

MODULE 2 - DOCUMENTATION

Slide 1 WELCOME

Welcome to the Florida Department of Transportation's computer-based training series on Final Estimates, Level 1 Training. This is Module 2, Documentation. You will become familiar with the various types of final estimates documentation and how they are used. We also look at detailed examples of documentation. This CBT contains audio and interactive elements. An alternate version is available on the resources page. To begin, select the start button or press Shift+N on your keyboard.

Slide 2 INTRODUCTION

Perhaps the most important part of preparing final estimates is the documentation of all measurements and computations. Careful documentation reduces errors and makes verifying computations easier. It is important when preparing these site source records to provide enough detail in the event someone who is not familiar with the project can understand what has been documented. These records may be required as evidence in any arbitration or lawsuit. Therefore, the information within them should be clear and concise.

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Final estimates site source records include, but are not limited to:

- Field Books
- Site Source Forms
- Computer Input and Output
- Final As-Built Plans
- Daily Work Report

Slide 4 KNOWLEDGE CHECK

Now let's test your knowledge about documentation.

- 1) Multiple Choice. Which of the following is not a site source record?
 - A. Final Estimates Forms
 - B. Field Book
 - C. Supplemental Agreement**
 - D. Final As-Built Plans

Slide 5 COMPUTATIONS

In order to standardize calculations and ensure uniform results, criteria has been established for precision in final quantities and the rounding of decimal numbers. This criteria is described in Chapter 2 of the Basis of Estimates (BOE) Manual and includes a listing of units of measure and the specified precision the Department requires.

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For example, unit precision is shown in the table which was derived from the Basis of Estimates manual. Tonnage contains a precision to the tenth place whereas square yard measured items will be rounded to the nearest whole number.

Abbreviation	Unit of Measure	Precision
AC	Acre	0.01
AS	Assembly*	1
CF	Cubic Foot	0.1
CY	Cubic Yard	0.1
DA	Day	1
EA	Each	1
ED	Each Day	1
GA	Gallon	1
GM	Gross Mile	0.001
HR	Hour	1
LB	Pound	1
LF	Linear Foot	1
LO	Location	1
LS	Lump Sum	1
LU	Luminaire*	1
MB	Board Measure/ Thousand Feet	0.1
MH	Man-hour**	1
MI	Mile	1
PI	Per Intersection*	1
PS	Per Set*	1
SF	Square Foot	1
SY	Square Yard	1
TN	Ton	0.1
YD	Yard	1

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Basic rules for rounding decimal numbers during manual calculations are described in the Construction Math Course. However, when using calculators or computers use the full decimal capabilities of the machines. In other words, do not round off intermediate results on multiple-entry calculations.

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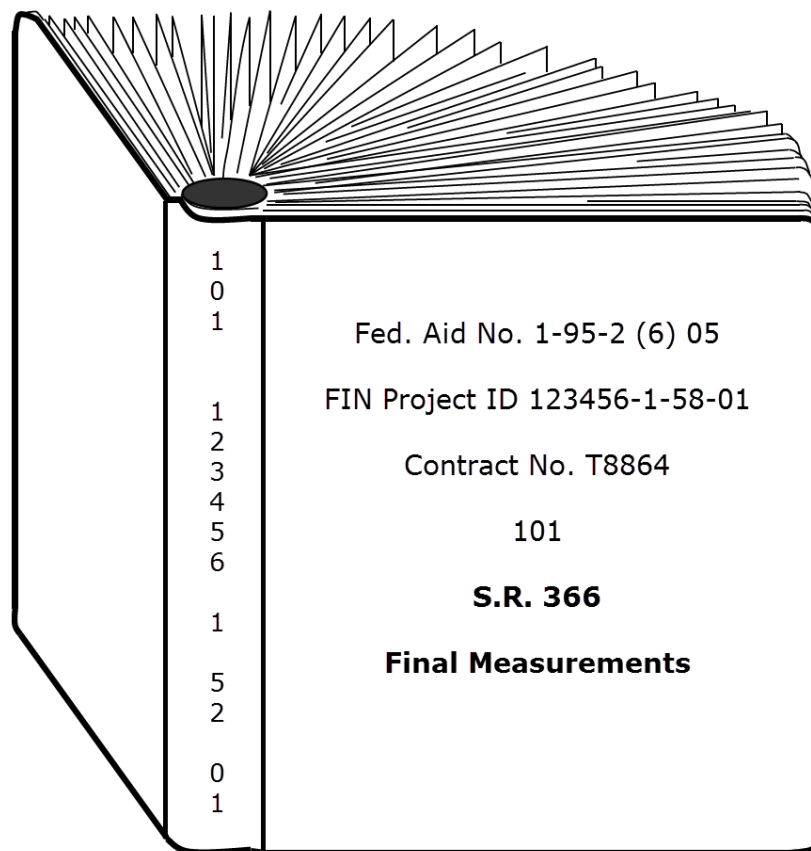
Let's test your knowledge about computations.

