Method Statement

*Topographic Survey*
*And*
*Hydrographic Survey*
1.0 INTRODUCTION

This documentation will summarize the procedure for the topographic and hydrographic work to be conducted by Infratech ASTM Co., Ltd for the construction of

2.0 SCOPE OF WORK

Scopes of work are listed below:

3.0 TOPOGRAPHIC SURVEY

DEFINITIONS
A. Bench Mark is a relatively permanent material object, natural or artificial, bearing a marked point whose elevation above or below and adopted datum is known.
B. A Contour is an imaginary line on the ground, all points of which are of the same elevation above or below a specified datum.
C. The Parcel is the area designated by the client and is usually, but not necessarily, given by a legal description of the property.
D. Utilities are services provided by governmental and private entities that provide the following: electric power, telephone, water, sanitary and storm sewer, gas, etc.

3.1 PROPOSE
The purpose of a TOPOGRAPHIC SURVEY is to gather survey data about the natural and man-made features of the land, as well as its elevations. From this information a three-dimensional map may be prepared. You may prepare the topographic map in the office after collecting the field data or prepare it right away in the field by plane table. The work usually consists of the following:

1. Establishing horizontal and vertical control that will serve as the framework of the survey by the theodolite and leveling instrument.
2. Determining enough horizontal location and elevation (usually called side shots) of ground points to provide enough data for plotting when the map is prepared
3. Locating natural and man-made features that may be required by the purpose of the survey
4. Computing distances, angles, and elevations
5. Drawing the topographic map Topographic surveys are commonly identified with horizontal and/or vertical control of third- and lower-order accuracies.

3.2 ACCURACY
A standard of accuracy requires concomitant Weld procedures, which were followed as rigorously as possible under conditions imposed by weather and personnel. To assure adequate and proper control for mapping topographical and planimetric features, such as tombs and temples, the standards adopted were second-order (modified):

- Number of courses between azimuth checks: 25 or less.
- Azimuth closure not to exceed 3 sec/station.
- Position closure after azimuth adjustment: 1:10,000.
- Distance measurement accurate within 1:15,000.
- Minimum distance to be measured with DI-10: 200 m.
- Minimum number of direction observations with a one-second theodolite: 4 positions of circle.
- Differential leveling-loop closure not to exceed 0.008 m multiplied by the square root of the loop length in km.

3.3 VERTICAL MEASUREMENTS
Elevations will be determined by differential leveling and by trigonometric resolution of slope-distance measurements and zenith angles. Three-wire differential levels will be run with a pendulum level. Each line will be run ahead and back to form individual closed loops between each succeeding pair of turning points. In areas of marked relief, differences in elevation between traverse points will be determined solely by trigonometric means.

3.4 CLOSURES
All lines, both differential and trigonometric, will be closed either in loops or upon other lines. The differential lines closed at second-order accuracies and the trigonometric lines closed within third-order values.

3.5 SIDE SHOTS in UNSAFE ZONE
To collect data in unsafe zone (explosive yard, strike or protest area and restrict area). Arial photographing by shooting digital camera from remote control helicopter will be utilized;

a. The camera model have to be NIKON model D3 with SLR (single lens reflection) or better since it has 12M pixels that may be sufficient for aerial photo at level 250 ft or less. (ASTM propose 8M pixels only)

b. The photo files should be raw files (not compressed files) in order to make finer details if we may need to zoom in later.

c. If their camera is not NIKON D3, it must have the same features as D3 include wireless linked from camera to the ground monitor (real-time).

Matching of control point between land survey and Arial map will be performed by the following software;
- Geotrans
- Adobe photoshop
- Google Earth
- AutoCAD

Illustration of work will be shown in the next pages.
3.6 REPORT

The following items may be included in the requirements to be shown on a topographic survey:

A. Boundary survey of the parcel. (Must comply with boundary survey standards)
B. Plot the location of easements and rights-of-way as shown on the recorded subdivision plat and all easements evidenced by a recorded document provided by the client. The reference book and page, or document number of each shall be shown.
C. Vicinity map with subject property highlighted.
D. Observable evidence of site use as a solid waste dump, sump or sanitary landfill.
E. Observable evidence of recent earth moving work, borrow or fill.
F. Location and the top elevation of soil borings or monitoring wells if ascertainable.

(Performed by others)
G. Cross-section of offsite drainage courses for engineering studies.
H. Location and elevation of at least one bench mark within the limits of the survey.
I. Existing contours shall not be drawn but the drawing shall show existing elevations in both directions over the parcel at 0.5 m. intervals in rough ground and 1.0 m. intervals on level ground and spot elevations at any abrupt changes.
J. Elevations at the inside of walk, top of curb, and gutter at approximately one inch (1") intervals at the final map scale.
K. Dimensions of curb, sidewalk, and gutter lines or ditch lines and centerline of all streets, alleys or roads adjoining the parcel. Indicate type of paving surface and condition.
L. Location, width and elevation at both ends of all existing sidewalks. Include a description of the kind and general condition of the sidewalk.
M. Location, diameter, and species of all trees over a _____ inch diameter.
N. Perimeter outline only of thickly wooded areas unless otherwise directed.
O. Electric utilities – the location of power poles, guy wires, anchors, vaults, etc., on the parcel or in the streets, roads, alleys, or railroad right of way adjoining the parcel.
P. Storm, sanitary or combined sewers – the location of all observable manholes and other structures such as culverts, headwalls, catch basins and clean-outs on the parcel or in streets, roads alleys or railroad right of way adjoining the parcel. Include elevations of the top and bottom of manholes and catch basins. Show type, size, direction of flow and invert elevation of all pipes or culverts.
Q. Water – the location of any water valves, standpipes, regulators, fire hydrants, etc. that are visible on the parcel.
R. Gas – the location of all valves, meters, and gas line markers that are visible on the parcel. Show elevation on top of any valves.
S. Telephone – the location of all poles, manholes, boxes, etc that are visible on the parcel.
T. Street lighting – the location of all lamp poles, boxes etc
U. Heating – the location of all steam manholes and vaults that are visible on the parcel.
V. Location and dimensions of any existing buildings, tanks, fences,miscellaneous structures, driveways, or other obstructions on the parcel.
W. Location and description of any building or major structure on adjoining land that is not more than _____ feet outside the parcel being surveyed
X. Location and elevation of the 100 year floodplain, if applicable for the surveyed parcel.
Y. Location of visible rock formations.
Z. Information about the utilities providing service to the parcel. This shall include as a minimum the name of the corporation, address, phone number,fax number and type of service.

3.7 ELECTRONIC DATA DISTRIBUTION
Digital data information will be stored in ACAD format and distribute to client in a CD-ROM . 3 set Hard copy of A1 size will be printed and submit to the client.

4.0 HYDROGRAPHIC SURVEY IN SEA WATER
The hydrographic surveyor shall produce a Method Statement for each hydrographic survey area. The Method Statement is to clearly set out the purpose of the survey, personnel,equipment, calibration methods and calibration frequency, processes used in reduction to sounding datum and the method of classification of results.
Where calibration or testing of equipment is carried out other than during the course of the hydrographic survey, the Method Statement shall refer to these calibrations. Calibrations of this nature shall be fully documented and archived.

The Method Statement shall as a minimum address the following points:

4.1 Horizontal Positioning
- Control points used to connect the hydrographic survey to horizontal datum.
- The method or methods used to obtain horizontal position.
- Calibration methods and calibration frequency.
- Process to be employed for dynamic calibration of the survey system.
- Rejection criteria used for horizontal position data.

4.2 Vertical Datum
- Control points used to connect the hydrographic survey to vertical datum.
- Location of Tide Gauges
- The method of measuring tidal heights for the duration of the hydrographic survey and throughout the survey area.
- Calibration methods and calibration frequency

4.3 Depth Measurement
- Survey Vessel Description (Length, Beam, Hull Type etc)
- The method or methods used to determine least depths shall be clearly stated.
Where necessary the manufacturer’s specifications shall be attached or referred to.
- Echo sounder frequency(s).
- Method and frequency of echo sounder calibration, including all associated equipment.
- Method used to negate or compensate for transducer motion (heave).
- Limiting sea conditions that would affect the quality of the survey.
- Settlement/squat of transducers at survey vessel’s sounding speed.

4.4 Seabed Coverage
- Methodology used to ensure the minimum seabed coverage criteria has been met.
- The echo sounders pulse repetition rate at anticipated survey
- Beam widths – along track and across travel.
- The speed over ground of the survey vessel.
- Sounding line spacing and orientation.
- Process to be used for sounding berth and channel limits (ie toe lines, berth faces).
- Rejection criteria for line running.

4.5 Sounding Reduction and Data Presentation
- The method used to reduce raw data to sounding datum.
- Principle and method used in sounding selection.
- Principle and process for rounding of selected soundings.
- Positioning of selected soundings.
- Method of contour generation.
- Scale of plans.
- Digital format of final data.

4.6 SURVEY REPORT
A survey report is mandatory when the completed hydrographic survey does not comply with the Method Statement. When the completed hydrographic survey complies with the Method Statement the information shown in the title block on the Survey Plan (Section 6) will suffice for the survey report.
As a minimum, the survey report shall address the following:
- The date(s) during which the hydrographic survey was carried out.
- The hydrographic surveyor responsible for the hydrographic survey.
- The variation of the hydrographic survey from the Method Statement.
- Survey Plan reference numbers.
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