CDOT REDLINE ESSENTIALS

Colorado DOT

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Software Versions

The software products referred to in this publication are furnished under a license and may only be used in accordance with the terms of such license. This document intended for use with the following (or later) software versions:

MicroStation® version 08.05.02.55
Redline® version 08.05.02.55
InRoads® version 08.05.00.00 – Service Pack 5

0507 – Version 03.01 CDOT Configuration
1207 – Version 3.02 CDOT Configuration

Document Conventions

There are several conventions that are used throughout this document to indicate actions to be taken or to highlight important information. The conventions are as follows:

Example Item	Meaning
View Perimeter	a command name or a file that you are to select, including directory path
Name:	field name, button or icon in a dialog box
Dialog Header	dialog box name
Tools > Options	a command path that you are to select - usually from the pull-down menus
Dialog Area	heading for separated areas within a dialog box
Tab	heading for tabs found within dialog boxes
Key in	entering data with the keyboard or items selected from drop-down list
Document name	style used when referring to another document
Note: text	information about a command or process that you should pay particular attention to
Concept: text	detailed definition of a concept, procedure or process
Emphasis	an important word or phrase
Prompt	user prompt
1. Numbered Steps	actions that you are to perform as part of the lab activities
<D> or **Data**	press the data button on the mouse
<R> or **Reset**	press the reset button on the mouse
<T> or **Tentative**	press the tentative button on the mouse

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1. Getting Started

Program Function

Bentley Redline is the safe answer for engineering teams to assist in revisions throughout the entire design process without affecting the original drawing file (***.DGN)*** file. Bentley Redline provides multiple-function viewing, allows for comments and redlining, and has a print-to-scale feature that enhances the design and engineering data. Bentley Redline offers user-friendly design review with annotation and printing tools for both ***.DGN*** and ***.DWG*** file content. Markups are easily managed and integrated into designs with clear communication to allow for an easy transition from markups to design changes.

Course Overview

In this course you will learn Bentley Redline® basics as they relate to CDOT projects.

- Creating Redline design files
- Learning the different components of the Redline environment
- Creating basic elements in the design file (lines, circles, blocks, etc.)
- Using view controls
- Controlling graphic placement
- Creating and working with groups of graphics
- Placing text
- Measuring elements

CDOT CADD Resources

There are many resources available to assist you when working on your CDOT CADD project. These resources can be found on the CDOT CADD & Engineering Innovation Web site.

CDOT CADD & Engineering Innovation Web Site

The CDOT CADD & Engineering Innovation web page is available at:

http://internal/cadd/ It can also be found on the internal CDOT website:

Organizations > Project Development > CADD and Engineering Innovation.

The website (presently only available to CDOT) provides CDOT users with up to date information, tools, and resources related to CADD and the Colorado Engineering Software Transition (CEST) project.

CDOT Support Process

Installation: Call the CDOT Help Desk to request Redline installation at any time on any CDOT computer, before or after training, and without any prerequisites.

However, before you call, check in "Start" on your desktop to see if Redline was installed by the IT department before your training. Search for **Start > All Program> Bentley Redline** to verify installation.

After a successful search, consider inserting a Redline icon on your desktop at this time. See "Starting Redline" below for help with icons on the desktop.

After training, follow the Instructions below to receive assistance on using Redline.

Step 1: For General Software Questions
Check the Application On-Screen Help Menu

Step 2: For CDOT Workspace Configuration Questions or change requests,
Visit the Requests & Support tab on the CADD & Engineering Innovation Home Page and select the Email CADD Manager Link.
CADD Homepage is http://internal/CADD/

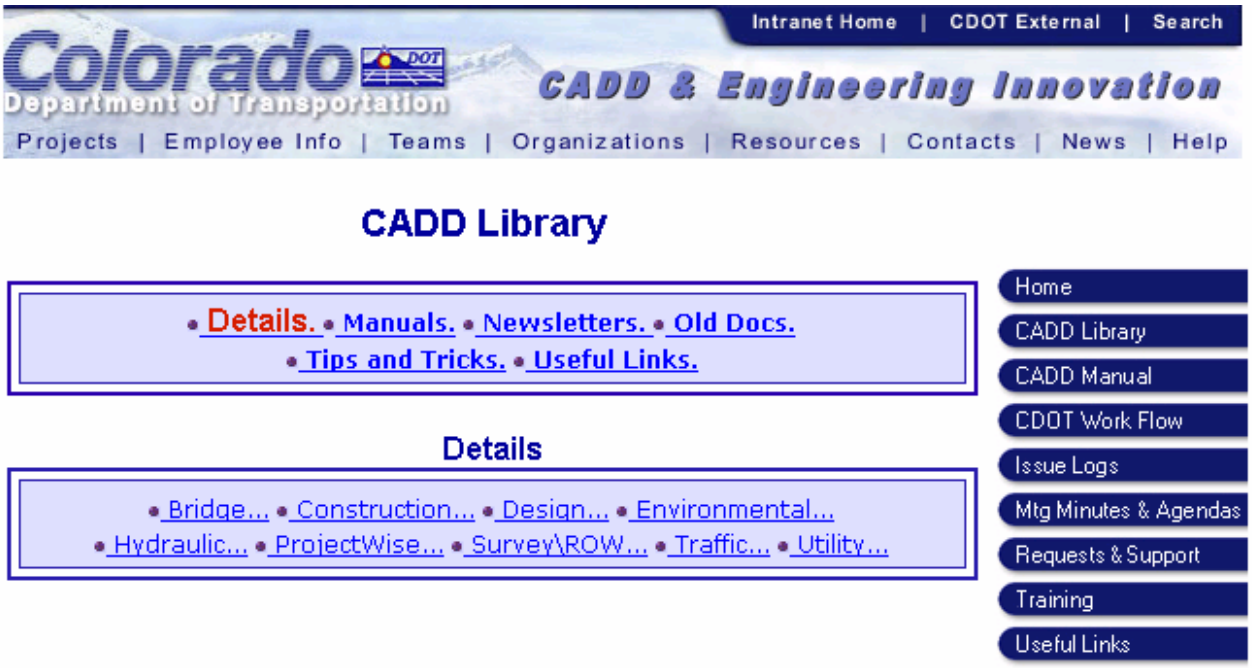
Step 3: For CADD Application Software Questions
1st - Visit Bentley SELECT Online
http://selectservices.bentley.com/
2nd - Call ***1-800-778-4277*** for
Bentley SELECT Technical Support

Step 4: For All Other Questions
Contact CDOT Help Desk: ***303-757-9317***
Onsite and telephone support is available

The CADD & Engineering Innovation website on the CDOT intranet is a valuable resource for CADD users and includes:

CADD Library

The **CADD Library** page provides links to manuals, newsletters, standard details, *etc*. One extremely useful link is to the **Tips and Tricks** section for MicroStation and InRoads. This information changes daily, so check back often.



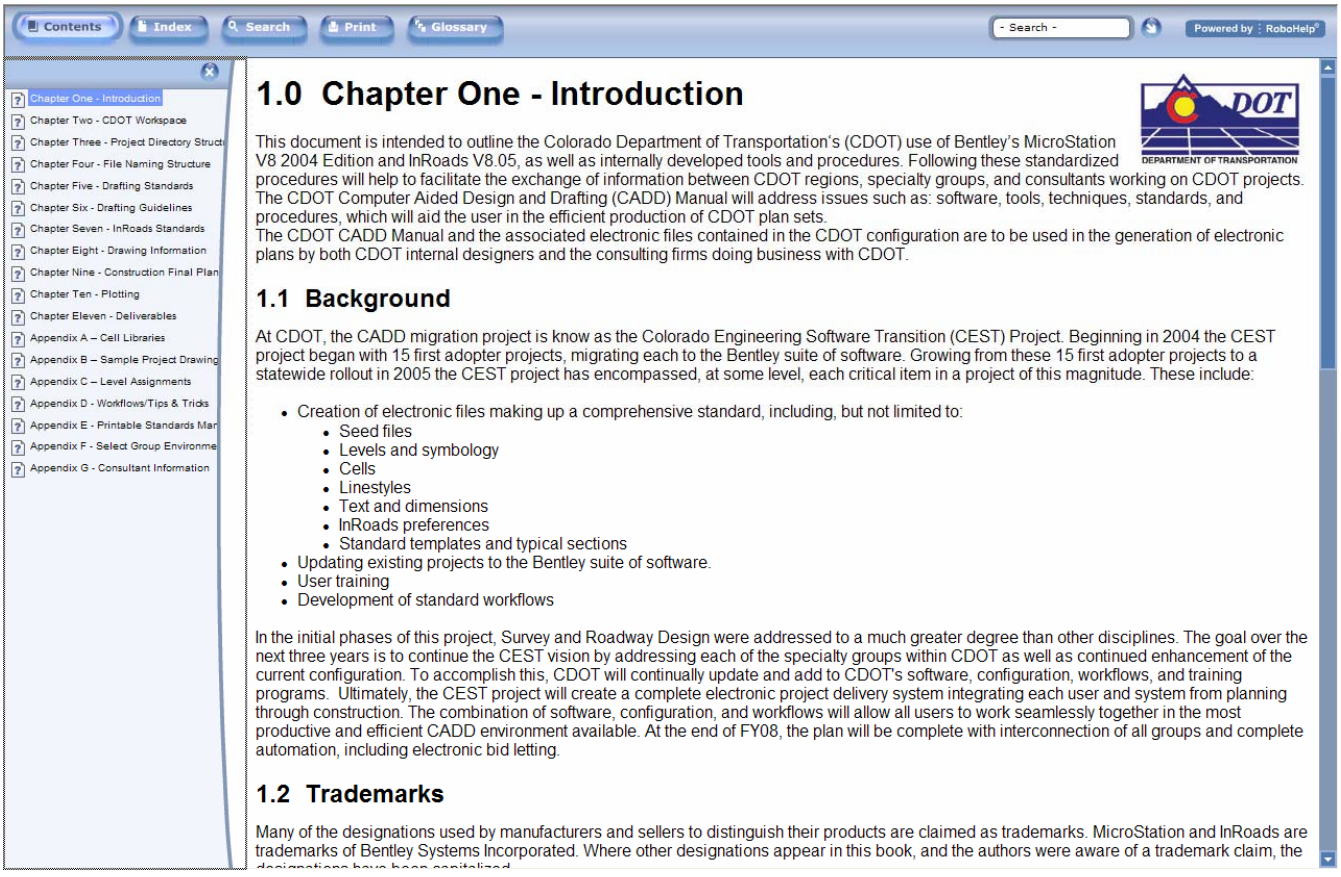
CADD Manual

The CDOT **Computer Aided Design and Drafting (CADD) Manual** outlines CDOT's use of Bentley's MicroStation and InRoads software. It documents standardized procedures for the exchange of information between CDOT regions, specialty groups, and consultants working on CDOT projects. The Manual also addresses software issues, tools, techniques, standards and procedures, etc. which will aid the user in the efficient production of CDOT plan sets.

The CDOT CADD Manual and the associated electronic files contained in the CDOT configuration are used in the generation of electronic plans by both CDOT internal designers and the consulting firms doing business with CDOT. The electronic version of the Manual provides hyperlinks to each chapter as well as context sensitive index and search functions. You can also print chapters or the entire manual.

The CDOT CADD Manual can be accessed several different ways including:

- From the CDOT internal CADD web site home page link;
- From the CDOT Design and Construction Project Support Page (external web site);
- From the CDOT Menu (**Help > CADD Manual**).



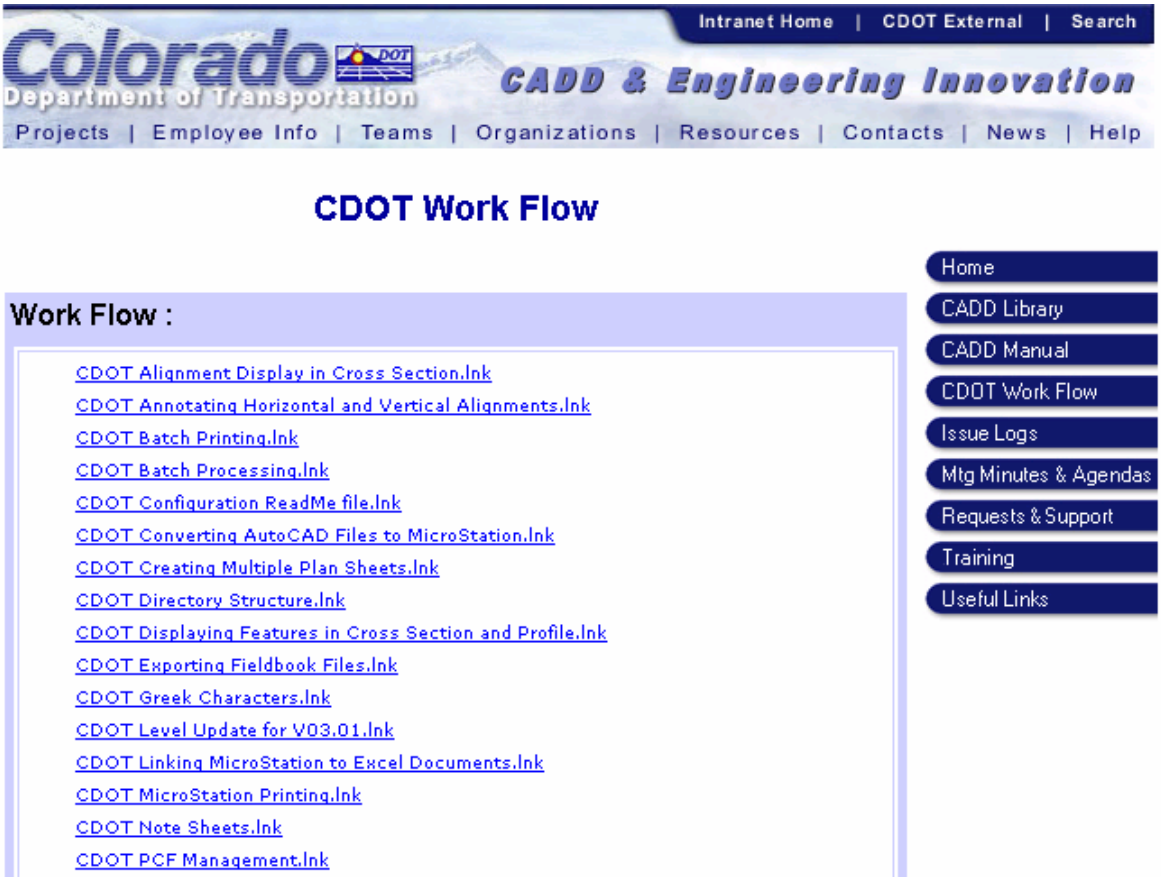
CDOT Workflows

There are several standardized Redline workflows that CDOT has developed to assist you. These workflows are step-by-step CDOT-specific procedures for certain tasks that you may encounter when working in Redline on a CDOT project. Many of these workflows are referenced throughout the course. Some of the workflows are specific to working in MicroStation or InRoads software. Others may apply to both MicroStation and Redline.

In addition to accessing the workflows from the CDOT CADD Web site Home page link **CDOT Work Flow**, you can also access workflows:

- From the Windows Start menu (**Start > All Programs > _CDOT_CADD_Information > Workflows**);
- From the CDOT Menu (**Help > Workflows**).

New workflows are typically added with CDOT configuration updates, so check back often.



Configuration Questions/Suggestions

Your Redline workspace configuration has been customized to CDOT standards. Each CDOT discipline group has provided input for items like standard symbols and details (cells), custom line types, discipline level structure, etc.

As you work with this configuration in class and begin using Redline in production, you may have questions about the configuration or suggestions on how to make improvements. For example, if you discover the need for additional levels or have a standard detail to include in the group's library, you can provide suggestions to the CDOT Design/CADD Manager via the **Request & Support** link on the CDOT **CADD & Engineering Innovation** web page. Your CDOT CADD/Design Manager is:

Helen Peiker
Design/CADD Manager
Project Development Branch
4201 East Arkansas Ave., 4th Floor
Denver, CO 80222
303.512.5204
Helen.Peiker@dot.state.co.us

Your instructor was not involved in developing the CDOT Redline configuration and has no authority to make configuration changes.

Project Design Files

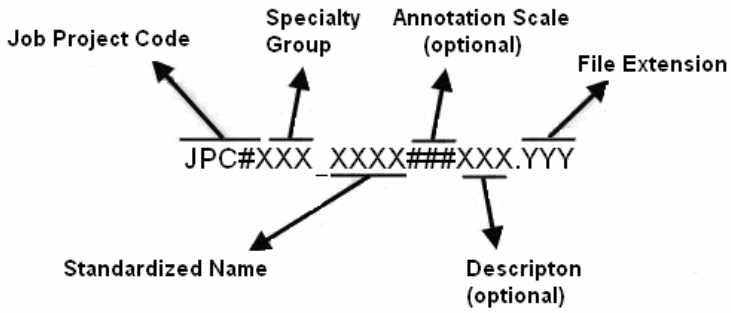
When using Redline to mark-up existing drawings, Redline will automatically generate a new MicroStation file using the same root filename (JPC and standardized short description) as the file selected for marking up. This file will be stored in a folder titled 'Redline' in the project folder (see the following section on directory structure for clarification). The file created for storing Redline mark-ups will be appended with a unique extension. The file extension of this new file will correspond to the Windows User login name. In this manual, files will have a *.cotrain01 extension as this is a representative User login name as may be used to log into a computer in a training environment.

File Naming Conventions

The CDOT naming standard uses a formula that restricts the character placement, ensures unique file names, and identifies the information contained in the file.

All CDOT projects must follow these file naming conventions. Standardizing file names is necessary for effective management of the large numbers of files needed to produce a set of design plans.

CDOT files are named in a standard format that identifies the file's project, the data contained within it, and the product used for its creation. The naming convention is illustrated as follows:



Job Project Code (JPC) is the CDOT project code, formerly known as the project sub account number.

Specialty Group is the CDOT discipline code.

Standardized Name is the defined names to describe the contents of the file.

Annotation Scale is an optional field to define the scale set within the file.

Description is an optional field to further define the contents and purpose of the file.

Counter indicates more than one file of a specific type.

File Extensions define the product used for its creation. Examples would be DGN for MicroStation, DOC for Microsoft Word, etc.

An example of a Redline file name follows:

12345DES_Model.smithj

12345 indicating the CDOT Project Number, **DES_Model** indicates it is Roadway Design's design data file and smithj representing the users Windows login name.

Directory Structure

Training Directory Structure

All files related to this course are stored in the ***C:\Projects\12345*** folder, where **12345** is the project code (JPC). Subfolders under the project contain the discipline-specific files.

Project files follow a standardized scheme. This section describes the location of project files and the standard directory structure for each group within CDOT.

Project Directory

At the beginning of each project, the Project Manager will create a project directory structure using the **CreatePrjDir.exe**. This executable will create a directory that is the single storage location for all information pertaining to a given project. The Project Manager is required to assign access permissions to every person on the design team and is also responsible for maintaining the access list to keep it current.

Top Level Directory

Each project includes a unique top-level directory and a set of standardized sub-directories. The job project code (JPC) indicates the top-level directory name.

Group Sub-Directories

Sub-directories for individual groups can be found below the top-level directory.

Each group at CDOT that works on the project is required to store its data in the appropriate sub-directory for that group.

Group Sub-Directory Structure

The following tables show the project directories for various groups and the file types that go into these directories. These directories will be used regularly for the training course.

Note: Refer to Appendix G for more information on the complete list of the project directory structure.

Construction Project Folder (\Construction)

Sub-directories		Description
\Calculations		
\Change_Orders		
\Claims		
\Correspondence		
\Diaries		
\Drawings		Sheet Files - Plan set sheets and detail sheets
	\Cross_Sections	All cross section Models and Cross Section *.job files
	\Reference_Files	All final Model files to be referenced to the sheets
	\Tabs	
\EEO		
\Estimates		
\Final_Documentation		
\Photos		Electronic photo files or scanned photos concerning the project and surroundings
\Public_Relations		
\Speed_Memos		
\Working		Design iterations and miscellaneous drafting without impacting final Model Files found in the Reference_Files subdirectory. The designers' initials should pre-fix all files in this directory so many designers can work in this directory. No working files should be used as Reference Models. When a working design is complete, copy it into the Reference_Files Folder and rename it to the standard naming convention. This directory will be deleted at project close-out.

Plot Sets Project Folder (\Plot_Sets)

Sub-directories	Description

The files located in this folder are project specific General Plan Set Sheets. The files located in the subfolders will be files reflecting plan set sheets captured at time of submittal. Final Plan Sets should be in Adobe Acrobat PDF file format for the Reproduction Department. The Reproduction Department will access the PDF from this location for submittals.

\Plot_Sets	
\AD	Advertisement
\Revisions	
\FIR	Field Inspections
\FOR	Final Office Revisions
\ROWPR	

Project Manager Project Folder (\Project_Manager)

Sub-directories	Description

\Budget

\Clearances

\Contract_&_Task_Order

\Correspondence

- **\Bridge**
- **\Construction**
- **\Design**
- **\EEO**
- **\Environmental_Landscape**
- **\Governmental_Agencies**
- **\Hydraulics**
- **\Letters**
- **\Materials_Geotechnical**
- **\Public_Relations**
- **\ROW**
- **\Senior_Management**
- **\Traffic**
- **\Utilities**

\Meeting_Minutes

\Schedules

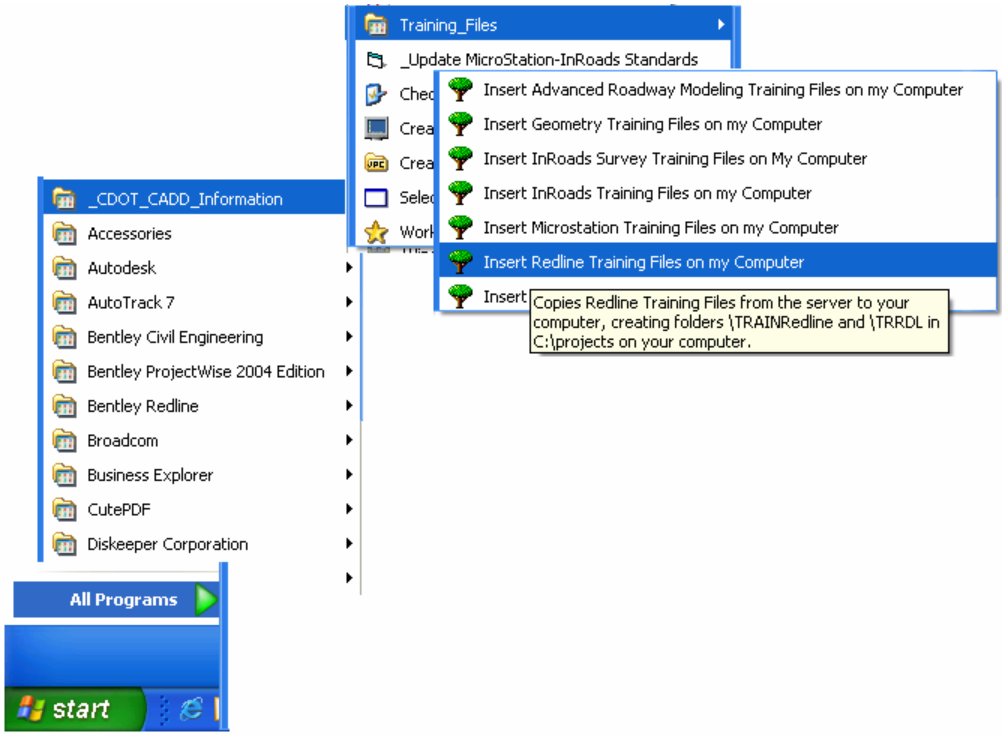
Redline Project Folder (\Redline)

Training Files

Lab exercises direct you to use training files. The most up-to-date training files for Redline are inserted onto your computer when Redline is installed.

However, training files have changed considerably over time. It might become necessary to reinstall the training files, especially if it has been several months since Redline was installed on your computer. If in doubt or the Redline training files on your computer do not adequately match directions in lab exercises, reinstall the training files and download the latest version of this training manual.

Installation icons for training files can be found on your Desktop Start Menu. Exit from all Bentley Applications before installing the training files. **Select Start > All Programs > _CDOT_CADD_Information > Training Files > Insert Redline Training Files on my Computer**.



A link on the **Training** tab of the **CADD & Engineering Innovation** web site can also be used to install training files. This link and the start menu icon perform the same self-extract zip process to install training files on your computer.

Lab Work

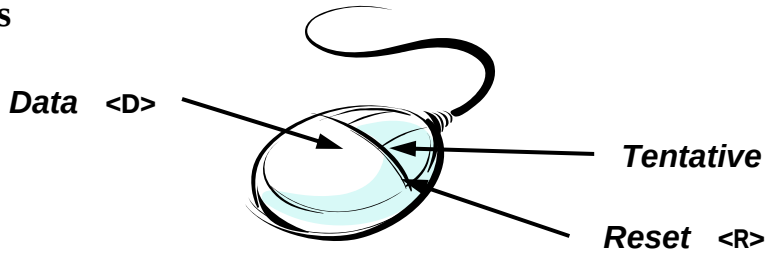
It is highly recommended that you install the training file and continue practicing with Redline by completing the lab exercises contained in this course guide, especially if you do not plan to start work on a Redline project soon.

This manual is set up for both Construction and Project Management therefore there are often two distinct lab files for these groups. Construction lab files will be labeled Lab Xa while Project Management groups will be labeled Lab Xb. Labs not specified with a letter after them are intended for both groups. These group labs are less user specific and more fundamental to general software use.

Mouse Mechanics

There are three types of mouse "points" you can execute in Redline. These points correspond to the different buttons on the mouse. The default settings are:

Mouse Points



Data point **<D>** — used to select tools and drop-down menus, identify coordinate locations, place and manipulate elements, or confirm/accept actions before they take place. The left button is the default data button.

Tentative point: **<T>** — used to temporarily locate a point in space or a location on an element. A tentative point can also be used to determine the coordinate value of an element or specific location. The middle button (or wheel) is the default tentative button.

> **Notes:** To execute a tentative point on a two button mouse, simultaneously **click** the right and left buttons.
> If your mouse has a roller wheel, it can be used for zoom control.

Reset: **<R>** — rejects a highlighted element or rejects the current operation/tool (*e.g.* after placing a line in the drawing, the tool used to place the line remains active, so pressing the reset button will complete the command). The right button is the default reset button.

Using the Mouse

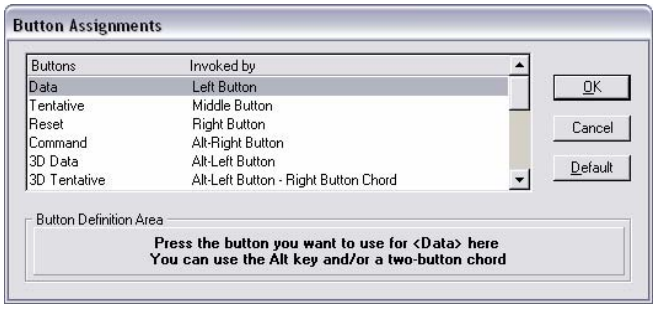
Click — tap the mouse button once.

Double **click** — tap the mouse button twice quickly.

Snap — locate an existing point on an element by using a **<T>,** then **<D>** to accept.

Controlling the Mouse

By default, the left mouse button is the **Data** button, the right is the **Reset** and the middle is the **Tentative**. You can change these button assignments by selecting **Workspace > Button Assignments**.



Starting Redline

To start Redline on the Windows platform:

- From the desktop Start button, select **Start > All Programs > Bentley Redline > Bentley Redline.**

or

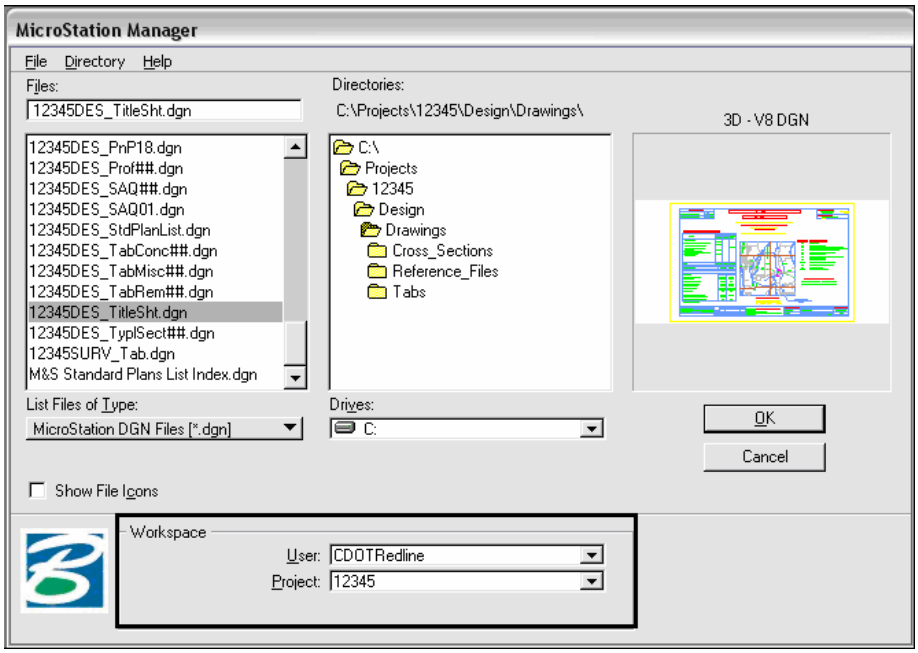
Double-click on the **Bentley Redline** icon (as a shortcut on your desktop).

Note: Bentley software installations at CDOT do not insert icons on the desktop. You must create shortcuts for Redline on your desktop. To do so, highlight the **Bentley Redline** icon from **Start > All Programs > Bentley Redline > Bentley Redline**, then right-click on the **Bentley Redline** icon and from the fly out list that appears choose **Send To > Desktop (create shortcut)**. Then go to your desktop and **Double-click** on the **Bentley Redline** icon to start Redline.

When Redline is started, the MicroStation Manager dialog box will appear on your screen.

MicroStation Manager

The MicroStation Manager is your file management interface to Redline.

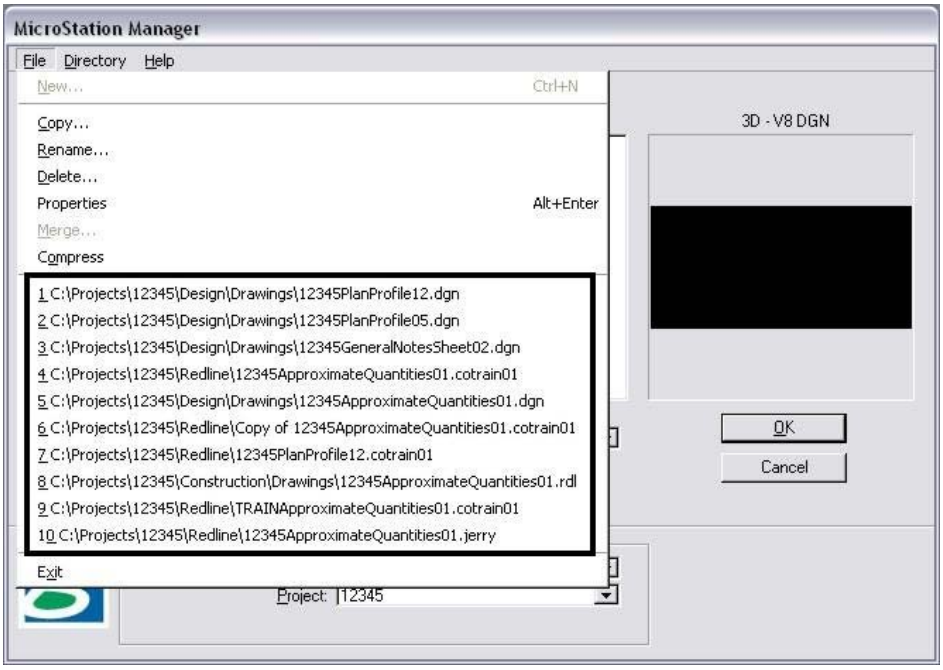


By default, a MicroStation design file has an extension of ***.dgn***. "Design file" is a generic term used to describe all MicroStation files, regardless of their use. In addition to MicroStation V8 DGN files, you can also open previous versions of MicroStation files and AutoCAD files (.***dwg*** or .***dxf***). To filter the various file types in a specific directory folder, change the **List Files of Type** option:

- The **CAD Files [*.dgn, *.dwg, *.dxf]** option will display MicroStation and AutoCAD files.
- The **Redline Files [*.rdl]** option will display only generic Redline files.
- The **All Files [*.*]** option will display all the files that are located in the selected folder.
- The ***.cotrain01** option will display files that are specific to the user. This extension is based on the user login name. The **.cotrain01** extension is automatically applied at the end of a file name when a Redline file is opened and a copy is made. (Example: When **12345DES_TitleSht*.dgn*** is opened from the **12345\Design\Drawing** folder, a new file is created and saved in the **12345\Redline** folder. The new file that is made is given the user specific extension, **12345DES_TitleSht*.cotrain01***). The intent of this procedure is designed to allow all files located in the Redline folder to be sorted per specific user.

  Note: When a **DWG** file is opened in Redline, the new file will be given the extension **_cotrain01.dwg**.

You can quickly access the last 10 files opened from the **File** drop-down menu. If a file is selected from the list, the file will automatically open.

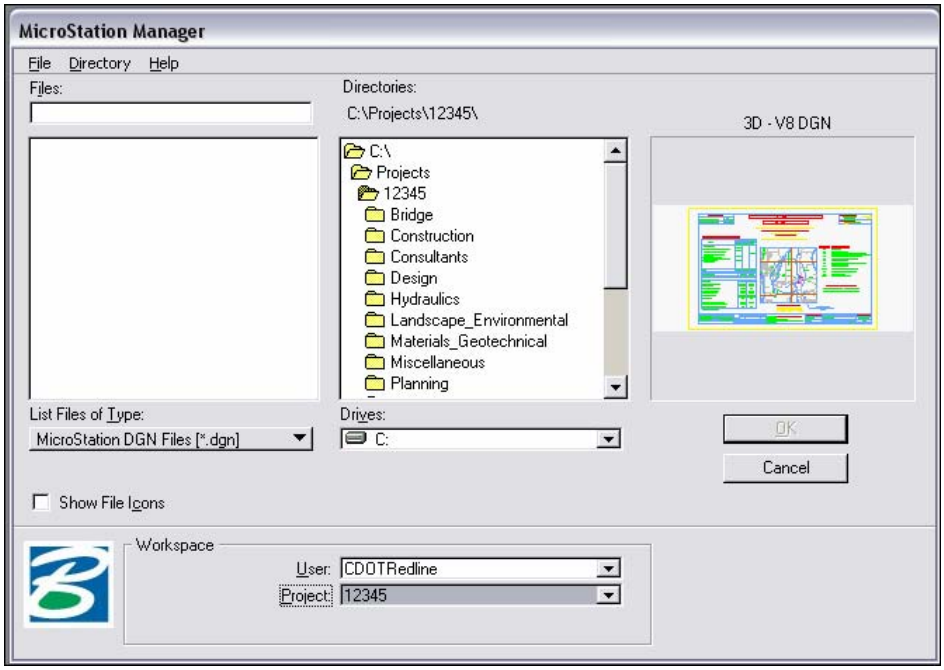


In the Workspace category a **User** and **Project** can be selected.

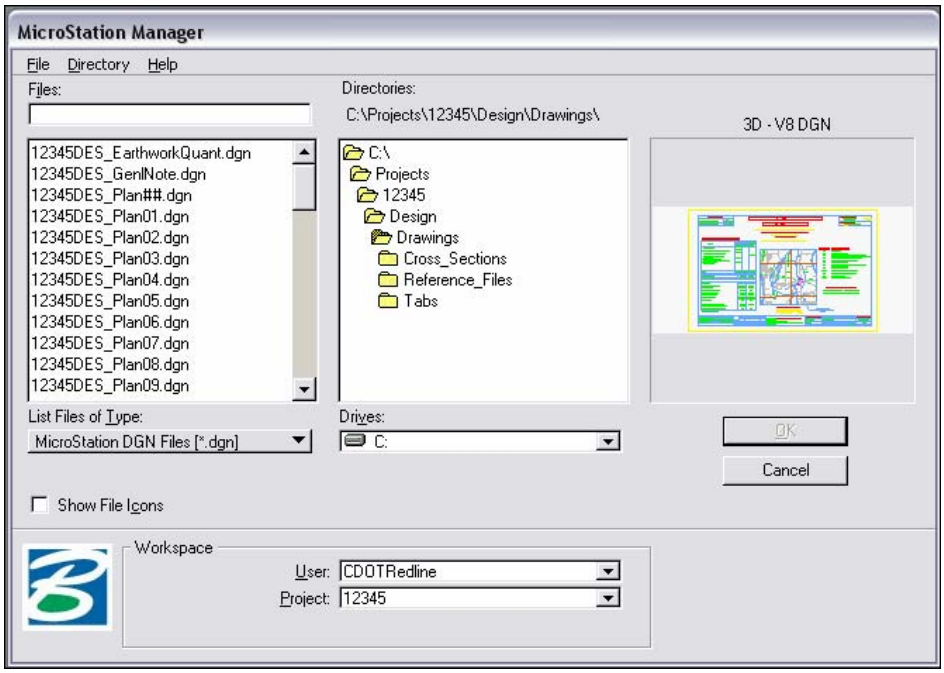
- The User workspace option sets the Redline environment to a predefined configuration. There are two existing ***User*** options**, CDOTRedline** and **CDOTViewonly**. *CDOTRedline* allows you to manipulate and modify graphics as needed. The *CDOTViewonly* is a read-only option and allows only viewing, measuring, and plotting of graphics. The **CDOTRedline** User option will be used for this training course.
- The Project workspace option automatically sets the location and names of data files that are associated with a specific project. The **12345** Project option will be used for this training course.

To open a MicroStation design file:

- Set the **Project** to your specific project code.



- Navigate to the correct directory.
- Set **List of File Types** to **All files** (***.***) (or to the type of file you wish to open.)
- **Click** to highlight the file.



- **Click OK** (or double-click the file name to open it directly).

Note: MicroStation design files have a default extension of ***.dgn***.

Thumbnail Previews

When you select a file from the MicroStation Manager, a thumbnail preview of the file is displayed along with the type. The four main types of previews you'll see are:

- ***The Bentley logo*** – represents a previous version (most likely V7 – it will list the version) design file.

- ***Graphics image*** – represents a V8 design file.

- ***A V8 logo*** – represents a converted V7 design file that has not been opened.

- ***A DWG logo*** – represents an AutoCAD drawing file. If AutoCAD is not present, a generic logo as shown appears for .dwg files.

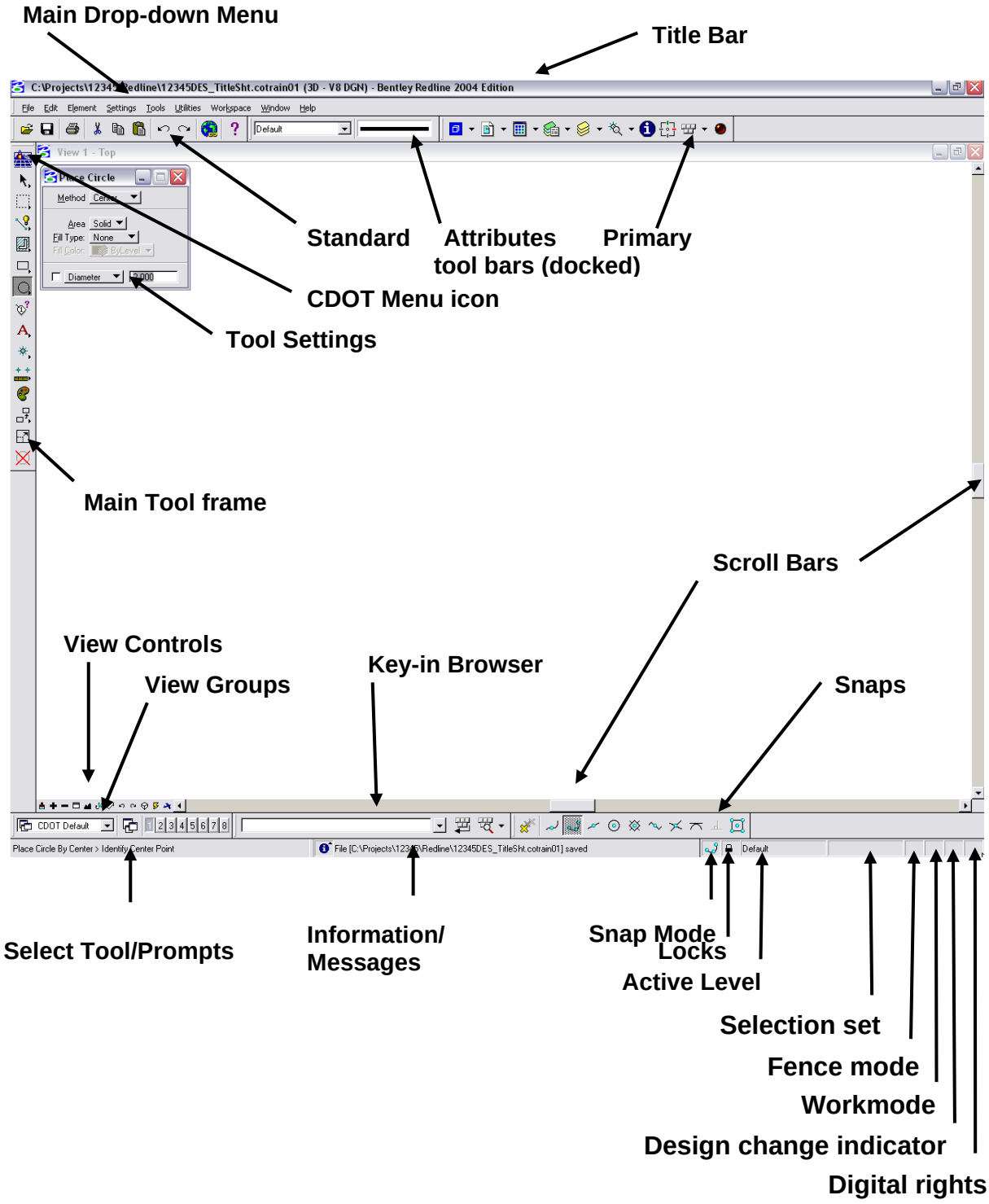
Thumbnail images are captured when the save settings command is used. Redline can use a saved view called ***Preview*** for the image. If this saved view doesn't exist, the lowest numbered open window is used for the thumbnail.

Thumbnail previews can also be viewed when in Windows Explorer. Simply set the Window Explorer **View** display option to **Thumbnails** and any Redline files will be shown with their thumbnail image captured from Redline.

> **Note:** All **AutoCAD** files (**.dwg** extension) can be opened in Redline. However, the Redline format for an AutoCAD file is a .dwg format. When a .dwg file is opened it creates the following file name, *MainFileName*_**cotrain01.dwg**. So, if a master DWG file is opened in Redline, the file format will be in DWG file format.

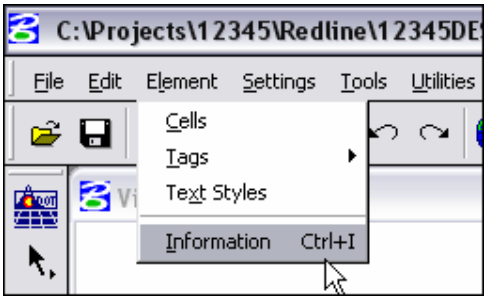
The Redline Interface

The Redline Screen



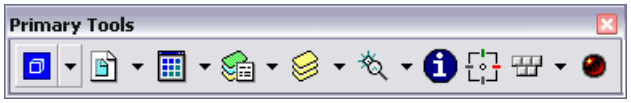
The different parts of the Redline screen are:

Drop-down Menus

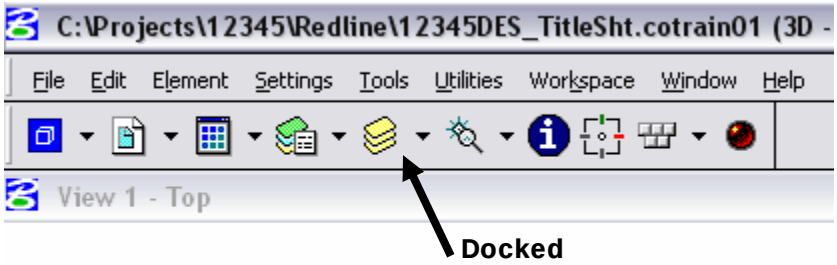


- Drop-down menus are used to access Redline toolbars, settings and dialog boxes.
- An arrow next to a drop-down command indicates sub-menu options.
- **...** Indicates a dialog box to open.

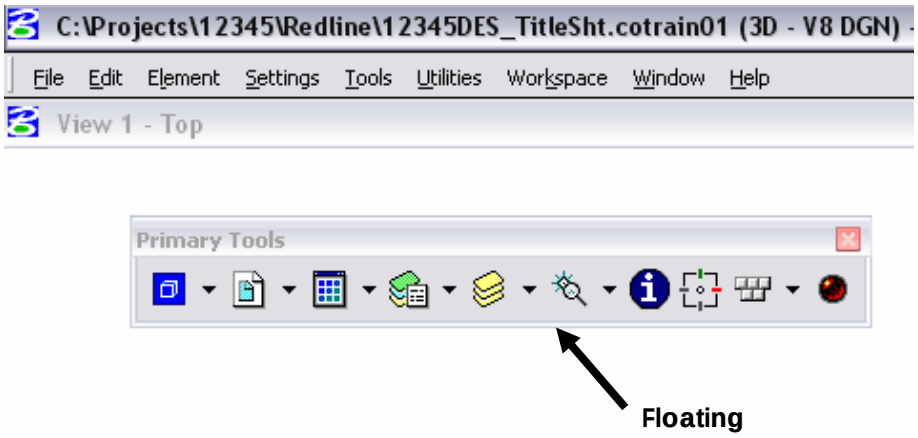
Toolbars



- Redline's tools for creating and manipulating your design elements are organized into logical groupings called toolbars.
- Each tool is represented by an icon on its toolbar.
- Toolbars can be opened, closed and moved around the screen like dialog boxes, views and the command window.
- Toolbars can be "docked."

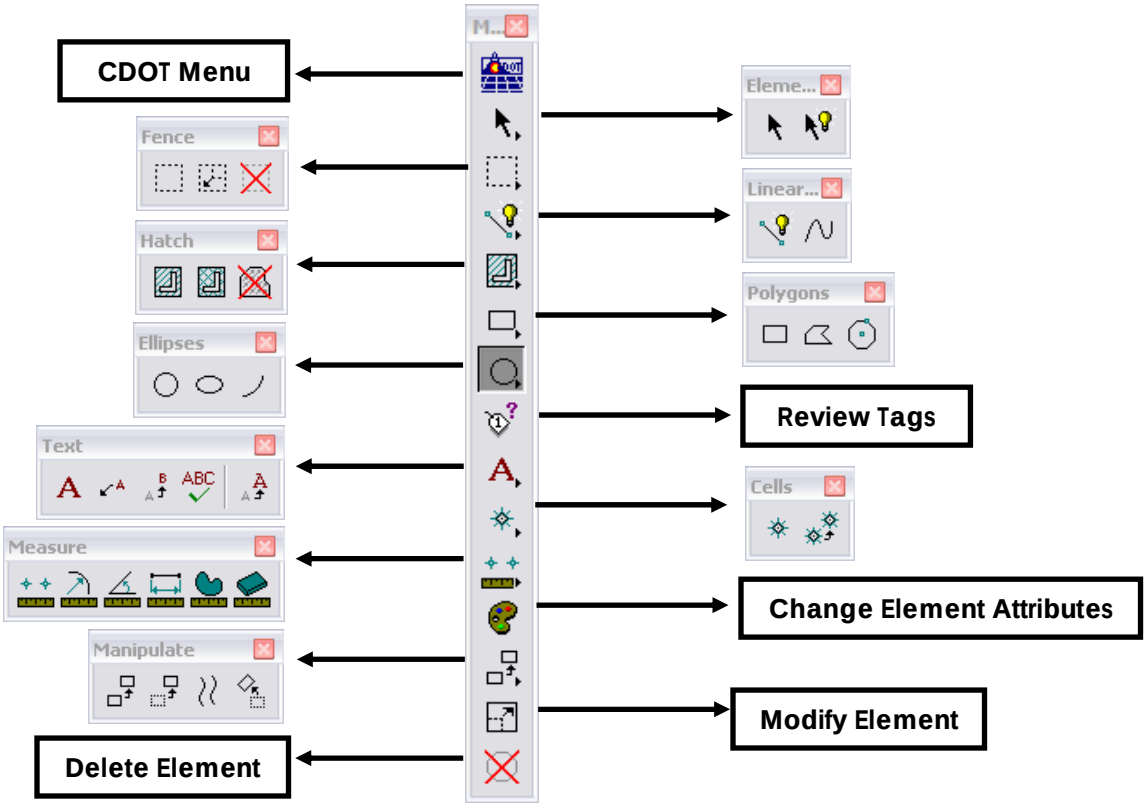


- Or "floating" within the drawing area.

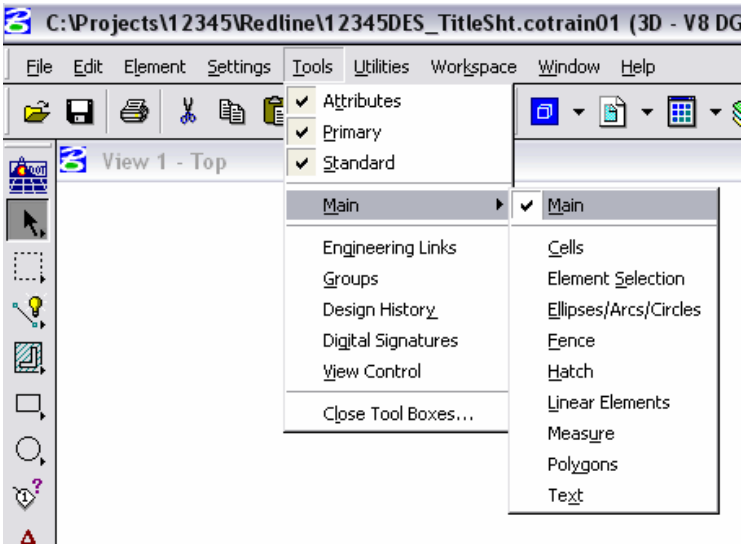


- Toolbars can be accessed from the drop-down menu or from the **Main** tool frame.

The Main Tool Frame



- The **Main** tool frame opens automatically when you start Redline. If you close the **Main** tool frame and want to re-open it, select **Tools > Main > Main** from the drop-down menu.



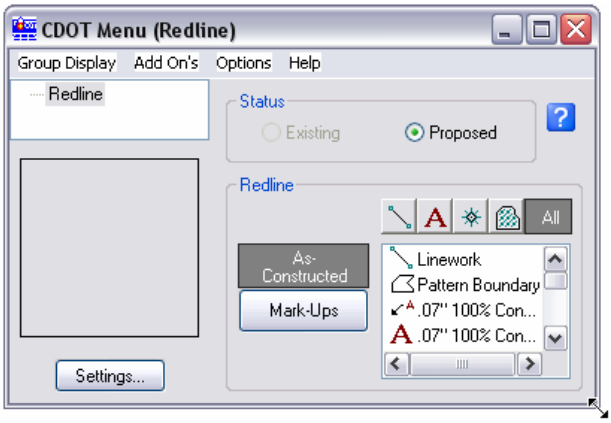
- The **Main** tool frame allows you access to other toolbars where most of your drawing tools exist.
- To open a toolbar from the **Main** tool frame, **<D>** and **hold** on one of the tool icons and drag the pointer away from **Main** tool frame (floating the toolbar in the view window area).

CDOT Menu

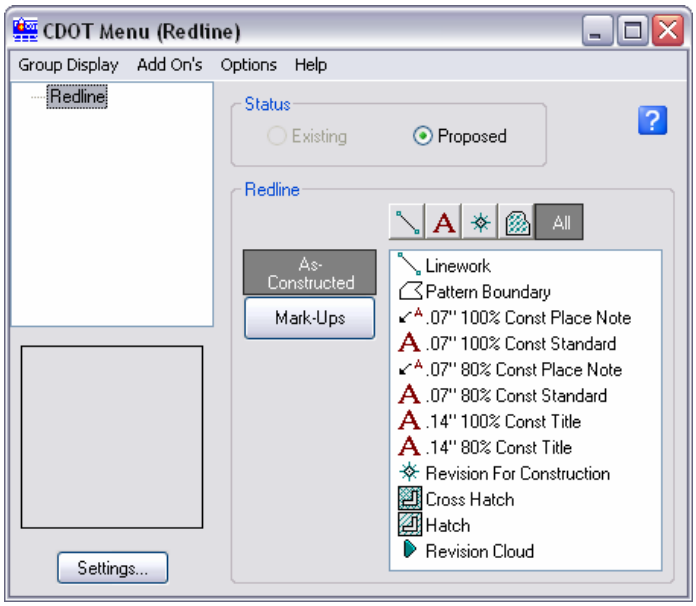
CDOT Menu basics:

- Aides in increasing user efficiency.
- Assists the user in adhering to standards.
- Can be accessed by selecting the **CDOT Menu icon** on the top of the Main Tool frame.

