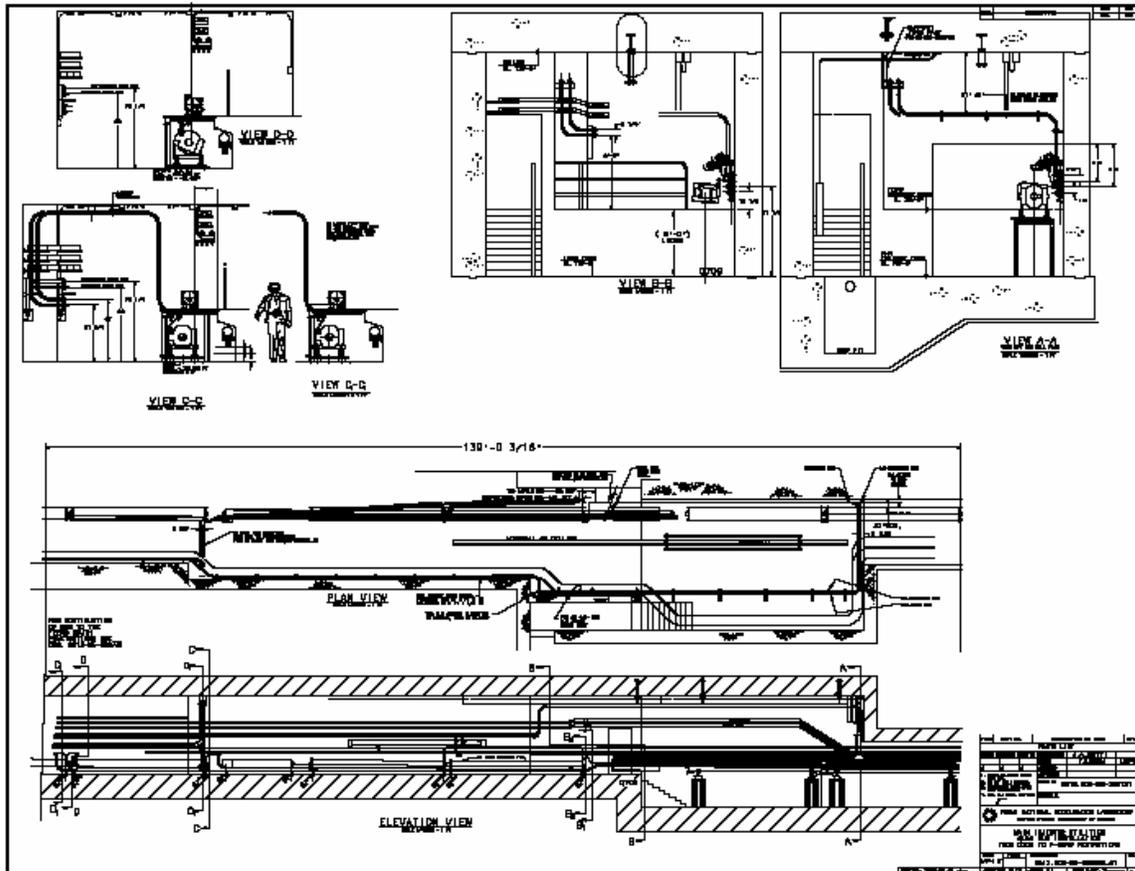


In the ADMS group we have been hampered by the IDEAS software functionality to create the Drawing output we require. Long processing times, large file sizes, and excruciating check in times have limited our use of 3D greatly. Having asked every expert resource I could find, including UGS, this document details the problem and the best solution found. The detailed method for implementing this solution (work around) can be found in the [IdeasBestPracticeAssemblySectionViews.pdf](#) document. Although the test uses an accelerator beam line as an example, the methods are also applicable to any assembly that requires section views to document.

