Guidance for Flood Risk Analysis and Mapping

Base Map and FIRM Panel Layout

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For Reference Only

November 2019

FEMA

Requirements for the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) Program are specified separately by statute, regulation, or FEMA policy (primarily the Standards for Flood Risk Analysis and Mapping). This document provides guidance to support the requirements and recommends approaches for effective and efficient implementation. Alternate approaches that comply with all requirements are acceptable.

For more information, please visit the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage (www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping). Copies of the Standards for Flood Risk Analysis and Mapping policy, related guidance, technical references, and other information about the guidelines and standards development process are all available here. You can also search directly by document title at www.fema.gov/library.

Document History

Affected Section or Subsection	Date	Description
Section 6.8	November 2019	This guidance has been revised to further clarify how suffixes are applied to printed and non-printed panels, particularly where FIRM panels are split as part of a Physical Map Revision.

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1.0 Introduction

This guidance supports the standards associated with the collection, development and quality control for base map data used and the development of the flood insurance rate map (FIRM) panel layout for Flood Risk Projects.

2.0 Definition

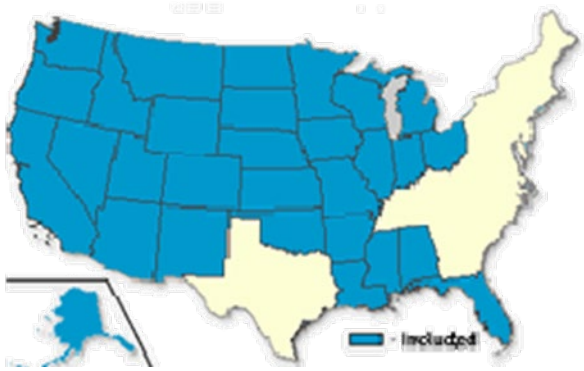
As it applies to Flood Risk Projects, a base map is defined as the planimetric, or horizontal representation, of map features that show geo-referenced locations, and contain attribute information (i.e., names) about the items. A base map does not include topographic or elevation data.

For a Flood Risk Project, the base map should include:

- Transportation features (e.g., road, railroad, etc.), including the feature names
- Hydrographic features (e.g., streams, lakes, etc.), including the feature names
- Hydraulic structures (e.g., levees, dams, floodwalls, etc.)
- Structures identified as levees should be captured as part of the base map. Those that do not meet the certification requirements in Section 65.10 of the National Flood Insurance Program Regulations should also be captured, but accompanied on the FIRM with a note about not providing protection from the 1-percent-annual-chance flood. Please refer to the Flood Insurance Rate Map (FIRM) Panel Technical Reference, Format for Flood Insurance Rate Maps, Guidelines and Standards for Flood Risk Analysis and Mapping, for more information about FIRM panel notes. The FIRM Panel Technical Reference is accessible through the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage.
- Jurisdictional boundaries (e.g., state, county, community, etc.), including the feature names
- Tribal boundaries, including the feature names
- Park, forest or Federal area boundaries, including feature names, if requested for the base map
- Public Land Survey System (PLSS) boundaries, also known as range, township and section lines, including applicable numbers, if located in a state with PLSS boundaries (Figure 1)

Figure 1: States included in the Public Land Survey System (PLSS)

Certain states only have portions covered by PLSS. Hawaii, which is not shown on the map, is not included in the PLSS. (U.S. Department of the Interior, 2006)



If attribute information (i.e., feature names) is not contained within the base map, sources such as the U.S. Geological Survey (USGS) Geographic Names Information System, U.S. Census Bureau Topologically Integrated Geographic Encoding and Referencing (TIGER) files, current FIRM panels, and/or other data sources should be utilized to obtain the missing information. Locally developed base map data (i.e., information created or obtained by local municipalities and jurisdictions) are generally more accurate than state or national level data sets. If local data can be obtained, it is recommended for use before state or national data.

Listed below are some additional base map data that can be collected if available. These data sets can be used with other aspects of Flood Risk Projects. These data can be less accurate than the data that serve as the starting point for the base map.

- Bridges
- Unimproved roads or trails (i.e., those travel ways not intended for motorized vehicles or not usually used by motorized vehicles due to width or seasonal conditions)
- Building footprints
- Parcel outlines or parcel centroids
- Address points

3.0 Characteristics

Most Flood Risk Projects require a base map to help users understand the location of flood hazard and other risks in relation to geographic features encountered in their communities.

The characteristics of base map data can vary among projects as long as the data fulfill the minimum role of a base map. At a minimum, the base map data should:

- Show sufficient ground features (e.g., roads, railroads and hydrography), to enable clear interpretation of the data displayed on the FIRM or other Flood Risk Products. Data created, updated, or checked within the last 7 years is preferred. A base map older than 7 years can be used if the area has not changed substantially since it was created, it provides reasonable reference information, and does not confuse map users.

- Have a horizontal radial accuracy (accuracy) better than or equal to 38 feet (11.58 meters) as measured using the National Standard for Spatial Data Accuracy (Federal Geographic Data Committee [FGDC], 1998a). Under the old National Map Accuracy Standard, this measure equates to maps of scales larger than or equal to 1:12,000.

- Have a horizontal datum of North American Datum of 1983 (NAD83).

- Be provided with permission from the source to allow FEMA to freely distribute the data and associated flood hazard information in hardcopy and digital formats with no restrictions. Distribution methods include, but are not limited to, incorporating an image of base map data on current flood maps, distributing digital base map data on media, distributing digital base map data online, and displaying digital base map data on the Web. FEMA also participates in interagency exchanges of base map data.

- Cover the entire project area and provide seamless coverage for all jurisdictions shown on the FIRM or other Flood Risk Products. The data should not have disconnects or missing features at boundary locations. For some projects conducted at the watershed level, it can be acceptable to develop tiled data coverage if the specific study areas are non-congruent. Cases such as this should be coordinated with the FEMA Project Officer before proceeding.

- Be provided with FGDC compliant metadata.

When working with communities or state agencies to obtain base map data, it is encouraged that all information be provided within 30 days of FEMA's request. If the request cannot be met within the time frame, alternative data sources should be evaluated.

Once a base map has been accepted, the locations of features in the data should be used "as is." Base map features from one source may be clipped where they meet those from another source. Graphical mismatches between communities, where roads or other features cross community boundaries, should be resolved.

4.0 Vector and Raster Options

Two of the most important features in the base map are the transportation and hydrographic features. These guide users to known locations and are often the most referenced features when it comes to discussing hazard locations. Two types of geospatial data can be utilized to represent these features: vector data or raster data.

Vector data use lines to depict geographic features. To use vector base map data for a Flood Risk Project, it should depict transportation features (e.g., roads, railroads, major airports, etc.), hydrographic features (e.g., streams, rivers, lakes, etc.), and boundaries (e.g., state limits, county limits, corporate limits, military lands, tribal lands, etc.). If the location of the Flood Risk Project is in a state (Figure 1) that uses PLSS, those features should also be depicted as part of the base map.

For vector base maps, the Master Address File (MAF) / TIGER street centerline data should be the default source. These data should be used as-is in regards to any stacked lines, used in cases where there are multiple names for a single feature. At the discretion of the FEMA Project Officer, data provided by the community may be substituted for MAF/TIGER data.

Raster data use a picture to depict geographic features. The typical raster base map is a digital orthoimage. Orthoimages depict the location of features using aerial photographs, which are orthorectified so that positions on the image are accurately georeferenced to true ground locations taking into consideration the terrain. In order to use a raster base map for a Flood Risk Project, the orthoimagery must be georeferenced and orthorectified.

A raster base map can be used to display the location of transportation and hydrographic features; however, jurisdictional boundaries and other non-natural features may not be visible. If raster data are selected as the base map, additional vector data should also be gathered to display reference information on the FIRM panels or products. Examples of additional vector data include political and PLSS boundaries.

