

Standard Operating Procedure

Subject: General Topographic Surveys

17 February, 2000

General Scope of Work:

General Topographic Surveys should be described as surveys that are required to collect the features of the land and any man made feature attached to the land. Topographic surveys are intended to show drainage patterns and structures, transportation features, vegetated areas, utilities, and any identifiable features that will affect a civil works design project. Survey data can be gathered using various techniques, procedures, and equipment. However, it will be negotiated such that the most efficient and cost effective techniques are used to gather the data necessary to support the intended design effort. Therefore, a scope of work outlining specific job requirements will typically accompany this document.

General Procedures:

Data may be gathered or collected as random topo points, cross sections, GPS points, or a combination of these. In all cases, control points shall be recovered or developed on-site to ensure efficient and complete coverage for intended data collection methods. Control points used for data collection shall be iron pins (2' minimum), PK nails, or permanent monuments (set or recovered). Control points used during the prosecution of the work shall be well marked with paint, flagging, and or witness posts to ease identification by Corps personnel. All breaklines shall be collected so as to facilitate drafting, checking, and plotting. A general site sketch shall be shown in the field book with breaklines shown. When digital terrain models are required, cross section intervals shall be sufficient to develop accurate contours to the intervals specified. If cross section data is used to develop a DTM, sufficient data shall be collected between sections to accurately define horizontal and vertical breakline data. All bridge/culvert data shall conform to standard operating procedures for bridge and culvert data. All points set or collected shall be noted in a field book with point number, description of point, and point code and corresponding instrument setup data. Positional tolerances of collected points shall correspond to accuracy standards as outlined in [Table 2-1 of EM 1110-1-1005, Dated 31 August, 1994](#). Level of project accuracy shall be specified in the scope of work. All topographic surveys shall be subject to map checks as outlined in the referenced EM. Target Map Scale, ASPRS Class, and Target Contour Interval will be specified in the scope of work

Deliverables:

1. All field books used in the survey development. Field books shall be submitted in both hardcopy and as scanned Adobe Acrobat pdf format.
2. All monument recovery forms. Monument recovery forms are to be completed at the time of monument recovery. All field documentation forms shall be scanned and submitted as Adobe Acrobat pdf files.

3. If GPS is used, all raw and processed data files shall be submitted along with hardcopy printouts of the GPS message files. (Trimble)
4. A 3-d alignment file shall be developed for original, unadjusted traverse data. An alignment file shall also be developed for adjusted traverse data. ALL adjusted control information and or baseline shall be shown in the design file. All monuments located during reconnaissance and or used or set shall be shown in the design file.
5. Vertical control runs shall be submitted with field books checked and reduced in the field. Loop closures shall be calculated prior to leaving the field. All vertical control readings shall be entered in an Excel spreadsheet and checked against the field-calculated data prior to development of level abstracts.
6. Profiles shall be developed for all ditch centerlines, right and left top bank lines, water surfaces, roadway centerlines, and other transportation feature centerlines. Profiles shall be plotted at 1"=100' horizontal and 1"=10' vertical exaggeration. Ditch or creek centerline and right and left top bank centerlines shall be contained on the same profile for comparisons. Feature points along the profiles shall be annotated. Culvert inverts, low chords, and roadway centerline elevations shall be shown on the profiles where they cross the drainage feature. Likewise, drainage feature elevations shall be annotated and plotted on profiles of roadways and transportation features.
7. An overall plan view design file shall be submitted containing all horizontal and vertical control information. Baseline points shall be connected with labeled lines. Vertical control points shall be connected with arrows noting the directions of the runs.
8. ASCII XYZ data files shall be submitted for all points set or collected. Data files shall contain the point number, northing, easting, elevation, point code, point description.
9. If a DTM is required, an inroads DTM file shall be submitted.

References:

[EM 1110-1-1005, Dated 31 August, 1994. Topographic Surveying](#)