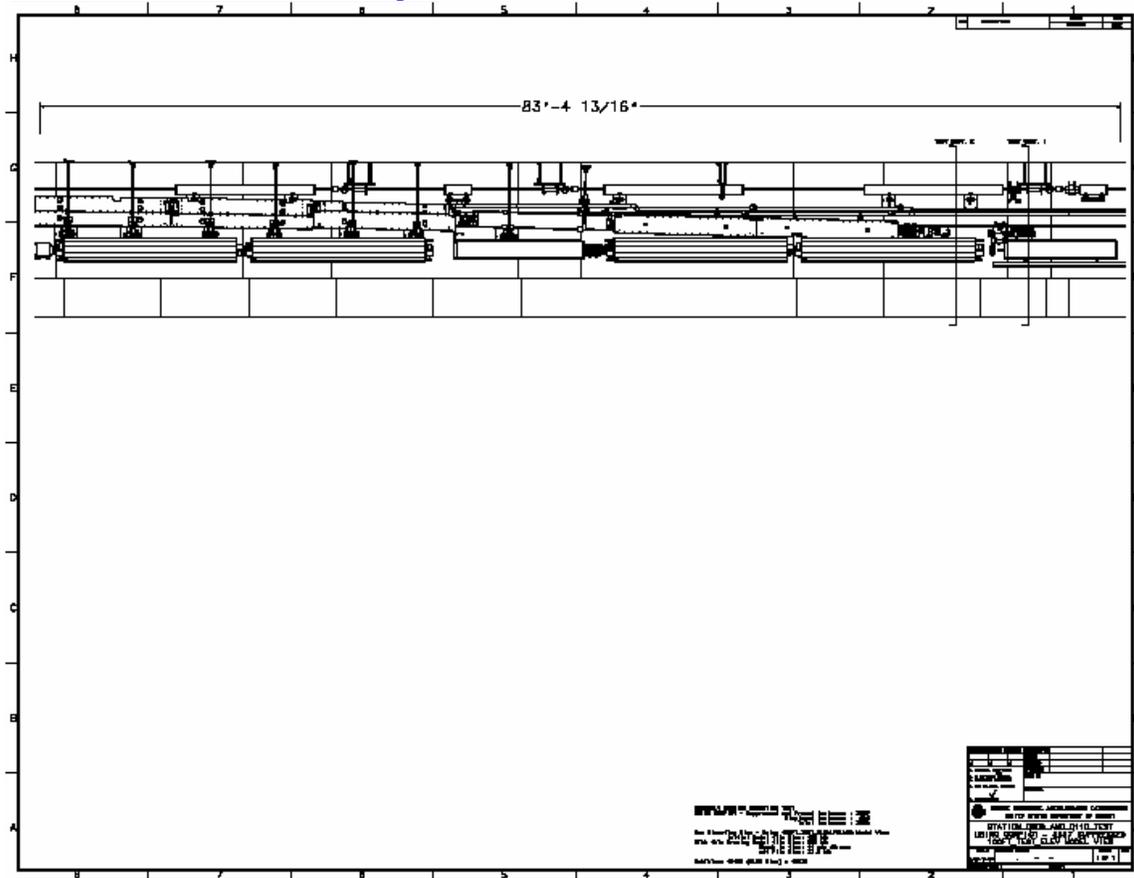
A typical drawing the ADMS group is required to create. Document the installation, utilities, supports, and vacuum system for ~50,000 feet or ~9.5 miles of various accelerator beam lines. If we target 100 feet as a single drawing then we need to produce at least 500 drawings, just to document the overall installation. There are always additional details required for the utility systems, and in areas where the installations are very complex.

A typical sample 2D drawing	<a href="#">359966--1.pdf</a>
Entities	14276
dwg File Size	2.5 MB
	Covers approx. 140 feet of installation (1/4"=1'-0") actually small for most uses.



For testing, an existing assembly was used to generate an elevation view of ~84 feet of tunnel installation. In this drawing two simplified section views were created to demonstrate the software's behavior. Note that this test drawing will not have most of the detail we require, as demonstrated in the above sample 2D drawing, but should still illustrate the seriousness of the software problem.

[TEST\\_ELEV\\_VIEW\\_ONLY.pdf](#)



For the test I started with a copy of Assembly Station\_Q609\_and\_Q110, which represents a typical section of a Fermilab accelerator installation. We are tasked to model and document these for installation and fabrication. The assembly consists of 649 individual items and 3780 instances. I have custom programs driven from the beam line lattice files that can create the assemblies in a matter of minutes, and during development these files change often. The routing of utilities also usually requires several iterations before the final design. Due to the limited space in the tunnels we are required to generate many cross section views to verify clearances. This should be an ideal situation for 3D design with the ability to update all these sections.