Vector base map data do not need to be collected for locations determined to be areas not included (ANI). For raster base map, the raster orthoimagery can be included for ANI areas.

Either vector or raster base map can be selected for a Flood Risk Project. To determine which, the preference of the community, the accuracy of the data, the availability of the data, and the degree of difficulty in using the proposed base map data should be taken into account. These criteria should be documented and supplied as part of the project correspondence. For additional guidance on base map submittal requirements, please refer to the base map section of the Data Capture Technical Reference, Guidelines and Standards for Flood Risk Analysis and Mapping. The Data Capture Technical Reference is accessible through the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage.

5.0 Orthoimagery

If raster is selected as the base map choice, there are certain criteria that should be met. Whenever possible, orthoimagery should be used as they are received, with little or no modification to the actual image. At a minimum, the raster base map should:

- Have a minimum resolution of 1-meter ground sample distance.
- Provide a clear view of features on the ground near areas of significant flood hazards. Leaf-off, cloud-free imagery is preferred, although the canopy of deciduous vegetation

and a small amount of cloud cover is tolerated if features near significant flood hazards are not obscured. Different spectral bands (such as near infrared) can be used if the resulting image provides a clear view of ground features.

At the request of state or local officials, portions of raster base maps can be blurred to restrict the visibility of sensitive areas or sites that are potential security concerns. These requests should be documented in the project correspondence and coordinated with the FEMA Project Officer. The blurred area should be limited as close as possible to the sensitive location to minimize the impacts to other parts of the FIRM panel.

Color orthoimagery is widely available and should be considered the first option if it meets the above criteria and provides the clearest option. If color imagery is not available, it is acceptable to use gray-scale imagery. If selected, it is recommended that orthoimagery have a minimum image radiometry of 256 gray levels.

Variations in tones between orthoimages are acceptable. If more than one image is included on a FIRM panel, lightening or darkening of individual images to balance tones is not required. However, adjustments that improve readability are acceptable provided they do not require significant effort.

Raster base maps may be updated to show new roads or other features that have changed since the data were produced by placing vector data on top of the orthoimages. Additionally, vector data that depict flooding sources may be shown on top of the orthoimagery to help clarify the hazard origins provided they do not conflict with profile baseline requirements in the FIRM Panel Technical Reference.

If the raster option is selected, these data can be contained in a single file or in tiled files. Tiling is not suggested for vector data because file sizes are small enough to be manageable.

Local communities often obtain orthoimagery specifically for their jurisdiction. These data can serve as the raster base map as long as the orthoimagery meets FEMA standards and is freely available. If suitable base map are not available from local communities, one-meter National Agricultural Imagery Program (NAIP) orthoimages or one-meter resolution Digital Orthophoto Quarter Quadrangles (DOQQs) from the USGS can be used. These orthoimages generally meet the minimum criteria for a base map. For additional guidance on obtaining raster base map data, please refer to the National and State Data Coordination Procedures available on FEMA's Mapping Information Platform (MIP). This lists sources of national data suitable for Flood Risk Projects. FEMA also maintains State Geospatial Data Coordination Procedures that list best practices for obtaining and using state and community data.

6.0 FIRM Panel Layout

The FIRM Panel layout including frame sizes and location of map elements is defined in the FIRM Panel Technical Reference. When the FIRM panel dimensions specified in the FIRM Panel Technical Reference cannot be matched because the map image sizes are larger due to far southern latitudes, a different system of measurement has been used, or other reasons that would make the use of ARCH D – sized paper not feasible, a different map size may be used at the discretion of the FEMA Project Officer. Examples include Puerto Rico (metric) and may include Hawaii, American Samoa, or other territories. If an alternative size is selected, all other map content not related to map format in the FIRM Panel Technical Reference must be adhered to.

The development of a FIRM panel layer often occurs as part of the base map preparation. The National Flood Hazard Layer (NFHL) should first be checked to determine if a FIRM panel layout already exists. If one does not exist, or the existing layout requires modification, the following guidance should be used.

6.1 Map Scale Selection

The scale to be used for the development of the FIRM should be determined before or during Flood Risk Project Discovery. Existing FIRM scales should be reviewed and, where appropriate, either the same map scales or a compatible map scale should be used for the new FIRMs. Existing small-scale FIRM panels should be remapped at larger scales where necessary to accommodate detailed floodplain mapping with narrow floodplains and/or floodways.

Map scales should be selected based on the density of information, width of floodplains, type of study (i.e., detailed, approximate), and scale of the previously prepared FIRM(s). The goal is for the flood hazard information depicted on the FIRM panel to be legible and clear at the chosen scale. If the flooding or the one-percent-annual-chance water surface elevations shown on the cross sections or Base Flood Elevation lines cannot be clearly read, then enlargement of the map to a different scale should be considered. However, it is not mandatory to show all areas of detailed flooding at 1”=500’ if the data are usable at 1”=1000’. If there are FEMA Regional preferences in map scale determination, these should also be taken into account.

In general, the map scale should not be smaller than that of the previously published FIRM. This means that if the map scale of the FIRM was previously 1”=1,000’ it may be changed to 1”=500’ in order to show the flood hazard information more clearly, but it should not be changed to 1”=2,000’.

6.2 Paneling / Tiling Scheme

The FIRM paneling scheme shall follow that used by the USGS for the 7.5-minute-series quadrangle, or subdivisions thereof depending on the scale of the FIRM. Map panels shown at 1”=2,000’ are to be tiled using the same neatlines as the corresponding USGS 7.5-minute-series quadrangles. Map panels shown at 1”=1,000’ are to be tiled using neatlines that correspond to USGS DOQs or 3.75-minute quarter-quadrangles. Map panels shown at 1”=500’ are to be tiled using neatlines that correspond to USGS 1.875-minute quarter-quarter-quadrangles.

Due to SHP file limitations, there should be no non-contiguous areas of a single panel. It may be necessary to adjust the paneling scheme to avoid this situation. Figure 2 below shows an example of non-contiguous areas of a 1”=2,000’ panel (panel 0050) that should be broken out and renumbered as shown in Figure 3.

If three-quarters of a smaller scale panel (1”=1000’) are broken out into larger scale panels (1”=500’), the fourth quadrant should also be broken out into the larger scale (1”=500’). Figure 4 below shows a 1”=1,000’ scale panel (panel 0005) that should be changed to 1”=500’ scale (panel 0004) as shown in Figure 5.

