FDOT Entity Manager for Civil 3D

2015 Design Training Expo

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Centennial FDOT 1915 ★ 2015

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Overview of Application

What is Entity Manager?

Entity Manager or "EMX" on the command line entry is a special FDOT application that the user can use to draw or place items with the appropriate pay items attached. If you receive a file from an outside source you can also use EMX to append pay items to those objects in the file. What are defined as objects?
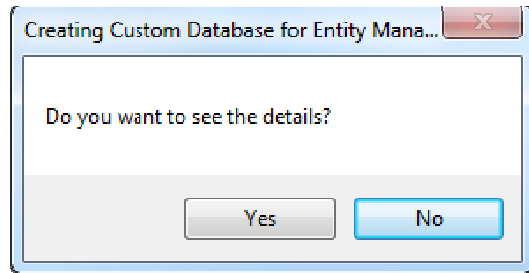
- Lines
- Polylines
- Arcs
- Circles
- Ellipses
- Alignments
- Feature Lines
- Multi Lines
- Geometric shapes
- Blocks
- Hatches
- Drainage Parts

You can find Entity Manager on the FDOT Ribbon in the Pay Item Tools Section
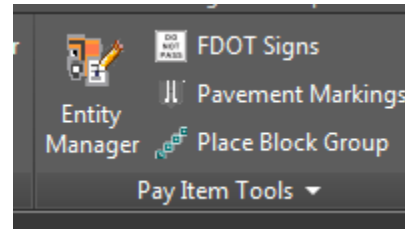
What is Entity Manager?

If this is the first time you launch the application in your file you will be asked if you want to see the details

Click No to save time. All this is telling you is that it is loading all of the Active Pay Items from the AECMERGE.xml file and creating a custom file named PayitemDB.xml which you should save with your project. It also would be prudent to save the file with a project specific name. Each time that AECMERGE.xml is updated on your workstation it will want to update the PayitemDB file which you can overwrite.

EMX knows the proper layer that objects go on. If you go to place an item and you get this message it is telling you that the layer does not exist in the file. If you see this you need to check and see if you have set up your drawing file with the proper template.

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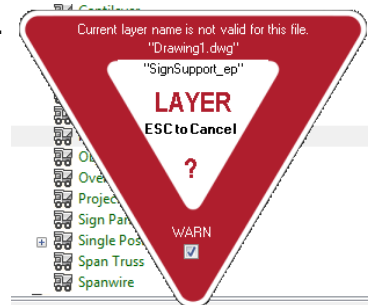
The Interface

TIP – You can single click in this box to launch a dialog box to open a new payitem file
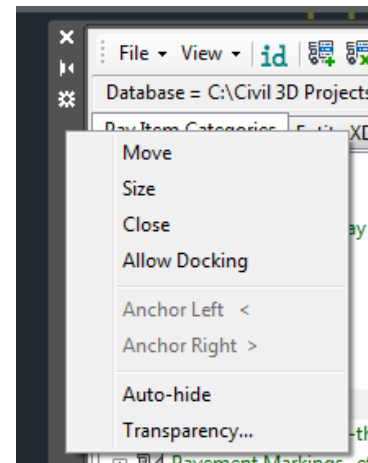
The interface behaves like any Civil 3D dialog box. You have the same behavior controls. Due to the size of the information I would recommend undocking and place on your second monitor.

Now let's look in detail what each icon and tab has to offer

Displays current location and Payitem file in use

Tree View Categories

Search Tools

Drawing Tools

Pay Item Details

The Interface

Open – Opens PayitemDB file
Save – Saves PayitemDB file
Save As – Saves PayitemDB file as a different name

Recent Files – Lists most recent PayitemDB file used
Export – Exports current file in AECMERGE format
Default – Recreates a new PayitemDB file. Reverts all changes you have made back to the original version

Id allows you to select an object in your file to read all of the Xdata attached. You can also click in the link to get to the adhoc data for editing

PayItem   0570 1 2

File ▾ View ▾ id

📂 Open...
💾 Save
💾 Save As...

Recent Files   ▸
Export...
📄 Default...

Erosion Control

View ▾ id
Show Categories
Hide Categories
Horizontal View
Structures

Show Categories –
Hide Categories – Exports current file in AECMERGE format
Horizontal View – Recreates a new PayitemDB file

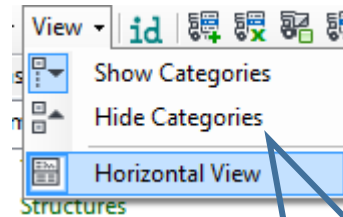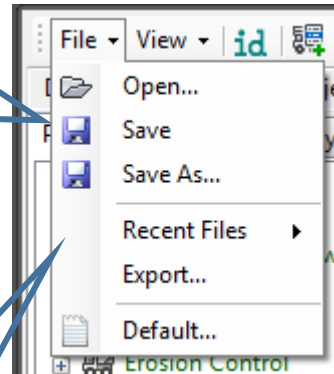Appends selected pay item data to object

Removes already placed pay item data from object

Edits already placed pay item data on object, **also is a shortcut to get to the adhoc editor**

Replaces already placed data with selected pay item data

Places a solid hatch pattern with selected pay item data

The Interface

When you select the id button and pick the pay item you have 4 options in the way the data is displayed. Typically displaying all data is the norm, however if you want to see less data the option exists (the Aeccxx data is used to quantify in QTO or TM)

FDOTEntityManager
- All pay item data
- FDOTEntityManager
- AeccUiQTOPayItemFormulaParameters
- AeccUiQTOEntityPayItemData

All pay item data

Name	Value
1001	*FDOTEntityManager*
1070	12
PayItem	0715 19113
Description	High Mast Light Pole, F&I, Wind Speed 150 MPH, Pol...
Layer	PoleLightHM
Block	HighMastPole
ComputeMethod	EA=IF(EA>0,EA*QF,(element_count)*QF)
ComputeMethodT...	0
QuantityFactor	1.00000
BlockScale	1.000000

FDOTEntityManager

Name	Value
1001	*FDOTEntityManager*
1070	12
PayItem	0715 19113
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ComputeMethod	EA=IF(EA>0,EA*QF,(element_count)*QF)
ComputeMethodT...	0
QuantityFactor	1.00000
BlockScale	1.000000

