FDOT Civil 3D Traffic Plans - Signalization

Workshop Training Manual

June 1st, 2017

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1 SIGNALIZATION PLANS

OBJECTIVE

This chapter is divided into three sections:

- Computer Aided Drafting and Design (CADD) Standards & File Creation

This section contains:

- General discussion on Signalization Plans and File Creation.
- Launching the FDOT C3D shortcut on the desktop.
- Using the FDOT Create File application to create the base files for a project.
- Traffic Plans Menu

This section discusses setting up the FDOT Traffic palette to add entities to the Traffic Plans.

- Layers, Text and Models

This Section discusses features/concepts used in Civil 3D 2017.

- Layers
- Layer Filters
- Text Styles
- Annotation Scale
- Sheet Layout Tabs

INTRODUCTION

This chapter reviews the FDOT C3D working environment including how to properly create design files that meet the Department's CADD standards.

GENERAL CADD STANDARDS & FILE CREATION

GENERAL DISCUSSION ON TRAFFIC PLANS AND FILE CREATION

Traffic Plan projects are normally a component of a Roadway plans package. Therefore, the project directory structure usually exists prior to beginning work on a Traffic Plans component. If this is not the case, the same directory structure and file standards that apply to Roadway apply to any other lead component. The Department's *CADD Manual* defines the naming convention used to create the different types of design files required in a project.

LAUNCHING THE FDOT C3D ICON ON THE DESKTOP

When the Department's CADD software was installed a folder named FDOT20xxC3D was placed on the desktop. This folder contains shortcuts to applications used when working on the Department's projects. The FDOT C3D Shortcut will also be placed on your desktop when the installation is complete.

The figure below shows the FDOT Civil 3D 2017 Shortcut.

It is recommended to use This shortcut to start Civil 3D, because it will start the program with the proper Civil 3D workspace with the FDOT Ribbon which can alleviate, among other things, issues with using the wrong CADD standards.

The Department delivers a desktop shortcut for starting Civil 3D:

o **FDOT C3D 2017** – Uses the AutoCAD 2013 dwg file format and FDOT CADD standards. This option requires an existing installation of AutoCAD Civil 3D 2017.

Upon launching the Civil 3D State Kit the FDOT Civil 3D Profile is loaded into the Civil 3D workspace but does not set the Data Shortcut folder unless previously set. If user is working on multiple projects the project number will need to be selected before work commences. To set the Data Shortcut folder to the appropriate project do the following. You will need to complete this step to continue to exercise 1.1

1. Select the **Data Shortcuts** option located on the toolspace then right click.

2. Select **Set Working Folder** and browse to the root folder of your projects (Do not select the actual project number).
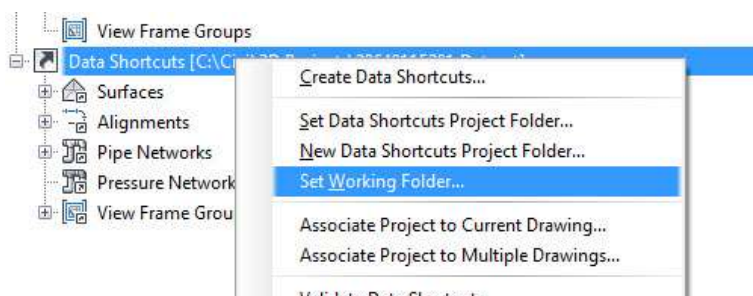
3. Select and right click on Data Shortcuts again and select **Select Data Shortcuts Project Folder.**

4. Select the appropriate project number from the list and select ok.
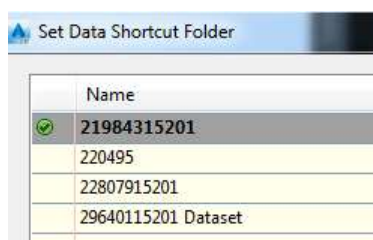
Now all design files created using the **Create File** application will use this project number to populate the appropriate folders with drawing files.

USING FDOT CREATE FILE - CREATE BASE FILES FOR A PROJECT

The Create File application is used to create Civil 3D design files and other files in accordance with the Department's CADD standard file naming conventions. Create File reads the *MasterStandards.xlsx* file to get the current Layers, Linetypes, Colors, etc. so it can propagate the appropriate design file. The file is located in the state kit install folder. Create File can only be accessed from inside of Civil 3D on the FDOT Ribbon. The

advantage to using this tool to create files is that the design file will always be named according to the Department's CADD standards and will pass QC..

The Figure below shows the Create File application.
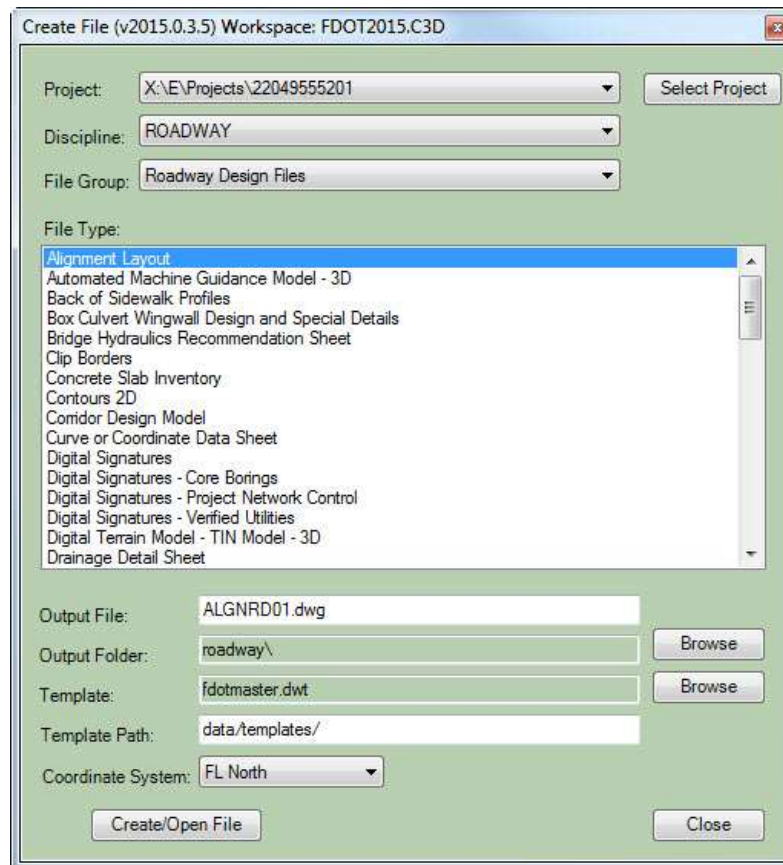
Exercise 1.1   Creating the Base Files for a Project

➢ **Creating Signalization files**

1. With Civil 3D still open and the Data ShortCuts from the previous step set up. Click on **Create File** Located on the Ribbon.
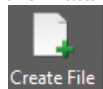
2. Click on the Select Project button and browse to project **22049555201.**

Note   If you have used the **Create File** application there is a previous history of selected projects. Click on the Project pull-down to view to re select a project

3. Set Discipline to **Roadway**.

4. Set File Group to **Signal Design Files**. This sets the proper Output Folder in your project.

5. Set File Type to **Proposed Design and Signal Information**. This sets the Output Filename and the correct template file.

6. The information on the bottom should already be filled in. If the **Coordinate system** is not already set to the appropriate system set it to **FL North**.

Note   The advantage of setting the data shortcuts in advance of using create file is that if the coordinate zone is already set in the project it is automatically selected when you create/open your file so your zone is already set in your new design file.

7. Your **Create File** dialog should match below.

8. Select **Create/Open** to start the drawing creation process. When the new drawing is open select **Close** on the dialog box.

Note   This version of Create File allows the designer to browse to a different Output Folder or Template if needed.

Note   If the file Dsgnsg01 already exists in this project, the application will increment the file name to Dsgnsg02 and will not overwrite the file.

9. Go on to the Optional Exercise or click **OK** to close the Create File/Project tool.

Exercise 1.2 *(Optional) Create Additional Files*

➤ *Use same File Group to create additional design files*

1. Using the Create File application select the **Tabulation of Quantity Sheets** file.

2. Select the **Create/Open** button.

3. Repeat steps 1 and 2 to create the **Summary of Pay Item** file.

4. Click **Close** on the Create File application. Close and save the newly created drawing file(s).

Exercise 1.3 *Getting familiar with the FDOT Civil 3D Workspace*

In this exercise, open Civil 3D with the FDOT Civil 3D Shortcut.

1. Click on the FDOT tab to switch to the FDOT Ribbon. The FDOT Civil 3D Ribbon contains all of the applications and tools needed to aid you in producing plans based on the departments standards.

2. Click on the home tab to return to the main Civil 3D Ribbon.
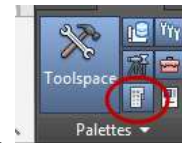
3. If your tool palettes are not turned on select the tool palette button. The palettes will fill the right side of your screen. The FDOT Subassemblies is the default palette

4. Right click on the control bar where it says Tool Palettes and select **FDOT Traffic**.

5. The FDOT Traffic Palette Group will load. There are 5 tabs located vertically on the palette.

   - **Mast Arms/Assemblies** – Contains Dynamic Mast Arm Blocks that can be inserted into the Signal design file.

   - **Signal Blocks –** Contains Signal Blocks that can be inserted into the Signal Design File

- **Signal Heads –** Contains Signal Head detail blocks that can be inserted into the Signal Design File. These blocks are annotative so they can be inserted in paper space or model space.

- **Pedestrian Signal Heads –** Contains Pedestrian Crossing Blocks that can be inserted into the Signal Design File. These blocks are annotative so they can be inserted in paper space or model space.

- **Signal & Lighting Tables –** Contains AutoCAD Tables for Signal and Lighting design that can be inserted into design file and data entered.

LAYERS, LAYER FILTERS, ENTITY MANAGER, & TEXT STYLES

LAYERS

The Department has created six Standard Layer libraries: Common, Survey, Right of Way, Roadway, Photogrammetry and Structures. There are approximately 1400 Layers. The appropriate Layer library is loaded when a Civil 3D file is created or opened using the FDOT Workspaces.

The Layer name is divided into three components: Layer Name, State & View

- o The format of the Layer / Layer Name is: ***object_sv (max. 18 characters)***

Where: (***object*** = entity type)_ (***s*** = state)(***v*** = view)

(S)tate Designations	**(V)iew Designations**
p (proposed)	**p** (plan)
d (drafting entity)	**r** (profile)
e (existing)	**x** (cross section)
	m (model)

An example of a Plan View Layer is: **PoleLight_ep**.

1. Layer Name – **PoleLight**
2. State - **e**
3. View - **p**

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> **Note** Some Layers do not show a State or View in their name. These Layers are set by default to be a proposed plan view entitiy. An example is the Layer (PullBox) this Layer is created for proposed Pull Boxes in the plan view.

The Layers symbology of color, weight and style are set to ByLayer. What this means is that each Layer takes on the properties the user has set as far as color, weight and line style. It is recommended that Designers do not create additional Layers because that will cause the drawing file to fail QC.

RULES & LAYER FILTERS

The Department has also created a set of Standard Rules that group the Standard Layers together for the purpose of Quality Control (QC) checking of the Department's Standard design files ensuring compliance with the Department's CADD Standards. The Department delivers Civil 3D Layer Filters to reflect each of these Standard Rules to assist in users searching through the Layer Properties Palette. These filters are discussed later in this section. The Layer Filters do not turn Layers on or off, but they reduce the number of Layers visible in the drawing.

Activating a Standard Layer Filter is very easy and can be done from the Layer Properties Palette located on the Home Ribbon. Expand the Standards in the filters section of Layer Properties and select the appropriate rule name.
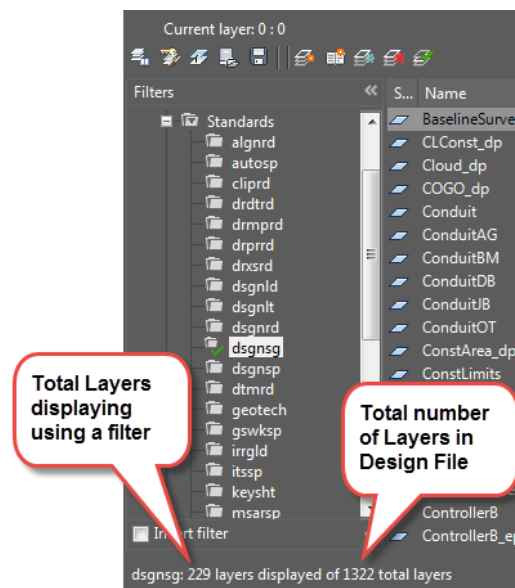
> **Note** By default the Standard Layer Filter is automatically set to specific file name that was created using the Create File application.

ENTITY MANAGER (EMX)

Entity Manager is used to define the symbology of entities and allows user to place, draw, and edit entities with pay item data attached. The symbology of the entities placed such as the correct layer, proper block, etc is controlled by the EMX application. For a more detailed explanation of the functionality refer to the fdot Entity Manager Reference Guide located in the FDOT2017.C3D/APPS/EntityManager folder

TEXT STYLES

A text style is comprised of a group of text attributes, such as font, width, height, spacing and so on. The Department delivers predefined text styles, which should be used whenever possible. The text styles delivered by the Department are created at a scale of 1 to 1. This is important to remember when placing text using Annotation Scale. Annotation Scale is discussed in more detail later in this section.

<u>*TEXT STYLE DIALOG BOX*</u>

The Text Style dialog can be accessed by typing **ST** and then enter on the command line.
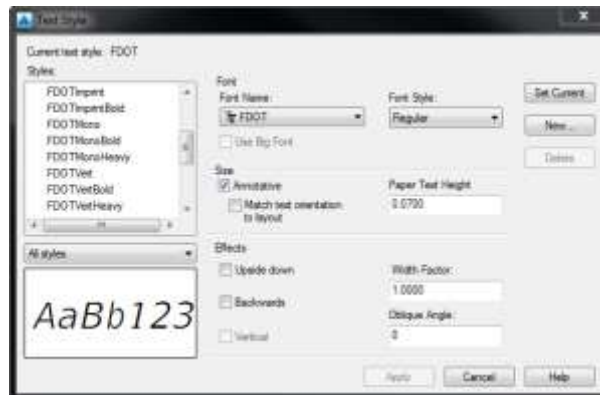
The Text Styles dialog box shows all of the text styles that exist in the design file, and all of the parameter settings for each style. When a new file is created and opened it is based on the fdotmaster.dwt which has all of the appropriate text styles loaded. No changes should be made to the delivered text styles.

<u>*TRUE TYPE FONTS*</u>

The Department has integrated the use of True Type Fonts and restructured the Text Styles.

True Type Fonts will ignore weights. The best method to show thicker text is to use the Bold font. The True Type Fonts delivered by the Department will be installed by the installation and are located in the FDOT2017.C3D\SUPPORT\FONTS folder on the server and in the Windows\Fonts folder on the client.

<u>*STYLE ORGANIZATION*</u>

Fonts at Common Sizes	40 Scale	50 Scale
Large = .125 x Scale	5.0	6.25
Medium = .1 x Scale	4.0	5.0
Small = .07 x Scale	2.8	3.5

<u>*ANNOTATION SCALE*</u>

Annotation Scale associates all of the text placed in a view to a specific scale so if the scale of that view is changed the text dynamically changes with it.

Using Annotation Scale also removes the burden of having to calculate what text height should be used at a particular scale when placing text.

The default scale is set to 1"=40'as shown in the image at right.

When on it will show which objects are annotative. When hovering over an object a triangle scale will appear.

When on (Blue) Objects will change if the drawing scale is modified

Current Scale of your view
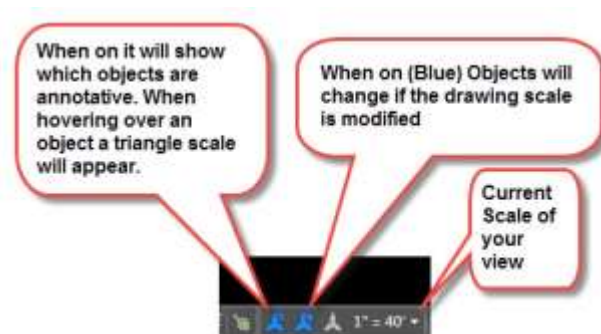
Exercise 1.4 *Setting up the Design File*

> ### *X-Reference Files, Data Shortcuts*

This exercise will cover attaching required reference files and data shortcuts to our design file. There is more than one way to start the Xref Manager dialog. Use the method most familiar.

1. Continuing with *Dsgnsp01.dwg* open the Xref Manager dialog box by typing **XREF** on the command line then enter.
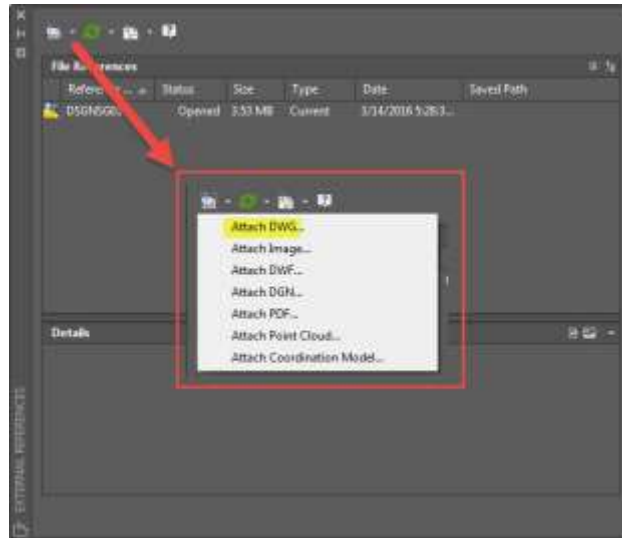
2. In the External References dialog, select the attach pull down as shown above > **Attach DWG.** This opens the Attach External Reference dialog.

3. Navigate to the *Roadway* folder.

4. Attach the reference file **Dsgnrd01.dwg** in the *roadway* folder.

5. Click on **Open**. This opens the Reference Attachment Settings dialog box.

6. Change the Reference type to **Overlay** and unclick the **Insertion Point** toggle as we want this file to come in at the correct coordinate zone. The dialog should match below. Click **OK**.
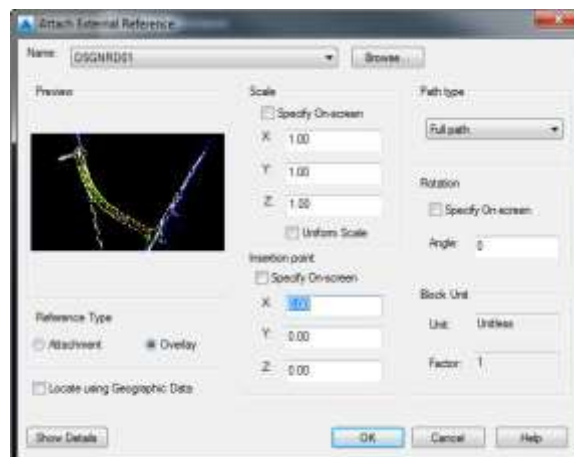

7. Do a zoom extents to see the newly attached file.

| *Note*	It may be necessary to attach the Topord*.dwg, Utexrd*.dwg and Drexrd*.dwg files depending on the type of project being worked. If there are conflicts with any of the existing features than that reference file should be displayed. Refer to the Plans Preparation Manual Volume II - Chapter 23 for further guidance.

➢ *Data Shortcuts*

This exercise will cover Data Referencing in the Alignment data. Data Shortcuts are an easy way to bring in Civil 3D objects without having to reference an entire drawing file.

1. Continuing in *Dsgnsp01.dwg* On the Toolspace expand the Alignments tree in the Data Shortcuts section > Right Click on **US98** and select **Create Reference**.
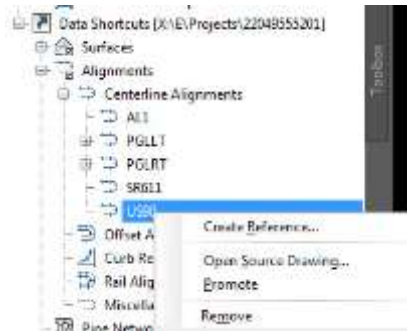
2. The **Create Alignment Reference** dialog box opens. The options should be already filled in since it reads the default settings and commands from the fdotmaster template. Your dialog should look like the image below.

- **Source Alignment –** The name of the Alignment is set from the name in the Data Shortcut list.

- **Site –** Alignments should be Site less (None). Sites are object holders that allow entities or objects in the same site to interact with each other.

- **Name & Description –** The name of the Alignment and a more informative description of the Alignment, which is recommended.

- **Alignment Style –** The default is **FDOT Proposed.** If you click on the pull down arrow you can see all of the styles available.

- **Alignment Layer-** The layer is set in the template using the object layers option in drawing setup.

- **Alignment Label Set –** The default is the 40 scale annotative label set. If using a different scale use the pull down to select the matching scale for your label set.
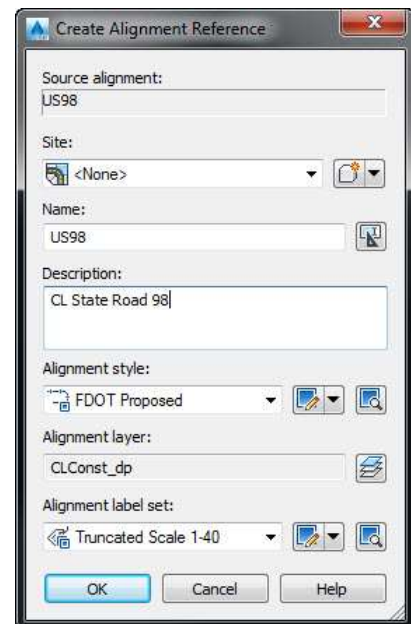
3. Select OK to bring in the Alignment reference. Zoom > Extents to see the alignment.