Figure 2: Panel Areas Should Not Be Non-Contiguous

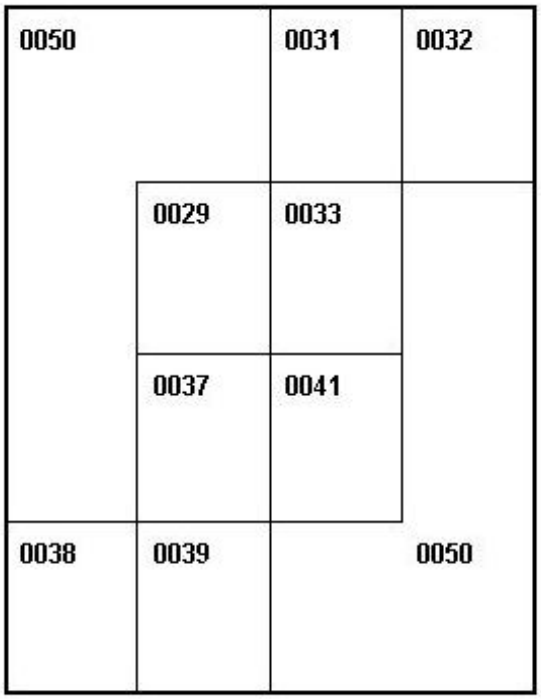


Figure 3: Correctly Broken Out Non-Contiguous Panel Areas

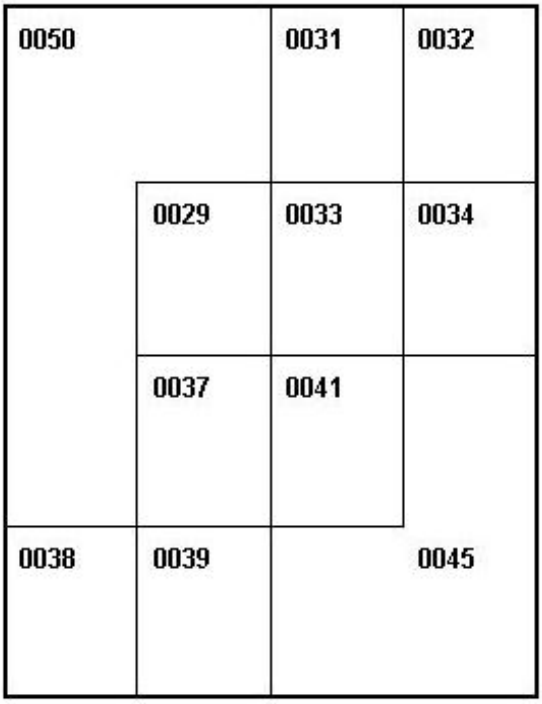


Figure 4: Break Out the Fourth Quadrant

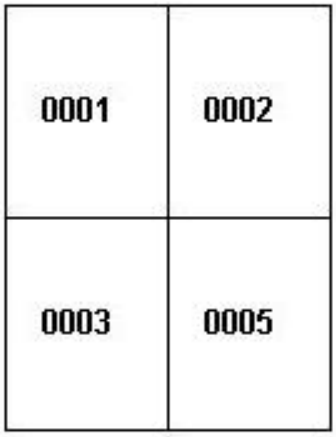
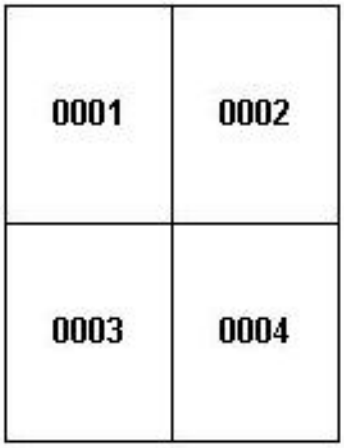


Figure 5: Correctly Broken Out Fourth Quadrant



6.3 North Orientation

All digital FIRMs must be oriented so that grid north points to the top of the map sheet. Older manual FIRMs may have been prepared with a different north orientation. Manual revisions to those panels may retain their existing north orientation.

6.4 Rotation

The FIRM data do not need to be rotated to align exactly to the map border. The slight tilt inherent in the data as the panels move farther away from the central meridian is acceptable.

6.5 Panel Numbering

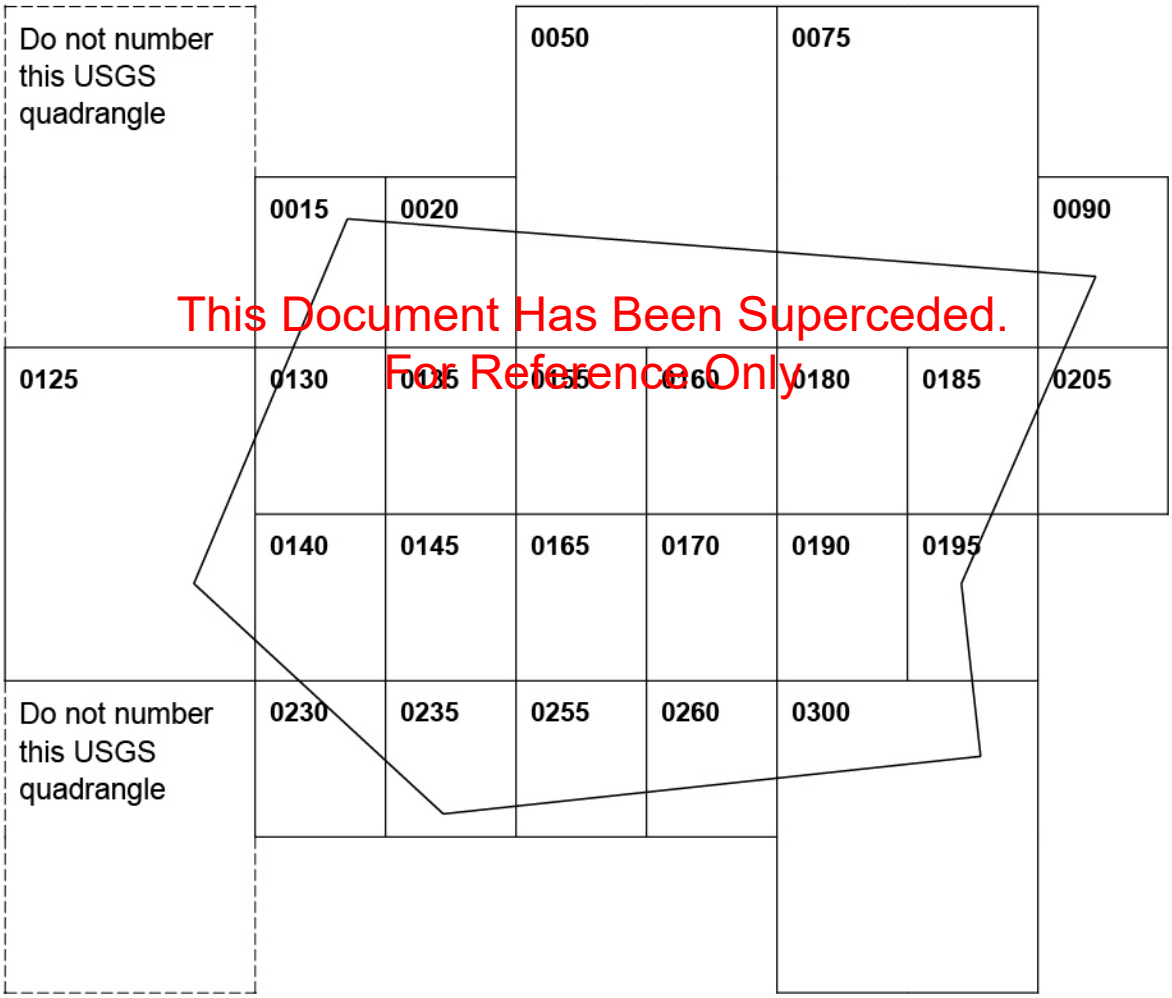
After the map scale(s) and layout for a jurisdiction have been established, the map panels are numbered. FIRMs use a panel numbering sequence that relates panel number to map scale. Panels shown at 1”=500’ use numbers divisible by 1; panels at 1”=1,000’ use numbers divisible by 5 (excluding those divisible by 25) and panels at 1”=2,000’ use numbers divisible by 25. Table 1 further illustrates the numbering sequence corresponding to the various map scales.

Table 1: Panel Numbering Sequence

Map Scale	Panel Numbers
1” = 500’	1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17, 18, etc.
1” = 1,000’	5, 10, 15, 20, 30, 35, 40, 45, 55, 60, 65, 70, etc.
1” = 2,000’	25, 50, 75, 100, 125, 150, 175, 200, 225, 250, etc.

As shown in Figure 6 below, panel numbering should not be applied to any fully non-printed USGS 7.5-minute quad areas.

