

7.2 Road Data Frame

name [Road Data Frame]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		Road Distribution Header		b
2	O1	B2		Road Data List		c
3	O2	B3		Passage Code Data Frame	(1)	c
4	O3	B4		Composite Node Data Frame	(2)	c
5	O4	B5		Expansion Data (Road Data Frame)	(3)	c

(1) This is a table defining passage codes used in the parcel.

(2) This frame defines nodes that compose complex intersections or roundabouts in the parcel.

For complex intersections or roundabouts divided on a boundary of the parcel, set up nodes only in the target parcel.

(3) Extension (Road Data Frame)

This is used for an expansion field.

The extension should be done according to the additional definition.

7.2.1 Road Distribution Header

name [Road Distribution Header]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	SWS	Header Size		a
2	2	2	N	Total Number of Intersections	(1)	b
3	4	1	N	Number of Display Classes (n)	(2)	a
4	5	1	N	Count of Additional Data(m)	(4)	b
5	6	2	I	Level of Route Planning Data Corresponding to Parcel Data	(3)	b
6	8	B1		A Sequence of Display Class Management Records		c
7	O1	B2		A Sequence of Additional Data Management Records		c
8	O2	B3		Expansion (Road Distribution Header)	(5)	c

(1) Total Number of Intersections

This field describes the total number of nodes for intersections that consist of three or more roads in the parcel. In this case, multiple nodes are handled as one node by adding the offset to the node connection information. 0xFFFF is assigned to invalid value.

(2) Number of Display Class Management Information Items

Up to 16 display classes can be specified. Display class is defined with metadata.

When there is no road of any target display class, 0xFFFF is assigned to the offset and 0 is assigned to the number of polylines for the corresponding display class management information (to fill up data).

(3) Level of Route Planning Data Corresponding to Parcel Data

No.	bit	Description
1	15 to 10	The level of region number for the route planning data is described in this field. The value range can be between -31 and +31, and -32 is assigned to "null." -32 is assigned to the dummy region management record.
2	9 to 0	(RESERVED)

Relationship between roads of main maps and route planning data

- All roads of route planning data are contained in main maps corresponding to it. (Roads at lower levels that are used for route planning are allowed to be included.)
- The main maps at the lowest level corresponding to route planning data contain all roads in the route planning data at the lowest level.

For example, when a main map (roads) consists of 6 levels and route planning data consists of 3 levels:

Level 6: Roads to be used for routing in main map \geq Level 6: Roads to be used for routing in route planning data

Level 5: Roads to be used for routing in main map \geq Level 6: Roads to be used for routing in route planning data

Level 4: Roads to be used for routing in main map \geq Level 4: Roads to be used for routing in route planning data

Level 3: Roads to be used for routing in main map \geq Level 4: Roads to be used for routing in route planning data

Level 2: Roads to be used for routing in main map $=$ Level 2: Roads to be used for routing in route planning data

Level 1: Roads to be used for routing in main map $=$ Level 2: Roads to be used for routing in route planning data

[Supplement] A main map at level 3 can contain roads used for route planning at level 2 but it must contain all roads used for route planning at level 4.

(4) Number of Additional Data Management Information Items

The number of passage code data frames, composite node data frames, and extension (road data frames) is described in this field.

(5) Extension (Road Distribution Header)

This is used for an expansion field.

For how to expand fields, see the expansion method defined separately.

7.2.1.1 Display Class Management Record

This record describes the displacement and the size of the display-class-specific road data.

name [Display Class Management Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	D	Offset by Display Class	(1)	b
2	2	2	B:N	Number of Polylines by Display Class	(2)	b

For display class management information and road data lists, data is sorted on the assumption that the data is bitmapped in the order in which data records are displayed. That is, data is sorted in the ascending order of display class (from low to high).

(1) Offset by Display Class

This field describes the displacement from the top of a road data frame to the top of the display-class-classified road. When it has no entity, FFFF(16) is assigned to the offset.

(2) Number of Polylines by Display Class

No.	bit	Description
1	15 to 12	(RESERVED)
2	11 to 0	Number of Polylines by Display Class (n_i)

This field describes the number of polylines (number of MultiLinks) for the display-class-classified road. When it has no entity, 0000(16) is assigned to the field. The allowable range is between 1 and 4095.

7.2.1.2 Additional Data Management Information Record

This record describes the displacement and the size of the additional data.

name [Display Class Management Information Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	D	Offset to Additional Data Frame	(1)	b
2	2	2	SWS	Size of Additional Data Frame	(2)	b

The records are placed in the order in which item 3 and later in the road data frames are placed (passage code data frames, composite node data frames, then extension (road data frames)).

(1) Offset to Additional Data Frame

This field describes the displacement from the beginning of a road data frame to the beginning of the target additional data frame. When it has no entity, FFFF(16) is assigned to the offset.

(2) Size of Additional Data Frame

This field describes the size of the additional data frame. When it has no entity, 0000(16) is assigned to the size.

7.2.2 Road Data List

name [Road Data List]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1				A Sequence of Display-class-classified Road Data (#1 to #n)		a

"n" indicates the number of display classes.

7.2.2.1 Display-class-classified Road Data

name [Display-class-classified Road Data]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	B:B:B:B::B :B:B:B	Display Scale Flag	(1)	a
2	2	B1		A Sequence of MultiLink Data Record(s) (#1 to #r _i)		c

"r_i" indicates the number of polylines by type.

(1) Display Scale Flag

Same with background data (Subsection 7.3.2.2.1).

No.	bit	Description
1	15	Display Scale Flag 1 (Enabled: 1/Disabled: 0)
2	14	Display Scale Flag 2 (Enabled: 1/Disabled: 0)
3	13	Display Scale Flag 3 (Enabled: 1/Disabled: 0)
4	12	Display Scale Flag 4 (Enabled: 1/Disabled: 0)
5	11	Display Scale Flag 5 (Enabled: 1/Disabled: 0)
6	10 to 4	(RESERVED)
7	3	Node/Link Connection Information Delete Flag (0: Not deleted, 1: Deleted)
8	2	Additional Node Information Management Header Delete Flag (0: Not deleted, 1: Deleted)
9	1	Altitude Information Management Header Delete Flag (0: Not deleted, 1: Deleted)
10	0	Passage Regulation Information Management Header Delete Flag (0: Not deleted, 1: Deleted)

The display scale flags 1 to 5 and scales actually used for displaying data are defined separately. The flags and scales can be specified by parcel level.

7.2.2.1.1 MultiLink Data Record

name [MultiLink Data Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	B0		MultiLink Header		a
2	O1	B1		MultiLink Shape Information		a
3	O2	B2		Link/Node Connection Information		c
4	O3	B3		Additional Node Information		c
5	O4	B4		Altitude Information		c
6	O5	B5		Passage Regulation Information		c
7	O6	8		Temporal Information		c
8	O7	B6		Street Address Information		c
9	O8	B7		Expansion Data (MultiLink Data Record)		c

7.2.2.1.1.1 MultiLink Header

name [MultiLink Header]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	B:B:B:B:SWS:B::SWS	MultiLink Management Header	(1)	a
2	4	2	:N	Node Information Management Header	(2)	a
3	6	2	:SWS	MultiLink Shape Information Management Header	(3)	a
4	8	2	:SWS	Additional Node Information Management Header	(5)	c
5	10	2	:SWS	Altitude Information Management Header	(6)	c
6	12	2	:SWS	Passage Regulation Information Management Header	(7)	c
7	14	B1		MultiLink Attribute	(8)	a
8	O1	B2	:SWS	Street Address Information Management Header	(10)	c
9	O2	B3		Expansion Data (MultiLink Header)	(9)	c

(1) MultiLink Management Header

No.	bit	Description
1	31	MultiLink Delete Flag (0: Not deleted, 1: Deleted) (1-3)
2	30	Temporal Information Flag (0: Not specified, 1: Specified) (1-4)
3	29	Expansion Data (MultiLink Data Record) Flag (0: Not expanded, 1: Expanded) (1-5)
4	28	Expansion Data (MultiLink Header) Flag (0: Not expanded, 1: Expanded) (1-6)
5	27 to 16	MultiLink Size (1-1), Unit: 2 bytes
6	15	Street Address Information Management Header Existence Flag (0:No data 1:Data contained)
7	14 to 8	(RESERVED)
8	7 to 0	MultiLink Header Size (1-2), Unit: 2 bytes

(1-1) MultiLink Size

The field describes the size of a MultiLink data record. The allowable range of the size is between 1 and 4095.

The size includes that of the expansion data (MultiLink data record).

(1-2) MultiLink Header Size

The size of a MultiLink header is described in this field. The allowable range for the size is between 1 and 255.

