PROTOTYPE UTILITY COST ESTIMATE SUBMISSION FORMS – USER GUIDE

INSTRUCTIONS

The prototype Microsoft® Excel® 2010-based template (Utility Cost Estimate Template.xlsm) enables users to submit standardized utility cost estimates. The Excel file includes six worksheets, as follows:

- Items.
- Unit Cost Analysis.
- Item Disaggregation Analysis.
- Cost Category Summary.
- Cost Categories.
- Definitions.

The first four worksheets are used for the preparation of cost estimates. The Cost Categories worksheet provides a lookup table and description of cost categories used for the item disaggregation analysis. The Definitions worksheet provides definitions of basic terms used in the workbook, such as item, component, and cost category.

The Excel file includes several macros, which were developed using Microsoft Visual Basic for Applications (VBA). The extension of the Excel file is .xlsm with an exclamation mark on the file icon, indicating it is a macro-enabled workbook. To run the application, double click the Excel file. If a macro-related security warning message appears, click "Enable Content" to enable the macros (Figure 1).
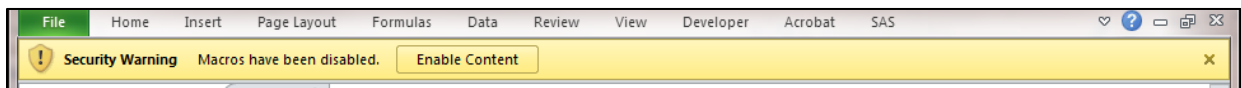

Figure 1. Security Warning when Opening the Excel File for the First Time.

Items Worksheet

This worksheet enables utility owners to add a list of items that represent logical divisions of work. As an illustration, Figure 2 shows items associated with the adjustment of a water main. Ideally, the list of items should be the result of cooperation between the utility owner and TxDOT to ensure a utility adjustment project is divided into manageable pieces of work that facilitate the development of reliable cost estimates and monitoring of construction activities in the field. A useful strategy to achieve this goal is to use construction specifications as a tool to define items. In many cases, the utility owner already has a set of construction specifications (either standard or special) that could be used for that purpose. Alternatively, a suitable construction specification might be available at TxDOT or from an external source.

Users can only enter items on item (yellow-background) rows. Initially, there is only one item row for each group. To add an item row, select a cell on an item row and click the "+" button. A new item row is then added below the selected cell. To delete an item row, select a cell on that row and click the "-" button.

The Remove All Items button removes all items on all worksheets in the workbook.

Remove All Items
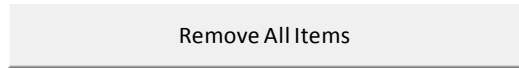
+	-	Item No.	Group/Item Name	Item Description
			General	
		1	Mobilization, bonds, and insurance	
			Earth Work	
		2	Clear and grub ROW	
		3	Crushed rock for trench stabilization	
			Lines, Pipes, and Other Linear Features	
		4	Remove and dispose of existing water line	
		5	18" DIP water line with polywrap	
		6	30" Steel casing with 18" carrier pipe by dry bore	
		7	30" Steel casing with 18" carrier pipe by open cut	
		8	Trench protection	
			Appurtenances	
		9	Remove air release valve, manhole, and appurtenar	
		10	Install air release manhole	
		11	18" gate valves	
		12	Ductile iron fittings	
		13	Ties into existing 18" water line	
		14	Water line marker	
			Other	
		15	Silt fence	
		16	Seeding areas disturbed by construction	
		101	Engineering - principal	
		102	Engineering - project manager	
		103	Engineering - design technician	
		104	Engineering - survey field party	
		105	Engineering - project assistant	
		106	Engineering - secretary	
		107	Engineering - project representative	
		108	Travel	

Figure 2. Example 1 (Water Main Adjustment) – Items Worksheet.

Unit Cost Analysis Worksheet

This worksheet enables utility owners to provide utility cost data using a unit cost approach. With this approach, users load the list of items from the Items worksheet and provide unit, quantity, and unit cost data for each item. The worksheet automatically calculates the total cost for each item and for the entire project. Figure 3 shows quantities and units used for each of the items entered in the Items worksheet shown in Figure 2.

To import items from the Items worksheet, click the Get Items button. The application automatically imports all item numbers and names from the Items worksheet. After importing the items, enter unit, quantity, and unit cost for each item. The application automatically calculates the amount for each item as well as the total amount. If a user adds, deletes, or changes item numbers or names in the Items worksheet, it is necessary to update the Unit Cost Analysis worksheet. To update this worksheet, click the Update Items button. This action does not erase units or quantities the user has entered previously.

Clicking the Validate Unit Costs button imports amounts from the Item Disaggregation Analysis worksheet and calculates validated unit costs for each item. The application calculates these unit costs by dividing the imported amounts by the corresponding quantities. To use this function, make sure that all items in the Unit Cost Analysis and the Item Disaggregation Analysis worksheets are the same as those included in the Items worksheet. Inconsistencies might appear if users update the list of items in the Items worksheet and only update the Unit Cost Analysis worksheet or the Item Disaggregation Analysis worksheet to reflect that change.

| Get Items | Update Items | | | | | | Validate Unit Costs | |

Item No.	Item Name	Unit	Quantity	Unit Cost ($/unit)	Amount ($)	Imported Amount ($)	Validated Unit Cost ($)
1	Mobilization, bonds, and insurance	LS	1	$ 20,085.00	$ 20,085.00		$ -
2	Clear and grub ROW	STA	17	$ 600.00	$ 10,200.00		$ -
3	Crushed rock for trench stabilization	CY	200	$ 40.00	$ 8,000.00		$ -
4	Remove and dispose of existing water line	LF	730	$ 15.00	$ 10,950.00		$ -
5	18" DIP water line with polywrap	LF	1120	$ 75.00	$ 84,000.00		$ -
6	30" Steel casing with 18" carrier pipe by dry bore	LF	110	$ 400.00	$ 44,000.00		$ -
7	30" Steel casing with 18" carrier pipe by open cut	LF	790	$ 275.00	$ 217,250.00		$ -
8	Trench protection	LF	1910	$ 1.50	$ 2,865.00		$ -
9	Remove air release valve, manhole, and appurtenan	EA	1	$ 1,000.00	$ 1,000.00		$ -
10	Install air release manhole	EA	1	$ 4,000.00	$ 4,000.00		$ -
11	18" gate valves	EA	2	$ 10,000.00	$ 20,000.00		$ -
12	Ductile iron fittings	LB	4000	$ 5.00	$ 20,000.00		$ -
13	Ties into existing 18" water line	EA	2	$ 5,000.00	$ 10,000.00		$ -
14	Water line marker	EA	7	$ 250.00	$ 1,750.00		$ -
15	Silt fence	LF	700	$ 3.50	$ 2,450.00		$ -
16	Seeding areas disturbed by construction	AC	0.75	$ 600.00	$ 450.00		$ -
101	Engineering - principal	HR	4	$ 145.00	$ 580.00		$ -
102	Engineering - project manager	HR	104	$ 110.00	$ 11,440.00		$ -
103	Engineering - design technician	HR	98	$ 60.00	$ 5,880.00		$ -
104	Engineering - survey field party	HR	28	$ 90.00	$ 2,520.00		$ -
105	Engineering - project assistant	HR	16	$ 55.00	$ 880.00		$ -
106	Engineering - secretary	HR	55	$ 40.00	$ 2,200.00		$ -
107	Engineering - project representative	HR	181	$ 55.00	$ 9,955.00		$ -
108	Travel	MI	180	$ 0.58	$ 104.40		$ -
Total					$ **490,559.40**	$ -	$ -

Figure 3. Example 1 (Water Main Adjustment) – Unit Cost Analysis Worksheet.

Item Disaggregation Analysis

This worksheet enables utility owners to provide utility cost data using a cost category approach. With this approach, users load the list of items from the Items worksheet and provide disaggregated cost component information for each item according to one or more of the cost categories listed in the Cost Categories worksheet, e.g., materials and supplies, labor, overhead, and transportation and equipment. For each component, users provide unit, quantity, and unit rate (or unit price). The worksheet automatically calculates the total cost for each component, for each item, and for the entire project.

