Chapter 3: Building Horizontal Alignments: the Basics

Section 1 - Managing Geometry

A project's geometry may become very complex. The design phase of a project may last for many years. Maintaining design data for maintenance and improvement projects may be required for many years after that. A little planning and a little foresight prior to and during the design of a project can literally reap benefits for decades.

Communication

Whether conducting a war, having a relationship, or designing sites or roads, good communication is an absolutely critical component to success. Poor communication results in confusion, wasted time, and failed objectives. InRoads is designed to facilitate good communication.

Self-Documentation

In data management there are tremendous advantages to embedding important information about an object within the object itself. Most objects in the InRoads data model can accept long names and descriptions. Many functions in InRoads reflect and report those names. Take advantage of this ability to communicate: use good, explicit names.

Generally, 80% of the time spent designing with InRoads is spent figuring out the engineering. It might take an extra 5% to take full advantage of the self-documentation functionality of InRoads, but it can save tremendous amounts of time throughout a decades long life cycle.

Naming Conventions

Using good Naming Conventions saves more time than perhaps any other habit in InRoads. The more people and companies involved and the longer the work cycle, the more important it is to communicate well. Even on single-person projects, poor naming conventions can cause much confusion and poor decisions.

Organizing Geometry

Is the design or construction partitioned into discrete phases or areas? Will there be few or many sharing the data? Will displaying existing geometry be needed universally? Will design teams need write-permissions only for discrete subsets of the proposed data? From a project level, how do you want to manage the geometry? The organization of the geometry should reflect the needs of your organization or project team and the needs of the project.

Object "Status"

It is critical to segregate one type of data from another in the clearest, most obvious manner. In my experience there are a handful of discrete data types between which there should be no confusion:

- Existing
- Proposed (preferred)
- Proposed (alternates)
- Bad (many variations, but all in need of clear quarantine).

Design your management of the InRoads data with this in mind.

Recall that InRoads works not from graphics but from its own data. You, as the Builder of the InRoads model, must decide how you want to manage the InRoads Geometry.

An organizational plan saves time when building geometry. While InRoads has a number of management tools such as Copy Geometry and Rename Geometry that can be used to modify and reorganize the Geometry, things proceed more smoothly when following a plan.

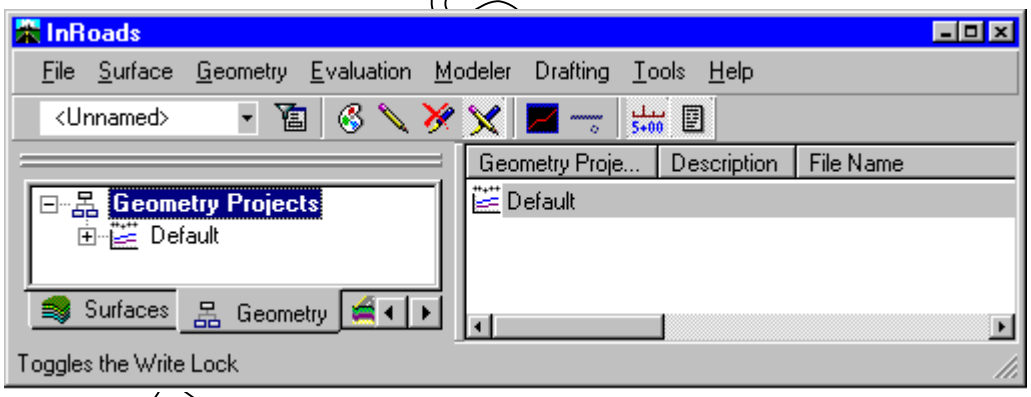
The highest level of Geometry organization in InRoads is the Geometry Project, containing, Coordinate Geometry Points, Horizontal and Vertical Alignments and Superelevation definitions. This is the unit that is saved as a file on the hard drive or server. InRoads can have any number of Geometry Projects open at the same time.

Section 2 - Building Practice Alignments

Creating New Geometry

First, since we will be working exclusively with Geometry this lab, let us set the InRoads Explorer Workspace tab to Geometry.

