Florida Department of

TRANSPORTATION

# Earthwork Records System (ERS) Plot Instructions

April 11, 2022

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## What is MAC ERS?

MAC ERS is the Electronic Earthwork Records System. It includes logbooks for Embankment, Subgrade and Base (known as ESB logbooks) and Drainage. The logbooks are created from points on the plans by Data Entry personnel which MAC uses to generate plots.

## Why is the Department implementing MAC ERS?

There are many advantages to including the ERS records in MAC.

- Eliminates the need to maintain site source records
- Allows for all project acceptance data to be stored in the enterprise application
- Allows for better tracking of Active Technicians for the Independent Assurance Program
- Connects the laboratory soils testing directly to testing the final product in the field
- Eliminates the need for hand recording data that is already included in MAC
    - Summary of Proctor Samples
    - LOT Index
    - Pit Proctor Tracker
    - List of ERS Technicians
- It provides a way for the raw data to be entered directly into the application reducing
    - The instances of transposition errors
    - The need to calculate final results
    - The number of fields needed to document the test

## Will some projects still have paper logbooks after implementation?

Yes, some projects will have paper logbooks. Any job using a paper logbook at the time of implementation will continue until the earthwork operations are complete. The Department will continue to review them for correctness and completeness.

## What if the project has no internet connection?

The Contractor can request the project be designated as a remote contract. The District Materials and Research Engineer (DMRE) will approve or reject the request depending on the availability of the internet at the project site.

## Does this mean a Remote Contract has plots in MAC?

Yes, data entry for a QC company will still need to create plots for a remote contract in MAC so that the test data can be recorded and entered in MAC on the ERS project.

For more questions and responses, see the MAC ERS FAQs.

## Chapter 1 – Navigating to an Existing ERS Project

An ERS Project must be created by a Program Maintenance User (PMU). Each District Materials and Research Office (DMRO) has multiple ERS PMUs. After the ERS Project is created, a Data Entry user from one of the Quality Control (QC) companies can create plots. There may be more than one QC company assigned. When multiple QC companies are assigned, the companies should discuss who will be responsible for creating and updating the plots.

To navigate to an ERS Project:

1. Select the Earthwork Records System menu option.
2. Select the Earthwork Records System submenu option.

The Earthwork Records System screen appears. If you have not worked on an ERS Project before, the screen will say *Please select a ERS Project to View*. If you have worked on an ERS Project before, MAC will default to the last ERS Project you worked on.

3. To navigate to a different ERS Project, or navigate to one for the first time, enter the Financial Project Number (FPN) of the ERS Project in the Go to field and select the FPN from the returned list.

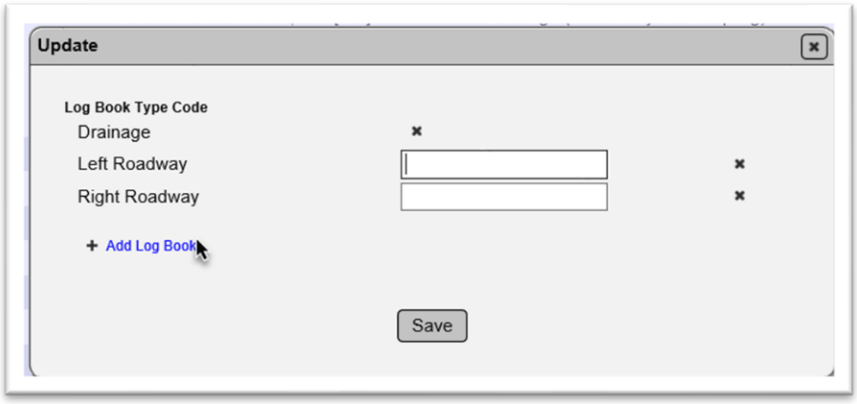
The Earthwork Records System screen for that ERS Project appears. If the ERS Project you need is not found, contact the District Materials and Research Office Earthwork personnel or District Application Coordinator (DAC).

## Chapter 2 – Updating an Existing ERS Project Logbooks

QC data entry can add, update, or delete logbooks.

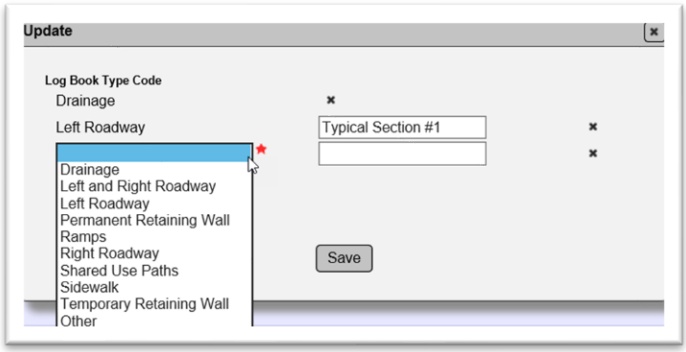
1. Select the Update ( ) icon on the ERS Project.

An Update dialog box appears.




2. Select the Add Log Book option.

A dropdown appears with the Log Book types.



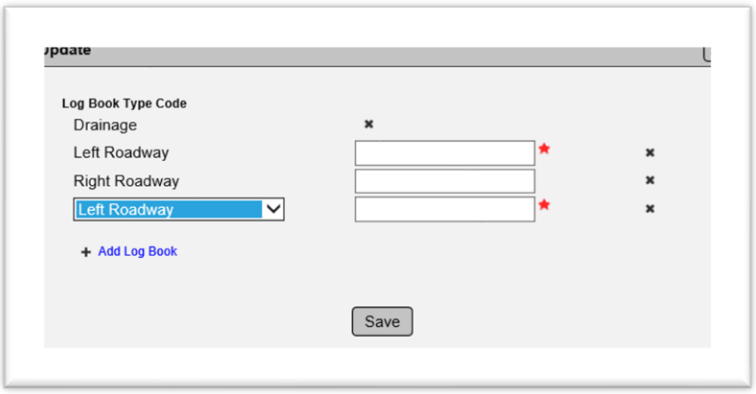

3. **Log Book Type Code** – select the logbook type from the dropdown list.
4. **Name** – enter a name if desired.
5. Update logbook names, if needed.
6. To delete a log book, select the x on the row of the log book.
7. Select the Save option.

**NOTE**: If updates to companies are needed, contact the appropriate DMRO ERS PMU.

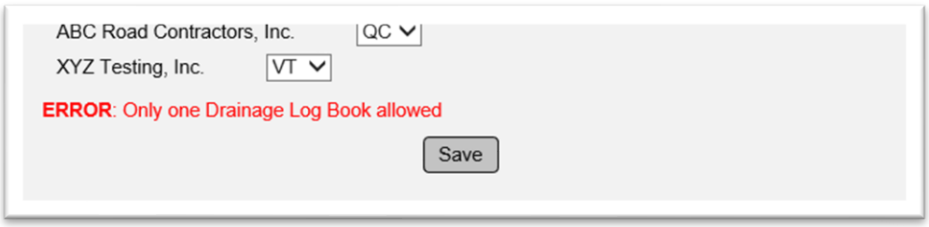
All logbook types except for Drainage are Embankment, Subgrade and Base (ESB) logbooks.

**NOTE:** If other is selected, a name is required.

**NOTE**: If two or more of the same logbook type is selected; for example, two Left Roadway logbooks, the name becomes a required field for all entries.

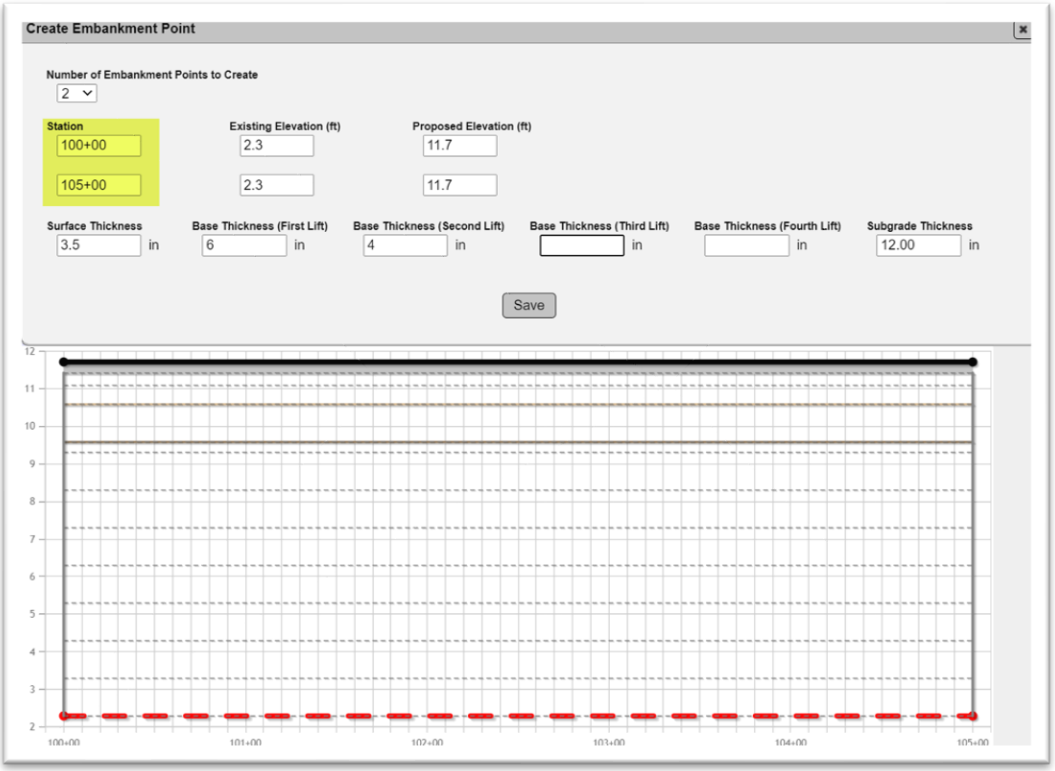



**NOTE**: You can only have one Drainage logbook type per ERS project.




**NOTE**: A separate logbook must be created when there is a station break in the sampling and testing. This is because MAC fills in the entries between station gaps to make it easier for the data entry person to manually enter the embankment points.

For example, if the existing and proposed elevations are the same from Station 100+00 to 105+00, data entry only needs to enter the values for stations 100+00 and 105+00. MAC fills in the data for stations 101+00, 102+00, 103+00, and 104+00.




While this is helpful for ranges with the same data, it means that when there are areas with no densities between stations, different logbooks must be created for each station range. One example of a station break would be a project with a station equation on the plans. One logbook would need to be created for the stationing up to the equation and another for the stationing after the equation. On a project where the densities on the left roadway begin at station 100+00 to station 150+00, but there are none from station 150+00 to station 157+00, and densities begin again at station 157+00 to station 202+00, this would result in 2 Left Roadway logbooks.

| Logbook Type | Logbook Name | Station Range | |
|---|---|---|---|
| Left Roadway | Sta 100+00 – Sta 150+00 | 100+00 | 150+00 |
| Left Roadway | Sta 157+00 – Sta 202+00 | 157+00 | 202+00 |

If only one logbook was created, MAC will generate plots from stations 150+00 to 157+00 when there are no densities for that station range.

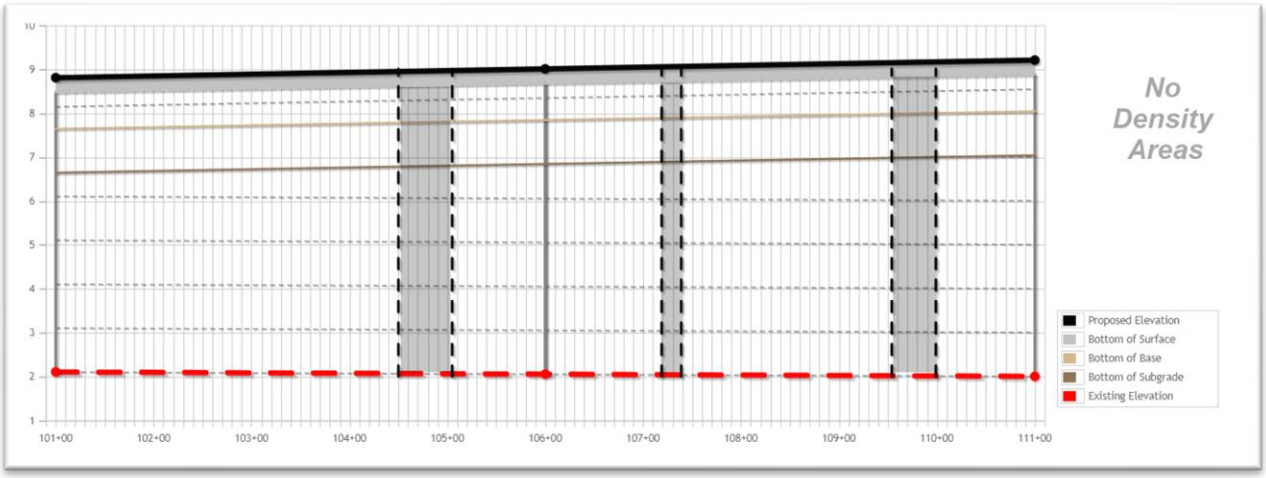
There are exceptions to this, for example, a widening project with multiple breaks for or between driveways or sidewalks. Breaking up the ESB into many small logbooks with short stationing will result in:

- More logbooks to manage and navigate to
- Issues with samples, especially comparison packages since you cannot put samples in different logbooks in the same comparison package
- Issues with the Density report not sorting and grouping samples together

As an alternate, create one logbook as long as it does not exceed 10,000 LF and use plot lines (Chapter 6 B. ESB Plot Lines) to designate the areas that do not have densities.

Plot Lines [6]

| | A | B | | | |
|---|---|---|---|---|---|
| 1 | 104+50, 2.00 | 104+50, 9.00 | Begin no density area 104+50 - 105+05 | Update | Delete |
| 2 | 105+05, 2.00 | 105+05, 9.00 | End no density area 104+50 - 105+05 | Update | Delete |
| 3 | 107+19, 2.00 | 107+19, 9.00 | Begin no density area 107+19 - 107+39 | Update | Delete |
| 4 | 107+39, 2.00 | 107+39, 9.00 | End no density area 107+19 - 107+39 | Update | Delete |
| 5 | 109+54, 2.00 | 109+54, 9.00 | Begin no density area 109+54 - 109+99 | Update | Delete |
| 6 | 109+99, 2.00 | 109+99, 9.00 | End no density area 109+54 - 109+99 | Update | Delete |




Another scenario is the roadway earthwork is constructed as a single operation but there are breaks in the pads for sidewalks.

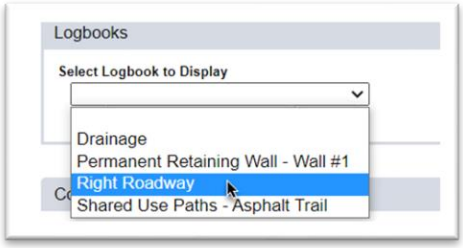
## Chapter 3 – ESB Plots

### A. Embankment Points

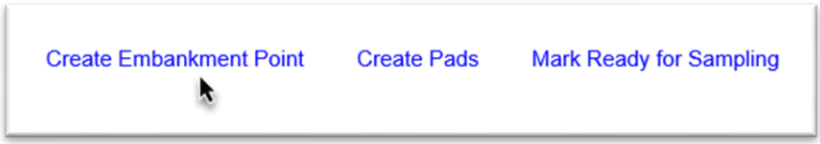
ESB plots are created from embankment points.

#### *1. Creating Embankment Subgrade Base (ESB) Points*

1. Click on the Logbooks tab to expand it.

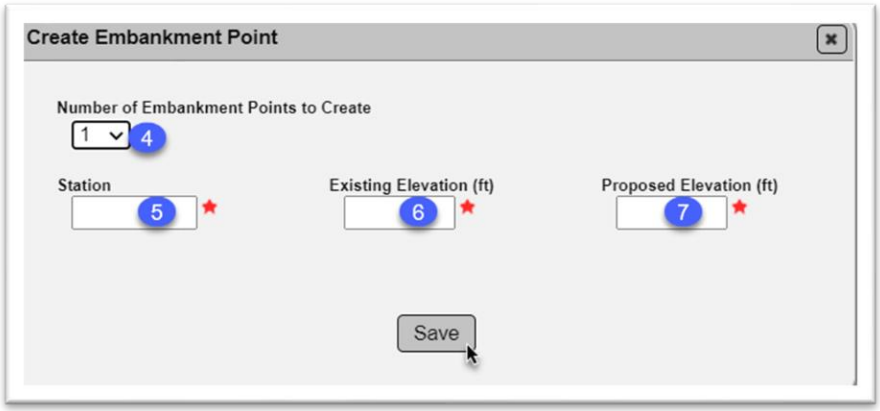



2. Select the logbook from the Display dropdown.




3. Select the Create Embankment Point option.

A Create Embankment Point dialog box appears.



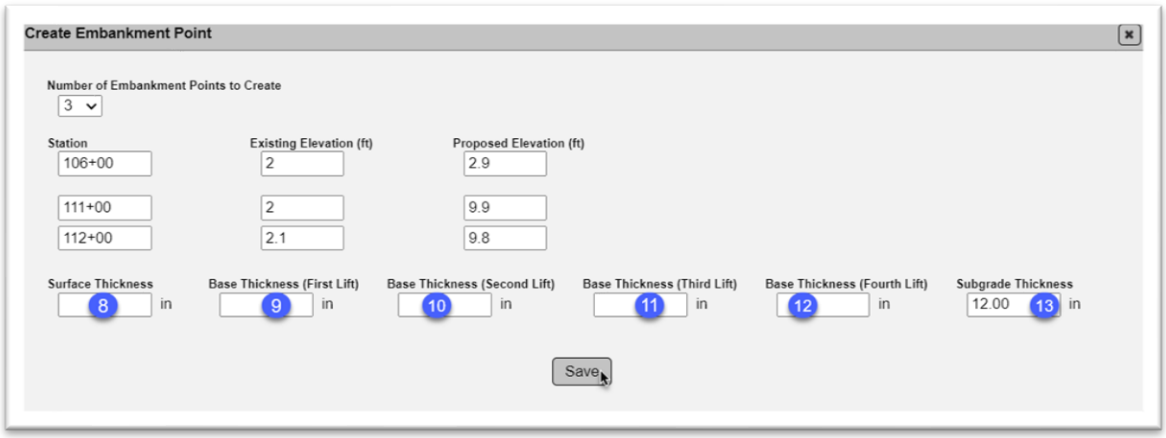

4. **Number of Embankment Points to Create** – Select the number of embankment points needed up to 40 (at a time).

**NOTE**: Each ESB is not limited to 40 entries total. MAC limits more than 40 entries at one time. This is due to system and screen constraints. In many cases, more than 40 entries will be needed for a logbook. To enter more than 40; create and save the first 40 points, then select the Create Embankment Point option again to get the ability to create the next 40 points. Repeat until all points are saved.

**NOTE**: For ESB plots, the data input is in the order of ascending stations.

5. **Station** – Enter the first station number for the plot.
6. **Existing Elevation** – enter the existing elevation from the cross sections for the stations.
7. **Proposed Elevation** – enter the proposed elevation from the cross sections for the station.

New fields appear for layer thicknesses.




8. **Surface Thickness** – from the Typical Section, enter the thickness for the structural and friction asphalt courses added together. For example, if the structural course is 2” and the friction course is 1 ½”, enter 3.5.
9. **Base Thickness (First Lift)** – enter the thickness of the first base lift.
10. **Base Thickness (Second Lift)** – enter the thickness of the second base lift.

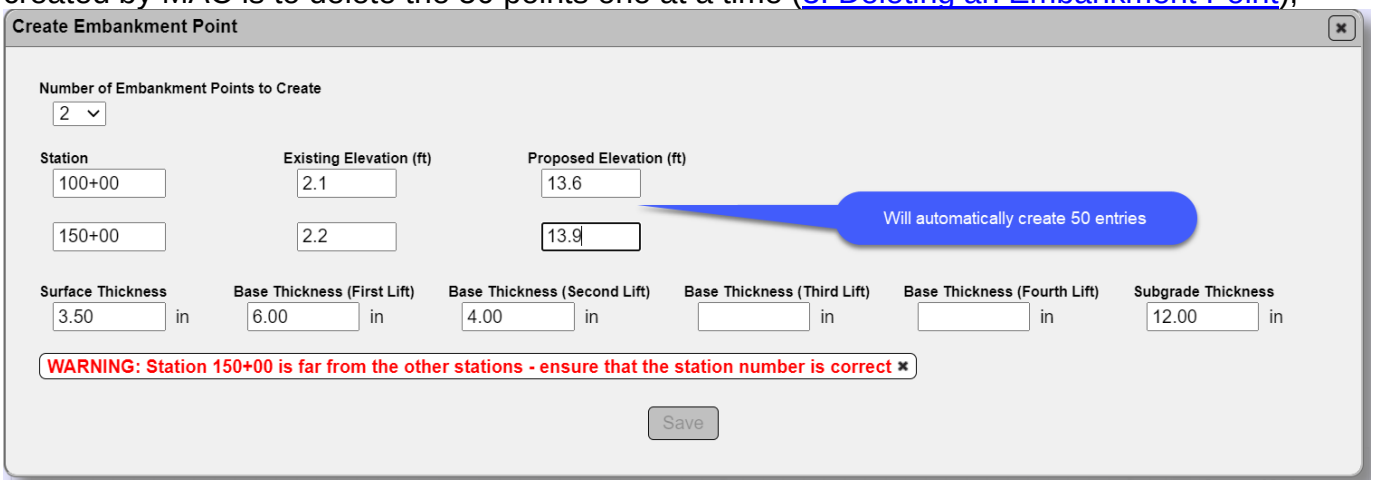
As an example, if the Base Group 9 option that was selected by Contractor was Limerock 10”, enter the values for the first and second lift. It would be either 5” for each, 6” and 4”, or 4” and 6”, depending on the method of constructing the lifts.

11. **Base Thickness (Third Lift**) – if the base group option requires the base to be constructed in 3 lifts, enter the thickness of the 3rd base lift.
12. **Base Thickness (Fourth Lift)** – in rare cases, like graded aggregate base, the base thickness may exceed 18” total. Since base cannot be placed more than 6” thick, it would require a 4th lift.
13. **Subgrade Thickness** – this field defaults to 12 inches. This is the correct value most of the time.
14. Select the Save option.

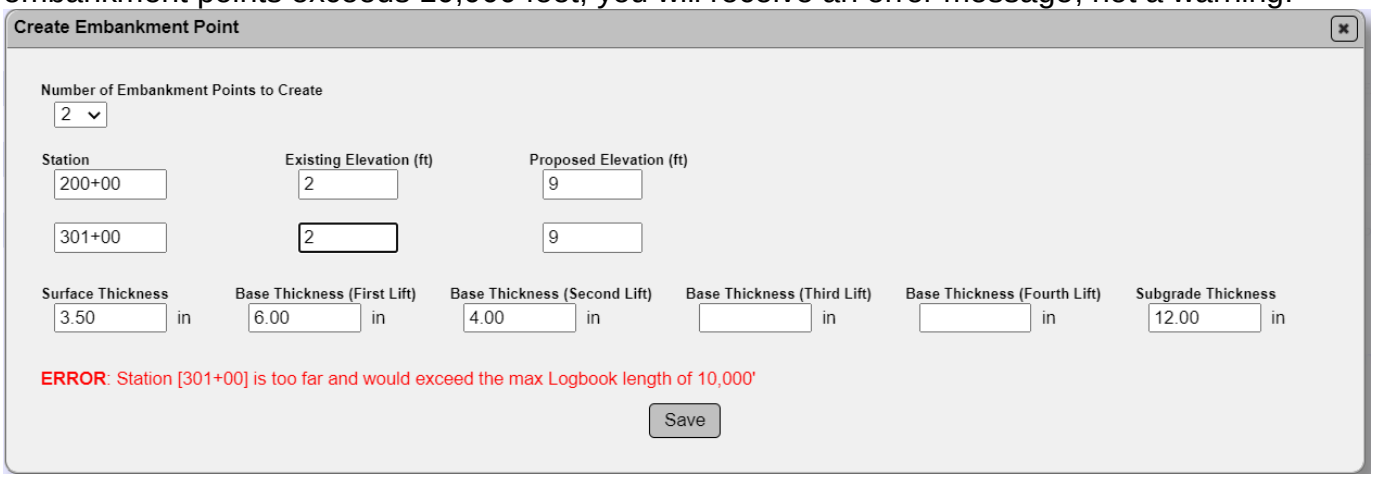
MAC plots the surface, base, subgrade and embankment points. Tabs are added for the Embankment Points, Lots, Pads and Water Table Lines.

**NOTE**: MAC provides a warning if two points appear to be too far apart (500 linear feet between the stations). Dismiss the warning message by clicking on the x on the line of the message to continue. If there is a data entry error, make changes to the data before saving.

In this example, the user meant 100+00 to 105+00 so MAC would create a record for Station 100+00, 101+00, 102+00, 103+00, 104+00 and 105+00 from these two points. They entered 100+00 to 150+00. If the user saves this information, MAC will create 50 entries, instead of 5. If the data error is not fixed before this entry is saved, the only way to fix it after the entries are created by MAC is to delete the 50 points one at a time (3. Deleting an Embankment Point),




**NOTE:** Logbooks are restricted to 10,000 linear feet. If the difference between any of the embankment points exceeds 10,000 feet, you will receive an error message, not a warning.

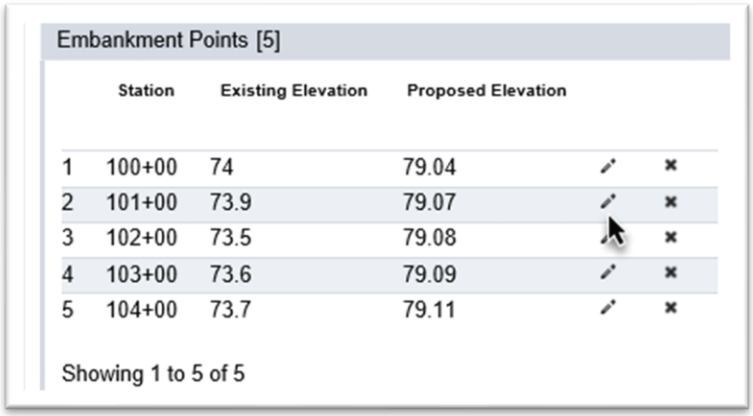



This cannot be dismissed. Another logbook must be created if this error is not due to a data entry error. This is to ensure no single logbook is too large for the system to retrieve and display. If more than 10,000 linear feet is needed, discuss with the appropriate ERS PMU the options for breaking up the logbook, for example by typical section.

### *2. Updating an Embankment Point*

Once you create the embankment points, MAC generates a new subtab where they are listed. You can go to this area to adjust existing embankment points. Once embankment points are created, updates must be made individually.

1. Click on the Embankment Points tab to expand it.



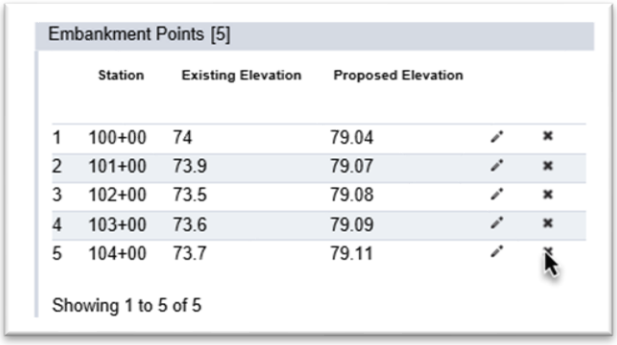

2. Select the Update icon ( ) on the row of the point(s) you want to update.

An Update dialog box appears.

3. Update the Existing Elevation, Proposed Elevation, or both.
4. Select the Save option.

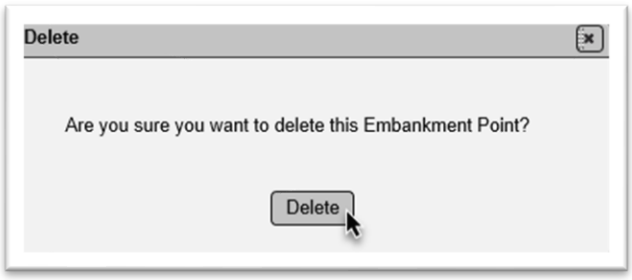
**NOTE**: Most of the time, this will automatically populate values in the lifts data. See J. Adjusting Lifts. Check the lifts to ensure the updates are also applied in the Adjust Lifts process.

### *3. Deleting an Embankment Point*




1. Select the Delete icon (x) on the row of the point(s) you want to delete.

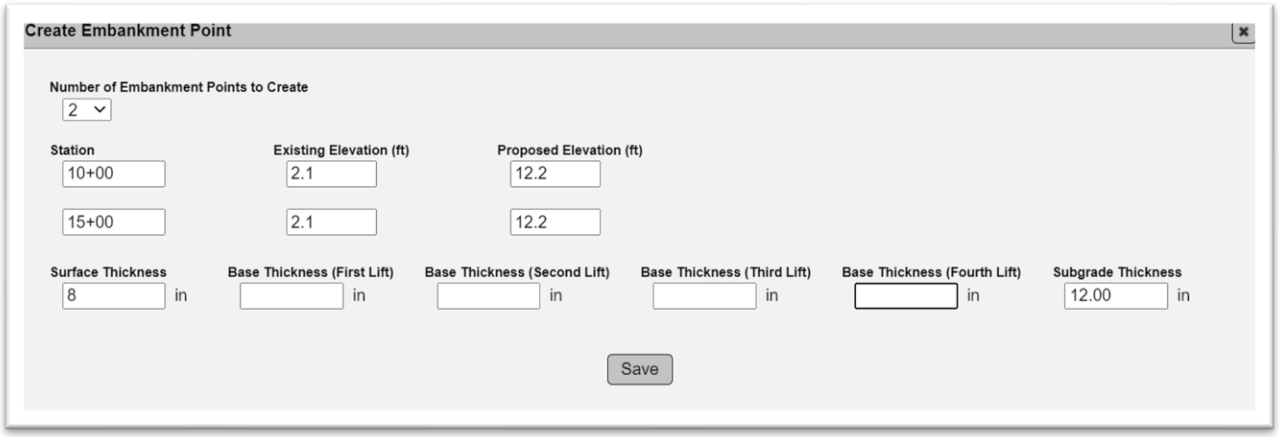
A Delete dialog box appears.




2. Select the Delete option.

## B. ESB Values for Asphalt Base

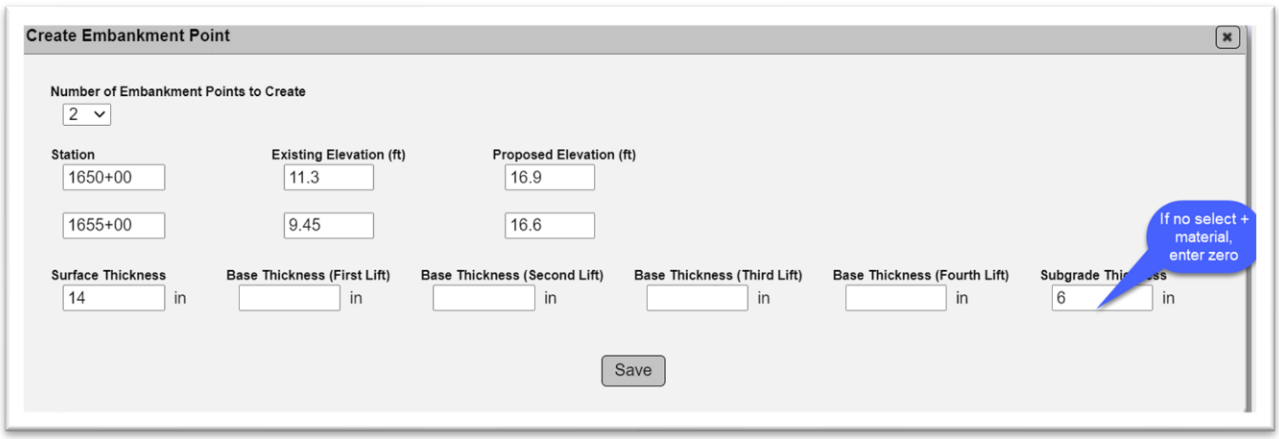
When Asphalt Base is used, the thicknesses need to be adjusted. Include the thickness of the asphalt base in the surface thickness. For example, the typical section shows Optional Base Group 10 and the contractor elected to use asphalt base that is 4 ½ inches thick. The typical section also shows a structural thickness of 2 inches and a friction course of 1 ½ inches. The surface thickness would be 8.00 inches (4.5+2+1.5). The base thickness values are left blank.



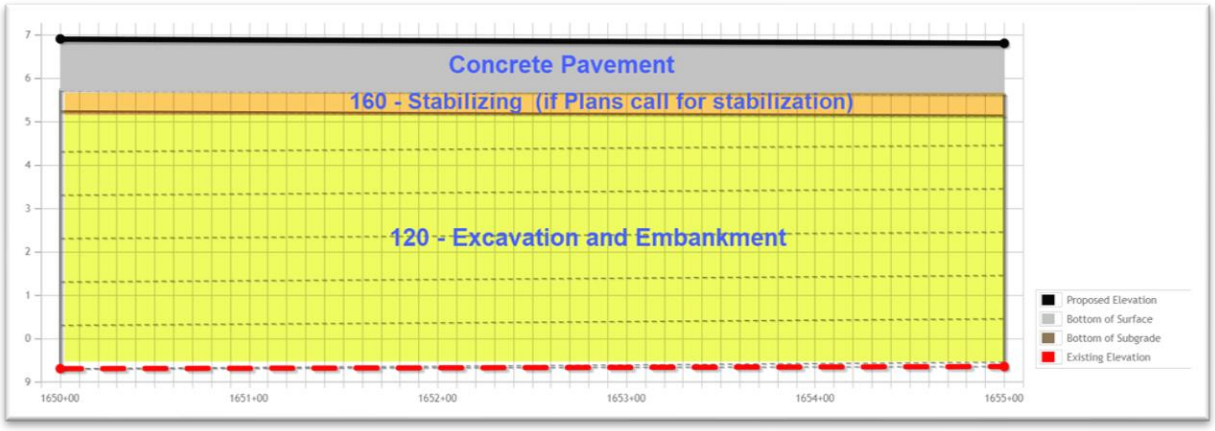
The plot appears like this:

## C. ESB Values for Concrete Pavement

For concrete pavement is, enter the thickness of the concrete pavement as the surface thickness. Leave the base thickness values blank. Concrete pavement doesn't normally have stabilizing. If there is no stabilizing, remove the default of 12" by entering a zero. If it there is stabilizing (known as select + material) enter the value from the Plans; for example, 6".

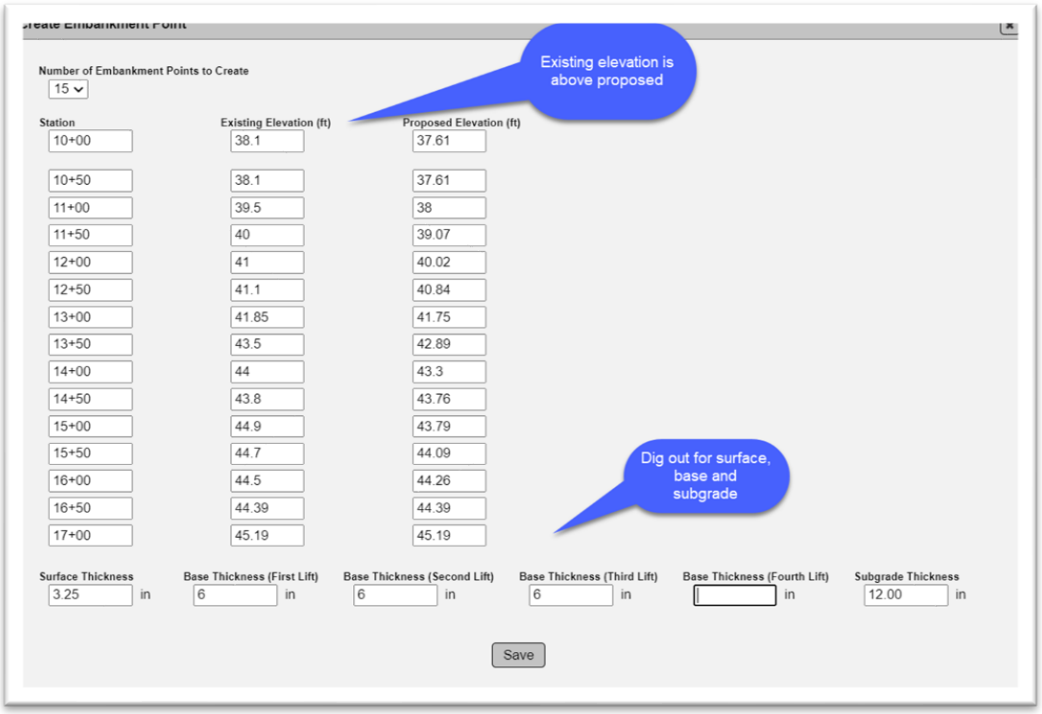


The plot appears like this.

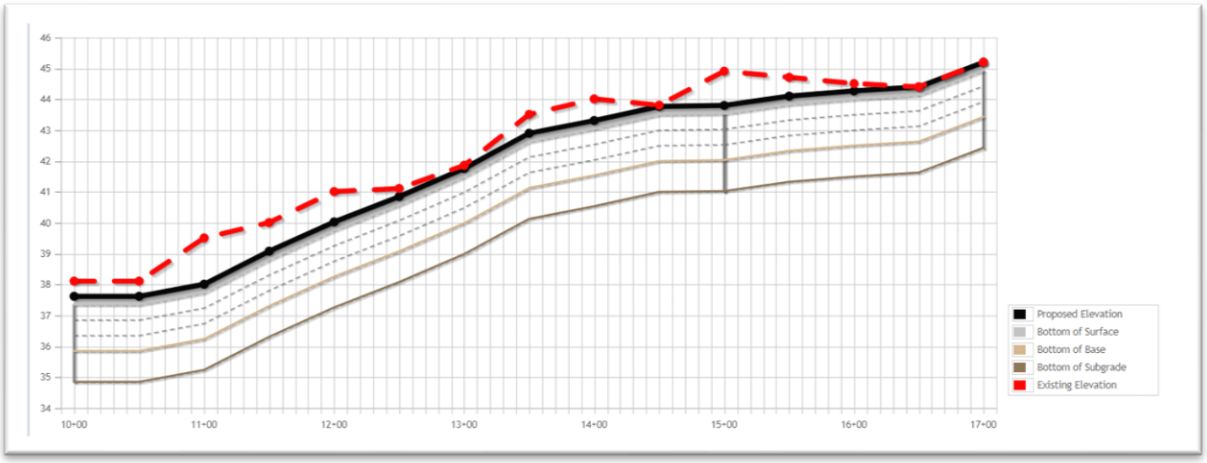



D. Plotting Dig outs when the Existing Elevation is above the Fill

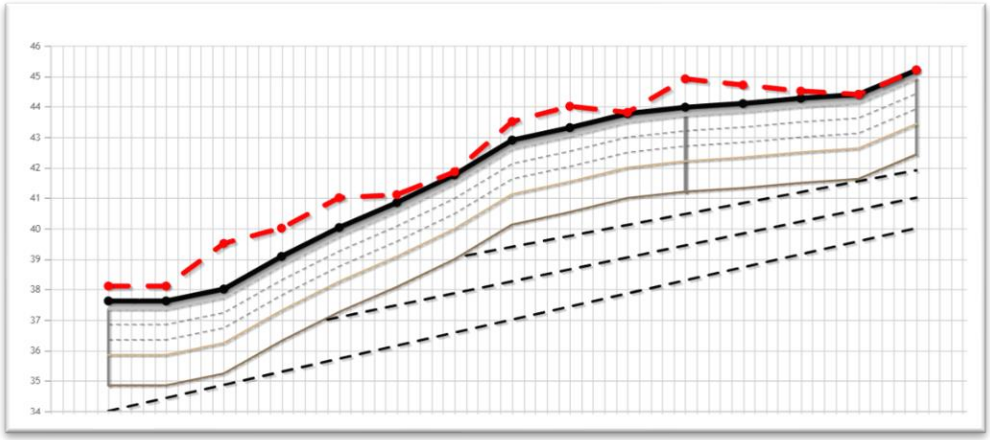
When there are areas that need to be dug out and replaced below the existing elevation, for example, cutting out for graded aggregate base, the plots need to reflect this as follows:



The plots appear as such:




The system does allow densities anywhere below existing elevation in case embankment lifts are needed. If there are cut scenarios, below the subgrade, they will need to be designated with plot lines (Chapter 6, Section B. ESB Plot Lines).

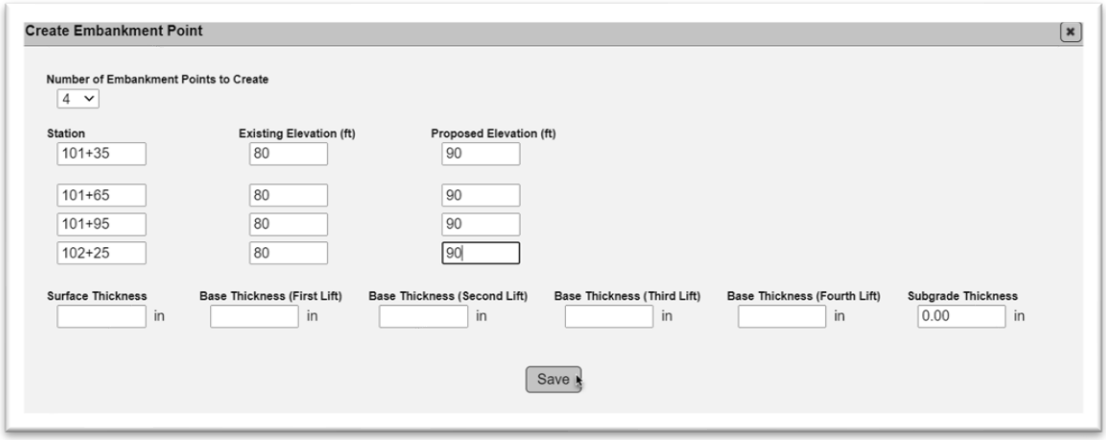


## E. Step Lines

### *1. Creating Step Lines*

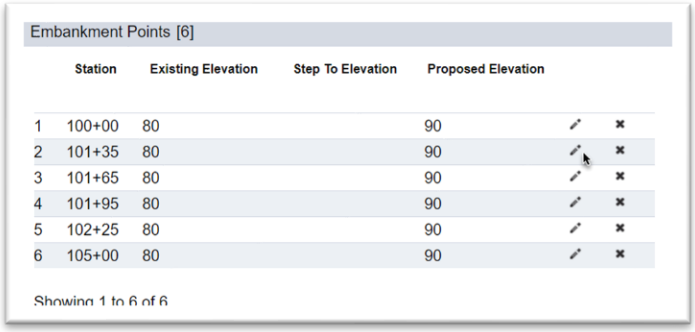
Sometimes plots need to step up or down. MAC will not permit you to enter more than one elevation per station. There is a way to step elevations up or down by using step lines. When step lines are needed, new points may be needed for existing elevations for the step lines to be plotted correctly. Let's look at an example for a retaining wall. The original elevation is 80' and the proposed elevation is 90 from station 100+00 to 105+00. At station 101+35 it steps up to elevation 82'. It remains at elevation 82' until station 101+65 where it steps up again to elevation 83'. It remains at elevation 83' until station 109+95 where it steps back down to elevation 82'. It remains at elevation 82' until it steps back down again to elevation 80 at station 102+25.

We have elevations at stations 100+00 and 105+00. For the step locations, we need to create an entry at 101+35, 101+65, 101+95 and 102+25.




1. If the original data does not include an original and proposed elevation for every station and step point needed, create new entries for each step location. The original and proposed elevations should match the current lines before accounting for the steps. In our example, we are entering the same existing and proposed elevations at the new locations.

2. Click on the Embankment Points tab to expand it.

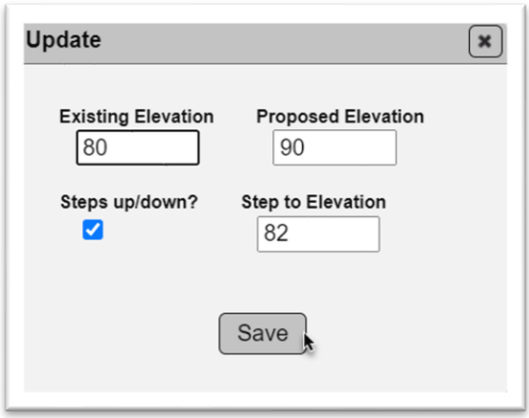



3. At the embankment point for the first step up or step down, select the Update ( ) icon.

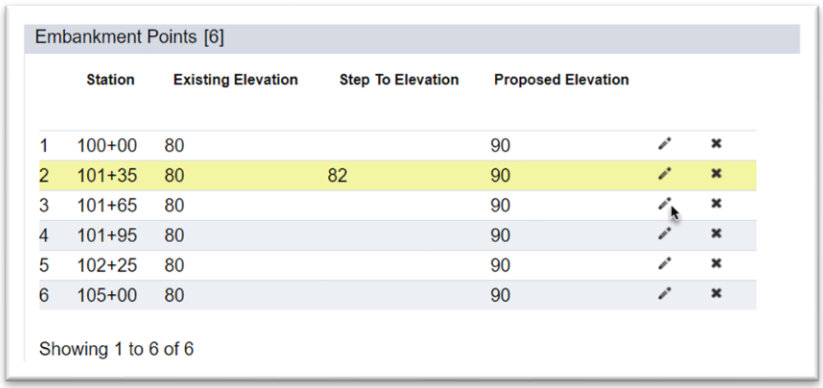
An Update dialog box appears.

4. **Steps up/down?** – select the indicator.

A new field for Step to Elevation appears.




5. **Step to Elevation** – enter a higher elevation above the existing elevation for a step up. Enter a lower elevation below the existing elevation for a step down. Our example is stepping up from 80 to 82.
6. Select the Save option.

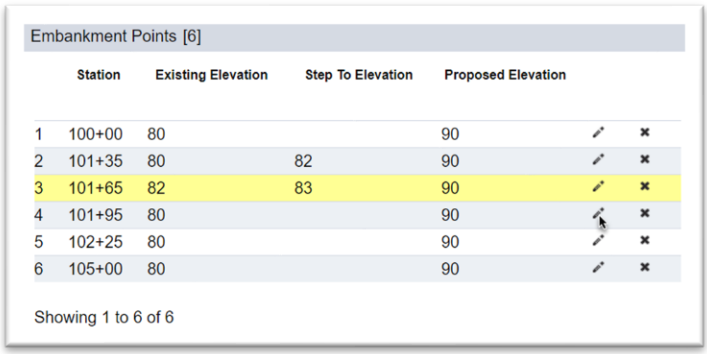



7. Select the Update icon on the embankment point where the step ends. In this example, there is also a step up at the same elevation.

An Update dialog box appears.

8. **Existing Elevation** – update the existing elevation to the step elevation, in our case from 80’ to 82’.
9. **Steps up/down?** – select the Step up/down? Indicator.
10. **Step to Elevation** – enter a higher elevation for a step up. Enter a lower elevation for a step down. Our example is stepping up from 82’ to 83’.
11. Select the Save option.

The area remains at 83’ until station 101+95. It also has a step down at this elevation back to elevation 82.



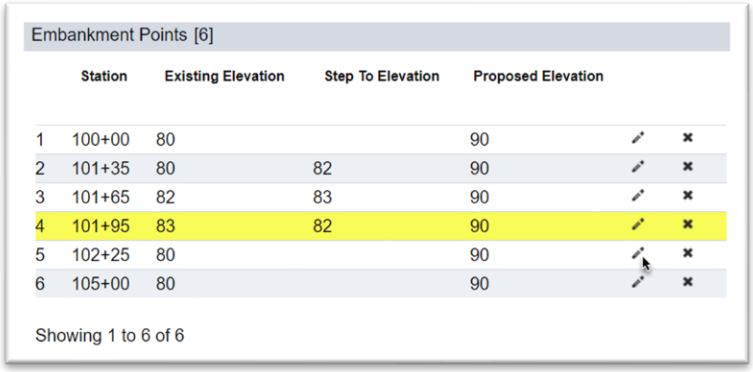

12. Select the Update icon on the embankment point where the step ends.

An Update dialog box appears.

13. **Existing Elevation** – update the existing elevation to the step elevation, in our case from 80’ to 83’.
14. **Steps up/down?** – select the Step up/down? Indicator.

15. **Step to Elevation** – enter a higher elevation for a step up. Enter a lower elevation for a step down. Our example is stepping down from 83’ to 82’.
16. Select the Save option.

Now for the final step at station 102+25.

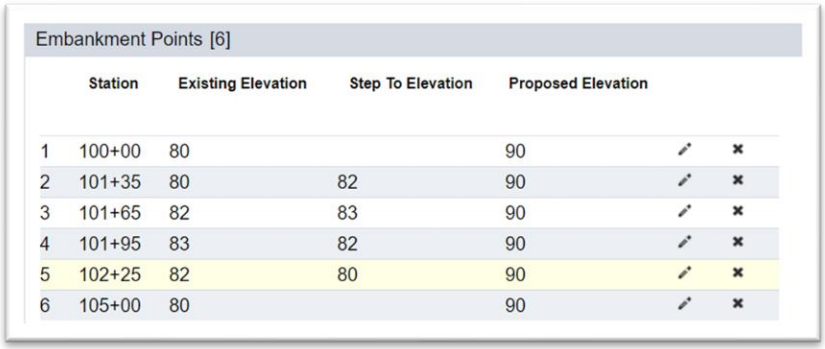



17. Select the Update icon on the embankment point where the original step ends.

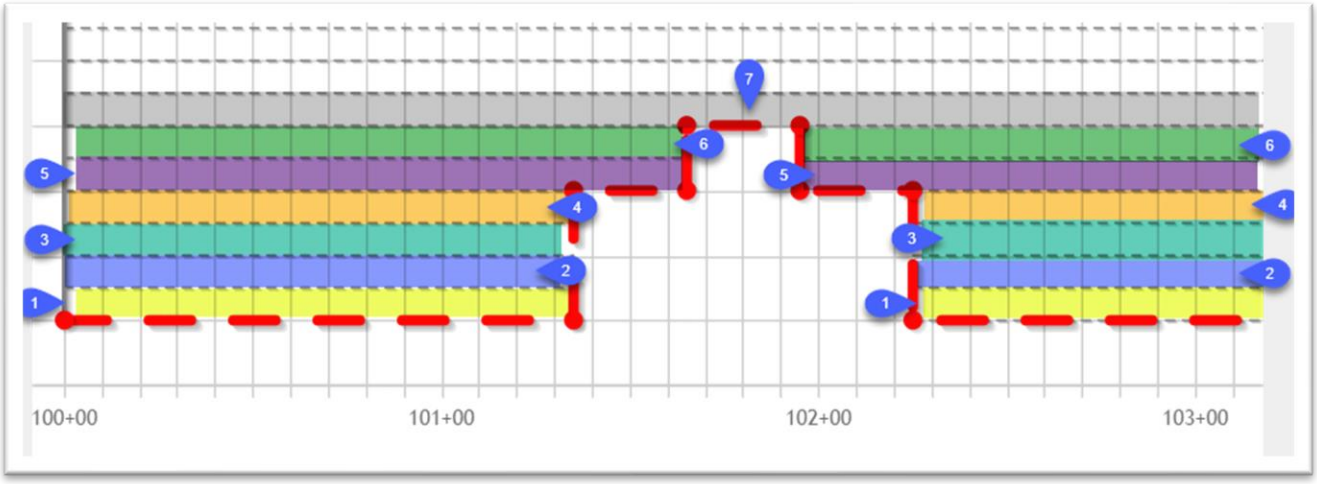
An Update dialog box appears.

18. **Existing Elevation** – update the existing elevation to the step elevation, in our case from 80’ to 82’.
19. **Steps up/down?** – select the Step up/down? Indicator.
20. **Step to Elevation** – enter a higher elevation for a step up. Enter a lower elevation for a step down. Our example is stepping down from 82’ to 80’.
21. Select the Save option.

The embankment points have been updated to these values:



The plots are redrawn to account for the steps we created. There are lifts on both sides of the steps for lifts 1 – 6 and lift 7 is one lift across the area and above the steps.




Not all step lines will follow this process exactly. These instructions follow the given example. You may not need to step up or down at every location. It may be helpful to draw a diagram and outline the step locations and elevations for the situation before you attempt to enter the step line data.

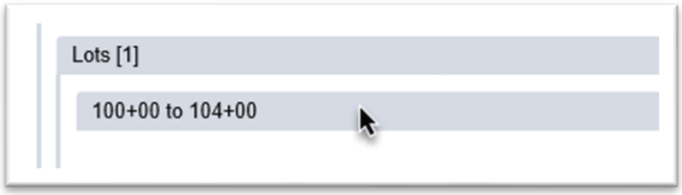
### *2. Updating and Deleting Step Lines*

Step lines are stored as embankment points. Follow the instructions in Section A, 2. Updating an Embankment Point or Section A,3. Deleting an Embankment Point.

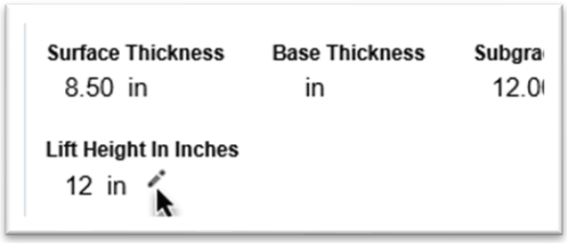
## F. Updating Lift Height

The entries for the surface and base lift thickness are stored under the Lots tab.

1. Click on the Lots tab to expand it.

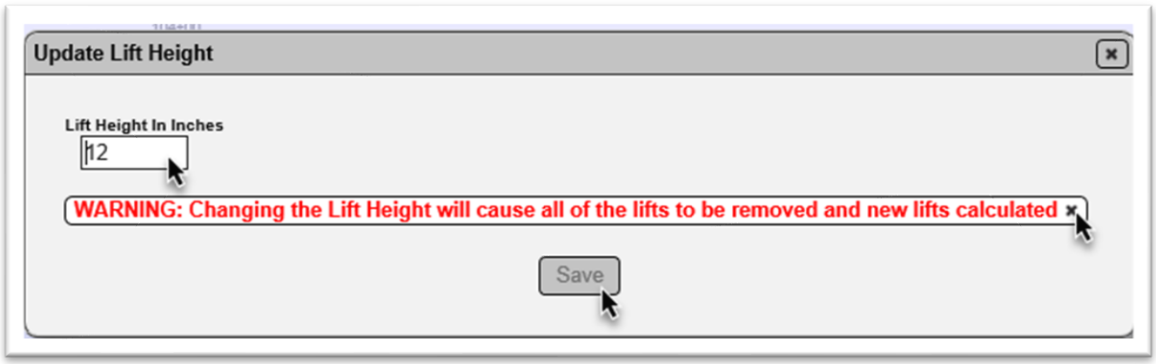



2. Click on the subtab of the Lot you want to update.




3. Select the Lift Height Update icon ( ).

An Update Lift Height dialog box appears. Even though the embankment lift thickness is specified at 6 inches, most Contractors request to construct thick lifts, so the default is 12 inches.

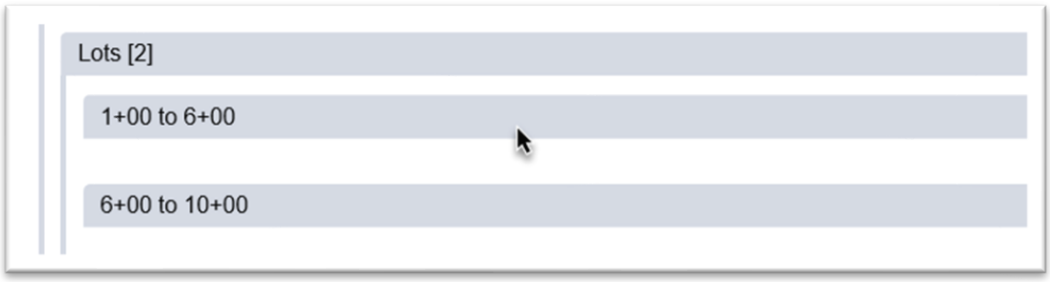



4. **Lift Height in Inches** – if 12-inch lifts are not constructed, revise the entry to the thickness constructed; for example, 6.
5. Dismiss the warning by selecting the x by the message. This message advises that changing this value causes MAC to recalculate the lots.
6. Once you dismiss the warning, the Save option will not appear greyed out. Select it to save new thickness value.

MAC will recalculate the lifts and replot the ESB plot.

### G. Updating Lot Values

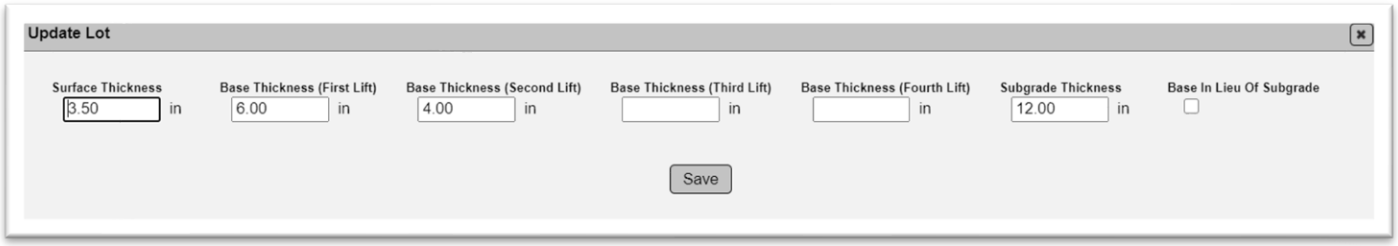
If other values, such as surface or base lift thicknesses, need to be adjusted, they are stored under the Lots tab. If the updates are needed on more than one lot, each lot subtab must be individually updated.




1. Click on the tab of the Lot you need to adjust to expand it.

2. Select the Update Lot option.

An Update Lot dialog box appears.




3. Make changes to the data as needed.
4. Select the Save option.

### H. Limerock in Lieu of Subgrade

If limerock is used in lieu of subgrade, different values are needed. Since this is typically an adjustment for field conditions, instructions are included in Chapter 6, Section A, 7. Limerock in Lieu of Stabilizing

### I. Splitting Lots & Merging Split Lots

Sometimes after the plots are created, a lot that was originally planned must be split to indicate that the lot is not being constructed as one operation. This is described in Chapter 6, Section A, 1. Splitting Lots and 2. Merging Split Lots.

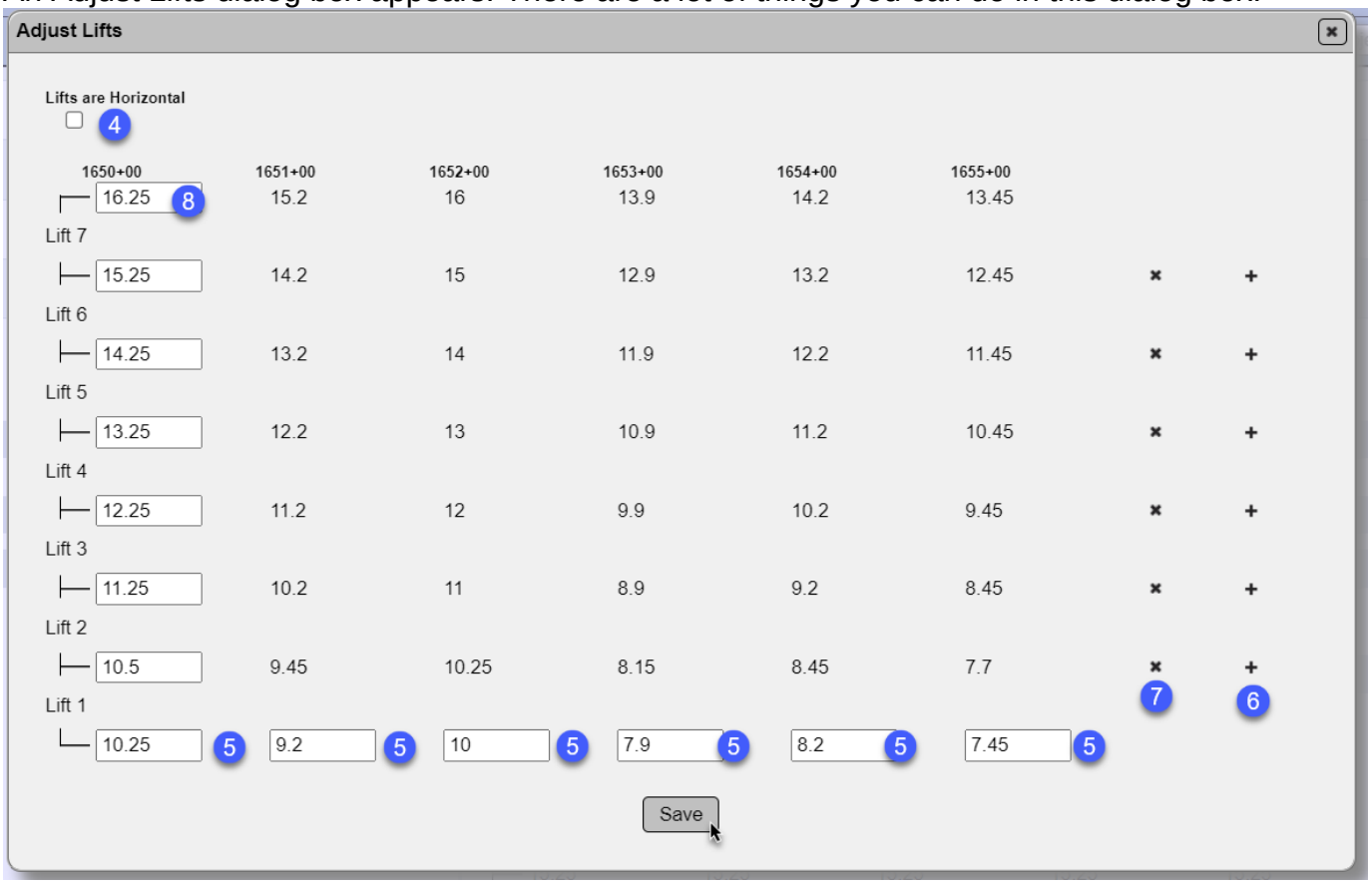
### J. Adjusting Lifts

When the calculated lifts need to be revised, you can use the Adjust Lifts option to make changes.

1. Click on the Lots tab to expand it.
2. Click on the subtab of the Lot you need to adjust the lifts.

3. Select the Adjust Lifts option.

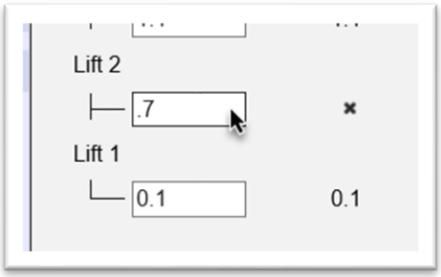
An Adjust Lifts dialog box appears. There are a lot of things you can do in this dialog box.




4. **Lifts are Horizontal** – MAC defaults to plotting the lift lines parallel to the line created from the original elevations. If the contractor builds the lifts horizontally, select this indicator and MAC will draw the lift lines horizontally.

**NOTE**: Lift plots default to following the proposed elevations. They can be adjusted to being plotted horizontally if the Contractor builds the lifts horizontally. This setting applies to all lifts so it must be set before samples are taken. This adjustment should not be revised once samples are taken.

5. **First Lift Elevations** – You can adjust the way MAC draws the plot lines manually by revising one or more of the entries on this line.
6. **Add Lift** – to insert a lift between the lifts calculated by MAC based on the lift thickness, select the Add Lift (+) icon on the lift you want to insert. For example, selecting the first Add Lift icon on the bottom of the dialog box will add a new lift 2 and move the current lift 2 to lift 3.




Add an original elevation for the new inserted lift. MAC will calculate the plot line for the new lift based on the elevation and other factors; for example, if Lifts are Horizontal indicator is selected.
7. **Remove Lift** – if you need to remove a lift, select the Remove Lift (x) icon on the lift you wish to remove.
8. **Lift Elevations** – make changes as needed to any specific lift elevation.
9. Select the Save option to apply adjustments.

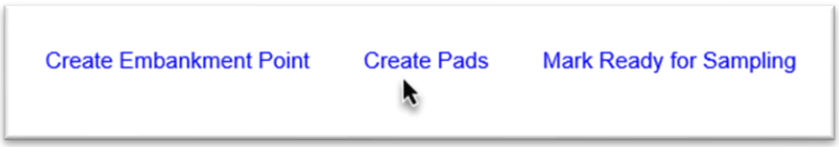
## K. Water Table Lines

Since water table lines are typically an adjustment for field conditions, instructions are included in Chapter 6, Section A, 4. Creating a Water Table Line, 5. Updating an Existing Water Table Line and 6. Deleting an Existing Water Table Line.

## L. Base and Subgrade Pads

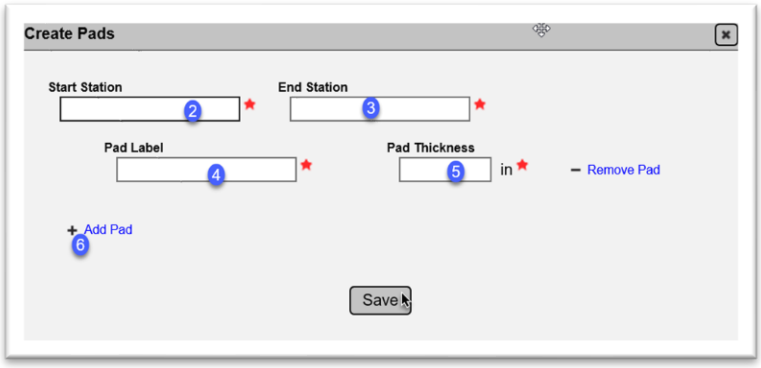
Stabilization and Base have irregular areas that may not be reflected in the standard ESB plot. These areas can be added to the plots as pads.

### *1. Creating a Pad*



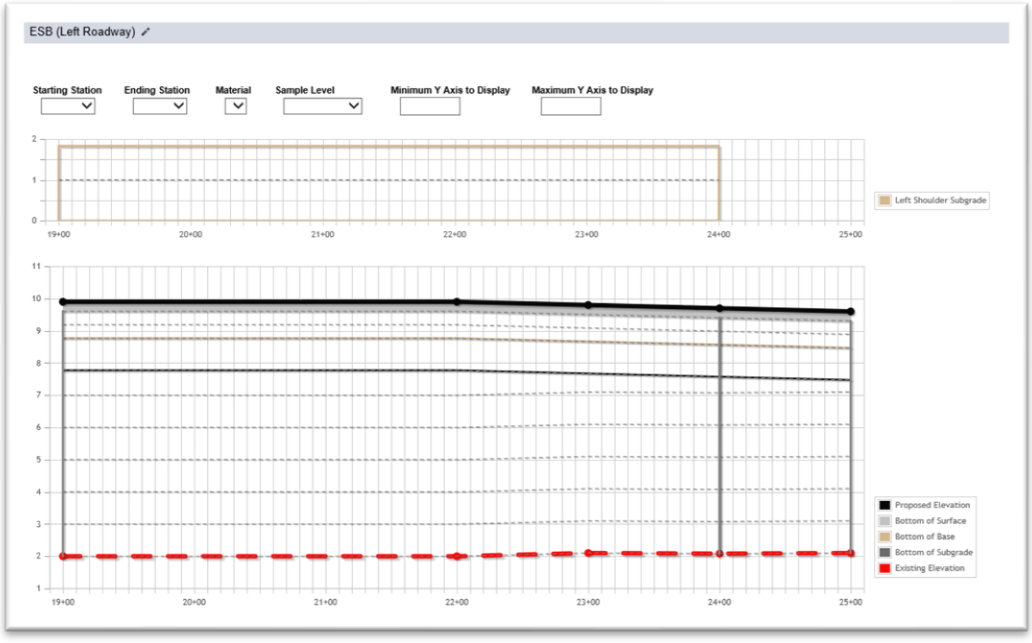

1. On the logbook where you want to create a pad, select the Create Pads option.

A Create Pads dialog box appears.




2. **Start Station** – enter the beginning station of the pad.
3. **End Station** – enter the ending station of the pad.
4. **Pad Label** – enter a name/label of the pad. Since Pads are for base and subgrade and are located on the left or right roadway, label the pads Subgrade or Base for Left or Right Roadway logbooks. For logbook type Left and Right Roadway, each pad can be labeled Right Subgrade, Left Subgrade, Right Base, Right Subgrade.
5. **Pad Thickness** – if the contractor constructs the entire thickness in one operation, enter the full thickness of the pad. If the contractor constructs part of the thickness in the ESB and part in the pad, enter the thickness that is not represented in the ESB. For example, if the full thickness is 20” and 12” was constructed and is tested with the ESB, enter 8”.
6. **Add Pad** – select the Add Pad option to create more pads.
7. Select the Save option.

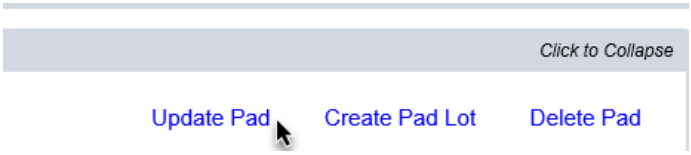
The pads appear above the ESB plots in the logbook you created them for.



### *2. Updating a Pad*

If you need to make changes to an existing pad, select the Update Pad option.

1. Click on the Pads tab to expand it.
2. Click on the tab of the pad you wish to update.

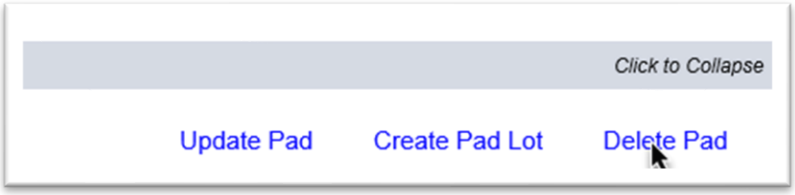



3. Select the Update Pad option.

An Update Pad dialog box appears.

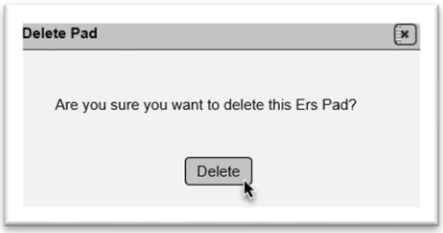
4. Make changes to the Label, order or thickness as needed.
5. If needed, you can update the inch line where the lift begins. Originally this was entered as a full depth of 20”. MAC sets the first lift from 0” – 12” by the value “12”. It sets the second lift from 12” – 20” (a thickness of 8” – what is left over after the first depth of 12”) with the value of “20”.
6. Select the Save option.

### *3. Deleting a Pad*




1. Select the Delete Pad option.

A Delete Pad dialog box appears.




2. If you are sure you need to delete the entire pad, select the Delete option.

The Pad will be deleted. If you only need to delete some of the pad lots, but not the entire pad, do not use this function. See Chapter 6, Section A, 11. Deleting a Pad Lot.

### *4. Pad Lot Adjustments*

Because adjustments to Pad Lots are typically field adjustments, the functions are described in the are included in Chapter 6, Section A, 9. Creating a Pad Lot, 10. Splitting a Pad Lot and 11. Deleting a Pad Lot

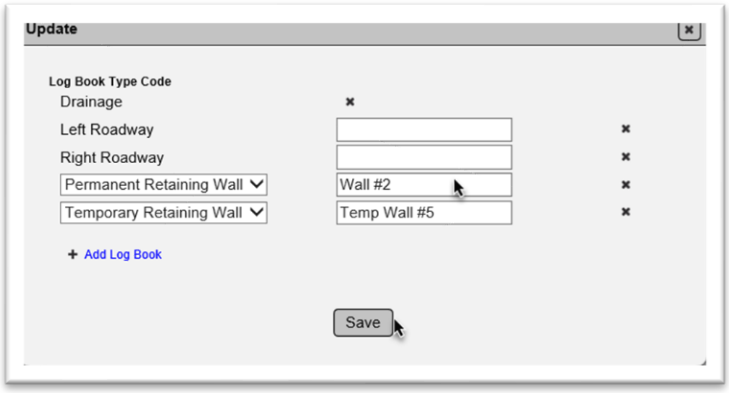
## M. Plot Lines

Plot Lines are non-intelligent lines that you can add to a plot to make notations. Instructions for Plot Lines can be found in Chapter 6, Section B. ESB Plot Lines.

## N. Walls

### *1. Creating a Retaining Wall Logbook*

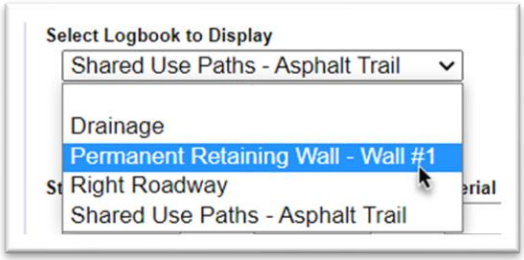
Following the instructions in Chapter 2 – Updating an Existing ERS Project Logbooks, there are two logbook types for walls: Permanent Retaining Walls, and Temporary Retaining Walls.



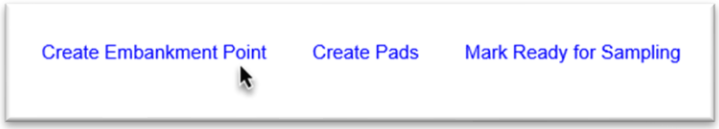

1. **Log Book Type Code** – select the logbook type for the wall, permanent or temporary.
2. **Name** – retaining wall log books should have a name even if there is only one on the project. The suggested name is the Wall #.
3. Select the Save option.

### *2. Creating a Retaining Wall Plot*

1. Click on the Logbooks tab to expand it.

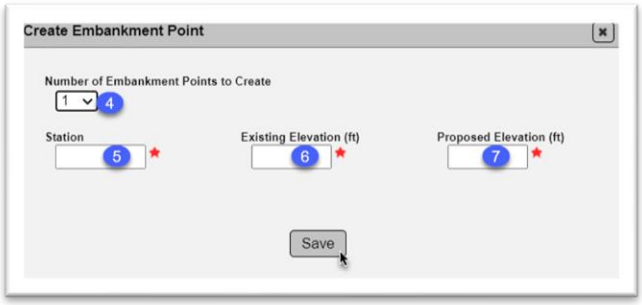



2. Select the logbook from the Display dropdown.




3. Select the Create Embankment Point option.

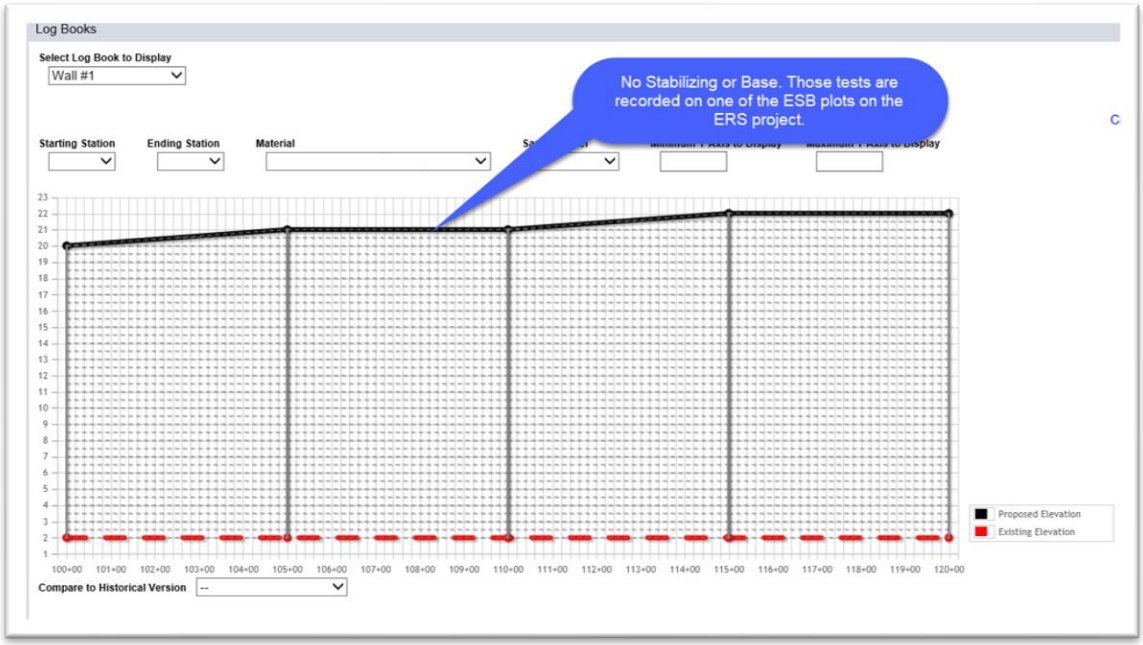
A Create Embankment Point dialog box appears.



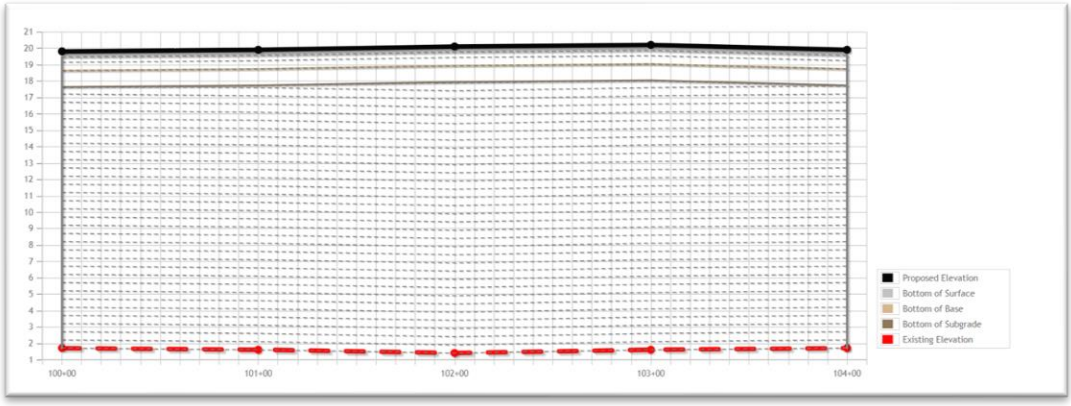

The instructions for creating ESB for a retaining wall are the same as described in Chapter 3, A. Creating Embankment Subgrade Base (ESB) Plots.

For retaining walls where some of the densities are recorded in another logbook, the proposed elevation should be equal to the top lift where the retaining wall densities occurred. For example, if the retaining wall densities will be recorded up to elevation 20' in the retaining wall logbook and the densities above elevation 20' will be in another ESB plot, enter 20 in the proposed elevation field.

This is an example of a plot for a retaining wall that only has densities for the retaining wall and densities above this proposed elevation are in another logbook. A comment should be made in the retaining wall density logbook that the area above the retaining wall is recorded in a different logbook.



This is an example of a retaining wall that includes all the densities for all the ESB layers in the same retaining wall logbook.

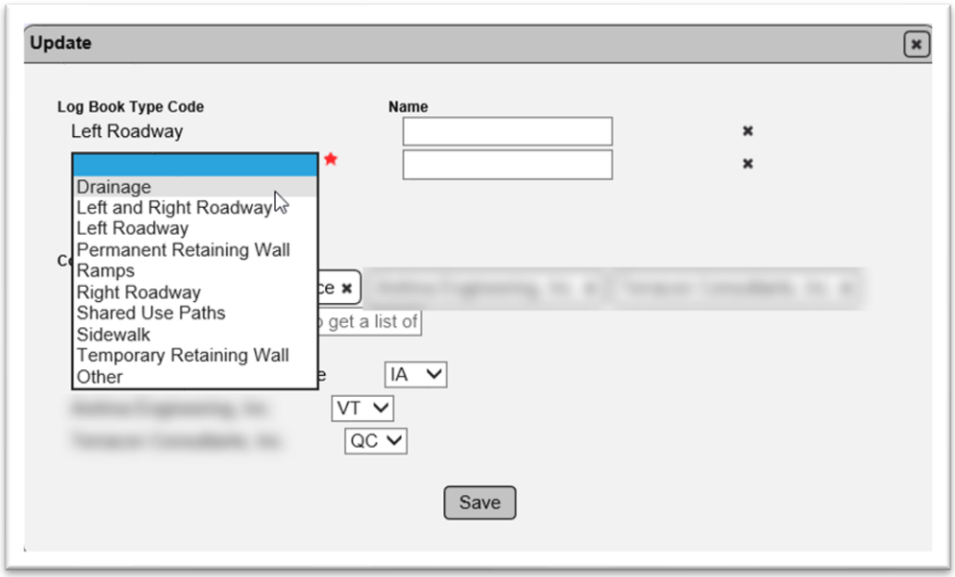



### *3. Updating and Deleting Retaining Wall Plots*

Follow the instructions in Section A, 2. Updating an Embankment Point and Section A,3. Deleting an Embankment Point.

## Chapter 4 – Drainage Plots

### A. Creating a Drainage Logbook




1. In the Update dialog box, select the Drainage Log Book Type Code.
2. Make other change as needed.
3. Select the Save option.

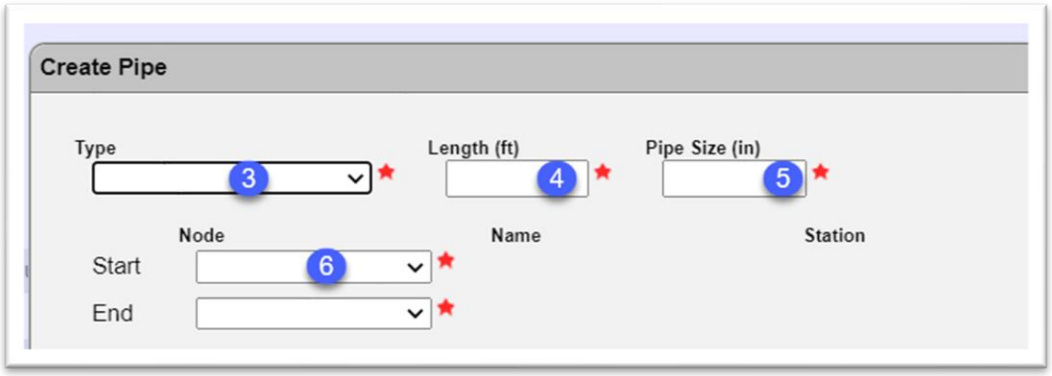
The Drainage logbook will be added designated as Not Ready for Sampling. All drainage related entries are meant to be included in a single Drainage logbook so only one can be selected. There is no option to name the logbook since it is the only entry for Drainage.

### B. Pipe Plots

#### *1. Creating a Pipe Plot*

1. Click on the Drainage tab to expand it.
2. Select the Create Pipe option.

A Create Pipe dialog box appears.




3. **Type** – select the type of pipe from the dropdown list.

**NOTE**: For drainage (pipe run) plots, the data runs the length of the pipe from the beginning to end of the pipe, regardless of the pipe type being a side drain or cross drain. The drainage structure is in the order of ascending station. Box culverts should be treated like a pipe and the data entered is the length of the box culvert from beginning to end.

**NOTE**: If any other type of pipe is selected, most of these types require a physical sample of the pipe to be submitted to the State Materials Office. You may wish to notify the QC Manager and PA and remind them that at the time the pipe is being installed to account for the sampling requirement.

4. **Length** – enter the pipe length in feet.
5. **Pipe Size** – enter the sizes of the pipe in inches; for example, 18.

6. **Start Node** – Select the starting end of the pipe run from the dropdown list. The first pipe created will have three options; add new structure, mitered end and other. Other is used for situations like tying into an existing structure or pipe run. As you add structures, they will be available to be selected. If Add New Structure is selected, a Name field appears.

7. **Name** – enter the structure name; for example, S-16.
8. **Station** – enter the station from the contract plans for the structure or mitered end.
9. **Bottom Slab Thickness (in)** – this field defaults to 8 inches. If the bottom slab thickness is not 8 inches, update this field to the correct thickness in inches.
10. **Invert Elevation** – enter the invert elevation.
11. **Flow Line** – enter the flow line of the pipe from the structure or mitered end from the contract plans.
12. **Top Elevation** – enter the top elevation from the contract plans for the structure or mitered end.

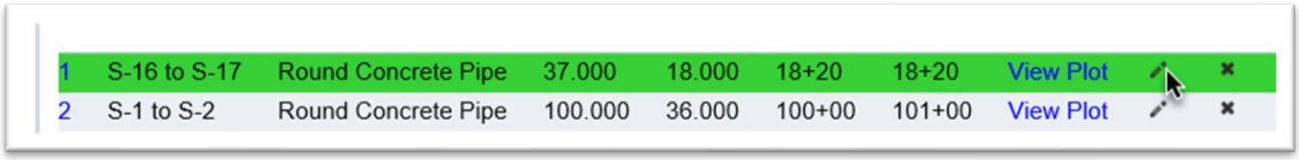
13. **End Node** – select the end of the pipe run from the dropdown list.
14. **Name** – if Add New Structure is selected in the end field, enter the structure name; for example, S-102.
15. **Station** – enter the station from the contract plans for the structure or mitered end.

16. **Bottom Slab Thickness (in)** – this field defaults to 8 inches. If the bottom slab thickness is not 8 inches, update this field to the correct thickness in inches.
17. **Invert Elevation** – enter the invert elevation.
18 **Flow Line** – enter the flow line of the pipe from the structure or mitered end from the contract plans.
19. **Top Elevation** – enter the top elevation from the contract plans for the structure or mitered end.
20. Enter any comments about the pipe run, if desired.
21. Select the Save option.
22. Repeat until all pipe runs are created.

The drainage plot will be added to the Drainage tab list of plots. The structures will appear under the Structures subtab that is added when a drainage plot is created.

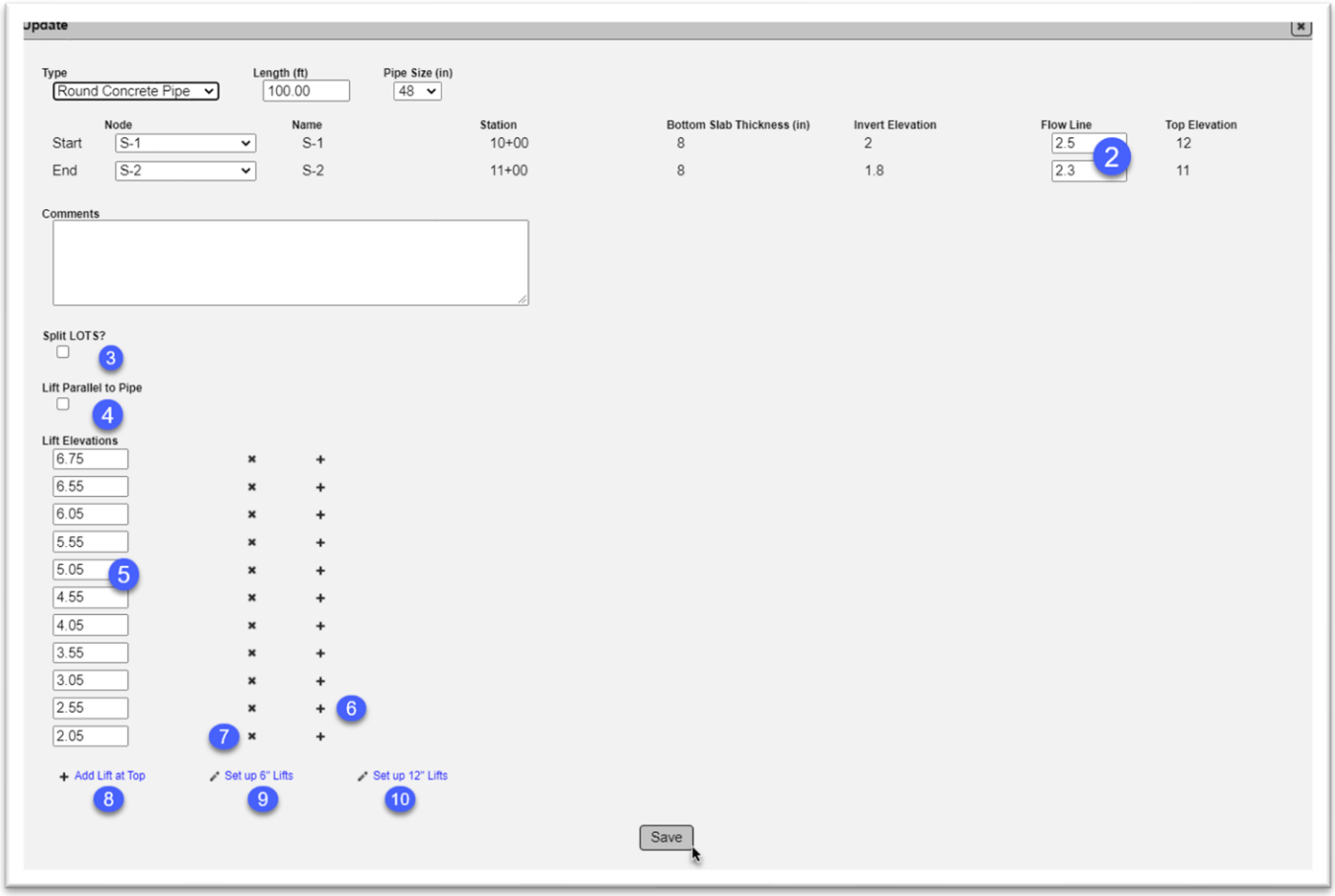
### *2. Updating a Pipe Plot No Split Lots*

Once a plot is created, some fields can be updated if needed. When viewing drainage plots with more than one entry, the row of the plot being displayed is highlighted in green.



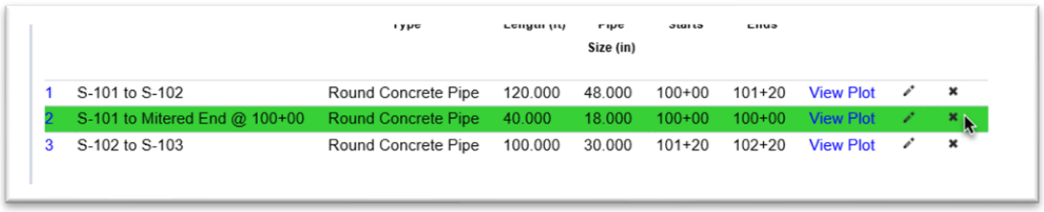

1. Select the Update icon ( ) of the row you wish to update.

An Update dialog box appears. You cannot update the structure elements in this dialog box. See Chapter 4, Section B 4. Updating a Structure.



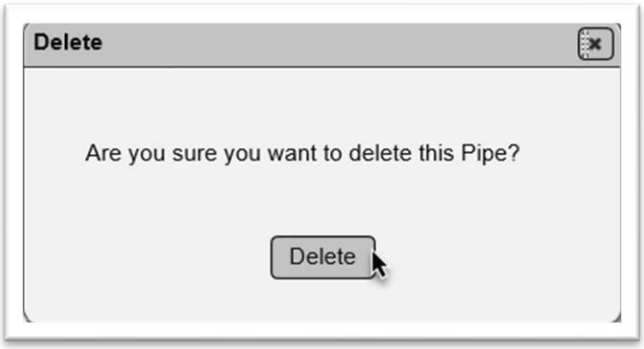

2. **Flow Line Elevations** – you can update the flow line for each structure, if needed.
3. **Split Lots?** – see Chapter 6, Section C, 2. Splitting Pipe Run Lots.
4. **Lifts Parallel to Pipe** – MAC defaults to horizontal lifts on pipe runs. In most cases, this is correct. If the pipe lifts are constructed parallel to the pipe run, select this indicator.
5. **Lift Elevations** – each lift elevation can be individually adjusted.
6. **Add Lift** – to add a lift at the bottom of the pipe run or in between lifts, select the Add Lift (+) option.
7. **Delete Lift** – to delete a lift, select the Delete Lift (x) icon.
8. **Add Lift at Top** – select this option if a lift is needed at the top of the pipe run.
9. **Set up 6” Lifts** – MAC defaults to 6” lifts for pipe runs. If the lifts display as other than 6” and need to be adjusted, select this option.
10. **Set up 12” Lifts** – if there are locations that allow for 12” lifts, select this option to reset the lifts at 12” thicknesses.
11. Select the Save option.

