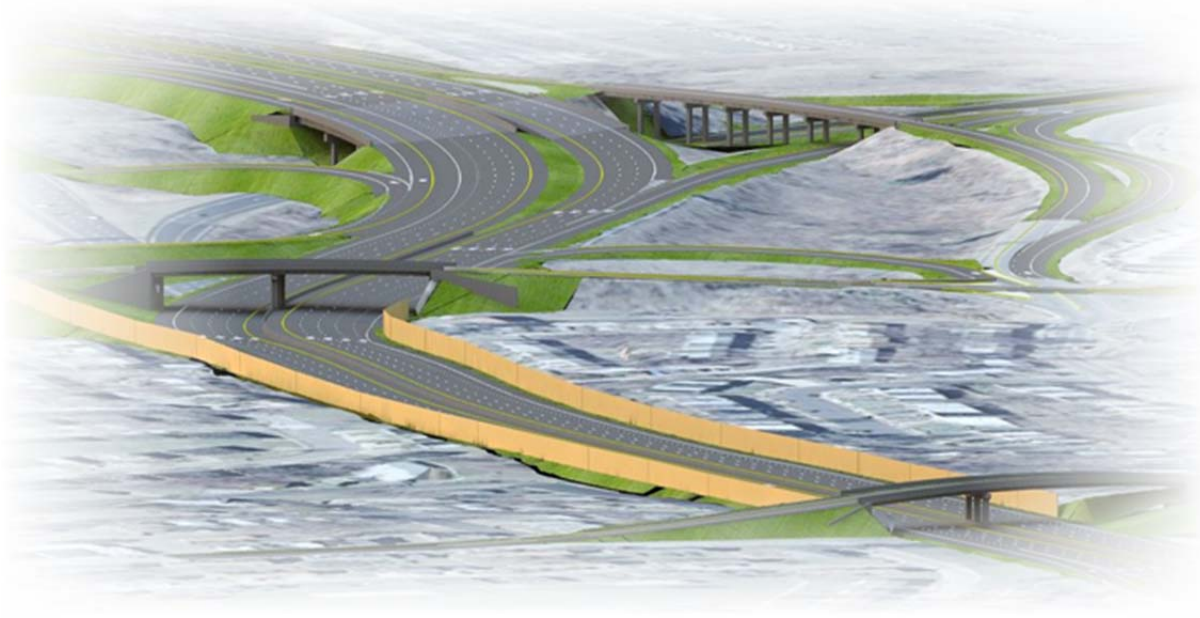


**Module****01****INTRODUCTION TO  
TRAINING MODULES****Introduction**

Welcome to the 3D InRoads Design module series. This module is your first step toward learning how to complete various details of your project in 3D using the Bentley InRoads software.



Model credit: AECOM

**Purpose of this Module**

The purpose of this module is first to orient the student to the textual formatting conventions used within the instruction of each of the later modules. Second, it will familiarize you with the technical scope and topics found in this particular module series. And lastly it will introduce you to the structure, general content and overall training approach of the upcoming technical modules.

**Objectives of this Module**

At the end of this module you will be adequately prepared to move onto the specific technical modules and follow the flow and expectations of the material.

## Definition of Audience for future Modules

Before moving forward, it needs to be stated that each module in this series will have its own prerequisites and skill level requirements. The skill level requirements will be based on instructor-led classes taught at ODOT and will be primarily focused on the InRoads series classes. Additional prerequisites may also include various modules within this series. Each individual module will list the applicable module requirements if there are any.

Do not take these prerequisites lightly, each module assumes that you have achieved a certain level of competency with the software tools and you may be asked to execute a command with very little instruction. If you are unable, you will likely not be able to successfully complete the module and achieve its intended objectives.

### Skill Level / Prerequisites:

Certain modules within this training are expected to be performed in a specific sequence. It is important to read the **Skill Level / Prerequisites** section for the module that you are preparing to work on as it will define any prior modules that are required as well as the following basic skills in MicroStation and basic and advanced InRoads skills:

- MicroStation basic skills to produce and edit 2D designs using established design standards in a production environment.
- InRoads basic skills to:
  - Navigating and using the InRoads Interface.
  - Create CAD files to be used for InRoads graphics.
  - Display surface contours, features and triangles.
  - Create horizontal geometry alignments from graphics.
  - Create and edit horizontal alignments.
  - Create profiles and cross sections.
  - Create and edit vertical PI's and define alignments.
  - Create a corridor.
  - Create a surface from a corridor.
  - Create and update cross sections.
  - Annotate cross sections.
  - Generate end-area volumes and volume reports.
  - Generate an XML report and fixed format reports.
- InRoads advanced skills to:
  - Define template constraints.
  - Create template components.
  - Create template end conditions.
  - Transitions templates.
  - Apply template point controls.
  - Define superelevation.
  - Make design changes.
  - Create custom cross sections.
  - Calculate advanced volumes.
- List any applicable Modules from this body of work

Refer to the course content or description for each of the instructor-led classes above for a more detailed breakdown of the subject matter covered in each of those classes.

## Document Formatting

The following content illustrates the formatting, along with examples as needed, which you will find in the upcoming training modules.

### Formatting Illustrations

The style of the formatting is used within the description and usage of that formatting below.

#### NORMAL BODY TEXT

Calibri – This is the normal body text that will be used for general text throughout the modules. It will be used for all text except for the text used for the hands-on steps of the module. This formatting will be used for clarifications, workflows, tips and other reference content.

As you go through the upcoming technical modules, any information in this font is for your study, general understanding, and reference only and is not intended to direct you toward any software interaction or manipulation of the module exercises.

#### NORMAL ACTION STEPS

- 1) Arial – This will be the normal body text for any action steps to be performed by the user as part of the hands-on exercises.
- 2) Anything identified with this font is part of the user interaction with the software in some way, or the identification of some other task to be performed by the user.
- 3) These steps contain the software interaction necessary to accomplish the module task.

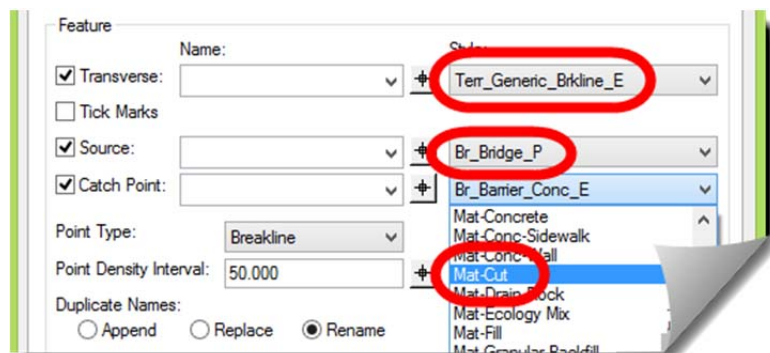
#### LOCALIZED SPECIAL FORMATTING

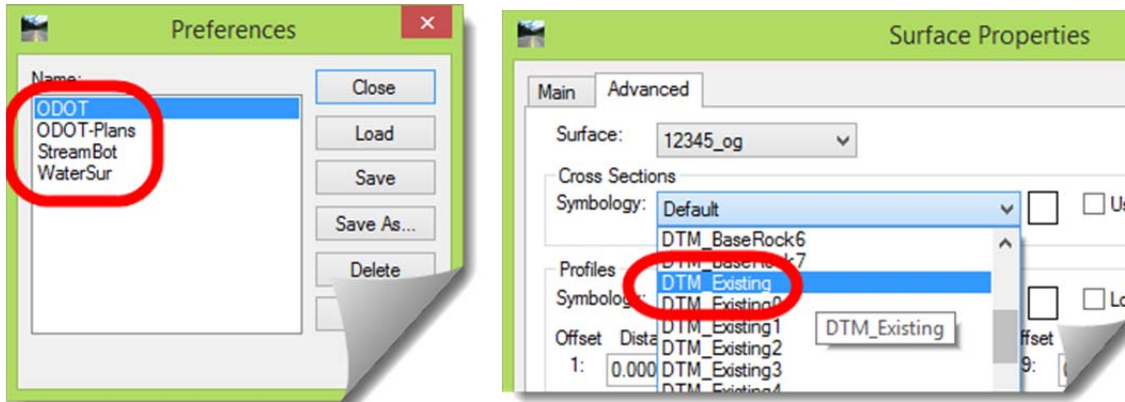
The majority of the text in these modules will be one of the two normal texts described above. In addition to the body text, special formatting will be periodically applied to that text in order to bring further clarity to the instructions and activity on your part. This special formatting will help you understand if you are to actually type something for yourself, or select something that has already been created. Additionally, the special formatting will more precisely put your attention on either a specific command, a specific area of a dialog box, or a particular button on that dialog box that should be selected. It's not critical that you memorize these formats; however, understanding them should make your work within these modules proceed smoother.

#### Pre-typed Information

**Courier New, Bold** – This formatting will be used when referring to any items that someone had previously created with a text entry, and basically represents something that someone else has previously typed. This includes InRoads Preferences like **ODOT**; Styles such as **Terr\_Generic\_Brkline\_E** and **Br\_Bridge\_P**; Named Symbolologies, such as **DTM\_Existing**; as well as Template Point Names, File Names, Surface Names, and any other related items.

In terms of interaction, these items will most often be selected from a predefined list.

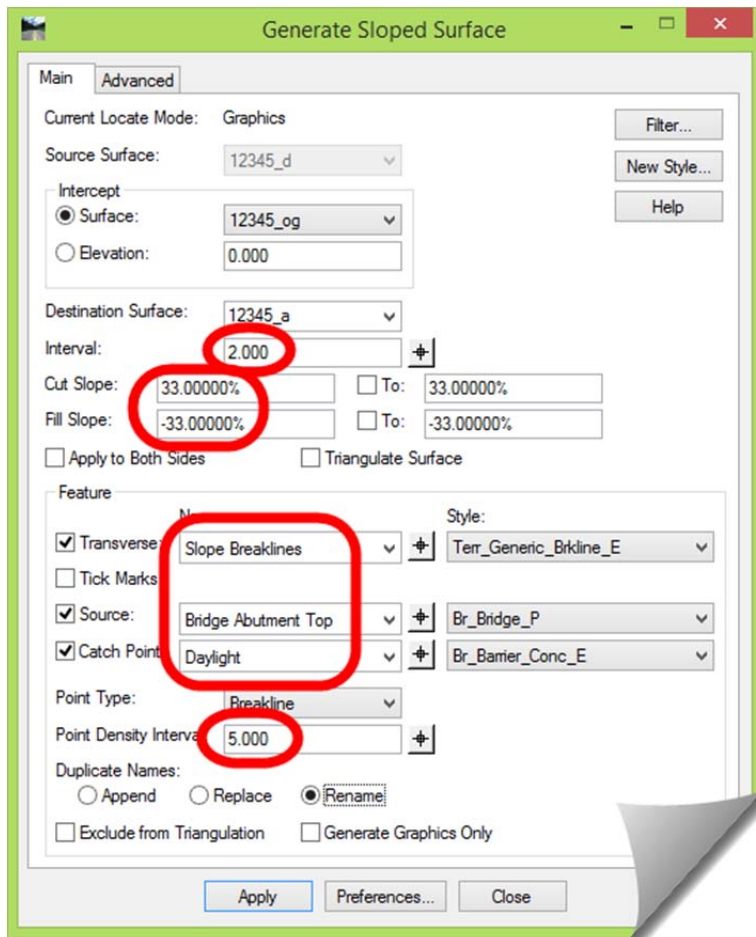




**Typed Information**

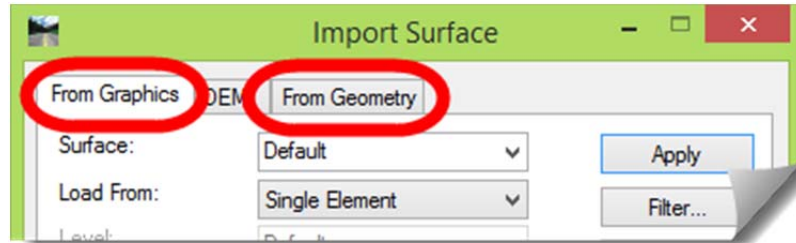
**Courier New, Bold underlined** – This will be used any place the user is expected to type an entry. For example, enter the surface name as **Temporary**, or, in the Seed Name field type in the name **Exterior Boundary**.

Another example: On the Generate Slope Surface command enter **2.00** for the Interval and define the Cut Slope and Fill Slope as **33%** and **-33%**. Also enter an appropriate Name for the Features that will be created such as **Slope Breaklines**, **Bridge Abutment Top** and **Daylight**. Lastly, enter **5.00** for the Point Density Interval.



### Commands & Tools

**BOLD SMALL CAPS** – This formatting will be used when indicating a more or less formal name of something like a command, **VERTICAL ANNOTATION** or **IMPORT SURFACE**. Other items that will fall in this category are the broader titles of a tab on a dialog box such as **FROM GRAPHICS** or **FROM GEOMETRY**; as well as the tabs on the InRoads Workspace Bar – **SURFACE**, **GEOMETRY**, **PREFERENCES** and so on.

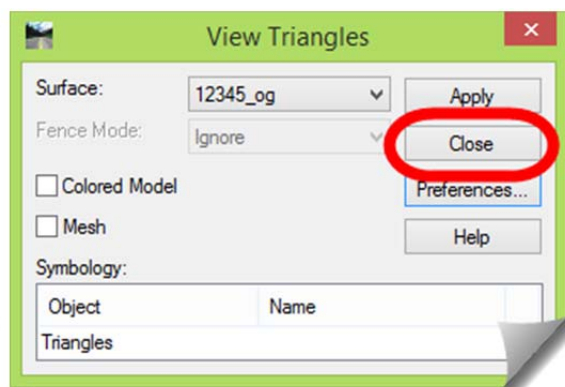
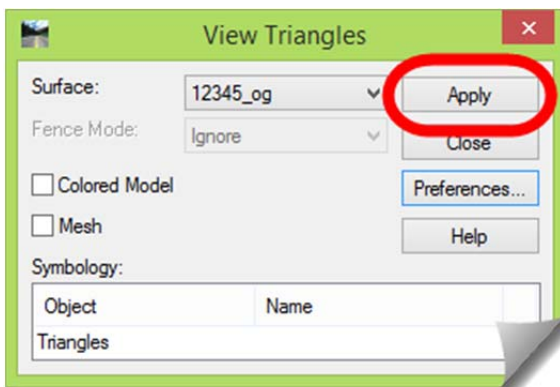
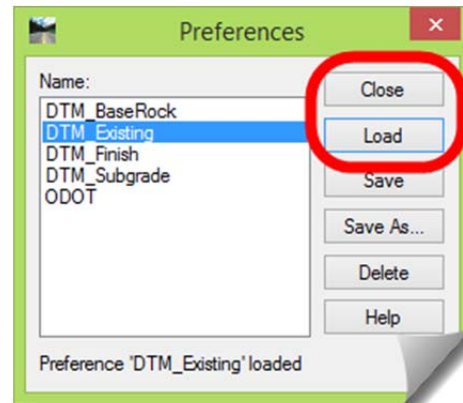
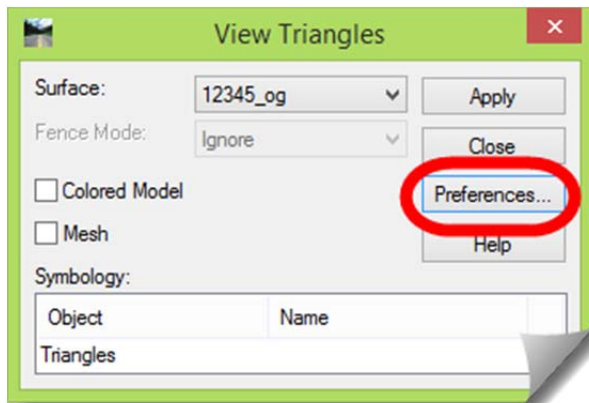


This formatting will also apply to MicroStation commands the same way. For example, selecting the **ELEMENT INFORMATION** tool, or going to the **PLACE LINE** command.

### Dialog Buttons

**[Bold in Brackets]** – This formatting will be used when directing the user to click on an actual button, and generally one that is on a dialog box such as **[Preferences...]** or **[Apply]** or **[Close]**.

For example: Open the View Triangles and select **[Preferences...]** to access the available pre-defined settings. Once there, **[Load]** the DTM Existing Preference and then **[Close]** that sub-dialog box. Now you can **[Apply]** that command and **[Close]** it once the triangles have been displayed.

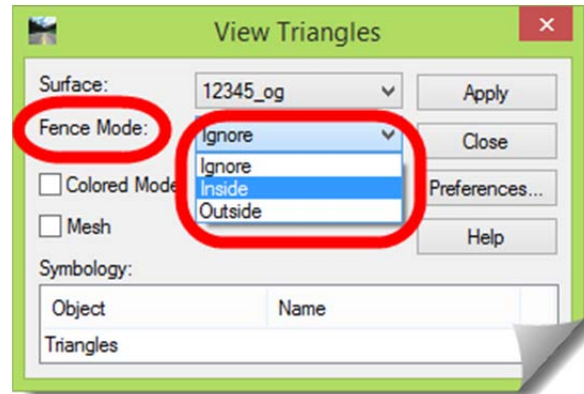


### Dialog Labels

**Bold** – There can be a considerable amount of parts to some of the dialog boxes within InRoads. Some are areas to type within, areas that provide drop-down lists to select from, and some of it is just fixed text to label an adjacent entry. This format is just a simple bold to draw attention to specific areas of the dialog box to help you find some focus as you interact with the tools.

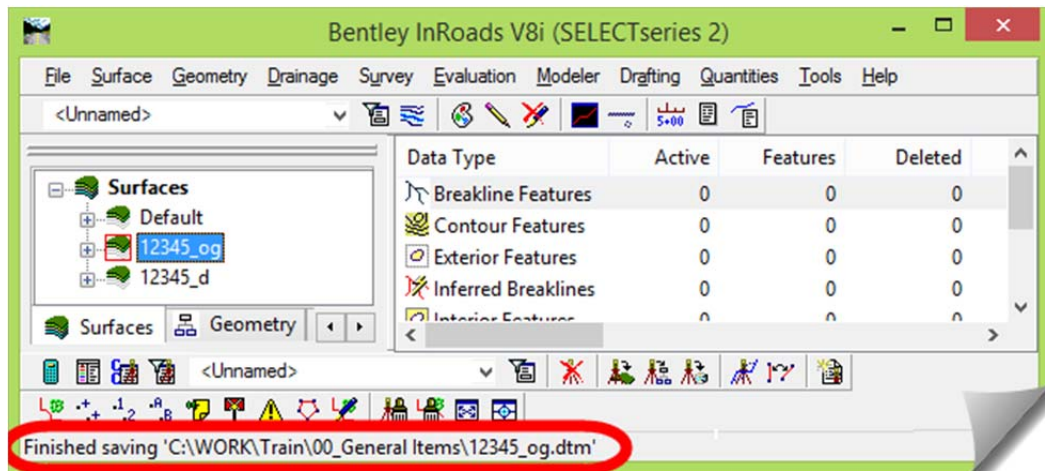
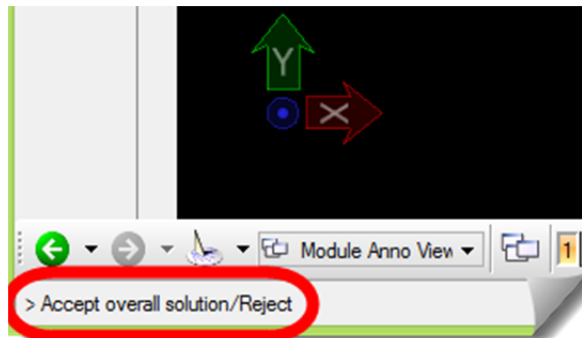
For example, a drop down list has a few unalterable options like on a **Fence Mode**: to **Ignore**, **Inside**, or **Outside**.

Whenever your attention is directed to something such as a toggle like the **Exclude from Triangulation** option, it will be bold so you know exactly what to look for, and more readily locate it. This formatting will apply to any area of dialog box or tool where a fixed, unalterable piece of text is referred to.



### Prompts & Messages

*“Italics in double-quotes”* – Software feedback such as prompts and other notices that appear in the lower left corners of MicroStation and InRoads interface frame will be italicized and placed in double-quotes “...” for emphasis. These messages are important to the guided operation of certain InRoads commands. Be alert to messages such as *“Accept overall solution / Reset”* or *“Finished Saving ‘C:\WORK\Train\03\_Features\03FEAT\_og.dtm’”* in addition to many others.



## Keyboard Keys

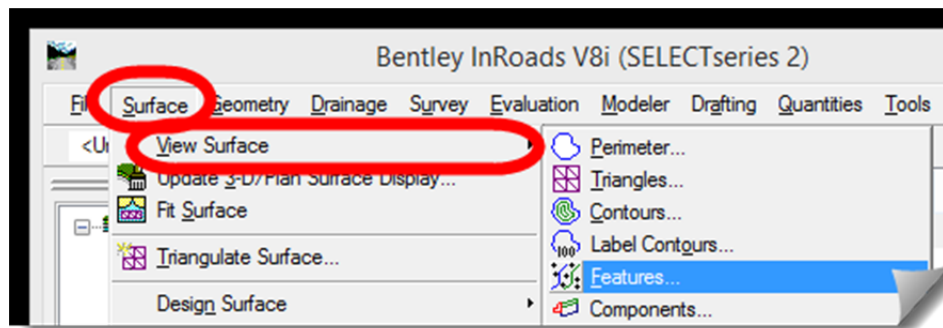
<**Bold & bounded by Angle brackets**> - When specific keyboard keys are part of the hands-on instruction, or work process, the description of those keyboard keys will be bounded by Angle brackets.

For example: Holding down <Alt> and <Shift> will reactivate the MicroStation AccuSnaps when using an InRoads command. Or, when in the Create Template tool, holding down <Shift> and using the mouse wheel will scale the template construction window in the vertical direction. Executing the same wheel action while holding down <Ctrl> will scale the template in the horizontal direction.

## FILE & SOFTWARE PATHS

**Bold Italics** – This will be used when a file path on the hard drive is identified in the instructions, such as open the file 02VIZ.dgn under *C:\WORK\Train\02\_Visualization*.

**BOLD ITALICS SMALL CAPS** – This formatting will be used when a software path is identified whether for MicroStation or InRoads. For example: go to **SURFACE > VIEW SURFACE** and select Features.



## Special Notices

The last thing that will be mentioned here are special notices that are used to add emphasis. There are three types of these special notices:

- TIP – These will most often take the form of pointing out some specific piece of MicroStation or InRoads software functionality that has relevance to the topic being covered. Knowing these will give you some sort of advantage when using the software.



**TIP:** Always check to ensure that the correct Module or Project-based XIN is loaded when you start InRoads. If the correct XIN is not open, any edits may be occurring in an XIN that is associated with a different Project or Module.

- NOTE – The content of these will be more of a gentle direction that something should have been done, known, or considered relative to some area and it may or may not be software related, and in some instances could be project or standards related.



**NOTE:** Before defining the exact Template details you will have to obtain the layout information from the correct Geotechnical person involved with this project.

- ALERT – The purpose of these will be to point out something that you should be cautious about. Failing to keep these items in mind will usually lead to a potential problem or difficulty at that point or some point later.



**ALERT:** If you have not taken the InRoads Level 2 class, and are not familiar with End Condition Targets and Display Rules, you will be challenged by the upcoming section.

## Technical Content of Training:

This training is all about taking various elements of a design project and showing how they can be accomplished with InRoads with the overall goal of creating a complete and accurate design surface of a project that could be used during construction and staking.

The specific areas of design included in this module series, along with their intent are:

- **#1 – Introduction to the Training Modules:** To prepare the student to move onto the technical modules.
- **#2 – Visualization:** To be able to display InRoads 3D data and look at it in different rotated views with various rendered displays.
- **#3 – Features:** To take information from graphics and move it into the DTM Surface with the end goal of being able to take that information (such as a ROW) and display it on a set of InRoads Cross Sections.
- **#4 – Rock Slope Benching:** To use InRoads to layout Rock Slope Benching using benching Components created in the Template Library and applied in the Roadway Designer.
- **#5 – Overburden End Condition:** To use an End Condition from the ODOT standard Template Library to model an overburden area where a rock surface exists.
- **#6 – Barrier:** To use InRoads and the Components in the ODOT ITL to model and control a roadway barrier so that it is contained in the resulting design surface model.
- **#7 – Retaining Walls:** To use InRoads to layout project-specific retaining walls that will accurately represent project conditions and be useful for quantity calculations.
- **#8 – Abutments:** To be able to create an accurate InRoads model of the abutments at a bridge end using the InRoads surface design tools.
- **#9 – Minor Approach/Driveway:** To demonstrate the tools and workflow required to model a driveway approach that intersects with a main corridor.
- **#10 – Guardrail:** To be able to use InRoads to layout project specific guardrail per ODOT standards.
- **#11 – Overlays/Widening:** To demonstrate modeling the addition of a new lane on the outside of an existing curvilinear road with Superelevation
- **#12 – Gores:** To be able to incorporate the gore areas of two intersecting roads into your InRoads surface design DTM.
- **#13 – Intersections:** To show how to use InRoads to model various complexities of intersections and the integration of secondary roads and ramps into the main corridor.

You can see from the topics above, there are some modules that cover smaller pieces of a project; whereas others address a much larger aspect of a job. And with that, it will become more apparent that some of these modules must be mastered before moving onto the larger topics such as Intersections.





**NOTE:** If a particular module is of high interest to you, feel free to go directly to that module. But you must take note of the prerequisites and if any other modules need to be completed prior to working through the module of interest. If other modules are listed as required, and you have not done them, you will have to work through those first and then return to the module of interest.

## Module Files and Folders

The activities of each technical module will be a combination of study and hands-on. The hands-on will work you through the process so you see how it is accomplished by your own hand (with the guidance of the module material). The study portion is there to support the hands-on and explain what you are doing and why you are doing it. The study portion is there to strengthen the activities and ensure that you can apply it to your project, and not just the sample project.

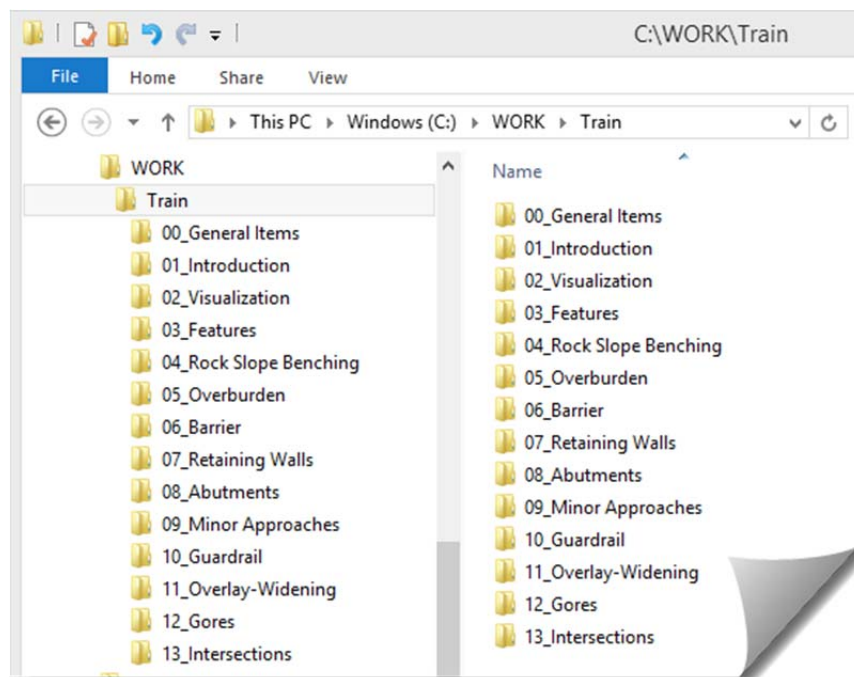
Now, with that said, a significant aspect of this training is working through the subject of the module with a sample project, and each module will have its own sample project files that you will have to use throughout the module exercises.

For this reason you will have to understand the project, its files, and the criteria presented as part of the module subject matter.

### Training Folders

You will be working on your own local hard drive during this training. The material within the modules will be expecting the training files and folders to be set up in a very specific way in order for them to align with the step by step module directions.

When a module is started, you will locate and copy the training files to your local hard drive. The module folder and related files should be placed under the **C:\WORK\Train** folder, and should ultimately look like this:



## Training Files

Within each folder will be the training files (DGNs, DTMs, ALGs, ITLs, IRDs, XIN and so on) that will be used during the module exercises. As you will discover later, each module will have a section that reviews and describes these files so that you are oriented to the project before starting the hands-on.

## Overall Typical Module Structure

Each module will be structured in a similar way so that the more modules that you work through the easier it will be to shift your focus away from the administrative and organization aspects of the module, and onto the technical material where it belongs.

The basic structure of each module will take this form:

### Purpose of this Training Module

Each module has its own specific and unique purpose.

### Objectives of this Training Module

The objectives of each module are also specified at the start of that material, but generally speaking the objectives are for the user to acquire the skill to execute the processes of the module on their current or future project.

### Definition of Audience for this Training Module

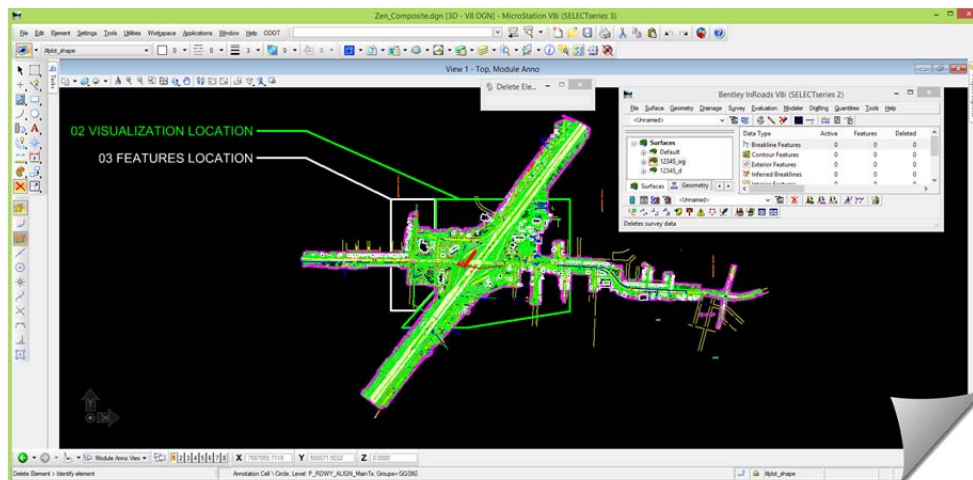
As was mentioned before, the required skill level relative to any training prerequisites are clearly defined in this section within each module. Please be attentive to this section otherwise you may find yourself struggling with the module and leaving it either incomplete or not being able to apply the material of the module.

### Technical Content of Training:

#### PROJECT ORIENTATION

##### Review Work area

This section will be describing the project data that will be used along with any unique CAD environment items that need to be known. After this section you should have a good grasp on the sample project data and the area that you will be working within.



## Prepare MicroStation / InRoads data & files

This is an extension of the overall project orientation and will consist of getting into the correct DGN file and ensuring that the InRoads files are loaded and / or available. This section may also provide an additional general orientation to the files used and provide an initial opportunity to familiarize yourself with the project.

It's at this stage when you will be launching the software, so some things need to be mentioned about this. The guidance presented in this module series was written as if this work is being done within the standard ODOT MicroStation Workspace. And additionally, it further assumes that the user is working at an ODOT computer. If you are a subcontractor, or are working with this material at home, on a personal laptop, or otherwise outside of the ODOT environment, you need to be aware of a few things.

First, the ODOT MicroStation Workspace consists of an environment where all of the standard CAD resources are immediately available. This includes items like Cell Libraries, Line Styles, Fonts, Level libraries and so on. If you are outside of the ODOT MicroStation Workspace, you have to ensure that these CAD resources are available while working within these modules because InRoads needs to see these resources to display its information properly.

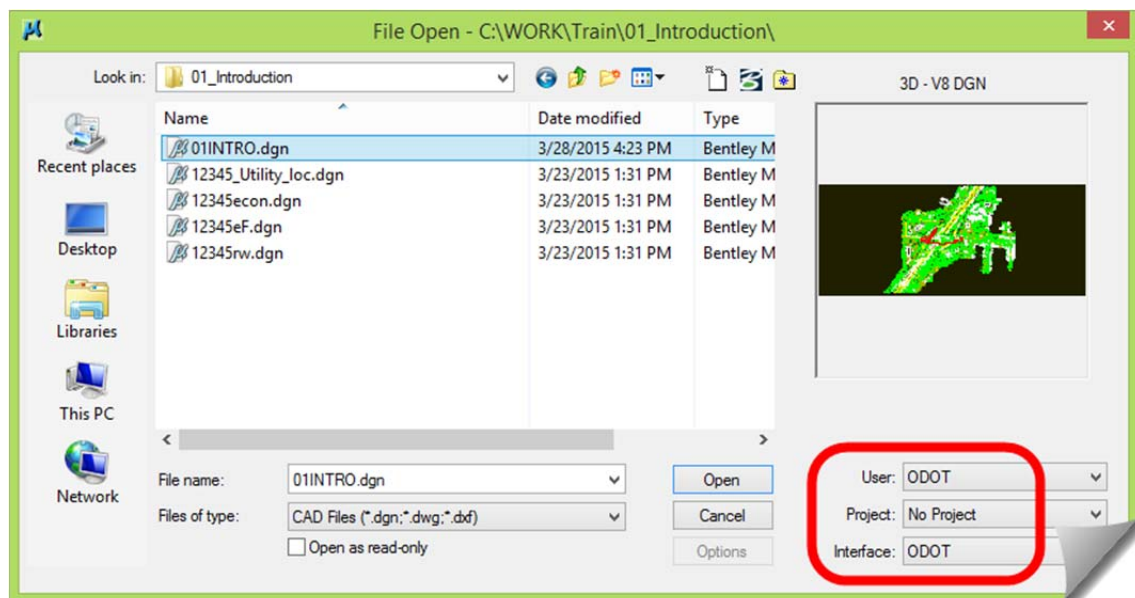
For the sake of repetition later, this is how you will begin each module:

- 1) Launch InRoads from either a desktop shortcut, Start menu, or other mechanism.

The first thing that should appear (unless you are using ProjectWise), is the **MicroStation Manager** file selection window.

- 2) Make sure that the **User** and **Interface** in the lower right of that dialog box are both set to **ODOT**.

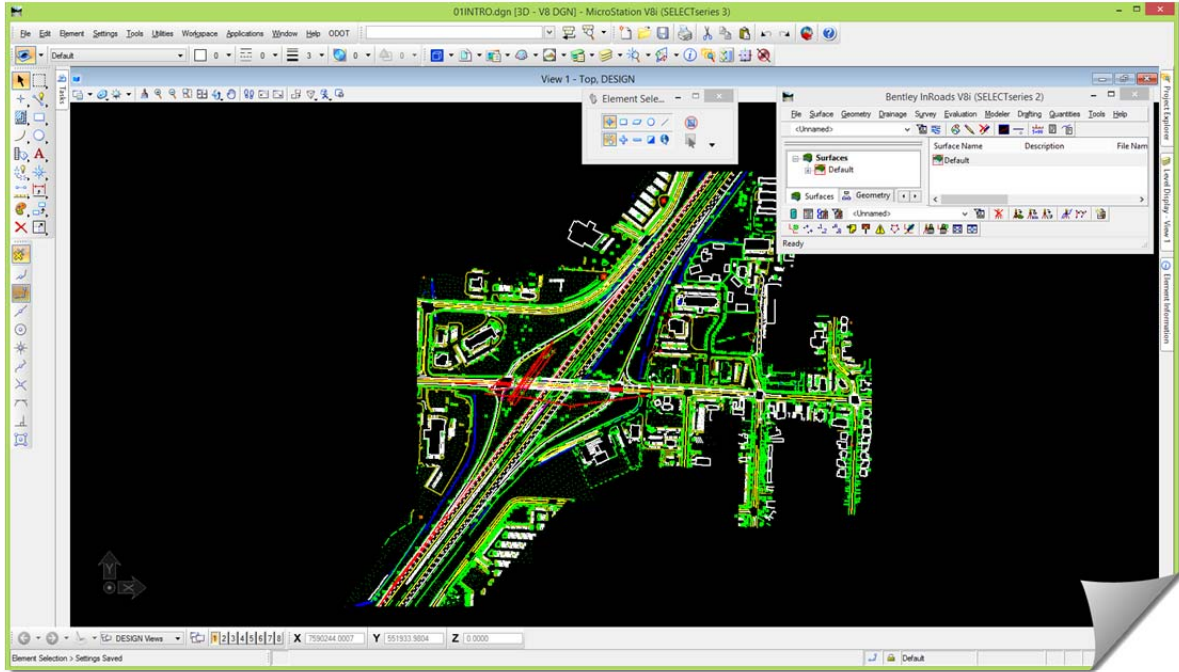
If you are working on a standard computer that's within the ODOT facility system this will likely be automatically defined for you already.



- 3) The next thing you will do is browse to the module folder and select the module named DGN file, in this case **01INTRO.dgn**. And then click **[Open]** to launch the software.

You will do this exact same thing going into each module except you will select that module specific DGN as identified in the module material.

- Let the software open and confirm that both MicroStation and InRoads are properly running and no error messages appeared.



**TIP:** Get in the habit of checking and verifying items as you go along. For instance, glance at the MicroStation **Main Menu**. Spotting the **ODOT** menu category is a simple verification that you are in the **ODOT Workspace**.

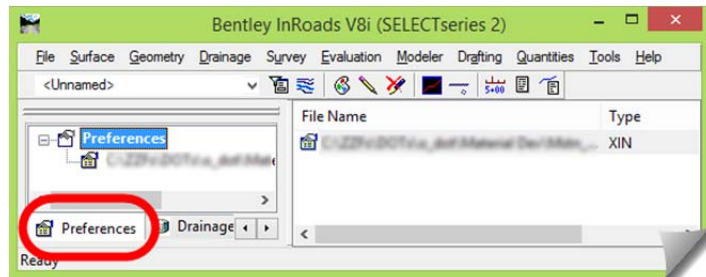
Now that you have the software open, and are in the ODOT MicroStation Workspace, the second area to consider is the InRoads environment. There are 4 areas to consider here:

- The InRoads XIN that will be used
- The **PROJECT DEFAULTS** that are established
- The **APPLICATION ADD-INS**
- The **VARIABLE MANAGER** settings

Each of these plays their role in standardizing the InRoads environment and should be given at least a minor mention.

- Click on the **PREFERENCES** tab of the InRoads **Workspace Bar** and notice the location of the XIN that is currently open.

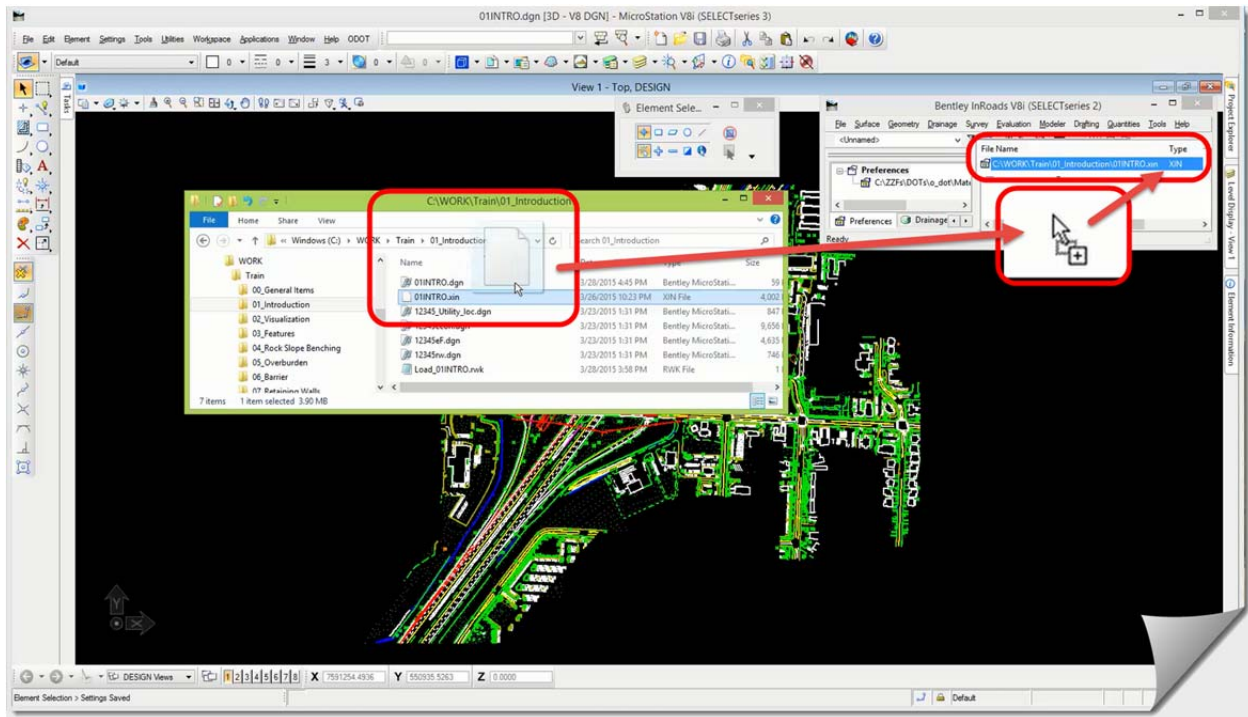
Most likely it is **civil.xin** and not pointed to the folder of the module that you are working in.



This is what you can do to open the correct XIN for any module that you are working within.

- 6) Open **Windows Explorer** and browse to your module folder. Bring the **Windows Explorer** window on top of the MicroStation window. Select the XIN in that folder and drag and drop it into the InRoads interface.

You should see the XIN appear in the **Feedback Pane** of the InRoads interface confirming that it has been loaded.



This is one way that you can load the XIN at the start of your work.



**TIP:** You can drag and drop any InRoads files (DTMs, ALGs, ITLs, IRDs, XINs and even RWKs) from the Windows Explorer directly into the InRoads interface to quickly load that data. And it doesn't matter what the active tab is, just drag and drop one or many of them.

The next area to consider is the InRoads **PROJECT DEFAULTS**. From your InRoads Level 1 class you should understand that the **PROJECT DEFAULTS** do two things.

- Open InRoads-specific configuration files like the XIN
- Point to project-specific folder paths to reduce browsing

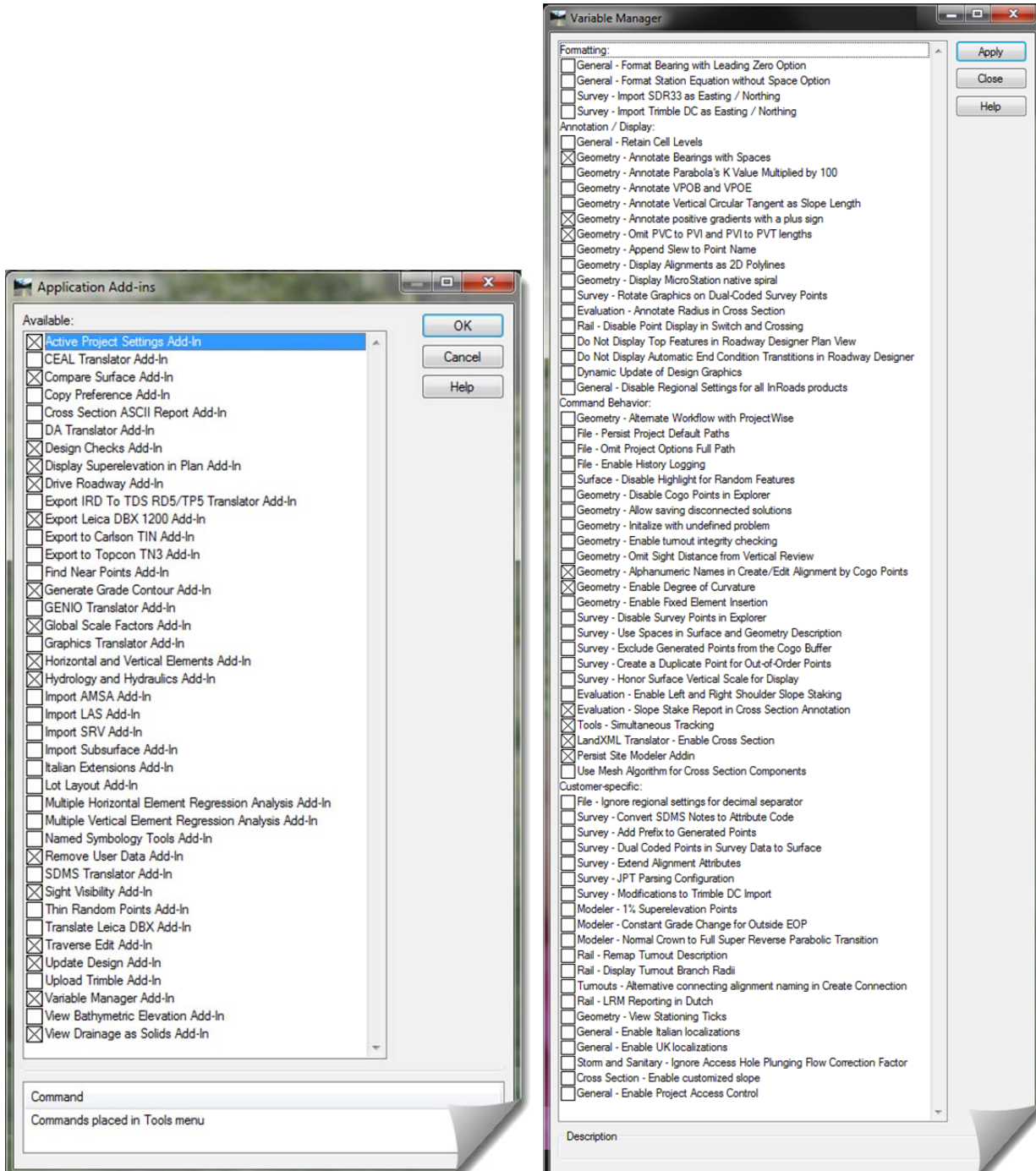
The ODOT environment has the **PROJECT DEFAULT** settings established during user logon. This is to ensure that default settings are at least 'reasonable' at start-up. To make this simple for this module series, we are going to avoid this area all together and just manually load the files that we need as we need them.

This can be done using the drag and drop technique just described, or through the use of an **RWK Project** file which will be set up for each module.

To summarize this item, just be aware that during the modules, you will be instructed to both **[Open]** and **[Save]** InRoads files. It will be up to you to accomplish that action and open the correct file, and save it inside your module specific folder.

The InRoads **APPLICATION ADD-INS** and **VARIABLE MANAGER** settings are also automatically defined at user logon at ODOT. So, for those of you working at ODOT this is done. For those working outside of ODOT, be aware that certain tools and settings will have to be set manually. This is noted because these modules assume that you are working within the ODOT system, not externally.

- 7) For those of you working outside of the ODOT system, you should verify that the setting for the **APPLICATION ADD-INS** and **VARIABLE MANAGER** are established as shown here.



That's all that will be done for this introduction module.

- 8) [Close] both **MicroStation** and **InRoads** and finish studying this document.

## THEORY - STUDY

This begins the section where you will do some background study to prepare for what's to come in the practical hands-on section.

### Process Overview

This portion of the module will be focusing on two aspects of the work to be done.

First, if applicable, will be the identification of things that should be considered just prior to moving into the software. An example of this would be the identification of any design criteria, details or parameters that would be required by the software. There is no sense in getting into the software only to find that you do not know the project design speed.

Additionally, this section will discuss any new ways of thinking or working as an introduction to the software-specific tools and exact processes. This will be akin to an introduction to the detailed nuts and bolts to follow.

The second portion of this section will be to discuss what you will be doing with InRoads relative to addressing the subject matter of the module. It will contain varying levels of discussion of the techniques and tools that will be used, and how they will be used within the workflow or process. This section will be foreshadowing things to come when you get into the hands-on.

## PRACTICAL APPLICATION - HANDS ON LAB EXERCISES

This last major section is the main body of the module and consists of the application of the tools and techniques. This will require you to use the applicable sample files and work through the exercise while studying any additional content integrated into the steps.

### Understanding the Details

Now that you've gone through a study of the theory, this section will be taking that knowledge and further explaining the area of the project that will be worked on as well as the exact criteria being used in the layout or design within that area. It will also include a final detailed review of any relevant project data, as well as reviewing any relevant ODOT design criteria, and finally reviewing any relevant ODOT CAD / InRoads ITL / XIN information that relates to this work.

### Layout Scenario 1

This section will contain a series of exercise steps that will walk you through the subject of the module. If the module content is complicated, this first section will attack the simplicities of the work as best as possible in order to lay down a solid technical foundation.

### Layout Scenario 2 (as applicable)

This section is another hands-on portion of the module and may contain a slightly more complicated example, or potentially a similar example with less guidance built into the step by step procedure. This will encourage you to really understand what you are doing and instigate a personal thought process versus just following predefined steps.

### Layout Scenario 3 (as applicable)

If the subject warrants it, an additional hands-on section will be presented to expand the level of application of the tools, or to further reinforce the work process, or to increase the level of complexity of application.

### Other Potential Details

Some topics within this module series have what might be called ‘spin off’ topics. These topics are somehow related to the main topic but not directly part of the workflow being presented. An example would be retaining walls. The main body of the module will discuss how to integrate retaining walls into your project. This will cover topics like the specific Templates used and how to define the various controls of the walls during modeling.

A follow-up subject covered in this additional section of the module could be how to use the resulting design surface with the walls and create your cross sections and further how to perform quantity calculations with these walls.

Some modules will have additional topics and some may not.

### TIPS, NOTES & ALERTS

These TIPS, NOTES and ALERTs will be scattered throughout the modules as applicable content reveals itself.

## Conclusion

Congratulations, you have completed the introductory module and are ready to move onward in the technical module series.

We leave you with one final thought – Do these modules with an attitude of application. Study them with the viewpoint that you are going to apply these new skills on your current or future project. Look into and beyond the exercise steps and motivate yourself to momentarily pause and consider past, present and future projects and how this information could be put into practice.