Design Process:

Step 1. Create the SOE file

Adding lines to the design file for the SOE file creation. ***Do Not add the lines in the color yellow because you will not be able to tell if the revetment program is choosing the lines or not. That is the default color for line select in the revetment program.***

A. For looking at design from annual surveys, you will need to decide whether or not to use the existing baseline or an arbitrary baseline for your design.

Extra notes for an arbitrary baseline : When drawing this in, you will need to look at the overall geometry of the design. You want to think ahead about how the cross sections will appear. You will want the cross sections to be perpendicular to any baseline that you draw in. Thus, you may have to break the SOE file into 2 files in order to get the coverage that you desire. Try not to place the baseline too far back in the design file away from the work area.

B. Draw a line perpendicular to the baseline for some set distance out.

It may be best to go ahead and get your mind set that the work will be done from downstream to upstream. Thus, you may want to draw in your perpendicular lines from downstream to upstream. This is up to you as the designer. This will not be an option when it comes time to create the SOE file.

C. Copy that perpendicular line 100 feet using the copy parallel command. (The copy parallel button is the third button from the left on the Manipulate button bar which is the second up on the right from the bottom of the Main toolbar.)

D. You will need to repeat the above procedures for B and C at every turning point on the baseline.

Extra Notes: Do not place lines for the SOE file that will overlap this seems to interfere in the design. You may have to draw some lines and angle the ends or delete some lines as you go along. Remember that these lines are drawn for cross sections that you will wish to display.

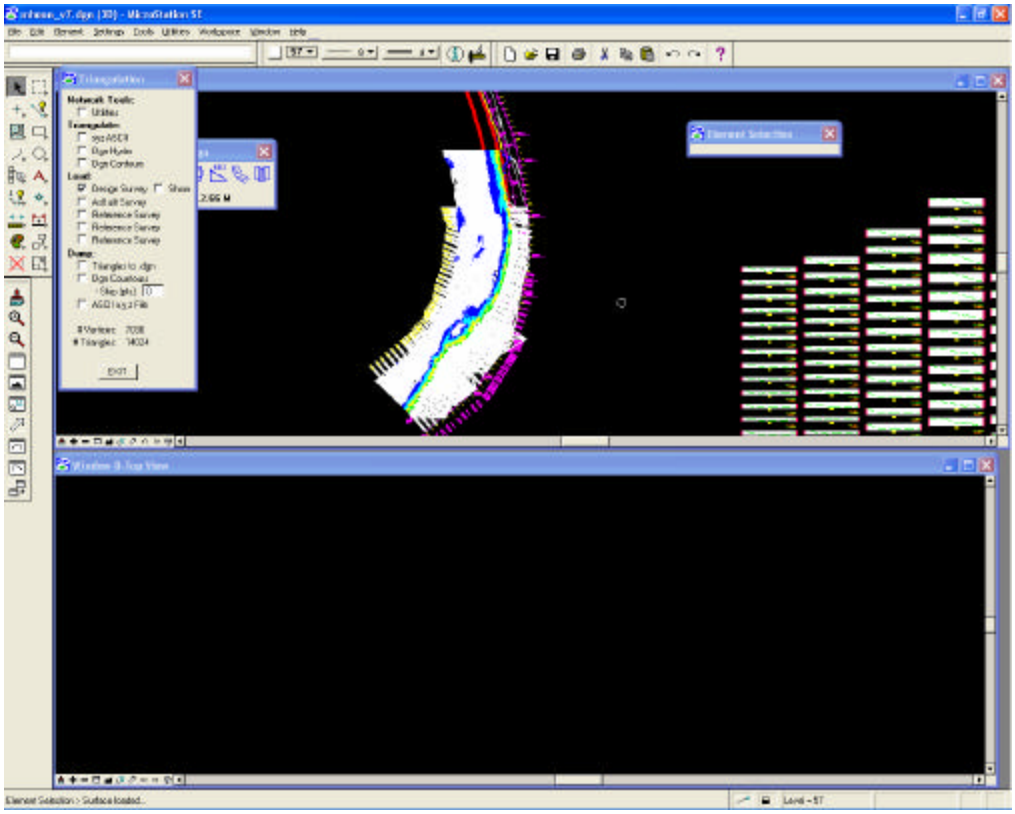
Step 2. If you have not loaded the Revetment Program already, load it now by typing in mdl load revet in the key-in window in Microstation.

Step 3. Load the FTN file that you just created by toggling on Design Survey under the Load option shown on the same Triangulation window above.

Once loaded, then can click on the **show** button to display the extent of the survey.

If you are doing a maintenance job, you will need to load in the design survey as well as the as built survey. To load the As-built survey, toggle on the As-built Survey button and load the as-built survey in the FTN format.

You also have the option to add up to three reference surveys that can be used for the creation of the cross sections. You simply have to toggle on those options and load them.



Extra Notes about As-built Surveys:

The dotted line on the cross section is the as-built survey.

The red line on the cross section is the design survey.

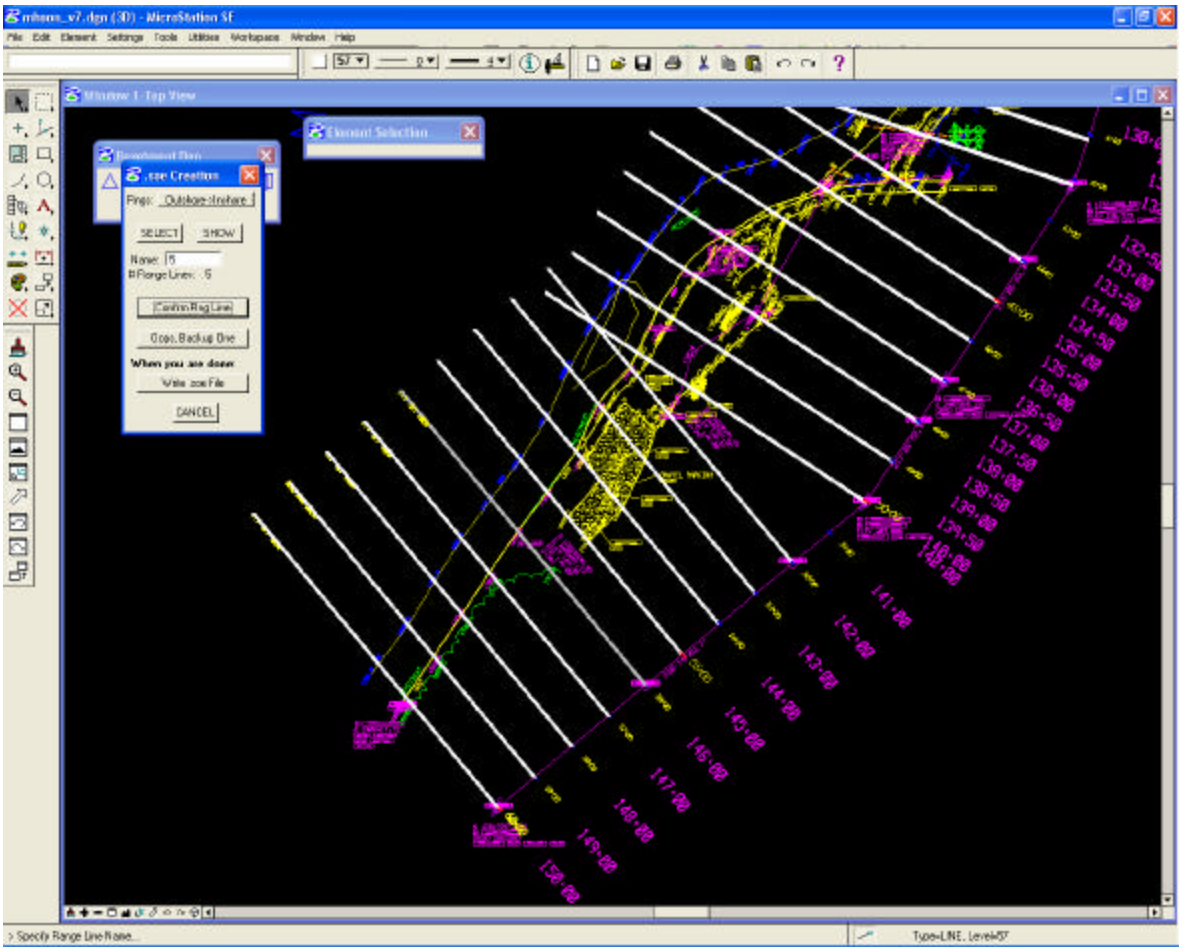
Step 4. Exit out the Triangulation window.

Step 5. Creating the SOE file in the Revetment Program.

A. To make the SOE file, click on the second button on the button bar under the Revetment Program which will open the .soe Interface window. (This button is the second from the left and will have perpendicular lines extending from on line or is the second button from the left.)

B. Click on Create .SOE File.

C. The next window to pop up will be the **.soe creation** window. Then select the SELECT button.



D. Give the line a name in the NAME window.

E. Select the riverward end of the downstream line in the design file.

F. Accept or Reject the line highlighted. The program will place the azimuth on the outshore edge of the line if this is done correctly.

G. Click on the CONFIRM RNG LINE button on the .soe creation window.

H. Follow steps D thru G for the remainder of the lines upstream. REMEMBER to always start this process at the downstream most line.

I. When all lines have been selected, click on **write .soe file** button.

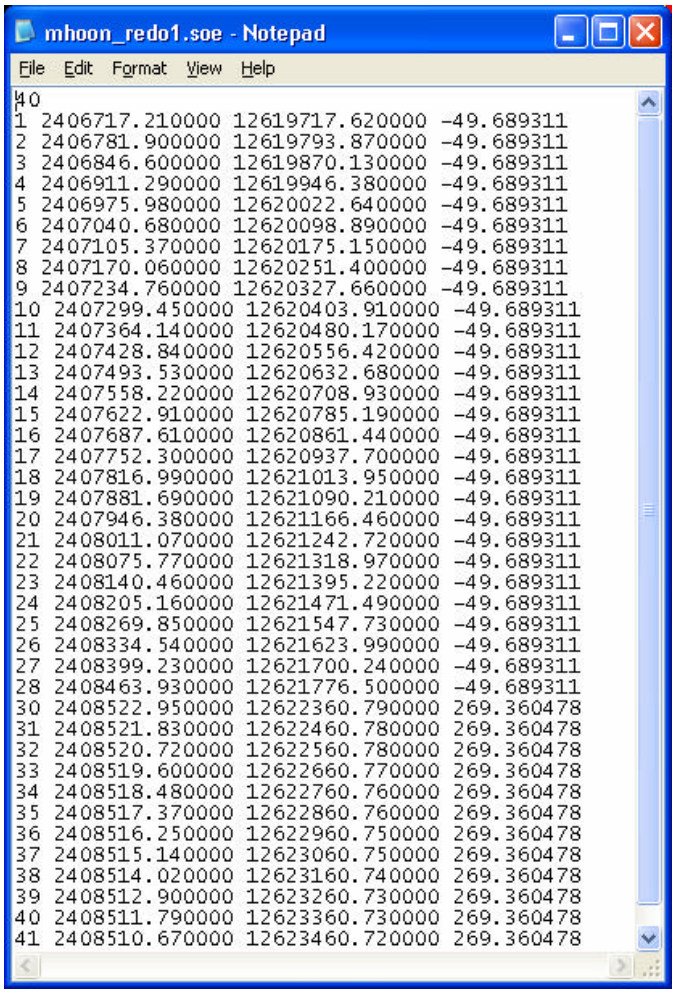
J. Save the SOE file in the appropriate directory.

K. Minimize Microstation

L. Open the SOE file that you just created using Notepad or some other text editor. (Toggle off the option to always use that program for these files.) It will be best to check the SOE file for any mistakes that may have been made in the naming convention or in the number of lines that were placed in the SOE and design file.

M. Once checked the SOE file, go back to Microstation.

This is an example of an SOE file. The first line reads that there are 40 lines of information in the file. You will notice that the numbering goes up to 41 and would think that there should be 41 lines of information. However, if you pay close attention, line 29 has been deleted from the SOE file. Make sure that each line has its own identity and that the first number/line correlates to the number of lines of information.

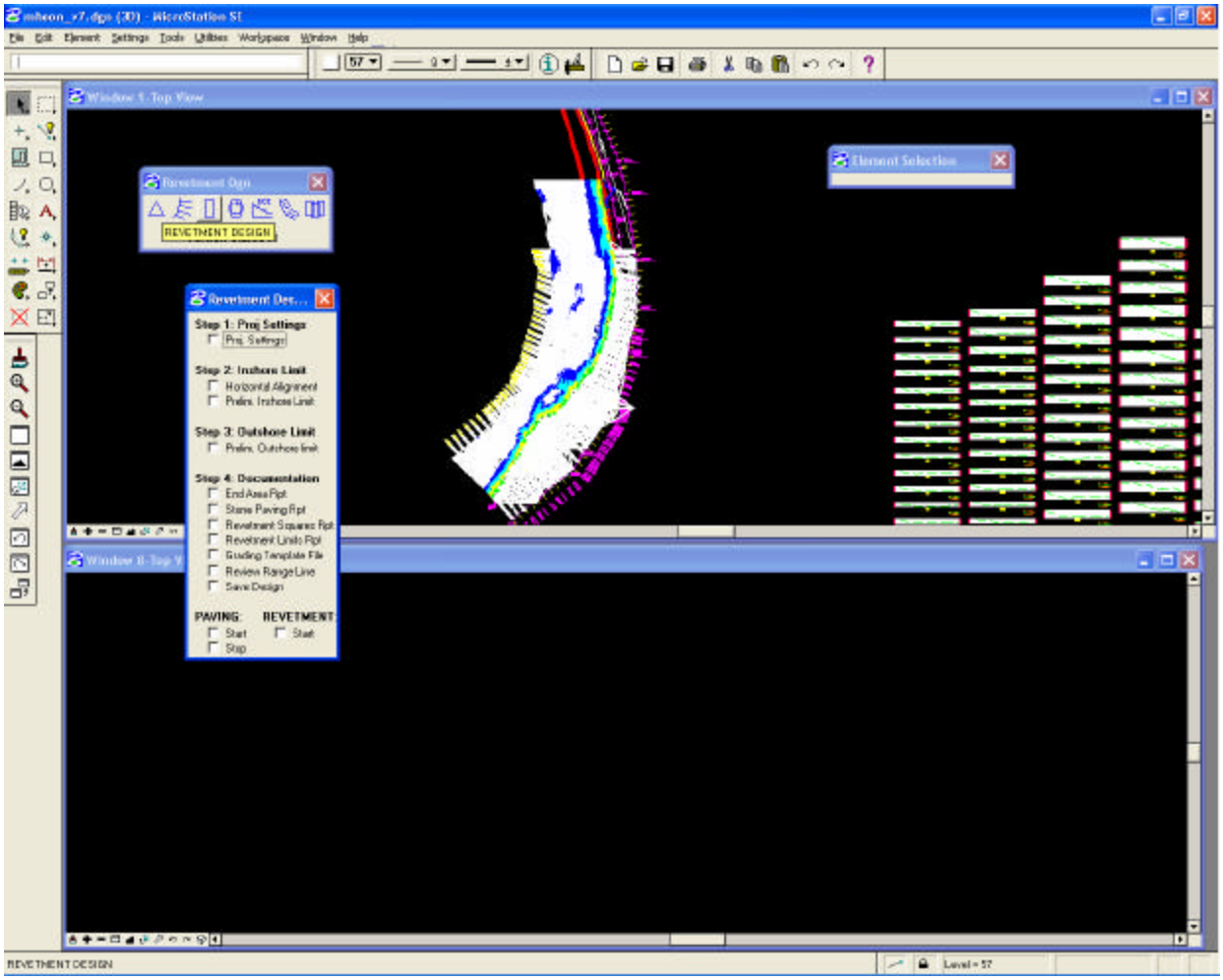


Extra Notes:

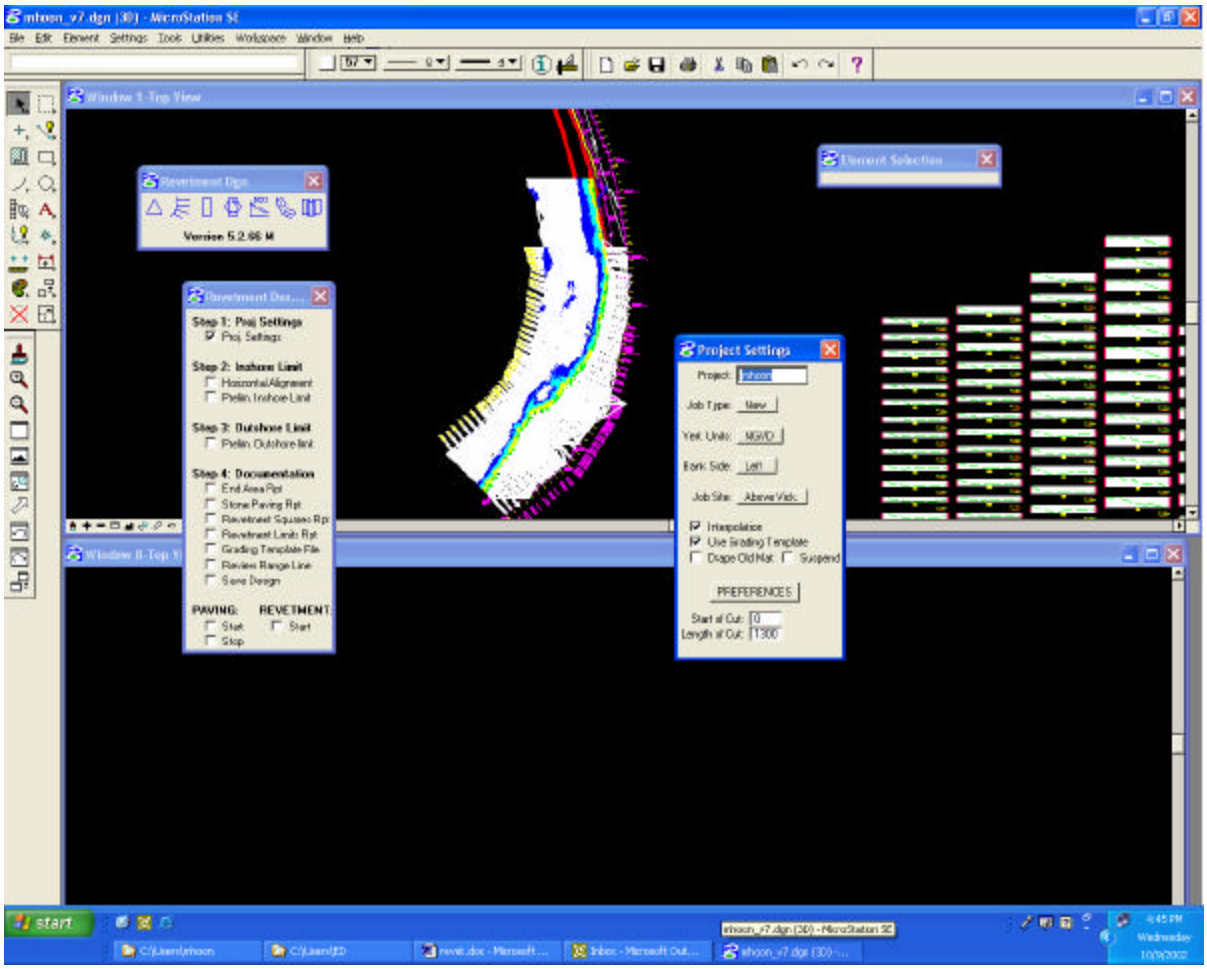
1. Make sure that you create the SOE file from the downstream end of the job and work upstream.
2. When selecting the lines for the soe file, make sure that the azimuth is placed on the outshore limit of the line when making the soe file. If they are not appearing on the outshore limit then you will need to change the toggle for the RNGS. This will either be inshore to outshore or outshore to inshore depending on how the line was drawn.
3. The first line for the soe file should fall within the limits of the survey. To check the limits of the ftn file (survey data), you can toggle on **show** under **load** on the Triangulation window of the Revetment Dgn window.
4. If you are not sure where you are to place the next line, you can select the SHOW button next to the SELECT button in the .SOE creation window. This will draw a line from the beginning of the SOE file up to where the last line was placed.
5. If you messed up in placing lines, you can use the OOPS, BACKUP ONE button which will allow you to go back one line and begin the creation process again.
6. Do not place lines for the SOE file that will overlap this seems to interfere in the design. You may have to draw some lines and angle the ends or delete some lines as you go along. Remember that these lines are drawn for cross sections that you will wish to display

Step 6. Open Views 1 and 8 and align them so that View one is on top and View 8 is on the bottom. Make sure that you can see both views equally. You want to do this because View 1 is the plan view and View 8 will have the profile views of your soe alignments.

Step 7. Go to Revetment Design window which is the third button from the left.



Step 8. Toggle on Project Settings in the Revetment Design window.



Filling in the Project Settings Window information:

1. Put a name in the Project window. Remember to keep the name to a maximum of eight characters in length.

2. Choose the Job Type whether it is new (construction–this is for grading jobs), maintenance (for jobs that do not require grading), or paving (rarely done- allows for some grading mostly for setting the rock limits). When you choose the type of job that your project is, toggles under the option Job Site will automatically toggle on and off.

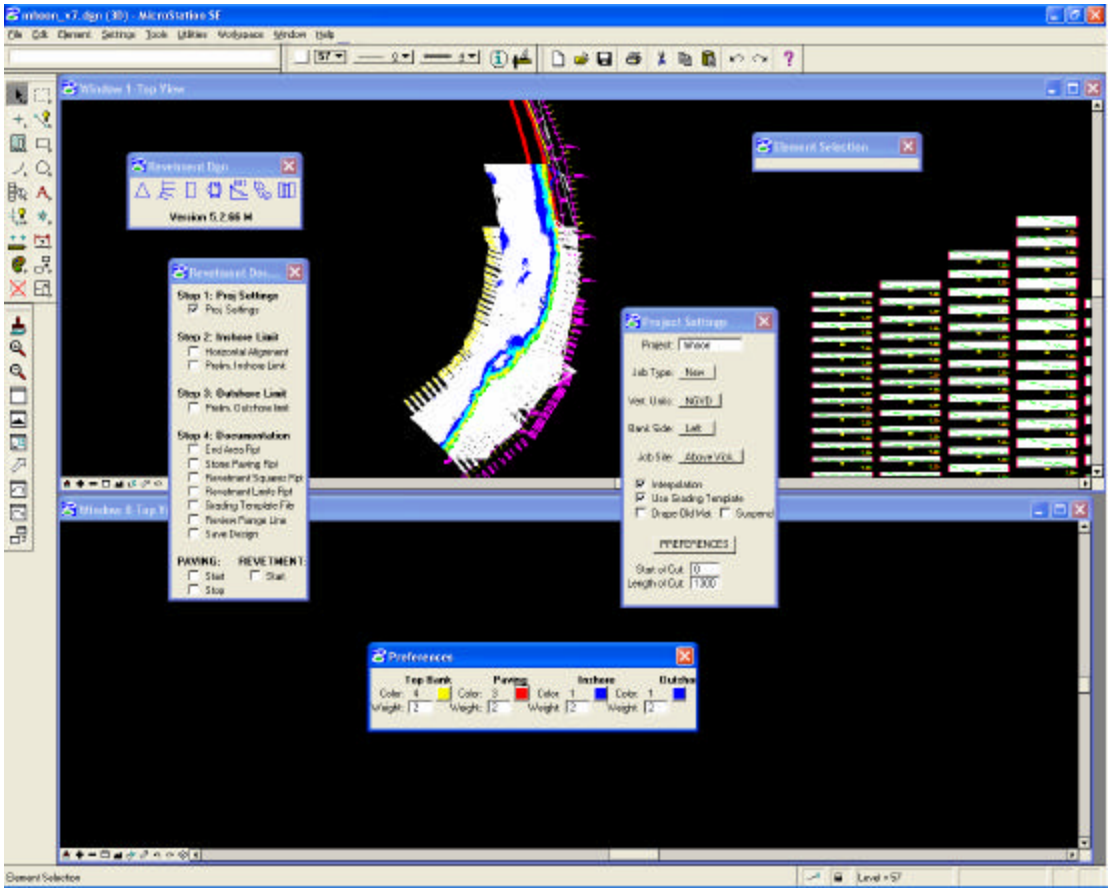
3. Leave the vertical units alone unless you would like to do the design in LWRP as opposed to NGVD.

4. Choose the correct descending bank side whether left or right.

5. The job site will always be above Vicksburg since we are in the Memphis District.

6. You can choose to change the Preferences which will allow you to change the colors of each line the program designs. These lines that you can change are outshore, inshore, paving, and top bank. It is recommended that you make each line a different color so that you can easily distinguish which line is what feature. (Below is a screen which demonstrates the preference window.

If you are doing a maintenance job, you will only have to change the inshore and outshore preference colors because these are the only two limits that are involved in maintenance work.

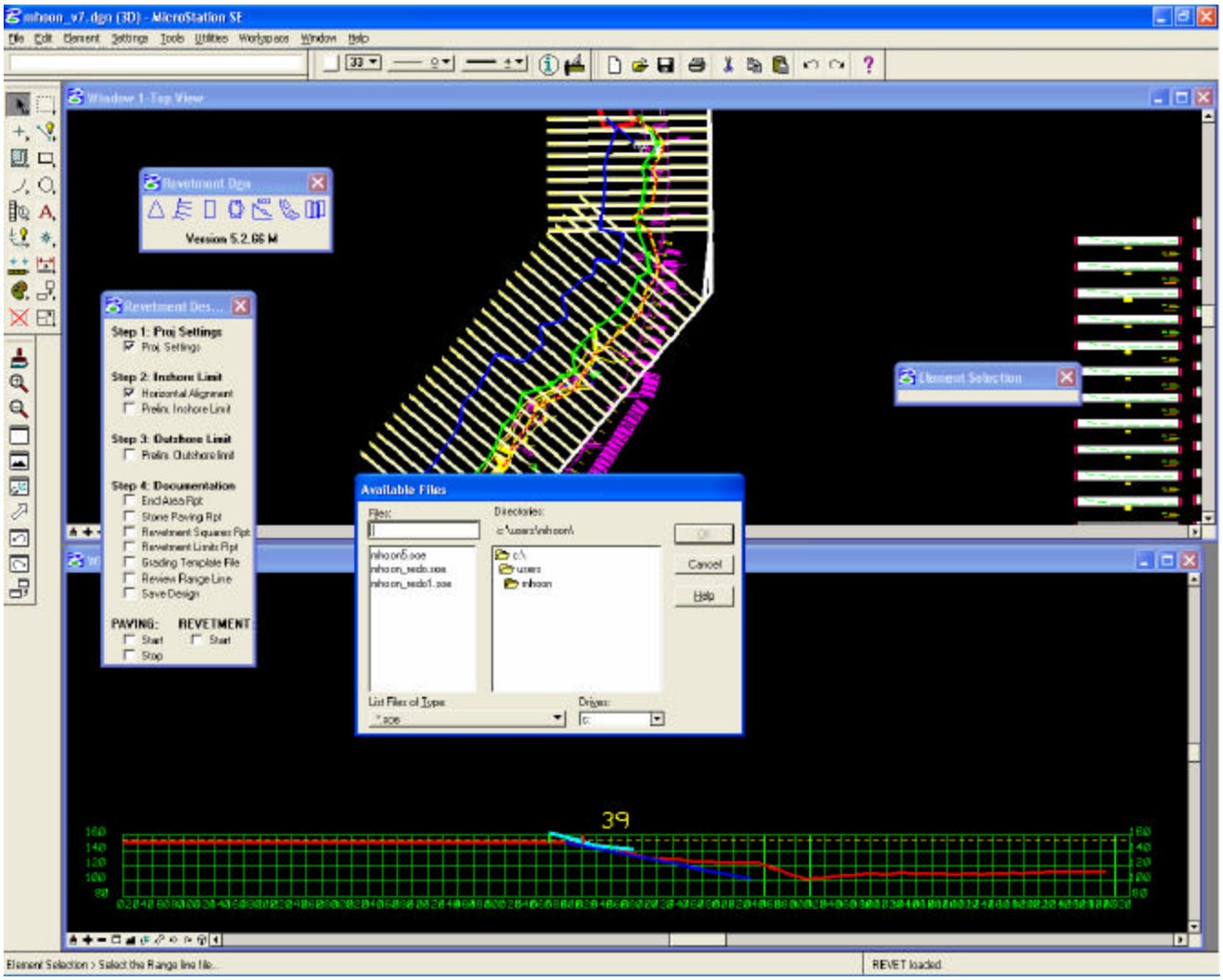


7. Start of cut - If you know where you will actually begin the cut then you can also change the default value of 0 to that known value. Since most of the time you will not know that distance, it is recommended that you leave that value alone. This option was used when we used the original baseline.

8. Length of cut - You will need to make the length of cut long enough that it extends out to the end of the survey. The more overbank data and further overbank that the baseline is located, the more length of cut that you will need. You can check this by looking at the outshore limit. If the outshore limit is at the surface edge, then you need a longer length of cut, but you will not know this until you run through the design process at least once. Therefore, it is probably best to make the length of cut long to begin. Keep in mind that if the cut began on 300 and the length of cut is 900, then the cut will extend 1200 feet from the baseline. The shorter that you can keep to length of cut the more detail that you will be able to see in the cross sections.

Step 9. Toggle on Horizontal Alignment in the Revetment Design window.

Step 10. In the Available Files window, only the soe files will be displayed. Choose the correct SOE file and click on the OK button.



Step 11. Once the SOE file has been chosen, the Cut Parameters window will appear. You will need to put in the correct LWRP for the area in which you are working. This should be the only information that you should have to enter. Click on the OK button which will bring up the Section Design window.

If you have chosen Maintenance in the Project Settings window (from Step 18) as the type of work that will be done the Prelim Outshore Limit will automatically be the first toggle on after you have clicked on the OK button on the Cut Parameters window.

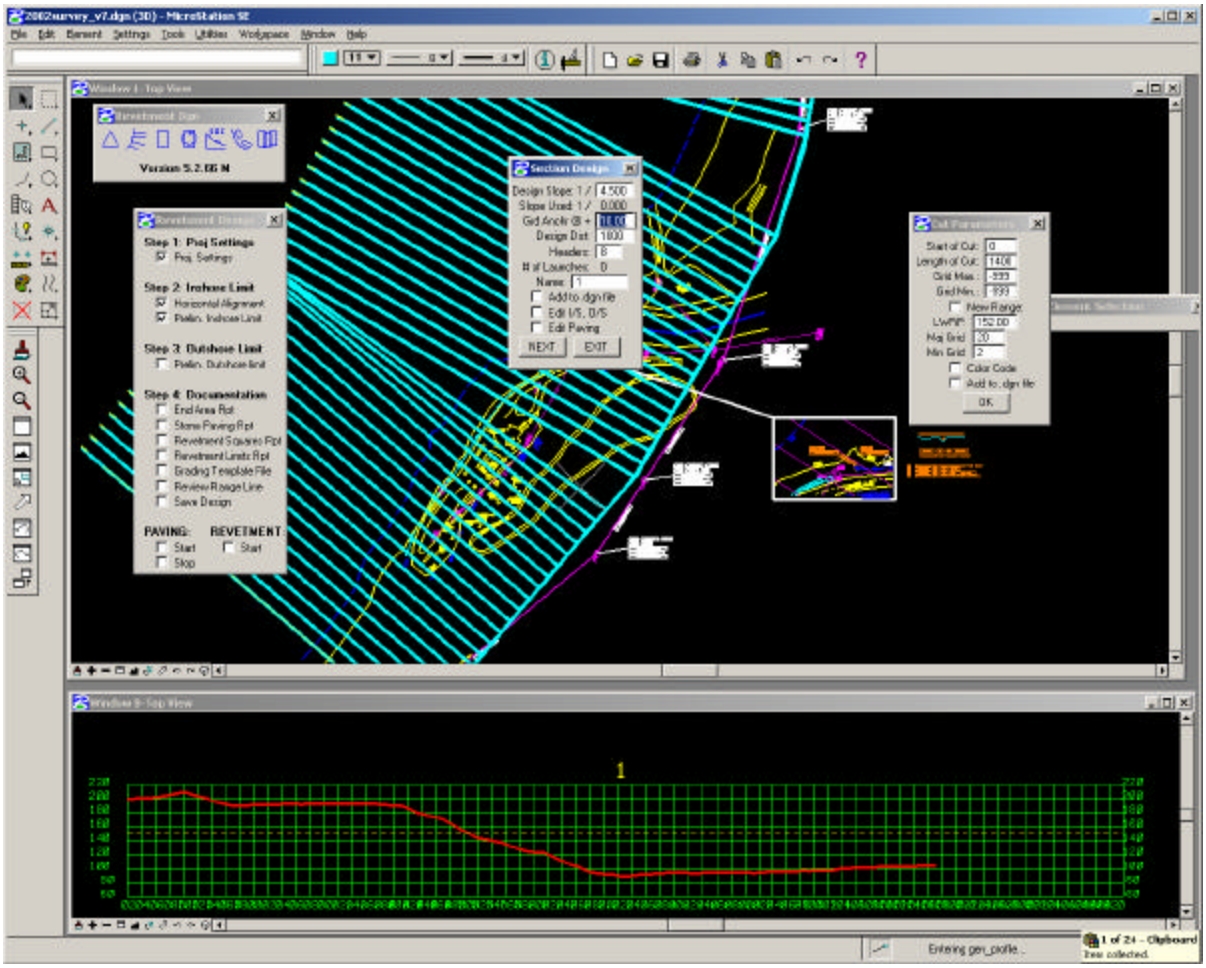
If you have chosen the type of work as New (Construction) (from Step 18), the Prelim Inshore Limit will be the first toggle that will be automatically chosen by the program once you have clicked on the OK button on the Cut Parameters window.

Extra Notes:

1. If you did not extend the length of cut far enough out on the Settings window, then you can change the length on this screen.

2. The LWRP Books are on the River Engineering server. (\\Mphscaddriver\river_data\LWRP_BOOKS) Look for the latest which at this time is the 1993 LWRP.

Step 12. In the Section Design window, you will need to input the design slope only. Do not change any of the other numbers. Click on the OK button to start looking at the cross sections.



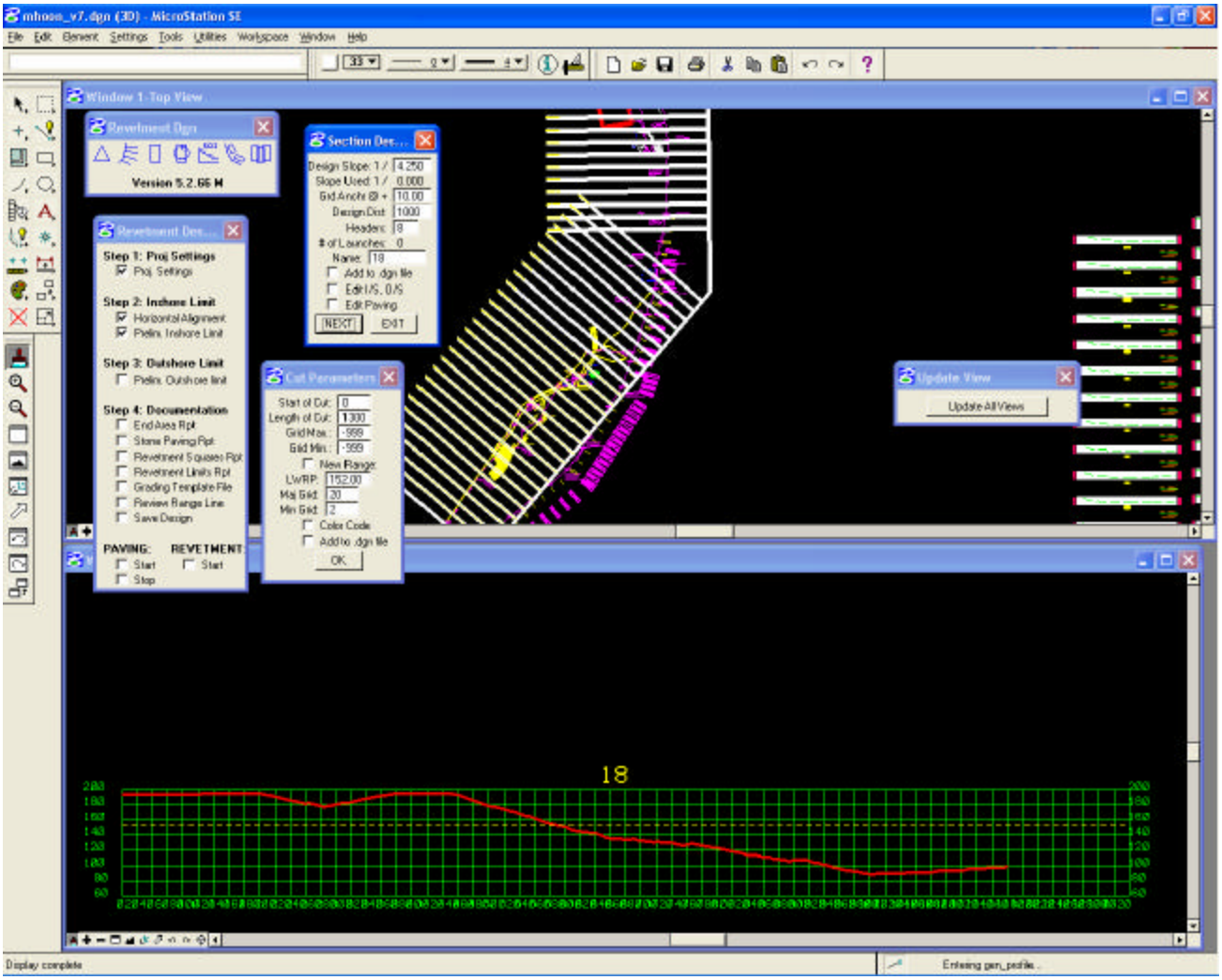
Extra Notes:

1. Grid Anchor is where the water's edge may be when they go out to place the mat.

2. # of launches = number of squares to go out. Each launch is 25' Long x 4' Width. The mat is laid at approximately 145' long with a 10' overlap. Thus, the sinking unit will move 135' upstream because they work from downstream to upstream.

Step 13. Examine all of the cross sections to determine where to begin and end the project by selecting the next button on the Section Design window. You can keep selecting the next button until it reaches the end of the soe file.

As you are going through the cross-sections, you are looking for cross sections that are 20' below the LWRP line or relatively close to that line. When looking for an ending cross section, you will look for a place that has a stable slope with no degradation or scour.



Step 14. Once a determination on the start and finish place of the project will be, unload the Revetment program by typing mdl unload revet in the key-in window of Microstation.

Step 15. Reload the Revetment program by typing in mdl load revet in the key-in window of Microstation.

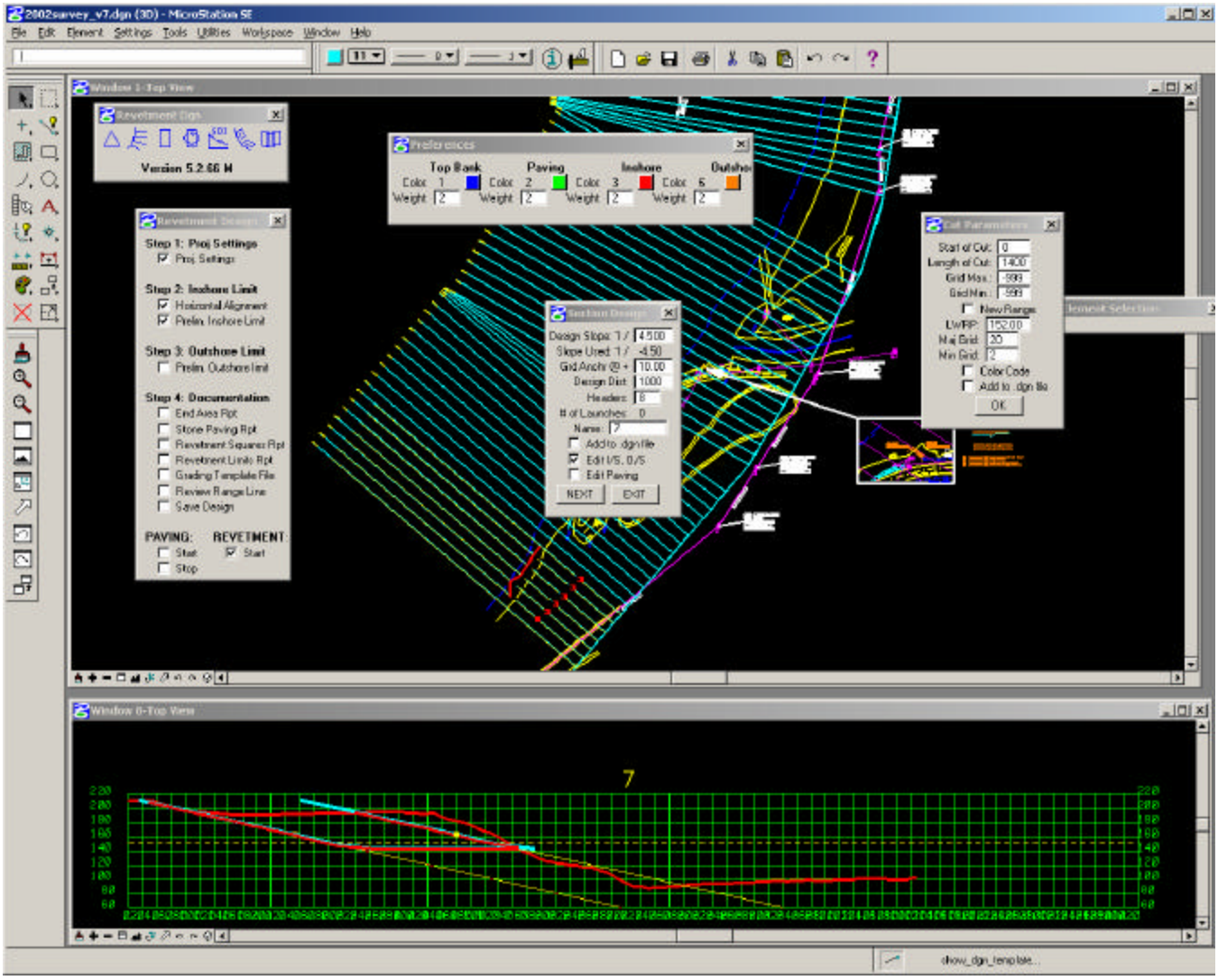
Step 16. Load the design survey as done in Step 13 of this workflow.

Step 17. Start the design process by repeating Steps 17-22 of this workflow.

A. Fill in the appropriate spaces in the project settings
B. Choose the correct SOE file
C. Input the correct LWRP for the area of work

Step 18. On the Section Design window, click the Next button until you get to the starting point of the project.

Step 19. When at the line which will be the downstream starting point of the project, make sure to input the correct slope to be used and toggle on Start in the lower right corner of the window under Revetment.



Extra Notes:

If you mess up in the design process, you will have to unload the program, load it back and start the process again with step 11 of this workflow.

For New (Construction) jobs, the inshore limit will be designed first.

For Maint (Maintenance) jobs, the outshore limits will be designed first.

The inshore limit is placed based on the slope that has to cross the section twice and ignores anything below a -15 LWRP.

The outshore limit looks for where there is more than 20’ below water.

The outshore limit is placed on a 1:5 slope because this is the sand run out line.

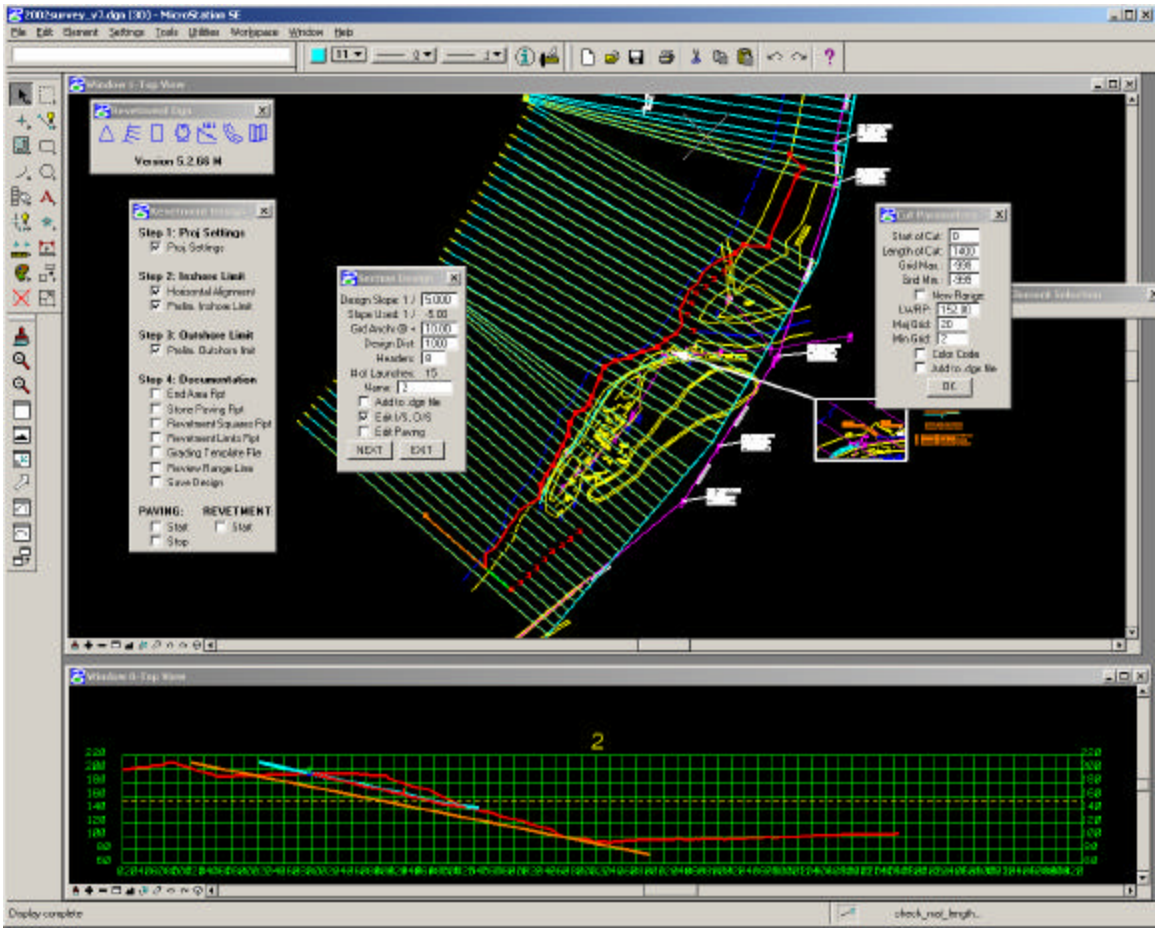
Keep in mind that this program was not intended to handle very much grading. Thus, massaging the layout will need to be done. It is best to edit the layout while at the initial design phase on that particular cross section. When you know that there is a lot a grading that will be done on the job, it is best to pull the top bank and inshore limits back farther than you anticipate grading. The line can be moved back in when it comes time for redesign, but the program does not handle it well by moving the limit back out.

If the limit that you begin designing with is not located where you desire, you can change the limit here in the initial phase of the design process. To do this, you will need to toggle on the EDIT I/S, O/S on the Section Design window. This will allow you to move the limits in the cross sectional view while paying attention the effects in the plan view. You want to look at both when choosing where to place the limit because you are going to eventually attempt to achieve some smoothness in the whole design.

When changing the inshore limit, you want to make the bottom of the line closer to the toe of the slope and where it begins to go back up. The illustration below shows where the inshore limit was (the first lines on the profile to the left) and where it is desired to be (the lines to the right on the profile). You can also look at the plan view and see where the limit was (the red dots closer to the arbitrary baseline (which is light blue in color or the same color as the lines input into the SOE file) and where the desired limit is now (the red dots more riverward with connecting lines between them).

Step 20. When reach the end or upstream end of the project, right click in the plan view.

Step 21. Toggle on the other limit. Thus, if you started with the Inshore limit then you will toggle on the Outshore limit and vice versa.



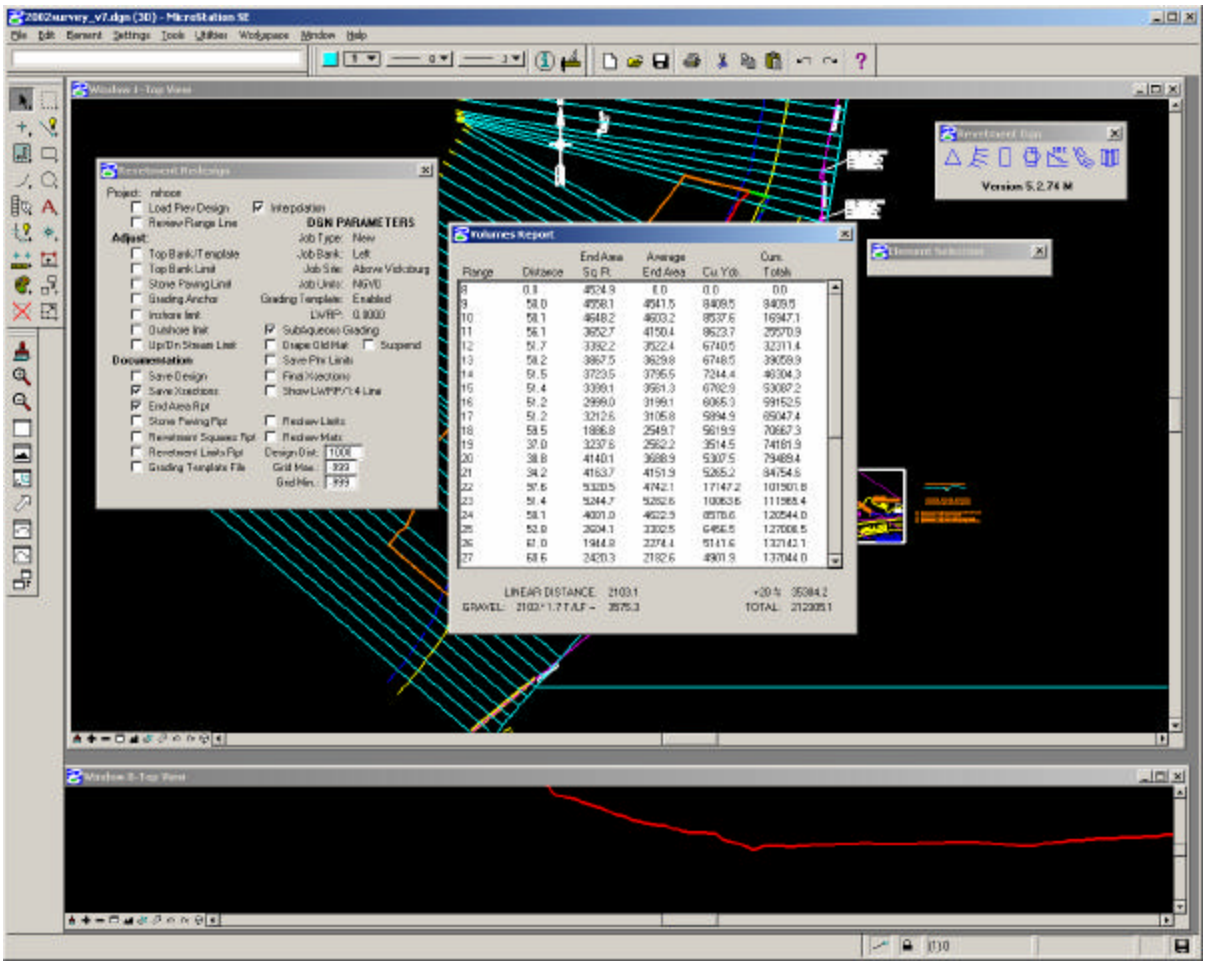
Step 22. When second limit has been set, right click in the plan view.

Step 23. Toggle on Save Design under Step 4: Documentation on the Revetment Design window.

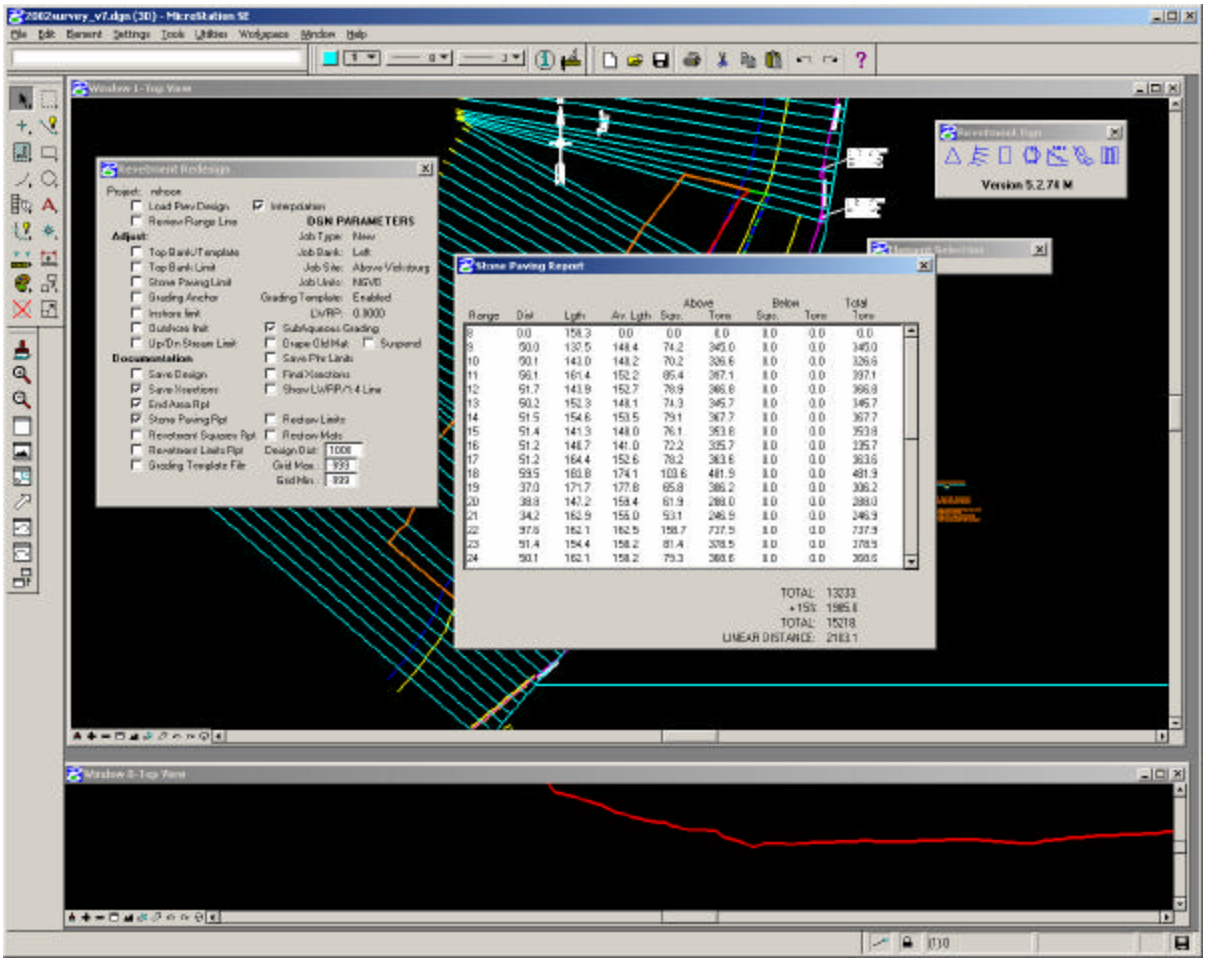
At this point you can run reports so that you can compare the results later or you may opt to run the reports later in the design process. If you choose to run comparison reports now, here is the way that you start the report process. All reports are under Documentation on the all the following windows: Revetment Design and Revetment Redesign. You will just have to choose the reports for which you want information. All report files will be created in the working directory. Thus, you may want to consider moving the reports that you generate in this step to a separate directory so that when you run the same reports in the Redesign window you can distinguish between the two reports.

Here are your options for reports that can be generated.

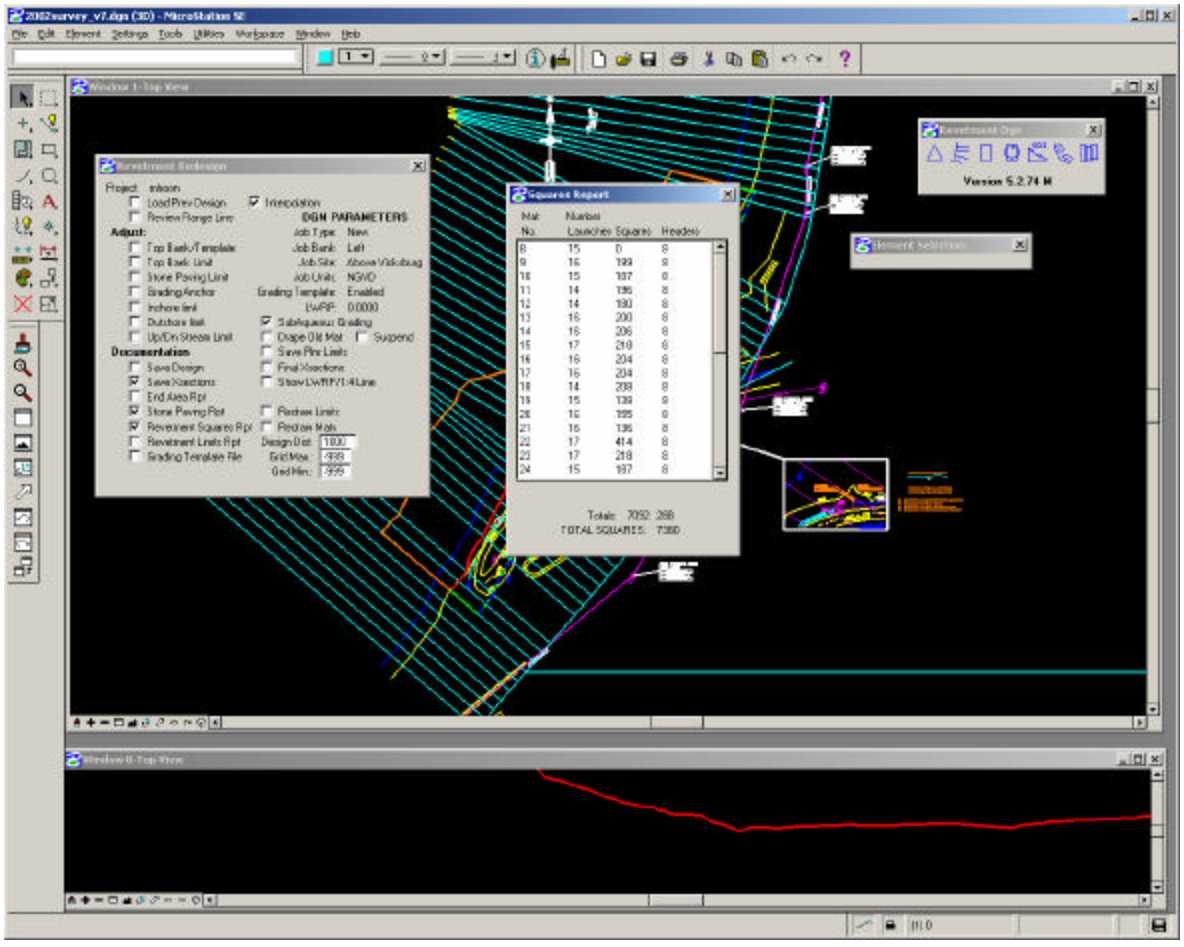
Option A. Toggle on End Area Rpt. This will give you the rough quantities by range lines which include linear distance and gravel that will be laid after paving (the width and depth of gravel to be placed is in the original specs for revetment which have not been altered in years). As part of the quantities provided in this option window, there is a 20% contingency factor. This will be named endarea.rpt.



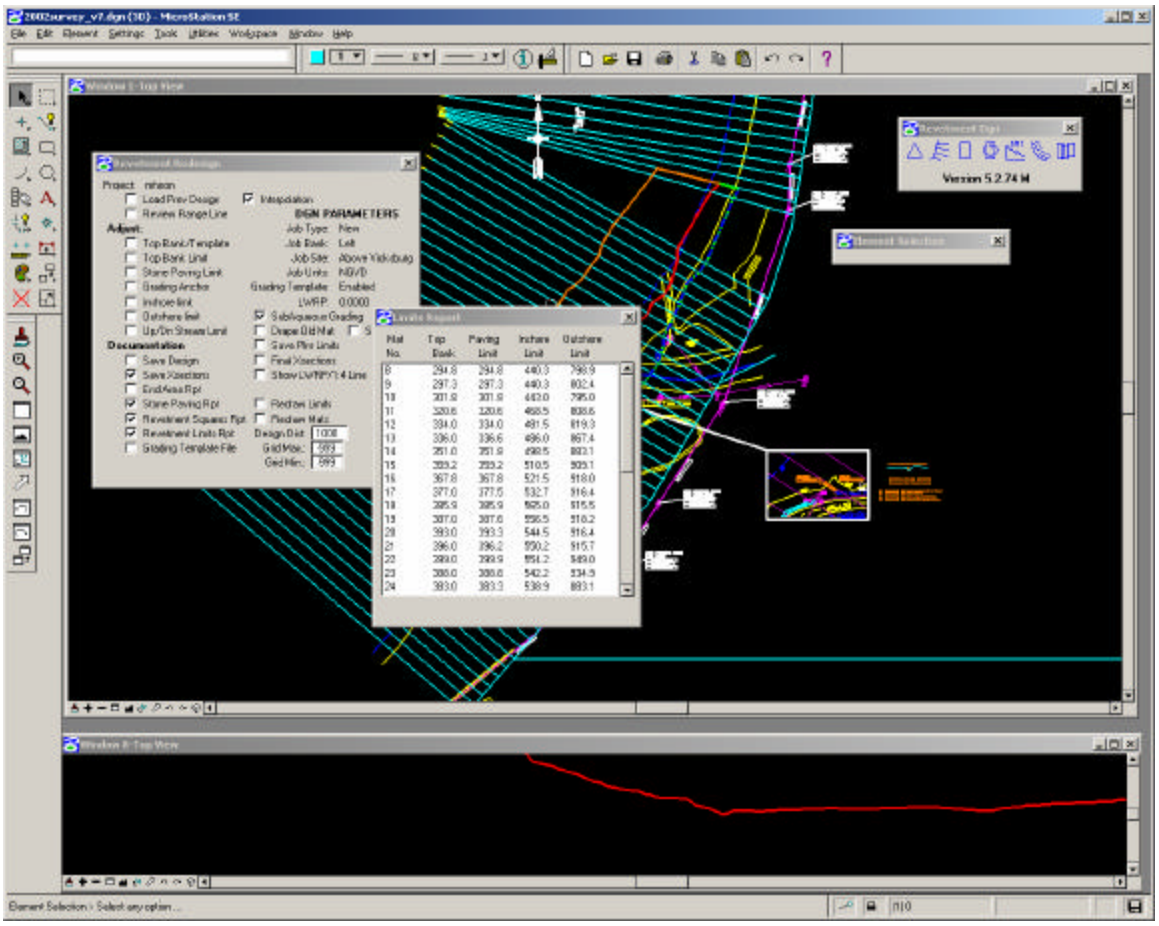
Option B. Toggle on Stone Paving Rpt. This will provide the tons of riprap needed for the project. This file will be named paving.rpt.



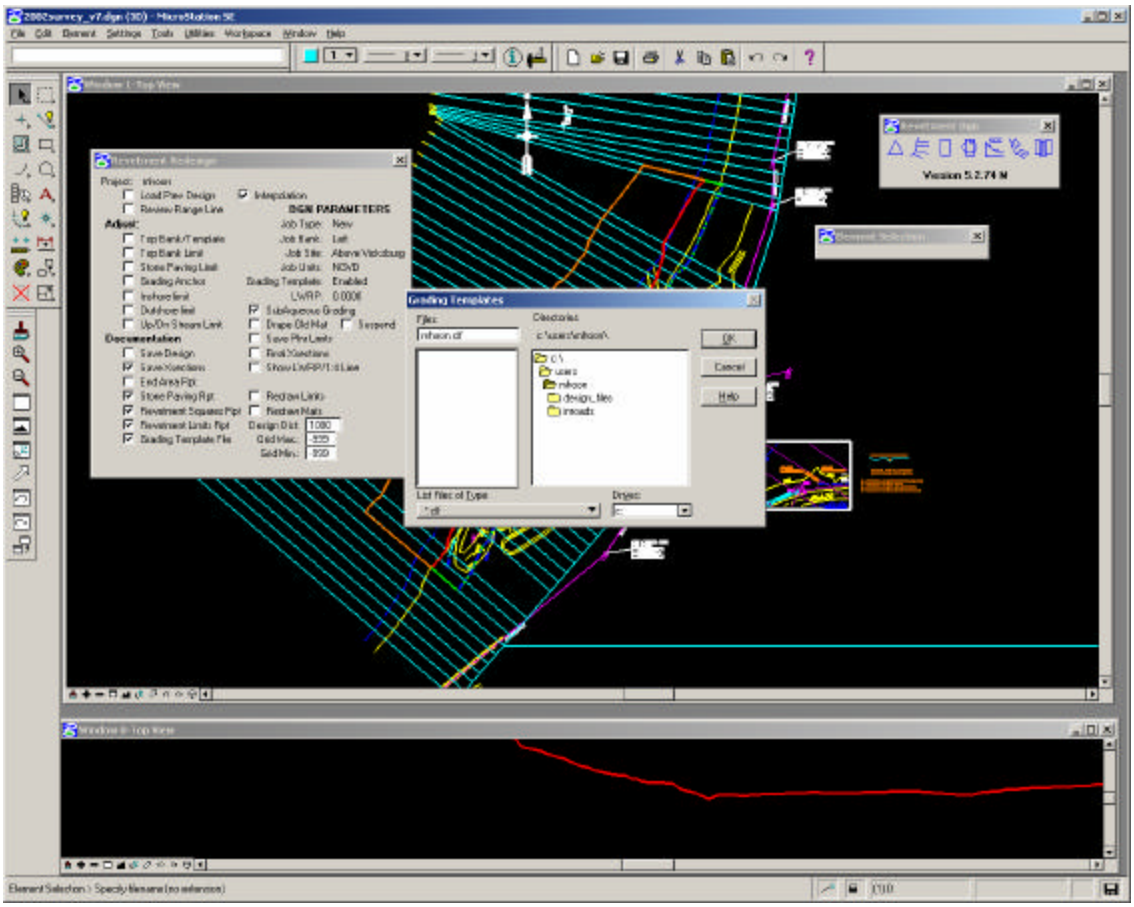
Option C. Toggle on the Revetment Squares Rpt. The name of this file is squares.rpt and it provides information on total amount of squares to be used and is displayed per range also. This option will also create a file with the project name that you gave under Project Settings on the Revetment Design window and with the extension .sqr. (For example, this project name was mhoon. Thus, the file name was mhoon.sqr.)



Option D. Toggle on Revetment Limits Rpt. This will provide limits for the top bank, paving, inshore, and outshore per range line. There are three files that are created in this process. These files are limits.rpt, <project_name>.grd, and <project_name>.lim.



Option E. Toggle on Grading Template File. This will provide information on what the limits are at a specific cross section. This creates a file that you name and has the extension .clf. You will have to view this information in some program like Wordpad.

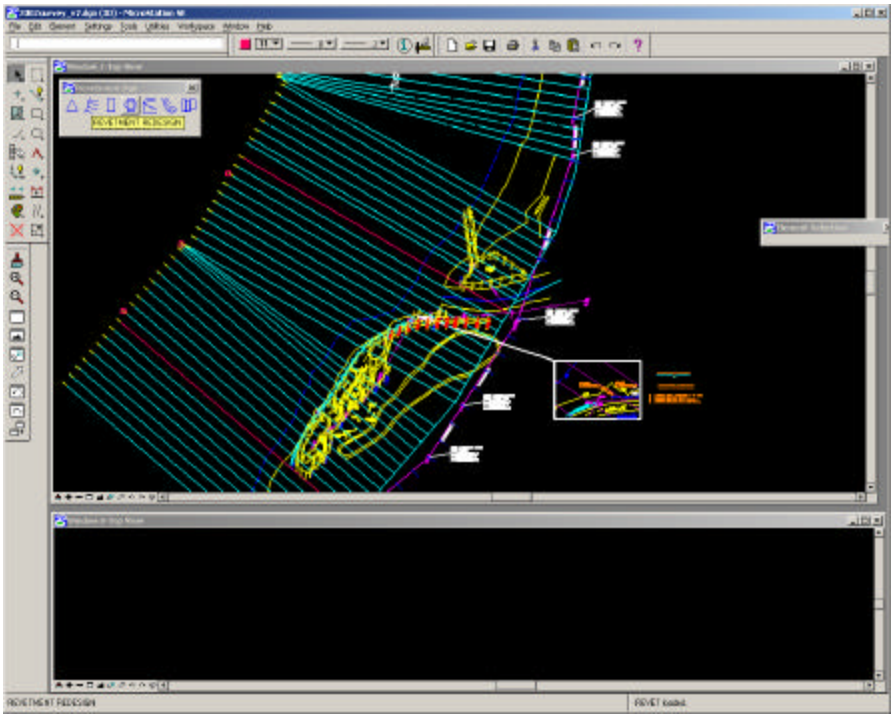


Step 24. Unload the Revetment program by typing in mdl unload revet on the key-in window of Microstation. You do not have to get out of Microstation.

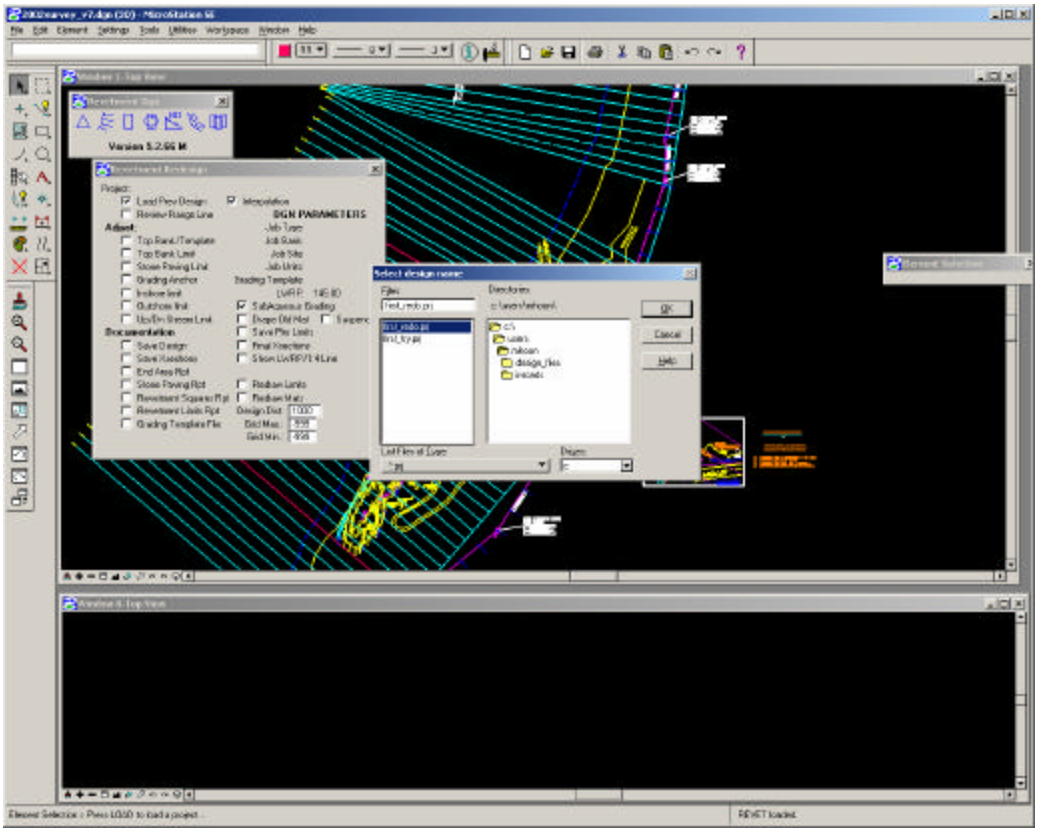
Step 25. Refresh both views.

