

# Automated Map Production (AMP) Best Practices

May 2021

## Document History

Affected Section	Date	Description
All	01/08/2021	First Public Draft of Best Practices Document
Map Body, Map Collar, FIRM Panel Production – General	03/04/2021	Map Body - Road Labels Section Added; Map Collar - Levee Notes Section Updated; FIRM Panel Production – General – Printed Panels Section Updated
Map Body	03/25/2021	Levees Section Updated
Map Body	04/02/2021	General Section Updated; FIRM Index Section Updated
Map Body	05/27/2021	Floodway Map Body Notes Section Added

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## Introduction

The incorporation of Automated Map Production (AMP) will cease all offline manual production of Flood Insurance Rate Maps (FIRM) panels in the Mapping Information Platform (MIP) for FY20 and later projects, and for any earlier projects opting into automated FIRM production. AMP will generate FIRM panels at all life stages where complete FIRM Databases (DB) are submitted: Draft, Preliminary, and Final.

Please note that AMP is not compatible with FIRM Databases using the 2003 Appendix L specifications. Projects with FIRM Databases that utilize 2003 Appendix L specifications should not opt into automated FIRM production.

## Map Body

### General

- For features to appear on AMP generated FIRM panels, they must appear in the FIRM DB.
- For features to be labeled, the correct field used for labeling must be populated with a non-null value.
- For more information on labeling specifications for certain features please see the sections below.
- Large features will only be labeled once. For example, a long profile base line that runs from the top of the FIRM panel down to the bottom will have one stream name label.

### Base Map

- Base Map information imagery will be displayed on the FIRM from the USGS national map. The base map information (source and date) will be displayed in the map frame in the Note to User. Please double check to ensure inclusion of the imagery and note on each panel.

### Hydraulic Structures

- AMP will only render and label S\_Gen\_Struct features that have the SHOWN\_FIRM field selected as true ("T") or null ("U"). AMP will not render and label structures if false ("F") is populated in the field.
- The following STRUCT\_TYP values are displayed with a dashed line symbol and without a label:
  - CHANNEL
  - CULVERT
  - STORM SEWER
  - AQUEDUCT
- The following STRUCT\_TYP values are displayed with a dashed line and labeled with a leader line to the feature with the exact text from the STRUCT\_TYP field. These will render and label with the graphic specifications set in the [FIRM Graphics Technical Reference](#):
  - 1-PERCENT-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN STRUCTURE
  - 0.2-PERCENT-ANNUAL-CHANCE FLOOD DISCHARGE CONTAINED IN STRUCTURE
  - FLOODWAY CONTAINED IN STRUCTURE
- BRIDGE has its own symbol in the FIRM Graphics Technical Reference and is only labeled if it has a non-null STRUCT\_NM field.
  - The structure name will be labeled on the map and have a leader line to the feature using the font specifications listed in the FIRM Graphics Technical Reference.

- Rendering and labeling of remaining STRUCT\_TYP values not listed above:
  - These STRUCT\_TYP values will be displayed with a solid line as specified in the FIRM Graphics Technical Reference. This is not only limited to those structure type values listed in the FIRM Graphic Technical Reference. They will be labeled with either a non-null STRUCT\_NM value, or if the structure name is null the designated structure type value will be used for the label verbatim.

## Water Lines

- Water line features and labels will only display on the map if the SHOWN\_FIRM field in the S\_Wtr\_Ln table is populated with “T”.
- If there are already Profile Baselines in the same location, or if the streamline is not a flood feature that should be labeled, these features should be attributed as SHOWN\_FIRM= “F” or “U” to avoid map clutter unless necessary.

## Levees

- Levees will not be labeled by the AMP system. An update to the FIRM Panel Technical Reference is currently pending.

## Boundaries and Political Areas

- Political Area labels in the S\_Pol\_Ar table will appear exactly as they do in the FIRM DB and will be the same in the FIRM Panel Title Block, i.e., spelling and sequence (e.g. City of Cleveland).
  - AMP will not handle alphabetization of community names in the title block; however, community names will be listed in the order they are provided in the S\_Pol\_Ar table.
    - The order is based off the POL\_NAME1 field.

## Zone Labels

### Special Flood Hazard Area (SFHA) Polygons

- AE Polygons with null static Base Flood Elevation (BFE) that are alongside floodways will not be labeled if the AE polygon has a null flood zone type.
  - A note will appear on the FIRM panel collar explaining that some elevations may be present on an adjacent panel.

### Flood Zone Polygons

- Open water areas of SFHA must appear in the FIRM DB to be labeled on AMP generated FIRM panels. AMP cannot render and label flood zones that are not present in the FIRM DB.
  - Political area data and open water data must be shown together as per the topology rules in the FIRM Database Technical Reference.

### Base Flood Elevations (BFE)

- Base Flood Elevations will only appear on AMP FIRM when BFE lines and static values are in the FIRM DB. If there is a small flood zone polygon that production teams’ users would prefer to have a BFE line or label, the line or label must appear in the FIRM DB.
  - A BFE line feature added to accomplish the communication of elevation in an SFHA polygon must carry over into the adjacent panel if it runs to the edge of the panel.
    - Do not overlap existing BFE or XS lines on the adjacent panel.

- In addition to existing FIRM panel guidance to limit elevation line features to four or less cross sections and/or BFE lines per 1 inch of map panel distance, users should edit line drawing direction as needed if an AMP-generated panel has labeling clutter that can be avoided.
  - S\_BFE features will label the ELEV value on the line if the line is long enough to fit the value's characters in the label based on the font type and size and if the label will not overprint SFHA boundaries. If either of the requirements are not met, it will label at the beginning or end of the line to avoid overprints with other features and labels.

## PLSS Labeling

- Public Land Survey System (PLSS) labeling in AMP will only use section numbers, and where section numbers are blank there will not be a label.

## Cross-Sections (XS)

- AMP will print cross-section elevations verbatim from the FIRM DB S\_XS table WSEL\_REG (Water Surface Elevation) field. Mapped cross-section elevations should be rounded to the tenth of a foot as per the FIRM Database Technical Reference.
- Additional mapped S\_XS feature labeling logic is divided into two categories:
  - Null XS\_LTR\_ID (Non-Lettered Cross Sections) values:
    - Mapped XS features with null XS\_LTR\_ID values will label the WSEL\_REG on the cross-section line if the line is long enough to fit the elevation value's characters in the label, and with consideration of the font type and size and if the label will not overprint SFHA boundaries. If either of these location requirements are not met, the elevation will label at the beginning of the line to avoid overprints with other features and labels.
      - (Note: Not all features are high enough priority to warrant conflict avoidance.)
    - If both ends of the XS line run beyond the edge of the FIRM panel, or if the elevation label will overprint other features, the label will be leadered to the line.
      - The existing labeling code will not allow for leader location specification and the leader may overlap other XS lines, XS labels, and potentially point to less sensible locations on the line.
    - Users should draw their cross-section lines in a direction that best avoids label clutter if the option is available.
  - Non-Null XS\_LTR\_ID (Lettered Cross Sections) values
    - Mapped cross section features with non-null XS\_LTR\_ID values must label the WSEL\_REG and the XS\_LTR values. AMP will always label the XS\_LTR value at the end of the line.
    - The WSEL\_REG value will label on the cross-section line if the line is long enough to fit the value's characters in the label, with consideration to the font type and size and if the label will not overprint SFHA boundaries. If either of the location requirements are not met, the elevation will label on the side of the line opposite the XS\_LTR unless it cannot label there due to overprints with other feature and labels.

- (Note: Not all features are high enough priority to warrant conflict avoidance)
- If the elevation cannot be labeled at the end of line and avoid overprints, the label will be leadered to the line.
- If both ends of the XS line run beyond the edge of the FIRM panel, or if the elevation label will overprint other features, the elevation label will be leadered to the line.
  - The existing labeling code will not allow for leader location specification and the leader may overlap other XS lines, XS labels, and potentially point to less sensible locations on the line.

