WisDOT Civil 3D training

Plat development - beginner

Last updated: 12/1/2017

Methods Development



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Civil 3D interface

Civil 3D interface introduction

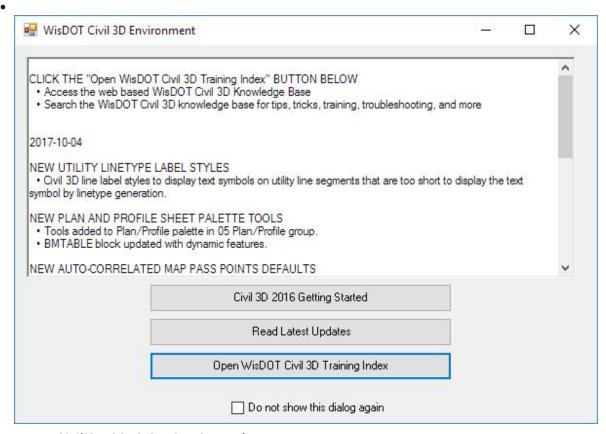
Last updated: 2017-12-01

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

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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

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- 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

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- 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

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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

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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

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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

PEfor 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

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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: <u>c3d-intrfc-data-c3d16.zip</u>

ProjectID\SheetsPlan\STH25-XS.dwg

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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

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- 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

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- 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

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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

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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

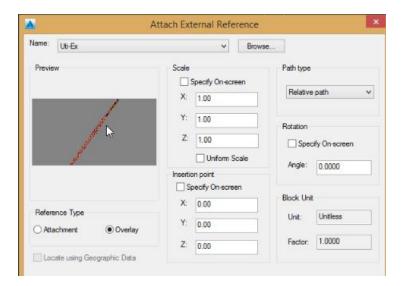
Insert tab > References panel > Attach (or type XREF)

Identify file type to attach

- DWG
- DGN
- PDF
- Image

Attachment dialog

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- 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
 - o Bind, for the entire file
 - NCOPY, for individual entities (not Civil 3D objects)

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

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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

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- 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

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👔 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

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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

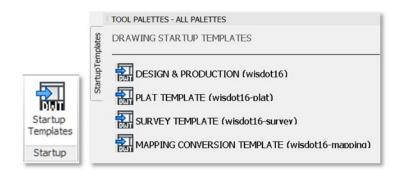
A startup template is a file with a .dwt extension that is used as the base to create a Civil 3D drawing file. WisDOT provides four startup templates to use depending on the content and workflow of the drawing being created. A WisDOT Civil 3D drawing should be created using a WisDOT startup template. 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.

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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.

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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 linetypes.

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

Civil 3D 2016 Drawing 1.dwg

WisDOT Standards WisDOT Design WisDOT Sheets WisDOT Tools

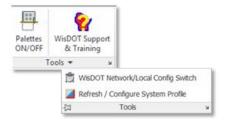
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Each of these ribbons is divided into panels and each ribbon has a Tools and a Startup panel as well as ribbon-specific panels.

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.



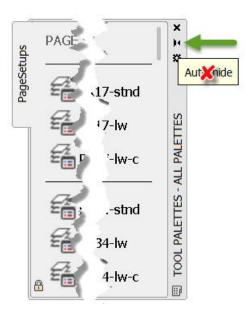
User interface best practices

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.

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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 reselect 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

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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.

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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 Windstein plates palette	sDOT Startup Tem-
--	-------------------

Standards Components panel

Add Layers	Adds 2016 WisDOT standard layers into drawing
------------	---

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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.

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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
Startup remplates	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.

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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 Subassem- blies/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
Autouesk Falettes	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

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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.	

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

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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.

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Borrowing and returning a Civil 3D license

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 net-

work. 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

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Returning a license earlier than the date specified

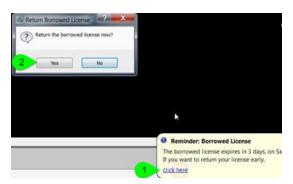
The options below all have the exact same result. You only need to choose the method that works for the circumstances you find yourself in.

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.

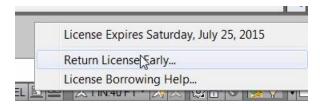
Returning a license earlier than the date specified, option 3

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.

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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.

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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

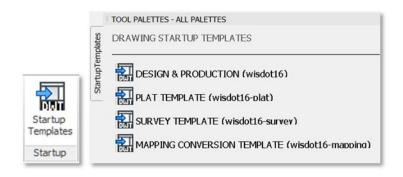
A startup template is a file with a .dwt extension that is used as the base to create a Civil 3D drawing file. WisDOT provides four startup templates to use depending on the content and workflow of the drawing being created. A WisDOT Civil 3D drawing should be created using a WisDOT startup template. 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.

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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.

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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 linetypes.

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

Civil 3D 2016 Drawing1.dwg

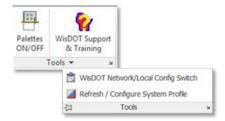
WisDOT Standards WisDOT Design WisDOT Sheets WisDOT Tools

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.



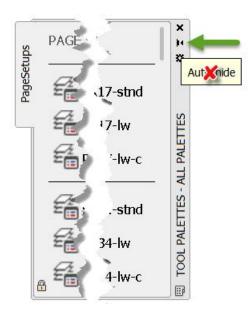
User interface best practices

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.

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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 reselect 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

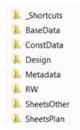
Use the data shortcut project creation tools.

- 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.

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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 Proiect 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.

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- 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

Units

USF = US Survey Foot

M = Meters

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Selecting the coordinate system for the dwg file

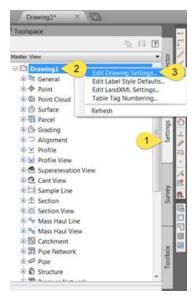
The coordinate system used to collect the survey data should be obtained from the surveyor or WisDOT Survey Data Coordinator. Review the Form DT1773 Geodetic Reference Documentation with the Survey Data Coordinator. It is encouraged that new projects are surveyed in WISCRS. It is required that WISCRS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

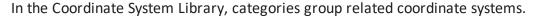


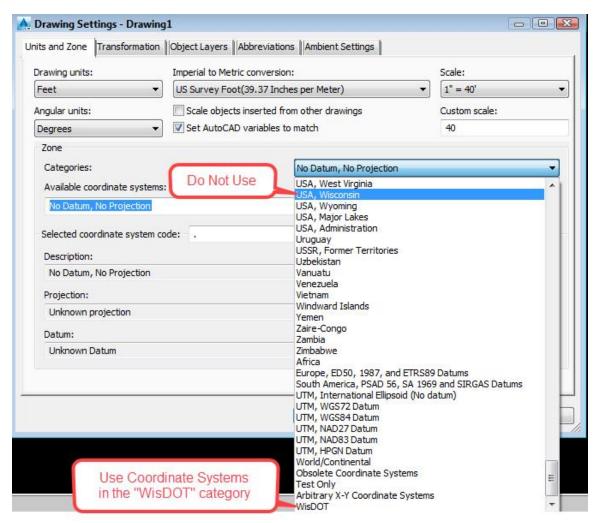
or



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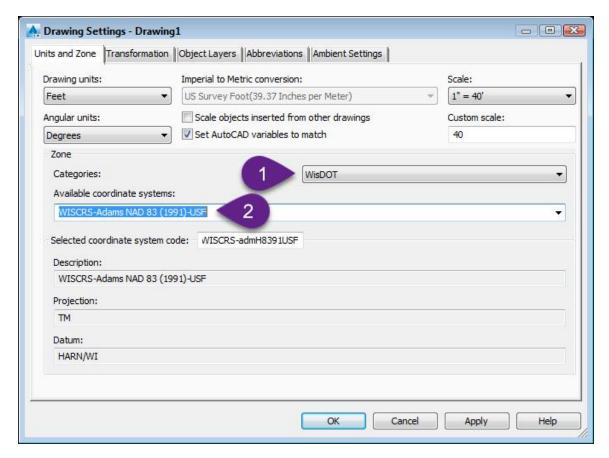
Categories





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)

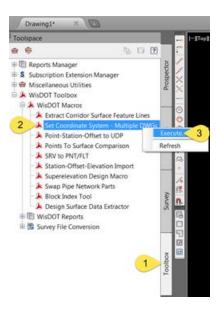
Can I select the coordinates for multiple files at once?

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.

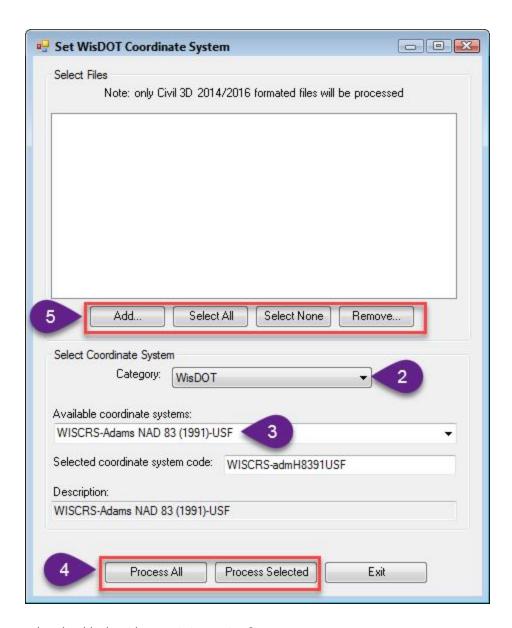
info: The macro cannot be used on a drawing that is currently open.

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

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- 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

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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.

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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 <u>FDM 9-20-28</u> 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

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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

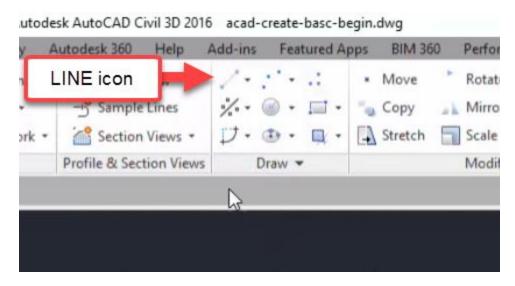
Exercise files: acad-basc-creat-edit-data-c3d16.zip

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.



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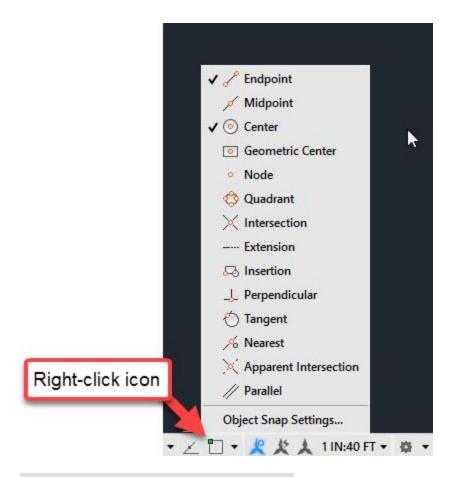
- 1. Open acad-basc-creat-edit-begin.dwg
- 2. Ribbon > Home tab > Draw panel > Line icon > Create Line
 - A. Move cursor to location of start point
 - I. Left-click
 - B. Move cursor to location of end point
 - I. Left-click
- 3. Enter
 - A. repeat steps 2.A-2.B
- 4. Activate ERASE command: E
 - A. Enter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

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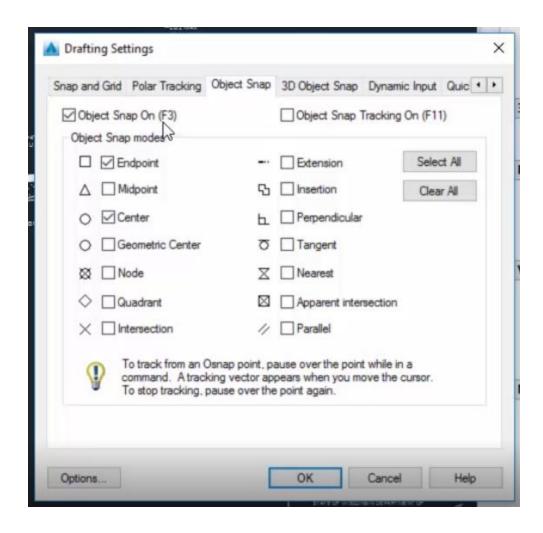


3. Status Bar > right-click Object Snap icon

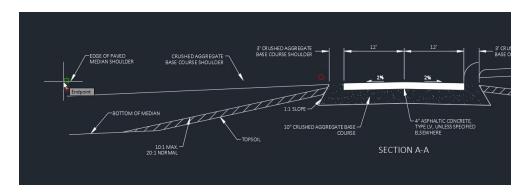
A. Object Snap Settings

I. Object Snap On = checked

II. OK



- 4. <u>F3</u>
- 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



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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

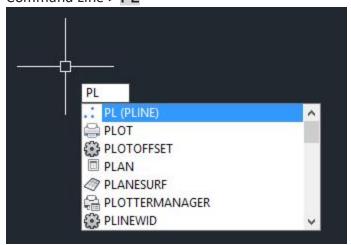
Exercise files: acad-basc-creat-edit-data-c3d16.zip

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
 - ing 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

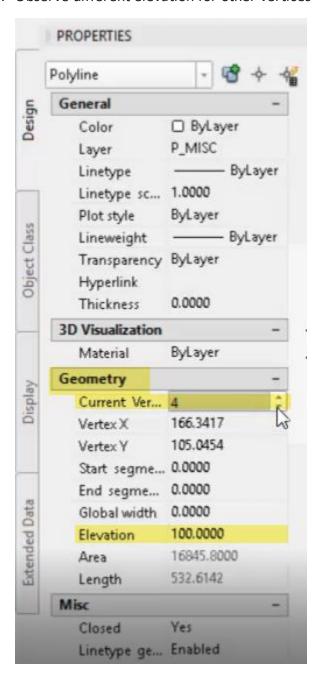
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3. Ribbon > Home tab > Draw panel > Draw flyout > 3D Polyline button

- 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 <u>cursor to</u> 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

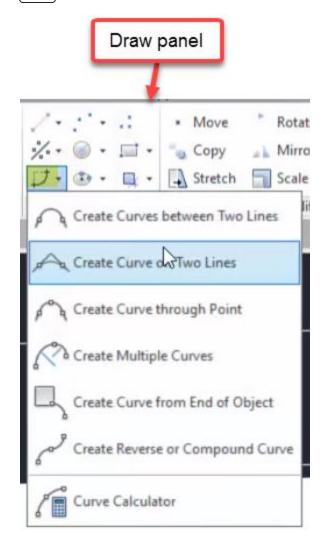
acad-basc-creat-edit-04.mp4 4:06

Curve

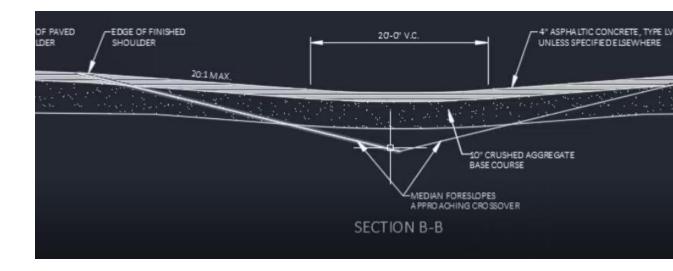
The Curve command includes several variations that use existing reference objects (ie tangent Lines) to create single radius, compound, or reverse curves. The object created is referred to as an Arc. The curve command can be helpful when laying out geometry from which to create a smart Civil 3D object.

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- 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



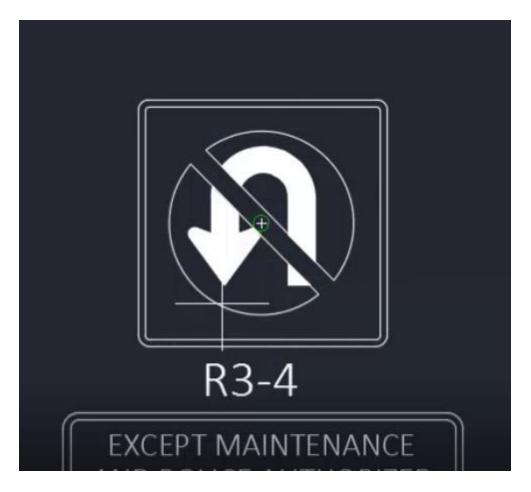
- 3. Ribbon > Home tab > Draw panel > Curve flyout > Create Curves between Two Lines
 - 1. Select one Section B-B Median Foreslope Line as first tangent
 - 2. Select other Section B-B Median Foreslope Line as second tangent
 - 1. **R**
- 1. Enter
- 2. SPECIFY RADIUS: 20



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, RadiusF
 - 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

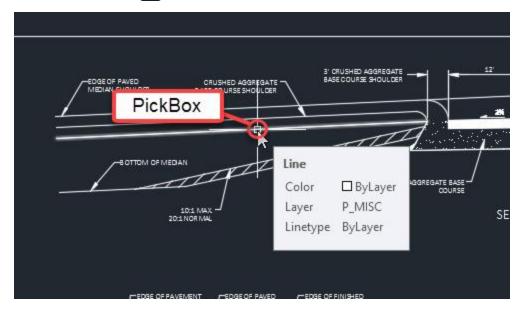
Properties palette population

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



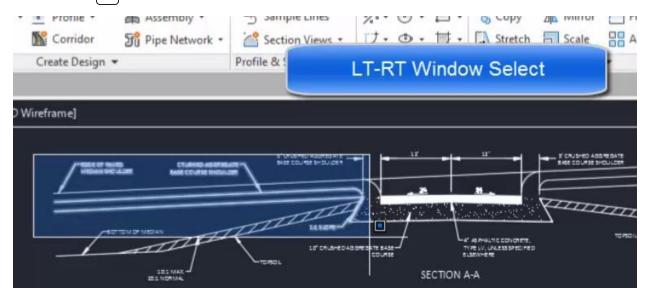
LT-RT Window Select

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)

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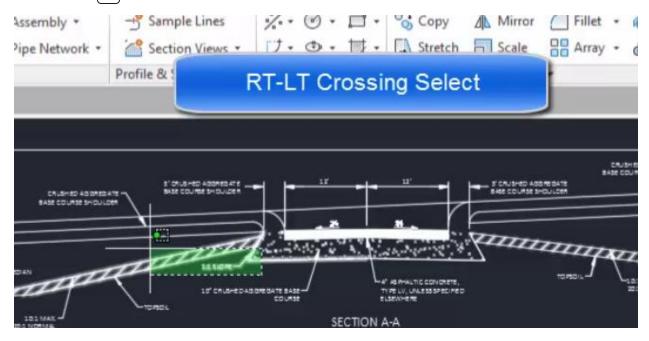
- C. Left-click to specify selection area
- D. esc



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

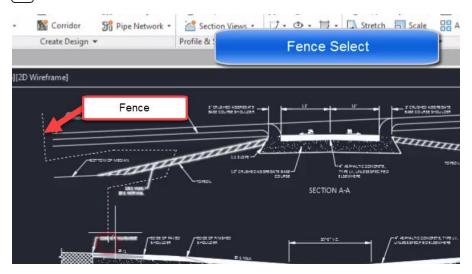


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Fence Select

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



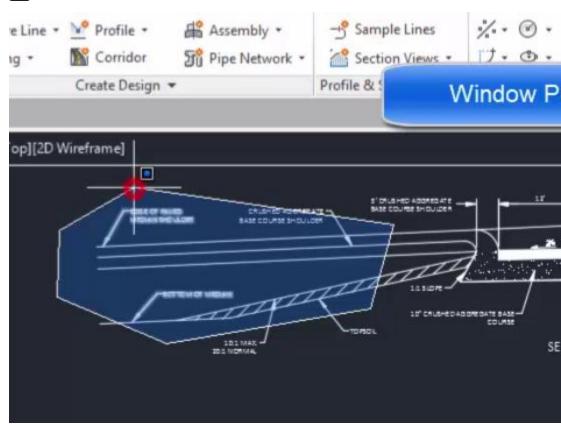
Window Polygon Select

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

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c. Esc

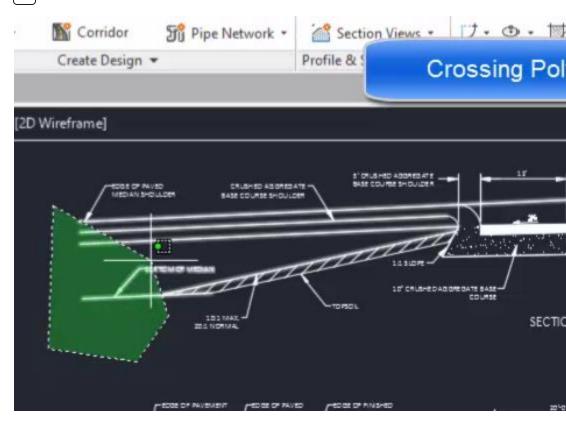


Crossing Polygon Select

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



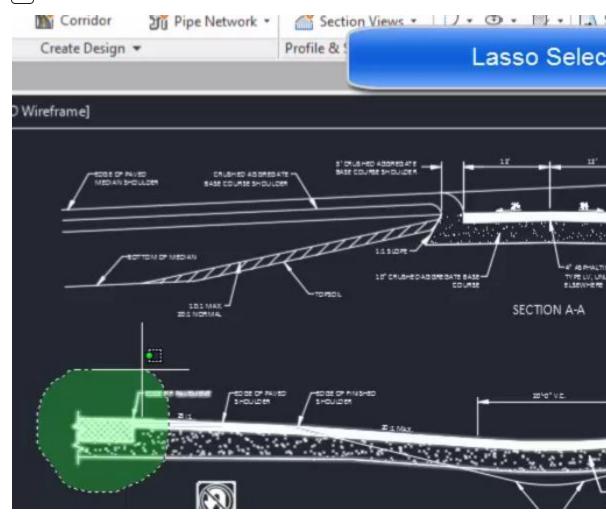
Lasso Select

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

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III. esc



Quick Select

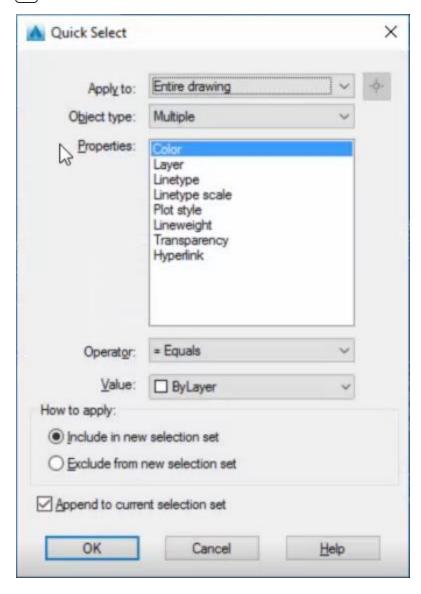
The Quick Select tool allows you to build a selection query based on object properties. The query can either be inclusive (select what is queried) or exclusive (select all but what is queried). The query can also be set to append or replace any current selection set.

- 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

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- III. Operator = Equals
- IV. Value = CalibriLight
- V. Include in new selection set = checked
- VI. Append to current selection = checked
- vii. Ok

C. esc

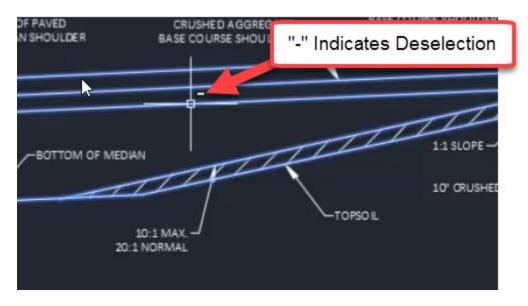


Editing current selection

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.

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- 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

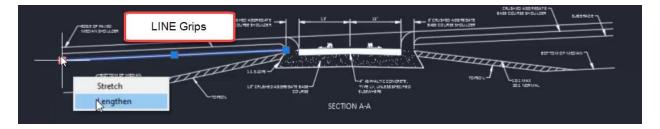
Start with acad-basc-creat-edit-end.dwg

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

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Line grips

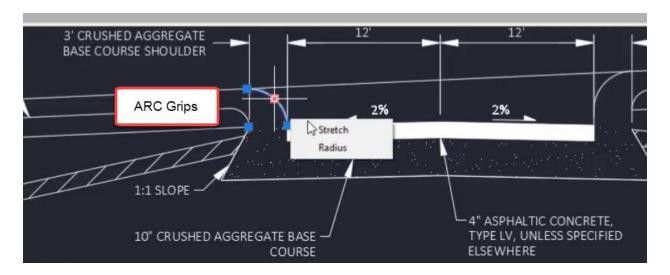
When a Line is selected, three Grips are display. The two endpoint vertex Grips allow you move/stretch or lengthen the respective vertex independently. The midpoint Grip allows you to move the Line with the midpoint as a basepoint, keeping all other geometry properties intact (ie length, rotation).



- 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

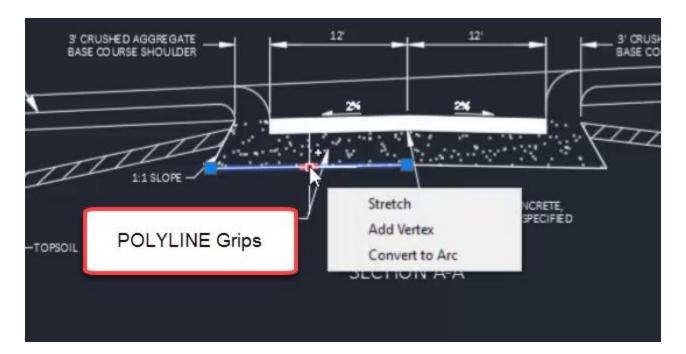
When an Arc is selected, four Grips are displayed. The two endpoint vertex Grips allow you move/stretch or lengthen the respective vertex independently. The midpoint Grip allows you to change the radius of the arc keeping intact either the location of the endpoint vertices or their alignment with the 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

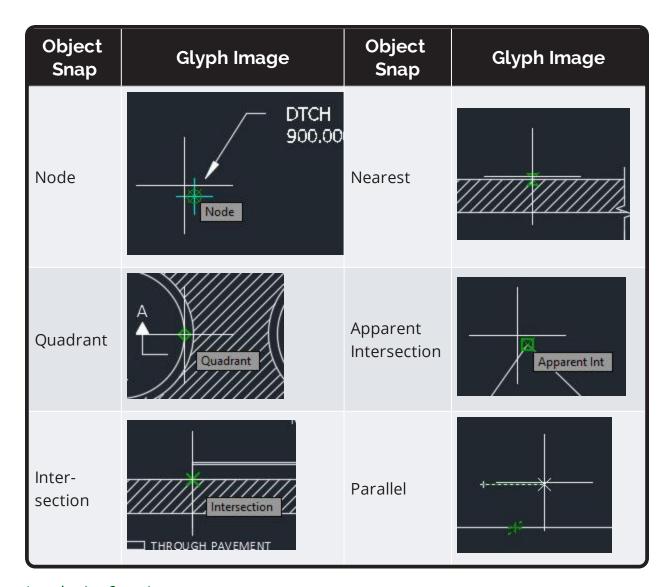
Object Snaps are tools built into Civil 3D that help ensure precision when laying out geometry with both basic objects (ie Line, Polyline) and smart Civil 3D objects. The idea is that when

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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	Endpoint /	Extension	
Midpoint	Midpoint	Insertion	PLAN VIEW
Center	A Center	Per- pendicular	Perpendicular
Geometric Center	Geometric Center	Tangent	Tangent



Introduction & settings

Exercise files: <u>acad-objct-snp-data-c3d16.zip</u>

Start with acad-objct-snp-begin.dwg

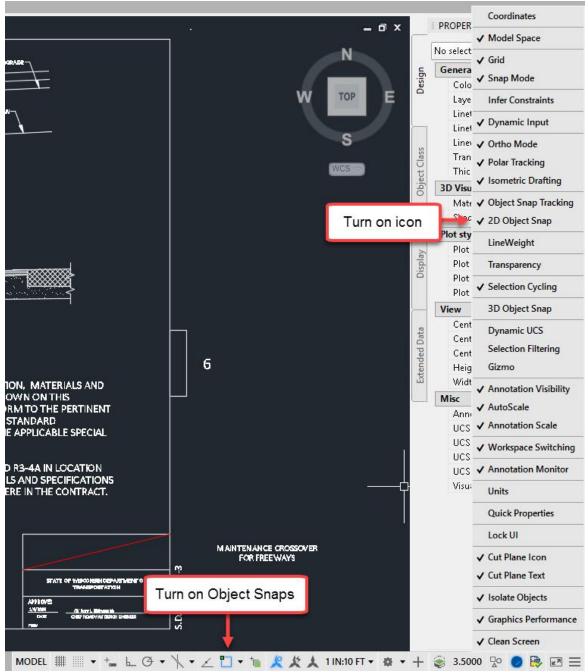
acad-objct-snp-01.mp4 4:06

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.

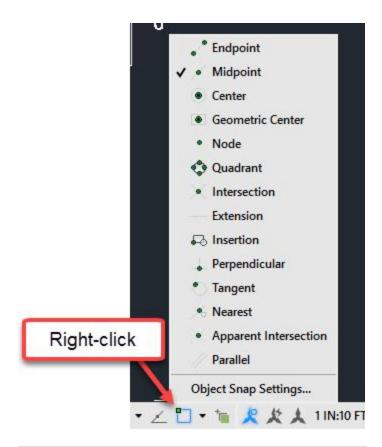
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- 1. Open acad-objct-snp-begin.dwg
- 2. Status Bar > Customization
 - A. 2D Object Snaps = checked



3. Status Bar > Object Snap icon

- A. Right-click
 - I. Midpoint = checked
- B. Left-click icon to Turn on Object Snaps

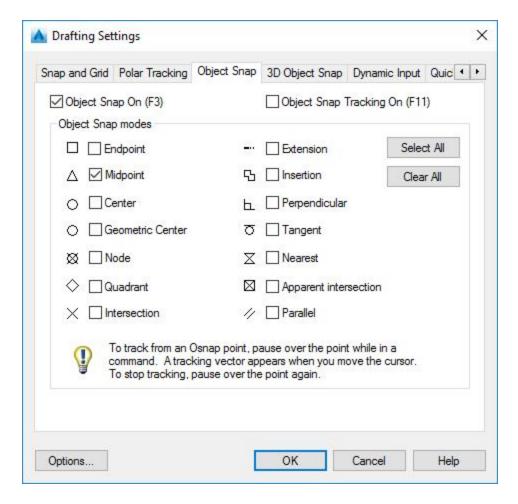


4. Ribbon > Home tab > Draw panel > Polyline button

- 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



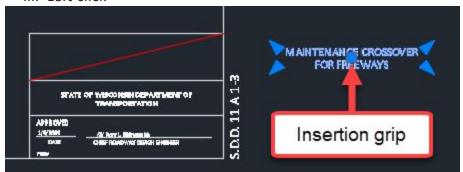
- a. Object Snap On = checked
- b. Select All
- c. Clear All
- d. Endpoint = checked
- 6. Modelspace
 - A. Shift+right-click
 - I. Osnap Settings...
 - B. Observe access to Drafting Settings dialog, Object Snap tab

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: <u>acad-objct-snp-data-c3d16.zip</u>

Start with acad-objct-snp-01.dwg

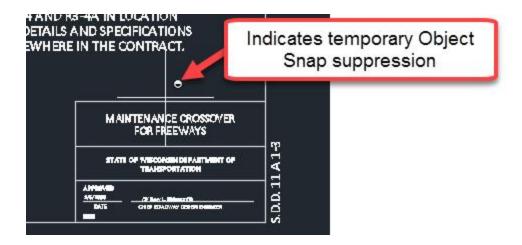
acad-objct-snp-02.mp4 5:34

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

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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

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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
 - в. 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-objet-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

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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

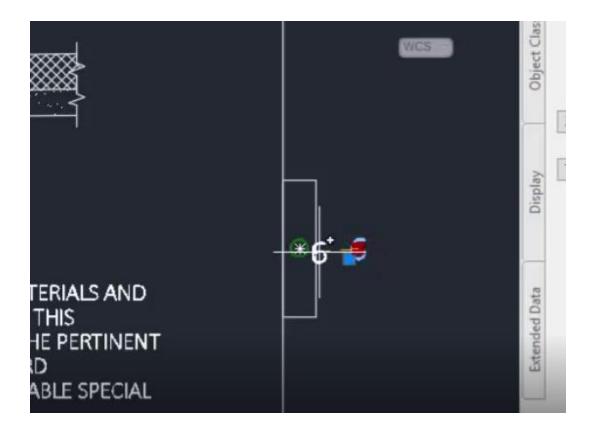
acad-objct-snp-03.mp4 4:08

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

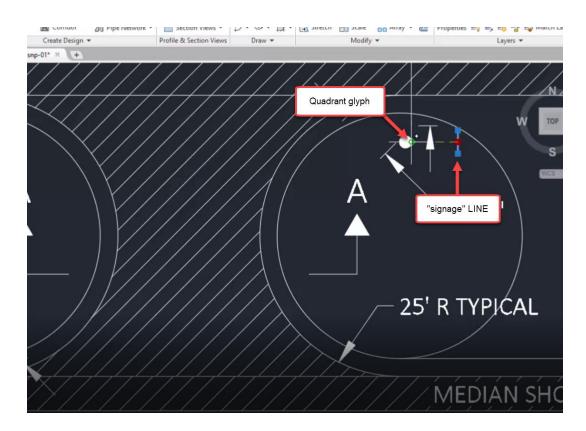
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Quadrant

This Object Snap grabs the location on a Circle, Ellispse 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

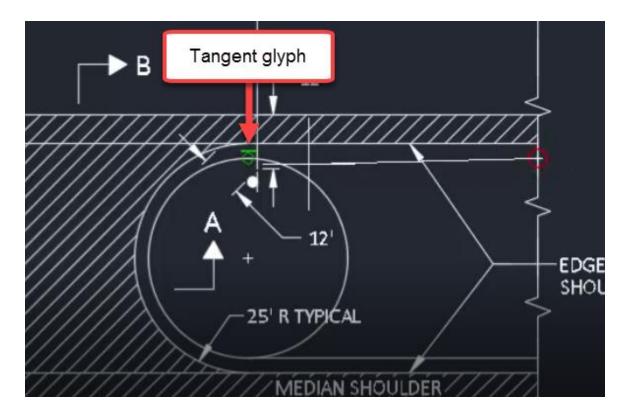
Start with acad-objct-snp-02.dwg

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

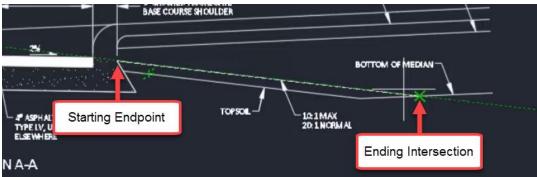
Use the Parallel Object Snap to lay out new linear objects while referencing existing linear objects for directional orientation. You will first start the new linear object command (ie Line), then hover over the desired linear reference object. This will activate the Parellel Object Snap and you will 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.

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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.

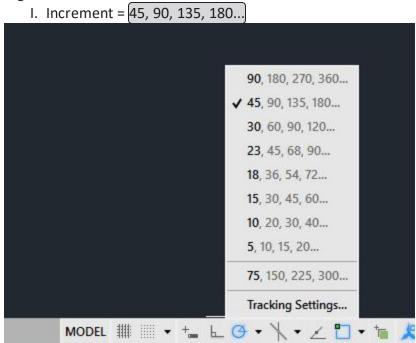
- 1. Open acad-polr-osnp-trak-begin.dwg
- 2. Status Bar > Customization flyout
 - A. Polar Tracking = checked
- 3. Status Bar
 - A. Polar Tracking on

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4. Status Bar > Polar Tracking icon

A. Right-click

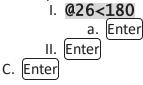


5. Ribbon > Home tab > Draw panel > Polyline button

- 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



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- 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

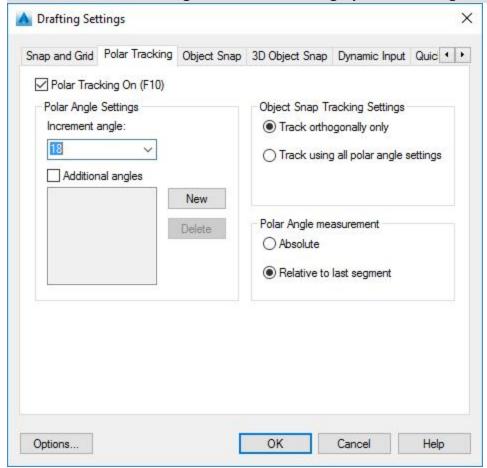
Start with acad-polr-osnp-trak-01.dwg

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.

