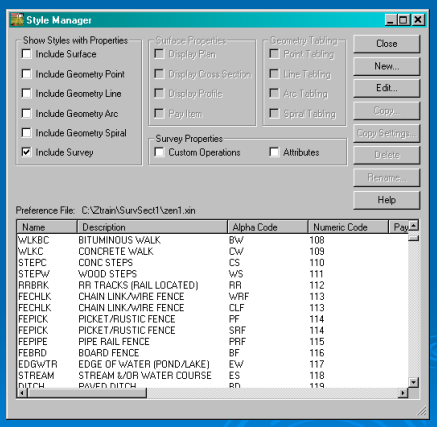
The DTM - Objectives

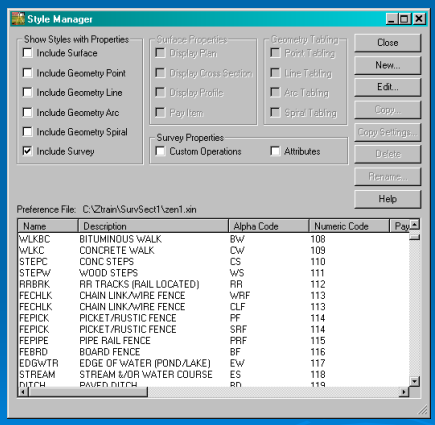
- InRoads Survey & Surface Basics
- Review the Basic DTM Point Types
- Creating a new InRoads Survey Surface
- Surface processing in InRoads
- Loading 3D data into a Surface
- A bit about Surface Properties
- Survey Viewing VS InRoads Viewing
- Overview of the View Surface commands
- InRoads Locks, … a beginning

The Brains of In-Survey

- The *Style Manager* defines how the field Coding is interpreted
  - For CAD Display
  - For Surface creation
  - For Geometry



Survey Field Codes



- Each shot collected in the field is represented by an item in this manager
- The table defines the characteristics for each field item

Surface Basics

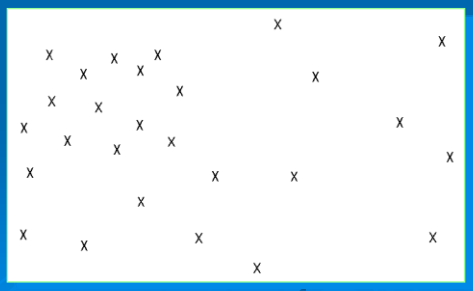
- InRoads Survey can create a Digital Terrain Model (.dtm) from the collected field data
- Only one surface can be created at a time
- The surfaces that are created can be used in InRoads, InRail, Site, Storm & Sanitary … etc.
- There are 4 different point types that Survey can assign to the collected field data
- Each Point type relates to a specific way that In-Survey defines relationships and triangulation within the surface model

Surface Point Types

- The InRoads software uses several different types of points
  - **Random points.**
  - **Breakline points.**
  - **Interior boundary points.**
  - **Exterior boundary points.**
  - **Contour points**
- DNC, '*Do Not Contour*' in Survey is the same as 'Exclude from Triangulation in InRoads
  - But this is really not a point 'Type' in InRoads

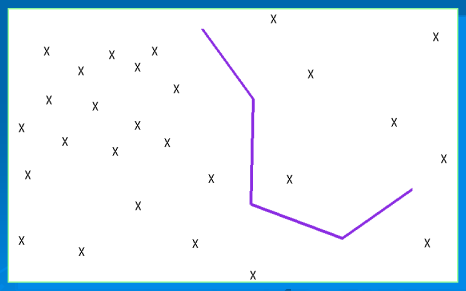
Random Points

- Random, or regular points, are singular points with X, Y and Z coordinates
- They have no direct relationship with other points.



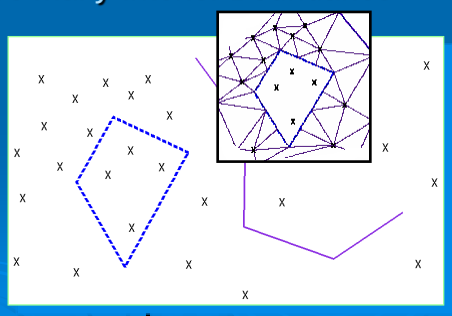
Breaklines

- Breaklines are used in a surface model where a linear relationship exists along a path
- Two or more points are required to define a breakline.