See [Station\\_Q609\\_and\\_Q610\\_BOM.pdf](#) for complete BOM listing.

Checkout of Library required 9 minutes (650 items).

Initial Model file Size: 160 MB

USING CONFIG1 - Suppressed Instances: 3287

    Displayed Instances: 493

        Total Instances: 3780

One Elevation View - Using 100FT\_TEST\_ELEV Model View  
With this Drawing Model file Size: 269 MB

Modified all 3287 Suppressed Instances to Pruned and Suppressed, result was No change in Model File size. Prune several magnet instances that were outside the actual Model View display. Redefine the named Prune Set and update the drawing view, only 50 fewer entities.

Conclusion - suppress and prune, appear to process the same for standard views.  
No change in Model File Size.

Check in the temporary Assembly - STATION\_Q609\_AND\_Q110\_TEST

All sub-assemblies are Reference and already exist in the library.

(Checked in to BETA\_700.PROJECT2-TEST\_2)

Check in time: 1 minute 40 seconds

asm File Size: 1.80 MB

(So far so good) The drawing has not been checked in yet. Check in Keep to Mod.

Entities	16128 (ELEV View)
Check in time	11 minutes 40 seconds
mdf File Size	33.9 MB
Model file Size	269 MB

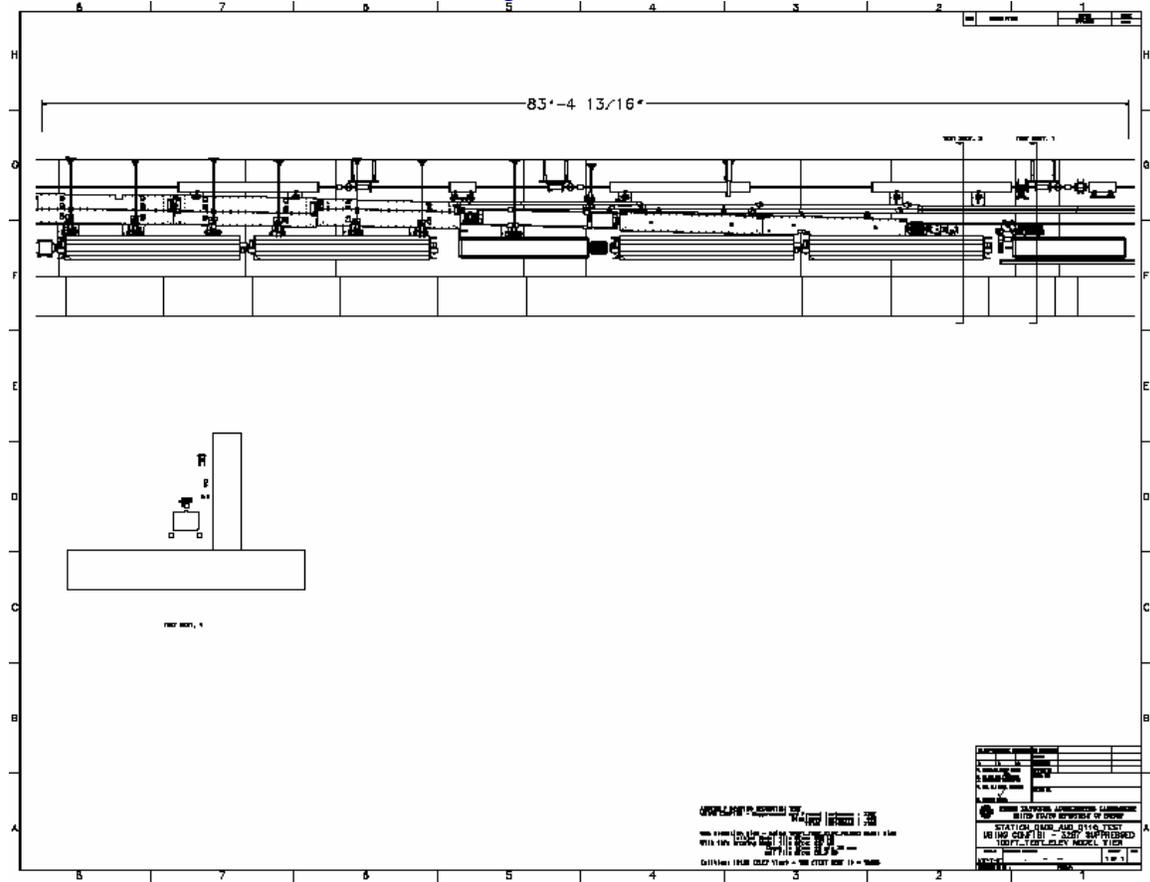
Since there are so many suppressed instances, this assembly should have been defined using many less items and covering only the desired ~100 FT span. The actual length of the entire assembly is ~460 FT. Since I can't modify the assemblies for this test, only suppress and prune will be used. The results would be the same but it would make pruning much easier on the user.

Using the suppressed configuration and Model View create two section cuts.

IDEAS crashed processing first view. (No warning - No error)

Try again – Section, Plane Only, No crosshatch, 1/2"-1'-0" scale, Check in Keep.

[TEST\\_ELEV\\_PARENT\\_ONE\\_SECT.pdf](#)



Entities	16128 (ELEV View) + 198 (TEST SECT 1) = 16236
Check in time	49 minutes 25 seconds
mdf File Size	50.3 MB
Model file Size	287 MB

Assembly was modified with additional suppression so check in was included in the processing time; new asm file was 1.9 MB and took 1 minute 45 seconds for check in. Time also includes automatic Model File save.

Whatever method IDEAS is using appears to be very inefficient since the system CPU usage is only ~1-2% and the actual library mdf file appears to get written in ~50 KB increments per second.

The additional 198 drawing entities in the section view cost us 8.3 MB in mdf size and 37 minutes 45 seconds in check in time. At this point we have created a pretty much useless drawing and have not really gotten very close to our goal. I'll create one more

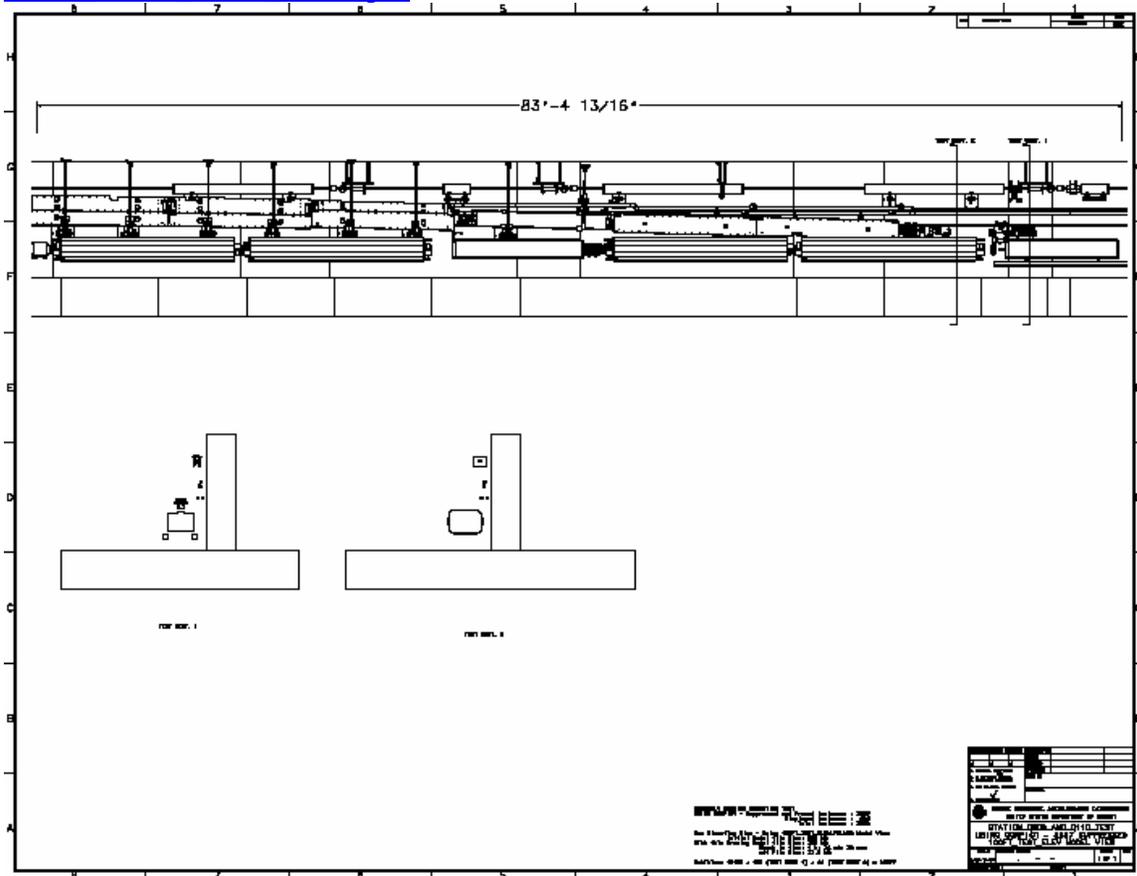
section view similar to the first one, and wait patiently for another update and check in just to get the resulting statistics.