- 1) Multiple choice. When using calculators or computers, you should use the:
 - A. Rules of rounding described in Construction Math Course
 - B. Full decimal capabilities of the machine**
 - C. Construction Project Administration Manual as a guide to rounding
 - D. Machine only as a backup to your manual computations
 - E. None of the above

Slide 9 FIELD BOOKS

Let's discuss each of the types of final estimates source documentation.

The first type is Field Books. Field books are hard bound source documents used primarily for sketches or renderings of items in the field. However they can also be used to document field measurements and calculations for establishing pay quantities.



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The Department has implemented a paperless initiative called e-construction and is encouraging the use of automated forms, specifically utilizing Form 700-050-61, Final Measurement Miscellaneous in place of Field Books, to save money and promote electronic documentation; therefore field books are being used less.

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However should a project need a field book, these general instructions should be followed:

1. Because field books are a source document, all information should be recorded accurately and uniformly. Field books are to be scanned into Electronic Document Management System (or EDMS).

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2. Each book is assigned a permanent reference number -- "field book number". This number is displayed on the front cover and spine. The front cover of each field book shall be identified with bold letters to show the Federal Aid Project Number, Financial Project ID Number, Contract Number, Field Book Number, State Road Number and the general contents of that book. The field book number and the Financial Project ID Number shall be shown on the binding or spine of each field book.

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3. Each field book shall be clearly indexed with a complete list of the content beginning on the first lined page, which is to be numbered Page One. All the following pages that are used to record notes shall be numbered sequentially in the upper right corner of each right hand page.

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4. The date, weather conditions and the names of the field party shall be shown on the field book page at the beginning of each day's notes. Well documented field records are indispensable in the event of litigation.

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5. Never erase in any field book. Corrections shall be made by striking through the incorrect data and inserting the correct data close to it. All such corrections shall be initialed and dated by the person making the correction.

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6. Do not remove pages from any field book. If an entire page is found in error, mark the original page VOID and show a note referring to the page where that item of work was corrected. The voided sheet should be initialed and dated by the person making the correction.

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7. Field notes shall be entered directly into the field books at the time and the place the work is originally done. Keeping notes on loose-leaf or scratch pads and transferring them to the field books is prohibited.

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8. Field records shall always be legible with sufficient sketches and explanatory notes to convey the intent to a person who is not familiar with the job. Pay items numbers, original and final cross-sections and the relevant information shall be included. Good sketches are most important when recording final measurements. The details of the sketches do not need to be elaborate, but shall be sufficient to clearly show the extent of the work as well as any exceptions.

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9. Use standard symbols and abbreviations. Keep the notes simple and avoid making ambiguous statements.

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10. Show all of the pertinent measurements and observations. Use the correct precision based on the unit of measure. If there is any doubt about the need for data, record it. Review the data for accuracy and completeness before leaving the field.

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11. A complete summary shall be made for each item at the end of its field notes. This item summary total will then be checked by those persons doing the final estimate and entered on the Summary of Quantity Sheets. The summary and field books shall be properly cross-referenced.

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12. Keep the calculations and measurements for Federal Aid participating and not-participating items separated in the field books. This also applies to Joint Participation Agreement items (or Locally Funded Agreement items).

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13. When more than one project (State or Federal) is constructed under the same contract, separate field books shall be kept for each project, keeping measurements and other data separate for each project.

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14. Field records for projects let under separate contracts shall never be recorded in the same field book. Field books shall contain only records related to a single contract.

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15. When documenting any data on grid sheets, neatness and legibility give credence to the accuracy of field notes and the calculations which they support.

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16. Field records containing alignment data shall be submitted with the final estimates documentation. It shall contain all the necessary information for horizontal control for new construction projects and major widening projects.

Slide 27 KNOWLEDGE CHECK

Now let's test your knowledge about field books.

- 1) Multiple Choice. Which of the following are NOT types of final estimates documentation?
 - A. Final Estimate Forms
 - B. Final As-Built Plans
 - C. Field Books
 - D. Basis of Estimates Manual**
 - E. None of the above.