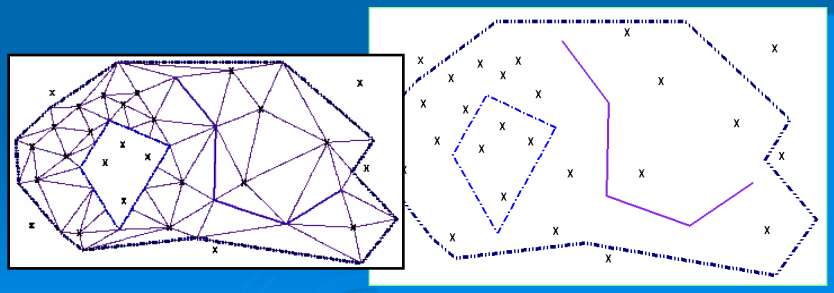
Interior Boundary

- Interior boundaries define void areas
  - No computations occur *inside* these void areas.
  - Must be a closed figure
  - A single surface can have many Interior Boundaries
- Can be collected around perimeters of ponds, buildings, lakes or inaccessible



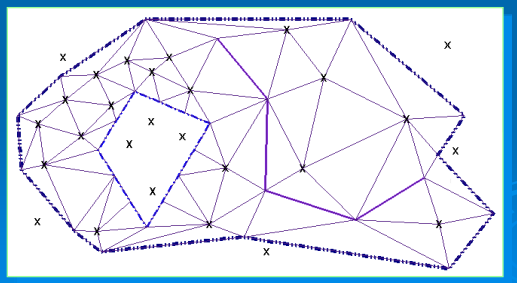
Exterior Boundary

- Exterior boundary points are used to limit the outer extent of the model.
  - No computations occur *outside* the exterior limit.
  - Only 1 exterior boundary can be defined per model.



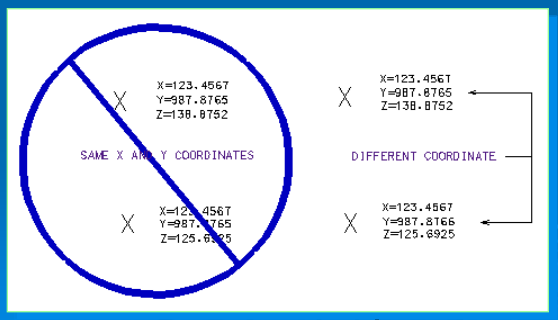
Creating a Surface

- First add the 'components' that define the elevational 'controls'
- Next, processing forms the relationships between all the data contained in the model



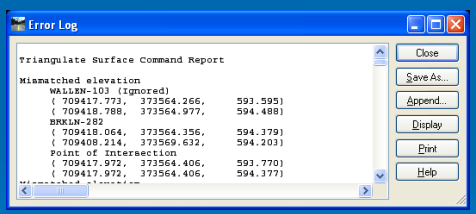
Data Conflicts

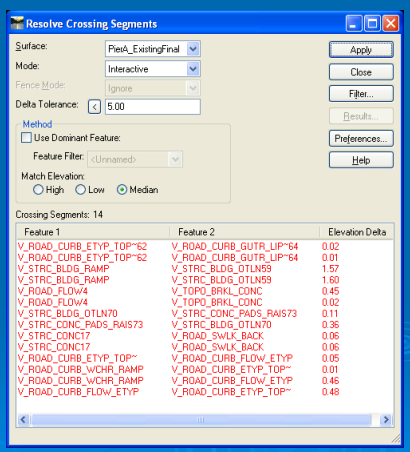
- The InRoads DTM allows only one Z (elev.) value for each X-Y coordinate
  - If these conflicts exist they will need to be resolved



