Florida Department of
TRANSPORTATION

# Earthwork Record System (ERS) Sample and Test Instructions

November 14, 2024

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## Updates

This section summarizes the updates in this document from the last posted version.

| Update | Page(s) |
|---|---|
| Added section in Chapter 1 for plot filtering | 14 – 19 |
| Added description of NDG and L-NGD | 21 |
| Added gauge comparison by Wet Density | 25-30 |
| Added testing instructions for FM 1-T310 and renumbered sections in Chapter 4 | 33-52 |
| Updated ERS Project Work Order information (ERS projects are now WO based) | 69 |
| Added a chapter on ERS Reports (Chapter 11) | 103 |
| | |

## 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 by Data Entry personnel from points on the plans which MAC uses to generate plots.

## Why is ERS in MAC?

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
    - Automatic identification of Method of Acceptance (MOA) issues
- Allows for better tracking of Active Technicians for the Independent Assurance (IA) 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
- Provides 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

## What Needs to be done before Sampling and Testing can begin?

- The Company Profile Manager must enter the company gauges used for earthwork acceptance testing on the company profile
- The Company Profile Manager must enter the company gauges calibration information
- The QC company or companies must create the plots
- The PA must review the plots
- The plots must be designated as Ready for Sampling
- The companies must select the project gauges from each company's gauge list
- An initial 3-way gauge comparison must be performed and entered by the Project Administrator (PA) or ERS Project IA Program Maintenance User (PMU)

## 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 (Chapter 8 – Remote Contracts and MAC Outages).

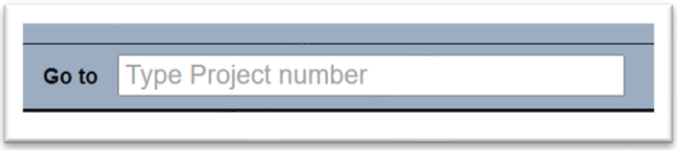
For more questions and responses, see the MAC ERS FAQs.

## Chapter 1 – Logbooks

### A. Navigating to an ERS Project

1. Select the Earthwork Records System menu option.
2. Select the Earthwork Record 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 an ERS Project to View*". If you have worked on an ERS project, MAC will navigate to the last ERS Project you worked on.



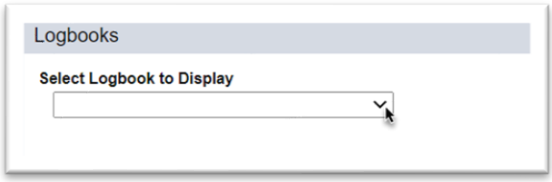

3. If this is not the correct ERS Project, enter the Financial Project Number (FPN) in the Go to field and select the project from the returned list.

You will be navigated to that ERS project.

### B. ESB Logbooks

An ERS Program Maintenance User (PMU) creates the ERS Project and may create one or more logbook(s). QC Data Entry can add logbooks as needed. You'll need to know the logbook for a sample.

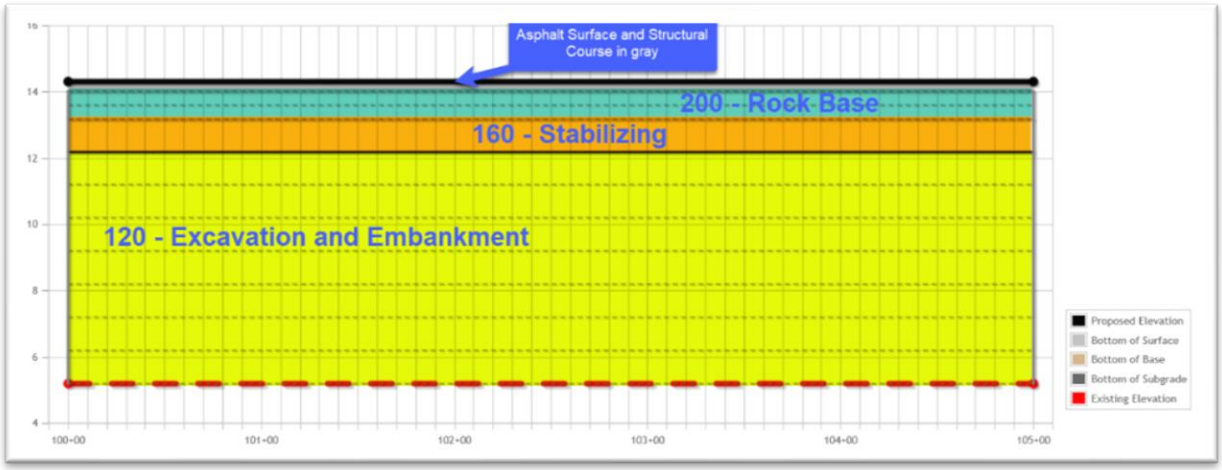
1. Click on the Logbooks tab to expand it.




2. Select the Logbook for the sample from the Display dropdown. See Section F, 1. Filtering ESB Plots for more information on displaying the plots and samples.

### *1. ESB Logbooks*

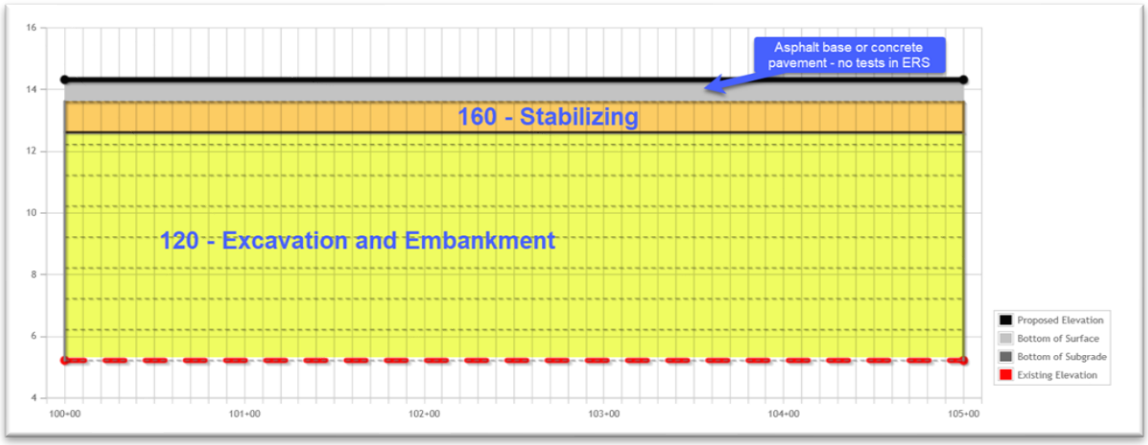
ESB stands for Embankment, Subgrade and Base. MAC treats the plot as a single plot with no regard to the different “layers” for each material. All logbook types are ESB plots except Drainage.




1. The Embankment is represented by the yellow highlighted area and goes from the existing elevation to the bottom of the subgrade. Field density tests are logged under MAC Material 120 – Excavation and Embankment.
2. The Subgrade is represented by the orange area and goes from the top of the embankment to the bottom of the base. Field density and stabilizing mixing depth tests are logged under MAC Material 160 – Stabilizing.
3. The Base is represented by the green area and goes from the top of the subgrade to the bottom of the asphalt layer. Field density and base thickness tests are logged under MAC Material 200 – Rock Base.

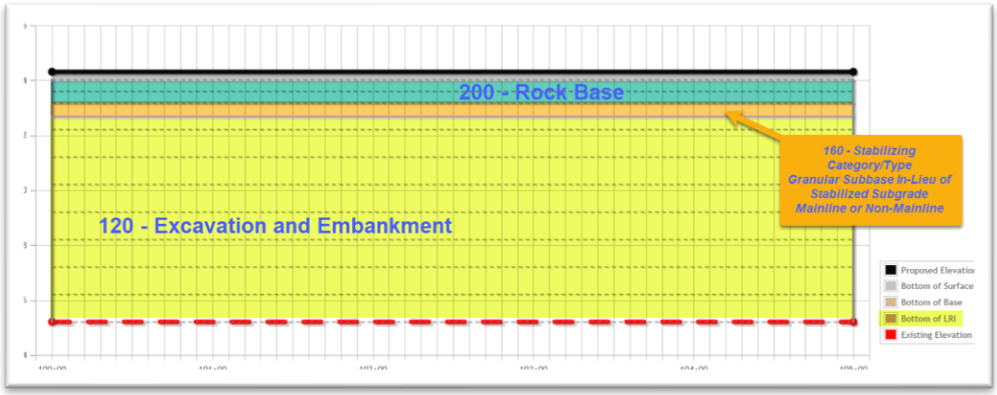
### 2. *Asphalt Base or Concrete Pavement Plots*

If a project has asphalt base or concrete pavement, there should be no layer for limerock base. For concrete pavements, there may not be a layer for stabilizing, or if there is, it may not be 12" thick.




### 3. *Limerock in Lieu of Subgrade*

If limerock is placed in lieu of subgrade, the plots look like this.




To designate an ESB Plot as Limerock in Lieu of Subgrade see the ERS Plots Manual.

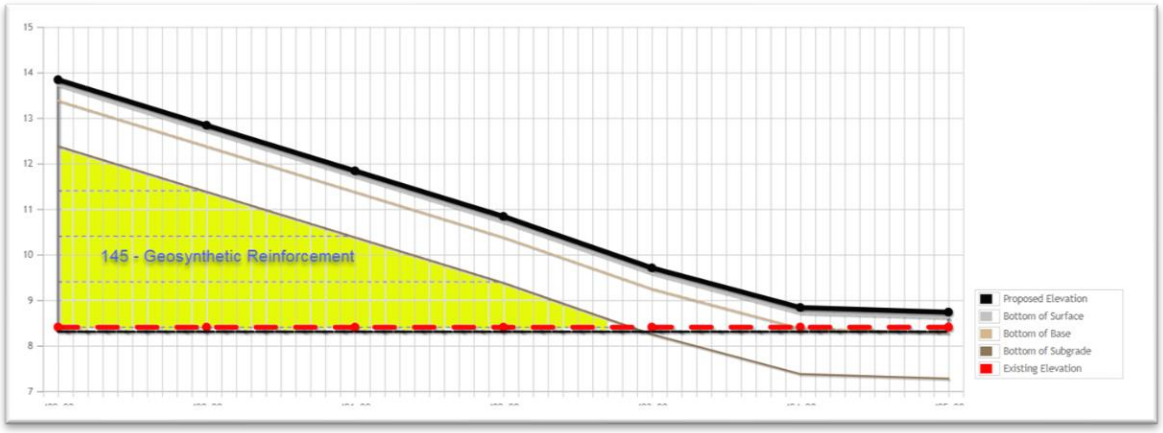
### 4. *Sidewalk and Curb Pads*

Pads may be created to represent areas for subgrade and base under sidewalks and curbs.

Depending on what the curb pad represents, you must select the appropriate MAC Material. For example, if the pad is for subgrade, select MAC Material 160.

### *5. 145 – Geosynthetic Reinforcement*

Geosynthetic ESB plots are for areas with steep slopes that are governed by ***Specification Section 145***.

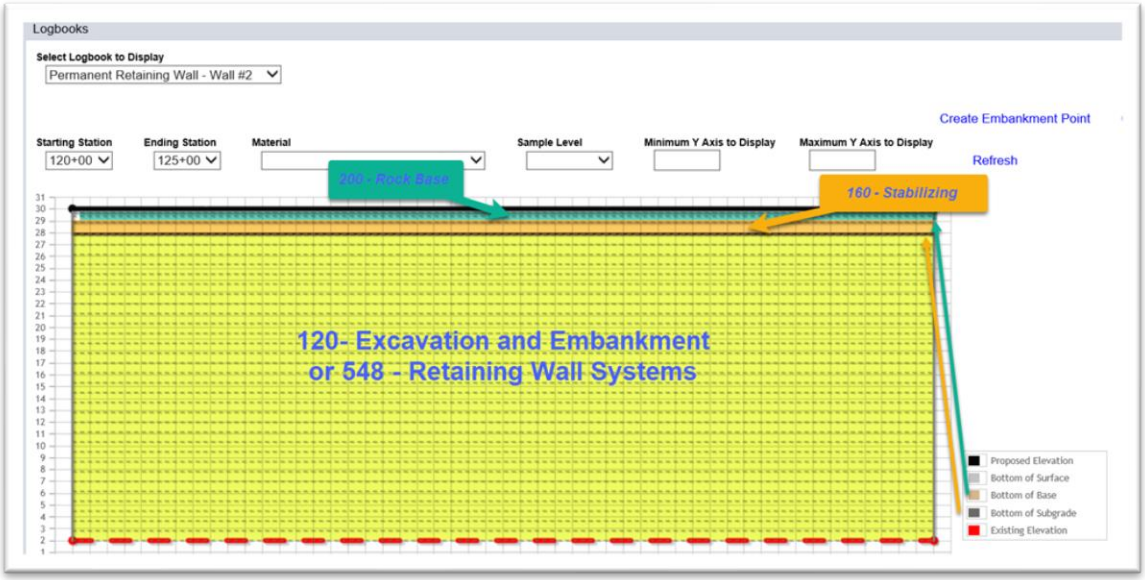



Field densities are logged under MAC Material 145 – Geosynthetic Reinforcement.

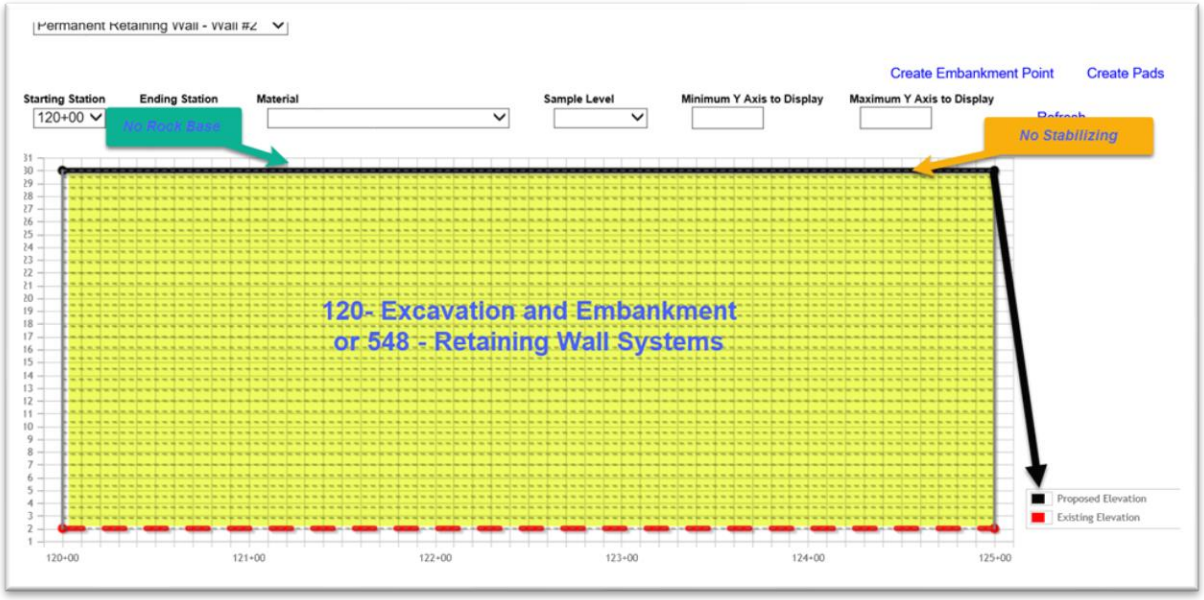
## C. Retaining Wall Logbooks

Retaining walls are ESB plots. Depending on how they are coded, they may have all layers of an ESB plot or only MAC Material 120 – Excavation and Embankment, and MAC Material 548 – Retaining Wall Systems, depending on how close to the wall the test is performed.

Here is an example where the user who created the retaining wall plot indicates that in conjunction with the MAC Material 120 – Excavation and Embankment or MAC Material 548 – Retaining Wall Systems samples for the wall, there needs to be tests for MAC Material 160 – Stabilizing and 200 – Rock Base.

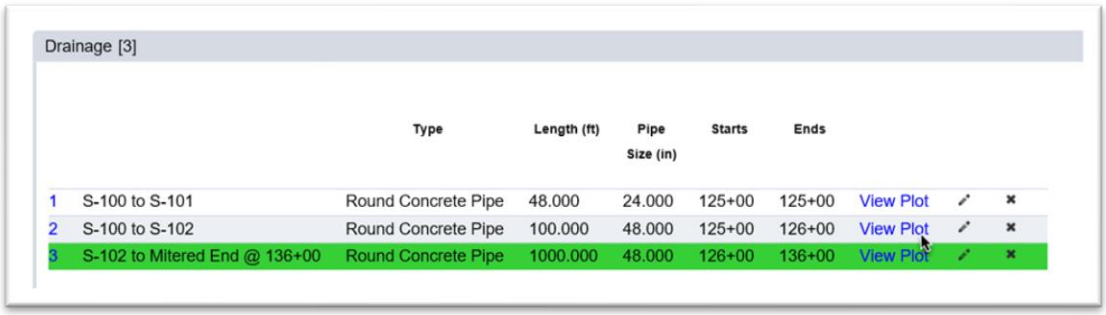


Here is an example where the user who created the retaining wall plot set it up so only samples for MAC Material 120 – Excavation and Embankment, and MAC Material 548 – Retaining Wall Systems belong on the retaining wall plots. When this situation occurs, make a comment about which logbook includes the samples for the stabilizing and rock base.




## D. Drainage Logbooks

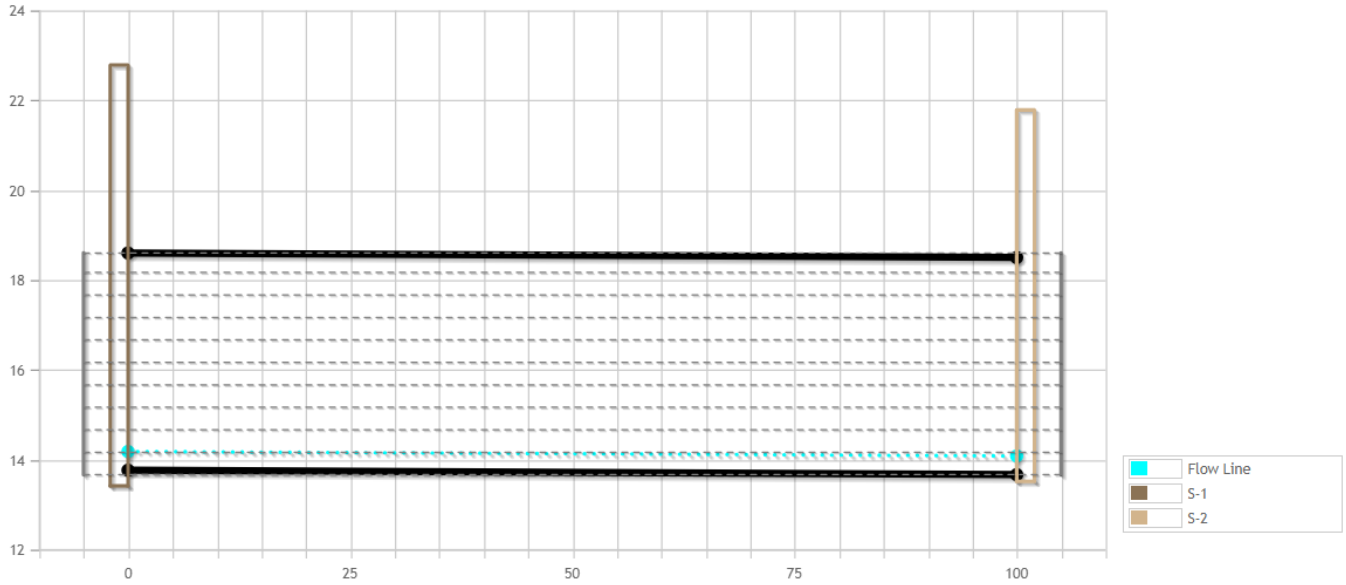
When the Drainage tab is expanded, the pipe run highlighted in green is the one being displayed on the screen. See Section F, 2. Filtering Drainage Plots




| | | Type | Length (ft) | Pipe Size (in) | Starts | Ends | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | S-100 to S-101 | Round Concrete Pipe | 48.000 | 24.000 | 125+00 | 125+00 | View Plot | | |
| 2 | S-100 to S-102 | Round Concrete Pipe | 100.000 | 48.000 | 125+00 | 126+00 | View Plot | | |
| 3 | S-102 to Mitered End @ 136+00 | Round Concrete Pipe | 1000.000 | 48.000 | 126+00 | 136+00 | View Plot | | |

1. To view a pipe run, select the View Plot option on the row of the plot you want to view or click anywhere on the row.

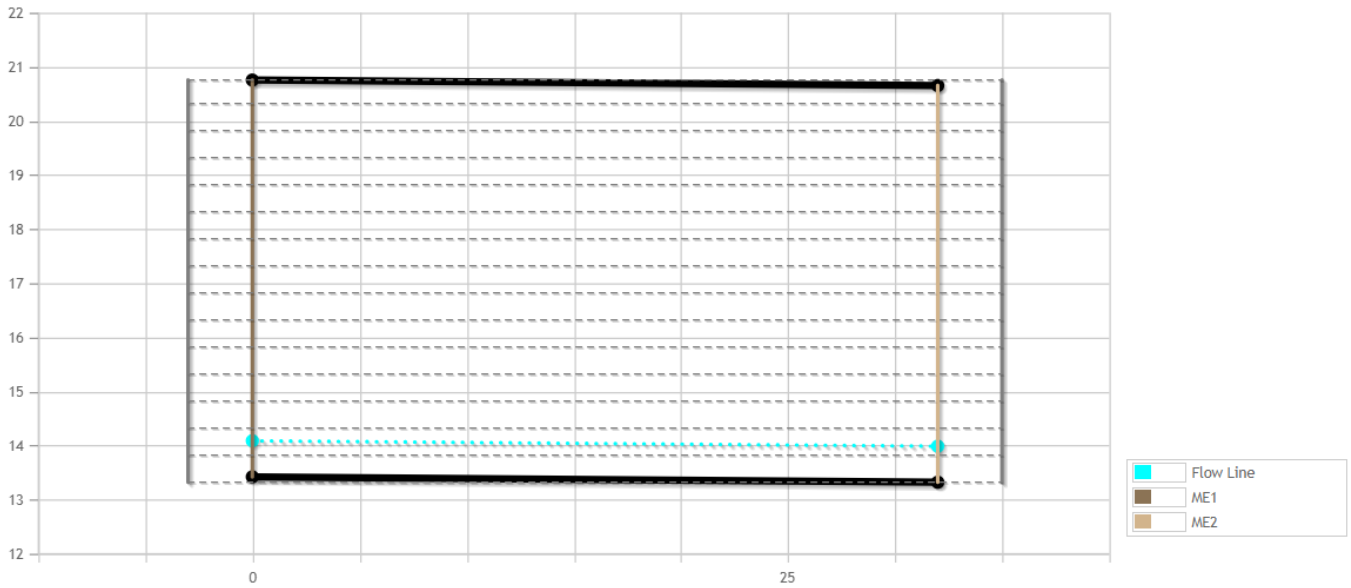
This is an example of a structure-to-structure plot.




Field density tests are governed by ***Specifications Section 125*** but logged under MAC Material 120 – Excavation and Embankment because the acceptance criteria for both materials are the same and the proctor samples are logged under MAC Material 120 so the field densities must be also.

**NOTE**: MAC does not apply all lifts to pipe plots. This is because it is not known when the densities taken will switch to an ESB logbook. If there are not enough lifts plotted, as shown in the example above, contact the QC data entry personnel responsible for creating the plots.

Here is an example of a box culvert.



## E. ERS Project Comments

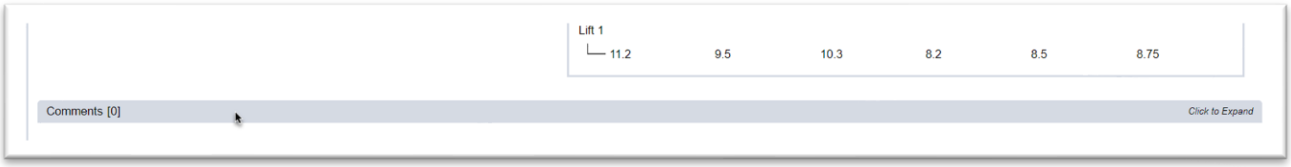
There are several places within the ERS Project to make comments.

### *1. ERS Project Comments Tab*

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

### *2. Logbook Comments*

#### a. Comments on ESB LOTs

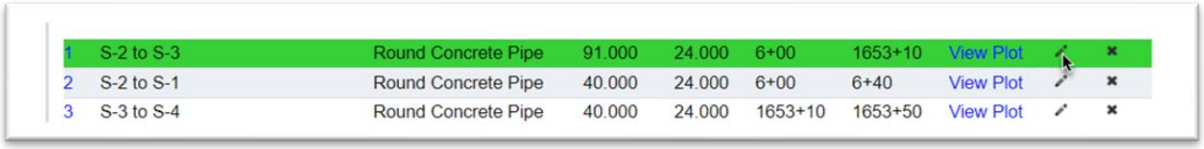



The Comments subtab under each LOT applies to that LOT of the ESB.

#### b. Comments for Pads, Plot Lines and Water Table Lines

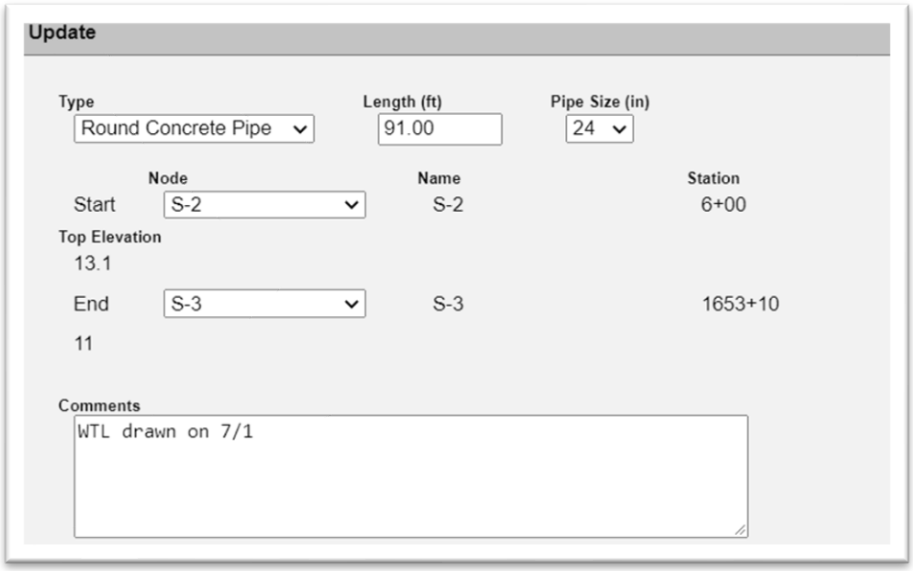
There is currently no option to make comments on these areas of the ESB. Use the LOTs comments tab to document information about a pad, plot line or water table line.

### *3. Drainage Comments*

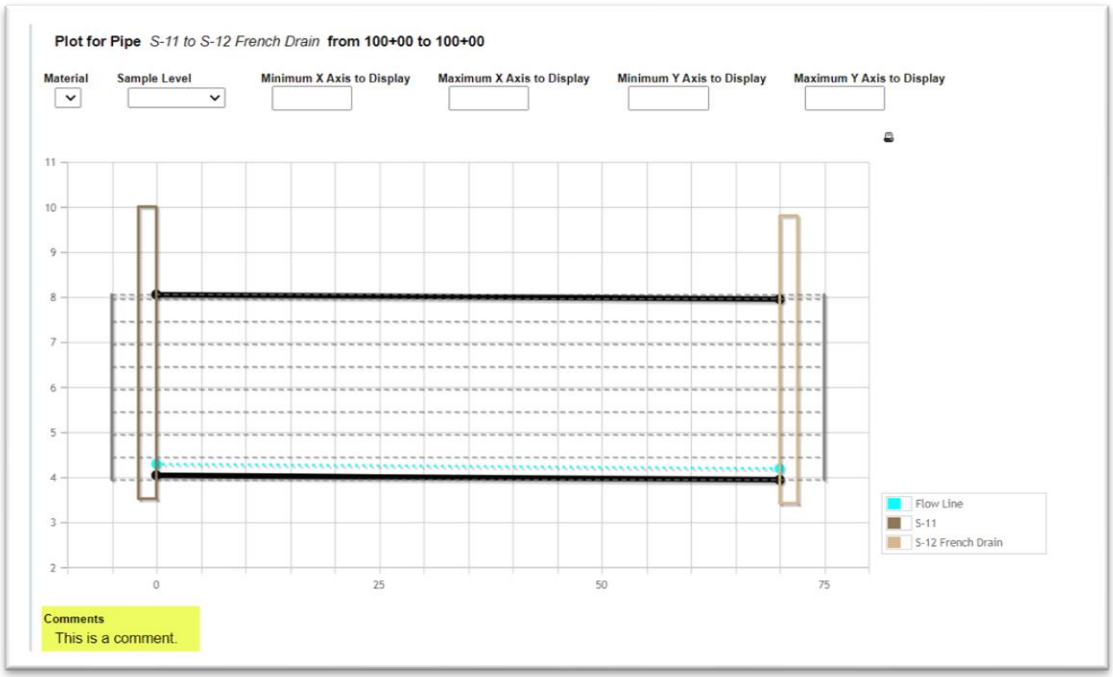



Comments about a specific pipe run can be seen by selecting the update option on that pipe run for users in one of the QC companies.

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.



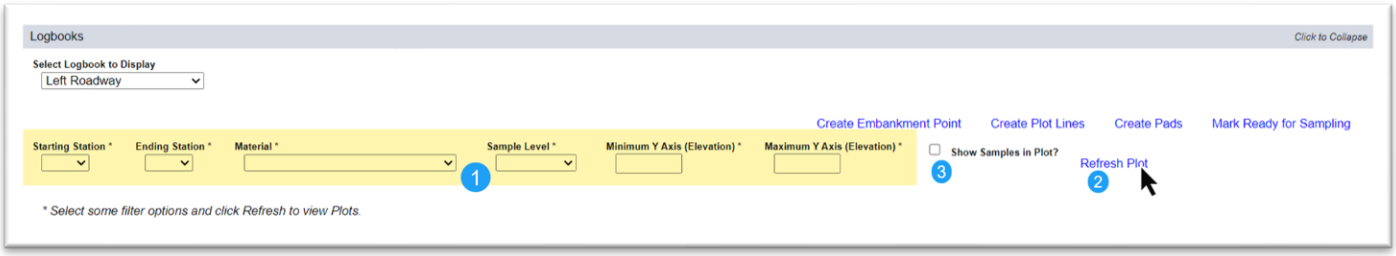
## F. Filtering Logbook Plots and Samples

MAC no longer automatically displays plots less than 1000'. This is due mostly to retaining wall plots. Most are less than 1000'. On a deep plot with a lot of samples, rendering the plots along with the samples at the same time exceeds the computer available memory in almost every case. The system does not know initially if the plot being selected will cause the available memory overload. To avoid this, you must now apply filters to every plot and then designate when you are ready to plot samples. This gives you a chance to "zoom in" on a realistic, workable area before MAC generates any displays.

**NOTE**: It is important for ERS users to use best practices when displaying plots:

- Do not click on display options such as Refresh or View Plots multiple times
  - This does not speed up the display process
    - It slows it down because by clicking to "reload" while MAC is still loading the first request causes the system to double the retrieval data in the background which in turns uses up the viewer's CPU and available memory
- Apply realistic filters when displaying plots, especially once samples are taken
  - Many factors will impact the speed of the display including system settings which have nothing to do with the MAC application
  - If the application is slow to respond, try applying filters to display less area; for example, one LOT at a time
  - Also, without filters, it may be difficult to determine where to place the mouse pointer, especially on deep fill areas

### *1. Filtering ESB Plots*

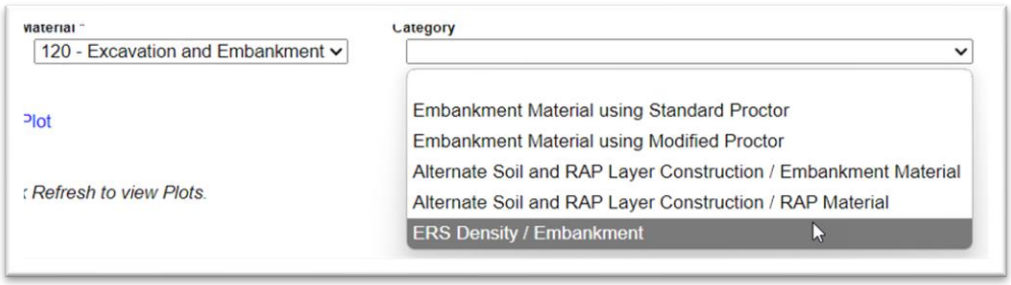



1. Apply filters as desired to the overall logbook. Not all filters have to be supplied every time. Use a combination of filters applicable to the area you wish to see.
a. **Starting Station** – select the embankment point starting station from the dropdown.
b. **Ending Station** – select the embankment point ending station from the dropdown.

**NOTE**: For ESB plots with pads, the station range includes both the stationing for the pad and the ESB plots. If they have different station ranges, for example, the pads beginning station is before the ESB beginning station, MAC filters now account for this difference.

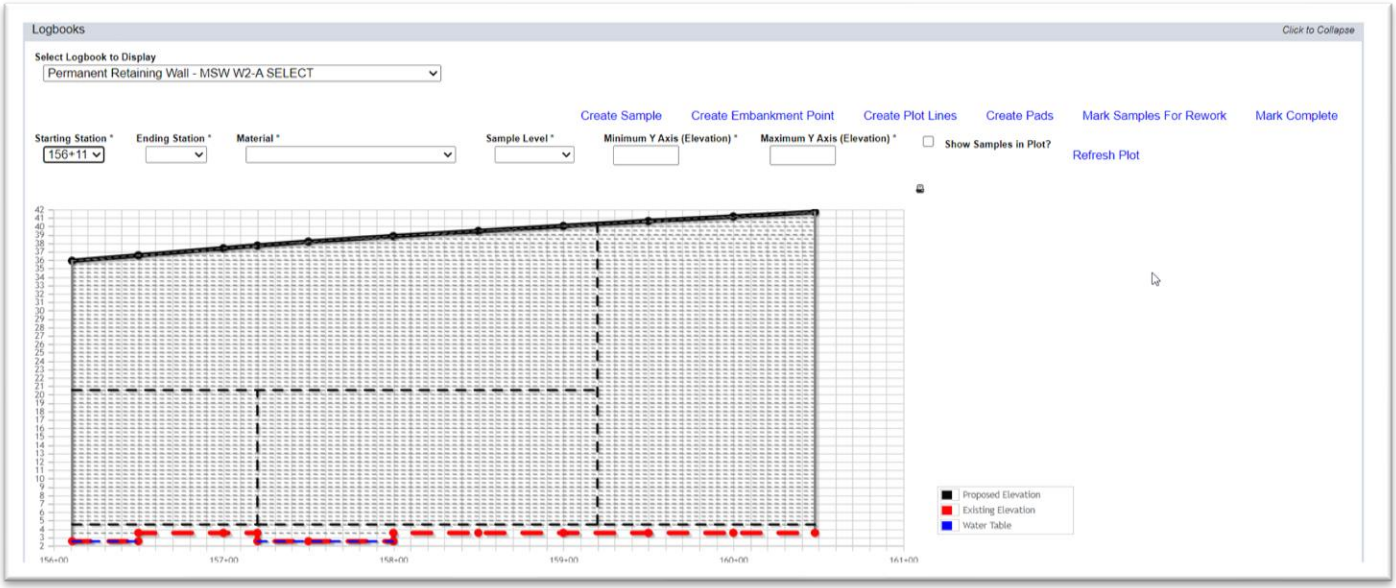
c. **Material** – If the ESB plots contain samples for more than one material and you only wish to see a certain material, select it from the dropdown; for example if you want to see subgrade samples, select 160 – Stabilizing.

d. **Category** – this field appears if a material is selected and displays ALL the category / types for the MAC Spec of that Material that is on your Job Guide Schedule (JGS). Not all are applicable to ERS samples, select the category with ERS samples.




e. **Sample Level** – select the sample level(s) you wish to display. These will not display until you have selected the Refresh Plot option in conjunction with the Show Samples on Plot? option.
f. **Minimum Y Axis (Elevation)** – select an elevation you wish to use as your bottom elevation of the plot,
g. **Maximum Y Axis (Elevation)** – for deep plots, it is helpful to plot the full depth in slices. Select an elevation you wish to use as your top elevation of the plot.

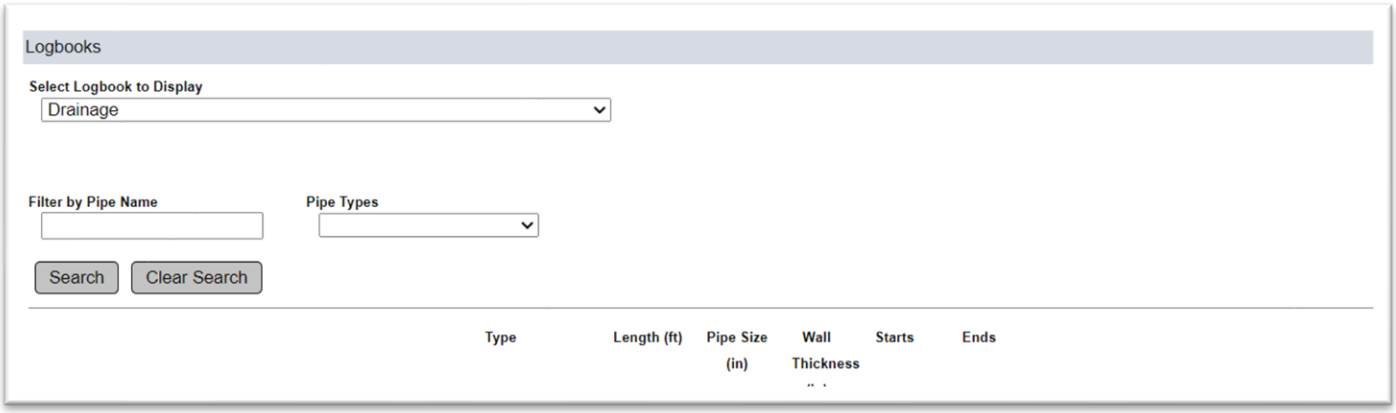
Here is an example of a retaining wall plot that is about 40’ deep with no filters.



Here is the same example with filters to display a more manageable, viewable plot. It might even be necessary to tighten in some more for sample display or location of the next sample purposes.

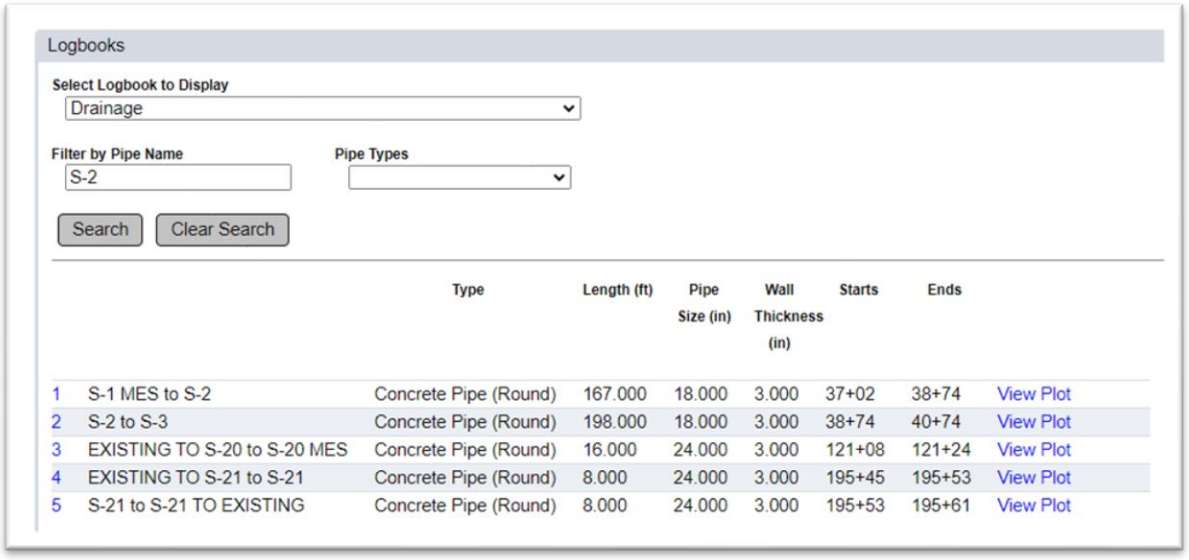
## *2. Filtering Drainage Plots*

Two new filters have been added for Drainage logbooks. The first is for filtering the list of pipe runs which can be helpful in logbooks with more than 50 pipe runs.




1. **Filter by Pipe Name** – if you know the structure name, you can use this field to narrow down the pipe run list to those with that structure in it. Enter all or part of the structure name.
2. Select the Search option.

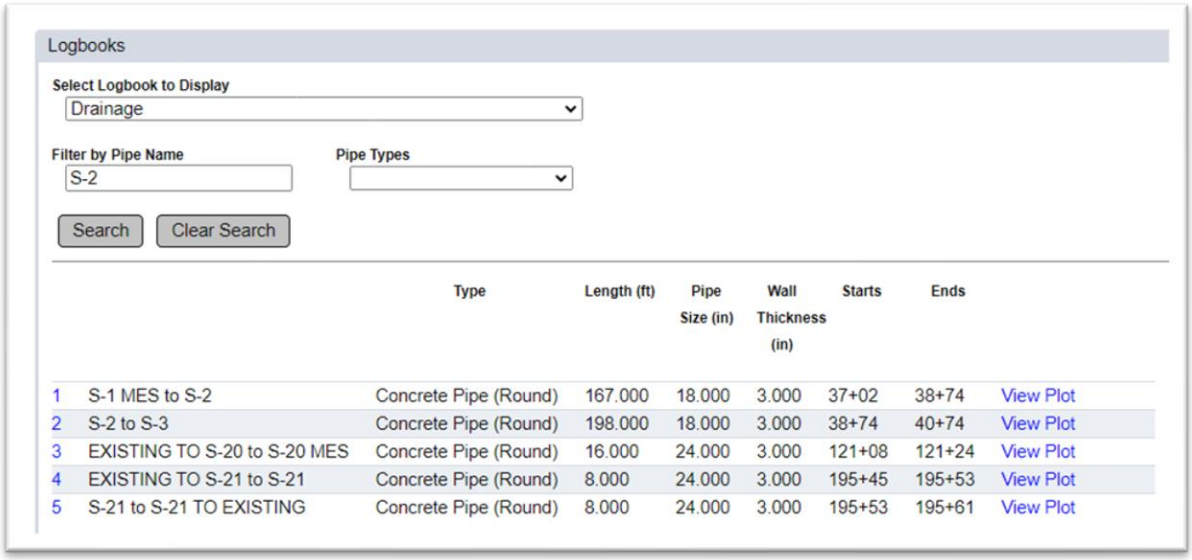
MAC will narrow down the pipe run list to the pip runs with that structure name or similar.



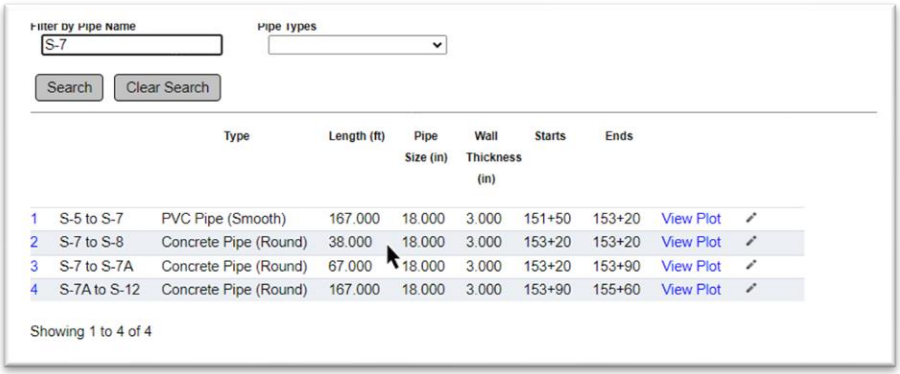

| | | Type | Length (ft) | Pipe Size (in) | Wall Thickness (in) | Starts | Ends | |
|---|---|---|---|---|---|---|---|---|
| 1 | S-1 MES to S-2 | Concrete Pipe (Round) | 167.000 | 18.000 | 3.000 | 37+02 | 38+74 | View Plot |
| 2 | S-2 to S-3 | Concrete Pipe (Round) | 198.000 | 18.000 | 3.000 | 38+74 | 40+74 | View Plot |
| 3 | EXISTING TO S-20 to S-20 MES | Concrete Pipe (Round) | 16.000 | 24.000 | 3.000 | 121+08 | 121+24 | View Plot |
| 4 | EXISTING TO S-21 to S-21 | Concrete Pipe (Round) | 8.000 | 24.000 | 3.000 | 195+45 | 195+53 | View Plot |
| 5 | S-21 to S-21 TO EXISTING | Concrete Pipe (Round) | 8.000 | 24.000 | 3.000 | 195+53 | 195+61 | View Plot |

3. **Pipe Types** – this field can be used to find all the pipe runs of a specific type. Select the pipe type(s) from the dropdown.
4. Select the Search option.

MAC will display the list of pipe runs for that pipe type.

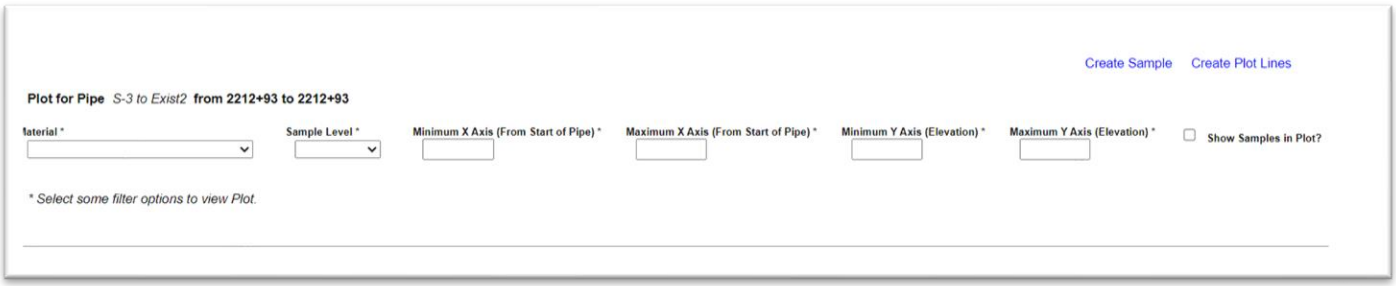



| | | Type | Length (ft) | Pipe Size (in) | Wall Thickness (in) | Starts | Ends | |
|---|---|---|---|---|---|---|---|---|
| 1 | S-1 MES to S-2 | Concrete Pipe (Round) | 167.000 | 18.000 | 3.000 | 37+02 | 38+74 | View Plot |
| 2 | S-2 to S-3 | Concrete Pipe (Round) | 198.000 | 18.000 | 3.000 | 38+74 | 40+74 | View Plot |
| 3 | EXISTING TO S-20 to S-20 MES | Concrete Pipe (Round) | 16.000 | 24.000 | 3.000 | 121+08 | 121+24 | View Plot |
| 4 | EXISTING TO S-21 to S-21 | Concrete Pipe (Round) | 8.000 | 24.000 | 3.000 | 195+45 | 195+53 | View Plot |
| 5 | S-21 to S-21 TO EXISTING | Concrete Pipe (Round) | 8.000 | 24.000 | 3.000 | 195+53 | 195+61 | View Plot |

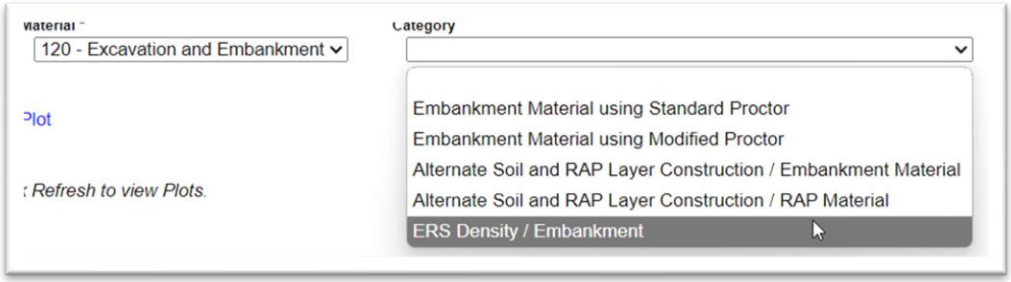



5. From any filtered list, select the row of the pipe run you wish to view.

The second place you must filter is on the pipe run itself. All pipe runs must now have filters in order to display. Although most pipe runes may not need filters, the system will not know which long, deep pipe runs with many samples will need filtering.



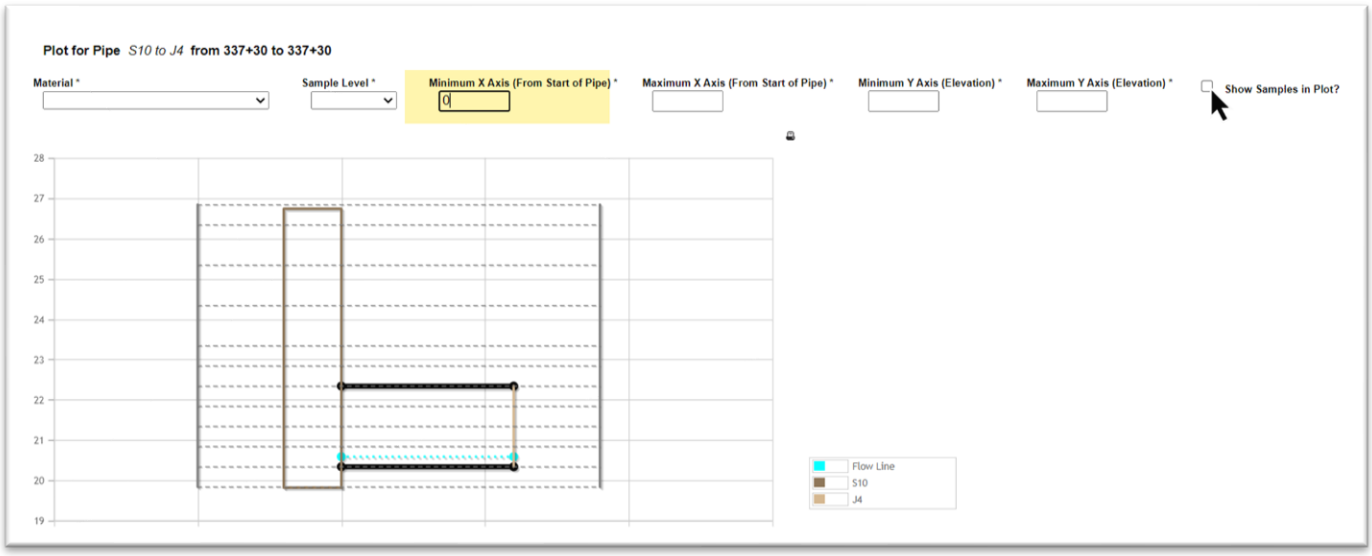

6. Select filters as desired.
a. **Material** – If the drainage plots contain samples for more than one material and you only wish to see a certain material, select it from the dropdown. In most cases, it will be 120 – Embankment and Excavation.
b. **Category** – this field appears if a material is selected and displays ALL the category / types for the MAC Spec of that Material that is on your Job Guide Schedule (JGS). Not all are applicable to ERS samples, select the category with ERS samples.




c. **Sample Level** – select the sample level(s) you wish to display. These will not display until you have selected the Refresh Plot option in conjunction with the Show Samples on Plot? option.
f. **Minimum X Axis (from Start of Pipe)** – for long pipe runs, it is helpful to plot the full length in slices. Select a beginning length you wish to use as your start of the pipe run plot.
g. **Minimum X Axis (from Start of Pipe)** – select an ending length you wish to use as your end of the pipe run plot.

h. **Maximum Y Axis (Elevation)** – for deep pipe runs, it is helpful to plot the full depth in slices. Select an elevation you wish to use as your top elevation of the plot.
i. **Maximum Y Axis (Elevation)** – select an elevation you wish to use as your top elevation of the plot.
7. Unlike the ESB plots, there is no Refresh. Once you have supplied all desired filters, click out of the filter fields (anywhere on the screen) to apply the filters.
8. If you need to refine the plot, update the filters and click out of them again to replot.
9. **Show Samples on Plot?** – once you are satisfied with the plotted area, select this option to plot the samples on the pipe run plot.

**NOTE**: For most pipe plots, that are not long with phases and many samples, the easiest way to filter so that the pipe run plot will display is by entering a 0 (zero) in the Minimum X Axis field and clicking out of the field.




Select the Show Samples on Plot? option to display the samples.

## Chapter 2 – Updating Plots for Field Adjustments – QC Data Entry

Plots can be updated during construction to account for construction operations and field conditions. Field personnel should coordinate changes made to the plots with the person responsible for creating the plots. This manual does not describe plot adjustments. See the ERS Plots Manual.

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.

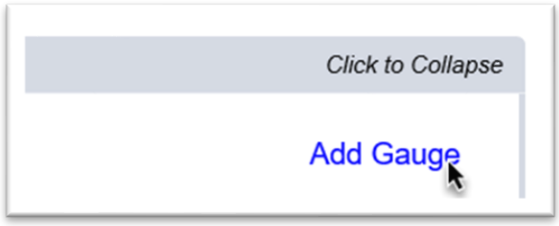
## Chapter 3 – Adding Project Gauges and Performing Gauge Comparisons

There is a new type of nuclear density gauge called a low-activity nuclear density gauge (L-NDG). Currently there are not many being used; however it is anticipated as many companies phase out older traditional (NDG) nuclear gauges, their use will be more widespread. These instructions and the ***FDOT Quality Control Earthwork Records System (Form No. 675-020-27)*** and ***Verification Earthwork Records System (Form No. 675-020-28)*** forms have been updated to account for when an L-NDG is currently being used.

### A. Adding Project Gauges – Data Entry each Company

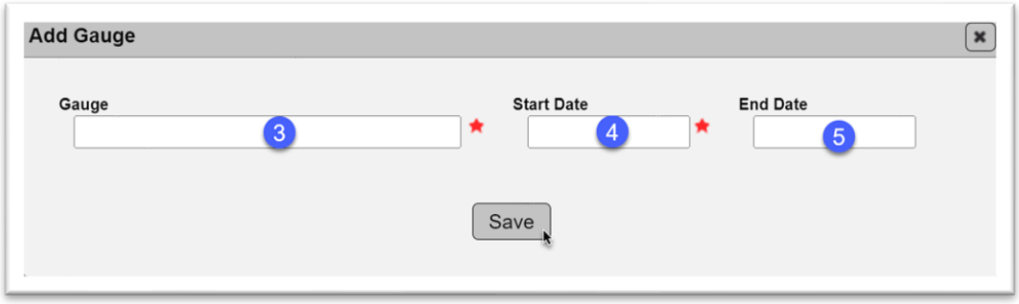
Data Entry users from each company (QC, VT, and IA) select gauges being used on the ERS project from each company's gauge inventory.

1. Click on the Gauges tab to expand it.




2. Select the Add Gauge option.

An Add Gauge dialog box appears.

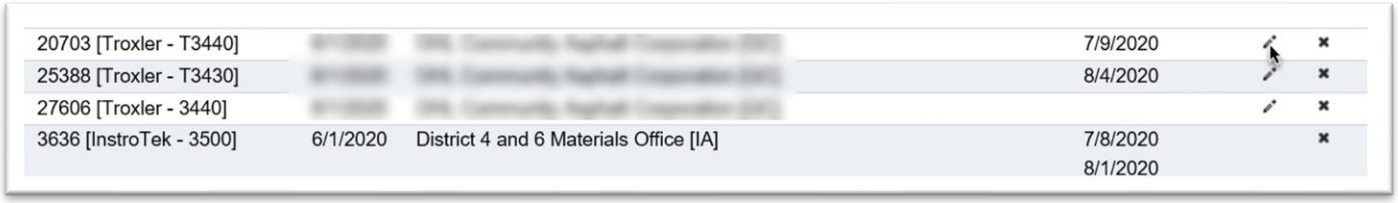



3. **Gauge** – enter all or part of the gauge serial number or company description in the field and select the gauge from the returned list.
4. **Start Date** – enter the date the gauge will start to be used on the project or select it from the calendar.
5. **End Date** – not applicable when adding a gauge. Do not enter an end date when adding a gauge.
6. Select the Save option.

**NOTE**: IA project gauges must be added to the project gauge list for the IA ERS PMU to perform an IV test with an IA company gauge if the gauge the inspector has at the time of the test is not the same gauge that was used to perform the initial 3-way gauge comparison.

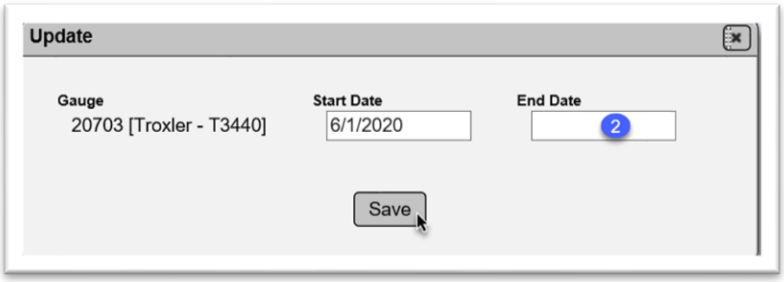
### B. Updating a Project Gauge – Data Entry Each Company

To indicate a gauge is no longer being used on a project, enter the end date.




1. Select the Update icon ( ) on the row of the gauge.

An Update dialog box appears.

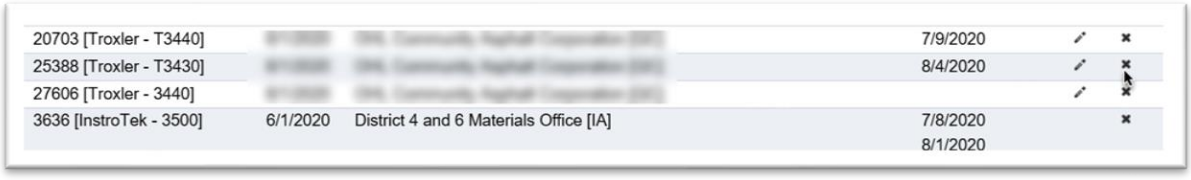



2. **End Date** – enter the date the gauge is removed from the project or select it from the calendar.

**NOTE**: An end date should **not** be entered unless the gauge has been used on the project and is being removed from the project permanently before the earthwork operations are complete. Entering a date impacts the gauge Valid logic.

3. Select the Save option.

### C. Deleting a Project Gauge – Data Entry Each Company




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

No Delete dialog box appears. The project gauge is simply removed from the list.

**NOTE**: The option to delete a project gauge may not always be available.

## D. Entering Gauge Comparison Results – Project Administrator or Program Maintenance User

For a QC or VT gauge (including IV sample level by VT) to appear in the gauge dropdown on a density test:

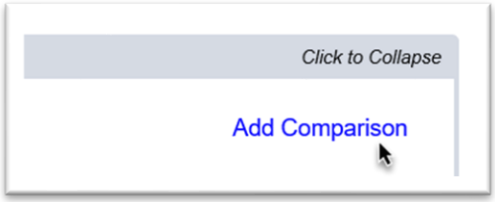
- The gauge must be listed on the company profile
- The gauge must be added as a project gauge
- The gauge must be calibrated within the last year
- The gauge must be in a successful comparison
- The gauge must not have an end date before the date test performed

With the implementation of the ***2024/2025 Specifications Workbook***, there is a change in the way the gauge comparison is calculated. These instructions will describe both as there are active projects with the older requirements still ongoing.

### *1. 3-Way Comparison before 07/01/2024 – IA ERS PMU*

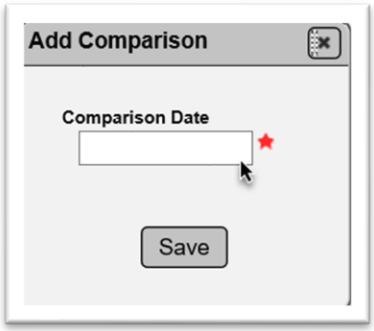
The first gauge comparison must be a 3-way comparison. After that, a valid gauge or an IA gauge can be used to validate a non-validated gauge of a different level. In most cases, the initial gauge comparison will be entered by the IA ERS PMU who performed the 3-way comparison.

1. Click on the Gauge Comparisons tab to expand it.



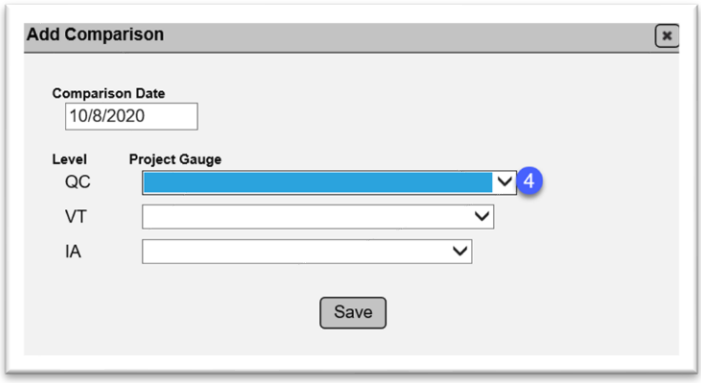

2. Select the Add Comparison option.

An Add Comparison dialog box appears.



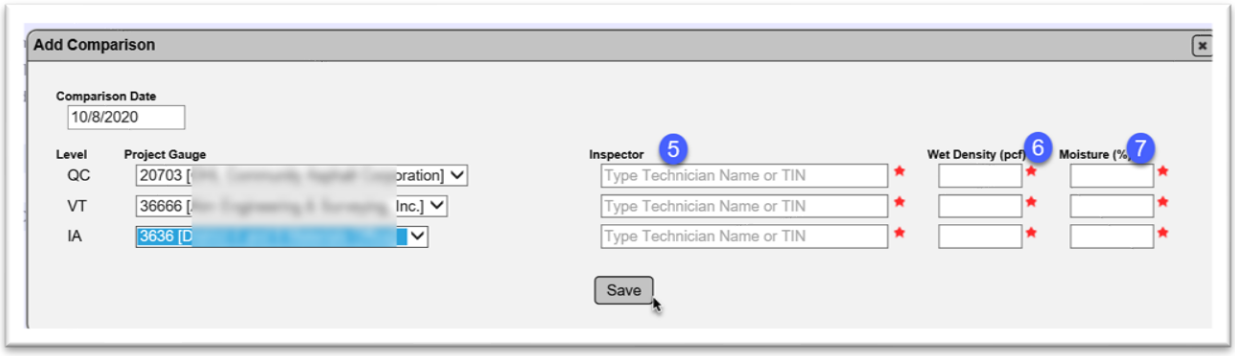

3. **Comparison Date** – enter the date the gauge comparison was performed or select it from the calendar.

New fields appear.




4. **Project Gauge** – select the appropriate project gauge from the dropdown for QC, VT, and IA.

New fields appear after each gauge is selected.




5. **Inspector** – enter the name or TIN of the inspector for each level and select the technician from the returned list.
6. **Wet Density** – enter the gauge wet density reading for each level.
7. **Moisture** – enter the moisture reading for each level.
8. Select the Save option.

If the gauges compare, the QC and VT gauges will be indicated as a valid project gauge. IA gauges are always valid.

If they do not compare, the noncomparison is indicated in red. The gauges that do not compare are not indicated as a valid project gauge.

| Gauge | Latest Calibration Date | Wet Density (pcf) | Moisture (%) | Dry Density (pcf) | Δ [Dry Density] (pcf) |
|---|---|---|---|---|---|
| 20703 [Troxler - T3440] | 7/9/2020 | 110 | 10 | 100 | QC - VT: 4.5 * |
| 36666 [Troxler - 3440] | 7/9/2020 | 105 | 10 | 95.5 | VT - IA: 4.5 * |
| 3636 [InstroTek - 3500] | 8/1/2020 | 110 | 10 | 100 | IA - QC: 0.0 |

**NOTE**: If a technician performing the gauge comparison is not qualified, the TIN will appear in bold red font. This is not an ERS project Materials Certification Review finding and does not impact the gauge's validity. It is intended to notify the technician, QC Manager, and PA they should not perform ERS acceptance testing until the qualification issue is addressed.

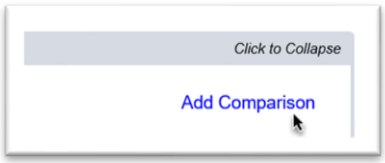
**NOTE**: If another 3-way gauge comparison with an IA gauge is needed, one can be performed and entered at any time after the initial gauge comparison

**NOTE**: If gauges in a successful gauge comparison are included another comparison and the new gauge comparison is unsuccessful, the previously valid gauges will be made invalid. Do not perform a gauge comparison that includes all gauges already indicated as valid.

**NOTE**: When a new calibration record is entered on the company gauge, the recalibrated gauge will no longer be valid, even if it is included in a successful comparison. It must be compared to another valid gauge in order to be designated as valid once again. In addition, if the gauges in a 2-way gauge comparison both have new calibration dates, each gauge will need to be compared to another valid project gauge individually in another successful gauge comparison in order for them to be designated as valid once again.

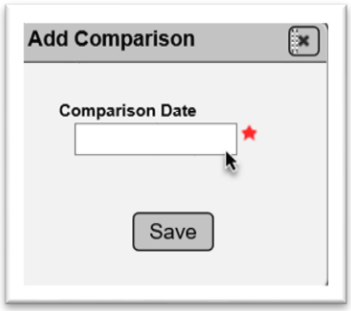
### *2. 2-Way Comparison before 07/01/2024 – PA*

Once QC or VT gauges are included in a successful gauge comparison, they can be used to validate other gauges in a 2-way gauge comparison. A valid QC gauge can validate a new VT gauge and vice versa. A valid gauge cannot be used to validate a gauge that is the same level.



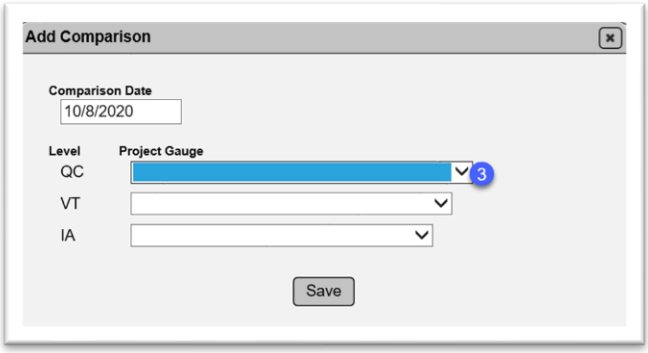

1. Select the Add Comparison option.

An Add Comparison dialog box appears.



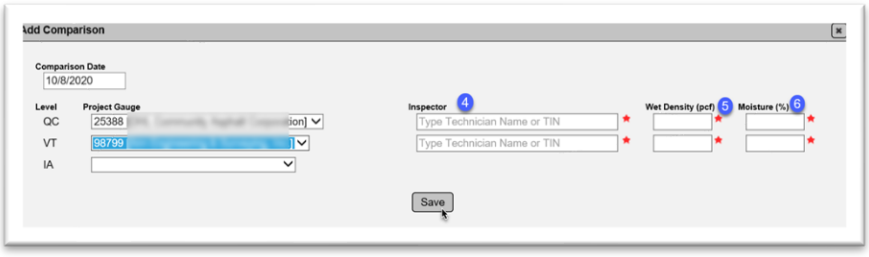

2. **Comparison Date** – enter the date the gauge comparison was performed or select it from the calendar.

New fields appear.




3. **Project Gauge** – select the appropriate gauge from the dropdown for QC and VT. Once there is an initial 3-way gauge comparison, MAC will allow you to create a comparison with only two of the three levels selected.

New fields appear.




4. **Inspector** – enter the name or TIN of the inspector for QC and VT and select the technician from the returned list.
5. **Wet Density** – enter the gauge wet density reading for QC and VT.
6. **Moisture** – enter the moisture reading for QC and VT.
7. Select the Save option.

If the gauges compare, the previously not validated gauges will be indicated as valid. If they do not compare, it will not be indicated as a valid gauge.

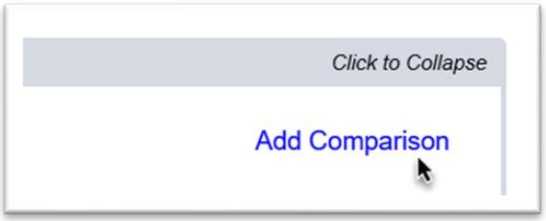
**NOTE**: An IA gauge can be used in a 2-way comparison, if needed.

**NOTE**: If gauges in a successful gauge comparison are included another gauge comparison and the new gauge comparison is unsuccessful, the previously valid gauges will be made invalid. Do not perform a gauge comparison that includes all gauges already indicated as valid.

### *3. 3-Way Comparison on or after 07/01/2024 – IA ERS PMU*

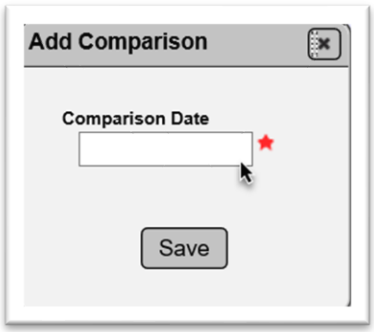
In the ***2024/2025 Specifications Workbook***, the calculation for the gauge comparison was revised from using Wet Density and Moisture Content to calculate Dry Density and then using that value for the comparison to using only the Wet Density value for the comparison. The rest of the logic and description is the same as described in (1. 3-Way Comparison before 07/01/2024 – IA ERS PMU.

1. Click on the Gauge Comparisons tab to expand it.



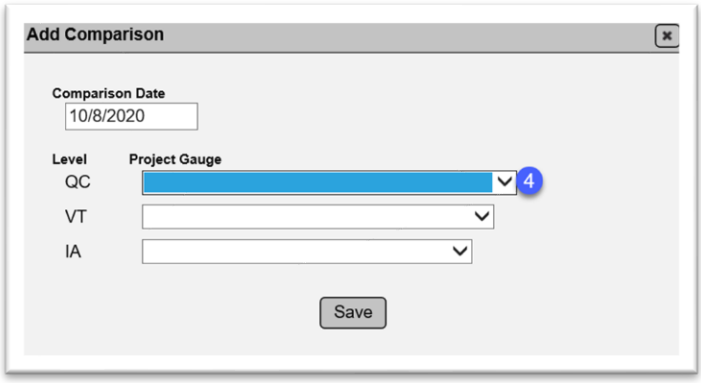

2. Select the Add Comparison option.

An Add Comparison dialog box appears.



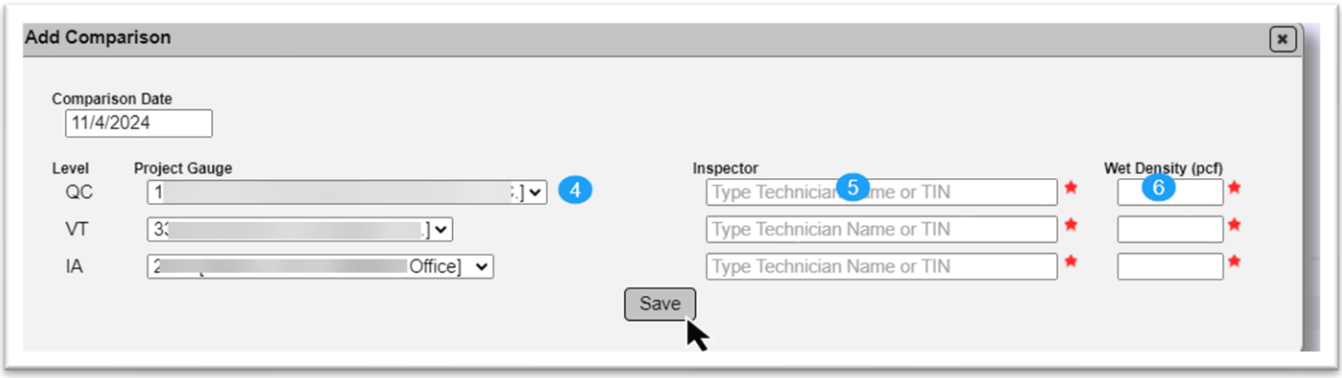

3. **Comparison Date** – enter the date the gauge comparison was performed or select it from the calendar.

New fields appear.



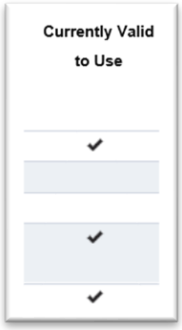

4. **Project Gauge** – select the appropriate project gauge from the dropdown for QC, VT, and IA.

New fields appear after each gauge is selected.



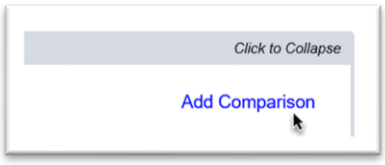

5. **Inspector** – enter the name or TIN of the inspector for each level and select the technician from the returned list.
6. **Wet Density** – enter the gauge wet density reading for each level.
8. Select the Save option.

If the gauges compare, the QC and VT gauges will be indicated as a valid project gauge. IA gauges are always valid.



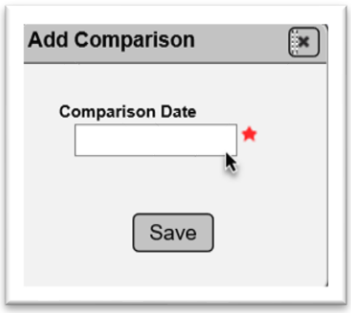
### *4. 2-Way Comparison on or after 07/01/2024 – PA*

Once QC or VT gauges are included in a successful gauge comparison, they can be used to validate other gauges in a 2-way gauge comparison. A valid QC gauge can validate a new VT gauge and vice versa. A valid gauge cannot be used to validate a gauge that is the same level.



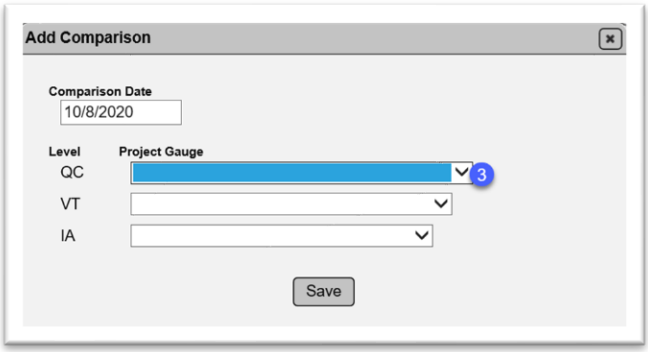

1. Select the Add Comparison option.

An Add Comparison dialog box appears.



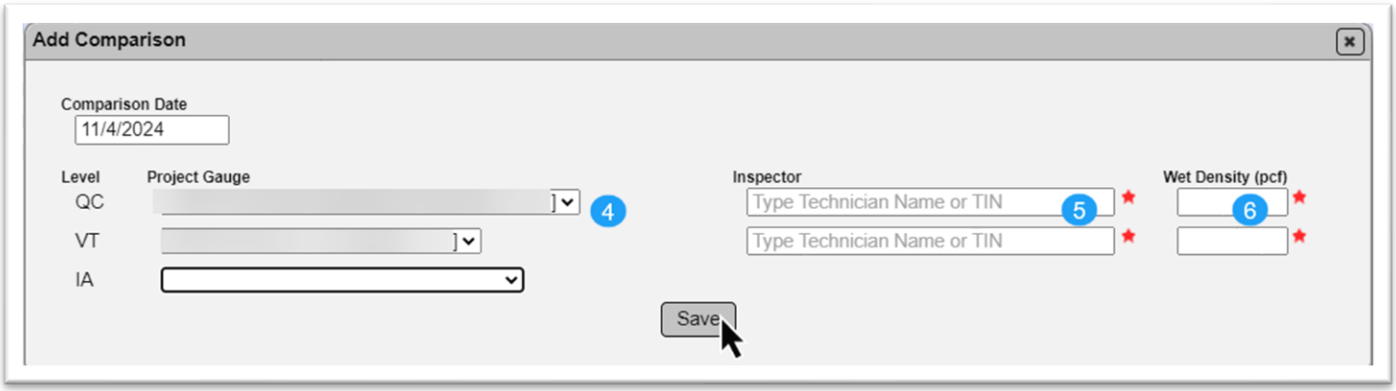

2. **Comparison Date** – enter the date the gauge comparison was performed or select it from the calendar.

New fields appear.




3. **Project Gauge** – select the appropriate gauge from the dropdown for QC and VT. Once there is an initial 3-way gauge comparison, MAC will allow you to create a comparison with only two of the three levels selected.

New fields appear.



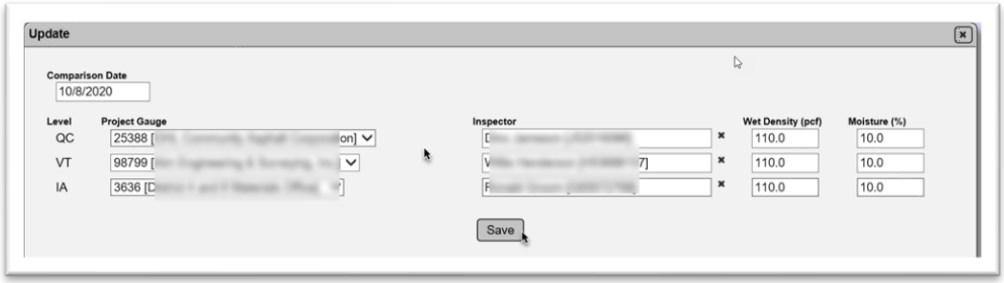

4. **Inspector** – enter the name or TIN of the inspector for QC and VT and select the technician from the returned list.
5. **Wet Density** – enter the gauge wet density reading for QC and VT.
6. Select the Save option.

If the gauges compare, the previously not validated gauges will be indicated as valid. If they do not compare, it will not be indicated as a valid gauge.

## E. Updating a Gauge Comparison – Project Administrator

1. Select the Update icon ( ) on the gauge comparison record you want to update.

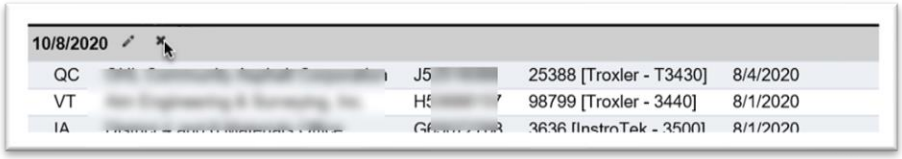
An Update dialog box appears.




2. Make changes to any of the data as needed.
3. Select the Save option.

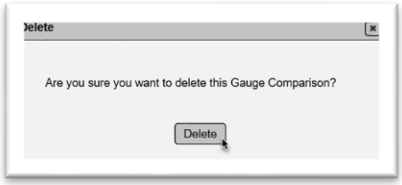
**NOTE**: On Gauge Comparisons created on or after 07/01/2024, the moisture content field does not appear. See 3. 3-Way Comparison on or after 07/01/2024 – IA ERS PMU and 4. 2-Way Comparison on or after 07/01/2024 – PA.

## F. Deleting a Gauge Comparison – Project Administrator




1. Select the Delete icon (x) on the gauge comparison record you want to delete.

A Delete dialog box appears.




2. Select the Delete option.

The gauge comparison record will be deleted. The gauges will no longer be available for testing.

## Chapter 4 – Creating Samples and Entering Test Results – Data Entry

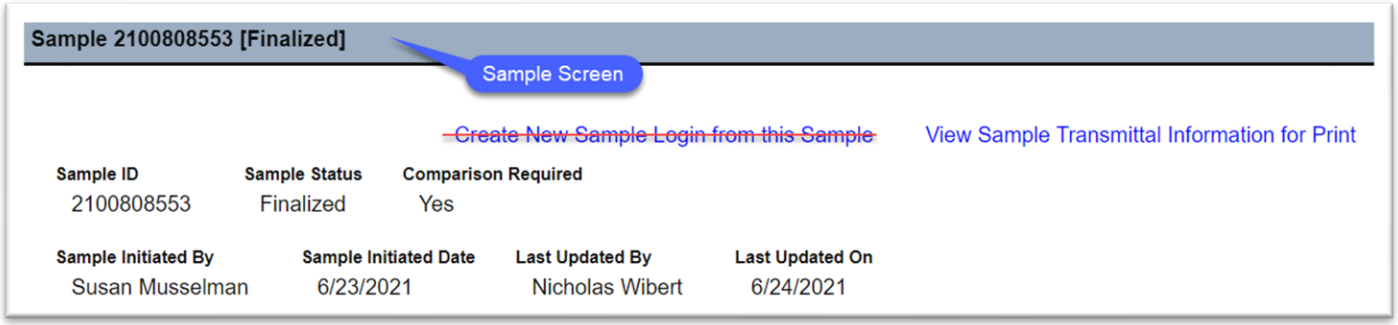
The ERS project is designed to create samples directly on the plots. Entering a sample for an ERS test does not require you to navigate to the sample screen. Also, it allows you to add the test results before you submit the sample. Samples processed from the ERS screen are designated as Pending Finalization status after they are created unless there is something wrong with the sample data, for example, missing required fields, or if the user opts not to submit the sample when saving it.

There is no restriction on the proctor sample status; however, if a proctor sample that is not yet tested is selected, the density test will not populate correctly. See Chapter 5, J. Entering Field Density Sample using an Open Proctor Sample.

For ERS tests, there is a sample. It is the lift of finished earthwork area (i.e., 500 linear feet of embankment). Users may see terms related to lab samples such as “Submitted for Lab Testing”. This is because most samples in MAC are lab samples. Field samples follow the lab sample life cycle. See Chapter 10 – ERS Sample Life Cycle for details about ERS sample life cycle. The location of the tests should be determined by using a random number generator. A form for selecting the random location is available in the Contractor Quality Control Earthwork Records System ***(Form No. 675-020-27)*** and Verification Earthwork Records System ***(Form No. 675-020-28)*** forms and in Chapter 4 Section, M. Earthwork Random Number Generator. See Chapter 8, Section C. Using Filled out Forms for Data Entry.

**NOTE**: ***FDOT Specification Sections 105, 120, 145, 160, 200 and 548*** require direct data entry into MAC for ERS tests. The only exception is a contract designated as a remote contract by the DMRE and periods where MAC is not available, for example, server outages (see Chapter 8 – Remote Contracts and MAC Outages).

**NOTE**: On the Sample screen, there is an option to create a sample from another sample. Most of the time, you won’t need to be on the sample screen; however, there will be times when you have to perform functions you can’t do on the ERS screen. If you navigate to the sample, you may see this option. **DO NOT** create ERS samples by copying them from another sample. There are shortcuts and time saving features built into the ERS sample life cycle on the ERS Project screen that are not available on the sample screen. If you create an ERS sample from the Sample screen, you will have to perform all the Sample Life Cycle steps as a non-ERS sample as described in Chapter 10 – ERS Sample Life Cycle.

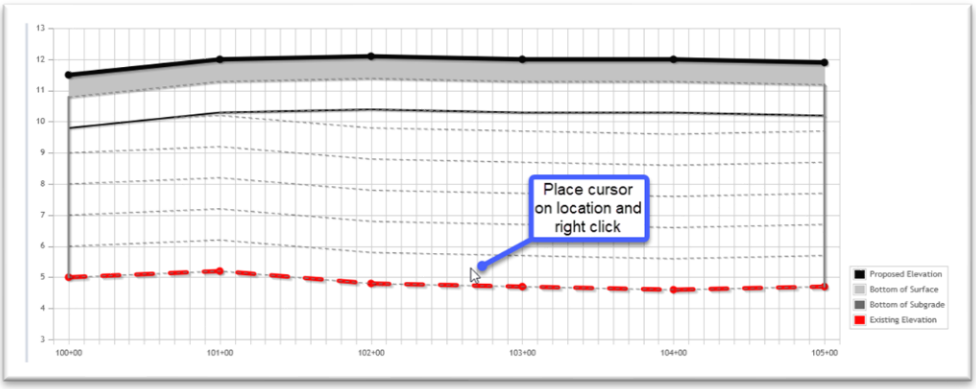


## A. Creating a Field Density Sample ESB – Data Entry Each Company before 07/01/2024

See Chapter 10 – ERS Sample Life Cycle for information on sample statuses and other sample related actions. See L. ERS Samples on Work Order Nonstandard JGS for login information on Work Order nonstandard JGS (NSJGS).

For contracts let before 07/01/2024, the test method used for testing field densities is FM 1-T 238.

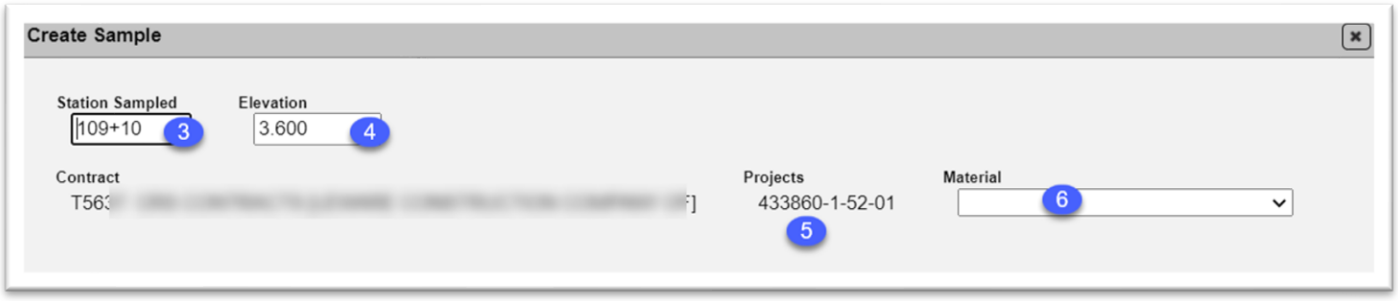
### *1. 120 – Excavation and Embankment*




1. Navigate to the ESB logbook for the sample and use filtering to display the plot where the test is being performed. Place your mouse pointer on the plot location where the test is being performed.
2. Right click to create the sample.

**NOTE**: If the cursor is in between lifts, the plot may appear across the lifts or in the wrong lift after the sample is saved or submitted. If this happens, you can adjust the elevation on the sample screen to reflect the correct lift. You do not have to delete the sample and reenter it. The PA may need to return the sample if it is in Pending Finalization status.

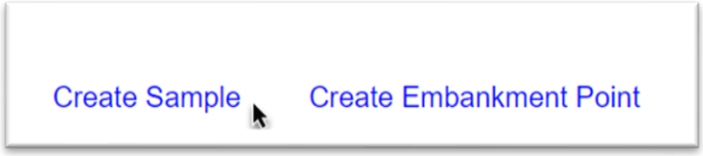
A Create Sample dialog box appears.




3. **Station Sampled** – MAC automatically populates this field based on the location of the mouse when you right click. Confirm that the value is correct for where the test was performed in the field.
4. **Elevation** – MAC automatically populates this field based on the location of the mouse when you right click. Confirm that the value is correct for where the test was performed in the field.

**NOTE**: Make sure the elevation is between the bottom of the lift and the top of the lift. In this example, the sample would be plotted as on lift 2. If you are on lift 1, the elevation should be below 10.9.

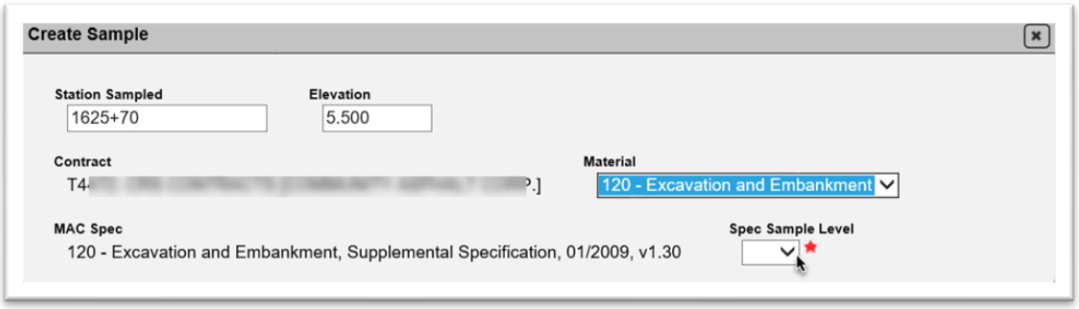
**NOTE**: Some devices may not be able to perform mouse operations. Some may need optional equipment, such as a stylus with mouse features for a tablet. Many touch screen devices will allow you to create a sample by touching the screen at the location in the plot. If you cannot right click with your device or you do not have a touch screen, you can use the Create Sample option. If you use this option, MAC will **not** populate the Station Sampled and Elevation fields, both of which are required. You enter them manually.




5. **Projects** – If the ERS Project has only one FPN on it, this field will default to the FPN of the ERS project. For ERS Projects with more than one FPN, you must indicate which project it is by deselecting all other projects.
6. **Material** – select the appropriate MAC material for the layer you are testing. Since we are entering an embankment field density, the material should be 120 – Excavation and Embankment.

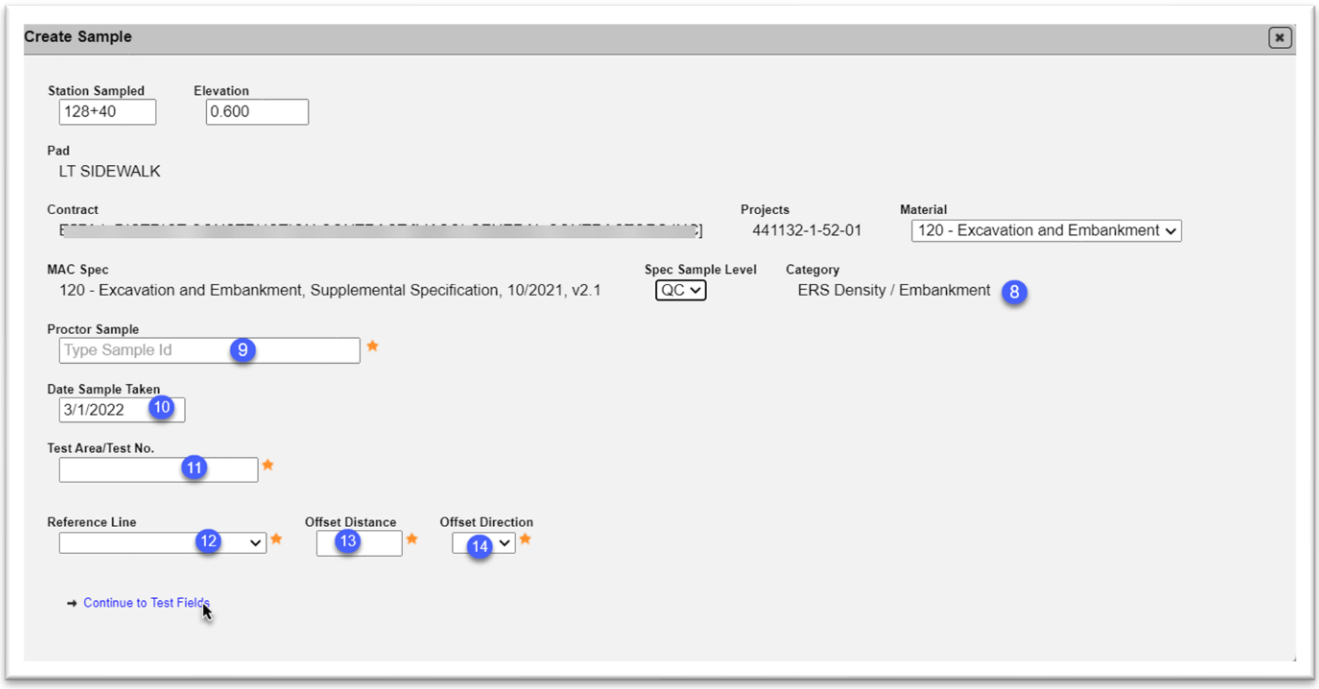
**NOTE**: MAC has no logic to tell that you are in the embankment part of the ESB plot. It is possible to select the incorrect material so make sure you have the correct material.

New fields appear.




7. **Spec Sample Level** – select the appropriate sample level from the dropdown. For Resolution testing performed by the QC technician, see E. Entering a Resolution Field Density (QR) when VT fails – QC Data Entry.

More fields appear.




8. **Category** – this field defaults to ERS Density/Embankment since it is the only option on the MAC Spec with an ERS test on it.

9. **Proctor Sample** – enter all or part of the FDOT Sample Number of the proctor sample and select it from the returned list. MAC displays information MAC Sample ID, FDOT Sample Number, and Soil Description for the proctor sample to ensure the correct proctor sample is selected. If it is an older proctor sample, some of this information (like Soil Description) may not be on the proctor sample so it will not display here.

**NOTE**: In Chapter 5 – Field Density Sample Special Cases, there are examples of special cases where the appropriate proctor must be selected. These examples do not cover all possibilities. It is the responsibility of the user to ensure the correct proctor is selected for the specific test being performed.

**NOTE**: New programming in the proctor sample field reduces the available samples to select in this field. The sample being selected must have:

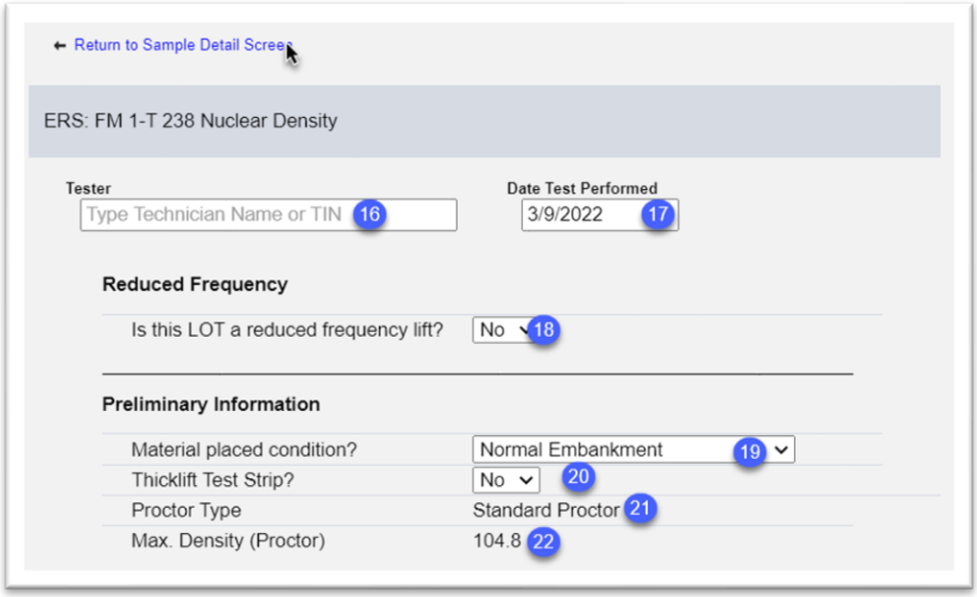
- The same Material as the ERS density sample (if the density sample is under MAC Spec 120, then only proctor samples under MAC Material 120
- Be on any FPN on the contract as the FPN of the ERS density sample
- Have one of these 3 tests:
    - FM 1-T 99 Standard Proctor
    - FM 1-T 180 Modified Proctor
    - Pit Proctor Reporting

10. **Date Sample Taken** – this field defaults to today's date which in most cases should be correct. The date sample taken field is required on all samples in MAC.
11. **Test Area /Test No.** – this field is the FDOT Sample Number field relabeled for ERS. Follow the sampling numbering instructions for field density samples (ERS Sample Numbering Instructions).

**NOTE**: MAC defines the first LOT in all plots as "LOT 1", regardless of what order the LOTs are tested. Think of this as the "Display LOT number". Displayed LOT 1 is the first LOT displayed. If a new LOT is inserted at the beginning of the plot all the Display LOTs will be renumbered. If a new LOT is inserted in the middle of the plot, all Display LOTs after the inserted LOT will be renumbered. Display LOT 1 may not be the first LOT tested.

12. **Reference Line** – select the controlling line of the project as shown in the plans. If the option used is not listed on the dropdown, select Other and make a comment in the comments section describing the reference line.
13 **Offset Distance** – enter the offset distance in feet.
14. **Offset Direction** – select the offset direction from the dropdown.
15. Select the Continue to Test Fields option.

The test fields for FM 1-T 238 Nuclear Density will appear in the dialog box. You can select the Return to Sample Detail Screen option to return to the sample login information.



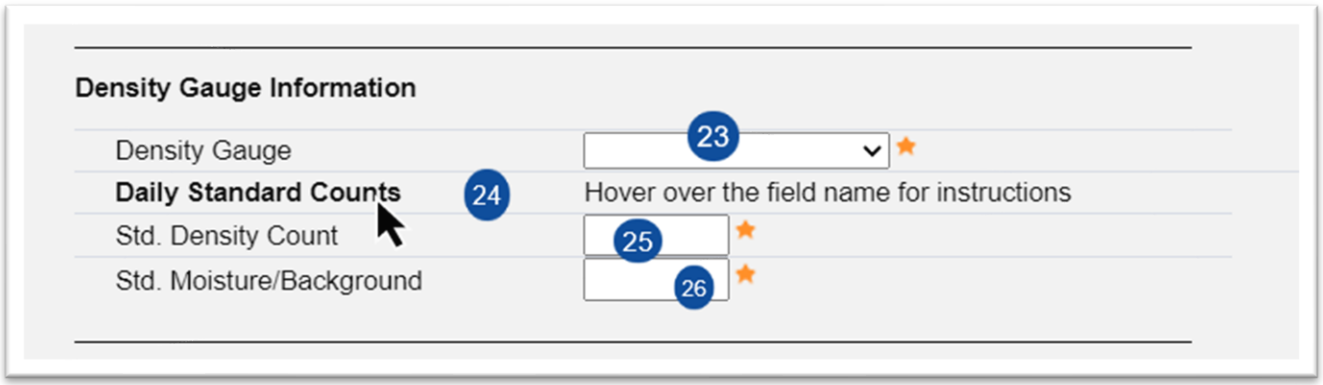

16. **Tester** – enter the name or TIN of the testing technician and select from the returned list.
17. **Date Test Performed** – this field defaults to today's date which in most cases should be correct.
18. **Is this LOT a reduced frequency lift?** – this field only appears on QC Samples. Select Yes if the test is a lift where a density test was not performed due to reduced frequency. If the lift is not reduced frequency, leave the default of No.

**NOTE**: If yes is selected, all other fields on the test screen disappear. This allows for a sample to be plotted on the plots for the lift not tested under reduced frequency and provides the PA with assistance in selecting the samples in the comparison package. See Chapter 5, C. Reduced Frequency.

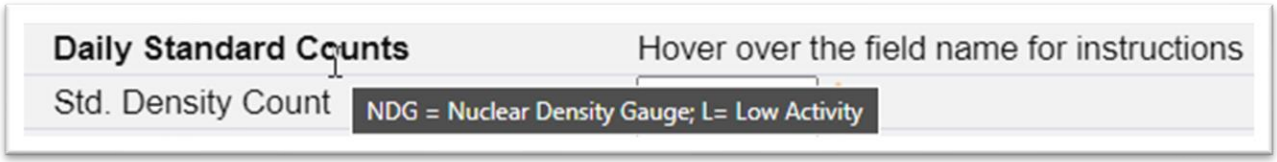
19. **Material placed condition?** – this field has different options, depending on the proctor type.
a. If the proctor type is Standard Proctor, select the appropriate placement condition from the dropdown. The selection will populate the Target Compaction % field.
i. **Normal Embankment** – select this option if the placement is for embankment. *This is shown as condition #1 on the ERS forms***.**
ii. **Pipe run only & within cover zone** – this option does not apply to embankment samples under ESB. *This is shown as condition #2 on the ERS forms.*
iii. **Sidewalk/Driveway** – select this option if the placement is for a sidewalk or a driveway. *This is shown as condition #3 on the ERS forms.*
iv. **Noise or Perimeter Wall** – select this option if the placement is for a noise or perimeter wall. *This is shown as condition #4 on the ERS forms.*

b. if the proctor type is Modified Proctor, there are different selections than for Standard Proctor.
i. **Spread Footer** – select this option if the placement is for a spread footer. *This is shown as condition #5 on the ERS forms.*

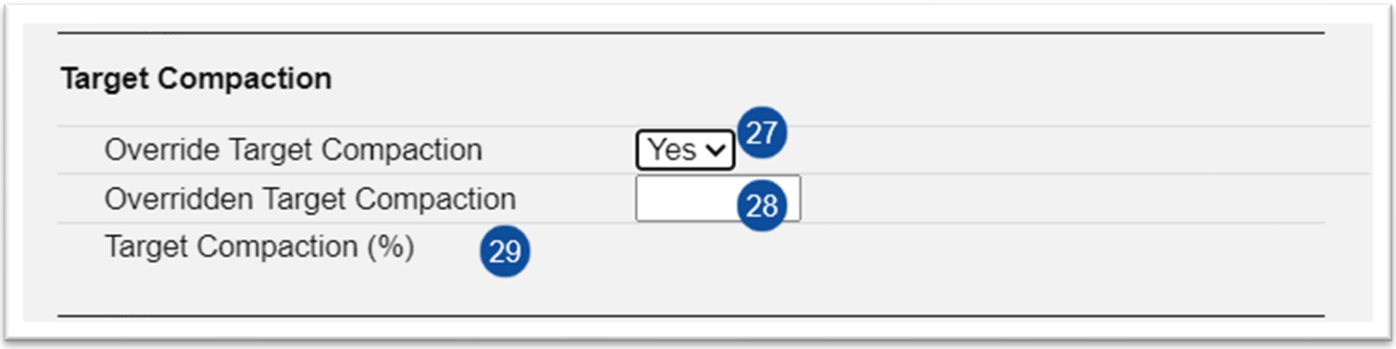
ii. **Concrete Barrier Wall** – select this option if the placement is for a concrete barrier wall. *This is shown as condition #6 on the ERS forms.*
iii. **Normal Embankment** – select this option if the placement is for embankment. *This is shown as condition #1 on the ERS forms.*
20. **Thicklift Test Strip** – this field defaults to No. If the test is for a thicklift test strip (see Chapter 5, Section D. Testing for Thicklift Approval – Data Entry Each Company), change this to Yes. *This is shown as condition #7 on the ERS forms.*
21. **Proctor Type** – this field is displayed from the proctor sample that you selected on the sample information. Confirm that it is the right type of proctor. If not, select the Return to Sample Detail option to review the Proctor Sample to ensure the correct one was selected.
22. **Max. Density (Proctor)** – this field is displayed from the proctor sample that you selected on the sample information. Confirm that it is the right value. If not, select the Return to Sample Detail option to revise the Proctor Sample field.




23. **Density Gauge** – select the gauge from the dropdown. If the gauge used does not appear, the test is not valid for acceptance, and you will not be able to log it in. Perform the test again with a valid gauge. (See Chapter 3 – Adding Project Gauges and Performing Gauge Comparisons).
24. **Daily Standard Counts** – this is a helper field. Hover over it to receive additional information on how to enter data for an NDG versus an L-NDG.

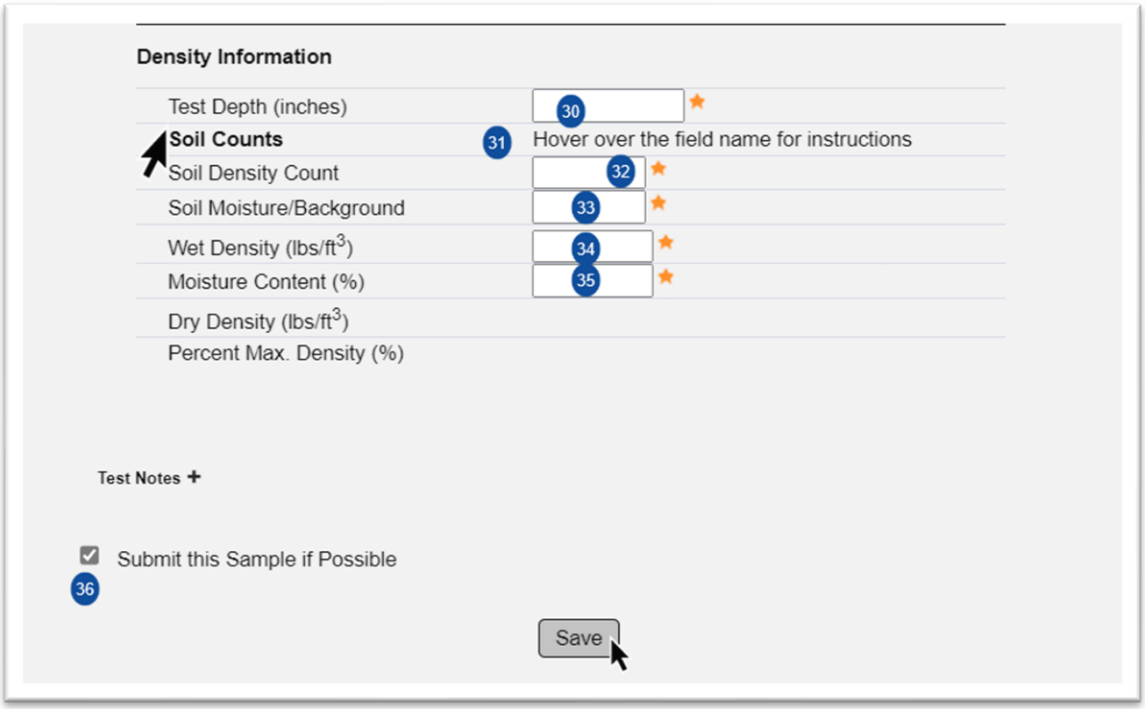



25. **Std. Density Count** – enter the daily standard density count of the gauge selected for NGDs. For L-NDG's, this will be displayed as DS.
26. **Std. Moisture/Background**– enter the daily standard moisture count of the gauge selected for NGDs. For L-NDG's, the standard background count maybe displayed as BGD or DSB depending on the model.



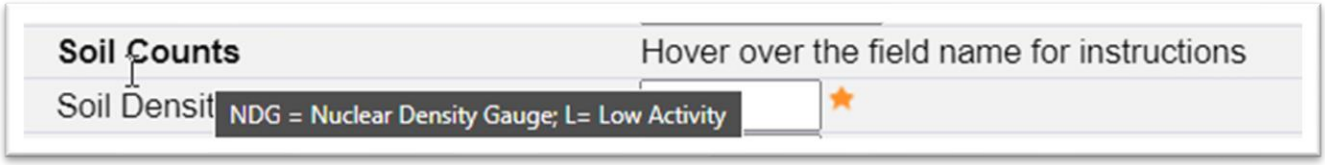

27. **Override Target Compaction** – this field defaults to No. If the Target Compaction Value is not correct, check the Material Id and category / type. If those are correct, but the Target Compaction field is incorrect, select Yes. *This is shown as condition #9 on the ERS forms.*
28. **Overridden Target Compaction** – if yes is selected, enter the new target for the compaction in this field. Some examples for new target compactions are thicklift approval for rock base or the target compaction for a retaining wall after a test wall has been completed. *This value should be shown in form field # 28.*
29. **Target Compaction** – this field is populated by the Material Id and category / type or the entry from the user in the Overridden Target Compaction field.

**NOTE**: The auto generated target compaction doesn't supersede any requirements of the ***Contract Documents***. If the target compaction applied by MAC is not correct, it is up to the user to enter the correct value.




30. **Test Depth** – enter the test depth; for example, 6 for a 6” test, or 12 for a 12” test.

31**. Soil Counts** – this is a helper field. Hover over it to receive additional information on how to enter data for an NDG versus an L-NDG.




32. **Soil Density Count** – enter the soil density count reading for NDGs. For L-NDG's, this will be displayed as DC.
33. **Soil Moisture/Background** – enter the soil moisture count reading for NDG's or soil background count displayed as BC if using L-NDG.
34. **Wet Density** – enter the wet density reading to the nearest 0.1 PCF.
35. **Moisture Content** – enter the percent moisture reading to the nearest 0.1%.

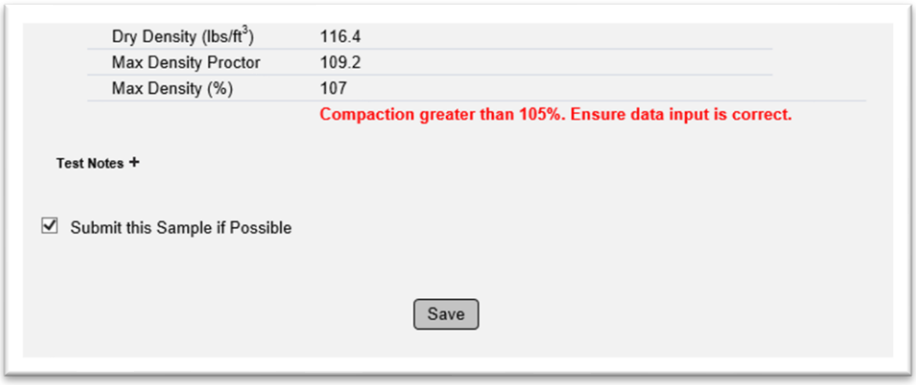
The Maximum Density value from the proctor sample you selected will be imported. The Dry Density will be calculated, and both will be used to calculate the % Maximum Density. If you don't see the Maximum Density Proctor value imported, select the Return to Sample Detail option to confirm you have the correct proctor sample selected. See Chapter 5, J. Entering Field Density Sample using an Open Proctor Sample.

36. **Submit this Sample if Possible** – this indicator defaults to selected. If you don't want the sample to automatically be Submitted to FDOT for Verification, deselect it. See Chapter 5, H. User Deselects Submit Sample if Possible - Data Reviewer Each Company) for the steps that need to be taken to submit the sample to FDOT when this field is deselected.

**NOTE:** The ERS Sample Life Cycle has shortcuts to make the creation and entry of the sample simpler and faster. The tradeoff is that when ERS samples are created, their first sample life cycle status is Pending Finalization. In this status, the sample can no longer be accessed by a company user unless the PA returns it for corrections. ***Before selecting the Save option, you should review the sample and test screens to make sure the data is correct***. If you're not sure and need time to investigate; for example, which proctor sample to select; you can deselect the Submit this Sample if Possible indicator. If you do deselect the indicator, see Chapter 5, H. User Deselects Submit Sample if Possible - Data Reviewer Each Company).

37. **Save** – select the Save option.

**NOTE**: For tests with a % Maximum Density of >= 105%, a test conditional warning message appears to the data entry person. This message does not have to be dismissed. The PA can see the message by navigating to the sample record (J. Navigating from the ERS Screen to the Sample Screen), clicking on the Associated Tests tab to expand it and selecting the View Test option.

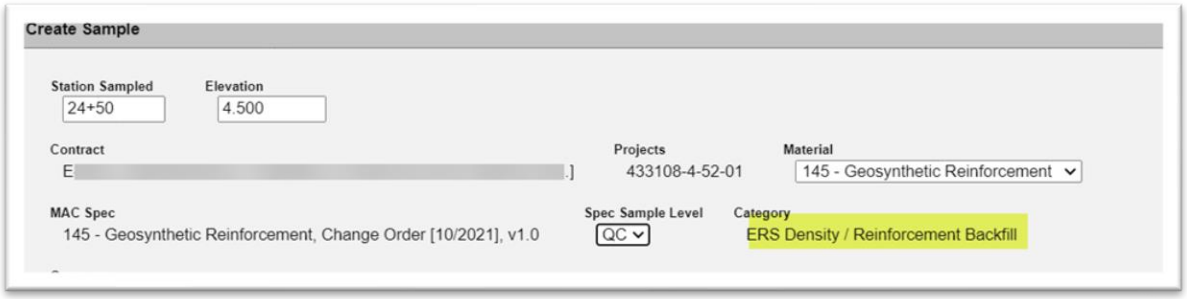



Per the ***Specifications***, when a QC density is greater than 105%, an Independent Verification (IV) density test must be performed within 5 feet of the QC. Other steps may need to be taken according to the ***Specification*** requirements.

**NOTE**: Failing QC tests do not need to be saved. See Chapter 5, Section B. Failing QC – QC Data Entry.

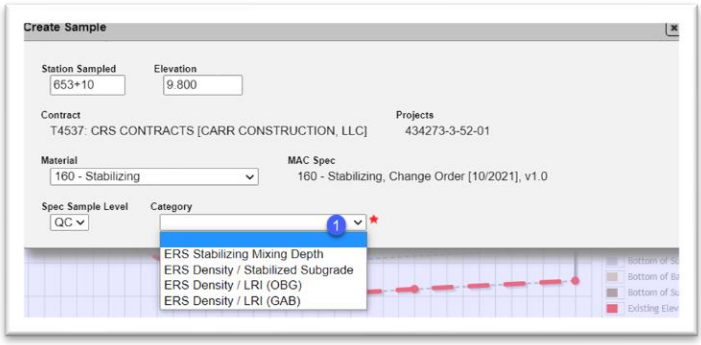
### *2. 145 - Geosynthetic Reinforcement*

For samples logged under MAC Material 145, the sample information and test information is the same as MAC Material 120, except the category/type defaults to ERS Density / Reinforcement Backfill.



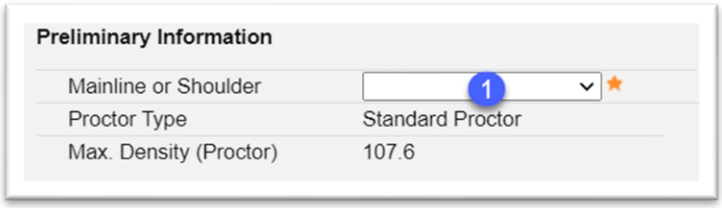
### *3. 160 – Stabilizing*

On the sample login screen, these are the category/type selections:




1. **Category** – select the appropriate category/type.
a. **ERS Density / Stabilized Subgrade** – stabilizing.
b. **ERS Density / LRI (OGB)** – granular subbase in lieu of stabilizing optional base material.
c. **ERS Density / LRI (GAB)** – granular subbase in lieu of stabilizing graded aggregate base.

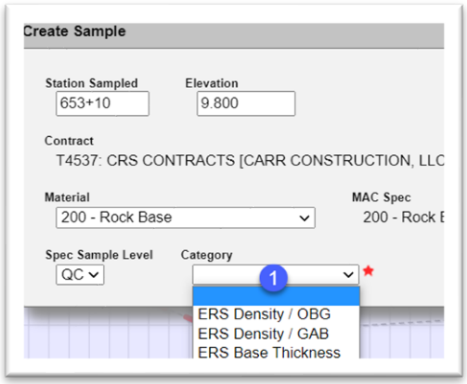
On the Test screen there is an additional field:




1. **Mainline or Shoulder** – select if the sample is in the mainline or full width, or on a shoulder from the dropdown.

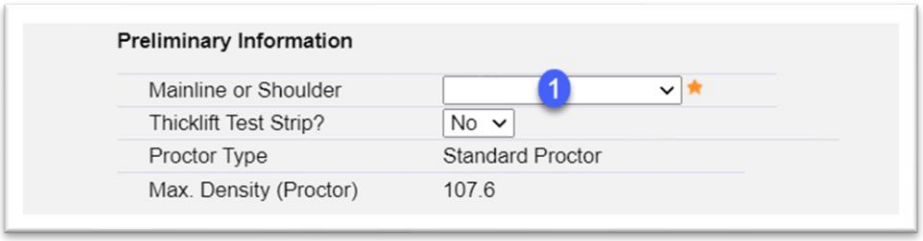
### *4. 200 – Rock Base*

Sample Login Category/Types:




1. **Category** – select the appropriate category type.
a. **ERS Density / (OGB)** – optional base material.
b. **ERS Density / (GAB)** – graded aggregate base.

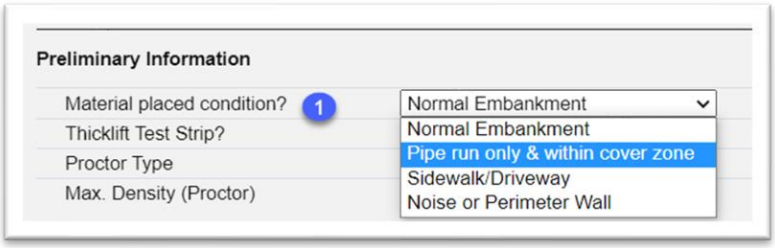
Test Screen:




1. **Mainline or Shoulder** – select if the sample is in the mainline or full width, or on a shoulder from the dropdown.

B. Creating a Field Density Sample Drainage – Data Entry Each Company

The sample fields for a drainage field density are the same as described in the previous sections. On the Test Fields screen, there is one field to be addressed.

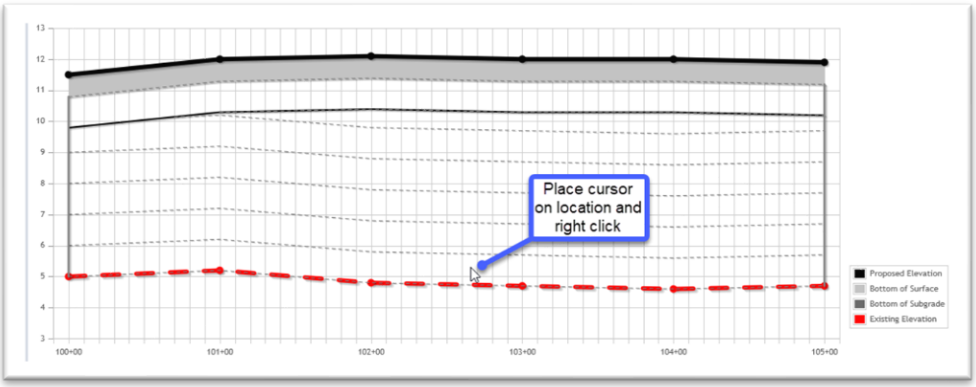



1. **Material placed condition?** – select the appropriate condition. For pipe run densities, there are only two that apply.
**a. Pipe run only & within cover zone** – if the test is being performed on a pipe run only within the cover zone, select this option. The option to perform thicklift approval goes away because thick lifts are not permitted within the cover zone.
b. **Normal Embankment** – if the test is being performed on a pipe run that includes the structure or outside the cover zone, select this option.

C. Creating a Field Density Sample ESB – Data Entry Each Company on or after 07/01/2024

For contracts let on or after 07/01/2024, the test method used for testing field densities is FM 1-T 310.

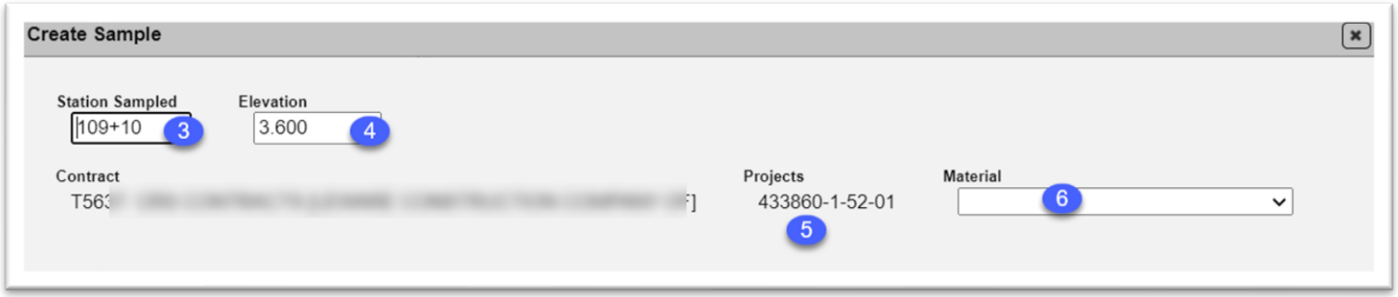
***1. 120 – Excavation and Embankment***




1. Navigate to the ESB logbook for the sample and use filtering to display the plot where the test is being performed, if needed. Place your mouse pointer on the plot location where the test is being performed.
2. Right click to create the sample.

**NOTE**: If the cursor is in between lifts, the plot may appear across the lifts or in the wrong lift after the sample is saved or submitted. If this happens, you can adjust the elevation on the sample screen to reflect the correct lift. You do not have to delete the sample and reenter it. The PA may need to return the sample if it is in Pending Finalization status.

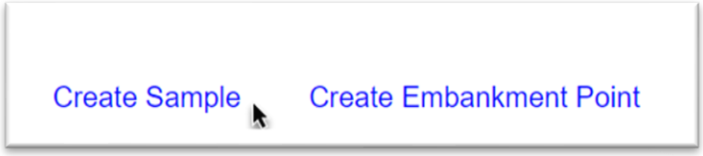
A Create Sample dialog box appears.




3. **Station Sampled** – MAC automatically populates this field based on the location of the mouse when you right click. Confirm that the value is correct for where the test was performed in the field.
4. **Elevation** – MAC automatically populates this field based on the location of the mouse when you right click. Confirm that the value is correct for where the test was performed in the field.

**NOTE**: Make sure the elevation is between the bottom of the lift and the top of the lift. In this example, the sample would be plotted as on lift 2. If you are on lift 1, the elevation should be below 10.9.

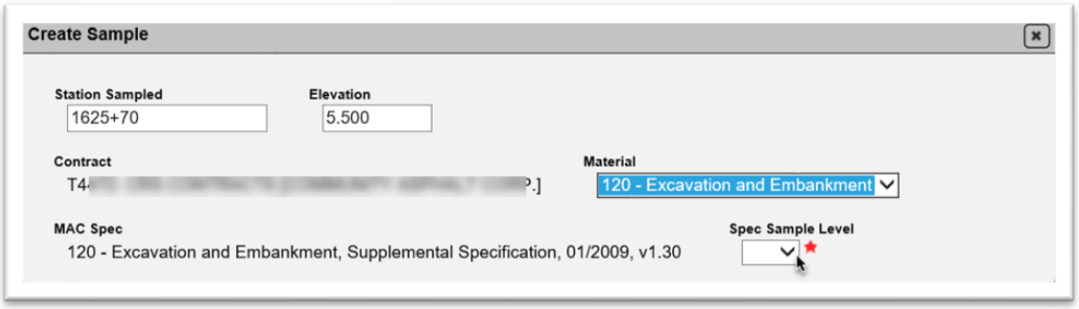
**NOTE**: Some devices may not be able to perform mouse operations. Some may need optional equipment, such as a stylus with mouse features for a tablet. Many touch screen devices will allow you to create a sample by touching the screen at the location in the plot. If you cannot right click with your device or you do not have a touch screen, you can use the Create Sample option. If you use this option, MAC will **not** populate the Station Sampled and Elevation fields, both of which are required. You enter them manually.




5. **Projects** – If the ERS Project has only one FPN on it, this field will default to the FPN of the ERS project. For ERS Projects with more than one FPN, you must indicate which project it is by deselecting all other projects.
6. **Material** – select the appropriate MAC material for the layer you are testing. Since we are entering an embankment field density, the material should be 120 – Excavation and Embankment.

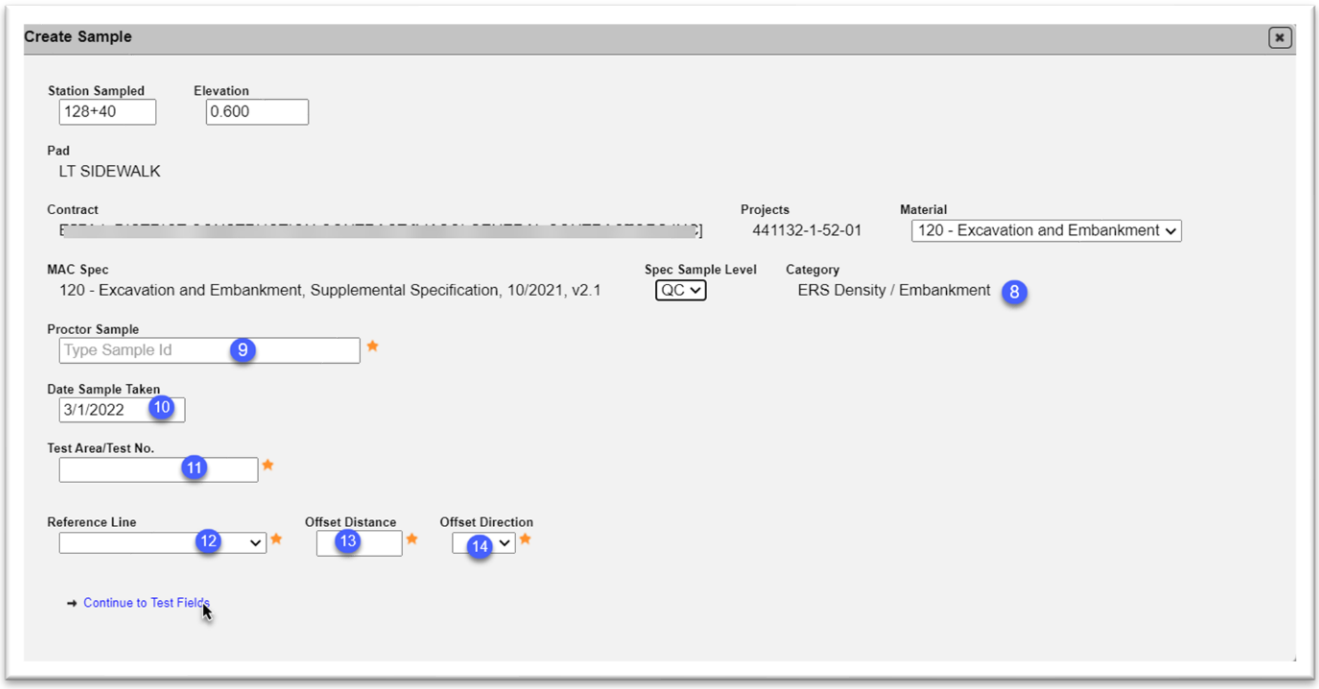
**NOTE**: MAC has no logic to tell that you are in the embankment part of the ESB plot. It is possible to select the incorrect material so make sure you have the correct material.

New fields appear.

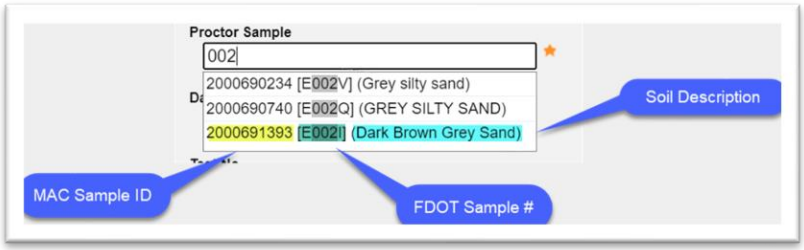



7. **Spec Sample Level** – select the appropriate sample level from the dropdown. For Resolution testing performed by the QC technician, see E. Entering a Resolution Field Density (QR) when VT fails – QC Data Entry.

More fields appear.




8. **Category** – this field defaults to ERS Density/Embankment since it is the only option on the MAC Spec with an ERS test on it.



9. **Proctor Sample** – enter all or part of the FDOT Sample Number of the proctor sample and select it from the returned list. MAC displays information MAC Sample ID, FDOT Sample Number, and Soil Description for the proctor sample to ensure the correct proctor sample is selected. If it is an older proctor sample, some of this information (like Soil Description) may not be on the proctor sample so it will not display here.

**NOTE**: In Chapter 5 – Field Density Sample Special Cases, there are examples of special cases where the appropriate proctor must be selected. These examples do not cover all possibilities. It is the responsibility of the user to ensure the correct proctor is selected for the specific test being performed.

**NOTE**: New programming in the proctor sample field reduces the available samples to select in this field. The sample being selected must have:

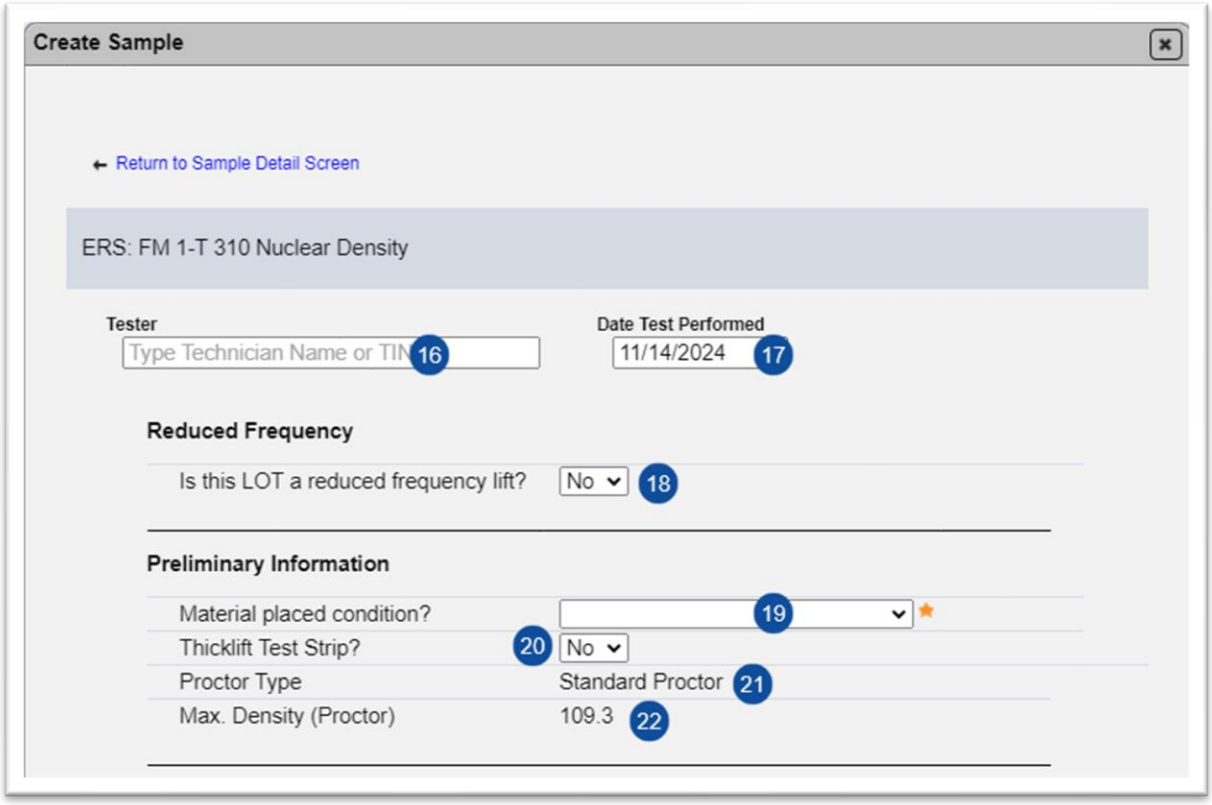
- The same Material as the ERS density sample (if the density sample is under MAC Spec 120, then only proctor samples under MAC Material 120
- Be on any FPN on the contract as the FPN of the ERS density sample
- Have one of these 3 tests:
    - FM 1-T 99 Standard Proctor
    - FM 1-T 180 Modified Proctor
    - Pit Proctor Reporting

10. **Date Sample Taken** – this field defaults to today's date which in most cases should be correct. The date sample taken field is required on all samples in MAC.
11. **Test Area /Test No.** – this field is the FDOT Sample Number field relabeled for ERS. Follow the sampling numbering instructions for field density samples (ERS Sample Numbering Instructions).

**NOTE**: MAC defines the first LOT in all plots as "LOT 1", regardless of what order the LOTs are tested. Think of this as the "Display LOT number". Displayed LOT 1 is the first LOT displayed. If a new LOT is inserted at the beginning of the plot all the Display LOTs will be renumbered. If a new LOT is inserted in the middle of the plot, all Display LOTs after the inserted LOT will be renumbered. Display LOT 1 may not be the first LOT tested.

12. **Reference Line** – select the controlling line of the project as shown in the plans. If the option used is not listed on the dropdown, select Other and make a comment in the comments section describing the reference line.
13 **Offset Distance** – enter the offset distance in feet.
14. **Offset Direction** – select the offset direction from the dropdown.
15. Select the Continue to Test Fields option.

The test fields for FM 1-T 310 Nuclear Density will appear in the dialog box. You can select the Return to Sample Detail Screen option to return to the sample login information.



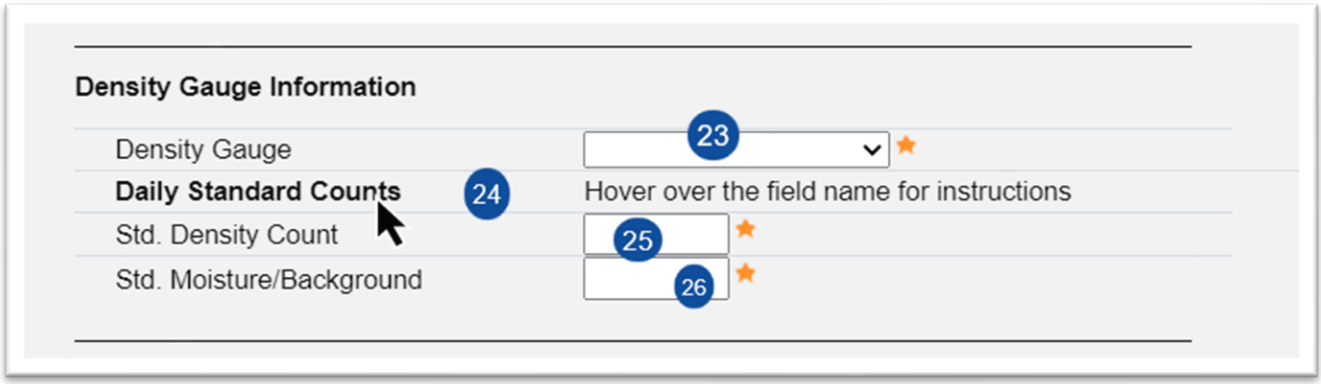

16. **Tester** – enter the name or TIN of the testing technician and select from the returned list.
17. **Date Test Performed** – this field defaults to today's date which in most cases should be correct.
18. **Is this LOT a reduced frequency lift?** – this field only appears on QC Samples. Select Yes if the test is a lift where a density test was not performed due to reduced frequency. If the lift is not reduced frequency, leave the default of No.

**NOTE**: If yes is selected, all other fields on the test screen disappear. This allows for a sample to be plotted on the plots for the lift not tested under reduced frequency and provides the PA with assistance in selecting the samples in the comparison package. See Chapter 5, C. Reduced Frequency.

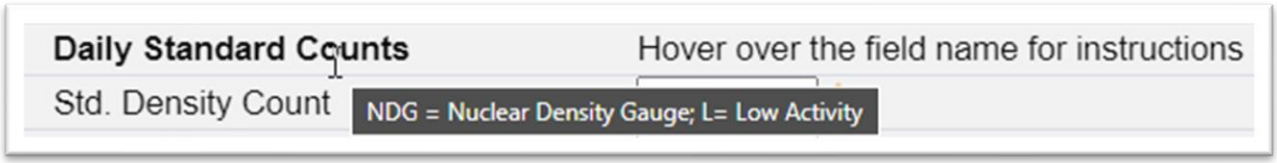
19. **Material placed condition?** – this field has different options, depending on the proctor type.
a. If the proctor type is Standard Proctor, select the appropriate placement condition from the dropdown. The selection will populate the Target Compaction % field.
i. **Normal Embankment** – this is the default. Select this option if the placement is for embankment. *This is shown as condition #1 on the ERS forms.*
ii. **Pipe run only & within cover zone** – this option does not apply to embankment samples under ESB. *This is shown as condition #2 on the ERS forms.*
iii. **Sidewalk/Driveway** – select this option if the placement is for a sidewalk or a driveway. *This is shown as condition #3 on the ERS forms.*

iv. **Noise or Perimeter Wall** – select this option if the placement is for a noise or perimeter wall. *This is shown as condition #4 on the ERS forms.*

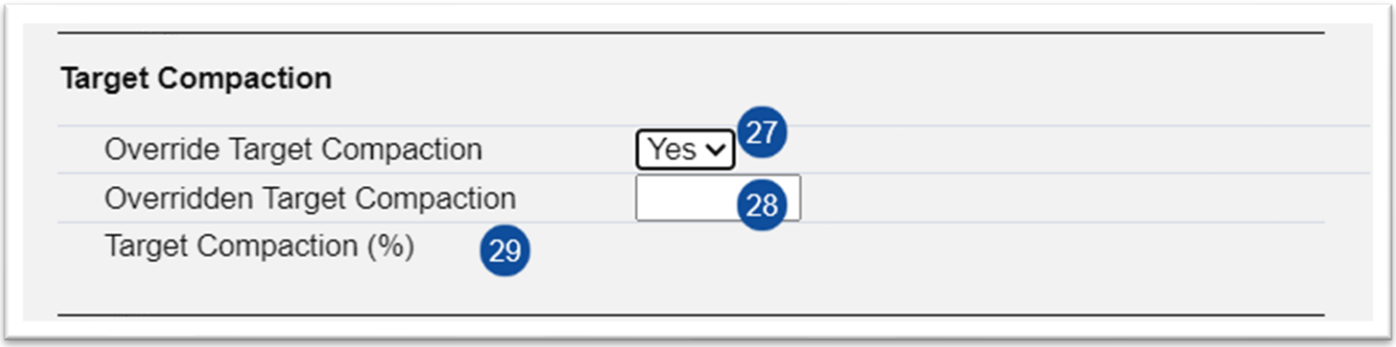
b. if the proctor type is Modified Proctor, there are different selections than for Standard Proctor.
i. **Spread Footer** – select this option if the placement is for a spread footer. *This is shown as condition #5 on the ERS forms.*
ii. **Concrete Barrier Wall** – select this option if the placement is for a concrete barrier wall. *This is shown as condition #6 on the ERS forms.*
iii. **Normal Embankment** – select this option if the placement is for embankment. *This is shown as condition #1 on the ERS forms.*
20. **Thicklift Test Strip** – this field defaults to No. If the test is for a thicklift test strip (see Chapter 5, Section D. Testing for Thicklift Approval – Data Entry Each Company), change this to Yes. *This is shown as condition #7 on the ERS forms.*
21. **Proctor Type** – this field is displayed from the proctor sample that you selected on the sample information. Confirm that it is the right type of proctor. If not, select the Return to Sample Detail option to revise the Proctor Sample field.
22. **Max. Density (Proctor)** – this field is displayed from the proctor sample that you selected on the sample information. Confirm that it is the right value. If not, select the Return to Sample Detail option to review the Proctor Sample to ensure the correct one was selected.




23. **Density Gauge** – select the gauge from the dropdown. If the gauge used does not appear, the test is not valid for acceptance, and you will not be able to log it in. Perform the test again with a valid gauge. (See Chapter 3 – Adding Project Gauges and Performing Gauge Comparisons).
24. **Daily Standard Counts** – this is a helper field. Hover over it to receive additional information on how to enter data for an NDG versus an L-NDG.

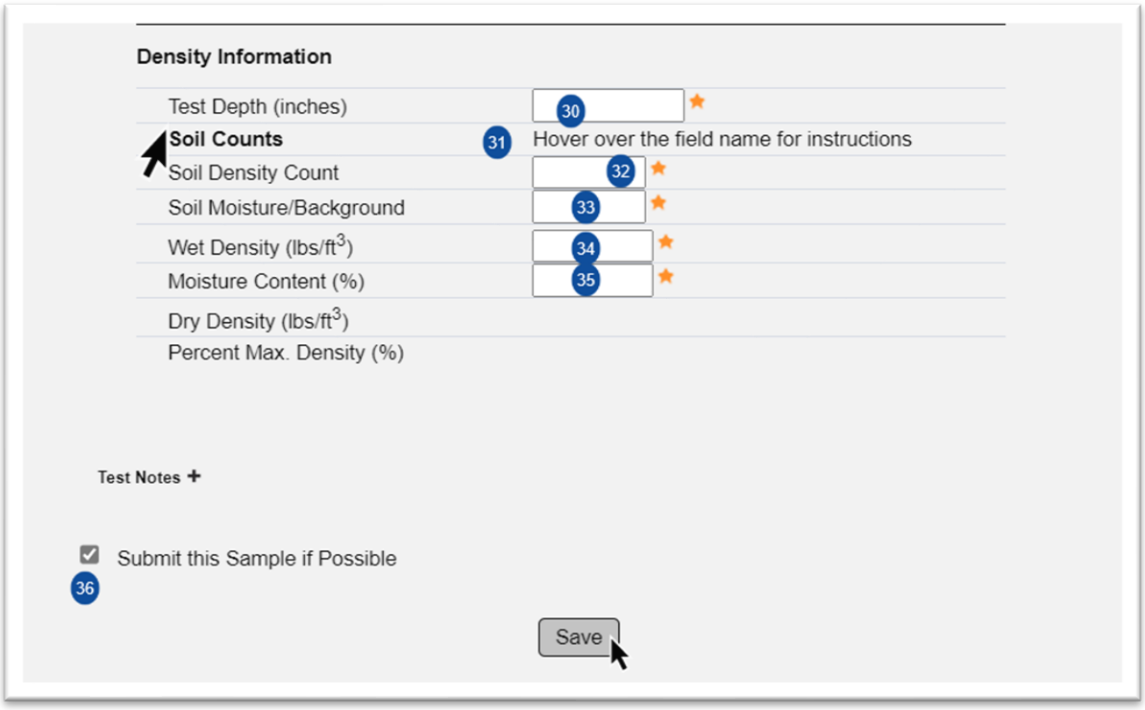



25. **Std. Density Count** – enter the daily standard density count of the gauge selected for NGDs. For L-NDG's, this will be displayed as DS.
26. **Std. Moisture/Background**– enter the daily standard moisture count of the gauge selected for NGDs. For L-NDG's, the standard background count maybe displayed as BGD or DSB depending on the model.



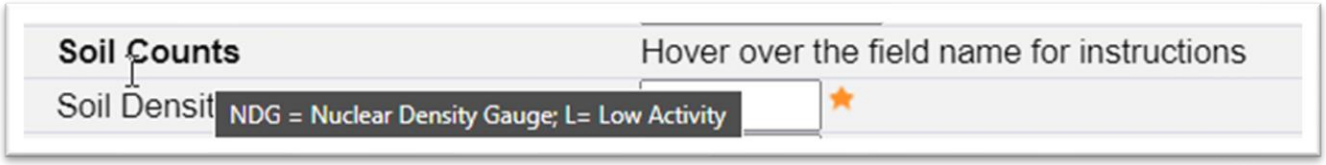

27. **Override Target Compaction** – this field defaults to No. If the Target Compaction Value is not correct, check the Material Id and category / type. If those are correct, but the Target Compaction field is incorrect, select Yes. *This is shown as condition #9 on the ERS forms.*
28. **Overridden Target Compaction** – if yes is selected, enter the new target for the compaction in this field. Some examples for new target compactions are thicklift approval for rock base or the target compaction for a retaining wall after a test wall has been completed. *This value should be shown in form field # 28.*
29. **Target Compaction** – this field is populated by the Material Id and category / type or the entry from the user in the Overridden Target Compaction field.

**NOTE**: The auto generated target compaction doesn't supersede any requirements of the ***Contract Documents***. If the target compaction applied by MAC is not correct, it is up to the user to enter the correct value.




30. **Test Depth** – enter the test depth; for example, 6 for a 6” test, or 12 for a 12” test.

31**. Soil Counts** – this is a helper field. Hover over it to receive additional information on how to enter data for an NDG versus an L-NDG.




32. **Soil Density Count** – enter the soil density count reading for NDGs. For L-NDG's, this will be displayed as DC.
33. **Soil Moisture/Background** – enter the soil moisture count reading for NDG's or soil background count displayed as BC if using L-NDG.
34. **Wet Density** – enter the wet density reading to the nearest 0.1 PCF.
35. **Moisture Content** – enter the percent moisture reading to the nearest 0.1%.

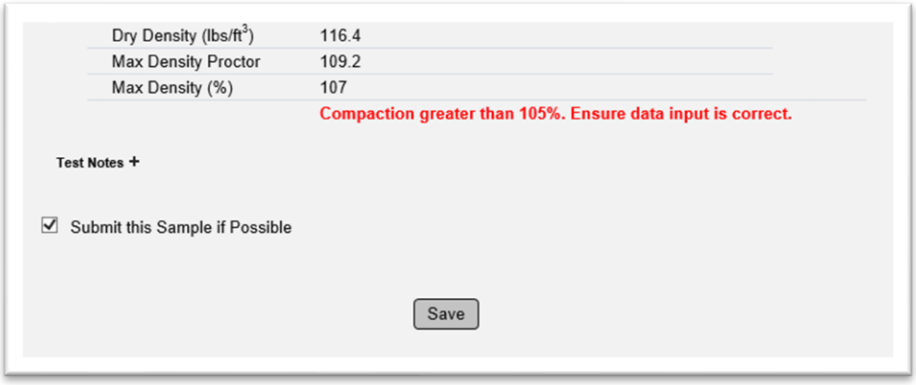
The Maximum Density value from the proctor sample you selected will be imported. The Dry Density will be calculated, and both will be used to calculate the % Maximum Density. If you don't see the Maximum Density Proctor value imported, select the Return to Sample Detail option to confirm you have the correct proctor sample selected. See Chapter 5, J. Entering Field Density Sample using an Open Proctor Sample.

36. **Submit this Sample if Possible** – this indicator defaults to selected. If you don't want the sample to automatically be Submitted to FDOT for Verification, deselect it. See Chapter 5, H. User Deselects Submit Sample if Possible - Data Reviewer Each Company) for the steps that need to be taken to submit the sample to FDOT when this field is deselected.

**NOTE:** The ERS Sample Life Cycle has shortcuts to make the creation and entry of the sample simpler and faster. The tradeoff is that when ERS samples are created, their first sample life cycle status is Pending Finalization. In this status, the sample can no longer be accessed by a company user unless the PA returns it for corrections. ***Before selecting the Save option, you should review the sample and test screens to make sure the data is correct***. If you're not sure and need time to investigate; for example, which proctor sample to select; you can deselect the Submit this Sample if Possible indicator. If you do deselect the indicator, see Chapter 5, H. User Deselects Submit Sample if Possible - Data Reviewer Each Company).

37. **Save** – select the Save option.

**NOTE**: For tests with a % Maximum Density of >= 105%, a test conditional warning message appears to the data entry person. This message does not have to be dismissed. The PA can see the message by navigating to the sample record (J. Navigating from the ERS Screen to the Sample Screen), clicking on the Associated Tests tab to expand it and selecting the View Test option.

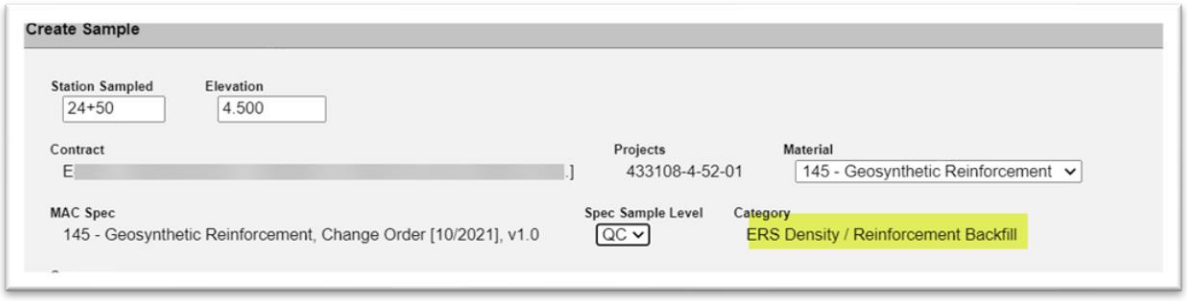



Per the ***Specifications***, when a QC density is greater than 105%, an Independent Verification (IV) density test must be performed within 5 feet of the QC. Other steps may need to be taken according to the ***Specification*** requirements.

**NOTE**: Failing QC tests do not need to be saved. See Chapter 5, Section B. Failing QC – QC Data Entry.

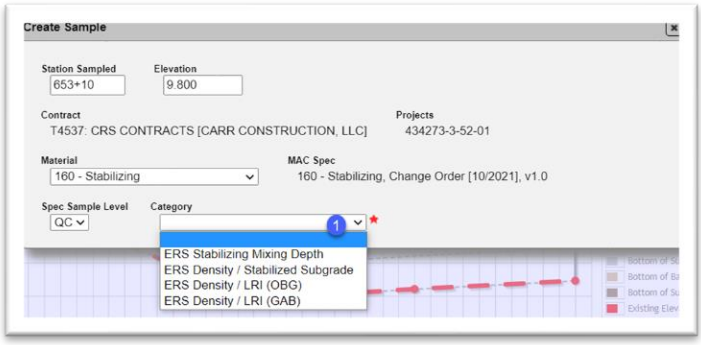
### *2. 145 - Geosynthetic Reinforcement*

For samples logged under MAC Material 145, the sample information and test information is the same as MAC Material 120, except the category/type defaults to ERS Density / Reinforcement Backfill.



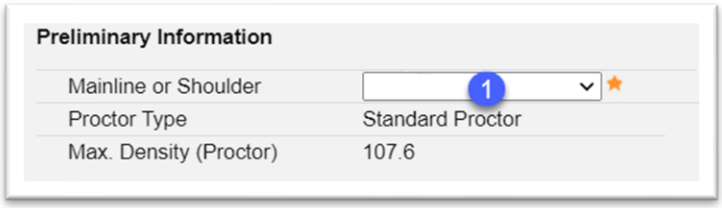
### *3. 160 – Stabilizing*

On the sample login screen, these are the category/type selections:




1. **Category** – select the appropriate category/type.
a. **ERS Density / Stabilized Subgrade** – stabilizing.
b. **ERS Density / LRI (OGB)** – granular subbase in lieu of stabilizing optional base material.
c. **ERS Density / LRI (GAB)** – granular subbase in lieu of stabilizing graded aggregate base.

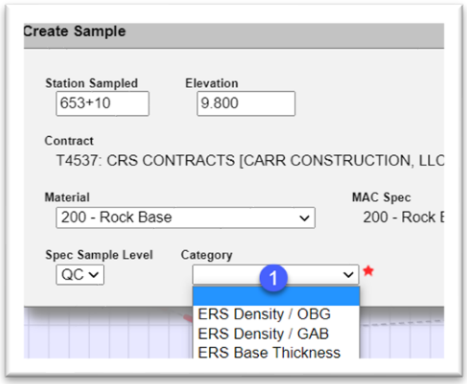
On the Test screen there is an additional field:




1. **Mainline or Shoulder** – select if the sample is in the mainline or full width, or on a shoulder from the dropdown.

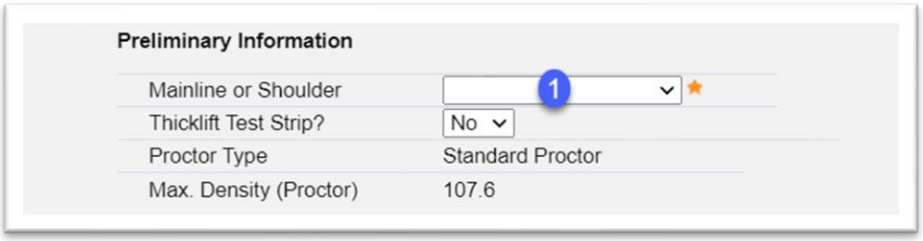
### *4. 200 – Rock Base*

Sample Login Category/Types:




1. **Category** – select the appropriate category type.
a. **ERS Density / (OGB)** – optional base material.
b. **ERS Density / (GAB)** – graded aggregate base.

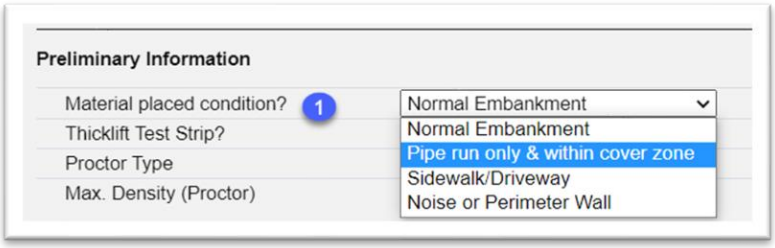
Test Screen:




1. **Mainline or Shoulder** – select if the sample is in the mainline or full width, or on a shoulder from the dropdown.

D. Creating a Field Density Sample Drainage – Data Entry Each Company

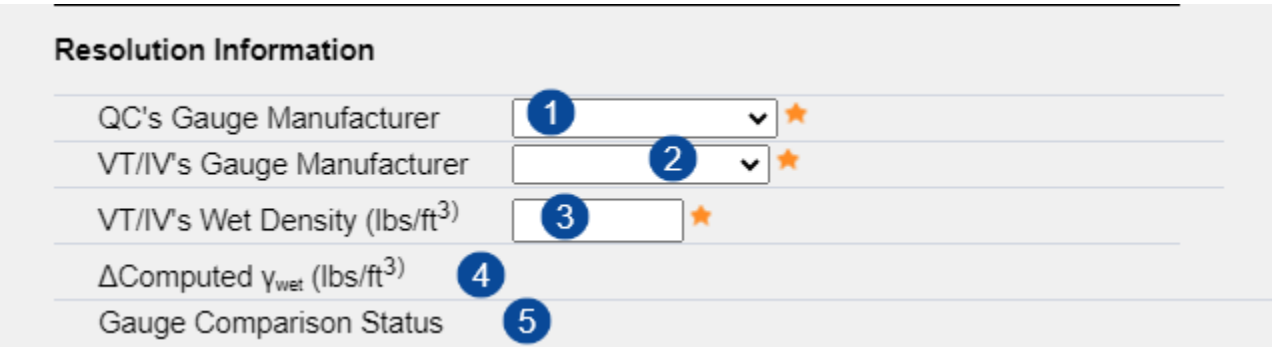
The sample fields for a drainage field density are the same as described in the previous sections. On the Test Fields screen, there is one field to be addressed.




1. **Material placed condition?** – select the appropriate condition. For pipe run densities, there are only two that apply.
**a. Pipe run only & within cover zone** – if the test is being performed on a pipe run only within the cover zone, select this option. The option to perform thicklift approval goes away because thick lifts are not permitted within the cover zone.
b. **Normal Embankment** – if the test is being performed on a pipe run that includes the structure or outside the cover zone, select this option.

E. Entering a Resolution Field Density (QR) when VT fails – QC Data Entry

When QC and VT both do not pass, this is considered a non-comparison and a QC technician performs a Resolution test. Since failing QCs are not entered into MAC, this would occur when VT fails. The QC technician enters a as sample level QR. There are a few fields that must be provided for the resolution comparison logic. The QC technician needs to communicate with the VT technician to complete the fields that only appear when sample level QR is selected.




1. **QC's Gauge Manufacturer** – select the appropriate gauge manufacturer for the QC gauge.
2. **VT/IV's Gauge Manufacturer**– select the appropriate gauge manufacturer for the VT or IV gauge.
3. **VT/IV's Wet Density** – obtain this value from the VT sample test results or from the technician.
4. **ΔComputed $\gamma_{wet}$ –** MAC will compute the difference of the VT's Dry Density results and the QC's Dry Density results from this sample.
4**. Gauge Comparison Status** – if the results are within the comparison difference depending on the gauge manufacturers, this field will show Pass. If they are not, the field will show Fail. The field is used as part of the comparison logic when QR is added as the resolution sample to the comparison package.

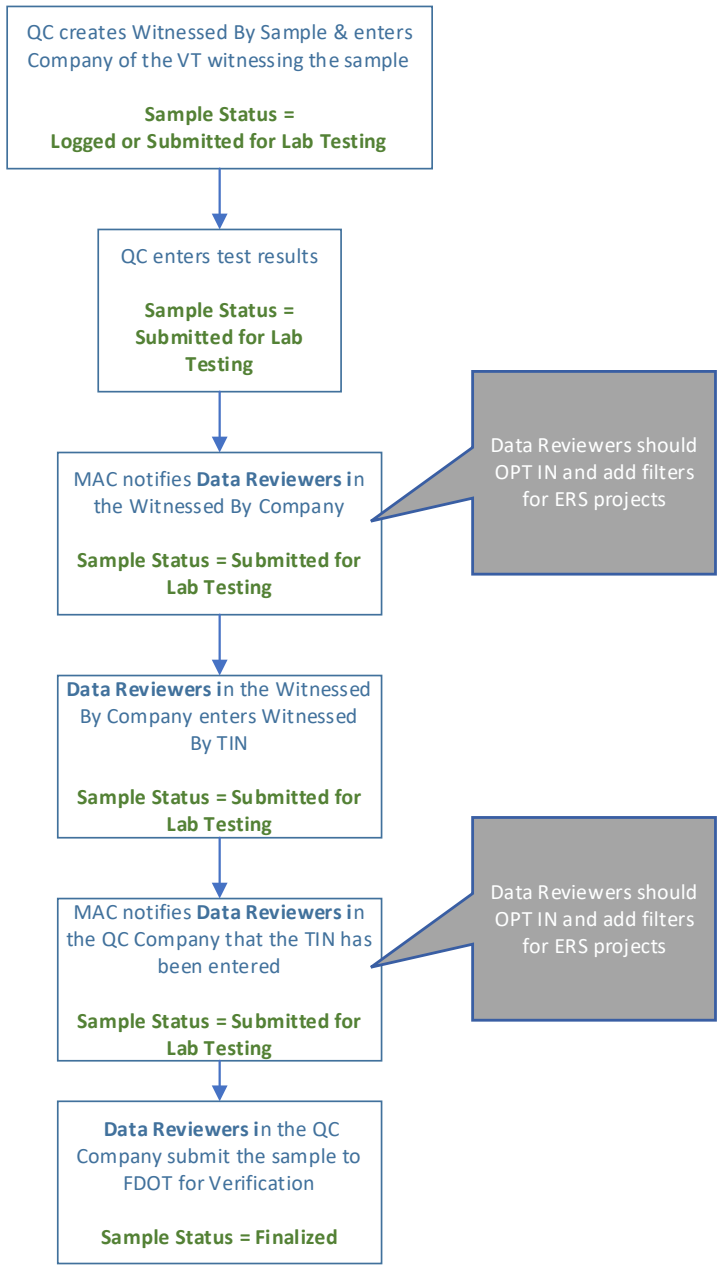
**NOTE**: Currently there is a bug in the conflict-of-interest logic applied to all samples in MAC. One of two things **may** happen, This does not happen in every case.

- Case 1 – MAC will not allow the QR sample to be created due to a conflict-of-interest flag
- Case 2 – MAC will allow the QR sample to be created
    - MAC then restricts the QC company from entering QC project or program samples of any kind for any Material
        - The conflict-of-interest flag shows on a sample created after the QR is allowed be entered even though the company already has QC samples in MAC

In either case, the only way to move forward is to either not enter the QR sample (case 1) or delete the QR sample (case 2). The comparison package that is awaiting the QR sample must be designated as Resolution Not Performed. The ERS IA Project MC Reviewer can exclude the finding that will result from that with the reason that this is a known bug in the application.

## F. Witnessed By Sample Flow

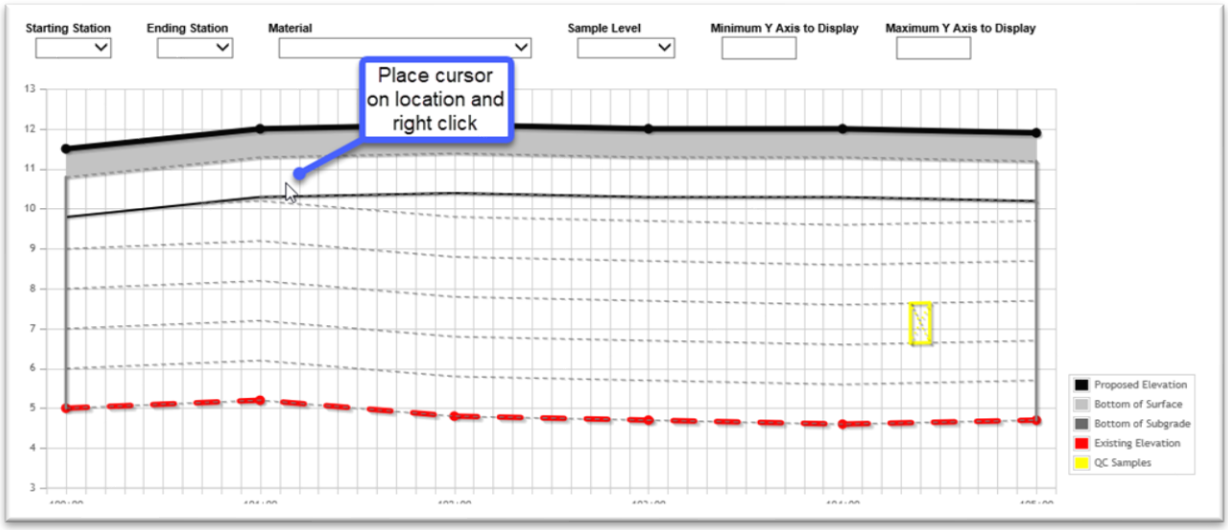
This flowchart shows how the QC Sample with a Witnessed By TIN is processed. Stabilizing Mixing Depth and Base Thickness samples use this feature.




**NOTE**: There is no VT sample.

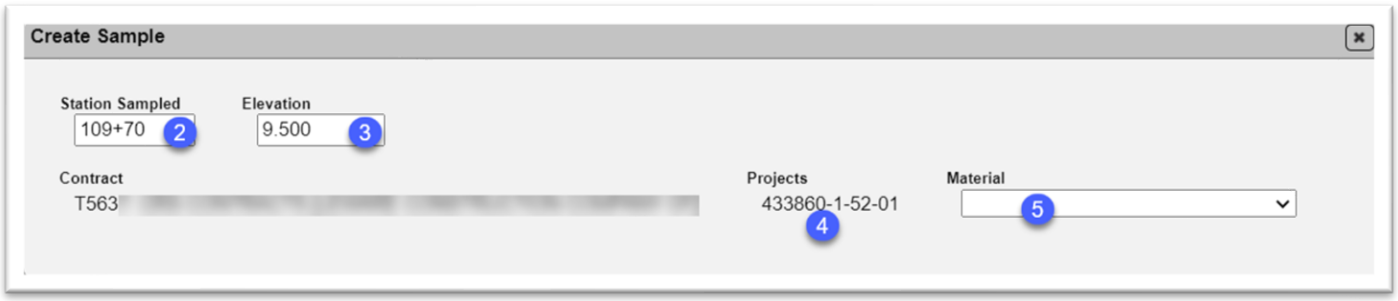
## G. Creating a QC Stabilizing Mixing Depth Check Sample – QC Data Entry

**NOTE**: There are no stabilizing mixing depth check tests performed when limerock is used in lieu of stabilizing material. See H. Creating a Base Thickness Sample QC Data Entry.



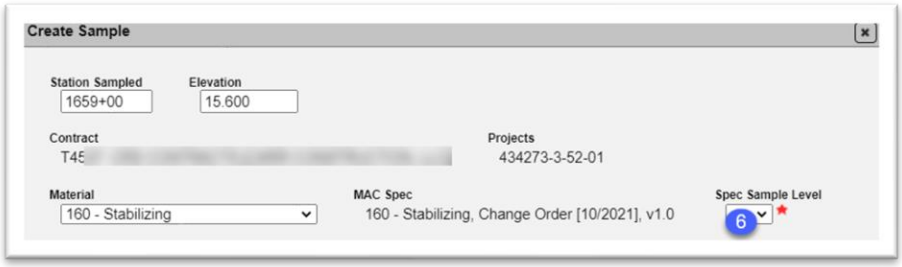

1. Place your mouse pointer on the Subgrade layer and right click.

A Create Sample dialog box appears.



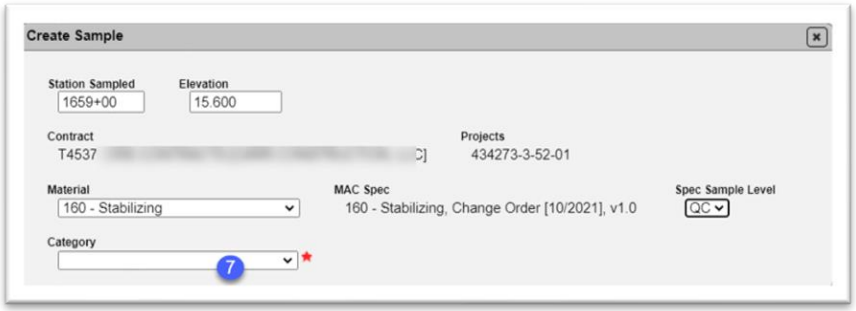

2. **Station Sampled** – MAC automatically populates this field based on the location of the mouse when you right click.
3. **Elevation** – MAC automatically populates this field based on the location of the mouse when you right click.
4. **Projects** – If the ERS Project has only one FPN on it, this will default to the FPN of the ERS project. For Projects with more than one FPN, you must indicate which project it is by deselecting all other projects. If all projects are left as indicated, the sample will appear more than once in summary reports that group by project.
5. **Material** – select MAC Material 160 – Stabilizing from the dropdown.

A Sample Level field appears.



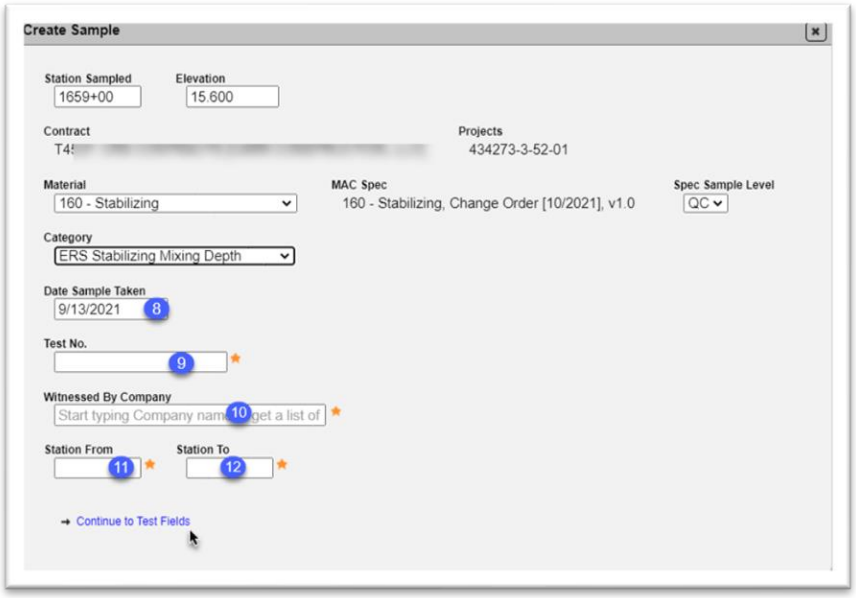

6. **Spec Sample Level** – select QC from the dropdown.

A Category field appears.




7. **Category** – select ERS Stabilization Mixing Depth Check from the dropdown.

More fields appear.



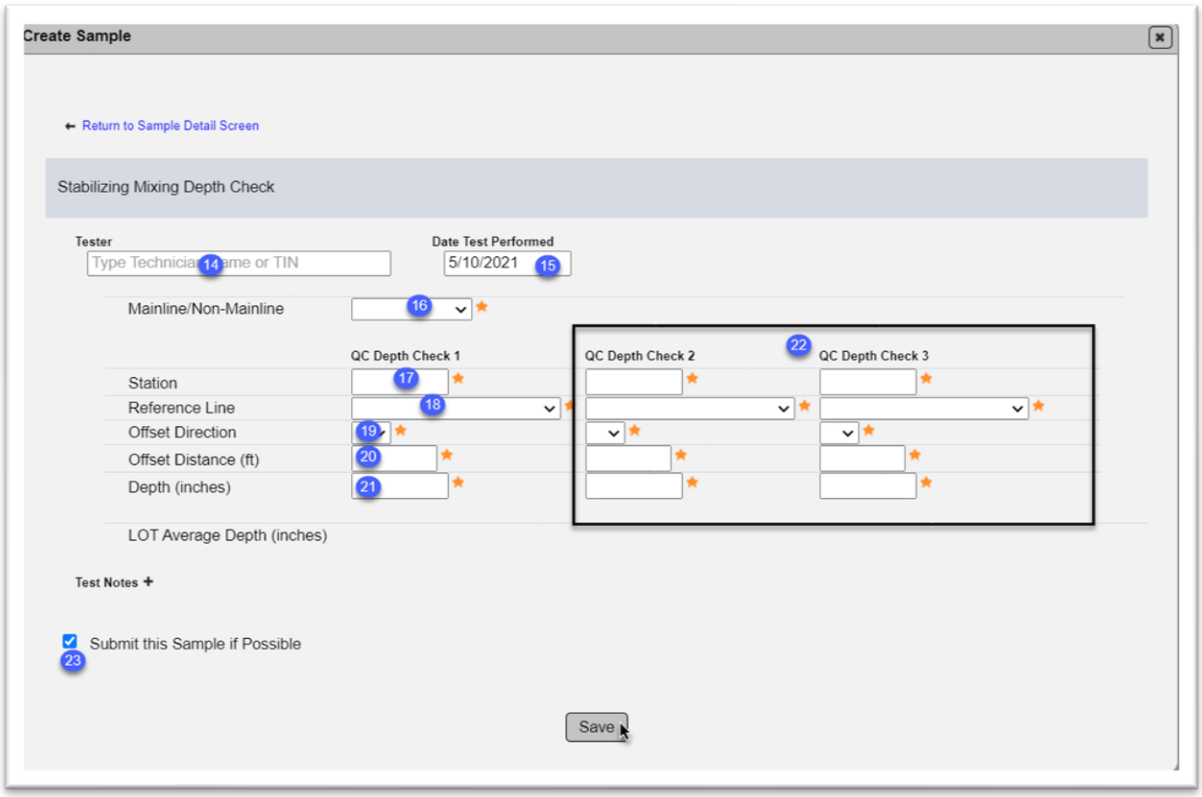

8. **Date Sample Taken** – this field defaults to today's date which in most cases should be correct.
9. **Test No.** – this field is the FDOT Sample Number Field. Follow the sampling numbering instructions for field density samples. It is important that you follow the sample numbering system (ERS Sample Numbering Instructions) so that the correct samples can be associated in a comparison package by the PA.

10. **Witnessed By Company** – enter the company name of the Verification Technician and select it from the returned list.
11. **Station From** – enter the beginning station of the LOT.
12. **Station To** – enter the ending station of the LOT.

**NOTE**: The Station From must be the lower of the two numbers.

13. Select the Continue to Test Fields option.

The test fields will appear in the dialog box. You can select the Return to Sample Detail Screen option to return to the sample login information.



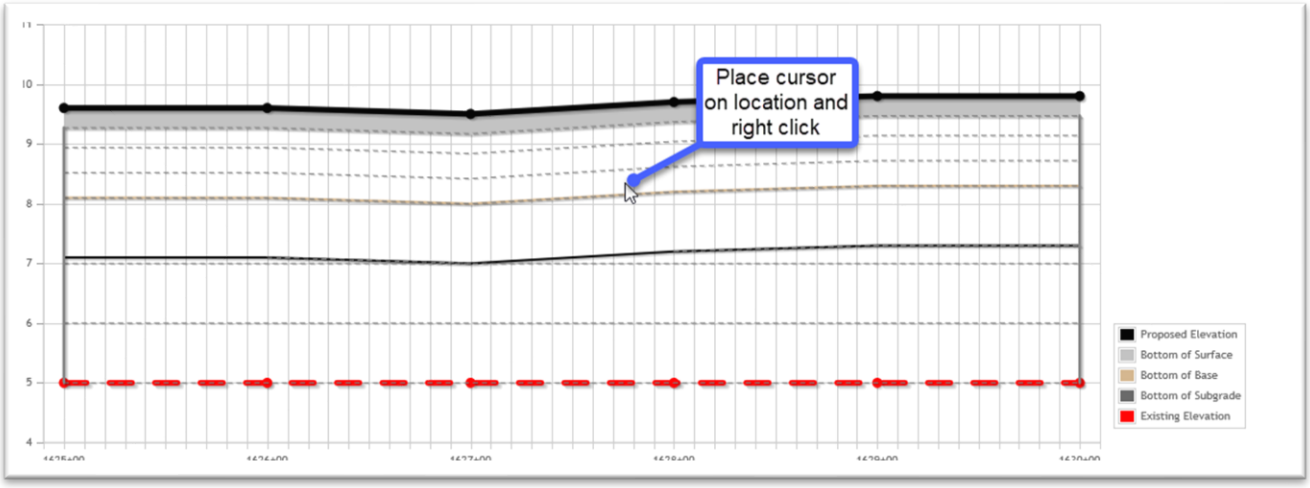

14. **Tester** – enter the name or TIN of the testing technician and select the entry from the returned list.
15. **Date Test Performed** – this field defaults to today's date which in most cases should be correct. If it is not, enter the date the depth check was performed or select it from the calendar.
16. **Mainline/Non-Mainline** – select the depth check was taken on the mainline or non-mainline.
17. **Station** – enter the station where the first depth check was taken. This station should be within the range of the entries for Station From and Station To on the Sample Detail screen.
18. **Reference Line** – select the reference line from the dropdown.
19. **Offset Direction** – select the direction the offset is from the reference line.
20. **Offset Distance** – enter the offset distance from the reference line.
21. **Depth** – enter the depth check in inches to the nearest 0.25 inches.
22. Repeat #s 16 – 20 for depth checks 2 and 3.

23. **Submit this Sample if Possible** – this indicator defaults to selected. If you don't want the sample to automatically be Submitted to FDOT for Verification, deselect it.

24. **Save** – select the Save option. If the Submit this Sample if Possible indicator is not selected, the sample status will be Submitted for Lab Testing and will need to be submitted to the FDOT on the sample screen. If the Submit this Sample If Possible indicator is selected, the sample status will be Pending Finalization.

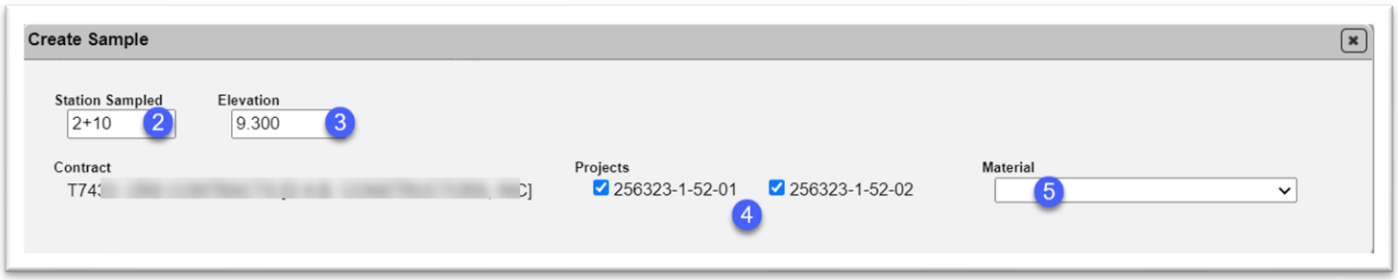
## H. Creating a Base Thickness Sample QC Data Entry

Base thickness samples can represent limerock base only, base over stabilization, limerock was not placed in lieu of stabilization, or in lieu of stabilization under asphalt base. The Base Thickness test and report accounts for this.



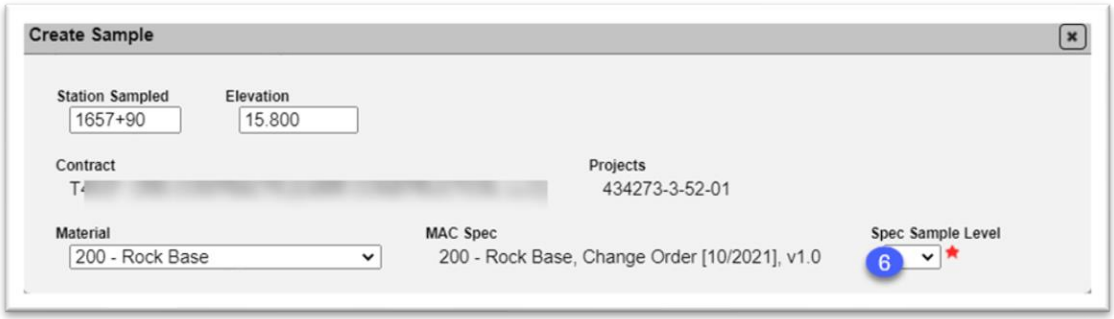

1. Place your mouse pointer on the Base layer and right click.

A Create Sample dialog box appears.



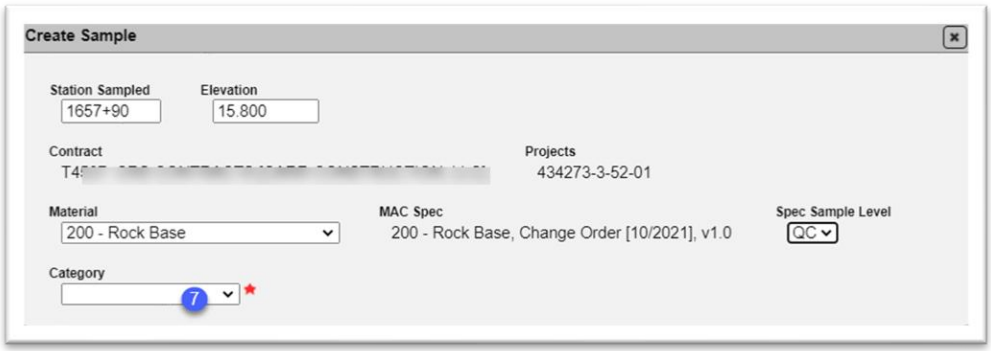

2. **Station Sampled** – MAC automatically populates this field based on the location of the mouse when you right click.
3. **Elevation** – MAC automatically populates this field based on the location of the mouse when you right click.
4. **Projects** – If the ERS Project has only one FPN on it, this will default to the FPN of the ERS project. For Projects with more than one FPN, you must indicate which project it is by deselecting all other projects. If all projects are left as indicated, the sample will appear in summary reports that group by project more than once.
5. **Material** – select MAC Material 200 – Rock Base from the dropdown.

The Spec Sample Level field appears.



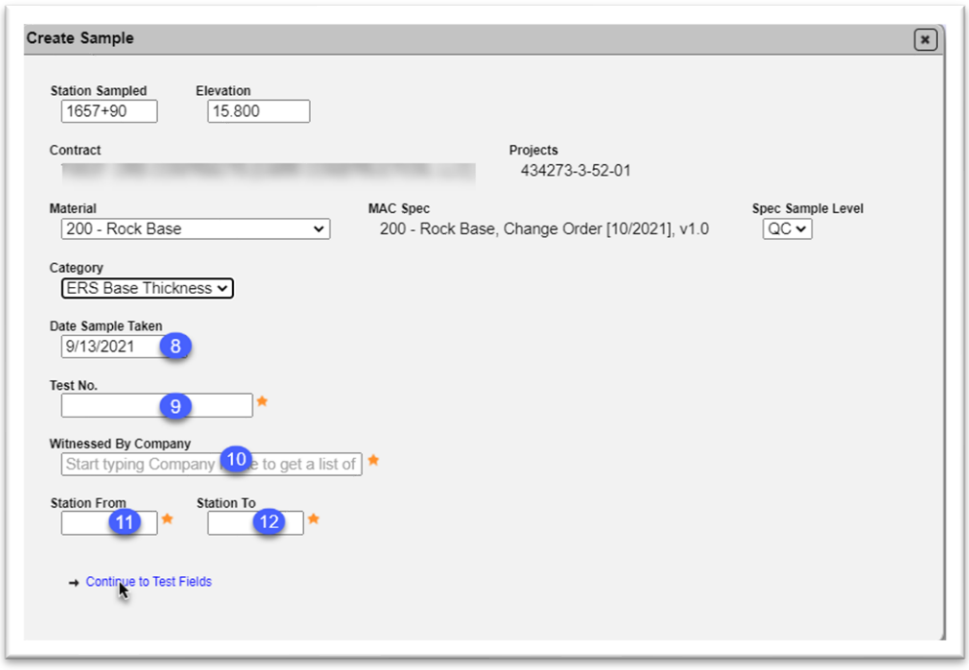

6. **Spec Sample Level** – select QC from the dropdown.

The Category field appears.




7. **Category** – Select ERS Base Thickness from the dropdown.

New fields appear.



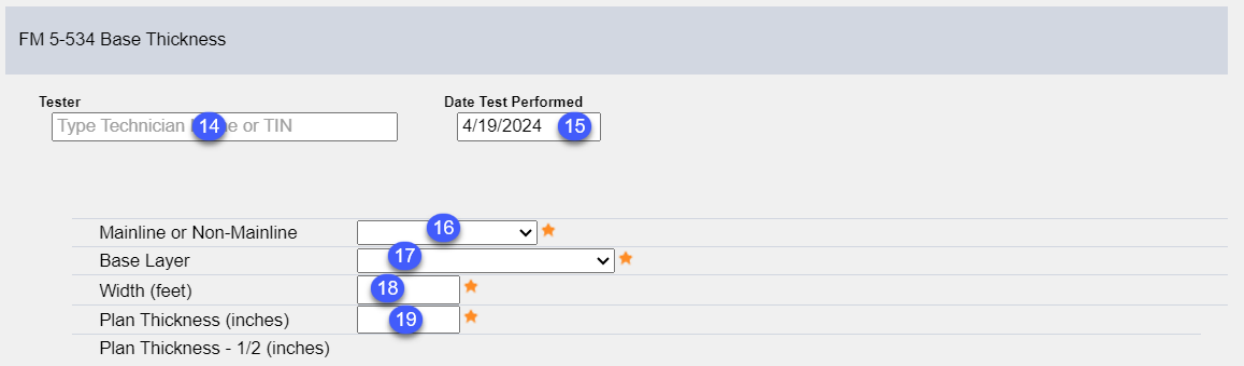

8. **Date Sample Taken** – this field defaults to today's date which in most cases should be correct.

9. **Test No.** – this field is the FDOT Sample Number Field. Follow the sampling numbering instructions for field density samples. It is important that you follow the sample numbering system (ERS Sample Numbering Instructions) so that the correct samples can be associated in a comparison package by the PA.
10. **Witnessed By Company** – enter the company name of the Verification Technician and select it from the returned list.
11. **Station From** – enter the beginning station of the LOT.
12. **Station To** – enter the ending station of the LOT.

**NOTE**: The beginning station must be the lower of the two numbers.

13. Select the Continue to Test Fields option.

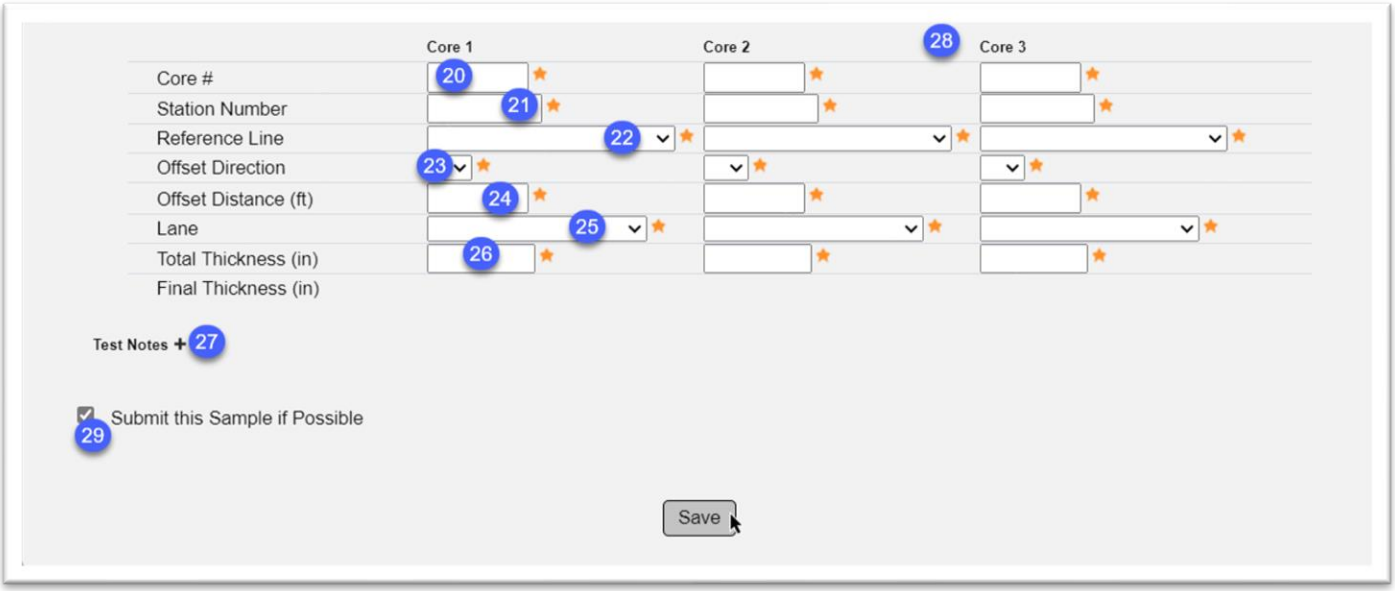
The test fields will appear in the dialog box. You can select the Return to Sample Detail Screen option to return to the sample login information.




14. **Tester** – enter the name or TIN of the testing technician and select the entry from the returned list.
15. **Date Test Performed** – this field defaults to today's date which in most cases should be correct. If it is not, enter the date the depth check was performed or select it from the calendar.
16. **Mainline or Non-Mainline** – select the Shoulder or Mainline from the dropdown.
17. **Base Layer** – select the appropriate option from the dropdown.
a. **Base Only (No LRI)** – the depth represents only limerock back.
b. **Base and LRI Combined** – the depth represents both the limerock and LRI
c. **Granular Subbase (LRI only)** – the depth represents only LRI
18. **Width** – Enter the roadway width in feet.
19. **Plan Thickness** – enter the base plan thickness.

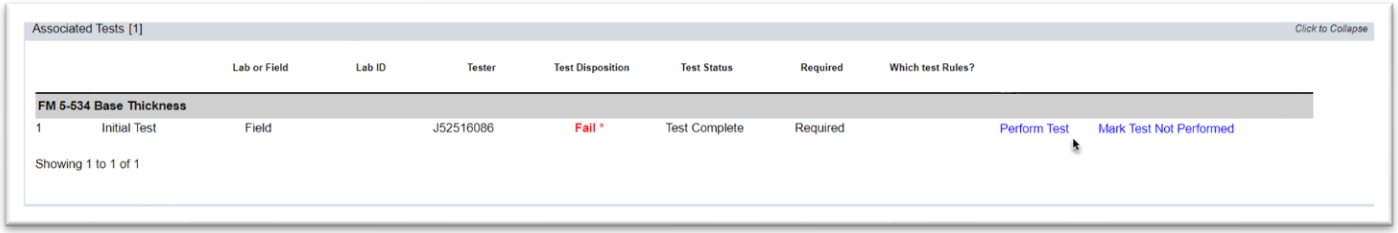
**NOTE**: It is vital that this field is entered correctly. It is used to set targets and group results in the summary report.

MAC calculates the value of the number of inches you enter in the plan thickness minus ½ inch and uses that value when determining any deficient thicknesses. That is why it is essential that you enter the correct value in the Plan Thickness field.

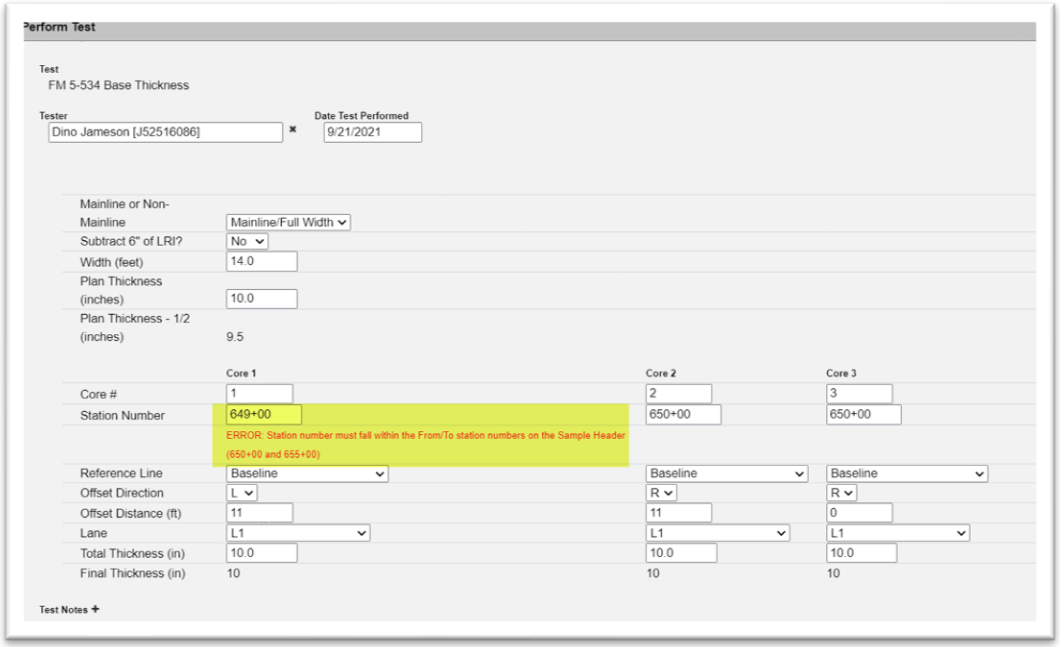



20. **Core #** – enter the sequential number of the core on the project.
21. **Station Number** – enter the station where the first core was taken. This station should be within the range of the entries for Station From and Station To on the Sample Detail screen.
22. **Reference Line** – select the reference line from the dropdown.
23. **Offset Direction** – select the direction the offset is from the reference line.
24. **Offset Distance** – enter the offset distance from the reference line.
25. **Lane** – select the lane the core was taken from, if desired.
26. **Total Thickness** – enter the core thickness in inches to the nearest 0.10 inches.
27. **Final Thickness** – MAC calculates this value using the Base Layer option selected in #17.
28 Repeat #s cores checks 2 and 3.
29. **Test Notes** – enter any comments related to the test if desired.
30. **Submit this Sample if Possible** – this indicator defaults to selected. If you don't want the sample to automatically be Submitted to FDOT for Verification, deselect it.
31. **Save** – select the Save option. If the Submit this Sample if Possible indicator is not selected, the sample status will be Submitted for Lab Testing and will need to be submitted to the FDOT on the sample screen. If the Submit this Sample If Possible indicator is selected, the sample status will be Pending Finalization.

**NOTE**: If the Core Station Number is outside the Station From and Station To on the Sample Detail screen, there is no test warning when the sample is submitted. If you navigate to the Sample Screen (see J. Navigating from the ERS Screen to the Sample Screen ) and click on the Associated Tests tab to expand it, the test disposition will show as **Fail*** even if the test results pass.



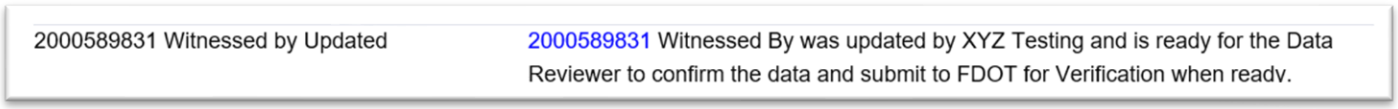

1. Select the Perform Test option and a Perform Test dialog box will appear.




2. Review the Station From, Station To and Core Station numbers to ensure there is no data entry error. In this example, there is a data entry in the Core Station Number. When the data is revised and the test is saved, the warning message and the failing test disposition goes away.

## I. Submit Sample to FDOT on Witnessed by Samples – Data Reviewer QC Company

When a user for the Witnessed By company enters the VT's TIN, the Data Reviewers for the QC company will get a notification from MAC. See Chapter 9 – ERS Sample Notifications.

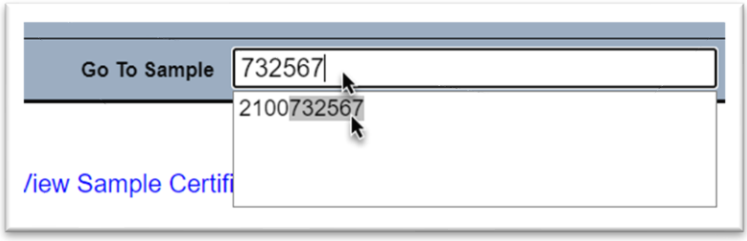



1. A Data Reviewer selects the sample hotlink in the notification or navigates to the sample screen in MAC.

2. The Data Reviewer reviews the sample and test data to ensure it is correct. If not, make changes as needed and Save the test. If the test data is correct or after corrections are made, the Data Reviewer can submit the sample to FDOT for Verification.

3. Select the Submit for FDOT Verification option to submit the sample to the PA and put it in Pending Finalization status.

**NOTE**: If the VT's review finds concerns with the data, their company will not enter the TIN. The VT will enter a comment about the data in question on the Sample Comments tab and notify the QC data entry that the sample needs further review. MAC will not send a notification because nothing is triggered.

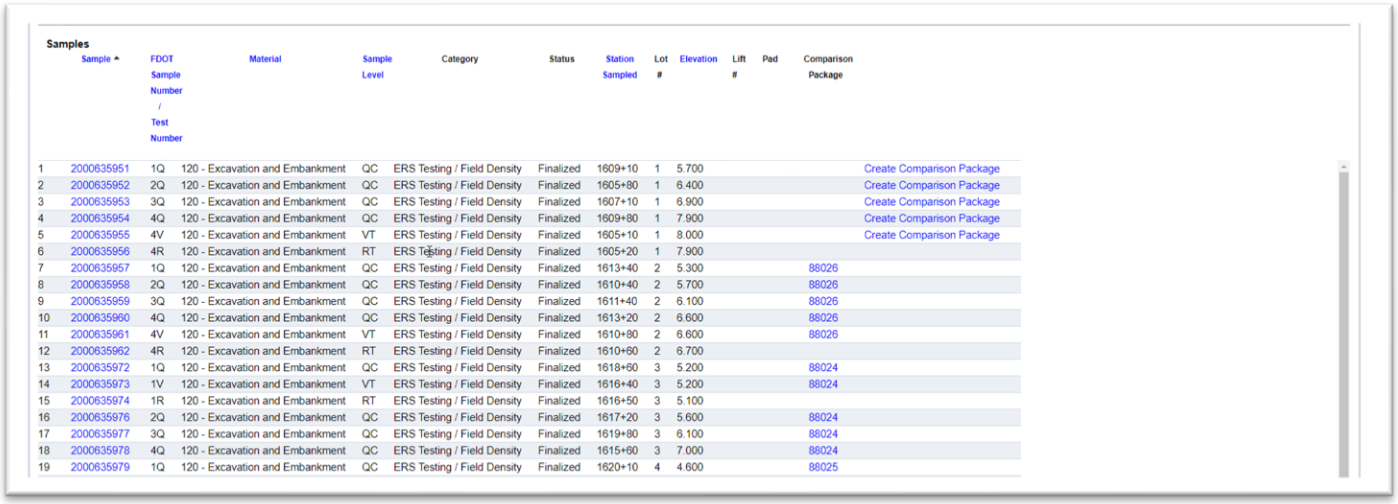



1. Navigate to the sample by entering the MAC Sample Id in the Go To field on the MAC Sample screen.

You will be navigated to the sample. Review the Sample Comments tab and make any changes that are needed. Let the VT company know that the sample is ready to be reviewed again.

## J. Navigating from the ERS Screen to the Sample Screen

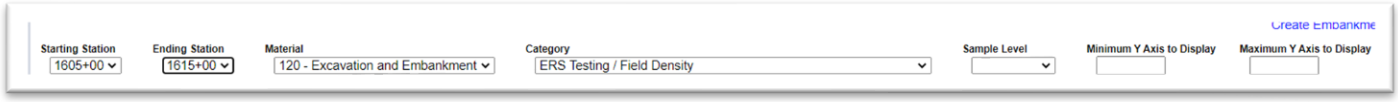
When you generate an ERS sample, MAC creates a sample record that can be seen on a Sample screen. You may need to navigate to the sample; for example, if you saved it and now need to Submit it to FDOT for Verification.



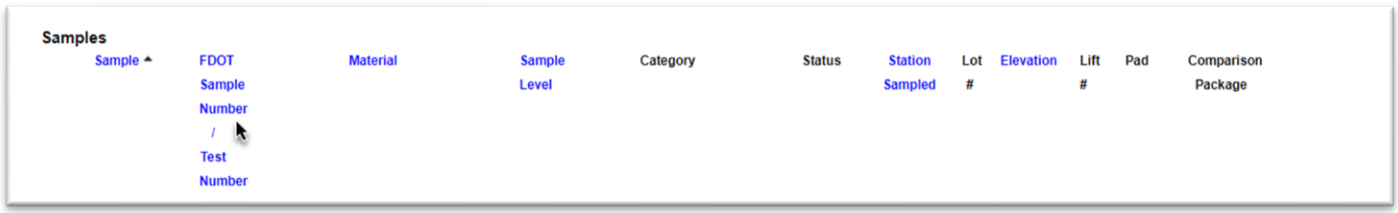
Samples

| | Sample | FDOT Sample Number / Test Number | Material | Sample Level | Category | Status | Station Sampled | Lot # | Elevation | Lift # | Pad | Comparison Package | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2000635951 | 1Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1609+10 | 1 | 5.700 | | | | Create Comparison Package |
| 2 | 2000635952 | 2Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1605+80 | 1 | 6.400 | | | | Create Comparison Package |
| 3 | 2000635953 | 3Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1607+10 | 1 | 6.900 | | | | Create Comparison Package |
| 4 | 2000635954 | 4Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1609+80 | 1 | 7.900 | | | | Create Comparison Package |
| 5 | 2000635955 | 4V | 120 - Excavation and Embankment | VT | ERS Testing / Field Density | Finalized | 1605+10 | 1 | 8.000 | | | | Create Comparison Package |
| 6 | 2000635956 | 4R | 120 - Excavation and Embankment | RT | ERS Testing / Field Density | Finalized | 1605+20 | 1 | 7.900 | | | | |
| 7 | 2000635957 | 1Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1613+40 | 2 | 5.300 | | | 88026 | |
| 8 | 2000635958 | 2Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1610+40 | 2 | 5.700 | | | 88026 | |
| 9 | 2000635959 | 3Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1611+40 | 2 | 6.100 | | | 88026 | |
| 10 | 2000635960 | 4Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1613+20 | 2 | 6.600 | | | 88026 | |
| 11 | 2000635961 | 4V | 120 - Excavation and Embankment | VT | ERS Testing / Field Density | Finalized | 1610+80 | 2 | 6.600 | | | 88026 | |
| 12 | 2000635962 | 4R | 120 - Excavation and Embankment | RT | ERS Testing / Field Density | Finalized | 1610+60 | 2 | 6.700 | | | | |
| 13 | 2000635972 | 1Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1618+60 | 3 | 5.200 | | | 88024 | |
| 14 | 2000635973 | 1V | 120 - Excavation and Embankment | VT | ERS Testing / Field Density | Finalized | 1616+40 | 3 | 5.200 | | | 88024 | |
| 15 | 2000635974 | 1R | 120 - Excavation and Embankment | RT | ERS Testing / Field Density | Finalized | 1616+50 | 3 | 5.100 | | | | |
| 16 | 2000635976 | 2Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1617+20 | 3 | 5.600 | | | 88024 | |
| 17 | 2000635977 | 3Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1619+80 | 3 | 6.100 | | | 88024 | |
| 18 | 2000635978 | 4Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1615+60 | 3 | 7.000 | | | 88024 | |
| 19 | 2000635979 | 1Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1620+10 | 4 | 4.600 | | | 88025 | |

When samples are generated, a list of all ERS samples appears under the plots.




1. The sample list can be filtered by selecting filters above the plot display.



Samples

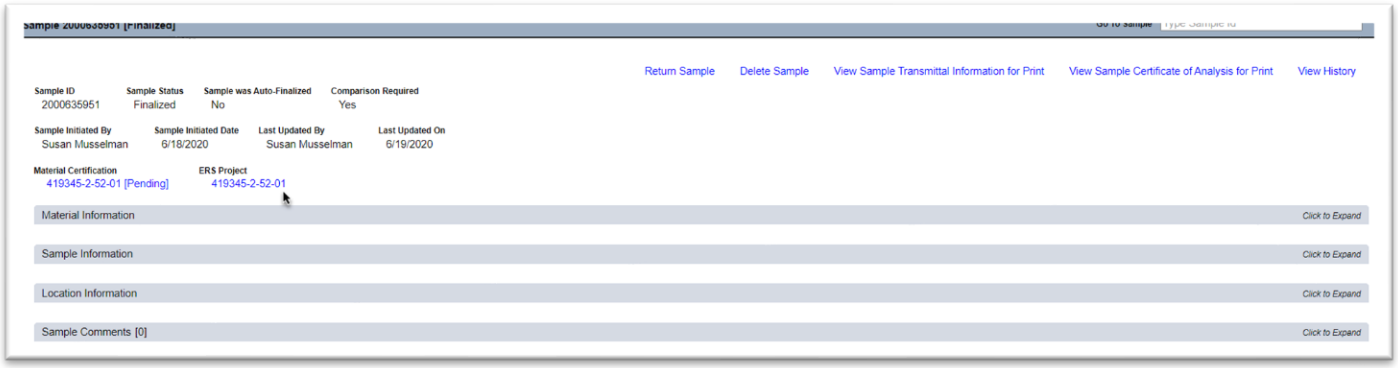
| Sample | FDOT Sample Number / Test Number | Material | Sample Level | Category | Status | Station Sampled | Lot # | Elevation | Lift # | Pad | Comparison Package |
|---|---|---|---|---|---|---|---|---|---|---|---|

2. The sample list can be sorted by clicking any of the column labels in blue.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2000635951 | 1Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1609+10 | 1 | 5.700 | | | Create Comparison Package |
| 2 | 2000635952 | 2Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1605+80 | 1 | 6.400 | | | Create Comparison Package |
| 3 | 2000635953 | 3Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1607+10 | 1 | 6.900 | | | Create Comparison Package |
| 4 | 2000635954 | 4Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1609+80 | 1 | 7.900 | | | Create Comparison Package |
| 5 | 2000635957 | 1Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1613+40 | 2 | 5.300 | | 88026 | |
| 6 | 2000635958 | 2Q | 120 - Excavation and Embankment | QC | ERS Testing / Field Density | Finalized | 1610+40 | 2 | 5.700 | | 88026 | |

3. Click on the Sample Id hotlink of the sample you want to see.

The Sample screen for that sample will appear.

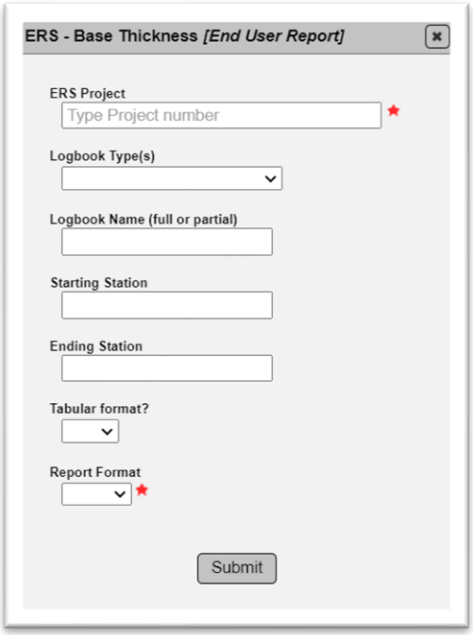



4. To return to the ERS screen, select the ERS Project hotlink. You need to select the logbook from the display dropdown to return to a specific logbook and apply filters to return to a specific sample list.

## K. Base Thickness Report and Deficient Thicknesses

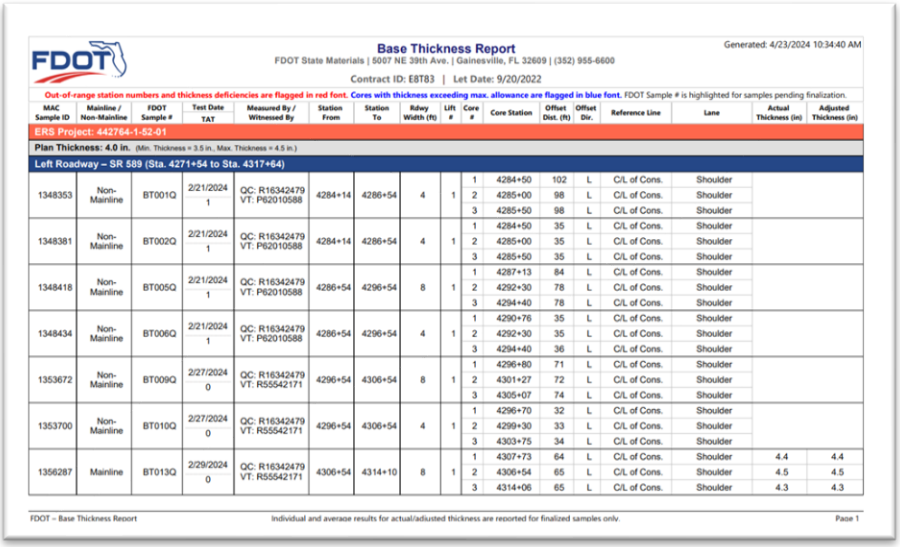
Base thickness samples will be designated as Failing test disposition when the measured result is less than ½ inch below the plan thickness.

Also, there is an ERS – Base Thickness Report on the MAC Reports screen under the Projects tab. It is used to calculate the average thicknesses. The report offers many parameters to track thickness during the life of the project.




For the purposes of Material Certification and final pay for Final Estimates, a final report using the FPN of the ERS Project Id as the only parameter should be generated so that all samples under each plan thickness are grouped and summarized together in accordance with ***Specifications Section 285 – Optional Base***. This version does not display any samples entered to record the LRI only Base Layer as they are not governed by ***Specifications Section 285.***

The report designates deficient thicknesses. Any areas with deficient thickness that are left in place are an Exception on the Project Material Certification Letter (PMCL).



**Base Thickness Report**

FDOT State Materials | 5007 NE 39th Ave. | Gainesville, FL 32609 | (352) 955-6600

Generated: 4/23/2024 10:34:40 AM

Contract ID: E8T83 | Let Date: 9/20/2022

Out-of-range station numbers and thickness deficiencies are flagged in red font. Cores with thickness exceeding max. allowance are flagged in blue font. FDOT Sample # is highlighted for samples pending finalization.

ERS Project: 442764-1-52-01

Plan Thickness: 4.0 in. (Min. Thickness = 3.5 in., Max. Thickness = 4.5 in.)

Left Roadway – SR 589 (Sta. 4271+54 to Sta. 4317+64)

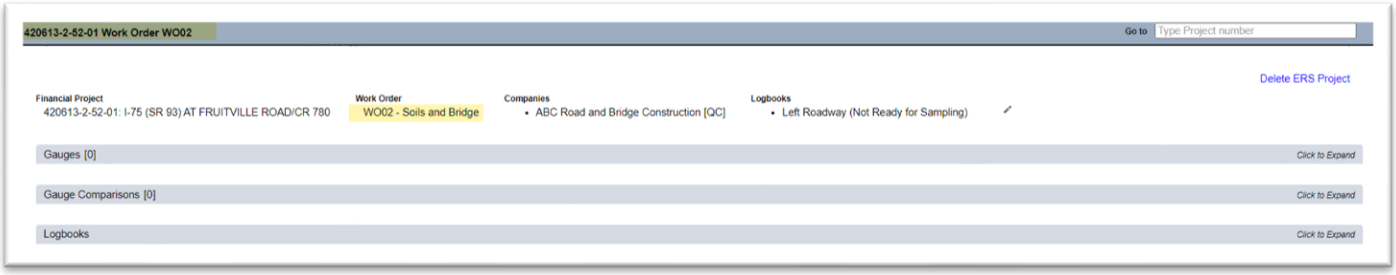
| MAC Sample ID | Mainline / Non-Mainline | FDOT Sample # | Test Date / TAT | Measured By / Witnessed By | Station From | Station To | Rdwy Width (ft) | Lift # | Core # | Core Station | Offset Dist. (ft) | Offset Dir. | Reference Line | Lane | Actual Thickness (in) | Adjusted Thickness (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1348353 | Non-Mainline | BT001Q | 2/21/2024 / 1 | QC: R16342479 VT: P62010588 | 4284+14 | 4286+54 | 4 | 1 | 1 | 4284+50 | 102 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 2 | 4285+00 | 98 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 3 | 4285+50 | 98 | L | C/L of Cons. | Shoulder | | |
| 1348381 | Non-Mainline | BT002Q | 2/21/2024 / 1 | QC: R16342479 VT: P62010588 | 4284+14 | 4286+54 | 4 | 1 | 1 | 4284+50 | 35 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 2 | 4285+00 | 35 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 3 | 4285+50 | 35 | L | C/L of Cons. | Shoulder | | |
| 1348418 | Non-Mainline | BT005Q | 2/21/2024 / 1 | QC: R16342479 VT: P62010588 | 4286+54 | 4296+54 | 8 | 1 | 1 | 4287+13 | 84 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 2 | 4292+30 | 78 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 3 | 4294+40 | 78 | L | C/L of Cons. | Shoulder | | |
| 1348434 | Non-Mainline | BT006Q | 2/21/2024 / 1 | QC: R16342479 VT: P62010588 | 4286+54 | 4296+54 | 4 | 1 | 1 | 4290+76 | 35 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 2 | 4292+30 | 35 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 3 | 4294+40 | 36 | L | C/L of Cons. | Shoulder | | |
| 1353672 | Non-Mainline | BT009Q | 2/27/2024 / 0 | QC: R16342479 VT: R55542171 | 4296+54 | 4306+54 | 8 | 1 | 1 | 4296+80 | 71 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 2 | 4301+27 | 72 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 3 | 4305+07 | 74 | L | C/L of Cons. | Shoulder | | |
| 1353700 | Non-Mainline | BT010Q | 2/27/2024 / 0 | QC: R16342479 VT: R55542171 | 4296+54 | 4306+54 | 4 | 1 | 1 | 4296+70 | 32 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 2 | 4299+30 | 33 | L | C/L of Cons. | Shoulder | | |
| | | | | | | | | | 3 | 4303+75 | 34 | L | C/L of Cons. | Shoulder | | |
| 1356287 | Mainline | BT013Q | 2/29/2024 / 0 | QC: R16342479 VT: R55542171 | 4306+54 | 4314+10 | 8 | 1 | 1 | 4307+73 | 64 | L | C/L of Cons. | Shoulder | 4.4 | 4.4 |
| | | | | | | | | | 2 | 4306+54 | 65 | L | C/L of Cons. | Shoulder | 4.5 | 4.5 |
| | | | | | | | | | 3 | 4314+06 | 65 | L | C/L of Cons. | Shoulder | 4.3 | 4.3 |

FDOT – Base Thickness Report — Individual and average results for actual/adjusted thickness are reported for finalized samples only. — Page 1

When there are granular subbase samples under MAC Material 200 – Rock Base, they do not appear on the Final Estimates version of this report.

## L. ERS Samples on Work Order Nonstandard JGS

On FPNs with Work Order Nonstandard JGS (NSJGS), ERS Projects in MAC are now created per NSJGS WO entry. In other words, the ERS Project is work order based because the NSGJS is work order based. It is essential that that NSJGS be created by the appropriate District Application Coordinator (DAC) before the ERS IA PMU creates the ERS project. See the Non-Standard JGS User Instructions for more information.




If your FPN is work order based and the ERS project does not reflect the specific work order, it means the ERS project for the FPN was created before the WO NSJGS. Notify the appropriate DAC.

## M. Earthwork Random Number Generator

Acceptance testing must be performed at random locations. Choose random number to determine each location and offset. Arbitrarily select numbers for the row and column. Use the row and column numbers to determine the random number from the table below.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 0.834 | 0.996 | 0.385 | 0.603 | 0.821 | 0.821 | 0.370 | 0.526 | 0.342 | 0.502 | 0.414 | 0.737 |
| **2** | 0.138 | 0.329 | 0.581 | 0.333 | 0.434 | 0.596 | 0.848 | 0.524 | 0.638 | 0.751 | 0.793 | 0.911 |
| **3** | 0.788 | 0.370 | 0.460 | 0.348 | 0.224 | 0.375 | 0.785 | 0.003 | 0.875 | 0.589 | 0.350 | 0.979 |
| **4** | 0.693 | 0.679 | 0.317 | 0.476 | 0.684 | 0.881 | 0.392 | 0.959 | 0.513 | 0.076 | 0.242 | 0.915 |
| **5** | 0.846 | 0.670 | 0.572 | 0.118 | 0.559 | 0.677 | 0.764 | 0.016 | 0.202 | 0.538 | 0.764 | 0.774 |
| **6** | 0.001 | 0.492 | 0.940 | 0.922 | 0.852 | 0.138 | 0.147 | 0.876 | 0.788 | 0.072 | 0.940 | 0.758 |
| **7** | 0.736 | 0.562 | 0.862 | 0.807 | 0.655 | 0.630 | 0.628 | 0.636 | 0.873 | 0.635 | 0.126 | 0.197 |
| **8** | 0.829 | 0.543 | 0.061 | 0.947 | 0.112 | 0.497 | 0.787 | 0.717 | 0.009 | 0.773 | 0.372 | 0.582 |
| **9** | 0.725 | 0.834 | 0.189 | 0.345 | 0.503 | 0.987 | 0.059 | 0.709 | 0.125 | 0.196 | 0.251 | 0.553 |
| **10** | 0.251 | 0.368 | 0.405 | 0.795 | 0.866 | 0.394 | 0.791 | 0.484 | 0.393 | 0.567 | 0.638 | 0.111 |
| **11** | 0.341 | 0.782 | 0.180 | 0.057 | 0.214 | 0.835 | 0.298 | 0.206 | 0.740 | 0.271 | 0.441 | 0.535 |
| **12** | 0.660 | 0.748 | 0.578 | 0.712 | 0.882 | 0.941 | 0.769 | 0.664 | 0.110 | 0.775 | 0.164 | 0.261 |
| **13** | 0.884 | 0.723 | 0.188 | 0.547 | 0.527 | 0.658 | 0.226 | 0.096 | 0.129 | 0.871 | 0.765 | 0.135 |
| **14** | 0.567 | 0.187 | 0.151 | 0.399 | 0.238 | 0.923 | 0.133 | 0.757 | 0.532 | 0.679 | 0.063 | 0.357 |
| **15** | 0.254 | 0.163 | 0.145 | 0.240 | 0.390 | 0.164 | 0.589 | 0.491 | 0.840 | 0.220 | 0.587 | 0.148 |
| **16** | 0.376 | 0.314 | 0.673 | 0.260 | 0.423 | 0.527 | 0.418 | 0.409 | 0.699 | 0.459 | 0.977 | 0.422 |
| **17** | 0.306 | 0.863 | 0.382 | 0.069 | 0.077 | 0.210 | 0.613 | 0.462 | 0.568 | 0.703 | 0.213 | 0.796 |
| **18** | 0.300 | 0.468 | 0.206 | 0.155 | 0.401 | 0.263 | 0.901 | 0.825 | 0.074 | 0.802 | 0.230 | 0.631 |

**Density test example:**

To get station and offset for a density test, multiply the length of the LOT in question by a random number obtained from the chart. For example, if the LOT you are testing is 500ft, and you choose Row 4 Column 5, then the number is 0.684. Your location for testing would be 0.684 X 500' = 342' from the beginning of the LOT, or 342' up station.

Then select a random number and multiply by the width to determine the offset. For example, if the width of the LOT is 24 ft and you selected the random number from Row 8 Column 2, your offset is 0.543 X 24' = 13.0 ft.

## Chapter 5 – Field Density Sample Special Cases

There are some special situations that apply to field density samples. This chapter will describe those special conditions.

### A. Samples on 1st Lift not Affected by Water Table Line – Data Entry VT Company

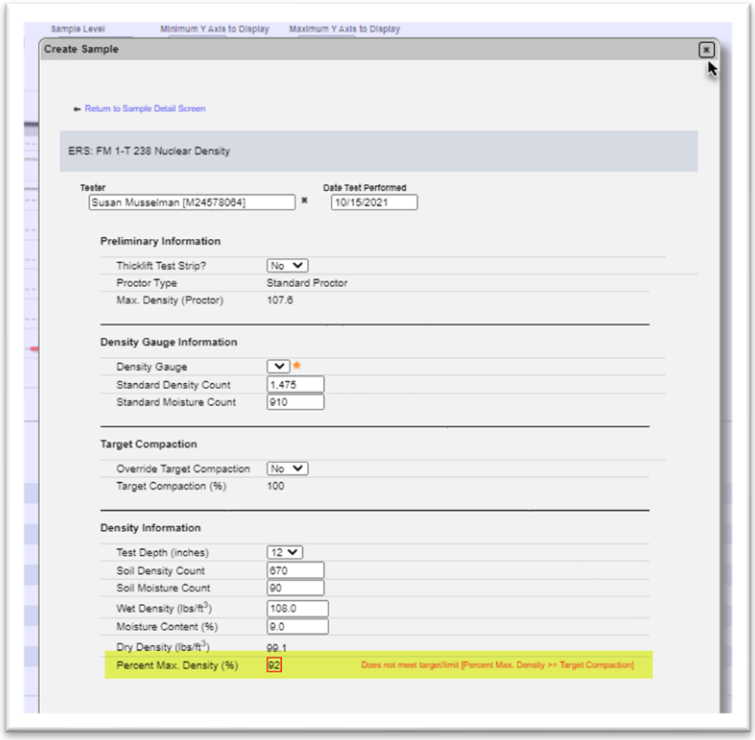
For the first sample that is on the 1st lift not affected by water, log the sample in under MAC Spec 120, Sample Level ***IV***.

### B. Failing QC – QC Data Entry

Failing QC tests do not need to be entered in MAC. Once a QC test fails, it becomes a process control test and is not used for acceptance. When entering a field density test, a user may not know it fails until entering the data needed to calculate the Maximum Density (%). If it is a QC test and the test indicates a failure check the data for these fields to ensure the failure isn't due to a data entry error in:

- The Proctor Sample Id which supplies the type of proctor and Max. Density (Proctor) value
- The Wet Density raw result
- The Moisture Content raw result

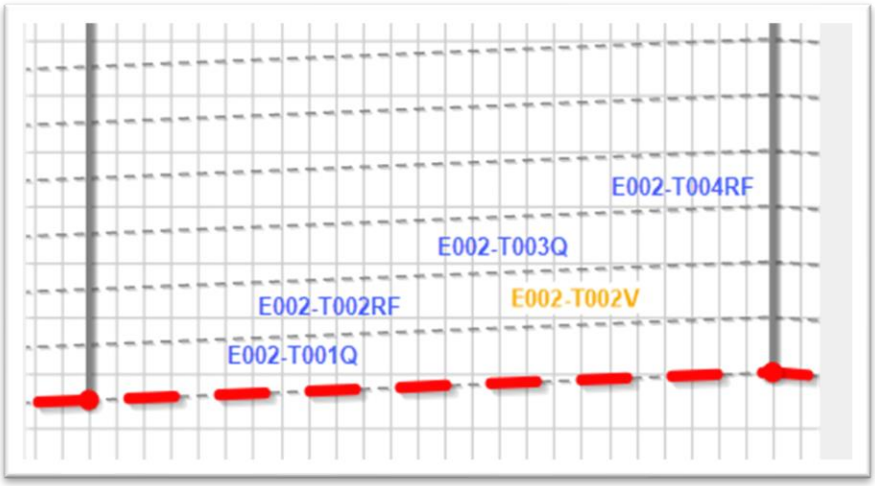
1. If any of that data is incorrect, make changes to the data to see if the correct data passes.




2. If the data is correct or after correcting, the test still fails, select the x at the top right corner of the dialog box to close it and the sample will not be entered in MAC.

C. Reduced Frequency

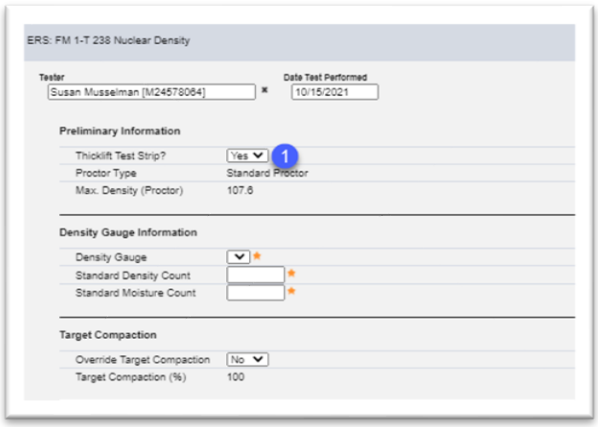
When QC has been approved for reduced frequency, a sample is still created for the lifts not tested. This is because the comparison packages need to reflect the correct original and verification samples. See the ERS Sample Numbering Instructions.




D. Testing for Thicklift Approval – Data Entry Each Company

The ERS Sample Numbering Instructions have been updated to reflect test strips so it is easier to create the comparison packages for the samples in the test strip.

***1. Embankment (QC)***




1. **Thicklift Test Strip?** – for the QC sample, on the density test screen, select Yes. *This is shown as condition #7 on the ERS forms.*

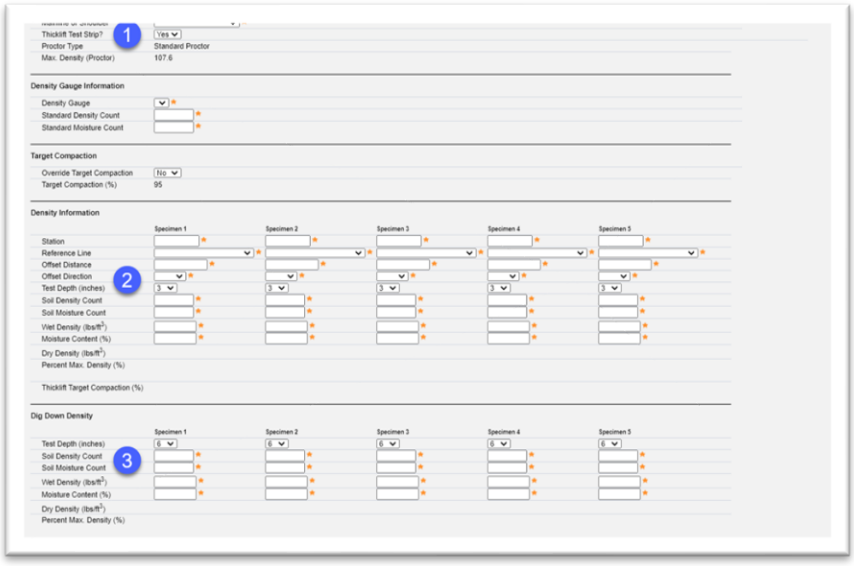
2. **Density Information** – the fields for the density test expand to include 5 specimens. Enter the data for the 5 tests performed for thicklift approval.

All 5 of the thicklift densities must pass 100% Percent Maximum Density.

### *2. Embankment – Data Entry VT Company*

1.**Thicklift Test Strip?** – for the VT sample, on the density test screen, select Yes. *This is shown as condition #7 on the ERS forms.*
2. **Density Information** – the VT density test only has 1 specimen. Enter the data for the VT test performed for thicklift approval.

### *3. Rock Base – QC Data Entry*




1. **Thicklift Test Strip?** – for the QC sample, on the density test screen, select Yes.
2. **Density Information** – the fields for the density test expand to include 5 specimens. Enter the data for the 5 tests performed for thicklift approval.

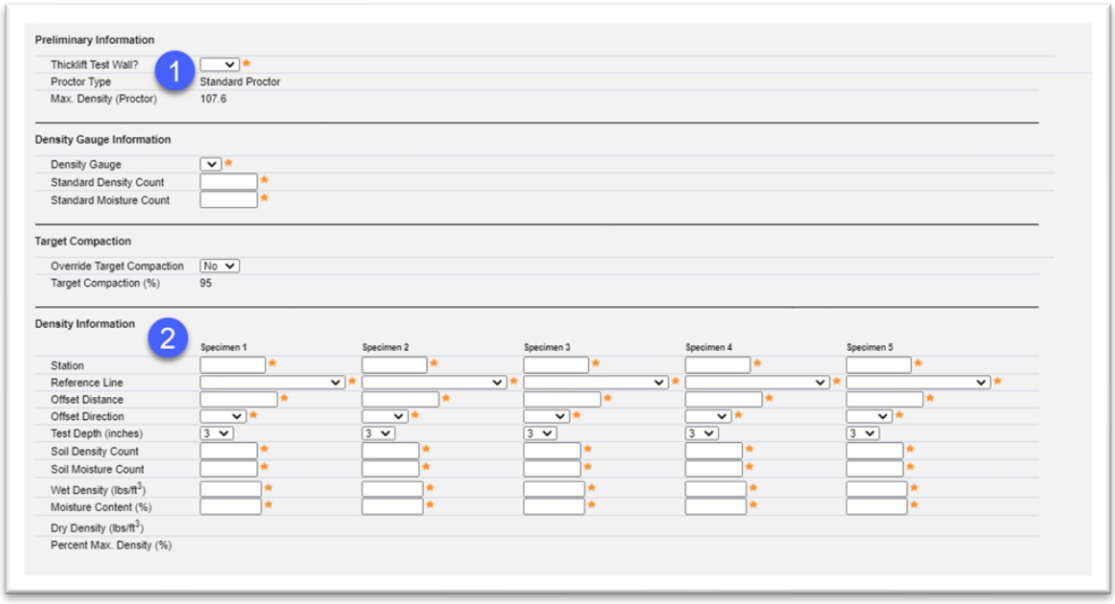
**NOTE**: The average of the 5 thicklift densities becomes the new target. Follow the process described in Chapter 4, A. Creating a Field Density Sample ESB – Data Entry Each Company.

3. **Dig Down Density** – fields for 5 specimens for densities taken for the dig down also appear. Enter the data for the 5 dig down tests performed.

### *4. Rock Base Data Entry – VT Company*

1. **Thicklift Test Strip?** – for the VT sample, on the density test screen, select Yes. *This is shown as condition #7 on the ERS forms.*
2. **Density Information** – the VT density test only has 1 specimen. Enter the data for the VT test performed for thicklift approval.
3. **Dig Down Density** – the VT density test only has 1 specimen. Enter the data for the 1 dig down test performed.

### *5. Retaining Wall Thick Lift Approval – QC Data Entry*




1. **Thicklift Test Wall?** – for the QC sample, on the density test screen, select Yes. *This is shown as condition #8 on the ERS forms.*
2. **Density Information** – the fields for the density test expand to include 5 specimens. Enter the data for the 5 tests performed for thicklift approval.

**NOTE**: Thicklift approval for retaining walls is done on a test wall. A report for the test wall gives the average of all the densities for the entire wall. This becomes the new target.

3. **Dig Down Density** –fields for the dig down density test appear for 5 specimens. Enter the data for the 5 tests performed for thicklift approval.

### *6. Retaining Wall Thick Lift Approval – VT Data Entry*

1.**Thicklift Test Wall?** – for the VT sample, on the density test screen, select Yes. *This is shown as condition #8 on the ERS forms.*
2. **Density Information** – the VT density test only has 1 specimen. Enter the data for the VT test performed for thicklift approval.
3. **Dig Down Density** – the VT density test only has 1 specimen. Enter the data for the VT dig down test performed for thicklift approval.

## E. Limerock in Lieu of Subgrade and Existing Base 160 – Stabilizing Proctor Selection

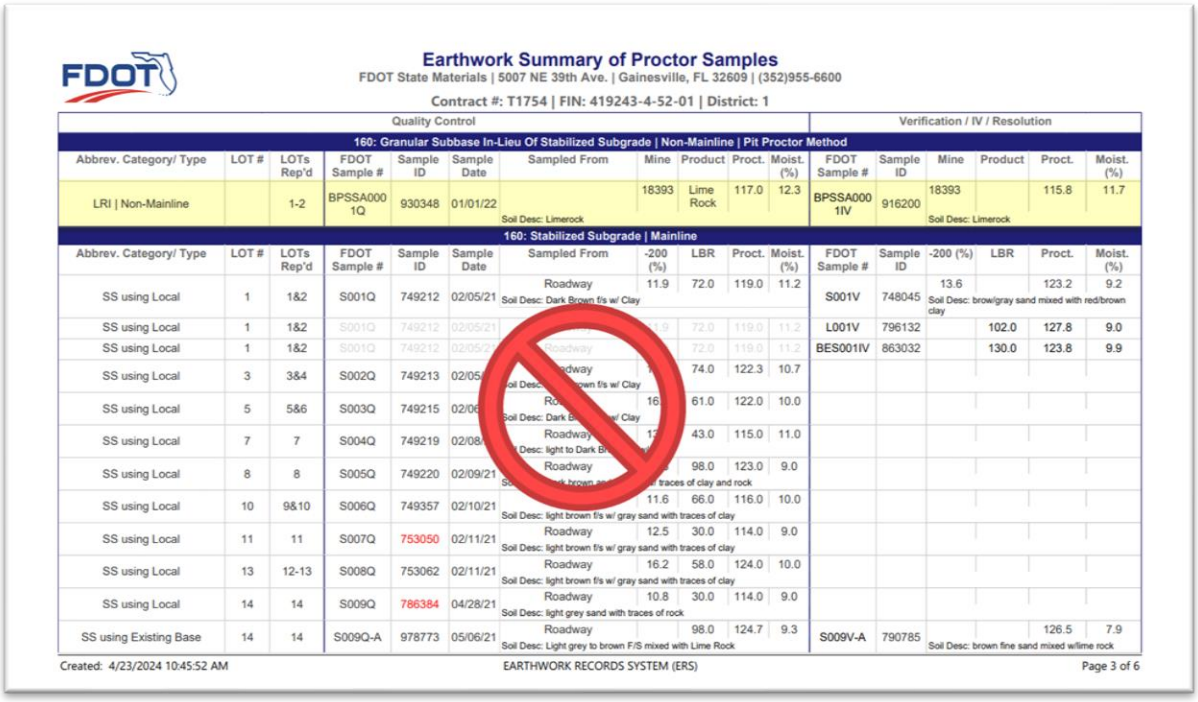
The density test in this layer should be logged under MAC Spec 160 – Stabilizing with the appropriate proctor under the same Category/Type of either of these two.

Granular Subbase In-Lieu of Stabilized Subgrade

- Mainline
- Non-Mainline

MAC will allow you to select any proctor sample category / type under MAC Material 160. This information does not display on the sample. You will need to look up the MAC Sample Id or FDOT Sample number before you log the field density sample into MAC.

If you generate the Earthwork Summary of Proctors report, you are looking the correct proctor sample under one of these two headings, depending on which one is the correct one for the specific density test:



FDOT

**Earthwork Summary of Proctor Samples**

FDOT State Materials | 5007 NE 39th Ave. | Gainesville, FL 32609 | (352)955-6600

Contract #: T1754 | FIN: 419243-4-52-01 | District: 1

| Quality Control | | | | | | | | | | | Verification / IV / Resolution | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **160: Granular Subbase In-Lieu Of Stabilized Subgrade \| Non-Mainline \| Pit Proctor Method** | | | | | | | | | | | | | | | | |
| Abbrev. Category/ Type | LOT # | LOTs Rep'd | FDOT Sample # | Sample ID | Sample Date | Sampled From | Mine | Product | Proct. | Moist. (%) | FDOT Sample # | Sample ID | Mine | Product | Proct. | Moist. (%) |
| LRI \| Non-Mainline | | 1-2 | BPSSA0001Q | 930348 | 01/01/22 | Soil Desc: Limerock | 18393 | Lime Rock | 117.0 | 12.3 | BPSSA0001IV | 916200 | 18393 Soil Desc: Limerock | | 115.8 | 11.7 |
| **160: Stabilized Subgrade \| Mainline** | | | | | | | | | | | | | | | | |
| Abbrev. Category/ Type | LOT # | LOTs Rep'd | FDOT Sample # | Sample ID | Sample Date | Sampled From | -200 (%) | LBR | Proct. | Moist. (%) | FDOT Sample # | Sample ID | -200 (%) | LBR | Proct. | Moist. (%) |
| SS using Local | 1 | 1&2 | S001Q | 749212 | 02/05/21 | Roadway Soil Desc: Dark Brown f/s w/ Clay | 11.9 | 72.0 | 119.0 | 11.2 | S001V | 748045 | 13.6 Soil Desc: brow/gray sand mixed with red/brown clay | | 123.2 | 9.2 |
| SS using Local | 1 | 1&2 | S001Q | 749212 | 02/05/21 | [illegible] | [illegible] | 72.0 | 119.0 | 11.2 | L001V | 796132 | | 102.0 | 127.8 | 9.0 |
| SS using Local | 1 | 1&2 | S001Q | 749212 | 02/05/21 | [illegible] | | 72.0 | 119.0 | 11.2 | BES001IV | 863032 | | 130.0 | 123.8 | 9.9 |
| SS using Local | 3 | 3&4 | S002Q | 749213 | 02/05 | [illegible] | | 74.0 | 122.3 | 10.7 | | | | | | |
| SS using Local | 5 | 5&6 | S003Q | 749215 | 02/06 | [illegible] | 16 | 61.0 | 122.0 | 10.0 | | | | | | |
| SS using Local | 7 | 7 | S004Q | 749219 | 02/08 | [illegible] | 17 | 43.0 | 115.0 | 11.0 | | | | | | |
| SS using Local | 8 | 8 | S005Q | 749220 | 02/09/21 | Roadway [illegible] traces of clay and rock | | 98.0 | 123.0 | 9.0 | | | | | | |
| SS using Local | 10 | 9&10 | S006Q | 749357 | 02/10/21 | Soil Desc: light brown f/s w/ gray sand with traces of clay | 11.6 | 66.0 | 116.0 | 10.0 | | | | | | |
| SS using Local | 11 | 11 | S007Q | 753050 | 02/11/21 | Roadway Soil Desc: light brown f/s w/ gray sand with traces of clay | 12.5 | 30.0 | 114.0 | 9.0 | | | | | | |
| SS using Local | 13 | 12-13 | S008Q | 753062 | 02/11/21 | Roadway Soil Desc: light brown f/s w/ gray sand with traces of clay | 16.2 | 58.0 | 124.0 | 10.0 | | | | | | |
| SS using Local | 14 | 14 | S009Q | 786384 | 04/28/21 | Roadway Soil Desc: light grey sand with traces of rock | 10.8 | 30.0 | 114.0 | 9.0 | | | | | | |
| SS using Existing Base | 14 | 14 | S009Q-A | 978773 | 05/06/21 | Roadway Soil Desc: Light grey to brown F/S mixed with Lime Rock | | 98.0 | 124.7 | 9.3 | S009V-A | 790785 | | | 126.5 Soil Desc: brown fine sand mixed w/lime rock | 7.9 |

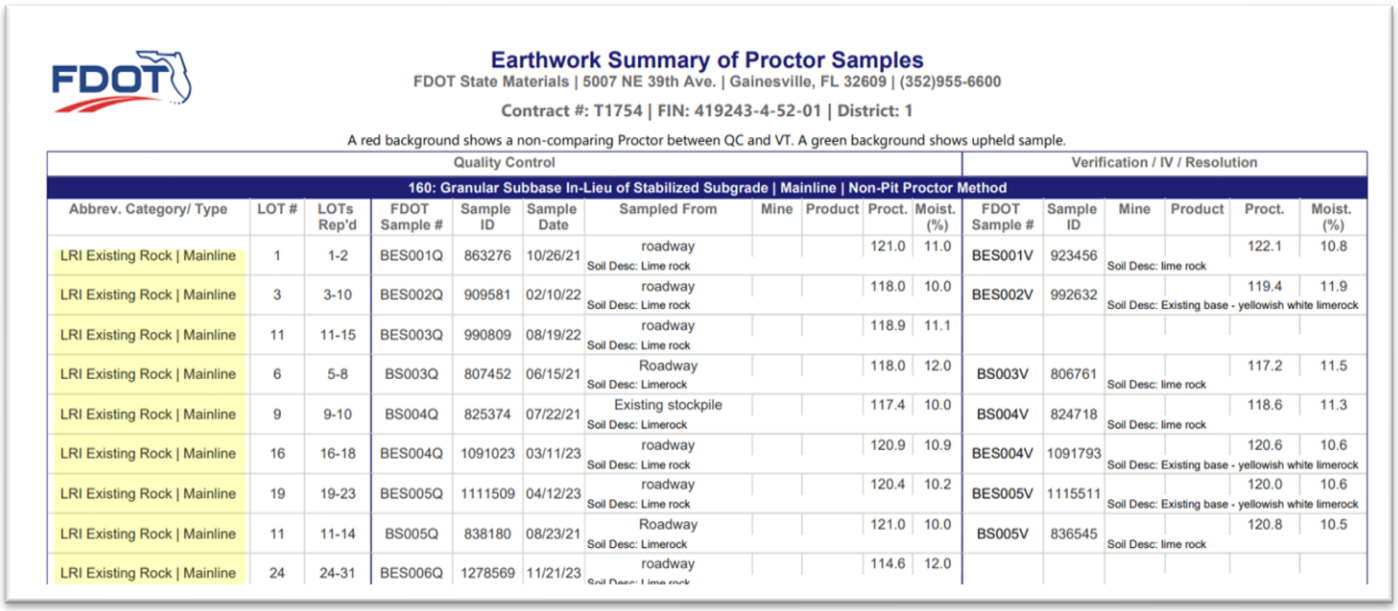
Created: 4/23/2024 10:45:52 AM EARTHWORK RECORDS SYSTEM (ERS) Page 3 of 6

When existing base is used for 160 - Stabilizing, it is considered to be LRI, however a proctor under the same Category/Type of either of these two must be selected.

Existing Reclaimed Rock Base

- Mainline
- Non-Mainline

On the Earthwork Summary of Proctors report, you are looking the correct proctor sample:



**Earthwork Summary of Proctor Samples**

FDOT State Materials | 5007 NE 39th Ave. | Gainesville, FL 32609 | (352)955-6600

Contract #: T1754 | FIN: 419243-4-52-01 | District: 1

A red background shows a non-comparing Proctor between QC and VT. A green background shows upheld sample.

| Quality Control | | | | | | | | | | | Verification / IV / Resolution | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 160: Granular Subbase In-Lieu of Stabilized Subgrade \| Mainline \| Non-Pit Proctor Method | | | | | | | | | | | | | | | | |
| Abbrev. Category/ Type | LOT # | LOTs Rep'd | FDOT Sample # | Sample ID | Sample Date | Sampled From | Mine | Product | Proct. | Moist. (%) | FDOT Sample # | Sample ID | Mine | Product | Proct. | Moist. (%) |
| LRI Existing Rock \| Mainline | 1 | 1-2 | BES001Q | 863276 | 10/26/21 | roadway Soil Desc: Lime rock | | | 121.0 | 11.0 | BES001V | 923456 | Soil Desc: lime rock | | 122.1 | 10.8 |
| LRI Existing Rock \| Mainline | 3 | 3-10 | BES002Q | 909581 | 02/10/22 | roadway Soil Desc: Lime rock | | | 118.0 | 10.0 | BES002V | 992632 | Soil Desc: Existing base - yellowish white limerock | | 119.4 | 11.9 |
| LRI Existing Rock \| Mainline | 11 | 11-15 | BES003Q | 990809 | 08/19/22 | roadway Soil Desc: Lime rock | | | 118.9 | 11.1 | | | | | | |
| LRI Existing Rock \| Mainline | 6 | 5-8 | BS003Q | 807452 | 06/15/21 | Roadway Soil Desc: Limerock | | | 118.0 | 12.0 | BS003V | 806761 | Soil Desc: lime rock | | 117.2 | 11.5 |
| LRI Existing Rock \| Mainline | 9 | 9-10 | BS004Q | 825374 | 07/22/21 | Existing stockpile Soil Desc: Limerock | | | 117.4 | 10.0 | BS004V | 824718 | Soil Desc: lime rock | | 118.6 | 11.3 |
| LRI Existing Rock \| Mainline | 16 | 16-18 | BES004Q | 1091023 | 03/11/23 | roadway Soil Desc: Lime rock | | | 120.9 | 10.9 | BES004V | 1091793 | Soil Desc: Existing base - yellowish white limerock | | 120.6 | 10.6 |
| LRI Existing Rock \| Mainline | 19 | 19-23 | BES005Q | 1111509 | 04/12/23 | roadway Soil Desc: Lime rock | | | 120.4 | 10.2 | BES005V | 1115511 | Soil Desc: Existing base - yellowish white limerock | | 120.0 | 10.6 |
| LRI Existing Rock \| Mainline | 11 | 11-14 | BS005Q | 838180 | 08/23/21 | Roadway Soil Desc: Limerock | | | 121.0 | 10.0 | BS005V | 836545 | Soil Desc: lime rock | | 120.8 | 10.5 |
| LRI Existing Rock \| Mainline | 24 | 24-31 | BES006Q | 1278569 | 11/21/23 | roadway | | | 114.6 | 12.0 | | | | | | |

## F. Existing Base for 200 – Rock Base Proctor Selection

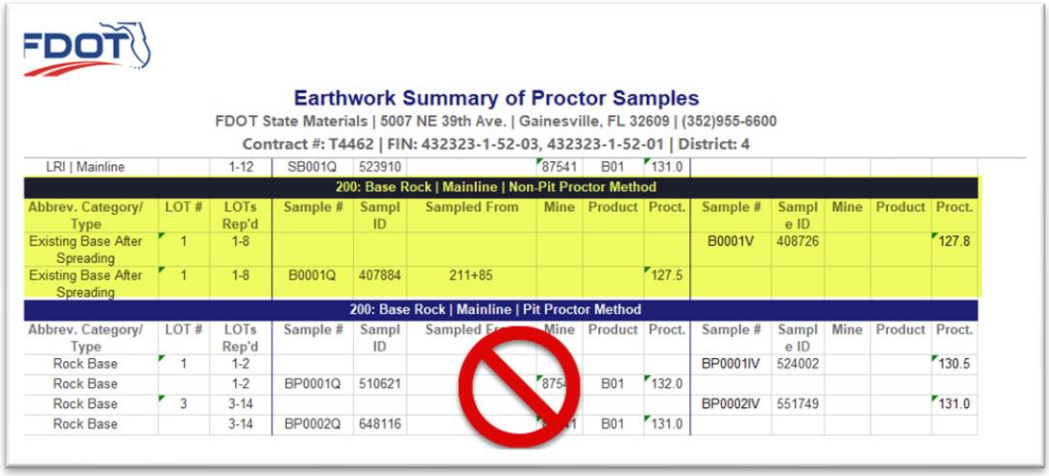
When existing base is used for 200 – Rock Base, an appropriate proctor under the same Category/Type of either of these two must be selected.

Existing Base

- Preliminary Stockpile
- Regular Production Stockpile
- Reduced Frequency Production Stockpile
- After Spreading on Mainline
- After Spreading on Non-Mainline

MAC will allow you to select any proctor sample category / type under MAC Material 200. This information does not display on the sample. You will need to look up the MAC Sample Id or FDOT Sample number before you log the field density sample into MAC.

If you generate the Earthwork Summary of Proctors report, you are looking the correct proctor sample:



**Earthwork Summary of Proctor Samples**

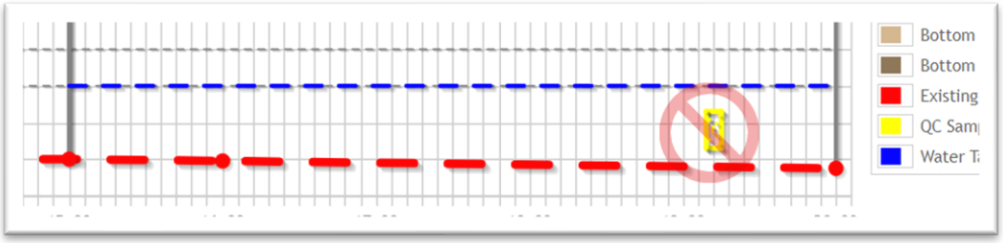
FDOT State Materials | 5007 NE 39th Ave. | Gainesville, FL 32609 | (352)955-6600

Contract #: T4462 | FIN: 432323-1-52-03, 432323-1-52-01 | District: 4

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LRI \| Mainline | | 1-12 | SB001Q | 523910 | | 87541 | B01 | 131.0 | | | | | |
| 200: Base Rock \| Mainline \| Non-Pit Proctor Method | | | | | | | | | | | | | |
| Abbrev. Category/ Type | LOT # | LOTs Rep'd | Sample # | Sampl ID | Sampled From | Mine | Product | Proct. | Sample # | Sampl e ID | Mine | Product | Proct. |
| Existing Base After Spreading | 1 | 1-8 | | | | | | | B0001V | 408726 | | | 127.8 |
| Existing Base After Spreading | 1 | 1-8 | B0001Q | 407884 | 211+85 | | | 127.5 | | | | | |
| 200: Base Rock \| Mainline \| Pit Proctor Method | | | | | | | | | | | | | |
| Abbrev. Category/ Type | LOT # | LOTs Rep'd | Sample # | Sampl ID | Sampled Fr... | Mine | Product | Proct. | Sample # | Sampl e ID | Mine | Product | Proct. |
| Rock Base | 1 | 1-2 | | | | | | | BP0001IV | 524002 | | | 130.5 |
| Rock Base | | 1-2 | BP0001Q | 510621 | | 875... | B01 | 132.0 | | | | | |
| Rock Base | 3 | 3-14 | | | | | | | BP0002IV | 551749 | | | 131.0 |
| Rock Base | | 3-14 | BP0002Q | 648116 | | ...1 | B01 | 131.0 | | | | | |

## G. Samples Below the Water Table Line

MAC allows samples to be taken below the plotted lines in case a sample needs to be taken for any reason. However, this means that the system will allow you to indicate that a sample was taken below a water table line. Samples should never be taken below the water table line, even though MAC will allow it.

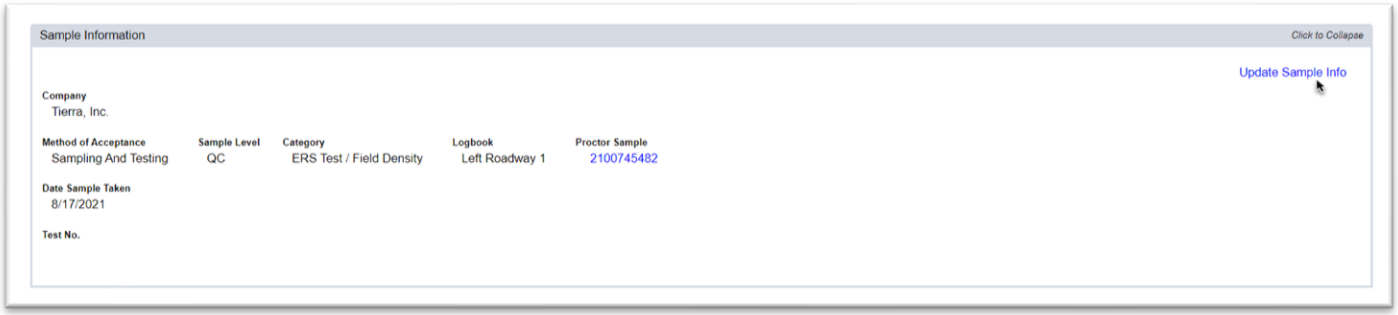



Do not perform a density test below the water table line. If a sample plots below the water table line, check the elevation on the sample location screen.

## H. User Deselects Submit Sample if Possible - Data Reviewer Each Company

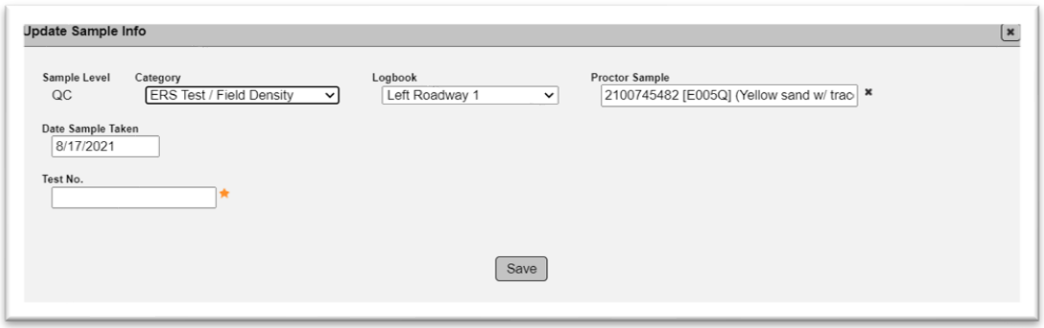
When a user deselects the Submit Sample if Possible, the sample is created with a sample status of Logged. It cannot be updated from the ERS Project screen. It also must be updated on the Sample screen by a user with the company role of Data Reviewer.

1. Navigate to the sample screen from the ERS project (see Chapter 4 Section I. Navigating from the ERS Screen to the Sample Screen).
2. If the information that is incorrect is under the Material tab, it cannot be updated.
a. Create a new sample with the correct information. You can use this sample as a reference for any of the other fields.
b. Request to have this sample deleted.

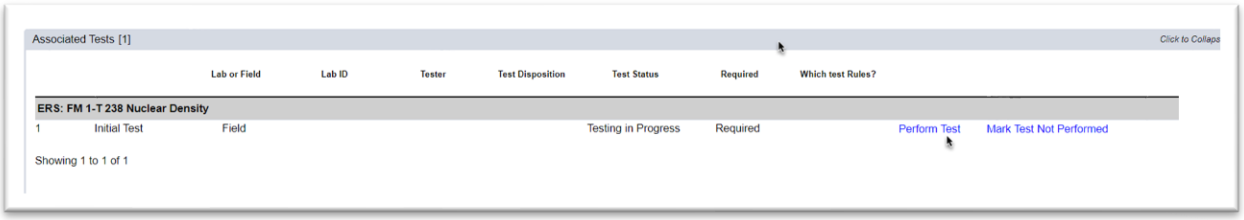



3. To update information under the Sample Information tab, click on it to expand it and select the Update Sample Information dialog box.

An Update Sample Info dialog box appears. The Sample Level cannot be updated. If the sample level is incorrect, create a new sample with the correct sample level.

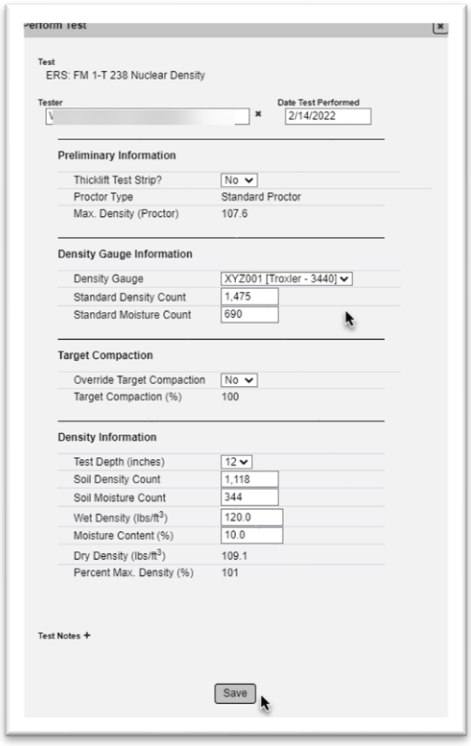



4. Make updates to any updateable field and select the Save option.



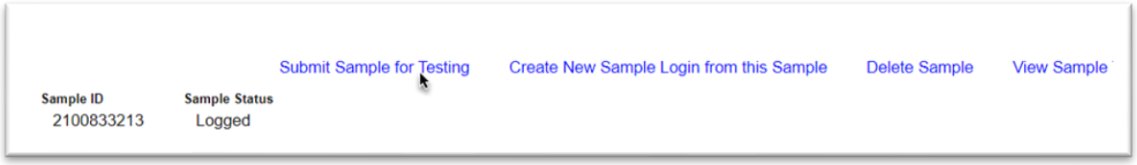

5. To make updates to the test information, click on the Associated Tests tab to expand it and select the Perform Test option.

A Perform Test dialog box appears.




6. Make changes as needed.
7. Select the Save option.

The sample is still in Logged Status and must have two steps performed to get the sample status to Pending Finalization.




7. Once all data has been reviewed, corrected and the sample is ready to be submitted to FDOT, select the Submit Sample for Testing option.

The sample status will be updated to Submitted for Lab Testing. This is a normal MAC phrase used for all samples, even those with only field tests. If you only have Data Entry, you will not see the option to Submit for FDOT Verification. You must have the Data Reviewer role.

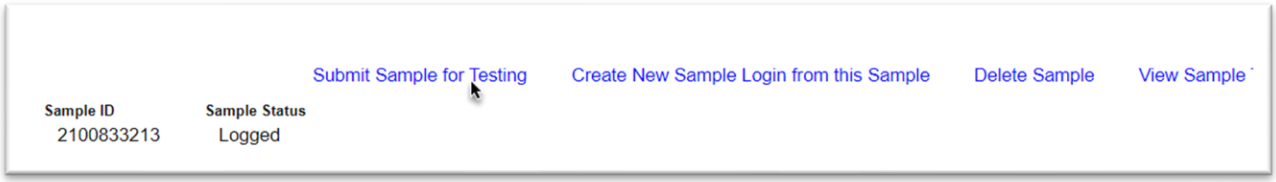
8. To put the sample in Pending Finalization status, select the Submit for FDOT Verification option. From this point on, a user with the system role of Project Administrator processes the sample unless the PA returns the sample for corrections (see Chapter 6 – Updating Samples Returned by the PA – Data Reviewer Each Company).

## I. Sample does not Include all Required Information at Save – Data Reviewer Each Company

Depending on the missing required information, the sample status will be either Logged or Submitted for Lab testing even if the Submit Sample if Possible indicator is selected when the sample is saved.

1. Navigate to the sample screen from the ERS project (see Chapter 4 Section I. Navigating from the ERS Screen to the Sample Screen).

2. Make changes to the sample and or test data.




3. If the sample is in Logged status, select the Submit Sample for Testing option.

4. If the Sample is already in Submitted for Lab Testing, select the Submit for FDOT Verification option.

## J. Entering Field Density Sample using an Open Proctor Sample

It is a common practice to proceed with earthwork operations before proctor samples have completed the MAC sample and comparison life cycles. Because the proctor sample is a child record of field density samples, proctor sample data changes impact field density samples. Contractors must understand that by proceeding, there is a risk that material acceptance issues will be encountered later and will take extra steps to resolve.

### *1. Proctor Test hasn't been Performed*

Field densities samples can be created, but not submitted to FDOT for Verification because the proctor sample Maximum Density value is a required field and cannot be populated from the proctor sample. The field density sample status will be Logged or Submitted for Lab Testing and sample cannot be Submitted to FDOT for Verification by a Data Reviewer from the Sample screen until the Maximum Density value from the proctor sample is populated on the field density sample.

### *2. Proctor Test is Designated as Not Performed*

If the lab is not able to complete the proctor test and mark the proctor sample as Test Not Performed, the field density sample(s) using that proctor sample will not have a Maximum Density value to import. The density sample(s) will need to have the proctor sample selected replaced on the Sample screen with the new proctor sample that has the proctor test performed.

### *3. Proctor Sample is tested, not Submitted to FDOT*

Until the proctor sample is Submitted to FDOT for Verification, the Maximum Density value may change if the Data Reviewer updates the proctor test before submitting to FDOT for Verification. This also may happen later in the sample life cycle; for example, the PA returns the proctor sample to the company of the lab for test corrections. On field density samples, MAC will replace the Maximum Density value and recalculate the % Maximum Density. If the recalculation results in a failure, the field density test disposition will be designated as **Fail***.

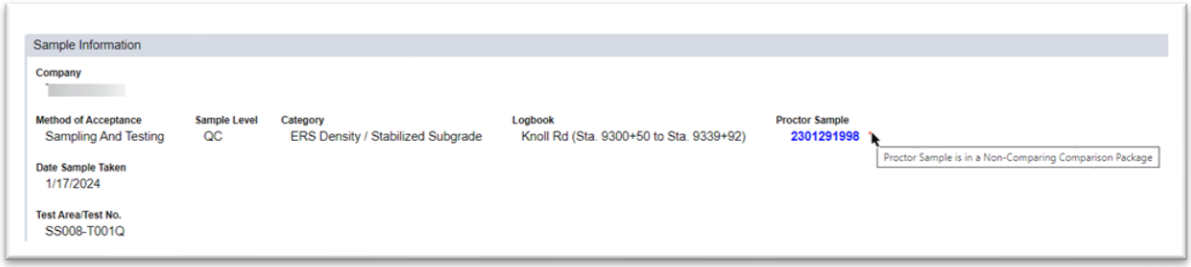
### *4. Proctor Type Impact on the Material Placed Condition Field*

When the proctor type cannot be derived from the proctor sample on the field density test, the dropdown options for the "Material placed condition?" field will not populate correctly.

### *5. Proctor Sample is not in a Comparison Package or Does Not Compare*

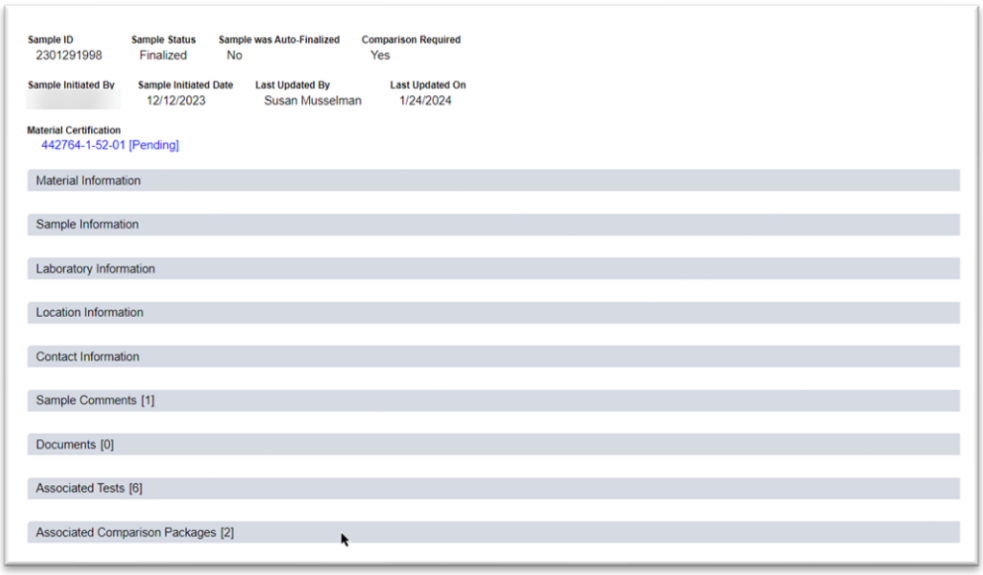
If the proctor sample comparison package hasn't been created and comparison performed, the comparison status is unknown. If it has been created and the comparison status is Does Not Compare, resolution must be performed to indicate if the QC proctor Maximum Density value can be used. If resolution is performed and QC is not upheld, all field density samples using the QC proctor sample must have the QC proctor sample replaced with the VT proctor sample. This must be done by a Data Reviewer of the companies on the Sample screen for any samples impacted, not just QC samples.

Any ERS field density sample with a proctor sample in a comparison package that Does Not Compare will have this flag.



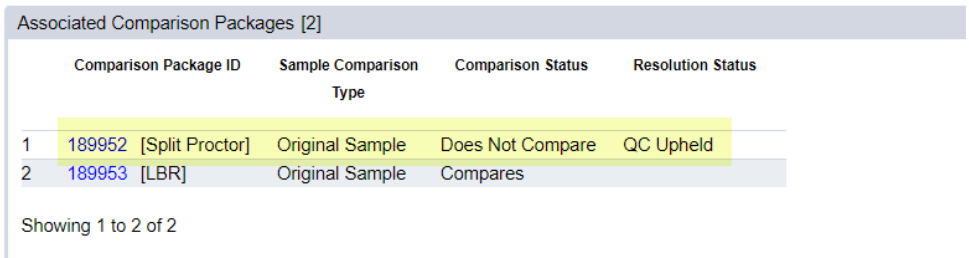

This is not a finding by itself. It is intended to indicate there may be further action needed based on the resolution results. The flag triggers Data Reviewers and the PA to see if any samples need to be changed because the proctor sample resolution status indicates QC results should not be used.

1. Click on the proctor sample MAC Sample Id hotlink to be navigated to the proctor sample screen.




2. Click on the Associated Comparison Packages tab to expand it.

Some soils samples can be included in more than one comparison package.




3. Review the comparison package designated with the Proctor comparison. Pay attention to the Resolution status.

a. If resolution is not yet performed, you will not be able to decide if additional steps are needed.
b. If resolution is performed, there are 2 possible outcomes.
i. **QC Upheld** – no action needed. The QC proctor sample can remain on any ERS field density sample.
ii. **Use VT Results for Acceptance** – action must be taken on **all** ERS field density samples using the proctor sample

- The PA must return any finalized samples for sample and test corrections
- The appropriate Data Reviewers must replace the QC proctor sample id with the VT proctor sample id
- MAC will recalculate the % compaction
    - This may result in a previously failing test now passing and vice versa
    - The PA will create an MC Review manual finding for the failing test results so that the resolution can be documented

**NOTE**: The ERS – Density report highlights when

- The proctor sample selected has a sample level that is not QC or VT
- The proctor sample does not have a proctor test on it
    - This does not occur on new samples but can appear on existing samples
- The proctor sample is not finalized
- The proctor sample comparison package has a comparison status of Does Not Compare and Resolution is Missing
- The proctor sample level is QC on a ERS density sample where the proctor sample comparison package has a comparison status of Does Not Compare and the Original Comparisons Status = Does Not Compare
    - This is an indication that the proctor sample on the ERS sample should be VT
- The proctor sample level is VT on a ERS density sample where the proctor sample comparison package has a comparison status of Does Not Compare and the Original Comparisons Status = Compares
    - This is an indication that the proctor sample on the ERS sample should be QC

## Chapter 6 – Updating Samples Returned by the PA – Data Reviewer Each Company

The role that finalizes ERS samples and create comparison packages is the system role of Project Administrator (PA). If a PA review of the data determines corrections are needed, you must have the company role of Data Reviewer to update the data and return the sample to the FDOT. PAs, see the PA ERS Manual for instructions on ERS sample review and finalization or returning samples for corrections.

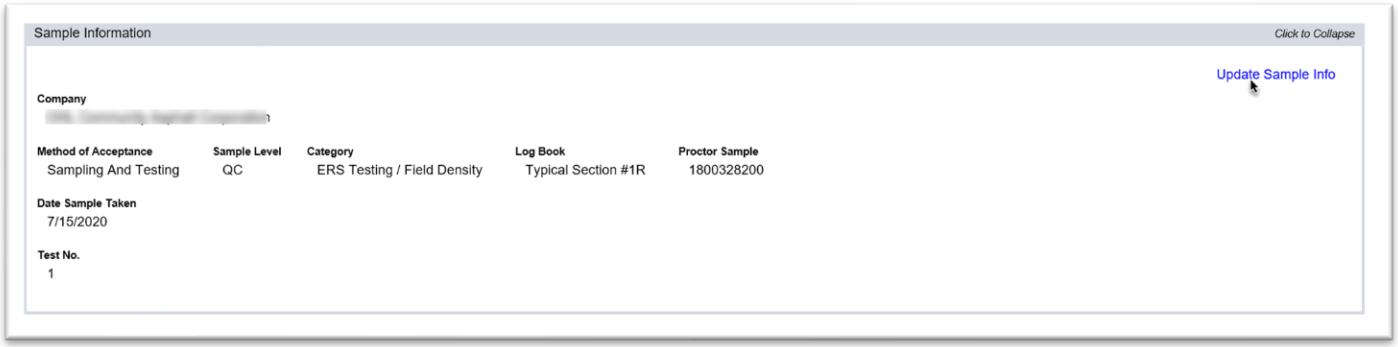
### A. Correcting the Sample Data and Returning the Sample to FDOT

If the sample has been returned by the PA for sample data corrections, the Sample Information and Location Information tabs are opened to Data Reviewers in the company of the sample. None of the test information can be corrected.

To correct the sample header information:

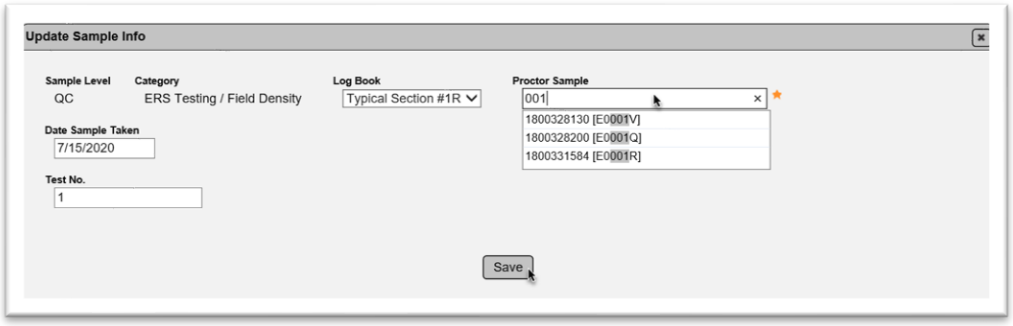
1. Navigate to the sample screen from the ERS project.

2. Click on the Sample Comments tab to expand it. The reason the PA returned the sample displays here. Make note of the corrections needed.




3. Click on the Sample Information tab to expand it.
4. Select the Update Sample Info option.

An Update Sample Info dialog box will appear.




5. Make the requested changes.
6. Select the Save option.

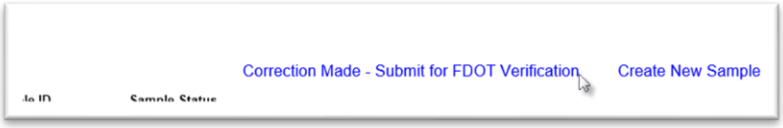
7. If the error is in the location information, click on the Location Information tab to expand it.

8. Select the Update Location Info option.

An Update Location Info dialog box appears.

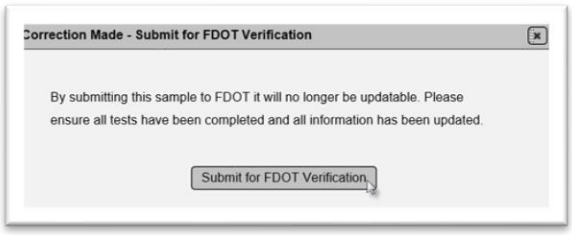
9. Make changes to the data as needed. For example, if the sample is plotted in the wrong lift, you may need to update the Elevation field to replot the sample in the correct lift.
10. Select the Save option.

The sample is still in the custody of the Data Reviewer's company. To return the sample to pending finalization for the PA to review:




11. Select the Correction Made – Submit for FDOT Verification option.

A Correction Made – Submit for FDOT Verification dialog box will appear.



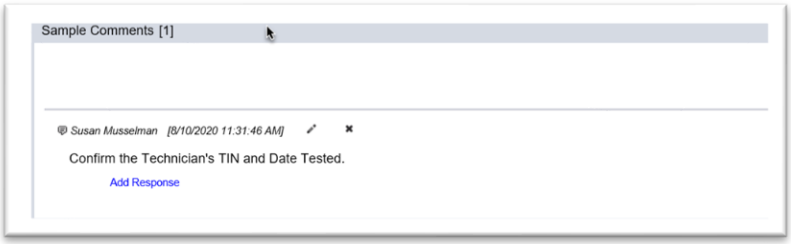

12. Select the Submit for FDOT Verification option.

**NOTE**: If the PA returns the Sample for an update to the Proctor Sample field (i.e., the wrong proctor sample was selected or the QC Proctor sample needs to be replaced with the VT Proctor sample) and the PA sent the sample back for Sample Data Corrections only – ***DO NOT*** update the proctor sample. Select the Correction Made – Submit for FDOT Verification option ***without*** updating the proctor sample. That will put the sample back in Pending Finalization status. Ask the PA to return the sample, but this time select the Return for Sample and Test Data Corrections option. You don't need to update anything on the test screen, but MAC does and will not be allowed to if this option is not selected. This results in the test being stuck in "In Progress" status with no ability to update it.

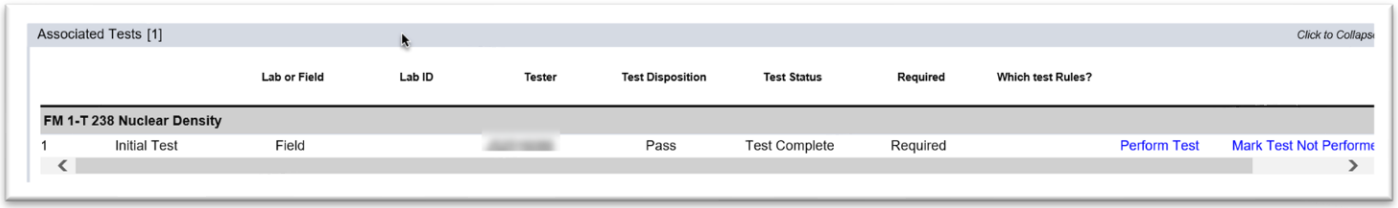
### B. Correcting the Test Results and Returning the Sample to FDOT

If the sample has been returned by the PA for test corrections, the associated tests are opened to data reviewers in the company laboratory that tested the sample. None of the sample information can be corrected.

To correct the test information:

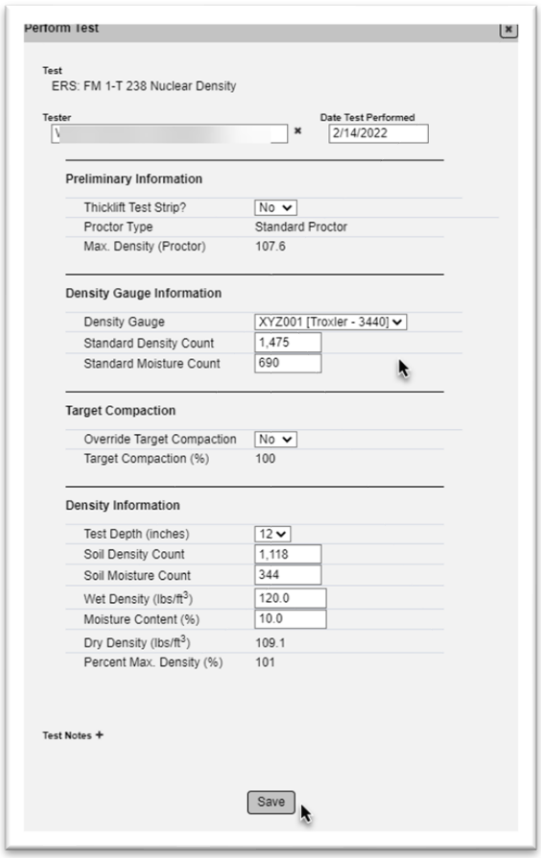



1. On the sample screen of the returned sample, click on the Sample Comments tab to expand it. The reason the PA returned the sample displays here. Make note of the corrections needed.



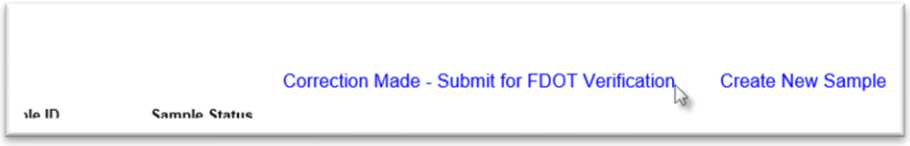

2. Click on the Associated Tests tab to expand it.
3. Select the Perform Test option.

A Perform Test dialog box will appear.



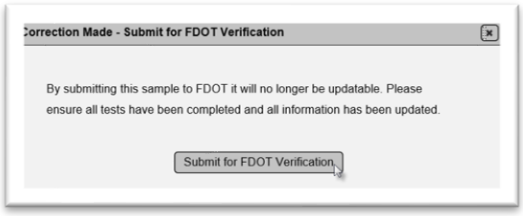

4. Make the necessary changes.
5. Select Save to save the changes.

The sample is still in the custody of the Data Reviewer's company. To return the sample to pending finalization for the PA to review:




6. Select the Correction Made – Submit for FDOT Verification option.

A Correction Made – Submit for FDOT Verification dialog box will appear.




7. Select the Submit for FDOT Verification option.

### C. Correcting the Sample and Test Data and Returning the Sample to FDOT

A Data Reviewer can complete both sections and submit the sample to FDOT when the corrections are made by following the instructions in A. Correcting the Sample Data and Returning the Sample to FDOT and B. Correcting the Test Results and Returning the Sample to FDOT.

## Chapter 7 – Marking Samples for Rework – QC Data Entry

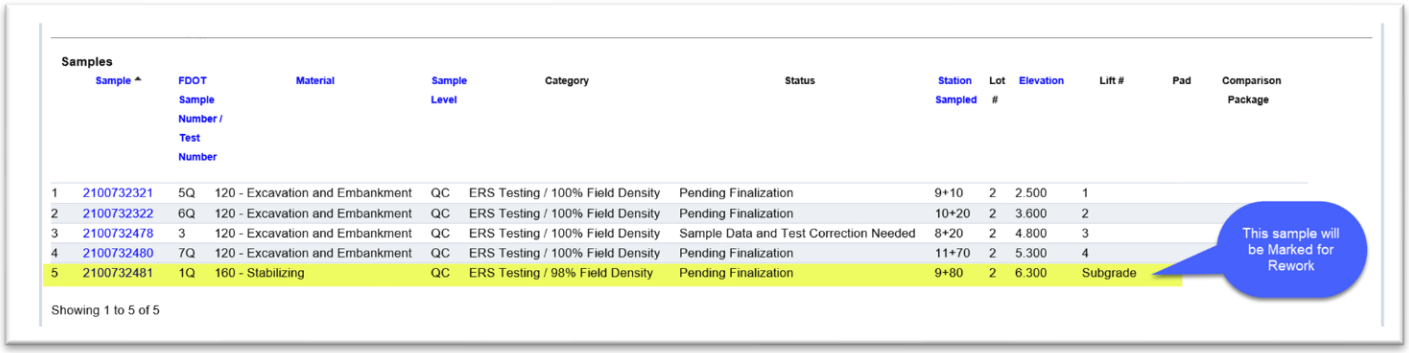
There are times when an area that has been tested needs to be removed, reworked and recompacted. In these instances, any samples that were created and represent the material before the dig down operation must be designated as an area that is being reworked. New samples must be created to represent the acceptability of the reworked material.

Marking Samples for Rework:

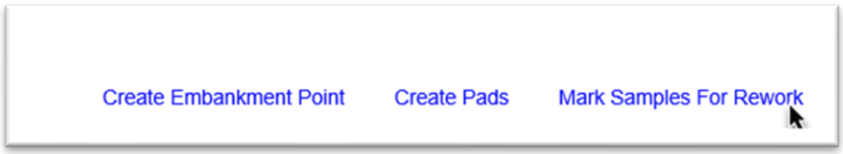
- Removes them from the Logbook Sample List
- Removes them from the ERS Plots
- Does **not** remove the sample from MAC
  - They can still be reached by searching for samples with the sample status of Marked for Rework on the Sample Search subscreen

### A. Marking Samples for Rework – ESB

In situations where new samples must be taken and there are existing sample, you will need to mark the existing sample for rework. For example, in this lot, the embankment and subgrade have been tested by QC and the material is being replaced due to a washout.

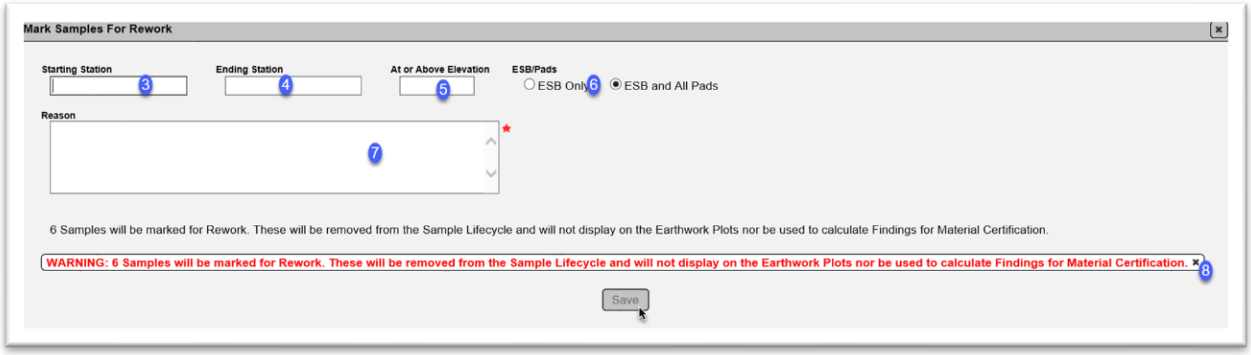


1. On the appropriate logbook, use filtering options, if needed, to display the appropriate location.




2. Select the Mark Samples For Rework option.

A Mark Samples for Rework dialog box appears. Because a dig down operation does not always impact the entire thickness of the construction and because it can happen before some parts of the construction (for example, the base layer) have been placed, the dialog box allows for many situations. You need to indicate what samples that have already been taken are impacted by the dig down operation and need to be removed so the area can be retested.



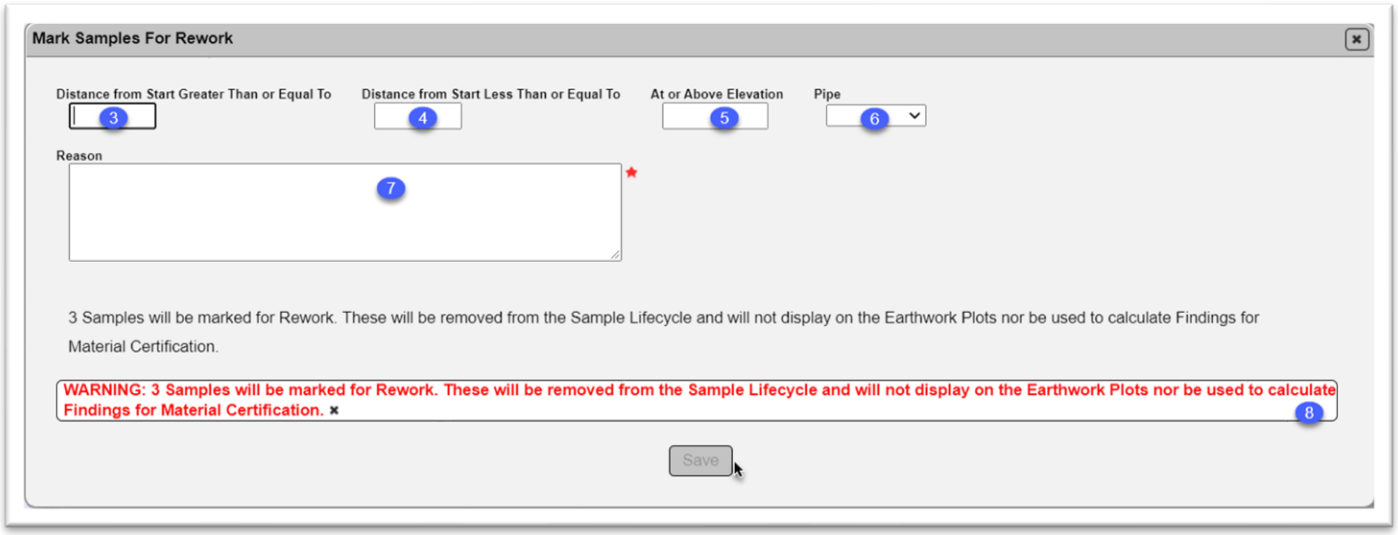

3. **Starting Station** – enter the starting station of the area that was removed.
4 **Ending Station** – enter the ending station of the area that was removed.
5. **At or Above Elevation** – enter the bottom elevation of the area removed.
6. **ESB Only or ESB and All Pads** – designate if the area removed went through the pads (ESB and All Pads or just the ESB. The default is ESB only which in most cases should be correct.
7. **Reason** – enter a reason for the removal; for example, a washout.
8. Confirm the number of samples is correct. If it is, dismiss the warning notice. If not, close the dialog box and reenter the data.
9. Once the warning is dismissed, the Save option will not be greyed out. Select the Save option to mark the sample(s) for Rework.

## B. Marking Samples for Rework – Drainage

1. On the Drainage logbook, use filtering options, if needed, to display the appropriate location.

2. Select the Mark Samples For Rework option.

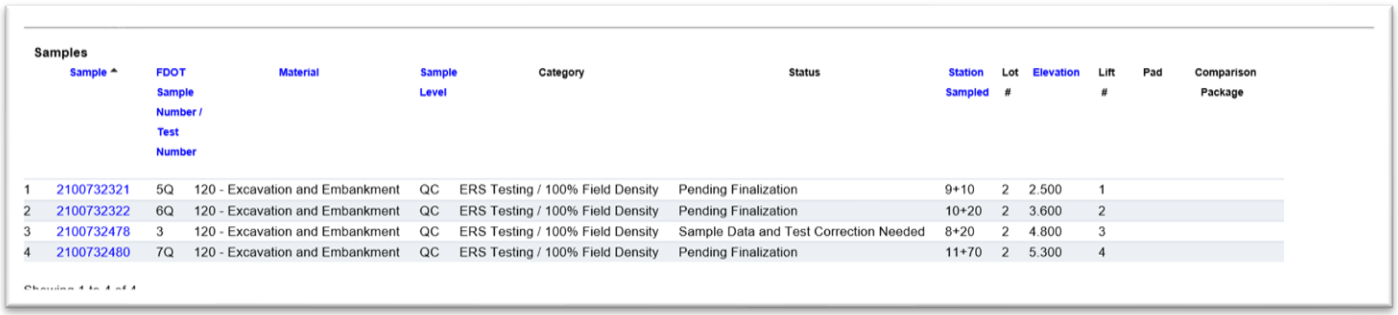
A Mark Samples for Rework dialog box appears.



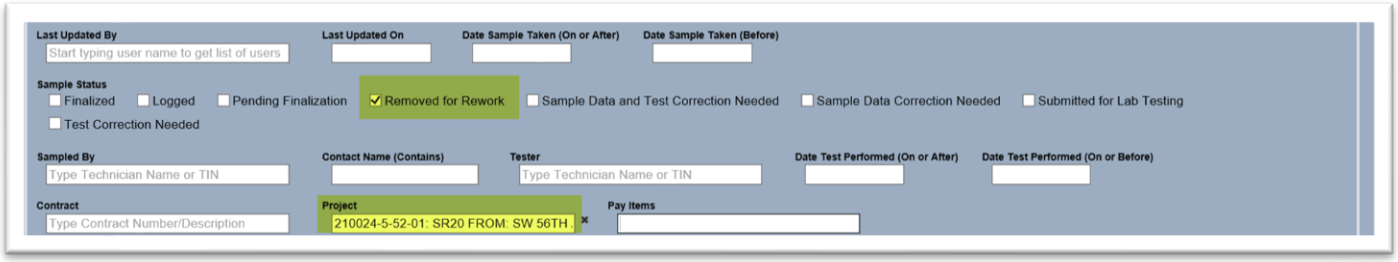

3. **Distance from Start Greater Than or Equal To** – enter the starting distance from the beginning of the pipe run that was removed.
4 **Distance from Start Less Than or Equal To** – enter the ending distance from the beginning of the pipe run that was removed.
5. **At or Above Elevation** – enter the bottom elevation of the area removed.
6. **Pipe** – designate the pipe run.
7. **Reason** – enter a reason for the removal; for example, a washout.
8. Confirm the number of samples is correct. If it is, dismiss the warning notice. If not, close the dialog box and reenter the data.
9. Once the warning is dismissed, the Save option will not be greyed out. Select the Save option to mark the sample(s) for Rework.

## C. Finding Samples Marked for Rework

The sample(s) marked for rework are removed from the ERS logbook sample list.

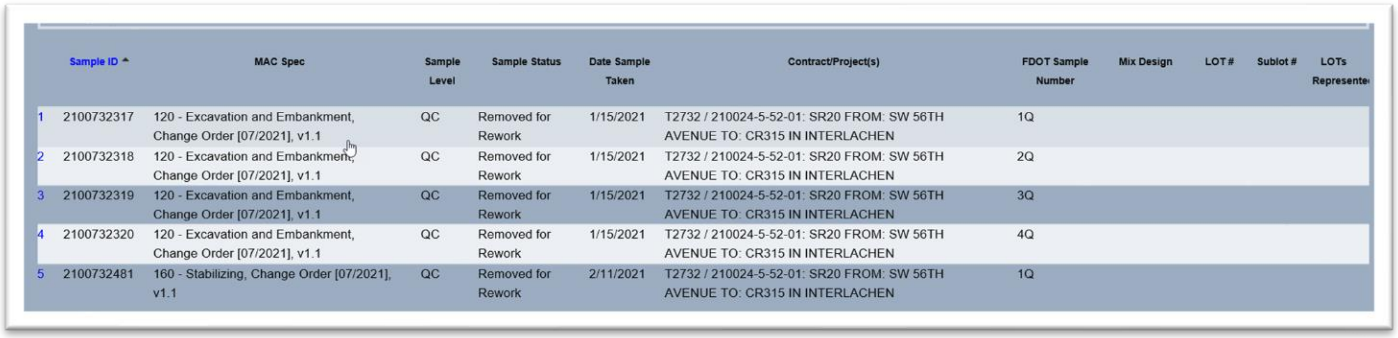


They are not removed from MAC and can be found by using the Sample Search subscreen with filters including Sample Status of Removed for Rework.




1. Enter the Financial Project Id of the ERS Project.
2. Select the Sample Status of Removed for Rework.
3. Select the Search option.

The samples marked for rework are displayed on the bottom of the Sample Search subscreen.



| | Sample ID | MAC Spec | Sample Level | Sample Status | Date Sample Taken | Contract/Project(s) | FDOT Sample Number | Mix Design | LOT # | Sublot # | LOTs Represente |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2100732317 | 120 - Excavation and Embankment, Change Order [07/2021], v1.1 | QC | Removed for Rework | 1/15/2021 | T2732 / 210024-5-52-01: SR20 FROM: SW 56TH AVENUE TO: CR315 IN INTERLACHEN | 1Q | | | | |
| 2 | 2100732318 | 120 - Excavation and Embankment, Change Order [07/2021], v1.1 | QC | Removed for Rework | 1/15/2021 | T2732 / 210024-5-52-01: SR20 FROM: SW 56TH AVENUE TO: CR315 IN INTERLACHEN | 2Q | | | | |
| 3 | 2100732319 | 120 - Excavation and Embankment, Change Order [07/2021], v1.1 | QC | Removed for Rework | 1/15/2021 | T2732 / 210024-5-52-01: SR20 FROM: SW 56TH AVENUE TO: CR315 IN INTERLACHEN | 3Q | | | | |
| 4 | 2100732320 | 120 - Excavation and Embankment, Change Order [07/2021], v1.1 | QC | Removed for Rework | 1/15/2021 | T2732 / 210024-5-52-01: SR20 FROM: SW 56TH AVENUE TO: CR315 IN INTERLACHEN | 4Q | | | | |
| 5 | 2100732481 | 160 - Stabilizing, Change Order [07/2021], v1.1 | QC | Removed for Rework | 2/11/2021 | T2732 / 210024-5-52-01: SR20 FROM: SW 56TH AVENUE TO: CR315 IN INTERLACHEN | 1Q | | | | |

4. Click on the row of any sample to be navigated to that sample's Sample screen.

## Chapter 8 – Remote Contracts and MAC Outages

ERS is designed for direct data entry. There will be times when direct data entry cannot be achieved. This chapter describes how to process the data in MAC for those situations.

### A. Remote Contracts

A remote contract is defined as a contract where one or more of the projects either has no access to the internet or the access is unreliable enough to warrant it not being accessible. If a Contractor thinks the project is eligible to be a remote contract, they should notify the PA who will coordinate with the appropriate DMRE. The DMRE approves or rejects remote contract requests.

If the project is approved as a remote contract, QC data entry must still create plots in MAC on an ERS Project. The sample and test data are required to be recorded on FDOT Quality Control Earthwork Records System ***(Form No. 675-020-27)*** and Verification Earthwork Records System ***(Form No. 675-020-28)*** forms. Each of these form packages has pages for MAC ERS field density, stabilizing mixing depth and base thickness. The fields on the form are designed to match the sample and test data entry forms in MAC. **DO NOT** write the test results on non-approved forms/loose paper and enter into MAC later. Technicians doing so risk being evaluated under the Independent Assurance Program and receiving a strike for improperly documenting test results and not following ***Specification*** requirements. It is understood that there will be construction operations where the technician will not want to subject the device used to record the data to certain risks, such as a trench operation. The nuclear gauge records raw data that can be entered into MAC as soon as the technician is in a safe area.

Each day, QC and VT turn in their forms to a data entry person who has access to MAC and the appropriate company roles. The data must be entered into MAC on the appropriate ERS logbook within 24 hours per ***Specifications Section 105***.

### B. MAC Outages on Contracts that are not Remote

As with any application, there will be occasional outages where MAC is not available. During these times, it would be unavailable to all users, not just MAC ERS. When this occurs, users on ERS projects will use the same forms as remote contracts, to record the data and provide the complete forms to a MAC user with access to enter the data. In this case, the data must be entered within 24 hours of MAC becoming available. ERS users should keep a supply of the blank forms with them on projects in anticipation of any system outage.

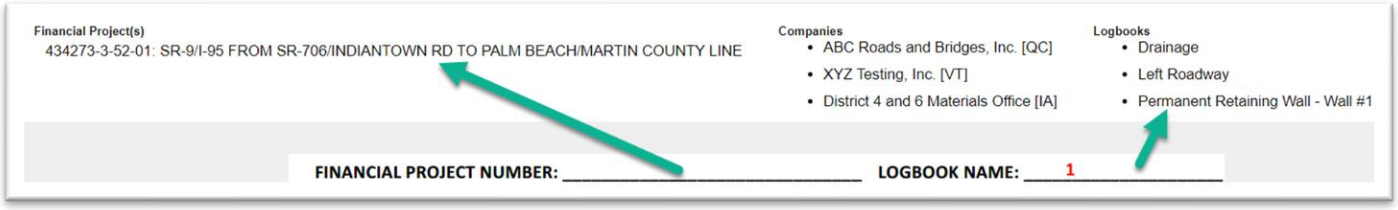
### C. Using Filled out Forms for Data Entry

The forms are designed to coincide with the data entry in MAC. As such, like samples can be grouped on the same page; for example, MAC Material 120 – Excavation and Embankment. Do not record samples with different identifying information on the same page. For example, MAC Spec 548 has multiple categories and types. Samples in comparison packages must be under the same category/type. So when documenting 548 samples, do not mix samples under different category/types on the same form.

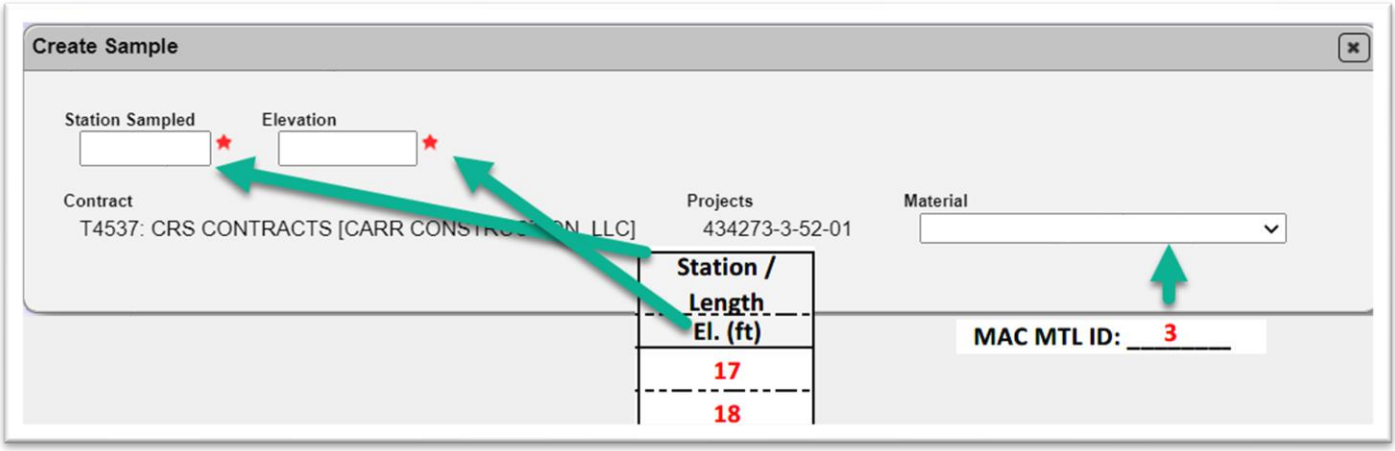
The instructions for filling out the forms are included in the form package. The following fields in MAC align with the fields on the form.

### *1. MAC Spec 120 – Excavation and Embankment ESB*

The Financial Project Number and Logbook name are needed to be in the correct ERS project and logbook to create the sample.

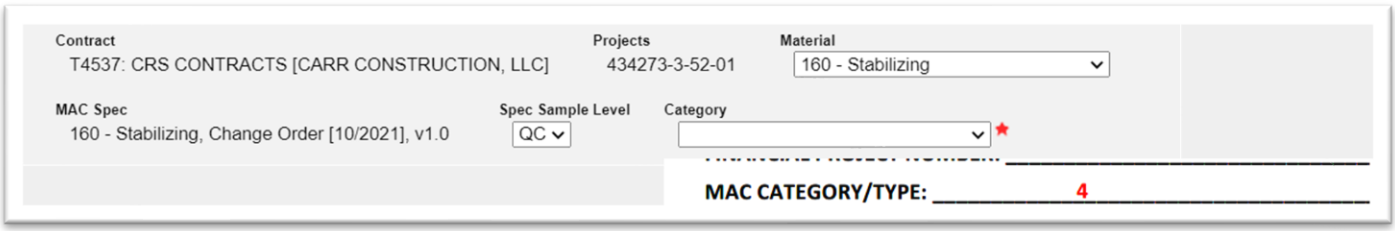



The station and elevation for ESB samples can be found in form fields 17 & 18.

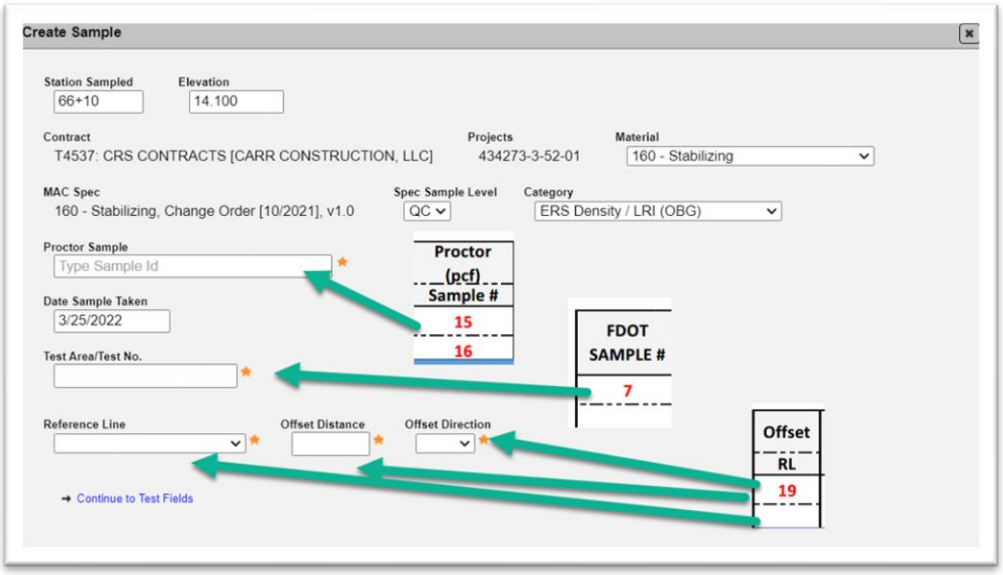



Sample Level can be derived from the form – QC form or VT form.

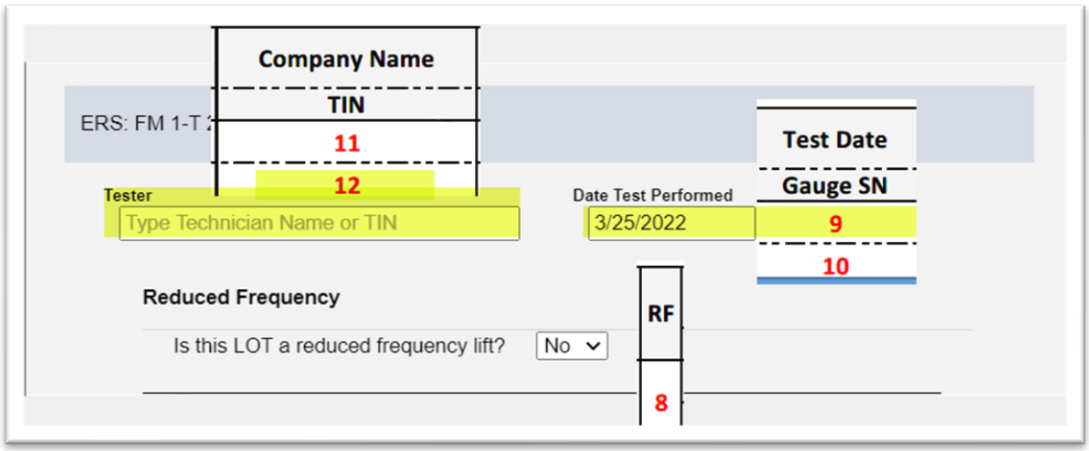
Category/Type is recorded in form field #4.



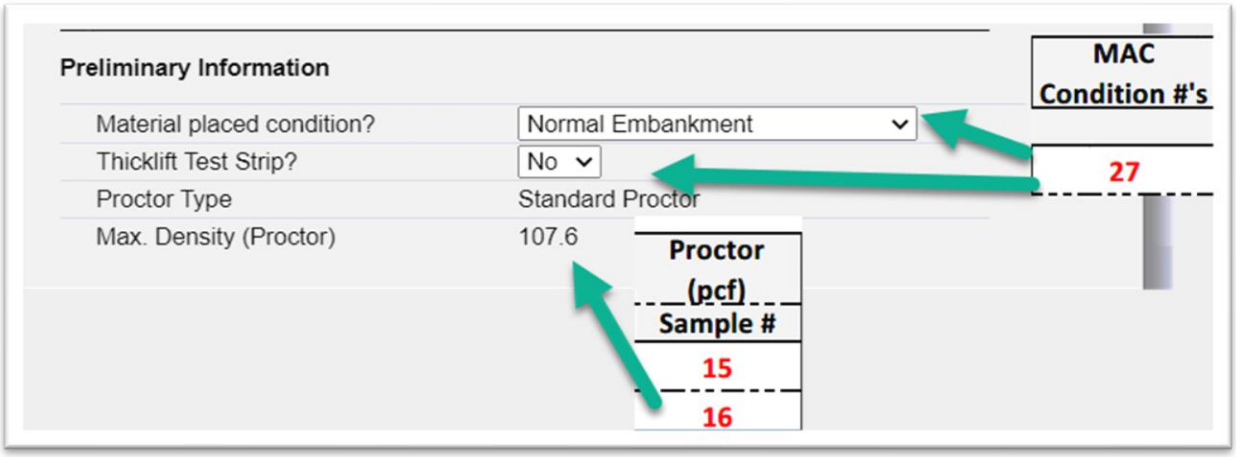
The Proctor Sample Number or MAC Sample Id is recorded in form field 15. The Test Area/Test No. value is in form field #7. The location information for offset distance and direction is in the top half of field #19; for example 17' L. The reference line is in the bottom half of form field #19.



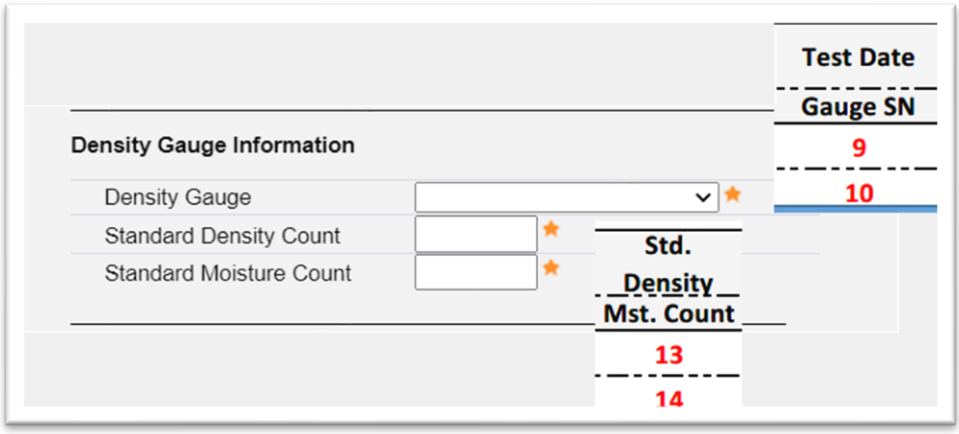

The initial information for a 120 – Excavation and Embankment sample can be found in the following fields:
Tester = 12
Date Test Performed = 9
QC Sample only Reduced Frequency = 8



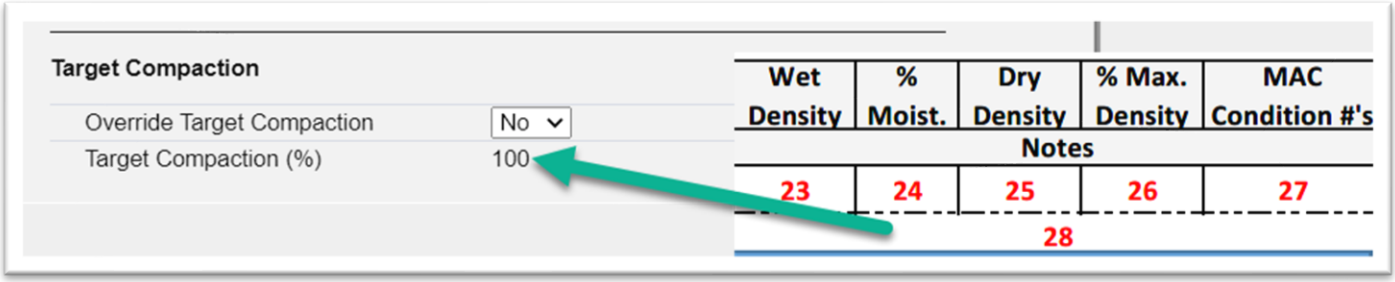
The Material placement condition and thicklift test strip will be indicated in field 27. MAC derives a value for the Maximum Density (Proctor). Ensure the value recorded by the technician in form field #16 matches.



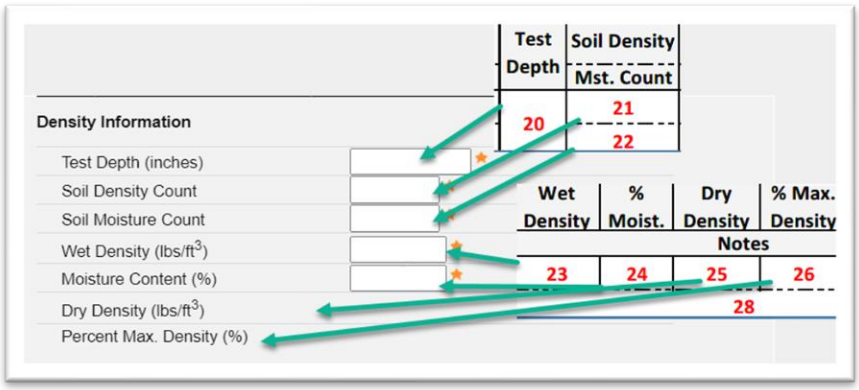

The gauge and standard counts can be found in these fields.
Gauge Serial Number = 10
Standard Density Count = 13
Standard Moisture Count = 14




If the target compaction needs to be overridden, the value should be recorded in field form 28. If there is a value in this field that differs from the target compaction, change the default to yes and enter the value in the Overridden Target Compaction Field. Also field # 27 should be indicated with a “9” to designate that it is a situation where the target compaction should be overridden.



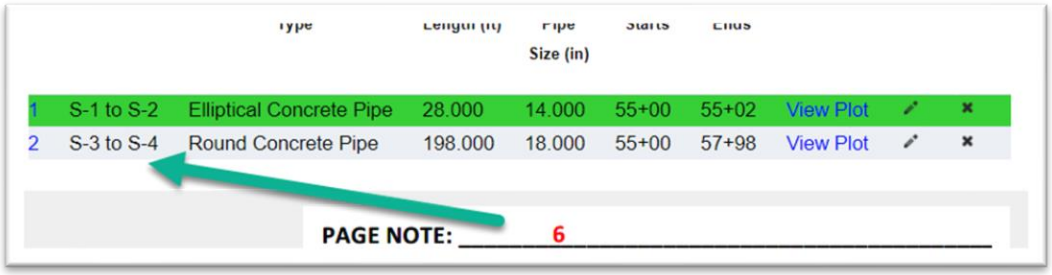
The test result data is entered in the following fields:
Test Depth = 20
Soil Density Count = 21
Soil Moisture Count = 22
Wet Density = 23
Moisture Content (%) = 24
Dry Density = 25
% Maximum Density = 26
MAC calculates the Dry Density and % Maximum Density. Ensure the values calculated by MAC match the values calculated by the technician in the field. The technician needs to calculate these values to determine if the test is passing.



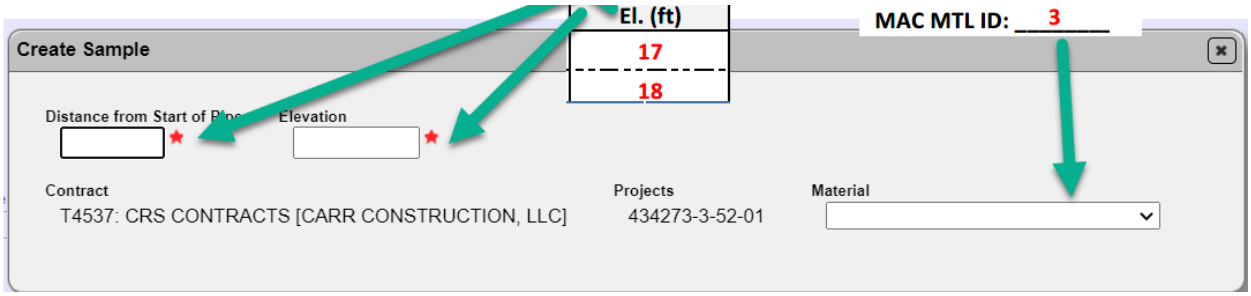

### *2. 120 – Pipe run*

The fields for a pipe run sample and an ESB sample are the same except for the following:

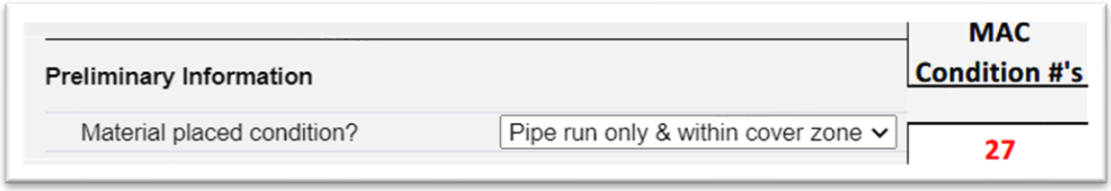
For pipe run samples, you will need to know the pipe run. This is included as a Page Note.




On the sample, the distance from start of pipe and elevation for drainage samples can be found in form fields 17 & 18.

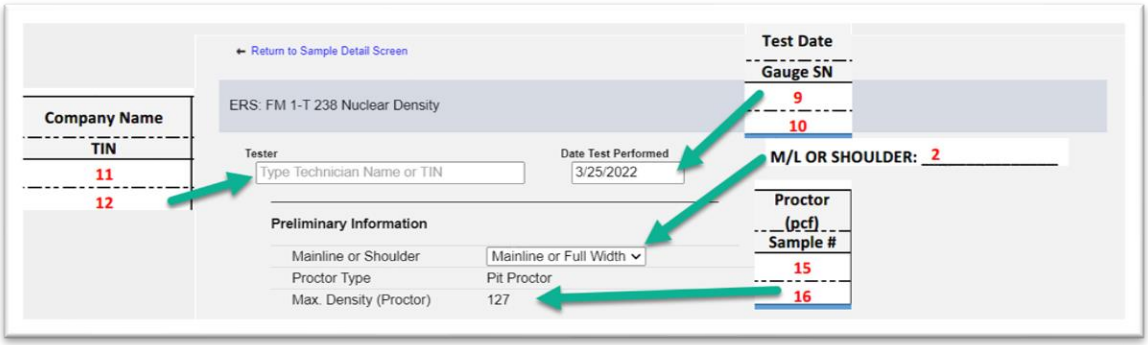


The Material placement condition field may be designated as pipe run only and within the cover zone. If this applies, it should be denoted in form field 27.



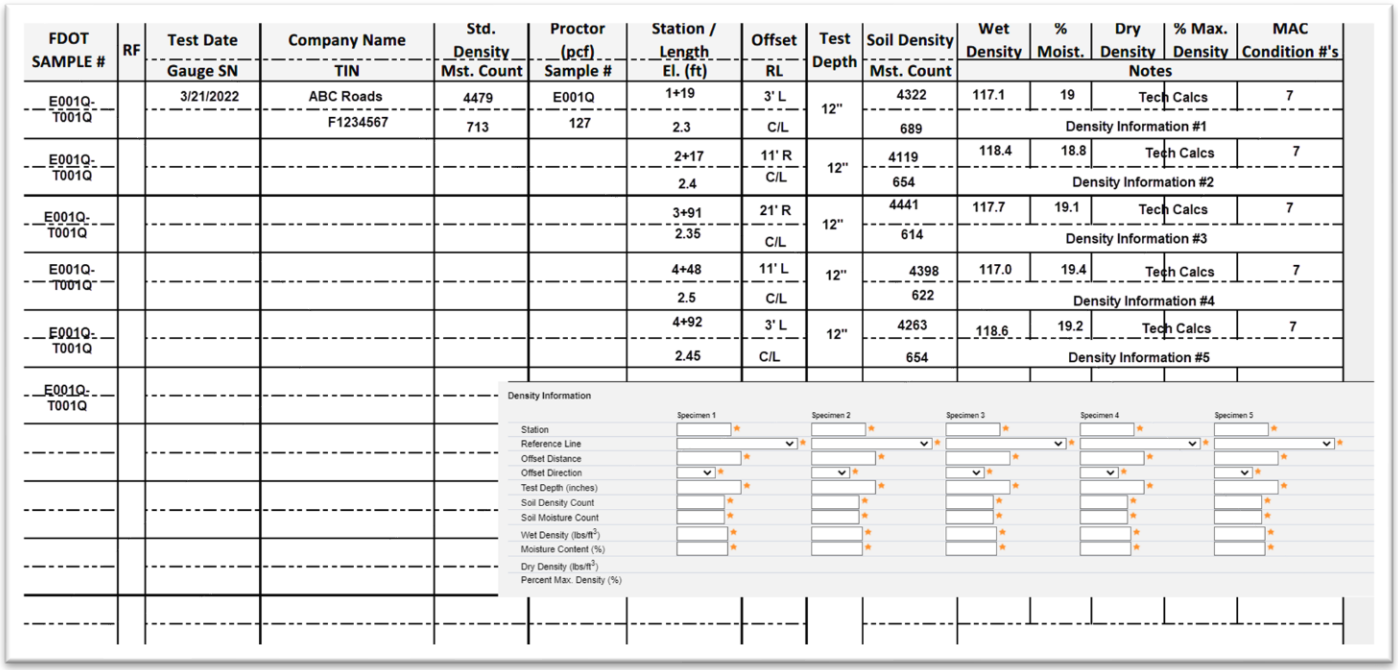

### *3. 160 – Stabilizing & 200 – Rock Base*

The following field applies:
Mainline or Shoulder = 2




### *4. Thicklift entries*

When a sample is for thicklift approval, it should be designated as one of the conditions in form field 27. There should be 5 rows with the same FDOT sample number.



| FDOT SAMPLE # | RF | Test Date / Gauge SN | Company Name / TIN | Std. Density / Mst. Count | Proctor (pcf) / Sample # | Station / Length / El. (ft) | Offset / RL | Test Depth | Soil Density / Mst. Count | Wet Density | % Moist. | Dry Density | % Max. Density | MAC Condition #'s / Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E001Q-T001Q | | 3/21/2022 | ABC Roads | 4479 | E001Q | 1+19 | 3' L | 12" | 4322 | 117.1 | 19 | Tech Calcs | | 7 |
| | | | F1234567 | 713 | 127 | 2.3 | C/L | | 689 | Density Information #1 | | | | |
| E001Q-T001Q | | | | | | 2+17 | 11' R | 12" | 4119 | 118.4 | 18.8 | Tech Calcs | | 7 |
| | | | | | | 2.4 | C/L | | 654 | Density Information #2 | | | | |
| E001Q-T001Q | | | | | | 3+91 | 21' R | 12" | 4441 | 117.7 | 19.1 | Tech Calcs | | 7 |
| | | | | | | 2.35 | C/L | | 614 | Density Information #3 | | | | |
| E001Q-T001Q | | | | | | 4+48 | 11' L | 12" | 4398 | 117.0 | 19.4 | Tech Calcs | | 7 |
| | | | | | | 2.5 | C/L | | 622 | Density Information #4 | | | | |
| E001Q-T001Q | | | | | | 4+92 | 3' L | 12" | 4263 | 118.6 | 19.2 | Tech Calcs | | 7 |
| | | | | | | 2.45 | C/L | | 654 | Density Information #5 | | | | |
| E001Q-T001Q | | | | | | | | | | | | | | |

Density Information

| | Specimen 1 | Specimen 2 | Specimen 3 | Specimen 4 | Specimen 5 |
|---|---|---|---|---|---|
| Station | | | | | |
| Reference Line | | | | | |
| Offset Distance | | | | | |
| Offset Direction | | | | | |
| Test Depth (inches) | | | | | |
| Soil Density Count | | | | | |
| Soil Moisture Count | | | | | |
| Wet Density (lbs/ft³) | | | | | |
| Moisture Content (%) | | | | | |
| Dry Density (lbs/ft³) | | | | | |
| Percent Max. Density (%) | | | | | |

## D. Storage of Completed Forms

The data recorded on a remote contract or during MAC outages is considered a site source record and must be maintained accordingly. For both situations, when data entry completes the data entry, they then upload the forms under the Documents tab on the ERS project. They should not be uploaded to each sample since the form can contain multiple samples. The form would have to be duplicated for each sample on the form. This is not necessary.

## Chapter 9 – ERS Sample Notifications

There are a few notifications for samples that are helpful for ERS samples are listed below. For basic instructions on notifications, see MAC Notifications and Basic Instructions. 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.

- QC Sample Needs Witnessed By VT entered – VT company Data Reviewers should Opt In and enter project numbers as filters
- QC Sample has Witnessed By TIN entered – QC company Data Reviewers should Opt In and enter project numbers as filter

These notifications are already part of MAC and apply to all samples. On these notifications, Data Reviewers are set as Can Opt Out, which means they will receive the notifications for all company samples unless they Opt In and apply filters (such as FPN) or Opt Out. Instructions for Data Reviewers can be found here MAC Notifications - Company Roles - Data Reviewers

- Sample Returned for Sample Data Corrections
- Sample Returned for Test Corrections
- Sample Returned for Sample Data and Test Corrections

This notification is meant for the PA when the QC Data Reviewer has made the revisions, resubmitted the sample to FDOT for Verification and it is now in Pending Finalization status again.

- Sample Corrections made and Resubmitted – PAs should Opt In and enter project numbers as a filter

This notification is already in MAC, but has value for Data Reviewers and PAs for ERS samples with failing results

- Sample has failed test(s) (Sample has failed tests notification)

ERS PMUs wishing to receive any ERS related notifications should filter on Managing District. This is the managing district of the project.

## Chapter 10 – ERS Sample Life Cycle

The ERS sample life cycle is abbreviated from the normal lab sample life cycle. It is also abbreviated from other field sample life cycles. This is because of the volume of ERS samples anticipated to be generated. It is intended to save time processing the number of samples required for Earthwork acceptance.

The normal project sample life cycle stages are as follows:

| Action | User | Sample Status | Open/Closed? | Comments |
|---|---|---|---|---|
| Create sample, but do not submit it | Data Entry | Logged | Open | This step is not required and only done if the user is not sure the sample is ready to be submitted |
| Create sample and submit for lab testing | Data Entry | Submitted for Lab Testing | Open | Status applies to all samples, both lab and field |
| Enter test results | Data Entry | Submitted for Lab Testing | Open | |
| Review sample and submit to FDOT | Data Reviewer | Pending Finalization | Open | |
| Review sample and finalize | Project Administrator | Finalized | ERS Density = Open<br>Stabilizing Mixing Depth, Base Thickness = Closed | |
| Create ERS Density Comparison Packages | Project Administrator | Compares | Closed for all samples | |
| | | Does Not Compare | Open for all samples until QR is added or Marked Resolution Not Performed | |
| | | Incomplete Package | Closed for all samples | |

The ERS sample life is as follows:

| Action | User | Sample Status | Open/Closed | Comments |
|---|---|---|---|---|
| Create sample, but do not submit it | Data Entry | Logged | Open | This step is done by deselecting the Submit Sample if Possible indicator |
| Create sample and submit for lab testing, enter test results, review sample, and submit to FDOT | Data Entry | Pending Finalization | Open | All 3 steps occur at once and a Data Entry user can submit the sample to FDOT |
| Review sample and finalize | Project Administrator | Finalized | ERS Density = Open Stabilizing Mixing Depth, Base Thickness = Closed | |
| Create ERS Density Comparison Packages | Project Administrator | Compares | Closed for all samples | |
| | | Does Not Compare | Open for all samples until QR is added or Marked Resolution Not Performed | |
| | | Incomplete Package | Closed for all samples | |

If samples are required to be in a comparison package, they will also have a comparison status. The comparison life cycle is the same for all samples.

| Action | User | Comparison Status | Comments |
|---|---|---|---|
| Create comparison and run comparison – package compares | Project Administrator | Compares | |
| Create incomplete package – comparison cannot be performed | | Incomplete Package | Incomplete package reason is assigned |
| Create comparison and run comparison – package does not compare | | Does Not Compares | Resolution must be performed in most cases |
| Run Resolution | | Does Not Compare | Resolution status is assigned |
| Mark Resolution not Performed | | Does Not Compare | Resolution not performed reason is assigned |

## Chapter 11 – ERS Reports

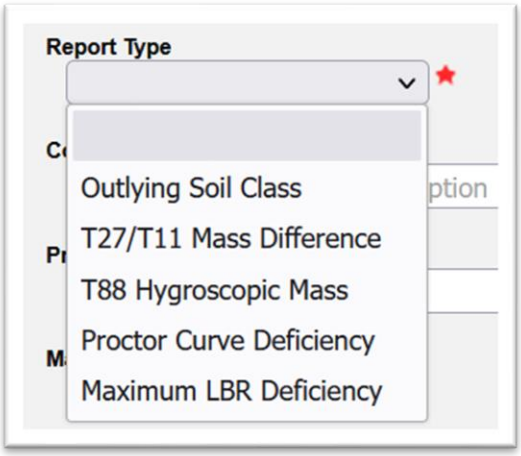
Many of the ERS reports have a dual purpose. One is for the project personnel to monitor sample status and health. The other is for ERS PMUs to find issues with ERS data before it becomes a finding. Here are the reports in MAC that can be used for project sample monitoring.

### A. Project Tab Reports

These reports are listed under the Project tab on the MAC Reports page. Many of these reports were created as a stop-gap measure until MC Review for ERS was implemented. They are still good for checking certain issues.

#### *1. Earthwork Non-Compliance*

This report assists with issues in the laboratory samples which can sometimes impact ERS field densities.




#### *2. Earthwork Sample Analysis*

This is a detailed report of the laboratory samples including test results, comparison results, and charts for gradation and proctor.

#### *3. Earthwork Sample and LOT #*

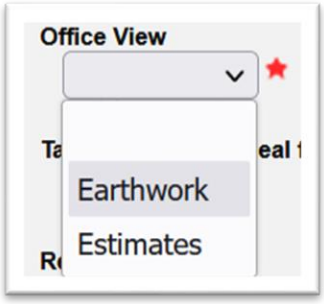
This is a sample summary report for laboratory that assists in determining if there are any missed frequencies.

#### *4. Earthwork Summary of Proctors*

This report summarizes the proctor samples for an ERS Project.

### 5. *ERS – Base Thickness*

This report summarizes the ERS base thickness samples and it has two options. Under the Office View option, it can be generated at any time for ERS PMU as a sample status report by selecting the Earthwork option. For the final version when all ERS base thickness samples are complete, the Estimates option should be selected. The report then averages the base thicknesses in accordance with Final Estimates and ***Specification*** requirements.




### 6. *ERS - Density*

This report summarizes the FM 1-T 238 or FM 1-T 310 tests for a project, logbook, date range or station range.

### 7. *ERS – Gauge Calibration/Usage*

This is a report for gauge calibration data and usage on projects for a specific company. It is designed to assist ERS PMUs in identifying all projects a gauge has been used.

### 8. *ERS – Gauge Comparison*

This report summarizes the gauge comparisons on an ERS project.

### 9. *ERS – Gauge Error*

The purpose of this report is to check on all ERS projects in a managing district for gauges with errors showing in the ERS – Density report.

### 10. *ERS – Pit Proctor Tracking*

This report summarizes all the ERS density samples on a contract or project with a pit proctor designated on the density sample.

### 11. *ERS – Stabilizing Mixing Depth*

This is a report summarizing the stabilizing mixing depth samples on an ERS project.

### *12. ERS – Unqualified Technicians*

This report identifies testing technicians being flagged as unqualified on ERS samples.

## B. Sample Tab Reports

In conjunction with the ERS and earthwork specific reports, there are other reports that can be found under the Sample Tab which might be helpful for ERS PMUs.

### *1. Open Sample Report*

This report is designed for PAs to be able to determine if project samples are still open. There is no Open status that appears on any sample screen. Chapter 10 – ERS Sample Life Cycle describes the different stages of the sample life cycle and when a sample is considered to be closed. This report is based on that logic. In addition to samples that are still being processed through the sample life cycle, some samples are open if they are required to be in a comparison package. Based on the results of the comparison, they may still be considered to be open even after they are included in a comparison package. Because MAC does not display open sample findings until the Final Review is initiated, this report is helpful in monitoring the processing of open samples during the life of the ERS project. The report has many options. It has a feature for “ERS only”.