LAB 18 - Tab Sheets

This lab demonstrates the functionality build into the standardized tab sheets. It highlights the ability to quickly modify the sheet's structure by adding and removing columns and dividing the sheet so that it will fit within the sheet border. The functionality is similar with all of the standardized tab sheets. This lab uses the DES_Tabulation of Surfacing.xls file for the exercises.

Chapter Objectives:

- Update the Pay Item File location
- Add additional columns to the table
- Delete columns from the table
- Modify fields associated with asphalt pay items
- Add additional rows to the table
- Enter data in the new rows and columns
- Divide the main sheet into sub sheets
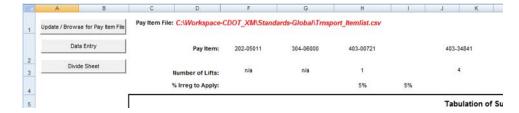- Link the sub sheets to a MicroStation sheet border.

The files used in this lab are:

- C:\Projects\12345\Design\Drawings\Tabs\12345DES_Tabulation of Surfacing.xls
- C:\Projects\12345\Design\Drawings\12345DES_TabMisc##.dgn
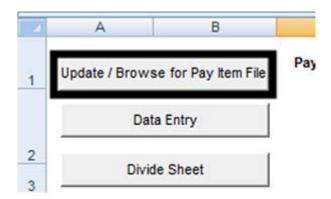
Lab 18.1 - Update the Pay Item File location

In order for the tab sheet to function properly, it must access the Trnsport_Itemlist.csv file. The location of this file is specified in cell D1 of the Surfacing Sheet worksheet. This exercise demonstrates how to select the the Trnsport_Itemlist.csv file's location.

1. Start Excel and select **File > Open**.

2. In the *Open* dialog box, navigate to *C:\Projects\12345\Design\Drawings\Tabs*.

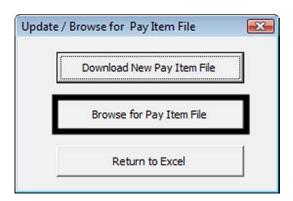3. Highlight the **12345DES_Tabulation of Surfacing.xls** file and **<D> Open**.

Notice that the text for the Pay Item File is red. This indicates that the file is not found. Without this file, additional pay items cannot be added. To locate the Trnsport_Itemlist.csv file:

4. **<D>** the **Update / Browse for Pay Item File** button. This displays the *Update / Browse for Pay Item File* dialog box.
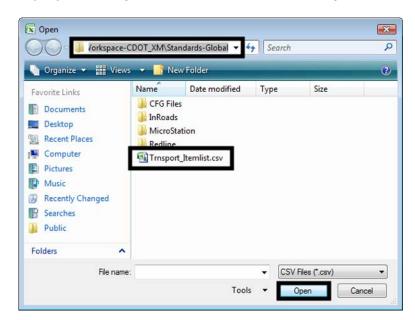

5. **<D>** The **Browse for Pay Item File** button. This displays the *Open* dialog box.

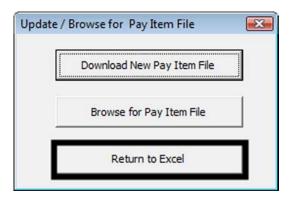6. Navigate to the *C:\Workspace\Workspace-CDOT_XM\Standards-Global* directory.

7. Highlight the **Trnsport_Itemlist.csv** file and **<D> Open**.
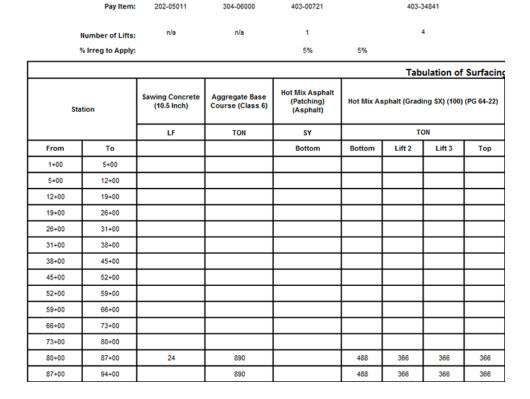

8. **<D>** the **Return to Excel** button in the *Update / Browse for Pay Item File* dialog box.