### *3. Deleting a Pipe Plot*




1. Select the Delete icon (x) on the row of the pipe plot you wish to delete.

A Delete dialog box appears.



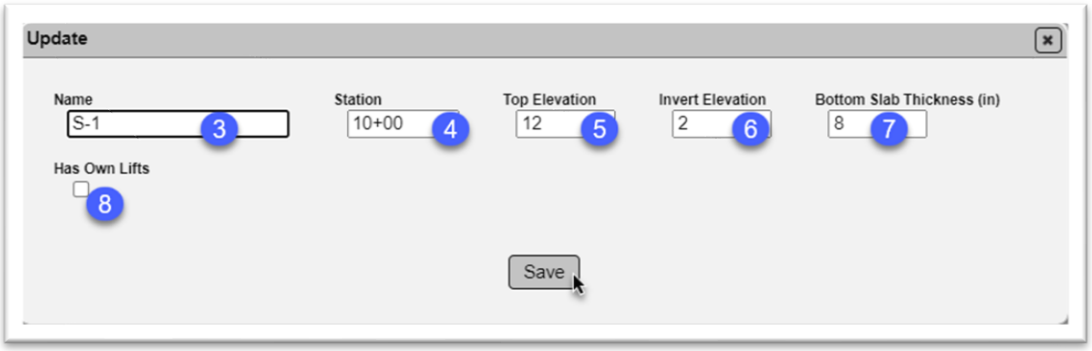

2. Select the Delete option.

**NOTE**: Deleting a pipe plot does not delete the structures created when the plot was created. See Chapter 4, Section B 5. Deleting a Structure.

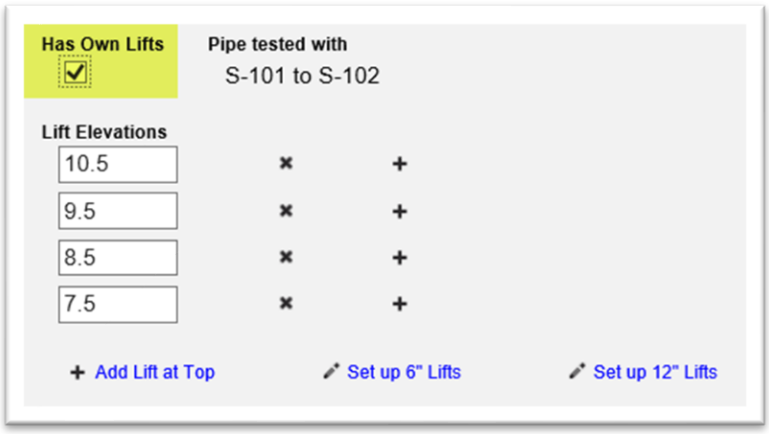
### *4. Updating a Structure*

1. Click on the Structures subtab to expand it.
2. Select the Update icon ( ) of the row you wish to update.

An Update dialog box appears.

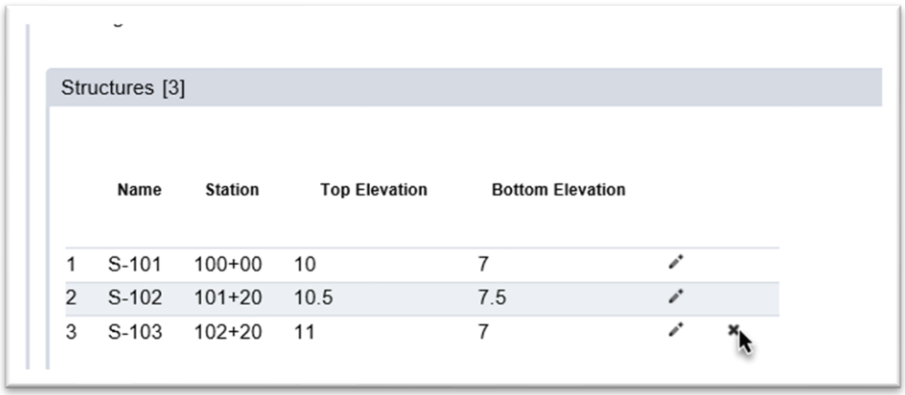



3. Make changes as needed.
4 – 7 described on page 31 (1. Creating a Pipe Plot).
8. **Has Own Lifts** – select this indicator if the structure is compacted separate from the pipe run. This creates lifts around the structure and accounts for separate lifts for the structure and the pipe run in the lift logic.
9. Select the Save option.



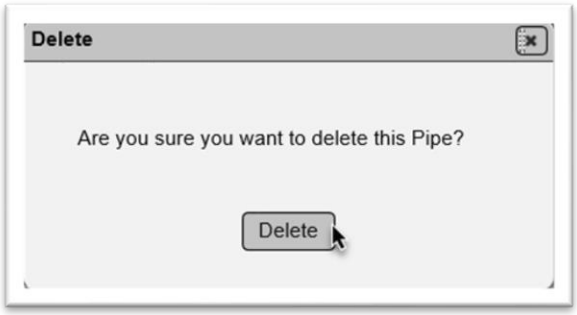

### *5. Deleting a Structure*

The Delete option will not always be available when structures are part of a pipe plot. It only appears on structures where the pipe plot has been deleted.




1. Select the Delete option (x) on the row of the structure you wish to delete.

A Delete dialog box appears.




2. Select the Delete option.

### *6. Box Culverts*

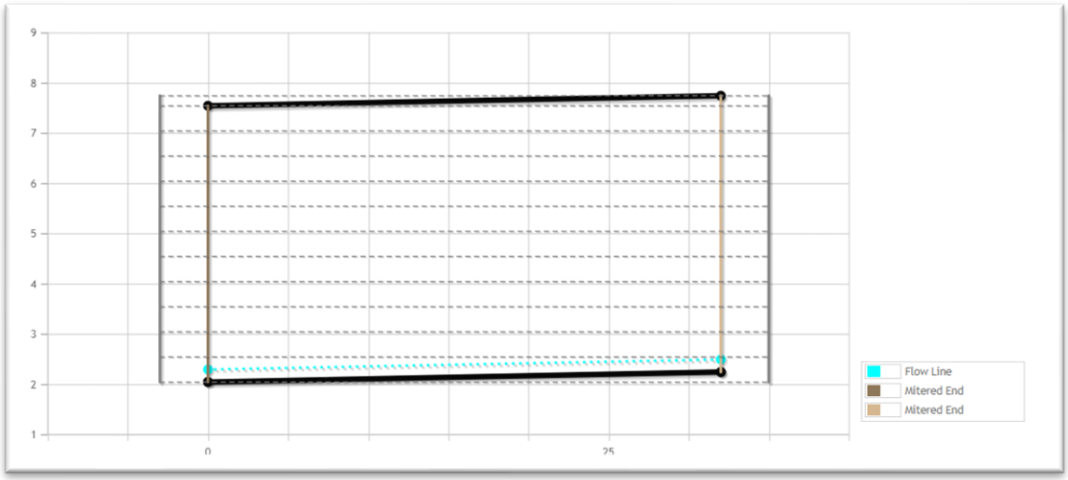
Box culverts are created as a pipe run.

1. Select the Create Pipe option.

A Create Pipe dialog box appears.

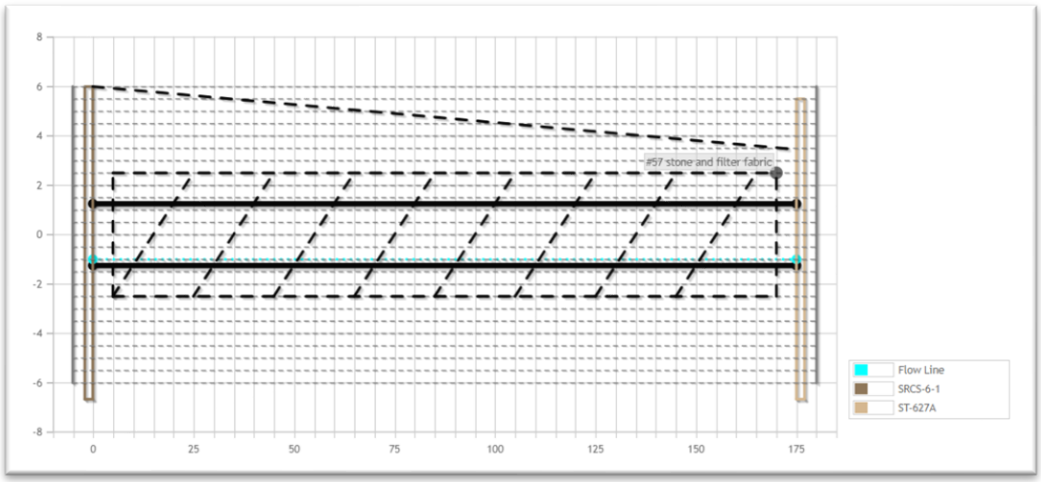
2. **Type** – select Box Culvert from the Type dropdown list.
3. **Length** – enter the box culvert length in feet.
4. **Pipe Size** – enter the size of the box culvert in inches.
5. **Start Node** – select Mitered End so MAC will draw the box culvert as a box.
6. **Station** – enter the starting station for the box culvert.
7. **Flow Line** – enter the flow line elevation.
8. **End Node** – select Mitered End so MAC will draw the box culvert as a box.
9. **Station** – enter the ending station for the box culvert.
10 **Flow Line** – enter the flow line elevation.
11. Enter any comments about the pipe run, if desired.
12. Select the Save option.

MAC will plot the box culvert.




### *7. French Drains*

French drains are plotted like pipe runs, except plot lines are used to separate coarse aggregate and normal embankment backfill. The plot lines represent perforated pipe areas and filter fabric envelop.




## C. Plot Lines

Plot Lines are non-intelligent lines that you can add to a plot to make notations. Instructions for Drainage Plot Lines can be found in Chapter 6, D. Drainage Plot Lines since these are most used to indicate field conditions such as a trench.

## D. Water Table Lines

Since water table lines are typically an adjustment for field conditions, instructions are included in Chapter 6, Section C, 4. Creating a Water Table Line, 6. Updating a Water Table Line and 7. Deleting a Water Table Line.

## Chapter 5 – ERS Project Comments

There are several places within an ERS Project to make comments.

### A. ERS Project Comments Tab

The Comments Tab at the bottom of the screen applies to the entire ERS project.

### B. Logbook Comments

#### *1. Comments on ESB LOTs*

The Comments subtab under each LOT applies to that LOT of the ESB.

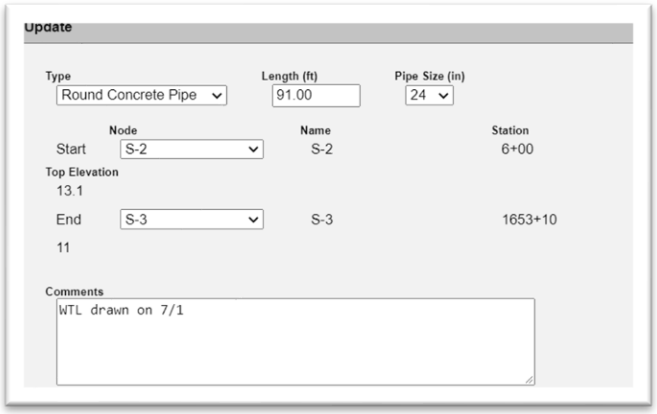
#### *2. Comments for Pads, Plot Lines and Water Table Lines*

There is currently no option to make comments on these areas of the ESB. Use the LOTs comments tab to document information about a pad, plot line or water table line.

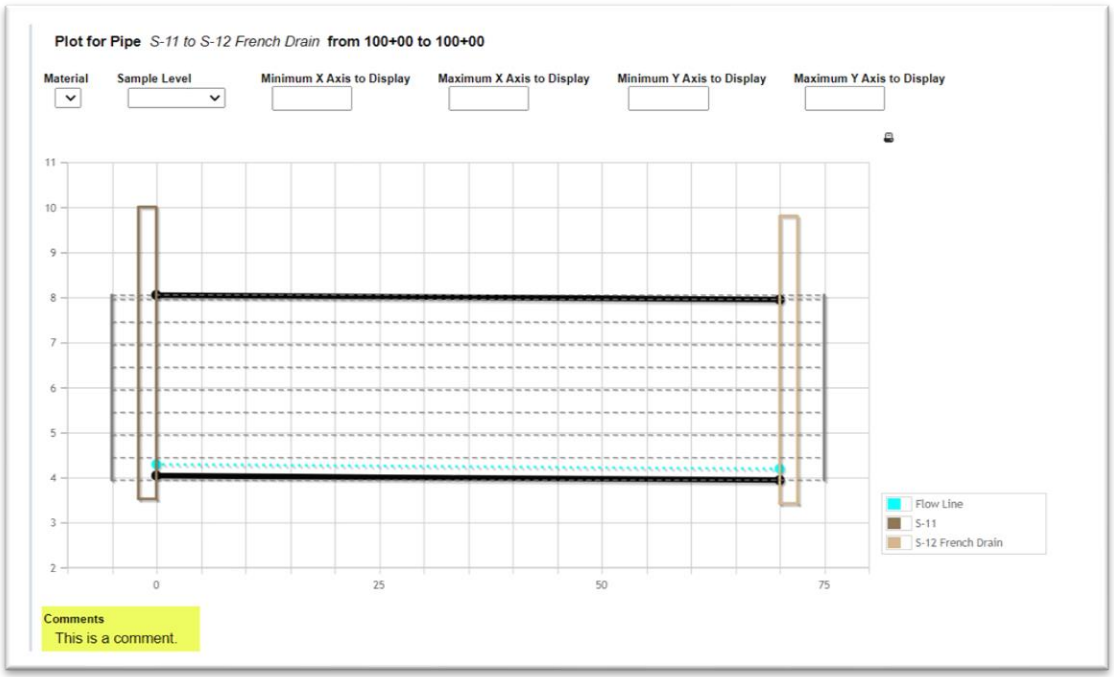
### C. Drainage Comments

Comments about a specific pipe run can be seen by selecting the update option on that pipe run for users in one of the QC companies.

The comments appear in the Update dialog box.




For users in other companies, the comments can be seen on the bottom of the pipe plot.



## Chapter 6 – QC Field Adjustments for Construction Operations

Some adjustments will be needed to the initial plots for field conditions. For example, existing embankment points for the original elevation can be updated to reflect an area where it was necessary to dig down below the existing elevation to excavate and replace material.

When a user updates data after a logbook is designated as Ready for Sampling, MAC sends a notification to the Data Reviewers for all the companies on the ERS project, not just the QC companies. Communicate with the personnel responsible for the original plots to confirm the change is appropriate. The following are some of the more common changes needed in the field after the logbook has been Marked Ready for Sampling.

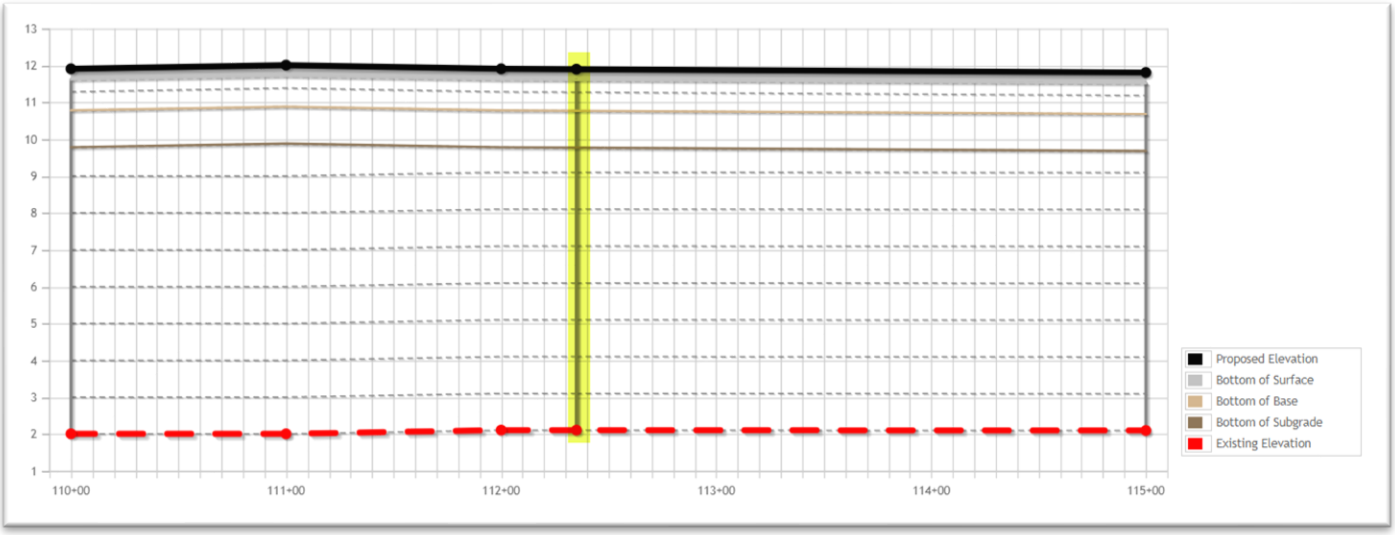
**NOTE**: Lift plots default to following the proposed elevations. They can be adjusted to being plotted horizontally if the Contractor builds the lifts horizontally. This setting applies to all lifts so it must be set before samples are taken. This adjustment should not be revised once samples are taken.

### A. ESB

#### *1. Splitting Lots*

Sometimes after the plots are created, a lot that was originally planned must be split to indicate that the lot isn't being constructed in one operation. The most common example is when the project is constructed in phases. When MAC applies a Split Line, it assumes the split is through the entire ESB Plot.

This Lot from Station 110+00 to 115+00 has been split at Station 112+35. MAC applies the split line through the entire ESB plot. Many times, only one or some of the layers are split. For example, the Embankment is split, but the Stabilizing and Rock Base are not.



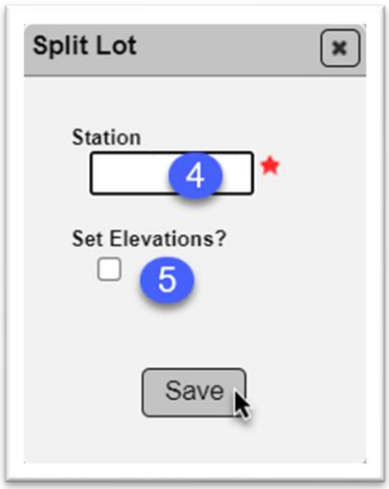

When Lots need to be split for only part of the ESB plot, do not use the Split Lot option. For partial splits, use a plot line (see B. ESB Plot Lines) to indicate the split and make a comment about the line.

Lots can only be split vertically, but not horizontally. For horizontal splits, use B. ESB Plot Lines to indicate the split and make a comment about the line.

1. Click on the Lots tab to expand it.
2. Click on the tab of the lot you want to split.

3. Select the Split Lot option.

A Split Lot dialog box appears.

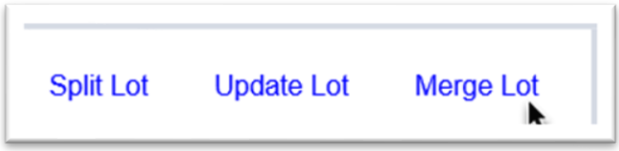



4. **Station** – enter the station where you want to split the lot.
5. **Set Elevations?** – Do not use this field. It was intended to allow for lots to be split horizontally but does not currently work. Horizontal lot splits will be updated in a future enhancement.
6. Select the Save option to split the lot.

### *2. Merging Split Lots*

If a lot that has been split needs to be unsplit, use the Merge Lot option to undo the split.

1. Click on the subtab of the **first** part of the split lot to expand it.




2. Select the Merge Lot option.

A Merge Lot dialog box appears.

3. Select the Merge option.

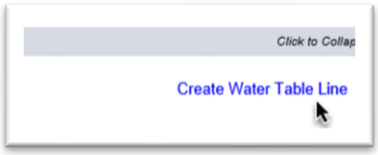
### *3. Adjusting Lifts*

Because the Adjust Lifts function impacts so much of the original plot, the instructions for adjusting lifts are described in the Chapter 3, J. Adjusting Lifts**.** Lifts should not be adjusted without consulting the data entry personnel responsible for the original plot creation.

### *4. Creating a Water Table Line*

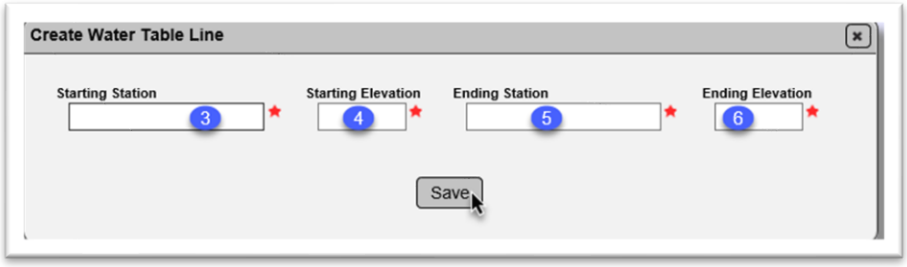
MAC has smart lines for water table lines that will recalculate the lifts in the area.

1. Select the Water Tale Lines tab to expand it.

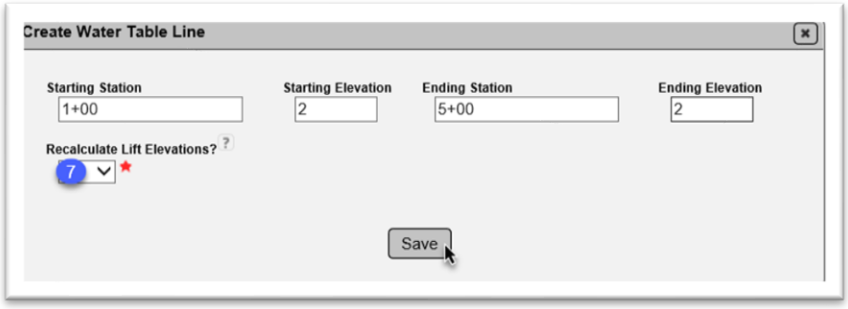



2. Select the Create Water Table Line option.

A Create Water Table Line dialog box appears.




3. **Starting Station** – enter the starting station of the water line.
4. **Starting Elevation** – enter the starting elevation of the water line.
5. **Ending Station** – enter the ending station of the water line.
6. **Ending Elevation** – enter the ending elevation of the water line.




7. **Recalculate Lift Elevations?** – this field appears after entering 3 – 6. Select Yes from the dropdown list to have MAC apply smart line programming and not require densities below the water line elevation.
8. Select the Save option.

The water line will be plotted on the plot.

