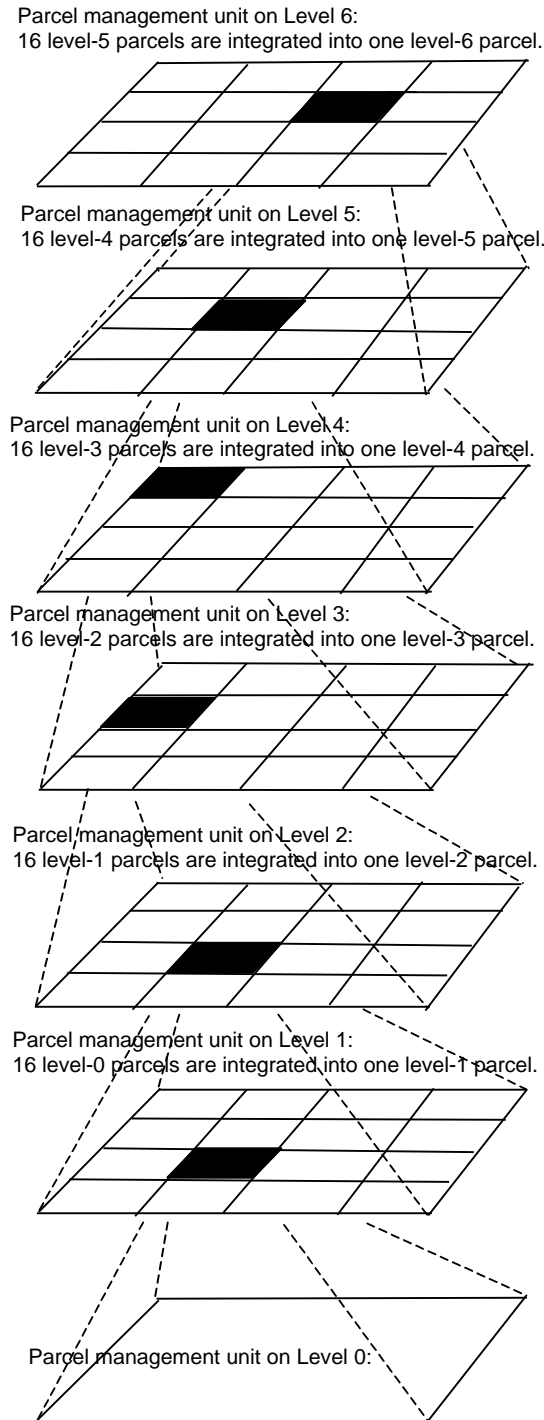


3. Hierarchical Structure of Maps

3.1 Parcel Hierarchical Structure of Main Map Data (used for Map Display and Positioning)

The main map data, which is used for map display and positioning, is managed as a collection of homogeneous parcels which consist of arbitrary rectangles called regular parcels. Parcels are integrated on higher levels according to the management units as shown below.



Level 6:

Block management unit	No. of regular parcels: 65,536 x 1 x 1 (65,536 parcels)
Parcel management unit	No. of regular parcels: 65,536 parcels
No. of managed parcels	1
No. of parcels per block	One block = one parcel

Level 5:

Block management unit	No. of regular parcels: 4096 x 4 x 4 (65,536 parcels)
Parcel management unit	No. of regular parcels: 4,096 parcels
No. of managed parcels	16
No. of managed parcels per block	One block = 4 x 4 parcels

Level 4:

Block management unit	No. of regular parcels: 256 x 16 x 16 (65,536 parcels)
Parcel management unit	No. of regular parcels: 256 parcels
No. of managed parcels	256
No. of managed parcels per block	One block = 16 x 16 parcels

Level 3:

Block management unit	No. of reference parcels: 16 x 16 x 16 (4096 parcels)
Parcel management unit	No. of regular parcels: 16 parcels
No. of managed parcels	256
No. of managed parcels per block	One block = 16 x 16 parcels

Level 2:

Block management unit	No. of regular parcels: 1 x 32 x 32 (1024 parcels)
Parcel management unit	No. of regular parcels: 1 parcel
No. of managed parcels	1,024
No. of managed parcels per block	One block = 32 x 32 parcels

Level 1:

Block management unit	No. of regular parcels: 1/16 x 32 x 32 (64 parcels)
Parcel management unit	No. of regular parcels: 1/16 parcels
No. of managed parcels	1,024
No. of managed parcels per block	One block = 32 x 32 parcels

Level 0:

Block management unit	No. of regular parcels: 1/256 x 32 x 32 (4 parcels)
Parcel management unit	No. of regular parcels: 1/256 parcels
No. of managed parcels	1,024
No. of managed parcels per block	One block = 32 x 32 parcels

Figure 3-1 Example of the Main Map Data Structure

3.1.1 Relationship Among Block Sets, Blocks, and Parcels

A collection of parcels is called a block, and a collection of blocks is called a block set.