## Road Labels

- AMP will only label S\_Trnsport\_Ln features with a ROUTE\_TYP of “Interstate”, “US Highway”, “State Highway”, or “County Road”.
- ROUTENUM will be used if the ROUTENUM is non-null. Otherwise, no label will appear.
- AMP will not use FULLNAME to label S\_Trnsport\_Ln. It will only use ROUTENUM.

## Floodway Map Body Notes

- The inclusion of Colorado River Floodway Zone subtypes will result in the Colorado River Floodway Map Body Notes appearing in AMP FIRM. No other special Floodway Zone Subtypes will result in Map Body Notes appearing in AMP FIRM.

## Map Collar

### Title Block

- Political Area/Community Name values will be shown verbatim in the title block as they are in the S\_Pol\_Ar table (e.g., “City of Cleveland”). Please populate this table with complete names in order to have complete labels in the FIRM Map Body and Title Block.
  - Ex. Putting “NC” in the state name field will produce “NC” on the FIRM panel, instead of “North Carolina”.
- Alphabetization of political area records will not be completed automatically in the title block. However, the list of political area/community names in the title block will populate based on the order they appear in the S\_Pol\_Ar table. Therefore, if the records in the S\_Pol\_Ar table are delivered in alphabetical order, they will populate that way in the Title Block.
  - The political area names displayed in the Title Block are derived from the POL\_NAME1 and POL\_NAME2 fields in the S\_Pol\_Ar table.
- AMP will no longer generate the “Panel of...” Note in the top of the Title Block (e.g., “Panel 375 of 450”).
- AMP will not label the Version ID in the FIRM Title Block. AMP will only export panels at the latest graphic specifications. It will not export FIRM to previous versions of graphic specifications.



## Panel Number

- The alphanumeric value printed in the FIRM Title Block and used to name the exported FIRM panel file is generated directly from the S\_FIRM\_Pan table's FIRM\_PAN field without change.
  - For example, a FIRM\_PAN value of 12345C0001B will be placed into the Title Block and filename verbatim.

## Dates

- Draft FIRM panels and Draft FIRM Indexes will be labeled with the date that the panel or index was generated by AMP in the bottom of the Title Block.
- Preliminary FIRM panels and Preliminary FIRM Indexes will use the highest non-null PRE\_DATE field value in the S\_FIRM\_Pan table to label a Preliminary Issue Date in the bottom of the Title Block.
- Final FIRM panels and Final FIRM Indexes will use the highest non-null EFF\_DATE field value in the S\_FIRM\_Pan table under the "Effective Date" section of the title block.
  - Note: The title block will never have "Map Revised" text.

## Study Info Table

- The following fields from the STUDY\_INFO table are used in generating the Flood Risk Project Area Name in the Title Block and the display logic is as follows:

Flood Risk Project Area Name = STUDY\_NM + STUDY\_PRE + CNTY\_NM + JURIS\_TYP

- Additional Rules:
  - STUDY\_PRE is only included if it is not blank.
  - CNTY\_NM is only included if it does not equal STUDY\_NM or STUDY\_PRE, the word 'COUNTY' is not found in STUDY\_PRE and CNTY\_NM, and CNTY\_NM is not blank.
  - JURIS\_TYP is only included if it does not equal CNTY\_NM and is not blank.
  - All STUDY\_INFO text is automatically converted to upper case for displaying in the Title Block.

## Note to Users

### Breakout Panel Notes

- AMP does not generate Breakout Panel Notes (also known as "See Panel" notes) on FIRMs when a larger scale panel will cover an area within a smaller scale panel. Instead, FIRM end-users should utilize the Panel Locator Diagrams to locate the FIRM panel that contains the area of interest.