Resolving Data Conflicts

- InRoads will 'auto-resolve' the crossing breaklines when it triangulates

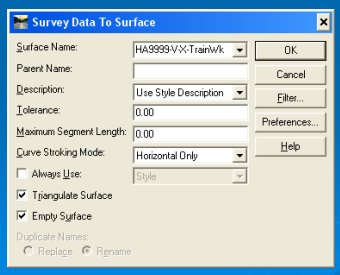


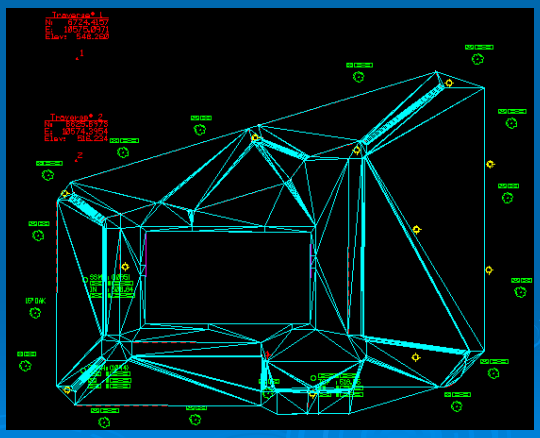


- Another tool has been added in an attempt to help here, but …

Creating a Surface Model

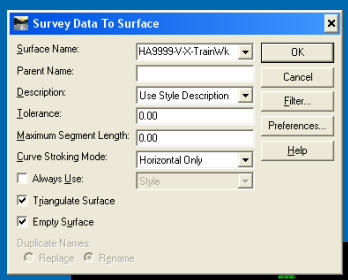
- *Survey > Survey Data to Surface* creates a surface model based on the Fieldbook data

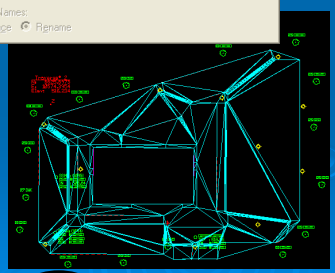




Creating a Digital Terrain Model

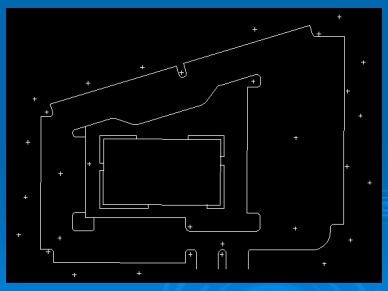
- Key-in the:
  - *Surface Name*
  - *Description source*
  - *Tolerance* (Area 'tube' Tolerance)
  - *Maximum Segment Length*
    - Linear Feature Densification
  - *Curve Stroking Mode*
    - Horiz Only; Horiz & Vert; or None
  - *Triangulate Surface*
  - *Empty Surface*
  - *Always Use*
    - For assigning the DTM Feature Name





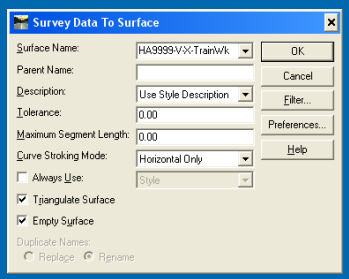
Feature Characteristics

- All Data in an InRoads DTM are called Features
- Every Feature in a DTM is always given:
  - A Name
    - To Uniquely identify it
  - A Style
    - One to Many definition
    - For added intelligence
  - A Type
    - For Triangulation purposes



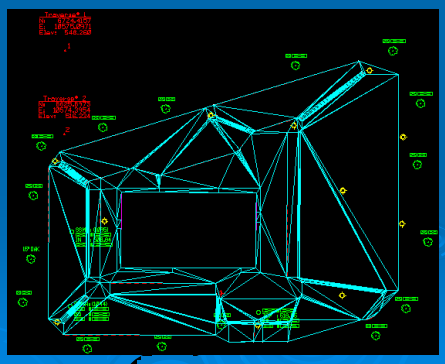
Assigning Characteristics

- The Surface Feature **Name**
  (Will always be unique)
  - Defined by the Always Use
    - Alpha Code
    - Numeric Code
    - Style
- The DTM **Type**
  (Breakline, Random, …etc)
  - Assigned in the Style Manager for that particular Field item collected
- The Feature **Style**
  - The Style is always the one associated with the Code



