

**PIMA COUNTY REGIONAL FLOOD CONTROL DISTRICT'S
DISTRICT STANDARD**

STANDARD NAME: **Standards for Floodplain Work Maps**

STANDARD NUMBER: **DS-305**

EFFECTIVE DATE: **January 28, 2014**

PURPOSE: To standardize floodplain work map data submitted to the Pima County Regional Flood Control District.

BACKGROUND: Floodplain work maps, hydrologic maps, and two-dimensional (2-D) floodplain mapping products are frequently submitted to the Pima County Regional Flood Control District (District) for review and approval. Many review comments are generated because the maps that are submitted lack basic map control information, do not incorporate a usable scale, or are not legible. This policy outlines the District's standards for submittals of hydraulic and hydrologic work maps.

STANDARDS:

General Standards

1. Hydraulic (floodplain) and hydrologic work map requirements outlined in this standard do not supersede subdivision or development plan mapping requirements established by Pima County Development Services and may not be combinable with Development Services requirements.
2. These map standards do not apply to single-lot Floodplain Use Permit applications. Such site plans shall conform to *Technical Procedure 102*.
3. Work maps shall be sealed by an Arizona registered civil engineer.
4. Work maps shall be legible and include a north arrow, map scale (at a standard engineering scale), topographic contours, index contours that are labeled, the contour interval, and vertical datum. Contour intervals shall be 2-feet unless map scale or terrain slope warrant the use of an alternative contour interval.
5. Horizontal and vertical controls shall follow PAG guidelines and be indicated on the work map. Work map data on different controls may be used if authorized by the District.
6. If the work maps are on multiple pages, the pages shall be indexed and "match lines" shall be included to indicate connectivity with adjacent maps.
7. Work maps shall include recent aerial photography, with the exception of USGS maps used for watershed delineation.
8. Folded work maps placed into reports shall be placed in individual pockets with the pockets labeled to indicate the specific map contained in the pocket.
9. Hard copies of work maps are to be 24" x 36" or 36" x 48" in either landscape or portrait orientation. Work maps produced with different dimensions shall be pre-approved by the District prior to review submittal.
10. Work maps shall be submitted in both hard-copy (paper) and digital format unless otherwise approved by the District. Digital map products are generally included on a CD or DVD stored in a sleeve in the report that accompanies the map(s). Refer to the Digital Data section of this standard.

Hydraulic Work Map Requirements

1. If the work maps are to be used in a FEMA mapping process, the work maps shall follow FEMA’s “Guidelines and Specification for Flood Hazard Mapping Partners”.
2. Cross sections shall be labeled by river station number.
3. Cross sections shall be labeled with the base flood elevation (BFE). When a watercourse can be considered confined pursuant to Section 16.08.350.B.3 of the Ordinance (commonly referred to as a Canyon Wash) the delineation of the 4% annual chance (25-year) floodplain shall be provided. If multiple profiles are required for FEMA submittals their respective water surface elevations are also required. NOTE: If labeling of cross sections is so dense that it obscures the underlying photography and topography, the work maps may include a reference table that ties cross sections to BFEs and other water surface elevations. The table must be shown on the map to which the data pertains.
4. If the modeling includes multiple reaches, the reaches shall be labeled on the work-maps.
5. If the work map supports a permit application for a critical facility within or adjacent to a FEMA Special Flood Hazard Area, the delineation of the 0.2% annual chance (500-year) floodplain shall be provided.
6. Additional map products may be necessary if the delineations are difficult to discern.
7. Separate map products are preferred for existing and proposed conditions.

Hydrologic Work Map Requirements

1. Reaches, sub-basins, concentration point nodes and cumulative flow cross section lines for two dimensional models (if used) shall be labeled.
2. The report accompanying the map shall include the following information for each discharge node:
 - a. Node label (such as “Concentration Point A”)
 - b. Node name, if the node name is different from the concentration point name.
 - c. Contributing area of watershed or sub-basin.
 - d. Discharge(s) with return interval descriptor such as Q_{100} or Q_{25}
 - e. Descriptor (such as “above confluence with...” or a road or boundary)
 - f. A table or list providing a brief hydrologic description summarizing the hydrologic functions used to generate the discharge at the concentration point. Examples may include but are not necessarily limited to combination of hydrographs from sub-basins, channel routing, or detention basins.
3. Other supporting maps may be necessary such as soil and vegetation maps.

Two Dimensional Work Map Requirements

1. A map showing the grid elements shall be provided, include the grid element identifiers, if practicable. If the grid elements are too numerous, submit the map data digitally.
2. Unless otherwise agreed to by the District, separate maximum flow depth and maximum velocity maps shall be provided. The maximum flow depth and maximum velocity maps shall present grid elements color coded using the following ranges:

Grid Color	Maximum Depth Range	Maximum Velocity Range
Green	>0.2 ft.-0.5 ft.	≤ 1 fps
Blue	>0.5 ft.-1ft.	>1 fps -3 fps
Yellow	> 1 ft.-2 ft.	>3 fps -5 fps
Orange	>2 ft.-3 ft.	>5 fps -7 fps
Red	>3 ft	> 7 fps


If the color-coded grid is to be placed on aerial photography the grid is to be semitransparent.

3. A map with maximum water surface elevation contours shall be provided, major contours shall be labeled. In some unique situations the contours could be depth contours.
4. Peak discharge values outside of concentration points should be presented as cumulative flow cross-sections. Such cross sections shall show the cumulative peak discharge value and not exceed the width of the combined grid elements from which the discharge values were derived. When possible the cross sections shall be displayed on the maximum flow depth map. If not possible, a separate map shall be provided.

Digital Data

1. Provide PDF copies of maps.
2. Provide geo-referenced files for all features which were incorporated into the maps.
 - a. Data shall conform to PAG projection requirements which are:
Projection = State Plane, Arizona Central Zone
Datum = NAD83-92(HARN)
Units = International Feet
 - b. Although the District prefers shape file data, AutoCAD files may be used with digital submittals. The digital requirements in this Technical Policy are not meant to supersede or replace other county digital map requirements such as those required by Pima County Development Services.
 - c. Files and attributes are to be named to ease review.
 - d. Areas such as floodplain boundaries are to be enclosed polygons.
 - e. Cross sections are to be line files and include river-station, reach and profile data for with different return interval descriptors (Q25 or Q 100) and/or for different conditions (such as “Existing Conditions”) if applicable.
 - f. Contour data is to be included if the contour data does not come from public source accessible to District Staff, such as Pima Association of Governments data.
 - g. Provide aerial photography (if the District does not have the aerial data used in study).
3. For modeling digital map data requirements, see Technical Policy 33.
4. For geo-reference features associated with hydrological work maps, include:
 - a. Discharge nodes. Attributes shall include: Node label, concentration point name, contributing area of watershed or sub-basin, discharge(s), descriptor (such as “above confluence with...” or a road or boundary)
 - b. Sub basin areas as enclosed polygons.
 - c. Reaches.

APPROVED BY:



Suzanne Shields, P.E.
Director and Chief Engineer



Date



DATE: November 3, 2015

TO: Brian Jones, CFM
Chief Hydrologist
Floodplain Management

FROM: Terry Hendricks, CFM
Chief Hydrologist
Planning and Development

SUBJECT: Correction to Color Code for Design Standard 305, Standards for Floodplain Work Maps

The memo I gave you on March 26, 2014 regarding the color pallet for Two Dimensional Modeling submittals for flow depths and velocities had some colors switched on the table. The table below reflects the text of the Design Standard.

Grid Color	RGB Color Code	Maximum Depth Range	Maximum Velocity Range
Green	R=0, G=255, B=0	>0.2ft.-0.5ft.	≤ 1 fps
Blue	R=0, G=0, B=255	>0.5ft.-1ft.	>1 fps – 3 fps
Yellow	R=255, G=255, B=0	>1ft.-2ft.	>3 fps – 5 fps
Orange	R=255, G=200, B=60	>2ft.-3ft.	>5 fps -7 fps
Red	R=255, G=0, B=0	>3ft.	>7 fps