

The Study
for
The Establishment of The Spatial Data Framework
for
The City of Nairobi
in
The Republic of KENYA

Data Specification for Topographic GIS Map
Rev 1.0

March 2005

JICA Study Team

CONTENTS

1. General	3
1.1 Map (Spatial) data	3
1.2 Attribute data (table)	3
1.3 Dataset	3
2. Database Design	5
2.1 Administrative boundary	5
2.2 Annotations	6
2.3 Buildings	7
2.4 Road centerline	8
2.5 Control point	8
2.6 Map index	9
2.7 Small object	9
2.8 Surround	10
2.9 Symbol	10
2.10 Topographic Features	11
2.12 Vegetation	13
2.13 Water area	14

1. General

1.1 Map (Spatial) data

(1) Data Model (Data format)

All GIS database shall be developed by ArcGIS Personal Geodatabase format

(2) Coordinate System

The following items shall be used

- Projection system is UTM(Universal Transverse Mercator) in Zone 37
- Origin of Meridian is 39° East of Greenwich
- Origin of Latitude is Equator
- Scale factor at origin is 0.9996
- False easting is 500,000m
- False northing is 10,000,000m
- Unit of measurement is Meter
- Spheroid is Clarke 1880 Arc
- Semi-major axis is 6,378,249.145m
- Inverse flattening is 293.465

(3) Extents of Map Coordinate

Min. X is 240,000

Max. X is 292,000

Min. Y is 9,844,000

Max. Y is 9,896,000

1.2 Attribute data (table)

All attribute data shall be developed by Microsoft Access

1.3 Dataset

The Geodatabase shall be organized around 13 datasets: Adm_bnd, Annotation, Buildings, Centerline, Control_pnt, Map_index, Small_obj, Surround, Symbol, Topographic, Transportation, Vegetation, Water_area. In addition, each dataset shall include some feature classes (refer to Table 1).

Table 1 Contents of Geodatabase

Name of Personal Geodatabase	Name of Feature Dataset	Name of Feature Class	Data Description
Nairobi_GISDB	Adm_bnd	Constituency_poly	Polygon data of constituency boundary
		Location_poly	Polygon data of location boundary
		Sublocation_poly	Polygon data of sub-location boundary
	Annotation	Annotation_pnt	Point data of annotation
	Buildings	Buildings_pnt	Point data of building symbol
		Buildings_line	Line data of gate, etc
		Buildings_poly	Polygon data of building
	Centerline	Centerline_line	Line data of center road
	Control_pnt	Control_pnt	Point data of control point
	Map_index	Each feature class includes a polygon showing the coverage of one map sheet.	
	Small_obj	Small_obj_pnt	Point data of small object
		Small_obj_line	Line data of small object
	Surround	Surround_line	Line data of surround
	Symbol	Symbol_pnt	Point data of symbol for open space
		Symbol_line	Line data of symbol for open space
	Topographic	Topographic_line	Line data of contour and geographical feature
	Transportation	Transportation_line	Line data of road, railway and those facility
	Vegetation	Vegetation_pnt	Point data of Vegetation
		Vegetation_line	Line data of Vegetation
		Vegetation_poly	Polygon data of Vegetation
	Water_area	Water_area_pnt	Point data of water area's object
		Water_area_line	Line data of water area
		Water_area_poly	Polygon data of lake, pond and big river

2. Database Design

2.1 Administrative boundary (Feature dataset: Adm_bnd)

2.1.1 Constituency_poly (Data type: Polygon)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#1)
Text_	Text	255	Name of constituency boundary
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)
Shape_area	Double		Area shall be calculated by ArcGIS (unit is sq. m)

#1 Layer code

Code	Item name	Category
110500	Constituency Boundary	Administrative Boundaries

2.1.2 Location_poly (Data type: Polygon)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#2)
Text_	Text	255	Name of location boundary
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)
Shape_area	Double		Area shall be calculated by ArcGIS (unit is sq. m)

#2 Layer code

Code	Item name	Category
110800	Location Boundary	Administrative Boundaries

2.1.3 Sublocation_poly (Data type: Polygon)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#3)
Text_	Text	255	Name of sublocation boundary
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)
Shape_area	Double		Area shall be calculated by ArcGIS (unit is sq. m)

#3 Layer code

Code	Item name	Category
110900	Sub-location Boundary	Administrative Boundaries

2.2 Annotations (Feature dataset: Annotation)

2.2.1 Annotation_pnt (Data type: Point)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#4)
Text_	Text	255	Annotation

#4 Layer code

Code	Item name	Category
910200	Province or Region	Administration
910300	District	
910500	Constituency	
910800	Location	
910900	Sub Location	
911000	Forest Name, Green Reserve and National Park	
920100	Road Name (Main)	Transportation
920200	Road Name (Bitumen)	
920300	Road Name (Earth)	
920400	Bridge Name	
920500	Tunnel	
920600	Railway	
920700	Railway Station	
930100	Building Name	Building
940100	Small Object	Small Objects
950100	River (Double Line) (Whole)	Water Areas
950200	River (Double Line) (Half)	
950400	River (Single Line) (Whole)	
950500	River (Single Line) (Half)	
950700	Lake, Pond, Swamp	
952200	Dam	Objects Related to Water
952300	Water Fall, etc	
960100	Airport	Open Space
960200	Graveyard, Cemetery	
960300	Park, Ground	
980200	Control Point Height	Control Point
980300	Direct Leveling Point Height	
980400	Photogrammetric Point Height	
980500	Contour Height	
990100	Principal Point Name	Others
990200	Annotation of Explanation	

2.3 Buildings (Feature dataset: Buildings)

2.3.1 Building_pnt (Data type: Point)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#5)

#5 Layer code

Code	Item name	Category
350910	Post Office	Building Symbols
351410	Police Station	
351510	Police Post	
351610	Fire Station	
352010	Market	
352110	Mosque	
352310	Church	
352410	School	
352510	Kindergarten	
352610	Public Hall	
353010	Guest House	
353110	Health Center	
353210	Hospital	
353310	Dispensary	
353410	Bank	
354810	Factory	
355010	Power Substation	
356010	Petrol Station	
356110	Police booth	

2.3.2 Building_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#6)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#6 Layer code

Code	Item name	Category
340100	Gate	Gate, etc
340200	Pool	

2.3.3 Building_poly (Data type: Polygon)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#7)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)
Shape_area	Double		Area shall be calculated by ArcGIS (unit is sq. m)

#7 Layer code

Code	Item name	Category
300100	Permanent Building	Buildings
300200	Semi-Permanent Building	
300300	Temporary Building	
300400	Under Construction Building	

2.4 Road centerline (Feature dataset: Centerline)

2.4.1 Center_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#8)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#8 Layer code

Code	Item name	Category
212000	The Center of Road	Roads

2.5 Control point (Feature dataset: Control_pnt)

2.5.1 Control_pnt (Data type: Point)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#9)
Elevation	Double		Elevation of control point (unit is m)

#9 Layer code

Code	Item name	Category
730510	Bench Mark	Control Point
731110	Direct Leveling Point (Instrumental Height)	
731210	Photogrametric Spot Height	
731300	Grid Height	
819810	Point Arrow	Others
819910	Principal Point	

2.6 Map index (Feature dataset: Map Index)

Data table definition form

Field name	Field type	Field size	Remarks
MAP	Text	10	Printed map sheet code
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)
Shape_area	Double		Area shall be calculated by ArcGIS (unit is sq. m)

2.7 Small object (Feature dataset: Small_obj)

2.7.1 Small_obj_pnt (Data type: Point)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#10)

#10 Layer code

Code	Item name	Category
420111	Mausoleum	Small Objects
420211	Monument	
420311	Statue	
422110	Prominent Tree	
423210	Wind Pump	
423410	Chimney	
423511	Pylon	
423611	TV / Radio Wave Tower	
425110	Water Level Observatory	

2.7.2 Small_obj_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#11)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#11 Layer code

Code	Item name	Category
422500	Oil Tank	Small Objects
422800	Water Reservoir	
423100	Water Tank	
426100	Pipeline (on the ground)	
426500	Power Line	

2.8 Surround (Feature dataset: Surround)

2.8.1 Surround_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#12)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#12 Layer code

Code	Item name	Category
610101	Artificial Slope (Embankment)-upper line	Surround
610102	Artificial Slope (Embankment)-lower line	
610201	Artificial Slope (Cutting)-upper line	
610202	Artificial Slope (Cutting)-lower line	
610300	Riverbank	
611001	Covering(Coating)-upper line	
611002	Covering(Coating)-lower line	
611003	Covering(Coating)-upper line (width less than 0.4mm on the printed map)	
613000	Hedge	
614000	Walls, Fences	

2.9 Symbol (Feature dataset: Symbol)

2.9.1 Symbol_pnt (Data type: Point)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#13)

#13 Layer code

Code	Item name	Category
621110	Car Park	Symbols for Open Spaces
621210	Garden	
621310	Graveyard (Muslim)	
621610	Cemetery	

2.9.2 Symbol_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#14)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#14 Layer code

Code	Item name	Category
620101	Area Boundary	Symbols for Open Spaces
620102	Area Boundary (Invisible on the printed map, e.g. tunnel, overpass, underpass)	

2.10 Topographic Features (Feature dataset: Topographic)

2.10.1 Topographic_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#15)
Elevation	Double		Elevation of contour line (unit is m)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#15 Layer code

Code	Item name	Category
710100	Contour (Index) 10m	Contours
710200	Contour (Normal) 2m	
710300	Supplementary Contour 1m	
710400	Contour (Index) 10m (Form)	
710500	Contour (Normal) 2m (Form)	
710600	Supplementary Contour 1m (Form)	
710700	Depression (10m)	
710800	Depression (2m)	
710900	Depression (1m)	
720101	Steep Slope-upper line	Deformed Geographical Features
720102	Steep Slope-lower line	
721101	Cliff-upper line	
721102	Cliff-lower line	
721200	Outcrop Rock	
721300	Quarry	

2.11 Transportation (Feature dataset: Transportation)

2.11.1 Transportation_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#16)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#16 Layer code

Code	Item name	Category
210101	Real Width Road (Main)	Roads
210102	Real Width Road (Main) (Invisible on the printed map, e.g. tunnel)	
210201	Real Width Road (Bitumen)	
210202	Real Width Road (Bitumen) (Invisible on the printed map, e.g. tunnel)	
210301	Real Width Road (Earth)	
210302	Real Width Road (Earth) (Invisible on the printed map, e.g. tunnel)	
210401	Edge of Road	
210402	Edge of Road (Invisible on the printed map, e.g. tunnel)	
210501	Main Track	
210601	Other Tracks and Foot path	
210602	Other Tracks and Foot path (Invisible on the printed map, e.g. tunnel)	
210701	Road Under Construction	
210702	Road Under Construction (Invisible on the printed map, e.g. tunnel)	
210801	Sidewalk	
210802	Sidewalk (Invisible on the printed map, e.g. tunnel)	
210901	Stairs	
210902	Stairs (Invisible on the printed map, e.g. tunnel)	
211001	Traffic Strip	
211002	Traffic Strip (Invisible on the printed map, e.g. tunnel)	
220300	Bridge	
220500	Bridge for Main Track, Other Track and Footpaths	
221100	Flyover Bridge	
221500	Culvert (Photo-interpretation)	
221600	Culvert (Field identification)	
221903	Tunnel	Railway
230101	Railway (Main)	
230102	Railway (Main) (Invisible on the printed map, e.g. tunnel)	
230201	Railway	
230202	Railway (Invisible on the printed map, e.g. tunnel)	Railway Facilities
240100	Railway Bridge	
242400	Railway Station	

2.12 Vegetation (Feature dataset: Vegetation)

2.12.1 Vegetation_pnt (Data type: Point)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#17)

#17 Layer code

Code	Item name	Category
633510	Shrub	Vegetation
633610	Scattered Trees	
633710	Palms	

2.12.2 Vegetation_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#18)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#18 Layer code

Code	Item name	Category
630101	Vegetation Boundary	Vegetation
630102	Vegetation Boundary (Invisible on the printed map, e.g. tunnel)	
630201	Cultivated Land Boundary	

2.12.3 Vegetation_poly (Data type: Polygon)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#19)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)
Shape_area	Double		Area shall be calculated by ArcGIS (unit is sq. m)

#19 Layer code

Code	Item name	Category
631310	Cultivated land	Vegetation
631710	Coffee Plantation	
631810	Sisal Plantation	
632910	Turf	
633010	Grass	
633111	Forest	
633210	Thicket	
633310	Bamboo	
633610	Scattered Trees	
633910	Tree Swamp	
634010	Papyrus Swamp, Marsh, Bog	
634110	Seasonal Swamp	
634210	Sand or Mud (Inland)	

2.13 Water area (Feature dataset: Water_area)

2.13.1 Water_area_pnt (Data type: Point)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#20)

#20 Layer code

Code	Item name	Category
521211	Dam	Objects Related to Water Areas
522010	Borehole	
522210	Well	
522310	Spring	
524110	Direction of Flowing Water	

2.13.2 Water_area_line (Data type: Line)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#21)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)

#21 Layer code

Code	Item name	Category
510401	River (Single line)	Geographic Features Related to Water Areas
510402	River (Single line) (Invisible on the printed map, e.g. under bridge)	
510501	Seasonal River	
510502	Seasonal River (Invisible on the printed map, e.g. under bridge)	
521201	Dam-upper line	Objects Related to Water Areas
521202	Dam-lower line	
521501	Waterfall	
521502	Waterfall (Single river)	
521801	Watergate (Base part)	
521802	Watergate (Middle part)	

2.13.3 Water_area_poly (Data type: Polygon)

Data table definition form

Field name	Field type	Field size	Remarks
Layer	Text	255	Layer code (#22)
Shape_Length	Double		Length of each line segment calculated by ArcGIS (unit is m)
Shape_area	Double		Area shall be calculated by ArcGIS (unit is sq. m)

#22 Layer code

Code	Item name	Category
510201	Lake, Pond	Geographic Features Related to Water Areas
510301	River	