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- 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

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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

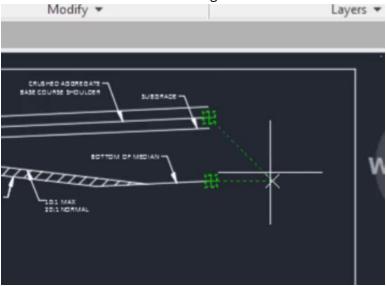
- 1. Open acad-polr-osnp-trak-02.dwg
- 2. Status Bar > Polar Tracking icon > Polar Tracking flyout

A. Increment = 45, 90, 135, 180...

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3. Status Bar > Object Snap icon > Object Snap flyout

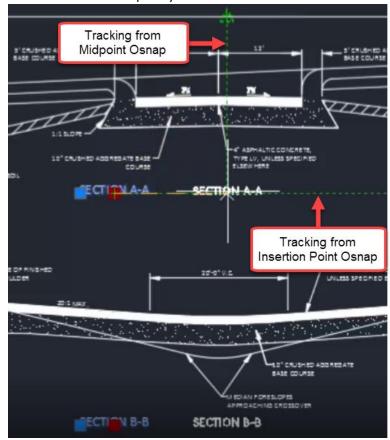
- A. Endpoint = checked
- 4. Status Bar
 - A. Polar Tracking on
 - B. Object Snap Tracking on
 - C. Object Snap on
- 5. **PL**
 - A. enter
- 6. Move cursor to hover over a Line endpoint
 - A. Observe Object Snap Tracking activate
 - B. Rotate cursor around active Object Snap Tracking location
 - C. Observe 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

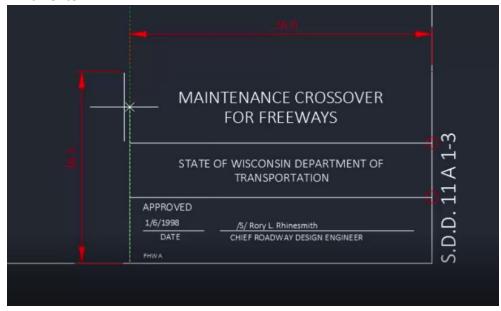
Exercise: align objects

- 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



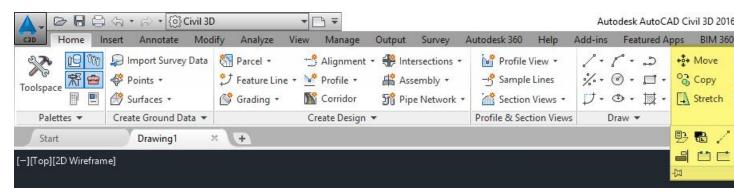
AutoCAD modify

Last updated: 2017-12-01

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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. sRibbon > 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

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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

Rotate & Scale

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

Continue with acad-modify-begin.dwg

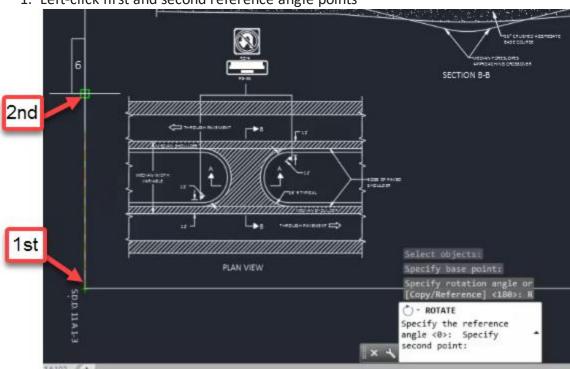
acad-modify-02.mp4 5:05

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".

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- 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
 - 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

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

Start with acad-modify-01.dwg

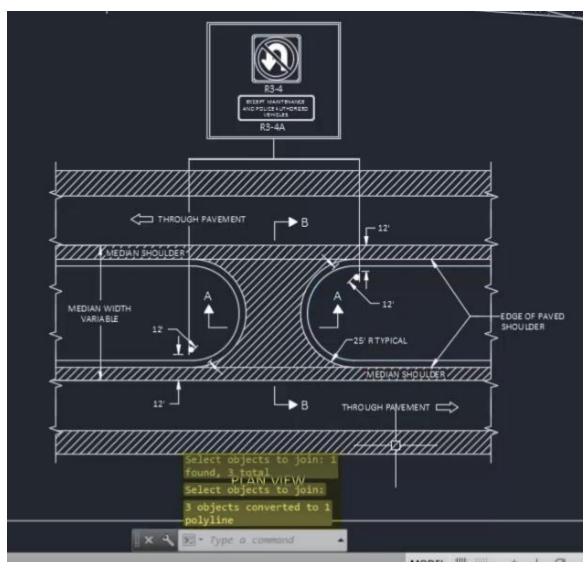
acad-modify-03.mp4 5:34

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.

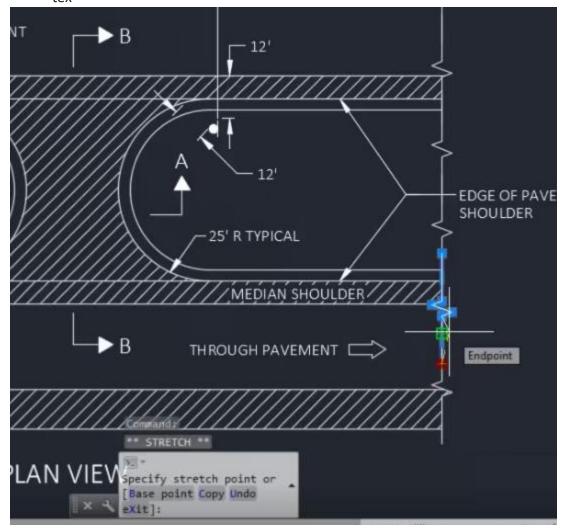
- 1. Open acad-modify-01.dwg
- 2. Pan and zoom to PLAN VIEW detail
- 3. Ribbon > Home tab > Modify panel flyout > Join button
- 4. Select Lines and Arc representing median back of curb

A. enter



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- 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

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Explode

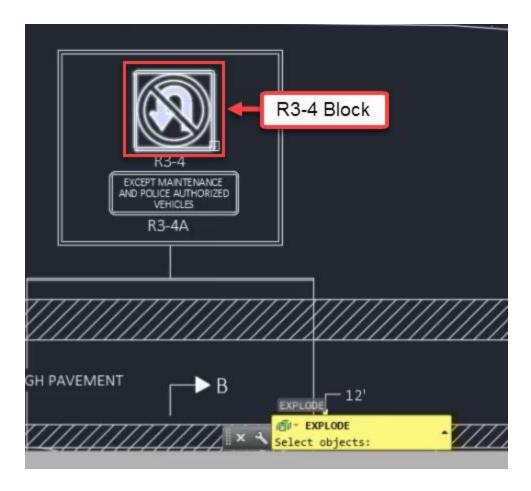
The Explode command will break objects down into foundational pieces. For example, a single Polyline can be Exploded into multiple Lines and/or Arcs that make up the Polyline geometry.



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

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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.

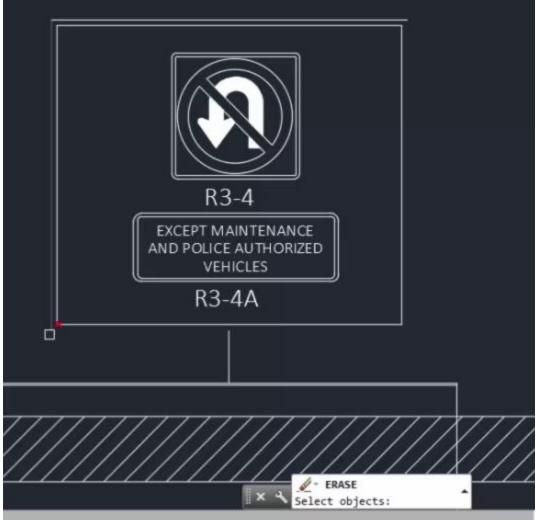


Tip: It is a good idea to hit esc a couple times before selecting objects to erase. This will ensure that you do not have objects selected that you do not intend to erase. Selected objects are not always visible depending your current Zoom level and Pan location. Your Properties Palette is a good place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

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- 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



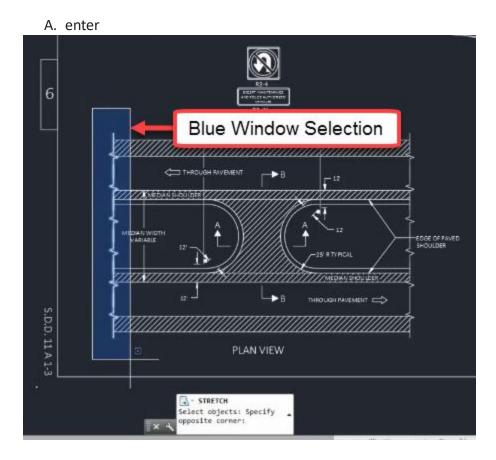


Stretch

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.

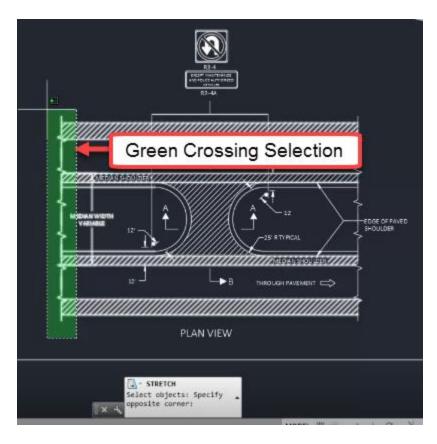
- 1. Continue working in acad-modify-01.dwg
- 2. Ribbon > Home tab > Modify panel flyout > Stretch
- 3. Use a Window Selection to select all "breakline symbol" Polylines on the left side of the PLAN VIEW detail

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- 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

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- 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

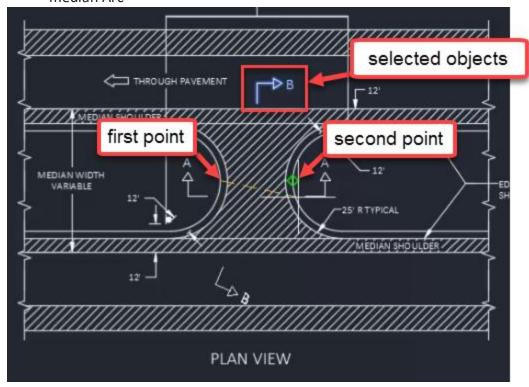
Mirror

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

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- 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

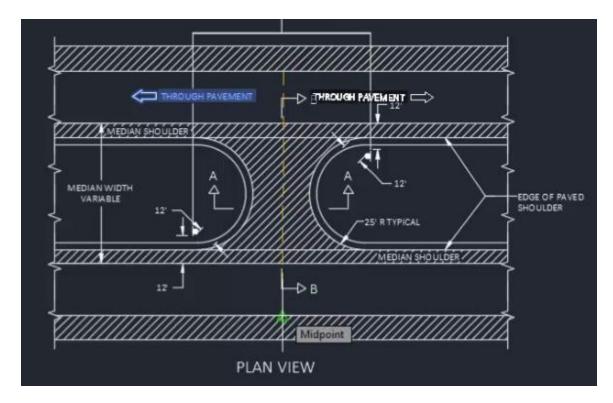


A. ERASE SOURCE OBJECTS: N

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 edgeof-pavement Line
 - F. Use Midpoint Osnap to specify second point of mirror line at lower midpoint of edge-of-pavement Line

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- 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

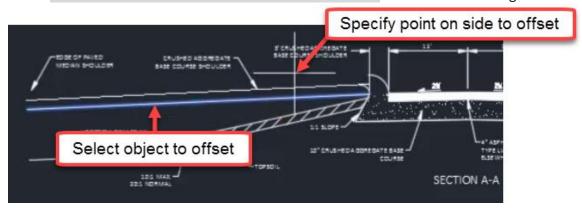
The Offset command allows you to create an object in reference to existing Polyline, Line or Arc objects. The geometry of the newly created objects is dictated by a constant distance measured perpendicularly from the source object. You can call out the offset distance using a known numeric value or by 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)



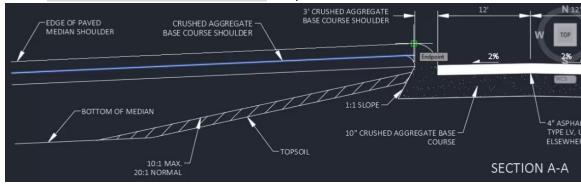
Tip: Using modify commands such as Offset to manipulate Polylines is a great way to lay the foundation for dynamic Civil 3D Objects. This is because many dynamic Civil 3D Objects (ie Alignment, Feature Line) can be initially created from simpler AutoCAD Objects (ie Polyline).

- 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

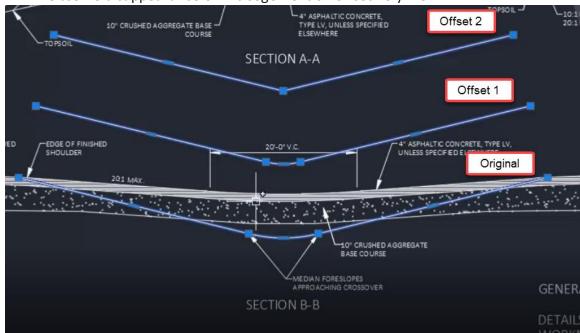


- E. **SELECT OBJECT TO OFFSET**: select "CRUSHED AGGREATED BASE COURSE SHOULDER" Line on right side of SECTION A-A detail
- F. **SPECIFY THROUGH POINT:** Endpoint of median nose Arc on right side of SECTION A-A detail
- 5. **OFFSET**
 - A. enter
 - B. **SELECT OBJECT TO OFFSET:** MEDIAN FORESLOPES Polyline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

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- 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

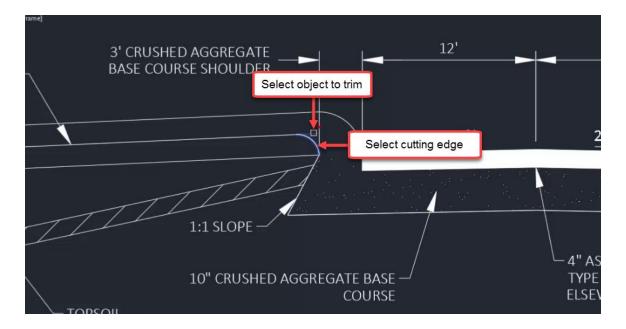
Continue with acad-modify-02.dwg

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.

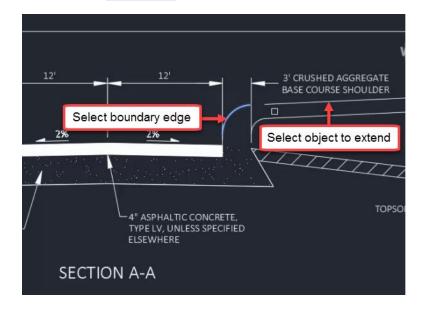
- 1. Continue working with acad-modify-02.dwg
- 2. Zoom and Pan to SECTION A-A detail area of drawing
- 3. Ribbon > Home tab > Modify panel > Trim
 - A. **SELECT OBJECTS:** select smaller Arc intersecting with Line representing AGGREGATE SHOULDER
 - B. **TRIM:** select segment of Line you wish to trim



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





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

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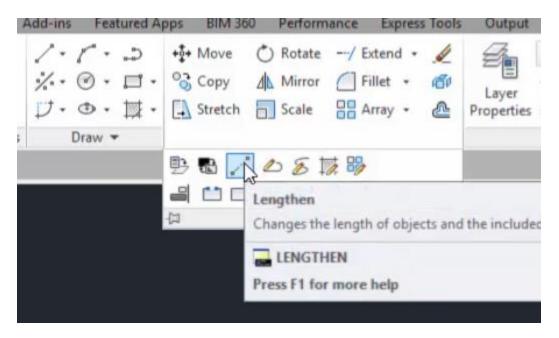


While selecting objects to Extend or Trim, choose the mid-command option <select all>. This allows you to use any existing geometry object as a potential Extend boundary or Trim cutting edge.

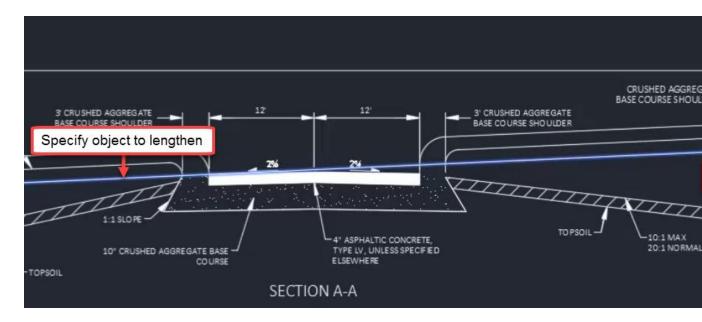
Lengthen

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

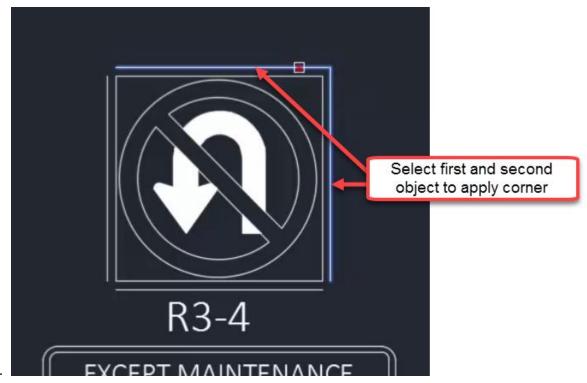
acad-modify-07.mp4 6:03

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

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- 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.

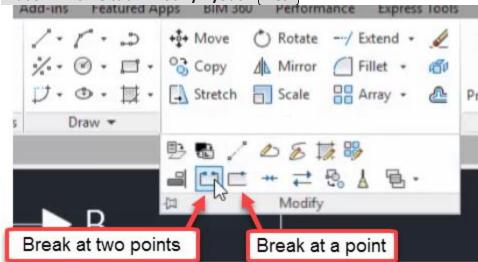
Break

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.

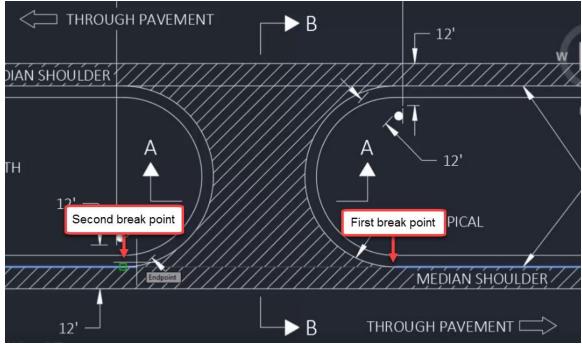
- 1. Continue working with acad-modify-03.dwg
- 2. Zoom and Pan to PLAN VIEW detail area of drawing

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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

 THROUGH PAVEMENT

 B

 12'

 MEDIAN SHOULDER

 A

 12'

 MEDIAN SHOULDER

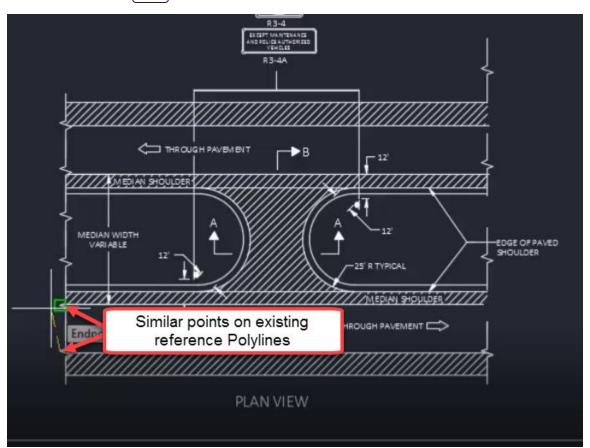
 B

 Select Polyline representing "breakline symbol"

 PLAN VIEW
 - B. Ribbon > Array contextual tab > Columns panel
 - I. Columns = 1
 - C. Ribbon > Array contextual tab > Rows panel
 - I. Rows = 6

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- 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

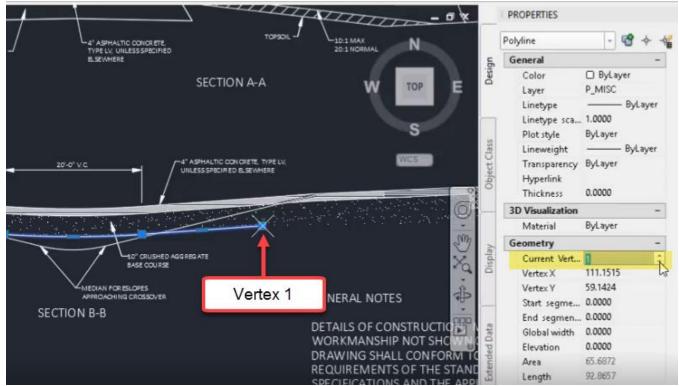
Reverse

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

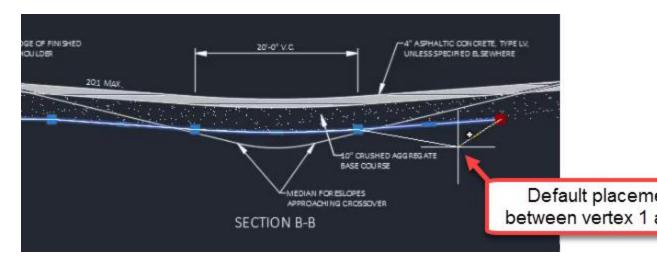
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order of Polyline and Line vertices also affects how a Linetype is generated. Linetypes will start at vertex 1.

- 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

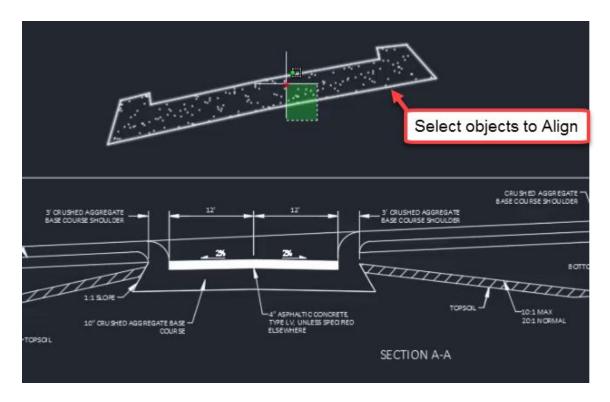


- E. Ribbon > Home tab > Modify flyout > Reverse
 - I. Properties palette > Geometry dropdown > Current Vertex
 - II. Observe reversed order of Polyline vertices
- F. Hover cursor over vertex 5
 - I. Add vertex
 - II. Observe default placement of new vertex
 - III. Use desired Osnap to place new vertex

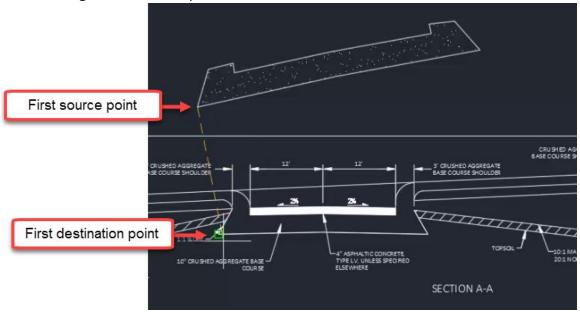
Align

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

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- 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. lenter
- 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.



nfo: 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

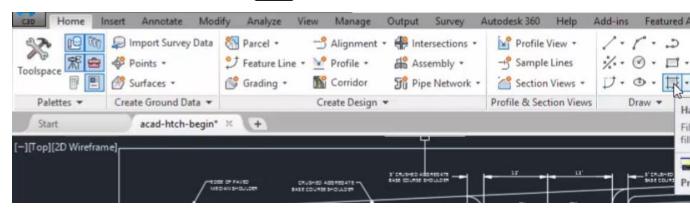
acad-htch-01.mp4 6:29

Hatch creation

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

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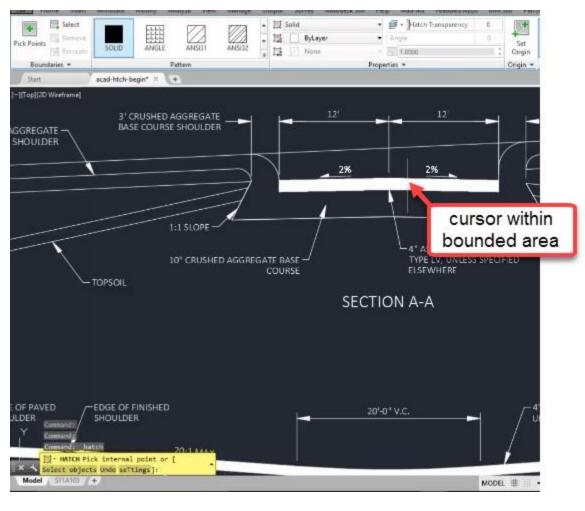
3. Ribbon > Home tab > Draw panel > Hatch



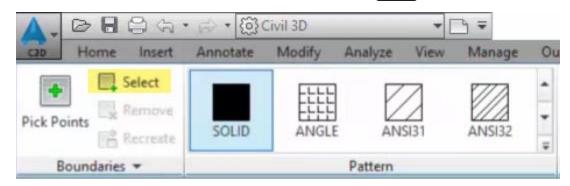
- 4. HATCH PICK INTERNAL POINT OR: leave default to pick internal point
 - A. Or, if necessary, **HATCH SELECT OBJECTS OR: PICK INTERNAL POINT**
 - B. Move cursor inside area bounded by Lines representing 4" ASPHALTIC CONCRETE
 - C. Observe Hatch preview

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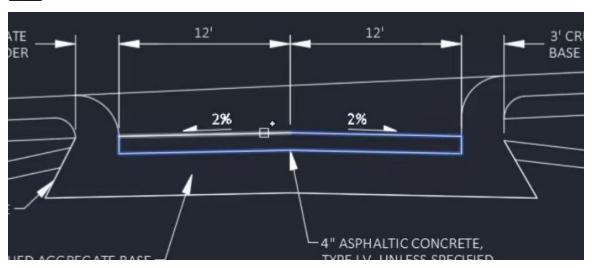
D. Left-click to place Hatch



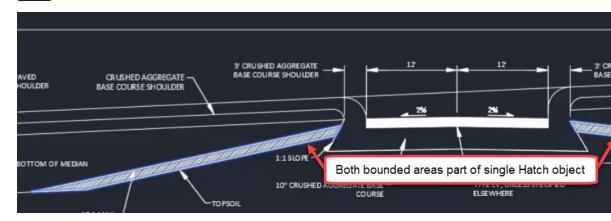
- E. Select previously created Hatch
 - I. delete
- 5. Ribbon > Home tab > Draw panel > Hatch
 - A. Ribbon > Hatch contextual tab > Boundaries panel > Select



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



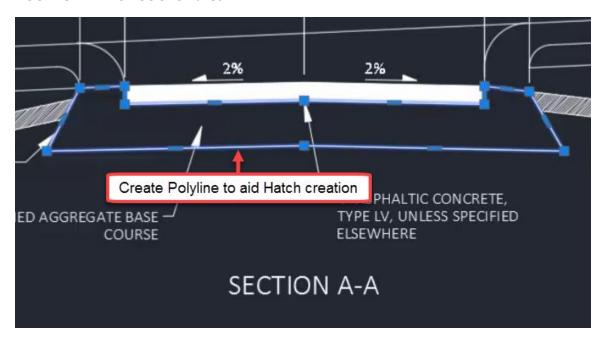
- C. Select previously created Hatch
 - I. delete
- 6. Select individual Lines bounding SECTION A-A PAVEMENT area
 - A. **J**
- I. enter
- 7. Ribbon > Home tab > Draw panel > Hatch
 - A. Ribbon > Hatch contextual tab > Boundaries panel > Select
 - B. Select single Polyline bounding SECTION A-A PAVEMENT 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



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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

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B. Ribbon > Hatch contextual tab > Pattern panel flyout

I. Patten = [AR-SAND]

Associative & Annotative

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

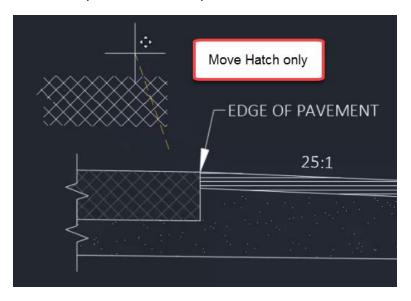
Start with acad-htch-01.dwg

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

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- 5. Select Hatch
 - A. Observe available grips
 - B. **M**
- I. entern
- 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

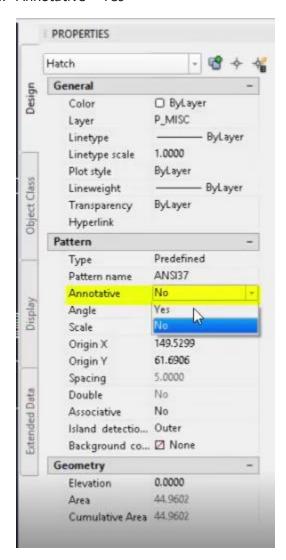
Annotative scaling is used to dynamically set an annotative object's displayed scale based on the current drawing scale. It can also be used control visibility of annotative objects based on inclusion of scales in an object's annotative scales list. The end goal here is to display objects at the correct 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

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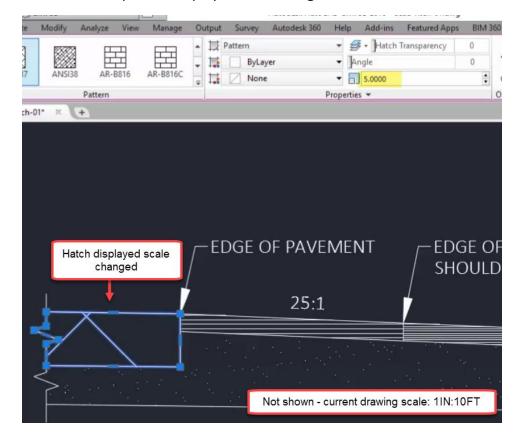
B. Properties palette > Pattern dropdown

I. Annotative = Yes



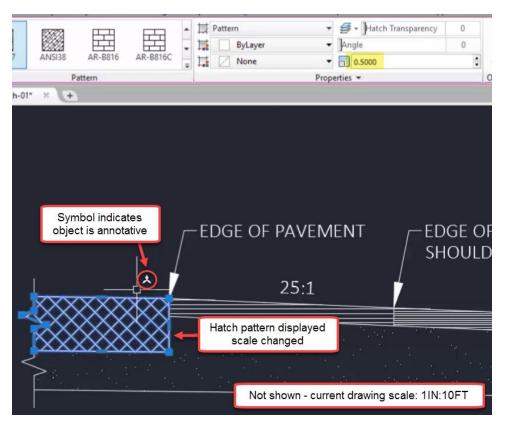
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A. Observe Hatch pattern displayed scale change



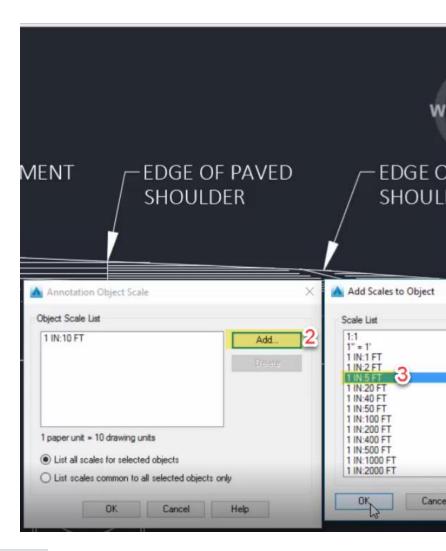
B. Ribbon > Hatch contextual tab > Properties panel

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

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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

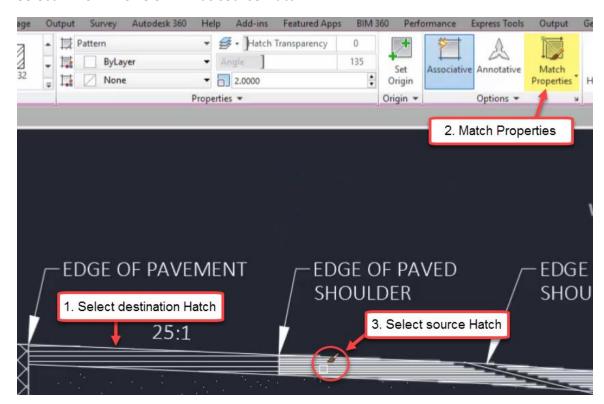
acad-htch-03.mp4 2:29

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.

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- 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.