### Levees

- Accredited Levee and Provisionally Accredited Levee Notes will display in the Map Body and the Map Collar when a flood zone polygon that has a reduced risk due to levee appears in the Map Body and the subtype designates if the levee is accredited or provisionally accredited.

- Users must select the correct protected by levee flood zone subtype as found in the [Domain Tables Technical Reference](#) (November 2020 or later) to communicate levee accreditation status to AMP for the creation of these notes.
- The date for the provisionally accredited Map Collar note will be acquired from the levee line that intersects the flood polygon designated as having a reduced risk due to the levee system.
  - The polygon will be buffered by 50 feet to find an intersecting levee line feature with a non-null Provisional Accreditation Date.
- A levee line appearing in the Map Body that is not attributed as accredited or provisionally accredited will trigger the display of a note in the Map Collar that notes that the levee is not accredited or has been de-accredited.
  - Flood zone polygons with zone subtypes other than accredited and provisionally accredited will not trigger map body or Map Collar notes.

## Vertical Datum

- AMP will use the vertical datum in the STUDY\_INFO table and will print only this value in the Map Collar note. AMP will not recognize if multiple vertical datums are used for elevation features appearing in the FIRM database.

## FIRM Index

- To create a full index for the entire county (or community/city) users must submit a complete S\_FIRM\_Pan table regardless of the scope or coverage of the PMR/project.
- The FIRM Index has two political area fill symbols, darker gray for incorporated areas and lighter gray for “Unincorporated” Areas. AMP will display a political area with lighter gray only if it detects “Unincorporated” in the POL\_NAME2 field of the S\_Pol\_Ar table.
- The letter suffix for the Index(s) will be selected from the highest letter suffix from the FIRM panels that AMP generates.
  - For example, if the panels printed from AMP have letter suffixes “J”, “K”, “L”, the Index will be given a suffix of “L”. This “L” suffix will appear in the title block of every sheet of the Index (e.g. Sheet 2 of 3) and in the filename for the Index(s) exported by AMP to the MIP.
- The FIRM Index will be labeled with dates in the map body of the Index as follows:
  - Draft Index(s) will have FIRM panel features in the map body labeled with non-null EFF\_DATE values in S\_FIRM\_Pan.
  - Preliminary Index(s) will have FIRM panel features in the map body labeled with either a non-null PRE\_DATE or non-null EFF\_DATE values in S\_FIRM\_Pan.
  - Final Index(s) will have FIRM panel features in the map body labeled with non-null EFF\_DATE values in S\_FIRM\_Pan.

## FIRM Panel Production - General

### Printed Panels

- Draft FIRM Panels - AMP will use the PRE\_DATE and EFF\_DATE fields in the S\_FIRM\_Pan table of the Draft FIRM DB to determine which panels will be printed.
  - AMP will only print FIRM features for records that contain the acceptable null value in both the PRE\_DATE and EFF\_DATE fields.

- AMP will not print FIRM Panels that have a PNP\_REASON listed in the S\_FIRM\_Pan table.
- Preliminary FIRM Panels - AMP will use the PRE\_DATE field in the S\_FIRM\_Pan table of the Preliminary FIRM DB to determine which panels will be printed.
  - AMP requires this field be populated with a Preliminary Issue date or the acceptable null value for a date field.
  - AMP will not print FIRM features with the acceptable null value in this field.
  - AMP will only print panels with the highest non-null value PRE\_DATE.
  - AMP will not print FIRM Panels that have a non-null PNP\_REASON listed in the S\_FIRM\_Pan table.
- Final FIRM Panels - AMP will use the EFF\_DATE field in the S\_FIRM\_Pan table of the Final FIRM DB to determine which panels will be printed.
  - AMP requires this field be populated with an Effective Date.
  - AMP will not print FIRM features with the acceptable null value in this field.
  - AMP will only print panels with the highest non-null value.
  - AMP will not print FIRM Panels that have a non-null PNP\_REASON listed in the S\_FIRM\_Pan table.