- The CDOT Menu dialog box can be resized as needed. To do so, hover the pointer at a corner of the dialog until a double ended arrow appears. Left-click, hold, and drag to resize the dialog.

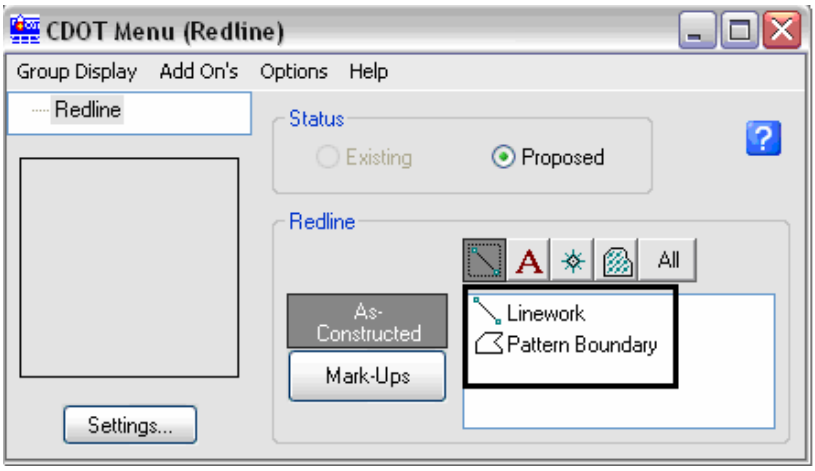


The expanded CDOT Menu is shown below.

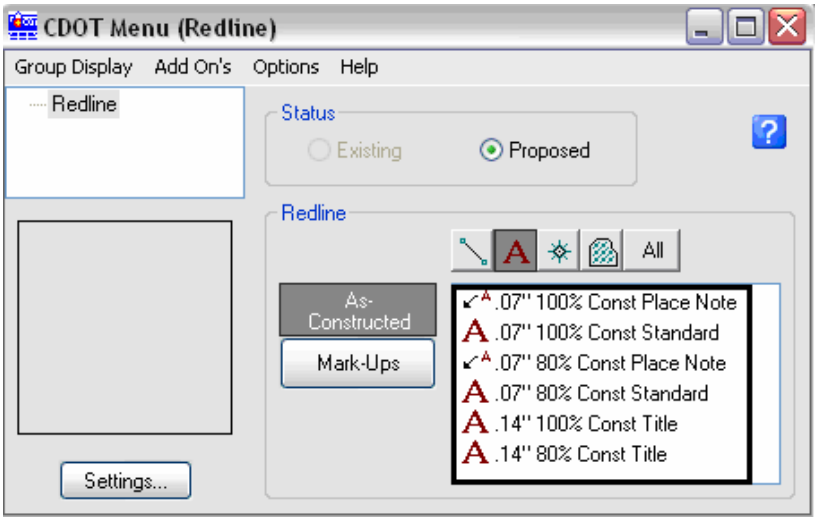


- The CDOT Menu contains four filters: **Show Lines**, **Text**, **Cells**, **Pattern,** and **All**. When a filter is selected, items (drafting tools) that are specific for each filter appear in the selection window located below the filters.

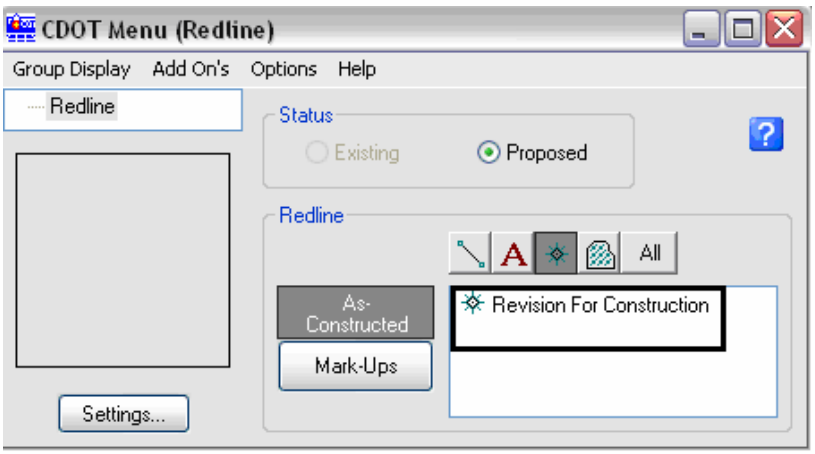
Show Lines Filter (As-Constructed):



Show Text Filter (Mark-Ups):

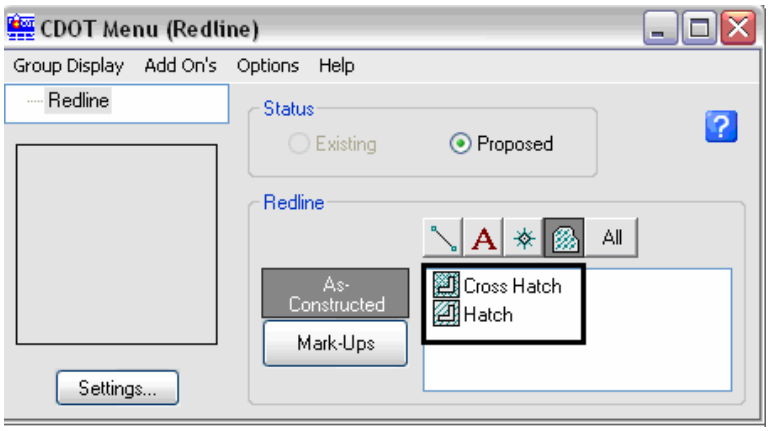


Show Cell Filter (As-Constructed):

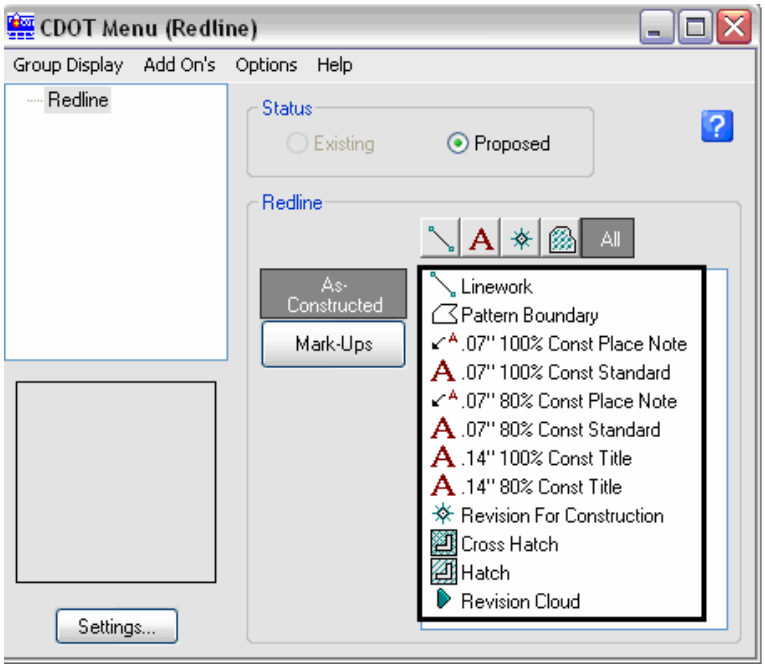


Show Cell Filter (Mark-Ups): No items available.

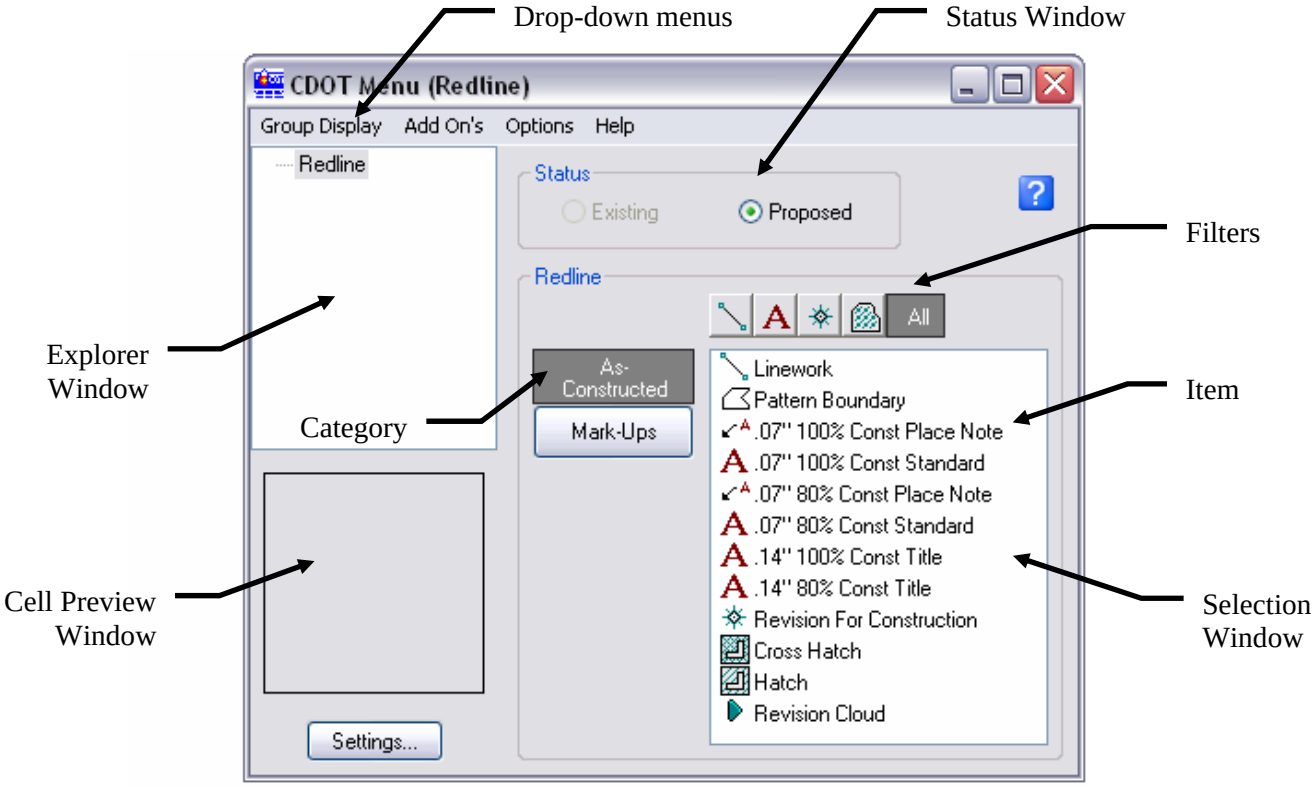
Show Pattern Filter (As-Constructed):



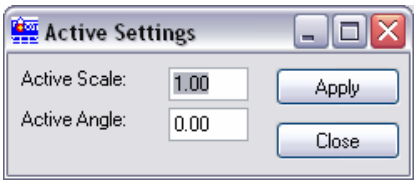
Show All Filter (As-Constructed):



- When the **All** filter is selected, all of the available items are listed at the same time in the selection window.

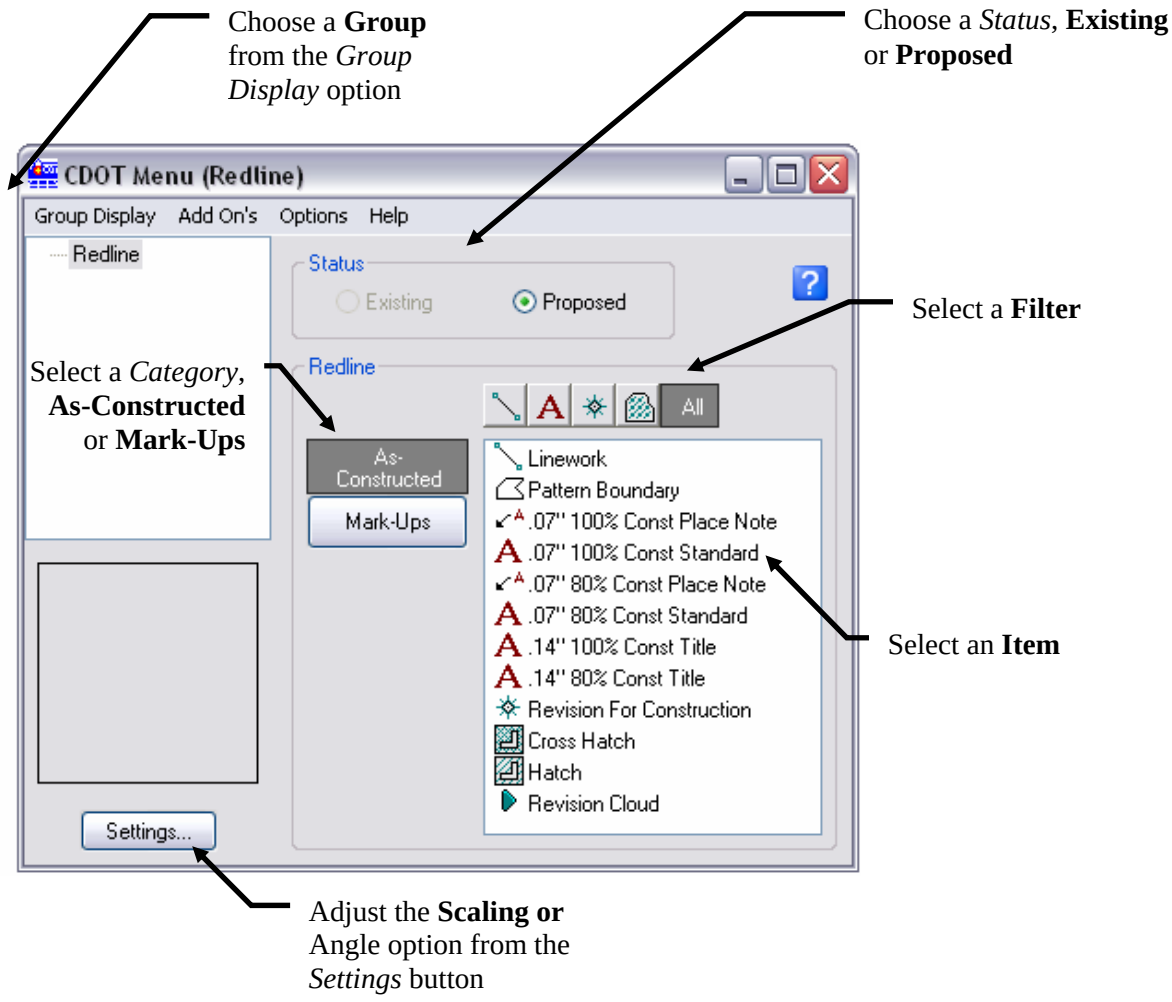


- Selecting the **Settings** button from the lower left corner of the CDOT Menu dialog will open the Active Settings dialog. An **Active Scale** and/or **Active Angle** can be changed from the Active Settings dialog.



General Work Flow for operating the CDOT Menu:

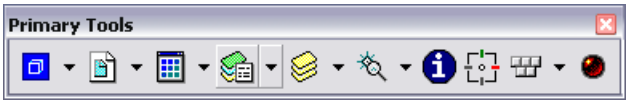
1. Select the *Group Display* menu pull-down option and choose the appropriate **Group** (Redline).
2. In the *Status* portion of the dialog, **Proposed** is selected by default because Redline will not be used to add reviewer comments and construction mark-ups. It is not used to draw any existing features (such as topography).
3. Select a *Category* **As-Constructed** (construction documentation) or **Mark-Ups** (reviewer comments).
4. Select a *Filter* (**Lines**, **Text**, **Cells**, **Pattern**, or **All**) to simplify the selection of the appropriate tool.
5. Select a specific drawing **Item** from the *Selection Window* to initialize the necessary drawing command.
6. If needed, change the **Active Scale** or **Active Angle** from the **Settings** button to scale or rotate cells.



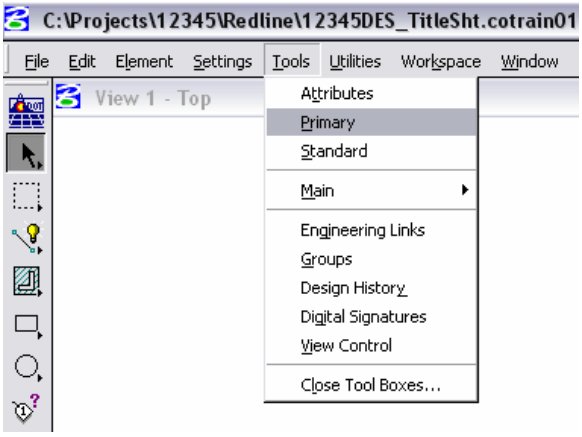
Tool Settings

- Many tools have parameters or settings associated with them, which are shown in the **Tool Settings** dialog box. Each time you select a drawing tool, the optional settings will appear in the **Tool Settings** box. The **Tool Settings** box is opened automatically when options exist for the selected drawing tool.
- If it is desired to temporarily hide the **Tool Settings** box, the **Popset** feature can be enabled. When **Popset** is enabled, the **Tool Settings** box is removed from the Redline viewing area. To redisplay the **Tool Settings** box, hover over the active tool icon or hover over the **Popset** icon. The **Popset** icon is located on the Primary Tools toolbar (discussed below).

The Primary Tools Toolbar



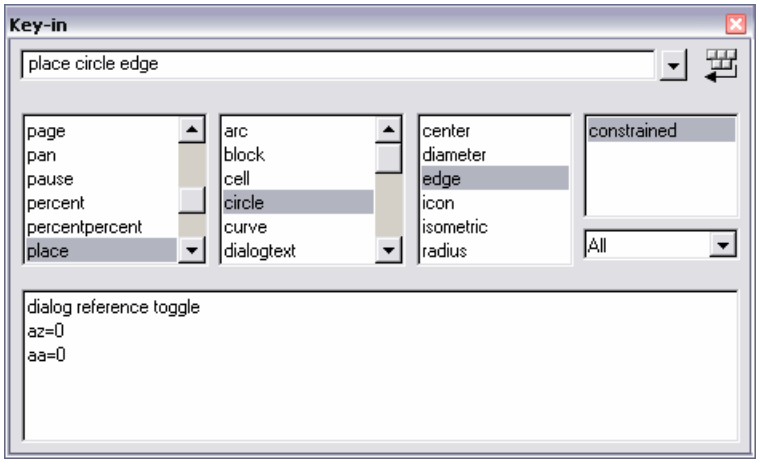
- The **Primary Tools** toolbar contains commonly used Redline tools, which will be discussed later.
- This is one toolbar you'll frequently use, so you will probably want to open and dock it.
- Select **Tools > Primary** to toggle on the Primary Tools toolbar.



The Key-In Browser Box

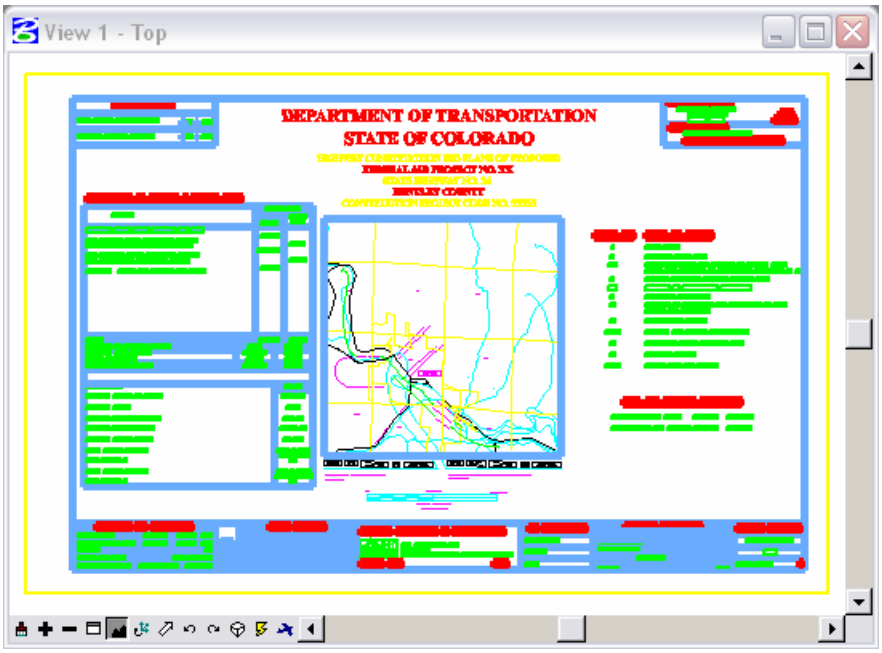
- Many Redline commands can be accomplished by keying in the command text (*e.g.* ***Change direction***).
- Key-ins can also be used to input data (*e.g.* ***xy=<x,y,z>*** to locate a coordinate).

  Note: Key-ins are ***not*** case sensitive.
- This is another method you can use to initialize drawing commands. Select **Utilities > Key-in** to open, and then dock the box.
- The Key-in dialog box can be resized vertically and horizontally. When resized vertically, additional data readout areas (**Key-in Builder** and **Key-in History**) are added to the bottom of the dialog box.

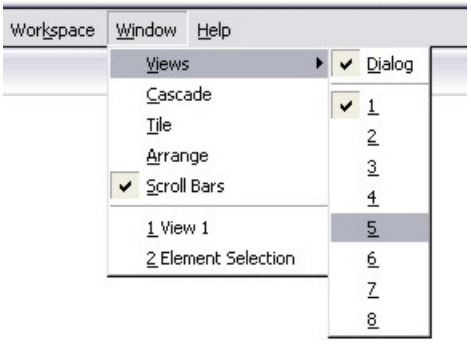


- When you're ready to key in a command, set the focus in the Key-in box by using the **<D>** (data) button.
- After you key in the command, use the **<Enter>** key to activate the command or select the **Run** icon.

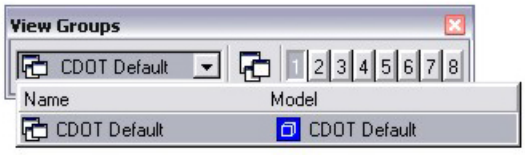
Views



- The area where graphics are placed is called a view.
- Up to eight view windows can be opened.
- Open and close views from **Window > Views**.

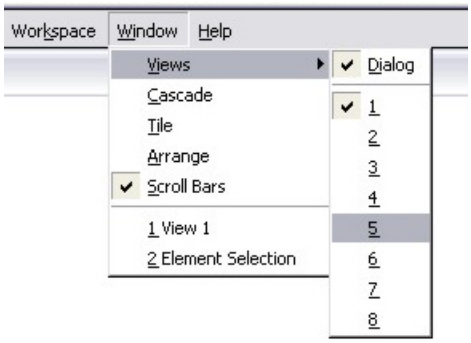


- Views can also be open and closed from the **View Groups** dialog box. This dialog box can be docked almost anywhere on your screen. A common location to find it is on the bottom of the drawing environment.

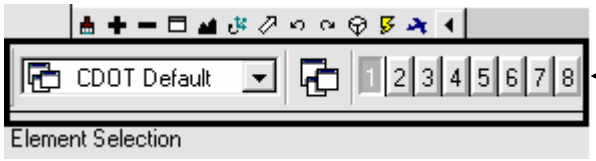


- You can set different view perspectives (top, front, rotated, etc.)

Opening Views



A view or view window is the area in which you place graphics and view your design. Up to eight view windows can be opened at one time. You can open and close views from the **Window > Views** drop-down menu. You can also select **Window > Views > Dialog** to open the **View Groups** toolbar where you can quickly turn views on or off.

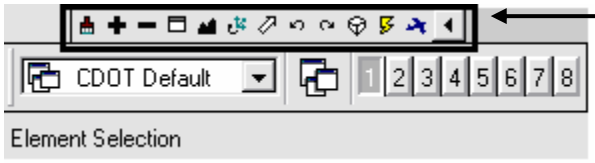


View Groups toolbar

You can use the control buttons in the upper right-hand corner to maximize, minimize, or close a view.

View Control Toolbar

The **View Control** toolbar located in the lower-left corner of each view allows you to adjust what you see in that view and to maneuver around in the view. The horizontal and vertical scroll bars also help you move around in the view. To use the **View Control** toolbar and **scroll bars**, turn on the option **Scroll bars on View Windows** under **Workspace > Preferences > View Options**.



View Control toolbar

Note: Choosing **Window > Tile** will display all open view(s) in the viewing area with equal size.

Use the following **View Control** tools as follows:

- ***Update View*** — to update a view (refresh or redraw).

- ***Zoom In*** — to increase the magnification of a view by Zoom factor.

- ***Zoom Out*** — to decrease the magnification of a view by Zoom factor (to see more of the design graphics).

- ***Window Area*** — to increase the magnification of a view by drawing a "box" around the area you want to see close up.

- ***Fit View*** — to show all displayable elements in a view.

- ***Rotate View*** — to rotate the view (top, front, etc.)

- ***Pan View*** — to move around in the view (up, down, right, left, etc.) to see other parts of the design without changing the magnification.

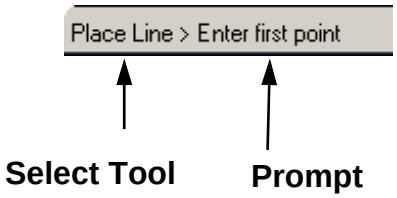
- ***View Previous*** — to step back through view operations.

- ***View Next*** — to step ahead through view operations.

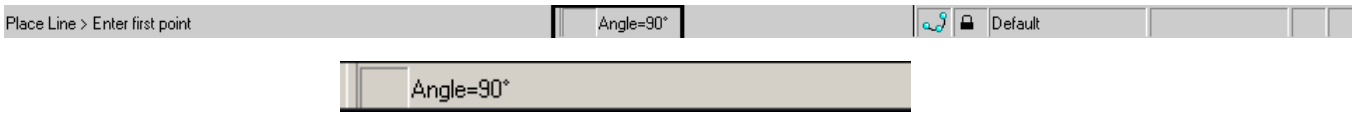
Status Bar

The **Status Bar** is Redline's command center composed of the following areas (left to right):

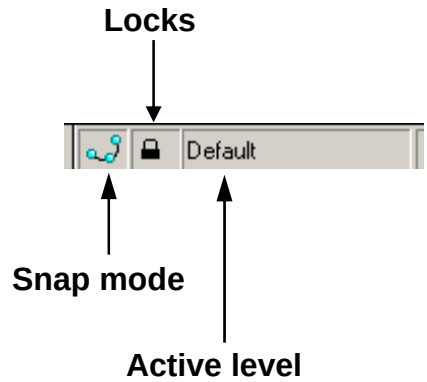
- ***Select Tool*** – displays the name of the active drawing tool and is located at the lower left corner of the screen.
- ***Prompt*** – displays the next user operation needed by Redline.



- ***Information and messages*** – displays current element parameter settings, error and other messages. A data point **<D>** in this area activates the **Message Center**.

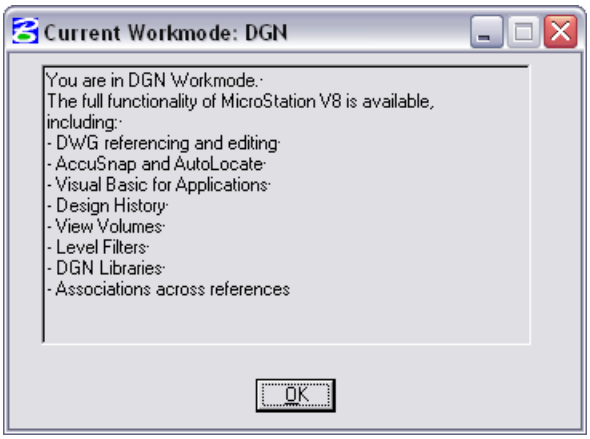


- ***Snap mode*** – displays the active snap mode used in conjunction with a tentative point or AccuSnap.
- ***Locks*** – displays a list of locks that you can quickly toggle on/off.
- ***Active level*** – displays the current level on which graphics are placed.

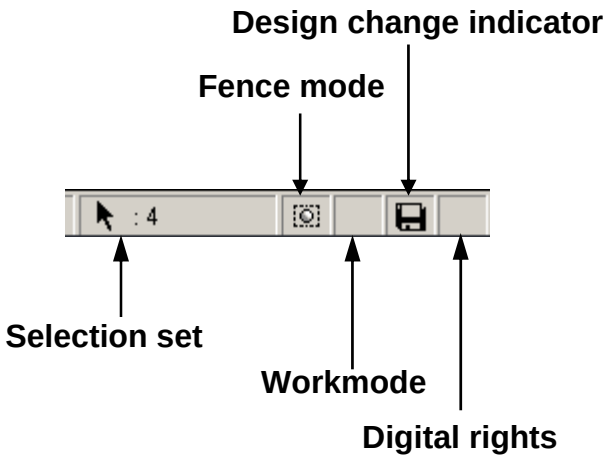


- ***Selection set*** – displays number of elements in the current selection set. A data point **<D>** in this area activates selection set commands.
- ***Fence mode*** – displays the active fence mode setting. A data point **<D>** in this area allows you to change the active fence mode.

- ***Workmode*** – a data point **<D>** in this area displays the current Workmode (*e.g.* DGN, V7, and DWG).



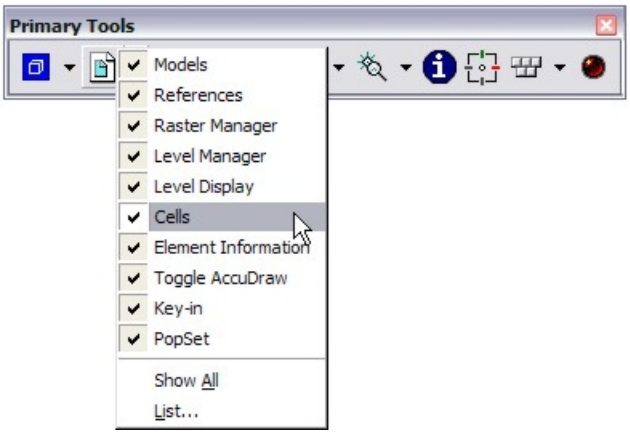
- ***Design change indicator*** – a floppy icon indicates the file has been graphically modified.
- ***Digital rights*** – displays if the file is protected for digital rights (user access control).



Many of these concepts will be covered in later sections.

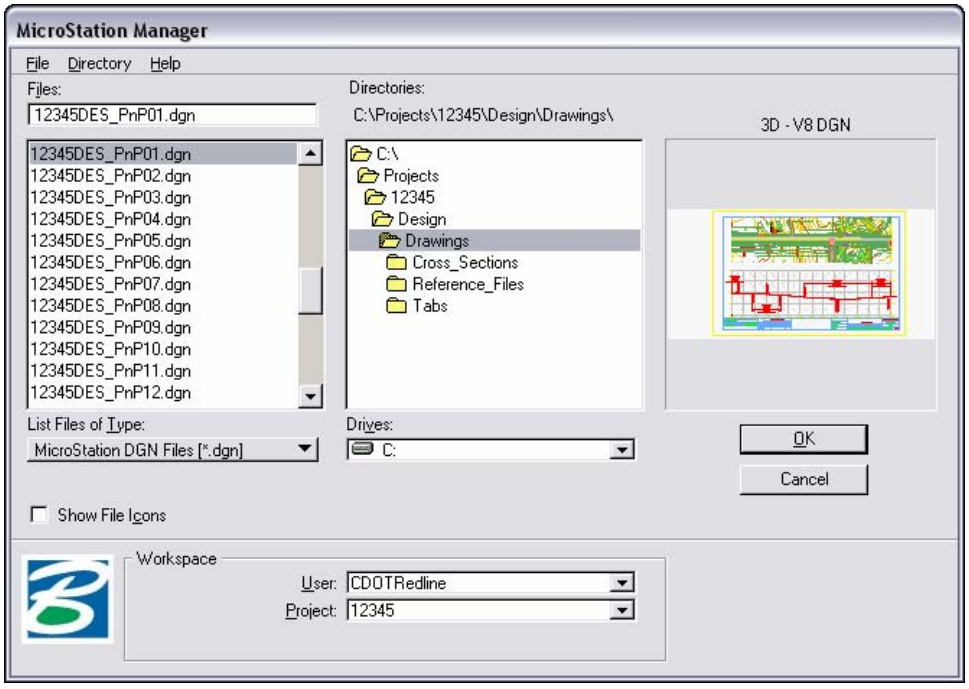
Show/Hide Toolbar Options

You can select which tools you want to include on any toolbar. This helps streamline your toolbars for the way you work and lets you customize your Redline setup.



To show/hide tools, **right-click** on any toolbar and toggle the tools on/off as desired.

Dialog Box Basics

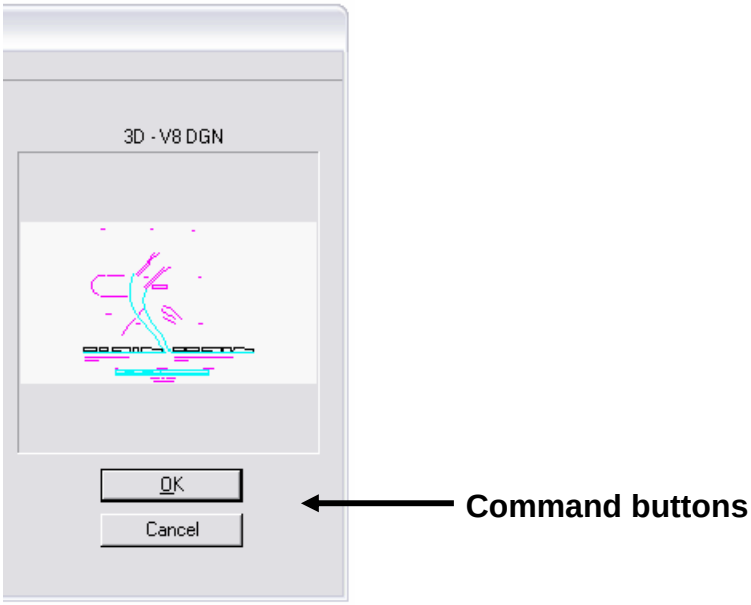


A dialog box can receive input from you or simply display information. Most dialog boxes have to be closed before you can continue with other operations.

A settings box refers to a special type of dialog box that can be left open on the screen while you work.

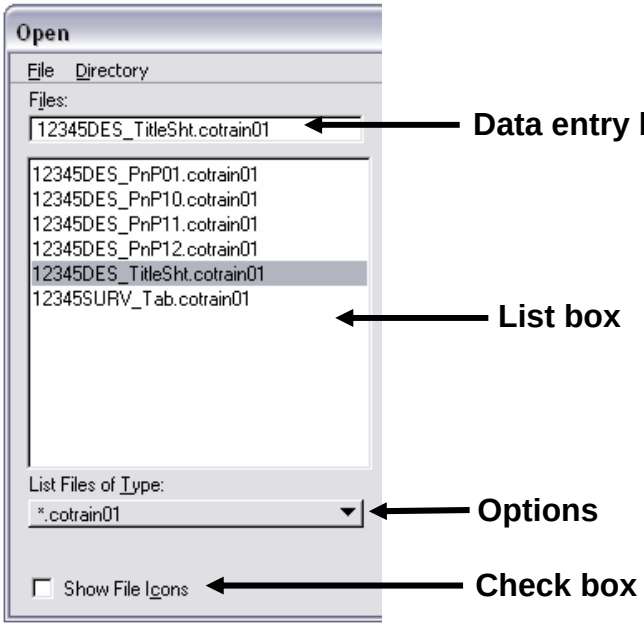
Dialog boxes can be moved anywhere in the Redline viewing area (**click** on the title bar and drag). Tab or use the pointer to move between the following fields:

Command Buttons — the active command button has a thicker black border (OK button).

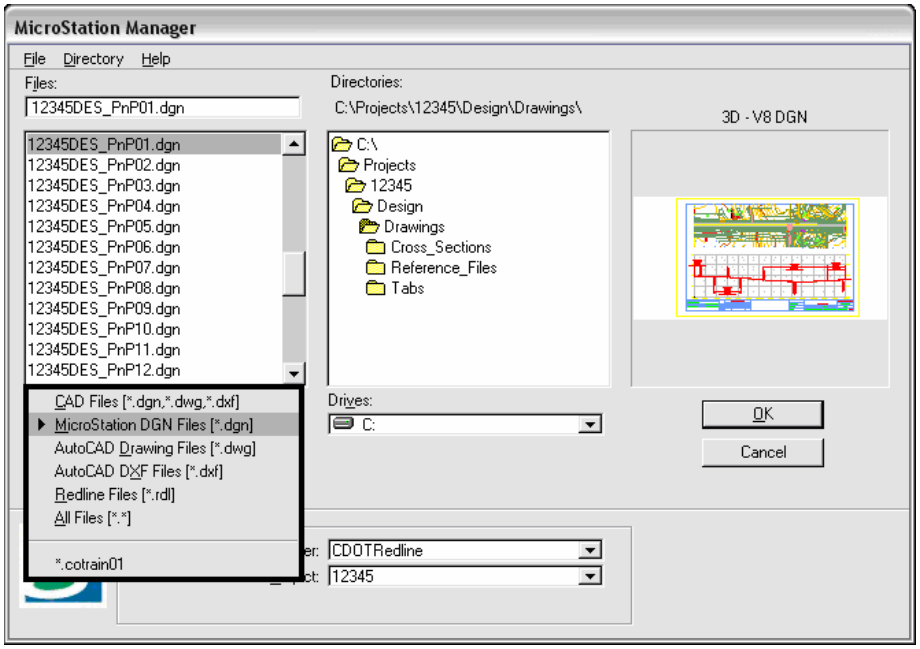


List box — List of items to choose with a mouse **click <D>.**

Data entry box — used to key in information.



Options — this is a drop-down list that contains a variety of choices.



Check Box — a check box item is on if a check mark (☑) appears in the box.

Lab 1 – Getting Started

Objectives

After completing this exercise you will know how to:

- Start Redline.
- Set the CDOT workspace.
- Use the new CDOT directory structure.
- Open a Redline design file.
- Use the Redline mouse buttons.
- Navigate the Redline interface.
- Use the View Control commands.
- Float and dock toolbars.
- Show and hide tools on toolbars.
- Access the key-in box.

Note

The text color was altered for ease of view.

Starting Redline

To start Redline:

1. Select **Start >All Programs > Bentley Redline > Bentley Redline**.

   or

   Double-click on the **Bentley Redline** icon (as a shortcut on your desktop).

Note: If the **Bentley Redline** icon is not located on your desktop as a shortcut, create it as a shortcut on your desktop. To do so, highlight the **Bentley Redline** icon from **Start > All Programs > Bentley Redline > Bentley Redline**, right-click on the **Bentley Redline** icon, and, from the fly out list that appears, choose **Send To > Desktop (create shortcut)**.

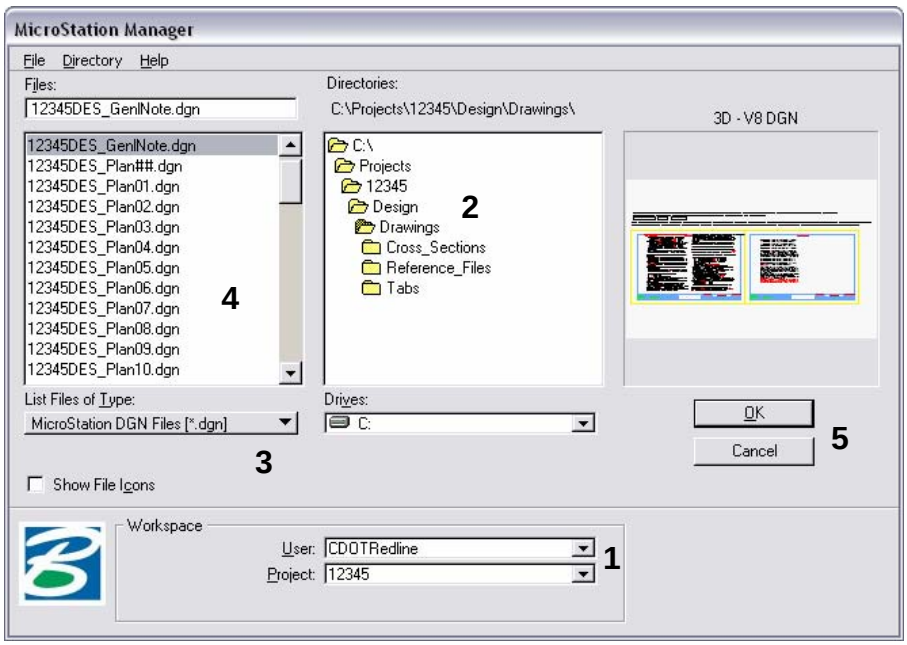
Redline will start and the **MicroStation Manager** dialog box will appear on your screen.

The Redline Interface

Working with Dialog Boxes

Do not press **<Enter>** after you key data into a dialog box unless you are ready to apply the settings. Use the **<Tab>** key or your mouse pointer to move from one field to the next to choose or enter your setup options before you **Apply** or **OK** the command.

Open a design file



1. In the Workspace section (lower portion) of the dialog box, set the options as follows:

   User: **CDOTRedline**

   Project: **12345**

2. Set the Directory to:
   C:\Projects\12345\Design\Drawings (**Double-click** on **C:** then **double-click** on the **Projects** folder, etc.)

3. Set **List Files of Type** to **MicroStation DGN Files (*.dgn)**.

4. Choose**12345DESGenNote.dgn** as the design file to open (place a data point **<D>** on the file name and it will highlight).

A thumbnail preview of the file is shown.

5. Select **OK** to open the design file.

Note: After you open the MicroStation DGN file (in Redline), a new Redline file by the same name is created. This file is automatically created and stored in the **C:\Projects\12345\Redline** directory. Also notice that the new file was given an extension of ***.cotrain01***. You are now working in a new Redline file with the original DGN file as a reference. This ensures that the original DGN file will not have any of its elements or text modified.

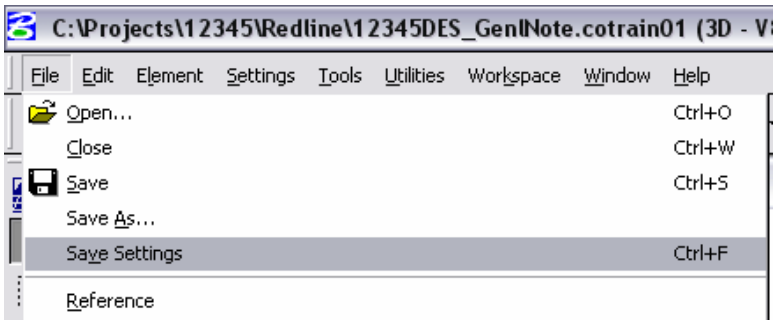
A General Notes Sheet of the example project is opened.

Access Drop-Down Menus

Use drop-down menus to select settings and non-drawing commands from the Redline interface. You can either post a menu (display it until you select a function from the menu) or open the menu and select a command all in one step.

Post a drop-down menu from the command window

6. Move your pointer to the **File** option in the pull-down menu and select it by **clicking** the data point (**<D>**) once.

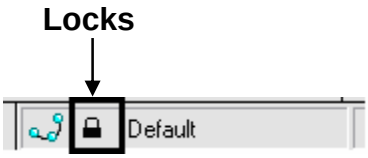


   - The drop-down menu appears.
   - Menu names followed by **...** indicate a dialog box will open when you select the item.
   - Names with an arrow to the right indicate there is a sub-menu associated with the item.
   - Use the up and down arrow keys on your keyboard to move up and down an item list or move your pointer.
   - Text to the right of an item indicates the hot key or shortcut to use to activate the command (*e.g.*, **Ctrl+F** means to hold down the **Ctrl** key and type **F**).
   - Underlined letters indicate a shortcut key to choose an item from a menu.

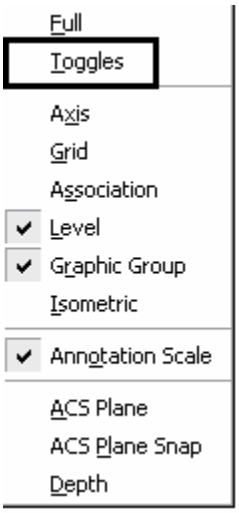
7. Move your pointer to **Element** to show the drop-down menu options. Take a minute to review the choices.

Open a Settings Box

8. **<D>** the **Locks** icon from the Status Bar at the bottom of the Redline interface.



9. From the popup menu, **<D>** on the **Toggles** option from the list. The Lock Toggles dialog will appear.



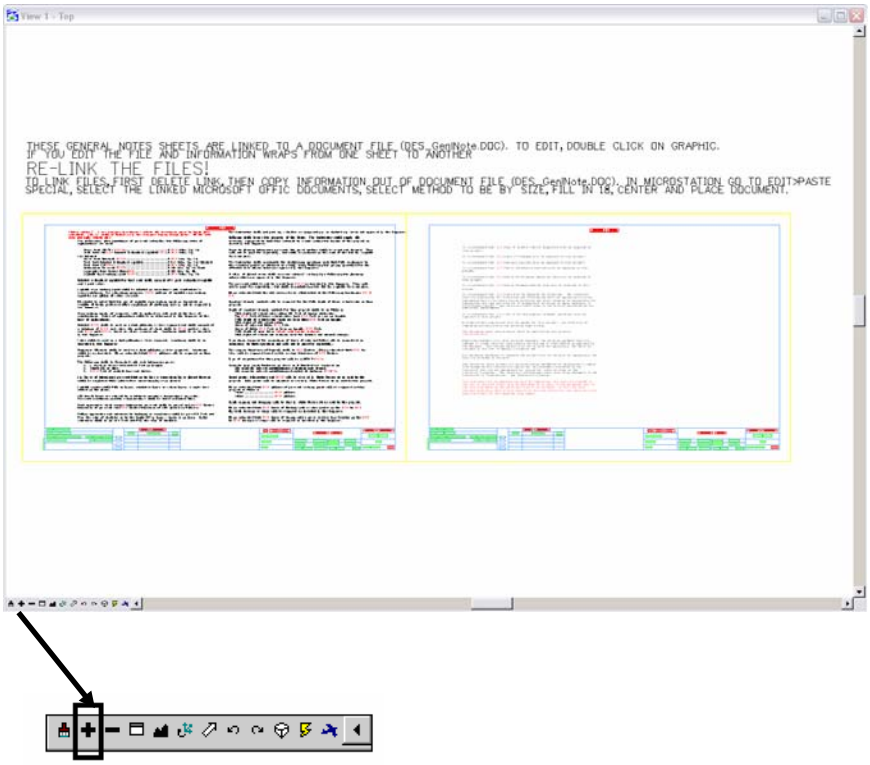
Note: A settings box, like the Locks box, does not have any command buttons (**OK**, **Close**, etc.). Settings boxes can be left open while working in Redline.

10. **Close** the Locks settings box by selecting the **X** in the upper right corner.

Control Views

Zoom In command

11. From the view control toolbar in View 1, select **Zoom In.**

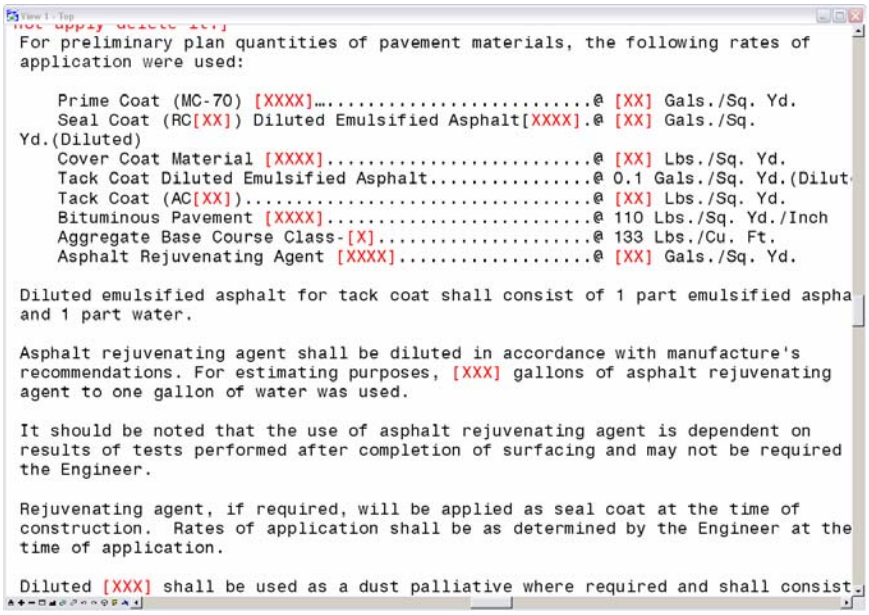


12. Make sure the **Zoom Ratio** option is set to **2** in the **Tool Settings**.

13. Place your pointer (the **X cross-hair**) in the upper left corner of the sheet and place a data point **<D>**.

The view is updated to **Zoom In** twice as close. The center of the view is the data point you identified.

14. **<D>** one more time in the same location so that you can easily read the text.



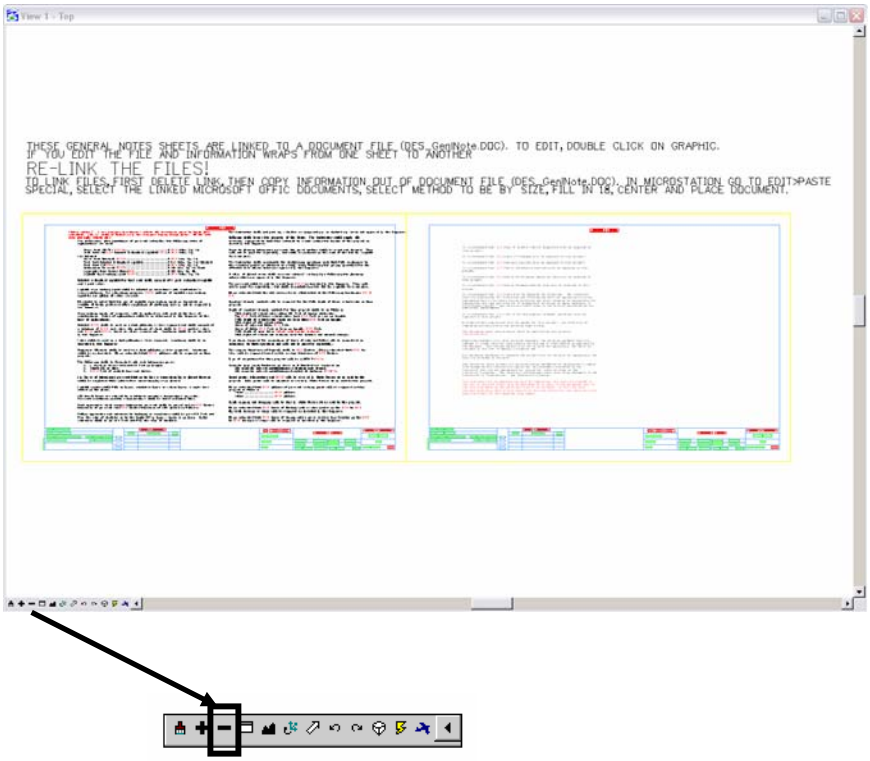
15. Reset **<R>** out of the **Zoom In** command.

Zoom Out command

16. From the view control toolbar in View 1, select **Zoom Out**.
17. Make sure the **Zoom Ratio** option is set to **2**.

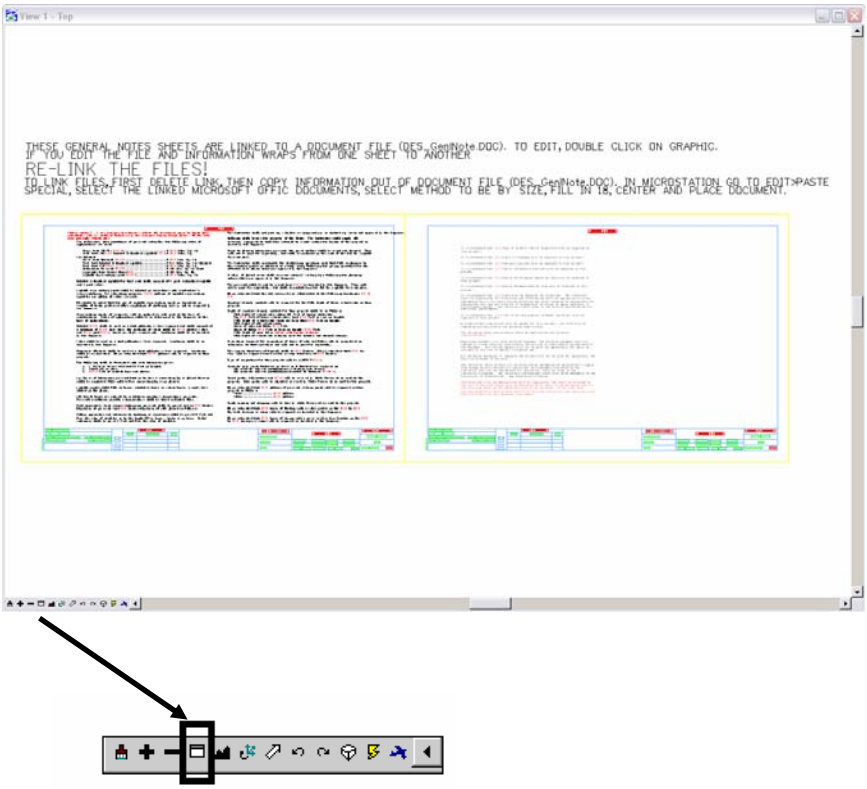
The view is updated to zoom out twice as far.