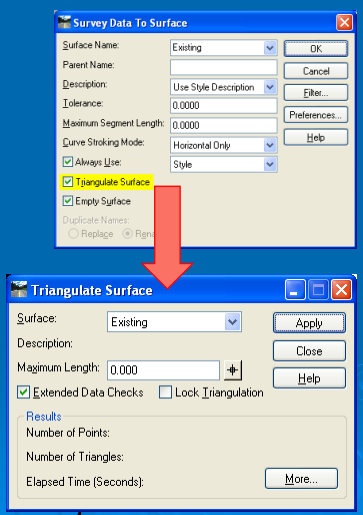
Creating the Surface Model

- *Survey > Survey Data to Surface* creates a surface model based on the field book data
- Triangulation is the process of defining the elevational relationships between the collected data

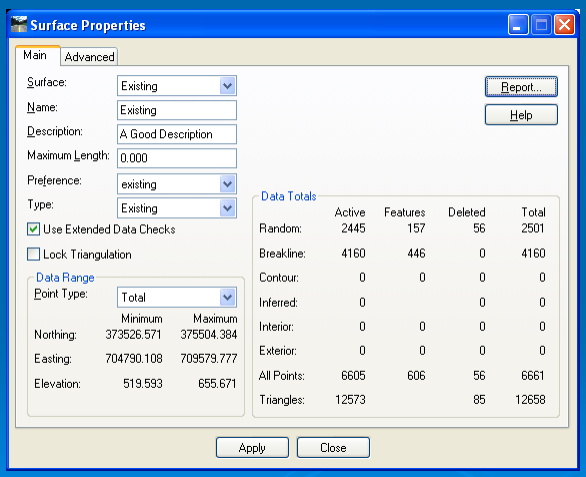


Processing the DTM

- Triangulate Surface
  - *Surface Name*:
    - Identify the surface to process
  - *Extended Data Checks*
    - Usually toggled *'on'*
  - *Maximum Length*
    - Data and project dependant
  - *Lock Triangulation*
    - Available to 'unlock' if 'locked'
  - *Results*



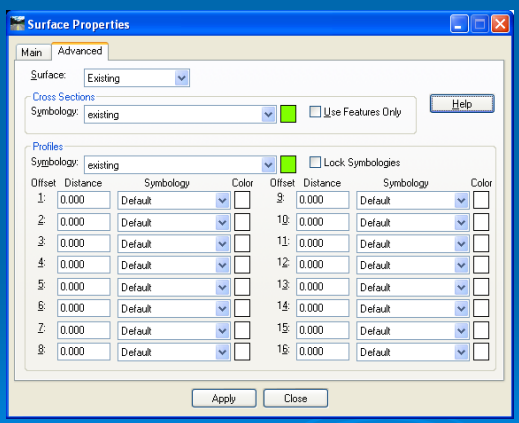
Surface Properties - Main Tab



- Name
- Description
- Max Length
- Preference
- Type
- Checks
- Lock
- Data Range
- Data Totals

Advanced tab...

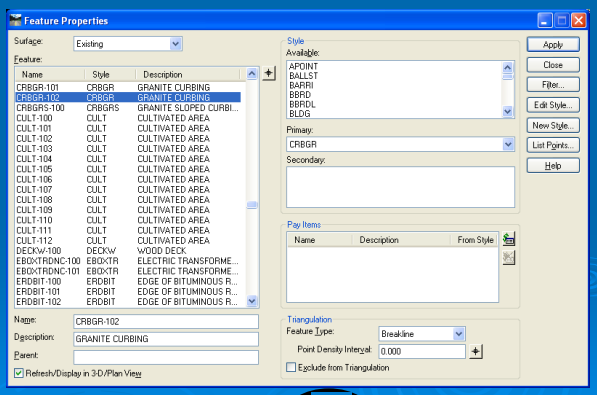
Surface Properties - Advanced



- The *Surface Properties* are enhanced in InRoads V8
- The *Advanced Tab* is for the Profile & Cross Section display settings

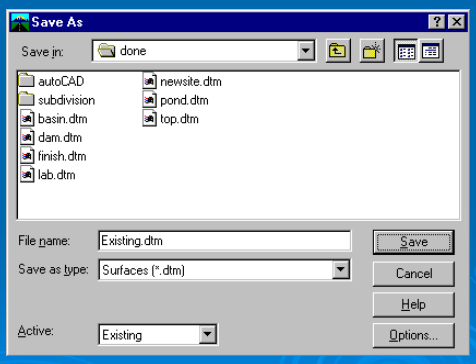
Feature Properties

- *Feature Properties* show the complete detailed Feature 'picture' for the surface
  - Name
  - Description
  - Style
  - Point Type
  - Point Density
  - Exclude from Triangulation
- 'List Points' is available



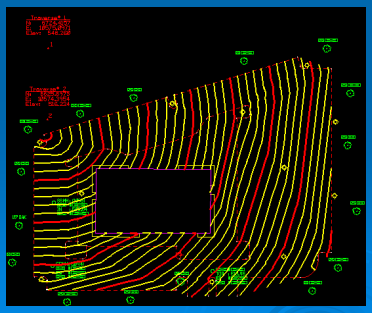
Save Surface

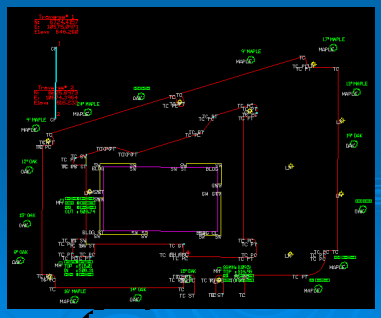
- Saves the point and triangle information from the surface
- To set the surface to be saved, toggle to the desired surface name at the bottom of the dialog box



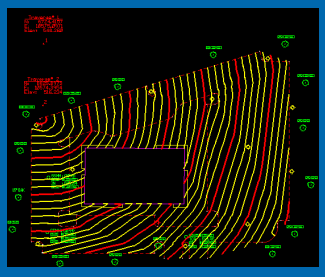
Viewing Field Data vs. ‘Exported’ Data

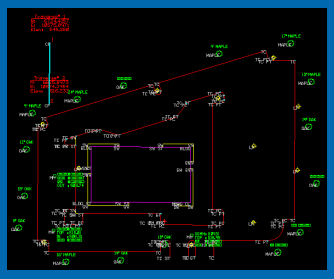
- There is an important viewing concept that must be understood before working with Survey V8
- *Field book Data is different than Exported Data when it comes to viewing*





Viewing Field Data vs. ‘Exported’ Data

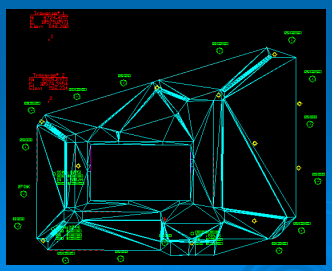


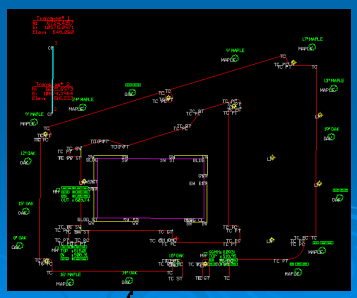


- Use the Survey Viewing tools when you are looking at the Field book info
- ‘Exported’ data (once it has left the Field book) follows the rules of the ‘Locks’

Viewing Field Data vs. ‘Exported’ Data

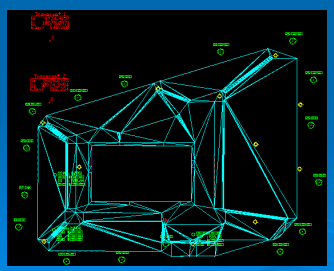
- Field book data is always temporary until committed to graphics with *Write Survey Data to Graphics*
- Display of ‘Exported’ data is based on the setting of the Pen / Pencil Lock at the time of viewing