4. Save the file before continuing.

➢ *Layers and Filters*

This exercise will cover investigating Layers and Layer Filters delivered by the Department. The entities placed in this exercise are not part of the final design; they are for experimenting and practicing only.

1. Continuing with *Dsgnsg01.dwg* select the Layer Properties on the Home Ribbon to open the Layer Properties Palette. Under Filters expand the **Standards** tree and select the dsgnsp filter.
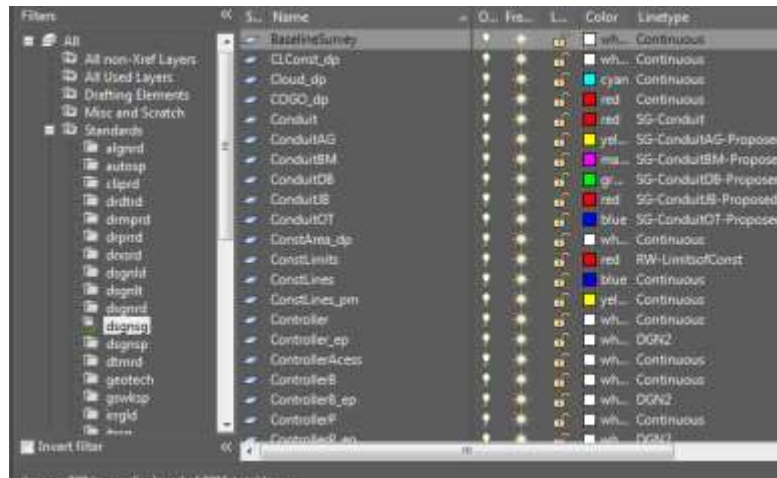
Note   As a refresher, a Layer filter isolates the Layers seen in the Layer dialog so it is easier to navigate. The Layer filters are grouped by the filename.

2. In the Layer Name list to the right double click on the Layer **ConduitBM**. This sets the current *Layer* to **ConduitBM** and sets the *Color, Weight* and *Style* because all Layers are set up **ByLayer**. The current layer always has a green check mark before the name.
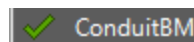

3. with the Layer Properties Palette, still open collapse the **Standards** tree and select the **Text** filter.

4. Take a moment to review the Layers in this filter. Notice that all Layers visible are associated to text.

5. Now that the Filter is loaded, navigate the Layer drop down menu and select the Layer that is appropriate to the item being placed. It is important to understand how useful the Layer filters are, they will save time when going from Line work to Text.

➢ *Annotation Scale and Text Styles*

This is a brief introduction to placing text using the Department delivered Text Styles. This is discussed in more detail later in this course.

1. Continuing with *Dsgnsg01.dwg* double click on the **TextLabel** layer to make it current**.** Close the Layer Prop. Dialog.

2. Select the **Annotate** Ribbon. Take time to become familiar with the text options available.

3. For a sample we are going to place some Multiline Text. Notice the default style is the FDOT font which is already set to annotative which is represented by the blue triangle.
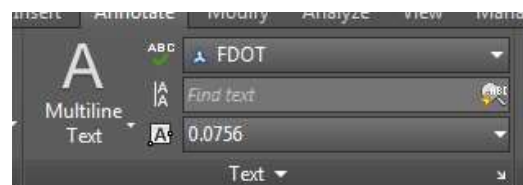
4. Click on Multiline Text > then draw a rectangle in the drawing area for the text box.

5. To see how Annotative text behaves change the drawing scale from 1"=100'.
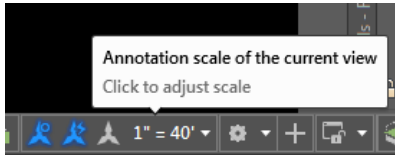
6. The text is bigger due to the scale being smaller. Notice how the Alignment labels also adjust.

2   CREATING A KEY SHEET

OBJECTIVE

The objective of this chapter is to teach the student how to create a Signalization Key Sheet that meets the Department's CADD standards.

INTRODUCTION

Once the student has completed this chapter they will be able to create a Key Sheet and all of its components that follow the Department's CADD standards. The Department's CADD standards and the Plans Preparation manual will be adhered to for the creation of this sheet.

GENERAL INFORMATION

The key sheet is the first sheet in the set of construction plans. The information shown on the Signalization plans key sheet varies depending if the Signalization plans are a component of the Roadway plans or the lead component. For example, if the Signalization plans are a component of the Roadway plans, you do not need a location map or length of project box because this information is on the lead key sheet. This also applies to the Signing & Pavement Markings and Lighting plans key sheets. Refer to Chapter 3 Volume II of the Plans Preparation Manual for more information.

During the creation of a Key Sheet, the designer is required to take the actions listed below.

Produce the graphical portion of the sheet with these entities:

- Use Create File to create the desired discipline Key Sheet.
- Place the project location map (only on a lead Key Sheet).
- Place the Section, Township and Range lines (only on a lead Key Sheet).
- Begin Milepost (correct to three decimal places).
- Place the North arrow block for a key sheet (only on a lead Key Sheet).
- Identify all Railroad Crossings (only on a lead Key Sheet).
- Fill in component Plans (Only on a lead Key Sheet).
- Index of Sheets & Revision Table

Fill in the project data, including the following (Text with Gray Background represents Fields which are entered through the sheet properties):

- Financial Project ID, Number
- Federal Funds (if applicable)
- County Section Number, County Name and State Road Number
- Fiscal Year

Note: *Some of the data will automatically be filled in to the fields on the keysheet after you use the Create Project application*

PROJECT LOCATION MAP

Florida county maps are available for download from the Department's Surveying & Mapping web page.
http://www.dot.state.fl.us/surveyingandmapping/countymap.shtm

These maps are available in PDF file format. Download the PDF file into the appropriate project directory. This file is used by the Key Sheet Clipping tool to attach, scale and clip the map to the key sheet.

The Project Location Map is placed in the center of the sheet and sized so as not to interfere with other entitys on the Key Sheet. Its purpose is to provide enough information so that the project location is easily understood. Township, Range, and County lines and numbers are shown to make the location clear.

USING CREATE FILE TO CREATE A SIGNAL DESIGN KEY SHEET

Create File application will create Key Sheets for all disciplines and place them in the appropriate folder. The advantage of using Civil 3D is there are Sheet Layouts along the bottom of the newly created Keysheet representing every Discipline and variation simply delete the Layouts not needed.

When a Key Sheet is created notice all the layouts on the bottom of the file, there are options for (FF) Federal Funds or without with maps or without. To delete the unwanted layouts either right click on them individually and select delete or holding the ctrl key select the layouts and right click to delete a group.

Note	No matter what discipline of key sheet you will need it will always be this base file as a starting point. If you were creating a key sheet with a map you would delete all but the ones with a map designation in the layout name. If you needed a map with your signal key sheet you would simply copy and paste the viewport and other map text to the appropriate discipline sheet layout.

INDEX OF PLANS

The *Index of Plans* is used to describe what sheets and corresponding sheet numbers are in the set of plans. There is an *Index of Plans* table on each key sheet which the user will type in the sheet numbers and descriptions. There is a tool in Civil 3D called Sheet Set Manager (SSM) that you will use to assemble your set of plans. It is discussed later in the manual. To aid in the data entry of the Index of plans the user can select their sheet set > right click > Insert Sheet List Table and then copy and paste the data into the Index of Plans.
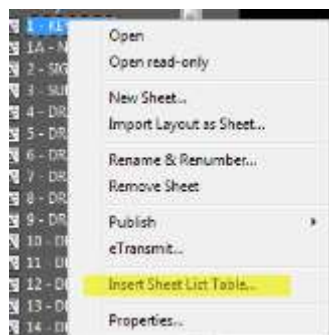
COMPONENTS OF CONTRACT PLAN SET

The *Components of Contract Plan Set* is a list of all disciplines that are a component to the lead project. The order of the component plans is:

1. Roadway
2. Signing and Pavement Marking
3. Signalization

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4. Intelligent Transportation Systems (ITS)

5. Lighting

6. Landscape

7. Architectural

8. Structures

Note   If your project includes Signing and Pavement Markings, Signalization or other component sheets as part of the Roadway Plans and those sheets are numbered consecutively within the Roadway Plans then these are not to be shown as components of the contract plans set.

The *Component Set* is populated by double clicking on the COMPONENTS OF CONTRACT PLANS SET in the key sheet to activate Mtext mode and fill in the information. As another alternative you could create a word document and link it to the key sheet. If the word document is updated the link updates the key sheet.

This file is set up for the lead key sheet in the set of plans. If a Signalization Key Sheet without a map is created, this file will not be used because there are no components; hence, there is no *COMPONENTS OF CONTRACT PLANS SET* option on the key sheet.

STRUNG PROJECTS NOTE

Projects that are independently prepared, but are let in the same construction contract shall have the additional Financial Project IDs noted on the right side of the key sheet below the Plans Prepared By block. This block can be placed by typing Insert and selecting the block.

The Strung Projects Note is already placed in the key sheet located on the bottom right.

NOTE: THIS PROJECT TO BE LET TO CONTRACT
WITH FINANCIAL PROJECT ID 000001-1-52-04

Note   The FPID numbers in this note are part of a data field; It will automatically fill in the FPID #.

TOWNSHIP AND RANGE MAP LABEL

The *Township and Range* are used to better describe the area of the project and are located in the Key Sheet file as a block. To insert the block for editing simply type **Insert or (I)** on the command line > Enter and use the Name pulldown to find the correct block.

FLORIDA MAP

The Florida map is a block within the Key Sheet file that is already placed on every sheet layout in the newly created Key Sheet. The Florida Map block is to be located in the upper right hand corner of the key sheet. Refer to the *Plans Preparation Manual Volume II - Chapter 23.2* for more detail.

A leader line and text label pointing at the general location of the project are also required.

PROJECT LOCATION
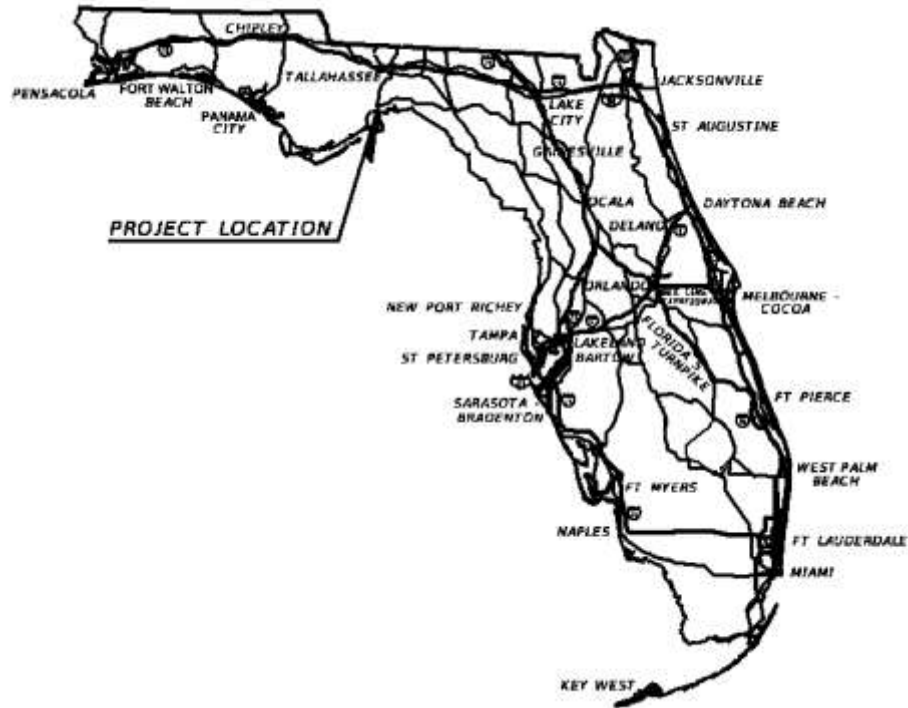
SHEET SET ORGANIZER

Sheet Set Organizer is a tool developed by the Department to aid in the proper identification of plan sheets in a construction set of plans. Sheet Set Organizer will read each sheet and gather information pertinent to the electronic delivery process. Sheet Set Organizer can also number and renumber sheets in a set of plans. SSO is the final process for delivering plans. Civil 3D has the ability to create sheet sets using Sheet Set Manager (SSM). We will go over this process first using the Signalization plans as an example.
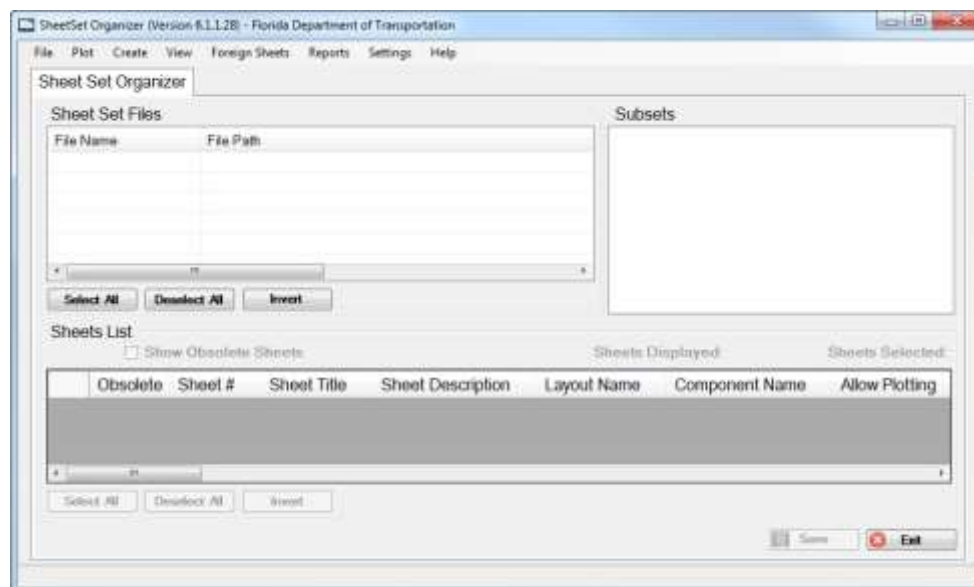
When ready to produce a submittal package Sheet Set Organizer will look for all sheet set files (dst) within your project folder. This tool will be covered later.

Exercise 2.1 *Creating a Key Sheet with a Location Map*

➢ **Create the Key Sheet (Part 1)**

1. Launch the FDOT Civil 3D State Kit.

2. Refer to Exercise 1.1 if needed for detailed steps on using Create File. From the FDOT Ribbon launch the Create File application and using the same project as before with the following settings create a Key sheet

   - **Discipline –** Roadway

   - **File Group –** Signal Design Files

   - **File Type –** Key Sheet

   - **Output File –** KEYSSGXX

   - **Output Folder –** Signals\

   - **Template –** keysht.dwt

   - **Template Path –** data/templates/

   - **Coordinate System –** FL North

3. Select **Create/Open**

4. With the KEYSSG01.dwg open delete all of the layouts except **FF w_Map**   `FF w_Maps`

5. Right Click on the remaining Layout and Rename to T-1

6. On the FDOT Ribbon click on the Links/Contacts button

7. Click on the CADD Resources pull down and select **State of Florida County Maps**
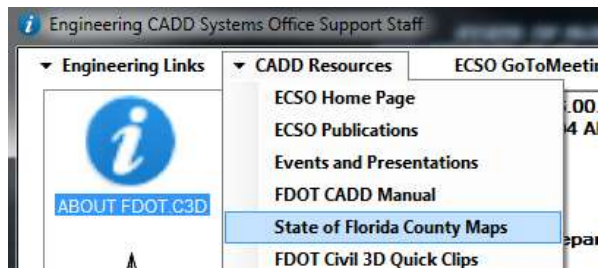

8. Click on the following pdf file: **Waku_c.pdf**   0.6 MB

9. Save it to your data folder in your project.

10. Click on the Model tab next to your sheet layout.

11. Switch to the **Insert Ribbon** and select Attach   and browse to the pdf you just saved.

12. The **Attach PDF Underlay** dialog opens. Your dialog input should look like below. Select OK.
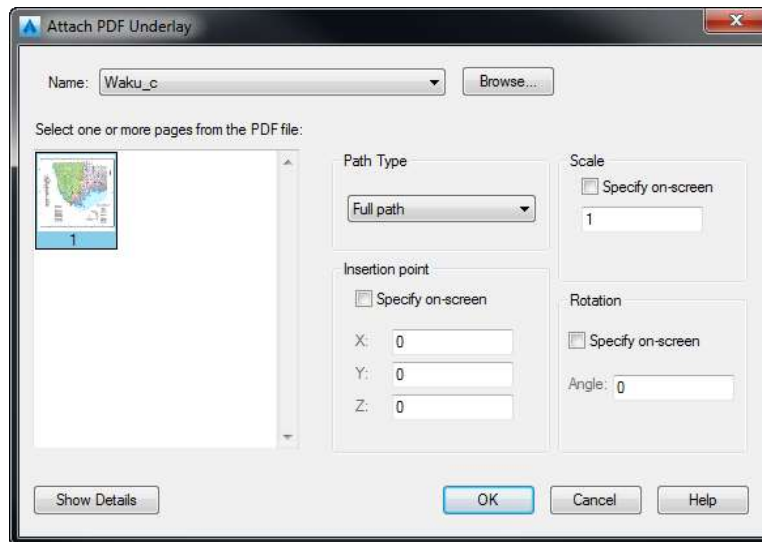
13. Inserting the pdf to a scale is no longer required, within the viewport zoom into the project area.

14. Switch back to the **T-1** Layout and select the Blue Viewport. With the Viewport selected click the Blue Lock to unlock the view port and double click inside the viewport to make it active. Zoom Extents so you can see the entire map and manually zoom into the vicinity of the project location. When the project

   location looks centered click on the Blue lock to lock the viewport.
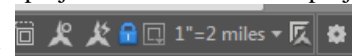
15. Notice we didn't clip the PDF image. We let the Viewport act as the clipping frame.

16. Double click on the End and Begin Project arrows to edit the text. Move the arrows by selecting the label and select the blue grip on the arrow end to stretch it to the appropriate location.

➢ *Add the Township and Range Labels (Part 2)*

1. Continuing in *keyssg01.dwg*, type I for Insert and select the block **KMLabelTnshp**.

2. Make sure you toggle on **Specify on Screen** and press OK.

3. Repeat steps 1 and 2 for the **KMLabelRange** entering the data shown on the Key Sheet image.

4. The Township and Range labels are blocks with attributes in them, do not explode the block to edit the text. The blocks when inserted open an Edit Attributes dialog which the user can enter in the desired information as shown below.
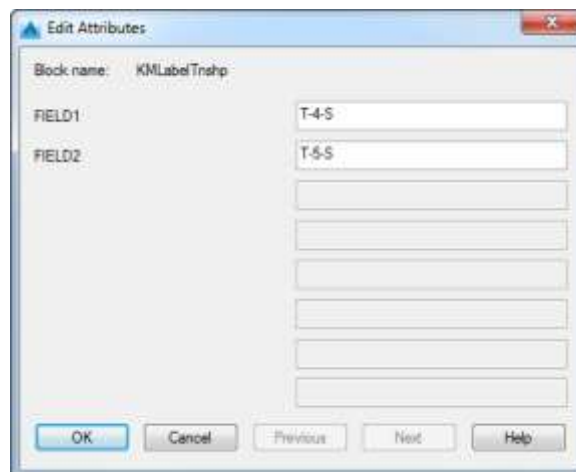
5. The figure below shows the Township and Range blocks placed on the Key Sheet.


6. Now change the layer to **TextLabel** and draw a leader line and add the text **To Panacea**

7. Your Location map should now look like the image below

> ### *Sheet Set Manager (SSM) (Part 3)*

1. Type **SSM** on the command line and press enter to launch **Sheet Set Manager**.

2. Create a **New Sheet Set**. The Create Sheet Set Wizard opens. Select An example Sheet set and click Next. Browse to the data folder in your project and open the FDOT Master dst file to use as the example.
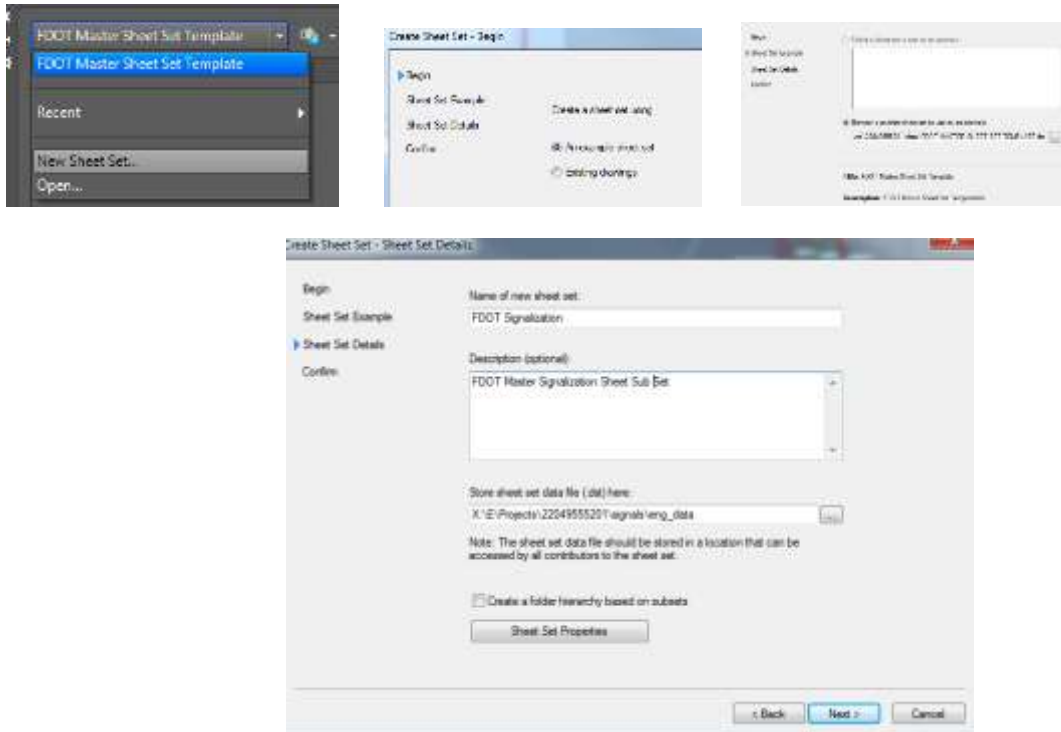
3. For Sheet Set Details Specify as the above image shows and click Next.

