

# **WSDOT CAE Environment Overview**

## **CAE Support**

CAE Support  
January 2022

# Overview

- This presentation provides an overview of the Washington State Dept. of Transportation (WSDOT) Computer Aided Engineering (CAE) environment.
- It is intended for consultants who are tasked with developing and delivering WSDOT project data using MicroStation and InRoads V8i.

# Overview - What's Covered

- Introduction to WSDOT Computer Aided Engineering (CAE)
- Supported Applications
- Standards Manuals
- Supporting Resources
- Project Organization
- File Naming Conventions
- Element Conventions
- Process Overviews
- ProjectWise
- WSDOT CAE Environment setup
- Quick Tour
- Getting Help

# Intro to WSDOT CAE

- The Computer Aided Engineering environment at WSDOT covers the following areas of work:
  - Field survey data processing
  - Design roadway geometrics analysis and engineering
  - Computer Aided Drafting (CAD) functions
  - Construction administration support
  - As-built deliverables
  - Engineering drawing\document management

# Supported Applications

- WSDOT currently accepts deliverables in the following formats:
  - **Deliverable File Formats**  
Bentley **MicroStation V8i SS3** (v8.11.09.xx) and **PowerInRoads V8i SS2** (v8.11.07.xx), are the official WSDOT drafting and design applications and versions. All deliverables to WSDOT shall be in the official version and produced using current CAE resources unless otherwise stated in a specific WSDOT-Consultant agreement.

WSDOT is developing an environment for the Bentley Connect and platform anticipates piloting it (internal only) 2021. WSDOT IS NOT accepting any Connect platform deliverables at this time.

- This information is published on our public web site:
  - [www.wsdot.wa.gov/Design/CAE](http://www.wsdot.wa.gov/Design/CAE)

# Standards Manuals

- WSDOT standards manuals applicable to CAE processes include (but are not limited to):
  - WSDOT Design Manual
    - ([www.wsdot.wa.gov/Publications/Manuals/M22-01.htm](http://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm))
  - WSDOT Plans Preparation Manual
    - ([www.wsdot.wa.gov/Publications/Manuals/M22-31.htm](http://www.wsdot.wa.gov/Publications/Manuals/M22-31.htm))
  - WSDOT Electronic Engineering Data Standards Manual
    - ([www.wsdot.wa.gov/Publications/Manuals/M3028.htm](http://www.wsdot.wa.gov/Publications/Manuals/M3028.htm))
  - WSDOT Highway Surveying Manual
    - ([www.wsdot.wa.gov/Publications/Manuals/M22-97.htm](http://www.wsdot.wa.gov/Publications/Manuals/M22-97.htm))
  - WSDOT Construction Manual
    - ([www.wsdot.wa.gov/Publications/Manuals/M41-01.htm](http://www.wsdot.wa.gov/Publications/Manuals/M41-01.htm))

# Supporting Resources

- WSDOT CAE has developed a custom resource environment for CAE applications, including MicroStation, InRoads, and survey tools. This environment supports Agency deliverable requirements, and production dataflows to achieve them.
- For V8i, this environment is powered by a central resource database that contains settings, attributes and parameters for all CAE applications. This ensures that the resources are synchronized and cross-referenced between applications. That database both generates foundational resource files, but also supports associated custom productivity tools.
- Working units are US Survey Foot and Inches. Use provided seed files!
  - Project footprint data files (Base files) are in US Survey Foot. = *PSE\_Base.dgn*
  - Sheet files may be in the following as determined by the WSDOT Project Office:
    - US Survey Foot for single-sheet per file and geographically correct sheets = *PSE\_Base.dgn*
    - Inches for single- or multiple-sheet per file approaches = *PSE\_Sheet.dgn*

# Supporting Resources

## MicroStation

- The CAE environment includes a comprehensive CAD element list in support of all WSDOT project deliverables development.
- MicroStation is the foundation of the platform
  - WSDOT uses a user-friendly alpha based element and level naming convention.
  - The central database contains approximately 2400 CAD elements and assigns the appropriate attributes, cell (if applicable), and text characteristics to each.
  - All standard deliverable levels, lines styles, fonts, and cells are provided along with supporting base functional resources for printing and other processes.
  - WSDOT utilizes ByLevel attributes for all levels and for the most part, a 1-to-1 level to element approach.
  - Supporting DGN seed files are provided.



