



Prepared by/for:
**Modeling, Mapping,
and Consequences**

Appendix 4.1.3

Map Production Guide for Levee Studies

**FY2023 Standard Operating Procedure
for Levees**

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SECTION 1

Background

This document is designed to guide an MMC GIS/Mapping team member through all required steps to produce a map series conforming to the MMC Inundation mapping standards. In order to produce the mapping products for the MMC, the GIS/Mapping team member should fully understand the source of the inundation data they are mapping and the goals of the products that they are developing. This section describes each step in the standard MMC process preceding mapping and gives a rough description of the data produced by that step and how it impacts the mapping. For more information see the corresponding section of the MMC SOP.

1.1 PRE-MODEL DATA

During the pre-model data development phase of an MMC project, the MMC GIS/Mapping team is responsible for developing the vector and raster datasets used to set up the model.

1.2 MODELING

The modeling phase of any MMC project is where most of the analysis is performed. The Hydraulic Modelers take the pre-model datasets and build on them to produce complete models using separate modeling software. The majority of models developed for the MMC will use HEC-RAS modeling software.

The output depth grids from the hydraulic modeling efforts are put into consequence models based in the HEC-FIA or LifeSIM software. This software uses depth and arrival time information to model impacts such as life-loss and economic impact based on a structure inventory. The default dataset used for the structure dataset is derived from Census Block data pulled from the HAZUS database. These structures are used in the profile graphs to show where population density is highest.

SECTION 2

Production Requirements

2.1 SOFTWARE REQUIREMENTS

There are some specific software requirements that must be met in order to follow the steps in this guide.

- ESRI ArcGIS 10, ArcInfo required for some steps (or equivalent)
 - Spatial Analyst Extension
 - 3D Analyst Extension
- Connection to services.arcgisonline.com
- MMC Utilities Toolbar (optional)
- Adobe Acrobat Pro (latest version)
- Microsoft Office 2007
- ProjectWise Explorer (version V8i)

2.2 THE MMC UTILITIES TOOLBAR

To install the MMC Utilities Toolbar:

1. Launch the MMC_Mapping_Addin.esriAddIn icon to begin the MMC Tools Setup Wizard
2. Follow the steps onscreen to install the tool
3. Open ArcMap.
4. Right click on any empty portion of the toolbar and activate the MMC Utilities Toolbar.
5. This should open the toolbar and you can place it anywhere on the mxd that you want.

Figure 2-1 displays the MMC Utilities Toolbar:



Figure 2-1. MMC Utilities Toolbar

2.3 QUALITY REQUIREMENTS

The work performed using this guide is subject to review as described in Appendix 4.3.7 MMC Mapping Review Guide. Reviews are to be performed by internal GIS team members, H&H team members and headquarters representatives as assigned.

2.4 TEMPLATE FILES

The following files will be used in the production of this Mapping Product:

Table 2-1. Map Template File Names

Product	File Name
Cover Page	4.4.1_MMC_Cover_Page_Levee.pptx
Map Notes I	4.4.2_MMC_MapNotesI_Levee.mxd
Map Notes II	4.4.3_MMC_MapNotesII_Levee.mxd
Sheet Index	4.4.4_MMC_Sheet_Index_Levee.mxd
Arrival Time Sheets	4.4.5_MMC_Levee_Arrival_Maps.mxd
Depth Grid Sheets	4.4.6_MMC_Levee_Depth_Maps.mxd
Notes II Table Template	4.4.7_MapNotes2_Tables_Study_Levee.xlsx

2.5 DELIVERABLE PRODUCTS

The MMC GIS/Mapping team is responsible for a number of deliverable datasets and products. Below is a brief summary of the products that the team is responsible for. This document describes how to develop the PDF maps and the data that is used in the other deliverable products. Please refer to any referenced document for more information about a specific topic.

- Flat PDF files—map books in optimized and full resolution .pdf format for printing and digital distribution.
- Web Map—interactive online web mapping application serving the data produced in this process.
- GIS Geodatabase—Enterprise level geodatabase for storage of all spatial data generated by the MMC.

SECTION 3

Data Preparation for Levee Maps

Output data may need to be revised based on assumptions made during the modeling process. If any datasets are missing from the model data that are needed to complete these steps, contact the modeler and request that they be exported from the model.

3.1 REQUIRED DATASETS

Two dimensional models are capable of producing different datasets than the one dimensional HEC-RAS software. The following datasets should be exported from the modeling software for use in Levee Maps:

- Arrival Time Grid at Cell – This grid is to be used for arrival time.
- Max Depth at Cell – This grid is to be used for maximum depth.

3.2 CREATE WORKING GEODATABASE

1. If it does not already exist, create a new folder under the Study Area root called Mapping.
2. If you had to generate the Mapping folder, create the three following folders in the Mapping folder: ArcGISMaps, GIS_Data, and PDF_Maps.
3. Using ArcCatalog, create a new empty file geodatabase named Inundation_[Levee_Name] in the GIS_Data folder.

3.3 CLIPPING RAS OUTPUTS FOR GRIDS

Revisions may be necessary to the model output grids depending on the assumptions made during the modeling process. Work with the modeler to determine if the raw output from the model is appropriate or if any areas need to be removed from the output prior to being used in an inundation map.

If the model output extent needs to be modified:

1. Digitized a polygon of the area that will remain in the inundation maps. Make sure the shapefile is the same projection as the model output grids.
2. Add the polygon layer to the map document with the arrival time grid and depth grid to the map document.
3. Open ArcToolbox and Navigate to Spatial Analyst Tools → Extraction → Extract by Mask.
4. Run the extract by mask feature on both the depth and arrival grids. This process may take a significant depending on the size of the inundation extent.
5. Create a folder for each modeled scenario that will have a map created. Each scenario will have unique data in the next steps.

3.4 ADJUSTING ARRIVAL GRIDS FOR MODEL BREACH TIMES

Arrival time grids that come from RAS may be calculated from model start time and not breach initiation time. Work with the modeler to determine what assumptions were used during the modeling process. If arrival time output grids were created from start of model, the arrival time grids will need to be adjusted for each scenario.

1. Determine the amount of time from start of model to breach time for each scenario. This will differ for each scenario and will need to be identified by the modeler.
2. In ArcToolbox navigate to Spatial Analyst Tools → Math → Minus.
3. Run the Minus tool on the clipped arrival grid created in the above section. Be sure to use the value provided by the modeler for the scenario you are working with (difference between

start of model and breach time). Make sure to save the file in the appropriate folder for the scenario and call the output arrival_time.

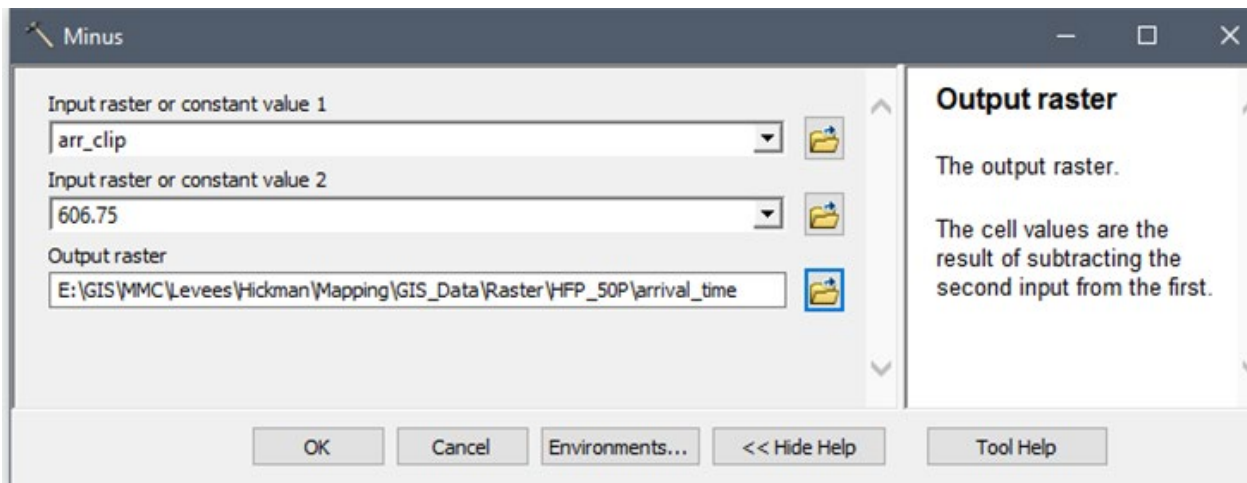


Figure 3-1. Minus Tool

3.5 CONSOLIDATE DATA INTO WORKING GEODATABASE

Prior to mapping, the layers that will be used in the maps should be consolidated into the working geodatabase. This will speed processing because we will only have data that is displayed in the maps in our geodatabase.

1. Start a new ArcMap session.
2. Add the clip polygon used in the previous steps to the map.
3. Add the following layers to the map session from the MMC_National_Data geodatabase¹:
 - COE_NID_DAMS
 - dtl_cntry_In
 - dtl_cntry
 - dtl_cnty_In
 - dtl_cnty
 - dtl_st_In
 - dtl_st
 - Railroad
 - CityCivilDivisions
 - CityCivilDivisions_In
 - MMC_DetailSheetExtents
 - MMC_StandardSheetExtents
 - MMC_Two_D_Points
 - mgrs_region
 - levee_centerline
 - floodwall_line
 - closure_structure_line

¹ See 4.1.6 Map Data Spec for sources of all national datasets, requires MMC National Database v.2012, available in MMC support files.

4. Use the Select by Location tool located in the Selection menu to select features from the MMC_DetailSheetExtents and MMC_StandardSheetExtents layers that intersect the InundationArea layer produced earlier.