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- 2) Multiple Choice. What is the proper identification for the spine of the field book?
- A. Federal Aid No. & Contract No
 - B. Contract No. & Financial Project ID No
 - C. Field Book Number & Financial Project ID No**
 - D. Financial Project ID No. & Description of Contents
 - E. All of the above

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- 3) Multiple Choice. If a field book entry is in error, how should the correction be made?
- A. Correction cannot be made
 - B. Strike through and enter the correct data
 - C. Strike through, enter correct data, initial, and date.**
 - D. Circle incorrect data and initial, but do not enter correct data.
 - E. None of the above.

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- 4) True or false. A detailed Index of contents should begin on the first lined page (page 1) of a field book.
- A. True**
 - B. False

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- 5) Multiple Choice. If an entire page of a field book is full of errors, what should you do to remedy the situation?
- A. Carefully remove the page and start on a new page.
 - B. Write the correct data on a new page.
 - C. Write the correct data on a new page and mark the incorrect page void.
 - D. Write the correct data on a new page, mark the incorrect page void and note where the correct information is shown. Initial and date the voided page.**
 - E. None of the above.

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- 6) True or false. You should keep notes on scratch pads and copy them in the field books at a later date so that your entries will be neater.
- A. True
 - B. False**

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- 7) True or false. Even though three financial project ID's are included in the same contract, you should combine information from all three jobs in the same Field Book.
- A. True
 - B. False**

Slide 34 SITE SOURCE FORMS

In addition to field books, the Department has created various forms for documenting measurements, quantities, and other important final estimate information. These forms are commonly referred to as site source forms. For some pay items, tabulation forms or delivery tickets are used as documentation for final estimate quantities. These forms are briefly described here and some examples are shown.

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There are six main types of forms used for tracking quantities and payment:

1. Final Measurement Site Source Record, *Form 700-050-53*
2. Daily Report of Truck Measured Material, *Form 700-050-54*
3. Daily Log Sheet Miscellaneous Tabulation Form, *Form 700-050-56*
4. Final Measurement Miscellaneous, *Form 700-050-61*
5. Asphalt Roadway – Daily Report of Quality Control, *Form 675-030-20A*
6. Asphalt Roadway Verification Report, *Form 675-030-21*

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Each form is to be completed on a per-day and per item basis. All tabulation forms should be dated for the day the work was performed. Begin a new tabulation form for each day's run. Keep these points in mind.

- When more than one form is used, show both the page number and the total pages in the series for each day's operation, so that reviewers can verify that all forms are accounted for.
- Write the total Quantity represented and summarize each day's operation. Any non-pay quantities (waste or off project) shall be identified on the forms.
- Cross check inspector records with contractor's records on a regular basis and reconcile any differences.
- Summarize the forms, electronically, for easy reference to back up documentation.

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1. FINAL MEASUREMENT SITE SOURCE RECORD, *FORM 700-050-53*

This form was designed for recording field measurement, using the Latitude and Departure measuring method for various pay items. It is used to record area calculations, including odd shapes.

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2. DAILY REPORT OF TRUCK MEASURED MATERIAL, *FORM 700-050-54*

This form is used to record the quantity for each truck as materials are delivered to the project. An example of this would be borrow excavation where it is measured by the cubic yard based on the volume per truck and the number of trucks.

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For recording volume measurements, each truck is assigned a number. All truck bodies will have a manufacturer's certification or permanent decal showing the truck capacity rounded to the nearest tenth of a cubic yard placed on both sides of the truck. This information should be inserted on the form and used to calculate the total volume hauled to the project.

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3. MISCELLANEOUS TABULATION, *FORM 700-050-56A/56B*

This form contains 2 versions and is used for two different types of measurements: weight and bag count. Form 700-050-56A, also known as the Weight Site Source Record, can be used to record the tonnage of stone placed on a project. Form 700-050-56B, also known as the Bag Count Site Source Record, is used to record the number of sand-cement rubble bags in a location.

Let's look at each of these forms in greater detail.

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Bulk-Weight Pay Records

The Miscellaneous Tabulation Form (Weight Site Source Record) is used to record the gross, tare and net weight of each pay item. Example pay items are Rip Rap Rubble and Bedding Stone which is paid by weight in tons. Additional useful information that is recorded is the truck identification number, date and time.

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In order for items to be paid for by weight, supporting documentation must be submitted in addition to this form. Weight measurements will be accompanied by certified weight tickets. Certain bulk weight shipments are acceptable as necessary supporting documentation. The following criteria must be followed.

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- There are three methods for weighing material: rail, truck or barge. Truck weights are the most common and must be done on state certified scales. The ticket indicates the gross, tare, and net weight.
- The State of Florida will recognize any scale that has been certified by a state agency outside Florida using traceable standards. All 50 states have adopted and use the same laws as Florida (***National Institute of Standards and Technology (NIST) Handbook-44***).

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- Project personnel will record each truck number and time of loading on the ***Miscellaneous Tabulation Form, Form 700-050-56A***.
- Hauling will be done in covered trucks in order to minimize loss of material.
- Material remaining in trucks after the job completion is to be hauled by truck to state certified scales to determine the gross, tare, and net weights in order to make appropriate deductions from the truck weights.
- If rail cars are used, they must be visually inspected to ensure that all material has been unloaded.

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Bag Count Pay Records

The Miscellaneous Tabulation Form (Bag Count Site Source Record) is used to record the number of sand-cement bags at a specific location. However, the Rip Rap (Sand-Cement) pay item is paid in cubic yards. This form is designed to calculate the volume by taking the number of bags inputted on the form and multiplying it by the unit weight of one bag and then converting the quantity to cubic yards, which can then be paid.

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Like the Weight Site Source Record, the quantities in this form must be supported. In this case, if the bags were pre-made and delivered to the jobsite, the justification will be delivery tickets with corresponding quantities. If each sand-cement rubble was made on-site, the size of the bags and mixture proportions must be manually documented.

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4. FINAL MEASUREMENT MISCELLANEOUS, *FORM 700-050-61*

The Final Measurement Miscellaneous Form was designed to replace hard bound Field Books and record the same type of field information including sketches, quantity calculations, survey information or any needed field notes. The use of the Final Measurement Miscellaneous form is encouraged to promote the paperless e-construction initiative and save the Department money. Since this form can be completed electronically, it is not necessary to print and bind these forms together. Instead, combine forms by pay item in a PDF or PDF package and upload into EDMS for easy reference.

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Here are some examples of what can be recorded on the Final Measurement Miscellaneous Form.

Check Level Notes

Many field measurements are made and documented in terms of elevations -- depth of cut, height of fill, ditch flow line elevation, etc. Roadway design features are based on a series of Bench Mark (B.M.) elevations established along the highway at the time of the original location survey.

Since considerable time may pass between the original survey and the start of construction, these B.M. elevations must be checked to verify accuracy and to re-establish any that have been disturbed. All temporary B.M.'s will be tied to the Project B.M.'s unless elevations are assumed.

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"Check levels" must be run at the start of a construction project to assure that (1) construction will be done to design elevations and (2) final measurements for payment will be from the same base elevations as the original survey. Final measurement from inaccurate bench marks could result in considerable overpayment or underpayment to contractors.

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Detailed instructions for establishing and checking bench marks are included in the Department's Survey Handbook.

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Cross Section Notes

The volume of most earthwork is measured by cross sections -- original ground line cross sections before construction and final cross sections on completion of the work. Cross section notes are recorded on field records.

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Procedures for preconstruction cross sections are described in both the Construction Project Administration Manual (CPAM) and the Survey Manual.

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Final Measurements

Field records generally are used for recording measurements in the field as work is actually accomplished. These notes are used to prepare progress estimates and are summarized as the basis for final estimates when a project is completed.

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Various types of measurements are recorded – such areas, volumes, lengths, and individual construction items, which are paid for as "per each." There is no fixed format for these notes. However, it is important that they are neat, legible, and accompanied by good sketches, when needed, so they can be clearly understood.

Slide 55 KNOWLEDGE CHECK

Let's test your knowledge about the Site Source Forms and what they can be used for.

- 1) Multiple Choice. "Check Levels" must be run at the start of a construction project to assure that:
 - A. Liquid Bituminous Material in Asphalt distributors is measured accurately.
 - B. Construction will be done to Contractor's elevation.
 - C. Final measurements for payment will be from the same base elevations as the original survey and the construction will be done to design elevations.**
 - D. Paver screeds are calibrated to lay down pavement of uniform thickness.
 - E. None of the above.

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- 2) Multiple Choice. In which Manual(s) are the procedures for running check levels and cross sections described?
 - A. Review and Administration Manual
 - B. Basis of Estimates Manual
 - C. Survey Handbook
 - D. Construction Project Administration Manual
 - E. Both C and D**

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- 3) True or false. Information within Final Measurement Miscellaneous forms should never be discarded.
 - A. True**
 - B. False

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4) Multiple Choice. What should be included with final measurements and calculations, so that non-standard measurements may be interpreted accurately?

A. Sketches.

B. Plan Sheets.

C. Tabulation Forms.

D. Computer Outputs.

E. None of the above.

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5. ASPHALT ROADWAY – DAILY REPORT OF QUALITY CONTROL (QCRR), FORM 675-030-20A

The purpose of this form is to record the daily asphalt paving operations. Information collected on this form will include the date, type of material, lot, subplot, the location of the material placed, widths, lanes, lift number, tonnage, spread rates and other relevant information. The Contractor's Quality Control Technician is responsible for filling out the Quality Control forms; however, it must be approved by the Department's Project Administrator prior to payment. The Contractor and Department personnel should coordinate on asphalt quantities frequently to confirm there is consensus in the quantities prior to payment.

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The QCRR is also used to determine the adjusted plan quantity and 105% limit for final payment.

Delivery Tickets

Since asphalt is a final measure item which is paid by tonnage, delivery tickets are used as documentation for Final Estimate quantities. They are used in conjunction with the QCRR as verification for the tonnage paid. Asphaltic Concrete delivery tickets are used to record the weight and distribution of all material produced at the Asphalt Plant.

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All Asphalt Plants are to be equipped with Electronic Weight Systems with Automatic Ticket Printout. The following information shall be provided on the delivery ticket, as a minimum.

- a) Sequential load number
- b) Financial project ID Number
- c) Date
- d) Name and location of plant
- e) Type of mix
- f) Place for hand recording mix temperature
- g) Truck number
- h) Gross, tare, and net weights (as applicable)
- i) Accumulated total of mix

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Each Asphaltic Concrete delivery ticket printed consists of an original and at least one legible copy.

1. The original “white” ticket is retained by the Plant Verification Technician, then scanned into PDF format to become part of the Lot Submittal Package.
2. One copy is retained by the Roadway Verification Technician.

Slide 63 KNOWLEDGE CHECK

Let's test your knowledge about asphalt documentation.

- 1) True or false. All asphaltic delivery tickets are used as documentation for Final Estimates quantities.
A. True
B. False

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- 2) True or false. Cross check inspector records with the Contractor's records on a regular basis and reconcile any differences.
A. True
B. False

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- 3) Multiple Choice. What is the name of the report used by the Contractor's Quality Control Technician?
- A. Asphalt Plant Worksheet
 - B. Record of Bituminous Materials
 - C. Asphalt Roadway – Daily Report of Quality Control (QCRR)**
 - D. Roadway Density Worksheet
 - E. None of the above

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6. ASPHALT ROADWAY VERIFICATION REPORT, FORM 675-030-21

The Department's Verification Technician is responsible for filling out the Asphalt Roadway Verification (VT) Report. This form is used by the Department's personnel to verify spread rates of asphalt, adequate temperatures and record the volumes of bituminous materials such as tack, prime, surface treatment, etc.

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In order to measure the bituminous materials, such as tack, the liquid must be measured prior to distribution and again after distribution. The difference is the quantity delivered. Depth measurements are taken from the top of the dome to the top of the material and are recorded to the nearest whole 16th of an inch. Conversion charts can be used to convert the inch measurements to gallons. All distributors must be calibrated and assigned a DOT tank number. Materials shall not be accepted from a distributor, which has not been previously calibrated.

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The volume of liquid bituminous material varies considerably with changes in temperature. The specifications require that measurements of pay gallons be corrected to a standard temperature of 60 degrees Fahrenheit. Because the depth measurements actually reflect volumes of bituminous material, adjustments must be made with temperature correction factors selected from tables furnished by the Department or calculated by the formula in the Standard Specifications book.

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In the event of a discrepancy between the QCRR and the VT Report, resolution testing must be done. A resolution report will be provided by an independent laboratory.

Slide 70 KNOWLEDGE CHECK

Let's test your knowledge of the asphalt verification testing.

- 1) True or false. The depth of material in a tank can be converted to gallons with a Tank Calibration Chart.
A. True
B. False

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- 2) Multiple Choice. What is the name of the report used by the Department's Verification Technician?
A. Asphalt Plant Worksheet
B. Asphalt Roadway Verification (VT) Report
C. Asphalt Roadway – Daily Report of Quality Control
D. Roadway Density Worksheet
E. None of the above

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- 3) True or false. Measurement of tack coat will be measured from the bottom of the dome to the top of the material in the tanker.
A. True
B. False

Slide 73 COMPUTER INPUT / OUTPUT

Computer Input / Output sheets are typically used to show the computations of pay item quantities. Information is input into a software program which automatically calculates the quantity, typically an area, volume or weight. An example of this is the volumetric calculations for subsoil earthwork quantities.

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Typically, a computer program, such as Trimble Business Center, is used to compare multiple surveyed surfaces and calculate an earthwork quantity. This is far quicker and more accurate than manual calculations. Computer Input / Output sheets must be uploaded in EDMS for justifying payment of the calculated quantity.

Slide 75 FINAL AS-BUILT PLANS

The Final As-Built Plans are an electronic set of plans which document the original plans with all changes made during construction and shows the "as-built" conditions. The original set of plans are signed and sealed by the Engineer of Record. However, the Final As-Built plans will be signed and sealed by the Responsible Engineer. The contents of the Final As-Built Plans can vary from project to project, but should always contain the sheets necessary to show all the work performed. They should include all changes, both design and construction, shop drawings, with adequate sketches, dimensions and notes. Guidance on how to properly document the changes can be found in Section 5.12 of the Construction Project Administration Manual.

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All changes made by the Resident Office shall be made in red font by striking through the original information and inserting the changes. Any backup documentation to support the changes will be referenced to a specific location.

Procedures for specific sheets of the Final As-Built Plans are described as follows:

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Receiving the Contract Plans and Creating the Final As-Built Plans

The District Construction office will receive a signed and sealed set of Contract Plans in electronic format. The District will then forward the plans to the Resident Office for use during construction.

1. The signed and sealed electronic set of Contract Plans will be saved in the Original Plans folder (within the collaboration site) upon receipt.

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2. The plans should then be extracted to the Final As-Built Plans folder (within the collaboration site) by component so any changes during construction can be recorded. Any and all changes made to the project will be electronically reflected on these plans. No pages shall be discarded from this set.

The Final As-Built Plans will be submitted as part of the Final Estimates Documentation at the conclusion of the project for review by the District Final Estimates Office (DFEO).

3. For bridge and other structures, shop drawings shall be processed according to Structures Design Guidelines.

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Updating the Final As-Built Plans

The Final As-Built Plans submitted with the Final Estimates Documentation shall be updated as the project progresses. All additions, deletions and revisions shall be clearly delineated to reflect the actual conditions of the completed project. All changes will be noted electronically in red by the Resident Office. If an entire plan sheet is revised, the original plan sheet shall have "VOID" imprinted on it using red text and the new plan sheet shall be inserted after the original (old) sheet in the set of Final As-Built Plans, with exception of the Key Sheet. The voided Key Sheet(s) should follow the revised Key Sheets(s).

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All revised sheets will be defined on the Signature Sheet of the appropriate component and must be signed and sealed by the responsible Professional Engineer or Resident Engineer. All changes made by the Resident Engineer (in red) will be detailed on the As-Built Signature sheet for each component and the Responsible Engineer will add the appropriate statement of disclaimer prior to signing and sealing the Final As-Built Plans.

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Signing and sealing means sheets will be digitally signed, dated and the Professional Engineer license number will be noted. The image of the Professional Engineer license seal is no longer required when signing and sealing the Final As-Built plans. If the plans are electronically signed and sealed, then Florida Administrative Code 61G15-23.002 must be followed. No pages shall be discarded from this set.

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Now let's discuss the main components of the Final As-Built Plans. This include the:

- Key Sheet
- Signature Sheet

- Typical Sections
- Summary of Quantities
- Plan Sheets
- Summary of Drainage Structures,
- Optional Materials Tabulations and Drainage Structure Sheets
- Cross Sections

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Key Sheet

The Key Sheet of the Final As-Built Plans shall show the following data.

- a) Final As-Built Plans shall be prominently redlined across the top of the sheet in place of or above the "Contract Plans" preprinted line.
The words "Contract Plans" shall be lined through or completely deleted.

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- b) On the right side and near the lower corner of the sheet, the following information shall be displayed in red on the Key Sheet:
 - Name of Prime Contractor
 - Name of the Prime Consultant Construction Engineering Inspection firm (if it is an In-House project, state so)
 - Name of District Secretary, Resident Engineer and Project Manager
 - Project Administrator
 - Date the work started
 - Date the work was final accepted or completed

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A complete Index of the related documents shall be shown on the left side of the Key Sheet, not to exclude the following:

- A complete list of permanent field books and a general description of their contents shall be shown.
- Additional plans such as shop drawings.
- Other As-Built Plans or Drawings, such as Jack & Bore, Boring Path Reports, Bore Logs, Plowing or Signalization shall be listed as well.

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- c) All project date descriptions, Financial Project ID Numbers, length, etc. shown on the Key Sheet shall be corrected to agree with the actual construction before the Final As-Built Plans are submitted.

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Signature Sheets

The Final As-Built Signature Sheet is the Construction version of the Signature Sheet required for Designers in the Original Contract Plans. The Final As-Built Signature sheet must be signed and sealed by the Responsible Engineer and include a Statement of Disclaimer as to whether or not changes were made to the Original Contract Plans. There are two scenarios to the statement of disclaimer:

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- "The above named professional engineer shall be responsible for the following changes, indicated in redline revision, in accordance with Rule 61G15-23.004, F.A.C. This project was constructed in substantial compliance with these plans as provided by the Engineer of Record."
- "This project was constructed in substantial compliance with these plans as provided by the Engineer of Record. These plans reflect "as-built" conditions and no changes were made to the plan sheets."

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All additions, deletions, and revisions to the Final As-Built Plans during construction shall be shown on the Final As-Built Signature Sheet(s) for each component.

The information shall include:

- Sheet number on which the change is shown in the plans
- A brief description of the revision

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Each person applying markups or changes and all QA/AC/IA reviewers must fill out the table in the bottom right hand corner of the As-Built Signature Sheet. It is important to know all personnel that updates and reviews the Final As-Built Plans in case of litigation or claims.

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Typical Section Sheets

Authorized revisions to the typical section shall be marked on these sheets. Documentation for such revisions shall be included as a part of the final estimates documentation. Some typical examples include:

- a) An increase or decrease in thickness
- b) A change in type of material
- c) Substitution of pay items
- d) Change in limits of work
- e) Addition/Deletion of items of work
- f) Other Geometric designs (such as varied cross slope)

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Summary of Quantities

The Summary of Quantities sheets contain Plan Summary Boxes which include designer's plan quantities for each pay item and the final quantities which were constructed. Any quantities that have changed will have backup documentation to substantiate the needed change. Supporting backup documentation that explains the variation from the original quantity must be referenced on these sheets. All final quantities should be recorded in the Plan Summary boxes on these sheets.

For Conventional Projects, projects that contain pay items, the plans will include Summary Sheets that contain Summary of Quantity Boxes. The Designer provides the pay item number with the corresponding quantity on the Summary of Quantity Boxes for each pay item shown in the plans.

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On Lump Sum & Design Build Projects, there are no pay item numbers. Instead, there are pay item descriptions such as Superpave Asphaltic Concrete or Optional Base. The Designer will breakout the estimated quantities into the appropriate Summary of Quantity Boxes by displaying the pay item description and not the pay item number. Only the pay item description will be shown with an estimated quantity used by the Contractor during the bidding process.

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Plan Sheets

The Plan Sheet details for all the major groups of plans become the permanent historical record of the construction project. All changes in construction that would constitute a conflict in this record shall be clearly delineated on the Final Plan Sheets. Insert revisions and cross out all incorrect data.

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The following revisions must be noted:

- a) Revisions to the horizontal and vertical alignments as shown on the original plans.
- b) Stations or equations that have been introduced or revised during construction.
- c) Intersection and crossover details that have been modified or relocated.

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- d) Inlets, manholes, box culverts and end walls that were added, relocated, revised or deleted.
- e) All sidewalk that was modified, thickness or otherwise and all curb and gutter and shoulder gutter that was added, revised or deleted.
- f) All driveways that were not shown on the original plans, or were shown but are no longer in existence, or were modified in thickness or otherwise.
- g) All ditch locations and grades that were adjusted during construction.
- h) Changes in fencing items including gate locations.

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- i) Sign locations that were changed and pavement markings that were modified.
- j) All signal details that changed during construction.
- k) All Bridge, Approach Slab and Lighting details that differ from the actual construction.
- l) Bench Mark and their descriptions that were set during construction shall be added to the profile portion of the plan sheets.
- m) All Utility relocates and/or conflicts shall be reflected on the Utility Adjustment Sheets

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Summary of Drainage Structures, Optional Materials Tabulations and Drainage Structure Sheets

The **Summary of Drainage Structures, Optional Materials Tabulations and Drainage Structure Sheets** are used to document all information about drainage structures. The drainage quantities are recorded on the Summary of Drainage Structures sheets rather than the Summary of Quantities sheet. Any significant changes during construction such as stationing, additions and/or deletions, are recorded in these sheets as construction progresses. This allows final pay **quantities to be easily tabulated and verified from the summary.**

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Revisions shall be made on the Final As-Built Plans set, to reflect:

- a) Plan lengths shall be changed to reflect the actual construction length only when an authorized field change is made or a plan error is noted.
- b) Changes in flow line elevations shall be shown on the ***Plan and Profile Sheets.***
- c) Changes in stations or offset dimensions.
- d) Changes in size of structures.

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- e) Added/Deleted structures.
- f) Type of pipe material and thickness used at each structure shall be shown on the ***Drainage Structures Sheets*** and the ***Optional Materials Tabulation Sheets.*** The as-built column will be checked to indicate what type of pipe material and thickness was used at each structure.
- g) Types of inlets and manholes constructed shall be indicated.
- h) When the method of measurement is plan quantity for cross drain and storm sewer pipes, plan errors shall be distinguished from field revisions due to different tolerances being applicable.
- i) All significant adjustments in horizontal alignment flow line grade shall be delineated on the ***Plan and Profile Sheets.*** The cross section shall be adjusted to reflect the revision if a pay quantity adjustment is required.

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Cross Section Sheets

The disposition of the **Cross Section Sheets** with regard to a set of Final As-Built Plans depends on the method of payment set up for the earthwork items.

- (a) **Excavation Borrow Pits, Excavation Subsoil, and Excavation Channel on Cubic Yard Basis:** Final cross section sheets and volumetric computations are to be prepared and included in the Final As-Built Plans. They are required to reflect the actual work accomplished and are the basis of final pay quantities. The original plan cross sections shall remain a part of the Final As-Built Plans.

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- (b) **Embankment, Regular Excavation, and Lateral Ditch Excavation on Cubic Yard Plan Quantity Basis:** The original design cross sections are used as the basis for both plan and final pay quantities and to control grading operations. They are to be retained as part of the Final As-Built Plans. Additional cross sections to correct plan errors and/or to reflect field revisions are prepared and added to the Final As-Built Plans. Detailed instructions pertaining to earthwork are included in **Section 5.16** of the **Construction Project Administration Manual**.

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Now let's test your knowledge about Final As-Built plans:

- 1) Multiple Choice. The changes to the Final As-Built Plans:
 - A. Should be signed and sealed by the Responsible Engineer
 - B. Should be done electronically in red.
 - C. Should be made by voiding the original information and recording the corrections.
 - D. All of the above**
 - E. None of the above

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- 2) True or False. On the left side of the Key Sheets a complete Index of the documents related to the Final As-Built Plans should be shown.
 - A. True**
 - B. False

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3) True or False. Excavation Borrow Pits, Excavation Subsoil, and Channel Excavation are to be final measured. Final cross section sheets and volumetric computations are to be prepared and included in the Final As-Built Plans.

- A. True**
- B. False

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4) Multiple Choice. Which of the following is the purpose of Plan Summary Boxes?

- A. To show the Designer's original plan quantity
- B. To show the final quantity as the project progresses
- C. To allow a central place to reference all supporting documentation for final quantities
- D. All of the above**
- E. None of the above

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5) True or False. Additional plan sheets to correct plan errors and/or to reflect field revisions may be needed and will be added to the Final As-Built Plans.

- A. True**
- B. False

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ROADWAY AND BRIDGE DAILY WORK REPORT

The project's Daily Work Report is a recorded collection of events for a single day of contract time. It will include site conditions (including weather and temperature), contract time summary, personnel and equipment on the job site, any accidents or situations, and estimated work performed each day during a construction project. Data is collected on every phase of work performed by the Prime Contractor, Subcontractor or Utility Company. Recorded information must be clear, detailed, accurate and objective. Anyone reading the project's Daily Work Report should be able to comprehend the project status and determine work performed.

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It is important to understand that the daily work report records only estimated quantities and is not to be used for final payment purposes. Quantities that appear on this document are not recorded with appropriate computations and exact measurements at the site. Therefore, actual measurements, computations and quantities for final payment purposes shall be recorded on the appropriate site source records. The site source record should then be referenced on the daily work report as the source of final payment. This will avoid any confusion with the contractor or others who may review the daily work report at a later date.

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Now let's test your knowledge.

- 1) Multiple choice. Please match the appropriate documentation name with the correct description below:
 - A. [Final As-Built Plans]: For reviewing contract time charges, occurrences, instructions and work performed each day; [Computer Printout]: Document pertinent changes during construction and show the "as-built" condition; [Field Books]: Contains alignment notes and cross section notes, etc.
 - B. [Daily Work Report]: For reviewing contract time charges, occurrences, instructions and work performed each day ; [Final As-Built Plans]: Documents pertinent changes during construction and shows the "as-built" conditions; [Field Books]: Contains sketches, alignment notes, cross section notes, etc.**
 - C. [Final As-Built Plans]: For reviewing contract time charges, occurrences, instructions and work performed each day ; [Tabulation Forms]: Document pertinent changes during construction and show the "as-built" conditions; [Field Books]: Contains alignment notes and cross section notes, etc.
 - D. [Final As-Built Plans]: For reviewing contract time charges, occurrences, instructions and work performed each day ; [Daily Work Report]: Document pertinent changes during construction and show the "as-built" conditions; [Field Books]: Contains alignment notes and cross section notes, etc.
 - E. None of the above

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This is the end of Module 2. Thank you for your time and attention.