

MicroStation – Optimizing References

WSDOT Resource Environment

Overview

This technote is a collection of requirements, work flows, and best practices for working with reference files and raster references in WSDOT PS&E plan sets. These principles apply to other work flows as well, but were developed with the PS&E process in mind.

General Practices

There are a couple of easy steps you can take to make your files run better.

Compress Your Files Regularly

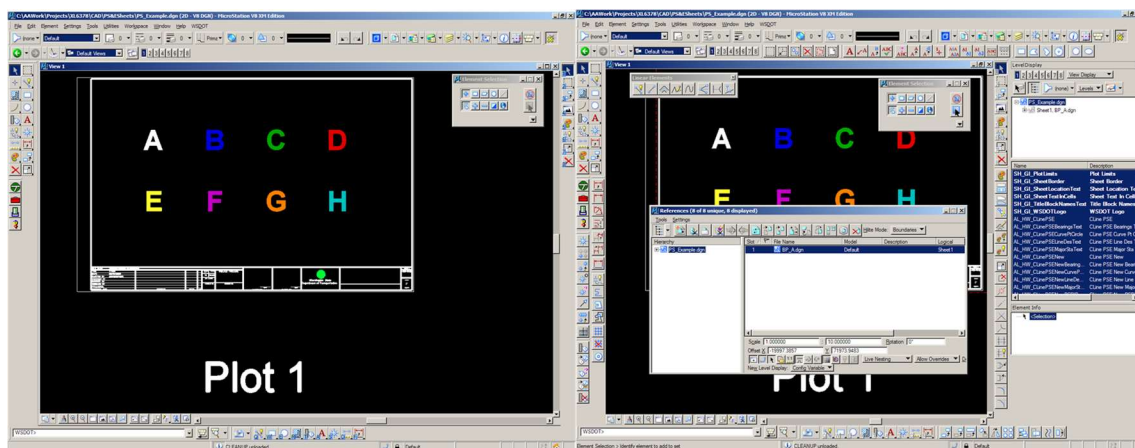
Smaller files equal quicker load time. MicroStation files retain a lot of information in the undo buffer. Old reference file configurations, information for detached references, deleted elements, and old raster reference settings are all saved until a file is compressed.

For more information on file compression see [WSDOT CAE FAQ](#)

Dialogue Boxes¹

The more dialogue and tool boxes you have open, the more memory MicroStation requires. This can slow your work down surprisingly quickly. Just having **Reference Manager** open increases file opening times by 17%.

To maximize the efficiency of MicroStation, close all unwanted tools and dialogue boxes. Use Tasks and Pop-up tool boxes whenever you can - this ensures tools are “demand loaded” and do not eat up resources unnecessarily.



Fast Workspace

Slow Workspace

¹ Nigel Davies of www.eatyourcad.com

Managing References

The majority of our referencing problems are in our sheet files. The most common issue is that MicroStation performance degrades severely. This stems from overloading design files, and poor reference management. The two main sources of trouble are from reference attachments using the Nested-Attachment method, and reference attachments with raster references in them. Some design offices have been struggling through slow (up to 15 min) load times and refresh rates (30sec+.) There are steps we can, and should, take to mitigate these issues. Some of these measures take some man hours, but the times is easily made up in the faster load times and refresh rates. Offices that have worked with CAE on these issues have seen up to a 98% reduction in load/refresh times.

Performance Recommendations

There are several known performance issues related to referencing. Here is a list of recommendations to speed up your load times and refresh rates.

Minimize Total References

The more reference attachments in a file, the longer it takes to load. You should avoid splitting base plans too finely, to minimize this impact. Separating base data so that more designers/draftspersons can work in parallel is good, however more references per sheet builds the total number of references very quickly.

Detach References

If you don't need a reference file anymore, detach it. Reattaching a file doesn't take very long if you find you need the file. There are preference settings (see below) to speed file open times, but the fastest option is to detach files not in use, especially files containing raster references. Remember to compress your file after detaching references.

Avoid Live Nesting

Live nesting encourages the proliferation of reference attachments, and can make it impossible to properly detach unnecessary files. In addition to that, live nesting increases file open and refresh rate times. In test files an increase of 22% was found using 10 references. This delay increases exponentially as the total number of references increases.

With the WSDOT multi-sheet per file approach: A production file with 300+ references (20 sheets with 15 references per sheet) suffered from a 3,000%+ increase in delay. Converting the references to direct references reduced open time from 15 min to less than 30 seconds.

With the WSDOT single-sheet per file approach: Nested references may be used and are required with container files. These container files reduce the number of nested references for each sheet file. Therefore the impact of live nesting is reduced. However, effectively managing those nested references by reducing the overall number of files to only those required will help.

Adjust Your Preferences

There are two reference preferences that can dramatically affect your PC's performance in the *Workspace > Preferences > Reference* command.

Cache When Display is Off = OFF

Disabling the **Cache When Display is Off** preference results in faster open times and refresh rate in files containing disabled reference attachments. However, disabling this preference results in an increase in lag time whenever you turn on a reference because MicroStation needs to load the file in to memory.

Reload When Changing Files = OFF

Disabling the **Reload When Changing Files** preference will speed up file open times when changing files. However you will have to reload reference files manually to see updates made in the course of a MicroStation session.

Misconceptions & FAQs

These are some common misconceptions about changing reference methods used in a project.

[Consultant] said nested attachments are the best/easiest way to work

Not surprisingly, the easiest way to work is to work in a format consistent with the final product.

For a multi-sheet per file deliverable: Attaching files via **Live Nesting** saves a marginal amount of time during the setup of the initial plan series. This gain is lost, and reversed often, in changing all of your sheets to direct references at each turn in, and before archiving.

For a single-sheet per file deliverable: Nested references are required when using a container file. However, keeping references down to only what's needed helps with those impacts.

The files are already set up this way, we can't change them now

The workflows to make these changes are easy, and quick to implement.

Nesting makes it easier for [support group] to work with my files

Projects stored on the WSDOT network: Support groups, such as traffic, signals, or signing, do not typically have a local network connection to your data like you do. This means they suffer worse load times and refresh rates. This additional delay outweighs any perceivable benefit.

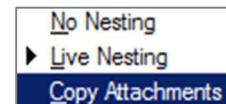
Projects stored in ProjectWise: All associated files are downloaded (including necessary reference files from other groups in ProjectWise, and requiring an internet connection) to your local machine and you work on them without the need for the network connection. Checking those files back in requires an internet connection to the ProjectWise system – for as long as it takes to update the server. In this case nested references are of nominal impact based on your local machine's available resources (available memory, disk space, and CPU).

It would [take too long]/[cost too much] to change now

Many people believe that it takes a lot of man-hours to convert a project. In actuality the change takes only a handful of minutes per file. This time is typically made up for in reduced load times.

Can't I just use Copy Attachments?

People think that changing the nesting method to **Copy Attachments** is the same thing as converting to direct references. This is not true.



With **Copy Attachments**, the files maintain their connections to the original reference. This setting only adjusts how the files are viewed in the **References** dialog.

Workflows

For your convenience instructions for several references related workflows are presented here. Where basic operations are called for, no step by step instructions are provided. Basic reference operations are covered in the *MicroStation 201* and *MicroStation 203* training [classes](#).

Converting Live Nested files to Direct References

There are two different ways to convert *live nested* references into *direct* references. A different approach is needed based on how the file was put together. The determining factor is whether a container file was used.

Without a Container File

This is a fairly common way to find nested references, especially if they were put together by someone unfamiliar with nesting. In our experience, this method leads to the most problems and confusion. Typically what has been done is the drafts person has referenced all the base plans to each other in every file. Then they attach one of the base plans to a sheet with a nested depth of 1.

1. Select the first direct reference in the hierarchy. This displays the nested references in the right pane.
2. Select all the nested files in the right pane.
1. Select *Tools > Make Direct Attachment* from the pull down menu.
2. Data point in your design plane to accept.
3. Return to the op level of the hierarchy and change the original reference to *No Nesting*.
4. Repeat steps 1-5 for each nested reference.
5. Detach any unneeded references
6. (OPTIONAL) Reorder the reference files as desired.
Click in the *Slot* column and type new slot number.

With a Container File

A container file is a halfway house between base plans and sheet files. You are likely to encounter container files in projects developed by consultants. The container file should be empty of elements, but will include saved views, and occasionally frames for reference attachment. The key to remember is that the container file is empty. In some cases it contains sheet specific data, normally stored in the plan sheets.

1. Select the top level of the hierarchy; this displays the direct references in the right pane.
2. Select all of your references to container files.
3. Change the reference attachments method to **Copy Attachments**.
This flattens the tree structure, but the nested files maintain their connection to the originals.
4. Reselect all of your references to container files.
5. Select *Tools > Merge Into Master* from the pull down menu.
6. Data point in your design plane to accept.
Merging the container files severs the Live Nesting link and the files are then treated as direct references.
7. Detach any unneeded references.
8. (OPTIONAL) Reorder the reference files as desired.

Click in the *Slot* column and enter a new slot number.

Raster References

Here at WSDOT raster references are predominantly used with aerial photography. These are typically **MrSid** or **TIFF** files. Because of the high resolution of these images, they tend to be quite large files ranging anywhere from 125 MB up to 2000 MB (upwards of 2 gigabytes). Smaller images are around 125 megabytes. There are no official requirements for raster images; what follows are recommendations.

Expect Delays

Raster references will cause your machine to slow down. There is no getting around it. However, there are things you can do to mitigate slowdowns.

Use an Image.DGN

Attaching a raster image (TIF, WMS, etc.) to a dedicated Image.dgn file and referencing that file only as needed will allow better performance when that image isn't part of the work process.

Minimize use of Raster References

No product *requires* the use of raster imagery. In most cases aerial photography obscures more than it helps when underlaid behind plan sheets.

Minimize number of Raster References

For every raster reference attached you will see further degradation.

Isolate Raster Images from Normal Base Plans

Every file you reference that contains raster references will also experience degraded performance. Turning off the reference will help, but not eliminate this.

Trim your Images

Raster references that are clipped via the raster manager are still loaded in their entirety. You will get better results if you trim the image externally before you attach it, especially if you are using multiple images in a project. For more information regarding trimming images please contact the Photogrammetry office.

For questions or comments on this tech note, contact your regional CAE Support Coordinator or the WSDOT CAE Help Desk at (360) 709-**8013**.