Step 26. Load the Revetment program again by typing in mdl load revet or clicking in the key-in window on Microstation on pushing the up arrow key until you get to that command that you have previously typed.

Step 27. Click on the Redesign button (fourth button from the left) on the Revetment Dgn window.

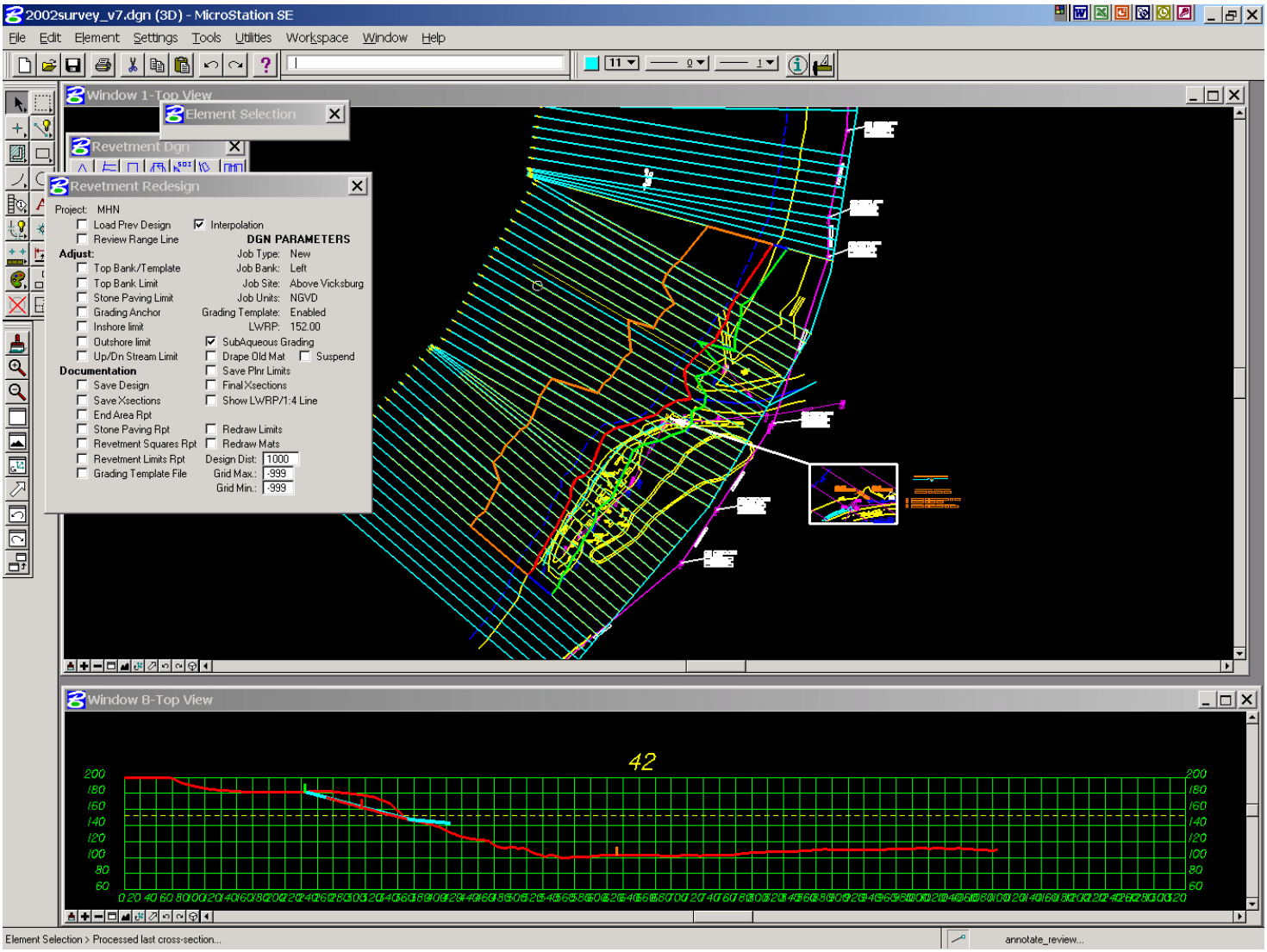


Step 28. Toggle on Load Prev Design under Project on the Revetment Redesign window to load the design that you just saved prior to exiting the program.



Step 29. Click OK after choosing the prj file that you want to load.

The Revetment Program will automatically load the designed cross sections and plan view showing the lines for the outshore limit, inshore limit, paving limit, and top bank. As the program loads this information, you will quickly see as the cross sections and the lines in the plan view are drawn per your design. Once the program is complete drawing the lines and cross sections, it will look like this.

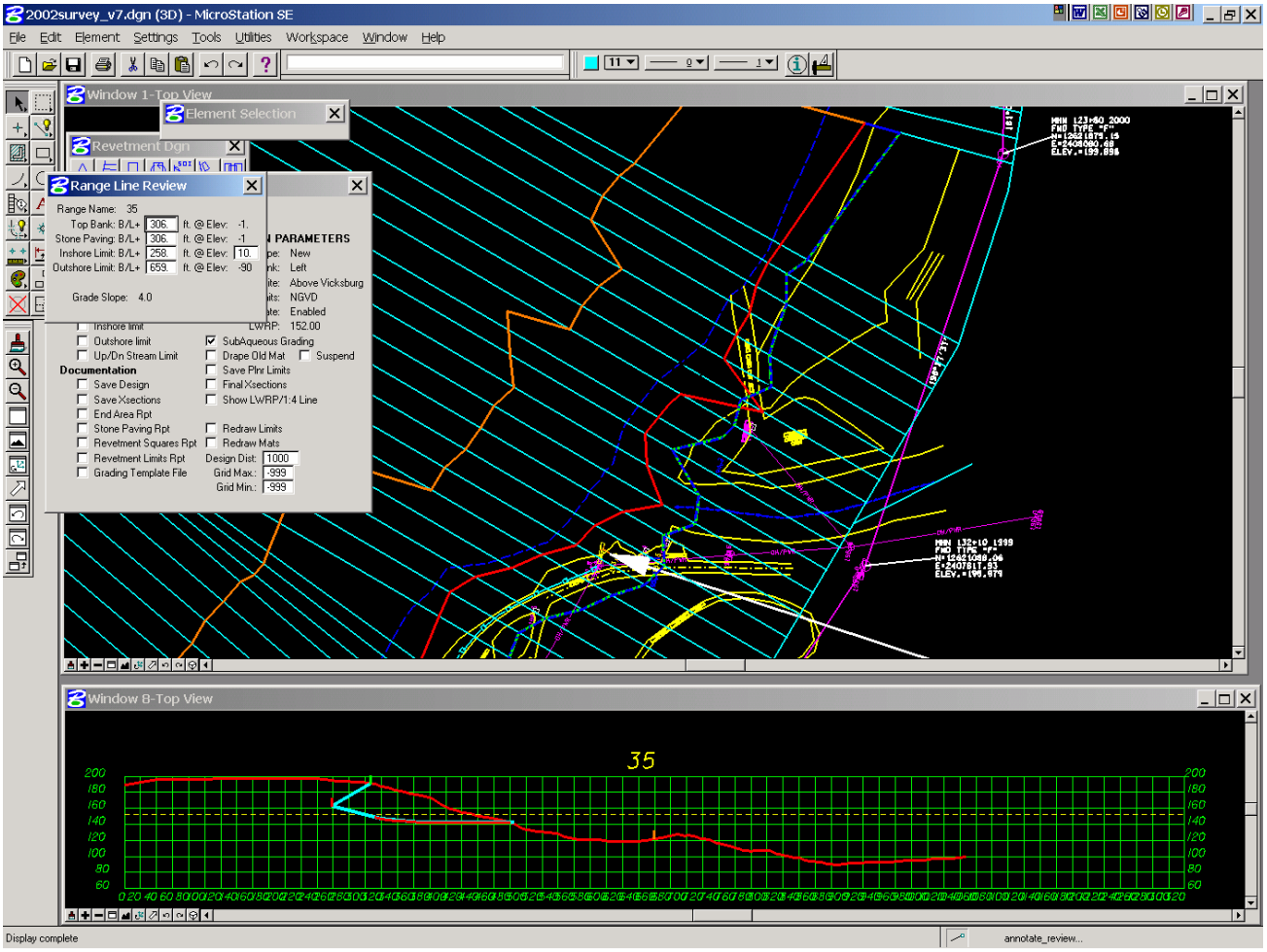


Step 30. Make necessary adjustments to the limits to make the design a little better and smoother. All limits will adjust the same way.

A. To adjust the top bank and paving limits:

1. Toggle on Top Bank/Template under Adjust on the Revetment Redesign window

2. Left click on the mouse in the plan view on the soe line that you want to adjust. The program will automatically select the top bank limit of the line that you selected. The Range Line Review window will pop up describing the range name and location of the limits from the baseline. The screen will look like this.



3. Drag the limit back to the position that you want in order to make for a smoother alignment and left click the mouse again to set the new top bank limit. You can also see the change in the cross section view.

4. If you want to change another line's limit then just follow directions 2 and 3 above.

5. Once you have the top bank limits where you desire in the plan view, right click the mouse in the plan view to reset all the limits. The program will then recalculate every thing.

6. It is recommended that you save your design in case something happens to the network, program, or you machine

B. To adjust the outshore or inshore limits (This will explain the outshore limit, but will be the same procedure for both.):

1. Toggle on Outshore Limit under Adjust on the Revetment Redesign window

2. Left click on the mouse in the plan view on the soe line that you want to adjust. The program will automatically select the top bank limit of the line that you selected. The Range Line Review window will pop up describing the range name and location of the limits from the baseline. The screen will look like this.

3. Pay attention to both views. Pull the outshore limit out as far as you think that you need it in the plan view. In the cross section view, you will look to see that the outshore limit extends past the toe at least 20-25 feet. This is just a good rule of thumb for new construction sites. If you are doing maintenance sites, this will not apply because you may not want to extend much farther out than the previous mat that was laid.

4. Once you have made a smooth alignment for the outshore limits, right click in the plan view to reset and to have the program re-calculate everything.

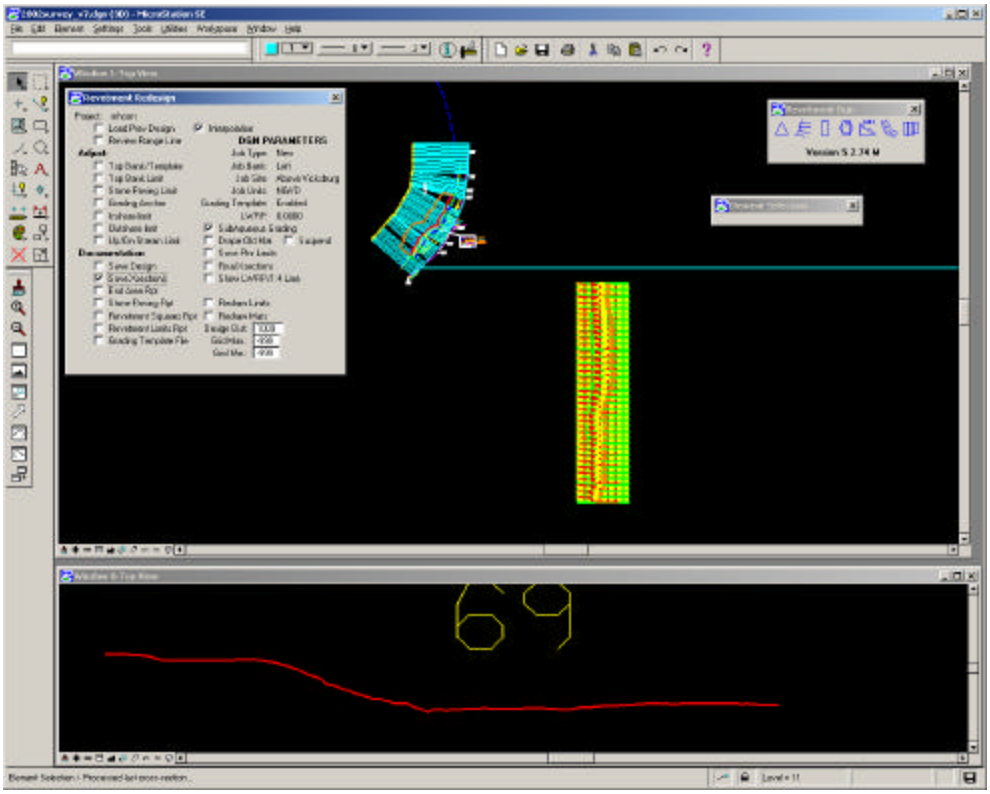
5. It is recommended that you save your design in case something happens to the network, program, or you machine.

Step 31. Save the adjusted limits to a project file by toggling on Save Design under Documentation in the Revetment Redesign window.

Follow Steps 42 – 51 if you have the Before Construction survey that you are using for the design. Otherwise, these will just take up space in the design file. Of course, you can do these steps in V8 using the annual surveys and just make another model for the final design using the BC surveys. Then you would be able to compare them later if you wanted.

Step 32. Save the limits to the design file by toggling on Save Plnr Limits on the right side of the Revetment Redesign window.

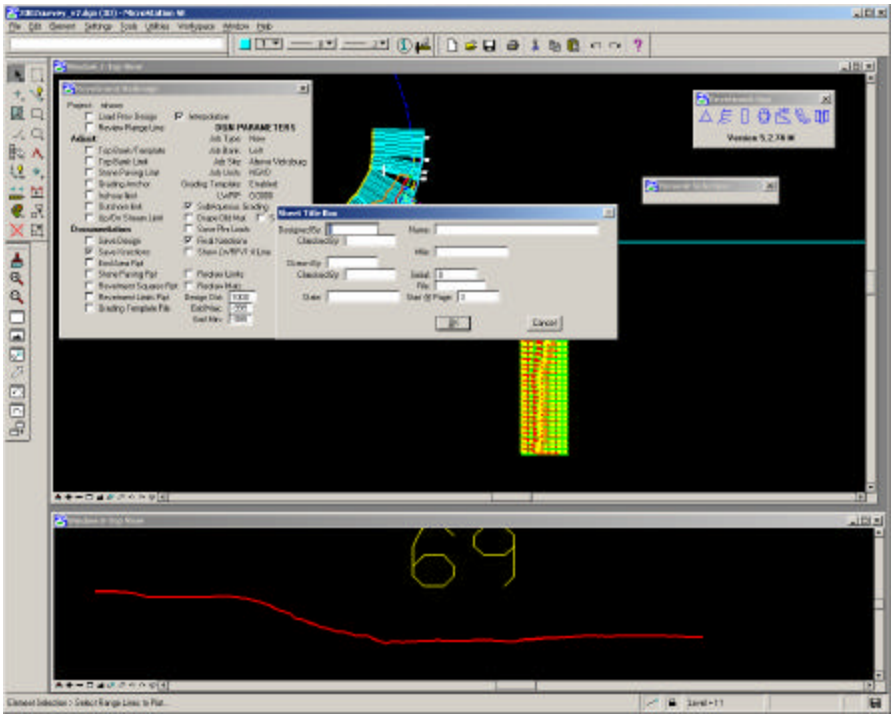
Step 33. Toggle on Save Xsections under Documentation on the Revetment Redesign window. This will put all the cross sections in the design file, one on top of the other. (The cross sections are below the blue horizontal line.)



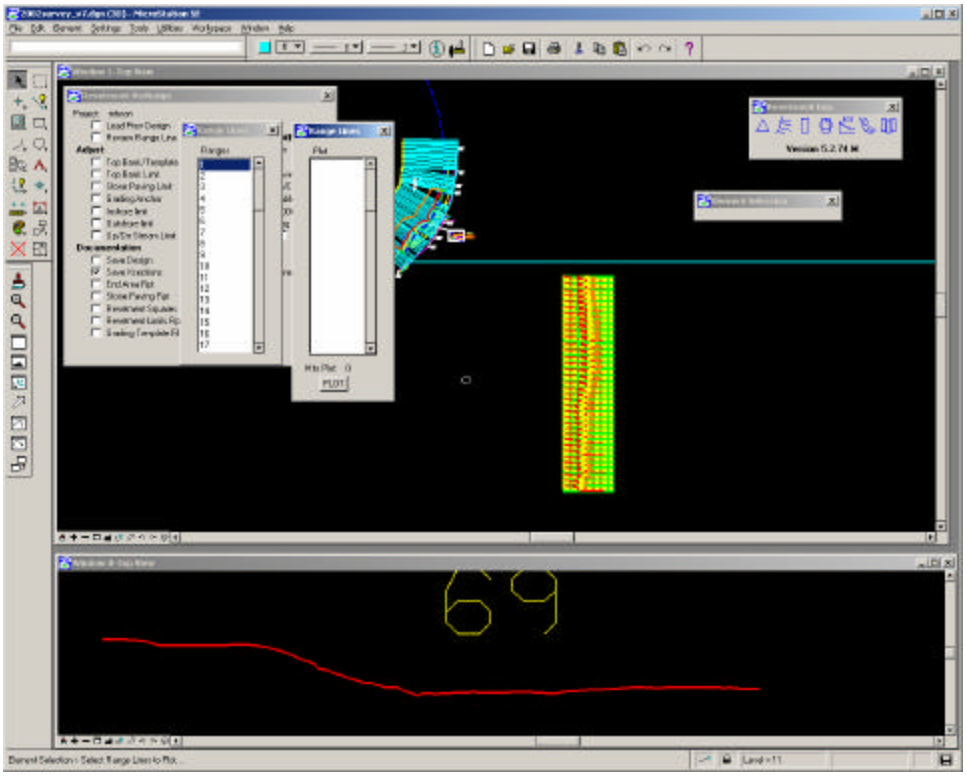
Step 34. Toggle on Final Xsections on the right side of the Revetment Redesign window. When you toggle on this, it will make a .dat file that makes the coordinate for a template that can be used in Inroads to get quantities. To do this, you would have to import the surface (.dat file) and triangulate it. The cross sections should be the same as those in the revetment program. The quantities that Inroads will compute will be more accurate. They will only need a 10% contingency.

Step 35. The Sheet Title Box window will appear. Fill in the appropriate information that will be on every cross section sheet. You will need to know the File and Serial numbers that you got form Map Sales (Lisa Rickard) in addition to the name of the project, mile, page number in plans where the cross sections will begin (thus you will have had to lay out the general map for the plans in order to know how many sheets that will take up), initials for designer, checker, and drawer (usually Pete).

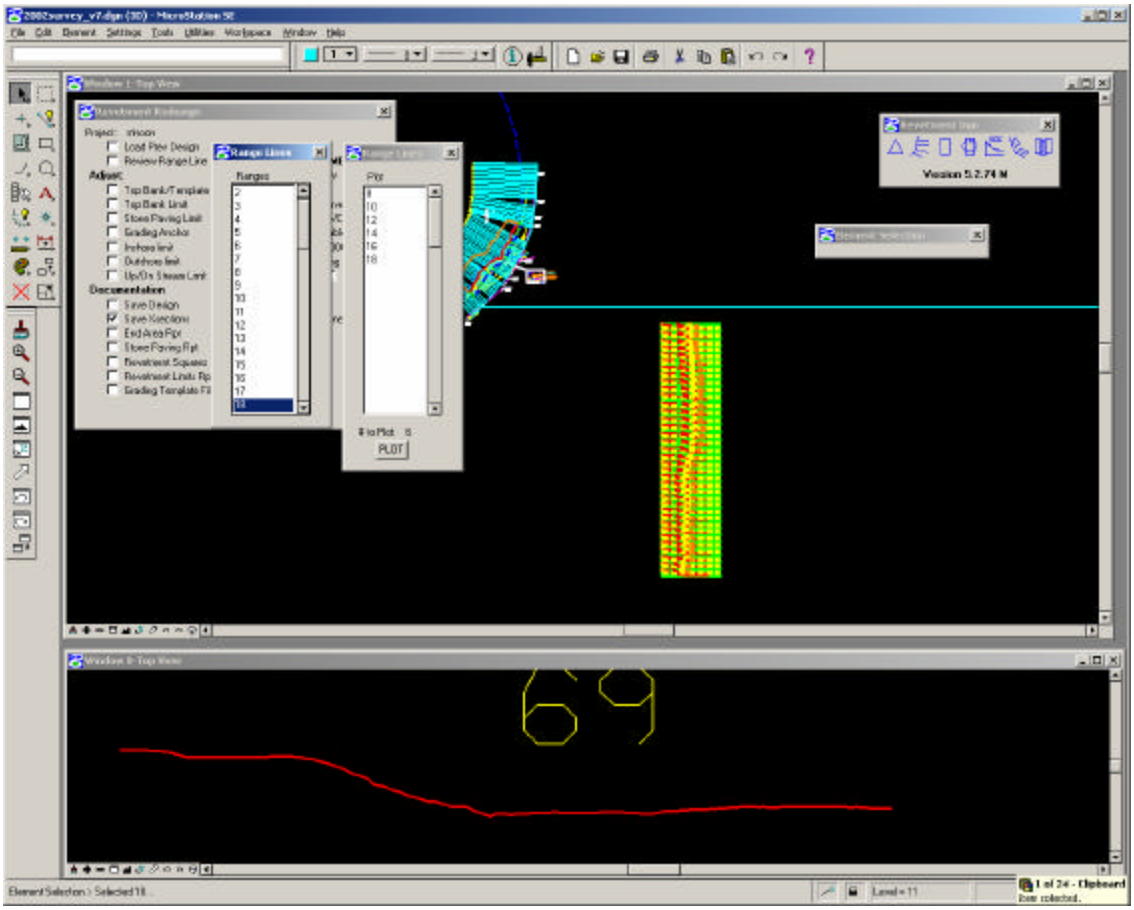
When you complete filling in all of the blanks, click on OK.



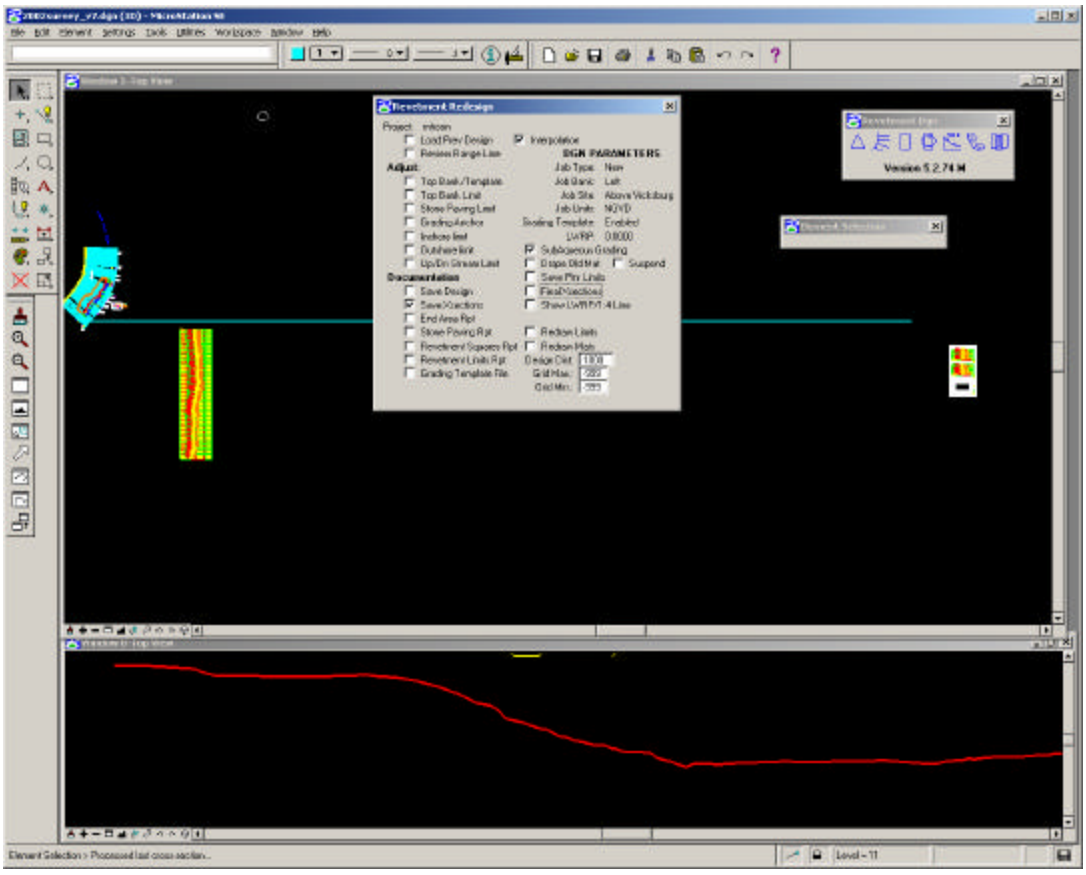
Step 36. The next windows that will pop up will be for choosing the cross sections that you would like to put on the plans. There will be one that displays the range lines per the soe file and another which will display the cross sections that you choose to put on the plans.



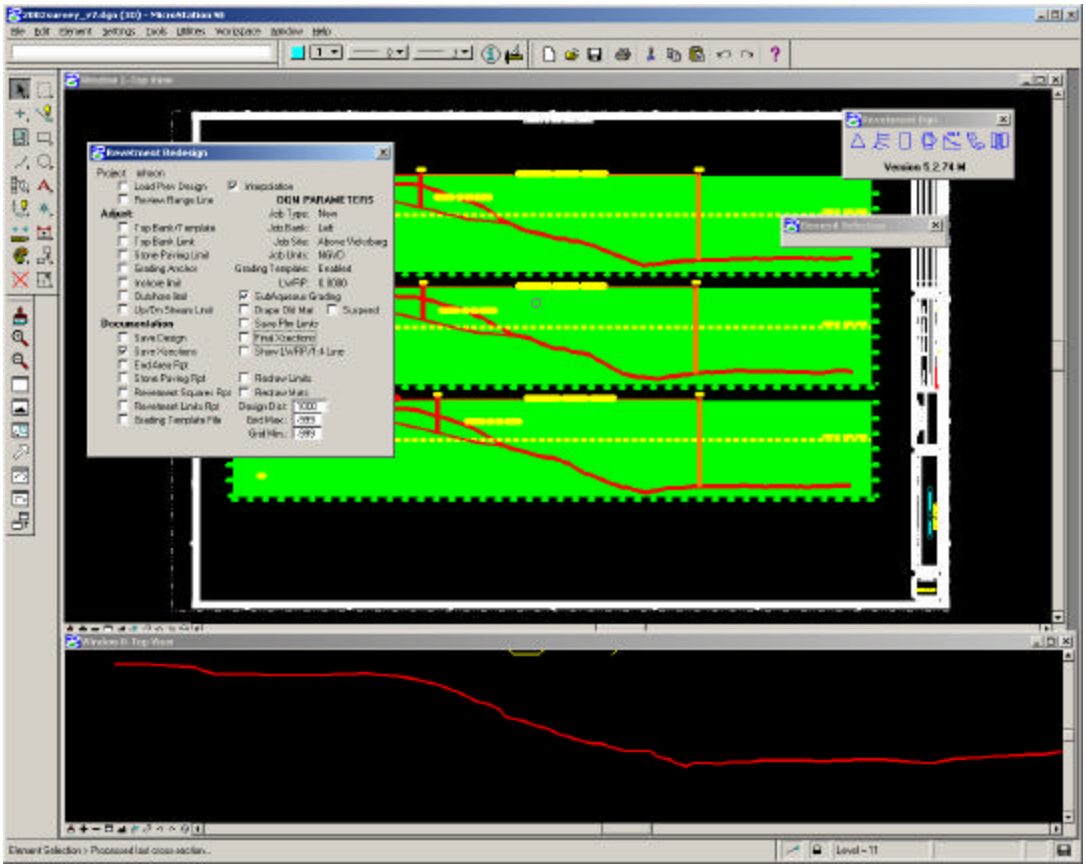
Step 37. Single click (left button on the mouse) on the range lines for which you want to have cross sections for the plans. The selected lines will go to the other window that has the plot option on the bottom.



Step 38. When you have selected all the cross sections that you desire to have in your plans, click on the plot button. The program will automatically place the cross sections in a border sheet to the far right of the plan view. Thus, you may have to zoom out in order to see them. This is what the screen will look like when the cross sections have been placed in the design file. (The cross sections are those in the far right of the plan view.)



This is what the final cross sections will look like for the plans. All of the limits are labeled as well as the slope used , the LWRP, and the title block information that you just input.



Step 39. Toggle on Save Design under Documentation on the Revetment Redesign window.

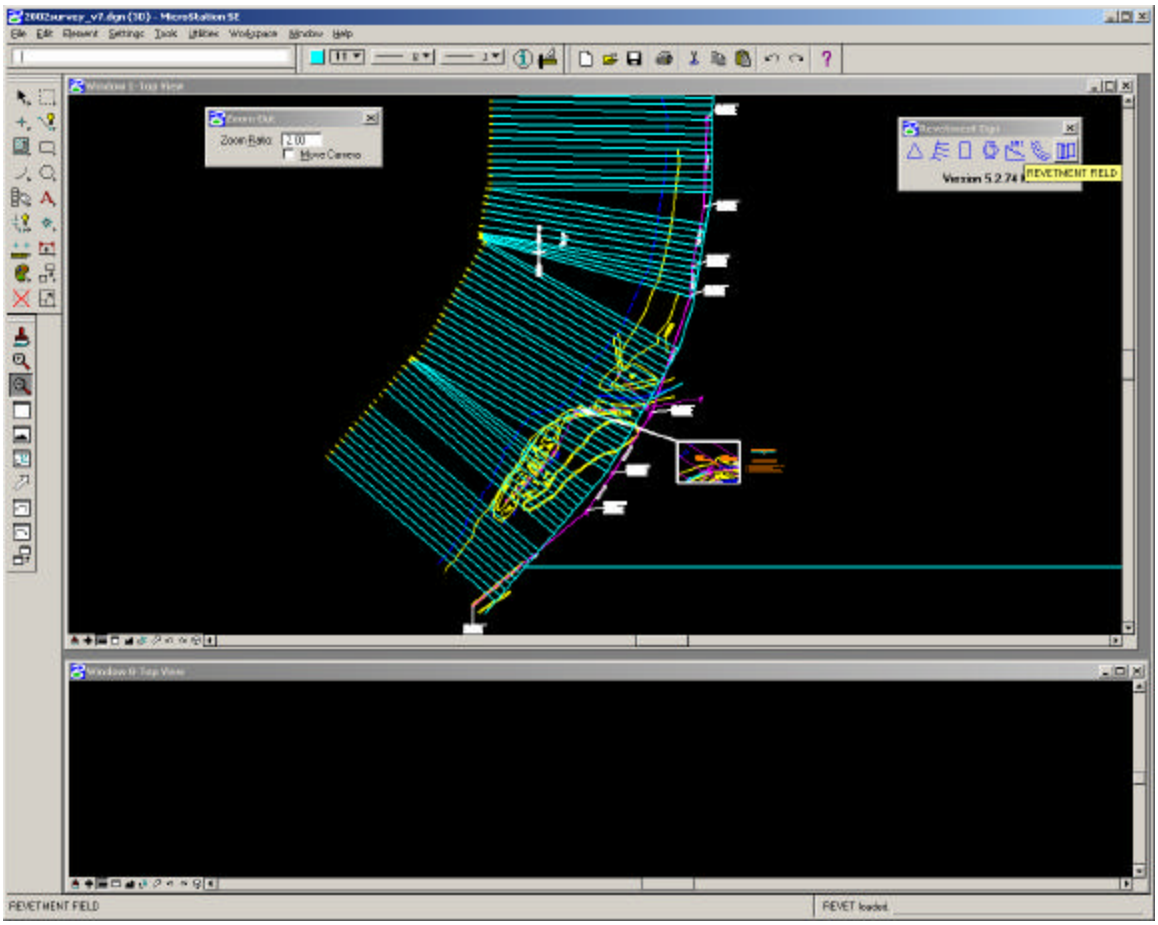
Step 40. Choose the final reports that you wish to have. The report options are under Step 33.

Step 41. Close the Revetment Redesign window.

Step 42. Unload the Revetment program.

Step 43. Load the Revetment Program

Step 44. Click on the Mat Design button on the Revetment Dgn window (this is the last button on the palette.)



Step 45. Toggle on Load Prev Design

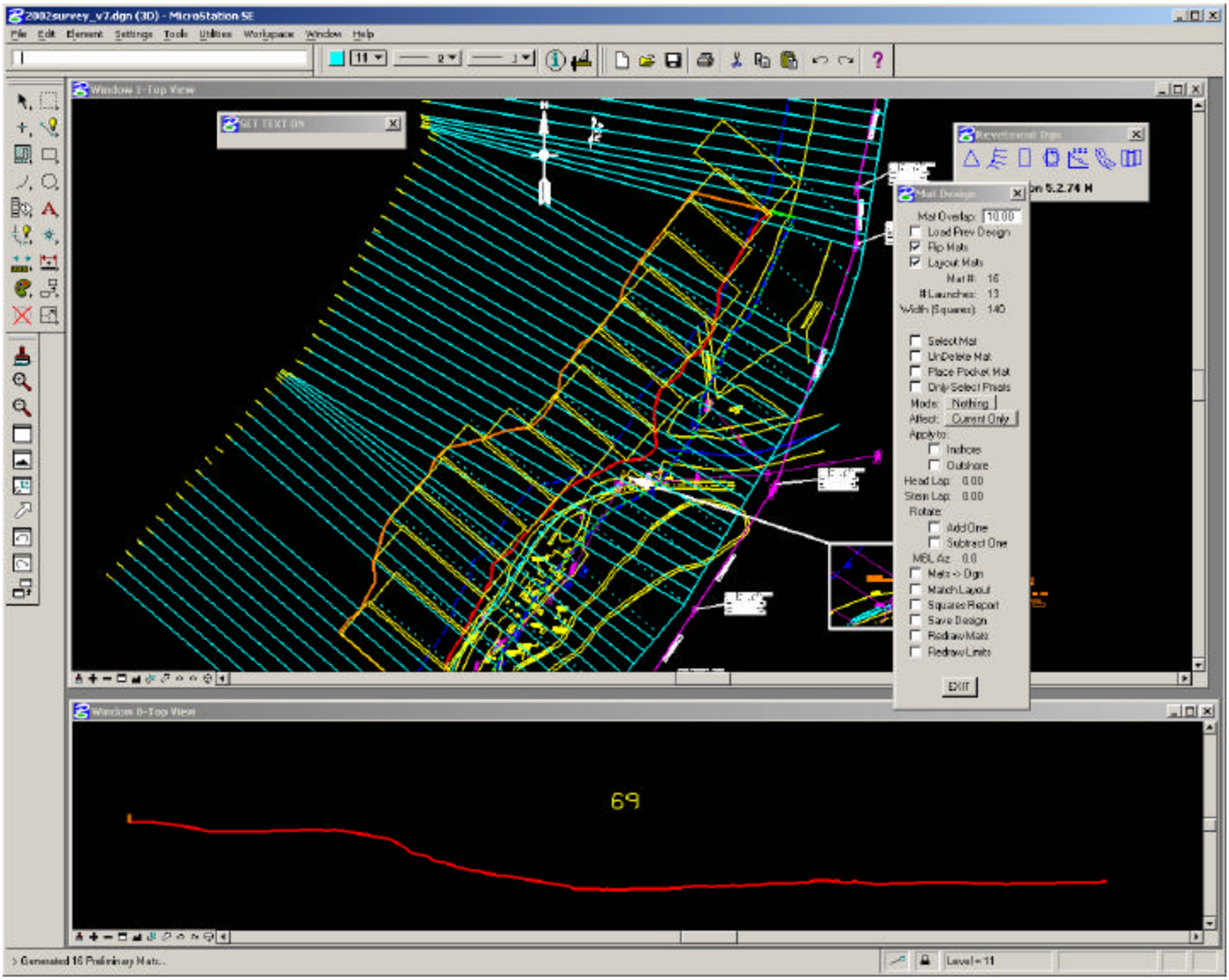
Step 46. Choose the last project file that you saved which would be the one that has all the adjusted limits in it.

Step 47. Toggle on Layout Mats.

If you do not see the mat outlines in your design area or if they are laid out in the right area:

1. Toggle on Flip Mats
2. Toggle off Layout Mats
3. Toggle back on Layout Mats

If this is done correctly, you will something like the following screen.



Step 48. Make adjustments to the mats if necessary so that they point slightly downstream.

A. If you like the way the mats are laid out and are satisfied with the number of squares, toggle on Save Design and give the file a name that indicates that it is the final design.

B. If you are not satisfied and would like to change anything, here are your options:

You will need to have an idea of what you want to do to the layout of the mats before you toggle on Select Mat. The following are the tools that you have to work with:

Options Under Mode:

Option A. Cut
Option B. Add
Option C. Move
Option D. Rotate
Option E. Delete
Option F. Nothing

Options under Affect:

Option A. Current Only – may choose this when know that particular mat may not be able to be laid the way that the program chose

Option B. All Upstream – when selected then most likely would be choosing the one most downstream, especially rotating

Options for Rotate: (both allow for the mats to be rotated 1 degree with each click on the option.)

Option A. Add One

Option B Subtract One

To rotate the mats manually (not by degrees like the add and subtract one options):

1. Set the mode to Rotate
2. Select the Affect to either all upstream or current only
3. Toggle on the Select Mat
4. Left click in the plan view in the mat that you want to rotate. If you are using the all upstream option, make sure to choose the most downstream mat that you want to rotate.
5. The mat that you chose should be red.
6. Select (left click) riverward of the mat in the plan view
7. The prompt will read to identify a baseline point
8. Select (left click) landward of the mat (or more toward the baseline) in the plan view
9. Rotate the mat(s) as needed.
10. Right click in the plan view when completed the rotation.
11. Refresh the view
12. Toggle on Redraw Mats to see the new mat outlines.
13. Repeat as necessary to get the mats where you think that will be laid in the field.

To rotate the mats using the add one or subtract one options:

1. Set the mode to Rotate
2. Select the Affect to either all upstream or current only
3. Toggle on the Select Mat
4. Left click in the plan view in the mat that you want to rotate. If you are using the all upstream option, make sure to choose the most downstream mat that you want to rotate.
5. The mat that you chose should be red.
6. Select one of the options to see if it rotates the way that you want. If it does not, then you may select the other option. You may have to reset then go back to step 1.
7. Rotate the mat(s) as needed.
8. Right click in the plan view when completed the rotation.
9. Refresh the view
10. Toggle on Redraw Mats to see the new mat outlines.
11. Repeat as necessary to get the mats where you think that will be laid in the field.

To move mat(s):

1. Set the mode to Move
2. Select the Affect to either all upstream or current only
3. Toggle on the Select Mat
4. Left click in the plan view in the mat (if all upstream is the option, make sure that you choose the downstream mat that you want to move) that you want to move.
5. The mat that you chose should be red.
6. Move the mat(s) to the desired location.
7. Left click in the plan view to place the mat(s)
8. Right click to reset the option and to have the program recognize the move.
9. Refresh the view
10. Toggle on Redraw Mats to see the new mat outlines.
11. Repeat as necessary to get the mats where you think that will be laid in the field.

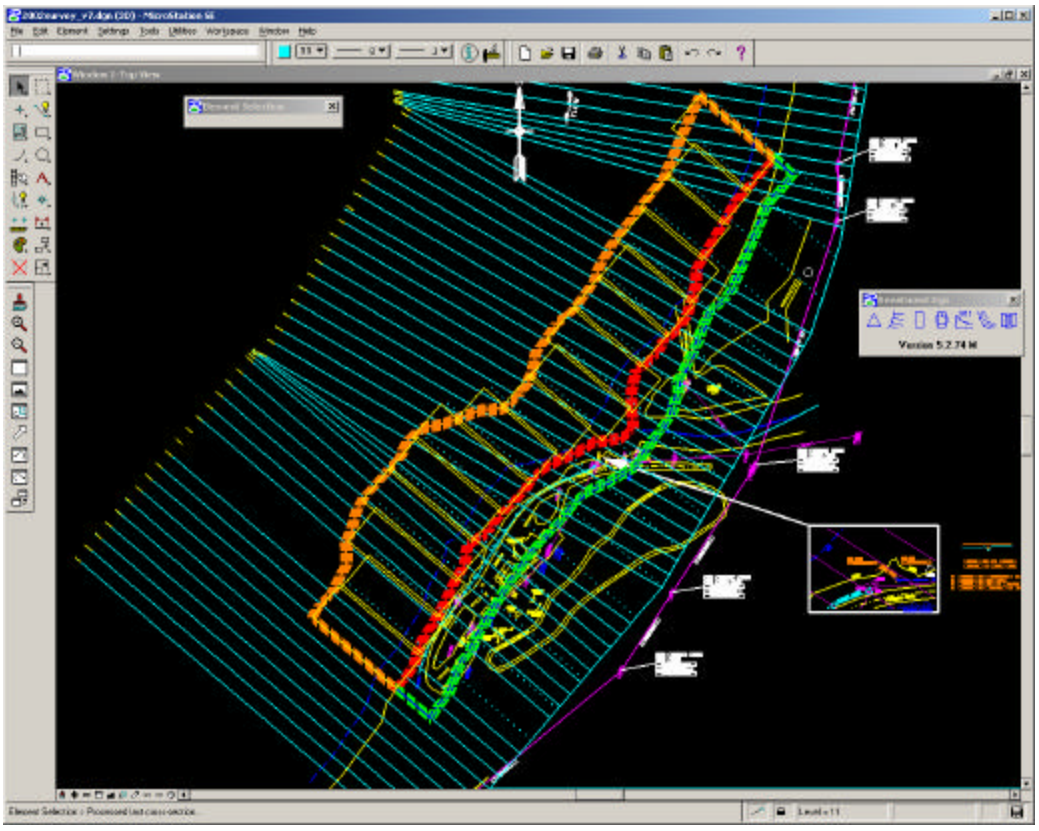
To delete mat(s):

1. Set the mode to Delete
12. Select the Affect to either all upstream or current only. With this option, it does not matter because it will only do one at a time.
13. Toggle on the Select Mat
14. Left click in the plan view in the mat that you want to delete.
15. The mat that you chose should be red.
16. Left click again in the plan view to accept the deletion.
17. Right click to reset the option and to have the program recognize the move.
18. Refresh the view
19. Toggle on Redraw Mats to see the new mat outlines.
20. Repeat as necessary to get the mats where you think that will be laid in the field.

Step 49. Once you are complete and satisfied with the results, toggle on Save Design giving the file a name that would indicate that it is the final design.

Step 50. Toggle on Mats -> Dgn to place the layout of the mats in the design file.

This is how the design file may look displaying the mat limits and the planar limits for the final design. (This example is not a smooth alignment that you would want for the final design.)



Step 51. Toggle on Squares Report to get the final and most accurate count for squares. This report is based on the number of launches necessary to reach the given design limits. The first squares report is based on the area enclosed by the inshore and outshore limits. Thus, if you were to compare the two square reports, you will notice a difference in numbers.

Step 52. You are now complete with the design and ready to clean up and make the remainder of the plan sheets.