The text for the Pay Item File is now black, indicating that the Trnsport_Itemlist.csv file is available for use.
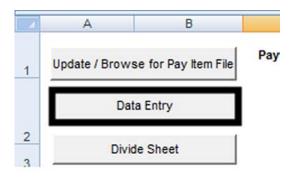
Lab 18.2 - Adding a Pay Item

There are times when additional pay items need to be added after work has begun on the tabulation sheet. The standardized tab sheet can add and sort the additional columns, keeping the existing data in the sheet with its proper pay item. In this exercise, a column for Removal of concrete pavement is added.
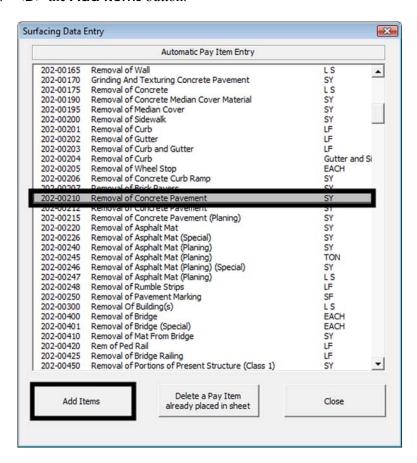
Pay Item:		202-05011	304-06000	403-00721		403-34841		
Number of Lifts:		n/a	n/a	1		4		
% Irreg to Apply:				5%	5%			

Station		Sawing Concrete (10.5 Inch)	Aggregate Base Course (Class 6)	Hot Mix Asphalt (Patching) (Asphalt)	Hot Mix Asphalt (Grading SX) (100) (PG 64-22)			
		LF	TON	SY	TON			
From	To			Bottom	Bottom	Lift 2	Lift 3	Top
1+00	5+00							
5+00	12+00							
12+00	19+00							
19+00	26+00							
26+00	31+00							
31+00	38+00							
38+00	45+00							
45+00	52+00							
52+00	59+00							
59+00	66+00							
66+00	73+00							
73+00	80+00							
80+00	87+00	24	890		488	366	366	366
87+00	94+00		890		488	366	366	366

Tabulation of Surfacing

The illustration above shows the sheet before adding the column.

1. **<D>** the **Data Entry** button. This displays the *Surfacing Data Entry* dialog box.

2. Scroll down the list of pay items and highlight the **202-00210 Removal of Concrete Pavement** pay item.

3.   **<D>** the **Add Items** button.

4.   **<D> Close** to dismiss the ***Surfacing Data Entry*** dialog box.

Notice that the Removal of Concrete Pavement is now the first pay item column on the sheet. Also note that the data in the sheet was shifted to keep it with the proper pay item.

Pay Item:	202-00210	202-05011	304-06000	403-00721		403-34841		
Number of Lifts:	n/a	n/a	n/a	1		4		
% Irreg to Apply:				5%	5%			

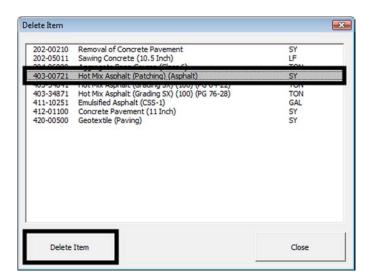| Station		Removal of Concrete Pavement	Sawing Concrete (10.5 Inch)	Aggregate Base Course (Class 6)	Hot Mix Asphalt (Patching) (Asphalt)	Hot Mix Asphalt (Grading SX) (100) (PG 64-22)			
		SY	LF	TON	SY	TON			
From	To				Bottom	Bottom	Lift 2	Lift 3	Top
1+00	5+00								
5+00	12+00								
12+00	19+00								
19+00	26+00								
26+00	31+00								
31+00	38+00								
38+00	45+00								
45+00	52+00								
52+00	59+00								
59+00	66+00								
66+00	73+00								
73+00	80+00								
80+00	87+00		24	890		488	366	366	366
87+00	94+00			890		488	366	366	366

The illustration above shows the sheet after the new column is added.

Lab 18.3 - Deleting a Pay Item

Sometimes pay items originally added to the sheet are not used. The standardized tab sheet can remove the specified columns and reorganize the remaining data. In this exercise, the column for patching asphalt is removed.
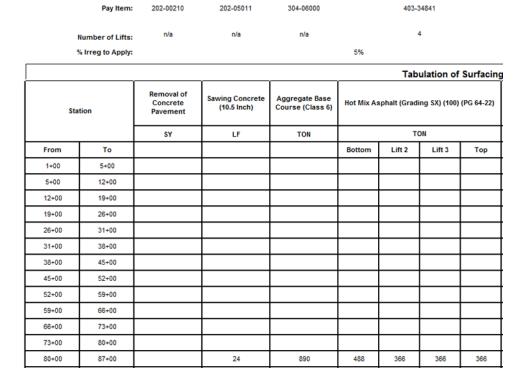
1. <D> the **Data Entry** button. This displays the *Surfacing Data Entry* dialog box.

2. <D> the **Delete a Pay Item already placed in sheet** button. This displays the Delete Item dialog box.

3. Highlight the **403-00721 Hot Mix Asphalt (Patching) (Asphalt)** pay item.

4.   **<D>** the **Delete Item** button.

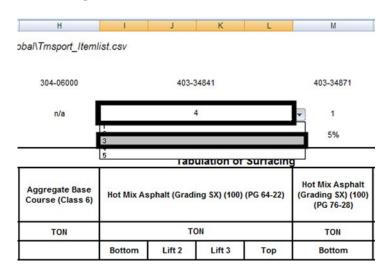5.   **<D> Close** on the *Delete Item* and the *Surfacing Data Entry* dialog boxes.

Notice that the patching asphalt column is gone and the columns to the right have shifted over. The illustration below shows the final layout.

Pay Item:	202-00210	202-05011	304-06000		403-34841		
Number of Lifts:	n/a	n/a	n/a		4		
% Irreg to Apply:				5%			

Tabulation of Surfacing

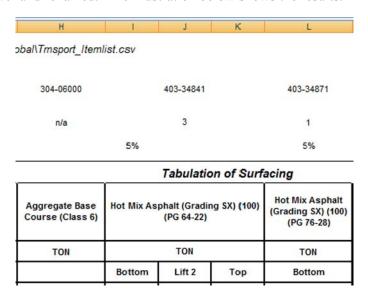| Station		Removal of Concrete Pavement	Sawing Concrete (10.5 Inch)	Aggregate Base Course (Class 6)	Hot Mix Asphalt (Grading SX) (100) (PG 64-22)			
		SY	LF	TON	TON			
From	To				Bottom	Lift 2	Lift 3	Top
1+00	5+00							
5+00	12+00							
12+00	19+00							
19+00	26+00							
26+00	31+00							
31+00	38+00							
38+00	45+00							
45+00	52+00							
52+00	59+00							
59+00	66+00							
66+00	73+00							
73+00	80+00							
80+00	87+00		24	890	488	366	366	366

Lab 18.4 - Additional Fields Associated with HMA Pay Items

Unlike concrete, asphalt pavement is laid down in a series of lifts. Each lift making up the total pavement thickness could be a different thickness and/or a different grade (which uses a different pay item code). The DES_Tabulation of Surfacing.xls In addition, extra material is often added to the first (Bottom) lift of asphalt to account for irregularities in the ground surface. These items are accounted for in the tabulation sheet with two fields outside of the table and a heading row within the table. For the exercise below, the pavement contains three lifts of PG 64-22 asphalt and one lift (the top lift) of PG 76-28 asphalt. The sheet shows four lifts of PG 64-22 asphalt and one lift of PG 76-28 asphalt listed as a bottom lift. It will also use an irregularity factor of 2% where the sheet currently shows 5%. The sheet will be modified to match the pavement description given above.

1. **<D>** in the Number of Lifts cell for the ***403-34841 Hot Mix Asphalt (Grading SX) (100) (PG 64-22)*** pay item. (cell I4 in this exercise)

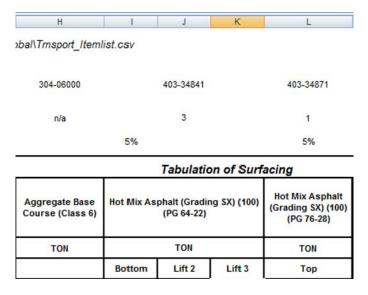2. Use the drop down menu and select **3** from the list.

The original Lift 2 row was deleted (including the data). The Lift 3 and Top rows were shifted over and renamed. The illustration below shows the results.

H	I	J	K	L
ɔbal\Trnsport_Itemlist.csv				
304-06000		403-34841		403-34871
n/a		3		1
	5%			5%

Tabulation of Surfacing

Aggregate Base Course (Class 6)	Hot Mix Asphalt (Grading SX) (100) (PG 64-22)			Hot Mix Asphalt (Grading SX) (100) (PG 76-28)
TON	TON			TON
	Bottom	Lift 2	Top	Bottom

Next, the lift headings for the Top lift of the PG 64-22 asphalt and the lift of PG 76-28 are modified.

3. **<D>** in cell **K9** (it reads Top under the PG 64-22 main heading).

4. Key in **_Lift 3_** and press the Enter key.

5. **<D>** in cell **K10**.

6. Key in **_Top_** and press the Enter key.

This changes the lift headings for the two asphalt items. The spreadsheet looks at these headings to determine if the irregularity factor is applied. The irregularity factor is applied to the Bottom lift only and if the PG 76-28 lift heading was not changed it would result in an erroneous total. The illustration below shows the changes made.

H	I	J	K	L
ɔbal\Trnsport_Itemlist.csv				
304-06000		403-34841		403-34871
n/a		3		1
	5%			5%

Tabulation of Surfacing

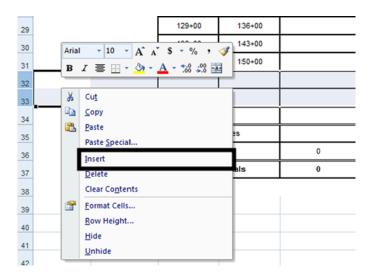| Aggregate Base Course (Class 6)	Hot Mix Asphalt (Grading SX) (100) (PG 64-22)			Hot Mix Asphalt (Grading SX) (100) (PG 76-28)
TON	TON			TON
	Bottom	Lift 2	Lift 3	Top

Finally, the irregularity factor for the PG 64-22 is changed. The irregularity factor for the PG 76-28 does not have to be changed because it is not a Bottom lift.

7. **<D>** in cell **I4**. This is the ***% Irreg to Apply:*** cell for the *4**03-34841 Hot Mix Asphalt (Grading SX) (100) (PG 64-22)*** pay item.

8. Key in *2* and press the Enter key. The change is made in cell I4. This value is used to determine the total amount of material used for irregularities at the bottom of the sheet.

Lab 18.5 - Adding Additional Rows

It is possible that additional rows for data are required. These can be added using the functionality built into Excel. In this exercise, two additional rows are needed.

1. Highlight rows **32** and **33**. To do this, **<D>** and hold on the row number 32 and drag through number 33 and release.

2. **<R>** in the highlighted area and select **Insert** from the menu.

The additional rows are added above row 32.

Lab 18.6 - Add Additional Data to the Sheet

Now that the sheet is set up, the quantities for the new columns and rows can be added. Station extents for the last five rows are needed. At the top of the sheet, quantities for removal of concrete pavement are added. At the bottom, the quantities associated with the asphalt pavement are added. (Note: on an actual project the quantity values are calculated based on design data prior to creating this sheet. Here we are inserting an arbitrary value to demonstrate the functionality of the sheet.)

1. **<D>** in cell **F10**. This is the first quantity cell of the removal of concrete pavement pay item.

2. Key in *132* and press the **Enter** key. This represents the number of square yards of concrete pavement removed between station 1+00 and 5+00.

3. Press **Enter** twice more. The cursor is in cell I13.

4. Key in *247* and press **Enter**.

5. Key in *316* and press **Enter**. This is in cell I14.

6. Scroll so that the **Project Totals** line is visible. The total for removal of concrete pavement is 695.

Next enter the station numbers for the last three lines. The stations are in 700 foot intervals.

7. **<D>** in field **C32**. This is the first empty cell in the *From* station field.

8. Key in *15000* and press the **Enter** key. This is 700 more the value in the cell above.

9. Continuing entering stations (adding 700 each time) down to cell C36.

10. Repeat this process in the To station column. The illustration below shows the completed station columns.

136+00	143+00	
143+00	150+00	
150+00	157+00	
157+00	164+00	
164+00	171+00	
171+00	178+00	
178+00	185+00	
Irregularities		
SubTotals		695
Project Totals		695

11. To finish the data entry, copy the data from row 31 – columns H through O into rows 32 through 36. The illustration below shows the completed data entry.

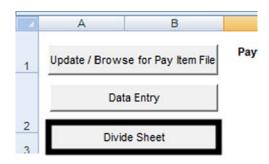| Station		Removal of Concrete Pavement	Sawing Concrete (10.5 Inch)	Aggregate Base Course (Class 6)	Hot Mix Asphalt (Grading SX) (100) (PG 64-22)			Hot Mix Asphalt (Grading SX) (100) (PG 76-28)	Emulsified Asphalt (CSS-1)	Concrete Pavement (11 Inch)	Geotextile (Paving)	Notes
		SY	LF	TON	TON			TON	GAL	SY	SY	
From	To				Bottom	Lift 2	Lift 3	Top				
1+00	5+00	132								1334		
5+00	12+00									1867		
12+00	19+00									1867		
19+00	26+00	247								1867		
26+00	31+00	316								1867		
31+00	38+00									1867		
38+00	45+00									1867		
45+00	52+00									1867		
52+00	59+00									1867		
59+00	66+00									1867		
66+00	73+00									1867		
73+00	80+00									1867		
80+00	87+00		24	890	488	366	366	245	176		2667	
87+00	94+00			890	488	366	366	245	176		2667	
94+00	101+00			890	488	366	366	245	176		2667	
101+00	108+00			890	488	366	366	245	176		2667	
108+00	115+00			890	488	366	366	245	176		2667	
115+00	122+00			890	488	366	366	245	176		2667	
122+00	129+00			890	488	366	366	245	176		2667	
129+00	136+00			890	488	366	366	245	176		2667	
136+00	143+00			890	488	366	366	245	176		2667	
143+00	150+00			890	488	366	366	245	176		2667	
150+00	157+00			890	488	366	366	245	176		2667	
157+00	164+00			890	488	366	366	245	176		2667	
164+00	171+00			890	488	366	366	245	176		2667	
171+00	178+00			890	488	366	366	245	176		2667	
178+00	185+00			890	488	366	366	245	176		2667	
Irregularities					146.4							
SubTotals		695	24	13350	7466.4	5490	5490	3675	2640	21871	40005	
Project Totals		695	24	13350	18446.4			3675	2640	21871	40005	

12. Examine the totals for the Asphalt pay items. Note:

   ♦ An irregularities total only for the bottom lift of asphalt

   ♦ Sub totals for each lift of PG 64-22

   ♦ A grand total for PG 64-22

Tabulation of Surfacing

Aggregate Base Course (Class 6)	Hot Mix Asphalt (Grading SX) (100) (PG 64-22)			Hot Mix Asphalt (Grading SX) (100) (PG 76-28)	Emulsified Asphalt (CSS-1)
TON	TON			TON	GAL
	Bottom	Lift 2	Lift 3	Top	
890	488	366	366	245	176
890	488	366	366	245	176
890	488	366	366	245	176
	146.4				
13350	7466.4	5490	5490	3675	2640
13350	18446.4			3675	2640

Lab 18.7 - Dividing the Surfacing Sheet into Sub Sheets

It the sheet is too long to fit inside the sheet border, there is a option to divide the master sheet into sub sheets of a specified number of data rows. When this option is selected, additional worksheets are added to the file that contain a part of the master sheet along with a sheet totals table. In this exercise, it was decided the 20 rows of data was the maximum per sheet. (this number will vary based on the tab sheet being used and additional information that may be included in the printable sheet.)