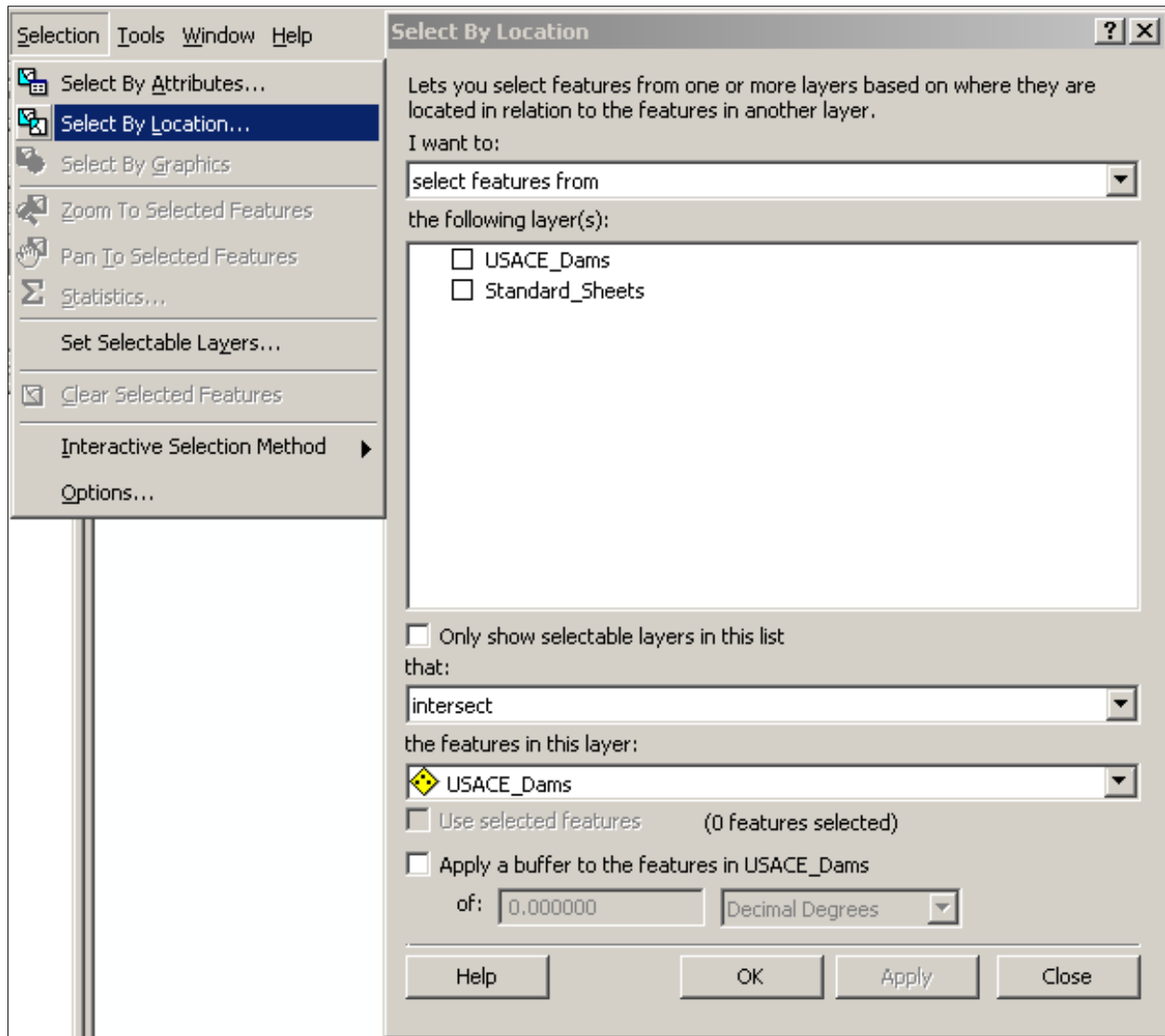


Figure 3-2. Select by Location Tool

5. Export each of the selected layers by right-clicking on the layer name, choosing Data, then Export Data from the context menu. Save each as a feature class in the working geodatabase with the respective names:
 - o MMC_DetailSheetExtents -> Detail_Sheets
 - o MMC_StandardSheetExtents -> Standard_Sheets
 - o Add the new Standard_Sheets layer to the map after exporting.
6. Remove the MMC_DetailSheetExtents and MMC_StandardSheetExtents national layers from the map.

7. Use the Select by Location tool located in the Selection menu to select features from the COE_NID_DAMS layer that intersect the Standard_Sheets layer.
8. Use the Select by Attributes tool located in the Selection menu to select features from the current selection in the COE_NID_DAMS layer that are USACE dams, or where the attribute "COE_DAM" = 'Yes'²
9. Export the selected features by right-clicking on the layer name, choosing Data, then Export Data from the context menu. Save the layer to the working geodatabase as a feature class named USACE_Dams.
10. Clear the selected features.
11. Use the Select by Location tool located in the Selection menu to select features from the COE_NID_DAMS layer that are within a distance of one mile of the centerline.
12. Use the Select by Location tool located in the Selection menu to select features from the current selection that intersect the InundationArea.
13. Use the Select by Attributes tool located in the Selection menu to select features from the current selection in the COE_NID_DAMS layer that are Non-USACE dams, or where the attribute "COE_DAM" = 'No'³
14. Export the selected features by right-clicking on the layer name, choosing Data, then Export Data from the context menu. Save the layer to the working geodatabase as a feature class named Non_USACE_Dams.
15. Remove the COE_NID_DAMS layer, as well as the newly created USACE_Dams and Non_USACE_Dams layers, from the table of contents.
16. Use the Select by Location tool located in the Selection menu to select features from the remaining layers that intersect the Standard_Sheets layer.
17. Export each of the selected layers by right-clicking on the layer name, choosing Data, then Export Data from the context menu. Save each as a feature class in the working geodatabase with the respective names:
 - dtl_cntry_In → Countries_Ln
 - dtl_cntry → Countries
 - dtl_cnty_In → Counties_Ln
 - dtl_cnty → Counties
 - dtl_st_In → States_Ln
 - dtl_st → States
 - Railroad → Railroad
 - CityCivilDivisions → Cities
 - CityCivilDivisions_Ln → Cities_Ln
 - mgrs_region → USNG_Grid
 - MMC_Two_D_Points → Two_D_Points
 - levee_centerline → Levee_Centerline
 - floodwall_line → Floodwall_Line
 - closure_structure_line → Closure_Structure_Line

² If you are using the latest MMC National Mapping Data geodatabase, there is a field Called COE_Dam, which is set to “Yes” for USACE Dams. Otherwise, the definition query WHERE “[FED_Own] LIKE “%CE%”” will capture the USACE dams from the NID.

³ Non-USACE dams will only appear in the maps where they are directly on or very near the centerline of the channel below the study dam of an MMC project.

18. The critical infrastructure points will be added to the Inundation geodatabase using the Copy Critical Facilities to the Inundation Geodatabase tool on the MMC Toolbar

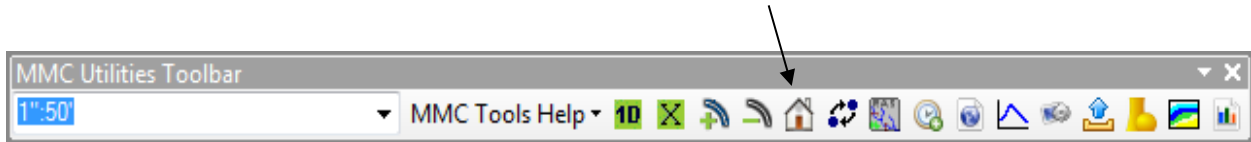


Figure 3-3. Copy Critical Facilities to the Inundation Geodatabase

19. Source the MMC Geodatabase that contains the critical infrastructure points. All of the feature classes in the Geodatabase that have "CIKR_" as the first 5 characters of the name will be found.
20. Map to the Standard_Sheets layer and press Copy.

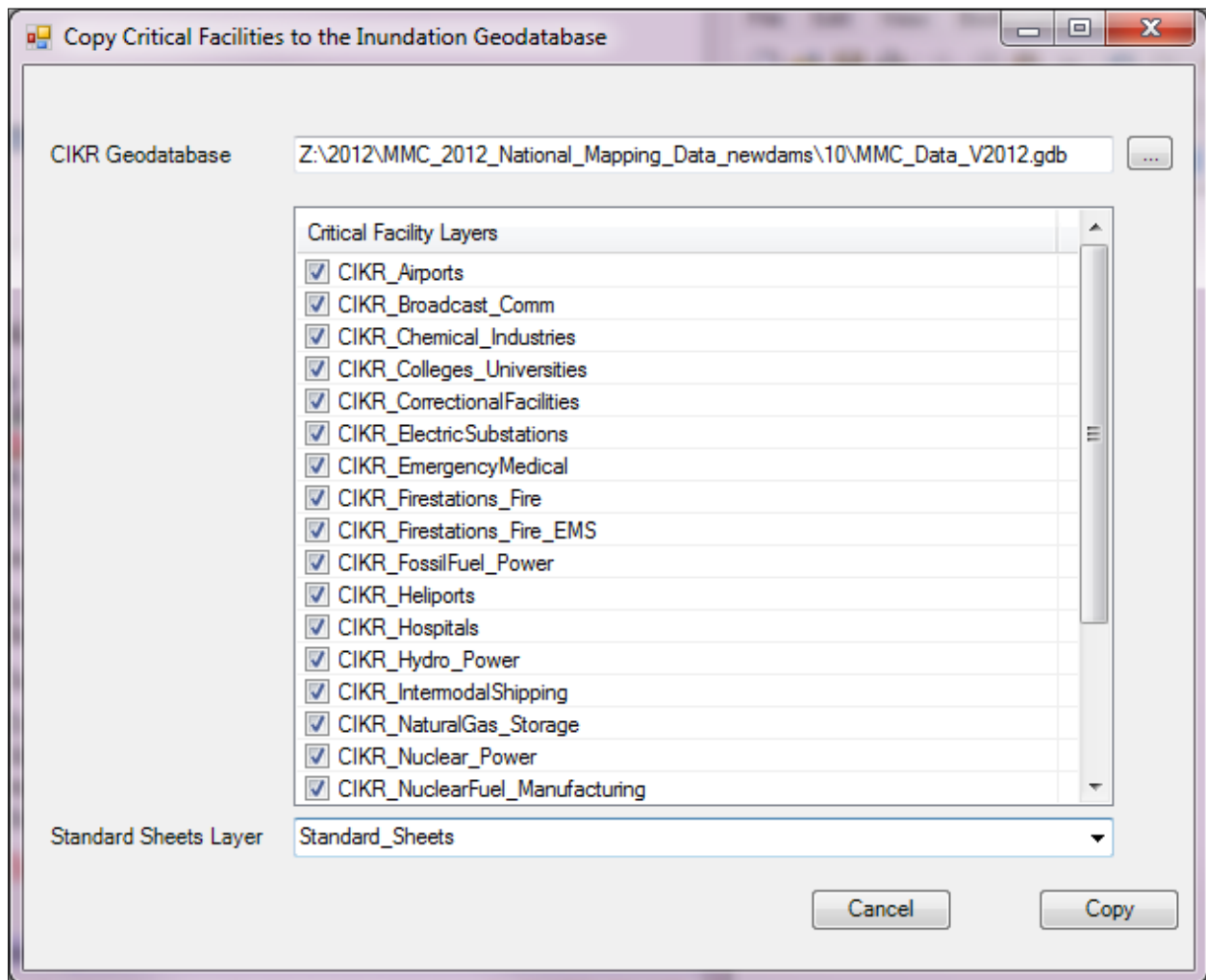


Figure 3-4. Copy Critical Facilities Tool

3.6 MAP GRID SET UP

The Map Grid scale is designed to be uniform for all study areas. Some extreme cases will warrant a different scale, but most of the study areas will use Standard Grids for use at a scale of 1:31,680 (1 inch=½ mile) and Detail Grids at a scale of 1:15,840 (1 inch=¼ mile).