(1-3) MultiLink Delete Flag

This flag indicates whether MultiLink data is enabled or disabled. Information related to a deleted (disabled) MultiLink must be modified whether the link or a related link (that is connected by the identical nodes information) is used or not. This flag is read from the medium and used on memory for editing the data in general.

(1-4) Temporal Information Flag

This flag indicates whether the multilink data record has "Temporal Information."

(1-5) Expansion Data (MultiLink Data Record) Flag

This flag indicates whether expansion data (MultiLink data record) is used.

(1-6) Expansion Data (MultiLink Header) Flag

This flag indicates whether expansion data (MultiLink header) is used.

(2) Node Information Management Header

No.	bit	Description
1	15 to 11	(RESERVED)
2	10 to 0	Number of Nodes (2-1)

(2-1) Number of Nodes

This field describes the total number of nodes (node records) that compose the multilink data record. The allowable range of the number is between 1 to 511.

(3) Multilink Shape Information Management Header

No.	bit	Description
1	15 to 12	(RESERVED)
2	11 to 0	Size of MultiLink Shape Information (3-1), Unit: 2 bytes

(3-1) Size of MultiLink Shape Information

This field describes the size of MultiLink shape information. The allowable range of the size is between 1 and 4095.

(4) Intentionally deleted.

(5) Additional Node Information Management Header

No.	bit	Description
1	15 to 12	(RESERVED)
2	11 to 0	Size of Node Additional Information (5-1), Unit: 2 bytes

(5-1) Size of Node Additional Information

This field describes the size of node additional information. The allowable range of the size is between 1 and 4095.

(6) Altitude Information Management Header

No.	bit	Description
1	15 to 12	(RESERVED)
2	11 to 0	Size of Altitude Information (6-1), Unit: 2 bytes

(6-1) Size of Altitude Information

This field describes the size of altitude information. The allowable range of the size is between 1 and 4095.

(7) Passage Regulation Information Management Header

No.	bit	Description
1	15 to 12	(RESERVED)
2	11 to 0	Size of Passage Regulation Information (7-1), Unit: 2 bytes

(7-1) Size of Passage Regulation Information

This field describes the size of passage regulation information. The allowable range of the size is between 1 and 4095.

(8) MultiLink Attribute

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	N:B:B:B:B:B::B: N:B:B	MultiLink Attribute	(8-1)	a
2	2	4	N	MultiLink Origin Point (Absolute Link ID (A))	(8-2)	c
3	6	2	N	MultiLink End Point: Differential to Absolute Link ID (B) (B-A: A <= B)	(8-3)	c
4	8	2	:B:N::B:N	Route Number (Alphabetical)	(8-4)	c
5	10	2	:N	Route Number (Numeric)	(8-5)	c
6	05	2	D	Route-type Guidance Data Offset	(8-6)	c

(8-1) name [MultiLink Attribute]

No.	bit	Description		
1	15 to 12	Road Type Code (8-1-1)		
2	11	Link ID Number Flag (by MultiLink)	bit11	Meaning
			0	No link ID number specified
			1	Link ID number specified
3	10	Infra-link Flag (8-1-2)	bit10	Meaning
			0	Infra-link
			1	Not infra-link
4	9	Route Number Flag	bit9	Meaning
			0	No route number specified
			1	Route number specified
5	8	Toll Flag (by MultiLink)	bit8	Meaning
			0	Not charged
			1	Charged
6	7	Selected Link Flag (by MultiLink) (8-1-3)	bit7	Meaning
			0	Link not used for selected route
			1	Link used for selected route
7	6	Link ID Differential Information Delete Flag (by MultiLink) (8-1-4)	bit6	Meaning
			0	Not omitted
			1	Omitted
8	5	(RESERVED)		
9	4	Corresponding Route Planning Data Flag (8-1-8)	bit4	Meaning
			0	Not contained in any link within corresponding route planning data
			1	Contained in a link within corresponding route planning data

No.	bit	Description	
10	3 to 2	Pseudo 3D Up/Down Code (8-1-5)	
11	1	Route-type Guidance Information Flag (by MultiLink) (8-1-6)	bit1
			0
			1
12	0	Altitude Information Flag (by MultiLink)	bit0
			0
			1

(8-1-1) Road Type Code

This code indicates the type of a road. See chapter 32 for the definition of the codes.

(8-1-2) Infra-link Flag

This flag indicates whether the node/link information contains one or more infra-links.

(8-1-3) Navigable MultiLink Flag

The link ID number flag must be "specified."

This flag indicates whether the multilink is navigable.

(8-1-4) Link ID Differential Information Omission Flag

When the link ID number flag is specified but differentials between links that compose the MultiLink are all 1, it is allowed to omit link ID number information (differential link ID) for the node additional information. To omit it, specify "Omitted."

(8-1-5) Up/down Code for 3D Schematic View of Road

This code indicates whether the MultiLink is up or down in the direction from its origin point to its end point for 3D schematic view of road.

Pseudo 3D up/down code	Description
0	No information about slope contained
1	Upslope from the start point to the end point
2	Downslope from the start point to the end point
3	(RESERVED)

(8-1-6) Route-type Guidance Information Flag

When the "guidance data offset" for guidance information relating to a route in the target MultiLink is contained in node additional information for the MultiLink start point, "Guidance information specified" must be set. Otherwise, "Guidance information not specified" must be set.

(8-1-8) Route Planning Data Correspondence Flag

This flag indicates whether the MultiLink is contained in the route planning data referred by the region number in the main map distribution header.

(8-2) Origin Point of MultiLink: Absolute Link ID

This field is provided when the link ID number flag is "Specified."

An absolute link ID is an unique ID number (4 bytes) specified for a road link at the lowest level in the medium. Road links in the medium are standardized for common use among main road data (display, locations), route planning data, route guidance data, and guidance data. They are numbered in sequence within a link, and sorted in ascending order.

Link IDs are specified according to links for lower level road displays or links in the data source. An integrated link of roads or link of routes at a higher level is represented using a link ID at its origin point and link ID at its end point.



Figure 7-5 Link ID Number

When road data is layered, nodes at a higher level must be contained in lower levels. (Integration method)

The following two items identify link ID numbers:

- Link direction (2 bits), 0 to 3: Indicates the direction based on the direction of a link shape at a higher level so that links integrated at higher levels correspond to the links expanded at lower levels.
 - 0: Simple network link without complex representation used at higher levels
 - 1: Forward simple network link that is allowed to use complex representation at higher levels
 - 2: Backward simple network link that is allowed to use complex representation at higher levels
 - 3: Network link with complex representation used (Link numbers are the same with those in 1, 2, and 3.)
- Line number (30 bits), 0 to 1073741823: Indicates link numbers in the medium.
(0: RESERVED, 1073741823: Indicates an unfixed number.)

(8-2) MultiLink End Point: Differential with Absolute Link ID (B)

This field is provided when the link ID number flag is "Specified."

For links to be put into a string, their data sizes are compressed on the condition that the link IDs are sequential and their differential is within 2 bytes (65535).

Thus, the value specified in this item is expressed as the absolute link ID at the end point minus the absolute link ID at the start point.

However, the relationship, the absolute link ID at the end point \geq the absolute link ID at the start point must be satisfied.

(8-4) Route Number (Alphabetical Character)

The route number flag of multilink header indicates whether the field exists or not.

The route number (alphabetical/numeric character) described in this record indicates the basis to create data for a MultiLink.

Alphabetical characters may be used as keys to other character strings.

No.	bit	Description						
1	15	(RESERVED)						
2	14 to 13	Alphabet Character Location Flag	bit14	bit13	Meaning			
			0	0	Located at the beginning of route number.			
			0	1	Located at the second digit of route number.			
			1	0	Located at the third digit of route number.			
			1	1	(RESERVED)			
3	12 to 8	Alphabetical Character 1	bit12	bit11	bit10	bit9	bit8	Meaning
			0	0	0	0	0	(No alphabetical character)
			0	0	0	0	1	A
			0	0	0	1	0	B
			0	0	0	1	1	C
					:			:
			1	1	0	0	1	Y
			1	1	0	1	0	Z
			1	1	0	1	1	(11011(2) and later are not fixed.)
4	7	(RESERVED)						
5	6 to 5	Alphabet Character Location Flag	bit6	bit5	Meaning			
			0	0	Located at the beginning of route number.			
			0	1	Located at the second digit of route number.			
			1	0	Located at the third digit of route number.			
			1	1	(RESERVED)			
6	4 to 0	Alphabetical Character 2	bit4	bit3	bit2	bit1	bit0	Meaning
			0	0	0	0	0	(No alphabetical character)
			0	0	0	0	1	A
			0	0	0	1	0	B
			0	0	0	1	1	C
					:			:
			1	1	0	0	1	Y
			1	1	0	1	0	Z
			1	1	0	1	1	(11011(2) and later are not fixed.)