Figure 6: Do Not Number Non-Printed USGS Quads



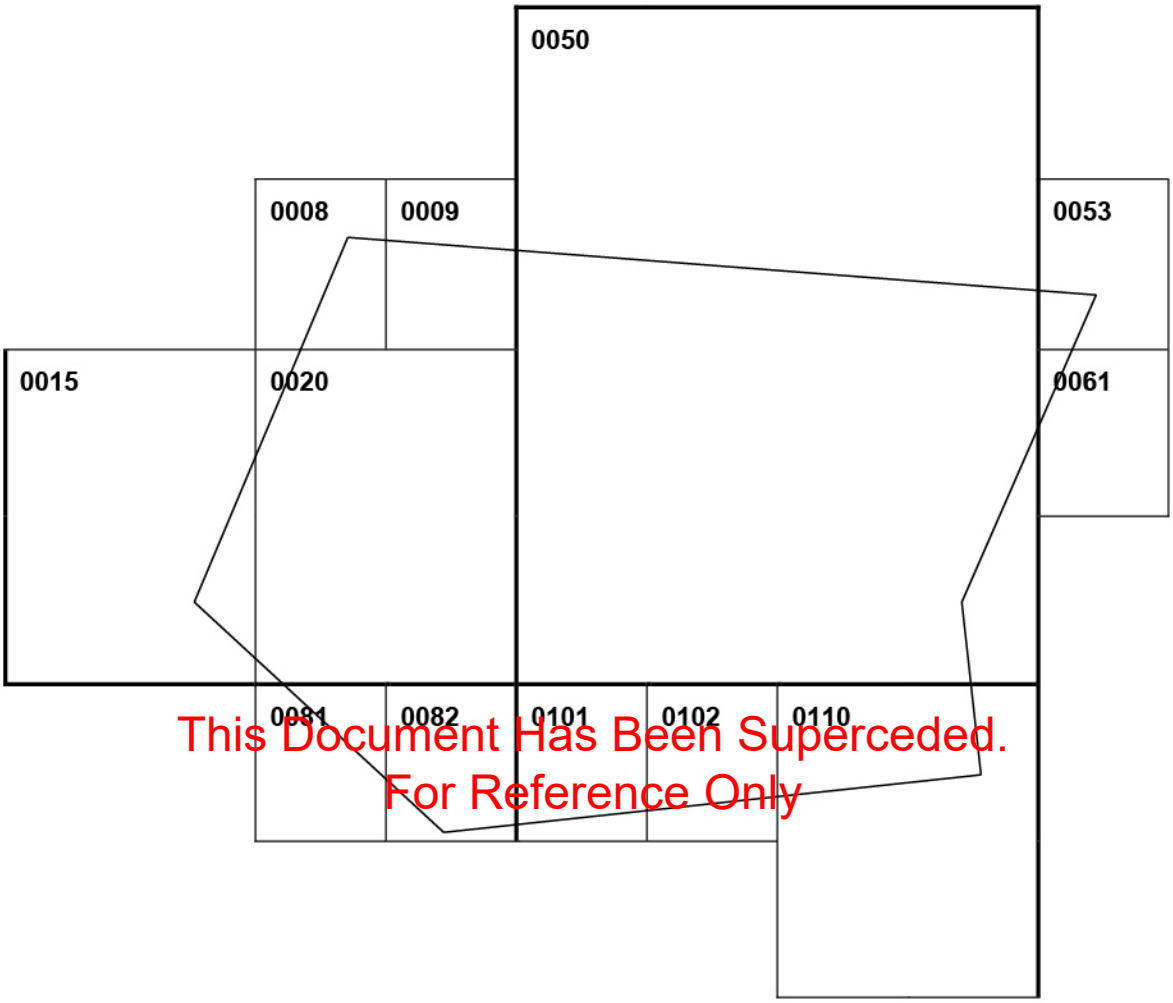
6.5.1 Multiple-Scale Flood Insurance Rate Maps

The preferred method for numbering is the multiple-scale FIRMs which are numbered based on a logical breakdown of USGS 7.5-minute series quadrangle sheets. To accomplish this, the assigned Mapping Partner may envision a USGS quadrangle as having 16 possible subdivisions, with the smallest block being a 1" = 500' scale segment and the largest block being the entire quadrangle at a scale of 1" = 2,000'.

Beginning with the first small-scale map panel, the four large-scale map panels that lie within the grid layout of the larger "parent" panel are to be numbered sequentially from left to right and top to bottom. The associated small-scale map panel is to be numbered sequentially after the four large-scale panels for the area of which it duplicates (i.e., Panel 0025 covers the same geographical area as Panels 0005, 0010, 0015, and 0020 combined). This numbering system is to be continued in a similar manner to the numbering system for single-scale maps; that is, the next number series would be 0030, 0035, 0040, and 0045 for the larger-scale panels, followed by 0050 for the smaller-scale panel. Figure 7 illustrates this system. Figure 8 contains an example of a FIRM with panels shown at different scales.

Figure 7: Multiple-Scale Panel Numbering Scheme

Figure 8: FIRM with Panels Shown at Different Scales

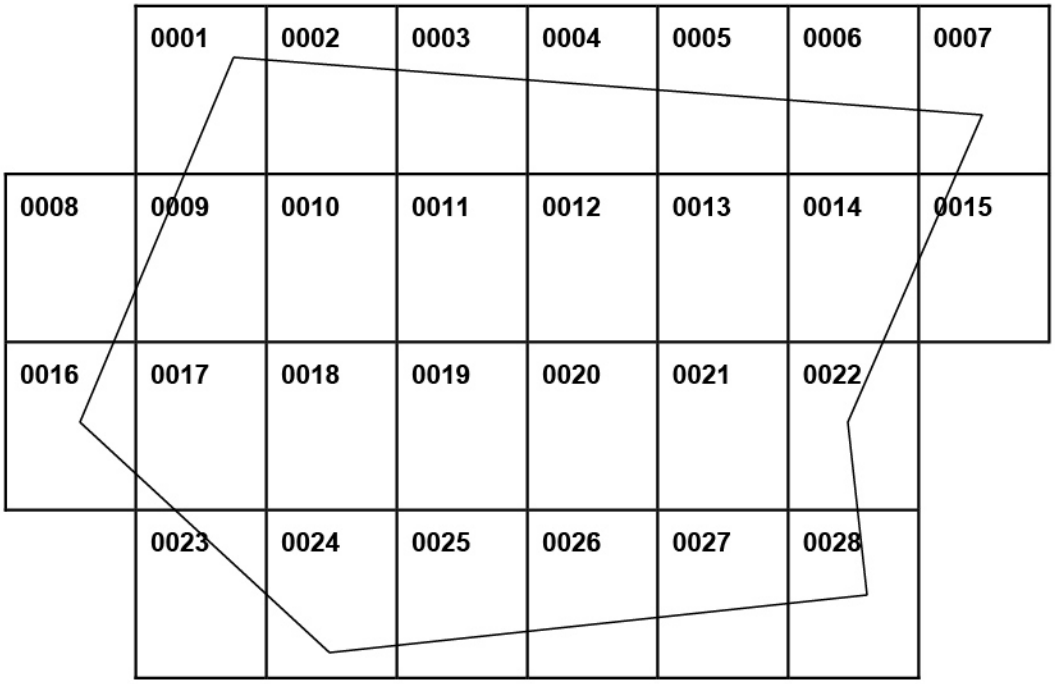


6.5.2 Single-Scale Flood Insurance Rate Maps

Single-scale FIRMs are those in which all panels within the community or county are printed at the same scale. The panel numbering follows sequentially from left to right and from top to bottom according to the scale. Figure 9 contains an example of a FIRM with all panels shown at a scale of 1" = 500'.

Single-scale numbering is not conducive to future combining of jurisdictions into countywide or state-wide mapping without renumbering all of the panels, so its use should be carefully considered.