## Worldfiles

- AMP will produce .PNG panel exports from the Final FIRM DB. However, please note that AMP will not create an accompanying worldfile (.PGW) as part of the initial AMP deployment. Final FIRM DB will be made available on the Map Service Center (MSC) where the shapefiles can be downloaded and viewed for geospatial orientation of the FIRM panels AMP produces.

## Base Index Table (S\_Base\_Index)

- AMP will be using base map imagery provided by the USGS National Map instead of provider-submitted data, therefore, the base index table (S\_Base\_Index) is optional for AMP users for all FIRM DB submissions.
  - If this data is uploaded to the MIP it will not be used by AMP to generate FIRM panels.

## Status of AMP-Generated Panels

- AMP will begin to produce FIRM panels automatically after DVT has passed. To check the status of panel creation, users can navigate to File Explorer and search for a file titled 'AMP\_Generation\_Status.txt' in the RFIRM folder for the purchase that the FIRM Database was loaded to. This text file will update dynamically with messages informing the user of the status of AMP. By opening this file, users can confirm that AMP has started running, if any FIRM panels failed to print (and if so, which ones), and see when AMP has finished generating panels.
  - Note: If there is no RFIRM folder, and no .TXT File, AMP has NOT started FIRM panel production and the submission is likely still in queue.

## Reviewing AMP Outputs

### Cross-Section Lines and Labels

- AMP reviewers must ensure that they have clear and distinct end points for mapped cross-section lines. Make sure that the cross-section water surface elevation labeling is clear to end users and that one label doesn't appear to be labeled for two or more adjacent cross-sections.
  - AMP will label cross section elevations off the line with a leader line pointing to the feature when the label will not fit on the line, or if the label would overprint on an SFHA boundary when labeling on the line.
  - Follow the above labeling logic to determine how best to create the cross-section lines in the FIRM DB to avoid labeling clutter on the FIRM.

### Opt-in to AMP for FY19 and Earlier Projects

MIP Users will be required to use AMP for any task (Draft FIRM DB Capture, Preliminary Products Data Capture, Final Mapping Data Capture) in a project that was created in FY20 or later. However, for projects created FY19 and earlier users will be provided an option to opt-in or out of AMP FIRM creation from the uploaded FIRM database:

- For FY19 and earlier projects, while working on any of the tasks listed above, users will see a Yes/No selection to "Use Automated Map Production" just below the FIRM DB schema selection and just above the 'Run Validation' button.
  - AMP will not be triggered if 'No' is selected and will not produce panels. Users should upload their own RFIRM folder containing manually generated panels, as is the current process.
  - AMP will be triggered if 'Yes' is selected and will produce panels based on the uploaded FIRM DB. Please note that AMP will overwrite the contents of a user uploaded RFIRM folder if AMP is run.