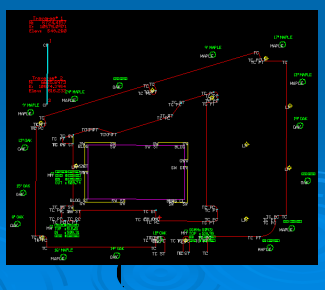




Viewing Field Data vs. ‘Exported’ Data

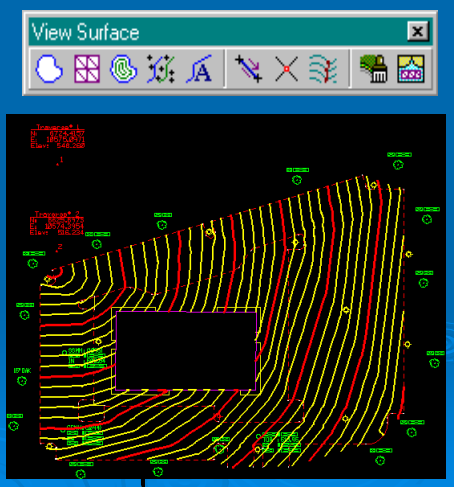
- Field book data is viewed with its own set of viewing tools discussed in an earlier section
- Display of ‘Exported’ data is viewed under that specific category of data (view surface, view geometry, …etc)



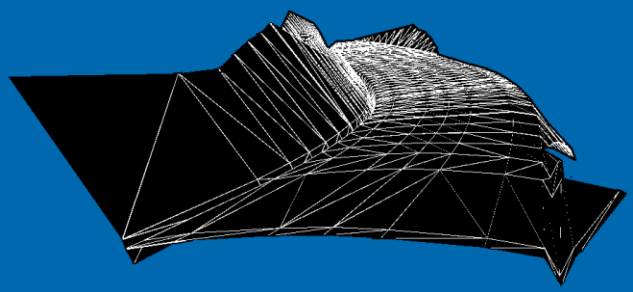


Viewing Surface Information

- Exported surface data can be viewed using the *Surface>View Surface* commands
  - Perimeter
  - Triangles
  - Contours
  - Features
  - Crossing Segments
  - 2 Point Slopes
  - … etc

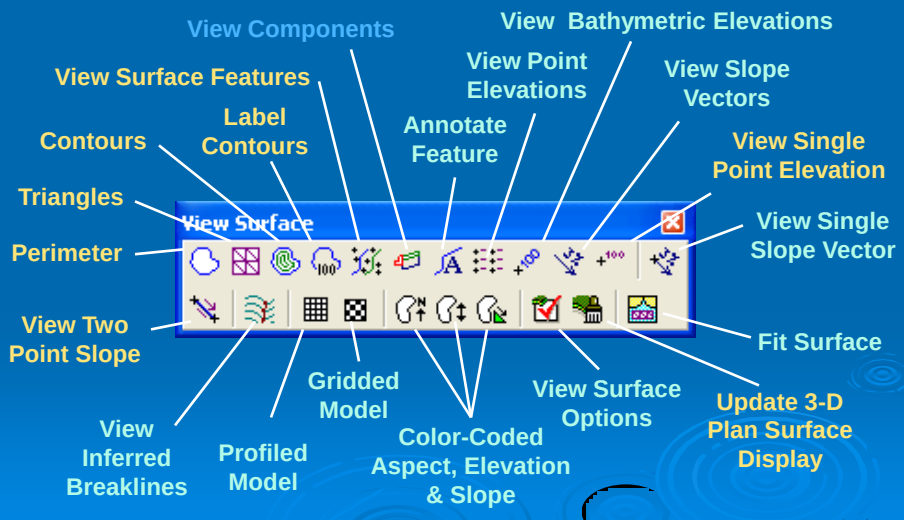


DTM – Contents

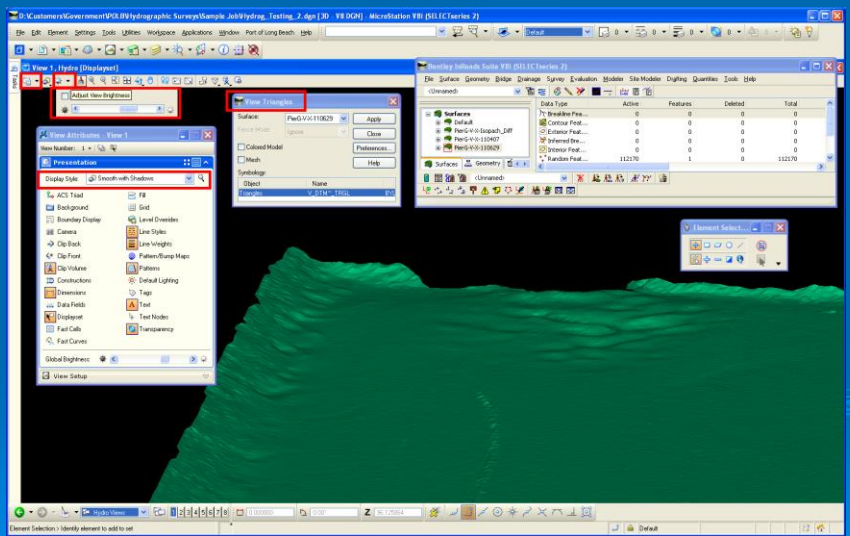


- Digital Terrain Models are composed of:
  - The 'pieces' or Features and
  - The Triangle network of relationships
- Some surface commands are Feature-based and others are Triangle-based.

View Surface Commands

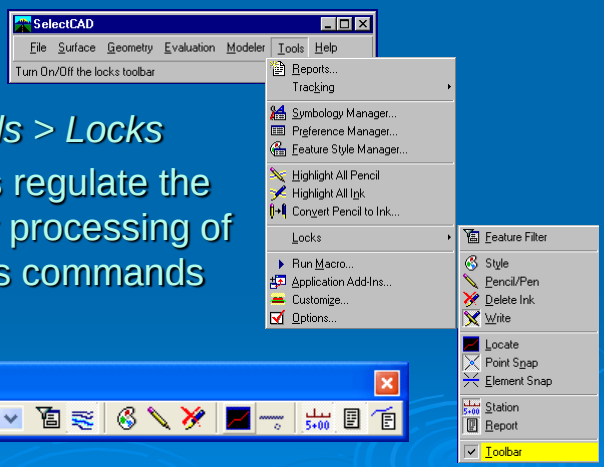


3D DTM Viewing



InRoads Locks

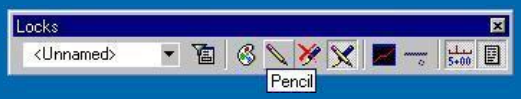
- *InRoads > Tools > Locks*
- These Controls regulate the output, input or processing of certain InRoads commands



Pen / Pencil Lock

- ***Pen / Pencil*** relates to what occurs on later re-display of that InRoads item
- The CAD package itself does not care about this setting, only InRoads.

Pencil Setting



- Information displayed is physically written to the design file, but it is considered a 'Draft' version.
  - An alignment is written to the design file in 'Pencil'; the alignment is revised in InRoads and then re-displayed; the previous graphics are updated resulting in 1 alignment in the CAD file.
  - Contours are displayed in 'Pencil'; revising the DTM in InRoads and re-displaying contours will update the current ones resulting in 1 set of contours written to the CAD file.
- Use *Pencil* to update earlier graphical versions after modifications are made and displayed.

Pen Setting

- Information displayed is physically written to the design file, and considered 'Final'
  - An alignment is written to the design file in 'Pen'; the alignment is revised in InRoads and then re-displayed; this results in 2 alignments written to the CAD file.
  - Contours are displayed in 'Pen'; revising the DTM in InRoads and re-displaying contours results in 2 sets of contours in the CAD file.
- Use *Pen* mode to retain earlier graphical versions after modifications are made and displayed.

InRoads Locks

- Unlike working with the InRoads Survey Fieldbook - the InRoads is in permanent 'Write' mode
- Tool Tip indicates the position of the lock

Feature Filter Lock Off
Feature Filter Lock On
Style Lock Off
Style Lock On
Report Lock Off
Report Lock On

The DTM – Summary

- Data added to a Surface model is defined by the DTM feature associated with a field code
- The 5 DTM Point Types are Random, Breakline, Interior & Exterior Boundaries and Contours with an additional Survey Type of DNC
- Triangulation is required to produce a DTM
- Triangulated information is saved as a .DTM file
- The graphics that Survey produces from the Fieldbook are only 'temporary' and are not written to a design file until the *Write Survey Data to Graphics* tool is used
- The display via the view surface tools are user definable and the setup is stored in the *civil.xin*