AeccUiQTOPayItemFormulaParameters

Name	Value
1001	*AeccUiQTOPayItemFormulaParameter*
1070	1
1070	1
1000	0715 19113
1070	2
1000	EA
1040	0
1000	QF

AeccUiQTOEntityPayItemData

| Name	Value
1001	*AeccUiQTOEntityPayItemData*
1070	2
1000	0715 19113

The Interface
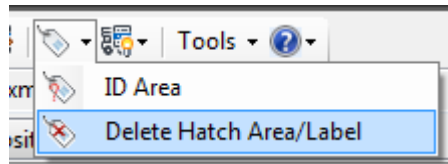
ID Area – Turns on the label which identifies the Area ID and area of hatch patterns

Delete Hatch Area/Label – When selected you can pick the hatch or label and both will be deleted from drawing

A **Single Click** brings up the Label Options where you can select universal Mtext label properties
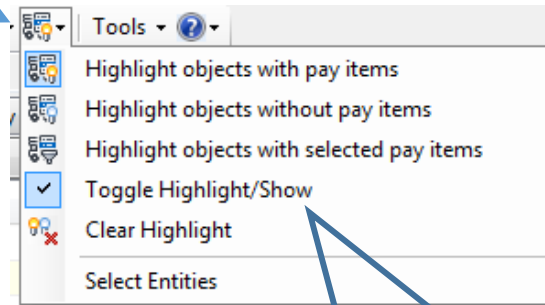
Highlight objects with pay items – Highlights objects in the drawing that have payitem data attached

Highlight objects without pay items – Highlights objects in the drawing that have NO payitem data attached

Highlight objects with selected pay items – Highlights objects in the drawing that have a specific pay item selected

Toggle Highlight/Show – Turns on the option to allow highlighting

Clear Highlight – clears the highlighting from objects in the file. (Regen also clears highlighting)

Select Entities – When highlighted you can select such objects
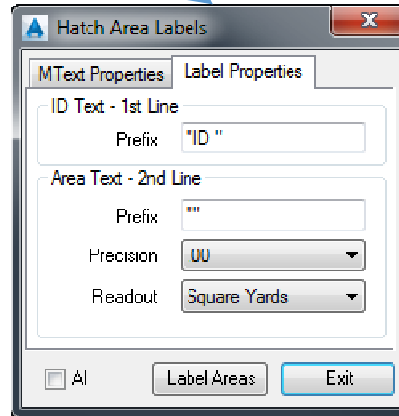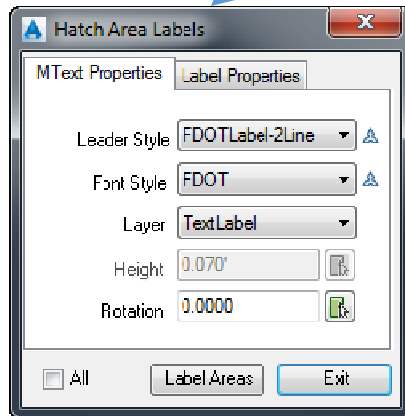
The Interface

Show Layer Warning – Turns on the Red Layer warning Shield when trying to place an object on a non standard layer

Show Drawing Tools –Toggles the display of the drawing tools located on the bottom of the application
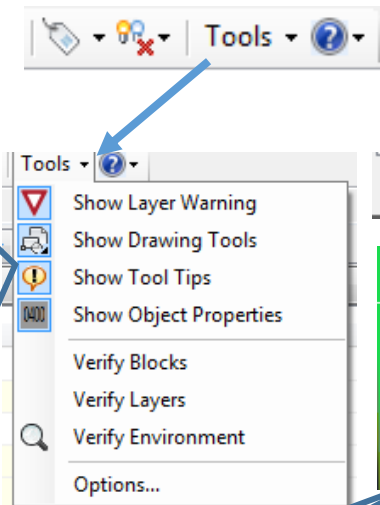
Show Tool Tips – Toggles the display of tool tips when hovering over icons

Show Object Properties – When hovering over an object the truck symbol appears and displays the XData
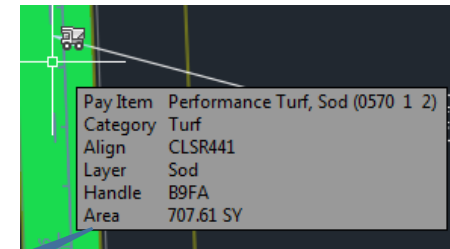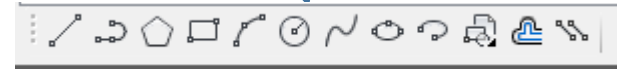
Verify Blocks – Verifies that all required blocks are in the block libraries that are called for and will report in the log file if any are missing

Verify Layers – Verifies that the appropriate layers are present and will report in the log file if missing

Verify Environment – Used by the development team at ECSO to troubleshoot the users system environment
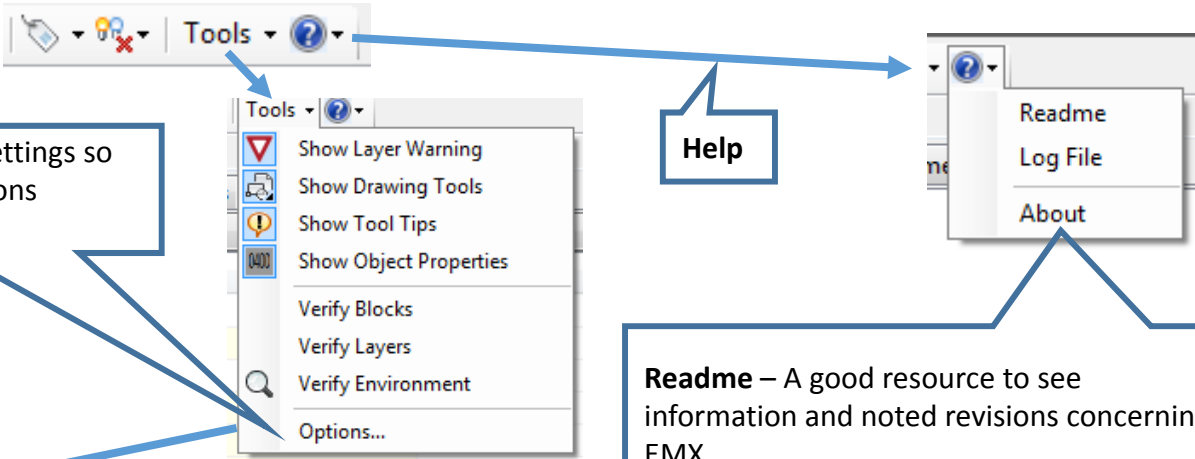
Drawing Tools

Tools

Show Layer Warning
Show Drawing Tools
Show Tool Tips
Show Object Properties

Verify Blocks
Verify Layers
Verify Environment

Options...