(8-5) Route Number (Numeric Character)

The route number flag in a MultiLink header indicates whether the field is contained.

No.	bit	Description
1	15 to 14	(RESERVED)
2	13 to 0	Route Number (Numeric Character) (8-5-1)

(8-5-1) Route Number (Numeric Character)

The range of the number is between 1 to 16382. When there is no corresponding route number, 000(16) is assigned to this field.

(8-6) Route Type Guidance Data Offset

This field is provided when the route type guidance information for the multilink attribute of the target link is 1(2). The displacement from the top of the guidance data frame to the route guidance data(basic data frame) relating to the target multilink is indicated. This is section-type data.

(9) Expansion Data (MultiLink Header)

When the multilink header size described in the multilink management header is larger than that defined by the specification, the expanded space can be used as an expanded field.

For how to expand fields, see the expansion method defined separately.

(10) Street Address Information Management Header

No.	bit	Description
1	15 to 12	(RESERVED)
2	11 to 0	Size of Street Address Information (10-1), Unit: 2 bytes

(10-1) Size of Street Address Information

This field describes the size of street address information. The allowable range of the size is 0 to 4095.

7.2.2.1.1.2 MultiLink Shape Information

name [MultiLink Shape Information]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	2	B1		A Sequence of Link Shape Data		a

The amount of link shape data corresponds to the number of nodes.

A link is defined by connection between adjacent nodes.

name [Link Shape Data]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	B:N:B:B:B:N	Link Attribute	(1)	a
2	2	2	N:N	X-axis Coordinate	(2)	a
3	4	2	N:N	Y-axis Coordinate	(3)	a
4	6	B1		A Sequence of Offset Coordinate Records	(4)	c

(1) Link Attribute

No.	bit	Description			
1	15	Validated One-way	bit15	Meaning	
			0	Validated	
			1	Not validated	
2	14 to 13	One-way Code	bit14	bit13	Meaning
			0	0	No one-way
			0	1	One-way in the forward direction (1-1)
			1	0	One-way in the backward direction (1-2)
			1	1	Two-way passage prohibited (1-3)
3	12	Additional Type Information 1 (Building-planned Road)	bit12	Meaning	
			0	Not building-planned road	
			1	Building-planned road	
4	11	Additional Type Information 2 (tunnel)	bit11	Meaning	
			0	Not tunnel	
			1	Tunnel	
5	10	Additional Type Information 3 (bridge)	bit10	Meaning	
			0	Not bridge	
			1	Bridge	
6	9 to 0	Number of intermediate Points (1-4)			

(1-1) One-way in the Forward Direction

This attribute indicates that passage is allowed in the direction corresponding to the order in which node records for the node information are displayed. This is the rule of one-way the whole day.

(1-2) One-way in the Backward Direction

This attribute indicates that passage is allowed in the direction opposite to the order in which node records for the node information are displayed. This is the rule of one-way the whole day.

(1-3) Two-way Passage Prohibited

This attribute indicates that passage is not allowed in both the directions corresponding and opposite to the order in which node records for the node information are displayed. This is the rule of two-way prohibited the whole day.

(1-4) Number of Intermediate Points

This attribute indicates the number of intermediate points between the target node and next node. Coordinates of nodes at both ends are not included. The allowable range of the number is between 0 and 1023.

(2) X-axis Coordinate (longitude)

No.	bit	Description
1	15 to 13	Relative Position in Integrated Parcel
2	12 to 0	X-axis Coordinate (longitude)

When the target parcel is an integrated parcel that consists of multiple basic parcels, the relative position in the integrated parcel is represented using the parcel at the lower left as point 0. Up to 8 parcels are represented in the direction of the X-axis using a value from 0 to 7.

The X-axis coordinate value indicates the coordinate in the basic parcel.

A basic parcel is 4096 x 4096.

The X-axis coordinate in a parcel is obtained as follows:

For a divided parcel: The normalized coordinate in the original basic parcel is used (Each relative position in the integrated parcel is set to 0). However, the range of the X-axis coordinate may be restricted depending on the parcel divided.

For an integrated parcel: The X-axis coordinate in the integrated parcel is represented by calculating the offset for the target basic parcel according to the relative position in the integrated parcel and adding the X-axis coordinate to the offset. The maximum value is: $4096 \times 8 = 32768$ (8000(16)).

(3) Y-axis Coordinate (Latitude)

No.	bit	Description
1	15 to 13	Relative Position in Integrated Parcel
2	12 to 0	Y-axis Coordinate (Latitude)

When the target parcel is an integrated parcel that consists of multiple basic parcels, the relative position in the integrated parcel is represented using the parcel at the lower left as point 0.

The Y-axis coordinate indicates the coordinate in the basic parcel.

The representation for a divided parcel and integrated parcel is the same with that for the X-axis coordinate.

(4) Offset Coordinate Record

name [Offset Coordinate Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	1	I	X-axis Coordinate Offset	(4-1)	a
2	1	1	I	Y-axis Coordinate Offset	(4-2)	a

(4-1) X-axis Coordinate Offset

This field describes the offset from the X-axis coordinate of the previous shape point to the X-axis of the target shape point. The allowable range is between -128 and 127.

Shape points are nodes or intermediate points.

(4-2) Y-axis Coordinate Offset

This field describes the offset from the Y-axis coordinate of the previous shape point to the Y-axis of the target shape point. The allowable range is between -128 and 127.

The unit used in the X-axis coordinate and Y-axis coordinate offset values is the same with that in the coordinates in a basic parcel.

7.2.2.1.1.3 Node and Link Connection Information

name [Node and Link Connection Information]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	2	B1		A Sequence of Node Records		a

The number of node records corresponds to the number of nodes.

name [Node Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	N:B:B:N:N:N:N	Identical Node Information/ Node Attribute	(1)	a
2	4	2	B:B:B:B:B:B: B:B:B:B:B:B: B:N	Additional Node Information Change Flag	(2)	a
3	6	2	D	Offset to Additional Node Record	(3)	b
4	8	B1		Expansion Data (Node Record)	(4)	c

One node is represented by one node record .

Attribute information in the node record (identical node information: node attribute, additional node information change flag) indicates information about the target node and link with the next node. When the node is located at an end of the multilink, the information about the link is insignificant. No changes are made.

(1) Identical Node Information/ Node Attribute

No.	bit	Description				
1	31 to 30	Target Node Type	bit31	bit30	Meaning	
			0	0	Intermediate point of MultiLink	
			0	1	Start point of MultiLink	
			1	0	End point of MultiLink	
			1	1	(RESERVED)	
2	29	On-boundary Node Flag (1-1)	bit29	Meaning		
			0	Not on a boundary.		
			1	On a boundary.		
3	28	Open/Close Median Strip Flag (1-2)	bit28	Meaning		
			0	Open (The median strip is interrupted.)		
			1	Close (The median strip is not interrupted.)		
4	27 to 25	Parcel Position the Node Connected to (1-3)	bit27	bit26	bit25	Meaning
			0	0	0	Upper
			0	0	1	Upper right
			0	1	0	Right
			0	1	1	Lower right
			1	0	0	Lower
			1	0	1	Lower left
			1	1	0	Left
			1	1	1	Upper left
5	24 to 21	Crossing MultiLink Display Class, 4 bits (0-15)				
6	20 to 9	Crossing MultiLink Number, 12 bits (0-4095)				
7	8 to 0	Node Number in Crossing MultiLink, 9 bits (0-511)				

Identical node information indicates that nodes in MultiLink data records are the same entity. The position where an identical node is located as viewed from a node is represented with the "crossing MultiLink display class," "crossing MultiLink number," and "node number in crossing MultiLink." 4095 is invalid for crossing MultiLink numbers.

A group of nodes that are indicated by identical node information must be a round connection that can be linked and is not duplicated by tuning.

Identical node information is enabled when the target node is one of the following types:

- a) MultiLink Intermediate Point
- b) MultiLink Start Point
- c) MultiLink End Point

When the target node is any of a), b), and c), but there are no other nodes connected to it (such as a dead-end and attribute change point), set 1 (2) to each item 5, 6, and 7 as an invalid value. (However, this does not apply to attribute change point where the MultiLink is cut.)

(1-1) On-boundary Node Flag

When the on-boundary node flag is 1, identical node information for neighboring parcels is contained. In this case, a group of nodes including neighboring parcels must be a connection that can be linked and is not duplicated by tuning. Note that there must be no (independent) nodes that do not relate to any link shape. (Even if there is a coordinate on a boundary, its on-boundary node flag must be 0.)

When the node on a boundary is an intersection and the intersection consists of a navigable road and Non-navigable road, the on-boundary node flag for the node at the edge point of the navigable must be set to 1.

(1-2) Open/Close Median Strip Flag

Open/close median strip flags are effective in multilinks.

In the example below, node 1 in MultiLink A is closed to the intersection and node 2 is open to the intersection.

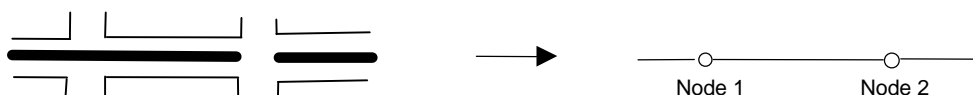


Figure 7-6 Open/Close Median Strip Flag

(1-3) Parcel Position the Node Connected to

This field describes the directions of parcels in which other nodes connected to the target node are located as viewed from the position of the target parcel. (See the explanation described later.)

These items are valid only when the on-boundary node flag is 1 (2), and items 5, 6, and 7 indicate information in the parcels connected.

(2) Additional Node Information Change Flag

No.	bit	Description	
1	15	Link ID Number Information Change Flag	bit15 Meaning
			0 Link number information not specified
			1 Link number information specified
2	14	Target Node Road Width/Lane Information Change Flag	bit14 Meaning
			0 Road width/lane information not specified
			1 Road width/lane information specified
3	13	Target Node Intersection-type Guidance Information Flag (2-8)	bit13 Meaning
			0 Guidance information not specified
			1 Guidance information specified
4	12	Target Node Street Name Information Flag	bit12 Meaning
			0 Street name information not specified
			1 Street name information specified
5	11	Target Node Street Address Information Flag	bit11 Meaning
			0 Street information not specified
			1 Street information specified
6	10	Target Node Passage Regulation Information Flag	bit10 Meaning
			0 Passage regulation information not specified
			1 Passage regulation information specified
7	9	Target Node Region Number Change Flag	bit9 Meaning
			0 Region number not specified
			1 Region number specified
8	8	Target Node Guidance Information Direction Guide Data Flag (2-1)	bit8 Meaning
			0 Direction guide data not specified
			1 Direction guide data specified
9	7	Target Node Guidance Information Name Data Flag (2-2)	bit7 Meaning
			0 Name data not specified
			1 Name data specified
10	6	Navigable Link Distance Information Flag (2-3)	bit6 Meaning
			0 Link distance information not specified
			1 Link distance information specified
11	5	Navigable Node Flag (2-4)	bit5 Meaning
			0 Node is not navigable
			1 Node is navigable
12	4	Target Node Skyway Start/End Point Flag (2-5)	bit4 Meaning
			0 Not skyway start/end point
			1 Skyway start/end point
13	3	Node Including Traffic Signal Flag (2-6)	bit3 Meaning
			0 Other than below
			1 Intersection with signals
14	2 to 0	Link Type Code (2-7)	

(2-1) Target Node Guidance Information Direction Guide Data Flag

This flag is effective when the target node guidance information flag is "specified."

This flag set the value of the "direction guide data flag" for the "data identification information" in the guidance data about the target node.

(2-2) Target Node Guidance Information Name Data Flag

This flag is effective when the guidance information flag for the target node is "specified."

This flag set the OR of the "intersection name data flag," "road name flag," and "district name flag" in the "data identification information" within the guidance data about the target node.

(2-3) Navigable Link Distance Information Flag

This flag is set "Link distance information specified" when there is link distance information for the target node.

(2-4) Navigable Node Flag

This flag is set "Navigable node" when the target node is a crossing point of the roads appeared on route planning data.

(2-5) Target Node Skyway Start/End Point Flag

When this flag is "Skyway start/end point," the section between odd nodes (first, third) and even nodes (second, fourth,) numbered in the order in which the nodes are displayed (in the direction of the MultiLink) is a skyway. When the skyway passes over a boundary of the parcel, set " Skyway start/end point" to indicate that the multilink end point is terminated.

(2-6) Target Node Signal Flag

When the target node is an intersection with signals, set "Intersection with signals."

For composite intersections, set "Intersection with signals" to all nodes that compose the intersection.

(2-7) Link Type Code

This code represents the link type of the roads. For details, see Chapter 32.

(2-8) Target Node Intersection-type Guidance Information Flag

This flag is set "Guidance information specified" when the additional node information contains the "guidance data offset" to the guidance information related to intersections or other items in the target node. Otherwise, set " Guidance information not specified."

(3) Offset to Additional Node Record

This information indicates the address of additional node information storing additional information for the current nodes for the MultiLink.

The offset indicates the displacement from the beginning of the road data frame to the beginning of the target additional node information.

(4) Expansion Data (Node Records)

The presence of this expansion data is judged by the size of the node record described in No. 15 of "6.1.1 Level management record."

The structure of the expansion data (node records) is defined as shown below.

No	Bit	Description
1	15 to 11	Sub-link Type Code
2	10 to 0	(RESERVED)

Sub-link Type Code

This code indicates the link type of the roads. For details, see Chapter 32.

7.2.2.1.1.4 Additional Node Information

The sequence order of additional node record(#1-) of the additional node information is determined according to the sequence of the node records of the node/link information(from #1 to the number of element points).

name [Additional Node Information]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		A Sequence of Additional Node Record(s) (from #1)		c

7.2.2.1.1.4.1 Additional Node Record

The additional node record consists of a "link shape data offset," "link ID number information," "road width/lane information," "intersection-type guidance data offset," "street name data offset," "street address data offset," "passage regulation information and data offset," and "region number," and "routed link distance information." It also specifies the order of the sequence. The section-type contains information about the node at which data from the previous node changes or the start point or end point of the multilink. The one-point-type contains information about the node itself.

- a) Node type of the target node in the node record
- b) Link ID number change flag for the target node in the node record
- c) Road width/lane information change flag for the target node in the node record
- d) Intersection-type guidance information flag for the target node in the node record
- e) Street name information flag for the target node in the node record
- f) Street address information flag for the target node in the node record
- g) Passage regulation information flag for the target node in the node record
- h) Region change flag for the target node in the node record
- i) Routed link distance information flag for the target node in the node record

These information determine whether the respective fields are specified.

name [Additional Node Records]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	D	Link Shape Data Offset	(1)	c
2	O1	2	N	Link ID Number Information	(2)	c
3	O2	2	B:B:B:M:M:M:M	Road Width/Lane Information	(3)	c
4	O3	2	D	Intersection-type Guidance Data Offset	(4)	c
5	O4	2	D	Street Name Data Offset	(5)	c
6	O5	2	D	Street Address Data Offset	(6)	c
7	O6	2	D	Passage Regulation Information Data Offset	(7)	c
8	O7	2	N	Region Number	(8)	c
9	O8	B1		Navigable Link Distance Information	(9)	c

(1) Link Shape Data Offset

This field describes the displacement from the beginning of the road data frame to the target link shape data. This information representing a point.

(2) Link ID Number Information

name [Link ID Number Information]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	N	Differential Link ID	(2-1)	a

This is section-type data.

The link ID number is the number of a link between nodes. It indicates the attribute of the link connecting the target node (MultiLink intermediate point, MultiLink start point, or MultiLink end point) containing the link ID number with the next node. Link ID number information is contained when the link ID number flag for the MultiLink attribute in the MultiLink data record is "specified," the link ID number information change flag for the target node in the additional node information change flag is "specified," and the target node's type is the "MultiLink intermediate point."

However, when the link ID differential information omission flag for a MultiLink attribute is "omitted," the link ID number information change flag must be set to "not specified." In this case, the differential between neighboring links that compose the MultiLink is 1.

(2-1) Differential Link ID

Assume that the differential link ID is difference between a link ID for the target node at the start point and a MultiLink start point link ID.

Example:

#1 #2 #k-1 #k #k+1
 - - - - - ... - - - - -

Differential link ID at the point = #k - #1 (#k >= #1)

The examples below show three layers, level 0, level 1, and level 2.