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

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A. Zoom and Pan to PLAN VIEW detail

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B. Ribbon > Home tab > Draw panel > Hatch

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I. Ribbon > Hatch contextual tab > Options flyout button

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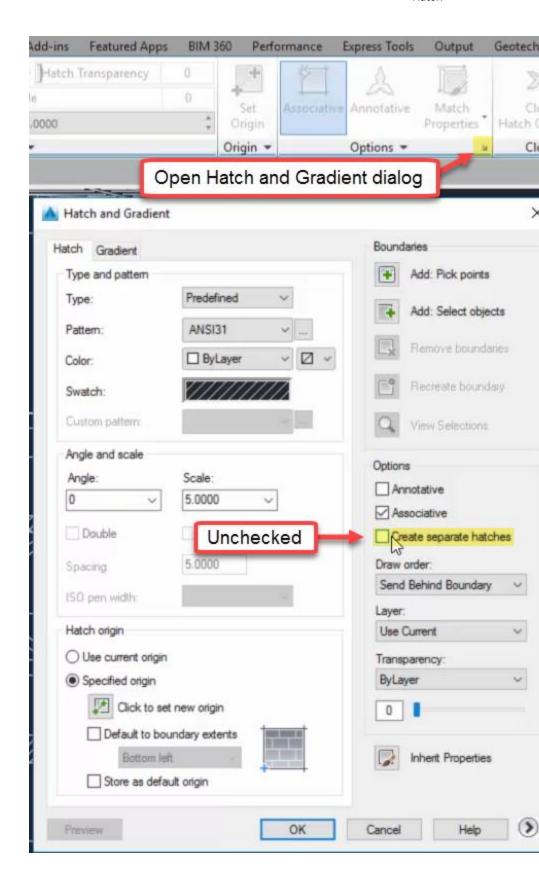
a. Hatch and Gradient dialog

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Hatch

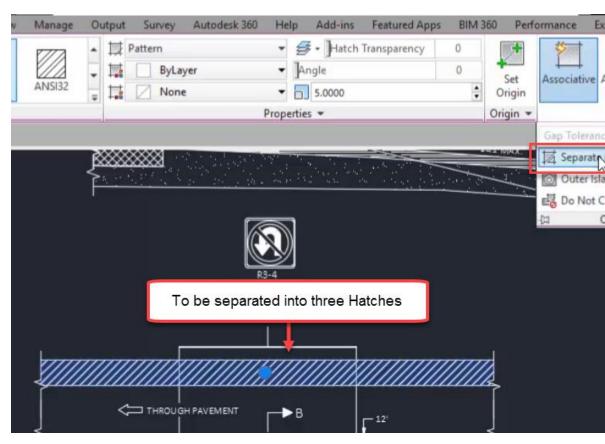
i. Create separate hatches = unchecked

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- 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



Grips

Last updated: 2017-12-01

Total video time: 22:29

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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

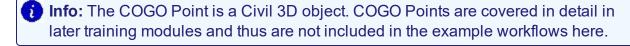
Arguably the most basic Grip function is the Stretch. Within the category of Stretch Grip functions, are two distinct types of editing behavior: Stretch and "move". In general, an endpoint Grip has a Stretch behavior and a midpoint or insertion Grip has "move" behavior. The Stretch behavior relocates 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

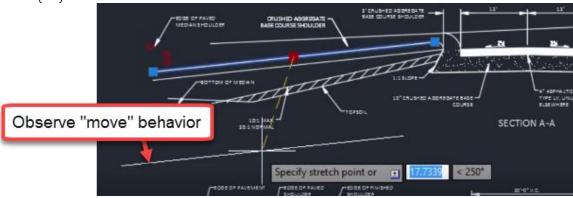
- Text insertion point
- Line midpoint
- Circle center
- Block insertion point
- COGO Point



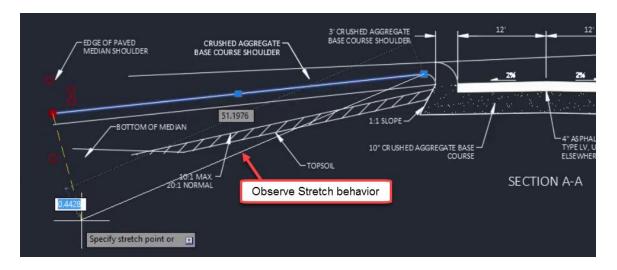
- 1. Open acad-grips-begin.dwg
- 2. Select CRUSHED AGGREGATE BASE COURSE SHOULDER Line on left side of SECTION A-A detail

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- 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

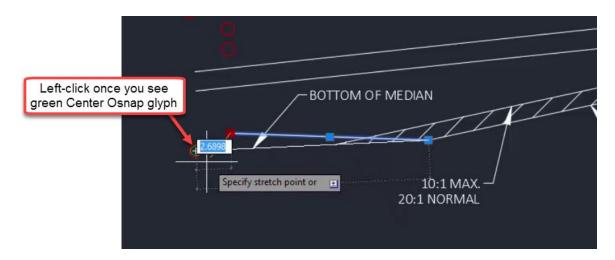
Continue with acad-grips-begin.dwg

acad-grips-02.mp4 5:42

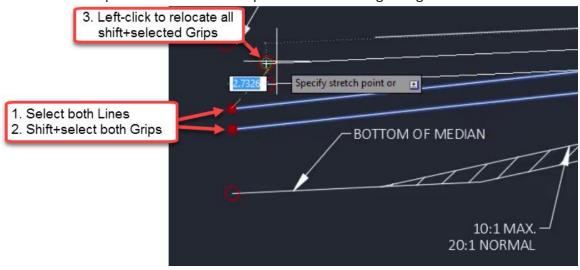
Hold the Shift key and select multiple Grips to simultaneously apply a similar Grip edit to multiple object Grip locations. The Grips will display red once selected and activated. Release the Shift key and select one of the activated Grips to apply a Grip edit as normal. The Grip edit will then be applied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

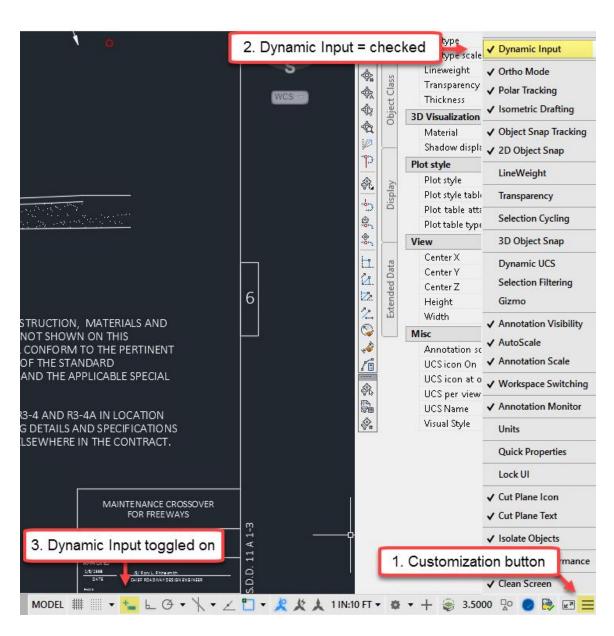
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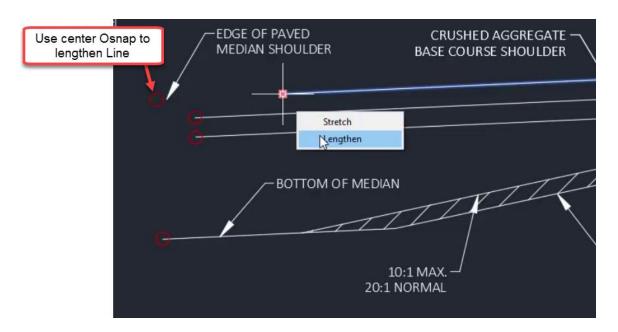
- 6. Select both CRUSHED AGGREGATE BASE COURSE and SUBGRADE Lines
 - A. shift+select both leftmost endpoint Grips
 - I. Release shift key
 - II. Left-click one of the shift+selected Grips
 - a. Use Osnaps to relocate Line endpoints at center of guiding Circles



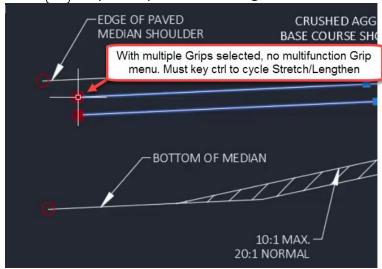
- 7. Select PAVED MEDIAN SHOULDER Line
 - A. Verify Dynamic Input is on
 - I. Status bar > Customization button
 - a. Dynamic Input = checked
 - II. Status bar
 - a. Dynamic Input toggled on



- 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

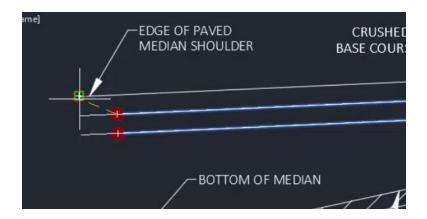


- 8. Select both CRUSHED AGGREGATE BASE COURSE and SUBGRADE Lines
 - A. shift+select both leftmost endpoint Grips
 - I. Release shift key
 - II. Left-click one of the shift+selected Grips
 - a. ctrl to cycle Grip function = Lengthen

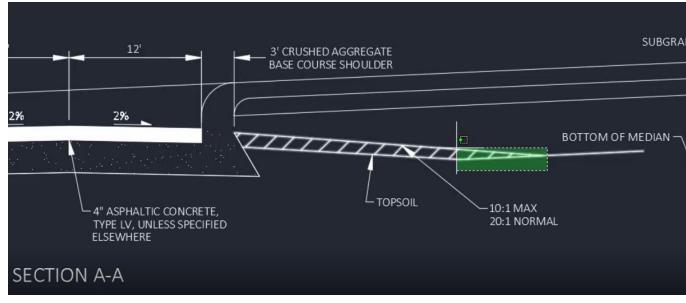


B. Use Osnaps to Lengthen Lines to leftmost endpoint of PAVED MEDIAN SHOULDER Line

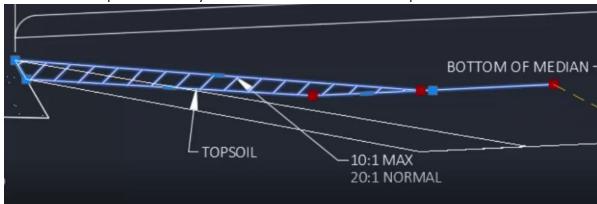
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- 9. Pan to right of SECTION A-A detail
 - A. Use crossing selection to select TOPSOIL Hatch and bounding Lines



- 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

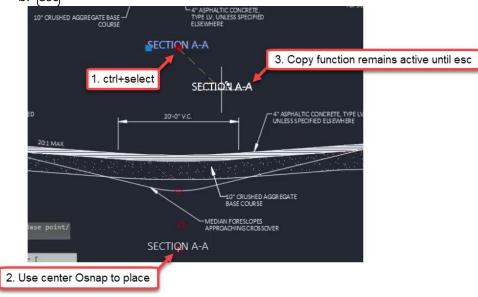
Exercise files: acad-grips-data-c3d16.zip

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

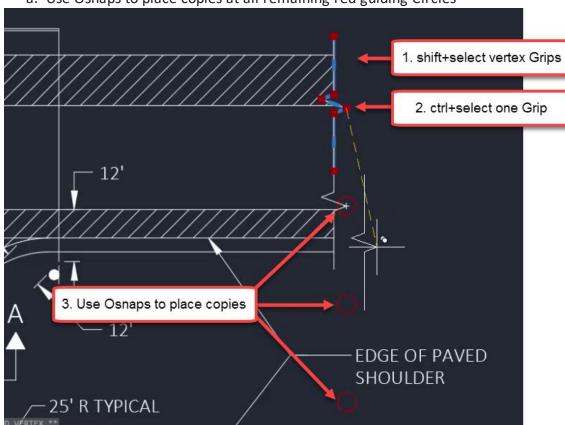
- 1. Continue with acad-grips-begin.dwg
- 2. Select SECTION A-A Text
 - A. ctrl+select insertion point Grip
 - I. Release ctrl key
 - II. Pan to SECTION B-B detail
 - a. Use Osnaps to place copied Text at center red guiding Circle
 - b. esc



3. Pan to PLAN VIEW detail

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- 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

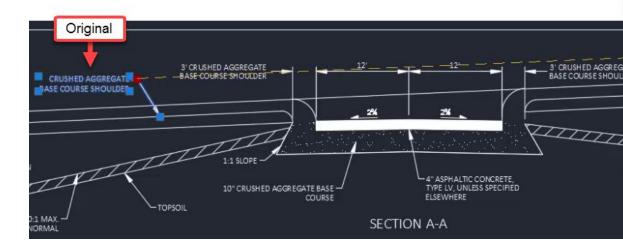
Exercise files: acad-grips-data-c3d16.zip
Start with acad-grips-01.dwg

acad-grips-04.mp4 6:46

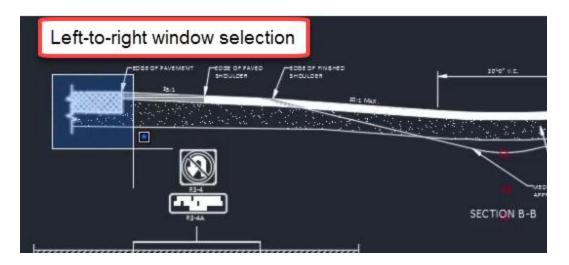
In addition to object-specific Grip edit behavior, all Grips have the ability to edit associated objects using four standard behaviors. These standard Grip editing behaviors are known as Grip Modes. They include Move, Rotate, Scale, and Mirror. Once an object is selected and a Grip is activated, use 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.

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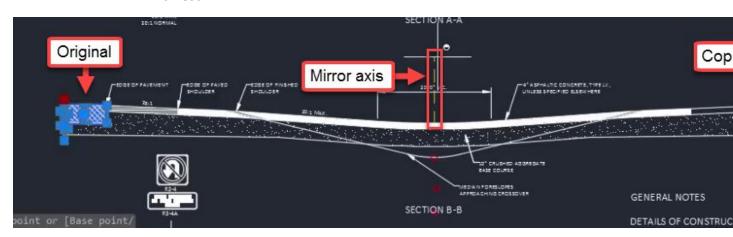
- 1. Open acad-grips-01.dwg
- 2. Zoom and Pan to PLAN VIEW detail
- 3. Select Line just below R3-4A signage
 - A. Left-click topmost endpoint Grip
 - I. Observe command line prompt **SPECIFY STRETCH POINT OR:**
 - II. Move cursor and observe behavior
 - a. enter
 - III. Observe command line prompt change SPECIFY STRETCH MOVE
 - 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



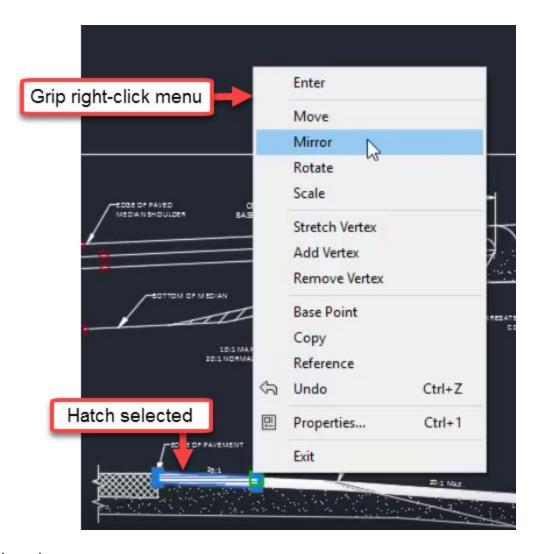
- 6. Pan to SECTION B-B detail
- 7. Verify midpoint Object Snap is on
- 8. Window select breakline symbol Polyline and Hatch near EDGE OF PAVEMENT Multileader



- 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: <u>acad-grips-data-c3d16.zip</u>

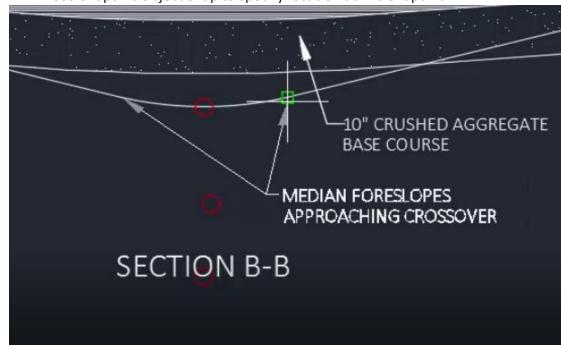
Continue with acad-grips-01.dwg

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.

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- 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. lenter
- 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:
 - 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

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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:

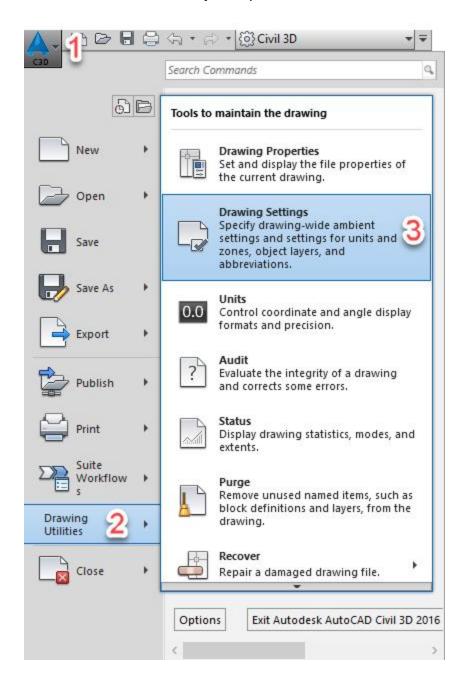
Civil 3D objects are made up of components. For example, an Alignment can have Line, Curve, Spiral, etc components. The object and it's component can all be on unique Layers.

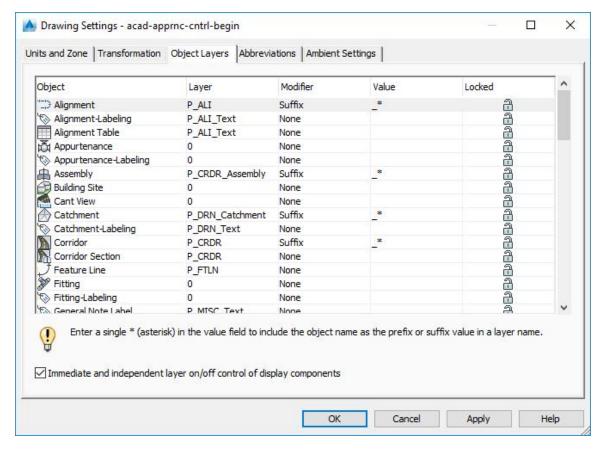
When Civil 3D objects (ie Alignments, Corridors, Surfaces) are created, they will be placed on the default Object Layer specified in the Drawing Settings dialog. An optional Layer name wildcard can be included that will append the default Object Layer name with the name you give to the Object. In this 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

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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**

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- 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-

Α

b. Observe Object Layer for selection = **P_XS_FinalBorrow**

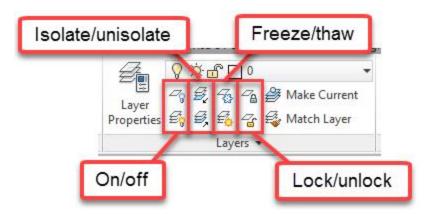
Layer commands: off, freeze, isolate, lock

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

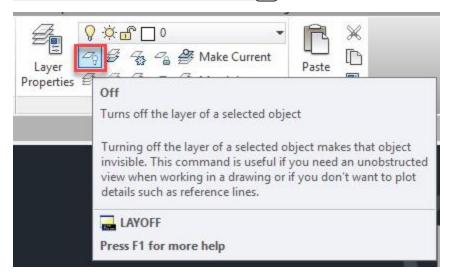


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Layer property	Description
On/off	When a Layer is turned off, objects residing on that Layer will not display, although they will be accounted for when processing object display, such as when you Zoom Extents or Regen.
lsolate/unisolate	Depending on 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



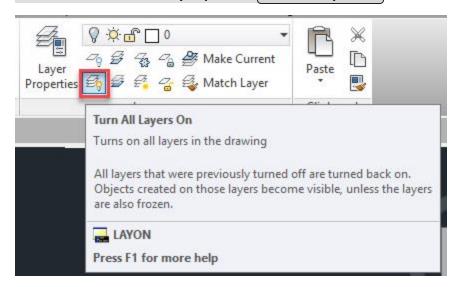
3. SELECT AN OBJECT ON THE LAYER TO BE TURNED OFF

- A. Select multiple objects below SECTION A-A detail
- B. esc

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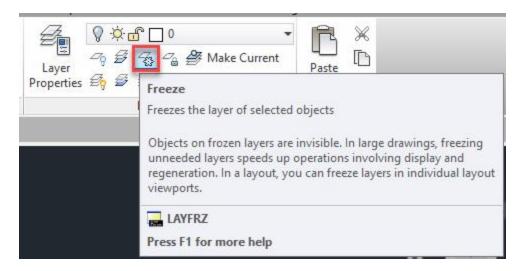


- 4. Double-click middle mouse wheel
 - A. Observe Zoom Extents still accounting for Layers turned off
- 5. Ribbon > Home tab > Layer panel > Turn All Layers On



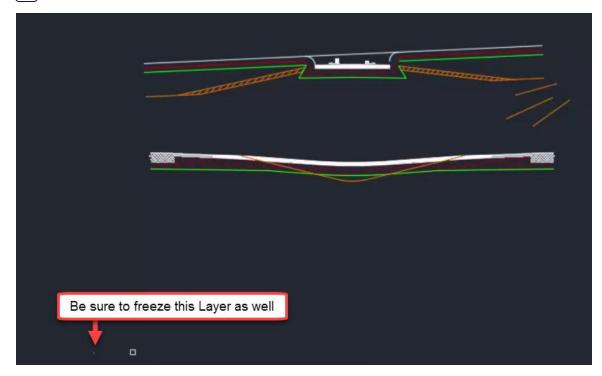
Freeze/thaw

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



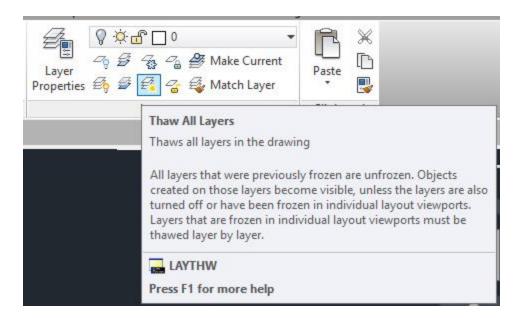
3. SELECT AN OBJECT ON THE LAYER TO BE FROZEN

- A. Select multiple objects below SECTION A-A detail
- B. esc



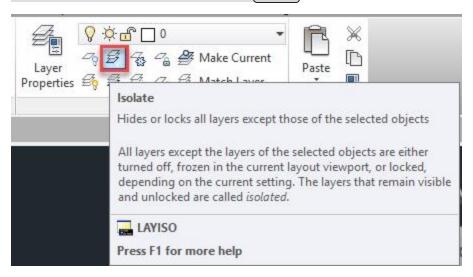
- 4. Double-click middle mouse wheel
 - A. Observe Zoom Extents not accounting for frozen Layers
- 5. Ribbon > Home tab > Layer panel > Thaw All Layers

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Isolate/unisolate

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

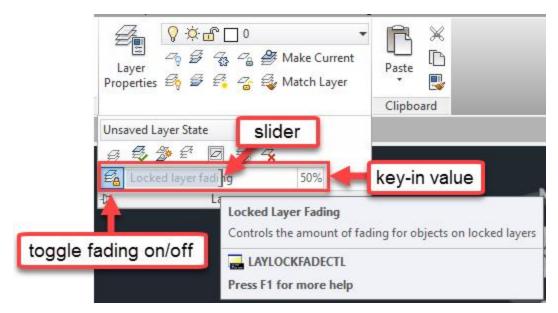


3. SELECT AN OBJECT ON THE LAYER TO BE ISOLATED

- 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

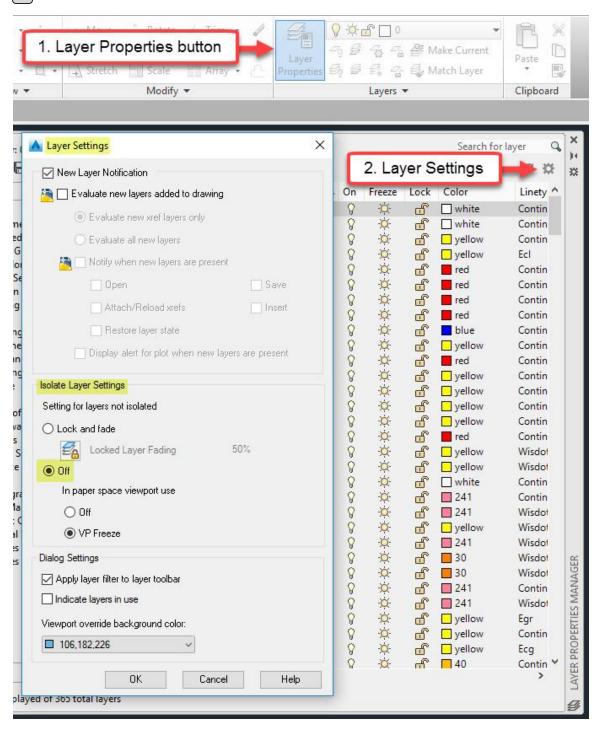


5. Ribbon > Home tab > Layer panel > Layer Properties

- A. Layer Settings
 - I. Isolate Layer Settings
 - a. Settings for Layers not isolated = Off

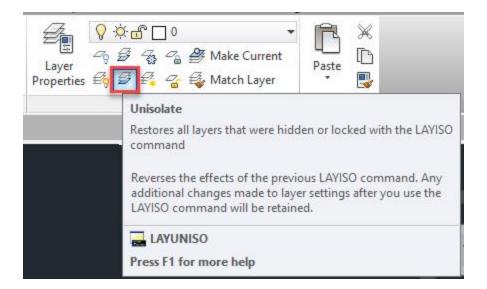
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B. OK

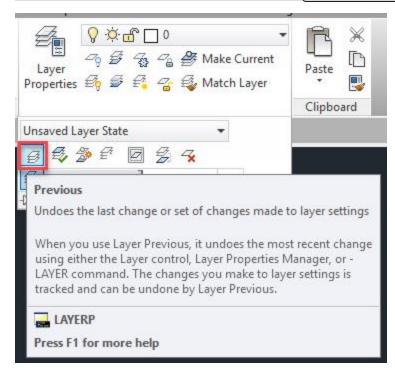


6. Ribbon > Home tab > Layer panel > Unisolate

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- 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

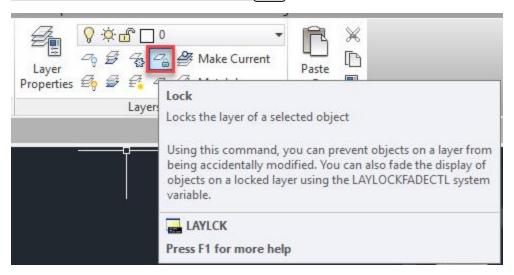


Tip: Use Layer Previous to turn on or thaw only the single Layer or selection of Layers you previously changed. The Ribbon buttons only allow you to turn on or thaw all layers

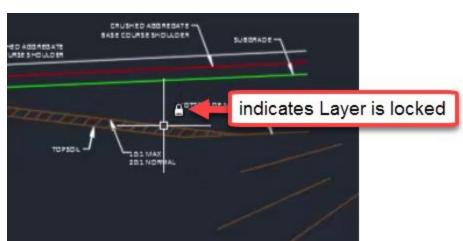
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Lock/ unlock

1. Ribbon > Home tab > Layer panel > Lock

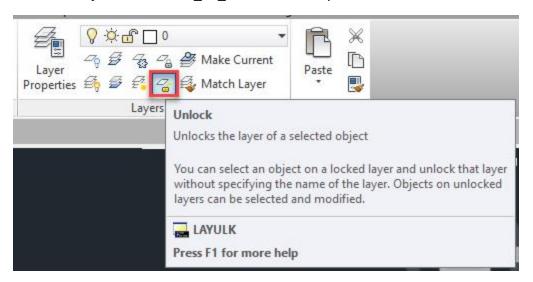


- 2. Select an object on the layer to be Locked
 - A. Select BOTTOM OF MEDIAN Line on right side of SECTION A-A detail
 - B. enter
 - C. Observe Locked layer display fade
 - D. Hover cursor over object on locked Layer
 - E. Observe "padlock" glyph indicating the Layer is locked



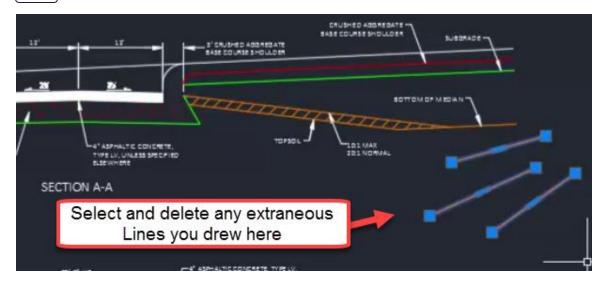
- 3. Select an object on the locked Layer
 - A. Observe absence of any Grips
 - B. **M**
- I. enter
- II. Observe command line history and inability to edit object on locked Layer:
 - a. MOVE 1 FOUND, 1 WAS ON A LOCKED LAYER
- III. esc

- 4. Ribbon > Home tab > Layer panel > Unlock
 - A. Select an object on locked **P_XS_FinalBorrow** Layer



5. Select the three extraneous Lines drawn near SECTION A-A detail

A. delete



Layer properties manager: interface & editing

Exercise files: <u>acad-layr-prprtis-data-c3d16.zip</u>

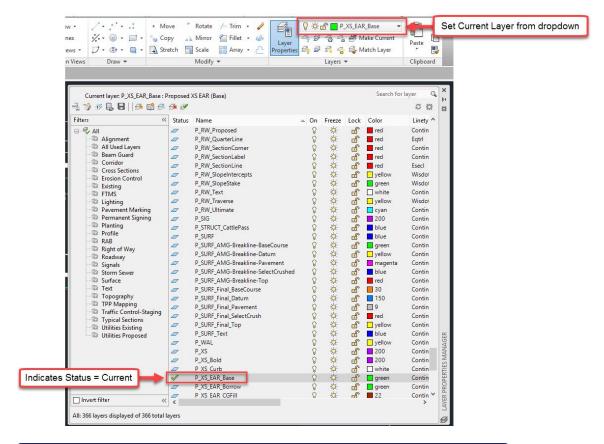
Start with acad-layr-prprtis-begin.dwg

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

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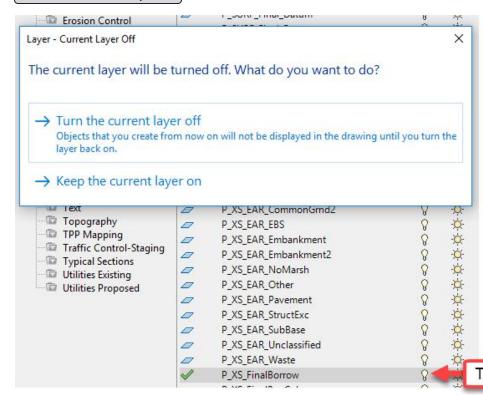
The Layer Properties Manager is where you can sort, create and delete Layers or edit Layer properties such as Layer name, description, display color, visibility (on/off or freeze/thaw), plot style name (how thick a lines will plot), whether the Layer will plot or not, etc. Take advantage of shift+select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

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- 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

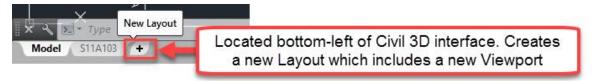
- a. Toggle freeze
 - i. Observe Layer not displayed in modelspace
- b. Toggle thaw
- c. Toggle lock
 - i. Observe Layer display fade in modelspace
- d. Color column
 - i. Color = yellow
 - ii. OK
 - 1. Observe layer color change in modelspace
- e. Color column
 - i. Color = 30
 - ii. OK
- f. Linetype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

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Toggle

- 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 Viewports. Viewports are used for plan production to "look" from you plan sheet Layout (Paperspace) into your Civil 3D model (Modelspace). The concepts and use of Layouts, Viewports and Paperspace vs Modelspace will be covered in more depth in later training modules.

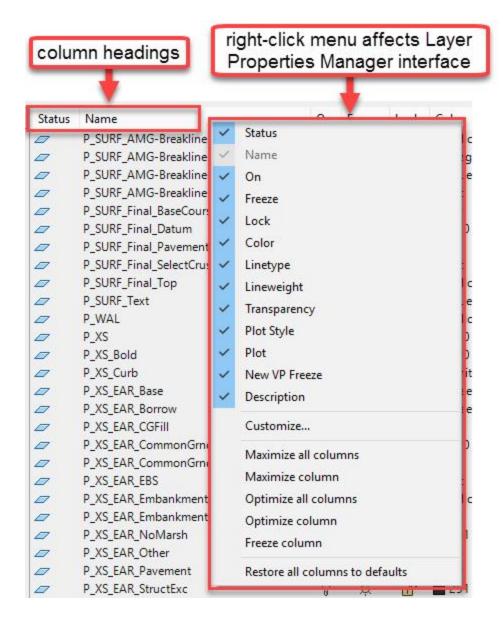
- C. Model and Layout tabs
 - I. New Layout



- 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

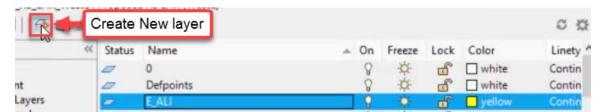
Exercise files: acad-layr-prprtis-data-c3d16.zip

Continue with acad-layr-prprtis-begin.dwg

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

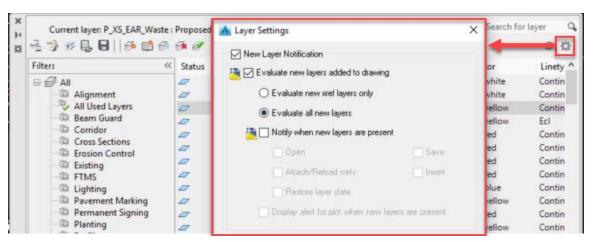
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- 1. Continue with acad-layr-prprtis-begin.dwg
- 2. Layer Properties Manager
 - A. Select **E_ALI** row
 - B. Create New Layer
 - I. Layer name = E ALI2
 - Info: When creating a new Layer in Layer Properties Manager, all properties of the selected 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

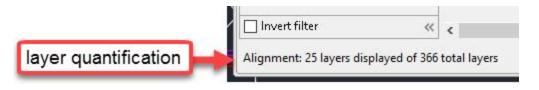
Exercise files: acad-layr-prprtis-data-c3d16.zip
Continue with acad-layr-prprtis-begin.dwg

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

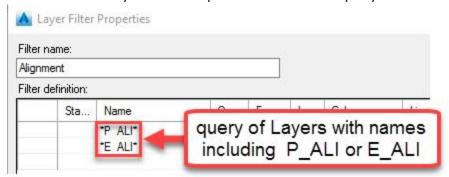
Layer Properties Filters essentially query all the Layers in your drawing based on Layer name text or other Layer properties. This allows you to reduce the Layers listed in Layer Properties Manager, making Layers easier to find and work with. You can also use the search field in the upper right corner 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
 - 1. 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

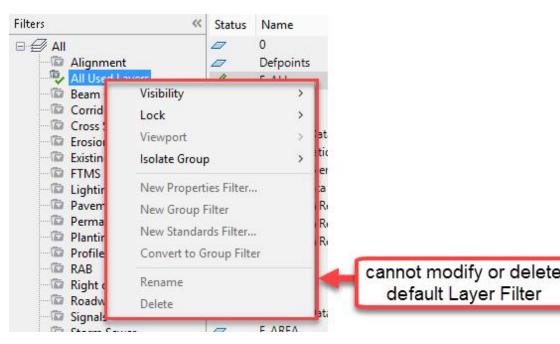
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- II. Right-click *Alignment* Layer Filter > Properties
 - a. Observe Layer Filter Properties name-based query



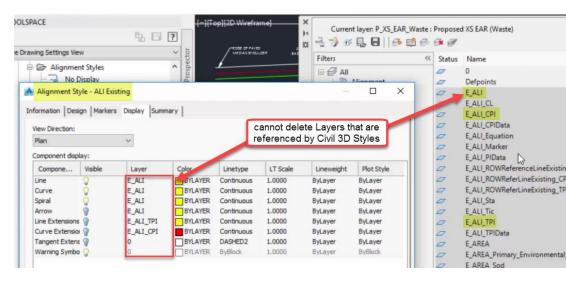
- III. Right-click All Used Layers Filter
 - a. Observe inability to modify properties or delete this filter



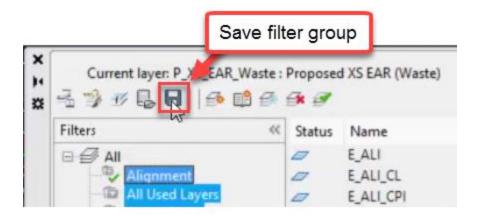
Info: The All Used Layers Filter is one of the default Layer Filters automatically created in any drawing. These default Layer Filters cannot be modified or deleted. Additional default Layer Filters include External Reference, Non-External Reference, Unreconciled Layers and Viewport Overrides.

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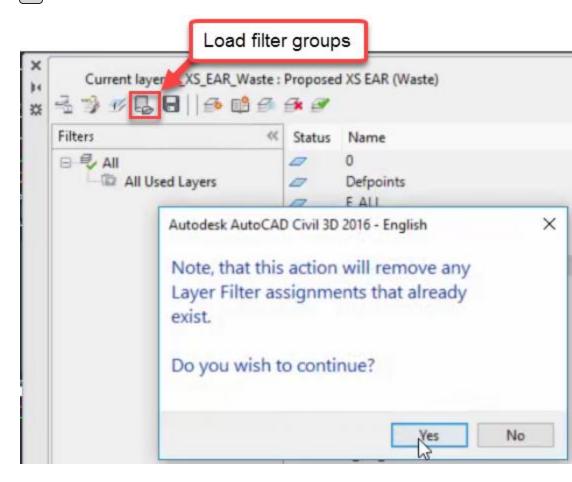
- b. Shift-select multiple Layers included in the All Used Layers Filter
 - i. Right-click selection
 - 1. Delete Layer
 - 2. Observe notification informing that you cannot delete these Layers
 - Info: When Layers are referenced by a Civil 3D Style included in a drawing or template, the Layers are included 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 > Doubleclick 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 guickly and accurately switch to a desired

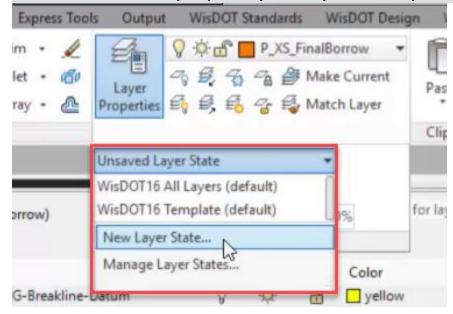
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Layer properties setup for specific design, external referencing, or plotting workflows. Some key Layer States are included in the WisDOT design template and on the Ribbon WisDOT Standards tab. The Layer States on the WisDOT Standards tab can be imported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

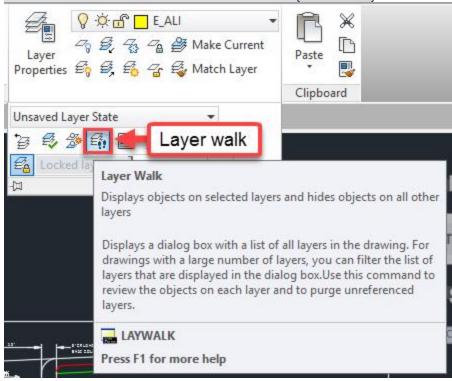


- A. New layer state name = *color*
- B. OK
- 3. Layer Properties Manager
 - A. Shift+select all Layers
 - B. Click any Layer Color field
 - I. Color = white
 - II. OK
- 4. Ribbon > Home tab > Layers panel flyout > Layer State dropdown > New Layer State
 - A. New layer state name = white
 - в. (ОК)
-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

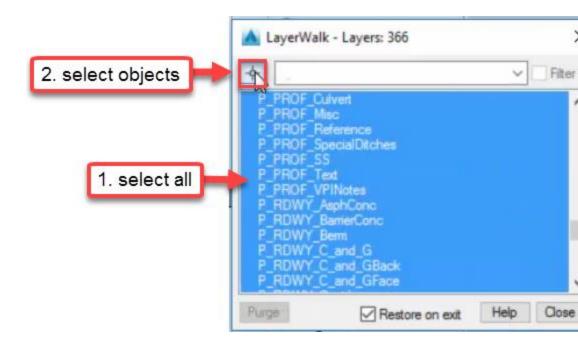
- 6. Layer Properties Manager
 - A. Shift+select all Layers
 - B. Click any Layer Lock field
- 7. Ribbon > Home tab > Layers panel flyout > Layer State dropdown > white
 - A. Observe Layer Color and Lock properties restored based on white Layer State

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

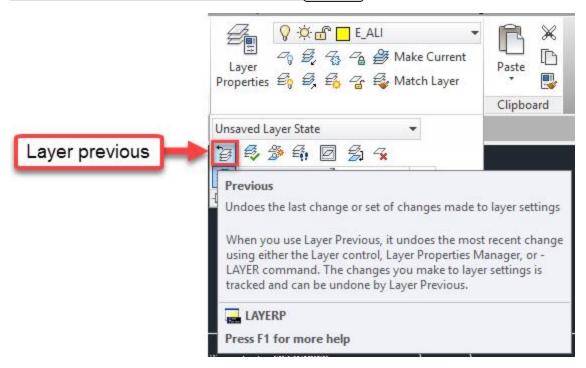
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is unique in that it is used by many Civil 3D styles to inherit parent object Layers or used by AutoCAD Blocks so that objects within a Block are control by the overall Block object Layer. The Defpoints Layer is used by Civil 3D to track object geometry 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

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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

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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.

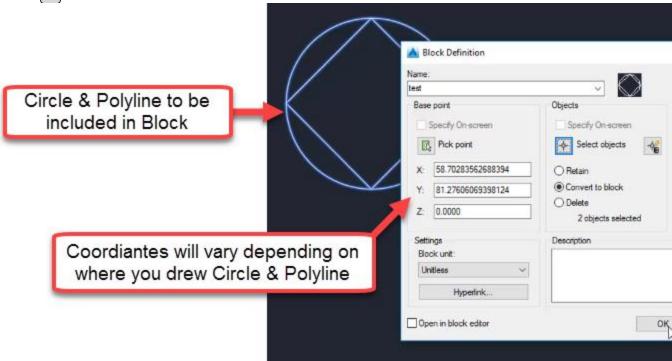
- 1. Open acad-blk-xref-begin.dwg
- 2. Set Current Layer = 0
- 3. Ribbon > Home tab > Draw panel
 - A. Draw a Circle
 - I. Radius = $15\pm$
 - B. Draw a Polyline within the Circle
- 4. Ribbon > Insert tab > Block panel > Create
 - A. Name = *test*
 - B. Base Point
 - I. Specify on-screen = unchecked
 - 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

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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

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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 = $15\pm$
 - 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

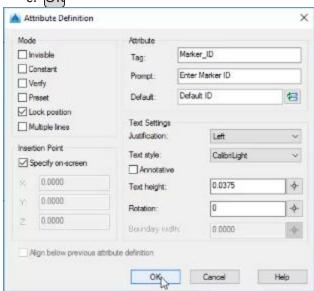


Info: If a Block has been created such that you do not have Layer control, you can enter Block Editor and place the objects contained in the Block on Layer 0. Then you will have Layer control of the Block.

- 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*

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- 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

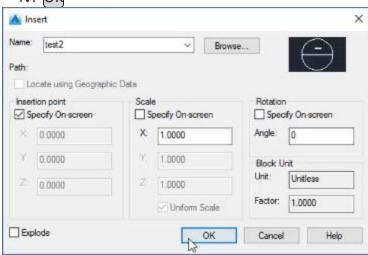
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Continue with acad-blk-xref-begin.dwg

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

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- 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

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- 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

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- 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: <u>acad-blk-xref-data-c3d16.zip</u>

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**
 - в. Ок
- 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**

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- 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: <u>acad-blk-xref-data-c3d16.zip</u>

Continue with acad-blk-xref-01.dwg

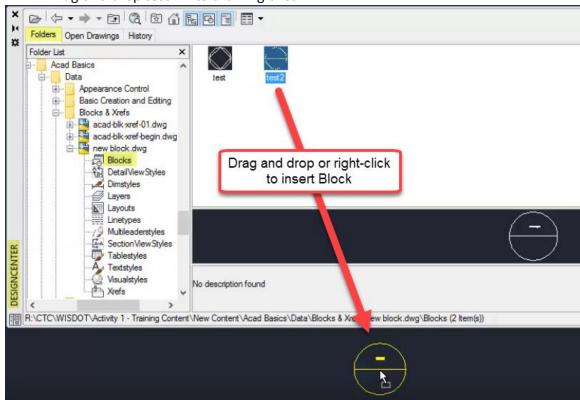
acad-blk-xref-06.mp4 2:19

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

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- 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



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

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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
 - 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

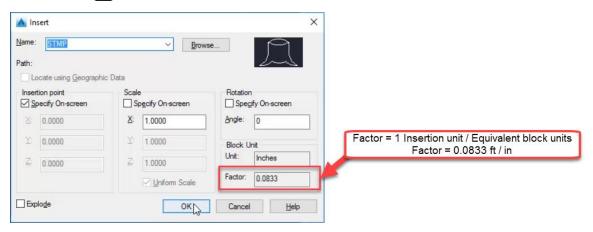
When a Block is inserted into a drawing it will be automatically scaled by a factor based on the drawing Insertion Units and the individual Block Units. The scale factor applied to a Block upon insertion will represent the Block in terms of the drawing Insertion Units. For example, a Block with Block 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.

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- 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
 - в. (ОК)



- 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-

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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

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- 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
 - в. (ОК)
 - 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*
 - с. (ок)
- 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

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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

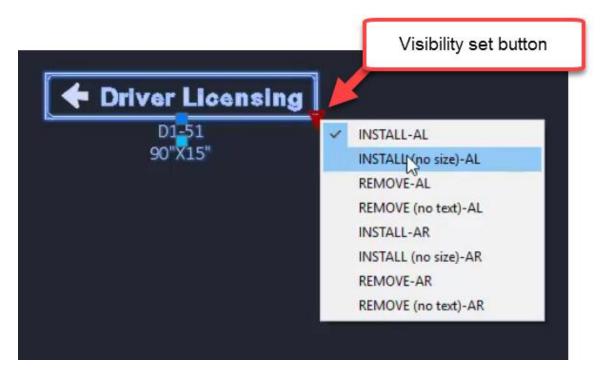
Start with acad-blk-xref-03.dwg

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

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- 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.

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- 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

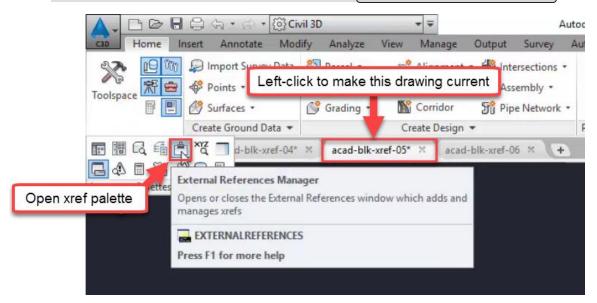
Start with acad-blk-xref-04.dwg, acad-blk-xref-05.dwg and acad-blk-xref-06.dwg

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.

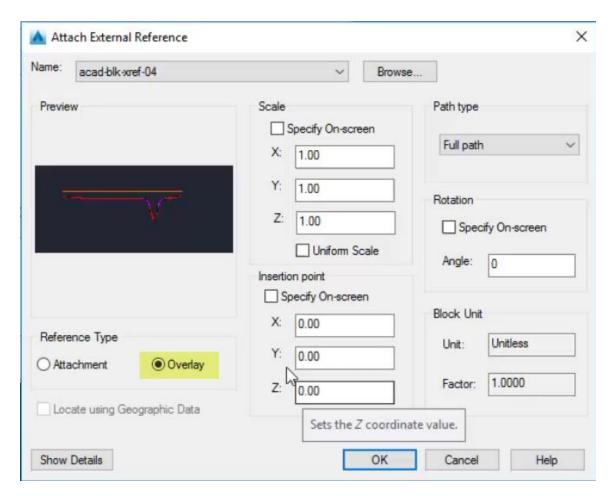
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- 1. Open acad-blk-xref-04.dwg, acad-blk-xref-05.dwg and acad-blk-xref-06.dwg
- 2. File tab > acad-blk-xref-05
- 3. Ribbon > Home tab > Palettes panel flyout > External References Manager



- 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

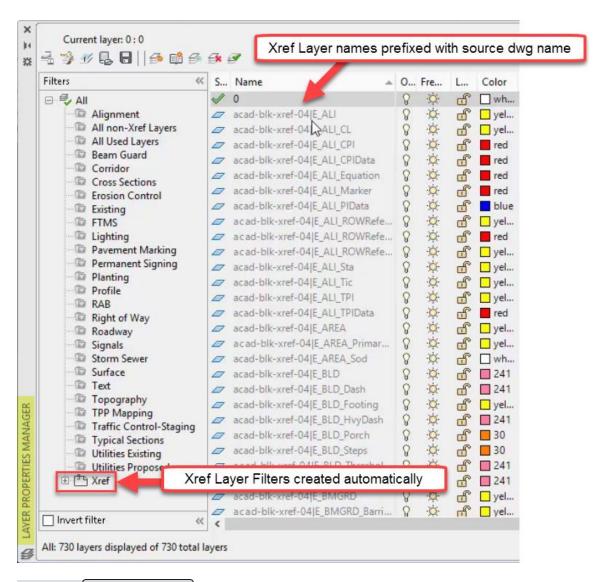
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6. Ribbon > Home tab > Layers panel > Layer Properties

A. Observe presence of Xref Layer Filters and Xref Layers

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- 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.

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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-blkxref-05 - <username> <computer name> 15,9508 Width Misc 1 IN:40 FT Annotation scale UCS icon On Yes UCS icon at origin No Yes UCS per viewport UCS Name Status bar prompt to reload xref External Reference File Has Changed once source file is saved A reference file has changed and may need reloading: Reload acad-blk-xref-05

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

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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

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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.

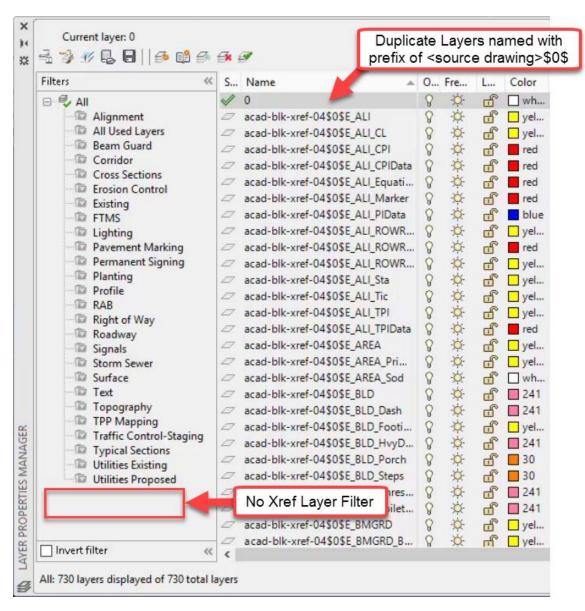
- 1. Open acad-blk-xref-07.dwg
- 2. **XR**
 - A. enter
 - B. Browse to acad-blk-xref-04.dwg
 - C. Open
- 3. Add External Reference
 - A. OK
- 4. External References palette > Right-click acad-blk-xref-04
 - A. Bind
 - B. Bind Xrefs/DGN underlays
 - I. Bind Type = Bind
 - II. OK



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

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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

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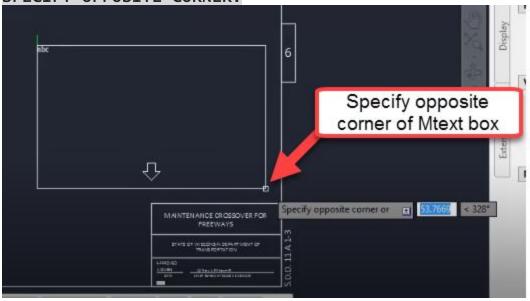
Specify first corner of Mtext box



- 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

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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

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

Continue with acad-annotatn-begin.dwg

acad-annotatn-02.mp4 5:20

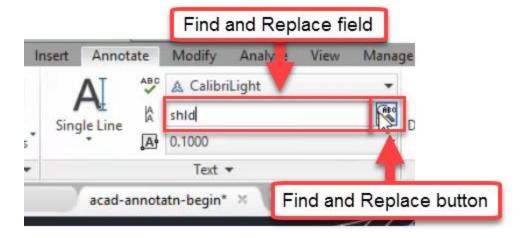
In this exercise, you will learn some time-saving text editing functions including Change Case, Convert to Mtext, Text Align, Match Properties, Check Spelling, and Find/Replace as well as the differences between Multiline Text (Mtext) and Text (aka Dtext). Essentially, Text is the old version of Mtext. 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

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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

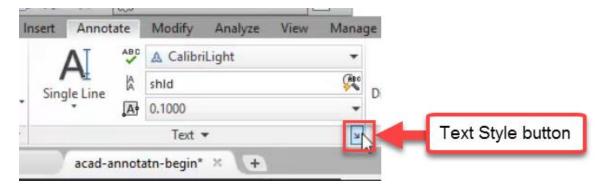
Continue with acad-annotatn-begin.dwg

acad-blk-xref-03.mp4 3:35

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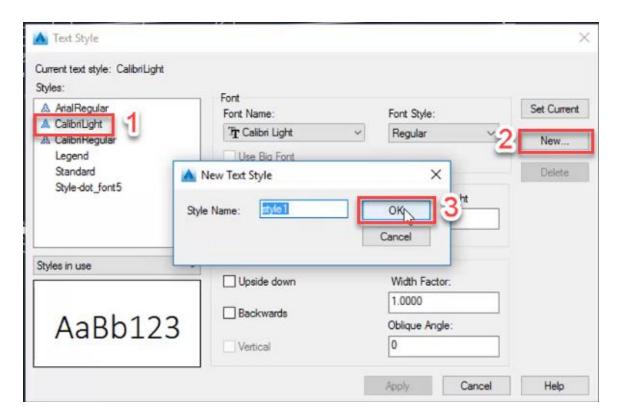
Whenever creating either Mtext or Text, the first step is to choose a Text Style. You pick this from a dropdown list on your Ribbon. As with other Civil 3D and AutoCAD Styles, the Text Styles available are associated with a drawing or template. The WisDOT Design templates come with the standard WisDOT 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.

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Multileader creation

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

Start with acad-annotatn-01.dwg

acad-annotatn-04.mp4 4:05

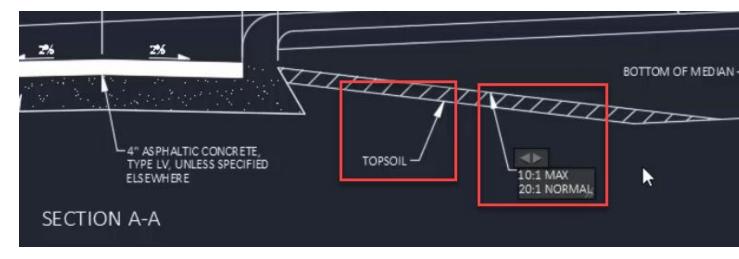
A Multileader (aka Mleader) is an annotation object consisting of a combination of a text and one or more leader/pointers. It is used to manually add notes pointing to a specific area of interest. The text portion behaves just like Mtext and the leader portion is dynamically attached to the text portion. 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 deal-

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ing 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

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- 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

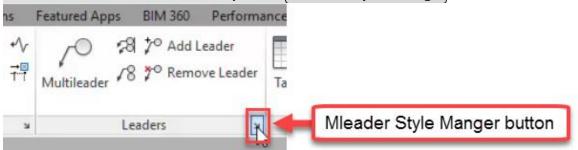
Continue with acad-annotatn-01.dwg

acad-annotatn-05.mp4 7:04

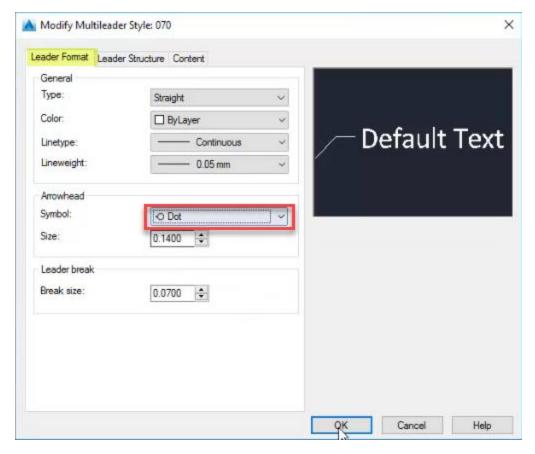
Whenever creating an Mleader, you want to be aware of the currently set Mleader Style. You set this through the Ribbon Mleader Style Manager button. Mleader Styles control what Text Style is used for the Text portion, what the Leader and arrow portion looks like, whether a user-defined Block is used 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.

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- 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



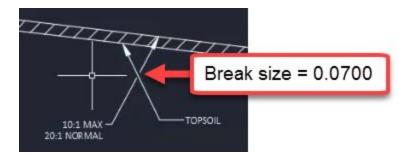
- A. Current mulitleader style: 070
- B. Modify
- C. Leader Format tab
 - I. General
 - a. Type = Straight
 - II. Arrowhead
 - a. Symbol = Dot
- III. OK
- D. Close
- E. Observe update to existing Mleaders with 070 Mleader Style



- 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



- 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

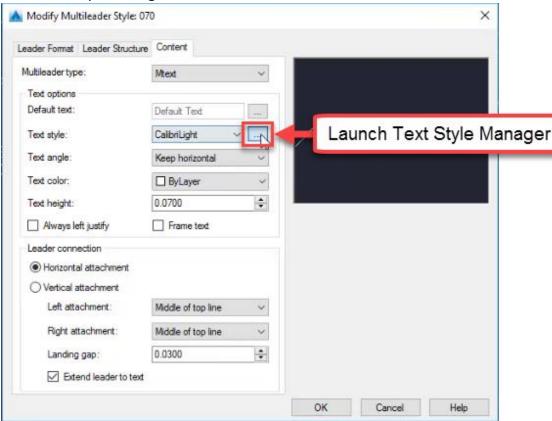


- 7. Ribbon > Annotate tab > Leaders panel > Mleader Style Manager
 - A. Modify
 - B. Leader Structure tab
 - I. Constraints
 - a. Maximum leader points = 2
 - info: Setting Maximum leader points = 3 or greater means you will be prompted for intermediate vertex points between the arrowhead and Leader 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



- 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
 - Observe options affecting Horizontal, Vertical Leader landing attachment

Dimension creation

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

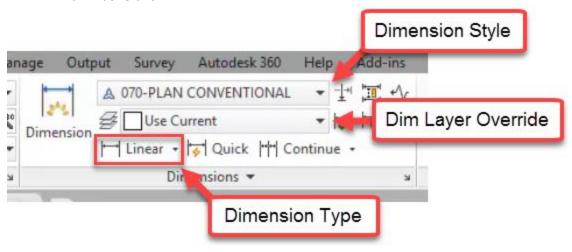
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Start with acad-annotatn-02.dwg

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
 - 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



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- 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 lage Output Survey Autodesk 360 Help Add-ins

 A 070-PLAN CONVENTIONALSO
 P_MISC
 P_MISC
 V P Continue
 Dimensions
 Dimensions

Dimension Style Ma

- III. Styles
 - a. Select 070-PLAN-CONVENTIONAL
 - i. Set Current

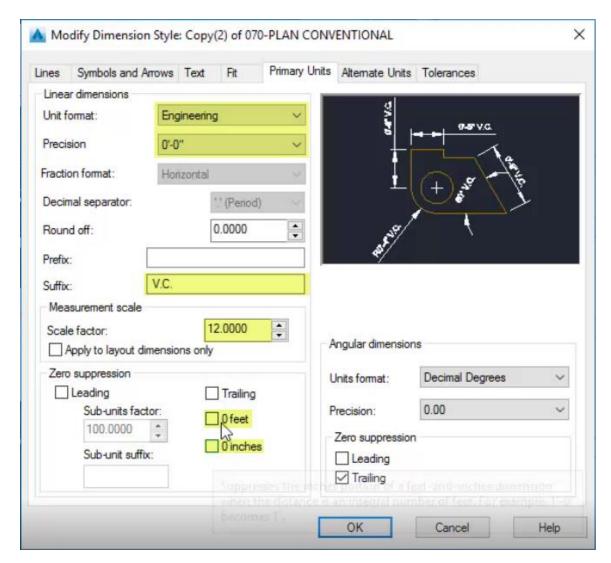
IV. New...

- a. Continue
- b. New Dimension Style dialog
 - i. Primary Units tab
 - 1. Unit format = Engineering
 - 2. Precision = 0'-0"
 - 3. Suffix = V.C.



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- 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

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- 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

Ι.

- 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

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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-annotaty-scl-begin.dwg

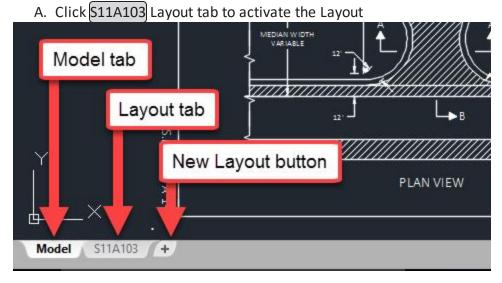
acad-annotatv-scl-01.mp4 5:02

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

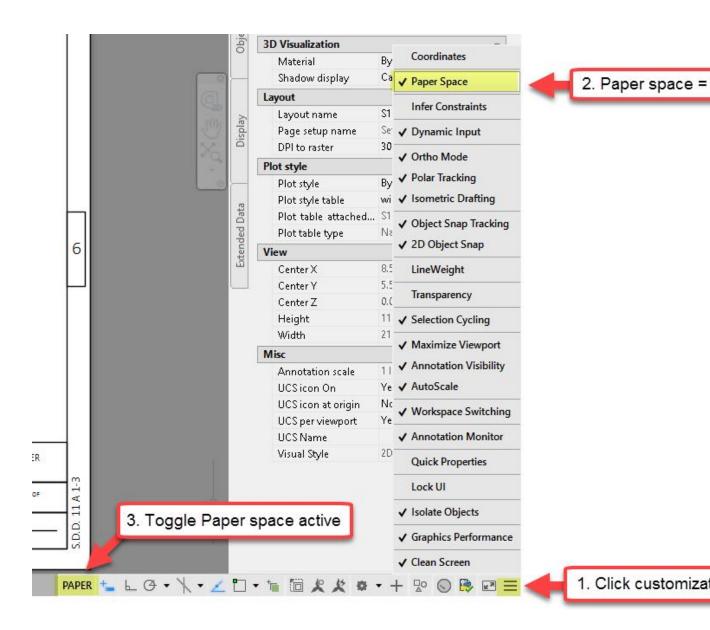
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design. You can switch from Model space to a Layout interface where you will set up what your plotted plan sheet will look like. In a Layout, you can either draw objects in Paper space, which will not affect Model space, or have a Viewport object that 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-annotaty-scl-begin.dwg
- 2. Observe the Model tab and Layout tab in the bottom left of your interface



- 3. Status Bar
 - A. Customization
 - I. Paper space = checked
 - B. Paper space active

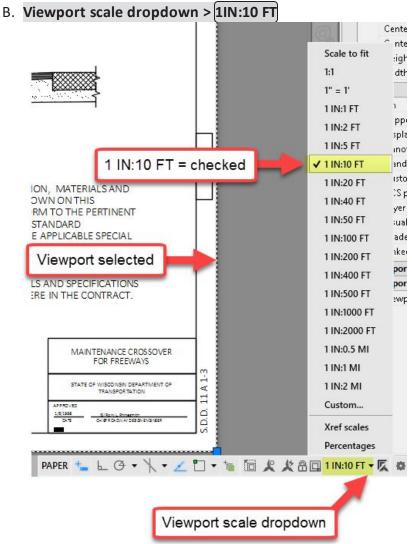


- C. Draw a Circle on your Layout in Paper space
- 4. Click Model tab to activate Model space
 - A. Observe no Circle displayed in Model space
- 5. S11A103
 - A. Delete the Circle drawn in step 3.C
- 6. Status Bar
 - A. Model space active
 - Info: Activating Model space by toggling the Status Bar PAPER/MODEL 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



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

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- 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-annotaty-scl-data-c3d16.zip

Continue with acad-annotaty-scl-01.dwg

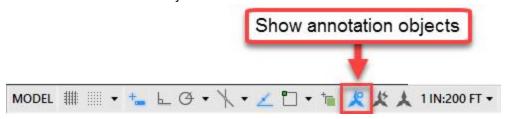
acad-annotatv-scl-02.mp4 6:23

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-annotaty-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

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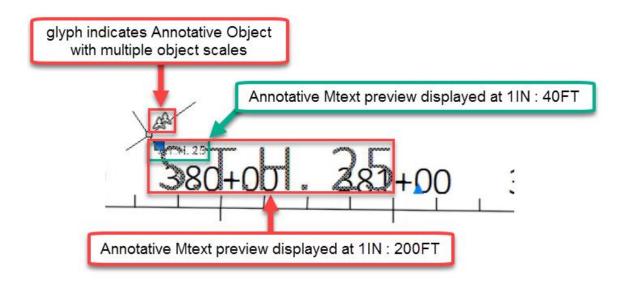
- 6. Verify Model text height
 - A. Double-click inside plan Viewport
 - B. Repeat steps 5.A 5.C.I
 - I. Observe tooltip displaying approx. 5.0000
- C. [esc]
 7. 1IN 200FT 1
- 8. Status Bar
 - A. Show annotation objects = on



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.

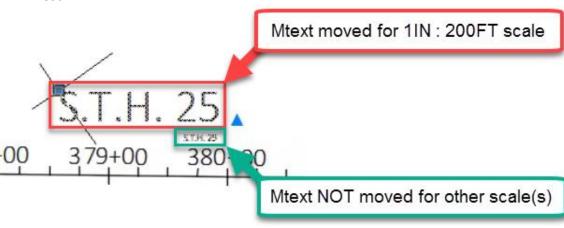
- B. Observe all Annotative Objects displayed in plan view Viewport
- 9. Select one of the *S.T.H. 25* Mtext objects
 - A. Properties > Text
 - I. Observe Annotative scale = 1IN:40 FT
 - B. Right-click menu > Annotative Object Scale > Add/Delete Scales
 - I. Add a. 1 IN:200 FT b. OK
- 10. Select S.T.H. 25 Mtext from step 9
 - A. Properties > Text
 - I. Observe Annotative scale = 1 IN:200 FT
 - II. Observe multiple scale previews displayed

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- 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

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Exercise files: acad-annotaty-scl-data-c3d16.zip

Continue with acad-annotaty-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-annotaty-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

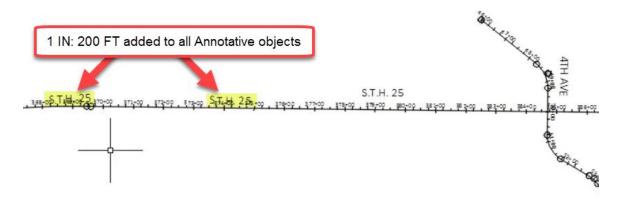


- 4. Status bar > Annotation scale dropdown > 1 IN:200 FT
 - A. Observe scaling of both AutoCAD Annotative objects and Civil 3D Labels
 - Info: When the "Add scales automatically" Status Bar option is turned on and you change the current view Annotative scale, the new Annotative scale will be automatically 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

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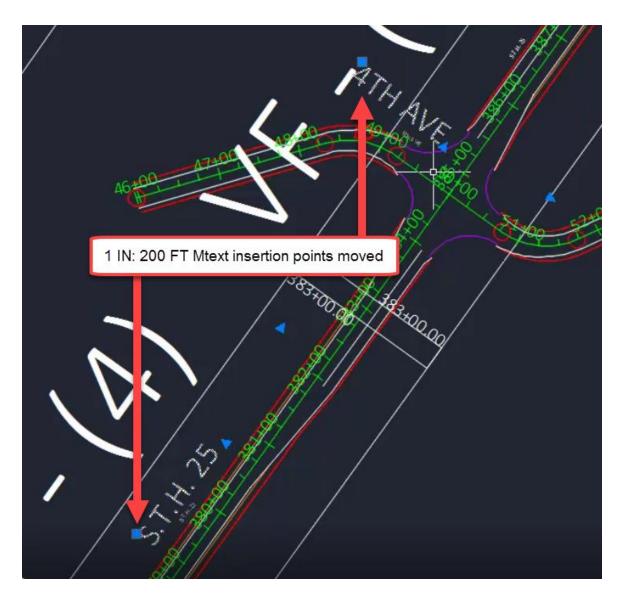
6. 1IN_200FT - 1

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

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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

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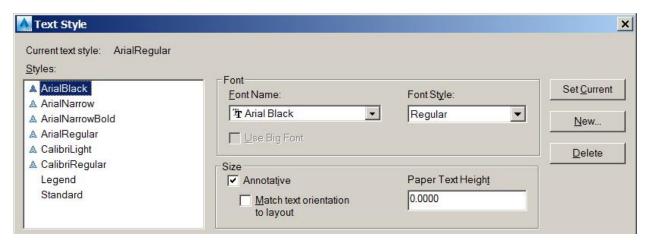
All of the custom DOT-fonts and DOT .shx font files are being retired as of the Civil 3D 2016 release. WisDOT Civil 3D 2016 standard fonts are now all Windows True-Type fonts.

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	<u>Annotative</u>
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

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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	2016	Legacy	2016
C3D Text Style	C3D Text Style	DOT Font	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: <u>acad-lit-drfting-data-C3D16.zip</u>

acad-lit-drfting.mp4 5:31

Light drafting technique

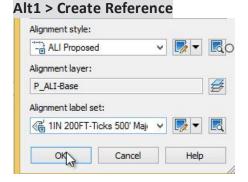
- 1. c3d > 12345678 > Design > AliProfs
- 2. Open file AliProf-Sth-15-Alt3.dwg
- 3. Scroll down to **Data Shortcuts**
 - A. Right-Click on Data Shortcuts > Set Working Folder
 - I. Set to folder 2 folders above shortcut folder
 - a. c3d and OK
 - B. Right-Click on Data Shortcuts > Set Data Shortcut Project Folder > choose pro-

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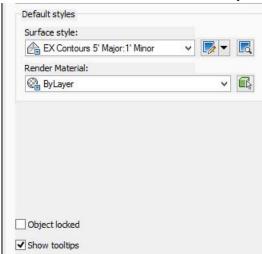
ject folder >

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-



- 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. <u>Starting</u> 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

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- 11. Left-Click to create a text box.
- 12. Type in the box Passing lane 150' widen 12'

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

(DWGUpdater interim workaround)

When a dwg file is updated by the DWG Updater macro, layouts may get lost. DWG Update creates a backup copy of the original dwg file in a backup subfolder. The layouts can be saved by moving them from the backup file to the recently created updated file.

Within Civil 3D, open the newly created dwg file in which the layouts are missing, keep it as your active drawing file

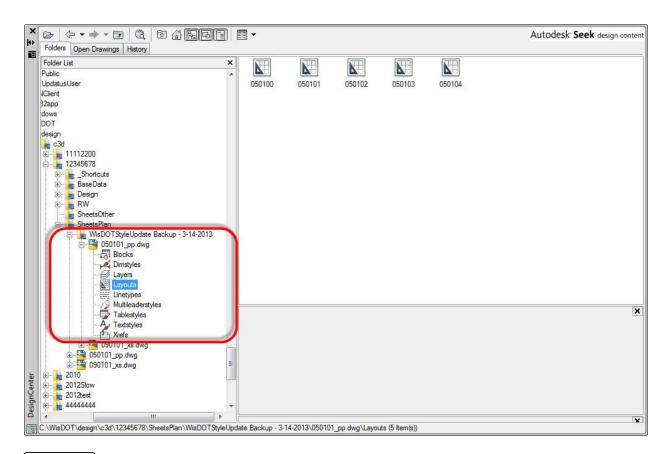
Open **Design Center**



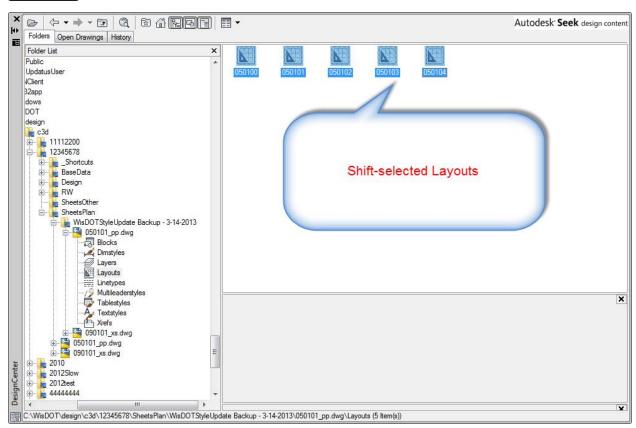
In the Design Center folder view, browse to the backup dwg file containing layouts, expand the backup file in folder view

Select layout category shown within file in Folder list

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Shift select to select all layouts in the backup file shown on the right side of Design Center.



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Linetype best practices

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

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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 *O (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

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WisDOT linetypes

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

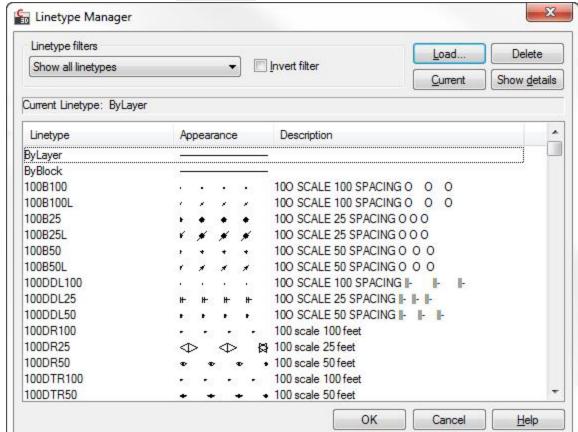
PSLTSCALE = 1

MSLTSCALE = 1

Importing older linetypes into older drawings

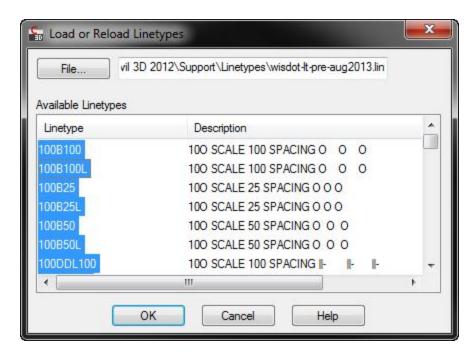
When you need to update your old drawing with compatible linetypes follow these steps.

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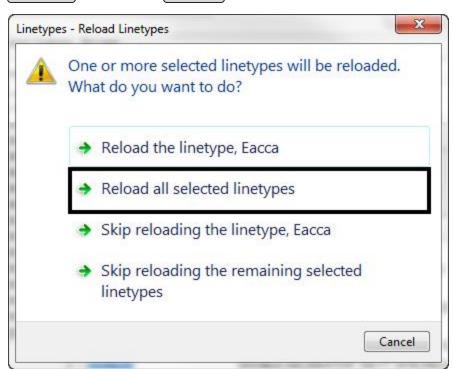


1. In the command line type **LINETYPE**. The *Linetype Manager* dialog will appear.

- 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

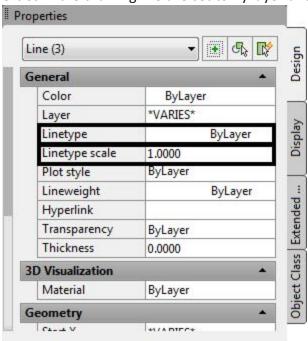


- 6. From the Linetypes Reload Linetypes dialog select Reload all selected linetypes. The new linetypes will be added to the drawing file.
- 7. Click the OK button in the Linetype Manager dialog. The dialog will close.
- 8. **REGEN** your drawing to see the change in scales.

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.

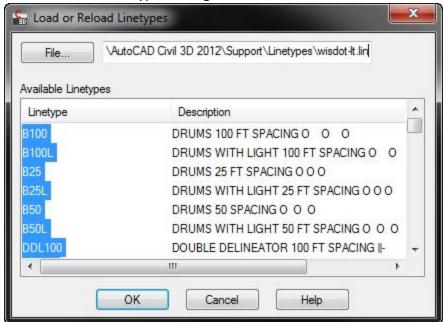
- 1. Prior to importing the linetypes verify the following variables are set. To read and set these, type the variable name at the command line.
 - LTSCALE = 1.0
 - CELTSCALE = 1.0
 - PSLTSCALE = 1
 - MSLTSCALE = 1
- 2. If any object overrides are applied to your line work the following steps will not 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.



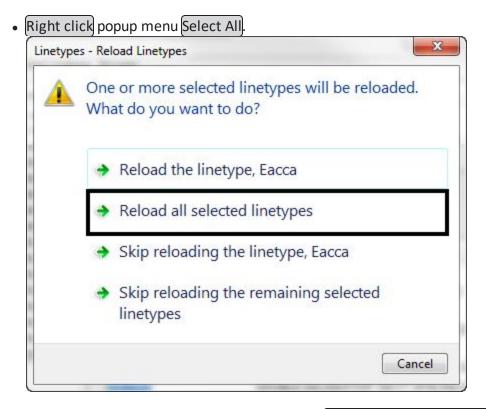
- 3. In the command line type **LINETYPE**. The *Linetype Manager* dialog will appear.
- 4. In the Linetype dialog click the Load button. The *Load or Reload Linetypes* dialog will appear.

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- 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

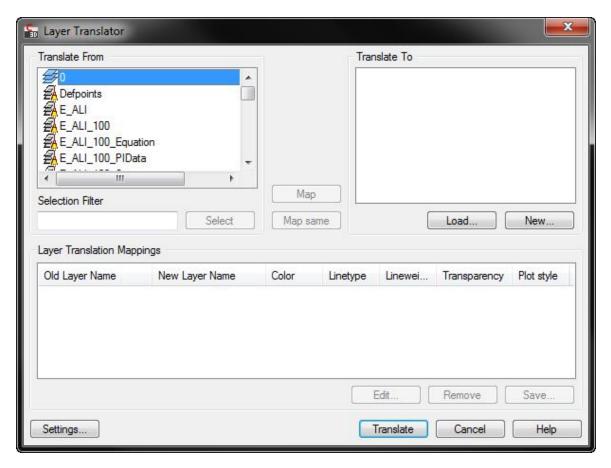


- 8. From the Linetypes Reload Linetypes dialog select Reload all selected linetypes. The new linetypes will be added to the drawing file and the old linetype definitions will be changed to match the new definitions.
- 9. Click the OK button in the Linetype Manager dialog. The dialog will close.
- 10. Regen your drawing to see the change in scales.

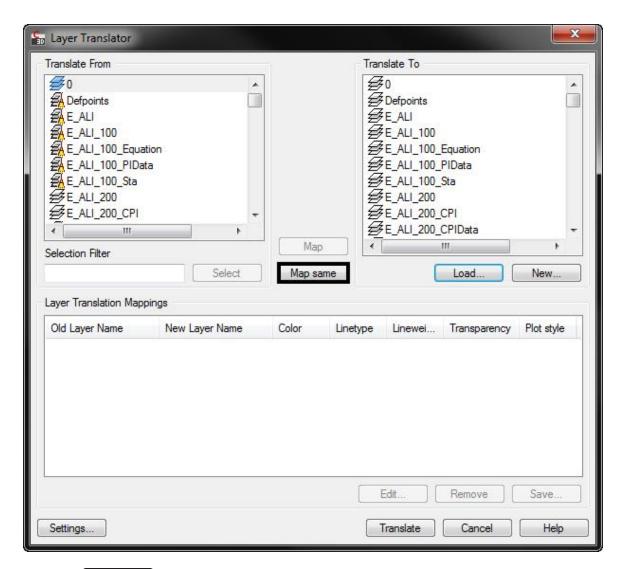
Updating layers with new ByLayer symbology

The linetypes are now in the design file but the layer definitions need to be updated to reflect the new linetype names.

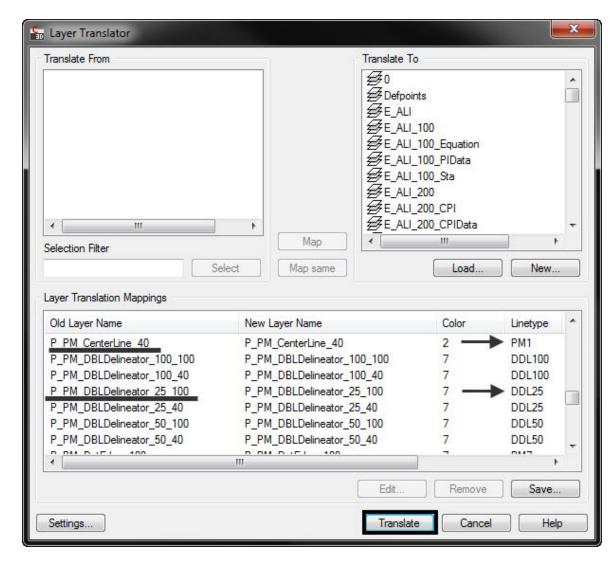
1. From the ribbon Manage tab > CAD Standards panel > Layer Translator. The Layer Translator dialog will appear.



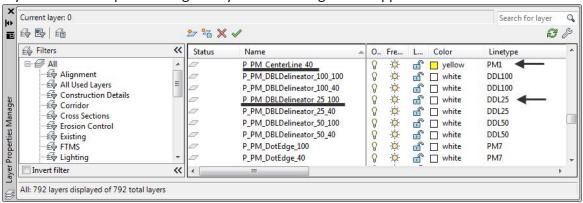
- 2. Pick the Load button from the *Translate To* section of the dialog.
- 3. Change the *Files of type* to *Drawing Template (*.dwt)*
- 4. Path to the WisDOT templates and select wisdot12.dwt or wisdot14.dwt depending on the version you are using, and click Open. The Layers will be loaded in the *Translate 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.



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- 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

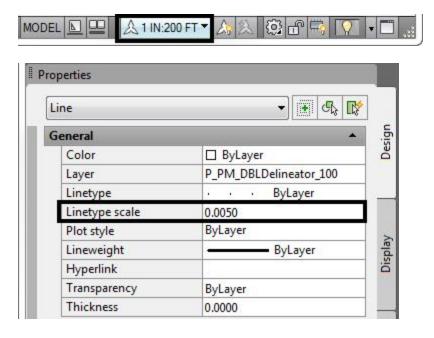
Workflows for true size linetypes

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

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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

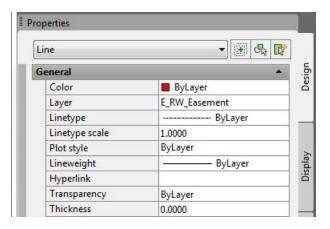
To change the linetype of an object, to use the layout's annotation scale.

- 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.

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- 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

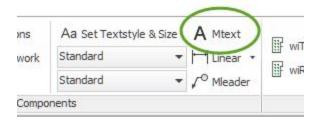
The tool launches a floating window.

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- 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 <u>Set Textstyle & Size</u> 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.

TrueView navigating and measuring

Last updated: 2017-06-06

Total video time: 3:56

Exercise files: acad-truvu-nvigat-mesur-data-C3D16.zip

acad-truvu-nvigat-mesur.mp4 3:56

TrueView navigating and measuring

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1. c3d > 12345678 > SheetsOther

- A. Open file Stoneridge Road Aerial.dwg
- 2. Scroll with the wheel to zoom in.
- 3. Push the wheel to pan.
- 4. Navigation ribbon > Extents



5. View ribbon > Unsaved View >

- A. West
- B. North
- C. East
- D. Intersection

6. Measure ribbon > Measure > Distance

- A. Left-Click where two road ways intersect.
- B. Object Snap toolbar > Endpoint
- C. Left-Click on the end of driveway

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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

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- 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

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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.

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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

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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:

- 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

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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.



nfo: Various file extensions can be given to Point Files depending on the application used to export/generate the Point File.

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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.

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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
 - 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)

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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.

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- 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 ext 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 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.

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👔 Info: Civil 3D Alignments and Profiles can also be uploaded directly to a survey data collector in preparation for staking work.

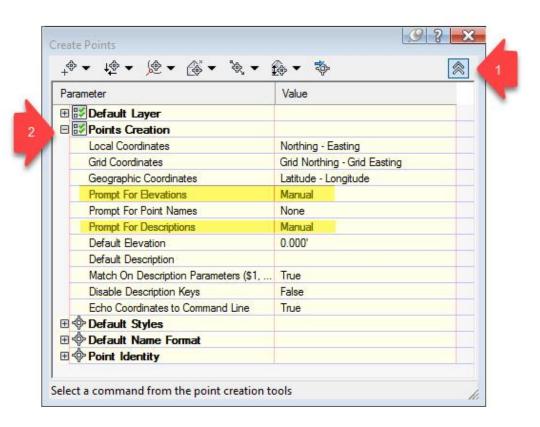
Points from Alignment

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



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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

- 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

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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

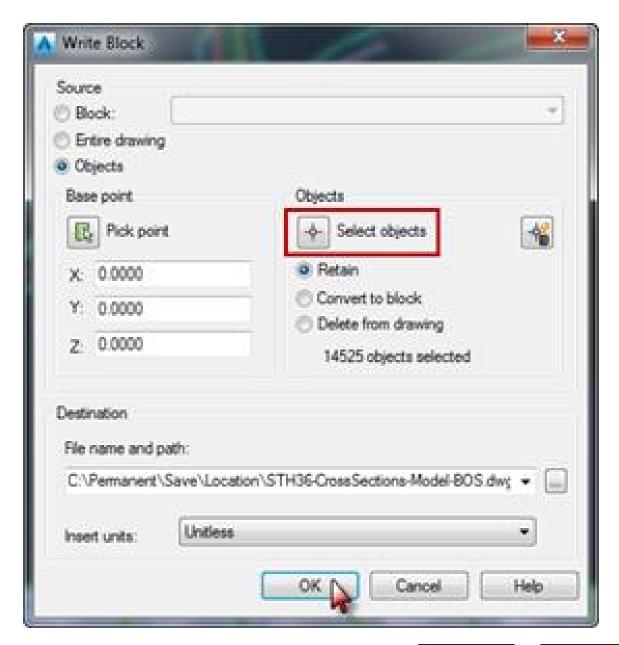
Accessing Civil 3D surfaces

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

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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.

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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

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- Edits
- Point Files
- Point Groups
- Point Survey Queries
- Figure Survey Queries

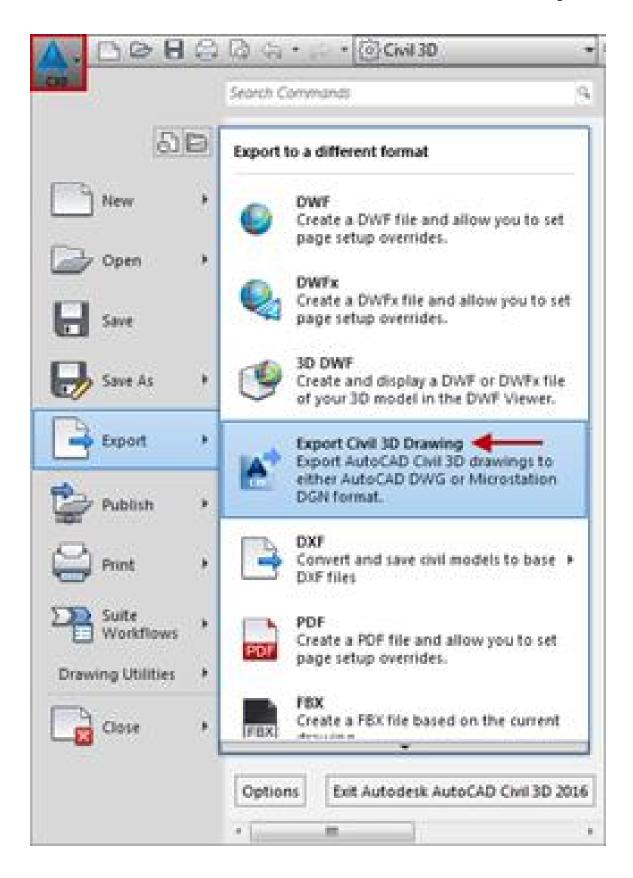
1. Toolspace palette > Prospector tab > expand Surfaces > expand Exist > expand Definition> right-click Edits

- 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.

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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)

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- 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

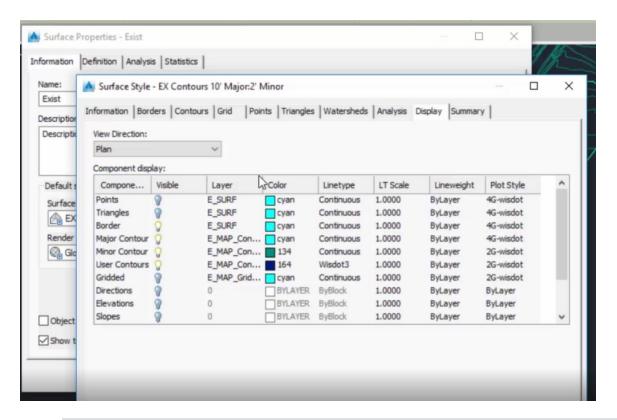
Use the following workflow to set the Surface Style after Surface is created. An initial Surface Style is specified in the Surface creation dialog.

- 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.

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- 1. Toolspace palette > Settings tab > expand Surface > expand Surface Style > Rightclick 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

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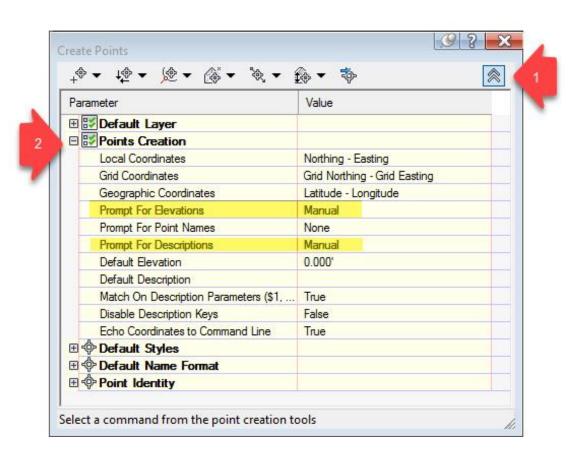
What is a Civil 3D surface

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.



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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:

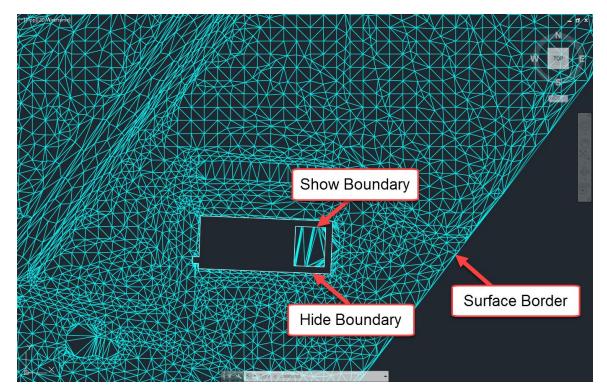
- ESRI Binary Grid (.adf)
- USGS DEM (.dem)
- GEOTIFF (.tif)
- ESRI ASCII Grid (.asc)
- ESRI ASCII Grid (.txt)

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



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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 Figures.

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

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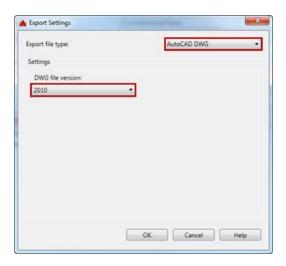
Extended

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

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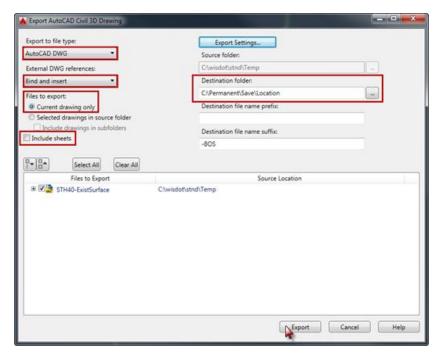
Exercise files: srfc-prprtis-def-data-c3d16.zip

Start with 12345678\Design\Surfaces\srfc-prprtis-def.dwg

srfc-prprtis-def.mp4 5:05

Surface Properties - 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.

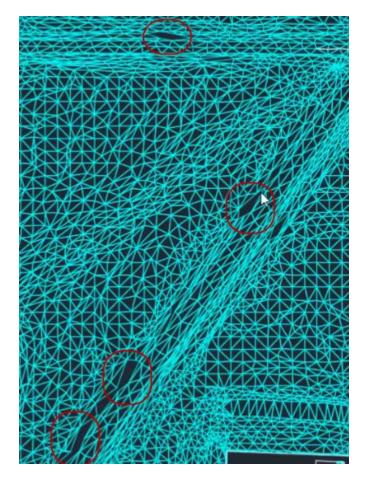
Expand Build to toggle on/off (Yes/No) and set values for unique Surface building operations. This training module examines *Use Maximum Triangle Length* and *Allow Crossing Breaklines* specifically.

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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



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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

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- 4. Surface Properties Definition tab
 - 1. Allow crossing breaklines = Yes
 - 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

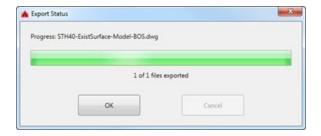
srfc-brklin.mp4 6:22

Surface breaklines

Adding a Breakline to a Surface forces new elevation and location along the object used as a

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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.

- 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 accordingly.

- 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.

- Toolspace Prospector > Expand Surfaces > Expand Exist > Expand Definition > Right-Click Breaklines > Add
 - A. Add Breaklines dialog > Type dropdown > Wall
 - в. Ок
- 2. Select polyline

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- 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



[7] 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

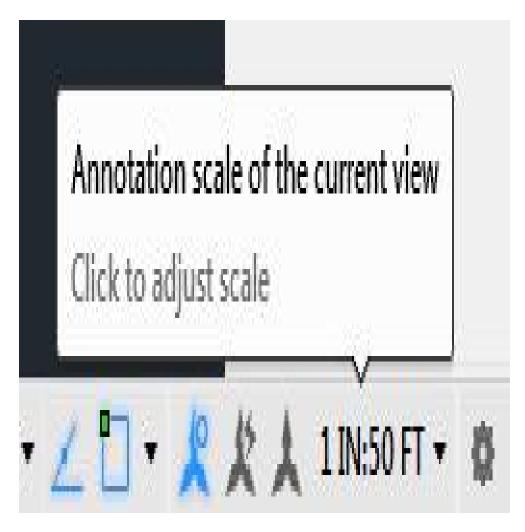
New Verticies and TIN lines are created along the Breakline, but Surface elevations remain unchanged.

- 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.

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- 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

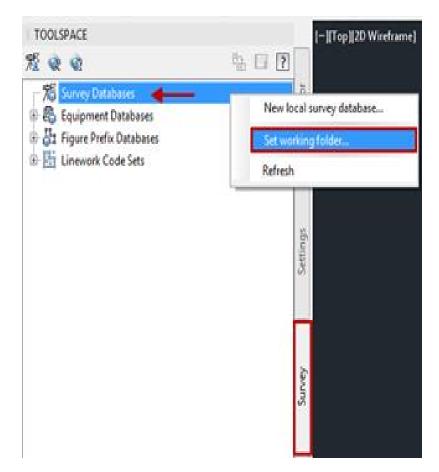
Start with 12345678\Design\srfc-creat-begin.dwg

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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

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- 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

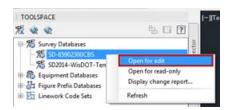
Surface Boundaries can be added to any Surface to set data processing and/or display limits. There are four available Surface Boundary types: Data Clip, Outer, Hide and Show. For all types

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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-ordinate 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

- 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

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- 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 > SEXIST.pnt > Open
 - B. Specify point file format section
 - I. Point file format = PENZ
 - C. OK

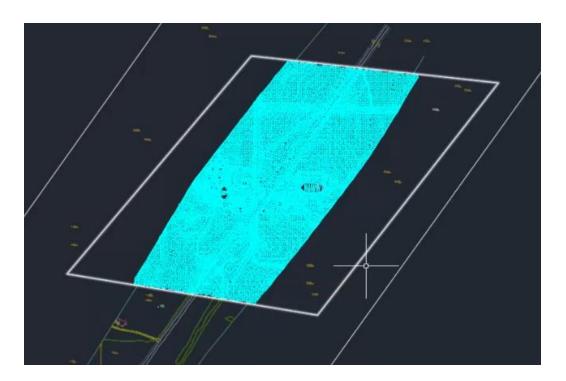
Outer

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.

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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.

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- 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

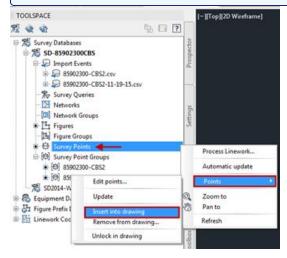
Surface masks

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.

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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

- 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
 - в. Ок



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

- Toolspace palette > Prospector tab > Expand Surface > Expand Exist > Expand Masks
 Right-click Mask 1 > Mask Properties
 - A. Mask Type = Outside
 - в. Ок
- 2. Toolspace palette > Prospector tab > Expand Surface > Expand Exist > Right-click Mask > Create Mask

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- 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.

- Toolspace palette > Prospector tab > Expand Surface > Expand Exist > Expand Masks
 Right-click Mask 1 > Display Order
 - A. Mask Display Order
 - B. Select Mask 2



Palettes

- C. Move Mask 2 to top of list ON/OFF
- 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.

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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.

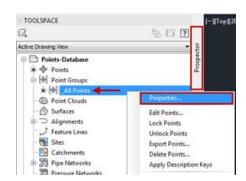
Refinement edits

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

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5. Reiterate steps 1-4 using Delete Line, Delete Point and Add Line until *Driveway* is finalized

Surface edits - Paste surface preparation

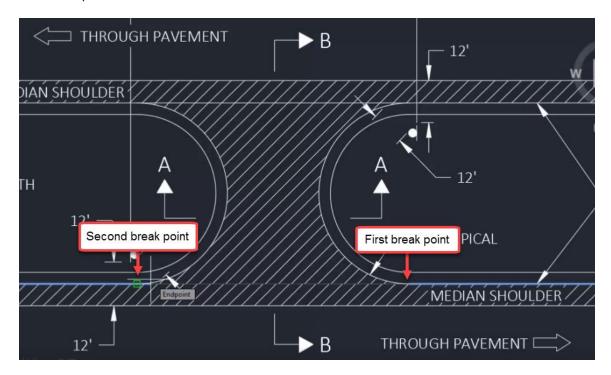
Exercise files: srfc-edit-data-c3d16.zip

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

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

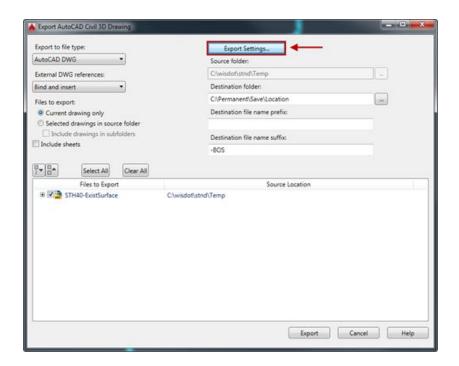
Create data references

- 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

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- 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

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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 Sur-
 - 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
- 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

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Start with 12345678\Design\Surfaces\srfc-prprtis-anlysis-begin.dwg

srfc-prprtis-anlysis.mp4 5:13

Surface properties - Analysis

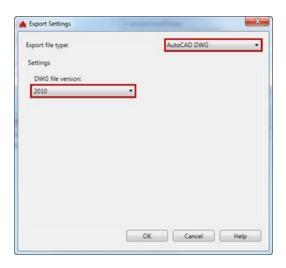
Several types of Surface Analyses can be performed in order to generate information helpful during design. Surface Analysis results can be displayed visually as a Surface Style and/or in tabular format as a Surface Legend. You will specify the number or ranges, range values (ie min and max) and corresponding 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

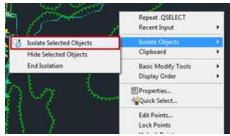
Use a Surface Slope Analysis to identify potential problem areas in a proposed pavement Surface.



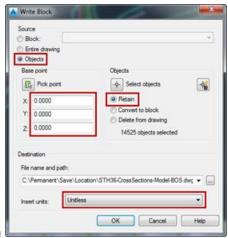
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1. Toolspace palette > Prospector tab > Expand Surfaces > Right-click Crdr-25> Surface **Properties**

- 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



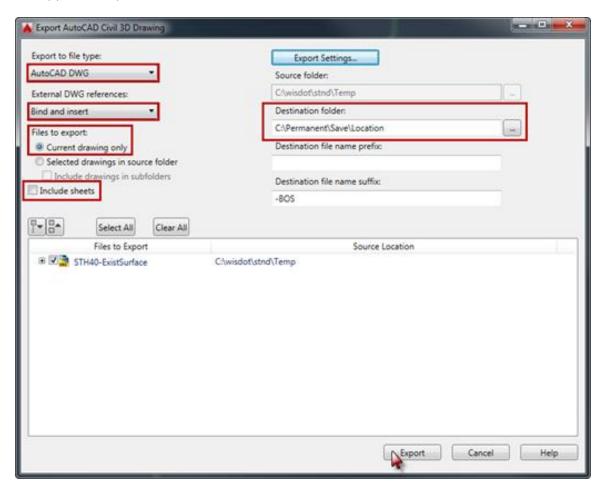
2. Pan and Zoom to see Surface Slopes Analysis displayed along Crdr-25



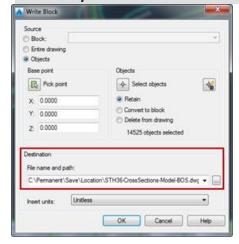
Tip: To Display the "middle range" of Surface Slopes, specify 3 Slope ranges in the Surface Properties window Analysis tab. Set Slope range values and Scheme colors according to design criteria.

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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



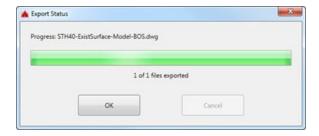
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- I. Profile Entities panorama
 - a. Entity No 6 Grade Out = 5.00%
 - b. Enter
 - c. Close Profile Entities panorama
 - d. Close Profile Layout Tools toolbar
- 5. Toolspace palette > Prospector tab > Expand Corridors > Right-click 25 > Rebuild
- 6. 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



- 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

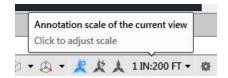
srfc-crop.mp4 2:56

Cropped surfaces

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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 > Rightclick Definition > Rebuild Snapshot
- Toolspace palette > Prospector tab > Expand Surfaces > Expand Exist-crop > Definition > Rebuild Surface

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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 <u>FDM 15-5-3 Att. 3.4</u> 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

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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 superelevation 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 centerline 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.

Create alignment from objects

Last updated: 2017-06-06

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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** Enterfor 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

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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

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- 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 *LcI-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.

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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 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

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- 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: <u>ali-lyout-tool-tngnt-data-C3D14.zip</u>

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.

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- 4. Geometry Editor
- 5. Alignment Layout toolbar > Insert Plicon
 - 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 \mathbb{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

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- 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

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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

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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 *LcI-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

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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 \mathbb{X} in the upper right.

Changing curve types after placement

Exercise files: ali-lin-crv-chng-crv-type-data-C3D14.zip

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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

- 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.

Alignment reverse and compound curves

Last updated: 2017-06-06

Total video time: 03:32

Alignment reverse curve

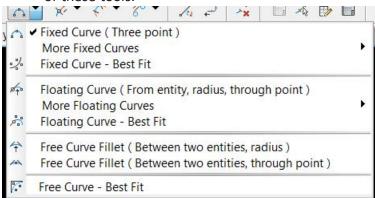
Exercise files: ali-rvrs-crv-data-C3D14.zip

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.

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- 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.



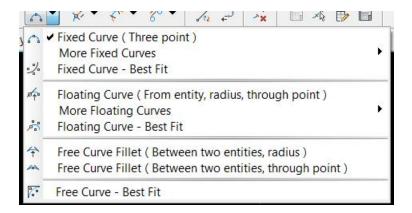
- B. Select the **4thAve** alignment on the curve that you intend to add the compound curve. If the selection cycling dialog opens make sure to select **Alignment**
- C. **90** Enter for the radius
- D. Select **Lessthan180** by hitting Enter
- E. Type R Enter to choose Reverse curve.
- F. Left-click 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.

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- 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.

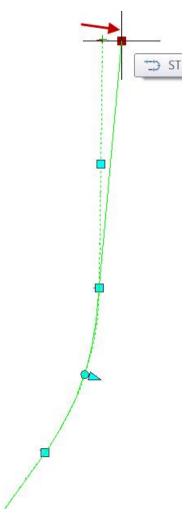
Alignment grip-point editing

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.

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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.

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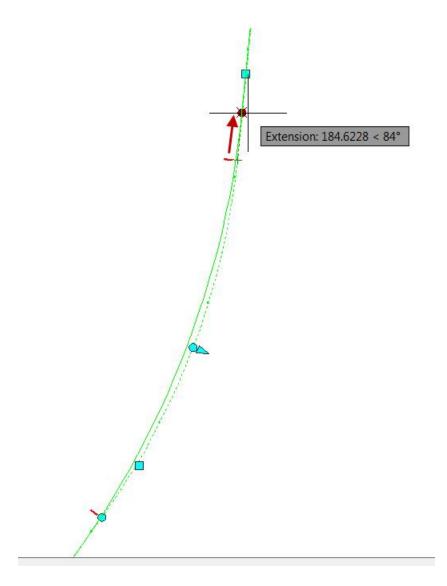
7. Zoom/pan to the curve.

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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.

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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.

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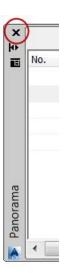


Edit a parameter constraint in the data grid

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.

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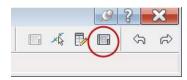


Alignment editing by data grid continued

- 1. Open AliProf-All.dwg.
- 2. Select the **25** alignment.
- 3. In the green context ribbon select Geometry Editor

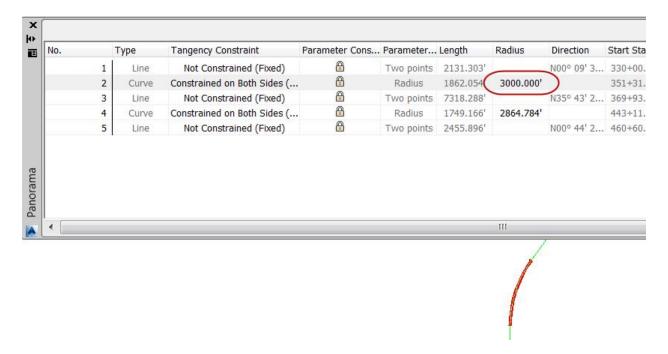


4. From the Alignment Layout toolbar select the Alignment Grid View icon.



5. In the Alignment Panorama select the row 2 Radius entry and change it to **3000**.

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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.

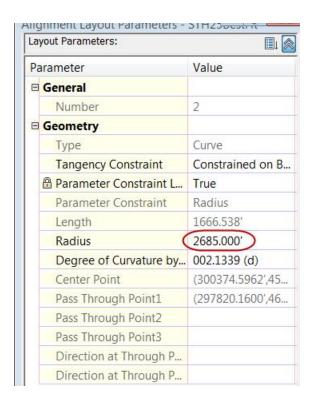


4. From the Alignment Layout toolbar select the Pick Sub-Entity icon.



- 5. Select the curve to the south of the alignment.
- 6. In the radius field change the value to 2685

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- 7. Close the sub-entity editor window.
- 8. Close the Alignment Layout toolbar by clicking the $\mathbb X$ 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.

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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

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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.)
 - 1. 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.

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- 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

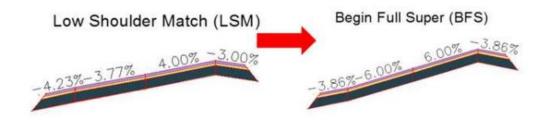
ali-prprtis-02.mp4 14:28

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.

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- 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]

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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

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- 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.

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- 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*.

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- 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 LcI-4thAve -Left-15 to *LcI-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 LcI-4thAve -Right-18 to *LcI-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 LcI-4thAve-Left-18 to *LcI-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).

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K. Close the Offset Alignment Parameters dialog by clicking the \bigcirc 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

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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.

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- 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.

Alignment from best fit

Last updated: 2016-11-02

Create Fixed Line – Best Fit entity

- 1. Open AliProf-All.dwg
- 2. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools
- 3. Alignment Layout toolbar > Line drop-down > Fixed Line Best Fit
- 4. From the Tangent by Best Fit dialog select From COGO points
- 5. OK
- 6. Select the south-most grouping of points, and the one point just north of that group.
- 7. Right-click > Enter
- 8. Review the Regression Graph and click the green check mark in the upper right corner to close it and create the alignment.
- 9. Click Save.

Create Floating Curve – Best Fit entities

- 1. Open AliProf-All.dwg.
- 2. Select the **25** alignment.
- 3. Select the Geometry Editor
- 4. Alignment Layout toolbar > Curve drop-down > Floating curve Best Fit
- 5. When prompted at the command line to select the entity to attach to select, graphically select the tangent alignment entity at the south of the project.
- 6. In the Curve by Best Fit dialog select the From COGO Points option
- 7. OK
- 8. Graphically select the points that are grouped in the lower part of the southern curve.
- 9. Right-click > Enter
- 10. In the Regression Graph scroll to the bottom and turn on the **Pass Through** option for the last point.

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- 11. Click the green check mark in the upper right corner to close it and create the alignment.
- 12. Zoom into the curve that was just created and graphically select it.
- 13. Select the circular grip point at the mid-point of the curve. Drag the grip point back to be in line with the COGO point objects.

Create compound curve with Floating Curve – Best Fit

- 1. Alignment Layout toolbar > Curve drop-down > Floating curve Best Fit
- 2. When prompted at the command line to select the entity to attach to select, graphically select the curve alignment entity that was just created.
- 3. In the Curve by Best Fit dialog select the From COGO Points option
- 4. OK
- 5. Graphically select the points that are grouped in the upper part of the southern curve.
- 6. Right-click > Enter
- 7. In the Regression Graph scroll to the bottom and turn on the **Pass Through** option for the last point.
- 8. Click the green check mark in the upper right corner to close it and create the alignment.
- 9. Save

Create Fixed Curve – Best Fit

- 1. Open AliProf-All.dwg.
- 2. Select the **25** alignment.
- 3. Select the Geometry Editor
- 4. Alignment Layout toolbar > Curve drop-down > Fixed curve Best Fit
- 5. In the **Curve by Best Fit** dialog select the **From COGO Points** option
- 6. (OK)
- 7. Graphically select the points that are grouped in the lower part of the northern curve.
- 8. Right-click > Enter
- 9. In the Regression Graph scroll to the bottom and turn on the **Pass Through** option for the last point.
- 10. Click the green check mark in the upper right corner to close it and create the alignment

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Parcels

Parcel basics

Last updated: 2012-10-01

Total video time: 14:26

Parcel basics

prcl-basc-01.mp4 14:26

Parcels are areas, not objects

- Labels are their point of access.
- Parcels can share boundary lines Closed shape is CRITICAL!.
- If more than one parcel or parcel line contributes to a closed shape external to an existing parcel a new parcel will be created.

Information tab

- Name field not editable from here there is a renaming tool.
- Use Name in Template in Parcel Style.

Composition tab

- Area Label selection.
- Parcel Statistics.

Analysis tab

- Mapcheck or Inverse Analysis.
- Reset Point of Beginning, or turn counterclockwise.
- Legal Description.

User Defined Properties tab

- Data for labeling.
- Includes WisDOT custom data.

Allows hatching in parcel area

- Beware of pattern and scale.
- "Fill Distance" allows hatching to be observed in a set distance from the boundary Parcel Naming Template.
- Parcel Segment Marker Style for displaying in sections.

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Parcel creation and editing

Last updated: 2012-10-01

Total video time: 21:41

Parcel creation and editing

prcl-creat-edit-01.mp4 21:41



Tip: Creating parcels works best if "from objects"

- 1. Draw polyline (2D or 3D), Lines, Arcs (no feature lines)
- 2. Type **C**Enter to close the polyline shape.
- 3. Home tab > Create Design panel > Parcel drop-down > Create Parcel from Objects
- 4. Creation dialog
 - Site is important don't cross grading in same site.
 - Parcel Style hatching and can lend its name to the parcel name.
 - Area Label.
 - Line/Curve labels
 - Edit Drop down is icon left of center on Parcel Creation Tools toolbar
- 5. Insert Pl
 - Select parcel line
 - Identify location of added PI
- 6. Delete Pl
 - Select parcel line
 - PI nearest to cursor will highlight left-click
- 7. Delete Sub-entity
 - Delete lines
 - Opens area, could destroy parcels

Parcel Union

- 1. Home tab > Create Design panel > Parcel drop-down > Parcel Creation Tools > Parcel Union
 - First select Destination parcel
 - Second select the parcel to dissolve into the destination
 - You may need to Delete Sub-entities to clean up leftover boundaries
- 2. Area Label
- 3. Line and Curve Labels
 - Single or multiple line/curve labels
 - Tag labels

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WisDOT standards - parcels

Last updated: 2010-07-01

Total video time: 7:11

Civil 3D sites

prcl-wisdot-stnd-01.mp4 7:11

A site is a container for related data. Parcels can only be created in sites.

There can be multiple sites in one file or project.

- Sites contain
 - Name
 - Description
 - Alignment (can exist outside of a site)
 - Feature Lines
 - Parcels

Parcels and alignments within the same site will affect each other.

- No two parcels can occupy the same space, separate them by site or file.
 - Existing parcels
 - Proposed parcels
 - Easement parcels
- Alignments created in a site with parcels will automatically split the parcels.
 - Proposed right-of-way lines in the proposed parcels site

Civil 3D parcel properties

Parcel properties include:

- Name (Limited manual control)
- Description
- Style
- Labels
 - Area
 - Segments
- User Defined Properties

Civil 3D parcel User Defined Properties

Set Manually

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- Parcel Number (Name and Schedule of Lands & Interests SLI)
- Parcel Address
- Parcel Tax ID
- WisDOT Specific
 - Owners Name (SLI)
 - Volume/Page/Document Number
 - Utility Name
 - Utility Volume/Page/Document Number
 - Existing Right-of-way (SLI)
 - Interest Required (SLI)

Custom macro to copy

Civil 3D ultimate Right-of-way



[1] Info: In order to display right-of-way on some sheets (such as cross sections), an ultimate right-of-way alignment must be created and shared.

- The ultimate right-of-way will follow existing and proposed right-of-way lines to make a consecutive line that can be projected on sheets.
 - Not in a Site
 - Alignment(s) data shortcut

WisDOT drawing file names and file management

Project folder (\Lan Drive\C3D\ProjectIDFolder\RW)

- Standard names (FDM 15-5-3)
 - Rwex.dwg
 - Rwpl.dwg
 - Rwpr.dwg
- Others
 - Rwgis.dwg (imported GIS data)
 - Rwsec.dwg (section lines)

WisDOT standards

Template WisDOT12.DWT (\Templates\USWI)

- Object Styles
- Label Styles
- Command settings
- Layers and Symbology

Site naming - name them what they are:

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- ROW
- Easements

Parcels (automatic) – parcel number Alignments

- RWLR# Right-of-way, left or right, number = RWL4
- URWLR# Ultimate ROW, left or right, number = URWL2

Parcels - Need to know!!!

- Sites! No two parcels can occupy the same space and alignments will affect parcels!
- Parcels
 - Must be closed areas or they will not act as a parcel
 - Parcel areas that over lap will create a third parcel
 - Select parcels by the area label, the default display is parcel number
 - Parcels cannot be graphically split and count as one (properties split by highway)

Exercise - Create existing base plat

Last updated: 2013-03-19

Total video time: 26:32

prcl-creat-ex-plat-data-C3D12.zip Exercise data

Begin the existing base plat file

prcl-creat-ex-plat-01.mp4 9:43

- 1. Start a file with the wisdot12.dwt template file.
- 2. Optional: Create a shortcut in the open dialog box by dragging the Project folder into the left blue shortcut bar.
- 3. Save the new file in the 12345678\RW\Corridors\81100024-ExistBasePlat.dwg

Connect to the Project

Set the Working Folder

- 1. Toolspace > Propsector tab > Right-click on the Data Shortcuts area.
- 2. Set Data Shortcuts Project Folder
- 3. Toolspace > Propsector tab > Right-click on the Data Shortcuts area.
- 4. Choose Set Data Shortcuts Project Folder.
- 5. Select the Project folder's number.
- 6. Browse to where the project folder is stored, and select the c3d folder.



Tip: This is two folders above the Project's Shortcuts folder.

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Xref Base Data Files

- 1. Insert tab > Reference panel > Attach icon
 - Browse to 12345678\BaseData\Mapping\Orig
 - Select Base Map.dwg
 - Set the Reference Type to Overlay
 - Set the Path Type to Relative
 - Set the Insertion Point XY and Z to 0's
 - Set the Scale to 1
 - Set the Rotation to 0
- 2. Zoom Extents to see the file location

Attach the Section Information file

- 1. Go to the Insert tab > Reference panel > Attach.
 - Browse to 12345678\BaseData\Survey
 - Select the Section Information.dwg
 - Set the Reference Type to Overlay
 - Set the Path Type to Relative
 - Set the Insertion Point XY and Z to 0's
 - Set the Scale to 1
 - Set the Rotation to 0
- 2. Zoom Extents to see the file location

Attach the Section Information file

- 1. Go to the Insert tab > Reference panel > Attach
- 2. Browse to 12345678\BaseData\Survey
- 3. Select the Section Information.dwg\
- 4. Set the Reference Type to Overlay
- 5. Set the Path Type to Relative
- 6. Set the Insertion Point XY and Z to 0's
- 7. Set the Scale to 1
- 8. Set the Rotation to 0

Attach the Data Reference of the Existing ROW Reference Alignments

- Toolspace > Prospector tab > Data Shortcuts > expand Alignments > expand Centerline Alignments
- 2. Right-click on *STH64-ExistingROWRefLine* and choose Create Reference.
- 3. Accept the defaults unless you have a preference of label set assignment.
- 4. Toolspace > Prospector tab > Data Shortcuts > expand Alignments > expand Centerline Alignments

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- 5. Right-click on CTH T-ExistROWRefLine and choose Create Reference.
- 6. Accept the defaults unless you have a preference of label set assignment.



🌠 Tip: To prevent accidental updates to the Base Plat File, Promote the data shortcuts into this file

- 7. Select the alignment in the file.
- 8. Context ribbon > Modify panel > Promote Data Reference.



Fig: An alternative method is to select the name of the alignment in the toolspace Prospector tab, right-click and choose Promote.

Open the Titles and Other Legal Documents

- 1. Open ProjectID\Base Data\Other\rw\6424\rwplat.pdf.
- Open 12345678\BaseData\Other\Titles\title pdf .
- 3. Right-click on STH64-ExistingROWRefLine and choose Create Reference.
- 4. Accept the defaults unless you have a preference of label set assignment.
- 5. Toolspace > Prospector tab > Data Shortcuts > expand Alignments > expand Centerline Alignments
- 6. Right-click on *CTH T-ExistROWRefLine* and choose Create Reference
- 7. Accept the defaults unless you have a preference of label set assignment.
- 8. Select the alignment in the file.
- 9. Context ribbon > Modify panel > Promote Data Reference

Drawing the ROW polylines

prcl-creat-ex-plat-02.mp4 8:05

Turning Off the XREF Fading

- 1. Insert tab > Reference panel pull-down> toggle off the XREF Fading.
- 2. Set the Layer for the ROW Polylines
- 3. Home tab > Layers panel > Layer Property Manager .
- 4. In the left column of the Layer Property Manager, select the Right of Way layer filter.
- 5. Scroll though the layers in the right window to find the E RW Existing layer.

Offset the Alignment to the ROW Width

- 1. Check the title documents and the rwplat document PDFs to find the ROW distances in the project area.
- 2. Home tab > Modify panel > Offset.
- 3. Type **33**Enter .
- 4. Select the ROW Ref Alignment.

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- 5. Click to the side of the offset.
- 6. Repeat this for the appropriate offsets on each side.
- 7. Turn on the Selection Cycling option at the right end of the status buttons.
- 8. Select the alignment.
- 9. A selection cycling box will open with a list of all of the objects in that selection.
- 10. Click on the alignment option.

Trimming the Offset Lines

- 1. Home tab > Modify panel > Trim.
- 2. Select the **STH64** alignment as the first cutting edge.
- 3. Click Enter.
- 4. Click on the parts of the lines that need to be removed.
- 5. Click on the offset lines south of the **STH64** alignment.
- 6. Repeat this for each offset line that needs to be trimmed.

Drawing with station/offset

prcl-creat-ex-plat-03.mp4 8:43

Start the Polyline Command

Home tab > Draw panel > Polyline.

The polyline command must be active for the next step, the station/offset transparent command to begin.

Using the Station/Offset Transparent Command

- 1. transparent commands toolbar > Station/offset .
- 2. Select the STH64 alignment.
- 3. You may need to use the Selection Cycling to accomplish this.
- 4. type **240+00** Enter .
- 5. type **50** Enter .
- 6. Offsets to the right are positive and left offsets are negative.
- 7. type **250+00** Enter.
- 8. type **-50** Enter.
- 9. type **250+00**Enter.
- 10. type **-80** Enter

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Further AutoCAD Editing Tools

Fillet Two ROW Lines to Trim or Extend

- 1. Home tab > Modify panel > Fillet.
- 2. Make sure the Radius is set to 0.00'.
- 3. Select the Inside of the first line.
- 4. Select the inside of the second line.
- 5. Those two lines will be joined together at their common point, as a single polyline.
- 6. Repeat this for each corner that you need to extend/trim and that you want to paste together into a continuous polyline.

Remove All Non-ROW Linework and References

Detach the XREFS

- 1. Insert tab > Reference panel > Options arrow (lower right corner)...
- 2. Right-click on the XREF'd drawings and click Detach.
- 3. Repeat this for each XREF'd drawing.

Delete the Alignments

• Select on the alignments and press delete.

Final Cleanup

With the references gone review all of the linework and trim/fillet where appropriate.

Save and close the file.

Exercise - Create proposed r/w geometry

Last updated: 2013-03-19

Total video time: 91:19

Exercise data: prcl-creat-prop-rw-gmtry-data-C3D12.zip

Updated template file added

prcl-creat-prop-rw-gmtry-00.mp4 5:35

Template wisdot12-plat.dwg

Located in USWI folder with other original templates.

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Updates in the template

- 1. Point Creation Updates
- 2. Point Style Updates
- 3. Point Labe Style updates

Using the new template

- 1. In the Menu Browser > New .
- 2. This allows you to choose a template rather than using a default.
- 3. In the dialog open the USWI folder, select on the wisdot12-plat.dwt.

To use the updated points

- 1. In the Home tab > Create Ground Data panel > Create panel > Points flyout menu > Point Creation Tools > chevron (arrow icon).
- 2. Expand Default Styles
- 3. Select the default styles field.
- 4. Click the ellipsis button.
- 5. In the dialog click the list drop down and choose the style of point that is appropriate.
- 6. There are many new and more appropriate point styles in this list for plat production workflow.
- 7. You can leave the chevron open while you use the point creation toolbar. You can also close the chevron and still use the point creation tools.

Special point styles and label styles

- 1. The styles with "No Plot" suffix will appear in the drawing file, but not appear in your plots.
- 2. Point styles that are not appropriate for plat development have been removed from this template.
- 3. Point styles that are appropriate for plat development have been added to this template. For example, point styles *P MARK Control Point*, *P MARK GPS Monument*, *P MARK NGS Monument*, etc.

Workflow outline

prcl-creat-prop-rw-gmtry-01.mp4 4:27

Creating proposed ROW alignments

- 1. Open Proposed ROW Alignments.dwg
- 2. Set the Working Folder

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- 3. Set Data Shortcuts Project Folder
- 4. Xref Base Data Files

Commands

- 1. XREF
- 2. Zoom Extents (double click mouse wheel)
- 3. Attach the Data Reference of the Surface
- 4. Open the Titles and Other Legal Documents
- 5. Rwplat pdf
- 6. Title pdfs
- 7. Create Proposed ROW alignments

Commands/Alignment Creation tools

- 1. Alignment Layout Tools toolbar
- 2. Transparent Command Station Offset
- 3. Endpoint and nearest object snaps

Creating ultimate ROW alignments

- 1. Open Ultimate ROW Alignments.dwg.
- 2. Create *Ultimate ROW* alignments
- 3. Commands/Tools
- 4. Alignment Creation tools
- 5. Alignment Layout Tools toolbar
- 6. Transparent Command Station Offset
- 7. End point Object Snaps
- 8. Create TLE Alignment
- 9. Commands/Tools
- 10. Alignment Creation tools
- 11. Alignment Layout Tools toolbar
- 12. Transparent Command Station Offset
- 13. End point Object Snaps
- 14. Create Data Shortcuts of Alignments
- 15. Create TLE Alignment
- 16. Commands/Tools
- 17. Alignment Creation tools
- 18. Alignment Layout Tools toolbar
- 19. Transparent Command Station Offset
- 20. End point Object Snaps
- 21. Create Data Shortcuts of Alignments

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Creating takings parcels

- 1. Open Takings Parcels.dwg
- 2. Connect to the Project
- 3. Set the Working Folder
- 4. Set Data Shortcuts Project Folder
- 5. Xref Base Data Files
- 6. Commands
- 7. XREF
- 8. Zoom Extents (double click mouse wheel)
- 9. Create the Takings Parcels by Object
- 10. Commands/Tools
- 11. **BPOLY**
- 12. Create a Site
- 13. Creating the Takings Parcels by Parcel Creation Tools
- 14. Commands/Tools
- 15. Parcel Layout Tools Toolbar
- 16. Fixed Line (Two points)
- 17. Create the TLE Parcel by Object
- 18. Commands/Tools
- 19. **BPOLY**
- 20. Editing Parcel Label Styles
- 21. Editing Parcel User Defined Properties
- 22. Export Parcel Data to Excel for table creation
- 23. Commands/Tools
- 24. WisDOT Parcel Extract Macro
- 25. Create Table in Excel to bring into Civil 3D
- 26. Commands/Tools
- 27. Paste Special
- 28. **SC** (scale)

Creating proposed ROW traverse alignment

- 1. Continue with Takings Parcels.dwg
- 2. Create Proposed ROW Traverse Alignment
- 3. Commands/Tools
- 4. Alignment Creation tools
- 5. Alignment Layout Tools toolbar
- 6. Transparent Command Station Offset
- 7. Endpoint and nearest object snaps
- 8. Create Points along the Proposed ROW Traverse Alignment
- 9. Commands/Tools
- 10. Create Points Toolbar

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- 11. Create Manual Points
- 12. Create Points along the TLE Alignment
- 13. Commands/Tools
- 14. Create Points Toolbar
- 15. Create Manual Points
- 16. Create Point for the Traverse project start point
- 17. Commands/Tools
- 18. Create Points Toolbar
- 19. Create Manual Points
- 20. Create Data Shortcuts of Traverse Alignment

Proposed ROW alignments file

prcl-creat-prop-rw-gmtry-02.mp4 8:25

Start a file with the wisdot12.dwt template file.

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\RW\81100024-ProposedROWAlignments.dwg

Connect to the project

- 1. Toolspace > Propsector tab > right-click on the Data Shortcuts area
- 2. Set Data Shortcuts Project Folder
- 3. Toolspace > Propsector tab > right-click on the Data Shortcuts area
- 4. Choose Set Data Shortcuts Project Folder.
- 5. Select the 12345678 folder.
- 6. Browse to where the project folder is stored, and select the c3d folder.



Tip: This is two folders above the Project's _Shortcuts folder.

XREF base data files

- 1. Type **XREF**Enter in the command line,
- 2. Click the Attach icon on top right of external reference palette
- 3. Browse to 12345678\RW\81100024-ExistROWRefLines.dwg.
- 4. Set the Reference Type to Overlay
- 5. Set the Path Type to Relative
- 6. Set the Insertion Point XY and Z to 0's
- 7. Set the Scale to 1
- 8. Set the Rotation to 0
- 9. Zoom Extents (double click mouse wheel) to see the file location
- 10. Insert tab > Reference panel > Attach icon

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- 11. Browse to the Project's RW folder.
- 12. Select the 81100024-ExistBasePlat.dwg
- 13. Set the Reference Type to Overlay
- 14. Set the Path Type to Relative
- 15. Set the Insertion Point XY and Z to 0's
- 16. Set the Scale to 1
- 17. Set the Rotation to 0

Attach the Data Reference of the surface

- 1. Right-click on RoadwayModel-Datum and choose Create Reference.
- 2. In the Toolspace > Prospector tab > Data Shortcuts > Expand Surfaces,
- 3. Change the Style to Slope Intercept.
- 4. In the Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments right-click on STH64-ProposedROWRefLine and choose Create Reference
- 5. Accept the defaults unless you have a preference of label set assignment.
- 6. In the Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments right-click on STH64-ProposedROWRefLine and choose Create Reference
- 7. Accept the defaults unless you have a preference of label set assignment.
- 8. Toggle off show and hide Lineweight to see the lines as all same thickness/weight
- 9. Save the file.

Proposed ROW alignments file - cont'd

prcl-creat-prop-rw-gmtry-03.mp4 20:23

Continuing from the previous exercise with the 81100024-ProposedROWAlignment.dwg file

Open the titles and other legal documents

- 1. In a Windows Explore window browse to 6424ProjectID\Design\Other folder\rw plans\ - rw plans 6424 rwplat
- 2. Open the rwplat.pdf file.
- 3. In a Windows Explore window browse to ProjectID\Base Data\Other\ titles.
- 4. Open the title pdf files.

Create proposed ROW alignment southwest

- 1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools
 - Name: Proposed ROW RT Southwest.
 - Type: Miscellaneous.
 - Site: None
 - Alignment Style: RW Proposed

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- Alignment Layer: P_RW-BaseAlignment Label Set: No Labels
- 2. Click Ok
- 3. Alignment Layout Tools toolbar
- 4. DRAW TANGENT TANGENT (NO CURVES)
- 5. Transparent Command toolbar > Station Offset
- 6. Hint: If you don't see the Transparent Command Toolbar go to the View Tab Toolbars dropdown Civil fly out Check Transparent Commands
- 7. Select STH 64 alignment.
- 8. Type **260+00** Enter .
- 9. Offset to Existing ROW line.
- 10. Type 262+00 Enter
- 11. Type **75**Enter
- 12. Type **264+50**Enter
- 13. Type **75** Enter '
- 14. Click Esc to end the Transparent command
- 15. Click Esc to end the draw tangent command
- 16. Select TANGENT TANGENT (NO CURVES)
- 17. Transparent Command toolbar > Station Offset
- 18. Turn object snaps on and select Endpoint
- 19. Snap to the endpoint where we left off in the last command
- 20. Snap that point a second time for the offset
- 21. Type **98+00** Enter
- 22. Select nearest to *Existing ROW* line.

Create proposed ROW alignment northwest

1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools

- Name: Proposed ROW LT Northwest.
- Type: Miscellaneous.
- Site: None
- Alignment Style: RW ProposedAlignment Layer: P RW-Base
- Alignment Label Set: No Labels
- 2. Click Ok
- 3. DRAW TANGENT TANGENT (NO CURVES)
- 4. Transparent Command toolbar > Station Offset
- 5. Hint: If you don't see the Transparent Command Toolbar go to the View Tab Toolbars dropdown Civil fly out Check Transparent Commands
- 6. Select the **STH 64** alignment
- 7. type **261+00**Enter
- 8. offset to Existing ROW line
- 9. Type **262+00**Enter
- 10. Type **-100**Enter

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- 11. Type **264+00**Enter
- 12. Type **-100**Enter
- 13. Click Esc to end the Transparent cosmmand
- 14. Click Esc to end the draw tangent command
- 15. Select TANGENT TANGENT (NO CURVES)
- 16. Select the endpoint of the alignment to continue
- 17. Transparent Command toolbar > Station Offset
- 18. Select **CTH T** for the alignment
- 19. Type **102+25**Enter
- 20. Select nearest to Existing ROW line for the offset.

Create proposed ROW alignment northeast

- 1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools
- 2. Create Alignment Layout dialog opens.
 - Name: Proposed ROW LT Northeast.
 - Type: Miscellaneous.
 - Site: None
 - Alignment Style: RW Proposed
 Alignment Layer: P_RW-Base
 - Alignment Label Set: No Labels
- 3. Click Ok
- 4. Select TANGENT TANGENT (NO CURVES)
- 5. Select the endpoint of the alignment to continue
- 6. Transparent Command toolbar > Station Offset
- 7. Hint: If you don't see the Transparent Command Toolbar go to the View Tab Toolbars dropdown Civil fly out Check Transparent Commands
- 8. Select STH 64 Alignment
- 9. Type **102+25** Enter
- 10. Offset to Existing ROW line
- 11. Type **101+50**Enter
- 12. Type **40**Enter
- 13. Click Esc to end the Transparent command
- 14. Click Esc to end the draw tangent command
- 15. Select TANGENT TANGENT (NO CURVES)
- 16. Select the endpoint of the alignment to continue
- 17. Transparent Command toolbar > Station Offset
- 18. Select STH 64 for the alignment
- 19. Type **266+70** Enter
- 20. Select nearest to Existing ROW line for the offset.

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Create proposed ROW alignment southeast

1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools

- Name Proposed ROW RT Southeast.
- Type Miscellaneous.
- Site None
- Alignment Style RW Proposed
- Alignment Layer P RW-Base
- Alignment Label Set No Labels
- 2. Click Ok
- 3. Select TANGENT TANGENT (NO CURVES)
- 4. Transparent Command toolbar > Station Offset
- 5. Select STH 64 Alignment
- 6. Type **102+25** Enter 269+00
- 7. Offset to Existing ROW line
- 8. Type **102+25** Enter 268+00
- 9. Type **102+25**Enter offset 90'
- 10. Type **102+25** Enter 266+80
- 11. Type **102+25** Enter offset 90'
- 12. Click Esc to end the Transparent command
- 13. Click Esc to end the draw tangent command
- 14. Select TANGENT TANGENT (NO CURVES)
- 15. Select the endpoint of the alignment to continue
- 16. Transparent Command toolbar > Station Offset
- 17. Select CTH T for the alignment
- 18. Type **102+25** Enter 98+00
- 19. Select nearest to Existing ROW line for the offset.

Ultimate ROW alignments file

prcl-creat-prop-rw-gmtry-04.mp4 7:38

Continue with the ProposedROWAlignments.dwg from the previous exercise.

Create ultimate ROW alignment southwest

1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools

- Name: Ultimate ROW RT Southwest.
- Type Miscellaneous.
- Site: None
- Alignment Style: RW Ultimate
- Alignment Layer: P RW-Ultimate
- Alignment Label Set No Labels

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- 2. Click Ok
- 3. In the Alignment Layout Tools toolbar
- 4. DRAW TANGENT TANGENT (NO CURVES)
- 5. Use Endpoint Snaps to snap to each vertex.
- 6. Trace Existing ROW linework until it meets the Proposed ROW Alignment, then trace the Proposed ROW Alignment until it meets back up with the Existing ROW linework, then trace the existing ROW linework to the end.

Create ultimate ROW alignment northwest

1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools

- Name: Ultimate ROW LT Northwest.
- Type: Miscellaneous.
- Site: None
- Alignment Style: RW Ultimate
- Alignment Layer: P_RW-Ultimate
- Alignment Label Set : _No Labels
- 2. Click Ok
- 3. Alignment Layout Tools toolbar
- 4. Select TANGENT TANGENT (NO CURVES)
- 5. Trace Existing ROW linework until it meets the *Proposed ROW* alignment.
- 6. Trace the Proposed ROW Alignment until it meets back up with the Existing ROW linework.
- 7. Trace the existing ROW linework to the end.

Create ultimate ROW alignment northeast

1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools

- 2. Create Alignment Layout dialog opens.
 - Name: Ultimate ROW LT Northeast.
 - Type: Miscellaneous.
 - Site: None
 - Alignment Style: RW Ultimate
 - Alignment Layer: P RW-Ultimate
 - Alignment Label Set: No Labels
- 3. Click Ok
- 4. In the Alignment Layout Tools toolbar
- 5. DRAW TANGENT TANGENT (NO CURVES)
- 6. Use Endpoint Snaps to snap to each vertex.
- 7. Trace Existing ROW linework until it meets the *Proposed ROW* alignment.
- 8. Trace the **Proposed ROW** alignment. until it meets back up with the Existing ROW linework,
- 9. Trace the existing ROW linework to the end.

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Create ultimate ROW alignment southeast

1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools

- 2. Create Alignment Layout dialog opens.
 - Name: Ultimate ROW RT Southeast.
 - Type: Miscellaneous.
 - Site: None
 - Alignment Style: RW Ultimate
 Alignment Layer: P_RW-Ultimate
 Alignment Label Set: No Labels
- 3. Click Ok
- 4. In the Alignment Layout Tools toolbar
- 5. DRAW TANGENT TANGENT (NO CURVES)
- 6. Use Endpoint Snaps to snap to each vertex.
- 7. Trace Existing ROW linework until it meets the *Proposed ROW* alignment
- 8. Trace the **Proposed ROW** alignment until it meets back up with the Existing ROW linework
- 9. Trace the existing ROW linework to the end.
- 10. Save your drawing.

Create TLE alignment

1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools

- 2. Create Alignment Layout dialog opens.
 - Name: TLE 1.
 - Type: Miscellaneous.
 - Site: None
 - Alignment Style: RW Temp Limited Easement
 - Alignment Layer: P_RW-Base
 - Alignment Label Set: _No Labels
- 3. Click Ok
- 4. In the Alignment Layout Tools toolbar
- 5. DRAW TANGENT TANGENT (NO CURVES)
- 6. Start the Transparent Command Station Offset
- 7. If you don't see the Transparent Command Toolbar go to the View Tab Toolbars drop-down Civil fly out Check Transparent Commands
- 8. Select STH 64 Alignment
- 9. Enter Station 262+50 offset to 75'
- 10. Enter station 262+50 offset 125'
- 11. Enter station 263+00 offset 125'
- 12. Enter station 263+00 offset 75'
- 13. Click Esc to end the Transparent command
- 14. Select the endpoint to close the alignment

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Create Data Shortcuts of alignments

- 1. Toolspace > Prospector tab
- 2. Right-click Data Shortcuts area.
- 3. Select Create Data Shortcuts.
- 4. Check all alignments that apply.

Takings parcels file

prcl-creat-prop-rw-gmtry-05.mp4 13:16

Start a file with the wisdot12.dwt template file.

Create a shortcut in the open dialog box by dragging the Project folder into the left blue shortcut area.

Save the new file as 81100024\RW\ProposedROWAlignments.dwg

Connect to the project

- 1. Set the Working Folder
- 2. Toolspace > Prospector tab
- 3. Right-click Data Shortcuts area.
- 4. Browse to where the project folder is stored, and select the c3d folder.
- 5. This is two folders above the Project's Shortcuts folder.
- 6. Set Data Shortcuts Project Folder
- 7. Toolspace > Prospector tab
- 8. Right-click on the Data Shortcuts area.
- 9. Choose Set Data Shortcuts Project Folder.
- 10. Select the Project folder's number.

XREF base data files

- 1. Insert tab > Reference panel > Attach icon
- 2. Attach the Base Files.
- 3. Select the 81100024\RW\ExistROWRefLines.dwg
 - Set the Reference Type to Attachment
 - Set the Path Type to Relative
 - Set the Insertion Point XY and Z to 0's
 - Set the Scale to 1
 - Set the Rotation to 0
- 4. Zoom Extents (double click mouse wheel) to see the file location

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Attach the Data Reference of the surface

- 1. In the Toolspace > Prospector tab > Data Shortcuts > expand Surfaces
- 2. Right-click on RoadwayModel-Datum and choose Create Reference.
- 3. Change the Style to Slope Intercept.
- 4. In the Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments
- 5. Right-click on STH64-ProposedROWRefLine
- 6. Choose Create Reference
- 7. Accept the defaults unless you have a preference of label set assignment.
- 8. In the Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments
- 9. Right-click on **STH64-ProposedROWRefLine**
- 10. Choose Create Reference
- 11. Accept the defaults unless you have a preference of label set assignment.
- 12. Toggle off show and hide Lineweight to see the lines as all same thickness/weight

Takings parcels file - cont'd

prcl-creat-prop-rw-gmtry-06.mp4 21:46

Open or continue with 81100024-TakingsParcels.dwg

Creating the takings parcels by object

- 1. Draw a polyline for the boundary of the parcel.
- 2. Key in the **BPOLY** command,
 - Uncheck Island Detection,
 - Click Pick
- 3. Points Icon.
- 4. Click inside the Proposed ROW RT Northwest Alignment and Exist Base Plat line for the Northwest side of the Intersection
- 5. Click Enter.
- 6. Home tab > Create Design panel > Parcel dropdown > Create Parcel from Objects
- 7. Select polyline
- 8. Click Enter,
 - Select TakingsParcels for the site
 - Change Parcel Style to RW Property Fee S45
 - Change Area Label Style to Parcel Number
 - Check Erase Existing Entities,
- 9. Click Ok

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Creating the takings parcels by Parcel Creation tools

- 1. Home tab > Create Design panel > Parcel dropdown > Parcel Creation Tools.
- 2. Click Create Parcel.
 - Change Site to TakingsParcels
 - Change Parcel Style to RW Property Fee S90
- 3. Click Ok
- 4. Select **FIXED LINE (TWO POINTS)**,
- 5. With Endpoint OSNAPS on trace parcel boundary
- 6. Click Esc
- 7. Click Create Parcel,
 - Change Site to TakingsParcels
 - Change Parcel Style to RW Property Fee S90
- 8. Click Ok
- 9. Select **FIXED LINE (TWO POINTS)**
- 10. With Endpoint OSNAPS on trace parcel boundary
- 11. Click Esc
- 12. Home tab > Create Design panel > Parcel dropdown > Parcel Creation Tools
- 13. Click Create Parcel
 - Change Site to TakingsParcels
 - Change Parcel Style to RW Property Fee S90
- 14. Click Ok
- 15. Select **FIXED LINE (TWO POINTS)**
- 16. With Endpoint OSNAPS on trace parcel boundary
- 17. Click Esc
- 18. Home tab > Create Design panel > Parcel dropdown > Parcel Creation Tools
- 19. Click Create Parcel
 - Change Site to TakingsParcels
 - Change Parcel Style to RW Property Fee S90
- 20. Click Ok
- 21. Select **FIXED LINE (TWO POINTS)**
- 22. With Endpoint OSNAPS on trace parcel boundary
- 23. Click Esc
- 24. Home tab > Create Design panel > Parcel dropdown > Parcel Creation Tools
- 25. Click Create Parcel
 - Change Site to TakingsParcels
 - Change Parcel Style to RW Property Fee S90
- 26. Click Ok
- 27. Select **FIXED LINE (TWO POINTS)**
- 28. With Endpoint OSNAPS on trace parcel boundary
- 29. Click Esc
- 30. Home tab > Create Design panel > Parcel dropdown > Parcel Creation Tools

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- 31. Click Create Parcel
 - Change Site to TakingsParcels
 - Change Parcel Style to RW Property Fee S90
- 32. Click Ok
- 33. Select **FIXED LINE (TWO POINTS)**
- 34. With Endpoint OSNAPS on trace parcel boundary
- 35. Click Esc

Creating the TLE parcel by object

- 1. Home tab > Draw > Polyline
- 2. Draw a polyline for the boundary of the parcel.
- 3. Home tab > Create Design panel > Parcel dropdown > Create Parcel from Object.
- 4. Key in the BPOLY command,
 - Uncheck detect Islands,
 - Click Pick
- 5. Points Icon, Click inside the TLE1 Alignment and Proposed ROW RT Southwest Alignment line for the Southwest side of the Intersection
- 6. Click Enter.
- 7. Home tab > Create Design panel > Parcel dropdown > Create Parcel from Object .
- 8. Select polyline,
- 9. Click Enter,
 - Select *TakingsParcels* for the site
 - Change Parcel Style to RW TLE Proposed
 - Change Area Label Style to Parcel Number
 - · Check Erase Existing Entities,
- 10. Click Ok
- 11. Save the File.

Editing parcel label styles

- 1. Select a parcel label and right-click
- 2. Select Parcel Properties
- 3. Composition tab, change Area selection label style to Owner ID Number
- 4. Repeat for all Parcels.

Editing parcel User Defined Properties

- 1. Select a parcel label and right-click
- 2. Select Parcel Properties
- 3. User Defined Properties tab, change Owner ID Number to a 2 for the TLE 1 Parcel,
- 4. Click Apply,.
- 5. Click Ok.

Save the file.

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Export parcel Data

- Toolspace > Toolbox tab > expand WisDOT Toolbox > expand WisDOT Macros > rightclick Parcel Extract
- 2. Click Execute
- 3. Check all the boxes
- 4. Select the Click this button to export the selected rows to a specified file Icon
- 5. Save file as 81100024-ParcelInfoTable.csv.

Create table in Excel to bring into Civil 3D

- 1. Open 81100024-ParcelInfoTable.csv and Schedule of L&I Template.xslx
- 2. Copy Parcel Information from 81100024-ParcelInfoTable.csv to Schedule of L&I Template.xslx
- 3. Format date in the Schedule of L&I Template.xslx file
- 4. Save as 81100024-ParcelInfoTable.xslx
- 5. Copy Formatted table from 81100024-ParcelInfoTable.xslx
- 6. Open 81100024-TakingsParcels.dwg
- 7. Paste Special the copied table into 81100024-TakingsParcels.dwg
- 8. Home tab > Clipboard Panel Paste dropdown paste special
 - Select Paste
 - Select As: Microsoft Excel Worksheet
- 9. Click Ok
- 10. Insert Table
- 11. Type **SC**Enter for scale
- 12. Select bottom corner of inserted table
- 13. Type in scale number that matches the current annotation scale.
- 14. Save the file.

Takings parcels file - cont'd

prcl-creat-prop-rw-gmtry-07.mp4 9:47

Open or continue with 81100024-TakingsParcels.dwg.

Create proposed ROW traverse alignment

1. Home tab > Create Design panel > Alignment drop-down > Alignment Creation Tools

• Name: ProposedROWTraverse

• Type: Miscellaneous.

• Site: None

• Alignment Style: RW Traverse

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- Alignment Layer: P_RW-BaseAlignment Label Set: No Labels
- 2. Click Ok
- 3. Alignment Layout Tools toolbar
- 4. DRAW TANGENT TANGENT (NO CURVES)
- 5. Use Endpoint Snaps to snap to each vertex.
- 6. Start at the PI 259+88.04 of STH 64 alignment
- 7. Continue by selecting first point of:
 - ProposedROW LT Northwest, picking each point, crossing CTH T continue picking points from
 - **ProposedROW LT Northeast**, picking each point, cross STH 64 continue picking points from
 - ProposedROW RT Southeast, picking each point, cross CTH T continue picking points from
 - **ProposedROW RT Southwest** to the end of the alignment then end back at the PI 259+88.04.
- 8. Save the File.

Create points for proposed ROW traverse alignment

- 1. Home tab > Create Ground Data panel > Points dropdown > Points Creation Tools
- 2. Click chevron to open expanded dialog box
 - Expand Default Styles
 - Set Point style to P RW Circle Filled
 - Set Point Label Style to Point Name 45
 - Expand Default Name Format
 - Set Point Name Template to PRW
 - Set starting number to 1
 - Expand Points Creation
 - Set Prompt for Point Names to Automatic
- 3. Click Chevron to close expanded dialog box
- 4. Select Manual Point Creation.
- 5. Pick all vertex points from *ProposedROW Traverse* alignment except for the PI Start Point

Create points along TLE alignment

- 1. Home tab > Create Ground Data panel > Points dropdown > Points Creation Tools
- 2. Click chevron to open expanded dialog box to expand the point creation dialog box
 - Expand Default Styles
 - Set Point style to P RW Circle Filled
 - Set Point Label Style to Point Name 45

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- Expand Default Name Format
 - Set Point Name Template to TLE
 - Set starting number to 1
- Expand Points Creation
 - Set Prompt for Point Names to Automatic
- 3. Click Chevron to close expanded dialog box
- 4. Select Manual Point Creation.
- 5. Pick all vertex points from *TLE* alignment

Create point for the traverse project start point

- 1. Home tab > Create Ground Data panel > Points dropdown > Points Creation Tools
- 2. Click chevron to expand the point creation dialog box
 - Expand Default Styles
 - Set Point style to P RW Circle Filled
 - Set Point Label Style to Point Name 45
 - Expand Default Name Format
 - Set Point Name Template to TRAV
 - Set starting number to 1
 - Expand Points Creation
 - Set Prompt for Point Names to Automatic
- 3. Click Chevron to close expanded dialog box
- 4. Select Manual Point Creation.
- 5. Pick PI 259+88.04
- 6. Close Create Points Toolbar
- 7. Save the file.

Create Data Shortcuts of proposed ROW traverse alignment

- 1. Toolspace > Prospector tab > right-click Data Shortcuts
- 2. Select Create Data Shortcuts
- 3. Check ProposedROWTraverse alignment click Ok.
- 4. Save the file.

Exercise - Create plat sheet

Last updated: 2013-03-19

Total video time: 14:41

prcl-creat-plat-sht-data-C3D12.zip Exercise data

Connect referenced data

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prcl-creat-plat-sht-01.mp4 14:41

Create a shortcut to the project in the Open dialog box

- 1. Click Open.
- 2. Browse to WisDOT\Design\C3D
- 3. You can create a shortcut to the project folder ocation by dragging the folder for the project into the left shortcut bar in the Open Dialog.
- 4. Open the 12345678\RW\Parcels.dwg

Connect to the Project Data Shortcuts

- 1. In the **Toolspace > Prospector tab** right-click on the Data Shortcuts
- 2. Choose Set Working Folder.
- 3. Select C:\WisDOT\Design\C3D folder
- 4. In the **Toolspace > Prospector tab** right-click on the Data Shortcuts
- 5. Choose Set Data Shortcut Project Folder.
- 6. Select the Project folder 12345678.



Tip: It should have a green check mark next to it when properly selected.

Create alignment references

Check to see if the alignments are already referenced into this file.

- 1. Toolspace > Prospector tab > Alignments > Centerline Alignments
- 2. If the alignments *STH 64 PropROWRefLine* and *CTH T PropROWRefLine* are listed they are already referenced.
- 3. If the alignments are not already referenced, create the data shortcut references.
- 4. Toolspace > Prospector tab > Data Shortcuts > Alignments > Centerline Alignments.
- 5. Right-click on STH 64 PropROWRefLine and choose Create Reference
- 6. Click Ok.
- 7. Right-click on *CTH T PropROWRefLine* and choose Create Reference
- 8. Click Ok.

Promote alignment references

- 1. In the Toolspace > Prospector tab > Alignments > Centerline Alignments
- 2. If there is a data shortcut emblem next to the alignments do the following
- 3. Right-click on the alignment name
- 4. Choose Promote
- 5. Repeat for the other alignment.

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Plan production sheet creation

- 1. Output tab > Create View Frames
- 2. Set the alignment to *STH 64 PropROWRefLine*
- 3. Select Automatic Range
- 4. Switch to Plan Only type.
- 5. Click on the template path file ellipsis button.
- 6. Select the template file ellipsis button
- 7. In USWI Planproduction Plats folder
- 8. 1 in 200 feet option. Select the Wisdot12tpp34.dwt template.
- 9. View Frame Group name default
- 10. Change the View Frame Name to **0401<next counter>**
- 11. Click the template button to check the counter number is set to 1.
- 12. Turn off match lines for this example.
- 13. Create View Frames button to place the frame.

Create sheets

- 1. In the Output tab > Create Sheets.
- 2. Select the proper View Frame Group.
- 3. Select number of layouts per new drawing, and set this to 1.
- 4. Change the layout name to **0401<next counter>**.
- 5. Check the layout name template and check the name counter is set to 1.
- 6. In the Sheet Set Option you MUST select Add to Existing Sheet Set.
- 7. Select the ellipsis to choose the sheet set.
- 8. Browse to 12345678\Sheets Plan\planproduction.dst.
- 9. Change the sheet location to the 12345678\RW folder.
- 10. The Sheet File name needs to be changed to **0401<next counter>_rp**.
- 11. Click Create Sheets.
- 12. Click Ok

Adjust the view frame

- 1. You can shift the name with the diamond grip point.
- 2. You can rotate the frame with the green grip point.
- 3. You can shift the frame in any direction with the square grip point.

Plotting options

Single sheet plotting

- 1. The plat is NOT ready for printing yet. There are labels that need to be placed.
- 2. If you need to plot this single sheet, go to the Quick Access Toolbar and choose the plot icon.
- 3. Alternatively, you can right lick on the layout tab and choose Plot.

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4. Alternatively, you can go into the Sheet Set Manager (type SSM at the command line) and right-click on the name of the single layout tab and choose Publish to PDF.

Multiple sheet or batch publishing

- 1. The plat is NOT ready for printing yet. There are labels that need to be placed
- 2. If you need to plot this as a group of pages you can plot multiple pages (known as Publish) from the Sheet Set Manager.
 - You can right-click on the individual layout name and choose plot.
 - You can right-click on the subset header to plot all of the drawings under that subset, but not all of the drawings in the project.
 - You can right-click on the project name to plot the entire project.
 - In all of these cases choose Publish Publish to PDF from the context menu.

Close this file.



Tip: The frame is in place for helping to place labels inside the plotable area of this

Exercise - Dressing up plat sheets

Last updated: 2013-03-19

Total video time: 106:52

prcl-drs-up-plat-sht-data-C3D12.zip Exercise data

Connect referenced data

prcl-drs-up-plat-sht-01.mp4 7:55

Create a shortcut to the project in the Open Dialog box

- 1. Click Open.
- 2. At the top of the dialog open the Look In drop-down menu.
- 3. Browse to 12345678\WisDOT\Design\C3D...
- 4. Click and drag the folder for the project 12345678 into the left shortcut bar in the Open
- 5. Click on the newly made shortcut.
- 6. Expand the RW folder.
- 7. Open the Takings Parcels.dwg

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Connect to the project Data Shortcuts

- 1. In the **Toolspace > Prospector tab** right-click on the Data Shortcuts.
- 2. Choose Set Working Folder.
- 3. Set Working Folder to C:\WisDOT\Design\C3D
- 4. In the **Toolspace > Prospector tab** right-click on the Data Shortcuts.
- 5. Choose Set Data Shortcut Project Folder.
- 6. Select the Project folder 12345678.

Create alignment references



- 1. Toolspace > Prospector tab > Alignments > Centerline Alignments.
 - If the alignments **STH 64 PropROWRefLine** and **CTH T PropROWRefLine** are listed they are already referenced.
 - If the alignments are not already referenced, create the data shortcut references.
- 2. In the Toolspace > Prospector tab >data shortcuts, alignments
- 3. Right-click on STH 64 Proposed ROWRefLine
- 4. Choose Create Reference
- 5. Click Ok
- 6. Right-click on CTH T Proposed ROWRefLine
- 7. Choose Create Reference
- 8. Click Ok

Promote alignment references

- 1. In the Toolspace > Prospector tab > Alignments Centerline Alignments.
- 2. If there is a data shortcut emblem next to the alignments do the following:
 - Right-click on the alignment name
 - Choose Promote
 - Repeat for the other alignment.

Change the point label styles through the All Points point group

- 1. In the Toolspace > Prospector tab > expand Point Group > right-click _All Points
- 2. Choose Properties
- 3. Set Point Label Style to PRW Point Number 140 90 Degrees.
- 4. In the Toolspace > Prospector tab > Point Groups > right-click on _All Points
- 5. Choose Edit Points
- 6. In the Panorama Window left click in one of the point number fields.
- 7. Click CTRL A.
- 8. Scroll over to Point Label Style columns

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- 9. Right-click on the column header and choose Edit.
- 10. Select < NONE > as the Label style

Set TLE point labels

- 1. Select the points around the TLE parcel
- 2. Right-click and choose Edit Points
- 3. Highlight all of the points in the Panorama.
- 4. Right click on the Point Label Style header.
- 5. Choose Edit.
- 6. Select the TLE Point Number 140 90 Degrees

Adding a line to the point label style

prcl-drs-up-plat-sht-02.mp4 10:13

- 1. Adding a Line to the PRW Point Label Style
- 2. Toolspace > Settings tab > Expand Point>
- 3. Right-click on PRW Point number 140 90 Degree style and choose Edit.
- 4. Layout tab >Add Component > Choose Line, .
 - Visibility set to True
 - Anchor set to <Feature>
 - Use Start Point Anchor set to True
 - Start Anchor Point to Middle Center
 - Use End Point Anchor Point set to PRW Point Name
 - End Point Anchor Point to Middle Left
- 5. Dragged State Tab
 - Display option, set to As Composed.

Adding a line to the TLE point label style

- 1. Toolspace > Settings tab > Expand Point > expand Label Styles
- 2. Right-click on TLE Point number 140 90 Degree style and choose Edit.
- 3. Layout tab > Add Component > Choose Line
 - Visibility set to True
 - Anchor set to <Feature>
 - Use Start Point Anchor set to True
 - Start Anchor Point to Middle Center
 - Use End Point Anchor Point set to PRW Point Name
 - End Point Anchor Point to Middle Left
- 4. Dragged State Tab
 - Display option, set to As Composed.

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Placing Station Offset labels from alignment to traverse labels

1. Annotate tab > Add Labels > Alignment > Add Alignment Labels

- Select Single Segment
- Station Offset Fixed Point
- Set label style to RW Sta Offset 120 90
- 2. Click Add.
- 3. Select the alignment
- 4. Turn on the Endpoint OSNAP.
- 5. Click to place a label at each traverse vertex point where labels that stand straight up should be placed.
- 6. In the Add Alignment Labels dialog select the style RW Sta Offset 120 135.
- 7. Click Add.
- 8. Repeat the steps to place the appropriate labels.
- 9. Repeat this for the label style of RW Sta Offset 120 270, and other angles as appropriate.

Rotate point labels to match station offset label angles

- 1. Left click on the point label
- 2. Hover (do not click on) the cursor over the point grip to access the tooltip.
- 3. Select Rotate Label.
- 4. Rotate the label to match the angle of the Station Offset label.
- 5. Repeat for each label.

Adjusting labels

prcl-drs-up-plat-sht-03.mp4 11:39

Edit the alignment geometry label

- 1. Click on the alignment geometry label.
- 2. Select on the square grip point to drag the label away from the label layout location
- 3. Select the alignment, or the alignment label..
- 4. Right-click and choose edit Alignment Labels.
- 5. Find the Geometry Label, select on the Standard style label tag.
- 6. Click the second button to select Create a Child Style
- 7. Name the new style Standard 0 Rotation
- 8. In the Dragged State tab change Display from As Composed to Stacked.
- 9. Change the text height to .06.

Fix the drawing scale to what the plat page to the plotting scale

- 1. In the lower right select on the drawing scale
- 2. Set the scale to 1'' = 200'

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Rotate the labels to fit the new scale

- 1. Select on the Station Offset label
- 2. Hover over grip point to select Rotate the Label.
- 3. Rotate the label to an appropriate location.
- 4. Select the Point Label style
- 5. Hover over the grip point to select Rotate the Label.
- 6. Rotate the label to an appropriate location.

Create traverse labels

- 1. Annotate tab > Add Labels > Alignment > Add Alignment Labels
 - Single Segment
 - Bearing Over Distance 120.
- 2. Click Add .



Tip: Turn on the Selection Cycling to make selecting the overlapping lines easier.

- 1. In the status bar click on the Selection Cycling to toggle on the option.
- 2. When selecting the alignment to label then select the Alignment from the Selection Cycling menu
- 3. Click on the alignment segment where the label could place.

Adjust the traverse label placement

Right-click options

- 1. If you need to reverse the label (example: south and west to north and east)
 - Left click on the label
 - Right click, choose Reverse Label
- 2. If you need to flip the label over the line (example: from below the line to above the line)
 - Left lick on the label
 - Right click, choose Flip Label

Dragging options

- 1. To move the label along the line
- 2. Left click on the label
- 3. Select the diamond grip point and slide the label along the line segment
- 4. To drag the label from the line
- 5. Left click on the label
- 6. Select the square grip point and drag it to a more appropriate location.



Tip: You may need to change the dragged style to one that supports a leader line

- 1. Right click Label Properties
- 2. Line Label Styles

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3. Change the style to RW Bearing Distance Horizontal with Leader

Resizing text

- 1. To resize the label to better fit a congested area:
- 2. Left click on the label
- 3. Right-click and choose Label Propedrties
- 4. Choose Label Style Options
- 5. Select Label RW Distance Over Bearing 100

Dragging point labels

- 1. Left click on the label
- 2. Select the square grip point and drag it away from the layout position.
- 3. The dragged state leaves a slight jog in the leader line.
- 4. The Station Offset label will also need to be dragged and rotated to meet the new leader location.
- 5. Left-click on the station offset label
- 6. Choose the square grip point to drag the label to the proper location.
- 7. Hover over the grip point to choose rotate.
- 8. Rotate the label to the appropriate location.

Labeling the TLE parcel

prcl-drs-up-plat-sht-04.mp4 4:43

Segment labels for the TLE parcel lines

1. Annotate Tab > Add Labels > Alignment > Add Alignment Labels

- Single Segment type,
- Bearing Over Distance
- Style 100
- 2. Select on the TLE parcel lines to place the line labels.

Create a table for the line label tags

1. Annotate Ribbon > Add Table > Add Line

- 2. Choose the Traverse Table 120 style
- 3. Click the Select from Screen button to select individual tag buttons.
- 4. Select the labels in the order the tags should be created, west edge, south edge and east edge labels.
- 5. Click a point to place the Line Table.

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Sorting by column

- 1. Select on the table, right-click and choose Edit Table Style
- 2. Data Properties tab.
- 3. Turn on Sort Data By, Column 1 (or whichever is appropriate).

Positioning TLE labels

- 1. Select on the line label tags and grip edit drag them outside the TLE parcel.
- 2. Select on the parcel area label, right-click Parcel Properties.
- 3. Composition tab, set the label style to No Labels.

Placing section corner data

prcl-drs-up-plat-sht-05.mp4 12:35

XREF takings parcels into section information drawing

- 1. Click Open
- 2. ProjectID\BaseData\Survey\ section Information drawing file
- 3. Insert tab > Reference panel > Attach.
 - Browse to ProjectID\RW\Takings Parcels.dwg,
 - Path type is Relative.
 - Attachment type is Overlay.



Tip: If XREF fading is turned on, you can turn it off in the **Insert tab > Reference panel pull-down**. Click the end button to turn off the fading.

Placing the section corner block

- 1. Home tab > Palettes panel > Tool Palettes .
 - Click on Label Section Corner block in tool palette.
 - Type **S** to Scale insertion block.
 - Type .5 for half scale.
- 2. Edit Attribute dialog, enter Town/Range data.
 - Attributes are 27, 34, 26, 35 for upper right, lower right, upper left, lower left.
 - Town is 31, Range is 17, N,W.

Northing/Easting for section corner

- 1. Annotate tab > Add Labels > Notes > N E style
- 2. Click Add and snap to actual section corner location.
- 3. Select on the N E label and grip drag the label into the frame area below the Section Corner block.
- 4. Left click on the Note label, right-click Toggle Leader off.

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Add marker information to label

- 1. Select on the N E Note label.
- 2. Right-click and choose Edit Label Text.
- 3. Add space to the top of the label.
- 4. Add "SEC801" for the corner point number.
- 5. Add a row of text "Railroad Spike."
- 6. Repeat these steps for each section corner related to the project area.

Section line labeling

prcl-drs-up-plat-sht-06.mp4 8:16

Add bearing label for section lines

- 1. Annotate tab > Labels and Tables panel > Add Labels .
- 2. Add Line and Curve labels,
 - Single Segment
 - Bearing style.
- 3. Click Ok
- 4. Click on the section line to place the label.
- 5. Select the label, right-click and choose Edit Label Text.
- 6. Select the text again to begin the editor.
- 7. Highlight the right-side text.
- 8. Under the properties
 - Set the precision to 1 second.
 - Set the Format to the DDMMSS format.
 - Click the arrow to update your label.
 - Left click at end of note, <space>, add General Segment Length property.
 - Click the arrow to place this at the end.
 - At the front of the label type SECTION LINE=.
- 9. Click Ok
- 10. Repeat for the other side of the section line.

Markers that represent section corners

- 1. Home tab > Tool Palette panel > Tool Palette.
- 2. In tool palette select the SEC block.
- 3. Shift right-click to select the Nearest temp OSNAP.
- 4. Place marker on section line near the edge of the view frame.

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Place a leader line to the section information

- 1. Home tab > Draw panel > Polyline .
- 2. Draw the polyline from the SEC block and draw to the Section Corner block and Marker information.
- 3. Draw a polyline that indicates a break in the section line.
- 4. Repeat for the other side of the section line.

Create a traverse tie-in label

prcl-drs-up-plat-sht-07.mp4 8:08

Distance from section corner to traverse tie-in

- 1. Home tab > Draw panel > Line > Create Line
- 2. Draw a line from the section corner to the traverse tie-in point.
- 3. In the **Annotate tab > Add Labels > Line and Curve label**, select the Bearing style.
- 4. Select on the line to place the Bearing label.
- 5. Select the label, right-click and choose Flip Label to put the label below the line.
- 6. Use the diamond grip point to slide the line label along the line to an appropriate location.
- 7. Draw a Leader Between the Section Corner and the Traverse Tie-in Point.
- 8. Home tab > Draw panel > Polyline
- 9. Draw a polyline from the representative section corner, down below the section line, toward the traverse tie-in, then angled back to end at the traverse tie-in point.

Edit the line label text

- 1. Select the line label text, right-click and choose Edit Label Text.
 - Set the precision to 1 second, the format to the compact DDMMSS format.
 - Add the General Segment Length to the end of the label.
- 2. Explode the text so that it can be separate from the line.
- 3. Select the line and delete the line.
- 4. Home tab > Modify panel > Move
- 5. Select the text and position it on the leader polyline.
- 6. Home tab > Modify panel > Break
- 7. Breakthe polyline to create a space for the text.

Move the section labels into the sheet frame and change the size

- 1. Select the section text and move it into the sheet frame.
- 2. Double-click the section text highlight the text.
- 3. Incontext ribbon > 140 text style to assign it to the selected text.
- 4. Repeat this process for the other three sections text.

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Detach the Takings Parcels.dwg XREF.

- 1. Insert tab > Reference panel > Settings arrow in the lower right .
- 2. In the XREF manager right-click the Takings Parcels attachment
- 3. Choose Detach
- 4. Save and close the file.

Return to takings parcels and cleanup labels

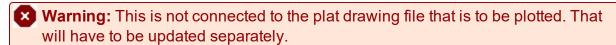
prcl-drs-up-plat-sht-08.mp4 7:35

XREF in updated section drawing

- 1. Open the Taking Parcels.dwg file
- 2. Insert tab > Reference panel > Attach.
- 3. Attach the Section Information.dwg
 - Attachment type is Attach (not Overlay)
 - Path type is Relative Path.

Review label placement

- 1. Find any labels that are overlapping or crowded and adjust them with the grip edits.
- 2. Shift the View Frame.



Insert road bearing labels

- 1. Annotate tab > Add Labels > Add Line and Curve Labels,
 - Line and Curve type
 - Bearing style.
- 2. Click Add
- 3. Select on the centerline of CTH T.
- 4. Select on the label right-click and choose Edit Label Text.
 - Set the precision to 1 second,
 - Set the more compact DDMMSS format
- 5. Repeat these steps for the south half of CTH T

Change the alignment geometry labels to point of intersection

- 1. CTRL select the individual geometry point label
- 2. Right-click and choose Edit Label Text.
 - Select the first half of the label. Type PI,

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3. Repeat steps for the other alignment PI points.

Adjust the plat printing page to match view frame

- 1. At the command line type **SSM**Enter.
- 2. Double-click on the Plat sheet listed in the Sheet Set.
- 3. Click on the XREF and Data Shortcut synch messages to reload and synch the references.
- 4. Double-click inside the viewport to make it active.
- 5. Next to the Scale chooser click the Lock function to UNLOCK the viewport.
- 6. Pan the view over slightly to match what the view frame shows in the Takings Parcels.dwg.
- 7. Lock the viewport.
- 8. Save and close the plat drawing.

Adding more labels

prcl-drs-up-plat-sht-09.mp4 7:58

Place the XY locations for alignment PI points

- 1. Annotate tab > Add Labels > Add Note Labels,
 - Note type label
 - N E style.
- 2. Click Add
- 3. Use OSNAPS (example: Center snap) to ensure the XY Labels are inserted at the actual PI point.
- 4. Drag the XY label into an area that it can be read in relation to the original PI point label.
- 5. Select the label and right-click and choose Toggle Leader so the leader is turned off.
- 6. Repeat for each PI point.

Dimension measurements of the Right-of-Ways

Dimension Tool Alternative

- 1. Annotate tab > Dimension Panel > Dimension Style drop-down.
- 2. Set dimension style to Plat ConvNoExtl.
- 3. Click on the Dimension tool.
- 4. Shift right-click, Nearest Snap to snap to the middle of one of the road lines.
- 5. Shift right-click, Perpendicular snap so the dimension will be appropriate.
- 6. Select the label text, right-click and choose Properties.
- 7. In the Properties, Text value, type in **80** to override the dimensioned distance.
- 8. In the Properties, turn off the Dimension Lines.

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Pre-defined text alternative

- 1. Type CTRL and 3 to open the tool palette.
- 2. Open the Wis-Right-of-Way tool palette tab.
- 3. At the bottom of the tool palette click on the Text Notes.
- 4. Draw a text box.
- 5. Type the measurement text into the text box.
- 6. Move the text box into an open area in one side of the road.
- 7. Use the Rotate command to rotate the text for the north-south road (CTH T).
- 8. Use the Copy command to copy the text in the other sides of the road.
- 9. Repeat these steps for the other ROW text that need to be placed.

Adding right-of-way information

prcl-drs-up-plat-sht-10.mp4 12:05

Attach the existing ROW drawing

- 1. Insert tab of the ribbon, Block panel, Insert Block.
- 2. Browse to location of the file that holds the block
- 3. ProjectID\RW\Existing Parcel file.
 - XY of 0
 - Scale of 1
 - Explode turned on.
- 4. Click Ok

Place the road names

- 1. Annotate tab > Multiline text .
- 2. Create a text box in the STH 64 part of the road way.
- 3. In the Text Editor blue context ribbon set the text style to 175.
- 4. Type **STH 64** in the text box.
- 5. Copy that text to the other side of STH 64.
- 6. Create a text box in the CTH T part of the road way.
- 7. Type **CTH T** in the text box.
- 8. Rotate the text to align with CTH T.
- 9. Copy the rotated text to the other side of CTH T.

Change the PL labels to EXISTING ROW

- 1. Find the PL labels that inserted with the Existing ROW dwg.
- 2. Delete any PL labels that are not needed (example: the PL labels around the intersection offset).

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- 3. For any PL label that is along the ROW
 - Select the PL label
 - Right-click and choose Edit Label Text.
 - Change the text to Exist R/W
 - Move the labels so they fit along the right-of-way line.
- 4. For any PL Label that is inside the ROW.
 - Select the PL label, drag it along the property line it is tied to.
 - Select on the PL label, right-click and choose Flip Label so they are on the outside of the parcel lines.

Bring in utility blocks

- 1. Insert tab > Reference panel > Attach.
- 2. ProjectID\BaseData\Mapping\Orig\BaseMap.dwg
 - Attachment type is Attach
 - Path type is Relative Path.
- 3. Home tab > Layer panel > Layer Properties Manager .
- 4. The layer filters on the left, select the XREF filters.
- 5. Right-click in the layer names and choose Select All.
- 6. Click OFF.
- 7. In the Layer Properties Manager, XREF filter, select on the Section Information XREF.
- 8. Right-click a layer and Select All.
- 9. Turn On.
- 10. In the Layer Properties Manager, XREF filter, select on the XREF filter.
- 11. In the layer manager search bar type *LEVEL 14* to search for any level 14 layers.
- 12. Turn those ON.
- 13. In the Layer manager search bar type *LEVEL 12* to search for any level 12 layers.
- 14. Turn those layers on.

Recreate buildings and utility poles

- 1. Type **NCOPY** at the command line.
- 2. Select on the building lines that are inside the view frame area.
- 3. Type **ADCENTER** at the command line to open the Designcenter.
- Browse to Program Data\Autodesk\C3D2012\enu\data\symbols\USWI\etopog12.dwg Blocks
- 5. Select on the PPOLE block,
- 6. right-click and choose Insert block.
 - Insertion Point on screen
 - Scale to .5.
- 7. Snap the block to the Center OSNAP, center of the pole.
- 8. Copy the PPOLE blocks to the other power pole markers. Use the OSNAPS to center them appropriately.

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- 9. Type **XREF** at the command line.
- 10. Detach the BaseMap.dwg.

Adjust the parcel lines

prcl-drs-up-plat-sht-11.mp4 8:48

Adjust the layer filter to reveal parcel layers

- 1. If the Layer that you are looking for is not available there may be a filter that is suppressing it.
- 2. Home tab > Layer panel > Layer Properties Manager .
- 3. In the Layer Filter select Right of Way filter
- 4. Or the All filter will also work.
- 5. Open the Layer pull down list
- 6. In the Layer Properties Manager Search bar type P RW -
- 7. This will begin to filter the layer list by the letters that you type. Use this to easily find the layer that you want to control.
- 8. Select the P_RW_Property Line layer

Draw a polyline for the parcel

1. Draw a polyline that snaps to the west edge, south edge and east edge of the parcel.

Change the parcel style to aid the view

- 1. In the Toolspace > Prospector tab > expand Sites > expand Existing Parcels.
- 2. Right-click on Parcels, choose Properties.
- 3. Go to the Composition tab.
- 4. Site Parcel style set to No Display.

Change the individual parcels to aid the view

- 1. In the Toolspace > Prospector tab > expand Sites > expand Existing Parcels.
- 2. Right-click on Parcel 1. Choose Parcel Properties.
- 3. On the Information tab change the Parcel Style to No Display.
- 4. Repeat this for each of the parcels in the Existing Parcels site.

Move parcel labels

- 1. Turn off the OSNAPS.
- 2. Select on the parcel label.
- 3. Select the square grip point to drag it to a better position.
- 4. Click on the arrowhead grip point.

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- 5. Drag the arrowhead to a better location.
- 6. Adjust other labels so these will fit in the drawing appropriately.
- 7. Repeat for each of the parcel labels.

Add alignment curve label and data

- 1. Select on the alignment
- 2. In the Context tab > Add Labels.
- 3. Choose Single Segment.
- 4. Select on the alignment where you want the label to originally be placed.
- 5. Click on the alignment curve label.
- 6. Grab the label grip point and drag it away from the original location. Place it somewhere in the drawing that has room. You may need to adjust other labels to accomplish this.

Utility labels

prcl-drs-up-plat-sht-12.mp4 6:52

Attach the utilities XREF

- 1. Insert tab > Reference panel > Attach.
- 2. ProjectID\BaseData\Survey\Utilities.
- 3. Select the CTHT Utilities.dwg drawing.
 - Attachment type
 - Relative path.

Place the labels

- 1. Annotate tab of the ribbon, Add Labels, Add Note Labels.
 - Note label style to Utility Parcel Label.
- 2. Click Add.
- 3. Click the labels at the location where the leader line arrowhead will be located.
- 4. Select the Utility Parcel Label.
- 5. Select the square grip point to drag this to a better location. (If you have room you do not need to drag this away, and the leader line is not added).

Fix the leader line connection.

- 1. Select the leader, right-click and choose Properties.
- 2. Turn the Leader Tail Visibility to Always Hide.
- 3. Click the grip point at the end of the leader line and drag it back to the edge of the circle.
- 4. Repeat this for each label. (You can select multiple leaders and make this change all at the same time).

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Set the proper text in the label

- 1. Select the label, right-click and choose Edit Label Text.
 - In the right-hand window click to highlight the XX text.
 - Type 40 to fill the text.
- 2. Click Ok.
- 3. Repeat for each label.

Place the label on the proper layer

- 1. Select the labels, right-click and choose Properties .
- 2. Click in the Layers field.
- 3. You can scroll to the proper layer, or type P_RW_Text to filter the list of layers for easier selection.
- 4. You can select several labels to do this all at once, or one at a time.

Plat COGO point creation - COGO editor alternative

Last updated: 2014-09-23

Total video time: 44:04

prcl-cogo-editr-alt-data-C3D12.zip Exercise data

COGO Editor overview

prcl-cogo-editr-alt-01.mp4 7:29

- The COGO Editor dialog box
- Opening the dialog box
- Analyze tab > Ground Data panel > Survey icon pull-down
- Type **COGOED** at command line to open
- Entering COGO data for lines and curves
 - · Format of bearing data
- Setting the begin and end points
- Setting the adjustment
- Creating polylines and points
 - Sideshots
- Saving a traverse
- · Editing using the COGO Editor
 - Populating the dialog from existing polylines
 - Populating the dialog from a saved traverse

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- Tools to navigate in the drawing
- Making changes to a traverse or polyline
- Editing As You Go
- Entering Curve Data

Create view frames for sheets

prcl-cogo-editr-alt-02.mp4 20:26

The first step to creating the COGO Plat sheet is to reference the proper material and create view frames...

Start a new file

- 1. Menu Browser > New
- 2. Select wisdot14-plat.dwt.
- 3. Save the file to 12345678\BaseData\Other.
- 4. Open the CSM legal description 20130809070724376.pdf.

Attach an XREF.

- 1. Insert tab > Reference panel > Attach
- 2. 12345678\BaseData\Other\Plymouth.dwg
- 3. Click Open.
 - Set the Path to Relative Path
 - Set the Attachment Type to Overlay
- 4. Zoom to the Section 26, the southeastern corner.
- 5. Attach the Iron Pipe file
- 6. Insert tab > Reference panel > Attach
- 7. 12345678\BaseData\Survey\401519 PROP1.dwg
- 8. Click Open.
 - Set the Path to Relative Path
 - Set the Attachment Type to Overlay
- 9. Enter the Plat Data into the COGO Editor Dialog
- 10. Type **COGOED**
- 11. Analyze tab > Ground Data panel > Survey drop down > Coordinate Geometry Editor
- 12. Provide the Beginning Point.
- 13. Click the Select from Screen button.
- 14. Snap to the intersection of the Section Lines.
- 15. Do NOT choose the End Point as the same as Begin Point.
- 16. Entering Data into the COGO Editor Dialog
- 17. In the first Angle/Direction field enter the bearing N 0 0 49 W
- 18. In the first Distance field type **95.03**.
- 19. Tab through the fields to the next Angle/Direction field.

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- 20. Enter the next description as Angle/Direction S 44 45 31 W, Distance 133.71
- 21. In the COGO Editor dialog, top center select on the Create Polyline from Traverse button.
- 22. Close the COGO Editor dialog to inspect the polyline.
- 23. Reopen the COGO Editor dialog to enter the plat description.
- 24. Select from Screen to enter the Point of Beginning. Choose the last traverse point.
- 25. Accept the Closing the Traverse Loop.
- 26. Enter the Angle/Direction and Distance information as below:
 - Angle/Direction N 89 58 22 W, Distance 505.05
 - Angle/Direction N 0 02 07 E, Distance 1321.1
 - Angle/Direction N 89 57 35 E, Distance 593.00
 - Angle/Direction S 0 04 06 E, Distance 718.58
 - Angle/Direction S 0 30 37 E, Distance 508.25
- 27. In the COGO Editor dialog, top center select on the Create Polyline from Traverse button.
- 28. Edit the Data in the COGO Editor Dialog
- 29. Reopen the COGO Editor with In-Place Data for editing
- 30. Type **COGOED** at the command line.
- 31. In the COGO Editor dialog, upper left corner select the Load the Traverse from a polyline button.
- 32. Select the polyline that represents the plat description.

Edit the new traverse data graphically

- 1. Click on line 1 of the traverse.
- 2. Select the Distance field from this row of data.
- 3. In the middle left icon bar, select the Set Locations from Direction or Distance.
- 4. Snap to the end point of the first traverse line end.
- 5. Snap to the intersection of the first traverse line and the south section line.
- 6. Select on the second line of the traverse data,
- 7. Click in the Direction field.
- 8. In the middle left icon bar, select the Set Locations from Direction or Distance.
- 9. Snap to the intersection of the first traverse line and the section line.
- 10. Snap using the Nearest snap somewhere along the south section line to the west of the first point.
- 11. Replace the Polyline with the New Data
- 12. In the COGO Editor dialog, top center select on the Create Polyline from Traverse button
- 13. Delete the first polyline to clean up the file.

