

MODULE 7 - OTHER MEASUREMENTS

Slide 1 WELCOME

Welcome to the Florida Department of Transportation's computer-based training series on Final Estimates, Level 1 Training. This is Module 7, Other Measurements. 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

Most construction items are measured and paid for by one of the techniques described in the previous modules. However, some items do not fall into any of these categories and are measured and paid for by other criteria such as:

- number of units (per each),
- a lump sum for completion of a described item,
- payment on the basis of planned quantities, or
- payment based on the Contractor's certified quantities

In this module we will talk about the criteria and procedures for these other types of measurement and payment.

Slide 3 PER EACH ITEMS

Some of the items commonly measured and paid for on a "per each" basis include:

- inlets
- manholes
- junction boxes
- prestressed concrete poles
- test loads
- delineators
- steel mast arm assemblies
- mailboxes, and
- guardrail end treatments

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Measurement of these "per each" items is simply a matter of counting the number of units of a particular item, completed and accepted. Documentation of the constructed items must be prepared in an organized manner so that the number of items can be

checked and verified. It is recommended to document “per each” items on the Final Measurement “Miscellaneous” form or directly in the appropriate Pay Item Summary box.

Slide 5 LUMP SUM ITEM

Some construction work can be quite clearly defined and is not usually subject to significant changes during construction. These can easily be paid for as a lump sum for satisfactory completion of the prescribed work.

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Items paid for on a lump sum basis include:

- maintenance of traffic,
- removal of buildings,
- clearing and grubbing,
- removal of existing structures,
- special detours,
- buildings,
- toll plazas, etc.

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Ordinarily, there is no measurement involved. The only question is whether the particular work item was completed in accordance with the plans, specifications, and any special provisions that may be applicable. Satisfactory completion is indicated by a one-line entry on the summary sheet for Lump Sum Quantities as shown. In this example, the clearing and grubbing limits were decreased from the original bid quantity of 1 lump sum. The final quantity is now 0.836 which is less than 1.

SUMMARY OF LUMP SUM ITEMS					
PAY ITEM NUMBER	DESCRIPTION	QUANTITY		DESIGN NOTES	CONSTRUCTION REMARKS
		P	F		
0110-1	Clearing & Grubbing Sta. 410+20 to 412+60 = 240' x 310.91 = 1.713 AC Sta. 437+33 to 442+35 = 480' x 300.02' = 3.306 AC Sta. 463+80 to 471+45 = 765' x 217.46 = 3.819 AC Total Acres = 8.838	1 LS	0.836 LS		<i>Trees left standing in median between Sta. 464+00 to 467+20, at the Direction of the Engineer. Area reduced by 1.450 Acres below estimate. Total Acres = 7.388 Acres</i>

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But, it is not always that easy. If the scope of work included in the lump sum item is increased or decreased significantly during construction, the amount of the lump sum payment must be adjusted. For example, clearing and grubbing on a project is paid as a lump sum item. The designer computes the estimated acres and records the information on the Summary of Quantity sheets in the plans. The contractor bids a lump sum amount to complete the prescribed clearing and grubbing without quoting a unit cost per acre.

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If the Project Engineer calls for some additional clearing and grubbing not identified in the plans, or eliminates some planned clearing and grubbing, there is need to adjust the lump sum payment.

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The Figure above shows a summary sheet with Designer's quantity of 1 LS. The description column details the locations for the lump sum area in secondary units of acres. However, during Construction, with the approval of the Engineer, 1.450 acres did not need clearing and grubbing, therefore the final quantity was reduced from 1 LS to 0.836 of a LS.

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This is calculated by first subtracting the acres not cleared from the original quantity to determine the final quantity.

$$\begin{aligned} \text{Final Quantity} &= \text{Original Quantity} - \text{AC Not Cleared} = 8.838 \text{ AC} - 1.450 \text{ AC} \\ &= 7.388 \text{ AC} \end{aligned}$$

Then divide the final quantity by the original quantity to determine what percentage was actually cleared and grubbed.

$$\frac{\text{Final Quantity}}{\text{Original Quantity}} = \frac{7.388 \text{ AC}}{8.838 \text{ AC}} = 0.836$$

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Note: If the plans do not show an estimated plan quantity this item cannot be adjusted without a supplemental agreement as per **Section 9-3.3.2 of the Specifications**.

Normally, when a lump sum item is completed in accordance with the plans and specifications, final payment is made on the basis of the bid amount - without measurement or adjustment.

Slide 13 PLAN QUANTITIES

Certain items will be paid for on the basis of plan quantity. The overall effect is much the same as for a lump sum item. If the scope of work for the item remains as planned, the Contractor is paid for the quantity shown in the plans without detailed measurement of final quantities.

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If it turns out that there is a significant difference between the original estimate and the work actually performed, there will be a need for adjustment. However only the plan error or the field change will need to be measured and documented. More information on how to adjust plan quantity can be found in Section 9-3 of the Standard Specifications.

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The Summary of Quantities sheet will refer to both the designer's original quantities as plan quantity of a pay item and the final quantity which will be the plan quantity subject to any changes in the field and/or any plan errors on the project. Explanation of any changes must be included in Construction Remarks column and could include location, explanation of change in quantity or a reference to supporting documentation location. Let's look at an example of how this is done.

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In this project, the final quantities for sidewalk and detectable warnings are recorded in the F column. However, the Resident Engineer also remembered to include a brief explanation for the change in quantities in the Construction Remarks column. This allows someone unfamiliar with this project to understand how the new quantity was derived. A lack of space in the Construction Remarks column should not deter anyone from providing adequate information for the changes.

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Additional documentation can be created to fully provide information or calculations on the quantity change. For example, a note has also been inserted on the Summary of Quantities sheet with details how the plan quantity was reduced and where this backup documentation can be found in the Electronic Document Management System.

SUMMARY OF SIDEWALK & DETECTABLE WARNINGS											
LOCATION STA. TO STA.	SIDE	AREA ID	CONC SIDEWALK 4"		CONC SIDEWALK 6"		DETECTABLE WARNINGS 0527 2		DESIGN NOTES	CONSTRUCTION REMARKS	
			0522 1		0522 2		0527 2				
			SY		SY		SF				
			P	F	P	F	P	F			
126+20.41 to 126+70.25	LT	10545	32.4	✓					20.0		5' x 2' @ 2 EA (FIELD CHANGE)
126+94.25 to 128+15.51	LT	10559	74.4	✓					22.0		5' x 2' and 6' x 2' (FIELD CHANGE)
127+20.55 to 127+42.88	RT	10620	14.4	✓					12.0		6' x 2' (FIELD CHANGE)
127+74.14 to 128+29.06	RT	10630	34.5	✓					21.0		5.5' x 2' & 5' x 2' (FIELD CHANGE)
128+50.66 to 130+79.20	LT	10573	146.6	✓					24.0		6' x 2' @ 2 EA (FIELD CHANGE)
128+53.06 to 129+74.82	RT	10645	78.1	✓					22.0		5' x 2' and 6' x 2' (FIELD CHANGE)
130+22.62 to 131+69.02	RT	10659	91.3	✓					24.0		6' x 2' @ 2 EA (FIELD CHANGE)
131+15.77 to 132+32.77	LT	10588	91.8	63.8*		34.7*			12.0		6' x 2' (FIELD CHANGE)
132+15.48 to 264+95.91 (@ 742)	RT	10674	136.7	✓					12.0		6' x 2' (FIELD CHANGE)
126+60.25 to 127+04.22	LT	8739			57.2	✓					URBAN FLARED TURNOUT
128+19.06 to 128+63.06	RT	8749			45.9	✓					URBAN FLARED TURNOUT
130+63.26 to 131+31.71	LT	7571			52.0	✓					RADIAL TURNOUT
132+99.65 to 133+09.62	LT	10703			33.3	✓					SIDEWALK & ISLAND NOSE
132+33.69 to 132+37.27	LT	16288						10.9	18.8		4' x 2' @ 132+80 LT (FIELD CHANGE)
133+01.42 to 133+09.95	LT	16291							14.8	✓	
133+09.38 to 133+16.15	LT	16289							14.3	✓	
133+64.57 to 133+70.09	RT	16293							10.6	✓	
134+08.66 to 264+89.10 (@ 742)	RT	16294							10.6	✓	
SUB-TOTAL:			700.1	672.2	188.4	223.1		61.2	238.2		
TOTAL:			700	672	188	223		61	238		

0522-1 & 0522-2 INCLUDES REMOVAL OF EXISTING SIDEWALK AND DRIVEWAYS.

*522-1: 91.8(SY) PLAN QUANTITY REDUCED BY 34.7(SY) FOR 6' SIDEWALK IN LIEU OF 6.7(SY) OF 34.7(SY) PREVIOUSLY PLACED AS 4' SIDEWALK FOR A NET CHANGE OF 34.7(SY) - 6.7(SY) = 28.0(SY). SEE EDMS DOC # 713124 FOR BACKUP DOCUMENTATION.

Slide 18 CONTRACTOR'S CERTIFICATION OF QUANTITIES

Sometimes pay items are paid based on the Contractor providing certification of the quantity. Certified quantities are those that the Contractor keeps track of and submits for payment each month. The Resident Office will spot check these quantities; however they will not expend time verifying each pay item's quantity.

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There are a few reasons for placing the responsibility of tracking the quantities on the Contractor rather than Department personnel. First, safety is the utmost importance in any project and tracking some of the quantities puts field personnel in harms way. An example of this are certified Maintenance of Traffic items such as signs, barrier, temporary guardrail and pavement markings. Most of these items are located immediately adjacent to the flow of traffic which poses a safety risk for additional personnel performing count of quantities. Rather allow the Contractor to certify these quantities.

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Another factor is time. The time it takes to count these individual items each day can be time consuming. Typically certified quantities are not big money items and worth the resources to count them daily. Instead, field personnel can perform spot check counts to verify the quantities are reasonable.

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Now let's test your knowledge.

- 1) Multiple Choice. Documentation of "Per Each" item usually is in the form of a tabulation by:
 - A. Date and Cost.
 - B. Location.**
 - C. Contractor or Subcontractor.
 - D. None of the above.
 - E. All the above.

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- 2) True or False. Documenting "per each" items should be done in Field Books, Forms or on the Pay Item Summary Sheets in the Final As-Built Plans.
 - A. True**
 - B. False

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- 3) Multiple Choice. Examples of "per each" items are:
 - A. Embankment, and Subsoil Excavation
 - B. Inlets, manholes, and signs (permanent)**
 - C. Optional Base, and Superpave Base
 - D. Borrow Excavation and Fill
 - E. None of the above

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- 4) True or false. If a plan error for a plan quantity item is found on a project, the total original quantity of the pay item must be measured again plus the area of error.
- A. True
 - B. False**

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- 5) True or false. Ordinarily it is necessary to measure a Lump Sum Item for Final Payment.
- A. True
 - B. False**

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- 6) The Summary of Quantities sheet of a plan quantity pay item would refer to the designer's original quantities and...
- A. The final quantity will be final measured and paid at the contract bid price.
 - B. The final quantity will be Lump Sum and paid at the contract bid price.
 - C. The final quantity will be plan quantity subject to any changes in the field and/or any plan errors on the project as per Section 9-3 of the Specifications.**
 - D. None of the above.

Slide 27 CONCLUSION

This is the end of Module 7. Thank you for your time and attention.