The Standard Grids in the data provided are for use at a scale of 1:31,680 and the provided Detail Grids are for use at a scale of 1:15,840. Study areas that require a different scale will need to have new Grids created. The process of Standard Sheet and Detail Sheet setup will be the same for all scales. A Map Grid scale should be determined for each study area individually based on the number of sheets required to complete mapping at a given scale.

The steps in this document will assume standard sheets for use at a scale 1:31,680 and detail sheets for use at a scale of 1:15,840 are being used.

Determine if the predefined Standard Sheet Extents and Detailed Sheet Extents are appropriate for the levee map. If the size and number of sheets is not appropriate, revise as needed to best fit the levee map area. The following steps will refer to Standard and Detail sheets regardless if they are the predefined data layers or custom sheets.

1. Add the Standard_Sheets, Detail_Sheets, Cities, InundationArea and USNG_Grid feature classes from the working geodatabase to a new ArcMap session. It may be helpful to also add the World Street Map base map from ESRI image service as well.
2. Detail sheets should be used in areas where the inundation affects densely populated areas, or areas where more detail is important. Use your judgment when selecting which detail sheets should be active. The Cities feature class and the World Street Map base map can be used for reference.
3. Two options exist for the selection of Detail_Sheets which will be included in the overall map product.
 - Use the select features tool to select all detail sheets that should be used and right click on the layer name, choose data, then export to export the selected features to a feature class in the working geodatabase with the name **Detail_Sheets_Active**.
4. Click the Calculate Page and Adjacent Page Numbers tool on the MMC Utilities Toolbar.



Figure 3-5. Calculate Page and Adjacent Page Numbers

5. Do not check box to change the Dam, Dam Owner and NIDID Name.
6. Fill out the rest of the form. Check on the box that says 'Include "Active" Field in Calculation.' Then Click "Calculate."

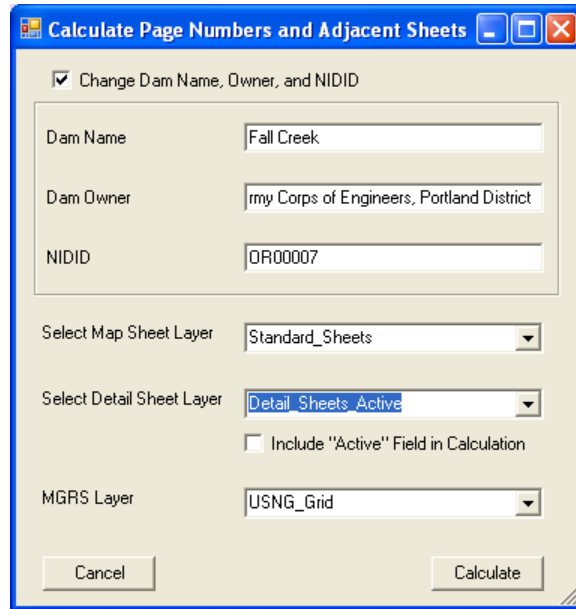


Figure 3-6. Calculate Page Numbers Tool

The Calculate Page Numbers tool assumes that the page numbering scheme should start in the upper left corner and progress right, then down as in Figure 19. This works well for some projects, but sheet numbers should begin at the dam and progress downstream in an ordered fashion. In the case where the standard numbering scheme does not work with the sheet layout, the sheets will need to be numbered manually. This can be done completely manually, or the following steps can be followed:

- Run the Calculate Page Numbers Tool for the Standard and Detail sheet layers.
- Open a new Excel worksheet.
- Create two columns, “OldPage” and “NewPage” as shown in Figure 16.

	A	B
1	OldPage	NewPage
2	No Join	No Join
3	1	4
4	2	6
5	3	5
6	4	3
7	5	2
8	6	1
9	7	7
10	8	8
11	9	9

Figure 3-7. Page Number Changes Table

- For each Standard Sheet, enter the original page number as calculated by the tool and the new page number that should be used. Include “No Join”=“No Join” as well.
- Format the columns as Text, the default will be double. Make sure all formulas are converted to values.
- Save the file to the GIS_Data folder in the Mapping directory as “NewSheetNbrs.xls”.
- Add the table to the ArcMap session.

- If you have problems with the field types not translating between Excel and ArcGIS, export the .xls table to the working geodatabase, add new text fields for the old and new page numbers and use the field calculator to populate the text fields.
- Join the NewSheetNbrs table to the Standard_Sheets feature class using the PageNmbr field and the OldPage field as shown in Figure 17.

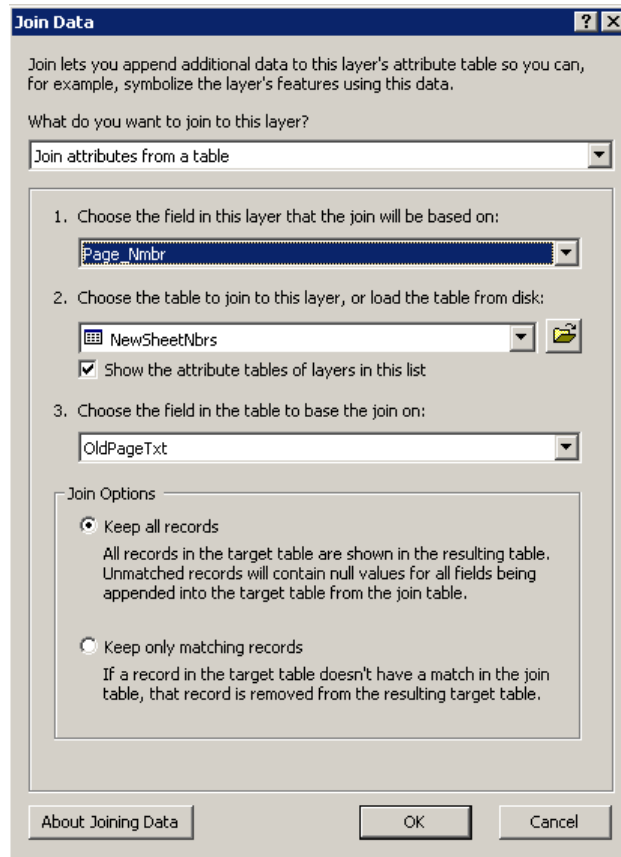


Figure 3-8. Join New Sheet Numbers Table

- Right click on the Page_Nmbr column in the Standard_Sheets attribute table and choose the field calculator. Calculate the Page_Nmbr field to equal the “NewPage” field from the joined table.
- Remove the join.
- Repeat the two previous steps for each of the join fields; “North_Pg”, “South_Pg”, “West_Pg” and “East_Pg”.
- Remove the join.
- Join the Standard_Sheets attribute table to the Detail_Sheets attribute table using the FID_USGS_S field.
- Use the following formula in the field calculator for the “Page_Nmbr” field in the Detail Sheets feature class:
- [Standard_Sheets.Page_Nmbr] & Right([Detail_Sheets_Active.Page_Nmbr],1)
- This will pull the new page number from the Standard_Sheets and append the detail sheet letter to the end of it.
- Right click the field name for the North_Pg field and choose the field calculator. Check the box next to “Show Codeblock” to open the pre-logic Pre-Logic Script Code editor. The code below can be copied into the Pre-Logic Script Code window. The .cal file imbedded in the MS

Word edition of this document can be saved to a local machine and used in lieu of copying or re-typing the code below.



DetailJoinPages.cal

Package 1. Cal File for Detail Sheet Join Pages (Code Below)

Dim Ltr

Dim Nbr

Dim NNbr

Dim SNbr

Dim WNbr

Dim ENbr

Dim N_Page

Dim S_Page

Dim W_Page

Dim E_Page

Dim NJoin

Dim SJoin

Dim EJoin

Dim WJoin

NJoin = [Detail_Sheets_Active.North_Pg]

SJoin = [Detail_Sheets_Active.South_Pg]

EJoin = [Detail_Sheets_Active.East_Pg]

WJoin = [Detail_Sheets_Active.West_Pg]

Ltr = Right([Detail_Sheets_Active.Page_Nmbr],1)

Nbr = Left([Detail_Sheets_Active.Page_Nmbr],Len([Detail_Sheets_Active.Page_Nmbr])-1)

NNbr = [Standard_Sheets.North_Pg]

SNbr = [Standard_Sheets.South_Pg]

ENbr = [Standard_Sheets.East_Pg]

WNbr = [Standard_Sheets.West_Pg]

if Ltr = "a" then

```
N_Page = NNbr & "c"  
S_Page = Nbr & "c"  
W_Page = WNbr & "b"  
E_Page = Nbr & "b"  
elseif Ltr = "b" then  
    N_Page = NNbr & "d"  
    S_Page = Nbr & "d"  
    W_Page = Nbr & "a"  
    E_Page = ENbr & "a"  
elseif Ltr = "c" then  
    N_Page = Nbr & "a"  
    S_Page = SNbr & "a"  
    W_Page = WNbr & "d"  
    E_Page = Nbr & "d"  
elseif Ltr = "d" then  
    N_Page = Nbr & "b"  
    S_Page = SNbr & "b"  
    W_Page = Nbr & "c"  
    E_Page = ENbr & "c"  
End if  
If NJoin = "No Join" Then N_Page = "No Join"  
If SJoin = "No Join" Then S_Page = "No Join"  
If WJoin = "No Join" Then W_Page = "No Join"  
If EJoin = "No Join" Then E_Page = "No Join"
```

- The same code block can be used for the North_Pg, South_Pg, West_Pg, and East_Pg fields to calculate the new join page numbers.
- Use the variable N_Page when calculating the North_Pg field
- Use the variable S_Page when calculating the South_Pg field
- Use the variable W_Page when calculating the West_Pg field
- Use the variable E_Page when calculating the East_Pg field
- See Figure 14 for an example.

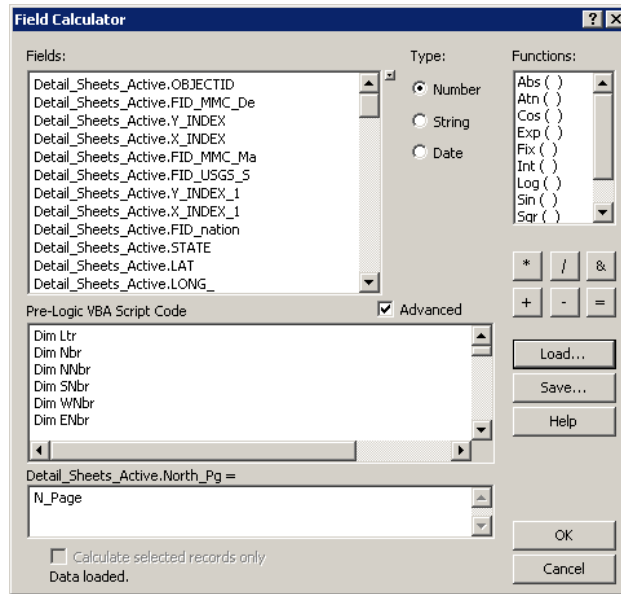


Figure3-9. Field Calculator with Pre-Logic VBA

- Remove the Join.
 - Check to make sure that all sheets are numbered according to plan.
 - Print a PDF map of the new numbering convention and send it to the MMC Mapping Technical Lead for District approval. Continue with the rest of the data processing steps.
7. Double check the sheet numbering and joining assignments. For Standard Sheet Grids, the upper left corner will be assigned number 1 and the numbers will increase from left to right by row so that the largest number will be the farthest right sheet of the last row.
 8. For Detail Sheet Grids the upper left corner of the corresponding standard sheet will be assigned the letter of “a” and the lettering will continue from left to right, by row. See Figure 19 for an example of the sheet numbering.

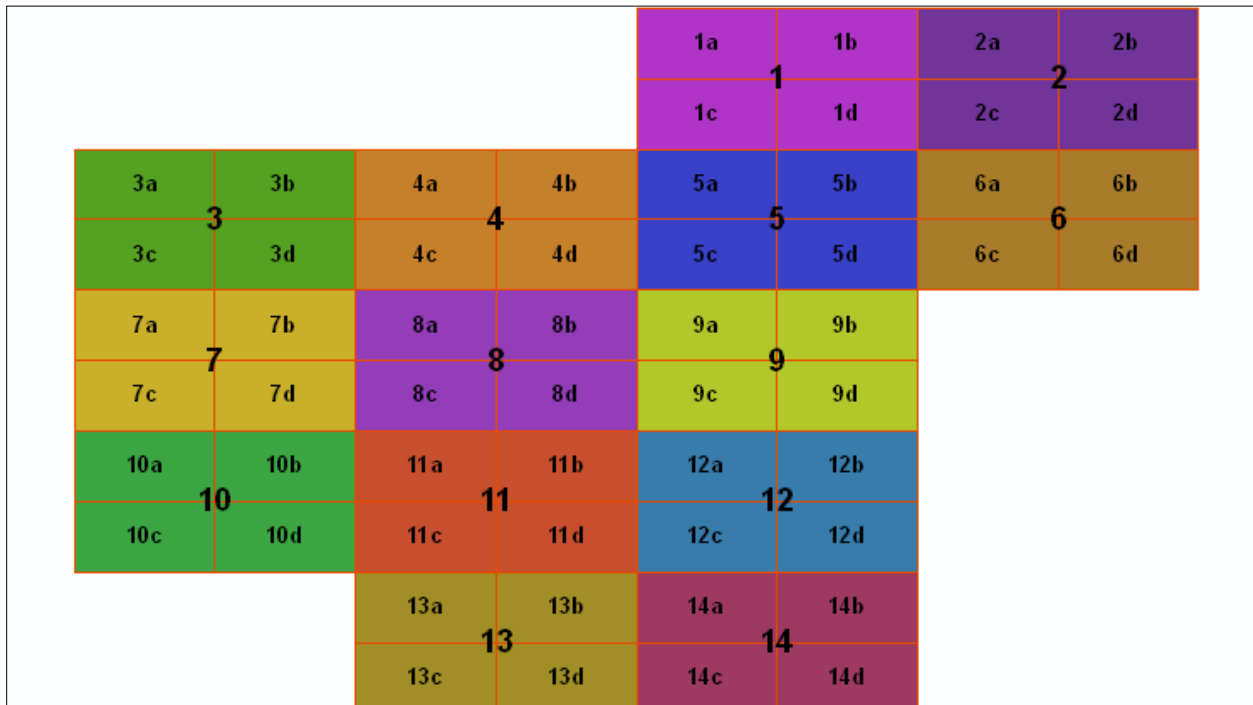


Figure 3-10. Sheet Numbering Example

Table 3-1. Page Join Information

Field Name	Populate with
North_Pg	Sheet number North of the current sheet
South_Pg	Sheet number South of the current sheet
East_Pg	Sheet number East of the current sheet
West_Pg	Sheet number West of the current sheet

SECTION 4

Standard Sheet Development

The first step to creating any of the maps is to copy all of the template .mxd files from their location to the ArcGISMaps folder in the Mapping folder for the working study area.

The Standard Sheets are created by opening 4.4.6_MMC_StandardSheets.mxd and re-setting the data sources for the various data layers. Once the .mxd for the Standard Sheets is set up the Map Book can be generated, creating a map series for the study area.

4.1 SET DATA SOURCES

1. Open 4.4.6_MMC_StandardSheets.mxd, the layers will have a red exclamation point next to them; indicating the computer is not able to find a layer in the expected location.
2. Right click the layer name and choose Repair Data Source or go to the layer properties dialog and under the Source tab, and set the data source. Point the layer source to the correct feature class, either in the MMC National Mapping Data database or in the working geodatabase created earlier.

Alternatively, you can click on the red exclamation point to set the data source for a single layer, and ArcMap will automatically re-set the sources for all layers in the same workspace, given that the names of the feature classes are the same. Make sure to check each layer and make sure that the correct feature class was selected.

The layer order for the basemap layers is as follows:

- Anno⁴
 - USACE_Dams_S_Anno
 - Non_USACE_Dams_S_Anno
 - St_S_Anno
 - Cnty_S_Anno
 - City_S_Anno
 - Grid_S_Anno
- Base Map Elements
 - CIKR Points
 - USACE Dams
 - Non-USACE Dams
 - Airports
 - Broadcast Communications
 - Chemical Industries
 - Colleges and Universities
 - State/Local Correctional Facilities
 - Electric Substations
 - Emergency Medical Services

⁴ You will remove existing annotation references in the .mxd, noting their order, and generate your own.

- Firestations – Fire Only
- Firestations – Fire/EMS
- Fossil Fuel Electric Power Generation and Other Power Generation
- Heliports
- Hospitals – General
- Hydroelectric Power Generation
- Intermodal Shipping Facilities
- Law Enforcement
- Natural Gas Storage
- Nuclear Electric Power Generation
- Nuclear Fuel Manufacturing
- Petroleum Bulk Stations and Terminals
- Potable Water Facilities
- Schools
- Wastewater Treatment Plants
- National Levee Database
 - Closure Structure Lines
 - Levee Centerlines
 - Floodwall Lines
- Boundaries/Lines
 - USNG Grid
 - Standard Sheets
 - Lettered Points
 - Countries
 - Countries (polygon) used for labeling
 - Countries_Ln (line) used for symbology
 - States
 - States (polygon) used for labeling
 - States_Ln (line) used for symbology
 - Counties
 - Counties (polygon) used for labeling
 - Counties_Ln (line) used for symbology
 - Cities
 - Cities (polygon) used for labeling
 - Cities (line) used for symbology
 - Railway Lines
- Inundation Elements
 - Inundation Area
- World_Street_Map
- Imagery Background
 - Reference/World Transportation
 - World Imagery

4.2 SET DATA FRAME PROPERTIES

The Standard Sheet layer has a field that holds a rotation value for most of the UTM zones in the continental U.S. This value will rotate the data frame so the sheet is oriented correctly on the page. Map Book will apply this rotation to the main data frame when it is set up, however it is useful to set the rotation on the data frames at this point when setting up the map. A representative rotation value can be chosen from the attributes of the center-most Standard Sheet in the group to be mapped.

This rotation value should be used when setting up the index maps as well.

- Right click on the Layers and choose Properties. In the Coordinate System tab select the coordinate system for the proper UTM Zone.

If the study area crosses UTM Zones, the process for creating Standard Sheets and Detail Sheets will apply for all additional UTM Zones used. Each UTM Zone used will require a new map book set up and pdf export.

Ensure that the horizontal units are set to meters.

4.3 MAP BOOK SET UP

For this section, when using ArcGIS v10, utilize the Data Driven Pages toolbar.