Figure 4 shows items associated with the adjustment of an electric transmission line. In this case, the utility owner did not provide quantities and unit costs for each item. Instead, the utility owner provided disaggregated cost data for each item by cost category (Figure 5).

| | | Remove All Items | |

+	-	Item No.	Group/Item Name	Item Description
			General	
		1	138 kV pole assembly (90 ft.)	
		2	138 kV pole assembly (95 ft.)	
			Earth Work	
			Lines, Pipes, and Other Linear Features	
			Appurtenances	
			Other	
		3	Contract labor, engineering	
		4	Environmental study and surveying	
		5	Inspection services	

Figure 4. Example 2 (Transmission Line Adjustment) – Items Worksheet.

Item	+/-	Component	Item/Component Name	Cost Category	Unit	Quantity	Rate or Unit Price ($/unit)	Amount ($)	Imported Amount ($)
1			138 kV pole assembly (90 ft.)					$ 79,360.41	
		1	Pole, concrete, 90 ft., H-frame str.	Materials and Supplies	EA	4	$ 5,000.00	$ 20,000.00	
		2	Materials (per list)	Materials and Supplies	EA	1	$ 3,434.91	$ 3,434.91	
		3	Purchasing and stores	Materials and Supplies	EA	1	$ 679.50	$ 679.50	
		4	Non-contract labor regular time	Labor	HR	41.5	$ 28.00	$ 1,162.00	
		5	Non-contract labor overtime time	Labor	HR	6	$ 42.00	$ 252.00	
		6	Non-productive time clearing	Labor	EA	1	$ 187.50	$ 187.50	
		7	Employment benefit loading	Overhead	EA	1	$ 70.50	$ 70.50	
		8	Retirement plan loading	Overhead	EA	1	$ 50.00	$ 50.00	
		9	Payroll taxes	Overhead	EA	1	$ 624.50	$ 624.50	
		10	Other employee benefit loading	Overhead	EA	1	$ 25.00	$ 25.00	
		11	Construction contract labor	Labor	HR	586.5	$ 80.00	$ 46,920.00	
		12	Construction overhead	Overhead	EA	1	$ 5,728.50	$ 5,728.50	
		13	Transportation	Transportation and Equipm	EA	1	$ 226.00	$ 226.00	
2			138 kV pole assembly (95 ft.)					$ 79,360.41	
		1	Pole, concrete, 95 ft., H-frame str.	Materials and Supplies	EA	4	$ 5,000.00	$ 20,000.00	
		2	Materials (per list)	Materials and Supplies	EA	1	$ 3,434.91	$ 3,434.91	
		3	Purchasing and stores	Materials and Supplies	EA	1	$ 679.50	$ 679.50	
		4	Non-contract labor regular time	Labor	HR	41.5	$ 28.00	$ 1,162.00	
		5	Non-contract labor overtime time	Labor	HR	6	$ 42.00	$ 252.00	
		6	Non-productive time clearing	Labor	EA	1	$ 187.50	$ 187.50	
		7	Employment benefit loading	Overhead	EA	1	$ 70.50	$ 70.50	
		8	Retirement plan loading	Overhead	EA	1	$ 50.00	$ 50.00	
		9	Payroll taxes	Overhead	EA	1	$ 624.50	$ 624.50	
		10	Other employee benefit loading	Overhead	EA	1	$ 25.00	$ 25.00	
		11	Construction contract labor	Labor	HR	586.5	$ 80.00	$ 46,920.00	
		12	Construction overhead	Overhead	EA	1	$ 5,728.50	$ 5,728.50	
		13	Transportation	Transportation and Equipm	EA	1	$ 226.00	$ 226.00	
3			Contract labor, engineering					$ 30,024.00	
		1	Contract labor, engineering	Labor	HR	417	$ 72.00	$ 30,024.00	
4			Environmental study and surveying					$ 7,418.00	
		1	Environmental study	Labor	HR	38	$ 65.00	$ 2,470.00	
		2	Surveying - registered surveyor	Labor	HR	3	$ 73.00	$ 219.00	
		3	Surveying - AutoCAD services	Labor	HR	13	$ 63.00	$ 819.00	
		4	Surveying - three man field crew	Labor	HR	46	$ 85.00	$ 3,910.00	
5			Inspection services					$ 6,656.00	
		1	Inspection services	Labor	HR	128	$ 52.00	$ 6,656.00	
Total								$ 202,818.82	

Figure 5. Example 2 (Transmission Line Adjustment) – Item Disaggregation Analysis Worksheet.

To import items from the Items worksheet, click the Get Items button (Figure 5). Users can only enter components on component (yellow-background) rows. Initially, there is only one component row for each item. To add a component row, select a cell on a component row and click the "+" button. A new component row is then added below the selected cell. To delete a component row, select a cell on that row and click the "-" button.

For each component, select a cost category, and enter unit, quantity, and rate or unit price. The worksheet automatically calculates the total amount for each component, for each item, and for the entire project. Click the Calculate Total button in case the worksheet does not calculate amounts automatically. The drop down list of cost categories comes from the Cost Categories worksheet.

If a user adds, deletes, or changes item numbers or names in the Items worksheet, it is necessary to update the Item Disaggregation Analysis worksheet. To update this worksheet, click the Update Items button. This action does not erase units or quantities the user has entered

previously. Clicking the Update Items button also updates the drop-down cost category list if changes have been made to the Cost Categories worksheet, but does not update already populated cells in the cost category column (users need to manually update this information).

The Import Amounts button enables users to import amounts from the Unit Cost Analysis worksheet (in case this information is available and users are interested in providing an additional quality control to the data). To use this function, make sure that all items in the Unit Cost Analysis and the Item Disaggregation Analysis worksheets are the same as those included in the Items worksheet. Inconsistencies might appear if users update the list of items in the Items worksheet but only update the Unit Cost Analysis worksheet or the Item Disaggregation Analysis worksheet to reflect that change.

Cost Category Summary Worksheet

This worksheet enables utility owners to prepare a summary tabulation of the detailed cost information provided in the Item Disaggregation Analysis worksheet. Figure 6 shows an example of the Cost Category Summary worksheet for the Item Disaggregation Analysis worksheet shown in Figure 5.

To get items and category costs from the Item Disaggregation Analysis worksheet, click the Get Items and Category Costs button (Figure 6). The application automatically imports the data and populates the summary table. Note: There might be cases where the total amount is different from that shown in the Item Disaggregation Analysis worksheet. This might occur if the cost categories have been modified in the Cost Categories worksheet but there are blanks or obsolete cost categories listed in the Item Disaggregation Analysis worksheet. The reason is that the application reads the list of cost categories from the Cost Categories worksheet and then obtain cost data from rows in the Item Disaggregation Analysis worksheet for which there is a cost category match.

Get Items and Category Costs

Item No.	Item Name	Cost Category				Total
		Materials and Supplies	Labor	Overhead	Transportation and Equipment	
1	138 kV pole assembly (90 ft.)	$ 24,114.41	$ 48,521.50	$ 6,498.50	$ 226.00	$ 79,360.41
2	138 kV pole assembly (95 ft.)	$ 24,114.41	$ 48,521.50	$ 6,498.50	$ 226.00	$ 79,360.41
3	Contract labor, engineering	$ -	$ 30,024.00	$ -	$ -	$ 30,024.00
4	Environmental study and surveying	$ -	$ 7,418.00	$ -	$ -	$ 7,418.00
5	Inspection services	$ -	$ 6,656.00	$ -	$ -	$ 6,656.00
Total		$ 48,228.82	$ 141,141.00	$ 12,997.00	$ 452.00	$ 202,818.82

Figure 6. Example 2 (Transmission Line Adjustment) – Cost Category Summary Worksheet.

Cost Categories Worksheet

This worksheet provides a lookup table and description of cost categories used for the item disaggregation analysis (Figure 7). As mentioned, users cannot enter cost categories manually in the Item Disaggregation Analysis worksheet if they are different from those listed in the Cost Categories worksheet. To add cost categories, it is necessary to add them to the Cost Categories worksheet.

The Cost Categories worksheet is protected to prevent unintentional changes to the list of cost categories. To add or edit cost categories, authorized TxDOT users need to unprotect the worksheet. After making the desired changes, click the Update Cost Category button to make the list of cost categories available in the Item Disaggregation Analysis worksheet. After completing this step, protect the worksheet again and save the file.

Cost Categories

Update Cost Category

Cost Category	Description
Materials and Supplies	This category includes materials and supplies needed for the utility adjustment.
Labor	This category includes wages and salaries of personnel involved in the utility adjustment, including supervisory labor, preparation of plans, and estimate and agreement documents.
Overhead	This category includes overhead amounts in connection with other categories. Overhead charges must be detailed separately.
Transportation and Equipment	This category includes transportation, meals, and lodging expenses required by a utility company's workforces in remote areas. Equipment and rental costs include equipment type, size, and actual rates.

Note: See the TxDOT ROW Utility Manual for additional information about allowable charges under each category.

Figure 7. Cost Categories Worksheet.

Definitions Worksheet

This worksheet provides definitions of basic terms used in the workbook, such as item, component, and cost category (Figure 8). Users can add or edit definitions as needed.

Element	Definition
Item	An item is a logical division of the utility work to be conducted in the field, which has the following properties: • It can be measured directly in the field or by using plan quantities. • It is directly relevant and needed for the production of the work. • It provides a reasonable elvel of disaggregation that addresses the needs of all parties involved.
Component	A component is one of the cost elements that makes up an item and can be associated with a cost category.
Cost Category	A cost category is a grouping of cost components that are needed for the production of work at the item, group of items, or project level that provide a reasonable level of aggregation of cost components.

Figure 8. Definitions Worksheet.

APPLICATION ARCHITECTURE

The application includes one main module (called Global_1) and two class modules. The main module includes global constants and two global functions, as follows:

- gColLetter. This function converts a column number to a corresponding letter.

- gGetTotalItem. This function counts the total items entered.

The two class modules define two classes (ConstructionItem and Project) used in the workbook.

The worksheets include a large number of routines. The most important routines in the Items worksheet are as follows:

- InsertRow. This routine adds an item row right after the current cell when users click the "+" button.

- DeleteRow. This routine deletes an item row at the current cell when users click the "-" button.

- MoveRows. In order to add a new row, the worksheet needs to move all the rows below the current row down. The worksheet uses this sub routine to move a block of rows to a new location.

- RemoveAllItemsInAllSheets. This routine deletes all items on all worksheets in the workbook.

- DeleteAllItems. This routine deletes all items on the Items worksheet only.

- ProtectThisSheet. This routine protects the structure of the worksheet from alteration.

The most important routines in the Unit Cost Analysis worksheet are as follows:

- GetItems. This routine erases all items on this worksheet, including user-entered data, and imports all items into the Item worksheet.

- ProtectThisSheet. This routine protects the structure of the worksheet.

- DeleteAllItems. This routine deletes all items on the worksheet, preparing for importing items from the Item worksheet.

- InsertItems. This routine inserts items from the Item worksheet.

- FormatCells. This routine inserts formulas to calculate item amounts and the total amount. This routine also set number formats for cells.

- ImportAmountFromItemDisaggregation. This routine imports item amounts on the Item Disaggregation Analysis into this worksheet.

The most important routines in the Item Disaggregation Analysis worksheet are as follows:

- GetAllItems.   This routine imports all items form the Item worksheet.

- DeleteAllItems. This routine deletes all items on the worksheet preparing for importing items.

- UpdateAllItems.   This routine updates all items on the worksheet with items on the Item worksheet. This routine retains all the numbers already on the worksheet.

- InsertInitialItems. This routine inserts all items into the Item worksheet into this worksheet.

- SetAllCellsFormat. This routine sets color and font style.

- InsertRow. This routine inserts new component rows when users click the "+" button.

- DeleteRow. This routine deletes a component row when users click the "-" button.

- ImportAmountFromUnitCostAnalysis. This routine imports item amounts from the Unit Cost Analysis worksheet.

- DeleteAnItemAndItsComponents. This routine deletes an item and all components of this item on the worksheet.

The most important routines in the Cost Category Summary worksheet are as follows:

- GetItems_CalculateCategoryCost. This routine gets all items and calculates item cost by category.

- DeleteAllItems. This routine deletes all items on the worksheet, preparing for importing items from the Items worksheet.

- ImportItemCategoryCost. This routine imports item costs by category from the Item Disaggregation Analysis.

- InsertItems. This routine inserts an item into the worksheet.

- SetFormatAndFormula. This routine sets formats and formulas for cells.

- CalculateTotalCost. This routine calculates total cost of all items.