1. Select the Geometry tab in the InRoads Explorer Workspace bar.



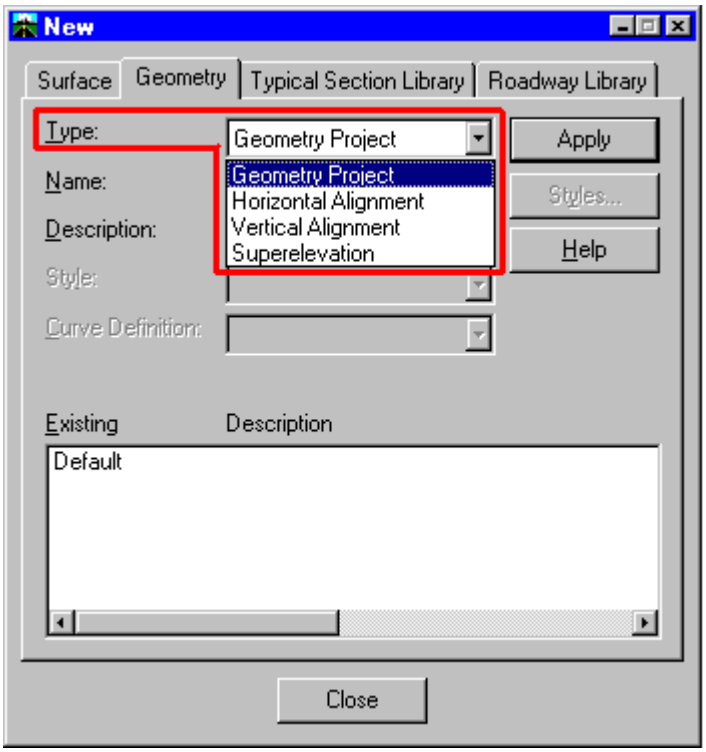
Create a New Geometry Project for our new alignments.

2. Select InRoads>File>New.

This form is used to create all new data file types in InRoads.

3. Select the Geometry Tab.

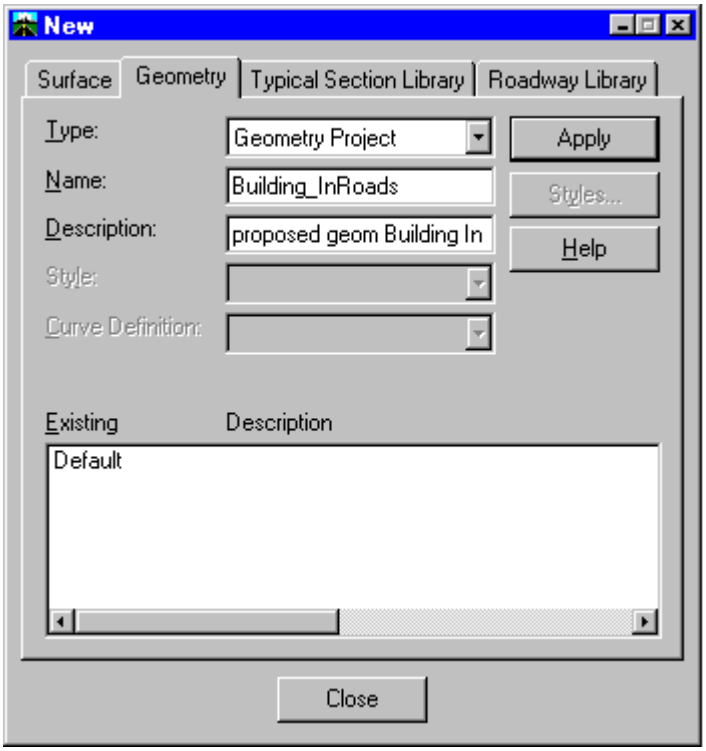
The Type listbox lists the Four Geometry structures that can be created. Selecting Geometry Project will create a new blank Geometry Project. Creating an Alignment or Superelevation definition will do so in the active parent structure. For example, a new Vertical alignment will be created in the Active Horizontal alignment.



- Geometry Project
  - COGO Buffer (Always 1)
  - Horizontal Alignment (Zero or more)
    - Superelevation definitions (Zero or more)
    - Horizontal Event Points (Zero or more)
    - Vertical Alignment (Zero or more)
      - Vertical Event Points (Zero or more)

To create a New Geometry Project:

4. Select `Geometry Project` for `Type`.
5. Key in a descriptive `Name`, such as the title of the class "`Building_InRoads`".
6. Key in a useful `Description`, such as "`proposed geometry for Building_InRoads`."