Items 2 and 3 in the MultiLink attribute (Absolute ID at start point: Differential ID at end point) = 10 to (5). In this example, (5) = 15 - 10

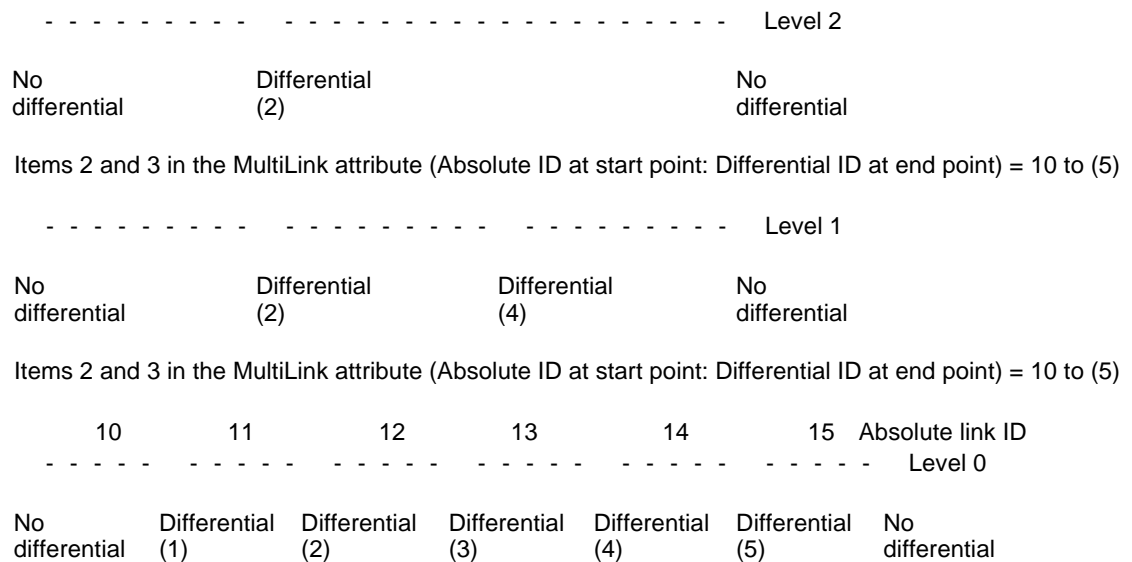


Figure 7-7 Differential Link ID

(3) Road Width/Lane Information

No.	bit	Description		
1	15	Median Strip Flag (3-1)	bit15	Meaning
			0	Median strip doesn't exist
			1	Median strip exist
2	14 to 13	Direction of Road Width/Lane (3-2)	bit14	bit13 Meaning
			0	0 No direction
			0	1 Forward
			1	0 Backward
			1	1 Forward/Backward
3	12	Up/Down Separated Lanes Flag	bit12	Meaning
			0	Other than below
			1	Road in which up lanes and down lanes are represented with separate MultiLinks
4	11 to 9	Number of Forward Lanes (3-3)		
5	8 to 6	Forward Road Width (3-4)		
6	5 to 3	Number of Backward Lanes (3-5)		
7	2 to 0	Backward Road Width (3-6)		

These are section-type data.

(3-1) Median Strip Flag

This flag indicates whether there are median strips on the road in the direction in which node records are stored as viewed from the target node records.

Note: For continuity of a median strip at a node, see the description about the node attribute.

(3-2) Direction of Road Width and Lane

Indicates the direction in which road width/lane information is read.

Direction	Description
No direction	The road is represented as a string of links. Road width/lane information indicates the total number of up lanes and down lanes. Set the number into the "Number of forward lanes" and "Forward road width."
Forward	The road is separated into up lanes and down lanes, and represented with one or more MultiLinks. (Including one-way roads.) For road width/lane information, information about lanes at one side is set.
Backward	The road is separated into up lanes and down lanes and represented with one or more MultiLinks. (Including one-way roads.) For road width/lane information, information about lanes at one side is set.
Forward/Backward	The road is represented as a string of links. For road width/lane information, information about lanes at each side is separately set.

(3-3) Number of Forward Lanes

Indicates the number of lanes in a section up to a node with a record containing road width/lane information that is indicated first from the target node record in the direction in which node records are stored.

The number of lanes is defined with metadata by country or zone.

(3-4) Forward Road Width

Indicates the road width in a section up to a node with a record containing road width/lane information that is indicated first from the target node record in the direction in which node records are stored.

The road width is defined with metadata by country or zone.

(3-5) Number of Backward Lanes

Indicates the number of lanes in a section up to a node with a record containing road width/lane information that is indicated first from the target node record in the direction in which node records are stored.

(3-6) Backward Road Width

Indicates the road width in a section up to a node with a record containing road width/lane information that is indicated first from the target node record in the direction in which node records are stored.

(4) Intersection-type Guidance Data Offset

This field is provided only when the intersection-type guidance information flag for the target node is 1(2). The offset is indicated using the displacement from the beginning of the guidance data frame to the route guidance data (basic data frame) relating to the target node. This is one-point-type data.

(5) Street Name and Data Offset

This field is effective only when the street name information flag for the target node is 1(2). This is section-type data.

The street name data offset indicates the position where the road name (name data record) that is assigned to links of the target MultiLink data record is stored. The offset is indicated using the displacement from the beginning of the name data frame to the beginning of the target name data record.

A road name is described with the format of "name-type = displayed-data-1, displayed-data-2, ,displayed-data-n;" (the last semicolon is not needed). The name type is specified as follows:

However, in case of the data on Europe and U.S.A. (areas with character sets conforming to ISO-8859), a tab character (0x09) is used as a delimiter of street names instead of a comma (0x2C). (This is because some street names contain commas.)

Name type	Description
1	Road Name
2	Intersection Name
3	Road Name Type-pb
4	Road Name Type-sb
5	Road Name Type-psb
6	EXIT No
7	Route Number Display-frame

The name of the link for road data or name associated to the node is specified in a name data record contained frame. Although there is a specified format for describing name types and displayed data, the application program displays them (notifies users of them).

Example: 1 = National route 1, Shin-Shonan bypass; 2 = Chigasaki-Cyuh IC

Road Name Type-pb: A street name in the format of *prefix+body* is stored in the format of "*prefix 2byte*" "*body*".

When the prefix consists of only one character, put the prefix character in the first byte and assign 00(16) to the second and subsequent bytes.

Example: S WESTERN AVE --> 3=S(00)WESTERN AVE

NE MAIN ST --> 3=NEMAIN ST

Road Name Type-sb: A street name in the format of *body+suffix* is stored in the format of "*suffix 2byte*" "*body*".

When the suffix consists of only one character, put the suffix character in the first byte and assign 00(16) to the second and subsequent bytes.

Example: I-405 N --> 4=N(00)I-405

INDEPENDENCE AVE SW --> 4=SWINDEPENDENCE AVE

Road Name Type-psb: A street name in the format of *prefix+body+suffix* is stored in the format of "*prefix 2byte*" "*suffix 2byte*" "*body*". When each of the prefix and the suffix consists of only one character, assign 00(16) to the second and subsequent bytes.

Example: N MAIN RD E --> 5=N(00)E(00)MAIN RD

Example (in European countries and U.S.A.): 3=S(00)WESTERN AVE

Example (in European countries and U.S.A.): 3=NEMAIN ST

Example (in European countries and U.S.A.): 4=N(00)I-5;1=SAN DIEGO FWY;4=W(00)CA-22

Example (in European countries and U.S.A.): 4=SWINDEPENDENCE AVE

Example (in European countries and U.S.A.): 5=N(00)E(00)MAIN RD

Example (in European countries and U.S.A.): 1 = Brooklyn Queens Expy;6=26 (State code)

For the route number field indicator of Name type=7, save the route number field indicator (see Chapter 12) and indicator string separated with a tab character.

Description Example: 7=1<TAB>101

(6) Street Address Data Offset

This field is effective only when the street address information flag for the target node is 1(2).

The offset indicates the displacement from the top of the road data frame to the street address information record corresponding to the relevant node.

(7) Passage Regulation Information and Data Offset

This field describes the displacement from the beginning of the road data frame to the passage regulation record for the target node.

This field is effective only when the passage regulation information flag for the target node is 1(2). This is one-point-type data.

(8) Region Number

This is section-type data.

This field describes the number of the region (region number corresponding to its parcel level at the routing region level) in which the target node is included. Set the region number for the route planning data locating the parcel containing the target node at the center of the region.

(9) Routed Link Distance Information

This is represented by one-point data.

When the MultiLink to which the target node belongs is route planning data and the target node's type and on-boundary node flag are any combination shown in the table below, set the link distance into its additional node records. However, if the target node is on a boundary and is an intersection with another routed link, information about the distance to the next node is not set.

Node type	On-boundary node flag	Routed link distance information
MultiLink start point	Not on boundary	MultiLink Distance in parcel (9-1)
MultiLink start point	On boundary	MultiLink Distance in parcel and Distance to the next routed node in the direction opposite to the MultiLink (9-2)
MultiLink end point	On boundary	Distance to the next routed node in the direction of the MultiLink (9-3)

(9-1) MultiLink Distance in Parcel

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	:B:N	Link Length Information (9-4)		a

(9-2) MultiLink distance in parcel and distance to the next routed node in the direction opposite to the MultiLink

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	:B:N	Link Length Information (MultiLink Distance in Parcel)		a
2	2	2	:B:N	Link Length Information (Distance to the Next Routed Node)		b

(9-3) Distance to the next routed node in the direction of the MultiLink

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	:B:N	Link Length Information		a

(9-4) Link Length Information

No.	bit	Description
1	15	(RESERVED)
2	14 to 12	Link Length Unit Code (9-4-1)
3	11 to 0	Link Length (9-4-2)

(9-4-1) Link Length Unit Code

Link length unit code	bit14	bit13	bit12	Unit	Range of length used
0	0	0	0	1m	0 to 4,093m
1	0	0	1	4m	0 to 16,372m
2	0	1	0	16m	0 to 65,488m
3	0	1	1	64m	0 to 261,952m
4	1	0	0	256m	0 to 1,047,808m
5	1	0	1	1024m	0 to 4,191,232m
6	1	1	0	4096m	0 to 16,764,928m
7	1	1	1	RESERVED	

(9-4-2) Link Length

Link lengths are handled according to the units above. Note that fractions below the decimal point of the link length unit are rounded off. FFF(16) and FFE(16) are not used.

7.2.2.1.1.5 Altitude Information

The number of altitude information records corresponds to the number of altitude information records calculated from the information sizes in the MultiLink header.

name [Altitude Information]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		A Sequence of Altitude Information Records		c

7.2.2.1.1.5.1 Altitude Information Record

name [Altitude Information Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	:N	Altitude Information Size	(1)	a
2	2	2	:l	Altitude Information	(2)	a

(1) Altitude Information Size

No.	bit	Description
1	15 to 12	(RESERVED)
2	11 to 0	Number of Sequential Element Points (1-1)

(1-1) Number of Sequential Element Points

This field describes the number of element points with the same altitude information concerning a group of element points (nodes and intermediate points) mutually associated from the start point of the MultiLink. Therefore, the total number of sequential element points is equal to the number of element points that compose the MultiLink. The allowable range of the number is between 1 and 4094.

(2) Altitude Information

No.	bit	Description
1	15 to 14	(RESERVED)
2	13 to 0	Altitude Value (2-1)

(2-1) Altitude Value

The offset is 4096. The range is between -4096 and +12287. The unit is meters. Therefore, the actual altitude with 4096 meters added is stored in the field.

7.2.2.1.1.6 Passage Regulation Information

name [Passage Regulation Information]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		A Sequence of Passage Regulation Records (from #1)		c

name [Passage Regulation Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	N:N:N	Number of Unconditional Passage Regulation Records: Number of Conditional Passage Regulation Records: Number of Passage Regulation Records for a Grouped Intersection	(1)	a
2	2	B1		A Sequence of Unconditional Passage Regulation Records	(2)	c
3	O1	B2		A Sequence of Conditional Passage Regulation Records	(3)	c
4	O2	B3		A Sequence of Passage Regulation Records for a Grouped Intersection	(4),(5)	c
5				Padding for Setting the Passage Regulation Record to even bytes		c

It is unnecessary to set the passage regulation record to all intersecting MultiLinks.

(To check intersections, a record for a node shall be set by intersection because identical node information is cyclically checked.)

- (1) Number of unconditional passage regulation records, conditional passage regulation records, and passage regulation records for grouped intersection

No.	bit	Description
1	15 to 10	Number of Unconditional Passage Regulation Records
2	9 to 4	Number of Conditional Passage Regulation Records
3	3 to 0	Number of Passage Regulation Records for a Grouped Intersection

- (2) Unconditional Passage Regulation Records

name [Unconditional Passage Regulation Records]

No.	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	1	N:B:N:B	Passage Node Information	(2-1)	a

(2-1) Passage Node Information

name [Passage Node Information]

No.	bit	Description		
1	7 to 5	Identical Node Number at Entry Link (2-1-1)		
2	4	Approaching Direction (to the Entry Link) Flag	bit4	Meaning
			0	Forward approach to entry link
			1	Backward approach to entry link
3	3 to 1	Identical Node Number at Exit Link (2-1-1)		
4	0	Exit Direction (from the Exit Link) Flag	bit0	Meaning
			0	Forward exit to exit link
			1	Backward exit to exit link

(2-1-1) Identical node numbers 1 to 7 are assigned, starting from 1, to nodes on the target MultiLink in the order in which they are indicated for cyclic identical node information. When the identical node number for an entry link is 0(2), it indicates "approach from all directions" or "restriction on exit link" due to data compression, and bit 4, entry link forward/backward flag, is invalid. When the identical node number for an exit link is 0(2), it indicates "exit to all directions" or "restriction on entry link" due to data compression, and bit 0, exit link forward/backward flag, is invalid.

(3) Conditional Passage Regulation Records

name [Conditional Passage Regulation Records]

No.	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	1	B:N	Regulation ID Flag + Passage Code	(3-1)	a
2	1	1	N:B:N:B	Passage Node Information	(3-2)	a

(3-1) Passage codes conform to the specification for the regulation id flags plus passage codes in route planning data frames (Subsection 10.7.1.2).

Common passage codes conform to the specification for route planning data (Chapter 9). (For details, see Chapter 10.)

(3-2) The specification for passage node information is the same with that for "passage node information" in unconditional passage regulation records.

(4) Passage regulation records for grouped intersection (when the direction of routed string of nodes is the same with that of regulations)

name [Passage regulation Records for Grouped Intersection]

No.	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	1	N	Regulation ID Flag + Passage Code	(4-1)	a
2	1	1	B:N:N:B	Entry Node Information	(4-2)	a
3	2	B1	N:B:N:B	A Sequence of Information for Exit Nodes	(4-3)	a

(4-1) Passage codes conform to the specification for the regulation id flags plus passage codes in route planning data frames (Subsection 10.7.1.2).

(4-2) Entry Node Information

name [Entry Node Information] (Item 1: Routed node string forward/backward flag at bit 7 is 0.)

No.	Bit	Description		
1	7	Routed Node String Forward/Backward Flag	bit7	Meaning
			0	Direction of routed string of nodes is the same with that of regulations.
			1	Direction of routed string of nodes is opposite to that of regulations.
2	6 to 4	Number of Exit Nodes		
3	3 to 1	Identical Node Number at Entry Link		
4	0	Entry Link Forward/Backward Flag	bit0	Meaning
			0	Forward approach to entry link
			1	Backward approach to entry link

(4-3) Exit Node Information

name [Exit Node Information]

No.	Bit	Description		
1	7 to 5	Identical Node Number at exit Link		
2	4	Exit Link Forward/Backward Flag	bit4	Meaning
			0	Forward exit to exit link
			1	Backward exit to exit link
3	3 to 1	Node identify Number at exit Link		
4	0	Exit Link Forward/Backward Flag	bit0	Meaning
			0	Forward exit to exit link
			1	Backward exit to exit link

It is allowed to describe two exit nodes in one exit node information record. (The first exit node is described using items 1 and 2. The second exit node is described using items 3 and 4.) When the number of exit nodes is odd, items 1 and 2 for the last exit node information are used.

(5) Passage regulation records for grouped intersection (when the direction of routed string of nodes is opposite to that of regulations)

name [Passage regulation Records for Grouped Intersection]

No.	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	1	N	Regulation ID Flag + Passage Code	(5-3)	a
2	1	1	B:N:N:B	Exit Node Information	(5-1)	a
3	2	B1	N:B:N:B	A Sequence of Entry Node Information	(5-2)	a

(5-1) Exit Node Information

name [Exit Node Information] (Item 1: Routed node string forward/backward flag at bit 7 is 1.)

No.	bit	Description		
1	7	Routed Node String Forward/Backward Flag	bit7	Meaning
			0	Direction of routed string of nodes is the same with that of regulations.
			1	Direction of routed string of nodes is opposite to that of regulations.
2	6 to 4	Number of Entry Nodes		
3	3 to 1	Identical Node Number at Exit Link		
4	0	Exit Link Forward/Backward Flag	bit0	Meaning
			0	Forward exit to exit link
			1	Backward exit to exit link

(5-2) Entry Node Information

name [Entry Node Information]

No.	bit	Description		
1	7 to 5	Identical Node Number at Entry Link		
2	4	Entry Link Forward/Backward Flag	bit4	Meaning
			0	Forward approach to entry link
			1	Backward approach to entry link
3	3 to 1	Identical Node Number at Entry Link		
4	0	Entry Link Forward/Backward Flag	bit0	Meaning
			0	Forward approach to entry link
			1	Backward approach to entry link

It is allowed to describe two entry nodes in one exit node information record. (The first entry node is described using items 1 and 2. The second entry node is described using items 3 and 4.) When the number of entry nodes is odd, items 1 and 2 for the last entry node information are used.

- (5-3) Passage codes conform to the specification for the regulation id flags plus passage codes in route planning data frames (Subsection 10.7.1.2).

7.2.2.1.1.7 Temporal Information

name [Temporal Information]

No.	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	N	Time at which generation is started		a
2	2	2	N	Time at which service is started		a
3	4	2	N	Time at which service is ended		a
4	6	2	N	Time at which entity is extinct		a

The reference time and units for time are defined with metadata.

7.2.2.1.1.8 Street Address Information

name [Street Address Information]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		A Sequence of Street Address Information Records		c

7.2.2.1.1.8.1 Street Address Information Record

name [Street Address Information Record]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		Supplementary MultiLink Information		a
2	O1	B1		A Sequence of Street Address Data Records		c

7.2.2.1.1.8.2 Supplementary MultiLink Information

name [Supplementary MultiLink Information]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	SWS	Size of Street Address Information Record	(1)	a
2	2	2	B:B:B:B	Storage Information Details	(2) (5)	a
3	4	2	D	Administrative Name (left) Data Offset	(3)	a
4	6	2	D	Administrative Name (right) Data Offset	(3)	c
5	8	2	D	Street Name (left) Data Offset	(4)	c
6	10	2	D	Street Name (right) Data Offset	(4)	c

- (2) Whether the Items No. 3 to No.6 exist or not is determined by the value of Item No. 1 of "Storage information details."
- (3) The administrative name (left) / (right) data offset indicates the location where the administrative name (name data record) is stored. This offset indicates the displacement from the beginning of the name data frame to the beginning of the relevant name data record. The storage format for the name data frame is "A=administrative name."
- (4) The street (left) / (right) data offset indicates the location where the road name (name data record) is stored. This offset indicates the displacement from the beginning of the name data frame to the beginning of the relevant name data record. The storage format for the name data frame is the same as for the street name data offset (1=road name, 3=road name Type-pb, 4=road name Type-sb, and 5=road name Type-psb).

(5) Storage Information Details

name [Storage Information Details]

No.	bit	Item name	Remarks	Classification
1	15	Same Administrative Name Applicable (For Both Sides) Flag	(1)	a
2	14	Same Street Name Applicable (For Both Sides) Flag	(2)	a
3	13	Street Name (left) Data Offset Storage Flag	(3)	a
4	12	Street Name (right) Data Offset Storage Flag	(4)	a
5	11 to 10	Odd/Even Address Information (left)	(5)	a
6	9 to 8	Odd/Even Address Information (right)	(5)	a
7	7 to 5	Street Address Type	(6)	a
8	4	Street Address Information Record Continuation Flag	(7)	a
9	3 to 0	(Reserved)		a

(1) Same Administrative Name Applicable (for Both Sides) Flag

1 --- Administrative names are the same on both sides of the road. --- The administrative name (left) represents both sides of the road and the Item No. 4 of the Supplementary MultiLink information is not stored.

0 --- Administrative names are different from either side of the road. --- Items No. 3 and No. 4 of the Supplementary MultiLink information are stored.

(2) Same Street Name Applicable (for Both Sides) Flag

1 --- Street names are the same on both sides of the road. --- The street name (left) represents both sides of the road and the Item of No. 6 of the Supplementary MultiLink information is not stored.

0 --- Street names are different from either side of the road. --- Items No. 5 and No. 6 of "Supplementary MultiLink information" can be stored depending on the flags of (3) and (4).

(3) Street Name (left) Data Offset Storage Flag

1 --- Item No. 5 of the Supplementary MultiLink information is stored.

0 --- Item No. 5 of the Supplementary MultiLink information is not stored.

(4) Street Name (right) Data Offset Storage Flag

1 --- Item No. 6 of the Supplementary MultiLink information is stored.

0 --- Item No. 6 of the Supplementary MultiLink information is not stored.

If both of the (3) street name (left) data offset storage flag and the (4) street name (right) data offset storage flag are 0, Items No. 5 and No. 6 are not stored regardless of the value of (2) Flag to indicate identical street names on both sides.

Administrative name data offset (left) and (right) are stored in the name data record in the same manner as with the street name data offset of the "7.2.2.1.1.4 Additional node record." The character string should be stored in the format "city name +", "+state name". For the city name, specify a postal name in the U.S., and a settlement name in other countries.

Example: "SAN FRANCISCO,CA" "COVENTRY,WEST MIDLAND"

A comma should not be followed by a space character to save the data size.

(5) Odd/Even Address Information for Left and Right Side

- 0 Invalid
- 1 Odd
- 2 Even
- 3 Odd and even numbers coexist.

(6) Street Address Type

- 0 Street address data is not stored.
- 1 Data is stored in the format of the street address data record - Type A.
- 2 Data is stored in the format of the street address data record - Type B.
- 3 Data is stored in the format of the street address data record - Type C.
- 4 Data is stored in the format of the street address data record - Type D.
- 5 Data is stored in the format of the street address data record - Type E.
- 6 Data is stored in the format of the street address data record - Type F.
- 7 Invalid value

(7) Street Address Information Record Continuation Flag

1 --- Street address information record continues.

0 --- Street address information record does not continue.

This flag is set to indicate information of multiple addresses on either side of one link (street). When multiple addresses are represented, the continuation flag of the last street address information record is set to 0 and the previous continuation flags are set to 1.

The street address data offset of the additional node information indicates the location of the top of the street address information records.

"Size of the street address information record" of "Supplementary MultiLink information" indicates the size of the individual street address information record.

7.2.2.1.1.8.3 Street Address Data Record

The street address data records are defined in six types, Type A to Type F.

7.2.2.1.1.8.3.1 Street Address Data Record Type A

name [Street Address Data Record Type A]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	N	House Number		a

Street address data record - Type A is used when all links forming a multilink have street address ranges which can be described as a simple increment or decrement, and when no address is skipped between links. The maximum value of house numbers should be 65534 or below. The number of records in a sequence must be the number of links forming the MultiLink plus 1. If the MultiLink contains an intersection and the link within the intersection has no house number, it can also be described.

When the house numbers increase along the direction of links forming a MultiLink, smaller one of the right and left house numbers on the start node side of each link are stored in the order of links forming the MultiLink, and the larger one of the right and left house numbers on the end node side of the last link is stored last.

When the house numbers decrease along the direction of links forming a MultiLink, larger one of the right and left house numbers on the start node side of each link are stored in the order of links forming the MultiLink, and the smaller one of the right and left house numbers on the end node side of the last link is stored last.

If some link contains no house number, store 0xFFFF(65535) as the house number of the link.

Example 1:

Street addresses are as shown below when the following conditions are met:

Storage information

Street address type - Type A

Odd/even information (left) - odd number

Odd/even information (right) - even number

A sequence of street address data records

1, 101, 201, 300

Street addresses:

<u>1</u>	99	<u>101</u>	199	<u>201</u>	299	
0	-----	0	-----	0	-----	0
2		100 102		200 202		<u>300</u>

Example 2:

Street addresses are as shown below when the following conditions are met:

Storage information

Street address type - Type A

Odd/even information (left) - none

Odd/even information (right) - even number

A sequence of street address data records

1298, 1198, 65535, 1098, 1000

Street addresses:

(Many double digitized roads have the addresses assigned this way)

None		None		None		
0	-----	0	-----	0	-----	0
1298		1200 1198		1100 1098		1000

Note: In case of Type A, the following combinations of odd/even numbers are not permitted.

- Odd-numbered addresses on both sides
- Even-numbered addresses on both sides
- Mixture of odd- and even-numbered addresses on both sides
- Invalid addresses on both sides

7.2.2.1.1.8.3.2 Street Address Data Record Type B

name [Street Address Data Record Type B]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	N	House Number		a

Street address data record - Type B is the same as Type A except that the maximum number of house numbers. Type B is used when the MultiLink contains house number exceeding 65534.

The number of records in a sequence must be the number of links forming the MultiLink plus 1. If the MultiLink contains a link having no house number, 0xFFFFFFFF is assigned as a house number corresponding to the link.

Note: In case of Type B, the following combinations of odd/even numbers are not permitted.

- Odd-numbered addresses on both sides
- Even-numbered addresses on both sides
- Mixture of odd- and even-numbered addresses on both sides
- Invalid addresses on both sides

7.2.2.1.1.8.3.3 Street Address Data Record Type C

name [Street Address Data Record Type C]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	B:N	House Number Start/End Point (2 bytes) (Left Start Point)	(1)	c
2	2	2	B:N	House Number Start/End Point (2 bytes) (Left End Point)	(1)	c
3	4	2	B:N	House Number Start/End Point (2 bytes) (Right Start Point)	(1)	c
4	6	2	B:N	House Number Start/End Point (2 bytes) (Right End Point)	(1)	c

Type C is used when the house numbers of links of a MultiLink contains some skipped numbers and does not conform to the rules of Types A and B. The classifications of all items are "c" because Items No. 1 and No. 2 are not stored when the odd/even information (left) is 0 and Items No. 3 and No. 4 are not stored when odd/even information (right) is 0.

The number of records in a sequence is the same as the number of links forming the MultiLink.

(1) House Number Start/End Point (2 bytes)

name [House Number Start/End Point (2 bytes)]

No.	bit	Description		
1	15	Address Continuation Flag on the Start (End) Point Side	Value	Meaning
			0	Not continued. (An address can be specified at the start (end) point.)
			1	Continued. (Unspecified value)
2	14 to 0	House Number		

The house number start/end point (2 bytes) should be set to 0xFFFF(65535) (both of the start and end points) when both sides of a link have house numbers but some part of the link lacks house numbers.

If house numbers of one side of the link cannot be specified such as for a T-shaped road, set the address continuation flag on the start (end) point to 1 and assign proportionally allotted numbers to house numbers.

Example 1:

Street addresses are as shown below when the following conditions are met:

Storage information

Street address type - Type C

Odd/even information (left) - odd number

Odd/even information (right) - even number

A sequence of street address data records

1299, 1201, 2600, 2502, 1199, 1101, 2500, 2402, 65535, 65535, 65535, 65535, 65535, 65535, 98, 2

Street addresses

1299	1201	1199	1101	None	None	
o-----o-----o-----o-----o-----o-----o						
2600	2502	2500	2402	None	98	2

Example 2:

Street addresses are as shown below when the following conditions are met:

Storage information

Street Address Type Type C

Odd/even information (left) - invalid

Odd/even information (right) - mixture of odd and even numbers

A sequence of street address data records

2600, 2501, 1599, 1401, 65535, 65535, 98, 2

Street addresses



Note: A mixture of odd numbers and even numbers does not always mean that the start point is an odd number and the end point is an even number.

Example 3:

Street addresses are as shown below when the following conditions are met:

Storage Information

Street Address Type C

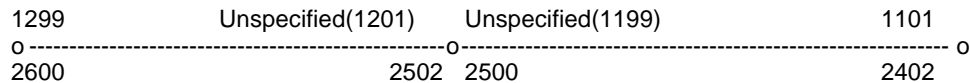
Odd/even information (left) - odd number (invalid for a T-shaped road)

Odd/even information (right) - even number

A sequence of street address data records

1299, 33969(1:1201), 2600, 2502, 33967(1:1199), 1101, 2500, 2402

Street Addresses



7.2.2.1.1.8.3.4 Street Address Data Record Type D

name [Street Address Data Record Type D]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	B:N	House Number Start/End Point (4 bytes) (Left Start Point)	(1)	c
2	4	4	B:N	House Number Start/End Point (4 bytes) (Left End Point)	(1)	c
3	8	4	B:N	House Number Start/End Point (4 bytes) (Right Start Point)	(1)	c
4	12	4	B:N	House Number Start/End Point (4 bytes) (Right End Point)	(1)	c

Type D is used when the links forming a MultiLink do not conform to the rules of Types A and B, when some house number is skipped, and when the largest house number exceeds 65534. Setting are the same as with Type C.

(1) House Number Start/End Point (4 bytes)

name [House Number Start/End Point (4 bytes)]

No	bit	Description	
1	31	Address continuation Flag on the start (end) Point side	bit 31
			Meaning
			0 Not continued. (An address can be specified at the start (end) point.)
			1 Continued. (Unspecified value)
2	30 to 0	House Number	

The house number start/end point (4 bytes) should be set to 0xFFFFFFFF (both of the start and end points) when both sides of a link have house numbers but some part of the link lacks house numbers.

7.2.2.1.1.8.3.5 Street Address Data Record Type E

name [Street Address Data Record Type E]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	4	C	Attached Character String	(1)	a
2	4	1	N	House Number (Left Start Point)		c
3	5	1	N	House Number (Left End Point)		c
4	6	1	N	House Number (Right Start Point)		c
5	7	1	N	House Number (Right End Point)		c

In case of hyphenated addresses such as those seen in Queens, NY, Fair lawn, and NJ, the preceding part of the hyphen is up to three digits and common in a link, and the address range is a repetition of 0 to 99. Type E is the format which allows efficient storage of addresses of this type. Valid house numbers are 0 to 254, and 255 is assumed invalid. To a street with one side partially invalid, assign 255 to the house numbers (both the start and end points).

The number of records in a sequence is the same as the number of links forming the MultiLink.

(1) When the attached character string contains control characters, it means as follows:

\%03 --- The house number is always "0 fill 3 digits."

Example: "%03", 1, 99, 2, 100 ---> 001 to 099, and 002 to 100 are indicated.

\s --- The continued prefix is actually a suffix.

Example: "sS", 1, 99, 2, 100 ---> 1S to 99S, and 2S to 100S are indicated.

When the data length of the attached character string is less than four characters, add NULL to the end.

Example: "sS" --> '\ ' 's' 'S' 0x00

Example 1:

Street addresses are as shown below when the following conditions are met:

Storage information

Street address type - Type E

Odd/even information (left) - odd number

Odd/even information (right) - even number

A sequence of street address data records

"100-", 1, 99, 0, 98, "101-", 1, 99, 0, 98

Street addresses

100-1	100-99	101-1	101-99
0	-----0-----		
100-0	100-98	101-0	101-98

7.2.2.1.1.8.3.6 Street Address Data Record Type F

name [Street Address Data Record Type F]

No	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	B0	C	House Number (Left Start Point)		c
2	01	B1	C	House Number (Left End Point)		c
3	02	B2	C	House Number (Right Start Point)		c
4	03	B3	C	House Number (Right End Point)		c
5				Padding to make the length of the Street Address Data Record - Type F an even Number of bytes		c

When street addresses cannot be described using Types A to E, store all of them as character strings. The character string should be of variable length and each string should terminate with NULL. For the part having no house number, store NULL only.

The number of records in a sequence is the same as the number of links forming the MultiLink.

Example 1:

Street addresses are as shown below when the following conditions are met:

Storage information

Street address type - Type F

Odd/even information (left) - odd number

Odd/even information (right) - even number

A sequence of street address data records

"100-799","100-700","2S100W500","2S98W400","","","2S97W398","2S97W300","1","99","100","2"

Street addresses

100-799	100-700	None	1	99
o-----o	o-----o	o-----o	o-----o	o-----o
2S100W500	2S98W400	2S97W398	2S97W300	100
				2

Note: The above is an extreme example; no actual road like this example has not been known.

7.2.2.1.1.9 Expansion Data (MultiLink Data Record)

When the expansion (MultiLink data record) flag is "1: Expanded" and the size of the MultiLink data record is larger than that specified by the specification, the expanded space can be used as an expanded field.

For how to expand fields, see the expansion method defined separately.

7.2.3 Passage Code Data Frame

The data structure of the passage code data frame is based on that described in Section 10.11, "Passage code data frame."

name [Passage Code Data Frame]

No.	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	N:N	Passage Code Data Header	(1)	a
2	2	2	SWS	Size of Passage Condition Record		a
3	4	B1		Passage Condition Table		a

(1) Passage Code Data Header

No.	bit	Description
1	15 to 8	Value at the beginning of the Passage Code
2	7 to 0	Number of Passage Condition Records

7.2.3.1 Passage Condition Table

name [Passage Condition Table]

No.	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		A Sequence of Passage Condition Records		a

7.2.3.1.1 Passage Condition Record

name [Passage Condition Record]

No.	Offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	B* ...:B	Passage Code		c

7.2.4 Composite Node Data Frame

name [Composite Node Data Frame]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	B1		A Sequence of Composite Node Information		c

7.2.4.1 Composite Node Information

name [Composite Node Information]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	N	Number of Nodes Composing Composite Intersections (n)	(1)	a
2	2	B1		A Sequence of Node Offset Records	(2)	a

(1) Number of Nodes Composing Composite Intersections

No.	bit	Item name
1	15 to 8	(RESERVED)
2	7 to 0	Number of Nodes Composing Composite Intersections

For nodes associated with identical node information, specify this data for only one of them. For example, the number of composing nodes is 4 for the # type.

(2) A Sequence of Node Offset Records

The field, Node offset records describes nodes that compose intersections adding offsets. Each offset is indicated with the displacement from the beginning of the road distribution header to the beginning of the target node record.

name [Node offset Record]

No.	offset	Data length	Data type	Item name	Remarks	Classification
1	0	2	D	Offset to Node		a

7.2.5 Expansion (Road Data Frame)

Used as an expansion field. For how to expand fields, see the expansion method defined separately.

