

Topographical Survey Specification

General

The distinction between 2D and 3D data is most important. Both a traditional 2D detail drawing and a 3D Ground Model are required.

Data Format

All drawings will be provided in AutoCAD DWG format. The 2D drawing will have the traditional presentation with all detail shown including hedges etc. drawn with the aid of complex line type enhancements etc. Spot levels shall be represented as blocks that have 3 attributes (level, number and code). All linear survey features should be represented as 2D Polylines and not lines or arcs. These 2D polylines may have a 'Fit Curve' applied by the "PEDIT" command; spline fit will never be used. Drawing entities, polylines, level and feature blocks will be supplied on the layers specified below.

3D ground models supplied in 3D AutoCAD drawing format will have the same format as the 2D drawings above. (2D polylines will not be included in the ground model) 3D polylines shall not be curve fitted; no interpolated points shall be included in the Model. Curved features shall be surveyed at intervals to accurately represent the 'feature'.

The 3D data is to be used to create a triangulated surface model. Sufficient data shall be collected to accurately represent the surface.

Changes in slope direction and Linear features will be represented by 3D Polylines including channel, centreline, top of kerb, back of footway, base and top of wall (i.e. any linear feature). Spot levels with level blocks and point features will be represented by the appropriate block.

Project Control

1. The survey must be undertaken in a 3 dimensional format with the completed survey provided in both 2 dimensional and 3 dimensional formats. All features shall be surveyed in 3 dimensions and this data will be maintained in the supplied 3D drawings. Kerb top strings should be taken 25mm back from the corresponding point on the adjacent channel string, care shall be taken not to allow crossing break lines, and these should not exist in well organised 3D data. Surface features such as Man Hole covers less than 0.4m² area should be picked up with a single central point. Larger features are to be surveyed with 3 or 4 points.
2. Information to be provided in metres to three decimal places.

3. The planimetric control shall be a plane rectangular grid with an origin defined by the nearest National Grid 10 km intersection to the south-west of the survey area and with the same orientation as the National Grid.

Permanent Ground Markers shall be stable for a period of 5 years and shall be of a suitable construction. A schedule of the Permanent Control Stations shall be prepared giving the following information:-

- a. Station designation
 - b. Plan co-ordinates
 - c. Level value (where applicable)
 - d. Description and Location diagram
4. Level Datum
 - a. All levels shall be related to ordnance datum
 - b. The value of the datum benchmark to which the survey is related shall be confirmed by check levelling to other existing benchmarks.
 - c. The location, description and value of each datum benchmark used shall be quoted on a key plan or data file
 - d. Null Levels shall have a z value of -999.000.

Accuracy

1. The planimetric co-ordinates of directly surveyed points shall be correct to $\pm 10\text{mm}$ rmse on carriageways and hard surfaces, and $\pm 10\text{mm}$ rmse on other surfaces, when checked from the nearest control point.
2. The levels of directly surveyed points shall be correct within $\pm 6\text{mm}$ rmse on carriageways and hard surfaces, (except on ploughed or otherwise broken surfaces), when checked from the nearest control point.
3. Features which cannot be surveyed to the specified accuracy without extensive clearing shall be treated in one of the following methods:
 - a. Surveyed approximately and annotated/labelled accordingly.
 - b. Cleared by, or with the authority of, the Survey Advisor or Design Organisation.
4. The co-ordinates of key points as defined above shall be accurate to within $\pm 5\text{mm}$ rmse when from the nearest control point.
5. The spacing of points on planimetric features shall be such that interpolated points are correct to within twice the accuracy specified above.
6. The spacing of levels shall be such that the ground configuration, including all discontinuities, is correctly represented except for minor features such as small banks and ditches which are insignificant in terms of earthworks quantities.

7. The spacing of levels shall be such that interpolated points shall not deviate from the true ground surface by more than $\pm 10\text{mm}$ on hard or well defined surfaces, and by more than $\pm 20\text{mm}$ on other surfaces

Data Presentation

2D Data

A 2D AutoCAD DWG format drawing in Release 2008 compatible format will be provided to the specification given above. All drawing entities shall be 'Colour ByLayer' and 'Line Type ByLayer' and arranged on layers.

3D Data

The survey data is to be provided digitally on CD media or by email in:-

1. AutoCAD 3D DWG format, Release 2008 compatible.

The drawing should be saved in Model Space with World UCS.

Scale and Units, "scale" shall be 1 drawing unit = 1 metre and expressed to 3 decimal places.

Angular orientation shall be in degrees, minutes and seconds with 0 degrees North "up the screen" (i.e. Whole Circle Bearings).

Features Surveyed

1. Highway
 - a. Carriageway Centre Line
 - b. Carriageway Camber changes
 - c. Carriageway Channels
 - d. Top of Kerb
 - e. Combined Kerb and Drainage Channel Blocks
 - f. Back of Footway
 - g. Verge extents
 - h. Highway Boundary
 - i. Dropped Crossings
 - j. Changes in Slope direction
 - k. Linear surface features, Buildings, walls, doors, (including openings, external stair features), fences etc.
 - l. Ends of drives, building thresholds and DPC where visible.
 - m. Street furniture, Man holes, Bollards, Columns etc.

2. Buildings

Building survey to include all elements of each floor of the buildings internal structure such as column and beam sizes and heights, heights to underside of ceiling and roof structure, sill heights, window/door head heights, ceiling heights, floor to floor heights and floor thickness where accessible (behind suspended ceilings etc). Manhole covers to be lifted and invert levels to be recorded.

Wall thickness and material construction, roof construction including all rooflights, ducts, vents etc.

All elevations including masonry details, cladding details, features, cornices, including fenestration details.

3. Drainage

All equipment associated with drainage shall be picked up on the survey and identified. All manholes and inspection chambers should be lifted wherever possible and the invert levels, together with cover levels, recorded. Size and direction of pipework should also be identified if practical.

4. Other

- a. All physical surface features with brief description of surface finishes.
- b. All visible drainage features.
- c. All visible surface Chambers and Statutory Undertakers equipment (labelled if known).
- d. All building footprints with a brief description of usage.
- e. All trees with a trunk diameter greater than 150mm must be surveyed individually unless otherwise stated.
- f. A footprint and description of extensive vegetation.
- g. All boundaries, fence, walls and hedges etc with height indicated.

The relevant Engineer at Sanderson Associates must be contacted prior to the commencing of survey work on site. Where access to land in private ownership is required for surveying purposes, the contractor shall be responsible for giving notice and obtaining any permission necessary. Where access is refused, the Survey Contractor shall immediately notify Sanderson Associates' Engineer.