# Supporting Resources InRoads

- For InRoads
  - A comprehensive set of Feature-, Geometry-, Named-, and Survey- Symbology are included in the CAE environment via a centralized XIN template file.
  - Additional resources support WSDOT standards to each process in the InRoads workflow.
  - Agency standard survey field codes are processed into CAE element features via the XIN.
  - The environment also includes:
    - an InRoads Template Library (ITL) of typical components
    - Standards files for Stopping Sight Distance, Superelevations, and other process criteria per the WSDOT Design Manual.
    - Preferences to support various scaled plotting of Cross Sections.
    - A comprehensive report style sheet library.
    - And much more.


# Project Organization

- WSDOT projects are standardized and include:
  - A consistent folder structure
  - Repository for project-specific resources
    - Cells and other resource files unique to the project that are generated by the project staff in complement to the Agency standards.
  - Discipline-specific workspaces
  - The deliverable requirements for each discipline
  - Defined in the WSDOT Electronic Engineering Data Standards (EEDS) Manual, *Deliverables 3 Project Directory Structure* and *Deliverables 8 ProjectWise*.
    - [www.wsdot.wa.gov/Publications/Manuals/M3028.htm](http://www.wsdot.wa.gov/Publications/Manuals/M3028.htm)

# File Naming Conventions

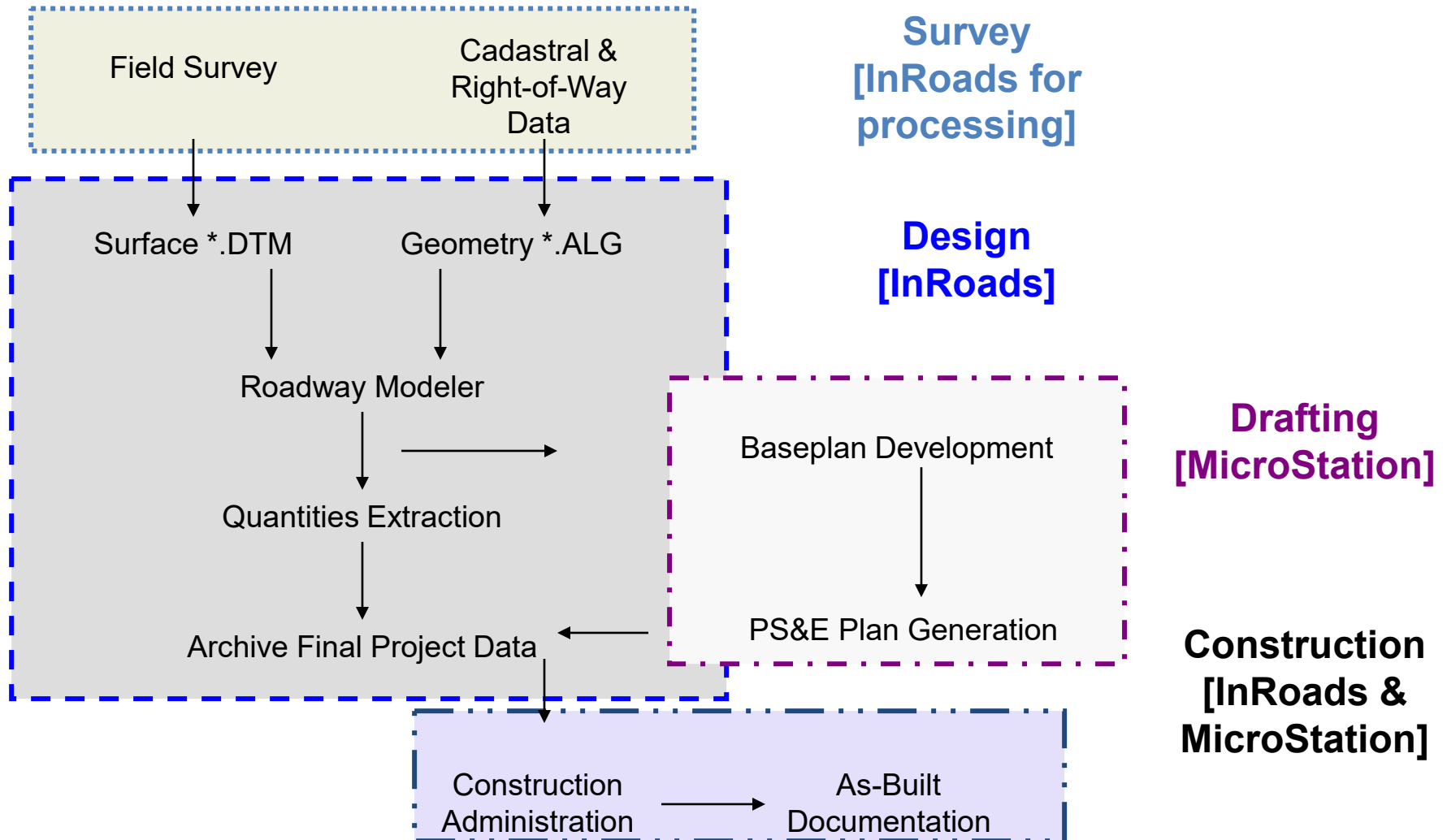
- Standardized file naming conventions provide uniformity in structure and greater ease when searching for data, and stable performance.
  - Keep file names to minimum practical length
  - Do not use special characters in folder or file names
- WSDOT applies standard naming conventions for each discipline. For example:
  - CAD\Plans Production (MicroStation) files
    - [PlanSheetNumber]\_Work Order\_FileType\_PlanType\_PlanRefNumber
    - 00025\_XL1234\_PS\_AL\_003.DGN
      - This is sheet AL3 which is sheet 25 in the overall contract plan set.
- See the [EEDS](#) Manual, Deliverables 4 File Naming Conventions.
  - [www.wsdot.wa.gov/Publications/Manuals/M3028.htm](http://www.wsdot.wa.gov/Publications/Manuals/M3028.htm)
- See WSDOT CAE Tech Notes ([www.wsdot.wa.gov/design/cae/technotes.htm](http://www.wsdot.wa.gov/design/cae/technotes.htm))
  - [CAE Standards Quick Reference Guide \(wa.gov\)](#)
- See Microsoft guidance on path and file naming convention limitations in Windows
  - <https://docs.microsoft.com/en-us/windows/win32/fileio/naming-a-file>