1. Right click on the Data Drive Pages set-up button on the left-side of the toolbar.

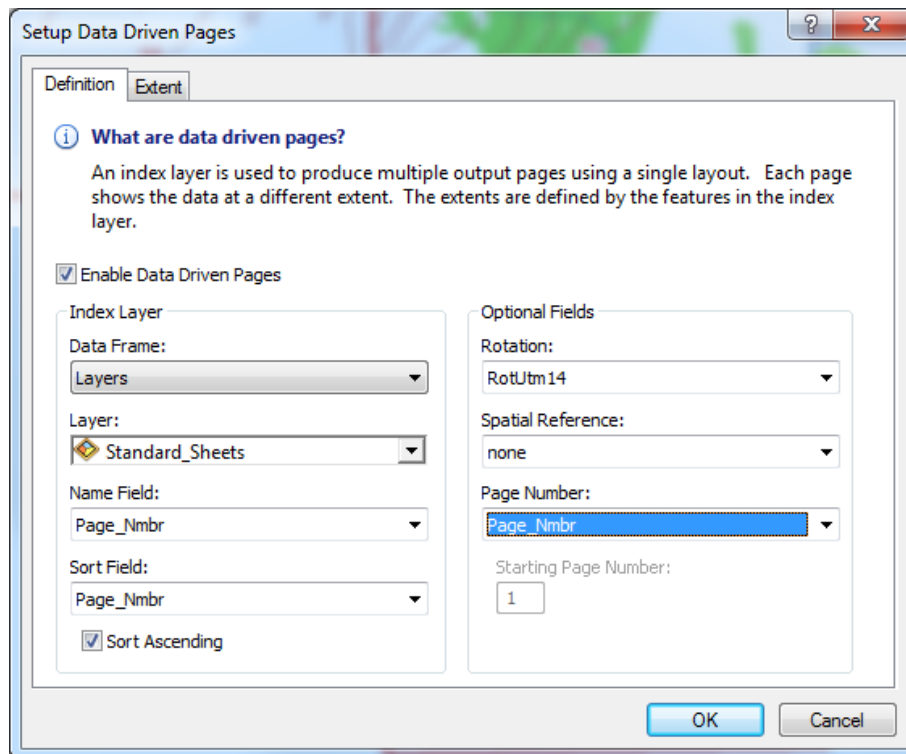


Figure4-1. Setup Data Driven Pages

2. On the Definition Tab, check the box 'Enable Data Driven Pages.'
 - a. Layer: Standard_Sheets
 - b. Name Field: Page_Nmbr
 - c. Sort Field: Page_Nmbr

- d. Rotation: Select the field for the correct UTM Zone
- e. Page Number: Page_Nmbr
3. On the next page, under Extent, choose Center and Maintain Current Scale.
4. Click OK to create the map series.
5. Move between map atlas pages by typing the page number in the Data Driven Pages toolbar.

4.4 LINKED TEXT

ArcGIS 10.x uses Dynamic Text elements in the context of Data Driven Pages to get the same effect as linked text in the older map book extension. There are a number of field-driven text elements that must be set up.

Table 3 in the reference section lists the text elements that must be linked to the index attribute table, the fields that they map to, and the rough location of the text element on the map panel.

1. Select the Text Element, as listed in Table 3 in the reference section.
2. Right-click on the Text Element to open the Properties Page. Use the following format for the Tag:
 - `<dyn type = "page" property = "[index_layer_field_name]"/>`
 - For example, to make the Page Number text on the Map Book dynamic, the following text would be typed in the Properties box, in the text box:
 - `<dyn type = "page" property = "Page_Nmbr"/>`
3. Repeat for all the listed Text Elements in **Table 3** in the reference section.
4. Make sure to change the NIDID, Dam Owner, Study Dam, and date (date when product is ready for GIS Review) on the title block with the format described in the MMC Graphics Specifications document.

4.5 ANNOTATION

Rather than using either the standard ESRI label engine or the Maplex labeling extension, the MMC maps will use editable annotation feature classes to label features on the map. Annotation will be created per study area

Table 4 in the reference section and Appendix 4.1.7, MMC Graphics Specifications, outline the layers that need annotation built and the format to be used. Annotation should be built at a scale of 1:31,680 and stored in the working geodatabase. The layers in the map template should have their label properties set to the correct anno properties, but double check to make sure.

1. Turn the labels on one at a time for the appropriate features shown in Table 4 and the Map Graphics Specifications.
2. Right click the current layer and select Convert Labels to Annotation making sure the correct reference scale is set. Make sure that all other labels and annotation layers are turned off prior to creating annotation. Turning off other layers will also speed performance.
3. Edit the annotation feature classes according to Table 4. For Counties, annotation should be parallel to the county line if possible or leader to the county line and be in the correct county where possible. County annotation should be placed at every instance of adjacent counties per sheet. State Line annotation should also be parallel to the state line where possible.
4. Place annotation in an appropriate location without overlapping point features. Avoid placing annotation in the inundation area if possible.
5. If possible, place annotation so that it does not overlap ESRI generated labels in the background. In some instances, annotation will have to overlap ESRI generated labels, this is known and expected.
6. It is recommended that mappers use the Annotation toolbar in ArcMap to edit the annotation feature classes. It makes it easier and faster to display high quality annotation on the maps.

7. If necessary, some annotation may have leader lines added. In order to set the annotation leader line symbol properties, go to Editor on the Editor toolbar and click Options.
8. On the Annotation tab, click the Leader button

Set the leader line symbology to the symbology found in the Graphics Specification document

4.6 EXPORT TO PDF

Once the map series is properly set up, export the map series to the AtlasPages folder under the FullResolution folder in the PDF Maps directory. Turn off or remove from the table of contents the base data feed that you are not including in the maps (World_Street_Map, or World_Imagery) prior to exporting.

Make sure all guides are turned off, labels are turned off, and selected features have been cleared before exporting to pdf.

9. Go to File → Export Map
2. Under the General tab, Use the default settings of 300 dpi, Normal resample ratio (1:3).
3. Under the Format tab, check 'Compress Vector Graphics' and 'Embed All Document Fonts' boxes. Set the Image Compression to 'None.'

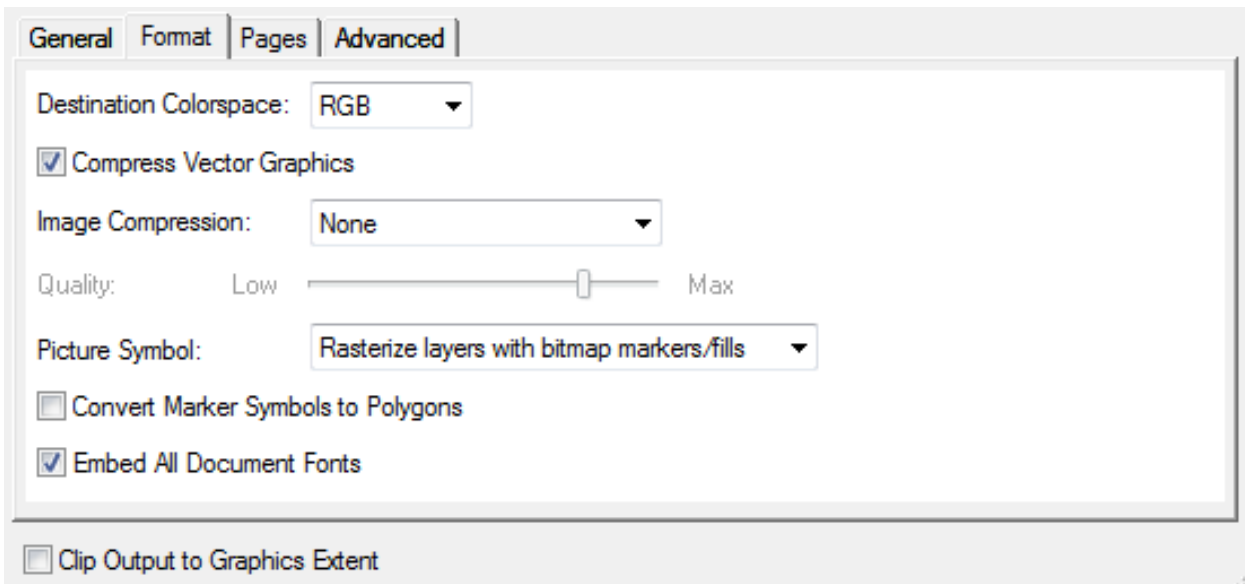


Figure 4-2. PDF Export Settings

4. Under the Pages tab, check the 'All' box and change the 'Export Pages As' option to 'Multiple PDF Files (page names).'
5. Click Save to export the street series to the appropriate location as .pdf files and name accordingly. There is no need to add the Page Number onto the Standard Sheet export names, as the Page Number will automatically append to the end of the PDF name. Once the street series has passed the Mapping Review, and all edits have been made, the aerial series should also be exported.

LFIM_[Fiscal Year]_[Levee Name]_[Scenario]_S_[Page Number].pdf (street view)

LFIM_[Fiscal Year]_[Levee Name]_[Scenario]_A_[Page Number].pdf (aerial view)

SECTION 5

Detail Sheet Development

The Detail Sheets are created by opening 4.4.7_MMC_DetailSheets.mxd and setting the data sources for the various data layers. Once the individual Detail Sheets are set up the Map Book can be set-up, creating a Sheet for each panel in the series.

5.1 SET DATA SOURCES

1. Open 4.4.7_MMC_DetailSheets.mxd, the layers will have a red exclamation point next to them; indicating the computer is not able to find a layer in the expected location.
2. Right click the layer name and choose **Repair Data Source** or go to the layer properties dialog and under the **Source** tab, and set the data source. Point the layer source to the correct feature class, either in the MMC National Mapping Data database or in the working geodatabase created earlier (feature class sources are listed in Appendix 4.1.6, MMC Data Specifications). Alternatively, you can click on the red exclamation point to set the data source for a single layer, and ArcMap will automatically re-set the sources for all layers in the same workspace, given that the names of the feature classes are the same.
3. The layer order for the basemap layers is as follows:
 - Anno⁵
 - USACE_Dams_D_Anno
 - Non_USACE_Dams_D_Anno
 - St_D_Anno
 - Cnty_D_Anno
 - City_D_Anno
 - Grid_D_Anno
 - Base Map Elements
 - CIKR Points
 - USACE Dams
 - Non-USACE Dams
 - Airports
 - Broadcast Communications
 - Chemical Industries
 - Colleges and Universities
 - State/Local Correctional Facilities
 - Electric Substations
 - Emergency Medical Services
 - Firestations – Fire Only
 - Firestations – Fire/EMS
 - Fossil Fuel Electric Power Generation and Other Power Generation
 - Heliports
 - Hospitals – General

⁵ You will remove existing annotation references in the .mxd, noting their order and generate your own.

- Hydroelectric Power Generation
- Intermodal Shipping Facilities
- Law Enforcement
- Natural Gas Storage
- Nuclear Electric Power Generation
- Nuclear Fuel Manufacturing
- Petroleum Bulk Stations and Terminals
- Potable Water Facilities
- Schools
- Wastewater Treatment Plants
- National Levee Database
 - Closure Structure Lines
 - Levee Centerlines
 - Floodwall Lines
- Boundaries/Lines
 - USNG Grid
 - Standard Sheets
 - Countries
 - Countries (polygon) used for labeling
 - Countries_Ln (line) used for symbology
 - States
 - States (polygon) used for labeling
 - States_Ln (line) used for symbology
 - Counties
 - Counties (polygon) used for labeling
 - Counties_Ln (line) used for symbology
 - Cities
 - Cities (polygon) used for labeling
 - Cities (line) used for symbology
 - Railway Lines
- Inundation Elements
 - Inundation Area
- World_Street_Map
- Imagery Background
 - Reference/World Transportation
 - World Imagery

5.2 SET DATA FRAME PROPERTIES

The Detail Sheet layer has a field that holds a rotation value for most of the UTM zones in the continental US. This value will rotate the data frame so the sheet is oriented correctly on the page. Map Book will apply this rotation to the main data frame when it is set up, however it is useful to set the rotation on the data frames at this point when setting up the map. A representative rotation value can be chosen from the attributes of the center-most Detail Sheet in the group to be mapped.

1. Right click on the Layers and choose Properties. In the Coordinate System tab select the coordinate system for the proper UTM Zone. If the study area crosses UTM Zones, the process for creating Standard Sheets and Detail Sheets will apply for all additional UTM Zones used.
2. Each UTM Zone used will require a new map book set up and pdf export. Ensure that the horizontal units are set to meters.
3. In the General Tab, set the rotation value to the rotation value from the Detail Sheet attribute table for the current UTM zone.

5.3 MAP BOOK SET UP

The Detail Sheet layer has a field that holds a rotation value for most of the UTM zones in the continental US. This value will rotate the data frame so the sheet is oriented correctly on the page. Map Book will apply this rotation to the main data frame when it is set up, however it is useful to set the rotation on the data frames at this point when setting up the map. A representative rotation value can be chosen from the attributes of the center-most Detail Sheet in the group to be mapped.

1. Right click on the Layers and choose Properties. In the Coordinate System tab select the coordinate system for the proper UTM Zone. If the study area crosses UTM Zones, the process for creating Standard Sheets and Detail Sheets will apply for all additional UTM Zones used.
2. Each UTM Zone used will require a new map book set up and pdf export. Ensure that the horizontal units are set to meters.
3. In the General Tab, set the rotation value to the rotation value from the Detail Sheet attribute table for the current UTM zone.

5.4 MAP BOOK SET UP

For this section, when using ArcGIS v10, utilize the Data Driven Pages toolbar.

1. Right click on the Data Drive Pages set-up button on the left-side of the toolbar.

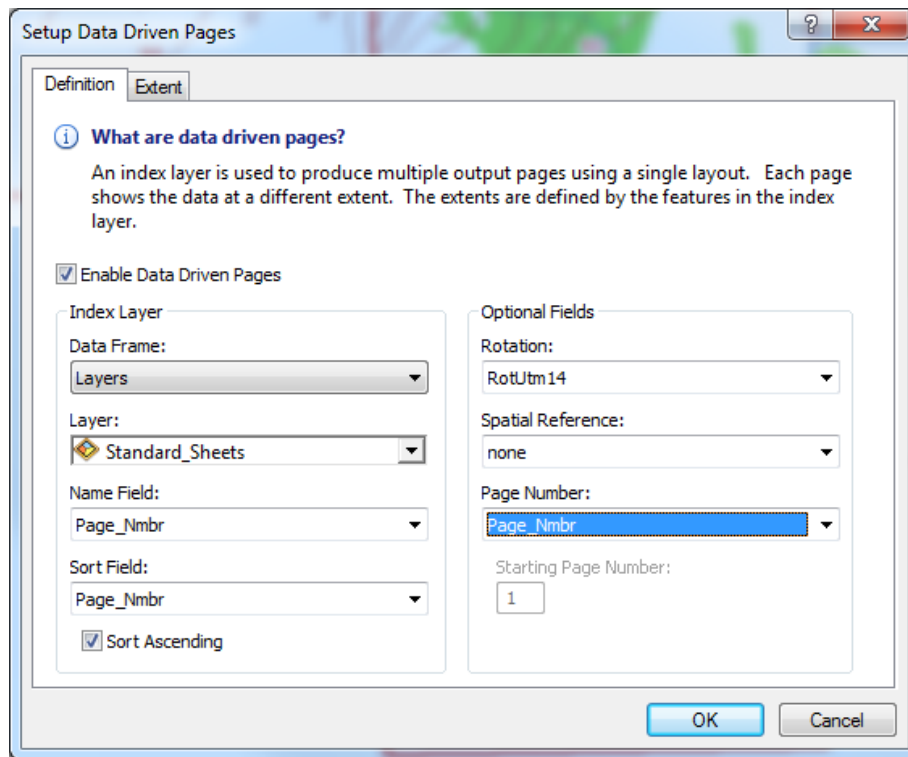


Figure 5-1. Setup Data Driven Pages

2. On the Definition Tab, check the box 'Enable Data Driven Pages.'
 - Layer: Detail_Sheets_Active
 - Name Field: Page_Nmbr
 - Sort Field: Page_Nmbr
 - Rotation: Select the field for the correct UTM Zone
 - Page Number: Page_Nmbr
3. On the next page, under Extent, choose Center and Maintain Current Scale.
4. Click OK to create the map series.
5. Move between map atlas pages by typing the page number in the Data Driven Pages toolbar.

5.5 LINKED TEXT

ArcGIS 10.x uses Dynamic Text elements in the context of Data Driven Pages to get the same effect as linked text in the older map book extension. There are a number of field-driven text elements that must be set up.

Table 3 in the reference section, lists the text elements that must be linked to the index attribute table, the fields that they map to, and the rough location of the text element on the map panel.

6. Select the Text Element, as listed in **Table 3** in the reference section.
7. Right-click on the Text Element to open the Properties Page. Use the following format for the Tag:
 - 8. <dyn type = "page" property = "[index_layer_field_name]"/>
 - 9. For example, to make the Page Number text on the Map Book dynamic, the following text would be typed in the Properties box, in the text box:

a. <dyn type = "page" property = "Page_Nmbr"/>

10. Repeat for all the listed Text Elements in **Table 3** in the reference section.
11. Make sure to change the NIDID, Dam Owner, Study Dam, and date (date when product is ready for GIS Review) on the title block with the format described in the MMC Graphics Specifications document.

5.6 ANNOTATION

Rather than using either the standard ESRI label engine or the Maplex labeling extension, the MMC maps will use editable annotation feature classes to label features on the map.

Annotation will be created per study area, Table 4 in the reference section and Appendix 4.1.7, MMC Graphics Specifications, outlines the layers that need annotation built and the format to be used. Annotation should be built at a scale of 1:31,680 and stored in the working geodatabase. The layers in the map template should have their label properties set to the anno properties, but double check to make sure.

12. Label the appropriate features shown in **Table 4** and the Map Graphics Specifications.
2. Right click the current layer and select Convert Labels to Annotation making sure the correct reference scale is set.
3. Edit the annotation feature classes according to **Table 4**. For Counties, annotation should be parallel to the county line if possible or leader to the county line and be in the correct county where possible. County annotation should be placed at every instance of adjacent counties per sheet. State Line annotation should also be parallel to the state line where possible.
4. Place annotation in an appropriate location without overlapping point features. Avoid placing annotation in the inundation area if possible.
5. If possible, place annotation so that it does not overlap ESRI generated labels in the background. In some instances, annotation will have to overlap ESRI generated labels, this is known and expected.
6. It is recommended that mappers use the Annotation toolbar in ArcMap to edit the annotation feature classes. It makes it easier and faster to display high quality annotation on the maps.
7. If necessary, some annotation may have leader lines added. In order to set the annotation leader line symbol properties, go to Editor on the Editor toolbar and click Options.
8. On the Annotation tab, click the Leader button

Set the leader line symbology to the symbology found in the Graphics Specification document

5.7 EXPORT TO PDF

Once the map series is properly set up, export the map series to the AtlasPages folder under the FullResolution folder in the PDF Maps directory. Turn off or remove from the table of contents the base data feed that you are not including in the maps (World_Street_Map, or World_Imagery) prior to exporting.

Make sure all guides are turned off, labels are turned off, and selected features have been cleared before exporting to pdf.

9. Go to File → Export Map
2. Under the General tab, Use the default settings of 300 dpi, Normal resample ratio (1:3).
3. Under the Format tab, check 'Compress Vector Graphics' and 'Embed All Document Fonts' boxes. Set the Image Compression to 'None.'

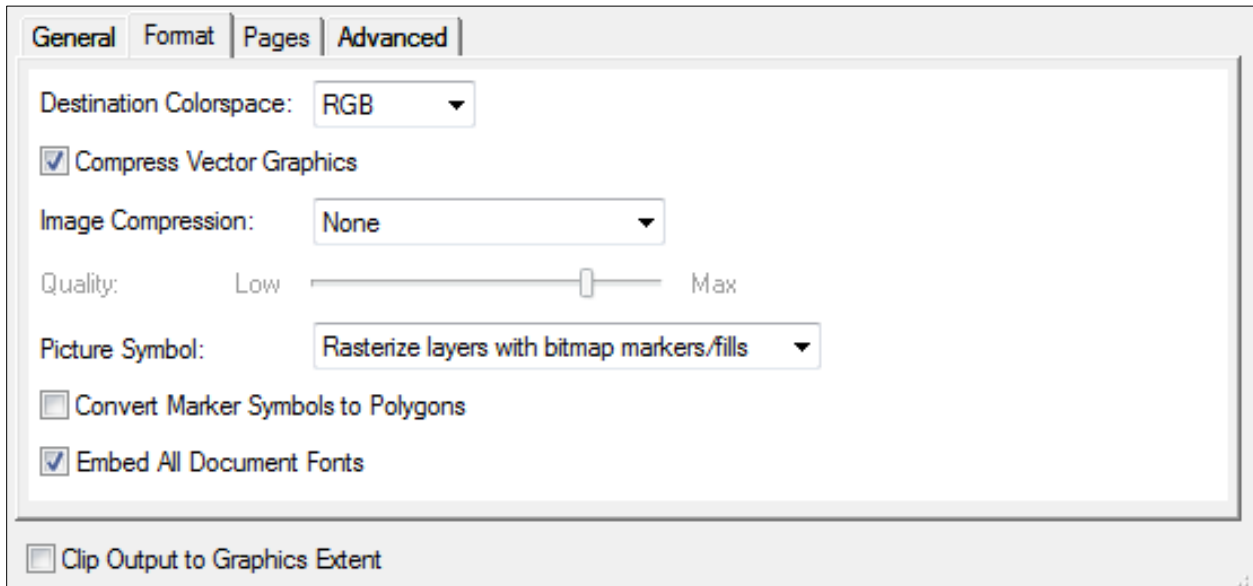


Figure 5-2. PDF Export Settings

4. Under the Pages tab, check the 'All' box and change the 'Export Pages As' option to 'Multiple PDF Files (page names).'
5. Click Save to export the street series to the appropriate location as .pdf files and name accordingly. There is no need to add the Page Number onto the Standard Sheet export names, as the Page Number will automatically append to the end of the PDF name. Once the street series has passed the Mapping Review, and all edits have been made, the aerial series should also be exported.

LFIM_[Fiscal Year]_[Levee Name]_[Scenario]_S_[Page Number].pdf (street view)

LFIM_[Fiscal Year]_[Levee Name]_[Scenario]_A_[Page Number].pdf (aerial view)

SECTION 6

Sheet Index Map Creation

The Sheet Index Map is a full-sized index for the entire study area. It consists of a main map data frame that shows the full extent of the study area and a locator map showing an even larger area. The map uses the same data sources as the Standard Sheets but is displayed at a different scale. The Sheet Index Map template file is included as 4.4.5_MMC_Sheet_Index.mxd.

6.1 SET DATA SOURCES

1. Open 4.4.5_MMC_Sheet_Index.mxd. The layers will have a red check mark next to them; indicating the computer is not able to find a layer in the expected location.
2. Reference each layer by either right clicking the layer name and choosing **Repair Data Source** or going to the layer properties dialog and under the **Source** tab, setting the data source.
3. Point the layer source to the correct feature class, either in a Corps-Map database or in the working geodatabase created earlier. The state and county lines should be used from the national data geodatabase to show data outside of the mapped extents.

6.2 SET DATA FRAME EXTENTS

Each of the data frames on the map need the extents set.

1. Right click on the Standard_Sheets layer and select Zoom to Layer, to zoom the data frame to the study extents.
2. Set a reference scale that displays all of the Standard_Sheets and some area outside of the Standard Sheets Grid. Each study dam will have a different reference scale depending on the number of sheets and size of study area.
3. Open the Data Frame Properties dialog box and under the “General” tab, paste the rotation value from the Standard_Sheets into the text box for rotation and change the coordinate system to the appropriate UTM for the study area.
4. For the locator map data frame, add an extent rectangle and zoom to the appropriate location of the study dam. Use the same coordinate system and rotation value as in the main data frame.
5. Set the reference scale so that the extent rectangle is in the center of the data frame. The “Index Extents” text should be pointing at the extent rectangle
6. In the locator map data frame, create annotation for State Line. Format for text is: Arial Narrow, size 14, black, bold, white halo 1 point.

6.3 SHEET INDEX MAP ANNOTATION

The required annotation for the Index Sheet Map can be found in Table 4 and more detail can be found in the MMC Graphics Specification Document. Annotation should be built at Sheet Index Map scale and stored in the working geodatabase.

1. Label the appropriate features in the index, following the description in Table 4 in the reference section and the Graphics Specifications.
2. Right click the current layer and select **Convert Labels to Annotation** making sure the correct reference scale is set for the index.

Annotation should be placed in an appropriate location without overlapping other important features. If possible, place annotation so that it does not overlap ESRI generated labels. In some instances, annotation will have to overlap ESRI generated labels, this is known and expected.

6.4 EXPORT TO PDF

Once the map is set up properly, export the map to the AtlasPages folder under the FullResolution folder.

Make sure all guides are turned off and selected features have been cleared before exporting to pdf.

1. Go to File → Export Map
2. Under the General tab, Use the default settings of 300 dpi, Normal resample ratio (1:3).
3. Under the Format tab, check 'Compress Vector Graphics' and 'Embed All Document Fonts' boxes. Set the Image Compression to 'None.'

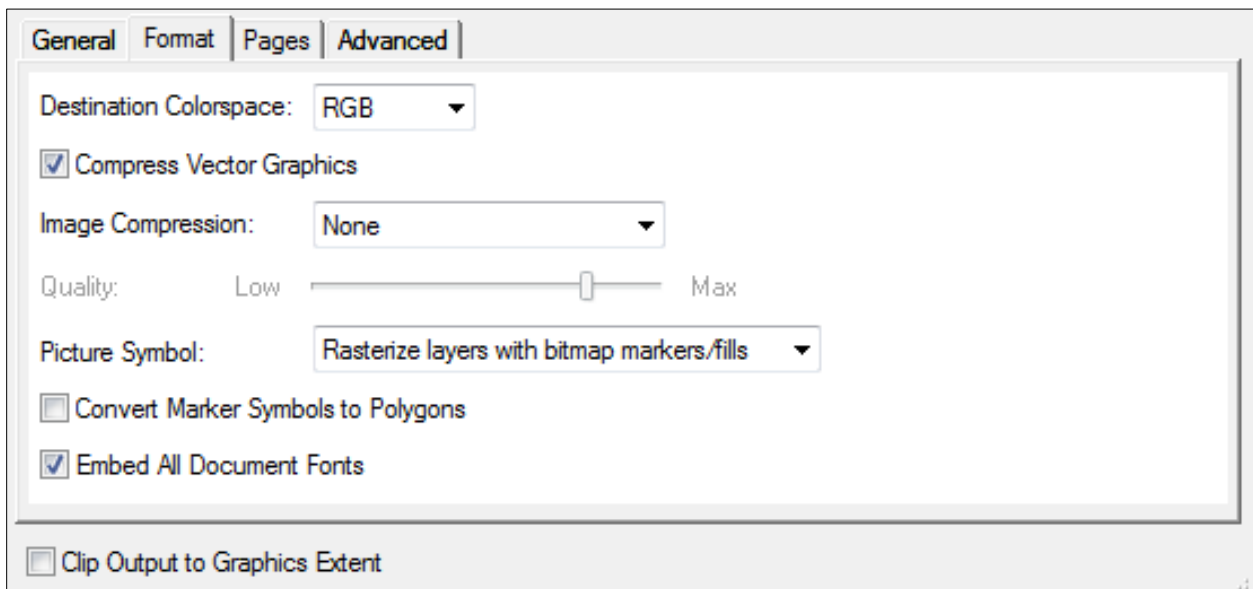


Figure 6-1. PDF Export Settings

Name the .pdf file:

LFIM_[Fiscal Year]_[Levee Name]_[Scenario Sheet]_Index.pdf

SECTION 7

Cover Page Set Up

The cover page will be standard for all study areas, with the information on the title block changing for each study area. The cover page will be provided to you and named 4.4.1_MMC_Cover_Page_Levee.pptx.

Appendix 4.1.7, MMC Map Graphics Specifications, shows an example of the cover page and title block. Follow the layout and format as described in the MMC Map Graphics Spec document.

1. Open the cover page template in MS PowerPoint, update the title block with the following information:
 - Levee Name
 - Map Series (Street or Aerial)
 - Scenario Name
 - Production Date (Month and Year when map product is ready for 50 percent internal review)
 - Levee ID
 - Levee Owner name, two lines
U.S. Army Corps of Engineers
Kansas City District
2. After the title block information has been edited, print the cover page to a pdf file.

Name the .pdf file:

LFIM_[Fiscal Year]_[Levee Name]_[Scenario]_Cover_Page_Street.pdf

or

LFIM_[Fiscal Year]_[Levee Name]_[Scenario]_Cover_Page_Aerial.pdf

SECTION 8

Map Notes Pages

The Map Notes Pages are standard for all study areas and will be provided to you as 4.4.2_MMC_MapNotesI_Levee.mxd and 4.4.3_MMC_MapNotesII_Levee.mxd.

Map Notes I:

1. Modify the arrival time and depth legend as needed for your study.
2. Save the .mxd file for the specific study area.
3. Export the Notes Pages to a .pdf file. Make sure all guides are turned off and selected features have been cleared before exporting to pdf.
4. Name the pdf file: LFIM_[Fiscal Year]_[Levee Name]_[Scenario]_MapNotesI.pdf

Map Notes II:

1. Use the .mxd template and the 4.4.7_MapNotes2_Tables_Study_Levee.xlsx to create the map notes II page. Information can be found in the modeling report.
The tables will need to be filled out using the Excel template and then copied and pasted into the Map Notes II page template as a picture.
Typically, only the scenarios being mapped will need to be displayed in the chart.
2. Add screen shots or other illustrations can be added to the page as needed:
Insert any notes that are specific to the study area being mapped.
Delete any of the template text if you do not use the text elements for your notes.
3. Insert any supporting graphics needed for the notes.
4. Save the .mxd file for the specific study area.
5. From the File menu, select print and choose the printer named Adobe PDF.
6. Click on the Properties button. In the Layout tab, set the layout to Landscape.
7. Set the output page size to Tabloid (11 by 17 inch). Save the pdf in the AtlasPages folder under the FullResolution folder.
8. Name the pdf file: LFIM_[Fiscal Year]_[Levee Name]_[Scenario]_MapNotesII.pdf

SECTION 9

PDF Inundation Atlas Creation

9.1 BUILDING INUNDATION ATLASES

1. Consolidate the exported PDF maps to include:

- Cover Page
- Notes I
- Notes II
- Sheet Index
- All study scenario maps for a breach location

2. Save the Inundation Atlases with names similar to the format of:

LFIM_[Fiscal Year]_[Levee Name]_[Breach Location]_A_DIGITAL_Atlas.pdf

A digital hard copy of the aerial inundation atlas

LFIM_[Fiscal Year]_[Levee Name]_[Breach Location]_S_DIGITAL_Atlas.pdf

A digital hard copy of the street inundation atlas

9.2 OPTIMIZING PDF FILES

1. Use Adobe Acrobat Pro to create reduced sized PDFs. Save the optimized PDFs with the same names in a new folder.

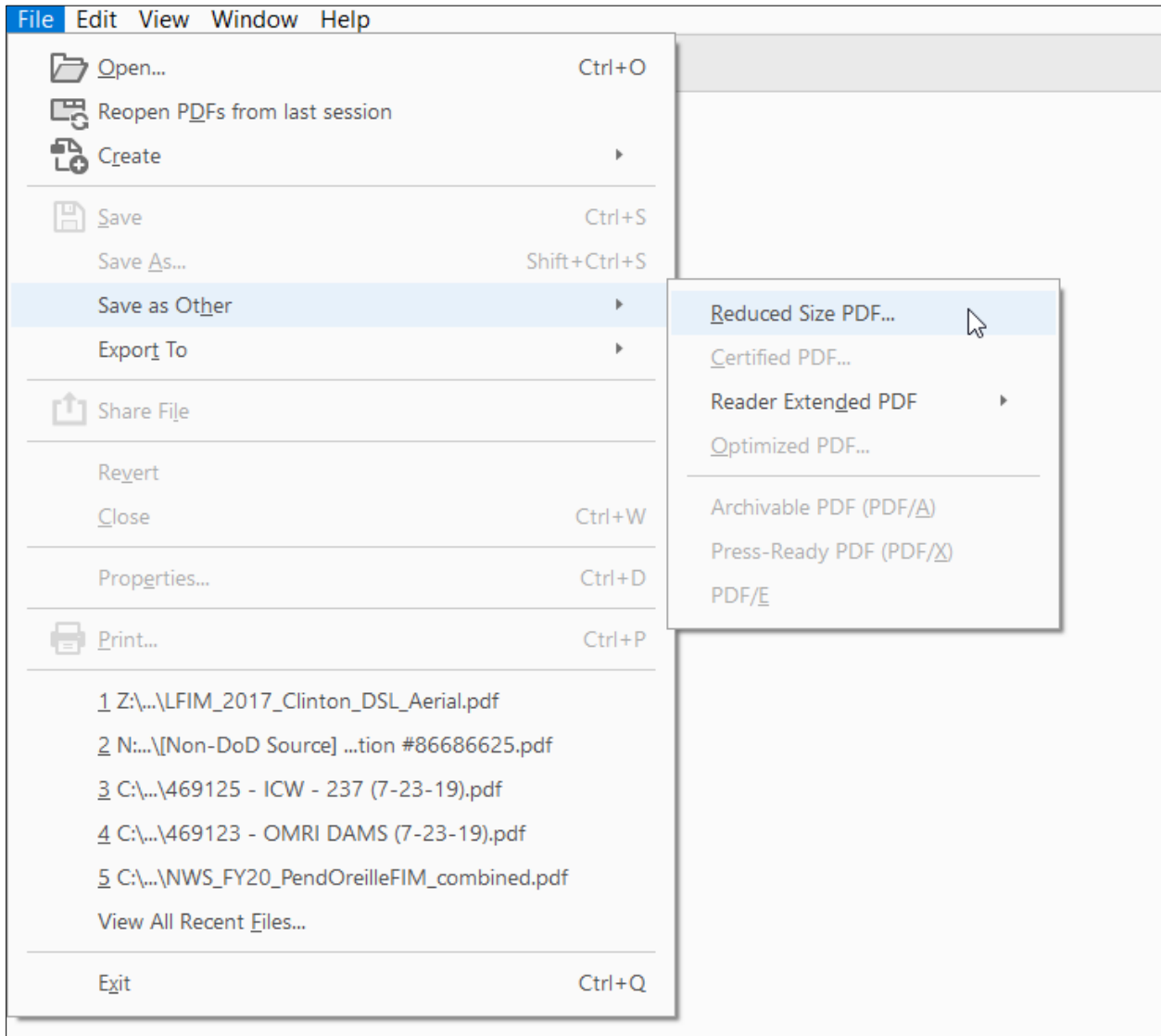


Figure 9-1. Optimization

2. Verify that files have been optimized by comparing the file sizes of the original pdfs to the newly created pdfs. The original file sizes will be approximately 25,000–30,000 KB while the new file sizes should be approximately 500–1,500 KB.

SECTION 10

Mapping Reviews

The mapping products produced for the MMC are reviewed at two levels within the MMC program and optionally outside the program. The Initial review is an internal GIS/Mapping team review. An assigned member of the GIS/Mapping team will review all products at this point. The Modeler review is an H&H review by a member of the MMC H&H team as assigned. Refer to Appendix 4.3.7, MMC Mapping Review Guide, for details on the review process. Below are the descriptions of the mapping products at the review milestones.

10.1 INTERNAL MAP REVIEW

Each mapping team should conduct an internal review by another MMC mapper in the district before maps are sent for the further review.

Map Review 1:

Optimized digital street view atlas should be uploaded to the “MMC Maps for Review” section of the SharePoint site.

A review will be conducted and the reviewed pdf file and review checklist will be returned to the mapping team through the SharePoint site.

The GIS/Mapping team member will address all comments.

Map Review 2:

Updated optimized digital street view atlas should be uploaded to the “MMC Maps for Review” section of the SharePoint site.

A review will be conducted to verify all edits were completed from the first map review and no new edits are required. The completed review checklist will be returned to the mapping team by e-mail with the request for the shipment of all mapping data.

The completed review checklist should be saved in the Mapping subfolder under the Review folder.

Final data should be shipped on an external hard drive to the Kansas City District for storage.

MMC Review:

An optional review may be completed by any member of the MMC production center, MMC customer, or member of the MMC Steering Committee. This review will be on an as-requested basis, not initiated by the GIS/Mapping team. The GIS/Mapping team lead will deliver the entire study area file structure to the reviewer and any comments received in return will be addressed by an assigned member of the GIS/Mapping team.

SECTION 11

Printing Requirements

11.1 PRINTING

When printed and assembled the Inundation Atlas will have a final size of 11 by 17 inches. Most pages in the Inundation Atlas will be printed on 11 by 17-inch paper, but some pages will be printed on larger paper and folded to fit the 11 by 17-inch book.

The final MMC Map Product will be assembled with the following format:

- Map Cover Page
- Map Notes Page
- Sheet Index Map
- Standard Sheets and Detail Sheets as per study area

11.2 GENERAL PRINTING REQUIREMENTS

Most pages will be printed on 11 by 17-inch paper, using double sided printing.

From the combined Inundation Atlas .pdf file you created, print the .pdf file using double sided printing.

SECTION 12

Inundation Atlas Hard Copy Map Product Assembly

The Inundation Atlas is an 11 by 17-inch bound book. The printed pages will be assembled in the following order:

- Map Cover Page
- 2 Map Notes Pages
- Sheet Index Map
- Standard Sheets and Detail Sheets as per study area

A clear overlay will be on top of the Map Cover Page and a black cardstock backing will be added in the binding process.

Please see the provided hard copy sample for better understanding of the layout of the map product. More information on the binding process will be provided at a later date.

SECTION 13

Reference

Table 13-1. Linked Text

Text Element	Standard_Sheets Field	Location
Sheet No.	Page_Nmbr	Title Block
Left Joins Tab	West_Pg	Sheet
Top Joins Tab	North_Pg	Sheet
Bottom Joins Tab	South_Pg	Sheet
Right Joins Tab	East_Pg	Sheet
USNG Grid Zone	USNG_GZD	Above Scale Bar

Table 13-2. Annotation

Source Layer	Annotation FC Name	Map Scale	Font	Size	Color	Format	Special	Notes
Counties	Cnty_S_Anno	Standard Sheet	Arial Narrow	14	Black	Bold	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	Parallel to county line *If table provides name only add "County" to text
Countries	Cntr_S_Anno	Standard Sheet	Arial Black	14	Black	Normal	White Halo 2 pt	Parallel to line
States	St_S_Anno	Standard Sheet	Arial Narrow	14	Black	Bold	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	Parallel to state line All Caps
USACE Dams	NID_S_Anno	Standard Sheet	Arial	11	Mars Red	Italics	White Halo 1 pt	All Caps
Non USACE Dams	NID_S_Anno	Standard Sheet	Arial	11	Cherrywood Brown	Italics	White Halo 1 pt	All Caps
Municipalities\Cities	City_S_Anno	Standard Sheet	Arial Black	12	Black	Italics	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	
Counties	Cnty_D_Anno	Detail Sheet	Arial Narrow	14	Black	Bold	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	Parallel to county line *If table provides name only add "County" to text
Countries	Cntr_D_Anno	Detail Sheet	Arial Black	14	Black	Normal	White Halo 2 pt	Parallel to line

Source Layer	Annotation FC Name	Map Scale	Font	Size	Color	Format	Special	Notes
States	St_D_Anno	Detail Sheet	Arial Narrow	14	Black	Bold	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	Parallel to state line All Caps
USACE Dams	NID_D_Anno	Detail Sheet	Arial	11	Mars Red	Italics	White Halo 1 pt	All Caps
Non USACE Dams	NID_Dams_D_Anno	Detail Sheet	Arial	11	Cherrywood Brown	Italics	White Halo 1 pt	All Caps
Municipalities\Cities	City_D_Anno	Detail Sheet	Arial Black	12	Black	Italics	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	
Counties	Cnty_I_Anno	Index	Arial Narrow	12	Black	Bold	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	Level
Countries	Cntr_I_Anno	Index	Arial Black	12	Black	Normal	White Halo 2 pt	Parallel to line
USACE Dams	USACE_Dams_I_Anno	Index	Arial	12	Mars Red	Italics	White Halo 1 pt	All Caps
Non USACE Dams	Non_USACE_Dams_I_Anno	Index	Arial	12	Cherrywood Brown	Italics	White Halo 1 pt	All Caps
States	St_I_Anno	Index	Arial Narrow	12	Black	Bold	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	Parallel to state line All Caps

Source Layer	Annotation FC Name	Map Scale	Font	Size	Color	Format	Special	Notes
Detail Sheet Number	Detail_I_Anno	Index	Arial	12	R0, G92, B230	Bold	White halo 1 pt	Black Outline 0.4 pt
Standard Sheet Number	Stand_I_Anno	Index	Arial	12	R255, G0, B0	Bold	White halo 1 pt	Black Outline 0.5 pt
States	St_L_Anno	Index Locator	Arial Narrow	10	Black	Bold	White Halo 1 pt Leader Line Width: 1.0 Pt Color: R0, G0, B0	Horizontal
Countries	Cntry_L_Anno	Index Locator	Arial Black	10	Black	Bold	White Halo 1 pt No leader	Parallel to Line