IDEAS crashed - 3 times (Boolean Failure) - moved second section cutting plane  
 Try again – Section, Plane Only, No crosshatch, 1/2"-1'-0" scale, Check in Keep.  
 Model File Size: 323 MB

Entities	16128 + 198 (TEST SECT 1) + 41 (TEST SECT 2) = 16277
Check in time	1 hour 34 minutes 30 seconds
mdf File Size	78.5 MB
Model file Size	328 MB

Time includes automatic Model File save.

[TEST\\_ELEV\\_TWO\\_SECT.pdf](#)



Created a new drawing TEST\_ELEV\_PARENT. In this drawing we will attempt to reduce the file by creating individual parent views for each section. These parent views will be created from assembly configurations, which suppress all items that will not actively participate in the section cut. This will be done by creating a CONFIG and Model View for the particular section view.

To make it easy, create new drawing as Copy of the 100FT\_TEST\_ELEV and delete the original drawing from the existing Model File.

Create TEST\_SECT1 configuration, Prune Set, and Model View

USING TEST\_SECT1 - Suppressed Instances: 3678

Displayed Instances: 102

Total Instances: 3780

Create minimal elevation view to use as parent for SECT 1 cut.

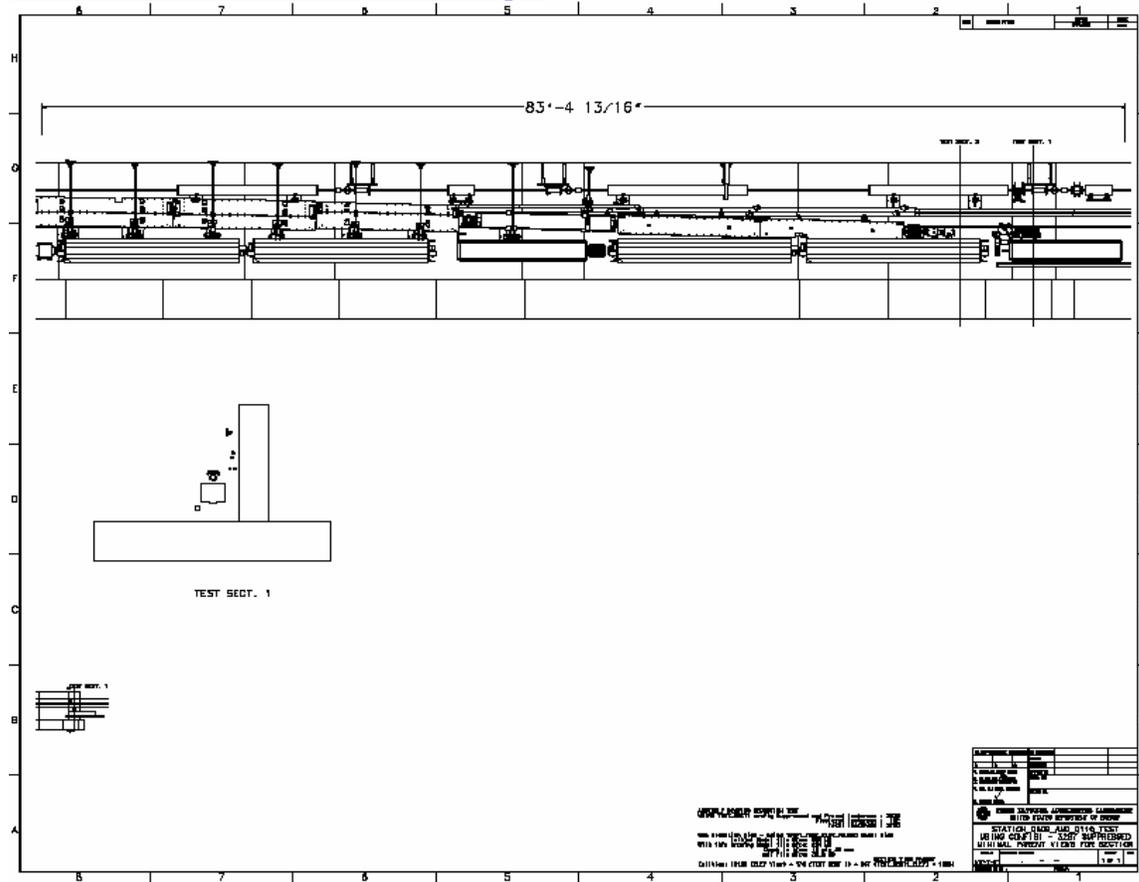
Section, Plane Only, No crosshatch, 1/2"-1'-0" scale, Check in Keep.

Model File Size: 269 MB

Check in Keep to Mod.

Entities	16128 (ELEV View) + 176 (TEST SECT 1) + 647 (TEST_SECT1_ELEV) = 16951
Check in time	18 minutes 30 seconds
mdf File Size	38.8 MB
Model file Size	284 MB

[TEST ELEV PARENT ONE SECT.pdf](#)



The file size is still large at 38.8 MB, but considering the first method it's an improvement of 11.5 MB and almost 31 minutes on the check in. And the drawing actually has 715 more entities. Now see if this scales to additional views.

Create the TEST SECT 2 using a TEST\_SECT2 configuration and model view.

Create minimal elevation view to use as parent for SECT 2 cut.

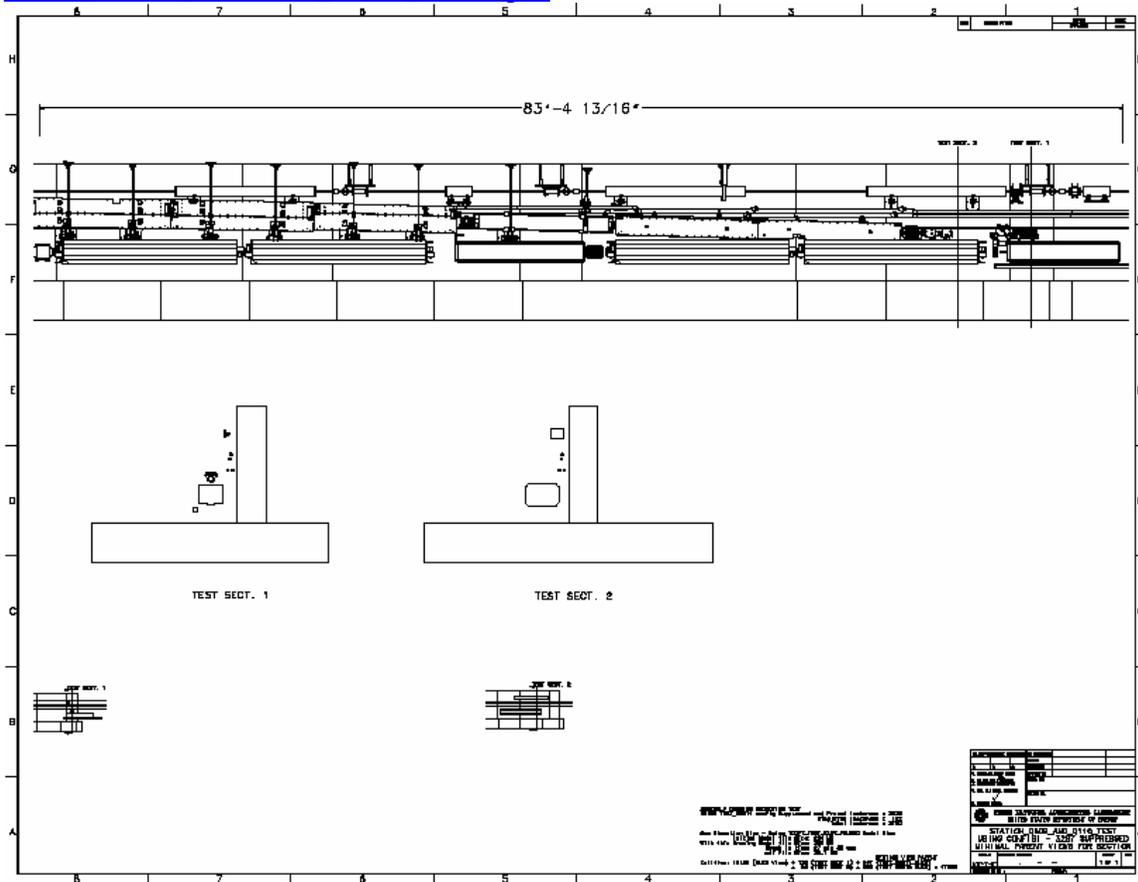
Section, Plane Only, No crosshatch, 1/2"-1'-0" scale, Check in Keep.

Model File Size: 284 MB

Check in Keep to Mod.

Entities	16128 (ELEV View) + 176 (TEST SECT 1) + 647 (TEST_SECT1_ELEV) + 26 (TEST SECT 2) + 282 (TEST SECT2 ELEV) = 17259
Check in time	27 m 30 s
mdf File Size	39.1 MB
Model file Size	285 MB

[TEST\\_ELEV\\_PARENT\\_TWO\\_SECT.pdf](#)



The mdf file size increased by 1.3 MB, which is more reasonable than the 28.2 MB increase using the first method. The check in time is also improved by over an hour (67 minutes). The model file size increase was also improved from 41 MB to 1 MB.

To see that this method will scale further I created an additional section view.

Create the TEST SECT 3 using a TEST\_SECT3 configuration and model view.

Create minimal elevation view to use as parent for SECT 3 cut.

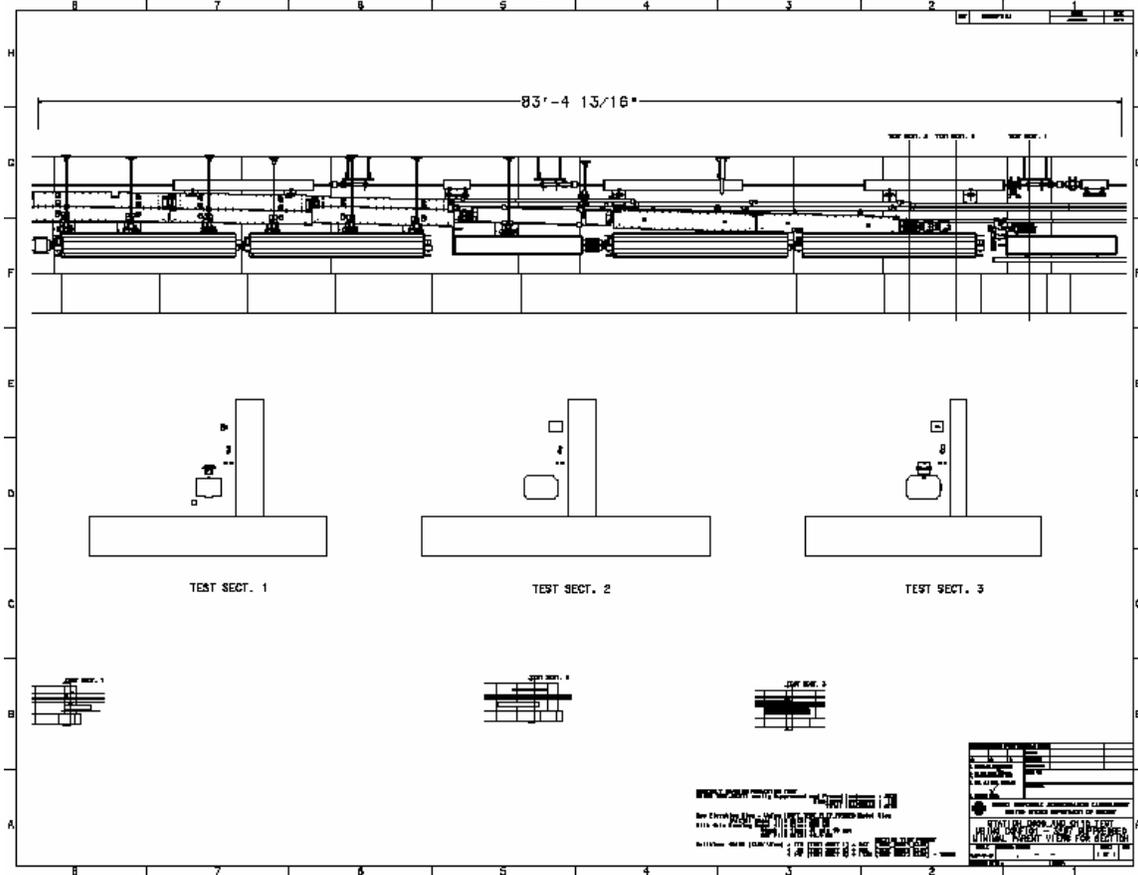
Section, Plane Only, No crosshatch, 1/2"-1'-0" scale, Check in Keep.

Model File Size: 285 MB

Check in Keep to Mod.

Entities	16128 (ELEV View) + 176 (TEST SECT 1) + 647 (TEST_SECT1_ELEV) + 26 (TEST SECT 2) + 282 (TEST SECT2 ELEV) + 147 (TEST SECT 3) + 1132 (TEST SECT3 ELEV) = 18538
Check in time	31 minutes 10 seconds
mdf File Size	42.4 MB
Model file Size	286 MB

[TEST ELEV PARENT THREE SECT.pdf](#)



The drawing now actually has four more views than the original TEST\_ELEV\_TWO\_SECT drawing, with 2261 additional entities. The file size is now 36 MB smaller, and the check in is 18 minutes faster than the original single section drawing, not to mention over an hour less than the original two-section test.

The Exclude option in the section view options could also be utilized for some reduction, but if you need to save the exclusions and be able to use them again, then assembly configurations with suppression, pruning, and model views are a better choice. Observations and Assumptions:

- When documenting large assemblies up front preparation is vital to the overall success. If a drawing is your final product then you should plan the drawing up front since it will affect how you sub divide the assembly. It's probably worthwhile to utilize old school drafting methods to plan the drawing views, scales and layout similar to paper drafting days.
- Create a naming scheme for assembly configurations, model views, and prune sets. Keep them consistent and use the same name for each to identify that they are all used for the same purpose.
- When creating a drafting section view observe the list window closely. If the list includes many instances that report cut not performed, instances do not touch etc. Cancel the process and prune the items that will not participate in the cut. These items appear to be the cause of the large mdf file sizes and check in times. Information for these items must be getting stored in the file.
- Utilize the minimal parent view for the actual cutting process. You can drawing your cutting plane lines in the main standard view and easily transfer them to the minimal parent views by using x0, y0 as the from and to locations. When the process is complete, it's easy to use View Visibility to hide the parent view contents, leave the border displayed so other users can easily find the view.
- Give careful thought to the actual section view, there are times when you can get the results you want by pruning the assembly and creating a model view normal to where you would cut. Also I have observed situations where the desired result can be achieved by simply pruning instances to a depth where the cut would be.
- If you are performing a full section on an assembly, consider pruning any items that are hidden from the direction of view. These will be items that report do not touch during the cut.

This assembly and set of drawings will be utilized for translation testing to the new CAD system. I expect that the required extra steps to create minimal parent views and so many configurations will not be required in the new CAD system, and that processing for saves and check in will also be greatly reduced. For migration to NX in particular, if the views will not translate correctly then it is not worth the extra effort to produce hundreds of drawings using this method. It would be a much wiser choice to proceed with the required testing, training, and implementation of the new CAD system, rather than waiting for the demise of IDEAS CAD which could be as late as 2008.