# Element Naming Conventions

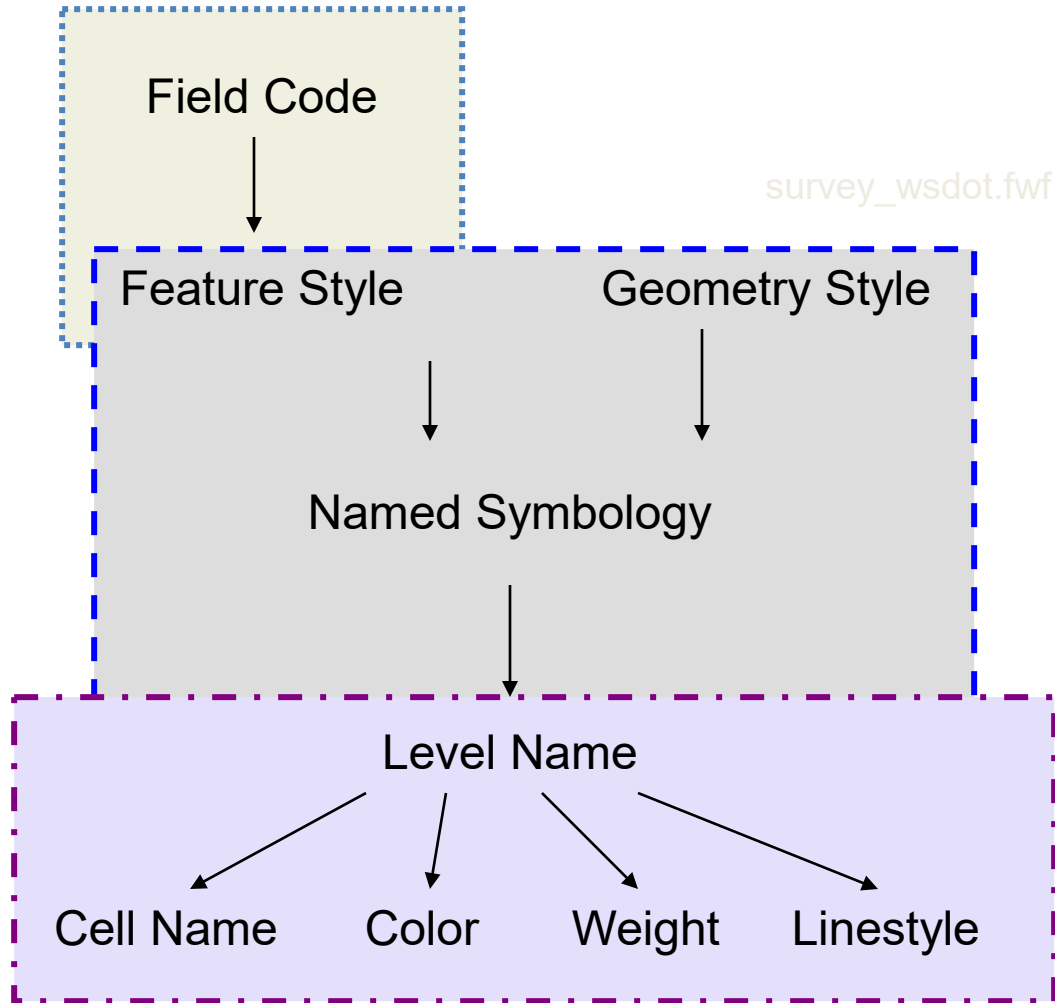
- WSDOT uses an environment-wide standard element naming convention for drafting and engineering elements.
- Survey uses short codes for efficient field data collection that get translated to the engineering convention via InRoads survey data processing.
  - See [Field Code Report - By Code \(wa.gov\)](#)
- WSDOT uses a Major (Parent) \_ Minor (Child) \_ Element approach
  - Parent Category = Drainage (DR)
  - Child Category = Structures (ST)
  - Element = CatchBasin