18. **<D>** in the ***bottom right*** of the sheet to zoom out again until you can see the entire map.



Window Area command

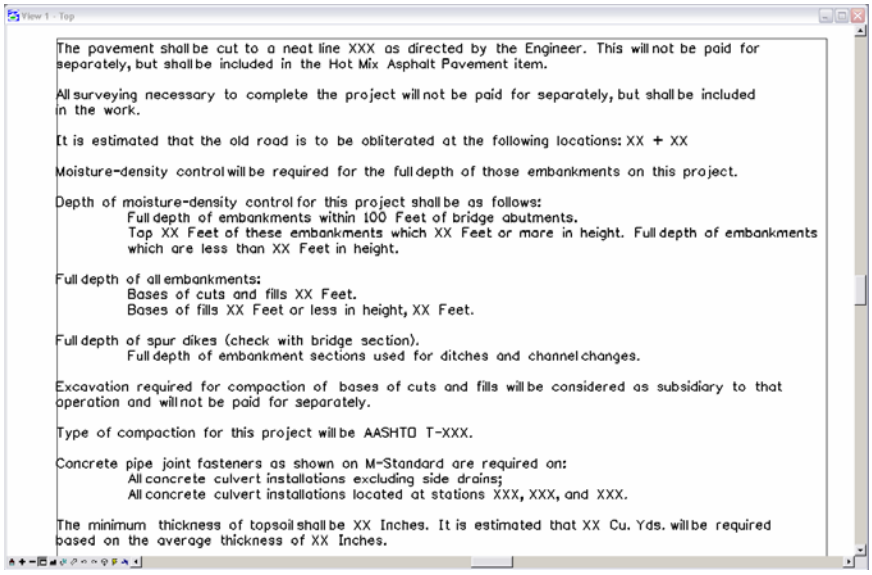
19. From the view control toolbar in View 1, select **Window Area.**



20. **<D>** below and to the right of the project title text ***General Notes***.

21. **<D>** again below and to the right of the text (this will draw a box around what you want to show close-up).

The view is updated.

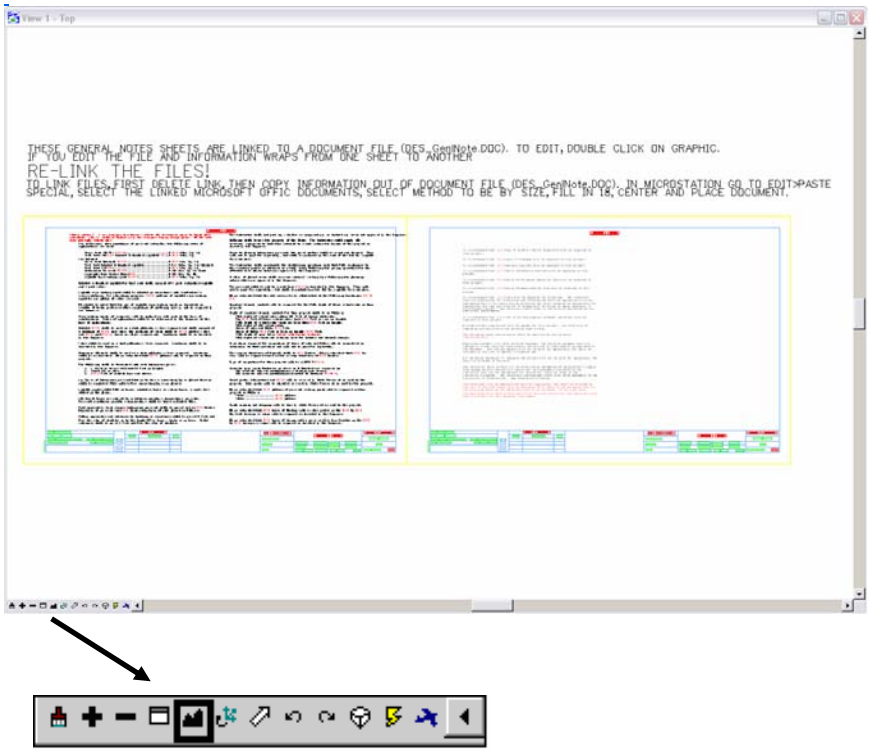


View Previous command

22. **<D>** on the **View Previous** command. The previous view is displayed.

Fit View command

23. From View 1, select **Fit View.**

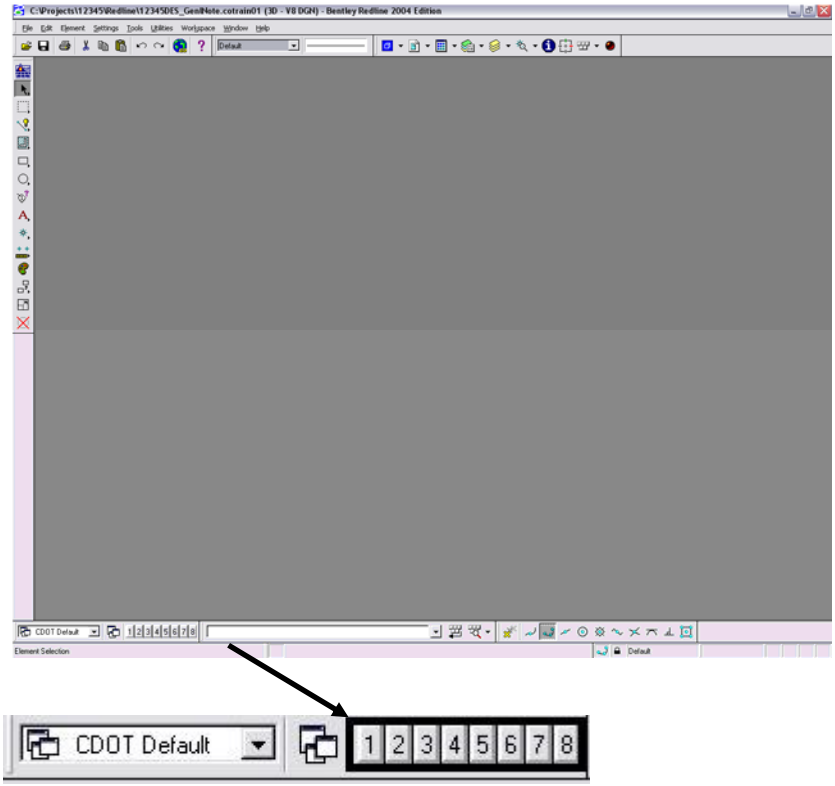


All of the graphics in View 1 are displayed in the view.

Note: If you are working in a drawing and cannot locate specific graphics, use the **Fit View** command. This is a handy way to quickly display all the graphics inside of the view window.

Closing a View

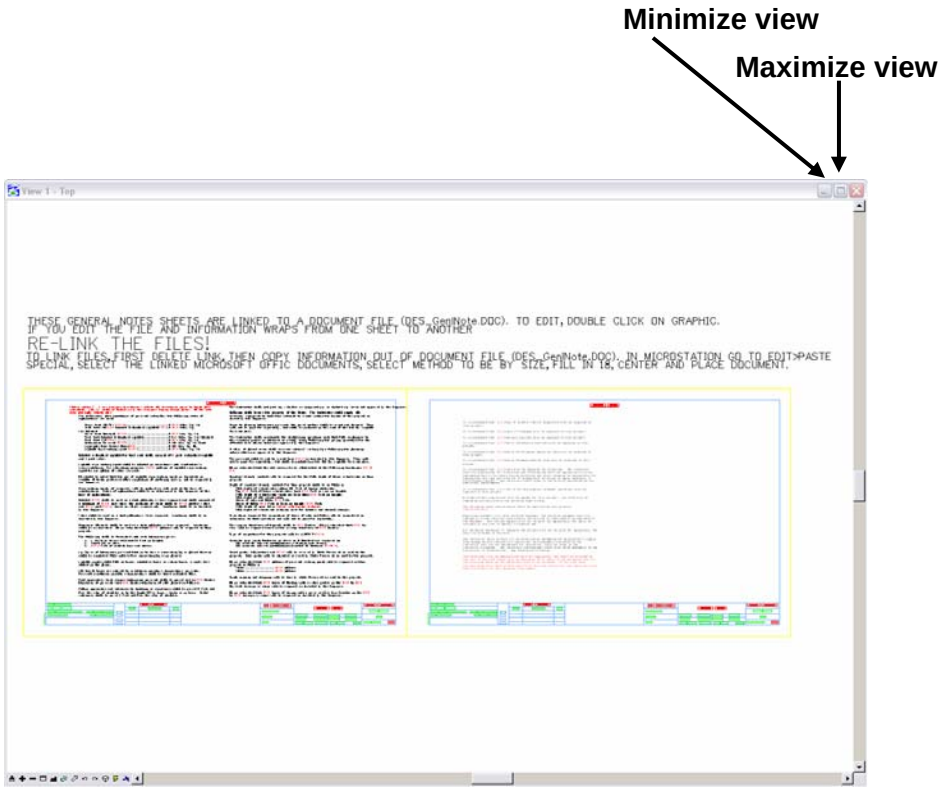
24. Toggle ***off*** view 1 on the **View Toggles** box.



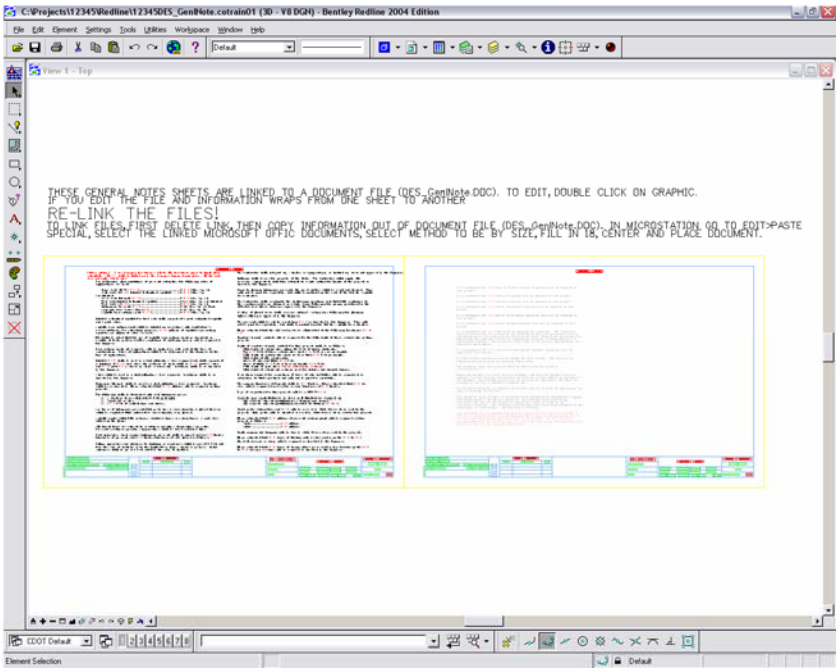
Note: You can also **double-click** on the **B** icon (the control menu icon) in the upper left corner of a view to close it or you can **click** the **X** icon in the view's upper right corner.

Make view one fill the screen.

25. Toggle ***on*** view 1 on the **View Toggles** box.
26. **<D>** the **Maximize** button in the upper right corner of View 1.



27. Select the **Fit View** command for View 1.

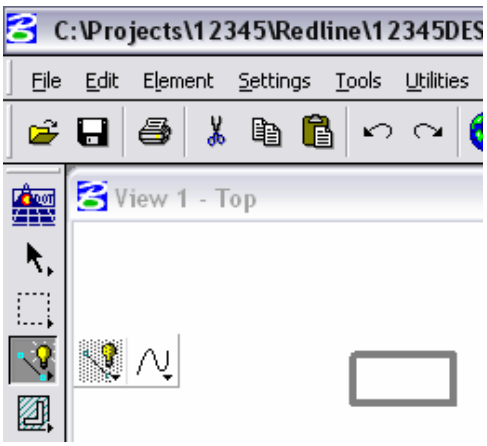


Practice Relocating Toolbars

Undock a toolbar from the Main tool frame.

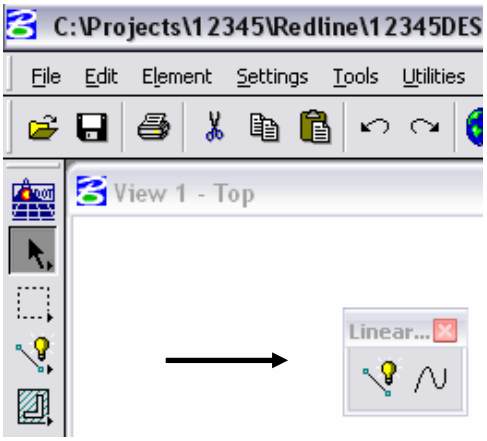
28. **<D>** on the **Place SmartLine** icon from the **Main** tool frame to display the **Linear Elements** toolbar.

29. Hold down the data button **<D>** and drag your pointer to the right until the toolbar is free from the main tool frame.



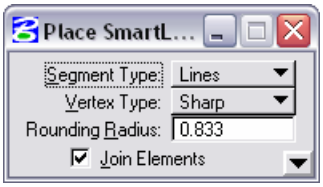
Hold down the data <D> button and drag

30. Release the data button when the temporary toolbar outline is at the desired location.



Release the data button and the tool bar is undocked

31. Select the **Place SmartLine** command.



Tool Settings for **Place SmartLine**

32. Select the **Place Point or Stream Curve** command from the **Linear** toolbar and notice the changes in the Tool Settings box.

Tool Settings for **Place Point or Stream Curve**

Note: **Tool Settings** dialog appears and updates for each tool selected.

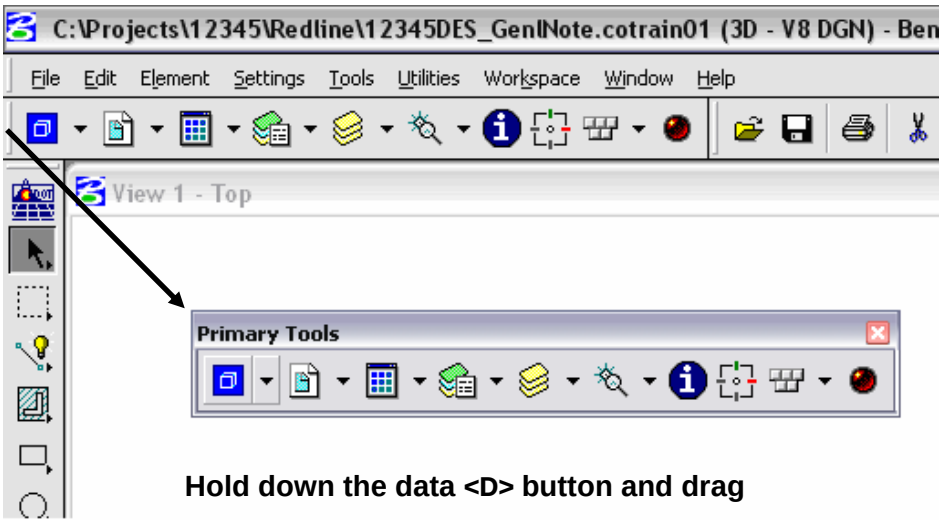
33. Close the **Linear** toolbar by **clicking** the **Close** icon (☒) in the upper right corner.

Float and Dock Toolbars

Float the Primary Tools toolbar.

34. Position your pointer over the left edge of the **Primary Tools** toolbar at the top of the Redline interface.

35. Hold down the data button and drag the toolbar until it "floats" in the view.



36. Repeat the steps to float or undock the **Standard** toolbar.

Toggle the Primary Tools toolbar off/on.

37. Select **Tools > Primary**.

The **Primary Tools** toolbar is turned off.

38. Select **Tools > Primary** again to toggle it back on.

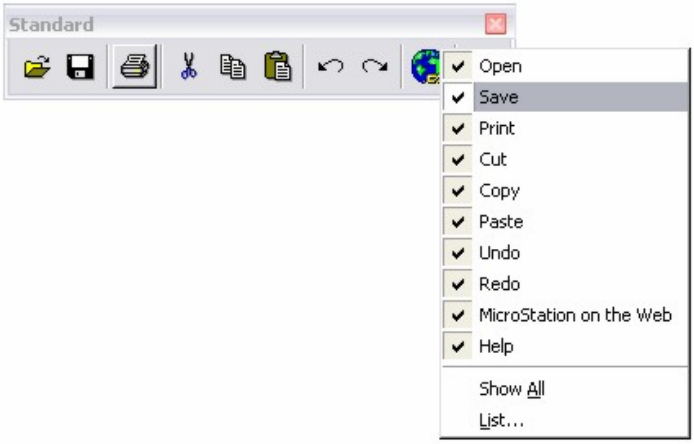
39. Dock the **Primary Tools** toolbar back to the upper right corner of the Redline interface by dragging the title bar with the data button.

Note: Any toolbar can be docked on the perimeter (top, bottom, left or right sides) of the Redline interface.

Show/Hide Tools

40. Locate the floating **Standard** toolbar.

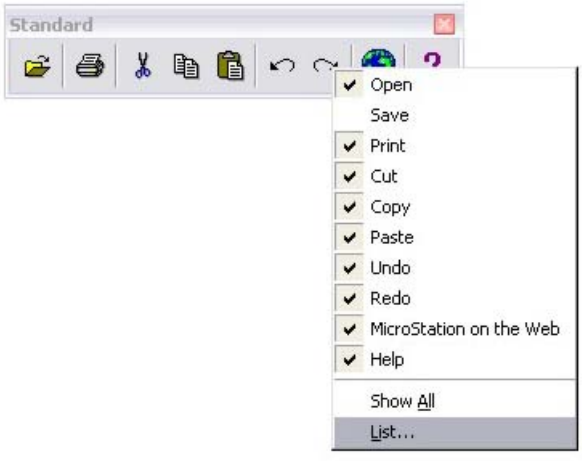
41. **Right-click** anywhere on the **Standard** toolbar. In the list of tools, toggle ***off*** **Save.**



Note: Redline files are automatically saved back to the disk drive.

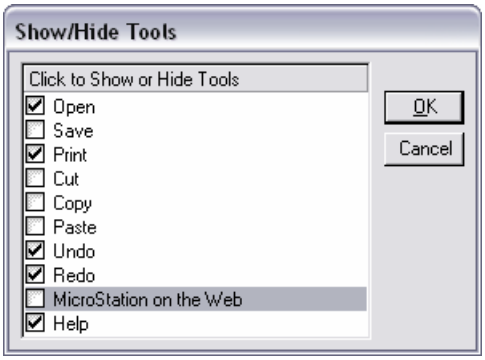
The **Save** tool is removed from the toolbar.

42. **<R>** and choose **List.**



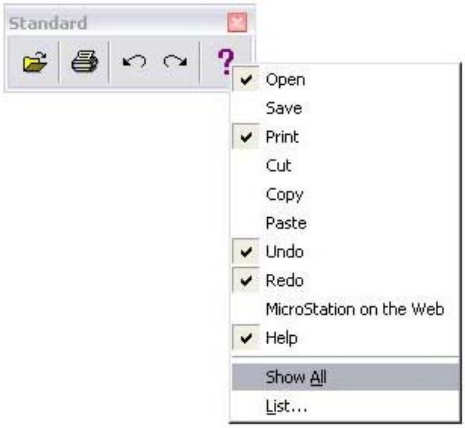
43. Toggle ***off*** the **Cut**, **Copy**, **Paste**, and **MicroStation on the Web** options.

44. Choose **OK.**



The toolbar is updated to show these tools hidden.

45. **<R>** and select **Show All.**



All tools are now shown on the toolbar.

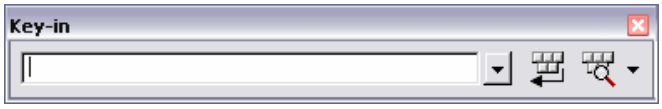
46. Dock the **Standard** toolbar back to the upper right corner of the Redline interface by dragging the title bar with the data button.

Note: Use this procedure to customize any toolbar to show just the tools you want to use.

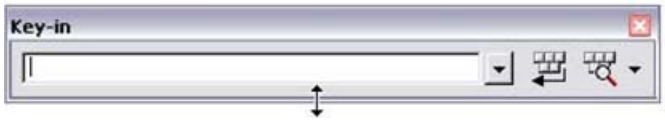
Using the Key-In Box

Open and dock the key-in box.

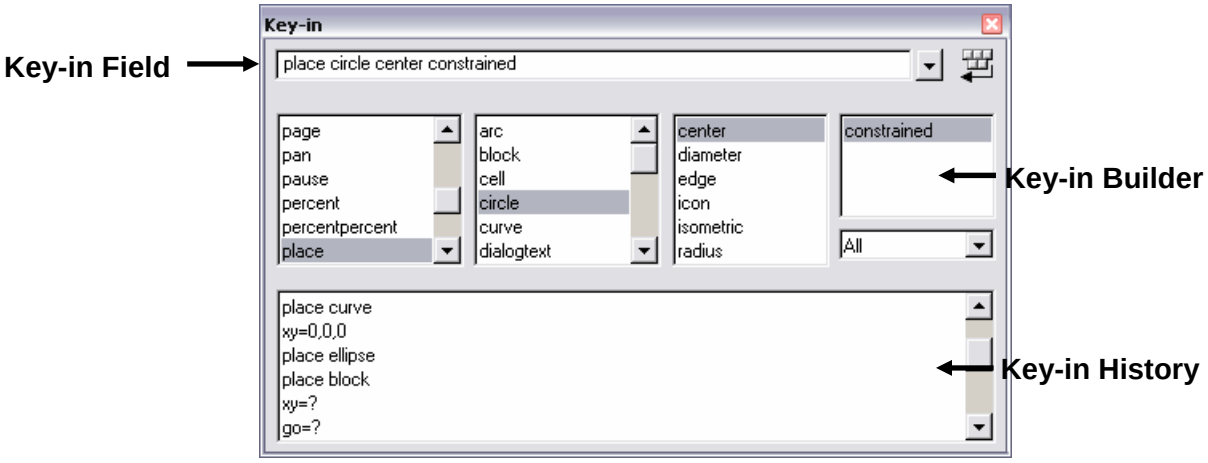
47. By default, the Key-In box is docked at the bottom of the Redline interface. Float the **Key-in** box from the bottom of the screen. If the **Key-In** box is not open, select **Utilities > Key-in** to open it.



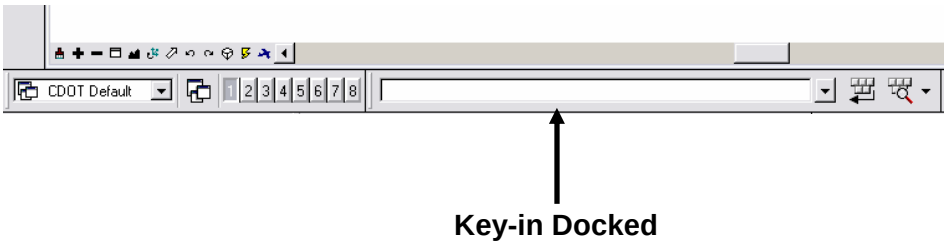
48. Expand the undocked box by grabbing the bottom of the box and dragging down when the double ended arrow appears. An expanded box can be made smaller to maximize available space. To do so, use the same double ended arrow that is used for expanding the box.



Key-ins can be selected from the list, but are typically just typed directly into the box.



49. Grab the title bar of the key-in box and drag it to the blank space at the bottom of the Redline interface to dock the box.



The **Key-in** box docks beside the other toolbars in the Redline interface.

Save settings in the file so the views will look the same when you next open the design file.

50. In the **Key-in** box you just docked, place a data point to set the focus in this box (you will get a blinking cursor).

51. Key in ***File*** (short for **File design**), then press **<Enter>** on the keyboard.

Note: When using key-ins, you ***always*** need to press **<Enter>** to initiate the key-in that was entered.

Keep the **Key-in** box docked. It is where you will key in all Redline commands.

Note: To **Save Settings** you could also select **File > Save Settings** or press **Ctrl+F** on your keyboard. Most commands can be accomplished with either key-ins or by selecting from the menu or toolbars.

By saving settings, the next time you enter this design file, it will be exactly as you left it.

52. Choose **File > Exit** to exit Redline and your design file.

Using the Undo and Redo Commands

When you delete an element, it is moved to the Undo buffer. Redline remembers everything that is placed in the design file even after it's gone. You can retrieve a deleted element using the **Undo** command (**Edit > Undo**). The **Redo** command (**Edit > Redo**) negates the last **Undo** command.

The **Undo** and **Redo** commands not only work on deleted elements, but on most graphics commands. For example, you can place a line, use **Undo** to remove the line, and then use **Redo** to re-place the line.

The Undo buffer is virtually unlimited in size (it's only limited by the operating system file size limit).

The **Undo** and **Redo** commands can also be accessed from the **Standard** toolbar (**Tools > Standard**).

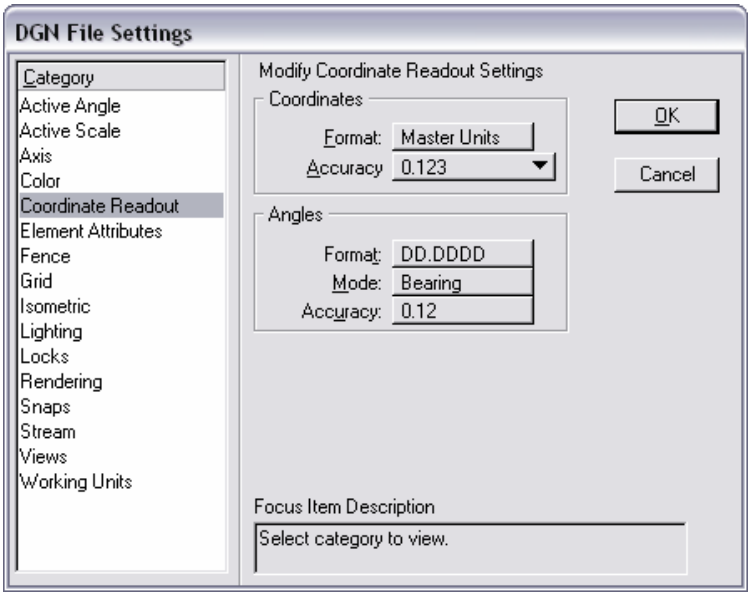
Note: Exiting the design file clears the Undo and Redo buffer.

2. Design File Basics and Element Placement

Coordinate Readout

Coordinates and Angles

Use **Settings > Design File > Coordinate Readout** to determine how Redline values are displayed. This is helpful, for example, when you measure graphics. You can set the display values to read out in master units (*e.g.* feet), sub units (*e.g.* inches), or both (*e.g.* feet : inches). Angles can be displayed as either degrees-minutes-seconds (**DD MM SS**) or decimal degrees (**DD.DDDD**) with up to 8 decimal place accuracy.



Entering Data

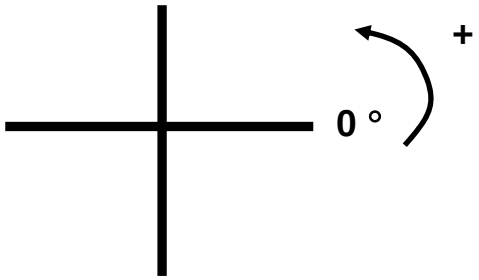
When entering data for any lengths or distances, use the format for working units: **MU:SU**. You can enter data in just master units, just sub units, or both. For example, if your working units are 1:12 (feet and inches), and you want to place a line with a length of 1 foot 1 ½ inches, you could enter the length as:

- 1.125
- 1**:**1 1/2
- :13 1/2

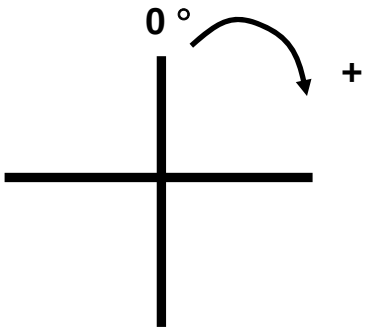
Note: You can use either fractions or decimals when entering data.

Angle Modes

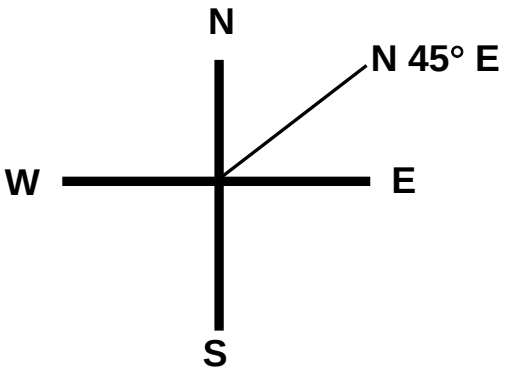
You can set the angle Mode to Conventional, Azimuth or Bearing.
Conventional angle mode sets 0 degrees at the horizontal (East) and positive angles are measured counterclockwise.



Azimuth angle mode sets 0 degrees at the vertical (North) and positive angles are measured clockwise.



Bearing angle mode measures angles based on direction. This is the default angle mode in Redline and CDOT's standard mode.



Graphics can be drawn with one angle mode and read with another. You can switch angle modes and formats as much as you like under **Coordinate Readout** without affecting your graphics.

Basic Element Commands

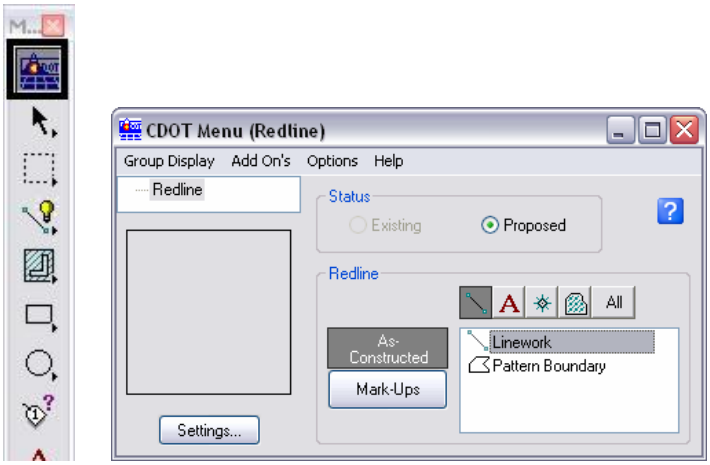
The following toolbars contain basic commands for creating elements such as lines, circles, blocks, and arcs. These common tools are shown below with their **Tool Settings** box options.

Notes: Any of the closed elements can be filled for shading.

A **<D>**, a key-in, or a snap can specify any location for placement of an element.

Selecting the *As-Constructed* category establishes both the commands and the appropriate levels for placing construction notations. As you will see in the following lab (2b) selecting the *Mark-ups* category offers additional options for modifying, adding, noting a deletion, or requesting a check of particular items while plans are in the review process.

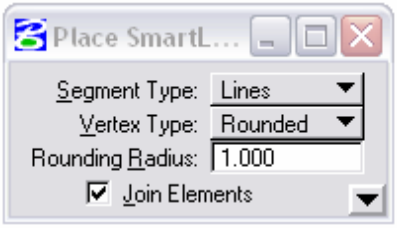
Linear Elements Toolbar



Place SmartLine

Activated from the CDOT menu – The Place SmartLine tool is the default tool that becomes active when the Linework item is selected from the CDOT menu. To use place SmartLine, open the CDOT menu from the main tool frame, set your filter to Show Lines, and choose the Linework item.

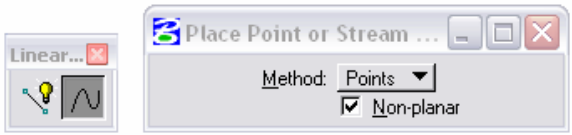
Smart Line places a chain of connected elements consisting of lines and/or arcs. The resulting graphic is one connected element. You can create sharp or rounded corners between the linear elements.



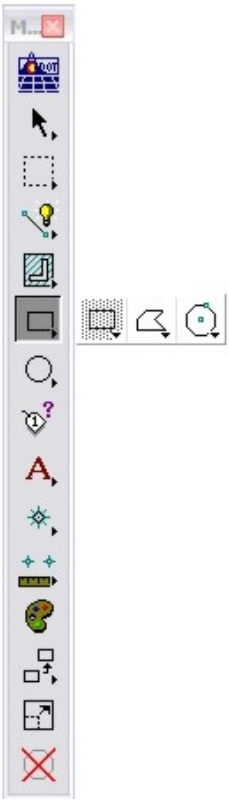
Place Point or Stream Curve

Points Method – Places a Redline curve through points identified in the view.

Stream Method – Places a continuous line based on the movement of the pointer. Largely used for digitizing or free handing contours.



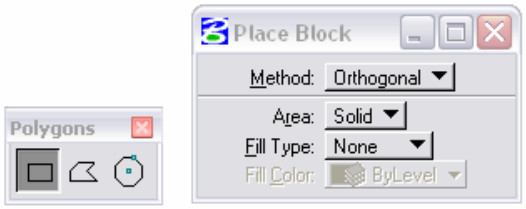
Polygons Toolbar



Place Block

Places a block (square or rectangle, not to be confused with an AutoCAD block) using two methods:

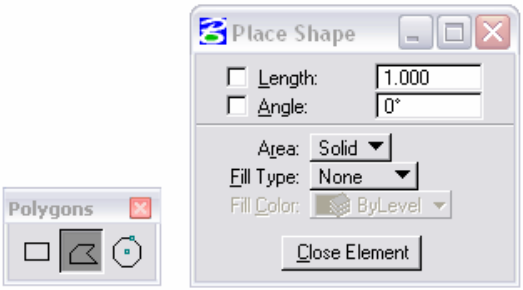
- ***Orthogonal*** — specify the opposite corners of the block or
- ***Rotated*** — specify a baseline angle, then the diagonal corner.



Note: This command has no relation to the term "block" in AutoCAD. They are two completely different concepts. In Redline, a cell is the equivalent of an AutoCAD block.

Place Shape

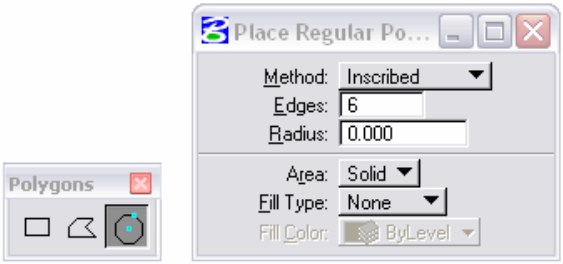
This command is used to place an irregular shape (closed element). You can draw the shape (data point to data point) or you can specify the length or angle of each shape segment. Use the **Close Element** option for the last point to ensure closure.



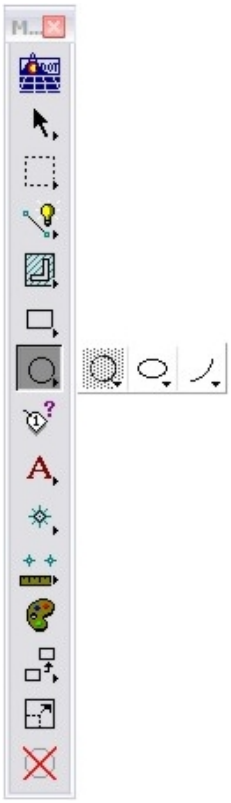
Place Regular Polygon

Places a 3-4999 sided shape where all sides are equal in length by any of these three methods:

- ***Inscribed*** — polygon is placed inside of an imaginary circle.
- ***Circumscribed*** — polygon is placed outside of an imaginary circle.
- ***By Edge*** — the length of one side is defined by the user graphically.



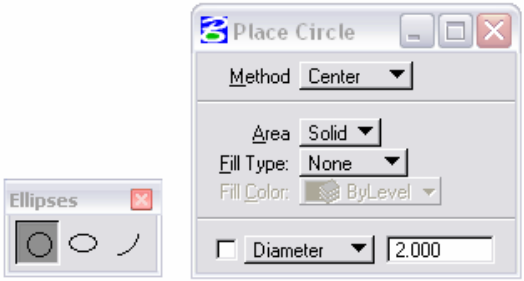
Ellipses Toolbar



Place Circle

Places a circle by one of three methods:

- ***Center*** — specify the center location and a point on the circle. A radius or diameter can also be specified.
- ***Edge*** — specify three edge points.
- ***Diameter*** — specify two points to define the diameter.

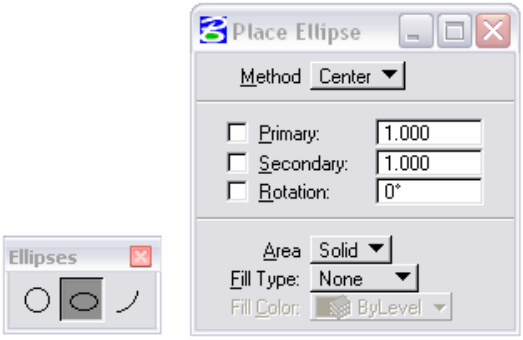


Place Ellipse

Places an ellipse by one of two methods:

- ***Center*** — specify two points for the primary axis and a third point for the secondary axis.
- ***Edge*** — specify three edge points.

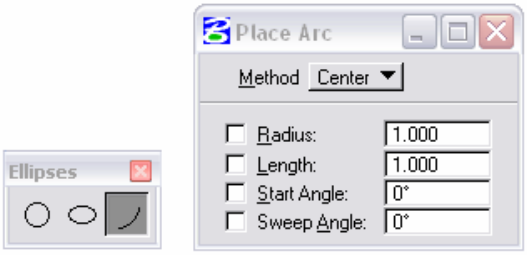
You can specify constraints — the **Primary** and **Secondary** axes and the **Rotation** angle. A location is all that is needed to then place the ellipse.



Place Arc

Places an arc by two methods:

- ***Center*** — specify an arc endpoint, center point and sweep angle for the other endpoint.
- ***Edge*** — specify three points: an endpoint, a point on the arc and the other endpoint.



Arcs can be placed either clockwise or counterclockwise.

The arc **radius**, **length**, **start angle,** or **sweep angle** can be constrained to help you place the arc. A positive length places the arc counterclockwise, a negative length places the arc clockwise.

Deleting Elements

To delete an element:

- Choose the **Delete Element** command from the **Main** tool frame.

- Move your pointer over the element and **<D>** anywhere on it to identify the element for deletion (it will highlight).
- **<D>** to accept the deletion.

Note: Choose **Element Selection** or another tool to get out of the Delete command.

Lab 2a – Placing Elements into the Drawing (Construction Group)

Objectives

After completing this exercise you will know how to:

- Place a line.
- Place a circle.
- Place a block.
- Delete an element.

Use various Drawing Tools

Open the Design File

1. Start Redline and open **12345DES_PnP01.dgn** from the **C:\Projects\12345\Design\Drawings** folder.

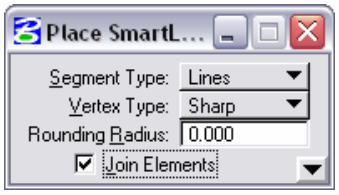
Use the Place SmartLine Command

2. **Window** or **Zoom** into a blank area on your screen where graphics are not present.
3. Activate the **CDOT Menu** from the Main Tool frame.

4. Resize the CDOT Menu dialog if necessary.
5. From the CDOT Menu, select the **As-Constructed** category.
6. Select the **Show Lines** filter.
7. Then select the **Linework** item.
8. Look at the **Linear** toolbar, notice that the **Place SmartLine** command was automatically selected as the active command.

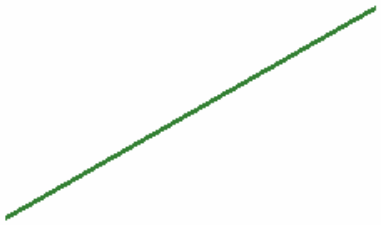
9. Look at the **Attributes** toolbar, the active symbology was also automatically selected for you (active level, color, line weight, etc.).

10. Verify that the Tool Settings **Segment Type** is set to **Lines**.



11. **<D>** anywhere in the view window area to define the starting point of the line.
12. Move the pointer to another location and **<D>** to define the end of the line.
13. **<R>** to complete the command.

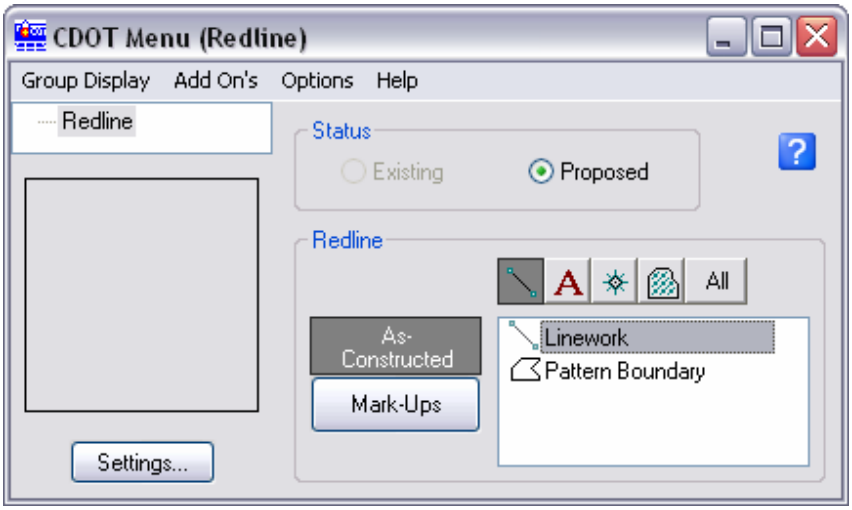
A line is placed in the drawing.



14. Follow the same steps (steps 11-13) to place another line in the drawing.

Use the Place Block Command

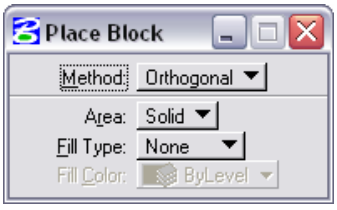
15. Verify that the **Linework** item is still selected from the CDOT Menu. By having the Linework item selected, the correct level and symbology are defined.



16. Select the **Place Block** command from the **Polygons** toolbar.

Note: It is required to select the **Place Block** command because the **Place SmartLine** command is always the ***default*** active command when a **Linework** item is selected.

17. Set the **Method** to **Orthogonal**.



18. **<D>** anywhere in the view window area to define the starting point of the block.

19. Move the pointer to another location and **<D>** to define the opposite corner of the block.

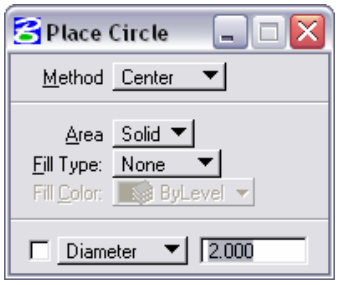
Use the Place Circle Command

20. Verify that the **Linework** item is still selected from the CDOT Menu.

21. Select the **Place Circle** command from the **Ellipses** toolbar.

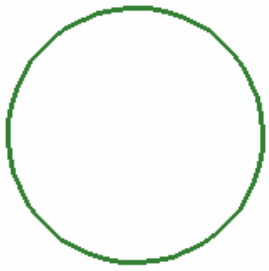
Note: It is required to select the **Place Circle** command because the **Place SmartLine** command is always the ***default*** active command when the **Linework** item is selected.

22. Set the **Method** to **Center**.



23. **<D>** anywhere in the view window area to define the center of the circle.

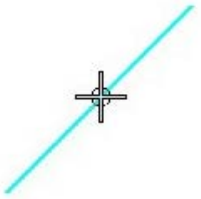
24. Move the pointer to another location and **<D>** to define a point on the circle.



Use the Delete Element Tool

25. Select the **Delete Element** tool from the Main Tool Frame.

26. Hover the pointer over any element and **<D>** to identify it for deletion.



27. **<D>** again (anywhere in the view window) to accept the element for deletion.

28. Practice deleting other elements on your own.

Lab 2b – Placing Elements into the Drawing (Project Management Group)

Objectives

After completing this exercise you will know how to:

- Use a variety of mark-up items.
- Place a line.
- Place a circle.
- Place a block.
- Delete an element.

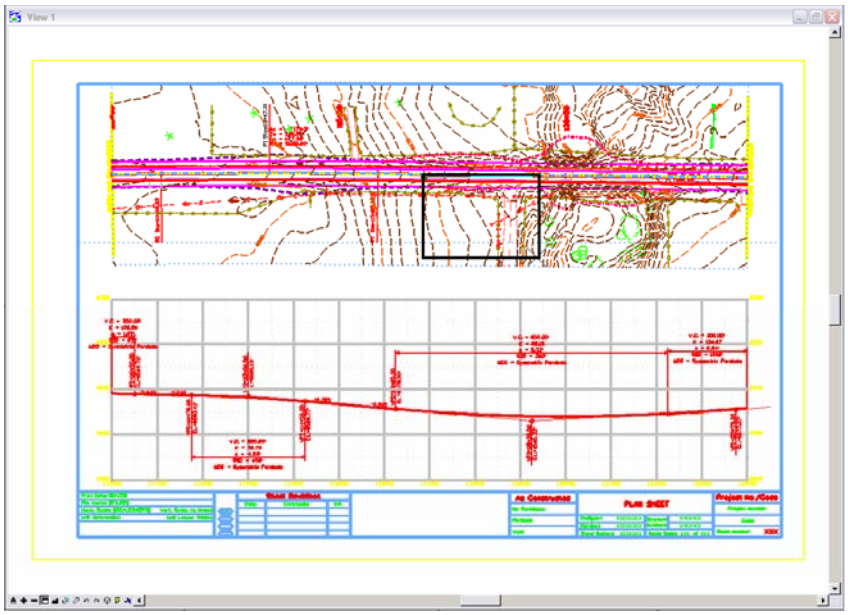
Use various Drawing Tools

Open the Design File

1. Start Redline and open **12345DES_PnP01.dgn** from the **C:\Projects\12345\Design\Drawings** folder (this is the same file that was used for the previous lab, Lab 2a, so this file may already be open if you completed Lab 2a).

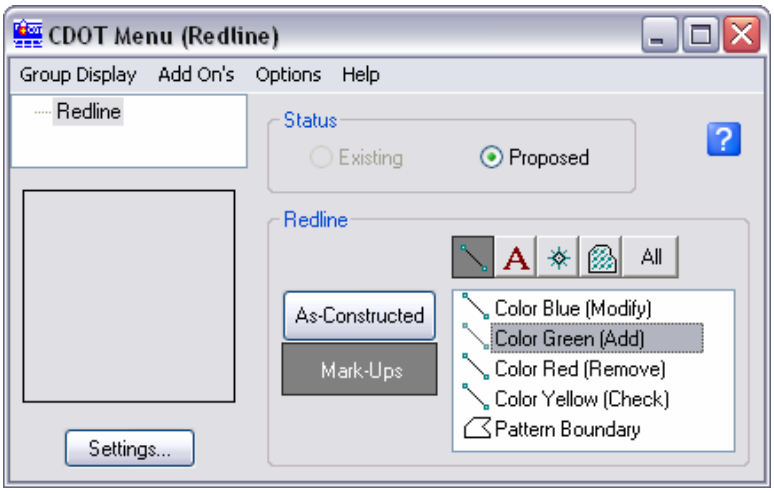
Use the Place SmartLine Command

2. **Window** or **Zoom** into the area shown.



3. Activate the **CDOT Menu** from the Main Tool frame.

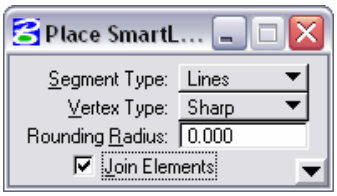
4. Resize the CDOT Menu dialog if necessary.
5. From the CDOT Menu, select the **Mark-Up** category.
6. Select the **Show Lines** filter.
7. Select the **Color Green (Add)** item.



8. Look at the **Linear** toolbar, notice that the **Place SmartLine** command was automatically selected as the active command.

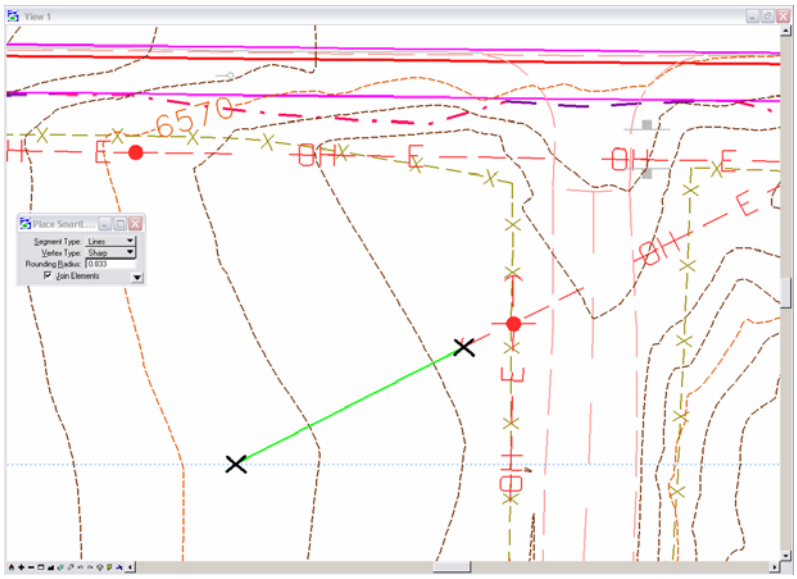
9. Look at the **Attributes** toolbar, the active symbology was also automatically selected for you (active level, color, line weight, etc.).

10. **Verify** that the Tool Settings Segment Type is set to Lines.



11. **<D>** near the existing power line to define the starting point of the line (indicated by an X).
12. Move the pointer and **<D>** to define the end point of your added power line (indicated by an X).
13. **<R>** to complete the command.

A line is placed in the drawing.



Use the Place Circle Command

14. Verify that the **Color Green (Add)** item is selected or reselect it from the CDOT Menu to ensure that the correct level and symbology are applied to indicate an added item.

15. Select the **Place Circle** command from the **Ellipses** toolbar.

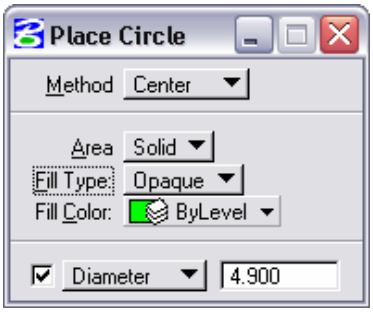
Note: It is required to select the **Place Circle** command because the **Place SmartLine** command is always the ***default*** active command when the **Linework** item is selected.

16. Set the **Method** to **Center**.

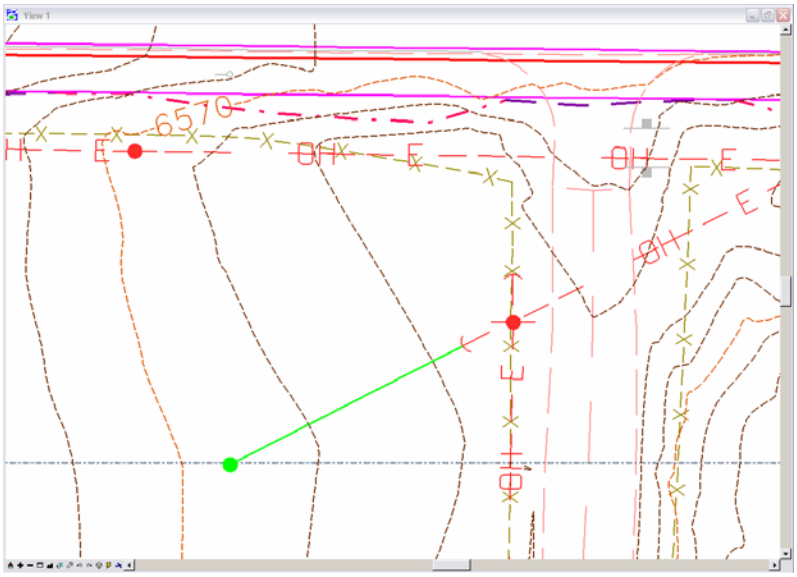
17. Set **Fill Type** to **Opaque.**

18. Enable the **Diameter** setting by **<D>** in the check box.

19. Enter a **Diameter** of 4.9 and press *Enter*.The dialog box should look like the following:

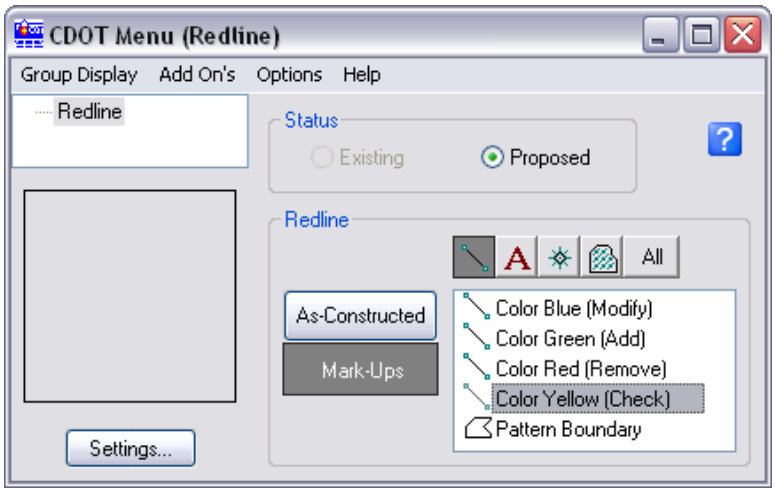


20. **<D>** near the newly added line to indicate position of new electric pole.