COGO Editor – Edit as you go

prcl-cogo-editr-alt-03.mp4 11:25

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Tour of the navigation and file tools



nfo: These are tools that will make navigation around the traverse easier during the editing process.

Description of the navigation tools

- 1. In the middle left icon bar click on the Zoom Extents button.
- 2. Select a line for data in the dialog. Click on the Zoom to Selection.
- 3. In the upper left icon bar select the Save Traverse to File.
- 4. Save the .TRVX file to the project 12345678\BaseData\Other.
- 5. In the upper left icon bar Click Open and open the TRVX file that you just saved.
- 6. Accept that this will overwrite the original data.

Edit as you go



Tip: Instead of completing the traverse description then returning to edit it, you can just enter the data mixing the legal description with graphic selection to follow the legal callouts.

- 1. Enter the Data Using the Editing Tools as an Aid
- 2. Delete the polylines left from the last exercise.
- 3. Type **COGOED** at the command line.
- 4. Select From Screen the Point of Beginning.
- 5. Snap to the Section Corner intersection point.
- 6. Do NOT accept the Closing of the traverse.
- 7. Click in the Angle/Direction field for line 1.
- 8. From the middle left icon bar select the Select the Direction Distance from Drawing.
- 9. Snap to the section corner intersection.
- 10. Nearest Snap to the east section line.
- 11. Type in the distance of **95.03**.
- 12. Insert Polyline from the icon bar at the top right.
- 13. Select in the line 2 Angle/Direction field.
- 14. From the middle left icon bar select the Select the Direction Distance from Drawing.
- 15. Snap to the end of the first polyline.
- 16. Snap to the node of the iron pipe block.
- 17. Select in the line 2 Distance field
- 18. From the middle left icon bar select the Select the Direction Distance from Drawing.
- 19. Snap to the end of the first polyline.
- 20. Snap to the node point of the iron pipe block.
- 21. Insert Polyline from the icon bar at the top right
- 22. Enter Traverse Callouts
- 23. Type **COGOED** at the command line to reopen the COGO Editor dialog.
- 24. Place the Point of Beginning at the end of the last line (at the IP block point).
- 25. Accept the Closing of the Traverse point.

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- 26. Select in the Line1 Angle/Direction field. type S 44 45 31 W
- 27. Select the Distance field and type **133.71**.
- 28. Select the Polyline from Traverse button.
- 29. Select in the line1 Distance field.
- 30. From the middle left icon bar select the Select the Direction Distance from Drawing.
- 31. Snap to the first traverse line start point.
- 32. Snap to the intersection of the polyline and the section line.
- 33. Insert Polyline from the icon bar at the top right.
- 34. Select in the line2 Angle/Direction field.
- 35. From the middle left icon bar select the Select the Direction Distance from Drawing
- 36. Snap to the intersection of the polyline and the south section line.
- 37. Snap to the Nearest point along the south section line somewhere west of the first snap.
- 38. Select in the Line2 Distance field and type **505.05**.
- 39. Insert Polyline from the icon bar at the top right.
- 40. Save the traverse to a TRVX file in the 12345678\BaseData\Other folder.

Entering curve data with the COGO Editor

prcl-cogo-editr-alt-04.mp4 4:42

This exercise beings with the traverse in progress. Open the TRVX file and begin adding data where the original file left off.

- 1. Open the COGO Editor with the Traverse in Progress
- 2. Open the POS.PDF document to preview the curve data.
- 3. Type **COGOED** at the command line.
- 4. Click Open, and open the Curve In Progress.TRVX
- 5. Select on line 3
- 6. Change the Line field to Chord Curve
- 7. In the Angle/Direction type N 33 02 22 E
- 8. In the Distance field type **511.73**
- 9. In the Radius field type **766.51**
- 10. Select on line4
- 11. Enter the Angle/Direction of S 76 27 38 E
- 12. Distance of **12**.
- 13. Select on line5
- 14. Change the Line field to Chord Curve
- 15. Enter the Angle/Direction of N 15 40 11 E
- 16. Enter the Distance of 183.54
- 17. Enter the Radius of **778.51**.

Plat COGO editing

Last updated: 2014-09-23

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Total video time: 22:49

prcl-plat-cogo-edit-data-C3D12.zip Exercise data

Entering plat data part 1

prcl-plat-cogo-edit-01.mp4 13:38

Open template and save to project location

- 1. Menu Browser > New
- 2. Select wisdot14-plat.dwt.
- 3. Save the file to 12345678\Design\Base Data\Other\.
- 4. Open the CSM legal description 20130809070724376.pdf.

Attach an XREF.

- 1. Insert tab > Reference panel > Attach .
- 2. 12345678\BaseData\Other\401519_PROP1.dwg
- 3. Click Open.
 - Set Path to Relative Path
 - Set Attachment Type to Overlay
- 4. Zoom to the Section 26, the southeastern corner.

Attach the iron pipe file

- 1. Insert tab > Reference panel > Attach,
- 2. 12345678\BaseData\Survey\Plymouth.dwg.
 - Set Path to Relative Path
 - Set Attachment Type to Overlay



Tip: To view external reference as faded or non-faded go to OPTIONS> display tab> fade control -90 is Non-faded 90 is fully faded.

- 3. Enter the Plat Data to POB
- 4. Select correct layer
- 5. Home tab > Layers panel > Layer Manager
- 6. Select P RW MinorLotLine.
- 7. Home tab > Draw panel > Line > Create Line by Bearing
 - Provide the Starting Point by snapping to the intersection of the section lines.
 - Enter quadrant 4, bearing 00.0049, and distance 95.03
 - Enter quadrant 3, bearing 89.5911, and distance 58.98 to Point of beginning (POB).
 - Enter the Plat Data

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- 8. Select correct layer
- 9. Home tab > Layers panel > Layer Manager. .
- 10. Select E RW CSM.
- 11. Home tab > Draw panel > Line > Create Line by Bearing
 - Provide the Starting Point by snapping to the POB.
 - Enter quadrant 3, bearing 44.4531, and distance 133.71
 - Enter quadrant 4, bearing 89.5822, and distance 505.05
 - Enter quadrant 1, bearing 00.0207, and distance 1321.10
 - Enter quadrant 1, bearing 89.5735, and distance 593.00
 - Enter quadrant 2, bearing 00.0406, and distance 718.58
 - Enter quadrant 2, bearing 00.3037, and distance 508.25

Edit the data graphically

- 1. Reopen the COGO Editor with In-Place Data for editing
- 2. Stretch endpoint of existing line back to section line.
- 3. Move rest of traverse to match new end point distance.
- 4. Rotate line to match section line with rotate and reference command.
- 5. Home tab > Modify panel > Rotate
- 6. Select line to be rotated,
- 7. Type **R** for reference,
- 8. Select start of line
- 9. Select endpoint of line,
- 10. Click Shift and right click
- 11. Select Nearest OSNAP override
- 12. Select section line.

Entering plat data part 2

prcl-plat-cogo-edit-02.mp4 5:06

- 1. Menu Browser > New
- 2. Select wisdot14-plat.dwt.
- 3. Save the file to the project, 12345678\BaseData\Other.
- 4. Open the CSM legal description 20130809070724376.pdf.

Attach an XREF.

- 5. Insert tab of ribbon > Reference panel > Attach
- 6. 12345678\BaseData\Other\401519 PROP1.dwg,
- 7. Click Open.
 - Set Path to Relative Path
 - Set Attachment Type to Overlay

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- 8. Zoom to the Section 26, the southeastern corner.
- 9. Attach the Iron Pipe file
- 10. Insert tab > Reference panel > Attach .
- 11. 12345678\BaseData\Other\401519 PROP1.dwg
- 12. Click Open
 - Set Path to Relative Path
 - Set Attachment Type to Overlay



Tip: To view external reference as faded or non-faded go to OPTIONS> display tab> fade control -90 is Non-faded, 90 is fully faded.

- 13. Enter the Plat Data to POB Select correct layer
- 14. Home tab > Layers panel > Layer Manager
- 15. Select P RW MinorLotLine.
- 16. Home tab > Draw panel > Line drop-down > Create Line by Bearing
 - Provide the Starting Point by snapping to the intersection of the section lines.
 - Enter quadrant 4
 - Shift -right-click, select Nearest
 - Select easterly section line
 - Distance 95.03
 - Enter quadrant 3
 - Shift -right-click select Node
 - Select pin for bearing
 - ,Shift -right-click select Node
 - Select pin for distance to Point of Beginning (POB).
- 17. Enter and edit the Plat Data
- 18. Select correct laver
- 19. Home tab > Layers panel > Layer Manager
- 20. Select E RW CSM.
- 21. Home tab > Draw panel > Line drop-down, Create Line by Bearing.
 - Provide the Starting Point by snapping to the POB.
 - Enter quadrant 3, bearing 44.4531, and distance 133.71
- 22. Click Esc.
- 23. Select previously drawn line
- 24. Grab endpoint vertex and stretch it back to the section line.
- 25. Home tab > Draw panel > Line drop-down, Create Line by Bearing.
 - Select the endpoint of previous line
 - Enter quadrant 4, bearing 89.5822, and distance 505.05
 - Enter quadrant 1, bearing 00.0207, and distance 1321.10
 - Enter quadrant 1, bearing 89.5735, and distance 593.00
 - Enter quadrant 2, bearing 00.0406, and distance 718.58
 - Enter quadrant 2, bearing 00.3037, and distance 508.25

Enter curve plat data

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prcl-plat-cogo-edit-03.mp4 4:04

- 1. Navigate to 12345678\BaseData\Other\Plat Description.dwg
- 2. Open references
- 3. Open the pos2.pdf for curve reference.
- 4. Enter Curve Plat data
- 5. Home tab > Draw panel > ARC drop-down > Create Arc (start, end, angle).
- 6. Select endpoint of line to start from
- 7. Select transparent command Bearing-Distance
 - Quadrant 1
 - Chord bearing 33.0222
 - Distance of 511.73
- 8. Click Esc
- 9. Click Enter
- 10. Type **39**Enter.
- 11. Select line from bearing command
- 12. Select endpoint of previous arc,
- 13. Select transparent command Bearing-Distance
 - Quadrant 2
 - Bearing 76.2738
 - Distance 12.
- 14. Home tab > Draw panel > ARC drop-down > Create Arc (start, end, angle) H
- 15. Select end point of previous line
- 16. Select Bearing-Distance transparent command,
 - Quadrant 1
 - Bearing 15.4011
 - Distance 183.54
- 17. Click Esc
- 18. Click Enter
- 19. Type **13.3222**Enter

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Plan production

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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

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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: BARRONHighway: 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 Shortcutsright 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

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pln-prod-creat-pp-w-anno-03.mp4 1:51

- 1. Save the file.
- 2. Refresh the data shortcuts
- 3. Toolspace > Prospector tab > Data Shortcutsright 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.

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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.

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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.

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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



X 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

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- 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: BARRONHighway: 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.

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- 2. Home tab > Layers panel > Layers Properties icon
- 3. Click XREF Corridor-STH25-4thAve.dwg
- 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 MAPWSPACEEnter
- 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



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

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- 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

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[] 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

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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 VEnter
 - 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).

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- 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.

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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

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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
- 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

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.

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- 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
- 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.

Styles, labels, and tables

Last updated: 2010-07-01

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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

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- 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

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Data exchange

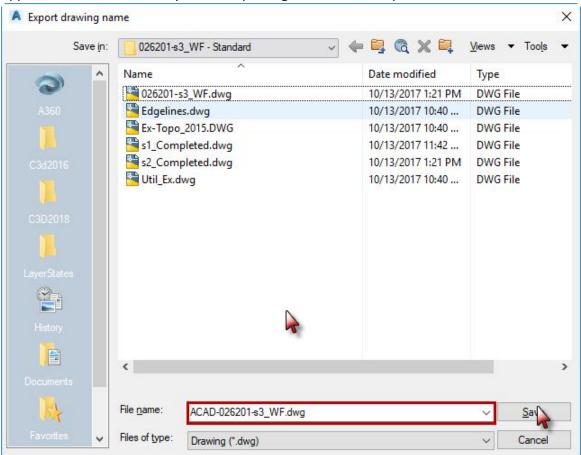
Translate DWG to DGN workflow using Civil 3D 2014

Last updated: 2017-11-30

Export to AutoCAD

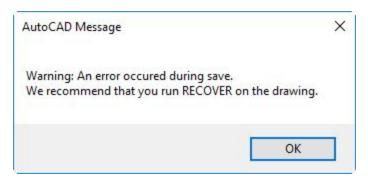
This workflow document will outline the steps involved to translate an AutoCAD Civil 3D 2014 file formation to MicroStation V8 DGN file format. The workflow will be Civil 3D based and the final deliverable will be the V8 DGN file.

- 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.

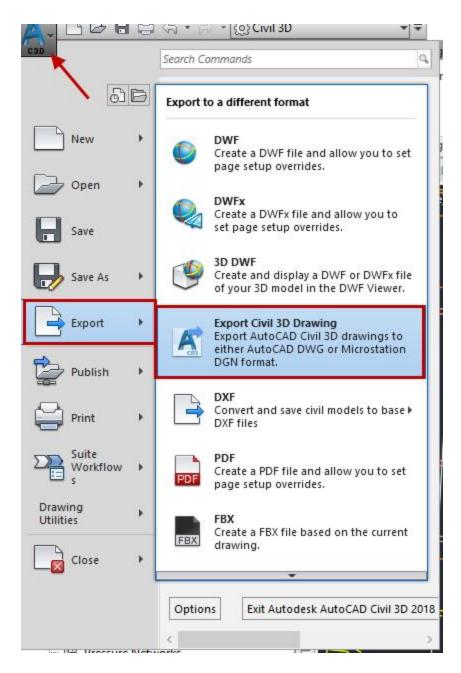


Info: Exporting a Civil 3D file to AutoCAD will create a new DWG file with all AEC objects exploded. The default Export Options should work for most files. If any options need to be changed use the command entry: -EXPORTTOAUTOCAD or AECTOACAD.

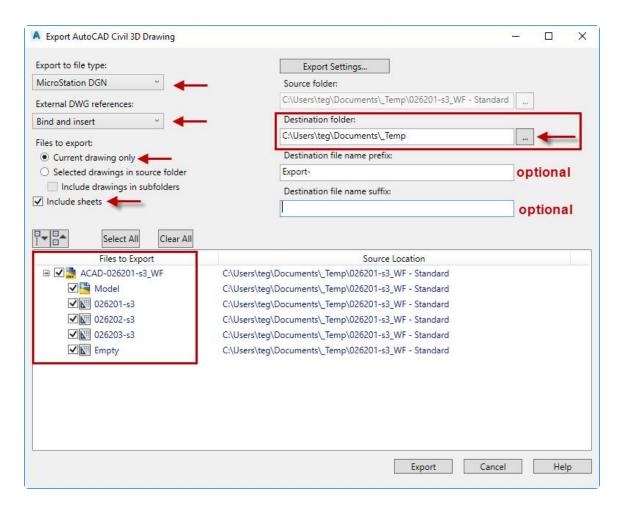
Export to MicroStation DGN

- 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

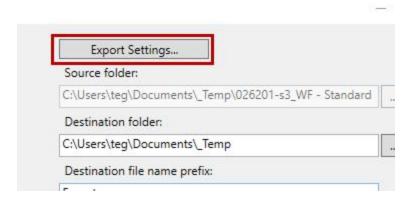
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- 3. Export to file type > MicroStation DGN
- 4. External DWG references > Bind and Insert
- 5. Files to Export > Current drawing only
- 6. > Include sheets if you wish to export the layout sheets
- 7. Destination Folder > Navigate to the folder you 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

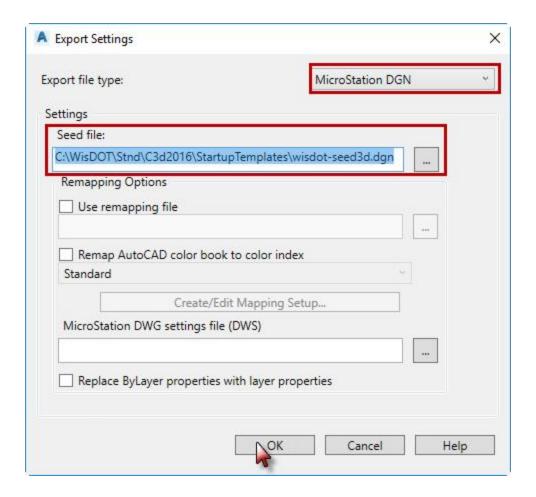


10. Export Settings



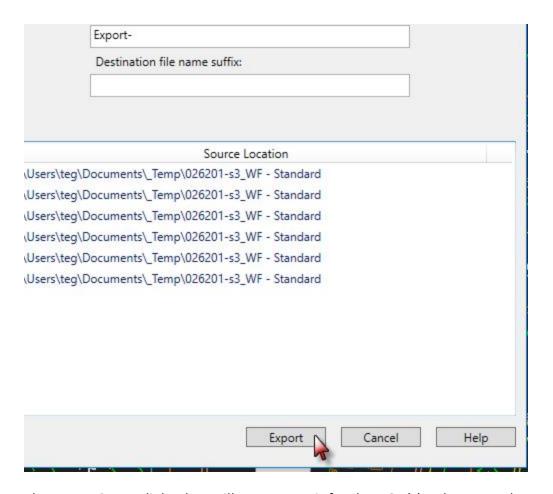
- 11. Export file type > MicroStation DGN
- 12. Seed file > C:\WisDOT\Stnd\C3d2016\StartupTemplates\wisdot-seed3d.dgn
- 13. OK

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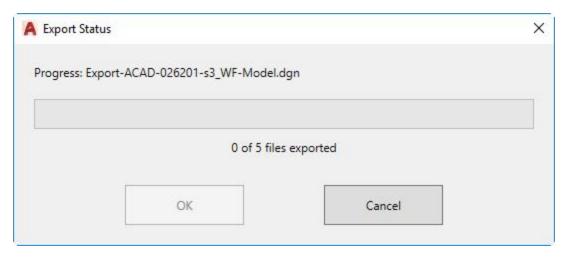


14. Export

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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.

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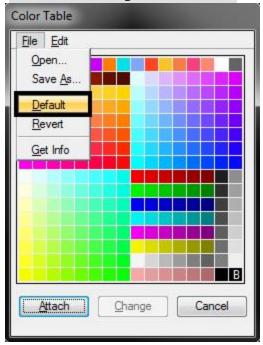
Verify DGN results

- 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

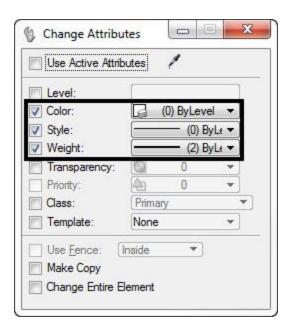
- 1. MicroStation pull down menu > Settings > Color Table
- 2. Color Table dialog > File > Default The WisDOT default color table will be loaded.



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**

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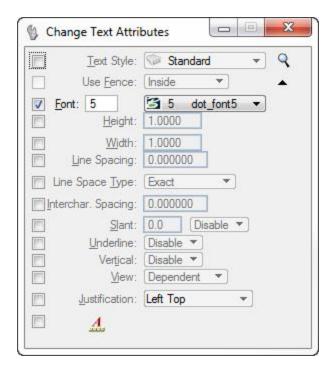
- E. Then accept the change in the MicroStation view.
- 5. Clear the selection set.

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.



Profile View of STH25BestFit

- 8. Clear the selection set.
- 9. Save Settings and Exit MicroStation.

Translate DGN to DWG workflow using Civil 3D 2014

Last updated: 2016-11-21

Translate DGN to DWG workflow using Civil 3D 2014

This workflow document will outline the steps involved to translate a MicroStation DGN file to AutoCAD 2012 DWG file format. The workflow will be Civil 3D based and the final deliverable will be the DWG file.

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.

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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.

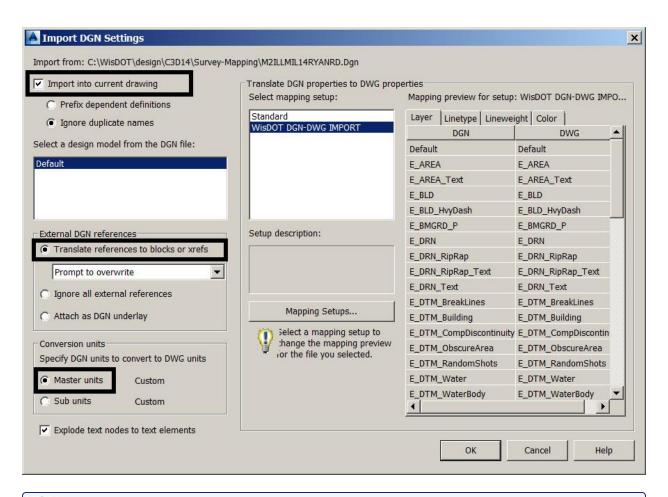
Import to AutoCAD

- 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.

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A

Info:

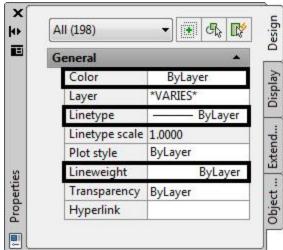
In the Import DGN Settings dialog box, if you select "Import into Current Drawing" and select the "Translate References to Blocks or Xrefs" option in the External DGN references section, all referenced DGN files are converted to block references. If you do not select "Import into Current Drawing" and 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**

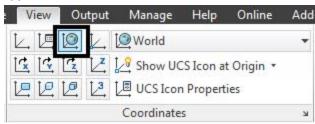
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• Lineweight = **ByLayer**



Verify the imported drawing

1. In AutoCAD Civil 3D go to the Ribbon and the View tab > Coordinates panel select World icon.



0

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.

Importing PDF and XLS files

Last updated: 2012-01-10

Total video time: 2:05

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Importing PDF and XLS files

data-xchng-imprt-pdf-xls-01.mp4 2:05

Insert (PDF) and Paste (XLS)

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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

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- 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.

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- 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.

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Reports and macros

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Reports

Civil 3D stock reports

Last updated: 2012-08-24

Total video time: 62:33

rpt-sum-stock.xls

Exercise files: rpt-c3d-stok-data-C3D10.zip

Civil 3D reports introduction

rpt-c3d-stok-01.mp4 11:55

- WisDOT C3D Reports worksheet explained 0:00
- StockReportSummary worksheet explained 1:46
- Alignment Curve Report Explained 2:32
- Setup Project data for Reporting 4:00
- Pick the Correct drawing file 6:44
- Run the Report from Toolbox 7:55
- Export to XML Report dialog 8:15
- HTML Report Review 9:00
- Save the CivilReport.HTML file 9:48
- Summary, things to remember 11:34

Stock alignment reports

rpt-c3d-stok-02.mp4 14:30

Alignment Design Criteria verfication Report 0:20

- Open Drawing File 0:39
- Prespector Toolbox Run Report 1:32
- Fill Dialog 1:50
- Save File 2:38
- Review Report 3:30

General Legal Description for Alignment 4:16

- Skip this Incremental Stationing Report 4:30
- Select Alignment

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- Start/End Sta 5:10
- Save to 5:20
- Review Report 5:40

PI Station Report 6:12

- Select Alignment 6:30
- Start End 6:54
- Save to 7:05
- Review Report 7:20

Stakeout Alignment 7:34

- Points 7:40
- Store the Points 7:56
- Insert Points Manually 8:30
- Review Points Collection 8:56
- Run Report 9:04
- Select Alignment 9:20
- Select Points 9:40
- Stationing start/end 10:00
- Save to 10:30
- Review Report 10:48

Alignment Station and Curve 11:25

- Alignment Station and Curve Report requirements 11:35
- Run Report 12:00
- Select Alignment 12:10
- Review Report 12:50 Compare running without all check boxes on 14:00

Stock corridor reports

rpt-c3d-stok-03.mp4 10:46

Corridor Reports Summary 0:20

Feature Line Report 0:40

- Switch Project 1:00
- Run Report 1:20
- Select Alignment 1:45
- Corridor Points 2:18
- Report Name and Location 2:50
- Create Report 3:38
- Review Report 3:50

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Feature Line Report - Corridor Links

- Corridor Links 4:24
- Link Code 4:42
- Report Name and Location 5:00
- Review Report 5:06

Feature Line Report - Surface Report 5:25

- Sample Line Group 5:36
- Select Surface 5:46
- Report Name and Location 6:18
- Review Report 5:06

Slopestake Report 6:36

- Requirements 7:05
- Create some Sample Lines 7:14
- Sampling Surfaces 7:45
- Station Range 8:12
- Run Slopestake Report 9:00
- Report Name and Location 9:45
- Create Report 10:06 image
- Review Report 10:28

Summary 10:36

Stock parcel reports

rpt-c3d-stok-04.mp4 9:20

Parcel Report Summary 0:10

- Parcel Area Report 0:40
- Generic Legal Description 1:06
- Inverse Report 1:28
- Report Review 2:20
- Save as 3:04
- Metes and Bounds 3:38
- Report Review 3:56
- Save as 4:08
- Pacel Area in CSV 4:12
- Report Review 4:44
- Save As 4:56
- Parcel Map Check 5:20

Page: 439

- Description 5:32
 - POB 6:00
- Save As 6:32
- Report Review 7:00
- Parcel Volume Report 7:34
- Surveyors Certificate 7:56
- Run Report 8:04
- Report Review 8:32
- Save As 9:04

Stock point reports

rpt-c3d-stok-05.mp4 7:21

Point Report Summary worksheet 0:10

- Points in CSV 0:35
- Switch to Corridor-STH25-4thAve. DWG file 0:40
- Report Review 1:54
- Save as 3:10
- Points List 3:21
- Report Review 3:38
- Save as 3:54
- Radial Stakeout 4:00
- Allow Blocked content 4:36
- Report Review 5:30
- Save as 5:45
- Station Offset Report 6:12
- Report Review 6:54
- Save as 7:18

Stock profile reports

rpt-c3d-stok-06.mp4 4:52

- Profile Report Summary worksheet 0:10
- Incremental Station Elevation Difference 0:25
- Report Review 0:48
- Incremental Stationing Report 1:12
- DWG File Data Referencing a Profile 1:28
- Report Review 2:20
- Profile Design Criteria Check does not work
- Profiles in CSV 2:40

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- Report Review 3:20
- Save as 4:00
- PVI Station 4:08
- Report Review
 - PVI Station and Curve
 - Report does not work
 - Vertical Curve Report
 - Report does not work

Stock surface reports

rpt-c3d-stok-07.mp4 3:49

- Surface Report Summary worksheet 0:20
- Select Earthwork-STH25BestFit.DWG for surface reporting 1:45
- Surface Points to CSV 2:21
- Report Review 2:48
- Surface Report 3:12
- Report Review 3:43

WisDOT custom reports

Last updated: 2012-08-24

Total video time: 49:48

rpt-sum-wisdot.xls

WisDOT alignment and point reports

rpt-wisdot-01.mp4 21:56

Right-click rpt-sum-wisdot.xls review 0:20

- 1. Alignments SuperElevation Transition Report
 - Select DWG (Earthwork-STH25-BestFit.DWG) 1:10
 - Running Reports if Toolbox does not work 2:00
 - Command: Netload 2:20
 - Select Reports.DLL 2:40
 - Command: SETransitions 3:20
 - Report Super Transitions at even stations
 - Save as 4:05
 - Report Review 5:00

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- 2. Run SETransitions Again 5:35
 - Report Slope Change
 - Save as 5:50
 - Review Report 6:25
- 3. Parcel -Legal Descriptions Report
- 4. Switch to Corridor-STH25-4thAve.DWG 7:00
- 5. Run LegalDescriptions command 7:20
 - Custom Header 7:50
 - Save AS 8:30
 - Review Review 8:50
- 6. Points Reports Summary rpt-sum-wisdot.xls 9:00
- 7. Points Describe Points Report 11:16
- 8. Run DescribePoints command 11:36
 - Create Points 11:50
- 9. Run DescribePoints command 13:05
 - Individual Points selection
- 10. Review Report 13:45
- 11. Run DescribePoints command 14:10 (use spacebar to repeat last)
 - Offset Alignment selection
 - Save as 14:40
- 12. Rerun Report because Offset limits were too limited 15:00
- 13. Rerun Report because Offset limits were too limited 15:20
- 14. Review Report 15:40
- 15. Points Stakeout From Remote Point
 - Run Stakeout command 16:00
 - From Remote Point 16:20
 - Review Report 17:00
- 16. Points Stakeout Even Stations
 - Run Stakeout command 17:18
 - Review Report 17:30
- 17. Points Stakeout Offset Alignment
 - Run Stakeout command 17:46
 - Review Report 18:06
- 18. Points SOE
 - Run SOE command 18:40
 - Do Not Select Boundary Limits 19:25
 - Review Report 19:54
- 19. Points Course Table
 - Run CourseTable command 20:40
 - Review Report 21:20

WisDOT profile and corridor reports

rpt-wisdot-02.mp4 11:51

ReportSummaryWisDOT.xls review 0:20

- 1. Reported from Corridor-STH25-4thAve.dwg
- 2. Profile Profile Grades
- 3. Run ProfileGrades command 1:21
- 4. Station Limits 1:50
- 5. Offsets 2:20
- 6. Save as 3:40
- 7. Open Report from Windows Explorer 5:00
- 8. Review Report 5:20
- 9. Change File to Earthwork-STH25BestFit.DWG

Corridor - Topsoil Computations

- 1. Summary 6:40
- 2. Explain Differences between Sample Line Group and Station Spacing 7:16
- 3. Run Topsoil command 7:40
- 4. Please PARDON HILL FARMS announcements! Select Boundary Limits 8:30
- 5. Real Offset inputs 9:30
- 6. Save as 9:40
- 7. Review Report 10:10

WisDOT feature line reports and Import Station Offset Depth

rpt-wisdot-03.mp4 16:01

- 1. Reported from Earthwork-STH25BestFit.DWG
- 2. Feature Line Report Offset from Alignment Summary 0:20
 - Open Surface-STH25-Refinement.DWG 2:30
 - Netload Reports.dll
 - 3:17
 - Featureline command 3:30
 - No Alignments Data Reference 4thAve 4:00
 - Run FeatureLine command 4:10
 - Report Offset from Alignment 4:40
 - Report 4:45
- 3. Feature Line Report Feature Line Run FeatureLine command 5:05
 - Report feature line 5:14
 - Review Report 5:30
 - Summary 6:00

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- 4. Import Station Offset Depth file 6:30
 - Create a New DWG file 7:00
 - Save As Exist-Sub.DWG 7:20
 - Create Reference to **4th Ave** alignment 7:40
 - Create SOD file (4thAveSub.txt) 9:30
 - Save File as 4thAveSub.SOD Netload Importsoe.dll 11:20
 - Run ImportSOE Command 11:30
 - Create Reference to **EXIST** surface 11:58
 - Rerun ImportSOE command 12:30
 - Import 13:30
 - Create Marsh Surface 13:56
 - Add Point Group 14:12
 - Add Point Group to Surface 14:56
 - Change Marsh Surface style 15:10
 - Review Surface 15:30

Course table report

Last updated: 2016-07-26

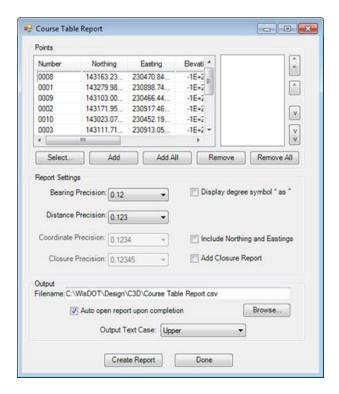
Description

The CourseTable report macro reports on distances and bearings between selected points. An optional Closure Report may be appended to the end of the report to calculate closure error of a closed traverse.

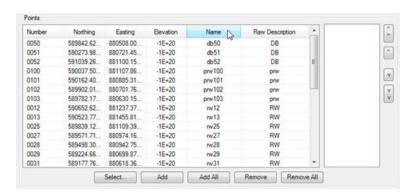
General Operation

When launching the macro the user must be in a drawing that contains Civil 3D COGO points. If no points are found the macro will display a message to the user and exit.

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Points



All of the COGO Point objects found in the drawing are displayed in the Points table. To expand the Points table, select a corner of the main dialog and drag to expand. The controls on the dialog will automatically adjust. To sort the point display, click in the desired column heading to sort on that column. Only points selected or added to the processing list to the right of the points table will be processed.

Select

Clicking the Select... button allows the user to graphically choose a COGO Point from the drawing and add it to the processing list.

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Add

The Add button will copy the selected points in the Points table listing and add them to processing list.

Add All

The Add All button will copy the all of the points in the Points table listing and add them to processing list.

Remove

The Remove button will delete the selected point from the processing list.

Remove All

The Remove All button will delete all points from the processing list.

Arrow Keys

The points will be processed in the order in which they are shown in the processing list. To change the order, select the desired point(s) and click the appropriate directional arrow. The double arrow icons will move the selected point(s) to the top or bottom of the list.



Report Settings

The *Report Settings* selections allow the user to format their report output.



Bearing Precision

This drop down allows the user to control the precision of the Bearing values displayed in the report.

Distance Precision

This drop down allows the user to control the precision of the Distance values displayed in the report.

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Reports

Coordinate Precision

This drop down allows the user to control the precision of the Coordinate values displayed in the report. This drop down is enabled only when the Include Northings and Eastings checkbox is toggled on.

Closure Precision

This drop down allows the user to control the precision of the values displayed *Closure Report* section of the output in the report file. This drop down is enabled only when the Add Closure Report checkbox is toggled on

Display degree symbol ° as ^

In some cases using the standard degree symbol will corrupt the text output. To correct the problem the user may toggle on this checkbox to replace the degree symbol with the alternate carat symbol.

Include Northings and Eastings

When toggled off the individual point Northing and Easting values are not displayed in the output report. To see the Northing and Easting values toggle this checkbox on. When this checkbox is toggled on the Coordinate Precision drop down is enabled.

Add Closure Report

To add a closure error calculation to the end of the report toggle on this checkbox. When this checkbox is toggled on the *Closure Precision* drop down is enabled.

Output

Filename

Specify the full output path and name of the report file.

Auto open report upon completion

When toggled on the report file is automatically opened in its default application when completed.

Output Text Case

This drop-down list allows the user to set the text case formatting in the output report file. The default setting is Upper.

- Upper Forces all text in the output report file to be upper case.
- Lower Forces all text in the output report file to be lower case.

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- Proper/Title Forces all text in the output report file to be Title case. (The first letter of each word is capitalized)
- As Is The text in the output report file has no case conversion applied.

Describe alignment report

Last updated: 2016-10-13

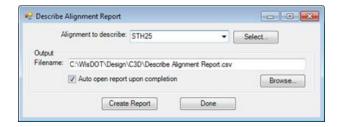
Description

Toolspace > Toolbox tab > WisDOT Toolbox > WisDOT Reports > Alignment Reports > Describe Alignments

The Describe Alignment Report provides detailed geometry information for each entity within the selected alignment.

General Operation

When launching the macro the user must be in a drawing with at least one alignment.



Alignment to describe

Users may select the alignment to report on either by choosing the alignment name from the drop-down list in the dialog, or by clicking the Select button to choose it graphically.

Output

In this section the user will specify the location for the output report file. If the Auto open check box is checked on the file will automatically open when completed.

Create Report

Clicking the Create Report button starts the report processing. A status dialog will display showing the progress as the data is being collected and exported. The status dialog will close when processing is completed.

Notes

1. The report only provides data on Tangent and Arc alignment entities. The Spiral alignment entity types are not supported.

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2. Multiple station equations are supported on an alignment. The only restriction is that the change in stationing must occur at a break point between alignment entities.

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