GIS Data Hub
Data Collection Specification - Part 1

1 Introduction

This specification sets out the standard and quality of as-constructed data to be submitted by the Contractor for all features forming the GIS Data Hub. The list of layers that is required to be captured is shown in Section 16.

2 Document Usage

This document is the property of LTA. Any enquiry should be directed to the Road Information System (RIMS) Unit.

3 Document Updates

This document shall be reviewed on an annual basis or whenever there are major changes in the IM8F clauses.

4 Intended Audience

This procedure applies to all contractors/consultants/surveyors who collect data on road features forming the GIS Data Hub.

5 Document References

IM8F Information Management - Policy on Data Administration

This specification shall be read in conjunction with the specification on As-Constructed Drawings and other contract documents (if applicable).

6 Version of Specification

The Contractor shall check with the Authority for the latest version of the GIS Data Hub Data Collection Specification to be used before the commencement of actual work. The latest version of this specification is published at the LTA website at http://www.lta.gov.sg/content/ltaweb/en/industry-matters/development-and-building-and-construction-and-utility-works.html

7 Responsibility

The Survey Consultant shall carry out the survey and collection of the field data and certify the correctness of the data to ensure that all requirements in this specification are strictly adhered to.

8 Data Quality

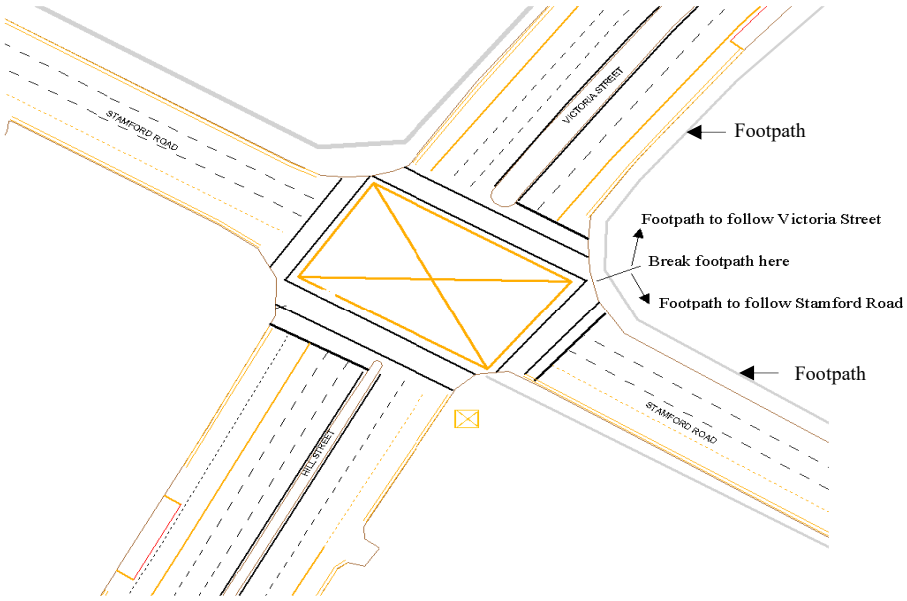
8.1 Accuracy

The data submitted shall be within the prescribed allowable tolerances as tabulated below:

8.1.1 Tolerances

Item		Description
Location	Kerblines RTS lines RTS Stations	The features shall not have a co-ordinate error of more than **± 0.03 metre** on ground. The co-ordinates of the curved linear features shall be surveyed as near as possible and sufficient data to define the curve shall be presented to reflect their actual alignment or curvature. Linear features (except for kerbline) that span across different roads are to be captured as separate records [1].
	All other layers	The location shall be within **± 0.5 metre** on its relative position with reference to the sides of the road surveyed.
Linear Measurement		All linear measurements (e.g. height, width) of inventories shall be within the accuracy of **± 0.02 metre**, unless otherwise stated in their individual inventory specification.
Bearing Measurement		The bearings of the inventory items where orientation is required shall not deviate by more than **±3°**.
Error in data		The total number of inaccurate or missing records in each inventory item submitted shall be within **± 1%** tolerance.

Note [1] - Please see illustration below



8.1.2 Topological Rules

The topology rules that apply to different layers are as listed below. The as-built data submitted must not violate these topological rules.

Layer Name	Topology rules
Detector loop	Must not overlap
Footpath	Must not overlap Must not self intersect
Kerbline	Must not overlap Must not self intersect Must not have dangles
Lane marking	Must not overlap Must not self intersect
Pedestrian Overhead Bridge/ underpass	Must not overlap
RTS line	Must not overlap Must not self intersect Must not have dangles
RTS Station	Must not overlap

8.2 Completeness

All mandatory attributes in each layer are to be updated. Please refer to Section 16 for the list of mandatory fields. Mandatory fields are those where "Allow Null" is set as No.

For mandatory fields where the information is not available on site (e.g. no number on lamp post or no number on control box etc.), update the value as "UNK" for string fields and "000" for numeric fields.

8.3 Consistency

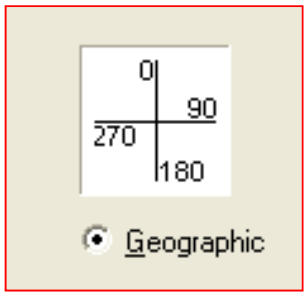
Data is consistent if it is represented in the same format or within the same value range, where the meaning of the valid values is the same for like data in all layers. Please refer to Section 16 for the list of valid values for the various GIS Data Hub layer fields.

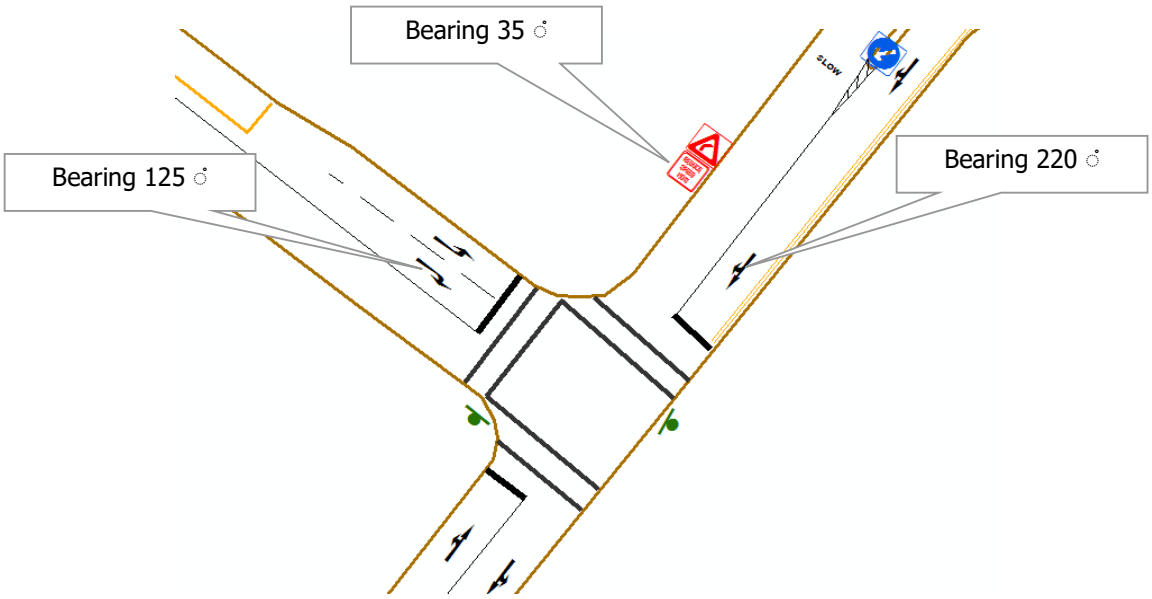
8.4 Timelines

The as-built data shall be submitted within 2 months from the completion of the project.

9 Bearing Format

Some of the road inventory layers require bearings to be captured. The bearing of the inventory items should follow the geographical bearing obtained from survey measurement. Some examples are shown below:





10 Data Format & Conventions

The Road Inventory data shall be submitted in digital format.

10.1 Graphical Data

The data submitted shall comply with one of the following formats and shall be readable by the ESRI Arc GIS Version 9.3.1

(a) ESRI Personal Geodatabase (mdb) format;
(b) ESRI Shape (shp) file 2D format (this format may truncate the attribute field names to the first 10 characters of the field name)

10.2 Naming Convention

The data submitted shall follow the following directory/file structure if multiple files are submitted:

yyyymmdd	-	date of submission (directory)	eg. 20060901
xxxxxxxx	-	inventory type (directory)	eg. kerbline
yyyyyyyy	-	version or release number (if any)	eg. V1.1

The name for the data files submitted (mdb/shp table names) must follow the layer names as listed in Section 16.

11 Spatial Parameters

All co-ordinates shall be based on the **ISN (SVY 21) co-ordinates system** used by the Singapore Land Authority.

All data submitted must have the following set of spatial parameters which is currently in use by the Singapore Land Authority. (These parameters are set in the sample personal geo-database file (.mdb) or the sample shape file that will be provided by the Land Transport Authority.)

11.1 Horizontal Coordinate system

Projected coordinate system name: SVY21
Geographic coordinate system name: GCS_WGS_1984
Details
Map Projection Name: Transverse Mercator
Scale Factor at Central Meridian: 1.000000
Longitude of Central Meridian: 103.8333333333333
Latitude of Projection Origin: 1.3666666666666667
False Easting: 28001.642000

False Northing: 38744.572000

11.2 Planar Coordinate Information

Planar Distance Units: meters
Co-ordinate Encoding Method: coordinate pair
Co-ordinate Representation
Abscissa Resolution: 0.000026
Ordinate Resolution: 0.000026

11.3 Geodetic Model

Horizontal Datum Name: D_WGS_1984
Ellipsoid Name: WGS_1984
Semi-major Axis: 6378137.000000
Denominator of Flattening Ratio: 298.257224

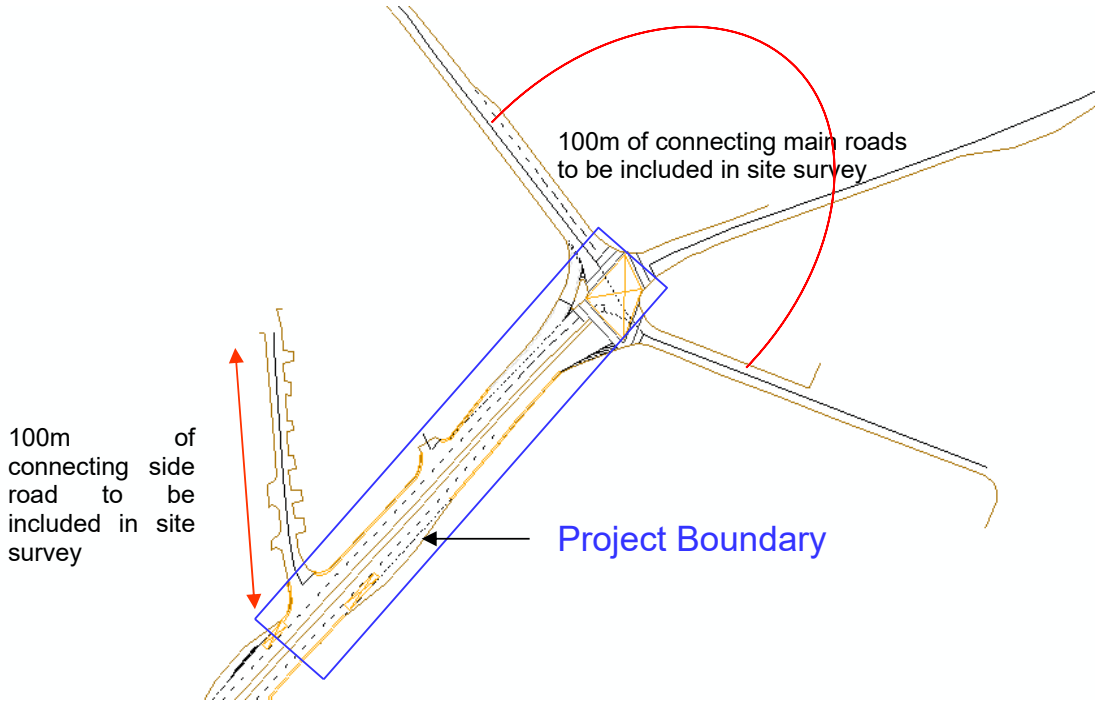
11.4 Altitude System Definition

Resolution: 1.000000
Encoding Method: Explicit elevation co-ordinate included with horizontal co-ordinates
Bounding co-ordinates
Horizontal
In decimal degrees
West: 103.621029
East: 104.021199
North: 1.468862
South: 1.260786
In projected or local co-ordinates
Left: 4375.673403
Right: 48907.968763
Top: 50044.786795
Bottom: 27037.757530

12 Extent of Survey

When the stretch of road(s) being surveyed connects with other road(s) - either main or side roads, the survey shall include at least 100m of these connecting road(s).

When surveying localised works where there are **changes to kerbline**, e.g. pedestrian overhead bridge/underpass, bus shelter etc., the survey corridor shall include 100m from both side of the item being surveyed. If there is no change to kerbline, then 10m from both side of the item suffice. Additionally, the survey corridor shall include 100m from both side of the original item for re-location cases.



13 Supporting files

The LTA will provide the following supporting files to the survey consultant prior to the commencement of GIS Data Hub survey works:

i. Symbology files (*.lyr) for personal geodatabase file and symbology files (*.lyr) for shape file in Arc GIS Version 9.3

ii. Font files (*.ttf) containing road inventory symbols (these font files have to be installed in the font directory of the personal computer for proper display of the road inventory symbols)

iii. Excel file (*.xls) containing Road Names and Road Codes to assist in filling up the information required for the new RD-CD field which is added to all the inventory layers.

14 Media of Submission

14.1 Softcopy Submission

The data is to be submitted in CD ROM. All media shall be digitally labelled with the Contract Number, Project Title and date of submission in yyyymmdd format.

14.2 Hardcopy Submission

The Contractor shall also submit three complete sets of the GIS SURVEY PLAN (hardcopy) at a scale of 1:500. Each inventory is to be represented using the correct symbology and in the correct orientation. A Reference scale of 1:1000 has to be set for correct representation of symbology. Please refer to the Part 2, Appendix – 19. Inventory Items and Symbol Representation. The symbology files mentioned in Section 13 shall be used for this purpose.

14.3 Video Submission

The Contractor shall also submit a colour video coverage reflecting the site conditions of the area being surveyed. The coverage extent is as specified in clause 12 of the Specification.
All road inventory items surveyed shall be clearly picked up on the video. For example, traffic signs should be clear and legible.

The video captured should be submitted in VCD in either wave or mp3 format and indexed by road names. The date and time stamp of the video captured must be visible on playback.
For two-way roads without central divider, separate videos should be submitted for each direction of traffic flow. For major roads/expressway where the carriageway is separated by a central divider, all inventory items on the divider must also be captured in the video.

15 Further Information

Training courses on Arc GIS are available from ESRI South Asia Pte Ltd. They are contactable at training@esrisa.com.

Training courses on GIS related surveys are available at GPS Lands (Singapore) Pte Ltd. They are contactable at enquiry@gpslands.com.