Figure 9: Single-Scale Panel Numbering Scheme (1"=500')

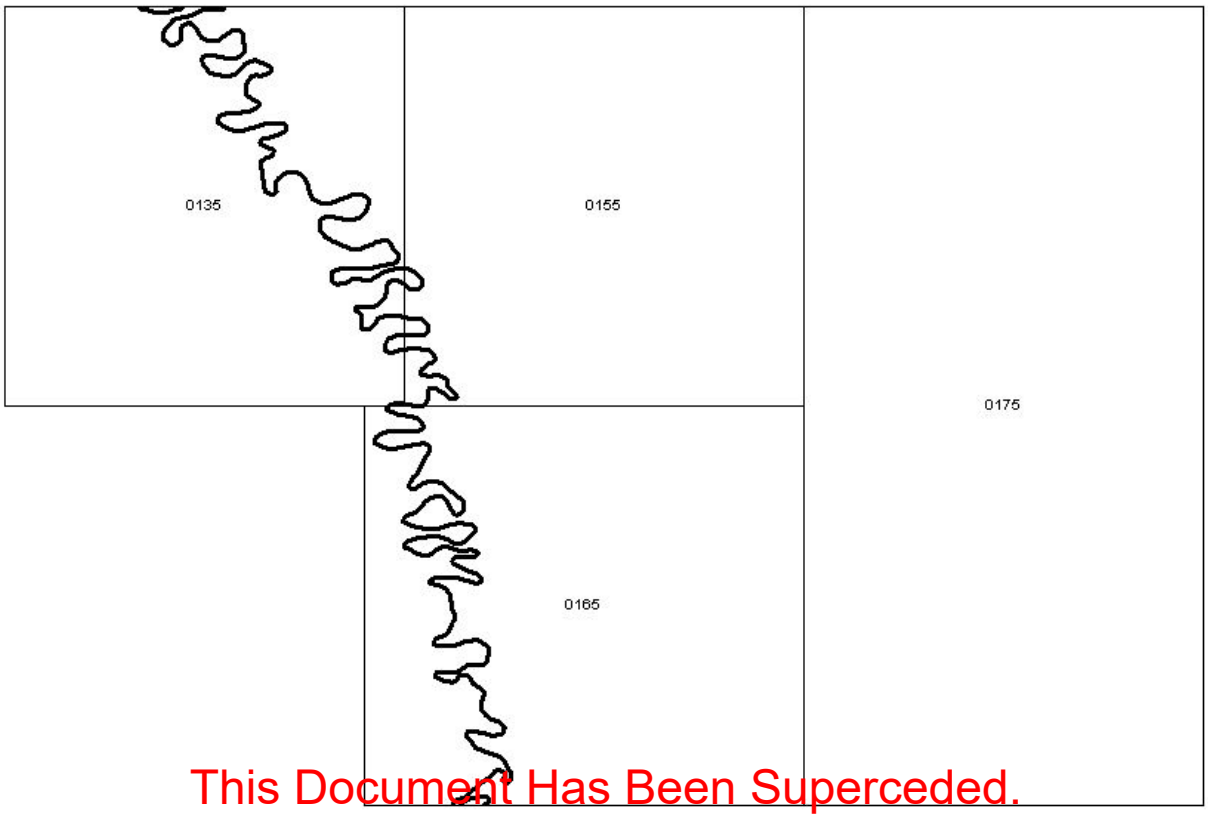


6.6 Map Insets

Map insets shall not be used in preparing FIRMs.

Narrow areas outside of the perimeter of a jurisdiction may be added to existing, adjacent map sheets as over-edge areas, if space permits and with the concurrence of the FEMA Project Officer. This may be done in order to reduce the panel count of a study or where the USGS quadrangles are not 7.5-minutes (e.g., Hawaii or other islands). Use of over-edge mapping should be carefully considered so as to avoid future re-paneling of the jurisdiction. It may be inadvisable for communities subject to future annexations. If used, the over-edge area can only be added to another panel if it fits within the FIRM border. It cannot be used for interior panels whereby a non-standard paneling scheme would be created.

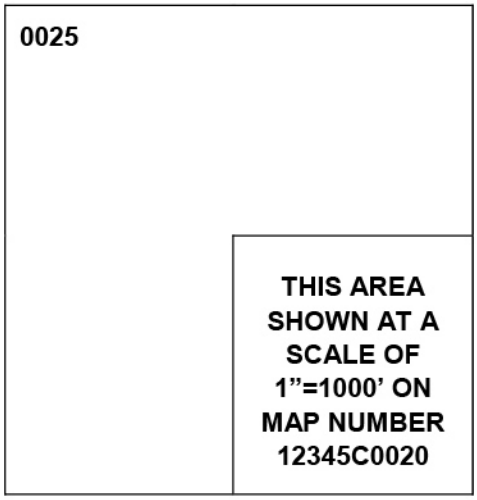
Figure 10: Over-Edge Panel



6.7 Breakout Panels

If a printed panel falls within the area of a smaller-scale panel that is also printed, the smaller-scale panel should show a breakout note in the blank area represented by the larger-scale panel (the breakout panel area). This note is placed in the center of the breakout panel area and specifies the larger-scale panel's map number and scale. The suffixes are not used in breakout panel notes, in order to avoid unnecessary updates in Physical Map Revisions.

Figure 11: Break Out Panel Note



6.8 Suffix

Standard ID (SID) #287 establishes how suffixes are applied to FIRM panels, according to the type of FIRM panel issuance or revision. SID #287 is supported by specifications and guidance presented in the FIRM Panel Technical Reference, Guidance Document No. 38, Guidance for Flood Risk Analysis and Mapping: Physical Map Revision (PMR) Guidance, and Guidance Document No. 1, Guidance for Flood Risk Analysis and Mapping: Base Map and FIRM Panel Layout Guidance. These resources are accessible through the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage.

Always refer to the current language for SID #287, as well as the current information in the FIRM Panel Technical Reference, the PMR Guidance, and the Base Map and FIRM Panel Layout Guidance, when determining FIRM panel suffixes for studies.

Per SID #287 and the FIRM Panel Technical Reference, suffixes I and O are not used.

6.8.1 First-time Countywide Issuance

The suffix for panels in a first-time countywide issuance is determined by examining the suffixes on the county's separate jurisdictions' community-based FIRMs. In the below example (Figure 12, "First-time Countywide Edition"), the highest suffix letter used for any of the county's separate jurisdictions' community-based FIRMs is **D**; therefore, per SID #287, the suffix for the first-time countywide panels are advanced to the next highest letter of all jurisdictions, which is **E**.