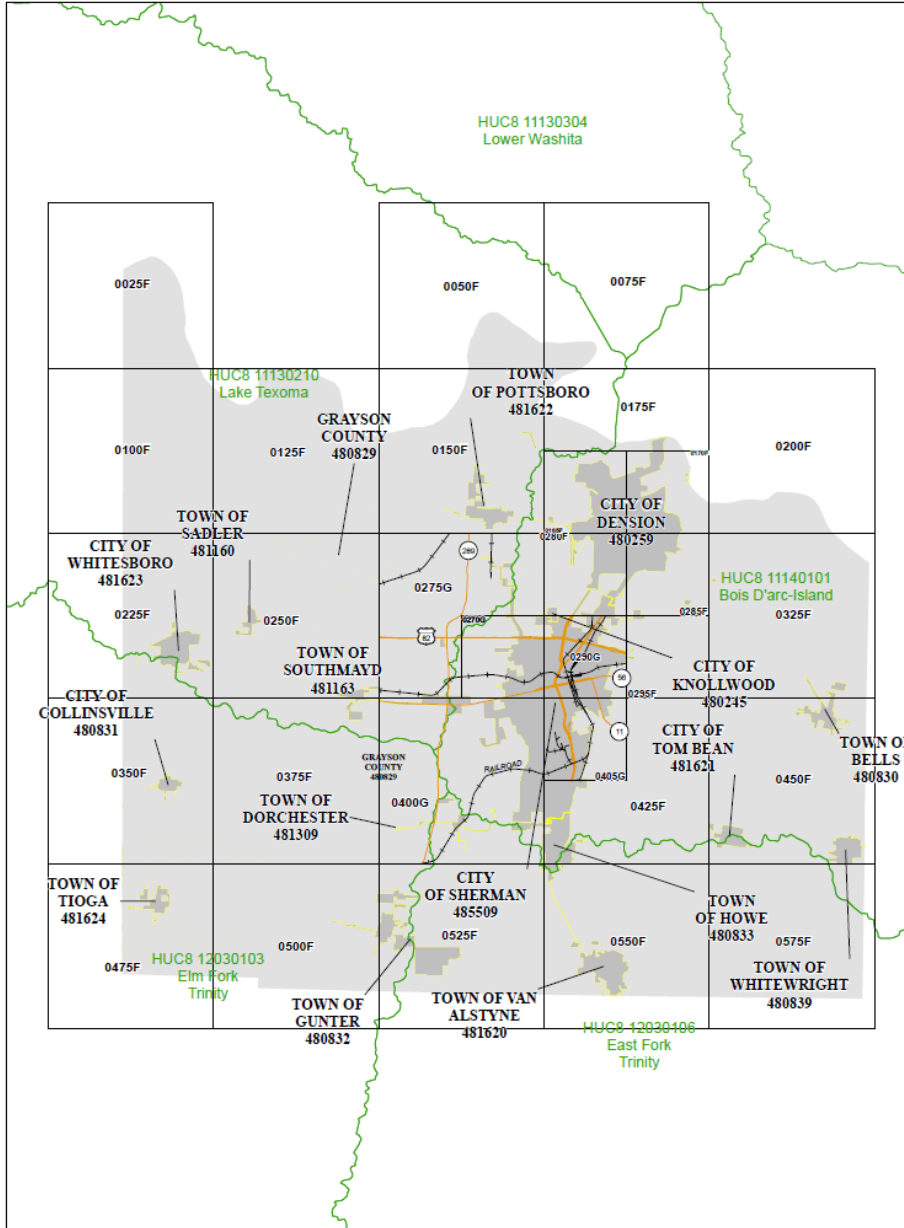
### Preliminary Products Data Capture Validation with AMP

- For all projects FY20 or later and for pre-FY20 projects where users have opted into AMP, the MIP will no longer validate that an RFIRM folder has been populated with FIRM and a FIRM Index for Preliminary data capture. AMP will now automatically populate that folder.
  - The MIP will still validate that a FIS folder and contents have been uploaded to the MIP.
- For FY19 and earlier projects where users have opted out of AMP, validation for the Preliminary Products Data Capture task will continue to require users to upload FIRM Panels, FIRM Index, and FIS report and require a passing status before metadata validation and DVT will be triggered.





# AMP-Generated FIRM Index Sample



1 inch = 26,100 feet 1:261,000
   
 Map Projection: GCS WGS 1984
   
 Vertical Datum: NAVD88
   
 THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTPS://MSC.FEMA.GOV](https://MSC.FEMA.GOV)
  
 SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

**NATIONAL FLOOD INSURANCE PROGRAM**
  
 FLOOD INSURANCE RATE MAP INDEX
   
 GRAYSON COUNTY, TEXAS And Incorporated Areas

PANELS PRINTED:
   
 0025, 0050, 0075, 0100, 0125, 0150, 0165, 0170, 0175, 0200, 0225, 0250, 0270, 0275, 0280, 0285, 0290,
   
 0295, 0325, 0350, 0375, 0400, 0405, 0425, 0450, 0475, 0500, 0525, 0550, 0575

**FEMA**
  
 MAP NUMBER
   
 48181CIND1G
   
 PRELIMINARY
   
 06/30/2020