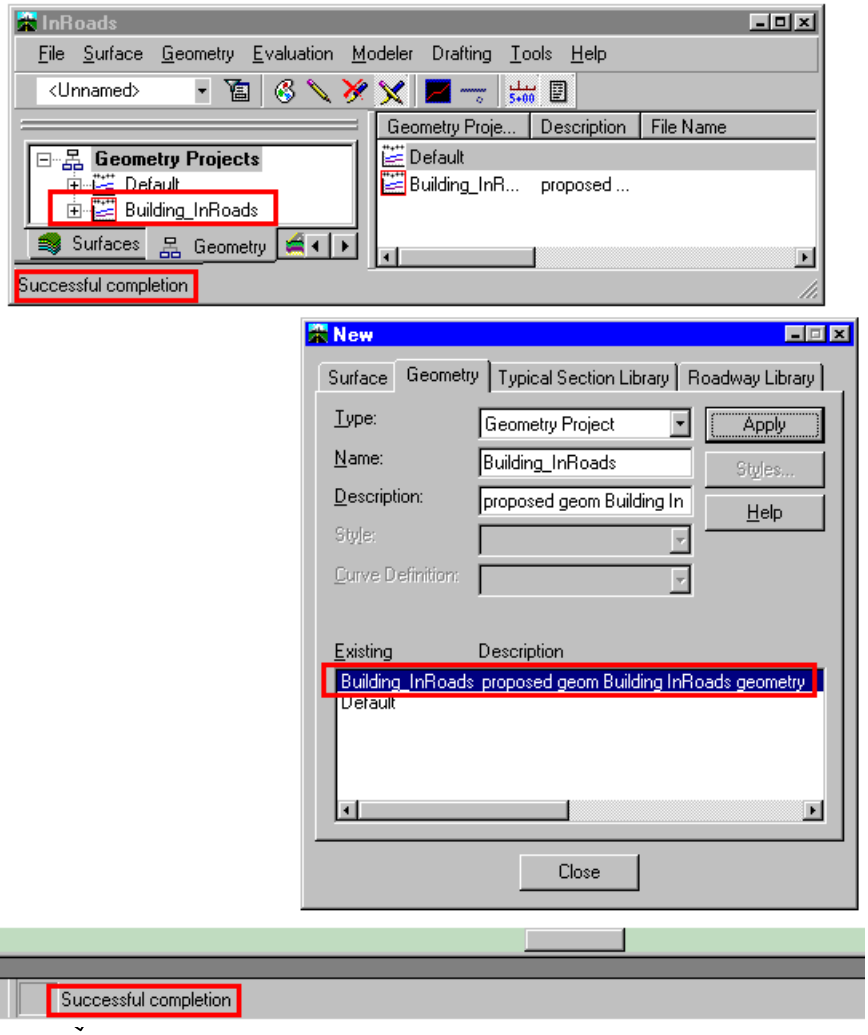


7. Hit Apply.

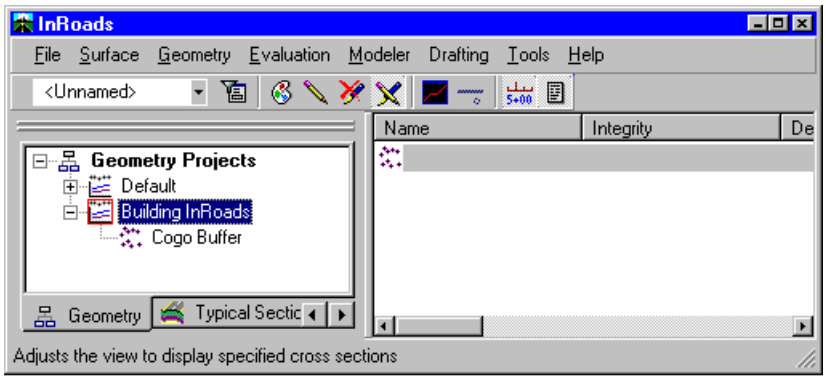
Feedback:

Notice the feedback upon hitting the Apply button:

- In the New Geometry form Building_InRoads is shown in the Existing [Geometry Project] list.
- In the InRoads Explorer "Building_InRoads" is shown as the Active Geometry Project.
- "Successful completion" is displayed in the InRoads and CADD message fields.



