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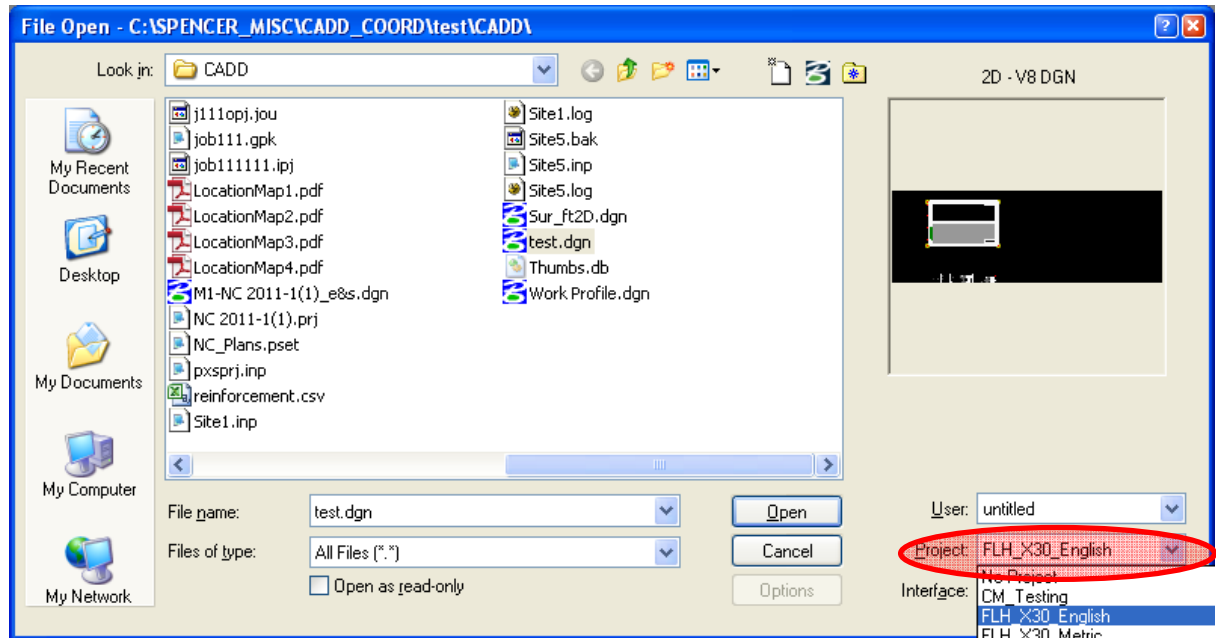
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## CHAPTER 12 : EFLHD STANDARD CADD PROCEDURES

### 12.1 – Standard Settings

#### 12.1.1 – Open a MicroStation File

**ALWAYS** check the **Project** workspace from the “**MicroStation Manager**” dialog box as shown below.



Select **FLH\_X30\_English** for U.S. Customary (English) projects, and **FLH\_X30\_Metric** for Metric projects in the Highway Design Section.

Using the Project Configuration of workspace “**FLH\_X30\_English**” will give the user access to the **X30** Generation of Standard Files (Level library, line styles, cell library, color table, text styles, ddb files, etc) and also set the MicroStation in **Survey Feet Unit** environment.

#### 12.1.2- Creating a New CADD File

All design files must be created from a Seed file. A separate two dimensional seed file has been developed for English and Metric scale design file. These are “**Sur\_ft2D.dgn**”, and “**Metric\_2D.dgn**”.

**ALWAYS** use the seed files from;

**M:\Engineering Software\Cadd\_resource\_v8i\X30\Standard\seed** when creating a new file. There is an English one (Sur\_ft2D or 3D) and a metric one (Metric\_2D or 3D). While in the MicroStation Manager Window (the first screen that pops up when you open MicroStation), make sure that the workspace is set to “FLH\_X30\_English” under Project.

Next, rename the file and save it in your project folder.

***Note** - These seed files have several operating parameters set specific to that sheet's purpose and scale .Some of the parameters are as follows:*

- a. Working Units: Imperial --- Master Unit- Survey Feet (')  
Sub Unit- Survey Inches (")  
Resolution- 10000 per Survey Foot
- b. Global origin set to lower left (GO=0,0)

**See M:\Engineering\_Software\Cadd\_resource\_v8i\X30\Standard\seed\ for available standard EFLHD Seed Files.**

### **12.1.3 – Text Styles in use at EFLHD**

See Chapter 4 for Text Styles and how to set Annotation Scale in EFLHD drawings.

## **12.2 – Border Sheet**

- Standard Border Sheets have been developed by the EFLHD Highway Design Section and will be used for all EFLHD projects.
- Border design files are accessed through the EFLnet  
<http://eflnet.flhd.fhwa.dot.gov/tools/template-drawings.aspx>

Originals are kept in the following directory.

**“M:\Engineering\_Software\Cadd\_resource\_v8i\Borders\”.**

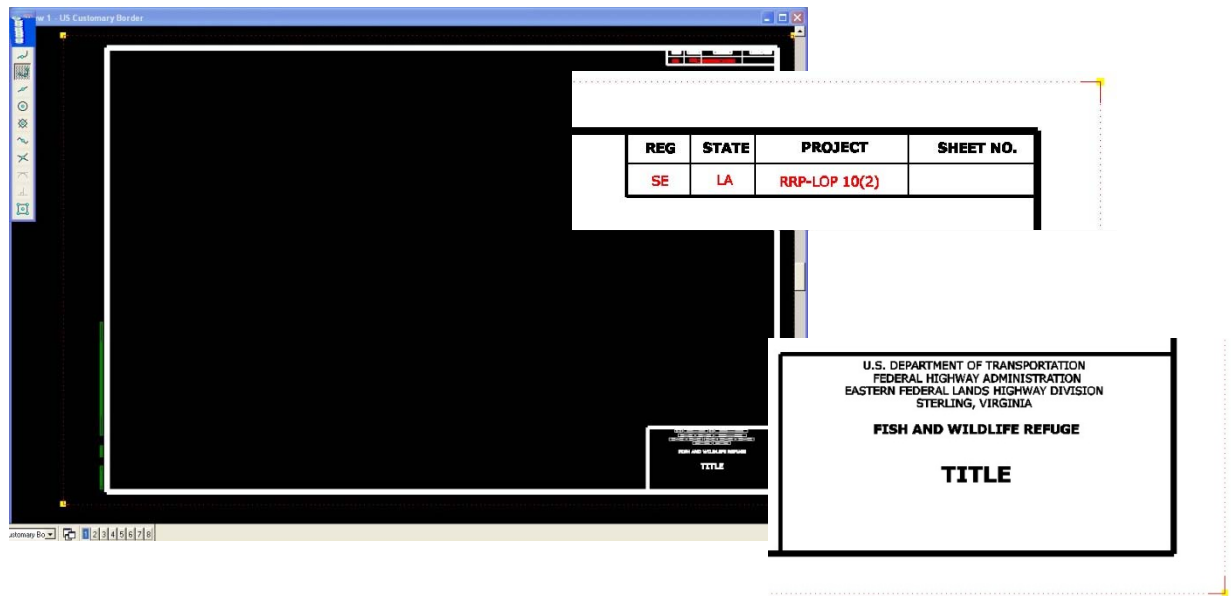
Border template 01-EFLHD\_bdr.dgn or 01-EFLHD\_bdr-nps.dgn will be used for most sheets in the plans.

(01-EFLHD\_bdr-nps.dgn is developed specifically for NPS projects and includes the PMIS # and NPS # cells in the upper title block)

Detail border template 01-EFLHD\_bdr-nps.dgn will be used for Standards and Details on NPS projects. (also includes the PMIS # and NPS # cells)

- English and Metric borders are kept in different models of this border design file.

- Designer needs to copy this file into project working directory.
- Rename this file according to the EFLHD’s naming convention [e.g. “**01-lop10(2)\_bdr.dgn**” for RRP-LOP 10(2) project].
- Edit all project information of the English and Metric border according to the working project.
- Attach the edited Border to the Sheet dgn’s as a reference file as required.



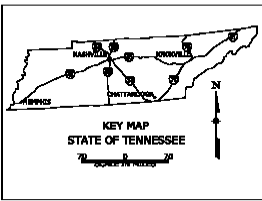
### 12.3 – Title Sheet

The Title Sheet identifies the set of plans, conveys the general type of improvement planned, and locates the improvement. The Title Sheet includes, at least the major criteria under which the improvement is designed, a sketch showing the location of the proposed project, a State map, a complete index of the sheets in the plan set, and the length of project.

- Standard Title Sheets for each partner agency have been developed and are accessed through EFLnet <http://eflnet.flhd.fhwa.dot.gov/tools/template-drawings.aspx> Originals are kept in the following directory.

“M:\Engineering\_Software\Cadd\_resource\_v8i\Standard\_Shts\Titles”

- Copy these files into your project working directory.  
Rename the files according to the EFLHD’s naming convention [e.g. “A01-lop10(2)\_ttl.dgn” for RRP-LOP 10(2) project].
- Replace location map and key map for the required State. Edit all required information according to the project.