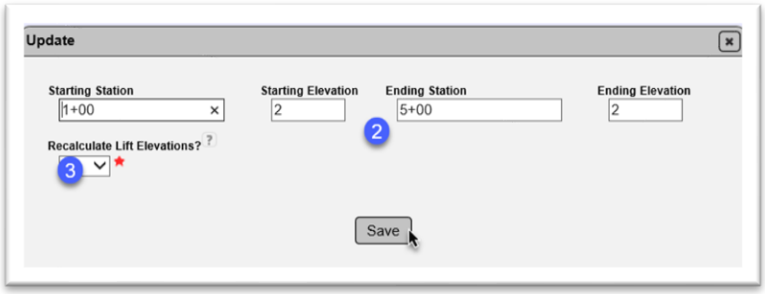
**NOTE**: There may be lifts above the water table line impacted by the water. To document the first lift not impacted by water, enter a plot line and label it 1st lift not impacted by water. See Section D, 1. Creating Plot Lines.

### *5. Updating an Existing Water Table Line*

Once a water line is created, you can update the values.

1. Under the Water Table tab, select the Update icon ( ) on the row of the water table line you want to update.

An Update dialog box appears.




2. Make changes as needed.
3. **Recalculate Lift Evaluations?** – select Yes from the dropdown list to have MAC recalculate the lifts based on the new information.
4. Select the Save option.

### *6. Deleting an Existing Water Table Line*

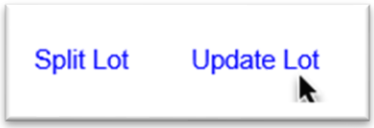
1. Under the Water Table tab, select the Delete icon (x) on the row of the water table line you want to Delete.

A Delete dialog box appears.

2. **Recalculate Lift Evaluations?** – select Yes from the dropdown list to have MAC recalculate the lifts based on the new information.
3. Select the Delete option.

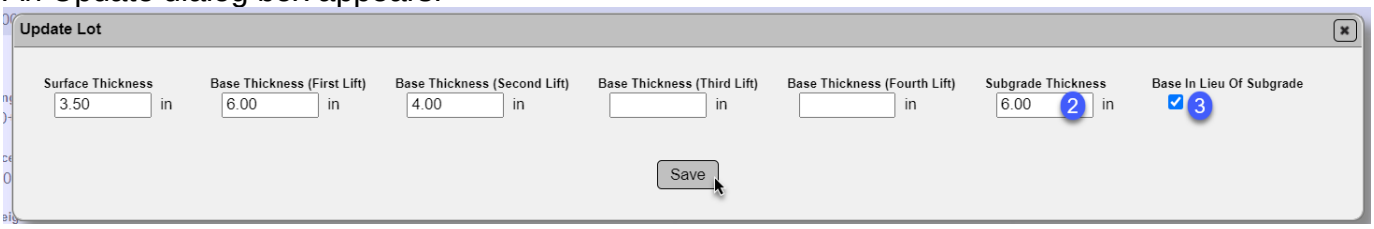
### *7. Limerock in Lieu of Stabilizing*

If limerock is used in lieu of subgrade, different values are needed in the Update Lot dialog box. This indicator is not available when the lot is created. It can only be indicated after the lot is created by using the Update Lot option.



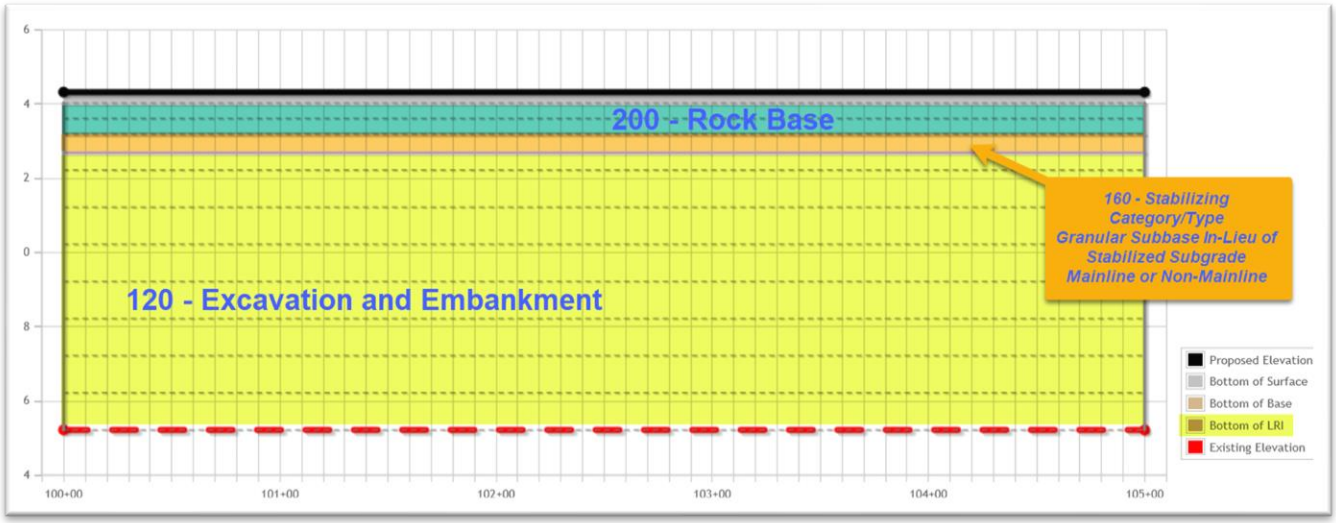

1. Select the Update Lot option.

An Update dialog box appears.



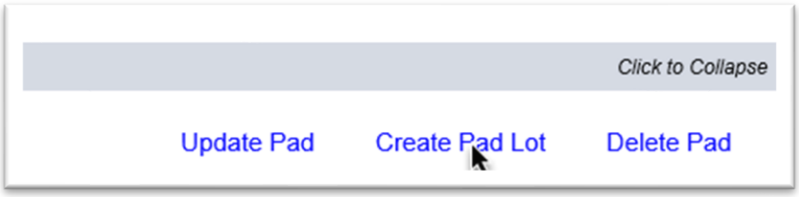

2. **Subgrade Thickness** – revise the default value of 12 to 6.
3. **Base in Lieu of Subgrade** – select this indicator.
4. Select the Save option.
5. Repeat for all LOTs with Base in Lieu of Subgrade.

MAC redesignates the bottom of subgrade to bottom of LRI (limerock in lieu of).



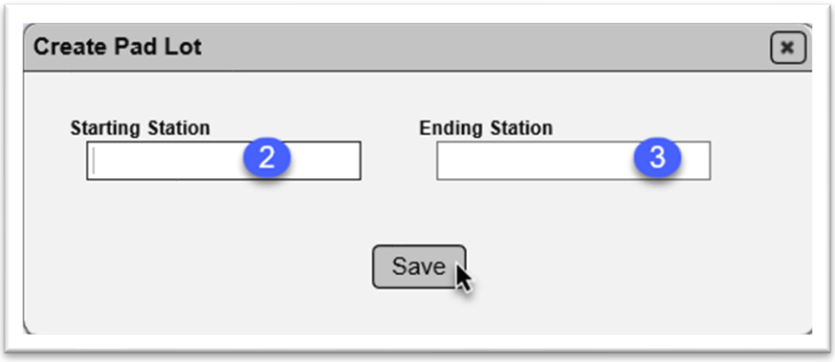

### *8. Creating a Pad Lot*

Once the pad is created, if additional lots need to be added to an existing pad, the Create Pad Lot option can be used. Creating Pads was described in Chapter 3, K. Base and Subgrade Pads.




1. Select the Create Pad Lot option.

A Create Pad Lot dialog box appears.



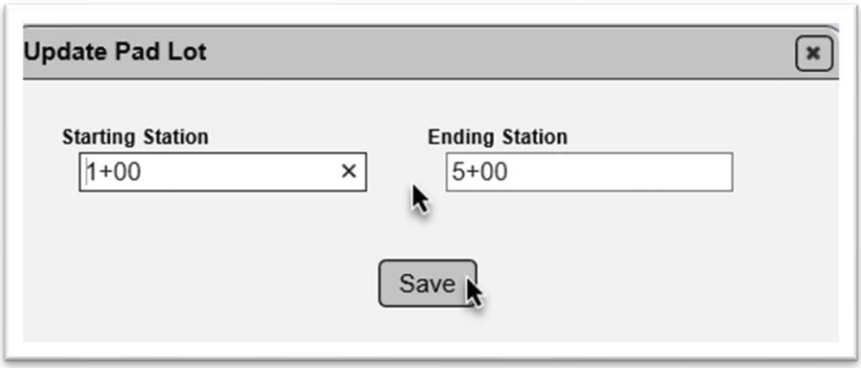

2. **Starting Station** – enter the starting station of the new pad lot.
3. **Ending Station** – enter the ending station of the new pad lot.
4. Select the Save option.

MAC creates the new pad lot based on the values entered when the pad was created.

### *9. Updating a Pad Lot*

1. Select the Update Pad Lot icon ( ) on the row of the lot you wish to update.

An Update Pad Lot dialog box appears. You can only update the starting and/or ending station.




2. Make changes to the field(s), as needed.
3. Select the Save option.

### *10. Splitting a Pad Lot*

1. Select the Split Pad Lot icon ( ) on the row of the lot you wish to split.

A Split Pad Lot dialog box appears.

2. Enter the station where the pad lot is split.
3. Select the Save option.

### *11. Deleting a Pad Lot*

This function is also used to merge lots that were previously split using the Split Pad Lot function but were not actually split, like the Merge Lot function for ESB.

1. Select the Delete Pad Lot icon ( ) on the row of the lot you wish to delete.

A Delete Pad Lot dialog box appears.

2. Select the Delete option.

The pad lot will be deleted.

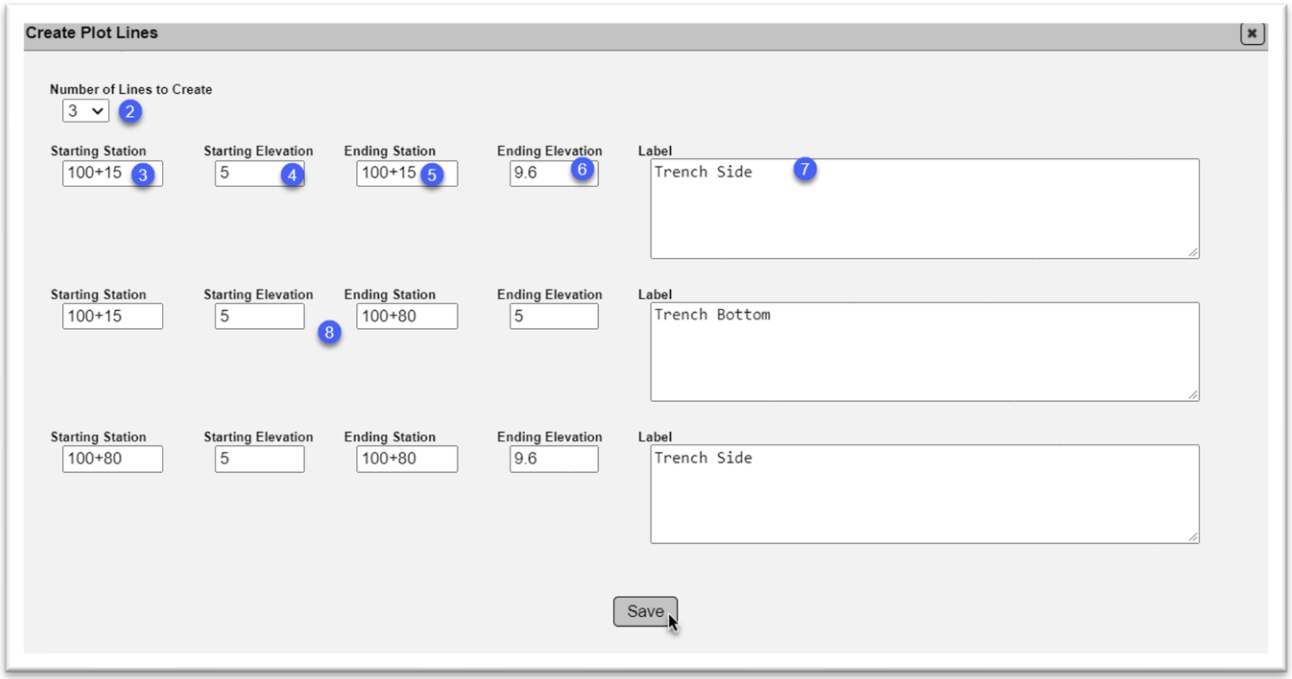
## B. ESB Plot Lines

Plot Lines are non-intelligent lines that you can add to a plot to make notations. They do not impact the lift count. They have no automatic adjustments or programming attached to them. They are meant to allow for plot creation and field adjustments to make notations on areas of the plot that are impacted by things like dig outs, 2:1 slope line, etc. Plot lines are specific to a logbook for ESB logbooks.

### *1. Creating Plot Lines*

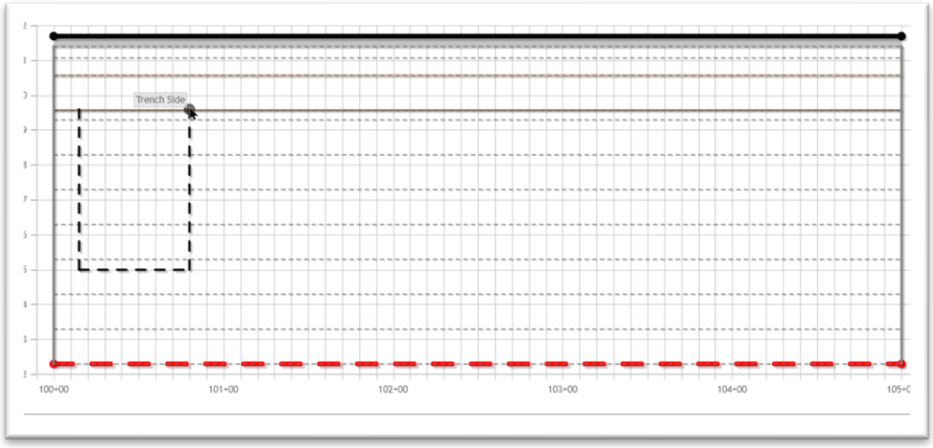
1. Select the Create Plot Lines option.

A Create Plot Lines dialog box appears. Plot lines can be a single line or more than one line to document a trench. We will create plot lines for a trench, so we need 3 lines; 2 vertical lines for the sides of the trench and 1 horizontal for the trench bottom.




2. **Number of Lines to Create** – select the number from the dropdown list; for example, 3.
3.**Starting Station (first line)** – enter the starting station of the first line.
4. **Starting Elevation (first line)** – enter the starting elevation of the first line.
5. **Ending Station (first line)** – enter the ending station of the first line.
6. **Ending Elevation (first line)** – enter the ending elevation of the first line.
7. **Label** – enter a short description to label the line; for example, 2:1 slope or trench bottom.
8. Repeat for all lines if more than one line is selected.
9. Select the Save option.

MAC plots the Plot lines.



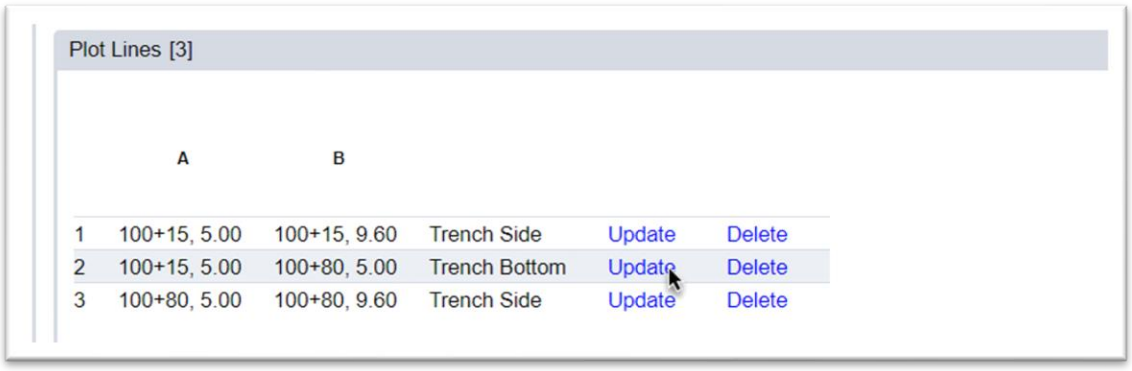

Hover over the line beginning or ending point to see the label.

**NOTE**: There are several situations where a plot line will be used in place of splitting a lot. The Split Lot function splits the entire ESB plot. If the entire plot is split through all layers, the lot should be split. If only part of the ESB plot is split; for example, only the area representing the embankment, a vertical plot line should be used.

### *2. Updating Plot Lines*

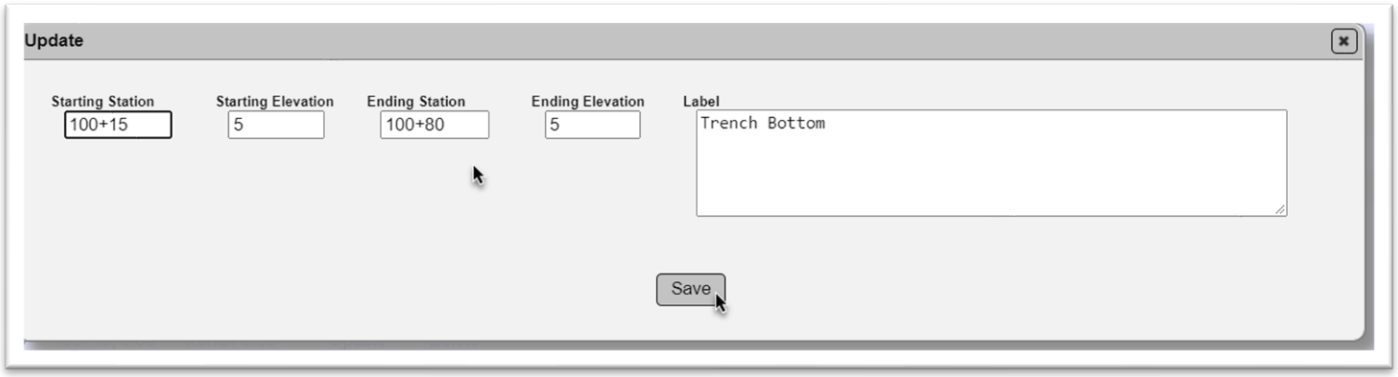
Once plot lines are saved, they are listed as individual entries, even if they are created at the same time.

1. Click on the Plot Lines tab to expand it.



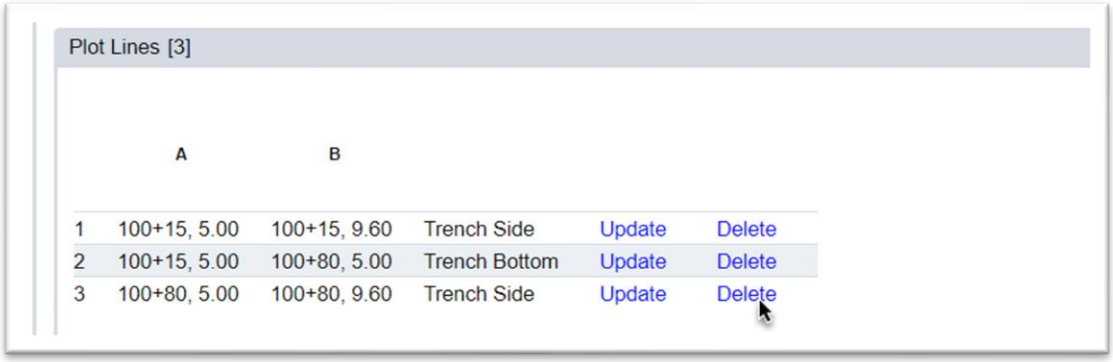

2. Select the Update option on the row of the line you want to update.

An Update dialog box appears.



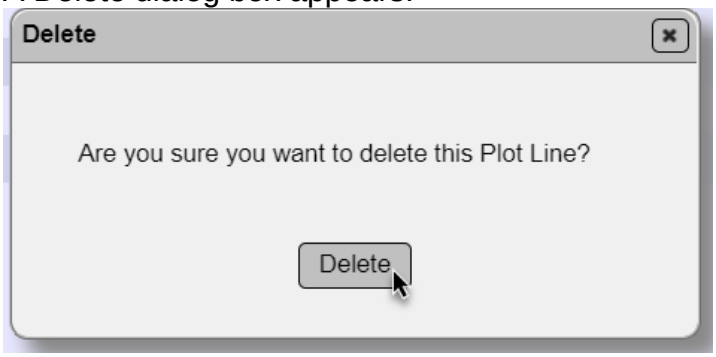

3. Make changes as needed.
4. Select the Save option.

### *3. Deleting Plot Lines*




1. Select the Delete option on the row of the line you want to delete.

A Delete dialog box appears.




2. Select the Delete option.

## C. Drainage Plots

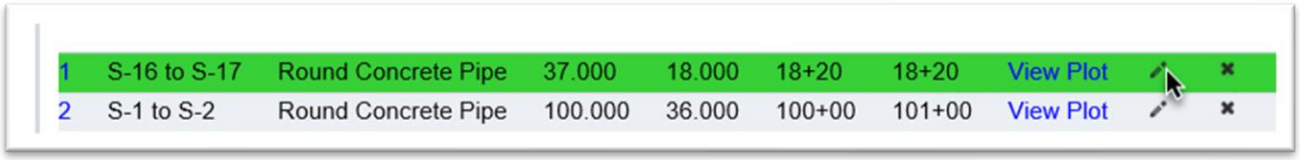
Here are the common field adjustments for Drainage logbooks.

### *1. Updating a Pipe Plot No Split Lots*

See Chapter 4, Section B, 2. Updating a Pipe Plot No Split Lots.

### *2. Splitting Pipe Run Lots*

Splitting pipe run lots is done using the Update Lot option.




1. Select the update icon (✎) of the row you wish to update.

An Update dialog box appears.

2. **Split LOTS?** – select this option to split the pipe run lots. New fields appear.

3. **Split into Lots** @ – pipe runs are measured in length of pipe whether the pipe is cross drain or side drain. Since no stationing is used, when splitting pipe lots, the length of the pipe where the lot is split is entered in this field. For example, if a 400’ pipe run is being split into two 200’ lots, enter 200.

4. **Set Elevations for Each Split LOT?** – MAC will default the split lots with the same elevations as the original single lot. In some cases, this is correct. If the lots are not constructed the same; for example, one lot is constructed horizontal and one is constructed parallel to the pipe, select this option to set each Lot’s elevations individually.

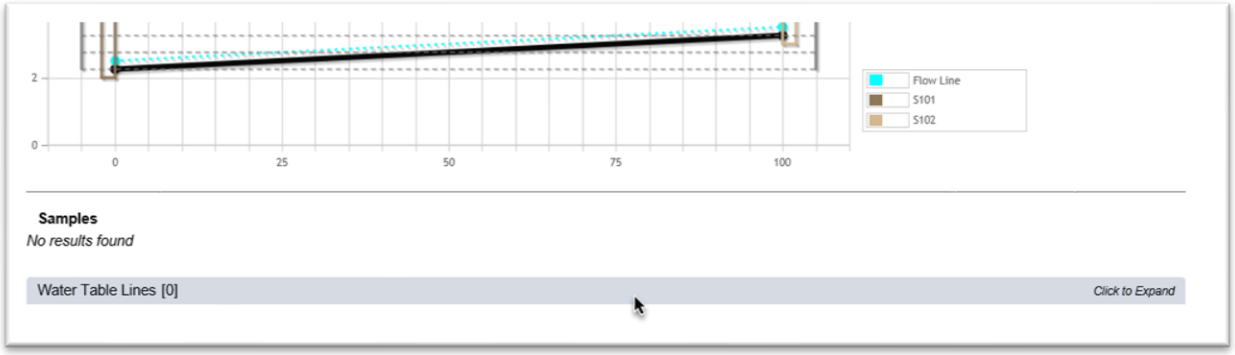
This is what a split run at 200’ with individual elevations looks like.

5. **Add Split** – if more lots are needed, select this option.
6. Make changes as needed.
7. Select the Save option which is located at the bottom of the dialog box.

### *3. Updating & Deleting a Structure*

See Chapter 4, Section B, 4. Updating a Structure and 5. Deleting a Structure.

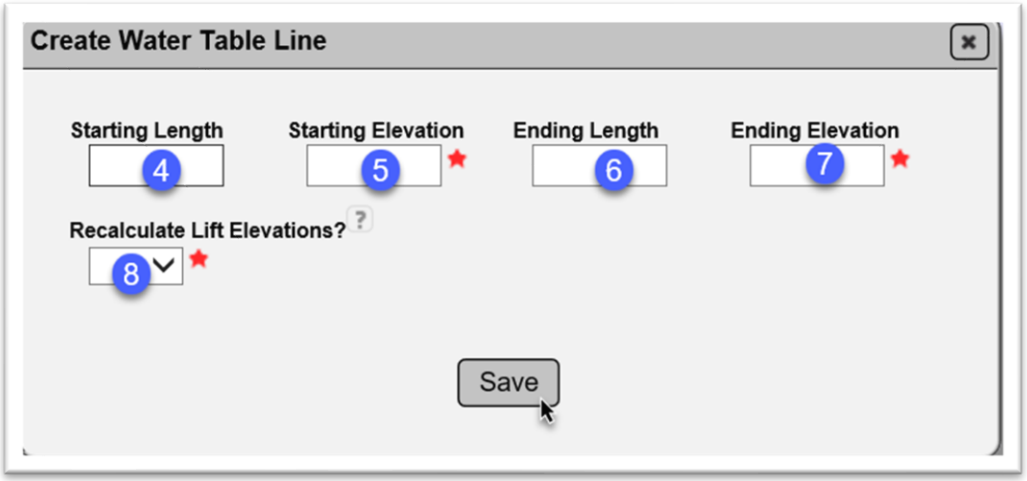
### *4. Creating a Water Table Line*




1. Select the pipe plot you wish to add the water table line.
2. Click on the Water Table Lines tab to expand it

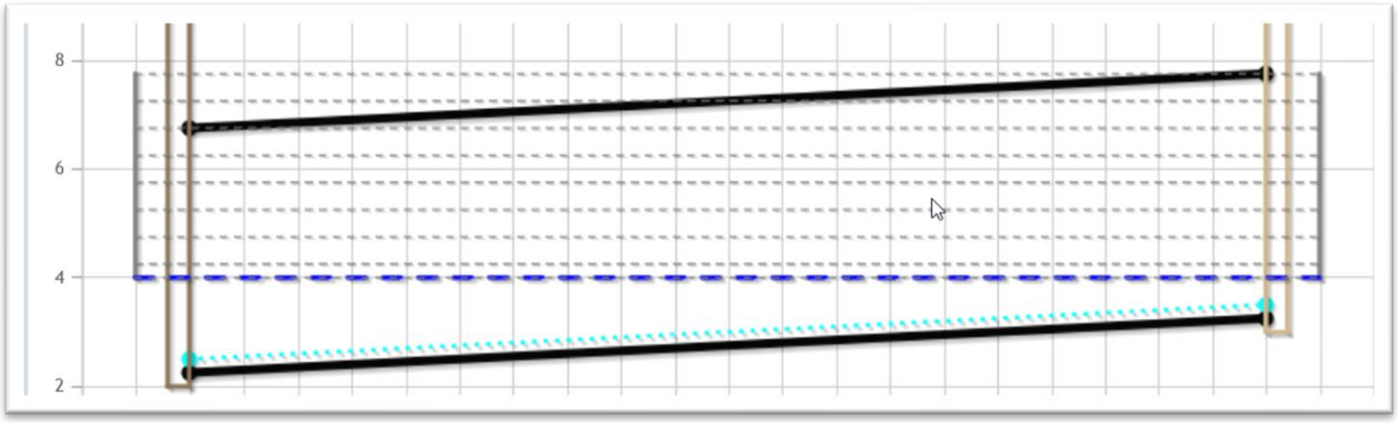
3. Select the Create Water Table Line option.

A Create Water Table Line dialog box appears.



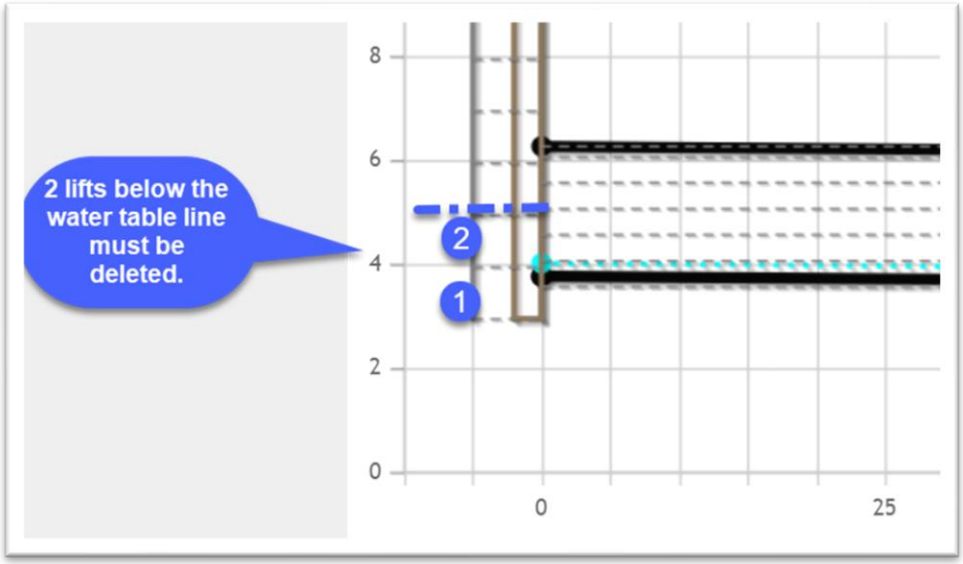

4. **Starting Length** – since pipe runs are lengths of the pipe and not station to station, enter the length at the pipe where the water line begins.
5. **Starting Elevation** – enter the elevation of the water line at the start of the line.
6. **Ending Length** –enter the length at the pipe where the water line ends.
7. **Ending Elevation** – enter the elevation of the water line at the end of the line.
8. **Recalculate Lift Elevations?** – select Yes from the dropdown list to have MAC apply smart line programming and not require densities below the water line elevation.
9. Select the Save option.

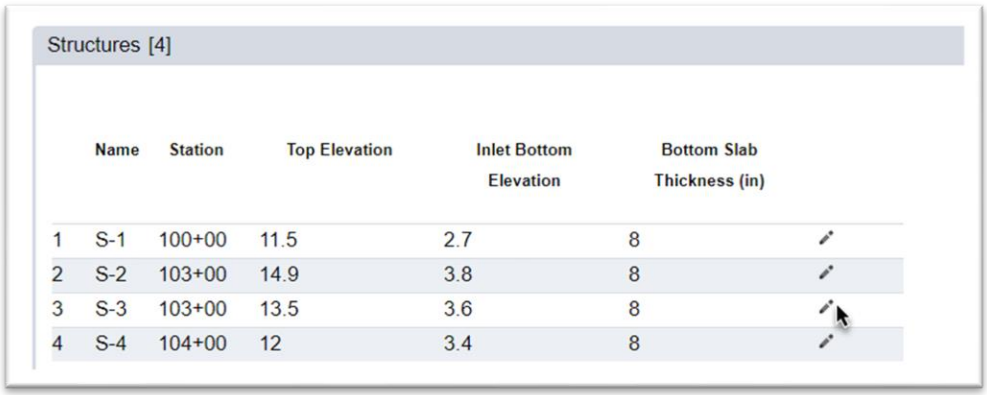
MAC will add the water table line to the pipe plot.




### *5. Water Table Line when Structure Has its Own Lifts*

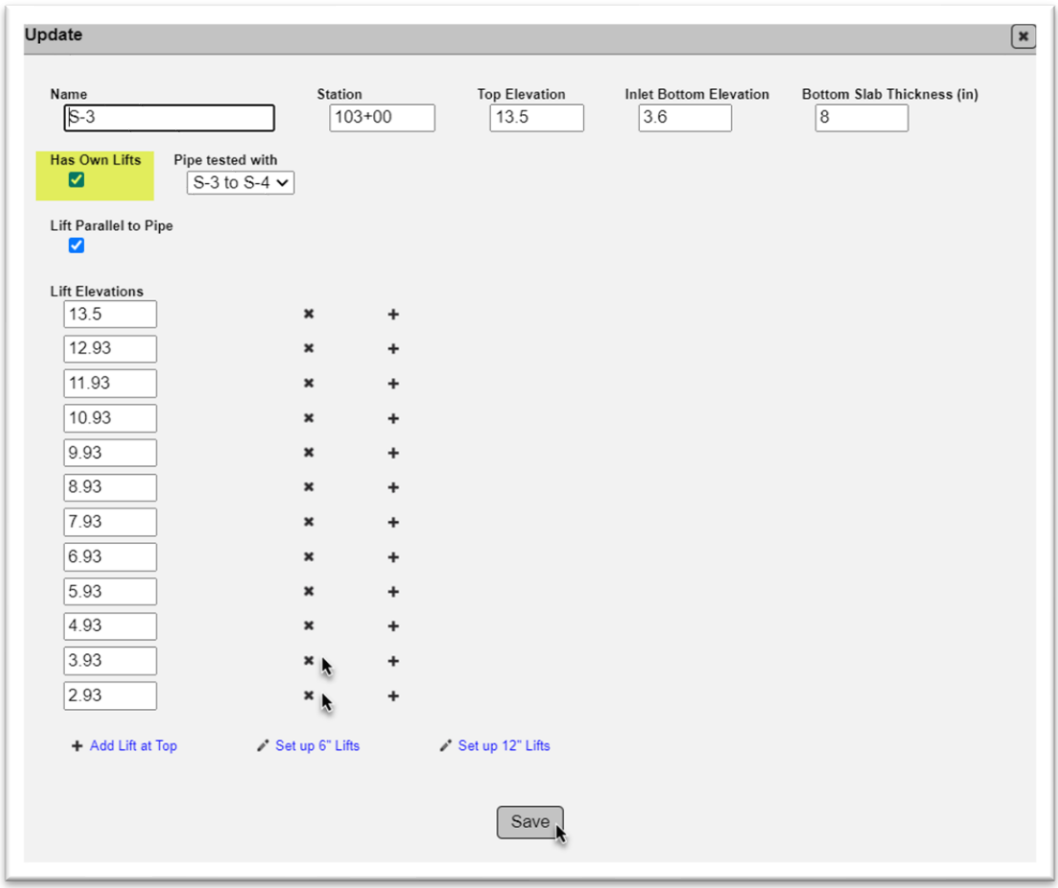
When a structure has its own lifts, there is no way to add a water table line to just the structure. In these cases, the lifts would be removed below the water table by adjusting the lifts. Plot Lines also will not appear in the area for the structure only.





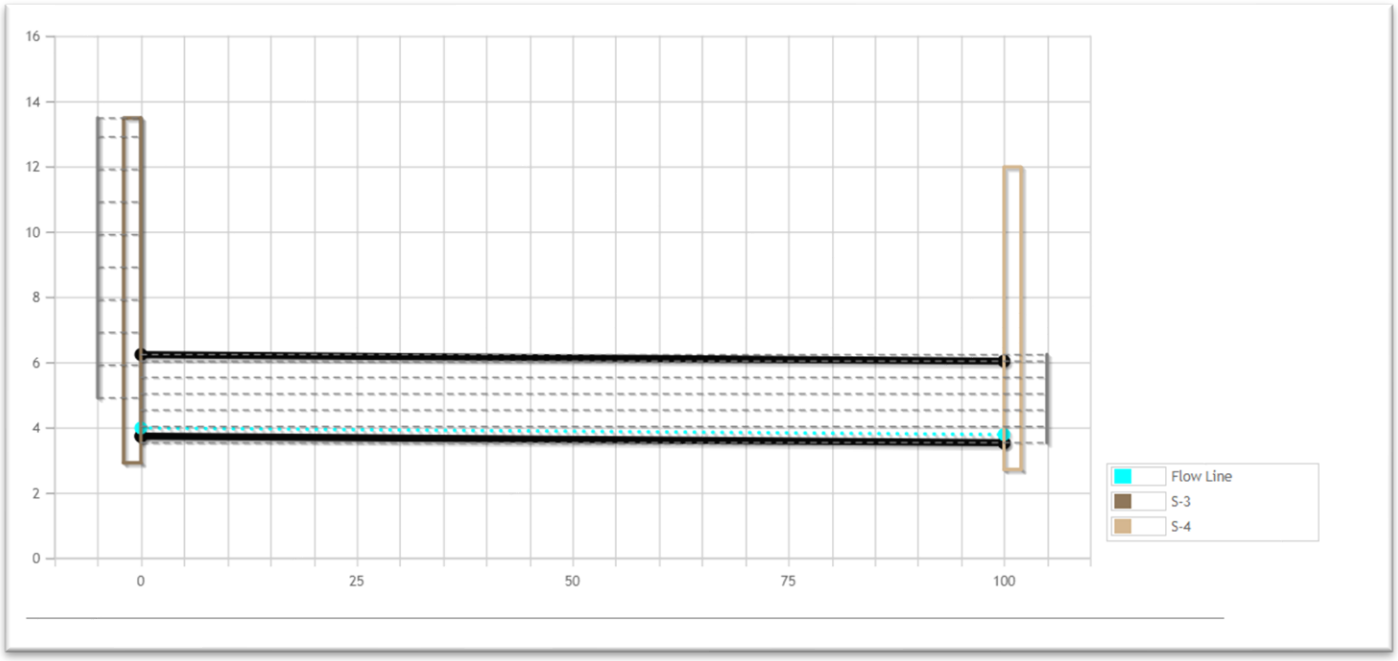

1. On the structure that has its own lifts, select the Update icon.

An Update dialog box appears.



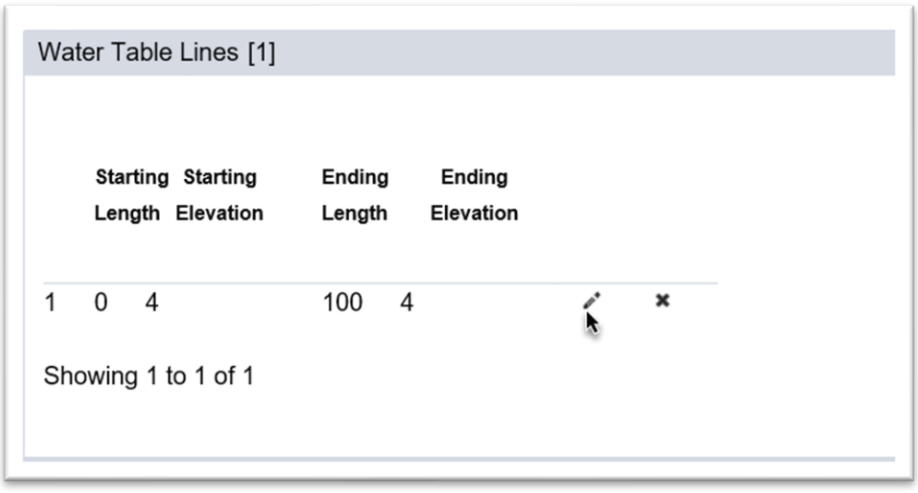

2. Delete the lifts impacted by the Water Table Line.
3. Select the Save option.

MAC will redraw the structure without the lifts impacted by the Water Table Line.



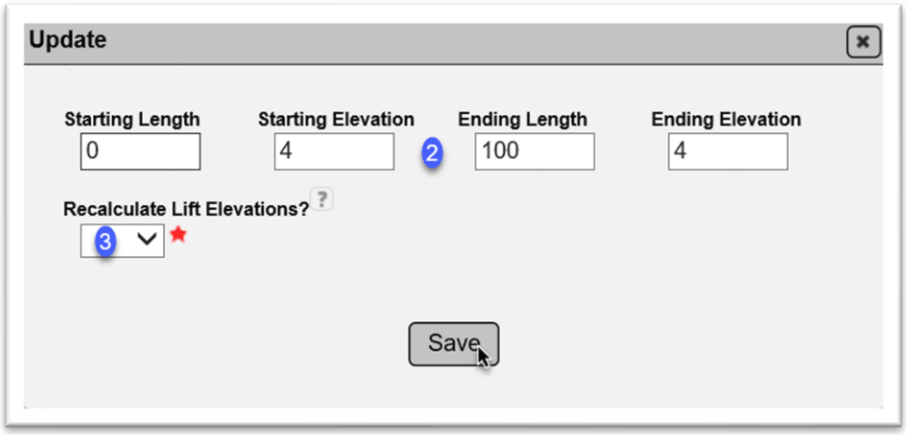

### *6. Updating a Water Table Line*

Once a water line is created, you can update the values.



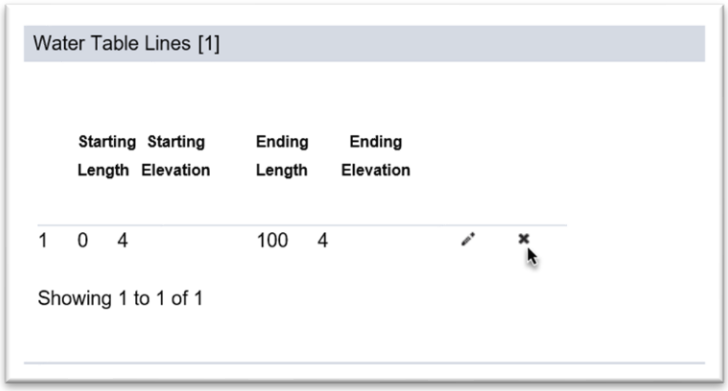

1. Under the Water Table tab, select the Update icon ( ) on the row of the water table line you want to update.

An Update dialog box appears.



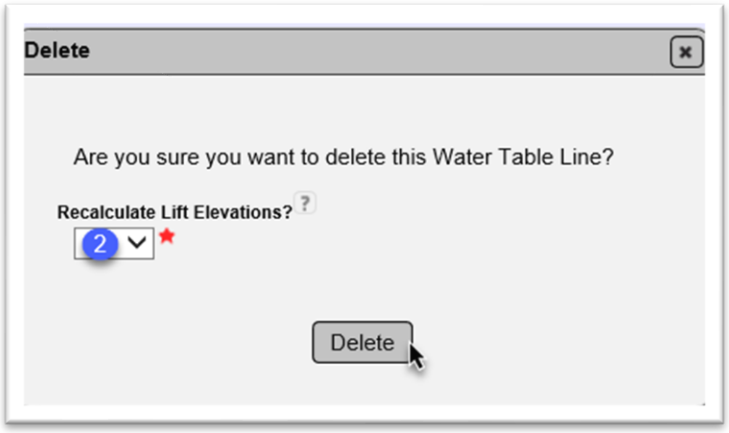

2. Make changes as needed.
3. **Recalculate Lift Evaluations?** – select Yes from the dropdown list to have MAC recalculate the lifts based on the new information.
4. Select the Save option.

### *7. Deleting a Water Table Line*




1. Under the Water Table tab, select the Delete icon (x) on the row of the water table line you want to Delete.

A Delete dialog box appears.

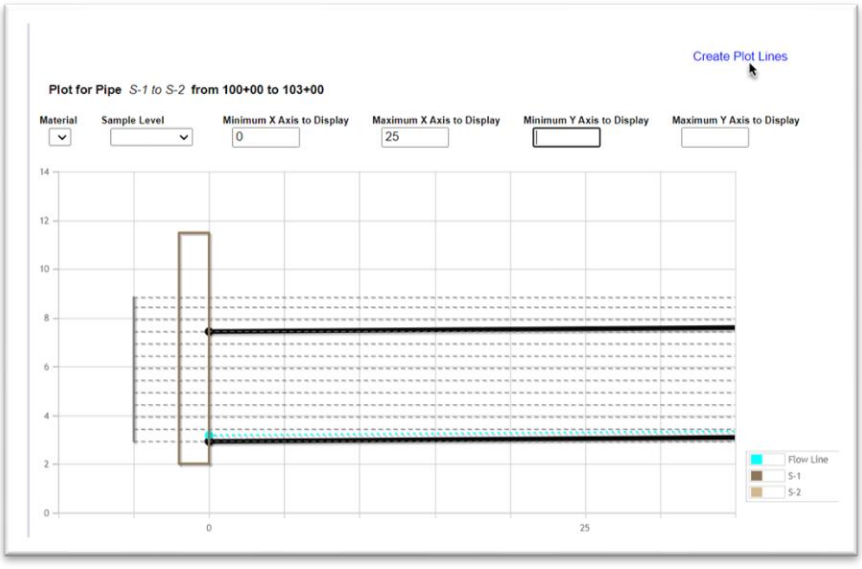



2. **Recalculate Lift Evaluations?** – select Yes from the dropdown list to have MAC recalculate the lifts based on the new information.
3. Select the Delete option.

## D. Drainage Plot Lines

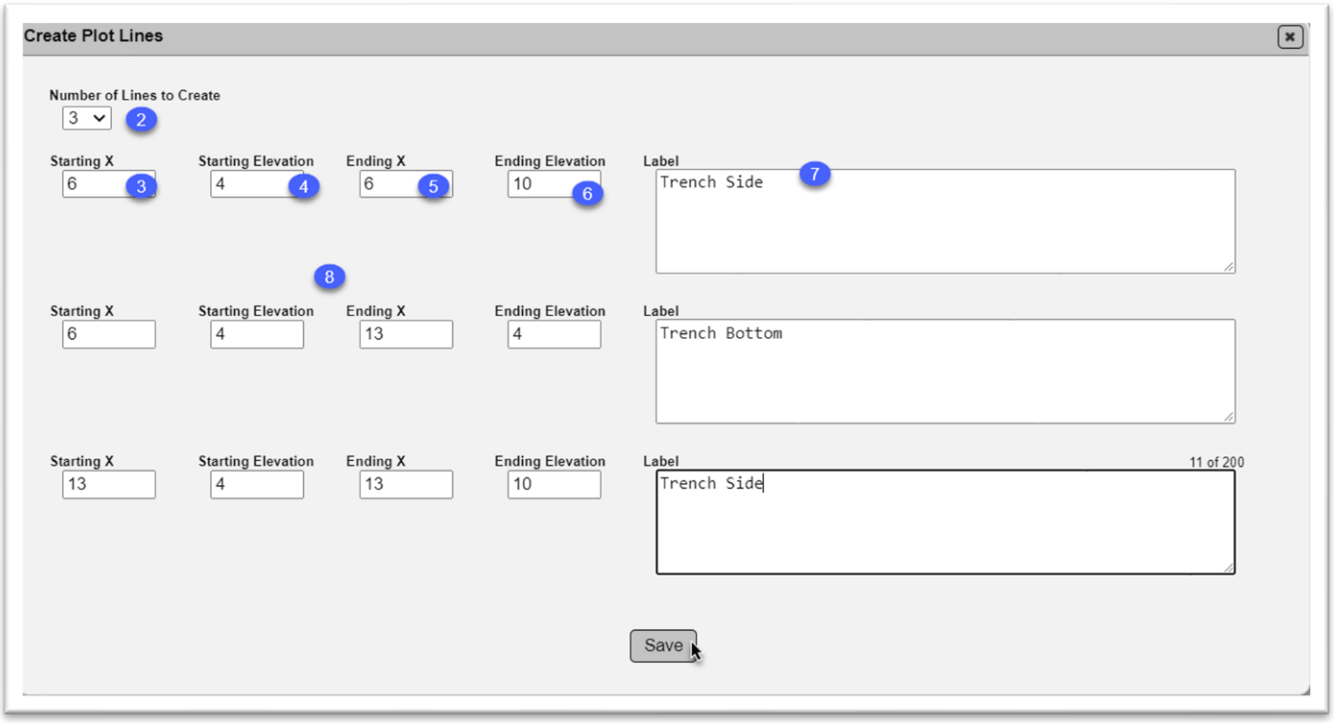
For drainage plots, plot Lines are specific to an individual pipe plot.

### *1. Creating Plot Lines*




1 Select the Create Plot Lines option.

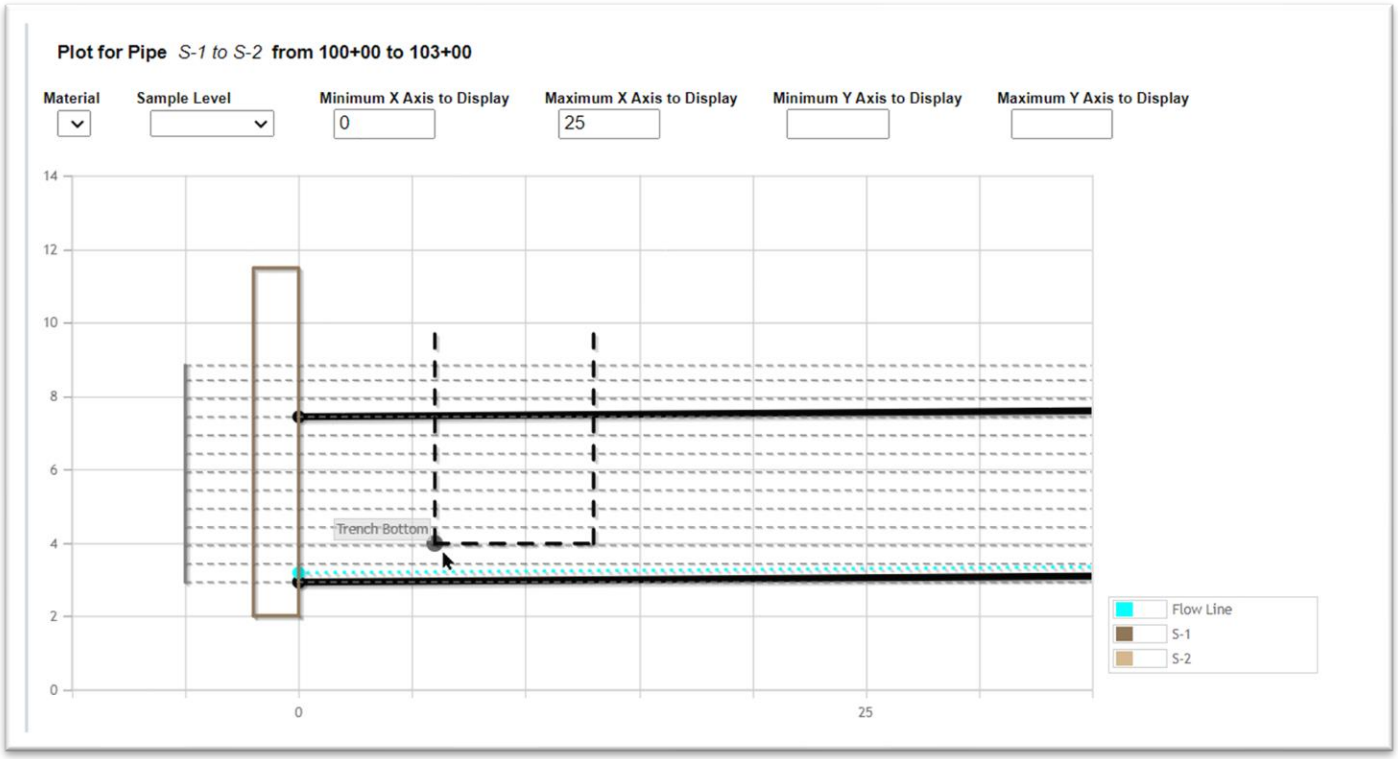
A Create Plot Lines dialog box appears. Plot lines can be a single line or more than one line to document a trench. We will create plot lines for a trench, so we need 3 lines; 2 verticals for the sides of the trench and 1 horizontal for the trench bottom.




2. **Number of Lines to Create** – select the number from the dropdown list; for example, 3.
3.**Starting X (first line)** – enter the starting length of the first line.
4. **Starting Elevation (first line)** – enter the starting elevation of the first line.
5. **Ending X (first line)** – enter the ending length of the first line.
6. **Ending Elevation (first line)** – enter the ending elevation of the first line.
7. Label – enter a short description to label the line; for example, 2:1 slope or trench bottom.
8. Repeat for all lines if more than one line is selected.
9. Select the Save option

**NOTE**: There are several situations where a plot line will be used in place of splitting a lot. The Split Lot function splits the entire Drainage plot. If the entire plot is split through, the lot should be split. If only part of the Drainage plot is split, a vertical plot line should be used.

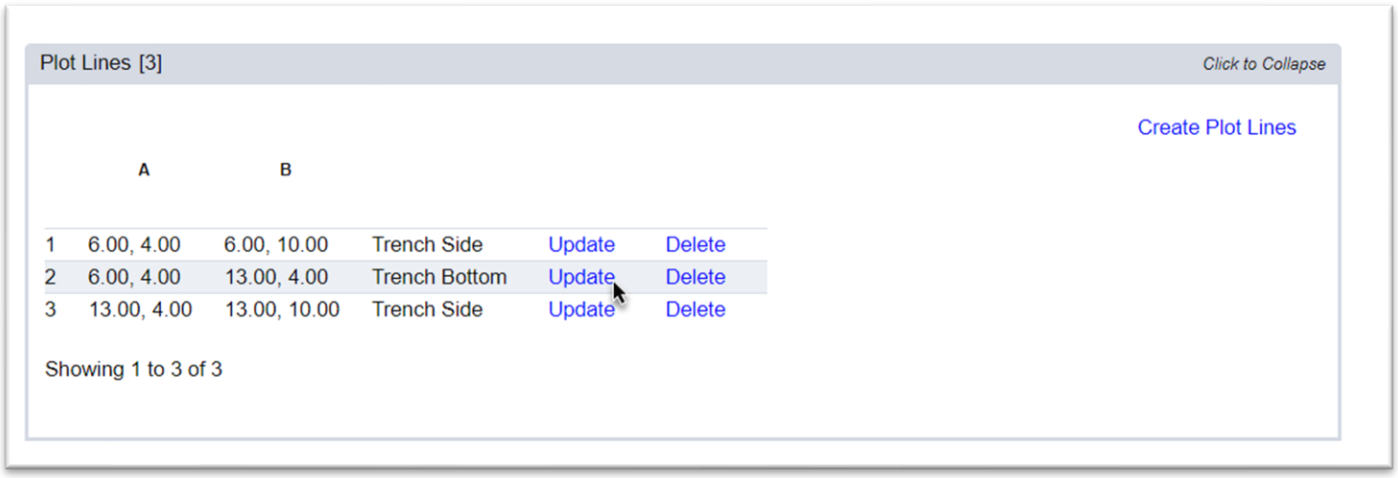
MAC plots the lines. Hover over the line beginning or ending point to see the label.




### *2. Updating Plot Lines*

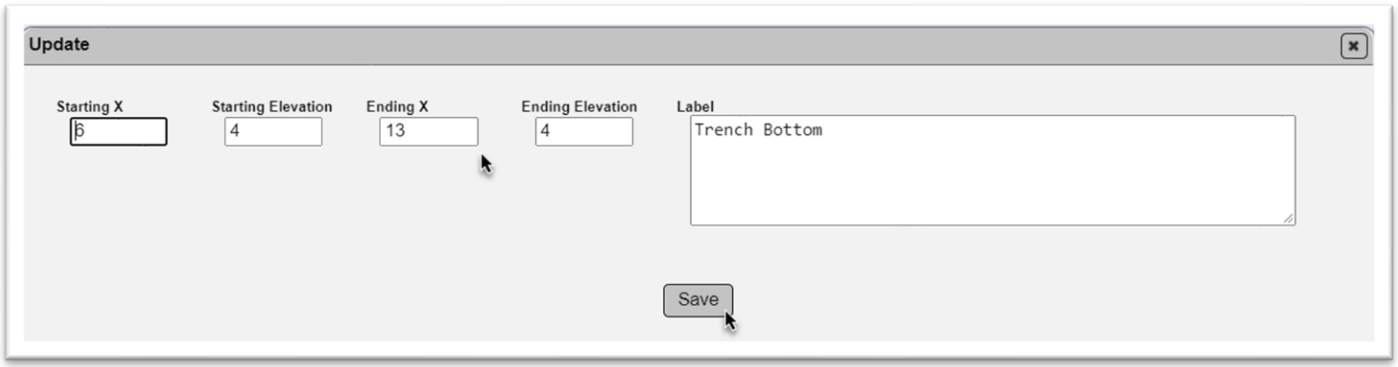
Once plot lines are saved, they are listed as individual entries, even if they are created at the same time.

1. Click on the Plot Lines tab to expand it.



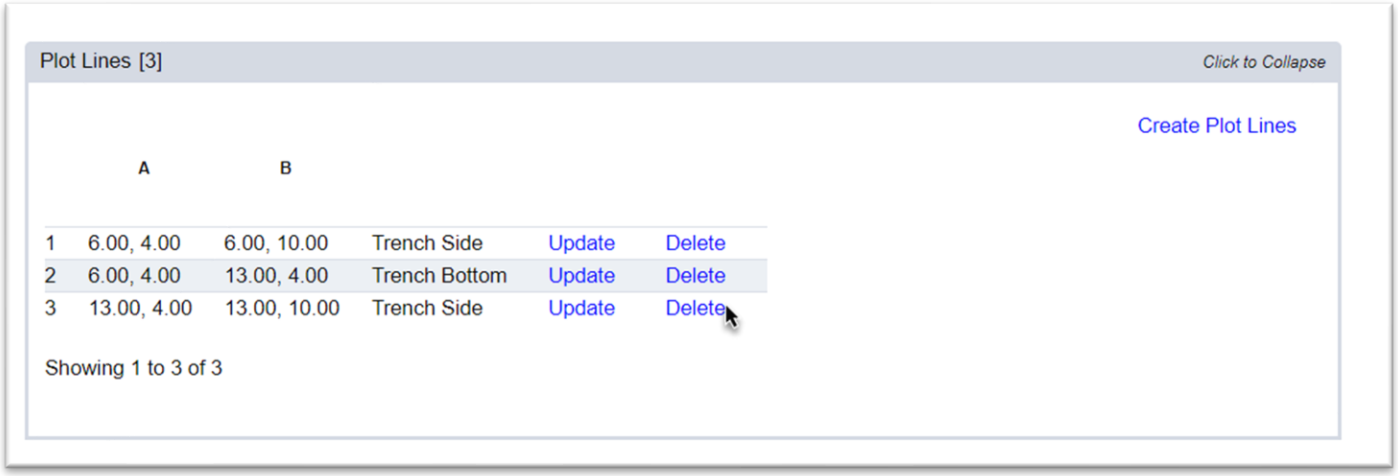

2. Select the Update option on the row of the line you want to update.

An Update dialog box appears.



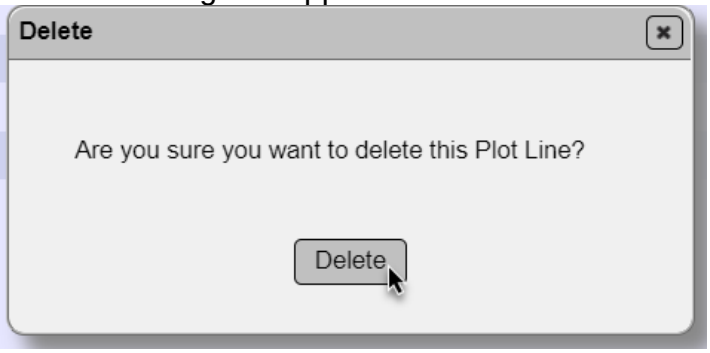

3. Make changes as needed.
4. Select the Save option.

### *3. Deleting Plot Lines*




1. Select the Delete option on the row of the line you want to delete.

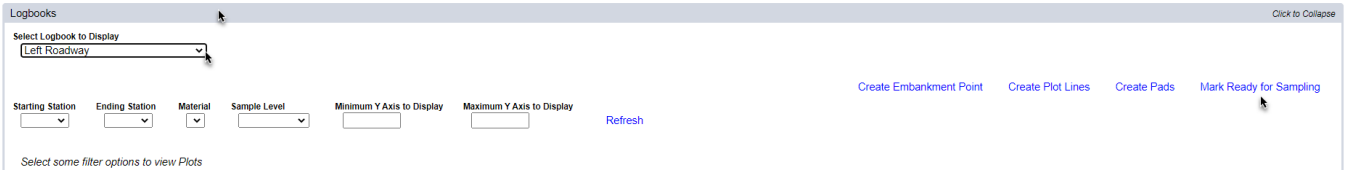
A Delete dialog box appears.



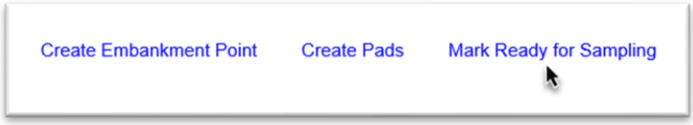

2. Select the Delete option.

## Chapter 7 – Marking Plots Ready for Sampling

While the data entry person creates and updates plots, MAC does not record the revisions. Once the initial data reflects the project records, QC data entry designates the plots as Ready For Sampling.

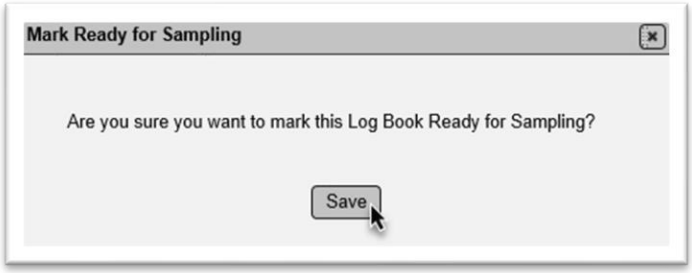



1. Click on the Logbook tab to expand it.
2. Select the logbook that is ready for sampling from the display dropdown list.




3. Select the Mark Ready for Sampling option.

A Mark Ready for Sampling dialog box appears.




4. Select the Save option.

Any changes to the plot data will be recorded by MAC and can be reviewed in the History option. The Project Administrator will review the plot entries before the initial gauge comparison as part of the Department's verification of the data entries. If the data appears to be correct and complete, no action needs to be taken. If the PA review indicates that the data is incorrect and incomplete, they will select Mark Not Ready for Sampling to reopen the plot entry for corrections and make comments on the data in question on the ERS Project Comments tab.

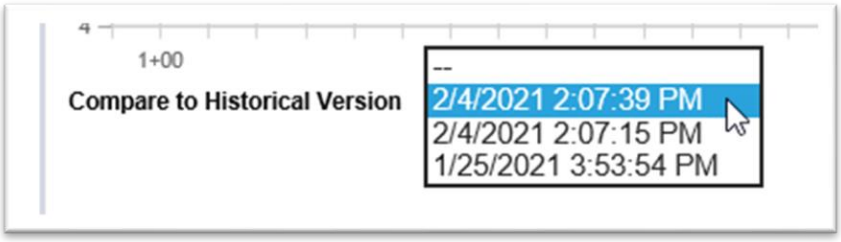
## Chapter 8 – Plot Change History

Plots can only be created, updated, or deleted by the companies indicated as QC on the ERS project, PMUs, DACs, and system administrators. Those system roles have been granted the ability for emergency purposes only and are not the primary users responsible for the plot data. Like samples, QC can change the data as much as they need.

Once the plots are marked Ready For Sampling, changes to the plot data are tracked. The ability to compare the data as it was when the data was indicated as marked ready for sampling and any changes made after that can be reviewed in the Historical Version dropdown list. This is in line with the Department's policy to allow QC to revise data as needed, but to track the changes for historical purposes.

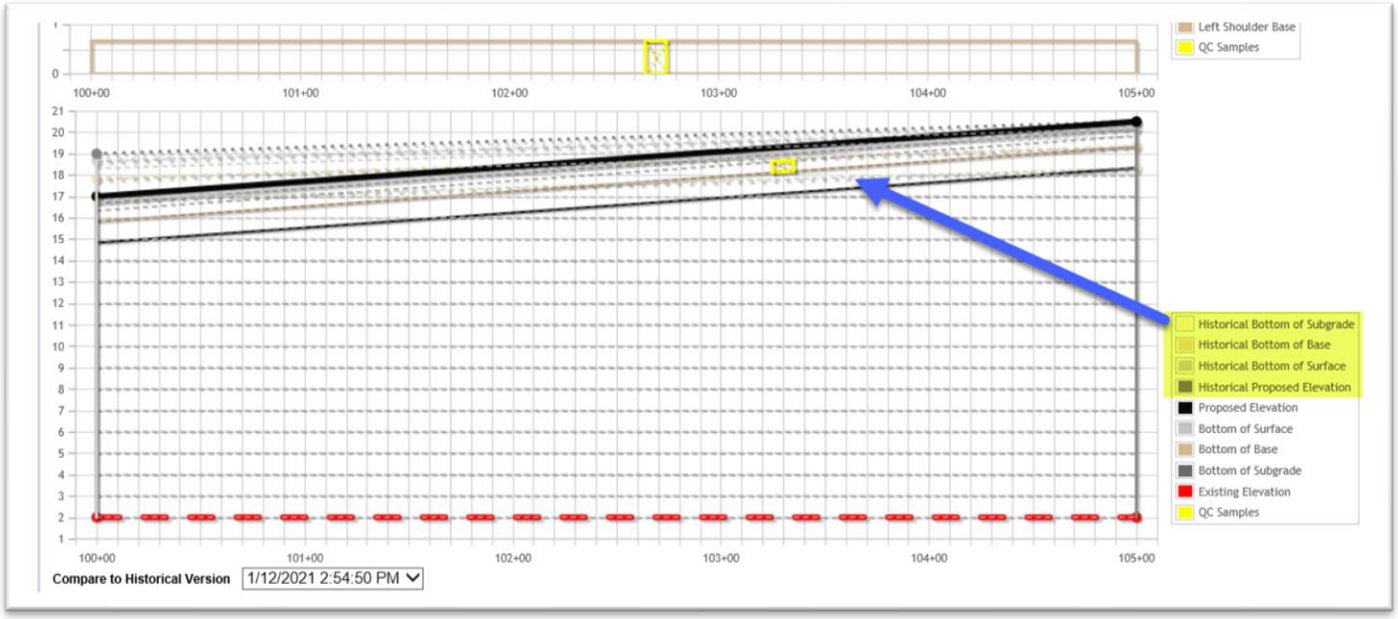
1. **Compare to Historical Version** – the dropdown appears when a change is made to the plots.

Each time a change is made and saved, an entry is added to the dropdown. Select the entry you wish to view.




2. Select the entry you wish to see the previously entered points from the dropdown list.

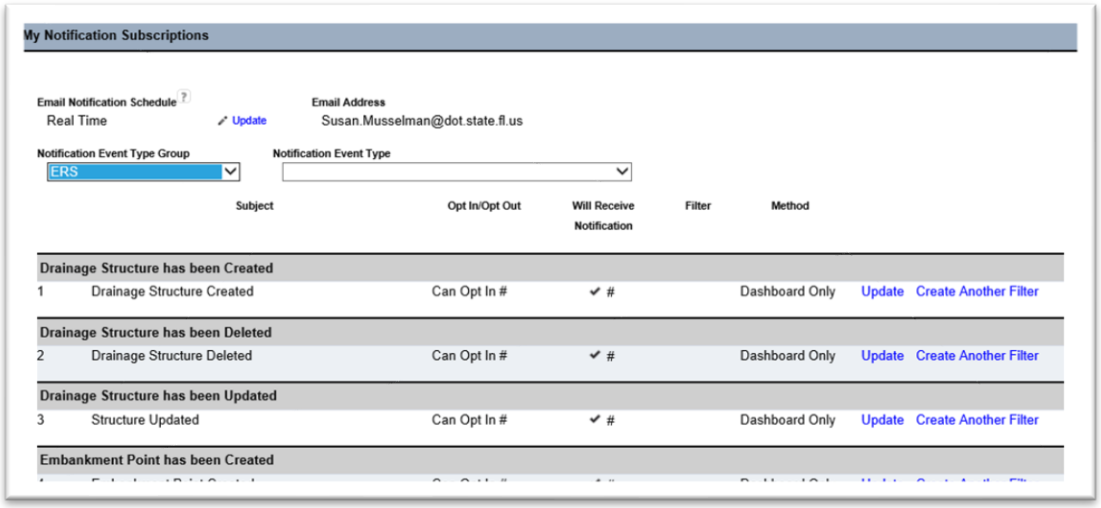
MAC will display “historical” entries, depending on what was updated after the plot was designated as Ready for Sampling.




In this example, changes were made to the proposed elevation which moved the surface, base, and subgrade down. No changes were made to the existing elevation.

## Chapter 9 – Notifications

MAC ERS notifications are available. For basic instructions on notifications, see MAC Notifications and Basic Instructions. The notifications that might interest users responsible for creating and maintaining plots are listed below. The recipients for most of these notifications are Data Reviewers for any company on the ERS Project, not just the QC Company. That way if the VT or IA company would like to be notified, they can. The notification is set up for Can Opt In, which means Data Reviewers are automatically opted out and must opt in to receive the notifications.




All these notifications can be found by selecting ERS from the Notification Event Type Group dropdown list on a user's My Notification Subscriptions screen.

- ERS Project has been Deleted
- Project Gauge Comparison Created
- Project Gauge Comparison Updated
- ERS Project Marked Ready for Sampling
- ERS Project Marked Not Ready for Sampling

These notifications are not sent until the logbook is designated as Not Ready for Sampling

- Embankment Point has been Created
- Embankment Point has been Updated
- Embankment Point has been Deleted
- Drainage Structure has been Created
- Drainage Structure has been Updated
- Drainage Structure has been Deleted
- Pipe has been Created
- Pipe has been Updated
- Pipe has been Deleted
- ERS Project Water Table Line has been Created
- ERS Project Water Table Line has been Updated
- ERS Project Water Table Line has been Deleted