DR\_ST\_CatchBasin
- See WSDOT [CAE Standards Quick Reference Guide \(wa.gov\)](#)

# Process Overview



# Process Overview



Field Survey

`wsdot_standards.xin`

InRoads Design

`wsdot_standards.xin`

MicroStation Drafting

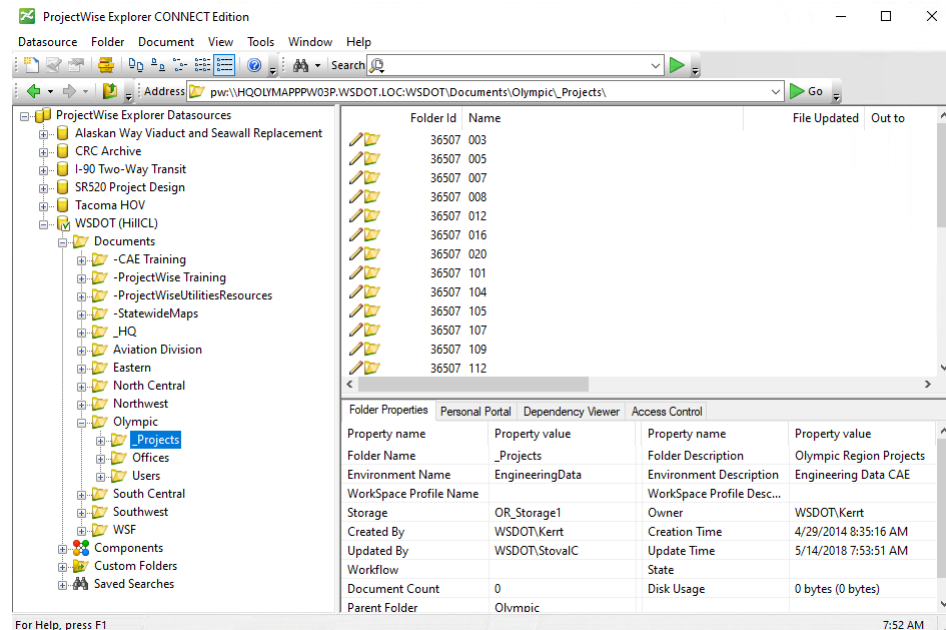
`WSDOT.DGNLib`

`WAE*.cel`

`LStyles.rsc`

# ProjectWise

- ProjectWise is a project collaboration and architecture, engineering, construction, (AEC) information management software.
- It allows full collaboration between workgroups made up of staff both internal and external to WSDOT.
- ProjectWise uses a folder\document structure similar to Windows Explorer.
- Contact WSDOT CAE Support for access and support.



# WSDOT CAE Environment Setup

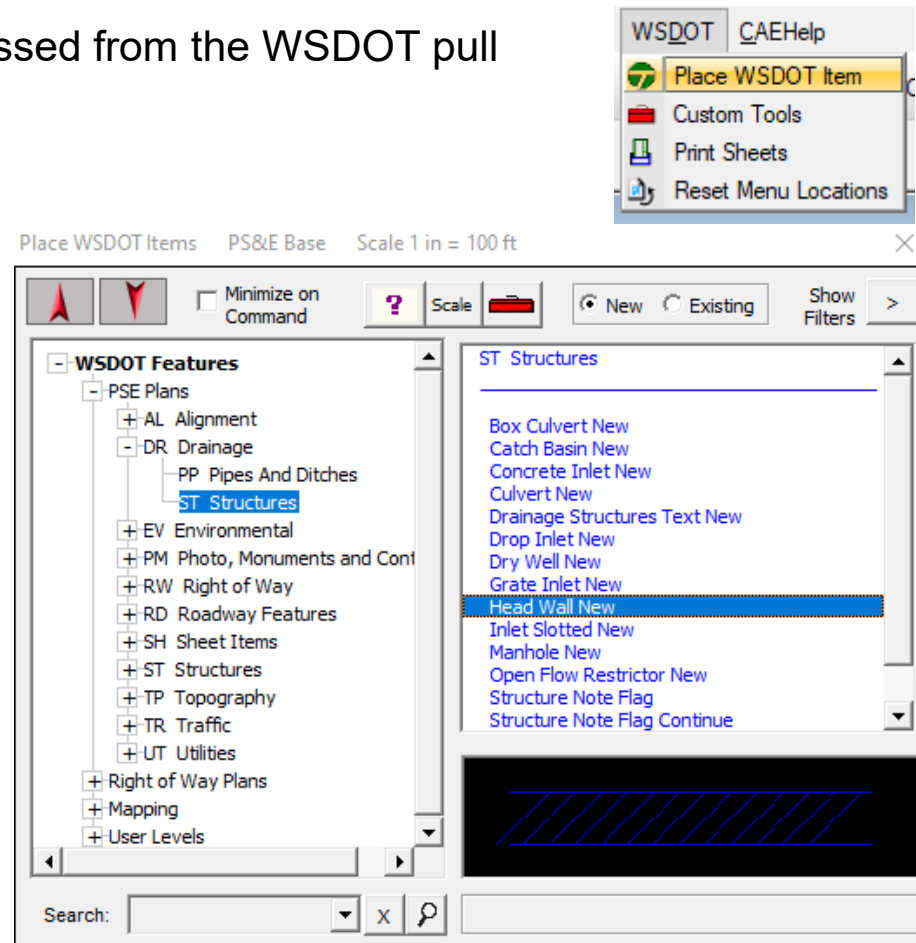
- Step 1 – Download the WSDOT V8i resource WinZIP
  - [Computer Aided Engineering - Resource Updates | WSDOT \(wa.gov\)](#)
  - [WSDOT CAE installation instructions \(wa.gov\)](#)
- Step 2 – Extract the resource set to a central location
- Step 3 – Create a shortcut with the appropriate switch content.
  - “Application EXE” –wsWSDOT\_Resources=[central location/]
- Add WSDOT.cfg file to workstation Application Install structure
- Test shortcut.
  
- You should see





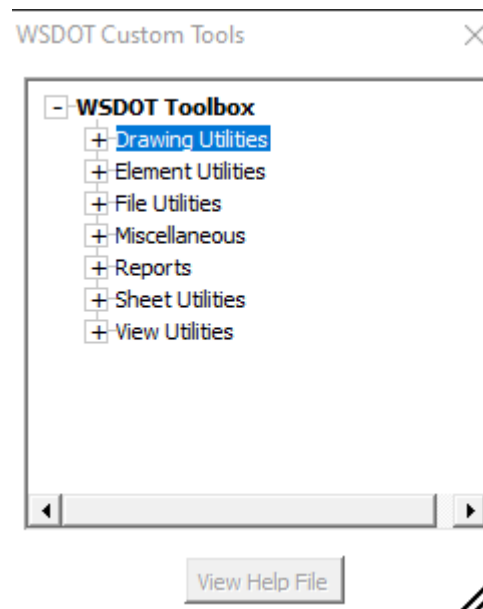
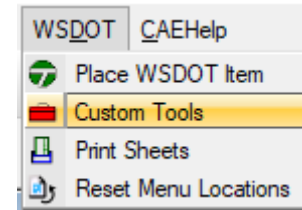
# Quick Tour

