name for a feature. For example, a culvert alignment on a stream called "Salt Creek" create may be named: "ALI_CULV_Salt".

If a feature does not contain a real-world name, then a two-digit numerical code may be assigned as the Identifier – such as: "03". For example, the fourth approach road alignment in a project may be named: "ALI_APPR_03".

Alternatively, the mainline station where the feature is found may be used an Identifier. For example, a driveway alignment at STA 10+62 may be named "ALI_DRWY_1062.

The Identifier should be typed out in Mixed Case (which means the first letter should be capital and the following letters should be lower-case). For example: "ALI_MAIN_Riverside". The Mixed Case spelling helps to visually distinguish the identifier from the ORD Entity Type and Feature Type.

In some cases, an Identifier may NOT be necessary to describe a feature and distinguish it from other features in the project. In these cases, it acceptable to omit the Identifier. For example, if a project contains a single mainline alignment, then the name "ALI_MAIN" would be sufficient to distinguish it from other features in the project.