1. Scroll to the top of the sheet (if it is not there already).

2. **<D>** the **Divide Sheet** button. This displays the **Sheet Rows** dialog box.

3. Key in **20**. This is the number of data rows used on each sub sheet.

4. **<D> OK**.

Two sub sheets (Sub Sheet 1 and Sub Sheet 2) were created along with Sub Sheet Totals.

The master sheet (Surfacing Sheet) is left intact. To re divide the master sheet by a different number of rows, delete the sub sheets and run through the process again.

5. **Save** but do not close the file.

Lab 18.8 - Link the Sub Sheets to a MicroStation Sheet Border

The final step in creating the tab sheet is to link the Excel file to the MicroStation sheet border. Linking allows the Excel file to be updated and reflect those updates in the MicroStation file. In this exercise, Sub Sheet 1 is linked to the sheet border file. The process is the same for the other sub sheets.

The first step in linking the spreadsheet is to prepare the MicroStation file. The miscellaneous tab sheet border is copied and renamed to be the surfacing tab sheet.

1. Start MicroStation and open **12345DES_TabMisc##.dgn**.

2. Select **File > Save As** from the MicroStation menu bar.

3. Key in **12345DES_TabSurf01.dgn** in the File name field.

4. **<D> Save**. This creates the new file and opens it.

5. Bring Excel to the front.

6. Select the **Sub Sheet 1** worksheet.

7. Highlight cells **C2** through **P29**. This is the entire table.

8. Select **Edit > Copy** from the Excel menu bar.

9. Bring MicroStation to the front.

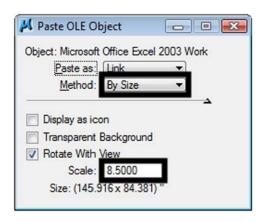10. Select **Edit > Paste Special** from the menu bar. This displays the *Paste Special* dialog box.

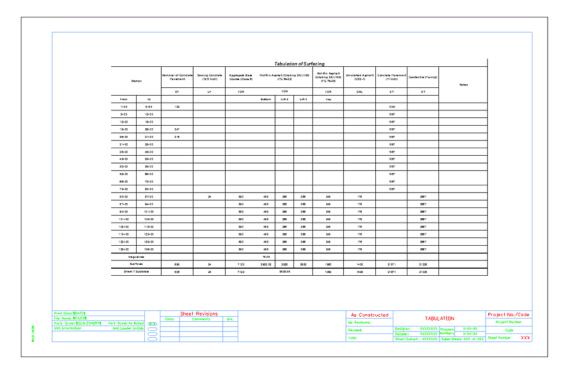11. In the *Paste Special* dialog box, highlight **Linked Microsoft Office Excel 2003 Worksheet**.

12. **<D> Paste**. This displays the *Paste OLE Object* tool settings box.

13. In the *Paste OLE Object* tool settings box, set the *Method* to **By Size**.

14. In the *Scale* field key in **8.500**. This makes the text in the Excel file the proper size for the MicroStation file.

15. A dashed box is connected to the cursor. This represents the size of the table that is being placed. Center it inside the sheet border and **<D>**. The file is now linked to the sheet border file.

16. The hatching in the table indicates that the Excel file is open. Bring Excel to the front and close it to remove the hatching. The illustration shows the final result.

17. **Close** MicroStation.

Chapter Summary:

- The tab sheets use the Trnsport_Itemlist.csv file to set the column headings for the tab sheet.

- The Trnsport_Itemlist.csv file is updated by ServerCop at log in or it can be manually updated.

- Programming that automates the layout and revision of the column headings is accessed through various buttons placed in the worksheet.

- Rows are added or deleted using standard Excel functionality.

- Large tab sheets can be divided to fit into multiple sheet borders.

- If the tab sheet is divided, a sheet totals table is also created.

- The tab sheets are linked to a MicroStation sheet border for printing