**KEY MAP**  
STATE OF TENNESSEE

**U.S. DEPARTMENT OF THE INTERIOR**  
**NATIONAL PARK SERVICE**  
**GREAT SMOKEY MOUNTAINS NATIONAL PARK**

PLANS FOR PROPOSED  
**PROJECT PRA-FOOT G14**  
**PMIS # 055898-G14**

**RESTORATION AND STABILIZATION OF THE SLIDE AREA**  
**NEAR MP 15.10**  
SEVIER COUNTY, TENNESSEE

PROJ. NO.	APP. NO.	ISS. NO.	REVISE	PROJECT	SHEET NO.	TOTAL SHEETS
00000	0001	0001	00	VA	PRA-PMIS 1401	001

SHEET NO.	DESCRIPTION
A01	Title Sheet
A02	Symbols And Abbreviations
A03	Location Map
B01	Typical Section
C01	Tabulation of Quantities
D01-D05	Plans And Profiles
H01	Broken Control Narratives
P01-P02	Construction Sign Schedule
S01-S03	Standards And Details
T01-T12	Roadway Cross Sections

**DESCRIPTION OF PROJECT**

DEVELOPMENT: Rehabilitation of Rte. 33, and parking area reconstruction

PROJECT LENGTH: 9.87 Miles

LANE POLISH: 14" aggregate surface course

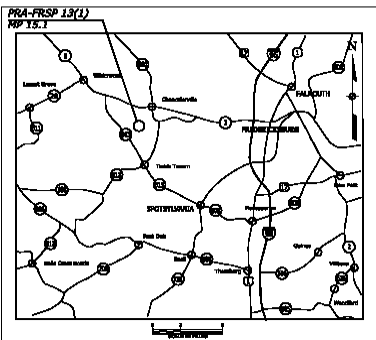
ROAD:	WIDTH:	TYPE:
SURFACE:	22' +/-	Aggregate
BASE:	22' +/-	Existing
ROADBED:	22' +/-	Existing

BRIDGE: (Structure Name, Structure No., Last date of inspection)

DESIGN DENOMINATION	
ADT (2006)	<100
ADT (2028)	500
DNV	15
D	60/40
%Track	2%
V (MPH)	40
C/A	None
e(max)	8%


**SPECIFICATIONS**

\*Standard Specifications for Construction of Roads and Bridges on Federal Highway Project, FH-02 (U.S. Customary Units.




**PRA-FRSP 15(1)**  
**MP 15.1**

Schedule	Description	Station to Station	Length (miles)	RIP In/leap/ Cycle #



**30% PLANS**

PLANS PREPARED BY



U.S. Department of Transportation  
**Federal Highway Administration**  
EASTERN FEDERAL LANDS HIGHWAY DIVISION  
STERLING, VIRGINIA  
MAY 1, 2010



## 12.5 – Location Map Sheet

The Location Map shows the location and limits of the improvement. The location sketch shows physical features that will aid in the identification of the proposed road location, including intersecting and adjacent roads, prominent landmarks, towns, property lines, and a north arrow. A graphic scale is included for the location sketch so the scale will be applicable on reduced size prints.

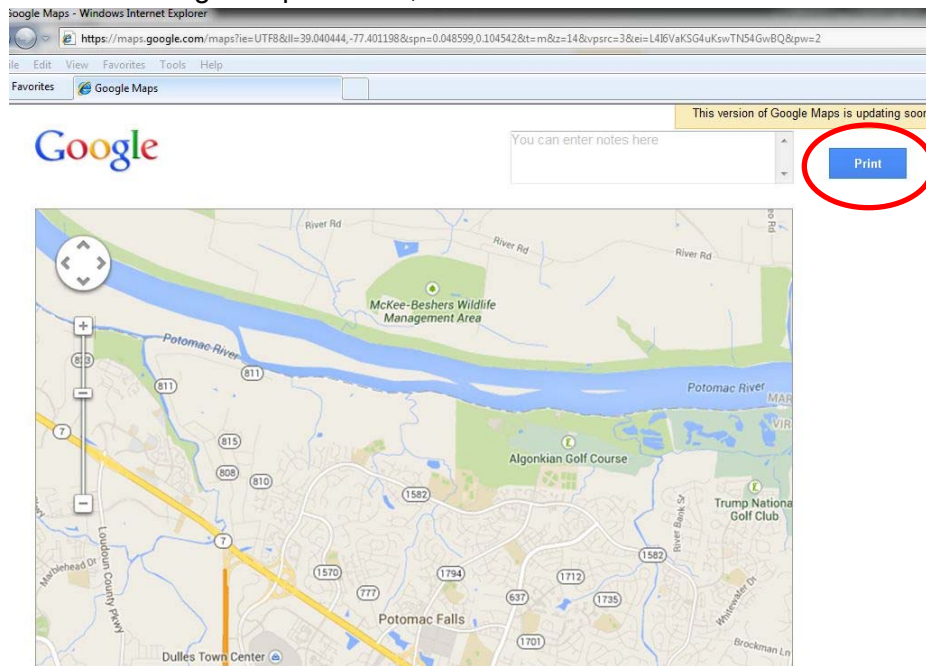
- Create a new DGN file using “**Sur\_ft2D.dgn**” seed file.
- Name this file according to the EFLHD Naming Convention [e.g. “A03-lop10(2)\_loc.dgn” for RRP-LOP 10(2) project].
- Attach your project Border file using reference default model selection (Note the Border is drawn for 1”=100’ US Customary).
- Use models in the same Location Map design file, if project has more than one Location Map sheet.

### 12.5.1 – Capture a Google Map image for Location Map

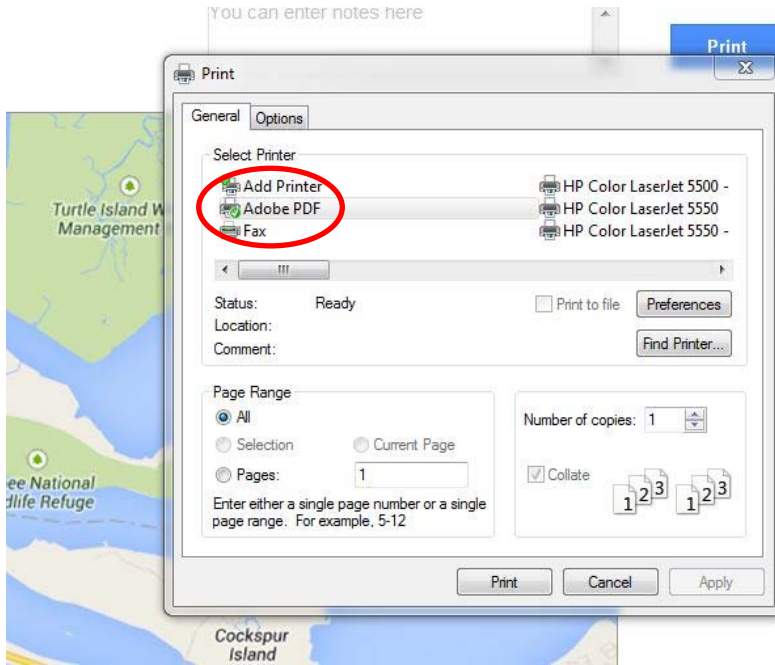
If you do not have a digitized or CADD drawn location map, you may choose to capture an image of the project location/vicinity using other online map sources.

If using Google Maps, navigate to project location. Zoom in to provide a scale that shows the project limits, major and minor access routes. Leave enough room to clip off the pan/zoom tool in the view.

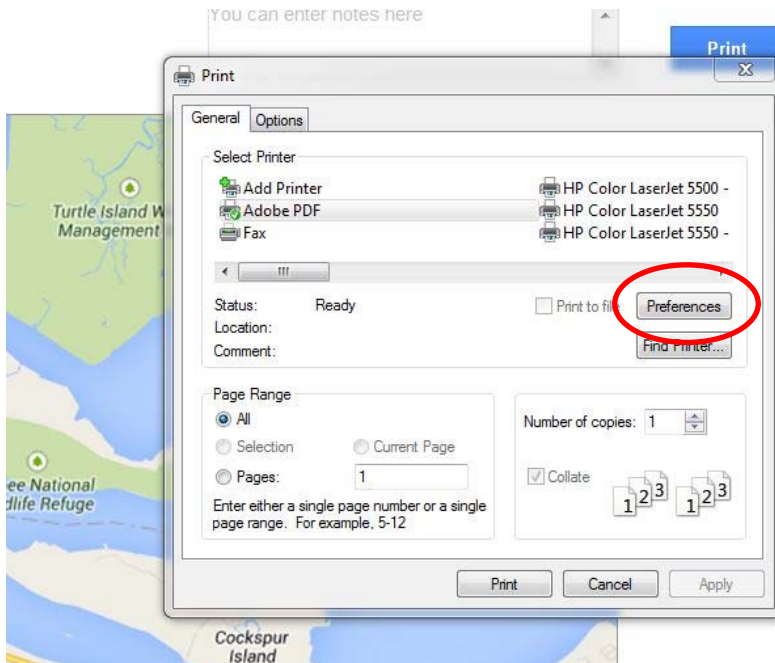
From the Google Maps screen, hit the **Print** button:



Choose the **Adobe PDF** Printer:

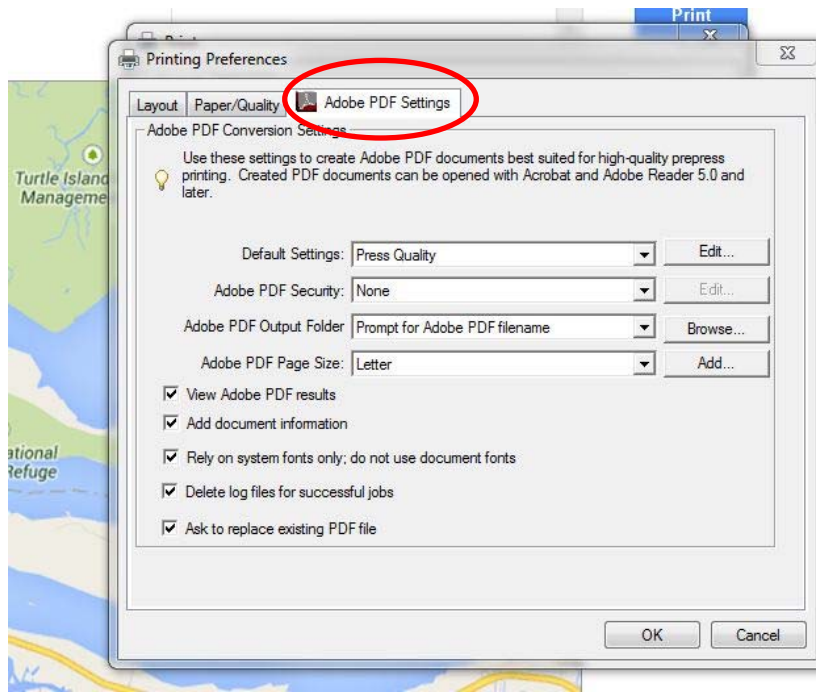


Select the **Preferences** button:

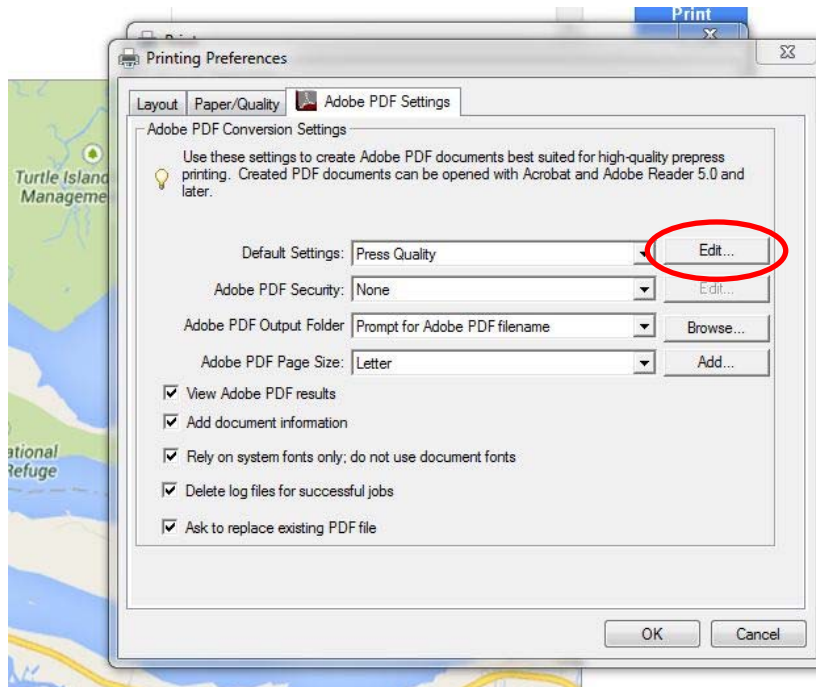




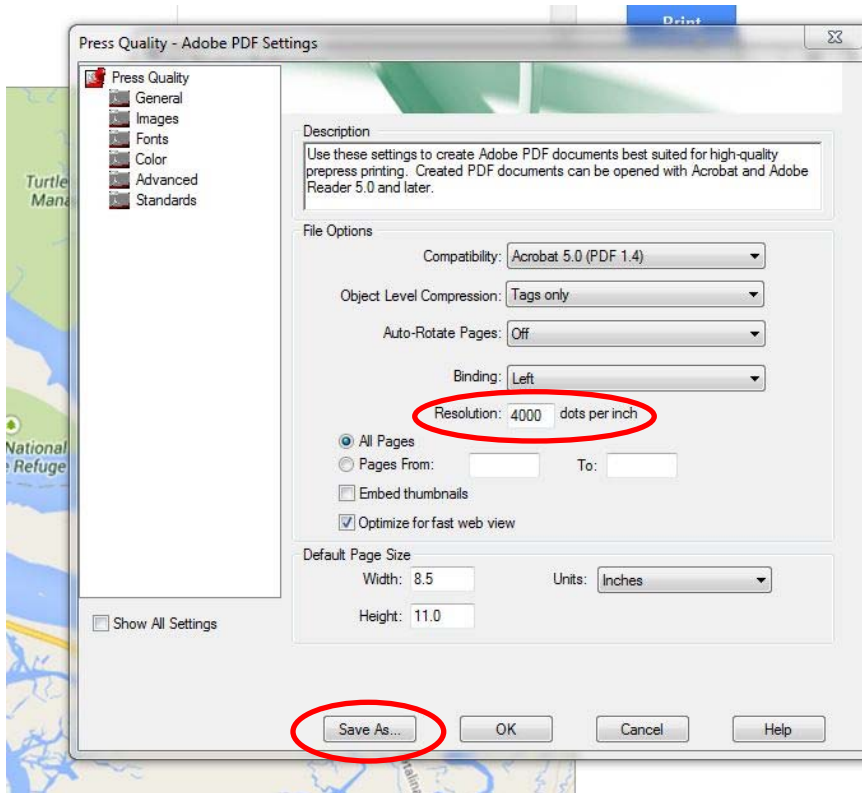
Inside the Printing Preferences dialog box, select the **Adobe PDF Settings** tab:



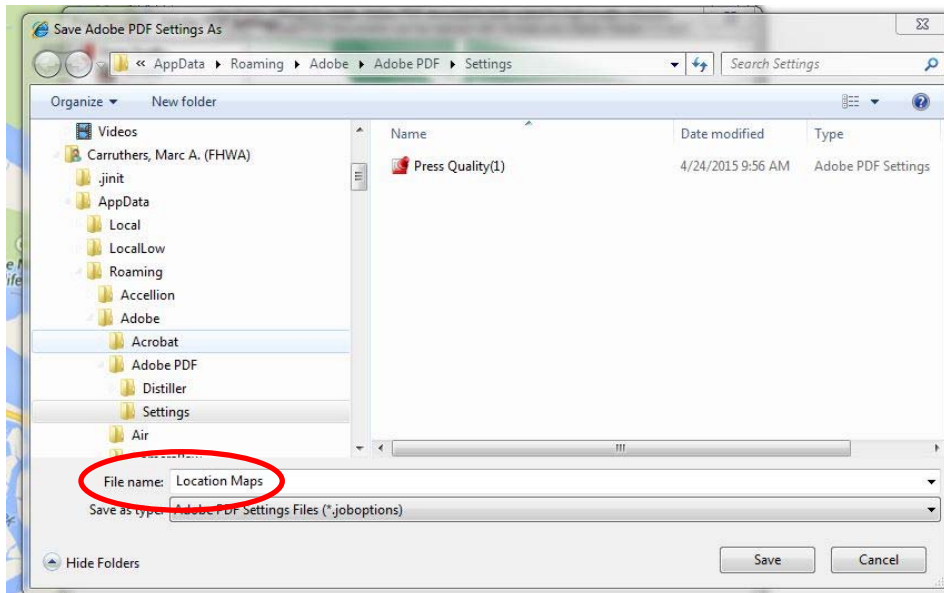
Hit the **Edit** button to the right of the Default Settings field.



Change the **Resolution** to the maximum allowed of **4,000** dots per inch.



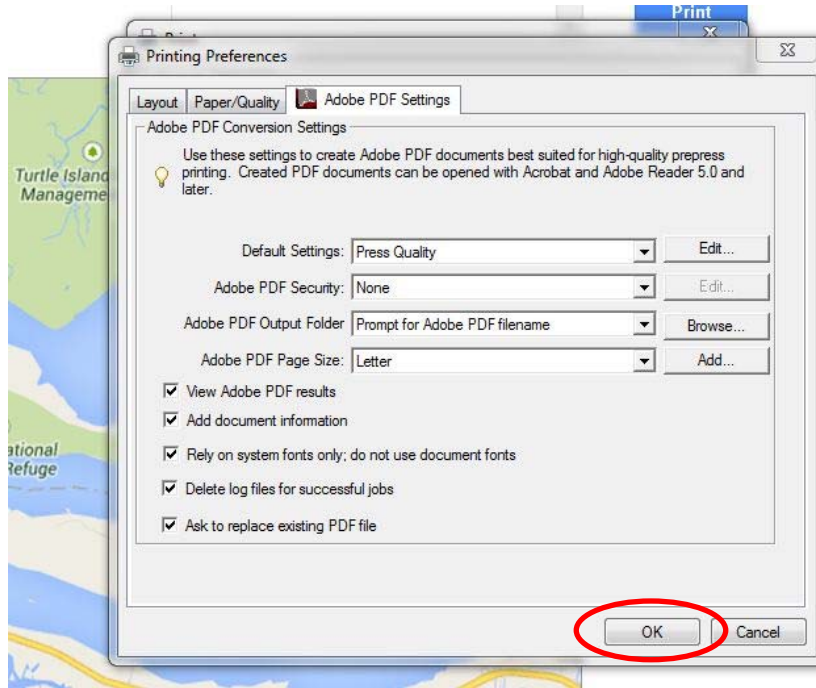
Hit **Save As** to save this setting for future use.



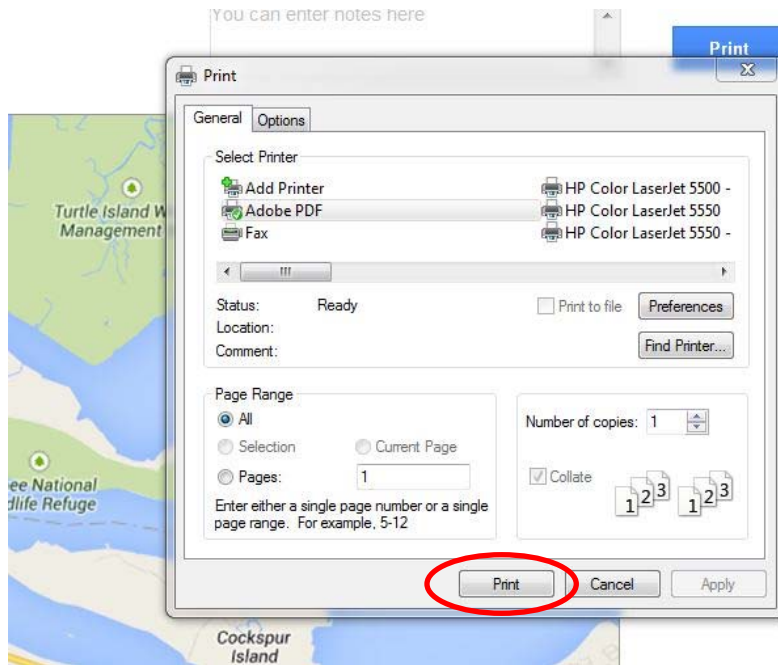
Give the setting a descriptive name to easily identify the settings file.

Hit **Save**.

Hit **OK** on the Printing Preferences dialog:



Hit **Print**.



Print the PDF to the project's CADD folder or the Plots > Adobe folder.

Use the Microstation **Reference > Attach** tool to attach the saved image to the Location Map CADD file. Resizing may be needed.

### 12.6 – Survey Information Sheet

The Survey Information Sheet shows the horizontal and vertical datum notes (State Plane Coordinates; NAD, NAVD, mapping on grid or ground with scale factor; location maps showing all primary and secondary control points; sketches of references of project control points including staked centerline points (POT, PC, PT, etc.); subsurface utilities notes (SUE Level A, B, C or D); coordinate listing of project control points (NEZ plus the type of points); and coordinate listing of proposed alignment or staked centerline data.



**The EFLHD Survey Office assists Highway Design by providing all of the data required for the Survey Info Sheet in the final mapping CADD file delivered to Highway Design. The Project Manager/Highway Design Manager will notify the Lead Designer when the final mapping is available.**

- You can copy the final mapping CADD file to your project folder OR reference the original final mapping file from the Survey > Final Mapping folder.
- Create a new DGN file using “**Sur\_ft2D.dgn**” seed file.
- Name this file according to the EFLHD Naming Convention [e.g. “A04-lop10(2)\_sur.dgn” for RRP-LOP 10(2) project].
- Attach your project Border file using Microstation Reference tool. Change the scale according to the project requirement.
- Within the Border, include Horizontal Alignments, Existing Features, Datum Information, Coordinate Listing, Sketches of References, and other survey information from the final mapping CADD file.
- Use Models in the same design file, if project will have more than one Survey Info Sheet.



**Some editing of the Sketches of References element symbology may be required for printing purposes, to eliminate pen table shading of existing features. Example; change level name from “E\_Uilities” . . . to AUX\_ or Default.**

**EFLHD Survey will notify Highway Design if any updates/ revisions are made to the final mapping CADD files.**

### **12.7 – Typical Section Sheet**

The Typical Section shows the shape of the finished cross-section within the construction limits, and represents the appearance of the completed project. It must be specific enough to describe the proposed work, its location, and material needed.

- Create a new DGN file using “**Sur\_ft2D.dgn**” seed file.
- Rename this file according to the EFLHD Naming Convention [e.g. For one sheet typical sections. The file name will be “**B01-lop10(2)\_typ.dgn**”. Use models if you have more than one sheet. The file name will be “**B-lop10(2)\_typ.dgn**”. B1, B2 will be the models name for RRP-LOP 10(2) project].

Attach your project Border file . (Attach reference on other models also if you have more than one sheet).

- Use models in the same Typical Section sheet design file, if project have more than one Typical Section sheet.
- Show sections for Normal Crown and Superelevated areas, as applicable.

## **12.8 – Quantities and Summaries Sheet**

The Summary of Quantities tabulation combines and summarizes the contract quantities for all pay items. This summary informs prospective bidders where to locate work within the plan sheets, the difference between plan quantities and bid schedule quantities, if any, and expands on contract bid schedule information.

### **12.8.1 – EFLHD Quantity Sheet Information**

Standard Quantity Design Sheets are developed by EFLHD to improve efficiency and consistency in the process of generating quantity summaries and schedules sheets for the PS&E Package.

There are two design files and one excel file.

- Border file, **01-EFLHD\_bdr.dgn**  
(M:\Engineering\_Software\Cadd\_resource\_v8i\Borders\01- EFLHD\_bdr.dgn).  
This file is used for borders as referenced to the quantity design sheets in each model.
- Quantity Sheet Design File, **Quantity.dgn**  
(M:\Engineering\_Software\Cadd\_resource\_v8i\Quantity\_Shts\Quantity.dgn)  
(This file has different summaries and Schedules on each model)
- Quantity Spread Sheet, **Quantity.xls**  
(M:\Engineering\_Software\Cadd\_resource\_v8i\Quantity\_Shts\Quantity.xls)  
(This file has same summaries and Schedules in each of the sheets)

**Note:** For A/E's, these files are available through the CADD\_Resources\_V8i.zip download (See Chapter 1.4).

## 12.8.2- Summaries & Schedules Sheets

### Step I

- Copy these files (explained above in Section 12.8.1) into the working directory.
- Rename these files as per EFLHD Naming Convention (See Section 2 of this guide).

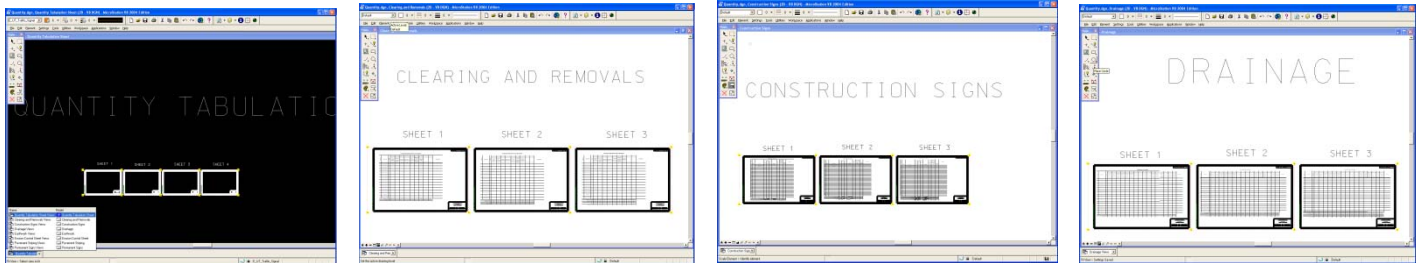
### Step II

- Open Quantity Sheet Design file.

**Note:** This file has the Tabulation of Quantities sheets in the Default Model and all other Summaries and Schedules sheets in different Models of the design file. 01-EFLHD\_bdr.dgn border file is already referenced to these models. You can't see the border in any of the models as you have changed the border file name and directory.

- Reattach all border reference files you need to use with your project border file.
- Click model view at the bottom left and select different Summaries and Schedules in your design file.

Some are shown as below:



Tabulation of Quantity

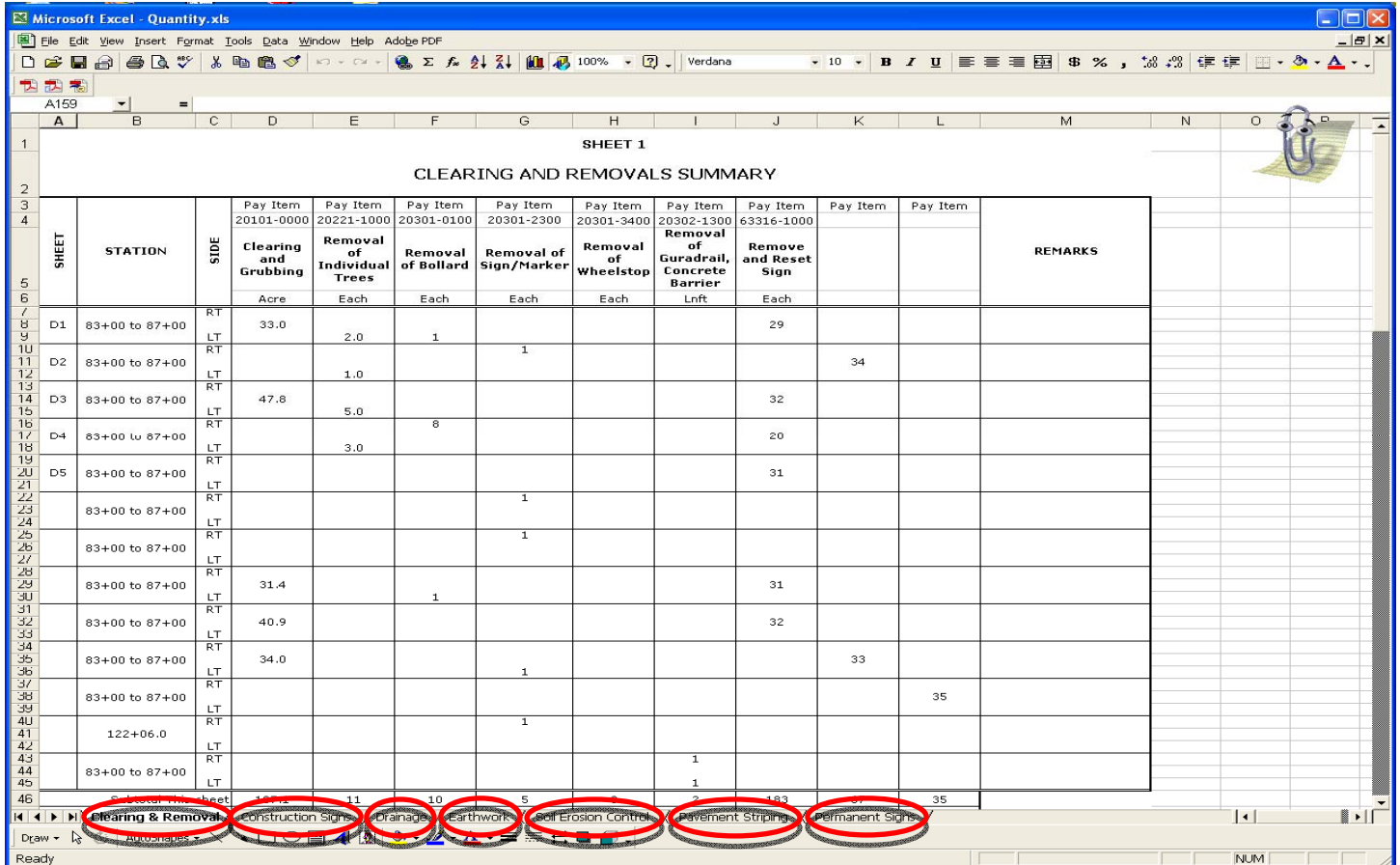
Clearing And Removals

Construction Signs

Drainage

- The Tabulation of Quantity Sheet is in the Quantity Tabulation Sheet Views model and Summaries and Schedules Sheets are in different models of the design sheet.
- Summaries and Schedules are as follows:
  - i) Clearing and Removals, ii) Construction Signs, iii) Drainage, iv) Earthwork, v) Erosion Control, v) Pavement Striping, and vi) Permanent Sign Sheets.

- The tables of different sheets of each model are linked with Excel worksheets. The Excel file has the Summaries and Schedules in different worksheets as shown below in red circles:



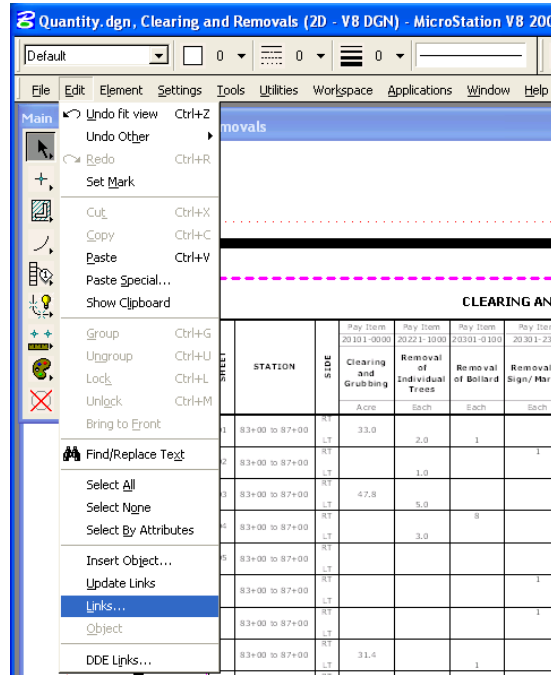
The above spreadsheet has seven worksheets and each worksheet has three tables for different Summaries and Schedules (sheet1, sheet2 and sheet3). These sheets have a link connection with the Quantity Sheet design file. Any changes in the spreadsheet will automatically be changed in your Quantity Sheet design file.

- The link in the Quantity Sheet design file with the Excel file will be lost because of a change in directory and files name. To reestablish the link, follow Step III.

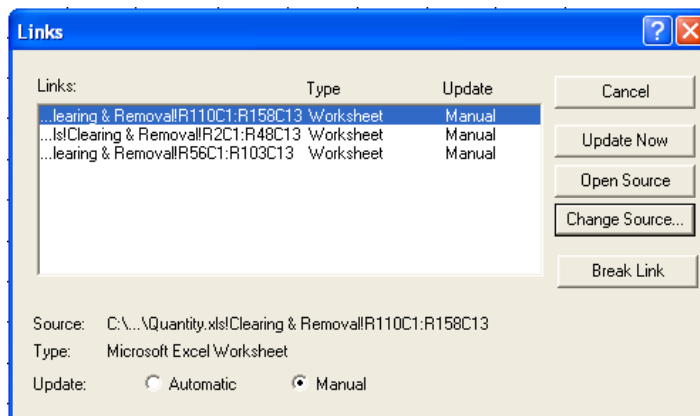


**Step III**

- Open the Quantity Sheet design file. Open Clearing and Removal Models.
- Open **Links** menu through **Edit>Link** as shown below:

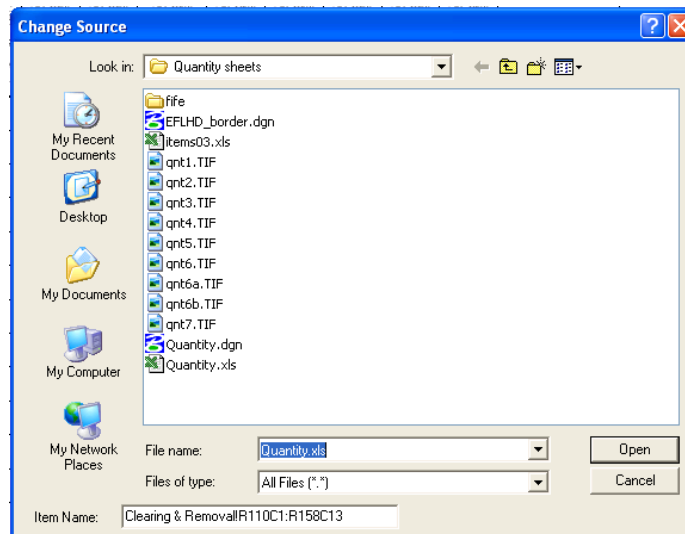


- The Links Menu for Clearing and Removal Models will appear.



- **Highlight** one line on link menu as shown above and click on **Change Source**.

- **Change Source** menu will appear.



- Select the Quantity excel file from the working directory of the Change Source menu. Select all three lines one by one and change the source of the link by selecting the same Excel file.
- Change the source of all the links in each Model with the same Excel file.
- Open the Excel file and select the working sheets of Summaries and Schedules to use. Edit according to the project information and **save** the Excel spreadsheet file.
- Open the Quantity Sheet design file and select **Edit > Update Links** as shown below. Your design file will be updated according to the Excel Spreadsheet.

The screenshot shows the MicroStation V8i interface. The menu bar includes File, Edit, Element, Settings, Tools, Utilities, Workspace, Applications, Window, and Help. The 'Edit' menu is open, showing options like Undo fit view, Undo Other, Redo, Set Mark, Cut, Copy, Paste, Paste Special..., Show Clipboard, Group, Ungroup, Lock, Unlock, Bring to Front, Find/Replace Text, Select All, Select None, Select By Attributes, Insert Object..., Update Links (highlighted), Links..., Object, and DDE Links....

Below the menu, a table titled "CLEARING AND REMOVALS" is visible. The table has columns for STATION, SIDE, and four Pay Item categories: Clearing and Grubbing (Acres), Removal of Individual Trees (Each), Removal of Bollard (Each), and Removal of Sign/ Mark (Each). The table contains data for stations 83+00 to 87+00.

STATION	SIDE	Pay Item	Pay Item	Pay Item	Pay Item
		20101-0000 Clearing and Grubbing Acres	20221-1000 Removal of Individual Trees Each	20301-0100 Removal of Bollard Each	20301-2300 Removal of Sign/ Mark Each
81 83+00 to 87+00	RT	33.0	2.0	1	
82 83+00 to 87+00	RT		1.0		1
83 83+00 to 87+00	RT	47.8	5.0	8	
84 83+00 to 87+00	RT		3.0		
85 83+00 to 87+00	RT				1
86 83+00 to 87+00	RT				1
87 83+00 to 87+00	RT	31.4		1	

## 12.8.4 – Engineer’s Estimate – EEBACS and Estimate Spreadsheets

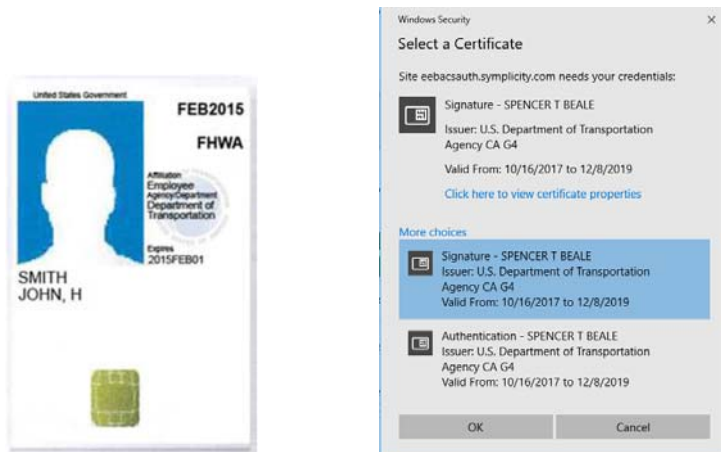
### EEBACS

EEBACS is LIVE and is the current system in use for generating the engineer’s estimate.

Refer to the EEBACS site on the **FLH webpage > Resources > PS&E Preparation > Engineer’s Estimates > EEBACS** for general information, system module chapters, users guide, user account and new project request forms.

### **Login with PIV Card**

PIV card login for EEBACS is required. If you don’t have your PIV card, you can request a login exemption (this is a separate request from a network login exemption).



Use the “**Signature**” certificate for login.

PIV login still requires a system Password (this is a separate password from your network login).

Like your network password, the EEBACS password expires and must be changed every 60 days.

If you don’t log in at least once in 60 days, your account will be disabled. Tip: Set a **Calendar reminder**. Additional instruction on setting up a Security Question and Answer can be found in the Users Guide.

Refer to the EEBACS site on the **FLH webpage > Resources > PS&E Preparation > Engineer’s Estimates > EEBACS** for general information, system module chapters, users guide, user account and new project request forms.

<https://flh.fhwa.dot.gov/resources/estimate/eebacs.htm>

The primary source for information about EEBACS is the [EEBACS User Guide](#), specifically [Chapter 2 - Design Module](#).

**The following provides additional information/tips for creating estimates in EFLHD -**

### **User Accounts**

- **EEBACS-001-AE-Staff-Construction-Contractors-Request-Form.** For AE Staff and Construction.  
Design A/E’s won’t see any data until they are added to the project team.  
An A/E user with a previous account needs to submit EEBACS-001 with “Restore” selected to reactivate their account.
- **EEBACS-002-Government-InHouse-Contractors-Request-Form.**  
For Government staff (i.e. users with @dot.gov email addresses); **Add New**, Modify, Disable, Delete or **Restore** user accounts.
- **EEBACS-005-Project Request Form**  
Use this form to request a new project, or to modify an existing project. **The Project Manager is required to sign this form.** Submit the PM signed form to the EEBACS Design Component Lead. The project information on the form will be used to create the EEBACS Project. (if the Design Component Lead (Lahoucine) is unavailable, send the request to the EFL EEBACS Administrator (Spencer) )

**Project Info**

**Roles:** You will see an alert (yellow triangle) if project roles are missing. On the *Team* tab, assign a "Highway Design Manager" a "Lead Designer" and "Project Manager".

Most of the other Project Information was filled out when the project was created. Changes to the *Project Number, Name, Description, etc.* must be done by the Design Component Lead.

Press the **Edit** button to modify the remaining project information. Fill out ALL information project.

The screenshot shows the 'Project Info' dialog box with the following content:

**Warning:** This project is currently missing the following role(s):  
 Project Manager  
 Highway Design Manager  
 Lead Designer  
 You can correct this by adding the missing roles on the [Team Tab](#)

**Project Details:**

Federal Lands Division:	Eastern Federal Lands
FP Version:	03
Project Number:	PRA-NATR 3C12, 3D32
Project Name:	NATCHEZ TRACE PARKWAY 3C12, 3D32
Project Description:	2.5" overlay and required reconstruction on the NTP from MP 266 to MP 282
Units:	U.S. Customary
State(s):	Mississippi
Partner Agency:	NPS
Funding Source(s):	RRP
Status:	Design

**Project Info Summary:**

- Created: 10-11-2013 07:54:26
- By: Spencer Beale
- Modified: 10-11-2013 07:55:21
- By: Spencer Beale

**Designs:** 95%

**Accounts:** CON1

## Estimate

**Milestone Name:** A default/unnamed estimate will come with the new project. Edit this estimate according to the current *Milestone*.

EFL will commonly save 15%, 30%, 70%, 95%, 99% and 100% milestone estimates.

DO NOT delete the base estimate, as the default settings will be lost.

Name the last milestone "100%" before promoting the estimate to Acquisitions.

The screenshot shows the 'Estimate' form in MicroStation. The form is titled 'Estimate' and is part of a project named 'PRA-NATR 3C12, 3D...'. The form contains the following fields and controls:

- Milestone Name\*:** 95%
- Description:** 95%
- Complete?\***:  Yes  No
- Current?\***:  Yes  No
- Buttons:** Save & Close, Save, Delete, Cancel, Cancel & Close, Copy Estimate, Check Spelling
- Right Sidebar:**
  - Estimate Info:** Created: 10-11-2013 07:54:04, By: Spencer Beale, Modified: 10-11-2013 07:54:04, By: Spencer Beale
  - Pay Items:** (checkbox)
  - Schedules:** A(Base), B(Options)

## Schedule

Set up a "Base" schedule. Use "A" for the base schedule letter. It should be edited to suit the needs of the individual project. If more than one schedule is used for the project, set up Schedule A as the "Base" schedule and all others as an "Option" schedules.

**Construction Type:** Change this field to the value that most closely matches the project's construction type.

Also, add the **Schedule Description** and **Schedule Termini** for the project.

**Line Item Numbers:** Line item numbers are very important in EEBACS. Each pay item is automatically assigned a line item number. Line item numbers are four digits. Start the first line item number with something like 0020 or 0100 or 1000, depending on the amount of pay items.

Use a value of 20 or 50 for the **Line Item Increment Number**.

Projects: PRA-NATR 3C12\_3D... Estimates: 95% Schedules [Return To Projects \(All\)](#) | [Return](#)

Project Info Design Account Team Event Log

Estimate CPL Schedules Column Headers Pay Items Construction Estimates

Save & Close Save Delete Cancel Cancel & Close \* indicates a required field

**Schedule**

Schedule Type\*: Base

Schedule Letter\*: A

Construction Type\*: Describes the type of construction for the project (i.e. Mill 2"/Overlay 4")  
40202 Asphalt Concrete Overlay <2.5-inches

Schedule Description\*: Describes the type of work being performed on the project (i.e. Grading, Base, Pavement)  
1 3/8 inch overlay

Schedule Termini\*: Describes the beginning and ending location of the project (i.e. From Milepost 349.7 to I-40)  
Schedule A, mp331.19 to 338.50

CPM Days: 0

Line Item Starting Number\*: 1000

Line Item Increment Number\*: 5

GIS Route(s): Add GIS Route

Schedule Length: 7.310 miles

Lane Miles: 0

Bridge(s): Add Bridge

Save & Close Save Delete Cancel Cancel & Close



## Column Headers

EFLHD will normally use column headers in the Summary of Quantities plan sheet to separate pay item quantities by alignment or site.

Set up column headings based on Name, Route, Area. Etc.

**The Page No. field MUST have a SPACE inserted if you want the field to remain empty on the Summary Sheet.**

Optionally, create an *Allowance* column to provide additional quantity used to round the bid quantity to some interval.

See the [Summary of Quantities](#) appendix for more information on creating the output and using the [spreadsheet](#).

Pick Label	Page No.	
Mainline		
Side Road A		
Side Road B		
Parking Area		
New Item	0	
New Item	0	
New Item	0	
New Item	0	

## Adding Quality Incentives

See the [EEBACS User Guide, Chapter 2.5.8 - Adding Incentives](#), for general guidance.

EFL Highway Design is responsible for calculating quality incentives for applicable pay items.

It is EFLHD practice to add a **Materials Quality Incentive** for Section 301, 309, 311, 401, 402, 405 and 407 pay items. **Follow the guidance notes in the QBS Incentives and Adjustments spreadsheet for applying the incentives.**

**Do not add quantities of multiple items (in the same Section) together to achieve the minimum threshold.** Each pay item should be considered separately. This includes not adding quantities for same items that appear in each Schedule.

It is also EFLHD practice to add a pavement **Roughness Quality** incentive for 401 and 402 pay items when there is **0.1 LANE MILES of continuous paving**. **Follow the guidance notes in the QBS Incentives and Adjustments spreadsheet for applying the incentive.**

For estimating both incentives, access the **Incentives and Adjustments** spreadsheet in QBS. ([https://flh.fhwa.dot.gov/resources/estimate/documents/EFL-TM-ESS-01\\_EFL\\_IncentiveAdjustmentFuel.xlsx](https://flh.fhwa.dot.gov/resources/estimate/documents/EFL-TM-ESS-01_EFL_IncentiveAdjustmentFuel.xlsx))

Save the worksheet to the project’s **Quantity** folder.

**Material Quality Incentive**

In the worksheet; Enter the line item #, pay item #, quantity and unit price in the gray fields. The incentive price will be calculated for you.

Multiple tabs are available for additional Schedules if needed.

Materials Incentives (6% Max. Incentive Items) <span style="color: red;">SEE NOTE 2</span>						
Use for the following FP Sections: 401 and 402						
Pay Item	Pay Item #	Quantity	Unit Price	Q	Ton Unit Price	Incentive Amt
Line # <span style="color: red;">SEE NOTE 5</span>	(Item Incentive is calculated from)	(Ton)				
0100	40101-0200	5,500	\$150.00		\$7.50	\$41,250.00
					-	-

In EEBACS, hit the **QUP** (Quality Unit Price) button;

<input type="checkbox"/>			40101-0200	A	NR	SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL (TYPE 1 PAVEMENT ROUGHNESS)	TON	\$85.00	8,700	\$739,500.00	yes	<input type="button" value="BHUP"/> <input type="button" value="CBUP"/> <input type="button" value="QUP"/>
--------------------------	--	--	------------	---	----	---	-----	---------	-------	--------------	-----	--

Fill in the required fields.  
It should match what is  
shown in the worksheet.

Toggle the Pay Item Type  
to “QM” (Quality Material)

Save and Close.

**Quality Unit Price**

save and close    save and go to QUP item    close \* Indicates a r

---

**Quality Unit Price Analysis**

Pay Item Number: 40101-0200

Pay Item Description: SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL

Pay Unit (U.S. Units): TON

Pay Item Type\*: QM

Unit Price: **\$85.00**

Incentive (%)\*:

Incentive Unit Price: **\$ 5.10**

Unit Price Used\*:

Remarks:   
(maximum characters: 4000) 4000 remaining.

save and close    save and go to QUP item    close

This adds a material quality incentive item to your list of pay items.

<input type="checkbox"/>			40101-0200	A	NR	SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL (TYPE 1 PAVEMENT ROUGHNESS)	TON	\$85.00	8,700	\$739,500.00	yes	<div style="display: flex; justify-content: space-around; width: 100px;"> <span style="border: 1px solid gray; padding: 2px;">BHUP</span> <span style="border: 1px solid gray; padding: 2px;">CBUP</span> <span style="border: 1px solid gray; padding: 2px;">QUP</span> </div>
<input type="checkbox"/>			40101-0200	A	QM	SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL (TYPE 1 PAVEMENT ROUGHNESS) (Quality)	Q_TON	\$5.10	8,700	\$44,370.00	yes	<div style="display: flex; justify-content: space-around; width: 100px;"> <span style="border: 1px solid gray; padding: 2px;">▲</span> </div>

### Pavement Roughness Incentive

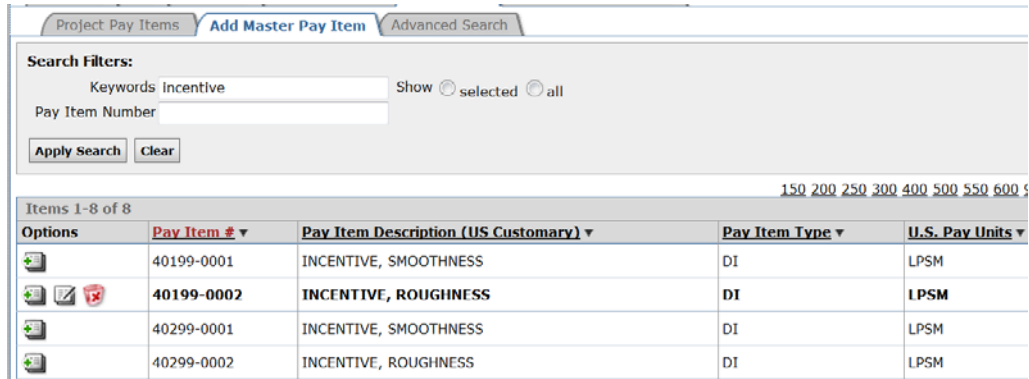
In the worksheet; Enter in the total Lane Miles for the material in the gray area.

The lump sum incentive price is calculated for you.

Roughness Incentives <span style="color: red;">SEE NOTE 3</span>				
Use for the following FP Sections: 401 and 402				
Pay Item #	Roadway Name (Route Incentive is calculated from)	Roadway Length Lane-miles		Incentive Amt
40101-0200	Mainline	1.050		\$2,100.00
				-
				-
<b>TOTAL ROUGHNESS INCENTIVES:</b>				<b>\$2,100.00</b>

After the calculation, in EEBACS;

ADD the incentive pay item to the estimate from the **Add Master Pay Item** tab. (keyword search “incentive”). Be sure to select the appropriate item (in this example, it would be the **40199-0002 Incentive, Roughness**).



Go back to the **Project Pay Items** tab and edit the 40199 incentive item. Enter the lump sum unit price from the worksheet.

Save and Close.

This adds a pavement roughness quality incentive item to your list of pay items.

Update/Create the **Construction Estimate** and verify that the Incentive items have been added correctly.

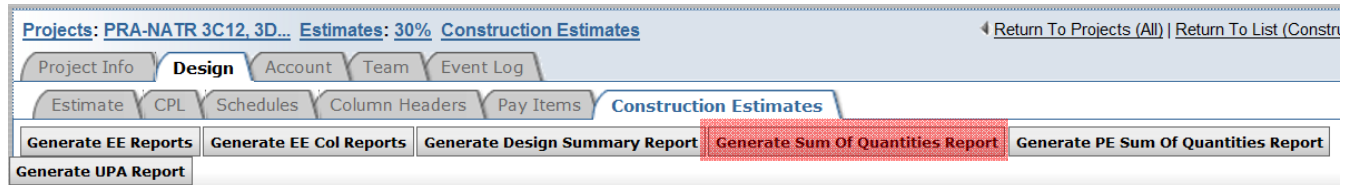
Estimated Quality Material Incentive:	<table border="1"> <thead> <tr> <th>Pay Item #</th> <th>Description</th> <th>Quantity</th> <th>U.S. Pay Units</th> <th>Unit Price</th> <th>Total Price</th> </tr> </thead> <tbody> <tr> <td>40101-0200</td> <td>SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO &lt;3 MILLION ESAL (TYPE 1 PAVEMENT ROUGHNESS) (Quality)</td> <td>8,700</td> <td>Q_TON</td> <td>\$5.10</td> <td>\$44,370.00</td> </tr> <tr> <td>40101-1400</td> <td>SUPERPAVE PAVEMENT, 1-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO &lt;3 MILLION ESAL (Quality)</td> <td>10</td> <td>Q_TON</td> <td>\$10.50</td> <td>\$105.00</td> </tr> <tr> <td>40102-0200</td> <td>SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO &lt;3 MILLION ESAL, WEDGE AND LEVELING COURSE (Quality)</td> <td>100</td> <td>Q_TON</td> <td>\$6.00</td> <td>\$600.00</td> </tr> <tr> <td colspan="5"></td> <td><b>\$45,075.00</b></td> </tr> </tbody> </table>	Pay Item #	Description	Quantity	U.S. Pay Units	Unit Price	Total Price	40101-0200	SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL (TYPE 1 PAVEMENT ROUGHNESS) (Quality)	8,700	Q_TON	\$5.10	\$44,370.00	40101-1400	SUPERPAVE PAVEMENT, 1-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL (Quality)	10	Q_TON	\$10.50	\$105.00	40102-0200	SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL, WEDGE AND LEVELING COURSE (Quality)	100	Q_TON	\$6.00	\$600.00						<b>\$45,075.00</b>
Pay Item #	Description	Quantity	U.S. Pay Units	Unit Price	Total Price																										
40101-0200	SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL (TYPE 1 PAVEMENT ROUGHNESS) (Quality)	8,700	Q_TON	\$5.10	\$44,370.00																										
40101-1400	SUPERPAVE PAVEMENT, 1-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL (Quality)	10	Q_TON	\$10.50	\$105.00																										
40102-0200	SUPERPAVE PAVEMENT, 3/8-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL, WEDGE AND LEVELING COURSE (Quality)	100	Q_TON	\$6.00	\$600.00																										
					<b>\$45,075.00</b>																										
Estimated Quality Smoothness Incentive:	No Estimated Quality Smoothness Incentive																														
Estimated Quality Roughness Incentive:	No Estimated Quality Roughness Incentive																														
Other Estimated Incentive:	<table border="1"> <thead> <tr> <th>Pay Item #</th> <th>Description</th> <th>Quantity</th> <th>U.S. Pay Units</th> <th>Unit Price</th> <th>Total Price</th> </tr> </thead> <tbody> <tr> <td>40199-0002</td> <td>INCENTIVE, ROUGHNESS</td> <td>All</td> <td>LPSM</td> <td>\$2,640.00</td> <td>\$2,640.00</td> </tr> <tr> <td colspan="5"></td> <td><b>\$2,640.00</b></td> </tr> </tbody> </table>	Pay Item #	Description	Quantity	U.S. Pay Units	Unit Price	Total Price	40199-0002	INCENTIVE, ROUGHNESS	All	LPSM	\$2,640.00	\$2,640.00						<b>\$2,640.00</b>												
Pay Item #	Description	Quantity	U.S. Pay Units	Unit Price	Total Price																										
40199-0002	INCENTIVE, ROUGHNESS	All	LPSM	\$2,640.00	\$2,640.00																										
					<b>\$2,640.00</b>																										

(Currently, the system places the Roughness Incentive under “Other . . .”)

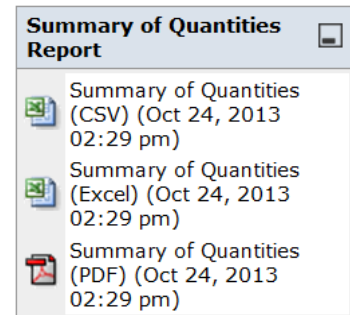
## Summary of Quantities (Tabulation of Quantities) Sheet

See the EEBACS User Guide Chapter 2.5.9.1.4 for general guidance.

Hit the “Generate Sum of Quantities Report” button under the Construction Estimates tab (be sure that the estimate and schedules are all up to date).



Three file formats are created (.csv, .xls, .pdf) for the Summary of Quantities Report.



The .csv file is used with the prepared summary sheet (not generally used in EFLHD).

EFLHD will normally use the Excel .xls spreadsheet to create the Summary of Quantities plan sheet. Hide unused columns and resize columns as needed. **DO NOT hide the “Line Item No.” column.** It is useful in the Amendment/ Contract Modification process.

Reference or Link the .xls spreadsheet into a Microstation CADD file. Attach your project sheet border to create the Summary of Quantities plan sheet.

Use the .pdf for a quick review of the summary.

### EEBACS Support

- EFL EEBACS System Admin – Spencer Beale
- EFL EEBACS Design Component Lead – Lahoucine Ouhssayne
- EFL EEBACS Acquisitions Component Lead – Janice Martin
- EFL EEBACS Construction Component Lead – Kim Pellegrini / Rajan Patel

Submit support requests thru 5-Help, cc. the EFL ServiceDesk and the Component Lead. Indicate that it is a “Tier 2” request.

## Estimate Spreadsheets

The Engineer Estimating, Bidding, Award and Construction System (EEBACS) was temporarily replaced by a series of spreadsheets for use in searching bid history, performing unit price analysis, and creating the engineer's estimate.

The spreadsheets provide the capability to:

- Document project data;
- Develop a list of the pay items for a project;
- Record quantities, price pay items, and calculate incentives;
- Develop Summary of Quantities containing the pay items;
- Create an independent government estimate for the project (IGE); and

Refer to the Engineer's Estimate Spreadsheet site on EFLNet > Highway Design tab > Estimate Spreadsheets button <http://eflnet.flhd.fhwa.dot.gov/tools/ees.aspx> for estimating resources.

Additional resources can be found on the FLH Estimates webpage <https://flh.fhwa.dot.gov/resources/estimate/>

### Engineer's Estimate Spreadsheet

Use the following spreadsheets to create Engineer's Estimates for FLH projects. The spreadsheet(s) allow for design quantity computation, bid history searches, FP-03 to FP-14 pay item comparison, unit price analysis and building of the engineer's estimate.

The Engineer's Estimate spreadsheet contains tabs for inputs, the EE printout, and the Summary of Quantities as well as tabs for GIS data and the bidding process. A refreshable pay item list is included.

- [QBS Design Quantity Computations spreadsheet FM-HWY-14](#)
- [FP03Bid\\_History - 09/2015](#)
- [FP14Bid\\_History -07/2016](#)
- [FP-14 to FP-03 Crosswalk spreadsheet](#)
- [Unit Price Analysis spreadsheet - Highway Design](#)
- [Unit Price Analysis spreadsheet - Bridge](#)
- [Engineer's Estimate spreadsheet - FP-03 \(Rev. 2/17/2016\)](#)
- [Engineer's Estimate spreadsheet - FP-14 \(Rev. 5/6/2016\)](#)

### Links & Resources

1. The first link takes you to the existing **QBS Design Quantity Computation** spreadsheet. Designers should be familiar with this spreadsheet already. See your HDM for guidance on completing the quantity computation form.

2. The next two links take you to the EFLHD **FP-03 and FP-14 Bid History**. Use the appropriate spreadsheet for your project.

Note: The UPA spreadsheet reads from these bid history links. You can access the same data in the UPA spreadsheet.

3. The next two links take you to the **Unit Price Analysis** spreadsheets for Highway Design and Bridge. Use the spreadsheets to record the results of the bid history unit price analysis.

Download the clean version to your project folder and use it to create separate UPA sheets for each pay item.

Follow instructions on the INFO tab. Note that in order to get the latest bid history to show up in the UPA spreadsheet, **you must also have the FP14Bid\_History.xlsx spreadsheet OPEN**. Follow the instructions to “refresh” the bid history.

- Filter by Date, by Federal Lands Division, by State, etc.
- Select desired bids. Use established practices for UPA bid selection. See your HDM for guidance.
- Hit the “Highlight Prices and Calculate Avg Price” button.
- PRINT THE SINGLE ITEM UPA TO PDF.
- Repeat for each pay item. (IT IS NOT RECOMMENDED TO COPY MULTIPLE UPA TABS FOR EACH ITEM IN THE UPA SPREADSHEET).
- Be sure to PRINT to PDF.

\*\*Inflation rates are not considered in the bid history spreadsheets. Note any adjustments for inflation in the REMARKS field, if applicable.

4. The next two links take you to the **Engineer’s Estimate** spreadsheets. The **“Information”** tab allows you to fill in the project information. Follow the instructions as shown. Yellow fields are for user entry of project info. \*\*Note the “Enable Content” prompt at the top. Click to allow all features to work correctly.

- On the **“Inputs”** tab, fill in the pay item number (yellow fields allow input), supplemental description, quantity and unit price used.
- Edit the Column Headers as needed.
- AVOID inserting/deleting rows and columns. It may affect the formulas. Use the HIDE function to eliminate rows and columns.
- When adding a supplemental description to a pay item, add it under the “Additional Description2” column. Use ALL CAPS in the supplemental description to match the pay item format.
- On the **“EE\_Summary”** tab, fill in the supplemental project information that will show up on the estimate summary page. (yellow fields allow user input)
- Data on this page should be consistent with other PS&E documents

Save ALL files to the M:\Projects folder.

It is suggested that you create a new “EE” folder under the Distribu > In-House and/or the Quantity > In-House folders for these documents at each milestone.



Always submit the LATEST VERSION of the engineer’s estimate spreadsheet to PSERT. If you need to transfer your EE data to the latest spreadsheet, follow these steps;

- On the **Information** tab, copy the yellow boxes from the old spreadsheet to the new. This can be done in one step (except for the extra Partner and Funding blocks, which would be a second step). Normally the lighter yellow cells don’t need to be copied unless they were changed. **Always** use the “special” paste options to copy values only (right click -> Paste Options -> Values (V) [Picture of capital A]).
- Similarly, copy the yellow cell blocks on the **Inputs** tab, pasting with the “Values” option. Copy the data in four steps: Pay Items (cells E5:E?), Description2 to Col 13 (cells J5:W?), Account2 to Amend (cells Z5:AF?), and the column headings (cells K2:W3). If you wait until the end there will be no need to copy the Added Pay Item cells since these should be all removed before it gets to Acquisition.
- On the **EE\_Summary** tab, copy only the yellow cells, again using the Paste Values option.
- If data was placed on the **GIS** tab, then copy cells N2:AA?, then paste using the Values option.
- If the spreadsheet data is transferred during the Acquisition process, then this same process should be followed for the **Bid Tabs Summary** tab.

There is no need to unprotect the sheets to copy data as long as you only copy the data indicated above.



### 12.9 – Plan and Profile Sheets

The designer may incorporate plan and profile sheets, plan sheets, line graphs, or other descriptive sheets that describe the proposed work. When laying out plan and profile sheets, avoid dividing major structures, highway intersections, interchanges, or grade separations between sheets.

See **GEOPAK V8i Section 2.1** to create **Plan & Profile Sheet Clipping** using Geopak Civil Software.

### **12.10 – Approach Roads and Parking Areas**

Plans, profiles, and details for approach roads, parking areas, turnouts, and other associated roadways may be placed in a single section or in multiple sections as appropriate. It may be appropriate to include approach road plans with the mainline plan and profile sheets. Use unique stationing for designed approach roads and secondary roads.

### 12.11 – Erosion and Sediment Control Narrative and Sheets

- A standard Erosion and Sediment Control Narrative Sheet is developed for EFLHD and will be used for all EFLHD projects with Erosion and Sediment Control Plans.

Access the Narrative Sheet through EFLnet

<http://eflnet.flhd.fhwa.dot.gov/tools/template-drawings.aspx>

Original is kept at;

**M:\Engineering\_Software\Cadd\_resource\_v8i\Standard\_Shts\ESC\_Narrative**

- Copy this file into the project working directory.
- Rename the file according to the EFLHD naming convention [e.g. “M01-lop10(2)\_e&s\_nar.dgn” for RRP-LOP 10(2) project].
- Re-attach the project Border sheet file from your working project directory.

## 12.12 – Temporary Traffic Control

### 12.13 – Permanent Traffic Control

## **12.14 – Drainage Cross Sections, Pipe Profiles and Details**

## 12.15 – FLH Standards and EFLHD Details

### 12.15.1- Introduction

FLH Standard Drawings are intended to cover various design elements and be applicable nationwide. They have been posted on the Western Federal Lands Highway Division office website for repetitive use in the plans. Each standard drawing is available in both Metric and US Customary units and conforms to the FP-03.

EFLHD Detail Drawings are also created within the Division on a continual basis by the Highway Design office to clarify the work required in the plans.

### 12.15.2 - EFLHD Policy

The following are the EFLHD policies regarding Standard Drawings and EFLHD Detail Drawings:

- All three Divisions have one set of Standard Drawings known as the FLH Standard Drawings. These Standards Drawings are located on the WFLHD website.  
<https://flh.fhwa.dot.gov/resources/standard/>
- Each Division also has their own set of Detail Drawings. EFLHD Detail Drawings are located on the EFLHD Intranet - Highway Design Tab  
<https://flh.fhwa.dot.gov/resources/standard/efl/>

EFLHD Detail Drawings are also available in the following directory: -

[M:\Standards\\_and\\_Details\EFLHD\\_Detail-Drawings\FP-14](M:\Standards_and_Details\EFLHD_Detail-Drawings\FP-14)

- Use EFLHD Detail Drawings when there is no available FLH Standard Drawing and/or when the Standard is not appropriate for the project.
- **FLH Standard Drawings and Eastern Federal Lands Detail Drawings may be modified based on individual project requirements. In addition, project-specific details may be developed to address situations not covered by any of the existing Standards or Details in the library. Include modified FLH Standards, EFLHD Details, and completely new project-specific Details in the 95% PS&E review package. As soon as the 95% PS&E package is submitted for review, send an email through the HDM to the EFLHD Design Services Team (DST), attn. LOS/Detail Coordinator. Clearly describe all modifications made to each FLH Standard or EFLHD Detail, and provide a brief explanation of need for the modifications, as well as the need for project-specific Details. For any modified FLH Standards, EFL Details, or project-specific Details added to the plans after the 95% distribution, submit another email to the DST describing any modifications made to those new drawings only.**

**When FLH Standard Drawings are modified, renumber as follows:**

- i) Modified Standard Drawings become Project Specific Detail Drawings.
- ii) Change Drawing Numbers by adding alphabetic characters.  
(e.g. Standard Drawing # 635-01 will be renumbered as Project Specific Detail Drawing # 635-01A).
- iii) Replace the word “Standard” with “Detail”.
- iv) Replace “Federal Lands Highway Division” with “Eastern Federal Lands Highway Division”.
- v) Remove “Standard Approved For Use” and dates. (your changes will not have been approved on the FLH level)
- vi) Change the File Name to match the new Detail number.  
(e.g. A Standard file name st63501.dgn would change to st63501a.dgn).

**• When EFLHD Detail Drawings are modified, renumber as follows:**

- i) Modified EFLHD Detail Drawings become Project Specific Detail Drawings.
- ii) Remove “Detail Approved For Use” and dates. (your changes will not have been approved on the EFL level).
- iii) Change Drawing Numbers by adding alphabetic characters.  
(e.g. EFLHD Detail Drawing # E633-02 will be renumbered as Project specific Detail Drawing # E633-02A for the English version).
- iv) Change the File Name to match the new Detail number.  
(e.g. A EFLHD Detail file name st63302\_detail.dgn would change to st63302a\_detail.dgn).

**• When adopting a detail from a DOT / another source / or creating a completely NEW detail, number as follows;**

- i) New details are Project Specific Detail Drawings.
- ii) Add an “E” prefix and alphabetic character at the end. (e.g. #E602-A)
- iii) Provide a reference to the source of the adopted detail.
- iv) Provide the original source Detail No.
- v) Review/Revise original source detail’s Notes.

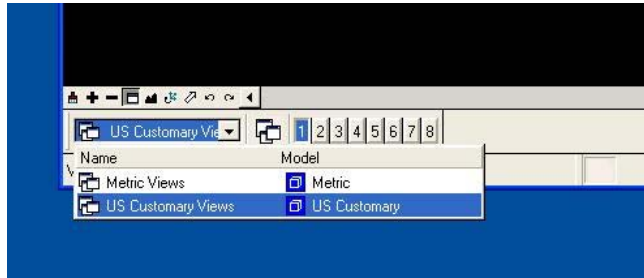


**Always use FLH Standard Drawings and EFLHD Detail Drawings from the original sources/directory as shown above and NOT from old project directories.**



**12.15.3 - Use FLH Standard Details copied from WFLHD Website****Step I**

- Copy border file “01-EFLHD\_bdr.dgn” or “01-EFLHD\_det\_bdr-nps.dgn” from “M:\Engineering\_Software\Cadd\_resource\_v8i\Borders\” directory into your project working directory. Change file name as per EFLHD naming Convention (e.g. 01-lop10(2)\_bdr.dgn for LOP 10(2) project).
- Open the border file and choose Metric and US Customary views from the “View Groups” dialog (Metric and English need both views to use Standard drawings downloaded from WFLHD Website).



- Edit text for your project information “the top right corner of the border”. (Edit this for both Metric and US Customary views).



Note: If you already have the Border for your project then skip Step I.

**Step II**

- Copy/Download the Standard drawing from WFLHD Website.
- Choose Metric or US Customary views from the “View Groups” as per your project requirement.
- Turn off the following levels from the active files:

D\_WFL\_Arch

D\_Trad

D\_EFL\_Handles

D\_EFL\_Border

D\_EFL\_Arch

D\_CFL\_Print

D\_CFL\_Iplot

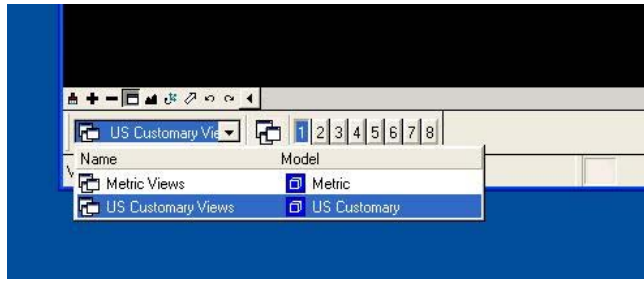
- Attach your project border from your project directory. Attach Metric or US Customary view as your requirement of your reference file. (Only metric will be used for dual unit)
- Turn off level default and D\_EFL\_Handles in the border reference file.

**Step III**

- Make sure to “Save Settings” for your permanent display.

**12.15.4 - Use EFLHD Details (V8)****Step I**

- Copy border file “**01-EFLHD\_bdr.dgn**” or “**01-EFLHD\_det\_bdr-nps.dgn**” from “M:\Engineering\_Software\Cadd\_resource\_v8i\Borders\” directory into your project working directory. Change file name as per EFLHD naming Convention (e.g. 01-lop10(2)\_bdr.dgn for LOP 10(2) project).
- Open the border file and choose Metric and US Customary views from the “View Groups” dialog (Metric and English both views need both views to use EFLHD Detail drawings).



- Edit text for your project information “the top right corner of the border”. (Edit this for both Metric and US Customary views).



Note: If you already have the Border for your project then skip Step I.

## Step II

Copy/Download EFLHD Detail drawing from EFLHD Website.  
Or copy from [M:\Standards\EFLHD\\_Detail-Drawings\V8](M:\Standards\EFLHD_Detail-Drawings\V8) directory.

- Choose Metric or US Customary views from the “View Groups”
- Re-attach your project Border from your project directory.

## Step III

Make sure to “Save Settings” for your permanent display.

### **12.16 – Cross Section Sheet**

See **GEOPAK V8i Section 2.2** to create **Cross Section Sheets Clipping** using GEOPAK Civil Software.