

**SPECIFICATIONS FOR TOPOGRAPHICAL  
SURVEYING WORKS**

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## TABLE OF CONTENTS

1.	Levels & Works	8f - 2
2.	Longitudinal Section	8f - 2
3.	Detailed Survey Plan (Flat Plan)	8f - 3
4.	Plans for Acquisition	8f - 3
5.	Contour Plans	8f - 4
6.	Details of Structures	8f - 4
7.	Drawings to be produced	8f - 4
8.	Bench Marks & Survey control stations	8f - 5
9.	Level Datum	8f - 5
10.	Dimension	8f - 5
11.	Accuracies	8f - 5
12.	Supervision	8f - 6
13.	Final Drawings and Data	8f - 6
14.	Appendix A	8f - 7

# TOPOGRAPHICAL SURVEYING WORKS

## 1. Levels & Works

All levels shall be with respect to Mean Sea Level (M.S.L.) and connected to the Survey Department Bench marks and level lines shall be closed by taking fly levels up to the permanent bench marks.

The topographical surveys shall comprise of the following but not limited to;

- Survey plans for intake sites, pump house sites, ground/elevated reservoirs sites, office and stores sites etc., with contours with all available details.
- Detailed survey plan (Flat Plan) and longitudinal section along the proposed pipe routes.
- Bridge crossing plans
- Key plan including all the roads and sites surveyed.
- Plans for acquisition
- Contour plans

## 2. Longitudinal Section

Levels of the longitudinal sections shall be taken at 30 m intervals along existing roads including culvert details & Nos, flyovers, bridge crossings, bends, Byroads Node Nos. Junctions, special places, Type of Roads, Pathways or pipe line routes and they should be in accordance with the attached sample survey drawing (Refer Appendix A to the Specification). In cases where sudden changes occur such as steep slopes, levels at shorter intervals and at change points shall be taken.

### LS for Sewerage

Spot levels will be taken at 20 m interval. Cross sections shall be taken at 20m interval and shall be extended up to the adjoining properties on either sides of the road with minimum one elevation within the property.

### **3. Detailed Survey Plan (Flat Plan)**

The flat plan should have following details.

- a. Roads with names, junction names, names of special places like school, flyover, police etc., should be clearly marked. Canals, drains and streams both earthen and built up including ponds, marshes, etc. should also be accompanied. The plan area to be extended up to 4 m across either side of the edge of the road or carriageway.
- b. For bridges; Bridge No., No. of spans, length of span, width of carriage way, top and bottom elevations of slab/beams on a cross section of the bridge drawn to a scale specified in Cl. 7 hereof. The plan area to be extended up to 30 m across either side of the edge of the bridge for the full length + 20 m along either side of the bridge.
- c. For culverts; Culvert No., No. of rows/opening, diameter or internal width and height of each row/opening, height of deck, length between head walls and upstream & downstream levels. The plan area to be extended up to 10 m across either side of the edge of the culvert for the full length + 10 m along either side of the culvert.
- d. For crossings of any other structures/ features, detail plan to be given comprising all sides of the structure/feature to an extent of 10 m all sides from the edges.
- e. The levels and distances to be marked on the plan for enabling to account all special features and level changes within the considered area.
- f. The data provided on the plan shall be sufficient for the detail design of bridge crossings and culvert crossings.
- g. Existing water supply/sewer lines, cables, electrical/telecom posts, manholes, drains and gullies, location of gates and access to properties should be properly marked.
- h. Manholes should be described with the ownership such as SLT, NWSDB etc.,
- i. Any other important data useful for designing the pipe line shall also be included.

### **4. Plans for Acquisition**

The survey of the required land shall be done to the Survey Department Specifications to facilitate the requirement of Section 2 & Section 05 of the land acquisition act. The outer boundaries of these lands should be defined with boundary stones.

## 5. Contour Plans

The contour surveys shall show all variations on the terrain and all natural & artificial features. The contour interval shall be decided according to the terrain & shall not be less than 0.1 m

## 6. Details of Structures

The dimensions such as height, width & length and the invert and sill levels, etc. of permanent bridges, culverts and any other structures should be taken with high accuracy.

Details of all Bridges shall be indicated on drawings drawn to a suitable scale except for standard culverts so that the pipe line proposed could be drawn with support details.

## 7. Drawings to be produced

The survey drawings produced according to the scope of work, shall be supplied on A3 sized drawings with the soft copies in AutoCAD format as described below.

### a. Longitudinal Sections

Horizontal	1:2500	or	1:2000
Vertical	1:500		1:200

### b. Detailed Survey Plan (Flat Plan)

An appropriate scale to suit in order to show full length of longitudinal section in the A3 drawing but not less than 1:200 scale.

### c. Contour Plan

The contour plan shall be to a Horizontal scale of 1:250 or larger and the contour interval shall not be less than 0.1 m.

### d. Acquisition plan

Scale : 1:1000 or 1:500.

All the details shall be indicated on the plan necessary for acquisition.

### e. Key Plan

Scale : 1:10,000 or 1:5000

All the roads and sites surveyed shall be included.

Node Nos and BM Also should be included.

## 8. Bench Marks & Survey control stations

- i. Permanent bench marks tied to MSL and connected to the Survey Department bench marks should be established along the survey route approximately 1 km distance apart.
- ii. All bench marks should be established with 10mm diameter steel pin embedded in concrete so positioned to be readily accessible ,clear of traffic and water logged areas. Location of these bench marks should be sketched with tie measurements.
- iii. All such survey control stations should be established permanently and the location of these stations should be sketched with tie measurements.

## 9. Level Datum

- i. Levels mentioned on the drawings should be based on heights above Mean Sea Level.

## 10. Dimension

All dimensions should be in Metric Units and should have a minimum of two decimals.

## 11. Accuracies

- i. Horizontal control error of closure  $= C\sqrt{(N^2 + E^2)}$  meters  
 $= 1.58C\sqrt{(N^2 + E^2)}$  meters

Where N =Northing error of coordinate

E = Easting error of coordinate

- ii. Vertical control error of closure should be less than  $C\sqrt{K}$  centimeters

C = 0.012

K = distance in kilo meters

## **12. Supervision**

All related surveying and leveling works shall directly be supervised by the NWSDB during the execution and after the completion of the work. Hence it shall be the contractor's responsibility to provide all necessary Survey Department Bench mark values and control station values with location sketches and obtain approval from the NWSDB. All other newly constructed temporary bench marks and control stations shall be referred there to.

## **13. Final Drawings and Data**

All field notes of surveying, leveling and coordinate sheets, plotting sheets and calculation sheets to be submitted in legible form to the NWSDB and remain the property of the NWSDB.

All drawings (LS, flat plans, contour plans, acquisition plans, bridge crossings, etc.) data shall also be submitted in soft copy.

All the plans and sketches should be produced on high quality drawing paper of Gauge 112 gsm and the plotting should be in quality acceptable to the Engineer. All the drawings shall be submitted in a CD in Auto CAD format.

Bench file to be contained all bench marks used.  
Sketched with tie measurements and values in a suitable format.

## Appendix A

**Note:** *Design Engineer shall have to attach the relevant format of the Longitudinal Section drawings and other details relevant to the contract.*