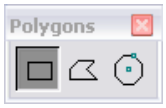
Use the Place Block Command

21. Choose **Color Yellow (Check)** item from the CDOT menu. This will ensure that the correct level and symbology are applied to your block to indicate an item to be checked.



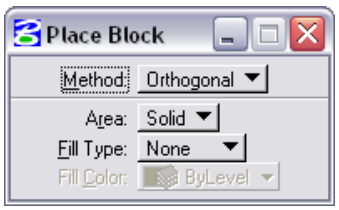
22. Select the **Place Block** command from the **Polygons** toolbar.

Note: It is required to select the **Place Block** command because the **Place SmartLine** command is always the ***default*** active command when the **Linework** item is selected.



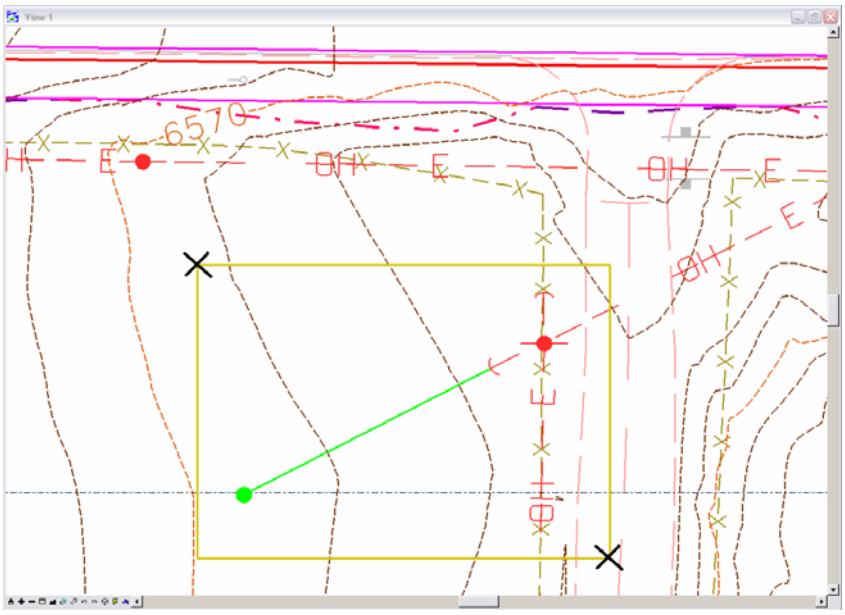
23. Set the **Method** to **Orthogonal**.

24. Set **Fill Type** to **None**.



25. **<D>** towards the upper left corner of your recent additions (indicated by an X).

26. Move the pointer to the lower right and **<D>** to define the opposite corner of the block and define the area to be modified (indicated by an X).



Use the Delete Element Tool

27. Select the **Delete Element** tool from the Main Tool Frame.

28. Hover over any of your recent additions and **<D>** to identify it for deletion.

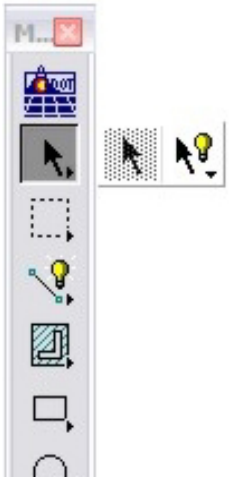
29. **<D>** again (anywhere in the view window) to accept the element for deletion.

30. Practice by deleting remaining additions on your own.

3. Element Selection and Manipulation

There are times when it is necessary to group elements because it is more efficient to place, modify, or manipulate groups of elements rather than perform repetitive commands on individual elements. If you want to perform a one-time manipulation on a group of elements (*e.g.*. copy or delete them), create a ***selection set*** or use a ***fence*** to group the elements.

Element Selection Toolbar

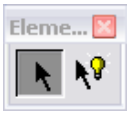


The **Element Selection** toolbar provides various methods for temporarily grouping elements. Once grouped, elements can be modified, manipulated or deleted as a group. When elements are grouped with these tools, they are placed in a selection set and remain in the selection set until you clear the set.

Elements are highlighted upon entry into a selection set. You can change the selection set color under **Settings > Design File > Color > Selection Set Color**. You can also quickly see the number of elements in the selection set from the indicator on the **Status Bar**.

Element Selection

Selects individual elements and adds them to the selection set in the Redline file.



Notes: Selected elements are indicated by color highlighting.

Elements in a referenced file may or may not be selectable based on the status of the References *locate* option, whether it is toggled on or off.

The status of the *locate* option determines whether elements in a referenced file can be copied into the active drawing. Copy is the only manipulation command allowed on referenced graphics.

Referencing is discussed in more detail in Chapter 6

To add an element to a selection set:

- Select the **Element Selection** command.
- **<D>** on the element.

  Handlebars appear on the element and it highlights.

To add multiple elements to the set

- Select the **Element Selection** command.
- Hold down the data button and drag across the elements to add (drag corner to opposite corner in a rectangular area).

  All elements placed in the set highlight.

To add additional elements to the set:

- Hold down the **<Ctrl >** key.
- **<D>** on the element to add.

  The element highlights.

To remove an element from the set:

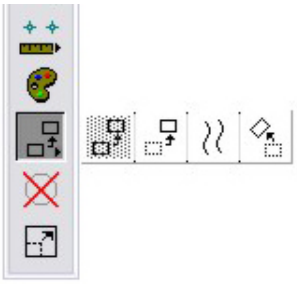
- Hold down the **<Ctrl >** key.
- **<D>** on the element currently in the set.

  The highlight is removed and the element returns to it original color.

To clear the selection set:

- Select the **Element Selection** command.
- **<D>** in any “clear” area in your view.

Manipulate Toolbar



The **Manipulate** toolbar commands (copy, move, *etc*.) allow you to manipulate an entire element. Follow your prompts closely to properly execute the commands.

Copy Element

The **Copy** command makes a copy of one or more existing element(s) and allows you to position the copy as desired.

To copy an element:

- Select the **Copy** command.
- **<D>** on the element to identify it.
- **<D>** to identify the location for the copy.

  Note: You can also identify the element for modification (using the Element Selection command) and then select the Copy command.

Move Element

The **Move** command moves an element from one location to another.

To move an element:

- Select the **Move** command.
- **<D>** on the element to identify it.
- **<D>** in the new location to position the element.

  Note: You can also identify the element for modification (using the Element Selection command) and then select the Move command.

Manipulating Multiple Elements

The tools in the manipulation toolbar can also be used on multiple elements at once.

To manipulate multiple elements:

- Create a temporary selection group using the element selection tool.
- Select the desired **manipulation command** from the manipulate toolbar.
- **<D>** on an element in the selection set to identify the group.
- **<D>** in the new location to position the elements.

Modify Element

The **Modify** command allows you to change the geometry of an existing element (*e.g.* shorten, lengthen, move the location of vertices, etc.).

To modify an element:

- Select the **Modify** command.
- **<D>** on the element to identify it.
- **<D>** at the location in which you would like to modify the element to (shorten, lengthen, etc.).

Lab 3 – Element Selection and Manipulation

Objectives

After completing this exercise you will know how to:

- Group elements using the Element Selection command.
- Copy elements.
- Move elements.
- Modify elements.

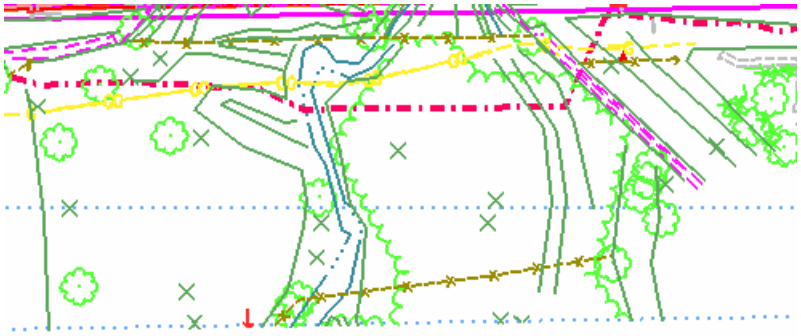
Select and Manipulate Elements

Open the Design File

1. Open **12345DES_PnP18.dgn** from the **C:\Projects\12345\Design\Drawings** folder (this file may still be open from the last lab).

Place Lines

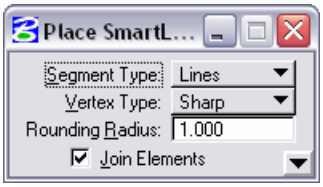
2. **Zoom** into the area below (top-center of the sheet).



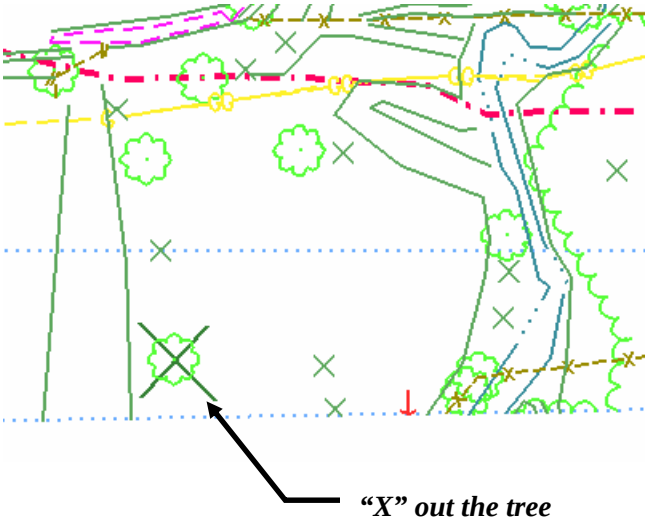
3. Activate the **CDOT Menu** from the Main Tool frame if it isn't already activated.
4. From the CDOT Menu, select the **Show Lines** filter.
5. Then select the **Linework** item.

The **Place SmartLine** command is selected.

6. Set the **Settings** options as shown.



7. "X" out one tree as shown below.

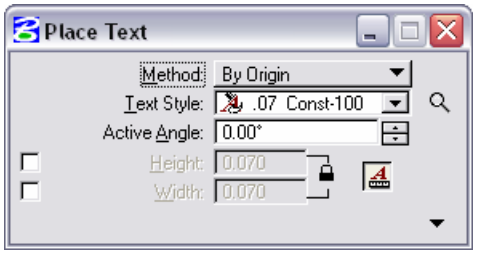


Place Text

8. From the CDOT Menu, select the **Show Text** filter.
9. Select the **.07 Const-100 Text** item.

The **Place Text** command is selected.

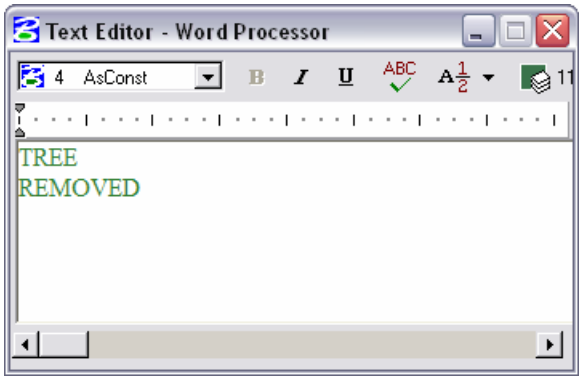
10. Set the **Settings** options as shown.



11. In the **Text Editor-Word Processor**, key in the text below. Where indicated press the **<Enter>** key to shift text to the next line.

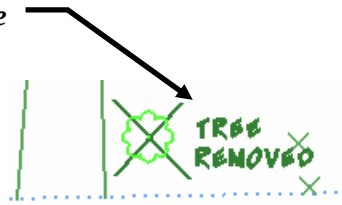
TREE <**Enter**>

REMOVED



12. **<D>** next to the "X" to place the text.

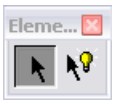
Place the text here



Use the Element Selection Command

Create a selection set of the redlines

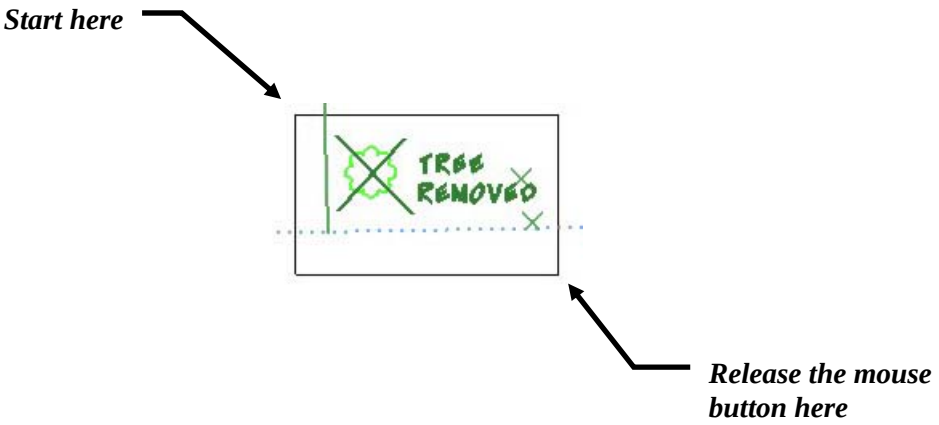
13. Select the **Element Selection** command from the **Element Selection** toolbar.



Place a selection box around the "X" and text.

14. **<D>**, **hold**, and **drag** the pointer.

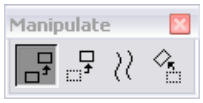
15. **Release** the **data** button once the selection set boundary encompasses the lines and text as shown.



The selection set field on the status bar should show that three elements are currently selected. Notice that the tree element was not included in the selection set. This is because the Reference 'locate' option is off by default (Referencing is discussed Chapter 6).

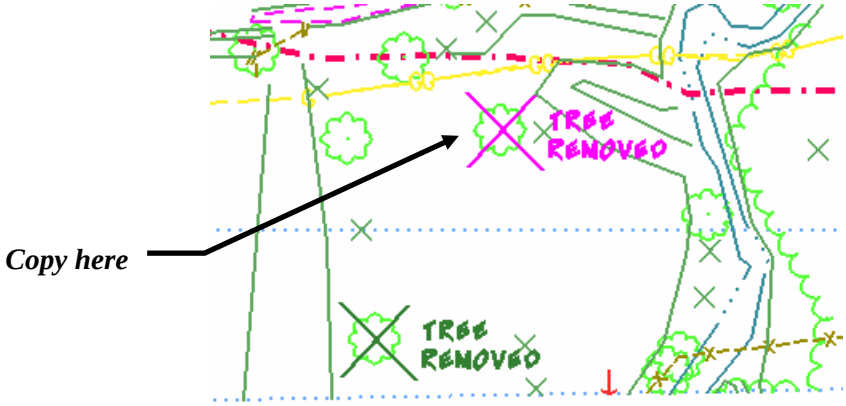
Copy Elements

16. With the three elements still selected, pick the **Copy** command from the **Manipulate** toolbar.



17. **<D>** a point on or near the selection set, ***DO NOT*** accept.

18. Move your pointer over another tree as shown below and **<D>** to accept the placement.

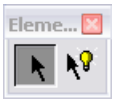


19. Using the same procedure, make another copy and place the graphics as shown.

Move Elements

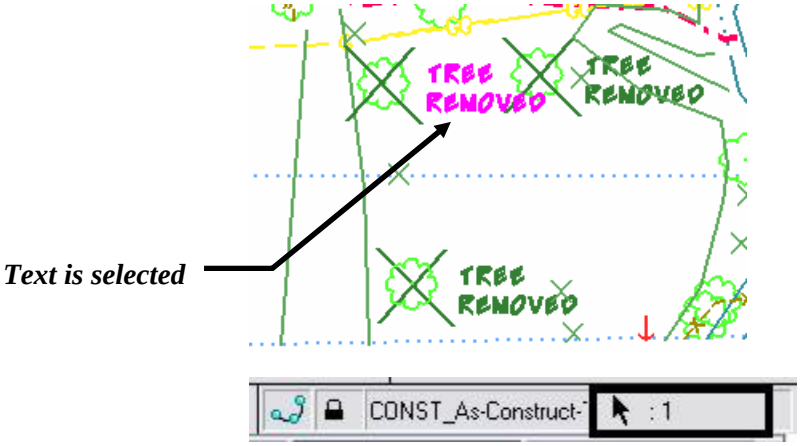
Deselect the “X”.

20. Select the **Element Selection** command.



21. **Press** and **hold** the **[Ctrl]** key.
22. **<D>** on one line and then the other.

The text should now be the only element selected.



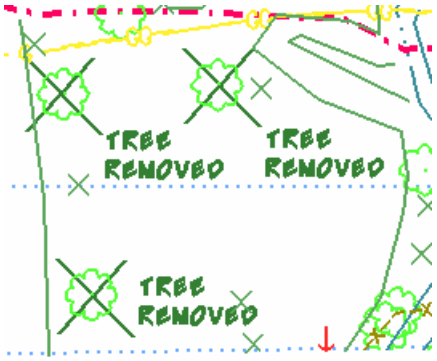
23. Select the **Move** command from the **Manipulate** toolbar.

24. Set the **Settings** options as shown.

25. **<D>** a point on or near the selection set.

26. Move your pointer and **<D>** to place the text approximately as shown.

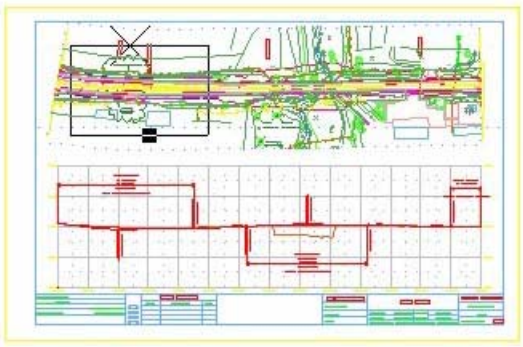
27. Move the other text to the right so that the graphics appear as shown.



28. Clear the selection set by clicking anywhere in the drawing (with the Element Selection command active).

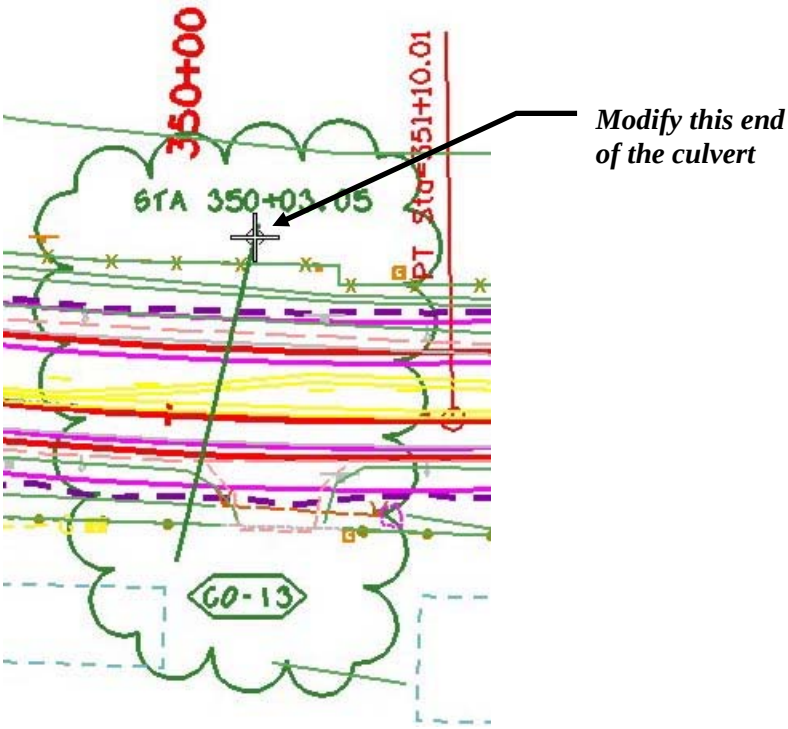
Modify Elements

29. **Window** into the area in which you placed a culvert from the previous chapter (the culvert placed for the Construction Group, Lab 3a, will be shown below).

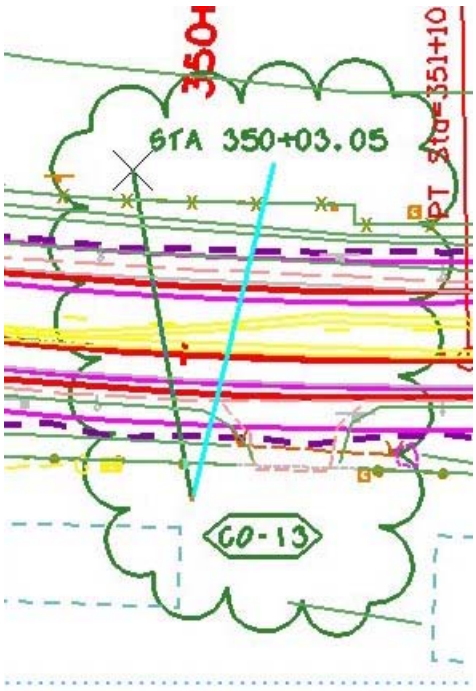


30. Select the **Modify** command.

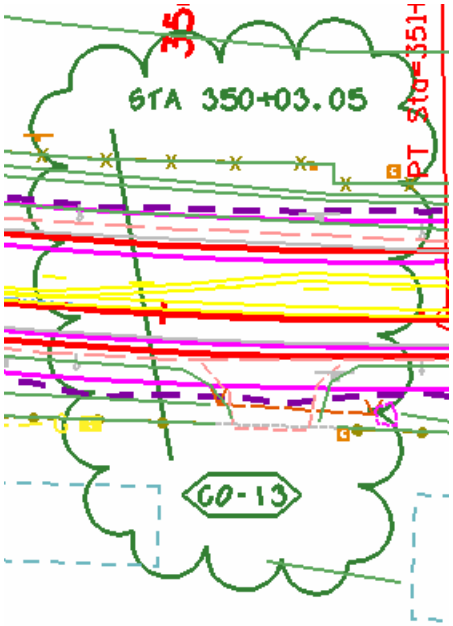
31. **<D>** on one end of the culvert as shown.



32. Move the pointer to the left approximately as shown and **<D>** to relocate (modify) the end of the culvert.



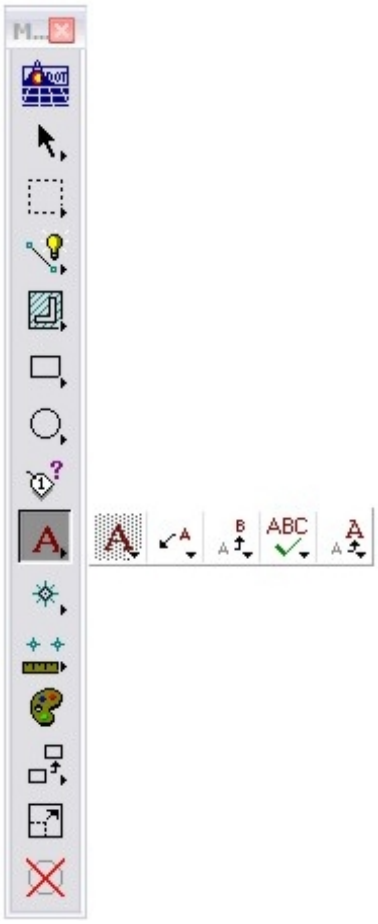
33. **<R>** to complete the modification operation.



4. Text

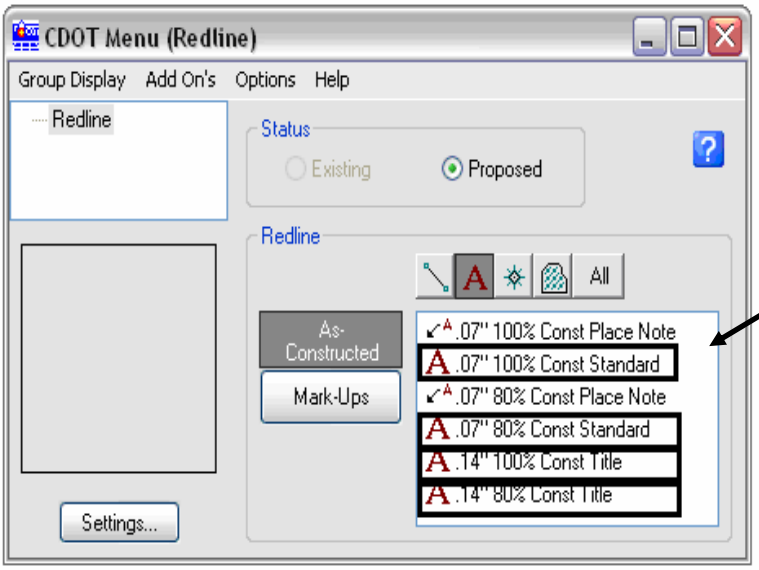
Text Toolbar

The **Text** toolbar is used to place and edit text. When you place text, you specify a style to apply to the text.



Place Text

Activated from the CDOT menu – There are two items available when the Show Text filter is selected. One is the Place Text tool and the other is the Place Note tool. The Place Note tool is detailed in the next section. To use the Place Text tool, open the CDOT menu from the main tool frame, set your filter to Show Text, choose the desired Place Text item (items with a corresponding "A" icon). The **Place Text** tool places text in the drawing based on the text that is entered into the **Text Editor — Word Processor** window. The Redline **Text Editor** uses some basic word processing format options (font, bold, underline, italics, etc.), which allows for quick text manipulations.



Information about CDOT text styles

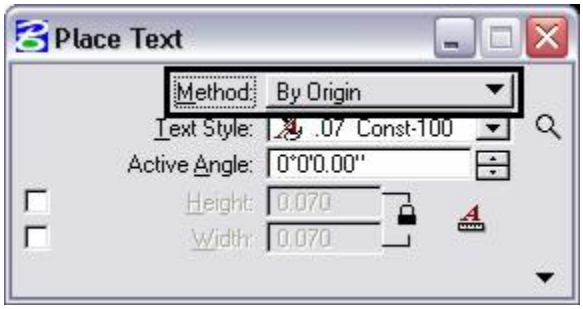
Text Styles provide a method of saving and applying text attributes in MicroStation. They function similar to styles used in word processing software, saving text setups that include font, height and width, line spacing, color, *etc.* When you apply a style, it's like applying a whole set of characteristics in one step. Once the style is applied, the text is linked to the style and any future changes to the style will update all text currently using the style. The text style contains attributes like font, height, width, line spacing, line length, text justification, *etc.*

CDOT text styles are categorized by text size (e.g. .07", .10", .14", etc.) Each style is one of two types – 100 or 80 (e.g. **.07" Const-100**). 100 styles have the same text height and width. 80 styles are proportional sized – the text width is 80% of the text height.

Text is placed using active text and design file parameters including:

- Active element symbology (color, weight)
- Active level
- Active angle and
- Text style.

Text placement methods

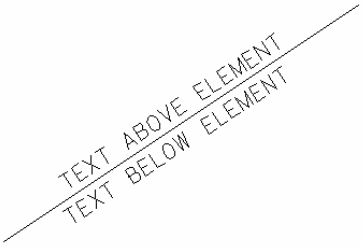


When you place text, choose one of the following methods for how the text is applied:

- ***By Origin*** uses active style or text settings (size, font, justification, *etc*.) and active element settings (AA, CO, WT, LV).

- ***Fitted*** uses two data points to define the active size, spacing and angle of the text (the text fits between the two points).

- ***Above Element*** places text above a selected element. Line spacing determines the distance the text is placed from the element. Other active style settings (size, font, justification, CO, WT, *etc*.) also apply.
- ***Below Element*** works like above element, but places text below a selected element.



- ***View Independent*** and ***Fitted View Independent*** operate like **By Origin** and **Fitted** modes, however, the text can be read from all views in a 3D file and not just the placement view.

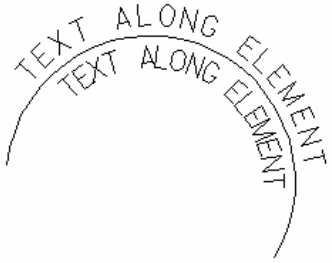
Text in Top View

Text in Front View

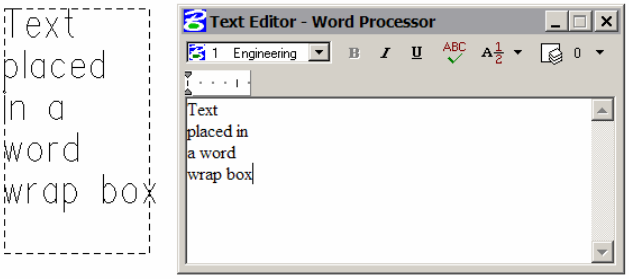
Like other 2D elements, text is planar to the view in which it is placed unless you use the ***View Independent*** placement modes.

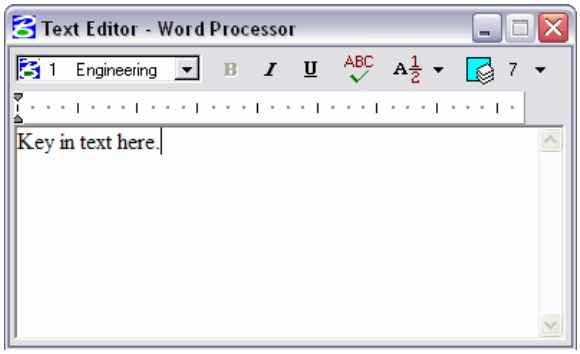
- ***On Element*** uses the active text and element settings and clips out the portion of the element behind the text.

- ***Along Element*** uses the active text font and size and places text along a selected element. You data point to identify which side during placement.



- ***Word Wrap*** places text within an area you define (corner to opposite corner) and then wraps the text within this limit. You can select the text object with the **Element Select** tool and resize the text box, if desired.





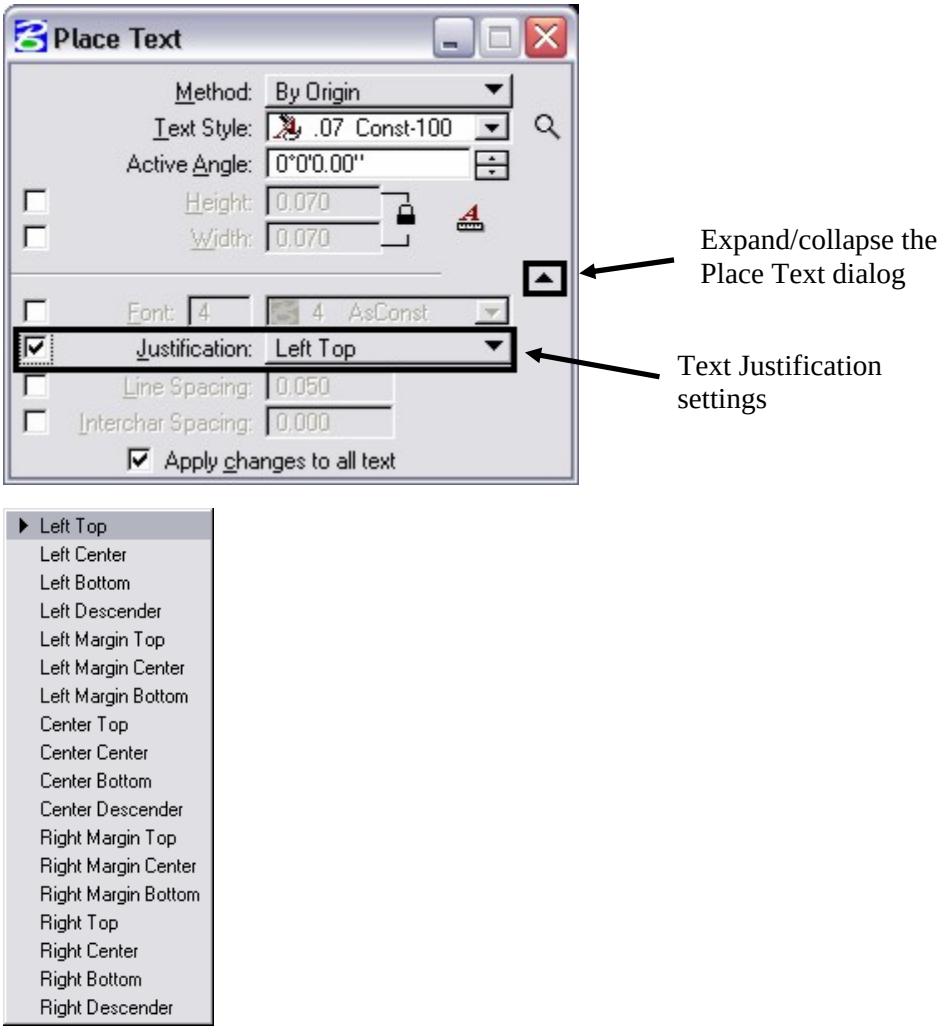
Other word processing functionality includes checking spelling prior to placing text and using **Cut**, **Copy** and **Paste** between Redline and other Windows applications.

Text is placed using active text and design file parameters including:

- Active element symbology (color, weight)
- Active level
- Active angle
- Text style

Placing Text from the CDOT menu automatically sets levels, text style, and symbology to the appropriate values.

Text justification



When you place text, you have the option of choosing any one of the justification settings typically found in any word processing software. Left Top justification is the customary standard.

Note: Do not use any of the justifications containing the term Margin as this may generate undesirable results due to the combination of text settings such as maximum line length and the inclusion of spaces.

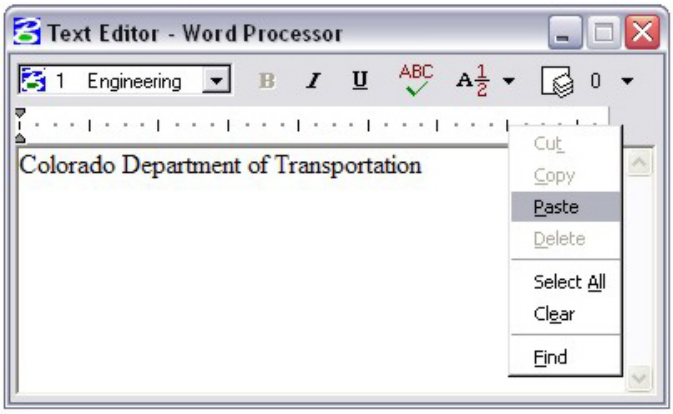
Importing Text

Importing text from an ASCII text file is another method of placing text. Use the **File > Import > Text** command to import the text file. This allows you to use your Word Processor to prepare your text, which is especially handy for lots of notes or lengthy text. Save the file as ASCII text, and then import it into Redline.

The imported text uses the active text style and can be edited using the **Edit Text** command.

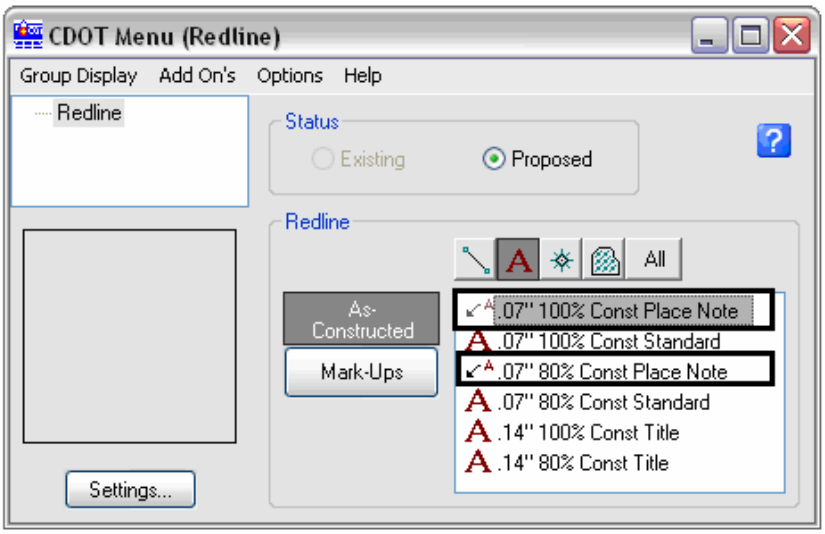
Notes: You can also **Copy** and **Paste** text from other applications if you don't want to import the entire file. When copying from Microsoft applications such as Word, there are known issues copying to the Word Processor dialog. An example of some of the errors are formatting issues, stacking fractions, and crashing Redline.

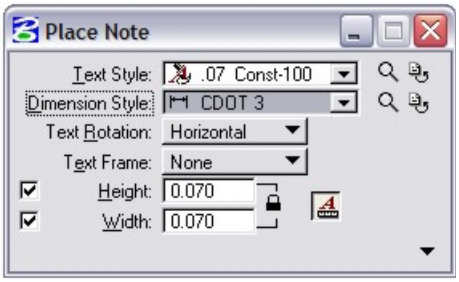
If you paste directly into the **Word Processor – Text Editor** window, the text takes on the active text style parameters, which can be edited before placing the text.



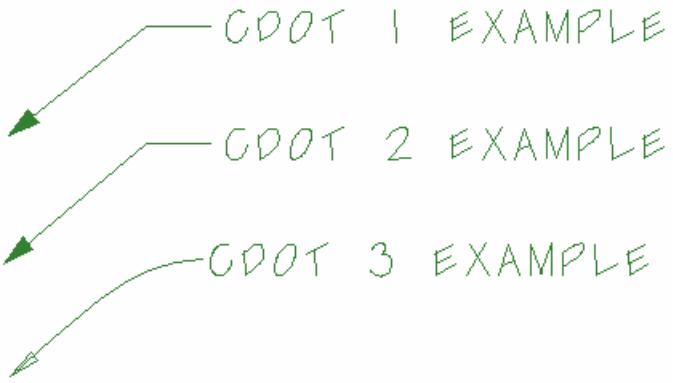
Place Note

Activated from the CDOT menu – The **Place Note** tool is located in the CDOT Menu. **Place Note** is similar to the Place Text tool in that text is placed in the drawing based on any text that is entered into the **Text Editor — Word Processor** window. The main difference between the two commands is that the **Place Note** command places text that is attached to a leader line with an arrow at the end of that leader. The Place Note icon in the CDOT Menu is indicated by a leader line.



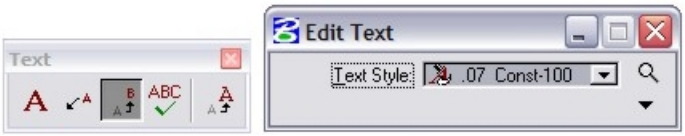


- ***Text Styles*** – Contain predefined settings for how the text is to appear (text height, width, font, justification, etc.). Using text styles for the Place Note command is the same as using text styles for the Place Text command.
- ***Dimension Styles*** – Contain predefined settings for the leader portion of a note as well as various settings for placing dimensions with leaders. Dimensioning is not covered in this manual. For the lab exercise in this chapter, you are using a dimension style to determine the size and type of leader (line and arrow) that is attached to the text when placing the note. Three dimension styles are available; **CDOT 1**, **CDOT 2**, and **CDOT 3**. Each one has different settings associated to it.
  CDOT 1 – accuracy of 0.1234, straight leader line with note
  CDOT 2 – accuracy of 0.12, straight leader line with note
  CDOT 3 – feet & inches, curved leader line with note



Edit Text

Edit Text is used to edit text placed in the Redline file. The selected text is shown in the **Text Editor** window where you can quickly edit the text string or change text parameters or style.



Spell Checker

You can use the **Spelling** command on text in the **Text Editor** box before placing it in the design file. You can also check spelling on text already placed using the **Spell Checker** command on the **Text** toolbar.

Lab 4 – Text

Objectives

After completing this exercise you will know how to:

- Place text using the CDOT Menu.
- Place notes.
- Edit text.
- Fill in sheet border text.

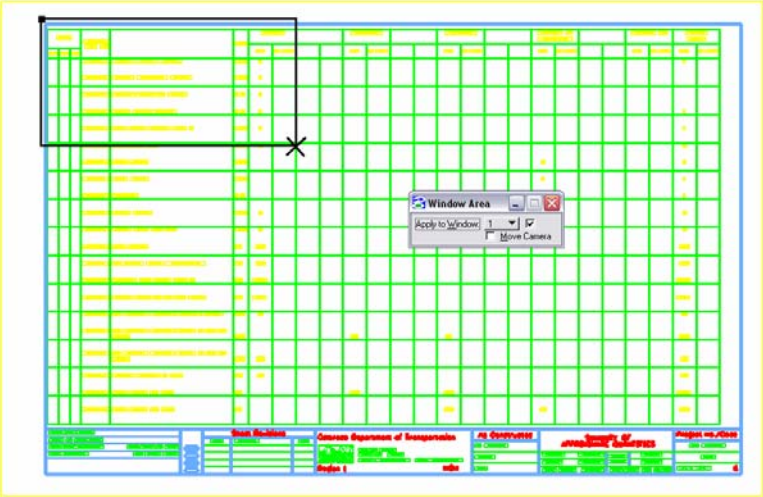
Working with Text

Open the Design File

1. Start Redline and open **12345DES_SAQ01.dgn** from the **C:\Projects\12345\Design\Drawings** folder.

Place Text

2. **Window** into the upper left corner of the sheet as shown.

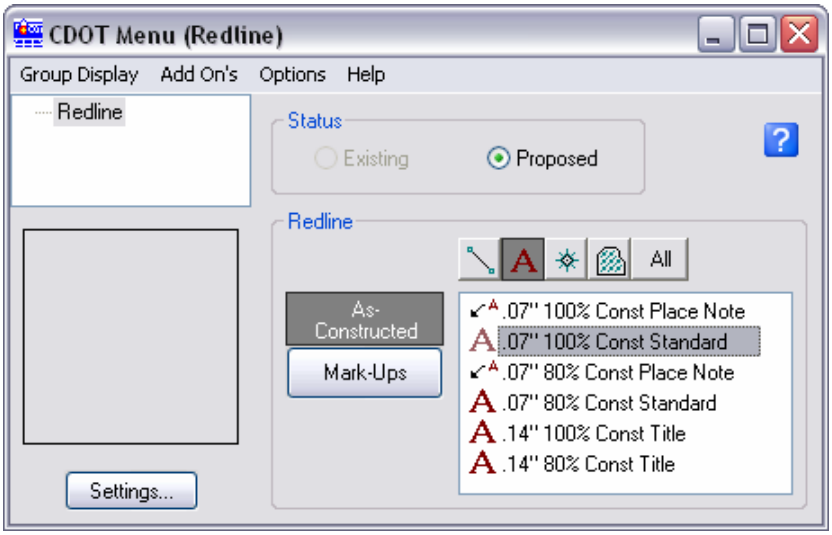


3. Activate the **CDOT Menu** from the Main Tool frame if it isn't already activated.

4. From the CDOT Menu, select the **Show Text** filter.

5. Select the **.07 Const-100 Text** item.

Note: When any of the four available text **items** are selected, by ***default***, the **Place Text** command becomes the active command.

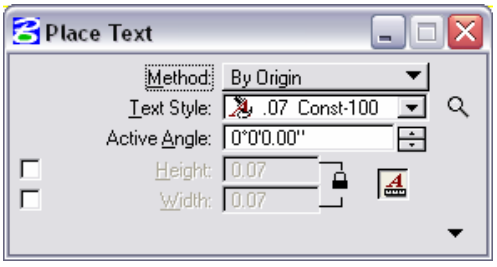


6. Set the Tool Settings **Method** to **By Origin**.

7. Verify that the **Text Style** is set to **.07 Const-100** (it should already be set because you selected that particular item from the CDOT Menu).

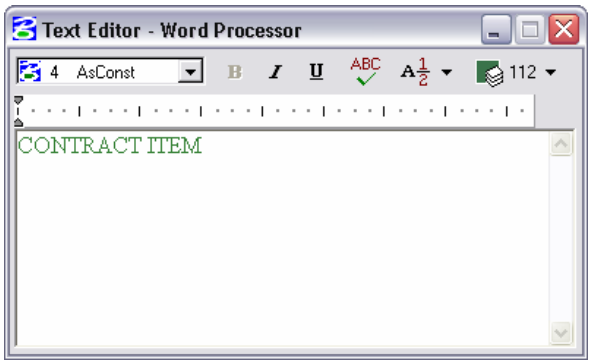
8. Set the **Active Angle** to **0**.

9. Make sure the **Annotation Scale** lock is **on**. By default it will be on.



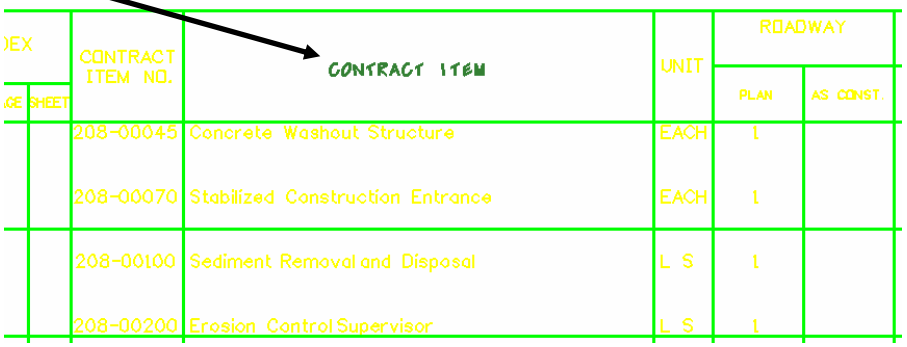
10. In the **Text Editor-Word Processor**, key in the following text:

CONTRACT ITEM



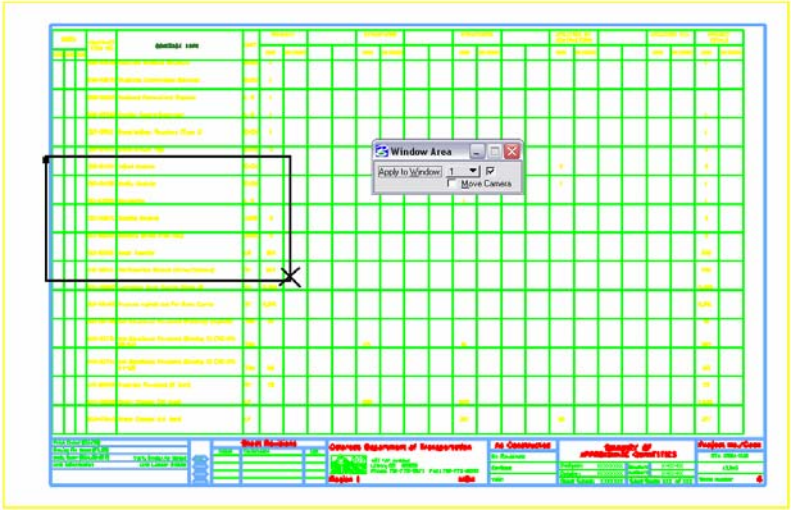
11. **<D>** in the open column header to place the text.

Place Text Here



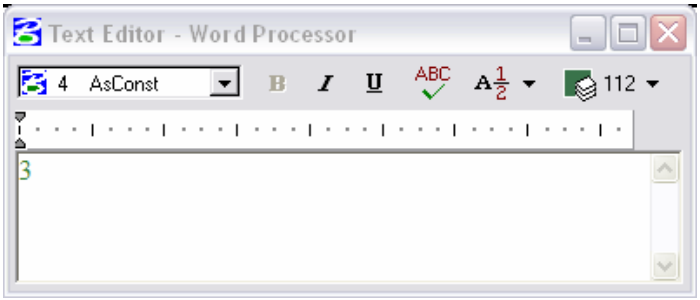
Place Additional Text

12. Select the **Fit View** command.
13. **Window** into the area as shown.



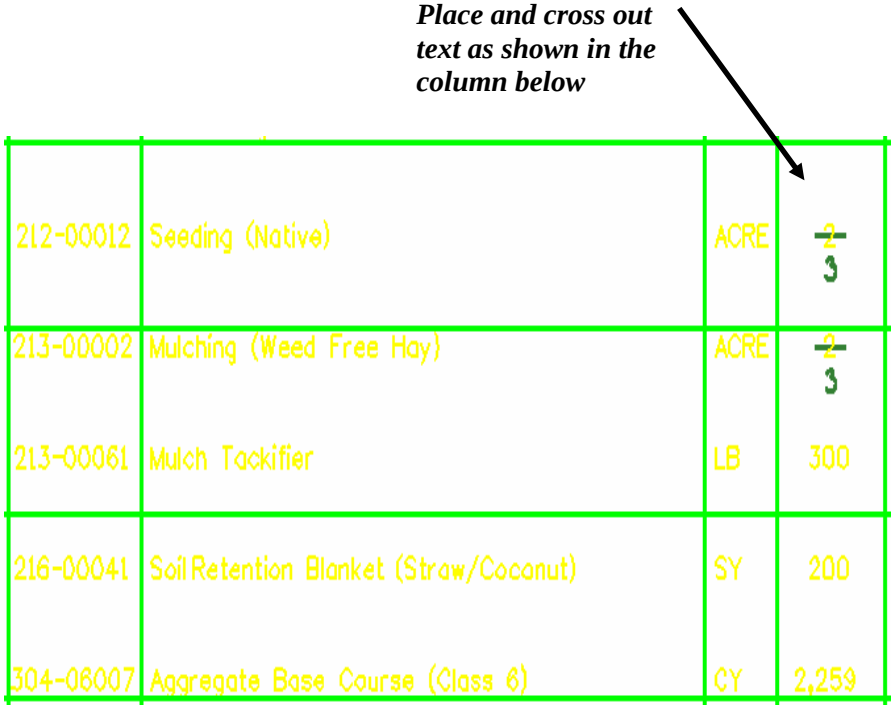
14. In the **Text Editor-Word Processor**, key in the following text:

3



15. **<D>** to place the text in the two places as shown (you may have to pan your view).

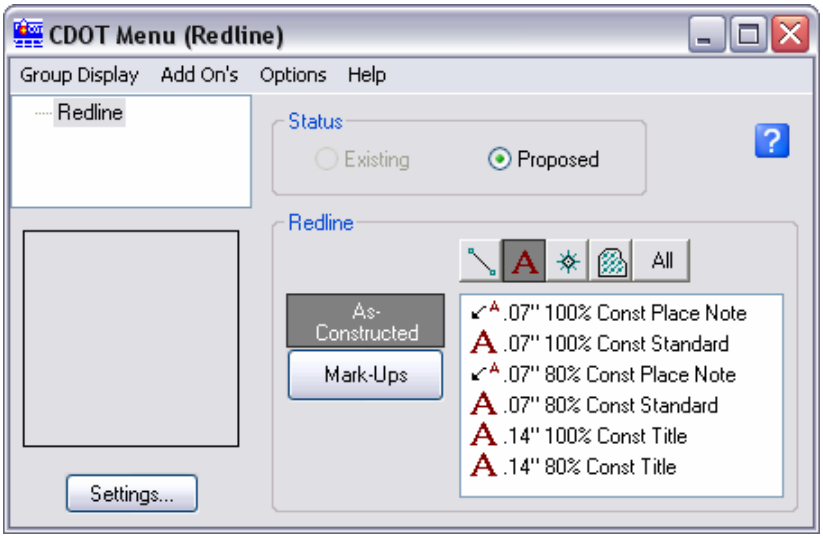
16. Use the **Place SmartLine** command to create a horizontal line to cross out the pieces of text as shown (refer to Lab 1 on placing a line if needed).



Place Note

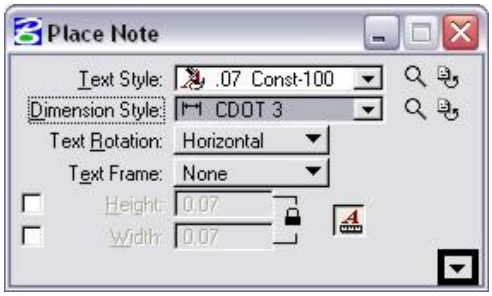
17. Select the **Fit View** command.
18. **Window** in the area shown below.

19. From the CDOT Menu, verify that the **Show Text** filter is selected.
20. Select the **.07 Const-100 Place Note** item. By selecting the desired text item from the CDOT menu, the correct text style and level are activated.

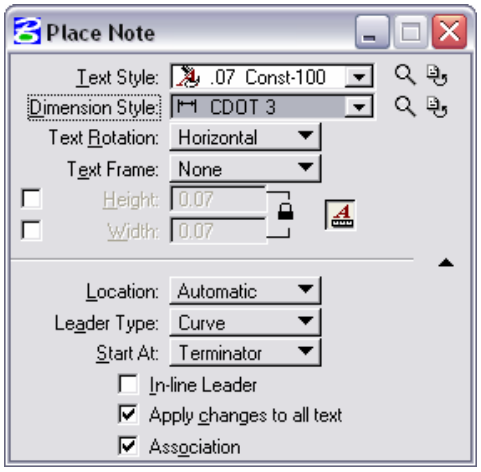


21. In the **Tool Settings** set the **Dimension Style** to **CDOT 3**.

Note: Refer to the beginning of this chapter for more information on dimension styles.

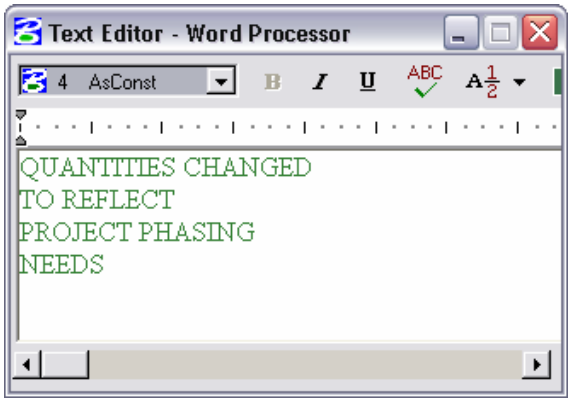


22. **<D>** the **Expand** arrow and set the options as shown.

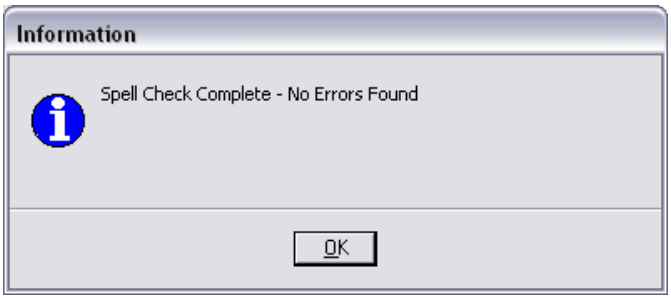


23. In the **Text Editor**, key in:

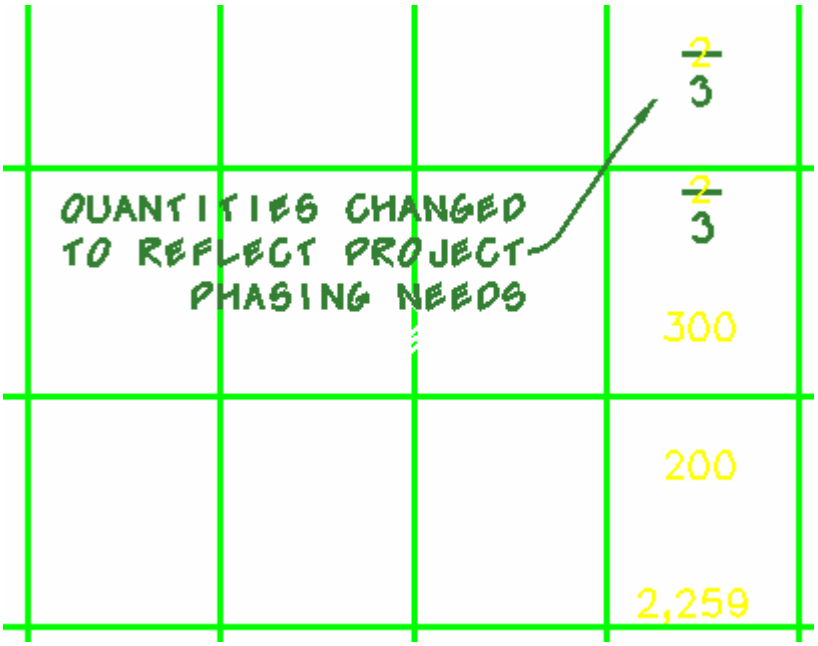
QUANTITIES CHANGED
TO REFLECT
PROJECT PHASING
NEEDS



<D> the **Spell Check** icon in the **Text Editor** dialog. If there are no spelling errors, the Information dialog box will appear.



24. **<D>** near the "2" as shown to define the start point of the leader line.
25. Move your pointer to position the text as shown, then **<D>** to place the end point of the leader.
26. Place ***linework*** and ***add text*** as depicted.

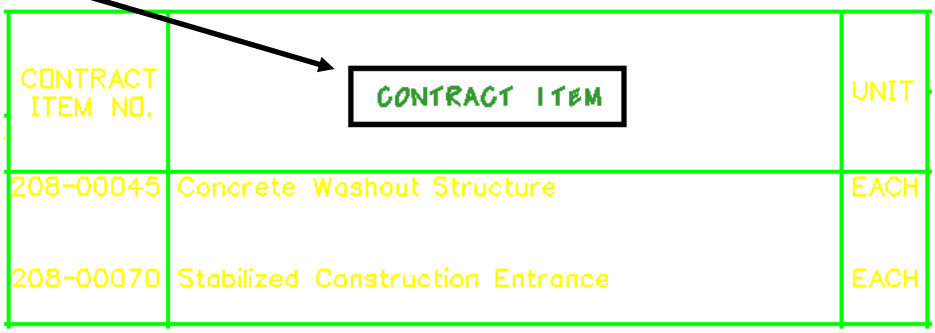


Edit Text

27. **Pan** to the upper left corner of the sheet.
28. From the **Text** toolbar, select **Edit Text**.

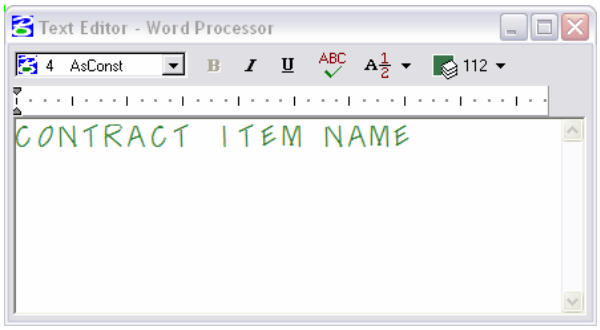
29. **<D>** on the text shown below (the text you placed earlier).
30. **<D>** anywhere to accept the specific text for editing.

Identify Text

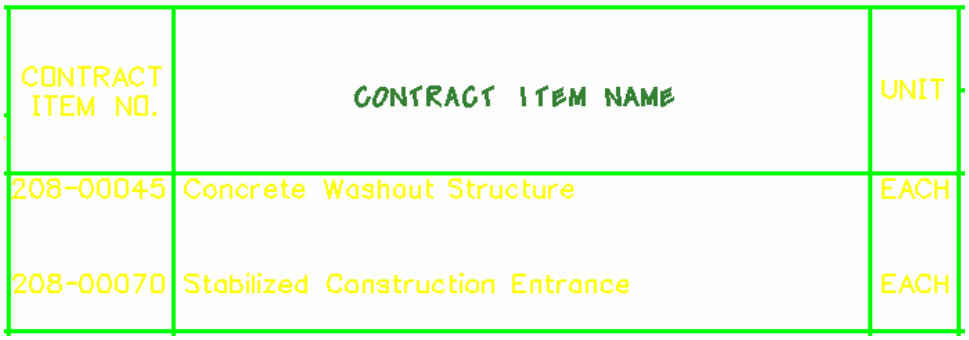


31. In the **Text Editor** window, correct the text by changing it to the following:

CONTRACT ITEM *NAME*

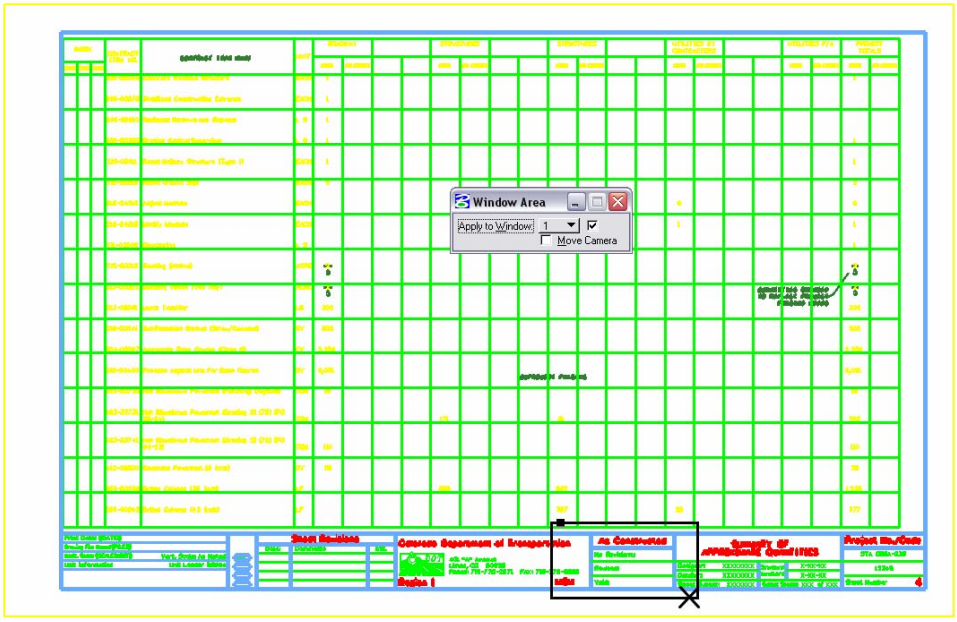


32. **<D>** anywhere in the view to accept the editing of the text.



Fill In Border Text

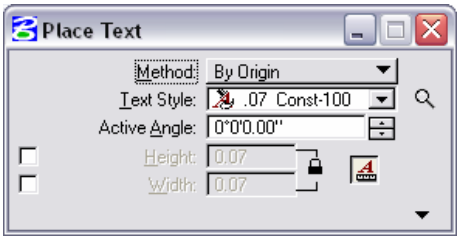
33. **Window** into the area as shown at the bottom of the sheet.



34. From the CDOT Menu, select the **Show Text** filter.

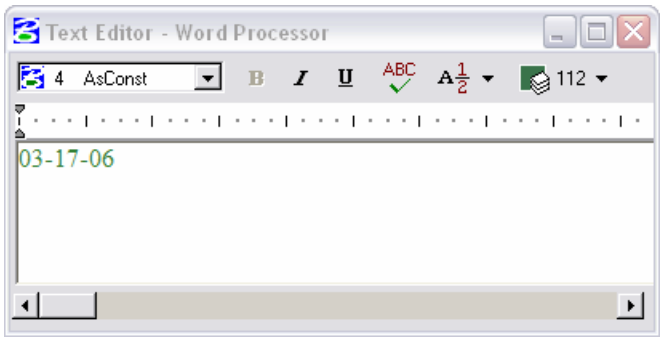
35. Select the **.07 Const-100 Text** item.

36. In the **Tool Settings**, verify the options are set as shown.



37. In the **Text Editor-Word Processor**, key in the text:

03-17-2006



38. **<D>** to place the text as shown.

39. Select the **Fit View** command.

40. Save Settings (**File > Save Settings**).

5. Using Cells

Permanent Groups

If you have standard groups of elements such as symbols, details, notes, and borders that you use on multiple projects, you can make a permanent group of these graphics by creating a cell. The workflow consists of:

- Drawing the graphics
- Creating a cell out of these graphics and
- Storing the cell in a library

When you're ready to place the cell in your design file, attach the cell library to the file. You can place the cell out of the library multiple times, like a rubber stamp. The cell library can be attached to any Redline design file. By default, the Construction cells will automatically be attached to the active design file.

Each cell in the library can be either 2D or 3D and have its own working units. Therefore, you can have both imperial and metric cells in the same library, if desired.

Cell Libraries

Cells are the equivalent to blocks in AutoCAD. Cell libraries are just ordinary Redline design files that have a ***.cel*** extension. The cell library file contains multiple models and each cell is stored in a separate model. The advantage of cell libraries is that a single file can contain all of your cells.

Cells can be organized into different libraries (disciplines, details, symbols, borders, etc.) or all cells can be placed in one library.

Models can also be imported from other DGN files. This is a good way to copy a lot of graphics from one DGN to another, or to build a cell library.

CDOT Cell Libraries

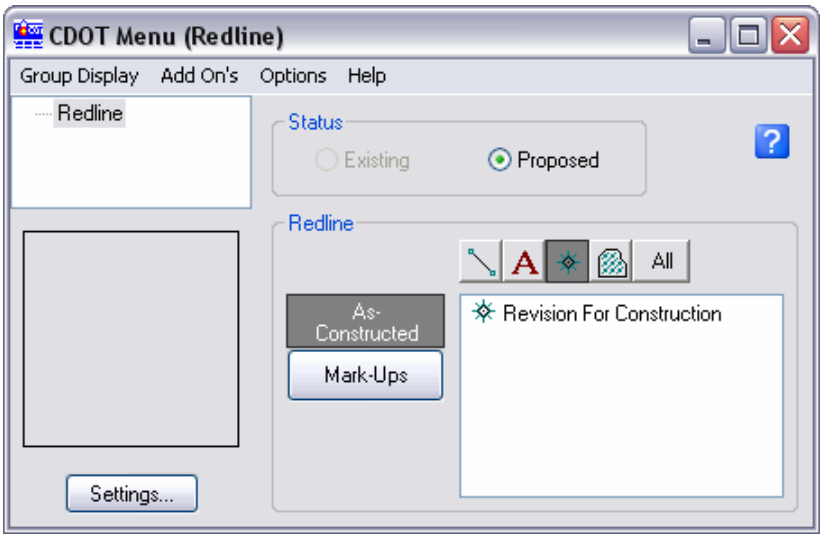
Many of the CDOT standard cells have been created and are stored in discipline-specific cell libraries (*e.g.* Design, Bridge, ROW). The appropriate cell library or libraries are attached to the discipline seed file.

The standard CDOT cell libraries are as follows:

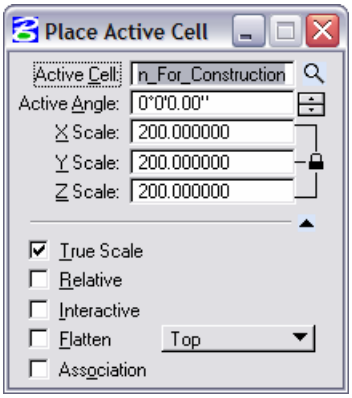
- **Construction.cel**

Revision for Construction Cell Command

The CDOT menu takes all of the work out of placing a Revision For Construction cell. To place a Revision for Construction cell, open the **CDOT Menu**, change the filter to **Show Cells**, and choose the **Revision for Construction** item under the **As-Constructed** Category.

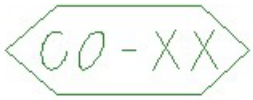


This will open a Place Active Cell dialog. Make sure that the **Active Angle, Scale**, and any placement options are selected to the desired preference and then simply place the cell **<D>** into the drawing.



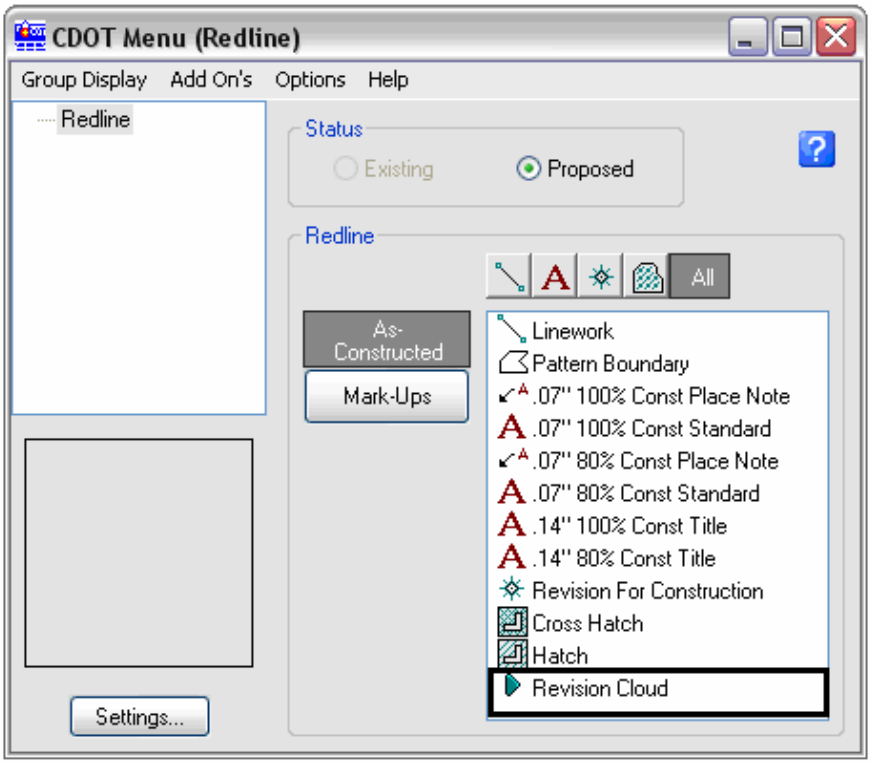
Edit Text of an existing Revision Cell

Once a Revision for Construction cell is placed, its text can be edited using the **Edit Text** command from the **Main Tool Frame** as described in Chapter 3. Simply <**D**> on the text inside the cell and the Text Editor will display allowing for changes.



Revision Cloud Command

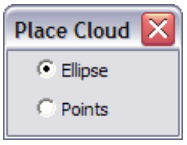
A revision cloud is used to emphasize portions of a project that need attention. There are two methods for placing a revision cloud: using an ellipse or using points**.** Both methods are accessed in the CDOT menu by selecting the **As-Constructed** category, **Show All** filter, and then selecting the **Revision Cloud** item. The Place Cloud dialog will then appear.



Note: The Show All filter displays all Items found in the other filters. The **Revision Cloud**, however, can only be found in the Show All Filter.

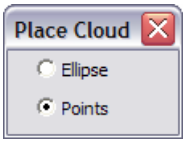
Ellipse Method:

- <**D**> where the center of the Revision Cloud will be located.
- <**D**> anywhere to extend a line forming the ellipse's major or minor axis.
- Determine the remaining axis by moving perpendicular to the axis just formed, <**D**> to complete the cloud.



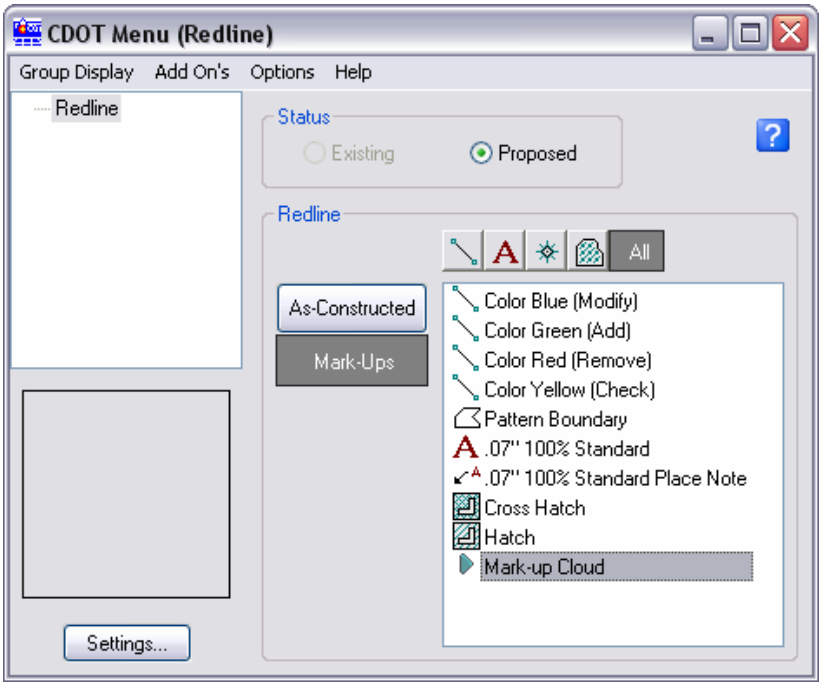
Points Method:

- Determine vertices for the cloud by <**D**> in the desired areas.
- <**R**> to accept and auto-complete the Revision Cloud.



Mark-up Cloud Command (Project Management Group)

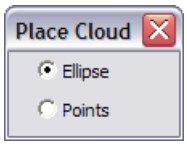
A **Mark-Up Cloud** is used by Project Managers to emphasize portions of a project that need attention. There are two methods to placing a Mark-up Cloud: using an ellipse or using points. Both methods are accessed in the CDOT menu by selecting the **Mark-Ups** category, **Show All** filter, and the **Mark-up Cloud** item,



Note: The Show All filter displays all Items found in the other filters. The **Mark-up Cloud**, however, can only be found in the Show All Filter.

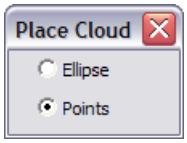
Ellipse Method:

- <**D**> where the center of the Mark-up Cloud will be located.
- <**D**> anywhere to extend a line forming the ellipse's major or minor axis.
- Determine the remaining axis by moving perpendicular to the axis just formed, <**D**> to complete the cloud.



Points Method:

- Determine vertices for the cloud by <**D**> in the desired areas.
- <**R**> to accept and auto-complete the Mark-up Cloud.



Lab 5a – Cells (Construction Group)

Objectives

After completing this exercise you will know how to:

- Activate a cell for placement from the CDOT Menu.
- Place a cell into the drawing.
- Edit the text contained in a cell.
- Use the Revision Cloud command.

Placing Cells into the Drawing

Open the Design File

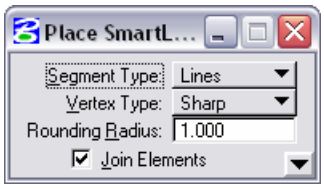
1. Start Redline and open **12345DES_PnP18.dgn** from the **C:\Projects\12345\Design\Drawings** folder.

Create a Culvert

2. **Window** into the area as shown.

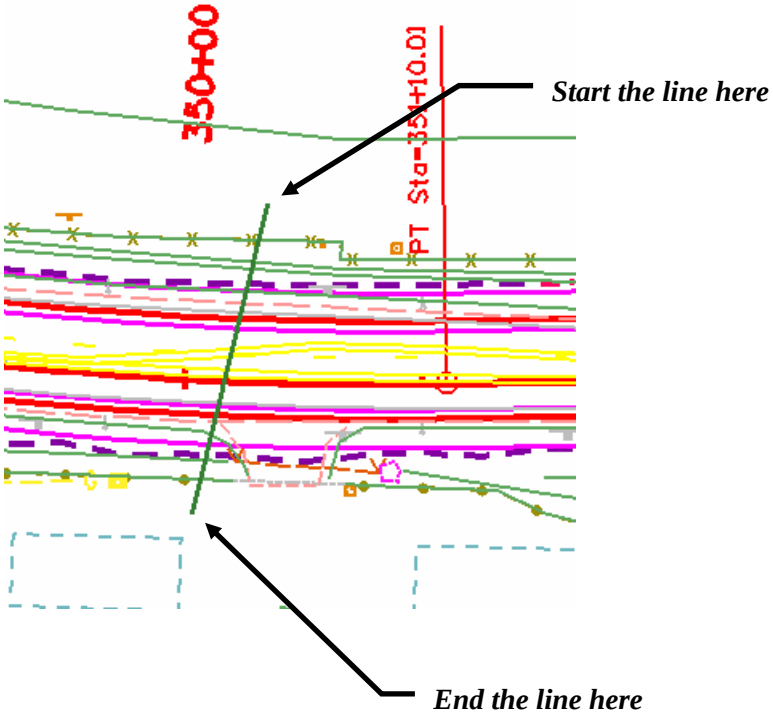
3. Activate the **CDOT Menu** from the Main Tool frame, if it isn't already activated.
4. Select the **As-Constructed** category.
5. Select the **Show Lines** filter.
6. Then select the **Linework** item.
7. The **Place SmartLine** command is automatically selected.

8. Set the **Settings** options as shown.



9. **<D>** to start the line approximately as shown.

10. **<D>** to end the line approximately as shown.

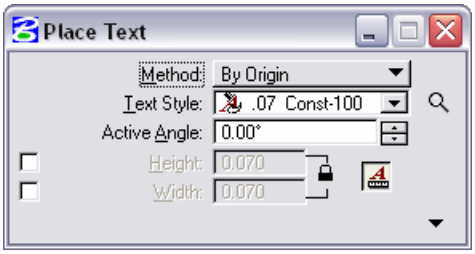


Place Text

11. From the CDOT Menu, select the **Show Text** filter.
12. Select the **.07 Const-100 Text** item.

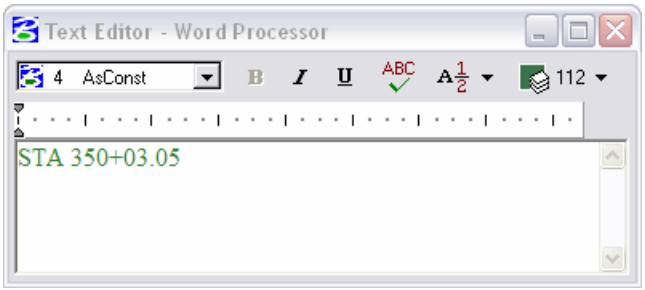
The **Place Text** command is selected.

13. Set the **Settings** options as shown.



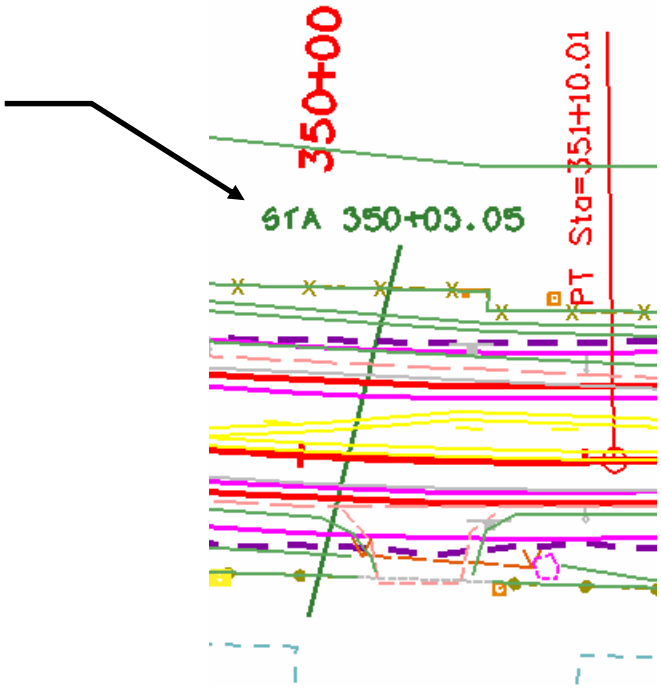
14. In the **Text Editor-Word Processor**, key in the text below.

STA 350+03.05



15. **<D>** to place the text approximately as shown.

Place the text here

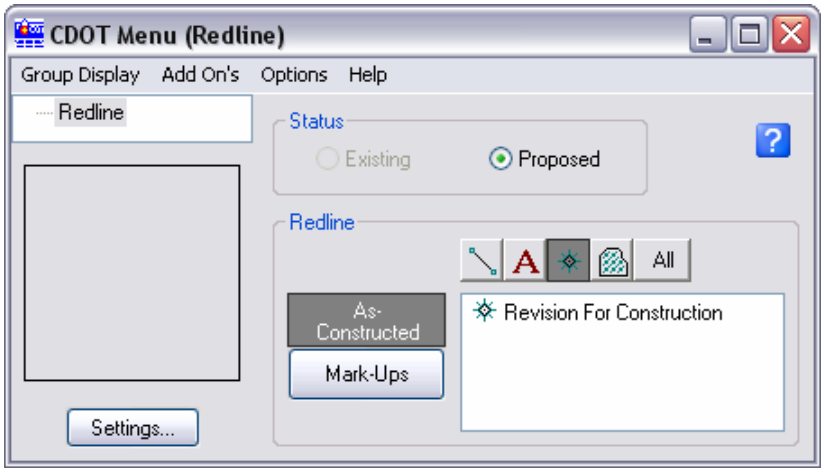


Place the Revision For Construction Cell

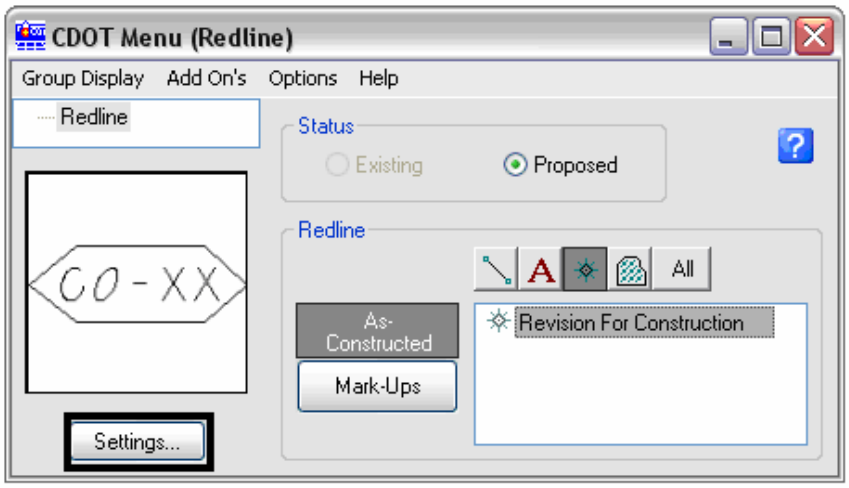
16. From the CDOT Menu, select the **Show Cells** filter.

17. Select the **Revision For Construction** item.

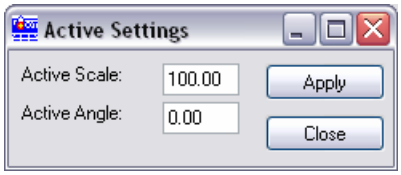
Note: When the **Revision For Construction** item is selected, by ***default***, the **Place Cell** command becomes the active command.



18. Select the **Settings** button.

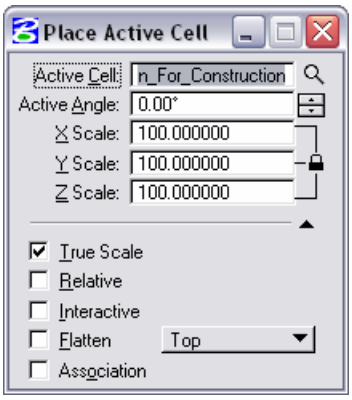


19. Set the **Active Scale** to **100**.

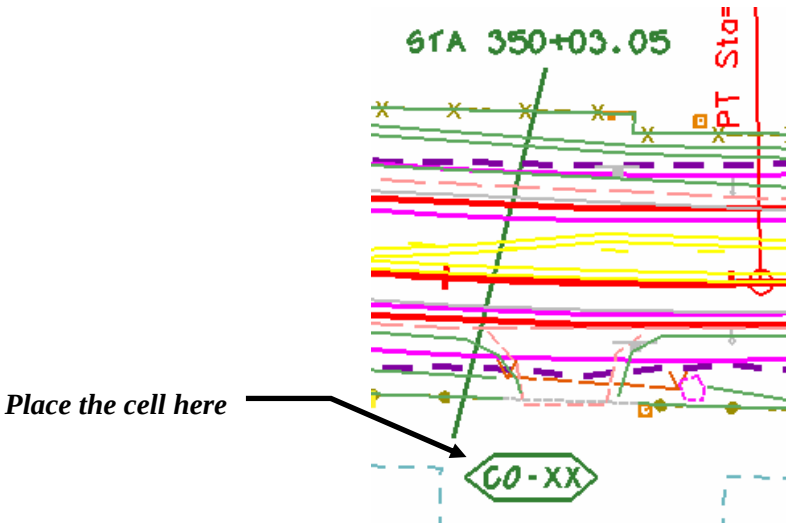


20. Select **Apply**.

21. Verify the **Settings** options are set as shown.



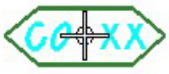
22. **<D>** to place the cell approximately as shown.



Edit the Text of the Cell

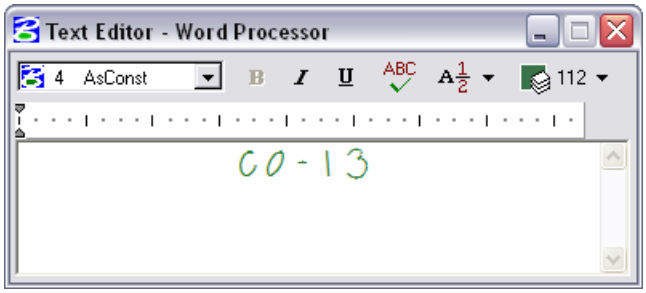
23. Select the **Edit Text** command from the **Text** toolbar.

24. Identify the **"CO-XX"** text of the cell that was just placed and **<D>** anywhere to accept it.



25. In the **Text Editor-Word Processor**, key in the text below.

CO-13



26. **<D>** anywhere in the view window to accept the editing of the text.

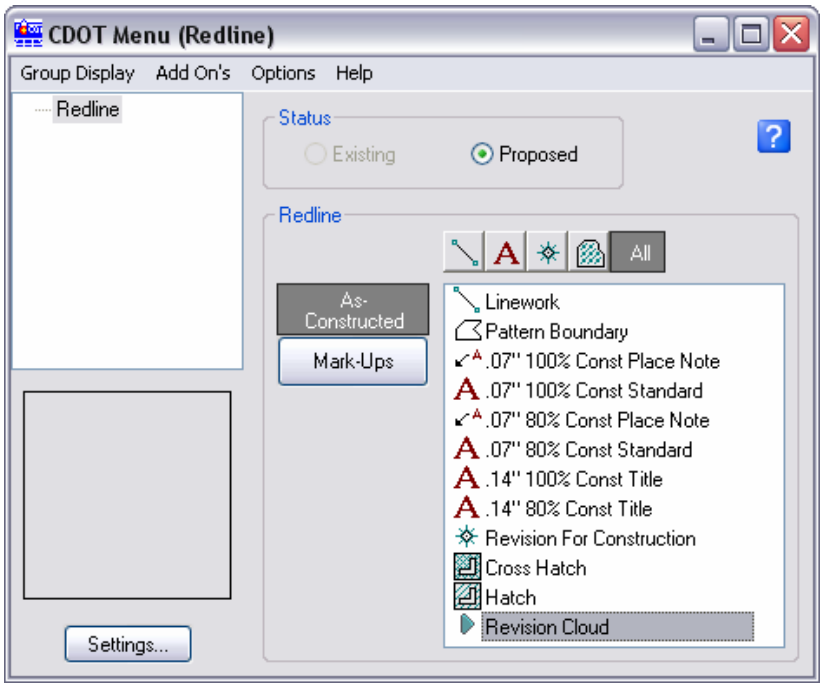
The text contained in the cell is changed.

Place a cloud element using the Revision Cloud command

27. From the CDOT Menu, select the **All** filter.

28. Select the **Revision Cloud** item.

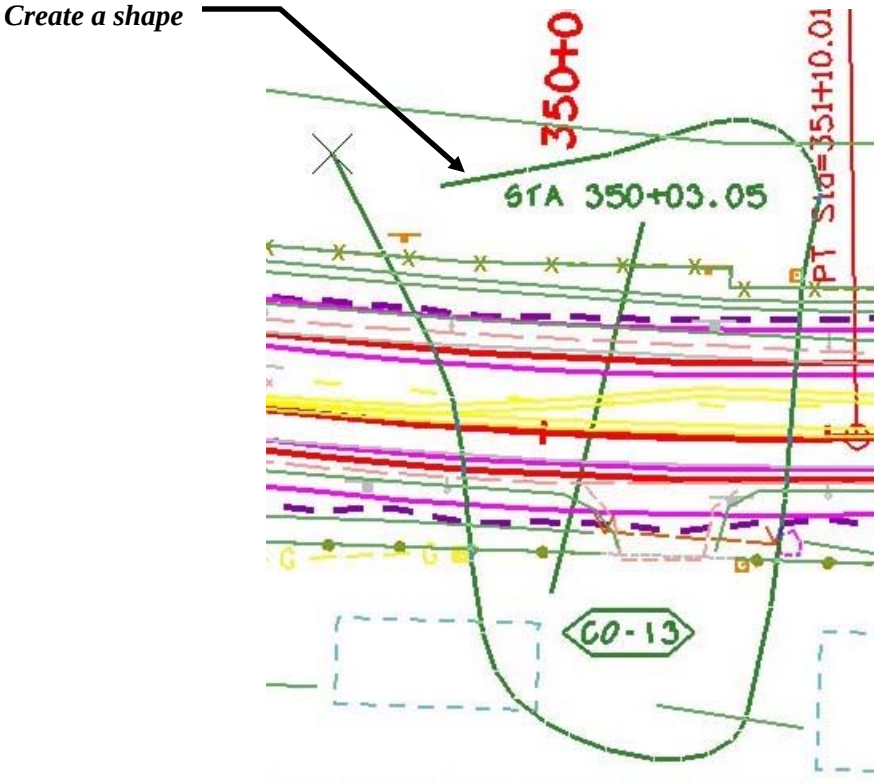
Note: When the **Revision Cloud** item is selected, by ***default***, the **Place Cloud** command becomes the active command (there isn't a Place Cloud icon located on the Main Tool frame).



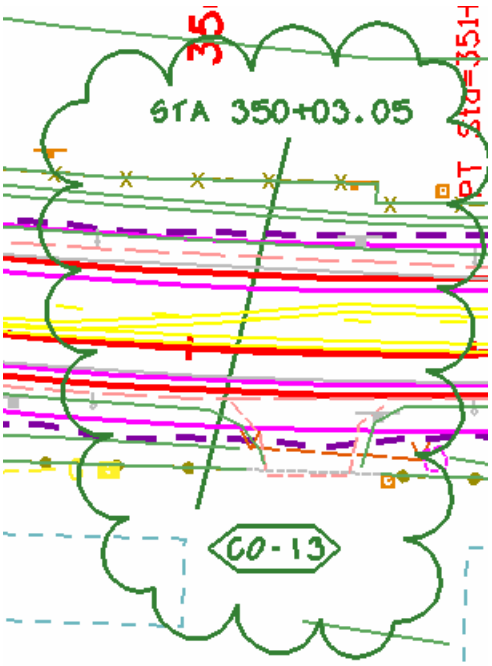
29. Set the **Settings** option to **Points**.

30. **<D>** several times (5-8 clicks) to create a shape approximately as shown around the culvert, text, and cell that was placed earlier (the shape doesn't need to be closed).

31. When a shape has been created to appear approximately as shown, **<R>** to complete the command.



A cloud element is created.



Lab 5b – Cells (Project Management Group)

Objectives

After completing this exercise you will know how to:

- Use the Mark-up Cloud command.

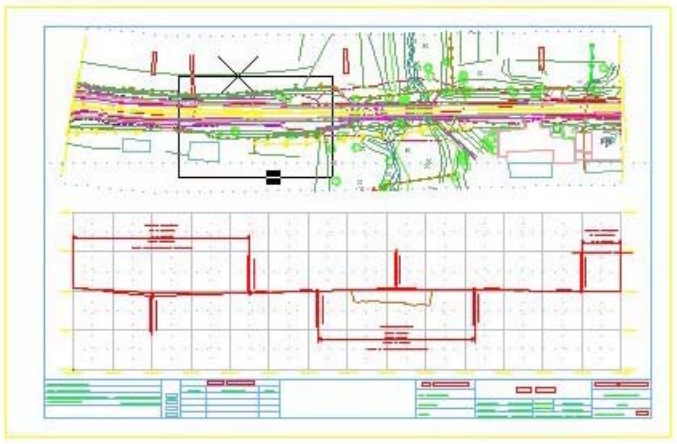
Placing Cells into the Drawing

Open the Design File

1. Start Redline and open **12345DES_PnP18.dgn** from the **C:\Projects\12345\Design\Drawings** folder.

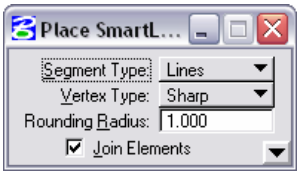
Indicate that a Culvert is to be Added to the Drawing

2. **Window** into the area as shown.

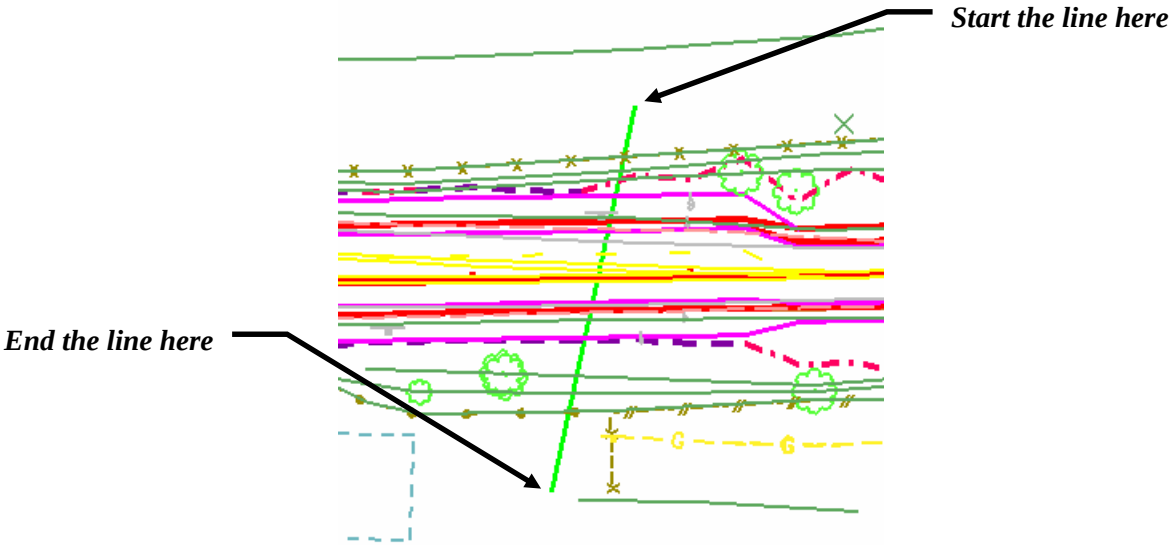


3. Activate the **CDOT Menu** from the Main Tool frame, if it isn't already activated.
4. Select the **Mark-Ups** category.
5. Select the **Show Lines** filter.
6. Then select the **Color Green (Add)** item.
7. The **Place SmartLine** command is automatically selected.

8. Set the **Settings** options as shown.



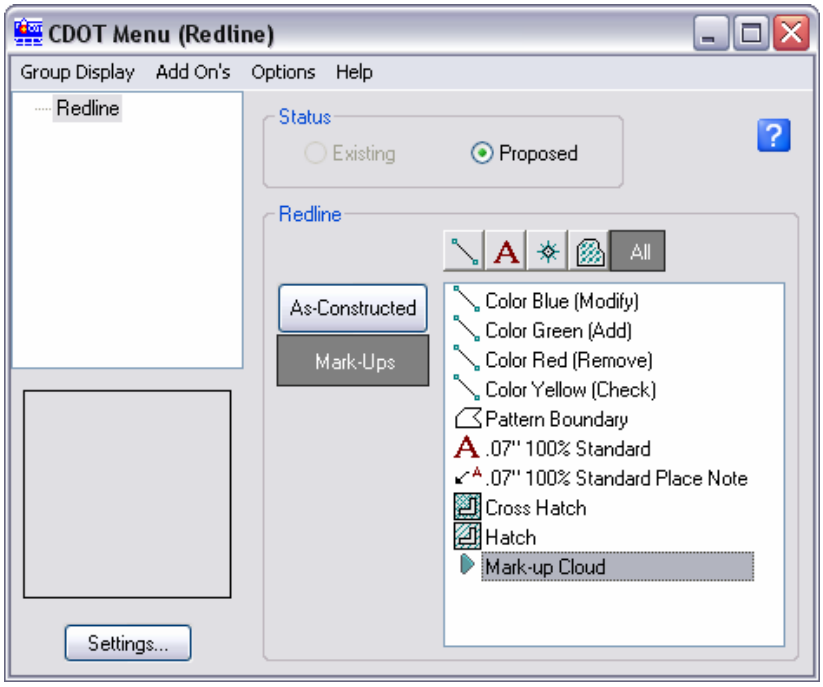
9. **<D>** to start the line approximately as shown.
10. **<D>** to end the line approximately as shown.



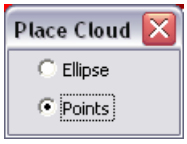
Place a cloud element using the Mark-up Cloud command

11. From the CDOT Menu, select the **All** filter.
12. Then select the **Mark-up Cloud** item.

Note: When the **Mark-up Cloud** item is selected, by ***default***, the **Place Cloud** command becomes the active command (there isn't a Place Cloud icon located on the Main Tool frame).

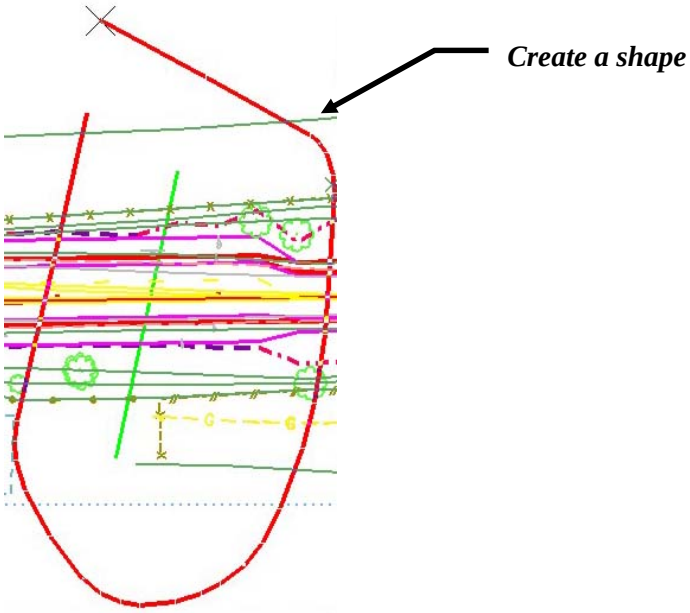


13. Set the **Settings** option to **Points**.

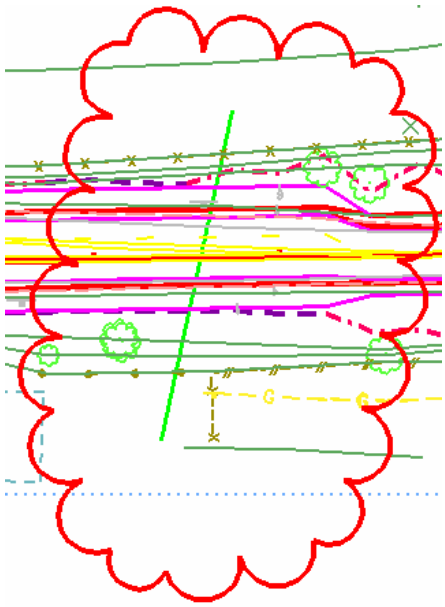


14. **<D>** several times (5-8 clicks) to create a shape approximately as shown around the line that was just placed (the shape doesn't need to be closed).

15. When a shape has been created to appear approximately as shown, **<R>** to complete the command.



A cloud element is created.



6. References and Level Display

Referencing Basics

References are models (individual files) that are attached to the active model. When the graphics of a reference file are 'attached' they are not actually 'in' the file. The graphics are background data and cannot be manipulated. However, these graphics can be copied into the active model, which would then allow for normal modifications and manipulations.

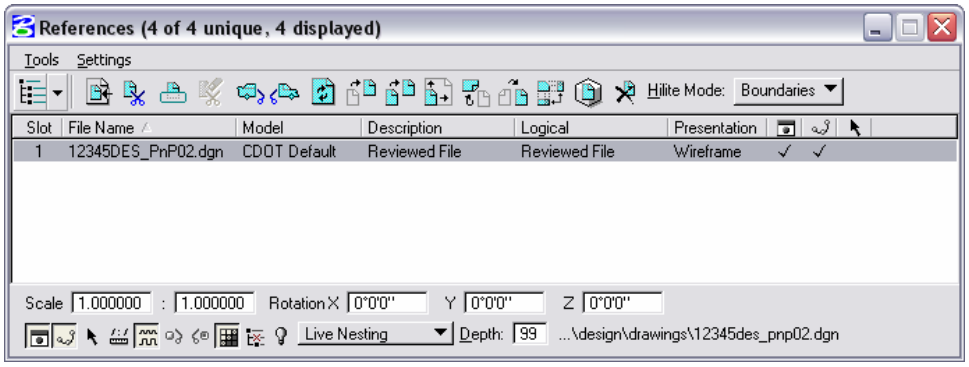
When opening a MicroStation model in Redline, a copy of the MicroStation file is created. The file that is created is given the same file name as in MicroStation, however, a different extension is used. The extension that is applied is the user name (*e.g.* .cotrain01). Also, when a MicroStation file is opened in Redline, the MicroStation file is automatically referenced into the Redline file. The purpose of this is to allow the user to be able to review the graphics of the MicroStation file without directly changing it. Hence, every Redline file opened will have a reference file automatically attached. This reference file is termed a Reviewed File.

Note: Copying and/or modifying elements should only be done in the Redline file. Changes to elements contained in the *Reviewed* file, will change the original content and intent of the drawing being reviewed or marked-up

Reference Dialog Box

Access the References dialog box by selecting **File > References** or by simply clicking on the icon from the **Primary Tools** toolbar.

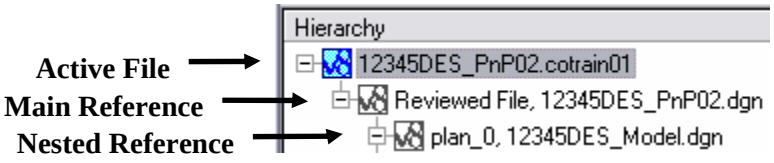
The References dialog box should resemble the following:



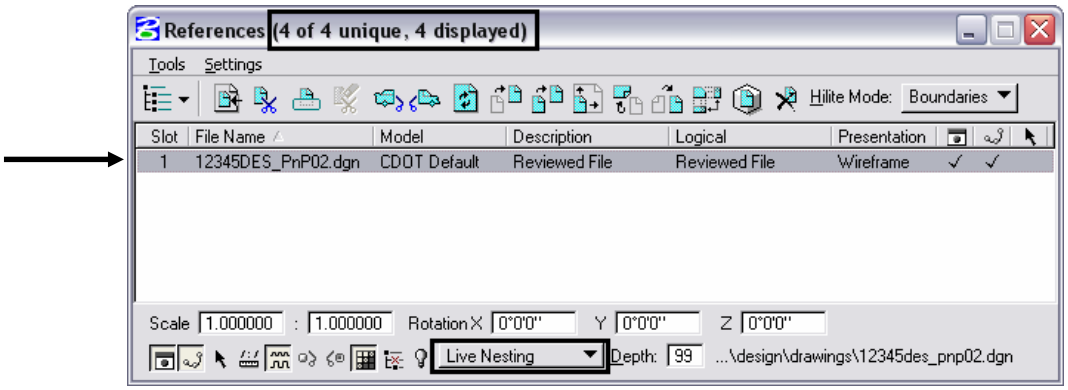
Nesting

When references are attached, the user has the option of attaching a single specific file, or the specified file plus any references previously made to that file. In other words, references of references otherwise call nested refrences.

Notice in the example below, the title bar contains 4 unique and 4 displayed references. Yet, the dialog box indicates only one attached reference file, the **12345DES_PnP02.dgn** file. This is due to reference nesting and, in this case, the file having three nested references attached to the Reviewed File. A nested reference is a model that is attached (referenced) to a specific file that happens to be referenced itself to another file.



Note: If desired, nesting can be turned off by simply changing the nesting type option at the bottom of the dialog box from **Live Nesting** to **No Nesting**.



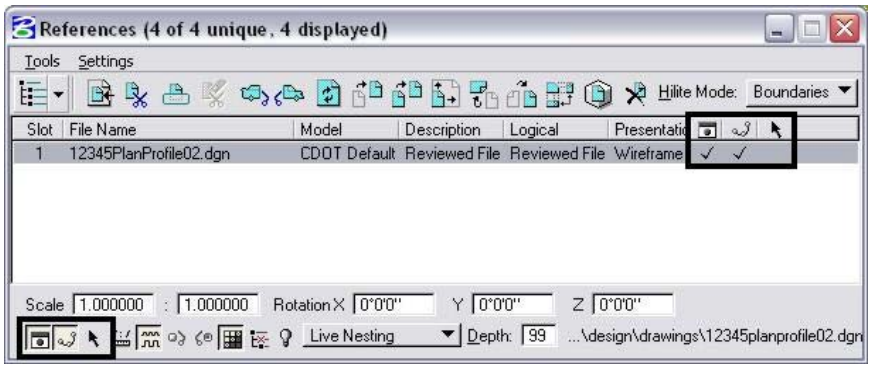
Reference Attachment Settings

There are three main attachment settings that can be turned on and off from the References dialog box. These settings can be toggled from two different locations inside of the References dialog:

Display **-** turns the entire reference on or off. By default, it is toggled *on*.

Snap **-** allows tentative snapping to reference graphics. By default, it is toggled *on*.

Locate **-** allows for selecting, measuring, copying, and analyzing of the reference. By default, it is toggled *off*.



Level Display

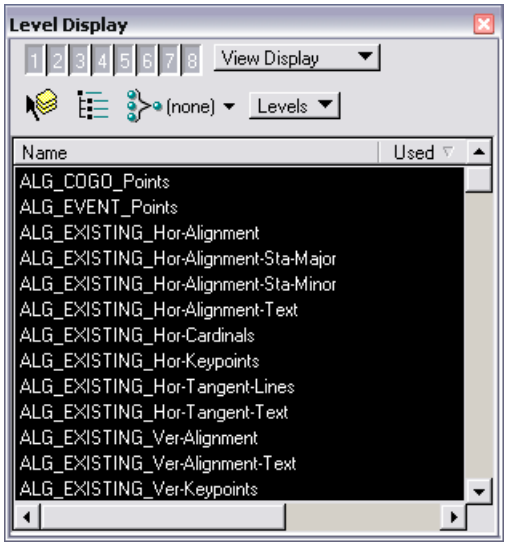
What is Level Display?

Level Display is used to assist in separating graphics in the design file. Graphics placed on different levels are easily controlled by toggling different levels on or off. Levels are synonymous with layers in AutoCAD.

All levels, including markup and reference levels, are controlled by the **Level Display** dialog box. To access the Level Display dialog box, select **Settings > Level >Display** or simply click on the icon from the **Primary Tools** toolbar.

When a reference is attached, all levels from the original file are attached as well, allowing for specific control. This is a beneficial feature for setting up plots, viewing, or printing a file.

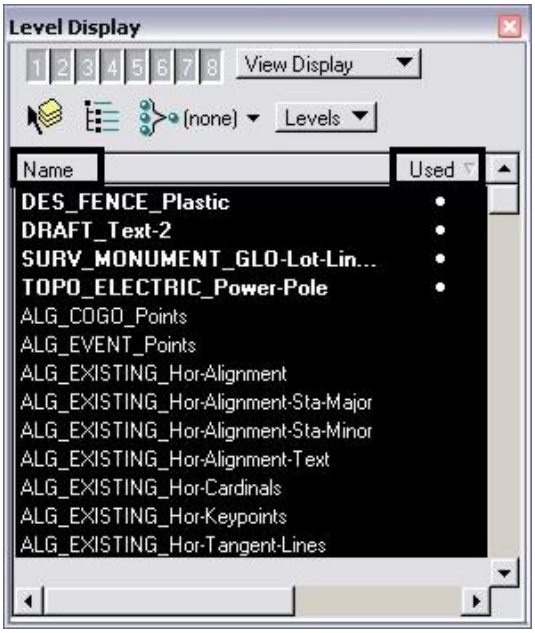
The Level Display dialog box should resemble the following:



Organizing the List of Levels

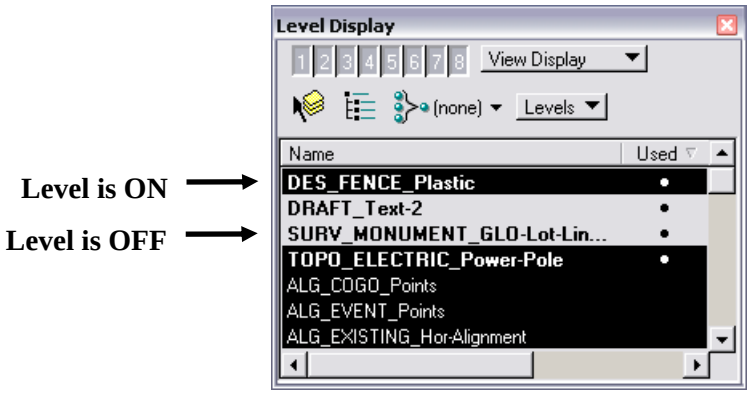
To assist in sorting the list of levels that is displayed in the dialog, the list can be sorted based on the different columns (*e.g.* Name and Used columns). Simply click on the column heading and the list will automatically sort based on the specific column that is identified.

> **Note:** The individual columns can be resized (narrowed or widened) as needed. Also, the columns can be reorganized. <*D*>, *hold*, and *drag* a specific column to a different horizontal location (the Level Display dialog may have be resized to do so).



Turning Levels On/Off

Individual levels can be turned on or off simply by **<D>** on the level from the list. The background of a level that is off turns gray.

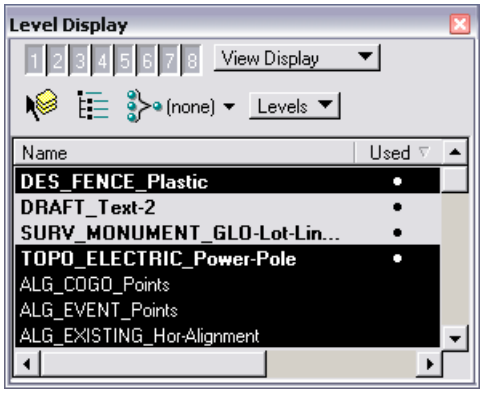


Used vs. Unused Levels

Individual levels turn bold if there are one or more elements in the drawing that are located on the particular level. The other way to identify whether a specific level has element(s) on it, is to refer to the Used column. A filled circle in that column, indicates that the level has one or more elements on it.

Level has element(s) on it →

Level does not have elements on it →

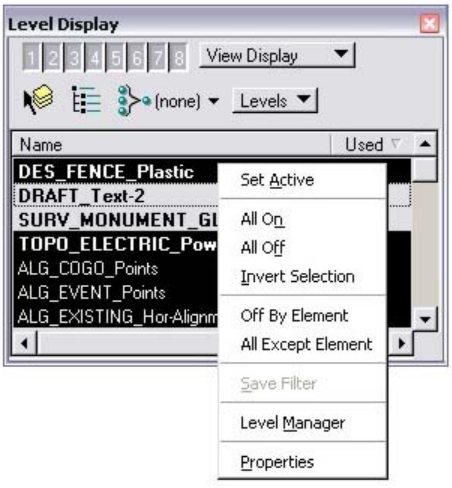


<R> on any level produces a flyout menu that allows for additional options:

- **All On** - turns all levels on within the selected file.
- **All Off** - turns all levels off within the selected file.
- **Invert Selection** - all levels are inverted. Levels that were selected to be displayed are now off while levels that were off are now displayed.
- **Off By Element** - allows users to turn off a level by identifying an element on that particular level.

  Note: Using the *Off By Element* method helps to minimize that chance of accidentally turning off a level that is desired to remain on. The other methods located in the flyout menu can substantially impact the look of the drawing. If levels are accidentally turned off, the *View Previous* command (from the View Control toolbar) can be useful for turning those levels back on.

- **All Except Element** - allows user to turn off all levels, expect for the level that contains the element that is identified.

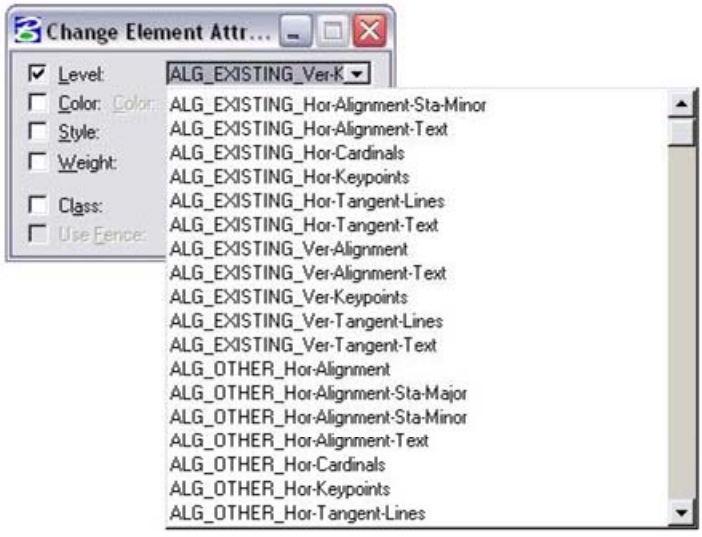


Change Element Attributes Command

Often times it is desired to change the level that an existing element is on. One way to do this would be to delete the graphics and then recreate it using the correct level. In most situations, however, a more efficient way of accomplishing this would be to simply change the attributes (level) of the existing element. Using the **Change Element Attribute** command provides a quick way of changing the level an element is on.

- Select the **Change Element Attribute** command from the Main Tool frame.

- In the Tool Settings dialog, activate the **Level** check box.
- **<D>** on the drop down arrow and identify the level that is desired to place the existing element(s) on.



- Then simply **<D>** on the element that is desired to change.
- **<D>** to accept the command.

Lab 6 – References and Level Display

Objectives

After completing this exercise you will know how to:

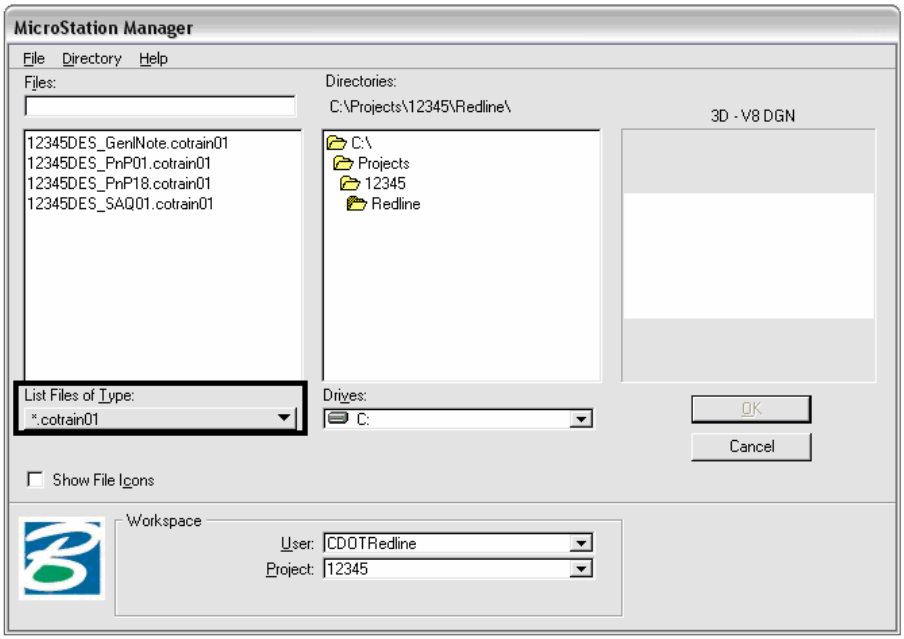
- Use various settings from the Reference dialog box.
- Control the display of references using Level Display.
- Copy graphics into the active file from an attached reference.
- Change the attributes of elements in the active file.

Working with References

Open an existing Redline Design File

1. Open the following directory:
   C:\Projects\12345\Redline

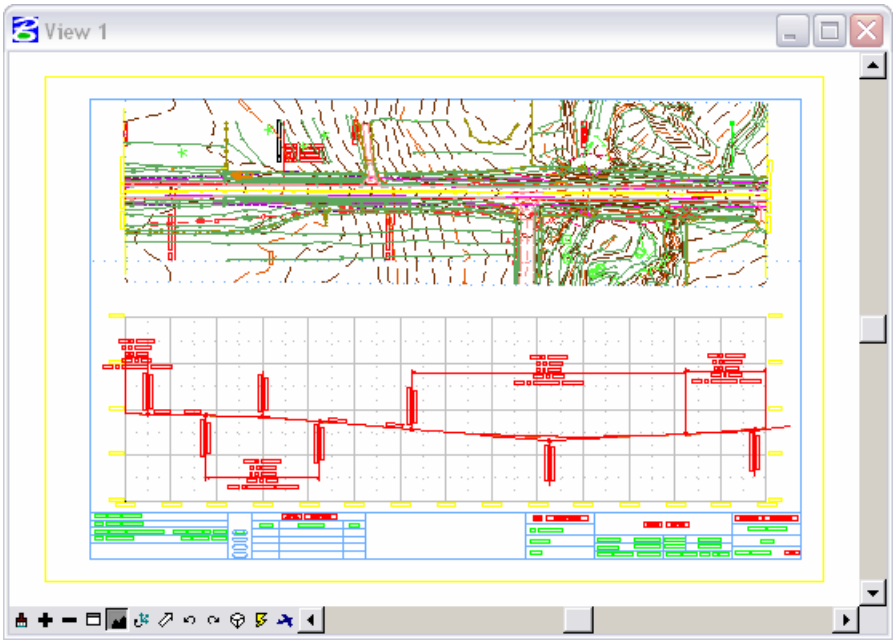
2. Change the **List Files of Type** option to:
   ***.cotrain01** (**All Files [*.*]** could also be used)



3. Open the **12345DES_PnP01.cotrain01** file (this file was used for Chapter 2). This existing ***.cotrain01*** file is opened to view any previous markups or edits that were made to the file.

Note: Recall from Chapter 1 that:
The **.cotrain01** extension is automatically applied at the end of a file name when a Redline file is opened and a copy is made. (Example: When **12345DES_TitleSht*.dgn*** is opened from the **12345\Design\Drawing** folder, a copy of that specific file is automatically made and, by default, it is saved in the **12345\Redline** folder. The new file that is made is given the user specific extension, **12345DES_TitleSht*.cotrain01***).

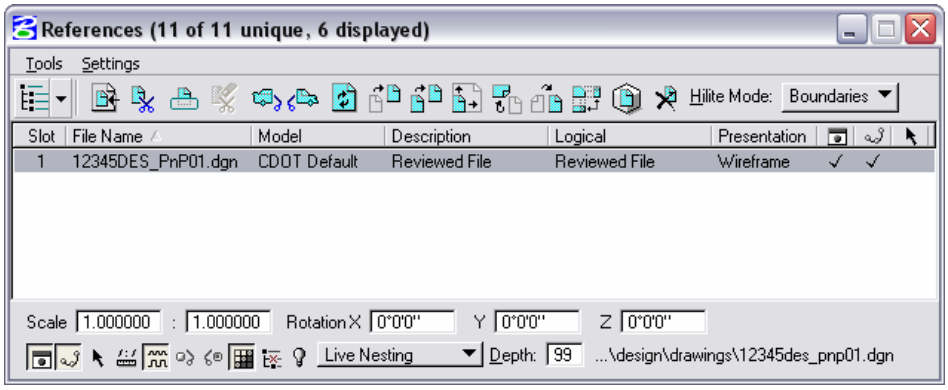
4. **Fit View** to display all elements.



Using the Reference Dialog Box

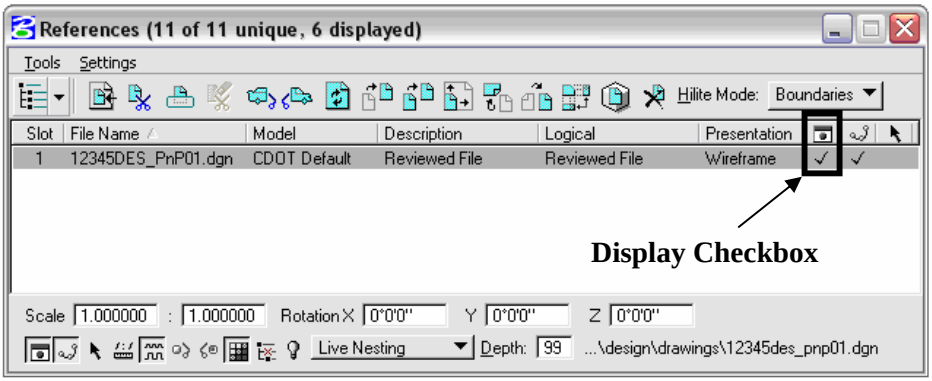
5. Select **File > References** or select the icon from the **Primary Tools** toolbar. The References dialog box will open.

Notice that one reference is displayed, the **12345DES_PnP01.dgn** file.



Turn the display of the reference on and off.

6. Toggle the **Display** check mark *off*. This will turn off all graphics included in the specific reference.



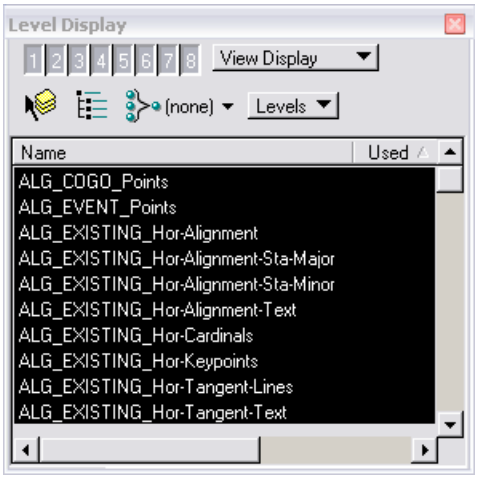
7. Toggle the **Display** check mark back *on*.
8. Close the **References** dialog box.

Using the Level Display Dialog Box

9. Select **Settings > Level > Display** or select the Level Display icon from the Primary Tools toolbar.

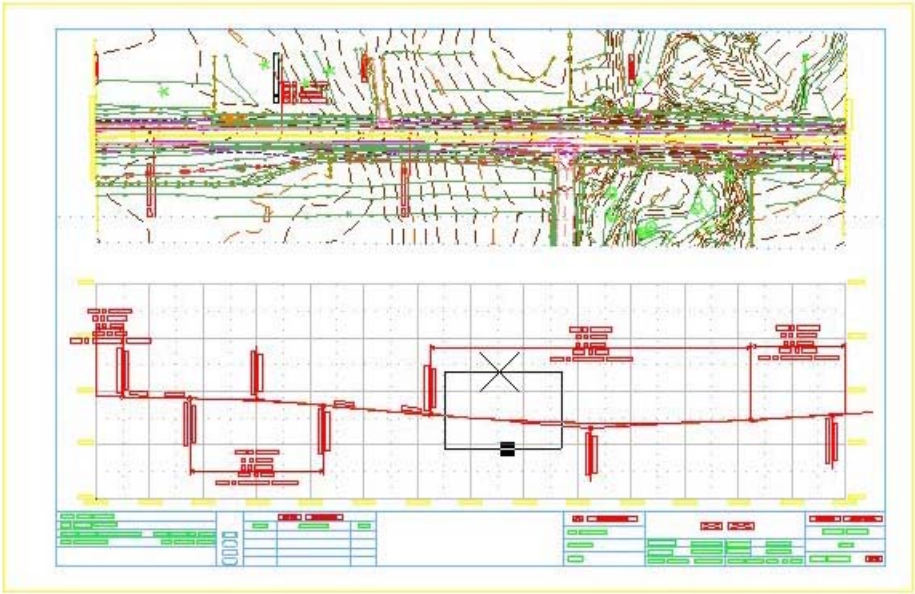
Level Display opens containing a list of all the available levels.

10. Resize the dialog and reorganize the columns as needed (Name, Used, etc.) so that the Level Display dialog appears similar to as shown.

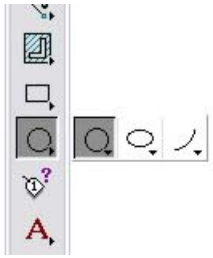


Add some graphics to the design file.

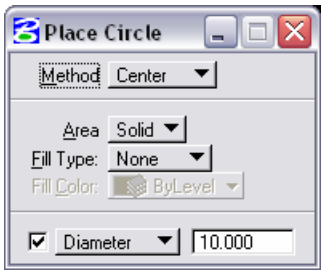
11. **Window** into the area as shown.



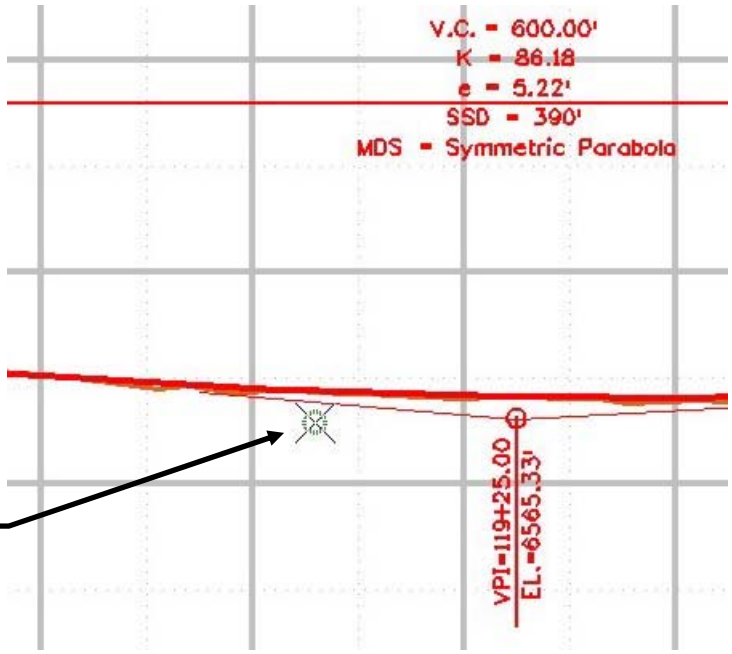
12. From the CDOT menu, select the **As-Constructed** category.
13. Select the **Show Lines** filter.
14. Select the **Linework** item.
15. Select the **Place Circle** command.



16. Activate the **Diameter** checkbox, and enter a value of **10** which will draw a 10-foot diameter circle.
17. Make sure the other options are set as shown.



18. Place the circle approximately as shown.

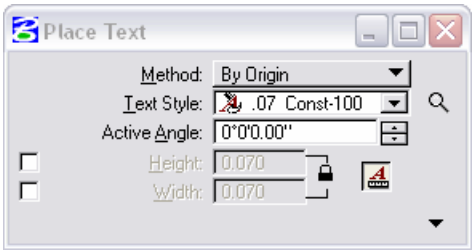


Place the circle here

19. **<R>** to get out of the command.
20. Select the **Show Text** filter.

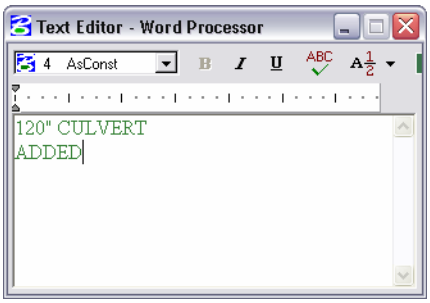
21. Select the **.07 Const-100 Text** item.

22. Set the **Settings** as shown.

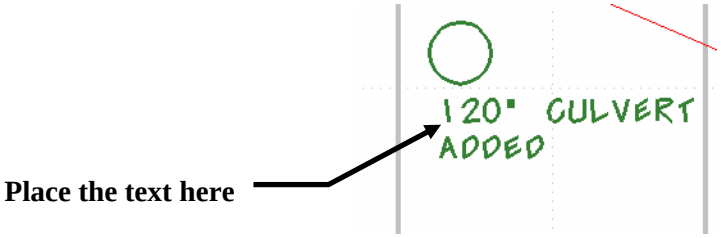


23. Enter the following text:

CULVERT
ADDED



24. **<D>** to place the text approximately as shown.



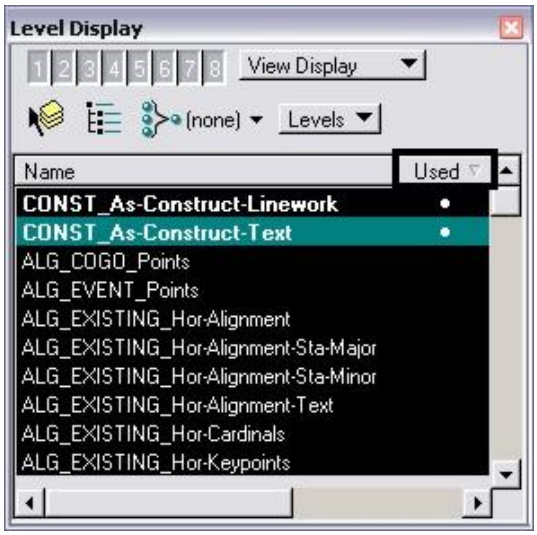
25. **<R>** to get out of the command.

Turn specific levels of the ***active file*** on and off using Level Display.

Note: Extreme caution should be exercised when manipulating the levels of a reference and levels of the active file. Such manipulations will have a direct effect on the appearance of the graphics resulting in making comments and/or mark-ups to a drawing having a different composition from the original.

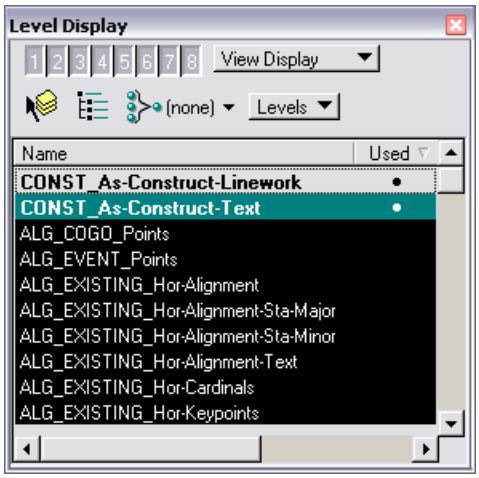
Use the column headings to ***sort*** the list of levels.

26. **<D>** on the **Used** column so that the level list appears as shown.

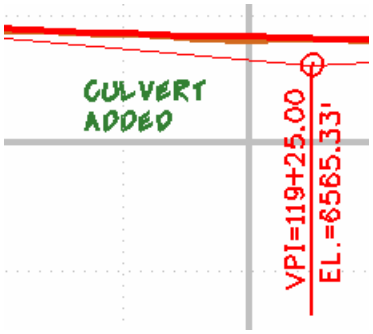


27. **<D>** on the **CONST_As-Construct-Linework** level.

The background of the selected level turns gray, indicating that the level is off.

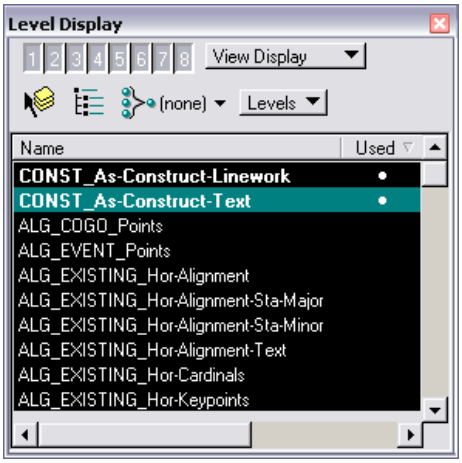


Notice that the circle that was placed earlier on that level is now not visible.



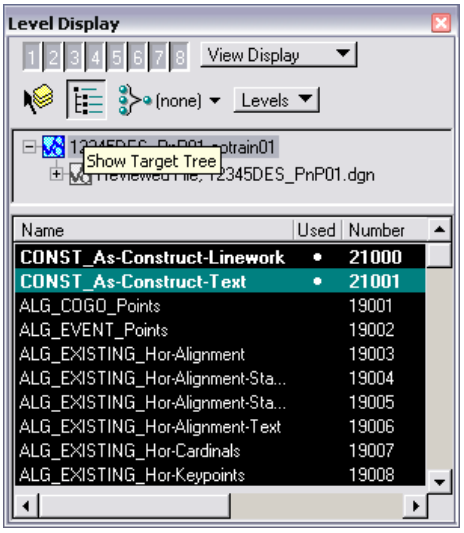
Note: It is often beneficial to be able to turn off the display of graphics that are on a specific level for printing, viewing, selecting, and other purposes.

28. **<D>** on the **CONST_As-Construct-Linework** level again to turn the level back on.

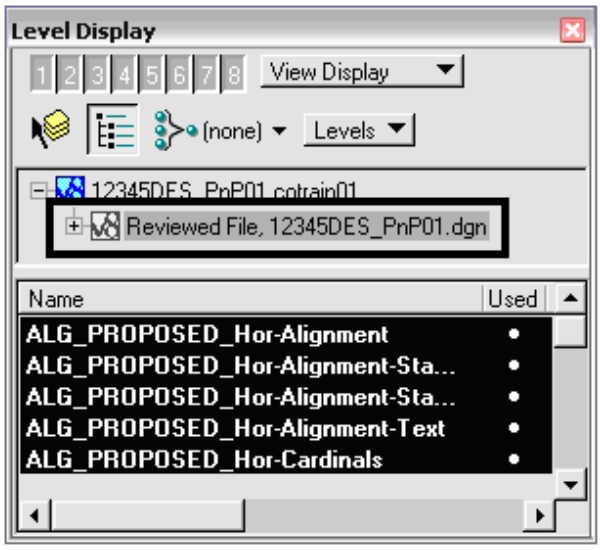


Turn specific levels of the ***reference file*** on and off using Level Display.

29. Select the **Show Target Tree** option. This will provide the option for displaying the list of levels of the reference file as well as the active model.

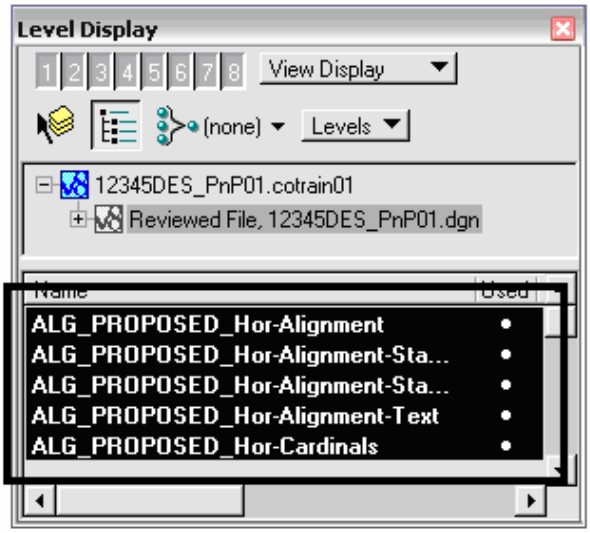


30. **<D>** on the **Reviewed File, 12345DES_PnP01.dgn** file located in the Target Tree list.



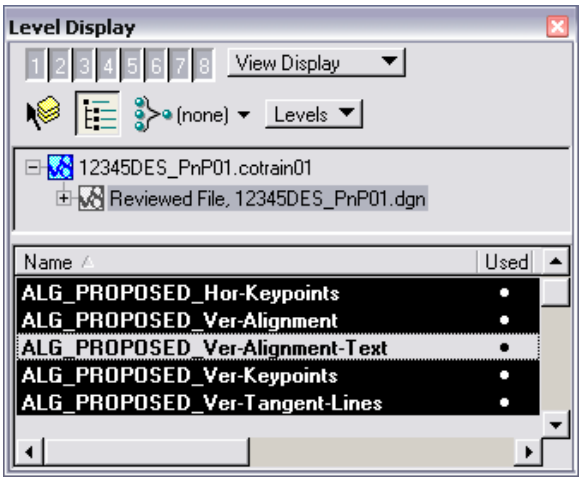
Notice that the list of levels changed because you are now looking at levels that are specific only for the ***reference file*** and not the active file.

Levels for the reference file →

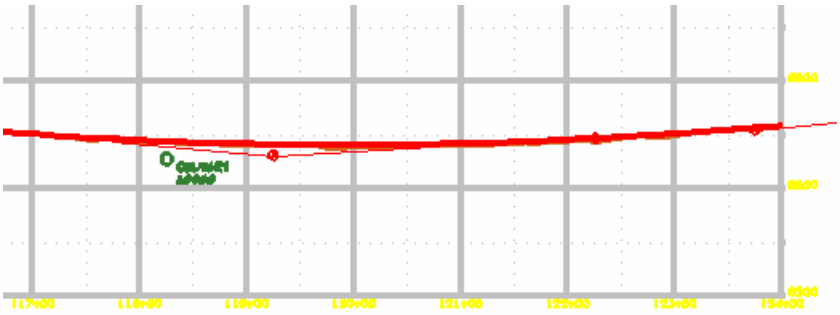


31. **<D>** on the **ALG_PROPOSED_Ver-Alignment-Text** level.

The background of the selected level turns gray, indicating that the level is off.



Notice that a variety of elements are located on that level, as they are currently not displayed.



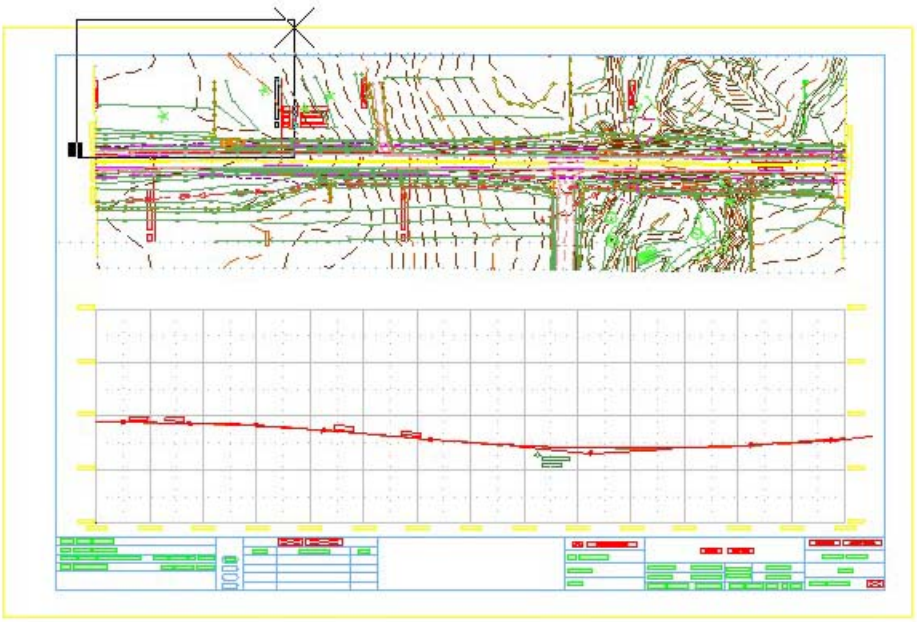
32. Select **File > Save Settings**. This preserves the manipulation of levels. So the next time this file will be opened, Redline will recall which levels were turned on and off at the time the Save Settings command was initiated.

33. Close the **Level Display** dialog.

Copy Graphics from the Reference File

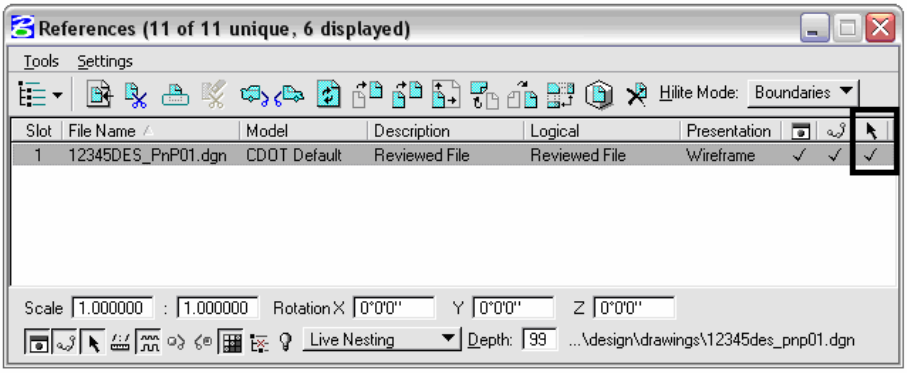
34. Select the **Fit View** command.

35. **Window** into the area as shown (upper-left corner of the sheet).

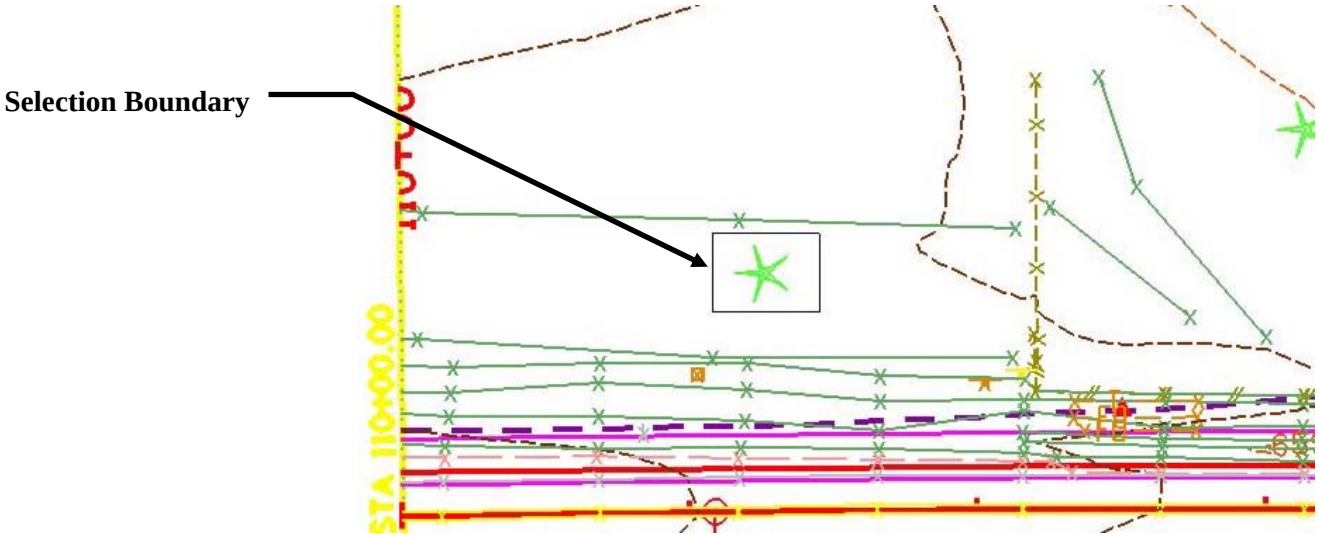


36. Open the **References** dialog.

37. Activate the **Locate** option as shown. With this option turned on, elements contained in the reference file can be selected.



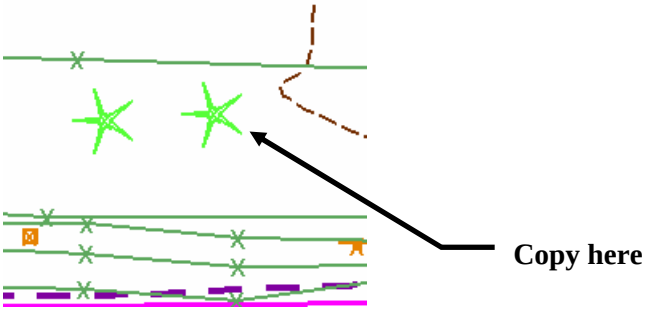
38. Using the Element Selection tool, select the tree as shown.



39. Select the **Copy** command.

40. **<D>** near the selected tree.

41. **<D>** to place the copied graphics approximately as shown.



Note: The tree element that was just placed in the drawing is located in the active design file, **12345DES_PnP01.*cotrain01***. Whereas, the original tree element is located in the reference file, **12345DES_PnP01.*dgn***. When copying elements from an attached reference file, make sure that this operation is to be performed versus making the copy in the reference file itself.

42. Practice turning the respective levels on and off for the two trees using Level Display.

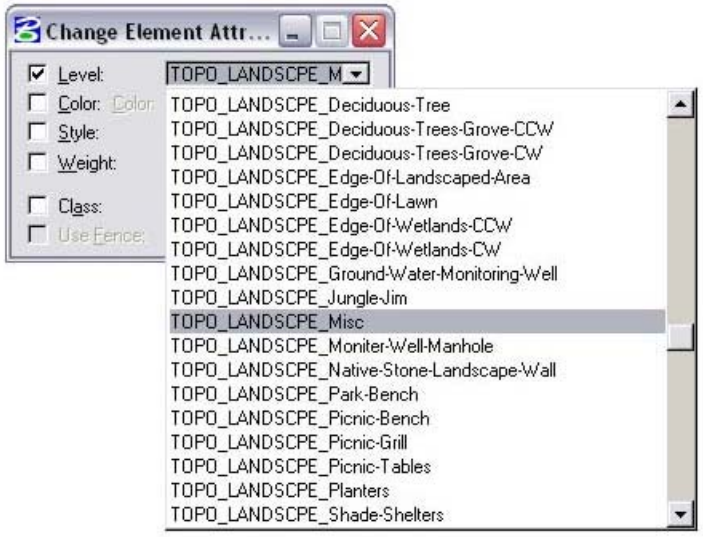
Change the Attributes of the "Copied" Graphics

It is desired to place the tree that was just copied on a different level. To do so, the Change Element Attributes command will be used.

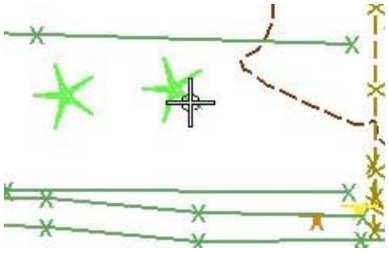
43. Select the **Change Element Attributes** command.

44. Activate the **Level** checkbox.

45. From the pull-down option, select **TOPO_LANDSCPE_Misc**



46. **<D>** anywhere on the tree as shown.



47. **<D>** to accept the command.

The tree that was identified is now on the desired level, *TOPO_LANDSCPE_Misc*. This was done without having to recreate the graphics, which is a big advantage of using the **Change Element Attributes** command.

7. Snapping and Measuring

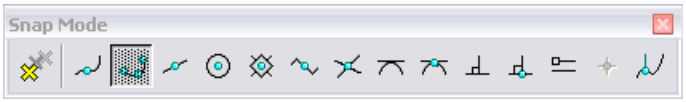
Snapping

What is Snapping?

Snapping is a procedure of identifying an exact point or location on an existing element for drawing or modification purposes. Snapping is especially beneficial when using various measuring commands. To aide in determining an exact point or location, *snap modes* can be utilized.

Snap Modes

The active snap mode determines how to snap onto an element. The following snap modes can be used from the Snap Mode toolbar:



- ***Nearest*** — snaps to a point on the element nearest your pointer.
- ***Keypoint*** — snaps to the nearest element keypoint. Typical keypoints are endpoints of lines and arcs, corners of blocks, vertices of shapes, center of circles. **Keypoint** is one of the most useful snap modes.

  Note: When using **Keypoint** snap mode, you can set the keypoint **Divisor** to determine intermediate keypoints snaps. For example, a **Divisor** value of 2 allows you to snap to the midpoint of a line. Set the divisor on the **Full** Locks settings box. You can also set the **Divisor** using the key-in ***KY=<value >***.
- ***Midpoint*** — snaps to the midpoint of the element segment (line, arc, etc.).
- ***Center*** — snaps to the center of elements (circles, arcs, etc.).
- ***Origin*** — snaps to the first vertex of a line, linestring or shape. Snaps to the origin of a cell or text, and the first data point in a dimension element.
- ***Bisector*** — snaps to the midpoint of a linestring, multi-line, or complex chain. Snaps to the midpoint of a line or arc.
- ***Intersection*** — snaps to the intersection of two elements.
- ***Tangent*** — when placing a new line, snaps to an existing element (like a circle) where the new line is dynamically tangent to the element.
- ***Tangent Point*** — behaves like the **Tangent** snap mode except you lock the tangent point.
- ***Perp*** — when placing a new line, snaps to an existing element (like a circle) where the new line is dynamically perpendicular to the element.
- ***Perp Point*** — behaves like the **Perp** snap mode, except you lock the perpendicular point.
- ***Parallel*** — when you snap to an existing line, the new line you place is parallel to the line to which you snapped.

- ***Through Point*** — defines the point on an existing element through which the new element that is placed must pass.
- ***Point On*** — defines the point on an existing element where the next data point of a new element must lie.
- ***Multi-snap*** — used to set up groups of snaps. With a **Multi-snap** set as the active snap mode, a predefined set of snaps (*e.g.* Intersection, Center, Midpoint, etc.) can be utilized all at once.

Using a Snap Mode

The procedure for using a snap mode is as follows:

- Activate a **drawing** or **manipulation** command.
- Select the desired **snap mode** from the Snap Mode toolbar.
- **<T>** (tentative/middle mouse button) on the element that is desired to snap to. A large crosshair symbol will appear on the element at the location in which the snap mode identified (end point, mid point, center, etc.).

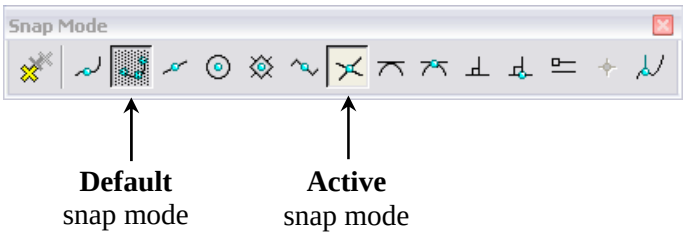
- If the large crosshair symbol appears at the correct location, **<D>** anywhere to accept that snap location.

  Note: The Intersection snap mode requires a second **<T>** (one on each of the two elements that make up the intersection point).

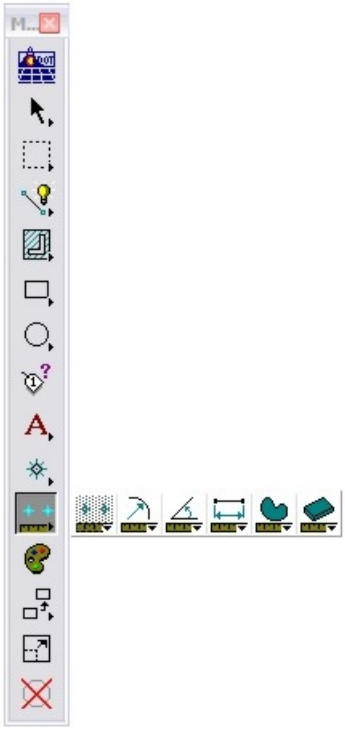
Active vs. Default Snap Mode

When identifying a snap mode to utilize, a specific snap mode can be set as the ***active*** or ***default*** snap mode.

- ***Active*** – Only one snap mode can be set as the active snap mode. The active snap mode is the snap that is used. This is a one time operation, meaning that once the active snap mode is used the active snap mode will then automatically become the snap mode that is currently set as the *default* snap mode. To set a snap mode as the **active** snap, **<D>** on any of the snap modes from the snap mode button bar.
- ***Default*** – There can be only one default snap mode at a time. Unlike the active, the default snap mode is unlimited in the number of times it can be utilized. The default can also be the active snap mode (note above info on the active snap). To set a snap mode as the **default** snap, **<D><D>** (double-click) on any of the snap modes from the snap mode button bar.


Snap Mode
Default
snap mode
Active
snap mode

Measure Toolbar



The **Measure** toolbar is used to measure distances, angles, radii and areas. Use **Settings > Design File > Coordinate Readout** to define how measurement values will display (units, precision, etc.)

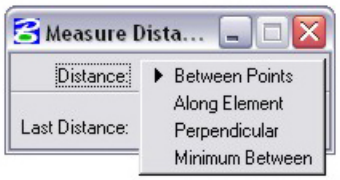
In a 3D file, if you want a planar measurement, turn on **Depth** lock before using the appropriate measure command. If you want a true slope measurement, turn off **Depth** lock.

When a measuring command is used and it is desired to review the results, refer to the **Tool Settings** dialog.

Some of the more commonly used measuring commands include:

Measure Distance

Measures distance using one of the following methods:



- ***Between Points***
- ***Along Element***
- ***Perpendicular***

  Note: This command locks on the ***element's*** depth you are measuring from when starting the measurement. If you want a horizontal measurement, you must first set the **Active Depth** to the depth of the element and make certain **Depth** lock is on.

- ***Minimum Between***

Measure Radius

Measures the radius of a circle or an arc. It also measures the circular segment of a complex chain or shape, or the primary and secondary axes of an ellipse.

Measure Angle

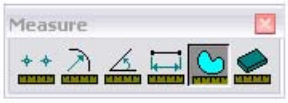
Measures the angle between two lines or line strings, or the angle between two segments of a shape.

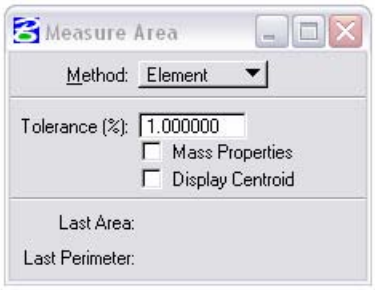
Measure Length

Measures the length of an element or the perimeter of a shape.

Measure Area

Measures area using the same method options as the **Pattern** commands. This includes the area of a shape (**Element** method) or an area you dynamically define using the **Points** method. In addition, you can **Flood** an area or measure the area of the **Intersection**, **Union** or **Difference** between elements.





Lab 7 – Measuring

Objectives

After completing this exercise you will know how to:

- Use various snap modes when snapping to elements.
- Measure distances.
- Measure radii.
- Measure the angle between lines.
- Measure areas.

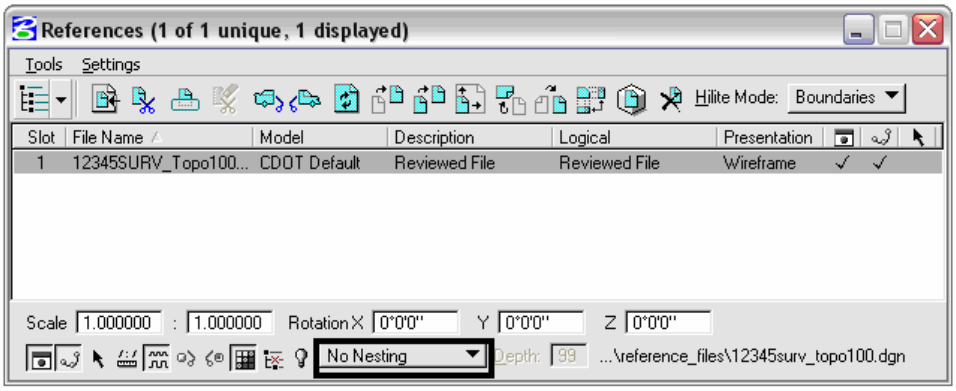
Practice Snapping and using some Measuring Tools

Open the Design File

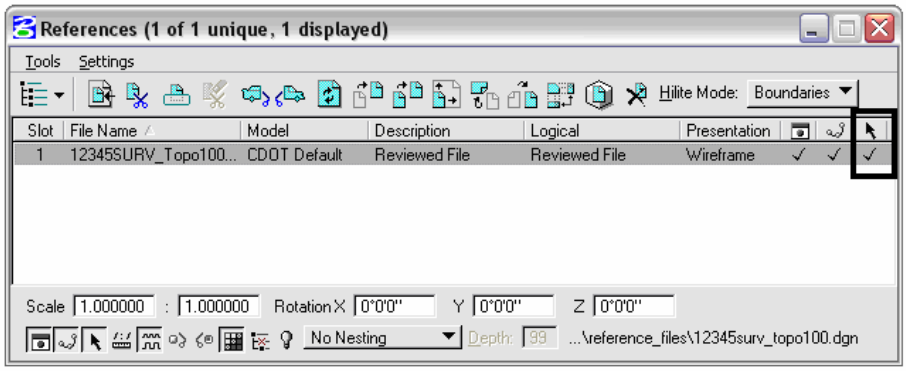
1. Start Redline and open **12345SURV_Topo100.dgn** from the **C:\Projects\12345\ROW_Survey\Drawings\Reference_Files** folder.

Manipulate the Appearance of the Graphics

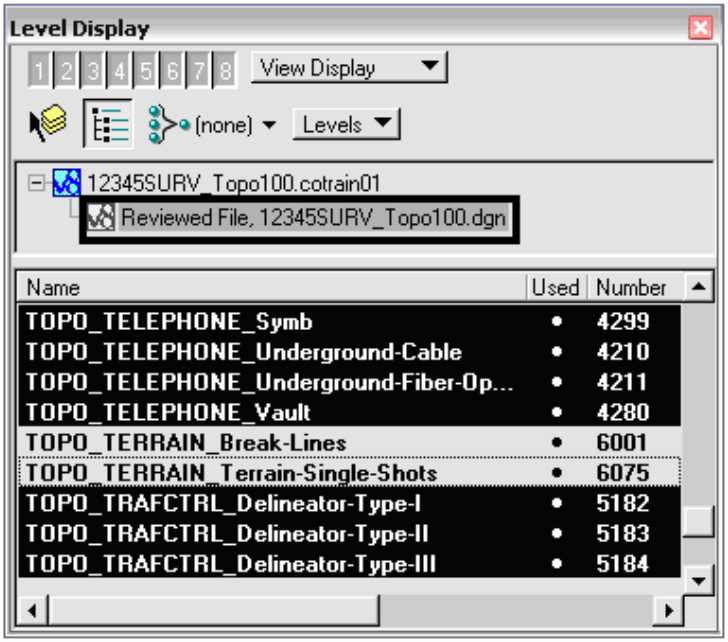
2. Open the **References** dialog.
3. If the Nesting is turned on, turn it off by selecting the **No Nesting** option as shown. Since the graphics that will be used for measuring are located in the main reference, it is not necessary to display nested references as well.



4. Turn on the **Locate** option.

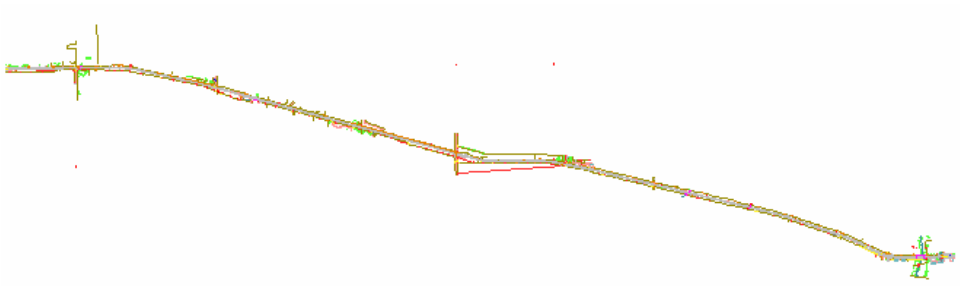


5. Close the **References** dialog.
6. Open the **Level Display** dialog.
7. In the reference file **Reviewed File, 12345SURV_Topo100.dgn**, turn off the following levels:
   TOPO_TERRAIN_Break-Lines
   TOPO_TERRAIN_Terrain-Single-Shots



8. Close the **Level Display** dialog.
9. **File > Save Settings**

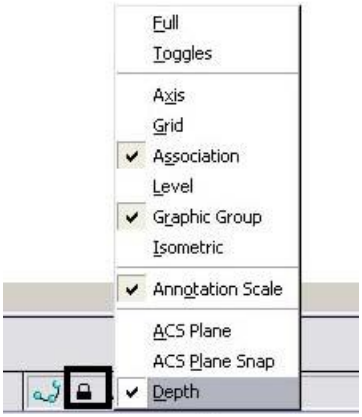
The graphics should appear as shown.



Turn on the Depth Lock

10. From the status bar (bottom of the Redline interface), select the **Locks** field. A fly out will appear.

11. Make sure the **Depth Lock** is on as shown. If it is turned off, **<D>** on the **Depth** option and the checkmark will appear.



Note: Turning on the *Depth Lock* will ensure planar measurements and not 3D measurements for specific measuring commands.

Measure Distance

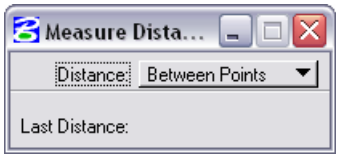
Measure Distance - Use the **Between Points** method.

12. **Window** into the area as shown.

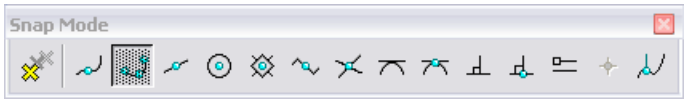
The view window should show the following graphics.

13. Select the **Measure Distance** command from the **Measure** toolbar.

14. Set the **Distance** option to **Between Points**.

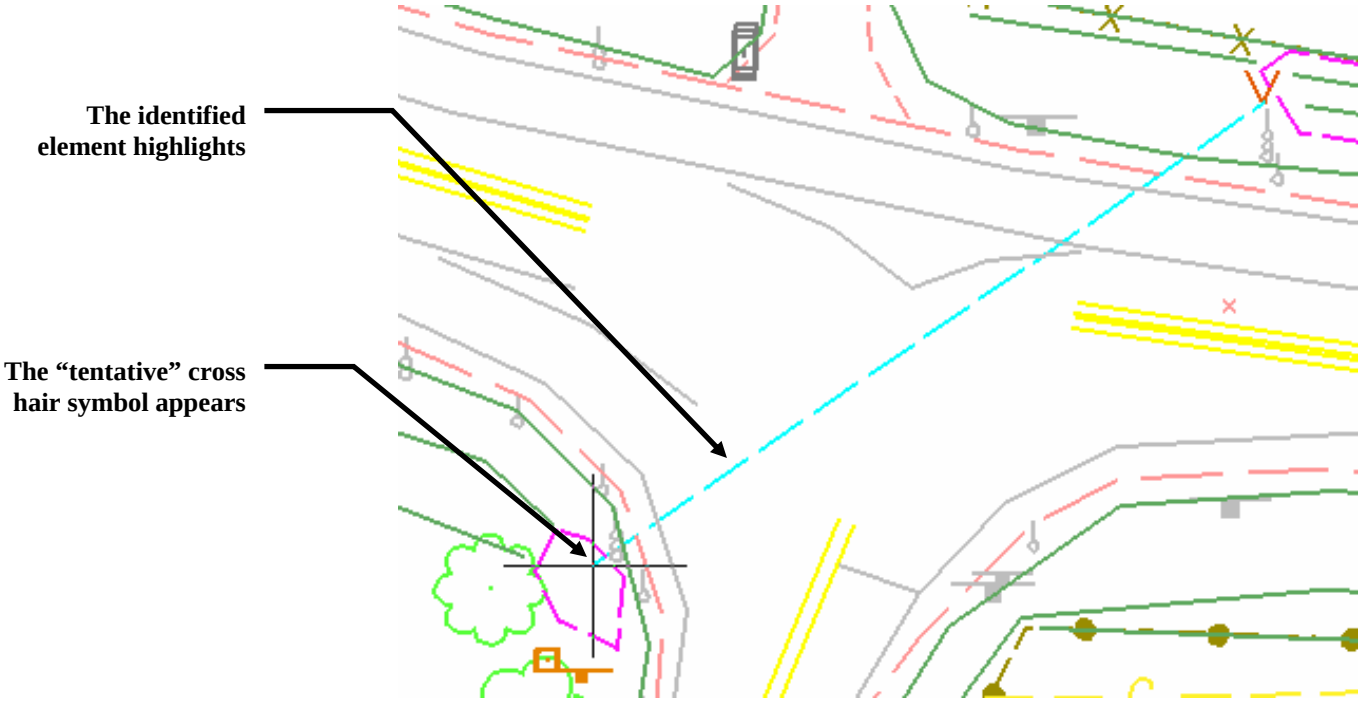


15. Set the **Keypoint** snap mode as the ***default*** snap mode.



16. **<T>** approximately on the left end of the dashed line (culvert) as shown (you may need to zoom in further).

The cross hair symbol appears at the end of the line. Also, the line that is identified highlights.



17. If the correct element is highlighted, **<D>** to accept the location.

18. **<T>** approximately on the right end of the dashed line (culvert) as shown (you may need to zoom in even further).

A temporary measuring reference line is drawn from tentative point to tentative point.

19. If the tentative symbol appears at the correct location, **<D>** to accept.

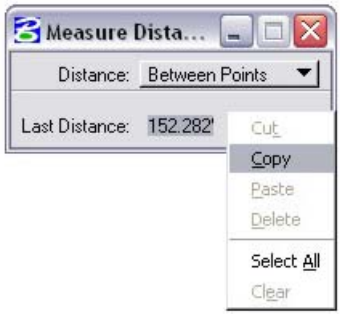
20. **<R>** to reset the command.

21. Check the **Tool Settings** for the measurement.

Verify the measurement, ***152.282'***.

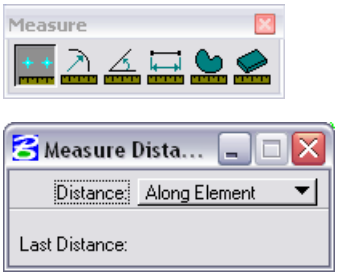
Note: Measurement readouts can be copied to the clipboard from the Tool Settings dialog. This comes in handy if it is desired to place the readout information in another application (*e.g.* Word or Excel) or in Redline using the Place Text command. To copy the information, **<D>** on the text, **hold**, and **drag** to select the text. Press **Ctrl+C** to copy the text to the clipboard or **<R>** to get

an editing fly out menu. Then simply paste that information where and when desired.



Measure Distance - Use the **Along Element** method.

22. Set the **Distance** option for the **Measure Distance** command to **Along Element**.



23. Use the same procedure that was just used (**<T>** at each end point) to measure the pavement marking line shown below.

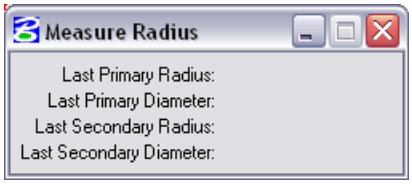
Measure this line using the **Along Element** method

24. Record your results: _____ feet

Note: See the last page of this lab for all measurement answers.

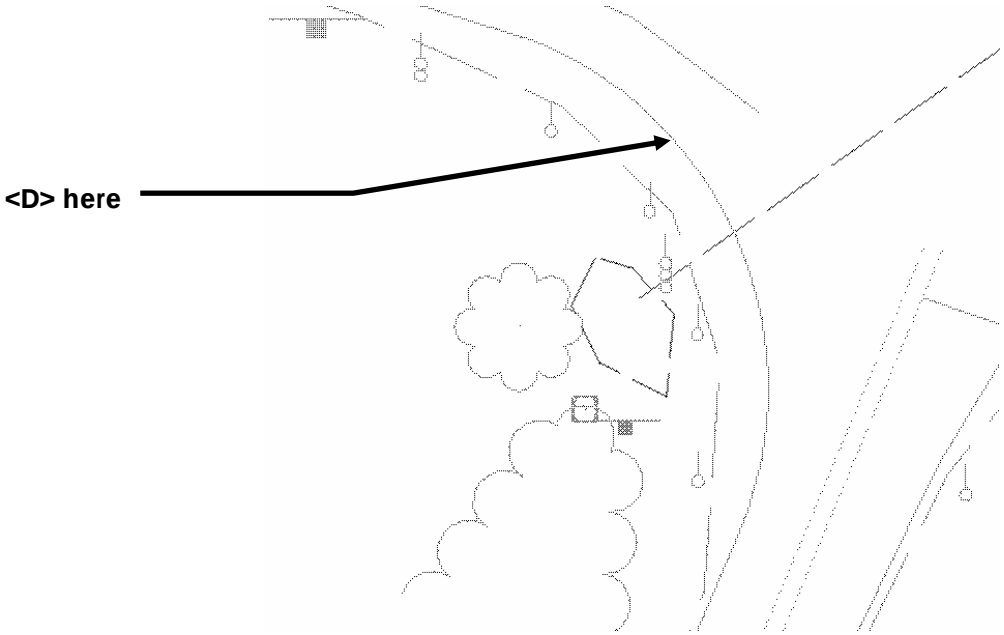
Measure Radius

25. Select the **Measure Radius** command from the **Measure** toolbar.



26. **<D>** on the arc as shown.

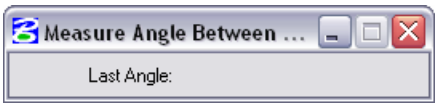
27. **<D>** to accept the command.



28. Record your results: _____Radius, _____Diameter

Measure the Angle between Lines

29. Select the **Measure Angle** command from the **Measure** toolbar.



30. **<D>** on the fence line as shown.

The entire element will highlight.

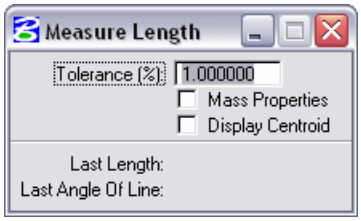
31. **<D>** on the other side of the fence as shown.

32. **<D>** to accept the command.

33. Record your results: _____

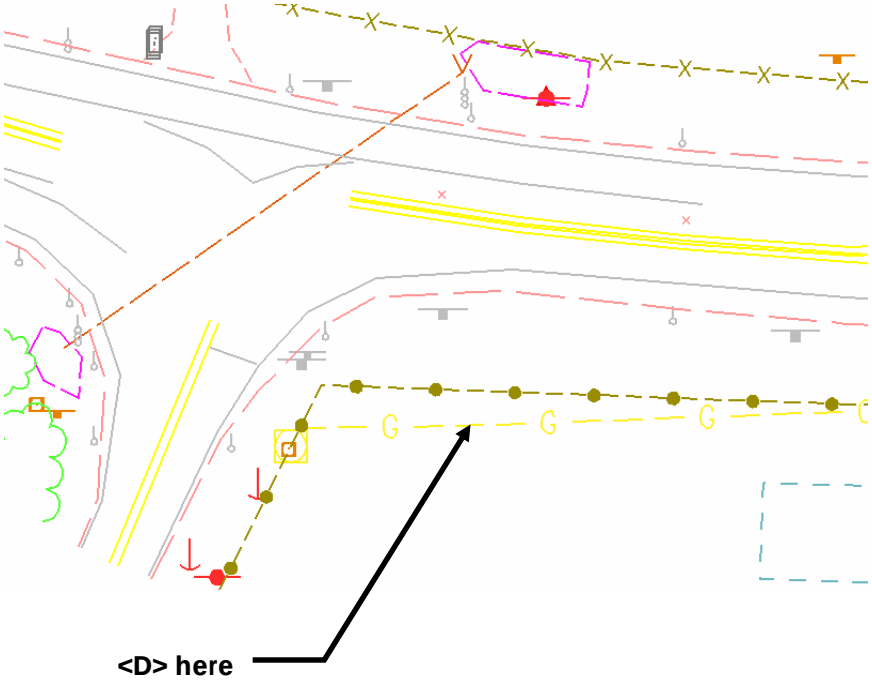
Measure Length

34. Select the **Measure Length** command from the **Measure** toolbar.



35. **<D>** on the gas line as shown.

36. **<D>** to accept the command.

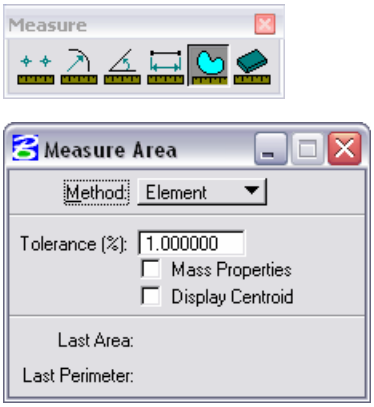


37. Record your results: _____ feet

Measure Area

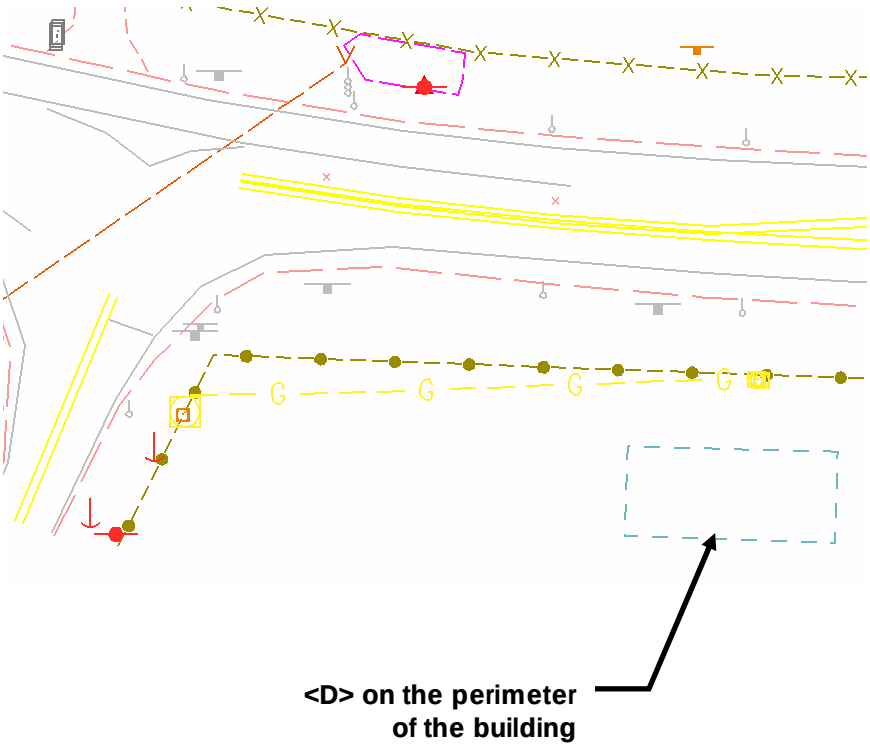
38. Select the **Measure Area** command from the **Measure** toolbar.

39. Set the **Method** to **Element**.



40. **<D>** anywhere on the perimeter of the building as shown.

41. **<D>** to accept the command.



42. Record your results:
    Area_____ square feet, Perimeter: _____ feet

43. Practice using various measuring tools and methods as well as snap modes on your own if time allows.

Answers to Measurements

Measure Distance (*Along Element* method): 71.168'

Measure Radius: 60.00’ Radius, 120.00’ Diameter

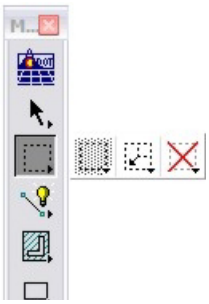
Measure Angle: 108°14'48.14"

Measure Length: 188.664’

Measure Area: 2144.7387’ Area, 202.0262’ Perimeter

8.Fences and Printing

Fence Toolbar



The **Fence** toolbar provides another set of tools to temporarily group elements. Once placed in the fence, the elements can be printed, deleted, manipulated or the attributes changed. When the fence is removed, the elements are no longer grouped.

Place Fence

Temporarily groups elements by drawing a fence boundary around the elements. There are several types of fences you can place including blocks (drawn corner to opposite corner), shapes, and circles, also by element, view or design file.

The fence mode determines which elements will be affected by the fence. These include:

- ***Inside*** — to select elements entirely inside the fence.
- ***Overlap*** — to select elements inside or overlapping the fence.
- ***Clip*** — to select elements inside the fence and cut or break all elements that intersect the fence.
- ***Void*** — to select all elements outside the fence.
- ***Void-Overlap*** — to select all elements outside or overlapping the fence.
- ***Void-Clip*** — to select elements outside the fence and cut or break all elements that intersect the fence.

Once the elements are grouped in the fence, they can be deleted or manipulated. You can use Redline view controls (**Zoom In**, **Zoom Out**, **Pan,** etc.) and the fence remains persistent.

To remove the fence, select the **Place Fence** command again.

> **Note:** Check the fence indicator on the **Status Bar** to quickly determine if there is a fence placed in the design file.

The **Void** and **Clip** modes are two features not available with selection sets. However, there may be times when attribute filtering (not available with fences) is easier to use — especially when grouping graphics in high-density areas.

To group elements with a fence:

- Select the **Place Fence** command.

Set the fence **Type** and **Mode.**

- Enter data points to define the fence (block, shape, etc.)

If placing a fence shape, select **Close Fence.**

Modify Fence

The **Vertex** mode allows you to modify a fence vertex to include or exclude elements in the fence without having to re-draw the fence. The **Position** mode lets you move the entire fence to include or exclude elements in the fence.

Delete Fence Contents

Deletes the contents of the fence based on the fence mode. Note that the **Delete Element** command on the **Main** tool frame ***does not*** work for fenced elements.

To delete the contents of a fence:

- Select the **Delete Fence Contents** command.
- Set/check the Fence **Mode** in the tool settings box.
- **<D>** to accept the deletion.

CAUTION: If the fence mode is set to a **Void** mode, all elements ***OUTSIDE*** the fence will be deleted.

> **Note:** It is good practice when working with fence modes to always set the **Mode** back to **Inside** so that accidental deletions are avoided.

CDOT Batch Printing

Batch Printing is used to print multiple files at one time. This tool can assist you in organizing Plot Sets for milestone submittals. A file can be saved (given a *.job* extension) and called back for future printing. It can also be used for plotting to Adobe Acrobat format (PDF). See page 15 for reference information about accessing CDOT CADD resources and documentation

Lab 8 – Fences and Printing

Objectives

After completing this exercise you will know how to:

- Place a fence.
- Set the print options.
- Print to PDF file format.
- Utilize batch printing.

Utilize the Fence commands and practice Printing

Open the Design File

1. Open **12345DES_SAQ01.dgn** from the **C:\Projects\12345\Design\Drawings** folder.

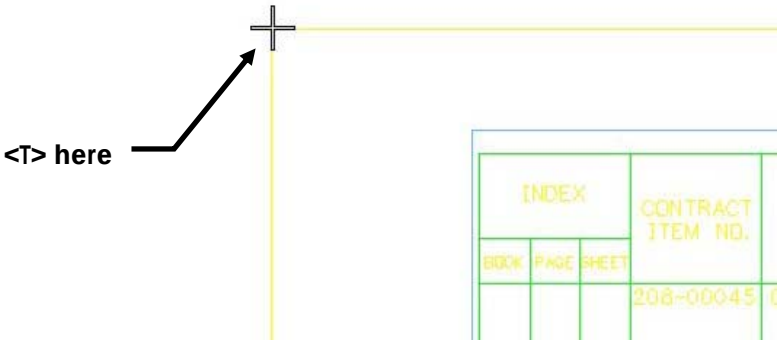
Printing a Sheet

Place a Fence to define the printing boundary.

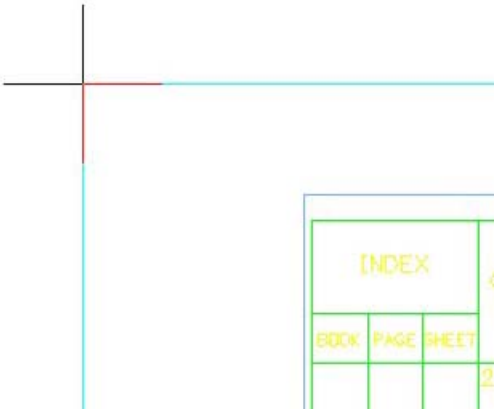
2. Select the **Place Fence** command.

3. Set the **Fence Type** to **Block** and **Fence Mode** to **Inside**.

4. **<T>** approximately as shown (upper-left corner of the border sheet).

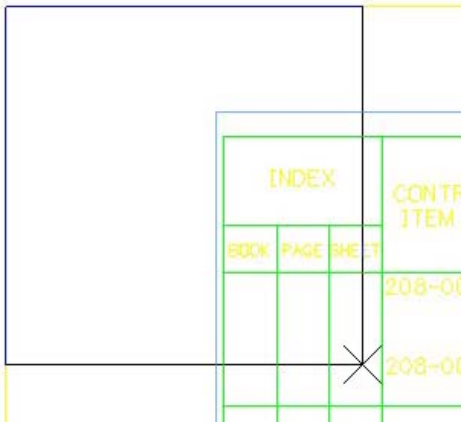


A large cross hair symbol appears.

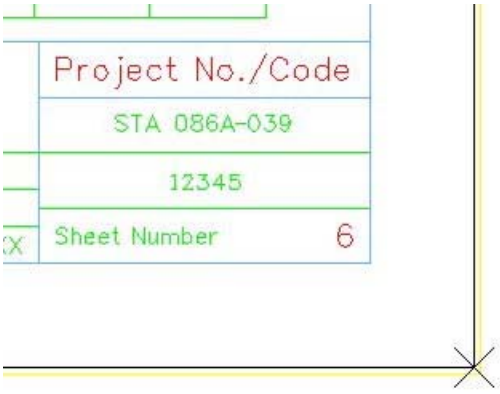


5. **<D>** anywhere to accept the location.

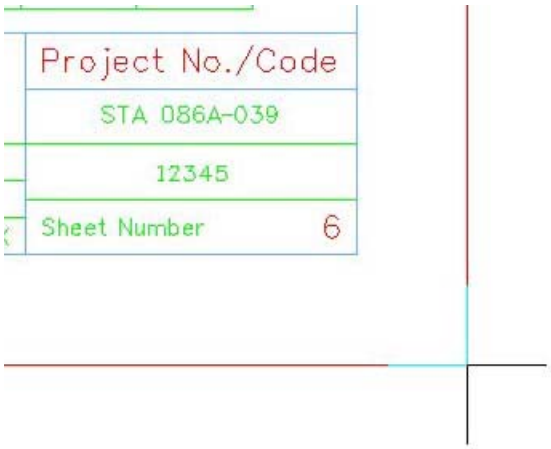
The location of one corner of the fence is now identified.



6. **Pan** or **scroll** to the opposite corner of the border sheet.
7. **<T>** approximately as shown.



A large cross hair symbol appears.



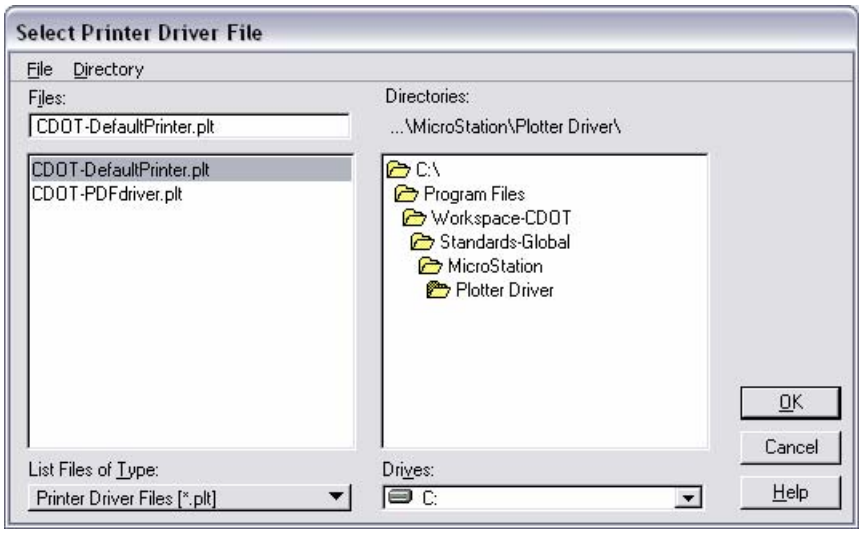
8. **<D>** anywhere to accept the location.

The fence is now placed around the outer boundary of the border sheet.

Set the print options.

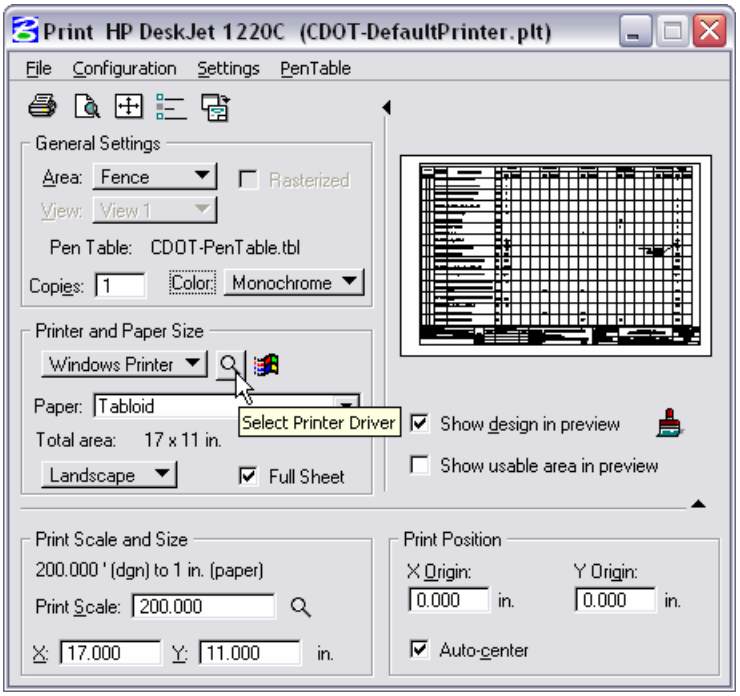
9. Select **File > Print** or choose the **Print** icon from the **Standard** toolbar.

10. If prompted, select **CDOT-DefaultPrinter.plt** for the print driver.

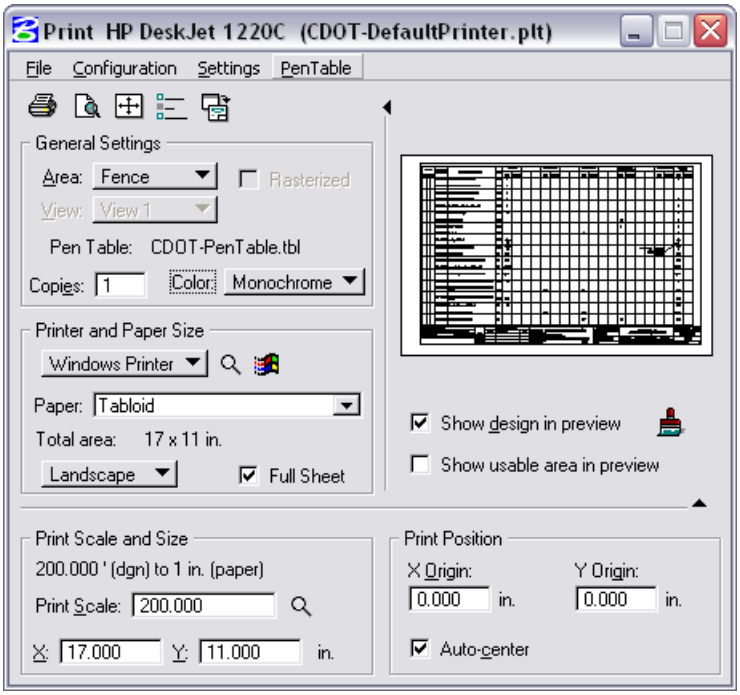


11. Select **OK**.

12. If the **Select Printer Driver File** dialog doesn't appear, select the **Select Printer Driver** icon (magnifying glass icon) as shown below.



13. Set the dialog as shown here.

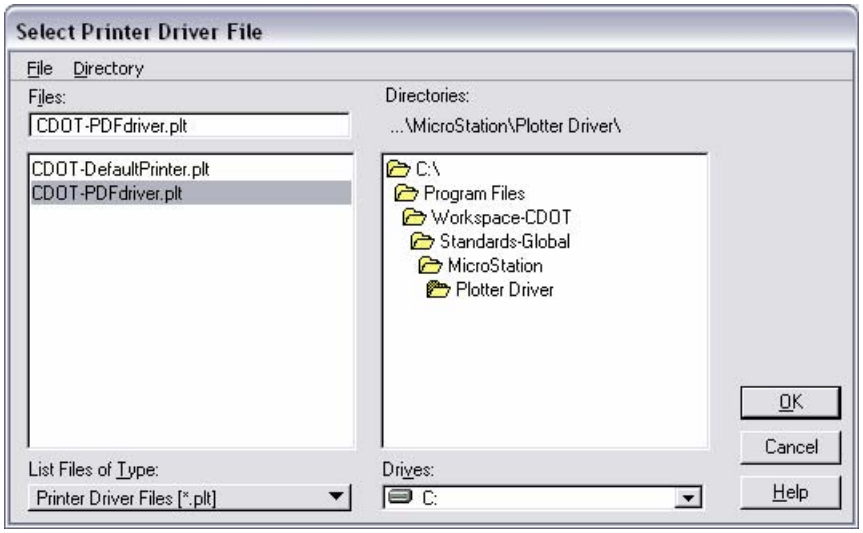


14. From the **Print** dialog, select the **Print** icon or **File > Print**.

Print to PDF File Format

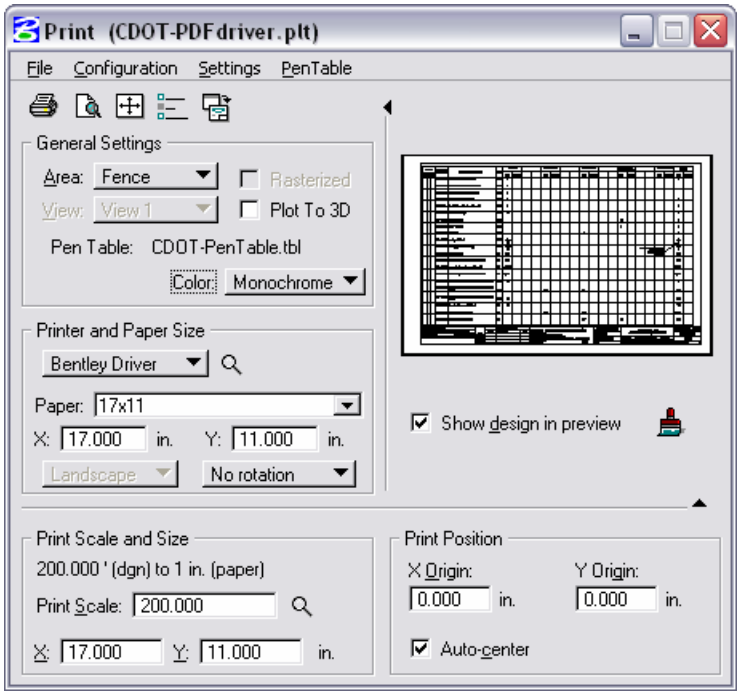
15. From the **Print** dialog, select **File > Select Bentley Driver**, or select the **Select Printer Driver** icon (magnifying glass icon).

16. Select **CDOT-PDFdriver.plt**.



17. Select **OK**.

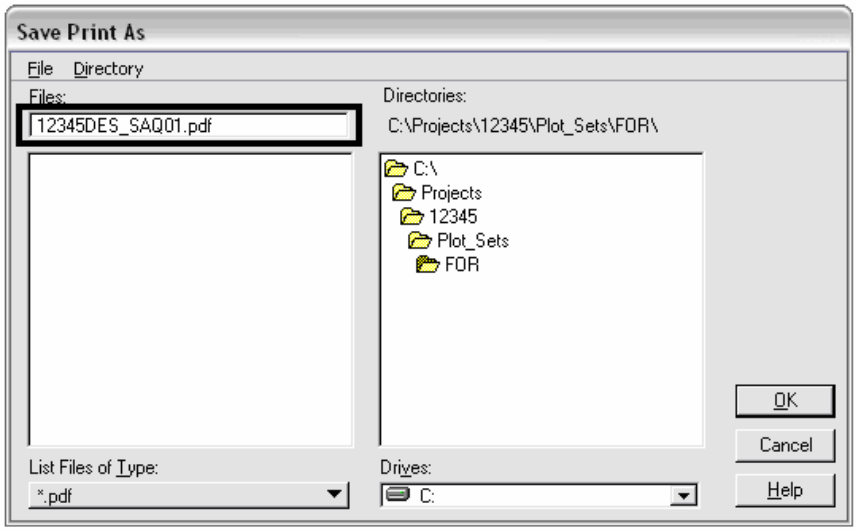
18. The Print dialog should appear as shown.



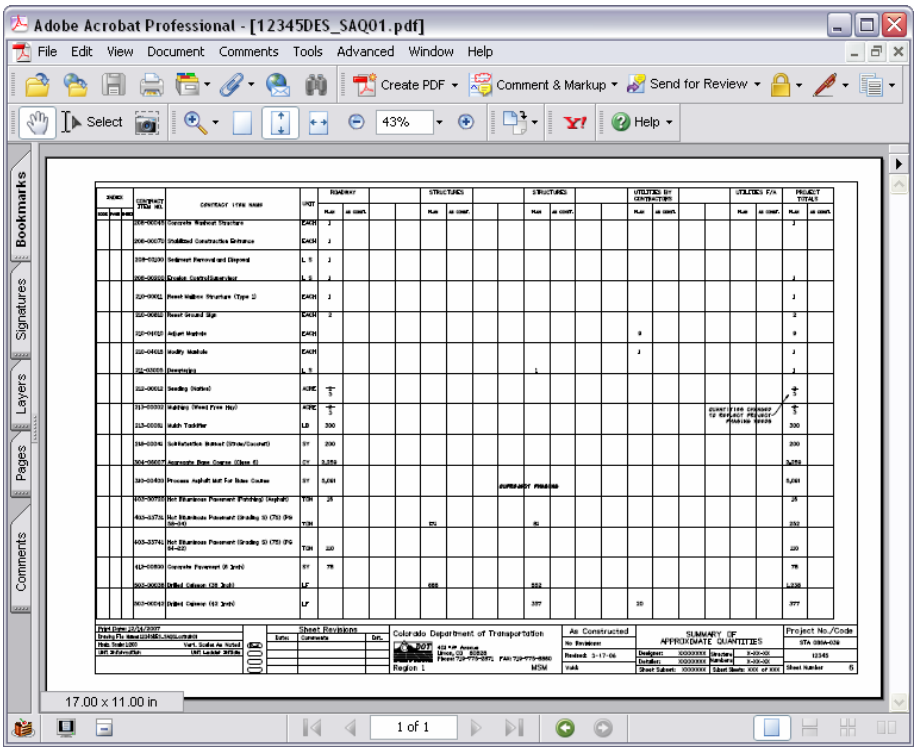
19. Select the **Print** icon or **File > Print**.
20. Set the **Directory** to **C:\Projects\12345\Plot_Sets\FOR**.

Note: The name should default to your file name with a .pdf extension.

21. Select **OK** and the PDF file is generated.

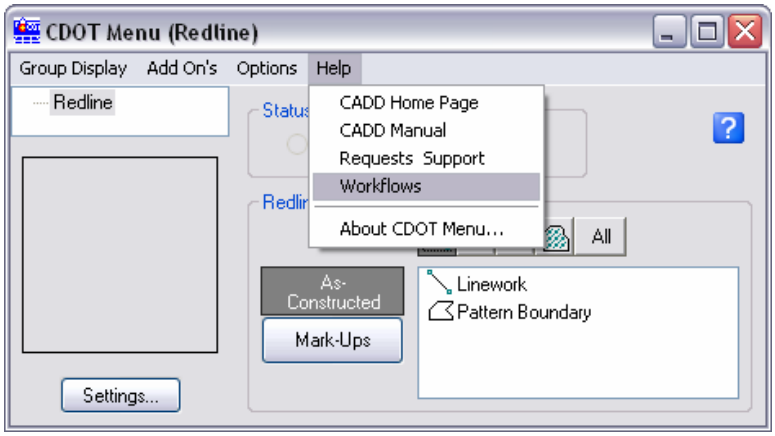


22. Go out to the output directory and double-click the new PDF file.



CDOT Batch Printing

23. From the CDOT Menu, select **Help > Workflows**.



This will launch the CDOT internal site. From there, a detailed workflow on Batch Printing can be accessed, called *CDOT Batch Printing*.

24. Using the CDOT Batch Printing workflow, create a PDF batch print of the following files you have been working with:

    C:\Projects\12345\Redline**12345DES_GenNote.cotrain01**
    C:\Projects\12345\Redline**12345DES_PnP01.cotrain01**
    C:\Projects\12345\Redline**12345DES_PnP18.cotrain01**

Appendix A

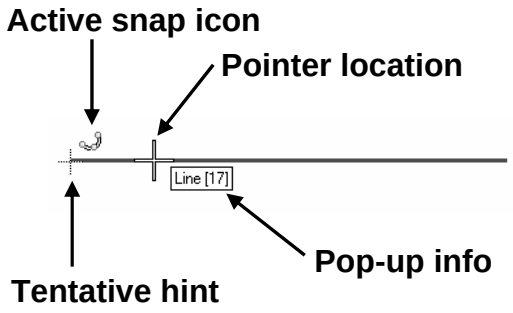
Using AccuSnap

AccuSnap is a feature that streamlines your snaps. Instead of tentative snapping to an element, you can **AccuSnap** to it. In addition, **AccuSnap** can give you basic element information and can identify whether a tool can be used on a specific element.

To snap to an element using AccuSnap:

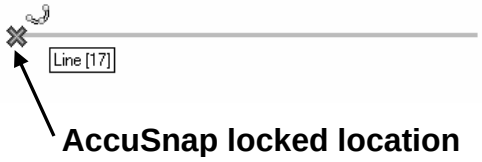
- Select a drawing tool.
- Select a **Snap** mode.
- Move your pointer across the element.

  AccuSnap identifies the element type and its level with ***Pop-up information***. An icon representing the current snap mode is displayed along with a tentative hint – a light dashed cross-hair at the closest snap point according to the selected snap mode.



- Move your pointer closer to the tentative hint.

  The pointer changes to a bold X and the element highlights to indicate you're locked on to the snap point.

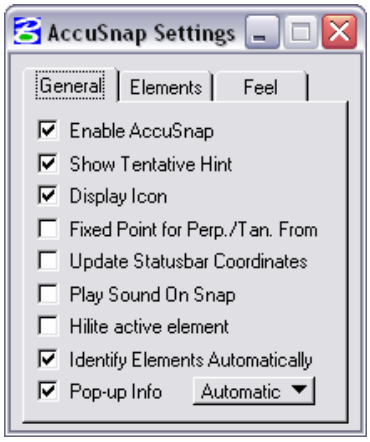


- **<D>** to select this location.

  A **Tentative** point is not necessary to define the temporary snap location.

AccuSnap Settings

There are several options to control how **AccuSnap** works. Find these settings by selecting the snaps button on the Status Bar or by **right-clicking AccuSnap** on the **Snaps Button Bar** and choosing **Properties**.



For example, you can choose to turn the tentative hint on or off, highlight all elements or just the active when a snap point is found, or no highlight, turn pop-up information on or off, and disable or enable **AccuSnap** altogether. Experiment with these options to determine how you like to work.

> **Note:** If you don't want **AccuSnap** to highlight all elements you pass with your pointer, turn off **Hilite active element** in **AccuSnap Settings**.

Snap Modes

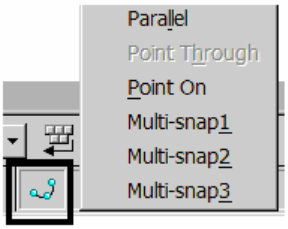
For more information on snap modes, refer to Chapter 7.

Multi-Snaps

Redline includes three **Multi-Snap** modes. **Multi-snaps** are an ordered list of snaps. When you choose a multi-snap with **AccuSnap** on, Redline processes the multiple snaps according to your pointer location.

Using Multi-Snaps

- From the **Snaps** button bar or from the **Status** bar, select a Multi-Snap (**Multi-snap1**, **Multi-snap2** or **Multi-snap3**).

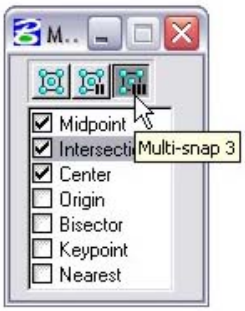


- Move your pointer over the element until **AccuSnap** locates the first multi-snap option.

- Continue moving your pointer until the next snap option highlights.
- When you have locked on the correct snap point, **<D>** to accept.

Editing Multi-Snaps

- Select **Multi-snaps** from the **Snaps** button on the Status bar.
- Select a multi-snap (1, 2 or 3).



Note: You can also right-click on the **Multi-snap** icon from the Button toolbar and select **Properties**.

- Toggle on the snaps you want to include in the multi-snap.
- Toggle off snaps you don't want.
- Close the **Multi-snaps** box.

Appendix B

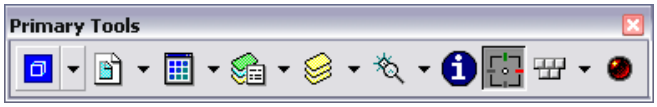
AccuDraw

AccuDraw is a precision drawing tool that streamlines the placement of data points. It basically combines the techniques of precision key-ins with axis lock-type features into one command to help you place, modify or manipulate elements.

AccuDraw is context sensitive. Its behavior changes depending on which drawing tool you've selected. **AccuDraw** will evaluate your current position, the previous data point, and the drawing tool's needs to help you place your next data point.

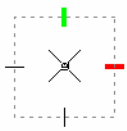
Starting AccuDraw

In the CDOT workspace, **AccuDraw** automatically loads when you open a design file. If you don't want to use **AccuDraw**, you can toggle it off by selecting the **Toggle AccuDraw** button from the **Primary Tools** toolbar.

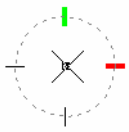


The AccuDraw Compass

When you start **AccuDraw**, one of the first things you notice is the **AccuDraw** compass. The compass shows your origin location (current drawing location) and defines your drawing plane. There are two different drawing plane modes and, therefore, two different compasses: rectangular and polar.



Rectangular mode

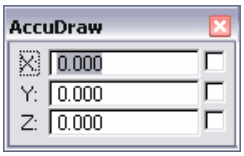


Polar mode

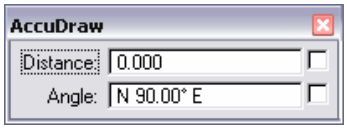
The rectangular mode allows you to enter coordinates or delta distances, relative to the origin point, in an X,Y, Z coordinate system (like an ***XY=***, ***DX=*** or ***DL=*** key-in). The polar mode allows you to enter distances and angles relative to an origin point (like a ***DI=*** key-in).

The AccuDraw Window

The **AccuDraw** window is where you enter your **X**,**Y**,**Z** or **Distance** and **Angle** values. You can also lock the drawing axes. The window changes according to your compass mode.



Rectangular mode



Polar mode

Note: To toggle the compass (rectangular and polar mode), set the focus into the **AccuDraw** window and press **<Spacebar>**.

You can dock the **AccuDraw** window at the top or bottom of the Redline window or you can float the window into the view.

Using AccuDraw – Place SmartLine Example

AccuDraw behaves differently with different tools, so it takes practice to understand all of its capabilities and nuances. It is very intuitive, however, so with a little practice, it should become very user-friendly.

Below is an example of using **AccuDraw** with the **SmartLine** command:

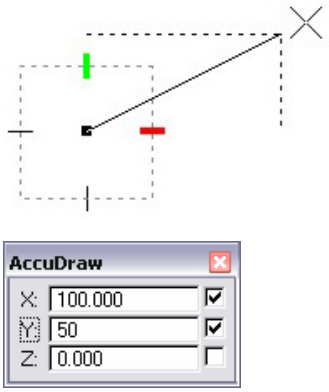
- Select **Place SmartLine**.
- Enter a data point to set the origin point.

  Notes: You can either just data point in the design file, use an ***XY=*** key-in, or enter and lock the X, Y and Z coordinates for the first point in the **AccuDraw** window.

  The **AccuDraw** compass appears at the origin point. If you need to changes modes, press **<Spacebar>**.

For Rectangular Mode:

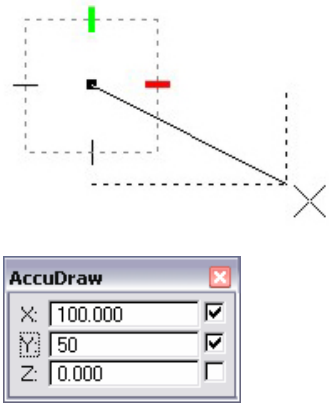
- In the **AccuDraw** window enter the **X**, **Y** and **Z** coordinates for the delta distance to move from your current location. If you don't specify a **Z** value, the data point is entered at the active depth.



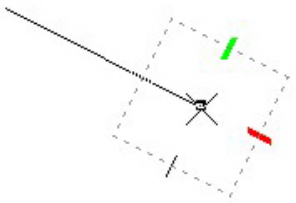
A delta distance of 100 in the X direction and 50 in the Y direction entered using AccuDraw's rectangular compass.

Note: When you key a value in the AccuDraw window and press **<Enter>**, it automatically locks the axis and maneuvers to the next field (you can also use the **Tab** or **Arrow** keys).

- **AccuDraw** shows you a preview of the entry and constrains your data point. Move your pointer if you want to place the data point in the negative X or Y direction. Then, **<D>** to accept or **<R>** to start over.

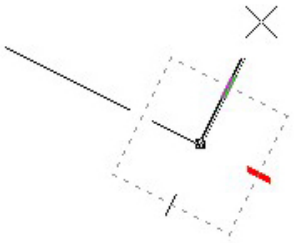


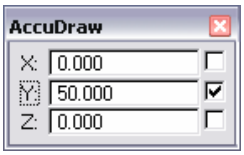
The **AccuDraw** compass rotates so that your drawing plane is "in line" with the element you've drawn. (The red X-axis rotates in line with the element.) This makes it easy to place the next point relative to the element (either orthogonal or in line with the element).



- Swing your pointer to lock on to an axis and then enter your next X,Y value in the **AccuDraw** window.

  Note: As you move your pointer, the focus (cursor location) is set to the appropriate location in the **AccuDraw** window (**X** or **Y** axis).



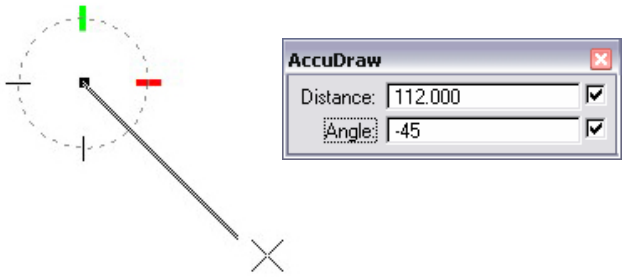


- Alternatively, you can enter another **X**,**Y** delta distance from the rotated axis.
- Continue entering data points until your **SmartLine** is complete.

For Polar Mode:

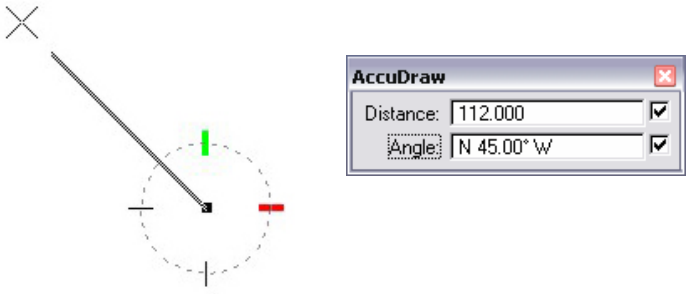
- In the **AccuDraw** window enter the **Distance** and **Angle** values to move from your current location.

  Note: When you key a **Distance** value in the **AccuDraw** window, it automatically locks the axis. Use the **Tab** or **Arrow** keys to maneuver to the **Angle** field. If you enter an angle value, it's automatically locked. Or, you can lock on to the 0°, 90°, -90°, or 180° axes by pressing **<Enter>**.

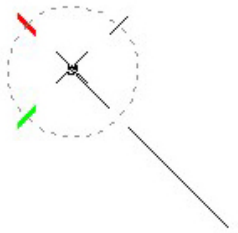


  Note: If your **Coordinate Readout** is set to **Bearing** mode and you enter the angle value in **Conventional** mode (or vice-versa), the angle is converted automatically.

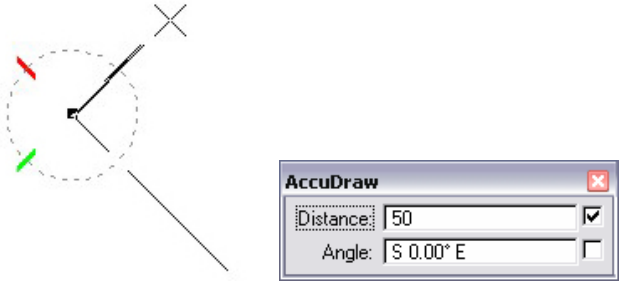
- **AccuDraw** shows you a preview of the entry and constrains your data point. Move your pointer if you want to place the line in the opposite direction. Then, **<D>** to accept or **<R>** to start over.



- The **AccuDraw** compass rotates so that your drawing plane is "in line" with the element you've drawn. (The red X-axis rotates in line with the element). This makes it easy to place the next point relative to the element (*e.g.* orthogonal to the element, in line with the element or at a specified angle off of the element just placed).



- Swing your pointer to lock on to an orthogonal axis and then enter your next **Distance** value in the **AccuDraw** window.



- Alternatively, you can enter another **Distance** and **Angle** from the rotated axis.
- Continue entering data points until your SmartLine is complete.

AccuDraw Locks

You can lock your X, Y or Distance, Angle entries by pressing the **<Enter>** key as described earlier. Locking can also be accomplished by "dynamically" locking a specific field in the **AccuDraw** window. Use the following keyboard shortcuts to lock dynamic entries:

- **<X>** – to lock x-axis entries in rectangular mode.
- **<Y>** – to lock y-axis entries in rectangular mode.
- **<D>** – to lock distance entries in polar mode.
- **<A>** – to lock angle entries in polar mode.

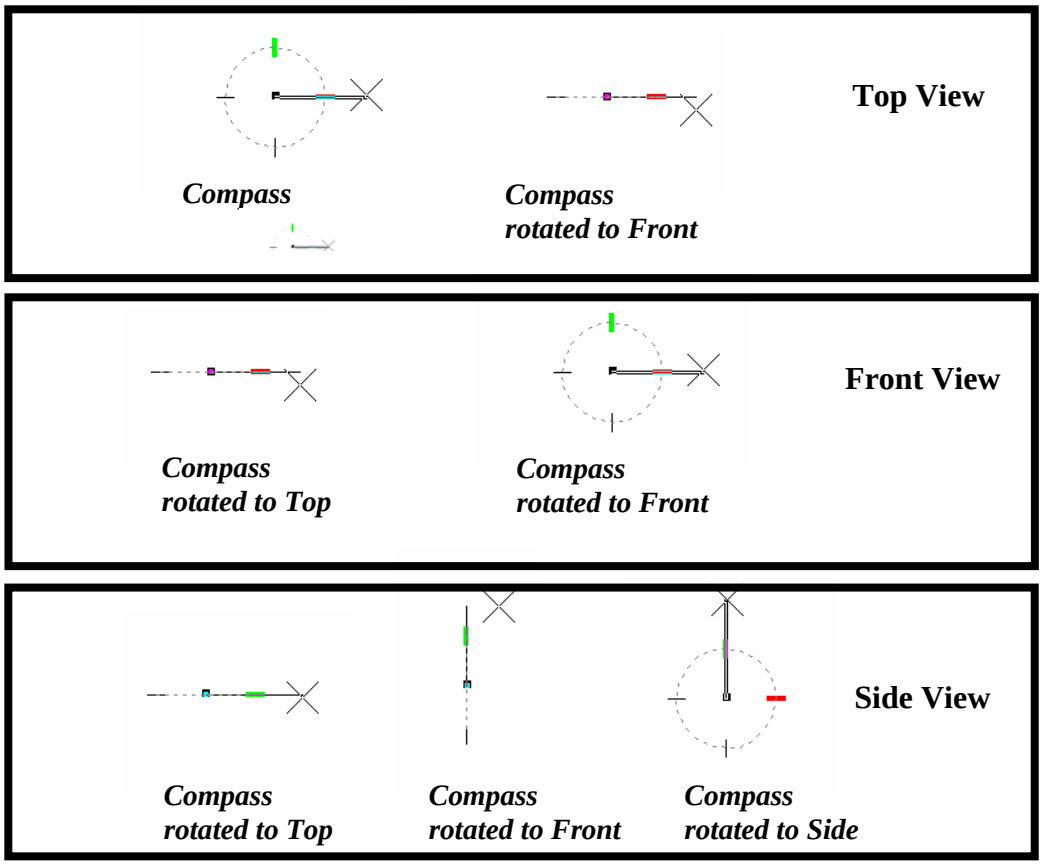
Rotating the AccuDraw Compass

There may be times when you do not want the AccuDraw compass to rotate with the element being placed. Instead, you want the compass to maintain its conventional drawing plan mode of X-axis horizontal and Y-axis vertical. In this case, press **V** on the keyboard to rotate the compass back to the "view" plane.

> **Note:** When using AccuDraw with the **SmartLine** command, there is a **SmartLine Placement Settings** (select the arrow) called **Rotate AccuDraw to Segments**. Toggle this option ***off*** if you always want the AccuDraw compass to maintain its conventional drawing plane mode of X-axis horizontal and Y-axis vertical.

The AccuDraw keyboard shortcut **V** will always rotate the compass to the view in which you're placing elements. Therefore, in a 3D file, pressing **V** in a front view, rotates the AccuDraw compass so that the X-axis is horizontal in the front view; whereas pressing **V** in a top view rotates the compass so that the X-axis is horizontal in the top view. Or, you can quickly rotate the compass to a particular view by pressing the appropriate keyboard shortcut below:

- **T** – top view
- **F** – front view
- **S** – side view



Using these keyboard shortcuts simplifies drawing in 3D. For civil design applications, however, most of the time you will be drawing in a top (plan) view.

Another handy rotation option is **Rotate Quick** (keyboard shortcut **<R> <Q>**). This temporarily rotates the compass dynamically as you move your pointer. This is handy to rotate the AccuDraw compass to match the angle of an existing element to place off of that element or when placing cells or text.

AccuDraw, Tentative Points and the AccuDraw Origin

When you tentative snap to an existing element, press **O** on the keyboard to move the AccuDraw origin temporarily to the tentative location. You can then locate the AccuDraw compass off of this tentative point by entering values in the AccuDraw window. If you accept the tentative with a data point, you compass "sticks" in this location.

AccuDraw Keyboard Shortcuts

Key	Effect
<Enter>	Smart Lock • In Rectangular coordinates, locks X to 0 if the pointer is on the drawing plane y-axis or Y to 0 if the pointer is on the x-axis. • In Polar coordinates, locks Angle to 0°, 90°, -90°, or 180° if the pointer is on a drawing plane axis or otherwise locks Distance to its last entered value.
<Space bar>	Switches between Rectangular and Polar coordinates.
<O>	Moves the drawing plane origin to the current pointer position.
<V>	Rotates the drawing plane to align with the view.
<T>	Rotates the drawing plane to align with the axes in a standard.
<F>	Rotates the drawing plane to align with the axes in a standard Front view.
<S>	Rotates the drawing plane to align with the axes in a standard Side view.
<B>	Rotates the drawing plane to align with the active ACS, or if you set up a rotation in the dialog, it will return you to that rotation. In a new file (where you haven't used an ACS yet) it will be the rotation of the view.
<E>	Rotates between three main planes: top, front, and side (3D only). This also works when your original plane is an ACS or context rotation, so you do not have to use RX, RY to rotate to a 90° plane.
<X>	Toggles the lock status for the X value.
<Y>	Toggles the lock status for the Y value.
<Z>	Toggles the lock status for the Z value.
<D>	Toggles the lock status for the Distance value.
<A>	Toggles the lock status for the Angle value.
<L>	Locks the current index state. If an axis or distance is not indexed, indexing is disabled. On the other hand, if an axis or distance is indexed, it is locked. The effect is temporary, lasting until a data point is entered or the shortcut is run again. This is useful if you need to index to one axis but not the other, or to enter a data point very close to an axis but not on the axis.
<R>,<Q>	Used to quickly and temporarily rotate the drawing plane.
<R>,<A>	Used to permanently rotate the drawing plane. Because it rotates the current ACS, this rotation will still be active after the tool in use is exited. If on, the tool setting Use Current Origin causes the drawing plane origin to be used as the x-axis origin, thereby eliminating the need to enter an extra data point. Of course, in many cases it is desirable to be able to define the x-axis origin at a different location than the drawing plane origin.
<R>,<X>	Rotates the drawing plane 90° about its x-axis.
<R>,<Y>	Rotates the drawing plane 90° about its y-axis.
<R>,<Z>	Rotates the drawing plane 90° about its z-axis.

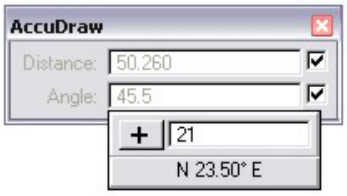
AccuDraw Keyboard Shortcuts (cont'd)

Key	Effect
<?>	Opens the AccuDraw Shortcuts window.
<~>	Bumps an item in the tool settings dialog box (shortcut is ~, usually right under the <Esc> key — there is no need to press the <Shift> key). It finds the first enabled item in the tool settings dialog box that is a toggle button or an option button, and either toggles it or bumps it to the next valid value. For instance, if you are drawing a SmartLine and the focus is in the AccuDraw window, you can just press the <~> key and it switches to arcs without moving the focus from the AccuDraw window. Key-in: ACCUDRAW BUMP TOOLSETTING.
<G>,<T>	Moves focus to the Tool Settings window.
<G>,<K>	Opens (or moves focus to) the Key-in window.
<G>,<S>	Opens (or moves focus to) the AccuDraw Settings dialog box (same as choosing AccuDraw from the Settings menu).
<G>,<A>	Opens the Get ACS dialog box, which lets you select a saved Auxiliary Coordinate System.
<W>,<A>	Opens the Write to ACS dialog box, which lets you save the drawing plane alignment as an ACS.
<P>	Opens the Data Point Key-in dialog box for entering a single data point.
<M>	Opens the Data Point Key-in dialog box for entering multiple data points.
<I>	Activates Intersect snap mode.
<N>	Activates Nearest snap mode.
<C>	Activates Center snap mode.
<K>	Opens the Keypoint Snap Divisor dialog box, which is used to set the Snap Divisor for keypoint snapping.
<U>	Suspends AccuSnap for the current tool operation. Selecting a new tool, or entering a Reset re-enables AccuSnap.
<J>	Toggles AccuSnap.
<Q>	Deactivates AccuDraw.

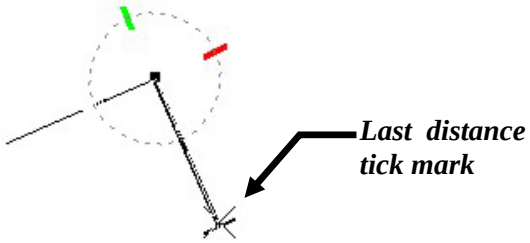
1. Source: Bentley Systems on-line Users Guide, ***Working with AccuDraw***.

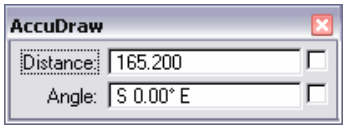
Tips

- Use **<Page Up>** and **<Page Down>** to recall AccuDraw entries.
- AccuDraw has a built-in pop-up calculator in all of the AccuDraw window fields. Entering an arithmetic (**+**, **-**, *****, **/** or **=**) key automatically activates the calculator. Use the **=** key to replace the current value and enter new values into the pop-up calculator.



- AccuDraw "remembers" your last X,Y or Distance value. To place the next data point using the same value, simply drag your pointer until you see the "tick" mark that indicates the last entry value. This saves you from repeatedly keying in the same value.





Exercise 1 – Precision Placement with AccuDraw

Objectives

After completing this exercise you will know how to:

- Locate a delta distance from a tentative point using AccuDraw.
- Place lines, arcs and blocks using AccuDraw's rectangular compass.
- Place lines, arcs and blocks using AccuDraw's polar compass.
- Use SmartLine to create a complex shape and a complex chain of lines and arcs.

Utilizing AccuDraw

Open the Design File

1. Start Redline and open **12345DES_PnP02.dgn** from the **C:\Projects\12345\Design\Drawings** folder.

As-Built the Median Island Nose Change using AccuDraw

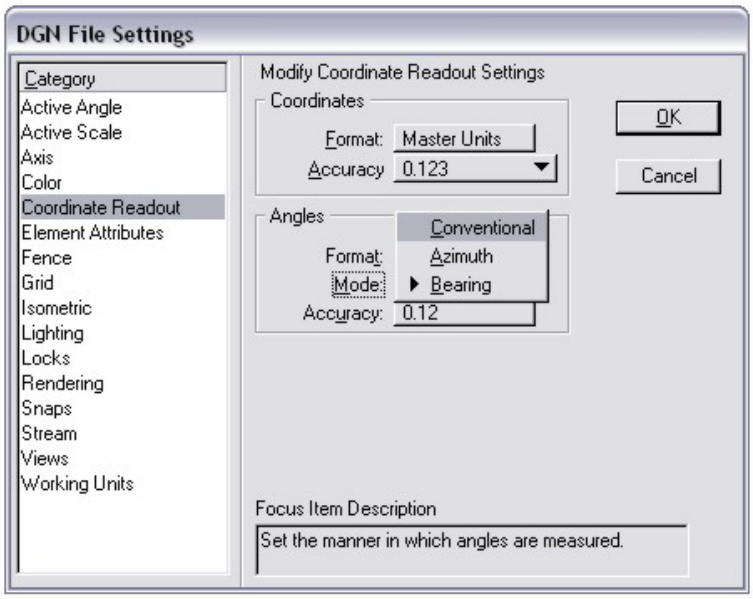
In the next series of steps, you'll draw the Median Island.

Check Design File Settings

Set Coordinate Readout Values

2. Open the **DGN File Settings** box from **Settings > Design File**.

3. Select the **Coordinate Readout** category and change the angle mode to **Conventional** as shown.



When drawing details later in this lab, you'll enter your angles in conventional mode instead of Bearing.

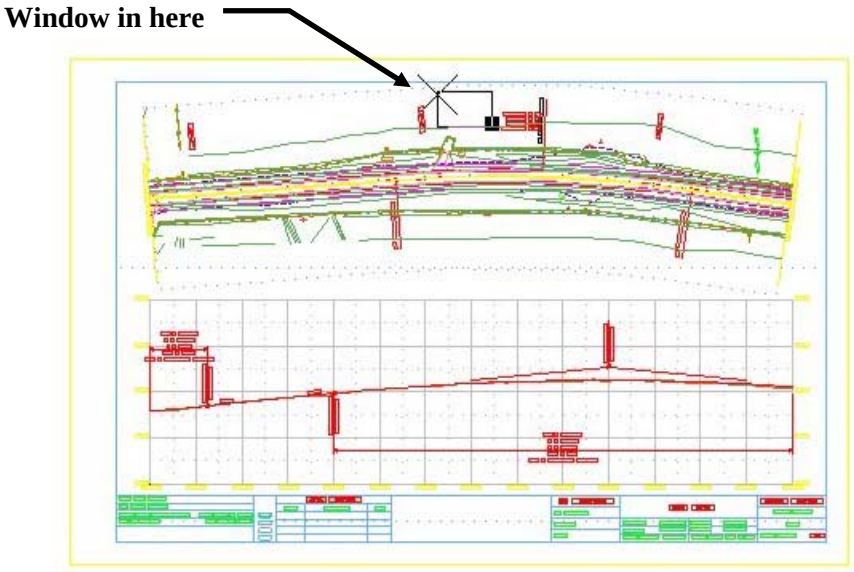
4. Select **OK** to apply the new parameters.

5. Save your design file settings by choosing **File > Save Settings**.

Note: You can also key in **File** to save settings.

When you next enter this design file, your settings (working units, coordinate readout, etc.) will be just as you have now saved them.

6. **Window** into the area approximately as shown.

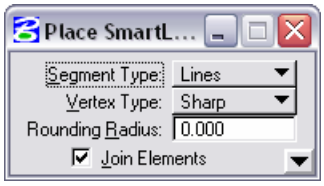


Draw Median Using AccuDraw

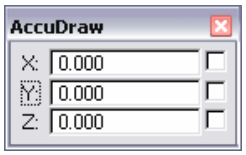
7. Activate the **CDOT Menu** from the Main Tool frame if it isn't already activated.
8. From the CDOT Menu, select the **Show Lines** filter.
9. Then select the **Linework** item.

The **Place SmartLine** command is selected.

10. Set the **Settings** options as shown.



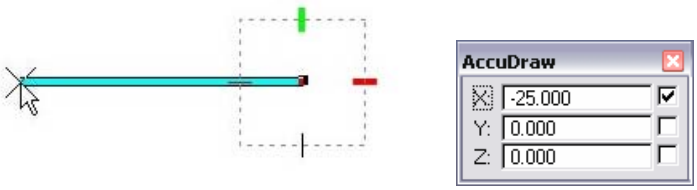
11. Verify that AccuDraw is toggled on and is in Rectangular mode.



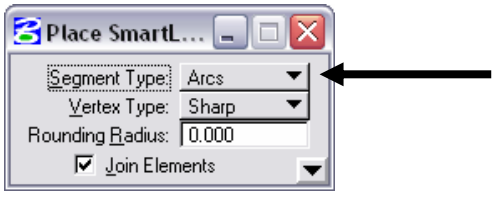
12. **<D>** at an empty area in the view window to start the line.
13. ***Nudge*** your pointer to the left using the *on-the-fly* horizontal axis, and then type ***25***.

This automatically locks the X value in the AccuDraw window.

14. The Y value in the AccuDraw window should read out 0.000.



15. **<D>** to place the point. ***DO NOT*** reset the command.
16. In **SmartLine's Tool Settings** set **Segment Type** to **Arcs**

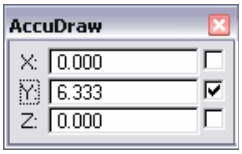


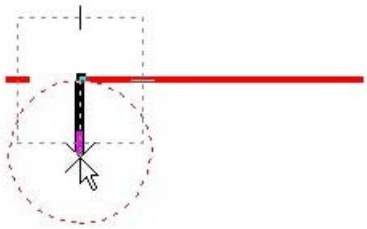
Redline now prompts you to enter the center of the arc.

17. ***Nudge*** your pointer down using the *on-the-fly* vertical axis.

Note: This sets the focus (the blinking cursor) in the AccuDraw window to the Y axis field.

18. In AccuDraw's window, key in a Y value of ***6.333***.

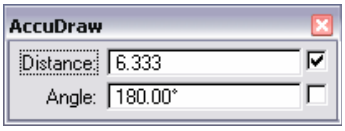


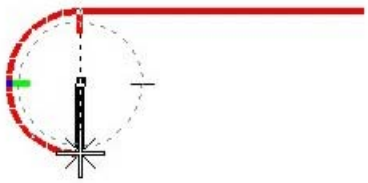


19. With your pointer locked in on the Y axis, **<D>** to define the arc's center point.

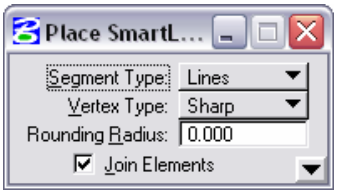
Redline now prompts you to enter the sweep angle. The AccuDraw compass automatically changes to polar mode.

20. Swing your pointer to the left **180** degrees and lock in on the Y axis again and **<D>** to define the sweep angle.

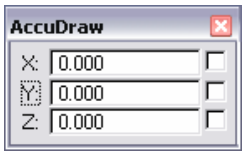




21. In **Tool Settings**, set **Segment Type** back to **Lines**.

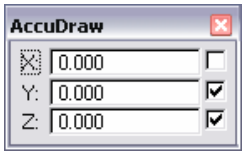


22. Press **<spacebar>** to switch the AccuDraw window and compass back to rectangular mode.

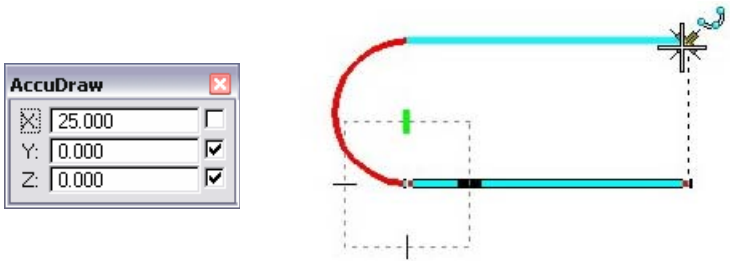


23. ***Nudge*** your pointer to the right using the *on-the-fly* horizontal axis.

24. Press **<Enter>** to ***Smart Lock*** AccuDraw. The Y and Z fields will be locked.

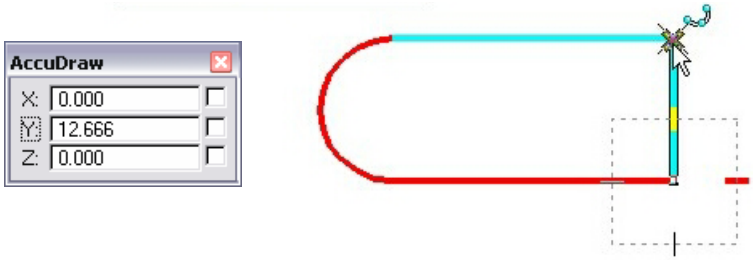


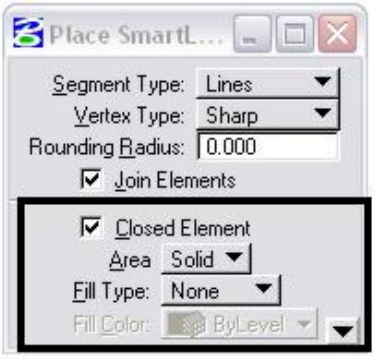
25. Hover the pointer over the original starting point to allow **AccuSnap** to identify the location. The X field in the AccuDraw window will populate with the parallel distance.



26. **<D>** to accept the length.

27. **AccuSnap** again to the first point to complete the shape.

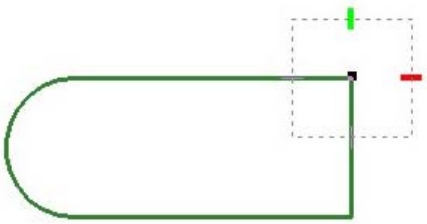




Note: Notice the change in the Tool Settings dialog; these are additional settings for closed elements that the **SmartLine** command is capable of creating. Instead of creating the individual lines and arc, **SmartLine** allows you to create these elements all in one step. Also, by AccuSnapping to the first point, the **SmartLine** command automatically converts the elements to a complex shape.

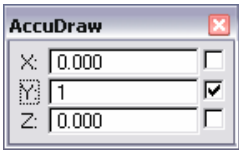
28. While still in the **Place SmartLine** command, **<T>** (tentative snap) to the upper right corner of the outside edge. A large cross hair symbol will appear at the identified location.

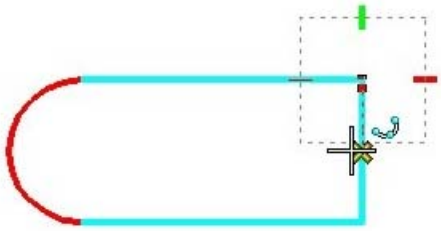
29. With focus in the AccuDraw dialog use the origin key-in **O**. This will place the origin of AccuDraw compass at the upper right corner of the detail.



30. Nudge your pointer down using the *on-the-fly* vertical axis then press the **<Enter>** key to activate ***Smart Lock***.

31. With the vertical axis locked enter a value of ***1***.



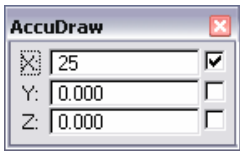


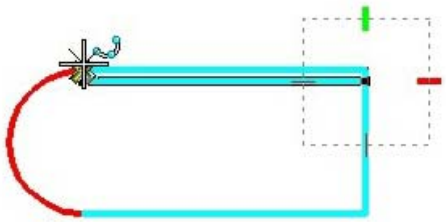
32. **<D>** to accept the new origin point. The AccuDraw compass will have moved 1 foot in the Y direction.

What we have done is defined the starting location of the new linestring with out the use of any construction elements.

33. ***Nudge*** your pointer to the left using the *on-the-fly* horizontal axis, activate ***Smart Lock***, and then type ***25***.

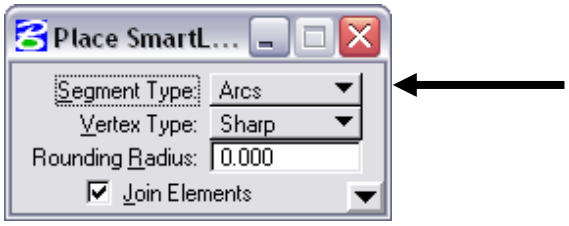
This automatically locks the X value in the AccuDraw window. The Y value in the AccuDraw window should be reading 0.000.





34. **<D>** to place the point.

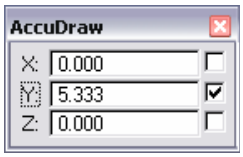
35. In **SmartLine's Tool Settings** and set **Segment Type** to **Arcs**.

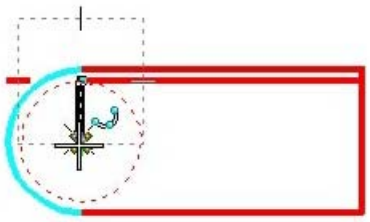


Redline now prompts you to enter the center of the arc.

36. ***Nudge*** your pointer down using the *on-the-fly* vertical axis.

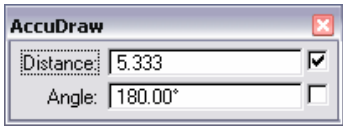
37. In AccuDraw's window, key in a Y value of ***5.333*** (the arc's radius).

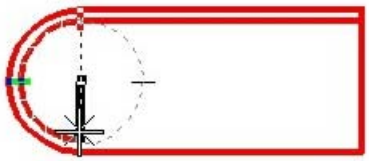




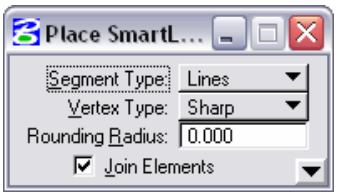
38. With your pointer locked in on the Y axis, **<D>** to define the arc's center point.

39. Swing your pointer to the left **180** degrees to lock in on the Y axis and **<D>** to define the sweep angle.

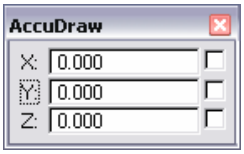




40. In **Tool Settings**, set **Segment Type** back to **Lines**.



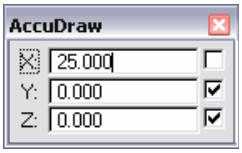
41. Press **<spacebar>** to switch the AccuDraw window and compass back to rectangular mode.

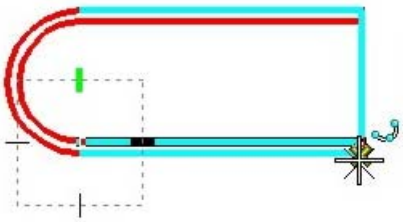


42. ***Nudge*** your pointer to the right using the *on-the-fly* horizontal axis.

43. Press **<Enter>** to ***Smart Lock*** AccuDraw. The Y and Z fields will be locked.

44. **AccuSnap** to the bottom right corner of the detail, the X field will populate with the parallel distance.

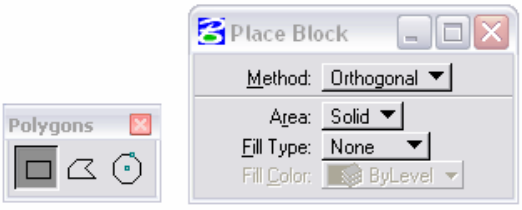




45. **<D>** to place the point.

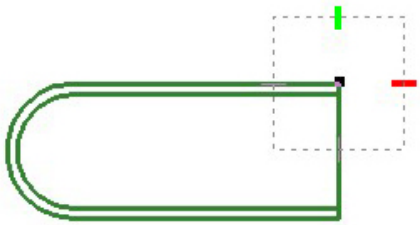
Draw the median cover

46. Select the **Place Block** command and set the options as shown.



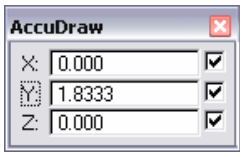
47. **<T>** to the upper right corner of the outside edge. A large cross hair symbol will appear at the identified location.

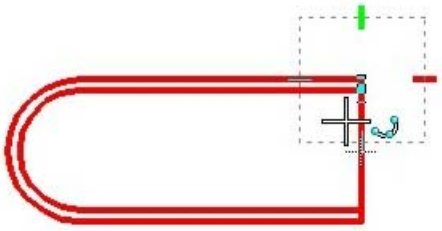
48. With focus in the AccuDraw dialog use the origin key-in **O**. This will place the origin of AccuDraw compass at the upper right corner of the detail.



49. ***Nudge*** your pointer down using the *on-the-fly* vertical axis then press the **<Enter>** key to activate ***Smart Lock***.

50. With the vertical axis locked key-in a value of ***1.8333***.





51. **<D>** to accept the new origin point. The AccuDraw compass will have moved 1.8333 feet in the Y direction.

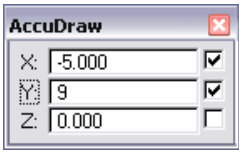
What we have done is defined the starting location of the new block with out the use of any construction elements.

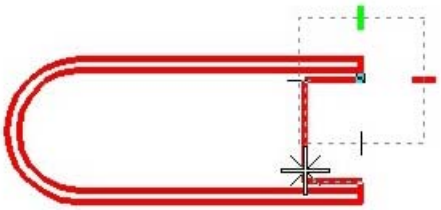
52. ***Nudge*** your pointer to the left using the *on-the-fly* horizontal axis, and then type ***5***. ***DO NOT*** accept the command.

This automatically locks the X value in the AccuDraw window.

53. ***Nudge*** your pointer down using the *on-the-fly* vertical axis, and then type ***9***.

This automatically locks the Y value in the AccuDraw window.





54. **<D>** to accept the placement of the block.

55. **Fit** View 1.

56. **File > Save Settings.**

57. Choose **File > Exit** to exit Redline and your design file.

Appendix C

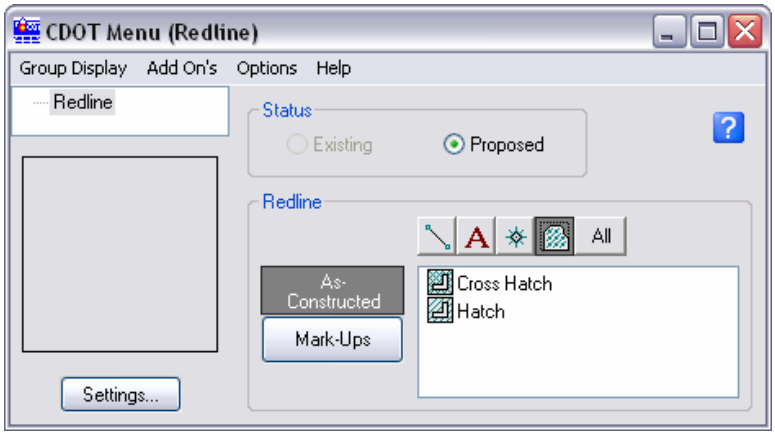
Patterning & Hatching

You may have a need to pattern areas on your plan sheet with a hatch or crosshatch.

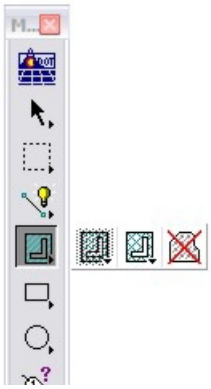
CDOT Menu Pattern

Two pattern types are available in Redline, they are Hatch and Cross Hatch. A hatch pattern is one line placed by an offset spacing and angle. A cross hatch pattern is two lines placed by an offset spacing and angle.

By selecting the Show Pattern icon in the CDOT Menu the two hatches will appear. Tool settings and methods for the two hatches are defined next.



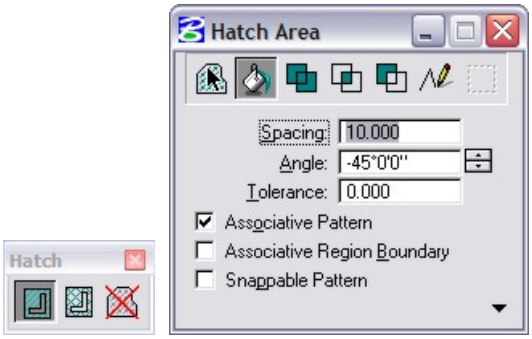
Hatch Toolbar



The **Hatch** toolbar contains tools for hatching and cross-hatching shapes or areas. You can also pattern any line, shape or area with a cell. The **Hatch** tools include:

Hatch and Crosshatch Area

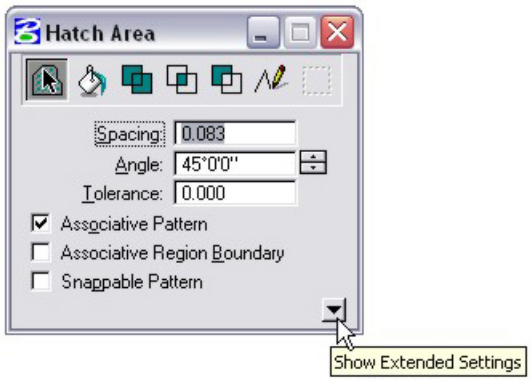
Hatches are closed shapes or an area in the active model or a reference. Set the **Spacing** (in master units) and **Angle** of the hatch line and turn on **Snappable Pattern** if you later want to snap to the pattern graphics (the hatch lines in this case). If you're patterning curved element, key in a **Tolerance** or minimum distance for chording off the pattern around the curve.



Toggle on **Associative Patterning** if you want the pattern to update if the element is modified. In addition, broken patterns can be re-associated by re-connecting the pattern shapes.

Toggle on **Associative Region Boundary** to place the pattern on a different level from the patterned element.

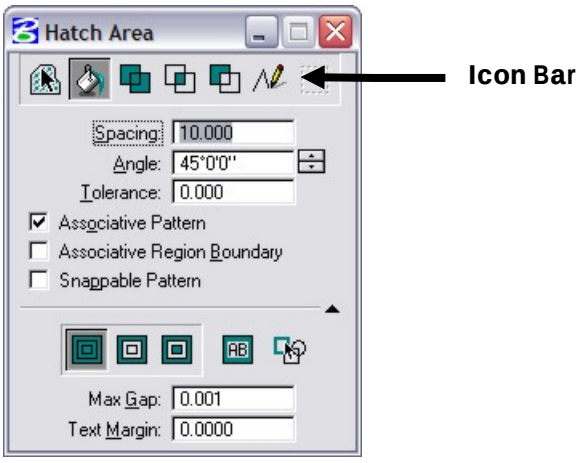
Choose the **Show Extended Settings** arrow to select the **Use Element Symbology** option, which allows you to place elements with the same symbology as the element being patterned.



The icon bar at the top of the dialog box allows you to select the pattern method (how the area will be patterned), which includes:

- ***Element*** —a closed shape.
- ***Flood*** — the area enclosed by a set of elements.
- ***Union*** — area defined by the union of two or more closed shapes.
- ***Intersection*** — area defined by the intersection between two or more closed shapes.
- ***Difference*** — area defined by the difference between two or more closed shapes.
- ***Points*** — an area defined by a series of data points where you dynamically define an area.
- ***Fence*** — the area inside the fence.

With the **Flood** method, select the **Show Extended Information** arrow for more icon bar options including:



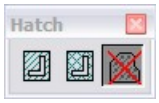
- ***Ignore Interior Shapes*** – patterns through any shapes located inside the pattern area.
- ***Locate Interior Shapes*** — excludes patterning of shapes located inside the pattern area.
- ***Identify Alternating Interior Shapes*** – alternating areas are patterned where shapes are nested inside one another.
- ***Locate Text*** — patterns around any text inside or overlapping the pattern area.
- ***Dynamic Area*** — provides a preview of what area will be hatched or patterned before actually patterning.
- ***Max gap*** – enter the maximum distance, in working units, between endpoints that make up the flooded region. If the distance is greater than that specified, the element will not be included in the flooded region.
- ***Text margin*** – when locating text, specify the "clear area" margin, in working units around the text. This area will not be patterned.

  If **Associative Pattern** is turned on, patterns will dynamically update when associated elements (text, interior shapes) are moved or modified. Be sure to turn on **Associative Region Boundary** and the **Association** lock for this to work.

  With the **Flood**, **Union**, **Difference** and **Intersection** methods, the **Associative Region Boundary** option creates a complex shape that is associated to the pattern graphics. This shape can also be moved or modified to update the pattern graphics. Also, turn on this option when locating text, to eliminate the text boundary box.

Delete Hatch

Although similar to the delete element icon, this command will only locate and delete hatches and cross hatches.

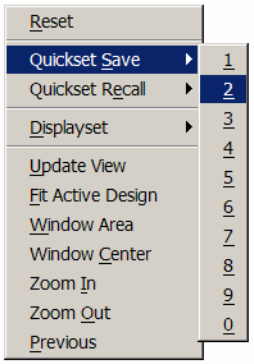


- Select the Delete Hatch icon
- Identify the pattern
- Accept the deletion

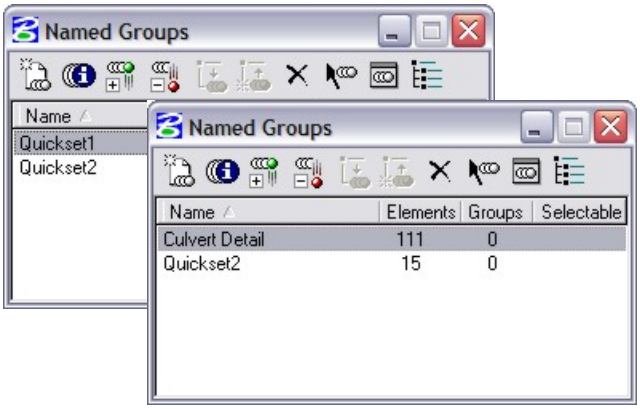
Appendix D

Quicksets

Quicksets let you save selected elements for later recall. You can create and recall up to ten named groups with the **Quickset Save** and **Quickset Recall** menus.



Quicksets are given the names ***Quickset0*** through to ***Quickset9***. If you prefer, you can use the **Named Groups** dialog box to rename them. However, you'll no longer have access to them via the **Quickset Save** and **Quickset Recall** menus.



To create a quickset using the pop-up menu:

- Create a selection set.
- Press **<Shift> + <R>,** to open the view pop-up menu.
- Choose **Quickset > Save** and the quickset number.

To recall a quickset using the pop-up menu:

- Press **<Shift> + <R>**, to open the view pop-up menu.
- Choose **Quickset > Recall** and the quickset number.

The previously saved selection set is re-activated.

To create a quickset using a keyboard shortcut:

- Create a selection set.
- Press **<Ctrl + Shift + n>** where "n" is the number of the quickset.

  Note: "n" must be from 0 to 9 and entered from the alphanumeric part of the keyboard (not the keypad).

To recall a quickset with a keyboard shortcut:

Press **<Ctrl + n>** where "n" is the number of the quickset that you want to recall.

Note: "n" must be from 0 to 9 and entered from the alphanumeric part of the keyboard (not the keypad).

To rename a quickset to a named group

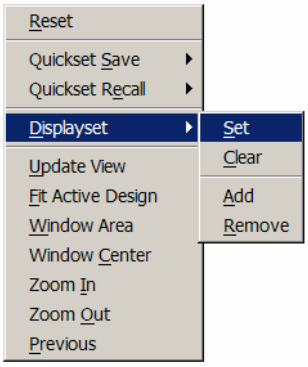
- Select **Add to Graphic Group** from the **Groups** toolbar.
- Select **Open Named Group** Dialog.
- In the **Named Groups** dialog box, select the named group.
- Click into the name field and rename the quickset.

  Note: After renaming, you'll no longer be able to recall the quick set via the pop-up menu.

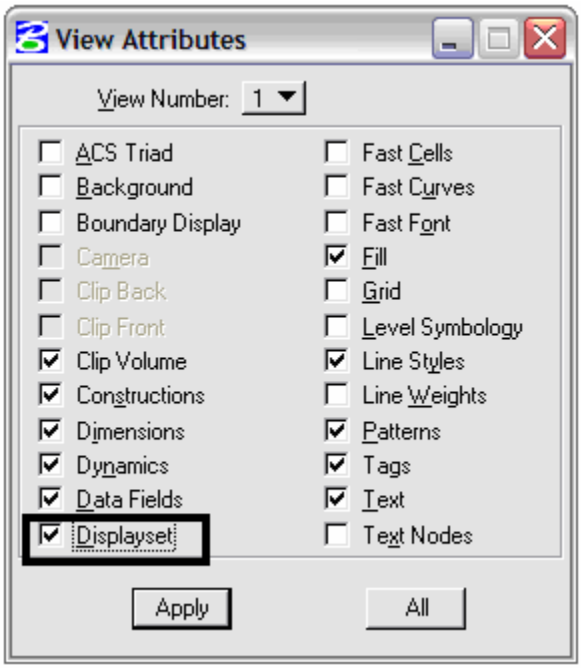
Appendix E

Displaysets

Displaysets let you select a group of elements to display in a selected view while hiding all other elements in a view. You can create Displaysets from selection sets or named groups.



To use Displaysets, you must have **Displayset** toggled on in **View Attributes**.



To create a displayset from selected elements:

- Create a selection set.
- Press **<Shift> + <R>**, to open the view pop-up menu.
- Choose **Displayset>Set**.

Only the Displayset elements are displayed in the view. All other elements are hidden.

To select a named group as the displayset

- Select **Add to Graphic Group** from the **Groups** toolbar.
- Select **Open Named Group** dialog.
- In the Named Groups dialog box, select the named group.
- Select **Put Elements into the Displayset** icon.

  All elements from the named group go into the active displayset and all other elements are hidden.

To clear a displayset:

- Press **<Shift> + <R>**, to open the view pop-up menu.
- Choose **Displayset>Clear**.

  The displayset is cleared and all elements are shown in the view.

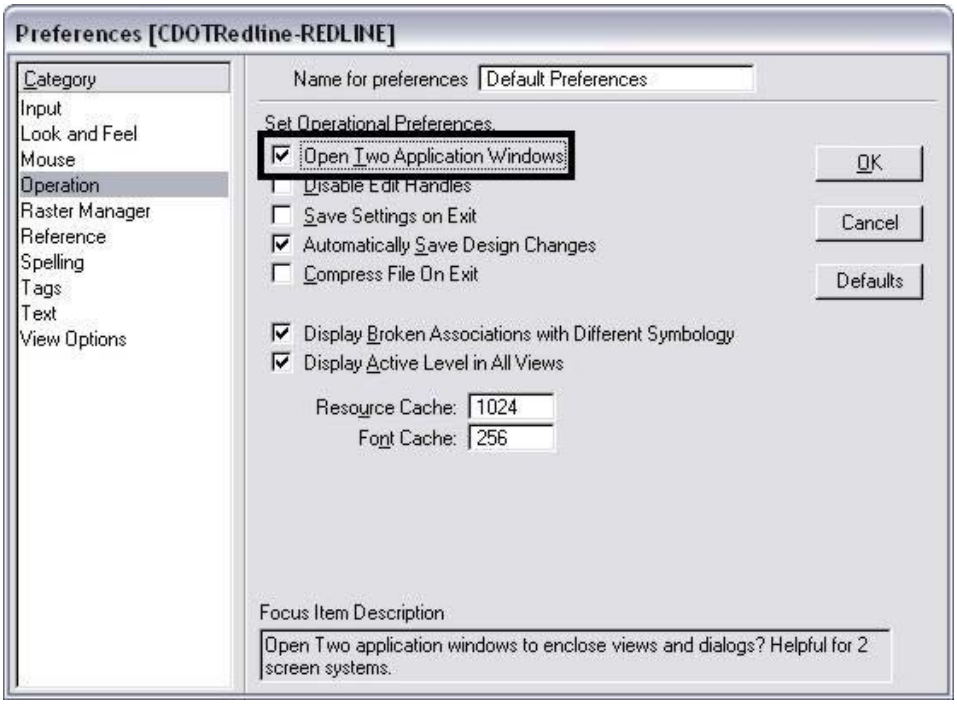
Appendix F

Preferences

Setting Views for Dual Monitors

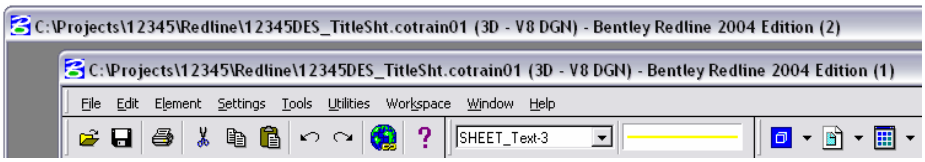
Redline allows the use of dual monitors, but you must follow this procedure to configure them the first time they are used.

- Start Redline.
- Select **Workspace > Preferences > Operation** and toggle on **Open Two Application Windows**.



- Select **File > Save Settings**.
- **Exit**, and then restart Redline.

When Redline starts this time, it will open two different windows.



You can drag one window to the other monitor. (***Click on the title bar and drag the window– don't stretch it***). When you maximize the window, it will fill the screen on the monitor where you placed it rather than span both monitors. In Redline, Views 1-4 open in application window 1, while Views 5-8 open in application window 2.

You can drag most Redline windows from one monitor to the other, but there are some that will not allow dragging. If you run into one, pick the Bentley logo

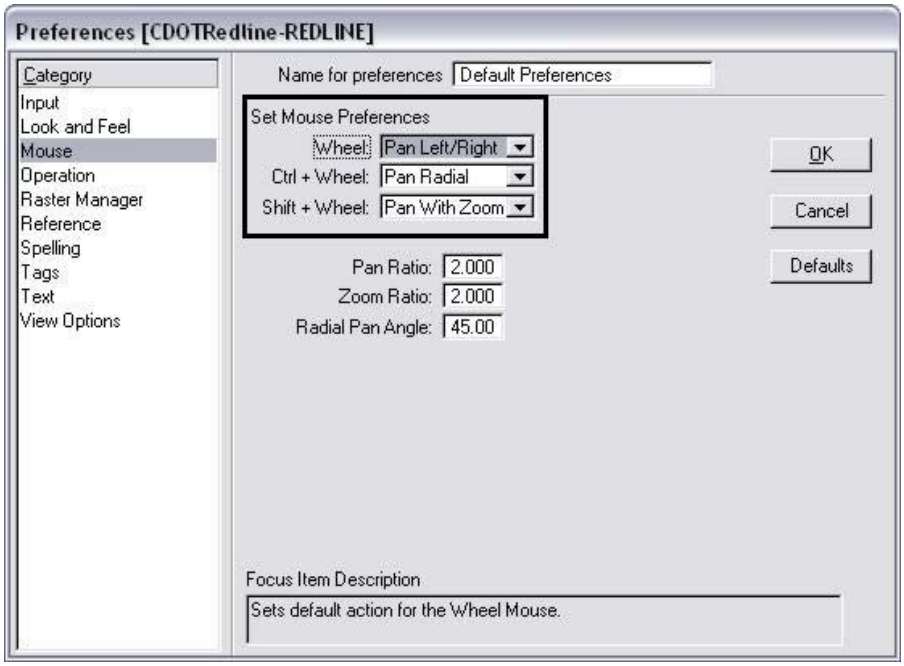
in the upper left corner and choose Change Screen to move the dialog or menu to the other screen.

Wheel Mouse Settings

Redline supports wheel mice. You can set your middle wheel to perform several different view control options including Zoom In/out, pan radial, and pan with zoom. Select **Workspace > Preferences > Mouse** to configure the wheel on your mouse.

Change the wheel settings

1. From the drop-down menu select **Workspace > Preferences**.
2. On the left side of the dialog, select **Mouse** from the Category list.
3. Set the **Wheel** to **Pan Left/Right.**



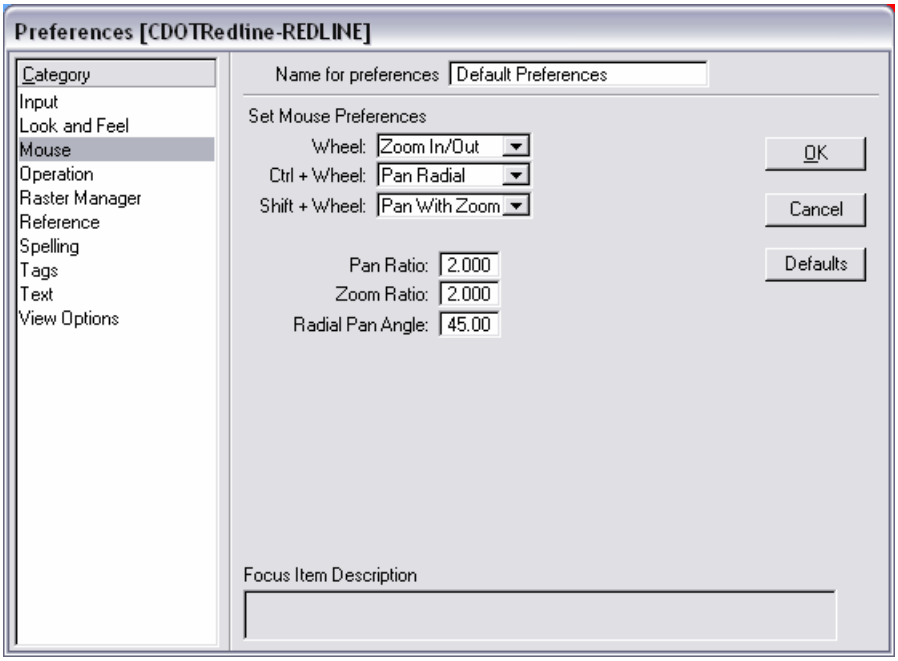
4. Select **OK** to accept the changes and close the dialog box.

5. Move your mouse wheel back and forth to pan in the view.

Note: You can also **Pan** by selecting this command on the **View Control** toolbar. Specify a "from" and "to" point to move in the view.

Tool Settings for **Pan View**

6. Set your wheel for the view control option you prefer (**Workspace > Preferences > Mouse**).



Use the wheel on the mouse to Zoom In/Out

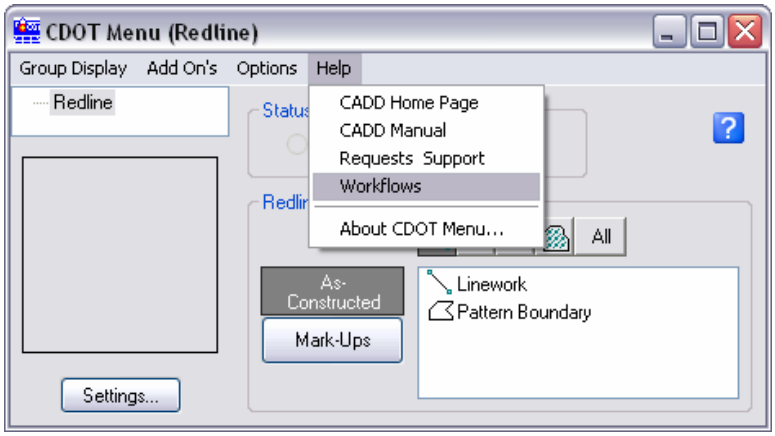
7. Roll the wheel up; ↑ this zooms in on your graphics.
8. Roll the wheel back; ↓ this zooms out.

Note: If you **<T>** on a location before rolling the wheel, that location will center in the view when the wheel is rolled.

Appendix G

Directory Structure

1. From the CDOT Menu, select **Help > Workflows**.

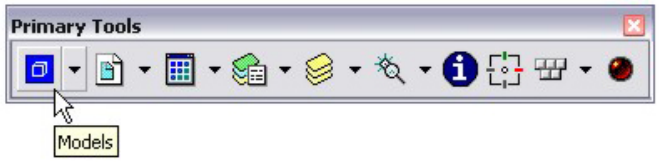


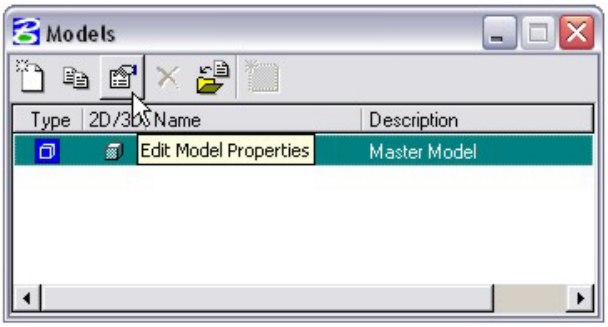
This will launch the CDOT internal site. From there, a workflow on the complete directory structure can be accessed, called *CDOT Directory Structure*. This workflow can also be accessed from the CADD Manual.

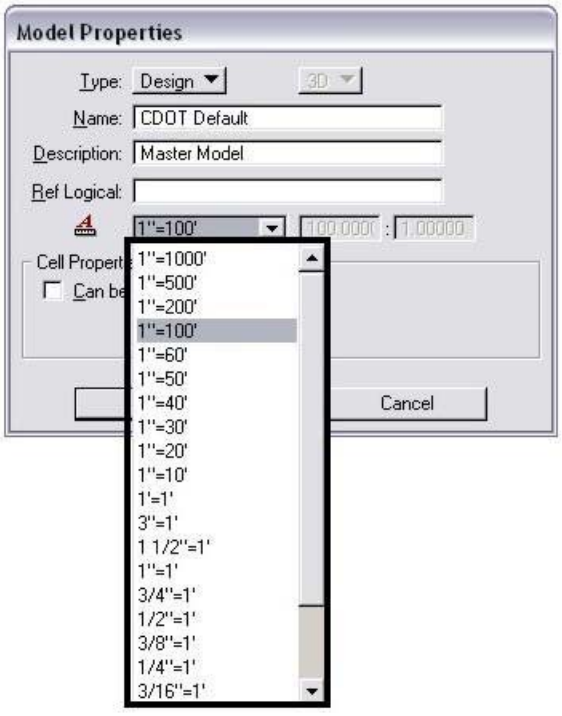
Appendix H

Annotation Scale

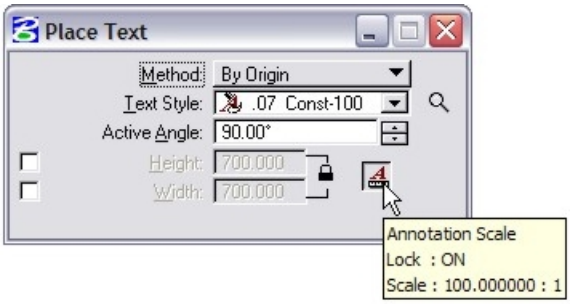
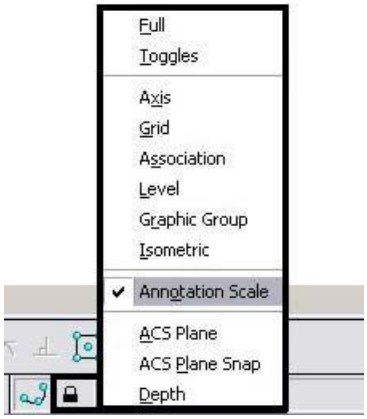
Before placing text, check the **Annotation Scale** for text under **Model Properties**. The **Annotation Scale** is set to ***100***, by default, in the CDOT seed file. This should be the same as your plot scale. If you're plotting at any other scale, change the Annotation Scale here. Any text that you've previously placed will be updated (*e.g.* you don't have to delete and replace the text – it will be re-scaled automatically).







Note: To enable scaling of text, make sure that the **Annotation Scale** lock is turned on for the **Place Text** command before placing your text. By default, the Annotation Scale is on.



Note: The **Annotation Scale** lock can be turned on from the status bar by selecting the Locks option.