8. Leave the New Geometry form open.
9. In the InRoads explorer expand the "Building_InRoads" object.
10. Select the Building_InRoads object in the Workspace pane so that the Results pane will show the "children" of Building_InRoads.



Creating Horizontal Alignments

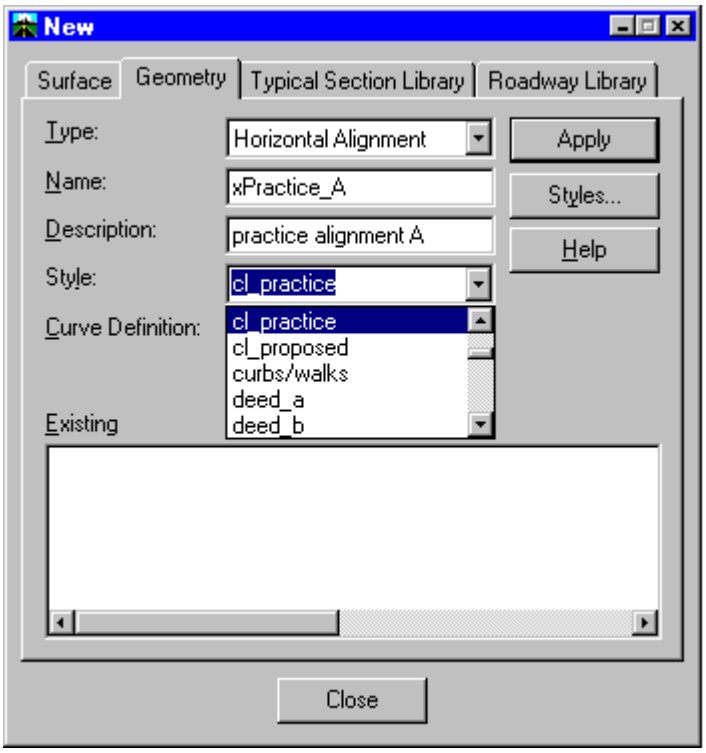
In this lab we will create a number of discrete alignments. We will need to create an InRoads Horizontal Alignment for each. If we can create blank alignments all at once we will have to set the appropriate Alignment as Active before defining its elements.

Alignment naming convention

For this lab we will be defining a number of "practice" alignments with little engineering meaning. The lab graphics are segregated by Letter prefixs: the first alignment will be between points A1 and A2; the second from B1, B2 and B3; etc. These alignments will not be used in future labs. What would be an appropriate naming convention? The lab will suggest one; you are free to use something you prefer.

11. Set the Type to Horizontal Alignment.
12. Key in "xPractice_A" for the alignment Name.
13. Key in a useful Description.
14. For the Style, select "cl_practice" (for special practice alignment symbology).

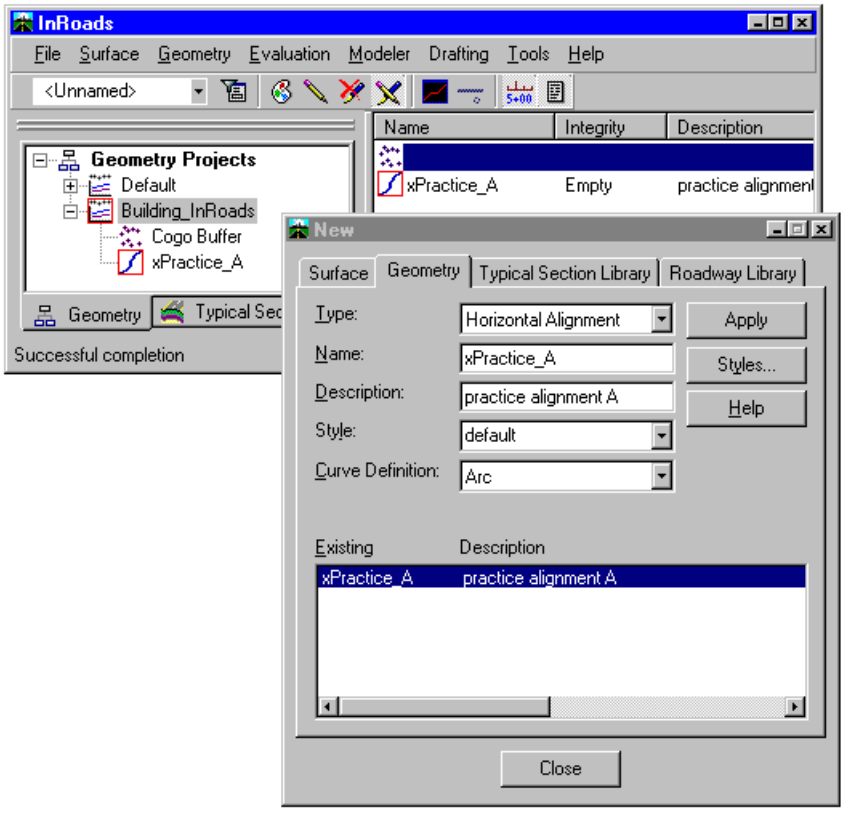
The Style controls how the alignment graphics are displayed (settings are defined via InRoads>View Geometry>Geometry Style Manager and stored in the wysiwyg.ini Style file). In addition to providing automatic conformance to graphics standards, the Styles can be used to provide information).