Pay Item   Performance Turf, Sod (0570 1 2)
Category   Turf
Align   CLSR441
Layer   Sod
Handle   B9FA
Area   707.61 SY

Object XData

Verify System Environment

FDOT Environment Inspector

Constants
Release Version: FDOT2015.C3D
Profile Name: FDOT2015C3D
Plot Device Name: FDOTPDF.pc3
Media Name: ANSI_B_(11.00_x_17.00_Inches)

Registry Variables
Installation Location: C:\Program Files\Autodesk\AutoCAD 2015\
ProgId: AutoCAD.Application.20.0
Local Directory: C:\FDOT2015.C3D\
Projects Directory: C:\Civil 3D Projects\
Server Directory: C:\FDOT2015.C3D\

Environment Variables
Local Directory: C:\FDOT2015.C3D\
Projects Directory: C:\Civil 3D Projects\
Server Directory: C:\FDOT2015.C3D\

Directory Variables
Apps Directory: C:\FDOT2015.C3D\APPS\
Apps Utl Directory: C:\FDOT2015.C3D\APPS\UTL\
Data Directory: C:\FDOT2015.C3D\Data\
Templates Directory: C:\FDOT2015.C3D\Data\templates\
Project Template Directory: C:\FDOT2015.C3D\FDOT Project Template\
Support Directory: C:\FDOT2015.C3D\Support\
Profile Directory: C:\FDOT2015.C3D\Support\Profiles\
Plot Directory: C:\FDOT2015.C3D\Support\Plot\

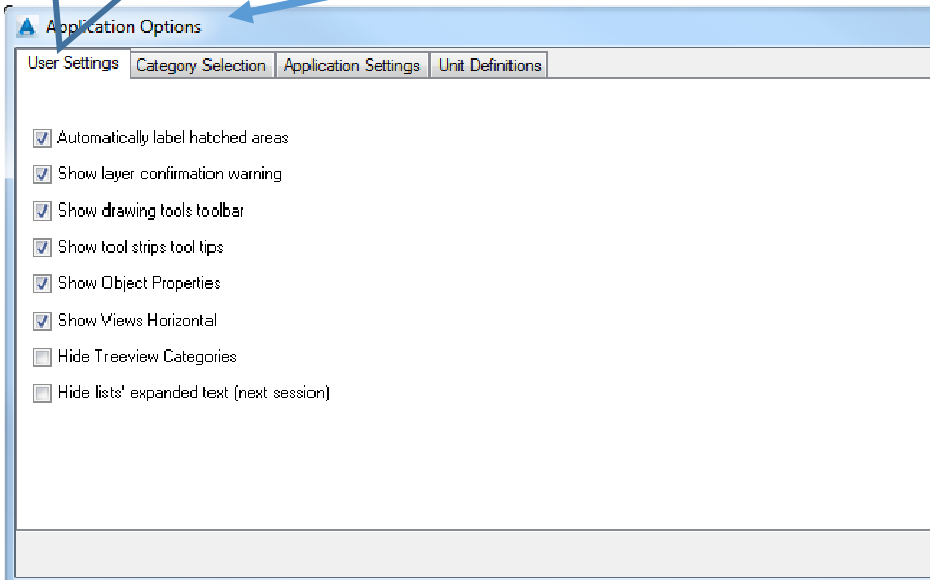2015 Design Training Expo

User Options

Options – Application settings so user can customize options

Help

Tools ▾
- ▽ Show Layer Warning
- Show Drawing Tools
- ⓘ Show Tool Tips
- [40] Show Object Properties
- Verify Blocks
- Verify Layers
- 🔍 Verify Environment
- Options...

Readme
Log File
About

User Settings Tab, another location to change some of the settings that were shown earlier

Readme – A good resource to see information and noted revisions concerning EMX

Log File – This is where all of your verify reports, error messages go. It creates a text file that you can open. During support calls we may ask you to send us this file so the developer can address errors

**About** – Displays the version number

A Application Options

| User Settings | Category Selection | Application Settings | Unit Definitions |

- ☑ Automatically label hatched areas
- ☑ Show layer confirmation warning
- ☑ Show drawing tools toolbar
- ☑ Show tool strips tool tips
- ☑ Show Object Properties
- ☑ Show Views Horizontal
- ☐ Hide Treeview Categories
- ☐ Hide lists' expanded text (next session)

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User Options

Category Selection – User can customize which categories show in the category view tree if working with a select group of pay items. By default all categories are displayed
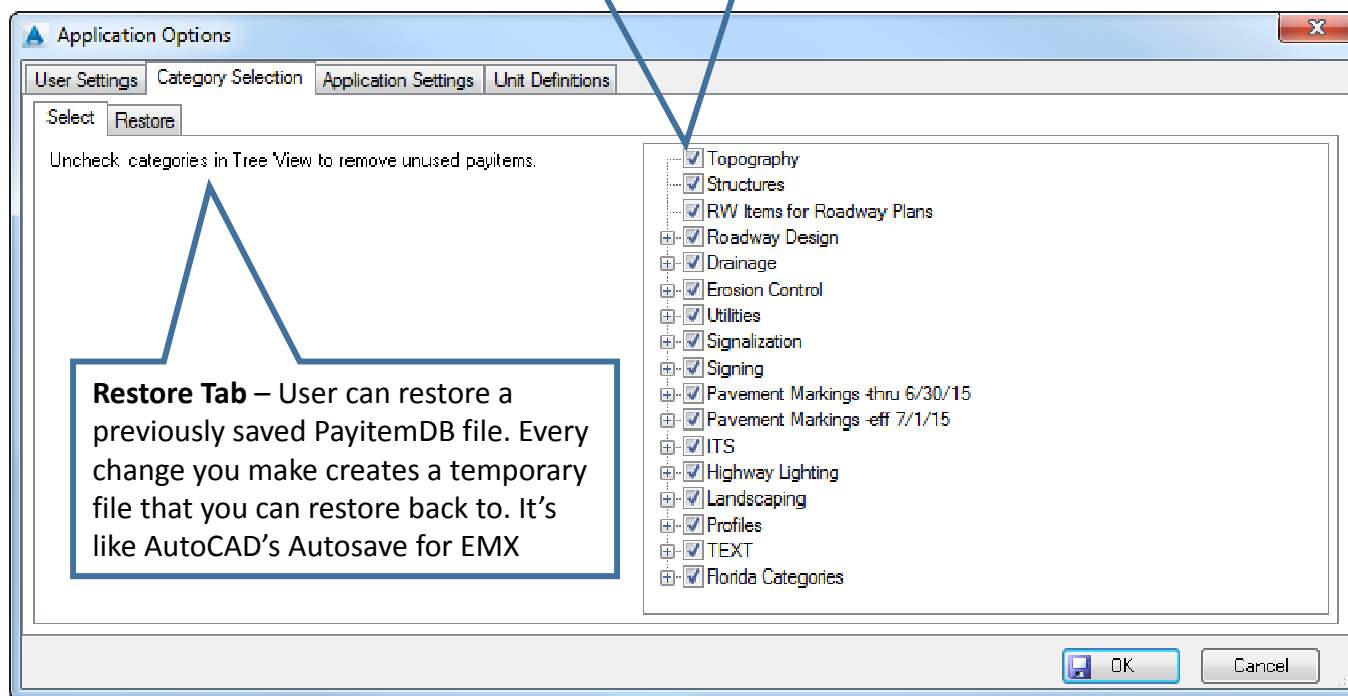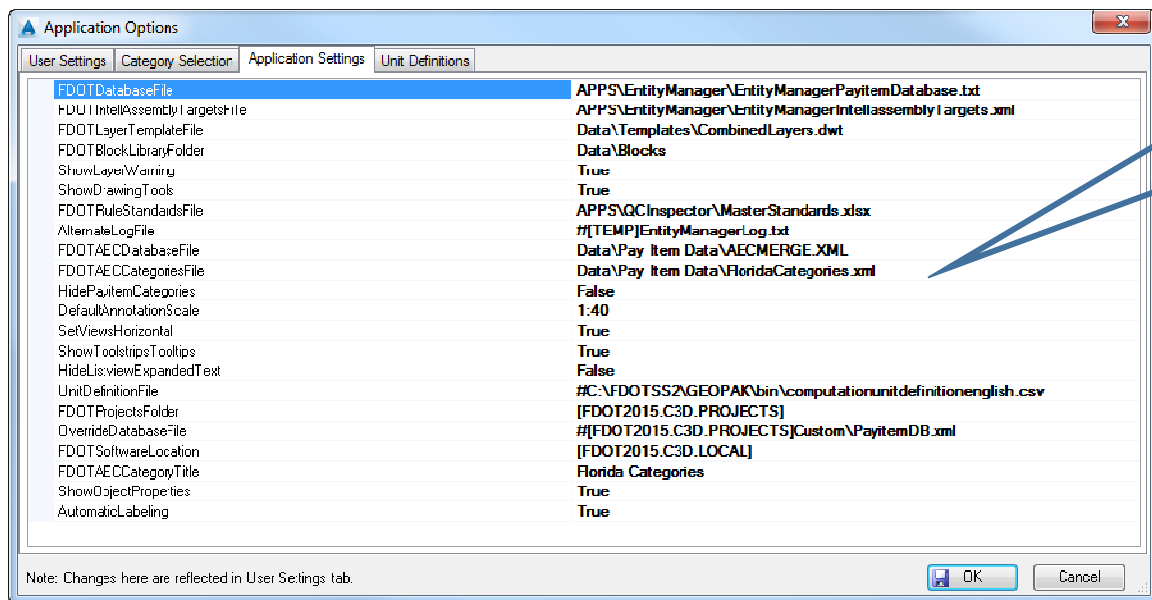
Restore Tab – User can restore a previously saved PayitemDB file. Every change you make creates a temporary file that you can restore back to. It's like AutoCAD's Autosave for EMX
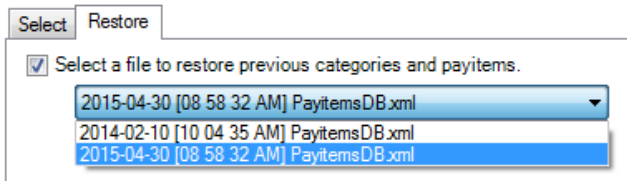
**Note- Florida Categories can not be unchecked**

User Options

Application Settings Tab – Shows a summary of all current settings in the file, used by support to verify settings

Unit Definitions Tab – A good resource to see how quantities are calculated and what formula is used along with the unit and definition. Note- This is for reference only, do not edit unless a special need.
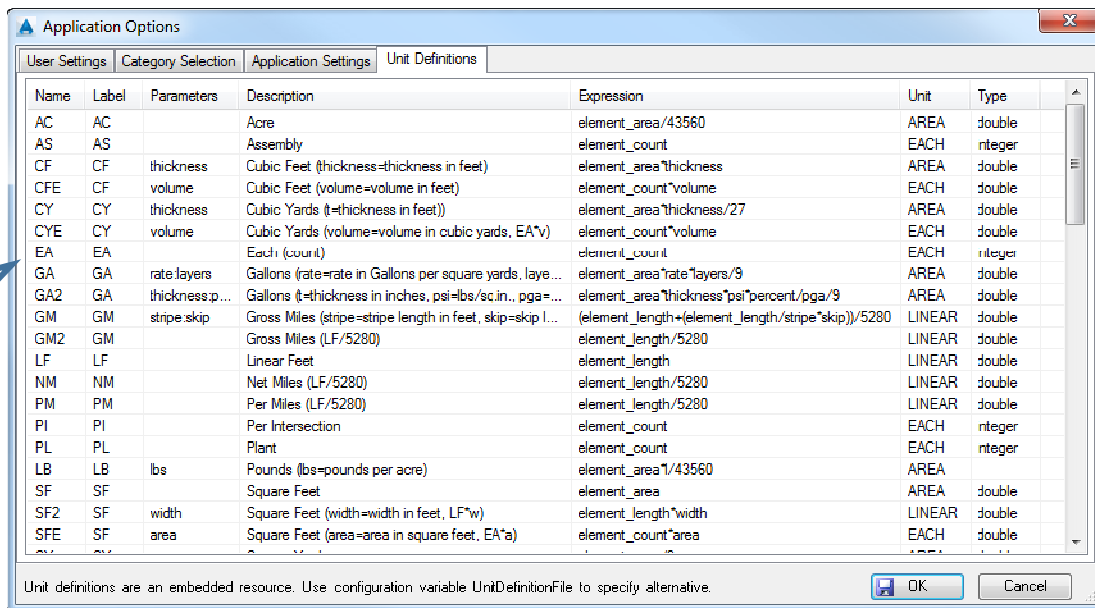
Main Options

Pay Item Categories Tab – Displays the tree list of categories. As seen here you expand an sub category to get to the type of item you want to place.

With the item selected in the above tree view the individual items appear here.

Main Options

Entity XData Tab – Displays the individual components that make up the Xdata of each item. The blue number represents a link that you can click on to edit adhoc data. This will be covered in detail later

Selected Tab – Allows user to build a list of Pay Items that can be appended to one object. For example if you had an object with 3 different pay items you could add them all here and then draw, place, or append. **To add items select and right click.** To place items make sure they are checked. User will be warned if this option is active.

Alternate Category- Shows you the same item inside the Florida Categories which reads the AECMERGE file

File ▾ View ▾ | id | 🗐 🗐 🗐 🗐 🗐 | 🏷 ▾ 🦟 ▾ | Tools ▾

Database = C:\Civil 3D Projects\PayitemDB.xml

Pay Item Categories | Entity XData | Selected | Alignments

All pay item data

Name	Value
1001	FDOTEntityManager
1070	13
PayItem	0570_1_2
Description	Performance Turf, Sod
Layer	Sod
Block	
ComputeMethod	SY=IF(SY>0,SY*QF,(element_area/9)*QF)
ComputeMethodT...	0
QuantityFactor	1.00000
BlockScale	
BlockLibrary	
CategoryPath	Roadway Design\Quantity Features\Turf
AlignmentName	CLSR441
adhoc	"DESIGN NOTES",1,0,""
adhoc	"SY",5,1,"0"

Pay Item Categories	Entity XData	Selected	Alignments

Pay Item Id	Description
☐ 0570 1 1	Performance Turf
☐ 0162 1 12	Prepared Soil Layer, Finish Soil Layer, 12"
☐ 0107 2	Mowing

Favorites ▾ | Text filter | 🔻 ▾ Pay item to find | 🔍

PayItem	Description	Layer	Block
0107 1	Litter Removal and Disposal	MowingAreaL...	
0107 2	Mow...	MowingAreaL...	
0162 1 11	Prep	Sod	
0162 1 12	Prep	Sod	
0162 1 21	Prep	Sod	
0162 1 23	Prep	Sod	
0162 1 31	Prep	Sod	
0162 1 32	Prep	Sod	
0162 1 33	Prep	Sod	
0570 1 1	Perf	Sod	

Right-click menu:
- Place Polyline
- Assign Pay Item
- Assign Pay Item to Area
- Add To Favorites
- Add To Selected
- Alternate Category
- Insert Pay Item Data
- Edit Pay Item Data
- Delete

Add pay item(s) to Selected Payitems list

⊞ 🗐 TEXT
⊞ 🗐 Florida Categories

Main Options

Alignments Tab – Shows user what shapes are associated with the Alignments in the file.

File ▾ View ▾ | id | 🗗 🗗 🗗 🗗 🗗 | 🏷 ▾ 🔩 ▾ | Tools ▾ ❓ ▾

Database = C:\Civil 3D Projects\PayitemDB.xml

Pay Item Categories | Entity XData | Selected | **Alignments**

Select an alignment name to associate with the pay item data attached to each entity. The alignment name will be written to XData on each Placement or Entity Edit action.

Alignment [CLSR441 ▾] 🔄 📲

⊟ C:\TAB Meeting\29640115201 Dataset\roadway\QTD RD01.dwg
  ⊟ CLSR441
     ID 2A886 (263.96 SY)
     ID 1420C (214.79 SY)
     ID 14037 (260.49 SY)
     ID BB3C (224.80 SY)
     ID BA9B (143.76 SY)
     ID B9FA (707.61 SY)
     ID AB30 (992.32 SY)
  ⊞ CrossStreet C

Selection – Allows user to select the Alignment in the file

You can select a shape to activate the "zoom to" feature
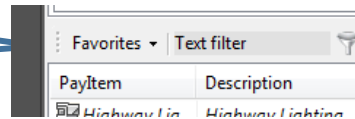

ID 2A886
263.96 SY
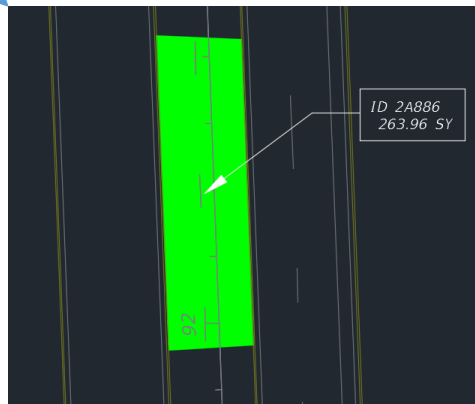
Refresh – If new items are placed in a file refreshing will re populate the list with new shape Id's and areas. **You can select a shape to activate the zoom to feature**
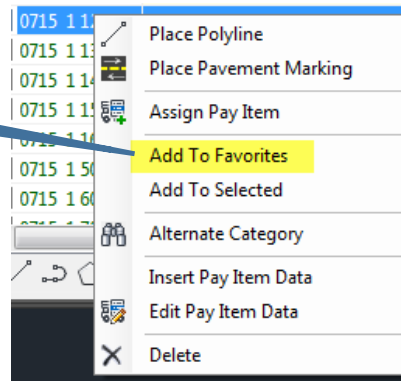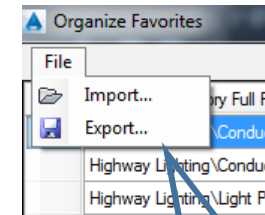
Favorites

Favorites – Located next to the search tools there is a Favorites option
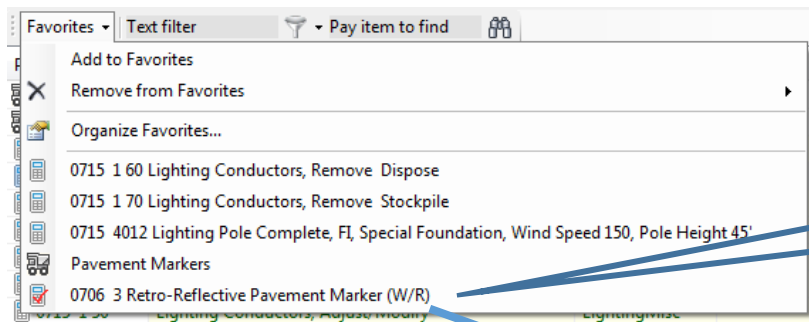
Favorites ▾ | Text filter

PayItem	Description
Highway Lig...	Highway Lighting

You can add individual Pay Items or Categories to your favorites list.

To add items make a selection and right click & Add to Favorites

0715 1 1...
0715 1 1...
0715 1 1...
0715 1 1...
0715 1 1...
0715 1 1...
0715 1 50...
0715 1 60...

Place Polyline
Place Pavement Marking
Assign Pay Item
Add To Favorites
Add To Selected
Alternate Category
Insert Pay Item Data
Edit Pay Item Data
✕ Delete

Organize Favorites

File
Import... ...ory Full Pat...
Export... ...\Conducto...

Highway Lighting\Conducto...
Highway Lighting\Light Pol...

Organize Favorites – Provides a list where you can add or delete. You can also Import/Export your list for future use or to transfer to another PC or user.

Favorites ▾ | Text filter | ▾ Pay item to find | 🔍

Add to Favorites
✕ Remove from Favorites ▶
Organize Favorites...
0715 1 60 Lighting Conductors, Remove Dispose
0715 1 70 Lighting Conductors, Remove Stockpile
0715 4012 Lighting Pole Complete, FI, Special Foundation, Wind Speed 150, Pole Height 45'
Pavement Markers
0706 3 Retro-Reflective Pavement Marker (W/R)

0715 1 90   Lighting Conductors, Adjust/Modify   LightingWise

Favorites Pull-down – Options allow users to Add, Remove, & Organize. If you pick one of your favorites it will take you to your selection in the list

0706 3	Retro-Reflective Pavement Marker (MD/W)	RPM1	RPMWhtM...
0706 3	Retro-Reflective Pavement Marker (MD/Y)	RPM3	RPMYelMo...
0706 3	Retro-Reflective Pavement Marker (Y/Y)	RPM4	RPMYelYel
0706 3	Retro-Reflective Pavement Marker (W/R)	RPM2	RPMWhtRe...
0706 3	Retro-Reflective Pavement Marker (W/R)	RPM5	RPMYelRed
Audible Pav...	Pavement Markings -thru 6/30/15\Audible Pavemen...		
Open Graded	Pavement Markings -thru 6/30/15\Audible Pavemen...		

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Search & Drawing Tools

Search – You can search two ways. You can enter a partial description using the text filter on the left or if you know the exact pay item number use the pay item to find on the right

Reapply or Clear your searches
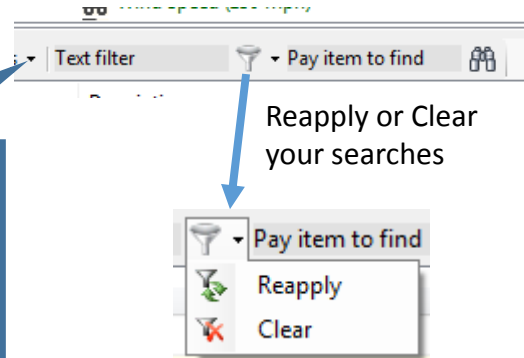
TIP - If you undock the EMX application and want to perform a search you have to click inside the text filter box and let your mouse hover inside of it to be able to enter text.

Text filter for pay items

Highway Lighting\Conductors
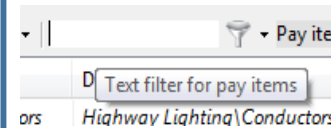
Drawing Tools in order from Left to Right

- ❑ Line
- ❑ Polyline
- ❑ Polygon
- ❑ Rectangle
- ❑ Arc
- ❑ Circle
- ❑ Ellipse
- ❑ Ellipse Arc
- ❑ Block Insert
- ❑ Offset
- ❑ Multi Lines

Drawing Tools – Provides user ability to use AutoCAD commands to draw entities while having the pay item Xdata attached

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Using Entity Manager

Drawing Items

1. Expand Categories to Guardrail
2. Select Pay Item # 0536 1 1 Roadway (Left)
3. Select the Polyline option from the drawing tools and draw in the file
4. Hover over the Guardrail and look at the Xdata attached

Pay Item	Guardrail - Roadway (Left) (0536 1 1)
Category	Guardrail
Align	CLSR441
Layer	GuardrailLt
Handle	16810
Length	172.48 FT
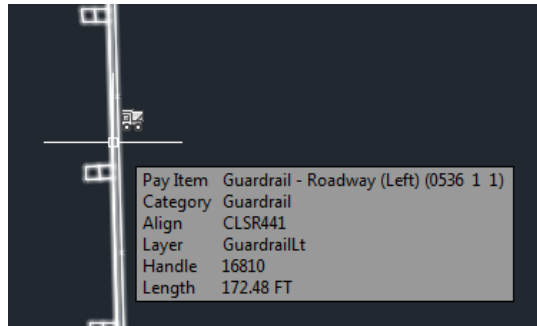
5. Now select the **id** button and look at your command line for instructions.

   `FDOT_EMX_IDENTIFYENTITY Select objects:`   Pick the guardrail and press enter

6. The Entity XData tab should be active now. Select the blue link 0536 1 1 . The Edit Attributes/Adhocs dialog box should be open
7. Under Alignment you now re assign Alignment Association

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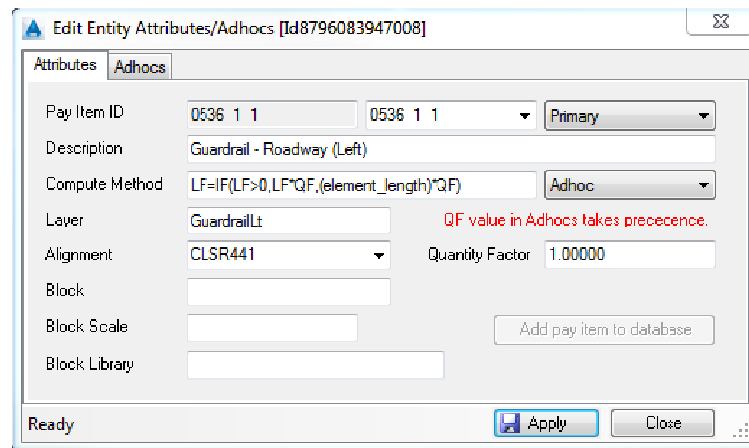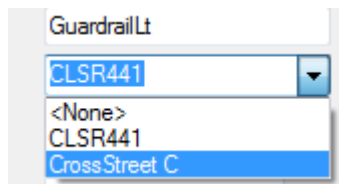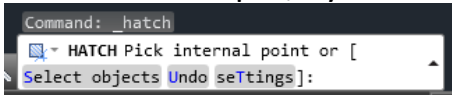
Working with Shapes

1. Using the text search option type in sod. Select the following

   | 0570 1 2 | Performance Turf, Sod | Sod |
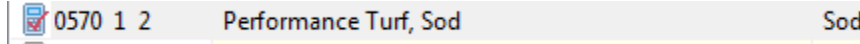
2. You can either flood a closed area by picking on the screen or draw some temporary lines to close an area so you can flood it. **Be careful not to draw a polygon (with the drawing tools) with the sod selection selected because the area will be counted twice unless you delete the polygon.** You can pick areas to flood from an Xref file too!

3. For this example just draw 2 temp. construction lines to create a closed region In the example below we will place a sod hatch in a median from an Xref file. Pick the Truck Symbol with the Green Hatch Box
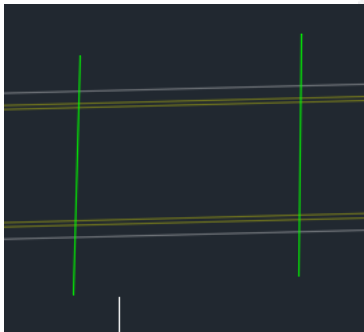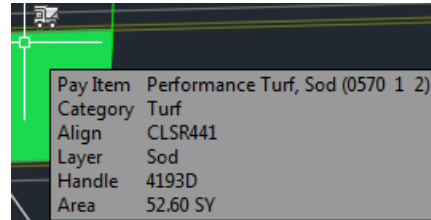
4. Look at your command line for input, by default you can select a point inside your boundary region. Pick a point inside the median between the two construction lines. *If you had a defined boundary you would type "S" for Select Objects* on the command line.

Working with Shapes

5. Once you left click to hatch inside the area press enter and a label appears that you can drag out of the way.
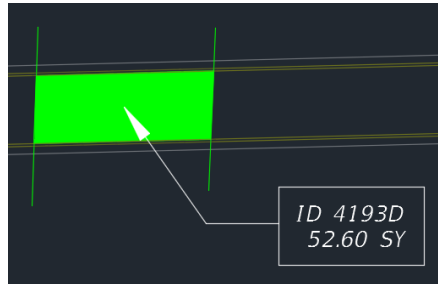
Looking at the Xdata attached to the hatch just placed you can see the alignment associated. If you need to change association it is the identical process as shown earlier with the guardrail example.
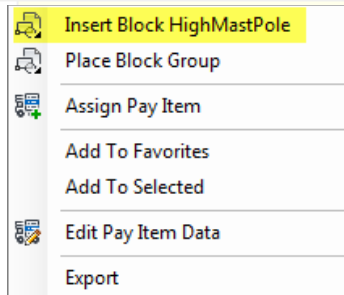
The Area ID (same as the handle designation in the Xdata hover) is used to identify the shape and will appear in the "Summary of Performance Turf" Excel Spreadsheet

Placing Blocks

1. To place blocks with pay items browse to the appropriate item and right click < Insert Block.

PayItem	Description	Layer	Block	ComputeMethod
ELP	Street Light Pole	Luminaire_ep	LP	
LP	Street Light Pole	PoleLight	PoleLum	
0715 19111	High Mast Light Pole, F&I, Wind Speed 150 MPH, Pol...	PoleLightHM	HighMastPole	EA=IF(EA>0,EA*QF,(element_count)*QF)
0715 19112	High Mast Light Pole, F&I, Wind Speed 150 MPH, Pol...	PoleLightHM	HighMastPole	EA=IF(EA>0,EA*QF,(element_count)*QF)
0715 19113	High Mast Light Pole, F&I, Wind Speed 150 MPH, Pol...	PoleLightHM	HighMastPole	EA=IF(EA>0,EA*QF,(element_count)*QF)
0715 19119	High Mast Light Pole, F&I, Wind Speed 150 MPH, Cu...	PoleLightHM	HighMastPole	EA=IF(EA>0,EA*QF,(element_count)*QF)

Menu:
- Insert Block HighMastPole
- Place Block Group
- Assign Pay Item
- Add To Favorites
- Add To Selected
- Edit Pay Item Data
- Export

There is good information visible in the above list.

- ❑ PayItem Number
- ❑ Description from BOE
- ❑ Layer it is assigned to
- ❑ Block Name that is used
- ❑ Formula used for Calculation

Right Click Shortcut Menu
Insert Block "Name" –Inserts selected block . You can also use the Insert block button on the drawing tools toolbar to use the AutoCAD method
Place Block Group – Opens the "Place Block Group" application to place using that method. *TIP- depending on the item you select "Pavement Markings Tool" maybe an option*
Assign Pay Items – Applies the selected pay item data to objects selected in drawing
Add To Favorites – Adds selection to your favorites list
Add To Selected – Adds to your selected group so you can add all at once

Subtleties

Paint Brush Symbol reflects that a Formula is not assigned but item can still be drawn or placed with associated block and layer

Gold Color text reflects drafting elements that can be drawn or placed, however if you need to use a Gold colored item as a pay item, that represents a problem and you should notify ECSO

PayItem	Description	Layer	Block	ComputeMethod
🖌 ELP	Street Light Pole	Luminaire_ep	LP	
🖌 LP	Street Light Pole	PoleLight	PoleLum	
📄 0715 19111	High Mast Light Pole, F&I, Wind Speed 150 MPH, Pol...	PoleLightHM	HighMastPole	EA=IF(EA>0,EA*QF,(element_count)*QF)
📄 0715 19112	High Mast Light Pole, F&I, Wind Speed 150 MPH, Pol...	PoleLightHM	HighMastPole	EA=IF(EA>0,EA*QF,(element_count)*QF)
📄 0715 19113	High Mast Light Pole, F&I, Wind Speed 150 MPH, Pol...	PoleLightHM	HighMastPole	EA=IF(EA>0,EA*QF,(element_count)*QF)
📄 0715 19119	High Mast Light Pole, F&I, Wind Speed 150 MPH, Cu...	PoleLightHM	HighMastPole	EA=IF(EA>0,EA*QF,(element_count)*QF)

Green Color text reflects drafting elements that can be drawn or placed with associated layer, block, & formula attached

Calculator with Red Check Mark reflects items with Adhocs (other than default)

Calculator with No Red Check Mark reflects Pay Item with Formula and associated layer

🧮 0711 16131	Thermoplastic, Std - Other Surfaces, White, Skip, 6" (...	PMStripe6W(3-9)	GM=IF(G

Paint Brush Symbol with Green text reflects an item with a pay item and associated layer but no Formula

🖌 0711 16131	Thermoplastic, Std - Other Surfaces, White, Skip, 6"	PMStripe6W(3-9)	

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Editing the PayItemDB file

Located in the Pay Item Tools pull down is the editor

This application is used to add or edit pay item data

Type in Number to search

File – Opens selected PayitemDB files

TIP - A lot of functionality in this application is right click activated

Pay Items DB Editor [EMX] - C:\Civil 3D Projects\PayitemDB.xml

File   Find Pay Item   Help

Pay Item List

	Pay Item	Description	Layer	Block	Block
Topography					
Structures					
RW Items for Roadway					
Roadway Design					
Drainage					
Erosion Control					
Utilities					
Signalization					
Signing					
Pavement Markings -thr					
Pavement Markings -efl					
ITS					
Highway Lighting					
Landscaping					
Profiles					
TEXT					

Pay Item Data read from - C:\Civil 3D Projects\PayitemDB.xml

File   Find Pay Item   He

📂 Open   Ctrl+O

💾 Save   Ctrl+S

Save As

Recent Files   ▶

Exit

Editing the PayItemDB file
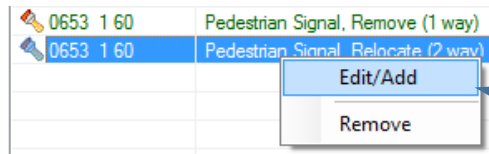
To **EDIT** an existing Pay Item Highlight it and right click < Edit/Add

To **ADD** a new item DO NOT Highlight a item. Right click over a blank space <Edit/Add

The rule of thumb used to **Edit** items is if you are using custom Adhocs that will be used project wide and you only want to "edit once used many".

The rule of thumb used to **ADD** items is if a new item is introduced that is not included in your AECMerge or Categories file and you don't want to wait for an update. You would also update the **AECMerge.xml** and rebuild your PayitemDB file for project use.

Pay Item Edit / Add [EMX]

Required Data | Graphical Data | Adhoc Data

Minimum Data Required to Run Quantities.

Pay Item ID: 0653 1 60   ☐ Add Pay Item

Compute Method: AS=IF(AS>0,AS*QF,(element_count)*QF)
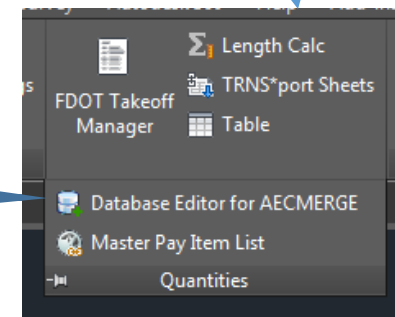
Description: Pedestrian Signal, Relocate (2 way)

Quantity Factor: 1.00000   * Warning: QF variable in Adhocs takes precedence.

Ready   OK   Cancel

Required Data Tab – This is where you can change the pay item number, the formula, description, and Quantity Factor

TIP – The same procedures apply to the AECMERGE editor as described in the PayitemDB editor

FDOT Takeoff Manager   Σ₁ Length Calc   TRNS*port Sheets   Table

Database Editor for AECMERGE

Master Pay Item List

Quantities

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Editing the PayItemDB file

Graphical Data Tab – This is where you can change the Layer, Block, Block Library File, & Block scale

Adhoc Tab – This is where you can change or add particular Adhoc data

Adding Data – When you select the add data option the main difference is all of the options are blank. You have to make all of the selections. The example to the right displays all of the compute methods available

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