Chapter 9
Topographic Survey

9-1. Licensing

All topographic survey efforts conducted under contract should be certified by a surveyor with a current surveyor's license in the project state. Any licensing requirements within the project state for contract or Corps of Engineers surveyors should be determined by the FA.

9-2. Horizontal Control

Each boring and/or well installation should be topographically surveyed to determine its map coordinates referenced to either a Universal Transverse Mercator (UTM) grid or the State Plane Coordinate System (SPCS). These surveys should be connected to the UTM or SPCS by third order, Class II control surveys in accordance with the Standards and Specifications for Geodetic Control Networks (Federal Geodetic Control Committee 1984). If the project is in an area remote from UTM or SPCS benchmarks and such horizontal control is not warranted, then locations measured from an alternate system depicted on project plans may suffice, at least on a temporary basis. All borings, wells, temporary and/or permanent markers should have an accuracy of ±300 mm (±1 ft) within the chosen system.

9-3. Vertical Control

Elevations for the natural ground surface (not the top of the coarse gravel blanket) and a designated point on the rim of the uncapped well casing (not protective casing) for each bore/well site should be surveyed to within 3 mm (±0.01 ft) and referenced to the National Geodetic Vertical Datum of 1929 (NGVD of 1929) or the North American Vertical Datum, 1988 Adjustment (NAVD 88). These surveys should be connected by third order leveling to the NGVD of 1929 or NAVD 1988 in accordance with the Standards and Specifications for Geodetic Control Networks. If the project is in an area remote from NGVD benchmarks and such vertical control is not warranted, then elevations measured from a project datum may suffice, at least on a temporary basis.

9-4. Field Data

The topographic survey should be completed as near to the time of last well completion as possible. Survey field data (as corrected), to include loop closures and other statistical data in accordance with the Standards and Specifications referenced above, should be provided to the FA. Closure should be within the horizontal and vertical limits given above. These data should clearly be listed in tabular form including the coordinates (and system) and elevation (ground surface and top of well) as appropriate, for all borings, wells, and reference marks. All permanent and semipermanent reference marks used for horizontal and vertical control, benchmarks, caps, plates, chiseled cuts, rail spikes, etc., should be described in terms of their name, character, physical location, and reference value. These field data should become part of the project records maintained by the FA.

9-5. Geospatial Data Systems

Geospatial data is non-tactical data referenced either directly or indirectly to a location on the earth. Geospatial data identifies the geographic location and characteristics of natural or constructed features and boundries on the earth. Monitoring wells and the data generated from them meet these definitions and therefore must be documented according to the metadata standards cited in ER 1110-1-8156. ER 1110-1-8156 requires geospatial data to be documented using the Federal Geographic Data Committee Content Standards for Digital Geospatial Metadata. Guidance on geospatial data systems (GDS) may also be found in EM 1110-1-2909 and ASTM Standard Specification D 5714.