OpenRoads Designer User Manual

2

U.S. Department of Transportation Federal Highway Administration

Chapter 3

FILE CREATION



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Chapter 3 File Creation

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

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RECORD OF REVISIONS

The following record of revisions to the OpenRoads Designer Manual Chapter 3 is offered as a "quick reference" to determine the latest changes.

DATE	SECTION	REVISION DESCRIPTION
4/2025	Section <u>3B.2</u>	Update step 7 of where to locate the Seed File in the Workspace
	Section <u>3B.3</u>	Survey Unit requirements for new projects starting January 1, 2023 were revised.
	Section <u>3C.1</u>	Project Specific Prefix: Updated website link
	Section <u>3E.1</u>	Google Earth Warning: Updated website link

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 Ω . For a 2D Seed File, a 3D Design Model \Box 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 <u>3B.3 The Seed File</u>.

Selection Mend	×
Recent WorkSets OpenRoads Designer CE	Set the
FLH_Stds-WS10.10.21.00V WorkSpace WorkSpace </th <th>oace and WorkSet</th>	oace and WorkSet
FLH_Stds-WS10.10.21.00V Moose Wilson Road Recent Files Pro	operties *
FLH_Stds-WS10.10.21.00V glen_hwy_PLN_PP.dgn Des Riverside Road C\Users\brendan\Desktop\NEW ORD CAD Files\G Wordified: 9/2:	ime Glenn Highway escription orkSpace FLH_Stds-WS10.10.21.00V
Line No WorkSpace No WorkSet glenn_hwy_COR.dgn C\Users\brendan\Desktop\\NEW ORD CAD Files\G Modified: 9/2: PM	st Project Line PS NPS Drwg No. 485623 NPS PMIS No. 255661
glenn_hwy_PLN_GEN.dgn Sec C\Users\brendan\Desktop\NEW ORD CAD Files\G Modified: 9/2:	cond Project Line ngle Project Numbe AK DOT 135(1)
glen_hwy_PLN_GEN_ABRV.dgn Proc C\Users\brendan\Desktop\NEW ORD CAD Files\G Notified: 9/2' Shoo Shoo	rojectWise Project Properties o project attached. ow All Properties
glen_hwy_PLN_Ex.dgn C\Users\brendz_NDesktop\RD_CAD_hts\G Modifiet_9/2:	
Browse Select the New File button	

3	Navigate to the project Folder Location for placement of the new ORD File.
	Assign the new ORD File a File Name.
4	<i>IMPORTANT:</i> ORD Files MUST be named in accordance with the agency's File Naming Convention . See <u>3C – ORD File Naming Conventions</u> .
	Assign the new ORD File the appropriate Seed File. See the WARNING on the previous page and <u>3B.3 The Seed File</u> . The Seed File must correspond to the project Survey Units (Survey Feet or International Feet). In most situations, a 2D Seed File is used.
5	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 <u>2C - Working In and Outside Of ProjectWise</u>.

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.

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 <u>2B - Introduction to the WorkSpace and</u> <u>WorkSet</u>.

Select the New File button.

Folder OR_NPS_CR Document Name: Description: File Name:	A_13(1) - Rehabilitate East Rim Drive Change NewFile.dgn	OK Cancel Apply	8 Ensure the Name and the File Name match exactly.
6 Application: OpenRoads I Source File:	Department:		The ".dgn" file extension must be included in the Name . Manually type in the File Extension if it is not shown.

3	Assign the new ORD File to the appropriate Project <i>Folder</i> . Push the Change button and navigate to the project folder.
4	Assign the new ORD File an appropriate Name and File Name . <i>WARNING:</i> 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 <u>3C – ORD File Naming Conventions</u> .
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>".</none>
	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 <u>3B.3 The Seed File</u> .
7	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_Stds-WS10.10.21.00V\Seed\International\SurvFt-2D.dgn
	Configuration\Organization-Civil\FLH_Stds-WS10.10.21.00V\Seed\International\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:

- The Survey Units used for the project. The Survey Units is either Survey Feet or International Feet. International Feet units are used in all states for projects starting after January 1st, 2023.
- 2. **2D or 3D Seed Files**. If a **2D Seed File** is used, then the ORD File initially contains a *2D Design Model* **2**. If a **3D Seed File** is used, then ORD File initially contains a *3D Design Model* **5**.

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: <u>https://highways.dot.gov/federal-lands/design/plan-prep/wfl/naming/active-project-prefixes</u>

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

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 <u>3C.4 ORD File Types</u>)

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 <u>3C.4.b</u>)
- Plan Sheet ORD Files (See 3C.4.c)

For a visual representation of Project Organization and the Referencing interaction between ORD File Types – see 2*F.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 Type File Suffix Purpose and Contents				
		Existing survey terrain model and planimetric linework.			
Survey	_sur.dgn	Includes existing utilities, signage, and contours.	3D		
		Also includes surveyed points and break lines.			
Right of Way	/ e_row.dgn	Existing Right of Way linework.	חנ		
		Includes Boundaries, Parcels, Section, Township and Range.	20		

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 <u>3C.5 Functional Design Area Code</u>.

Proposed Design File Naming				
File Type	File Suffix	Purpose and Contents	Seed File	
		Proposed alignment and profiles.	2D	
Alignments	_ali.dgn	Contains the proposed mainline alignment and profile. Typically contains stationing and curve data annotations.		
		Proposed corridor modeling file.		
Corridor	_cor.dgn	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	_cvc.dgn	Civil Cells, intersections, and approach road models to supplement the proposed corridor model (_cor.dgn).	2D	
		Contains proposed intersection alignments, profiles, and corridors models.		
		Superelevation File		
Superelevation	_sup.dgn	Contains superelevation elements and calculations that are applied to the proposed corridor model (_cor.dgn)	2D	
		Cross Section File.		
Cross Sections	_xs.dgn	Contains cross section <i>Named Boundaries</i> and <i>Sheet Models</i> . Used to create Road Cross Section Sheets.	2D	
		Quantity and Earthwork calculation file.		
Quantities	_qty.dgn	Contains Named Boundaries for <i>Element</i> <i>Component</i> quantity calculations. Also contains <i>Cut and Fill Meshes</i> for earthwork calculations.	2D	
Proposed	n row den	Proposed Right-of-Way file.	70	
Right of Way	_p_row.dgn	Contains linework for the Proposed Right of Way.	20	

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 <u>3C.5 Functional Design Area Code</u>.

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			
		Plan Sheets to create the General Information of a Plan Set.			
General	_gen.dgn	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	tup dap	Plan Sheets to create the <i>Typical Sections</i> of a Plan Set.			
Section	_typ.ugn	Linework for roadway typical section schematics are drawn in this ORD File.			
		Plan Sheets to create Plan & Profile or Plan & Plan sections in a Plan Set.			
Plan and Profile	_pp.dgn	Contains plan and profile drawing and sheet models. Also contains Profile Annotations including vertical curve labels, and grids lines.			
or Plan and Plan		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 <i>Tabulation of [Plan Set Section] Quantities</i> sheets that may serve as the first sheet of a Section.			
Erosion Control _ec.dgn		Plan or Plan/Plan Sheets to create the <i>Soil Erosions and Sediment Control</i> Section of a Plan Set. Used to create linework for Erosion Control features - such as silt fence			
Drainage Details_hy.dgnPlan Sheets to s Section of a Plan		Plan Sheets to show Tables and create details found in the <i>Drainage Section</i> of a Plan Set.			
Temporary Traffic Control	_ttc.dgn	Plan Sheets to create the <i>Temporary Traffic Control</i> 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 <i>Permeant Traffic Control</i> 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 <i>Right of Way</i> 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 <i>Landscaping</i> 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 <i>Miscellaneous Details</i> Section of a Plan Set.			
Wall	_wall.dgn	 Plan Sheets to create the <i>Retaining Walls</i> 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 <i>Staging</i> 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 redemolition.		Plan Sheets to create the <i>Demolition</i> 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 <i>Utilities</i> 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 - <i>ut_fiber.dgn</i>			
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.

Func	Functional Codes for File Names		
Code	Functional Area		
(blank)	Highway Design and general use is implied by lack of Functional Code		
_hyd	Hydraulics		
_sur	_ 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.

- Reference the Survey ORD File and necessary Design ORD Files (See <u>3D.2 Reference in the</u> 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.

From the Ribbon, select the *Coordinate System* tool: [*OpenRoads Modeling* \rightarrow *Utilities* \rightarrow *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:

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

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 협 method:

In the Coordinate System Menu, select the From File button.
 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.
 Select the Open button.

Select Geographic Coord	dinate System Source				×
← → ~ ↑ 📙 697	5 Riverside Road Improvements	ł	ٽ ~	⊖ Search N	ew folder
Organize 👻 New fold	er				:== 🕶 🔳 😮
📥 OneDrive - DJ&A, ^	Name	Date modified	Туре	Size	
	🜍 id-a2158061_e_row.dgn	11/4/2020 10:45 AM	Bentley MicroStati	1,368 KB	
2 Inis PC	id-a2158061_sur.dgn 📐	1/7/2021 12:03 PM	Bentley MicroStati	7,171 KB	
J 3D Objects	6				
	File 🔻	Directory	•		
File name: id-a2158061_sur.dgn				Micru On [OGN Files (*.dgn) \vee
				Open	Cancel:

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 <u>1E.4 Nested Attachments in Drawing Models and Sheet</u> <u>Models</u>.

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 for (Default 3D) has to be Referenced in addition to the 2D Design Model 9 (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 III. 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:

Left-Click and hover over the Terrain Model with the mouse cursor until the *Pop-Up Icon Menu* appears.

Activate a Terrain Model with the Ribbon:

• Left-Click on the *Set Active* tool under the *Active* dropdown.

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:

Locate the Terrain Model in the Project Explorer.

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 Ω . When a Terrain Model is Activated, the software automatically creates a 3D Design Model $\overline{\bullet}$.

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* Ω . 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* Ω .

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

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 <u>18.5 – The Background Map</u>. 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: <u>https://support.google.com/earth/answer/168344?hl=en</u>

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

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
X	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 <i>View</i> 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 <i>View</i> in the ORD Software
*	Follow Google Earth View	When this tool is used, the <i>View</i> position in the ORD Software is automatically re-positioned to correspond with the location shown in Google Earth.
R	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.
Ø	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 \rightarrow Utilities tab \rightarrow 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 <i>View</i> window showing the <i>3D Design Model</i> , 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.

	Within Google Earth Pro:
3	In the upper-right corner, go to: File \rightarrow Save \rightarrow 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 <i>Capture Google Earth Image</i> 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.
	Within Google Earth Pro: Modify the Save options in the ribbon:
4	In the Map Options dropdown: Uncheck all boxes. In the Resolution dropdown: Change the resolution to <i>Maximum.</i>
	Do not select Save Image in this step.
	Within Google Earth Pro:
5	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.

To show the aerial image, change the *Display Style* of the *3D Design Model* $\overline{1}$ View. The *Display Style* must be set to *Smooth*.

View Attributes \rightarrow Display Style \rightarrow Smooth.

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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.

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 Ω :

When viewing the aerial image from in the 2D Design Model \mathfrak{D} , 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)**.

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

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To manipulate the brightness and contrast of the aerial image in the 2D Design Model Ω :

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*

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

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 <u>3D.1 Set the Coordinate System</u>.

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".

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1	Select the Import Geometry tool from the ribbon.
	Ribbon Location: OpenRoads Modeling workflow \rightarrow Geometry tab \rightarrow 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.

	CHECK the boxes of the Alignments and Profiles to Import.
4	NOTE: Profiles can be found in the dropdown of each Alignment. Import only the Profile that corresponds to the selected Alignment.
	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
5	If the <i>Create Civil Rules</i> 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 gripedits.
	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 <u>1E.1</u> 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 <u>1E.5 Manipulating References (Move, Rotate,</u> 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* for an ORD File. The "Modelspace" in AutoCAD is a 3-dimensional space, which is similar in concept to the *3D Design Model* for 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 <u>1G.5 Level Manager</u>. The FLH Pen Table is discussed in <u>19D</u> – <u>The FLH Pen Table, Custom Levels, and AUX Levels</u>.

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.