



**Harris County Flood Control District,  
Harris County, Texas  
Cooperating Technical Partners  
Mapping Activity Statement**

**Mapping Activity Statement No. 5 – Digital Topographic Data Development**

In accordance with the Cooperating Technical Partners (CTP) Memorandum of Agreement dated July 31, 2000, between Harris County Flood Control District (HCFCD), Harris County, Texas, and the Federal Emergency Management Agency (FEMA), Mapping Activity Statement No. 5 is as follows:

- 1. Objective and Scope:** The objective of this Agreement is to develop digital topographic data for all of Harris County, Texas, and an additional area extending from the county borders one-half mile surrounding Harris County. The digital topographic data will be used for hydraulic modeling and floodplain mapping to produce Digital Flood Insurance Rate Maps (DFIRMs) for Harris County, Texas.
- 2. Period of Performance:** This Mapping Activity will begin on September 25, 2001, and will be completed no later than January 31, 2003. This Mapping Activity may be terminated at the option of FEMA or HCFCD in accordance with the provisions of the July 31, 2000, CTP Memorandum of Agreement.
- 4. Standards:** The following standards and documents are relevant to this Mapping Activity:
  - **Survey Methodology:**
    - Global Positioning System (GPS) Surveys: Follow National Geodetic Survey publication NGS-58, "Guidelines for Establishing GPS-Derived Ellipsoid Heights (Standard: 2 cm and 5 cm)," November 1997.
    - Aerial Surveys: Follow United States Army Corps of Engineers (USACE) EM 1000-1-1000, "Photogrammetric Mapping," March 31, 1993.
    - Conventional Surveys: Follow standard American Congress on Surveying and Mapping (ACSM) procedures.
    - Hydrographic Surveys: Follow USACE EM 1110-2-1003, "Hydrographic Surveys," October 31, 1994.
  - Draft LIDAR specifications are available on FEMA's Web site at [www.fema.gov/mit/tsd/MM\\_lidar.htm](http://www.fema.gov/mit/tsd/MM_lidar.htm).
  - *Guidelines and Specifications for Study Contractors* (FEMA 37). FEMA is in the process of revising Aerial Mapping and Surveying Specifications in FEMA 37, Appendix 4. The revisions will include procedures for evaluating Triangulated Irregular Network (TIN) data in accordance with the new National Standards for Spatial Data Accuracy (NSSDA) for data used in automated and semi-automated hydrologic and hydraulic modeling. Once those specifications are complete, they will apply to this Mapping Activity.

September 13, 2001

Mapping Activity Statement no. 5 – LIDAR Acquisition

- Digital mapping submissions will comply with the requirements of Chapter 9 and Appendix 7 of FEMA 37.

**5. Products:** The Harris County Flood Control District shall make the following products available:

- TIN data in electronic archivable format.
- Hardcopy topographic maps.
- Report summarizing methodology and results.
- Completed Form 5 of *Revisions to National Flood Insurance Program Maps, Application/Certification Forms and Instructions (MT-2)*.
- Checkpoint analyses to assess the accuracy of TIN data, including Root Mean Square Error (RMSE) calculations to support vertical accuracy.
- Identification of remote sensing data voids and methods used to supplement data voids.
- National Geodetic Survey (NGS) data sheets for Network Control Points (NCP) used to control remote sensing and ground surveys.

**6. Schedule and Milestones:**

Final products will be provided to the FEMA Regional Project Manager in accordance with the Project Master Schedule.

**Milestone 1:** Products for the first milestone to be provided to the FEMA Project Officer include:

- Documentation of methodology, data analyses, date of survey/data collection, NCP, and other relevant information.
- Work plan for supplementing data voids caused by limitations of remote sensing and/or source of any supplementary data collection.

**Milestone 2 (Final Products):** Final products for the second milestone to be provided to the FEMA Project Officer include:

- TIN data on CD-ROM.
- Hardcopy topographic maps.
- Report summarizing methodology and results.
- Completed Form 5 of MT-2.
- Checkpoint analyses to assess the accuracy of TIN data including RMSE calculations to support vertical accuracy.
- Identification of remote sensing data voids and methods used to supplement data voids.
- NGS data sheets for NCP used to control remote sensing and ground surveys.
- Bare earth digital elevation model.
- Raw data set after elevation adjustments.

Final products will be made available in accordance with the Period of Performance described in Section 2 of this Mapping Activity Statement.

**7. Certification:** The following certifications apply to this Mapping Activity (as appropriate):

- Registered Professional Engineer or Licensed Land Surveyor will certify topographic information, in accordance with 44 CFR 65.5(c).
- Certification of topographic information by the American Society for Photogrammetry and Remote Sensing (ASPRS) is also acceptable.

**8. Technical Assistance and Resources:** The Harris County Flood Control District may obtain copies of FEMA-issued Letters of Map Change (LOMCs), archived engineering back-up data, and data collected as part of the Mapping Needs Assessment Process from FEMA's Mapping Coordination Contractor (MCC). The MCC may be contacted at 1-877 FEMA MAP (1-877-336-2627). General technical and programmatic information, such as FEMA 265, the Quick-2 computer program, and the MT-2 forms, can be downloaded from FEMA's Flood Hazard Mapping Web site ([www.fema.gov./mit/tsd/](http://www.fema.gov./mit/tsd/)). Specific technical and programmatic support may be provided through FEMA's MCC; such assistance should be requested through the FEMA MCC Project Officer specified in Section 12 of this Mapping Activity Statement.

**9. Contractors:**

TerraPoint  
4800 Research Forest Drive  
The Woodlands, TX 77381-4142

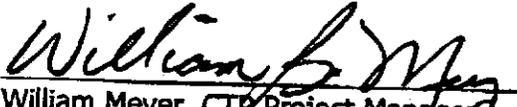
Procurement of subcontractors using Federal funds provided as part of this Mapping Activity will comply with the requirements of 44 CFR 13.36.

**10. Quality Assurance/Quality Control (QA/QC) Procedures:** The Harris County Flood Control District will undertake internal QC reviews to ensure that the products described under Section 5 of this Mapping Activity Statement conform with the standards outlined under Section 4 of this Mapping Activity Statement. Additionally, Dodson and Associates, Inc will undertake an independent review for compliance with these standards. The QA/QC procedures outlined in Chapter 10 of FEMA 37 should be followed during the development of the approximate Zone A analyses and mapping.

**11. Reporting:** Reporting requirements will be in accordance with Agreement Articles V & VI.

**12. Points of Contact:** The FEMA Regional Program Manager is Jack Quarles, P.E., and the CTP Project Manager is William B. Meyer or subsequent personnel of comparable experience who are appointed to fulfill these responsibilities. If it is necessary, the assistance of FEMA's MCC should be requested through the FEMA Regional Program Manager, Jack Quarles.

Each party has caused this Mapping Activity Statement to be executed by its duly authorized representative.

  
William Meyer, CTP Project Manager  
Harris County Flood Control District  
Harris County, TX

9/21/2001  
Date

  
Jack Quarles, P.E.  
Region 6 CTP Program Manager  
Federal Emergency Management Agency

9/21/2001  
Date