4. Now we will add the Key Sheet to the Signalization Plans Subset. Right Click on the Signalization Plans subset and select **Import Layout as Sheet**
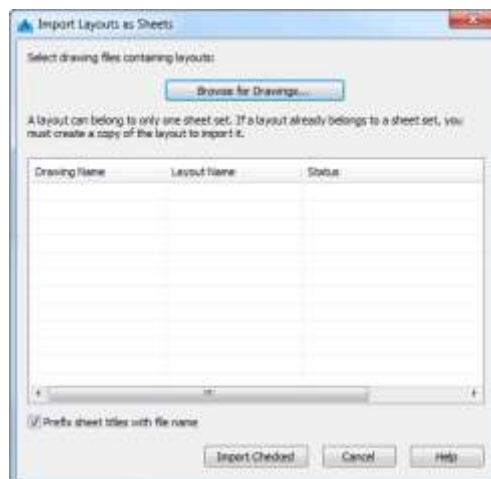
5. Select Browse for drawings and navigate to your Signal folder and select the **KEYSSG01.dwg**. The list will contain all sheet layouts that are in the drawing file, since there is only one layout in this file it picks it for you as seen below. Select **Import Checked** to close the dialog.

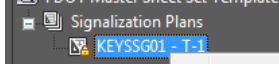| Drawing Name	Layout Name	Status
☑ KEYSSG01.dwg	T-1	Available for import

6. The fields on the Key Sheet will populate with the data that was created when you created the project, if they don't automatically either Regen the drawing or close and reopen the file.


1. Before

2. After

7. To add information to the additional fields so it will propagate to the Key Sheet Right Click on the T-1 in the subset and select properties.

8. The list has a scroll bar on the left side, simply fill in the required data > Press OK > and type in **Regen** on the command line for the fields to fill in.

➢ *Sheet Set Organizer (SSO) (Part 4)*

1. Close Civil 3D and **Save** your *Keyssg01.dwg*.

2. Open Sheet Set Organizer from the FDOT2017.C3D Folder on your desktop. **Make sure Civil 3D is NOT open before doing the next step.**
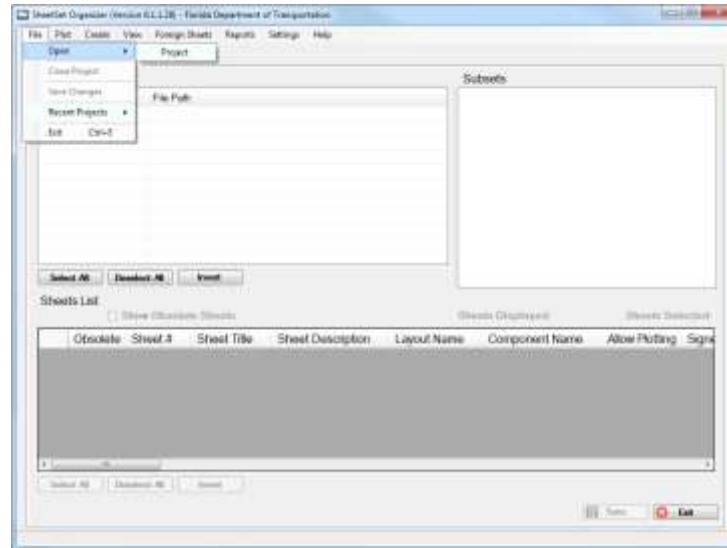
3. Select **File > Open Project**.

4. Browse to and select your project folder. SSO will now open Civil 3D and look through every sub folder in your project searching for all of the dst files you created.
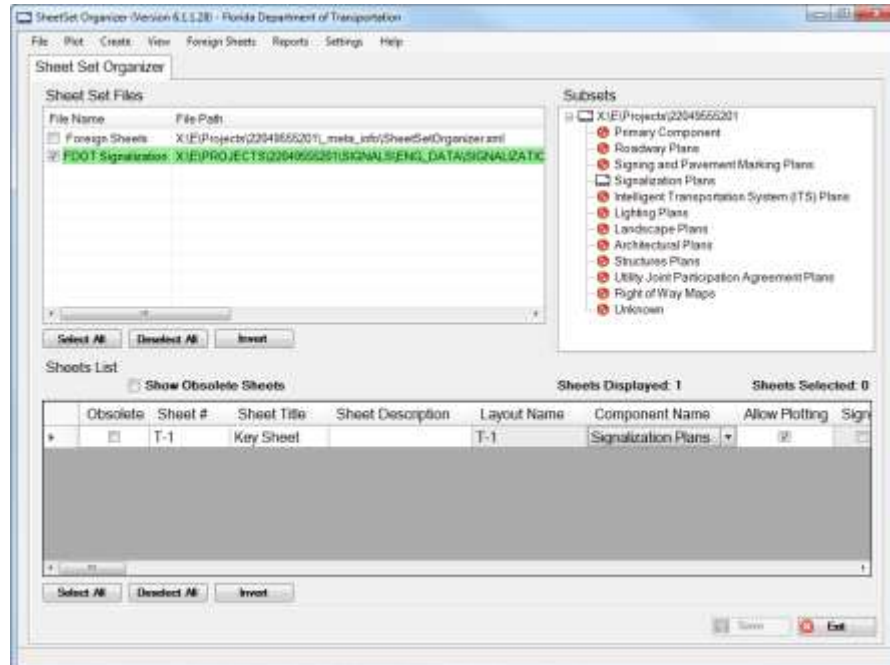
5. From here you can publish your digitally signed plan set and you can also edit information such as Sheet No, Sheet Title, Layout Name and send the updates back into the drawing file.

➢ *Placing Project Location Label (Part 5)*

In this exercise the student will move the arrow to the general location of the project on the Florida Map. .

1. Continuing in *Keyssg01.dwg*, zoom to the *Florida Map* area of the key sheet.

2. Click anywhere on the **Project Location** text as shown above. Three Blue grips appear as shown in the above image. Select the Arrow end point and move it to the appropriate location. If necessary you can also move the text by clicking on the other blue grips. Press escape to clear the grips.

3 SUMMARY OF PAY ITEMS

OBJECTIVE

The objective of this chapter is to teach the designer how to create the Summary of Pay Items sheet.

INTRODUCTION

The summary of pay items sheet is generated from data outputted from the Designer Interface website, the Project Summary of Pay Items and the Proposal Summary of Pay Items. Use the appropriate report, based on the project's phase.

When the Signalization Plans are a component of the Roadway plans, the Summary of Pay Items Sheet is part of the Roadway plan set and is not included as part of the Signalization Plans.

The CADD version of the Summary of Pay Items Sheet is created by a program, TRNS*PORT Sheets that is available on the FDOT Ribbon. This tool transfers the AASHTOWare Project Preconstruction Output file data, and imports it into a design file, and places it on Sheet Layouts.

GENERAL INFORMATION

The TRNS*PORT Sheets tool gives the designer the option to place the reports on an existing sheet layout in the design file or to add the sheets into an existing sheet set. The figure below shows how to access the tool.

The figure below shows the TRNS*PORT Sheets tool loaded from the FDOT Ribbon. The dialog is broken into two parts; the top portion of the dialog defines the input file. The bottom part of the dialog gives the user a choice to add the report data into the design file only or in addition to an existing Sheet set.

- *Input File Name* - The name of the data input file, It doesn't matter where the data file is located as long as it is accessible by the file list box. This file should be an XML file, for example: 22049555201_SG.XML. Click Browse to navigate to the location of the file in your project directory.

- *Add Sheets to Sheet Set Toggle* - If toggled on user must browse to their project and select the appropriate subset.

Exercise 3.1 Transferring Data to Plan Sheet

➢ *Summary Of Pay Items Sheet (Part 1)*

In this exercise, the instructor will cover the steps that would normally take place after the designer submits the report from the designer interface menu. These steps will take the designer through accessing the output data and setup for the use of the automated process called FDOT TRNS*port.
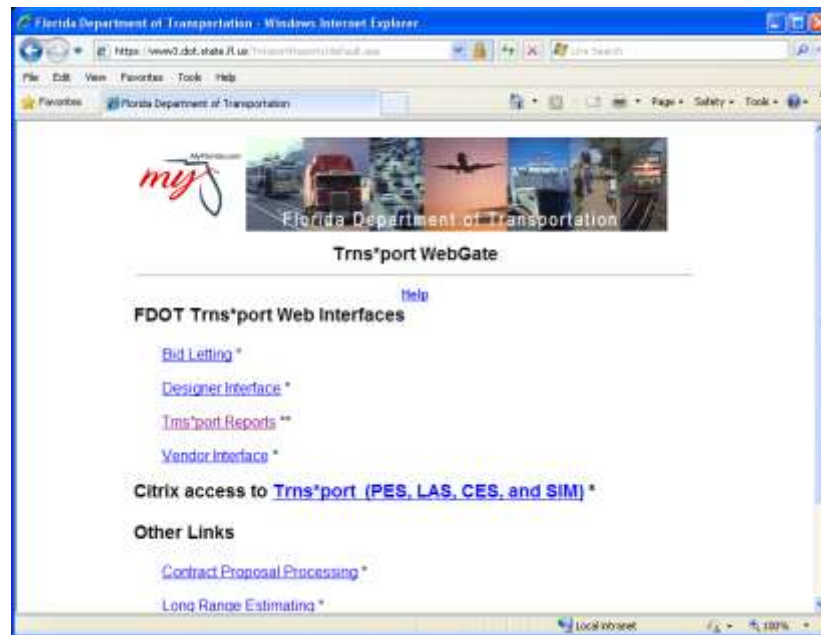
1. The designer would access the *Designer Interface* from the FDOT Ribbon option: **FDOT Web Gate Menu > Designer Interface Link**
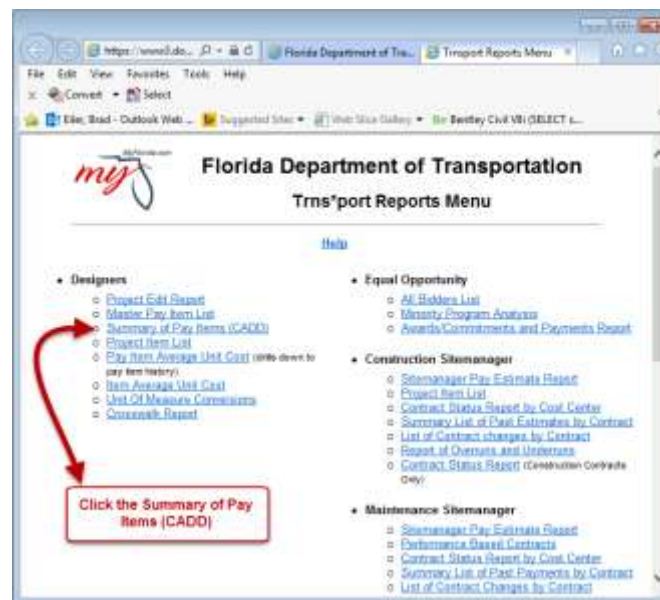

2. .

3. The designer would *Login* by typing their **User ID** in the *User Id* field and typing in their **password** in the *Password* field and clicking the **Submit** button.

4. This will take them to the Trnsport WebGate page.

5. Clicking on the **Trns*port Reports** link will take the designer to the Trns*port Report Menu.

6. Clicking the **Summary of Pay Items (CADD)** link takes the designer to the Summary of Pay Items (CADD XML) page.

7. The designer will select the radio button for either *Proposal* or *Project* from the *Select Option Type* section. For this project, the **Project** radio was selected.

8. The designer will type in the project **Financial (Project ID)** number in the *Enter Project ID* section field. The *Project ID* is **22049555201**.

9. The designer will select the radio button for either **XML File** or **Report** from the *Select Output Type* section. For this project, the **XML File** radio button was selected.

10. The designer will then click the **Submit** button to submit the request for the output data.

➢ *Create Summary Of Pay Items Sheet (Part 2)*

In this exercise, the designer will create a new design file and import the TRNS*PORT XML data at one time. The Department delivers a tool to automate this process called FDOT TRNS*PORT Sheets. This tool can be started from the FDOT Ribbon.

1. Open the Civil 3D State Kit and from the default open drawing switch to the FDOT Ribbon, Click on the **Create File** Application. Select your project. Create the **CESSSG01.dwg** as shown below.
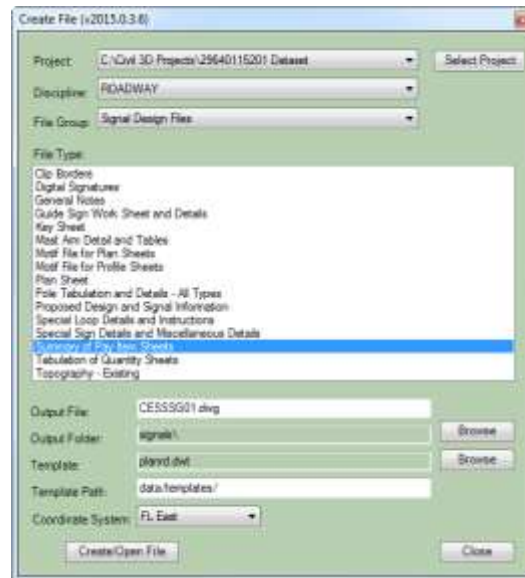
2. Select **Create Open File**. Select **Close** when drawing is open.

3. From FDOT Ribbon, select **TRNS*port Sheets** > This opens the FDOT TRNS*port tool.

4. For the *Input File*, select **Browse**.

5. Browse to the **data** folder in the project and select the **22049555201_SG.xml** file.

6. Click **Open**. This fills in the *Input File name, County Name* and the *Financial Number* in the FDOT TRNS*PORT dialog. For Template Layout it is using the Sheet Layout that is already in the design file which is named what it is scaled at: 1 Scale.

7. Toggle **On** the *Add Sheets to Sheet Set* check box.

8. Browse to the eng_data folder in the signals folder and select the **Signalization.dst** you made earlier. Your dialog should match image below.
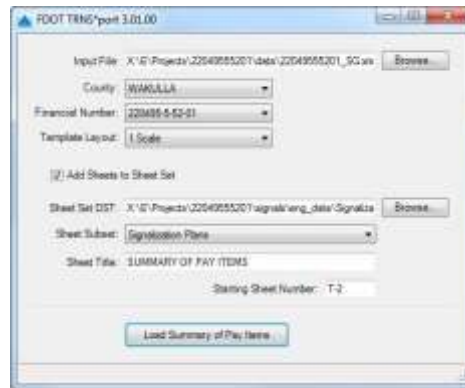
9. Set the *Number* to **2**. This will number the sheet **T-2**.

10. Click **Load Summary of Pay Items** and close the TRNS*port dialog

11. Notice the Layout that was created along the bottom of the drawing.

Exercise 3.2 *Update the Signalization Plans Sheet Set (Part 1)*

➢ *Editing the Summary of Pay Items Layout in Sheet Set Manager*

1. Close and save the *Cesssg01.dwg*, type in SSM if the sheet set manager isn't already open.

2. Open the Signalization dst that was created earlier. Notice the new Summary of Pay Item Sheet in the list.
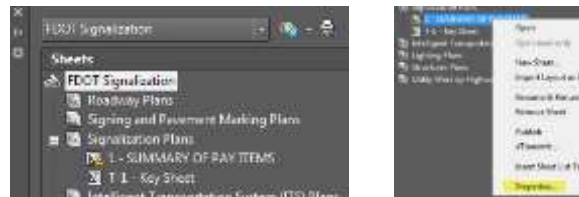

3. Right Click on the Summary of Pay Items and select properties. Make the following changes, see below.
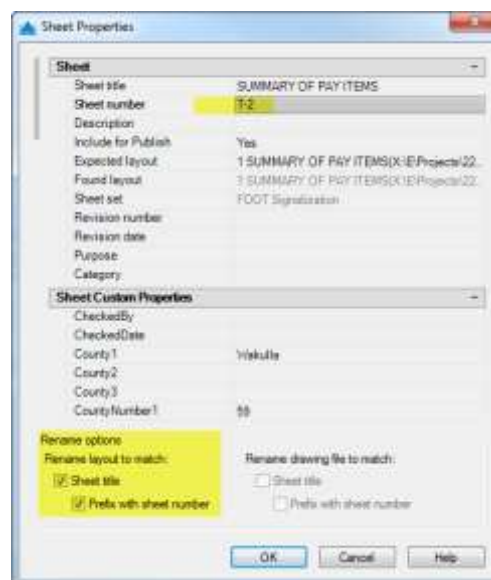
4. **Regen** your drawing for the fields in the layout to update.

5. In the Sheet Set Manager Left click and hold on the T-1- Key Sheet and drag it above the new T-2 sheet to re order the sheets.

➢ *Updating Component Index (Part 2)*

1. In SSM Right Click on the Key Sheet and select **Open**. We are going to update the Index on the Key Sheet.

2. Right Click on Signalization Plans in SSM and select **Insert Sheet List Table**
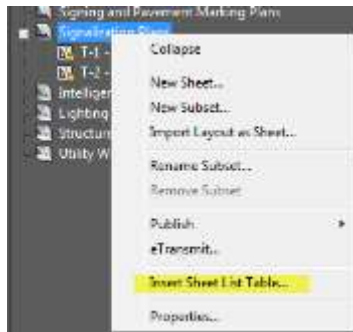
3. Select somewhere outside the border for placement of the temporary Sheet List Table. We are going to copy and paste the data from the Sheet List Table to the Index on the Key Sheet. The advantage of doing this is the fields remain intact.

4. Delete the Sheet List Table that was just placed.

The advantage of using SSM to navigate between drawing files is that you can open the sheet directly from SSM without having the drawing file open, using the example below we have 2 separate dwg files yet we can open each up from within SSM. You can also publish your set to pdf or to a printer for a quick check set if needed.

Note   The reason we do not use the automatically generated Index is Civil 3D currently does not combine multiple sheets, instead it lists them separately. For Example it will list 3,4,5,6, etc. instead of 3-6.

4   SIGNALS TOOLS

CHAPTER OBJECTIVES

The objective of this chapter is to teach the student how to use Entity Manager, Dynamic Blocks, Place Block Group, and Design Center and other Civil 3D tools to create proposed a proposed Signal Design.

INTRODUCTION

The Signal Tools section introduces several applications that help the user in the creation of Signals plans.

As explained in Chapter One of this course material, the designer will create a new file, *dsgnsg01.dwg*, in which the Signals proposed design entities will be drawn. In addition, the designer must reference the proposed roadway design file, *dsgnrd01.dwg*, existing topographic file *topord01.dwg*, existing utilities *utexrd01.dwg*, existing drainage, *drexrd01.dwg*, existing and proposed right-of-way files, and any additional files containing the existing features along the project.

After the above is done, the designer is ready to create a clipsg.dwg file which will contain the view frame(s). View frames are what Civil 3D uses to create your Sheets.

The next step is to draw/place the proposed Signal features in accordance with the Department's CADD Standards. The FDOT Traffic Palette provides tools with the active settings (Layer and Symbology) used to create the Signal features. There are additional tools available to help in the efficient placement of Signal poles and Controller Cabinets on the FDOT Civil 3D Ribbon: Entity Manager and the FDOT Place Block Group tool.

Refer to chapter 24 in the *Plans Preparation Manual*, Volume II, for more detail on developing the Signalization plans. Refer to the Design Standards indexes for design criteria.

The labeling of the plan sheet items can be completed by using the Add Labels Button on the Annotate Ribbon, which allows the designer to use/edit/create styles for the placement of repetitive labels.

Finally, the designer must compute the pay items used and populate the Tabulation of Quantities Sheet. FDOT Takeoff Manager can calculate and report every "each" and "linear" item. FDOT Takeoff Manager generates a report that can be polished in Microsoft Excel, which can then be imported into the Civil 3D Tabulation of Quantities design file using Civil 3D's DLM (Data Link Manager).

CREATING VIEW FRAMES FOR SIGNAL PLAN SHEETS

Creating View Frames for Signal Plan Sheets is different than for Roadway or Signing and Pavement Marking Sheets. Unlike Signing and Pavement Marking plans there may only be one Signal Plan sheet depending on the number of intersections. The user will use Civil 3D to Create View Frames and then create a data shortcut of the View Frame that can be data referenced into the design file to layout and clip the sheet(s). The scale should not be smaller than 1" = 50'.

If a Motif file is used, this should be set up prior to starting the clipping process. A Motif file is basically a Civil 3D file with all of the reference files attached that the user wants attached to each plan sheet.

In this section, the student will learn how to use the Create View Frames Wizard to create view frame(s) and create data shortcuts to bring in the view frames to the *clipsg.dwg*. As with any process, it is important to communicate with the Department's Project Manager to make sure that all district specific requirements are addressed i.e. Match Lines or no Match Lines, Grey Scaling existing features and so on.

CREATE VIEW FRAMES WIZARD

From the Civil 3D Output Ribbon click Create View Frames. The wizard will not start unless you have an alignment in your current file. This is the first of two steps in creating a finished Layout sheet with the FDOT Border that you will add to your plan set.

Once activated, the View Frame Wizard opens. As you can see on the left pane of the wizard it has pages that you walk through and input required parameters. The Blue arrow indicates which page you are on.

ALIGNMENT PAGE

The first page is the Alignment Page. There is an alignment list pull down bar to choose from a list or you can pick the green select in drawing button. The default Station Range is the entire length, however you can also switch to user specified to type in the station or using the pick button select from the drawing the station range.

SHEETS PAGE

The second page is the Sheets Page where you select either Plan or Plan & Profile. The department provides a folder of ready to use template files that contain Plan, Profile, Plan & Profile, Section sheets, Etc. They are located here

The second part of the page is the View Frame Placement where you select how the view frames will be rotated along the alignment. FDOT workflow recommends you rotate **Along Alignment.**
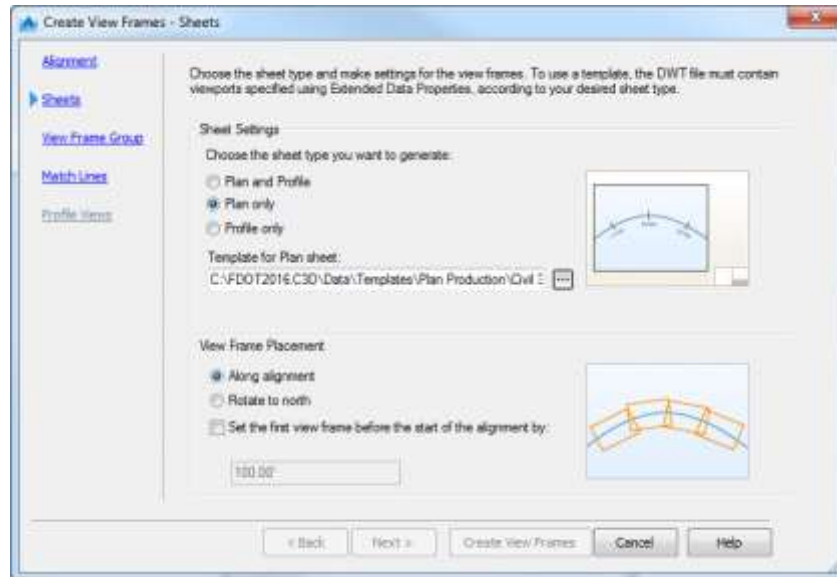
VIEW FRAME GROUP PAGE

The View Frame Group page is where you give your View Frame Group a name and description. To edit how and what is labeled you can edit the naming template by clicking on the drafting graphic to the right of the Name box.

The rest of the page deals with styles that will be used for your View Frame Group. The department provides pre-set styles that will auto populate your wizards which are set through command settings.
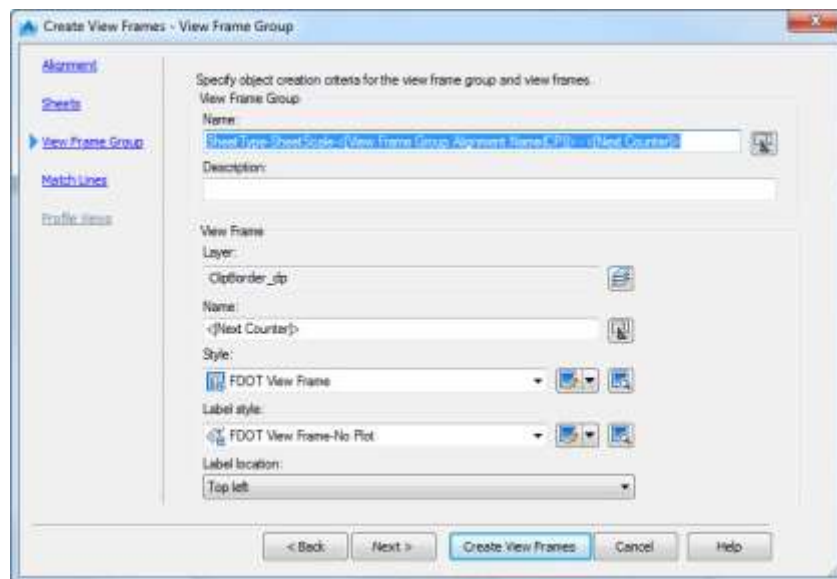
MATCH LINES PAGE

The Match Lines Page deals with how you want your match lines to overlap or not, Layers, Match Line Styles and Match Line Label Styles.

When all missing parameters are filled in select **Create View Frames** and the frames will be placed along the alignment in the drawing file.
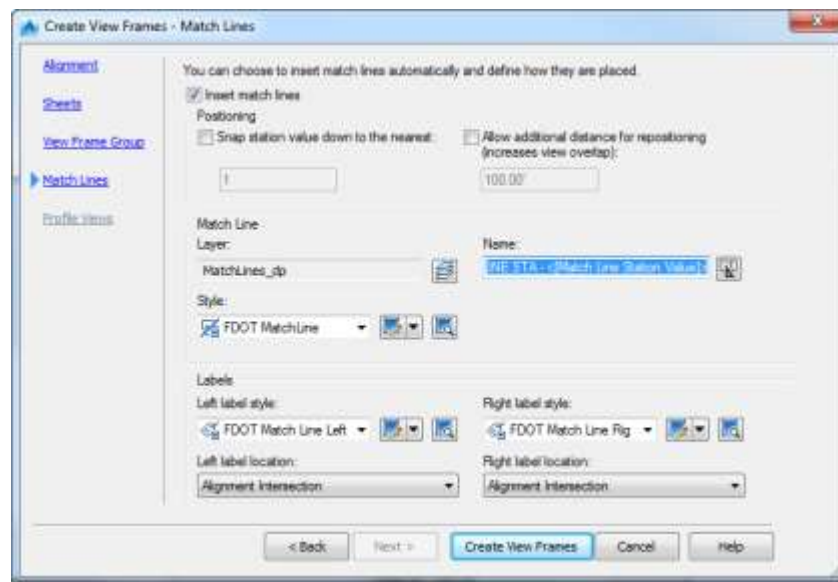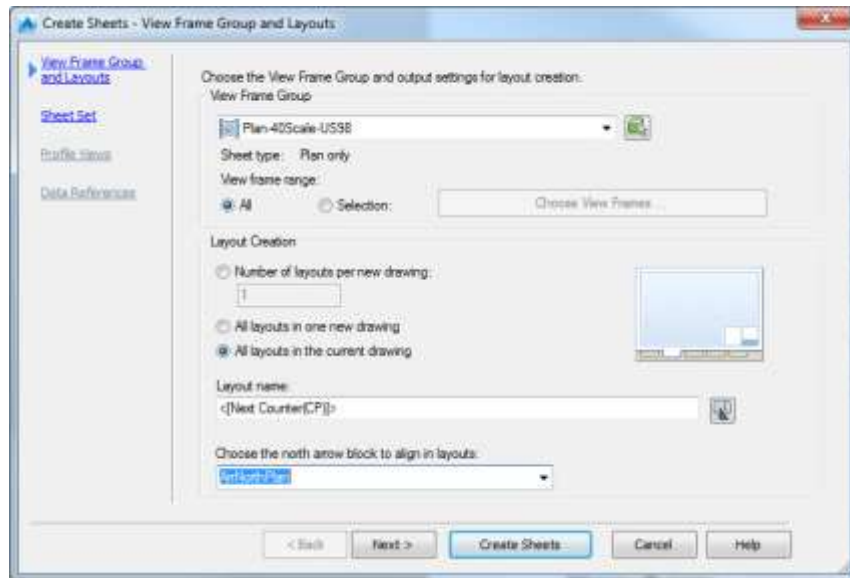
CREATE SHEETS

Create Sheets provides the method to take the view frame and combine it to a FDOT Sheet Border to make a layout sheet to add to your plan set.

Once activated, the Create Sheets Wizard opens. As you can see on the left pane of the wizard it has pages that you walk through and input required parameters. The Blue arrow indicates which page you are on. The Grayed out pages represent not used or available.

VIEW FRAME GROUP AND LAYOUTS PAGE

View Frame Group – Chose the view frame group that exists in your drawing either created in the drawing or from a data shortcut. You can use the pull down or select from the file. The sheet type selected when the view frame was created is displayed. You have a choice of selecting all view frames or manually selecting frames.

Layout Creation - From here you can control the number of layouts per drawing, put them in a new drawing, or in the current drawing. You can name your layouts now or you can rename after you create them. IF a North Arrow is required chose the block to use here.

VIEW FRAME GROUP AND LAYOUTS PAGE

Sheet Set – You can either create a new sheet set (dst) or add to an existing sheet set, make sure you specify the location within your project for the sheet set, They should be stored in your eng_data folder.

Sheets- This area is only active if you are creating layouts in new drawings. If you chose to create layouts in the current drawing, the area will be inactive. Type the path or browse to the folder where the sheet files will be located. If you are using Autodesk Vault the Vault Icon will be highlighted for use. The Sheet File Name controls the naming template of the sheet files.
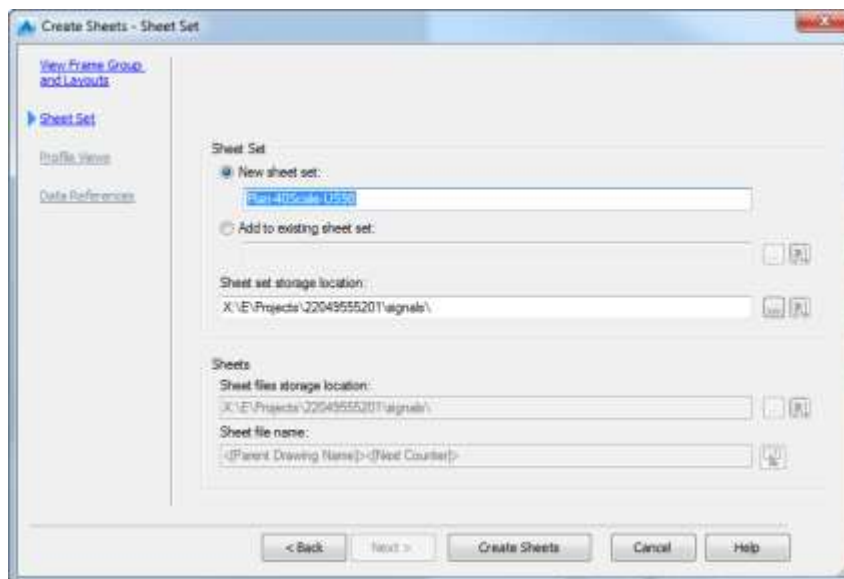
When all options are filled in select Create Sheets to create your new layout(s)

Exercise 4.1 Create View Frame and Sheet Layout

➢ **Create View Frame (Part 1)**

In this exercise, the student will create the View Frame and save it as a data shortcut.

✓ *Create and Set up the Clipsg design file*

1. Starting from the default drawing click on the FDOT Ribbon, select **Create File** to open the Create File application.

2. Using what has been learned in this course guide, create the *Clip Borders* file. Create/Open the file in the *Signals* folder using the **Signal Design Files** Group. Refer to chapter 1 in this training guide for assistance if needed. Close the Create File application.

3. In the Data Shortcuts on Prospector, expand the Alignments and right click on US98 and select **Create Reference**. The default styles that will be used are already set. Click OK.
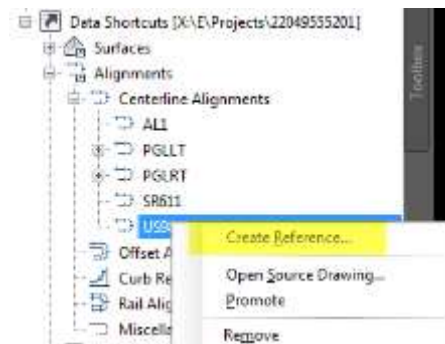

4. Using what you have already learned creating Xref's type Xref in on the command and reference the following files as overlays: **dsgnrd01.dwg, dsgnsp01.dwg**. Zoom Extents to see the references.

5. Switch to the Output Ribbon and start **Create View Frames**.

6. On the Alignment Page set the **Station Range** to **User Specified** and type in **30+50 to 35+40**, you can roughly pick in that range also. Since we only want one View Frame we don't want to use the default Alignment length since that would put multiple View Frames in our drawing file. Keep in mind you can edit the View Frame after placement.

7. Click **Next** to advance to the Sheets Page. Select **Plan Only** for Sheet Type. For Template for Plan Sheet select the Ellipse button to browse to the following location and pick the *SHPLAN.dwt*. When the scale dialog comes up select **40 Scale**. See Image Below.
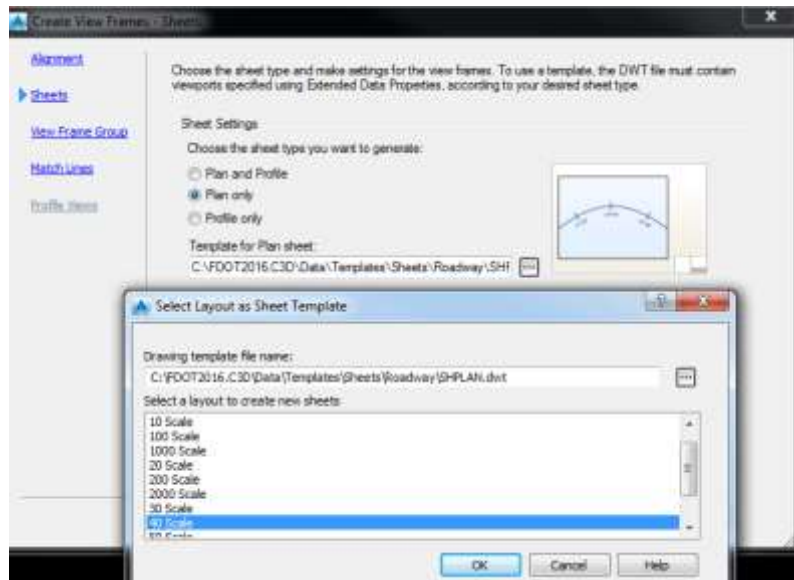
8. Still on the Sheets Page, toggle on Along alignment for View Frame Placement. You can also control if you need the view frame to start before the alignment. Click **Next**.

9. On the View Frame Group Page. Give it the name and description as shown below.
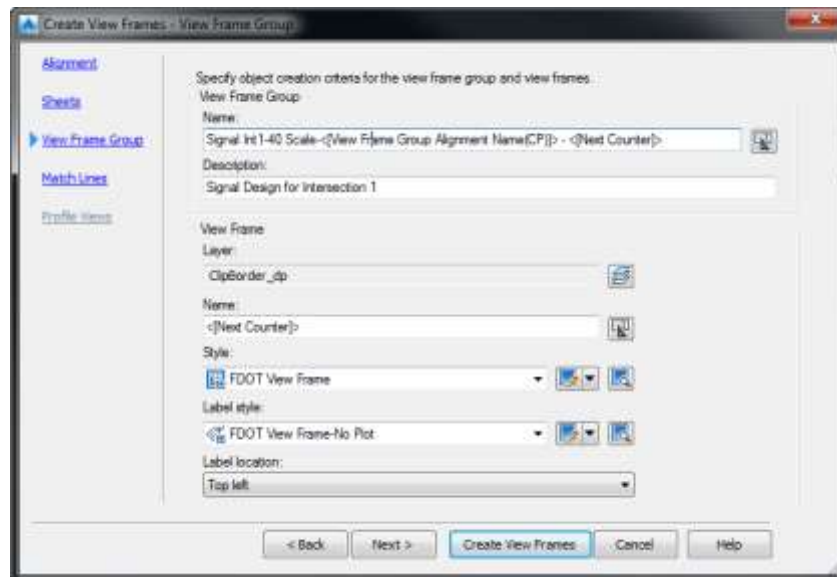
10. Click **Next** to advance to the **Match Lines** Page. Since we don't have any matchlines toggle off the **Insert Match Lines.** Notice all options are grayed out now. Select **Create View Frames.** Your *clipsg01.dwg* should look like below.
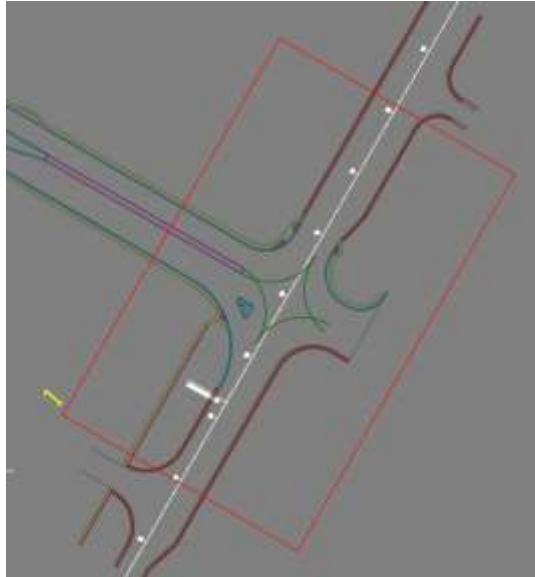
11. Save your file > Right Click on Data Shortcuts > Create Data Shortcuts

12. Select the View Frame Group that is listed. This dialog will populate with all available Shortcuts that can be saved to the _Shortcuts Folder in your project. Select **OK** to execute.
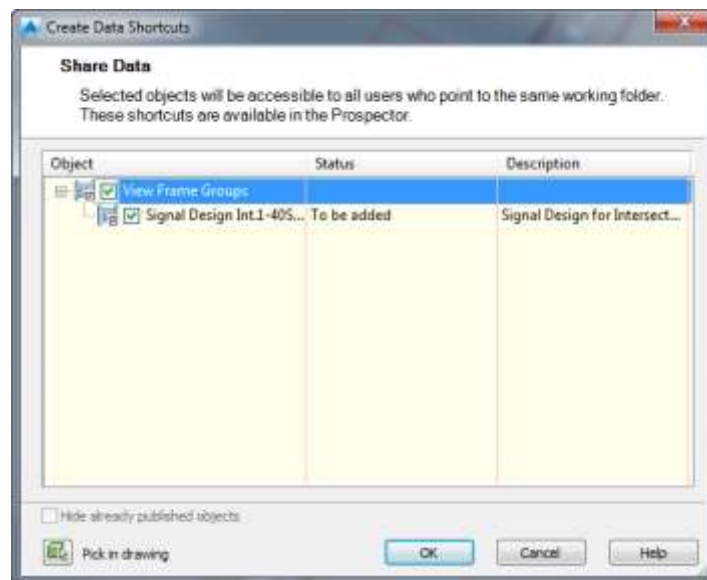

➢ *View Frame Setup (Part 2)*

✓ *Data Reference or Dref's*

1. Open or switch back to *dsgnsg01.dwg*. On Prospector expand the **View Frame Groups** located in the Data Shortcuts tree. Right Click on the **Signal Design Int.1-40Scale-US98 > Create Reference**
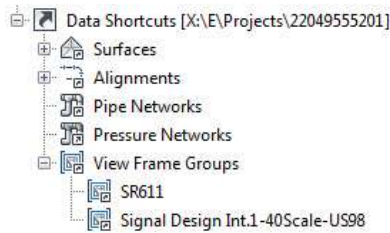
2. The Create Reference Dialog Box opens. Take a moment and look at the settings and available styles in the image below. Your dialog should match.
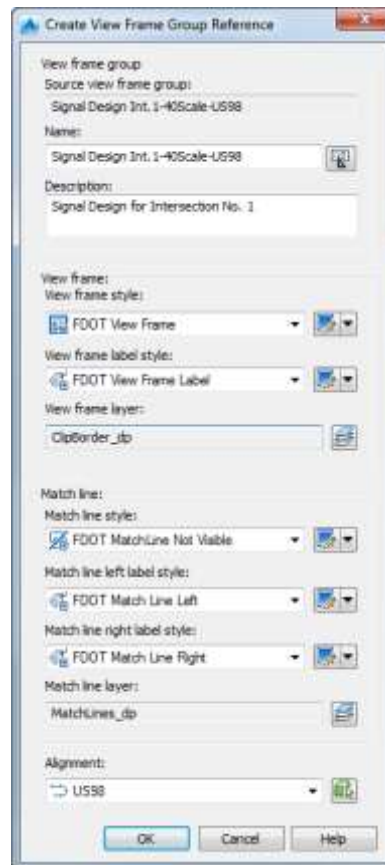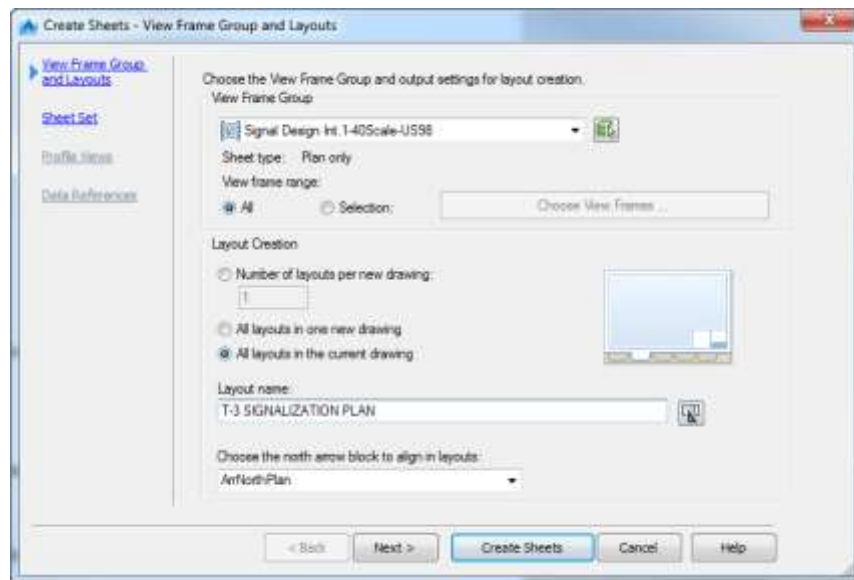

3. Select **OK**. After a moment you should see the View Frame that you created previously at the intersection.

➢ *Create Sheet Layout and Adding to Sheet Set (Part 3)*

✓ *Sheet Layout*

1. Start **Create Sheets** from the Output Ribbon. This can also be loaded from typing it in on the command line.

2. On the **View Frame Group and Layouts** page make sure you have the correct **View Frame Group** selected > Put the Sheet in the **Current Drawing** > Enter in the **Layout name**. If you don't know the sheet number you can always edit the properties after creation.

3. Select the Block used as the North Arrow. The North Arrow will rotate in each sheet to orient to North. Click **Next**.
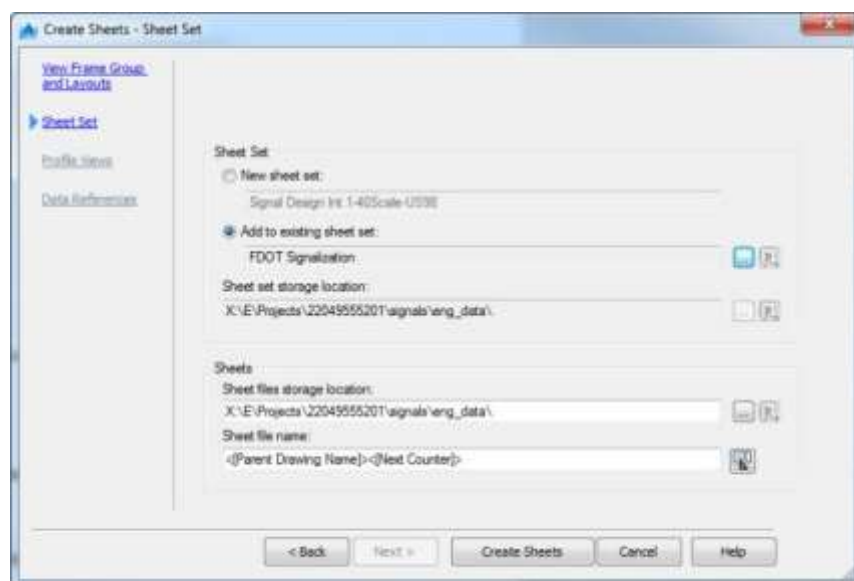
4. On the **Sheet Set** Page browse to the already created DST file as shown above.

5. Click **Create Sheets**.

6. The **Signalization Plans** Sheet set should look like the image below. We need to make some obvious edits
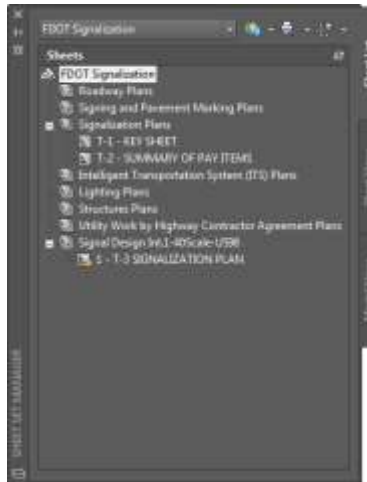
7. First Left Click on the new sheet and drag it up to the Signalization Plans Sheet set. Then Right Click and remove subset as shown below
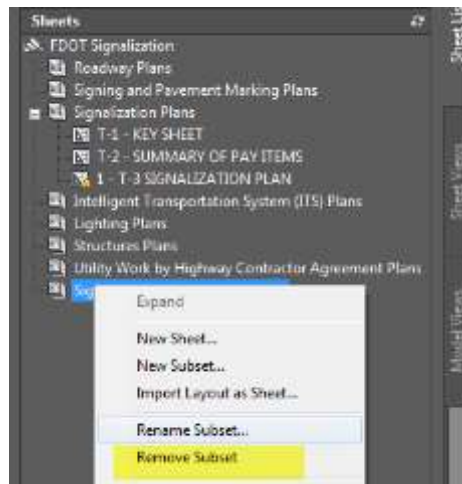
8. Right Click on the new sheet > **Properties** and make the changes as shown below. So far the new Sheet set has 3 separate drawing files that can be accessed in one convenient spot.

9. Switch to the new Sheet Layout tab. Double Click inside the viewport to make it active. Notice the following items

- The North Arrow is already rotated and scale is listed.

- The view inside the viewport is already rotated (click on the model tab to compare).

- The scale is already set to 1"=40'.

- The fields in the sheet border are already filled in.

Exercise 4.2 *Signal Head Detail*

> ➢ *Place Signal Head Details (Part 1)*

In this exercise the student will use the FDOT Traffic Palette to place the Signal Head Detail.
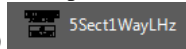
1. Continuing in *dsgnsg01.dwg*,

2. On the Home Ribbon select **Tool Palettes** if they are not already displayed.

3. Right Click on the Palette Name and select **FDOT Traffic**.

4. Select the Signal Heads tab.

5. Make sure your Sheet Layout is in **Paper Space**.

6. Scroll down the palette and select the block **(5Sect1WayLHz) 5 Section 1 Way Left Horizontal (650-1-18)**

7. Left Click to place anywhere in the top left corner of the sheet.

8. The **Edit Attributes** dialog opens. Enter in 4 for the assembly count. You can always edit this later by double clicking on the block or selecting and right click > Properties. Select OK.

9. On the palette select the block **(3Sect1WayHz) 3 Section 1 Way Horizontal (650-1-14)**.

10. Place it next the previously placed signal head detail. For Assembly count enter 2.

11. Drawing should look like below.

> ➢ *Place Detail Text (Part 2)*

In this exercise the designer will place the description text "SIGNAL HEAD DETAIL" above the two signal heads placed in the previous exercise. This note is bigger than normal text so the user will have to set the text height manually.
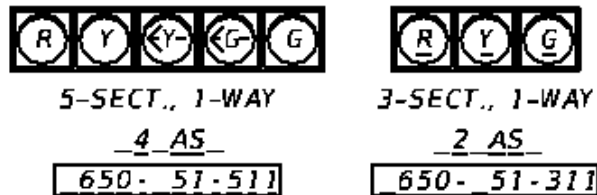

1. Continuing in *dsgnsg01.dwg*, type in **Mtext** on the command line and draw the text box as shown below.

2. You can set the text height before typing or highlight the text and make edit using the Text Editor contextual ribbon. In this case change the text height to **.10** and toggle on the underline symbol. The font is still annotative as you can see the blue drafting triangle in the text style pick box.

Change the text height to 0.10
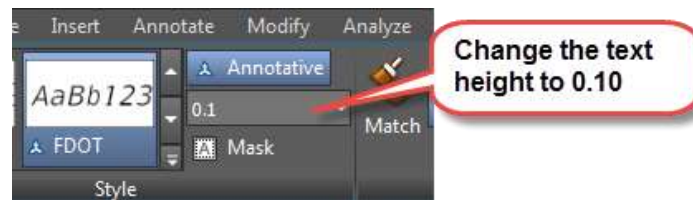
3. In the Text box type in **SIGNAL HEAD DETAIL** and left click outside the text box to exit the Mtext editor and place the text.

➤ *Place Controller timing and Loop Detector (Part 3)*

This exercise is placing the Timing Charts for Controllers and Loop Detector Charts. Make sure to remain in paper space.

1. Continuing in *dsgng01.dwg* on the Traffic Palette switch to the **Signal & Lighting Tables** tab.

2. Click on the **Controller Timings** table to insert it in lower left corner of the drawing file.

3. Click on the **Detectors for Loops Table** and insert it in the lower right corner of the drawing file.

4. Both of the objects are AutoCAD Tables and are ready for user input..

Exercise 4.3 *Mast Arm Assemblies Sheet*

➤ *Create Mast Arm Assemblies Sheet (Part 1)*

In this exercise the user will create the Mast Arm Assemblies sheet and place the standard notes and table.

1. From the FDOT Ribbon, select **Create File**.
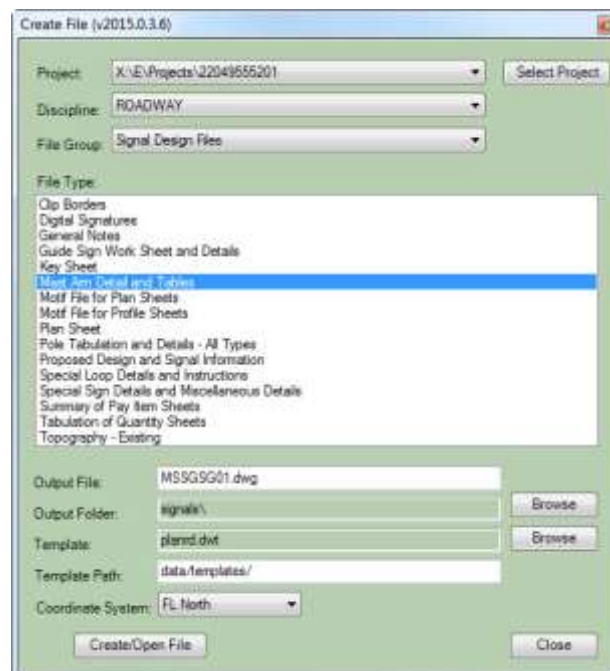
2. Fill in your options matching the image above.

3. Click **Create/Open.** Close dialog when file opens in the background.

4. The file is already created with a sheet border and is set to 1 Scale since we will be working with details which will be placed in paper space.

➢ **Use the Traffic Palette to Place the Standard Mast Arm Assemblies Data Table (Part 3)**

1. Change the Layer to **Tables_dp** then From the FDOT Traffic Palette, select the **Signal & Lighting Tables tab >** select the **Mast Arm Assemblies Data** table.

2. Insert in the top center of the sheet.

➢ **Fill in Table (Part 2)**

The AutoCAD table can be filled in with data. An AutoCAD Table behaves like an Excel File.

1. Zoom to the table, enter the appropriate data and save the file.

| 2. Structure Assembly Numbers	First Arm/Arm Type	Pole/Pole Type	Pole/UB (ft.)
3. 1	E3-T2	E3	T2	20
4. 2	E5-T3	E5	T3	20
5. 3	E6-T4	E6	T4	20
6. 4	E5-T3	E5	T3	21

Notice when you insert the Mast Arm Table the **Mast Arm Assembly Data Notes** are already included as a block within the table. You can edit the notes by double clicking in the block. The Gray border on the table does not print. Your drawing should look like below.

Exercise 4.4 *Mast Arm Tabulation Detail Sheet (Part One)*

➢ **Create New File**

1. Using the Create File application from the FDOT Ribbon, select **Create File**.
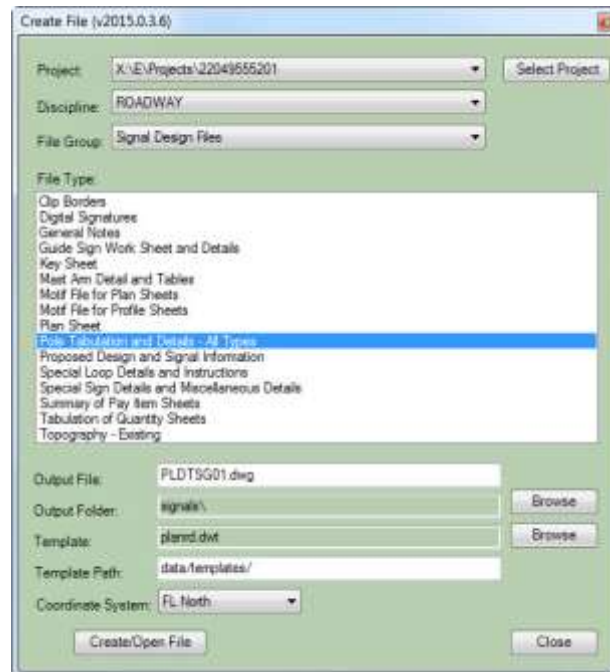
2. Select Create/Open to create the **Pole Tabulation and Details for all Types** file.

3. Close the Dialog.

4. Like the other detail sheet the current drawing file has a 1 Scale Layout and is set in Paper Space..

➢ ***Using the Traffic Palette to Insert the Standard Mast Arm Tabulation Table (Part 2)***

1. Change the current Layer to **Tables_dp**.

2. With FDOT Traffic tool palette selected click on the **Signal & Lighting Tables** tab.

3. Select the **Mast Arm Tabulation** table to insert it in the drawing. Insert it in the lower left corner of the drawing.

4. In the drawing file, enter the appropriate data and save the file. Please see images below.

									SIGNAL	DATA				
											DISTANCE			
ID NO.	SHEET NO.	LOCATION BY STA.	TOP OF FOUND. ELEVATION	RDWY ARM NO.	CROWN ELEV.	SIGNAL Y/H	BACK PLATES Y/N	PED. SIGNAL Y/N	1	*	2	*	3
1		32+58.00	37.00	1	37.30	H	N	Y	20.0	3	34.0	5	
---	------	---------------	-------	2									
2		33+59.00	36.80	1	37.00	H	N	N	38.0	3	54.0	5	
---	------	---------------	-------	2									
3		33+48.00	36.70	1	37.00	H	N	N	40.0	3	55.0	5	
---	------	---------------	-------	2									
4		32+36.00	36.00	1	36.00	H	N	N	30.0	3	45.0	5	
---	------	---------------	-------	2									

TOTAL ARM LENGTH	ARM M.H.	ANGLE BETWEEN DUAL ARMS 90/270	SIGN DATA								
			DISTANCE FROM POLE / HEIGHT AND W.								
			A	H1	W1	B	H2	W2	C	H3	W3
46	20		9	1	3.5						
		- - - - -									
60	20		19	1	3						
		- - - - -									
70.5	20										
		- - - - -									
60	20		15	1	6				65	1	3.5

➢ *Place the Standard Mast Arm Assembly Data Table Notes Block (Part 3)*

1. From the command line type in **Design Center (DC)** and press enter. Make sure you are still in paper space.

2. Using Design Center browse to the Block folder within the state kit.

3. Expand the Roadway drawing and select Blocks.
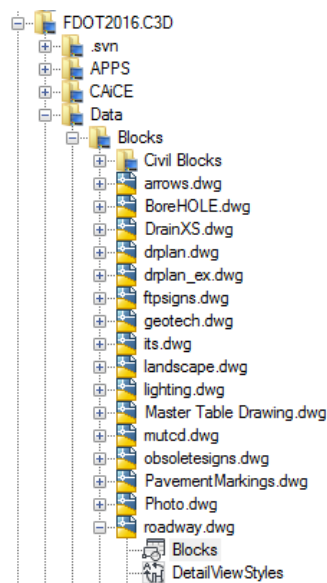
4. Locate the **SHMastArmTabulation** block and **Right Click > Insert Block**.

Note   **The origin of this block is positioned at the top left corner of the plan sheet.**

➢ *Sheet Set (Part 4)*

1. Using what you learned earlier add this sheet to the Signalization DST file. Rename the Layout to **Mast Arm Tabulation**.

2. Save Drawing.

STRAIN POLE SCHEDULE

Creating the *Strain Pole Schedule* sheet is a little different in Civil 3D, since you can have multiple sheet layouts in one drawing it is easier to copy the **Standard Mast Arm Tabulation** Layout the same way you would copy a tab in Excel. And using what you have already learned place the Tabulation/Summary Boxes that would be linked to the Excel spread sheet with the Strain Pole Schedule data. After the data is link to the Tabulation/Summary Boxes, the designer would place the Strain Pole Schedule Details & Notes block (SHStrainPoleSchedule) on the Strain Pole Schedule sheet. Finally, the designer would update the Strain Pole Schedule sheet layout with Sheet Set Manager.

EXPLORING ENTITY MANAGER (EMX)

Entity Manager or EMX uses a proprietary database that is provided by the Department. When the Department's CADD software is installed, the latest EMX database is placed on the local hard drive. When new projects are started and EMX loads for the first time it will ask you to save a Payitemdb.xml file. This will be your projects Database file that contains the current Payitem data., it is recommended to save the latest PayitemDB file from the Department's default folder to the project SYMB folder and rename it to the eleven digit FPID number. For the **22049555201** project used as the example in this manual, the **PayitemDB.xml** is renamed to **22049555201.xml**. This allows the designer to modify the database for specific parameters, and protect it from being overwritten by any future maintenance updates. The original version of the AECMERGE is delivered with the FDOT C3D software suite as *[Device]:\FDOTXXXX\Data\Pay Item Data\AECMERGE.XML* and is automatically loaded and updated by EMX.

When EMX Manager is opened during a drawing session it can be minimized or closed and reopened again in the same session. If you close your civil 3D session with EMX open it will remember if it was opened or closed and load accordingly.

It is highly recommended that every user that works on projects becomes very familiar with Entity Manager. Entity Manager should be the standard tool used by everyone whether they are drawing simple lines, placing blocks, or designing major interchanges. Other applications and processes rely on the X-data that EMX places on entities, if these features are not found then quantifying, for example, would be impossible.

This database has been set up specifically by the Department to create entities with the correct Layer symbology according to the Department's CADD Standards. The **AECMERGE.xml** file is set up with discipline folders called categories. Inside of each category are items.
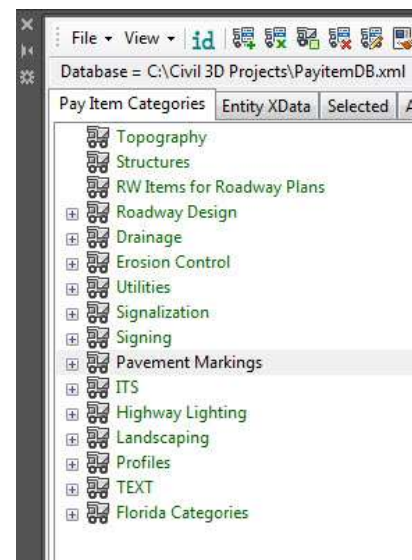
o **Pay Item Categories -** The basic component of the hierarchical tree is the Category. The AECMERGE.XML database categories are divided by discipline. The figure above shows the Categories with a description relative to their discipline. Inside these Categories, you have either subcategories or items. Items are represented by one of three icons as described below.

o **Items -** The other database component is the item. An item could be a drafting item, a compute item or a default item. Items contain specific functions related to defined entity symbology or quantity calculations. Items are represented by one of two icons:

o **Paintbrush Icon** – This symbol reflects that a compute formula is not assigned but entity can still be drawn or placed with correct symbology.

o   **Calculator Icon with Red Check** – In addition to having a compute method and correct symbology this symbol reflects entities that have Adhocs that can be added.

o   **Calculator Icon –** This symbol reflects that entity contains no Adhocs.

EMX MENU BUTTONS

EMX has a toolbar to quickly access different modes. The function of each button is summarized below.

 - **File View –** This section allows user to save, save as, export or open a project specific database. The default option allows user to rebuild the project database with default settings.

 - **Identify Item**. Identifies and displays (Pay Item Data) XData for a selected entity. The entity may be preselected or selected after the tool is activated. The tool works with one entity at a time.

 - **Appends**. Appends XData to select entities. Most common entities - arcs, lines, circles, feature lines, rectangles and others are included.

 - **Replace**. Replaces XData to select entities. These entities must already contain pay item data to be selected.

 - **Region**. Creates a hatched region from an enclosed area. The region is appended with XData and a label is also created. The boundary for the region should not have XData attached. The region is used for quantifying.

 - **Remove**. Removes XData from selected entities. The entity may be preselected or selected after the tool is activated.

 - **Edit**. Displays **Edit Entity Attributes/Adhocs** dialog for the selected entity. The entity may be preselected or selected after the tool is activated.

 - **Match Properties**. Transfers the properties and XData from a source entity to one or more target entities. The entity may be preselected or selected after the tool is activated.

 - **Label Tools**. This opens the Hatch Area Labels dialog. This dialog configures the label used when the Region command is used to enclose regions and attach XData.

 - **Highlight/Show Tools.** The Highlight/Show tools work with the entities found in the primary drawing file and currently do not work with X-Referenced files or Data-Referenced entities.

DESIGN SETTINGS

Settings used while using EMX are based on how your Civil 3D environment is set up. The department has set the State Kit up to be a By layer standard, meaning that all Colors, Linetypes, and Lineweight are controlled by the Layer Property. All symbology is set by the Master Standard spreadsheet that resides in the state kit install folder.

DESIGN MODE

Design Mode is the default mode when the EMX is opened. *Design Mode* is used for the following functions:

- Sets Symbology Standards by use of the **Drawing Tools** on EMX for the placement of AutoCAD entities.

- Place Adhoc Attributes on an entity.

Items are placed in the file by generic AutoCAD commands using the EMX Drawing tools, the items can be placed as pay items for future tabulation.

The Drawing tools as shown below are used to **Place Entities with Influence**, which is another way of saying it attaches the Xdata used to extract quantity reports.

When a command is started using the drawing tools the FDOT Civil 3D Layer symbology is set.

It cannot be stressed enough how important it is to NOT use regular AutoCAD commands to draw or place Entities, they will not have the required Xdata attached and you will have to append appropriate Xdata to them.

ADHOC ATTRIBUTES

An *Adhoc Attribute* is additional information about a particular entity. Look at it as just another property for the drawing entity. Example, a line has this fundamental data associated to it:

Layer, Color, Lineweight, and *Linetype*.

By placing an Adhoc on the line the designer is giving that line additional information. That information could be a chain name, cross slope, profile name, thickness, etc. It is almost limitless as to what can be associated to an entity with Adhocs.

AdHoc Attributes are comprised of three types of information that must be defined:

1. *Name* - The **Name** is an identifying term.
2. *Type* - The **Type** identifies the nature of the information, and can be set to various options: Numeric, String, Unit, Quantity, and Remarks.
3. *Value* - The **Value** is the actual information to be used by FDOT Takeoff Manager, and is determined by the Type. For example, if the Type is set to Numeric then the Value must be a number.

DRAWING SIGNAL POLES

Generating the proposed Signal design is the responsibility of the engineer. The Department has developed a workflow to help simplify the process. One method is to place the pole using the dynamic blocks, another method is to place the signal blocks using Place Block Group which will attach the appropriate Xdata to the object. The other method is to use EMX to place the block.

DRAWING OTHER FEATURES

Pull boxes, Conduit and Loop Detectors are also important parts of the Signal plans. In this course the designer will learn how to place these entities using EMX, Place Block Group, & Design Center. The designer will also learn how to attach an AdHoc attribute on the signal poles for use in generating automated quantities.
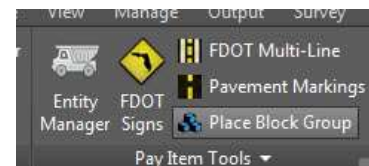
PLACE BLOCK GROUP

Another option the designer has to place the light poles, directional arrows, RPM's etc… is the Place Block Group tool located on the FDOT Ribbon. This tool works well when placing multiple blocks at one time.

Note   When using the Place Block Group you will be browsing the same database that is used in EMX.
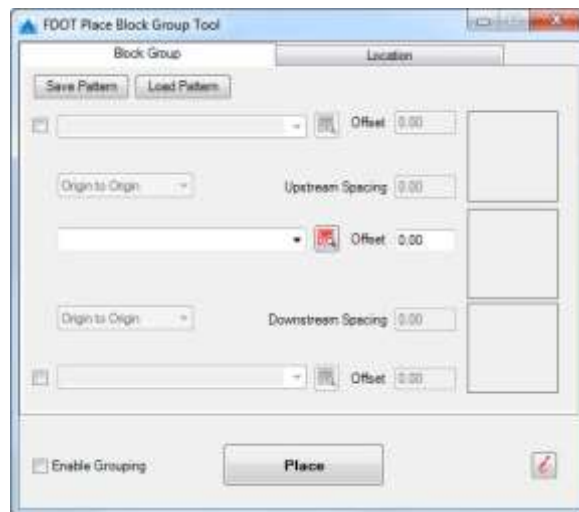
The Place Block Group tool can be loaded from the FDOT Civil 3D Ribbon on the **Pay Item Tools** panel.

This tool can also be loaded from the **Command Line** by typing **blckgrp.**


BLOCK GROUP TAB

Defines the EMX Manager item to use which in turn selects the block to be placed, the Offset, and Upstream-Downstream spacing from the selected entity to place the item.

Based on the items that are checked the designer can place up to three different blocks with this tool. The Magnifying glass next to each item allows the designer to browse to the EMX database and select the appropriate item which will attach the block to be placed. The *Offset* is the distance off of the selected drawing Entity or Xref Entity when placing the block.

LOCATION TAB

Defines what object the designer selects to place block, Line, Polyline, Alignment, or Xref Entity. Begin and End stations and Spacing.
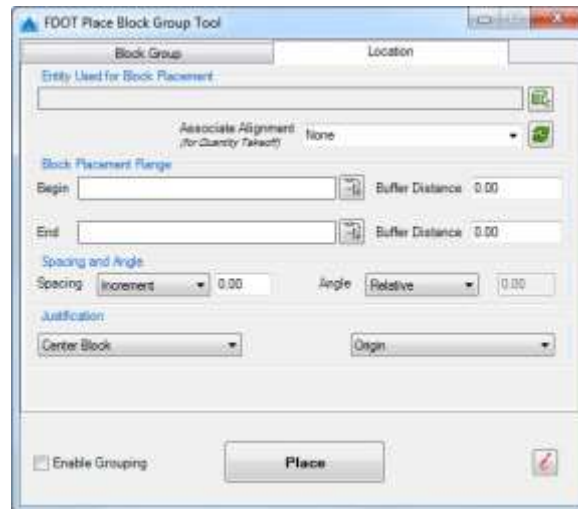
- o *Entity* – This can be a Line, Polyline, Arc, Alignment, or Xref Entities. This functions just like the Draw Striping tool. The Begin and End station will be populated with the entire length of object selected. They can also be modified using the buttons or by keying in the value.

- o *Buffer Distance* – This is for setting where to start the first block and end the last block.

- o *Spacing* – There are several options available to set the spacing between the blocks, they are:

  - o **Increment** – This is a set value between blocks.
  - o **Even** – Evenly spaces the blocks at a specified spacing, the buffer distances are ignored.
  - o **Max Spacing** – The location of the beginning and ending block are determined, then a sufficient number of blocks are placed in between, so that the distance between them is no more than the specified Max Spacing.
  - o **Once** – Only one set or block is placed. The ending buffer distance is ghosted.
  - o **Each Vertex** – The origin of the block is placed at each vertex of the selected entity. The Begin and End and buffer distances are ghosted.
  - o **End Points** – The origin of the block is placed at each end point of the selected entity. The Begin and End and buffer distances are ghosted.

- o *Angle* – If set to **Absolute** the angle is based on 0 degrees as horizontal. If set to **Relative** the block is placed relative to the entity selected.

- o *Justification* - The justification can be based on the center block (only option if only one row is placed), the upstream or downstream block. Only those toggled on in the **Block Group Tab** are available for setting Justification.

REVIEW EMX SIGNALS ITEM

Before placing the Signals items it is important to understand how they are set up. The AECMERGE file that the Department delivers will have blocks assigned to the Signal items to assist in the production of plan entities. The advantage to using EMX to draw the mast arms and other Signal entities is that the entities can be automatically quantified. The figure to the right shows the Mast Arm item in EMX.
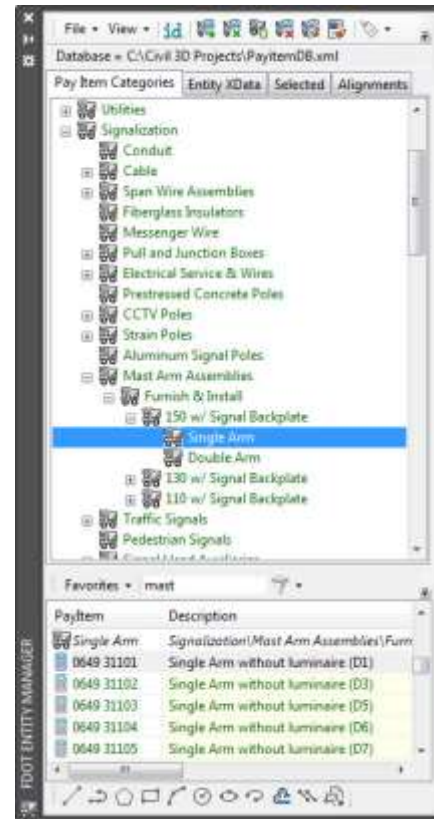
Exercise 4.5 *Placing Signal Poles using Dynamic Blocks*

> ➢ **Placing Signal Poles using Dynamic Mast Arm assemblies (Part 1)**

In this exercise the student will place a Mast Arm Signal Pole at a specified station and offset. The dynamic mast arm assemblies contain the Mast Arm Pole along with the Mast Arm. A visibility state with options is available for each block. The symbol ⚡ *More* designates blocks that are dynamic.
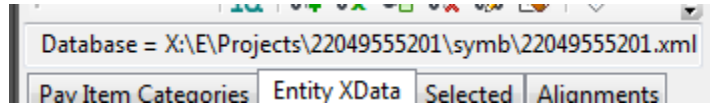
> ✓ *Load or create the Payitemdb.xml and Select mast Arm Item*

1. Open the **Dsgnsg01.dwg** and ensure the following reference files are attached:

   • **Dsgnrd01.dwg** from the roadway folder as an overlay.

   • **Dsgnsp01.dwg** from the signing folder as an overlay.

2. Make sure the Following is Data Referenced in

   • **Alignment -** CL98

   • **View Frame Group –** Signal Design Int.1-40Scale-US98

3. Click on the **T-3 SIGNALIZATION PLAN** layout. It is already centered near station **33+00** on the **CL98** alignment. This is at the intersection.

4. Use the Xref Manager to unload the *Display* of the **Dsgnsp01.dwg** to clean up the area around the intersection.

5. Open EMX [Entity Manager] **,** if closed.

6. From EMX click **File > Open** and browse to the project *symb* folder.

7. Select **22049555201.xml**. This is the AECMERGE file copied from the FDOT2017.C3D folder and renamed.

8. Click **OK** to load the file. It should now appear in EMX as shown below.

Database = X:\E\Projects\22049555201\symb\22049555201.xml

Pay Item Categories | Entity XData | Selected | Alignments

   ✓ *Using FDOT Traffic Palette to place block*

9. The first pole to be placed is **Pole 4** (The South West Quadrant of the Intersection). From the FDOT Traffic Palette > **Mast Arms/Assemblies** tab select the following block **MAPole1Arm(130)**.

10. Using the **Station Offset** Transparent Command [icon] which is located along the right side of your drawing space.

11. The command line will ask for the **Alignment**. Select the **US98** Alignment

12. The command line will ask for the **Station**. Enter **3232**, be sure not to enter station values with the + symbol.

13. The command line will ask for the Offset. Enter **62.28**.

14. The block is placed but is not rotated correctly. Using the following Osnap settings, type in **RO** for rotate > Press Enter > select the block > Press Enter > For Base Point select the **Geometric Center** of the Pole.
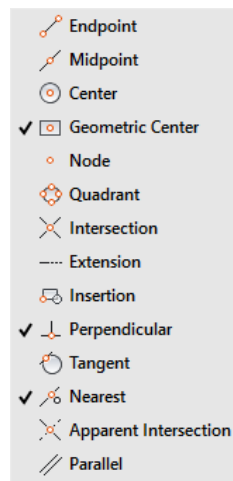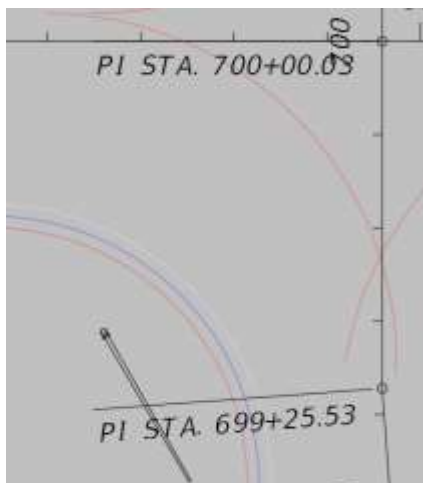

15. With the Perpendicular Osnap enabled you can select the **SR61** Alignment as the object to snap to since it is Perpendicular to the intersection.

16. The type needs to be changed with the correct Pay Item. Select the block. There are two blue grips visible now.
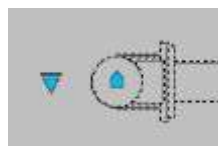
17. Click the Left Triangle grip and from the pull down select the **MAPole1ArmT3-E5 w/o Luminaire 0649 31203**. Each block contains visibility states which allows the block to change to the correct size and pay item number. Once selected notice the block has changed in size.
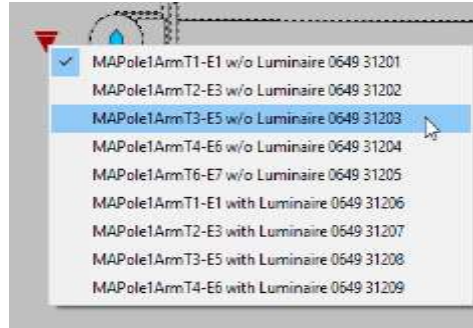

18. Repeat steps 9–18 for **Poles 1-3** using the same block with the data shown below. Rotate Mast Arm direction as needed. (Please see the BOE for payitem detail):

Note	Remember to enter station values without the + enter as 3258.04. Left offset values should be entered as a negative number (i.e. -41.47)

Pole	Pay Item	Station	Offset/Direction
Pole 1	0649 31202 Single Arm without Luminaire (E3)	32+58.04	-41.47(Left)
Pole 2	0649 31203 Single Arm without Luminaire (E5)	33+59.34	-56.27 (Left)
Pole 3	0649 31204 Single Arm without Luminaire (E6)	33+49.31	63.11 (Right)

Your intersection with all four Mast Arm assemblies should look like image below. Notice the Pole number designations. You will use this as a reference in later exercises.
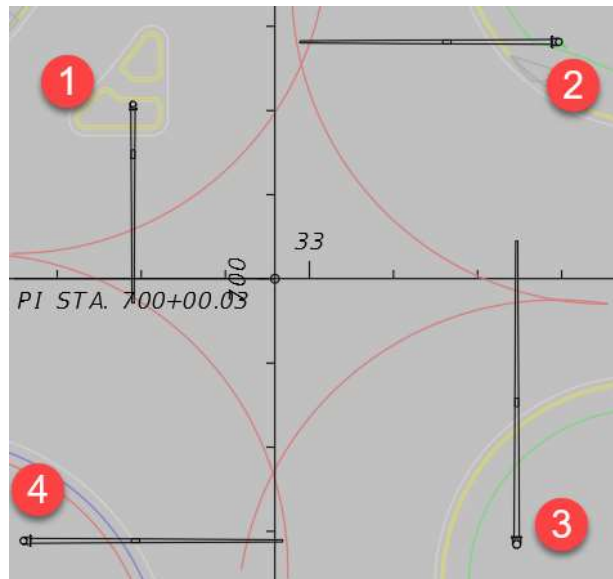

19. Save the File before continuing.

PLACE SIGNAL HEAD

The Signal Head can be placed using *EMX.* The advantage of using *EMX* is the ability to quantify the items automatically.

➢ *Place Signal Head (Part 3)*

In this exercise the designer will place a **Signal Head** on the **Mast Arm** using **EMX**.

✓ *Place Signal Head 5 section 1 Way*

1. Continuing in *Dsgnsg01.dwg*, **Pole 4**, zoom out so the entire intersection is in the view.

2. Open **EMX** if it is closed.

3. In **EMX,** using the Pay Item Categories navigate to **Signalization > Traffic Signals > Furnish & Install**.

4. Scroll to find **0650 1 18, Traffic Signal, F&I, Aluminum, 5 Section, 1 way > 5SHORAL, Traffic Signal, F&I, Aluminum, 5 Section, 1 way**.

5. Right click on item **5SHORAL, Traffic Signal, F&I, Aluminum, 5 Section, 1 way** and select Insert Block.
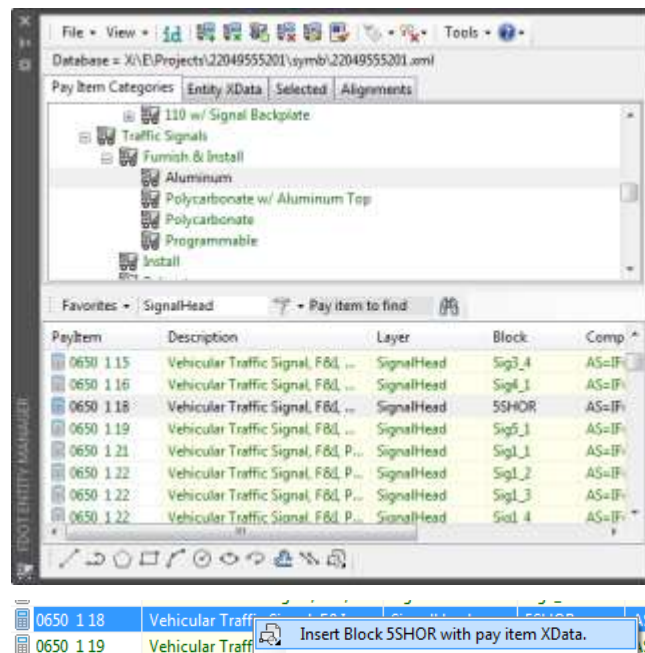
6. Using the nearest **NEA** osnap, snap along the Mast Arm. Don't worry about the rotation since we will rotate the signal head to match the Mast Arm. Right Click to close command.

7. Select the **Signal Head Block > Click the Grip > Right Click > Rotate** > Snap to NEArest along the mast arm. The Block is now aligned with the Mast Arm.

8. Select the block again and select the **Grip** > Slide the block down the mast arm. Notice the NEArest osnap keep the block stuck on the Mast Arm. See image below for final location.

✓ *Place Signal Head 3 Section 1 Way*

9. In **EMX**, navigate to **Signalization > Traffic Signals > Furnish & Install**.

10. Scroll to find **0650 1 14, Traffic Signal, F&I, Aluminum, 3 Section, 1 way > 3SHORAL, Traffic Signal, F&I, Aluminum, 3 Section, 1 way**.

11. Right click on item **3SHORAL, Traffic Signal, F&I, Aluminum, 3 Section, 1 way** and select Insert Block

12. Snap to the Mast Arm and Rotate it like you did the other Signal Head. Your Drawing and **Pole 4** should look like below.

Note   You may need to draw a temp construction line marking the center of the opposing Lanes so you can center the Signal Heads.

13. Repeat steps 2-12 to complete placing signals heads on **Mast Arm Assembly Poles 1-3***:* You can also copy the Blocks as the Xdata copies along with it.

Pole	Mast Arm Block	Signal Heads
Pole 1	**Mast Arm Type E3**	**5 Section, 1 Way & 3 Section, 1 Way**
Pole 2	**Mast Arm Type E5**	**5 Section, 1 Way & 3 Section, 1 Way**
Pole 3	**Mast Arm Type E6**	**5 Section, 1 Way & 3 Section, 1 Way**

Refer to completed Signal Head Placement image below for final location.
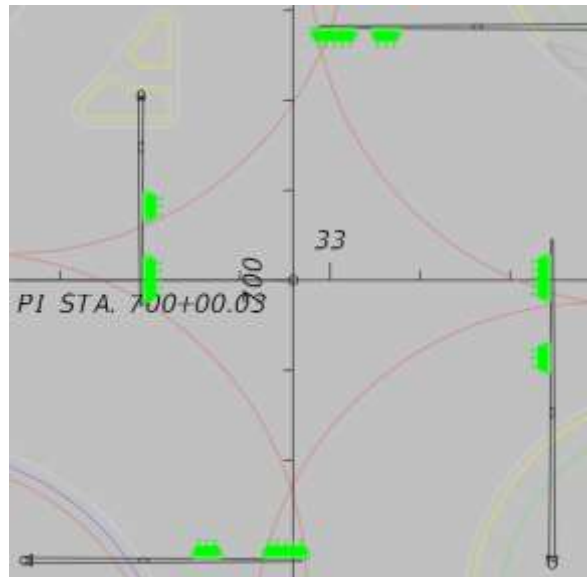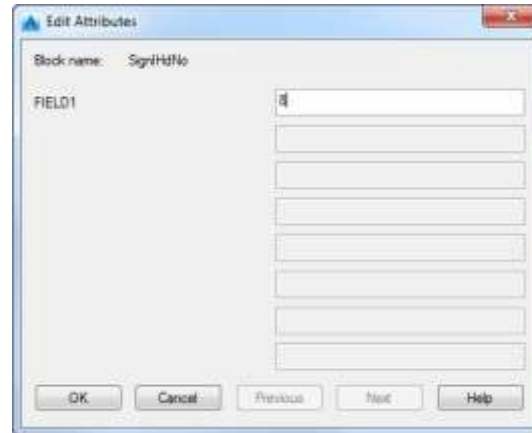

✓   *Place Signal Head Number*

In this part of the exercise the designer will complete the *Signal Heads* by placing a signal number. The next figure shows the finished product.
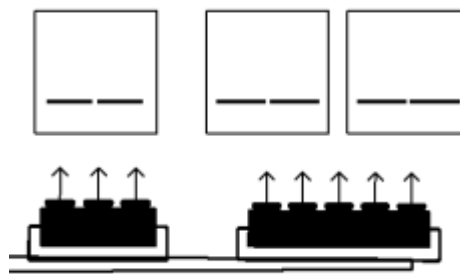
14. In Civil 3D, set the Current Layer to SignalHead.

15. On the *Signal Blocks Palette* Select **SignHdNo** which **is the Signal Head Number** block.

16. Position the *Signal Head Number Box* center, front of the arrow on the **3 Section, 1 Way Signal Head**.

17. When you select the insertion point an Edit Attributes dialog box opens. Enter **8** for Field 1.


18. Rotate the Block to be parallel to the Signal Head, using the PERpendicular osnap snap to the SR61 Alignment as show below.

19. Place or Copy **2 Signal Head Number Boxes** on the **5 Section, 1 Way Signal Head** offset from center, but both boxes centered about the **Signal Head**.

   To Edit an already labeled Attribute Double Click on the Block..

20. Repeat steps to fill in the **2 Signal Head Number Boxes** for the **5 Section, 1 Way Signal Head.** Click inside each **Signal Head Number Box** for the **5 Section, 1 Way Signal Head**. The first box enter the number **8**. The last box enter the number **3**. Drawing should look like below.
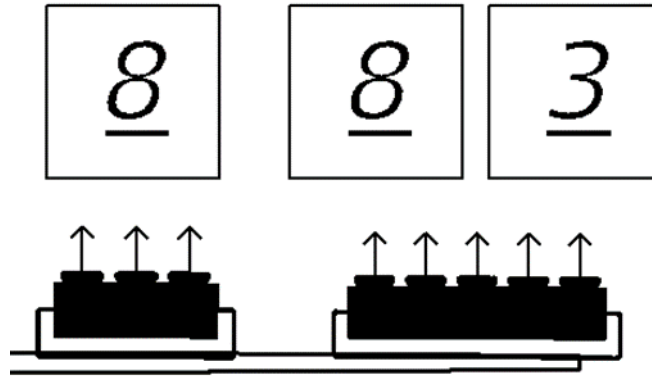
21. Repeat steps 14-20 to place the **Signal Head Number Boxes** and use the *Edit Attributes* to fill in the data on all the **Signal Heads Number Boxes** for each pole with data in the table below:

Pole	Mast Arm Block	Signal Heads	Box 1	Box 2
Pole 1	Mast Arm Type E3	3 Section, 1 Way	2	
Pole 1	Mast Arm Type E3	5 Section, 1 Way	2	5
Pole 2	Mast Arm Type E5	3 Section, 1 Way	4	
Pole 2	Mast Arm Type E5	5 Section, 1 Way	4	7
Pole 3	Mast Arm Type E6	3 Section, 1 Way	6	
Pole 3	Mast Arm Type E6	5 Section, 1 Way	6	1

LOOP ASSEMBLIES

The loops, like the signal heads, can be placed with Civil 3D tools and from EMX . The advantage to using EMX is the ability to tag the item with Xdata. The Figure below shows the Loop Assembly for a *Type F* loop. Like the other Block placement you will need to rotate the Loops.

Exercise 4.6   *Place Loop Assemblies*

In this exercise the designer will continue working in the same intersection and place the Loop Detectors, using EMX, that correspond to the Signal Heads placed in the previous exercise. Refer to Design Standard index 17781 for additional design criteria for Loop Assemblies. The figure below shows the Loop placed 2' behind the stop bar centered in the turn lane.
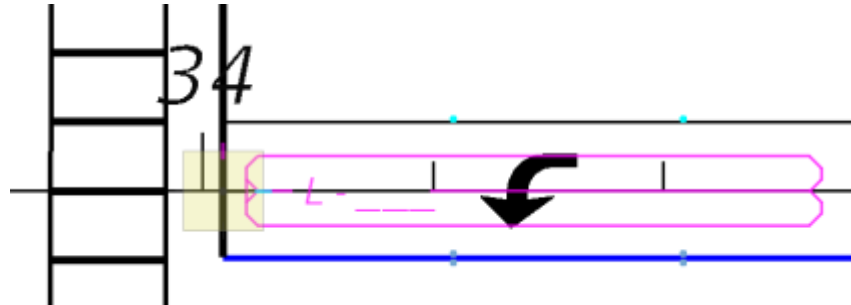

> ➤ **Place Loop Type F**

1. Continuing in *Dsgnsg01.dwg* reload *Dsgnsp01.dwg* from the Xref manager.

2. Zoom in near station **34+00**.

3. Open EMX and navigate to **Signalization > Loop Assemblies > Furnish & install**.
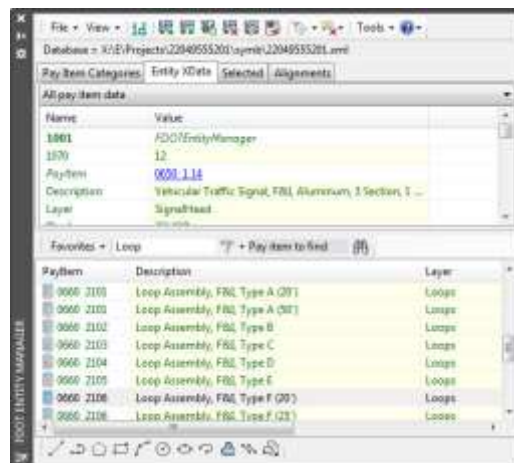
4. Scroll to find **0660 2106 Loop Assembly, F&I, Type F > LoopF50 Loop Assembly F&I, Type F (50')** and Right Click > **Insert Block**.

5. Snap to the midpoint of the stop bar centered in the Turn Lane and **Left Click**.

6. The command line is asking for the rotation angle > **PERpendicular snap** to any of the alignment tics. See Image below for snap graphics.
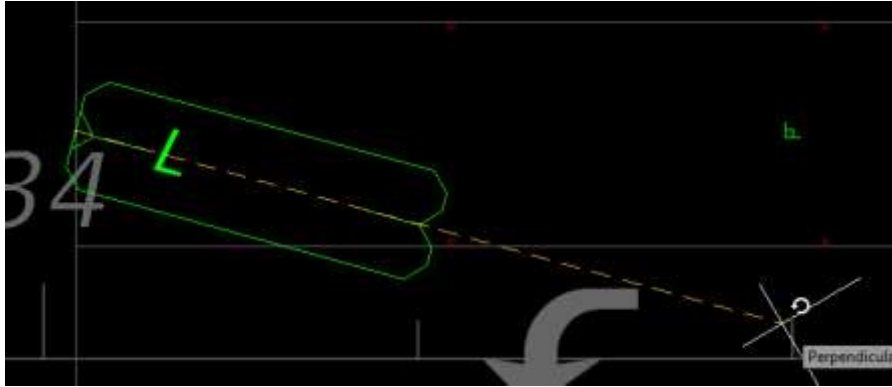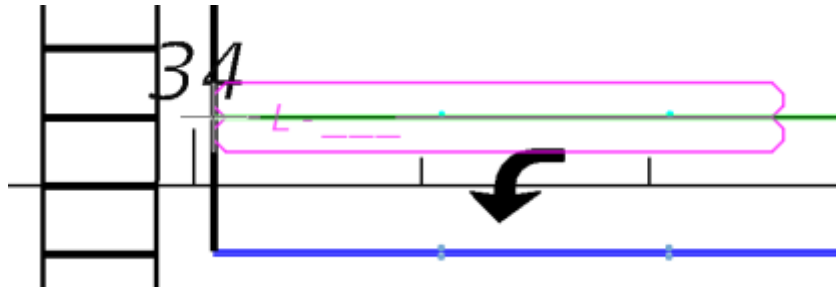
Note   If you accidently rotate it to the wrong angle, you can always type U for Undo.
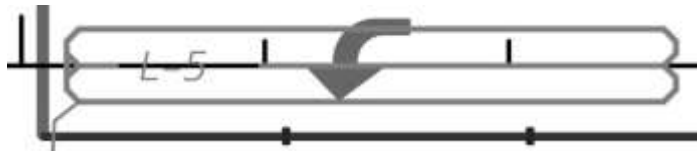
7. When the Edit Attributes dialog opens enter **-5** after L > Press **OK**.
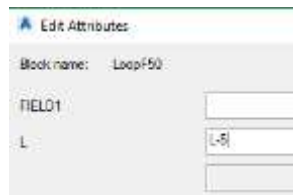
8. Move the Loop Block **2'** behind the stop bar by selecting it > **Click the Blue Grip >** Zoom in and Move it until the **NEArest osnap highlights on the Loop itself > Type 2 > Enter.**
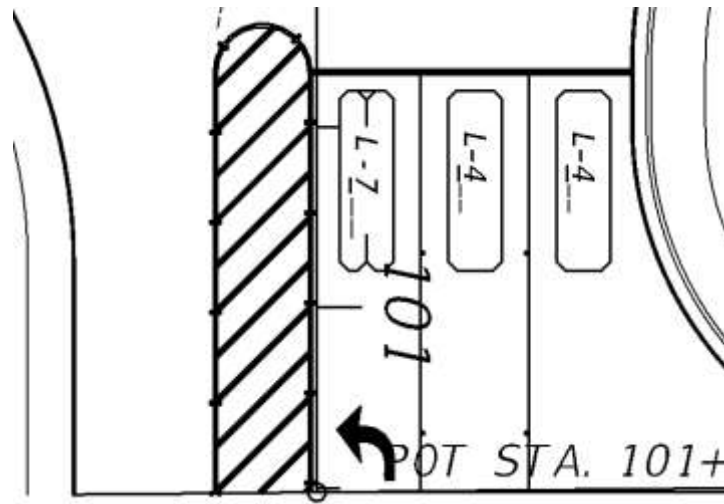

9. Loop should look like below. **Save** your File.

> ### *Place Multiple Loop Assemblies*

In this part of the exercise the designer will place multiple loop assemblies to complete a leg of an intersection using a different technique. When complete your drawing should look like below.


1. Continuing in *Dsgnsg01.dwg* zoom in near the south side of the Intersection.

2. First draw 2 temporary circles 6' in diameter with the center at the end of the lane lines at the stop bar.

3. Draw a Line **Perpendicular** to the Lane Lines. We will use these objects as references.

4. Open EMX and navigate to **Signalization > Loop Assemblies > Furnish & install**.

5. Scroll to find **0660 2106 Loop Assembly, F&I, Type F > LoopF20 Loop Assembly F&I, Type F (20')** and Right Click on item **LoopF20 Loop Assembly F&I, Type F (20')** and select Insert Block.

6. For Insertion Point Select the Intersection of the first circle and the Stop Bar. This is the Center of the Travel Lane.

7. For Rotation Select the **PERpendicular** osnap of the Temporary Reference Line.

8. Press Ok when the Edit Attribute box comes up. You will edit the three fields when all are in place. Your Drawing should currently look like below.

9. Scroll to and Insert the **0660 2101 Loop Assembly, F&I, Type A (20')** The insertion point is the middle lane as shown below.
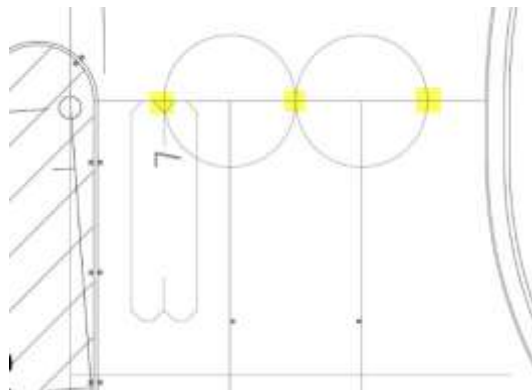
10. Using the AutoCAD **Copy** command select the Middle Loop **A(20)** and using the Circle Intersection with the Stop Bar as a base point snap to the third yellow highlighted location as shown above.

11. Select all of the loops and move them down 2' snapping to the **NEA**rest osnap.

12. Going Left to Right double Click on the Loop Blocks and fill in the following; L-7, L-4, L-4. If you haven't already delete your reference line and circles. Your drawing should look like below.
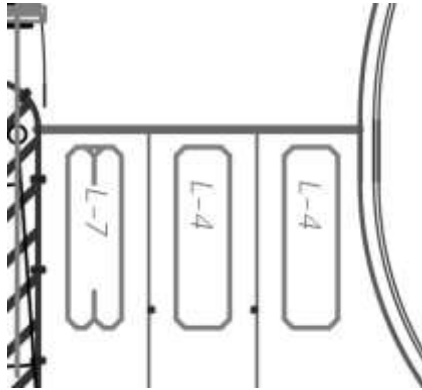
Note   If you haven't noticed yet, there is a visual difference between the two images above. The bottom one which is thicker and realistic to how the drawing will publish has the **Line Weight** option turned on. What this means is that it will display the assigned Line Weights that are assigned through the Layer Properties when you created your file which meets the Department Standards.

13. Repeat steps to place the **0660 2101 Loop Assembly, F&I, Type A** in the **Left Turn Lane o**n the West Side of the Intersection**.**

   HINT   You can also copy and mirror the already placed Loops.

14. Copy and Mirror the Appropriate Loops to the North Intersection.

15. Enter **L-8 and L-3** in the Loop Fields. The North Side of Intersection when complete as shown below.

16. Enter **L-**1 in the Loop Field. The West Side of Intersection when complete as shown below.
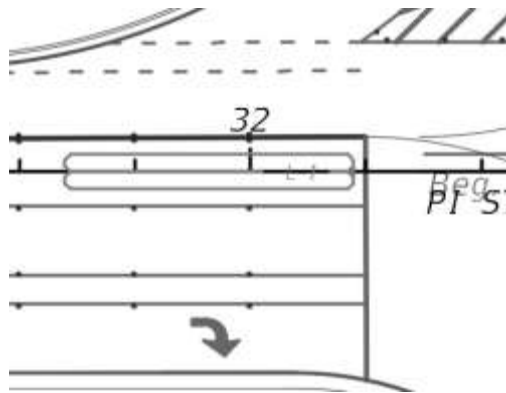
17. Next using **EMX** browse to Pay Item Number **0660 2102 Loop Assembly, F&I, Type B** and select the Insert Block Icon on the Drawing Tools Tool bar along the bottom.

18. Select the **Station Offset** Transparent Command located along the right side of your drawing screen. Transparent commands are used inside another command to allow the user to place objects with precision using Civil 3D Objects.

19. The command line will ask for you to select an Alignment. Select **US98.**

20. A Red Jig will appear on the screen locked to the Alignment. The Command Line will ask for the Station. Type in **3066.42.** Note that you don't enter in the + symbol when typing in stations.

21. Notice the Red Jig is now locked on the Alignment at the Station you entered. For offset enter **12.56.**

22. Using the above steps insert the same block at **Station 3532.09, Offset -12.46**. Note that the negative offset denotes Left Side placement.

PULL BOXES

Inserting the Pull Box items using **EMX** works much like the Loop Assemblies. As with any item being placed with **EMX** it is good practice to review the item to better understand how the item is placed. If the designer places the Pull Boxes using AutoCAD inserting methods the items will not have the appropriate Xdata attached to allow for Quantities reporting.
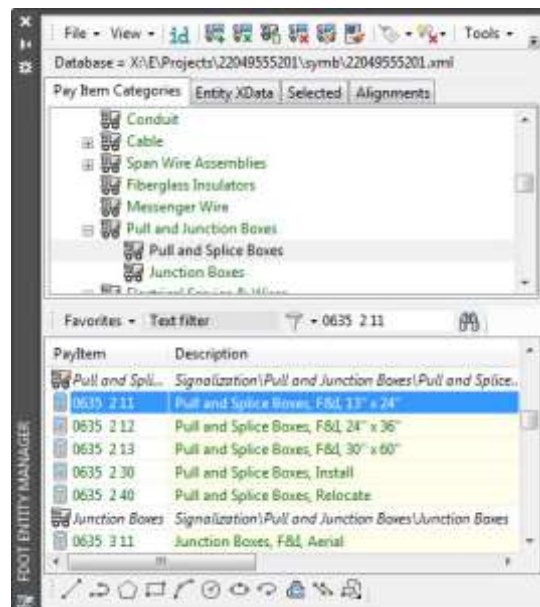
Exercise 4.7   Place Pull Box

In this exercise the designer will use EMX in conjunction with *AutoCAD Commands* to place several pull boxes around the intersection. By using EMX, the designer will be able to generate automated quantities.

1. Continuing in *Dsgnsg01.dwg*, zoom in near **Pole 3**.

2. Open EMX if it is closed. Make sure the correct **Payitemdb** file is loaded.

3. In the Pay Item Categories Navigate to **Signalization > Pull and Junction Boxes**. As Shown above.

4. Click on Item **0635 2 11 Pull and Splice Boxes, F&I, 13"
x 24"**.

5. Click on the **Insert Block** as shown on Image to Right.

6. Type **R** for rotate > press enter > and using your end point osnap select Left to Right the two Lane Lines at the Stop bar as shown. The reason we rotated using these two objects is to rotate the block to the view orientation
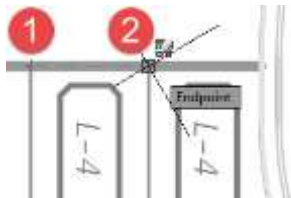
7. Select the **Station Offset Transparent Command** on the Transparent Command Toolbar located on the Right Side of your Drawing screen.

8. The command line will ask for the Alignment, Pick the **US98** Alignment.

9. The command line now asks for the Station, enter in the following without the plus symbol. **3342.57.**

10. For Offset enter **66.02** and press **enter**. Keep in mind if the offset is on the Left side it is a negative number.

11. Press Enter twice to place the Block.

12. Since the Pull Boxes are all the same size and Pay Item numbers you can select the AutoCAD **Copy** command and using the center of the block as a base point select the **Station Offset** Transparent Command to place the remaining blocks with the location data as shown below.

13. Repeat steps to place **Pull Boxes** at the following *offsets* and *stations*: Keep in mind not to enter the stations with the + symbol.

Offset	*Station/Side*	*Offset*	*Station/Side*	*Offset*	*Station/Side*	*Offset*	*Station/Side*
42.53'	**30+74.08 RT**	**-51.65'**	**32+61.17 LT**	**66.06'**	**33+65.61 RT**	**33.05'**	**34+01.29 RT**
45.00'	**32+24.67 RT**	**62.00'**	**33+42.57 RT**	**-54.86'**	**33+62.59 LT**	**65.89'**	**34+34.12 RT**
65.30'	**32+30.58 RT**	**62.10'**	**33+54.83 RT**	**34.42'**	**33+74.98 RT**	**-42.24'**	**35+29.48 LT**

-38.85'   32+61.18 LT   65.83'   33+54.83 RT   -49.35'   33+82.27 LT

## Exercise 4.8 *Place Controller Assembly*

In this exercise the designer will use EMX to place a Base Mounted Controller.

1. Continuing in *Dsgnsg01.dwg*, zoom in near **Pole 3 (South East)** side of intersection.

2. Open EMX if it is closed. Make sure the correct **Payitemdb** file is loaded.

3. In EMX, navigate to **Signalization > Controllers and Cabinets > Traffic Controller Assembly > Furnish & Install**.

4. Select item **0670 5110 Traffic Controller Assembly, F&I, NEMA**.

5. Select the **Insert Block Icon** located on the bottom of the EMX drawing Tools as in the previous exercise.

6. Type **R** in the command line and press enter to rotate the block like the Pull Boxes were rotated. Use the Lane Lines at the Stop Bar to Rotate to View. See the previous exercise for steps if necessary

7. Using the **Station Offset Transparent** Command Select **CL98** as the Alignment.

8. Type in *Station* as **3360.25** and press enter.

9. Set the *Offset* to **64.68** and press enter until block is visible.
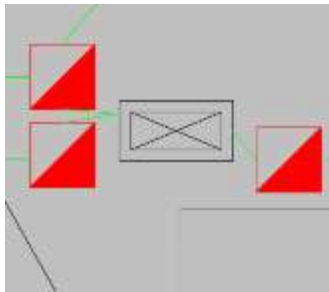
Exercise 4.9 *Draw Loop Lead in Wire*

In this exercise the designer will draw the Loop Lead-In wire from the end of the Loop Detectors to the Pull Box. The lead-In is paid for under the Loop Detector so the designer will draw this line using the AutoCAD PolyLine command, The figure below shows the Loop Lead-In drawn from Loop Detectors to the Pull Box.
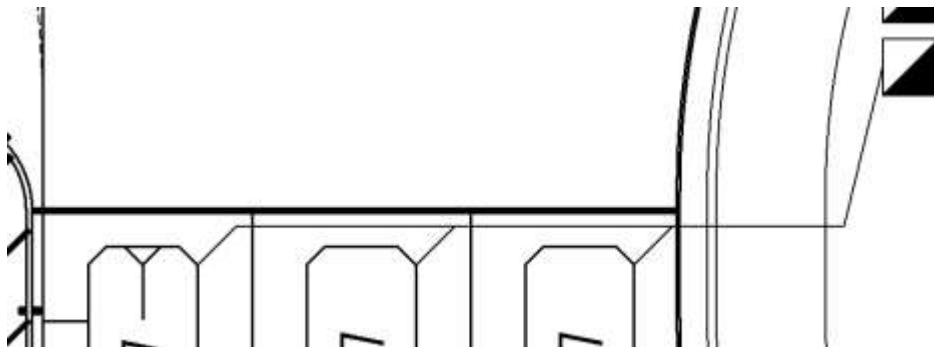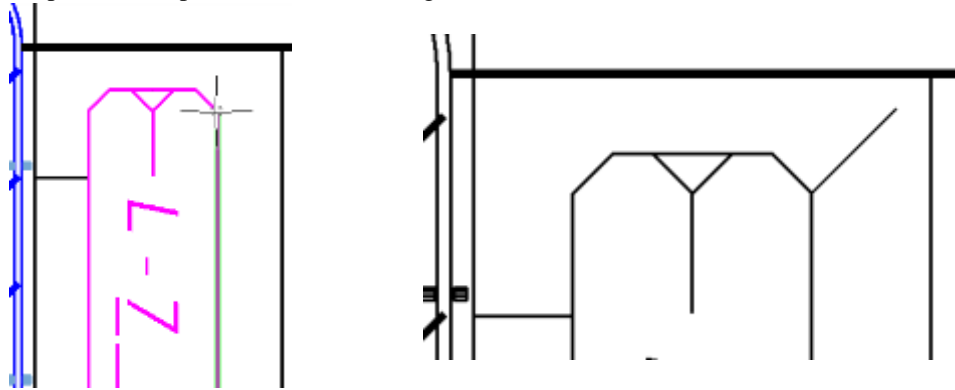

> ➤ *Draw Loop Lead-In*

1. Zoom in near the *Loop Detectors* placed earlier on the Southern Side of the Intersection

2. In Civil 3D, set the Current Layer to **LoopLI**.

HINT   You can type in the layer name on the command line to set it current.

3. Type **PL** on the command line to start the Polyline command.

4. Snap to the end points as shown in images.

5. Repeat this process on the remaining two **Loop Detectors**. Connect to pull box. Drawing should resemble Image below.
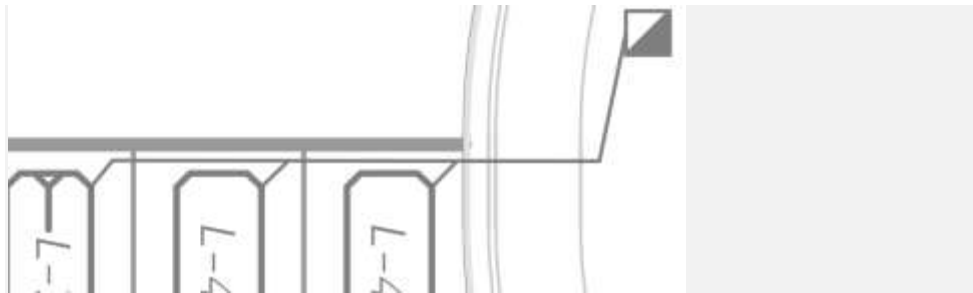
6. Using the *Poly Line* command, draw a line from **Loop L-7** parallel to the *Stop Bar* to a point past the last **Loop L-4,** then into the first **Pull Box** as shown in the next figure. The three images below represent the other connections
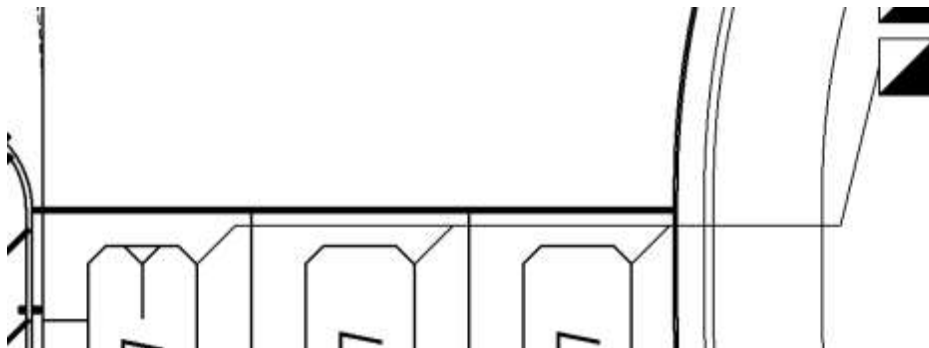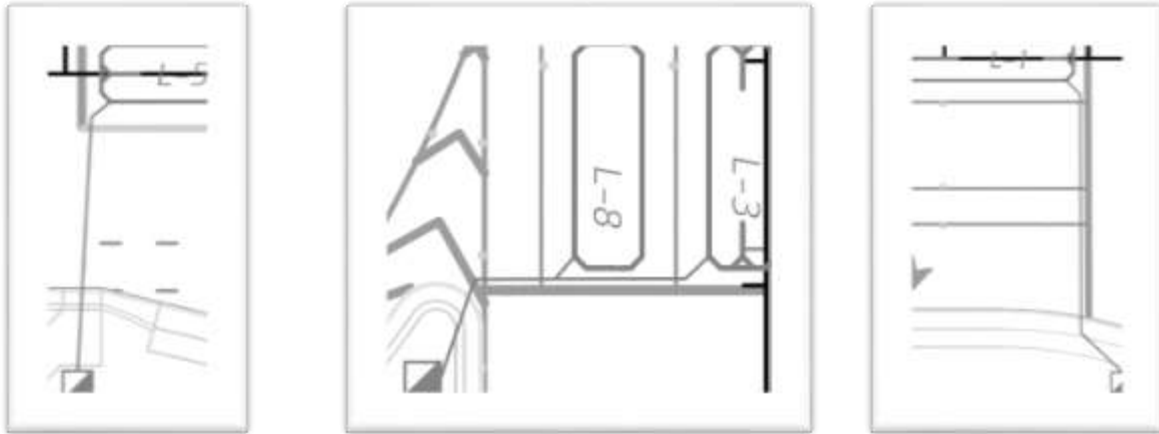
> *Note*   The location of the Pull Boxes will be dependent on each individual project. The placement of Loops, Types of Loops used and Loop Lead-In wire placement may vary from district to district, consult with the district traffic engineers regarding these issues.

7. Save your file.

DESIGN SETTINGS

The conduit Lines are special Linestyles that are delivered in the State Kit. It is specifically created to match the PPM examples.

Exercise 4.10 *Place Conduit*

In this exercise the designer will draw conduit from Pull Box to Pull Box and then to the Controller Cabinet. This exercise will use three different types of Conduit, Underground and Under Pavement and Open Trench. The next figure shows the types of conduit drawn in Plan view.
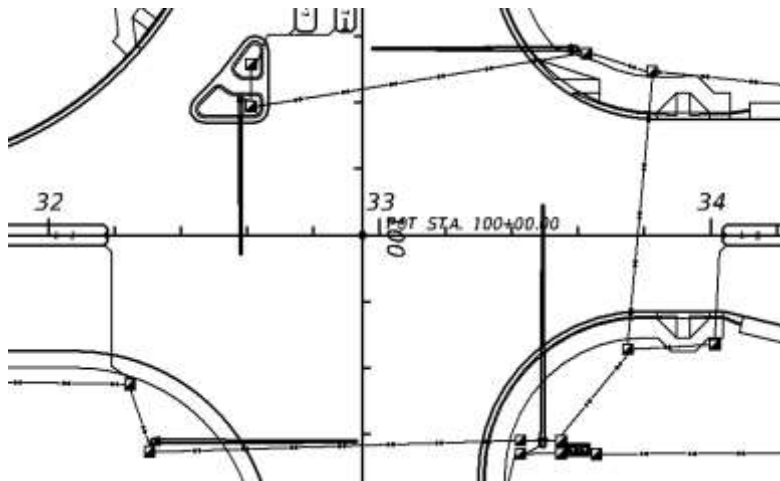

> ➤ **Place Conduit Underground**

1. Continuing in *Dsgnsg01.dwg*, zoom in near the **Pull Box** at Station **30+74.08** placed in a previous exercise.

2. Open EMX, if closed. Make sure the correct **Payitemdb** file is loaded.

3. In EMX, navigate to **Signalization > Conduit**.

4. Select item **0630 2 12 Conduit, Furnish & Install, Underground or Underpavement- Directional Bore**.

5. Select the Polyline Command ⌐⌐ from the EMX drawing tools. This will set the Civil 3D Layer symbology and draw with influence.

6. Using your **Midpoint** Osnap Snap to the midpoints of the Pull Boxes. See figure below.
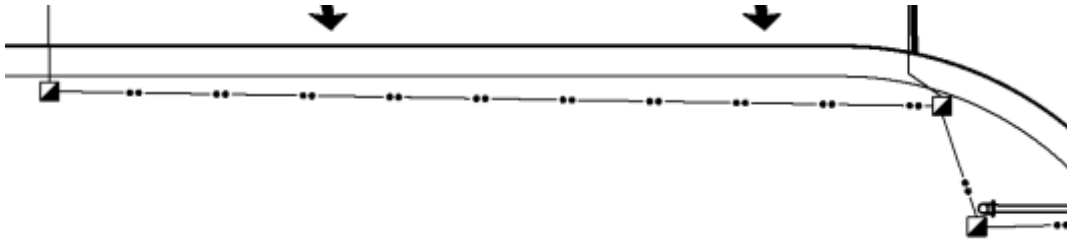
7. Continue to place the rest of the *Conduit item* **0630 2 12 Conduit, Furnish & Install, Underground or Underpavement- Directional Bore** around the intersection and down the **US98** Alignment. Complete the conduit from the Pull Box to the Controller Cabinet.

8. Zoom to the area near the *Signal Poles* and draw a line from the **Signal Pole** to the **Pull Box**.
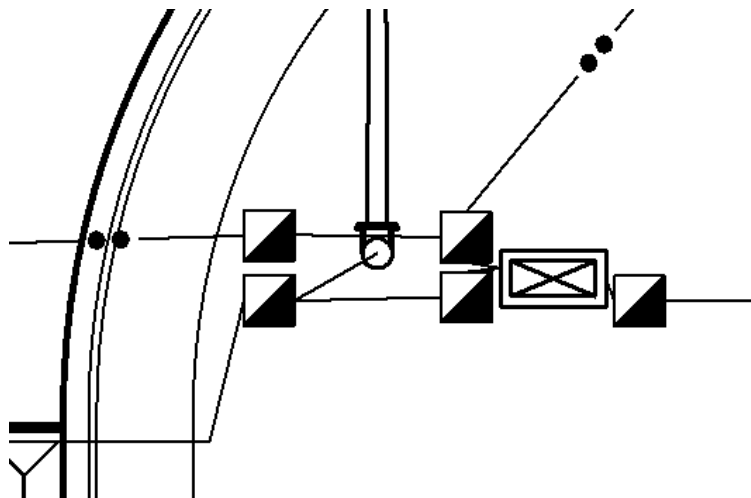
9. Drawing should resemble image below.
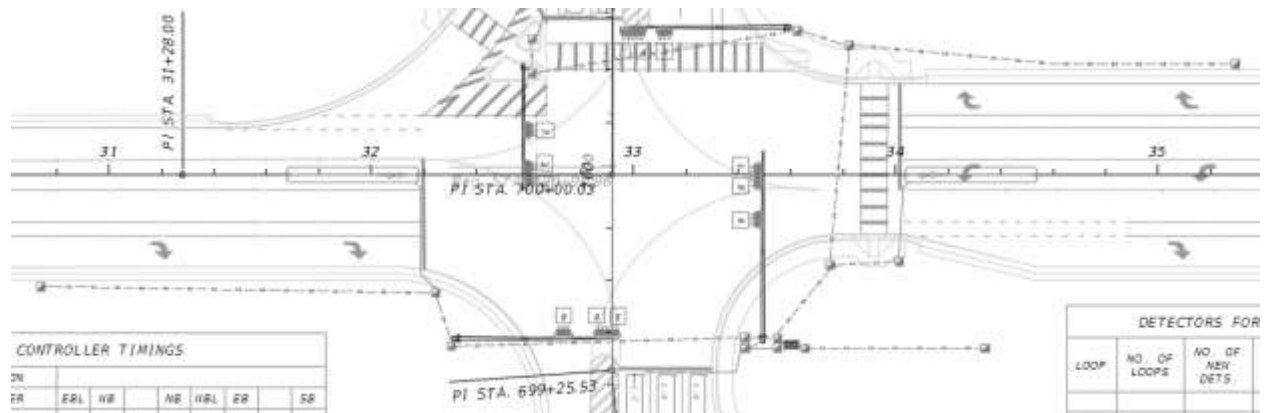
PLACING TEXT LABELS

There are several different types of notes and labels that are placed on Signal Plans that are not used in other components. For example the **Pole location label** and the **Pay Item number box**. These are handled with a combination of Civil 3D label styles and from the FDOT Traffic Palette.

Exercise 4.11 Place Pole Location Label

1. To start lets label **Pole No. 4.** Switch to the **Annotate Ribbon** > Click the top half of the **Add Labels** button and select the following options


2. Select **Add > Select the US98 Alignment** and then the center of **Pole 4**. Drag the label off of the Pole to remove the box and show the Leader Line. Currently your drawing should look like image below. To drag label off select the label and hover over the grips, select the grip that says **Move Label**.


3. Select the Label and select **Edit Label Text** from the Contextual Ribbon.

4. Click in the Text Preview box and add the number 4 to the Pole Number as shown below and select OK. The label should update and look like image to the right.
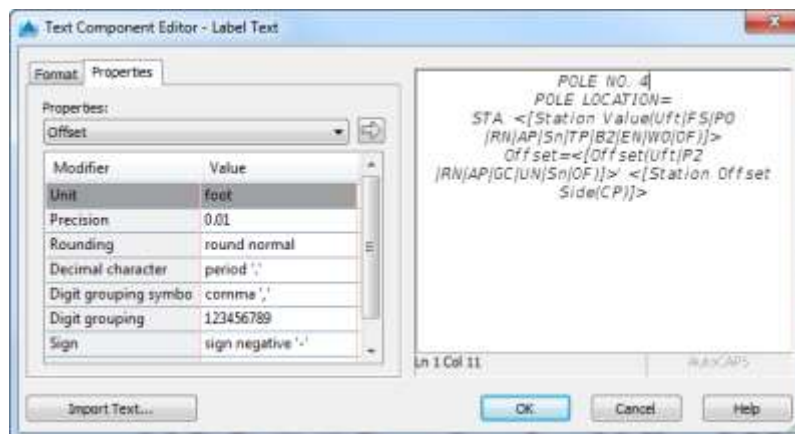

5. You could Place the label again for the other 3 Poles like the above steps but this time use the Copy command and select the center of the Pole as the base point and select the other the center points on the poles. Notice how the label updates with the Station, Offset, & Side, this is because the Labels are dynamic.

6. The drawing should look like below.
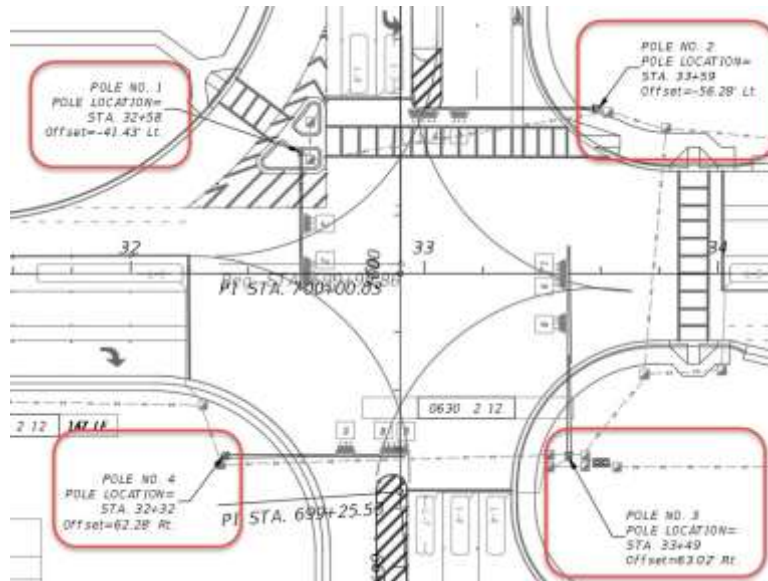
Similar to the Pole Location label is the **Pay Item Number box**, this block can be placed from the palette previously mentioned. Once this block is placed it turns into an AutoCAD table and can be edited by clicking in the individual cells and type the data in, there are also cells with a gray border (which will not print) around this table which represents where the lengths of the conduit gets filled in.
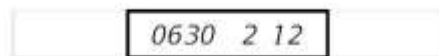
This block is placed in the general location of the item it is referring to and a leader line if needed is drawn from the Pay Item box to the item. Next to the pay Item Number box the designer will add a piece of text with the quantity and unit as shown below.
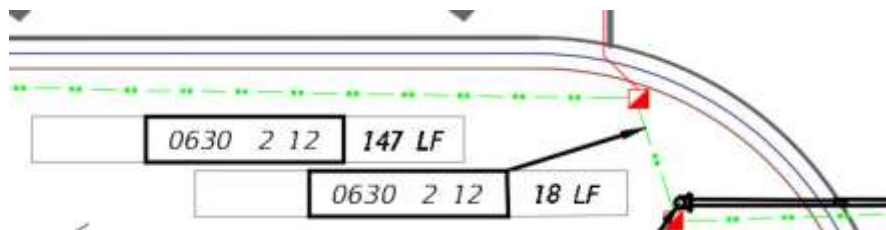
Exercise 4.12 *Place Pay Item Number Box*

In this exercise the designer will place the Pay Item Number Box then add a leader line and arrow head as shown above.

1. Continuing in the *Dsgnsg01.dwg*, from the FDOT Traffic Palette select **Signal Blocks tab > SignalPayItem > Insert underneath the Conduit as shown above**. Using the same techniques you have learned earlier rotate the table as necessary.

2. To add text to the table select in the cell you want to type and it will become active. For Pay Item Number enter **0630 2 12**.

3. Delete the entry's you do not need by clicking in the cell and pressing **delete**.

4. Select the Conduit and **Right Click > Properties** to get the Length.

5. Enter the length **147 LF** into the gray box to the right of the Pay Item Number.

6. **Copy** the Pay Item Table and move it closer to the conduit connecting the pull boxes.

7. Get the distance of the conduit and enter it in the box to the right which is **18 LF**.

8. Type in **Leader** on the command line and select a point on the conduit and the top right corner of the pay item box as shown above.

9. Next Copy a Pay Item Table and place it above the conduit in the Intersection as shown below
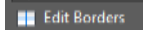

10. We have to add a top Row to the table with no border so as to enter in the Length of the conduit.

    Select the Table and on the Contextual Ribbon select Insert Above.

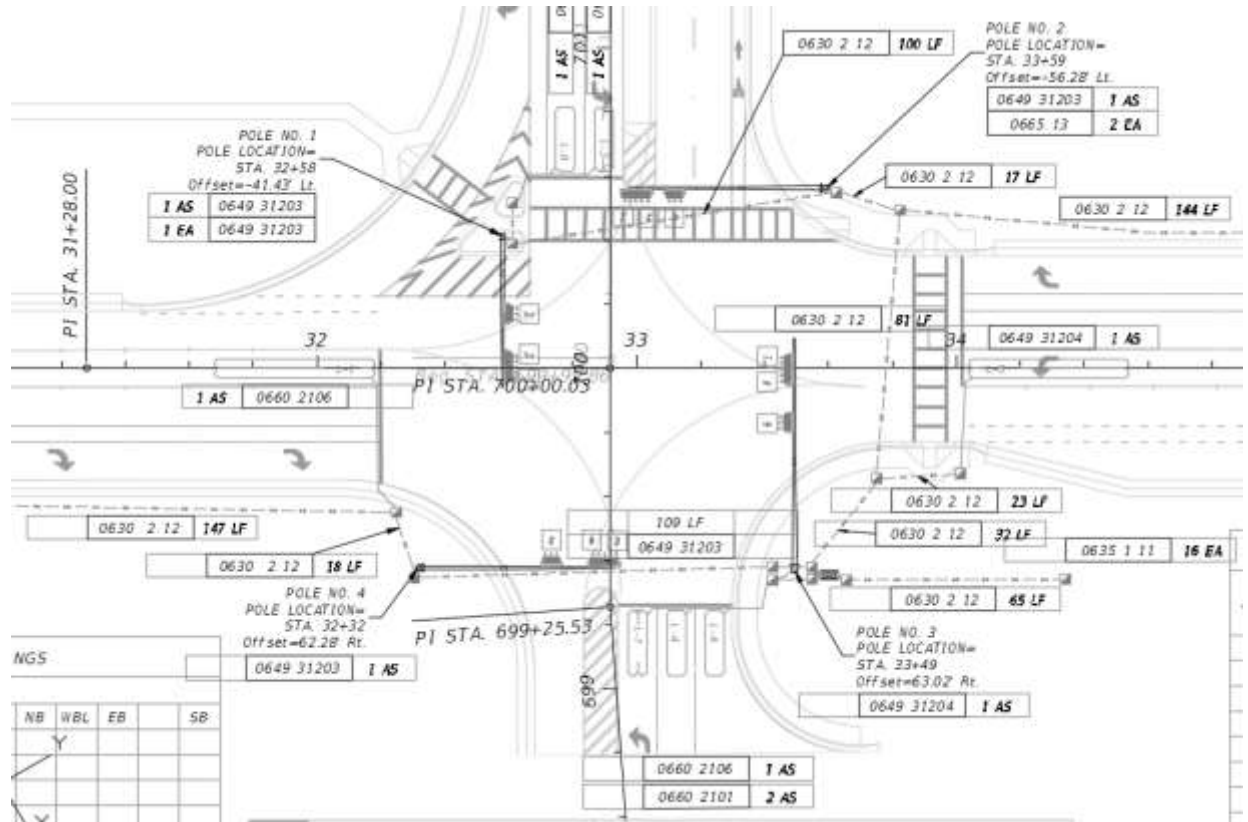11. Select the cell above the Pay Item Number. We need to turn the border gray so it won't print. Select Edit Borders.

12. Click in the following order.

13. Type in the Length **(109 LF).**

14. Using what you have learned copy and enter in the appropriate data. Your drawing should look like image below.

Note   Drawing a Leader Line is optional when the labeling is obvious. However, when the label is placed a considerable distance from the item being labeled, a leader line is required, but the arrowhead is optional depending on the Districts internal preference.

Note   You can always select the cell you are not using on the Pay Item Number Table and select Delete Columns to remove, if your drawing gets too busy. Remember the gray borders will not show on a print. Note that the Top Right Corner in the image shows the Tables with the Deleted Columns.

This concludes the workshop exercises.