A coverage area is divided according to the number specified in the field "the number of attitudinal/longitudinal blok sets" of the level management records.
(For the field "the number of attitudinal/ longitudinal blok sets", see subsection 6.1.1)

Block Sets (on the same level)

A block set is divided according to the number specified in the field "the number of attitudinal/longitudinal blocks" of the level management records.
(For the field "the number of latitudinal/ longitudinal blok sets", see subsection 6.1.1)

Blocks

A block is divided according to the number specified in the field "the number of latitudinal/longitudinal parcels of the level management record."
(For the field "the number of latitudinal/ longitudinal parcels", see subsection 6.1.1)

Parcels

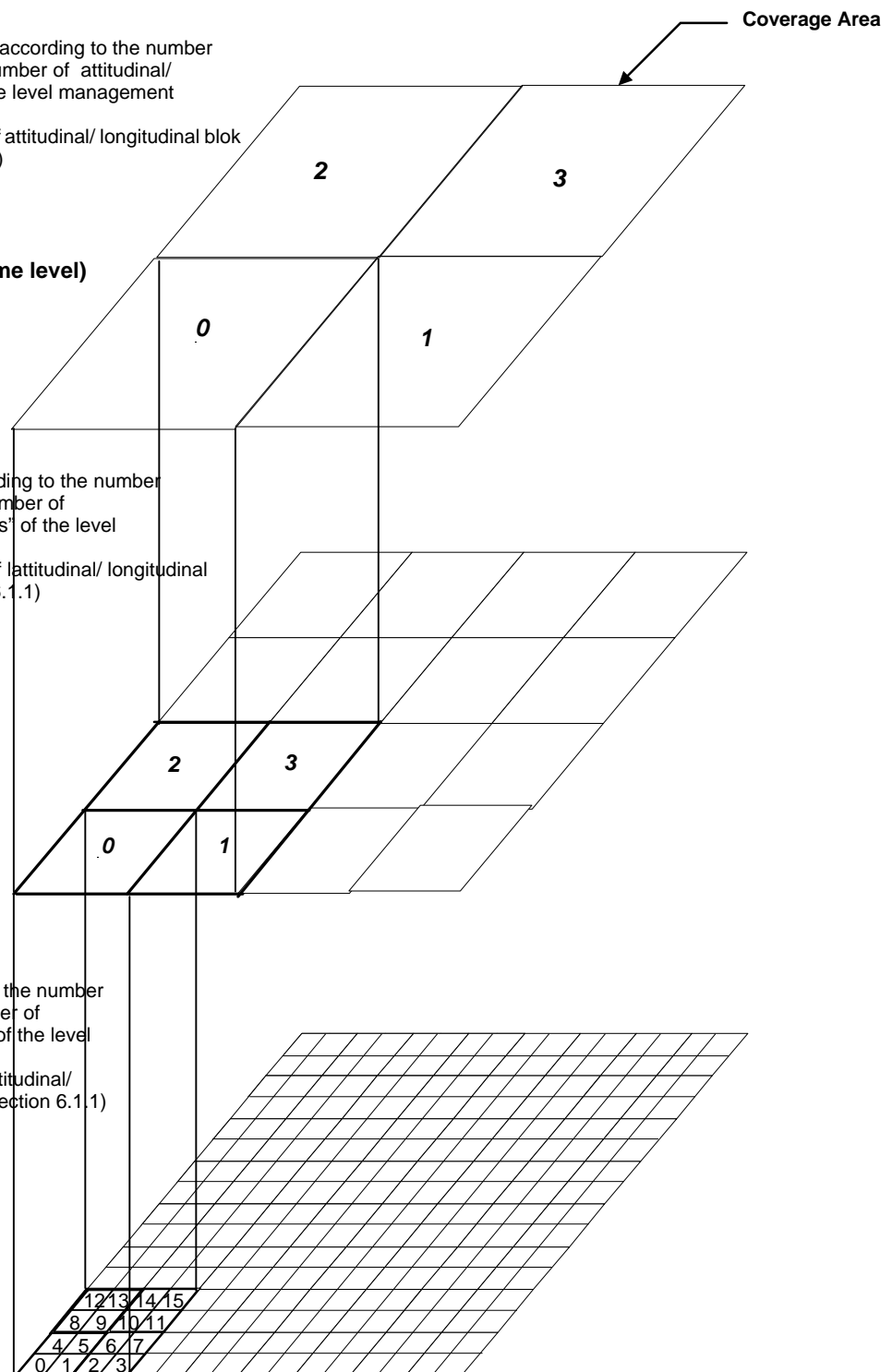


Figure 3-2 Relationship Among Block Sets, Blocks, and Parcels

3.2 Hierarchical Structure of a Region of the Route Planning Data

Regions in the shape of polygons are used for the route planning data. A region is further divided as the level goes down. On a lower level, any region must not extend across the coverage area of the corresponding higher level region.

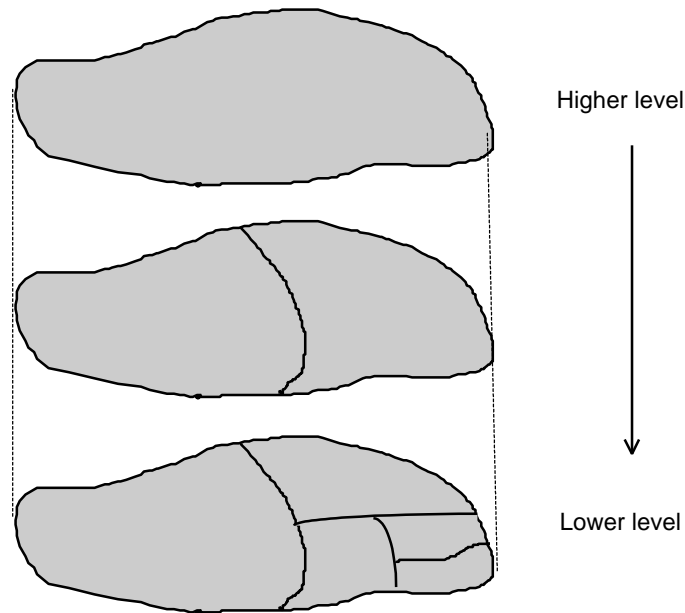


Figure 3-3 Structure of the route planning Data

3.3 Relationship between the Main Map Data and the Route Planning Data

The main map data and the route planning data on the same level are related to each other in the areas as shown below. The road data (links and nodes) in the regular parcel ($P_{i,j}$ in the figure below) stored in the main map data is related to the route planning data (links and nodes) by assigning region numbers.

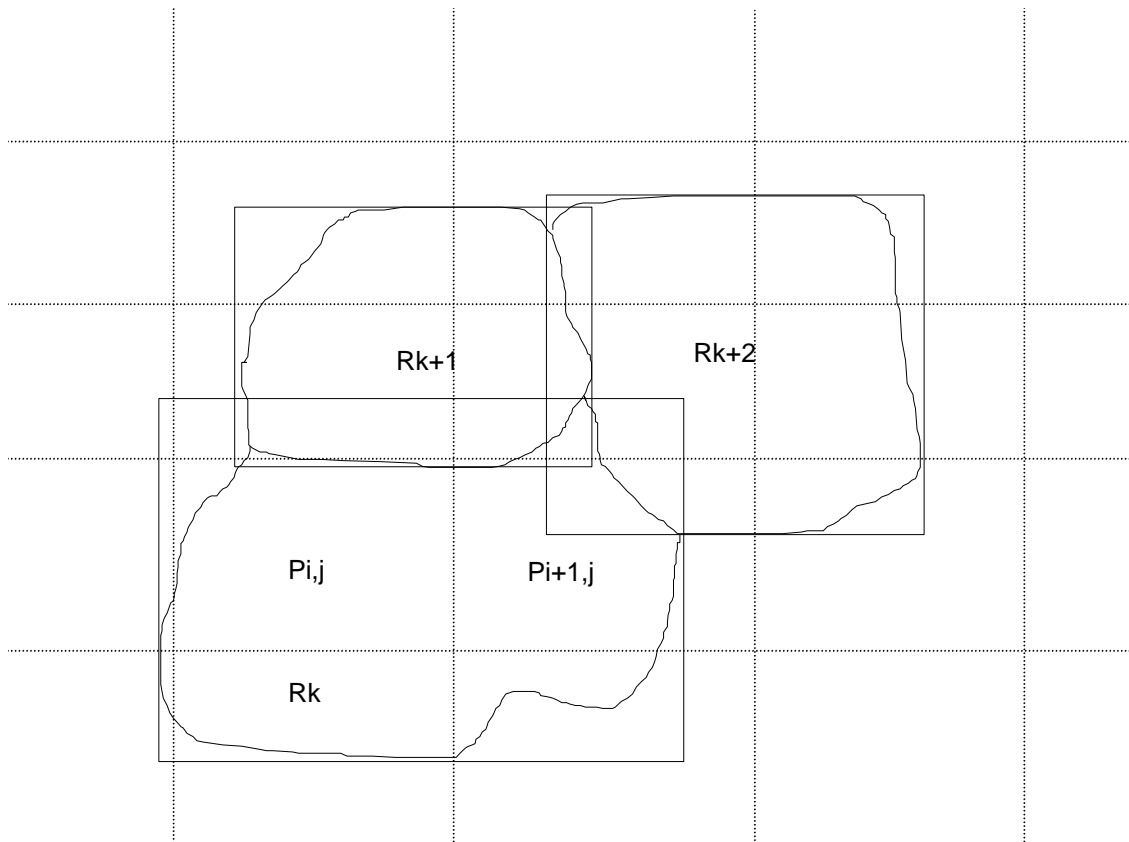


Figure 3-4 Relationship between the Main Map Data and the Route Planning Data

Parcel $P_{i,j}$ is the reference parcel of the main map data.

Region R_k is the region on the lowermost level of the route planning data.

- (1) The size of the regular parcel of the main map data should be the size of a rectangle defined by the latitude and the longitude of the lower left corner and the upper right corner. The reference coordinate (latitude and longitude of the lower left corner) of a parcel must be the same as that of the lower left parcel on the corresponding lower level.
- (2) A region for the route planning data has arbitrary form. The region coverage area is indicated by the latitude and the longitude of the lower left corner and the upper right corner of the minimum size rectangle including the region.