15. Hit Apply.

Feedback:
Notice the feedback upon hitting the Apply button:

- In the New Geometry form xPractice_A is shown in the Existing [Horizontal Alignment] list
- In the InRoads Explorer "xPractice_A" is shown as the Active Horizontal Alignment. In the Results pane additional information for "xPractice_A" is displayed.
- ."Successful completion" is displayed in the InRoads and CADD message fields.



Building Horizontal Alignments with the Horizontal Curve Set tools.

Now that InRoads has a "memory slot" for the alignment, we can start defining the Alignment. The primary "Build and Create" commands for horizontal alignments are found under the InRoads>Geometry>Horizontal Curve Set menu and/or the Horizontal Curve Set toolbar.

Similar to CAD tools.
The Horizontal Curve Set tools are similar to CAD tools

Horizontal Curve Set command	MicroStation command	AutoCAD command
Add PI	Place Linestring	Polyline
Insert PI	Insert Vertex	Pedit>Edit>Insert
Move PI	Modify Element	Pedit>Edit>Move
Delete PI	DeleteVertex	Pedit>Edit>Straighten
Define Curve	Fillet	Fillet

In its most simple form, defining an alignment can be as easy as placing a linestring and filleting the vertices with the proper radii. Of course, InRoads provides a great deal more functionality than the CAD packages. CAD doesn't provide support for spirals (clothoids) for transitional curves nor the "unusual" practice of using circular curves in the horizontal plane and parabolas in the vertical.

For our first alignment we will simply place a single tangent from points A1 to point A2. A single line means two endpoints or Points of Intersection. We will use the Add PI command.

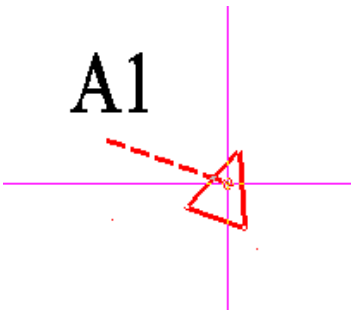
Before using this command:
Simplify and verify: It is always a good idea to verify your objects in InRoads before working. Make sure there are no extraneous and possibly confusing graphics in your working or target area. Is the existing condition of the alignment like you expect it to be? In this case we are working with a brand new alignment; it should, therefore, be empty. This can be verified by Viewing or Reviewing the alignment.

Feedback during the command:
InRoads uses prompts extensively during the Add PI command: read the prompts! Expect "rubberbanding" during the command.

16. In the CAD file `xLabHorizontalAlignments`, Zoom or Window so that A1 and A2 are visible.
17. Select InRoads>Geometry>Horizontal Curve Set>Add PI.

The Add PI command adds a Point of Intersection to either end of the active alignment. It first prompts `> Identify alignment end`. If the alignment is empty, a data point or precision key in is taken as the first PI. Otherwise, the data point is used to select which end of the alignment to "Add PI's" to.

18. Place a data point near "A1" (accuracy is irrelevant at this point).



The initial PI is placed at the datapoint (a PI symbol may or may not be shown at the PI, depending on settings).

The prompt changes to: `> Identify Point/Reject`, the alignment "rubber bands" from the Initial PI to the cursor, and the InRoads Explorer message field echoes the Coordinates of the cursor: