WisDOT Civil 3D training

Plan production - beginner

Last updated: 2/15/2018

Methods Development

Support, Develop, Innovate

Civil 3D interface

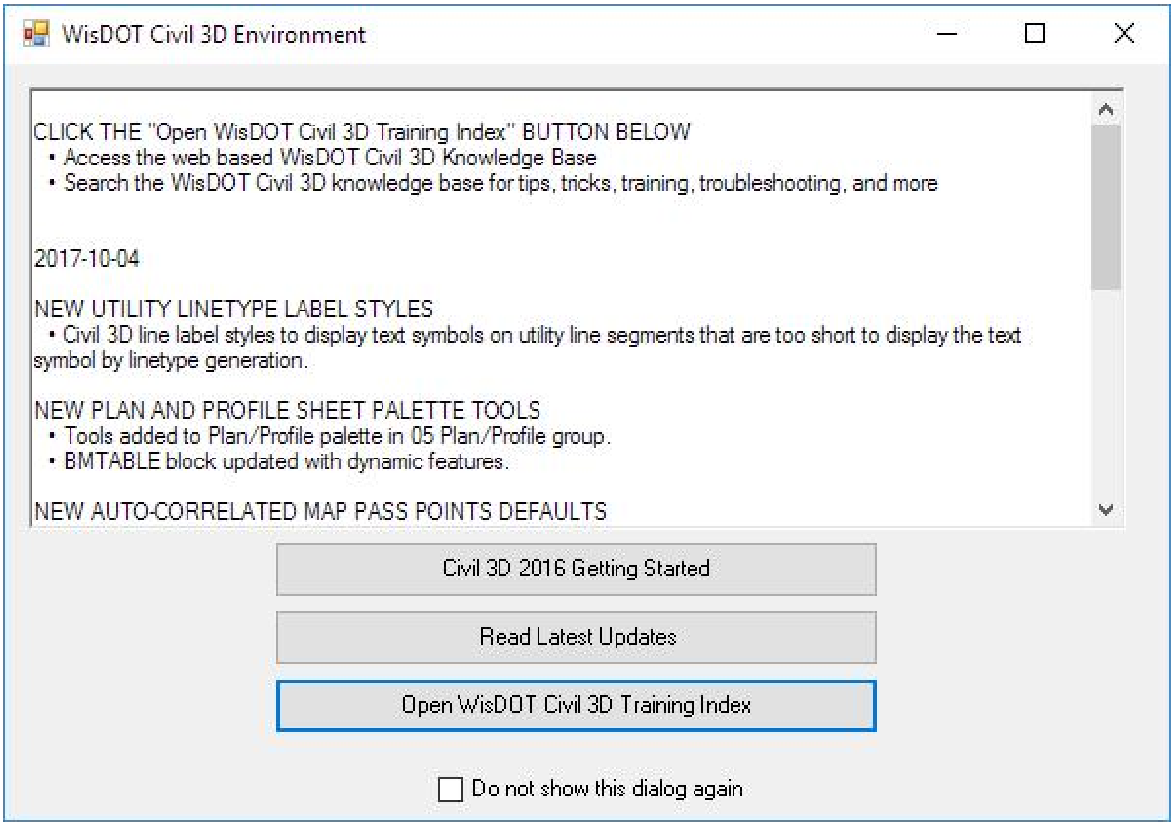
Civil 3D interface introduction

Last updated: 2017-12-01

Total video time: 21:39

Workspace components

c3d-intrfc-intro-01.mp4 5:13

- WisDOT Civil 3D Environment Dialog box
- 

    - Civil 3D 2016 Getting Started
        - Training documentation (PDF format)
    - Read Latest Updates
    - Open WisDOT Civil 3D Training Index
- Application Menu Browser
- Quick Access Toolbar
- Ribbon
    - Tabs and Panels

- Drawing Tabs
- Toolspace
    - Prospector
    - Settings
    - Survey
    - Toolbox
- Status Bar
- Toolbars

Application menu browser

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\SheetsPlan\STH25-XS.dwg

c3d-intrfc-intro-02.mp4 3:52

- General File Functions
- New, Open, Save, Save As, Export, Publish, Print, Drawing Utilities, and Close
- Command Search
- Recently Opened Files or Currently Open Files List

Quick Access toolbar

c3d-intrfc-intro-03.mp4 4:16

- Typical program commands
- New, Open, Save, Plot, Undo/redo
- Workspace and workspace settings
- Can add your own commands.
    - Add More Commands
    - Right-click icon Add to Quick Access Toolbar
- Show Menu Bar
- Show below ribbon

Toolbars

c3d-intrfc-intro-04.mp4 1:05

- Held icons prior to ribbon
- Transparent Commands and filters only ones open by default

Command line

c3d-intrfc-intro-05.mp4 2:54

- For typed versions of commands
- Input settings
- Palette can be docked at the top or the bottom of screen
- Palette can be moved to another screen
- View and cycle through previous commands
- Transparency

Status bar (Icons)

c3d-intrfc-intro-06.mp4 2:43

- Icons…
- Function Key Alternatives
- Customization

Drawing scale

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\BaseData\Mapping\ExistSurface.dwg

c3d-intrfc-intro-07.mp4 1:33

- Always draw at 1” = 1”
- Drawing Scale controls size of text
- And space between section views in array

Ribbons and tabs

Last updated: 2017-12-01

Total video time: 5:56

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\SheetsPlan\STH25-XS.dwg

c3d-intrfc-rbn-01.mp4 5:56

Tabs for grouping of command panels

Home, Insert, Annotate, Modify, Analyze, View, Output, Survey, ...

Minimize Arrow icon

- Minimize to Panel Buttons
- Minimize to Panel Tiles
- Minimize to Tabs
- Show Full Ribbon

Contextual Ribbons

- Specific to selected object
- Launchpad commands for selected object

Panels for grouping of similar command icons Icons for starting commands

Panel Pull-downs for less frequently used commands

Panels can be dragged off ribbons and placed back.

Toolspace

Last updated: 2017-12-01

Total video time: 25:32

Toolspace tabs

c3d-intrfc-tlspc-01.mp4 3:21

- Prospector
- Settings
- Survey
- Toolbox

Preview window

Active Drawing View

Master View

Drawing objects access & data shortcuts

c3d-intrfc-tlspc-02.mp4 5:15

Drawing objects

- Points
- Point Groups
- Point Clouds

- Surfaces
- Alignments (Profiles and Sections)
- Sites (Grading and Parcels)
- Catchments
- Pipe Networks (including Interference objects)
- Pressure Networks
- Corridors
- Assemblies
- Intersections
- Survey
- View Frame Groups

Data Shortcuts

- Surfaces
- Alignments (and Profiles)
- Pipe Networks
- Pressure Networks
- View Frame Groups

Active Drawing View/MasterView

c3d-intrfc-tlspc-03.mp4 3:07

- Master view
- Active Drawing Settings View
- Active Drawing Labels Only View
- Labels Only View

Object Style Defaults

c3d-intrfc-tlspc-04.mp4 2:24

Managing objects

- Right-click on object names for Properties or Edit Current Style

Styles for each object

- Object styles
- Label styles
- Table styles
- Commands
- Other settings - criteria or rules

Setting default styles

- Right-click on object collection name (header)
- Edit Feature Settings
- Drawing Settings and Object Defaults

Command Settings

c3d-intrfc-tlspc-05.mp4 4:35

Commands

- Macros for creation settings
  - Edit Command Settings

Overall drawing settings

- **Right-click on drawing name > Edit drawing settings**
  - Units and Zone (coordinates)
    - WisDOT specific coordinate systems
  - Transformation (coordinates)
  - Object Layer defaults
  - Abbreviations (for labels)
  - Ambient Settings (drawing settings)

Survey database access

Exercise files: c3d-intrfc-data-c3d16.zip ProjectID\SheetsPlan\STH25-XS.dwg c3d-intrfc-tlspc-06.mp4 4:16

- External to any drawing
- Survey Databases (per project)
- Equipment Database
  - Survey equipment data to aid analysis
- Figure Prefix Database
  - Point codes that have linework
  - Manages the linework style, layer
- Linework Code Sets
  - Field codes that start linework

Toolbox

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\Design\Corridors\Corridor-STH25-4thAve.dwg

c3d-intrfc-tlspc-07.mp4 2:31

Toolbox - extra functionality

- Report Manager
- Subscription Extension Manager
- Miscellaneous Utilities
- WisDOT Toolbox
  - WisDOT Macros
  - WisDOT Reports
  - Survey File Conversion
- Productivity Packs
- Autodesk Labs tools (extensions)

To access tools

- Right-click and choose Execute

Command shortcuts and hotkeys

Last updated: 2017-12-01

Total video time: 9:27

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\SheetsPlan\STH25-XS.dwg

c3d-intrfc-cmnd-shrtct-htky-01.mp4 9:27

All commands have a typed alternative

Some typed commands are quicker than switching ribbon tabs

Tip: This is not a comprehensive list – just some helpful ones

Hotkeys

Esc = Exit a command

Spacebar = Enter

F1 = Opens Help to topic you are working with

F2 = Expands command line to a window

F3 = OSNAPS toggle

Shift + Right-Click – Temporary OSNAP Overrides

Shift + Spacebar = selection cycling

Ctrl + Left-click select for some labels

Ctrl + 9 = toggles Command Line palette

Ctrl + 3 = toggles tool palettes

Command line commands

`Z ENTER E ENTER` = Zoom Extent ("Fit View")

`Z ENTER ENTER` = "real-time" zoom

`P ENTER` = Pan

`DELETE` = Erase

`E` = Erase

`PL` for polyline

`PE`for polyline edit

`DI` for Distance command (slightly different than ribbon version)

`FILEDIA`, setting should = 1

`CMDDIA`, setting, should =1

`GEOMARKERVISIBLITY` = 0

`OSNAPZ` = if 1 then snaps to 3D objects (x/y/z), if 0 then snaps to X/Y but ignores elevation z

`OPTIONS` = opens OPTIONS dialog box

`XREF` = opens Xreference manager dialog box

`OOPS` = Brings back last deleted selection

`REA` = Regenerates graphics

Basic mouse operations

Last updated: 2017-12-01

Total video time: 4:56

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\SheetsPlan\STH25-XS.dwg

c3d-intrfc-basc-mous-01.mp4 4:56

Exercise file: STH25-XS.dwg

Three-button wheel mouse

Click = select

Right-click = context menus

Wheel operation

- Roll forward/backward = zoom in/out
- Click wheel = pan
- Double-click wheel = zoom extents

Keyboard & Mouse clicks

Shift + Right-click = Temporary OSNAPS menu

Shift + wheel-button = Orbit

Ctrl + Click for some objects allows individual label editing

Shift + Click = remove from selection set

MBUTTONPAN

- = 1, pan
- = 0, Temporary OSNAP menu

Options > User Preference tab > Right-click Customization button = Right-click customization

Context sensitive

Repeat Last command

Steering wheel control

Last updated: 2017-12-01

Total video time: 3:10

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\SheetsPlan\STH25-XS.dwg

c3d-intrfc-strng-whl-01.mp4 3:10

Navigation controls that follow your cursor

Sections of the wheel do different tasks

- Zoom
- Pan
- Orbit
- Center

Open through the Navigation Bar

Different sized steering wheels depending on your preference

Set pivot point for orbits

Status bar

Last updated: 2017-12-01

Total video time: 8:31

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\SheetsPlan\STH25-XS.dwg

c3d-intrfc-status-bar-01.mp4 8:31

Status bar

- Icons...
- Function Key Alternatives
- Right-Click Settings

Status bar keys

- Constraints Ctrl+Shift+I
- Snap/Grid F9/ F7
- Ortho Snap F8
- Polar Track F10
- OSNAP F3
- 3D OSNAP F4
- Object Snap Tracking F11
- Dynamic UCS F6
- Dynamic Input F12

- Lineweight
- Transparency
- Quick Properties Ctrl+Shift+P
- Selection Cycling Ctrl+W
- Annotation objects

File open/save/new

Last updated: 2017-12-01

Total video time: 5:32

c3d-intrfc-fil-opn-sav-new-01.mp4 5:32

All new files start with a “template” (.DWT) file

DWT brings settings into new drawings

Similar to “seed” files

AutoCAD settings like text styles, linestyles, etc.

Civil 3D specific object and label styles

WisDOT provides four Startup templates for new drawings

- wisdot16.dwt
- wisdot16-county-map-import.dwt
- wisdot16-plat.dwt
- wisdot16-survey.dwt

Use the New command

1. Application Menu Browser
2. Browser starts at DWT location
3. Browse and choose the appropriate template
4. Save the new DWG in location and with name

QNEWcommand

- In Quick Access Toolbar
- Begins file with default template

Default Template is set at **Options > Files > Template Settings > Default Template File Name for QNEW**

WisDOT Sheets ribbon tab

- Startup Templates in tool palette
- Sheet Templates in tool palette

WisDOT Standards ribbon tab

- Startup Templates in tool palette

WisDOT Design ribbon tab

- Startup Templates in tool palette

File/model/layout tabs

Last updated: 2012-09-01

Total video time: 5:32

Exercise files: c3d-intrfc-data-C3D12.zip

File, model & layout tabs

c3d-intrfc-fil-mdl-lyout-01.mp4 5:32

Exercise file: 123456789_2.dwg

File tabs

Display current files open

Turning on/off file tabs

- Right click in modelspace **Options > Display tab**

- check or uncheck Display File Tabs

Right click on file tab to:

- New... Open... Save Save as... Save All
- Close Close All Close All other drawings
- Copy full file path
- Open File Location

Layout tabs include:

For plotting to scale

- The printable area of the paper
- Titleblock information

- Viewport(s) to display portions of modelspace

Turning on layout tabs

- Right click in modelspace **Options > Display tab>**
- Check or uncheck Display Layout Tabs
- Right-click on model button
- Choose Display…

Paperspace

- Titleblock
- Dimensions and labels (ACAD labels)

Viewports

- When viewport is selected, viewport scale pop-up menu is available
  - Regen after changing the scale
  - As many viewports as you need
  - Can be any shape that you need

Modelspace viewports

Last updated: 2017-12-01

Total video time: 5:46

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\Design\Corridors\Corridor-STH25-4thAve.dwg

c3d-intrfc-mdlspc-vwprt-01.mp4 5:46

Exercise file: Corridor-STH25-4thAve.dwg

Divide screen into real-time windows

Individual zoom and pan control

Objects in different areas can be seen together (in context)

Named Views

Configuring the screen

- Corridor Section Editor is automated configuration
- Manual configuration = **View tab > Model Viewport panel > Set Viewports**
- “In-canvas” controls, minus sign

Join Viewports

Xreference

Last updated: 2017-12-01

Total video time: 11:10

Exercise files: c3d-intrfc-data-c3d16.zip

Xreference overview part 1

c3d-intrfc-xref-01.mp4 4:44

Exercise files: ProjectID\BaseData\Mapping\ExistSurface.dwg, ProjectID\BaseData\Mapping\Uti-Ex.dwg.

For bringing drawings behind design drawings

Reduces design drawing size

“Overlays” DWG files

“Underlays” DGN files

Attaches Images

Can be Unloaded or Detached

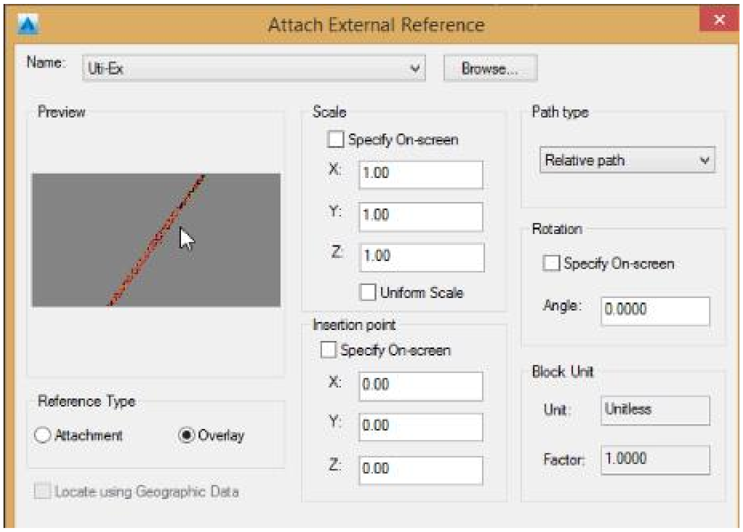
Binding brings the XREF into the current file

Insert tab > References panel > Attach (or type **XREF**)

Identify file type to attach

- DWG
- DGN
- PDF
- Image

Attachment dialog



- Location, Rotation, Scale (similar to a block)
- Path Type: Relative path
- Attachment versus Overlay

> **Warning:** unless told (for good reason) to do otherwise, references should always be overlays and they should always be relative. Overlays prevent circular references from happening and relative path allows for project copying and moving and keeping xrefs intact.

Xreference overview part 2

c3d-intrfc-xref-02.mp4 6:26

Exercise file: ProjectID\BaseData\Mapping\Topo-Ex.dwg .

External Reference Manager

- Select Xref in model space **xref contextual ribbon> options panel> external references**
- External references options

You can...

- label Civil 3D objects
- sample data for sections
- draft in relation to those referenced files
- unload
- snap to Xref'd drawing entities
- add data from references into design drawing if needed
  - Bind, for the entire file
  - NCOPY, for individual entities (not Civil 3D objects)

Reference fading control in **Insert tab > Reference Panel pull-down**

Data shortcuts

Last updated: 2017-12-01

Total video time: 11:10

Exercise files: c3d-intrfc-data-c3d16.zip

ProjectID\Design\Corridors\Corridor-STH25-4thAve.dwg

ProjectID\BaseData\Mapping\ExistSurface.dwg

Overview

c3d-intrfc-data-shrtct-01.mp4 2:33

Exercise file: Existing Surface.dwg

Provides selective object data for use in other files

- surfaces
- alignments
- profiles
- pipe networks
- pressure networks
- view frame groups

Files must be attached to a “project”

Object geometry is in one file, can be referenced into many other files. Allows for different styles to be applied to the same object in different references.

Data References can be used simultaneously

Control/distribution of geometry held in XML file

Data shortcut folder relationship

c3d-intrfc-data-shrtct-02.mp4 3:00

Working Folder = Path where projects are stored (level above project folders)

Project Folder = in working folder path where project files are stored

“_shortcut” folder = inside Project folder, where actual data shortcuts reside

- The data is in XML format
- DO NOT go in here – this is for Civil 3D to access/manage

If a project is moved, these locations are relative.

Data shortcut process

c3d-intrfc-data-shrtct-03.mp4 5:36

1. **Right-click on Data Shortcuts > Set Working Folder**
2. **Right-click on Data Shortcuts > New (or Set) Project Folder**
3. **Right-click on Data Shortcuts > Create Data Shortcuts**

Now that project path and folder are established, this step is repeated throughout project.

Xreference vs data shortcut concepts

Last updated: 2017-12-01

Total video time: 4:14

Exercise files: c3d-intrfc-data-c3d16.zip ProjectID\SheetsPlan\STH25-XS_2016.dwg ProjectID\Design\AliProfs\AliProf4thSt-Best-Fit.dwg

Concepts

c3d-intrfc-xref-vs-data-shrtct-01.mp4 4:14

XREFS

- Connects to an entire file, then items can be filtered out by layer
- Intended for items that you cannot data shortcut (acad objects, and a few civil 3d objects, corridors most notably)

Data shortcuts

- Connects to individual objects
- Intelligent data remains intact through connection (example: you can get station offset of an alignment through a data shortcut, but not an xref)
- Styles can be different per connection (you cover this well)

Info: In general, you should use the data connection intended for the object (i.e. use data shortcut for those objects, xref for others). The reverse is also true. You should generally not XREF objects that can have a data shortcut. If you happen to XREF a file that has connections to data shortcut objects, you can either remove the data shortcut or freeze the layer of the data shortcut object in the XREF. Classic example here is XREF topo and there's a DS to an alignment. That alignment will show up static and cannot be styled or queried. It's better to freeze the ali out of the xref and data shortcut it.

Both tools for referencing data in different ways

- Data Shortcuts are more Civil 3D specific.
- XREFs are "generally" more AutoCAD entities.
- Civil 3D Objects will Xref and are usable

Data shortcuts usage

- When you need data from surface, alignment, profile or pipes
- View Frames for plan and profile sheets
- When object interaction is needed
- Alignment (for sample line creation)

XREFS usage

- Background information
- Just for labeling, but not for interaction with other objects
- Everything else, especially the corridor

Inquiry tools

Last updated: 2017-12-01

Total video time: 3:15

c3d-intrfc-inqry-01.mp4 3:15

For reporting data from Civil 3D objects

Analyze tab > Inquiry panel

Fill in a field or two to report data

Types of Inquiries:

- Point
- Surface
- Alignment
- Profile and Profile View

- Section and Section View
- Corridor Sections

WisDOT tool palettes

Last updated: 2016-11-30

Total video time: mm:ss

c3d-intrfc-wisdot-tool-paltt-01.mp4 2:30

Civil 3D 2016 – WisDOT configuration

Last updated: 2016-03-09

Total video time: 09:08

acad-C3D2016-cnfg.mp4 9:08

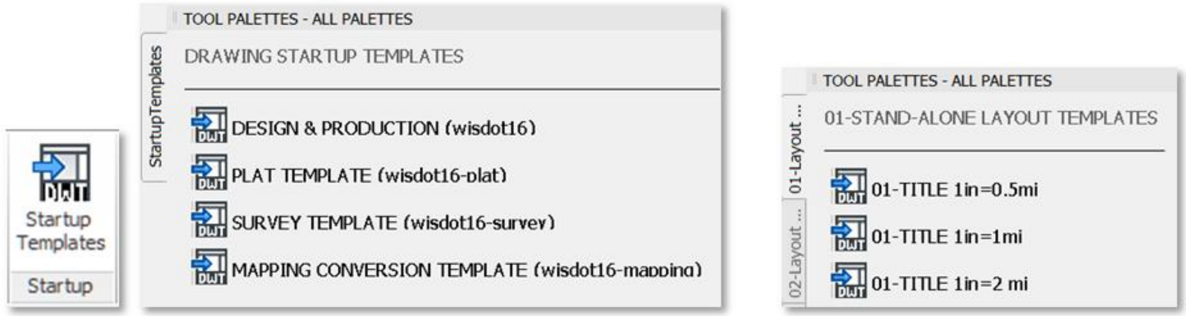
WisDOT drawing startup templates

A startup template is a file with a .dwt extension that is used as the base to create a Civil 3D drawing file. WisDOT provides four startup templates to use depending on the content and workflow of the drawing being created. A WisDOT Civil 3D drawing should be created using a WisDOT startup template. These four startup templates do not have any objects within the model or layout drawing spaces.

There are a few additional sheet production templates that are designated as stand-alone layout templates. These consist of Title Sheets and Speed Sheet templates for typical details or typical sections. Drawings created for these purposes do not require beginning the drawing with one of the four startup templates. These templates do contain layout objects and/or some model space objects.

WisDOT has reconfigured the drawing startup templates for 2016 to contain only objects and components that are being used in the drawing settings, Civil 3D styles, and annotation elements of the startup template. These templates are lighter and do not require any type of purge to remove extra items such as layers, linetypes, blocks and fonts. The “extra” components, along with all the parts and pieces that make up the templates are provided in a Tool Palette library accessible through the WisDOT ribbons. These Tool Palettes are the backbone for maintaining and delivering WisDOT standards and design and production components.

The startup templates for WisDOT Civil 3D 2016 can be found in **C:\WisDOT\Stnd\C3d2016\StartupTemplates**, and can be accessed from any of the WisDOT ribbons on the Startup panel which opens the Startup Template palette.



wisdot16.dwt

Used as the startup template for most design and production drawings.

wisdot16-plat.dwt

Used as the startup template for creating plat drawings.

wisdot16-survey.dwt

Used as the startup template for survey drawings. This template can also be used as a secondary template that can be imported into a drawing that was started with the wisdot16.dwt template.

wisdot16-mapping.dwt

Used only for mapping conversion.

WisDOT standard configuration components

In Civil 3D 2016, WisDOT standards design and production components have been divided into object groups. The raw component files can be found in **C:\WisDOT\Stnd\C3d2016\Components**, all of these components can be accessed by the use of a ribbon and specific palettes.

Raw component elements are organized in the following folders:

Assemblies

Reference files for all WisDOT custom assemblies accessible on palettes. Assembly help files.

Blocks

Collection of WisDOT marker symbol blocks, parametric blocks, and all other blocks used in the startup or sheet templates or organized on palettes.

Dimensions

Reference drawing of WisDOT standard dimension styles accessible on palettes. Reference drawing of WisDOT standard multi-leader styles accessible on palettes.

Fonts

Collection of legacy WisDOT font files and a reference drawing of WisDOT text styles accessible on palettes.

Layers

Reference drawing of all WisDOT layers accessible on palettes. Layer state and layer filter files. Plot style insert configuration file.

Linetype

Reference drawing of WisDOT standard linetypes accessible on palettes.

Reports

Collection of report reference files and style sheets.

SheetSets

Collection of sheet set files for standard WisDOT plan sheets.

SheetTemplates

Reference drawings of WisDOT sheet layout templates accessible on palettes.

Support

Reference shape files and pattern files to support the WisDOT templates, hatches, and line-types.

The WisDOT Civil 3D 2016 user interface

WisDOT standards, custom components and tools are included on ribbons which deliver custom palettes into the tool palette interface. There are four separate ribbon tabs:

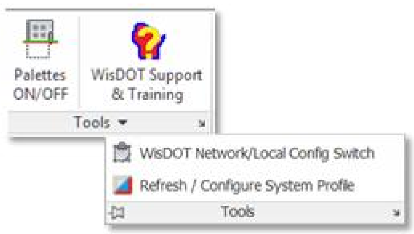
- **WisDOT Standards**
- **WisDOT Design**
- **WisDOT Sheets**
- **WisDOT Tools**

Each of these ribbons is divided into panels and each ribbon has a Tools and a Startup panel as well as ribbon-specific panels.

The Tools panel on each ribbon consists of:

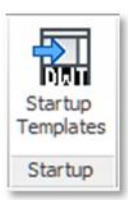
- **Palettes ON/OFF** tool which turns the display of the Tool Palette on and off.
- **WisDOT Support/Training** tool which opens the WisDOT Civil 3D Environment Dialog.
- A Tools drop down option that contains the **WisDOT Network/Local Config Switch** tool and the **Refresh/Configure System Profile** tool

All of the buttons on the WisDOT ribbons that are provided to access palettes will change the palette regardless of whether the tool palettes are being displayed, but will not automatically display the palettes if the palettes are turned off. Use the **Palettes ON/OFF** tool to change the display mode.



The Startup panel on each of the ribbons consists of:

- **Startup Templates** tool to access the drawing startup templates palette.

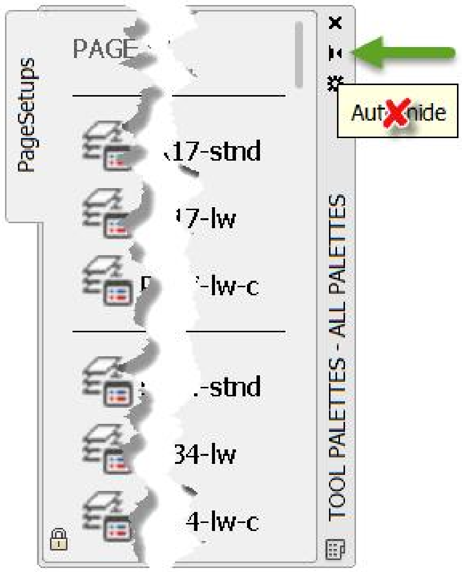


User interface best practices

The Civil 3D 2016 configuration provides many palettes and many options to switch between these palettes rapidly.

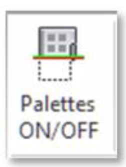
Palette Best performance

For best performance when using the ribbon tools to change palettes, whether docked or floating, keep the tool palette dialog in its expanded mode. Do not use the hide or auto-hide feature.



This is a best practice suggestion. You may use the hide or auto-hide feature, but this will result in longer wait times for the palette to refresh and the palette may "hang" until you exit and re-select the palette.

A **Palettes ON/OFF** tool that mimics the hide feature is provided on each WisDOT ribbon as a quicker alternative.



Civil 3D Startup Setting

The **STARTUP** system variable controls what tabs are displayed when the application is started, or when a new drawing is opened. In the WisDOT configuration the Start tab will not display and the ribbons will be pre-loaded when Civil 3D starts. The WisDOT Civil 3D configuration will always open with the **STARTUP** system variable set this way.

WisDOT ribbons

Last updated: 2016-03-11

Total video time: 12:43

c3d-intrfc-wisdot-rbn-01.mp4 12:43

Why WisDOT ribbons and palettes for 2016?

One reason Methods Development has created the ribbons and palettes is to encourage drawings to be PURGED and AUDITED with the confidence that any item can easily be added to or removed from a drawing.

The widely adhered best practice is to maintain a clean and healthy drawing file by using Purge and Audit regularly. There is a common misconception that drawings should not be purged and/or audited. However, there is no reasonable argument against regularly purging and auditing of a drawing file, and we are working to correct this misconception for the rollout of Civil 3D 2016.

When a drawing is not purged or audited, it makes the file more likely to become corrupt and possibly unrecoverable. Items are purged from a drawing because they are not being consumed or used in the drawing. For more instructional information about purge, audit and tips on cleaning and keeping drawings clean read: **Keeping Drawings Clean and Working**

To add a purged component into a drawing in Civil 3D 2014 the user has to use Windows Explorer, copy from another drawing, or use Design Center to find the elements. A considerable amount of all CAE Support problems and complaints about slowness of drawings, app glitches, and crashes can be traced back to a failure to purge and audit. Out of date items or objects copied in the wrong manner from other drawings is a bad practice that has lead to drawing file problems.

In Civil 3D 2016, we have created the ribbons / palettes to introduce an easier, more reliable process, of adding components into a drawing, whether purged or not. Placing all of the components on the palettes allows us to add only the minimum required components to the startup templates. The startup templates now allow components to be added as needed. This reduces the number of items that need to be purged and audited from the start.

We are striving to keep the drawings in a clean, purge an audit ready state, with tools to allow the user easy access to all the latest and greatest component(s), if and when the component(s) are needed.

Methods Development realizes the components and tool configuration on the palettes will be a work in progress. We are open to suggestions for the sequence and groups of the items on the palettes.

Purpose of ribbons

The main purpose of the WisDOT ribbons is to provide an organized way to access palettes, standards components, and tools needed for specific WisDOT Civil 3D workflows.

Palettes can be accessed from the ribbons to conveniently add WisDOT standards components into a drawing. The components are developed to adhere to WisDOT FDM guidelines, recommendations, and standard design and production practices, to produce the correct deliverable output.

The secondary purpose of the WisDOT ribbons is to provide a common location for delivering custom macros, custom reports, and custom tools.

Tips: Tool Tips: For additional information about a tool simply hover over the tool button to expose extended notes and/or a short video or animation.

WisDOT Standards ribbon

The WisDOT Standards ribbon has tools to access the standards components palettes and tools to add standards components into a drawing.

Tools panel

Palettes ON/OFF	Toggles the palette window ON or OFF
WisDOT Support/Training	Toggle the WisDOT environment dialog ON/Off, which has links to the WisDOT help and training.

Tools panel – drop down

WisDOT Network/Local Config Switch	This tool allows the user to switch between local and network-based work environment for instances when a user is not connected to the WisDOT server
Refresh/Configure System Profile	This tool will refresh or configure the WisDOT system profile

Startup panel

Startup Templates	Launches the WisDOT Startup Templates palette

Standards Components panel

Add Layers	Adds 2016 WisDOT standard layers into drawing

Add Marker Symbols	Adds 2016 WisDOT standard symbol blocks into drawing
Add Dimensions	Adds 2016 WisDOT standard dimension styles into drawing
Add Multi-Leaders	Adds 2016 WisDOT standard multileader styles into drawing
Add Textstyles	Adds 2016 WisDOT standard text styles into drawing
Add Linetypes	Adds 2016 WisDOT standard linetypes into drawing

Plot Configuration panel

Page Setups	Launches the WisDOT standard page setups palette
Layer States	Launches the WisDOT standard layer states palette
Layer States (pull-down)	Layer States set and manage tools.

Plot Configuration panel – drop down

Current Page Setup All	This tool sets all layouts in the current drawing to the current page setup.

WisDOT Design ribbon

The WisDOT Standards ribbon has tools to access the standards components palettes and tools to add standards components into a drawing.

The Design ribbon a design workflow tools and palettes. The Design Utilities panel has six useful design tools; Superelevation Design Macro, Extract Corridor Surface Feature Lines, Alignment Bearing Tip toggle, Swap Parts List Styles, Swap Pipe Network Parts, and Pipe Network Sump Adjust.

The Assemblies & Subassemblies panel includes a button to access the Autodesk and WisDOT subassemblies and assemblies. The Autodesk Palette includes a button to access all available Autodesk palettes. The Parametric Design panel provides buttons to access the parametric design block palettes for Beam Guard and Intersections.

Tools panel

Palettes ON/OFF	Toggles the palette window ON or OFF
WisDOT Support/Training	Toggle ON/OFF the WisDOT environment dialog which has links to the WisDOT help and training.

Tool panel – drop down

WisDOT Network/Local Config Switch	This tool allows the user to switch between local and network-based work environment for instances when a user is not connected to the WisDOT server
Refresh/Configure System Profile	This tool will refresh or configure the WisDOT system profile

Startup panel

Startup Templates	Launches the WisDOT Drawing Startup Templates palette

Design Utilities panel

Superelevation Design Macro	Updates the superlevation tabular editor values to adhere to WisDOT standards
Corridor Surface Feature Lines	Executes the macro to extract surface point codes from a corridor surface as lines, polylines or feature lines. (Hover over tool on ribbon for more information)
Alignment Bearing Tip	Toggles the Alignment Bearing tip On and Off.

Swap Parts List Styles	Executes the macro to switch all the style in a Parts list between design styles and production styles, with options to switch styles in existing pipe networks.
Swap Pipe Network Part	Executes the macro that changes the part type of selected pipes and or structure within a pipe network.
Pipe Network Sump Adjust	Executes the macro which make necessary sump adjustments to account for pipe thicknesses when a sump depth of a structure is set to zero.

Assemblies & Subassemblies panel

WisDOT/ Civil Imperial	Launches the WisDOT Subassemblies/Assemblies palettes
Subassembly Help	Opens the WisDOT subassembly and Assemblies help file. Users can look at how the subassemblies work without needing to access the palette or an assembly in the drawing.

Autodesk panel

Autodesk Palettes	Launches the out-of-the-box Autodesk palettes and groups.

Parametric Design panel

Beam Guard	Launches the Beam Guard EATS palette, with parametric blocks to assist in beam guard design layout.
Intersection Block	Launches the Intersection Layout palette, with parametric blocks to assist in intersection design layout.

WisDOT Sheets ribbon

The concept of the WisDOT Sheets ribbon is to provide a single plan production workflow starting point. This should offer the user the ability to progress through the specific sheet (or group of sheets) development workflows by selecting the corresponding sheet type button on the Sheet Creation Components panel of the ribbon to expose the corresponding workflow grouped palettes.

These palettes are not comprehensive and are a work in progress. Using palettes to deliver these tools and components allows for more fluid and instant updates and workflow modifications.

Sheet Utilities panel

The Sheet Utilities panel contains a few tools to assist in creating text using the new fonts styles, and creating Superelevation tables.

Superelevation Tables	Create production ready superelevation tables within the drawing, and or export excel.
Point Station Offset to UDP	Tool to add station, offset information to point collections.

Sheet Creation Components panel

Each sheet tool delivers the specific components, objects and commands on a palette that pertain to the workflow to develop the sheet. This panel is divided into two sections. On the left side are the buttons to access the sheet workflow palettes. The right side are the general AutoCAD component tools.

Title Sheets	Access the Title Sheet palette.
(pull-down)	This pull down offers access to multiple palettes, and will show the last palette selected.

Typical Sections, Construction Details, Plan Details, Storm Sewer Plan, Detail Sheets

Quantities	Access the Quantities Sheet palette
ROW / Plat	Access the ROW / Plat Sheet palette.
Plan / Profile	Access the Plan / Profile Sheet palette.
Sign Plates	Access the Sign Sheet palette.
Sections	Access the Sections Sheet palette.

Earthwork	Access the Title Sheet palette.
Set Textstyle & Size	Opens a floating dialog to set WisDOT textstyle and or text size at any time. To be used in conjunction with the Mtext and Text commands.
Dimension gallery (pull-down)	Select a dimension style to make it the current style.
Multileader gallery (pull-down)	Select a multileader style to make it the current style.
Mtext	Multi line text tool.
Dimension tool (pull-down)	Create dimensions tool.
Mleader	Create multileader tool.

Wis-Manage panel

The tools on this panel launch the legacy 2014 Wis-manage palettes.

Plot Configuration panel

Page Setups	Launches the WisDOT standard page setups palette.
Layer States	Launches the WisDOT standard layer states palette.
Layer States (pull-down)	Layer States set and manage tools.

Plot Configuration panel – drop down

Current Page Setup All	This tool sets all layouts in the current drawing to the current page setup.

WisDOT Tools ribbon

The WisDOT Tools ribbon has five panels that contain all the macros, reports and tools offered in the WisDOT Toolbox as well as additional navigation and drawing maintenance tools.

Navigation Panel

These tools allow for ease of accessing user-defined model space views between drawings.

Rotate View	This tool prompts the user to pick two locations in modelspace, and uses those to rotate the drawing view without changing the current UCS. Best practice for working in modelspace in design drawings is to keep the UCS set to World to maintain the proper coordinate system.
Plan View	This tool will reset the view back to plan view using the current UCS.

Info: Important: Be sure that your UCS is set to WORLD before you export or import any model space views.

Export View	This tool will prompt the user for a name and location to save a text file (.txt) and add the information for the creation of any user-defined model space views in the current drawing.
Import Views	This tool will prompt the user to search for a text file containing previously exported view information and add the selected views to the current drawing.
Delete Views	Use this tool to delete any user-defined model space views from the current drawing. The user can delete a saved view in the drawing by typing the name of one particular view or when prompted press the enter key to search for a saved view text file. The tool will delete all the saved views within the drawing that match those saved in the text file.

DWG Maintenance Panel

DWG Clean	This tool should be used regularly to keep the drawing clean. It runs a macro to purge and audit the drawing.

WisDOT Macros Panel

These are the WisDOT custom macros that are also found on the Toolbox tab on the Toolspace palette.

WisDOT Reports Panel

These are the WisDOT custom reports that are also found on the Toolbox tab on the Toolspace palette.

Survey File Conversion Panel

These are the WisDOT and Autodesk conversion macros that are also found on the Toolbox tab on the Toolspace palette.

Borrowing and returning a Civil 3D license

Last updated: 2017-11-28

Total video time: 1:39

c3d-intrfc-brrw-c3d-lcns-01.mp4 1:39

Borrowing a Civil 3D license

If you borrow a license you are removing it from the network pool of licenses, whether you are actively using it or not. The license can be borrowed for a limited amount of time, after which it will automatically be removed from your computer and returned to be available on the network. You can only borrow networked licenses, not stand alone licenses.

In the title bar of the Civil 3D instance click the Help button.

At the bottom of the menu choose About AutoCAD Civil 3D.

In the About dialog, upper right, click Product Information (or Product License Information).

Click Borrow License.

In the Borrow License dialog, in the calendar, select the automatic return date. This date must be within a length of time set by your administrator.

Click Borrow License.

Click Close in the Borrowed License message.

Returning a borrowed Civil 3D license

Returning a license earlier than the date specified

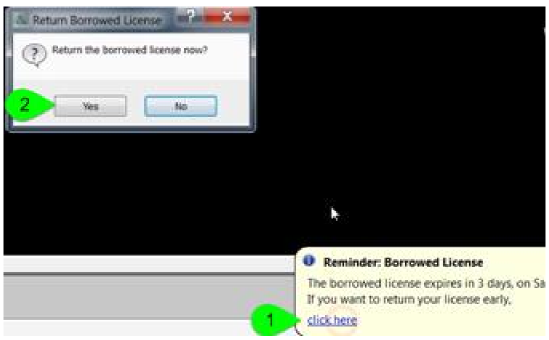
The options below all have the exact same result. You only need to choose the method that works for the circumstances you find yourself in.

Returning a license earlier than the date specified, option 1

You can return a license earlier than your chosen automatic return date.

At the beginning of each session of Civil 3D while the license is checked out you should receive a balloon notification stating that the license is checked out and can be returned early. Click the Click Here option in this balloon notification.

In the Return Borrowed License dialog click YES to confirm the early return.



In the License Returned dialog click Close.

Returning a license earlier than the date specified, option 2

If you are not receiving that balloon notification, or you closed it before using the early return option, but would like to return the license early do the following steps:

In the title bar of the Civil 3D instance select the Help button.

At the bottom of the menu choose About AutoCAD Civil 3D.

In the About dialog, upper right, choose Product Information (or Product License Information).

In the lower left select the Return License button.

In the Return Borrowed License dialog click YES to confirm the early return.

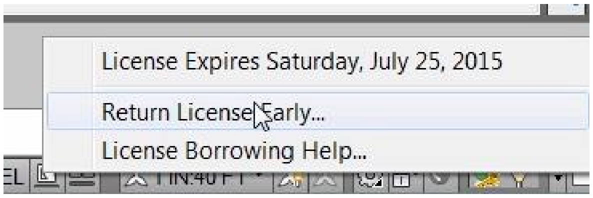
In the License Returned dialog click Close.

Returning a license earlier than the date specified, option 3

If you are not receiving that balloon notification, or you closed it before using the early return option, but would like to return the license early do the following steps:

In the Status Bar in the lower right of the screen, right-click the License button.

Click Return license early.



In the Return Borrowed License dialog click YES to confirm the early return.

In the License Returned dialog click Close.

Adding a folder link to a Civil 3D dialog

Last updated: 2017-12-01

Total video time: 1:27

Adding a folder link to a Civil 3D dialog

c3d-intrfc-add-fldr-lnk-to-c3d-dlg-01.mp41:27

Adding a folder shortcut

In the Application Menu, select Open

Browse to the project 12345678 folder

Click the up folder icon to go to the c3d folder above the project folders

In the right-hand window click and drag the c3d folder to the blue shortcut bar and release the mouse button.

Click on the new c3d shortcut to see the project folders.

In the right-hand window click and drag the 12345678 project folder to the blue shortcut bar and release the mouse button.

Left click on the new 12345678 shortcut icon.

Click cancel to close the dialog.

Select Yes when prompted to save changes to the Places list.

Removing a folder link from a Civil 3D dialog

In the Quick Access toolbar select Open.

In the Open dialog, left-hand blue Places bar, right-click on the 12345678 folder.

Click Remove.

Confirm you wish to remove the shortcut by clicking Yes.

Click cancel to close the dialog.

Select Yes when prompted to save changes to the Places list.

Civil 3D 2016 – WisDOT configuration

Last updated: 2016-03-09

Total video time: 09:08

acad-C3D2016-cnfg.mp4 9:08

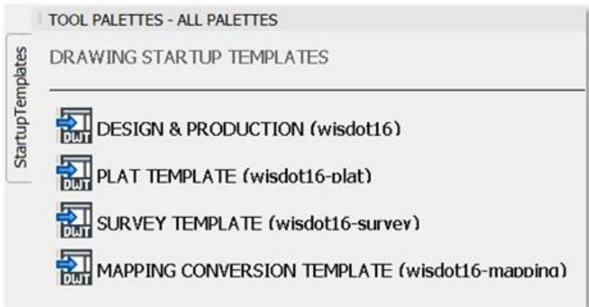
WisDOT drawing startup templates

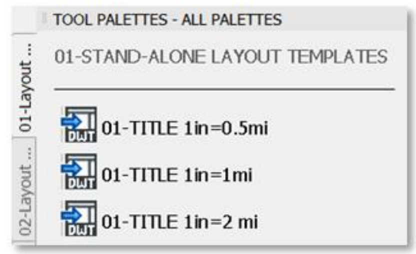
A startup template is a file with a .dwt extension that is used as the base to create a Civil 3D drawing file. WisDOT provides four startup templates to use depending on the content and workflow of the drawing being created. A WisDOT Civil 3D drawing should be created using a WisDOT startup template. These four startup templates do not have any objects within the model or layout drawing spaces.

There are a few additional sheet production templates that are designated as stand-alone layout templates. These consist of Title Sheets and Speed Sheet templates for typical details or typical sections. Drawings created for these purposes do not require beginning the drawing with one of the four startup templates. These templates do contain layout objects and/or some model space objects.

WisDOT has reconfigured the drawing startup templates for 2016 to contain only objects and components that are being used in the drawing settings, Civil 3D styles, and annotation elements of the startup template. These templates are lighter and do not require any type of purge to remove extra items such as layers, linetypes, blocks and fonts. The "extra" components, along with all the parts and pieces that make up the templates are provided in a Tool Palette library accessible through the WisDOT ribbons. These Tool Palettes are the backbone for maintaining and delivering WisDOT standards and design and production components.

The startup templates for WisDOT Civil 3D 2016 can be found in **C:\WisDOT\Stnd\C3d2016\StartupTemplates**, and can be accessed from any of the WisDOT ribbons on the Startup panel which opens the Startup Template palette.





wisdot16.dwt

Used as the startup template for most design and production drawings.

wisdot16-plat.dwt

Used as the startup template for creating plat drawings.

wisdot16-survey.dwt

Used as the startup template for survey drawings. This template can also be used as a secondary template that can be imported into a drawing that was started with the wisdot16.dwt template.

wisdot16-mapping.dwt

Used only for mapping conversion.

WisDOT standard configuration components

In Civil 3D 2016, WisDOT standards design and production components have been divided into object groups. The raw component files can be found in **C:\WisDOT\Stnd\C3d2016\Components**, all of these components can be accessed by the use of a ribbon and specific palettes.

Raw component elements are organized in the following folders:

Assemblies

Reference files for all WisDOT custom assemblies accessible on palettes. Assembly help files.

Blocks

Collection of WisDOT marker symbol blocks, parametric blocks, and all other blocks used in the startup or sheet templates or organized on palettes.

Dimensions

Reference drawing of WisDOT standard dimension styles accessible on palettes. Reference drawing of WisDOT standard multi-leader styles accessible on palettes.

Fonts

Collection of legacy WisDOT font files and a reference drawing of WisDOT text styles accessible on palettes.

Layers

Reference drawing of all WisDOT layers accessible on palettes. Layer state and layer filter files. Plot style insert configuration file.

Linetype

Reference drawing of WisDOT standard linetypes accessible on palettes.

Reports

Collection of report reference files and style sheets.

SheetSets

Collection of sheet set files for standard WisDOT plan sheets.

SheetTemplates

Reference drawings of WisDOT sheet layout templates accessible on palettes.

Support

Reference shape files and pattern files to support the WisDOT templates, hatches, and line-types.

The WisDOT Civil 3D 2016 user interface

WisDOT standards, custom components and tools are included on ribbons which deliver custom palettes into the tool palette interface. There are four separate ribbon tabs:

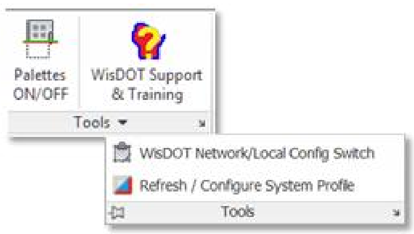
- **WisDOT Standards**
- **WisDOT Design**
- **WisDOT Sheets**
- **WisDOT Tools**

Each of these ribbons is divided into panels and each ribbon has a Tools and a Startup panel as well as ribbon-specific panels.

The Tools panel on each ribbon consists of:

- **Palettes ON/OFF** tool which turns the display of the Tool Palette on and off.
- **WisDOT Support/Training** tool which opens the WisDOT Civil 3D Environment Dialog.
- A Tools drop down option that contains the **WisDOT Network/Local Config Switch** tool and the **Refresh/Configure System Profile** tool

All of the buttons on the WisDOT ribbons that are provided to access palettes will change the palette regardless of whether the tool palettes are being displayed, but will not automatically display the palettes if the palettes are turned off. Use the **Palettes ON/OFF** tool to change the display mode.



The Startup panel on each of the ribbons consists of:

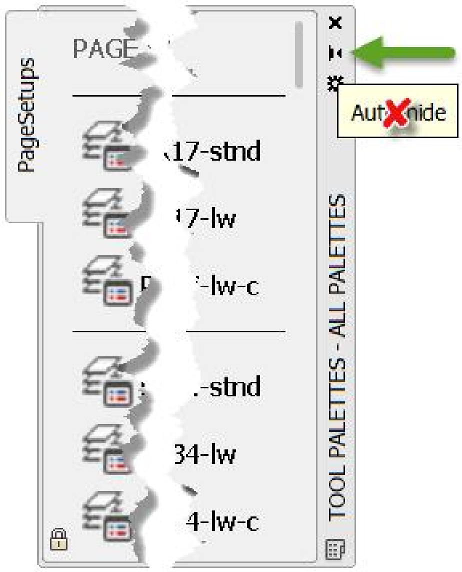
- **Startup Templates** tool to access the drawing startup templates palette.

User interface best practices

The Civil 3D 2016 configuration provides many palettes and many options to switch between these palettes rapidly.

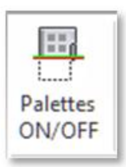
Palette Best performance

For best performance when using the ribbon tools to change palettes, whether docked or floating, keep the tool palette dialog in its expanded mode. Do not use the hide or auto-hide feature.



This is a best practice suggestion. You may use the hide or auto-hide feature, but this will result in longer wait times for the palette to refresh and the palette may "hang" until you exit and re-select the palette.

A **Palettes ON/OFF** tool that mimics the hide feature is provided on each WisDOT ribbon as a quicker alternative.



Civil 3D Startup Setting

The **STARTUP** system variable controls what tabs are displayed when the application is started, or when a new drawing is opened. In the WisDOT configuration the Start tab will not display and the ribbons will be pre-loaded when Civil 3D starts. The WisDOT Civil 3D configuration will always open with the **STARTUP** system variable set this way.

WisDOT Civil 3D project setup

WisDOT standards – Civil 3D project

Last updated: 2015-01-13

Total video time: 06:05

WisDOT standards – Civil 3D project

prj-wisdot-stnd-c3d-prj-01.mp4 6:05

Why project folder structure is important

Connectivity of referenced data, for data shortcut references and external references (XREF)

Project consistency. The ability to find files based on the type of data.

Project portability. The ability to move a project internally, or externally, and maintain the connectivity and file locations.

How project folder structure is created

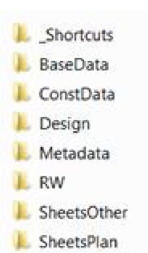
Use the data shortcut project creation tools.

- All projects will need data shortcuts
- The data shortcuts project creation lends itself well to the WisDOT workflow.

Use the folder structure at C:\Civil 3D Project Templates\WisDOTProjectTemplate

A look at the project folder structure

The top level of the project folders should not change.



Underneath that top level folders can be added.

Standard folders should never be deleted, removed or moved.

Steps to create the project folder structure

1. Set the data shortcut working folder to the c3d folder
2. Create a new project folder
3. Use the WisDOTProjectTemplate

Requirement: Reference FDM 15-5-3, Att 3.1 for file naming and locations

Create a Civil 3D project

Last updated: 2015-01-13

Total video time: 01:59

Create a Civil 3D project

prj-creat-c3d-prj-01.mp4 1:59

1. **Toolspace > Prospector tab > Right-click Data Shortcuts > Set Working Folder**.
2. Browse to the project location, C3D folder. Example: N:\PDS\C3D
3. **Toolspace > Prospector tab > Data Shortcuts > Right-click Data Shortcuts > New Project Data Folder**
   A. New Data Shortcut Folder = **98765432**
   B. Use Project Template = **Checked**
   C. Select **WisDOTProjectTemplate**
   D. OK

Wisconsin coordinate system settings in Civil 3D

Last updated: 2017-06-28

Warning: A known issue has been identified related to Wisconsin county coordinate projections. Please review Wisconsin coordinate projection issue - XML/SDB and Wisconsin coordinate projection issue - SDB/DWG for more information.

Wisconsin coordinate systems available in Civil 3D

- **SPCS – State Plane Coordinate System** – FDM 9-20-26 Developed nationally by the US Coast and Geodetic Survey in the 1930s. Wisconsin has three state plane zones North, Central and South that follow county lines.
- **WCCS – Wisconsin County Coordinate System** – FDM 9-20-27 Developed in 1993 by WisDOT. Achieved design goal of minimal distortion between grid (map) and ground distances by creating individualized ellipsoids for every county.

- **WISCRS – Wisconsin Coordinate Reference System** – FDM 9-20-28 Developed in 2006. Design goal is to arrive at the same WCCS coordinate while utilizing one nationally recognized ellipsoid, making it easier for vendors to include Wisconsin county coordinates in their software and equipment. For all counties except Jackson County, WCCS and WISCRS coordinates will essentially be the same for a given point.
- **WTM – Wisconsin Transverse Mercator** – FDM 9-20-25.3.1 Developed by the Wisconsin DNR in the 1980s. The Universal Transverse Mercator used by the Department of Defense divided Wisconsin almost equally into two zones down the 90 degree west longitude line. The WTM is centered on the 90 degree longitude line and allows Wisconsin to be covered by one WTM zone rather than two UTM zones.

Updates to coordinate data available in Civil 3D for Wisconsin

- Previously there were two Wisconsin coordinate systems shown in Civil 3D in the USA, Wisconsin category. For example, the two coordinate systems listed for Adams county were:
  - Wisconsin Adams, US FT (or use HARN/WI.AdamsWI-F)
  - Wisconsin County Systems: Adams County, US Foot

Comment: Both of these systems are for WCCS and WISCRS were not available to choose from.

- WisDOT also provided multiple coordinate system categories that titled "WisDOT<HorizDatum>-<VertDatum>". These categories and coordinate systems have been moved to an "obsolete" category and replaced with a simplified category called "WisDOT".
- The format of the coordinate naming convention and example is shown below:

Coordinate System	Zone / County	Horizontal Datum Year	(Horizontal Adjustment Year)	Units
SPCS	Wisconsin Central	NAD83	(1991)	USF
WCCS	Adams	NAD83	(1991)	USF
WISCRS	Adams	NAD83	(1991)	USF
WTM	Yes	NAD83	(1991)	USF

<u>Units</u>

USF = US Survey Foot

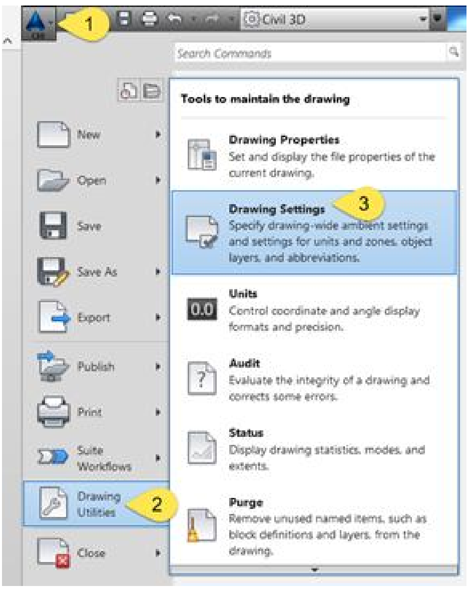
M = Meters

Selecting the coordinate system for the dwg file

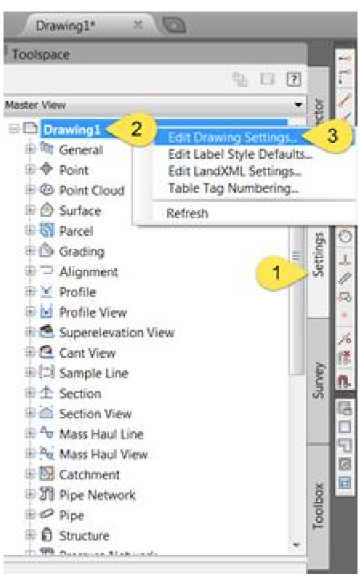
The coordinate system used to collect the survey data should be obtained from the surveyor or WisDOT Survey Data Coordinator. Review the Form [DT1773 Geodetic Reference Documentation]() with the Survey Data Coordinator. It is encouraged that new projects are surveyed in WISCRS. It is required that WISCRS coordinates are used for Jackson County.

Drawing Settings

The coordinate system is assigned in the Drawing Settings. The Drawing Setting can be accessed using either of the menus below.

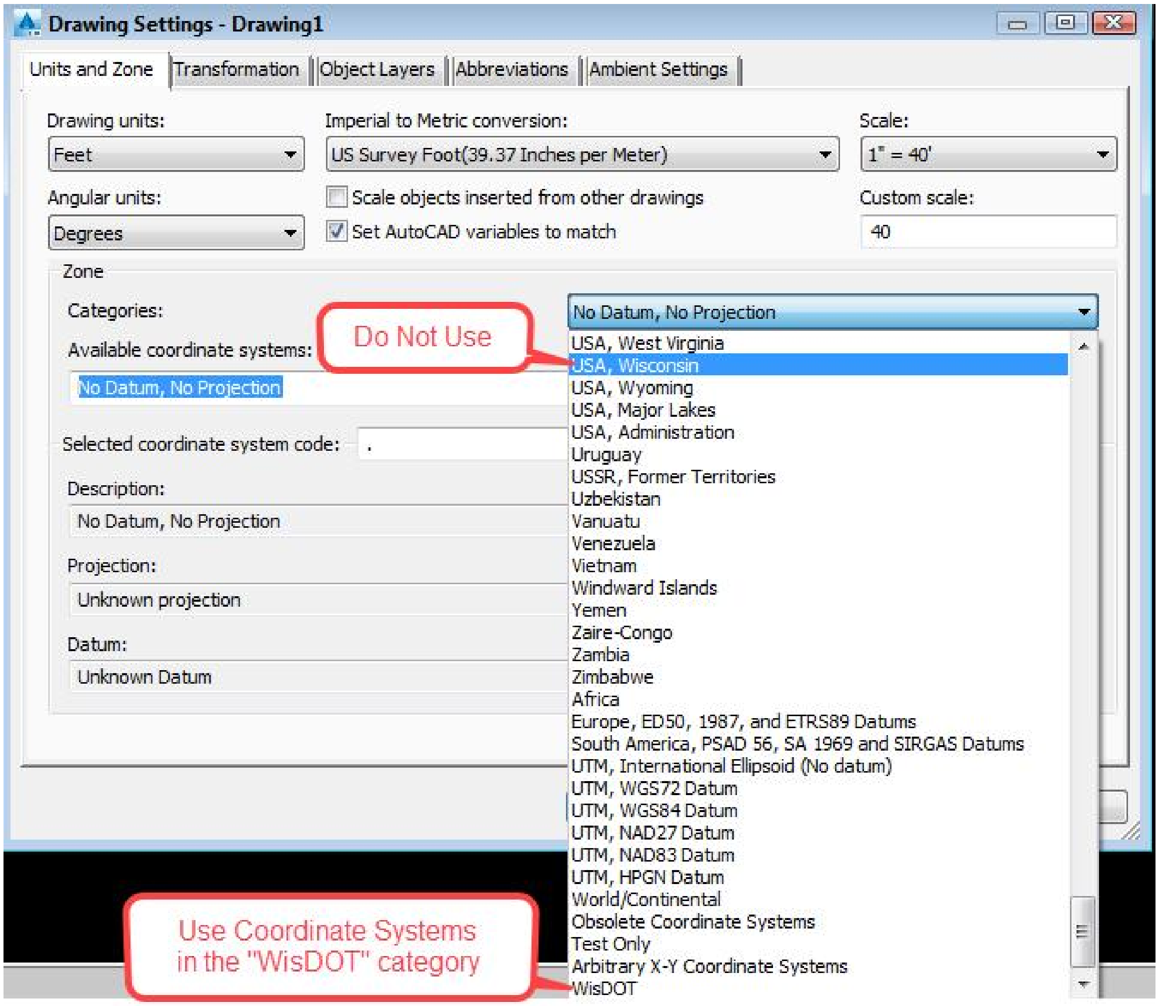


or



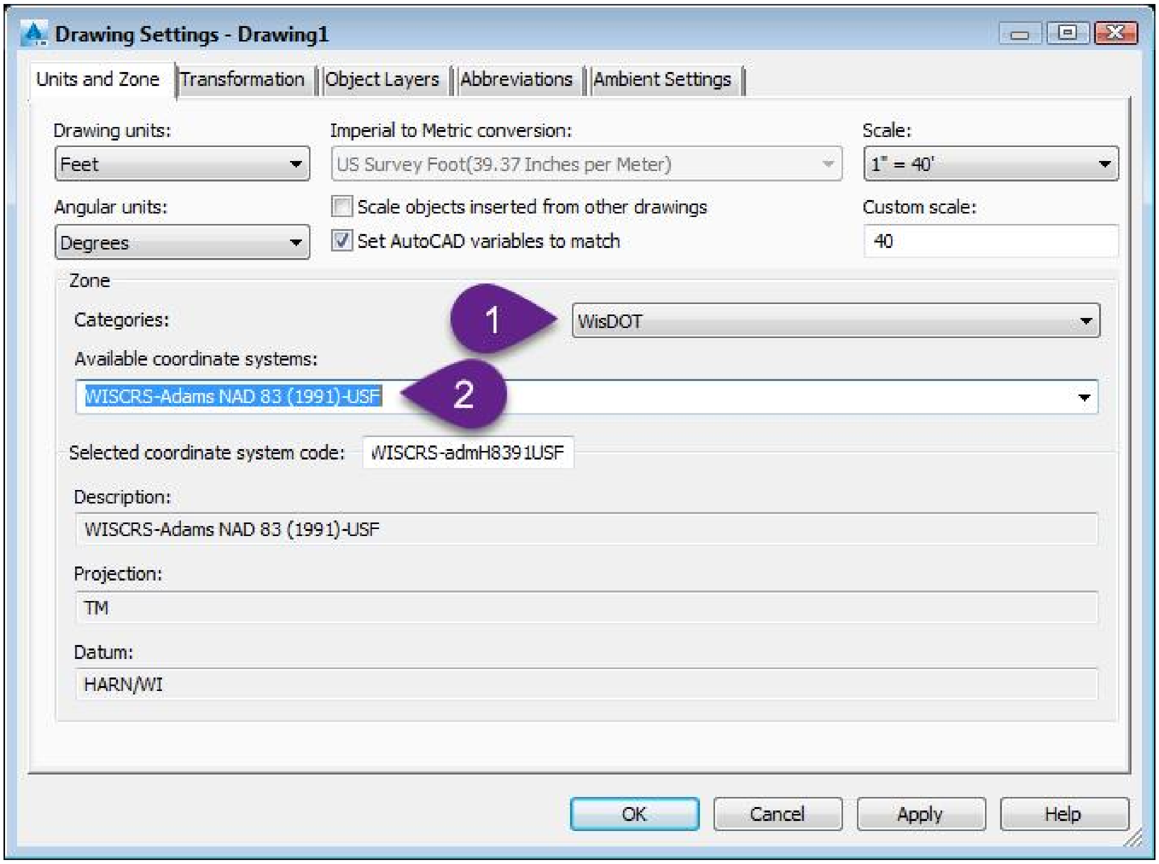
Categories

In the Coordinate System Library, categories group related coordinate systems.



In order to maintain legacy coordinate information in the Autodesk products the previous Wisconsin county coordinates could not be renamed. The Wisconsin coordinates under the category USA Wisconsin will still be available however only the coordinates under the WisDOT category should be used. The coordinates in the WisDOT category are only available by downloading the information from Wisconsin DOT and will not be offered in the out-of-the-box software offered by Autodesk. WisDOT employees do not need to download the coordinate systems. They are automatically loaded on WisDOT computers

1. Select the WisDOT category.
2. Next select the coordinate system used for the project.



3. OK after the coordinate system has been selected.

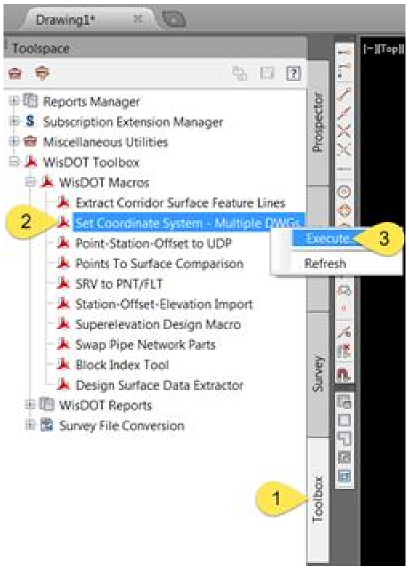
Frequently Asked Questions (FAQ)

Can I select the coordinates for multiple files at once?

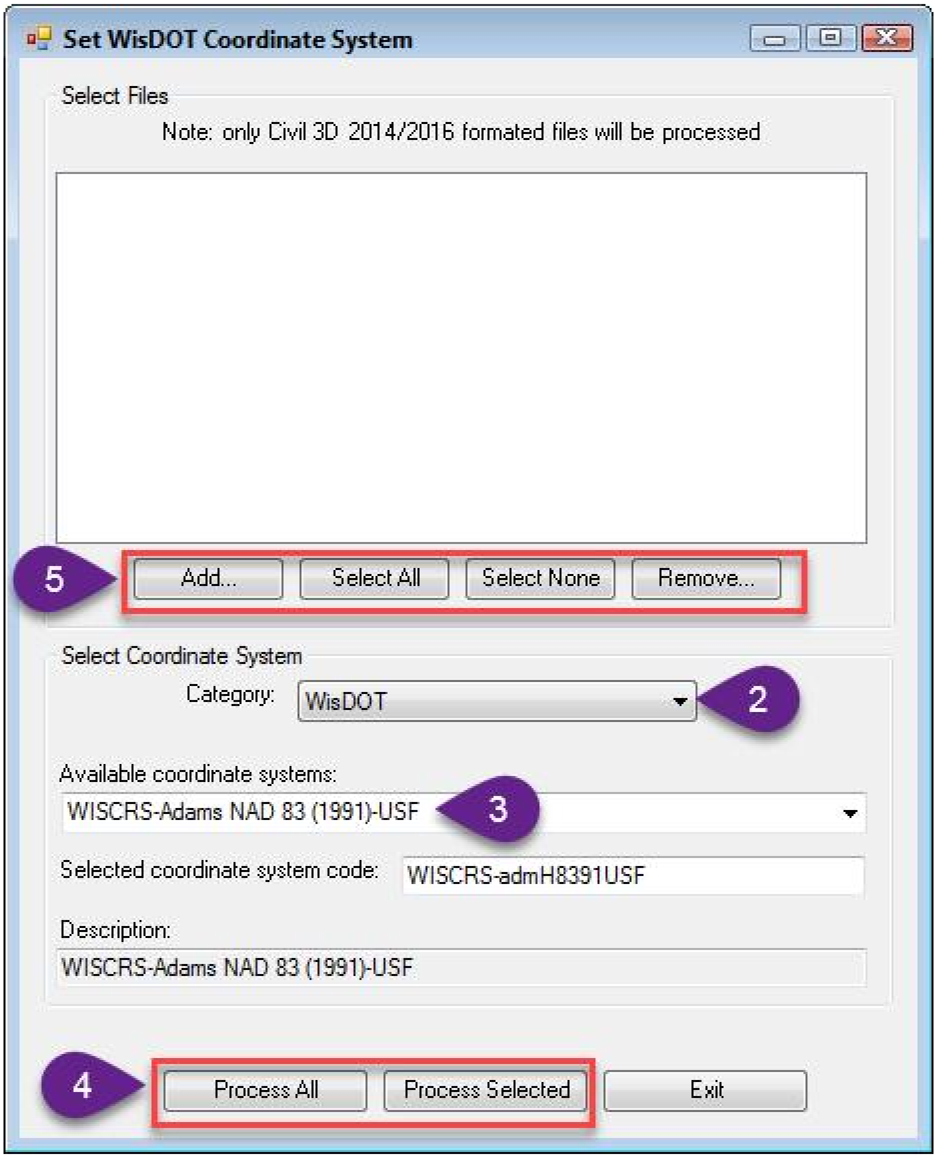
To set a coordinate system use the Set Coordinate System – Multiple DWGs macro found in the Toolbox tab of the Toolspace under WisDOT Macros. This tool can be used for a single drawing or multiple drawings.

Info: The macro cannot be used on a drawing that is currently open.

1. Close the target drawing(s) if currently open.
2. Execute the Set Coordinate System – Multiple DWGs macro.



3. Browse to the drawing(s) by clicking Add…
4. Select a county from the list in the dialog box and select the datum.
5. Process All to set the coordinate system.



What should I do with my existing project?

Check with the Region Survey Data Coordinator to verify that the correct coordinate system has been applied to the drawing. Changing the coordinate system in Civil 3D will not affect the drawing itself but may cause errors to referenced aerial photos, GIS information, or survey database data that are based on a different coordinate system.

Is the survey information drawn differently for the adjustment years?

The horizontal datum versions for NAD 83 include (1986), (1991), (1997), (2007) and (2011). The differences are fundamentally a result of upgrades and enhancements in technology, surveying methodologies and computing power. In addition, as the Wisconsin Height Modernization program has worked its way around the state, additional measurements (horizontal and vertical) to survey stations has added more data to further refine the previously published coordinates. There is no direct mathematical relationship between NAD83 adjustment years. Therefore, any change in coordinate values due to a change in adjustment year should be handled by the Region Survey Data Coordinator outside of Civil 3D.

Civil 3D reflects what is imported in the survey database, and if another coordinate system is needed by Civil 3D, then the survey data coordinator should transform the data.

Civil 3D is a design tool and should not be considered a survey adjustment tool. Any questions or concerns regarding the project datum and adjustment should be addressed to the Region Survey Data Coordinator. Any changes to the project survey datum and adjustment should be overseen by the Region Survey Data Coordinator.

Should I translate my survey data to a newer projection?

No. Transforming a project to another coordinate system is reserved for the Survey Data Coordinator and should not be done by the engineer/designer. If survey data is collected based on the NAD 83 (2011) coordinates and saved to a survey database, then the project is in NAD 83 (2011) coordinates. Civil 3D projects are a Cartesian plane based on what the survey database tells the project the coordinates are. The adjustment year in the coordinate name does not include any additional information that will allow Civil 3D to translate coordinates between adjustment years. Only one adjustment year is provided in the "WisDOT" category.

Civil 3D reflects what is imported in the survey database, and if another coordinate system is needed by Civil 3D, then the survey data coordinator should transform the data.

What is the difference between WCCS and WISCRS?

In general WCCS is based on a local ellipsoid (the reference surface) for each county whereas WISCRS uses GRS 80 as the single reference ellipsoid for all individual coordinate systems.

Horizontal differences

Except for Jackson County, there is negligible difference between WCCS coordinates and WISCRS coordinates. The goal of the WISCRS system is to replicate WCCS coordinates (from lat/long) using a ‘simpler’ mathematical method. The vast majority of ‘differences’ between WCCS and WISCRS (over 97%) are less than 3 mm. There are no differences of over 5mm (0.016’). Jackson County WISCRS (Transverse Mercator) is a completely different projection than WCCS (Lambert Conformal Conic), so the user will get radically different coordinates from the same lat/long.

Vertical differences

There is no difference in elevations between WCCS and WISCRS. It is a horizontal system only. See Version updates for elevation version updates from NGS.

What coordinate system should I use for Jackson County?

Please note that only the WISCRS Jackson County coordinate projection is to be used for new DOT projects. Do not use the WCCS Jackson County coordinate system for new projects. The WCCS-Jackson County coordinates have been retained for legacy projects. Refer to FDM 9-20-28 Wisconsin Coordinate Reference System for more information.

What happens if you share a dwg with the DOT custom coordinate naming convention assigned to it and the receiving party does not have the DOT files installed?

The receiving party would not be able to convert the file to another coordinate system. The data will still be valid and be placed in the correct location.

Resources:

FDM Section 9-20 Spatial Reference Systems

Wisconsin State Cartographer's Office – Coordinate Reference Systems

Data shortcut best practices

Last updated: 2015-04-17

Migrating a project from Civil 3D 2012 to Civil 3D 2014

When migrating a project from Civil 3D version 2012 to version 2014 it is very important that you

Warnings:

1. DO NOT do anything else with the project files other than migration.
2. DO NOT move files.
3. DO NOT copy files.
4. DO NOT rename files or objects within the files. If there is a problem with data shortcuts while migrating a project we do not want to add variables to complicate troubleshooting.

Follow the How to Re-path all subassemblies within project corridor drawings and Project drawing migration Civil 3D 2012 to 2014 sections for the proper process to migrate your project drawings. If this process is followed, the data shortcuts will be migrated properly as well.

Warning: DO NOT perform a SAVE AS command within the data shortcut editor in an attempt to migrate the data shortcuts to the new version. This will create a copy of all of the XML files for the data shortcuts which can create a problem. This will happen automatically when the above steps are followed.

Moving a project location

When moving a project location on the network drive you should move the ENTIRE project folder. This will ensure that all of the data shortcuts and their references will follow the relative paths of the moved data shortcut XML files.

Next, open the data shortcut editor from the start menu, and navigate to the project shortcut folder. Perform a Find and Replace command on the paths in order to re-path them to the new data shortcut folder location.

Renaming or moving individual project files

Best practice for renaming or moving project files is not to do it at all, but in the event that it must be done you must first validate your data shortcuts after renaming or moving a file.

Once the data shortcut list has been validated you must synchronize the references in any files which are consuming the data shortcuts coming from the file which was renamed or moved. DO NOT wait on validating the data shortcuts when these types of changes are made. It will cause problems downstream such as data shortcut duplications and general confusion among team members.

It is also good practice to inform all team members of such a change so they are aware of it.

Renaming individual drawing objects

The same practices should be applied to this type of project change as outlined in the above section for renaming or moving individual project files.

Incorporating external drawings into a project

Warning: When incorporating drawings from an external consultant copy over ONLY the drawings. DO NOT copy over any of the shortcut folders nor any of the XML files contained therein.

If these files are replacing existing project files then archive the original files, and replace them in windows explorer with these new external files.

Open these new files, and synchronize references.

Repair all broken references by navigating to the proper source files from your project folder for each broken reference.

If there were data shortcuts which were created from these external files you will need to recreate these data shortcuts in your project.

Notable difference between Data Shortcuts in Civil 3D 2012 and in Civil 3D 2014

Data references, other than for surfaces, are now saved (cached) directly in the drawing files. This is a great benefit when sharing files remotely. This eliminates the need to re-route all data shortcuts to the source files in order to view and use the data as references.

Project data workflow map

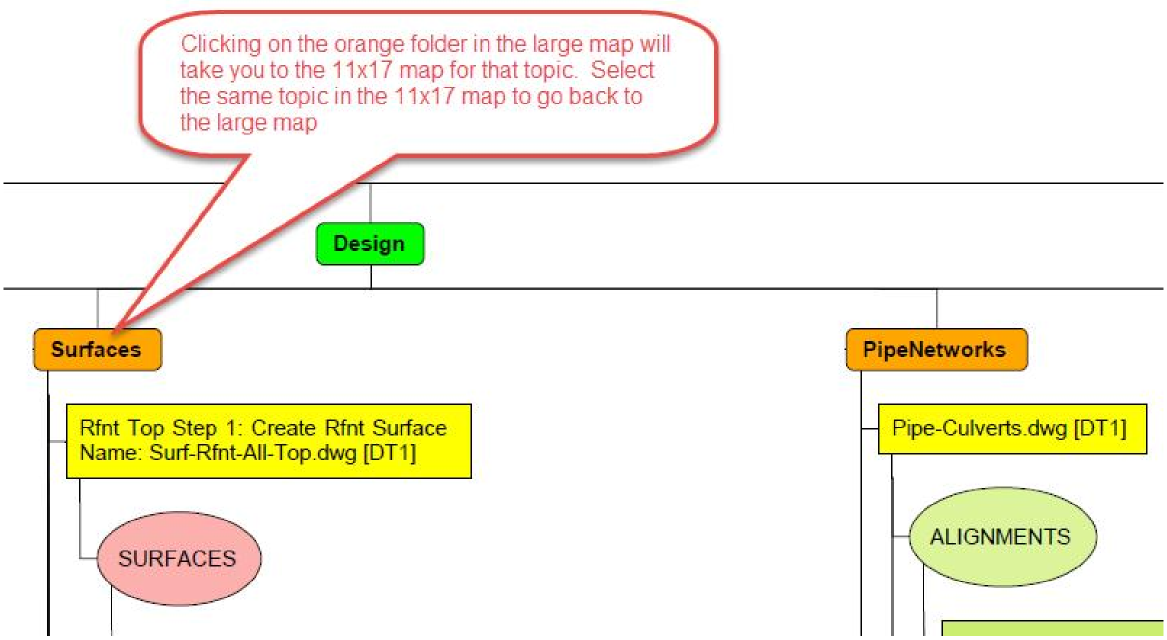
Last updated: 2017-01-27

A map of a typical, basic Civil 3D project has been posted here:

[wisdot-prjct-data-flo.pdf]

It's purpose is to give a visual example of standard files and objects in a Civil 3D project and the connections between the files.

- The pdf contains the large 48x36 map and 11x17 maps for each orange folder or green folder if there are no orange subfolders
- The large map is linked to all the 11x17 maps and vice versa. Hover the cursor over the orange or green folder until it changes, then click on that area



Edgeline data management

Last updated: 2017-06-06

[edgeline-data-mgt.pdf]

The linked PDF shows the relationship among edge line design objects (alignments). Some edge line objects are used in both design and production workflows, and others are only used in one capacity or the other.

There are 3 scenarios shown in the map to detail how these objects are used.

Scenario 1 shows this relationship when there is no modeling required.

Scenario 2 shows this relationship when there is one corridor being modeled.

Scenario 3 shows this relationship when there are multiple corridors being modeled.

Updating settings and styles in production DWG files

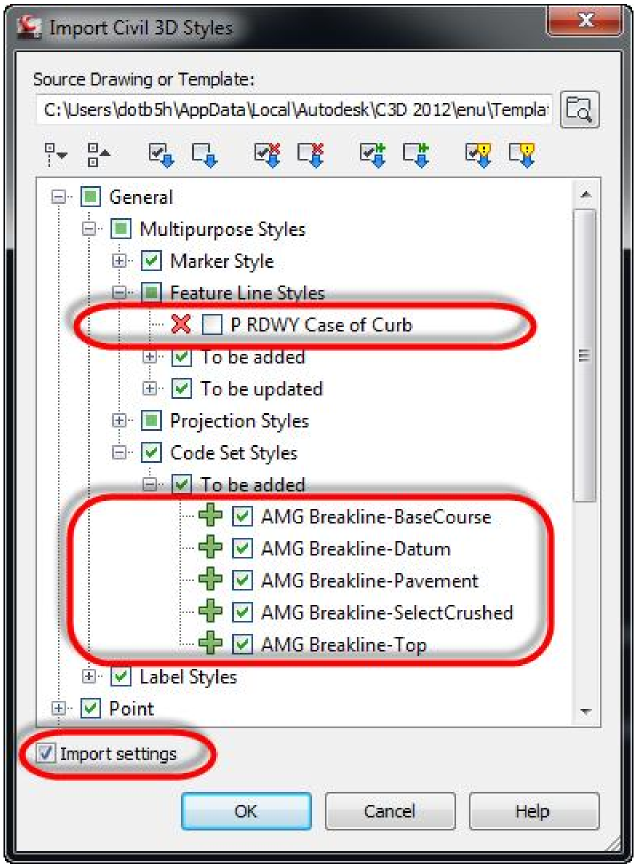
Last updated: 2015-04-17

Most of the settings and styles that control a DWG file are contained within the file. Updates to a template file are not automatically brought into existing files. This topic covers the different methods for updating settings and styles for existing files in Civil 3D.

Civil 3D styles and drawing settings update

Use the import styles tool to update a DWG file's Civil 3D standards with those found in the latest WisDOT template.

1. Open the dwg file you wish to update in Civil 3D.
2. **Manage ribbon > Styles panel > Import**
3. Browse to template file containing standards you'd like to apply to the dwg file. In a standard Windows7 Civil 3D install, WisDOTxx.dwt is found at C:\Users\USERNAME\AppData\Local\Autodesk\C3D 2012\enu\Template\USWI. In a standard WindowsXP Civil 3D install, WisDOTxx.dwt is found at C:\Documents and Settings\USERNAME\Local Settings\Application Data\Autodesk\C3D 2012\enu\Template\USWI.



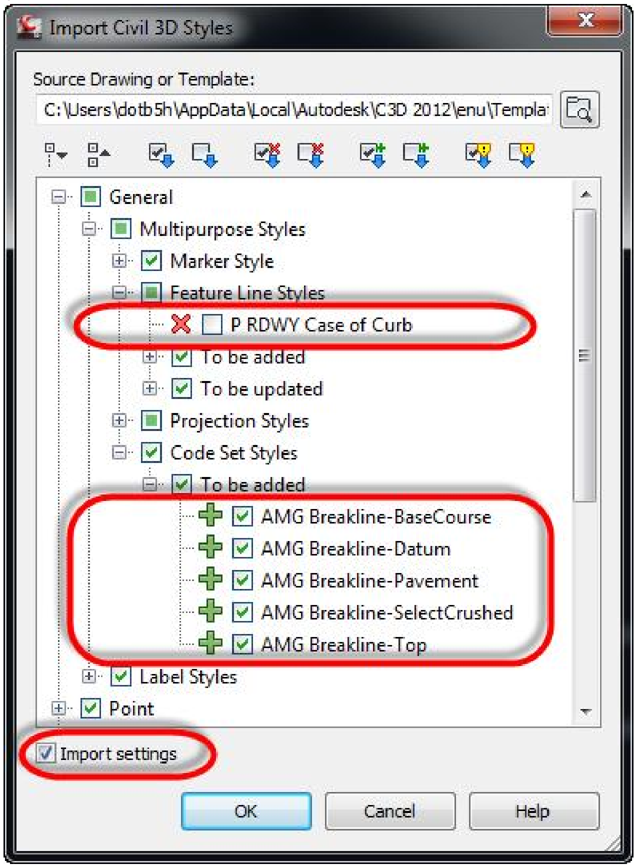
4. In the ***Import Civil 3D Styles*** dialog box, you can review new Civil 3D standards that will be imported. You can also choose to delete standards that are no longer in the WisDOT template - if they aren't in use in the drawing. You can make modifications to the import/delete actions if you wish. You can turn on, or off import drawing settings. Details are available in Civil 3D Help documents.
5. OK Save the dwg file.
6. Consider updating AutoCAD standards also.

AutoCAD standards update

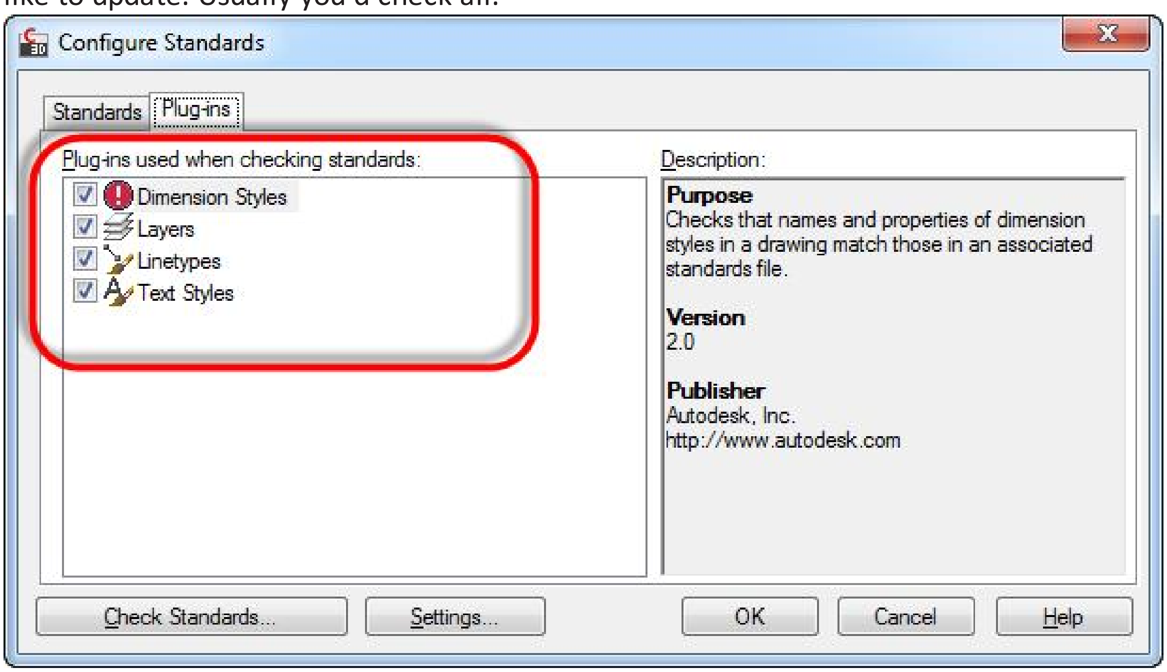
Use the import styles tool to update a DWG file's AutoCAD standards with those found in the latest WisDOT template.

1. Open a new drawing using the template containing the new standards you want applied to the project dwg file.
2. **C3D button > Save As > AutoCAD Drawing Standards**. Remember where you save this DWS file.
3. Open the dwg file you wish to update.
4. **Manage ribbon > CAD Standards panel > Configure**

5. In the ***Configure Standards*** dialog box, ***Standards*** tab, click the + button and browse to you DWS file.

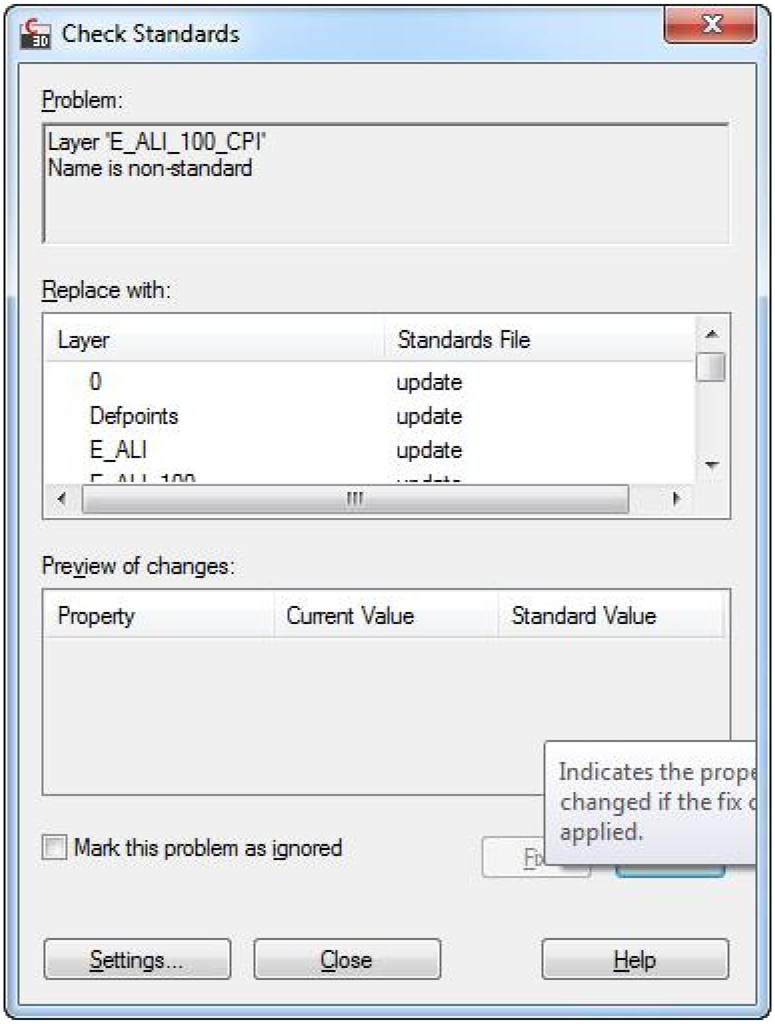


6. In the ***Configure Standards*** dialog box, ***Plug-Ins*** tab, select the types of standards you'd like to update. Usually you'd check all.

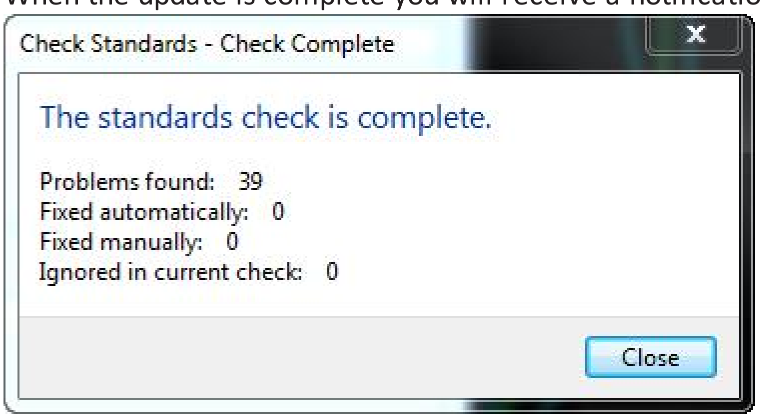


7. Click the Settings... button. The settings should look as shown.

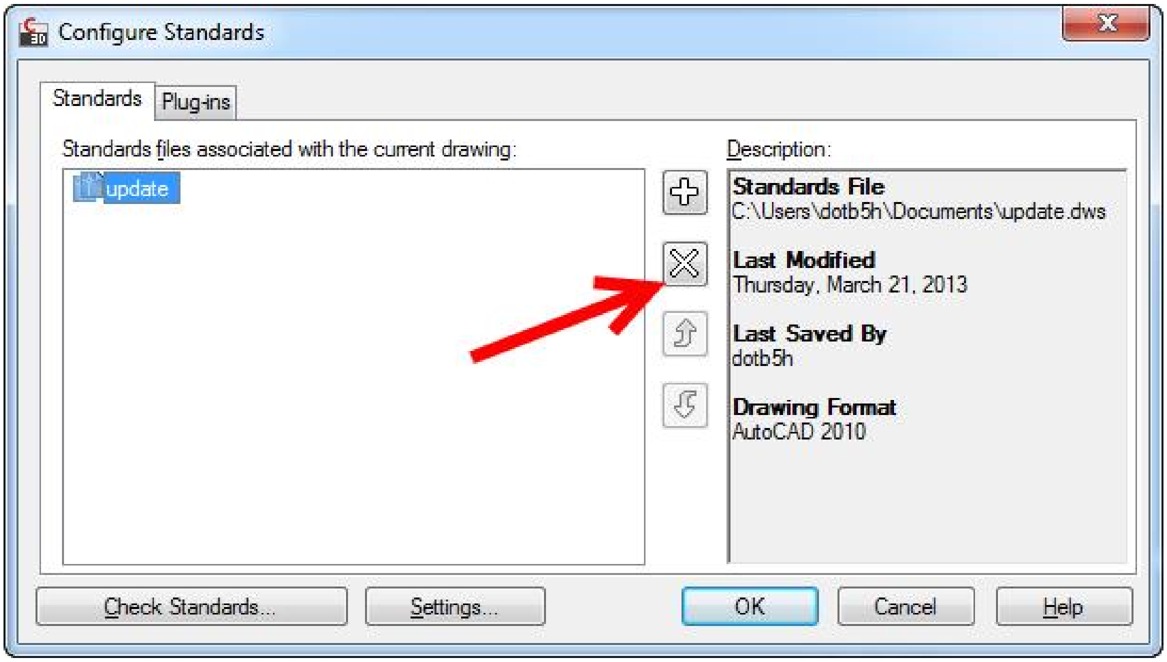
8. Click Check Standards... button
9. The tool will notify you of DWG layers that are no longer in the DWS standards file. You can cycle through this by clicking Next. The layer will not be deleted from the dwg file.



10. When the update is complete you will receive a notification with update statistics.



11. Close the ***Check Standards*** dialog box
12. **Manage ribbon > CAD Standards panel > Configure**
13. Remove the DWS file from the drawing by clicking the X button. Click OK to close the ***Configure Standards*** dialog box.



14. Save the DWG file.

Migrating blocks between Civil 3D versions

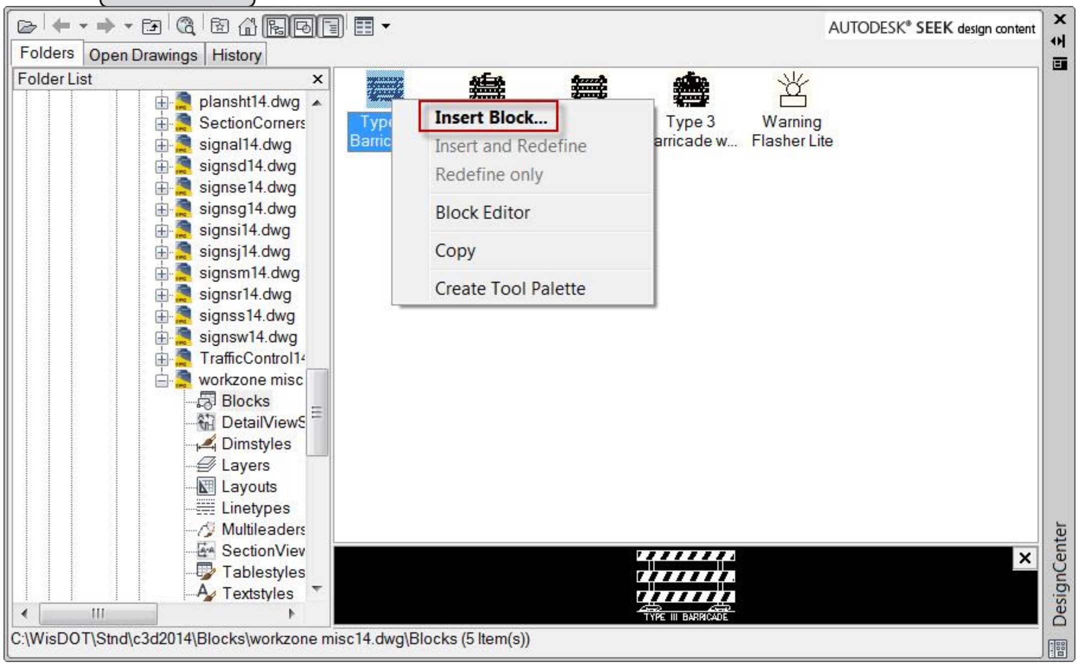
Last updated: 2015-04-17

It is good practice when migrating blocks to insert them into a blank out-of-the-box template. This way we avoid saving forward any old settings contained in the drawings within which these older blocks reside. Depending on the scale of migration we can accomplish this a couple of different ways.

Workflow 1 – Migrating a small number of blocks

1. Start a new block library drawing using the out-of-the-box acad.dwt template found here:
    - **C:\Users\<user name>\appdata\local\autodesk\c3d 2014\enu\template**
2. Insert older blocks using Design Center
    - Open ***Design Center***, and browse to the source drawing containing the blocks to be migrated. The reason this workflow is designed for migrating a small number of blocks is because Design Center only allows one block to be inserted at a time. That is not ideal for migrating hundreds of blocks, but it does work well for smaller numbers.
    - Open the ***Blocks*** section in the source drawing in Design Center, and drag each block into model space one at a time. Otherwise, right-click on each block and

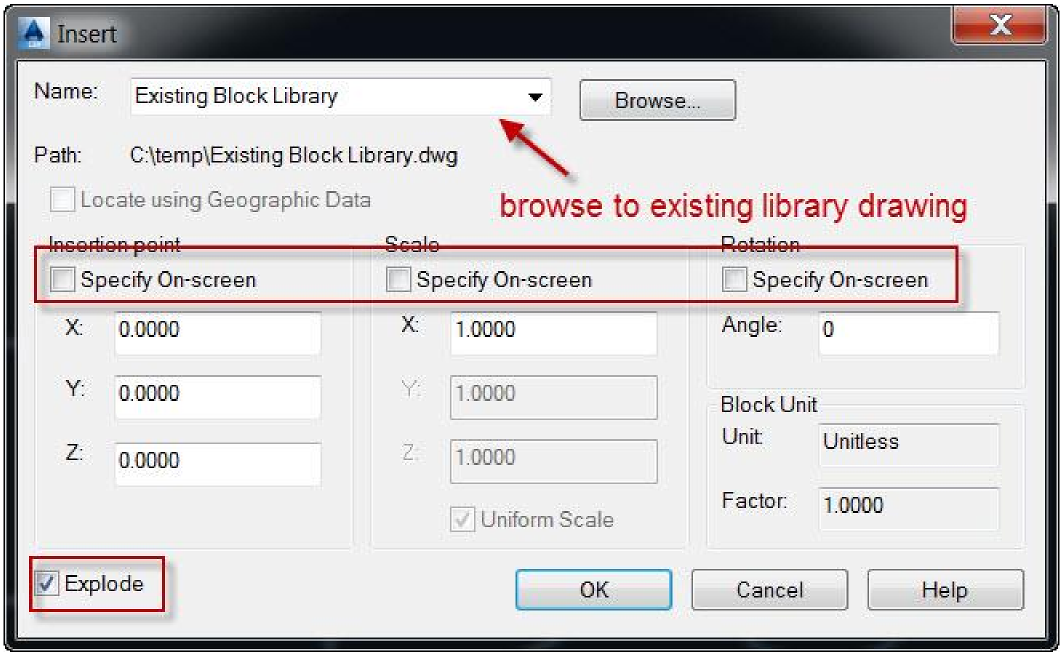
choose Insert Block.



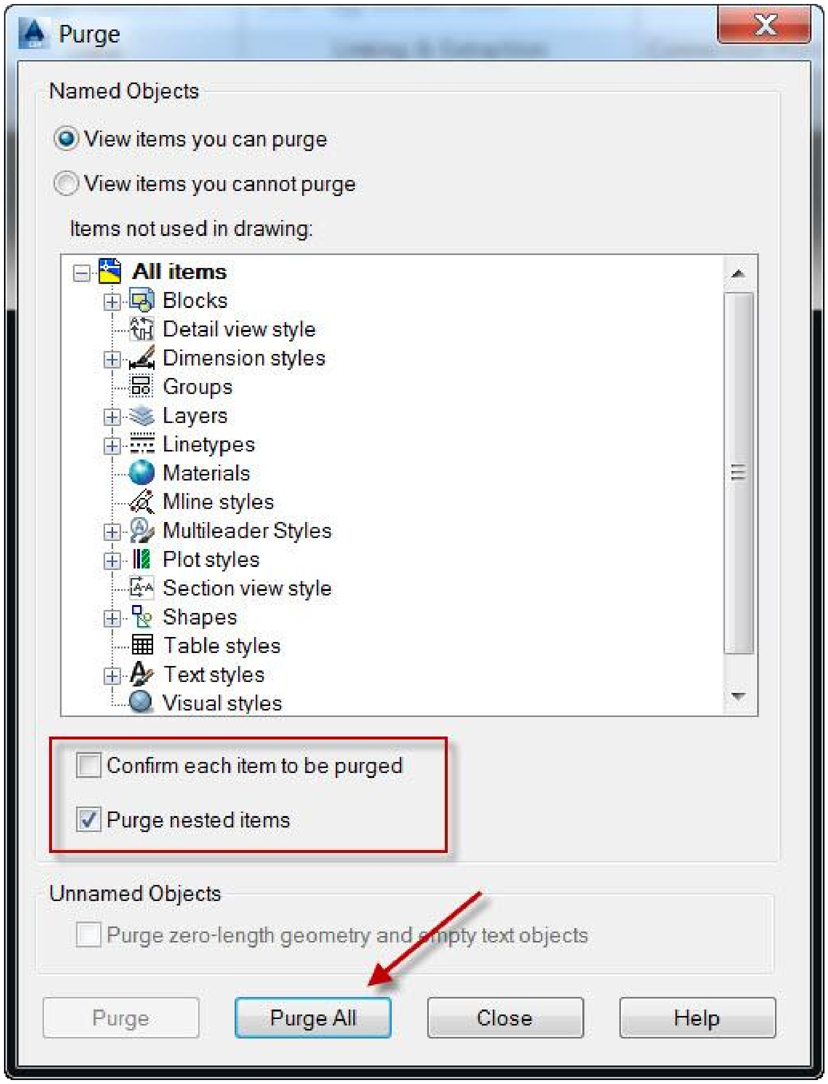
3. Save the new block library drawing in the appropriate location with the appropriate name, and the newly migrated blocks are now ready to be used.

Workflow 2 – Migrating many blocks

1. Start a new block library drawing using the out-of-the-box acad.dwt template found here:
   - **C:\Users\<user name>\appdata\local\autodesk\c3d 2014\enu\template**
2. Insert and explode existing block library drawing
   - Click on the ***Insert*** tab of the Ribbon and then select the Insert button on the ***Block*** panel. In the Insert dialog box browse to the existing block library drawing you wish to migrate. Be sure that the ***Insertion point***, ***Scale***, and ***Rotation*** options are all unchecked. Be sure the Explode option is checked on. This will insert the entire drawing into the new 2014 drawing template and will explode into its individual objects.



- Next we will run a few commands in order to clean unwanted items out of the new block library drawing.
    - Type **PURGE** in the command line. Be sure that the option for ***Confirm each item to be purged*** is unchecked and that the option for ***Purge nested items*** is checked on. Click on the Purge All button, and close the dialog box when the command is finished.



- Type **–PURGE** in the command line. Type **R** to select the option Regapps. Hit enter to select the default asterisk for name of regapps to purge. This will select all regapps. Type **N** when prompted to verify each name to be purged. This will get rid of any 3rd party apps running in the background.
- Type **AUDIT** in the command line. Type **Y** when prompted to fix any errors detected in the drawing.

- Save the new block library drawing in the appropriate location with the appropriate name, and the newly migrated blocks are now ready to be used.

AutoCAD fundamentals

AutoCAD basic creation and editing

Last updated: 2017-11-28

Total video time: 19:24

There are several tools available in Civil 3D that are intended for basic geometry object creation. These basic objects can either be an end product such as with a standard detail layout or they can be used as a foundation from which to create Civil 3D objects. This section will focus on using basic Line, Polyline, 3D Polyline, Rectangle, Curve and Circle tools along with basic Object Snap settings to create geometry for a standard detail drawing.

Osnap & Line

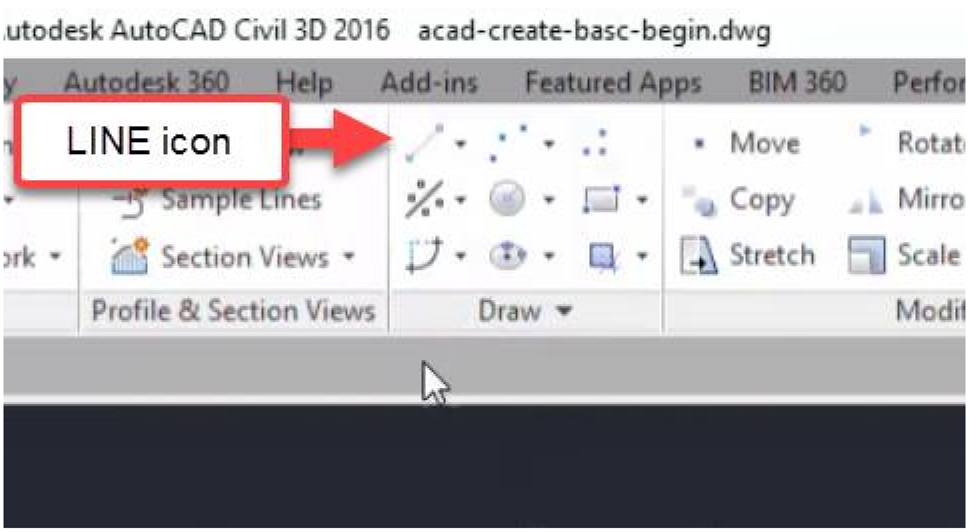
Exercise files: acad-basc-creat-edit-data-c3d16.zip

Start with acad-basc-creat-edit-begin.dwg

acad-basc-creat-edit-01.mp4 5:00

Line

One of the most basic geometry objects available is the Line. In Civil 3D, a single Line has two vertices with independent locations and elevations. The Line is often used as a starting point or guide by which other objects are laid out.



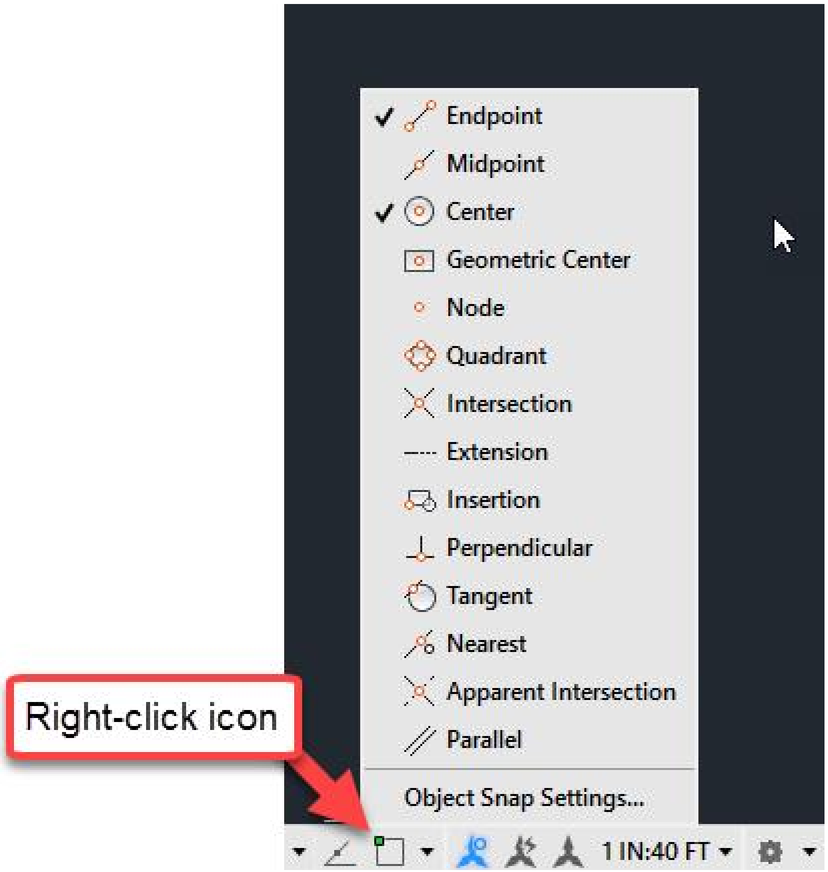
1. Open acad-basc-creat-edit-begin.dwg
2. **Ribbon > Home tab > Draw panel > Line icon > Create Line**
    A. Move cursor to location of start point
        I. Left-click
    B. Move cursor to location of end point
        I. Left-click
3. Enter
    A. repeat steps 2.A-2.B
4. Activate ERASE command: **E**
    A. Enter
        I. select both Lines create in steps 2-3
    B. Enter

Info: Keying Enter immediately after a command is executed will repeat the last command (see step 3 above)

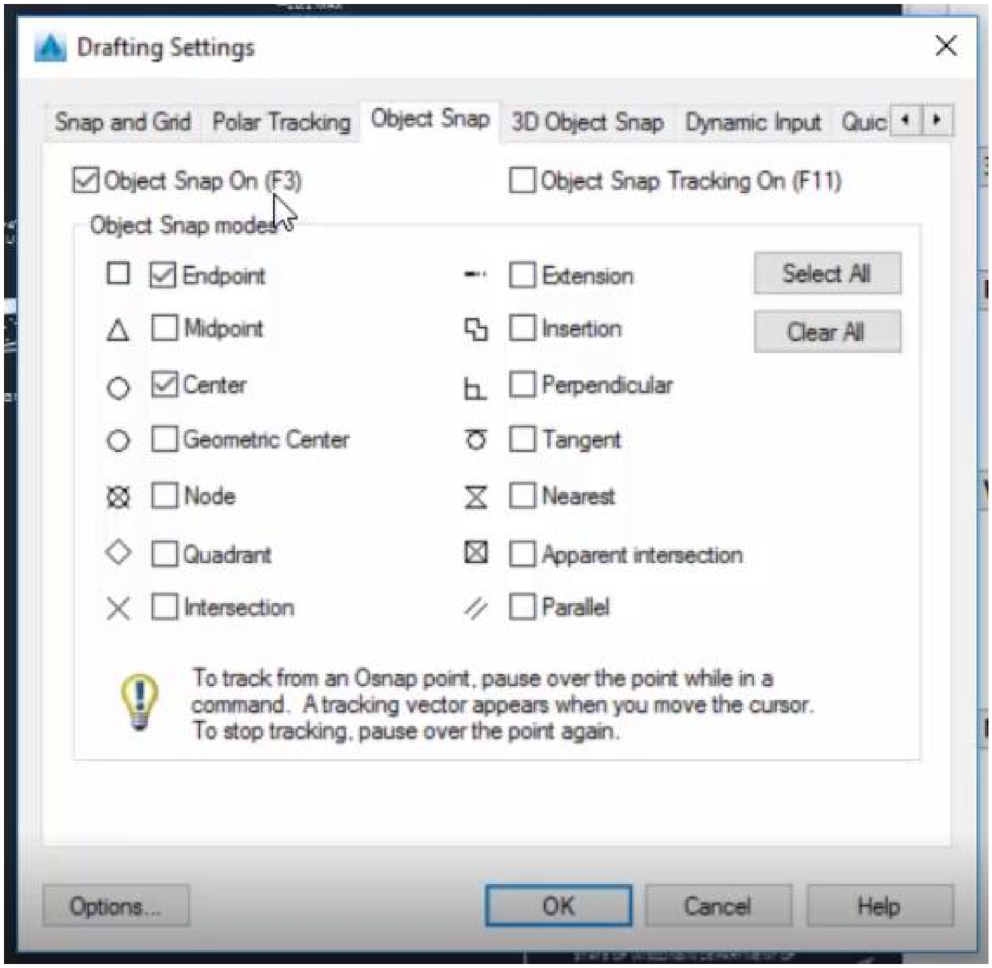
Object snaps

When laying out object geometry or specifying a location when prompted in a command, it is often helpful to be able to reference existing object geometry. The object snap tool is built for just that. When Object Snaps are turned on (as a system variable) and you are prompted to specify a location within a command you can "snap" to the exact point desired based on the type of Object Snap turned on simply by moving the cursor within an Object Snap tolerance distance from that point. There are multiple ways to turn on Object Snaps for either "one-time" use or to remain on until turned off. We will cover these and other uses of Object Snaps in a later training module. This section is intended to show what Object Snaps are and provide a few examples of their use.

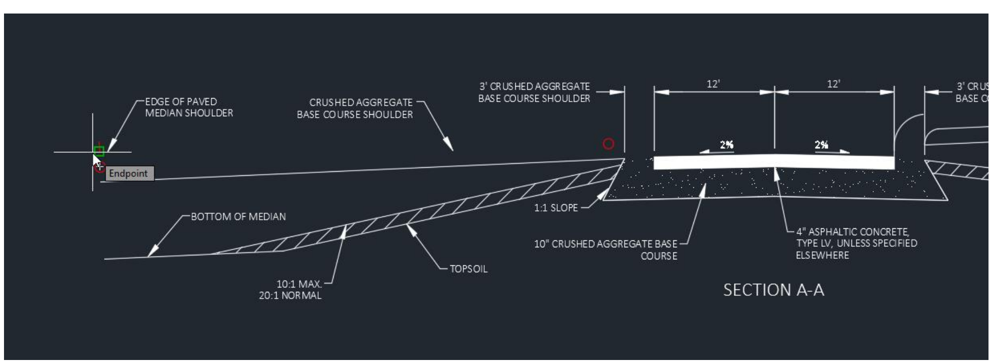
1. Continue working in acad-basc-creat-edit-begin.dwg
2. **Status Bar > right-click Object Snap icon**
    A. Endpoint: checked
    B. CEnter: checked



3. **Status Bar > right-click Object Snap icon**
    A. Object Snap Settings
        I. Object Snap On = checked
        II. OK



4. F3
5. F3
6. **Ribbon > Home tab > Draw panel > Line icon > Create Line**
   A. Move cursor near bottom endpoint of red guiding line on left side of Section A-A
   B. Observe Endpoint Object Snap glyph appear
      I. Left-click
   C. Move cursor near bottom endpoint of red guiding line on right side of Section A-A
      I. Left-click



Info: F3 is a "hotkey" that will toggle Object Snaps on/off

Tips: F3 A common theme you will notice in Civil 3D is that there are multiple ways to access the same commands. Toggling Object Snaps on via Object Snaps Settings vs F3 hotkey is only one example. With experience you will find the workflows you are comfortable with, thus reducing the some of the complexity of Civil 3D.

Polyline

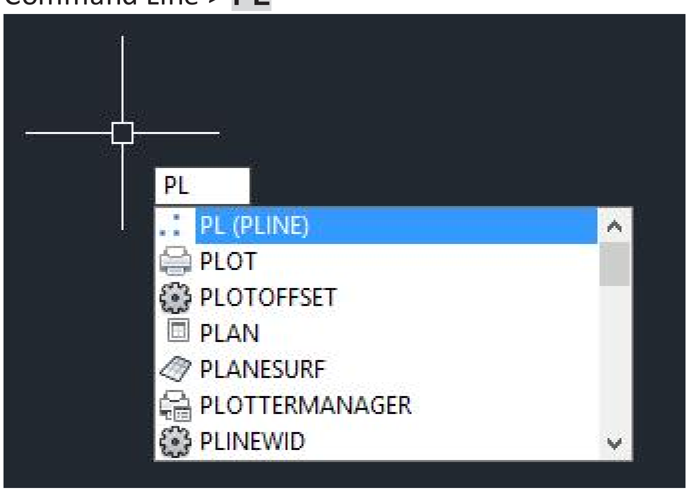
Exercise files: acad-basc-creat-edit-data-c3d16.zip

Start with acad-basc-creat-edit-01.dwg

acad-basc-creat-edit-02.mp4 4:53

A Polyline is arguably one of the most versatile basic AutoCAD drawing objects. It can be edited in many ways including joining multiple linear geometry objects to one, adding/removing vertices, adding/removing curves and more. In addition, many Civil 3D objects can be created from a Polyline, thus allowing you to set geometry in place using the simpler Polyline object then generate more powerful objects necessary for Civil 3D workflows. This section focuses on basic Polyline creation. It should be noted that when adding elevation data to your objects, a Line can have different elevations at start and end vertices, while a Polyline can have only one elevation for all vertices.

1. Start with acad-basc-creat-edit-01.dwg
2. Command Line > **PL**



   A. Spacebar
      I. Move cursor near red guiding circle on left side of Section A-A
         a. Left Click

II. Move cursor near red guiding circle on just to the left of of Section A-A
    a. Left Click
III. Mid-command option: A
    a. Enter
    b. Move cursor near endpoint of subgrade Line
        i. Left Click
        ii. Enter

3. Zoom out using mouse wheel
    A. Command Line > **PL**
        I. Begin drawing Polyline border using outermost guiding circles
        II. Command line prompt: Close

Info: PL is a command alias that will activate the Polyline command. A command alias is an alternative to activating a command from the Ribbon or typing the full name of the command on the command line. Simply begin typing any command alias when your drawing area (ie Modelspace) is active to call it up on the command line

Info: Keying Spacebar executes an active command the same way as keying Enter

3D polyline & rectangle

Exercise files: acad-basc-creat-edit-data-c3d16.zip

Start with acad-basc-creat-edit-02.dwg

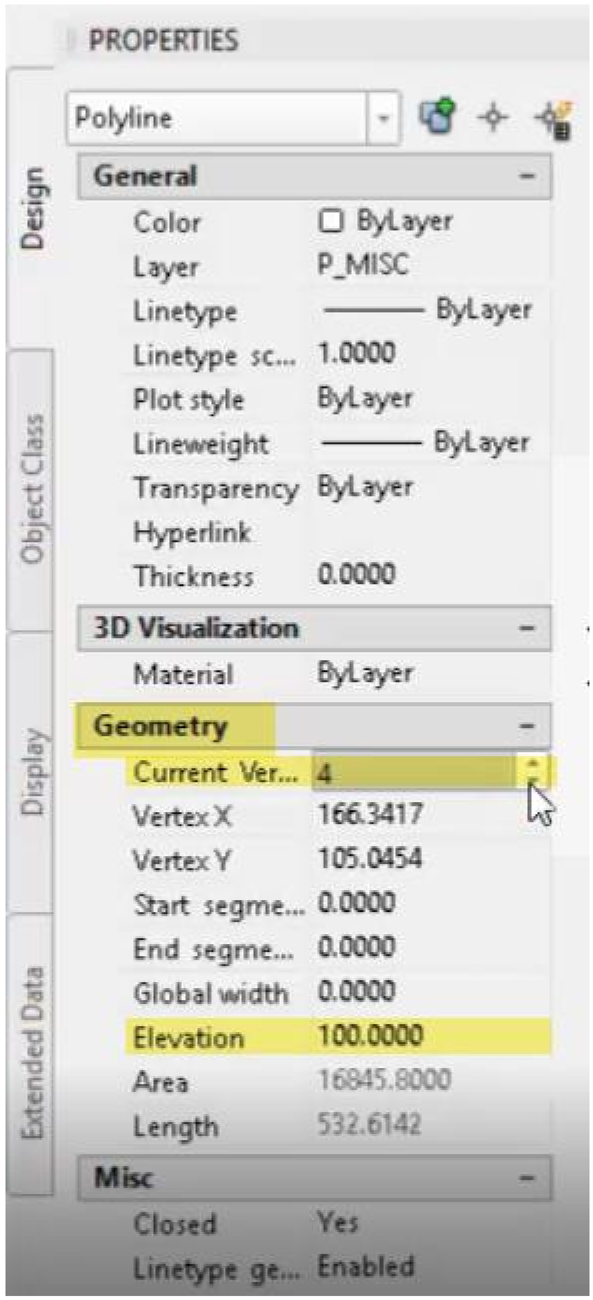
acad-basc-creat-edit-03.mp4 5:25

3D Polyline

A 3D Polyline behaves in many ways the same as a Polyline. The chief difference is that a 3D Polyline can have different elevations at each of its vertices. Having multiple vertex elevations assigned ahead of time can be useful when creating a Civil 3D object such as a Feature Line, Surface Breakline, or Pipe Network from a 3D Polyline.

1. Open acad-basc-creat-edit-02.dwg
2. Select Polyline border
    A. **Properties palette > expand Geometry > Elevation = 100**
        I. Cycle Current Vertex
        II. Observe same elevation for all vertices
    B. Delete

3. **Ribbon > Home tab > Draw panel > Draw flyout > 3D Polyline button**
   A. Begin drawing 3D Polyline border using outermost guiding circles
   B. command line: C
      I. Enter
   C. **Select 3D Polyline > Properties palette > expand Geometry > Elevation = 100**
      I. a. Cycle Current Vertex
         b. Observe different elevation for other vertices



Rectangle

The Rectangle command creates a closed Polyline with rectangle geometry. This simplifies the creation of a Polyline using the common rectangle shape.

1. Continue working in acad-basc-creat-edit-02.dwg
2. Select 3D Polyline border
    A. delete
3. **Ribbon > Home tab > Draw panel > Rectangle button**
    A. Specify first corner
        I. Snap to upper left guiding circle
    B. Specify second corner
        I. Snap to lower right guiding circle
4. Enter
    A. Repeat 3.A - 3.B around "6" text on left side of drawn objects
5. Command line: **RECT**
    A. Enter
        I. Snap to guiding circle around "6" text on right side of drawn objects
        II. **D**
            a. Enter
        III. `2.8`
            a. Enter
        IV. `11.6`
            a. Enter, F3
        V. Move cursor to upper right quadrant relative to Rectangle starting corner
            a. Left-click

Curve & Circle

Exercise files: acad-basc-creat-edit-data-c3d16.zip

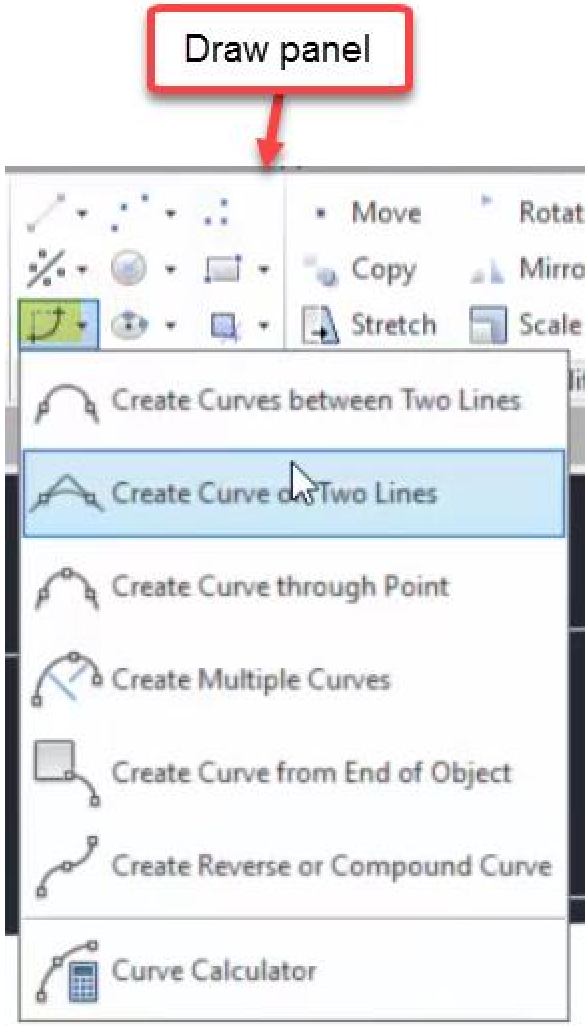
Start with acad-basc-creat-edit-02.dwg

acad-basc-creat-edit-04.mp4 4:06

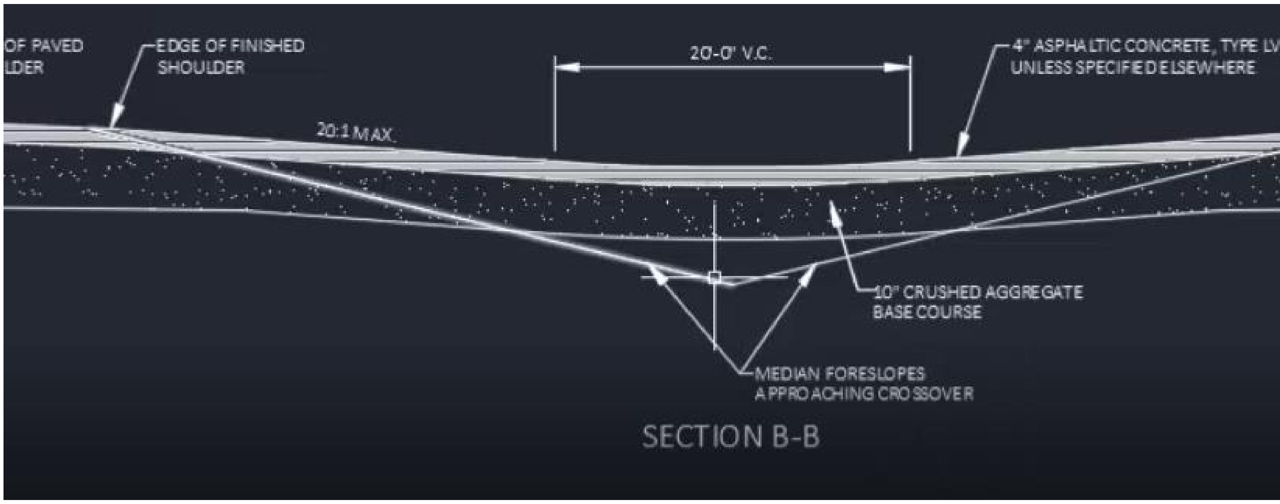
Curve

The Curve command includes several variations that use existing reference objects (ie tangent Lines) to create single radius, compound, or reverse curves. The object created is referred to as an Arc. The curve command can be helpful when laying out geometry from which to create a smart Civil 3D object.

1. Continue working in acad-basc-creat-edit-02.dwg
2. **Ribbon > Home tab > Draw panel > Curve flyout > Create Curve on Two Lines**
   A. Select edge of paved median shoulder (Section A-A) as first tangent
   B. Select left edge of asphalt concrete hatch boundary as second tangent
   C. Radius: **3**
      I. Enter



3. **Ribbon > Home tab > Draw panel > Curve flyout > Create Curves between Two Lines**
   1. Select one Section B-B Median Foreslope Line as first tangent
   2. Select other Section B-B Median Foreslope Line as second tangent
      1. **R**
         1. Enter
      2. `SPECIFY RADIUS: 20`



Circle

The Circle command creates an object with circular geometry. Civil 3D refers to the object as a Circle. If a Circle object is trimmed, it becomes an Arc object. Several options are built into the command from which to dictate the radius and location of the Circle.

1. Continue working in acad-basc-creat-edit-02.dwg
2. **Ribbon > Home tab > Draw panel > Circle flyout > CEnter, Radius**F
   A. Ensure CEnter Object Snap is toggled on: F3
   B. Pan and Zoom to Plan View, R3-4 signage
   C. Move cursor over existing signage Arcs to activate CEnter Object Snap glyph
      I. Left-click
      II. `SPECIFY RADIUS OF CIRCLE: 2.4`

3. Zoom Extents

Object Selection

In order to direct commands or apply edits to an object, the objects must be selected. In many cases this can be either before or after a command is activated. Selecting an object is also a good way to gather information about the object via the Properties palette. Objects can be selected using a variety of methods. In this section we will cover simple cursor selection, Window, Crossing, Lasso, Fence and Quick Selection. We will also cover ways to deselect, append and edit the current selection without need to start your selection over from scratch.

Exercise files: acad-basc-creat-edit-data-c3d16.zip   Start with acad-basc-creat-edit-end.dwg   acad-basc-creat-edit-05.mp4 6:44

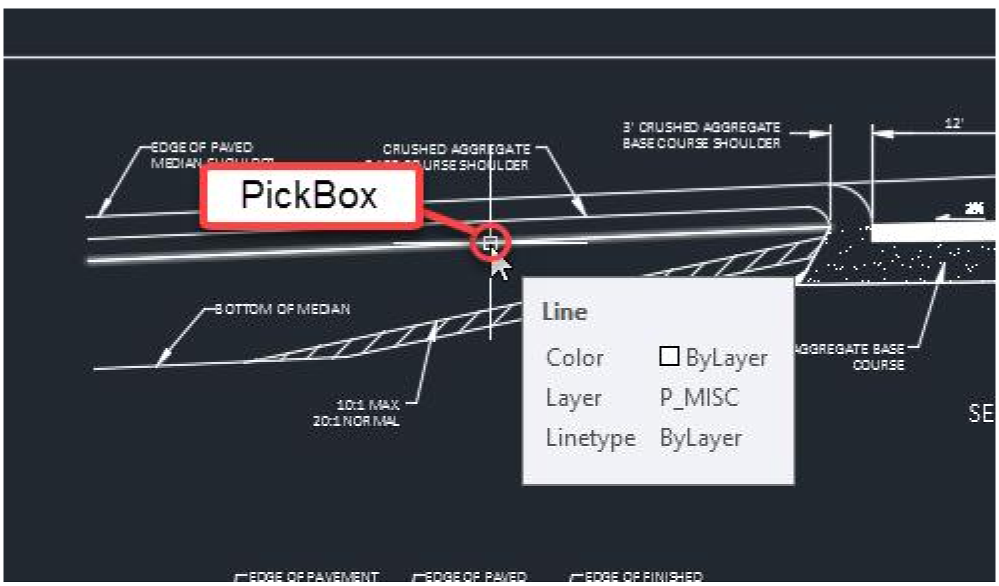
Properties palette population

When the Properties palette is open, selecting an object or group of objects will populate the Properties palette with object information common to the entire selection.

1. Open acad-basc-creat-edit-end.dwg
2. Activate the Properties palette
    A. Command line > **PROPERTIES**
3. Move cursor over Line representing subgrade
    A. Left-click Line geometry
    B. Observe population of Properties palette
4. esc

Cursor selection

1. Continue working in acad-basc-creat-edit-end.dwg
    A. move cursor PickBox over any object geometry in Modelspace
        I. Left-click to select object
        II. esc

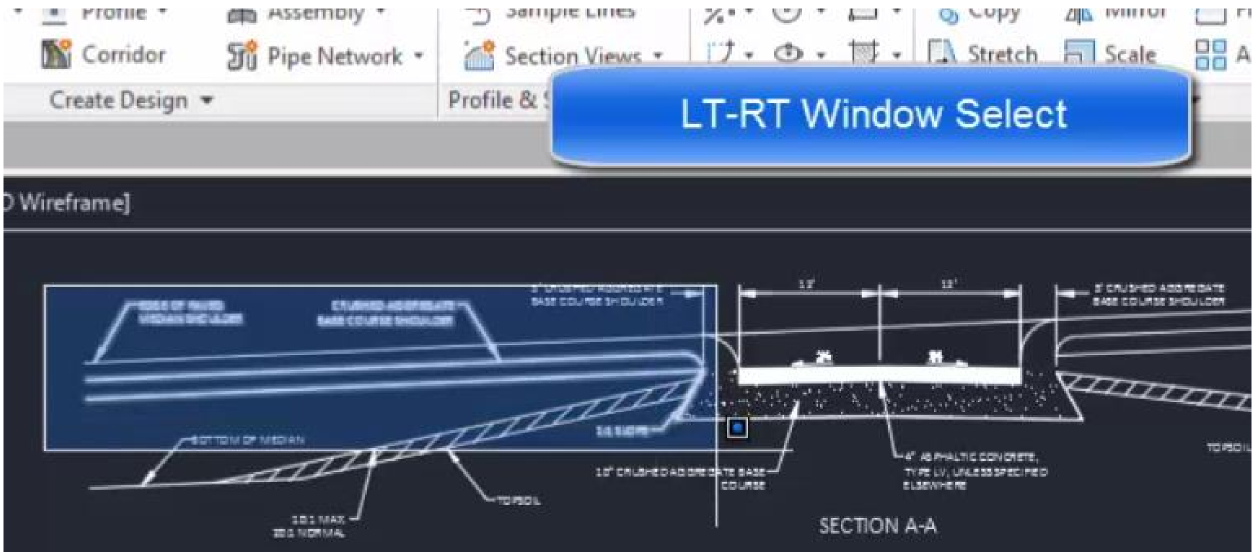


LT-RT Window Select

All objects completely enclosed by a Window Selection will be included in the Selection Set. Objects to be selected are highlighted white.

1. Continue working in acad-basc-creat-edit-end.dwg
2. Move cursor left of desired object(s)
    A. Left-click to activate Window Selection
    B. Move cursor right of desired object(s)

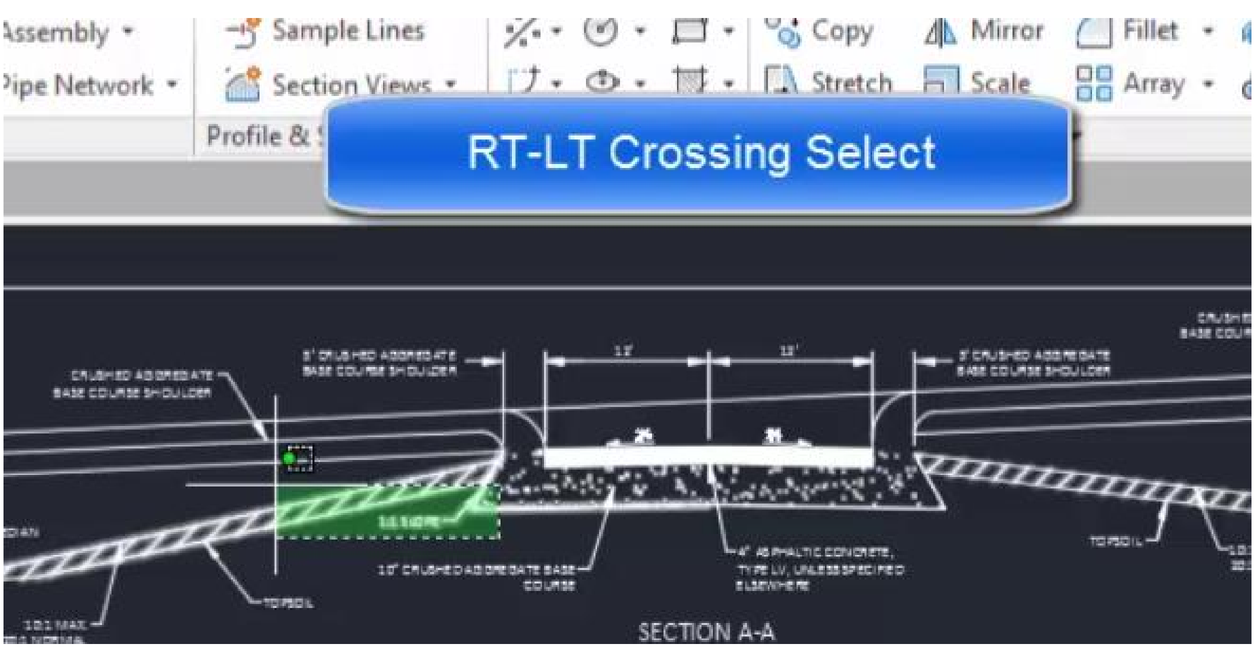
   C. Left-click to specify selection area
   D. esc



RT-LT Crossing Select

All objects at least partially enclosed by a Window Selection will be included in the Selection Set. Objects to be selected are highlighted white.

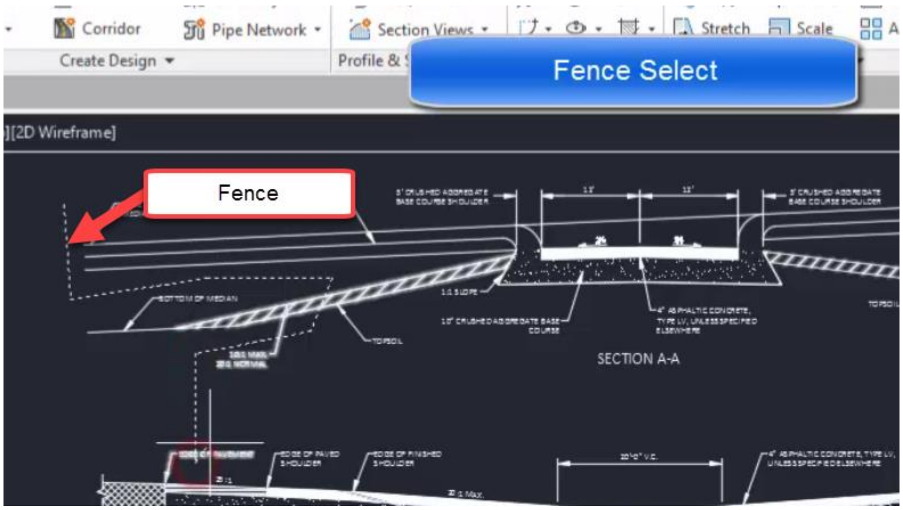
1. Continue working in acad-basc-creat-edit-end.dwg
2. Move cursor right of desired object(s)
   A. Left-click to activate Crossing Selection
   B. Move cursor left of desired object(s)
   C. Left-click to specify selection area
   D. esc



Fence Select

All objects crossed by a Fence Selection path will be included in the Selection Set. Objects to be selected are highlighted white.

1. Continue working in acad-basc-creat-edit-end.dwg
2. Move cursor to desired location of Fence
    A. Left-click to activate Selection
        I. Command Line > **F**
        II. Enter
            a. Left-click to dictate additional Fence path vertices
            b. Enter
            c. Esc

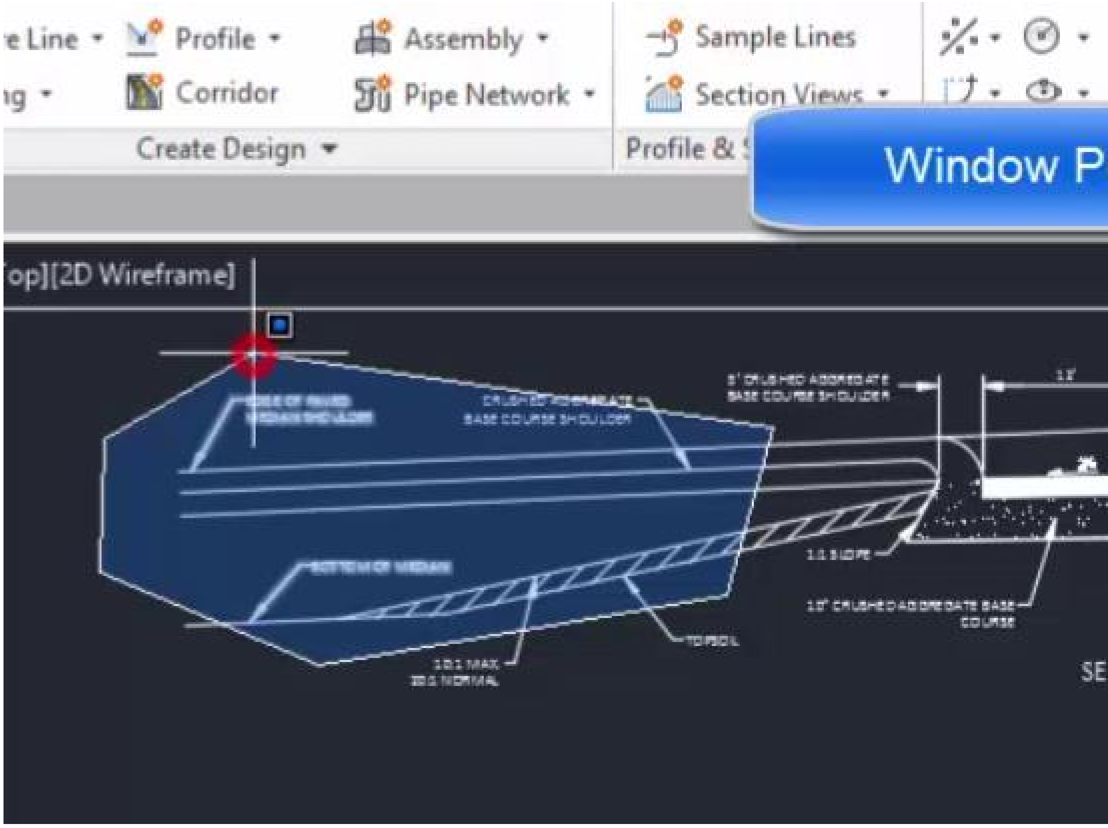


Window Polygon Select

Similar to the standard Window Selection, all objects completely enclosed by a Window Polygon Selection will be included in the Selection Set. Objects to be selected are highlighted white.

1. Continue working in acad-basc-creat-edit-end.dwg
2. Move cursor to desired initial vertex of Window Polygon
    A. Left-click to activate Selection
        I. Command Line > **WPF**
        II. Enter
            a. Moving clockwise, Left-click to dictate successive Window Polygon vertices
            b. Enter

c. Esc

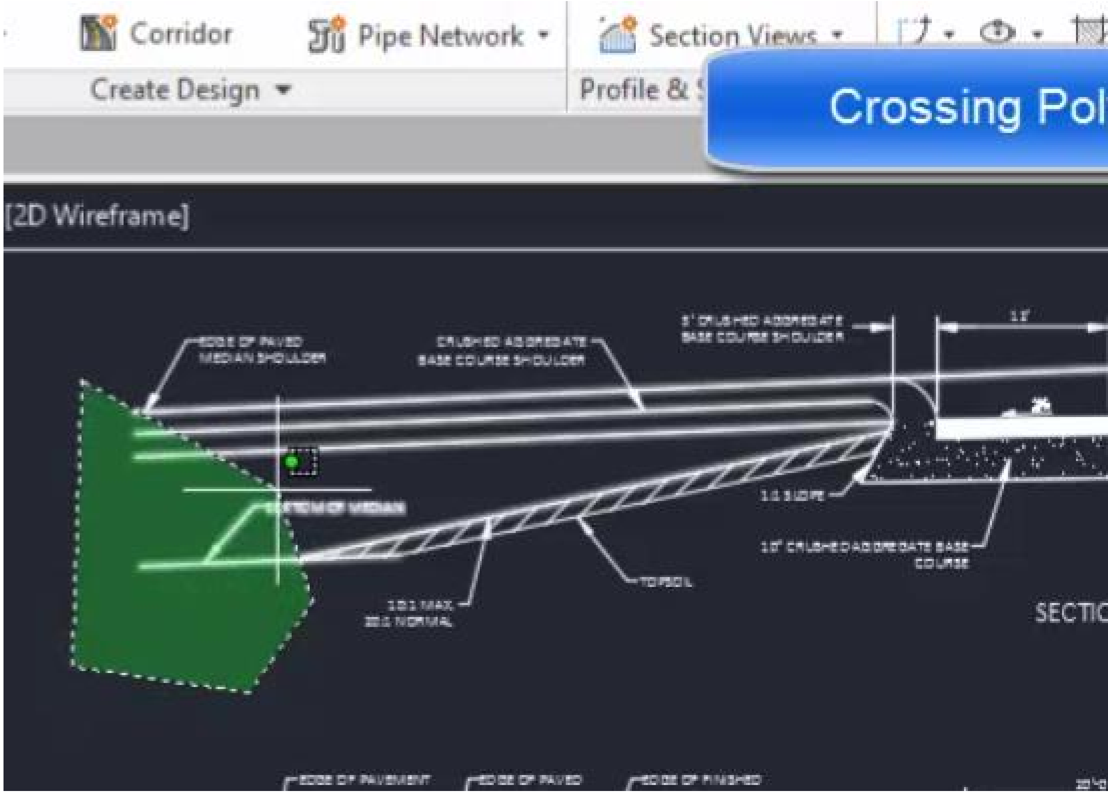


Crossing Polygon Select

Similar to the standard Crossing Selection, all objects at least partially enclosed by a Crossing Polygon Selection will be included in the Selection Set. Objects to be selected are highlighted white.

1. Continue working in acad-basc-creat-edit-end.dwg
2. Move cursor to desired initial vertex of Window Polygon
    A. Left-click to activate Selection
        I. Command Line > **WP**
        II. Enter
            a. Left-click to dictate successive Window Polygon vertices
            b. Enter

c. Esc

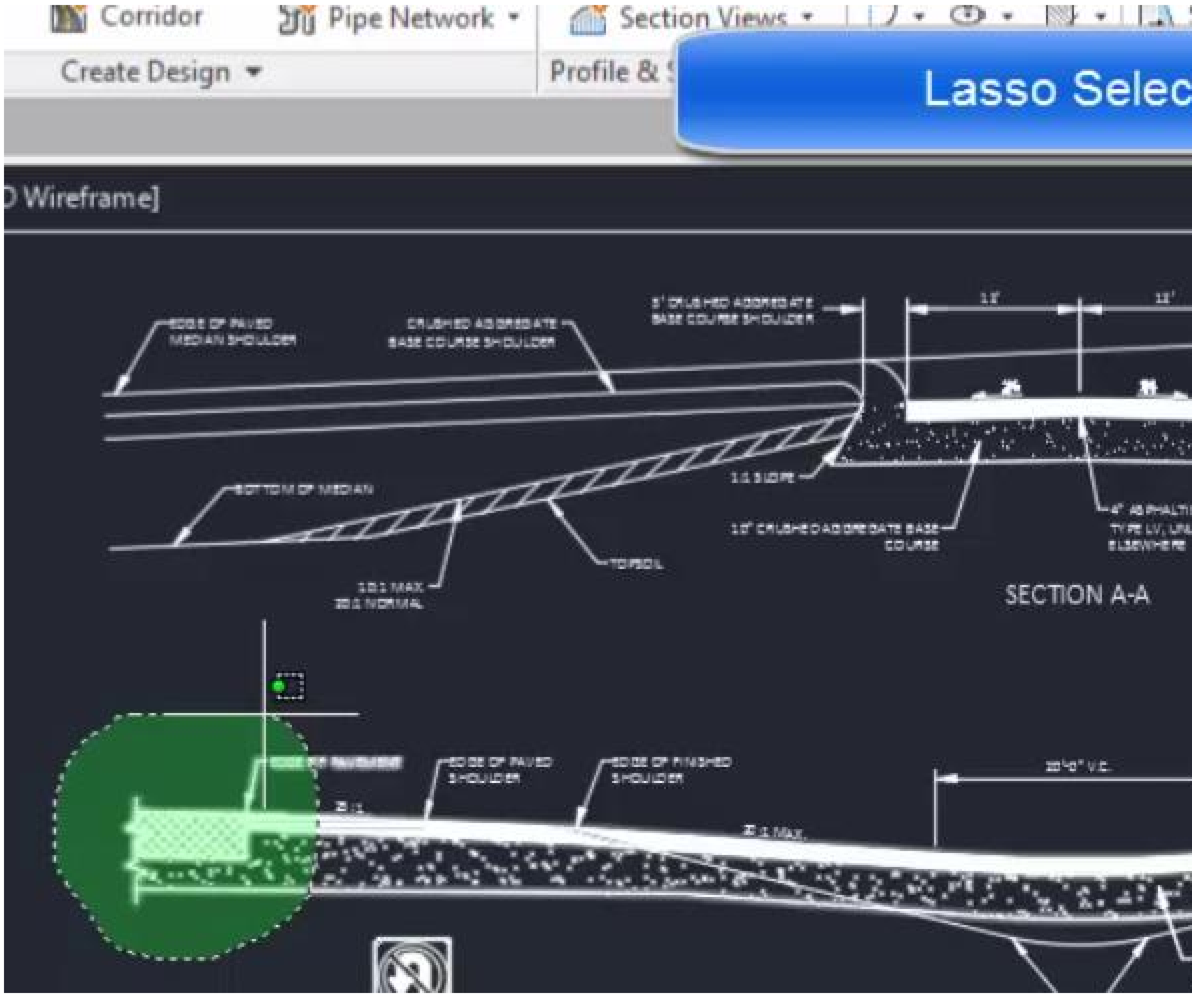


Lasso Select

Similar to both standard Window/Crossing or Polygon Window/Crossing Selection, a Lasso selection can be applied either clockwise or counter-clockwise. Objects to be selected are highlighted white.

1. Continue working in acad-basc-creat-edit-end.dwg
2. Move cursor to desired initial start point of Lasso Selection
    A. Left-click and hold mouse button to activate Lasso Selection
        I. Move cursor along desired boundary of Lasso Selection (begin path left of start point for crossing-type and vice-versa)
        II. Release mouse button

III. esc



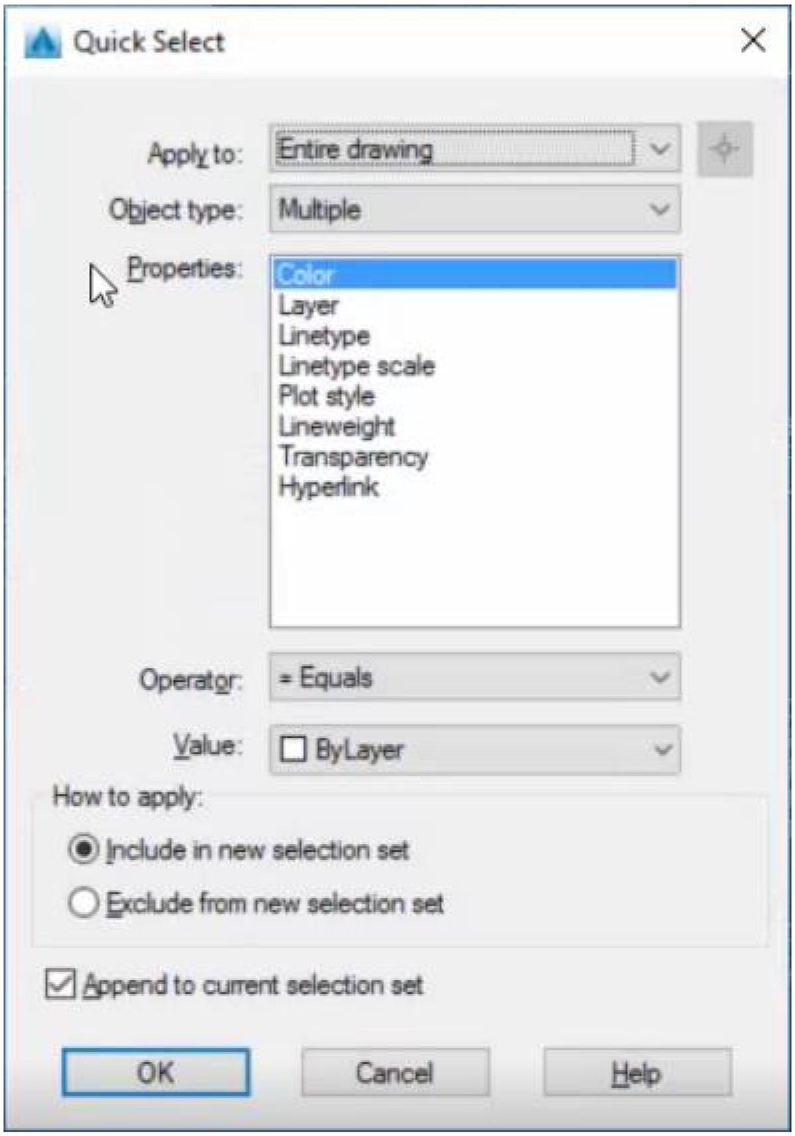
Quick Select

The Quick Select tool allows you to build a selection query based on object properties. The query can either be inclusive (select what is queried) or exclusive (select all but what is queried). The query can also be set to append or replace any current selection set.

1. Continue working in acad-basc-creat-edit-end.dwg
    A. Command line > **QSELECT**
        I. Apply to = Entire drawing
        II. Object type = Line
        III. Operator = Select All
        IV. Include in new selection set = checked
        V. Append to current selection = checked
        VI. OK
    B. Command line > **QSELECT**
        I. Apply to = Entire drawing
        II. Object type = Text

III. Operator = Equals
IV. Value = CalibriLight
V. Include in new selection set = checked
VI. Append to current selection = checked
VII. OK

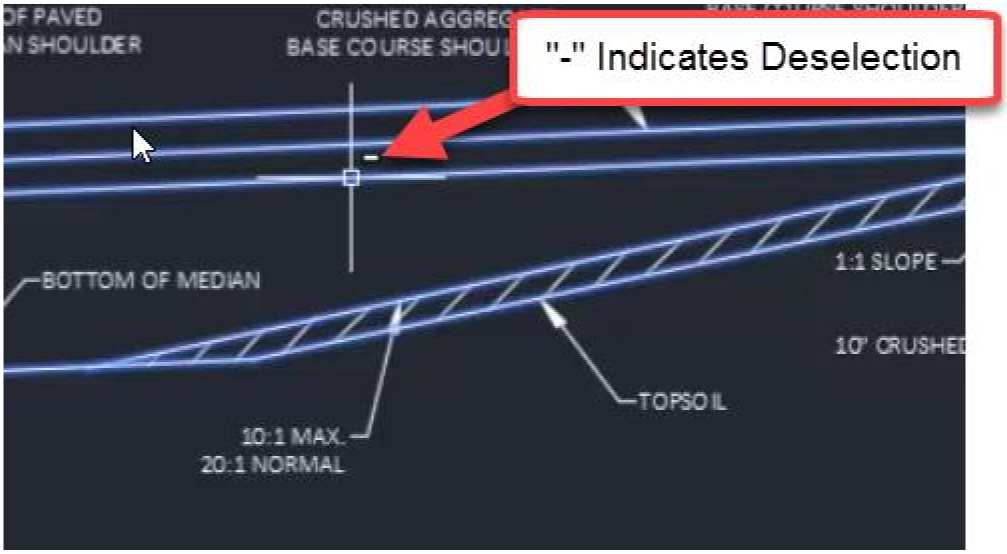
C. esc



Editing current selection

Once multiple objects are selected, you may wish to remove certain objects from the selection set. To switch selection tools from selecting to deselecting, hold the Shift key while performing the selection in Modelspace. A "-" glyph indicating deselection will appear next to the cursor when holding the Shift key and hovering over an object in the current selection set.

1. Continue working in acad-basc-creat-edit-end.dwg
    A. Select multiple objects using RT-LT Crossing Select method
    B. Hold Shift
        I. Use cursor selection to deselect objects from the selection set
    C. esc
    D. D



Grips

When an object is selected, Grips will be displayed along the object. These Grips make various geometric object edits available. They are generally located at key points along or adjacent to an object (ie Line endpoints/midpoint or Arc endpoints/midpoint/radius point. To edit an object based on a Grip, click on a Grip or hover over it and choose from available Grip options. There are several advanced object edits that can be performed using grips. Many of these will be covered in a later training module. This section will cover a sample of basic grip functions. This is intended to provide a general understanding of grips as a foundation for further independent exploration.

Tips: When performing grip edits, displacement values can be keyed in or specified by mouse click.

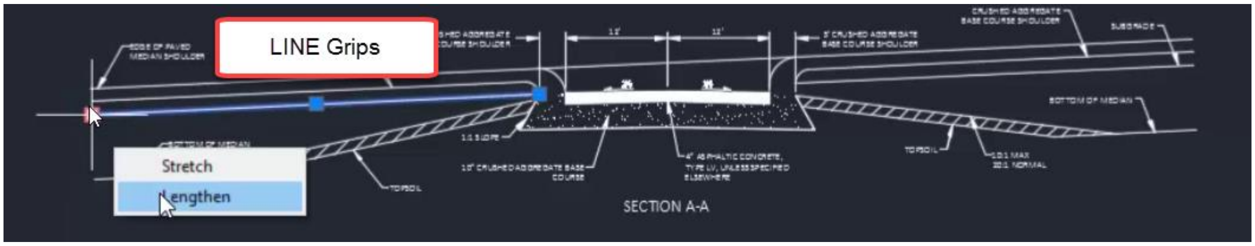
Exercise files: acad-basc-creat-edit-data-c3d16.zip

Start with acad-basc-creat-edit-end.dwg

acad-basc-creat-edit-06.mp4 3:23

Line grips

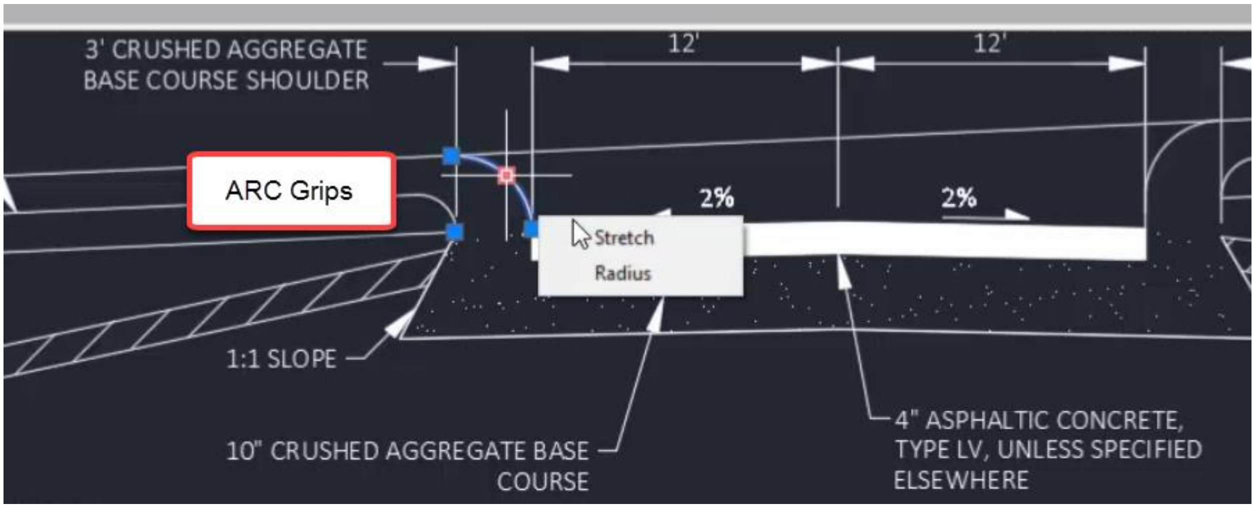
When a Line is selected, three Grips are display. The two endpoint vertex Grips allow you move/stretch or lengthen the respective vertex independently. The midpoint Grip allows you to move the Line with the midpoint as a basepoint, keeping all other geometry properties intact (ie length, rotation).



1. Open acad-basc-creat-edit-end.dwg
2. Select ***Line*** representing subgrade
    A. Left-click endpoint ***Grip***
        I. Move mouse
        II. Left-click
    B. Hover over endpoint ***Grip***
        I. Lengthen
            a. Move mouse
            b. Left-click
    C. Left-click midpoint ***Grip***
        I. Move mouse
        II. Left-click
3. Close acad-basc-creat-edit-end.dwg(do not save)

Arc grips

When an Arc is selected, four Grips are displayed. The two endpoint vertex Grips allow you move/stretch or lengthen the respective vertex independently. The midpoint Grip allows you to change the radius of the arc keeping intact either the location of the endpoint vertices or their alignment with the radius point. The radius point grip allows you to move the arc with the radius point as a basepoint, keeping all other geometry properties intact (ie radius).



1. Open acad-basc-creat-edit-end.dwg
2. Select ***Arc*** representing median nose
    A. Hover over midpoint ***Grip***
        I. Stretch
            a. Move mouse
            b. Left-click
    B. Hover over midpoint ***Grip***
        I. Radius
            a. Move mouse
            b. Left-click
    C. Hover over endpoint ***Grip***
        I. Stretch
            a. Move mouse
            b. Left-click
    D. Hover over endpoint ***Grip***
        I. Lengthen
            a. Move mouse
            b. Left-click
3. Close acad-intrfc-begin.dwg(do not save)

Polyline grips

When a Polyline is selected, square Grips are displayed at all vertices and dash Grips are displayed at all line segment midpoints. Endpoint vertex Grips allow you stretch (ie move) the respective vertex independently or add a vertex adjacent to the endpoint. The midpoint Grip allows you to stretch the line segment, add a vertex between the two adjacent endpoint vertices, or convert the line segment to an arc. When stretching a line segment, the length and rotation geometry of the selected line segment stays intact. Geometry of any adjacent line segments will adjust as necessary. When converting a Polyline line segment to arc, a radius must be specified. A Polyline arc segment can also be converted back to a line segment.

1. Open acad-basc-creat-edit-end.dwg
2. Select ***Polyline*** representing bottom of base course
   A. Hover over endpoint ***Grip***
      I. Add Vertex
         a. Move mouse
         b. Left-click
   B. Hover over midpoint ***Grip***
      I. Add Vertex
         a. Move mouse
         b. Left-click
   C. Hover over Polyline line segment midpoint ***Grip***
      I. Convert to Arc
         a. Move mouse
         b. Left-click
   D. Hover over Polyline arc segment midpoint ***Grip***
      I. Convert to Line
3. Close acad-basc-creat-edit-end.dwg(do not save)

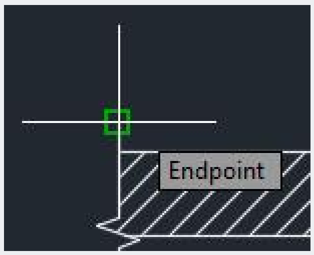
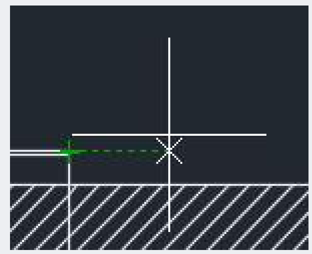
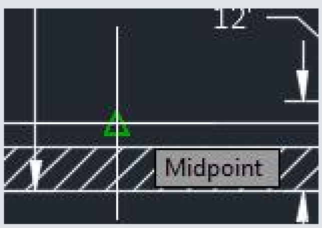
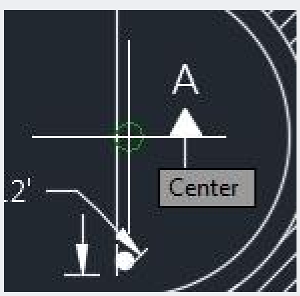
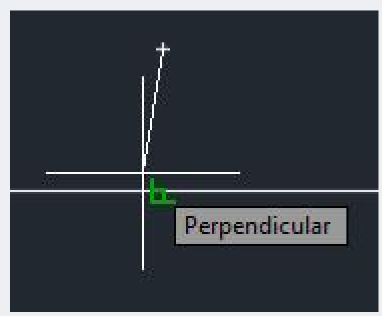
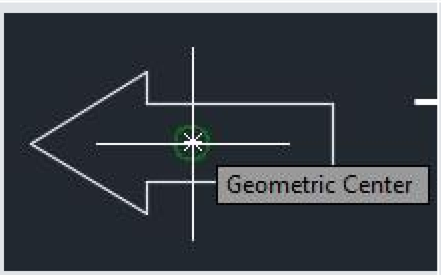
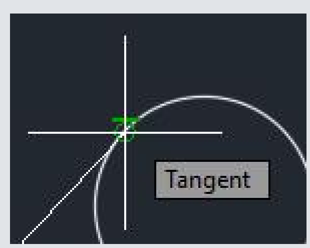
Object snaps

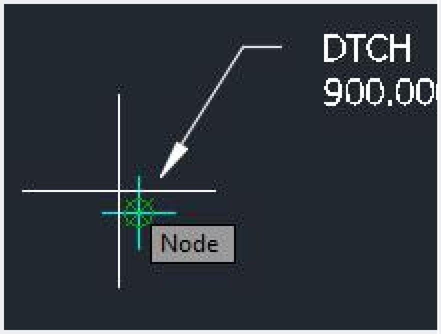
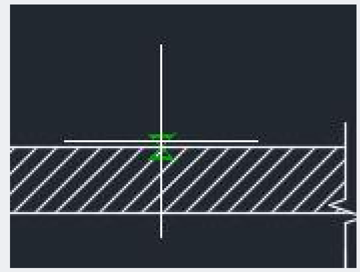
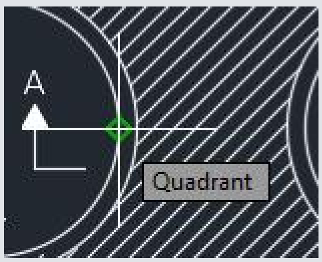
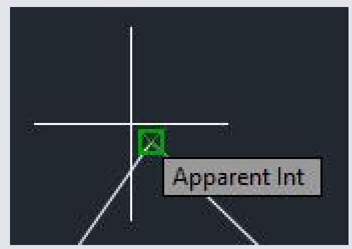
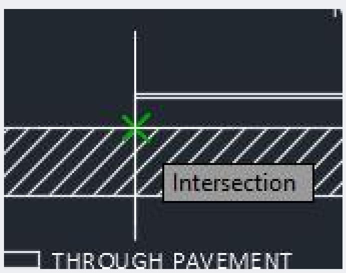
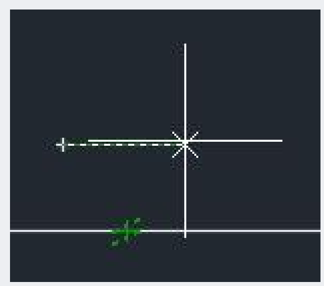
Last updated: 2017-12-01

Total video time: 19:47

Object Snaps are tools built into Civil 3D that help ensure precision when laying out geometry with both basic objects (ie Line, Polyline) and smart Civil 3D objects. The idea is that when specifying location during a command, a given Object Snap will force the location to be at the exact specified object point when the command is active and your cursor is within the Object Snap buffer distance. When an Object Snap is ready to take effect, a glyph will appear indicating this.

Object snap glyphs

Object Snap	Glyph Image	Object Snap	Glyph Image
Endpoint		Extension	
Midpoint		Insertion	
Center		Per-pendicular	
Geometric Center		Tangent	

Object Snap	Glyph Image	Object Snap	Glyph Image
Node		Nearest	
Quadrant		Apparent Intersection	
Inter-section		Parallel	

Introduction & settings

Exercise files: acad-objct-snp-data-c3d16.zip

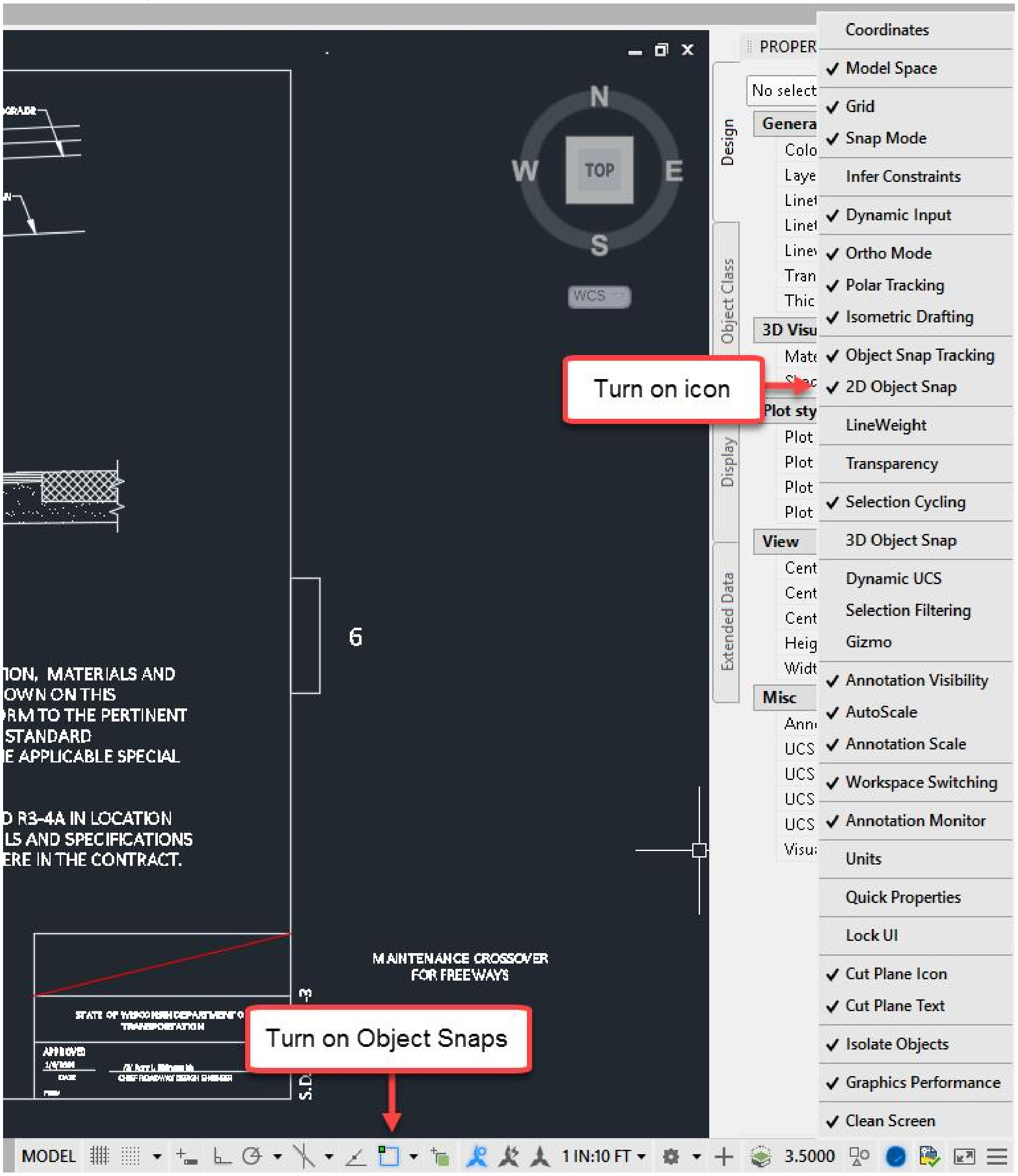
Start with acad-objct-snp-begin.dwg

acad-objct-snp-01.mp4 4:06

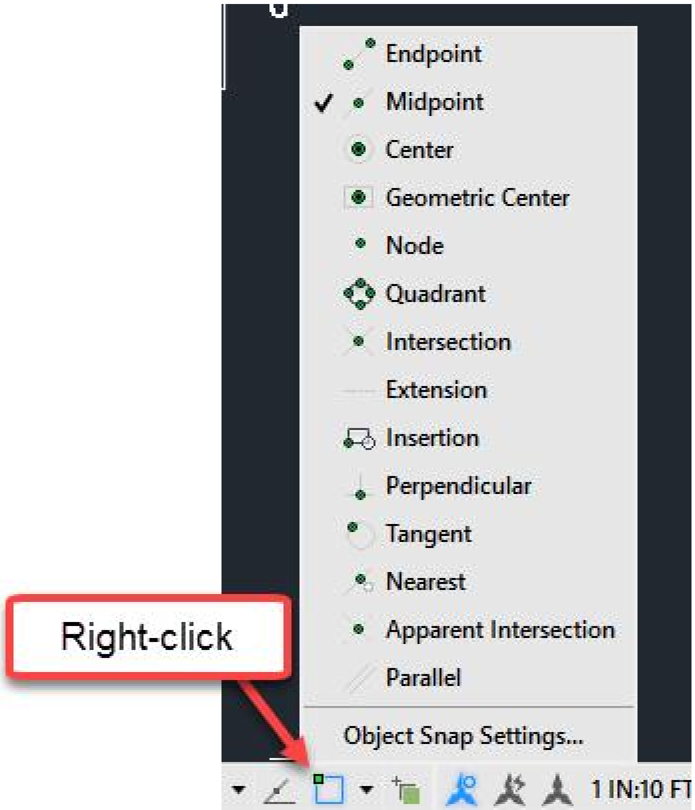
Access to settings

One of the most intuitive ways to access Object Snap settings is by interacting with the Object Snap icon on the Status Bar.

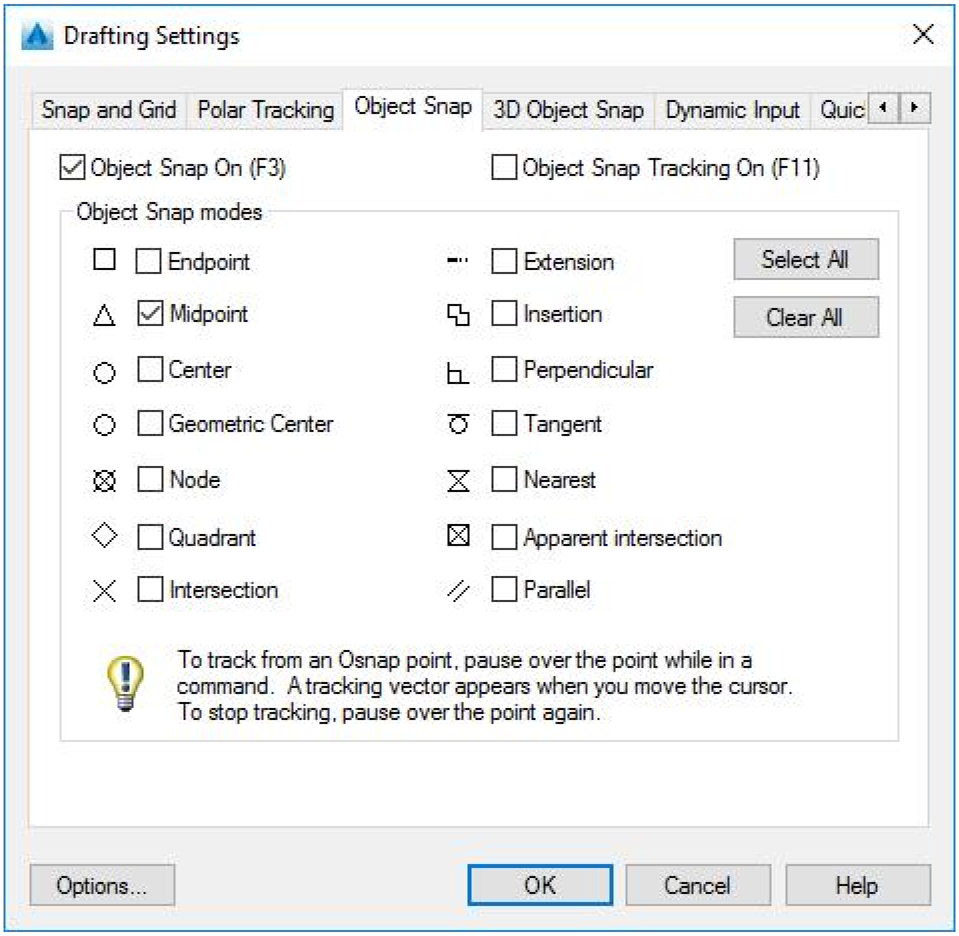
1. Open acad-objct-snp-begin.dwg
2. **Status Bar > Customization**
   A. 2D Object Snaps = checked



3. **Status Bar > Object Snap icon**
   A. Right-click
      I. Midpoint = checked
   B. Left-click icon to Turn on Object Snaps



4. **Ribbon > Home tab > Draw panel > Polyline button**
   A. Move cursor over existing objects
      I. Observe Midpoint glyph appear
      II. Left click to "snap" to Object Snap location
      III. esc
5. **Status Bar > Object Snap icon**
   A. Left-click flyout triangle 
   B. Observe access to running Object Snaps list
      I. Object Snap Settings...
         a. Drafting Settings dialog box, Object Snap tab



a. Object Snap On = checked
b. Select All
c. Clear All
d. Endpoint = checked

6. **Modelspace**
   A. Shift+right-click
      I. Osnap Settings...
   B. Observe access to Drafting Settings dialog, Object Snap tab

Introduction to Object Snap use

In this example you will use the Midpoint Snap to move Mtext to the correct location on a title block.

1. Continue working in acad-intrfc-begin.dwg
2. **Status Bar > Object Snap icon**
   A. Right-click
      I. Midpoint = checked

3. Select "MAINTAINENCE CROSSOVER FOR FREEWAYS" Mtext object
    A. Select insertion point grip
        I. Move cursor near middle of red construction line
        II. Observe Midpoint glyph appear
        III. Left-click

    B. Select red construction line
        I. delete

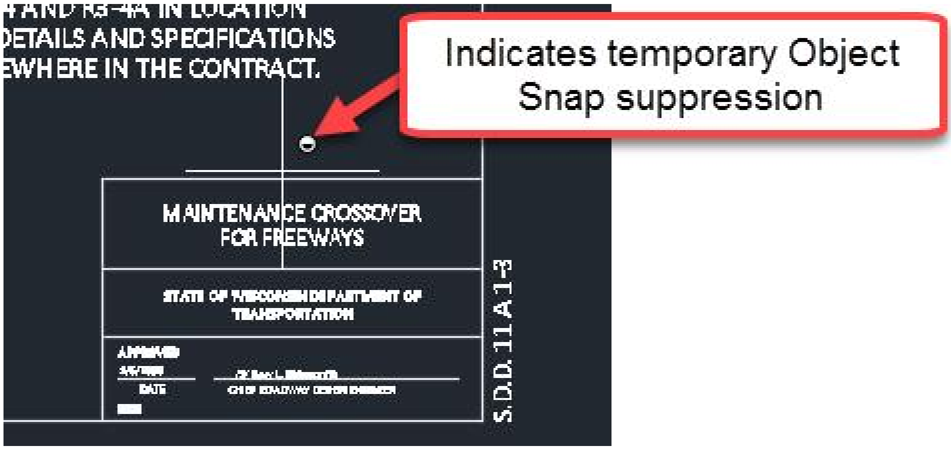
Workflow efficiency

Exercise files: acad-objct-snp-data-c3d16.zip   Start with acad-objct-snp-01.dwg   acad-objct-snp-02.mp4 5:34

F3 hotkey

A "hotkey" is essentially a single keystroke shortcut designed to streamline execution of a task or string of tasks. Many hotkeys are programmed and ready for use in Civil3D. The"f3" key is one powerful hotkey relevant to Object Snap use. You might incorporate this into your typical Object Snap workflow to improve efficiency.

1. Open acad-objct-snp-01.dwg
2. Toggle Object Snaps off: f3
3. Toggle Object Snaps on: f3
4. **Ribbon > Home tab > Draw panel > Polyline button**
    A. Hold f3
    B. Hover over a Line object
    C. Observe that Object Snaps are temporarily suppressed



Object snap cycling

Pressing the tab key allows you to cycle through Object Snaps relevant to a given object as long as those Object Snaps are turned on.

1. Continue working in acad-objct-snp-01.dwg
2. **Status Bar > Object Snap icon**
    A. Right-click
        I. Endpoint = checked
        II. Midpoint = checked
    B. Verify Object Snaps turned on
3. **Ribbon > Home tab > Draw panel > Polyline button**
    A. Hover cursor over middle of EDGE OF PAVED MEDIAN SHOULDER Line
        I. Observe Midpoint glyph appear
        II. tab
        III. tab
        IV. tab

System variable: ignore elevation

By default, Civil 3D will apply existing geometry elevation when using Object Snaps and existing geometry to specify location. You can change this behavior so elevation properties are ignored and only location in the X,Y plane are used when "snapping". This is done by resetting the OSNAPZ System Variable. When this is done, the elevation Z=0 will be used for new location specification.

1. Continue working in acad-objct-snp-01.dwg
2. **Ribbon > Home tab > Draw panel > Polyline button**
    A. Draw a single Polyline
        I. Select Polyline drawn
        II. Properties Palette > Geometry
            a. Set Elevation = 100
            b. esc

3. **Ribbon > Home tab > Draw panel > Polyline button**
    A. Use Endpoint Snap to specify location on end of Polyline drawn in 2.A
        I. Select Polyline drawn
        II. Properties Palette > Geometry
            a. Observe Elevation = 100
4. **`COMMAND LINE: OSNAPZ`**
    A. enter
    B. **`1`**
    C. enter
5. **Ribbon > Home tab > Draw panel > Polyline button**
    A. Use Endpoint Snap to specify location on end of Polyline drawn in 2.A
        I. Select Polyline drawn
        II. Properties Palette > Geometry
            a. Observe Elevation = 0
6. Select previous three Polylines drawn
    A. delete

Temporary overrides

Calling up temporary Object Snap overrides either through the command line or right-click menu allows a "one-time use" override to current Object Snap settings. For example, you could have Endpoint Object Snaps currently on, then use a temporary Midpoint Object Snap override to ignore all Endpoint Snaps and use Midpoint Snaps for the next location specification. Alternatively you might have all running Object Snaps off, then use any temporary Object Snap overrides as you need them for the next location specification. This temporary override workflow avoids the need to open a running Object Snap interface and thus can improve efficiency.

Command line

After a command requiring location input is activated, type in the Object Snap override alias you wish to use and "enter" to execute. This will generally be the first three letters of the Object Snap name (ie "end" for Endpoint). You can then continue with the cursor based location specification.

1. Continue working in acad-objct-snp-01.dwg
2. Toggle Object Snaps off: f3
3. **Ribbon > Home tab > Draw panel > Polyline button**
    A. **`COMMAND LINE: END`**
        I. enter
    B. Move cursor to existing object endpoint
        I. Observe endpoint glyph appear
        II. Left-click
    C. Move cursor to existing object endpoint
        I. Observe lack of endpoint glyph

        D. esc

Right-click menu

After a command requiring location input is activated, hold Shift key and right-click to open the temporary Object Snap override menu. Choose a one-time use temporary Object Snap override from this list. Continue location specification.

1. Continue working in acad-objct-snp-01.dwg
2. Turn on running Endpoint Object Snap using your method of choice
3. **Ribbon > Home tab > Draw panel > Polyline button**
    A. Specify first Polyline vertex using Endpoint Object Snap
    B. Shift+Right-click
        I. Left-click Midpoint
    C. Move cursor near middle of existing Line object
        I. Left-click

Examples 1

Exercise files: acad-objct-snp-data-c3d16.zip

Start with acad-objct-snp-01.dwg

acad-objct-snp-03.mp4 4:08

Geometric Center

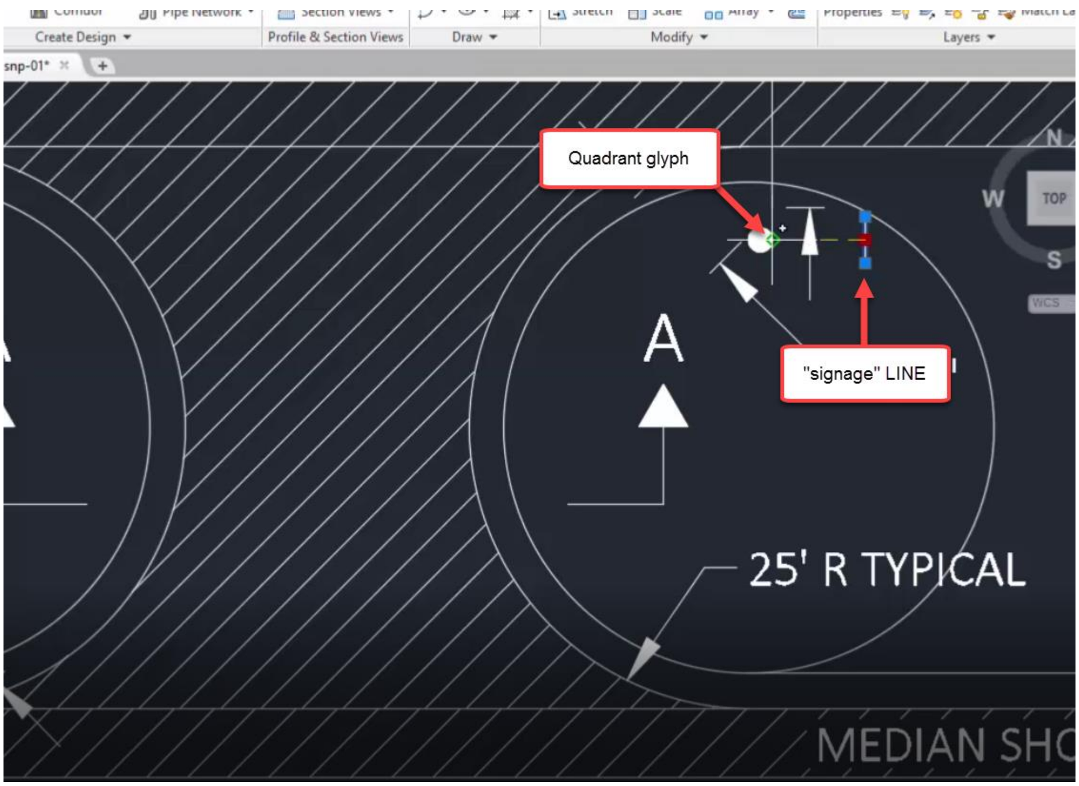
This Object Snap analyzes any closed area object and snaps to the centroid of that area. The object can be irregularly shaped, but must show as "closed" in the properties palette for the Geometric Center snap to work.

1. Continue working in acad-objct-snp-01.dwg
2. Turn on running Geometric Center Object Snap using your method of choice
3. Select "6" Mtext at right of drawing extents
    A. Select middle-center Mtext insertion point
        I. Move cursor to hover over adjacent rectangular closed Polyline
        II. Observe Geometric Center glyph appear
        III. Left-click

Quadrant

This Object Snap grabs the location on a Circle, Ellipse or Arc object intersecting with any of the four 2D quadrant lines (ie along X or Y axis).

1. Continue working in acad-objct-snp-01.dwg
2. Turn on running Quadrant Object Snap using your method of choice
3. Select Line representing signage in the PLAN VIEW area of drawing extents
    A. Select midpoint grip on Line
    B. Move cursor near Circle representing sign post in PLAN VIEW area of drawing extents
        I. Observe Quadrant glyph along positive X-axis appear
        II. Left-click



Examples 2

Exercise files: acad-objct-snp-data-c3d16.zip

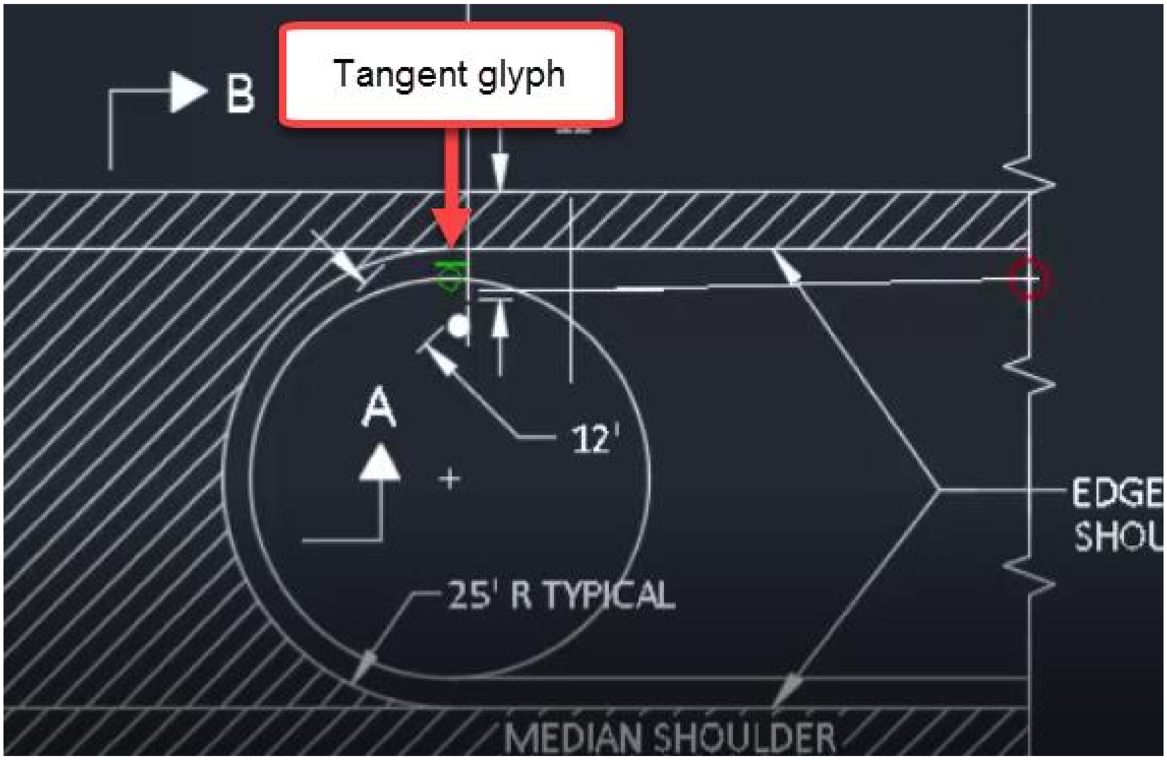
Start with acad-objct-snp-02.dwg

acad-objct-snp-04.mp4 5:59

Tangent

The Tangent Object Snap finds the point of tangency on a Circle, Arc, or Ellipse object coming in from any Line or Polyline object.

1. Open acad-objct-snp-02.dwg
2. Turn on running Center and Tangent Object Snaps using your method of choice
3. **Ribbon > Home tab > Draw panel > Polyline button**
    A. Move cursor near red Circle guiding mark in PLAN VIEW area of drawing extents
        I. Observe Center Object Snap glyph appear
        II. Left-click
    B. Move cursor near Circle representing median back of curb in PLAN VIEW area of drawing extents
        I. Observe Tangent Object Snap glyph appear
        II. Left-click

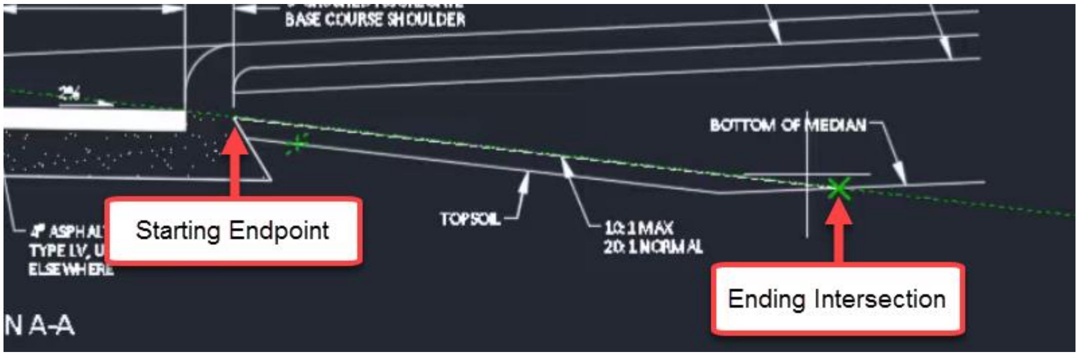


Parallel

Use the Parallel Object Snap to lay out new linear objects while referencing existing linear objects for directional orientation. You will first start the new linear object command (ie Line), then hover over the desired linear reference object. This will activate the Parellel Object Snap and you will see a dashed extension line as a preview of your new linear object draw parallel to that existing.

1. Continue working in acad-objct-snp-02.dwg
2. Turn on running Enpoint, Apparent Intersection and Parallel Object Snaps using your method of choice
3. **Ribbon > Home tab > Draw panel > Line flyout > Create Line**
    A. Move cursor near upper right of SECTION A-A, CRUSHED AGGREGATE BASE COURSE border Line
        I. Observe Endpoint Object Snap glyph appear
        II. Left-click
    B. Move cursor to hover over adjacent TOPSOIL Line
        I. Observe Parallel Object Snap glyph appear
    C. Move cursor along path from the new Line starting vertex parallel to TOPSOIL Line
        I. Observe Parallel preview line appear
    D. Move cursor to point of intersection of parallel preview line and existing BOTTOM OF MEDIAN Line.

I. Observe Apparent Intersection Object Snap glyph appear
II. Left-click



Polar and osnap tracking

Last updated: 2017-12-01

Total video time: 13:52

Both Polar Tracking and Object Snap (aka Osnap) Tracking are tools designed to streamline the process of specifying location precisely when executing a command. Polar tracking allows "snapping" along vectors based on preset angle increments around an initially specified point. Osnap Tracking allows projection out from existing Osnap locations to specify the next command location. These projection vectors can come from multiple Osnap locations and can use current Polar Tracking angles to form the projections. Once you become familiar with the tools, both Polar Tracking and Object Tracking can greatly improve efficiency when specifying command location.

Polar Tracking

Exercise files: acad-polr-osnp-trak-data-c3d16.zip

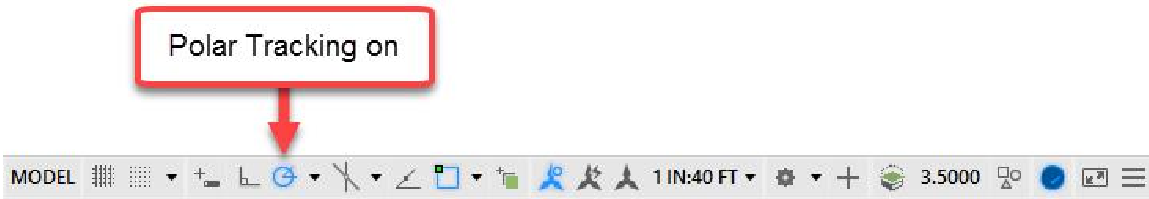
Start with acad-polr-osnp-trak-begin.dwg

acad-polr-osnp-trak-01.mp4 4:12

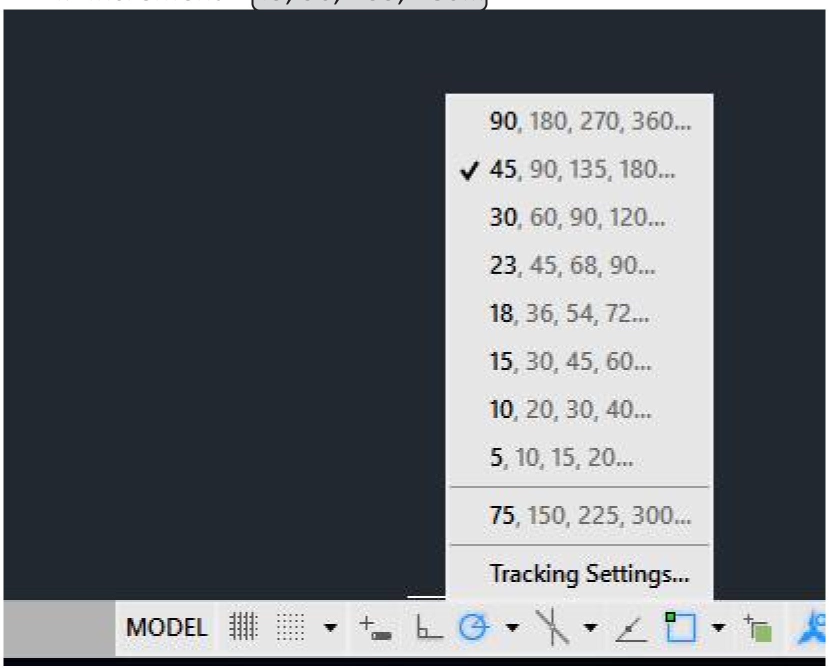
Basics

This section will get you started using Polar Tracking with an example exercise laying out title block Lines.

1. Open acad-polr-osnp-trak-begin.dwg
2. **Status Bar > Customization flyout**
   A. Polar Tracking = checked
3. **Status Bar**
   A. Polar Tracking on



4. **Status Bar > Polar Tracking icon**
    A. Right-click
        I. Increment = 45, 90, 135, 180...



5. **Ribbon > Home tab > Draw panel > Polyline button**
    A. Left-click anywhere in Modelspace to specify first points
    B. Rotate cursor around first point location
    C. Observe Polar Tracking vector "snapping"
6. **Status Bar**
    A. Dynamic Input off
    B. Polar Tracking off
    C. Center Object Snap on
7. Zoom to lower right of drawing extents
8. **L**
    A. Enter
    B. Snap to bottom red guiding Circle for first point
        I. **@26<180**
            a. Enter
        II. Enter
    C. Enter

D. **Status Bar**
    I. Dynamic Input on
E. Snap to middle red guiding Circle for first point
    I. **26**
    II. tab
    III. **180**
        a. Enter
9. **Status Bar**
    A. Dynamic Input off
    B. Polar Tracking on
10. **L**
    A. enter
    B. Snap to top red guiding Circle for first point
        I. Move cursor until 180 deg Polar Tracking vector appears
            a. **26**
                i. enter
        II. Move cursor until 270 deg Polar Tracking vector appears
            a. **16.5**
                i. enter

Access to settings

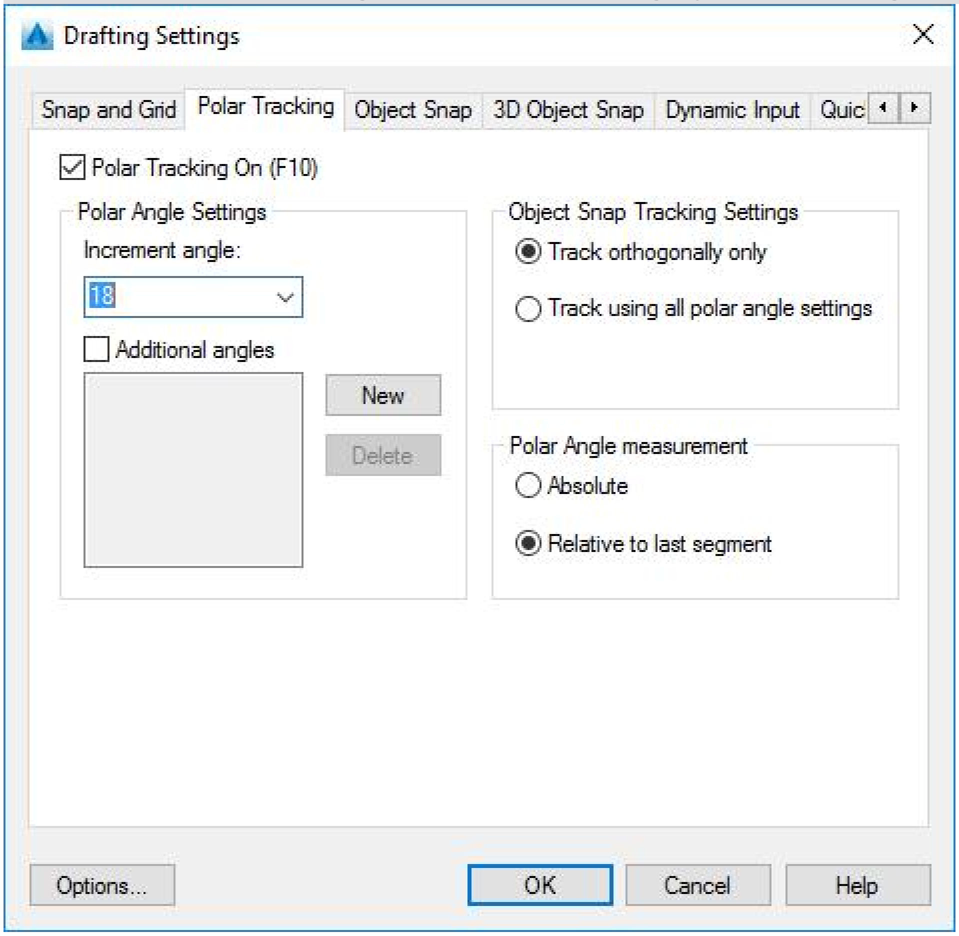
Exercise files: acad-polr-osnp-trak-data-c3d16.zip

Start with acad-polr-osnp-trak-01.dwg

acad-polr-osnp-trak-02.mp4 4:28

You can customize the way Polar Tracking works based on your preferences and/or workflow needs. Here you will be able to add increment angles, additional angles (single angle relative to 0 deg), set display preferences, set Osnap Tracking interaction preferences, and toggle between relative (direction of last drawn line segment is assumed as 0 deg) and absolute angle measurement. This section will walk you through these settings and their effect on Polar Tracking function.

1. Open acad-polr-osnp-trak-begin.dwg
2. **Status Bar > Polar Tracking icon > Polar Tracking flyout > Tracking Settings**



   A. Polar Tracking On = checked
   B. Polar Angle Settings
      I. Increment angle = 60
   C. OK
3. **PL**
   A. enter
   B. Left-click in anywhere in Modelspace to specify first point
      I. Rotate cursor around first point
      II. Observe 60 deg Polar Tracking angle increments
   C. esc
4. **Status Bar > Polar Tracking icon > Polar Tracking flyout > Tracking Settings**
   A. Polar Angle Settings
      I. Additional angles = checked
      II. New
      III. **75**
   B. OK

5. **PL**
   A. enter
   B. Left-click in anywhere in Modelspace to specify first point
      I. Rotate cursor around first point
      II. Observe 75 deg Polar Tracking additional angle
   C. esc
6. **Status Bar > Polar Tracking icon > Polar Tracking flyout > Tracking Settings**
   A. Polar Angle measurement
      I. Absolute = checked
   B. OK
7. **Status Bar > Polar Tracking icon > Polar Tracking flyout**
   A. Increment = 45, 90, 135, 180...
8. **PL**
   A. enter
   B. Left-click in anywhere in Modelspace to specify first and second points
      I. Rotate cursor around second point
      II. Observe Polar Tracking increment angle relative to positive x-axis = 0 deg
      III. **Status Bar > Polar Tracking icon > Polar Tracking flyout > Tracking Settings**
         a. Polar Angle measurement
            i. Relative to last segment = checked
         b. OK
      IV. Rotate cursor around second point
      V. Observe Polar Tracking increment angle relative to last line segment drawn = 0 deg
   C. esc

Object Snap Tracking

Exercise files: acad-polr-osnp-trak-data-c3d16.zip

Start with acad-polr-osnp-trak-02.dwg

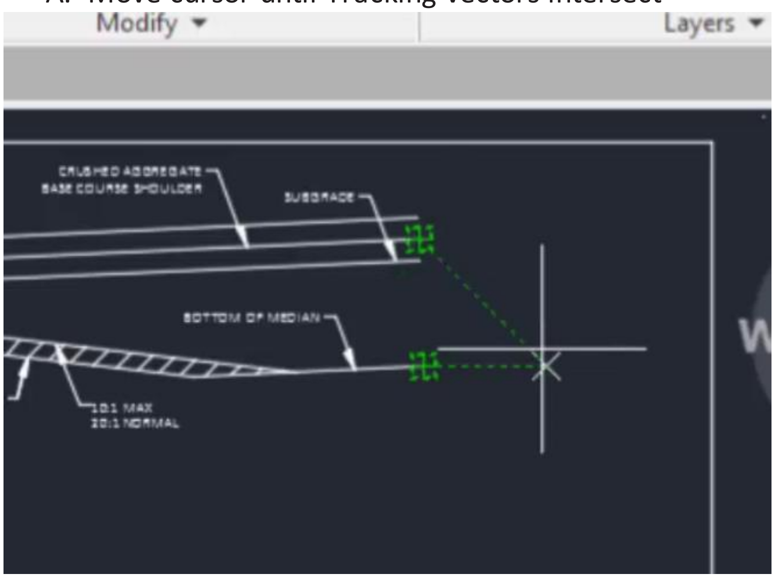
acad-polr-osnp-trak-03.mp4 4:59

In this section you will be introduced to the Object Snap (aka Osnap) Tracking tool including functionality when combined with Polar Tracking and Dynamic Input. Keep in mind that for Object Snap Tracking to take effect, you will first need to have at least one Osnap turned on.

Basics

1. Open acad-polr-osnp-trak-02.dwg
2. **Status Bar > Polar Tracking icon > Polar Tracking flyout**
   A. Increment = 45, 90, 135, 180...

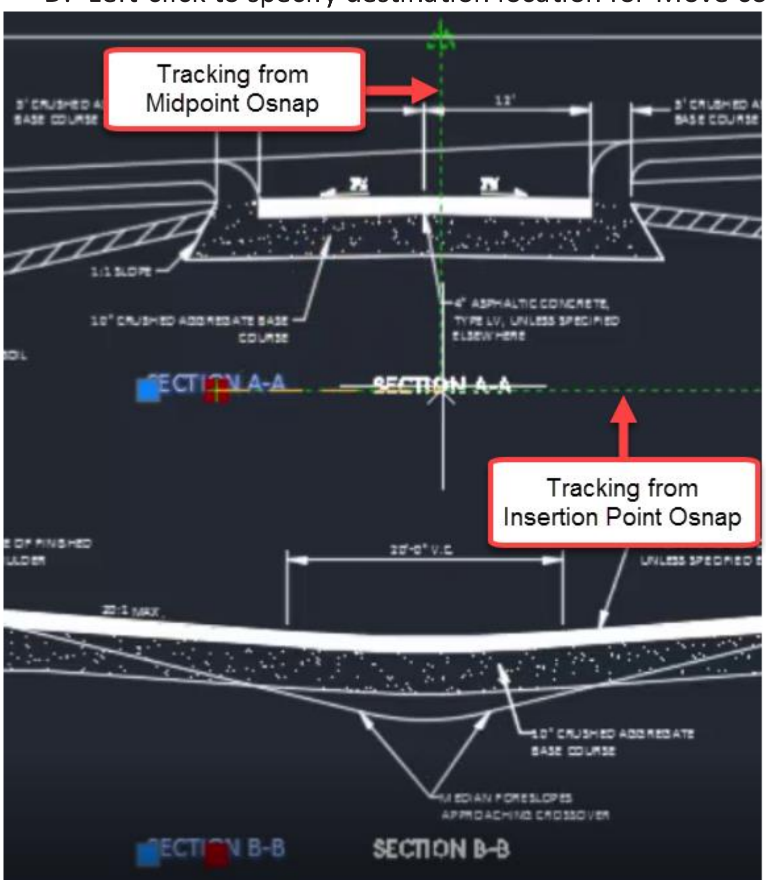
3. **Status Bar > Object Snap icon > Object Snap flyout**
    A. Endpoint = checked
4. **Status Bar**
    A. Polar Tracking on
    B. Object Snap Tracking on
    C. Object Snap on
5. **PL**
    A. enter
6. Move cursor to hover over a Line endpoint
    A. Observe Object Snap Tracking activate
    B. Rotate cursor around active Object Snap Tracking location
    C. Observe Tracking vectors available based on Polar Tracking increments
7. Move cursor to hover over additional endpoint
    A. Move cursor until Tracking vectors intersect



8. **Status Bar > Polar Tracking icon > Polar Tracking flyout > Tracking Settings…**
    A. Object Snap Tracking Settings
        I. Track orthogonally only = checked
    B. OK
9. Move cursor to hover over a Line endpoint
    A. Observe Object Snap Tracking activate
    B. Rotate cursor around active Object Snap Tracking location
    C. Observe Tracking vectors available based on x and y-axes only
10. Move cursor to hover over activated Object Snap Tracking location again to deactivate

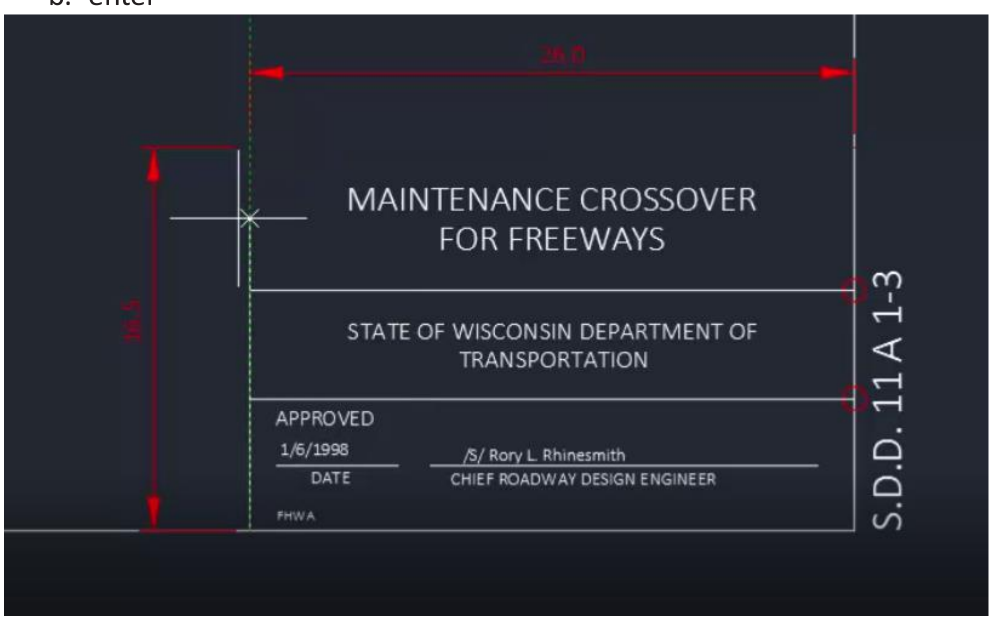
Exercise: align objects

1. Continue working in acad-polr-osnp-trak-02.dwg
2. **Status Bar > Object Snap icon > Object Snap flyout**
    - A. Midpoint = checked
    - B. Insertion Point = checked
3. Select both SECTION A-A and SECTION B-B Mtext objects
    - A. Hold shift
        - I. Select middle insertion point grips on both Mtext objects
        - II. Note grip color change to red
    - A. Release shift
4. Select one red Mtext grip to begin Move command
    - A. Move cursor to hover over insertion point grip
        - I. Observe insertion point Osnap Tracking activate
    - B. Move cursor to hover over midpoint of top sheet border Line
        - I. Observe midpoint Osnap Tracking activate
    - C. Move cursor to intersection of Osnap Tracking vectors
    - D. Left-click to specify destination location for Move command



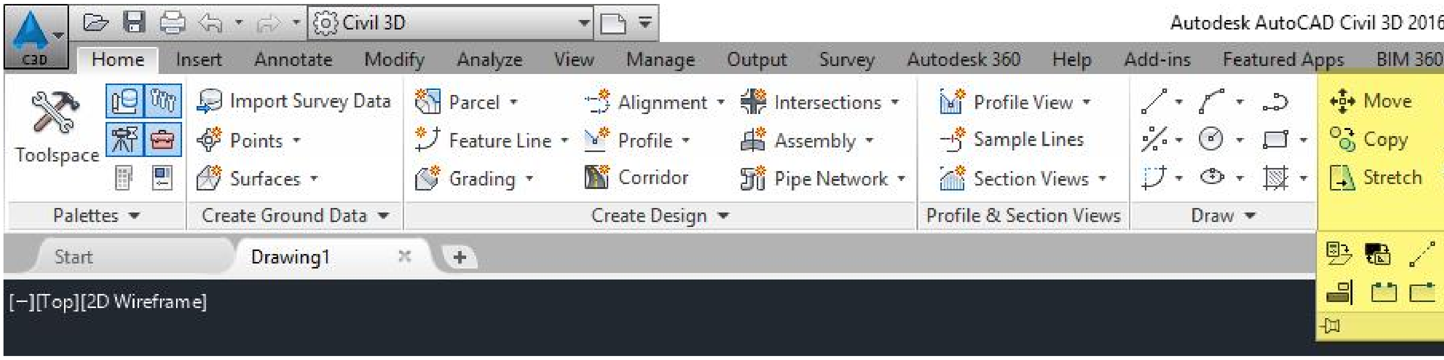
Exercise: lay out geometry

1. Continue working in acad-polr-osnp-trak-02.dwg
2. **Status Bar > Object Snap icon > Object Snap flyout**
   A. Endpoint = checked
3. **Status Bar**
   A. Polar Tracking on
   B. Dynamic Input on
4. **L**
   A. enter
5. Move cursor to hover over lower right sheet border Line endpoint
   A. Observe Object Snap Tracking activation
   B. Move cursor left of Endpoint Snap location along 180 deg Object Snap Tracking vector
      I. 26
      II. enter
      III. Move cursor above Line first point along 90 deg Object Snap Tracking vector
         a. 16.5
         b. enter
      IV. Move cursor right of Line second point along 0 deg Object Snap Tracking vector
         a. 26
         b. enter



Total video time: 39:51

Modify commands are used to make changes to objects that have already been drawn. These commands can greatly improve workflow efficiency by eliminating the need to re-create objects, streamlining object creation and location specification, combining multiple commands, and otherwise utilize existing geometry objects.



Move & Copy

Exercise files: acad-modify-data-c3d16.zip

Start with acad-modify-begin.dwg

acad-modify-01.mp4 3:40

Move

The Move command allows you to relocate objects either by keying in X, Y, Z displacement or by cursor-selecting a base point and destination point.

1. Open acad-modify-begin.dwg
2. **Ribbon > Home tab > Modify panel > Move**
   A. Select objects: ***SD.D.11.A 1-3*** text in lower right of drawing extents
   B. Specify base point: lower right Endpoint of sheet border Line
   C. Specify second point: lower left Endpoint of sheet border Line
   D. Ctrl+z
3. s**Ribbon > Home tab > Modify panel > Move**
   A. Select objects: ***SD.D.11.A 1-3*** text in lower right of drawing extents
   B. **D**
      I. Enter
   C. **-50,0,0**
      I. enter
   D. Ctrl+z

Copy

The Copy command allows you to duplicate an existing object and then paste it to a location either by keying in X, Y, Z displacement or by cursor-selecting a base point and destination point.

1. Continue working in acad-modify-begin.dwg
2. **Ribbon > Home tab > Modify panel > Copy**
   A. Select objects: ***SD.D.11.A 1-3*** text in lower right of drawing extents
      I. Right-click
   B. Specify second point: lower left Endpoint of sheet border Line
   C. Left-click multiple additional destination points
   D. **Quick Access Toolbar > Undo**
3. **Ribbon > Home tab > Modify panel > Copy**
   A. Select objects: ***SD.D.11.A 1-3*** text in lower right of drawing extents
      I. Right-click
   B. **D**
      I. enter
   C. **`-50,0,0`**
      I. enter
   D. Ctrl+z
4. **CO**
   A. enter
   B. Mode
      I. Single
   C. Displacement
      I. **`-50,0,0`**
         a. enter

Rotate & Scale

Exercise files: [acad-modify-data-c3d16.zip]

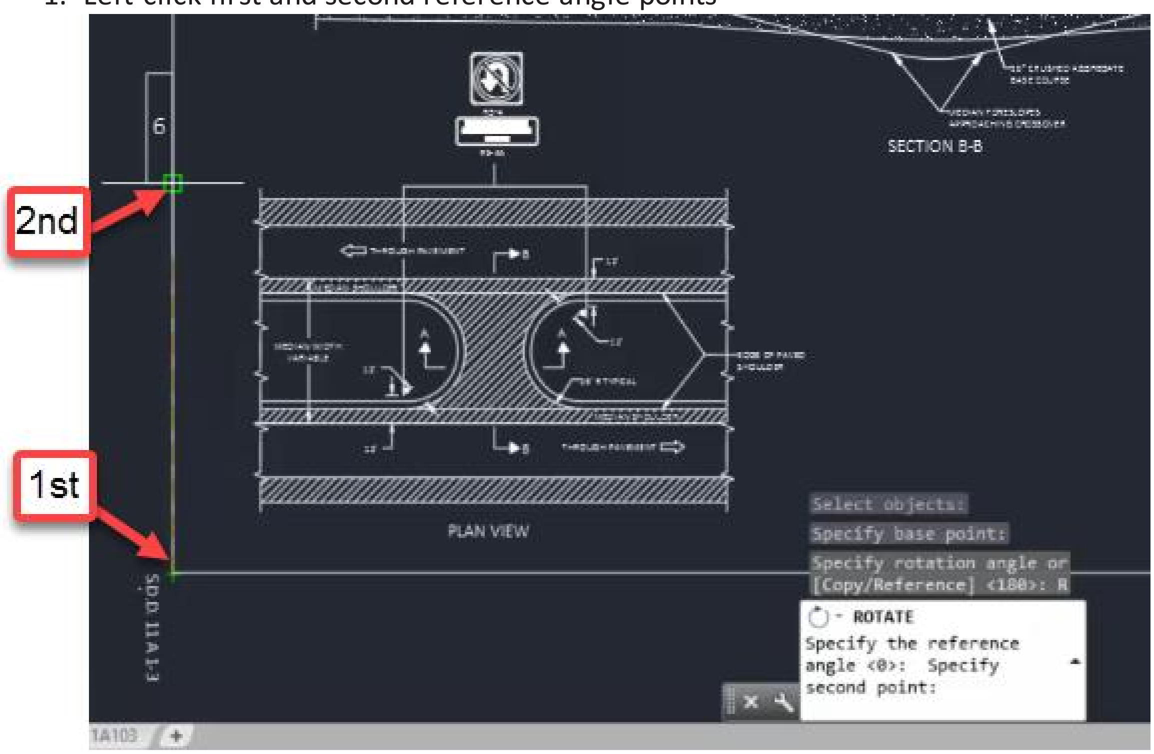
Continue with acad-modify-begin.dwg

[acad-modify-02.mp4] 5:05

Rotate

The Rotate command allows you to rotate an object in the XY plane about a point either by keying in a rotation angle, selecting a relative rotation point, or picking two points to form a reference "line" and two points to form a destination rotation "line".

1. Continue working in acad-modify-begin.dwg
2. Select ***SD.D.11.A 1-3*** text in lower middle of drawing extents
    A. **M**
        I. enter
    B. hold f3 to temporarily override Osnaps
        I. Specify base point: lower left of ***SD.D.11.A 1-3*** text
        II. Specify second point: lower left Endpoint of sheet border Line
    1. **Ribbon > Home tab > Modify panel > Rotate**
        1. Select ***SD.D.11.A 1-3*** text
            1. Right-click
            2. Specify base point: lower left Endpoint of sheet border Line
            3. `SPECIFY ROTATION ANGLE: 180`
                1. enter
    2. **RO**
        1. enter
    3. Select ***SD.D.11.A 1-3*** text
        1. Right-click
        2. Reference
            1. Left-click first and second reference angle points



        3. Specify the new angle: **P**
            1. enter
        4. Left-click first and second new angle points
        5. Select ***SD.D.11.A 1-3*** text
            1. Right-click

6. **RO**
    1. enter
    2. Hold shift to temporarily use ORTHOMODE (force cursor along X or Y-axis)
    3. Move cursor until text is rotated 180 degrees
    4. left-click

Scale

The Scale command allows you to resize a selection of objects while holding a specified base point either by keying in a scale factor or referencing existing objects.

1. Continue working in acad-modify-begin.dwg
2. Double-click middle mouse wheel to Zoom Extents
3. Window-Select full-sized "PLAN VIEW"
    A. delete
4. **Ribbon > Home tab > Modify panel > Scale**
    A. Select objects: Window-Select half-size objects to left of full-size objects
    B. Specify base point: lower right of half-size border Line
    C. Specify scale factor: **2**
        I. enter
    D. Ctrl+z
5. Window-Select half-sized objects to left of full-size objects
    A. **SC**
        I. enter
    B. Specify base point: lower right of half-size border Line
    C. Reference
        I. enter
    D. Specify reference length: Left-click beginning and end of bottom half-size border Line
    E. Specify new length: **P**
        I. enter
        II. Left-click beginning and end of bottom full-sized border Line
6. Window Select "PLAN VIEW" objects that were Scaled up
    A. **M**
        I. enter
    B. Specify base point: lower left of bottom border Line that was Scaled up
    C. Specify second point: lower left of original full-size bottom border Line
7. Select redundant border Lines
    A. delete
8. Double-click middle mouse wheel to Zoom Extents

Join & Explode

Exercise files: acad-modify-data-c3d16.zip

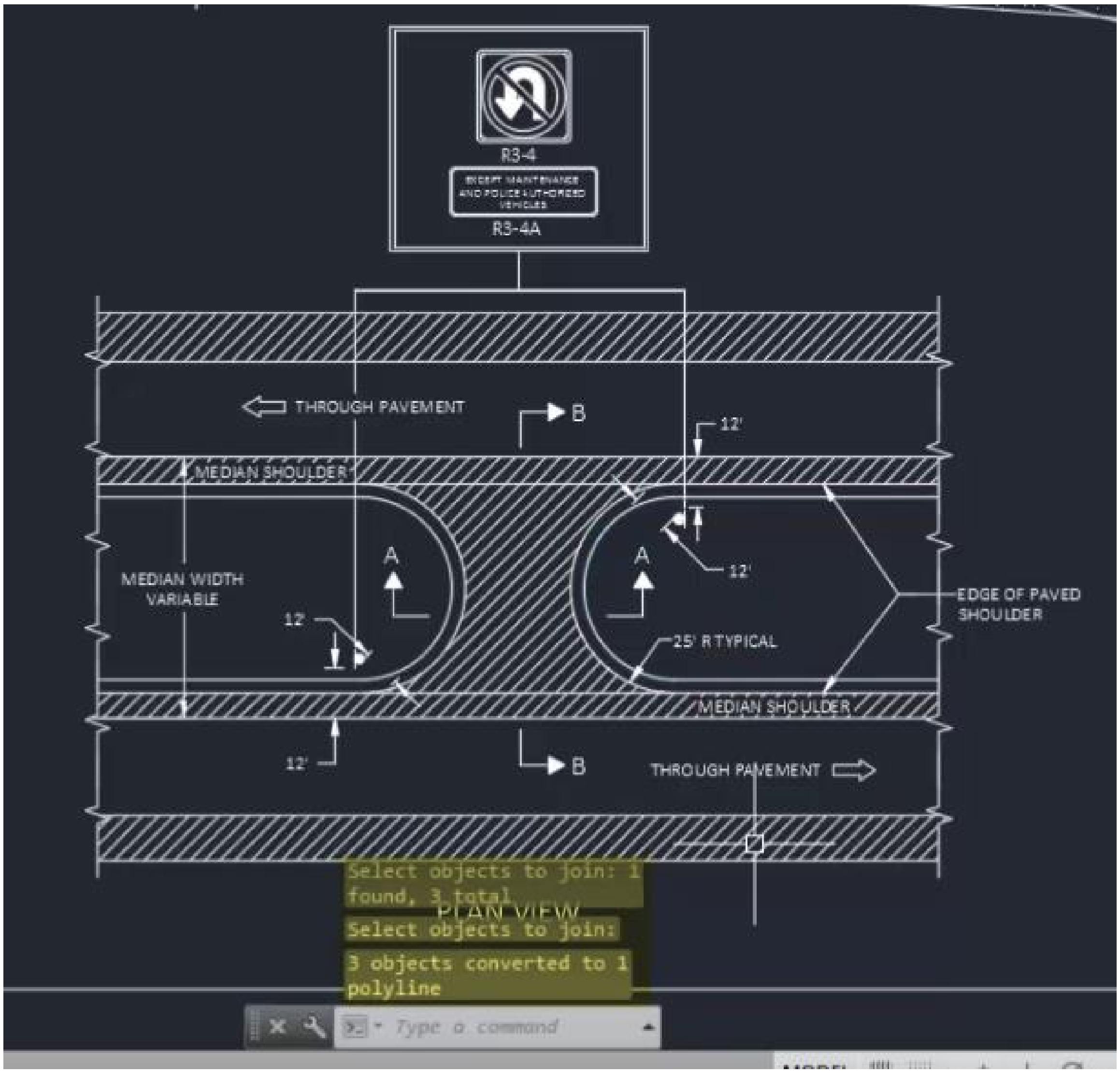
Start with acad-modify-01.dwg

acad-modify-03.mp4 5:34

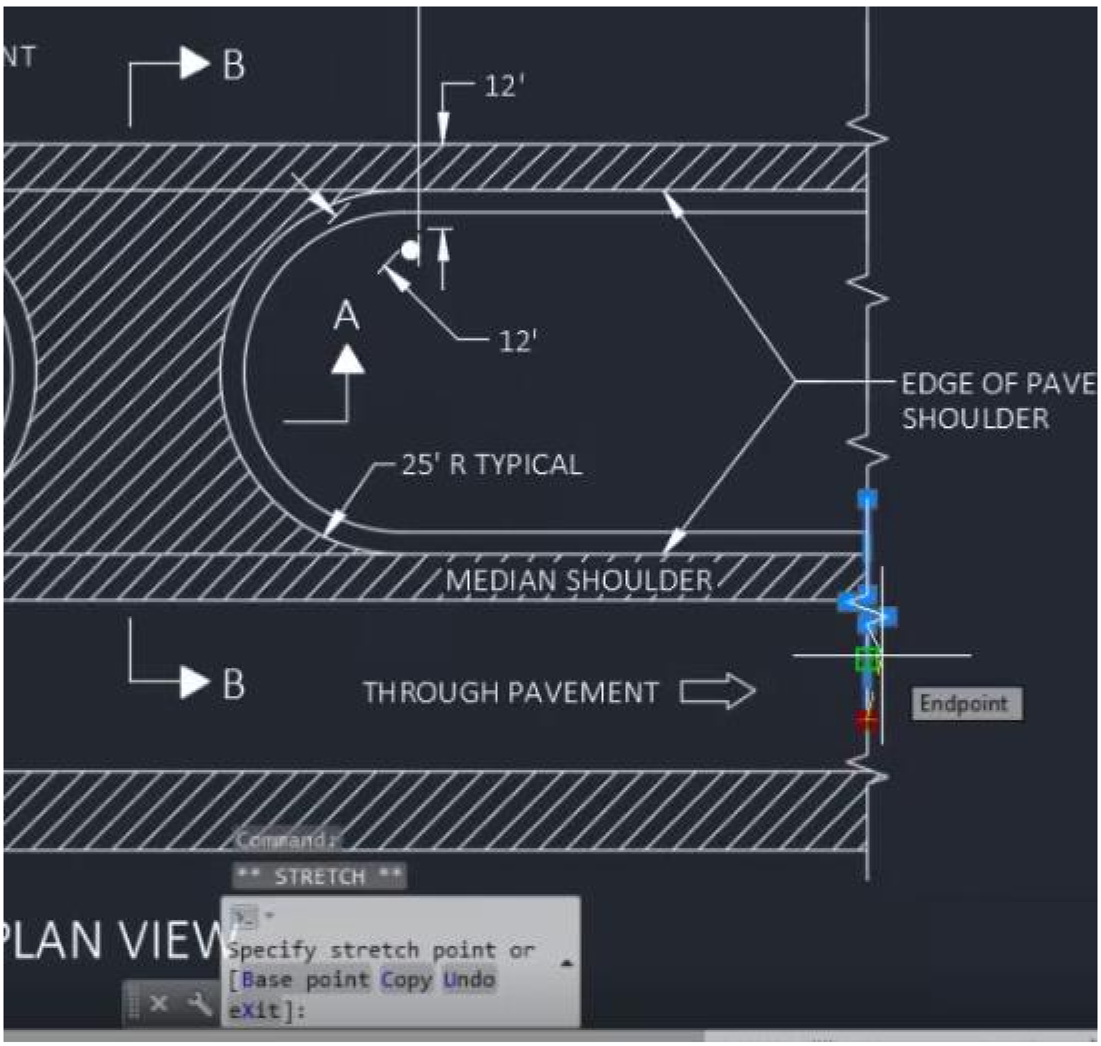
Join

The Join command will take all Line and/or Arcs objects included in a selection set that share common start and end point coordinates (same X,Y,Z) and combine them into a single Polyline.

1. Open acad-modify-01.dwg
2. Pan and zoom to PLAN VIEW detail
3. **Ribbon > Home tab > Modify panel flyout > Join button**
4. Select Lines and Arc representing median back of curb
    A. enter



1. `J`
    A. enter
2. Select all "breakline symbol" Polylines along right side of PLAN VIEW detail
    A. enter
3. Observe "0 objects joined, 6 objects discarded..." on command line history
4. Select "breakline symbol" Polyline near bottom right of PLAN VIEW detail
    A. Left-click vertex grip
    B. Use Endpoint Object Snap to set vertex at same location as adjacent Polyline vertex



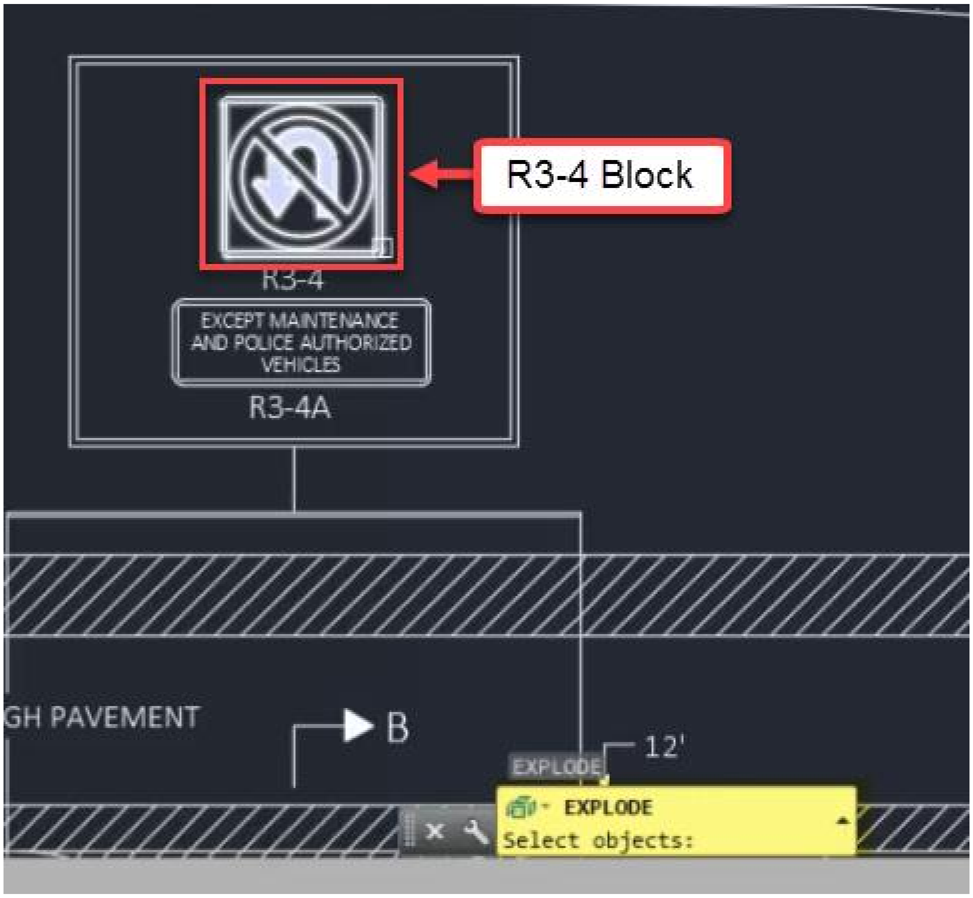
5. Select two Polylines whose vertices were aligned in step 4
6. `J`
    A. enter
7. Observe "5 segments joined into 1 polyline" on command line history

Explode

The Explode command will break objects down into foundational pieces. For example, a single Polyline can be Exploded into multiple Lines and/or Arcs that make up the Polyline geometry.

> **Warning:** Never Explode a Civil 3D Object (ie Alignment, Surface, Corridor). This will cause you to lose dynamic updating, labeling, data referencing and other powerful object functionality. Thus, the Explode command should be limited to simple AutoCAD objects as demonstrated in this section.

1. Continue working in acad-modify-01.dwg
2. **Ribbon > Home tab > Modify panel > Explode button**
3. Select PLAN VIEW median Polyline previously Joined
    A. enter
4. Zoom and pan to R3-4 signage detail
5. **X**
    A. Select R3-4 Block
    B. enter
6. **X**
    A. Select outermost Polyline resulting from the Exploded R3-4 Block
    B. enter



Erase & Stretch

Exercise files: acad-modify-data-c3d16.zip

Continue with acad-modify-01.dwg

acad-modify-04.mp4 2:41

Erase

The Erase command allows you to remove a selection set of objects from a drawing. You can either invoke the command and then select objects to remove using your selection method of choice or vice-versa.

Tip: It is a good idea to hit esc a couple times before selecting objects to erase. This will ensure that you do not have objects selected that you do not intend to erase. Selected objects are not always visible depending your current Zoom level and Pan location. Your Properties Palette is a good place to check on what is included in the current selection set.

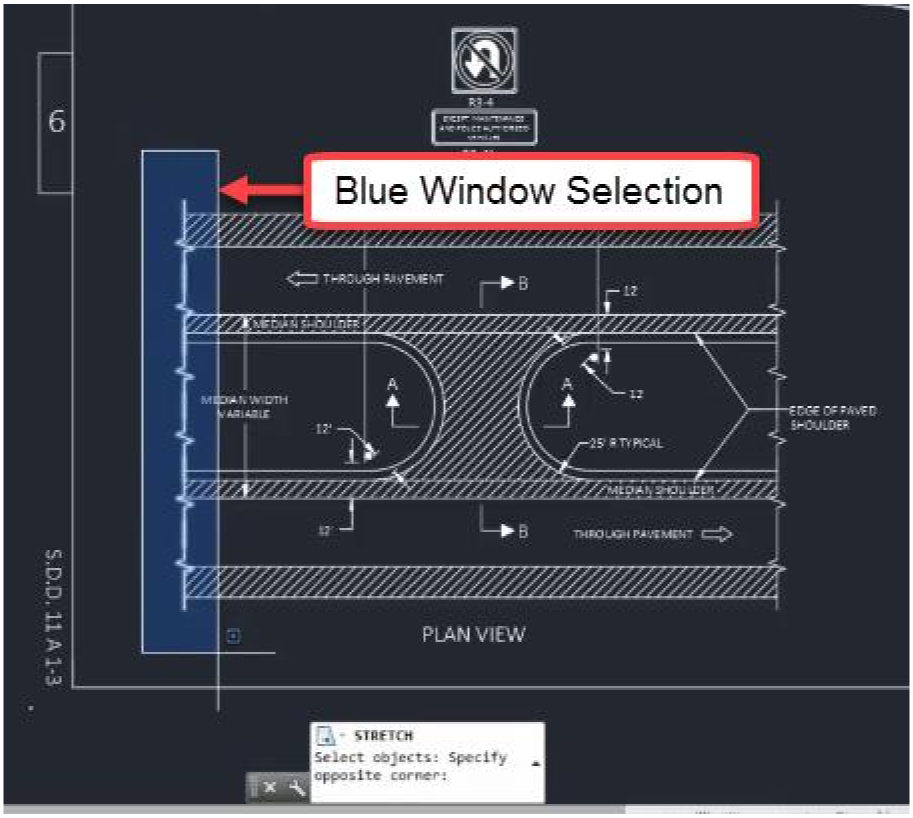
1. Continue working in acad-modify-01.dwg
2. **Ribbon > Home tab > Modify panel > Erase button**
3. Select outermost Lines surrounding the R3-4 and R3-4A details
    A. enter

Stretch

The Stretch command allows you to move objects and simultaneously lengthen and reorient adjacent objects while maintaining the original attachment location. After invoking the Stretch command, any objects completely enclosed in a Crossing selection will be moved and any objects partially enclosed in the same Crossing selection will be lengthened and reoriented.

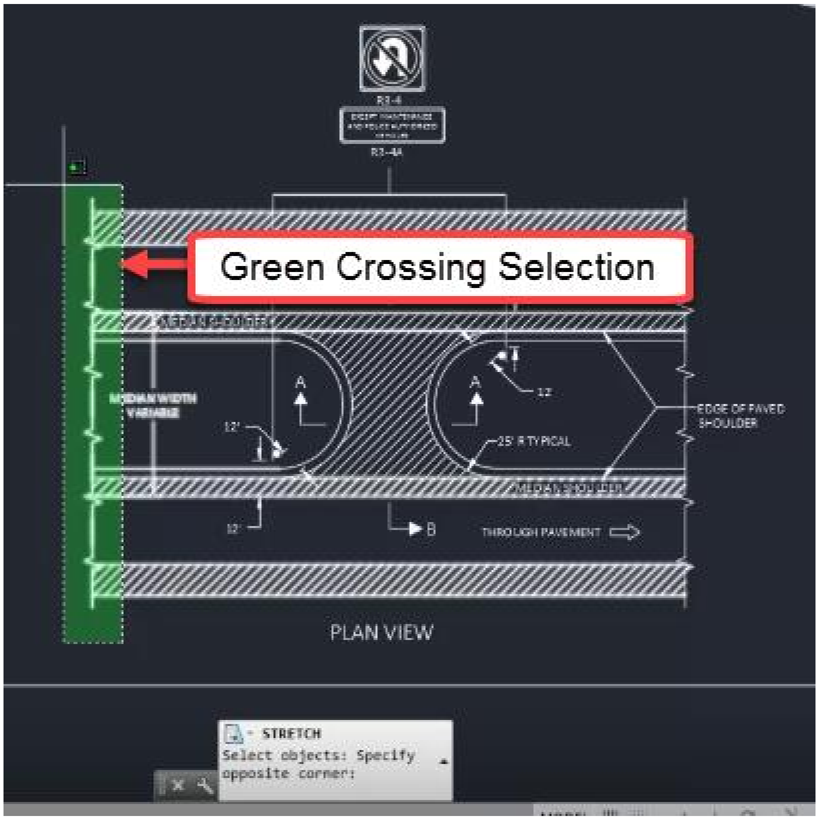
1. Continue working in acad-modify-01.dwg
2. **Ribbon > Home tab > Modify panel flyout > Stretch**
3. Use a Window Selection to select all "breakline symbol" Polylines on the left side of the PLAN VIEW detail

A. enter



B. Right-click to finish selection
   I. Left-click to specify base point
   II. Move Cursor and Left-click to specify second point
   III. Observe move-only behavior

4. Ctrl+z
5. **Ribbon > Home tab > Modify panel flyout > Stretch**
6. Use a Crossing Selection to select all "breakline symbol" Polylines on the left side of the PLAN VIEW detail
   A. enter



B. Right-click to finish selection
    I. Left-click to specify base point
    II. Move Cursor and Left-click to specify second point
    III. Observe intended Stretch behavior

Mirror & Offset

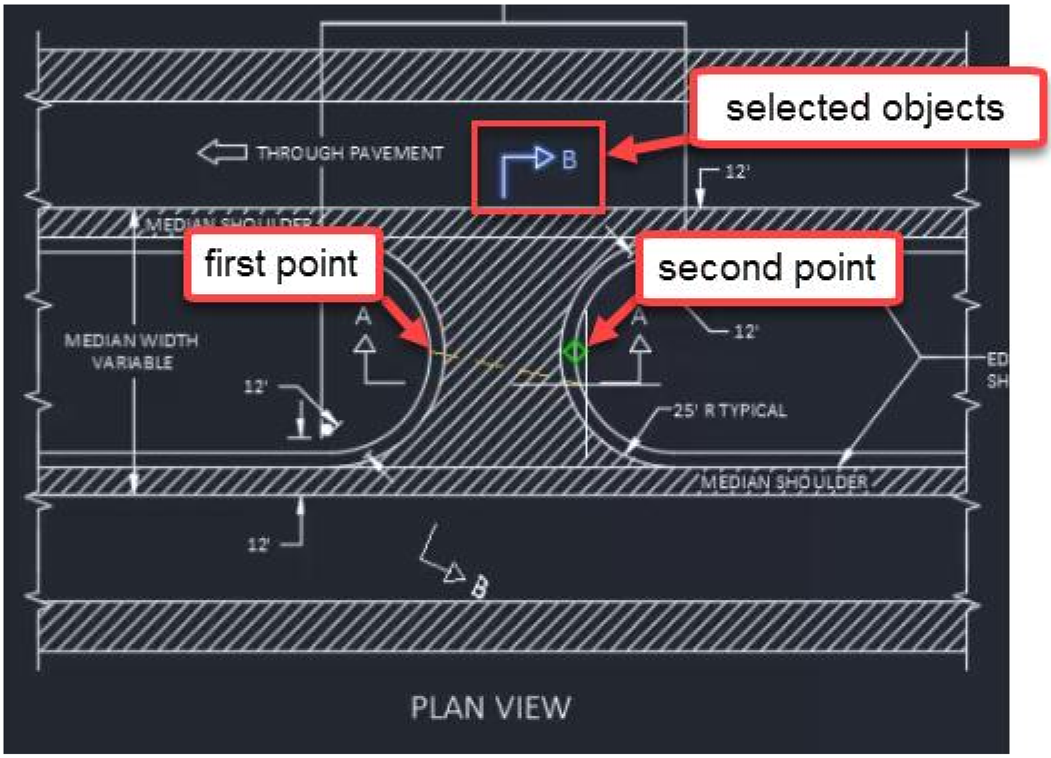
Exercise files: acad-modify-data-c3d16.zip Start with acad-modify-02.dwg acad-modify-05.mp4 5:21

Mirror

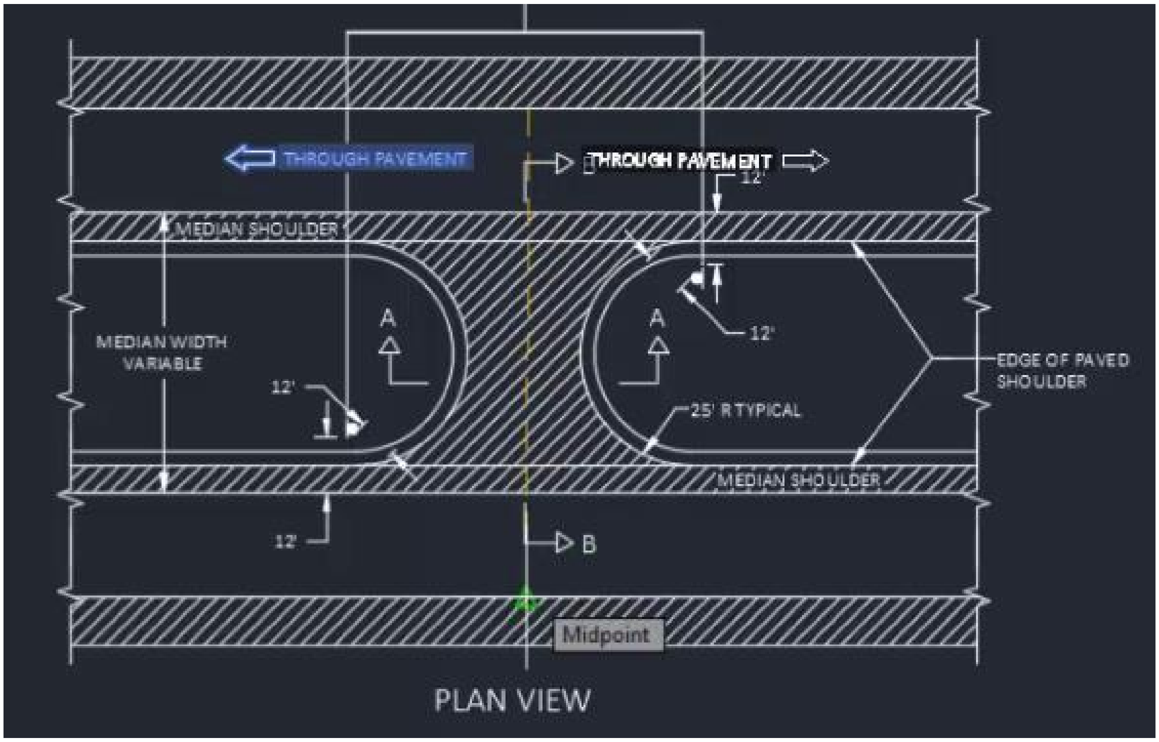
The Mirror command allows you to essentially copy, rotate, and paste an object in the X-Y plane about a mirror line you specify. You can then choose to keep or remove the original object you have mirrored. This can greatly reduce your task time whenever you are creating object with an axis of symmetry in the X-Y plane.

1. Open acad-modify-02.dwg
2. Zoom and Pan to PLAN VIEW detail area of drawing
3. **Ribbon > Home tab > Modify panel > Mirror**

4. Select "section line arrow" and "B" Text in upper pavement area of PLAN VIEW detail
    A. Right-click
    B. Turn on Quadrant Osnap
    C. Use Quadrant Osnap to specify first point of mirror line at quadrant point on median Arc
    D. Use Quadrant Osnap to specify second point of mirror line at center of opposite median Arc



    A. **ERASE SOURCE OBJECTS: N**
        I. enter
5. **MIR**
    A. enter
    B. Select "THROUGH PAVEMENT" Text and adjacent "arrow symbol"
    C. Right-click
    D. Turn on Midpoint Osnap
    E. Use Midpoint Osnap to specify first point of mirror line at upper midpoint of edge-of-pavement Line
    F. Use Midpoint Osnap to specify second point of mirror line at lower midpoint of edge-of-pavement Line



G. **ERASE SOURCE OBJECTS: N**
   I. enter
6. Select newly created "THROUGH PAVEMENT" Text and adjacent "arrow symbol"
7. **M**
   A. enter
   B. Specify base point and second point to move objects to lower pavement area of PLAN VIEW detail

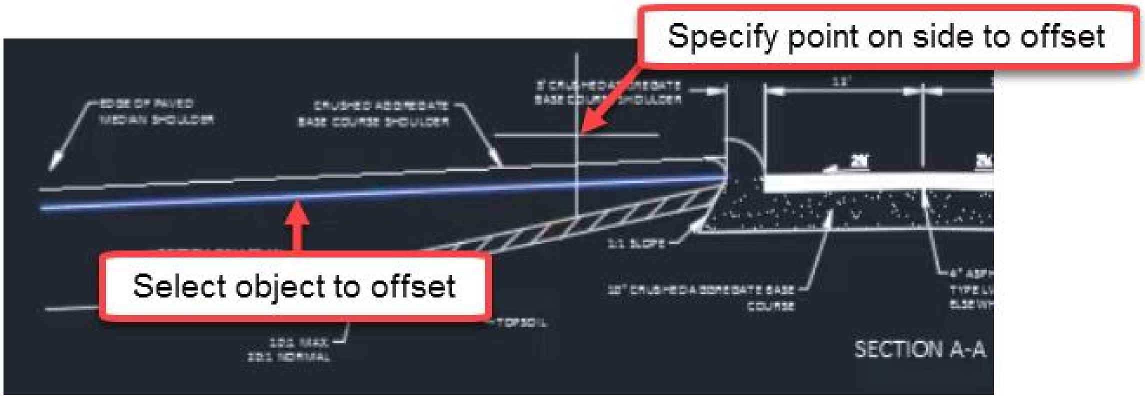
Offset

The Offset command allows you to create an object in reference to existing Polyline, Line or Arc objects. The geometry of the newly created objects is dictated by a constant distance measured perpendicularly from the source object. You can call out the offset distance using a known numeric value or by specifying an offset location using your cursor. This tool is especially helpful when laying out proposed roadway or parcel linework (ie Edge of Pavement, ROW)

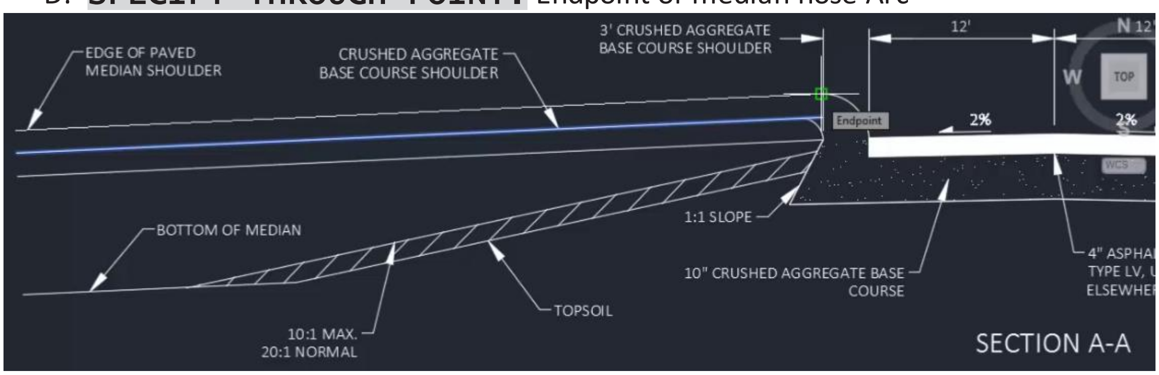
> **Tip:** Using modify commands such as Offset to manipulate Polylines is a great way to lay the foundation for dynamic Civil 3D Objects. This is because many dynamic Civil 3D Objects (ie Alignment, Feature Line) can be initially created from simpler AutoCAD Objects (ie Polyline).

1. Continue working with acad-modify-02.dwg
2. Zoom and Pan to SECTION A-A detail area of drawing

3. **Ribbon > Home tab > Modify panel > Offset button**
    A. **SPECIFY OFFSET DISTANCE: 1.5**
    B. enter
    C. **SELECT OBJECT TO OFFSET:** select subgrade Line on left side of SECTION A-A detail
    D. **SPECIFY POINT ON SIDE TO OFFSET:** left-click above subgrade Line

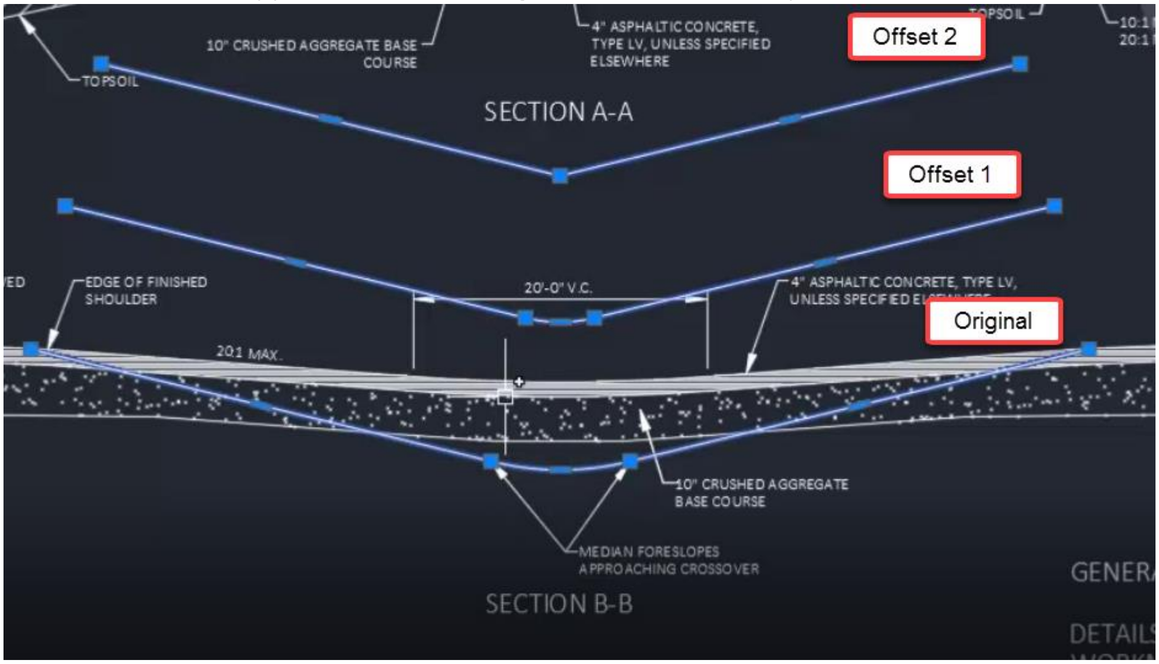


    A. enter
4. **OFFSET**
    A. enter
    B. **SPECIFY OFFSET DISTANCE:** THROUGH
    C. Turn on Endpoint Osnap
    D. **SPECIFY THROUGH POINT:** Endpoint of median nose Arc



    E. **SELECT OBJECT TO OFFSET**: select "CRUSHED AGGREATED BASE COURSE SHOULDER" Line on right side of SECTION A-A detail
    F. **SPECIFY THROUGH POINT:** Endpoint of median nose Arc on right side of SECTION A-A detail
5. **OFFSET**
    A. enter
    B. **SELECT OBJECT TO OFFSET:** MEDIAN FORESLOPES Polyline in SECTION B-B detail
    C. **SPECIFY OFFSET DISTANCE: 10**
        I. enter

D. specify point on side to offset: above selected Polyline
E. Repeat steps 5.A thru 5.D selecting previously offset Polyline as object to offset
    I. Observe disappearance of Arc segement on offset Polyline



Trim, Extend & Lengthen

Exercise files: [acad-modify-data-c3d16.zip]

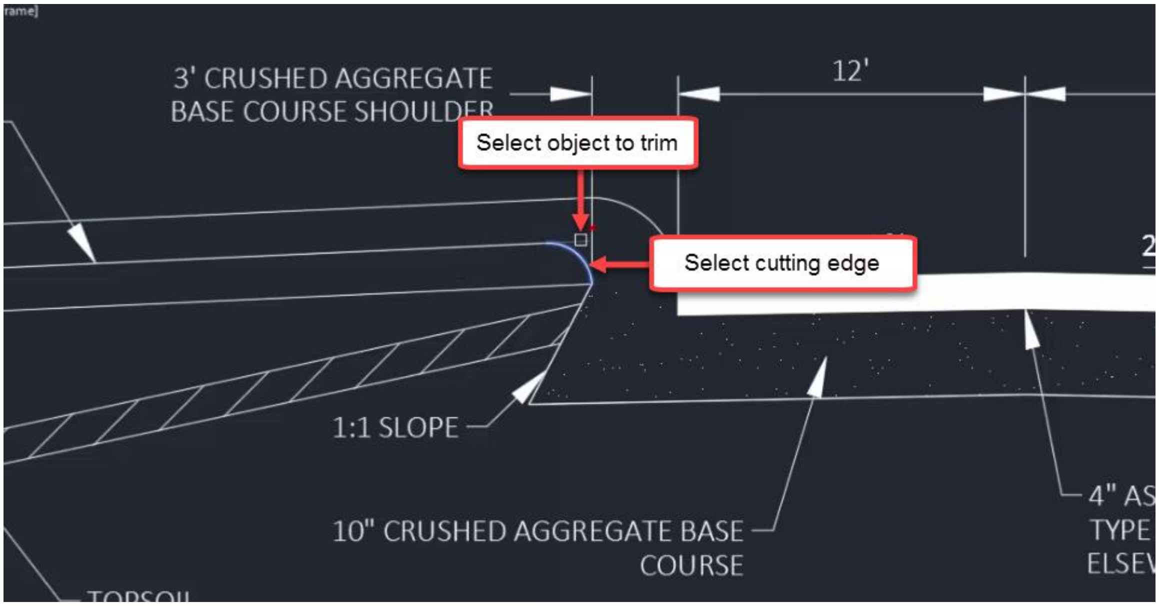
Continue with acad-modify-02.dwg

[acad-modify-06.mp4] 3:50

Trim

The Trim command allows you to modify existing geometry such that a section is removed based on intersection with other referenced existing geometry. For example, a Line can be shortened to the point at which it intersects with another Line. The Trim command applies to objects such as Line, Polyline, Circle, Ellipse, and Arc.

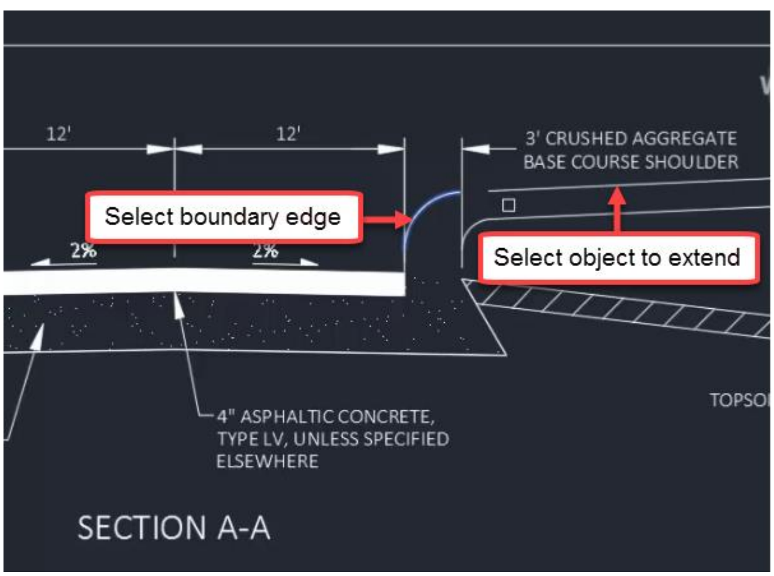
1. Continue working with acad-modify-02.dwg
2. Zoom and Pan to SECTION A-A detail area of drawing
3. **Ribbon > Home tab > Modify panel > Trim**
    A. **`SELECT OBJECTS:`** select smaller Arc intersecting with Line representing AGGREGATE SHOULDER
    B. **`TRIM:`** select segment of Line you wish to trim



Extend

The Extend command is essentially the reverse of the Trim command. Extend allows you to lengthen a geometry object (ie Line, Polyline, Arc) up to the point where it would intersect referenced existing geometry.

1. Continue working with acad-modify-02.dwg
2. **Ribbon > Home tab > Modify panel > Extend**
   A. **`SELECT OBJECTS:`** select median nose Arc on right side of SECTION A-A detail
   B. **`EXTEND:`** select Line you wish to extend



Tips:
Hold shift while the Trim command is active in order to switch to the Extend command

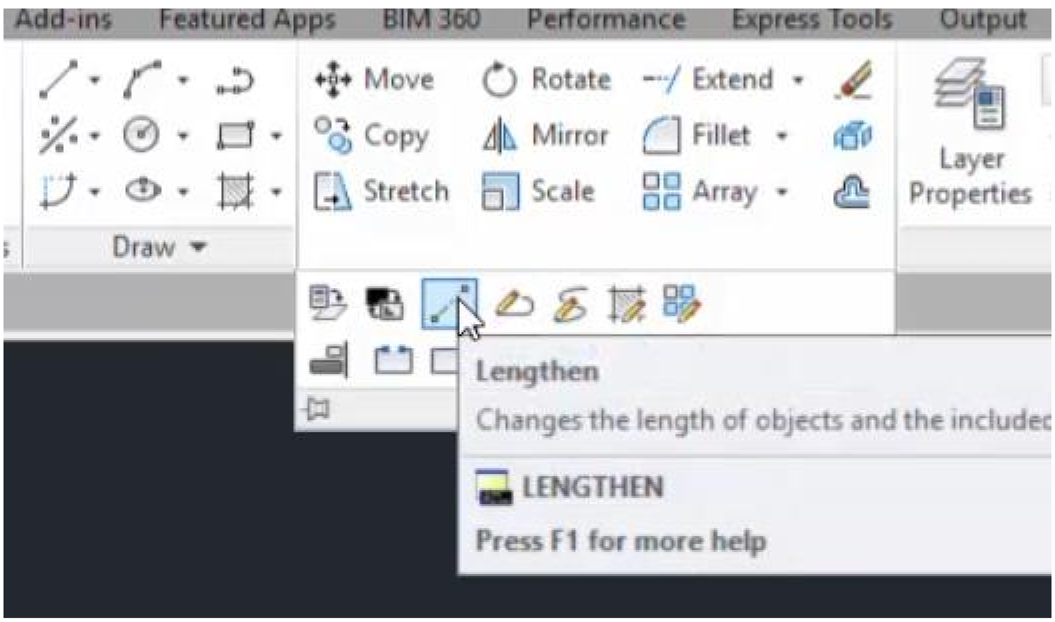
on the fly.

While selecting objects to Extend or Trim, choose the mid-command option <select all>. This allows you to use any existing geometry object as a potential Extend boundary or Trim cutting edge.

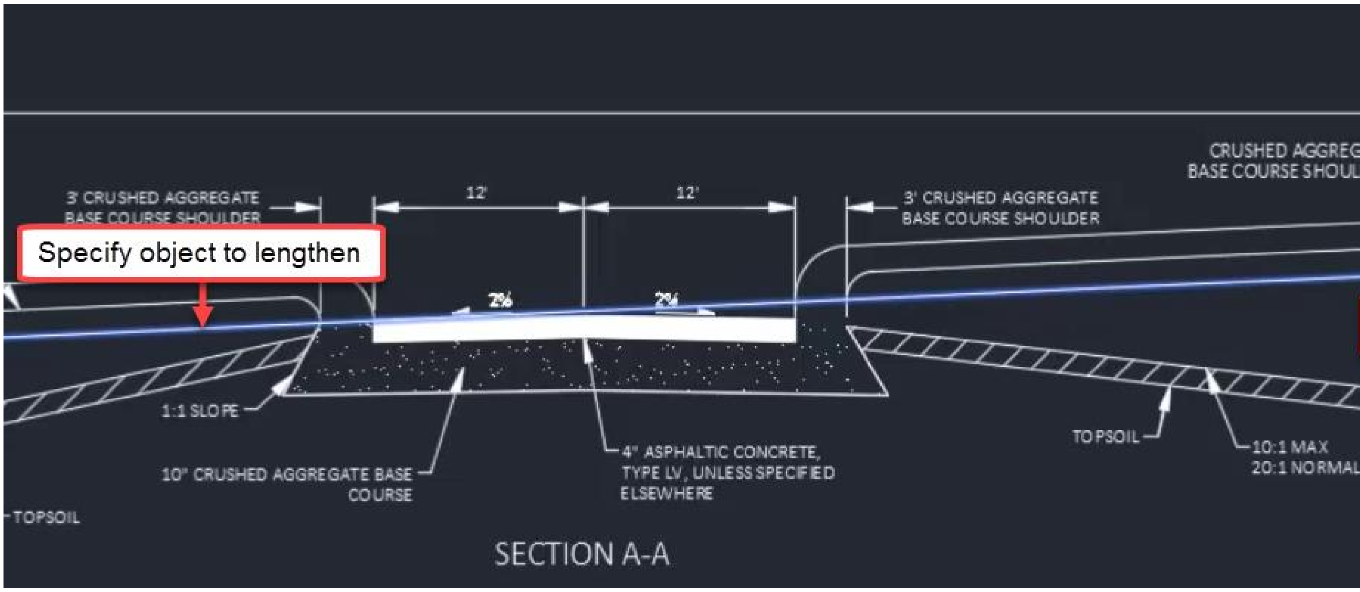
Lengthen

The Lengthen command allows you to continue an object along it's current direction without the need for existing geometry to serve as a boundary to extend to. You can use Object Snaps to specify the amount you wish to lengthen the object. The Lengthen command also includes mid-command options to measure selected object geometry.

1. Continue working with acad-modify-02.dwg
2. **Ribbon > Home tab > Modify flyout > Lengthen button**



A. **SELECT AN OBJECT TO MEASURE OR: DY**
    I. enter
B. **SELECT AN OBJECT TO CHANGE:** select Line on left side of SECTION A-A representing SUBGRADE
C. **SPECIFY NEW END POINT:** use Endpoint Osnap to select the end of the Line representing CRUSHED AGGREGATE BASE COURSE SHOULDER on the right side of SECTION A-A detail
D. enter



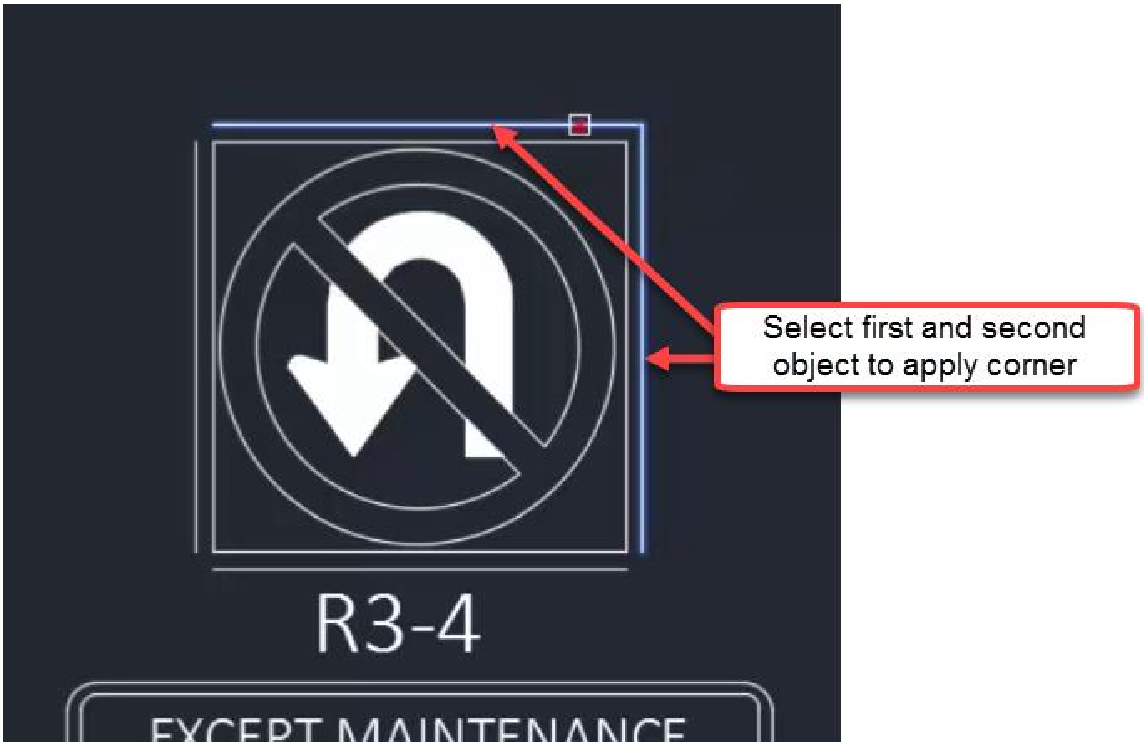
Fillet & Break

Exercise files: [acad-modify-data-c3d16.zip]()   Start with acad-modify-03.dwg   [acad-modify-07.mp4]() 6:03

Fillet

The Fillet command allows you to insert an Arc at the intersection (or apparent intersection) of two Lines (or Polylines) and trim the Lines at the points of tangency of the Arc. Fillet mid-command options allow you to specify Radius, apply Fillets to all line segment intersections on a Polyline, or continue the command and apply it multiple times consecutively.

1. Open acad-modify-03.dwg
2. Zoom and Pan to R3-4 sign above PLAN VIEW detail
3. **Ribbon > Home tab > Modify panel > Fillet button**
   A. `SELECT FIRST OBJECT OR: R`
      I. enter
   B. `SPECIFY FILLET RADIUS: 0`
      I. enter

C. 

D. **SELECT FIRST OBJECT:** select one of the outermost R3-4 detail Lines
E. **SELECT SECOND OBJECT TO APPLY CORNER:** select adjacent R3-4 detail Line

4. **F**
   A. enter
   B. **SELECT FIRST OBJECT OR: R**
      I. enter
   C. **SPECIFY FILLET RADIUS: 0.35**
      I. enter
   D. **SELECT FIRST OBJECT:** select one of the outermost R3-4 detail Lines
   E. **SELECT SECOND OBJECT TO APPLY CORNER:** select adjacent R3-4 detail Line
5. **F**
   A. enter
   B. **SELECT FIRST OBJECT OR: M**
      I. enter
   C. Apply Fillets to all remaining outermost R3-4 detail Lines
      I. enter
6. Select all four innermost Lines on R3-4 detail
   A. **J**
      I. enter

B. `F`
    I. enter
C. `SELECT FIRST OBJECT OR: R`
    I. enter
D. `SPECIFY FILLET RADIUS: 0.2`
    I. enter
E. `SELECT FIRST OBJECT OR: POLYLINE`
    I. enter
F. `SELECT 2D POLYLINE:` select Polyline formed in Step 6.A

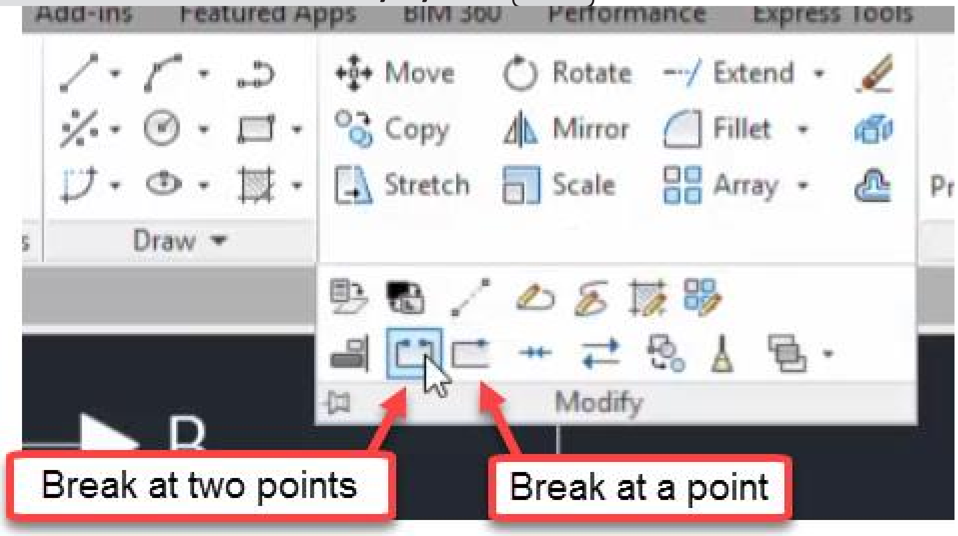
Tip: Use the Fillet command with radius=0 to extend line segments to their point of apparent intersection. The arc segment will then be omitted.

Break

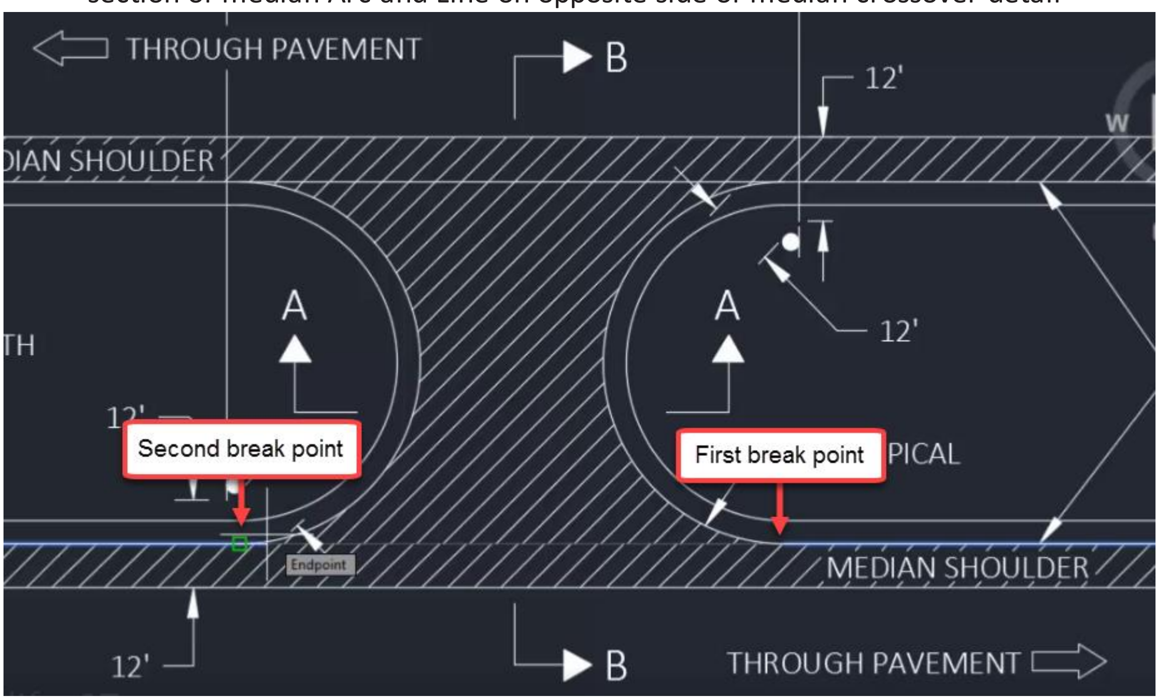
The Break command allows you to create two Lines or Polylines from a single existing Line. You have the option to Break the Line at a single point so that the two resulting Lines share a common endpoint location or to Break the Line at two points so that a gap is formed between the two resulting Lines.

1. Continue working with acad-modify-03.dwg
2. Zoom and Pan to PLAN VIEW detail area of drawing

3. **Ribbon > Home tab > Modify flyout > Break**



   A. **SELECT OBJECT:** select Line bounding MEDIAN SHOULDER on bottom side of PLAN VIEW detail tangent to median Arc
   B. **SPECIFY SECOND BREAK POINT OR: F**
      I. enter
   C. **SPECIFY FIRST BREAK POINT:** Use Endpoint Osnap to select intersection of median Arc and Line
   D. **SPECIFY SECOND BREAK POINT OR:** Use Endpoint Osnap to select intersection of median Arc and Line on opposite side of median crossover detail



Array

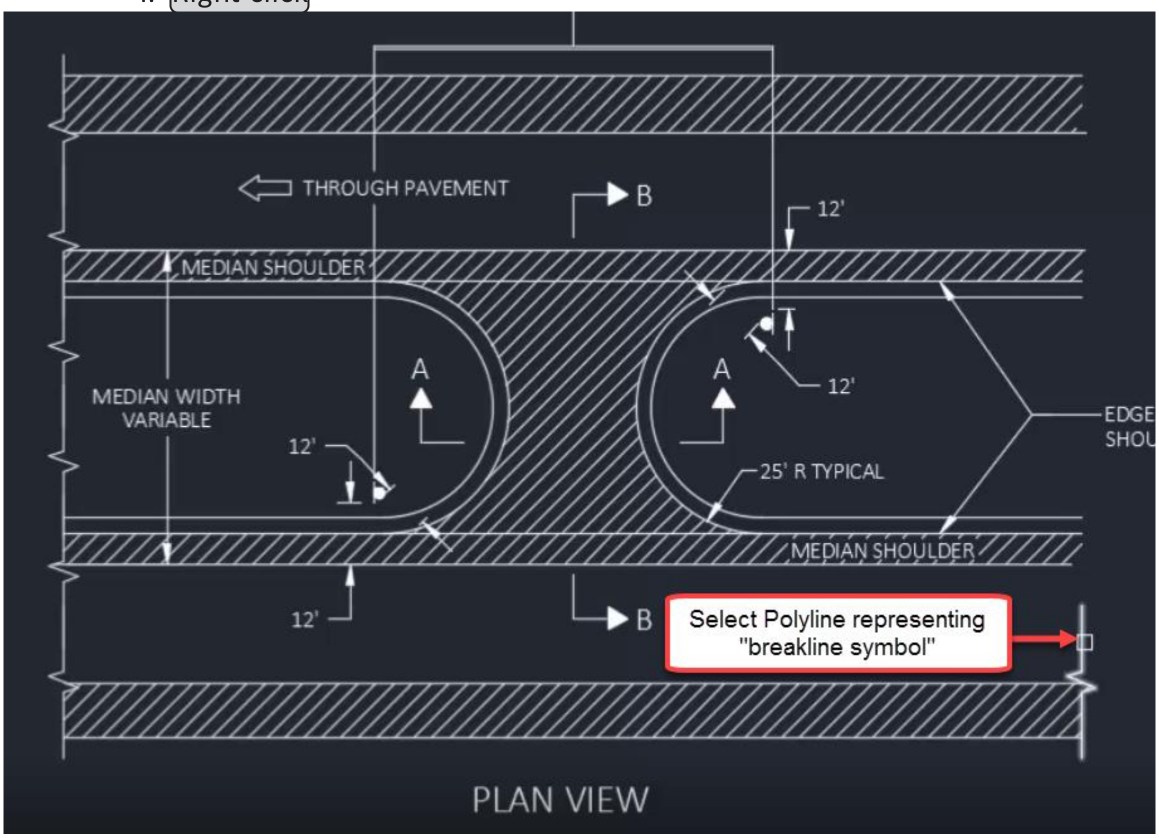
Exercise files: [acad-modify-data-c3d16.zip]

Continue with acad-modify-04.dwg

[acad-modify-08.mp4] 4:34

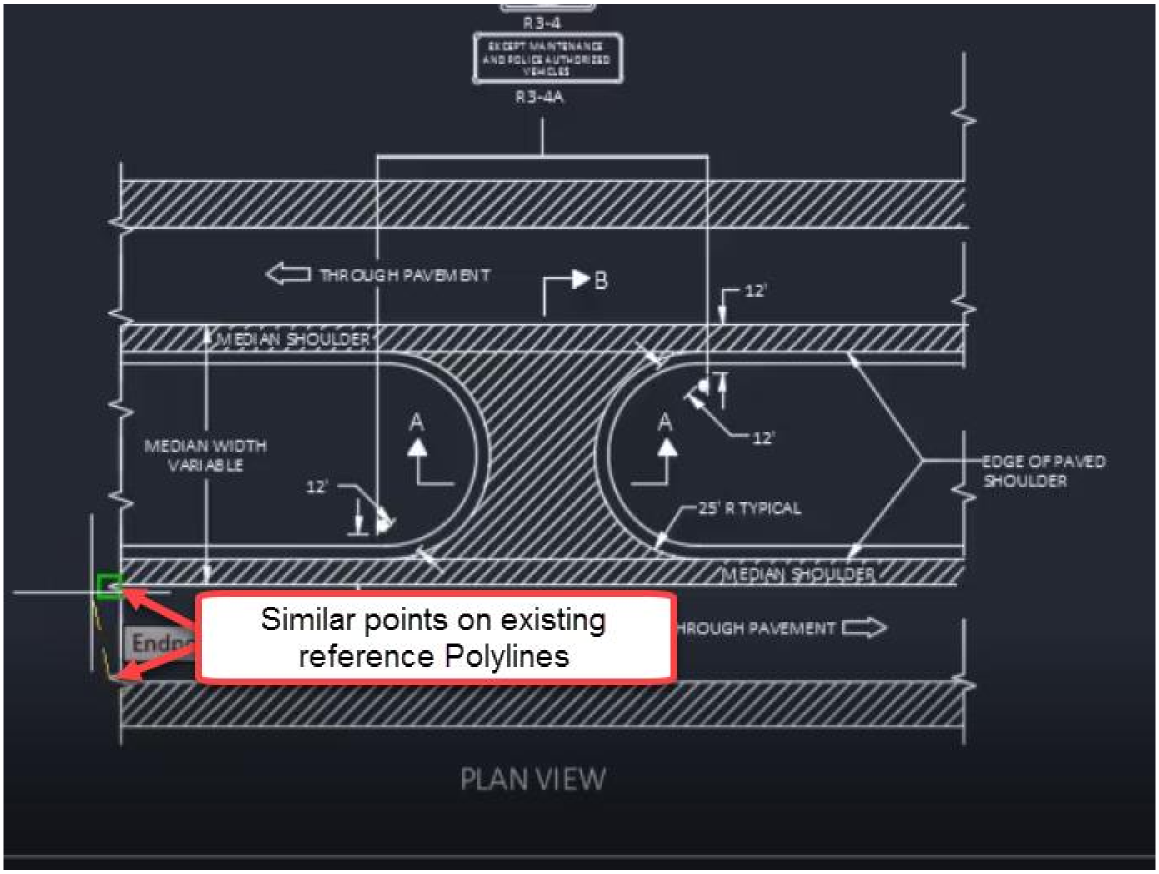
The Array command allows you to copy a selected object and paste the object repetitively in a Rectangular, Polar, or Path based Array. A Rectangular Array is arranges the copied object in rows and columns. A Polar Array arranges the copied object at a radius and incremental angle about a specified location. A Path Array arranges the copied object at a specified location along a path based on an existing Line or Polyline. This section will cover the Rectangular Array.

1. Open acad-modify-04.dwg
2. Zoom and Pan to PLAN VIEW detail area of drawing
3. **Ribbon > Home tab > Modify panel > Array (Rectangular)**
   A. **SELECT OBJECTS:** select Polyline representing "breakline symbol"
      I. Right-click



   B. **Ribbon > Array contextual tab > Columns panel**
      I. Columns = 1
   C. **Ribbon > Array contextual tab > Rows panel**
      I. Rows = 6

D. **SELECT GRIP TO EDIT ARRAY OR: SPACING**
   I. enter
E. **SPECIFY DISTANCE BETWEEN ROWS:** Use Endpoint Osnap to select two similar points on "breakline symbol" Polylines on left side of PLAN VIEW
   I. enter
   II. enter



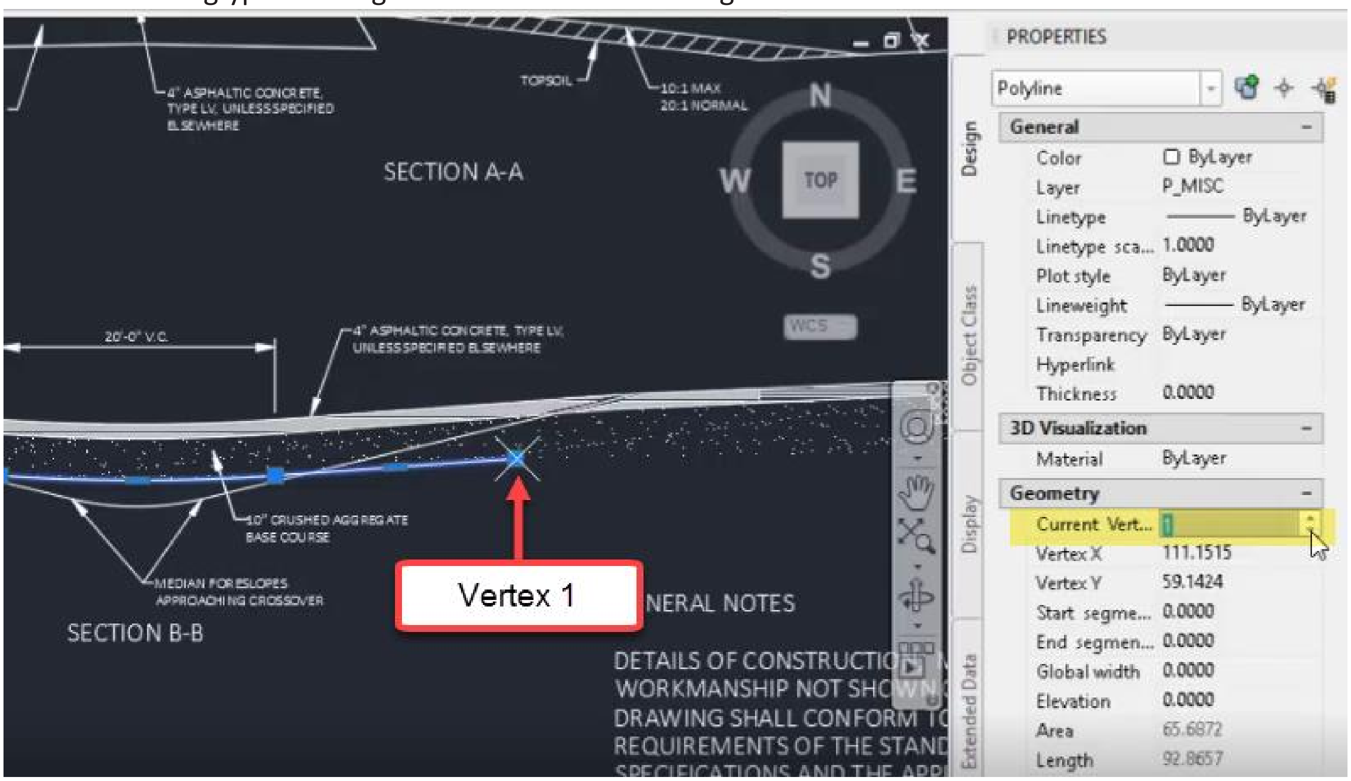
Reverse & Align

Exercise files: [acad-modify-data-c3d16.zip] Continue with acad-modify-04.dwg [acad-modify-09.mp4] 3:03

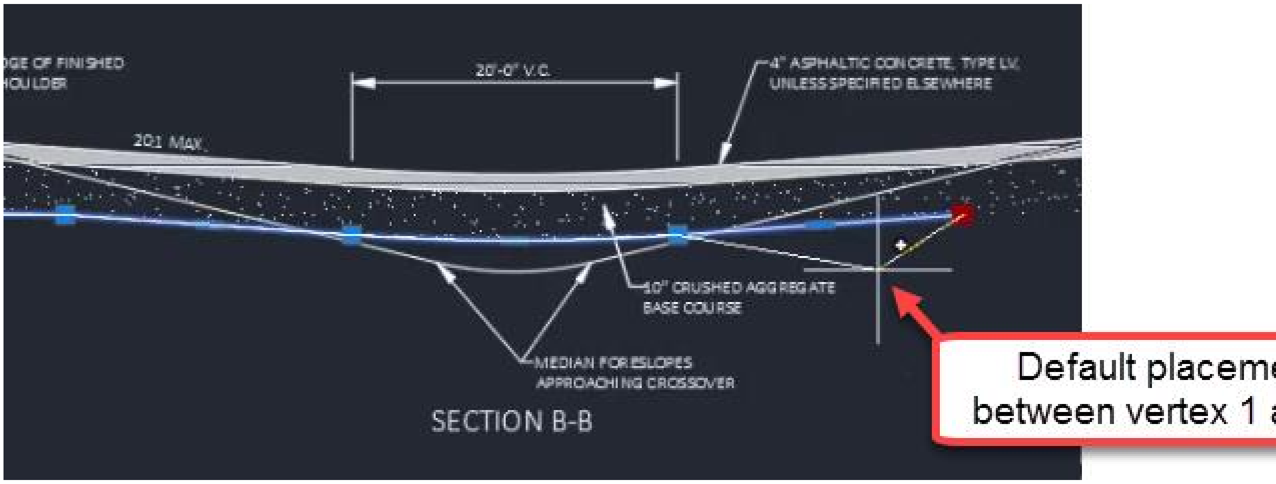
Reverse

The Reverse command will change the order of Polyline vertices. This is helpful when you wish to add a vertex to the end of an existing Polyline. By default, Civil 3D will add the vertex in front of the highest numbered vertex (the last vertex placed). If you want to add a vertex to the end of the lowest numbered vertex (vertex 1), it will instead be placed between vertex 1 and 2. The order of Polyline and Line vertices also affects how a Linetype is generated. Linetypes will start at vertex 1.

1. Continue working with acad-modify-04.dwg
2. Open Properties Palette
    A. **PROPS**
        I. enter
3. Select Polyline drawn along bottom of 10" CRUSHED AGGREGATE BASE COURSE Hatch
    A. **Properties palette > Geometry dropdown > Current Vertex**
    B. Toggle between numbered vertices
    C. Observe glyph showing vertex location in drawing area



    D. Hover cursor over vertex 1
        I. Add vertex
        II. Observe default placement of new vertex

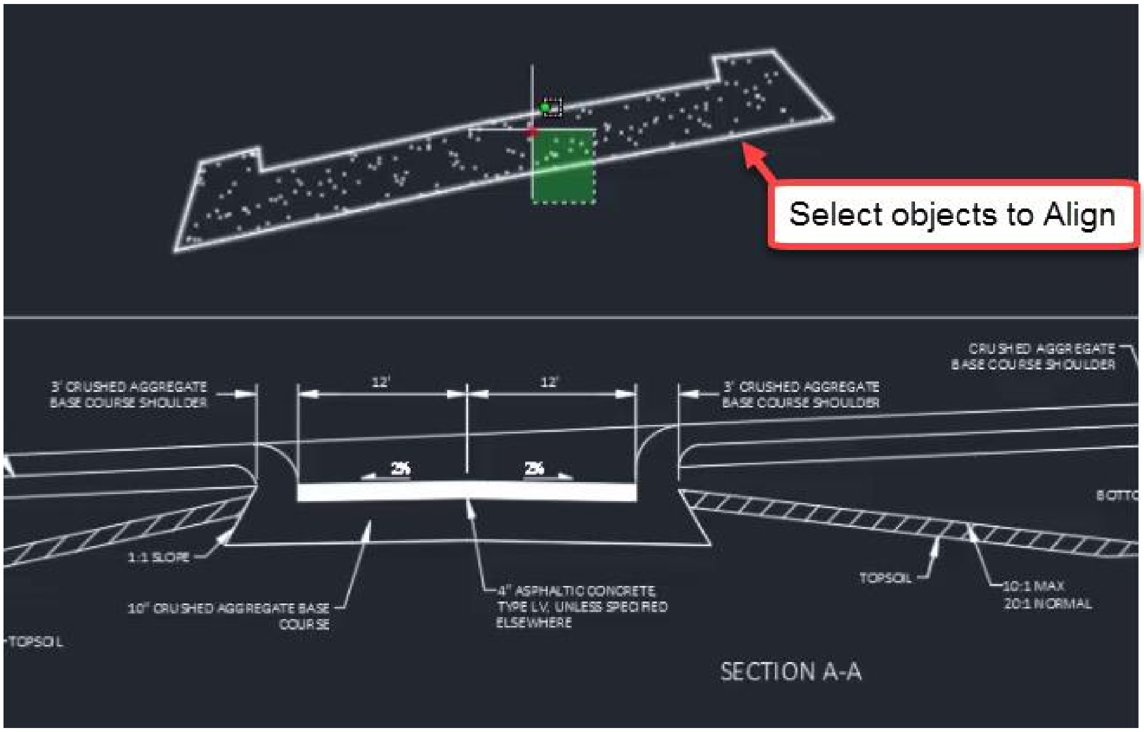


E. **Ribbon > Home tab > Modify flyout > Reverse**
   I. **Properties palette > Geometry dropdown > Current Vertex**
   II. Observe reversed order of Polyline vertices
F. Hover cursor over vertex 5
   I. Add vertex
   II. Observe default placement of new vertex
   III. Use desired Osnap to place new vertex

Align

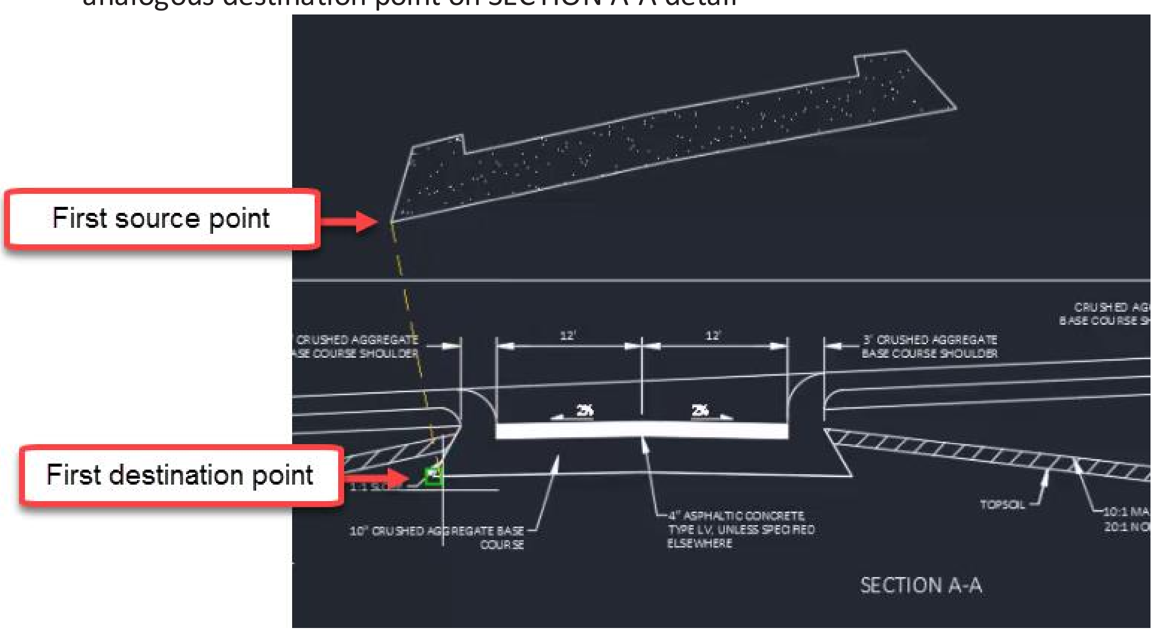
The Align command combines the functionality of the Move, Rotate, and Scale commands. Most basic AutoCAD objects can be affected by the Align command (ie Polyline, Block, Hatch, Text). Once the command is activated, you will select obects to Align then select at least two source and destination points. If any rotation, repositioning, or scaling is necessary to replace the source points with destination points, the Align tool will do this for you.

1. Continue working with acad-modify-04.dwg
2. Zoom and Pan to area including SECTION A-A detail and misaligned objects above sheet border Line
3. **Ribbon > Home tab > Modify flyout > Align**
   A. **SELECT OBJECTS:** select misaligned objects above sheet border Line
      I. Right-click



B. **SPECIFY FIRST SOURCE POINT:** use Endpoint Osnap to select lower left Polyline vertex

C. **SPECIFY FIRST DESTINATION POINT:** use Endpoint Osnap to select analogous destination point on SECTION A-A detail



D. **SPECIFY SECOND SOURCE POINT:** use Endpoint Osnap to select lower right Polyline vertex

E. **SPECIFY SECOND DESTINATION POINT:** use Endpoint Osnap to select analogous destination point on SECTION A-A detail
F. **SPECIFY THIRD SOURCE POINT OR <CONTINUE>:**
   I. enter
G. **SCALE OBJECTS BASE ON ALIGNMENT POINT?: Y**
   I. enter

Hatch

Last updated: 2017-12-01

Total video time: 14:23

A Hatch is an object that fills in a bounded area and displays either a Solid, Pattern, or Gradient. The display of the Hatch can be affected by setting a hatch scale, rotation, color (typically ByLayer), and/or transparency. The origin of the Hatch pattern can be reset so that it displays appropriately depending on the shape of the area filled, the hatch rotation, and the hatch scale. There are also options to associate the Hatch with a boundary object such as a Polyline so that a change to the boundary object will affect the Hatch accordingly such as with a Move, Scale or Rotate command. A Hatch object can be made Annotative so that the scale of the drawing dictates the scale of the Hatch. There are several additional Hatch options such as Match Properties and Separate Hatches that affect the way a Hatch is defined.

Warning: Having a large number of Hatch objects can significantly reduce drawing performance and stablitly. This is especially true if Hatch transparency is used.

Info: Many of the desired effects of a Hatch object are handled by Styles when working with Civil 3D objects (ie Surface, Pipe Network, or Corridor objects). This has the benefit of the "hatched" area of the Civil 3D object being created automatically as part of the object, being dynamically linked to the object, and being turned on/off at any time by editing Style display settings.

Hatch Creation, Pattern, & Properties

Exercise files: acad-htch-data-c3d16.zip

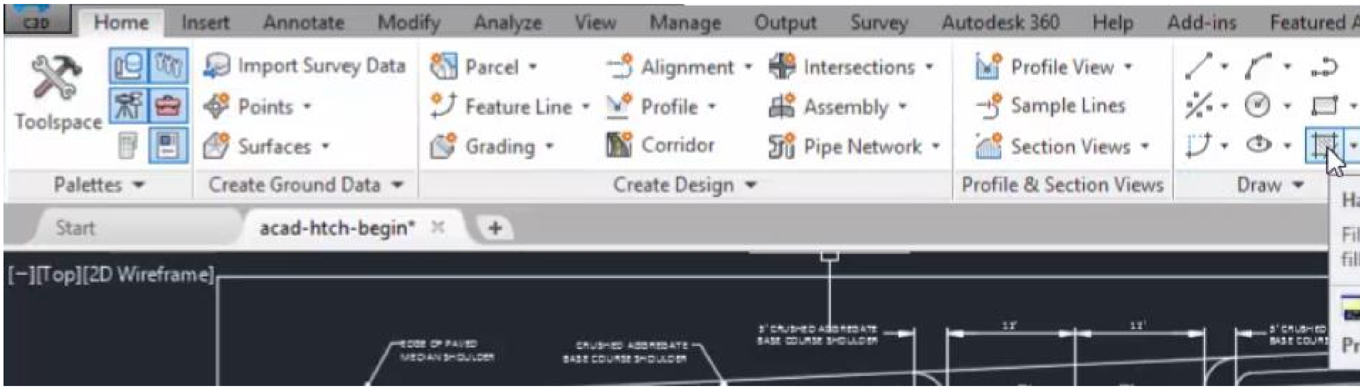
Start with acad-htch-begin.dwg

acad-htch-01.mp4 6:29

Hatch creation

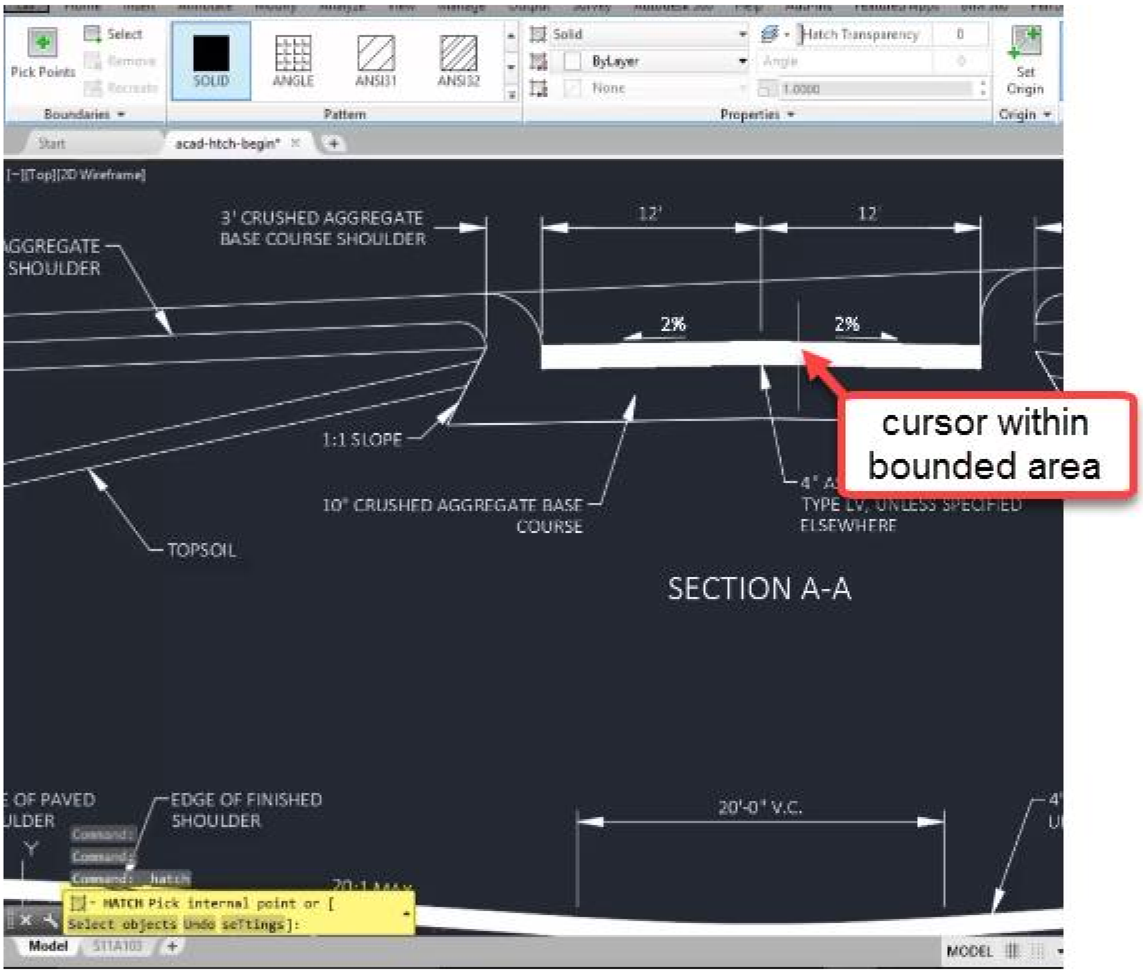
1. Open acad-htch-begin.dwg
2. Zoom and Pan to SECTION A-A detail

3. **Ribbon > Home tab > Draw panel > Hatch**



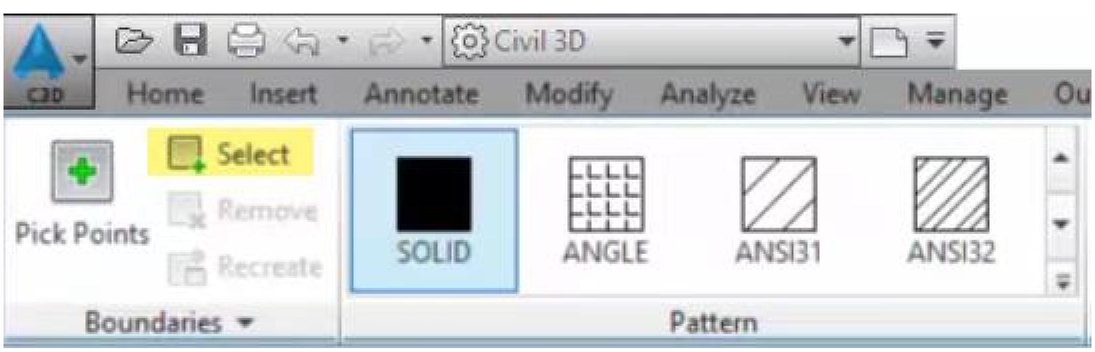
4. **`HATCH PICK INTERNAL POINT OR:`** leave default to pick internal point
   A. Or, if necessary, **`HATCH SELECT OBJECTS OR: PICK INTERNAL POINT`**
   B. Move cursor inside area bounded by Lines representing 4" ASPHALTIC CONCRETE
   C. Observe Hatch preview

D. Left-click to place Hatch

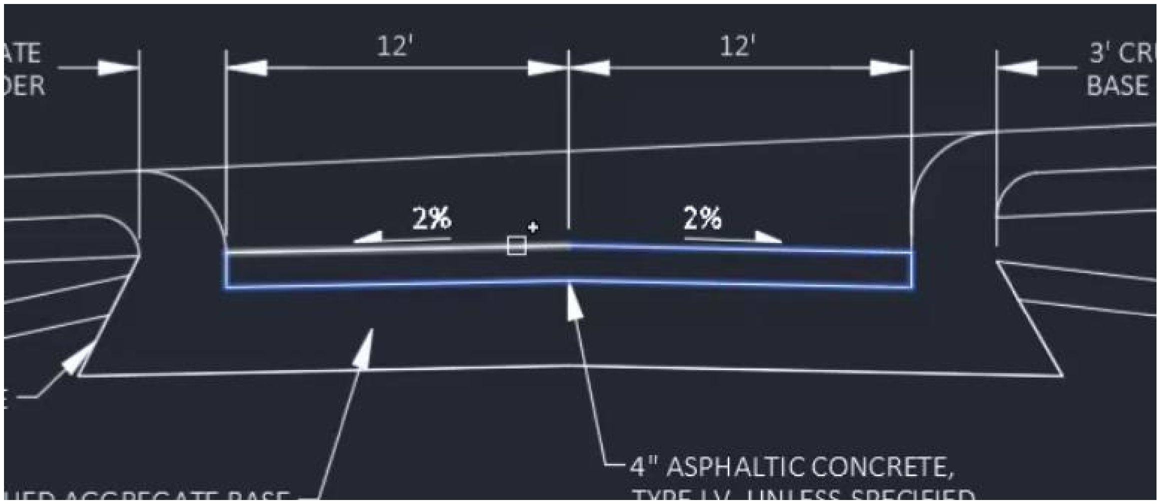


E. Select previously created Hatch
   I. delete

5. **Ribbon > Home tab > Draw panel > Hatch**
   A. **Ribbon > Hatch contextual tab > Boundaries panel > Select**

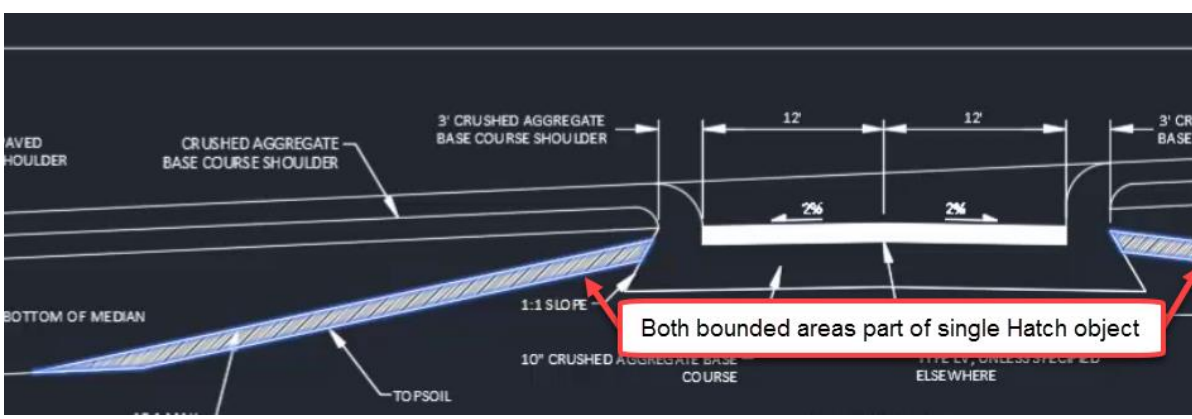


B. Select individual Lines bounding SECTION A-A PAVEMENT area
   I. enter

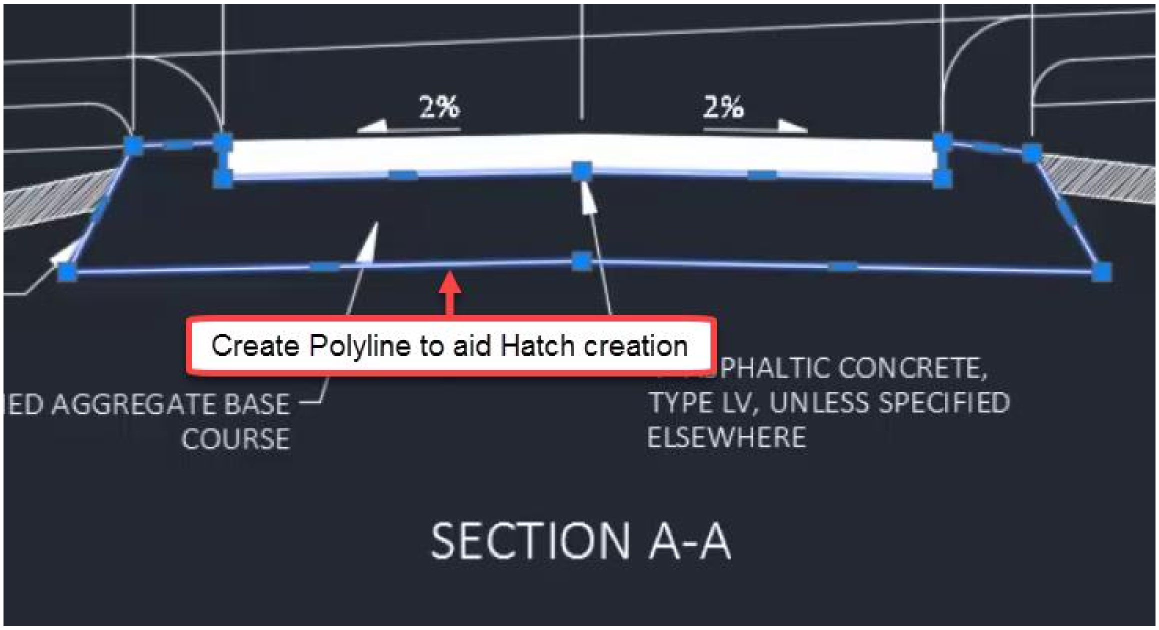


C. Select previously created Hatch
   I. delete

6. Select individual Lines bounding SECTION A-A PAVEMENT area
   A. **J**
      I. enter
7. **Ribbon > Home tab > Draw panel > Hatch**
   A. **Ribbon > Hatch contextual tab > Boundaries panel > Select**
   B. Select single Polyline bounding SECTION A-A PAVEMENT area
      I. enter
8. **Ribbon > Home tab > Draw panel > Hatch**
   A. **Ribbon > Hatch contextual tab > Pattern panel > ANSI31**
   B. **Ribbon > Hatch contextual tab > Boundaries panel > Pick Points**
   C. Left-click inside Lines bounding both SECTION A-A TOPSOIL areas
      I. enter



9. **Ribbon > Home tab > Draw panel > Polyline**
    A. Use Endpoint Osnap to pick vertices bounding SECTION A-A 10" CRUSHED AGGREGATE BASE COURSE area



Tip: It may be necessary to create a Polyline to help with Hatch creation if existing linework does not get you the results you are after. You can delete the Polyline afterward if desired and still retain the Hatch.

Pattern & Properties

Use the Pattern panel flyout found on the Hatch contextual tab to choose from the available Patterns. Use the Properties panel to set fill type (Pattern, Solid, or Gradient), scale, rotation angle, and transparency. A Hatch scale will work in combination with the drawing scale if the Hatch is set to be annotative (see Associative & Annotative section).

10. **Ribbon > Home tab > Draw panel > Hatch**
    A. **Ribbon > Hatch contextual tab > Pattern panel > ANGLE**
    B. **Ribbon > Hatch contextual tab > Boundaries panel > Select**
        I. Select Polyline bounding SECTION A-A 10" CRUSHED AGGREGATE BASE COURSE area
            a. enter
        II. Select Polyline bounding SECTION A-A 10" CRUSHED AGGREGATE BASE COURSE area
            a. delete
11. Select previously created TOPSOIL Hatch
    A. **Ribbon > Hatch contextual tab > Properties panel**
        I. Hatch pattern scale = 10

B. **Ribbon > Hatch contextual tab > Pattern panel flyout**
   I. Patten = AR-SAND

Associative & Annotative

Exercise files: [acad-htch-data-c3d16.zip]

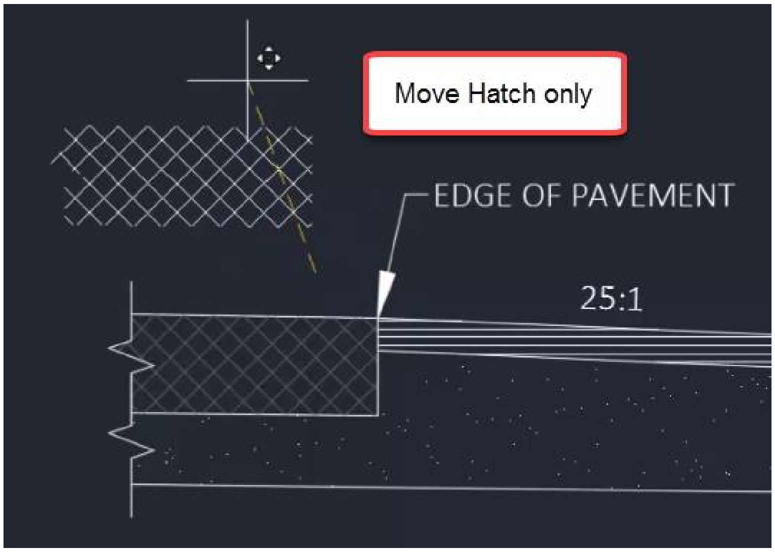
Start with acad-htch-01.dwg

[acad-htch-02.mp4] 5:25

Associative Boundaries

A Hatch is an independent object. As such, it does not depend on the presence of a boundary object in order to be retained after it is first generated. If desired, however, a Region or Polyline boundary can be created to aid in moving or retaining the original shape of a Hatch. For example, a Polyline boundary provides basepoint grips when performing a Move command on a Hatch. A Region will retain the original shape of the Hatch in the event the Hatch needs to be rebuilt. In order for the Hatch to move with or respond to edit to the boundary, the boundary must be made associative.Ipsum lorem. Ipsum lorem. Ipsum lorem. Ipsum lorem.

1. Open acad-htch-01.dwg
2. Zoom and Pan to left side of SECTION B-B detail
3. Select Hatch representing PAVEMENT section
   A. **M**
      I. enter
      II. Select basepoint and second points



4. Observe lack of Hatch boundary

5. Select Hatch
    A. Observe available grips
    B. **M**
        I. enter n
        II. Observe lack of grips during Move command
        III. esc
6. Ctrl+z to undo initial Move
7. Select Hatch
    A. **Ribbon > Hatch contextual tab > Boundaries panel > Recreate**
        I. **ENTER TYPE OF BOUNDARY OBJECT: POLYLINE**
            a. enter
        II. **ASSOCIATE HATCH WITH NEW BOUNDARY? Y**
            a. enter
    B. esc
8. Select Hatch boundary Polyline
    A. **M**
        I. enter
        II. Select basepoint and second point
        III. Observe Hatch association with Polyline
9. Select Hatch boundary Polyline
    A. **M**
        I. enter
        II. Use Endpoint Osnap to move Polyline back to original location

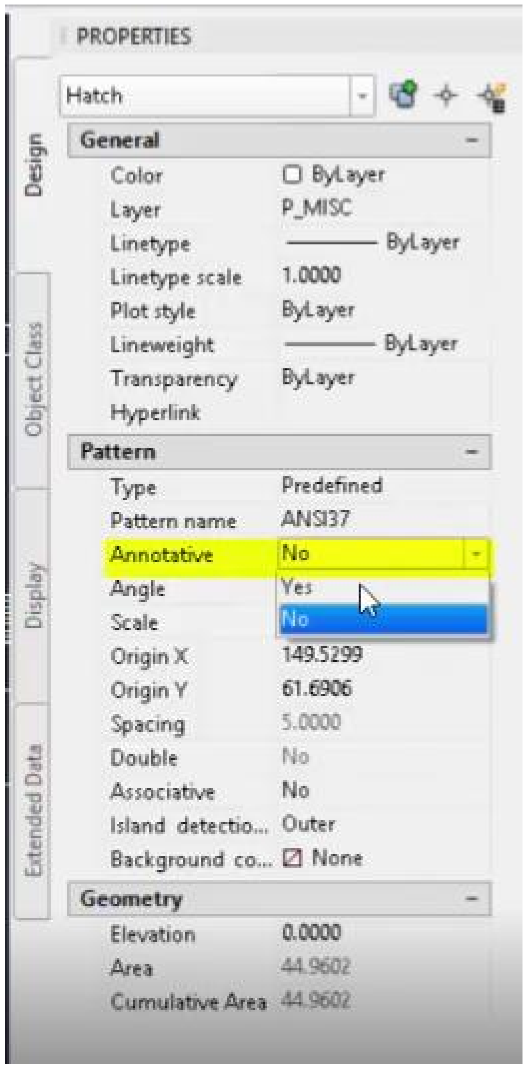
Annotative

Annotative scaling is used to dynamically set an annotative object's displayed scale based on the current drawing scale. It can also be used control visibility of annotative objects based on inclusion of scales in an object's annotative scales list. The end goal here is to display objects at the correct scale when plotting layouts. More detail on annotative scaling in general can be found in the training module dedicated to the topic. This section will walk you through making a Hatch annotative and managing the annotative scales list. You will also see how the Hatch pattern scale is different from a Hatch annotative scale, and how the two can work together.

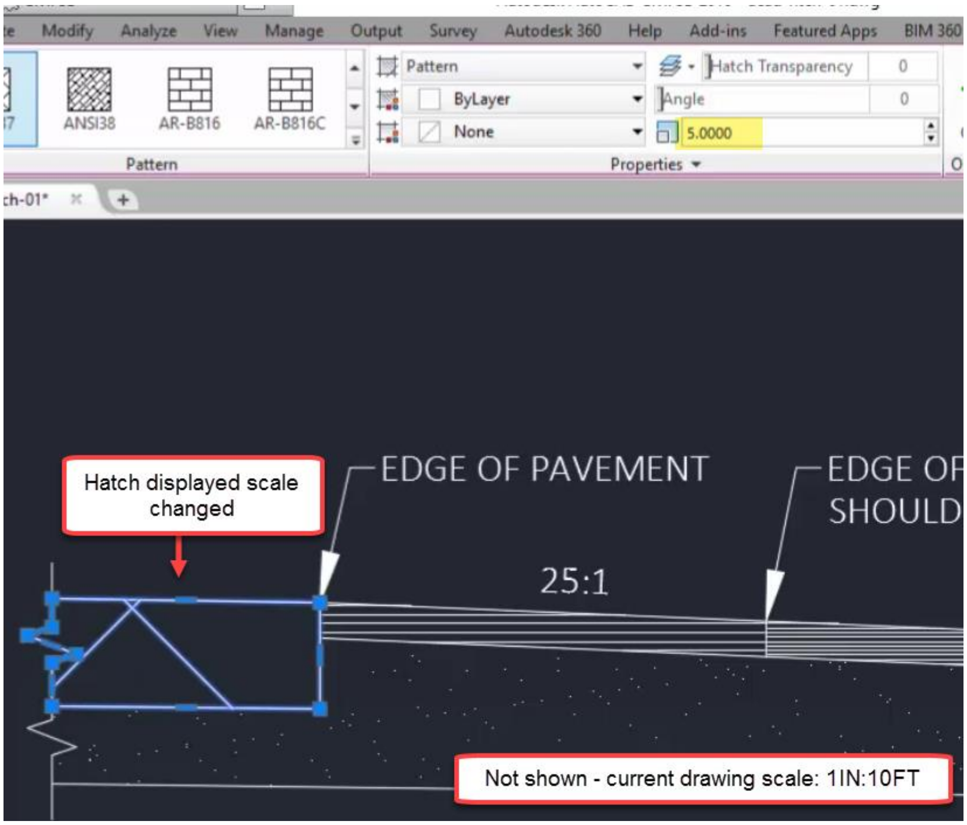
1. Continue working in acad-htch-01.dwg
2. Select Hatch representing PAVEMENT section on left side of SECTION B-B detail
    A. **Ribbon > Hatch contextual tab > Properties panel**
        I. Observe Hatch pattern scale = 5.0000

B. **Properties palette > Pattern dropdown**

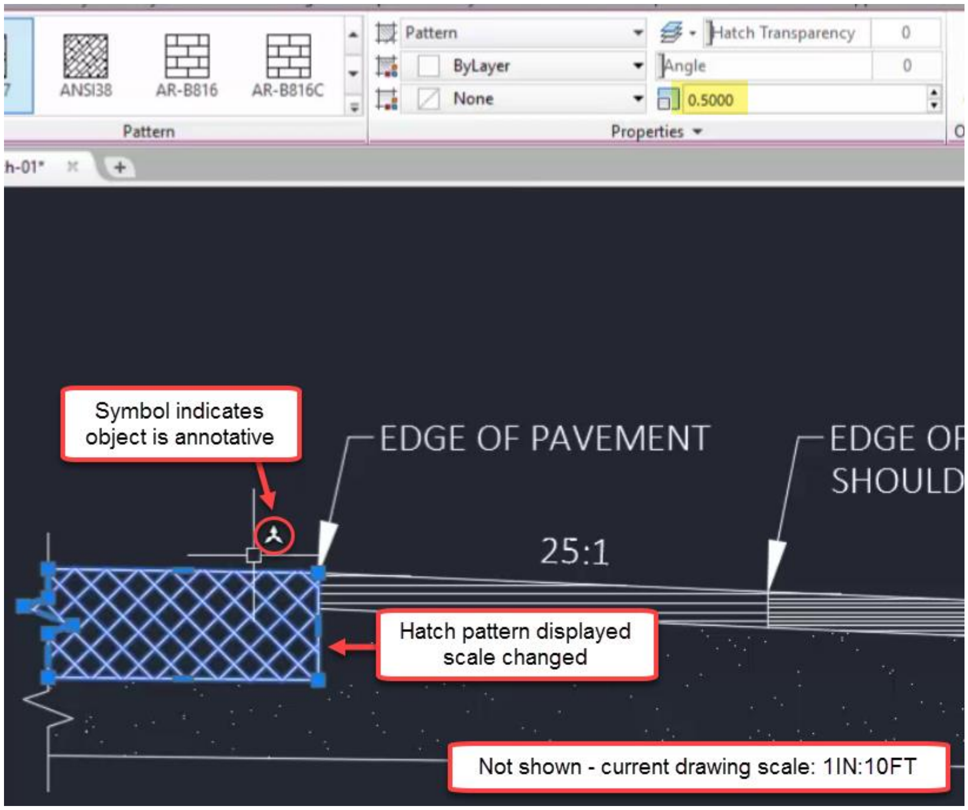
I. Annotative = Yes



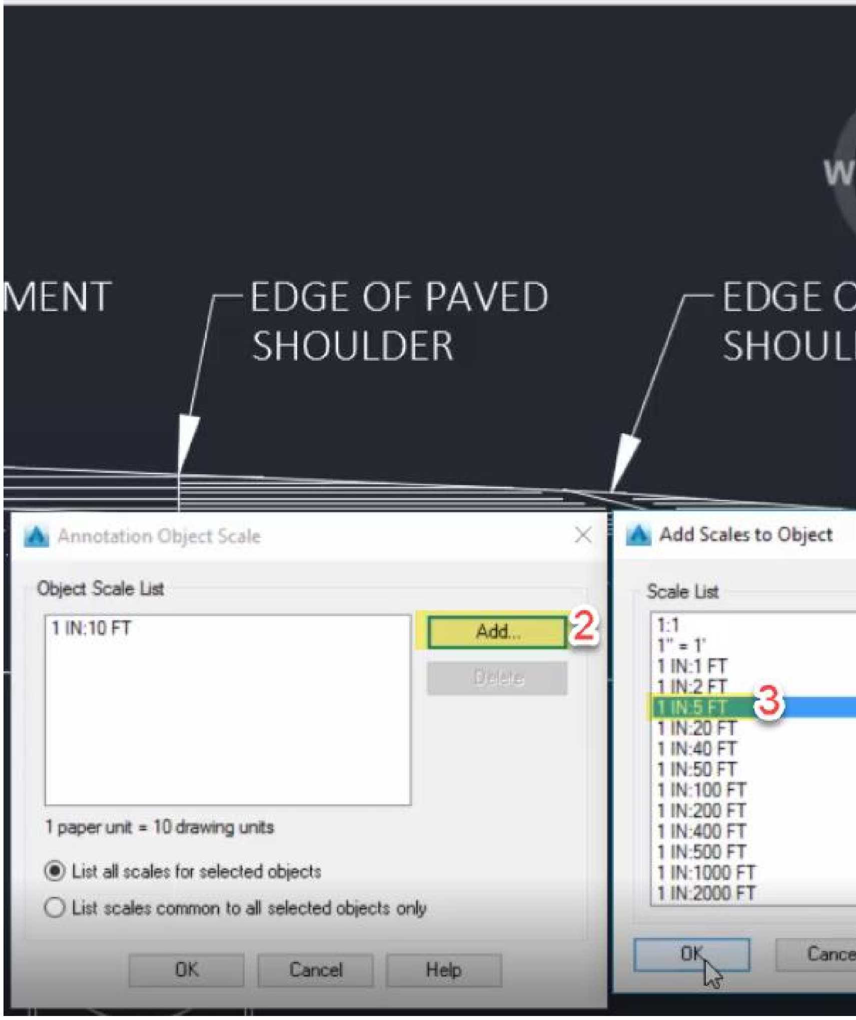
A. Observe Hatch pattern displayed scale change



B. **Ribbon > Hatch contextual tab > Properties panel**
   I. Hatch pattern scale: **0.5**



3. **Status bar > Current drawing scale flyout**
   A. Select 1 IN:5 FT
   B. Observe no change in Hatch pattern displayed scale
4. **Status bar > Current drawing scale flyout**
   A. Select 1 IN: 10 FT
5. Select Hatch representing PAVEMENT section on left side of SECTION B-B detail
   A. **Ribbon > Hatch contextual tab > Properties panel**
      I. **Pattern dropdown > Annotative scale > dialog box icon**
         a. Annotation Object Scale dialog
            i. Add...
               1. Add Scales to Object dialog
                  1. 1 IN:5 FT
                  2. OK



6. **Status bar > Current drawing scale flyout**
   A. Select 1 IN:5 FT
   B. Observe change in Hatch pattern displayed scale

Match Properties & Separate Hatches

Exercise files: [acad-htch-data-c3d16.zip]

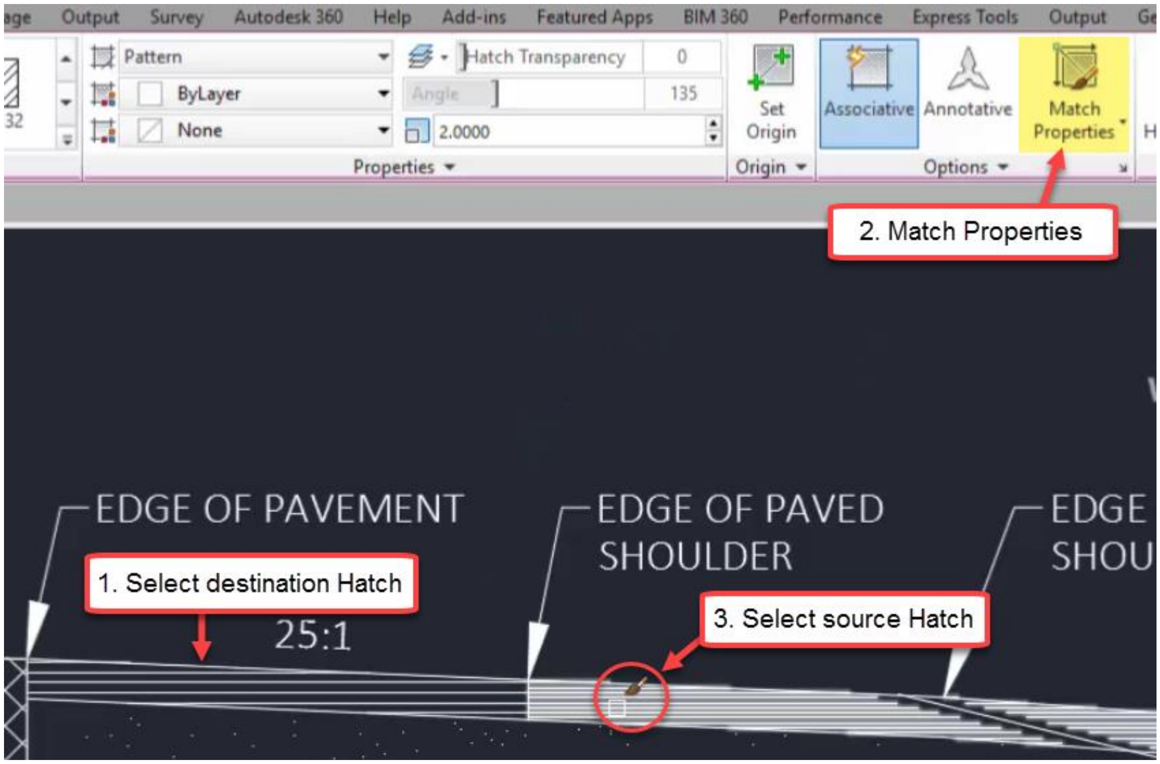
Continue with acad-htch-01.dwg

[acad-htch-03.mp4] 2:29

Match Properties

Use the Match Properties button found on the Hatch contextual tab to push pattern, color, transparency, and Hatch pattern scale from a source to destination Hatch. This saves you time if you need to update multiple Hatches to have similar Hatch properties.

1. Continue working in acad-htch-01.dwg
    A. Select PAVED SHOULDER Hatch on left side of SECTION B-B detail
    B. **Ribbon > Hatch contextual tab > Options panel > Match Properties**
        I. Select FINISHED SHOULDER as source Hatch



Separate Hatches

You can set your Hatch creation options so that picking multiple bounded areas while in a single Hatch command creates either a single Hatch throughout all bounded areas or individual Hatch objects for each bounded area. You can also break an existing single Hatch that covers multiple bounded areas into separate Hatch objects for each bounded area.

1. Continue working in acad-htch-01.dwg

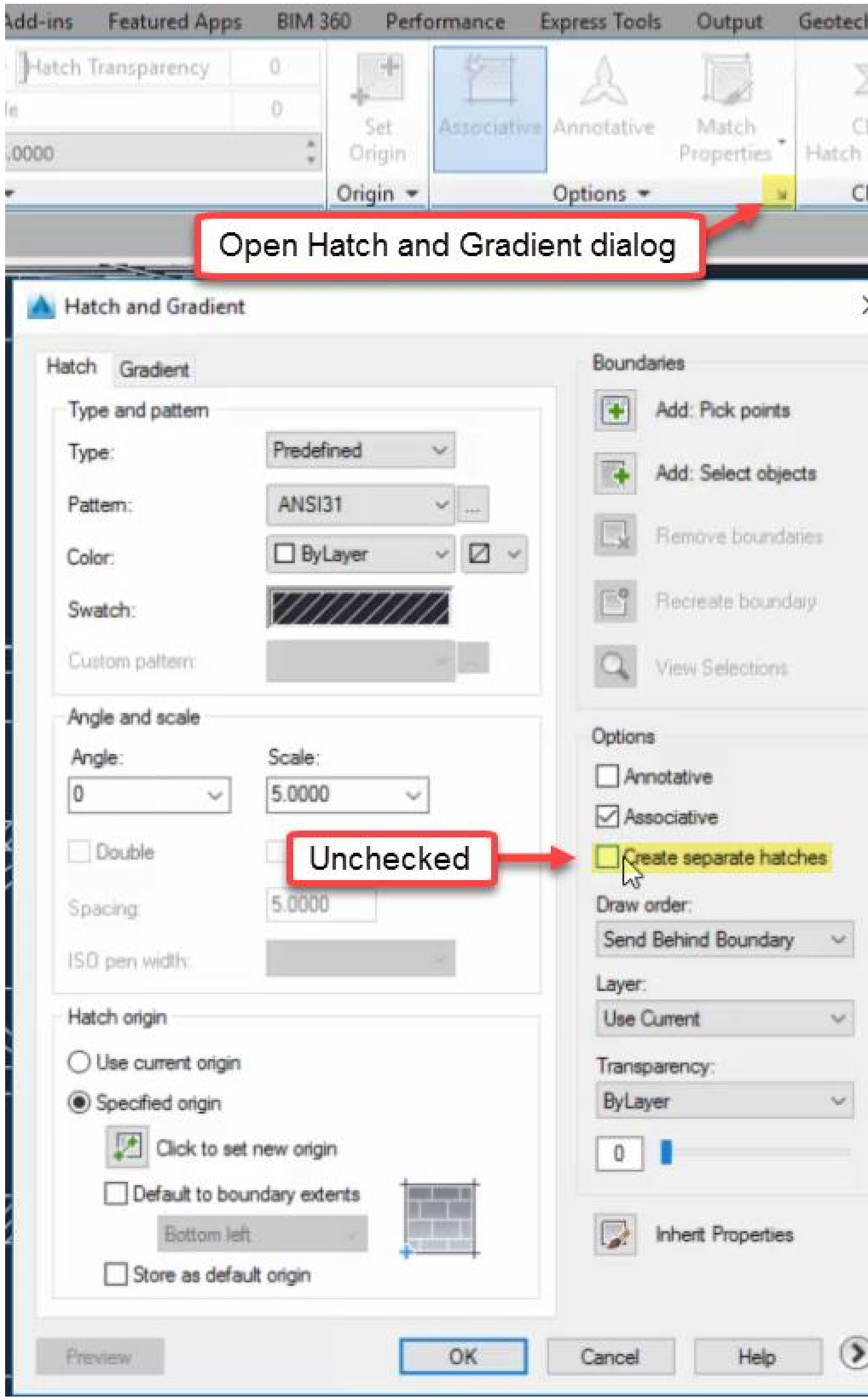
A. Zoom and Pan to PLAN VIEW detail

B. **Ribbon > Home tab > Draw panel > Hatch**

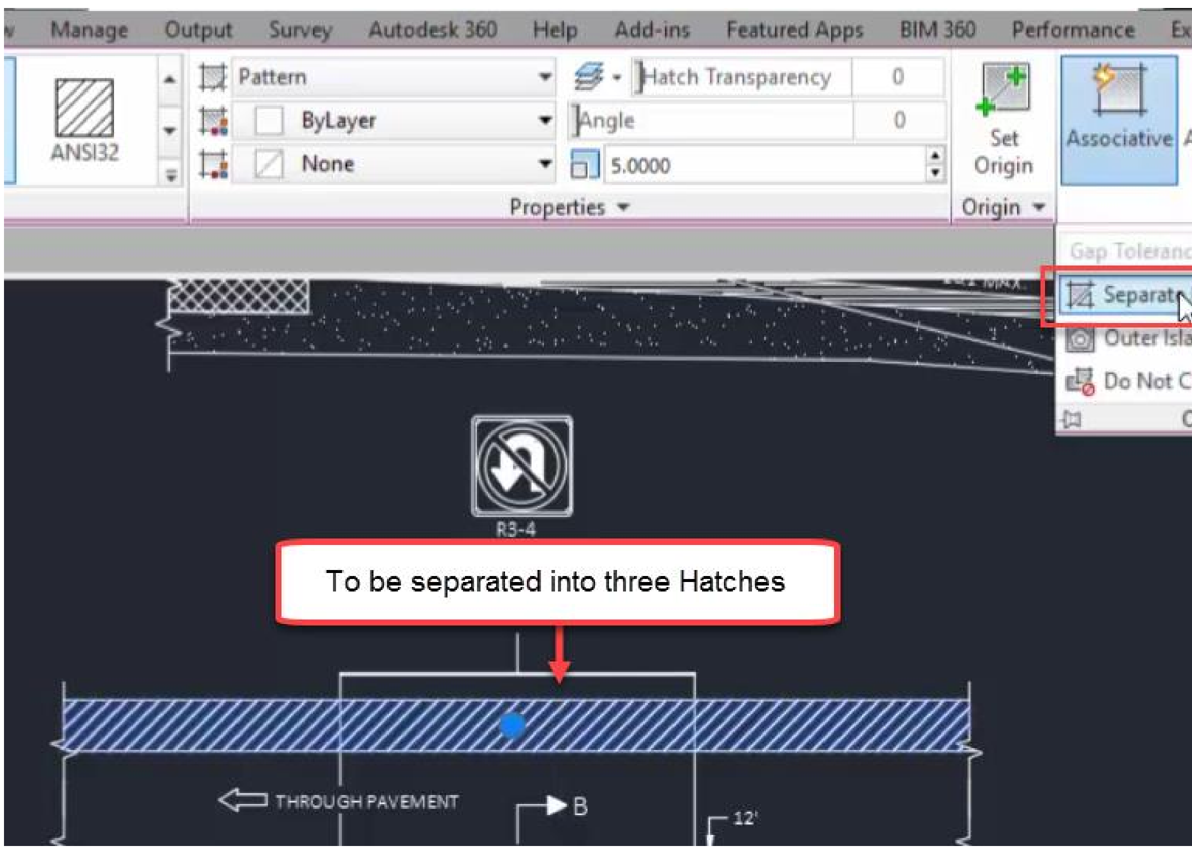
I. **Ribbon > Hatch contextual tab > Options flyout button**

a. Hatch and Gradient dialog

i. Create separate hatches = unchecked


Add-ins
Featured Apps
BIM 360
Performance
Express Tools
Output
Hatch Transparency
Set Origin
Associative
Annotative
Match Properties
Origin
Options
Open Hatch and Gradient dialog
Hatch and Gradient
Hatch
Gradient
Type and pattern
Type:
Predefined
Pattern:
ANSI31
Color:
ByLayer
Swatch:
Custom pattern:
Angle and scale
Angle:
0
Scale:
5.0000
Double
Spacing:
5.0000
ISO pen width:
Hatch origin
Use current origin
Specified origin
Click to set new origin
Default to boundary extents
Bottom left
Store as default origin
Boundaries
Add: Pick points
Add: Select objects
Remove boundaries
Recreate boundary
View Selections
Options
Annotative
Associative
Create separate hatches
Unchecked
Draw order:
Send Behind Boundary
Layer:
Use Current
Transparency:
ByLayer
0
Inherit Properties
Preview
OK
Cancel
Help

        II. Pick internal points in the three bounded areas along top of PLAN VIEW detail
            a. enter
            b. Observe a single Hatch object created that covers all three bounded areas
    C. **Ribbon > Home tab > Draw panel > Hatch**
        I. **Ribbon > Hatch contextual tab > Options flyout button**
            a. Hatch and Gradient dialog
                i. Create separate hatches = checked
        II. Pick internal points in the MEDIAN SHOULDER and median crossover areas through center of PLAN VIEW detail
            a. enter
            b. Observe multiple Hatch objects created for the bounded areas
    D. Select Hatch created in step 1.B
        I. **Ribbon > Hatch contextual tab > Options dropdown > Separate Hatches**
        II. Observe single Hatch split into multiple Hatches



Object Grips are used to interact with and edit objects in through the drawing view (ie Modelspace). Upon selecting an object, available Grips will display for the object(s) selected. Depending on the type of object selected, you may have Multifunction Grips allowing access to several options for Grip editing. Additionally, for all Grips, you can cycle between Grip Modes including Move, Rotate, Scale, and Mirror. Though many of the edits you perform using Grips can be handled elsewhere, utilizing Grip edits in combination with object snaps, polar tracking, and dynamic input can significantly expedite your object editing workflow.

Basics: stretch vs move

Exercise files: acad-grips-data-c3d16.zip

Start with acad-grips-begin.dwg

acad-grips-01.mp4 3:21

Arguably the most basic Grip function is the Stretch. Within the category of Stretch Grip functions, are two distinct types of editing behavior: Stretch and "move". In general, an endpoint Grip has a Stretch behavior and a midpoint or insertion Grip has "move" behavior. The Stretch behavior relocates the Grip and changes the length or radius and rotation or centerpoint of an object as necessary. The "move" behavior will relocate the Grip and object while retaining all other object geometry properties such as length and rotation.

Grips with Stretch function exhibiting "stretch" behavior:

- Polyline vertex and endpoint
- Line endpoint
- Arc endpoint

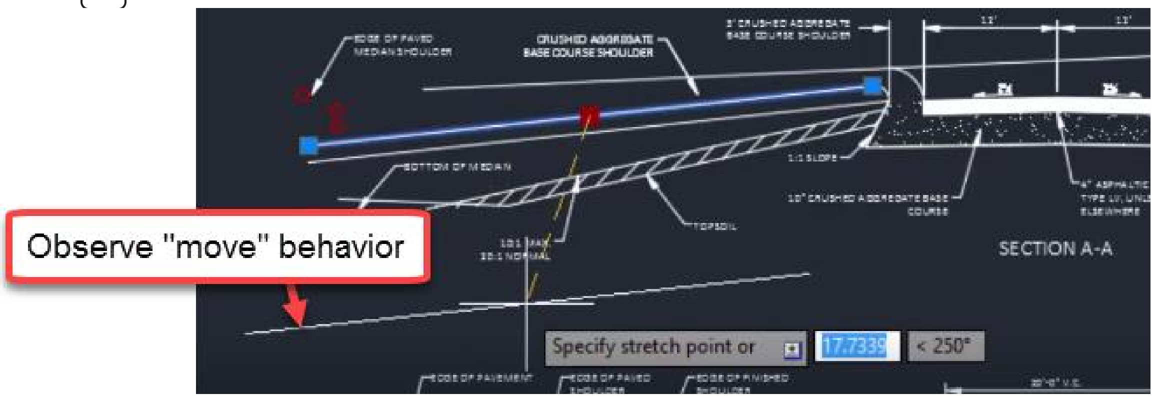
Grips with Stretch function exhibiting "move" behavior

- Text insertion point
- Line midpoint
- Circle center
- Block insertion point
- COGO Point

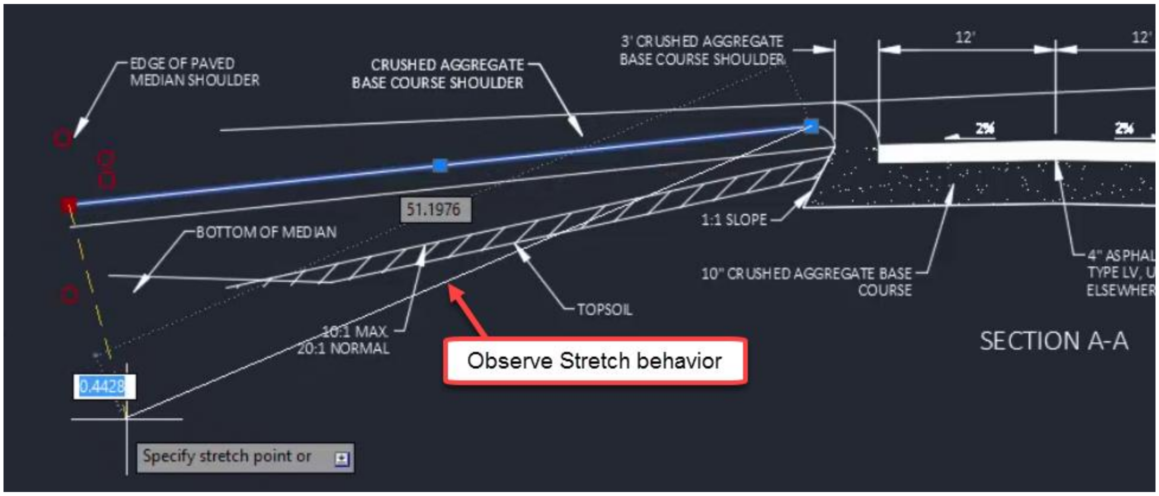
Info: The COGO Point is a Civil 3D object. COGO Points are covered in detail in later training modules and thus are not included in the example workflows here.

1. Open acad-grips-begin.dwg
2. Select CRUSHED AGGREGATE BASE COURSE SHOULDER Line on left side of SECTION A-A detail

   A. Observe display of two endpoint Grips and one midpoint Grip
   B. Left-click midpoint Grip to activate
      I. Move cursor and observe behavior
      II. esc



3. Select R3-4 Block at top of PLAN VIEW detail
   A. Observe display of insertion point Grip
   B. Left-click insertion point Grip to activate
      I. Move cursor and observe behavior
      II. esc
4. Select SECTION A-A Text
   A. Properties palette > Text dropdown > Justify
      I. Observe Justify=Center
   B. Left-click insertion point Grip
      I. Move cursor and observe behavior
      II. esc
5. Zoom & Pan left of SECTION A-A detail
6. Select red guiding Circle
   A. Observe display of four quadrant Grips and one center Grip
   B. Left-click center Grip to activate
      I. Move cursor and observe behavior
      II. esc
7. Select CRUSHED AGGREGATE BASE COURSE SHOULDER Line on left side of SECTION A-A detail
   A. Left-click endpoint Grip to activate
      I. Move cursor and observe behavior
      II. esc



8. Repeat step 7 for Polyline bounding 10" CRUSHED AGGREGATE BASE COURSE Hatch
9. Repeat step 7 for SECTION A-A detail median nose Arc

Shift+select multiple

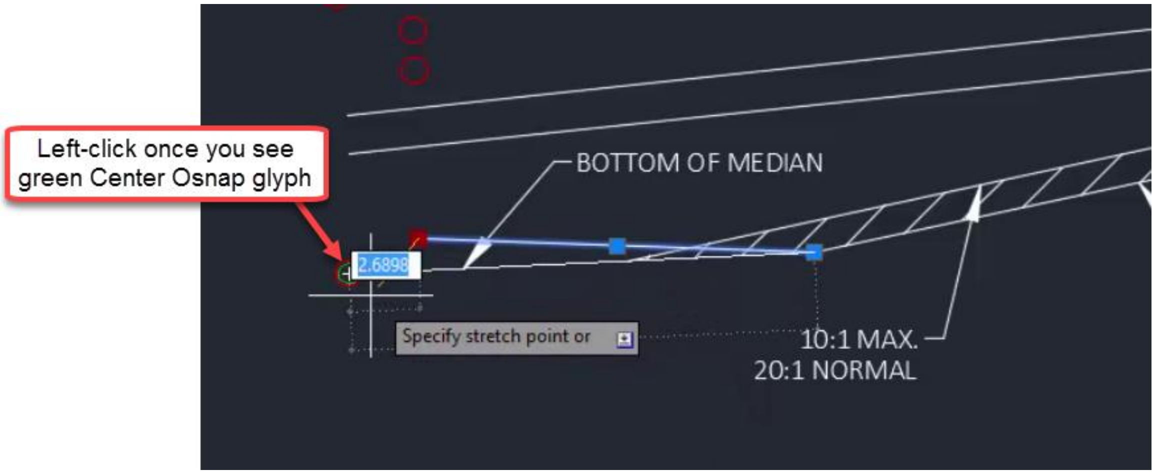
Exercise files: acad-grips-data-c3d16.zip

Continue with acad-grips-begin.dwg

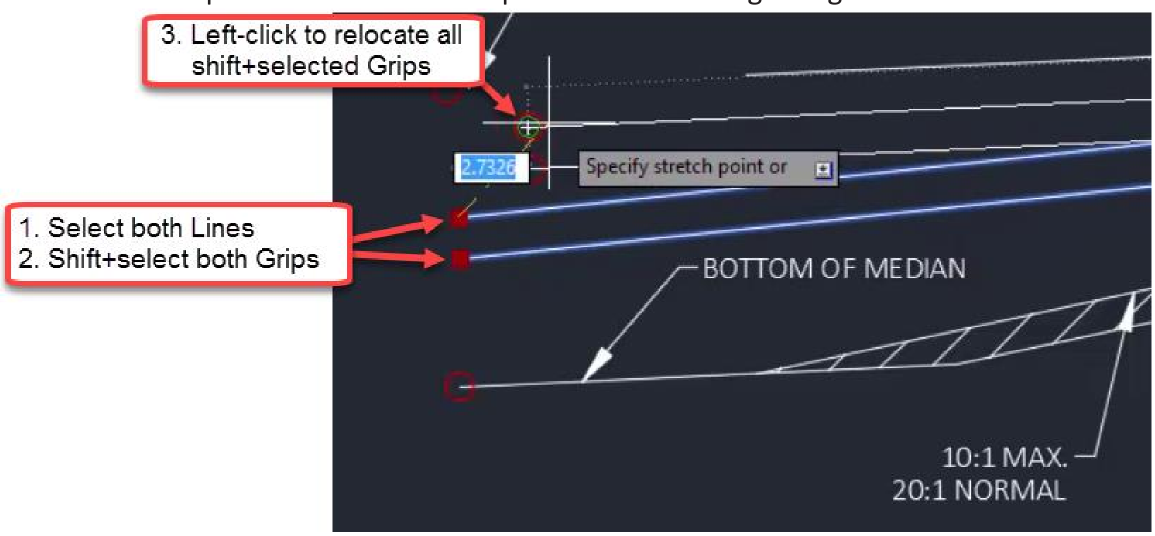
acad-grips-02.mp4 5:42

Hold the Shift key and select multiple Grips to simultaneously apply a similar Grip edit to multiple object Grip locations. The Grips will display red once selected and activated. Release the Shift key and select one of the activated Grips to apply a Grip edit as normal. The Grip edit will then be applied to all Grips included in the selection.

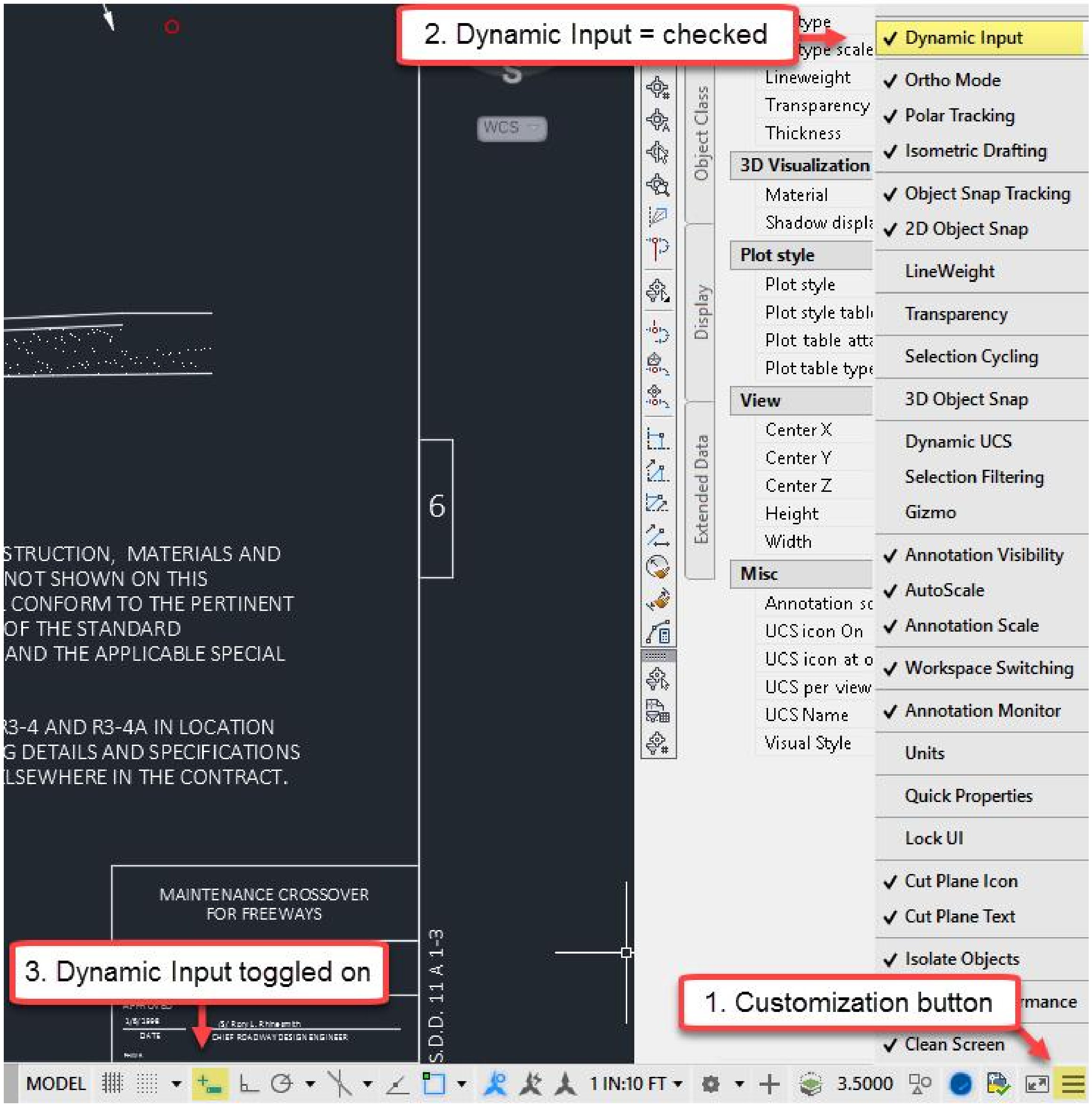
1. Continue working in acad-grips-begin.dwg
2. Zoom and Pan left of SECTION A-A detail
3. Observe location of red guiding Circles
4. Turn on Center and Endpoint Object Snaps
5. Select BOTTOM OF MEDIAN Line
    A. Left-click left-most endpoint Grip
        I. **SPECIFY STRETCH POINT OR:**
            a. Use Osnaps to relocate Line endpoint at center of guiding Circle



6. Select both CRUSHED AGGREGATE BASE COURSE and SUBGRADE Lines
   A. shift+select both leftmost endpoint Grips
      I. Release shift key
      II. Left-click one of the shift+selected Grips
         a. Use Osnaps to relocate Line endpoints at center of guiding Circles



7. Select PAVED MEDIAN SHOULDER Line
   A. Verify Dynamic Input is on
      I. **Status bar > Customization button**
         a. Dynamic Input = checked
      II. **Status bar**
         a. Dynamic Input toggled on



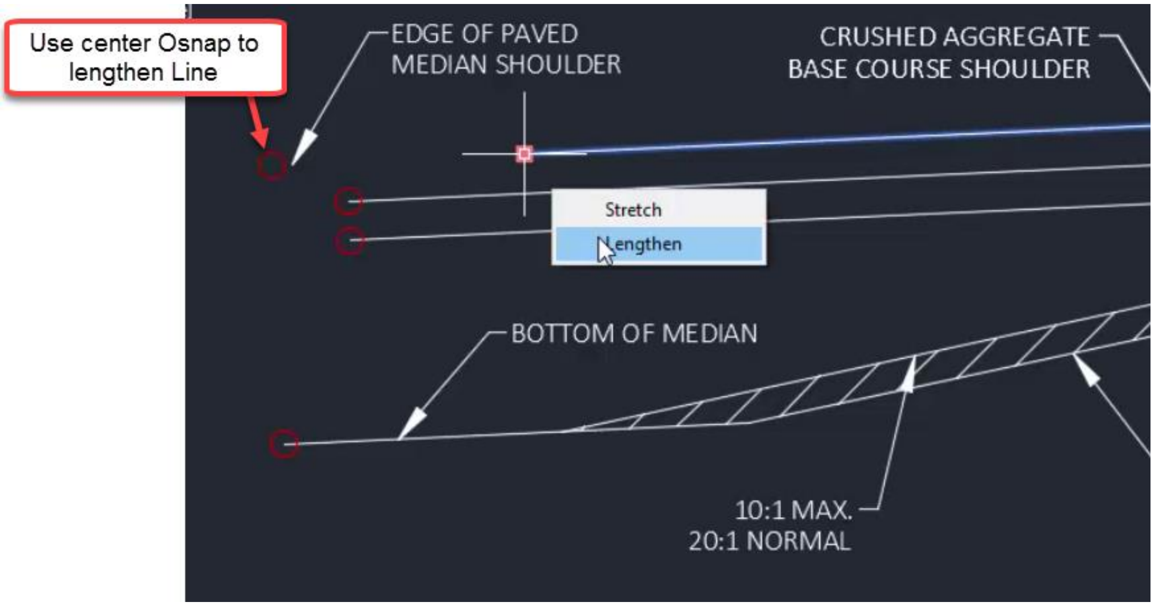
B. Hover cursor over leftmost Line endpoint

I. Observe Dynamic Input tooltip

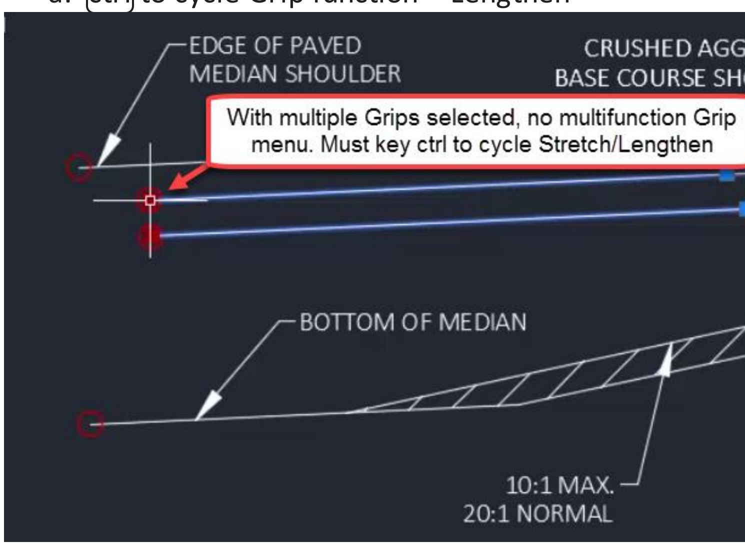
II. **SPECIFY END POINT: 5**

a. enter

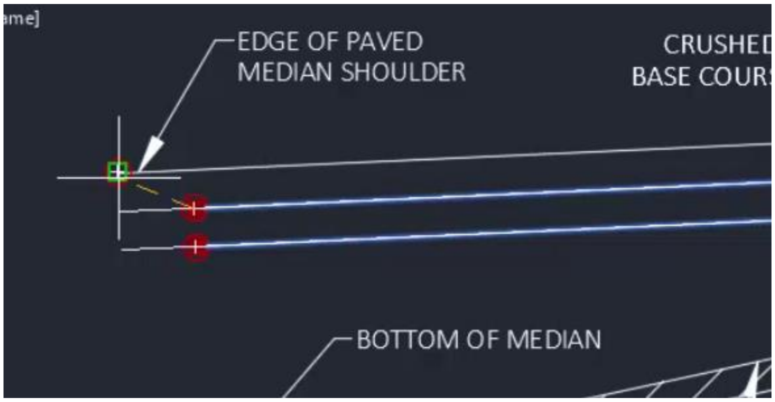
III. Use Osnaps to Lengthen Line to center of red guiding Circle



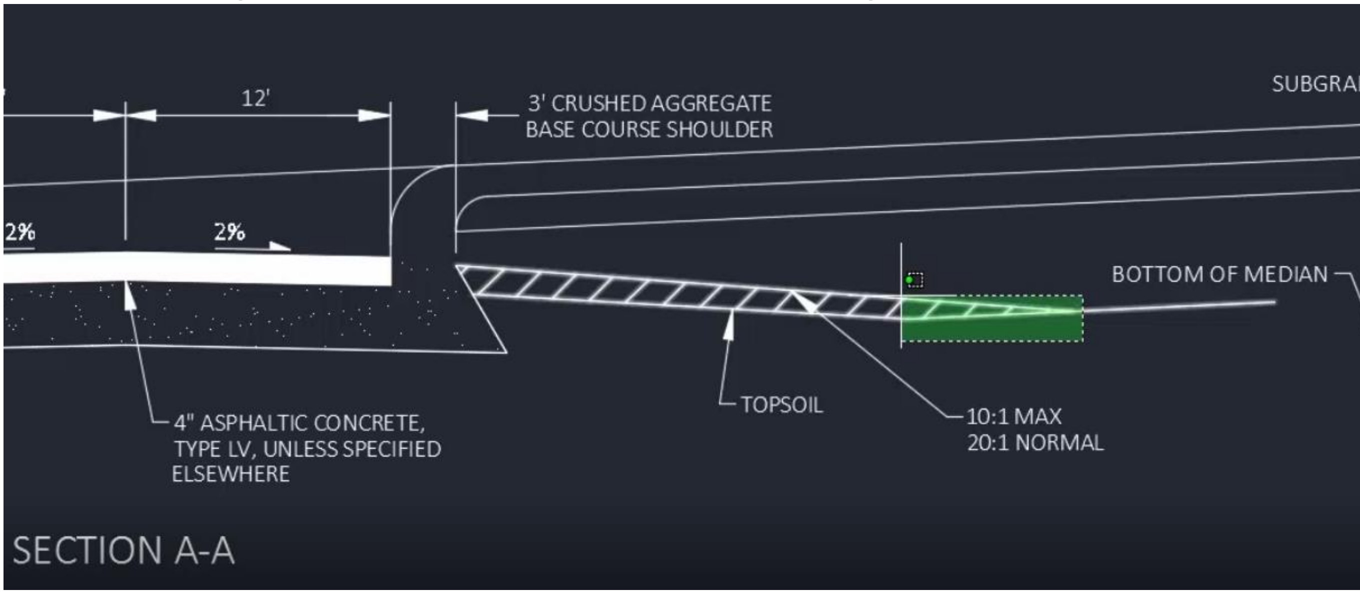
8. Select both CRUSHED AGGREGATE BASE COURSE and SUBGRADE Lines
    A. shift+select both leftmost endpoint Grips
        I. Release shift key
        II. Left-click one of the shift+selected Grips
            a. ctrl to cycle Grip function = Lengthen



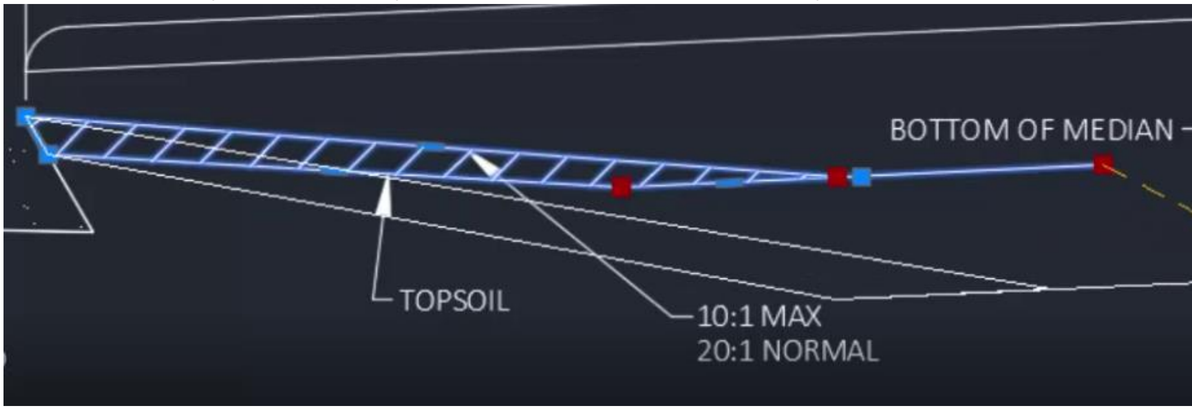
    B. Use Osnaps to Lengthen Lines to leftmost endpoint of PAVED MEDIAN SHOULDER Line



9. Pan to right of SECTION A-A detail
   A. Use crossing selection to select TOPSOIL Hatch and bounding Lines



   A. shift-select appropriate endpoints of selected objects
      I. Release shift key
      II. Select rightmost endpoint of BOTTOM OF MEDIAN Line
         a. Move cursor and observe behavior
         b. Use Osnaps to uniformly relocate selected linework endpoints



Ctrl+select to copy

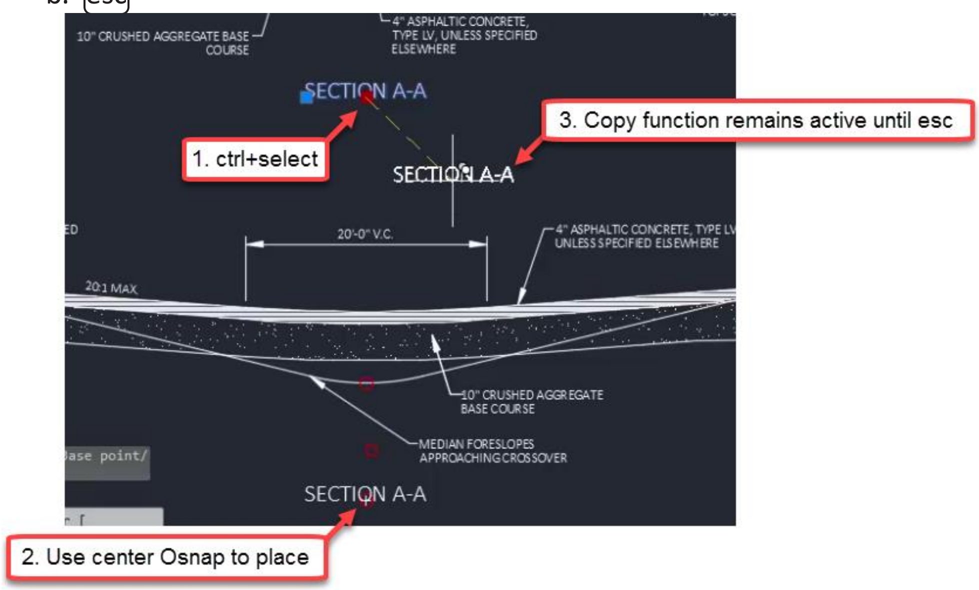
Exercise files: acad-grips-data-c3d16.zip

Continue with acad-grips-begin.dwg

acad-grips-03.mp4 2:44

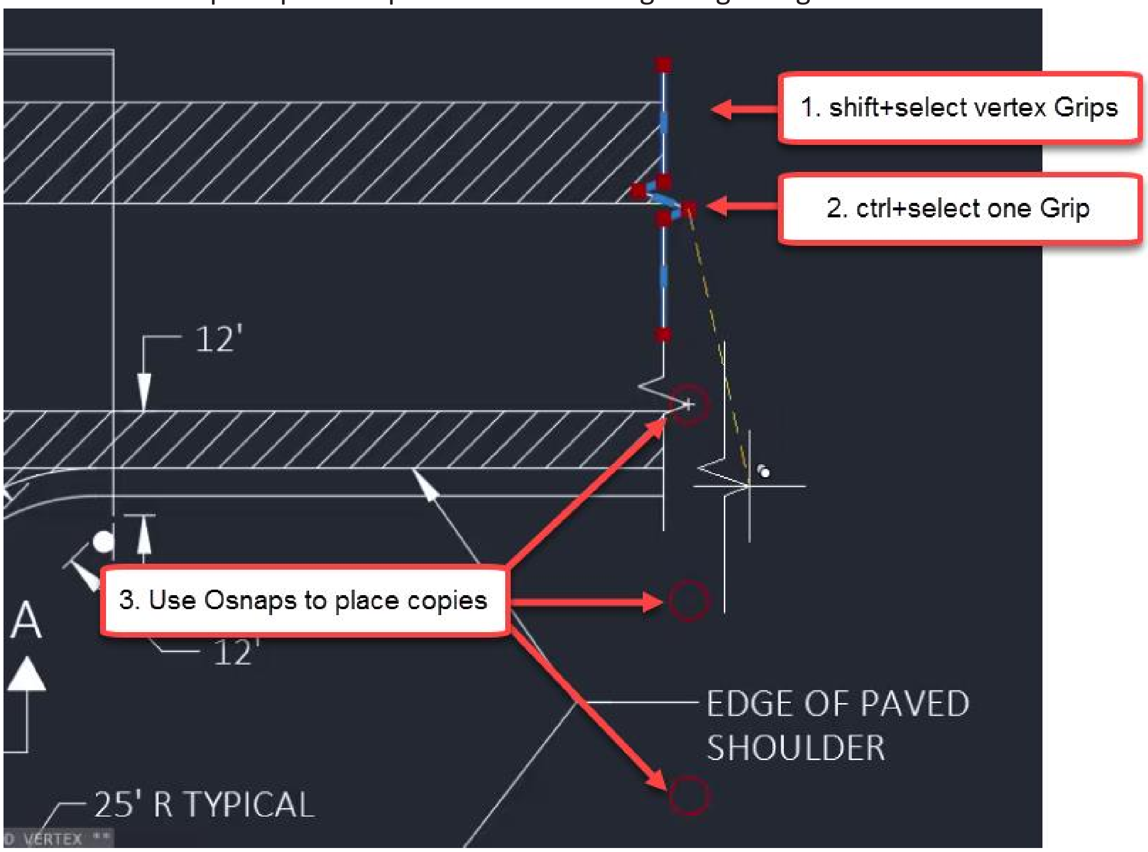
Hold the ctrl key when selecting a Grip to make a copy of the objects attached to the Grip. For example, ctrl+select a Text Grip to copy the full Text object. Ctrl+select a Polyline vertex to copy and the Line segements touching the selected Grip(s). You can combine the ctrl+select technique with the shift+select technique to copy multiple objects attached to the shift+selected Grips

1. Continue with acad-grips-begin.dwg
2. Select SECTION A-A Text
    A. ctrl+select insertion point Grip
        I. Release ctrl key
        II. Pan to SECTION B-B detail
            a. Use Osnaps to place copied Text at center red guiding Circle
            b. esc



3. Pan to PLAN VIEW detail

4. Select breakline symbol Polyline at top-right of PLAN VIEW detail
   A. shift+select all vertex Grips
   B. Release shift key
      I. ctrl+select righmost vertex Grip
      II. Release ctrl key
         a. Use Osnaps to place copies at all remaining red guiding Circles



Grip modes

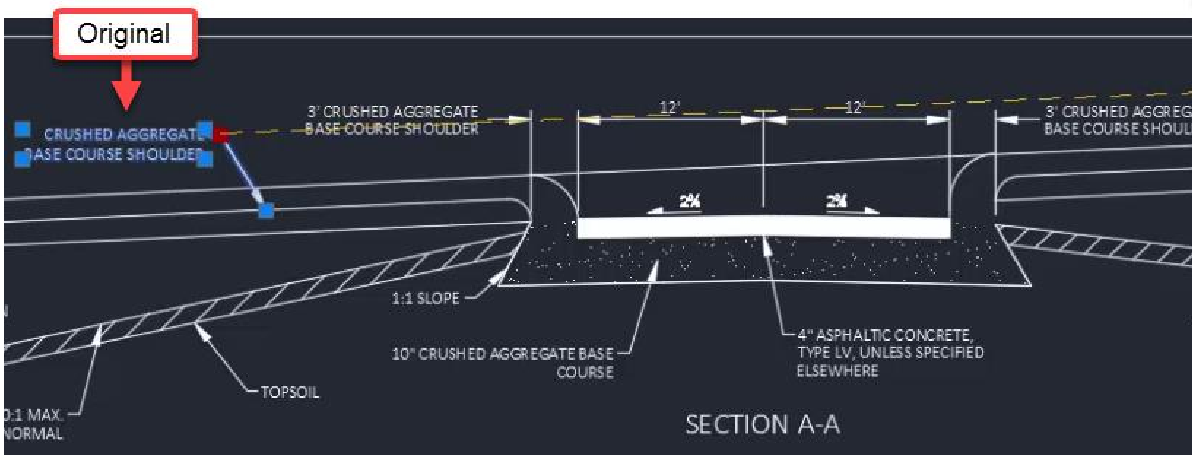
Exercise files: [acad-grips-data-c3d16.zip]()

Start with acad-grips-01.dwg

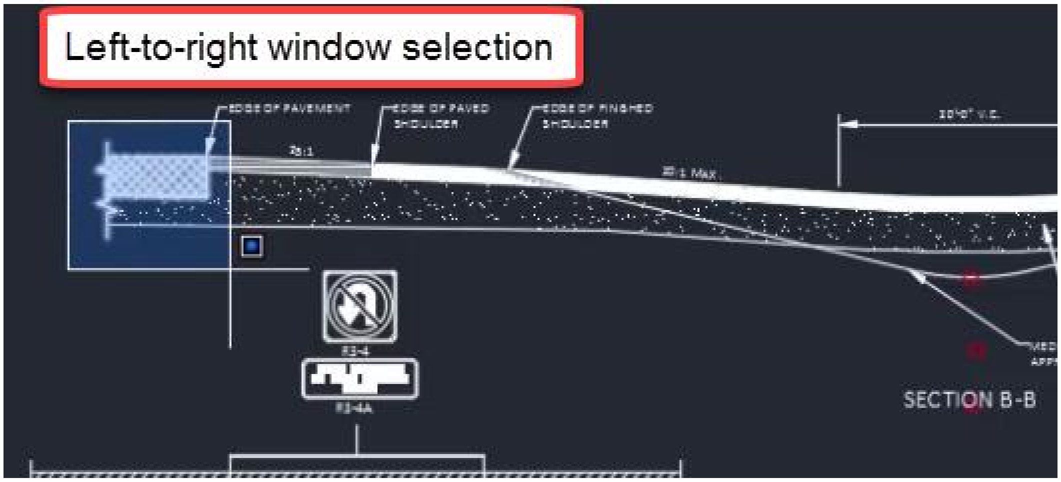
[acad-grips-04.mp4]() 6:46

In addition to object-specific Grip edit behavior, all Grips have the ability to edit associated objects using four standard behaviors. These standard Grip editing behaviors are known as Grip Modes. They include Move, Rotate, Scale, and Mirror. Once an object is selected and a Grip is activated, use the enter key to cycle between Grip Modes. Once you begin cycling, you are limited to one of the four standard Grip Modes. Hit esc and re-activate a Grip to perform a non-Grip Mode edit such as Stretch or Lengthen.

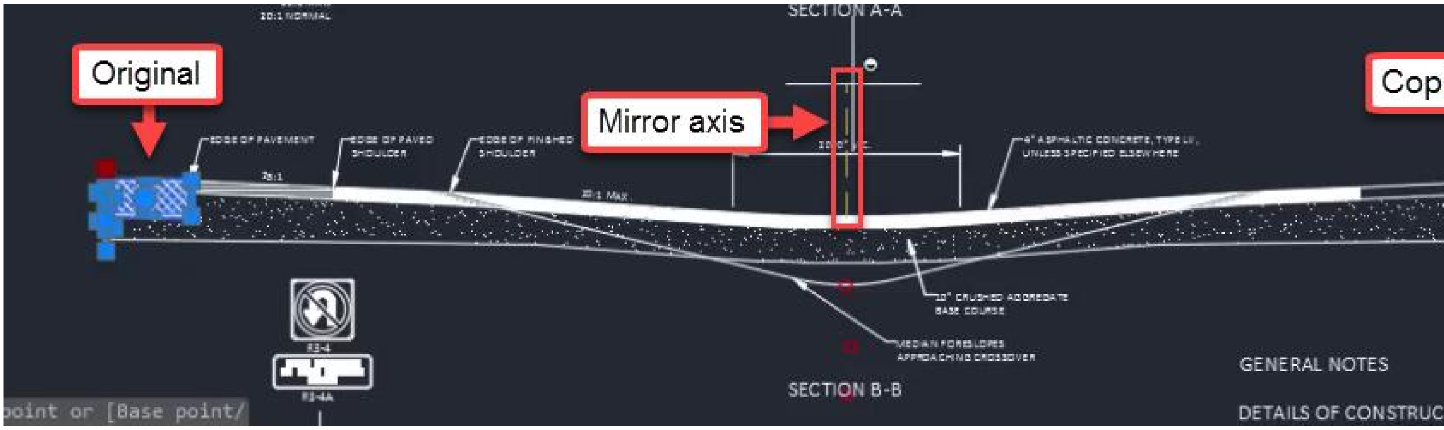
1. Open acad-grips-01.dwg
2. Zoom and Pan to PLAN VIEW detail
3. Select Line just below R3-4A signage
    A. Left-click topmost endpoint Grip
        I. Observe command line prompt **SPECIFY STRETCH POINT OR:**
        II. Move cursor and observe behavior
            a. enter
        III. Observe command line prompt change **SPECIFY STRETCH MOVE OR:**
        IV. Repeat steps 3.A.I - 3.A.III to cycle all Grip Modes
        V. esc
    B. esc
4. Zoom and Pan to SECTION A-A detail
5. Select CRUSHED AGGREGATE BASE COURSE SHOULDER Multileader
    A. Left-click leader Grip
        I. enter
        II. **SPECIFY MOVE POINT OR: COPY**
            a. Left-click to place a copy of Multileader on right side of SECTION A-A detail
            b. esc



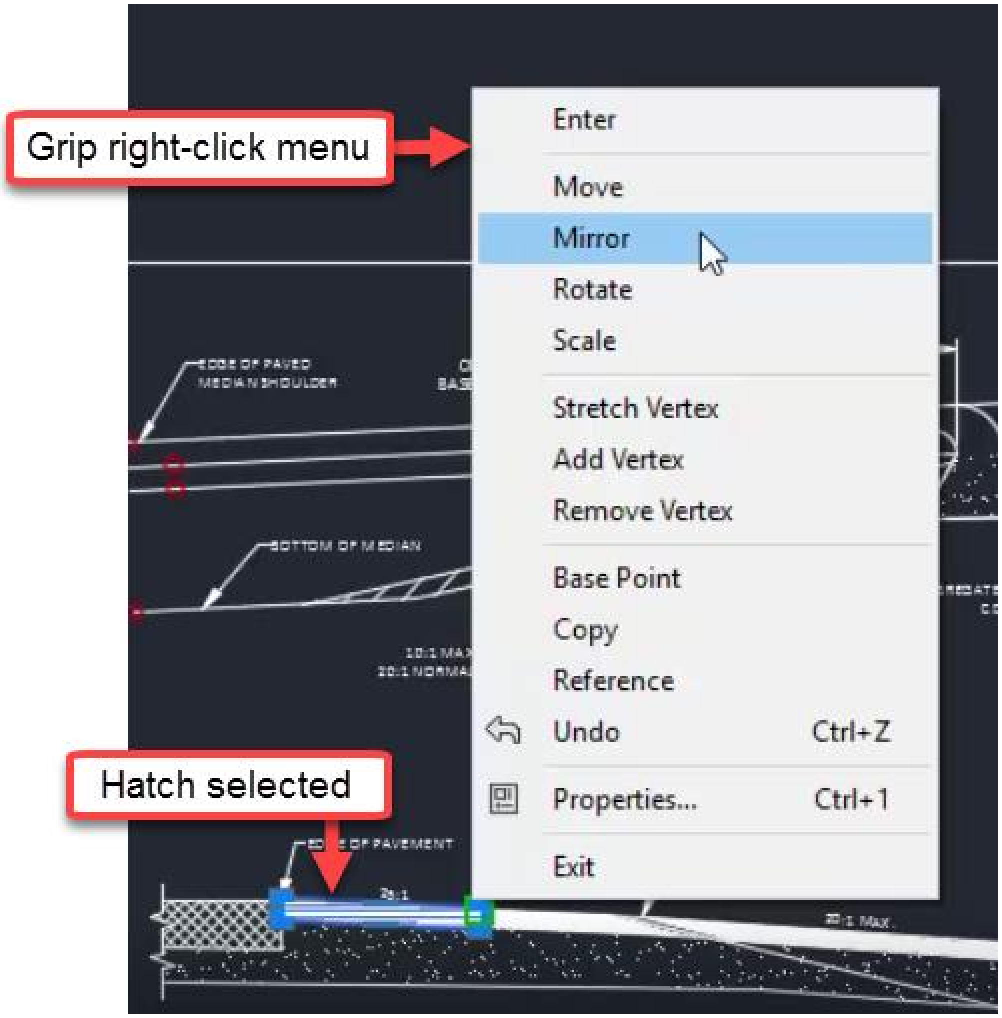
6. Pan to SECTION B-B detail
7. Verify midpoint Object Snap is on
8. Window select breakline symbol Polyline and Hatch near EDGE OF PAVEMENT Multileader



1. Left-click one of the displayed Grips
   A. enter to cycle to Mirror Grip Mode
      I. **SPECIFY SECOND POINT OR: BASE POINT**
         a. Use midpoint Object Snap to specify midpoint of 4" ASPHALTIC CONCRETE Polyline
      II. **SPECIFY SECOND POINT OR: COPY**
         a. Hold shift key for temporary Orthomode
         b. Left-click second mirror point above basepoint
         c. esc



2. Select PAVED SHOULDER Hatch one left side of SECTION B-B detail
   A. Left-click a displayed Grip
      I. Right-click
         a. Mirror
      II. Repeat steps 1.A.I - 1.A.II to place copy of PAVED SHOULDER Hatch

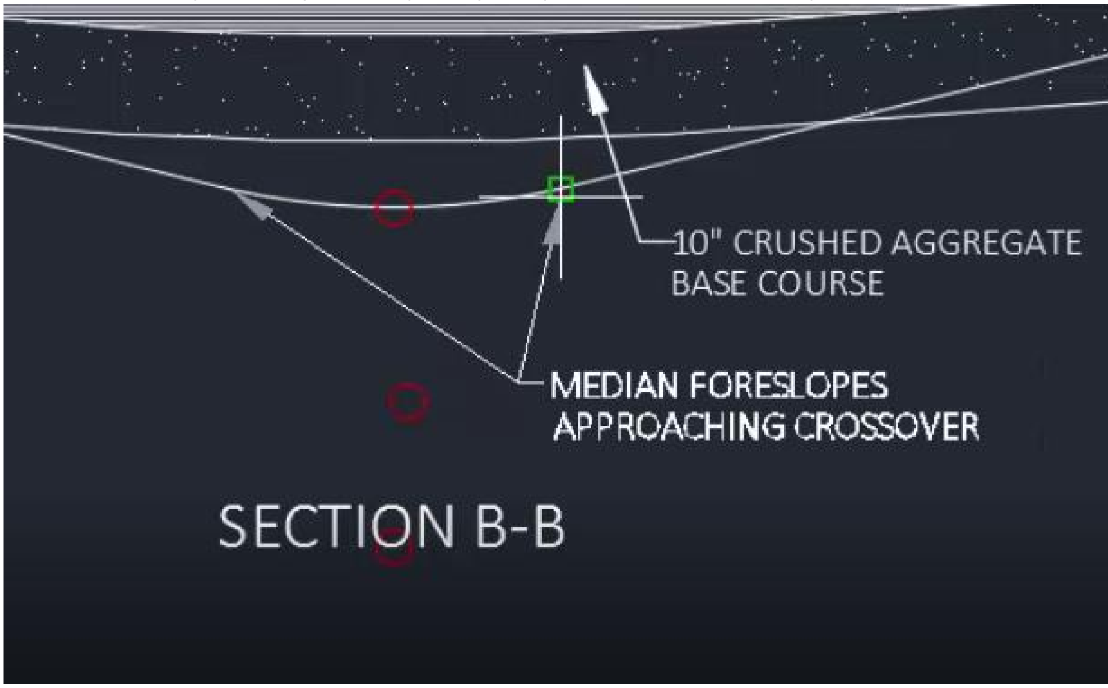


Multifunction grips

Exercise files: acad-grips-data-c3d16.zip Continue with acad-grips-01.dwg acad-grips-05.mp4 3:56

In addition to the four standard Grip Modes, some objects have Multifunction Grips. The first example we saw of this was the Line endpoint Grip. This is a Multifunction Grip with Stretch and Lengthen functions. Once a Multifunction Grip is activated, use the ctrl key to cycle between Grip functions. When only a single Multifunction Grip is activated, hover your cursor over the Grip to see a Multifunction Grip menu. This menu will not display when multiple Grips are activated such as when shift+selecting multiple Grips.

1. Continue with acad-grips-01.dwg
2. Zoom and Pan to SECTION B-B detail
3. Select MEDIAN FORESLOPES APPROACHING CROSSOVER Multileader
    A. Left-click the leader landing Grip
        I. ctrl to cycle Grip functions to Add Leader
            a. **SPECIFY LEADER ARROWHEAD LOCATION:**
                i. Use endpoint Object Snap to specify location at Arc endpoint



        II. ctrl to cycle Grip funcitons to Stretch
            a. Use red guiding Circle to relocate leader vertex
    B. Select Polyline representing MEDIAN FORESLOPES APPROACHING CROSSOVER
        I. Left-click Polyline arc segment midpoint Grip
            a. ctrl to cycle Grip functions to Convert to Line
            b. enter
    C. Select Polyline representing MEDIAN FORESLOPES APPROACHING CROSSOVER
        I. Left-click Polyline line segment midpiont Grip
            a. ctrl to cycle Grip functions to Convert to Arc
                i. **SPECIFY MIDPOINT OF ARC SEGMENT:**
                    1. Use Osnaps to place specify center of red guiding Circle
                    2. esc

Layers and their properties

Last updated: 2017-12-01

Total video time: 35:48

Layer basics

Exercise files: acad-layr-prprtis-data-c3d16.zip

Start with acad-layr-prprtis-begin.dwg

acad-layr-prprtis-01.mp4 4:36

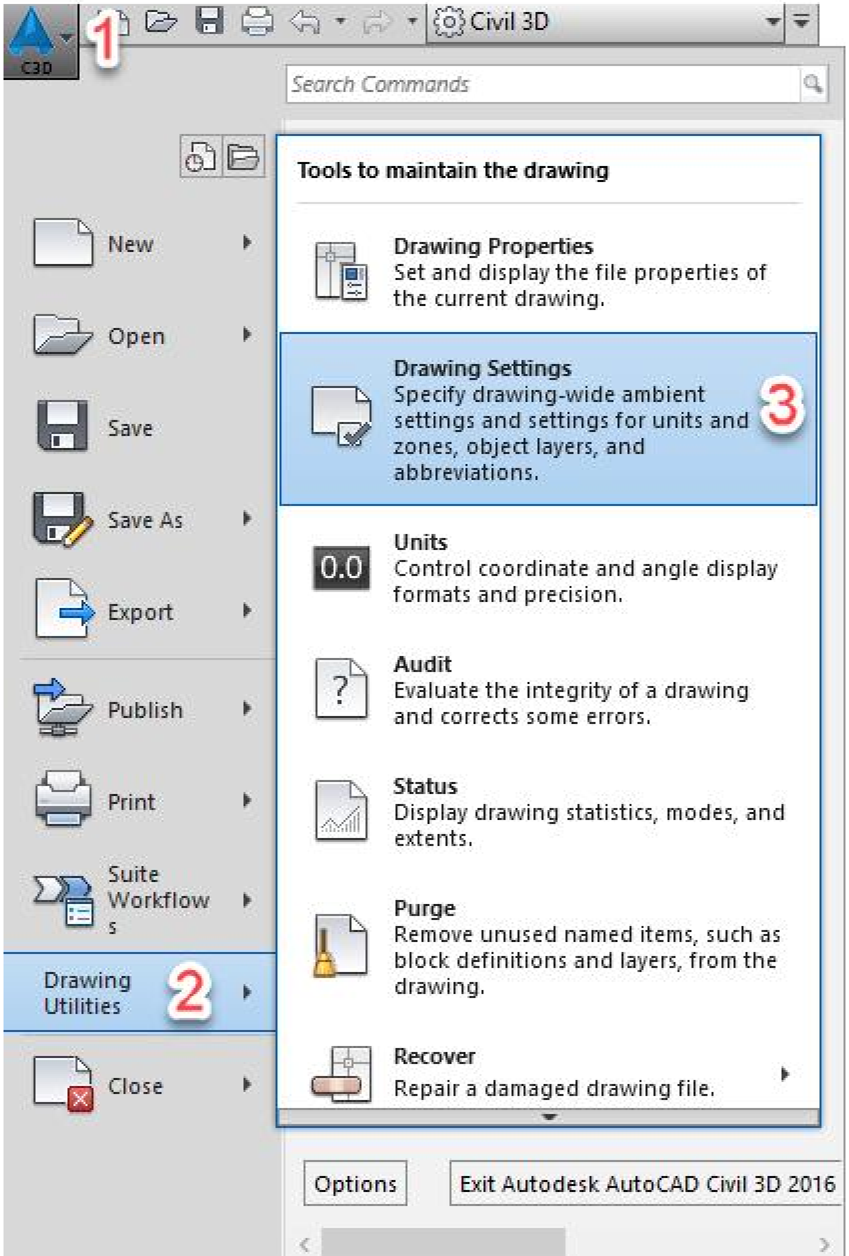
Layers in AutoCAD are used to control object display properties, visibility, plotting, object selection, and organization. All objects in a drawing will reside on a Layer. The Layer an individual object resides on is known as the Object Layer. When AutoCAD objects are created, they will be placed on the Current Layer. You can set which Layer is the Current Layer either through the Ribbon Layer Panel or Layer Properties Manager. Some of the most commonly used/edited Layer properties are On/off, Isolate/unisolate, Freeze/thaw, Lock/unlock.

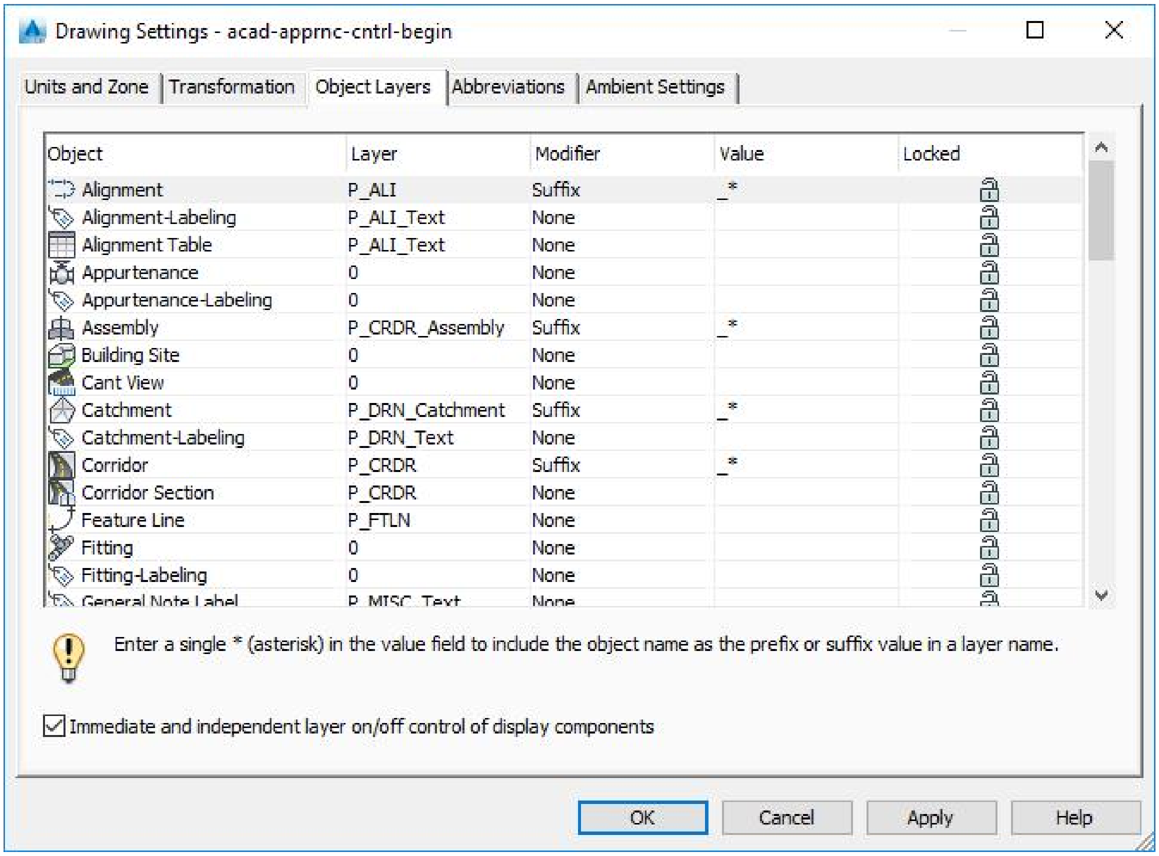
Info:
Civil 3D objects are made up of components. For example, an Alignment can have Line, Curve, Spiral, etc components. The object and it's component can all be on unique Layers.

When Civil 3D objects (ie Alignments, Corridors, Surfaces) are created, they will be placed on the default Object Layer specified in the Drawing Settings dialog. An optional Layer name wildcard can be included that will append the default Object Layer name with the name you give to the Object. In this way, a new Layer will be created for each named Civil 3D Object created. For example, the default Object Layer for Alignments in the WisDOT design template is P_ALI_*. The * character is the wildcard. If an Alignment is named HWY 14, the default Object Layer created will be P_ALI_HWY 14.

1. Open acad-layr-prprtis.dwg
2. **Ribbon > Home tab > Layers panel**
   A. Observe Current Layer = ***E_ALI***
3. **Application menu dropdown > Drawing Utilities > Drawing Settings > Object Layers tab**

A. Observe default Civil 3D Object Layers





4. **PLINE**
    A. enter
    B. Draw Polyline with two vertices anywhere between SECTION A-A and SECTION B-B details
    C. Select Polyline just drawn
    D. **Properties palette > General**
        I. Observe Object Layer = ***E_ALI***
5. Select BOTTOM OF MEDIAN Line on right side of SECTION A-A detail
    A. **Ribbon > Home tab > Layers panel**
        I. Observe Object Layer = ***P_XS_FinalBorrow***

    > **Info:** The Ribbon Layer Panel shows the Current Layer if no object is selected. It shows the selected Object Layer if a object is selecting

    C. **Properties palette > General**
        I. Observe Object Layer = ***P_XS_FinalBorrow***
    D. esc
6. **PLINE**
    A. enter
    B. **Ribbon > Home tab > Layers panel**
        I. Observe dropdown display change to Current Layer = ***E_ALI***

    C. Draw Polyline with two vertices anywhere between SECTION A-A and SECTION B-B details
7. Select BOTTOM OF MEDIAN Line on right side of SECTION A-A detail
    A. **Ribbon > Home tab > Layers panel > Make Current**
8. **PLINE**
    A. enter
    B. **Ribbon > Home tab > Layers panel**
        I. Observe Current Layer = ***P_XS_FinalBorrow***
    C. Draw Polyline with two vertices anywhere between SECTION A-A and SECTION B-B details
9. Select multiple objects
    A. **Properties palette > General**
        I. Observe Layer = *VARIES*
    B. esc
    C. **Ribbon > Home tab > Layer panel > Layer list dropdown**
        I. Choose Layer for all selected objects
            a. Observe Object Layer change
        II. Match Layer
            a. **SELECT OBJECT ON DESTINATION LAYER**
                i. Select BOTTOM OF MEDIAN Line on right side of SECTION A-A
            b. Observe Object Layer for selection = ***P_XS_FinalBorrow***

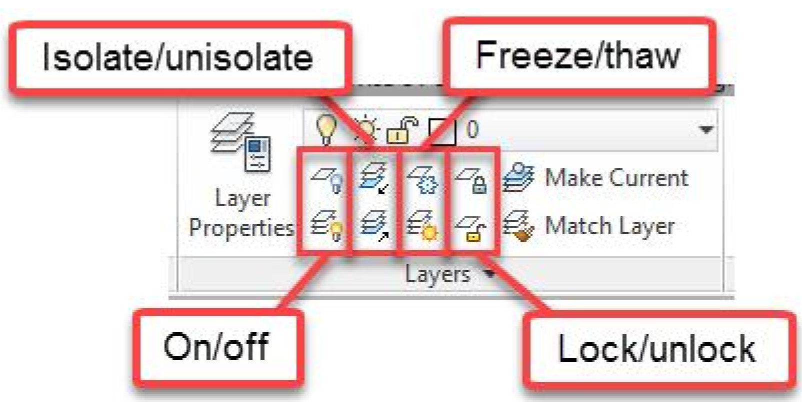
Layer commands: off, freeze, isolate, lock

Exercise files: acad-layr-prprtis-data-c3d16.zip

Start with acad-layr-prprtis-begin.dwg

acad-layr-prprtis-02.mp4 6:57

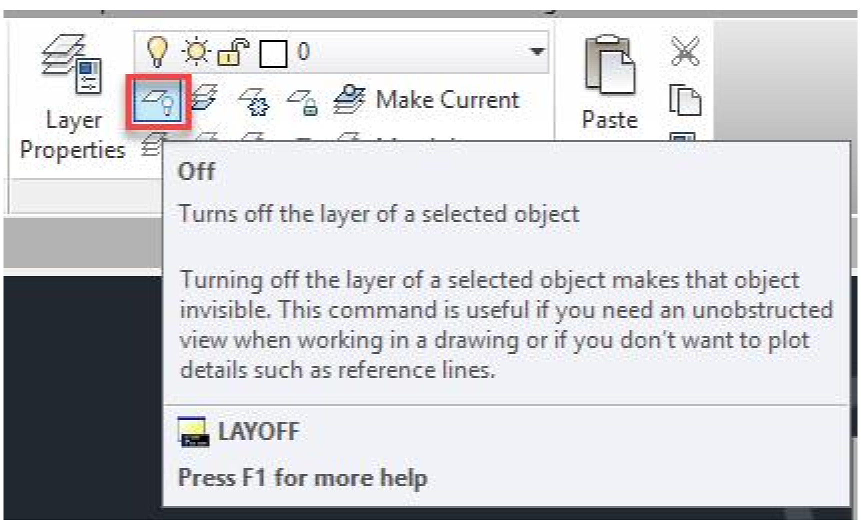
Commonly edited Layer properties



Layer property	Description
On/off	When a Layer is turned off, objects residing on that Layer will not display, although they will be accounted for when processing object display, such as when you Zoom Extents or Regen.
Isolate/unisolate	Depending on Layer settings, Layer Isolate will either Lock and fade display or turn off all Layer except those of selected objects.
Freeze/thaw	When a Layer is frozen, objects residing on that Layer will not display and will not be accounted for when processing object display. Freezing a Layer with an extraordinarily large number of objects can help drawing performance.
Lock/unlock	Objects on a locked Layer cannot be deleted or edited. Locking Layers can be helpful when you wish to use objects on a Locked Layer for visual reference or Osnapping while protecting their geometry.

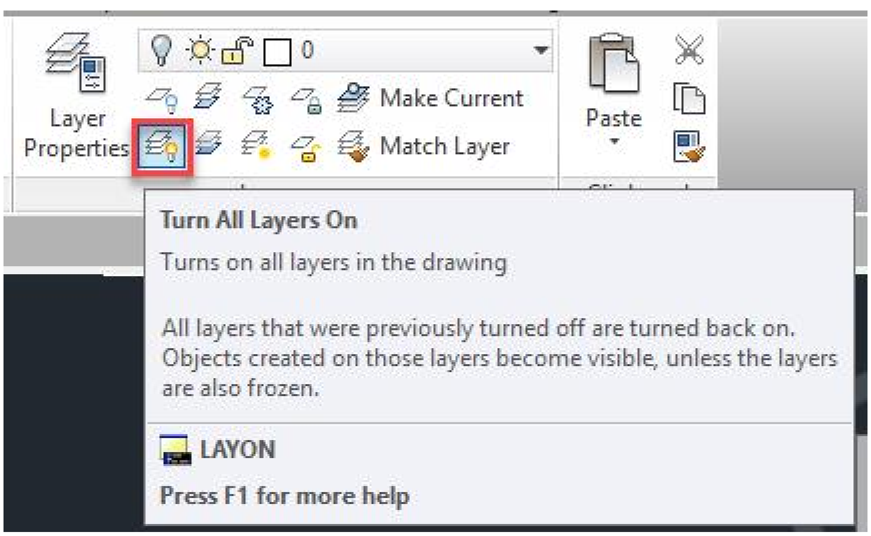
On/ off

1. Continue working in acad-layr-prprtis-begin.dwg
2. **Ribbon > Home tab > Layer panel > Off**



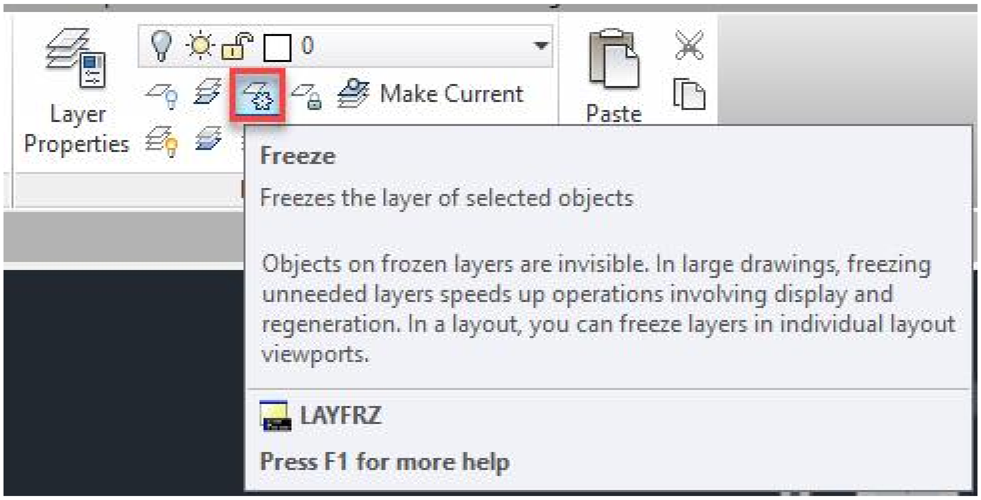
3. SELECT AN OBJECT ON THE LAYER TO BE TURNED OFF
   A. Select multiple objects below SECTION A-A detail
   B. esc

4. Double-click middle mouse wheel
   A. Observe Zoom Extents still accounting for Layers turned off
5. **Ribbon > Home tab > Layer panel > Turn All Layers On**

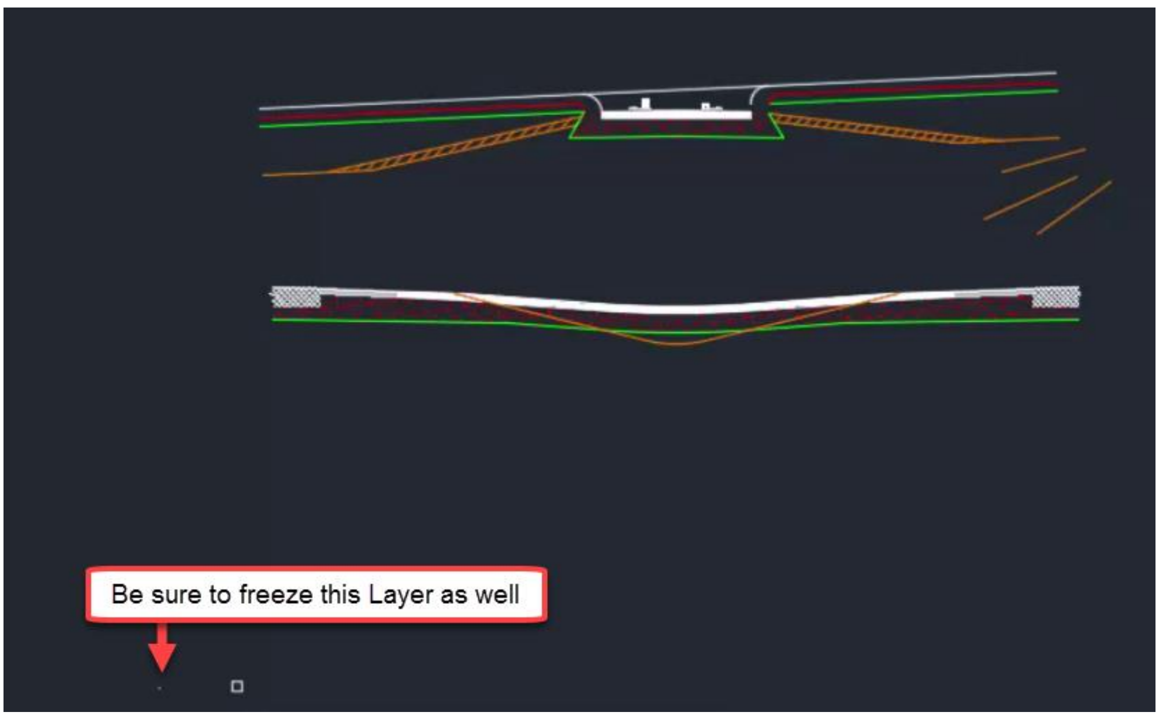


Freeze/ thaw

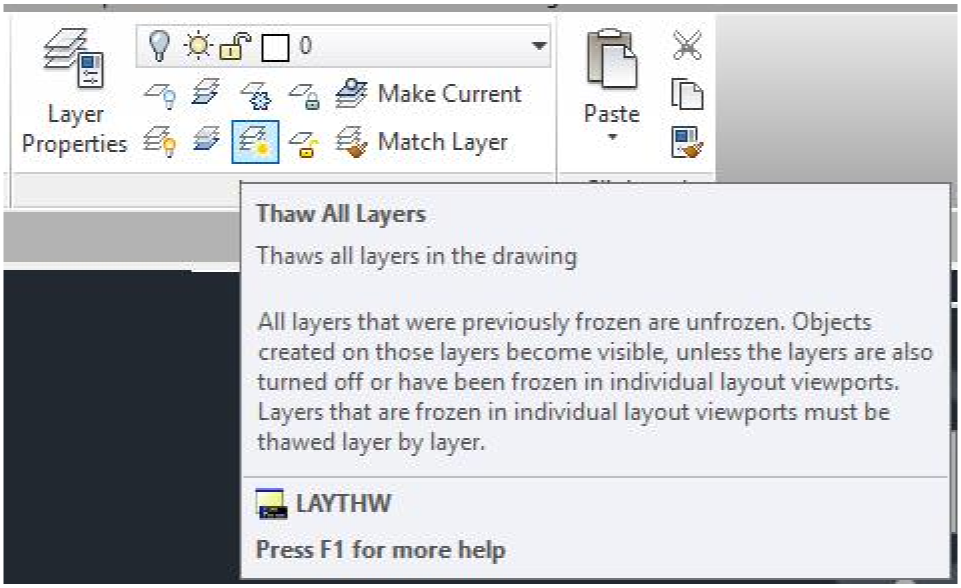
1. Continue working in acad-layr-prprtis-begin.dwg
2. **Ribbon > Home tab > Layer panel > Freeze**



3. **SELECT AN OBJECT ON THE LAYER TO BE FROZEN**
   A. Select multiple objects below SECTION A-A detail
   B. esc

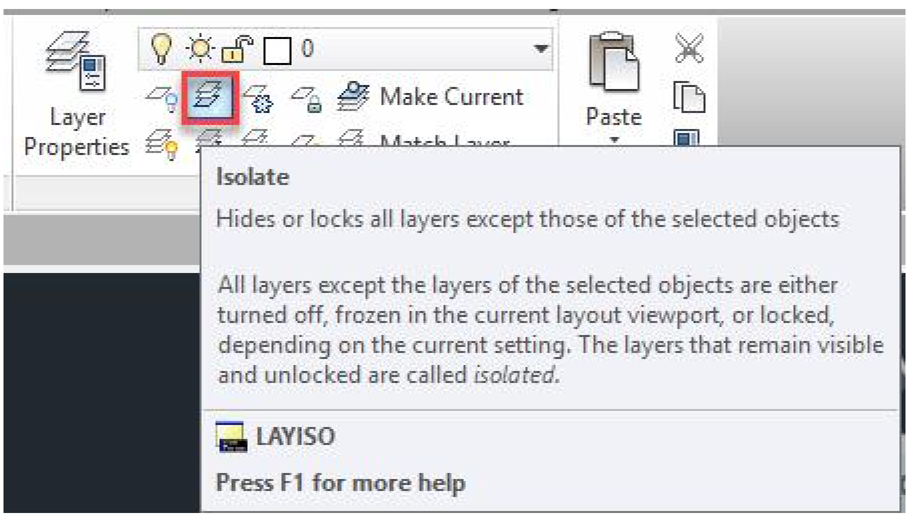


4. Double-click middle mouse wheel
   A. Observe Zoom Extents not accounting for frozen Layers
5. **Ribbon > Home tab > Layer panel > Thaw All Layers**



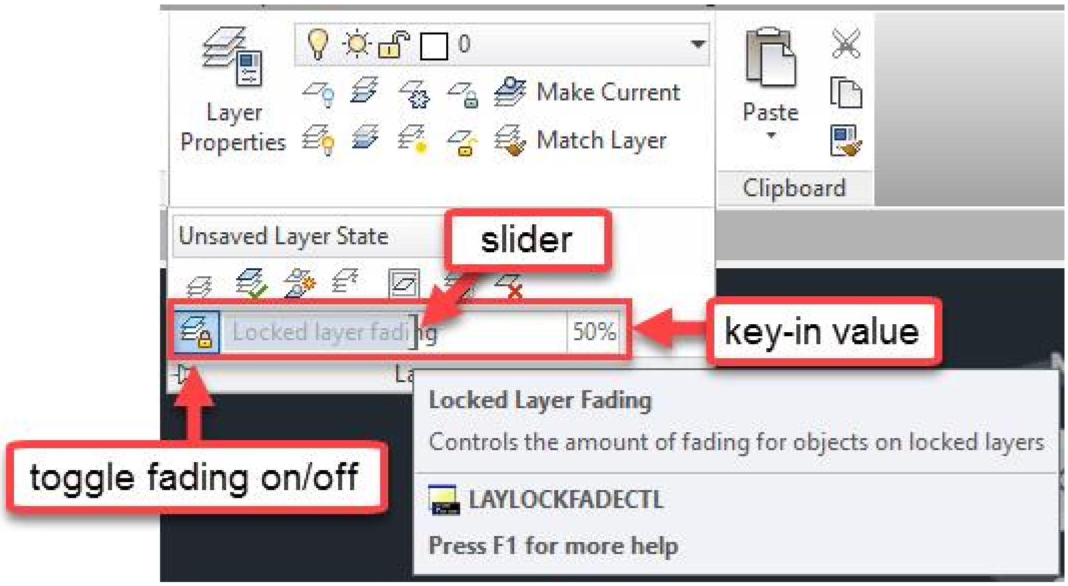
Isolate/ unisolate

1. Continue working in acad-layr-prprtis-begin.dwg
2. **Ribbon > Home tab > Layer panel > Isolate**



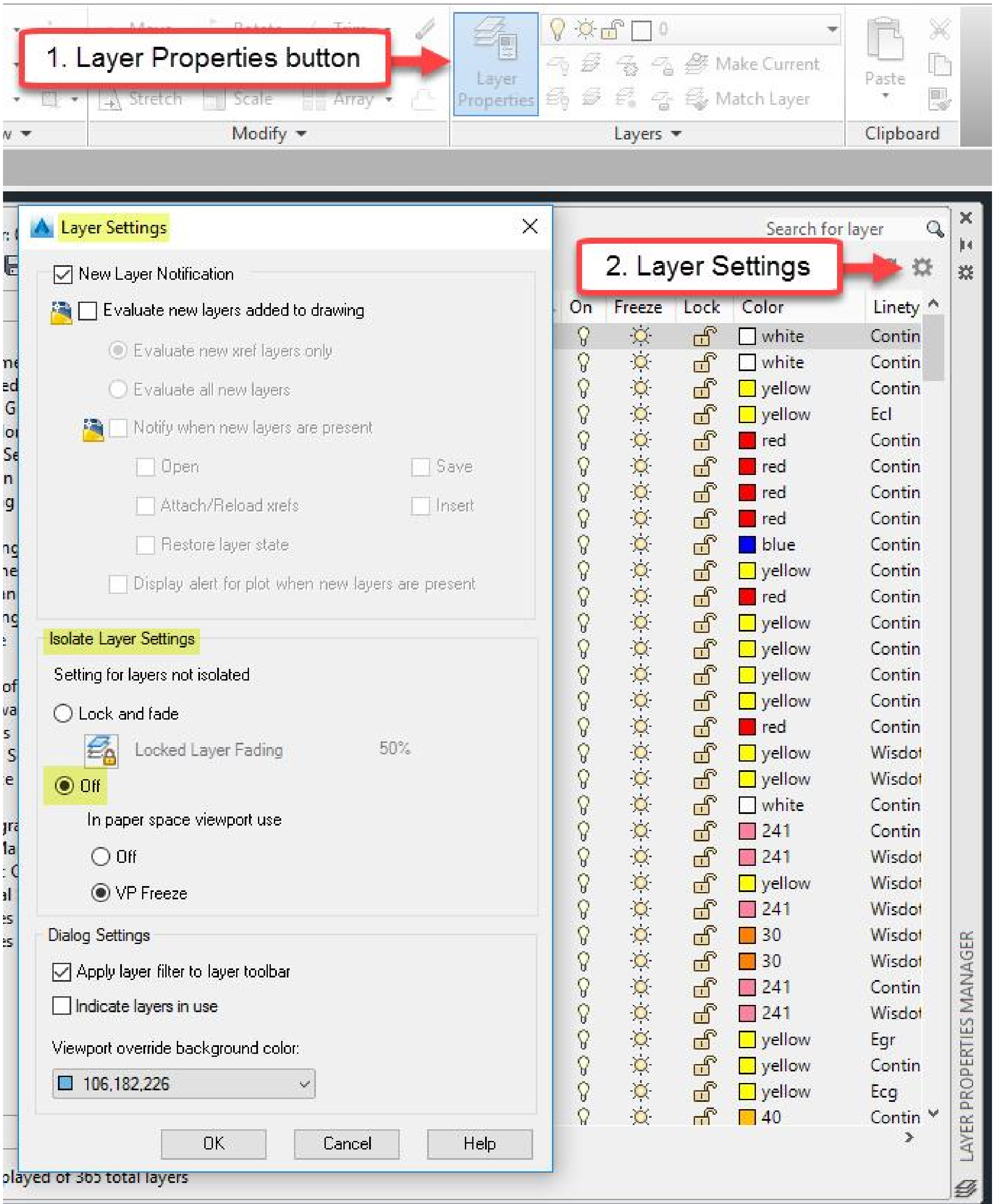
3. **SELECT AN OBJECT ON THE LAYER TO BE ISOLATED**
   A. Select BOTTOM OF MEDIAN Line on right side of SECTION A-A detail
   B. enter
   C. Observe non-isolated Layers fade and lock

4. **Ribbon > Home tab > Layer panel flyout**
   A. Adjust Locked Layer Fading with slider

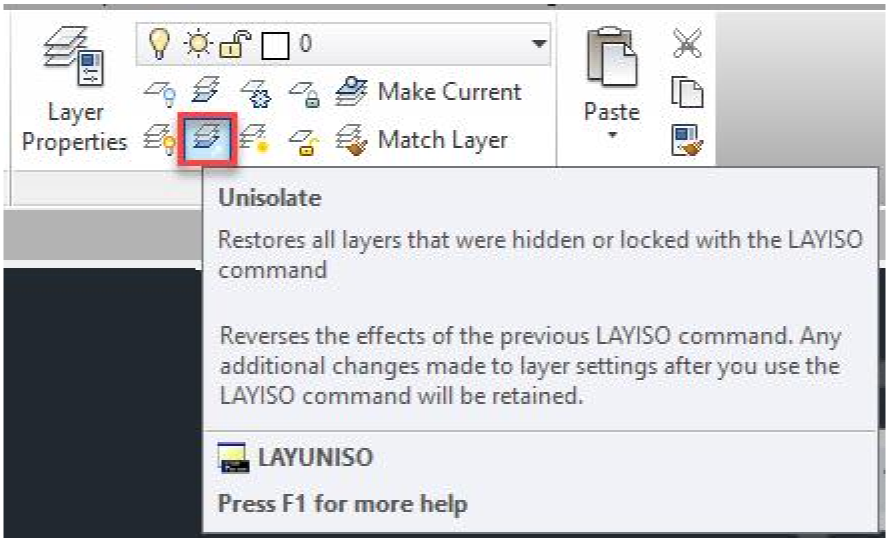


5. **Ribbon > Home tab > Layer panel > Layer Properties**
   A. Layer Settings
      I. Isolate Layer Settings
         a. Settings for Layers not isolated = Off

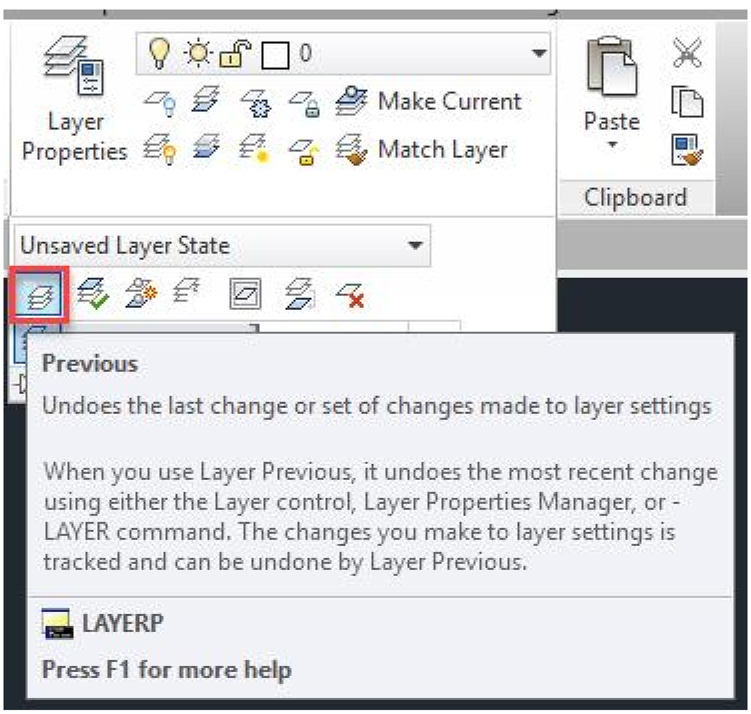
B. OK



6. **Ribbon > Home tab > Layer panel > Unisolate**



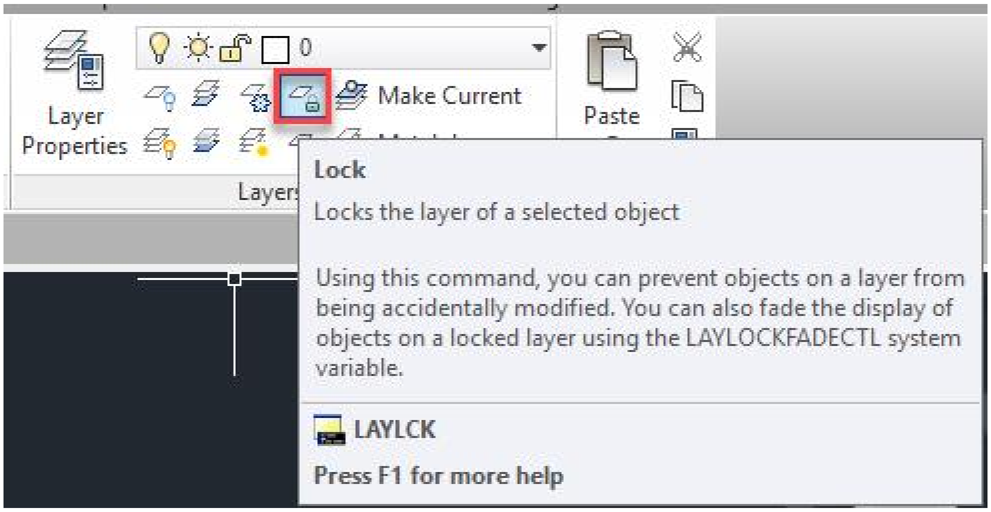
7. **Ribbon > Home tab > Layer panel > Isolate**
8. **SELECT AN OBJECT ON THE LAYER TO BE ISOLATED**
    A. Select BOTTOM OF MEDIAN Line on right side of SECTION A-A detail
    B. enter
    C. Observe non-isolated Layers turn off
9. **Ribbon > Home tab > Layer panel flyout > Layer Previous**



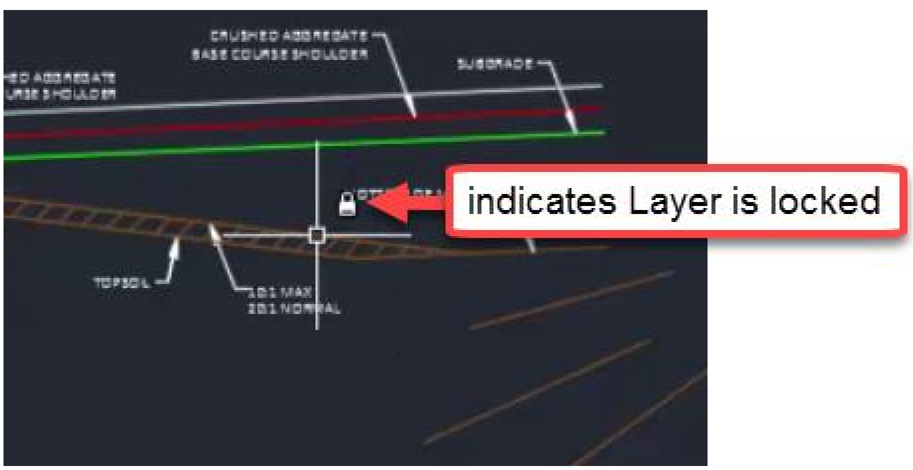
Tip: Use Layer Previous to turn on or thaw only the single Layer or selection of Layers you previously changed. The Ribbon buttons only allow you to turn on or thaw all layers

Lock/ unlock

1. **Ribbon > Home tab > Layer panel > Lock**

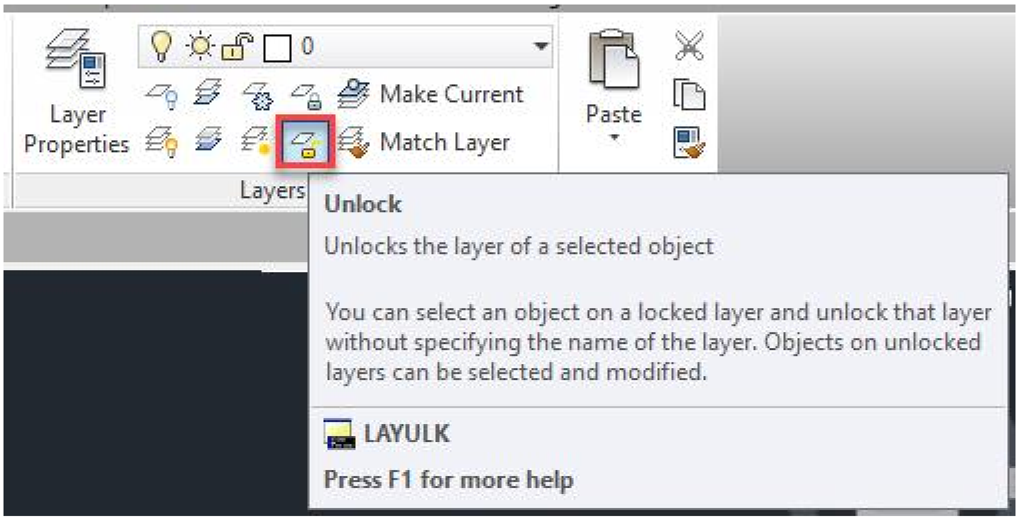


2. Select an object on the layer to be Locked
    A. Select BOTTOM OF MEDIAN Line on right side of SECTION A-A detail
    B. enter
    C. Observe Locked layer display fade
    D. Hover cursor over object on locked Layer
    E. Observe "padlock" glyph indicating the Layer is locked

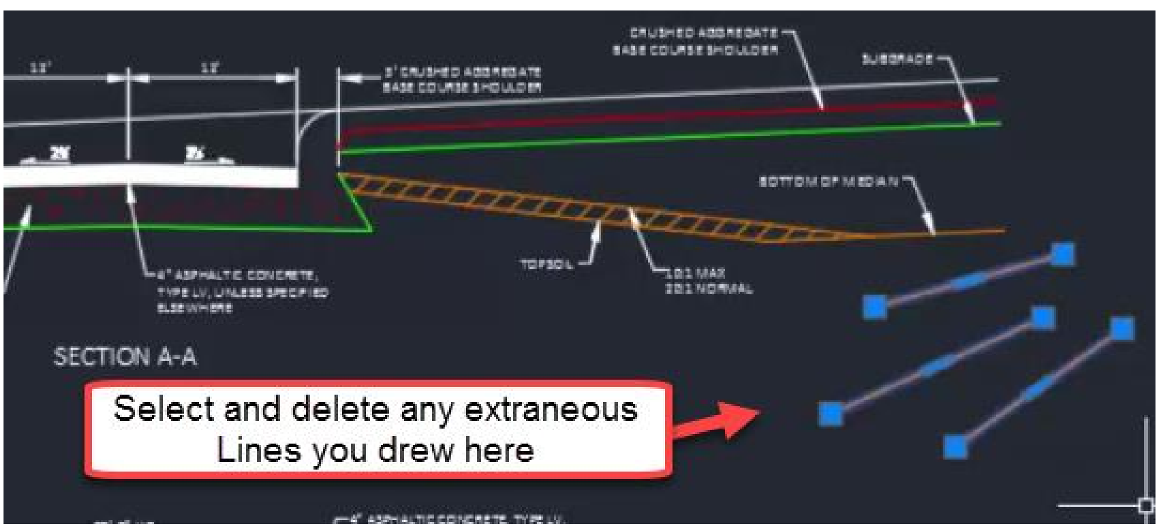


3. Select an object on the locked Layer
    A. Observe absence of any Grips
    B. **M**
        I. enter
        II. Observe command line history and inability to edit object on locked Layer:
            a. **MOVE 1 FOUND, 1 WAS ON A LOCKED LAYER**
        III. esc

4. **Ribbon > Home tab > Layer panel >** $\boxed{\textbf{Unlock}}$
   A. Select an object on locked ***P_XS_FinalBorrow*** Layer



5. Select the three extraneous Lines drawn near SECTION A-A detail
   A. $\boxed{\text{delete}}$



Layer properties manager: interface & editing

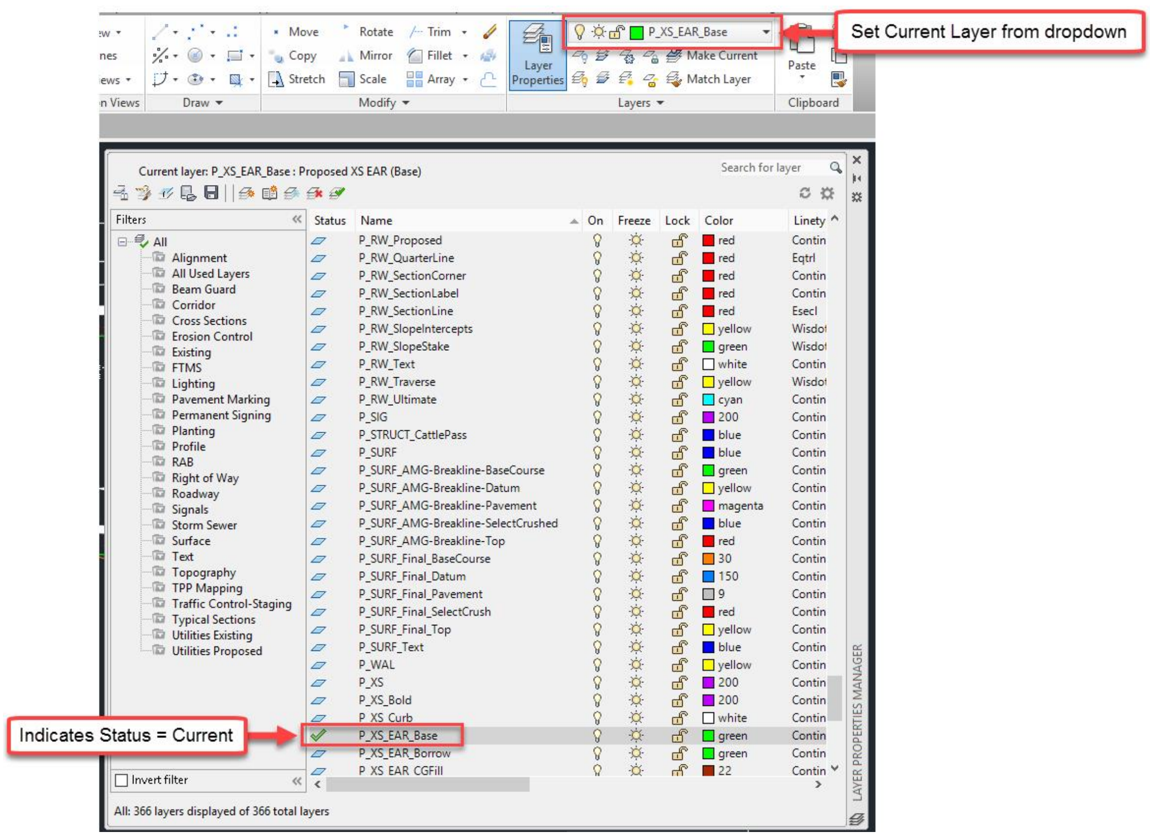
Exercise files: [acad-layr-prprtis-data-c3d16.zip]

Start with acad-layr-prprtis-begin.dwg

[acad-layr-prprtis-03.mp4] 6:39

The Layer Properties Manager is where you can sort, create and delete Layers or edit Layer properties such as Layer name, description, display color, visibility (on/off or freeze/thaw), plot style name (how thick a lines will plot), whether the Layer will plot or not, etc. Take advantage of shift+select and ctrl+select to affect multiple Layers at once.

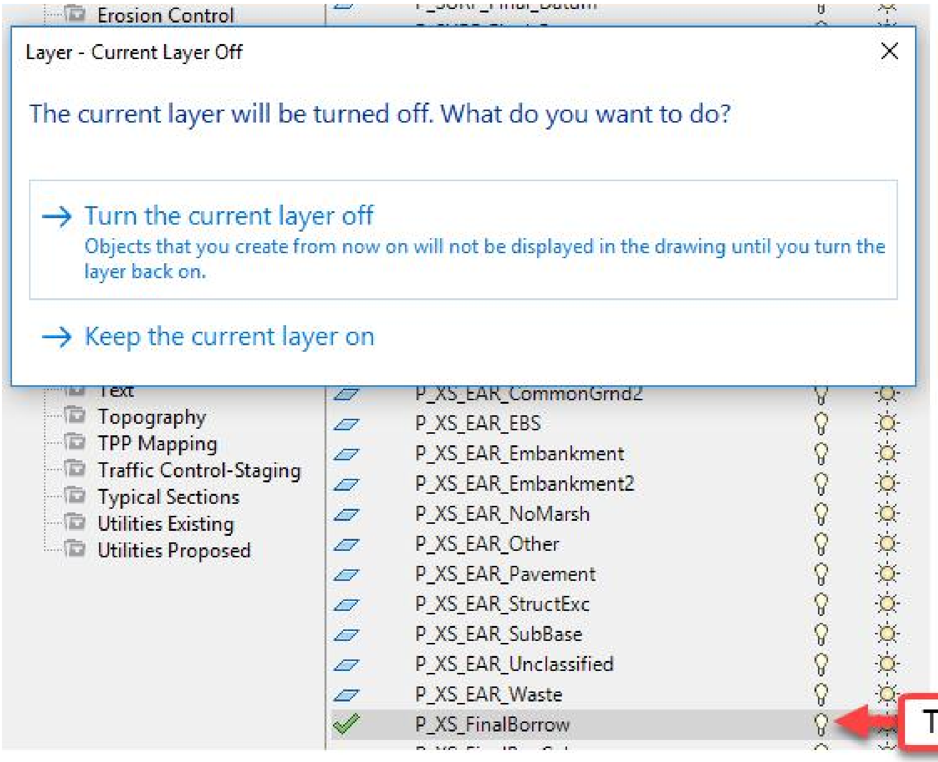
1. Continue with acad-layr-prprtis-begin.dwg
2. **Ribbon > Home tab > Layer panel > Layer Properties**
   A. Observe "366 total Layers" listed along bottom of Layer Properties Manager palette
3. **Ribbon > Home tab > Layer panel > Layers dropdown > P_XS_EAR_Base**
   A. Layer Properties Manager
      I. Observe Status = Current



> **Info:** Alternatively, set a Layer Current by selecting a row and clicking the Set Current button or double-clicking a row in Layer Properties Manager

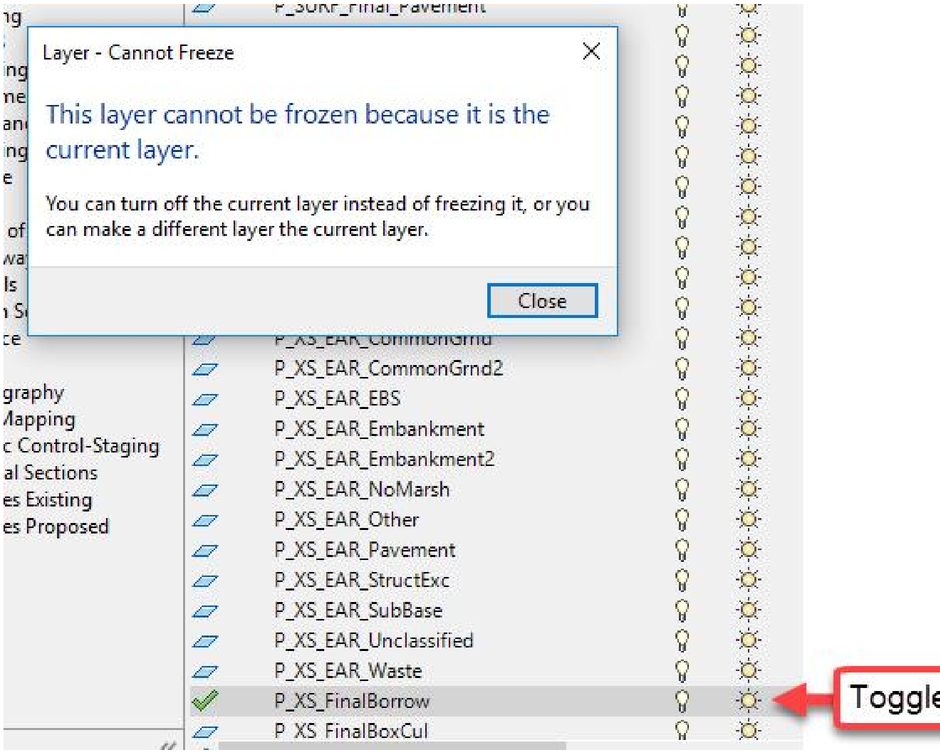
      II. Select a row in by left clicking
         a. Left click once more on the Layer name to edit the name
         b. Left click elsewhere in to cancel or finish the name edit

4. Select BOTTOM OF MEDIAN Line on left side of SECTION A-A detail
    A. **Ribbon > Home tab > Layer panel > Make Current**
    B. Layer Properties Manager
        I. ***P_XS_FinalBorrow*** row
            a. Toggle Layer Off
                i. "The current layer will be turned off. What do you want to do?"
                    1. Turn the current layer off



            b. Toggle Layer On

c. Toggle Layer Freeze
    i. "This layer cannot be frozen because it is the current layer."
        1. Close



II. ***P_XS_EAR_Waste*** row
    a. Set current by double clicking this row

III. ***P_XS_FinalBorrow*** row
    a. Toggle freeze
        i. Observe Layer not displayed in modelspace
    b. Toggle thaw
    c. Toggle lock
        i. Observe Layer display fade in modelspace
    d. Color column
        i. Color = yellow
        ii. OK
            1. Observe layer color change in modelspace
    e. Color column
        i. Color = 30
        ii. OK
    f. Linetype column
        i. Select Linetype: choose Ecomlin from list
        ii. OK

g. Linetype column
    i. Select Linetype: choose Continuous from list
    ii. OK
h. Lineweight column
    i. Lineweight = 0.80mm
        1. observe no change to display in modelspace
    ii. `LINEWEIGHT`
        1. enter
        2. Display Lineweight = checked
        3. OK
        4. Observe change to display in modelspace
    iii. Lineweight = 0.30mm
    iv. `LINEWEIGHT`
        1. enter
        2. Display Lineweight = unchecked
        3. OK
i. Plot column
    i. Toggle plot/ noplot
j. Plot Style column
    i. Click on ***5B-wisdot*** named Plot Style
        1. Observe list of Plot Styles
        2. Cancel

Warning: Named plot styles have been assigned intentionally to Layers included in the WisDOT design template. These Plot Styles dictate the plotted color (ie Black), line-type and lineweight of plotted objects. Do not change these assigned Plot Styles as doing so will result in non-uniformity among plotted WisDOT plan sets.

k. New VP Freeze column
    i. Toggle New VP Freeze

Info: New VP Freeze affect creation of new View-ports. Viewports are used for plan production to "look" from you plan sheet Layout (Paperspace) into your Civil 3D model (Modelspace). The con-cepts and use of Layouts, Viewports and Paper-space vs Modelspace will be covered in more depth in later training modules.

C. Model and Layout tabs

I. New Layout

II. Click newly created ***Layout 1*** to make active

a. Status Bar > Customization > Model Space = Checked

b. Status Bar > Model or paper space = Model

III. Layer Properties Manager

a. Observe VP Freeze = frozen

i. Observe no display of ***P_XS_FinalBorrow*** in this Viewport only

b. VP Freeze = thawed

D. Model and Layout tabs

I. Set Model tab active

E. Layer Properties Manager

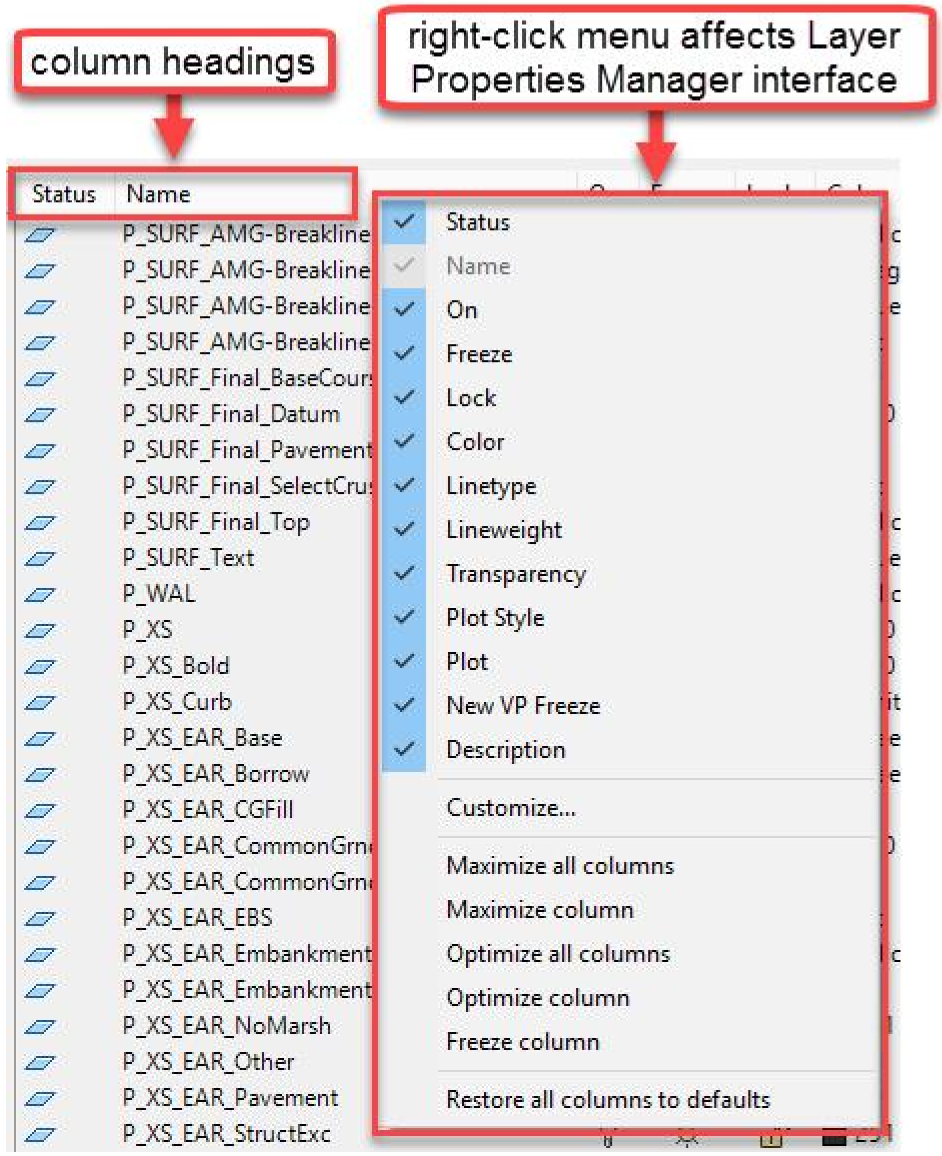
I. Right-click any column header

a. Maximize all columns

II. Right-click Name column header

a. Freeze column

i. Observe static display of Name and Status Column while scrolling left-right



Layer properties manager: create new & layer notification

Exercise files: [acad-layr-prprtis-data-c3d16.zip]

Continue with acad-layr-prprtis-begin.dwg

[acad-layr-prprtis-04.mp4] 2:49

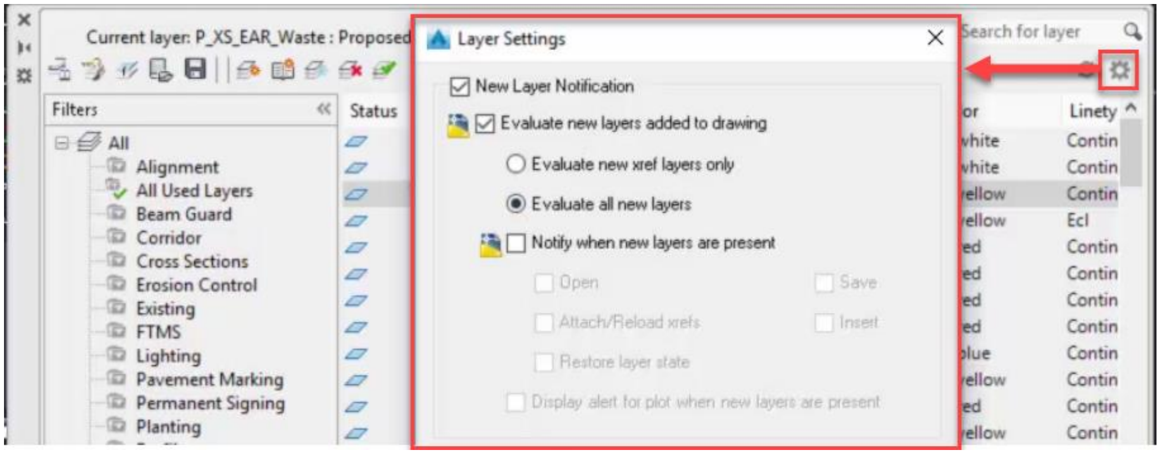
1. Continue with acad-layr-prprtis-begin.dwg
2. Layer Properties Manager
    A. Select ***E_ALI*** row
    B. Create New Layer
        I. Layer name = ***E_ALI2***

> **Info:** When creating a new Layer in Layer Properties Manager, all properties of the selected Layer other than the Layer name will be assigned to the new Layer created.

> **Requirement:** When creating a new layer, follow the WisDOT Layer naming convention. For example, E_ALI_<object name> ("E for existing or P for proposed"_"three or four letters for object type"_"optional additional sections of three or four letters for object type"_ "object name or description")

    C. Select E_ALI2
        I. Right-click > Merge selected layer(s) to...
            a. Select ***E_ALI***
            b. OK
            c. "The selected layers will be merged into layer ***E_ALI***. Do you want to continue?"
                i. Yes
    D. Layer Settings
        I. New Layer Notification = checked
        II. Evaluate new layers added to drawing = checked

III. Evaluate all new layers = filled



E. Select ***E_ALI***
F. Create new Layer
G. Right click newly created ***Layer 1***
   I. Reconcile Layer

Layer properties manager: properties filter & settings

Exercise files: [acad-layr-prprtis-data-c3d16.zip]

Continue with acad-layr-prprtis-begin.dwg

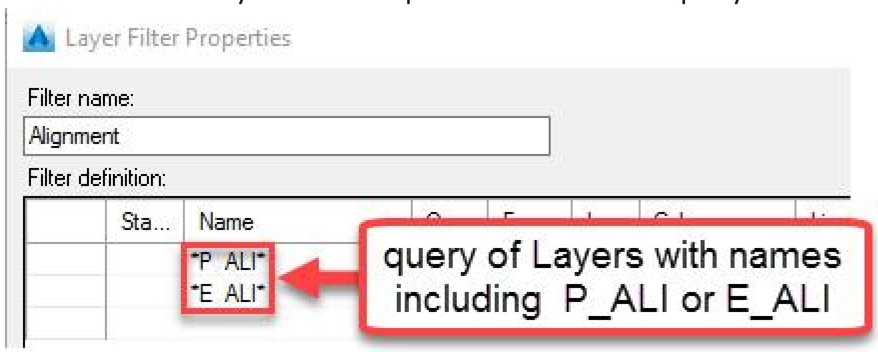
[acad-layr-prprtis-05.mp4] 6:07

Layer Properties Filters essentially query all the Layers in your drawing based on Layer name text or other Layer properties. This allows you to reduce the Layers listed in Layer Properties Manager, making Layers easier to find and work with. You can also use the search field in the upper right corner of Layer Properties Manager to filter the Layers shown based on Layer name. Using Layer Settings, you can also apply the current Layer Properties Filter to the Ribbon Layer Panel dropdown list.

1. Continue working in acad-layr-prprtis-begin.dwg
2. Layer Properties Manager
   A. Filters
      I. ***Alignment***
         a. Observe reduced list of Layers displayed in Layer Properties Manager
         b. Observe Layer quantification note in lower-left of Layer Properties Manager window

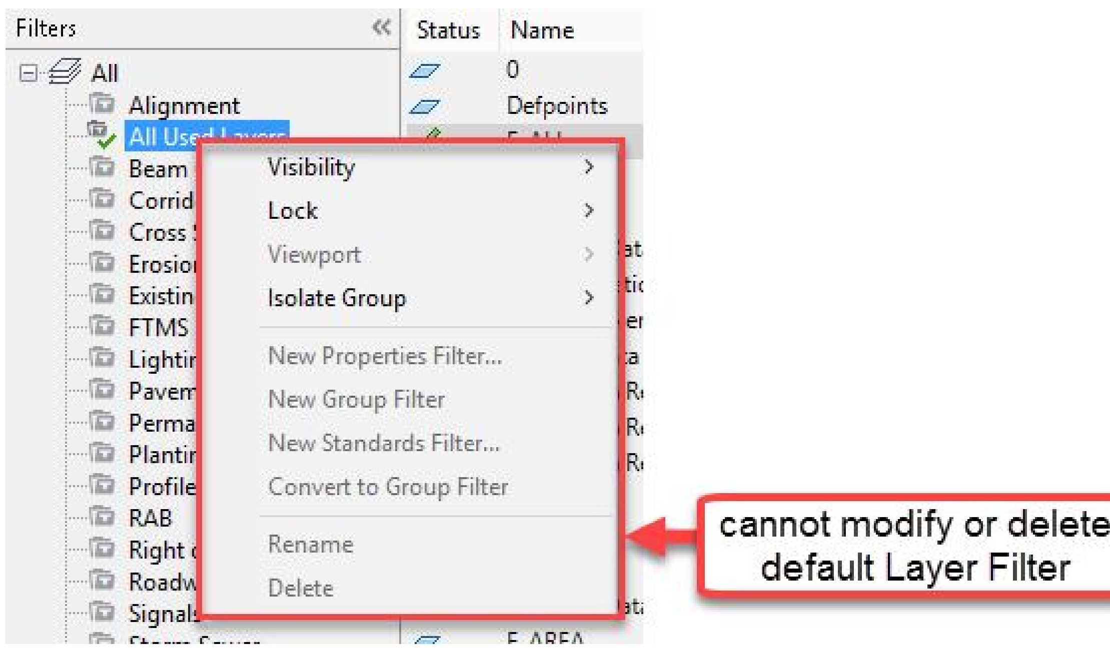
II. Right-click ***Alignment*** Layer Filter > Properties

   a. Observe Layer Filter Properties name-based query



III. Right-click ***All Used Layers*** Filter

   a. Observe inability to modify properties or delete this filter

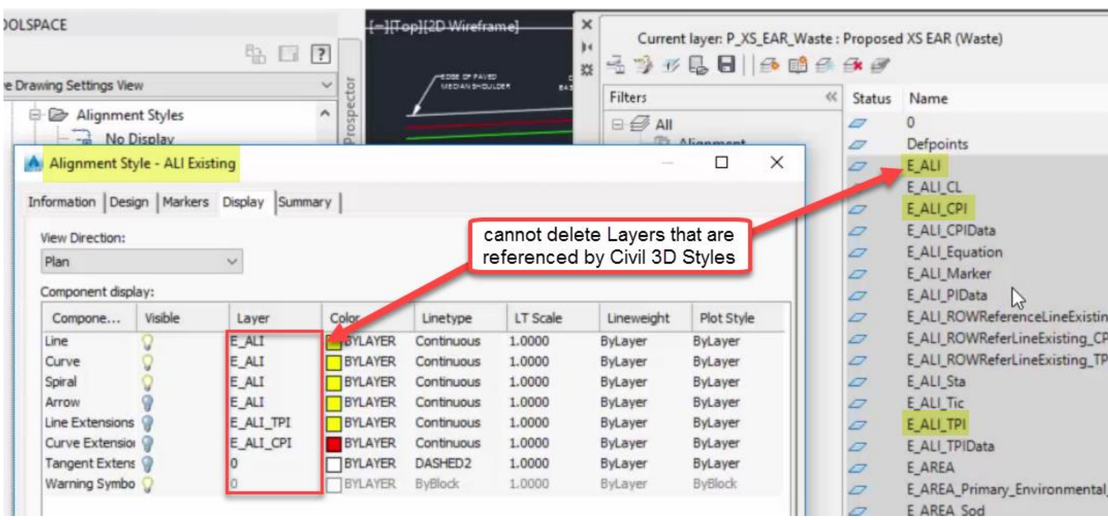


Info: The All Used Layers Filter is one of the default Layer Filters automatically created in any drawing. These default Layer Filters cannot be modified or deleted. Additional default Layer Filters include External Reference, Non-External Reference, Unreconciled Layers and Viewport Overrides.

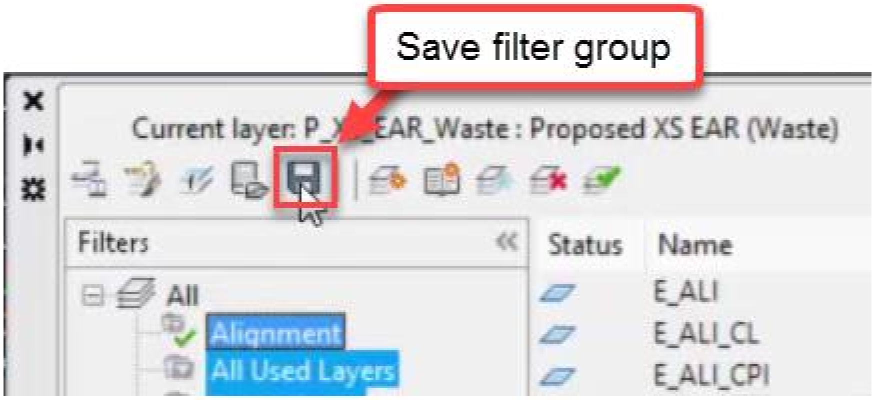
b. Shift-select multiple Layers included in the ***All Used Layers*** Filter
    i. Right-click selection
        1. Delete Layer
        2. Observe notification informing that you cannot delete these Layers

> **Info:** When Layers are referenced by a Civil 3D Style included in a drawing or template, the Layers are included in the All Used Layers Filter and cannot be deleted. This is true even if there are no Civil 3D objects in the drawing. For example the Alignment Civil 3D Style is included in the WisDOT design template even before any Alignments are created.

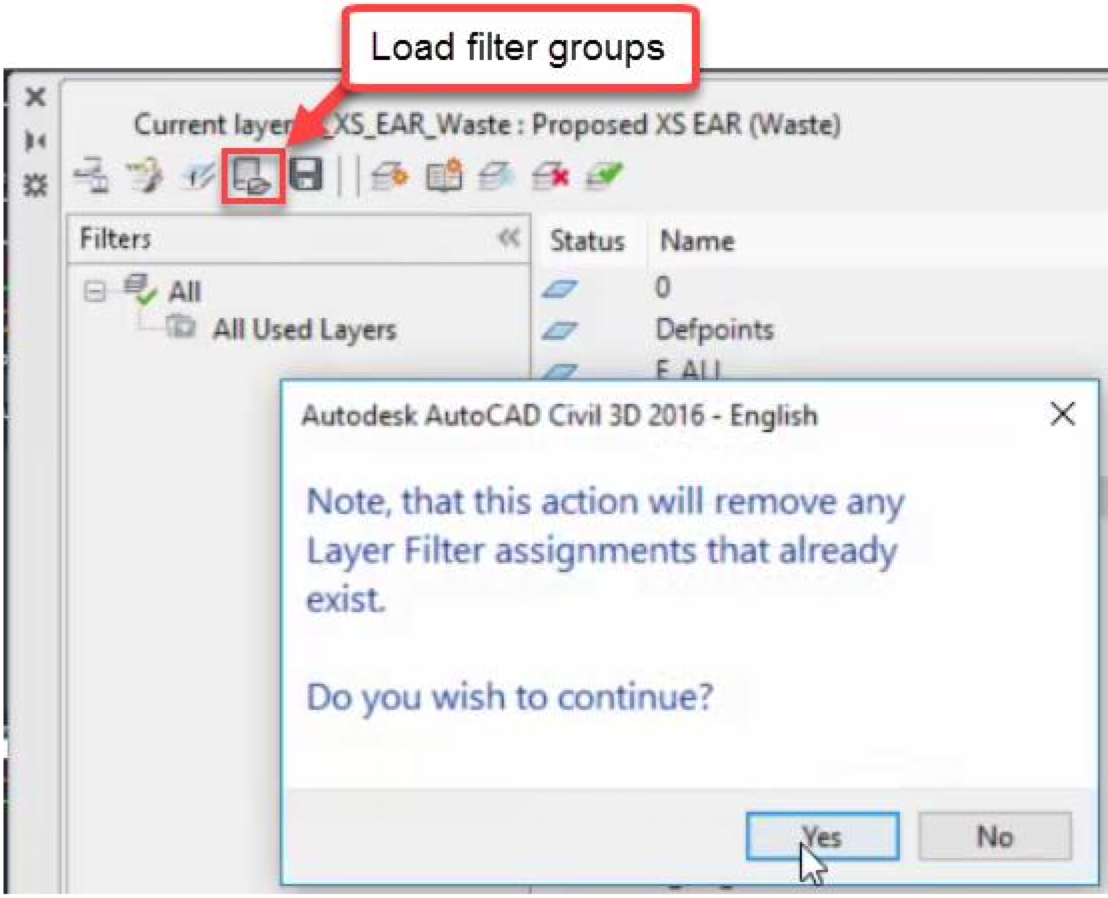
3. **Ribbon > Home tab > Toolspace**
    A. **Toolspace palette > Settings tab > Alignments > Alignment Styles > Double-click ALI Existing**
        I. **Alignment Style palette > Display tab > Layer column**
            a. Observe Layers referenced by the ***ALI Existing*** Civil 3D Alignment Style



4. Layer Properties Manager
    A. Shift-select all Layer Filters
        I. Save filter group
            a. Save Layer Filters dialog > File name = filter groups.lft
            b. Save



B. Shift-select all Layer Filters > Right-click > Delete
C. Load Filter Groups
   I. "Note, that this action will remove any Layer Filter assignments that already exist. Do you wish to continue?"
      a. Yes



   II. Browse to filter groups.flt
      a. Open

D. Layer Properties Manager search field
   I. syntax = p_ar*
   II. Observe real-time filtering of Layer list

E. Layer Settings
   I. **Dialog Settings > Apply layer filter to layer toolbar = unchecked**
   II. OK
F. Set ***Beam Guard*** Layer Filter active

5. **Ribbon > Home tab > Layer panel > Layer list dropdown**
   A. Observe all Layers in drawing included in Layer list
6. Layer Properties Manager
   A. Layer Settings
      I. **Dialog Settings > Apply layer filter to layer toolbar = checked**
      II. OK
7. **Ribbon > Home tab > Layer panel > Layer list dropdown**
   A. Observe only the Current Layer and those Layers included in the ***Beam Guard*** Layer Filter included in Layer list dropdown

Layer states & layer walk

Exercise files: acad-layr-prprtis-data-c3d16.zip

Continue with acad-layr-prprtis-begin.dwg

acad-layr-prprtis-06.mp4 5:00

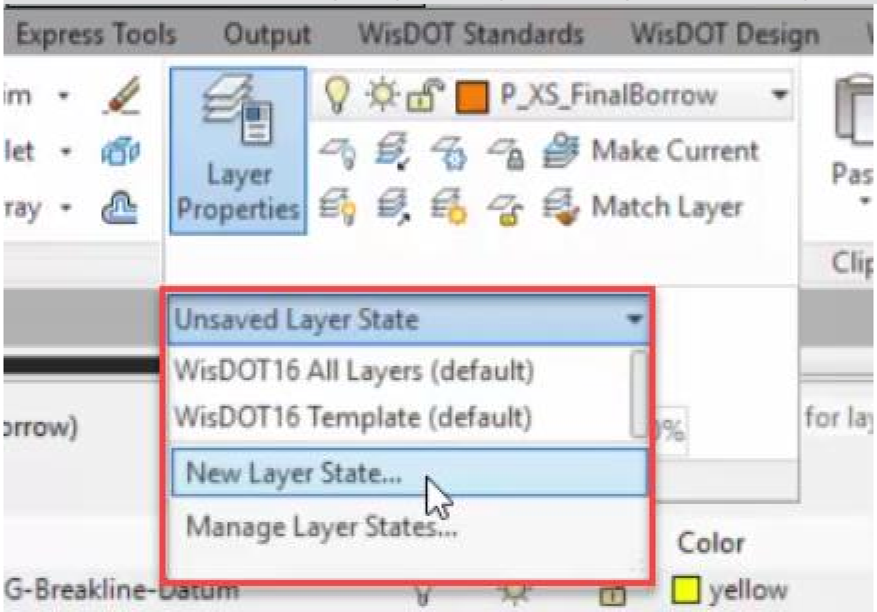
A Layer State is a saved version of the way a drawings Layer properties are set up. The properties saved in a Layer State include Layer On/ off, Freeze/ thaw, Lock/ unlock, Color, Linetype, Lineweight, Transparency, Plot style, Plot/ no plot, New VP Freeze and VP Freeze. Layer States can be imported, saved from the current Layer Properties setup, or restored in a drawing at any time. Restoring a Layer State will reset all Layer properties currently set in a drawing to those saved in the Layer State. Use Layer States to quickly and accurately switch to a desired

Layer properties setup for specific design, external referencing, or plotting workflows. Some key Layer States are included in the WisDOT design template and on the Ribbon WisDOT Standards tab. The Layer States on the WisDOT Standards tab can be imported through the Layers Tool Palette.

The Layer Walk command allows you to sort and select Layers from a list or your drawing area and see them displayed in real time. You can use Layer Walk to efficiently select a group of Layers either by name or by selecting objects in the drawing area, then create a Layer State based on that selection from within the Layer Walk dialog. The Layer State created from within the Layer Walk command will only affect visibility through the Layer on/ off property. All other properties will remain unchanged.

Layer states

1. Continue working in acad-layr-prprtis-begin.dwg
2. **Ribbon > Home tab > Layers panel flyout > Layer State dropdown > New Layer State**

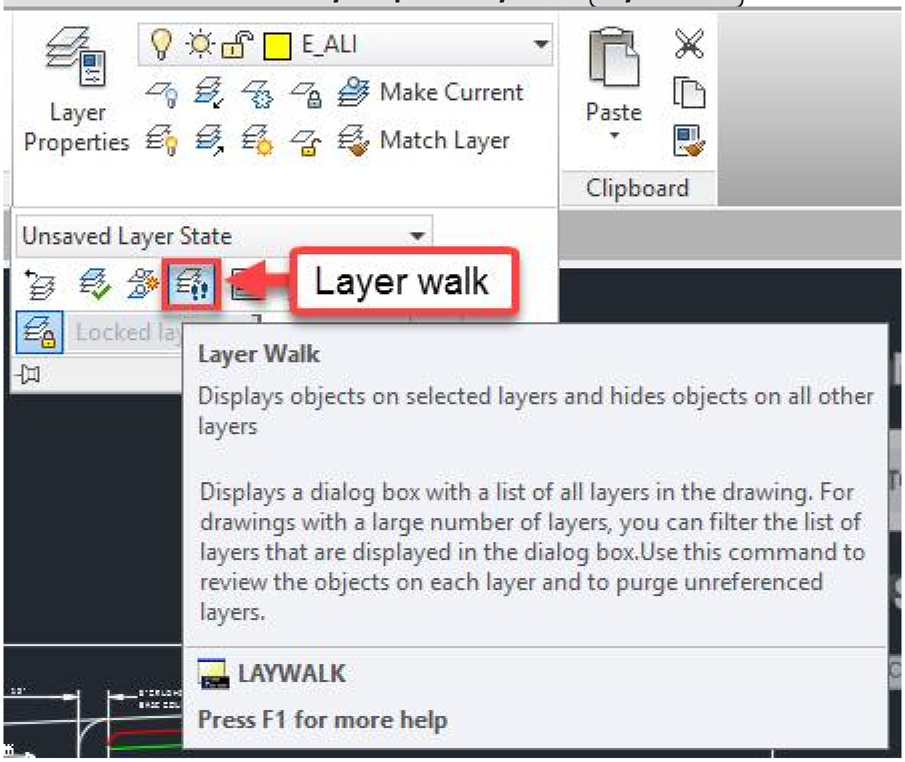


   A. New layer state name = ***color***
   B. OK
3. Layer Properties Manager
   A. Shift+select all Layers
   B. Click any Layer Color field
      I. Color = white
      II. OK
4. **Ribbon > Home tab > Layers panel flyout > Layer State dropdown > New Layer State**
   A. New layer state name = white
   B. OK
5. **Ribbon > Home tab > Layers panel flyout > Layer State dropdown > color**
   A. Observe all Layer Color properties restored based on color Layer State

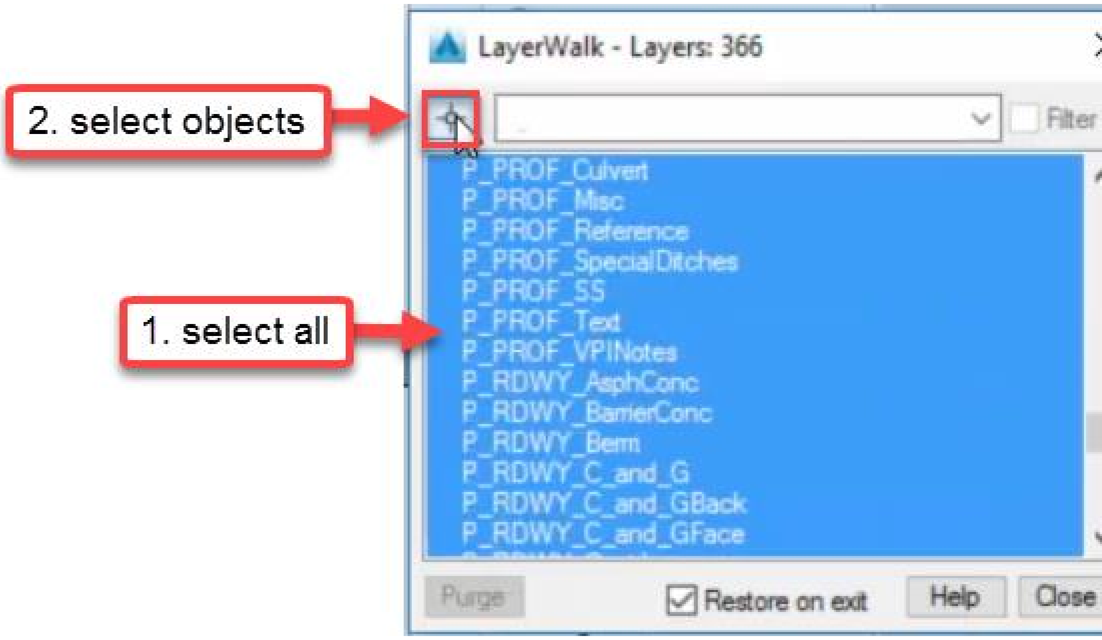
6. Layer Properties Manager
   A. Shift+select all Layers
   B. Click any Layer Lock field
7. **Ribbon > Home tab > Layers panel flyout > Layer State dropdown > white**
   A. Observe Layer Color and Lock properties restored based on ***white*** Layer State

Layer walk

1. **Ribbon > Home tab > Layers panel flyout > Layer Walk**



   A. Layer Walk dialog
      I. Right-click in Layer list
         a. Select all
         b. Observe Layers displayed in drawing area
      II. Select objects
         a. Use crossing selection to select objects in drawing area
         b. Observe selection in Layer list based on object selection:



III. Right-click in Layer list
   a. Save Layer State
      i. New layer state name = ***layer walk***
      ii. OK
IV. Select only ***P_XS_Final Borrow***
V. Restore on exit = checked
   a. Close

2. **Ribbon > Home tab > Layers panel flyout > Layer State dropdown > layer walk**
   A. Layer Properties Manager
      I. Observe Layer On property restored based on ***layer walk*** Layer State

WisDOT layer tools & best practices

Exercise files: acad-layr-prprtis-data-c3d16.zip Continue with acad-layr-prprtis-begin.dwg acad-layr-prprtis-07.mp4 3:40

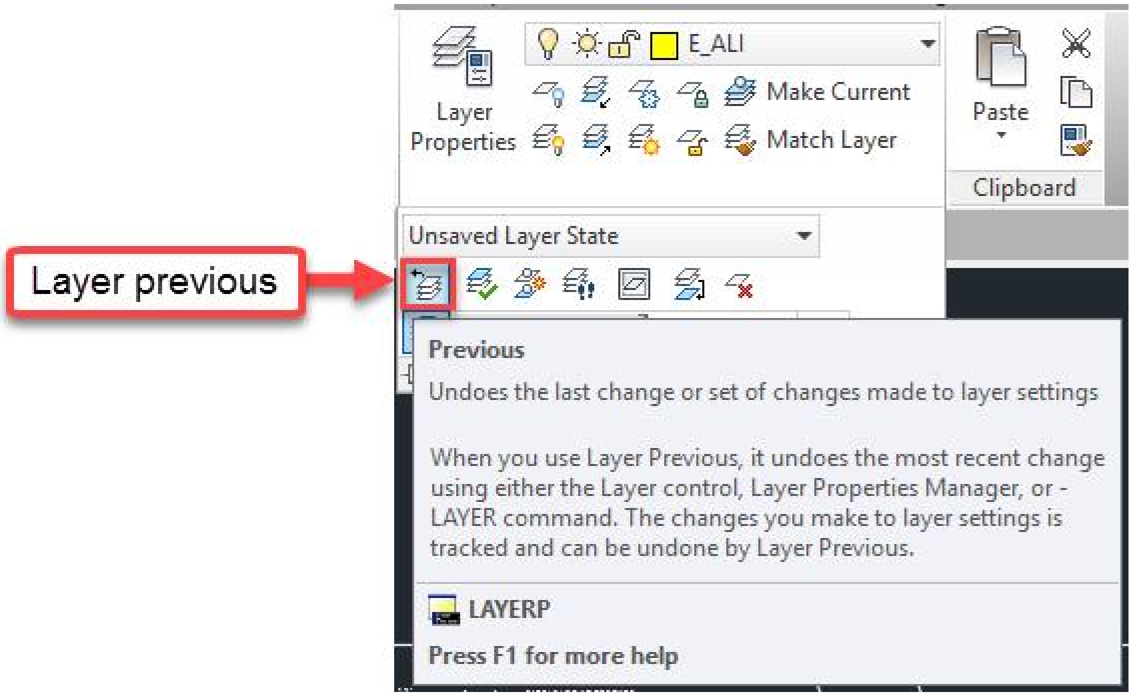
Find tools to import WisDOT Layers and Layer States in the Ribbon WisDOT Standards tab. You might import all WisDOT Layers if a drawing is lacking standard WisDOT Layers either because the drawing was started from a template other than WisDOT design or if Layers have been Purged. Several pre-defined Layer States can also be imported to help with things like switching a drawing so Layer Plot Style properties work with the latest WisDOT Plot Style Table.

Two key best practices for working with Layers in Civil 3D are to always assign relevant object Layers (don't leave objects on Layer 0) and to never assign object the Defpoints Layer. Layer 0 is unique in that it is used by many Civil 3D styles to inherit parent object Layers or used by AutoCAD Blocks so that objects within a Block are control by the overall Block object Layer. The Defpoints Layer is used by Civil 3D to track object geometry for things like Dimensions. Civil 3D objects will typically default to the appropriate Layer based on default Object Layers as covered in previous videos in this training module. Basic AutoCAD Layers for thing like preliminary or reference line work must be assigned correct Layers, however. AutoCAD Blocks and Dimensions will be covered in detail in later training modules

Warning: Never leave objects on Layer 0 when finishing a drawing or workflow. Always assign or verify assignment of relevant Layers to objects created. Never place objects on the Defpoints Layer. The Defpoints Layer is used by Civil 3D to track object geometry for things like Dimensions. Placing objects on the Defpoints Layer will inevitably cause drawing corruption at some point.

1. Continue working in acad-layr-prprtis-begin.dwg
2. Layer Properties Manager
    A. Observe total number of Layers in drawing = 366
3. **Ribbon > WisDOT Standards tab > Standards Components panel > Add Layers**
    A. Observe total number of Layer in drawing = 669
4. **PURGE**
    A. enter
    B. Items not used in drawing:
        I. Layers
        II. Confirm each item to be purged = unchecked
        III. Purge
    C. Observe total number of Layers in drawing = 366
5. **Ribbon > WisDOT Standards tab > Plot Configuration panel > Layer States**
    A. **Layer State Tool Palette > Translate Layer States > Load Layer State: Translate 2014 Layers to 2016 Standards**
6. **Ribbon > Home tab > Layers panel flyout > Layer States dropdown > Layer Translate 2014 to 2016**
7. **Ribbon > Home tab > Layers panel > Thaw all layers**
    A. Observe all Layers turned on in Layer Properties Manager

8. **Ribbon > Home tab > Layers panel flyout > Previous**



Tip: If you do not have a Layer State to restore to, but you made an unintentional change to one or more Layer properties, use the Layer Previous button to revert back to the previous setup of Layer properties. This is your "undo" button specific for Layers.

Blocks and external references

Last updated: 2017-12-01

Total video time: 60:11

Both Block References (aka Blocks) and External References (aka Xrefs) allow you to bring previously created, external objects into your Civil 3D drawing.

A Block is an object type that is made up of one or more other drawings objects. When objects are contained in a Block, they are easily inserted into any drawing to avoid duplicated work in assembling the various objects making up the Block. Blocks are typically used for Survey Point Markers, standard construction or plan details, plan set sheet text and typical plan-view linework. Blocks can be dynamics in that you have special control options for visibility or editing. They can also contain attributes, which are text objects whose content can be edited while locking down the text Style/Layer/etc.

You can think of an Xref as a view in a destination drawing back to a source drawing. In the destination drawing, the Xref source objects are protected from editing beyond Layer display control. Additionally, a source drawing can be Externally Referenced into multiple destination drawings simultaneously. Whenever a change is made to an Xref source drawing, you are prompted in the destination drawing to update the Xref. In this way, the referenced source content is easily kept up to date and consistent throughout all destination drawings. Xrefs can be used in design drawings to see and reference linework or other objects for the purposes of design without actually having those reference objects in your current drawing. Another use for an Xref is for displaying existing conditions or other site objects needed on multiple plan sheets. If you only want to display certain objects from the Xref on certain plan sheets, you can accomplish this through Viewport Freezing Layer control. More detailed information on plan production will be covered in later training module.

Block creation basics

Exercise files: acad-blk-xref-data-c3d16.zip

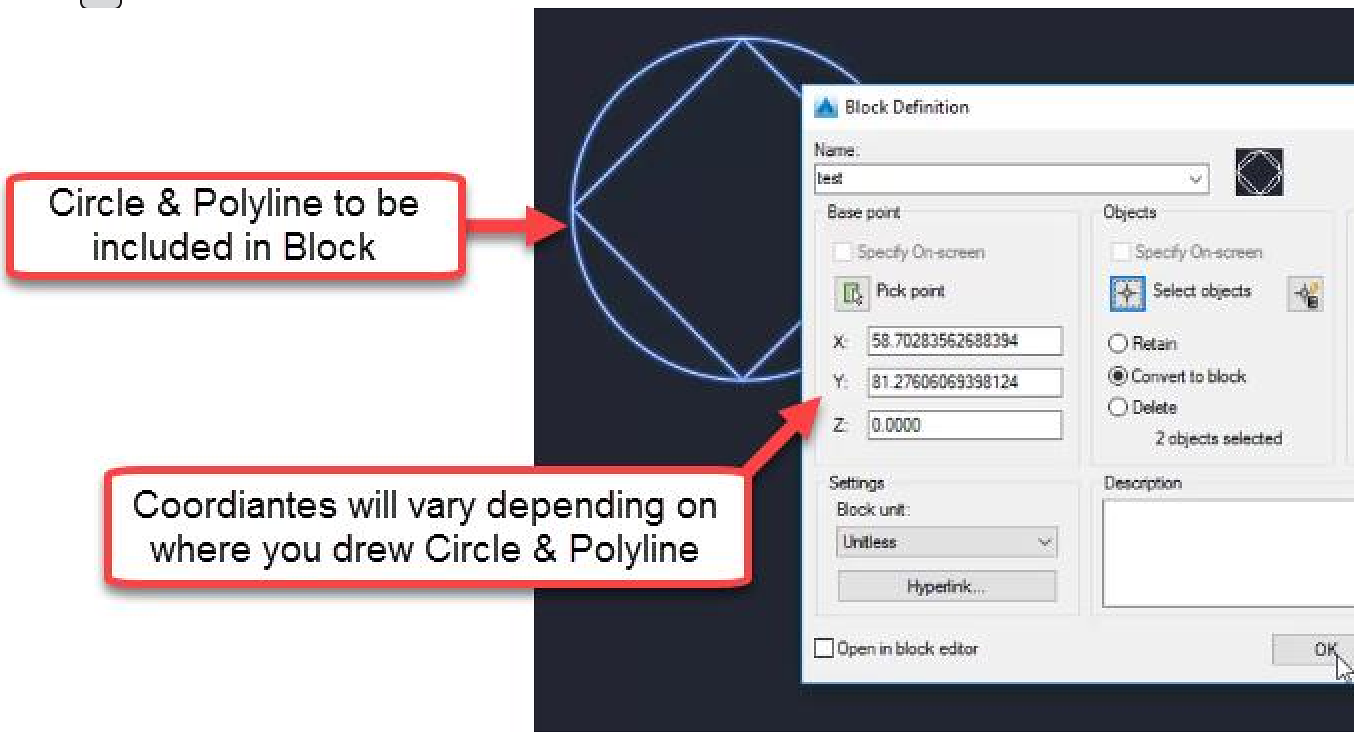
Start with acad-blk-xref-begin.dwg

acad-blk-xref-01.mp4 5:07

In this exercise, you will create a Block such that you have Layer control of the Block once created. You will do this by setting the objects making up the Block on Layer 0.

1. Open acad-blk-xref-begin.dwg
2. Set Current Layer = ***0***
3. **Ribbon > Home tab > Draw panel**
    A. Draw a Circle
        I. Radius = 15±
    B. Draw a Polyline within the Circle
4. **Ribbon > Insert tab > Block panel > Create**
    A. Name = ***test***
    B. Base Point
        I. Specify on-screen = unchecked
        II. Pick point
            a. Use Osnaps to specify center of Circle
    C. Settings
        I. Block unit = unitless
    D. Objects
        I. Specify on-screen = unchecked
        II. Convert to block = filled
        III. Select objects
            a. Select Circle and Polyline
            b. enter

E. Behavior
   I. Annotative = unchecked
   II. Scale uniformly = checked
   III. Allow exploding = checked
F. OK



5. Select ***test*** Block
   A. **Properties palette > General**
      I. Layer = ***E_ALI_Marker***
      II. Observe Layer properties take effect

> **Info:** In order to have Layer control of a Block Reference, the objects included in the Block must be placed on Layer 0. The Block itself can then be placed on any Layer as needed and the Layer properties will take effect.

Block creation continued, attributes & editing

Exercise files: acad-blk-xref-data-c3d16.zip

Continue with acad-blk-xref-begin.dwg

acad-blk-xref-02.mp4 5:24

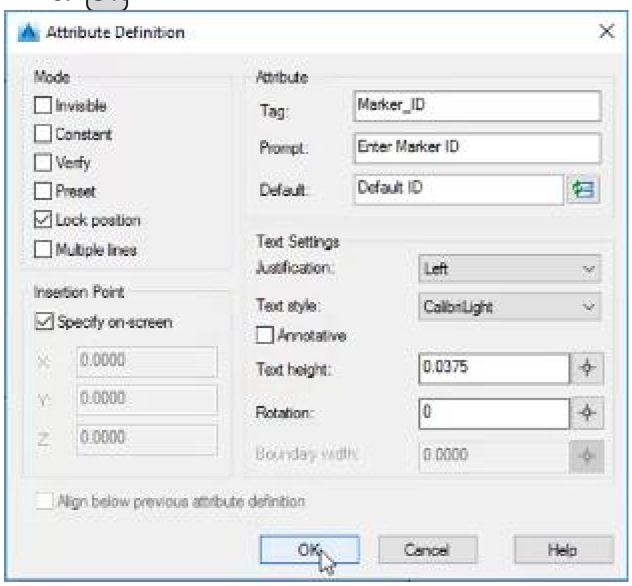
In this exercise, you will create a Block such that you do not have Layer control, then edit the Block so that you do have Layer control. You will also learn how to add a Block Attribute, which is a text object contained in the Block whose properties are protected and whose content value can be edited in a user-friendly interface. When you insert an Attributed Block into a drawing, you will be prompted to enter specific information for the attribute content. Block Attributes are a great way to ensure that necessary text information is entered and that it is in the correct format. In the process of completing this exercise, you will take an introductory look at the Block Editor interface.

1. Continue working in acad-blk-xref-begin.dwg
2. Current Layer = ***E_ALI***
3. **Ribbon > Home tab > Draw panel**
    A. Draw a Circle
        I. Radius = 15±
    B. Draw a Polyline within the Circle
4. **BLOCK**
    A. enter
    B. Name = ***test2***
    C. Base Point
        I. Pick point
            a. Use Osnaps to specify center of Circle
5. Objects
    A. Select objects
        I. Select Circle and Polyline
        II. enter
6. Select ***test2*** Block
    A. **Properties palette > General**
        I. Layer = ***E_ALI_Marker***
        II. Observe Layer properties not taking effect

> **Info:** If a Block has been created such that you do not have Layer control, you can enter Block Editor and place the objects contained in the Block on Layer 0. Then you will have Layer control of the Block.

7. **Ribbon > Insert tab > Block panel > EDIT**
    A. Block to create or edit = ***test2***
    B. OK
        I. Select Circle and Polyline
            a. **Properties > General**
                i. Layer = 0
        II. **Block Editor Ribbon > Close panel > Close Block Editor**
            a. Save the changes to test2
8. Observe Layer properties take effect
9. Select ***test2*** Block
    A. **Properties palette > General**
        I. Layer = ***E_ALI***

10. Double-click ***test2*** Block
    A. Block to create or edit = ***test2***
    B. OK
        I. **Block Editor Ribbon > Action Parameters panel > Attribute Definition**
            a. Attribute
                i. Tag = Marker_ID
                ii. Prompt = Enter Marker ID
                iii. Default = Default ID
            b. Text Settings
                i. Annotative = unchecked
                ii. Text Height = 1
            c. OK



        II. Specify insertion point of Attribute within Circle
    C. **Block Editor Ribbon > Close panel > Close Block Editor**
        I. Save the changes to test2
11. **Ribbon > Insert tab > Blocks panel flyout > Synchronize Attributes**
    A. **ENTER AN OPTION: SELECT**
    B. Select ***test2*** Block
    C. enter
12. Double-click ***test2*** Block
    A. **Enhanced Attribute Editor > Attribute tab**
        I. Value = 12345
        II. OK

Insert from block definition & edit insertion point

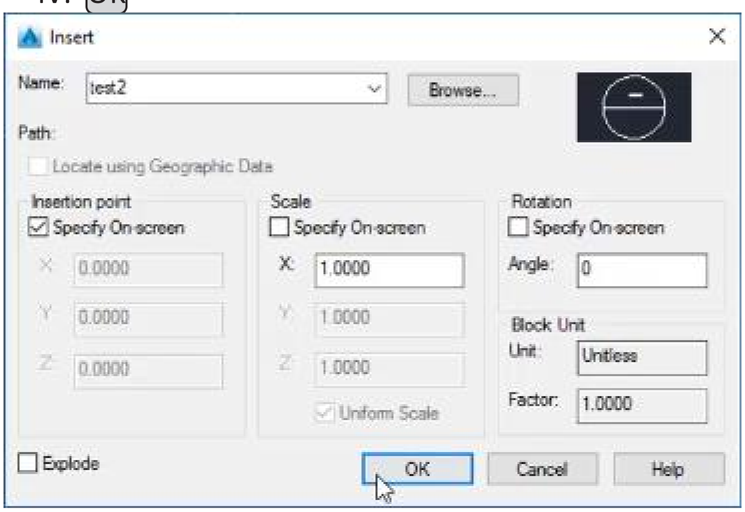
Exercise files: acad-blk-xref-data-c3d16.zip

Continue with acad-blk-xref-begin.dwg

acad-blk-xref-03.mp4 2:53

In this exercise you will learn to insert a Block from the definition stored in the current drawing. You will also learn two methods to reset a Block insertion point in Block Editor.

1. Continue with acad-blk-xref-begin.dwg
2. **Ribbon > Insert tab > Insert dropdown > More Options**
    A. Block to create or edit = ***test2***
        I. Insertion point
            a. Specify on-screen = checked
        II. Scale
            a. Specify on-screen = unchecked
            b. X = 1
        III. Rotation
            a. Specify on-screen = unchecked
            b. Angle = 0
        IV. OK



3. Specify insertion point of ***test2*** Block near other drawing objects
    A. Edit Attributes
        I. Enter Marker ID = 6789
    B. OK
4. **BE**
    A. enter
    B. Block to create or edit = ***test2***
        I. Select all objects in Block Editor drawing area
            a. **M**
            b. enter

II. Specify base point
a. Select bottom of Circle using Osnap
III. Specify second point
a. Verify Dynamic Input is off
b. `0,0`
c. enter
C. **Block Editor Ribbon > Close panel > Close Block Editor**
I. Save the changes to test2
5. Select ***test2*** Block
A. Observe Grip location at bottom of Circle
6. **`BE`**
A. enter
B. Block to create or edit = ***test2***
C. Block Editor Ribbon > Action Parameters panel > Parameters dropdown > Basepoint
I. `SPECIFY PARAMETER LOCATION`
a. Use Osnap to specify center of Circle
D. **Block Editor Ribbon > Close panel > Close Block Editor**
I. Save the changes to test2
7. Select ***test2*** Block
A. Observe Grip location at center of Circle

Write block (WBLOCK)

Exercise files: acad-blk-xref-data-c3d16.zip

Continue with acad-blk-xref-begin.dwg

acad-blk-xref-04.mp4 2:55

The WBLOCK command will write a Block Definition based on either existing Blocks or objects in the current drawing or the entire current drawing to a new, external drawing. This workflow is commonly used to write an entire drawing that has become corrupt to Block in order to leave behind those elements causing the corruption. This Block can then be inserted into a new drawing created from the appropriate template.

1. Continue with acad-blk-xref-begin.dwg
2. **`WBLOCK`**
A. enter
B. Source
I. Entire drawing = checked

C. Destination
    I. File name and path: ...
        a. Browse to folder containing acad-blk-xref-begin.dwg
        b. File name = new block.dwg
        c. Save
D. Insert units = unitless
E. Include AutoCAD Map information in the export?
    I. No

3. **Ribbon > Insert tab > Insert > More Options**
    A. Browse
        I. Browse to new block.dwg
        II. Open
    B. Explode = unchecked
    C. OK
4. Specify insertion point near other drawing objects

Info: When an entire drawing is written to a Block Definition using WBLOCK, the insertion point for the newly written Block will be at the same location relative to the newly written Block objects as the 0,0 coordinate in the original drawing was to the original drawing objects.

Tip: In the case where WBLOCK is used to insert an entire drawing into a blank drawing started from an appropriate template in order to leave behind corruption, the Insertion point: Specify on-screen option is typically unchecked. This way the objects in the original drawing and the Block inserted into the new drawing will be a the same coordinates. Additionally, the Explode option is typically checked. This way the newly inserted Block is automatically broken down to the level of the objects in the original drawing,

5. **X**
    A. enter
    B. **SELECT OBJECTS**
        I. Select ***new block***
        II. enter

Tip: Another method to insert an entire drawing into another drawing is to drag and drop the DWG file from Windows File Explorer into the Civil 3D drawing area.

6. Windows File Explorer
    A. Browse to folder containing new block.dwg
    B. Select new block.dwg
        I. Drag and drop into Civil 3D drawing area

7. Specify insertion point near other drawing objects
   A. **ENTER X SCALE FACTOR <1>:**
      I. enter
   B. **ENTER Y SCALE FACTOR <USE X SCALE FACTOR>:**
      I. enter
   C. **SPECIFY ROTATION ANGLE <0>:**
      I. enter

Purged block definitions & WisDOT standards tab

Exercise files: acad-blk-xref-data-c3d16.zip

Start with acad-blk-xref-01.dwg

acad-blk-xref-05.mp4 5:26

In this video you will how it is possible to purge Block Definitions if they are not currently inserted into the drawing are or referenced by Civil 3D or AutoCAD Styles. You will then use the Add Marker Symbols tool located on the Ribbon WisDOT Standards tab to bring those Block Definitions back into the drawing. The Add Marker Symbols tool can be used to add the standard WisDOT Marker Blocks into any drawing regardless of whether that drawing ever had those Block Definitions or not.

1. Open acad-blk-xref-01.dwg
2. **Ribbon > Insert tab > Insert > More Options**
   A. Name = ***AC***
   B. OK
3. Specify insertion point near other drawing objects
4. **Ribbon > WisDOT Standards tab > Standards Components panel > Add Marker Symbols**
5. **Ribbon > Insert tab > Insert > More Options**
   A. Name = ***ZOR***
   B. OK
6. Specify insertion point near other drawing objects
7. Select all objects in drawing area
   A. delete
8. **Ribbon > Insert tab > Insert > More Options**
   A. Name dropdown
   B. Observe ***ZOR***, ***test***, ***test2*** and ***new block*** listed
   C. Cancel
9. **PURGE**
   A. enter
   B. Items not used in drawing
      I. select ***Blocks***

   C. Purge
   D. Iterate steps 9.B - 9.C until no Blocks are listed
10. **Ribbon > Insert tab > Insert > More Options**
    A. Name dropdown
       I. Observe ***ZOR***, ***test***, ***test2*** and ***new block*** not listed
    B. Cancel
11. **Ribbon > WisDOT Standards tab > Standards Components panel > Add Marker Symbols**
12. **Ribbon > Insert tab > Insert > More Options**
    A. Name dropdown
       I. Observe ***ZOR*** listed
    B. Cancel

Design center: insert block

Exercise files: [acad-blk-xref-data-c3d16.zip]

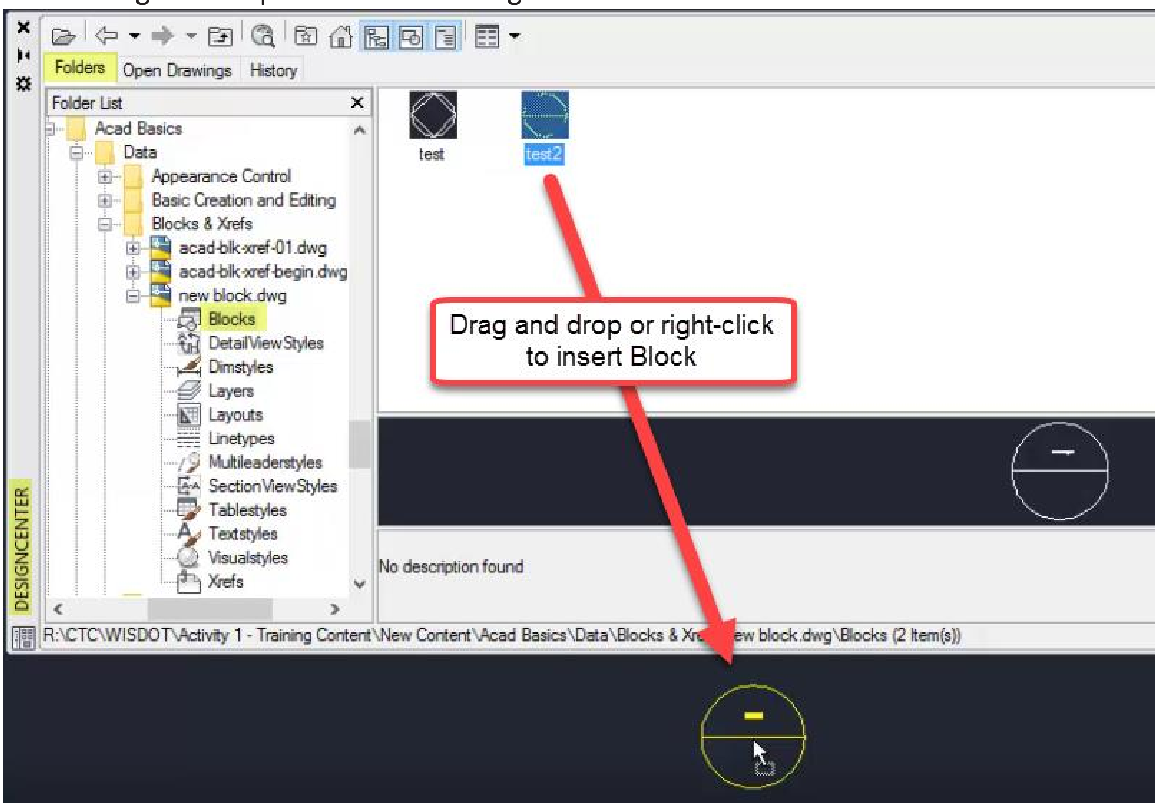
Continue with acad-blk-xref-01.dwg

[acad-blk-xref-06.mp4] 2:19

In this exercise you will explore options to insert a Block Definition from an external drawing when it is not available through the WisDOT contextual tabs. You can either insert an entire external drawing using the INSERT command or pick which Block(s) to insert from an external drawing using the Design Center interface.

1. Continue working in acad-blk-xref-01.dwg
2. **INSERT**
   A. enter
   B. Browse
      I. Browse to folder containing new block.dwg
      II. Select new block.dwg
      III. Open
   C. Specify insertion point anywhere in drawing area
3. **INSERT**
   A. enter
   B. Name dropdown
   C. Observe ***new block*** listed
   D. Cancel
4. Select ***new block***
   A. delete

5. **PURGE**
    A. enter
    B. Items not used in drawing
        I. select ***Blocks***
    C. Purge
    D. Iterate steps 9.B - 9.C until no Blocks are listed
6. **Ribbon > Home tab > Palettes panel flyout > Design Center**
    A. **Folders tab > expand Folder list to new block.dwg**
        I. Select ***Blocks***
        II. Drag and drop ***test2*** into drawing area



7. Edit Attributes
    A. OK

WisDOT sheets tab: topo tool palette

Exercise files: acad-blk-xref-data-c3d16.zip
Start with acad-blk-xref-02.dwg
acad-blk-xref-07.mp4 4:23

The topography Blocks used as Point Markers in Civil 3D Point Styles can be found and inserted directly as Blocks into any drawing through the WisDOT Topo Tool Palette, which is found on the WisDOT Sheets contextual Ribbon. The Blocks inserted from these Tool Palettes are defined in external source drawings that install with the WisDOT Standards package.

1. Open acad-blk-xref-02.dwg
2. **Ribbon > WisDOT Sheets**
   A. **Sheet Creation Components panel > Topo**
   B. **Tools panel > Palettes ON/OFF**
      I. **Topo Tool Palette > BuildingFencesTrees tab**
         a. Tree Stump
            i. Specify insertion point near other drawing objects
3. Select ***STMP*** Block
   A. **Properties palette > General**
      I. Layer = ***E_LAND_Vegetation***
4. Select ***STMP*** Block
5. **Ribbon > Home tab > Layers > Make Current**

> **Info:** The Blocks included on the Topo Tool Palette are also included as Block Definitions in most of the WisDOT templates. They are referenced as Point Markers in Civil 3D Point Styles which are also included in the WisDOT templates. More detailed information on Civil 3D Point Styles and Markers can be found in the Points training module.

Automatic scaling: block units & insertion units

Exercise files: acad-blk-xref-data-c3d16.zip

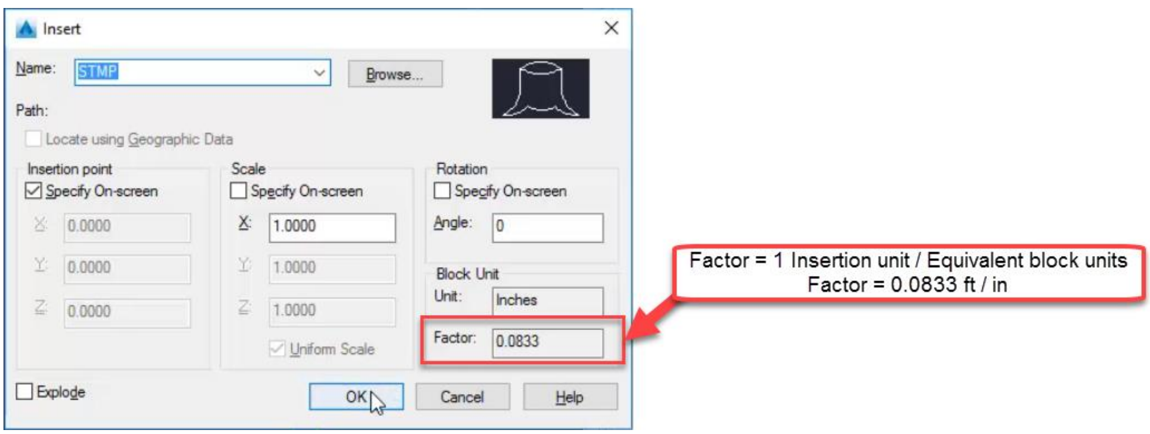
Continue with acad-blk-xref-02.dwg

acad-blk-xref-08.mp4 5:44

When a Block is inserted into a drawing it will be automatically scaled by a factor based on the drawing Insertion Units and the individual Block Units. The scale factor applied to a Block upon insertion will represent the Block in terms of the drawing Insertion Units. For example, a Block with Block Units of "inches" and a length magnitude of 24 that is inserted into a drawing with Insertion Units of "feet" will be scaled by a factor of 1/12 and will be have a length magnitude of 2 after insertion. Both the Insertion Units and the Block Units must be set to a value other than "unitless" in order for this form of automatic scaling to take place. If either is set to unitless in the source drawing, the Block will come in with the same length quantity as that in the source drawing.

> **Info:** Note that automatic Block scaling is not Annotative scaling, which will be covered in later training modules.

1. Continue working in acad-blk-xref-02.dwg
2. Select ***STMP*** Block
3. Properties palette > Misc
    A. Observe Block Unit = Unitless
    B. Observe that this field is not editable here
4. **BE**
    A. enter
    B. Block to create or edit = ***STMP***
    C. OK
    D. Properties palette > Block
        I. Units = Inches
    E. **Block Editor Ribbon > Close panel > Close Block Editor**
        I. Save the changes to STMP
5. **INSERT**
    A. Name = ***STMP***
    B. OK



6. Specify insertion point near other objects
    A. Observe automatic scaling
7. Topo Tool Palette > BuildingFencesTrees tab
    A. Tree Stump
        I. Specify insertion point near other objects
        II. Observe lack of automatic scaling
8. When a Block is inserted from an external Block Definition, such as the source drawing used by the WisDOT Topo Tool Palette, the Block will scale based on the units in that external source drawing even if the Block Definition in the current drawing has been edited to have different Block units. To avoid this, the Block Definition in the source drawing would need to be edited.

Warning: The Blocks included in the WisDOT Tool Palettes and various Templates should not be edited by the end user. This training module exer-

> cise is intended to teach you general Block behavior. You may need to edit Blocks coming from outside of WisDOT, however.

9. Select ***STMP*** Block inserted in step 7.B
   A. Properties palette
      I. Geometry
         a. Observe Scale = 12
      II. Misc
         a. Observe Block unit = Inches
10. Topo Tool Palette > BuildingFencesTrees tab
    A. Right-click Tree Stump
    B. Redefine
11. Select ***STMP*** Block inserted in step 7.B
    A. Properties palette
       I. Geometry
          a. Observe Scale = 1
       II. Misc
          a. Observe Block unit = unitless
12. Select all instances of ***STMP*** Block
    A. Properties palette > Geometry
       I. Scale = 1

Automatic scaling: redefine block from design center

Exercise files: acad-blk-xref-data-c3d16.zip

Continue with acad-blk-xref-02.dwg

acad-blk-xref-09.mp4 4:16

The Blocks included on the WisDOT Tool Palettes can be redefined in a drawing by right-clicking on the corresponding Tool Palette button and choosing Redefine. For those Blocks not included on the WisDOT Tool Palettes, you can redefine the drawing Block Definition by browsing to the source drawing through Design Center. This exercise goes through the workflow to redefine a Block through Design Center.

1. Continue with acad-blk-xref-02.dwg
2. Select ***test2*** Block
3. **BE**
   A. enter
   B. Block to create or edit = ***test2***
   C. OK

4. Properties palette > Block
    A. Units = Inches
    B. **Block Editor Ribbon > Close panel > Close Block Editor**
        I. Save the changes to test2
5. Insert
    A. Name = ***test2***
    B. OK
    C. Specify insertion point near other drawing objects
        I. Edit Attributes
        II. OK
6. **DC**
    A. enter
    B. Folders
        I. Browse to new block.dwg
            a. Blocks
                i. Drag & drop ***test2*** into drawing area
                ii. Edit Attributes
                iii. OK
7. Properties palette
    A. Geometry
        I. Observe Scale = 12

Info: In order to Insert a Block from an external source, such as through a Design Center, and have that external Block Definition update that in the current drawing, the Block in the external source drawing must be edited. Then you can browse to that Block in the external source through Design Center and redefine any instances of that Block Definition in the current drawing. This is the same functionality that is found by right-clicking a WisDOT Tool Palette button and choosing Redefine, but it applies to any Block even if it is not included in the WisDOT Tool Palette.

8. Open new block.dwg
9. **BE**
    A. enter
    B. Block to create or edit = ***test2***
    C. OK
10. Properties palette > Block
    A. Units = Inches
    B. **Block Editor Ribbon > Close panel > Close Block Editor**
        I. Save the changes to test2
11. Application menu > SaveAs
    A. File name = new block1.dwg
    B. Save

12. **DC**
    A. enter
    B. Folders
        I. Browse to new block 1.dwg
            a. Blocks
            b. right-click ***test2***
                i. Redfine only
13. Select all instances of ***test2*** Block
    A. Properties palette > Geometry
        I. Scale = 1

WisDOT sheets tab: signs tool palette

Exercise files: acad-blk-xref-data-c3d16.zip

Start with acad-blk-xref-03.dwg

acad-blk-xref-10.mp4 3:23

This exercise will walk you through the unique features included in the WisDOT Signs Tool Palette. The Blocks included on this tool palette represent the WisDOT standard signage details. These Dynamic Blocks include the ability to choose a version of each block from a dropdown list (Visibility Set) as well as a hyperlink to quickly view the associated WisDOT standard detail sheets.

1. Open acad-blk-xref-03.dwg
2. **Ribbon > WisDOT Sheets tab > Sheet Creation Components panel > Signs**
    A. D-Signs tab
        I. D1-51
            a. Specify insertion point anywhere in drawing area
3. Select ***D1-51*** Block
    A. Visibility set dropdown
    B. Choose alternative Visibilty from list
    C. esc

4. Double-click ***D1-51***Block
   A. Enhanced Attribute Editor
      I. Select SIZE row
      II. Value = 120"X15"
      III. Observe update to ***D1-51*** Block in drawing area
   B. OK
5. Ctrl+click ***D1-51*** Block
   A. Observe web browser open the WisDOT signage detail D1-51.pdf

WisDOT design tab: intersections, beam guards & general blocks

Exercise files: acad-blk-xref-data-c3d16.zip

Continue with acad-blk-xref-03.dwg

acad-blk-xref-11.mp4 4:37

The WisDOT Intersection Blocks and Beam Guard Tool Palattes contain dynamic Blocks which include easily editable linework to get started with your geometric layout. Insert these Blocks and use the Properties palette or dynamic Block grips to edit the linework. The WisDOT Design Ribbon tab also includes the Autodesk Palettes button. This will populate your Tool Palette with all of the default Autodesk Tool Palette tabs. Some of these default Tool Palette tabs contain default Autodesk Blocks that could potentially be useful to convey your design intentions.

1. Continue working in acad-blk-xref-03.dwg
2. **Ribbon > WisDOT Design > Parametric Design panel > Intersection Blocks**
    A. Int-Type-A-Q-Grtr-80-In-Curve
    B. Specify insertion point near other drawing objects
3. Select ***Int-Type-A-Q-Grtr-80-In-Curve*** Block
    A. Select Grip along incoming intersection centerline
        I. Specify point location for centerline
    B. Select Visibility Set dropdown
        I. Graphics Mode = checked
    C. **Properties palette > Custom**
        I. Observe editable parameters in tabulated form
    D. esc
4. **Ribbon > WisDOT Design > Parametric Design panel > Beam Guard**
    A. BG EAT R Right Curve
    B. Specify insertion point near other drawing objects
5. Select ***BG EAT R Right Curve*** Block
    A. Observe grips to edit linework geometry
    B. **Properties palette > Custom**
        I. Observe editable parameters in tabulated form
    C. esc
6. **Ribbon > WisDOT Design > Autodesk panel > Autodesk Palettes**
    A. Left-click "stacked" tabs at bottom of Tool Palette
    B. Scroll down in list
        I. Highways
            a. Scroll to explore available out-of-the-box Blocks
        II. External Works
            a. Scroll to explore available out-of-the-box Blocks

Xref: overlay vs attach

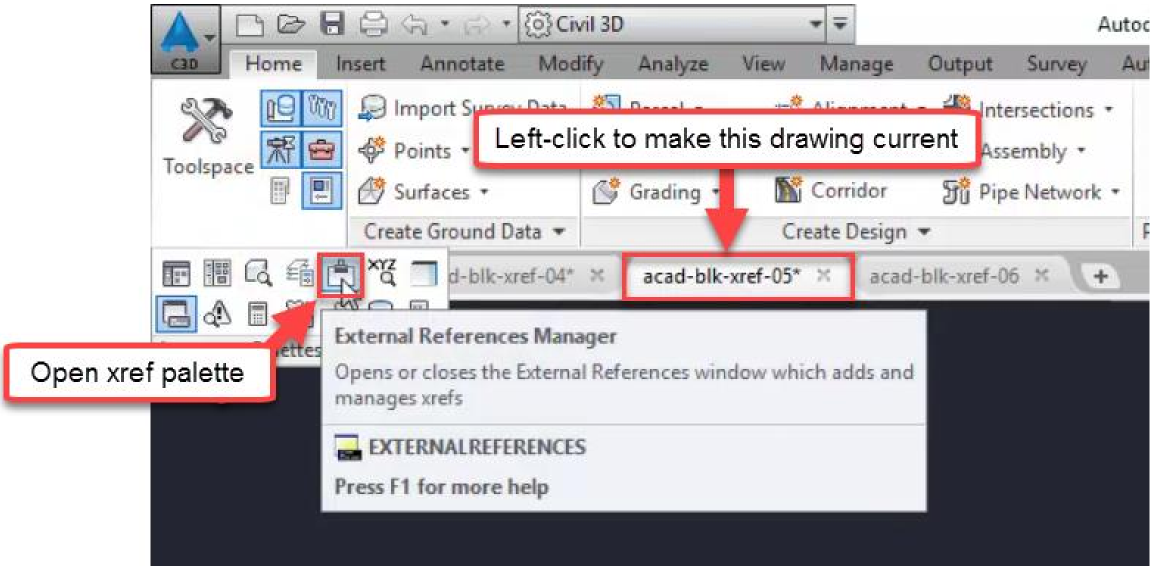
Exercise files: acad-blk-xref-data-c3d16.zip

Start with acad-blk-xref-04.dwg, acad-blk-xref-05.dwg and acad-blk-xref-06.dwg

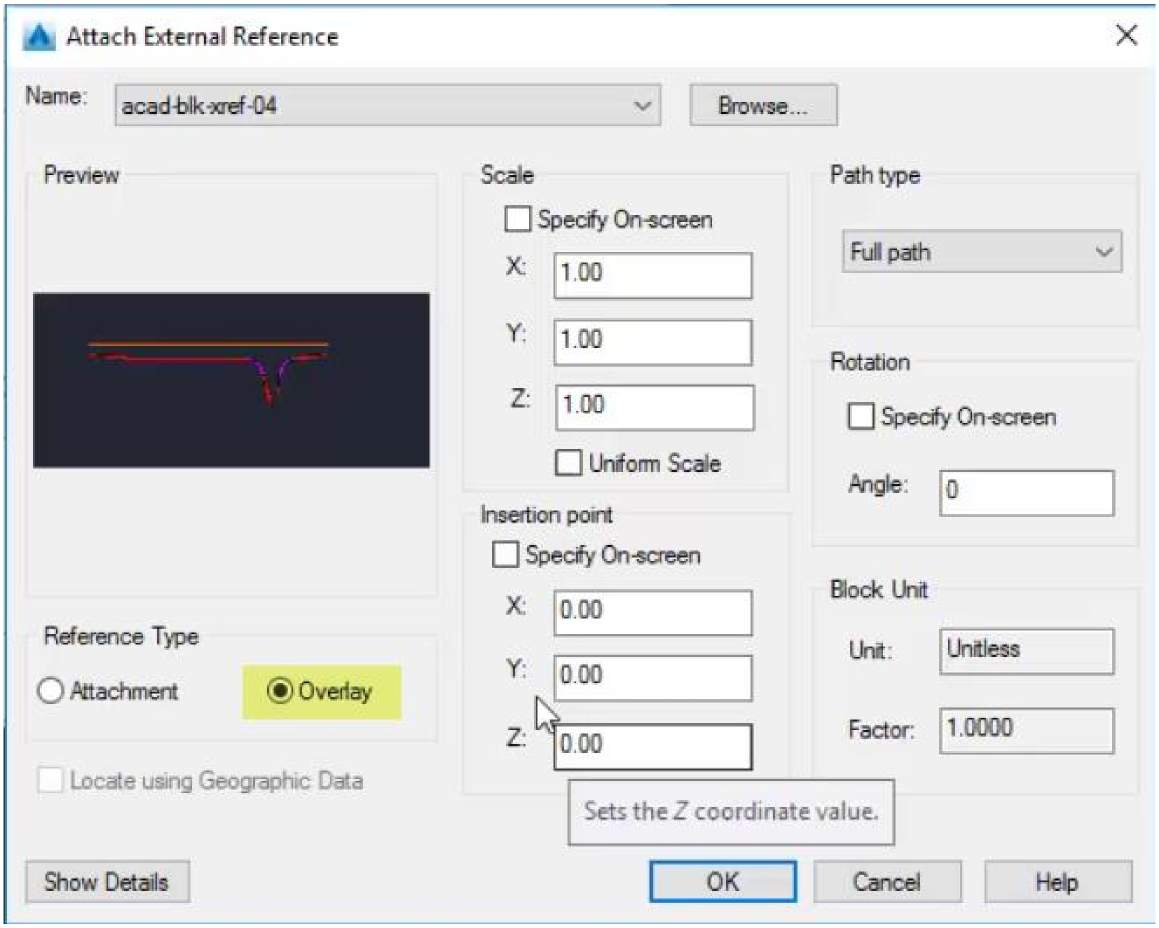
acad-blk-xref-12.mp4 5:56

This exercise will introduce you to the External Referencing (Xref) workflow. You will create an Overlay Xref then change it to an Attach Xref and observe behavioral differences between the two. When an Xref is created as the type "Overlay", the Externally Referenced source drawing will not be carried forward if the destination drawing is then Externally Referenced into another drawing. When an Xref is created as the type "Attach", the Externally Referenced source drawing will be carried forward.

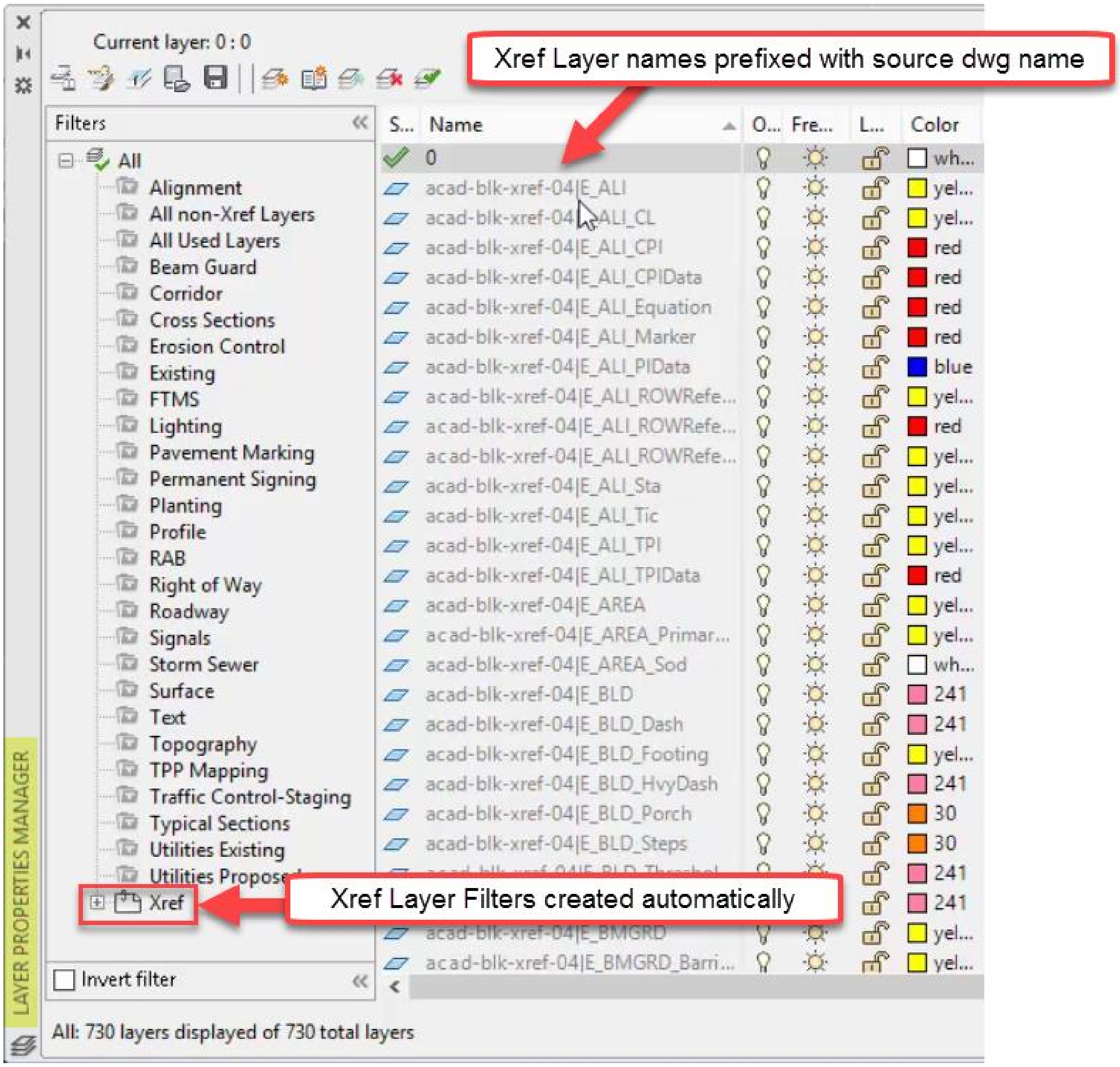
1. Open acad-blk-xref-04.dwg, acad-blk-xref-05.dwg and acad-blk-xref-06.dwg
2. **File tab > acad-blk-xref-05**
3. **Ribbon > Home tab > Palettes panel flyout > External References Manager**



4. **External References palette > Attach dropdown > Attach DWG**
   A. Browse to acad-blk-xref-04.dwg
      I. Open
5. Attach External Reference
   A. Reference Type = Overlay
   B. OK



6. **Ribbon > Home tab > Layers panel > Layer Properties**
   A. Observe presence of Xref Layer Filters and Xref Layers

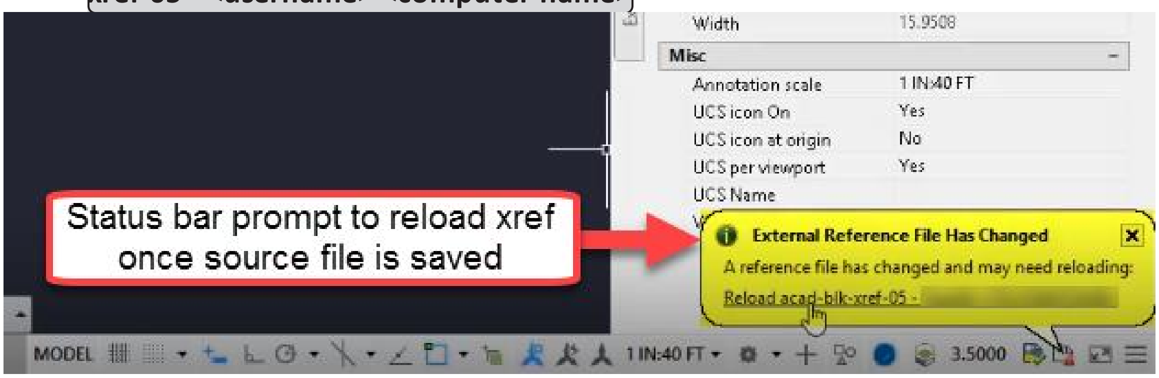


7. **File tab > acad-blk-xref-06**
8. **XR**
    A. enter
9. **External References palette > Attach dropdown > Attach DWG**
    A. Browse to acad-blk-xref-05.dwg
        I. Open

> **Info:**
> When acad-blk-xref-05.dwg is externally referenced into acad-blk-xref-06.dwg, no objects are displayed in acad-blk-xref-06.dwg. This is because the objects displayed in acad-blk-xref-05.dwg are only an "Overlay" xref of acad-blk-xref-04.dwg. "Overlay" xrefs are not carried forward when their destination drawing is then used as an xref source drawing in another drawing. "Attach" xrefs are carried forward in this manner, however.

> When acad-blk-xref-05.dwg is externally referenced into acad-blk-xref-06.dwg, xref Layers prefixed with acad-blk-xref-05 are created and are similar to the Layers in acad-blk-xref-04.dwg. This is because both acad-blk-xref-04.dwg and acad-blk-xref-05.dwg were started from the same template (wisdot16.dwt) and this template includes all of those Layers.

10. **File tab > acad-blk-xref-05**
11. **XR**
    A. enter
12. **External References palette > right-click acad-blk-xref-04**
    A. Xref Type = Attach
13. Save acad-blk-xref-05.dwg
14. **File tab > acad-blk-xref-06**
    A. **Status Bar > External Reference File Has Changed prompt > Reload acad-blk-xref-05 - <username> <computer name>**



Xref source path: full vs relative

Exercise files: [acad-blk-xref-data-c3d16.zip]

Continue with acad-blk-xref-04.dwg, acad-blk-xref-05.dwg and acad-blk-xref-06.dwg

[acad-blk-xref-13.mp4] 4:00

You have three options to specify how the Xref file path relationship between the source drawing and destination drawing is defined. A Full Path Xref requires that the source drawing exist at the exact drive location called out in the destination drawing when the Xref was created. If not, the Xref source file will not be read and a notification will be displayed. A Relative Path Xref requires that the source drawing exist at the same folder hierarchy location relative to the destination drawing. In other words, the source and destination drawings must be the same number of folders away from each other in order for the Xref source drawing to be read. There is also a No Path option which requires that the path to the source drawing be included in the Civil

3D profile options support file search path list. This No Path Xref type is less common and will not be covered in this exercise.

1. Continue working in acad-blk-xref-04.dwg, acad-blk-xref-05.dwg and acad-blk-xref-06.dwg
2. **XR**
    A. enter
    B. Observe full path displayed in acad-blk-xref-04 row, Saved Path column
3. **File tab > Close acad-blk-xref-04**
4. Windows File Explorer
    A. Browse to acad-blk-xref-04.dwg
    B. Move acad-blk-xref-04.dwg into xref folder
5. **External References palette > right-click acad-blk-xref-04**
    A. Reload
    B. Observe "Not Found" displayed in acad-blk-xref-04 row, Status column
6. Windows File Explorer
    A. Browse to acad-blk-xref-04.dwg
    B. Move acad-blk-xref-04.dwg to location displayed in Saved Path column of External References palette
7. **External References palette > right-click acad-blk-xref-04**
    A. Reload
    B. Observe "Loaded" displayed in acad-blk-xref-04 row, Status column
    C. Right-click acad-blk-xref-04
        I. Make Relative
        II. Observe partial file path displayed in acad-blk-xref-04 row, Saved Path column
8. Save acad-blk-xref-05.dwg
9. **File tab > Close acad-blk-xref-05**
10. Windows File Explorer
    A. Browse to acad-blk-xref-04.dwg
    B. Move acad-blk-xref-04.dwg and acad-blk-xref-05.dwg into xref folder
11. Open acad-blk-xref-05.dwg
12. External References palette
    A. Observe "Loaded" displayed in acad-blk-xref-04 row, Status column

Bind xref

Exercise files: acad-blk-xref-data-c3d16.zip

Start with acad-blk-xref-07.dwg

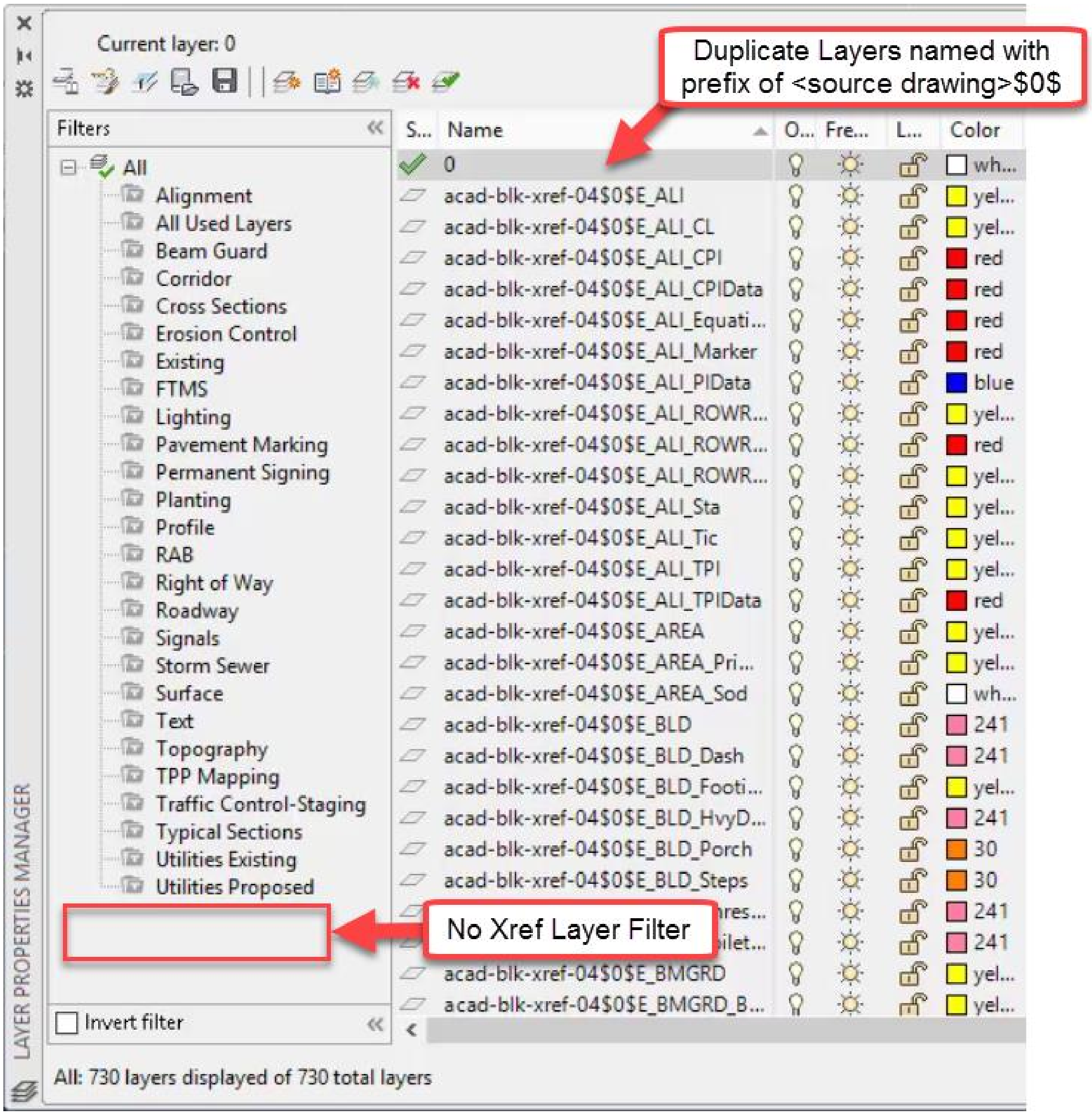
acad-blk-xref-14.mp4 3:48

Once an Xref is created in a drawing, you can insert the source objects, styles, Block Definitions and Layers through the BIND command. This will insert the source drawing content and create or merge similar content (ie similarly named Layers or Blocks) depending on the type of Bind you specify. In this exercise, you will Bind an Xref using both types of the Bind command and observe behavioral differences between the two.

1. Open acad-blk-xref-07.dwg
2. **XR**
    A. enter
    B. Browse to acad-blk-xref-04.dwg
    C. Open
3. Add External Reference
    A. OK
4. External References palette > Right-click acad-blk-xref-04
    A. Bind
    B. Bind Xrefs/DGN underlays
        I. Bind Type = Bind
        II. OK

> **Info:** When you Bind an Xref using the type Bind, any content in the source drawing similarly named in the destination drawing will be duplicated. That duplicated content will be named with a prefix based on the source drawing name. When you Bind using the type Insert, any content in the source drawing similarly named in the destination drawing will be merged. The version of that similar content in the destination drawing will be used.

5. Select all drawing objects
    A. Properties
        I. Observe selected object is a Block Reference
        II. Misc
            a. Observe name = ***acad-blk-xref-04***
6. **Ribbon > Home tab > Layers panel > Layer Properties**
    A. Observe duplicate Layer naming convention



7. **Quick Access toolbar > Undo dropdown > External References**
8. **XR**
   A. enter
9. **External References palette > Right-click acad-blk-xref-04**
   A. Bind
   B. Bind Xrefs/DGN underlays
      I. Bind Type = Insert
      II. OK
10. Select ***acad-blk-xref-04*** Block
11. **Ribbon > Home tab > Layers panel > Layer Properties**
    A. Observe no duplicate Layers created

Annotation

Last updated: 2017-11-28

Total video time: 40:14

This section will cover annotation tools used to add notes and callouts to a drawing. We will go over AutoCAD tools to create Multiline Text (text-only notes), Multileaders (callouts with text and pointer), and Dimensions as well as their associated styles. It should be noted that any Civil 3D objects have their own Label Styles which can automatically label key design features and dynamically update based on changes to associated Civil 3D objects. These Civil 3D Labels Styles should always be used where possible as they reduce the potential for human error and eliminate tedious, manual annotation work. The annotation tools covered in this section are typically reserved for cases where Civil 3D Label Styles are not applicable. For example, they can be used for things like construction details, title sheets, and plan sheet borders.

Multiline text

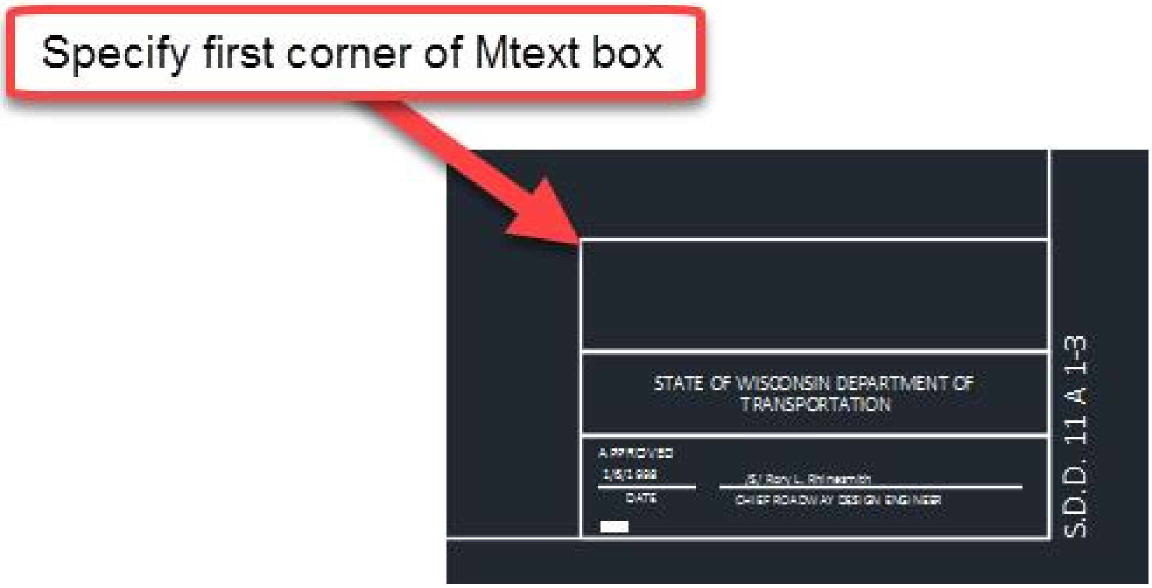
Exercise files: acad-annotatn-data-c3d16.zip

Start with acad-annotatn-begin.dwg

acad-annotatn-01.mp4 7:01

Multiline text is the preferred method in Civil 3D for typing or inserting general notes.

1. Open acad-annotatn-begin.dwg
2. **Ribbon > Annotate tab > Text panel > Multiline text**
    A. `SPECIFY FIRST CORNER:`
        I. Use Osnaps to pick upper left corner of title block box
    B. `SPECIFY OPPOSITE CORNER:`
        I. Use Osnaps to pick lower right corner of title block box



C. Type *notes* in Mtext box
D. Open maintainence crossover.txt in Notepad
   I. Copy text content
E. Paste text content into Mtext box

3. Select previously created Mtext with single click
   A. Observe insertion, column height and column width Grips displayed
   B. esc
4. Double click previously created Mtext
   A. Observe Mtext contextual Ribbon displayed
   B. Mtext Ribbon
      I. **Formatting panel > Text style dropdown**
         a. Choose alternative Text style
         b. Set back to ***Callibri Light***
      II. **Style panel > Text height field**
         a. Key in new Text height
         b. Set back to 0.1000
      III. **Paragraph panel > Justification dropdown**
         a. Choose Middle Center
   C. Left-click outside Mtext editing box
5. Select Mtext object
   A. Use Geometric Center Osnap to place insertion point at centroid of title block area
   B. esc
6. **Ribbon > Annotate tab > Text panel > Multiline Text**
   A. `SPECIFY FIRST CORNER:`
      I. Pick lower endpoint of green guiding Line

B. **SPECIFY OPPOSITE CORNER:**

C. Type *general notes* into Mtext box
D. Highlight *general notes* text content
E. **Mtext Ribbon > Formatting panel > Change case dropdown**
   I. Uppercase
F. **Mtext Ribbon > Tools panel flyout > Import text**
   I. Browse to general notes.txt
   II. Open
G. Select part of the Mtext content
H. **Mtext Ribbon**
   I. **Formatting panel > Text style dropdown**
      a. Change Text style
   II. **Style panel > Text height field**
      a. Change Text height
   III. **Formatting panel > Match**
      a. Highlight Text content with source formatting
      b. Highlight Text content for which to apply formatting
   IV. Highlight entire Mtext content
      a. **Style panel > Text height field**
         i. Text height = 0.1250
   V. **Insert panel > Columns dropdown > No Columns**
      a. Right click top of Mext box
         i. Set Mtext width = 38
         ii. OK
I. Left-click outside Mtext box to finish editing

Text editing & legacy text

Exercise files: acad-annotatn-data-c3d16.zip

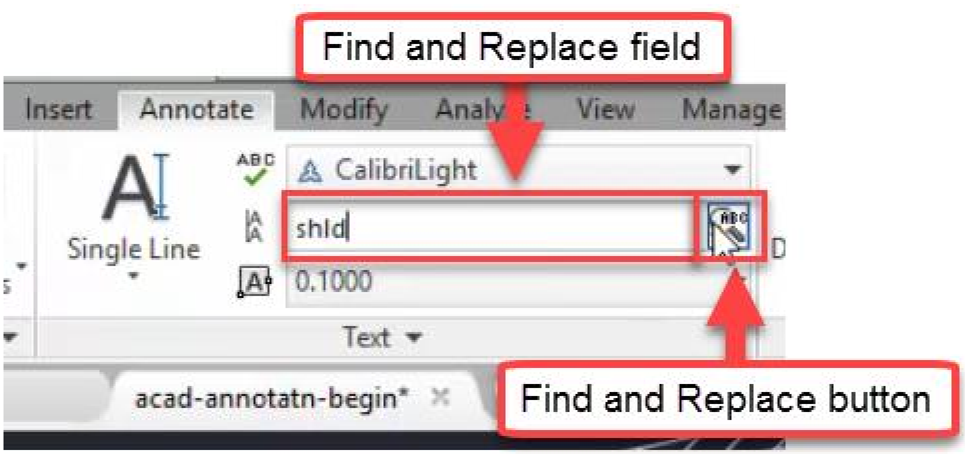
Continue with acad-annotatn-begin.dwg

acad-annotatn-02.mp4 5:20

In this exercise, you will learn some time-saving text editing functions including Change Case, Convert to Mtext, Text Align, Match Properties, Check Spelling, and Find/Replace as well as the differences between Multiline Text (Mtext) and Text (aka Dtext). Essentially, Text is the old version of Mtext. Where Mtext can have multiple lines of text content sorted into columns and rows as desired, Text is single line and has no column sorting ability built in. You can type mulitple lines of text content in a Text object, but each line will result in its own individual Text object. There is much less editing ability with Text vs Mtext and no associated contextual Ribbon. All that said, many older drawings or Civil 3D drawings with content imported from Microstation will contain the older legacy Text.

1. Continue working in acad-annotatn-begin.dwg
2. **Ribbon > Annotate tab > Text panel > Multiline text dropdown > Single line**
    A. **SPECIFY START POINT OF TEXT OR**
        I. Pick bottom endpoint of the green Line above SECTION B-B detail
    B. **SPECIFY PAPER HEIGHT <0.1000>**
        I. enter
    C. **SPECIFY ROTATION ANGLE OF TEXT <0>**
        I. enter
    D. Type ***section a-a***
        I. Left-click outside of Text object
        II. esc
3. Select ***section a-a***Text
    A. **Right click > Change Case > UPPERCASE**
4. Type **MA** to initiate the match properties command
    A. enter
    B. **SELECT SOURCE OBJECT**
        I. Left click ***SECTION B-B*** Text
    C. **SELECT DESTINATION OBJECT**
        I. Left click ***SECTION A-A*** Text
5. Select ***SECTION A-A*** Text
    A. **Properties palette > Text**
        I. Justify = Center
6. **Ribbon > Express tools tab > Text panel > Convert to Mtext**
    A. **SELECT OBJECTS**
        I. Select ***STATE OF WISCONSIN DEPARTMENT OF*** Text
        II. Select ***TRANSPORTATION*** Text
        III. enter

7. Select ***STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION*** Mtext
   A. **Properties palette > Text**
      I. Justify = Middle Center
      II. esc
8. **Ribbon > Annotate tab > Text panel > Text Align**
   A. SELECT TEXT OBJECTS TO ALIGN
      I. ***SECTION B-B*** Text
      II. ***SECTION A-A*** Text
      III. enter
      IV. SELECT TEXT OBJECT TO ALIGN TO
         a. ***SECTION A-A*** Text
         b. PICK SECOND POINT
            i. shift + left click below ***SECTION A-A*** Text
9. **Ribbon > Annotate tab > Text panel > Check Spelling**
   A. Start
   B. Add to Dictionary
   C. Close
10. **Ribbon > Annotate tab > Text panel**
   A. Find and Replace field: shld
   B. Find and Replace
      I. Replace with: SHOULDER
      II. Replace All
      III. Done



Text Styles

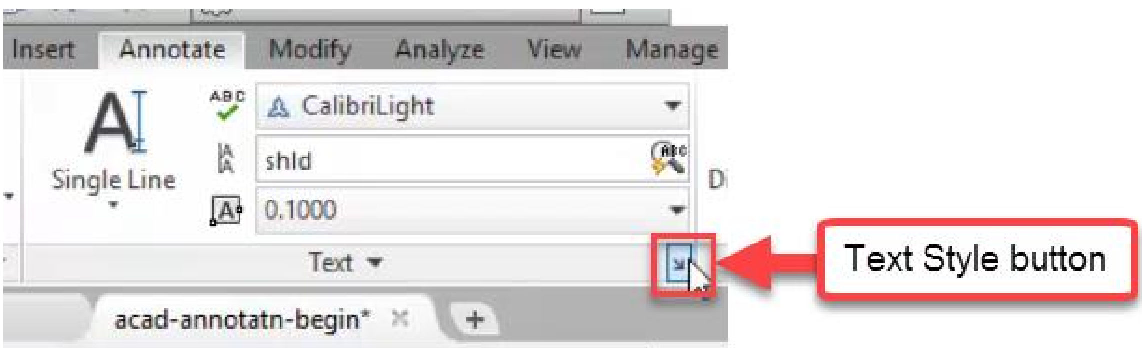
Exercise files: acad-annotatn-data-c3d16.zip

Continue with acad-annotatn-begin.dwg

acad-blk-xref-03.mp4 3:35

Whenever creating either Mtext or Text, the first step is to choose a Text Style. You pick this from a dropdown list on your Ribbon. As with other Civil 3D and AutoCAD Styles, the Text Styles available are associated with a drawing or template. The WisDOT Design templates come with the standard WisDOT Text Styles pre-loaded, though you may need to create or edit one when working with a drawing not created from the WisDOT template. A Text Style mainly controls font, text height, and annotative scaling functionality. In the following exercise you will learn how to interface with, edit and create a Text Style.

1. Continue with acad-annotatn-begin.dwg
2. **Ribbon > Annotate tab > Text Style**

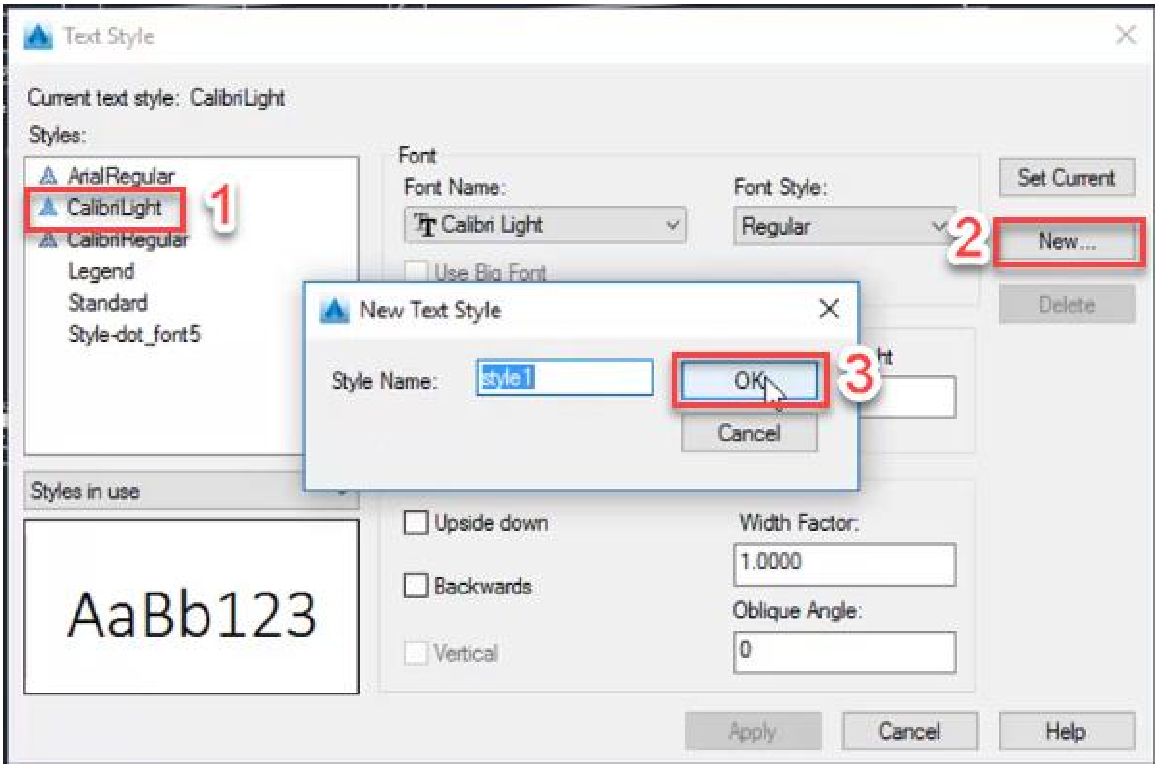


3. Current Text Style: Callibri Light
4. New
   A. Style Name: style 1
   B. OK
      I. Font Name: Cambria
      II. Font Style: Regular
      III. Paper Text Height = 0.0000

Info: When Paper Text Height = 0 in a Text Style, the height set in the TEXTSIZE system variable or the last Text Height used is applied.

      IV. Font Name: cdm.shx

Info: Two basic font types can be used in Civil 3D. They are True Type or SHX. Where True Type fonts such as Arial and Callibiri can have unique shapes and thickness, the older, SHX fonts are only one pixel wide and are more limited in styling options. WisDOT Text Styles as well as most design firms and software applications in general use True Type fonts. Note the different icons in the Font Name dropdown.



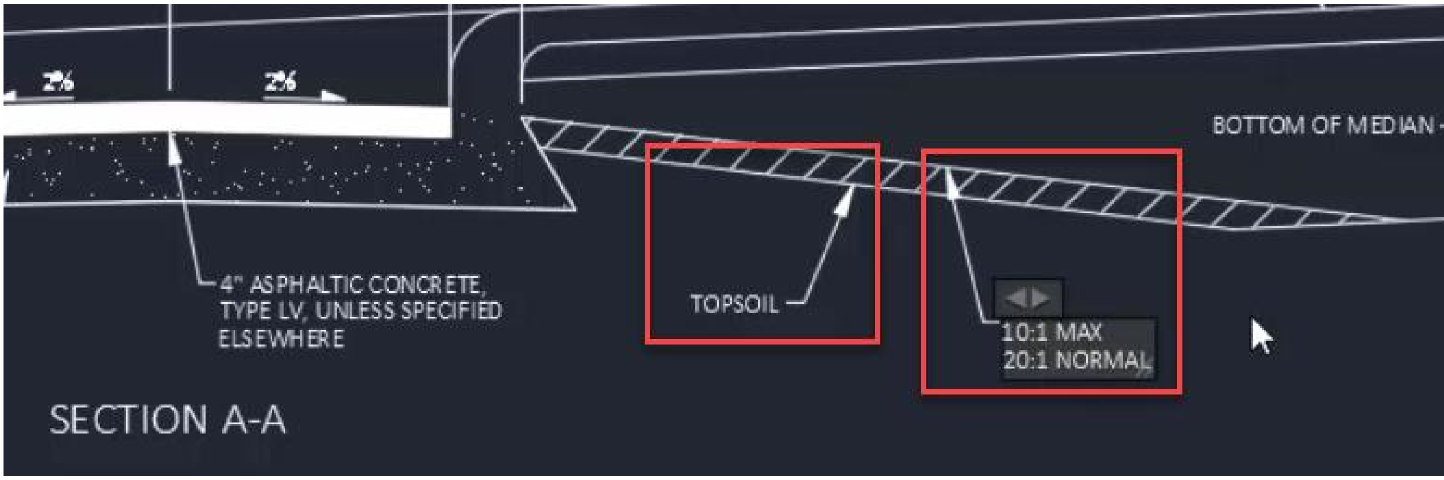
Multileader creation

Exercise files: acad-annotatn-data-c3d16.zip Start with acad-annotatn-01.dwg acad-annotatn-04.mp4 4:05

A Multileader (aka Mleader) is an annotation object consisting of a combination of a text and one or more leader/pointers. It is used to manually add notes pointing to a specific area of interest. The text portion behaves just like Mtext and the leader portion is dynamically attached to the text portion. The behavior of an Mleader is quite flexible. For instance, you can add multiple leaders on one or both sides of the text portion of an Mleader if you like. A typical use case for an Mleader would be for manual annotation of construction details or title sheets. In the following exercise, you will learn how to create and edit Mleaders.

Keep in mind that Civil 3D objects have their own automatically generated Civil 3D Labels that will automatically annotate key information like Alignment stationing, Points of Curvature/Tangency, PVIs, Corridor Cross Section information, etc and thus do not require manually created Mleaders for annotation. More information on Civil 3D Label Styles will be covered in other training modules. Use of Mleaders should be reserved for cases where you are either not dealing with a Civil 3D object or need to add extra information not feasible to put into a Civil 3D Label.

1. Open acad-annotatn-01.dwg
2. Select ***BOTTOM OF MEDIAN*** Mleader on right of SECTION A-A detail
   A. Double-click on the text portion
   B. Observe Mtext contextual Ribbon populated
   C. Left-click away from Mleader
3. **Ribbon > Annotate tab > Leaders panel > Multileader**
   A. `SPECIFY LEADER ARROWHEAD LOCATION`
      I. Use Nearest Osnap to pick bottom of TOPSOIL Line on right side of SECTION A-A detail
   B. `SPECIFY LEADER LANDING LOCATION`
      I. Pick below and left of arrowhead location
   C. Type TOPSOIL
      I. Left-click away from Mleader
4. Repeat Steps 3.A - 3.C for ***10:1 MAX 20:1 NORMAL*** Mleader



5. Select ***TOPSOIL*** Mleader
   A. Select arrow Grip
      I. `SPECIFY STRETCH POINT`
         a. Pick to left of TOPSOIL text portion

> **Info:** Note that the Leader portion of the Mleader is dynamically attached to the text portion. Once the specified location of the Leader arrow crosses the middle of the text portion, the Leader landing will automatically flip to the other side of the text.

   B. Select text insertion Grip
      I. `SPECIFY STRETCH POINT`
         a. Left-click a new location

C. Hover cursor over Leader landing Grip
   I. Lengthen landing
      a. `SPECIFY LEADER LANDING ENDPOINT`
         i. Left-click new location
   II. Add Leader
      a. `SPECIFY LEADER ARROWHEAD LOCATION`
         i. Left-click multiple new locations
D. Hover cursor over arrow Grip
   I. Remove Leader
E. **Ribbon > Annotate tab > Leaders panel > Remove Leader**
   I. `SPECIFY LEADERS TO REMOVE`
      a. Select Leader
      b. enter
F. **Ribbon > Annotate tab > Leaders panel > Align**
   I. `SELECT MULTILEADERS`
      a. Select ***TOPSOIL*** and ***10:1 MAX 20:1 NORMAL*** Mleaders
      b. enter
   II. `SELECT MULTILIEADER TO ALIGN TO`
      a. Select ***10:1 MAX 20:1 NORMAL*** Mleader
   III. `SPECIFY DIRECTION`
      a. shift + left-click left of ***10:1 MAX 20:1 NORMAL*** Mleader

Multileader styles

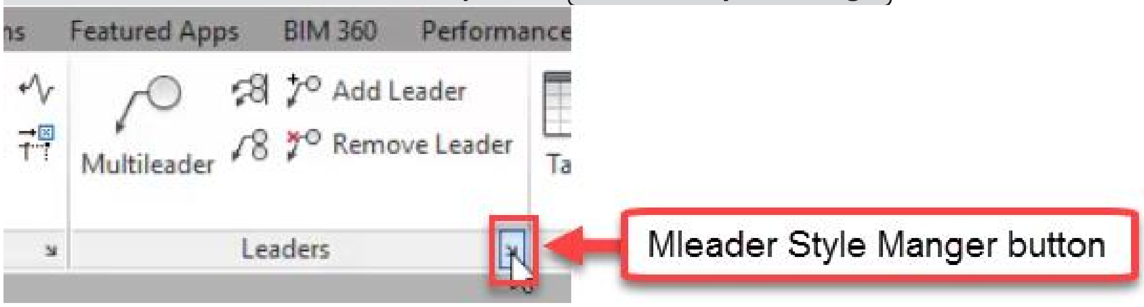
Exercise files: acad-annotatn-data-c3d16.zip

Continue with acad-annotatn-01.dwg

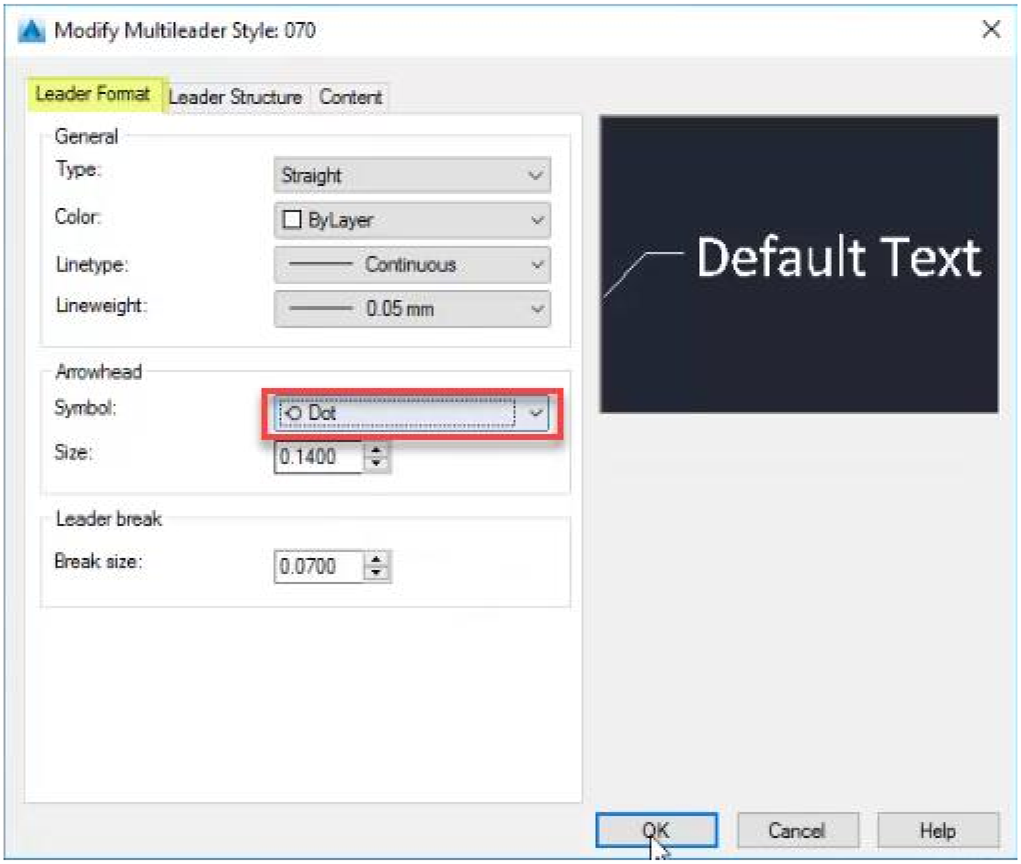
acad-annotatn-05.mp4 7:04

Whenever creating an Mleader, you want to be aware of the currently set Mleader Style. You set this through the Ribbon Mleader Style Manager button. Mleader Styles control what Text Style is used for the Text portion, what the Leader and arrow portion looks like, whether a user-defined Block is used for either the arrow or in place of the text, and whether the Mleader is affected by Annotative Scaling among other things. Through the following exercise, you will learn how to set the current Mleader Style, how to create or edit an Mleader Style, and what key Mleader parameters are set through the Mleader Style. The WisDOT templates come pre-loaded with standard WisDOT Mleader Styles and as with other Civil 3D or AutoCAD Styles, these should be used to streamline the plan production workflow and maintain a standard appearance across WisDOT plan sets.

1. Continue working in acad-annotatn-01.dwg
2. Select ***TOPSOIL*** Mleader
    A. **Properties palette > Misc**
        I. Observe Multileader style = 070
3. **Ribbon > Annotate tab > Leaders panel > Mleader Style Manager**

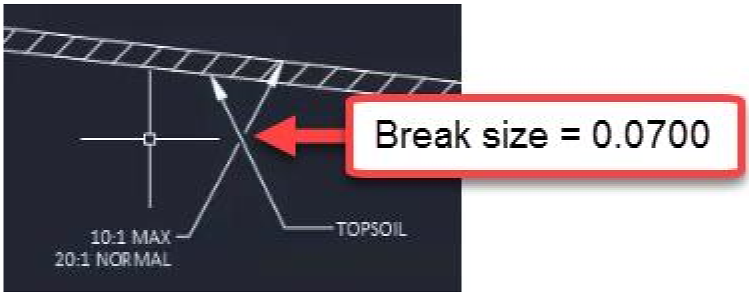


    A. Current mulitleader style: 070
    B. Modify
    C. Leader Format tab
        I. General
            a. Type = Straight
        II. Arrowhead
            a. Symbol = Dot
        III. OK
    D. Close
    E. Observe update to existing Mleaders with 070 Mleader Style



4. **Ribbon > Annotate tab > Leaders panel > Mleader Style Manager**
   A. Modify
   B. Leader Format tab
      I. Arrowhead
         a. Symbol = Closed filled
      II. Leader break
         a. Break size = 0.0700
      III. OK
   C. Close
5. Select ***TOPSOIL*** and ***10:1 MAX 20:1 NORMAL*** Mleaders
   A. Use Mleader Grips to relocate Leader landings such that Leader lines cross
6. **Ribbon > Annotate tab > Dimensions panel > Break**
   A. **SELECT DIMENSION TO ADD/REMOVE BREAK**
      I. Select ***10:1 MAX 20:1 NORMAL*** Mleader
   B. Select object to break dimension
      I. Select TOPSOIL Mleader
      II. enter

Tip: The "object to break dimension" does not need to be an Mleader or Dimension. This could be most any Civil 3D or AutoCAD object

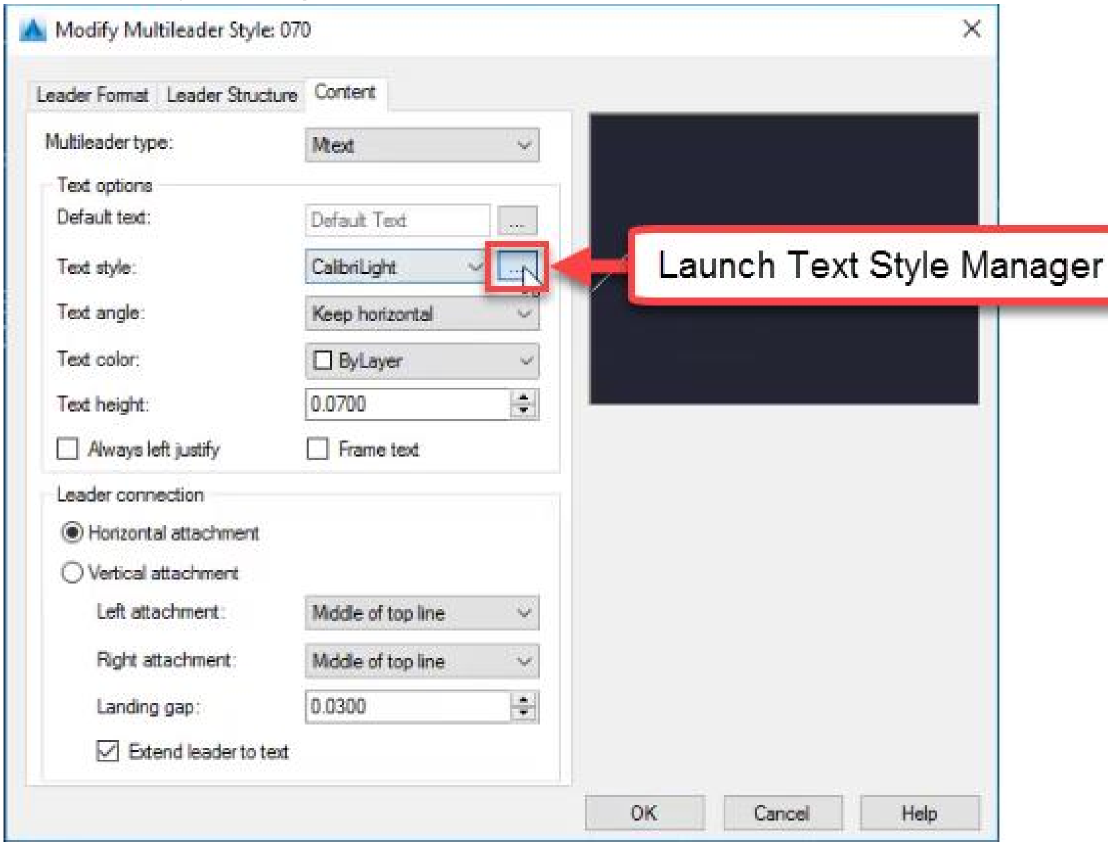


7. **Ribbon > Annotate tab > Leaders panel > Mleader Style Manager**
   A. Modify
   B. Leader Structure tab
      I. Constraints
         a. Maximum leader points = 2

> **Info:** Setting Maximum leader points = 3 or greater means you will be prompted for intermediate vertex points between the arrowhead and Leader landing when creating an Mleader. If Maximum leader points = 2, you can still place additional Leader vertices manually by hovering your cursor over an Mleader arrowhead Grip and choosing Add vertex.

      I. Landing settings
         a. Automatically include landing = unchecked
         b. Observe effect in preview window
         c. Automatically include landing = checked
      II. Scale
         a. Annotative = checked
   C. Content tab
      I. Multileader type = Block
         a. Block options
            i. Source block = Detail Callout
      II. OK
   D. Close
8. **Ribbon > Annotate tab > Leaders panel > Multileader**
   A. **SPECIFY LEADER ARROWHEAD LOCATION**
      I. Pick any location
   B. **SPECIFY LEADER LANDING LOCATION**
      I. Pick any location
   C. Edit Attributes
      I. Enter view number = 1
      II. Enter sheet number = 2
   D. OK

9. **Ribbon > Annotate tab > Leaders panel > Mleader Style Manager**
    A. Content tab
        I. Multileader type = Block
            a. Block options
                i. Source block = User Block
                ii. Observe ability to pick any Block Definition in the current drawing
                iii. Cancel
        II. Multileader type = Mtext
            a. Text options
                i. Text Style = Calibri Light
                ii. Text Style Manager



                i. Cancel
            b. Leader connection
                i. Observe options affecting Horizontal, Vertical Leader landing attachment

Dimension creation

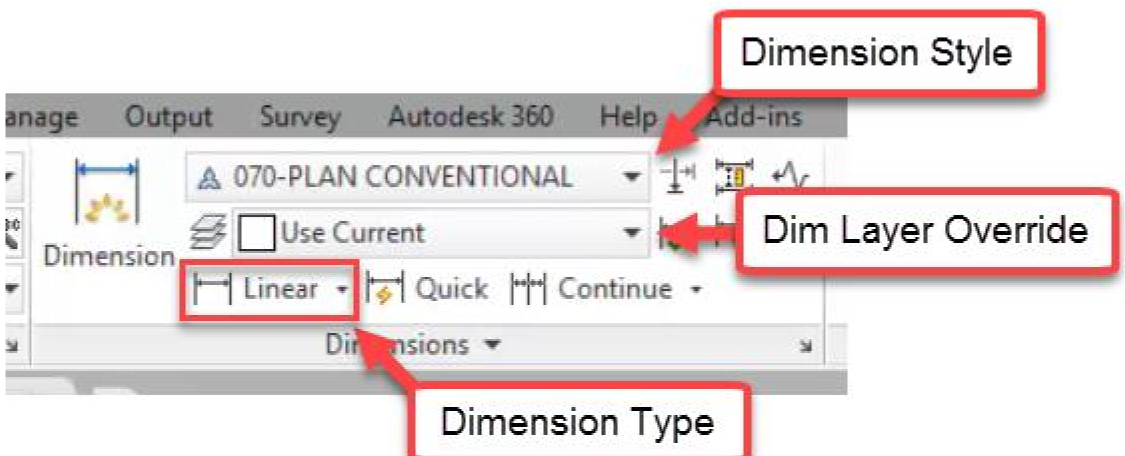
Exercise files: acad-annotatn-data-c3d16.zip

Start with acad-annotatn-02.dwg

acad-annotatn-06.mp4 3:07

In Civil 3D, a Dimension is an object used to call out an angle or distance (length, radius, etc) in your drawing. It is made up of Dimension lines, Tick marks, and an automatically generated and dynamic Dimension value derived from the object or points you specify, the drawing units, and the Dimension Style units. The following exercise will walk you though how to create a Dimension as well as the importance of setting the correct Dimension Style.

1. Open both acad-annotatn-02.dwg and acad-annotatn-end.dwg
2. acad-annotatn-end filetab
   A. Observe ***20'-0"V.C.*** Dimension in SECTION B-B detail
   B. Observe ***3' CRUSHED AGGREGATE BASE COURSE*** and ***12'*** Dimensions in SECTION A-A detail
3. acad-annotatn-02 filetab
   A. **Ribbon > Annotate tab > Dimensions panel > Dimension Style dropdown > 070-PLAN-CONVENTIONAL**
   B. Dim Layer Override = Use Current
   C. **Ribbon Home tab > Layers panel > Layer dropdown > P_MISC**
   D. **Ribbon > Annotate tab > Dimensions panel > Dimension type dropdown > Linear**
   E. Linear
      I. **SPECIFY FIRST EXTENSION LINE ORIGIN**
         a. Left end of arc in SECTION B-B
      II. **SPECIFY FIRST EXTENSION LINE ORIGIN**
         a. Right end of arc in SECTION B-B
      III. **SPECIFY DIMENSION LINE LOCATION**
         a. Above arc



4. acad-annotatn-end filetab
   A. Double click ***20'-0" V.C.*** Dimension
      I. Observe that all text in cell is highlighted

> **Info:** The highlighted text in a Dimesion is automatically generated based on the geometry of the Dimension along with the Dimension Style. It can include a prefix or suffix such as "ft" etc. among other things

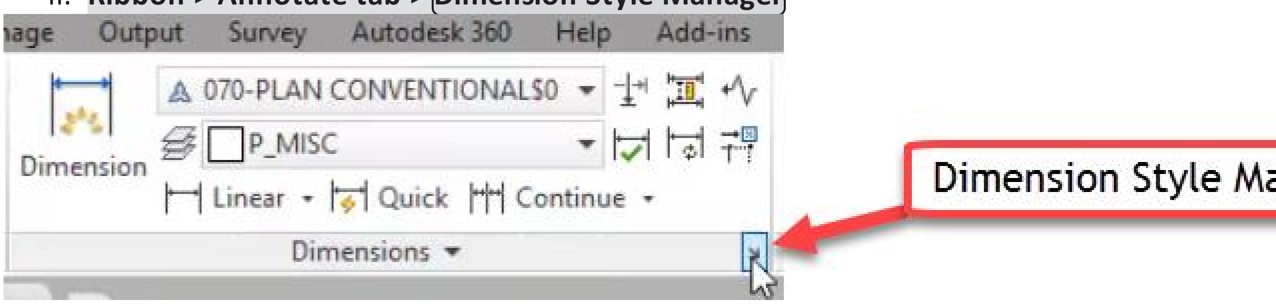
Dimension styles

Exercise files: acad-annotatn-data-c3d16.zip

Continue with acad-annotatn-02.dwg

acad-annotatn-07.mp4 5:24

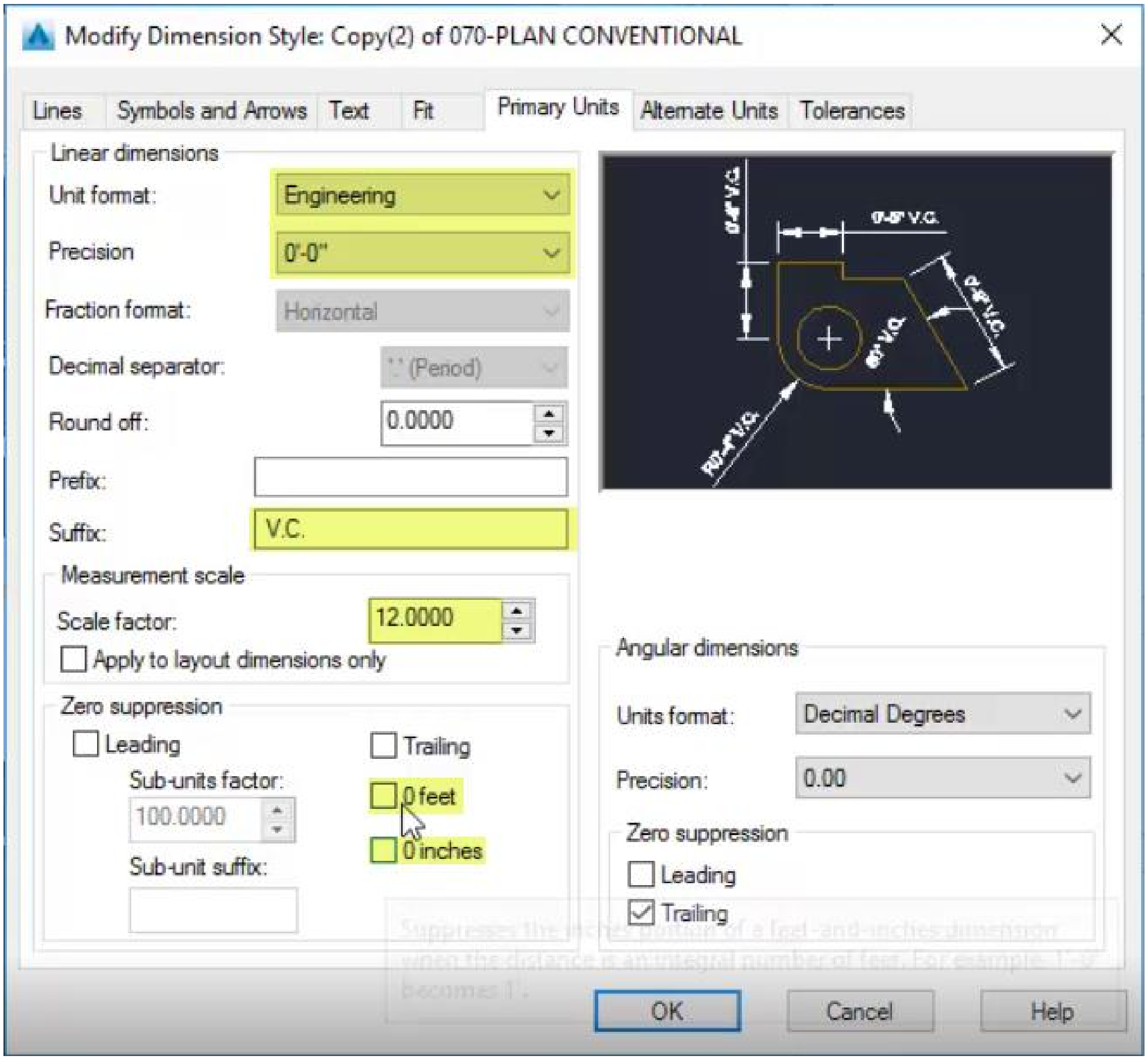
1. Continue with both acad-annotatn-02.dwg and acad-annotatn-end.dwg
2. acad-annotatn-02 filetab
   A. Select ***20.00'*** Dimension
      I. **Properties palette > Misc**
         a. Observe Dim Style = 070-PLAN-CONVENTIONAL
      II. **Ribbon > Annotate tab > Dimension Style Manager**



      III. Styles
         a. Select 070-PLAN-CONVENTIONAL
            i. Set Current
      IV. New...
         a. Continue
         b. New Dimension Style dialog
            i. Primary Units tab
               1. Unit format = Engineering
               2. Precision = 0'-0"
               3. Suffix = V.C.
         c. OK
      V. Close

A. Primary Units tab
    I. Scale factor = 12
    II. Place a space before V.C.
    III. Toggle off all Zero suppression boxes
B. OK
C. Close

3. Select ***20.00'*** Dimension
    A. Properties palette > Misc
        I. Dim Style = Copy(2) of 070-PLAN CONVENTIONAL
4. **Ribbon > Annotate tab > Dimensions panel > Dimension Style Manager**
    A. Select ***Copy(2) of 070-PLAN CONVENTIONAL*** Dimension Style
    B. Modify
        I. Primary Units tab
            a. Linear dimensions
                i. Scale factor = 12
            b. Zero suppression
                i. 0 feet = unchecked
                ii. 0 inches = unchecked



C. OK
D. Close

Additional Dimension Tools

Exercise files: acad-annotatn-data-c3d16.zip

Continue with acad-annotatn-02.dwg

acad-annotatn-08.mp4 4:38

1. Continue with both acad-annotatn-02.dwg and acad-annotatn-end.dwg
2. acad-annotatn-end filetab
   A. Observe dimensions for SECTION A-A

3. acad-annotatn-02 filetab
4. **Ribbon > Annotate tab > Dimensions panel > Dimension Style dropdown**
   A. Select ***Copy of 070-PLAN CONVENTIONAL***
5. **Ribbon > Annotate tab > Dimensions panel > Linear**
   A. SPECIFY FIRST EXTENSION LINE ORIGIN
      I. Left endpoint of pavement in SECTION A-A
   B. SPECIFY SECOND EXTENSION LINE ORIGIN
      I. Crown endpoint of pavement in SECTION A-A
   C. SPECIFY DIMESION LINE LOCATION
      I. Above SECTION A-A detail
6. **Ribbon > Annotate tab > Dimensions panel > Continue**
   A. SPECIFY SECOND EXTENSION LINE ORIGIN
      I. Right endpoint of pavement in SECTION A-A
      I.
   B. SPECIFY SECOND EXTENSION LINE ORIGIN
      I. Right endpoint of SECTION A-A Crushed Aggregate Shoulder
      II. enter
7. Select previously drawn Dimensions
8. delete
9. **Status bar > Selection cycling = on**
10. **Ribbon > Annotate tab > Dimensions panel > Quick**
    A. SELECT GEOMETRY TO DIMENSION
       I. Select Lines on top of SECTION A-A Pavement
       II. enter
    B. SPECIFY DIMENSION LINE POSITION
       I. Above SECTION A-A detail
11. **Ribbon > Annotate tab Dimension panel > Continue**
    A. SPECIFY SECTION DIMENSION LINE ORIGIN
       I. Right endpoint of SECTION A-A Crushed Aggregate Shoulder
12. **Ribbon > Annotate tab > Dimension panel > Linear**
    A. SPECIFY FIRST EXTENSION LINE ORIGIN
       I. Left endpoint of SECTION A-A Crushed Aggregate Shoulder
    B. SPECIFY SECOND EXTENSION LINE ORIGIN
       I. Left endpoint of pavement in SECTION A-A
13. Double click ***3'*** Dimension
    A. Place cursor after auto-generated Dimension text
    B. Type *CRUSHED AGGREGATE BASE COURSE SHOULDER*
14. Repeat step 13 for other ***3'*** Dimension
15. Select ***3' CRUSHED AGGREGATE BASE COURSE SHOULDER*** Dimension
    A. Hover cursor over text Insertion Grip
       I. Move Text Only
       II. Relocate Dimension text beside outer Dimension extension line
16. Repeat step 15 for other ***3' CRUSHED AGGREGATE BASE COURSE SHOULDER*** Dimension
17. Select ***3' CRUSHED AGGREGATE BASE COURSE SHOULDER*** Dimension
    A. Reset width to 12 units

18. Repeat step 17 for other ***3' CRUSHED AGGREGATE BASE COURSE SHOULDER*** Dimension

Annotative scale

Last updated: 2017-12-01

Total video time: 17:15

Annotative scaling is a way to control display and scaling of certain annotation-related AutoCAD objects when setting up a sheet layout to plot. The purpose of this scaling is to maintain readability of your plan sheet regardless of the sheet scale. For instance, you may want to label individual property parcels on a 1 IN:40 FT scale, but omit the parcel labels at a 1 IN:200 FT scale since they would not be readable. You may want to label street or highway names at a constant plotted text height on both a 1 IN:40 FT scale sheet and a 1 IN:200 FT sheet. You can accomplish both of these scenarios without creating duplicate text objects and Layers for different sheet sizes. It should be noted that Civil 3D objects will be labeled automatically based on their Label Style and these Labels will automatically scale similarly to AutoCAD objects affected by Annotative scaling.

Any object that will be affected by Annotative Scaling is said to be Annotative. AutoCAD objects available to be Annotative include Multiline Text, legacy single line Text, Blocks, Hatch objects, Dimensions and Multileaders. Many of the text-related WisDOT Styles (Multiline Text, Dimension and Multileader Styles) are already set up to be Annotative. You can also change any Non-annotative Multiline Text, legacy single line Text, Block, Hatch object, Dimension or Multileader to be Annotative through the Properties Palette.

This training module will familiarize you with basic sheet Layout concepts necessary to understand Annotative Scaling, how Annotative Scaling works and tools/best practices for managing Annotative objects. More detailed information on sheet Layouts and plotting will be covered in other training modules.

Model vs paper, layouts & viewports

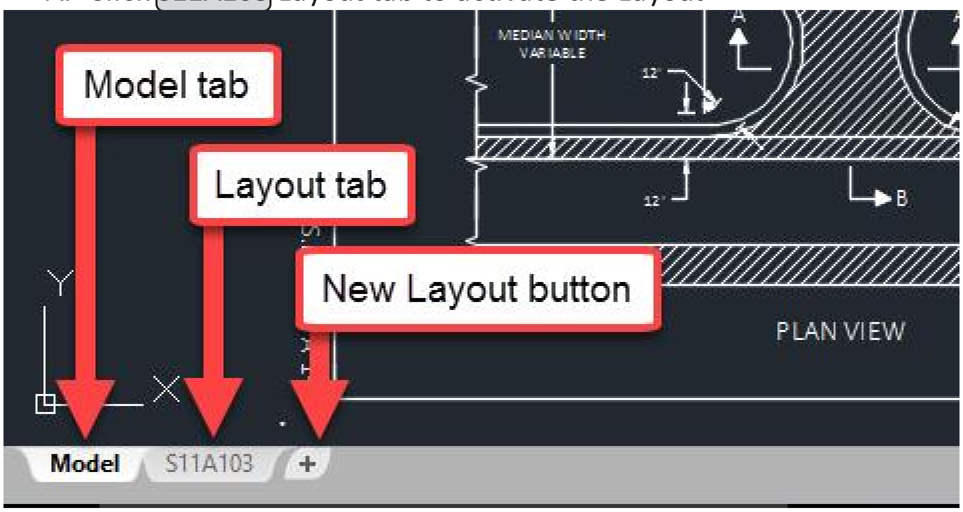
Exercise files: acad-annotatv-scl-data-c3d16.zip

Start with acad-annotatv-scl-begin.dwg

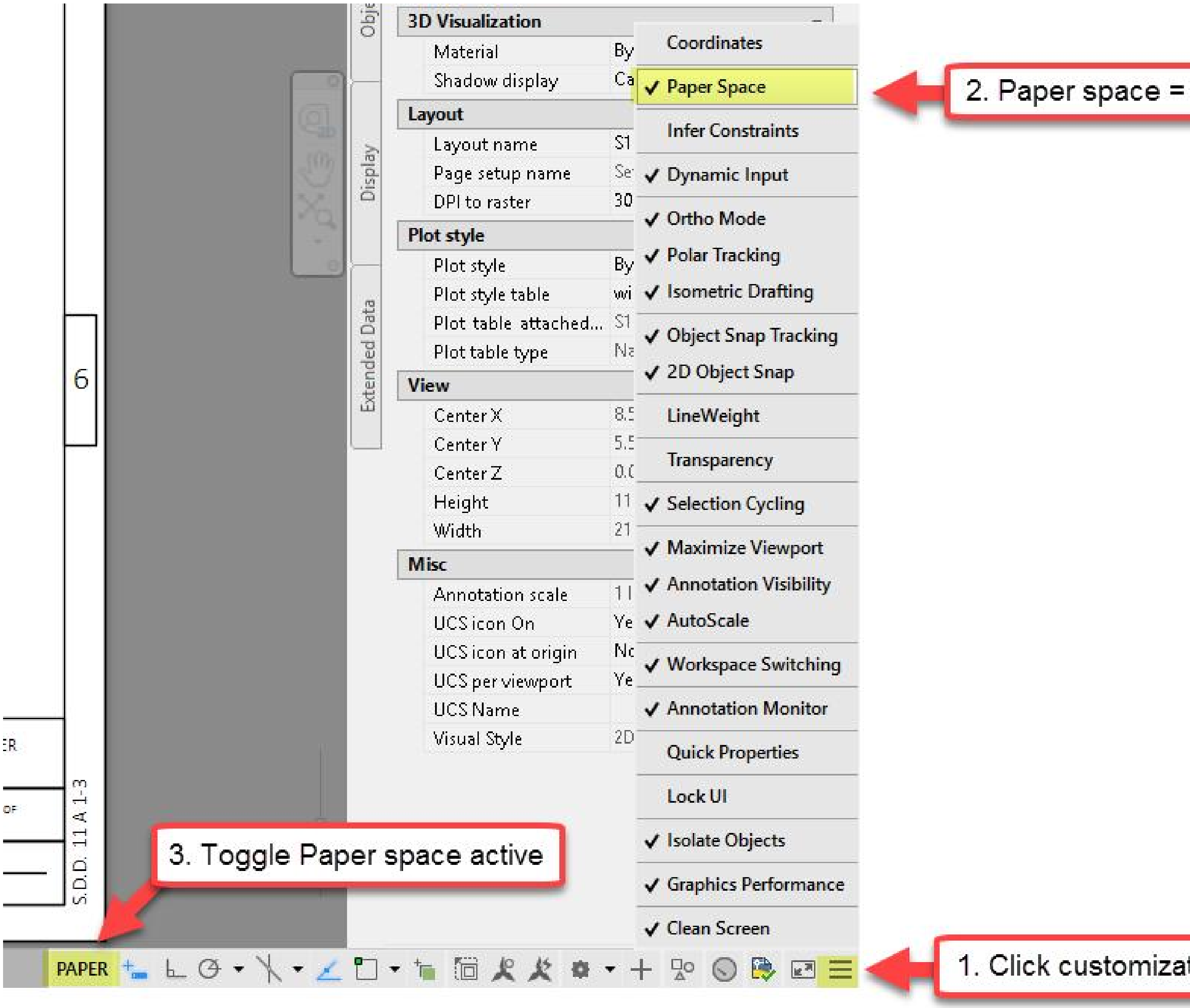
acad-annotatv-scl-01.mp4 5:02

This exercise will introduce you to the concepts of Model space vs Paper space, Layouts, Viewports, and Viewport Scales. Model space is the interface you will design your Civil 3D model in. It includes all of the Civil 3D and AutoCAD objects you will create to represent your modeled design. You can switch from Model space to a Layout interface where you will set up what your plotted plan sheet will look like. In a Layout, you can either draw objects in Paper space, which will not affect Model space, or have a Viewport object that acts as a window looking into Model space. You will learn how to switch between Model space and a Layout, how to work in Paper space and Model space within a Layout, and how to create a Viewport and work with the Viewport scale.

1. Open acad-annotatv-scl-begin.dwg
2. Observe the Model tab and Layout tab in the bottom left of your interface
    A. Click S11A103 Layout tab to activate the Layout



3. Status Bar
    A. Customization
        I. Paper space = checked
    B. Paper space active



  C. Draw a Circle on your Layout in Paper space
4. Click Model tab to activate Model space
  A. Observe no Circle displayed in Model space
5. S11A103
  A. Delete the Circle drawn in step 3.C
6. Status Bar
  A. Model space active

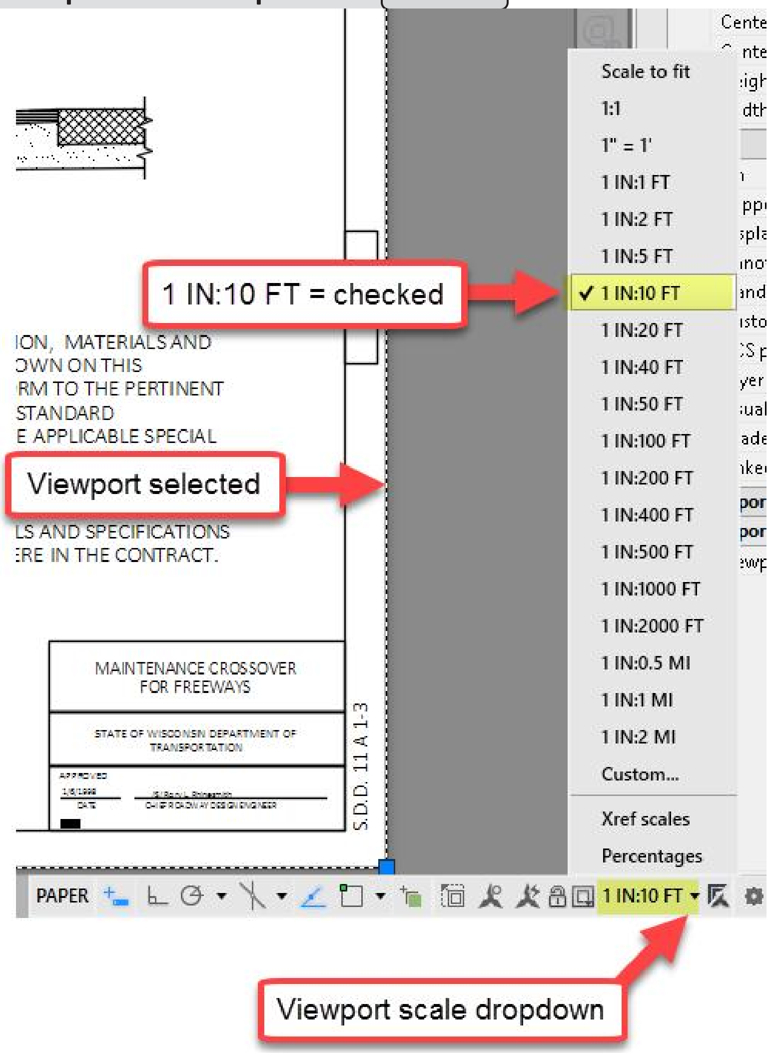
Info: Activating Model space by toggling the Status Bar PAPER/MODEL button allows you to work in Model space through your Layout Viewport. This is not the same as switching to Model space by clicking the Model tab in the bottom left of your interface.

   B. Draw a Circle on your Layout in Model space
7. Model
   A. Observe Circle displayed in Model space
8. S11A103
   A. Delete the Circle drawn in step 6.B

> **Info:** Double-click in grey area outside your Viewport as an alternative method to activate Paper space. Double-click in area inside a Viewport as an alternative method to activate Model space.

9. Select Viewport
   A. delete
   B. Observe Model space objects not displayed
10. **Ribbon > Home tab > Layers panel > Layer Properties**
    A. Filters
       I. ***All*** = checked
    B. ***P_MISC_NoPlot*** = Current
11. **`MVIEW`**
    A. enter
    B. **`SPECIFY CORNER OF VIEWPORT: 0,0`**
       I. enter
    C. **`SPECIFY OPPOSITE CORNER: 17,11`**
       I. enter

12. Select Viewport created in step 11
    A. Observe Viewport scale ≠ 1IN:10 FT
    B. **Viewport scale dropdown > 1IN:10 FT**



13. Status bar
    A. Lock Viewport scale

    B. Zoom in/out
        I. Observe Viewport scale unchanged
14. Status bar
    A. Unlock Viewport scale
    B. Double-click inside Viewport to activate Model space

C. Zoom in/out
    I. Observe Viewport scale changed
D. Undo Zoom command to reverse Viewport scale change

Scaling factor, display options & object scales list

Exercise files: acad-annotatv-scl-data-c3d16.zip

Continue with acad-annotatv-scl-01.dwg

acad-annotatv-scl-02.mp4 6:23

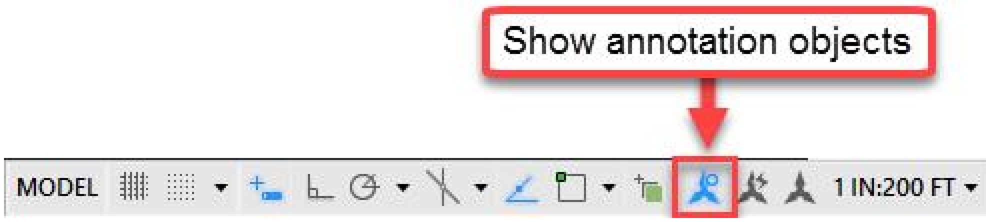
In this exercise you will learn how Annotative Scale factors are applied based on the currently set Annotative Scale (aka Viewport Scale). Annotative objects have a constant Paper space size and a Model space size that depends on the current Annotative Scale. After completing this exercise, you will learn how to manually add scales to an Annotative Object's scales list to enable Annotative Scaling of the object. Additionally, you will learn how to utilize Annotative scaling Status Bar options to control when Annotative Objects are displayed and whether scales are added to Annotative Objects automatically.

1. Continue working in acad-annotatv-scl-01.dwg
2. Select ***S.T.H. 25*** Annotative Mtext near 557+00
    A. **Properties Palette > Text**
        I. Observe Paper Text Height = 0.1250, Model Text Height = 5.0000
3. Status Bar
    A. Observe current view Annotative Scale = 1 IN:40 FT

> **Info:** For Annotative Objects, the Paper size is set manually or by the object Style. The current view Annotative Scale is set manually by selecting from a dropdown list on the Status Bar. The Model size is set automatically and is a product of the Paper Size and the current Annotative Scale (ie Model Text Height = Paper Text Height x Annotative Scale = 0.1250" x (40'/1") = 5.0000'

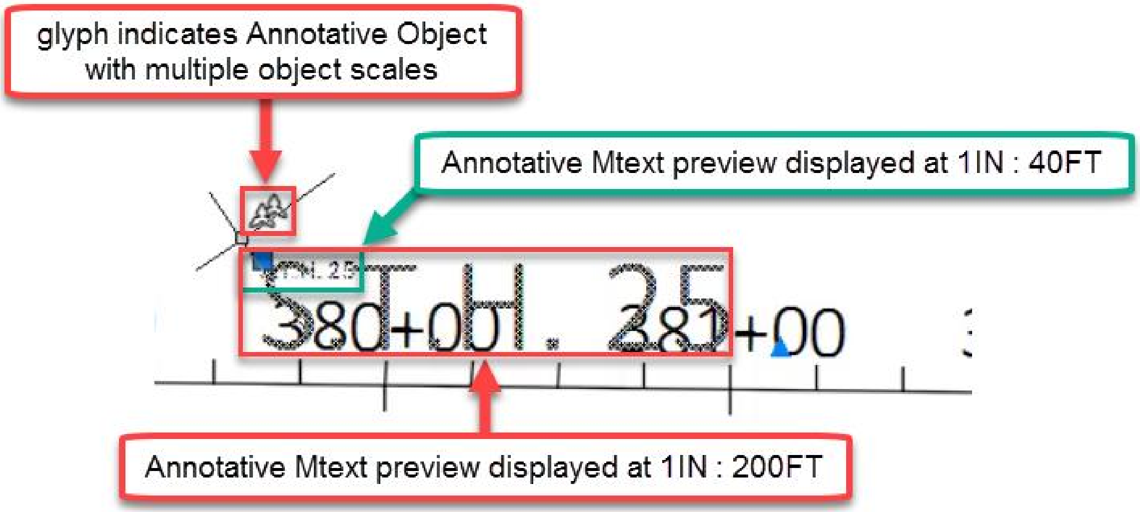
4. Click 1IN_40FT - 4 Layout tab
5. Verify Paper text height
    A. **DIST**
        I. enter
    B. **SPECIFY FIRST POINT**
        I. Left-click near bottom of ***S.T.H. 25*** Mtext
    C. **SPECIFY SECOND POINT**
        I. Move cursor near top of ***S.T.H. 25*** Mtext
        II. Observe tooltip displaying approx. 0.1250
        I. esc

6. Verify Model text height
    A. Double-click inside plan Viewport
    B. Repeat steps 5.A - 5.C.I
        I. Observe tooltip displaying approx. 5.0000
    C. esc
7. 1IN_200FT - 1
8. Status Bar
    A. Show annotation objects = on



Turning "Show annotation objects" on allows all Annotative objects to be displayed regardless of whether they have the current view Annotative Scale added to their object Scales List or not. If objects do have the current view Annotative Scale added to their object Scales List, they will be scaled using the current view Annotative Scale. If not, they will be displayed using the original Annotative Scale added to their scales list.

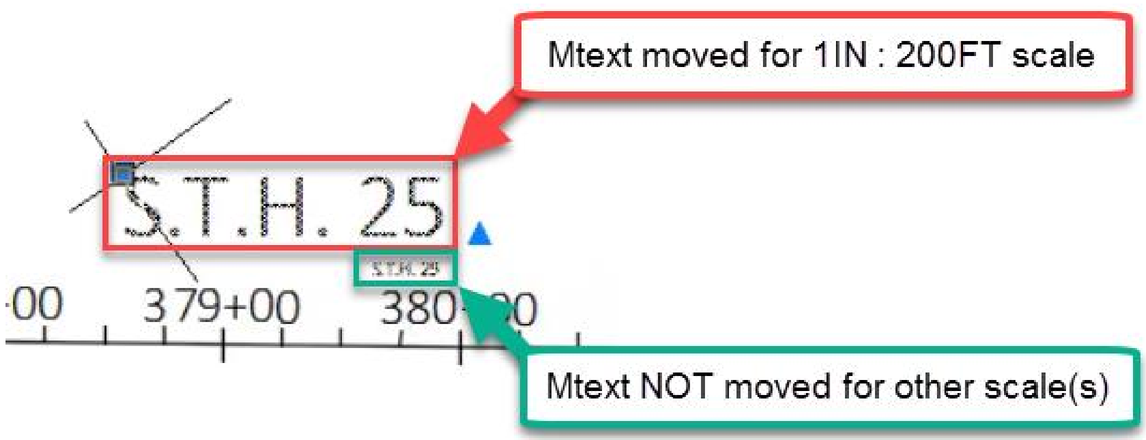
    B. Observe all Annotative Objects displayed in plan view Viewport
9. Select one of the ***S.T.H. 25*** Mtext objects
    A. **Properties > Text**
        I. Observe Annotative scale = 1IN:40 FT
    B. **Right-click menu > Annotative Object Scale > Add/Delete Scales**
        I. Add
            a. 1 IN:200 FT
            b. OK
        II. OK
10. Select ***S.T.H. 25*** Mtext from step 9
    A. **Properties > Text**
        I. Observe Annotative scale = 1 IN:200 FT
        II. Observe multiple scale previews displayed



B. Use insertion grip to move Mtext
   I. Observe only the display of the 1IN:200 FT scaled Mtext is moved

> **Info:** When an Annotative Object has multiple scales, you have different locations for the display of the object at each scale. Do this by setting the scale of the display you want to move as the current Annotative Scale, then use the displayed Insertion Grip to move the object. The object will not be moved for the remaining object scales.

   II. esc



11. Select ***4TH AVE*** Mtext
    A. **Right-click menu > Annotative Object Scale > Add Current Scale**
12. Select ***4TH AVE*** Mtext
    A. Use insertion grip to move Mtext for readability
13. Status Bar
    A. Show annotation objects = off
    B. Observe annotative objects lacking the current Annotation Scale in their object scales list no longer displayed

Use cases & scales list best practices

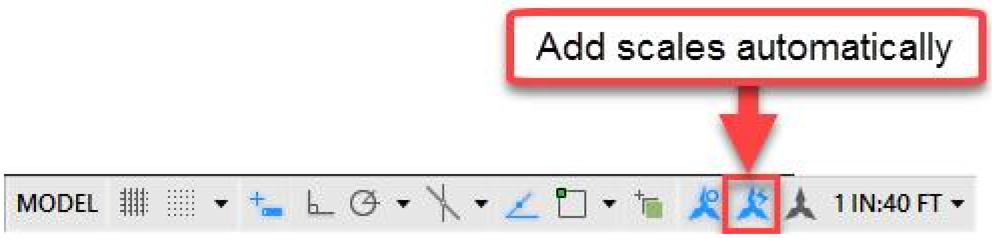
Exercise files: acad-annotatv-scl-data-c3d16.zip

Continue with acad-annotatv-scl-01.dwg

acad-annotatv-scl-03.mp4 5:50

In this exercise, you will learn best practices for Annotative object management including how to use the Annotative Scaling Status Bar options, strategies for object Scales List management, how to clean up multiple insertion points for objects with multiple object scales.

1. Continue working in acad-annotatv-scl-01.dwg
2. Click Model tab
3. Status bar
    A. Add scales to annotative objects when the annotation scale changes = on
    B. Note that the above Status bar option is commonly referred to as "Add scales automatically" or similar



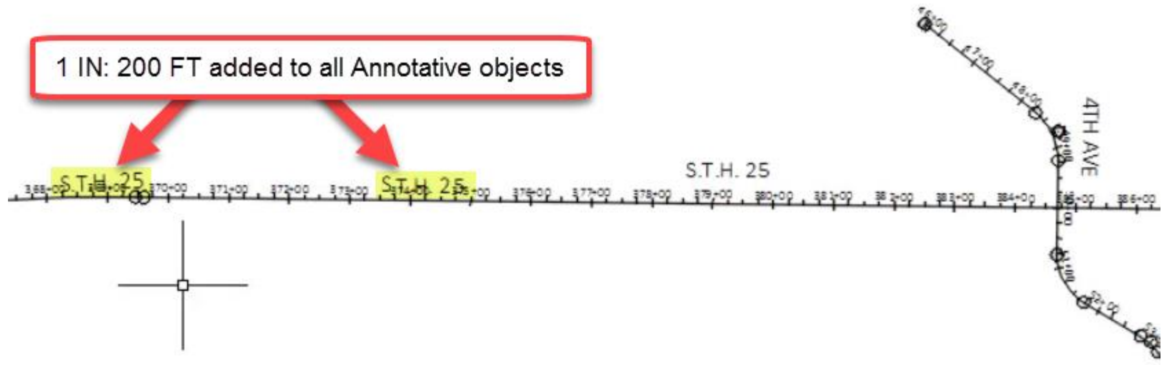
4. **Status bar > Annotation scale dropdown > 1 IN:200 FT**
    A. Observe scaling of both AutoCAD Annotative objects and Civil 3D Labels

Info: When the "Add scales automatically" Status Bar option is turned on and you change the current view Annotative scale, the new Annotative scale will be automatically added to all Annotative object Scales lists in the drawing.

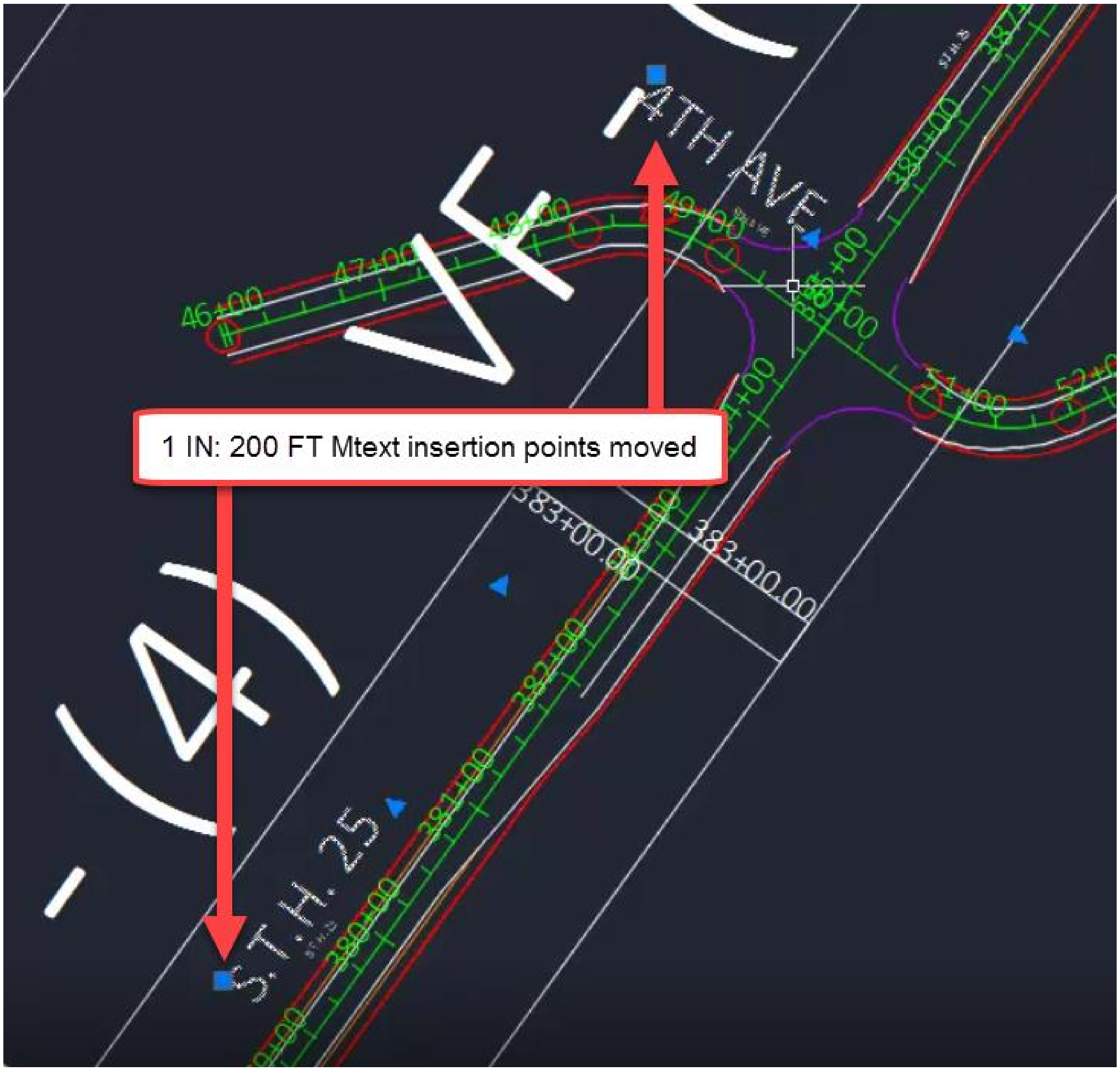
Warning: If you find yourself switching the current view Annotative scale often, it is best to leave the "Add scales automatically" Status Bar option turned off. This will prevent you from adding extraneous object scales to Annotative objects unintentionally. You may not want all Annotative objects displayed at a given scale and thus should be more selective about adding Annotative Scales to object Scales lists. Additionally Civil 3D must read all object Scales for display generation and this can become a significant resource drain if the number of object scales is too great.

5. Select one of the ***S.T.H. 25*** Mtext objects
    A. **Properties palette > Text**
        I. Observe Annotative scale = 1 IN:200 FT

6. 1IN_200FT - 1
    A. Observe all Annotative objects now displayed at 1 IN:200 FT scale



7. Model
    A. **Status bar > Annotation scale dropdown > 1 IN:40 FT**
8. Select all Annotative Mtext objects
    A. **Right-click menu > Annotative Object Scale > Add/Delete Scale**
        I. List all scales for selected objects = checked
        II. 1 IN:200 FT
            a. Delete
        III. OK
9. Status bar
    A. Add scales automatically = off
    B. **Current view Annotative Scale dropdown > 1 IN:200 FT**
10. Select ***4TH AVE*** Mtext and ***S.T.H. 25*** Mtext near 380+00
    A. **Right-click menu > Annotative Object Scale > Add Current Scale**
11. Select the Mtext from step 10
    A. Relocate respective insertion points for readability
    B. esc



12. Select ***4TH AVE*** Mtext
    A. **Right-click menu > Annotative Object Scale > Synchronize multiple scale positions**

Info: When running Synchronize multiple scale positions, the insertion point location used for synchronization is that associated with the current view Annotative Scale. Conveniently, this will be this insertion point whose Grip is displayed.

Text styles - fonts

Last updated: 2016-03-11

2016 fonts

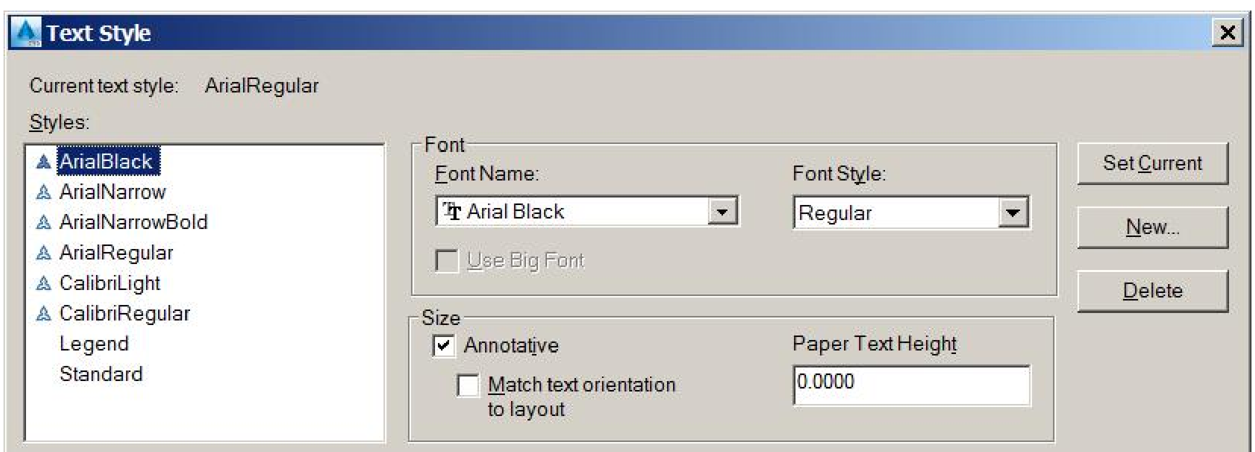
All of the custom DOT-fonts and DOT .shx font files are being retired as of the Civil 3D 2016 release. WisDOT Civil 3D 2016 standard fonts are now all Windows True-Type fonts.

The old fonts will be provided for legacy purposes during the transition from Civil 3D 2014 to Civil 3D 2016, but should not be used going forward. The legacy text styles that use the DOT fonts are not included in the 2016 startup templates or sheet templates. The following is a list of the new 2016 Text Styles with corresponding fonts.

Style Name	Font Name	Font Style	Annotative
ArialBlack	Arial Black	Regular	Yes
ArialNarrow	Arial Narrow	Regular	Yes
ArialNarrowBold	Arial Narrow Bold	Bold	Yes
ArialRegular	Arial Regular	Regular	Yes
CalibriLight	Calibri Light	Regular	Yes
CalibriRegular	Calibri	Regular	Yes
Legend	Calibri	Regular	No
Standard	Arial	Regular	No

Annotative text styles

The default for all but two of these Text Styles is Annotative. The text height is set to 0.00 in each style. The size of text should be addressed at the Civil 3D style level or annotation tool level and not at the Text Style level. This allows to leverage the civil annotation tools without the need for multiple styles with different sizes. To maintain typical WisDOT production standards it is unnecessary to develop any other Text Styles.



Legacy text styles & DOT fonts vs. Civil 3D 2016 text styles

The default for all but two of these Text Styles is Annotative. The text height is set to 0.00 in each style. The size of text should be addressed at the Civil 3D style level or annotation tool level and not at the Text Style level. This allows to leverage the civil annotation tools without the need for multiple styles with different sizes. To maintain typical WisDOT production standards it is unnecessary to develop any other Text Styles.

Legacy C3D Text Style	**2016 C3D Text Style**	**Legacy DOT Font**	**2016 C3D Text Style**
080	CalibriLight	DOT_FONT_5	CalibriLight
100	CalibriLight	Dot_Font_10	CalibriLight
120	CalibriLight	dot_font15	ArialRegular
140	CalibriLight	dot_font20	CalibriLight
175	CalibriLight	dot_font25	TBD
200	CalibriLight	dot_font35	ArialBlack
350	CalibriLight	dot_font44	TBD
TPP_240	ArialRegular	dot_font45	ArialRegular
TPP_280	ArialRegular	dot_font49	TBD
TPP_400	ArialRegular	dot_font55	CalibriRegular
TPP_500	ArialRegular	dot_font125	TBD
TPP_525	ArialRegular		

Light drafting techniques

Last updated: 2017-06-06

Total video time: 5:31

Exercise files: acad-lit-drfting-data-C3D16.zip

acad-lit-drfting.mp4 5:31

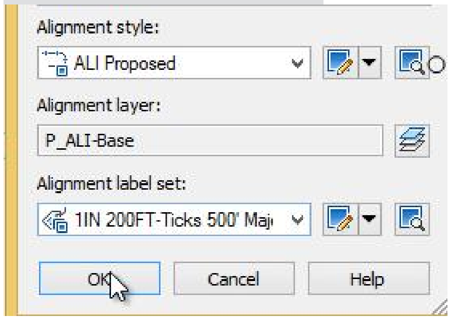
Light drafting technique

1. **c3d > 12345678 > Design > AliProfs**
2. Open file AliProf-Sth-15-Alt3.dwg
3. Scroll down to **Data Shortcuts**
    A. **Right-Click on Data Shortcuts > Set Working Folder**
        I. Set to folder 2 folders above shortcut folder
            a. c3d and OK
    B. **Right-Click on Data Shortcuts > Set Data Shortcut Project Folder > choose pro-**

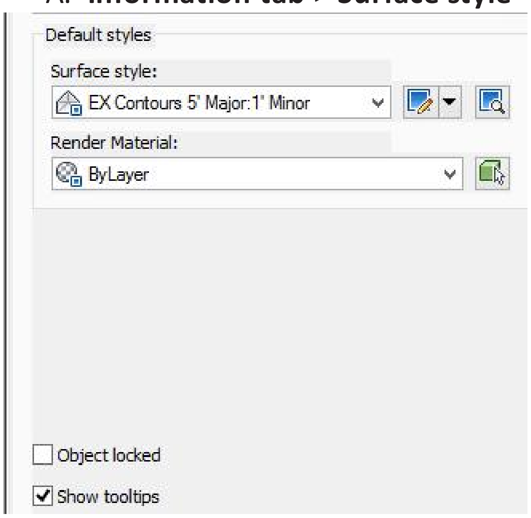
ject folder >

I. OK

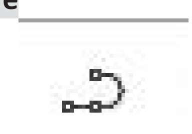
4. **Data Shortcuts pull down > Surfaces > right-click on Exist > Create Reference**
   A. OK
5. Double Click on wheel mouse to Zoom.
6. **Data Shortcuts pull down > Alignments > centerline alignments > right-click on 15-Alt1 > Create Reference**



   A. OK
7. **Left-Click on the surface > Modify panel > Surfaces Properties**
8. A. **Information tab > Surface style** = EX Contours 5'Major:1'Minor



   B. OK.
   C. ESC
9. **Draw panel of the Ribbon > Polyline**



   A. Starting from the left hand side and working to the right click a series of points.
   B. Enter
10. **Annotate tab of the Ribbon > Multiline Text**

11. Left-Click to create a text box.
12. Type in the box Passing lane 150' - widen 12'

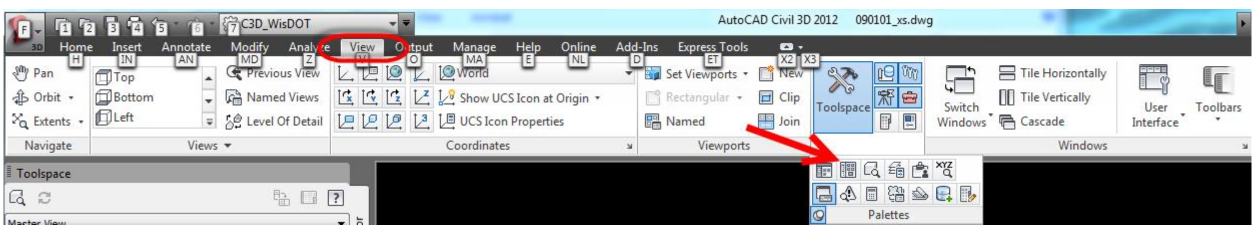
13. Left-Click to enter text box.
14. Click on text and enter SC in the command line.
15. Click on text and type in 10.
16. Enter

Using Design Center to transfer layouts from one dwg file to another

Last updated: 2015-04-17

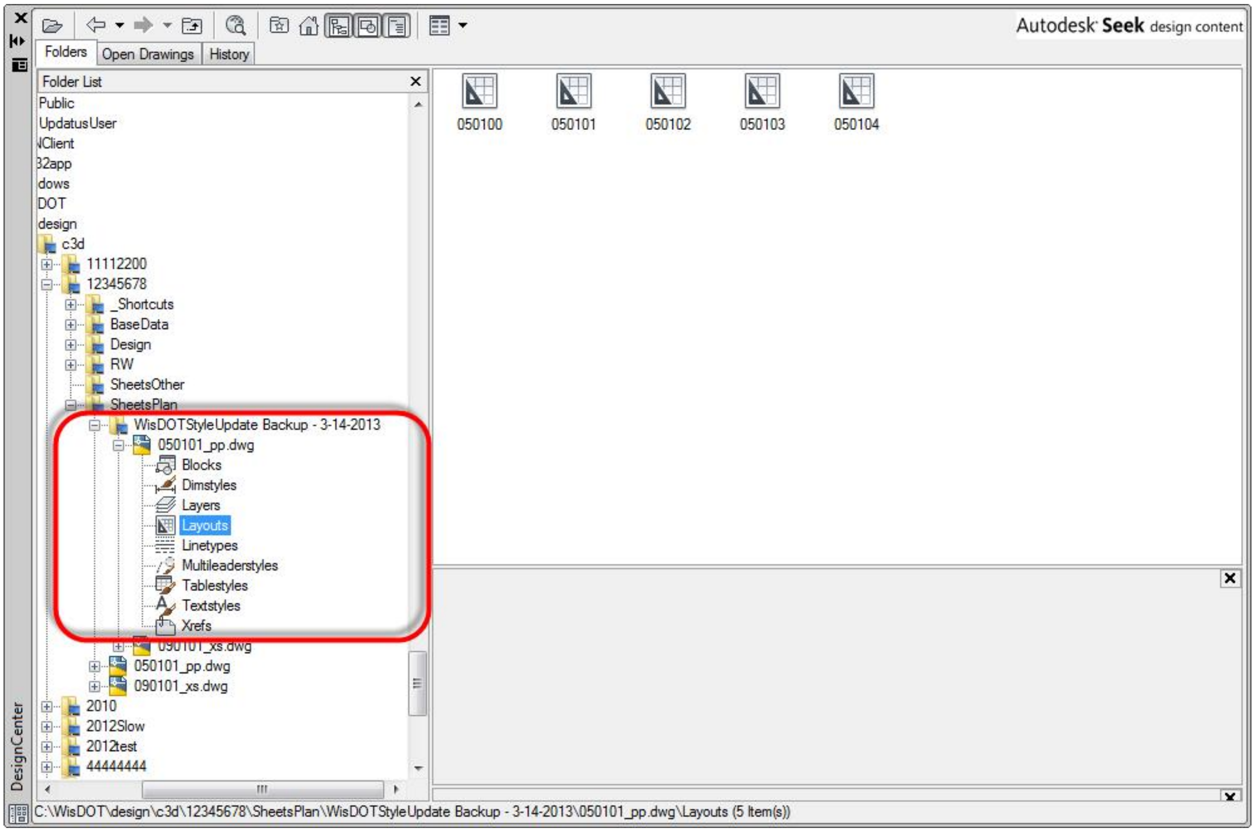
Using Design Center to transfer layouts from one dwg file to another

Open ***Design Center***

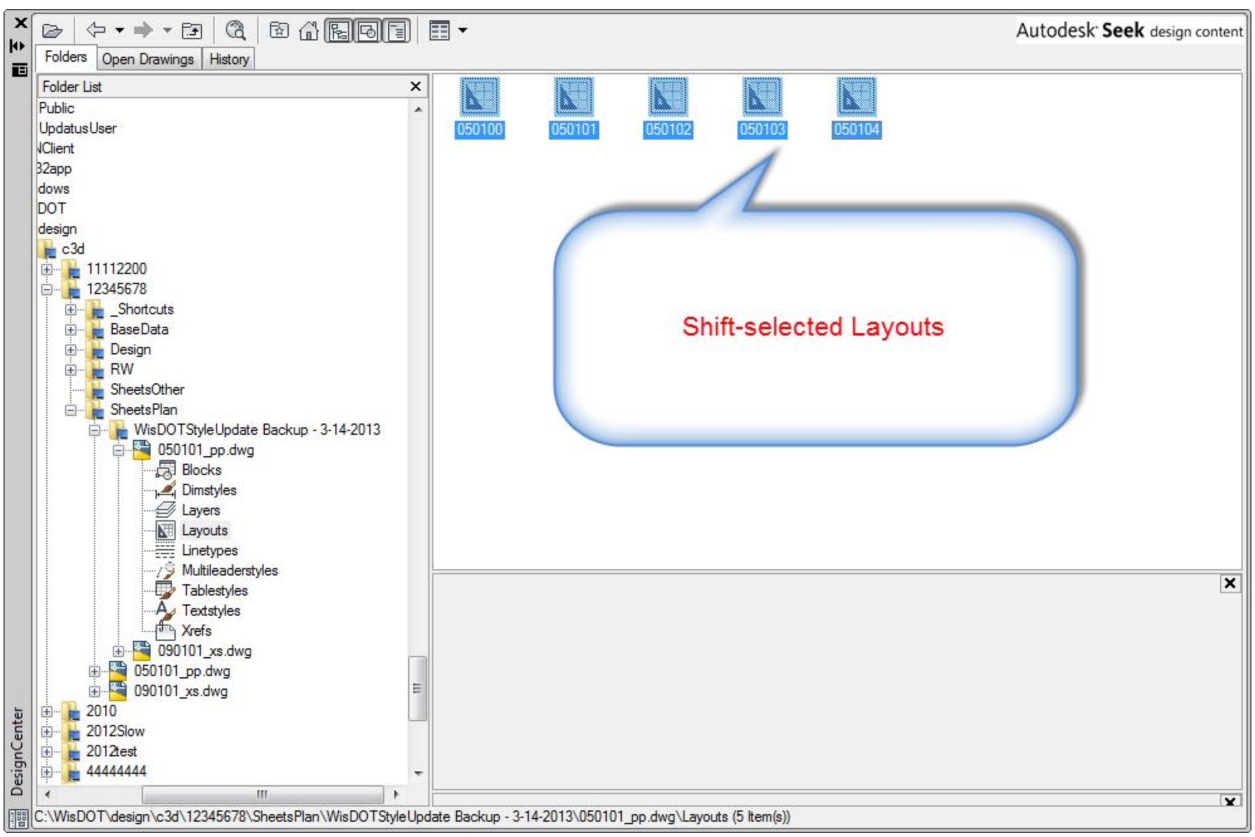


In the Design Center folder view, browse to the backup dwg file containing layouts, expand the backup file in folder view

Select layout category shown within file in Folder list



Shift select to select all layouts in the backup file shown on the right side of Design Center.



Right-click on the selected layouts, choose Add Layout(s) from the right-click menu

Layouts are now in the updated dwg file, save and close.

Linetype best practices

Last updated: 2014-10-05

Linetype best practices

Linetype scaling on or off with XREFs needs to be a wholesale choice. Turning it off in a file only impacts the view in that file. So unless you're going to have linetype scaling turned off in all the files you're going to use, it's not helpful in getting the real world linetypes to display correctly. Leave MSLTSCALE on always.

While not necessary, it may be easiest to keep all real world linetypes in files separate from associative linetypes. I wouldn't do this on mapping files, but it may simplify things for pavement marking and construction staging files.

Object linetype scaling needs to be identical for all of the real world linetypes that you intend to use together. The reason for this is the global effect of LTSCALE and not being able to differentiate LTSCALE for different XREFs. For simplicity sake, I would recommend having the object linetype scaling being identical across a project. You could have it as something like 1 inch: 1 ft to keep object linetype scale as 1 on all of the objects, but associative linetypes would look awful in modelspace. So I would recommend going with something like 1 inch: 100 ft and then for real-world linetype files, set CELTSCALE to 0.01 so that all objects you create inherent that LTSCALE.

It is possible to create sheets with the different scales than the default scale you choose with real world linetypes. To do so, XREF in the real world linetype files that you need and change the LTSCALE of the sheet file you're working in. For example, if you set your default scale to 1 inch:100 ft and you want to create sheets at 1 inch: 50 ft, set the LTSCALE for the 1 inch: 50 ft. file to 0.5.

You cannot create a single file with layouts that have different scales and get real world linetypes to look correct in all the layouts. This is an okay workflow if you only have associative linetypes.

WisDOT linetypes

Last updated: 2014-10-05

This document will describe the changes to the WisDOT custom linetypes; the changes in the drawing template settings; and outline the workflows for both true size and annotation scales in the new template. Linetypes that are true size such as pavement markings and barrels will need to be scaled using the objects properties. The rest of the linetypes such as easement lines and utilities will automatically adhere to the annotation scale in the layouts.

Linetype scale reference

There are three linetype settings to consider when setting up your drawings: ***LTSCALE***, ***PSLTSCALE***, & ***MSLTSCALE***.

Linetype scale

LTSCALE controls the dash spacing and symbol size in linetypes. For WisDOT new linetypes the default scale factor will be set 1.00. A value larger than 1 will scale the linetype up and a value less than 1 will scale the linetype down. The Linetype scale is an absolute value and not relative value.

MSLTSCALE

Model Space Line Type Scaling only has two options ON or OFF. Setting ***MSLTSCALE*** to 1 (ON) is the default setting.

Setting MSLTSCALE to ***1 (ON)*** will cause the Line type scale of any geometry in model space to be scaled by the Annotation scale. This allows you to have a preview of how the line type scale might look when seen through a scaled viewport.

MSLTSCALE Overrides LTSCALE in Modelspace, but it doesn't effect Paperspace, so it won't change how your geometry looks inside your viewports.

Using MSLTSCALE is a really good way of checking that your linetypes are going to look as you expect them to, without having to 'Flick' back and forth between Paperspace and Modelspace.

Setting MSLTSCALE to ***0 (OFF)*** will cause the Linetypes displayed on the Model tab to be not scaled by the annotation scale.

PSLTSCALE

This variable controls the linetype scaling of geometry displayed in paper space viewports – Paper Space Line Type Scale.

This variable only has two settings. Setting ***PSLTSCALE*** to ***0 (Off)*** will mean that the linetype scale factor of your modelspace geometry will not be effected by the scale of your viewport.

Setting PSLTSCALE to ***1 (On)*** means that the line type scale of your modelspace geometry will be scaled to match the viewport scale.

If you use paper space layouts, turning paper space line type scaling on ensures that all your geometry will have the correct line type scale, no matter what the viewport scale is.

CELTSCALE

Sets the current object linetype scaling factor. The linetype scaling for any new objects placed in the drawing file will be relative to the LTSCALE command setting.

A line created with CELTSCALE = 2 in a drawing with LTSCALE set to 0.5 would appear the same as a line created with CELTSCALE = 1 in a drawing with LTSCALE = 1. The default value is set to 1.

Working with existing files

If your drawing is nearing completion and linetypes are working with your project there should be no need to update your drawing from the new template. To determine if your drawing file has the old linetypes, type LTSCALE at the command line. If it is set to 0.005 then you are using the old template with the older linetypes.

Settings for previous templates

Prior to August 2013 all WisDOT drawing templates had the following settings.

LTSCALE = 0.005

CELTSCALE = 1.0

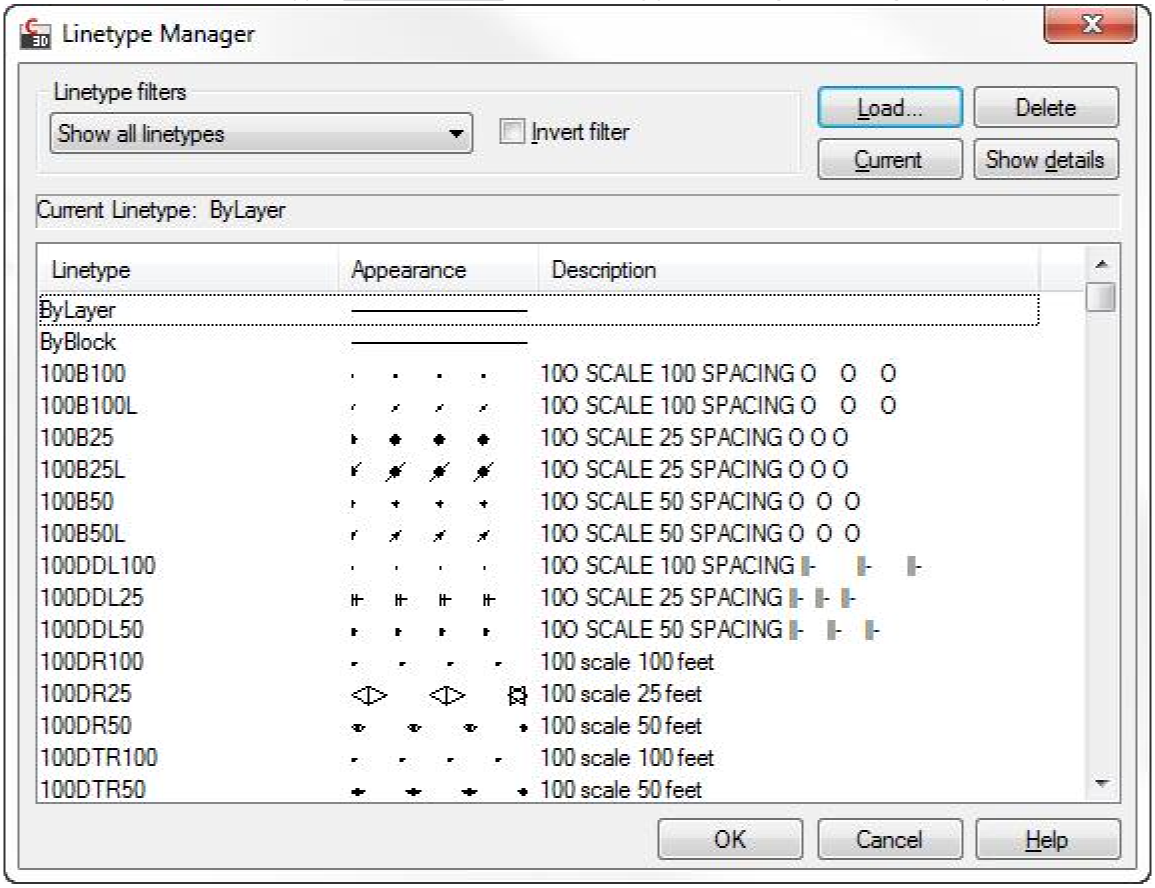
PSLTSCALE = 1

MSLTSCALE = 1

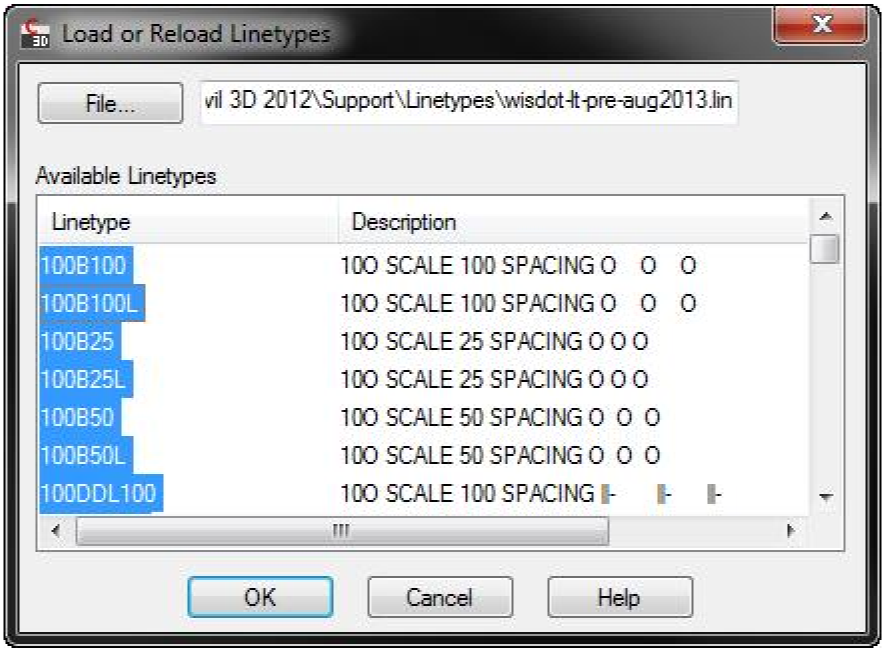
Importing older linetypes into older drawings

When you need to update your old drawing with compatible linetypes follow these steps.

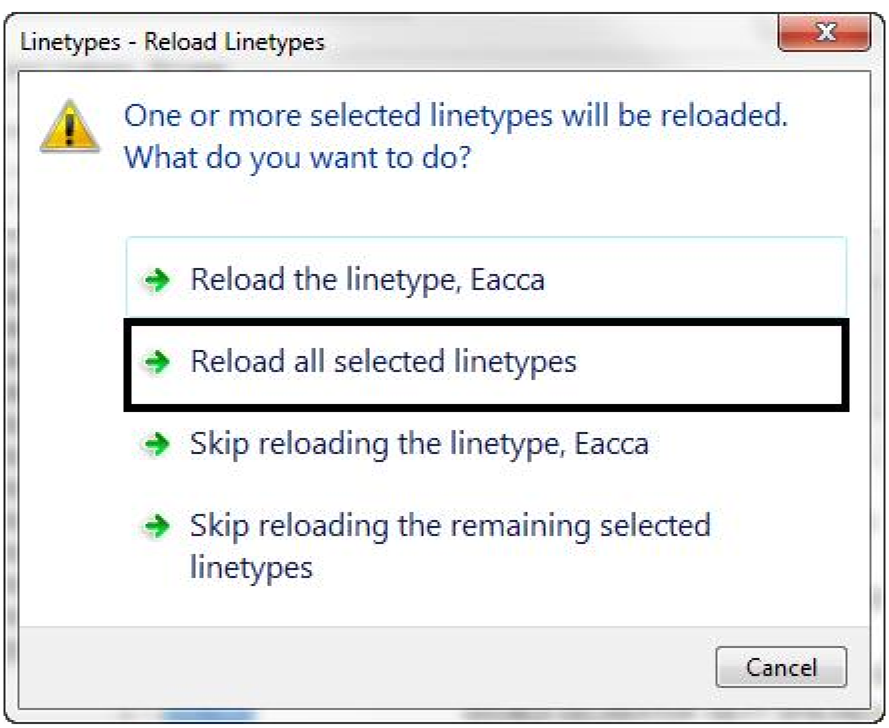
1. In the command line type **LINETYPE**. The ***Linetype Manager*** dialog will appear.



2. In the Linetype dialog click the Load button. The ***Load or Reload Linetypes*** dialog will appear.
3. From the Load or Reload Linetypes dialog click the File button. The Select Linetype File dialog will appear.
4. Path to **C:\Program Files\Autodesk\AutoCAD Civil 3D 2012\Support\Linetypes** and select the file wisdot-lt-pre-aug2013.lin click Open. The linetypes will be loaded into the Load or Reload Linetypes dialog.



5. Select the linetype(s) you wish to add and then click the OK button. The Linetypes – Reload Linetypes dialog will appear.
    - You can hold down Ctrl to select several linetypes
    - SHIFT to select a range of linetypes
    - Right click popup menu Select All

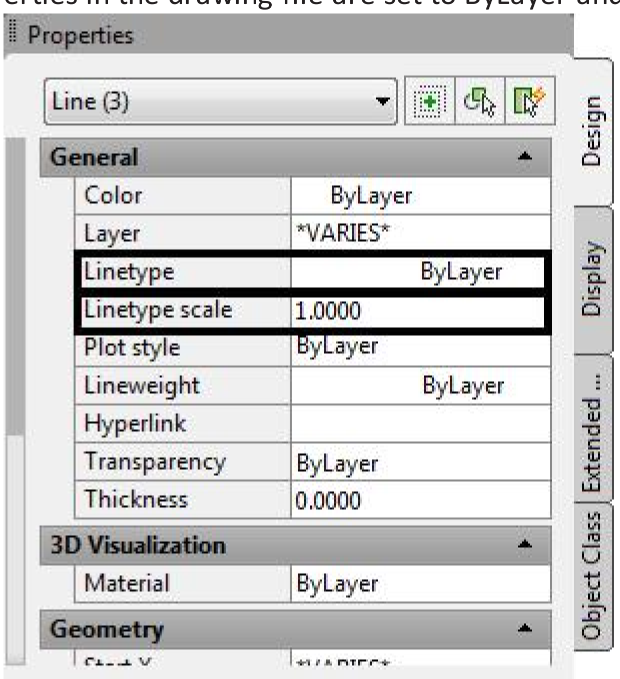


6. From the Linetypes – Reload Linetypes dialog select Reload all selected linetypes. The new linetypes will be added to the drawing file.
7. Click the OK button in the Linetype Manager dialog. The dialog will close.
8. **REGEN** your drawing to see the change in scales.

Workflow for updating new linetypes into older drawings

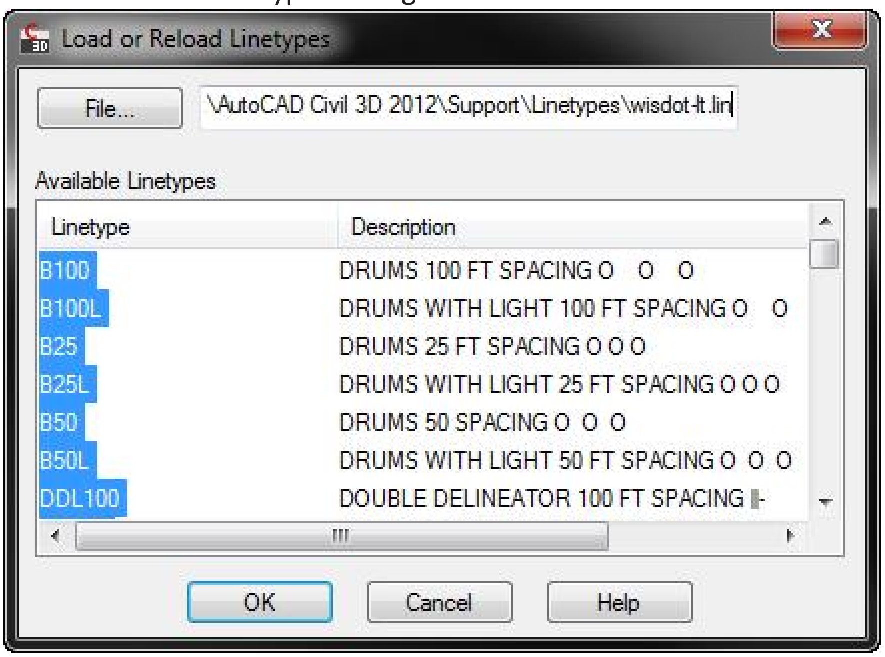
If you have an old drawing and you can take advantage of updating your drawing with the new linetypes follow these steps.

1. Prior to importing the linetypes verify the following variables are set. To read and set these, type the variable name at the command line.
   - LTSCALE = 1.0
   - CELTSCALE = 1.0
   - PSLTSCALE = 1
   - MSLTSCALE = 1
2. If any object overrides are applied to your line work the following steps will not show the updated linetypes. Select all line work in the drawing file and verify ALL Linetype properties in the drawing file are set to ByLayer and the Linetype scale is set to 1.



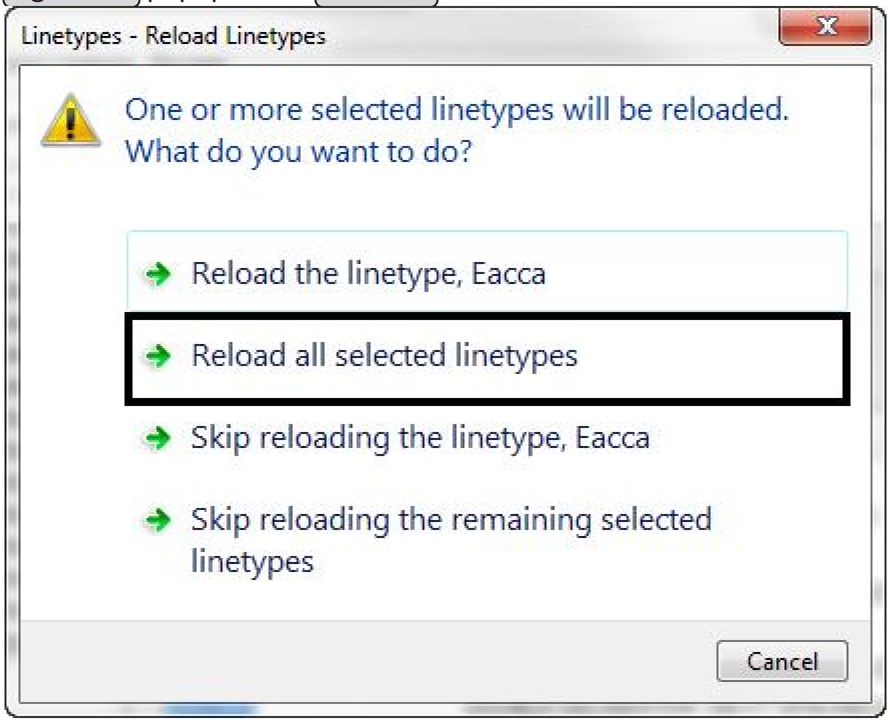
3. In the command line type **LINETYPE**. The ***Linetype Manager*** dialog will appear.
4. In the Linetype dialog click the Load button. The ***Load or Reload Linetypes*** dialog will appear.

5. From the Load or Reload Linetypes dialog click the File button. The ***Select Linetype File*** dialog will appear.
6. Browse to the new linetype file
   - For Civil 3D 2012 path to **C:\Program Files\Autodesk\AutoCAD Civil 3D 2012\Support\Linetypes** and select the file wisdot-lt.lin click Open. The linetypes will be loaded into the Load or Reload Linetypes dialog.
   - For Civil 3D 2014 path to **C:\WisDOT\Stnd\c3d2014\Support\Linetype** and select the file wisdot_2014.lin click Open. The linetypes will be loaded into the Load or Reload Linetypes dialog.



7. Select All the linetypes and then click the OK button. The Linetypes – Reload Linetypes dialog will appear.
   - You can hold down Ctrl to select several linetypes
   - SHIFT to select a range of linetypes

- Right click popup menu Select All.

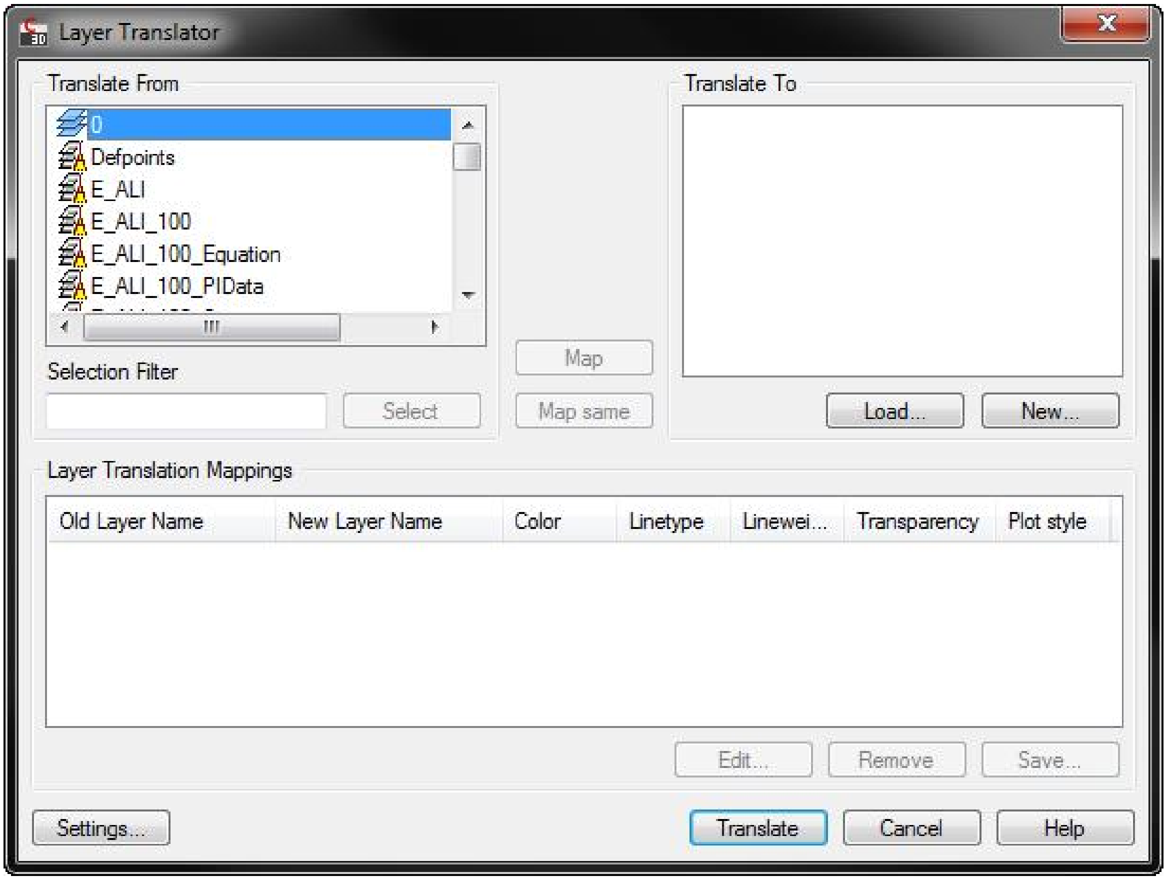


8. From the Linetypes – Reload Linetypes dialog select Reload all selected linetypes. The new linetypes will be added to the drawing file and the old linetype definitions will be changed to match the new definitions.
9. Click the OK button in the Linetype Manager dialog. The dialog will close.
10. Regen your drawing to see the change in scales.

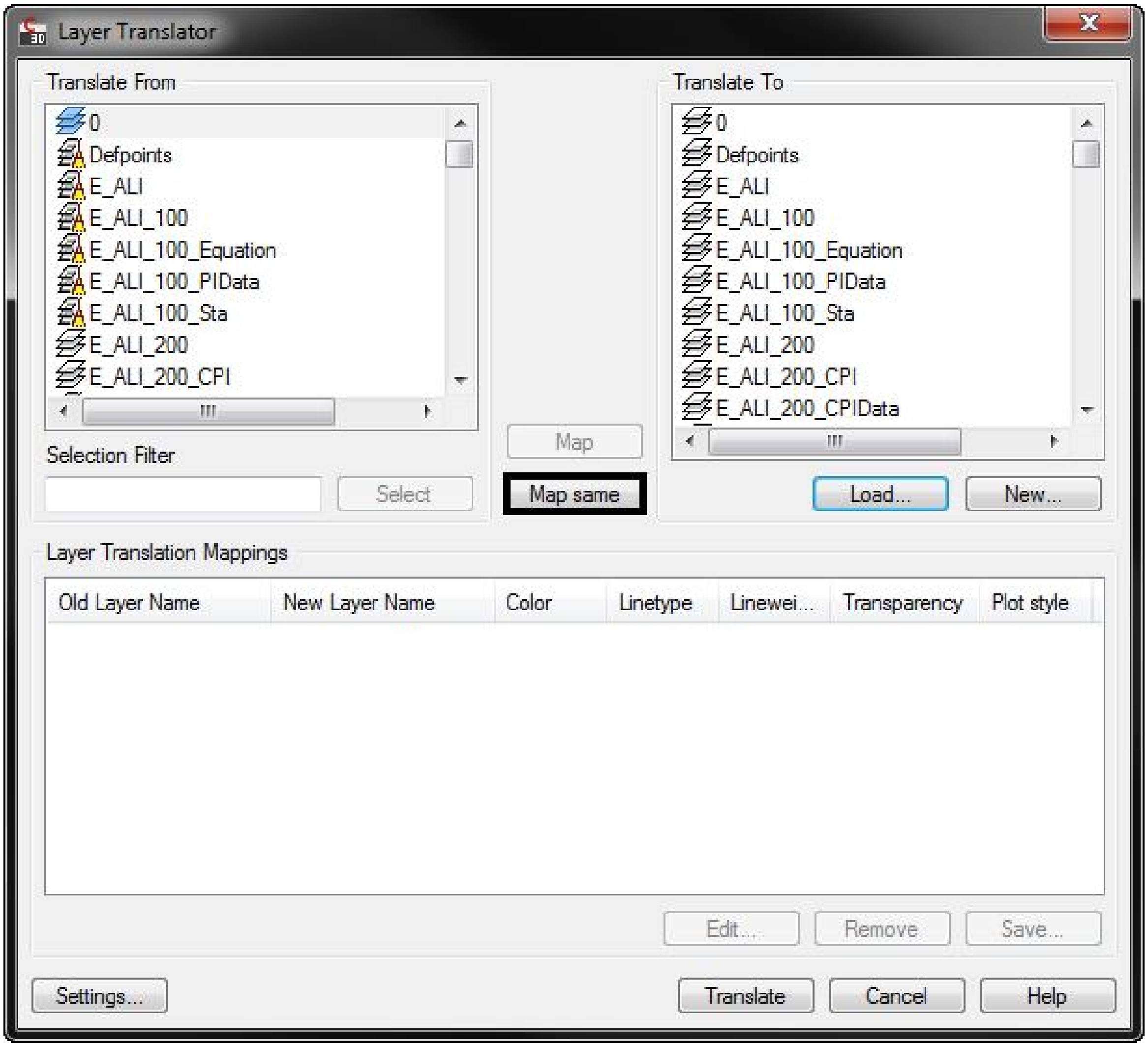
Updating layers with new ByLayer symbology

The linetypes are now in the design file but the layer definitions need to be updated to reflect the new linetype names.

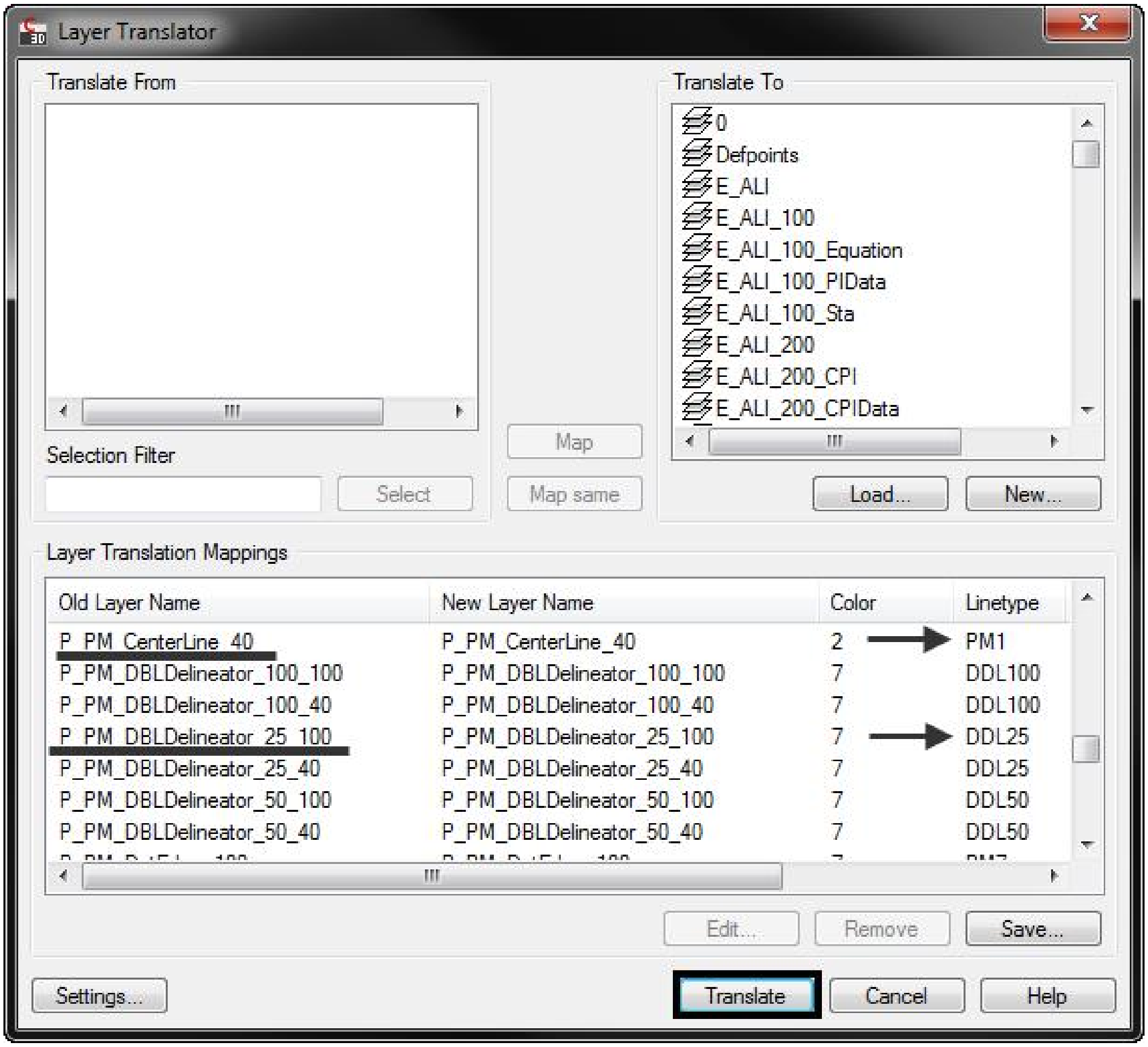
1. From the ribbon **Manage tab > CAD Standards panel > Layer Translator**. The ***Layer Translator*** dialog will appear.



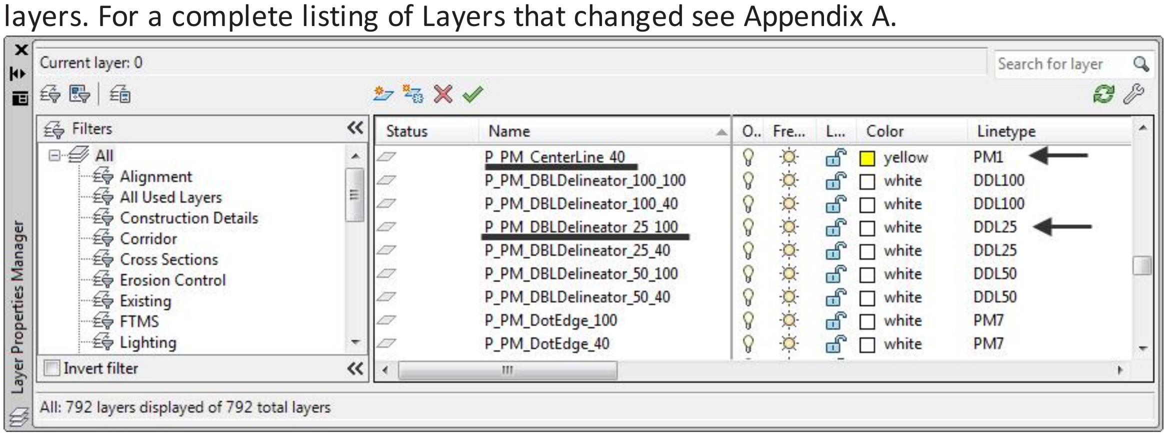
2. Pick the Load button from the ***Translate To*** section of the dialog.
3. Change the ***Files of type*** to ***Drawing Template (*.dwt)***
4. Path to the WisDOT templates and select wisdot12.dwt or wisdot14.dwt depending on the version you are using, and click Open. The Layers will be loaded in the ***Translate To*** section of the dialog.



5. Click the Map Same button. The layers will be added to the ***Layer Translation Mappings*** section of the dialog.



6. Click the Translate button. An alert box will appear asking if you want to save the mapping information. Click Translate Only. The layers will be translated to the new layer scheme.
7. Verify the layers are correct by opening the Layer manager and checking a couple P_PM layers. For a complete listing of Layers that changed see Appendix A.



8. In the command line type **PURGE**. Purge all unused linetypes from the drawing file.
9. Save the drawing file.

Workflow to update Xref files with old linetypes

If your file has an xref file using the old linetypes you will need to update the linetypes and the properties of the xref-dependent layers.

1. Open each Xref design file that is attached to a host file and follow the workflow above named Workflow for Updating New Linetypes into Older Drawings.
2. After each xref file is updated then open each Host file (the drawing file that is consuming the external referenced drawings).
3. In the command line type **VISRETAIN=0**.

> **Info:** Note: Setting Visretain to 0 will allow each xref to be reloaded and the layer table, as stored in the reference drawing (xref), will take precedence.

4. Click **View tab > Palettes panel > External References Palette**
   - Command: **XREF**
5. Select each xref to be reloaded and Right click. From the menu select Reload. The reference will be reloaded and the new layer properties will be updated.
6. In the command line set **VISRETAIN** back to ***1***.
7. Save the host file and Exit.

Working with the new template

After August 2013 all WisDOT drawing templates have the following settings.

LTSCALE = 1.0

CELTSCALE = 1.0

PSLTSCALE = 1

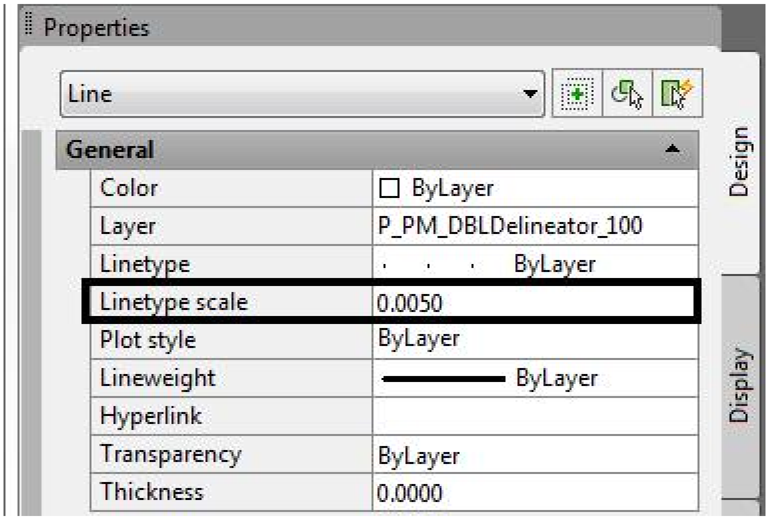
MSLTSCALE = 1

Workflows for true size linetypes

Objects using the True Size linetypes must be scaled by changing the linetype scale of the object.

1. Select the objects whose linetype scale you want to change.
2. Click **Home tab > Palettes panel > Properties**.
3. On the ***Properties*** palette, click the ***Linetype scale*** control.
4. Change the linetype scale that you want to assign to the objects.

Layout scales = Linetype scale



When LTSCALE is set to 1 use the equation (linetype scale = (1/Desired Scale) to determine the linetype scale.

Below is a list of common Linetype scale settings.

Viewport ScaleLinetype Scale

1IN:10FT = 0.10

1IN:20FT = 0.05

1IN:40FT = 0.025

1IN:50FT = 0.02

1IN:100FT = 0.01

1IN:200FT = 0.005

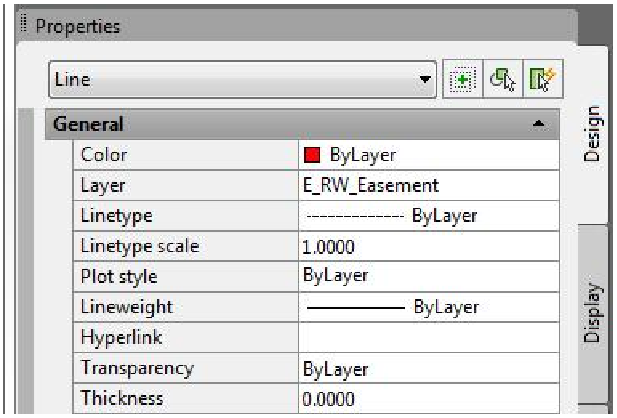
In a drawing that contains a vast majority of objects using the True size linetypes, it is a good practice to set MSLTSCALE to 0 (zero). MSLTSCALE sets whether the objects linetypes are affect by the annotation scale in the Model tab. 0 = Off and 1 = On. Setting MSLTSCALE off will display the objects linetypes as true size. The same way it will be displayed in the Layout viewport.

Annotative linetypes

To change the linetype of an object, to use the layout's annotation scale.

1. Verify that LTSCALE is set to 1, PSLSCALE is set to 1 and MSLTSCALE is set to 1.
2. Select the objects whose linetype scale you want to use annotation scale.

3. Click **Home tab > Palettes panel > Properties**.
4. On the ***Properties*** palette, click the ***Linetype scale*** control.
5. Change the linetype scale to 1.0.



WisDOT annotate tool

Last updated: 2016-03-09

Total video time: 02:37

acad-wisdot-anno-tl-01.mp4 02:37 - This video contains the training for this entire module.

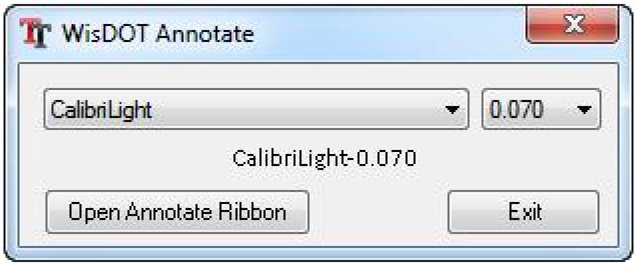
Info: The WisDOT Annotate Tool is used to quickly set current a textstyle and text height. The tool can then be used to switch to the AutoCAD Annotate ribbon to place or edit text.

Ribbon location

The ***WisDOT Annotate Tool*** is located on the ***WisDOT Sheets*** ribbon, in the ***Sheet Utilities*** panel. Select Set Textstyle & Size to reveal the tool.

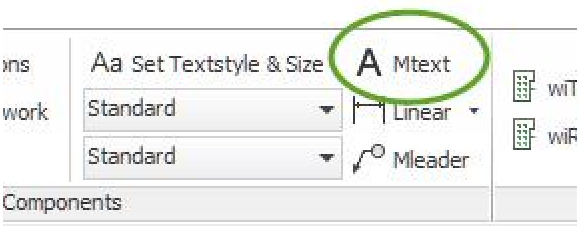
Using the tool

The tool launches a floating window.



- Select a textstyle from the dropdown
- Select a text height from the dropdown
- There is no Apply or OK button. The values are immediately set as the current textstyle and text height.

The Mtext tool is located right next to the Set Textstyle & Size button on the WisDOT Sheets ribbon. If the WisDOT Annotate dialog is left open, then the Mtext tool will need to be pressed twice, even if the Mtext button on the Annotation ribbon is used.



The user is provided the option to select the Open Annotate Ribbon button to quickly switch to the Annotate ribbon. Note that the current textstyle and text height on the annotation ribbon has been set by the WisDOT Annotation tool.

Exiting the tool

The WisDOT Annotate Tool window can be left open and will not interfere with any other commands. The window floats over the application area and can also be moved to another monitor. Pressing the Exit button will dismiss the window.

Points

Civil 3D point basics

Last updated: 2017-06-06

Total video time: 04:21

Exercise files: pnt-basc-data-c3d16.zip

pnt-basc-01.mp4 4:21

Point basics

Three types of points in Civil 3D

- AutoCAD Point aka "Node"
- COGO Point
- Survey Point

Definitions

AutoCAD Point

- Very basic traditional AutoCAD point object with limited attributes beyond Cartesian coordinates (XYZ)
- Not used for most Civil 3D workflows
- Limited selection of symbols using PTYPE System Variable. All points in drawing share same symbol.
- Limited display control; only Layers

COGO Points

- Smart object that contains many properties such as name, number, raw description, full description, coordinates, etc.
- Typically used for proposed construction staking points, not existing survey data.
- Appearance is controlled by Civil 3D Styles with Description Key Set. Point Style for the symbol, Point Label Style for the text.
- Text and symbol are one object, not separate entities.

Survey Points

- Smart object that’s nearly identical to COGO points except it cannot be moved on the screen and is generated through a Survey Database
- Typically created by importing existing topographic survey data
- Uses Civil 3D Styles with Description Key Set in the same way as COGO Points

- Can be inserted into drawing from Survey Database with survey Template
- Should not typically be inserted in drawings other than by survey department

Point Groups

- Used to control the display of points in mass, or to easily reference a group of points with a common characteristic.
- Referenced points share a common property. For example, all Electrical Utility shots or all shots brought in from the same point file.

Description Key Set

- A set of field codes, Styles, Layers, and other properties.
- When a point is imported/created, Civil 3D checks to see if there is a code matching the Raw Description. If so, the point will take on the properties defined in the Description Key Set. Exception to this is when there is an overriding Point Group. This will be discussed in detail in later training.

Survey Databases

- Stores and manages raw survey data, which is then inserted into a drawing
- Works in conjunction with Equipment Database, Figure Prefix Database and Linework Code Set. These files are stored outside the drawing.
- Primary toolset for Automatic Linework functionality

Accessing Civil 3D points

Last updated: 2017-06-06

Total video time: 03:39

Exercise files: pnt-basc-data-c3d16.zip
pnt-accss-01.mp4 3:39

Point Access

Civil 3D Points and related tools can be accessed through the Ribbon, Toolspace and Model Space. Point properties can quickly be viewed through the Properties Palette

Ribbon

Access Point creation, conversion and modification tools through the Ribbon

Point creation and conversion

1. **Home tab > Create Ground Data panel > Points dropdown**

Point Contextual Ribbon Tools

1. **Modify tab > Ground Data panel > Points**

Toolspace

Access Points and Point Groups through the Toolspace Prospector tab and Item View. When Points or Point Groups are selected in the Prospector tree, detailed information is displayed in Item View.

Points

1. **Toolspace palette > Prospector tab > Points**
   A. **Left-click > Points** populates Item View
   B. **Right-click > Points** for contextual functions

Point Groups

1. **Toolspace palette > Prospector tab > Point Groups**
   A. **Left-click > Point Groups** populates Item View
   B. **Right-click > Point Group** for contextual functions
      I. Properties to set hierarchy
   C. Expand Point Group list
      I. **Right-click > Point Group name** for contextual functions

Info: Right click a column heading in Item View to customize the data displayed. Left click a column heading to sort rows by selected column heading. Right click a row in Item View for contextual functions

Tips: Use familiar Ctrl-A, Shift-Select and Ctrl-Select macros then right click to apply contextual functions to a group of objects in Item View

Modelspace

Directly selecting a COGO or Survey Point in Modelspace opens the respective Contextual Ribbon. Once selected you can right-click for contextual functions. A Contextual Ribbon is not available when multiple Survey Points are selected.

Properties Palette

Regardless of how you select a Point or multiple Points, you can see detailed information and make limited modifications in the Properties Palette. Properties shown in grey tone are not available for edit within the Properties Palette, such as with Survey Points.

Warnings: Modifying properties within the Properties Palette sets object level overrides to properties that can be difficult to track and thus are often best set elsewhere. For example, a Point Style, Point Label Style and Layer is best dictated by a Description Key Set and Point Raw Description.

Point groups and styles

Last updated: 2017-06-06

Total video time: 07:45

Exercise files: pnt-grp-styl-data-c3d16.zip

pnt-grp-styl-01.mp4 3:00

pnt-grp-styl-02.mp4 4:45

Point groups and styles

Point display is largely set by the Point Style, Point Label Style and Layer properties assigned to a Point. These properties can be controlled on an object level during Point creation by assigning a Raw Description code referencing a Description Key Set stored in the current drawing.

Point Groups can also be created and set to filter which Points are displayed and apply overrides to properties set by a Description Key Set.

Point Tables can be generated from any drawing containing Points for display in the drawing or export to other file formats. By default, Point tables update dynamically with changes to included Point properties.

Info: When Point Styles or Point Label Styles are not dictated by a Description Key Set, Civil 3D looks to applicable Point Groups for Point Style and Point Label Style application. One example of this is when a Point Raw Description does not match the Description Key Set or when an individual Point Style is not defined in the Description Key Set.

Definitions

Point Style

Marker used to display the Point. These are defined by AutoCAD Blocks, or other basic symbols.

Point Label Style

Controls the display and arrangement of text properties associated with a Point.

Layer

Controls display and plot behavior of Points set to display By Layer

Raw Description

Code referencing a Description Key Set to assign display properties to a Point

Description Key Set

An applicable Description Key Set will be set up and included in a template to set Point display properties upon Point creation. It defines the Point Style, Point Label Style, Layer and other properties given to a Point based on a matching Raw Description Code. A Description Key Set is only available if it has been built in the template used to start a drawing.

Point Group

Points in a drawing are queried based on assigned Point properties (ie Raw Description, Full Description, Point Number, Point Name, Elevation) . Point Groups are used to filter the display and plotting of Points in a drawing based on a point group hierarchy. They can also assign Point Styles and Point Label Styles when they are not dictated by a Description Key Set or when Point Group overrides are set.

Point creation tools

Last updated: 2017-06-06

Total video time: 04:06

Exercise files: pnt-creat-tl-data-c3d16.zip

pnt-creat-tl-01.mp4 4:06

Point Creation Tools

Many tools are available to specify location and/or elevation while manually creating COGO Points in your drawing. The various tools available can reference objects such as existing Points, Alignments, Surfaces, Corridors, Lines/Polylines/Arcs, Parcels, etc. You can use typical surveying techniques such as referencing a bearing or azimuth angle, lattitude/longitude or northing/easting for example as well. There is a great deal of flexibility and functionality built into these tools that warrants exploration.

Manual Point Creation Tools

All manual Point creation tools will generate a COGO Point as specified through unique command prompts for each respective tool. The differences between the tools lie in the techniques used to specify Point coordinates. Two ways to access point tools:

1. **Ribbon > Home tab > Create Ground Data > Points dropdown > Point Creation Tools**
   A. **Create Points toolbar> Point command category dropdown > Point command**

1. **Ribbon > Home tab > Create Ground Data > Points dropdown > Create Point - ******** flyout**
   A. Choose Point command

Tip: Hover over a Point command category or Point command for a quick brief description of the tool. This is a quick way to determine the appropriate coordinate specification technique for your situation

Commands Categories Available

- Miscellaneous - Coordinates specified using a variety of techniques including reference to line, polyline, survey resection etc. Conversion from AutoCAD Points also available.
- Intersection - Distance and/or direction from existing Points or objects (ie line, arc) used to specify intersection coordinates.
- Alignment - Coordinates specified based on reference to alignment such as Station/Offset.
- Surface - Various horizontal coordinate specification with elevation pulled from specified Surface at Point location.
- Interpolate - Coordinates interpolated from two known Points or object locations.
- Slope - Coordinate specifed by distance or vertical displacement at given slope from a know Point.

Tip: Transparent commands can be used within Point Creation commands while specifying coordinates. These will be discussed in detail in a later training module.

Importing points from a file

Last updated: 2017-06-06

Total video time: 04:08

Exercise files: pnt-imprt-frm-fil-data-c3d16.zip

pnt-imprt-frm-fil-01.mp4 4:08

Import Points From File

Point data can be transferred between applications and/or organizations by exporting and importing Point Files. Point files are simple text files that Civil 3D can read and use to generate COGO points.

Display of imported Points is controlled by a Description Key Set and/or Point Group in the same way as with other Point creation methods.

Info: Various file extensions can be given to Point Files depending on the application used to export/generate the Point File.

Warning: Design staff should NOT import survey data point files into design drawings. Contact your Survey Data Coordinator for survey data workflows

Point Import Workflow

1. Open drawing from the WisDOT Survey Template
   A. **Application dropdown > New > wisdot16-survey.dwt**
   B. Save drawing
2. Import Point File
   A. **Ribbon > Insert tab > Import panel > Points from File**
      I. Browse to file
      II. Select correct File Format (ie. PNEZD - Point Number, Northing, Easting, Elevation, Description)
      III. Toggle Add Points to Point Group On/Off
      IV. OK

Editing points

Last updated: 2017-06-06

Total video time: 4:42

Exercise files: pnt-edit-data-c3d16.zip

pnt-edit-01.mp4 4:42

Editing Points

After creating or inserting Points into your drawing, you may need to edit location or attribute data. Point editing tools are available when selecting a Point in modelspace, through Toolspace Prospector and through the Contextual Ribbon.

COGO Points and Survey Points exhibit different editing behavior. When inserted into a drawing from a Survey Database, Survey Points are locked and thus cannot be edited beyond simple label movement and display changes. Contact your Survey Data Coordinator for workflows dealing with Survey Points. COGO Points are unlocked and available for edit by default. They can be locked/unlocked within a drawing as needed.

Modelspace

Select a COGO Point directly in your Modelspace canvas to activate grip editing functions. Hover over the Marker Grip or Label Grip to see a menu of respective movement and rotation edit functions.

Marker Grip Edit

- **Move Point** - Reset Point location with mouse or applicable Transparent Commands (covered in later training module)
- **Rotate label and marker** - Rotate marker and label about horizontal Point location. Label remains readable by flipping vertically as needed.
- **Rotate marker** - Rotate marker only about horizontal Point location.

Label Grip Edit

- **Move label** - Reset location with mouse or applicable Transparent Commands (covered in later training module)
- **Rotate label** - Rotate label only about horizontal Point location. Label remains readable by flipping vertically as needed.
- **Toggle sub-item grips**- Activate additional grips to move label rows independently.

Tips: Options to reset label or reset all (marker rotation and label) are available after applicable edits are performed. Point (marker) location cannot be reset this way.

Toolspace Prospector

Open the Point Editor Panorama through the right-click contextual menu. Choose specific Points for inclusion in the Panorama by Point Group or selection from the Item View pane.

COGO Points can be renumbered, locked/unlocked for edit and/or have elevations edited based on row selection within the Point Editor Panorama.

When Points are unlocked, attribute overrides can be directly entered into cells within the Panorama as well.

Renumber Points

1. **Toolspace > Prospector tab > Right-click Points or Point Group Name or selection from Item View**
   A. Select row(s) from Panorama
      I. **Right-click > Renumber**
      II. **ENTER ADDITIVE FACTOR** (Overwrite or Next option if specified number already in use)

Change Elevations by Factor

1. **Toolspace > Prospector tab > Right Points or Point Group Name or selection from Item View**
   A. Select row(s) from Panorama
      I. **Right-click > Datum**
      II. **ENTER CHANGE IN ELEVATION** (or use Reference option)

Assign Elevations from Surface

1. **Toolspace > Prospector tab > Right Points or Point Group Name or selection from Item View**
    A. Select row(s) from Panorama
        I. **Right-click > Elevation From Surface**
            a. **Select Surface dialog box > Surface dropdown > Surface Name**
            b. OK

Info: Most Point editing functions are available through Modelspace right click menu and Contextual Ribbon upon selection as an alternative to the Point Editor Panorama

Transparent commands for points

Last updated: 2017-06-06

Total video time: 04:38

Exercise files: pnt-trnsprnt-cmnd-data-c3d16.zip

pnt-trnsprnt-cmnd-01.mp4 4:38

Transparent Commands

Transparent Commands are tools available to aid in specifying location when prompted within another command. They can only be used once another command is started (ie start Polyline command, then start Transparent command of choice to specify vertex coordinates). A Transparent Commands toolbar is available from which to chose commands. Alternatively, you can enter the command alias into the command line.

Reference Existing Points

There are a variety of Transparent Commands available for use in Civil 3D, some of which reference existing Point coordinates when prompted for a location within a command. These can be useful for preliminary Alignment layout or whenever you would like to reference existing Point locations to build an Entity.

Transparent Command Aliases

Enter one of these options to use known Point coordinates when prompted for a location within a command

- **Point Number**: **'PN** - Specify Point Numbers individually, by range, by list or by a combination of these (ie 1 or 1-3 or 1,2,3 or 1-3,5). Point Numbers called out need not be consecutive or sequential.

- **Point Name**: **'PA** - Specify Points Name sequentially
- **Point Object**: **'PO** - Select desired Points in Modelspace sequentially

Transparent Commands Toolbar

Pick from the Transparent Commands Toolbar. If it is not visible in your interface:

1. **Ribbon > View tab > Interface panel > Toolbars dropdown > Civil > Transparent Commands**

Best Fit Alignment Example Workflow

This example workflow uses COGO Points and the Point Number Transparent Command in Pnt-Trnsprnt-Cmnd-begin.dwg to generate a preliminary Alignment.

1. **Ribbon > Home tab > Create Design panel > Alignment dropdown > Create Best Fit Alignment**
   A. Within *Create Best Fit Alignment* dialog box click object selection icon next to *Path 1 point group*
      I. Select Point Number icon from Transparent Commands Toolbar or enter **'PN** in the command line
      II. Enter Point Number range **1-11**
      III. Esc once to end Transparent Command
      IV. Enter or Right-click to end object selection
   B. Leave all other *Create Best Fit Alignment* dialog box options as default
   C. OK
   D. Review *Best Fit Report* and close dialog box

Points from Alignment

Last updated: 2017-06-06

Total video time: 6:00

Points from Alignment

Exercise files: pnt-frm-ali-data-c3d16.zip [pnt-frm-ali-01.mp4](pnt-frm-ali-01.mp4) 6:00

COGO Points can be created with horizontal location, elevation and description data generated automatically from a specified Alignment and Profile within a drawing. Point data can then be exported to a number of file formats (ie CSV) and uploaded to a survey data collector in preparation for staking work.

Info: Civil 3D Alignments and Profiles can also be uploaded directly to a survey data collector in preparation for staking work.

Points from Alignment

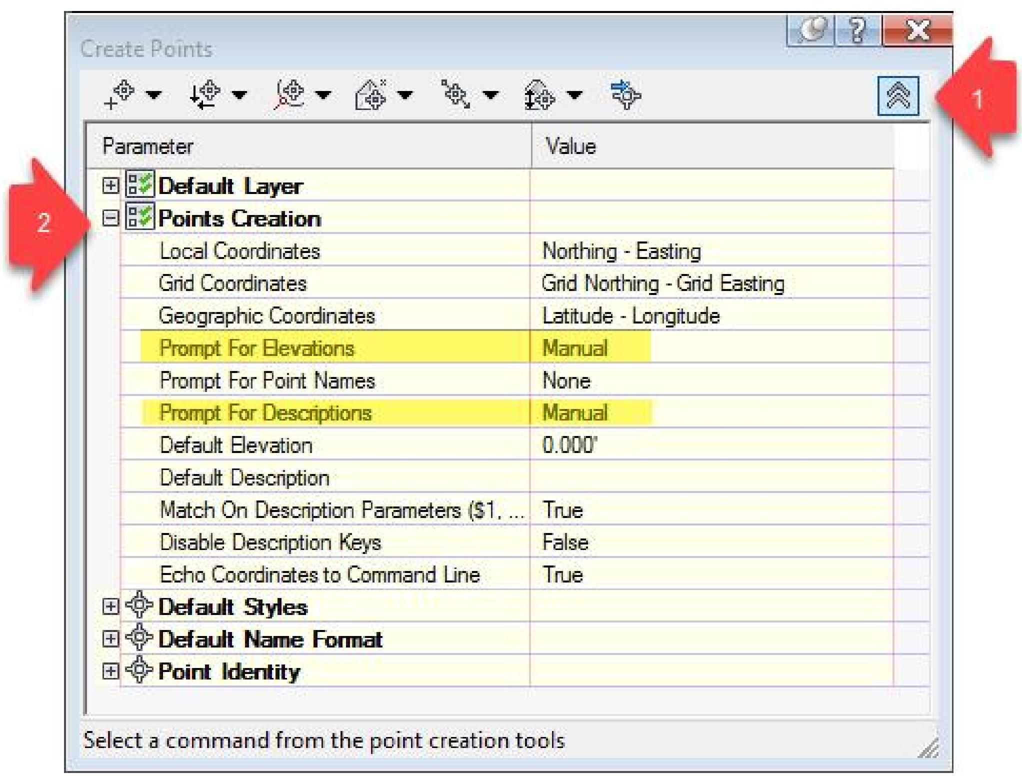
Create Points from Alignment

In the following workflow you will create typical COGO Points for staking including those at even stationing, horizontal geometry points and profile geometry points. You will then edit COGO Points with elevation 0.000' to pull elevation data from a surface and export Point data to a CSV file.

Create Points

1. **Ribbon > Home tab > Create Ground Data panel > Points dropdown > Point Creation Tools**
   A. Expand settings chevron
   B. Expand **Points Creation**
      I. **Prompt For Elevations** = Automatic
      II. **Prompt For Descriptions** = Automatic - Object

   C. Collapse settings chevron



D. **Create Points - Alignment dropdown > Measure Alignment**
   I. Pick Alignment ***25***
   II. Select Profile ***25-Prop*** from dropdown
   III. OK
   IV. Enter for default Starting Station
   V. Enter for default Ending Station
   VI. Enter for default Offset
   VII. `SPECIFY INTERVAL:` **50**Enter
E. **Create Points - Alignment dropdown > At Geometry Points**
   I. Pick Alignment ***25***
   II. Select Profile ***25-Prop*** from dropdown
   III. OK
   IV. Enter for default Starting Station
   V. Enter for default Ending Station
F. **Create Points - Alignment dropdown > Profile Geometry Points**
   I. Pick Alignment ***25***
   II. Select Profile ***25-Prop*** from dropdown
   III. OK
   IV. Enter for default Starting Station
   V. Enter for default Ending Station

Edit Points

Toolspace > Prospector tab > Right Click Points > Edit Points

1. Click Point Elevation column header to sort numerically
2. Shift-select all 0.000' elevation fields
3. **Right-click > Elevations from Surface…**
   A. Choose ***Exist*** Surface from dropdown
4. Close *Point Editing* Panorama

Export Points to File

Ribbon > Output tab > Export Points

1. **Format** = PNEZD (comma delimited)
2. Browse to Destination File path desired
3. Save as 25 Align.csv
4. Open with text editor or Microsoft Excel to view/sort/etc as needed

Surfaces

Accessing Civil 3D surfaces

Last updated: 2017-06-06

Total video time: 4:52

Exercise files: srfc-accs-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-accs.dwg

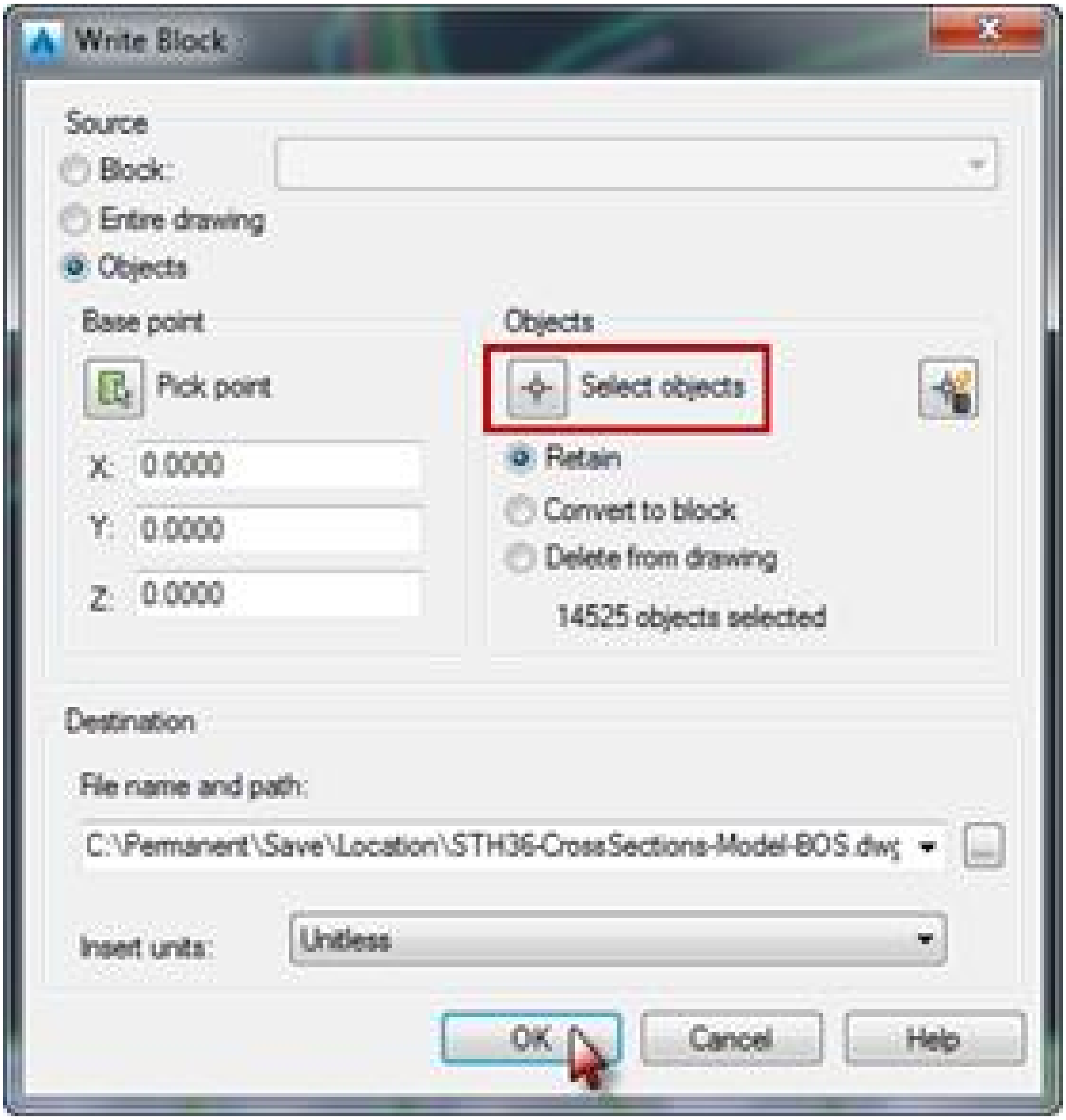
srfc-accs.mp4 4:52

Accessing Civil 3D surfaces

Surfaces and many of the editing and analysis tools available for working with them can be access via the Standard Ribbon, Toolspace Prospector and Modelspace.

Standard ribbon

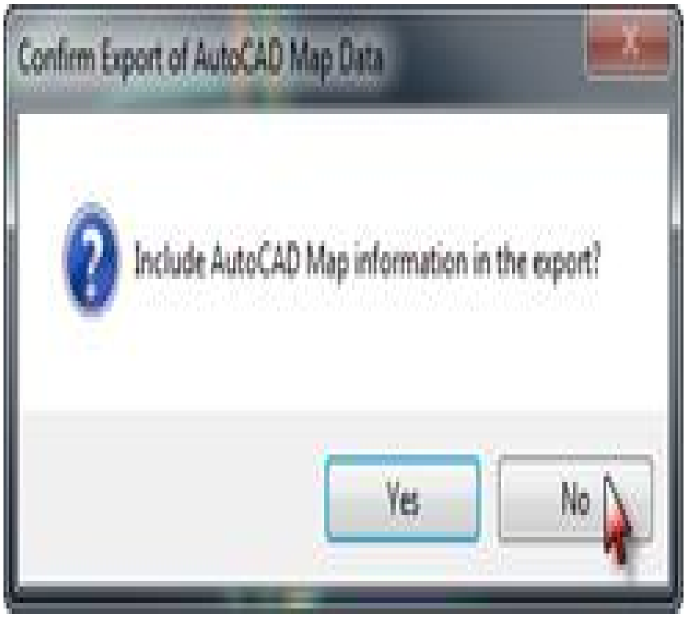
Surface creation tools can be found on the Standard Ribbon. You can either create an empty Surface and proceed to add data or Create a Surface from existing data (ie from external DEM file or Point Cloud within current drawing). Most of these tools will generate a TIN Surface



1. **Ribbon > Create Data panel > Surfaces dropdown > Create Surface or Create Surface from ******

Toolspace prospector

Several Surface creation, export and editing options are available through Right-Click menus at various levels of Prospector tree expansion.



1. **Toolspace palette > Prospector tab > Right-click Surfaces**
   A. Access to:
      - Create Surface
      - Create Surface from DEM
      - Create Surface from TIN
      - Export to DEM
      - Export LandXML

1. **Toolspace palette > Prospector tab > expand Surfaces > right click *Exist***
   A. Access to:
      - Surface Properties
      - Edit Surface Style
      - Rebuild tools
      - Snapshot tools
      - Add Label (ie Contour, Slope, Spot/Grid Elevations)
      - Export tools

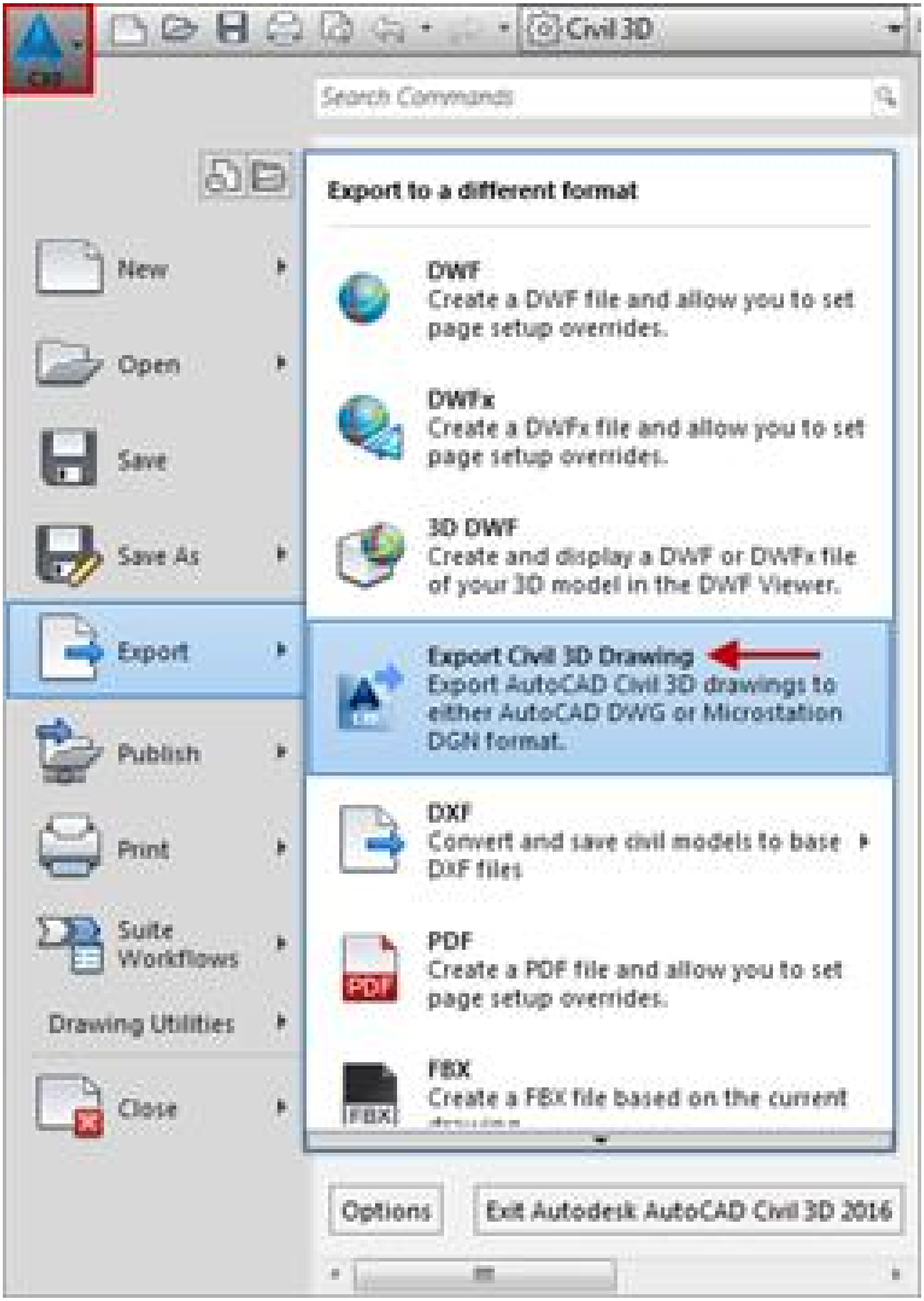
1. **Toolspace palette > Prospector tab > expand Surfaces > expand *Exist* > expand Definition**
   A. Access to:
      - Masks
      - Watersheds
      - Add Surface definition:
        - Boundaries
        - Breaklines
        - Countours
        - DEM files
        - Drawing Objects

- Edits
- Point Files
- Point Groups
- Point Survey Queries
- Figure Survey Queries

1. **Toolspace palette > Prospector tab > expand Surfaces > expand *Exist* > expand Defin-ition> right-click Edits**
    A. Access to Surface editing tools:
        - Line editing
        - Point editing
        - Minimize Flat Areas (based on tolerance inputs)
        - Raise/Lower Surface
        - Smooth Surface (adds data)
        - Paste Surface (make composite surface by pasting existing Surfaces "pieces" into one)
        - Simplify Surface (removes data)
        - Add Label (ie Contour, Slope, Spot/Grid Elevations)

Modelspace

Select a Surface in Modelspace to activate the Surface Contextual Ribbon. The properties palette will now be populated with Surface object data. In Modelspace, the right-click menu also provides access to Surface Properties and Edit Surface Style options.


Civil 3D
Search Commands
New
Open
Save
Save As
Export
Publish
Print
Suite Workflows
Drawing Utilities
Close
Export to a different format
DWF
Create a DWF file and allow you to set page setup overrides.
DWFx
Create a DWFx file and allow you to set page setup overrides.
3D DWF
Create and display a DWF or DWFx file of your 3D model in the DWF Viewer.
Export Civil 3D Drawing
Export AutoCAD Civil 3D drawings to either AutoCAD DWG or Microstation DGN format.
DXF
Convert and save civil models to base DXF files
PDF
Create a PDF file and allow you to set page setup overrides.
FBX
Create a FBX file based on the current
Options
Exit Autodesk AutoCAD Civil 3D 2016

Contextual ribbon

1. Select Surface
2. **Contextual Ribbon > Labels & Tables tab**
   A. Access to:
      - Add Surface Labels - spot/grid elevations, slopes, contours
      - Add Legends - these may correspond with a Surface style and analysis. For example Elevation ranges displayed in a range of solid colors.
3. **Contextual Ribbon > General Tools tab**
   A. Access to:
      - Inquiry - determine coordinates at a specified point or coordinates for and slope between two specified points on a Surface.
      - Object Viewer - rotate to isometric view of Surface
4. **Contextual Ribbon > Modify tab**
   A. Access to:
      - Surface Properties - change Style, Name, manipulate Definition Operations, perform analyses
      - Add Data - Boundaries, Breaklines
      - Edit Surface tools
      - Surface tools - Drape Image, Extract From Surface, Move to Surface
      - Launch Pad
5. **Contextual Ribbon > Analyze tab**
   A. Access to:
      - Water Drop - create 2D or 3D Polyline along downhill slope of TIN triangles until a low point is found
      - Resolve Crossing Breaklines
      - Visibility Check - check for visibility of a location or in all directions by specifying height of eye at a location
      - Catchment Area - creates catchment area from Surface for TR-55 time of concentration hydrology analysis
      - Volumes Dashboard - create Volume Surface and generate cut/fill reports
      - Stage Storage - generate stage-storage volume report (conic or average end area)
6. **Contextual Ribbon > Surface Tools tab**
   A. Access to:
      - Drape Image
      - Extract/ Move to Surface
7. **Contextual Ribbon > Launch Pad tab**
   A. Access to:
      - Quick Profile - temporary profile view of Surface lying beneath line, polyline, arc, parcel segment or feature line (Quick Profile view and data not saved with drawing)

- Data Shortcut
- Create Profile - create Profile object with surface elevation data Surface
- Grading Creation Tools

Surface styles

Last updated: 2017-01-10

Total video time: 4:12

Exercise files: srfc-styl-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-styl-begin.dwg

srfc-styl.mp4 4:12

Surface styles

Surface Styles control the display of a Surface. Certain display features are only available with some styles. For instance, a style with Contours turned on is necessary to display Contour Labels. Further, certain styles will correspond with Surface Legend Tables and associated Surface analysis. Surface analysis will be discussed in detail in a later training module. Styles included with the template chosen can be accessed through Toolspace Settings, the Surface Contextual Ribbon or Surface Properties.

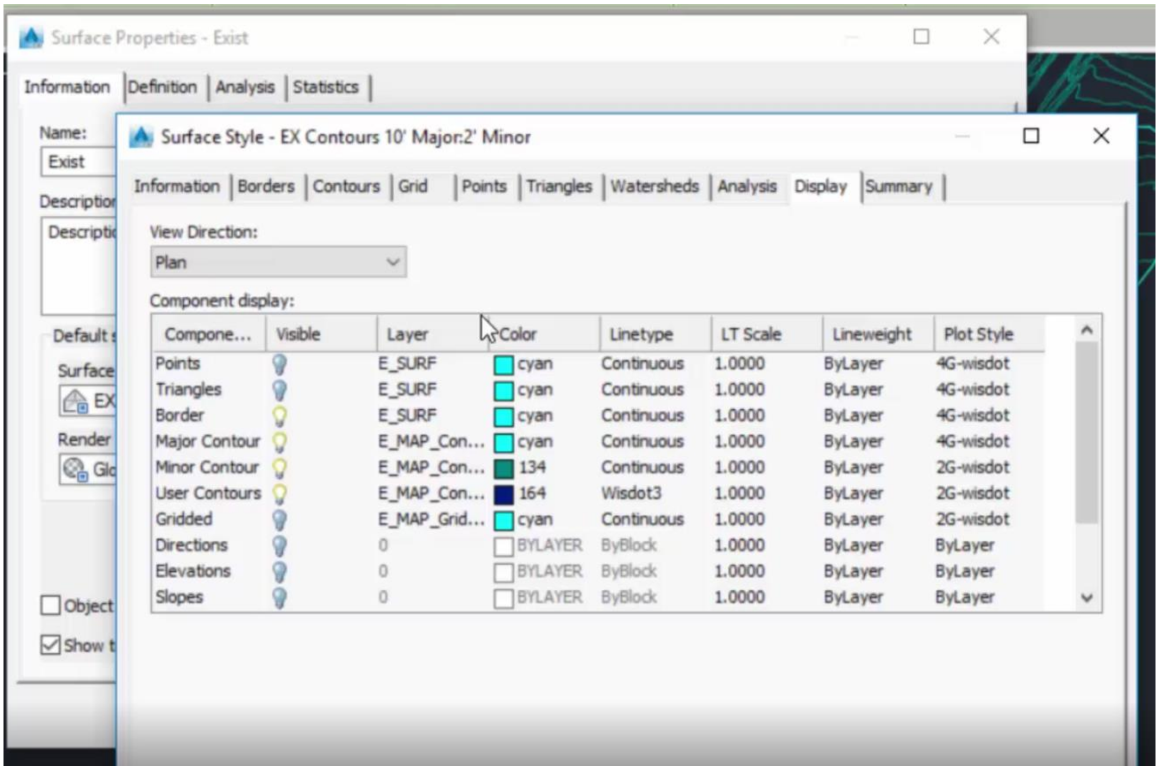
Change surface style

Use the following workflow to set the Surface Style after Surface is created. An initial Surface Style is specified in the Surface creation dialog.

1. **Select Surface from Modelspace or Toolspace Prospector > Right-Click menu > Surface Properties > Information tab**
   A. Select Surface Style from dropdown menu
   B. Edit Surface Style to view Surface Style definition
   C. OK
   D. OK

Review surface style definition

Open the Surface Style dialog box to review how a Surface Style is defined. This can be opened as described above or through Toolspace Settings.



1. **Toolspace palette > Settings tab > expand Surface > expand Surface Style > Right-click on Surface Style Name > Edit**
   A. **Display tab > View Direction dropdown > Select Plan, Model, or Section**
   B. Review respective Display definition
   C. OK
   D. OK

Warning: Surface Styles should be used as built in the WisDOT template and not edited. This helps to maintain standardization.

Surface basics

Last updated: 2017-01-10

Total video time: 5:14

srfc-basc.mp4 5:14

Surface basics

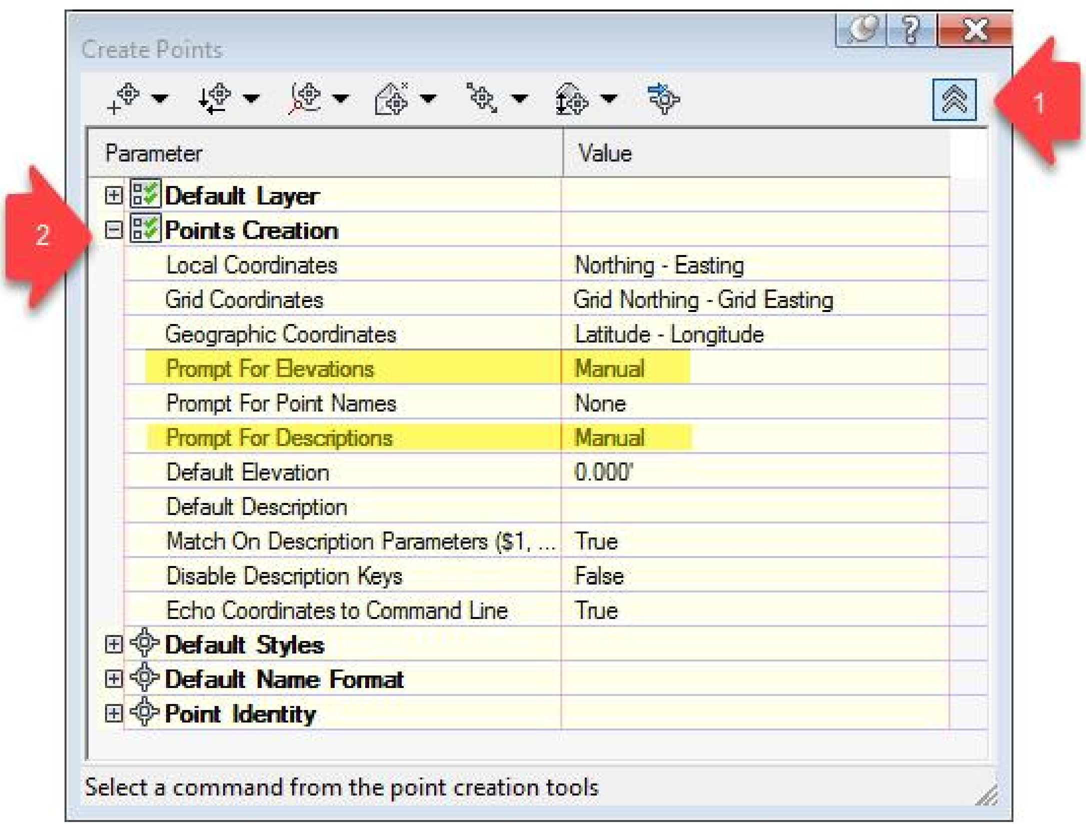
What is a Civil 3D surface

A Civil 3D Surface is a dynamic object representing elevation. One and only one elevation (Z) is assigned for a given location (X,Y) within the extents of the data used. A Surface representing existing conditions is typically built using topographical data gathered from Survey Points, Automatic Linework and/or Figures combined with LiDAR from an online data clearinghouse. A Surface representing proposed design is typically built from Civil 3D design objects such as Corridors, Grading Objects, and Feature Lines. A Surface can either be built as a TIN or Grid.

- Dynamic object representing elevation
- Only one Z per X,Y
- Existing Surface from Survey Linework, Figures, Points and LiDAR
- Design Surface from Corridor, Grading, Feature Lines

TIN surface

A TIN (Triangulated Irregular Network) Surface consists of a series of points and edges forming a series of interconnected triangles. Each point has unique elevation and location. Nearly all Surfaces you will encounter in design will be TIN Surfaces.



Grid surface

A Grid Surface consists of a series of adjacent equally sized grid squares, each with a unique elevation and central location. A Grid Surface is built based on a Digital Elevation Model (DEM) file available from an online data clearinghouse. Supported DEM file types are:

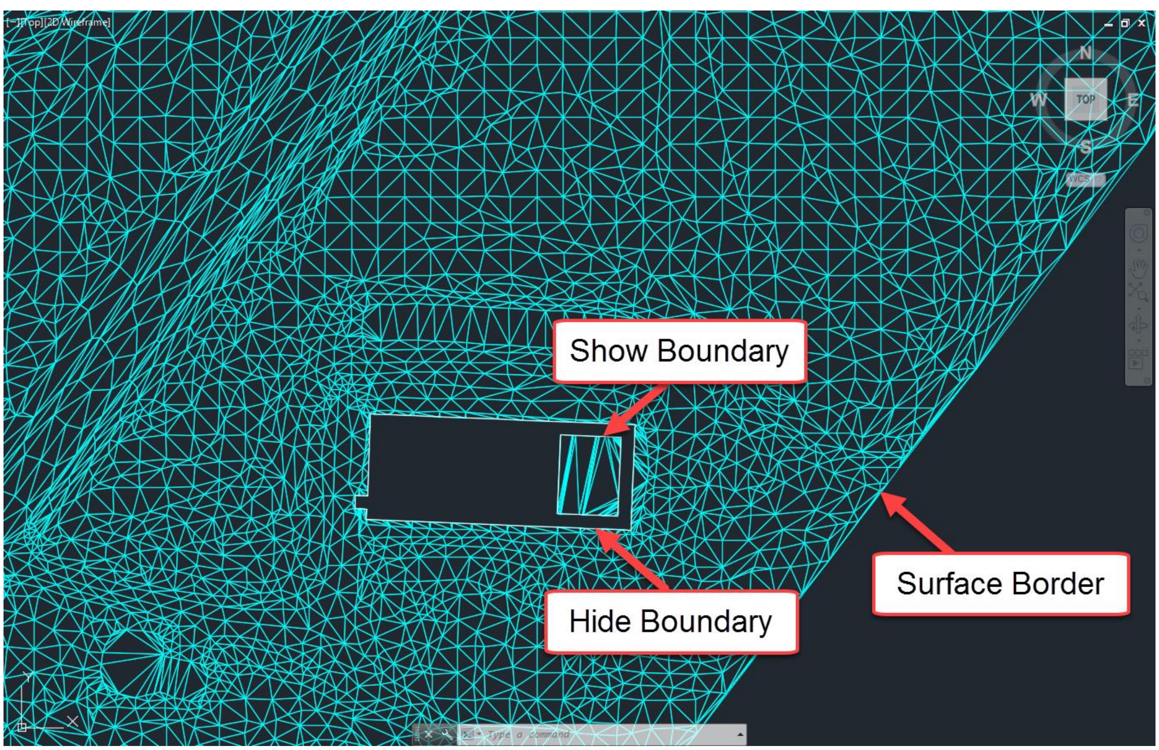
- ESRI Binary Grid (.adf)
- USGS DEM (.dem)
- GEOTIFF (.tif)
- ESRI ASCII Grid (.asc)
- ESRI ASCII Grid (.txt)

Boundary vs border

A *Surface Border* is automatically created based on the outer edge or TIN lines defined by the data used to build the Surface.

A *Surface Boundary* is data manually added by the user to specify limits. A Surface Boundary can be defined by a closed polygon such as closed Polyline or Parcel. Surface Boundary types are:

- Data - sets limits for data calculation
- Outer - sets outer display limits
- Hide - hide area inside Surface
- Show - show are inside a Hide Boundary



Breakline

A Breakline is added to a Surface to force new elevation data along the object used to define the Breakline. Objects that can be added to a Surface as a Breakline are 3D Lines/Polylines and Feature Lines as well as Survey Linework and Survey Figues.

Volume surfaces

A Volume Surface is actually a comparison of two Surfaces already in the drawing. These can then be used to automatically calculate cut and fill volumes.

Surface properties - General

Last updated: 2017-06-06

Total video time: 3:00

Exercise files: srfc-prprtis-gnrl-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-prprtis-gnrl.dwg

srfc-prprtis-gnrl.mp4 3:00

Surface properties - General

The Surface Properties dialog box is split into four tabs: Information, Definition, Analysis and Statistics. This training module will focus on the Information and Statistics tabs.

1. **Modelspace > Select *Exist* Surface > Right-click menu or Contextual Ribbon > Surface Properties**
    1. Statistics or Information tab

or

1. **Toolspace palette > Prospector tab > Expand Surfaces > Right-click *Exist* > Surface Properties**
    A. Statistics or Information tab

Statistics tab

The Statistics tab is used to view statistical information about the Surface. This may be helpful to get a general idea of what makes up your Surface. Within the Statistics tab are General, Extended, and TIN listings.

General

Expand the General listing for statistics on Points, Coordinates, and Elevation

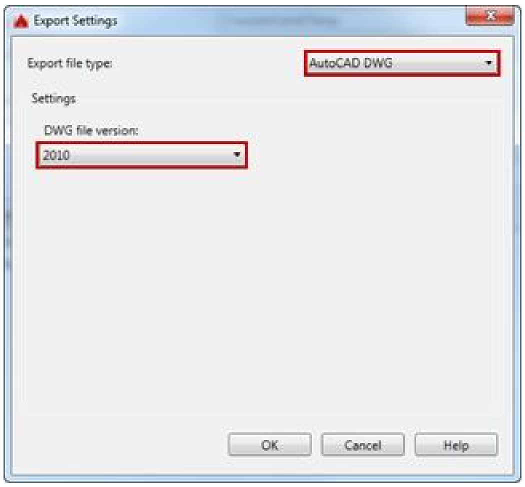
Extended

Expand the Extended listing for statistics on Surface area and Minimum/ Maximum/ Mean slope

TIN

Expand the TIN listing for statistics on the Quantity of and Minimum/ Maximum area/ length of the triangles making up the Triangulated Irregular Network

Information tab



Within the Information tab you can:

- Rename the Surface
- Add a Description to the Surface
- Select a Surface Style
- Preview or View Display properties of available Surface Styles
- Apply Render Material
- Lock/Unlock Surface object for editing
- Turn Tooltips On/Off

Tip: Turning Tooltips off can help remedy performance/ processing speed issues

Warning: Renaming a Surface after a Data Shortcut has been created from it can cause problems that may propagate to drawings with a Data Reference of the Surface. Repathing or recreating Data Shortcuts and Data References may be required.

Surface properties - Definition

Last updated: 2017-01-10

Total video time: 5:05

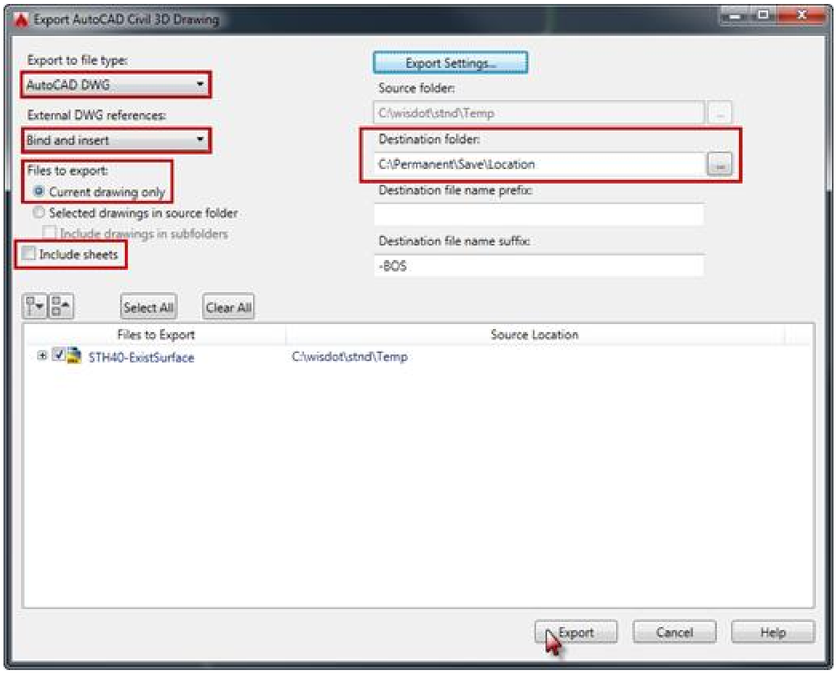
Exercise files: srfc-prprtis-def-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-prprtis-def.dwg

srfc-prprtis-def.mp4 5:05

Surface Ppoperties - Definition

The Definition tab of the Surface Properties window provides access to the Definition Options table and the Operation Type table. Use the Definition Options table to view or change Surface definition settings. Use the Operation Type table to work with existing Surface operations.



Definition options

Expand Edit operations to toggle on/off (Use? Yes/No) all existing and future instances of any specific Edit Surface operation for the selected Surface.

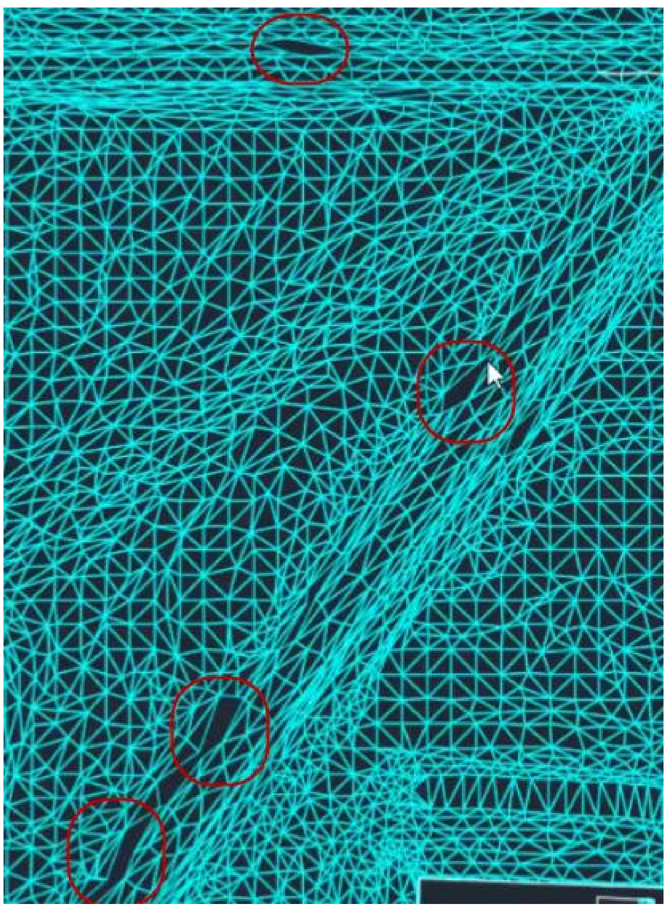
Expand Data operations to toggle on/off (Use? Yes/No) all existing and future instances of any specific Add Data operation for the selected Surface.

Expand Build to toggle on/off (Yes/No) and set values for unique Surface building operations. This training module examines *Use Maximum Triangle Length* and *Allow Crossing Breaklines* specifically.

Use maximum triangle length

Setting this Definition Option to Yes allows you to limit the length of the longest side edge of any given TIN triangle. This technique is used to eliminate long "sliver" triangles that add data without much affect on the Surface definition or shape. Eliminating them can improve drawing performance.

1. **Modelspace > Select *Exist* Surface > Right-click menu or Contextual Ribbon > Surface Properties**
    1. **Definition tab > Expand Build**
    2. **Use Maximum Triangle Length** = Yes
    3. **Maxium Triangle Length** = 50
    4. Apply
2. Dialog box > **Rebuild the surface**
3. Observe "holes" in Surface



> **Warning:** Setting the Maximum Triangle Length value too low can create "holes" or interior boundaries in your Surface. The appropriate value may vary by Surface depending on the data used to build.

Allow crossing breaklines

Crossing Breaklines should be avoided when adding data such as Feature lines or Grading Objects to a Surface. An example of where you not be able to avoid crossing Breaklines is when Automatic Linework is generated along roadway centerline Survey Points when importing data to a Survey Database. When working with such a Surface, you will need to decide if Crossing Breaklines will be allowed.

Remeber, only one elevation (Z) is allowed at any given horizontal location (X,Y) for a Surface. If a Surface has Crossing Breaklines with different elevation at their intersection, there are two elevations at the same horizontal location. You must specify how to assign the elevation at this point.

Set to "No"

If the Allow Crossing Breaklines value is set to No, only one of the crossing Breaklines is used and the other is not added to the Surface.

Set to "Yes"

When the Allow Crossing Breaklines value is set to Yes, you must further specify how to assign the elevation at the crossing Breakline intersection:

- **Use first breakline elevation at intersection** - the elevation from the first crossing breakline listed under Operation Type is used
- **Use last breakline elevation at intersection** - the elevation from the last crossing breakline listed under Operation Type is used
- **Use average breakline elevation at intersection** - this option should not be used since it requires extra data processing and may cause performance problems or crashing.

1. **Modelspace > Select *Exist* Surface > Right-click menu or Contextual Ribbon > Surface Properties**
    1. **Definition tab > Expand Build**
        1. **Allow crossing breaklines** = No
        2. **Under Operation Type, Add breakline** = checked
        3. Apply
    2. Dialog box > **Rebuild the surface**
    3. Observe Events notification indicating one breakline was not added

4. **Surface Properties Definition tab**
    1. **Allow crossing breaklines** = Yes
    2. **Elevations to use** = Use first breakline elevation at intersection
    3. Apply
5. Dialog box > **Rebuild the surface**
6. Observe Events notification indicating the remaining breakline was added

Operation type

All of the Surface Operations (ie Add Data, Edit Surface, Snapshots) currently used to build the Surface are listed in this table. Where all instances of a given Add Data or Edit Surface operation can be toggled in the Definition Options table, individual Surface building operations can be toggled on/off or reordered in the Operation Type table. The order of Surface Operations can and often will affect the end result of how a surface is built.

1. **Modelspace > Select *Exist* Surface > Right-click menu or Contextual Ribbon > Surface Properties**
    1. **Click Definition tab**
    2. Select an Operation Type
    3. Reorder build operation with up/down arrow buttons (ie)
    4. Apply
        1. Dialog box > **Rebuild the surface**
        2. Observe effect of Operation Type reordering

Tip: Be cautious and observe individual changes whenever Surface operations are toggled on/off or reordered in the Operation Type table.

Surface breaklines

Last updated: 2017-06-06

Total video time: 6:22

Exercise files: srfc-brklin-data-c3d16.zip

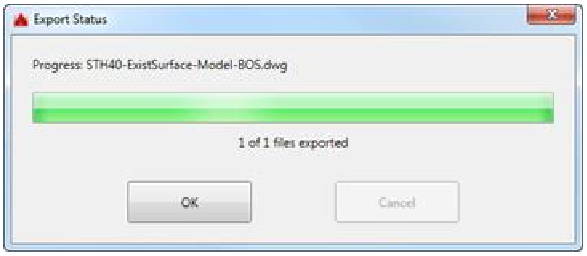
Start with 12345678\Design\Surfaces\srfc-brklin.dwg

srfc-brklin.mp4 6:22

Surface breaklines

Adding a Breakline to a Surface forces new elevation and location along the object used as a

Breakline. Polylines, 3D Polylines and Feature lines as well as Survey Linework and Survey Figures can all be added to a Surface as Breaklines. New triangulation is forced for TIN triangles adjacent to any Breakline added. When adding a breakline you must specify the type of Breakline to add. You can choose from Standard, Proximity, Wall, Non-destructive and From File.



Standard

New TIN lines and verticies are forced along the Breakline object. All elevation and location data is pulled directly from the Breakline object.

1. **Toolspace Prospector > Expand Surfaces > Expand Exist > Expand Definition > Right-Click Breaklines > Add**
    A. **Add Breaklines dialog > Type dropdown > Standard**
    B. OK
2. Select polyline
3. Right-Click

Proximity

Elevation data is pulled from the existing TIN vertex closest to any given Breakline vertex. Adjacent triangulation is updated acordingly.

1. **Toolspace Prospector > Expand Surfaces > Expand Exist > Expand Definition > Right-Click Breaklines > Add**
    A. **Add Breaklines dialog > Type dropdown > Proximity**
    B. OK
2. Select polyline
3. Right-Click

Wall

An offset side of and vertical displacement from the Breakline is specified. The effect is a near-vertical wall in a Surface.

1. **Toolspace Prospector > Expand Surfaces > Expand Exist > Expand Definition > Right-Click Breaklines > Add**
    A. **Add Breaklines dialog > Type dropdown > Wall**
    B. OK
2. Select polyline

3. Specify offset side by clicking
4. Enter option for wall heights - **ALL**
5. Enter
6. Enter elevation difference for offset points - **1**
7. Enter

> **Info:** A minimum offset (0.0001 drawing unit) is necessary to maintain unique Surface elevation (Z) values for every location (X,Y). Specifying All applies the vertical displacement to all Breakline verticies

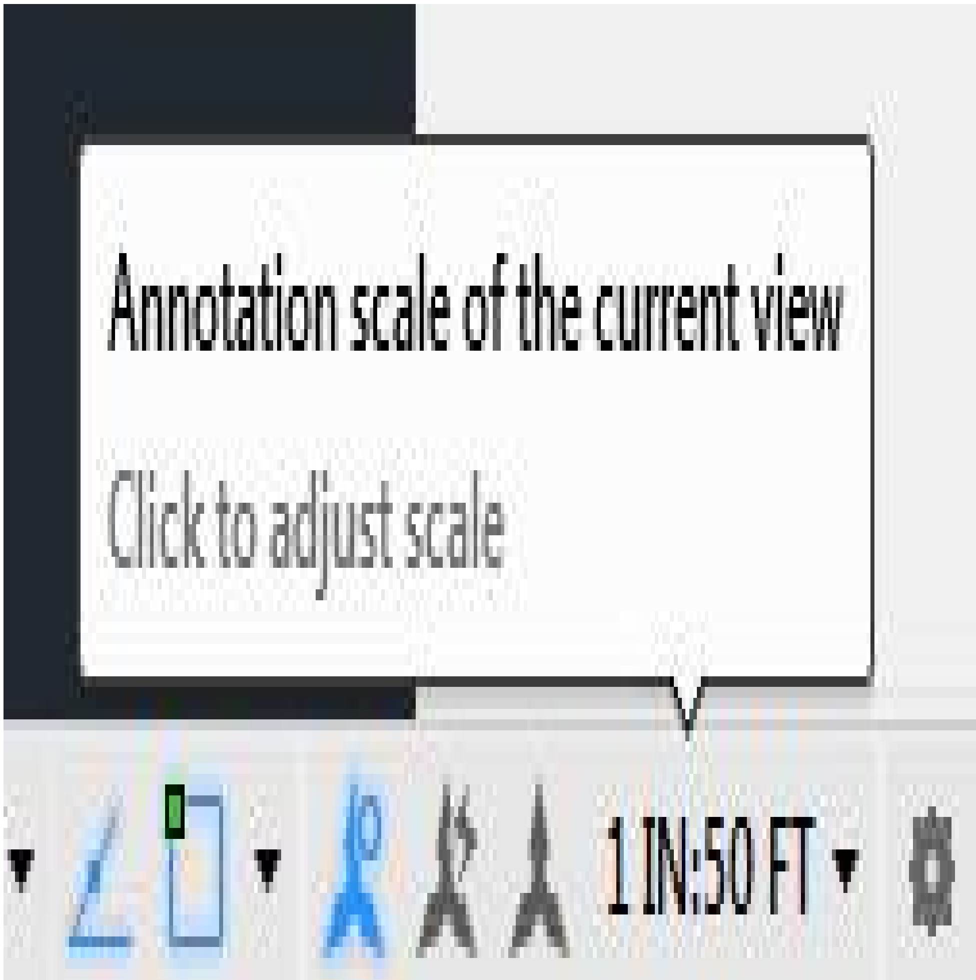
Non-destructive

New Verticies and TIN lines are created along the Breakline, but Surface elevations remain unchanged.

1. **Toolspace Prospector > Expand Surfaces > Expand Exist > Expand Definition > Right-Click Breaklines > Add**
    A. **Add Breaklines dialog > Type dropdown > Non-destructive**
    B. OK
2. Select polyline
3. Enter

From file

This option imports Breakline data from an FLT file. You can choose to either maintain a dynamic link to the FLT file or break the link and write the data directly to the Surface definition in the drawing.



1. Open srfc-brklin-flt-begin.dwg
2. **Toolspace Prospector > Expand Surfaces > Expand From File flt > Expand Definition > Right-Click Breaklines > Add**
   A. **Add Breaklines dialog > Type dropdown > From File**
   B. **Add Breaklines dialog > File link options dropdown > Break link to file**
      I. Import Breakline File dialog
      II. Browse to EXIST.flt
      III. Open
      IV. Dismiss Events Panorama

Surface creation

Last updated: 2017-06-06

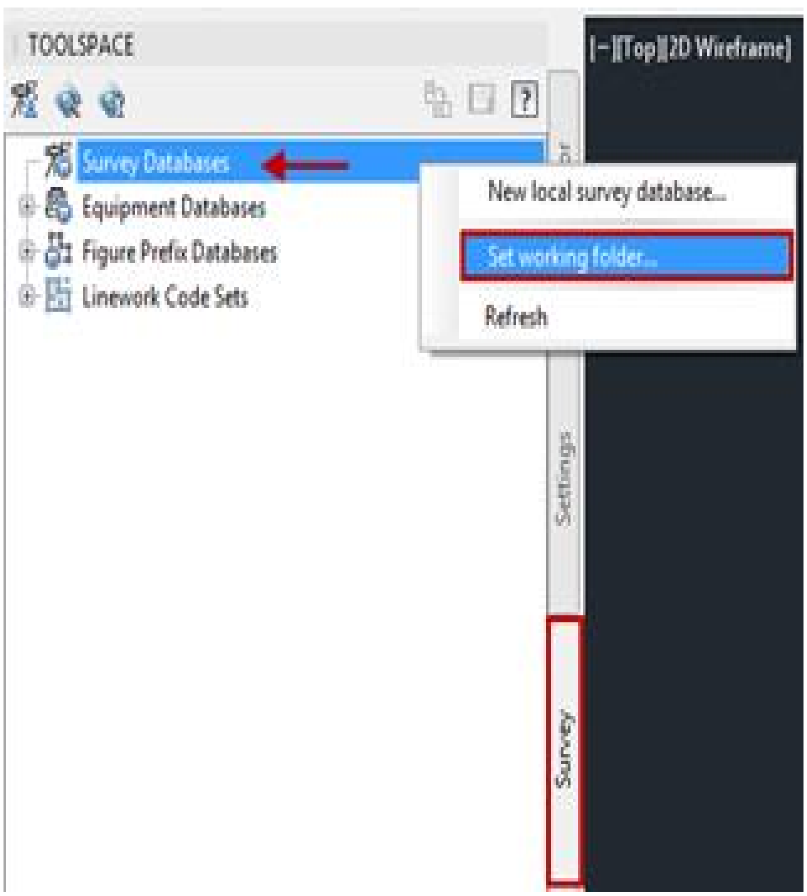
Total video time: 5:47

Exercise files: srfc-creat-data-c3d16.zip

Start with 12345678\Design\srfc-creat-begin.dwg srfc-creat.mp4 5:47

Surface creation

There are many approaches to Surface creation both from a Survey standpoint dealing with existing conditions and from a Design standpoint using dynamic Civil 3D tools. In either case, a Surface can either be created first with data then added afterword or created with available Surface definition data specified at the time of creation. Typically, existing conditon Surfaces are created from topo Survey data (Survey Points, Linework and Figures) and proposed design Surfaces are created largely from Corridors and Grading Object Featurelines. The workflow shown in this training module involves creating a Surface with no definition and subsequently adding data. Specifically, an external point file (.pnt) and external breakline file (.flt) will be used to add Surface definition data after creation.



Create surface

1. **Ribbon > Home tab > Create Ground Data panel > Surfaces dropdown > Create Surface**

A. Create Surface dialog: Layer
  I. Object Layer dialog: Layer
    a. **Layer** = E_SURF
    b. OK
  II. **Name** = Existing
  III. Style Ellipses
    a. Select Surface Style dialog
    b. ***EX Contours 10' Major: 2' Minor***
    c. OK

Add data

1. **Toolspace > Prospector tab > Expand Surfaces > Expand Definition > Right-click Point Files > Add**
   A. Add Point File dialog
     I. Browse to EXIST.pnt
     II. Open
   B. **Point file format** = PENZ (space delimited)
   C. OK
2. Zoom Extents
3. **Toolspace Prospector > Expand Surfaces > Expand From File flt > Expand Definition > Right-Click Breaklines > Add**
   A. **Add Breaklines dialog > Type dropdown > From File**
   B. **Add Breaklines dialog > File link options dropdown > Break link to file**
     I. Import Breakline File dialog
     II. Browse to EXIST.flt
     III. Open
     IV. Dismiss Events Panorama

Surface boundaries

Last updated: 2017-01-12

Total video time: 8:59

Surface boundaries - Data clip & outer

Exercise files: srfc-bndry-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-bndry-begin.dwg

srfc-bndry-01.mp4 4:24

Surface Boundaries can be added to any Surface to set data processing and/or display limits. There are four available Surface Boundary types: Data Clip, Outer, Hide and Show. For all types but Data Clip, you have the option to add the Boundary as a Non-destructive Breakline. Doing so interpolates Surface slopes and adds TIN lines and points so that the Surface is displayed exactly up to the limits of the object used as a Boundary. If the Non-destructive Breakline option is unchecked, the Surface will be displayed using only previously existing TIN lines and points completely within the limits of the polygon used as a Boundary.

Closed polygon objects such as 2D or 3D Polylines, Circles, Parcels and Survey Figures can all be used as a dynamic reference for a Surface Boundary. If a polygon is not closed, Civil 3D will define and force a closed polygon when adding a Boundary. If the object referenced to add a Surface Boundary contains arcs, TIN tessellation is generated based on the Mid-ordianate distance specified in the Add Boundaries dialog. The mid ordinate distance is the distance from the center of the chord connecting adjacent points along an arc perpendicular to the center of the arc. TIN lines are then generated along the chord after adding the Surface Boundary. A smaller mid-ordinate distance results in a "smoother" arc on a Surface Boundary.

The following section describes the Data Clip and Outer Boundary Types.

Data clip

A Data Clip Boundary is used to limit the area where new data will be processed when added. This can help improve drawing performance and utilize hardware resources more efficiently. Only data added after the Data Clip Boundary is added will be affected by the Data Clip Boundary. For this reason, it is a good idea to add any Data Clip Boundary during the initial steps of Surface creation.

Create surface and add data clip boundary

1. **Toolspace palette > Prospector tab > Right-click on Surfaces > Create Surface > Create Surface dialog**
   A. **Name** = Exist
   B. **Style** = EX Triangles
   C. OK
2. **Ribbon > Home tab > Draw panel > Activate Polyline command**
   A. Draw simple polygon around externally referenced (xref) mapping data
3. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Exist > Expand Definition > Right-click Boundaries > Add > Add Boundaries dialog**
   A. **Name** = Data Clip
   B. **Type** = Data Clip

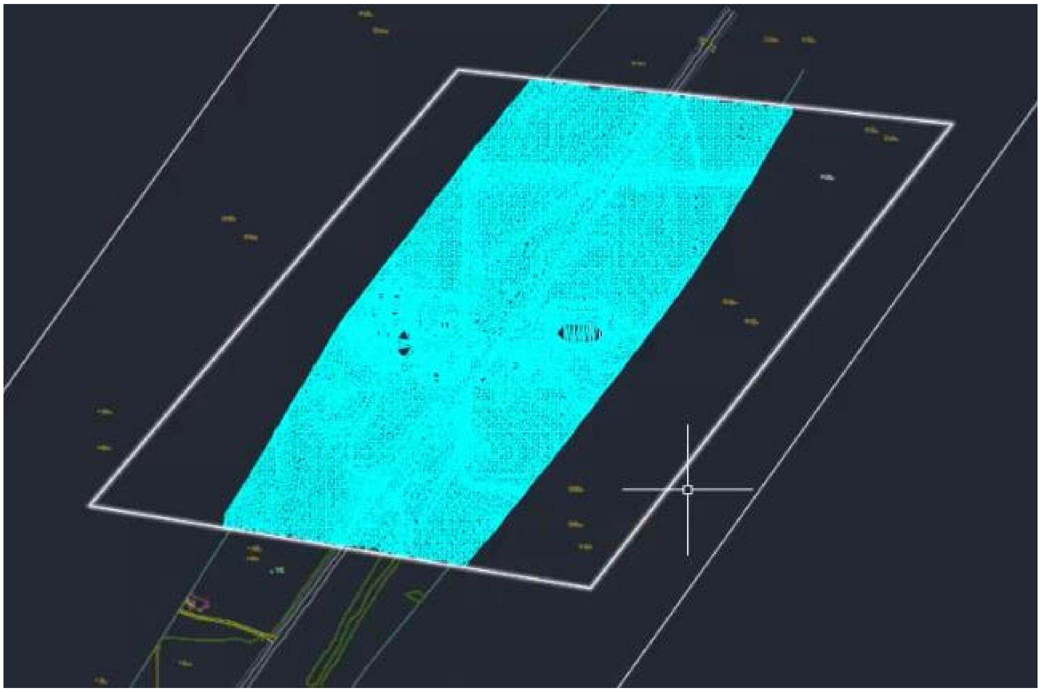
   C. OK
4. Select Polyline drawn in Step 2.1
5. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Exist > Expand Definition > Right-click *Point Files* > Add > Add Point File dialog**
   A. **Add Point File dialog > Selected Files section > > EXIST.pnt > Open**
   B. Specify point file format section
      I. **Point file format** = PENZ
   C. OK

Outer

An Outer Boundary is used to define the outermost display limits of a Surface. Multiple Outer Boundaries may be added to a Surface, but only the most recently added Outer Boundary will be used during Surface rebuilding. If multiple Outer Boundaries have been added to a Surface, they may be toggled on/off in the Definition tab of the Surface Properties dialog.

Add outer boundary to surface

1. Complete the *Create Surface and add Data Clip Boundary* workflow
2. **Ribbon > Home tab > Draw panel > Activate Polyline command**
   A. Draw simple polygon within the Data Clip Boundary. Be sure to enclose all previously drawn "building pad" Polylines as these will be used in the next exercise
3. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Exist > Expand Definition > Right-click *Boundaries* > Add > Add Boundaries dialog**
   A. **Name** = Outer
   B. **Type** = Outer
   C. Uncheck Non-destructive breakline
   D. OK
4. Select Polyline drawn in Step 2.



Surface boundary - Hide & show

Exercise files: srfc-bndry-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-bndry-01.dwg

srfc-bndry-02.mp4 2:35

The following section describes the Data Clip and Outer Boundary Types.

Hide

A Hide Boundary is used to prevent display of an area inside an Outer Boundary. One example situation where a Hide Boundary may be useful is to prevent display of constant-elevation building pads. When a Hide Boundary type is specified and the Non-destructive breakline option is checked, another Surface may be selected as the reference object to define a Hide Boundary.

Add hide boundary to surface

1. Complete the *Add Outer Boundary to Surface* workflow or start from srfc-bndry-01.dwg
2. **Ribbon > Home tab > Layers panel > Activate LAYERFRZ (Layer Freeze) command**
   A. Select a TIN line on the Surface
3. Window select "building pad" Polylines
4. Shift+select to deselect the Polyline drawn inside one of the "building pad" Polylines.

5. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Exist > Expand Definition > Right-click Boundaries > Add > Add Boundaries dialog**
   A. **Name** = Hide
   B. **Type** = Hide
   C. Check Non-destructive breakline
   D. OK

Show

A Show Boundary is used to allow display of an area inside a Hide Boundary or to build TIN lines and points within a gap on a single Surface. If the Show Boundary falls within a Hide Boundary, be sure to add any Show Boundaries after the corresponding Hide Boundary. Keep in mind any Add Data operations can be reordered in the Definition tab of the Surface Properties dialog.

Add show boundary to surface

1. Complete the *Add Hide Boundary to Surface* workflow
2. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Exist > Expand Definition > Right-click Boundaries > Add > Add Boundaries dialog**
   A. **Name** = Show
   B. **Type** = Show
   C. Check Non-destructive breakline
   D. OK
3. Select "courtyard" Polyline (inside one of the "building pad" hide boundaries)

Surface masks

Last updated: 2017-06-06

Total video time: 4:20

Exercise files: srfc-msk-data-c3d16.zip

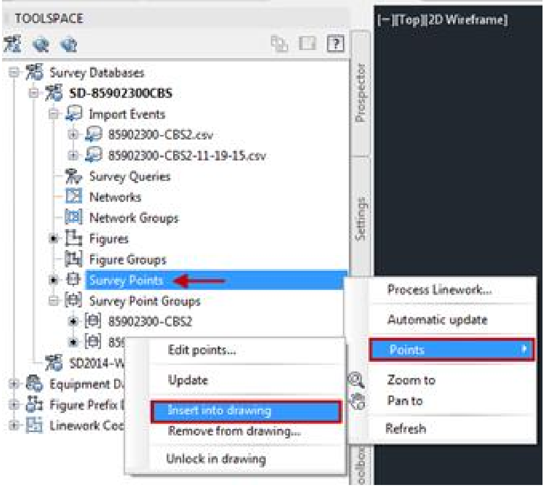
Start with 12345678\Design\Surfaces\srfc-msk-begin.dwg

srfc-msk.mp4 4:20

Surface masks

Surface Masks can be used to control the display of a Surface based on a closed polygon object. Many closed polygon objects can be used as reference objects for a Surface Mask including 2D or 3D Polylines, Survey Figures, Feature Lines, Parcels and other Surfaces. You can specify that a Surface Mask should affect Rendering only or not. Surface Rendering applies a Render Material available in the drawing template used (ie concrete or grass) as an aid in design visualization. This can be viewed in Object Viewer. You can specify to "mask" (not display) either the Surface inside or outside the polygon object used.

Info: It is worth noting that Surface Masks differ from Hide or Show Boundaries in that they only affect graphic display and do not add TIN data to the Surface. Also, the ability to add Surface Masks is more limited than that of Surface Boundaries



Create surface mask

Inside mask

1. **Toolspace palette > Prospector tab > Expand Surface > Expand *Exist* > Right-click Mask > Create Mask**
2. Select Polyline around the intersection
3. Right-Click
   A. **Mask Type** = Inside
   B. OK
4. **Toolspace palette > Prospector tab > Expand Surface > Expand *Exist* > Expand Masks > Right-click Mask 1 > Mask Properties**
   A. **Mid-Ordinate Distance** = 1
   B. OK

Info: Specifying Mask type as Inside prevents additional Masks from being created for the Surface. Changing the Mask type to Outside opens up the ability to add more Surface Masks.

Outside mask

1. **Toolspace palette > Prospector tab > Expand Surface > Expand *Exist* > Expand Masks > Right-click Mask 1 > Mask Properties**
   A. **Mask Type** = Outside
   B. OK
2. **Toolspace palette > Prospector tab > Expand Surface > Expand *Exist* > Right-click Mask > Create Mask**

3. Select previously drawn Polyline around the building pad
4. Right-Click
    A. **Mask Type** = Outside
    B. OK

Info: You can select multiple closed polygons when creating a single mask, but you will be limited to Mask type = Outside and Render only = Yes

Change display order

While you can have multiple Outside type Surface Masks on a Surface, only the Mask at the top of the Display Order list will affect the rendered display.

1. **Toolspace palette > Prospector tab > Expand Surface > Expand *Exist* > Expand Masks > Right-click Mask 1 > Display Order**
    A. Mask Display Order
    B. Select Mask 2
    C. Move Mask 2 to top of list 

    D. OK

Surface edits

Last updated: 2017-11-28

Total video time: 11:00

Surface edits - Add/delete lines & points

Exercise files: srfc-edit-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-edit-begin.dwg

srfc-edit-01.mp4 4:00

Many updates to Surfaces will be driven by dynamic links to smart Civil 3D objects such as Corridors or Grading Feature Lines (see the Corridor and Grading Objects training modules for more information on these types of dynamic Surface updates). For minor refinements, the Add Line, Delete Line, Add Point and Delete Point Surface editing tools can be useful.

Warnings:
Add/Delete Lines & Points Surface edits should be applied conservatively as final minor refinement. They are manually applied and the workflow can become time intensive.

> Surface edits in design should never be used to correct errors in corridors or gradings. They should only be used to fix incorrect triangulation in the surface.

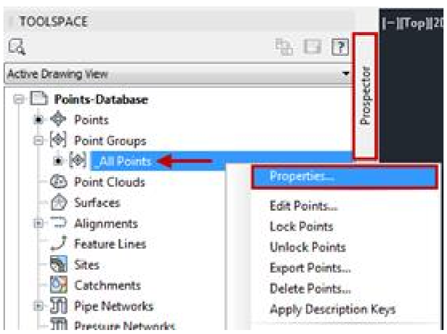
Refinement edits

Use Object Viewer to identify refinement editing needs. Use Delete Line, Delete Point and Add Line tools to perform final minor refinements to a Surface created from Grading Feature Lines.

Object viewer

1. Open srfc-edit-begin.dwg
2. Select ***Driveway*** and ***Crdr-25*** Surfaces in Modelspace
   A. **Multiple Surfaces Contextual Ribbon > Object Viewer**
      I. Pan and zoom to identify Surface refinement needs
      II. Close Object Viewer

Line & point edits



1. Esc
2. Select ***Driveway*** Surface
   A. **Surfaces Contextual Ribbon > Edit Surface dropdown > Delete Line**
      I. Select TIN lines to delete using Crossing Window
      II. Right-Click
      III. Esc
3. Select ***Driveway*** and ***Crdr-25*** Surfaces
   A. **Multiple Surfaces Contextual Ribbon > Object Viewer**
      I. Pan and zoom to identify Surface additional refinement needs
      II. Close Object Viewer
4. Select ***Driveway*** Surface
   A. **Right-Click > Surface Properties > Information tab**
      I. **Surface Style** = Rfnt-Edits
      II. OK
   B. **Surfaces Contextual Ribbon > Edit Surface dropdown > Delete Point**
      I. Select Surface points to delete using Crossing Window
      II. Right-Click

5. Reiterate steps 1-4 using Delete Line, Delete Point and Add Line until ***Driveway*** is finalized

Surface edits - Paste surface preparation

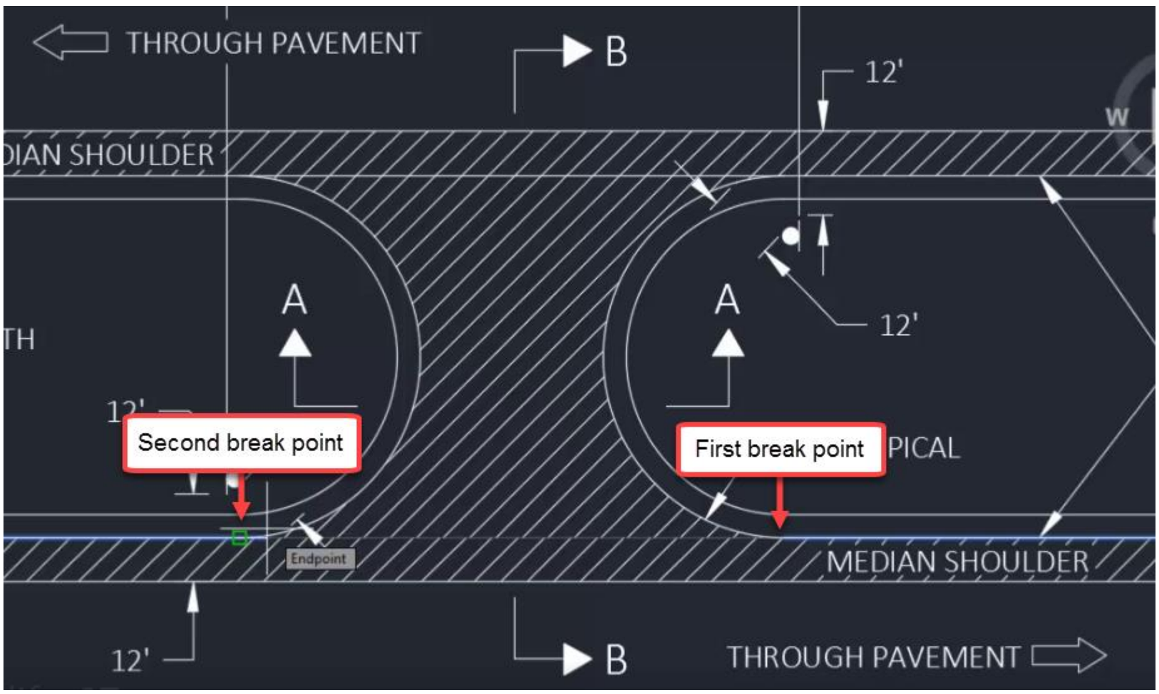
Exercise files: srfc-edit-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-edit-01.dwg

srfc-edit-02.mp4 1:07

A typical workflow to combine multiple component Surfaces into a single final proposed Surface involves creating Data Shortcuts of each component Surface (see Data Shortcuts Training Module for more information on setting up a Data Shortcut Working Folder).

Create component surface data shortcuts



1. Open srfc-edit-01.dwg
2. **Toolspace palette > Prospector tab > Verify that the Data Shortcuts Working Folder path has been set**
3. Save drawing
4. **Toolspace palette > Prospector tab > Right-click Data Shortcuts > Create Data Shortcut**
   A. Place check next to ***Crdr-25*** and ***Driveway***
   B. If ***Exist*** Data Shortcut has not yet been created, place a check next to ***Exist***
   C. OK

Surface edits - Paste surface

Exercise files: srfc-edit-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-edit-02.dwg

srfc-edit-03.mp4 3:04

Once all desired edits to component Surfaces have been completed, you are ready to combine all Surfaces into a single final Surface. You will do this by creating a new Surface empty of data and using the Paste Surface Edit to add and combine component Surface data.

Warning: To avoid potential Surface referencing problems, use only one level of Surface Pasting. For example, do not Paste Surfaces 1 and 2 into Surface 3 then Paste Surfaces 3 and 4 into Surface 5. Rather, paste Surfaces 1, 2, 3 and 4 into Surface 5.

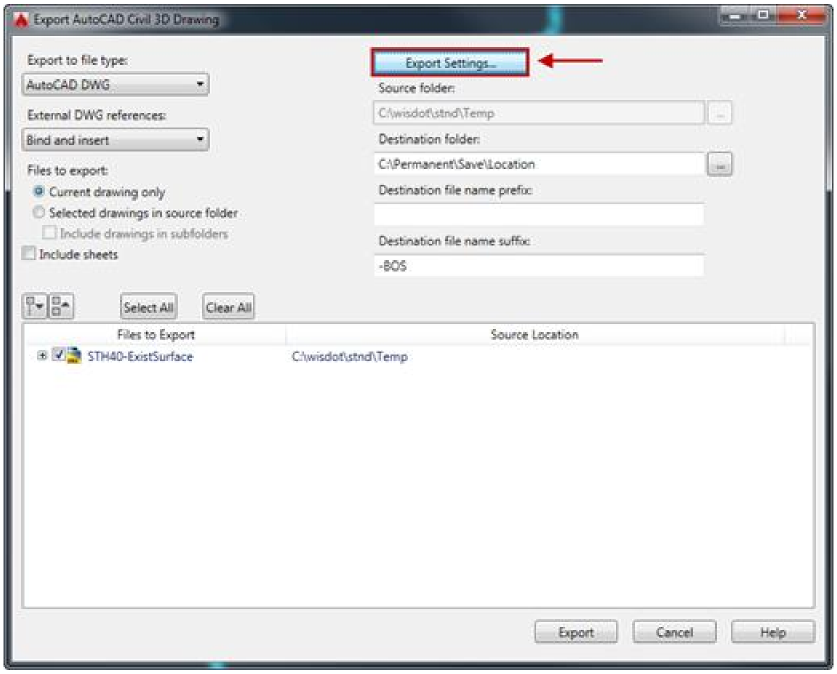
Paste surfaces

Create data references

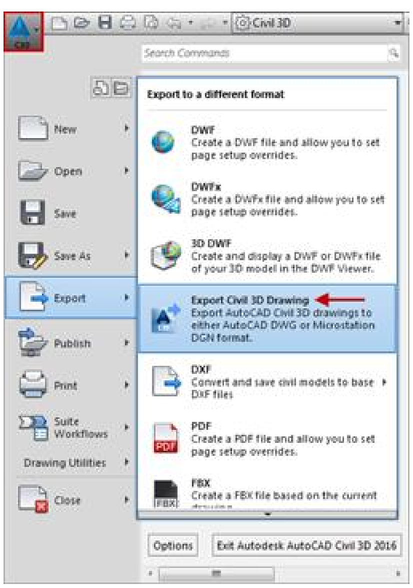
1. Open srfc-edit-02.dwg
2. **Toolspace palette > Prospector tab > Expand Data Shortcuts > Expand Surfaces > Right-click on Crdr-25**
   A. Create Surface Reference dialog
   B. **Style** = _No Display
   C. OK
3. Repeat Step 2 for ***Driveway*** and ***Exist*** Surfaces

Create final surface & perform paste surface edit

1. **Toolspace palette > Prospector tab > Right-click Surfaces > Create Surface**
   A. Create Surface dialog
   B. **Name** = Final
   C. **Style** = P Triangles
   D. OK



2. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Final > Expand Definition > Right-Click Edits > Paste Surface**
    A. Select ***Exist***
    B. OK
3. Repeat Step 2 for ***Crdr-25***
4. Repeat Step 2 for ***Driveway***
5. Zoom Extents



Surface edits - Paste surface: survey

Exercise files: srfc-edit-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-edit-03.dwg

srfc-edit-04.mp4 2:49

After a Surface built from survey data is delivered, a typical workflow is to incorporate the surveyed area into the larger project limits by combining the survey Surface with a Surface built from mapping data (DEM or LiDAR etc). This will result in an existing conditions Surface built with survey level accuracy where feasible and LiDAR level coverage covering the remainder of the project limits. Do this by creating a new, blank Surface and adding data by Pasting the mapping Surface and survey Surface in.

Warning: To avoid potential Surface referencing problems, use only one level of Surface Pasting. For example, do not Paste Surfaces 1 and 2 into Surface 3 then Paste Surfaces 3 and 4 into Surface 5. Rather, paste Surfaces 1, 2, 3 and 4 into Surface 5.

Paste survey and mapping surfaces into existing conditions surface

1. Open surf-edit-04.dwg
2. **Ribbon > Home tab > Create Ground Data panel > Surfaces dropdown > Create Surface**
   A. **Name** = Composite
   B. **Style** = EX Triangles
   C. OK
3. **Modelspace > Select Mapping Example Surface > Right-click > Surface Properties**
   A. Information tab
   B. **Surface Style** = _No Display
   C. OK
4. Repeat Step 3 for Survey Example Surface
5. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Composite > Expand Definition > Right-Click Edits > Paste Surface**
   A. Select ***Mapping Example***
   B. OK
6. Repeat Step 5 for ***Survey Example***

Surface properties - Analysis

Last updated: 2017-06-06

Total video time: 5:13

Exercise files: srfc-prprtis-anlysis-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-prprtis-anlysis-begin.dwg

srfc-prprtis-anlysis.mp4 5:13

Surface properties - Analysis

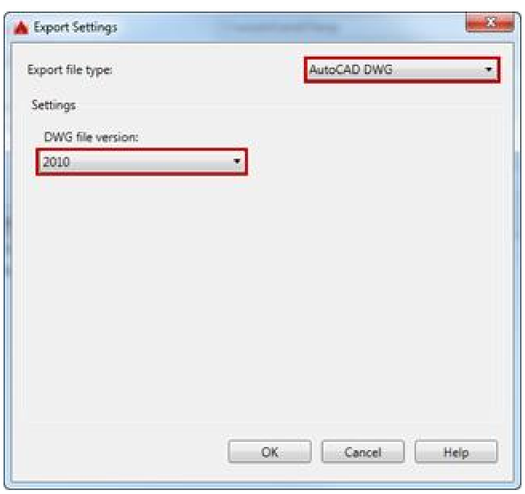
Several types of Surface Analyses can be performed in order to generate information helpful during design. Surface Analysis results can be displayed visually as a Surface Style and/or in tabular format as a Surface Legend. You will specify the number or ranges, range values (ie min and max) and corresponding display color. Surface Analysis display is turned on/off in the Display tab of a given Surface Style Editing window. The following Surface Analysis types are available in the Surface Properties window:

- Directions - TIN triangle color based on facing direction
- Elevation - TIN triangle color based on elevation range
- Slopes - TIN triangle color based on slope range (all values are positive)
- Slope Arrows - Direction arrow displayed at each TIN triangle. Color is based on slope range
- Contours - Contour color based on elevation range
- User-Defined Contour - Specify desired contour values and display based on elevation range
- Watersheds - Uses Surface Slope algorithm to analyze TIN triangles, draw Watershed boundaries and hatch according to type (ie Depression, Multi-Drain)

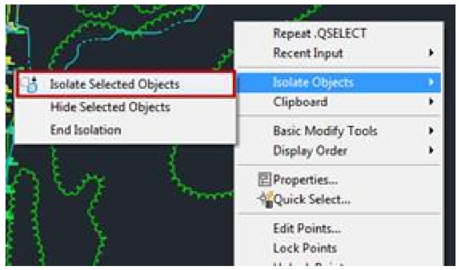
This training module will focus on Surface Slope Analysis. Specifically, you will analyze a proposed pavement Surface for drainage problem areas in flat or steep spots.

Generate and display surface slope analysis

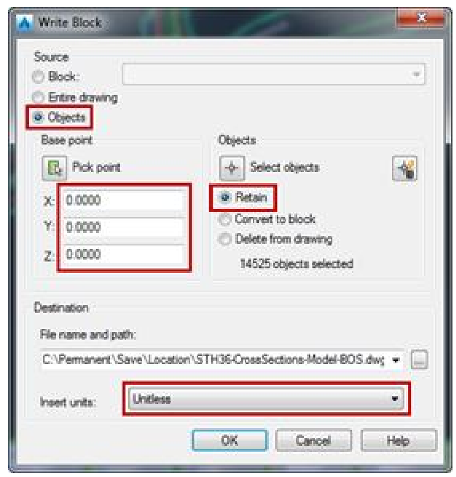
Use a Surface Slope Analysis to identify potential problem areas in a proposed pavement Surface.



1. **Toolspace palette > Prospector tab > Expand Surfaces > Right-click Crdr-25> Surface Properties**
    A. **Analysis tab**
        I. **Analysis type** = Slopes
        II. **Legend** = WisDOT Standard
        III. **Ranges Number** = 2
        IV. Populate Range Details,



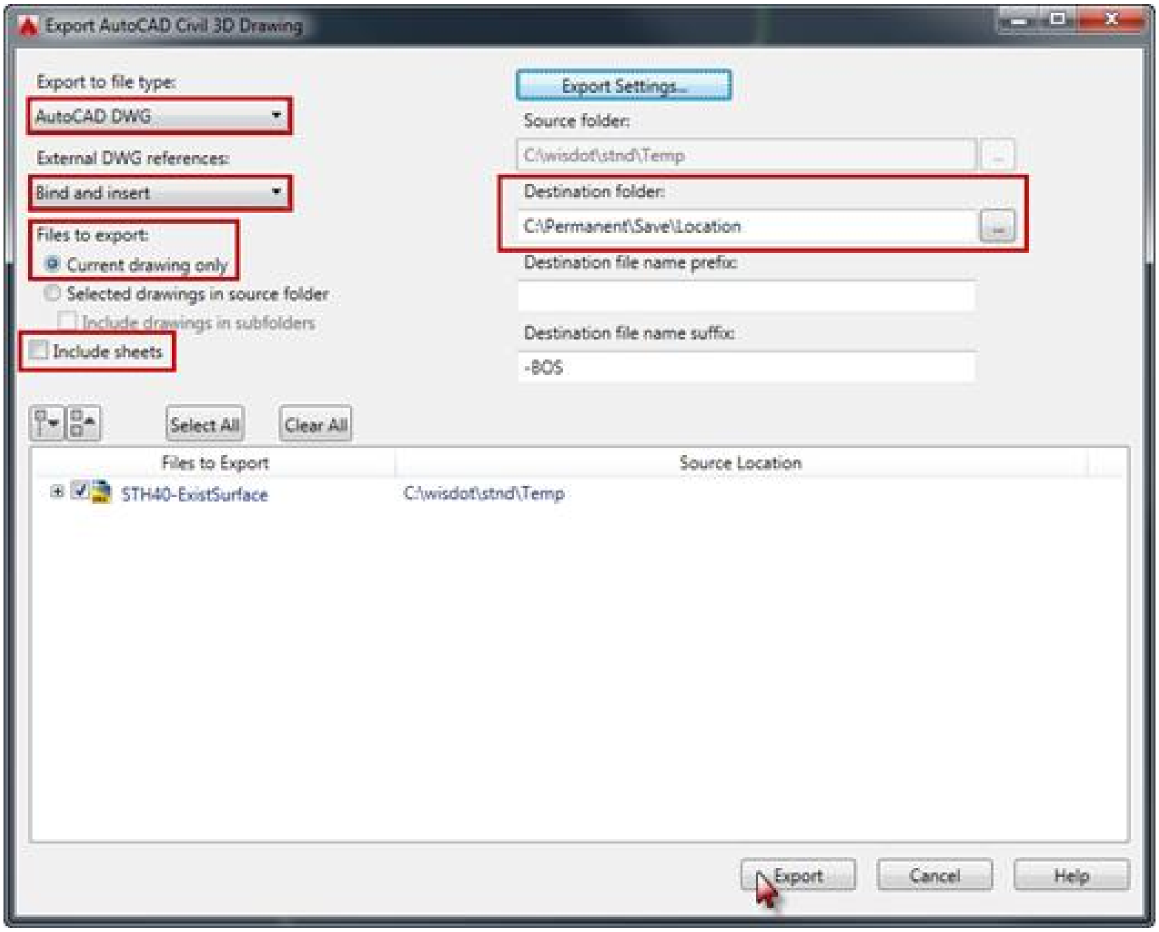
        V. **Range ID 1 Minimum Slope** = *default*, **Maxiumum Slope** = 0.29%
        VI. **Range ID 2 Minimum Slope** = 6.001%, **Maximum Slope** = *default*
        VII. **Range ID 2 Scheme (color)** = green
    B. **Information tab**
        I. Surface Style > Edit Current Selection



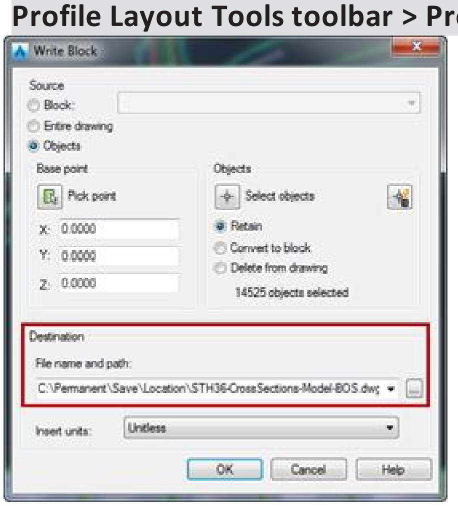
            a. **Display tab**
                i. Component display
                ii. Toggle Slopes Component to Visible
            b. OK
        II. OK
2. Pan and Zoom to see Surface Slopes Analysis displayed along ***Crdr-25***

Tip: To Display the "middle range" of Surface Slopes, specify 3 Slope ranges in the Surface Properties window Analysis tab. Set Slope range values and Scheme colors according to design criteria.

Modify profile to update corridor surface



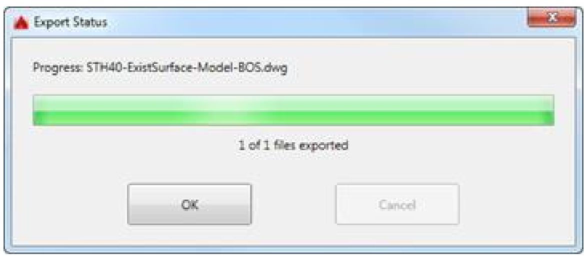
1. Zoom to ***PV-1*** Profile View, Station 395+00
2. Observe 6.00% Slope on ***25-Prop*** Profile near Station 395+00
3. Select ***25-Prop*** Profile
4. **Profile Contextual Ribbon > Modify Profile panel > Geometry Editor**
    A. **Profile Layout Tools toolbar > Profile Grid View button**



            I. Profile Entities panorama
                a. **Entity No 6 Grade Out** = 5.00%
                b. Enter
                c. Close Profile Entities panorama
                d. Close Profile Layout Tools toolbar
5. **Toolspace palette > Prospector tab > Expand Corridors > Right-click 25 > Rebuild**
6. Pan and Zoom to see updated Surface Slopes Analysis displayed along ***Crdr-25***

Info: See Profiles training module for more detailed information on Profiles and Profile editing

Add surface legend



1. **Ribbon > Annotate tab > Labels & Tables panel > Add Tables dropdown > Add Surface Legend Table**
    A. Command Line: Enter (to pick from list)
        I. Select ***Crdr-25***
        II. OK
    B. Command Line: **S** (specify Slopes table type)
    C. Enter
    D. Command Line: **D** (specify Dynamic table type)
    E. Enter
    F. Click in Modelspace to insert table

Cropped surfaces

Last updated: 2017-06-06

Total video time: 2:56

Exercise files: srfc-crop-data-c3d16.zip

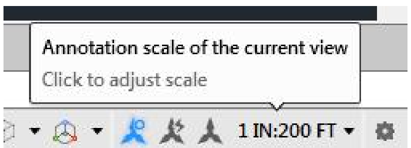
Start with 12345678\Design\Surfaces\srfc-crop-begin.dwg

srfc-crop.mp4 2:56

Cropped surfaces

When working on a small area within a Surface which contains a large amount of data, it can be helpful to extract only the area of the Surface you need to work with. Do this with the Create Cropped Surface command. Using this command will create a new cropped Surface built from a source Surface. Edits can be pushed from the source Surface to the cropped Surface by saving the source drawing, rebuilding the cropped Surface Snapshot and rebuilding the cropped Surface. This workflow can conserve hardware resources, improve application performance and prevent drawing crashing.

Create cropped surface



1. Open srfc-crop-begin.dwg and srfc-crop-01.dwg
2. **Ribbon > Home tab > Create Ground Data panel > Surfaces dropdown > Create Cropped Surface**
   A. Click in Select crop area Value field
   B. Click ellipses
      I. Command Line: **P**
      II. Enter
      III. Draw polygon around desired area of Surface
      IV. Command Line: **C**
      V. Enter
   C. **Drawing for new surface** = Select an open drawing
   D. **Select an open drawing** = *srfc-crop-01.dwg
   E. **New surface name** = ***Exist-crop***
   F. **Surface Style** = EX Triangles
   G. **Layer** = E_SURF
   H. OK
3. Make srfc-crop-01.dwg the active drawing
4. Zoom Extents

Update cropped surface

If you wish to apply edits from the source Surface to the cropped Surface, save the source drawing then Rebuild Snapshot of cropped Surface and Rebuild cropped Surface.

1. Save srfc-crop-begin.dwg
2. Make active or open srfc-crop-01.dwg
3. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Exist-crop > Right-click Definition > Rebuild Snapshot**
4. **Toolspace palette > Prospector tab > Expand Surfaces > Expand Exist-crop > Definition > Rebuild Surface**

Alignments

Alignment basics

Last updated: 2017-02-10

Total video time: 06:45

ali-basc-01.mp4 03:31

Alignments in context of project

Project index for location by station and offset.

Basis for design of corridors.

Targets for corridor design.

Basis for profiles, profile views, and sample lines.

Folder and object naming

In FDM 15-5-3 Att. 3.4 the folder location and the file naming is spelled out, with multiple examples.

Alignments will be created and saved with any related profiles. Multiple alignment/profile combinations can be stored in a single file or split up. In general, fewer files are better unless there is a need (such as multi-user editing) to have multiple files. These will be data shortcut referenced so they can be shared among project files.

Offset alignments, and their profiles, must be in the same file as the parent alignment.

Sites in relation to alignments

Sites are a control mechanism that allow objects to interact. These objects include parcels, grading elements and possibly alignments. Alignments are an option in the site control since they usually do not need the sort of interaction that is required, and can sometimes become a problem with other objects in the file. It is best to make sure the alignments you create are set to “No site” so that accidental interaction does not occur. Places where alignment interaction with objects is preferred would be with parcels, and will be discussed in detail there.

ali-basc-02.mp4 03:14

Alignment types

There are five types of alignments that can be created. Generally, users should only be concerned with two of those types, centerlines and rail, outlined below:

- Centerlines: Despite its name, centerline type alignments are not always centerlines of a design. These are alignments created by a user, and is the predominant type for designs. These can be used for design start locations, as well as targeting for design definitions (edge of travel ways, shoulder slope breaks, etc.) Centerline alignments can have super-elevation assigned to them.
- Rail: If you are creating rail design this type understands the Cant functionality, and will build with specific rail needs in mind. You should not use rail alignment types in other designs.
- Offset: This type of alignment creates a child alignment that is geometrically tied to a parent alignment. This type is used for creating tapers and geometry parallel to center-line alignments.
- Curb Return: This type of alignment is built by the intersection tool to create curb return horizontal geometry. The user would not create a curb return alignment manually, and an alignment should never have the type changed to this after it is created. In the case this switch is made it has prevented other functionality from working.
- Miscellaneous: The alignment type is created from pipe networks. The user should not change an alignment to the miscellaneous type, and there is no acceptable way to create a miscellaneous type alignment manually.

Offset Alignments

This type of alignment creates a child alignment that is geometrically tied to a parent alignment. This will allow generally parallel design that moves to stay a defined offset from the parent alignment. This type does allow for widening while maintaining the geometric tie to the parent alignment. This type is created with specific creation commands, and you should not change an alignment you are creating to an offset type manually. In the case this switch is made it has prevented other functionality from working. If you need to create an offset alignment , select the parent alignment and choose Create Offset to create the geometric connection.

Superelevation assignments in alignments

While creating corridor designs that utilize superelevation to transition subassembly slope over long distances, the data needed to accomplish this will be stored in the alignment. This alignment data will then work with properly attached subassemblies to create the needed slopes and transitions.

Alignment layout tools

Last updated: 2017-06-06

Total video time: 09:38

Alignment layout toolbar overview

Exercise files: ali-lyout-tool-ovrview-data-C3D14.zip

ali-lyout-tool-01.mp4 1:40

There are both alignment creation and alignment editing tools on the layout toolbar. This series covers the creation tools, while the editing tools are covered in a later series.

You can create alignments by drawing tangent to tangent using the first icon tool. This has an option to include curves of a specific radius. Alignments can also be created per localized part by using the Lines and Curves tools, the 5th and 6th icon on the toolbar. This is useful if you have location, bearing and distance, or other parameters that you have to design around.

You can also add, delete, or break the point of intersecting tangents apart in the 2nd, 3rd and 4th icon. This allows for adding to the design elements of the alignment you have created.

Finally, you can draw alignments with lines and arcs, and translate these directly into an alignment. These cannot be polylines, or other objects, only lines and arcs. The line and arc segments must be snapped together at a coincident point for the alignment to continue through the segments. After the segments are selected you will be prompted with the direction the alignment will be created, low station to high station. This can prevent unforeseen directional issues as you are designing or labeling with the alignment.

Curve settings

Exercise files: ali-lyout-tool-crv-sttings-data-C3D14.zip

ali-lyout-tool-02.mp4 1:27

1. Open AliProf-All.dwgCrdr-25.dwg
2. **Status bar > right-click on the OSNAPS icon > Settings**
    A. Clear all of the OSNAPS except for **Node**.
    B. Ok
3. **Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools**
    A. **Alignment name** = Lcl-4thAve.
4. Ok
5. **Alignment Layout toolbar > first icon drop-down > Curve and Spiral Settings**
    A. **Default Radius** = 100’
6. Ok

Tangent-Tangent (no curves)

Exercise files: ali-lyout-tool-tngnt-data-C3D14.zip

ali-lyout-tool-03.mp4 1:50

1. **Alignment Layout toolbar > first icon drop-down > Tangent-Tangent (no curves)**
    A. **Shift + right-click to access the temporary OSNAP menu > Node**
    B. Hover near the point number **1201** and left click to begin the alignment there.
    C. Hover near the point number **1203** and left click to draw the alignment there.
    D. Hover near the point number **1204** and left click to draw the alignment there.
    E. Right-click to end the alignment creation.

Tangent-Tangent (with curves)

1. **Alignment Layout toolbar > first icon drop-down > Tangent-Tangent (with curves)**
    A. Hover near the end of the alignment at point **1204**, and left click to begin the alignment there.
    B. Hover near the point number **1202** and left click to draw the alignment there.
    C. Right-click to end the alignment creation.

Exercise files: ali-lyout-tool-PI-edit-data-C3D14.zip

ali-lyout-tool-04.mp4 2:42

Note: Video and exercise files to be used on the following 3 sections

PI Editing - Add PI

1. Open AliProf-All.dwg.
2. **Status bar > right-click on the OSNAPS icon > Settings**
    A. Clear all of the OSNAPS except for **Node**.
    B. Ok
3. Select the ***Lcl-4thAve***alignment.
4. Geometry Editor
5. **Alignment Layout toolbar > Insert PIicon**
    A. Hover near the point number **1206** and left click to draw the alignment there.
    B. Hover near the point number **1205** and left click to draw the alignment there
    C. Right-click to end the alignment creation.
6. Close the Alignment Layout toolbar by clicking the X in the upper right.

PI Editing - Delete PI

1. Select the ***Lcl-4thAve***alignment.
2. Select the Geometry Editor.

3. **Alignment Layout toolbar > Delete PI**
   A. Hover near point **1206** and left-click.
   B. Right-click to end the alignment creation.
4. Close the Alignment Layout toolbar by clicking the X in the upper right.

PI Editing - Break Apart PI

1. Select the ***Lcl-4thAve***alignment.
2. Select the Geometry Editor.
3. **Alignment Layout toolbar > Break Apart**
4. At the command line you are prompted to enter the distance by which to split the PI.
   A. `25` Enter
   B. Right-click to end the alignment creation.

Exercise files: ali-lyout-tool-sbntity-cntrl-data-C3D14.zip

ali-lyout-tool-05.mp4 1:59

Note: Video and exercise files to be used on the following 2 sections

Subentity Control - Reverse Subentity Direction

1. Open AliProf-All.dwgCrdr-25.dwg.
2. Select the ***Lcl-4thAve***alignment.
3. Select the Geometry Editor
4. **Alignment Layout toolbar > Reverse Subentity Direction**
   A. Select the curve near point **1203**.
   B. Right-click to end the selection process.
5. **Alignment Layout toolbar > Reverse Subentity Direction**
   A. Select the tangent entity between points **1204** and **1202**.
   B. Right-click to end the selection process.

Subentity Control - Delete Subentity

1. Open AliProf-All.dwg.
2. Select the ***Lcl-4thAve***alignment.
3. Select the Geometry Editor
4. **Alignment Layout toolbar > Delete Subentity**
   A. Select the last tangent of the alignment.
   B. Enter to delete the selected tangent.
5. The white line that created that tangent is still in the location. Only the alignment portion is deleted.

Alignment lines and curves

Last updated: 2017-06-06

Total video time: 12:22

Fixed, floating, and free lines and curves

Exercise files: ali-lin-crv-ovrview-data-C3D14.zip

ali-lin-crv-01.mp4 2:16

Fixed, floating, and free lines and curves

When creating an alignment not from start to finish, it is best to add alignment subentities as lines or curves. Fixed, floating and free are methods by which these subentities can be added, based on already available geometry.

Fixed lines and curves

A “fixed” definition for lines and curves indicates that the geometry is defined and locked geometrically, independent of any other geometry of the alignment. An example of this would be a three point curve, where the user defines the start, mid-point and end of the curve geometry.

Floating lines and curves

A “floating” definition for lines and curves indicates that the geometry is geometrically locked to a point, but also ties in to some other geometry of the alignment. An example of this is a line that is tangent to a previous curve but it needs to go through a specific point. The tangent point on the curve will adjust along the curve so that the “through point” can be achieved. The alignment will then forgive the portion of the curve that is not needed, while still providing the user with a graphical representation of where the excess had been.

Free lines and curves

A “free” definition for lines and curves indicates the object has no geometric definition, but rather all definition is dependent on other geometry in the alignment. An example of this would be a curve that is tangent to both incoming and outgoing lines of the intersection.

The vast majority of curves should use the free curve option. This is to maintain the tangency to both the incoming and outgoing alignment lines.

Alignment layout with fixed lines

Exercise files: ali-lin-crv-fxd-lin-data-C3D14.zip

ali-lin-crv-02.mp4 2:05

1. Open AliProf-All.dwg.
2. **Home tab > Create Design panel > Alignment pull-down > Alignment Creation Tools**
3. **Create Alignment - Layout dialog**
   A. **Name** = Lcl-4thAve
   B. Ok
4. **Alignment Layout toolbar > Line drop down tool > Fixed Line (two points)**
   A. **Shift right-click to get the Temporary OSNAP menu > Node**
   B. Hover near point ***1201*** and click to begin drawing the alignment.
5. **Transparent Command toolbar > Bearing and Distance tool**
   A. `1` Enter to select the NE quadrant
   B. `73.5147` Enter to enter the bearing
   C. `234.85` Enter to enter the distance
   D. Esc to end the transparent command
   E. Esc to end the alignment creation tool
6. Close the Alignment Layout toolbar.

Alignment layout with fixed curve options

Exercise files: ali-lin-crv-fxd-crv-data-C3D14.zip

ali-lin-crv-03.mp4 1:20

1. Open AliProf-All.dwg.
2. Select the ***Lcl-4thAve*** alignment.
3. **Alignment contextual menu > Geometry Editor tool**
4. **Alignment Layout toolbar > Curve icon drop-down > More Fixed Curves > Fixed Curve (From Entity End Through Point)**
   A. Select the tangent of the ***Lcl-4thAve*** alignment.
   B. **Shift right-click to get the Temporary OSNAP menu > Node**
   C. Hover near point ***1207*** and click to begin drawing the alignment from here.

Alignment layout with floating lines

Exercise files: ali-lin-crv-flt-lin-data-C3D14.zip

ali-lin-crv-04.mp4 1:08

Warning: This exercise is unique and may have elements that do not continue from the previous video session. It is recommended that you start with the dataset specifically for this exercise.

1. Open AliProf-All.dwg.
2. Select the ***Lcl-4thAve*** alignment.

3. **Alignment contextual menu > Geometry Editor tool**
4. **Alignment Layout toolbar > Line icon drop-down > Floating Line (From Curve End, Length)**
    A. Select the end of the curved entity of the alignment.
    B. `156.0` Enter
    C. Esc to end alignment creation.
5. Close the Alignment Layout toolbar.

Alignment layout with floating curves

Exercise files: ali-lin-crv-flt-crv-data-C3D14.zip

ali-lin-crv-05.mp4 1:27

Warning: This exercise is unique and may have elements that do not continue from the previous video session. It is recommended that you start with the dataset specifically for this exercise.

1. Open AliProf-All.dwg.
2. Select the ***Lcl-4thAve*** alignment.
3. Geometry Editor
4. **Alignment Layout toolbar > Curve icon drop-down > More Fixed Curves > Floating Curve (From Entity, Radius, Through Point)**
    A. Select the end of the last tangent.
    B. At the command line type **90** Enter for the radius.
    C. At the command line hit Enter to accept **LessThan180**.
    D. Shift + right-click for the Temporary OSNAP menu and choose Node.
    E. Hover near point **1216** and left-click to end the curve at this location.
    F. Right-click to end the command.
5. Close the Alignment Layout toolbar by clicking the X in the upper right.

Alignment layout with free lines

Exercise files: ali-lin-crv-fre-lin-data-C3D14.zip

ali-lin-crv-06.mp4 1:04

Warning: This exercise is unique and may have elements that do not continue from the previous video session. It is recommended that you start with the dataset specifically for this exercise.

1. Open AliProf-All.dwg.
2. Select the ***Lcl-4thAve*** alignment.
3. Geometry Editor
4. **Alignment Layout toolbar > Line icon drop-down > Free Line (Between Two Curves)**
   A. Select the first curve, to the north and west.
   B. Select the second curve, to the south and east.
   C. Right-click to end the command.
5. Close the Alignment Layout toolbar by clicking the X in the upper right.

Alignment layout with free curves

Exercise files: ali-lin-crv-fre-crv-data-C3D14.zip

ali-lin-crv-07.mp4 1:10

Warning: This exercise is unique and may have elements that do not continue from the previous video session. It is recommended that you start with the dataset specifically for this exercise.

1. Open AliProf-All.dwg.
2. Select the ***Lcl-4thAve*** alignment.
3. Select the Geometry Editor.
4. **Alignment Layout toolbar > Curve icon drop-down > Fixed Curve Fillet (Between Two Entities, Radius)**
   A. Select the first tangent to the north and west of the curve.
   B. Select the second tangent to the south and the east of the curve.
   C. Enter to accept the **LessThan180** option.
   D. In the command line type **90** Enter for the radius.
   E. Right-click to end the command.
5. Close the Alignment Layout toolbar by clicking the X in the upper right.

Changing curve types after placement

Exercise files: ali-lin-crv-chng-crv-type-data-C3D14.zip

ali-lin-crv-08.mp4 1:52

1. Open AliProf-All.dwg.
2. Select the ***Lcl-4thAve*** alignment.
3. Select the Geometry Editor.
4. **Alignment Layout toolbar > Alignment Grid View**
   A. In the second row, **Tangency Constraint** column, select the **Constrained on Both Sides (Free)** text.

B. From the drop-down menu in this field select **Constrained by Previous (Floating)**

Changing Parameter Constraint

1. In the **Alignment Grid View** unlock the second row by clicking on the **Parameter Constraints Lock** padlock so that it appears unlocked. This will open the **Parameter Constraints** field for editing.
   A. In the **Parameter Constraints** field for the second row click on the **Passthrough Radius** text.
      I. From this drop-down menu select **Radius and Length**.
      II. In the drawing area select on the first curve of the alignment. Notice the grip points that are available.
   B. In the **Parameter Constraints** field for the second row click on the **Radius and Length** text.
      I. From this drop-down menu select **Passthrough Radius**.
      II. In the drawing area select on the first curve of the alignment. Notice the grip points that are available.
2. Close the **Alignment Grid View** panorama by clicking on the X in the upper left.
3. Esc to let go of the alignment.
4. Close the Alignment Layout toolbar by clicking the X in the upper right.

Create alignment from objects

Last updated: 2017-06-06

Total video time: 18:42

Cleaning up AutoCAD objects prior to conversion

Exercise files: ali-creat-frm-objct-clnup-data-C3D14.zip

ali-creat-frm-objct-01.mp4 2:40

Warning: It is preferred that you use the layout tools to build alignments. This prevents gaps in alignment objects that can cause problems in stationing, targeting, and other advanced functions. If you need to translate AutoCAD objects into alignment objects it is preferred that these objects be transformed into singular polylines prior to conversion. This will prevent tangent segments that are not properly snapped from ending an alignment early.

Creating polylines from lines and arcs.

1. **PE** Enter for polyline edit.
2. Select the line segment that is the furthest west.

3. **Y** Enter to turn the line into a polyline segment.
4. **J** Enter for Join.
5. Window select all of the alignment line and arc segments.
6. Enter to end the selection process.

Snapping lines and arcs

1. Click on the polyline to make sure it is complete. It should only highlight from the west end past the first curve.
2. Zoom to the location where the highlighted polyline ends.
3. Esc to let go of the highlighted polyline.
4. Select the line after the polyline.
5. Select the west-most grip on the line segment.
6. Using the Endpoint OSNAP, snap this line end to the polyline end.
7. Zoom Extents to see the entire project.
8. **PE** Enterfor polyline edit.
9. Select the line segment that is the furthest west.
10. **Y** Enter to turn the line into a polyline segment.
11. **J** Enter for Join.
12. Window select all of the alignment line and arc segments.
13. Enter to end the selection process.
14. Left-click on the polyline to make sure it completely highlights. Esc to release the polyline.

Create alignment from objects dialog

Create alignment from objects dialog – General tab

Exercise files: ali-creat-frm-objct-dialg-data-C3D14.zip

ali-creat-frm-objct-02.mp4 9:50

1. Open AliProf-All.dwg
2. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects**
3. Select the polyline on the westernmost end.
4. **Create Alignment from Objects** dialog
   A. **Name** = 25-L-EPS
   B. **Starting Station** = 4596.64
   C. **Add Curves between Tangents** = Off

Create alignment from objects dialog – Design Criteria tab

1. **Create Alignment from Objects dialog > Design Criteria tab**
   A. **Starting Design Speed** = 45 MPH
   B. **Use Design Criteria File** = Off
   C. Click the ellipsis button at the right of the design criteria path field.
      I. Browse to C:\wisdot\stnd\c3d2014\Program\Corridor Design Standards\Imperial.
      II. Select _WisDOT Design Criteria 2009.xml Open.
      III. Default Criteria window
         a. **Minimum Radius Table** = WisDOT eMax 4%
         b. **Transition Length Table** = 1LaneRamp, 2LaneUndiv@CL
         c. Ok

Reversing the alignment direction during creation

Exercise files: ali-creat-frm-objct-rvrs-dring-data-C3D14.zip

ali-creat-frm-objct-03.mp4 1:45

1. Open AliProf-All.dwg
2. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects**
   A. Select the polyline on the easternmost end. Enter to end the selection process.
   B. **R** Enter to reverse the direction.
   C. **Create Alignment from Objects** dialog
      I. **Name** = Lcl-4thAve
      II. **Start station** = 46+50
      III. Ok to create the alignment.
3. Check the stationing to make sure the alignment is moving west to east.

Reversing the alignment direction after creation

Exercise files: ali-creat-frm-objct-rvrs-aftr-creat-data-C3D14.zip

ali-creat-frm-objct-04.mp4 1:49

1. Select the ***Lcl-4thAve*** alignment.
2. **Green Context> Modify panel pull-down > Reverse Direction**
3. Ok to the Warning.
4. Confirm that the stationing is now reversed.

Exercise: Create alignment from objects

Exercise files: ali-creat-frm-objct-exrcs-data-C3D14.zip

ali-creat-frm-objct-05.mp4 2:38

1. Open AliProf-All.dwg
2. **PE** Enter for polyline edit.
3. Select the tangent line at the south of the project.
4. **Y** Enter to convert it to a polyline.
5. **J** Enter for join.
6. Window select all the line and arc segments. Enter to end the selection set.
7. Enter again to end the polyline edit command.
8. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects**
   A. Select the polyline closer to the south end.
   B. Enter to end the selection process.
   C. Enter to accept the direction, north to south.
9. **Create Alignment from Objects** dialog
   A. **Name** = 25
   B. **Start Station** = 33000
   C. **Add Curves Between Tangents** = Unchecked
   D. Ok to create the alignment.
10. Select the ***25*** alignment.
11. **Alignment contextual tab > Geometry Editor**
12. **Alignment Layout toolbar > Curve drop-down > Free Curve Fillet (Between two entities, Radius)**
    A. Select the tangent that is entering the curve on the north end of the alignment.
    B. Select the tangent that is exiting the curve on the north end of the alignment.
    C. Enter to accept **LessThan180**.
    D. **2865** Enter for the radius.
    E. Enter to end the command.
13. Close the Alignment Layout toolbar by clicking the x in the upper right corner.

Alignment from existing alignment

Last updated: 2017-06-06

Total video time: 08:25

Create an alignment from an existing alignment using alignment stations

Exercise files: ali-frm-exst-ali-sta-data-C3D14.zip

ali-frm-exst-ali-01.mp4 2:09

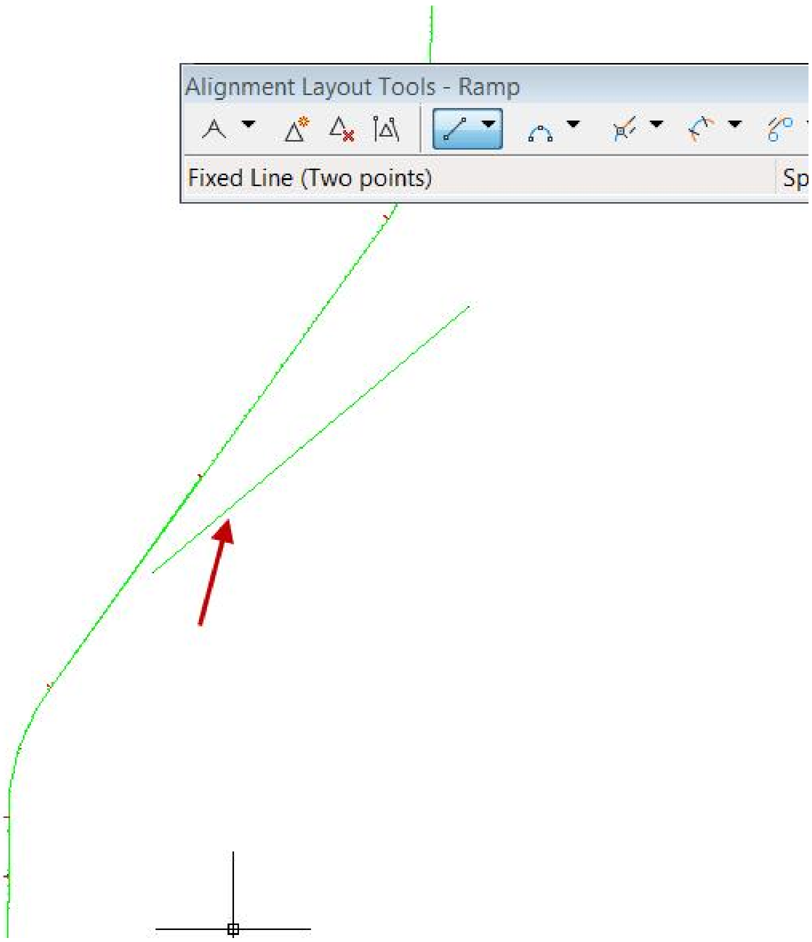
1. Open AliProf-All.dwg
2. **Home tab > Create Design panel > Alignment pull-down > Create Alignment from Existing Alignment**
3. Select the ***25*** alignment.
4. Type **40245** (for station 402+45).
5. Pull the cursor south until roughly 343+25 (you can type this in for precision).
6. At the command line type **F** for Finish.
7. In the alignment dialog name the alignment ***25-Alt1***.

Add design to new alignment

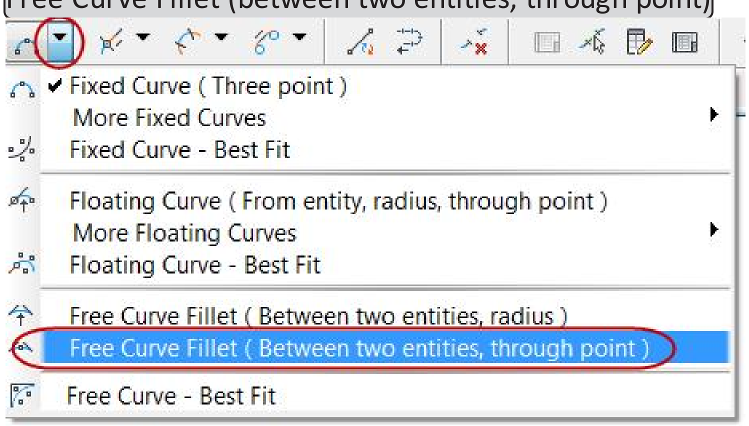
Exercise files: ali-frm-exst-add-dsgn-data-C3D14.zip

ali-frm-exst-ali-02.mp4 2:16

1. Select the ***25-Alt1*** alignment. It is on top of the original 25 alignment, but the Selection Cycling option can aid in this selection.
2. Select the Geometry Editor
3. Fixed Line – Two Points icon
   A. Draw a diverging alignment tangent near the north end of the ***25-Alt1*** alignment.



4. Free Curve Fillet (between two entities, through point)



   A. When prompted for the first entity, select the ***25-Alt1*** alignment. Make sure you are selecting the correct alignment. Selection Cycling can help in this selection.
   B. When prompted for the next entity select the tangent that diverges from the original.

Tip: If the command line reads “Selected Entity must be part of the main entity.” And you are prompted for the next entity again, then your first entity selection is not the same alignment of the diverging tangent, and the selection must be done again.

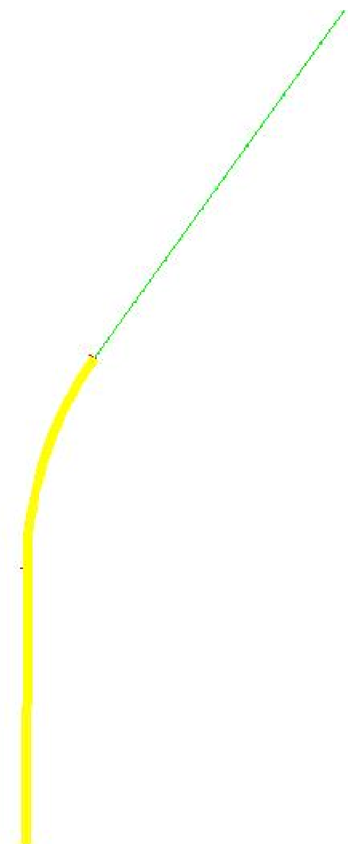
C. Identify the point between the two tangents that the curve must pass through. A red-X will appear if no solution is possible. Move until a curve connects the two tangents. Then left click to accept the location.

Create an alignment from an existing alignment using alignment entities

Exercise files: ali-frm-exst-ents-data-C3D14.zip

ali-frm-exst-ali-03.mp4 4:00

1. Open AliProf-All.dwg
2. **Home tab > Create Design panel > Alignment pull-down > Create Alignment from Existing Alignment**
   A. Select the ***25-Alt1***.
   B. Type **E** for Entities.
   C. Enter
   D. Select the southern-most curve and the southernmost tangent line.
   E. At the command line type **F** for Finish.
   F. In the Create Alignment from Existing Alignment dialog change the name to ***25-Alt2***.
   G. Ok



Alignment reverse and compound curves

Last updated: 2017-06-06

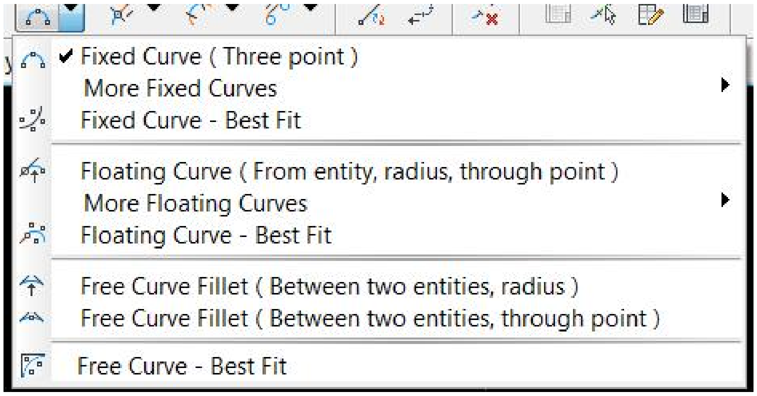
Total video time: 03:32

Alignment reverse curve

Exercise files: ali-rvrs-crv-data-C3D14.zip

ali-rvrs-cmpnd-crv-01.mp4 1:45

1. Open AliProf-4thAve.dwg.
2. Zoom to the north end of the alignment.
3. Select the ***4thAve*** alignment.
4. Select the Geometry Editor
    A. **Alignment Layout Tools tool bar > Draw Curves drop-down > More Floating Curves > Floating Curve (From Entity, Radius, Through Point)** You may need to find this option under the More Floating Curves option depending on the last use of these tools.



B. Select the ***4thAve*** alignment on the curve that you intend to add the compound curve. If the selection cycling dialog opens make sure to select **Alignment**
C. **90** Enter for the radius
D. Select **Lessthan180** by hitting Enter
E. Type **R** Enter to choose Reverse curve.
F. Left-click to place the endpoint to the north and east of the alignment, similar to the screenshot below.

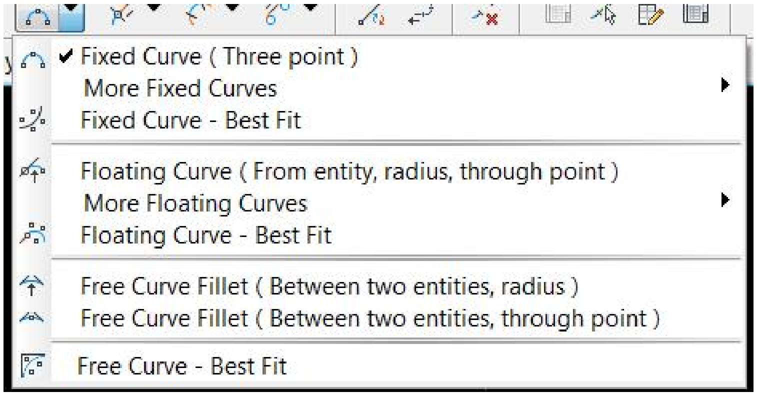
5. Enter

Alignment compound curve

Exercise files: ali-cmpnd-crv-data-C3D14.zip

ali-rvrs-cmpnd-crv-02.mp4 1:47

1. Open AliProf-4thAve.dwg.
2. Zoom to the north end of the alignment.
3. Select the ***4thAve*** alignment.
4. Select the Geometry Editor
   A. **Alignment Layout Tools tool bar > Draw Curves drop-down > More Floating Curves > Floating Curve (from entity, radius, through point)**. You may need to find this option under the More Floating Curves option depending on the last use of these tools.



A. Select the ***4thAve*** on the curve that you intend to add the compound curve. If the selection cycling dialog opens make sure to select Alignment.
A. **70** Enter for the radius
B. Select **Lessthan180** by clicking Enter
C. **C** Enter to choose Compound curve
D. Select a point to the north and east of the alignment, similar to the screenshot below.

5. Enter

Alignment editing

Last updated: 2016-11-30

Total video time: 09:45

Alignment editing with geometric constraints

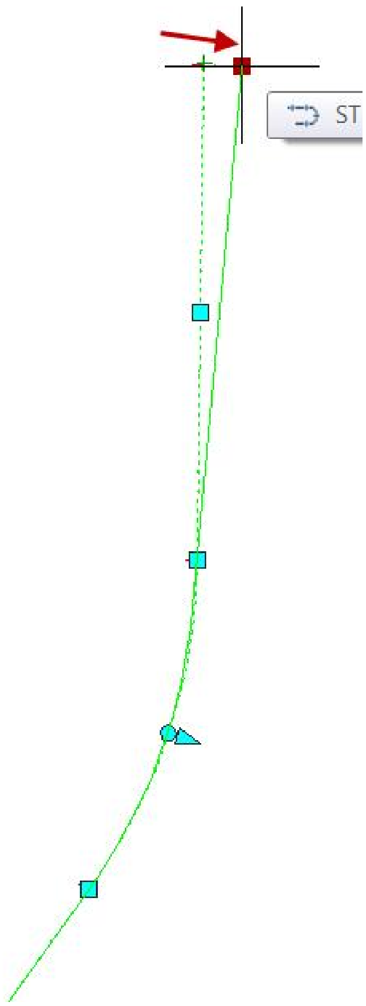
Info: Unless modified directly, geometric constraints (fixed, floating, free) are not changed by edit operations. They will constrain the edits that are allowed unless the constraints are changed.

Alignment grip-point editing

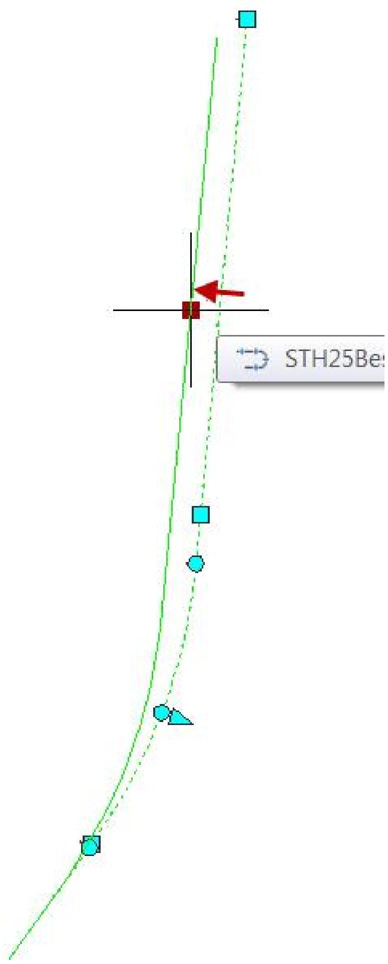
ali-edit-01.mp4 1:52

1. Open AliProf-All.dwg.
2. Zoom to the north end of the ***25*** alignment, close enough to see the curve and last tangent.
3. Zoom to the north end of the ***25*** alignment, close enough to see the curve and last tangent.
4. Graphically select the ***25*** alignment.

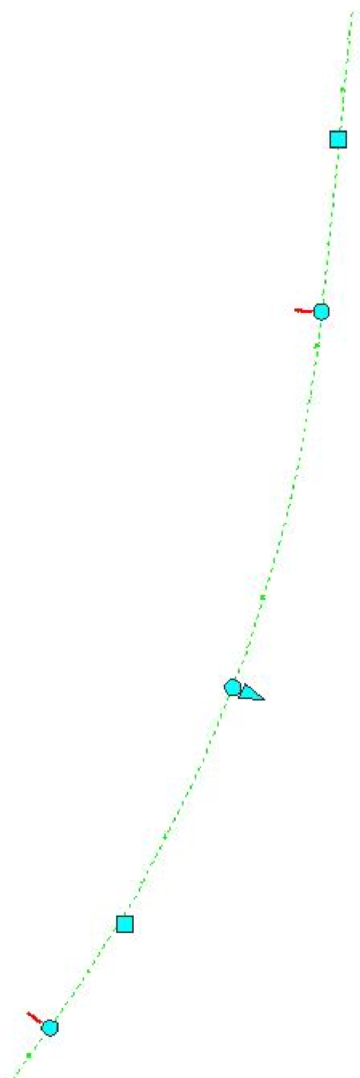
5. Select the square grip point at the north end of the alignment and move it a small amount to the east and left-click to drop it.



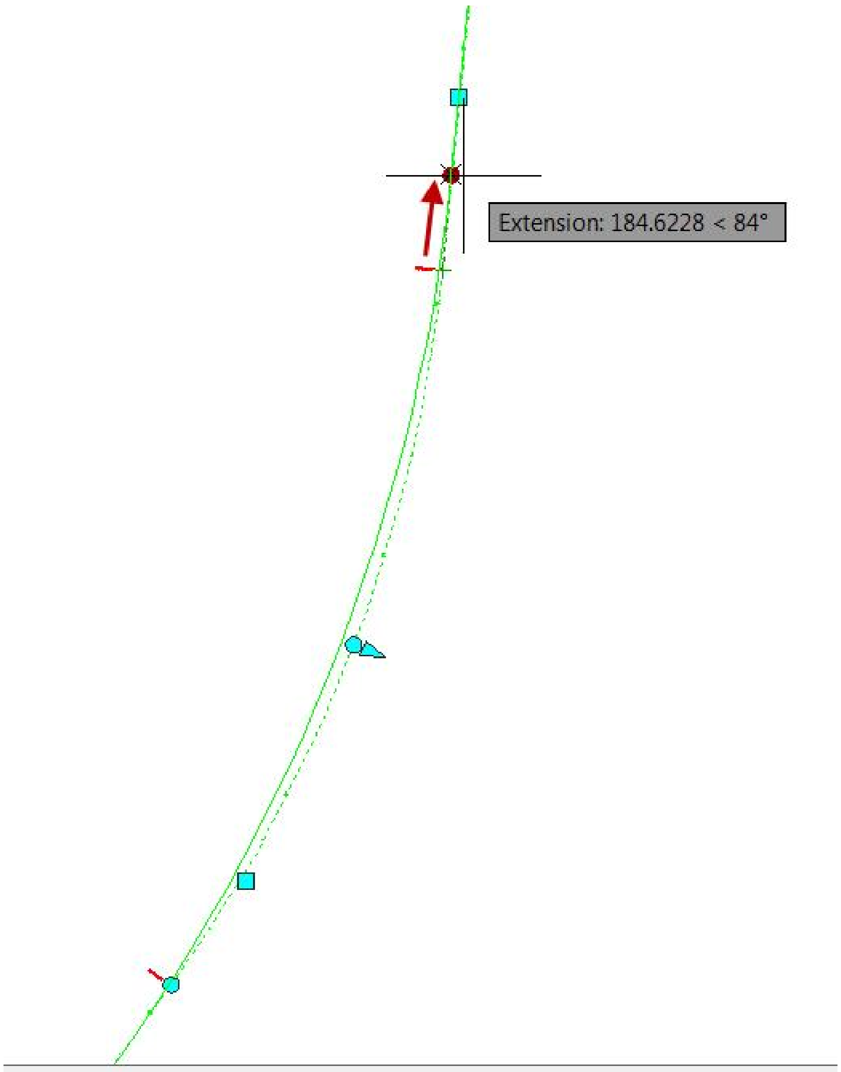
6. Select the square grip point in the middle of the northern tangent and move it a small amount to the west and left-click to drop it.



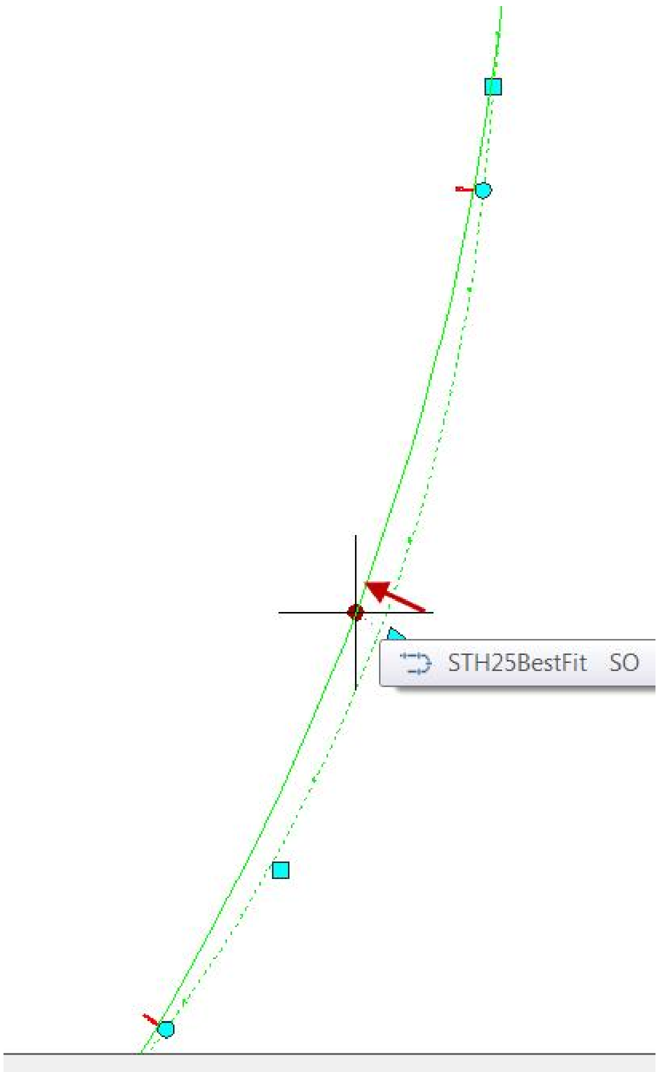
7. Zoom/pan to the curve.



8. Select the northern-most circular grip point (the north end of the curve). Move it a small amount to the north and left-click to drop it.



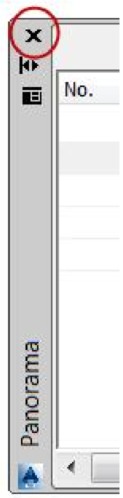
9. Select the circular grip point in the middle of the curve and pull it a small amount to the west to adjust the curve's radius and left-click to drop it.



Edit a parameter constraint in the data grid

ali-edit-02.mp4 2:42

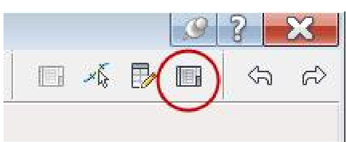
1. In the Alignment Panorama click Parameter Constraint Lock for row 4 to unlock it.
2. Select the Parameter Constraint for row 4 and choose Radius and Length.
3. Select alignment ***25***.
4. Select the arrow grip point.
5. Drag that some distance to the north and west.
6. Click Parameter Constraint Lock symbol to relock that row.
7. Esc to release the alignment.
8. Close the panorama window.



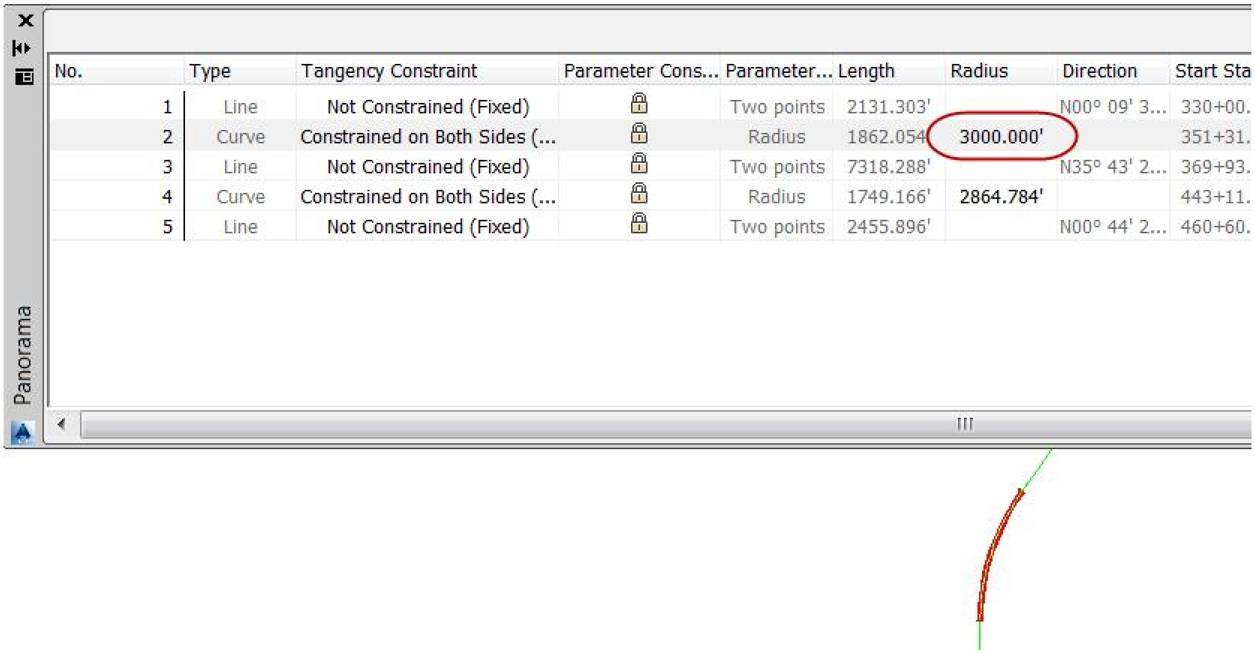
Alignment editing by data grid continued

1. Open AliProf-All.dwg.
2. Select the ***25*** alignment.
3. In the green context ribbon select Geometry Editor

4. From the Alignment Layout toolbar select the Alignment Grid View icon.



5. In the Alignment Panorama select the row 2 Radius entry and change it to **3000**.



No.	Type	Tangency Constraint	Parameter Cons...	Parameter...	Length	Radius	Direction	Start Sta
1	Line	Not Constrained (Fixed)		Two points	2131.303'		N00° 09' 3...	330+00.
2	Curve	Constrained on Both Sides (...		Radius	1862.054'	3000.000'		351+31.
3	Line	Not Constrained (Fixed)		Two points	7318.288'		N35° 43' 2...	369+93.
4	Curve	Constrained on Both Sides (...		Radius	1749.166'	2864.784'		443+11.
5	Line	Not Constrained (Fixed)		Two points	2455.896'		N00° 44' 2...	460+60.

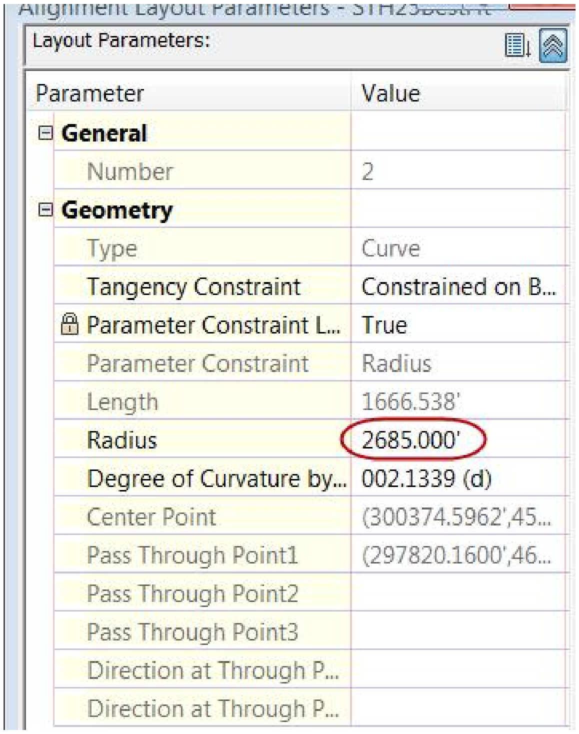
6. Leave the panorama open but zoom to the north-most end of the alignment.

Edit alignment by data grid for single entity

1. Open AliProf-All.dwg.
2. Select the ***25*** alignment.
3. In the green context ribbon select Geometry Editor.

4. From the Alignment Layout toolbar select the Pick Sub-Entity icon.

5. Select the curve to the south of the alignment.
6. In the radius field change the value to **2685**



7. Close the sub-entity editor window.
8. Close the Alignment Layout toolbar by clicking the X in the upper right.

Change alignment direction

ali-edit-03.mp4 2:41

1. Open AliProf-All.dwg.
2. Select the ***25*** alignment.
3. **Green context ribbon > Modify panel pull-down > Reverse direction**
4. Click OK to close the warning that appears.
5. Click Esc to release the alignment.

Adding to the beginning of an alignment

1. Open AliProf-All.dwg.
2. Select the ***25*** alignment.
3. Select the Geometry Editor
4. Tan-Tan(No Curves)
5. Left click a point out some distance beyond this new location.
6. Click Esc and left-click to open the temporary OSNAP menu.
7. Choose Endpoint.
8. Snap to the end point of the ***25*** alignment.
9. Right-click to end the alignment creation tool.

10. Click Esc to release the alignment.

Adding to the end of an alignment

1. Open AliProf-All.dwg.
2. Select the ***25*** alignment.
3. Select the Geometry Editor.
4. Tangent-Tangent (No Curves)
5. Click Esc and left-click to open the temporary OSNAP menu.
6. Choose Endpoint.
7. Snap to the end point of the ***25*** alignment.
8. Left click a point out some distance beyond this new location.
9. Right-click to end the alignment creation tool.
10. Click Esc to release the alignment.

Troubleshooting gaps

ali-edit-04.mp4 2:30

1. Open AliProf-All.dwg.
2. Select the ***25*** alignment.
3. Select the Geometry Editor.
4. Select the Reverse Subentity icon.
5. Select the first alignment tangent that has no labels.
6. Right-click to end the alignment editing command.

Deleting specific problem elements

1. Open AliProf-All.dwg.
2. Select the ***25*** alignment.
3. Select the Geometry Editor.
4. Select the Delete Subentity icon.
    A. Select the southernmost curve. Right-click to end the command.
5. Free Curve Fillet (Between two entities, Radius)
    A. Select the incoming tangent.
    B. Select the outgoing tangent.
6. At the command line, accept **LESTHAN180** Enter.
7. At the command line, type **2950** Enter for the radius.

Alignment properties

Last updated: 2017-03-16

Total video time: 25:21

Design violation

ali-prprtis-01.mp4 10:53

The warning symbol will appear on an alignment if:

- A line-curve connection is not tangent
- A curve's radius is too small for the design speed
- Superelevation table is out of date
- Any design check is violated

Adding Design Speed to an Existing Alignment

1. Open the file Design criteria.dwg
2. Select the ***Lake Kegonsa*** alignment (the shorter one)
3. From the alignment contextual tab click Alignment Properties
    A. Switch to the ***Design criteria*** tab.
    B. Place a checkmark next to Use Criteria based design.
    C. Click the ellipsis button to select the _wisdot design criteria 2009.xml file. This file is part of the WisDOT Civil 3D design files package that can be downloaded from the FTP site
    D. **Radius table** = WisDOT eMax 6% - 1lane
    E. **Attainment method** = Crowned Roadway
    F. Verify that ***check for tangency between elements*** is checked ON.
    G. **Design Speed** = 30 mph
    H. add design speed (green plus sign.)
        I. **start station of the new design speed** = 25+00
        II. **design speed** = 45mph
    I. Notice that you now have several radius warnings on the alignment.
        I. To rectify the problem, you could change the design speed or increase the radius.
        II. To ignore the problem and hide the warning symbol, click the LAYOFF button. And click one of the symbols.

Adding a Design Speed as the Alignment is Created

1. Remain in the file Design criteria.dwg
2. **Home tab > Create Design panel > Alignment > Create Alignment from objects**
    A. Select the polyline near the right end.
    B. enter to accept the direction.
    C. Name the alignment ***USH 51***.
    D. Leave all the rest of the options on the General tab as default.
    E. Switch to the ***Design Criteria*** tab.
        I. **Starting design speed** = 50
        II. Put a checkmark next to **Use criteria based design**.
        III. Click the ellipsis button to select the *_wisdot design criteria 2009.xml* file.

IV. **Radius table** = WisDOT eMax 6% - 1lane
V. **Attainment method** = Crowned Roadway
VI. Leave other options as default.

F. OK

3. You can view any warnings graphically or by clicking the Alignment grid view from the alignment layout toolbar.
4. Save

Superelevation

ali-prprtis-02.mp4 14:28

To add superelevation to a design you need:

- An alignment with a design speed
- Use Criteria-based design turned on
- Superelevation calculated for the alignment
- A typical cross-section (Assembly) that can superelevate

Superelevation Terminology

Exercise: Apply Superelevation to an Alignment

1. Remain in the file Design criteria.dwg
2. Select the alignment.

3. From the contextual tab, click ***Alignment Properties***.
    A. Verify that a design speed is active for the alignment by going to **Alignment Properties > Design criteria tab**
    B. OK
4. Click the Superelevation > Calculate / Edit Superelevation button from the alignment contextual tab (for ***USH 51***).
    A. Click Calculate Superelevation Now.
        I. In the **Calculate Superelevation** wizard, be sure the roadway type is set to **undivided crowned road**. This will match the assembly type and the option in the design criteria.
        II. Next
        III. Lane width = 14
        IV. Next
        V. **Shoulder control > normal shoulder width** = 8'
        VI. **Shoulder control > normal shoulder width** = 4%
        VII. **Lowside option** = Breakover removal
        VIII. **Highside option** = Default slopes
        IX. Place a checkmark next to **Maximum shoulder rollover** = 8%
        X. Next
        XI. In the **Attainment method** area, verify that the same design criteria file is selected by clicking the ellipsis.
        XII. **Superelevation rate table** = WisDOT eMax 6%
        XIII. Transition length table = 1laneRamp, 2laneUndiv@CL
        XIV. Attainment method = Crowned Roadway
        XV. Leave all other values as default
        XVI. Finish
5. You should now see the Superelevation table complete with stations and Superelevation stage name.
6. This table can be used to override calculated values. You can change the length, station, and/or lane & shoulder slopes depending on your needs.
7. Close the table by clicking the green checkmark.
8. The Superelevation table can be revisited by clicking Superelevation > View tabular editor from the alignment contextual tab.
9. When changes to the geometry occur, you will see a warning symbol indicating that the superelevtion needs to be recalculated.
10. **Alignment contextual tab > superelevtion > Calculate/edit superelevation**
    A. Advance through the curves by clicking Next at the top of the Superelevation curve manager.
    B. Observe the Superelevation status at the bottom of the Superelevation curve manager for confirmation of the curve situation.
    C. Click Recalculate for any curves that report as ***Out of Date***.
    D. Click Continue to recalculate when warned that manual edits will be overwritten.
11. Save

Offset alignments and widenings

Last updated: 2017-06-06

Total video time: 23:15

Creating offset alignments from a parent alignment

Exercise files: ali-offst-widen-creat-data-C3D14.zip

ali-offst-widen-01.mp4 2:32

1. Open AliProf-All.dwg.
2. **Home tab > Create Design panel > Alignment drop-down > Create Offset Alignments**
    A. Select the ***25***.
    B. **Increment offset** = 12 for both right and left
    C. **Alignment Style** = RDWY Lane Edge
    D. **Alignment Label** = _No Labels
    E. Ok
3. **Home tab > Create Design panel > Alignment drop-down > Create Offset Alignments**
    A. Select the ***25***
    B. **Increment offset** = 15 for both right and left
    C. **Alignment Style** = RDWY Pavement Edge
    D. **Alignment Label** = _No Labels
    E. Ok
4. **Home tab > Create Design panel > Alignment drop-down > Create Offset Alignments**
    A. Select the ***25***.
    B. **Increment offset** = 18 for both right and left
    C. **Alignment Style** = RDWY Shoulder Aggregate
    D. **Alignment Label** = _No Labels
    E. Ok

Clean up offset alignment names

Exercise files: ali-offst-widen-clnup-nms-data-C3D14.zip

ali-offst-widen-02.mp4 2:45

1. Select the right ETW offset alignment.
2. Select the Alignment Properties.
    A. In the **Information** tab change the name from 25-Right-12 to ***25-R-ETW***.
    B. Ok
    C. Esc

3. Select the left ETW offset alignment.
4. Select the Alignment Properties.
   A. In the **Information** tab change the name from 25-Left-12 to ***25-L-ETW***.
   B. Ok
   C. Esc
5. Select the right EPS offset alignment.
6. Select the Alignment Properties.
   A. In the Information tab change the name from 25-Right-15 to 25-R-EPS.
   B. Ok
   C. Esc
7. Select the left EPS offset alignment.
8. Select the Alignment Properties.
   A. In the Information tab change the name from 25-Left-15 to ***25-L-EPS***.
   B. Ok
   C. Esc
9. Select the right EGS offset alignment.
10. Select the Alignment Properties.
    A. In the Information tab change the name from 25-Right-18 to ***25-R-EGS***.
    B. Ok
    C. Esc
11. Select the left EGS offset alignment.
12. Select the Alignment Properties.
    A. In the Information tab change the name from 25-Left-18 to ***25-L-EGS***.
    B. Ok
    C. Esc

Creating offset alignments for a portion of a parent alignment

Exercise files: ali-offst-widen-creat-prtn-data-C3D14.zip

ali-offst-widen-03.mp4 3:03

1. Open AliProf-All.dwg.
2. Zoom in to the area where the 25 and Lcl-4thAve alignments cross.
3. **Home tab > Create Design panel > Alignment drop-down > Create Offset Alignments**
   A. Select the ***Lcl-4thAve*** alignment.
   B. Uncheck the **From Start** and the **From End** boxes.
   C. Under **From Start** select the **From Screen** icon.
   D. Hover your cursor near station **47+45**.
   E. At the command line type **4745** Enter
   F. Under **To End** select the **From Screen** icon.
   G. Hover your cursor near station **52+45** and left click to select the station. Do not worry if you are not right on 52+45. This is an approximate station selection.

   H. **Increment offset** = 12 for both right and left
   I. **Alignment Style** = RDWY Lane Edge.
   J. **Alignment Label** = _No Labels.
   K. Ok
4. **Home tab > Create Design panel > Alignment drop-down > Create Offset Alignments**
   A. Select the ***Lcl-4thAve*** alignment.
   B. **From Start** = 4745
   C. **To End** = 5245
   D. **Increment offset** = 15 for both right and left
   E. **Alignment Style** = RDWY Pavement Edge.
   F. Ok
5. **Home tab > Create Design panel > Alignment drop-down > Create Offset Alignments**
   A. Select the ***Lcl-4thAve*** alignment.
   B. **From Start** = 4745
   C. **To End** = 5245
   D. **Increment offset** = 18 for both right and left
   E. Alignment Style = RDWY Shoulder Aggregate.
   F. Ok
6. Select the right ETW offset alignment.
7. Select the Alignment Properties.
   A. In the Information tab change the name from Lcl-4thAve -Right-12 to ***Lcl-4thAve - R-ETW***.
   B. Ok
   C. Esc

Clean up offset alignment names

Exercise files: ali-offst-widen-clnup-nms-prtn-data-C3D14.zip

ali-offst-widen-04.mp4 1:48

1. Select the left ETW offset alignment.
2. Select the Alignment Properties.
   A. In the Information tab change the name from Lcl-4thAve -Left-12 to ***Lcl-4thAve -L-ETW***.
   B. Ok
   C. Esc
3. Select the right EPS offset alignment.
4. Select the Alignment Properties.
   A. In the Information tab change the name from Lcl-4thAve -Right-15 to ***Lcl-4thAve - R-EPS***.

    B. Ok
    C. Esc
5. Select the left EPS offset alignment.
6. Select the Alignment Properties.
    A. In the Information tab change the name from Lcl-4thAve -Left-15 to ***Lcl-4thAve -L-EPS***.
    B. Ok
    C. Esc
7. Select the right EGS offset alignment.
8. Select the Alignment Properties.
    A. In the Information tab change the name from Lcl-4thAve -Right-18 to ***Lcl-4thAve -R-EGS***.
    B. Ok
    C. Esc
9. Select the left EGS offset alignment.
10. Select the Alignment Properties.
    A. In the Information tab change the name from Lcl-4thAve-Left-18 to ***Lcl-4thAve -L-EGS***.
    B. Ok
    C. Esc

Add widening to an offset alignment

Exercise files: ali-offst-widen-add-widen-data-C3D14.zip

ali-offst-widen-05.mp4 3:43

1. Open AliProf-All.dwg.
2. **Home tab > Create Design panel > Alignment drop-down > Create Widening** .
    A. Select the ***25-Right-ETW*** alignment.
    B. **38370** Enter for start station.
    C. **38462** Enter for end station.
    D. **22** Enter to create a 22' offset from the parent alignment (10' from the 12' lane edge).
    E. **R** Enter for right side.
    F. **Offset Alignment Parameters dialog > Transition Parameters > Exit transition length** = 1'
    G. **Offset Alignment Parameters dialog > Transition Parameters > Entry transition length** = 50'
    H. **Widening Parameters > Start Station** = 38350
    I. **Transition Parameters > Entry > Taper Input Type** = By Taper Ratio.
    J. **Taper Ratio** = 3 (it will assume the 1: portion).

K. Close the Offset Alignment Parameters dialog by clicking the X in the upper left corner.

Add widening areas to the EPS alignment

Exercise files: [ali-offst-widen-add-to-EPS-data-C3D14.zip]

[ali-offst-widen-06.mp4] 2:43

1. Open AliProf-All.dwg.
2. **Home tab > Create Design panel > Alignment drop-down > Create Widening** .
   A. Select the ***25-Right-EPS*** alignment.
   B. Snap to the start of the widened area 25-R-ETW alignment.
   C. Snap to the end of the widened area of 25-R-ETW.
   D. **`37`** ENTER
   E. **Transition Parameters > Entry > Taper Input Type** = By Taper Ratio.
   F. **Taper Ratio** = 3
   G. **Widening Parameters > Start Station > From Screen icon > Snap to the beginning of the widened region of 25-R-ETW**
   H. **Transition Parameters > Exit > Transition Length** = 1
   I. Close the Offset Alignment Parameters dialog.
3. Repeat these steps to widen the 25-R-EGS alignment to 40’ from the 25 alignment.

Create a masked area

Exercise files: [ali-offst-widen-creat-mask-data-C3D14.zip]

[ali-offst-widen-07.mp4] 1:29

1. Open AliProf-All.dwg.
2. Select the ***25-R-ETW*** alignment.
3. Select the **`ALIGNMENT PROPERTIES`**.
   A. **Masking tab > Add Masking Region** = 33000
   B. Snap to the beginning of the entry transition of 25-R-ETW (station 382+95).
   C. Select the Add Masking Region icon.
   D. Snap to the end of the 25-R-ETW widened region (station 384+65.57).
   E. **`48544.46`**Enter
   F. Ok

Add widening areas during the offset alignment creation

Exercise files: [ali-offst-widen-widen-dring-offst-data-C3D14.zip] ali-offst-widen-08.mp4 1:53

1. Open AliProf-All.dwg.
2. **Home tab > Create Design panel > Alignment drop-down > Create Offset Alignment** .
   A. Select the ***Lcl-4thAve*** alignment.
   B. Create Offset Alignment dialog:
      I. **Number of offsets right** = 0
      II. **Incremental offset on left** = 18
      III. **Alignment style** = RDWY Lane Edge
      IV. **Alignment Label** = _No Labels
   C. Widening Criteria tab > Checkmark Add widening around curves
   D. **Specify Widening Manually> increase width** = 4'
   E. **Transition length** = 50'
   F. Ok

Edit the parameters of a widened offset alignment

Exercise files: ali-offst-widen-edit-prmtrs-data-C3D14.zip

ali-offst-widen-09.mp4 1:30

1. Open AliProf-All.dwg.
2. Select the north offset alignment.
3. **Modify panel > Offset Parameters**
   A. **Offset Alignment Parameters dialog > Nominal Offset** = -15
   B. **Transition In > Curve 2 Radius** = 45
   C. **Widening Region > Offset** = -25
   D. **Widening Region > Start station** = 5015
   E. Close the Offset Alignment Parameters dialog by clicking the X in the upper left.

Edit a widened offset alignment graphically

Exercise files: ali-offst-widen-widen-grphcly-data-C3D14.zip

ali-offst-widen-10.mp4 1:49

1. Open AliProf-All.dwg
2. Graphically select the north offset alignment.
3. Near the end of the offset alignment select one of the diamond grip points on the parent alignment.
4. Slide that grip point west roughly 20'.
5. Select the grey circular grip point in the middle of the offset alignments exit transition area.

6. This turned on to small cyan circular grips at the ends of the transition exit. Select the eastern most cyan grip.
7. Drag this grip to the east roughly 20’.
8. Toward the start of the offset alignment select the cyan plus grip point to create a new widened area.
9. Select the cyan arrow at the widened area and drag it back roughly 10’.
10. Select the grey circular grip in the middle of the transition.
11. This turned on to small cyan circular grips at the ends of the transition exit. Select the cyan grip closest to the parent alignment.
12. Drag that grip to the west roughly 20’.
13. Click Esc to release the alignment.

Intersection edgeline geometry creation

Last updated: 2017-06-06

Total video time: 25:28

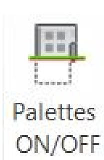
Insert south intersection dynamic block

Exercise files: ali-int-edglin-geom-creat-01-data-C3D16.zip

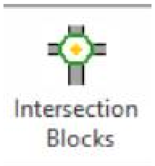
ali-int-edglin-geom-creat-01.mp4 3:18

1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Home tab > Layer panel> Layer Properties**
3. New Layer

4. Name new ***Layer P_Int_Block_NPLT***
5. Mark the Plot Column.
6. Close the Layer Manager box.
7. Open the **WisDOT Design** tab.
8. Palettes ON/OFF



9. **Parametric Design panel > Intersection Blocks**



Tip: Refer to SDD 9a1: At-Grade Side Road Intersections for type A, B1, B2, C, and D.

10. Int-Type-B-Tan

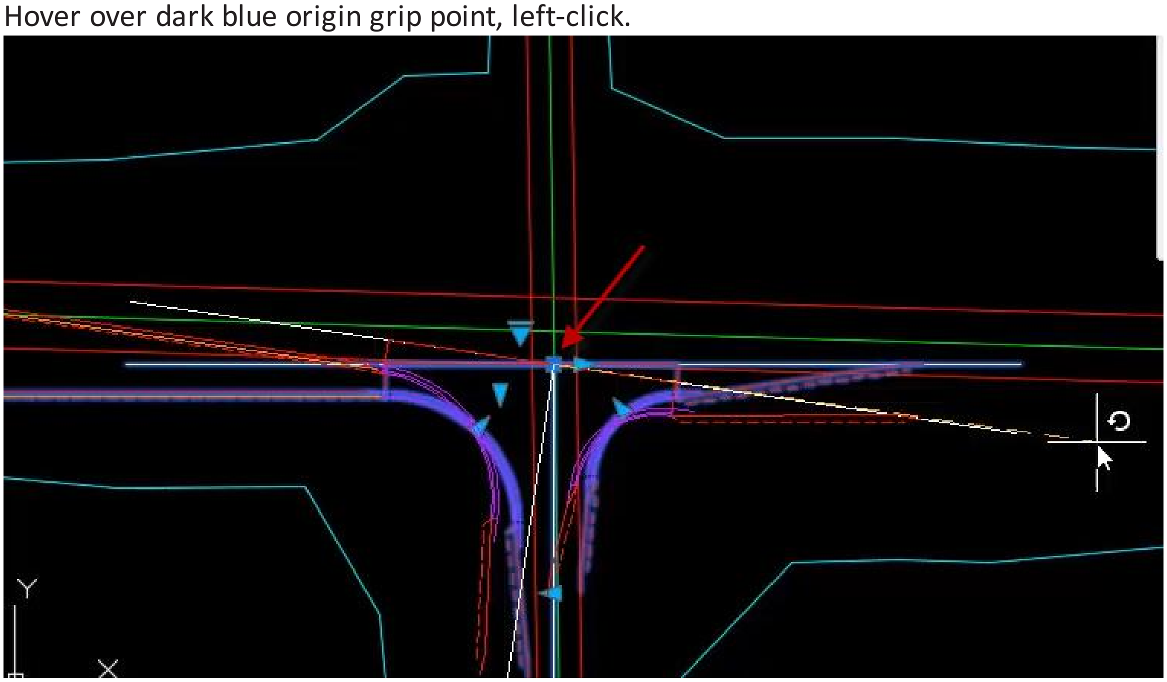
11. Hover near where the south-main road alignment crosses the center line of the secondary road.
    A. **Shift + right-click > Apparent Intersect**
        I. Snap to that point.

Adjust south intersection dynamic block

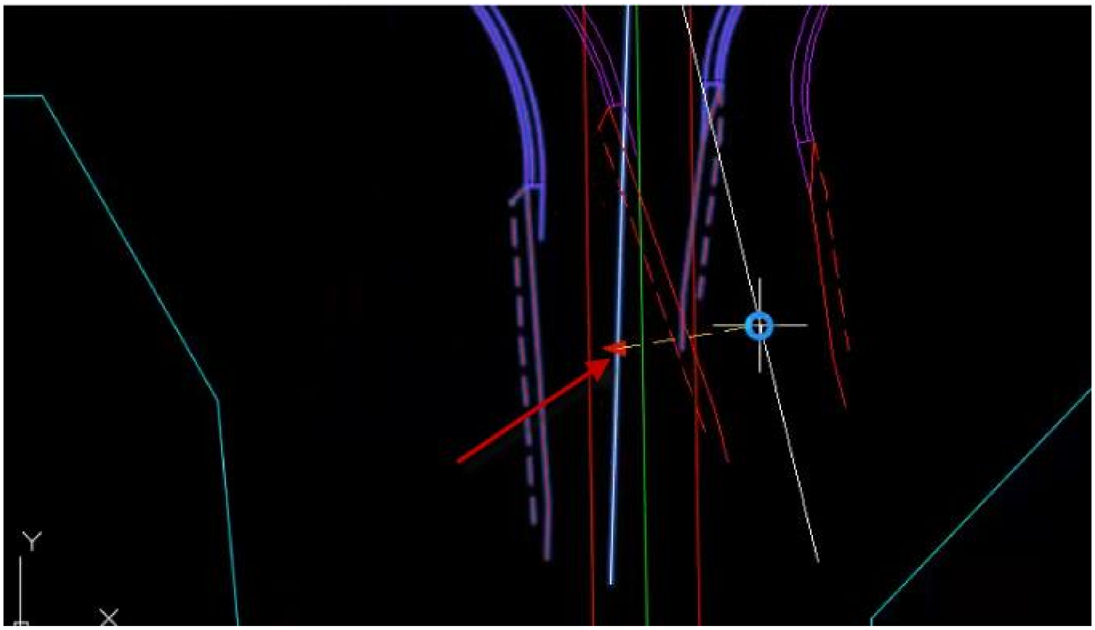
Exercise files: ali-int-edglin-geom-creat-02-data-C3D16.zip

ali-int-edglin-geom-creat-02.mp4 2:39

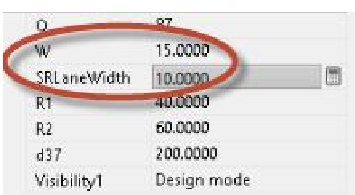
1. Open Crdr-Int-CthE-RiverRd.dwg
2. Select on the block.
3. Hover over dark blue origin grip point, left-click.



   A. **Right-click > Rotate**
      I. **Shift + right-click > Nearest**
      II. Snap to the edge of roadway.
4. Left click the blue directional arrow.



   A. **Shift + right-click > Nearest**
   B. Snap to the center-line of the secondary road.
5. Select block.
   A. **Right-click > Properties**
      I. Scroll to Custom field.
      II. **SRLaneWidth** = 10
      III. **W** = 15

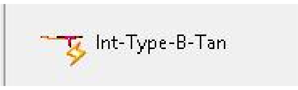


6. Close the Palette.

Insert north intersection dynamic block and make adjustments

Exercise files: [ali-int-edglin-geom-creat-03-data-C3D16.zip] [ali-int-edglin-geom-creat-03.mp4] 1:39

1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Intersection Layout palette >** Int-Type-B-Tan



3. Shift**+ right click > Apparent Intersect**
    A. Snap to north edge lane.
4. Select on the block.
    A. Left-click in grip edit.
    B. **Right-click > Rotate**
    C. **Shift + right-click > Nearest**
    D. Snap to west-side of line.
    E. Left click the blue directional arrow.
    F. **Shift + right-click > Nearest**
    G. Snap to the center-line of the secondary road.
5. Select block.
    A. **Right-click > Properties**
    B. Scroll to Custom field.
    C. **SRLaneWidth** = 10
    D. **W** = 15

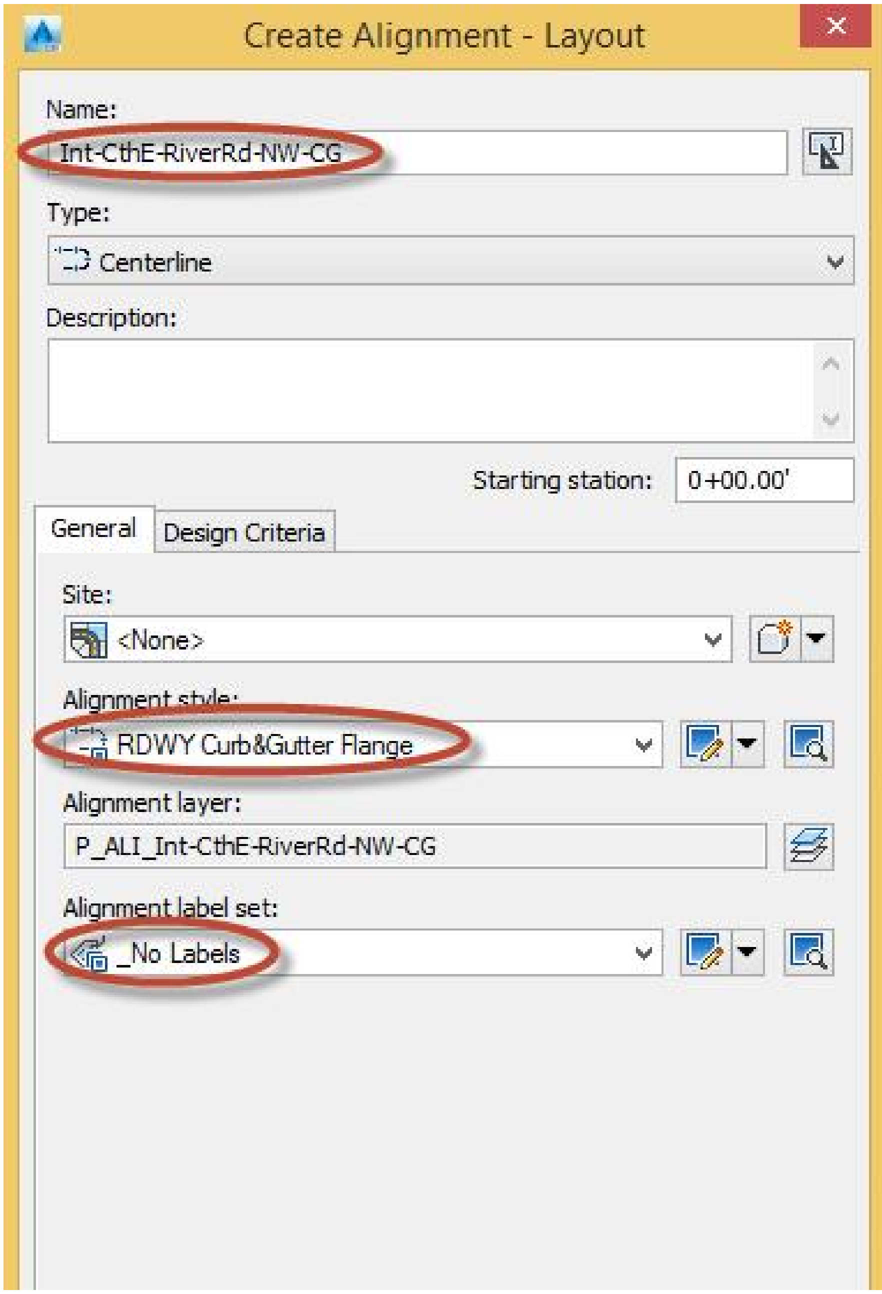
6. Esc
7. Select blocks.
8. **Home tab > Layer panel > Layer Manager pull-down menu**
    A. Select the ***P_Int_Block_NPLT*** layer

Create curb and gutter edge lines for NW and NE quadrants

Exercise files: ali-int-edglin-geom-creat-04-data-C3D16.zip

ali-int-edglin-geom-creat-04.mp4 2:58

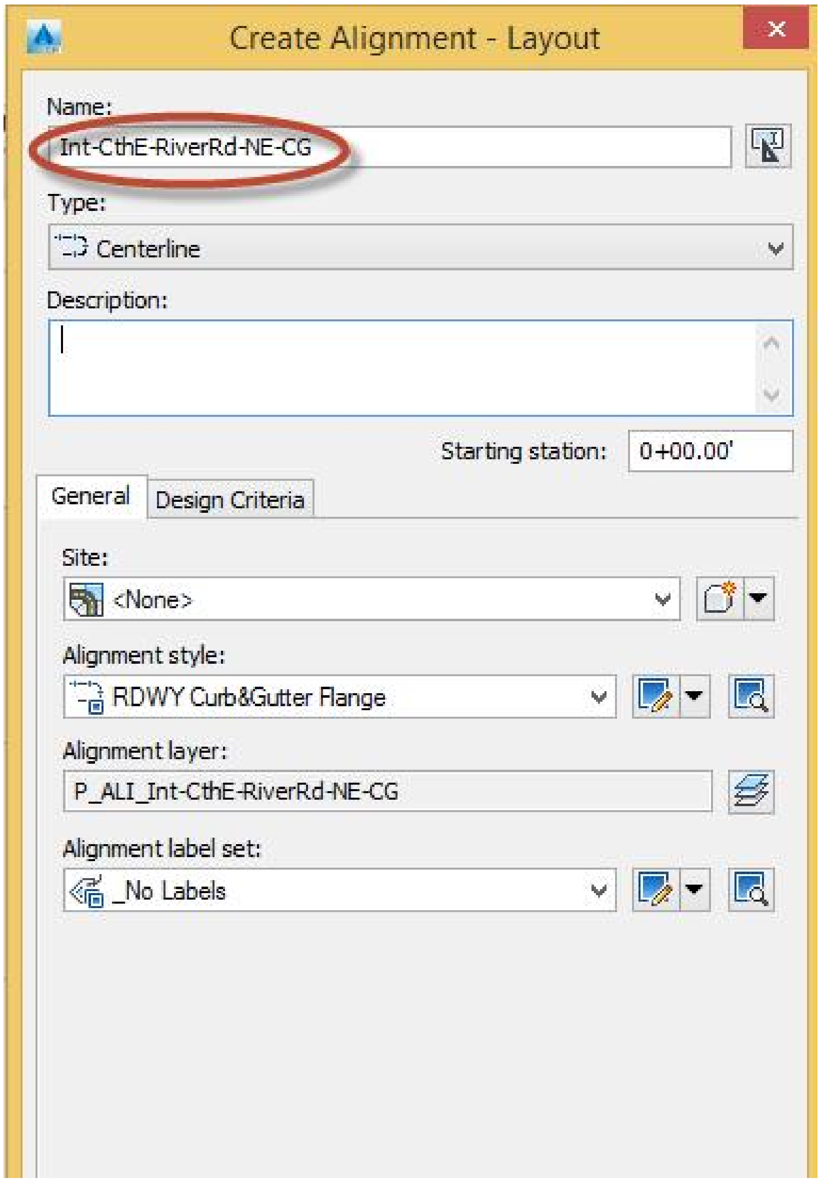
1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Home tab > Create Design > Alignment > Alignment Creation Tools**
    A. Change the name to ***Int-CthE-RiverRd-NW-CG***.
    B. Change the Alignment style to **RDWY Curb&Gutter Flange**.
    C. Change the Alignment label set to **_No Labels**.



3. OK
4. **Line Tool > Fixed Line (Two Points)**.
    A. O-Snap to the top of the North-West intersection.
    B. O-Snap to the end of the curve.
    C. Right-click to set the points.
5. **Curve Tool > Fixed Curve (Three Points)**
    A. O-Snap to the start of the curve.
    B. Shift **+ right-click > Midpoint**

C. Select the endpoint of the curve
D. Right-click to set the points.

6. **Line Tool > Fixed Line (Two Points)**
   A. O-Snap to the end of the curve.
   B. Shift **+ right-click > Endpoint**
   C. Select the endpoint of the line
   D. Right-click to set the points.
7. **Home tab > Create Design > Alignment > Alignment Creation Tools**
   A. Change the name to ***Int-CthE-RiverRd-NE-CG***.
   B. Leave the rest of the selections as is.



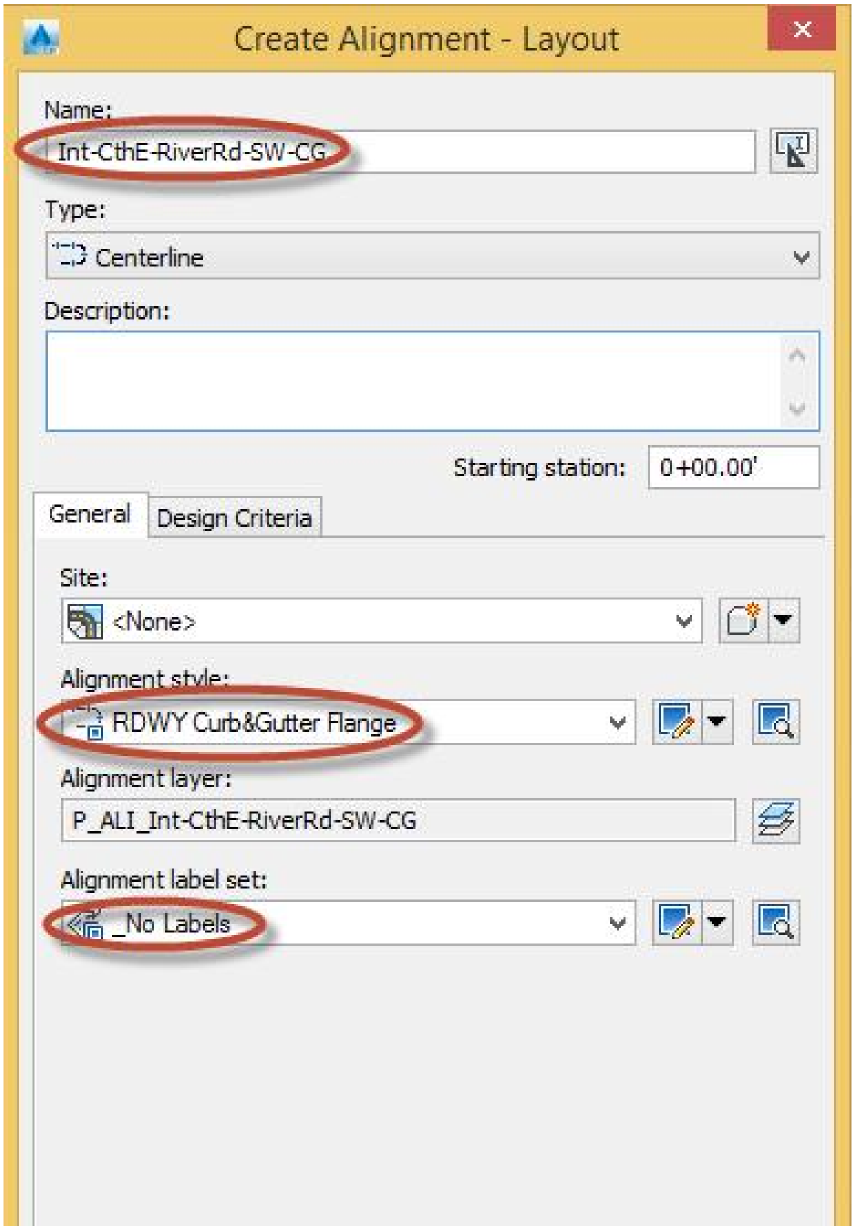
8. OK
9. **Line Tool > Fixed Line(Two Points)**
    A. O-Snap to the bottom of the North-East intersection.
    B. O-Snap to the end of the curve.
    C. Right-click to set the points.
10. **Curve Tool > Fixed Curve(Three Points)**
    A. O-Snap to the end of the curve.
    B. Shift **+ right-click > Midpoint**
11. Select the start of the curve.
12. Right-click to set the points.
13. **Line Tool > Fixed Line (Two Points)**
    A. O-Snap to the end of the curve.
    B. Shift **+ right-click > Endpoint**
    C. Select the endpoint of the line
    D. Right-click to set the points.

Create curb and gutter edgelines for SW and SE quadrants

Exercise files: ali-int-edglin-geom-creat-05-data-C3D16.zip

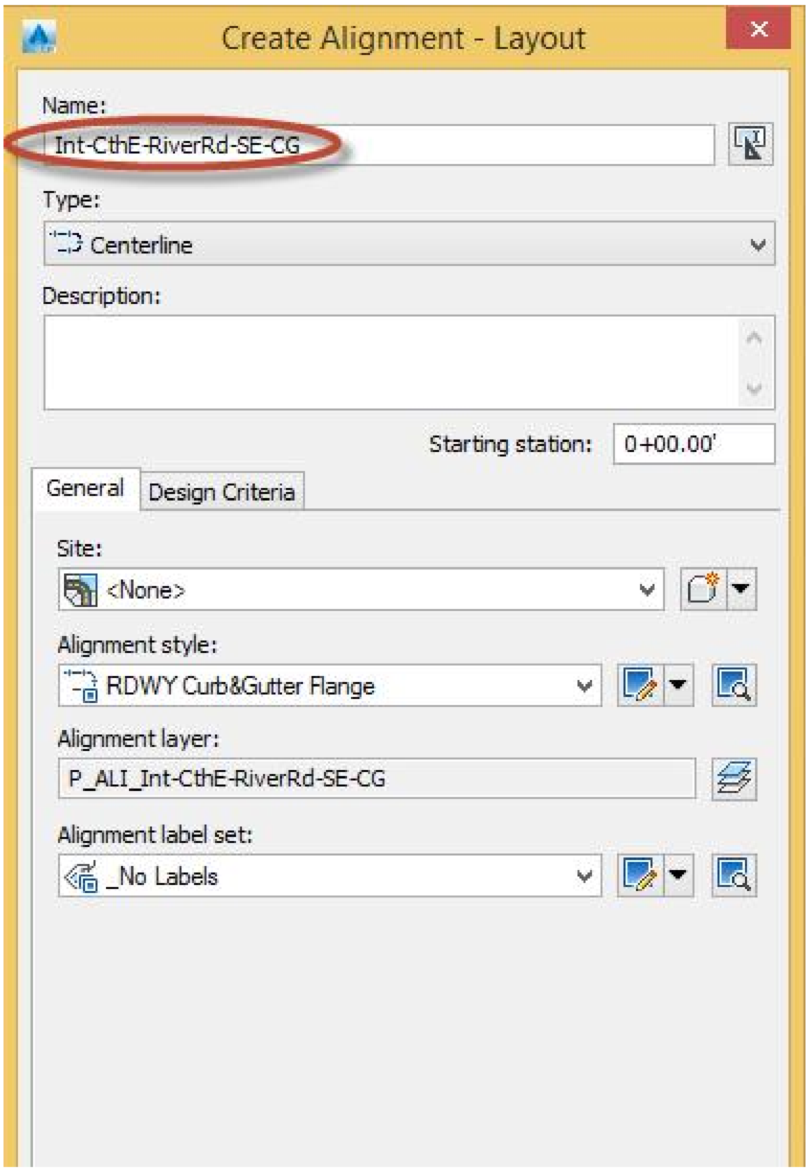
ali-int-edglin-geom-creat-05.mp4 1:32

1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Home tab > Create Design > Alignment > Alignment Creation Tools**
    A. Change the name to ***Int-CthE-RiverRd-SW-CG***
    B. Change the Alignment style to **RDWY Curb&Gutter Flange**
    C. Change the Alignment label set to **_No Labels**



3. OK
4. **Line Tool > Fixed Line (Two Points)**.
   A. O-Snap to the start of the South-West intersection.
   B. O-Snap to the end of the curve.
   C. Right-click to set the points.
5. **Curve Tool > Fixed Curve (Three Points)**
   A. O-Snap to the start of the curve.
   B. Shift **+ right-click > Midpoint**
   C. Select the endpoint of the curve.
   D. Right-click to set the points.

6. **Line Tool > Fixed Line (Two Points)**
    A. O-Snap to the end of the curve.
    B. Shift **+ right-click > Endpoint**
    C. Select the endpoint of the line
    D. Right-click to set the points.
7. **Home tab > Create Design > Alignment > Alignment Creation Tools**
8. Change the name to ***Int-CthE-RiverRd-SE-CG***.
    A. Leave the rest of the selections as is.



9. OK
10. **Line Tool > Fixed Line (Two Points)**
    A. O-Snap to the bottom of the South-East intersection.
    B. O-Snap to the end of the curve.

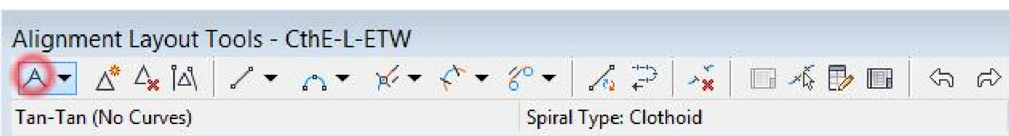
   C. Right-click to set the points.
11. **Curve Tool > Fixed Curve(Three Points)**
   A. Shift **+ right-click > Midpoint**
   B. Select the start of the curve.
   C. Right-click to set the points.
12. **Line Tool > Fixed Line (Two Points)**.
   A. O-Snap to the end of the curve.
   B. Shift **+ right-click > Endpoint**
   C. Select the endpoint of the line
   D. Right-click to set the points.

Create CthE ETW edgelines

Exercise files: [ali-int-edglin-geom-creat-06-data-C3D16.zip]

[ali-int-edglin-geom-creat-06.mp4] 2:49

1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Home tab > Create Design > Alignment > Alignment Creation Tools**
   A. Change the name to ***CthE-L-ETW***.
   B. Change the Alignment style to **RDWY Pavement Edge**.
3. OK
4. Tan-Tan(No Curves)



5. On the north side of ***CTH E***, endpoint OSNAP to:
   A. the west end of the lane transition.
   B. the west transition line connects to the NW curb and gutter
   C. the east transition line connects to the NE curb and gutter
   D. the east transition meets the ten foot extension of the NE curb and gutter
   E. the widened lane transition ends
   F. the bend in the transition lane
   G. east end of the widened lane transition
   H. the east end of the ten foot transition extension
6. Right-click to end the Draw Tangent command.
7. Close the toolbar.
8. **Home tab > Create Design > Alignment > Alignment Creation Tools**
   A. Change the name to ***CthE-R-ETW***.
9. OK
10. Tan-Tan(No Curves)

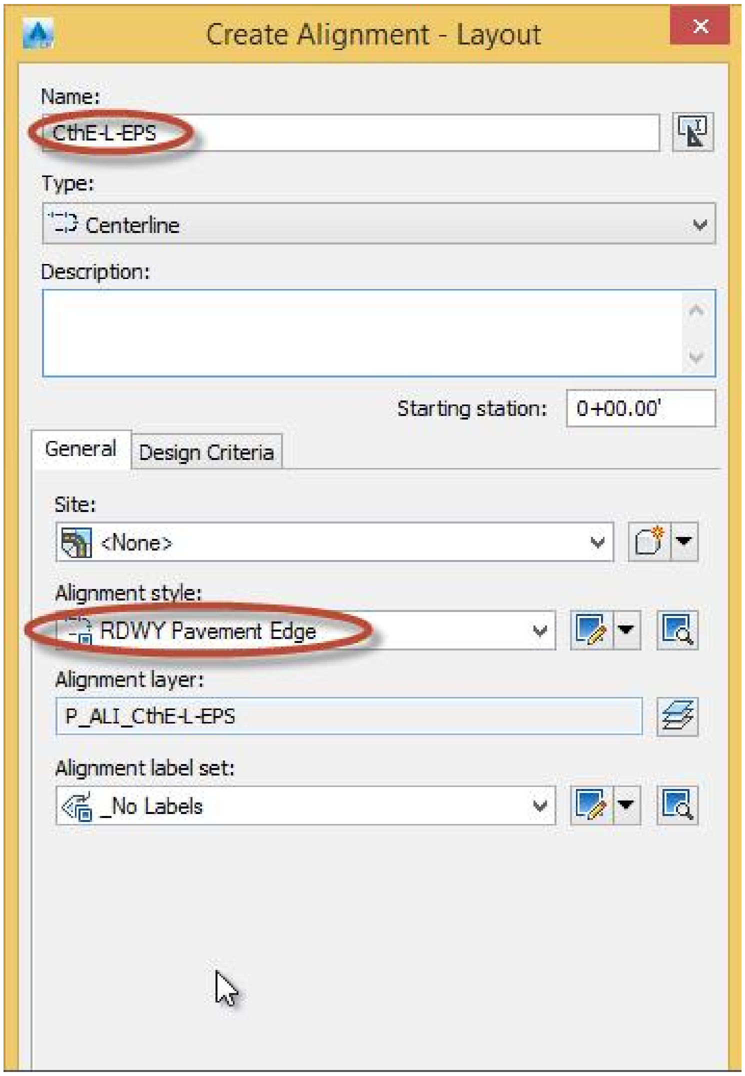
11. on the south side of ***CTH E***, endpoint OSNAP to:
    A. the west end of the ten foot extension of the lane transition.
    B. the west end of the transition line
    C. the west transition line bend
    D. the west transition meets the ten foot extension of the SW curb and gutter
    E. the west transition line connects to the SW curb and gutter
    F. the east transition line connects to the SE curb and gutter
    G. the east transition meets the ten foot extension of the NE curb and gutter
    H. the widened lane transition ends
    I. the east end of the ten foot transition extension
12. Right-Click to end the Draw Tangent command.
13. Close the toolbar

Create CthE EPS edgelines

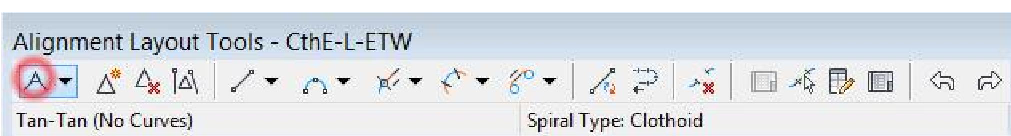
Exercise files: ali-int-edglin-geom-creat-07-data-C3D16.zip

ali-int-edglin-geom-creat-07.mp4 1:43

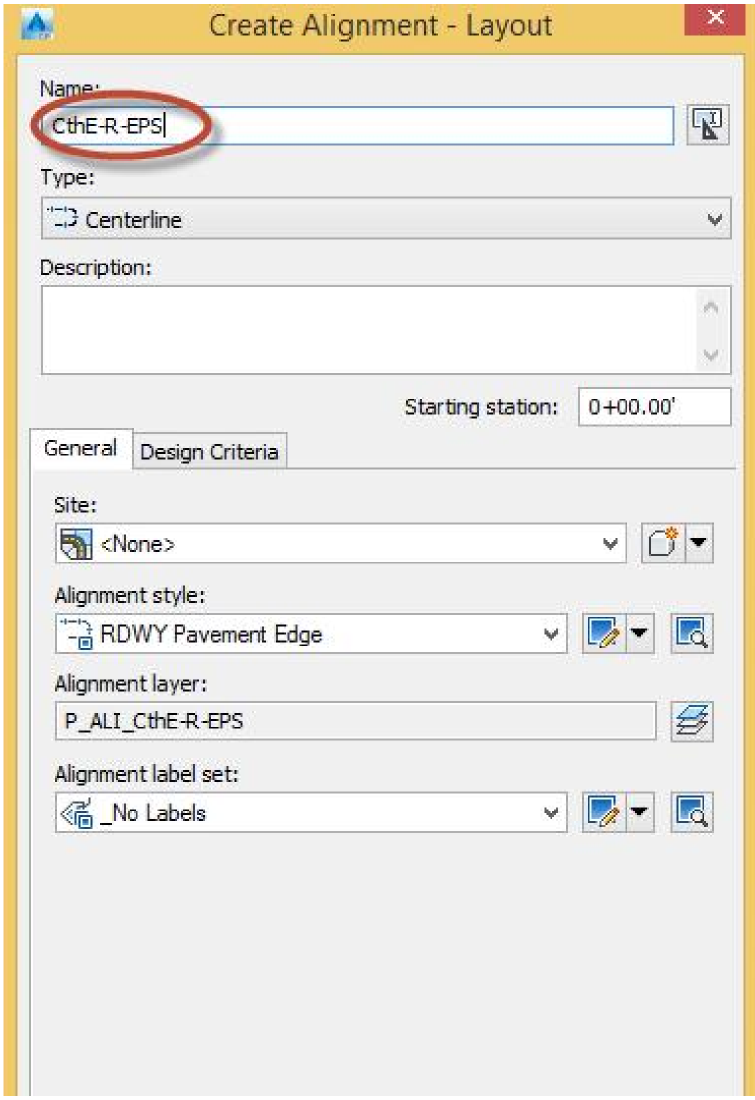
1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Home tab > Create Design > Alignment > Alignment Creation Tools**
    A. Change the name to ***CthE-L-EPS***
    B. Change the Alignment style to **RDWY Shoulder Paved**.



3. OK
4. Tan-Tan(No Curves)



5. Snap to the end of the paved shoulder, end of the transition, end of the line.
6. Right-Click to lock in the points.
7. Close the tool bar.
8. **Home tab > Create Design > Alignment > Alignment Creation Tools**
   A. Change the name to ***CthE-R-EPS***
   B. OK



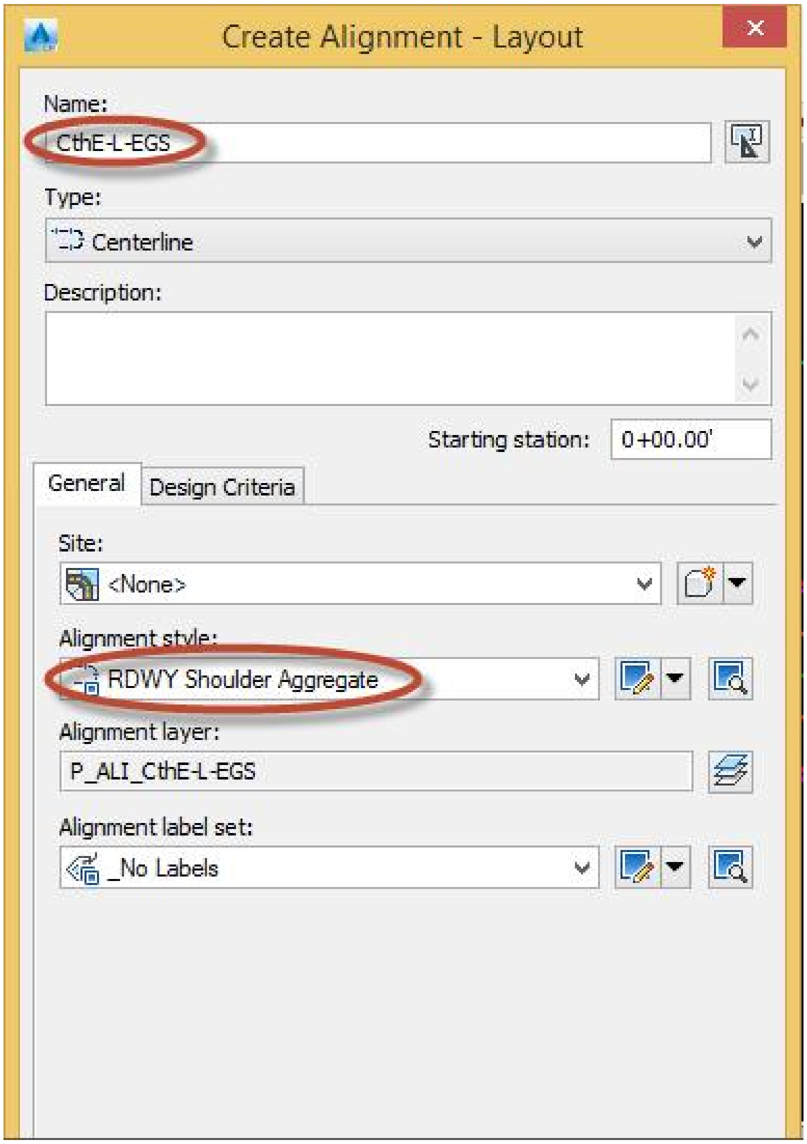
7. Snap to the end of the lane, the end of the transition, and the end of the paved shoulder.
8. Right-Click to lock in the points.
9. Close the tool bar.

Create CthE EGS edgelines

Exercise files: ali-int-edglin-geom-creat-08-data-C3D16.zip

ali-int-edglin-geom-creat-08.mp4 1:42

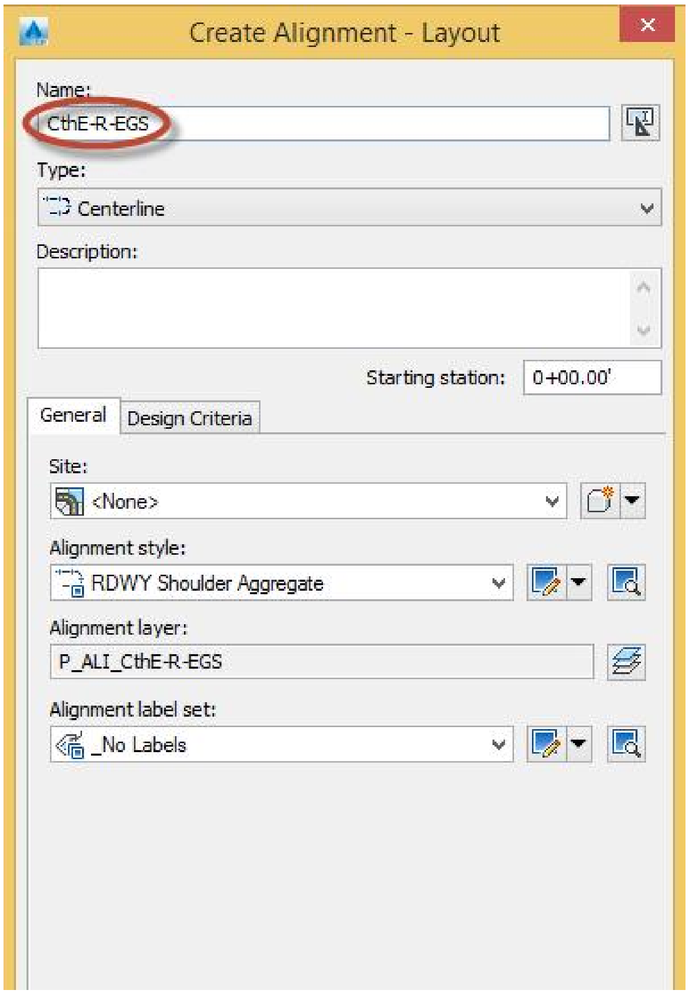
1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Home tab > Create Design > Alignment > Alignment Creation Tools**
   A. Change the name to ***CthE-L-EGS***
   B. Change the Alignment style to **RDWY Shoulder Aggregate**.



3. OK
4. Tan-Tan(No Curves)

5. On the north side of ***CTH E***, endpoint OSNAP to:
    A. the west end of the EGS line.
    B. the west EGS line bends before the NW curb and gutter
    C. the west EGS connects to the NW curb and gutter
    D. the east EGS connects to the NE curb and gutter
    E. the east EGS transition bend
    F. the east end of the EGS line
6. Right-Click to end the Draw Tangent command.

7. Close the toolbar.
8. **Home tab > Create Design > Alignment > Alignment Creation Tools**
    A. Change the name to ***CthE-R-EGS***.



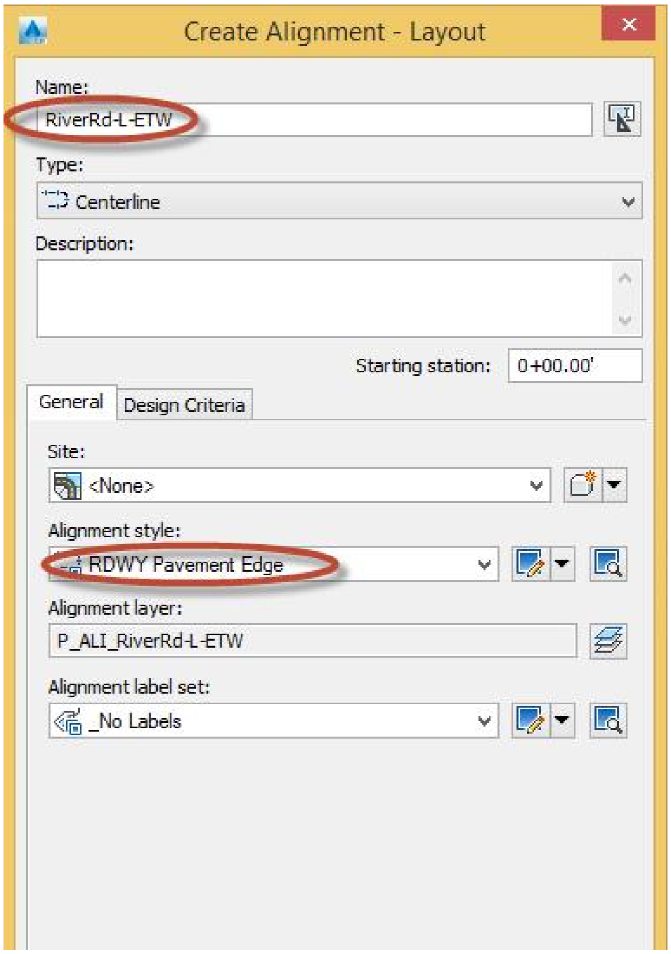
9. OK
10. Tan-Tan(No Curves)
11. On the south side of ***CTH E***, endpoint OSNAP to:
    A. the west end of the EGS
    B. the west EGS bend in transition line
    C. the west end of the EGS where it matches the SW curb and gutter
    D. the east end of the EGS where it matches the SE curb and gutter
    E. the east EGS line bends after the SE curb and gutter
    F. east end of the EGS line.
12. Right-Click to end the Draw Tangent command.
13. Close the tool bar.

Create RiverRd ETW edgelines

Exercise files: ali-int-edglin-geom-creat-09-data-C3D16.zip

ali-int-edglin-geom-creat-09.mp4 2:07

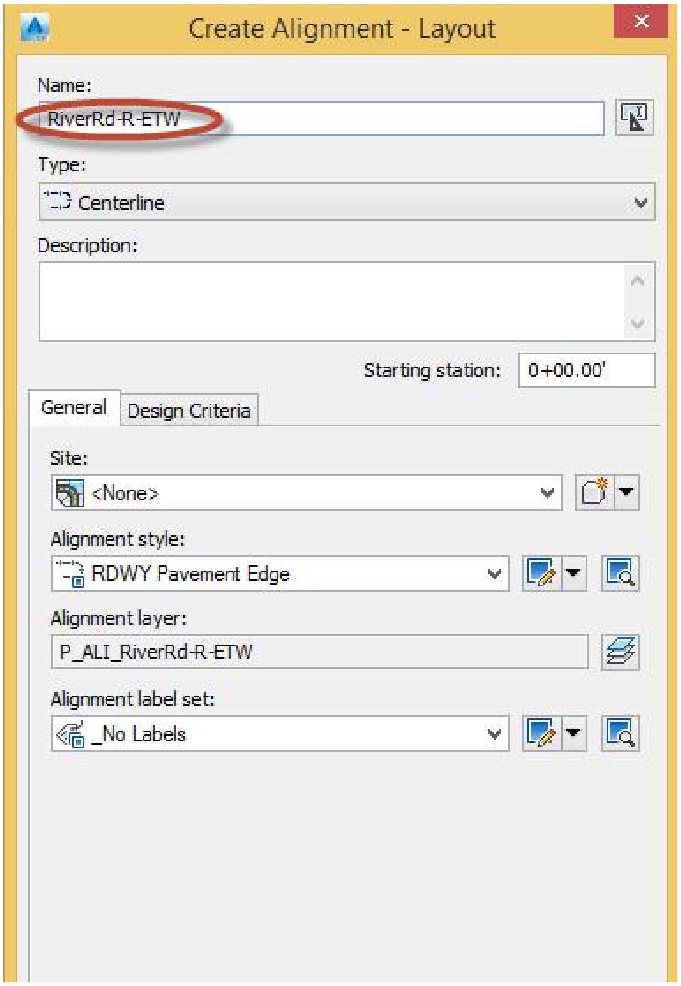
1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Home tab > Create Design > Alignment > Alignment Creation Tools**
   A. Change the name to ***RiverRd-L-ETW***.
   B. Change the Alignment style to **RDWY Shoulder Aggregate**



3. OK
4. Tan-Tan(No Curves)

5. Starting at the south end
   A. snap to the end of the extension
   B. snap to the beginning of the transition

C. snap to the end of transition.
6. Jump to the other side
    A. snap to where it touches the curve
    B. snap to where it returns back to the pavement
    C. snap to the end of the extension
    D. snap to the end of the 10 foot extension.
7. Right-Click to lock in the points.
8. Close the tool bar.
9. **Home tab > Create Design > Alignment > Alignment Creation Tools**
    A. Change the name to ***RiverRd-R-ETW***.



10. OK
11. Tan-Tan(No Curves)
    A. the south end of the ETW at the 10' extension
    B. the south end of the transition lane line
    C. the south end where the transition line meets the SW curb and gutter
    D. the north end where the transition line meets the curb and gutter

E. the north end where the transition meets the 10' extension of the curb and gutter
F. the north end of transition line
G. the north end f the 10' extension of the transition line

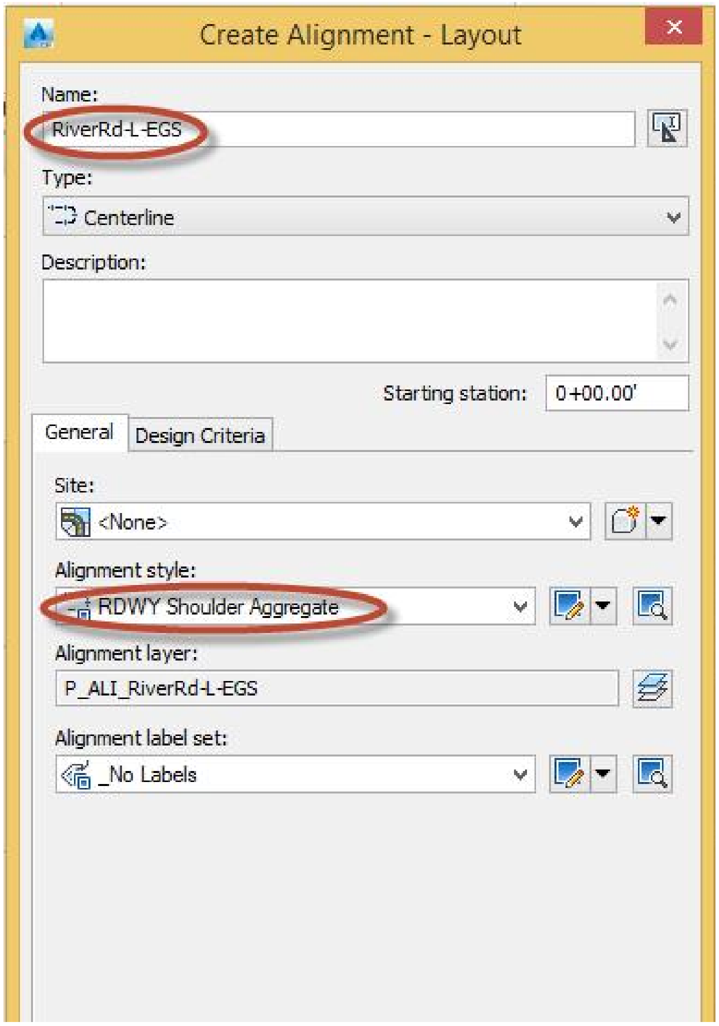
12. Right-Click to end the Draw Tangent command.
13. Close the toolbar.

Create RiverRd EGS edgelines

Exercise files: ali-int-edglin-geom-creat-10-data-C3D16.zip

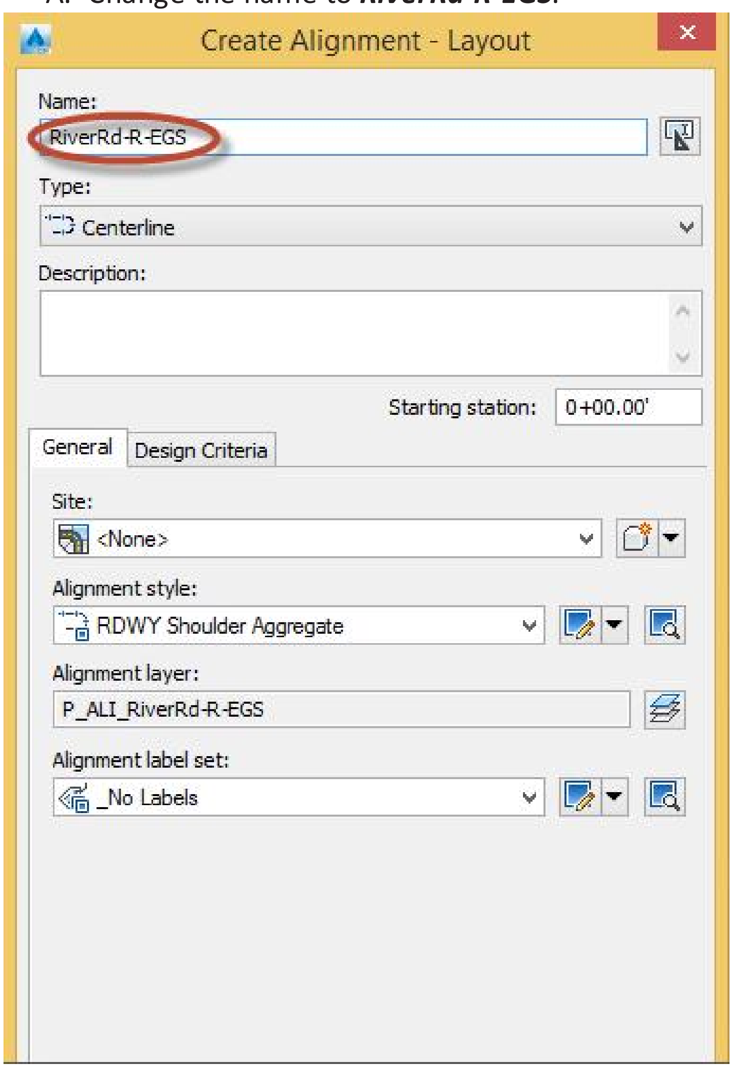
ali-int-edglin-geom-creat-10.mp4 1:43

1. Open Crdr-Int-CthE-RiverRd.dwg
2. **Home tab > Create Design > Alignment > Alignment Creation Tools**
   A. Change the name to ***RiverRd-L-EGS***.
   B. Change the Alignment style to **RDWY Shoulder Aggregate**



3. OK
4. Tan-Tan(No Curves)

5. on the west side of ***River Rd***, endpoint OSNAP to:
   A. the south end of the EGS
   B. the south end where the EGS line meets the SW curb and gutter
   C. the north end where the EGS line meets the curb and gutter
   D. the north end of the EGS
6. Right-click to end the Draw Tangent command.
7. Close the toolbar.
8. **Home tab > Create Design > Alignment > Alignment Creation Tools**
   A. Change the name to ***RiverRd-R-EGS***.



9. OK
10. Tan-Tan(No Curves)
11. on the east side of ***River Rd***, endpoint OSNAP to:
    - A. the south end of the EGS
    - B. the south end where the EGS line meets the SW curb and gutter
    - C. the north end where the EGS line meets the curb and gutter
    - D. the north end of the EGS
12. Right-Click to end the Draw Tangent command.
13. Close the toolbar

Create layers for edgeline alignments

Exercise files: ali-int-edglin-geom-creat-11-data-C3D16.zip

ali-int-edglin-geom-creat-11.mp4 2:38

1. **Home tab > Layer panel > Layer Properties**
2. New Layer

    - A. Name the new layer ***P_RDWY_LaneEdge-L***.
    - B. Enter
3. Create another new layer.
    - A. Name this new layer ***P_RDWY_LaneEdge-R***.
    - B. Enter
4. Create another new layer.
    - A. Name this new layer ***P_RDWY_ShldAgg-L***.
    - B. Enter
5. Create another new layer.
    - A. Name this new layer ***P_RDWY_ShldAgg-R***.
    - B. Enter
6. Create another new layer.
    - A. Name this new layer ***P_RDWY_ShldPaved-L***.
    - B. Enter
7. Create another new layer.
    - A. Name this new layer ***P_RDWY_ShldPaved-R***.
    - B. Enter
8. Close the Layer Properties manager.

Assign edgeline alignments to layers

Exercise files: ali-int-edglin-geom-creat-12-data-C3D16.zip

ali-int-edglin-geom-creat-12.mp4 4:25

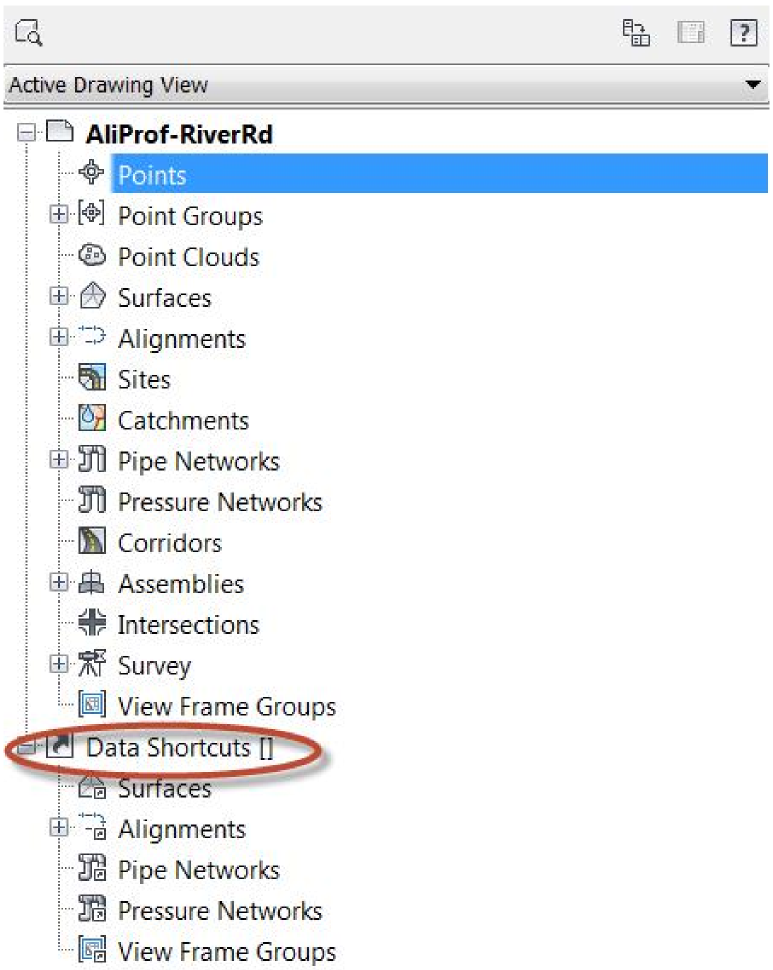
1. Left-Click on the north side of ***CTH E*** and the west side of ***River Rd***
   A. **Right-click > Properties**
   B. Select the Layer pull-down.
   C. Select ***P_RDWY_LaneEdge-L***
   D. ESC
2. Select the south side of ***CTH E*** and the east side of ***River Rd***.
   A. With both selected **Right-click > Properties**
   B. Select the Layer pull-down.
   C. Select ***P_RDWY_LaneEdge-R***
   D. ESC
3. Select the paved shoulder west of ***CTH E***.
   A. With both selected **Right-click > Properties**
   B. Select the Layer pull-down.
   C. Select ***P_RDWY_ShldPaved-L***
   D. ESC
4. Select the paved shoulder on the left hand side of ***CTH E***.
   A. With both selected **Right-click > Properties**
   B. Select the Layer pull-down.
   C. Select ***P_RDWY_ShldPaved-R***
   D. ESC
5. Select the shoulder aggregate left of ***CTH E*** and the shoulder aggregate west side of ***River Rd***.
   A. With both selected **Right-click > Properties**
   B. Select the Layer pull-down.
   C. Select ***P_RDWY_ShldAgg-L***
   D. ESC
6. Select the shoulder aggregate right of ***CTH E*** and the shoulder aggregate east side of ***River Rd***.
   A. With both selected **Right-click > Properties**
   B. Select the Layer pull-down.
   C. Select ***P_RDWY_ShldAgg-R***.
   D. ESC
7. Select all the Curb&Gutter radii.
   A. With both selected **Right-click > Properties**
   B. Select the Layer pull-down.
   C. Select ***P_RDWY_C_and_G***.
   D. ESC
8. Close out the Properties Dialogue box.

Create data shortcuts

Exercise files: ali-int-edglin-geom-creat-13-data-C3D16.zip

ali-int-edglin-geom-creat-13.mp4 1:38

1. Open Crdr-Int-CthE-RiverRd.dwg
2. Save
3. **Prospector > Right-click on Data Shortcuts [] > Create Data Shortcuts**



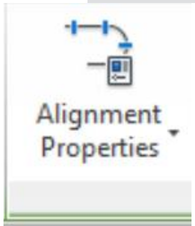
4. Click on Centerline Alignments to select all the alignments.
5. OK

Mask CthE ETW and EGS edgelines in intersection

Exercise files: ali-int-edglin-geom-creat-14-data-C3D16.zip

ali-int-edglin-geom-creat-14.mp4 2:51

1. Open Crdr-Int-CthE-RiverRd.dwg
2. Select on the north ETW alignment.
   A. **Home tab > Modify panel> Alignment Properties**



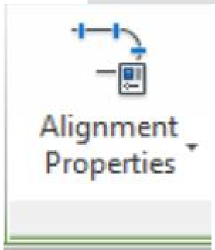
   B. Go to the ***Masking*** tab.
   C. Create Masking Station.
   D. Endpoint Snap to:
      I. ETW where it matches to the NW curb and gutter
      II. ETW where it matches to the NE curb and gutter.
   E. OK
   F. ESC
3. Select on the north EGS alignment.
   A. Go to the ***Masking*** tab
   B. Create Masking Station.
   C. Endpoint Snap to:
      I. EGS where it matches to the NW curb and gutter
      II. EGS where it matches to the NE curb and gutter.
   D. OK
   E. ESC
4. Select on the south ETW alignment.
   A. Endpoint Snap to:
      I. ETW where it matches to the NW curb and gutter
      II. ETW where it matches to the NE curb and gutter.
   B. OK
   C. ESC to release the ETW.
5. Select on the south EGS alignment.
   A. Endpoint Snap to:
      I. EGS where it matches to the NW curb and gutter
      II. EGS where it matches to the NE curb and gutter.
6. OK
7. ESC to release the EGS

Mask RiverRd ETW and EGS edgelines in intersection

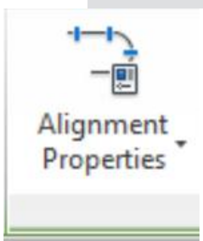
Exercise files: ali-int-edglin-geom-creat-15-data-C3D16.zip

ali-int-edglin-geom-creat-15.mp4 2:38

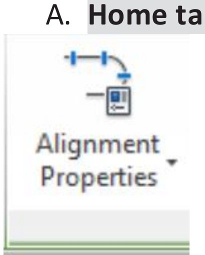
1. Open Crdr-Int-CthE-RiverRd.dwg
2. Select on the **River Rd** west ETW alignment.
    A. **Home tab > Modify panel> Alignment Properties**



    B. Go to the ***Masking*** tab.
    C. Create Masking Station.
    D. Endpoint Snap to where the west ETW line intersects the SW curb and gutter.
    E. Endpoint snap to where the west ETW line intersects the NW curb and gutter.
    F. OK
    G. ESC
3. Select on the **River Rd** east ETW alignment.
    A. **Home tab > Modify panel> Alignment Properties**

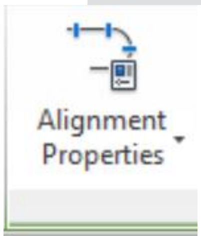


    B. Go to the ***Masking*** tab.
    C. Create Masking Station.
    D. Endpoint Snap to where the west ETW line intersects the SE curb and gutter.
    E. Endpoint snap to where the west ETW line intersects the NE curb and gutter.
    F. OK
    G. ESC
4. Select on the **River Rd** west EGS alignment.
    A. **Home tab > Modify panel> Alignment Properties**



   B. Go to the ***Masking*** tab.
   C. Create Masking Station.
   D. Endpoint Snap to where the west EGS line intersects the SW curb and gutter.
   E. Endpoint snap to where the west EGS line intersects the NW curb and gutter.
   F. OK
   G. ESC

5. Select on the **River Rd** east EGS alignment.
   A. **Home tab > Modify panel> Alignment Properties**



   B. Go to the ***Masking Tab***.
   C. Create Masking Station.
   D. Endpoint Snap to where the east EGS line intersects the SE curb and gutter.
   E. Endpoint snap to where the east EGS line intersects the NE curb and gutter.
   F. OK
   G. ESC

Mask curb return extensions

Exercise files: ali-int-edglin-geom-creat-16-data-C3D16.zip

ali-int-edglin-geom-creat-16.mp4 2:47

1. Beginning in the Northwest Quadrant select on the alignment.
2. **Home tab > Modify panel> Alignment Properties**
   A. Go to the ***Masking*** tab.
   B. Create Masking Station.
   C. Starting at the North end of the block
      I. Endpoint Snap to the beginning of the curb return extension.
      II. Endpoint snap to where the curb return actually begins.
   D. Create Masking Station.
   E. From the South end of the block.
      I. Endpoint snap to where the curb return actually begins.
      II. Snap to the beginning of the curb return extension.
   F. OK
   G. ESC
3. Beginning in the Northeast Quadrant select on the alignment.

4. **Home tab > Modify panel> Alignment Properties**
    A. Go to the ***Masking*** tab.
    B. Create Masking Station.
    C. Starting at the east end of the block
        I. Endpoint Snap to the beginning of the curb return extension.
        II. Endpoint snap to where the curb return actually begins.
    D. Create Masking Station.
    E. From the North end of the block.
        I. Endpoint snap to where the curb return actually begins.
        II. Snap to the beginning of the curb return extension.
    F. OK
    G. ESC
5. Beginning in the Southwest Quadrant select on the alignment.
6. **Home tab > Modify panel> Alignment Properties**
    A. Go to the ***Masking*** tab.
    B. Create Masking Station.
    C. Starting at the west end of the block
        I. Endpoint Snap to the beginning of the curb return extension.
        II. Endpoint snap to where the curb return ends.
    D. Create Masking Station.
    E. From the South end of the block.
        I. Endpoint snap to where the curb return ends.
        II. Snap to the beginning of the curb return extension.
    F. OK
    G. ESC
7. Beginning in the Southeast Quadrant select on the alignment.
8. **Home tab > Modify panel> Alignment Properties**
    A. Go to the ***Masking*** tab.
    B. Create Masking Station.
    C. Starting at the South end of the block
        I. Endpoint Snap to the beginning of the curb return extension.
        II. Endpoint snap to where the curb return ends.
    D. Create Masking Station.
    E. From the South end of the block.
        I. Endpoint snap to where the curb return actually begins.
        II. Snap to the beginning of the curb return extension.
    F. OK
    G. ESC
9. **Home tab > Layers panel> Layer pull down**
    A. Type in **P_INT_BLOCK_NPLT**
    B. Freeze the layer
10. Save

Edit CthE geometry and linework

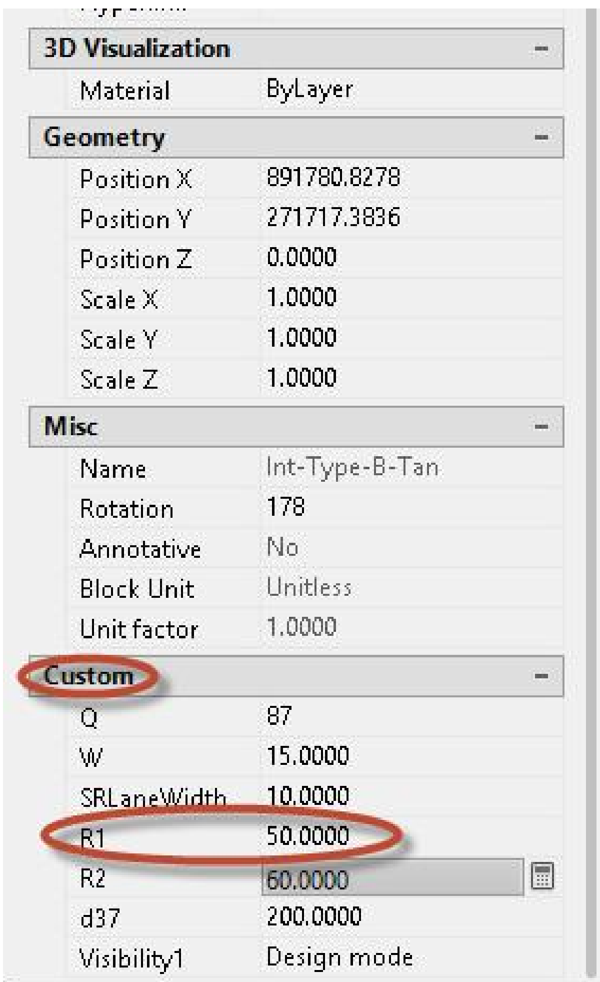
Exercise files: [ali-int-edglin-geom-creat-17-data-C3D16.zip]

[ali-int-edglin-geom-creat-17.mp4] 2:46

1. Open Crdr-Int-CthE-RiverRd.dwg

Tip: This is only to show the edit process, should that be necessary. This will not be part of the regular creation workflow.

2. **Home tab > Layer panel > Layer Panel Pull-down**
   A. Find the ***P_Int_Block_NPLT*** layer and thaw it.
3. Select on the northern block.
   A. **Right-click > Properties**
   B. Scroll down to Custom.
   C. **R1** = 50



   D. Close the window.
   E. ESC to let go of the block.

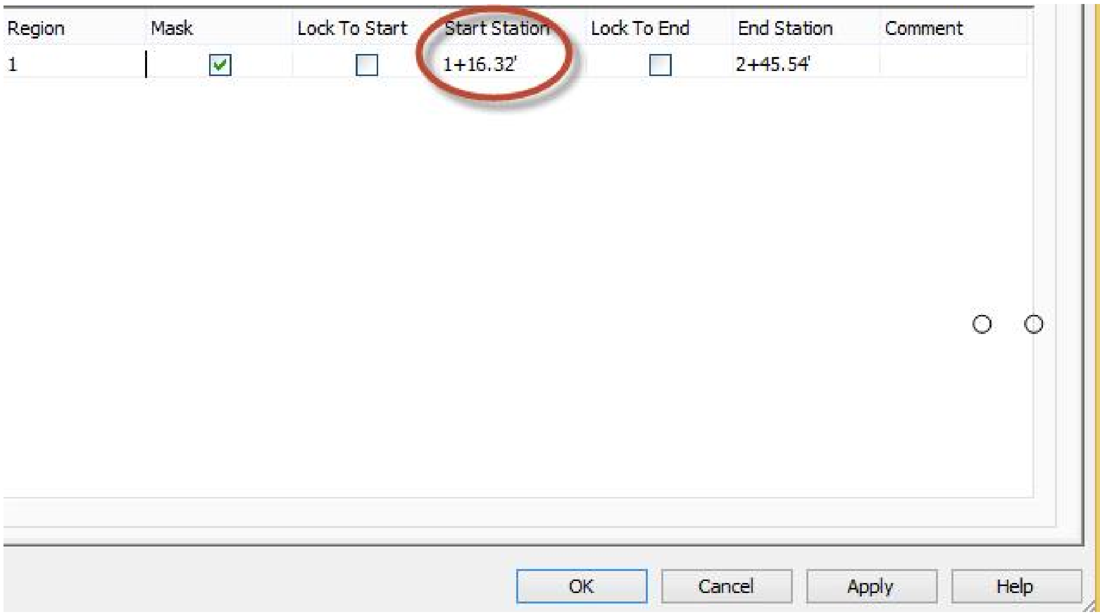
4. Select on the block.
    A. Select on the alignment for the curb-return.
    B. Grab the end point of the alignment and move it to the end.
    C. Grab the end of the straight portion and move it to the end of the curb.
    D. On the top half of the block grab the end point of the alignment and move it to the end.
    E. Grab the end of the straight portion and move it to the end of the curb.
5. Select on the ETW.
    A. Move the end of the ETW to the intersection point.
6. Select on the EGS.
    A. Move the top end point to the end of the EGS line.
    B. Move the end point to where the EGS line matches the curb and gutter.
    C. ESC
7. Select (2:30 Mark)
8. Snap overlap to the end of the block.
9. Snap the corner to the end of transition.
10. ESC
11. Select the EGS and snap that to the end of the EGS line.
12. Repeat the steps for the top half of the curve.

Edit RiverRd geometry and linework and masks

Exercise files: ali-int-edglin-geom-creat-18-data-C3D16.zip

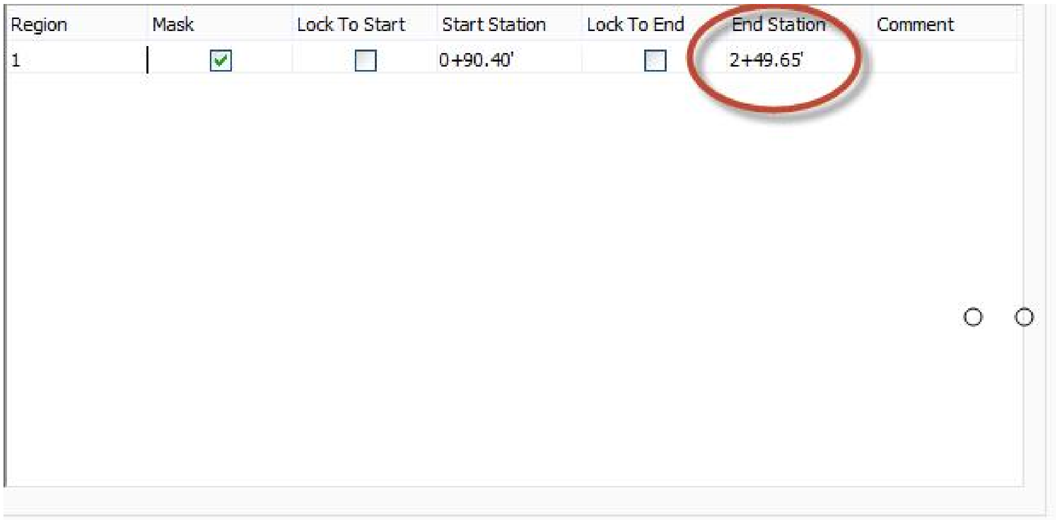
ali-int-edglin-geom-creat-18.mp4 2:51

1. Open Crdr-Int-CthE-RiverRd.dwg
2. Select on the ETW.
    A. Select on the end point of the ETW an move it to the end of the transition.
    B. Move the ETW match point to curb to the new location of the end of the curb.
    C. ESC
3. Select on the EGS line.
    A. Select on the end point of the EGS and move it to the end of the transition.
    B. Move the EGS match point with the curb to the new location of the end of the curb.
    C. ESC
4. Select on the West EGS alignment.
5. **Home tab > Modify panel> Alignment Properties**
    A. Click on the ***Masking*** tab.
    B. Select the Start Station inside Region 1.
    C. Select from Screen Icon.



D. Endpoint OSNAP to the end of the curb and gutter.
E. OK
F. ESC

6. Select on the ***West ETW*** alignment.
7. **Home tab > Modify panel> Alignment Properties**
   A. Click on the ***Masking*** tab.
   B. Select the Start Station inside Region 1.
   C. Select from Screen Icon.
   D. Endpoint OSNAP to the end of the curb and gutter
   E. OK
   F. ESC
8. Select on the ***North ETW*** alignment.
9. **Home tab > Modify panel> Alignment Properties**
   A. Click on the ***Masking*** tab.
   B. Select on the ***North EGS*** alignment.
   C. Select the Start Station inside Region 1.
   D. Select from Screen Icon.



E. Select back of curb endpoint.
F. OK
G. ESC

10. Select on the ***North EGS*** alignment.
11. **Home tab > Modify panel> Alignment Properties**
    A. Click on the ***Masking*** tab.
    B. Select the End Station inside Region 1.
    C. Select from Screen Icon.
    D. Select back of curb endpoint.
    E. OK.
    F. ESC
12. Grab the end of the EGS alignment and snap it to the new location of the end of the EGS.
    A. ESC
13. Grab the ETW alignment and snap it to the new location of the end of the ETW.
    A. ESC
14. **Home tab > Layer panel > Layer Panel Pull-down**
15. Type **P_INT_BLOCK_NPLT** and select the sunshine icon to freeze the block.

Make edgelines ready for plan production

Last updated: 2017-06-06

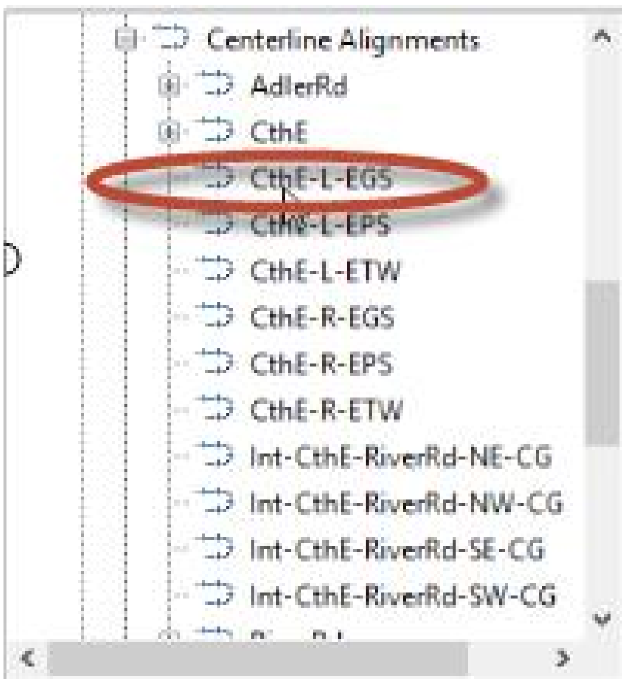
Total video time: 12:53

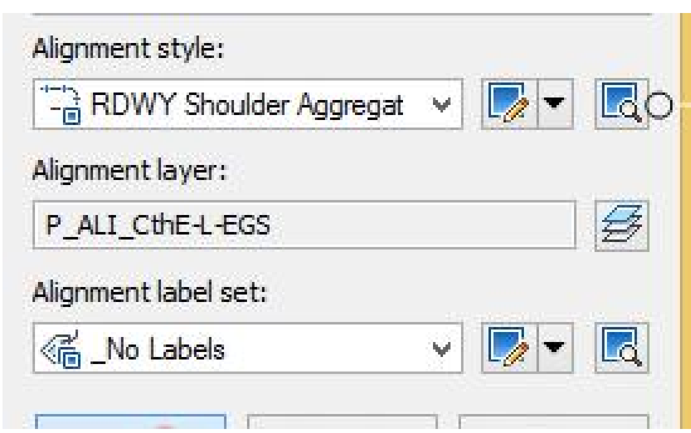
Data reference edgeline alignments into Pavt.dwg

Exercise files: ali-mak-edglin-rdy-pln-prod-01-data-C3D16.zip

ali-mak-edglin-rdy-pln-prod-01.mp4 4:15

1. **12345678 > Design Folder > Edgelines Folder > Open pavt.dwg file**
2. **Prospector > Right-click on Data Shortcuts [] > Set Working Folder**
    A. Open C3D file.
3. **Data Shortcuts > Alignments > Centerline Alignments > Right-click on CthE-L-EGS > Create Reference**
    A. **Alignment style** = RDWY Shoulder Aggregate
    B. **Label Set** = _No Label
4. OK

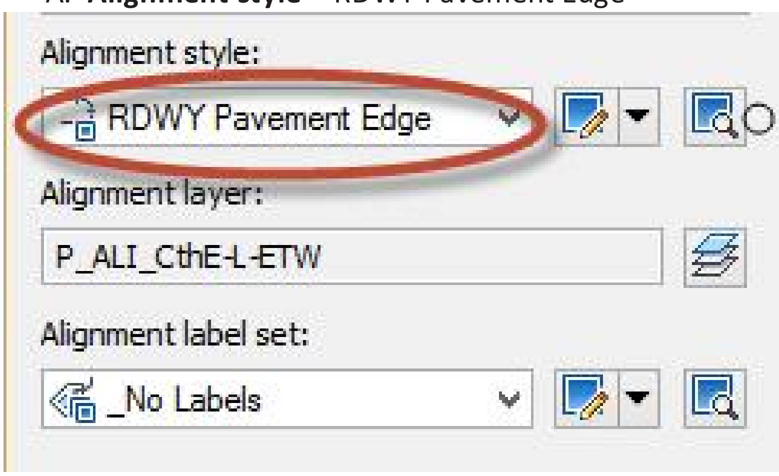




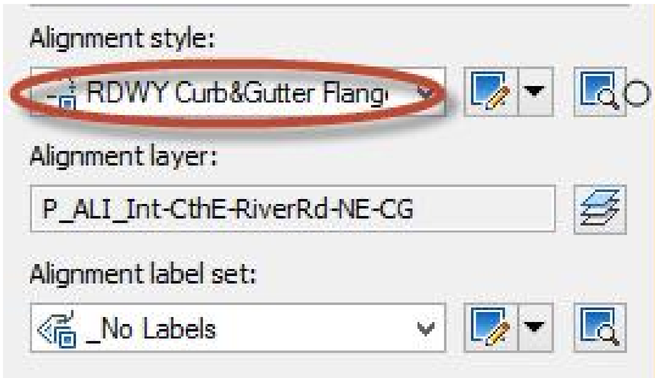
5. **Right-Click on CthE-R-EGS > Create Reference**
    A. OK
6. **Right-Click on RiverRd-L-EGS > Create Reference**
    A. OK

7. **Right-Click on RiverRd-R-EGS > Create Reference**
   A. OK
8. **Right-Click on the CthE-L-EPS > Create Reference**
   A. **Alignment style** = RDWY Shoulder Paved

   B. OK
9. **Right-Click on the CthE-R-EPS > Create Reference**
   A. OK
10. **Right-Click on the CthE-L-ETW > Create Reference**
    A. **Alignment style** = RDWY Pavement Edge



    B. OK
11. **Right-Click on the CthE-R-ETW > Create Reference**
    A. OK
12. **Right-Click on the RiverRd-L-ETW > Create Reference**
    A. OK
13. **Right-Click on the RiverRd-R-ETW > Create Reference**
    A. OK
14. **Right-Click on the Int-CthE-RiverRd-NE-CG > Create Reference**
    A. **Alignment style** = RDWY Curb&Gutter Flange



B. OK

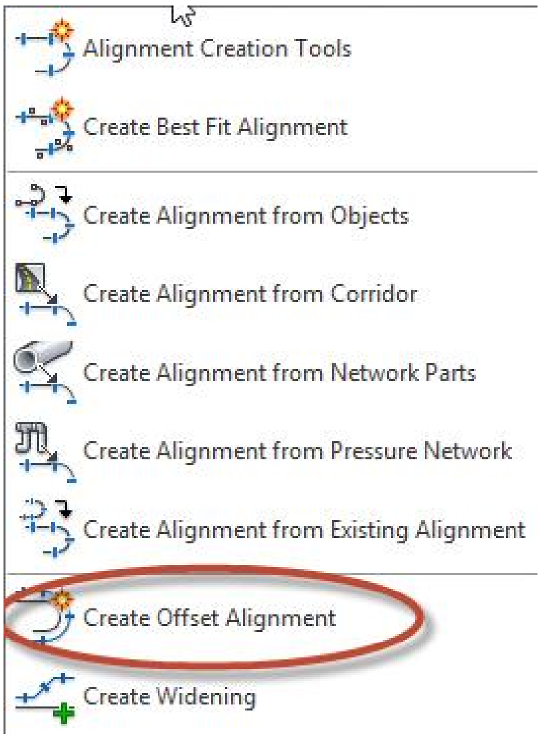
15. **Right-Click on the Int-CthE-RiverRd-NW-CG > Create Reference**
    A. OK
16. **Right-Click on the Int-CthE-RiverRd-SE-CG > Create Reference**
    A. OK
17. **Right-Click on the Int-CthE-RiverRd-SW-CG > Create Reference**
    A. OK

Create offsets for back of curb edgelines

Exercise files: ali-mak-edglin-rdy-pln-prod-02-data-C3D16.zip

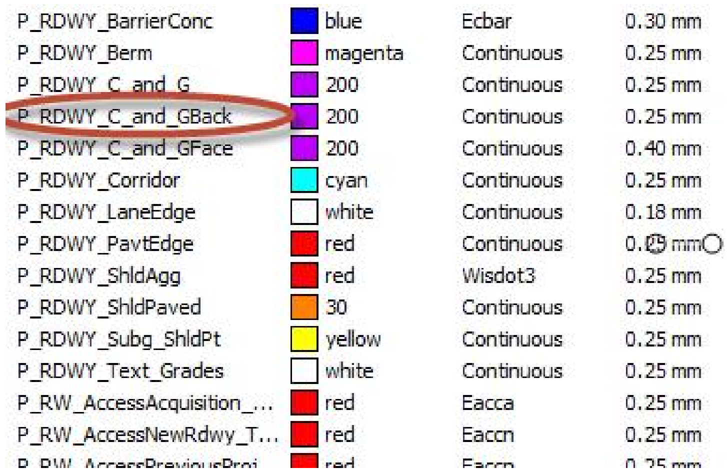
ali-mak-edglin-rdy-pln-prod-02.mp4 4:08

1. **Home Tab > Create Design > Alignment > Create Offset Alignment**

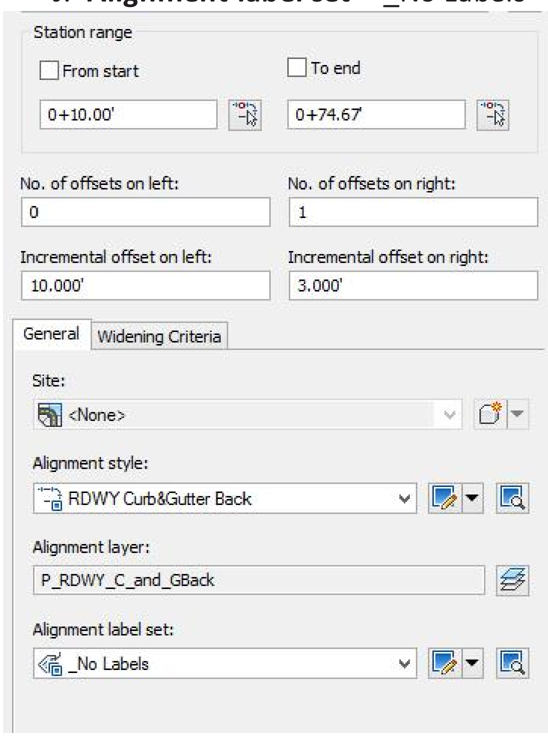


2. Select NW Curb and Gutter Flange.
   A. Un-Check **From Start** and **To End**
   B. Click select from Screen Icon for the start.

   C. Select the North End for the start.
   D. Click the select from screen button for the end.
   E. Snap to the end.
   F. **Offsets on right** = 1
   G. **Incremental offset on right** = 36"
   H. **Alignment Style** = RDWY Curb&Gutter Back
   I. Select the sheet icon in the Alignment layer.
      I. **Modifier** = None
      II. **Base Layer Name** = P_RDWY_C_and_GBack

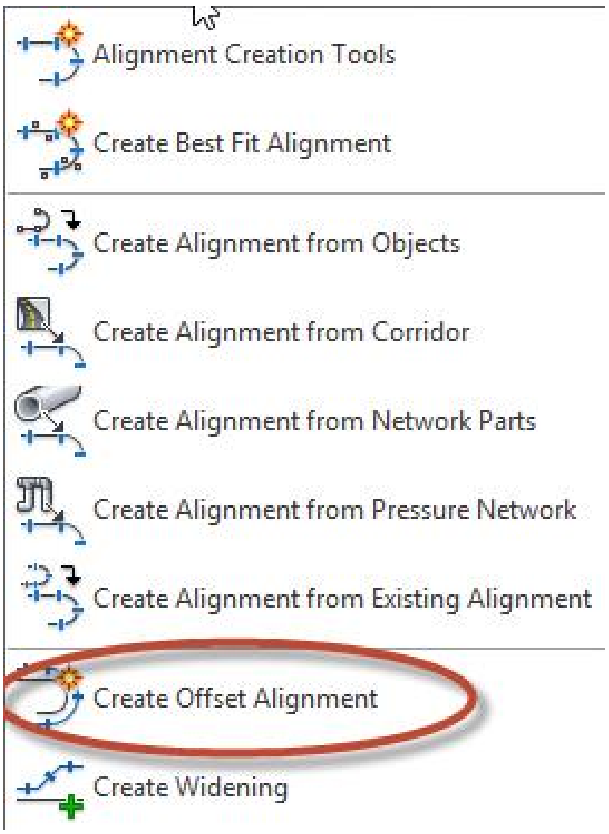


J. **Alignment label set** = _No Labels



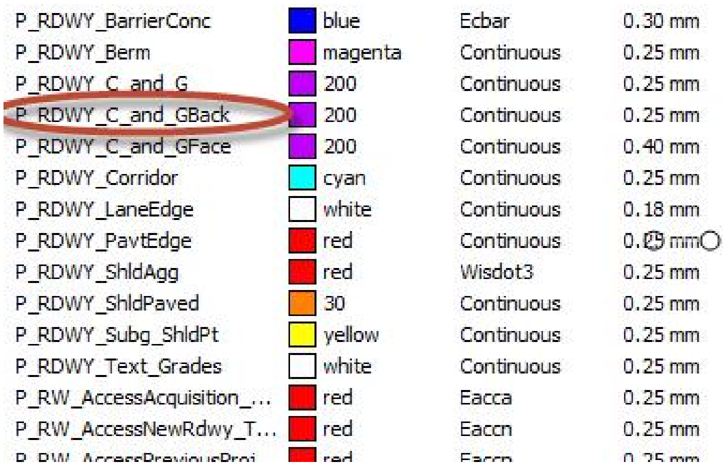
K. OK

3. **Home Tab > Create Design > Alignment > Create Offset Alignment**



5. Select NE Curb and Gutter Flange.
    A. Un-Check **From Start** and **To End**
    B. Click select from Screen Icon for the start.

    C. Select the North End for the start.
    D. Click the select from screen button for the end.
    E. Snap to the end.
    F. Select the sheet icon in the Alignment layer.
        I. **Modifier** = None
        II. **Base Layer Name** = P_RDWY C_and_GBack

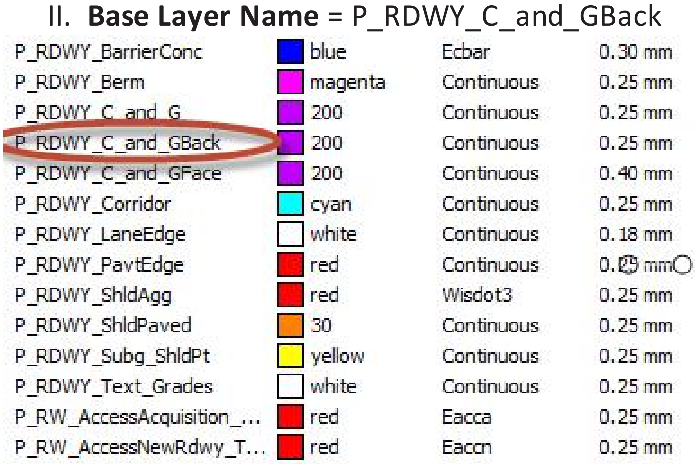


P_RDWY_BarrierConc	blue	Ecbar	0.30 mm
P_RDWY_Berm	magenta	Continuous	0.25 mm
P_RDWY_C_and_G	200	Continuous	0.25 mm
P_RDWY_C_and_GBack	200	Continuous	0.25 mm
P_RDWY_C_and_GFace	200	Continuous	0.40 mm
P_RDWY_Corridor	cyan	Continuous	0.25 mm
P_RDWY_LaneEdge	white	Continuous	0.18 mm
P_RDWY_PavtEdge	red	Continuous	0.[illegible] mm
P_RDWY_ShldAgg	red	Wisdot3	0.25 mm
P_RDWY_ShldPaved	30	Continuous	0.25 mm
P_RDWY_Subg_ShldPt	yellow	Continuous	0.25 mm
P_RDWY_Text_Grades	white	Continuous	0.25 mm
P_RW_AccessAcquisition_...	red	Eacca	0.25 mm
P_RW_AccessNewRdwy_T...	red	Eaccn	0.25 mm
P_RW_AccessPreviousProj	red	Eaccn	0.25 mm

G. OK

6. **Home Tab>Create Design>Alignment > Create Offset Alignment**
7. Select SW Curb and Gutter Flange.
   A. Un-Check **From Start** and **To End**
   B. Click select from Screen Icon for the start.

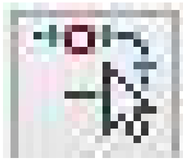
   C. Select the North End from the west end.
   D. Click the select from screen button for the end.
   E. Snap to the south end.
   F. Select the sheet icon in the Alignment layer
      I. **Modifier** = None
      II. **Base Layer Name** = P_RDWY_C_and_GBack



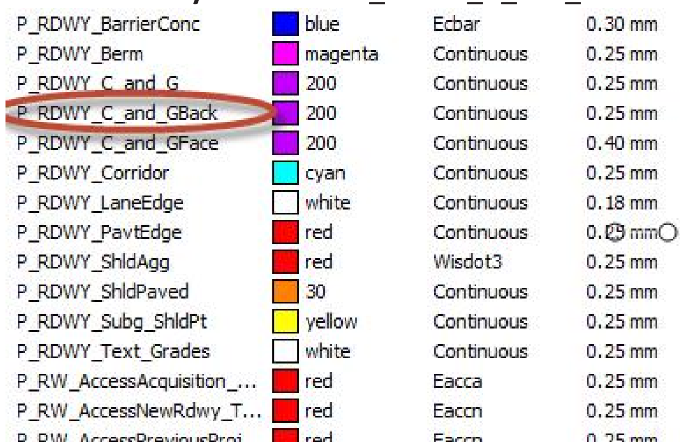
P_RDWY_BarrierConc	blue	Ecbar	0.30 mm
P_RDWY_Berm	magenta	Continuous	0.25 mm
P_RDWY_C_and_G	200	Continuous	0.25 mm
P_RDWY_C_and_GBack	200	Continuous	0.25 mm
P_RDWY_C_and_GFace	200	Continuous	0.40 mm
P_RDWY_Corridor	cyan	Continuous	0.25 mm
P_RDWY_LaneEdge	white	Continuous	0.18 mm
P_RDWY_PavtEdge	red	Continuous	0.[illegible] mm
P_RDWY_ShldAgg	red	Wisdot3	0.25 mm
P_RDWY_ShldPaved	30	Continuous	0.25 mm
P_RDWY_Subg_ShldPt	yellow	Continuous	0.25 mm
P_RDWY_Text_Grades	white	Continuous	0.25 mm
P_RW_AccessAcquisition_...	red	Eacca	0.25 mm
P_RW_AccessNewRdwy_T...	red	Eaccn	0.25 mm
P_RW_AccessPreviousProj	red	Eaccn	0.25 mm

   G. OK

8. **Home Tab > Create Design > Alignment > Create Offset Alignment**
9. Select SE Curb and Gutter Flange.
    A. Un-Check **From Start** and **To End**
    B. Click select from Screen Icon for the start.



    C. Click the select from screen button for the end.
    D. Snap to the east end.
    E. Select the sheet icon in the Alignment layer.
        I. **Modifier** = None
        II. **Base Layer Name** = P_RDWY_C_and_GBack



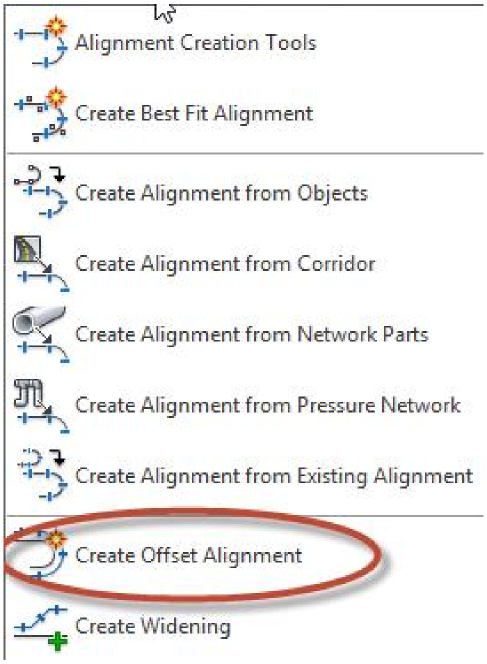
P_RDWY_BarrierConc	blue	Ecbar	0.30 mm
P_RDWY_Berm	magenta	Continuous	0.25 mm
P_RDWY_C_and_G	200	Continuous	0.25 mm
P_RDWY_C_and_GBack	200	Continuous	0.25 mm
P_RDWY_C_and_GFace	200	Continuous	0.40 mm
P_RDWY_Corridor	cyan	Continuous	0.25 mm
P_RDWY_LaneEdge	white	Continuous	0.18 mm
P_RDWY_PavtEdge	red	Continuous	0.[illegible] mm
P_RDWY_ShldAgg	red	Wisdot3	0.25 mm
P_RDWY_ShldPaved	30	Continuous	0.25 mm
P_RDWY_Subg_ShldPt	yellow	Continuous	0.25 mm
P_RDWY_Text_Grades	white	Continuous	0.25 mm
P_RW_AccessAcquisition_...	red	Eacca	0.25 mm
P_RW_AccessNewRdwy_T...	red	Eaccn	0.25 mm

    F. OK

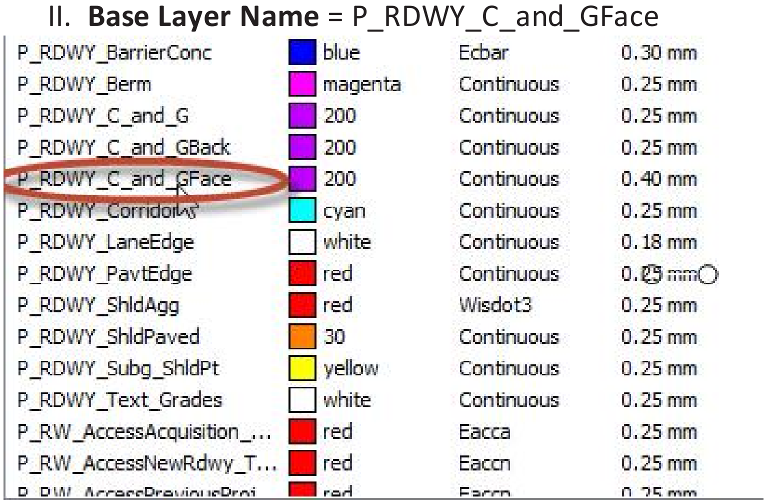
Create offsets for face of curb edgelines

> Exercise files: [ali-mak-edglin-rdy-pln-prod-03-data-C3D16.zip]()
>
> [ali-mak-edglin-rdy-pln-prod-03.mp4]() 3:14

1. **Home Tab > Create Design > Alignment > Create Offset Alignment**

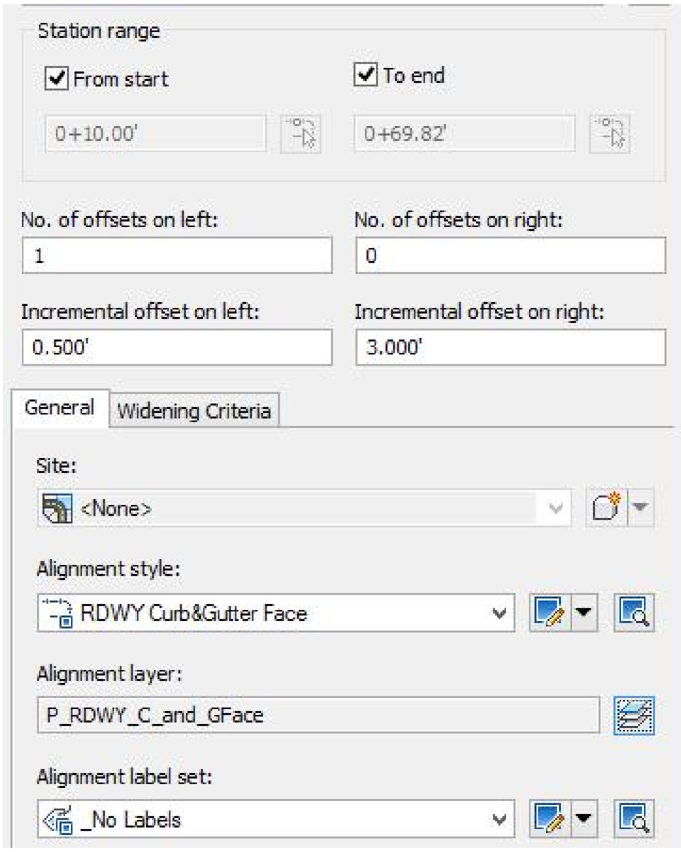


2. Select the NW back of curb.
    A. Check **From Start** and **To End**
    B. **Offsets on left** = 1
    C. **Offsets on right** = 0
    D. **Incremental offset on left** = 6"
    E. **Alignment Style** = RDWY Curb&Gutter Face
    F. Select the sheet icon in the Alignment layer.
        I. **Modifier** = None
        II. **Base Layer Name** = P_RDWY_C_and_GFace



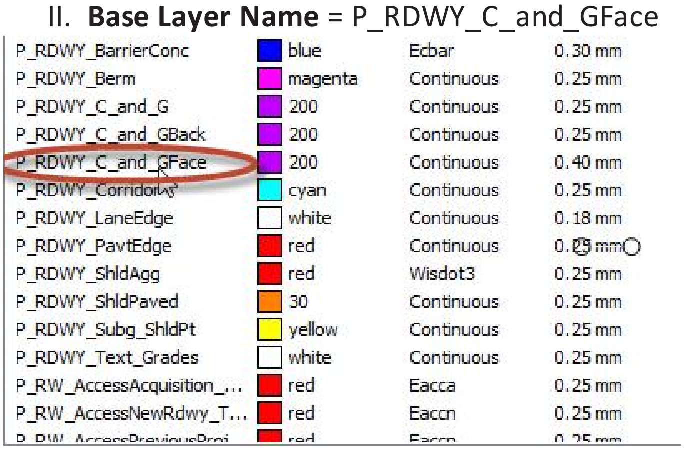
P_RDWY_BarrierConc	blue	Ecbar	0.30 mm
P_RDWY_Berm	magenta	Continuous	0.25 mm
P_RDWY_C_and_G	200	Continuous	0.25 mm
P_RDWY_C_and_GBack	200	Continuous	0.25 mm
P_RDWY_C_and_GFace	200	Continuous	0.40 mm
P_RDWY_Corridor	cyan	Continuous	0.25 mm
P_RDWY_LaneEdge	white	Continuous	0.18 mm
P_RDWY_PavtEdge	red	Continuous	0.25 mm
P_RDWY_ShldAgg	red	Wisdot3	0.25 mm
P_RDWY_ShldPaved	30	Continuous	0.25 mm
P_RDWY_Subg_ShldPt	yellow	Continuous	0.25 mm
P_RDWY_Text_Grades	white	Continuous	0.25 mm
P_RW_AccessAcquisition_...	red	Eacca	0.25 mm
P_RW_AccessNewRdwy_T...	red	Eaccn	0.25 mm

    G. **Alignment label set** = _No Labels



H. OK

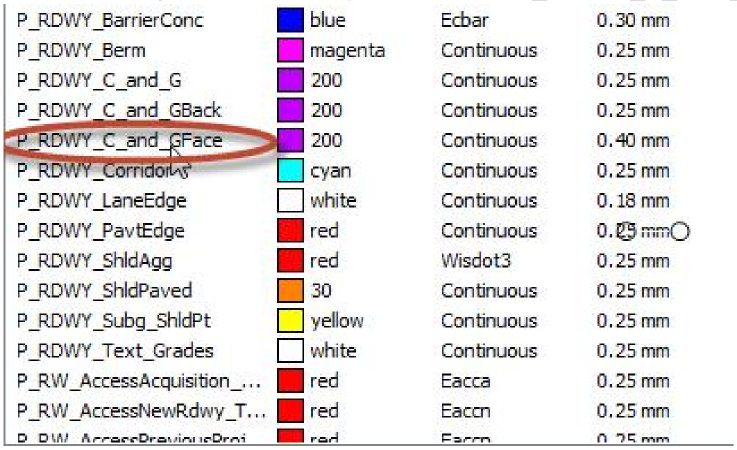
3. **Home Tab > Create Design > Alignment > Create Offset Alignment**
4. Select the NE back of curb.
    A. Select the sheet icon in the Alignment layer.
        I. **Modifier** = None
        II. **Base Layer Name** = P_RDWY_C_and_GFace



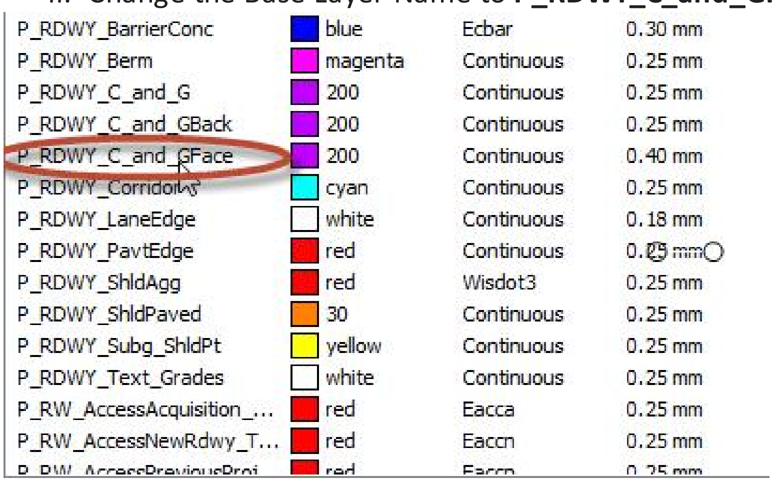
    B. OK

5. **Home Tab>Create Design>Alignment > Create Offset Alignment**

6. Select the SW back of curb.
    A. Select the sheet icon in the Alignment layer.
        I. Modifier = **None**.
        II. Change the Base Layer Name to **P_RDWY_C_and_GFace**.



    B. OK
7. **Home Tab > Create Design > Alignment > Create Offset Alignment**
8. Select the SW back of curb.
    A. Select the sheet icon in the Alignment layer.
        I. Change the modifier to **None**.
        II. Change the Base Layer Name to **P_RDWY_C_and_GFace**.



    B. OK
9. Save

Edit curb and gutter offset edgelines

Exercise files: ali-mak-edglin-rdy-pln-prod-04-data-C3D16.zip

ali-mak-edglin-rdy-pln-prod-04.mp4 1:16

1. Left-Click on the back of curb.
2. Select the diamond that appears on the parent flange of curb
3. Adjust the length of the parent alignment.

Profiles

Profile basics

Last updated: 2018-02-12

Total video time: 3:44

prfl-basc-01.mp4 3:44

Profiles are sub-entities of alignments. During creation of a profile you will be required to assign an alignment.

Definition of important terms:

- Profile is the actual elevation data..
- Profile View is the grid and the text around it.
- Profile Band is the display of profile elevations at the bottom of the profile view grid.

Profile data types:

- Surface profile can be surface conditions but can also be surfaces from proposed corridors.
- Design profile is information you have built yourself.

Profiles are a key element of elevation in design

- Baseline elevation, where design is initiated.
- Target elevation that design is going to.

Create surface profile

Last updated: 2018-02-14

Total video time: 21:08

Create surface profile

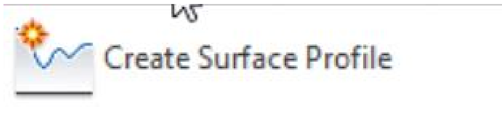
Exercise files: prfl-data-c3d16.zip

Start with prfl-01.dwg

prfl-creat-srfc-01.mp4 4:42

Quick access toolbar open AliProf-CthE.dwg

1. **Home Tab > Create Design > Profile > Create Surface Profile option**



2. Click the alignment name drop-down and choose ***CthE***.

> **Tip:** If there is any doubt about which alignment you are dealing with use the Select from Screen icon.

3. In the To Sample section leave the Start and End stations for the entire station length.
4. You could type the start and end stations, or use the Select from Screen icon to assign start and end stations.
5. Under Surface Selection choose ***Exist***.

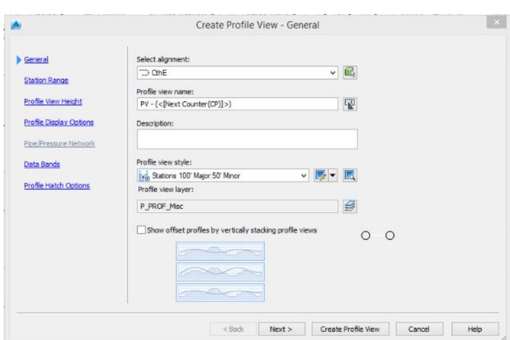
> **Tip:** If there is any doubt about which surface you are dealing you can use the green select from screen icon.

6. Add>> to create the profile.
   A. Check Sample Offsets: **20**
   B. Add>>
   C. Select in the Style field for the 20' offset profile.
      I. **Pick Profile Style > drop down menu > RDWY Lane Edge**
   D. To delete a profile you just created click Remove.
   E. Click Draw in Profile View.

Create Profile View - General Tab

prfl-creat-srfc-02.mp4 2:54

The Create Profile View General tab is open.



1. Select the ***CthE*** alignment.

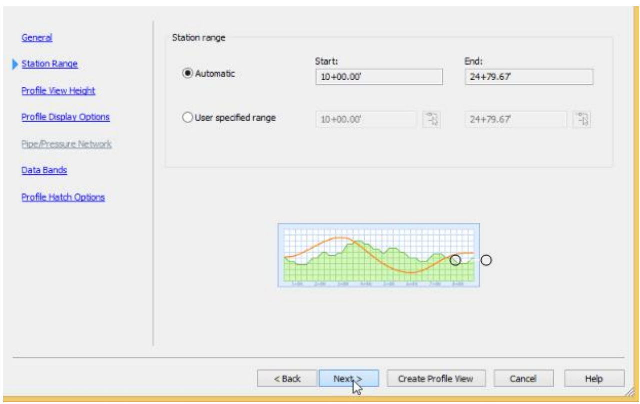
   > **Tip:** If there is any doubt about which alignment you are dealing with use the Select from Screen icon.

2. Profile view name: **PV-(<Next Counter(CP)>)**
3. Profile view style: **Stations 100' Major: 50' Minor**
4. Profile view layer: **P_PROF_Misc**
5. Vertically stacked option: **off**
6. Next >

Create Profile View - Station and View Height tabs

prfl-creat-srfc-03.mp4 3:16

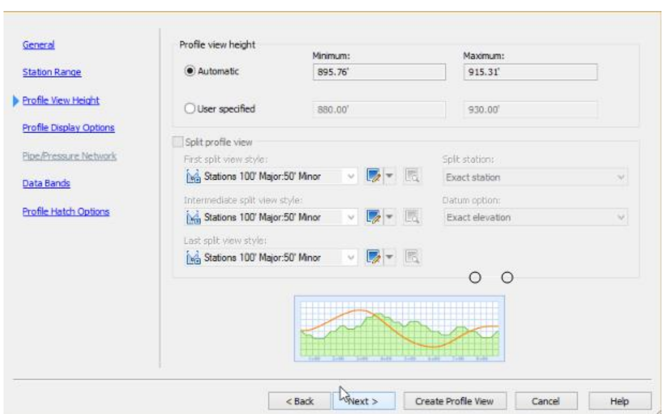
The Create Profile View Station Range tab is open.



1. **Automatic** option selected.

   > **Tip:** You can select User Specified range to shorten the views that need to be truncated.

2. Next >.



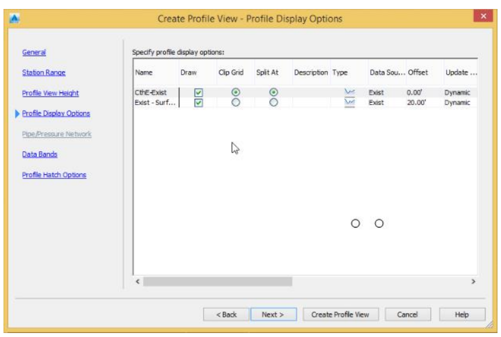
Profile View Height tab

1. **Automatic profile view height** option selected.
2. select **User Specified** if you do not have room for the entire height of the profile view.
    A. Type in the Minimum and Maximum elevation.
    B. Select **Split profile view** to cut missing profile view sections and drop it within height limits.
        I. The **Split Station** option allows control for what station the split occurs:
            a. Options include **Exact, Previous Major, Previous Minor**.
        II. The **Datum Option** allows control for what elevation the split occurs:
            a. Options include **Exact, Previous Major, Previous Minor**.
    C. Deselect **Split profile view**
3. Next >

Create Profile View - Profile Display Options tab

prfl-creat-srfc-04.mp4 3:20

The Create Profile Display Options tab is open.



In the Profile Display Options tab you can see the profiles tied to the alignment assigned in the General Tab.

1. In the Draw column select both profiles that will appear in the view.
2. Style column: **RDWY Lane Edge**.
3. ***CthE-Exist*** row, select the Labels field.
    A. Pick Profile Label Set: **_No Labels**
4. Next >

Create Profile View - Data Bands tab

prfl-creat-srfc-05.mp4 2:03

The Create Profile View - Data Bands tab is open.

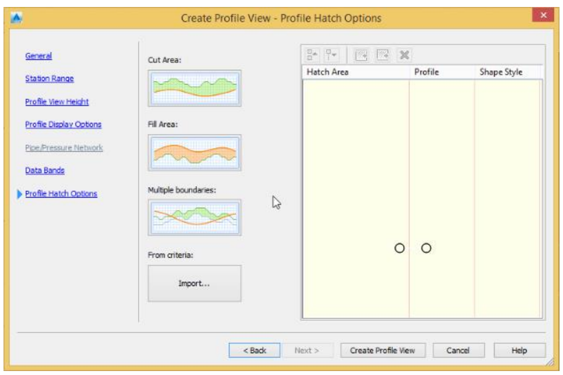
Info: We skipped over the Pipe/Pressure Networks because there are no pipes in the file.

1. Select band set: **Elevation Both with High-Low Point (Exist Left Proposed Right)**
2. Location: **Bottom of Profile View**
3. Set Band Properties:
    A. Style Elevation Left (Exist), set Profile 1 and Profile 2 to ***CthE-Exist***.
    B. Style Elevation Right (Proposed), set Profile 1 and Profile 2 to ***Exist - Surface - 20.000 (1)***
4. Next >

Create Profile View - Hatch Options tab

prfl-creat-srfc-06.mp4 1:37

The Create Profile View - Hatch Options tab is open.



Info: This page hatches your profile view between two surfaces you define.

1. Cut Area:
    A. Upper Boundary: ***CthE-Exist***
    B. Lower Boundary: ***Exist-Surface-20.000(1)***
2. Fill Area:
    A. Upper Boundary: ***CthE-Exist***
    B. Lower Boundary: ***Exist-Surface-20.000(1)***

Tip: Multiple Boundaries can be used if the differences between more than two surfaces is required.

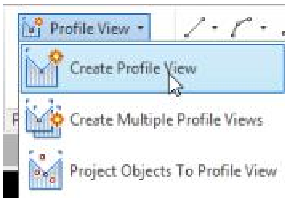
To remove hatching areas select the area to remove and click  delete button.

3. Create Profile View

Create a separate profile view

prfl-creat-srfc-07.mp4 3:16

Home Tab > Profile & Section Views > Create Profile View



1. Select alignment ***CthE***

   Warning: It is important to confirm the correct alignment has been selected.

   Tip: If there is any doubt about which alignment you are dealing with use the Select from Screen icon.

2. **Next >**
3. **User specified range:**
   A. Start: **1100**
   B. End: **1500**
4. **Next >** for Profile View Height tab.
5. **Next >** for Profile Display Options tab.
   A. Scroll over to the labels and make sure that both profiles are set to **_No labels**.
6. **Next >** for Data Bands tab.
   A. For Elevation Right(Proposed), set Profile 1 and Profile 2 to **Exist-Surface-20.000 (1)**.
7. Create Profile View .
8. Click where the lower left corner of the entire profile view should be located, above the original profile view.

Warning: When a User Defined station profile view is placed, you are selecting where the origin of the view grid is, even if the visible grid does not begin for several stations. This can make the view appear shifted too far right. Place the views accordingly.

Profile properties and styles

Last updated: 2018-02-09

Total video time: 7:16

Profile styles

Exercise files: prfl-data-c3d16.zip

Start with prfl-01.dwg

prfl-prprtis-styl-01.mp4 2:28

Change profile style for existing surface profile

1. Select ***CthE-Exist*** profile.
2. **Context ribbon > Modify Profile > Profile Properties > Information tab**
   A. Object Style: **PROF Proposed**
   B. Apply
   C. OK
3. Esc
4. Select ***CthE-Exist*** profile.
5. **Context ribbon > Modify Profile > Profile Properties > Information tab**
   A. Object Style: **RDWY Lane Edge**
   B. Apply
   C. OK
6. Esc

Change profile style for design profile

1. Select ***CthE*** profile.
2. **Context ribbon > Modify Profile > Profile Properties > Information tab**
   A. Object Style: **PROF Ditch Flow Line**
   B. Apply
   C. OK
3. Esc

Profile properties - Profile Data tab

prfl-prprtis-styl-02.mp4 1:42

Select the ***CthE*** profile

Context ribbon > Modify Profile > Profile Properties > Information tab.

1. Name
2. Description
3. Object style

Profile Data tab

1. Statistics of the profile

Profile properties - Design Criteria tab

prfl-prprtis-styl-03.mp4 1:14

Profile properties dialog > Design Criteria tab

1. Check **Use Criteria Based Design**
2. ... ellipsis button
   A. Select _WisDOT Design Criteria 2009.xml
   B. Open
3. Minimum K Table > Value field drop down: **WisDOT Standard - Desirable Category 1**

Profile properties - Profile Locking tab

prfl-prprtis-styl-04.mp4 1:52

Profile properties dialog > Profiles Locking tab

1. Select the Anchor profile geometry points to alignment geometry points
2. Select Modify affected entities
3. Select Notify which entities are affected
4. OK

Profile view properties

Last updated: 2018-02-12

Total video time: 10:45

Open profile view properties

Exercise files: prfl-data-c3d16.zip

Start with prfl-01.dwg

prfl-vu-prprtis-01.mp4 1:58

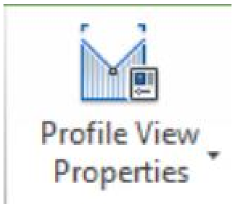
Prospector Tab>Alignments>CthE>Profile Views

Right-Click on profile view ***PV-(1)*** and select Properties.

Cancel out of the dialogue box.

Left-Click on the grid.

Expand Profile View Properties.



Select Profile View Properties.

Information tab

prfl-vu-prprtis-02.mp4 1:08

The name of the Profile is edited.

Description Field allows you to create a small description of the profile.

Optic Style controls how the grid is displayed and the band information is presented at the bottom.

Station tab

prfl-vu-prprtis-03.mp4 1:21

The Station tab is how long the view is gonig to be covering our profile.

Shows us the Alignment Name.

- Is not editable.

Allows us to adjust the Station range.

- The Automatic feature covers the entire length of the alignment.
- The User specified range allows us to select which portion of the alignment we are dealing with.

Elevation tab

prfl-vu-prprtis-04.mp4 2:52

The elevation tab allows us to work in the elevation of the grid.

The Automatic feature goes from the lowest height to the highest height for the entire length of our profile.

The User specified range allows for us to set what heights we would like the grid to show.

The Split profile view is used when you have requirements on size.

- The Automatic will detect where the paper ends and should auto cut it for you.
- Manual is used for selecting where you want the adjustments to take place.

Profiles tab

prfl-vu-prprtis-05.mp4 1:46

The Profiles tab shows us what profiles are used in the view and allows for features of them to be edited.

- The Draw tab controls which Profiles are shown in the view.
- The Clip Grid is used to clip the grid at one of the profiles.
- The Split At is for when using automatic split view which then splits at the first major, minor, or exact station of the assigned profile.

Bands and Hatch tabs

prfl-vu-prprtis-06.mp4 1:40

The Bands tab displays all the band information that will be displaying at the bottom of the grid.

The Hatch Tab is used for cutting or adding material in the space between the existing and proposed.

Profile layout tools

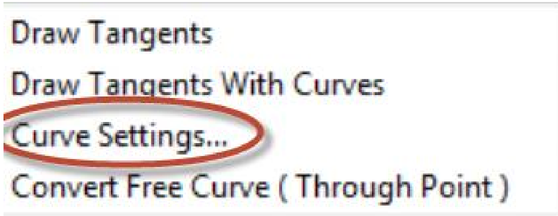
Last updated: 2018-01-30

Total video time: 9:36

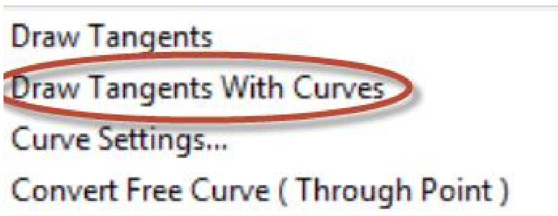
Profile layout by tangent

prfl-lyout-tl-01.mp4 3:37

1. **Layout toolbar > Draw Tangents > Curve Settings**



2. OK
3. **Layout toolbar > Draw Tangents > Draw Tangents with Curves**



   A. Shift right-click Endpoint.
   B. Snap to beginning point of existing profile.

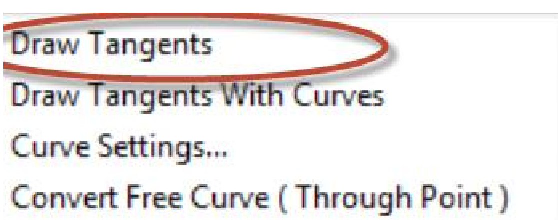
   > **Warning:** Make sure you are snapping to the point you intend. Existing profiles have many small line slopes, and it is easy to snap to an incorrect point

   C. Left-click a point to the east, and above the existing profile.
   D. Left-click a point to the east, and below the existing profile.
   E. Right-click to end profile creation.

Profile layout tool Add/Delete PI

prfl-lyout-tl-02.mp4 1:23

1. **Layout toolbar > Draw Tangents > Draw Tangents**

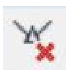


   A. Shift right-click Endpoint.
   B. Snap to end of ***CthE-Prop*** profile.

   C. Left-click a point to the east, and above the existing profile.
   D. Left-click a point to the east, and below the existing profile.
2. **Layout toolbar > Insert a PI point**

   A. Left-click a point below the ***CthE-Prop*** profile, in the middle of a profile slope.
   B. Right-click to end PI point creation.
3. **Layout toolbar > Delete PI point**.

   A. Left-click near the PI point that was recently added.

Profile layout tool by data

prfl-lyout-tl-03.mp4 2:03

1. Close the layout toolbar by clicking the X in the top right.
2. **Home > Create Design > Profile > Profile Creation Tools**.

3. Select on the profile view grid.

   A. Name: ***CthE-Prop-Data***
   B. OK
4. **Layout toolbar > Insert PVIs - Tabular**.

   A. Select Parabolic Curve

Station	Elevation	Curve Len
1000	890	0
1200	897	200
1400	890	0

   B. OK

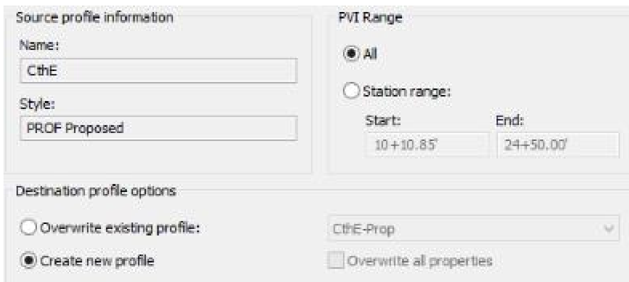
Profile layout tool copy design

prfl-lyout-tl-04.mp4 2:33

1. **Layout toolbar > Copy Profile**.

   A. PVI Range: **All**
   B. Destination profile options: **Create new profile**

   C. OK
2. Esc to release selected profile.
3. Select the proposed profile.
4. In the Selection cycling dialog select the top of the profiles listed.

1. **Layout toolbar > Raise/Lower PVI**.

   A. Elevation change: **-6**
   B. PVI Range: **All**
   C. OK
2. Select ***CthE (Copy)*** profile.
3. Delete

Profile lines and curves

Last updated: 2018-02-09

Total video time: 7:36

Create profiles with lines

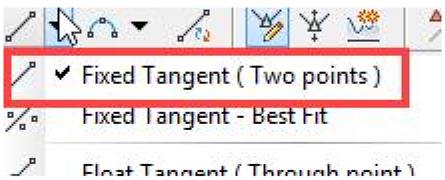
Exercise files: prfl-data-c3d16.zip

Start with prfl-01.dwg

prfl-lin-crv-01.mp4 2:48

1. **Home tab > Create Design > Profile > Profile Creation Tools**

   A. Select on the profile view grid.
   B. Name: ***CthE-Prop-2***
   C. OK
2. **Layout toolbar > Lines > Fixed Tangent (Two Points)**



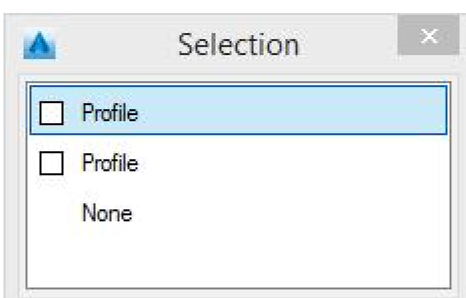
   A. Shift right-click Endpoint.
   B. Snap to the end of the existing profile.
   C. Click a point to the east, along the existing profile.
   D. Right-click to end the line creation.
3. **Layout toolbar > Lines > Fixed Tangent (Two Points)**.
   A. Click two points along the existing profile line.
   B. Right-click to end the line creation.

Create profiles with curves

prfl-lin-crv-02.mp4 4:48

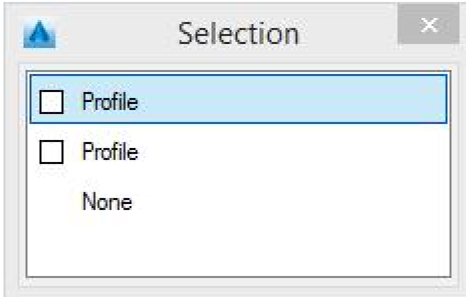
1. **Layout toolbar > Curves > Free Curves > Free Vertical Curve (Parabola)**.

   A. Select the incoming slope tangent.
   B. In Selection Cycling dialog select the top profile.



   C. Select the outgoing slope tangent.

D. In Selection Cycling dialog select the top profile.



E. **R** Enter
F. **1000** Enter

2. **Layout toolbar > Curves > Floating Curves > Floating Vertical Curve (Parameter, through point)**.
   A. Select the incoming slope tangent.
   B. Enter
   C. Click a point to the east that completes the curve.
   D. If the point you want to select creates a red X image there is not enough room to mathematically complete the curve.
3. **Layout toolbar > Lines > Floating Lines > Floating Tangent (Through point)**.
   A. Select the curve entity at the end of the design.
   B. The line will always be tangent to the curve.
   C. Click a point to the east near the end of the exiting profile.
   D. If the point you want to select creates a red X image there is not enough room to mathematically complete the line tangent to the curve.
   E. Right-click to end the line creation.
4. **Layout toolbar > Curves > Fixed Curves > Fixed Vertical Curve (Three point)**.
   A. This curve will not be tangent to the entities you snap it to.
   B. Shift right-click Endpoint.
   C. Snap to the end of the ***CthE_Prop-2*** profile.
   D. Click a second point to the east that represents the mid-point of a 3-point curve.
   E. Click a point to the east that represents the endpoint of the 3-point curve.
   F. Right-click to end the curve creation.

Create design profile

Last updated: 2018-02-09

Total video time: 9:00

Create design profile

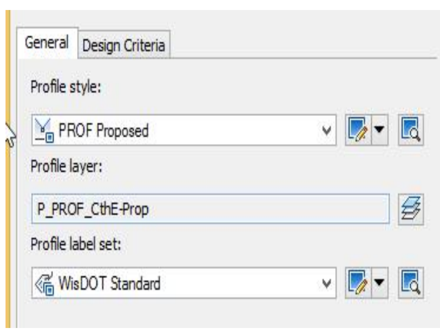
Exercise files: prfl-data-c3d16.zip

Start with prfl-01.dwg

prfl-creat-dsn-01.mp4 3:59

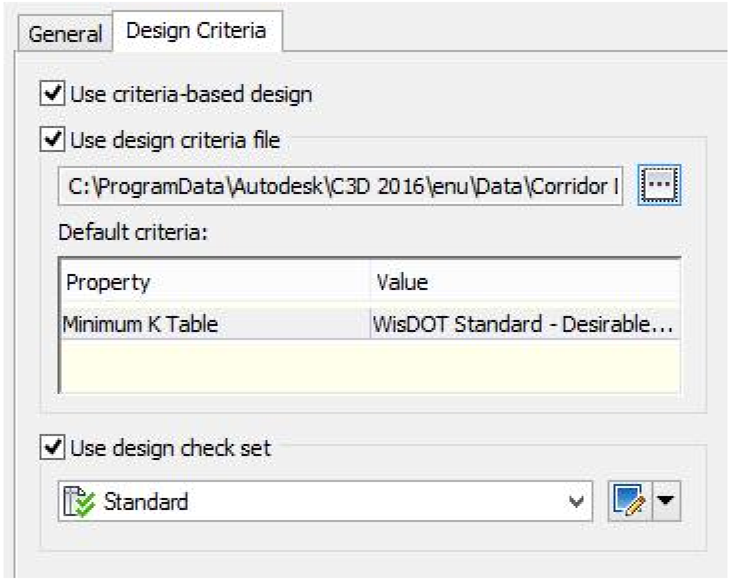
1. **Home Tab > Create Design > Profile > Profile Creation Tools**

2. Select profile view grid.
3. Select the grid lines, or any grid label (anything but the profile data itself).
4. Name: ***CthE-Prop***
5. General tab
   A. Profile style: **PROF Proposed**
   B. Profile layer: **P_PROF_CthE-Prop**
   C. Profile label set: **WisDOT Standard**



6. Design Criteria tab
   A. Use criteria-based design: **Checked**
   B. Use design criteria file: **_WisDOT Design Criteria 2009**
   C. Default criteria: **WisDOT Standard - Desirable Category 1**
   D. Use criteria-based design: **Unchecked**

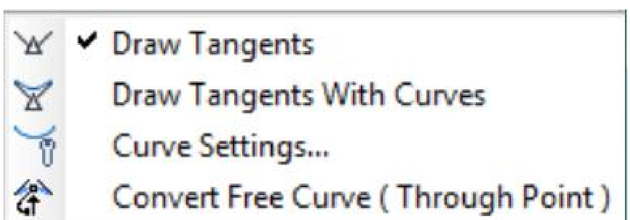
E. OK



Create design profile transparent tools

prfl-creat-dsn-02.mp4 5:01

1. **Home > Create Design > Profile > Profile Creation Tools.**
   A. Select the profile view grid
   B. Name the profile ***CthE-Prop-Trans***
   C. In the layout toolbar select the Draw Tangents > Draw Tangents



   D. Shift right-click Endpoint snap.
   E. Snap to end of existing profile.
   F. Click Profile Station Elevation transparent command 
      I. Select the profile view grid.
      II. **1375** Enter
      III. Left-click a point above the existing profile.
   G. Click the Profile Grade Station transparent command 
      I. **-5** Enter
      II. **2040** Enter

H. Click the Profile Grade Station transparent command 
   I. **5** Enter
   II. **904** Enter
I. Click the Profile Grade Length transparent command 
   I. **2** Enter
   II. **10** Enter
   III. **5** Enter
   IV. **40** Enter
   V. Esc
J. Esc

Edit design profile

Last updated: 2018-02-12

Total video time: 11:10

Edit design profile with grip points

Exercise files: prfl-data-c3d16.zip

Start with prfl-01.dwg

prfl-edit-dsn-01.mp4 2:37

Endpoint grip point

1. Select ***CthE*** profile.
2. Left-click the grip point at the end of ***CtE***.
3. Shift right-click.
4. Select Endpoint.
5. Snap the end point snap to the end of the ***CthE-Exist*** profile.

Midpoint grip point

1. Select the square grip point in the middle of the last slope of the ***CthE*** profile.
2. Move the grip point.
3. Esc

Curve length grip points

1. Select the circular grip point at the beginning of the last curve.
2. Drag it to the right to shorten the length of the curve.

Curve radius grip point

1. Select the circular grip point in the middle of the last curve.
2. Move the grip point up and down to graphically change the radius of the curve.
3. Esc

PVI grip points

PVI adjusting incoming and outgoing slopes

1. Grab the triangle grip point that points straight up.
2. Move it up and down, left and right to move the PVI point.
3. Esc.

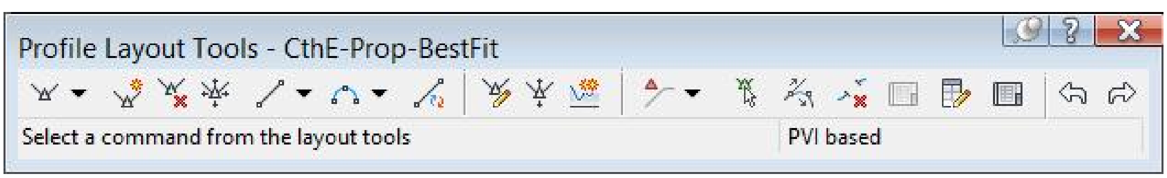
PVI maintain one slope

1. Select the triangular grip point that points to the right.
2. Move the grip point left and right to adjust the PVI while holding the incoming tangent.
3. Esc

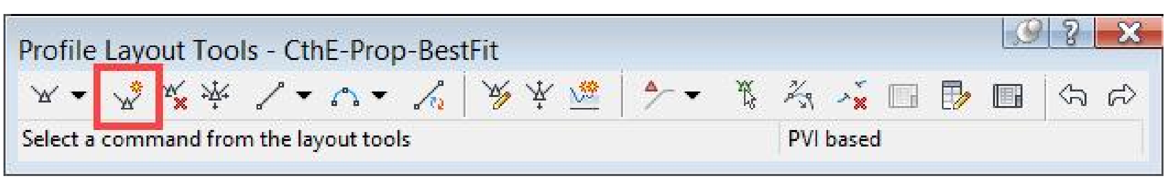
Edit design profile through toolbar edits

prfl-edit-dsn-02.mp4 2:14

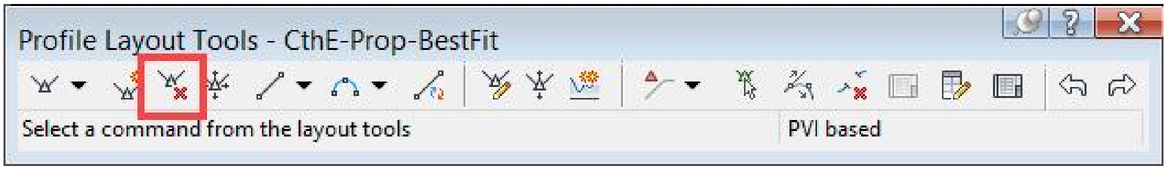
1. Select the ***CthE*** profile.
2. **Context ribbon > Modify panel > Geometry Editor**.



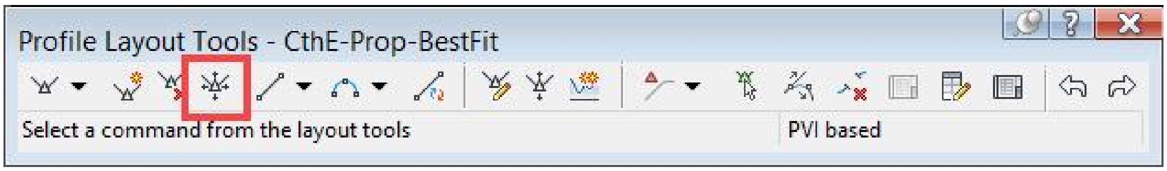
3. Insert PVI.



4. Click near the middle slope line.
5. Delete PVI points.



6. Click near the PVI point that was just added.
7. Move PVI.



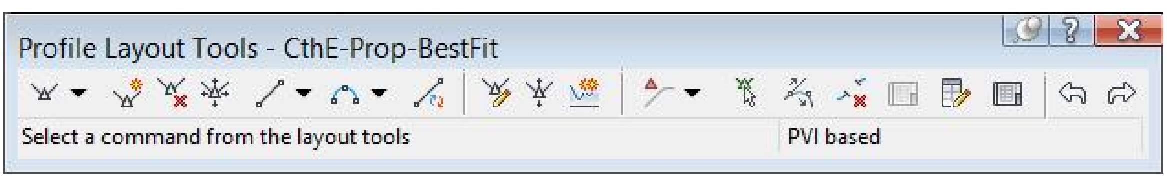
8. Select near the sag curve PVI point.
9. Left-click a new point to the right of the original PVI location.
10. Esc to end command.

Delete design profile entities

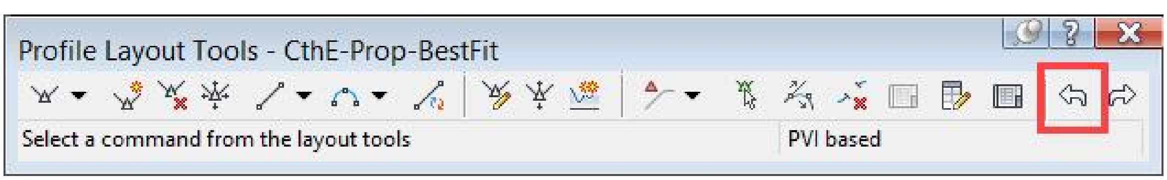
prfl-edit-dsn-03.mp4 1:08

1. Select the ***CthE*** profile.
2. **Context ribbon > Modify Profile > Geometry Editor**

3. Select the Delete Entity icon.



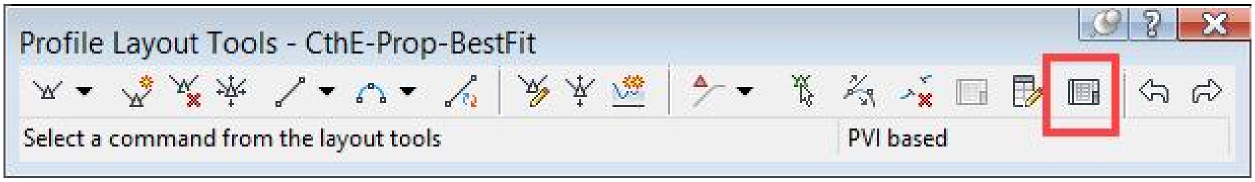
4. Select the last tangent line.
5. Left-click on the curve attached to the last tangent line.
6. In the toolbar select the Undo icon.



Edit design profile by data grid

prfl-edit-dsn-04.mp4 m:ss

In the toolbar select Profile Grid View .



In the third entity row make the following changes:

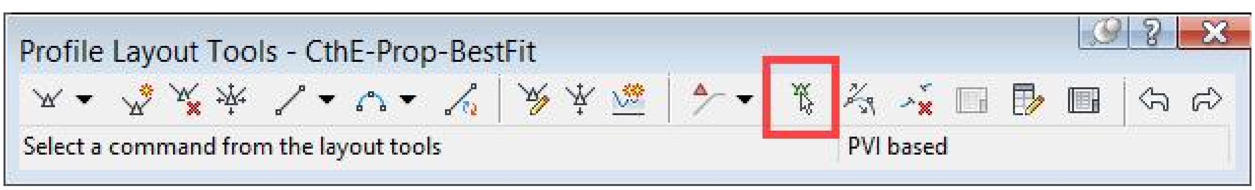
Variable	Value
Station	**2097**
Elevation	**895**
Grade In	**-2.5**
Grade Out	**3**
Profile Curve Length	**500**
K Value	**90**
Curve radius	**8000**

Click the X in the title bar to close the Profile Grid View panorama.

Edit design profile by parameter grid

prfl-edit-dsn-05.mp4 2:21

Select the Select PVI icon.



Select near the PVI at the sag curve.

In the dialog make the following changes:

Variable	Value
Grade In	**-2.5**
Grade Out	**3**
PVI Station	**2079**
PVI Elevation	**899**
Profile Curve Length	**400**
Low Point Elevation	**902**
Curve radius	**1500**
K Value	**74**

Click the X in the upper right of the dialog.

Esc

Profile labels

Last updated: 2018-02-09

Total video time: 4:36

Profile Label sets

Exercise files: prfl-data-c3d16.zip

Start with prfl-01.dwg

prfl-lbl-01.mp4 1:55

1. Select the profile view grid.
2. **Context ribbon > Labels > Edit Profile Labels**
    A. Select the ***CthE*** profile data inside the profile view grid.

   B. Import Label Set.
      I. Select the **WisDOT Standard [ALI DESC]+00** set.
      II. OK
   C. OK
3. Esc
4. Select the profile view grid.
5. **Context ribbon > Labels > Edit Profile Labels**
6. Select the ***CthE*** profile data inside the profile view grid.
   A. Import Label Set.
      I. Select the **WisDOT Standard** set.
      II. OK
   B. OK

Profile View labels

prfl-lbl-02.mp4 1:35

1. Select the profile view grid.
2. **Context ribbon > Labels > Add View Labels > Station Elevation**.
   A. `1265` Enter.
   B. `912.65` Enter.
   C. Esc
3. Select the profile view grid.
4. **Context ribbon > Labels > Add View Labels > Depth**.
   A. Select a point inside the profile view grid.
   B. Select a second point inside the profile view grid.
   C. Esc

Removing profile labels

prfl-lbl-03.mp4 1:06

1. Select one of the labels that needs to be removed.
2. **Context ribbon > Modify > Edit Label Group**

   A. Import Label Set
   B. Select **_No Labels**
   C. OK
3. OK

Create best fit profile

Last updated: 2018-02-12

Total video time: 11:02

Create best fit profile (part 1)

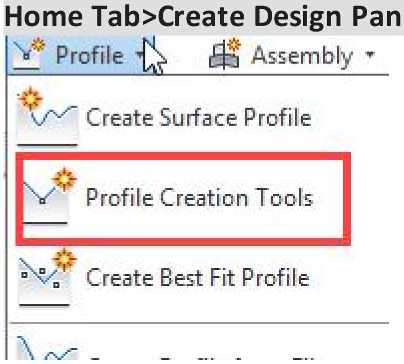
Exercise files: prfl-data-c3d16.zip

Start with prfl-01.dwg

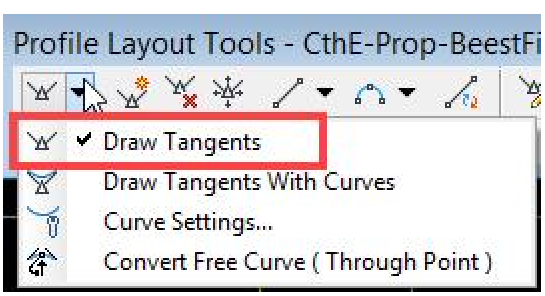
prfl-creat-best-fit-01.mp4 3:59

Warning: The Best Fit alignment creation tool often doesn't work for creating profile design for WisDOT projects. The following is a work flow to create a best fit profile while using tools that are more appropriate for WisDOT design needs.

1. **Home Tab>Create Design Panel > Profile Dropdown > Profile Creation Tools**

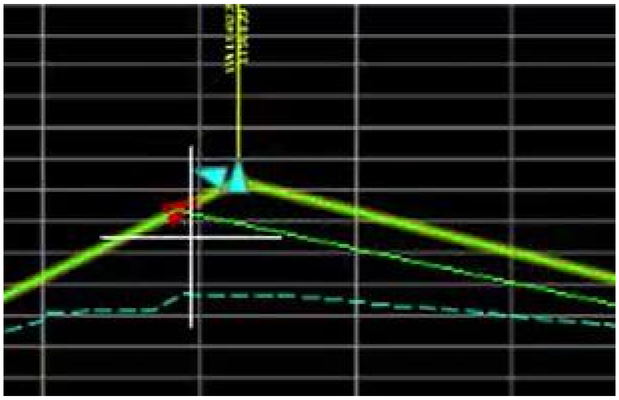


   A. Left click Profile View Grid
   B. In the Create Profile dialog box:
      1. Name: ***CthE-Prop-Best Fit***
      2. Click OK
2. On the Profile Layout Tools toolbar
   A. **Profile Layout Tools toolbar > Draw Tangents dropdown > Draw Tangents**

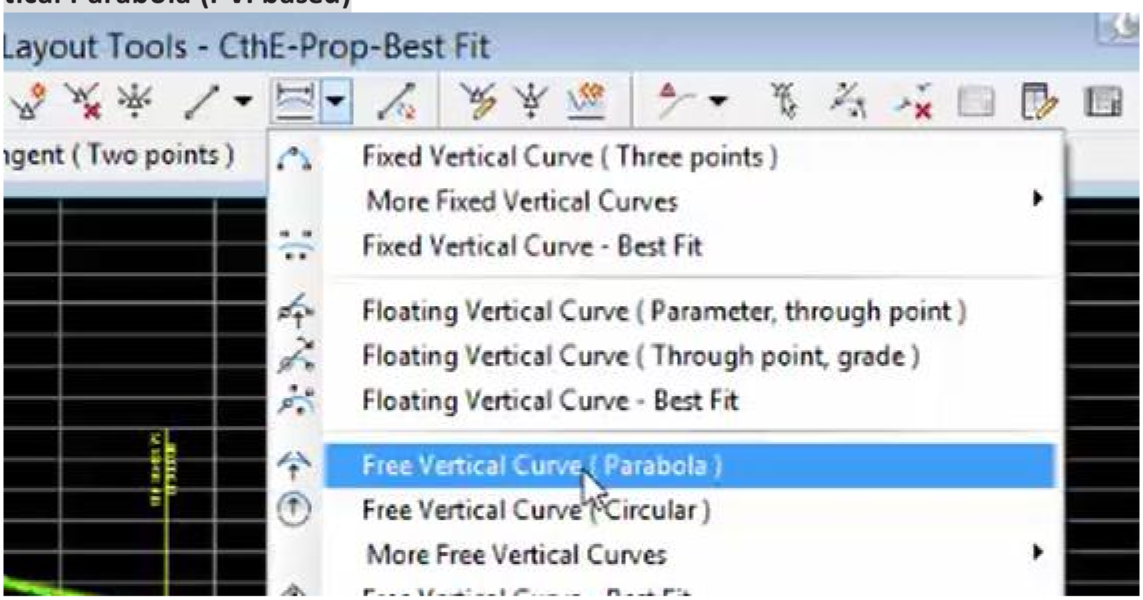


   B. Shift+Right Click>Endpoint Snap

C. Select endpoint of ***CthE-Exist*** profile by Left Click
D. Left click on location of next PVI
E. Left Click to select an endpoint PVI
F. Right click to end the command
G. Adjust tangents with Arrow Grips



3. **Profile Layout Tools toolbar>Curve Dropdown>More Free Vertical Curves>Free Vertical Parabola (PVI based)**



A. Left click near PVI
B. Type **K**
C. Click Enter
D. Type **45**
E. Click Enter
F. Click Enter to exit the command

4. Use the grip points to further edit the profile geometry
5. A. Input Type: **Surface Profile**
   B. Surface profile: ***CthE-Exist***

C. Profile name: ***CthE-Prop-BestFit***
D. OK

6. Check the regression graph against the created profile.

Create best fit profile (part 2)

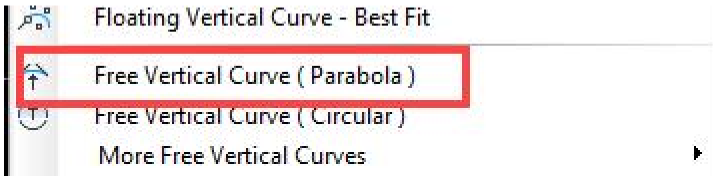
prfl-creat-best-fit-02.mp4 03:41

Warning: The Best Fit alignment creation tool has been deemed incorrect for creating profile design for WisDOT projects. The following is a work flow to create a best fit profile while using tools that are more appropriate for WisDOT design needs.

1. **Profile Layout Tools toolbar>Draw Tangents dropdown>Draw Tangents**

2. **Profile Layout Tools toolbar>Line Command>Fixed Tangent (Two points)**

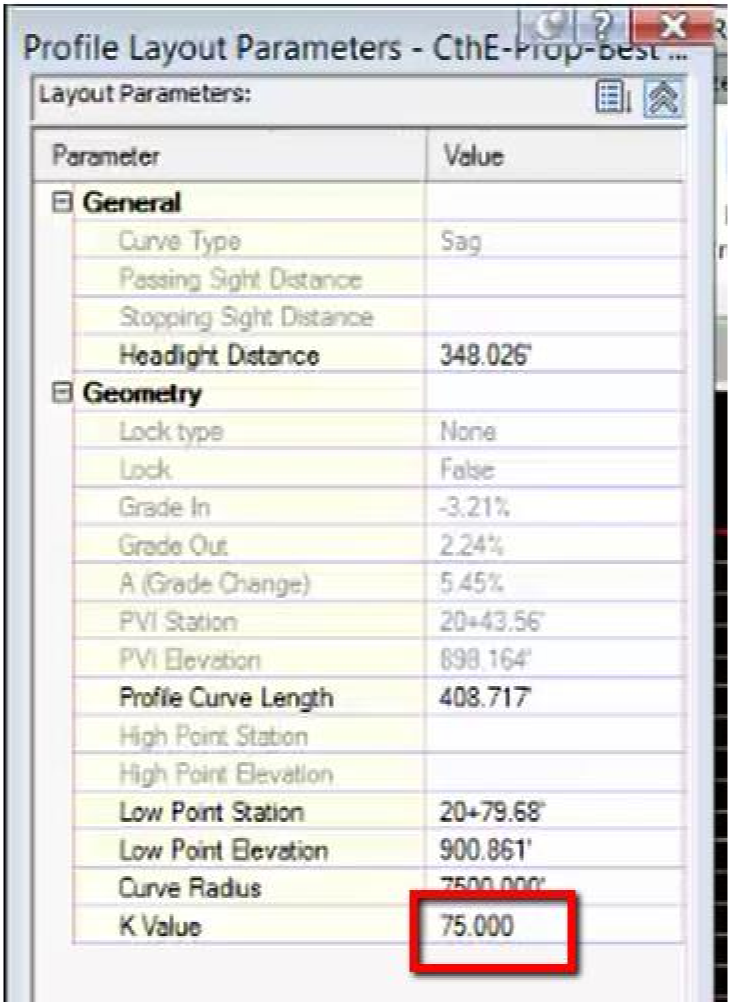
3. A. Left click the desired start point of the tangent
   B. Left click the desired endpoint of the tangent
   C. Left click the desired start point of the 2nd tangent
   D. Left click the desired endpoint of the 2nd tangent
   E. Left click the desired start point of the 3rd tangent
   F. Shift+Right click>Endpoint snap
   G. Select the endpoint of the ***CthE-Exist*** profile
   H. Click Esc to end command
4. **Profile Layout Tools toolbar>Curve Tool>Free Vertical Curve (Parabola)**



5. Left Click on Incoming line
6. Left Click on Outgoing line
7. Enter the "K" value of **175** Enter
8. Esc
9. **Profile Layout Tools toolbar>Delete Segment**

10. Left Click on segment to be deleted Enter
11. **Profile Layout Tools toolbar>Curve Tool>Free Vertical Curve (Parabola)**
12. Left Click to select the incoming line
13. Left Click to select the outgoing line
14. Enter to accept default "K" value of 36.7
15. Right Click to end command
16. Left Click on curve to select it
17. **Profile Layout Tools toolbar>Select PVI**

18. Left Click near PVI point
19. In the Profile Layout Parameters dialog box enter a new "K" value of 75



20. Enter
21. Close the Profile Layout Parameters dialog, Close the Profile Layout Tools toolbar

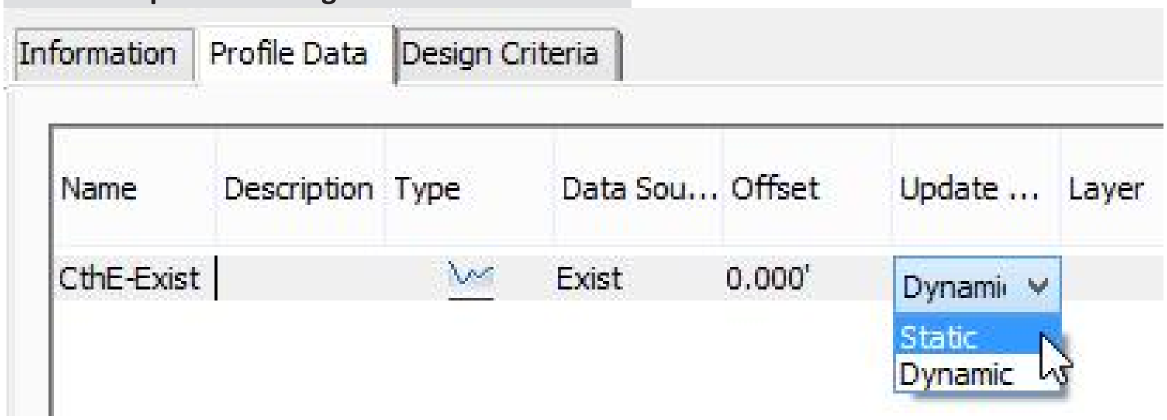
Create best fit profile (part 3)

prfl-creat-best-fit-03.mp4 03:23

Warning: The Best Fit alignment creation tool has been deemed incorrect for creating profile design for WisDOT projects. The following is a work flow to create a best fit profile while using tools that are more appropriate for WisDOT design needs.

1. Left Click on ***CthE-Exist***
2. **Contextual Ribbon>Profile Properties**

3. **Profile Properties Dialog Box>Profile Data Tab**



   A. Update Method, change to Static
   B. Click OK
4. **Contextual Ribbon>Geometry Editor**

5. **Profile Layout Tools toolbar>Copy Profile**

6. Click OK
7. Click Esc
8. Select ***CthE-Exist***
9. **Contextual Ribbon>Profile Properties>Profile Properties Dialog box>Profile Data Tab**
   A. Update Method, change to Dynamic
   B. Click OK
   A. **Contextual Ribbon>Profile Properties>Profile Properties Dialog Box>Information Tab**
   B. Change name CthE-Prop-Best Fit
   C. Click OK
10. Select ***CthE-Exist [Copy]***
11. **Profile Layoout Tools toolbar>Delete PVI**

12. Left Click to remove PVIs
13. Click Esc

Cross-sections

Sample lines, sections, and volumes

Last updated: 2012-10-01

Total video time: 10:12

General steps:

xsec-smpl-ln-sctn-vlm-01.mp4 10:12

1. WisDOT12.dwt
2. Save to ProjectID\SheetsPlan directory
3. Use Data Shortcuts to make a reference to the alignment & profile.
4. XREF Corridor drawing
5. Create Sample Lines
6. Create Section Views and/or compute materials

Frequency lines vs sample lines

- Used to compute slope intercept and other cross section info (i.e. super elevation slope)
- Corridor data can be overridden at frequency stations
- Will vary in length depending on assembly or distance to slope intercept
- Frequency distance depends on design situation (i.e. 5’ frequency in intersections)

Sample lines

- Used in preparation to show data in section views for plotting
- Needed to compute end area volumes
- Best practice is to have all of your sample lines at a uniform length
- No design changes can be made via sample lines

Section views

- Primarily used for plotting
- Great place to verify your design
    - No design changes can be made from section views
    - Design changes must be made in the corridor drawing
- Laid out on Sheets

A Sheet refers to the grid, print area and sheet border

The section view refers to the supporting information shown with the section; offset text, elevation text, and station value.

The section refers to station-specific data that is coming in for the surfaces and corridor.

Quantities

For earthwork quantities all you need is:

- An Existing Surface
- A Final Datum surface

Tip: Other surfaces such as rock, marsh, excavation below subgrade (EBS) and embankment are optional

Material quantities come from Corridor Shapes

Sample line creation

Last updated: 2012-10-01

Total video time: 24:57

Before you create sample lines:

Exercise files: xsec-smpl-ln-creat-01-data-C3D12.zip

xsec-smpl-ln-creat-01.mp4 16:01

1. Start a new drawing based on WisDOT12.dwt
2. Save the new file to ProjectID\SheetsPlan folder
3. Create data shortcut reference to the centerline alignment & design profile
4. XREF the corridor drawing.

Data references and cross sections

Tip: “Don’t I need more data references? What about my existing surface?”

- Corridors do not have the ability to be shared via data shortcut.
- Sample lines are unique objects that can “pull” data through the corridor XREF.
- The corridor and any surfaces associated with it will come over automatically when you create sample lines.
    - Existing surface
    - Corridor Top
    - Corridor Datum

Sample line terminology:

Swath Width: length of one side of a sample line as measured from the centerline.

Tip: Use the default of 150’ if you plan to plot at 1”=20’

Tip: Use swath widths of 75’ if you plan to plot at 1”=10’

Sampling Increment: Standard distance between sample lines

Additional Sample Controls: optional additional stations where sample lines can be automatically generated

Exercise: Create sample lines

1. Verify that your data shortcuts path is listed as c:\Civil 3D Projects\11111111\
2. Start a new drawing based on WisDOT12.dwt
3. Save the file as C:\Civil 3D Projects\11111111\SheetsPlan\090100_xs.dwg
4. In the **Toolspace > Prospector tab > Data Shortcuts**, expand Centerline alignments.
5. Expand the alignment ***USH 51 Best Fit from Exist***
6. Expand Profile
7. Right-click ***Proposed Profile Final*** and select Create Reference.
8. Click Ok .
9. Zoom extents to view the alignment.

Info: Because you go for the profile, you will not have to repeat the process for the alignment. The data for he profile is not available in the drawing but we do not need to see the profile to proceed. If you wish, you could make the profile visible by going to Home tab > Profile & Section Views panel and selecting Profile View > Create Profile view.

10. Click Attach DWG
11. Browse to c:\Civil 3D Projects\11111111\Design\Corridors and select Corridor-USH51 North Segment.dwg.
12. Click Open .
13. Set the reference type to Overlay
14. Be sure all checkboxes for Specify on screen are clear.
15. Set the Path type to **Relative Path**
16. Click Ok.
17. **Quick Access Toolbar > Save** .
18. **Home tab > Profile & Section Views Panel > Sample Lines** .
19. When prompted to select an alignment,click Enter (to pick from a list).
20. Select ***USH 51 Best Fit from Exist*** (this will be the only available alignment)
21. Click Ok.
22. Expand the Data source column so you can see the full names of the data you are working with.
    - Set the style for the surface ***Exist*** to ***EX Ground***
    - Set the style for ***USH 51 Best Fit from Exist S***corridor to XS Sheets with Links
    - Set the style for the corridor ***Top*** surface to ***Final Top***
    - Set the style for the corridor ***Datum*** surface to ***Final Datum***

23. Click Ok
24. You will now see the Sample Line Tools toolbar
25. From the Sample Line creation methods icon (pulldown) select the By Range of Stations option.
26. In the ***Create Sample Lines - By Station Range*** dialog box:
27. Set the Start Station to **191+00.00**
28. Set the End Station to **214+00.00**
29. Scroll down and change the At Superelevation critical stations to False.
30. Click Ok.
31. vClose the corridor is out of date warning
32. Save the drawing.

Situations where you may need to make changes to your sample lines:

Exercise files: xsec-smpl-ln-creat-02-data-C3D12.zip

xsec-smpl-ln-creat-02.mp4 8:56

- You need to add sample line stations
- You need to change the swath widths
  - For example to 75’ from 150’ (or vice versa)
- More section information is available
  - Examples: a new corridor surface is generated; a pipe network needs to be shown

Tip: #1 Rule of Sample Lines and Cross Sections: Always look for a way to makes changes to the group as a whole.

Exercise: Modify sample lines

1. Verify that your data shortcuts path is listed as c:\Civil 3D Projects\11111111\
2. Open the file 090100_xs.dwg

Adding a sample line

1. **Home tab > Profile & Section Views panel > Sample Lines** .
2. Click Enter to pick an alignment from the list.
3. Highlight ***USH 51 Best Fit from Exist***
4. Click Ok

Tip: Because a sample line group already exists for this alignment, you will not need to set styles as you did in the previous example. Any stations you create will be added to the existing group.

Changing sample line lengths

1. Select any sample line in the drawing.
2. **Context tab > Modify panel > Group Properties** .
3. Select the first row in the listing of sample line stations.
4. Scroll to the bottom of the listing.
5. Hold Shift and select the last row of the listing.
6. Click one of the left offset values and type **75** Enter .
7. Click one of the right offset values and type **75** Enter ..
8. At this point, all rows should read 75' for both left and right swath widths.
9. Click Ok
10. click Enter to accept the swat width of 150 to the left
11. click Enter to accept a swath width of 150 to the right.
12. Click Esc to end the command.
13. Close the panorama dialog box if you receive a "corridor is out of date" warning.

Add more data; sample more sources

Info: To mimic the effect of more project data being added after sample lines are created, you will import a LandXML file containing pipe information. You will then use the Sample More Sources tool to ensure that pipes will appear as part of the sampled data.

1. **Insert Tab > Import panel > Land XML** .
2. Browse to the file 130-020-002-pipes.xml
3. Click Open.
4. Click Ok
5. Click the green checkbox to dismiss this message.
6. Click any sample line in the drawing.
7. **Sample Line contextual tab > Sample More Sources**.
8. Select the drainage item listed under Available sources.
9. Click Add.
10. Click Ok.
11. Save the Drawing.

Calculate and report volumes

Last updated: 2012-10-01

Total video time: 17:18

Computing volumes

xsec-calc-rpt-vlm-01.mp4 5:42

You can compute volumes as soon as you have:

- Proposed Data
  - Datum surface
  - Corridor
- Sample Lines
  - Sample lines must "see" the proposed data, so use Sample More Sources as needed.

Analyze tab > Compute Materials panel > Volumes and Materials

When computing volumes for the first time:

Click Edit Style.

Click Ok

You will then see materials listed in the Compute Materials dialog box.

Warning: Never click OK with the compute materials dialog box empty! It WILL crash otherwise.

Exercise: Calculate volumes

Exercise files: xsec-calc-rpt-vlm-01-data-C3D12.zip

Info: If you successfully completed the previous exercise where you created sample lines, you may continue working in that file. If not, extract the example files associated with this exercise to your local Civil 3D projects folder.

1. Verify that your data shortcuts path is listed as C:\Civil 3D Projects\11111111\
2. Open the file 090100_xs.dwg
3. **Analyze tab > Volumes and Materials panel > click Compute Materials** .
4. Click Edit Style
5. You do not need to make any changes

   Tip: The Compute Materials dialog will now have spots for different materials. You do not need to fill in every type of surface, but you do need to fill in at least the Existing Surface and Datum surface.

7. Click Ok.
8. Click the <Click Here to Set All> field next to the ***Exist*** surface.
9. Choose the ***Exist*** surface
10. Click the <Click here to set all> field next to ***Final Datum***.
11. Choose the ***USH 51 Best Fit from Exist - (1) Datum***.

12. Click Ok.
13. You will receive a message indicating that “Not all of the named surfaces or corridor shapes have been mapped to an object in the drawing…”
14. Click Ok.
15. Save the drawing.

Volume reports

xsec-calc-rpt-vlm-02.mp4 6:27

Info: A Volume Report creates a text file that will open in Internet Explorer.

Volume tables & material volume tables

Total Volume Table and Material Volume table place information directly into AutoCAD.

The Style sheet determines the format and what information is shown when generating a volume report.

Exercise: report volumes

If you successfully completed the previous exercise where you created sample lines, you may continue working in that file. If not, extract the example files associated with this exercise to your local Civil 3D projects folder.

1. Verify that your data shortcuts path is listed as c:\Civil 3D Projects\11111111\
2. Open the file 090100_xs.dwg
3. **Analyze tab > Volumes and Materials panel > Volume Report.** .
4. Click the folder icon next to Select a Style sheet.
5. Select Earthwork.xsl
6. Click Ok.
7. When Internet Explorer pops up, it may ask you if you would like to run scripts. Click Yes.
8. Right-click anywhere in the browser window and click Select All
9. Right-click again and click Copy.
10. Launch Microsoft Excel. (Keep Civil 3D and the Internet Explorer Window open.)
11. Right-click and paste using the Match Destination theme option.
12. Save the Excel Spreadsheet as Earthwork 11-10-2012.xls in C:\Civil 3D Projects\11111111\Design\Quantities\EWKDetailWorkbooks\
13. Close Excel.
14. Save the Civil 3D drawing.

Exercise: Calculate & report structure volumes

Exercise files: xsec-calc-rpt-vlm-02-data-C3D12.zip xsec-calc-rpt-vlm-03.mp4 5:09

Info: If you successfully completed the previous exercise where you created sample lines, you may continue working in that file. If not, extract the example files associated with this exercise to your local Civil 3D projects folder.

1. Verify that your data shortcuts path is listed as c:\Civil 3D Projects\11111111\
2. If you receive a message "Corridor is out of date and may be out of sync with other objects," dismiss panorama by clicking the green checkbox.
3. **Analyze tab > Volumes and Materials panel > Compute Materials.** .
4. Click Ok.
5. Click Add New Material .

   Tip: You may need to expand the listing using the + sign

7. Rename the New Material to **ASPHALT**.
8. Change the Quantity Type to ***Structures***.

   Warning: This step is very important. If you forget to change the type to structures, it will not allow you to add a corridor shape to the earthwork table.

10. Change the Data Type to **Corridor Shape**.
11. With ***USH 51 Best Fit from Exist - (1) Pave 1*** as the active corridor shape, click the + sign.
12. Change the Corridor shape to ***USH 51 Best Fit from Exist - (1) Pave 1*** and click the + sign.

    Info: By adding both of these corridor shapes to the Asphalt material, they will be lumped together for one overall asphalt volume - of course if these need to be separate pay items in "real life" you can make a separate material entry for the different types of asphalt.

14. Click Add New Material.
15. Rename the material to **BASE**.
16. Change the Quantity Type to ***Structures***.
17. Change the Data Type to ***Corridor Shape***.
18. With ***USH 51 Best Fit from Exist - (1) Base*** as the active corridor shape, click the + sign.
19. Click Add New Material.
20. Name it **SUBBASE**.
21. Repeat the previous steps to make sure this is a Structure-type computation.
22. Add the subbase corridor shape to this material.
23. Click Ok.
24. If you receive a message "Corridor is out of date and may be out of sync with other objects," dismiss panorama by clicking the green checkbox
25. **Analyze tab > Volumes and Materials panel > Volume Report.** .
26. Click the folder icon next to the Select a Style Sheet field.

27. Click the Select Material. option.
28. Click Ok.
29. Click Yes to the message that displays.
30. Using the same techniques as the previous exercise, select all of the information and paste it into an excel spreadsheet.
31. Save the excel spreadsheet as Corridor.xls in C:\Civil 3D Projects\11111111\Design\Quantities\EWKDetailWorkbooks\
32. Close Excel.
33. Save the AutoCAD file.

Modify sheet style

Last updated: 2012-10-01

Total video time: 06:12

Exercise: Modify styles

xsec-mdify-sht-styl-01.mp4 6:12

Info: For this example, use the file www.C3DKB.dot.wi.gov/data/130/130-040-xs-styles- example.dwg. This is a self-contained example project where you will have a chance to experiment with changing style options.

1. Select one of the section views or sheets.
2. From the **Section View Context tab > Section View Properties > Edit Group Plot Styles** .
3. When prompted to pick a graph, select a magenta offset labels along the bottom of any view.
4. Click Enter.
5. Switch to the Array tab.
6. Change the Row spacing to 1.5”
7. Click Ok.
8. You should see that the spacing between each view has increased.
9. **Section View Context tab > Section View Properties > Edit Group Plot Styles**
10. When prompted select the magenta offset labels along the bottom of any view.
11. Click Enter
12. Switch to the Display tab.
13. Click the light bulb next to Minor Horizontal Grid.
14. Click the light bulb next to Minor Vertical Grid.

Info: This will hide or “turn off” these items.

16. Click Ok.

17. Change the annotation scale of the drawing to ***1IN 20 FT***.
18. Select one of the sheets or views
19. Click Update Group Layout
20. You should see that the spacing between each view has increased.
21. **Section View Context tab > Section View Properties > Edit Group Plot Styles**
22. When prompted select the magenta offset labels along the bottom of any view.
23. Switch to the Array tab
24. Change the Column spacing to `0.01”`
25. Click Ok

Info: You should see that two columns don’t quite fit on a page.

26. Save the drawing.

Section view creation

Last updated: 2012-10-01

Total video time: 29:32

Section views and scale

Exercise files: xsec-vw-creat-01-data-C3D12.zip

xsec-vw-creat-01.mp4 7:00

- When creating views it is important that all of the scales you choose agree with each other:
    - Annotation Scale
    - Section View Style
    - Section Template

Exercise: Create section views

Info: If you successfully completed the previous exercise where you created sample lines, you may continue working in that file. If not, extract the example files associated with this exercise to your local Civil 3D projects folder.

1. In the **Toolspace > Prospector tab > Data Shortcuts** verify the working folder is c:\Civil 3D Projects\11111111\
2. Open 090100_xs.dwg.
3. If you receive a message “Corridor is out of date and may be out of sync with other objects,” dismiss panorama by clicking the green checkbox.
4. Change the drawing annotation scale to ***1 in:10FT***

5. Click Save.
6. **Home tab > Profile & Section Views panel > Section Views > Create Multiple Views**.
7. On the Section Placement page of the wizard, click the ellipsis next to Template for Cross Section Sheet.
8. Click the ellipsis again to browse to the file wisdot12-09-xs.dwt.
9. This will be located in: C:\Users\<your_name>\AppData\Local\Autodesk\C3D 2012\enu\Template\USWI\planproduction\xsection\
10. Pick the ***X-Section 1 IN 10 FT Horiz 10 FT Vert*** option for the layout.
11. Click Ok.
12. Make sure the group plot style is set to ***By Page Bottom to Top***
13. Click Next.
14. Verify that the offset range is set to Automatic and is listed as -75 and 75'.

Info: This length comes directly from the sample lines and should be left as-is.

15. Click Next
16. Do not make any changes to the elevation range page.
17. Click Next.
18. On the Section Display options page, clear the checkboxes next to:
    - CutCommon
    - Embankment
    - Asphalt
    - Base
    - Subbase
19. Click Next.
20. No action is needed on the Data Bands or Section View Tables pages, so Click Create Section Views .
21. Click off to the side in an empty location on your drawing.
22. You should have many pages of cross sections.
23. Save the drawing.

Adding an additional sample line

Exercise files: xsec-vw-creat-02-data-C3D12.zip

xsec-vw-creat-02.mp4 7:39

Warning: Do not graphically delete section views!

Use the Delete option from the right-click menu in prospector!

#1 Rule of Sample Lines and Cross Sections:

Always look for a way to makes changes to the group as a whole.

In other words, if you a repeating a task on multiple stations – there is probably a better way!

Exercise: Add n additional sample line & add it to the section views.

Info: If you successfully completed the previous exercise where you created sample lines, you may continue working in that file. If not, extract the example files associated with this exercise to your local Civil 3D projects folder.

1. In the **Toolspace > Prospector tab > Data Shortcuts** verify the working folder is c:\Civil 3D Projects\11111111\
2. Open 090100_xs.dwg.

Info: If you receive a message "Corridor is out of date and may be out of sync with other objects," dismiss panorama by clicking the green checkbox.

3. **Home tab > Profile and Section Views panel > Sample Lines** .
4. click Enter
5. Select USH 51 Best Fit from Exist
6. Click Ok.
7. When prompted to key-in a station along the alignment, type **19155** Enter
8. Type **75** Enter
9. Type **75** Enter

Info: Feel free to experiment by adding stations on your own. Just remember to set the swath widths to the uniform 75' for both the left and right sides. If you add a sample line where one already exists, civil 3d will ask if you wish to delete the old one.

10. Click Esc
11. **Home tab > Draw panel > Rectangle** .
12. Draw a rectangle directly over the first sheet.
13. In Prospector, go to the alignment area.
    - Expand USH 51 Best Fit from Exist
    - Expand Sample Line Groups
    - Expand Section View Groups
    - Right-click section view groups and select Delete
14. **Home tab > Profile & Section Views > Rectangle > Section Views > Create Multiple Views**
15. On the General page of the wizard, set the Section view style to Sheets 1 In 10 FT Horiz 10 FT Vert
16. Click Next.
17. Click the ellipsis next to Template for Cross Section Sheet.
18. Click the ellipsis again to browse to the file wisdot12-09-xs.dwtg.

19. Pick the X-Section 1 IN 10 FT Horiz 10 FT Vert option for the layout.
20. Click Ok.
21. Make sure the group plot style is set to By Page Bottom to top.
22. Click Next.
23. Verify that the offset range is set to Automatic and is listed as -75 and 75'.

Tip: This length comes directly from the sample lines and should be left as-is.

24. Click Next.
25. Do not make any changes to the elevation range page.
26. Click Next
27. On the Section Display options page, clear the checkboxes next to:
    - CutCommon
    - Embankment
    - Asphalt
    - Base
    - Subbase
28. Click Next.
29. No action is needed on the Data Bands or Section View Tables pages,
30. Click Create Section Views..
31. Using the rectangle you created earlier as a guide, place the section views in the same location by snapping to the lower-left corner of the rectangle.
32. Save the drawing.

ROW and utilities

Exercise files: xsec-vw-creat-03-data-C3D12.zip

xsec-vw-creat-03.mp4 7:09

The example uses Beam Guard but the technique can be used for:

- Utilities
- Right-of-way labels
- Any item that needs to be shown in section with a unique style.

Overview of steps

- An alignment is needed for the horizontal location
- A profile is needed for the elevation component
    - Usually developed from a surface
- Use the Section View Group Properties
    - Add Profile Grade
    - Set Marker style as needed

Exercise: Showing beam guard in section

Info: If you successfully completed the previous exercise where you created sample lines, you may continue working in that file. If not, extract the example files associated with this exercise to your local Civil 3D projects folder.

1. In the **Toolspace > Prospector tab > Data Shortcuts** verify the working folder is c:\Civil 3D Projects\11111111\
2. Open 090100_xs.dwg.

Info: If you receive a message “Corridor is out of date and may be out of sync with other objects,” dismiss panorama by clicking the green checkbox.

1. **Insert tab > Import panel > click Land XML**
2. Import the file 130-050-003-beamguard alignments.xml with all the default settings.
3. Click Ok.
4. **Manage tab** . .
5. Save the drawing.
6. On the Styles panel, click Import.
7. Browse to file Beam Guard Style.dwg in the files included with this chapter.
8. Clear all other style options except for Beam Guard Left. and Beam Guard right..
9. Clear the checkbox for Import Styles.
10. Click Ok.
11. Click any sheet or section view.
12. **Contextual tab > View Group Properties** .
13. Open the Section Views tab.
14. Scroll over and find Profile Grade.
15. Click the ellipsis.
16. From the Alignment list, pick Beam Guard North.
17. Click Add.
18. Set the Marker style to Beam Guard R.
19. From the Alignment list, pick Beam Guard South.
20. Click Add.
21. Set the Marker style to Beam Guard L.
22. Click Ok.
23. Click Ok.

Info: You should now see beam guard at every station.

24. Save the drawing.

Exercise: Create sheets

Exercise files: xsec-vw-creat-04-data-C3D12.zip

xsec-vw-creat-04.mp4 7:44

Info: Add the sheets to the sheetset manager.

1. Click the ellipsis and browse to C:\Civil 3D Projects\11111111\SheetsPlan

Info: If you successfully completed the previous exercise where you created sample lines and multiple section views, you may continue working in that file. If not, extract the example files associated with this exercise to your local Civil 3D projects folder.

2. In the **Toolspace > Prospector tab > Data Shortcuts** verify the working folder is c:\Civil 3D Projects\11111111\
3. Open 090100_xs.dwg.

Info: If you receive a message “Corridor is out of date and may be out of sync with other objects,” dismiss panorama by clicking the green checkbox.

4. **Output tab > Plan Production Panel> Click Create Section Sheets**
5. Under the sheet set area of the Create Section sheets dialog box, switch the radio button over to Add to Existing Sheet set.
6. Click the ellipsis.
7. Browse to C:\Civil 3D Projects\11111111\SheetsPlan\planproduction.dst
8. Click Open
9. Click Create Sheets
10. Click Ok to confirm that the drawing will be saved.

Tip: After a moment multiple tabs will appear for each sheet. If you do not see the new tabs right away, close the drawing and go back in.

11. Save the drawing.

WisDOT standards - section views

Last updated: 2010-07-01

Total video time: 58:59

Section views for plan sheets – file management

xsec-wisdot-stnd-01.mp4 2:04

- File location = ProjectID\\SheetsPlan folder

Section Views for plan sheets – data referencing data shortcut references

xsec-wisdot-stnd-02.mp4 4:42

- Baseline Alignments
- Roadway Model Surfaces
    - Utility Surface Profiles
    - Ultimate Right-of-Way Surface Profiles
    - Corridor dwg file

Section views for plan sheets – graphic content

xsec-wisdot-stnd-03.mp4 5:19

- Proposed objects are represented by the Roadway Model Surfaces
- Corridors provide automated labeling

Corridor links are typically not visible

xsec-wisdot-stnd-04.mp4 6:56

- XSSheets code set style
- XSSheets With Links code set style

Utilities and RW markers are tied to surface profiles

xsec-wisdot-stnd-05.mp4 4:47

- Edge of lane markers

Section views for plan sheets – adding labels

xsec-wisdot-stnd-06.mp4 1:39

- Why do we need manual labels?
    - Because the corridor isn't always visible, so automated labeling needs to be supplemented with manual labels.
- Elevation-Offset labels
- Slope-Percent labels
- Slope-Ratio labels

Adding labels - elevation/offset

xsec-wisdot-stnd-07.mp4 2:47

Adding labels - slope percent

xsec-wisdot-stnd-08.mp4 3:20

Adding labels - slope ratio

xsec-wisdot-stnd-09.mp4 1:59

Section views for plan sheets – custom text markers

xsec-wisdot-stnd-09.mp4 5:34

- Single Custom Text Marker Using Block

Multiple custom text markers at common points using corridor feature lines 1

xsec-wisdot-stnd-10.mp4 10:05

Multiple custom text markers at common points using corridor feature lines 2

xsec-wisdot-stnd-11.mp4 5:25

Section views for plan sheets – conclusion

xsec-wisdot-stnd-12.mp4 4:22

- File Management
- Data Referencing
- Graphic Content
- Labels
- Custom Text Markers

Exercise DS1800 - Create section views for plans

Last updated: 2017-06-06

Total video time: 104:03

Exercise files: xsec-creat-xs-pln-data-C3D10.zip

xsec-creat-xs-pln.pdf

Introduction/unzip project dataset

xsec-creat-xs-pln-01.mp4 2:54

Ensure corridor surfaces are current

xsec-creat-xs-pln-02.mp4 3:08

Open corridor file, synchronize data shortcuts and rebuild corridor

Ensure refinement surfaces are current

xsec-creat-xs-pln-03.mp4 4:25

Open refinement surfaces files, synchronize data shortcuts and rebuild refinement surfaces

Ensure roadway model surfaces are current

xsec-creat-xs-pln-04.mp4 4:28

Open Roadway Model surfaces files, synchronize data shortcuts and rebuild Roadway Model surfaces

Create section view DWG. Create references

xsec-creat-xs-pln-05.mp4 8:09

1. Create a new section view drawing from the main WisDOT design template, and save it in the SheetsPlan project folder
2. Data shortcut reference roadway model surfaces, and centerline alignments
3. XREF the corridor drawing

Matchline layout explanation

xsec-creat-xs-pln-13.mp4 3:28

Create matchline alignments

xsec-creat-xs-pln-14.mp4 7:50

1. Create polylines utilizing the ***Station-Offset*** transparent command to create a polyline parallel with the mainline alignment which runs from the starting station of the inter-section to the ending station of the intersection which is offset to the end of the curb return. Do this on each side of the alignment to create 2 polylines (see video).
2. **Home tab > Alignment > Create Alignment from Objects**
    - select left polyline and enter name Matchline1
    - type = Miscelaneous
    - style = XS Sample Line
    - label style = **_No Labels**
    - Erase existing entities = **check on**
3. Repeat step 2 for the right matchline polyline naming it ***Matchline2***

Create sample lines by range of stations 1

xsec-creat-xs-pln-15.mp4 6:05

1. **Home tab > Sample Lines**
    - Leave name and sample line styles as default
    - Select data sources to sample:
        - Deselect all corridor surfaces
        - Leave all roadway model surfaces selected and set respective surface styles:
            - RoadwayModel-Datum = Final Datum
            - RoadwayModel-BaseCourse = Final Base Course
            - RoadwayModel-Top = EX Ground
            - RoadwayModel-Exist = Final Top
        - Deselect Exist surface coming from Corridor file XREF
        - Leave corridor section selected and set the style to XS Sheets
    - OK

Create sample lines by range of stations 2

xsec-creat-xs-pln-16.mp4 8:20

1. **Sample Line Tools > Sample line creation method > By range of stations**
    - Station Range:
        - From alignment start = **False**
        - Start Staion = **366+00**
        - To alignment end = **False**
        - End Station = **383+95.00**
    - Left Swath Width:
        - width = **150'**

- Right Swath Width:
  - width = **150'**
- Sampling Increments:
  - **50'** for all settings
- Additional Sample Controls:
  - At Range Start = **True**
  - At Range End = **False**
  - At Horizontal Geometry Points = **True**
  - At Superelevation Critical Staions = **True**

2. **Sample Line Tools > Sample line creation method > By range of stations**

- Station Range:
  - From alignment start = **False**
  - Start Staion = **383+95.00**
  - To alignment end = **False**
  - End Station = **385+44.82**
- Left Swath Width:
  - Snap to alignment = **True**
  - Alignment = **Matchline1**
- Right Swath Width:
  - Snap to alignment = **True**
  - Alignment = **Matchline2**
- Sampling Increments:
  - **50'** for all settings
- Additional Sample Controls:
  - At Range Start = **False**
  - At Range End = **False**
  - At Horizontal Geometry Points = **True**
  - At Superelevation Critical Staions = **True**

3. **Sample Line Tools > Sample line creation method > By range of stations**

- Station Range:
  - From alignment start = **False**
  - Start Staion = **385+44.82**
  - To alignment end = **False**
  - End Station = **395+00**
- Left Swath Width:
  - Snap to alignment = **False**
  - Alignment = **150'**
- Right Swath Width:
  - Snap to alignment = **False**
  - Alignment = **150'**

- Sampling Increments:
  - **50'** for all settings
- Additional Sample Controls:
  - At Range Start = **False**
  - At Range End = **True**
  - At Horizontal Geometry Points = **True**
  - At Superelevation Critical Staions = **True**

4. OK

Create multiple section views

xsec-creat-xs-pln-17.mp4 2:54

1. Set annotation scale to match the viewport scale on your section view sheets (1"=20')
2. **Home > Section Views > Create Multiple Views**
   - General
     - Alignment = **STH25BestFit**
     - Sample Line Group Name = **SLG-1**
     - Station Range = **Automatic**
     - Section View Style = **Sheets**
     - Group Plot Style = **By Page Top to Bottom**
   - Offset Range
     - Offset Range = **Automatic**
   - Elevation Range
     - Elevation Range = **Automatic**
   - Section Display Options
     - These settings should all be coming in correctly from the sample line group settings
3. Create Section Views
4. Select location in model space for section view placement

Inspect section views

xsec-creat-xs-pln-18.mp4 4:30

1. Check for all of the roadway model surfaces to be present and styled correctly
2. Check for presence of corridor labels and markers
3. Confirm accuracy of intersection sections

Add special stations to section views

xsec-creat-xs-pln-19.mp4 6:58

1. **Prospector > Alignments > Centerline Alignments STH25BestFit > Sample Line Groups > SLG-1 > Section View Groups**
   - delete the Section View Group
2. **Home > Sample Lines**
   - select STH25BestFit alignment
3. **Sample Line Tools > Sample line creation methods > At a station**
   - Snap to any critical stations to create additional sample lines in location such as drainage sections, driveways, changes at typical sections for taper lanes etc
   - Enter left and right swath widths after each station selection
4. Recreate the section view group exactly as was done the first time

Add r/w and utilities to section views

Refer to the training topic for "Projecting 3D objects onto cross sections" below

Review

xsec-creat-xs-pln-21.mp4 2:19

Projecting 3D objects onto cross sections

Last updated: 2015-04-13

Total video time: 13:36

Projecting 3D objects onto cross sections

Exercise files: xsec-prjct-3d-obj-onto-xs-01-data-C3D14.zip

Exercise files: xsec-prjct-3d-obj-onto-xs-01-finished-data-C3D14.zip

xsec-prjct-3d-obj-onto-xs-01.mp4 8:25

Info: ** NOTE ** This method should only be used if a survey database is not available. If a survey database is available, that provides a shorter workflow for projecting survey figures onto cross sections. That method is found at 130.075.002.

Prerequisites

Info: Before starting this training module users should have a working knowledge of Civil 3D corridor modeling and cross section sheet production. The cross sections sheets drawing should have already been created before moving on to this module

Objectives

Projection styles are used to project AutoCAD objects such as 3Dpolylines, feature lines, blocks, 3D cogo points, survey figures and 3D solids onto profile views and section views. Objects are represented by marker styles and label styles. Projection styles are very useful in showing locations of utilities, and ROW locations in section views. Elevations can be assigned to the projections based on the object elevation itself or based on a surface or profile. Projection styles are dynamically linked to the objects they reference. However, when projected objects are added to a drawing, the markers and labels do not update until the projections command is re-run. This module will demonstrate how to apply and update projection styles for feature lines.

Obtaining data from utilities file

> **Tip:** Data found in existing conditions utilities files can be inserted into a cross section drawing for use with projection styles.

1. Open C:\WisDOT\design\c3d\12342014\BaseData\Uti-Ex.dwg.

   > **Info:** Each of the utilities line work groups (electric, gas, etc.) will need to be converted to feature lines.

3. **Home tab > Layers panel > Isolate** .
4. Select a representative polyline from each utility.
5. **Home tab > Create Design panel > Feature Line > Create Feature Lines From Objects** .
6. Select all visible linework.
7. In the Create Feature Lines dialog box, check the Style box in order to select the proper style.
8. From the Feature Line Style drop-down list select the appropriate E UTL layer for each utility group.
9. Click Erase Existing Entities .
10. Save Uti-Ex.dwg.

> **Info:** This file will be inserted into your cross sections drawing later in the workflow.

Setting up the cross section drawing for projections

1. Open Crdr-25_xs.dwg

   > **Tip:** Ensure that the corridor file is an XREF in the cross section drawing.

2. Ensure that the following data has been referenced:
   - Exist surface

     > **Info:** Note: All projections will use the existing ground surface to set elevations.

- Proposed centerline alignment and design profile
- All existing ROW alignments

3. Ensure that your sample line group has been created, and that your section views exist in the drawing.

Create feature lines from existing ROW alignments

Tip: Alignments cannot be projected in Civil 3D, but feature lines can be created from the existing ROW alignments, and these can be projected.

1. **Home tab > Create Design panel > Feature Line > Create Feature Line From Alignment** .
2. Uncheck the Weed Points option
3. Select E RW Existing Right-Of-Way for the style,
4. Click Ok.

Info: This will need to be done for each separate existing ROW alignment.

5. Insert Uti-Ex.dw Into Cross Section Drawing

Info: The Uti-Ex.dwg file will now need to be inserted into the cross section drawing, and the feature lines from that file will need to be assigned to a site.

6. **Insert tab > Block panel > Insert** .
7. Browse to the Uti-Ex.dwg file for the project, and make sure none of the boxes are checked for Insertion Point, Scale, or Rotation.
8. Be sure to check the Explode option.
9. Click Ok.
10. Right-click in model space and select **Quick Select**.
11. In the Quick Select dialog box select:
    - Apply to: Entire drawing
    - Object type: Feature line
    - Operator: Select All
    - Click Ok .
12. Right-click in model space and select **Move to Site**
13. Choose the same site which was created for the existing ROW feature lines created from alignments and select OK.

Info: This will ensure that all of the newly inserted feature lines are associated with a site. If this is not done, these feature lines will not get projected.

Applying utilities projection styles to cross sections

1. To project all feature lines to the cross section views type **`PROJECTOBJECTSTOMULTISECT`** Enter
2. Select either a section view or a sample line from model space.
   - When the dialog box appears, uncheck all object types from the list except feature lines.
   - Keep the Style as Use Object.
   - Elevation Options should be set to surface Exist.
   - Label Style should be set to <None>
3. Check your section views to confirm that the markers for utilities and ROW are showing up.
4. Editing Projection Styles
5. Projection styles can be edited after being applied, and can also be removed or added.
6. Type **`PROJECTOBJECTSTOMULTISECT`** Enter.
7. Uncheck everything but feature lines.
8. Set the setting just as detailed in the last step.
9. Click Ok.

> **Info:** A message will appear with an option to overwrite the definition of already existing projections, or to leave them as they are. If any feature lines were deleted in plan view, the user can choose to overwrite the definition in order to remove the corresponding projection markers in the section views. If new feature lines were added to plan view then these will now be added into the section views.

Projecting utilities into cross-sections

Exercise files: xsec-prjct-3d-obj-onto-xs-02-data-C3D14.zip

Exercise files: xsec-prjct-3d-obj-onto-xs-02-finished-data-C3D14.zip

xsec-prjct-3d-obj-onto-xs-02.mp4 5:11

Prerequisites

> **Info:** Before starting this training module users should have a working knowledge of Civil 3D corridor modeling and cross section sheet production. The cross sections sheets drawing should have already been created before moving on to this module.

Objectives

Projection styles are used to project AutoCAD objects such as 3Dpolylines, feature lines, blocks, 3D cogo points, survey figures and 3D solids onto profile views and section views. Objects are represented by marker styles and label styles. Projection styles are very useful in showing locations of utilities, and ROW locations in section views. Elevations can be assigned to the projections based on the object elevation itself or based on a surface or profile. Projection styles are dynamically linked to the objects they reference. However, when projected objects are added to a drawing, the markers and labels do not update until the projections command is re-run. This module will demonstrate how to apply and update projection styles for survey figures.

Obtaining utilities data from survey database

Info: Survey figures representing existing conditions utilities found in the project survey database can be inserted into a cross section drawing for use with projection styles.

1. Open Crdr-25_xs.dwg

Info: This dwg should already have the corridor file as an XREF within it, and the section sheets created.

2. The Exist surface is data referenced into the drawing.
3. **Toolspace > Survey tab** right-click on Survey Databases and choose **Set Working Folder**.
4. Set the working folder location to C:\WisDOT\design\c3d\12342014\BaseData\Surveyg
5. Click Ok.
6. **Toolspace > Survey tab > Survey Databases**right-click on Projection Styles Training.
7. Click Open for Edit.

Info: This will open the example survey database to give you access to insert data into your current drawing.

8. Right-click on each query you would like to insert and select **Insert into drawing**.

Tip: If you would like to insert them all at once, you can right-click on the Figures heading and select Insert into drawing.

9. Confirm that the survey figure have been inserted into model space in your cross sections drawing,
10. **Toolspace > Survey tab > Survey Databases**right-click on Projection Styles Training database
11. Click Close survey database.

Applying utilities projection styles to cross sections

1. Type **PROJECTOBJECTSTOMULTISECT** Enter..
2. Select either a section view or a sample line from model space.
   - When the dialog box appears, uncheck all object types from the list except survey figures.
   - Keep the Style as Use Object.
   - Elevation Options should be set to surface Exist.
   - Label Style should be set to <None>.
   - Click Ok.
3. Check your section views to confirm that the markers for utilities are showing up.

Reloading survey figures after survey database update

> **Warning:** When inserting survey figures to a drawing from survey database, these inserted figures are not "live". This means that if there is a change to the survey figures made within the survey database, those changes will not automatically take place within the drawing they have been inserted into.

> **Warning:** You will have to be working in the cross sections drawing when completing the following steps.

1. If only one utility group was modified you will only need to reload that one query.
2. Right-click on the query for that utility group and
3. Click Remove from drawing. .
4. Right-click on the query a second time and click Insert into drawing. .

> **Tip:** This will effectively give you the newest survey figures from the survey database.

> **Info:** If changes were made to many of the utility groups it will be quicker just to do the above steps on the Figures heading in the Survey tab of toolspace. However, this will add all survey figures to the drawing so in many cases this may not be desirable.

Updating projection styles

> **Info:** Projection styles will need to be updated if changes have been made to the survey database.

1. Type **PROJECTOBJECTSTOMULTISECT** Enter.
2. Uncheck everything but survey figures.
3. Set the setting just as detailed in the original steps.
4. Click Ok.

Info: A message will appear with an option to overwrite the definition of already existing projections, or to leave them as they are. If any feature lines were deleted in plan view, the user can choose to overwrite the definition in order to remove the corresponding projection markers in the section views. If new feature lines were added to plan view then these will now be added into the section views.

Quantities

WisDOT standards - earthwork

Last updated: 2010-07-01

Total video time: 71:20

WisDOT earthwork

qnty-erthwrk-wisdot-stnd-01.mp4 24:22

Earthwork – file management

- File location = {ProjID}\Design\Quantities folder
- File naming
- Drawing Template

Earthwork – data referencing

- Data Shortcut References:
- Baseline Alignments
- Roadway Model Surfaces
- Subsurface
- Corridor Marsh Excavation Surface
    - Xreferences:
        - Corridor dwg file

Earthwork – matchline alignments

- Why?
- Matchline Layout
- Matchline Alignment Naming

Earthwork – sample line groups and sample lines

- Sample Line Groups
    - Naming
        - SLG - Parent Alignment Name
    - Surfaces
    - Corridors
    - Display Styles

Sample lines

- Naming
  - SL – Station Value
- Spacing

Earthwork - sample line groups and sample lines

qnty-erthwrk-wisdot-stnd-02.mp4 14:52

Earthwork – assign materials list

- Material List
  - Naming – does it matter?
  - Surfaces
  - Corridor Shapes
  - Check out "SLG - Sections"

Earthwork – create reports

- File Type
  - XML
- File Naming
  - EwkDetail-Alignment Name or Sample Line Group Name
- Folder Management
  - Place in \Quantities\EWKDetailReports folder
- Why?

Earthwork - create reports

qnty-erthwrk-wisdot-stnd-03.mp4 25:53

Earthwork – create earthwork detail Excel workbooks

- File Naming
  - EwkDetail-Alignment Name or Sample Line Group Name
- Folder Management
  - Place in \Quantities\EWKSummaryWorkbooks folder
- Why?

Earthwork – checking the results

- Surface to Surface
- Why won't the numbers be exact?

Earthwork - summary

qnty-erthwrk-wisdot-stnd-04.mp4 6:13

Earthwork – summary

- Earthwork DWG file
- Data to Xreference and Data Reference
- Create Matchline Alignments
- Create Sample Line Groups and Sample Lines
- Assign Material Criteria to Sample Line Groups
- Create Earthwork Detail XML Reports
- Create Earthwork Detail Excel Workbooks
- Create Earthwork Summary Excel Workbooks
- Check your work

Exercise DS1900 - Create earthwork reports

Last updated: 2010-07-01

Total video time: 131:13

Exercise files: qnty-creat-erthwrk-rpt-data-C3D10.zip

qnty-creat-erthwrk-rpt.pdf

Create marsh excavation surface

qnty-creat-erthwrk-rpt-01.mp4 14:04

Create the Marsh Excavation limits surface in the Corridor-STH25-4thAve.DWG file and save the ***MarshEXCSurface*** data shortcut. This surface will be used when we compute Earthwork Quantities.

1. Open Corridor-STH25-4thAve.dwg
2. Create the ***STH25-Corridor-MarshExcSurface*** surface from the corridor.
    - From Corridor Properties dialog
        - Select Surfaces tab
        - Press Create a Corridor Surface button
        - Enter Surface Name ***STH25-Corridor-MarshExcSurface***
            - Select a Type = Links
            - Select the Code = MarshEx
            - Press the Add Surface Item button
            - Select a Type = Feature Lines
            - Select the Code = Marsh_Bottom
            - Press the Add Surface Item button

        - Select a Type = Feature Lines
        - Select the Code = Marsh_Daylight
        - Press the Add Surface Item button
    - Corridor Properties dialog Press Ok
3. Visually inspect the ***STH25-Corridor-MarshExc*** surface, and add an outer boundary if necessary.
4. Create a data shortcut for the ***STH25-Corridor-MarshExc*** surface

Info: Marsh bottom surface was loaded previously

Info: Rock surface was loaded previously

Info: STH25-4thAve Corridor (Assemblies) solve for Marsh Excavation limits

Create DWG

qnty-creat-erthwrk-rpt-02.mp4 9:49

1. Create the Earthwork-STH25.dwg from the main WisDOT design template.
2. XREF the Corridor-STH25-4thAve.dwg file.
3. Data reference the ***4thAve*** and ***STH25BestFit*** alignments and profiles
4. Data reference the ***STH25-RoadwayModel*** surfaces
    - ***STH25-RoadwayModel-BaseCourse***
    - ***STH25-RoadwayModel-Datum***
    - ***STH25-RoadwayModel-Exist***
    - ***STH25-RoadwayModel-Top***

Create matchlines 1

qnty-creat-erthwrk-rpt-03.mp4 11:31

1. Open the Earthwork-STH25.DWG file
2. Create Graphics that locate the Curb Center of Curve for all (see video)

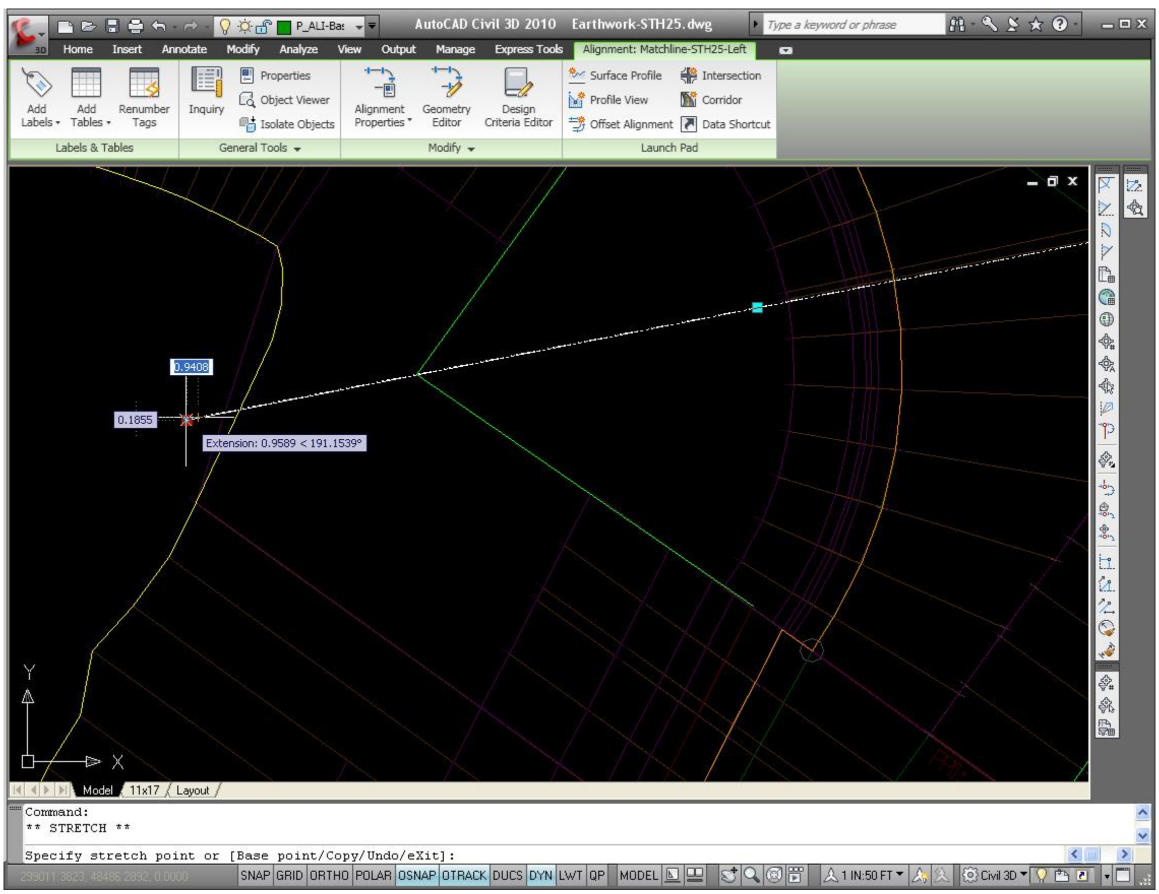
Create matchlines 2

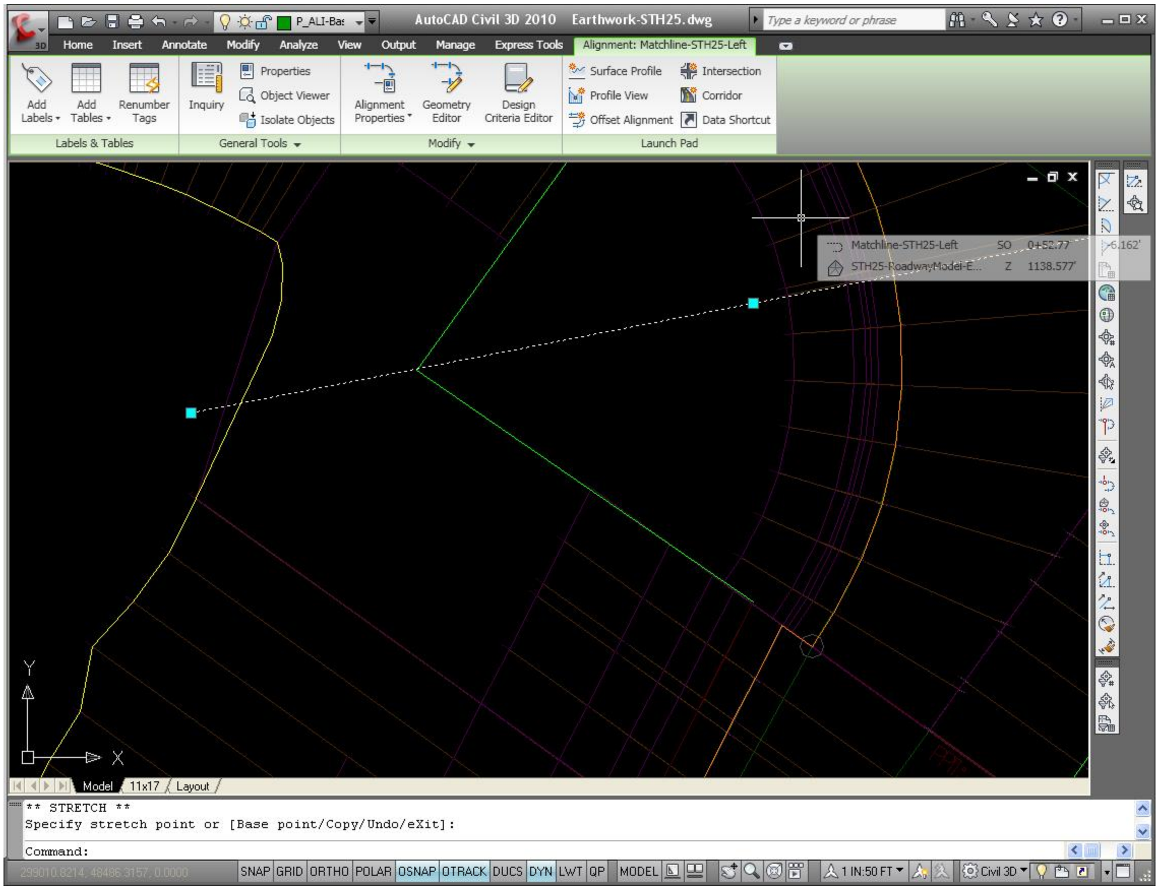
qnty-creat-erthwrk-rpt-04.mp4 7:01

1. **Home Ribbon > Create Design > Alignment > Alignment Creation Tools**
    - Alignment Name: ***Matchline - STH25-Left***
    - Type: Miscellaneous
    - Description: Earthwork matchline left
    - Alignment style: RDWY Lane Edge

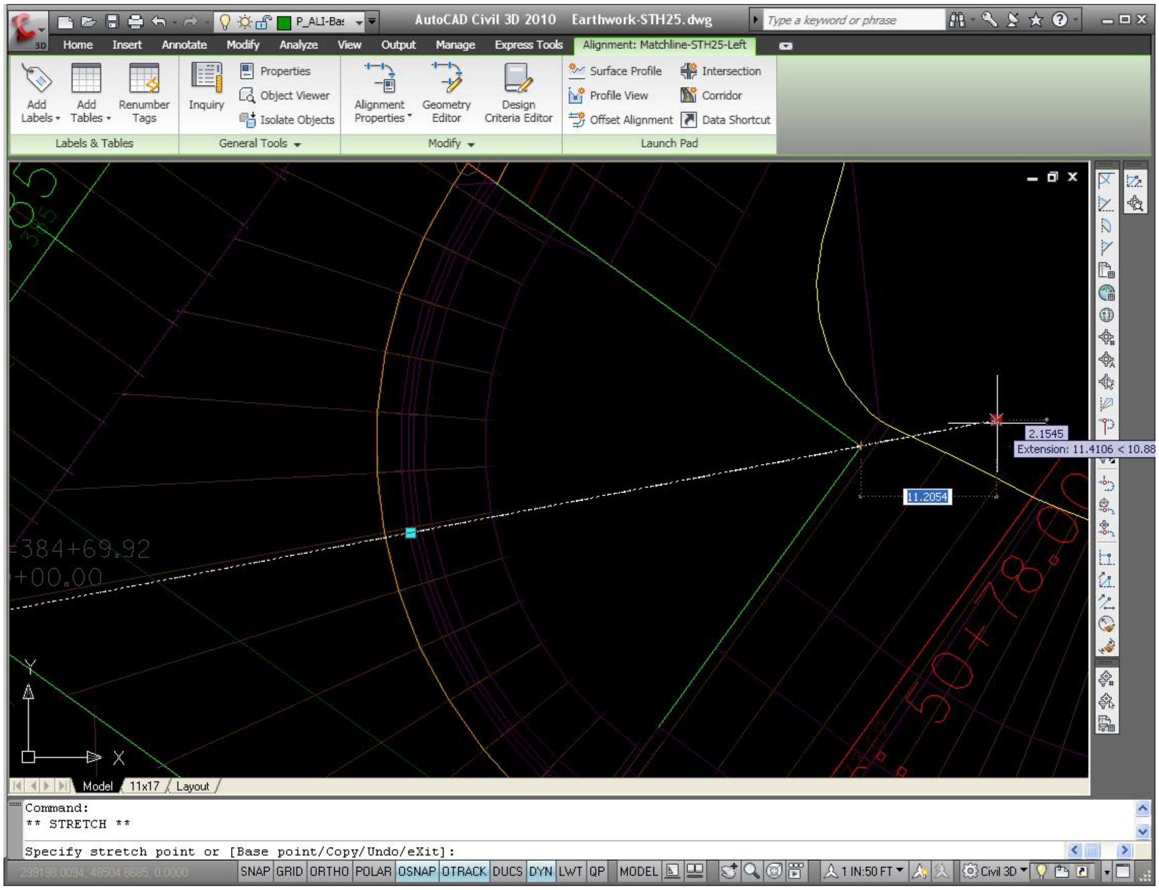
- Alignment label set: _No Labels
- **Alignment Layout Toolbar > Tangent-Tangent-No Curves**
    - PI 1 = SW Quadrant Curb center
    - PI 2 = Intersection of 4thAve and STH25 Lane edge left
    - PI 3 = NW Quadrant Curb center

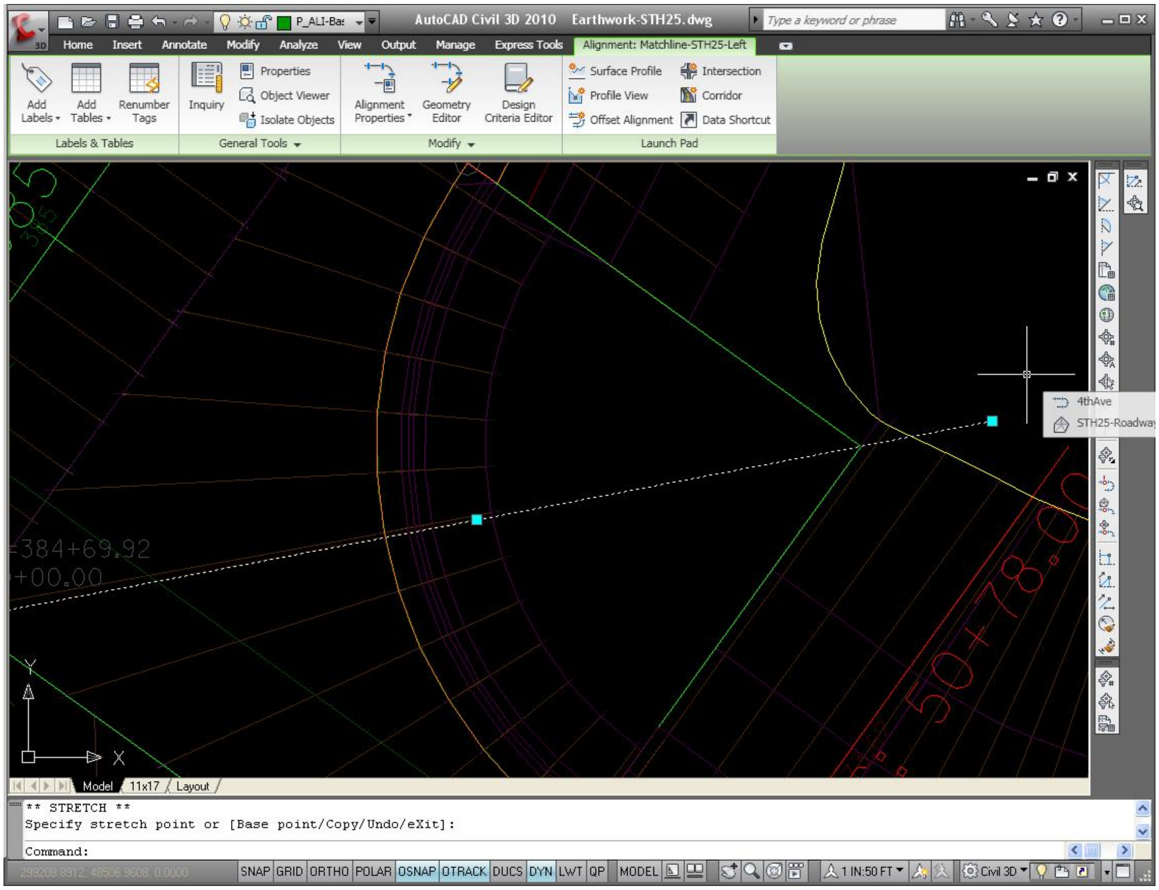
2. **Home Ribbon > Create Design > Alignment > Alignment Creation Tools**
    - Alignment Name: ***Matchline - STH25-Right***
    - Type: Miscellaneous
    - Description: Earthwork matchline right
    - Alignment style: RDWY Lane Edge
    - Alignment label set: _No Labels
    - **Alignment Layout Toolbar > Tangent-Tangent-No Curves**
        - PI 1 = SE Quadrant Curb center
        - PI 2 = Intersection of 4thAve and STH25 Lane edge right
        - PI 3 = NE Quadrant Curb center
3. Extend the matchline alignments beyond the slope intercepts for ***Matchline-STH25-Left*** alignment





4. Extend the matchline alignments beyond the slope intercepts for ***Matchline-STH25-Right*** alignment


AutoCAD Civil 3D 2010 Earthwork-STH25.dwg
Home Insert Annotate Modify Analyze View Output Manage Express Tools Alignment: Matchline-STH25-Left
Add Labels
Add Tables
Renumber Tags
Inquiry
Properties
Object Viewer
Isolate Objects
Alignment Properties
Geometry Editor
Design Criteria Editor
Surface Profile
Profile View
Offset Alignment
Intersection
Corridor
Data Shortcut
Labels & Tables
General Tools
Modify
Launch Pad
2.1545
Extension: 11.4106 < 10.88
11.2054
Model 11x17 Layout
Command:
** STRETCH **
Specify stretch point or [Base point/Copy/Undo/eXit]:
SNAP GRID ORTHO POLAR OSNAP OTRACK DUCS DYN LWT QP MODEL
1 IN:50 FT
Civil 3D

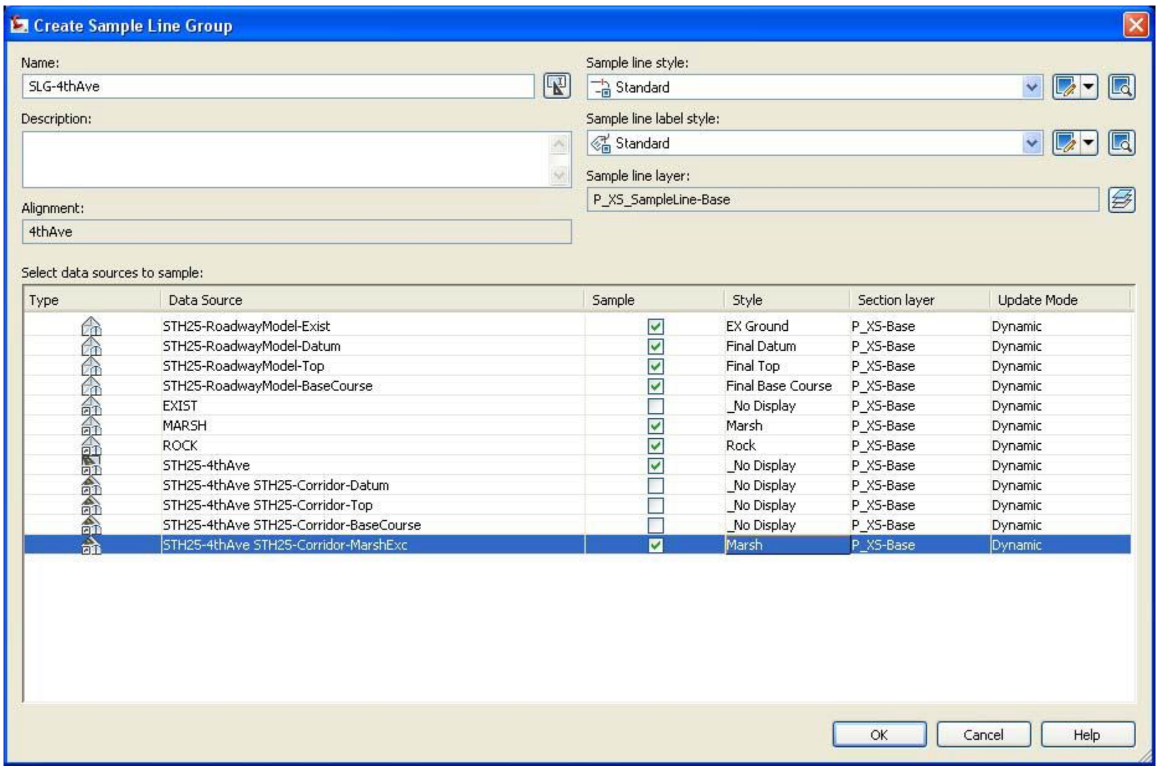


Create sample lines 1

qnty-creat-erthwrk-rpt-05.mp4 10:41

1. Open the Earthwork-STH25.dwg file
2. Create the Sample Line Group ***SLG-STH25BestFit***
    - **Home Ribbon > Sample Lines > Create Sample Lines**
        - Name: ***SLG-STH25BestFit***
        - Sample Line Style: Standard
        - Sample Line Label Style: Standard
        - Sample Surfaces:
            - ***STH25-RoadwayModel-Exist***
                - Style = Ex Ground
            - ***STH25-RoadwayModel-Datum***
                - Style = Final Datum
            - ***STH25-RoadwayModel-Top***
                - Style = Final Top

- ***STH25-RoadwayModel-Base Course***
  - Style = Final Base Course
- ***Marsh***
  - Style = Marsh
- ***Rock***
  - Style = Rock
- ***STH25-4thAve***
  - Style = No Display
- ***STH25-4thAveSTH25-Corridor-MarshExcSurface***
  - Style = Marsh



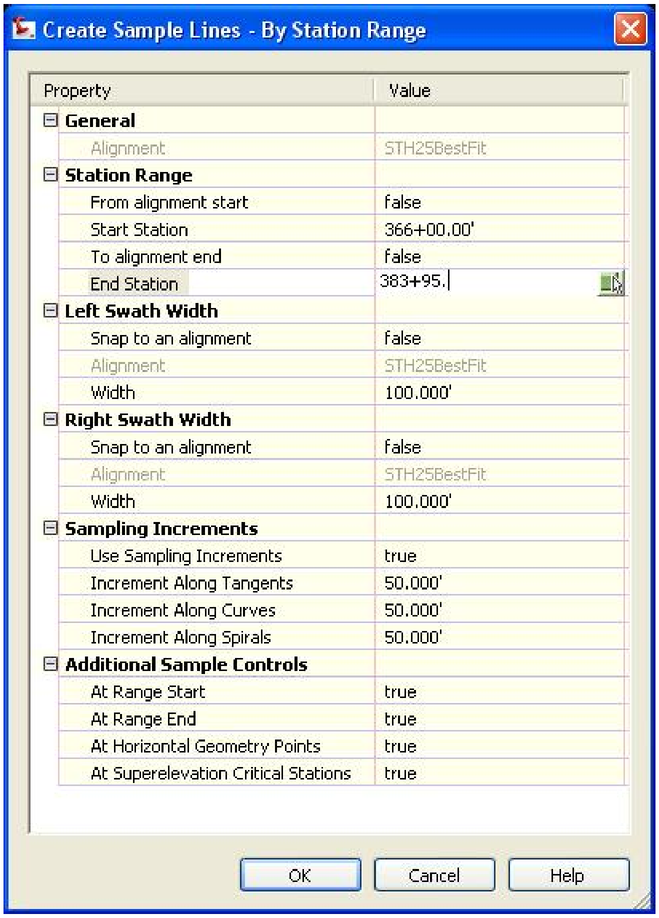
Info: STH25-4thAve is the Corridor. It is read from the Xref'd Corridor DWG file.

Info: The STH25-4thAve STH25-Corridor-Datum, Top and BaseCourse surfaces are the surfaces created from the Xreferenced Corridor DWG file. The Road-wayModel surfaces use these Corridor surfaces and include edits. We therefore want to use the RoadwayModel surfaces for Quantities

Info: EXIST is included because it was used in the Xreferenced Corridor DWG file. We do not want to use this surface. We will use the STH25-RoadwayModel-Exist surface. It is recently created and takes into consideration Construction sta-ging (if applicable).

Info: vSTH25-4thAve STH25-Corridor-MarshExcSurface comes from the Xref'd Corridor DWG file. We do not have any RoadwayModel edits to this surface and will use it directly from the Corridor DWG file.

3. Create Sample Lines for stations 366+00 to PC of SE Quadrant (add to the sample line group ***SLG-STH25BestFit***)
    - From the Sample Line Tools toolbar Select Edit Name Template button (next to Sample Line name).
    - From the Name Template dialog Highlight <[Next Counter(CP)]> in Name field Select Sample Line Station Value in Property Fields
    - Press Insert
    - Press OK
    - From the Sample Line Tools toolbar Select the By Range of Stations selection
    - From the ***Create Sample Lines- By Range of Stations*** dialog
        - From Alignment Start = False
        - Start Station = 366+00
        - To Alignment End = False
        - End Station = 383+95 (PC of SE Quadrant)
        - Left Swath width = 100
        - Right Swath Width = 100
        - Note: Swath width must extend to the limits of the slope intercepts or Earth-work will not be computed completely.
        - Sampling Increments = 50 for all
        - Note: 50 ft increments for Rural Roadway outside of intersection area
        - Additional Sample Controls:
            - At Range Start = True
            - At Range End = True
            - At Horizontal Geometry Points = True
            - At Superelevation Critical Stations = True
        - Press Ok



Info: Creates Sample lines for Stations 366+00 to Sta 383+95 at 50 ft increments with extra sample lines at critical stations

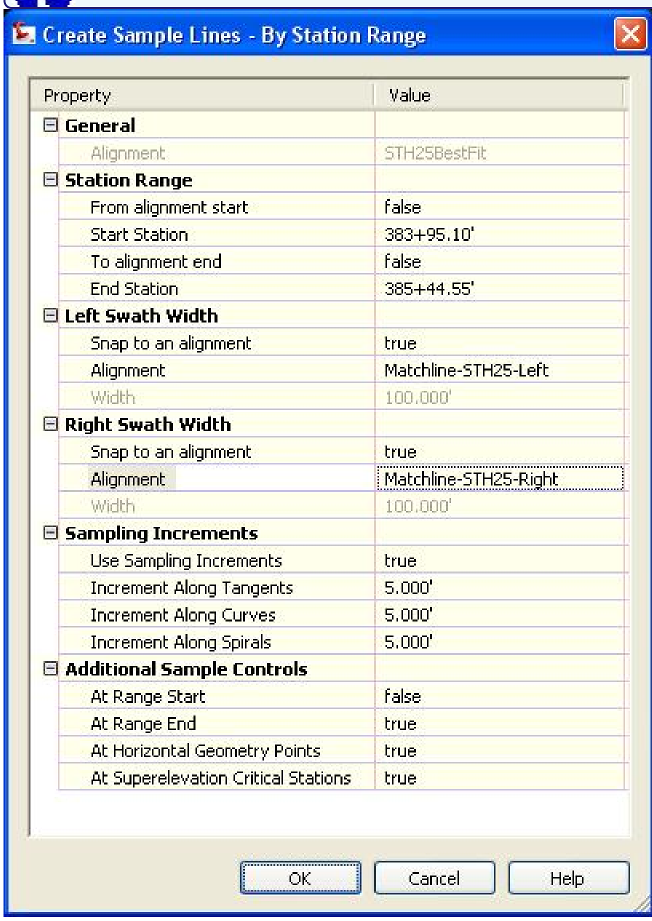
Info: Sample Line Tools remains open

4. Create Sample Lines for intersection stations (383+95 to 385+44.83)
    - From the Sample Line Tools toolbar Select the By Range of Stations selection
    - From the ***Create Sample Lines- By Range of Stations*** dialog
        - From Alignment Start = False
        - Start Station = 383+95
        - To Alignment End = False
        - End Station = 385+44.55 (PT of NW Quadrant)
        - Left Swath width
            - Snap to Alignment = True
            - Alignment = Matchline-STH25-Left
        - Right Swath Width
            - Snap to Alignment = True
            - Alignment = Matchline-STH25-Right
        - Note: Swath width must extend to the limits of the slope intercepts or Earthwork will not be computed completely.
        - Sampling Increments = 5 for all

- Note: 5 ft increments for Rural Roadway within intersection area
- Additional Sample Controls:
    - At Range Start = False
    - At Range End = True
    - At Horizontal Geometry Points = False
    - At Superelevation Critical Stations = False
- Press Ok

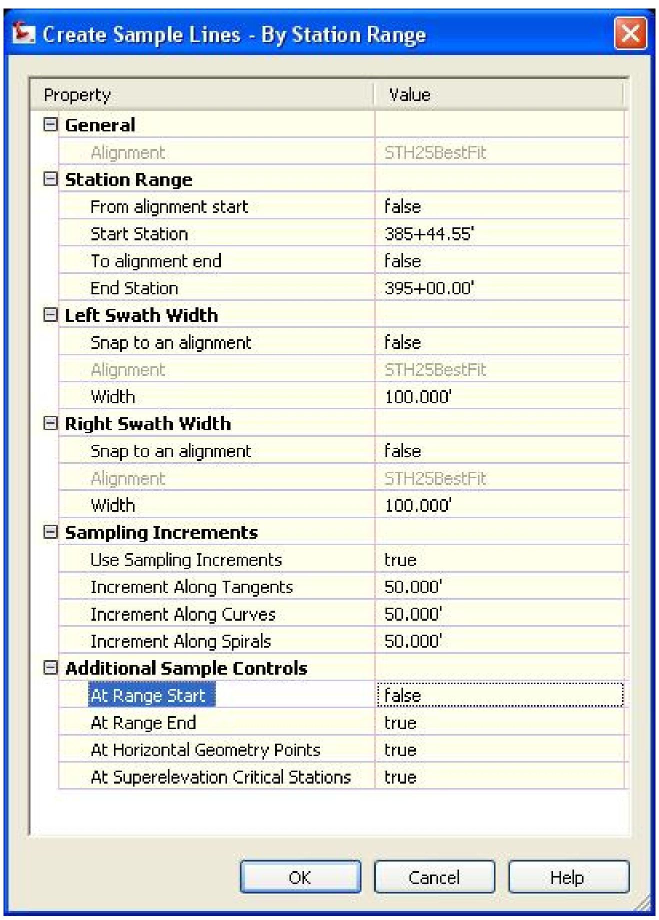
Info: Creates Sample lines for Stations 383+95 to 385+44.55 at 5 ft increments

Info: Sample Line Tools remains open



5. Create Sample Lines from intersection to end of project (385+44.83 to 395+00)
    - From the Sample Line Tools toolbar Select the By Range of Stations selection
    - From the ***Create Sample Lines- By Range of Stations*** dialog
        - From Alignment Start = False
        - Start Station = 385+44.83 (PT of NW Quadrant)
        - To Alignment End = False
        - End Station = 395+00

- Left Swath width
    - Snap to Alignment = False
    - Width = 100
- Right Swath Width
    - Snap to Alignment = False
    - Width = 100
- Note: Swath width must extend to the limits of the slope intercepts or Earth-work will not be computed completely.
- Sampling Increments = 50 for all
- Note: 50 ft increments for Rural Roadway outside of intersection area
- Additional Sample Controls:
    - At Range Start = False
    - At Range End = True
    - At Horizontal Geometry Points = True
    - At Superelevation Critical Stations = True
- Press Ok
- Exit Sample Line Tools toolbar


Create Sample Lines - By Station Range

Property	Value
General	
Alignment	STH25BestFit
Station Range	
From alignment start	false
Start Station	385+44.55'
To alignment end	false
End Station	395+00.00'
Left Swath Width	
Snap to an alignment	false
Alignment	STH25BestFit
Width	100.000'
Right Swath Width	
Snap to an alignment	false
Alignment	STH25BestFit
Width	100.000'
Sampling Increments	
Use Sampling Increments	true
Increment Along Tangents	50.000'
Increment Along Curves	50.000'
Increment Along Spirals	50.000'
Additional Sample Controls	
At Range Start	false
At Range End	true
At Horizontal Geometry Points	true
At Superelevation Critical Stations	true

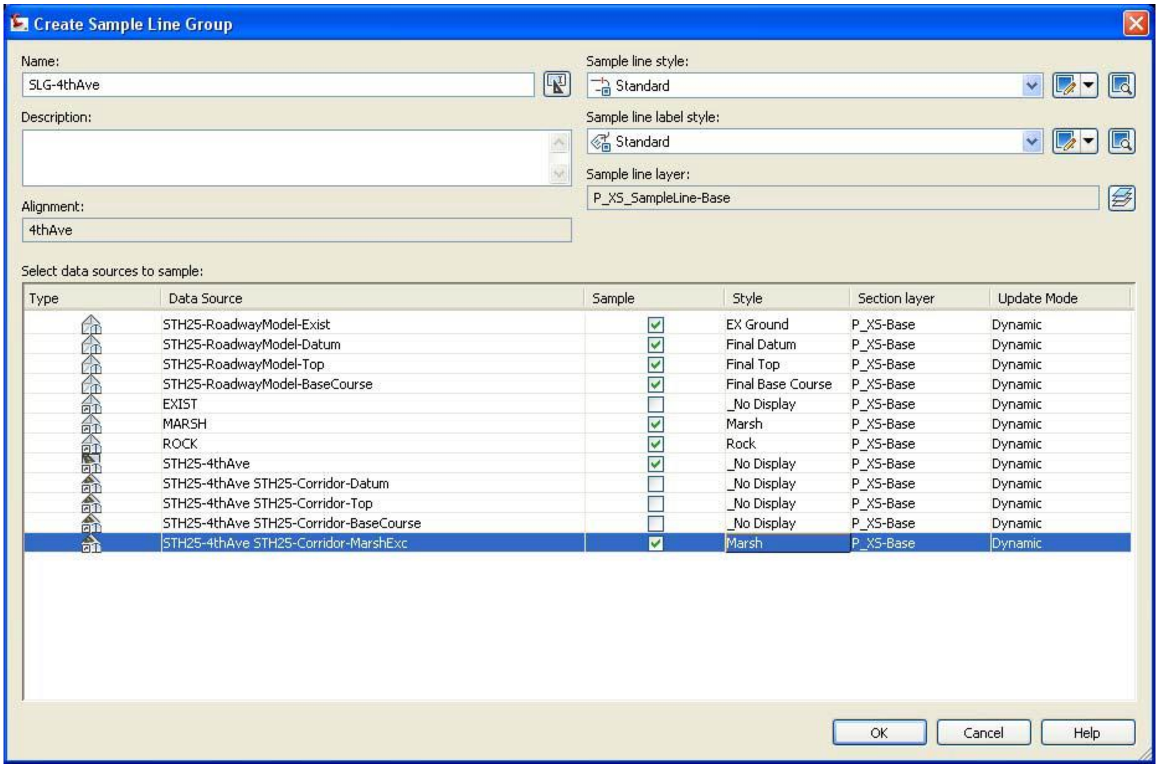
OK Cancel Help

Info: Creates Sample lines for Stations 385+44.55 to 395+00 at 50 ft increments

Create sample lines 2

qnty-creat-erthwrk-rpt-06.mp4 6:08

1. Create the Sample Line Group ***SLG-4thAve***
    - **Home Ribbon > Sample Lines > Create Sample Lines**
        - Name: ***SLG-4thAve***
        - Sample Line Style: Standard
        - Sample Line Label Style: Standard
        - Sample Surfaces:
            - ***STH25-RoadwayModel-Exist***
                - Style = Ex Ground
            - ***STH25-RoadwayModel-Datum***
                - Style = Final Datum
            - ***STH25-RoadwayModel-Top***
                - Style = Final Top
            - ***STH25-RoadwayModel-Base Course***
                - Style = Final Base Course
            - ***Marsh***
                - Style = Marsh
            - ***Rock***
                - Style = Rock
            - ***STH25-4thAve***
                - Style = No Display
            - ***STH25-4thAveSTH25-Corridor-MarshExcSurface***
                - Style = Marsh



Info: STH25-4thAve is the Corridor. It is read from the Xref'd Corridor DWG file.

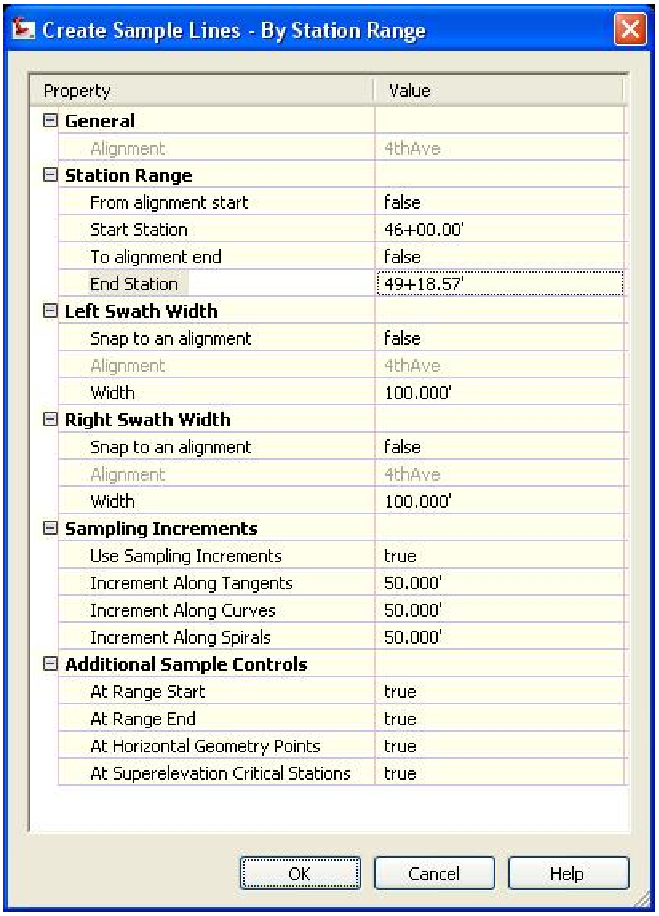
Info: The STH25-4thAve STH25-Corridor-Datum, Top and BaseCourse surfaces are the surfaces created from the Xreferenced Corridor DWG file. The Road-wayModel surfaces use these Corridor surfaces and include edits. We therefore want to use the RoadwayModel surfaces for Quantities

Info: EXIST is included because it was used in the Xreferenced Corridor DWG file. We do not want to use this surface. We will use the STH25-RoadwayModel-Exist surface. It is recently created and takes into consideration Construction sta-ging (if applicable).

Info: vSTH25-4thAve STH25-Corridor-MarshExcSurface comes from the Xref'd Corridor DWG file. We do not have any RoadwayModel edits to this surface and will use it directly from the Corridor DWG file.

2. Create Sample Lines for Stations 46+00 to 49+18.63 (NW Quadrant CC)
   - From the Sample Line Tools toolbar Select the By Range of Stations selection
   - From the ***Create Sample Lines- By Range of Stations*** dialog
     - From Alignment Start = False
     - Start Station = 46+00
     - To Alignment End = False
     - End Station = 49+18.57 (CC of NW Quadrant)
     - Left Swath width = 100
     - Right Swath Width = 100

- Note: Swath width must extend to the limits of the slope intercepts or Earthwork will not be computed completely.
- Sampling Increments = 50 for all
- Note: 50 ft increments for Rural Roadway outside of the intersection area
- Additional Sample Controls:
    - At Range Start = True
    - At Range End = True
    - At Horizontal Geometry Points = True
    - At Superelevation Critical Stations = True
- Press Ok

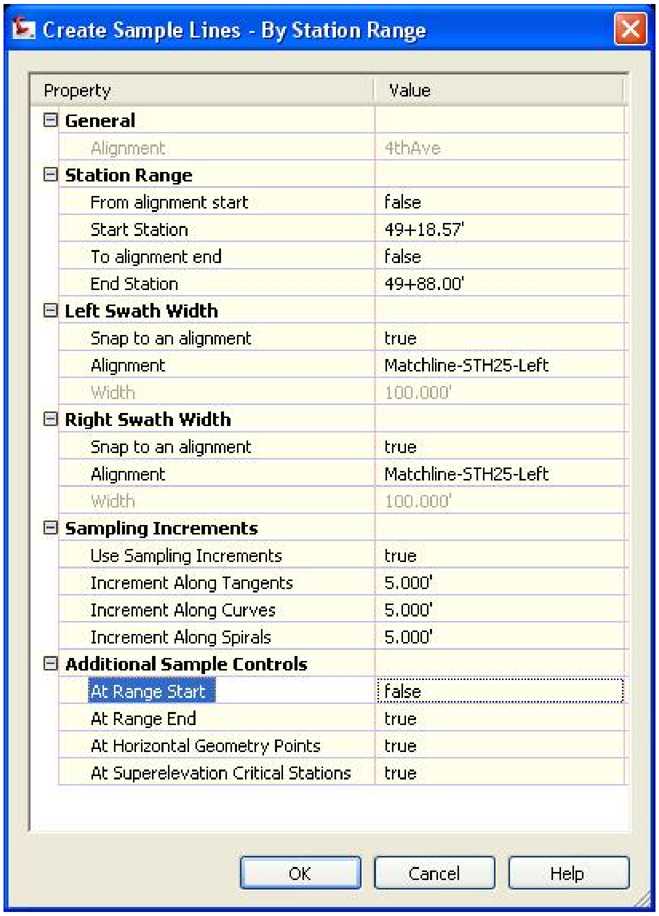


Info: Creates Sample lines for Stations 46+00 to 49+18.63 at 50 ft increments with extra sample lines at critical points

Info: Sample Line Tools remains open

3. Create Sample Lines for Intersection Stations to edge of pavement on mainline (49+18.63 to 49+88)

- From the Sample Line Tools toolbar Select the By Range of Stations selection
- From the ***Create Sample Lines- By Range of Stations*** dialog
    - From Alignment Start = False
    - Start Station = 49+18.57
    - To Alignment End = False
    - End Station = 49+88 (Edge of pavement along mainline)
    - Left Swath width
        - Snap to an Alignment = True
        - Alignment = Matchline-STH25-Left
    - Right Swath Width
        - Snap to an Alignment = True
        - Alignment = Matchline-STH25-Left
    - Note: Swath width must extend to the limits of the slope intercepts or Earthwork will not be computed completely.
    - Sampling Increments = 5 for all
    - Note: 5 ft increments for Rural Roadway within the intersection area
    - Additional Sample Controls:
        - At Range Start = False
        - At Range End = False
        - At Horizontal Geometry Points = True
        - At Superelevation Critical Stations = True
    - Press Ok



Create Sample Lines - By Station Range

Property	Value
General	
Alignment	4thAve
Station Range	
From alignment start	false
Start Station	49+18.57'
To alignment end	false
End Station	49+88.00'
Left Swath Width	
Snap to an alignment	true
Alignment	Matchline-STH25-Left
Width	100.000'
Right Swath Width	
Snap to an alignment	true
Alignment	Matchline-STH25-Left
Width	100.000'
Sampling Increments	
Use Sampling Increments	true
Increment Along Tangents	5.000'
Increment Along Curves	5.000'
Increment Along Spirals	5.000'
Additional Sample Controls	
At Range Start	false
At Range End	true
At Horizontal Geometry Points	true
At Superelevation Critical Stations	true

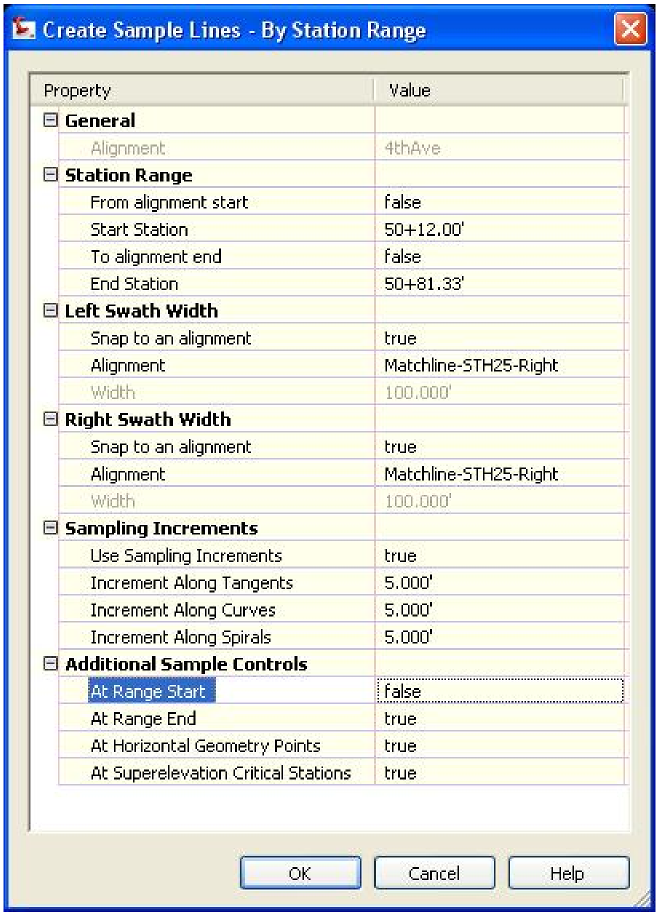
OK Cancel Help

Info: Creates Sample lines for Stations 49+18.57 to 49+88 at 5 ft increments

Info: Sample Line Tools Toolbar remains open

4. Create Sample Lines from edge of mainline pavement to end of intersection (50+12 to 50+81.26)
    - From the Sample Line Tools toolbar Select the By Range of Stations selection
    - From the ***Create Sample Lines- By Range of Stations*** dialog
        - From Alignment Start = False
        - Start Station = 50+12 (Edge of pavement along mainline)
        - To Alignment End = False
        - End Station = 50+81.26
        - Left Swath width
            - Snap to an Alignment = True
            - Alignment = Matchline-STH25-Right
        - Right Swath width
            - Snap to an Alignment = True
            - Alignment = Matchline-STH25-Right
        - Note: Swath width must extend to the limits of the slope intercepts or Earth-work will not be computed completely.

- Sampling Increments = 5 for all
- Note: 5 ft increments for Rural Roadway within the intersection area
- Additional Sample Controls:
  - At Range Start = False
  - At Range End = True
  - At Horizontal Geometry Points = True
  - At Superelevation Critical Stations = True
- Press Ok

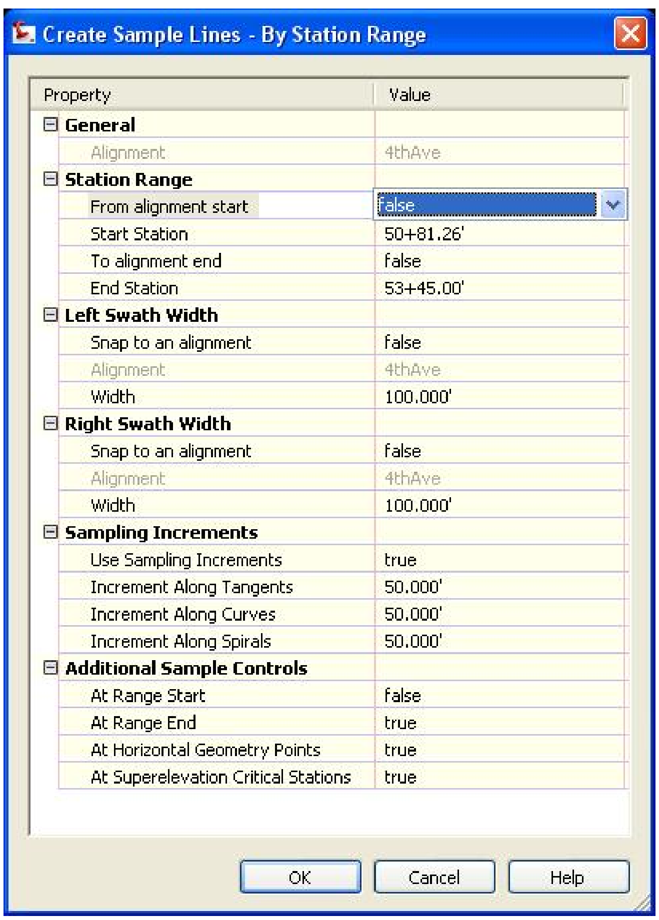


Info: Creates Sample lines for Stations 50+12 to 50+81.26 at 5 ft increments

Info: Sample Line Tools Toolbar remains open

5. Create Sample Lines from edge of mainline pavement to end of intersection (50+81.26 to 53+45)
   - From the Sample Line Tools toolbar Select the By Range of Stations selection
   - From the ***Create Sample Lines- By Range of Stations*** dialog
     - From Alignment Start = False
     - Start Station = 50+81.26 (PT of SE Quadrant)
     - To Alignment End = False
     - End Station = 53+45

- Left Swath width
    - Snap to an Alignment = False
    - Width = 100
- Right Swath width
    - Snap to an Alignment = False
    - Width = 100
- Note: Swath width must extend to the limits of the slope intercepts or Earthwork will not be computed completely.
- Sampling Increments = 50 for all
- Note: 50 ft increments for Rural Roadway outside of the intersection area
- Additional Sample Controls:
    - At Range Start = False
    - At Range End = True
    - At Horizontal Geometry Points = True
    - At Superelevation Critical Stations = True
- Press Ok
- Exist the Sample Line Tools toolbar



Info: Creates Sample lines for Stations 50+81.26 to 53+45 at 50 ft increments

Create sample lines 3

qnty-creat-erthwrk-rpt-07.mp4 6:27

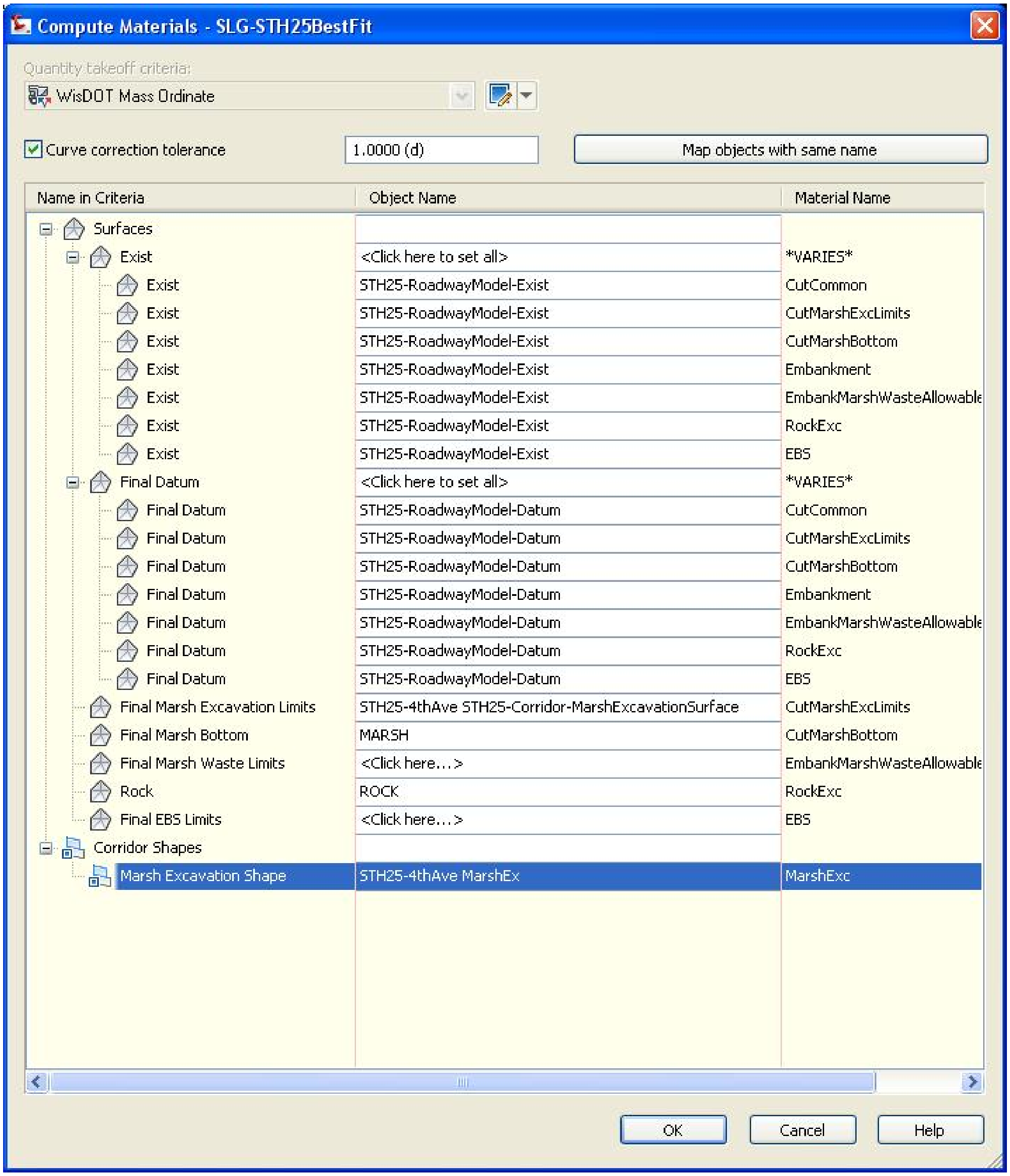
1. Grip Edit the length of the Sample lines in the NE (and SE) Quadrant of the Intersection
    - Do not overlap the ***STH25BestFit*** sample lines
    - Extend to the slope intercepts where applicable
    - Should not have situations where Sample Lines overlap Sample Lines within the same Sample Line Group
2. Select a Sample Line Select the Arrow on the Sample Line (it turns red) Drag Back to the desired ending location (Osnap intersection)
3. Repeat for other Sample Lines

Assign materials 1

qnty-creat-erthwrk-rpt-08.mp4 8:59

1. Apply Materials Criteria to ***SLG-STH25BestFit*** Sample Line Group
    - **Toolspace > Prospector > Alignments > STH25BestFit > Sample Line Groups**
    - Right-click ***SLG-STH25BestFit*** Sample Line Group and click Properties
        - From Sample Line Group Properties dialog Select Material List Tab
        - Press Import Another Criteria button (lower right)
        - From ***Select a Quantity Takeoff Criteria*** dialog Select WisDOT Mass Ordinate then click OK
        - From ***Compute Materials –SLG STH25BestFit*** dialog use the <Click here to set all> for all surfaces
            - Exist = ***STH25-RoadwayModel-Exist***
            - Final Datum = ***STH25-RoadwayModel-DATUM***
            - Final Marsh Excavation Limits = ***STH25-4thAveSTH25-Corridor-MarshExcSurface***
            - Final Marsh Bottom = ***MARSH***
            - Final Marsh Waste Limits = Leave Blank
            - Rock = Rock
            - Final EBS Limits = Leave Blank
            - Final Structure Excavation Limits = Leave Blank
            - Marsh Excavation Shape = ***STH25-4thAveMarshEx***
            - Click OK

Info: A message that not all of the named surfaces have been mapped appears. We know this… Press OK



2. From ***Sample Line Group Properties – SLG-STH25BestFit*** dialog ***Material List*** tab rename the Material List to ***Earthwork-SLG-STH25BestFit***

Info: Civil 3D allows overlapping areas when defining materials criteria.

Info: CutCommon - the Cut area defined below Existing ground surface and above Datum surface

Info: CutMarshExcLimits – sometimes our Exist surface if higher than the proposed Datum within the Marsh Excavation limits. Removal of this road core is

> MarshExcavation. This area will also show up as CutCommon as it is below Exist surface and above Datum surface. In order to compute accurate CommonExcavation quantities we will reduce the CutCommon by the CutMarshExcLimits when processing the Earthwork Detail workbooks.

> **Info:** CutMarshBottom – sometimes we have ditches where there is Marsh. These ditches should be classified as MarshExcavation (CutMarshExLimits is included in this area). Marsh Ditches are also classified as CutCommon because they are Above Datum and Below Exist surfaces.

> **Info:** MarshExc is also stored as a shape in the Corridor DWG file. We need this shape in order to distinguish between the different Marsh Excavation possibilities and compute total areas correctly.

3. Adding a surface to a Sample Line Group after the SLG has already been created
    - **Toolspace > Prospector > Alignments > STH25BestFit > Sample Line Groups**
    - Right-click ***SLG-STH25BestFit Sample Line Group*** and click Properties
        - From Sample Line Group Properties dialog
        - Select Sections Tab
        - Select Select More Sources
        - From ***Section Sources*** dialog
            - Select Surfaces from Available Sources
            - Press ADD
            - Press Ok
        - Press Ok in ***Sample Line Group Properties*** dialog to accept

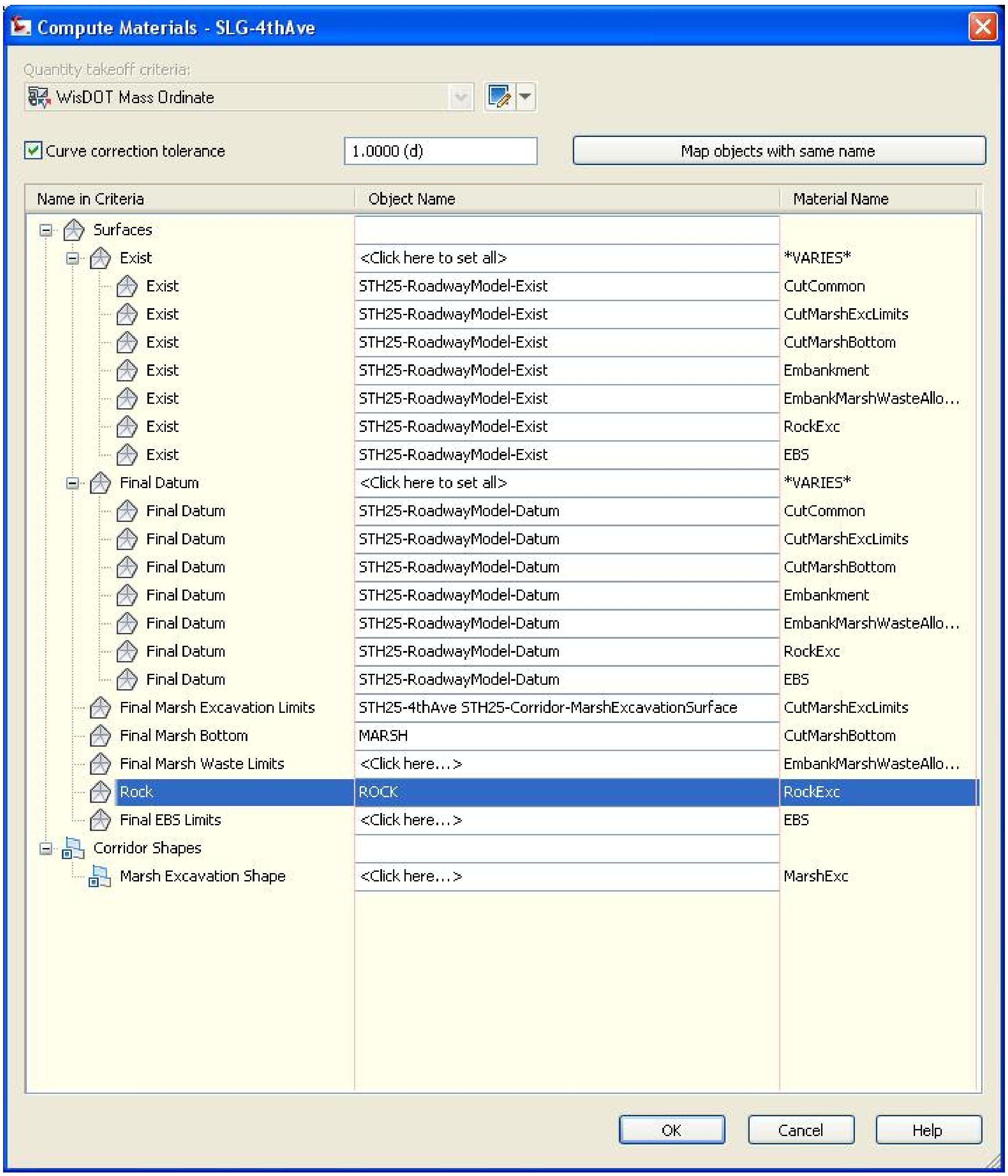
> **Info:** Note: if these new section surfaces were to be used in your material list, you would have to change the Material List to reflect those new surfaces.

Assign materials 2

qnty-creat-erthwrk-rpt-09.mp4 1:27

1. Apply Materials Criteria to ***SLG-4thAve*** Sample Line Group
    - **Toolspace > Prospector > Alignments > 4thAve> Sample Line Groups**
    - Right-click ***SLG-4thAve*** Sample Line Group and click Properties
        - From ***Sample Line Group Properties*** dialog Select Material List Tab
        - Press Import Another Criteria button (lower right)
        - From ***Select a Quantity Takeoff Criteria*** dialog Select ***WisDOT Mass Ordinate*** then click OK
        - From ***Compute Materials –SLG 4thAve*** dialog use the <Click here to set all> for all surfaces
            - Exist = ***STH25-RoadwayModel-Exist***
            - Final Datum = ***STH25-RoadwayModel-DATUM***

- Final Marsh Excavation Limits = ***STH25-4thAveSTH25-Corridor-MarshExcSurface***
- Final Marsh Bottom = ***MARSH***
- Final Marsh Waste Limits = Leave Blank
- Rock = Rock
- Final EBS Limits = Leave Blank
- Final Structure Excavation Limits = Leave Blank
- Marsh Excavation Shape = ***STH25-4thAveMarshEx***
- Click OK



Info: Note: A message that not all of the named surfaces have been mapped appears. We know this… Press OK

Info: This loads the Materials List associated with the SLG-4thAve

Info: Note: there can be more than one material list per SLG

2. From ***Sample Line Group Properties – SLG-4thAve*** dialog Material List tab rename the Material List to ***Earthwork-SLG-4thAve***

Create reports

qnty-creat-erthwrk-rpt-10.mp4 7:13

1. Open the Earthwork-STH25.dwg
2. Synchronize Data References
3. Clear Panaroma Events (**Actions > Clear All Events**)
4. **Analyze tab > Volumes and Materials > Volume Report**
5. In report Quantities dialog:
    - Alignment = ***STH25BestFit***
    - Sample Line Group = ***SLG-STH25BestFit***
    - Material list = ***Earthwork-SLG-STH25BestFit***
    - Style sheet = leave as it is
    - Check Display XML Report ON
    - Press Ok
    - If a message 'allow scripts to run' appears, Press Yes
    - Close the HTML Report (the Text Report)
    - From the QuantityReportTempXML.XML Report Select **File > Save As**
        - \12345678\Design\Quantities\EWKDetailReports\EWKDetail-STH25BestFit.xml

Info: Note: this saves the STH25BestFit materials information to a named XML file. We will use this file as input when we create Earthwork Detail Excel work-books.

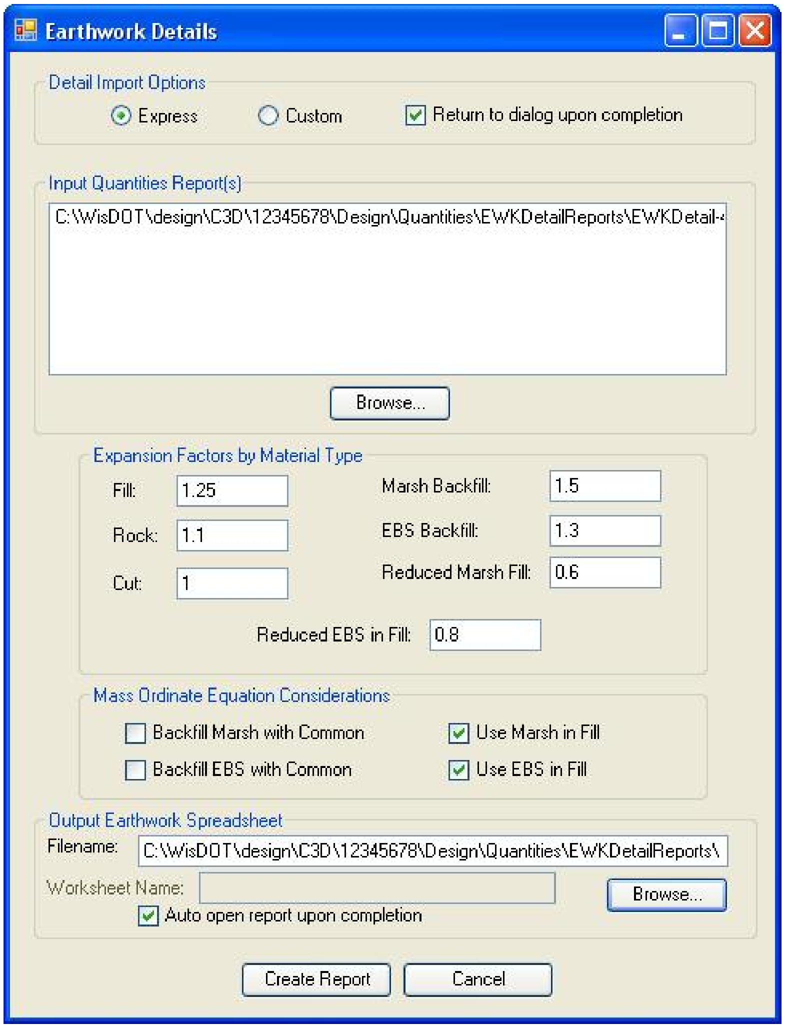
6. **Analyze tab > Volumes and Materials > Volume Report**
7. In report Quantities dialog:
    - Alignment = ***4thAve***
    - Sample Line Group = ***SLG-4thAve***
    - Material list = ***Earthwork-SLG-4thAve***
    - Style sheet = leave as it is
    - Check Display XML Report ON
    - Press Ok
    - If a message 'allow scripts to run' appears, Press Yes
    - Close the HTML Report (the Text Report)

- From the QuantityReportTempXML.XML Report Select **File > Save As**
    - \12345678\Design\Quantities\EWKDetailReports\EWKDetail-4thAve.xml

Create earthwork detail report 1

qnty-creat-erthwrk-rpt-11.mp4 6:37

1. Create the Earthwork Detail workbook for ***STH25BestFit***
    - **Toolbox tab > WisDOT Toolbox > WisDOT Reports > WisDOT Earthwork Detailed**
2. In Earthwork Details dialog box:
    - Detail Import Options = Express
    - Press Browse button
    - Navigate to \Quantities\EWKDetailReports folder, Select EwkDetail-STH25BestFit.XML file
    - Complete Expansion Factors as follows
        - Fill = 1.25
        - Rock = 1.1
        - Cut = 1
        - Marsh Backfill = 1.5
        - EBS Backfill = 1.3
        - Reduced Marsh in Fill = 0.6
        - Reduced EBS in Fill = 0.8
    - Complete Mass Ordinate Considerations as follows
        - Backfill Marsh with Common = do not check
        - Backfill EBS with Common = do not check
        - Use Marsh in Fill = check
        - Use EBS in Fill = check
    - Output Earthwork Spreadsheet
        - Press Browse
        - From Save Report File As dialog
        - Press Create New Folder
        - Folder Name = EWKDetailWorkbooks
        - Select EWKDetailWorkbooks folder
        - File name = EwkDetail-STH25BestFit.XLS
        - Press Save
    - From ***Earthwork Details*** dialog Press Create Report button
    - If Microsoft Excel is Running dialog appears, press Ok
    - When Excel Workbook appears click Cancel for the ***Earthwork Details*** dialog



3. Inspect EwkDetail-STH25BestFit.XLS file

Create earthwork detail report 2

qnty-creat-erthwrk-rpt-12.mp4 12:30

1. Create the Earthwork Detail workbook for 4thAve
   - **Toolbox tab > WisDOT Toolbox > WisDOT Reports > WisDOT Earthwork Detailed**
2. In Earthwork Details dialog box:
   - Detail Import Options = Express
   - Press Browse button
   - Navigate to \Quantities\EWKDetailReports folder, Select EwkDetail-4thAve.XML file

- Complete Expansion Factors as follows
  - Fill = 1.25
  - Rock = 1.1
  - Cut = 1
  - Marsh Backfill = 1.5
  - EBS Backfill = 1.3
  - Reduced Marsh in Fill = 0.6
  - Reduced EBS in Fill = 0.8
- Complete Mass Ordinate Considerations as follows
  - Backfill Marsh with Common = do not check
  - Backfill EBS with Common = do not check
  - Use Marsh in Fill = check
  - Use EBS in Fill = check
- Output Earthwork Spreadsheet
  - Press Browse
  - From Save Report File As dialog
  - Press Create New Folder
  - Folder Name = EWKDetailWorkbooks
  - Select EWKDetailWorkbooks folder
  - File name = EwkDetail-4thAve.XLS
  - Press Save
- From ***Earthwork Details*** dialog Press Create Report button
- If Microsoft Excel is Running dialog appears, press Ok
- When Excel Workbook appears click Cancel for the ***Earthwork Details*** dialog

3. Inspect the EwkDetail-4thAve.XLS file

Create earthwork summary report 1

qnty-creat-erthwrk-rpt-13.mp4 6:42

1. Create a combined Excel Spreadsheet for Earthwork Summary
2. From Windows Explorer:
   - Navigate to \Wisdot\Design\C3D\12345678\Design\Quantities folder
   - Create a New Folder named EarthworkSummaryWorkbooks
3. Open the EWKDetail-STH25BestFit.XLS file
   - Save As Quantities\EarthworkSummaryWokbooks\EwkSummary-STH25-4thAve.XLSx
4. Open the EwkDetail-4thAve.XLSx file
   - Right Click the EwkDetail-4thAve.XML Worksheet
   - Select Move Or Copy
   - Select the To Book = EwkSummary-STH25-4thAve.XLSX

- Select the Before Sheet = EWKDetail-STH25BestFit.XML
- Check the Create a Copy checkbox
- Press Ok
- Close the EwkDetail-4thAve.XLSx file

5. Inspect the EwkSummary-STH25-4thAve.XLSx file

Create earthwork summary report 2

qnty-creat-erthwrk-rpt-14.mp4 6:05

1. Run the Earthwork Summary Macro on the EwkSummary-STH25-4thAve.XLSX file
   - **Toolbox tab > WisDOT Toolbox > WisDOT Reports > WisDOT Earthwork Summary**
2. In the frmEarthworkSummary dialog
   - Summary Sheet Options = Express
   - Summary Sheet Divisions = All Details to one Division
   - Expansion Factors by materials = leave same as when EWK Detail workbooks were created
   - Mass Ordinate Considerations = leave same as when EWK Detail workbooks were created
   - Select Browse for Earthwork Spreadsheet
   - Select EwkSummary-STH25-4thAve.XLSX file
   - Press Open
   - Press Create Report in frmEarthworkSummary dialog

Check earthwork summary

qnty-creat-erthwrk-rpt-15.mp4 15:59

1. Compute Earthwork between surfaces
2. Open Earthwork-STH25.DWG file
3. **Analyze tab > Volumes and Materials > Volumes Dashboard**
4. Click Create Volume Surface:
   - Base Surface = ***STH25-RoadwayModel-Exist***
   - Comparison Surface = ***STH25-RoadwayModel-Datum***
   - This is a check for the Cut and Fill
5. Compare Earthwork comps to ***EwkSummary-STH25-4thAve.XLSX*** quantities

Plan production

Plotting & layouts

Exercise PLPR0305 - printing

Last updated: 2010-07-01

Total video time: 03:43

Printing

plt-lyout-prnt-01.mp4 2:07

Exercise PLPR0350 - Create roll plot

Last updated: 2010-07-01

Total video time: 02:49

Exercise files: plt-lyout-roll-plt-data-C3D14.zip

Create roll plot

plt-lyout-roll-plt-01.mp4 2:49

Exercise DD0100 - Import table on layout

Last updated: 2010-07-01

Total video time: 02:07

Exercise files: plt-lyout-imprt-tbl-lyout-data-C3D10.zip

Import table on layout

plt-lyout-plt-overrides.mp4 2:07

Exercise PR0105 - Create plan & profile sheets w/annotation

Last updated: 2011-07-01

Total video time: 27:46

Exercise files: pln-prod-creat-pp-w-anno-data-C3D10.zip

Create plan and profile sheets with annotation pln-prod-creat-pp-w-anno-01.mp4 2:52

1. Delete project data and download and unzip this exercise.
2. Create plan and profile sheets with annotation
3. Create a sheet set file.
4. **View tab > Palettes panel > Sheet Set Manager** .
5. In Sheet List, right click down arrow,
6. Click New Sheet Set...
    - Create a sheet set using an example sheet set.
    - Click Next.
7. Sheet Set Example
    - Select a sheet set to use as an example:
8. Plan Production.
    - Click Next.

Sheet Set Details

- Name of new sheet set: ***050201***
- Description: ***4th Ave Plan & Prof***
- Store sheet set data file (.dst) here:
    - C:\WisDOT\design\c3d\12345678\SheetsPlan

- Click Sheet Set Properties.
    - Sheet Set Custom Properties
    - County: ***BARRON***
    - Highway: ***STH 25***
    - Project No: ***1234-56-78***
    - Title Plan Profile: ***FOURTH Avenue***
    - Click Ok.
    - Click Next.
    - Click Finish.

Annotate alignments and profile

pln-prod-creat-pp-w-anno-02.mp4 2:11

1. **Toolspace > Prospector tab > Data Shortcuts**right click ***4th Ave*** alignment
2. Click Open Source Drawing..

Tip: Annotate alignments and profile by adding annotation to Description.

3. Right-click on either object and click Properties.
4. Click on the Information tab and enter the annotation in the Description box.

Create Data Shortcuts

pln-prod-creat-pp-w-anno-03.mp4 1:51

1. Save the file.
2. Refresh the data shortcuts
3. **Toolspace > Prospector tab > Data Shortcuts**right click "***4th Ave***.
4. Click Remove..
5. **Data Shortcuts > Create Data Shortcuts**

Create Data Shortcuts dialog

1. Make sure 4th Ave alignment and profiles are checked.
2. Click Ok.
3. Save and close the file.
4. Save new file for Sheets. C:\WisDOT\design\c3d\12345678\SheetsPlan\050201.dwg

XREF topo data into view frame group file

pln-prod-creat-pp-w-anno-04.mp4 2:26

1. Set annotation scale to 1 IN:40 FT.
2. XREF topo data into view frame group file.
3. **Home tab > Layers panel > Freeze**

Create data reference of profile

pln-prod-creat-pp-w-anno-05.mp4 2:52

1. Save the file.
2. Data shortcut 4thAve alignment and profile into view frame file.

Create Alignment Reference dialog...

Toolspace > Prospector tab > Data Shortcuts > right-click 4thAve alignment > Create Reference

- Alignment style: ***ALI Proposed***
- Description: ***F***
- Alignment label set: ***Ticks 100' Major:25' Minor[DESC]***

Toolspace > Prospector tab > Data Shortcuts > right-click 4thAve-Exist > Create Reference.

- Profile style: ***Existing***
- Profile label set: ***_No Labels***

Toolspace > Prospector tab > Data Shortcuts > right-click 4thAve > Create Reference.

On Create Profile Reference dialog...

- Profile style: ***Proposed***
- Profile label set: ***Standard [ALI DESC]***

Info: **NOTE** Profile label set "Standard [PROF DESC]" available for ditch and miscellaneous profiles.

View annotations.

Tip: Do not add profile view. Profile views for layouts are created automatically and managed by ViewFrameGroup.

Add alignment PI labels

pln-prod-creat-pp-w-anno-06.mp4 1:35

1. Save the file.
2. **Annotate tab > Labels & Tables ribbon > Add Labels button (picture, not text to get full dialog box)**
3. Add Labels dialog
    - Feature: ***Alignment***
    - Label type: ***Multiple Tangent Intersections***
    - Tangent intersection label style: ***PI Station[DESC]***
4. Click Add
5. Select the alignment ***4thAve*** in model space.

Create View Frames

pln-prod-creat-pp-w-anno-07.mp4 3:16

Create View Frame Group -

Output tab > Plan Production panel > Create View Frames

Create View Frames - Alignment dialog...

Alignment

- Alignment"***4thAve***
- Station Range ***Automatic***. Click Next.

Sheets

- Sheet Settings: ***Plan and Profile***
- Template: wisdot10-pp40.dwt|PlanProf 1 IN 40 FT
- Click Next

View Frame Group

- Name ***0502 Fourth Ave***
- View Frame Name ***VF - 0502<[Next Counter]>*** and click Next
- Under Match Lines
    - Verify values and click Next
- Click Create View Frames

Modify the station range of Profile Views

pln-prod-creat-pp-w-anno-08.mp4 1:42

1. Save the file.
2. Verify and modify station range of Profile Views to better fit sheets.

Tip: It is much easier to change view frame location prior to creating profile views and sheets.

3. Slide location with diamond grip.
4. Rotate with circle grip.

Create sheets

pln-prod-creat-pp-w-anno-09.mp4 4:39

Create Sheets > Output tab > Plan Production ribbon > Create Sheets button

Create Sheets dialog

- Layout Creation All layouts in the current drawing
- Layout name ***05020<[Next Counter(CP)]>***
- Click Next

Sheet Set

- Sheet Set: Add to existing sheet set: ***0502***
- Click Next.

Profile Views

- Other profile view options Choose settings:
  - Click Profile View Wizard
  - **Create Multiple Profile Views > Profile Display Options**
    - Profile ***4thAve***
      - Layer: ***P_Prof-Base***
      - Style: ***PROF Proposed***
      - Labels: ***Standard [ALI DESC]***
    - Profile ***4thAve-Exist***
      - Layer: ***P_E_PROF***
      - Style: ***PROF Existing***
      - Labels: ***_No Labels***
    - **Create Multiple Profile Views > Data Bands**
      - Select band set: ***Elevation Both (Exist Left, Proposed Right)***
      - Set band properties: Set ***Profile1*** to ***4thAve*** and ***Profile2*** to ***4thAve***
    - Click Finish
- Click Create Sheets

Results

pln-prod-creat-pp-w-anno-10.mp4 4:22

Warning: View Frames automate the creation of sheets, but do not provide a live link to them. Changing view frame location will probably mean re-creating sheets.

Tip: Profile views split at matchline. No overlap. Overlap can be achieved by changing the station range. However, alignment of plan and profile views may not be exact.

Exercise PR0205 - Create cross section sheets

Last updated: 2011-07-01

Total video time: 21:20

Create a sheet set file

pln-prod-creat-xs-01.mp4 3:07

Warning: This exercise should only be used with Civil 3D 2010. An improved workflow for creating cross sections can be found at 190.010

1. Delete project data and download and unzip this exercise.
2. Create plan and profile sheets with annotation
3. Create a sheet set file.
    - **View tab > Palettes panel > Sheet Set Manager icon**
    - In ***Sheet List***, right click down arrow
    - Click New Sheet Set
    - Begin - create a sheet set using an example sheet set.
    - Click Next
    - Click Next
    - Sheet Set Example - Select a sheet set to use as an example: ***planproduction***
    - Click Next.
    - Sheet Set Details
        - Name of new sheet set: ***090101***
        - Description: ***STH 25***
        - Store sheet set data file (.dst) here:
            - C:\WisDOT\design\c3d\12345678\SheetsPlan
        - Click Sheet Set Properties

Sheet set custom properties

pln-prod-creat-xs-02.mp4 2:44

1. **Sheet Set Properties > Sheet Set Custom Properties**
    - County: ***BARRON***
    - Highway: ***STH 2***
    - Project No: ***1234-56-78***
    - Title Cross Section: ***STH 25***
2. Click Ok.
3. Click Next.
4. Click Finish.
5. Right-click the sheet set ***090101***
6. Click Close Sheet Set
7. Open file C:\WisDOT\design\c3d\12345678\SheetsPlan\090101_xs.dwg

XREF corridor

pln-prod-creat-xs-02.mp4 3:56

1. Freeze all unnecessary corridor layers

Tip: This will eliminate a lot of unneeded file space in your plot.

2. **Home tab > Layers panel > Layers Properties icon**
3. Click XREF Corridor-STH25-4thAve.dwg
4. Select layers **Corridor-STH25-4thAve|P_XS-Base** and **Corridor-STH25-4thAve|P_XS_Text**
5. Right-click and click Invert Selection
6. Click Freeze Column to freeze for the rest of the layers
7. Close ***Layer Properties*** dialog

Create cross section layouts with a Map Book part 1

pln-prod-creat-xs-04.mp4 3:54

1. type **MAPWSPACE** Enter
2. Select On.
3. Click on the Map Book tab.
4. Click New.
5. Click New Map Book.
6. Create Map Book dialog
   - Source: ***Model Space***
   - Book Name: ***xs***
   - **Sheet Template > Settings**
   - Choose a Sheet Template: C:\Documents and Settings\%username%\Local Settings\Application Data\Autodesk\C3D 2010\enu\Template\USWI\planproduction\xsection\wisdot10-xs20h-20v.dwt
   - Choose a Layout: ***X-Section 1 IN 20 FT Horiz 20 FT Vert***
   - Layout Options:
     - Uncheck the two Includes.
     - Set the Scale Factor: 20

Tip: This number should always match the scale of the sheet template.

Create cross section layouts with a Map Book part 2

pln-prod-creat-xs-05.mp4 3:34

Tiling Scheme > ...By Number

1. Click Pick Upper Left >>.
2. Snap and click on the top left corner of the first cross section sheet.
3. Count the number of rows and columns (sheets).
   - Columns: 10
   - Rows: 1
   - % overlap of each tile: 0

- Naming Scheme: Columns and Rows.
- Rows: Leave the defaults.
- Columns: Change the ***Start with*** and ***Increment by*** both to 1
- Key and Legend: Leave set to ***None***

4. **Sheet Set > Create New Subset**
5. Choose Sheet Set file: C-WisDOT-design-c3d-12345678-SheetsPlan-090101.dst
6. Position new subset: Can be left as is or changed to user preference.
7. Click Preview Tiles >>.

Info: The dialog will disappear and show dashed lines around the area to become sheets. If you zoom or pan, the dashed lines will disappear, key-in [r] to refresh them. Press Enter to return to the map book dialog. If your tile preview was not correct, make the necessary changes in the dialog until it previews correctly.

8. Click Generate
9. Save the file.

Editing Map Book settings for cross-sections

pln-prod-creat-xs-06.mp4 4:05

1. If there were any errors made when creating the cross-sections or if changes need to be made, access the map book by:
2. **Map Task Pane > Map Book** .
3. Right-click the map book ***xs***
4. Click Edit Settings and Rebuild.

Tip: Changes can then be made in any of the settings and the layouts and Sheet Set can be regenerated.

Title sheet

Last updated: 2013-04-10

Total video time: 59:05

pln-prod-ts.pdf

Starting a title sheet

pln-prod-ts-01.mp4 5:24

Info: *Note* - This exercise creates a new file in a project folder. There are no connections to this file and the rest of the project, so an exercise project dataset is not included. Save the file in an existing training project.

1. **Menu Browser > New**
2. **USWI > PlanProduction > Title**
3. wisdot12-SHT10.dwt

Save the started file to the proper directory

1. **Menu Browser > Save As**
2. **Project Folder > SheetsPlan**
3. Name the title sheet 010101_ti.dwg

Attaching a location sketch

pln-prod-ts-02.mp4 14:40

Attach as an External Reference (XREF)

Most common file types

- DWG
- DGN
- PDF

Need to scale DGNs and PDFs

Hide/Display Model/Layout tabs

1. Right-click on tabs to hide layout tabs
2. Right-click on the model

Attaching a PDF in Modelspace

1. This method will work for PDF, DGN or DWG XREFs
2. **Insert tab > Reference panel > Attach**
3. In XREF Manager click Attach button drop down.-
4. Choose Attach PDF.
5. Project folder\BaseData\Mapping\Orig\Chippewa.pdf.
    - Clear the Specify on screen option for Insertion Point
    - Clear the Specify on screen option for scale
    - Clear the Specify on screen for Rotation
    - Path Type should be Relative Path

Scaling the XREF

Scale command

1. **Home tab > Modify panel > Scale**
2. Select the XREF
3. Base Point is 0,0
    - Reference option in the scale command
        - type **SCALE** Enter
        - Assign the base point location
        - Type **V** Enter
        - Find the bar scale (or some known quantity of distance) on the XREF
        - Snap to the first point, then second point to graphically identify the reference length
        - Type in the distance that the reference points were supposed to be

Tip: Enter this in feet, so for a mile you would type 5280.

5. Zoom Extents to see the scaled XREF. Double check distances.

Change the color of the XREF to monochrome

1. Select on the edge of the XREF.
2. **Context ribbon > Adjust panel > Monochrome** .

Title sheet refinement

pln-prod-ts-03.mp4 18:01

1. Setting the attached sketch in the layout tab viewport.
2. Adding Begin/End Project Notes and Project indications in the sketch area.

Setting the sketch in the layout viewport

1. Switch to the layout tab.
2. Activate the viewport by double clicking inside the viewport.
3. Unlock the viewport - click the small padlock icon next to the viewport scale list.
4. Inside the active and unlocked viewport double click to zoom extents.

Creating a scale for the viewport

1. If the scale of the sketch area does not exist select on the scale list and choose Custom.
2. Type in the appropriate name of the scale. Example: `1" = 1/2MI`
3. Paper Units should be 1 unit
4. Drawing Units should be 2140 (for half mile in feet).

5. In the scale list select that new scale.
6. Inside the active viewport pan to the where the location sketch should display.
7. Lock the viewport. Next to the scale list, click the padlock icon.

Set the titleblock notes per project information titleblock multiline text

Info: The scale information in the titleblock is MTEXT (multiline text).

1. Double click on the text to edit it.
2. Enter the correct distance. Example `1/2` (the MI is already there).
3. Double click on the Total Length...text to edit.
4. Enter the length of your project.

Titleblock attribute text

1. Double click on any part of the titleblock block. This opens the Enhanced Attribute Editor to access the attributes associated with the titleblock.
2. Enter the Values for the appropriate fields.

Placing markings on the location sketch

Placing Begin/End Project multileader text

1. **Annotate tab > Leaders panel > Multileader drop down**.
2. Choose **Begin End Project** to choose that style.
3. Change the active layer to the layer that the notes should be on
4. In the Layer Manager pull-down select P_MISC.
5. **Home tab > Leader panel > Multileader** .
6. Select first where the arrowhead should be.
7. Select second where the beginning of the text should be.
8. Type the proper note, `BEGIN PROJECT STA. 99+00`.
   - Click outside the text box to end typing.
9. Set the End Project location. `END PROJECT STA. 102+50`.
   - Click outside the text box to end typing.

Placing project location line

Tip: Make sure you are in Paperspace, not working through the viewport in Modelspace.

1. Check the status bar for the Model/Paper toggle reads Paper. If it does not click the Model button and it switches to Paper.
2. Start the polyline command and draw in where the project road location is.
3. **Home tab > Modify panel pull-down > Edit Polyline.**
4. Choose W for width and set the polyline width to something appropriate for the scale of the location sketch. In this example the width was .25.

Title sheet finishing touches

pln-prod-ts-04.mp4 15:33

Editing the viewport information.

1. Double click inside the viewport to activate it.
2. Click the padlock icon next to the scale list to unlock the viewport for scaling and panning.
3. Select the scale list and choose a new scale.
4. Pan as necessary. You may need to select the scale again to ensure this was not "bumped" during the panning.
5. Lock the viewport with the padlock next to the scale list.
6. Zooming in now will hold the viewport scale but allow you to see the page closer.
7. Delete the original polyline that marks the project road location.
8. Redraw the polyline and set the width to something appropriate to the new sketch scale.
9. Move the Begin/End Project notes to the new locations.
10. Double click on the Begin and End Project MTEXT to edit the location stations and other details.
11. Edit any titleblock information that may have changed due to the changes in the project. Double click on the titleblock to access the Enhanced Attribute Editor.

Placing Town-Range numbers at sketch margins

Placing the town line marker

1. Find where the section corners are located in the sketch.
2. Start the line command
3. **Home tab of the ribbon - Draw panel - Line command - Create Line icon** OR type L or LINE at the command line
4. You can turn on the ORTHO function by typing <F8> to keep the line straight to the cardinal directions.
5. Draw a line of appropriate length near the location sketch viewport.

Placing the town text

1. **Annotate tab of the ribbon > Multiline text** (or type MTEXT)
2. vPlace a text window near the Town-Range line.
3. vIn the text editor ribbon select the 120 scale text style.
4. vFrom the text editor ribbon select the Justification tool and choose MC for middle center.
5. vIn the text box type the Town numbers: `T-10-W T-9-W`.
6. vClick outside the text box to end the typing

Move the town text and line to the proper location

1. Select on the text, select the middle grip point and snap it to the midpoint of the Town line.
2. Copy the text and town line to the next town corner location.
3. Double click the text to edit the contents for the next town: `T-9-W T-8-W`.

Copy town text to create range text

1. Copy the Town text and line near where the Range corner is located.
2. Rotate the Range text using -90 as the angle.
3. Use the MOVE command to move the line and range text into its proper location.
4. Double click the range text and type in the range information: `R-29-N R-28-N`
5. Copy the range text to the next range corner.

Copy Town and Range text to other side of location sketch

1. Copy the range text and lines to the other side of the location sketch.
2. Use the MOVE command to refine the location of both.
3. Copy the Town text and lines to the other side of the location sketch.
4. Use the Move command to refine the text and line location.

Change the name of the layout tab

1. Double click on the layout tab text to edit.
2. Type the new name of the tab.

Plotting the title sheet as a single page.

1. Plotting a single page
2. You can right-click on the layout tab and choose plot.
   - Or you could go to the Quick Access Toolbar and choose the plot icon.
3. In the Plot dialog:
   - Make sure the plotter is set to WisDOT PDF.pc3
   - Make sure that the paper size is set correctly
   - Make sure the plot area is set to Layout
   - Make sure the scale is set to 1:1
   - Make sure the Pen Style Table is set to WisDOT gshade (for greyscale) or wisdot monochrome (for black/white plotting).Make sure the plot with linetypes and plot styles are turned on

Requirement: When you click plot you will choose a location for where the PDF file is to be saved. This should be in the project SheetsPlan folder.

5. Click the preview button to double check how the plot will look.
6. Check the preview for the edges of the titleblock fitting on the page, text location, color, general readability.

7. You can zoom and pan inside the plot preview.
8. You can choose the plot icon from the preview or click the X to close the preview and return to the plot dialog.

Adding the title sheet to the sheet set manager

pln-prod-ts-05.mp4 5:27

Opening the sheet set manager

1. **Home tab > Palettes panel pull-down > Sheet Set** (Or type **SSM** at the command line).
2. In the Sheet Set Manager tool palette, at the top click Open drop down.
    - Click Open
    - Browse to ProjectID\SheetsPlan\planproduction.dst

Create a subset in the project

1. Right-click on the title of the project.
2. Choose Create New Subset
3. Name the subset name **Title Sheet**

Adding a layout tab to the sheet set manager.

1. In the Sheet Set Manager right-click on the title of the project (or the name of the appropriate subset)
2. Choose Import Layout as Sheet.
3. Browse to the file location and select the file.

    Tip: Or with the sheet set manager open right-click on the layout tab and choose Import Layout as Sheet

5. Check mark the appropriate layout tabs from the drawing(s) you are adding.
6. Check that the layout tabs you are adding do not have a status that this drawing is already in another sheet set.

Plotting or publishing from sheet set manager

Tip: You can plot individual sheets from the sheet set manager,

1. Right click on a subset or the project name and choose **Publish > Publish to PDF** .
2. Or publish groupings of pages by right clicking on a subset or the project name and choose **Publish > Publish to PDF** . This will create a multipage PDF file.

Construction detail sheet

Last updated: 2013-05-03

Total video time: 82:06

Exercise files: pln-prod-data-C3D10.zip

Starting a construction detail drawing

pln-prod-cnst-dtl-01.mp4 9:37

Create a new file

Create a new file using wisdot12.dwt

Add drafting guidelines and “viewframes”

1. Make sure you are on the Model tab.
2. **Insert tab > Block panel > Insert** .
3. Select 021000_cd.dwg.
    - Clear the check boxes for Insertion Point, Scale and Rotation.
    - Place a check mark next to Explode.

Tip: There are sample construction details in the upper left and pre-set view blocks for you to place your details in. Do not remove or delete the view outlines.

Overview of DesignCenter

Info: DesignCenter is a tool we will use extensively in this module. DesignCenter is a tool that will allow you to move items from a source drawing to your current drawing.

Many types of base ACAD elements can be moved between drawings using DesignCenter:

- Blocks
- Text Styles
- Annotation Styles
- Layout tabs
- Table Styles
- Layers
- Multileader Styles
- Linetypes

How Design Center works

Info: DesignCenter acts like a special version of Windows Explorer. On the left, you will see drives, folders and files that you can browse to. What makes Design

Center different is that it will only show you AutoCAD DWG and DWT files. Once you find the file you are looking for, you can browse into the file to view blocks, layers, layouts, etc.

Create a favorites list in Design Center

Tip: Since some files will be difficult to locate, you can add paths to the favorites list.

Right-click the directory you wish to add, and select Add to favorites.

Info: In this module we will use DesignCenter to select blocks representing construction details and layouts.

Add layout tabs

1. Open DesignCenter
2. Drag & drop layout tabs into new file from 021001_cd.dwg.

Tip: You can drag and drop all needed layouts at once, but it will take longer to drag and drop. If you drag multiple sheets at once, BE PATIENT!

3. Save as 021001_cd.dwg in the SheetsPlan directory.

Review of base AutoCAD commands

pln-prod-cnst-dtl-02.mp4 28:10

Always draw and dimension in modelspace at full size.

Preparing to draw

1. Continue working from the drawing you started in exercise 150-090-001.
2. Set your current layer to P_MISC_CONSTD
3. Set your annotative scale to 1IN:10FT

Text

1. On the **Annotate Tab > Text Panel**, set the current text style to 175.
2. Click the Multiline Text tool.

Tip: Create an imaginary rectangle representing the text box. It doesn’t matter exactly where you place this, as we will position it in a later step.

3. In the Text Editor Contextual tab:
    - Turn on the Underline formatting.
    - Set the Justification to Top Center.
    - Key-in BOX CULVERT GRATE DETAIL
4. Click Close Text Editor to complete the command.(Do not press escape.)
5. Use Properties to set the lineweight to 0.35.
6. Use the Midpoint Object snap (OSNAP) to place the text centered at the bottom of the box culvert.

Info: The object you are about to draw is a simple shape. However, because this is a construction detail, there are several “rules” that we will break. For example, all of the objects, hatching and text will go on the same layer. You will use the Properties to change linetypes and lineweight when needed.

7. **Home tab > Draw Panel > Rectangle** .
8. Click inside one of the “viewframes” to activate it.
9. Key-in 6.5, 6.5.

Info: Because you have dynamic input on, this will draw a rectangle that is 6.5 x 6.5 (if you did not have dynamic input turned on, you would need to key in @6.5,6.5 otherwise, AutoCAD interprets the input as going to the coordinate 6.5, 6.5)

10. **Home tab > Modify panel > Offset**.
11. Type **1** Enter.
12. Select the rectangle you just created.
13. Click inside the rectangle.
14. Click Esc.
15. **Home tab > Draw panel > Hatch**.
    - Set the pattern to AR-CONC.
    - Set the scale to 0.1
16. Click in the area formed between the two rectangles.
17. Click Esc .
18. **Home tab > Draw panel > Offset**.
19. Offset the outside line 0.5’ to the inside.
20. Click Esc .
21. Select the new line and right-click.
22. Click Properties from the right-click menu.
    - Change the lineweight from “Bylayer” to 0.40 mm.

Tip: Verify that you have polar tracking turned on, since you will need it to change the shape of the new thick rectangle.

23. Click the skinny grip at the center-bottom of the polyline.
24. Push straight up until you see the green polar tracking line.

25. Type **17** Enter
26. On the **Home tab > Modify panel** .,
27. Click Enter
28. Explode.
29. **Home tab > Modify panel > Offset**.
30. Offset the horizontal lines 0.5’ from bottom to top.

Tip: Hint: Use the Multiple option in the offset command to save clicks as you copy the lines for the grate.

31. **Home tab > Draw panel > Offset**.
32. Offset one of the vertical bars 2.75’
33. Select all of the inside bars for the grate.

Info: There should be 9 lines selected in total.

- Open AutoCAD properties if you closed it earlier.
- Change the lineweight to 0.30 mm.
- Click Esc .

Multileaders

1. On the **Annotate tab > Leaders panel** , verify that 140 DOT is the active style.
2. **Annotate tab > Leaders panel > Multileader**
3. Click to place the first multileader at the outer grate (one of the thicker lines).
4. Click a second time to set the landing location.
5. Type `1" ⌀ STANDARD PIPE FRAME OR 1" ROD`

Tip: Use the symbol menu in the Text Editor to get the diameter symbol to appear.

6. Click Close Text Editor to complete the multileader.
7. **Annotate tab > Leaders panel > Multileader**
8. Click to place the arrowhead near one of the thinner, inner grate lines.
9. Click a second time to set the landing location.
10. Type `0.8" ⌀ STANDARD PIPE 6” O.C` .

Tip: Use the symbol menu in the Text Editor to get the diameter symbol to appear.

11. Click Close Text Editor to complete the multileader.
12. Add a leader.

Dimensioning

1. Set the current dimension style to Plat_Bearing.
2. Add dimensions to the top and sides of the culvert.

Getting started

pln-prod-cnst-dtl-03.mp4 13:31

Info: If you successfully completed the previous exercises, continue working from the drawing you started in exercise 150-090-001. Otherwise, open up the file 021001_cd.dwg from your class files.

1. Verify your drawing settings before continuing:
   - Set your current layer to P_MISC_CONSTD
   - Set your annotative scale to 1IN:10FT

Open Design Center

1. Open Design Center

Tip: HINT: You can type DC <enter>at the command line or click the icon from the Home tab > Palettes panel.

2. On the left side of DesignCenter, browse to the following path:
   - On Windows 7: C:\ProgramData\Autodesk\C3D 2012\enu\Data\Symbols\USWI\Construction Details
   - On Windows XP: C:\Documents and Settings\All User\Application Data\Autodesk\C3D 2012\enu\Data\Symbols\USWI\Construction Details
3. Once you have located the Construction Details folder, right-click and select Add to Favorites so will not have to browse to this location in the future.

File name type of details

Cdbemgrd12.dwg Beam guards and related details

Cdcrbgtr.dwg Curb and gutter, transition details

Cddrnage12.dwg Drainage, culverts

Cdexcgrd12.dwg Excavation and grading

Cdinlman12.dwg Inlets, manholes

Cdintshl12.dwg Rumble strips, shoulders, cul-de-sac and intersections

Cdislmed12.dwg Islands, medians

Cdjoints12.dwg Pavement joints

Cdmisc12.dwg Anchor bolts, demolition

Cdtraffc12.dwg Traffic control

Cdtyps12.dwg Common typical sections

Cdwldvrl12.dwg Driveway details, concrete steps

Cddrnage12.dwg

4. Highlight the Blocks category.
5. Highlight block named 10.
6. The preview will show and the description indicates that this is an end grate for a pipe.
7. Drag block 10 into the drawing.
8. Close DesignCenter.

Placement & scaling

1. Next you will need to make sure that the size of the detail is in line with your desired plotting scale.
2. If it is not already inside the first “viewframe”, use the grip to position the new block.
3. Start the scale command from **Home tab > Modify panel** .
4. Use a base point that is anywhere on the block.
5. Scale the block up by typing **9** Enter.
6. Reposition the block if needed.
7. Save the drawing.

Work with layout tabs

pln-prod-cnst-dtl-04.mp4 16:12

Info: If you successfully completed the previous exercises, continue working from the drawing. Otherwise, open up the file 021001b_CD.dwg from your class files.

1. Verify your drawing settings before continuing:
    - Set your current layer to P_MISC_CONSTD
    - Set your annotative scale to 1IN:10FT
2. Switch to the layout tab labeled 021001_CD.
3. Double click the text items to modify titleblock information..
4. Set the Project Number to 1234-56-78
5. Set the HWY to USH 51
6. Set the County to Sauk

Single Sheet Plot

1. Right-click the layout tab and select Plot…
2. Click Preview
3. Save and close the drawing.

Sheetset Manager vs Publish command plot/print

pln-prod-cnst-dtl-05.mp4 14:36

Info: The terms “plot” and “print” are used interchangeably throughout AutoCAD lingo. The Plot and Print commands usually refer to creating a single, “one-off” print from either modelspace or from a layout. If you had many pages to print, this would be extremely tedious!

Warning: Neither Sheet Set Manager nor the Publish command will plot multiple pages at once. In both cases, you have the ability to print directly to a printer, or PDF file.

Always print to PDF first

Printing to a PDF file is your best option for several reasons:

- If something is incorrect on the page or the plot, the PDF will reflect the problem. You will save paper and ink by catching problems in the PDF!
- Creating a PDF is much quicker than plotting to a printer.
- Creating a PDF is less likely to cause performance or crashing issues.

Sheetset/Publish

The advantage of the Sheetset manager is that the listing of related pages is saved to a DST file. Ideally, all layouts related to a project will get added to the sheetset manager for that file. For example, for a completed project cross-sections, profiles, construction details and typical sections can all be seen in the sheet set listing.

Additional plotting information

1. Open the file 021001c_CD.dwg.

Info: Even if you have completed previous exercises, additional tabs have been set up for you to experiment with.

2. Type **SSM**Enter
3. Click the sheetset manager pulldown and select Open.
4. Browse to the SheetsPlan folder and select PlanProduction.dst.
5. The top of the sheetset manager should show the name of the sheetset as ProjectSheetData.
6. Right-click the tab and select Import Layout as Sheet

Working with multiple layout tabs

1. Select the tab 021001_CD.
2. Hold Shift while selecting 021006_CD.

Tip: Even though it is very subtle, all 6 tabs will be selected.

3. Right-click on one of the tabs and select Add Layout to Sheet.
4. Click Import Checked.

Info: Similar to the previous exercise all sheets will be added to the sheetset manager.

5. Right-click the tabs again.
6. Select Publish Selected Layouts.

Typical section sheet

Last updated: 2013-05-03

Total video time: mm:ss

pln-prod-ts.doc

Starting a typical section drawing

pln-prod-typ-sctn-01.mp4 9:12

Create a new file

Create a new file using wisdot12.dwt

Add drafting guidelines and "viewframes"

1. Make sure you are on the model tab.
2. **Insert tab > Block panel > Insert** .
    - C:\ProgramData\Autodesk\C3D 2012\enu\Data\Symbols\USWI\plansht\020300_ts.dwg
    - Clear the checkboxes for Insertion Point, Scale and Rotation
    - Place a checkmark next to Explode (as shown)

Info: This is how your file should look. There are sample typical sections in the upper left and pre-set view blocks for you to place your details in. Do not remove or delete the view outlines.

Overview of Design Center

Info: Design Center is a tool we will use extensively in this module. Design Center is a tool that will allow you to move items from a source drawing to your current drawing.

Many types of base ACAD elements can be moved between drawings using Design Center:

- Blocks
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- Linetypes

How Design Center works

Info: Design Center acts like a special version of Windows Explorer. On the left, you will see drives, folders and files that you can browse to. What makes Design Center different is that it will only show you AutoCAD DWG and DWT files. Once you find the file you are looking for, you can browse into the file to view blocks, layers, layouts, etc.

Create a favorites list in Design Center

Tip: Since some files will be difficult to locate, you can add paths to the favorites list.

1. Right-click the directory you wish to add.
2. Select Add to Favorites.
3. In this module we will use Design Center to select blocks representing typical sections and layouts.

Add layout tabs

1. Open Design Center.
2. Drag & drop layout tabs into new file from 020300_ts.dwg.

Tip: You can drag and drop all needed layouts at once, but it will take longer to drag and drop. If you drag multiple sheets at once, BE PATIENT!

3. Save as 020301_ts.dwg in the SheetsPlan directory.

Drawing a typical section "from scratch"

pln-prod-typ-sctn-02.mp4 14:17

Review of base AutoCAD commands

Always draw and dimension in modelspace at full size.

Preparing to draw

1. Continue working from the drawing you started in exercise 150-100-001.
2. Set your current layer to **P_MISC_TYPS** or **P_MISC_TYPS_Dashed** or **E_MISC_TYPS** as appropriate.
3. Set your annotative scale to 1IN:10FT

   Tip: On the Status Bar, turn on tools that will help you draft. You will want Object Snaps, Object Snap Tracking and Dynamic Input. Polar tracking may get in the way, so you can turn that off.

5. Check which object snaps you have active before proceeding. To draw a typical section some particularly helpful osnaps will be:
   - Endpoint
   - Extension
   - Intersection
6. Base AutoCAD commands you will use in this section:
   - Line/Polyline
   - Offset
   - Trim/Extend
   - Mirror
   - Hatch
   - Circle
   - Dimensioning
   - Multileaders

Drawing lines at a specific length & angle

Tip: There are no tools built into base AutoCAD that will allow you to draw using a length and a percent slope or length and run:rise value. Therefore we need to remember some quick math to get our change in Y value.

1. Given length (L) and percent slope (P): $\Delta Y = L*P$
2. For example, a 12’ lane at 2% would be 12’*0.02 = 0.24’ Given length (L) and run:rise value: $\Delta Y = L/Run$
3. For example, a 5’ shoulder at 4:1 would be 5’/4 = 1.25’

Use dynamic input!

Tip: Once you know the change in elevation and the length, you can easily key this into AutoCAD. Use Dynamic Input to ensure that the numbers you enter are relative to the first click of your lines.

Info: Decide on your start location and try to utilize the CAD tools as efficiently as possible.

1. Turn on Dynamic Input.
2. **Home tab > Draw panel > Line > Create Line**
3. Click inside the first rectangle representing the "view frame".
4. Type `12,0.24` Enter

   Info: You should now have a lane 12' in length at a 2% slope.

6. Click F8
7. Draw a line 3 units long going straight down.

   Tip: Our lane really won't be 3' thick - but we will use this line as a construction line.

9. Click Enter
10. Click F8
11. **Home tab > Modify panel > Offset** .
12. Type `0.5` Enter
13. Click the 12' line.
14. Click below to place the offset.
15. **Home tab > Modify panel > Offset** .
16. Type `0.5` Enter .
17. Click the copied 12' line.
18. Click below to place the offset.
19. Click Esc .
20. **Home tab > Modify panel > Offset** .
21. Type `1` Enter.
22. Click the lowest line and offset it down 1'
23. Click Esc.
24. **Home tab > Modify panel > Copy** .
25. Use the endpoint snap at the top of the vertical line,

    Info: On each end, there are pieces that need cleaning up.

26. Copy the line to the west end of the lane.
27. **Home tab > Modify panel > Trim** .
28. Click Enter to use every line as a "cutting edge".
29. Zoom into the right side of the lane and trim back the three lines that overhang.

30. Click and hold Shift while selecting the left ends of the lines.

Tip: Shift will cause the trim to act as an Extend tool.

31. Release Shift and the vertical lines to remove.
32. **Home tab > Modify panel > Mirror** .
33. Select all of the lines comprising the lane.
34. Click Enter
35. Establish the mirror line:
    - Snap to the crown of the road
    - Snap to the bottom of the vertical line
36. Click Enter to confirm that you do not want to delete the source objects.

Info: Using similar techniques as you used to create the lane, draw the top part of the shoulder as shown here.

Tip: Don't add dimensioning just yet. The dimensions shown here are just to give you the geometry that you need to draw.

Tip: We will add the drain later on.

Tip: Remember that to go to the left and down, you will need to key-in negative numbers.

Tip: Another good trick to know if that you can divide right in the text field (as long as you use Dynamic input).

Tip: Use the Extend command to extend the base and subbase to the 4:1 slope.

5. Start by drawing the drain off to the side.
6. Draw a 1.25x4' rectangle (use dynamic input).
7. Turn on MID OSNAP.
8. **Home tab > Draw panel > Circle** .
9. Place the circle 0.75' from the bottom center of the drain.
10. Type `0.33`Enter (radius of the drain pipe).
11. **Home tab > Modify panel > Offset**
12. Type **2**Enter
13. Select the left vertical line.
14. Click to the left of the vertical line.
15. Move the drain into place using the Move command.
16. Use the line that you offset in the previous step to locate the drain in the correct position.

17. **Insert tab > Insert** .
    - vBrowse to block TYPE-A 30in
    - vTurn Insertion Point On-Screen to ON
    - vScale = 1
    - vRotation = 0
    - vExplode = OFF
18. Click Ok
19. Insert the block at the right edge of the lane.
20. **Home tab > Modify panel > Mirror** to copy the underdrain to the right side of the road.

    Tip: Use the crown of the road with a vertical mirror line to place the drain.

21. Delete the vertical construction lines.
22. Use the Trim/Extend command to clean up the underdrain with the base course.
23. Use the line tool and rectangle tool to draw a line representing the slope intercept to earth.

    Tip: Both the line and the rectangle can be “eyeballed” in, i.e. no specific length or size is needed for these shapes.

24. **Home tab > Draw panel > Hatch**
    - Use a SOLID hatch to fill in the asphalt
    - Use the GRAVEL hatch at 0.5 scale to fill in the base and underdrain area
    - Use the DOTS pattern at 5 scale. in the subbase area
    - Use the EARTH hatch pattern, using a 45 degree angle with a scale of 2, in the rectangle you created
    - Draw a final line 10’ in length at a 2% slope to the right

Drawing a typical section “from scratch” continued

pln-prod-typ-sctn-03.mp4 17:04

Dimension the assembly.

Dimensioning

1. Verify the annotation scale is 1IN:10FT.
2. **Annotate tab > Dimension panel > Dimension Style drop-down** .
3. Set the current dimension style to Plan_Bearing.
4. Set the layer to P_MISC_TYPS
5. **Annotate tab > Dimension panel > Linear** .
6. Add a dimension to the newest line on the right.
7. Place the dimension line approximately 7 feet above the typical section.

    Tip: The first and second clicks establish the measurement, so be sure to

> use the endpoint snap to place this.

> **Tip:** The third click establishes the dimension line location above the object.

10. **Annotate tab > Dimension panel > Continue**
11. Working right to left add dimensions by snapping to each endpoint.

> **Tip:** The continue command will automatically measure from the previous dimension and line up the dimension lines.

13. Click Esc when complete.
14. Use the grips that appear when selecting dimensions to reposition the text on the shorter segments.

Dimension overrides

Civil 3D annotation

1. **Annotate tab > Add Labels > Line and Curve** .
2. Set the Label type to Single Segment
3. Set the Line Label Style to Cross Section Slope only.
4. Click Add.
5. Click along the median, roadway and shoulder top to place slope labels.
6. Click Esc when complete.
7. Change the Line Label style to Cross Section Run:Rise Label (no arrow).
8. Add labels to the steep part of the shoulder and the line leading out of the ditch.
9. Click Esc when complete.

Modifying Civil 3D text

1. Click the label on the far left.
2. **Context tab > Edit Label Text** .
3. Click the label again.
4. Clear the text and replace it with VARIES.
5. Click Ok.
6. Click Esc to clear the selection.

Finishing touches and multileaders

1. Select all of the text, dimensions, lines, hatching and everything else that is part of your typical section.
2. **Home tab > Modify panel > Mirror**
3. Mirror the typical section across the median.
4. Set the Multileader style to 140 DOT (that is the minimum acceptable text style size).
5. Add the text.

6. If any of the finished typical section goes outside of the view rectangle, use the move command to relocate it.

> **Tip:** Alternately, you could adjust the text editor width to create a hard return. This shortens the width of the text box, and puts text on a second line.

8. Place multileader text just below the median.
9. Click on the text to see the leader grips.
10. Hover over the landing leader grip to expose the control tooltip.
11. Select the Add Leader option from the control tooltip.
12. Add a leader to the other side of the median.
13. Save the drawing.

Using a typical section from Design Center

pln-prod-typ-sctn-04.mp4 22:01

Getting started

1. If you successfully completed the previous exercises, continue working from the drawing you started in exercise 150-100-001. Otherwise, open up the file 020301c_CD.dwg from your class files.
2. Verify your drawing settings before continuing:
3. Set your current layer to **P_MISC_TYPS**
4. Set your annotative scale to 1IN:10FT

Open Design Center

1. Open Design Center.

> **Tip:** You can type DC <enter>at the command line or click the icon from the Home tab > Palettes panel.

2. On the left side of Design Center, browse to the following path:
   - On Windows 7: C:\ProgramData\Autodesk\C3D 2012\enu\Data\Symbols\USWI\Construction Details
   - On Windows XP: C:\Documents and Settings\All User\Application Data\Autodesk\C3D 2012\enu\Data\Symbols\USWI\Construction Details

> **Tip:** Once you have located the Construction Details folder, right-click and select Add to Favorites so will not have to browse to this location in the future.

File name type of details

Cdbemgrd12.dwg Beam guards and related details

Cdcrbgtr.dwg Curb and gutter, transition details

Cddrnage12.dwg Drainage, culverts

Cdexcgrd12.dwg Excavation and grading

Cdinlman12.dwg Inlets, manholes

Cdintshl12.dwg Rumble strips, shoulders, cul-de-sac and intersections

Cdislmed12.dwg Islands, medians

Cdjoints12.dwg Pavement joints

Cdmisc12.dwg Anchor bolts, demolition

Cdtraffc12.dwg Traffic control

Cdtyps12.dwg Common typical sections

Cdwldvrl12.dwg Driveway details, concrete steps

3. Locate the drawing Cdtyps12.dwg.
4. Highlight the Blocks category.
5. Highlight block named 9.
6. The preview will show and the description indicates that this is 4 Lne Urban with parking.
7. Drag block 9 into the drawing.
8. Close Design Center.

Placement & scaling

Info: Next you will need to make sure that the size of the detail is in line with your desired plotting scale.

1. Use the grip to position the new block.
2. **Home tab > Modify panel > Scale** .
3. Use a base point that is anywhere on the block.
4. Type in R for reference.
5. Click the length between the driving lanes.

   Tip: These two clicks establish the current length.

7. Type **12** Enter as the new length.
8. Reposition the block if needed.
9. Explode and edit text as needed.
10. Save the drawing.

Layout preparation

pln-prod-typ-sctn-05.mp4 21:24

Work with layout tabs

1. If you successfully completed the previous exercises, continue working from the drawing. Otherwise, open up the file 020301d_TS.dwg from your class files.
2. Verify your drawing settings before continuing:
   - Set your current layer to **P_MISC_TYPS**
   - Set your annotative scale to 1IN:10FT
3. Switch to the layout tab labeled 020301_TS.
4. Double click the text items to modify titleblock information.
   - Set the Project Number to 1234-56-78
   - Set the HWY to USH 51
   - Set the County to Sauk

Single sheet plot

1. Right-click the layout tab and select Plot…
2. Save and close the drawing.

Plotting

pln-prod-typ-sctn-06.mp4 13:50

Sheetset Manager vs Publish command

Plot/Print

Info: The terms "plot" and "print" are used interchangeably throughout AutoCAD lingo. The Plot and Print commands usually refer to creating a single, "one-off" print from either modelspace or from a layout. If you had many pages to print, this would be extremely tedious!

Info: Both Sheet Set Manager and the Publish command will plot multiple pages at once. In both cases, you have the ability to print directly to a printer, or PDF file.

Always Print to PDF first

1. Printing to a PDF file is your best option for several reasons:
   - If something is incorrect on the page or the plot, the PDF will reflect the problem. You will save paper and ink by catching problems in the PDF!
   - Creating a PDF is much quicker than plotting to a printer.
   - Creating a PDF is less likely to cause performance or crashing issues.

Sheetset/Publish

Info: The advantage of the Sheetset manager is that the listing of related pages is saved to a DST file. Ideally, all layouts related to a project will get added to the sheetset manager for that file. For example, for a completed project cross-sections, profiles, construction details and typical sections can all be seen in the sheet set listing.

Additional plotting information

1. Open the file 020301d_CD.dwg. Even if you have completed previous exercises, additional tabs have been set up for you to experiment with.
2. Type **SSM**Enter
3. Click the sheet set manager pull-down and Click Open.
4. Browse to the SheetsPlan folder and select PlanProduction.dst.
5. The top of the sheet set manager should show the name of the sheet set as ProjectSheetData.
6. Right-click the tab and select Import Layout as Sheet

Working with multiple layout tabs

1. Select the tab 020301_CD.
2. Click Shift while selecting 020303_CD.

   Tip: Even though it is very subtle, all 6 tabs will be selected.

4. Right-click on one of the tabs and select Add Layout to Sheet.
5. Click Import Checked.
6. Similar to the previous exercise all sheets will be added to the sheetset manager.
7. Right-click the tabs again.
8. This time, select Publish Selected Layouts.

Traffic control sheets

Last updated: 2014-03-10

Total video time: 59:03

Exercise files: pln-prod-trfc-cntrl-data-C3D12.zip

Traffic control sheet workflow

pln-prod-trfc-cntrl-01.mp4 10:59

- Reference alignment and Edgelines files
- Placing Lines with Linetypes
- Placing blocks (Designcenter)
    - UCS Manipulation (view rotation)
- Dimensioning and labeling
- Editing placements in viewport
- Drawing details in paperspace

Setting up the traffic control sheets

The Traffic Control sheets need to have plan sheets made so that the markings can be displayed across the entire project. This process begins with creating the plan only sheets with the plan production tools.

Starting the file and referencing data

1. Start a new file with wisdot14-plat.dwt.
2. Save the file in 12345678\Design\View Frame Groups.

Data Shortcut references

1. In the **Toolspace > Prospector tab**, right-click the Data Shortcuts area and choose Set Working Folder.
2. Select the working folder in the 12345678\Design\Corridors\c3d folder (two folders above the _Shortcuts for the project).
3. In **Toolspace > Prospector tab > Alignments > Centerline Alignments**
4. Right-click on ***STH25BestFit*** alignment name and choose Create Reference.
    - In the dialog change the style to No Display
    - In the dialog change the label set to No Labels
    - Click OK

Attaching the XREF data.

1. **Insert tab > Create Design panel > Reference panel > Attach** in the ribbon, icon.
    - Browse to the : 12345678, Design, Edgelines
    - Select the Edgelines.dwg file
    - Set the XREF to Relative Path, and Attached
    - Zoom Extents

Creating the view frames

1. **Output tab > Create View Frames**
2. On the General tab:
3. Select the ***25-L-EPS***alignment.
4. Set the station range to User Specified.
5. Select stations from screen button.

6. Select the beginning station and the end station from the screen.
7. For the Template for Plan Sheet, select the Ellipsis button.
8. Make sure the template file is wisdot14-02-pd.dwt.
9. Select the Plan 1 IN 40 FT layout.
10. In the **View Frame Group tab > Name** change the field to read VF-0201<[Next Counter (CP)]>.
11. Click Edit Layout Name button to check that the counter is starting at 1 of 1.
12. In the Match Lines tab unselect the Add Match Lines.
13. Click the Create View Frames button.
14. Set the scale of the drawing to 1 IN : 50 FT.
15. Graphically shift the view frames so they cover the project area more efficiently.
16. Save the file.

Placing the traffic control linetypes

pln-prod-trfc-cntrl-02.mp4 16:11

Set the Modelspace Scale

Access the Annotation Scale pop-up. Select 1IN 50FT.

Creating the traffic control lines

Set the layer for the special linetype

1. Home tab of the ribbon, Layers panel, Layer Properties Manager.
2. In the left column select the Pavement Marking filter
3. In the layer area on the right find the P_PM_4 layer.
4. Double-click that layer to make it current.
5. Close the Layer Properties Manager.

Draw the polylines with the special linetype

1. **Home tab > Draw Panel > Polyline tool** .
2. Draw in the polylines that should be on the P_PM_4 (4" line width) layer.
3. **Home tab > Layer panel > Polyline tool > Layer pull-down list**.
4. Select the next layer (P_PM_8).
5. Draw in the polylines that should be on the P_PM_8 (8" line width) layer
6. Repeat drawing the lines in the file.
7. Repeat switching layers and drawing polylines as necessary.

Set the linetype scale for special linetypes

1. Linetypes that have special symbols or dashing needs a linetype scale adjustment.
2. **Home tab > Layer panel > Polyline tool > Layer pull-down list**.
3. Select the next layer (P_PM_SGLDelineator_25_100).
4. At the command line, type **LTSCALE** Enter
5. Set the scale to 1/50 (or .02).
6. Draw the polyline as necessary.
7. **Home tab > Layer panel > Layer Properties Manager**.
8. Left panel, select the Traffic Control-Staging layer filter.
9. Double click the P_TC_Drumes_25_50 layer to make it current.
10. Draw the polyline as necessary.

Entering blocks to finish special linetypes

1. Linetypes that use symbols, and indicate spacing, sometimes need a block the "finish" the linetype.
2. **Insert tab > Block panel > Insert.**.
3. Select the TCDRM bock
   - Make sure the Insertion is set to Choose from Screen
   - Make sure the Scale is set to 1
   - Make sure the rotation is set to 0
4. Click Ok
5. Place the block on the last special linetype symbol.
6. Make sure the Selection Cycling is turned on.
7. Second to last icon in status bar.
8. Select on the block, and choose Block Reference from the Selection Cycling dialog.
9. **Home tab > Modify panel > Move** ..
10. Move the block starting from its insertion point
11. Aim the movement vector to the end of the line.
12. Type **20** to move the barrel 20' past the end of the linetype.

Alternate: setting the individual linetype scale

Setting the polyline's scale

1. Select the polyline(s) that have special linetype symbols.
2. Right-click and choose Properties
3. Check the Linetype Scale field. Make sure it is set to .02 (1/50).
4. Type **LTSCALE** at the command line.
5. Set to 1.

Creating the sheets in the sheet set

1. **Output tab > Create Sheets** .
2. Set the view frame group.
    - For Layout Creation set to 1 layout per drawing
    - Change the Layout Name so it reads 0201<[Next Counter(CP)]>
    - Click the Edit Layout Name button to check that the counter is starting at 1 of 1
    - In the Sheet Set tab change to Add to an Existing Sheet Set
        - Click the ellipsis button to browse to the 12345678, Sheets Plan
        - Select the PlansProduction.dst
3. Change the sheet name to 0201<[Next Counter(CP)]_tc.
4. Click the Edit Layout Name button to check that the counter is starting at 1 of 1
5. Click Create Sheets.
6. Click Ok .
7. In the Sheet Set Manager double click on one of the files to open it.

Adjust the traffic control sheets

pln-prod-trfc-cntrl-03.mp4 19:25

There are some parts of the traffic control detail plan sheet that will not be correct. They will need slight adjustments.

Adjust the titleblock data

1. Double-click on the Grey-box X's at the lower right (where the sheet Title should be).
2. In the text editor type **`TRAFFIC CONTROL DETAILS`**.

Adjust the viewport

1. Select on the viewport. It will be under the edge of the titleblock.
2. Select the Viewport of the lines that were there.
3. Click one of the grip points and adjust the viewport to be a more appropriate size.
4. Double-click inside the viewport to activate it.
5. Next to the viewport scale click the grey lock icon to unlock the viewport.
6. Pan the viewport so that the project is better positioned in the view.
7. Click on the lock icon to relock the viewport.

Insert sign blocks

Adjust the UCS (view rotation)

1. Type **UCS** at the command line
2. Type **V**for View

Insert sign blocks into the viewport modelspace

1. **Home tab > Palettes panel pull-down> Designcenter icon** (or type DC).
2. C:\ProgramData\Autodesk\C3D 2014\enu\Data\Symbols\USWI\signsw12.dwg
3. Expand the Blocks area.
4. In Designcenter find W6-3.
5. Drag that into the file
6. Fill out the attributes.
7. Click Ok.
8. Click on the block and click in the dark blue grip point to move the block appropriately.
9. In **Designcenter > signsw12.dwg\blocks** , find W57-5-1.
10. Drag this into the file.
11. Fill out the attributes.
12. Click Ok.
13. Click on the block and click in the dark blue grip point to move the block appropriately.
14. Click on the block and select the light blue grip to move the text around the block.
15. Place the block below the first block.
16. In **Designcenter > signsw12.dwg\blocks** , find W-16-9P.
17. Drag this into the file.
18. Fill out the attributes.
19. Click Ok.
20. Click on the block and click in the dark blue grip point to move the block appropriately.
21. Click the block and select the light blue arrow grip point to change the sign to the REMOVE option.
22. In **Designcenter > signsw12.dwg\blocks** , find W-11-50P.
23. Drag this into the file.
24. Fill out the attributes.
25. Click Ok.
26. Click on the block and click in the dark blue grip point to move the block appropriately.
27. Click the block and select the light blue arrow grip point to change the sign to the REMOVE option.
28. In **Designcenter > etopog12.dwg\blocks** , find the SGN block.
29. Drag this to the file.
30. Adjust the location of the signs by selecting the blocks and type **M** for MOVE.

Place leader lines to the signs

1. **Annotate tab > Leader panel > Leader Style drop-down** .
2. vChoose the 140 style.
3. vClick Multileader.
4. vType **H** to place the arrowhead first.
5. vPlace the leader from the sign to the representative block.
6. vLeft-click to skip placing text.
7. vRepeat for each sign.

Adjust the UCS (view rotation)

1. Type **UCS** at the command line
2. Type **W** for World (or **View tab > Coordinates tab > World UCS button**

Add Text and Dimensions

Place Callout Bubbles

1. **Annotate tab > Leader panel > Leaders drop-down menu**
2. Choose the 140 style.
3. Click the Multileader command.
4. Type **H** to place the arrowhead first.
5. Select where the leader should start.
6. Type the appropriate note in the text. Left-click outside the text box.
7. **Home tab > Draw panel > Rectangle tool** .
8. Draw a rectangle around specific text.
9. **Annotate tab > Leaders panel > Style pull-down menu** .
10. Choose the Callout Bubble style.
11. Select the Multileader command.
12. Type **C** for content first.
13. Left-click a placement spot
14. Type the number of the callout bubble
15. Click a position for the leader.
16. Select the multileader leader,
17. Right-click, and choose Remover leader
18. Select the leader to remove it.

Add dimensions

1. Switch to the Paperspace.
2. **Annotate tab > Dimensions panel > Style drop-down**,
3. Choose Pavement Marking dimstyle
4. Select the Align dimension command.
5. Select the middle of one barrel, then the middle of the second barrel.

Manually adjust the dimension text

1. Left-click on the dimension.
2. Right-click and choose Properties.
3. Under the Text area find the Text Override field.
4. Type **50'\PTYP**. To create a two line text.
5. Click Enter.
6. Select the dimension and adjust its position with the grip points.

Create a small detail on the sheet

pln-prod-trfc-cntrl-04.mp4 12:28

Draw the polylines

1. **Home tab > Draw panel > Polyline tool** .
2. Draw the polyline(s) as necessary.

> **Tip:** Use Ortho (F* toggle), COPY, TRIM/EXT, and other drafting tools to simplify the drawing process.

4. **Home tab > Draw panel > Line > Line Create** .
5. Use Ortho (F* toggle), COPY, TRIM/EXT, and other drafting tools to simplify the drawing process.
6. Place lines at the edge of hatched areas.
7. **Home tab > Draw panel > Hatch command** .
8. Click the Solid Hatch style.
9. Left-Click in the closed area to hatch it.

Place text for the detail

1. **Annotate tab > Text panel > Style drop-down** .
2. Choose 140.
3. Click the Multiline tool
4. Place a text box.
5. Type `TYPICAL ROAD SECTION DIMENSIONS`
6. Double-click on text.
7. In the Text Editor ribbon choose the Underline tool.

Add dimensions to the detail

1. **Annotate tab > Dimension panel > Dimension style drop-down** .
2. Choose Plan_Conventional.
3. Select the Linear Dimension tool.
4. Place dimensions at the proper locations.
5. **Annotate tab > Dimension panel > Continue Dimension** .
6. Snap to the other dimension locations.

Manually adjust the dimension text

1. Click on the dimension that needs to be adjusted.
2. Right-click and choose Properties.
3. In the Text Area, the last field is Text Override. Click in that field.
4. Type in the needed text. If two text lines are needed add a \P as a <return> character.
5. Example: `50'\PTYP` for "50' TYP."
6. Grip edit the placement of the dimension as necessary

Add special text

1. **Annotate tab > Text panel > Style drop-down** .
2. Choose 120.
3. Click the Multiline tool.
4. Place a text box.
5. Type **`4:1`**
6. Left-click Outside the Text Editor box.
7. **Home tab > Modify panel > Rotate command** .
8. Left-click the text.
9. Click a rotation point near the text.
10. <Shift>-Right-click and choose Parallel.
11. Hover near the line that is being labeled to get the parallel OSNAP marker.
12. Move the cursor until the Parallel OSNAP dotted line appears. Left-click to place the text.
13. Repeat for the other slope text.
14. Place Other Leader Text in Detail
15. **Annotate tab > Leader panel > Leader Style drop-down** .
16. Choose 140.
17. Choose the Multileader command.
18. Click to place the leader lines.
19. Type **`EDGELINES`**
20. Left-click outside the Text Editor box to end the text.
21. **Annotate tab > Leader panel > Add Leader icon** .
22. Select on the first leader line.
23. Place the second (and more) leaders.
24. Grip edit to adjust text placement.
25. Repeat as necessary.

Pavement marking sheets

Last updated: 2014-03-10

Total video time: 53:42

Exercise files: pln-prod-pvmnt-mrk-data-C3D12.zip

Setting up the pavement marking sheets

pln-prod-pvmnt-mrk-01.mp4 20:37

> **Info:** The Pavement Marking sheets need to have plan sheets made so that the markings can be displayed across the entire project. This process begins with creating the plan only sheets with the plan production tools.

Starting the file and referencing data

1. Start a new file with the wisdot14-plat.dwt.
2. Save the file in 12345678\Design\View Frame Groups

Data Shortcut references

1. In the **Toolspace > Prospector tab** Toolspace, Prospector tab, right-click on the Data Shortcuts area and choose Set Working Folder.
2. Select the working folder in the project folders, Design, c3d folder (two folders above the _Shortcuts for the project).
3. Expand the Alignments, expand the Centerline Alignments
4. Right-click on the STH25BestFit alignment name and choose Create Reference.
5. In the dialog change the style to No Display.
6. In the dialog change the label set to No Labels.
7. Click Ok.

Attaching the XREF data.

1. Insert tab in the ribbon, Reference panel, Attach icon.
2. Browse to the project folder, Design, c3d, 12345678, Design, Edgelines folder,
3. Select the Edgelines.dwg file.
4. Set the XREF to Relative Path, and Attached.
5. Zoom Extents.

Creating the view frames

1. Output tab of the ribbon, Create View Frames.
2. On the General tab:
3. Select the STH25BestFit alignment.
4. Set the station range to User Specified.
5. Select stations from screen button.
6. Select the beginning station and the end station from the screen.
7. On the Sheets tab Select Plan Only.
8. For the Template for Plan Sheet, select the Ellipsis button.
9. Make sure the template file is correct.
10. Select the Plan 1 IN 40 FT.
11. In the View Frame Group tab change the Name field to read VF-0201<[Next Counter (CP)]>.
12. Click the Edit Layout Name button to check that the counter is starting at 1 of 1.
13. In the Match Lines tab unselect the Add Match Lines.

14. Click the Create View Frames button.
15. Set the scale of the drawing to 1 IN : 50 FT.
16. Graphically shift the view frames so they cover the project area more efficiently.
17. Save the file.

Create the pavement marking lines

1. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab of the ribbon, Layers panel, Layer Properties Manager icon.
2. Set the layer filters to Pavement Markings.
3. Find the P_PM_Centerline40. Double click on this layer to make it Current
4. Close the Layer Properties Manager.
5. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab, Draw Panel, Polyline icon.
6. Draw in the centerline line location. Adjust its location as necessary.
7. Select the linetype, right-click and choose Properties.
8. Change the Linetype scale to 1/50 (or .02).
9. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab, Layers panel, Layer pull-down.
10. Select the P_PM_LaneLine_50.
11. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab, Draw panel, Polyline tool.
12. Draw in where the lane line should be
13. Select the lane lines and the dashed centerlines.
14. Right-click and choose Properties.
15. Change the Linetype Scale to 1/50.
16. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab, Layers panel, Layer pull-down.
17. Select the P_PM_4.
18. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab, Draw panel, Polyline tool.
19. Draw in where the double line should be.
20. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab, Modify panel, Offset command.
21. Type in distance of 1.4.
22. Select the line.
23. Click to the side the offset should go.
24. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab, Layers panel, Layer pull-down.
25. Set the layer to P_PM_18.
26. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Home tab, Draw pane, Line command, Line Create Line.

27. Draw in where the “Stop Lines” are located.
28. Save the file.

Creating the sheets in the sheet set

1. **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Output tab of the ribbon, Create Sheets.
2. Set the view frame group.
3. For Layout Creation set to 1 layout per drawing.
4. Change the Layout Name so it reads 0201<[Next Counter(CP)]>.
5. Click the Edit Layout Name button to check that the counter is starting at 1 of
6. In the Sheet Set tab change to Add to an Existing Sheet Set.
7. Click the ellipsis button to browse to the project, Design, c3d, 12345678, Sheets Plan.
8. Select the PlansProduction.dst.
9. Change the sheet name to 0201<[Next Counter(CP)]_pm.
10. Click the Edit Layout Name button to check that the counter is starting at 1 of
11. Click Create Sheets. Click Ok to save the file.
12. In the Sheet Set Manager double click on one of the files to open it.

Adjust the pavement sheets

pln-prod-pvmnt-mrk-02.mp4 18:28

Info: There are some parts of the pavement detail plan sheet that will not be correct. They will need slight adjustments.

Adjust the titleblock data

1. Double-click on the Grey-box X’s at the lower right (where the sheet Title should be). In the text editor type PAVEMENT MARKING DETAILS.

Adjust the viewport

1. Select on the viewport. It will be under the edge of the titleblock.
2. Click one of the grip points and adjust the viewport to be a more appropriate size.
3. Double-click inside the viewport to activate it.
4. Next to the viewport scale click the grey lock icon to unlock the viewport.
5. Pan the viewport so that the project is better positioned in the view.
6. Click on the lock icon to relock the viewport.

Place the callout bubbles in the file

1. **Annotate tab > Leaders panel > Leader style pull-down** .

Choose the callout bubble style.

1. **Annotate tab > Leaders panels > Multileader**.
2. Type **HEXECUTETOOL** Enter.
3. Select where the leader is pointing.
4. Select where the text landing should be.
5. Type in the bubble number.

Create a legend on the sheet

Info: A legend needs to be created to describe the callout bubbles and the line-types.

Place the legend title

1. **Annotate tab > Text panel** , set the style to 200.
2. **Annotate tab > Text panel > MTEXT** , choose the icon.
3. In the sheet select a point then select a second point to create a text editing box.
4. **Text Editor ribbon > Formatting panel** ,
5. Select the U icon to underline this text.
6. Type **LEGEND** Enter.
7. Click outside the text editor to end the text creation.

Place the callout bubbles in the legend

1. **Annotate tab > Leader panel > Multileader** .
2. Type **C** Enter.
3. Select where in the legend the bubble should be.
4. Type the proper number for the first bubble.
5. Select a location for the leader to be placed.
6. Select the multileader that you just place and right-click.
7. From the right-click menu select Remove Leader.
8. Select the leader that you just placed to remove it, leaving the bubble alone.

Info: Repeat these steps for each bubble or copy the first one then edit the numbers.

9. Double-click on the bubble to type in the proper number.
10. If you need to line-up the bubbles, go to the **Annotate tab > Leader panel > Align** .
11. Select all of the bubbles.
12. Select the first bubble and align the others to it.

Place the linetypes in the legend

1. **Home tab > Layers panel > Layer pull-down** .
2. Select the layer that represents the first bubble's linetype.
3. **Home tab > Draw panel > Line > Create Line** .
4. Draw a line left to right next to the appropriate bubble.
5. Copy this line next to any bubbles where they would be appropriate.
6. Copy the first line for the double line type.

Place the blocks in the legend

1. Open the Designcenter by typing **DC**Enter at the command line).
2. Browse to Program Data\Autodesk\C3D 2014\enu\Data\Symbls\USWI\ew-dot12.dg\blocks.
3. Scroll through the blocks until you find blocks representing ones that will be used in your file.
4. Click and drag these blocks into your file. Line them up with the bubble that represents them.

Place the description text in the legend

1. **Annotate tab > Text panel** , and set the style to 240.
2. Click the MTEXT tool.
3. Select two points to create a text editor box near the callout bubbles and linetypes.
4. Type in the appropriate description.
5. Click outside the text editor box to end the text creation.
6. Select the text, right-click, choose Basic Modify tools > Copy.
7. Left click text locations next to each linetype.
8. Double click on each text to edit the text to what is descriptive of the linetypes.

Create a small detail

pln-prod-pvmnt-mrk-03.mp4 14:37

Create a detail sketch of some special line layouts.

Draw in the detail

1. **Home tab > Draw tab > Polyline** .
2. Draw the detail lines.
3. **Home tab > Modify panel > Offset** .
4. Offset the double lines through the detail.
5. **Home tab > Modify panel > Extend** .
6. Extend the subgrade material lines to the sketched surfaces.
7. **Home tab > Modify panel > Rotate** .

8. Rotate the top line, right-click to accept.
9. Place a rotation point somewhere in the middle of the line.
10. Type **CL** Enter for copy inside the rotate command.
11. Type **-45** Enter for the rotation.
12. Left-click the polyline and use the rectangular grip to move the polyline.
13. **Home tab > Modify panel > Copy** .
14. Copy the rotated line to represent the striping.
15. **Home tab >Modify > Copy** .
16. Select both rotated polylines.
17. Copy these over to represent the offset pavement marking. Repeat as necessary.
18. **Home tab > Create Design panel > Modify > Trim** .
19. Select the pavement lines as cutting edges and trim back the striping.
20. **Home tab > Draw panel > Hatch** .
21. Solid Hatch the striping.

Dimension the detail

1. **Annotate tab > Dimension panel > dimension style drop-downs** .
2. Choose the Plan_Conventional style.
3. Select the Linear dimension command.
4. Dimension the front of the detail, and the spacing between the striping.
5. Dimension the front of the first striping.

Place leader text in the detail

1. **Annotate tab > Leader panel > Style drop down** .
2. Choose the 140 style.
3. Select the Multileader command.
4. Place leaders for text describing the line types.

Placing free text and blocks in the detail

1. **Annotate tab > Text panel > text style drop down**
2. Choose the 140 style.
3. Select the MTEXT command.
4. Create a text editor box. Type the appropriate free text.
5. **Home tab > Palettes panel > Palettes panel pull-down > Designcneter icon** .
6. Browse to ewdot-14.dwg file, blocks folder.
7. Find the TSTFA block. Drag that into the file.
8. Copy this block to the opposite travel direction.
9. **Annotate tab > Text panel > text styles drop-down** ,
10. Select the 200 style
11. Select the MTEXT command.
12. Below the detail type the detail name

Set the dimension text

1. Select one of the dimension text.
2. Right-click and choose Properties.
3. Scroll down and find the Text Overrides field.
4. Type in the proper text.
5. Repeat for each dimension.

Last cleanup of the legend

1. Create the dashed line for the legend
2. **Home tab > Modify panel > Modify panel pull-down**.
3. Choose the Break command.
4. Break the line creating a single dash
5. Repeat this step for the other line(s).
6. **Home tab > Modify panel > Copy** .
7. Select any of the dashes.
8. Copy the dash in line to simulate a dashed linetype.

Erosion control sheets

Last updated: 2014-09-23

Total video time: 53:18

Exercise files: pln-prod-ersn-cntrl-data-C3D14.zip

Begin the erosion control file

pln-prod-ersn-cntrl-01.mp4 8:32

Start a file with the wisdot14.dwt template file.

Tip: Optional: Create a shortcut in the open dialog box by dragging the Project folder into the left blue shortcut area. Save the new file in the project's SheetsPlan folder as 12345678-STH25-ErosionControl.dwg

Connect to the project

Set the Working Folder

1. **Toolspace > Prospector tab > right-click Data Shortcuts area > Set Working Folder**
2. Browse to the ***c3d*** folder.

Tip: This is two folders above the Project's _Shortcuts folder.

Set Data Shortcuts project folder

1. **Toolspace > Prospector tab > right-click Data Shortcuts area > Set Data Shortcuts Project Folder**
2. Select the Project number from the list.

Attach the Data References

1. **Toolspace > Prospector tab > Data Shortcuts > expand Surfaces**
2. Right-click on ***STH-Refinement-Top*** and choose Create Reference.
3. Change the style to ***_EX Border***.
4. **Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments**
5. Right-click on ***4thAve*** and choose Create Reference
   - Under ***Description*** enter 4thAve
   - Choose 1IN 100FT-Ticks200'Major:100'Minor-NoPCPT for the label set
6. Click Ok
7. Select the PT label, Click delete
8. **Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments**
9. Right-click on ***STH25BestFit*** and choose Create Reference
   - Under ***Description*** enter STH25
   - Choose 1IN 100FT-Ticks200'Major:100'Minor-NoPCPT for the label set.
10. Click Ok

Tip: Toggle off show and hide Lineweight to see the lines as all same thickness/weight

Xref mapping files

1. **Toolspace > Prospector tab > Data Shortcuts > View Frame Groups**
2. Right-click on ***STH25BestFit – DBL 100Sc*** and choose Create Reference
   - Under ***View frame style*** select Standard
   - ***Match line style*** select _Line
   - Match line labels can be default
3. Select ***STH25BestFit*** for the alignment.
4. Click Ok
5. Type **XREF**Enter
   - Click the .DWG icon
   - Browse to the Project's Mapping folder
   - Select the 3109.dwg, 3110.dwg, 3111.dwg and 3112.dwg, select open
   - Set the ***Reference Type*** to Attachment
   - Set the ***Path Type*** to Relative
   - Set the ***Insertion Point XY and Z*** to 0
   - Set the ***Scale*** to 1
   - Set the ***Rotation*** to 0

6. **ZOOM EXTENTS** to see the file location

Xref edgelines file

1. **Insert tab > Reference panel > Attach icon** .
    - Browse to the Project's Edgelines folder.
    - Select the Edgelines.dwg
    - Set the ***Reference Type*** to Attachment
    - Set the ***Path Type*** to Relative
    - Set the ***Insertion Point XY and Z*** to 0
    - Set the ***Scale*** to 1
    - Set the ***Rotation*** to 0
2. **ZOOM EXTENTS**

Xref storm sewer file

1. **Insert tab > Reference panel > Attach icon**
    - Browse to the Project's Edgelines folder.
    - Select the Storm Block.dwg
    - Set the ***Reference Type*** to Attachment
    - Set the ***Path Type*** to Relative
    - Set the ***Insertion Point XY and Z*** to 0
    - Set the ***Scale*** to 1
    - Set the ***Rotation*** to 0
2. Zoom Extents (double click mouse wheel) to see the file location.

Add erosion control measures using Design Center

pln-prod-ersn-cntrl-02.mp4 22:42

1. Select the layer drop-down and select the **P_EC_SiltFence** layer to be current
2. On the **Home tab > Draw panel > polyline**
3. Draw polylines to represent the silt fence
4. Select the layer drop-down and select the **P_EC_RipRap** layer to be current
5. **Home tab > Palettes panel > palettes drop down > Design Center**
    - In the Design center folders tab navigate to: C:\WisDOT\stnd\c3d2014\Blocks\ErosionControl14.dwg
    - Expand blocks to see the available blocks.
    - On the Design Center select ***ECRR***, place riprap block in front of desired culverts
    - On the Design Center select ***ECCPDC***, place Ditch Check block in front of desired culverts
    - On the Design Center select ***ECBALE***, place Bales block in behind desired silt fence
    - On the Design Center select ***ECWFA***, place surface water flow arrows were necessary

> **Tip:** Change the STH-Refinement-Top surface style to P Contours 5' Major: 1' Minor and add contour labels to determine what direction the surface water is flowing.

Add erosion mat with hatch

1. Select the layer drop-down and select the **P_EC_MatClass1** layer to be current
2. **Home tab > Draw panel > polyline**
3. Draw polylines to represent the erosion mat
4. Select the new polyline
5. **Home tab > Layers Panel > Layer > Layer Isolate**
6. **Home tab > Draw panel > Hatch**
7. **Context tab > Hatch pattern drop- down**select the ***DGN_ECMC1P***
8. Pick inside the polyline boundary

Add silt fence alignment offset labels

1. **Annotate Tab > Labels & Tables tab > Add Labels > Alignment**
2. ***Label type*** drop-down, select Station Offset
   - ***Station offset label style*** select Silt Fence Sta Off 100 000 LT for the left side of the alignment.
   - ***Station offset label style*** select Silt Fence Sta Off 100 000 RT for the Right side of the alignment.
     - ***Marker style*** select No Display
3. Click Add
4. Pick the alignment needed for the offset.
5. Place labels at points on the silt fence as needed.
6. If the ***Add Labels*** dialog box is still open change the label style to the opposite side from your first selection, proceed to place labels on the silt fence as needed for the other side.

Creating the erosion control sheets

pln-prod-ersn-cntrl-03.mp4 7:44

1. **Output tab > Create Sheets**
   - Set the view frame group.
   - For ***Layout Creation*** set to All layouts in current drawing
   - Change the Layout Name so it reads 0220<[Next Counter(CP)]>-ec.
2. Click the Edit Layout Name button to check that the counter is starting at ***1 of 1***
3. In the ***Sheet Set*** tab change to Add to an Existing Sheet Set
4. Browse to ProjectID\Sheets Plan.
5. Select the PlansProduction.dst.

6. Change the sheet name to 0220<[Next Counter(CP)]-ec
7. Click the Edit Layout Name button to check that the counter is starting at ***1 of 1***
8. Click Create Sheets
9. Click Ok .
10. In the ***Sheet Set Manager*** double click on one of the files to open it if they were created in a separate file.

Edit north arrow direction

1. Move north arrow block from the right side of the sheet onto desired location of viewport.
2. Double click in viewport.
3. Draw line true north.
4. Double click outside viewport to get back to paper space.
5. Select north arrow.
6. **Home tab > Modify panel > Move**
7. Move insertion point to endpoint of previously created line.
8. Select north arrow.
9. **Home tab > Modify panel > Rotate**
10. Use **ROTATE** then **REFERENCE**

Create second viewport

1. Select Viewport, and north arrow
2. **Home tab > Modify panel > Copy**
3. Select upper right hand corner of viewport, copy to lower right hand corner of same viewport.
4. Crop viewport to fit sheet by moving bottom line up.
5. Select viewport, select unlock from properties.
6. Move model space to fit desired location.

Draft erosion control block legend

pln-prod-ersn-cntrl-04.mp4 14:20

Home tab > Draw panel > Rectangle

- Draw a rectangle near the bottom right side of the sheet.

Home tab > Layer Panel

- Set the current layer to **P_MISC_TXT**

Insert text for the Legend

1. **Annotate tab > Text panel**
2. Select the text style ***120***
3. Select the Multiline Text command.
4. The command line will prompt to specify first corner and opposite corner (a rectangle representing the area for the text field)
5. Type **LEGEND**, select all the text and click the underline command then the center command.
6. Left click outside the text box to finish the multiline command

Tip: Hint: Match Properties (MA) to place text on same layer as rectangle.

7. **Insert tab > Block panel > Insert**
8. On the Insert dialog box
   - Change the Name drop down scroll to ***ECBALE***
   - Leave ***Insertion Point*** checked
   - Type .5 for the ***x scale***
   - Leave the rest default, make sure explode is unchecked
9. Click Ok
10. Select place to put block in legend box
11. Select the multiline text command
12. Command line prompts to specify first corner and opposite corner (a rectangle representing the area for the text field)
13. Type EROSION BALES
14. Left click outside the text box to finish the multiline command.
15. Repeat these steps for all the blocks in the erosion control plan sheet.
16. **Home tab > Layer panel** , select the ***P_EC_SiltFence*** layer.
17. **Home tab > Draw panel > Polyline**
18. Draw a polyline next to text under previous block inserted. This should represent the silt fence.
19. Select the multiline text command
20. Create a rectangle for the text field.
21. Type SILT FENCE
22. Left click outside the text box to finish the multiline command
23. **Home tab > Layer panel** ***P_EC_MatClass1*** layer
24. **Home tab > Draw panel > Polyline**
25. Draw a polyline next to text under previous polyline created

Info: This should represent the Class I, Type B Erosion Mat.

26. Select the multiline text command.
27. Create a rectangle for the text field.

28. Type EROSION MAT CLASS I, TYPE B
29. Left click outside the text box to finish the multiline command

Tip: Use WIPEOUT Command to hide model space data behind legend table.

Joint detail sheets

Last updated: 2014-09-23

Total video time: 55:18

Exercise files: pln-prod-jnt-dtl-data-C3D14.zip

Begin the joint detail file

pln-prod-jnt-dtl-01.mp4 9:06

1. Start a file with the wisdot12.dwt template file.

Tip: Optional: Create a shortcut in the open dialog box by dragging the Project folder into the left blue shortcut area.

2. Save the new fileas 12345678\SheetsPlan\12345678-STH25-JointDetails.dwg

Connect to the project

Set the working folder

1. **Toolspace > Prospector tab** Right-click on the Data Shortcuts area in the Toolspace, Prospector tab, choose Set Working Folder.
2. Browse to where the project folder is stored, and select the c3d folder.

Tip: This is two folders above the Project's _Shortcuts folder.

Set Data Shortcuts project folder

1. **Toolspace > Prospector tab** right-click the Data Shortcuts area.
2. Choose Set Data Shortcuts Project Folder.
    - 12345678\BaseData\Survey

Attach the Data References

1. **Toolspace > Prospector tab > Data Shortcuts > expand Surfaces**,
2. Right-click on ***STH-Refinement-Top***
3. Choose Create Reference.
4. Change the Style to _No Display.

5. **Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments**.
6. Right-click on ***4thAve***
7. Choose Create Reference
8. Under Description enter -4thAve.
9. Choose 1IN 50FT-Ticks100’Major:50’Minor[DESC] for the label set.
10. Click Ok.
11. Select the PT label.
12. Click the delete button.
13. **Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments**.
14. Right-click on ***STH25BestFit***
15. Choose Create Reference
16. Under Description enter –STH25.
17. Choose 1IN 50FT- Ticks100’Major:50’Minor[DESC] for the label set.
18. Click Ok

Tip: Toggle off show and hide Lineweight to see the lines as all same thickness/weight

19. **Toolspace > Prospector tab > Data Shortcuts > View Frame Groups**
20. Right-click on ***STH25BestFit***
21. Choose Create Reference
    - View frame style select Standard
    - View frame label style select VF Name
    - Match line style select _No Display
    - Match line labels can be default
    - Select ***STH25BestFit*** for the alignment
22. Click Ok.

Xref edgelines file

1. **Insert tab > Reference panel > Attach icon**
2. Browse to 12345678\Design\Edgelines\Edgelines.dwg
    - Set the ***Reference Type*** to Overlay
    - Set the ***Path Type*** to Relative
    - Set the ***Insertion Point XY and Z*** to 0
    - Set the ***Scale*** to 1
    - Set the ***Rotation*** to 0
3. Zoom Extents.

Tip: Use NCOPY to bring in all pavement linework from an XREF.

Create manual points

pln-prod-jnt-dtl-02.mp4 15:24

1. **Home tab > create ground data panel > Points dropdown > Point Creation Tools** .
2. Click the chevron to expand the Create Points Properties
   - Change the Default Layer to P_RDWY_Text_Grades
   - Expand Points Creation, Default Description to PAV
   - Prompt for Elevations to Automatic
   - Prompt for Point Names to Manual
   - Prompt for Description to None
3. Expand Default Styles
   - Change Point Style to P PM Pavement Marker
   - Point Label Style to Pave Grade Bottom
4. Expand Default Name Format
   - Change Point Name Template to PAV<[Next Counter(CP)]>.
5. Close the chevron.
6. **CREATE POINTS TOOLBAR > ALIGNMENT POINT DROPDOWN > MEASURE ALIGNMENT**
7. Select ***STH25BestFit***,
   - Enter Start Station, Enter End station, Enter Interval.
8. **CREATE POINTS TOOLBAR > ALIGNMENT POINT DROPDOWN > MEASURE ALIGNMENT**
9. Select ***4thAve***,
   - Enter Start Station, Enter End station, Enter Interval.
10. **CREATE POINTS TOOLBAR > MISCELLANEOUS POINT DROPDOWN > MEASURE OBJECT**.
11. Select a Pavement line.
    - Enter Start Station, Enter End station, Enter Interval.
12. **CREATE POINTS TOOLBAR > MISCELLANEOUS POINT DROPDOWN > MANUAL POINT**.
13. Pick at the vertice points on the Pavement lines that were not inserted with previous commands.
14. **Context tab > Modify panel > Elevations from Surface** ,
15. Select ***STH25-Refinement-Top***,
16. Type **A**Enter.
17. **Context tab > Modify panel > Elevations from Surface**
18. Select ***STH25-Refinement-Top***,
19. Type **A**Enter.
20. Click the chevron to expand the Create Points Properties,
21. Expand Default Styles.
    - Change Point Style to P PM Pavement Marker Radius
    - Point Label Style to Point Name Circled
22. Expand Default Name Format.
    - Change Point Name Template to PAV<[Next Counter(CP)]>

23. Expand Points Creation.
    - Change Prompt for Point Names to Manual
24. Close the chevron
25. `CREATE POINTS TOOLBAR > MISCELLANEOUS POINT DROPDOWN > MANUAL POINT`.
26. Pick at the Center points of each curb and gutter arc and the endpoints of each Arc

Generate point data for point tables (macro)

pln-prod-jnt-dtl-03.mp4 6:41

1. **Toolspace > Toolbox tab > expand WisDOT Toolbox > expand WisDOT Macros**
2. Right-click Point-Station Offset to UDP.
3. Select Execute
4. In the WisDOT Points Station-Offset UDP dialog box :
    - Pick Select Points.
    - Check Create Point Group.
5. Enter Radius,
6. Select ***STH25BestFit*** as Alignment 1.
7. Click Apply .
8. Select all the radius points,
9. Click Enter.
10. In the WisDOT Points Station-Offset UDP dialog box pick Point Group
11. Select Radius as the point group,
12. Select ***4thAve***as Alignment 2.
13. Click Apply .
14. **Toolspace > Prospector tab > expand Point Groups,**
15. Select the Radius point group.
16. Right-click Edit points
17. Panorama opens to look at the info created for the point table that will be created.

Create point tables

1. **Annotate tab > Labels & Tables Panel > Add Tables dropdown** select Add Point table.
2. On the Point Table Creation dialog box under the Table style dropdown
3. Select STA OFF STA OFF NE RADIUS
4. Click icon next to No Point Group Selected
5. Select Radius point group,
6. Click Ok.
7. Click Ok,
8. Pick a spot for table to reside.

Create sheets

pln-prod-jnt-dtl-04.mp4 24:07

1. **Output tab > Create Sheets** .
2. On the Create Sheets – View Frame Group and Layouts dialog box
   - View frame group select STH25BestFit
   - View frame range select Selection, click Choose View Frames
3. In the Select View Frames dialog box click the green box icon to select view frame from drawing
4. Click Ok
5. Select All layouts in the current drawing
6. Click Next
7. Click Create Sheets.
8. Click Ok

Insert radius dimensions

1. **Annotate Tab > Dimension panel** .
2. Select Radius from the Dimension dropdown.
3. Select DOT 140 RADIUS from the Style dropdown.
4. Insert Radius dimensions as needed.
5. Select Arc end points on Curb and Gutter

Create joint lines

1. **Home tab > Layers panel** ,
2. Select the layer dropdown and select the P_RDWY_Joint layer to be current
3. **Home tab > Draw panel, > Polyline**,
4. Draw polylines to represent Joints marks
5. **Home tab > Modify panel > Offset**.
6. Type in the distance,
7. Select side to be offset to,
8. ClickEnter
9. ClickEnter
10. Type in a new distance,
11. Select side.
12. Repeat until all joint lines are complete.

Tip: Use Layer Isolate command to only show the layers needed

Tip: Use Layer Isolate command to only show the layers needed

Tip: Use trim and extends command to clean up joint lines.

Tip: Use Layer un-isolate command to bring back the previous layers

Insert joint dimensions

1. **Annotate Tab > Dimension panel > Dimension dropdown > Aligned**.
2. Select DOT 140 Plan Joints_NoDimLines from the Style dropdown.
3. Insert Joint dimensions as needed.
4. Select joint end points on joint lines

Tip: Use DIMCONTINUE command to speed the dimension process up

5. **Annotate Tab > Dimension panel > Dimension dropdown > Aligned**.
6. Select DOT 140 Plan Joints from the Style dropdown
7. Insert Joint dimensions as needed
8. Select joint end points on joint lines.

Intersection detail sheets

Last updated: 2014-09-23

Total video time: 49:59

Exercise files: pln-prod-int-dtl-data-C3D14.zip

Begin the intersection details file

pln-prod-int-dtl-01.mp4 7:36

Start a file with the wisdot12.dwt.

Info: Optional: Create a shortcut in the open dialog box by dragging the Project folder into the left blue shortcut area

Save the new file as 12345678\SheetsPlan\12345678-STH25-IntersectionDetails.dwg

Connect to the Project

Set the Working Folder

1. **Toolspace > Prospector tab** right-click the Data Shortcuts area
   - Choose Set Working Folder
2. Browse to the project folder and select the ***c3d*** folder.

Tip: This is two folders above the Project's _Shortcuts folder.

Set Data Shortcuts project folder

1. **Toolspace > Prospector tab** right-click the Data Shortcuts area
   - Choose Set Data Shortcuts Project Folder
   - Select ProjectID\BaseData\Survey folder.

Attach the Data References

1. **Toolspace > Prospector tab > Data Shortcuts**expand ***Surfaces***
2. Right-click on ***STH-Refinement-Top***
3. Choose Create Reference
4. Change the ***Style*** to _No Display
5. Click Ok
6. Click Ok
7. **Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments**
8. Right-click on ***4thAve***
9. Choose Create Reference
10. Under ***Description*** enter 4thAve
11. Choose 1IN 50FT-Ticks100'Major:50'Minor[DESC] for the ***label set***
12. Click Ok
13. Select the PT label. Click the delete button.
14. **Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments**
15. Right-click on STH25BestFit
16. Choose Create Reference
17. Under ***Description*** enter STH25
18. Choose 1IN 50FT- Ticks100'Major:50'Minor[DESC] for the ***label set***
19. Click Ok

Tip: Toggle off show and hide Lineweight to see the lines as all same thickness/weight

20. **Toolspace > Prospector tab > Data Shortcuts > View Frame Groups**
21. Right-click on STH25BestFit-40Scale
22. Choose Create Reference
    - Under ***View frame style*** select Standard
    - ***Match line style*** select _No Display
    - Match line labels can be default
23. Select STH25BestFit
24. Click Ok

Xref edgelines file

1. **Insert tab > Reference panel > Attach**
   - Select 12345678\Design\Edgelines\Edgelines.dwg
   - Set the ***Reference Type*** to Overlay

- Set the ***Path Type*** to Relative
- Set the ***Insertion Point XY and Z*** to 0
- Set the ***Scale*** to 1
- Set the ***Rotation*** to 0

2. Click Ok
3. Zoom Extents

Create manual points

pln-prod-int-dtl-02.mp4 24:55

1. **Home tab > Create Ground Data panel > Points drop-down > Point Creation Tools**
2. Click the chevron to expand the ***Create Points Properties***
3. Change the Default Layer to ***P_RDWY_Text_Grades***
4. Expand ***Points Creation***
   - Default ***Description*** to PAV
   - Prompt for ***Elevations*** to Automatic
   - ***Prompt For Point Names*** to Manual
   - ***Prompt for Description*** to None
5. Expand ***Default Styles***
   - Change ***Point Style*** to P PM Pavement Marker Radius
   - Change ***Point Label Style*** to Point Name Circled
6. Expand ***Default Name Format***
   - Change ***Point Name Template*** to PAV<[Next Counter(CP)]>
   - Set ***Starting Number*** to 1
7. Close the chevron
8. On the **CREATE POINTS TOOLBAR > MISCELLANEOUS POINT DROPDOWN > MANUAL POINT**
9. Select Curb and gutter arc endpoints and radius points
10. Pick at the taper points on the Pavement lines
11. Select **Context tab > Modify panel > Elevations from Surface**
12. Select ***STH25-Refinement-Top*** surface
13. Type **A**Enter

Generate point data for point tables (macro)

1. In the **Toolspace > Toolbox tab > expand WisDOT Toolbox > expand WisDOT Macros**
2. Right-click Point-Station Offset to UDP
3. Click Execute
4. In the ***WisDOT Points Station-Offset UDP*** dialog box pick Select Points and check Create Point Group
5. Enter Radius Points, into the Point Group name box

6. Select STH25BestFit as ***Alignment 1***
7. Click Apply
8. Select all the radius points
9. Click Enter
10. In the ***WisDOT Points Station-Offset UDP*** dialog box pick Point Group
11. Select Radius Points as the point group
12. Select ***4thAve*** as Alignment 2
13. Click Apply
14. In the **Toolspace > Prospector tab > expand Point Groups** select Radius Points
15. **Right-click > Edit points**

Create point tables

1. **Annotate tab > Labels & Tables Panel > Add Table**
2. Select Add Point Table
3. On the ***Point Table Creation*** dialog box select Table Style
4. Select STA OFF STA OFF NE RADIUS
5. Click the icon next to No Point Group Selected
6. Select Radius Points point group
7. Click Ok
8. Click Ok
9. Place the table in the file

Tip: Rerun Macro with overwrite checked to see alignment station DESC changes.

Insert radius dimensions

1. **Annotate Tab > Dimension panel > Dimension dropdown > Radius**
2. Select DOT 140 RADIUS from the Style dropdown
3. Insert radius dimensions as needed
4. Select Arc end points on Curb and Gutter

Tip: Toggle ANNOAUTOSCALE Icon to add scale of sheet.

Edit point info for tables

1. In the **Toolspace > Prospector > expand Point Groups**
2. **Right-click > Radius Points**
3. Select Edit Points
4. Panorama, radius column, add radius lengths to points

Create sheets

pln-prod-int-dtl-03.mp4 17:28

1. **Output tab > Create Sheets**
2. On the ***Create Sheets – View Frame Group and Layouts*** dialog box
   - Under ***View frame group*** select STH25BestFit-40Scale
   - For ***View frame range*** select Selection
   - Click Choose View Frames
   - Click the green box icon to select view frame from drawing
3. Click Ok
4. Select all layouts in the current drawing
5. Click Next
6. Click Create Sheets
7. Click Ok

Insert lane & shoulder dimensions

1. On the **Annotate Tab > Dimension panel > Dimension dropdown > Aligned**
2. Select DOT 140 LANE & SHLD DIMENSION
3. Insert dimensions as needed

Tip: Toggle ANNOAUTOSCALE Icon to add scale of sheet

Add miscellaneous labels

1. **Annotate Tab > Leaders panel > Leaders dropdown > Multileader**
2. Select DOT 175 BEGIN END PROJECT
3. Insert labels/leaders as needed

Tip: These labels should be placed on paperspace to insure correct rotation of label text.

Tip: Toggle ANNOAUTOSCALE Icon to add scale of sheet.

Storm sewer plan and profile sheets

Last updated: 2014-09-23

Total video time: 81:32

Exercise files: [pln-prod-ss-pln-prfl-data-C3D14.zip]

Create File and Attach References

[pln-prod-ss-pln-prfl-01.mp4] 4:58

Set the data shortcuts working folder

1. In the **Toolspace > Prospector tab > right-click Data Shortcuts**.
2. Select Set Working Folder.
3. Browse to the 87654321 project folder, and go one level up from that.

> **Tip:** You should select the C3D folder that is two levels above the 87654321 project _Shortcuts folder.

4. In the **Toolspace > Prospector tab > right-click Data Shortcuts**
5. Select the Set Data Shortcut Project Folder.
6. Select the project folder 87654321.
7. Click Ok.

Create the drawing File and Attach References

1. Click New
2. Save the new file as 87654321\SheetsPlan\022501-ss.dwg .
3. In the **Toolspace > Prospector tab > Data Shortcuts area > expand Pipe Network area**.
4. Right-click on the ***Storm-10yr*** pipe network name.
5. Choose Open Source Drawing.
6. In the **Toolspace > Prospector tab > expand Pipe Network area**
7. Expand Networks, and expand the ***Storm-10yr*** Storm-10yr network.
8. Left-click on the Pipes.
9. In the **Toolspace > Prospector tab > preview area** (at the bottom) look for the Reference Alignment column.
10. Scroll down through that column to find the alignments that this network references.
11. In the**Toolspace > Prospector tab > preview area**t (at the bottom) look for the Reference Alignment column.
12. Scroll down through that column to find the alignments that this network references.
13. In the **Toolspace > Prospector tab > expand Pipe Networks area > expand Storm-10yr**
14. Left-click on the Structures.
15. In the **Toolspace > Prospector tab > preview area** (at the bottom) look for the Reference Alignment column.
16. Scroll down through that column to find the alignments that this network references.

> **Tip:** The process of searching names can be made easier if you left click the Reference Alignment column header. This will sort the table by this column.

17. In the **Toolspace > Prospector tab > preview area** (at the bottom) look for the Reference Surface column.
18. Scroll down through that column to find the surfaces that this network references.

Tip: The process of searching names can be made easier if you left click the Reference Alignment column header. This will sort the table by this column.

Create file and attach references

pln-prod-ss-pln-prfl-02.mp4 11:11

Create the drawing file and attach references

1. Click New.
2. Click Save As.
3. 87654321\SheetsPlan\022501-ss.dwg
4. **Toolspace > Prospector tab > Data Shortcuts expand Surfaces** header:
5. Right-click on ***Surface – Exist*** and choose Create Reference.
6. In the Style field click on the style name, then select the ellipsis button.
7. Set the style settings as No Display.
8. Cick Ok.
9. Zoom extents so you are near the project.
10. Repeat this for the surfaces:
    - ***Cmbn-Exist-USGS-Top***
    - ***Crdr-Commercial-PipeDatum***
    - ***Ex-USGS-DEM***
    - ***Exist***
    - ***Rfnt-Commercial-Datum***
    - ***Rfnt-Commercial-Top***
11. Expand Alignments, and expand Centerline type.
12. Right-click ***AlexanderDr*** and choose Create Reference.
13. Set the Label Set to 1IN 100FT-Ticks 200' Major:100' Minor-NoPCPT
14. Click Ok to create the reference.
15. Repeat this process for the alignments:
    - ***CarriageDr***
    - ***CastleOakDr***
    - ***CommercialS***
    - ***OldeSchoolRd***
    - ***RegentPl***
    - ***SParkAve***
16. Expand Pipe Networks.
17. Right-click on ***Storm-10y*** and choose Create Reference.
18. Leave all of the defaults (including the parts list)
19. Click Ok.

Requirement: Before bringing in the pipes as a data shortcut you need to make sure the styles are in this file. The template file we used to start this drawing intentionally does not have pipe styles in it so it isn't cluttered.

1. In the **Toolspace > Prospector tab > Data Shortcuts area > expand Pipe Network area**.
2. Right click Storm-10yr
3. Open source drawing
4. Tile the two files **View tab > User Interface panel > Tile Vertically (or Horizontally)**
5. Make sure the Pipe-StormSewer is the active one by left clicking in it
6. **Toolspace > Settings tab > expand Pipe Networks > expand Parts List**
7. Click and drag the Storm Sewer and drag it over to the drawing area of the 022501 drawing
8. Save.
9. Close the Pipe Drawing
10. **Toolspace > Prospector tab > Data Shortcuts area > expand Pipe Network area > Right click > Create Reference**.
11. In the dialog box Network parts list > select Storm Sewer

Tip: You could also drag the Storm Sewer down the toolspace into the other drawing

Info: If there is any other data that you need data referenced into the file repeat these steps for the appropriate objects.

1. Select **Insert tab > Reference panel > Attach**
2. Browse to 87654321/Design/Edgelines/Pavt.dwg
3. Cick Open.
4. Make sure Xref Attach dialog is set to:
   - Attachment Type: Overlay
   - Path Type: Relative
5. Click Ok
6. Select **Insert tab > Reference panel > Attach** .
7. Browse to 87654321/BaseData/Survey/Topo-EX_Survey.dwg
8. Click Open
9. Make sure Xref Attach dialog is set to:
   - Attachment Type: Overlay
   - Path Type: Relative
10. Click Ok
11. If there are any other dwg files that need to be XREF'd into this file go to select **Insert tab > Reference panel > Attach** .

Create alignments for each pipe run

pln-prod-ss-pln-prfl-03.mp4 6:12

Info: Alignments need to be created above each pipe network to capture the profile data above all the pipes and structures, and to project the pipe data onto the profile views. These alignments will also serve as the baseline for the view frames that will be used to create the plan and profile sheets of these pipes. These alignments should be created from south to north and west to east.

Create an alignment and profile for the pipe trunk

1. Pan and zoom to the south end of the project.
2. Select the apron end wall structure just south of the SParkAve alignment. This is structure number 7.
3. In the**Context tab > Launch Pad panel** , select Alignment from Network.
4. Pan north to the next eastbound turn (***RegentPl*** alignment), and select on the manhole in that intersection. This is structure 1.
5. Name the alignment ***Trunk 7-1***.
6. Set the alignment style to anything appropriate.
7. Set the Alignment Label Set to _No Labels
8. Make sure the Create Profile and Profile View is check-marked.
9. In the Create Profile from Surface dialog make sure the Alignment assignment is ***Trunk 7-1***, and the ***Exist*** surface is selected.
10. Click Add
11. Click Ok

Tip: If you need to confirm, or see the profile with the pipes click Draw in Profile View, then follow that dialog through the profile view creation wizard.

12. Close the Event Panorama if it opened.

Create an alignment and profile for the pipe laterals

1. Select the structure at the north end of the ***Trunk 7-1***, to the west of Commercial Road. This is structure 1B.
2. In the**Context tab > Launch Pad panel** , select Alignment from Network.
3. Pan east and north to the structure at the east side of Commercial Road. This is structure 1A.
4. Name the alignment ***Lateral 1B-1A***.
5. Set the alignment style to anything appropriate.
6. Set the Alignment Label Set to _No Labels
7. Make sure the Create Profile and Profile View is check-marked.

8. In the Create Profile from Surface dialog make sure the Alignment assignment is ***Lateral 1B-1A***, and the ***Exist*** surface is selected.
9. Click Add
10. Click Ok

Tip: If you need to confirm, or see the profile with the pipes click Draw in Profile View, then follow that dialog through the profile view creation wizard.

11. Close the Event Panorama if it opened.

Create view frames for the sheets

pln-prod-ss-pln-prfl-04.mp4 5:02

Info: The view frames will be created along the Trunk pipes so that the sheets have a base as they are being created.

Create the view frames

1. In the **Output tab > Plan Production panel > Create View Frames**
2. In the Create View Frames dialog select the ***Trunk 7-1*** alignment from the drop-down list.
3. Click Next.
4. Make sure the Plan and Profile option is selected.
5. For the Template for Plan and Profile Sheet, select the ellipsis button (“three dot” button).
6. Make sure the template file is set to C:\WisDOT\stnd\c3d2014\SheetTemplates\02-SS-wdot14.dwt. If this is not the path appearing in the Drawing Template File Name box click the ellipsis button to browse this path and select this template file.
7. In the Select a Layout to Create New Sheets window select SS 1 IN 100 FT.
8. Click Ok.
9. On the left side of the dialog select the Profile Views hypertext to advance to that page of the wizard.

   Tip: You could also advance through the pages by clicking Next three more times.

   - Set Select Profile View Style to Storm Sewer
   - Set Select Band Set Style is set to No Display
10. Click Create View Frames.
11. Repeat these steps for other trunk alignments in the file.

Turn the alignment display off

Info: After the frames are created make sure the alignments over the trunks and laterals are not visible.

1. In the **Toolspace > Prospector tab > Alignments > Miscellaneous**
2. In the **Toolspace > Prospector tab > preview area**, click Shift and select the trunk and lateral alignments from the list.
3. Scroll to the right to find the Style column.
4. Right-click the header of the style column and choose Edit.
5. Select _No Display.
6. Click Ok.

Create sheets from the view frames

pln-prod-ss-pln-prfl-05.mp4 9:44

The Create Sheets command makes use of the “stacked profiles” process, which is slightly different than the process used for road design plan and profile sheets.

Create sheets

1. In the **Output tab > Plan Production panel > Create Sheets**
2. Make sure the correct View Frame Group is selected (***VFG-Trunk 7-1***)
3. For the Layout Creation option, select the All Layouts in the Current Drawing.

   Warning: This is important, and will not work with a different setting.

5. For the Layout Name, select the layout name template button to the right.
6. In the Name field type `0225`.
7. In the Name Field, place the cursor immediately after the name 0225 (no space between)
8. Click the Insert button.
9. Set the Number Style is to 01,02,03...
10. Set the Starting number to 1.
11. Click Ok.
12. Click Next
13. For the Sheet Set select Add to an Existing Sheet Set.
14. Click the ellipsis button.
15. Select 87654321\SheetsPlan\87654321.dst.
16. Click Open
17. At the bottom, select Sheet File Name .
18. In the Name field type `0225`

19. In the Name Field, place the cursor immediately after the name 0225 (no space between).
20. Click the Insert button.
21. In the Name field, place the cursor immediately after the <Next Counter> and type **-SS**
22. Set the Number Style is set to 01,02,03...
23. Set the Starting number to 1.
24. Click Next.
25. In the Other Profile View Options area, click Choose Settings,
26. Click the Profile View Wizard.
27. On the left side, select the General page..
28. At the bottom of the page select the Show Offset Profiles By Vertically Stacking Profile Views .
29. On the left select the Stacked Profile. page.
    - Set the Number of Stacked Profiles o 2
    - Gap between views should be 0’
    - Set all three styles to Storm Sewer
30. Click Next.
31. With the Select Stacked View to Specify Options set to Bottom View, make sure there is nothing set to Draw.
32. With the Select Stacked View to Specify Options set to Top View, make sure:
    - the ***Trunk 7-1*** profile is set to Draw
    - the Style is set to PROF Existing
    - the Labels are set to _No Labels
33. Click Next.
34. In the Pipe/Pressure Pipe Networks page:
    - Change the Stacked Profile to Top
    - Click the Select From Screen icon
    - Type **P** at the command line for individual parts
    - Left-click each pipe and structure that is part of the trunk sewer and belongs in the trunk profile view.
35. Click Enter
36. Click Finish

Tip: This will return you to the Create Sheets Wizard.

38. Click Create Sheets.
39. Click Ok .
40. Select a location to the east of the project to place the profile views.
41. Close the Panorama Event Viewer if it opens.

Adjust the profile views

pln-prod-ss-pln-prfl-06.mp4 8:09

The profile views will generally come in too small for the viewport provided. Some minor station and elevation adjustments may be necessary.

Lengthen the profile view to fit the sheet

1. Select the 022501 layout tab.
2. Double click in the profile view viewport to make it active.
3. Select the top profile view.

> **Tip:** Remember there are two profile views stacked on top of each other so select higher rather than lower.

4. In the **Context tab > Profile View Properties**
   - Select the Stations tab
   - Select User Specified Range
     - Change the Start Station to -300
     - Change the End station to add 300’ to whatever the end station is (1361.42 in this case)
   - Click Apply
     > **Tip:** Apply allows more adjustments to be made.
   - Change the Start station to -240, and the End station to 1275.
   - Click Ok.
   - Select the lower profile view

> **Tip:** This fits the profile view inside the viewport so the labels can be read.

6. In the **Context tab > Profile View Properties**
   - Select the Station tab
   - Select the User Specified Range
   - Set the Start and End Stations to the same as the profile view above (-240 to 1275 in this case)
7. Click Ok

Adjust the elevation of the profile views

1. In the 022501 layout tab, make sure the viewport is (still) active (double click inside it if it is not).
2. Select the top profile view.

> **Tip:** Remember there are two profile views stacked on top of each other so select higher rather than lower.

3. In the**Context tab > Profile View Properties** ..
   - Open the Elevations tab.

     Tip: Make note of the “height” value. It is grayed out, but whatever changes you make you need that value to be the same as it is at the start. In this case the value is 25’.

     Tip: Change the Minimum elevation to a lower value to push the profile view and the pipes displayed upward. Change this to a higher number if you need to push the view and pipes down

   - Change the Minimum elevation to 750

     Tip: Repeat this step until the view and the structures appear in the view properly.

     Tip: In the Maximum field change the value until the Height field reads what it did at the beginning.

   - In the Maximum field change the value to 775

     Tip: At the top of the profile view there is an elevation label that we need to remove (half off the page). To do this 0.01’ less than what it is now.

   - Change the Maximum elevation to 774.99

Create profile views for the storm laterals

pln-prod-ss-pln-prfl-07.mp4 7:04

Info: You will be placing profile views for the laterals below the overall profile view for the trunk.

Create profile views

1. Switch to the Model tab, and pan to the stacked profile view.
2. In the top profile view check the lowest elevation grid line . This elevation will become necessary in a future step. In this case it is 750’.
3. Select the lower of the stacked profile views.
4. In the **Context tab > Profile View Properties** .
   - In the Elevation tab, in the User Specified Height set the minimum elevation to 750 and maximum elevation to 775.
5. In the **Home tab > Profile & Section Views panel** select the Profile View drop down and choose Create Profile View..

6. In the General page:
    - Select the alignment ***Lateral 1B-1A***
    - Set the profile view style to Storm Sewer
7. In the Profile View Height set the Profile View Height option to User Defined.
8. Set the Minimum elevation to 750.
9. Set the Maximum elevation to 775.
10. In the Profile Display Options page, set the Labels to _No Labels
11. In the Pipe/Pressure Network page check mark Select for the ***Storm-10yr*** network.
12. Uncheck Show Only Parts.. in the lower left.
13. Uncheck the Select option for the ***Storm-10yr*** network.
14. Individually select the lateral pipes and structures ***1A-1*** and ***1B-1*** laterals.
15. Individually select structures ***1***, ***1A*** and ***1A***.
16. Click Next.
17. At the top of the Data Bands page Change the Select Band Set to No Display.
18. Click Create Profile View.
19. Place the profile view somewhere near where the profile view will ultimately be placed.
20. Select the Profile View grid and select Profile View Properties.
21. In the Station tab set the User Specified Range to -20 for the Start, and 75 for the End.
22. Click Ok.

Remove profile view band

1. Select the lateral's profile view grid.
2. In the **context tab > Profile View Properties** .
3. In the Bands tab click the Import Band Set.
4. Choose the No Display option.
5. Click Ok.

Create pipe network labels

pln-prod-ss-pln-prfl-08.mp4 5:20

Place the pipe network plan labels

1. Select the layout tab 022501.
2. Double click in the top "plan" viewport to access the model.
3. Select on one of the pipe network parts.

Tip: Either pipe or structure doesn't matter.

4. In the **Context tab > Labels & Tables panel > Add Labels drop-down > Add Pipe Network Labels .**

5. In the Add Labels dialog:
    - Change the Label Type to Entire Network Plan
    - Set the Pipe Label Style to PLAN Storm – Multiple Arrows
    - Set the Structure Label Style to Structure Desc Circle Left
    - Click Add, then select one of the parts of the network
6. Select the structure labels and grip-edit move them to locations that are readable and appropriate.
7. Several of the structures have labels that are in tight locations.
    - Select the labels that need to be flipped, right-click and choose Properties
    - In the Structure Label Properties change the Structure Label Style to Structure Desc Circle Right
        - Grip-edit move these labels to be appropriately placed
        - Repeat as necessary to place all of the labels appropriately
8. Click Close

Fix structure styles

pln-prod-ss-pln-prfl-09.mp4 10:19

- Select on the end wall structure, right-click and select Structure Properties.
- In the Information tab change the style to Proposed End Wall (Storm Sewer).
- Click Ok

Create pipe network labels

Place the pipe network profile labels

1. In the 022501 layout tab, activate the profile view viewport by double clicking inside of it.
2. Select on one of the pipe network parts. Either pipe or structure doesn't matter.
3. In the **Context tab > Labels & Tables panel > Add Labels drop-down > Add Pipe Network Labels** .
4. In the Add Labels dialog:
    - Change the Label Type to Single Part Profile
    - Set the Pipe Label Style to PROF Storm
    - Set the Structure Label Style to Structure Profile
5. Click Add.
6. Select on each pipe and structure that needs a label.

Adjust Pipe Labels

1. Move labels so they are more appropriately placed.
    - Pipe labels can be shifted along the pipe by the diamond grip point
    - Pipe Labels can be dragged and dropped with a leader if you select the square grip point
    - Structure labels can be individually adjusted by selecting on the label
    - Select the diamond grip point and adjusting the distance of the label line

Add pipe invert labels

1. Select on one of the pipe network parts. Either pipe or structure doesn't matter.
2. In the **Context tab > Labels & Tables panel > Add Labels drop-down > Add Pipe Network Labels** .
3. In the Add Labels dialog:
    - Change the Label Type to Single Part Profile
    - Set the Pipe Label Style to Invert - End
    - Set the Structure Label Style to Rim Elevation
4. Click Add.
5. Select on each pipe and structure that needs a label.
6. Check the label elevation, and which end of the pipe it is actually labeling

    Tip: The terms "Start" and "end" are drafting terms, not representing downslope flow

8. In the Add Labels dialog:
    - Change the Label Type to Single Part Profile
    - Set the Pipe Label Style to Invert - Start
9. Click Add.

Adjust the invert elevation labels

1. Select on an invert elevation label.
2. Use the diamond grip to slide the label to the edge of the structure.
3. Use the Nearest OSNAP to snap to the edge of the structure.
4. Grab the labels square grip point and drag the text away from the structure.
5. Grab the label's "plus" shaped grip point to add a vertex to the leader line.
6. Use the Endpoint OSNAP to snap this new vertex to the pipe invert where it meets the structure.
7. Repeat for each pipe invert elevation label.

Adjust the rim elevation labels

1. Select the rim elevation label.
2. Use the rhombus (diamond) grip point to drag the label straight up from the rim location.
3. In the label’s grip points select the rhombus grip point to adjust the leader location slightly to the side.
4. With the rim elevation label selected right-click and choose Label Properties.
5. In the Label Is Pinned field set to True.
6. Grab the rim elevation label’s square grip point and drag the label to the side to a more appropriate location.

Place the elevation labels in the lateral profile view

pln-prod-ss-pln-prfl-10.mp4 9:11

Place the elevation labels

1. Go to the Model tab.
2. Zoom to the lateral profile view.
3. Select on a pipe or structure.
4. From the **Context tab > Add Labels drop down > Add Pipe Network Labels** .
5. In the Add Labels dialog, switch the Label Type to Single Part Profile.
6. Set the Pipe Labels to PROF Storm style.
7. Set the Structure Labels to Structure Profile style
8. Click Add.
9. Click on each pipe and structure.
10. In the Add Labels dialog
11. Switch the Pipe Labels to the Invert – End style
12. Switch the Structures to Rim Elevation style
13. Click Add.
14. Select on each pipe, and on each structure.
15. In the Add Labels dialog switch the Pipe labels to Invert – Start style.
16. Click Add,
17. Select each pipe.

Adjust the structure rim elevation label locations

1. Select the structure number label.
2. Select each pipe.
3. Grab the top grip point and drag the label to a better location.
4. Select the structure Rim Elevation labels.
5. Click the square grip point and drag them straight up from the rim location.

6. Grab the rhombus (diamond) grip point for each structure rim elevation label, and adjust the leader line slightly off to the side.
7. With all of the structure rim elevation labels selected, right-click and choose Label Properties.
8. In the Label is Pinned field, set to TRUE.
9. Select the square grip point for the rim elevation labels and shift them where they are appropriate.

Adjust the label locations

1. Select on the Structure labels that may need to have their position adjusted.
2. Select the top rhombus (diamond) grip point and adjust the label location appropriately.
3. Select the rim elevation labels and adjust them straight up from the rim location.

   Tip: Leave these for later position adjustment.

5. Click on any pipe labels that are tool long for the pipe they are labeling.
6. Use the square grip point to drag the label to a more appropriate location
7. Select the Pipe Invert elevation labels, and use the square grip point to drag them away from the pipe.
8. Identify which label should go to which side of the pipe, based on elevation.
9. Select the first invert elevation label.
10. Use the diamond grip point to drag the label.
11. Use the Nearest OSNAP to sap to the structure.
12. Repeat for the other invert elevation labels.
13. Select on the invert elevation labels.
14. Click the “plus” shaped grip point in the middle of the leader.
15. Use End Point OSNAP to snap the new leader bend to the pipe invert at the structure.
16. Repeat for each invert elevation label.

Move lateral profile grid to sheet profile location

Move the profile grid

1. Select the lateral profile view.
2. Use the grip point to move the profile grid.
3. Use the Nearest OSNAP to snap the profile view grip point to the bottom of the ***Trunk*** profile view grid.

Adjust the pinned labels

1. Select the rim elevation labels.
2. In the **Context tab > Toggle Label Pin > Alignment drop-down > Create Alignment from Objects**

   Tip: If all of the labels are selected this will pin all of the rim elevation labels.

4. Select the square grip point of a rim elevation label and adjust it appropriately.
5. Repeat for each rim elevation label.
6. Select each label and use the square grip point to move it to a more appropriate location.

Tip: Finer label placement can happen in the layout tab through the viewport so that it looks more appropriate on the sheet.

Final sheet cleanup

pln-prod-ss-pln-prfl-11.mp4 4:22

Move profile grids below pipe network

1. In the Model tab, select the profile view grids.
2. Right-click and choose Display Order Options
3. Choose Send to Back..

Place and rotate north arrow

1. In the Model draw a line near the north end of the profile view frame.
2. In the **Home tab > Draw panel > Line > Line function** .
3. Turn on the Ortho status option (F8. or from the status bar).
4. Draw a line near the top inside of the frame
5. In the 022501 layout tab zoom to the top of the plan viewport.
6. Turn on the OSNAP – Endpoint from the status bar.
7. Select the North Arrow block.
8. Grab the grip point and move the North Arrow near the line that was drawn on model.
9. Use the Endpoint OSNAP to snap to the left end of the line.
10. With the north arrow block still selected right-click and chose Rotate.
11. Select the left end of the line as the rotation point.
12. Type **R**.
13. Select the bottom of the north arrow block then select the top of the north arrow block.
14. Select on the right end of the line to rotate the north arrow correctly.
15. Double-click inside the plan view port to make it active.
16. Select the line that was drawn in model.
17. Click Delete.
18. Double-click outside the viewport to close the active viewport.

Sign block fundamentals

Last updated: 2015-04-13

Total video time: 12:38

Where can sign blocks be found

pln-prod-sgn-blc-fndmntl-01.mp4 2:23

Sign blocks can be found on the Tool Palette and the Design center.

Getting blocks from the tool palette

On the **Home tab > Palettes panel > Tool Palette icon** .

In the Tool Palette, select **WisDOT Manage > Wis-Signs**

Getting blocks from the Design Center

On the **Home tab > Palettes panel > Design Center icon**

Navigate to C:\wisdot\stnd\c3d14\blocks.

Select block and place in paperspace.

How to use dynamic blocks

pln-prod-sgn-blc-fndmntl-02.mp4 5:49

Select the block,

Select the down arrow grip (visibility state).

Tip: Blocks contain multiple visibility states. Each visibility state changes the layer (inside the block definition) and the color so to plot correctly.

Sign blocks in paper space

Info: Sign blocks should be placed in paper space as they are scaled correctly and can be manipulated on each sheet individually

Sign blocks in model space

Info: Sign blocks can be placed in model space. This option comes with several drawbacks including rotation and placement.

How to use blocks with attributes

pln-prod-sgn-blc-fndmntl-03.mp4 4:26

Double click on attribute text to bring up the Attribute Editor dialog.

With the block selected, attributes can be accessed in the Properties dialog.

Signing plan sheets

Last updated: 2015-04-13

Total video time: 20:52

Exercise files: pln-prod-sgn-pln-data-C3D14.zip

Open the existing plan sheet drawing

pln-prod-sgn-pln-01.mp4 5:34

1. From the Applicaton menu, click Open.
2. Select C:\WisDOT\Design\c3d\12345678\SheetsPlan\023201-ps.dwg
3. Click Open.

Creating the Permanent Sign Sheets

1. From **Home tab > Create Design panel > Alignment drop-down > Create Alignment from Objects** Output tab of the ribbon, Plan production panel, select Create Sheets.
2. Set the view frame group.
3. For Layout Creation set to All layouts in current drawing, Change the Layout Name so it reads <[Next Counter(CP)]>,
4. Click the Edit Layout Name button to change the single digit to double digit for the counter and check that the counter is starting at 1 of 1,
5. Click Ok.
6. In the **Sheet Set Manager tool palette > Sheet List tab > Add to an Existing Sheet Set** .
7. Click the ellipsis button
    - 12345678\Sheets Plan\023201.dst.

Tip: Hint: If there is not a sheet set already associated with the project refer to video 150.020.001 Change the sheet name to 0232<[Next Counter(CP)]-ps.

8. Click the Edit Layout Name button.
9. Check the counter is set to 1 of 1 Click
10. Create Sheets.
11. Click Ok .
12. In the Sheet Set Manager double click on one of the files to open.

Add permanent signing using Tool Palette (WisDOT Manage) pln-prod-sgn-pln-02.mp4 10:17

1. Select the layer drop-down and select the P_SGN layer to be current

Tip: Select the Permanent Signs filter to sort out unnecessary layers

2. Switch to Model space
3. On the **Home tab > Palettes panel > Tool Palettes** .
4. Change UCS to align with view frame\paper space view
5. On the **View tab > Coordinates panel > UCS object** .
6. Select view frame border as the object
7. Change View (model space) to orient with object
8. On the **View tab > Coordinates panel > Option arrow**
9. On the settings tab of the UCS dialog box, check "Update view to plan when UCS is changed"
10. Click Ok
11. Select World from the Named UCS combo control drop-down.
12. Select UCS object command
13. Select view frame border as the object
14. **Sheet Set Manager tool palette > Sheet List tab > WisDOT Manage > Wis-Signs > M tab** .
15. Select block M1-6.
16. Place on sheet in paper space.
17. Select the dynamic arrow.
18. Select REMOVE-2N.
19. Double-click block to open annotation.
20. Type **25** Enter .
21. Click Ok.
22. Copy the M1-6 block.
23. Place near new sign location.
24. Select block M1-6.
25. Place on sheet in paper space.
26. Select dynamic arrow.
27. Select REMOVE-2N, Double click block to open annotation, type 25 for Value, and
28. Click Ok.
29. Place on sheet in paper space.
30. Select the dynamic arrow.
31. Select INSTALL-2N.
32. Switch to Paper space Layout 11.
33. Double click in the viewport,
34. **Sheet Set Manager tool palette > Sheet List tab > WisDOT Manage > Wis-Signs > R1-R3 tab** .

35. Select block R1-1.
36. Place block in model view near intersection.
37. Select dynamic arrow.
38. Select REMOVE.
39. Copy block R1-1.
40. Place near new sign location.
41. Select block.
42. Select down arrow.
43. Change to INSTALL

Create a legend on the sheet (optional)

pln-prod-sgn-pln-03.mp4 5:01

Info: Some offices and/or projects use a legend to describe the blocks shown in the sheet.

Place the legend title

1. **Annotate tab > Text panel > Alignment drop-down > Create Alignment from Objects** ,and set the style to Legend.
2. **Annotate tab > Text panel > MTEXT icon** .
3. In the sheet select a point then select a second point to create a text editing box.
4. In the **Text Editor > Formatting panel > U icon** .
5. Type **LEGEND**Enter.
6. Click outside the text editor to end the text creation.

Place the blocks in the legend

1. Open the Tool Palette (if it has been closed **Home tab > Palettes panel > Toolpalette icon**).
2. **Sheet Set Manager > Sheet List tab > WisDOT Manage > Wis-Signs Tool Palette**.
3. Alternately the block previously used in paper space for each sheet can be copied to the legend. Line them up under the legend text.
4. Place the description text in the legend annotate tab, text panel, set the style to 200. Click the MTEXT tool.
5. Select two points to create a text editor box to the right side of the blocks.
6. Type in the appropriate description.
7. Click outside the text editor box to end the text creation.
8. Select the text,
9. (**Right-click > Basic Modify tools > Copy** .
10. Left click text locations next to each block.
11. Double click on each text to edit the text to what is descriptive of the block.

Staged signing plan sheets

Last updated: 2015-04-13

Total video time: 09:20

Creating the staged sign sheets

pln-prod-sgn-pln-stg-01.mp4 3:30

1. From **Output tab > Plan Production panel > Create Sheets** .
    - Set the view frame group.
    - For Layout Creation set to All layouts in current drawing.
    - Change the Layout Name so it reads 0260<[Next Counter(CP)]>-s1.
    - Click the Edit Layout Name button.
        - Change the single digit to double digit for the counter.
        - Check that the counter is starting at 1 of 1.
    - Select N for the north arrow block.
2. In the Sheet Set tab change to Add to an Existing Sheet Set.
    - Click the ellipsis button to browse to the 12345678\Design\Corridors\023201.dst, Sheets Plan

      Tip: If there is not a sheet set already associated with the project refer to video 150.020.001

    - Change the sheet file name to 0260<[Next Counter(CP)]-s1.
    - Click the Edit Layout Name
    - To change the single digit to double digit for the counter and check that the counter is starting at 1 of 1.
3. Click Create Sheets.
4. Click Ok
5. In the Sheet Set Manager double click on one of the files to open it if they were created in a separate file.

Edit xref block as existing signage

pln-prod-sgn-pln-stg-02.mp4 2:41

1. **Home tab > Layers panel > Layer properties**
2. Use the layer filters to select only the 023201-ps xref layers
3. Scroll to the P_SGN_Text.
4. Freeze the layer.

5. Scroll to the P_SGN_Cell.
6. Change the viewport plot style to existing

Add permanent signing using Tool Palette (WisDOT Manage)

pln-prod-sgn-pln-stg-03.mp4 3:09

1. Select the layer drop-down and select the P_SGN layer to be current

Tip: Select the Permanent Signs filter to sort out unnecessary layers

2. Switch to Layout tab 026008-s1
    - On the **Home tab > Palettes panel > Tool Palettes**
3. **Sheet Set Manager > Sheet List tab > , select WisDOT Manage > , select wissigns > Wis-Signs M tab**
4. Select the M1-6 block.
5. Place block on sheet in paper space.
6. Select dynamic arrow.
7. Select REMOVE-2N.
8. Double- click block to open annotation.
9. Type **25**Enter
10. Click Ok.
11. Copy block M1-6.
12. Place near new sign location.
13. Select block.
14. Click down arrow,
15. Change to INSTALL-2N
16. Select Wis-Signs R1-R3 tab
17. Select block R1-1.
18. Place on sheet in paper space.
19. Select dynamic arrow.
20. Select REMOVE,
21. Copy block R1-1.
22. Place near new sign location,
23. Select block.
24. Select down arrow.
25. Change to INSTALL.

Styles, labels, and tables

Last updated: 2010-07-01

Total video time: 12:30

Styles, labels, and tables

pln-prod-styl-lbl-tbl-01.mp4 12:30

- Styles
- Style Labels
- Annotation Labels
- Tables

Exercise - Annotate cross sections

Last updated: 2011-07-01

Total video time: 06:32

Exercise files: pln-prod-anno-xs-data-C3D12.zip

Annotate cross sections

pln-prod-anno-xs-01.mp4 3:16

1. Modify and set Section View Group settings including annotations.
2. Delete project data and download and unzip this exercise.
3. Open file 12345678\SheetsPlan\090101_xs.dwg

Set section view group bottom to top

4. **Toolspace > Prospector tab**, right-click ***Section View Group - 1***
5. Click Properties.
6. Under Group Plot Styleset to "By Page Bottom to Top".
7. Click Ok.
8. Click Ok.

Annotate section station labels

pln-prod-anno-xs-02.mp4 3:16

1. From Prospector, click Section View Group - 1
2. Click one of the sections in the list below. Press Ctrl+A to select all sections
3. Right-click the selected sections and click Select. Press Ctrl+1 to view the Properties window of all sections.
4. Change Description to F

5. Change Style to ***Sheets 1 IN 20 FT Horiz 20 FT Vert***
6. Press Esc to clear the selection
7. Description can also be entered in Create Section View workflow.
8. **Home tab > Profile & Section Views ribbon > Section Views button > Create Multiple Views.**
9. **Create Multiple Section Views dialog > General > Description: F**

Data exchange

Translate DGN to DWG workflow using Civil 3D 2016

Last updated: 2017-12-18

Translate DGN to DWG workflow using Civil 3D 2016

This workflow document will outline the steps involved to translate a MicroStation DGN file to AutoCAD 2016 DWG file format. The workflow will be Civil 3D based and the final deliverable will be the DWG file.

Warning: The DGN import and export capabilities are designed to provide a fundamental exchange of information between MicroStation V8 DGN files and AutoCAD DWG files. However, translating data from one format to a completely different format has inherit compromises and substitutions.

Simple elements: Simple geometric objects such as lines, arcs, and circles, and properties such as layer assignments correlate directly between the DWG and DGN data formats.

Elements with custom properties: Data with built-in features or variations are visually approximated. For example, text and dimensions might have specialized formatting, and color definitions might be customized.

Product-specific features: Some data cannot be translated completely. For example, product-specific features such as data fields or dynamic blocks can be represented visually but not behaviorally.

No symbol color: AutoCAD only supports colors for lines so all entities in the DGN file that have a color property set for a symbol in MicroStation lose the symbol color when imported as a block.

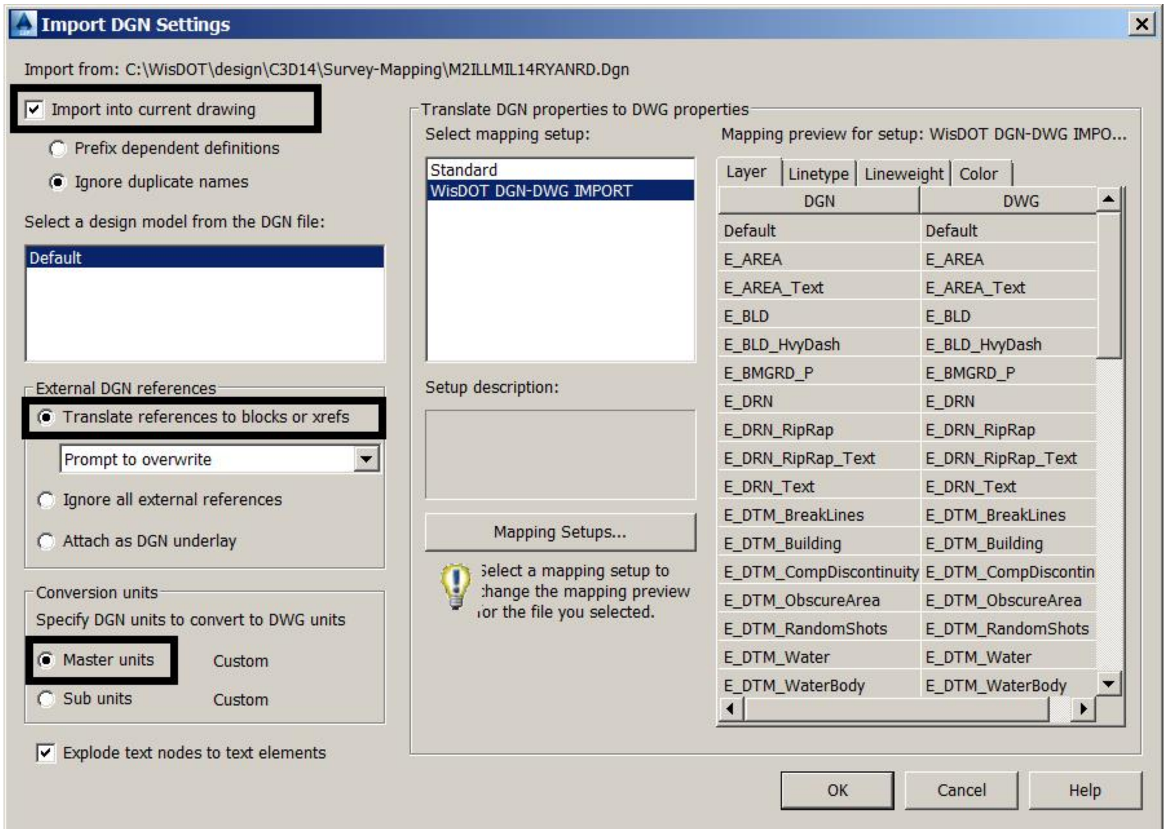
Multilines do not retain linetypes: When importing DGN files that contain multilines, any linetypes associated with the multilines do not display.

Closed property of polyline not retained: The closed property of a DGN polygon or closed polyline is automatically set to No when imporproting a DGN file into AutoCAD. This is done to ensure that linetypes display properly.

Import to AutoCAD

1. In AutoCAD Civil 3D create a New drawing.
2. From the Application Menu Button select Open > DGN. The ***Import DGN File*** dialog will appear.
   Command: **`DGNIMPORT`**

3. Select the file you want to convert and then select Open. The DGN Import Settings dialog will appear.
4. Check ON Import into current drawing and select Ignore duplicate names radio button.
5. In the External DGN references section of the dialog select the radio button Translate references to blocks or xrefs.
6. In the Specify DGN units to convert to DWG units select the Master units radio button.



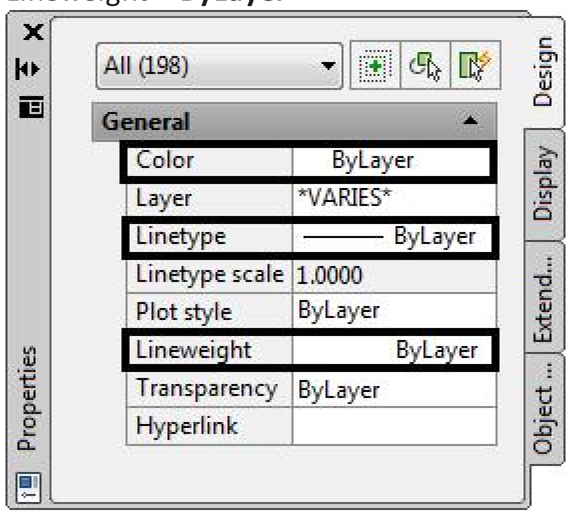
Info:

In the Import DGN Settings dialog box, if you select “Import into Current Drawing” and select the “Translate References to Blocks or Xrefs” option in the External DGN references section, all referenced DGN files are converted to block references. If you do not select “Import into Current Drawing” and select the “Translate References to Blocks or Xrefs” option, then all referenced DGN files are converted to DWG external references.

If you are importing a V7 DGN file that MicroStation V7 DGN file does not have ByLayer setting for color. The user may want to use the Standard DGN mapping rather than the WisDOT one to preserve colors.

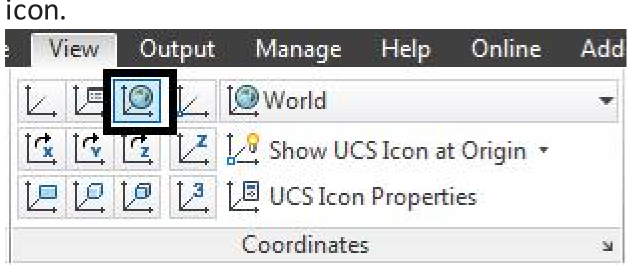
7. Click the WisDOT DGN-DWG IMPORT as the setup.
8. Click the OK button. The Import DGN dialog will close and the file will be imported.

9. Zoom extents the drawing and Select All the elements.
10. **Properties dialog**
    - Color = **ByLayer**
    - Linetype = **ByLayer**
    - Lineweight = **ByLayer**



Verify the imported drawing

1. In AutoCAD Civil 3D go to the Ribbon and the **View tab > Coordinates** panel select World icon.



Info:
World aligns the UCS with the world coordinate system (WCS). You can also click the UCS icon and choose World from the origin grip menu.From the pull down menu **View > 3D Views > Plan View > World UCS**
Command: **PLAN [W]** Enter

Plan view set to World displays an orthographic view of the XY plane of a specified user coordinate system.

2. Locate a known coordinate location in the file and verify the coordinates out to 3 decimal points.
3. Save drawing and then Exit AutoCAD Civil 3D.

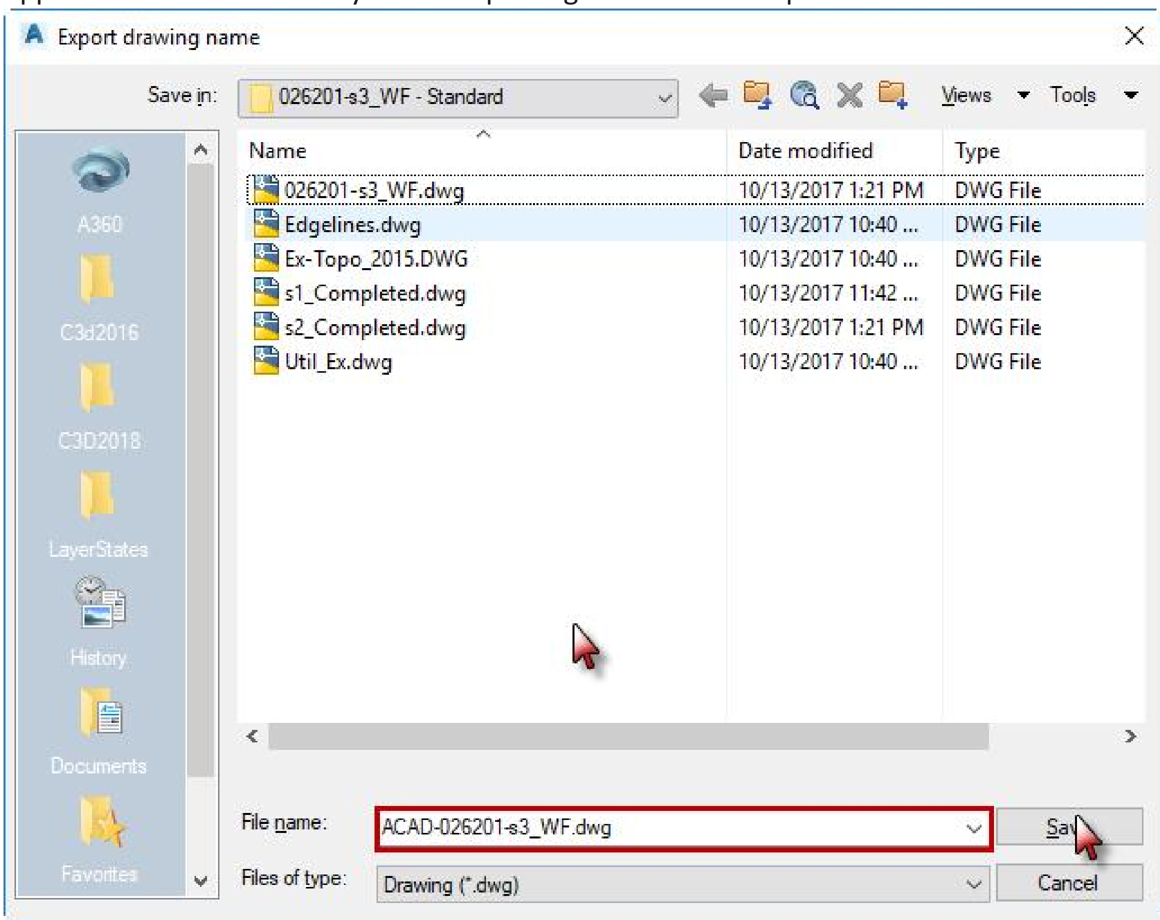
Translate DWG to DGN workflow using Civil 3D 2016

Last updated: 2017-12-18

Export to AutoCAD

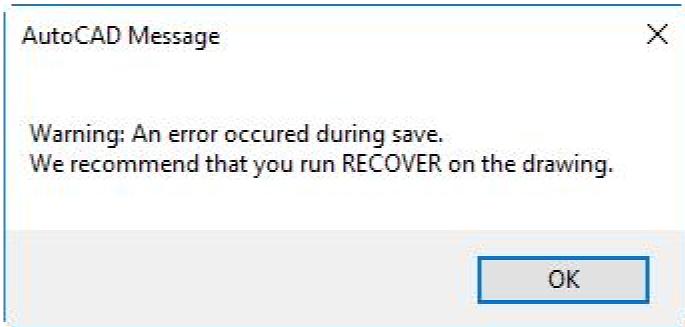
This workflow document will outline the steps involved to translate an AutoCAD Civil 3D 2016 file formation to MicroStation V8 DGN file format. The workflow will be Civil 3D based and the final deliverable will be the V8 DGN file.

1. In AutoCAD Civil 3D open DWG drawing file you want to convert to MicroStation DGN.
2. At the command line **EXPORTTOAUTOCAD**. The Export drawing name dialog will appear with the file name you are exporting with an ***ACAD-*** prefix.



3. Click the Save button. The file will be exported to the folder.
4. The export may take some time to complete depending on the complexity of the drawing and the number of Civil 3D objects. If you get a warning message OK to keep the process

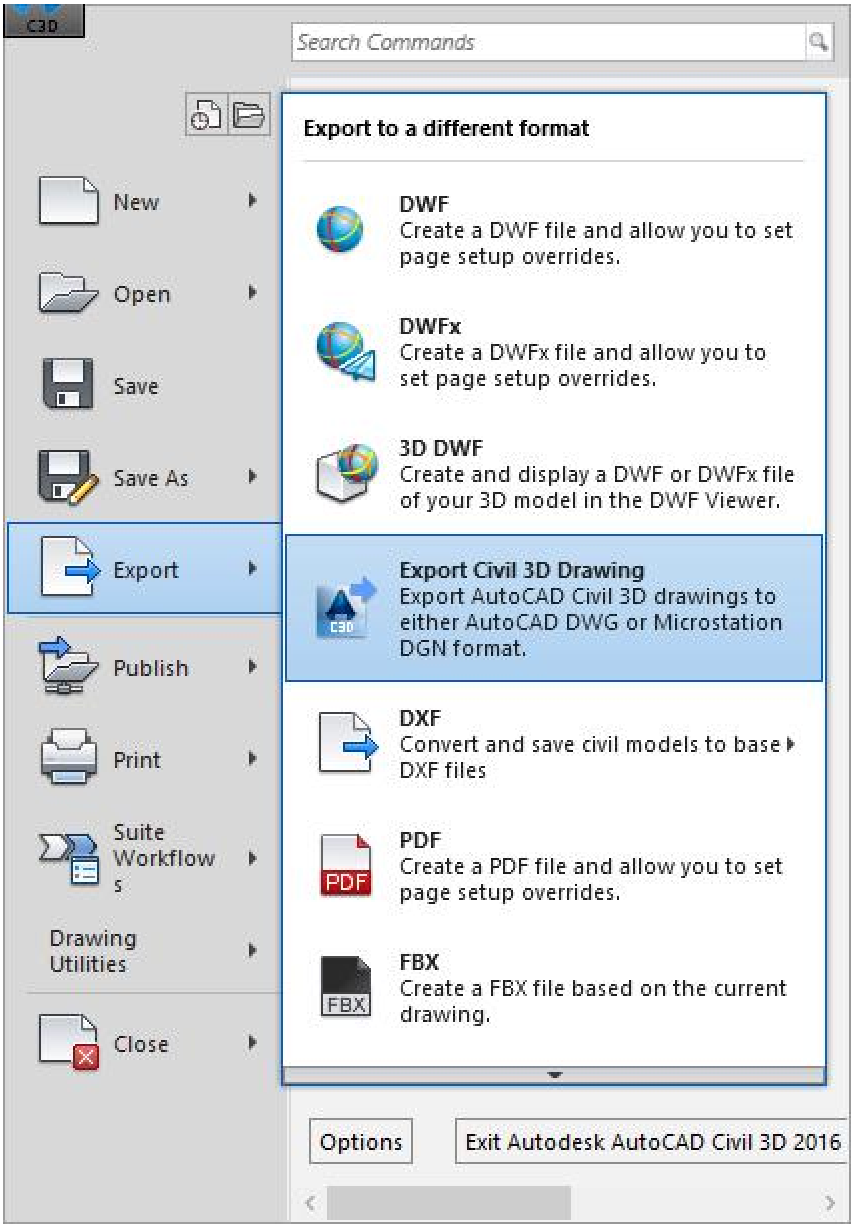
moving.



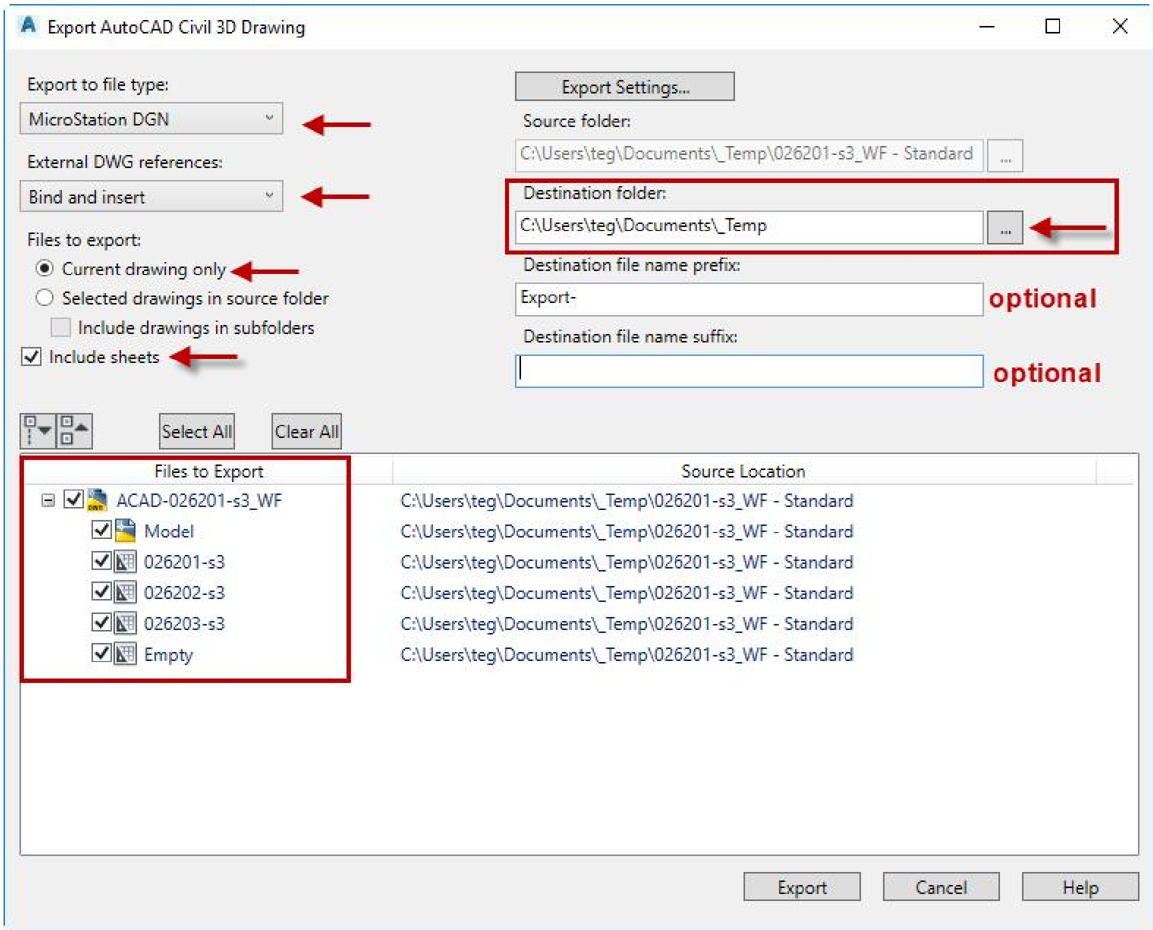
Info: Exporting a Civil 3D file to AutoCAD will create a new DWG file with all AEC objects exploded. The default Export Options should work for most files. If any options need to be changed use the command entry: **-EXPORTTOAUTOCAD** or **AECTOACAD**.

Export to MicroStation DGN

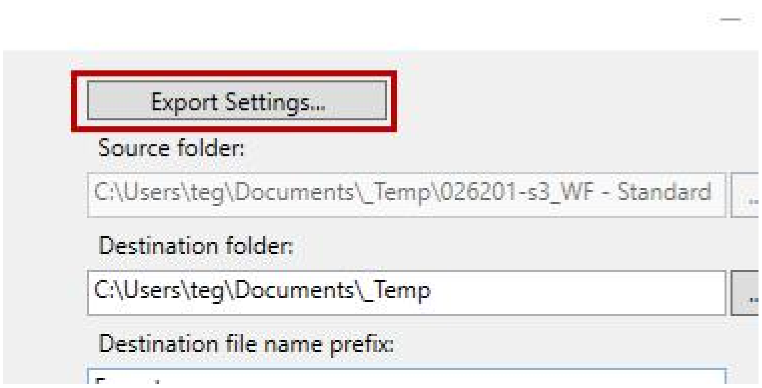
1. In AutoCAD Civil 3D open the previously exported ACAD-file. Use the AUDIT command to fix any errors. Some of the colors of the elements may have changed now that the Styles are not being used.
2. Export > Export Civil 3D Drawing



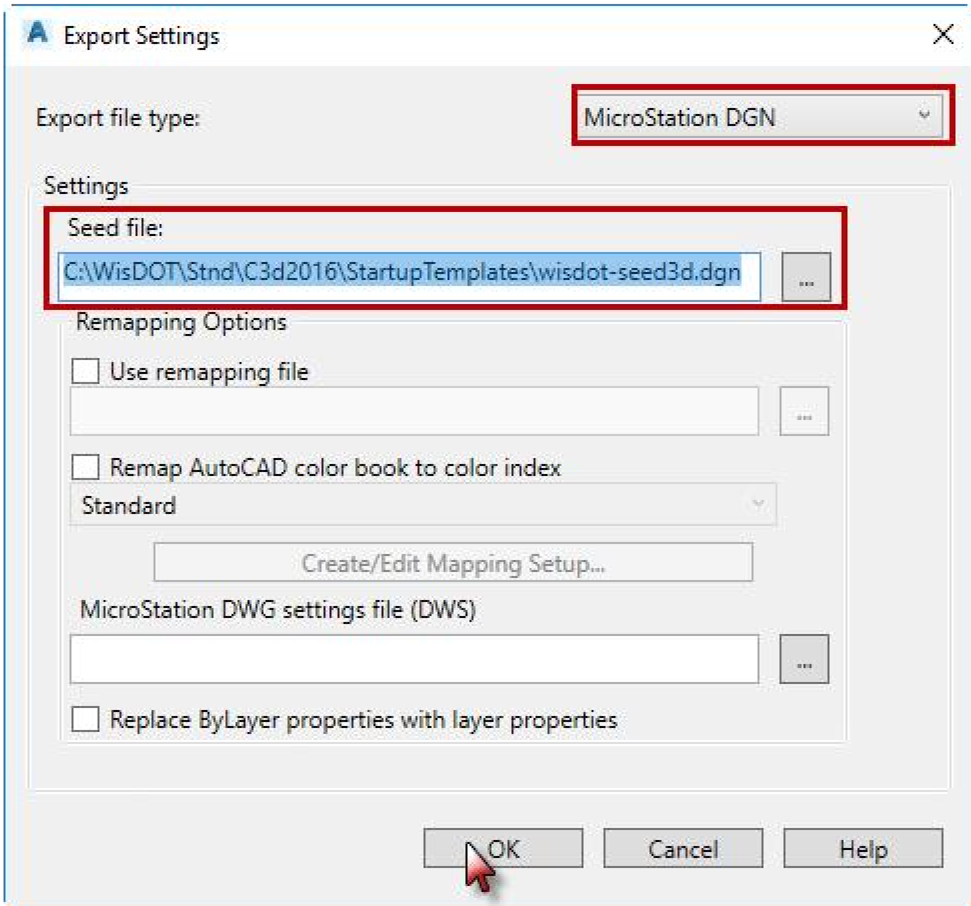
3. Export to file type > MicroStation DGN
4. External DWG references > Bind and Insert
5. Files to Export > Current drawing only
6. > Include sheets if you wish to export the layout sheets
7. Destination Folder > Navigate to the folder you want it saved in
8. OPTIONAL: enter a prefix or suffix to add to the filename when exported
9. Files to Export > check or uncheck the layouts as needed



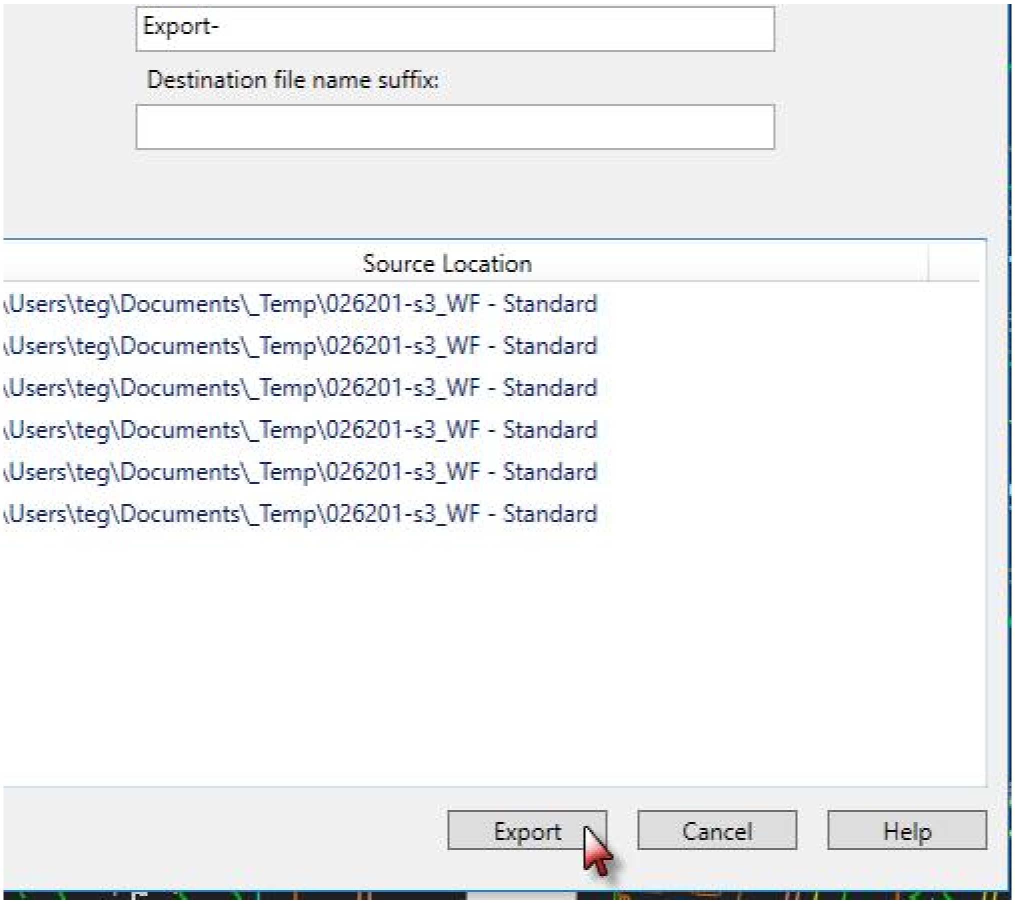
10. Export Settings



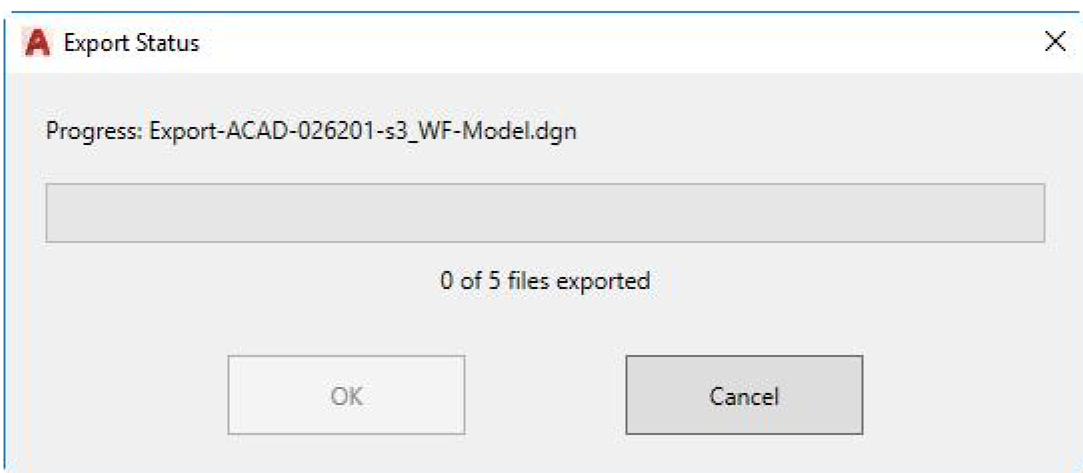
11. Export file type > MicroStation DGN
12. Seed file > C:\WisDOT\Stnd\C3d2016\StartupTemplates\wisdot-seed3d.dgn
13. OK


Export Settings
Export file type:
MicroStation DGN
Settings
Seed file:
C:\WisDOT\Stnd\C3d2016\StartupTemplates\wisdot-seed3d.dgn
Remapping Options
Use remapping file
Remap AutoCAD color book to color index
Standard
Create/Edit Mapping Setup...
MicroStation DWG settings file (DWS)
Replace ByLayer properties with layer properties
OK
Cancel
Help

14. Export



15. The Export Status dialog box will appear. Wait for the DGN(s) to be created.



16. OK.

Warning: The Export to MicroStation DGN process doesn't always work. It is common for it to fail or crash Civil 3D without explanation. If this happens contact support.cae@dot.wi.gov for help.

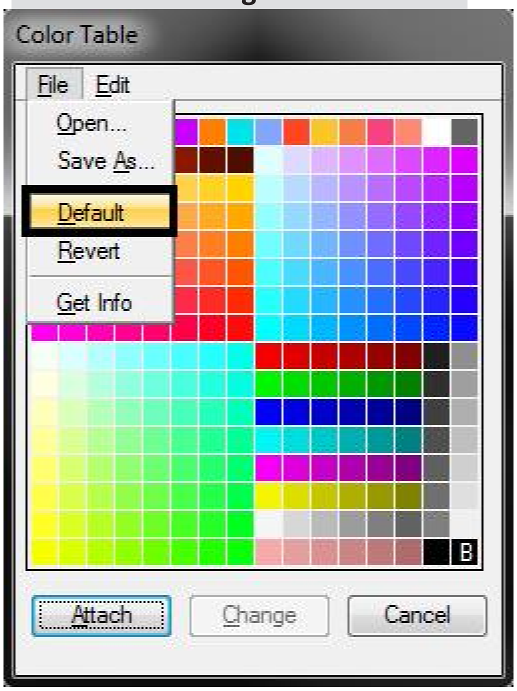
Verify DGN results

1. Open the exported DGN file in MicroStation.
2. Locate a known coordinate location in the file and verify the coordinates out to 3 decimal points.
3. **MicroStation pull down menu > Settings > Design File**. The Design File Settings dialog will appear.
4. Working Units = **US Survey Feet**

DGN cleanup

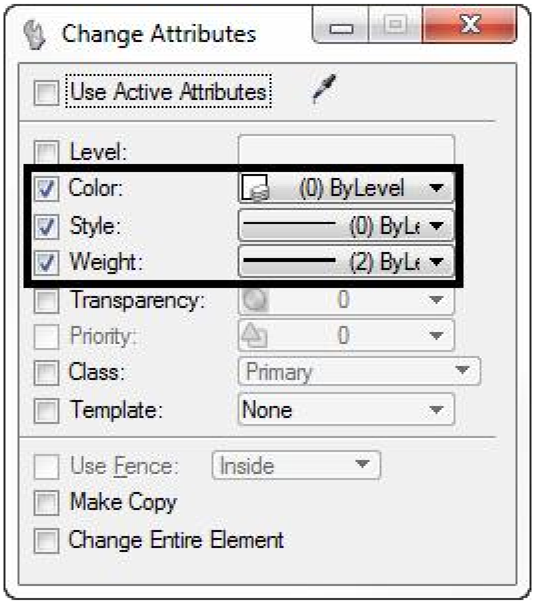
Color

1. **MicroStation pull down menu > Settings > Color Table**
2. **Color Table dialog > File > Default** The WisDOT default color table will be loaded.



ByLevel symbology

3. Select All elements in the drawing.
4. **Change Attributes** icon
   A. Color = **Checked on**
   B. Style = **Checked on**
   C. Weight = **Checked on**
   D. All others = **Not checked**



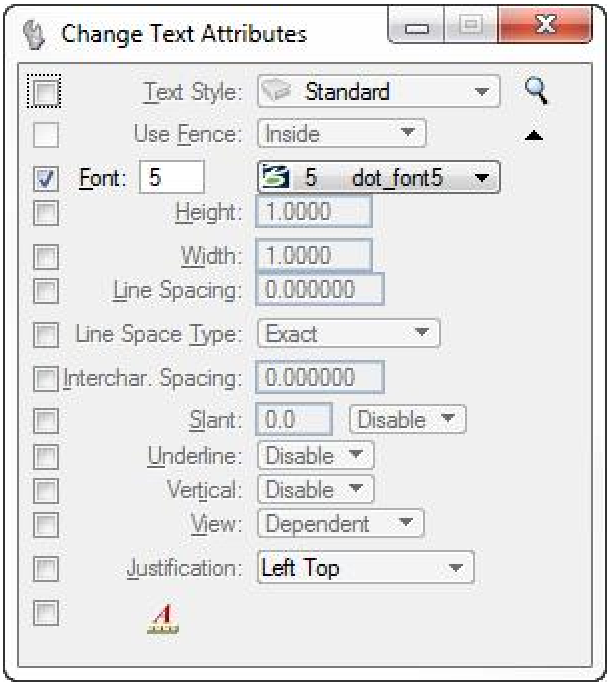
E. Then accept the change in the MicroStation view.

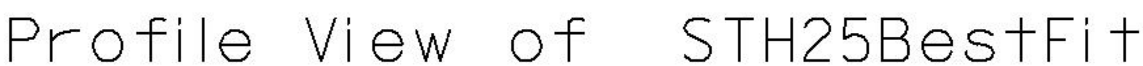
5. Clear the selection set.

Text

6. In the MicroStation file all the AutoCAD text has been converted to TrueType fonts. This causes display issues with some of the characters as shown below.

7. Select All elements in the drawing. Select the **Change Text Attributes** icon. From the Tool settings dialog check on **Font** and set it to “5 dot_font5” then accept the change in the MicroStation view.





8. Clear the selection set.
9. Save Settings and Exit MicroStation.

Importing PDF and XLS files

Last updated: 2012-01-10

Total video time: 2:05

Importing PDF and XLS files

data-xchng-imprt-pdf-xls-01.mp4 2:05

Insert (PDF) and Paste (XLS)

Non-Survey base data

Working with spatially referenced DWG, image, and GIS files

Last updated: 2012-01-10

Assign coordinate system to active DWG and any DWG files to be attached

1. **Application Menu > Drawing Utilities > Drawing Settings**.
    - **Drawing Settings dialog box > Units and Zone tab.**
        - In the zone area at the bottom of the tab, change the category to "USA, Wisconsin".
        - Change the available coordinate system to the one desired. Make sure that the units are set correctly.
        - OK

If other DWG files are to be georeferenced, repeat this process for all DWG used to be used.

Open the Map Task Pane

The rest of the commands required to attach files correctly georeferenced are part of Civil 3D’s Map functionality. These commands can be found in the "Planning and Analysis" workspace, but that workspace does not contain the Tool space. Therefore, open the Map task pane to add required functionality to the "Civil 3D" workspace.

At the command prompt, **MAPWSPACE** Enter. Press Enter at the next prompt to set the task pane on. The Task Pane should be visible.

The rest of the commands can all be found in the same area, but have slightly different options depending on what type of file is being attached.

Attach DWG

1. **Map Task Pane > Display Manager tab > Data button > Add Drawing Data > Attach Source Drawings**
    - This will open the Define/Modify Drawing Set dialog box.
    - Click Attach... This will open the Select Drawings to Attach dialog box.
    - The first time this dialog is used, an alias will need to be set for any drives other than the C drive.

Set N drive as an alias

1. **Select Drawings to Attach dialog box >** Create/Edit Aliases
    - It can be found two buttons to the right of the drive letter dropdown. This will open the Drive Alias Administration dialog box.
    - For Drive Alias Details Drive Alias: N

- Actual Path: \\wis31fp1\n3public (This is an example in drive for the Wisconsin Rapids office. A user's individual in drive can be found by looking at the path after the N drive in My Computer in Windows Explorer.)

2. Click Add. The alias letter and path should appear in the Drive List window. Click Close.
3. Select the alias letter where the DWGs are in the Look in: window.
4. Navigate to the folder with the DWGs. Highlight the files to attach. Click Add.
5. When all of the DWGs have been selected, click OK. This will return the user to the Defined/Modify Drawing Set dialog box.
6. Click on the drawings to be attached, or click Select All. Click OK.
7. The files may not display immediately. If this occurs, in the Task Pane, click the Map Explorer tab. The attached files should show up under Drawings. Right-click on the file name and click "Quick View" to view the file.

How to use a data connection

All types of data connections work in a similar manner. The following instructions will use a shape file for an example. Data connections to local files can either be at the folder level or at the file level. A folder full of shape files can be managed through one data connection.

1. Click Add SHP Connection.
   - Connection name: Set this to something meaningful. "Dane County Tax Parcels” for instance.
   - Source file or folder: Click either the Open File or Browse Folder buttons to navigate to the correct location. This field will then fill in with the correct information.
   - When the source is populated, the Connect button will be enabled. Click Connect . This will open the AddDatatoMap dialog.

The available files will display in a window. If Civil 3D can read the files projection information, it will show up here under Coordinate System. If a coordinate system is not found,<unknown > will be displayed.

2. To set the coordinate systems for files, click on the file to set under Schema, then click the Edit Coordinate Systems button. This will open the Edit Spatial Contexts dialog box.
   - Click on the files to set the coordinate system for and click Edit.... This will open the Coordinate System Library dialog box.
     - In the Category: window, select the appropriate category of coordinate systems. For example, USA, Wisconsin.
     - In the Unit: window, select the appropriate unit. For example, US Survey Foot.
     - In the main window, click the coordinate system to be assigned to the referenced file.
     - Click Select. This will bring back the Edit Spatial Contexts dialogbox.

- Click OK. This will bring back the AddDatatoMap dialog. The correct coordinates system should show up in the main window.
- Click Add to Map. The contents of the file should show up in model space and also show up in the Task Pane. Raster images will also show up in the AutoCAD reference dialog.

Working with GIS data

This section will not attempt to go into all of the different options available to work with GIS data in Civil 3D.

- In **Task Pane > Display Manager**, right-click on any data layer to see all of the possible options associated with it. From this right-click menu, data display, selection, labeling, data table viewing, and other options can be accessed.