- WSDOT custom tools are accessed from the WSDOT pull down.
  - Place WSDOT Items
  - Driven by our central database
  - Set drawing Scale
  - Browse through standard categories and lists
  - Pick an element
  - Double-click to place
  - Search for elements



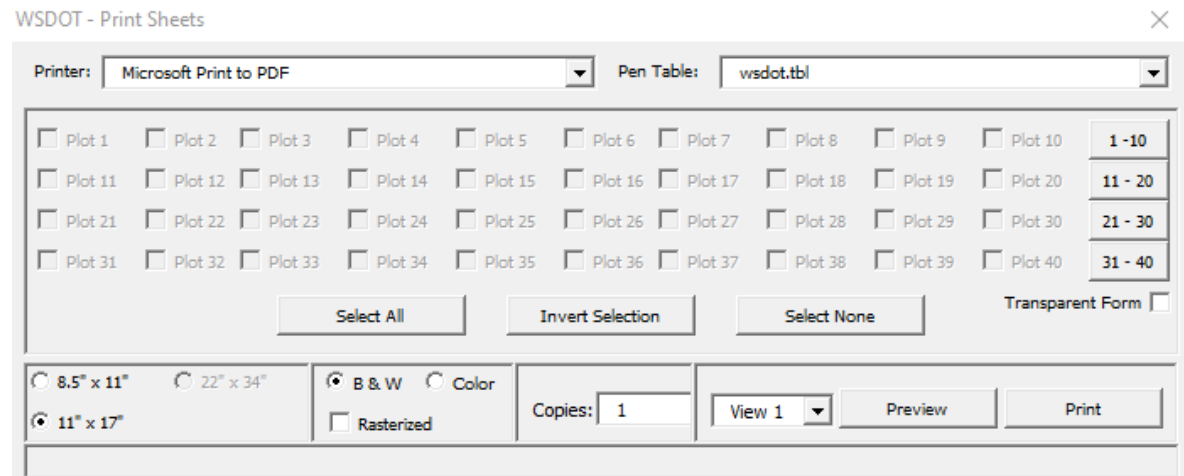
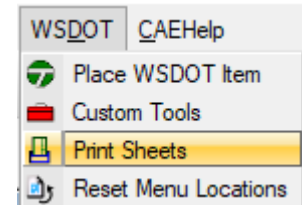
# Quick Tour

- WSDOT custom tools are accessed from the WSDOT pull down.
  - Custom Tools
  - Browse through categories of custom tools
  - Double-click to activate
  - Click once to enable the View Help File button for instructions.



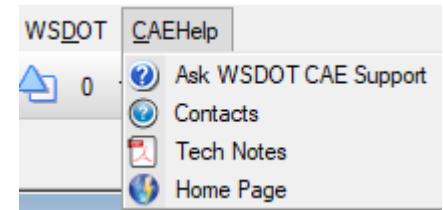
# Quick Tour

- WSDOT custom tools are accessed from the WSDOT pull down.
  - Print Sheets
    - Exclusive to PSE\_Sheet seed based files
    - Specific to historic WSDOT custom 40 sheet border per file approach.
    - Relies on Place\Label sheet utility in Custom Tools > Sheet Utilities
    - Contact your WSDOT Project Office for sheet method requirements.



# Quick Tour

- CAEHelp provides resources to get more info down.
- Ask WSDOT CAE Support – sends quick question to WSDOT HQ CAE Help Desk
- Contacts – quick link to our contacts website
- Tech Notes – links to our library of tech notes and process instructions
- Home Page – links to our main external home page



# Getting Help

- WSDOT Statewide CAE Help Desk [hqcaehelpdesk@wsdot.wa.gov](mailto:hqcaehelpdesk@wsdot.wa.gov)