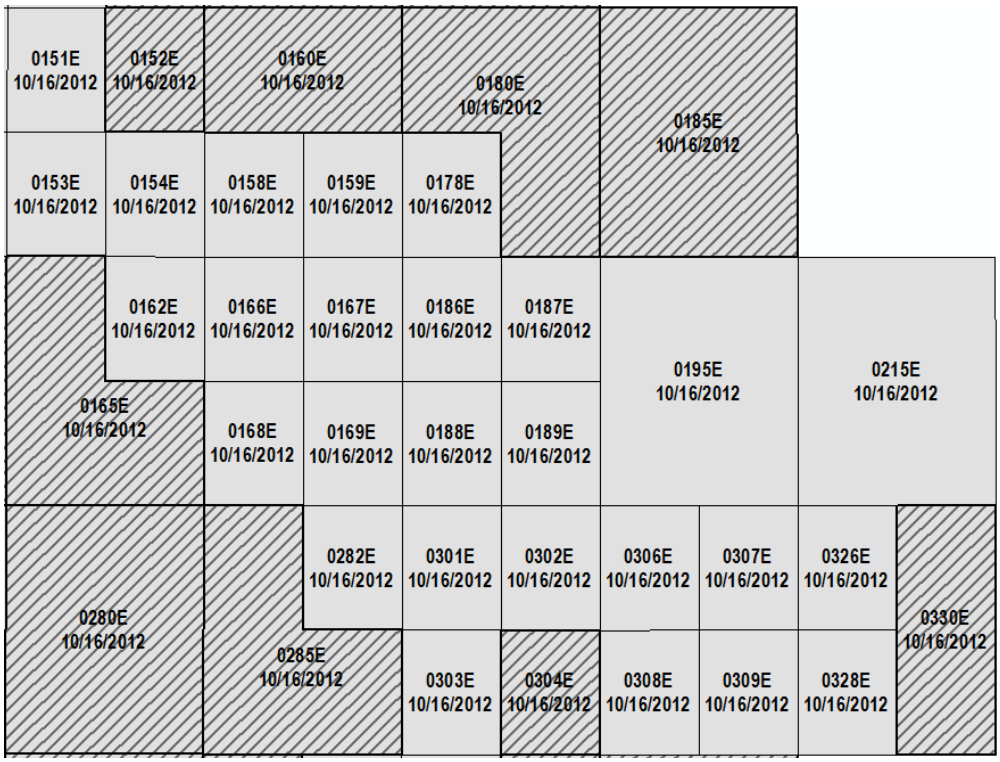


Figure 52. First-time Countywide Edition

6.8.2 Physical Map Revision (PMR)

The following examples (shown in Figures 13, 14 and 15) present an area of a county that undergoes two PMRs. In the example, some FIRM panels in the county are not included in either PMR, some FIRM panels are part of either PMR #1 or PMR #2, and some FIRM panels are included in both PMRs. Furthermore, in the example, a full Countywide Revision follows PMR #2.

PMR #1

Recall that Figure 12 above shows a countywide layout, with all suffixes for the county established at **E**. The first PMR is issued for the FIRMs shown in blue below (Figure 13, "PMR #1"). Panels included in PMR #1 are revised and published as new editions of the effective FIRM panels, so those panels' suffixes are advanced one letter, to **F**.

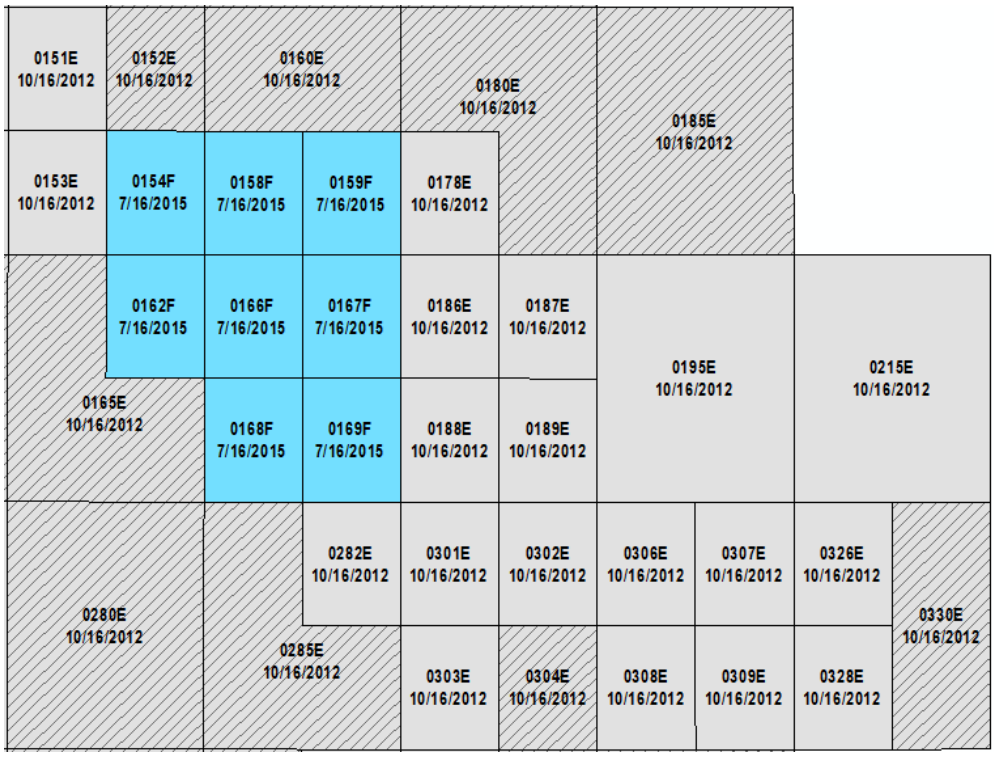


Figure 13. PMR #1

PMR #2

PMR #2 is then issued, which includes some of the FIRM panels from PMR #1, as well as some panels that weren't part of PMR #1. This is shown in Figure 14, "PMR #2."

In Figure 14, the 'Panel Not Printed' (PNP) reason has changed for effective panel 0185**E**. For example, the PNP reason has changed from "All Zone VE (EL 10)" to "All Zone VE (EL 11)." Because this is a change in the panel's flooding status, the suffix is advanced to **F**, even though the panel remains not printed.

Furthermore, two 500-scale breakout panels (0193 and 0194) have been created within the area of 1000-scale effective panel 0195**E**. The suffixes for the two printed 500-scale breakout panels and the remaining 1000-scale panel advance to suffix **F**. The two breakout panels receive suffix F because they were created from areas previously mapped on an E-suffix panel. Panel 0195 receives suffix F because its neatlines have now been adjusted, which is a format change for the panel, and also because it was previously a printed panel but is now not printed, which reflects a change in the panel's flooding status.

Additionally, one 500-scale breakout panel (0284) has been created within the area of 1000-scale effective FIRM 0285**E**. Both the 500-scale breakout panel (0284) and the remaining 1000-scale panel (0285) advance to suffix **F**.

Finally, effective panel 0282**E** is revised as part of PMR #2 and retains its effective panel scale; its suffix advances to **F**.

Note that for non-printed panels whose PNP reason, flooding status, or format (neatlines) have not changed, the suffix does not advance as part of the PMR.

Figure 14. PMR #2

Countywide Revision

A new Countywide Revision is completed after PMR #2. Per SID #287, the suffix for every individual panel, printed and non-printed, is advanced to its next letter.

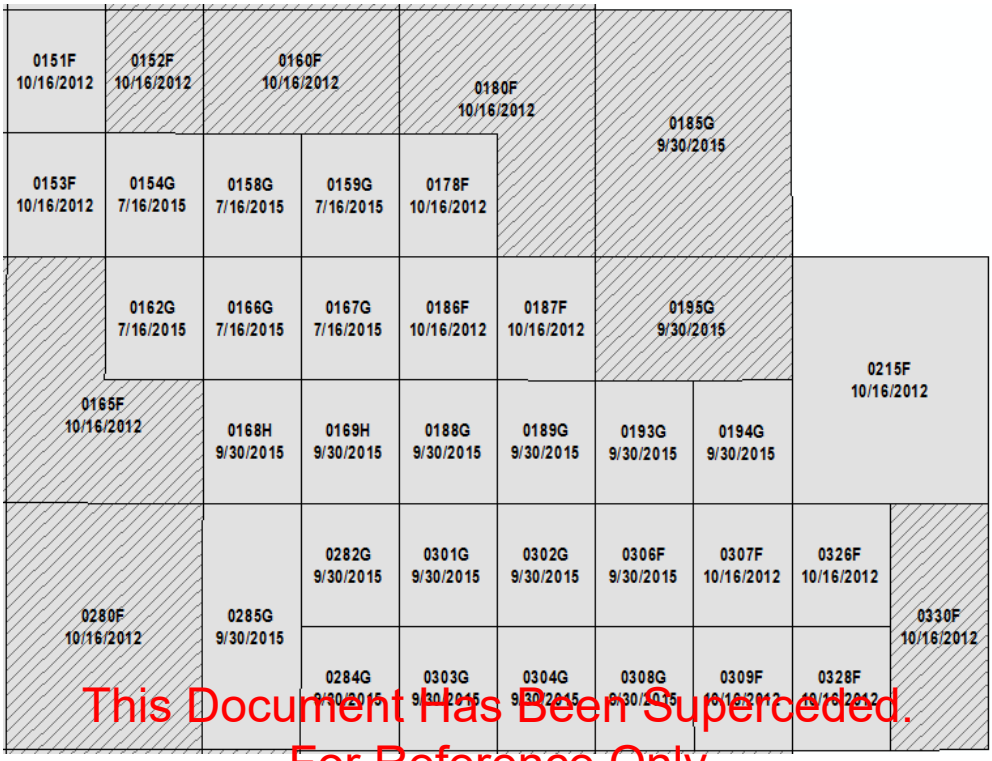


Figure 15. Countywide Revision

6.8.3 First-time Partial Countywide Issuance

Determining panel suffixes for a first-time Partial Countywide Issuance is the same as in the Countywide Issuance example above, where the map suffix for the Partial Countywide FIRMs is one letter higher than the highest suffix of all jurisdictions being revised in the Partial Countywide issuance. All separate jurisdictions' FIRMs that are not included in the first-time Partial Countywide issuance would remain at their existing suffix letter(s).

6.8.4 Partial Countywide Revision

Suffix determination for a Partial Countywide Revision is the same as in the Countywide Revision example. Per SID #287, the map suffix for each Partial Countywide FIRM advances one letter. All FIRMs that are not included as part of the Partial Countywide Revision would remain at their existing suffix letters.

6.9 New FIRM panel layout

Any FIRM being revised to reflect a completely new panel layout will have suffixes one letter higher than the highest of any previously published panel. Splitting existing quad-based FIRM panels does not constitute a new panel layout. A new panel layout consists of either:

a. Updating legacy community-based "E-size" FIRM paneling scheme to a latitude-longitude "quad-based" FIRM paneling scheme.

b. Adding panels to an existing quad-based FIRM paneling scheme, in a new lat-long quadrant, due to an extended political boundary or correcting the boundary of a previously extended panel. This will cause all of the panels to be renumbered and the highest panel number to increase.

The following examples (shown in Figures 16, 17 and 18) present a countywide study that adds panels to the existing quad-based FIRM paneling scheme due to extending the political boundary. Figure 16 shows the existing countywide layout, with all suffixes for the county established at **B**.

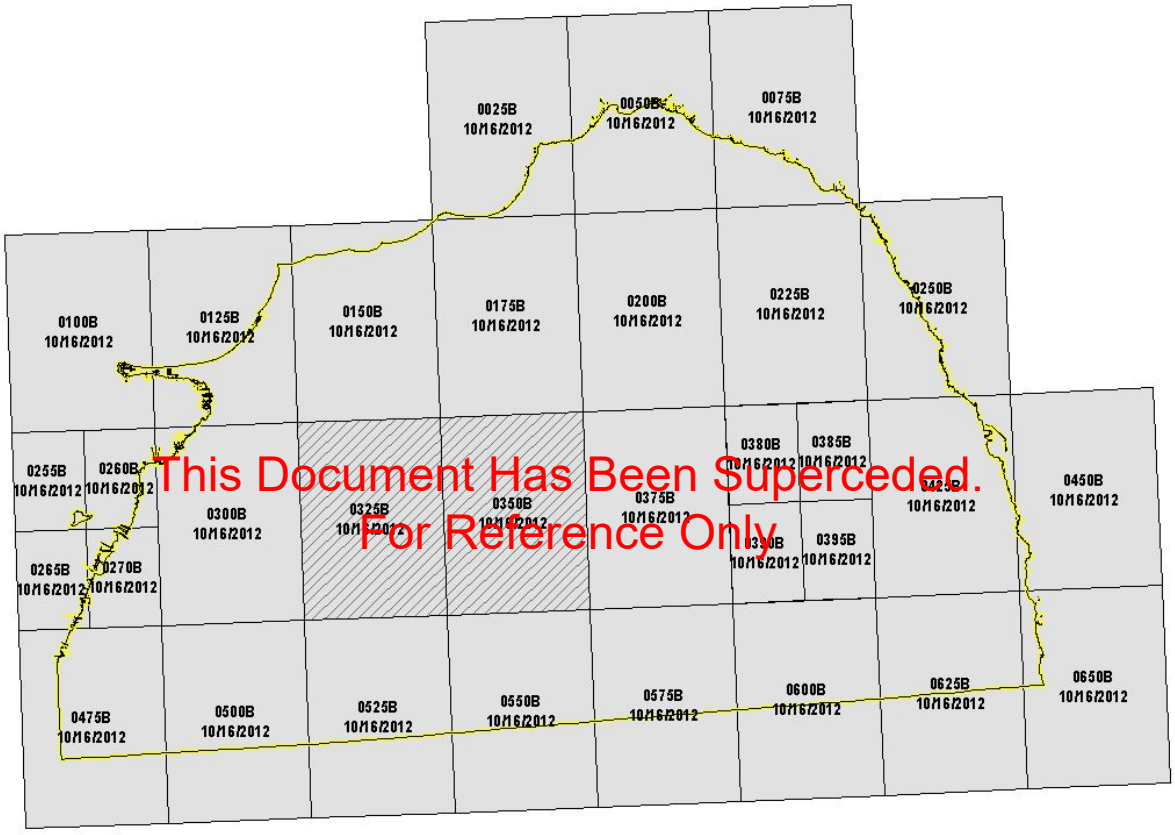


Figure 16. Existing Countywide Panel Layout

PMR #1

PMR # 1is issued for the FIRMs shown in blue below (Figure 17, “PMR #1”). Panels included in PMR #1 are revised and published as new editions of the effective FIRM panels, so those panels’ suffixes are advanced one letter, to **C**.

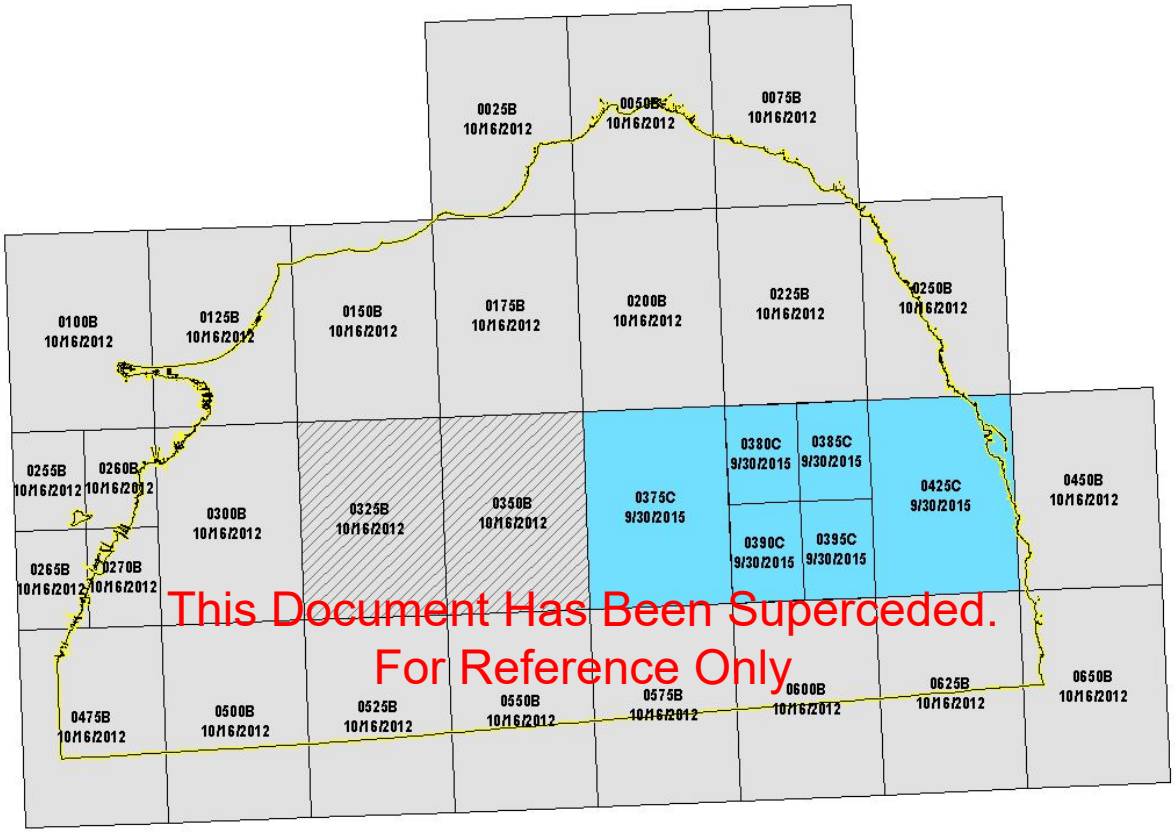


Figure 17. PMR #1

PMR #2

PMR #2 is then issued, the county boundary along the coastline is updated which adds two additional quads to the FIRM panel layout (green below in Figure 18, "PMR #2"). The suffix for all panels are advanced to D.

In Figure 18, effective panel 0375**D** and 0400**D** are PNP. Both will have the suffix advanced to **D** because both panels were renumbered, even though the panel remains not printed.

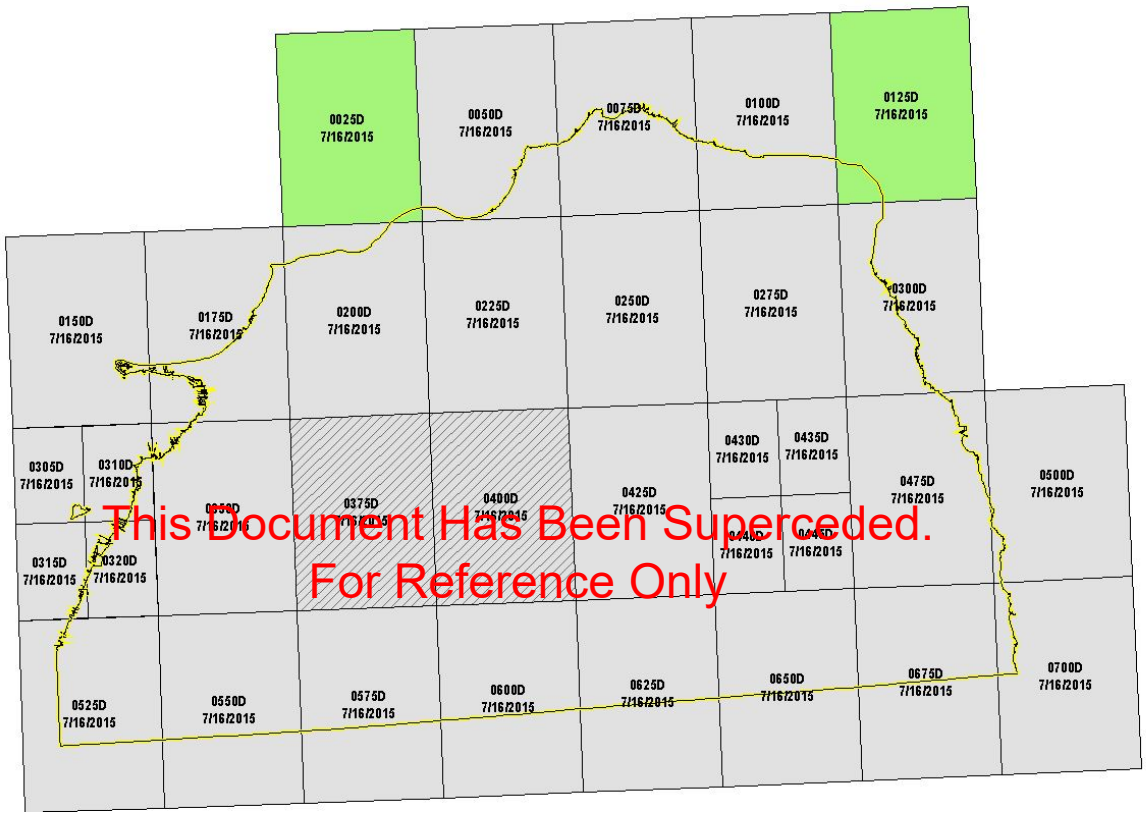


Figure 18. PMR #2

7.0 Formatting the Base Map

Once collected, the base map data should be formatted and compiled into a countywide FIRM database. For more information about the FIRM database requirements, please refer to the Flood Insurance Rate Map (FIRM) Database Technical Reference, Preparing Flood Insurance Rate Map Databases, Guidelines and Standards for Flood Risk Analysis and Mapping. The FIRM Database Technical Reference is accessible through the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage.

8.0 Metadata

Metadata, or "data about data," provide information about the content, quality, condition, and other characteristics of data. For Flood Risk Projects, the content of base map metadata should follow the guidance in the Metadata Profiles Technical Reference, Guidelines and Standards for

Flood Risk Analysis and Mapping. The Metadata Profiles Technical Reference is accessible through the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage. A specific base map metadata profile is available. FEMA created the profile based on the Federal Geographic Data Committee's Content Standard for Digital Geospatial Metadata (1998b and 2006).

The best time to collect metadata is when the data are being developed or obtained. It is recommended that metadata be collected when the base map is supplied for the project, working directly with the data owner to recover information that may not have been recorded. It also recommended that vendors provide compliant metadata for any newly collected data.

Most Flood Risk Projects include the requirement of a digital base map that meet the standards established in FEMA's Policy for Flood Risk Analysis and Mapping, and closely follow this guidance document. Any exceptions or variances from those standards or guidance should be documented in the metadata.

There should be no restrictions on FEMA's use or redistribution of metadata. Distribution methods include, but are not limited to, incorporating metadata in FIRM collar information, annotations on printed flood maps, distributing metadata with digital flood data online, digital media, and providing metadata on the Web. FEMA also participates in interagency exchanges of metadata, and participants can expect the metadata to appear on publicly available data portals and. The metadata also may appear in other applications that acquire data from such portals and clearinghouses, even if FEMA does not participate in these other applications directly.

9.0 Procuring New Data

For Flood Risk Projects, FEMA will not provide funding for new base map data collection. Regarding leverage credits to communities, if adequate base map data exist but a community supplies better data, FEMA will provide leverage credit to the community.

10.0 Quality Control

Any base map used as part of a Flood Risk Project should be subject to Quality Assurance and Quality Control (QA/QC) to provide reasonable assurance that the data meet the specifications reported and are suitable for the project. QA/QC should be applied before determining if the data can be used. When data are obtained, it is recommended the following QC checks be applied:

- Check if the base map data contain complete attributes, such as full road or stream names.
- Check if the base map data contain any gaps or disconnection with the project area.
- Check if the base map data reasonably edge match to adjoining jurisdictions.
- Check if the base map data are accompanied by metadata.
- Check if the orthoimagery is clear and not blurred (unless intentionally for security concerns).
- Check if all required features have been collected.

- Check if the data are geo-referenced to a known projection and datum which are documented.

- Check if data and metadata redistribution is allowed.

Documentation of any QA/QC should accompany the base map submittal. For additional guidance about quality documentation, please refer to Guidance Document No. 19, Guidance for Flood Risk Analysis and Mapping: Quality Management for Flood Risk Projects Guidance. Guidance Document No. 19 is accessible through the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage.