



## WHAT DO YOU NEED FOR EACH TYPE OF STUDY?

Topographic data development is needed to performing flood study analyses, including:

- Aerial topography survey;
- Cross sections survey;
- Hydraulic Structures survey; and
- Establishment of vertical control and location of qualifying benchmarks.

Accurate, up-to-date topographic data is required when performing detailed, approximate or limited-detail studies and/or redelineation.

Further, ground survey of channel cross-sections, underwater elevations, and hydraulic structures geometry (e.g., bridges, culverts, or dams) is required for detailed study. Less extensive survey of cross sections (no underwater points) may be required for limited-detail studies and some approximate studies (requirements is provided below and specifications is provided in further documents).

The Georgia Map Modernization project will result in digital FIRMs and will require acquisition of digital base maps that reflects reference features (i.e., roads, streets, hydrographic features, political jurisdiction boundaries) needed by users to locate properties on the produced DFIRMs. Road and railroad names may be derived from community-supplied files or hardcopy sources, effective FIRM panels, and/or U.S. Bureau of Census Topologically Integrated Geographic Encoding and Reference System (TIGER) files. Road names are needed regardless of which base map source is chosen for digital FIRM production.

Base map data to be used in producing a digital FIRM are prioritized as follows:

1. Base map data that are supplied by communities or other non-Federal sources (e.g., State or regional agencies) that meets FEMA criteria (Minimum Standards) are the first choice for digital FIRM production. These map files may be in either vector or raster format. If both are available vector data are preferable due to the ease of their use, their file size, and lower printing costs.
2. USGS DOQs are second choice and the default base map if suitable community data are not available.

Georgia Clearinghouse statewide coverage of the 1999 color infrared digital ortho quarter quads (DOQQs) is available. The Department of Natural Resources has acquired the complete data set (1-meter pixel) along with some 2002, true color, and high-resolution data (1-foot pixel), with coverage of metro Atlanta (full or partial coverage of metro Atlanta eleven counties).

### MINIMUM STANDARDS FOR COMMUNITY-SUPPLIED DATA

To use community-supplied base maps instead of USGS DOQs for new DFIRMs production, minimum standards for resolution, horizontal accuracy, vertical accuracy, horizontal reference system, data source, currency, coverage, availability, restrictions on use must be met.

## RESOLUTION

The minimum resolution requirement for raster data files is 1-meter ground distance. Higher resolution data are also acceptable.

## HORIZONTAL ACCURACY

The National Standard for Spatial Data Accuracy (NSSDA) is used to report the horizontal accuracy (Accuracy<sub>r</sub>). It is defined as the radius of a circle of uncertainty, such that the true or theoretical location of a point falls within that circle 95 percent of the time. The minimum horizontal positional accuracy for new FIRM base map data is that of the default base map which is the USGS DOQs, which have an NSSDA radial accuracy of 38 feet. Data that meet higher accuracy standards are also acceptable. Accuracy<sub>r</sub> of 38 feet is the same as radial root mean square error (RMSE<sub>r</sub>) of 22 feet. According to NSSDA, RMSE<sub>r</sub> for a DFIRM is defined as the cumulative result of all errors including those introduced by ground surveys, aerial triangulation, map compilation, and digitization activities. Typically for a base map, RMSE<sub>r</sub> equals square root of (RMSE<sub>x</sub><sup>2</sup> + RMSE<sub>y</sub><sup>2</sup>).

## VERTICAL ACCURACY

The term Accuracy<sub>z</sub> defines vertical accuracy at the 95 percent confidence level. This means that the true or theoretical location of a point falls within linear uncertainty (vertical line of points of uncertainty) 95 percent of the time.

The following provide guidance for contour interval preferences:

- For hilly terrain, 4-foot contours are acceptable for hydraulic modeling and the digital elevation must have vertical accuracy of (Accuracy<sub>z</sub>) of 2.4 feet (vertical root mean square error [RMSE<sub>z</sub>] of 1.2 feet).
- In moderate to flat terrain, 2-foot contours are required to accurately determine the 100-year flood elevations and flood plain boundaries; the digital elevation data must have Accuracy<sub>z</sub> of 1.2 feet [RMSE<sub>z</sub> of 0.6].

## HORIZONTAL REFERENCE SYSTEM

The files must be georeferenced to a known projection and datum and be accompanied by information that describes those parameters.

## DATA SOURCES

Community-supplied data may be in the form of digital orthophotos or vector data files. Locally produced digital orthophotos may be at larger scales and higher resolution than USGS DOQs, but they must meet USGS DOQ at a minimum. Aerial images that are not ortho rectified are not acceptable. Vector files may be photogrammetrically compiled or digitized from orthophotos. Unacceptable vector file source include TIGER files or other compiled at scales smaller than 1:20,000.

## CURRENCY

The data must have been created or reviewed for update needs within the last 7 years.

## COVERAGE

Complete and integrated data for an entire county are preferred. If only portions of a county are available, the default USGS DOQ may be chosen.

## AVAILABILITY

The data needs to be available or prepared for timely production of the DFIRM.

## DATA REQUIREMENTS

Requirements for topographic, cross sections, and hydraulic structure survey will vary from Flood Map project to another depending on the following:

- The flood hazard being addressed: riverine, coastal, or alluvial fan.
- The option that is selected for generating these studies: Detailed study, limited-detailed or approximate study, and redelineation of floodplain boundaries from the effective FIRM using more up-to-date topographic information. The requirements for each analysis option are summarized below:

### REQUIREMENTS FOR DETAILED FLOOD HAZARD ANALYSES

This type of study will generally include a detailed hydraulic analysis, digital topographic data, surveying of cross sections (including underwater elevations), and of hydraulic structures. The mapping partner shall not establish dimensions and elevations of hydraulic structures by aerial survey methods (i.e., photogrammetry or LIDAR).

### REQUIREMENTS FOR LIMITED-DETAIL ANALYSES

For this type of study, ground survey of non-critical cross sections may be interpolated from photogrammetric or LIDAR sources. Underwater elevations of non-critical sections may be interpolated from upstream or downstream surveyed cross sections, when no significant changes are anticipated in the channel geometry. Limited hydraulic structures survey may be needed (e.g., culverts invert elevations, bridges cords, and dams elevations) depending on the quality and availability of other sources (LIDAR or photogrammetry).

### REQUIREMENTS FOR APPROXIMATE ANALYSES

Cross sections may be interpolated from contours on topographic maps, and underwater elevations may be interpolated from upstream/downstream data, assuming the channel bottom information has not changed significantly. Hydraulic structures survey is not required.

### REQUIREMENTS FOR REDELINEATION OF FLOODPLAIN BOUNDARIES

More updated or current topographic data is required to redelineate the floodplain boundaries to reflect actual floodplain conditions. No new surveying of cross sections or hydraulic structures is required.

The requirements summarized above are based on the assumption that suitable data do not exist from alternative sources (e.g., USACE, NRCS, DOT) and that new ground/aerial surveys will be required as described.