Draft Development Specification for Spatial Network Model for Pedestrians

March 2017

Director-General for Policy Planning, Ministry of Land,

Infrastructure, Transport and Tourism

Draft Development Specification for Spatial Network Model for Pedestrians

Table of Contents

1. Introduction 1

1.1 Purposes 1

1.2 Scope of Application 2

1.3 Data Types 2

2. Basic Concepts of Data 4

2.1 Data Structures 4

2.2 Coordinate System 5

3. Specification for Development of Spatial Network Model for Pedestrians 6

3.1 General Provisions 6

3.2 Targets of Spatial Network Model for Pedestrians 6

3.2.1 Composition of Spatial Network Model for Pedestrians 6

3.2.2 Placement of Links 6

3.2.3 Placement of Nodes 9

3.3 Information Items and Attribute Information of Links and Nodes 14

3.3.1 Information Items and Attribute Information of Links 14

3.3.2 How to Acquire Attribute Information of Links 18

3.3.3 Information Items and Attribute Information of Nodes 31

3.3.4 How to Acquire Attribute Information of Nodes 31

3.4 Data Format of Spatial Network Model for Pedestrians 33

4. Specification for Facility Data Development 34

4.1 General Provisions 34

4.2 Target Facilities and Information 34

4.3 Information Items and Attribute Information of Facility Data 35

4.4 How to Acquire Attribute Information of Facility Data 39

4.5 Data Format of Facility Data 43

【Reference Data】

[Reference 1: Example of Creating Spatial Network Model for Pedestrians]..... 45

[Reference 2: Example of Creating Facility Data]..... 50

[Reference 3: Example of Creating Metadata]..... 53

1. Introduction

1.1 Purposes

The "Draft Development Specification for Spatial Network Model for Pedestrians" (hereinafter referred to as "this Specification") defines the development procedures and data structures of the "spatial network model for pedestrians" and "facility data" that have important roles in providing a pedestrian mobility support service.

[Explanation]

The promotion of pedestrian mobility support services is required to realize a Sustainable Well-being Society in which everyone can carry out activities freely and independently, regardless of the presence of disabilities, age, and language spoken, etc.

A pedestrian mobility support service allows individuals to acquire information on routes, facilities, and other factors required to ensure smooth movement and activities via their mobile devices such as smartphones and tablets. The service provides them with support appropriate for their respective physical characteristics and travel occasions.

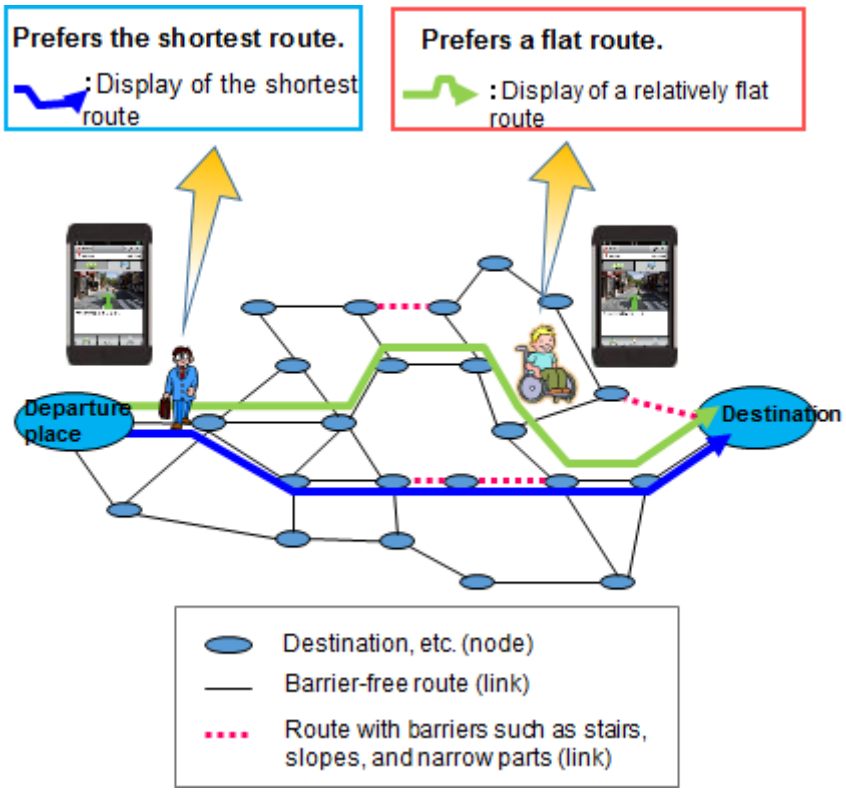


Figure 1.1 Image of Pedestrian Mobility Support Service

Three elements are required to provide a pedestrian mobility support service: "positioning technology," "mobile data terminal," and "information data." This Specification defines two types of information data required to provide a pedestrian mobility support service: "spatial network model for pedestrians" and "facility data."

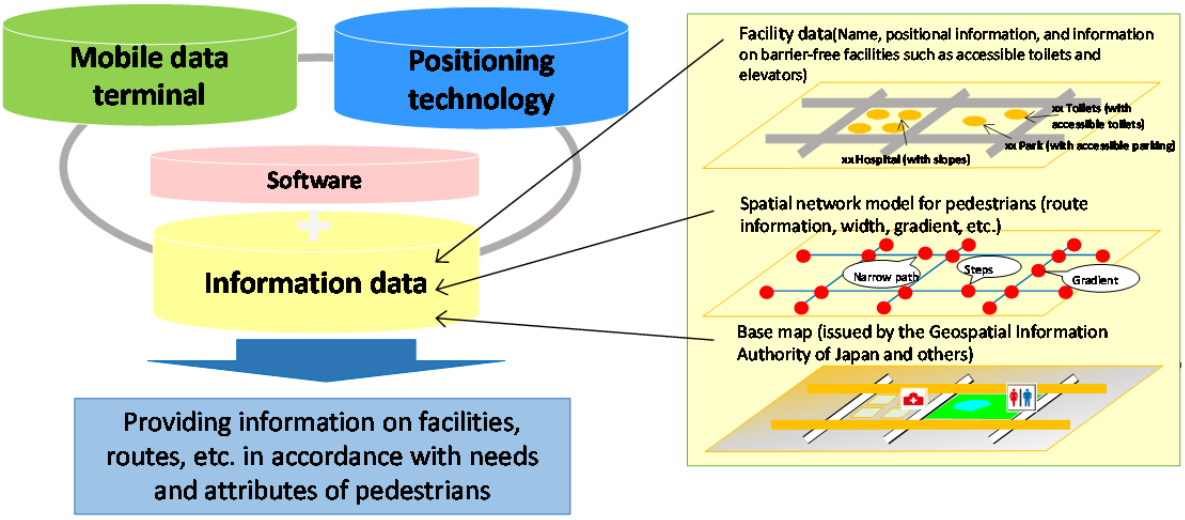


Figure 1.2 Constituent Elements of Pedestrian Mobility Support Service

1.2 Scope of Application

This Specification shall be applied to a spatial network model for pedestrians and facility data.

1.3 Data Types

This Specification defines two types of data: 1) spatial network model for pedestrians and 2) facility data.

1) Spatial network model for pedestrians

A spatial network model for pedestrians consists of "links" with information on barrier-free services on pedestrian routes and "nodes" connected by links.

2) Facility data

Facility data includes positional information of public facilities, etc. and information on barrier-free services provided at the facilities.

[Explanation]

1) Spatial network model for pedestrians

A spatial network model for pedestrians consists of "links" with information on barrier-free services such as width and gradients of pedestrian routes and "nodes" connected by links. The types of barrier-free travel information respectively assigned to "links" and "nodes" shall be called "information items." The contents of "information items" shall be called "attribute information."

Wise use of this data enables to provide services such as navigation from an origin to a destination.

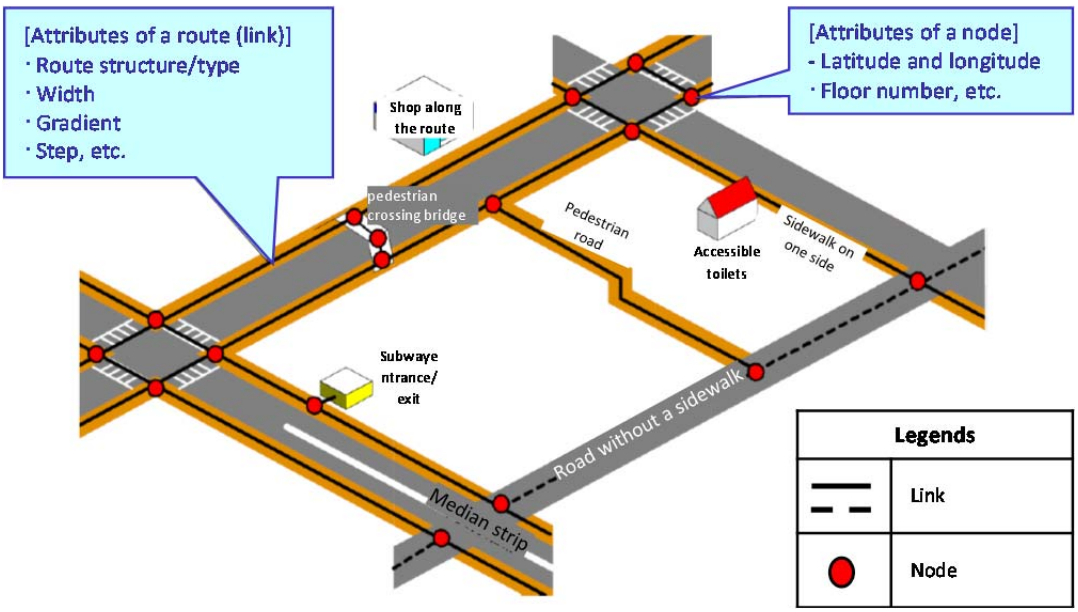


Figure 1.3 Image of Spatial Network Model for Pedestrians

2) Facility data

Facility data represents names ,positional information of facilities and availability of barrier-free equipment.

Wise use of this data enables to provide services for checking the barrier-free equipment of the facilities and finding multipurpose lavatories close to them.

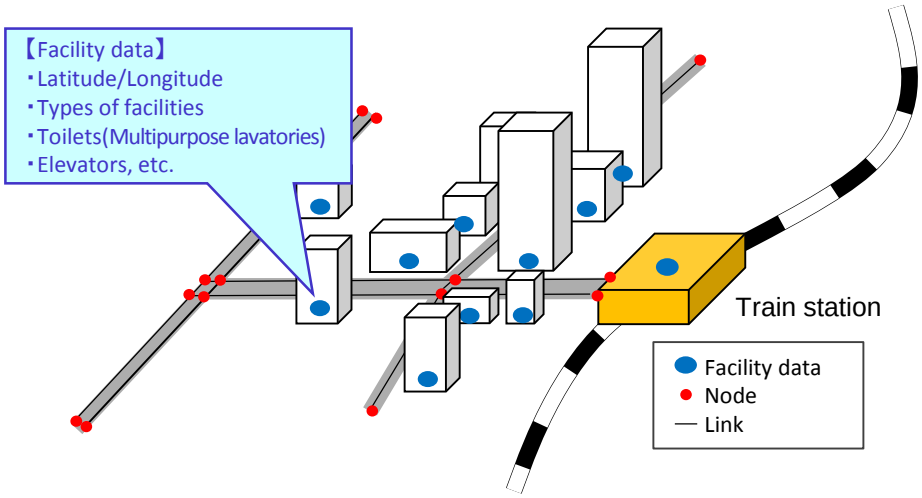


Figure 1.4 Image of Facility Data

2. Basic Concepts of Data

2.1 Data Structures

This Specification defines the data structures of a spatial network model for pedestrians and facility data by classifying them into two categories: Mandatory information items for developing pedestrian mobility support service and optional information items that can be added in an arbitrary manner in order to satisfy regional needs and to upgrade the service.

1) Layer 1 data

Mandatory information items in a spatial network model for pedestrians and facility data, which are needed to facilitate a pedestrian mobility support service.

2) Layer 2 data

Optional information items that can be added in an arbitrary manner according to the regional circumstances and other factors relating to upgrading a pedestrian mobility support service.

3) Layer 3 data

Information items not included in the Layer 1 and 2 data but required for regionally-specific service, which can be arbitrarily added according to the regional circumstances and other factors. For this data, no definition is given in this Specification.

[Explanation]

A spatial network model for pedestrians and facility data consist of mandatory information items as well as optional information items that can be added in an arbitrary manner according to the regional circumstances and other factors.

1) Layer 1 data

The information items to be defined in the Layer 1 data shall be mandatory information required to provide a pedestrian mobility support service and support the transportation of people including disabled persons. This data must be created to develop a spatial network model for pedestrians and facility data.

Note that the information items in the Layer 1 data are defined with an eye on the accessibility of disabled users of manual wheelchairs.

2) Layer 2 data

The information items to be defined in the Layer 2 data shall be developed as spatial network model for pedestrians and facility data required to upgrade a pedestrian mobility support service according to regional needs and other factors. This data can be arbitrarily selected and added to the Layer 1 data.

3) Layer 3 data

The information items to be defined in the Layer 3 data, which are not included in the Layer 1 and 2 data, shall be developed uniquely in order to satisfy regional needs etc. The Layer 3 data is not specified in this Specification.

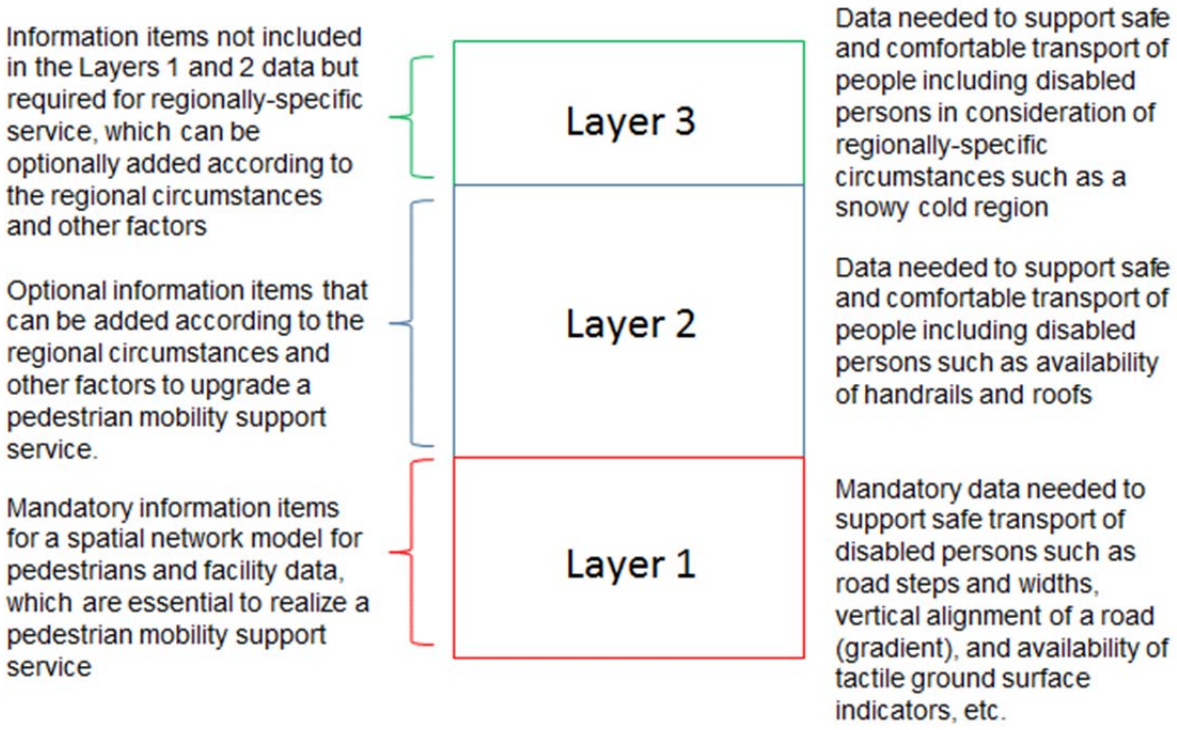


Figure 2.1 Image of Data Structure

2.2 Coordinate System

The data coordinate system to be used in this Specification shall be the Japanese Geodetic Datum 2011 (JGD2011), which is the latitude longitude coordinate system newly established in Japan based on the World Geodetic System.

[Explanation]

In Japan, the Survey Act was partially amended in 2001 and took effect in April 1, 2002 in order to use the World Geodetic System.

The amendment of the Survey Act in 2002 changed the geodetic reference system of Japan from the Tokyo Datum (former geodetic system) to the Japanese Geodetic System 2000 (JGD2000 of the World Geodetic System). Later, JGD2011 was established as a revised coordinate system in consideration of the massive crustal displacements caused by the Great East Japan Earthquake. The JGD2011 coordinate system is commonly used as the current geodetic reference system of Japan. The world geodetic system other than JGD2011 is WGS84, which was developed and is maintained by the U.S.

3. Specification for Development of Spatial Network Model for Pedestrians

3.1 General Provisions

This section defines the specifications on the information items to be added to spatial network model for pedestrians to express the forms of pedestrian routes and attribute information to be acquired for each of the information items.

3.2 Targets of Spatial Network Model for Pedestrians

A spatial network model for pedestrians shall mainly cover the passages in outdoor public space such as roads, parks, squares, and pedestrian decks.

[Explanation]

This Specification mainly defines the pedestrian routes in outdoor public space. A spatial network model for pedestrians may be developed by giving priority to passages that are frequently used by aged and disabled persons. For example, data may be developed in a phased manner by giving priority to routes in a priority area for wheelchair accessibility development or routes in a tourist spot.

3.2.1 Composition of Spatial Network Model for Pedestrians

A spatial network model for pedestrians consists of "links" that represent pedestrian routes and "nodes" connected by links.

3.2.2 Placement of Links

Links shall be placed as follows:

1) Roads (sidewalks or woonerf): If a sidewalk is available, place a link along the said sidewalk as a pedestrian route. If there is a center line on the road, however, place a link also on the side (edge) of the road without a sidewalk. On a woonerf without a center line, place a link approximately in the center of the road.
2) Railroad crossing: Place a link in the same way as for a road in the above, depending on the structure of the relevant road section.
3) Elevator and escalator: Place a link that enables a straight-line connection between starting and ending points or between floors.
4) Large space such as a square: Place a link at the end of a straight line which extends from each of the entrances/exits to the center of a square, etc. Place a link along a garden path if any.
5) Pedestrian space with a large width: Place a link approximately in the center of a range through which people can pass. The same applies to public open space of an apartment

building, etc.

6) Sidewalk equipped with tactile walking surface indicators: Place a link approximately in the center of a sidewalk.

7) Other links: Place a link along an actual pedestrian route.

8) Either of the ends of a link may be a source or target point of it. For a section with a fixed moving direction such as a moving walkway and an escalator, set the entrance to the section as a source point and the exit from it as a target point.

[Explanation]

1) How to place links

In principle, acquire links on both sides of a road and place them as two line data. If there is a sidewalk separated by a curb from a roadway, place a link on the route of the said sidewalk. If there is no sidewalk, place a link assuming that the side (edge) of the road is a pedestrian route. On a woonerf without a center line, however, place a link approximately in the center of the road as one line data. Note that a "sidewalk" here refers to a pedestrian passage made by physically partitioning a road with a curb or guardrail. If the road is partitioned only by means of roadway edge marking, the said road is not considered as a sidewalk.

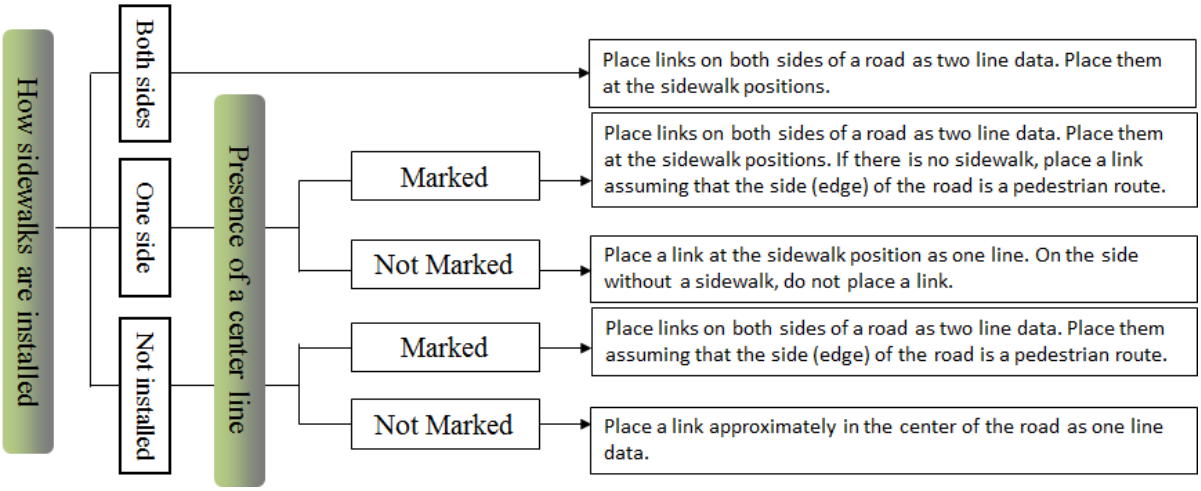
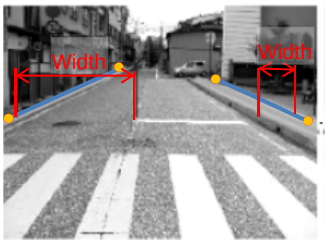
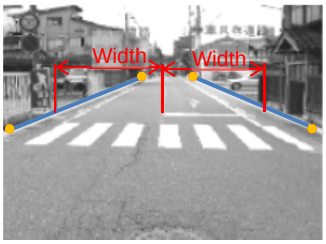
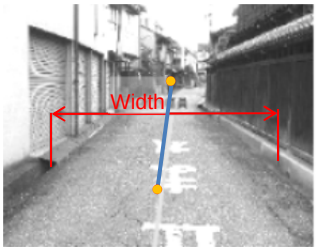


Figure 3.1 How to Place Links Depending on How Sidewalks Are Installed

Table 3.1 Link Placement depending on the status of each sidewalk

No.	Status of sidewalk			How to place links			
	Sidewalk	Center line	Photograph	No. of links	Sidewalk or Woonerf	Where to place	Width
1	Both sides	Marked	-	2	Sidewalk	On the sidewalk	Sidewalk width
2	Both sides	Not marked	-	2	Sidewalk	On the sidewalk	Sidewalk width
3	One side	Marked		1	Sidewalk	On the sidewalk	Sidewalk width
				1	Woonerf	On the side (edge) of road	Center line to side (edge) of road
4	One side	Not marked	-	1	Sidewalk	On the sidewalk	Sidewalk width
5	Not installed	Marked		2	Woonerf	On the side (edge) of road	Center line to the side (edge) of road
6	Not installed	Not marked		1	Woonerf	Approx. in the center of road	Left end to right end

3.2.3 Placement of Nodes

Nodes shall be placed at the following positions:

1) Crossing/branching points of routes

Points where links cross or from which a link branches.

2) Changing points of route forms

Points where the route forms change such as turns of routes.

3) Changing points of attribute information

Changing points of attribute information such as changing points of route types, starting/ending points of slopes and stairs, changing points of barriers to accessibility such as gradients and steps, and areas near the entrances of elevators.

4) Boundary points between outdoors and indoors/underground

Boundary points between outdoors and indoors/underground such as subway station entrances.

5) Large space such as squares

Entrances to squares and centers of squares. Place nodes along a garden path if any.

6) Boundaries of municipalities

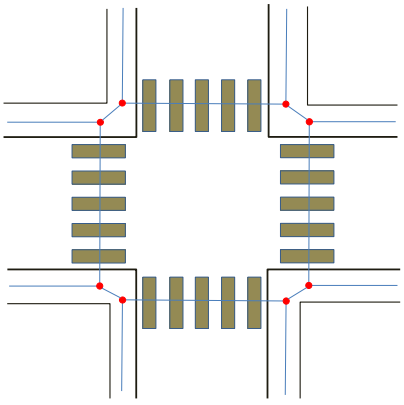
Boundary points between the different municipalities.

Note: In cases where there is no crossing/branching point or changing point over a long distance, there is no need to place a node midway.

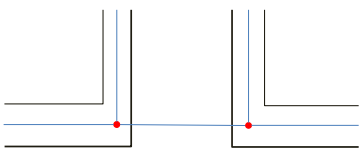
[Explanation]

1) Crossing/branching points of routes

a) Example of intersection

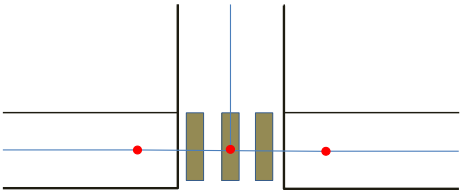


For an intersection with pedestrian crossings, place nodes at the ends of pedestrian crossings.



For an intersection without pedestrian crossings, place nodes at the ends of sidewalks.

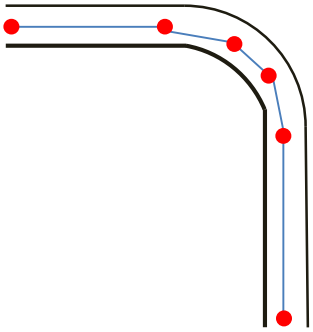
b) Example of intersection of roads with two sidewalks on both sides and woonerfs without center lines



For an intersection of roads with two sidewalks on both sides and woonerfs without center lines, place a node on a pedestrian crossing. Even if there is no pedestrian crossing, place a node in the same way.

2) Changing points of route forms

a) Example of curve



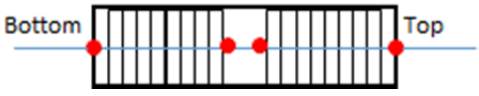
For a route with a curve, etc., place nodes appropriately so that links do not deviate from a sidewalk.

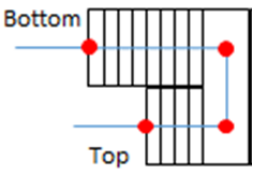
b) Considerations required in placing nodes at changing points of route forms

Route search becomes time-consuming after many nodes and many links are placed. In this Specification, nodes are basically placed on "changing points of route forms." However, you may create data in a data format that enables representation of polylines as graphics in Shapefile, etc. Furthermore, you may choose not to place nodes on "changing points of route forms" in data to be released as open data.

3) Changing points of attribute information

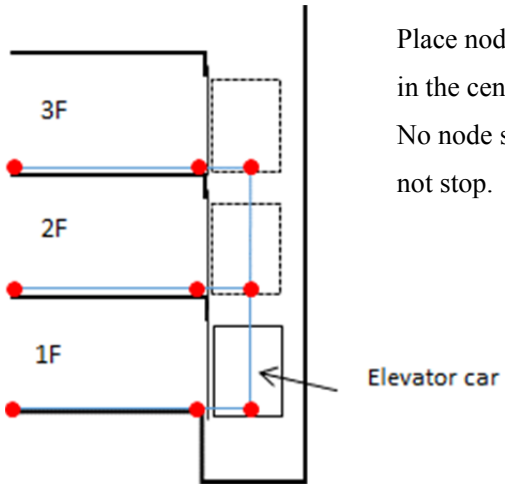
a) Example of stairs





Place nodes before and after a flight of stairs and on landing.

b) Example of elevator

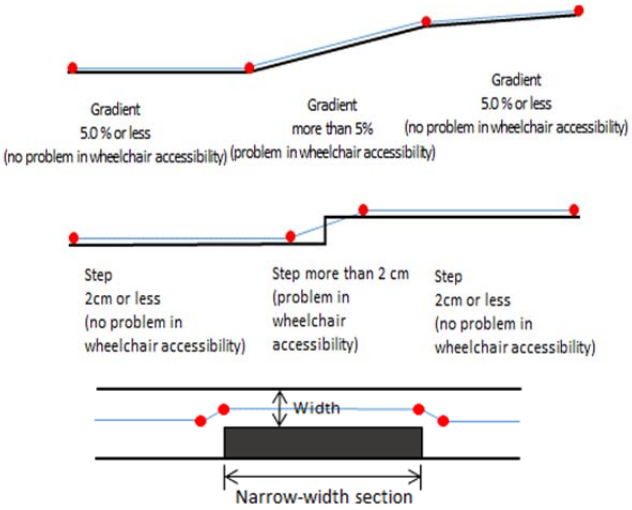


Place nodes near the entrances to elevators and approximately in the center of elevator cars and connect the nodes with links. No node should be placed on floors where the elevator does not stop.

c) Considerations required in placing nodes on elevators

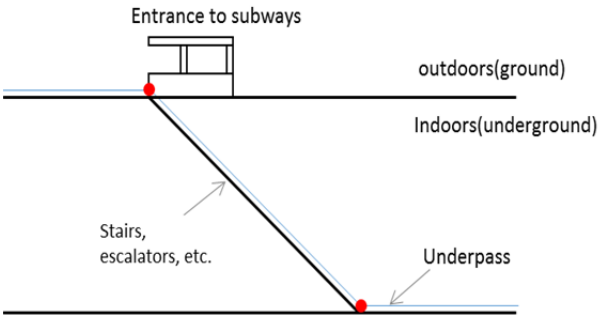
If, when creating data in Shapefile, it is not possible to connect with links any nodes that are placed in the same position and on different floors in the center of an elevator car, it is possible to connect nodes with links by placing links at slightly different positions on different floors.

d) Example of changing points of barriers to accessibility



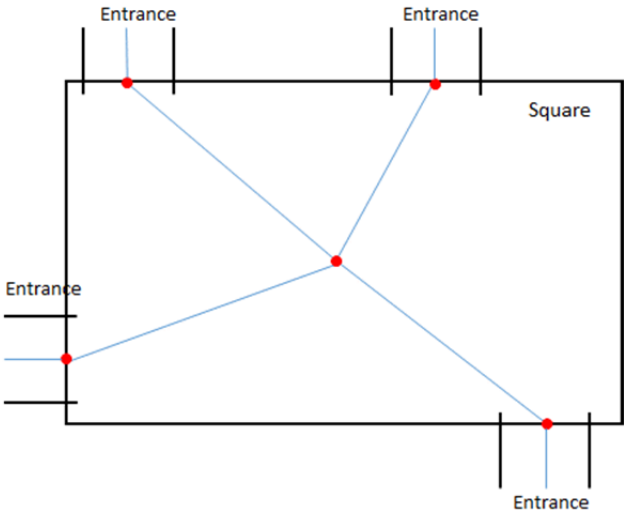
Place nodes before and after changing points of barriers to accessibility such as gradients, steps, and narrow-width sections.

4) Boundary points between outdoors and indoors/underground



Place nodes at the boundary points between outdoors and indoors/underground.

5) Large space such as squares



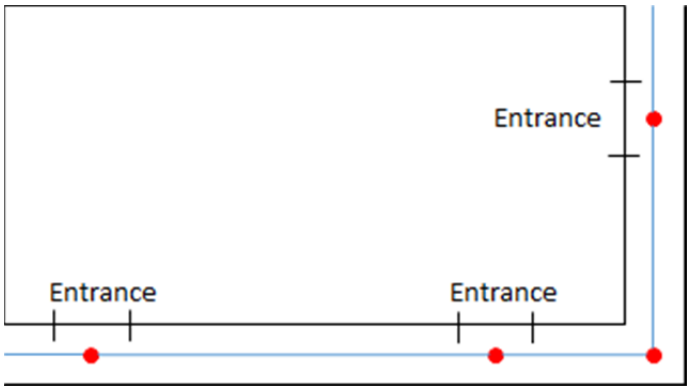
In a large space such as a square, place nodes near the entrances and in the center of the square and connect the nodes near the entrances and in the center with links. Place nodes along a garden path if any.

6) Boundaries of municipalities

A spatial network model for pedestrians is assumed to be developed for each municipality. Therefore, place nodes at the boundaries of municipalities to facilitate data integration and division between municipalities.

7) Considerations required in placing nodes near the entrances to large-scale facilities

Route guidance will be easier if nodes are placed near the entrances to large-scale facilities, public facilities, etc. It is advisable to place nodes near the entrances to large-scale facilities, public facilities, etc.


Entrance
Entrance
Entrance

3.3 Information Items and Attribute Information of Links and Nodes

3.3.1 Information Items and Attribute Information of Links

The following information items and attribute information shall be specified for links. The Layer 1 data must be assigned to a spatial network model for pedestrians. The Layer 2 data can be arbitrarily selected and added.

Table 3.2 Information Items and Attribute Information of Links

No.	Information item	Field name	Format	Attribute information	Layer 1 (mandatory)	Layer 2 (optional)
1	Link ID	link_id	Character string	ID of a link	●	
2	Source node ID	start_id	Character string	ID of a source node	●	
3	Target node ID	end_id	Character string	ID of a target node	●	
4	Link length	distance	Numeric value	Enter a link length up to the first decimal place (in meters). (No need to enter this item if the route type is an elevator.)	●	
5	Route structure	rt_struct	Code	1: physical separation provided between roadways and sidewalks, 2: no physical separation provided between roadways and sidewalks, 3: pedestrian crossing, 4: road crossing without road marking for pedestrian crossing, 5: underpass, 6: pedestrian crossing bridge, 99: other	●	
6	Route type	route_type	Code	0: no corresponding attribute information, 1: moving walkway, 2: railroad crossing, 3: elevator, 4: escalator, 5: stairs, 6: slope, 99: other	●	
7	Direction	direction	Code	0: both directions, 1: direction from source to target, 2: direction from target to source, 99: unknown	●	
8	Width	width	Code	0: less than 1.0 m (wheelchair inaccessible), 1: 1.0 m to less than 2.0 m (wheelchair accessible (difficult to pass each other)), 2: 2.0 m to less than 3.0 m (wheelchair accessible (possible to pass each other)), 3: 3.0 m or more (no problem in wheelchair accessibility), 99: unknown	●	
9	Gradient	vtcl_slope	Code	0: 5% or less (no problem in wheelchair accessibility), 1: more than 5% (problem in wheelchair accessibility), 99: unknown	●	
10	Step	lev_diff	Code	0: 2 cm or less (no problem in wheelchair accessibility), 1: more than 2 cm (problem in wheelchair accessibility), 99: unknown	●	
11	Signals for pedestrians	tfc_signal	Code	0: without signals for pedestrians, 1: with pedestrian-vehicle separated signals, 2: with pedestrian-control signals, 3: other signals than these, 99: unknown	●	
12	Types of signals for pedestrians	tfc_s_type	Code	0: without sound equipment, 1: with sound equipment (without a button for visually impaired person), 2: with sound equipment (with a button for visually impaired person), 99: unknown	●	

13	Tactile walking surface indicators	brail_tile	Code	0: without tactile walking surface indicators, etc., 1: with tactile walking surface indicators, etc., 99: unknown	●	
14	Elevator type	elevator	Code	0: without elevator, 1: with elevator (not accessible), 2: with elevator (accessible), 99: unknown	●	
15	Service start time	start_time	Character string	Enter service start time if the service time is limited. Leave this field blank if the service time is not limited. Enter "99" if it is unknown. The format is "HH-MM."		●
16	Service end time	end_time	Character string	Enter service end time if the service time is limited. Leave this field blank if the service time is not limited. Enter "99" if it is unknown. The format is "HH-MM."		●
17	Service start date	start_date	Character string	Enter a service start date if network data is to be developed before the services start of a road or passage. Leave this field blank if the road is already in service. Enter "99" if it is unknown. The format is "YYYY-MM-DD."		●
18	Service end date	end_date	Character string	Enter a service end date if the service end of a road or passage is planned. Leave this field blank if the service end is not planned. Enter "99" if it is unknown. The format is "YYYY-MM-DD."		●
19	Service closing days	no_serv_d	Character string	Enter non-service days if the service days of the week are limited. Omitted if the service days of the week are not limited. Convert the days of the week into numbers (1: Monday to 7: Sunday) and enter numbers consecutively in an ascending order if there are more than one. Leave this field blank if there is no service closing day. Enter "99" if it is unknown.		●
20	Restricted traffic	tfc_restr	Code	0: freely accessible, 1: access undesirable (private space), 2: fare payment required, 99: unknown		●
21	Minimum width	w_min	Numeric value	Enter the minimum width in a link up to the first decimal place (in meters).		●
22	Latitude at minimum width	w_min_lat	Numeric value	Latitude of a point at the minimum width. Enter a value in decimal notation (e.g., 35.6755310).		●
23	Longitude at minimum width	w_min_lon	Numeric value	Longitude of a point at the minimum width. Enter a value in decimal notation (e.g., 139.7512700).		●
24	Maximum gradient	vSlope_max	Numeric value	Enter the maximum gradient in a link as an integer (in percent).		●
25	Gradient latitude	vSlope_lat	Numeric value	Latitude of a point at the maximum gradient in a link. Enter a value in decimal notation (e.g., 35.6755310).		●
26	Gradient longitude	vSlope_lon	Numeric value	Longitude of a point at the maximum gradient in a link. Enter a value in decimal notation (e.g., 139.7512700).		●
27	Maximum crossfall	hSlope_max	Numeric value	Enter the maximum gradient in a link as an integer (in percent).		●
28	Crossfall latitude	hSlope_lat	Numeric value	Latitude of a point at the maximum crossfall in a link. Enter a value in decimal notation (e.g., 35.6755310).		●

29	Crossfall longitude	hSlope_lon	Numeric value	Longitude of a point at the maximum crossfall in a link. Enter a value in decimal notation (e.g., 139.7512700).		●
30	Road surface condition	condition	Code	0: no problem in accessibility, 1: soil, 2: gravel, 3: other, 99: unknown		●
31	Maximum step height	levDif_max	Numeric value	Enter the maximum step height in a link as an integer (in centimeters).		●
32	Step latitude	levDif_lat	Numeric value	Latitude of a point at the maximum step height in a link. Enter a value in decimal notation (e.g., 35.6755310).		●
33	Step longitude	levDif_lon	Numeric value	Longitude of a point at the maximum step height in a link. Enter a value in decimal notation (e.g., 139.7512700).		●
34	Number of steps of stairs	stair	Numeric value	Enter a number of steps as an integer.		●
35	Handrail	handrail	Code	0: none, 1: on the right, 2: on the left, 3: on both sides, 99: unknown (The direction is as seen from the source.)		●
36	Roof	roof	Code	0: none, 1: yes, 99: unknown		●
37	Uncovered street gutter or ditch	waterway	Code	0: none, 1: yes, 99: unknown		●
38	Bus stop	bus_stop	Code	0: none, 1: yes, 99: unknown		●
39	Latitude of a bus stop	bus_s_lat	Numeric value	Latitude of a bus stop in a link if any. Enter a value in decimal notation (e.g., 35.6755310).		●
40	Longitude of a bus stop	bus_s_lon	Numeric value	Longitude of a bus stop in a link if any. Enter a value in decimal notation (e.g., 139.7512700).		●
41	Support equipment	facility	Code	0: none, 1: accessible escalator for wheelchair, 2: stair lift, 3: step lift, 4: audio guidance device, 5: other support equipment, 99: unknown (Equipment requiring human intervention is excluded.)		●
42	Latitude of support equipment	facil_lat	Numeric value	Latitude of support equipment in a link if any. Enter a value in decimal notation (e.g., 35.6755310).		●
43	Longitude of support equipment	facil_lon	Numeric value	Longitude of support equipment in a link if any. Enter a value in decimal notation (e.g., 139.7512700).		●
44	Latitude of an elevator	elev_lat	Numeric value	Latitude of an elevator in a link if any. Enter a value in decimal notation (e.g., 35.6755310).		●
45	Longitude of an elevator	elev_lon	Numeric value	Longitude of an elevator in a link if any. Enter a value in decimal notation (e.g., 139.7512700).		●
46	Door type	door_type	Code	0: none, 1: automatic door, 2: press-button automatic door, 3: manual sliding door, 4: manual door, 5: revolving door, 6: other door, 99: unknown		●
47	Latitude of a traffic signal	tfc_s_lat	Numeric value	Latitude of a traffic signal near a link if any. Enter a value in decimal notation (e.g., 35.6755310).		●

48	Longitude of a traffic signal	tfc_s_lon	Numeric value	Longitude of a traffic signal near a link if any. Enter a value in decimal notation (e.g., 139.7512700).		●
49	Daily traffic	day_trfc	Numeric value	Enter a daily traffic as an integer (Enter a value only for a census target section. Do not enter a value for a non-target section.)		●
50	Main users	main_user	Code	0: pedestrian, 1: vehicle, 99: unknown		●
51	Name of a street or an intersection	st_name	Character string	Enter an alias if any (Enter an intersection name if the link is on an intersection). Leave this field blank if there is no alias, etc. Enter "99" if it is unknown.		●

[Explanation]

When developing a spatial network model for pedestrians, the information items and attribute information defined in Layer 1 must be developed. The information items and attribute information defined in Layer 2 can be arbitrarily selected and added according to the regional circumstances and other factors. Other information items and attribute information than those defined in Layer 2 can be uniquely defined as the Layer 3 data to develop a network model.

3.3.2 How to Acquire Attribute Information of Links

1) Link ID

An ID that is used to identify a link and must be a unique ID number. “Location information codes” managed by the Geospatial Information Authority of Japan are recommended as unique ID numbers.

2) Source node ID

Information that expresses a connecting relationship between a link and a node and is used as the ID number of a specified source node.

3) Target node ID

Information that expresses a connecting relationship between a link and a node and is used as the ID number of a specified target node.

4) Link length

Acquire a link length and enter it up to the first decimal place in meters.

5) Route structure

Check the route structure status and enter a code for it.

6) Route type

Check the route type status and enter a code for it. Enter "0: no corresponding attribute information" if there is no corresponding attribute information.

7) Direction

Check the direction status of a moving walkway or escalator and enter a code for it. Enter "0: both directions" for other sections than moving walkway or escalator in which the movement is in both directions.

8) Width

Acquire the status of a point with the minimum width in a link and enter a code for the width, assuming it as the attribute information of the entire link.

9) Gradient

Acquire the status of a point with the maximum gradient in a link and enter a code for the gradient, assuming it as the attribute information of the entire link.

10) Step

In consideration of a wheelchair width (around 1.0 meter) at a position where wheelchairs are assumed to pass, acquire the status of a point with the maximum step in a link and enter a code for the step, assuming it as the attribute information of the entire link.

11) Signals for pedestrians

In a link with a route type of "pedestrian crossing," check for the presence of signals for pedestrians and the statuses of pedestrian-vehicle separated signals and pedestrian-control signals. After that, enter codes for them.

12) Types of signals for pedestrians

In a link with a route type of "pedestrian crossing," check for the presence of sound

equipment and a button for visually impaired persons. After that, enter codes for them.

13) Tactile walking surface indicators

Check for the installation status of tactile walking surface indicators in a link and enter a code for it, assuming it as the attribute information of the entire link. If guiding tactiles are installed on pedestrian crossing, enter "1: with tactile walking surface indicators."

14) Elevator type

Check the status of an elevator such as accessibility and enter a code for it. Enter "0: No elevator" if the route type is not an elevator.

15) Service start time

Enter service start time of a route if the service time of a passage is limited.

16) Service end time

Enter service end time of a route if the service time of a passage is limited.

17) Service start date

Enter a service start date if a passage is not yet in service at the time of data development.

18) Service end date

Enter a service end date if a passage is already in service at the time of data development but the service end is planned later.

19) Service closing days

Enter service closing days as character strings if a passage is not in service on certain days of the week.

20) Restricted traffic

Enter a code for a passage to which access is undesirable because it is a private path or a passage for which a fare must be paid for accessibility.

21) Minimum width

Acquire the minimum width in a link and enter it up to the first decimal place in meters.

22) Latitude at minimum width

Enter the latitude of a point with the minimum width in a link in decimal notation.

23) Longitude at minimum width

Enter the longitude of a point with the minimum width in a link in decimal notation.

24) Maximum gradient

Enter the maximum gradient value in a link as an integer in percent.

25) Gradient latitude

Enter the latitude of a point with the maximum gradient in a link in decimal notation.

26) Gradient longitude

Enter the longitude of a point with the maximum gradient in a link in decimal notation.

27) Maximum crossfall

Enter the maximum crossfall value in a link as an integer in percent.

28) Crossfall latitude

Enter the latitude of a point with the maximum crossfall in a link in decimal notation.

29) Crossfall longitude

Enter the longitude of a point with the maximum crossfall in a link in decimal notation.

30) Road surface condition

Check the status for any problem in wheelchair accessibility and enter a code for the road surface condition.

31) Maximum step height

Enter the maximum step height in a link as an integer in centimeters. Acquire a step height at a point where a wheelchair is expected to pass as described for Item 10).

32) Step latitude

Enter the latitude of a point with the maximum step height in a link in decimal notation.

33) Step longitude

Enter the longitude of a point with the maximum step height in a link in decimal notation.

34) Number of steps of stairs

Enter the number of steps of stairs if the route type of a link is "stairs."

35) Handrail

Check the installation status of a handrail in a passage and enter a code for it.

36) Roof

Check for the presence of a roof in a passage and enter a code for it.

37) Uncovered street gutter or ditch

Check for the presence of an uncovered street gutter or ditch along a passage and enter a code for it.

38) Bus stop

Check for the presence of a bus stop in a link and enter a code for it.

39) Latitude of a bus stop

Check the position of a bus stop and enter the latitude of it.

40) Longitude of a bus stop

Check the position of a bus stop and enter the longitude of it.

41) Support equipment

Check for the availability of an accessible escalator for wheelchairs or an audio guidance device for visually impaired persons and enter a code for it.

42) Latitude of support equipment

Enter the latitude of a point where support equipment is available in decimal notation.

43) Longitude of support equipment

Enter the longitude of a point where support equipment is available in decimal notation.

44) Latitude of an elevator

Check the position of an elevator and enter the latitude of it in decimal notation.

45) Longitude of an elevator

Check the position of an elevator and enter the longitude of it in decimal notation.

46) Door type

Check for the type of a door in a link and enter a code for it.

47) Latitude of a traffic signal

Enter the latitude of a point where a signal for pedestrians is available in decimal notation.

48) Longitude of a traffic signal

Enter the longitude of a point where a signal for pedestrians is available in decimal notation.

49) Daily traffic

Enter daily traffic using census data, etc.

50) Main users

Check and enter whether the main users of a passage are assumed to be pedestrians or vehicles.

51) Name of a street or intersection

Enter the specific name or alias of a street if any. Enter the name of an intersection if the link is on an intersection.

[Explanation]

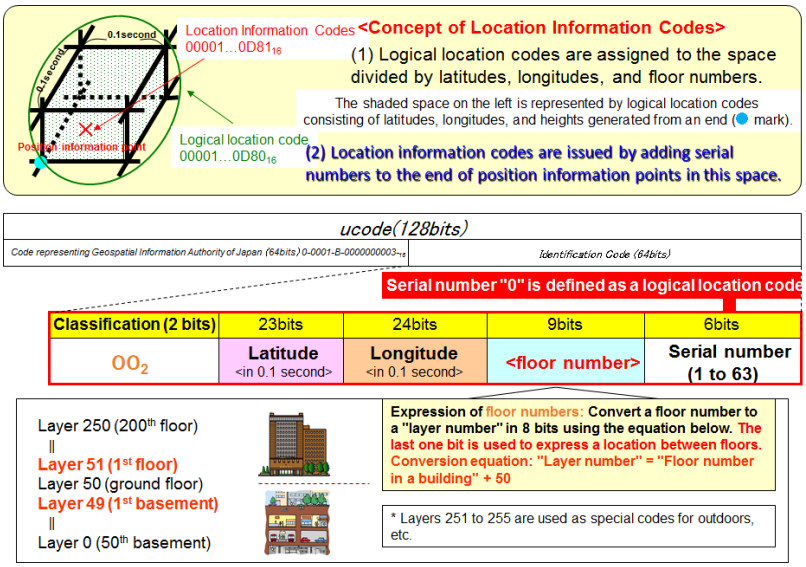
There are the following concepts and precautions for acquiring what has been defined as the Layer 1 data.

1) Link ID

The link IDs used to identify links must be unique IDs without duplication among links even if various entities develop spatial network models for pedestrians in various regions.

Although no mandatory ID system is specified, it is recommended to use "location information codes" managed by the Geospatial Information Authority of Japan to ensure assignment of unique IDs. "Location information codes" enable to identify objects fixed to certain locations and combine necessary information. Each location information code shall be compliant with "ucode" used in the information and communication sector and consists of a positional information (latitude, longitude, and height (floor number)) and a serial number enabling to specify an object at the said position. A latitude and a longitude shall be acquired from the middle point of a link.

Note that an application must be made to the Geospatial Information Authority of Japan for issuance of location information codes. For details of location information codes and how to apply for them, refer to the Website of the Geospatial Information Authority of Japan (http://ucopendb.gsi.go.jp/ucode/index.html).



Source: Geospatial Information Authority of Japan Website (http://ucopendb.gsi.go.jp/ucode/explain.html)

Figure 3.2 Outline of Specifications of Location Information Codes

2) Route structure

Check whether roadways and sidewalks are physically separated because it is preferable to let vehicles (automobiles) and pedestrians pass without getting mixed to ensure safe transport of disabled persons.

A sidewalk and a woonerf shall be distinguished as follows: A sidewalk is a part separated from a roadway with such structures as curbs and barriers and a woonerf is a part marked off with a line or color coding, not a structure.

Set the structures of routes as shown in the table below.

Table 3.3 Route Structure Setting

No.	Route structure	Route structure setting
1	Physical separation provided between roadways and sidewalks	a) Sidewalk A road section demarcated with a curb, fence, or any other similar structure in order to make such section available for passage of pedestrians. b) Pedestrian road A walkway for exclusive use by pedestrians. (Stairs are not included.) c) Garden path A pedestrian road available in a park, natural park, etc. (Stairs are not included.) d) Free passage A passage that crosses station premises.
2	No physical separation provided between roadways and sidewalks	A woonerf not demarcated with a curb, fence, or any other similar structure.
3	Pedestrian crossing	A part of a roadway, mainly near an intersection, demarcated with road markings to make it available for crossing of pedestrians.
4	Road crossing without road marking for pedestrian crossing	A part of a roadway, mainly near an intersection, where pedestrians cross the road frequently although it is not demarcated with road markings to make it available for crossing of pedestrians.
5	Underpass	An underground passage for pedestrians to cross a road, railroad, etc.
6	Pedestrian crossing bridge	A bridge for pedestrians to cross a road, railroad, etc. or a pedestrian deck that connects stations and private facilities, etc.
99	Other	An accessible passage for pedestrians in public open space of an apartment building, etc.

Examples of "Route Structure" Settings

a) Examples of physical separation provided and not provided between roadways and sidewalks

Enter "Physical separation provided between roadways and sidewalks" if they are physically separated with a curb, fence, etc. Enter the same also for garden paths in parks. Enter "No physical separation provided between roadways and sidewalks" if a roadway is demarcated only with a white line.

- Example of physical separation provided between roadways and sidewalks

(Separation with a fence)

(Garden path in a park)

Figure 3.3 Example of Physical Separation Provided between Roadways and Sidewalks

Example of no physical separation provided between roadways and sidewalks

(Demarcation with white lines)

(Colored pavement)

Figure 3.4 Example of No Physical Separation Provided between Roadways and Sidewalks

b) Road crossing without road marking for pedestrian crossing

The route type shall be "road crossing without road marking for pedestrian crossing" if a sidewalk and a roadway are not clearly separated with a curb. If a sidewalk and a roadway are clearly separated with a curb, for example, in an entrance to the parking of a building, the route shall be assumed as a sidewalk with "physical separation provided between roadways and sidewalks."

(Example of road crossing without road marking for pedestrian crossing)

(Example of physical separation provided between roadways and sidewalks)

Figure 3.5 Example of Road Crossing without Road Marking for Pedestrian Crossing

3) Route type

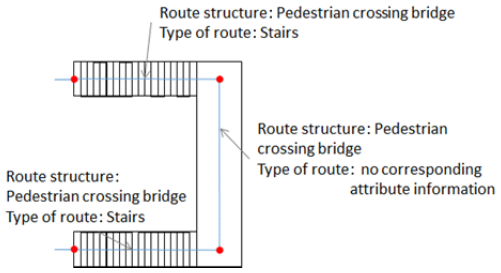
The type of a route through which pedestrians pass such as an elevator or escalator shall be set as shown in the table below. Note that "0: no corresponding attribute information" shall be set if none of the route types "1" through "6" applies.

Table 3.4 Route Type Setting

No.	Route type	Route type setting
0	No corresponding attribute information	Set this type if none of the types "1" through "6" applies
1	Moving walkway	A walkway with an automatic device consisting of a slope with a continuous flat tread similar to a conveyor belt.
2	Railroad crossing	A section of a road that crosses a railroad and consists of a boundary between the road and the railroad premises.
3	Elevator	A lift that moves people or goods vertically in its car.
4	Escalator	A stair-like lift installed and used mainly to move between floors of a building.
5	Stairs	Stairs
6	Slope	An inclined road or passage built to allow users of wheelchairs and baby buggies to pass through it.

Examples of "Route Type" Settings

a) Example of Pedestrian Crossing Bridge

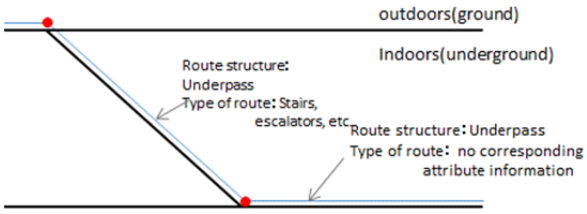


For a pedestrian crossing bridge, place nodes on the ends of the upper section and piers.

In the left figure, the route structure of the piers shall be "6: pedestrian crossing bridge" and the route type shall be "5: stairs."

Furthermore, the route structure of the upper section shall be "6: pedestrian crossing bridge" and the route type shall be "0: no corresponding attribute information."

b) Example of underpass

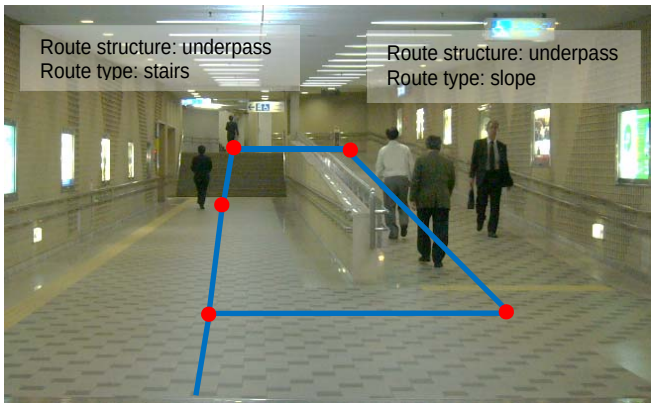


For an underpass, place nodes on the ends of the ground and underground sections.

In the left figure, the route structure of the underground pedestrian passage shall be "5: underpass" and the route type shall be "0: no corresponding attribute information."

Furthermore, the route structure of the passage that connects the ground and underground sections shall be "5: underpass" and the route type shall be "5: stairs," "4: escalator," etc.

c) Example of multiple route types in the direction of travel



If there are passages with different route structures and types in the same direction, place more than one link to ensure distinction of these route structures and types. In the left figure, the route types of "5: stairs" and "6: slope" shall be distinguished.

4) Width

The "guideline for promoting barrier-free transport and facilities for elderly and disabled on path" defines the minimum width of a sidewalk accessible to pedestrians as 2.0 m and the minimum width of a bicycle and pedestrian path as 3.0 m. Furthermore, it defines the basic width of a wheelchair as 70 cm in a stationary state and 100 cm in motion.

In consideration of the basic dimension of 1.0 m in motion of wheelchair users and the minimum width of a sidewalk, the attribute information of a width shall be acquired as one of the four classifications: "0: less than 1.0 m (wheelchair inaccessible)," "1: 1.0 m to less than 2.0 m (wheelchair accessible (difficult to pass each other))," "2: 2.0 m to less than 3.0 m (wheelchair accessible (possible to pass each other))," and "3: 3.0 m or more (no problem in wheelchair accessibility)."

Basically acquire the width of a narrow part if a sidewalk has localized narrowness due to such permanent structures as utility poles and plants. However, acquire the entire width of a sidewalk if there are more than two sections where wheelchairs can pass due to bumpers and where they can pass each other. A width at which wheelchairs can pass shall be "80 cm," a minimum width specified in the "guideline for promoting barrier-free transport and facilities for elderly and disabled on path" as that of an entrance, etc. through which wheelchair users can pass.

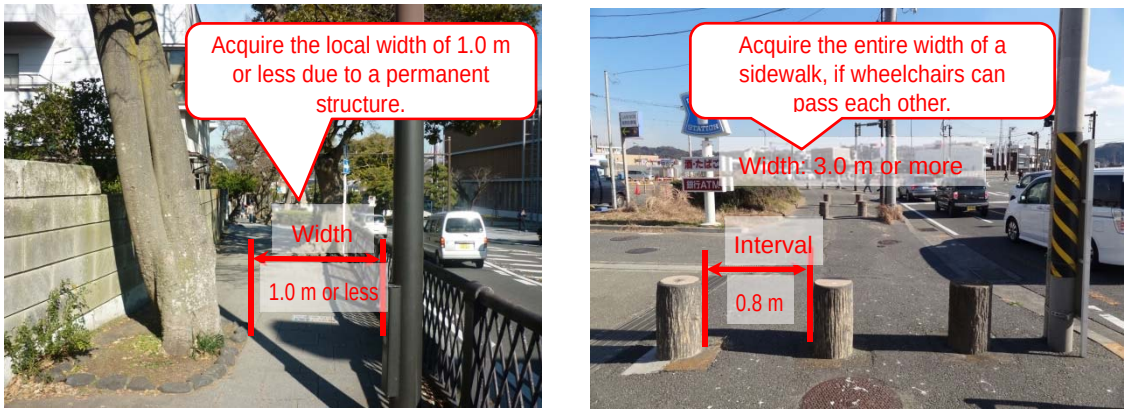


Figure 3.6 Examples of Narrow Parts of Sidewalks Due to Structures Installed on Sidewalks

5) Gradient

Gradients shall be as small as possible in consideration of accessibility of wheelchair users and aged persons with lower walking abilities. However, not all the gradients can be eliminated due to topographical circumstances along a route. The "guideline for promoting barrier-free transport and facilities for elderly and disabled on path" defines the maximum gradient as 5%.

This Specification defines two categories to be entered based on this concept: "0: 5% or less (no problem in wheelchair accessibility)" and "1: More than 5% (problem in wheelchair accessibility)."

If some part of a link has a gradient of 5% or more due to local circumstances, measure

the gradient at a position where wheelchairs are assumed to pass in a link, in consideration of the range of motion in wheelchairs (around 1.0 m). As a rule, if a measured gradient is around 5%, measure gradients at three or four locations nearby and acquire an average value of them.

If the route type is "stairs" or "escalator," the gradient shall be "1: More than 5% (problem in wheelchair accessibility)."

6) Step

The "guideline for promoting barrier-free transport and facilities for elderly and disabled on path" specifies that the outside edge of a sidewalk that connects to a pedestrian crossing shall have a step of 2 cm as a standard to allow wheelchair users to pass without difficulty and visually impaired persons to recognize the boundary between a sidewalk and a roadway. This Specification defines two categories to be entered based on this concept: "0: 2 cm or less (no problem in wheelchair accessibility)" and "1: More than 2 cm (problem in wheelchair accessibility)."

Measure the step height at a position where wheelchairs are assumed to pass in a link, in consideration of the range of motion in wheelchairs (around 1.0 m) and acquire the maximum value obtained within this range.

If the route type is "stairs" or "escalator," the step shall be "1: More than 2 cm (problem in wheelchair accessibility)."

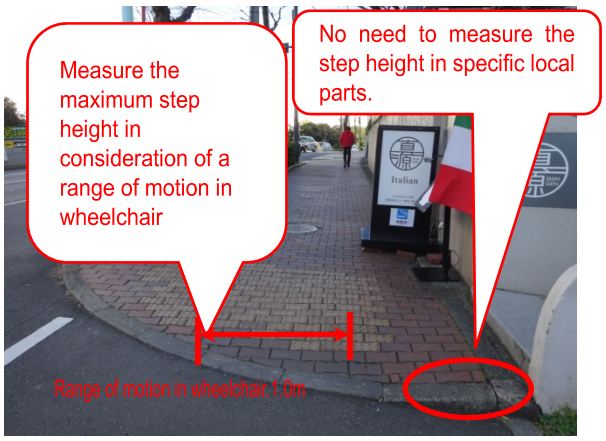


Figure 3.7 Where to Acquire a Step Height Value

7) Signals for pedestrians

For signals for pedestrians, select one of "0: without signals for pedestrians," "1: with pedestrian-vehicle separated signals," "2: with pedestrian-control signals," and "3: other signals than these."

A pedestrian-vehicle separated signal is used to separate the passage of pedestrians and vehicles in terms of time to prevent mixture of them. Pedestrian-control signals have two types of buttons: a button for pedestrians (yellow) and a button for visually impaired persons (white). Here, the former shall be the target. Enter "3: other signals than these" if the signal is neither pedestrian-vehicle separated signal nor pedestrian-control signal.

Figure 3.8 Image of Pedestrian-control Buttons

8) Types of signals for pedestrians

Sound equipment to be checked for the types of signals for pedestrians comes in two types: One that emits a sound only if the button for visually impaired persons is pressed and another that emits a sound automatically during designated hours even if the button is not pressed. Furthermore, many of them are configured not to emit a sound during the night in consideration of the ambient environment, etc. The presence of sound equipment can be checked by checking the presence of a speaker and a button for visually impaired persons installed at a signal for pedestrians.

Figure 3.9 Example of Signal for Pedestrians
(Left: Speaker, Right: Button for Visually Impaired Persons)

9) Tactile walking surface indicators

There are two types of tactile walking surface indicators: guiding tactiles (line-type blocks) and attention tactiles (dot-type blocks).

Since tactile walking surface indicators are not installed in a uniform way, the decision of a type may be difficult depending on the local circumstances.

If attention tactiles (dot-type blocks) are installed only in front of a pedestrian crossing or around an occupying structure, enter the attribute information as "0: without tactile walking surface indicators." If guiding tactiles (line-type blocks) are continuously

installed on a sidewalk, etc., enter "1: with tactile walking surface indicators."

Since guiding tactiles on crossing are installed to support the guidance of visually impaired persons, enter "1: with tactile walking surface indicators."

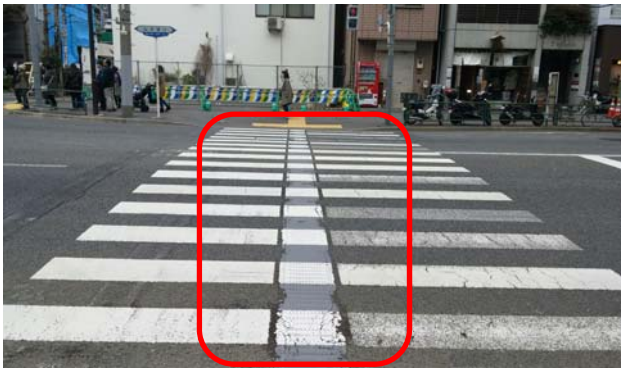


Figure 3.10 Example of Guiding Tactiles on Crossing

10) Elevator type

For the elevator type, check whether an elevator is wheelchair accessible. A wheelchair accessible elevator shall meet the criteria specified in the "guideline for promoting barrier-free transport and facilities for elderly and disabled on path" as shown in the table below.

Table 3.5 Criteria of Wheelchair Accessible Elevator

	Item	Criteria
1	Entrance width	80 cm or more
2	Car width	140 cm or more *1
3	Car depth	135 cm or more *1
4	Mirror in the car	Needed *1
5	Glass window in the entrance or video display that allows persons in and out of the car to visually recognize each other	Needed
6	Handrail in the car	Needed
7	Door open time extension function	Needed
8	Function in the car to display the current floor and the floors at which the car will stop	Needed
9	Audio guidance in the car (announcing which floor the car is about to stop and that the door is about to close)	Needed
10	Control panels for wheelchair users in the car and in the elevator lobby	Needed
11	Braille signs for visually impaired persons on the control panels in the car and in the elevator lobby	Needed

*1 Not needed if wheelchair users can get on and off the car smoothly due to two-way entrance, etc.

3.3.3 Information Items and Attribute Information of Nodes

The following information items and attribute information shall be specified for network nodes.

Table 3.6 Information Items and Attribute Information of Nodes

No.	Information item	Field name	Format	Attribute information
1	Node ID	node_id	Character string	Node ID
2	Latitude	lat	Numeric value	Latitude of the center position Enter a value in decimal notation (e.g., 35.6755310).
3	Longitude	lon	Numeric value	Longitude of the center position Enter a value in decimal notation (e.g., 139.7512700).
4	Floor number	floor	Numeric value	Floor number (A location between floors shall be expressed with a decimal point such as "1.5." Outdoors shall be "0.")
5	Connected link ID	link1_id	Character string	Enter the ID of a link to be connected (Enter multiple link IDs to connect multiple links.)

Note: If one node has multiple connected links, add the connected links as required, such as "connected link ID 1," "connected link ID 2," "connected link ID 3," etc. The field names of added links shall be "link1_id," "link2_id," ... "link99_id," etc.

3.3.4 How to Acquire Attribute Information of Nodes

1) Node ID

An ID is used to identify a node and must be a unique ID number. “Location information codes” managed by the Geospatial Information Authority of Japan are recommended as unique ID numbers.

2) Latitude

Acquire the latitude of the central position of a node and enter it in decimal notation.

3) Longitude

Acquire the longitude of the central position of a node and enter it in decimal notation.

4) Floor number

Enter the floor number at which a node is placed. Enter the floor number of outdoors as "0" and that of a location between floors with a decimal point such as "1.5."

5) Connected link ID

Enter the ID of a link to be connected to a node. Enter multiple link IDs to connect multiple links to one node.

[Explanation]

1) Node ID

The node IDs used to identify nodes must be unique IDs without duplication among nodes even if various entities develop spatial network models for pedestrians in various regions. Although no mandatory ID system is specified, it is recommended to use "location information codes" managed by the Geospatial Information Authority of Japan to ensure assignment of unique IDs. For location information codes, refer to "3.3.2 How to Acquire Attribute Information of Links."

2) Floor number

For outdoors, enter the floor number "0" basically. For a pedestrian deck and a pedestrian crossing bridge, enter "1." For indoor facilities, enter a floor number in the said building: "1" for the first floor, "-1" for the underground, and a number in steps of 0.1 for a location between floors if any. When specifying a floor number in steps of 0.1, the larger the number, the higher the floor. If there is one location between floors, basically enter numbers in steps of 0.5, such as "1.5" and "2.5."

(Examples)

"3": 3rd floor above the ground
"2": 2nd floor above the ground
"1": 1st floor above the ground
"0": Ground
"-1": 1st floor below the ground
"-2": 2nd floor below the ground
"-3": 3rd floor below the ground

Note: For a mezzanine, enter "1.5" because it is between the 1st and 2nd floors.

When developing a spatial network model for pedestrians for a route that connects outdoors and indoors, the floor numbers may be different between outdoors and indoors. For example, if a pedestrian deck and a second-floor entrance of a building are connected, a node on the pedestrian deck may have the floor number "1" and a node on the second floor of the building may have the floor number "2," which are different from each other. When connecting spatial network models for pedestrians for outdoors and indoors, it is necessary to determine the nodes to be connected in consideration of floor numbers.

3.4 Data Format of Spatial Network Model for Pedestrians

Data shall be developed in data formats appropriate for open data such as CSV, Shapefile, GeoJSON, and XML (GML) file formats.

[Explanation]

1) Data format

A spatial network model for pedestrians to be developed based on this Specification shall be released in a data format that allows secondary use of it as open data so that it can be utilized to create various pedestrian mobility support services in the future.

Use the field names listed in Table 3.2 to create data in CSV or Shapefile format. Furthermore, use the field names listed in Table 3.2 as the names of properties and tags to be used to create data in GeoJSON or XML (GML) file format, etc.

2) Creation of metadata

Basically, release metadata that shows a data creator and a data update date for a spatial network model for pedestrians.

3) Data file name

Basically, specify file names with due consideration to allow data users to use them uniformly nationwide without renaming the files. Furthermore, specify file names in single-byte alphanumeric characters to facilitate the use of them on computers. Basically, give link data such file names as "link.csv" and "link.shp" and node data such file names as "node.csv" and "node.shp."

Furthermore, basically release data in which files are stored in a folder given the name of an area (municipality) for which data have been developed such as "yokohama."

If data to be developed in various regions is thus released with relevant files names, it can be used by data users without renaming the files.

4) Character code

If data is created and released in CSV file format, basically use the "UTF-8" character code that is widely used across the world.

4. Specification for Facility Data Development

4.1 General Provisions

This section defines the basic specifications on data including accessibility of facilities.

4.2 Target Facilities and Information

The target facilities for development of facility data shall be set in accordance with regional needs and the nature of services to be provided.

[Explanation]

The target facilities for a pedestrian mobility support service shall be destination facilities to which aged and disabled persons may go and other facilities at which these persons may stop on the way to the former. Select facilities for which facility data should be developed using the table below as reference and in consideration of how a spatial network model for pedestrians is developed and how life-related facilities in the barrier-free transportation scheme are designated.

Table 4.1 Examples of Target Facilities

No.	Facility type	Facilities
1	Public offices, etc.	Prefectural office, city or ward office, town office
		Post offices, banks, ATM locations
		Police stations (including police boxes), courthouse
		Citizen and district center, community center, etc.
		Prefectural and national tax offices
2	Educational and cultural facilities, etc.	Libraries
		Citizen assembly hall, citizen hall, and cultural hall
		Schools (elementary, junior high, and senior high schools)
		Public hall
		Museums, art museums, music museums, archives museums
3	Medical facilities	Hospitals and clinics
4	Health and welfare facilities	Integrated welfare facilities, welfare facilities for aged and disabled persons, etc.
5	Commercial facilities	Large retail stores, etc.
		Shopping arcades, etc. (including underground shopping arcades)
6	Accommodations	Budget hotels, luxury hotels, etc.
7	Parks and athletic facilities	Parks
		Gyms, martial arts gyms, and other indoor facilities
8	Tourist facilities	Tourist facilities
9	Transport facilities	Railroad stations, taxi stands, bus stops, etc.
10	Public toilets (standalone)	Public toilets
11	Other facilities	Facilities for ceremonial occasions such as wedding and funeral halls
		Off-street parking facilities
		Bicycle parking lots

Source: Created based on the Guidebook to Barrier-free Transportation Scheme (September 2016, Ministry of Land, Infrastructure, Transport and Tourism)

4.3 Information Items and Attribute Information of Facility Data

The following information items and attribute information shall be specified for facility data. The Layer 1 data must be assigned to facility data. The Layer 2 data can be arbitrarily selected and added.

Table 4. 2 (1) Information Items and Attribute Information of Facility Data

No	Information item	Field name	Format	Attribute information	Layer 1 (mandatory)	Layer 2 (optional)
1	Facility ID	facil_id	Character string	Facility ID	●	
2	Facility type	facil_type	Code	1：Public offices, etc., 2：Educational and cultural facilities, etc., 3：Medical facilities, 4：Health and welfare facilities, 5：Commercial facilities, 6：Accommodations, 7：Parks and athletic facilities, 8：Tourist facilities, 9：Transport facilities, 10：Public toilets (standalone), 99：Other facilities	●	
3	Evacuation center and area	evacuation	Code	0: none designated, 1: designated emergency evacuation center, 2: designated evacuation center, 3: welfare evacuation site, 4: both 1 and 2, 5: both 1 and 3, 6: both 2 and 3, 7: all of 1, 2, and 3, 99: unknown	●	
4	Temporary stay facility	temporary	Code	0: none designated, 1: designated, 99: unknown	●	
5	Name (Japanese)	name_ja	Character string	Facility name. Leave this field blank if there is no name. Enter "99" if it is unknown.	●	
6	Name (English)	name_en	Character string	Facility name in English. Leave this field blank if there is no name. Enter "99" if it is unknown.	●	
7	Address	address	Character string	Facility location. Enter "99" if it is unknown.	●	
8	Telephone number	tel	Character string	Facility telephone number. Leave this field blank if there is no telephone number. Enter "99" if it is unknown.	●	
9	Latitude	lat	Numeric value	Latitude of the center position Enter a value in decimal notation (e.g., 35.6755310).	●	
10	Longitude	lon	Numeric value	Longitude of the center position Enter a value in decimal notation (e.g., 139.7512700).	●	
11	Total number of floors	floors	Numeric value	Total number of floors	●	
12	Toilets	toilet	Code	0: none, 1: general toilets, 2: multipurpose toilets (ostomate), 3: multipurpose toilets (baby changing station), 4: multipurpose toilets (ostomate, baby changing station, and others), 99: unknown	●	
13	Elevators	elevator	Code	0: without elevator, 1: with elevator (not wheelchair accessible), 2: with elevator (wheelchair accessible), 99: unknown	●	
14	Escalators	escalator	Code	0: none, 1: yes, 99: unknown	●	
15	Accessible parking	parking	Code	0: none, 1: parking for general visitors, 2: wheelchair accessible parking, 3: both 1 and 2, 99: unknown	●	

16	Wheelchair accessible entrance	barrier	Code	0: none, 1: with wheelchair accessible entrance, 99: unknown (If the step at the entrance is approximately 2 cm or less or there is a slope, enter "1: with wheelchair accessible entrance.")	●	
17	Nursing rooms	nursing	Code	0: none, 1: yes, 99: unknown	●	
18	Tactile walking surface indicators	brail_tile	Code	0: none, 1: yes, 99: unknown	●	
19	Information offices	info	Code	0: none, 1: yes (not accessible to hearing-impaired persons), 2: yes (accessible to hearing-impaired persons), 99: unknown	●	
20	Information board	info_board	Code	0: none, 1: yes (not accessible to visually impaired persons), 2: yes (accessible to visually impaired persons), 99: unknown	●	
21	Name (hiragana)	name_hira	Character string	Enter a facility name in hiragana. Leave this field blank if there is no facility name. Enter "99" if it is unknown.		●
22	Fax number	fax	Character string	Facility fax number. Leave this field blank if there is no fax number. Enter "99" if it is unknown.		●
23	E-Mail	mail	Character string	Facility e-mail address. Leave this field blank if there is no e-mail address. Enter "99" if it is unknown.		●
24	Service start time	start_time	Character string	Enter service start time if the service time is limited. Leave this field blank if the service time is not limited. Enter "99" if it is unknown. The format is "HH-MM."		●
25	Service end time	end_time	Character string	Enter service end time if the service time is limited. Leave this field blank if the service time is not limited. Enter "99" if it is unknown. The format is "HH-MM."		●
26	Service closing days	no_serv_d	Character string	Enter non-service days if the service days of the week are limited. Omitted if the service days of the week are not limited. Convert the days of the week into numbers (1: Monday to 7: Sunday) and enter numbers consecutively in an ascending order if there are more than one. Leave this field blank if there is no service closing day. Enter "99" if it is unknown.		●

Table 4. 2(2) Information Items and Attribute Information Assignable to Facility Type "Public Toilets (Standalone)"

No	Information item	Field name	Format	Attribute information	Layer 1 (mandatory)	Layer 2 (optional)
27	Sex	sex	Code	1: male, 2: female, 3: shared, 99: unknown		●
28	Fee	fee	Code	1: free, 2: charged, 99: unknown		●

Table 4. 2(3) Information Items and Attribute Information Assignable to Facility Type "Medical Facilities"

No	Information item	Field name	Format	Attribute information	Layer 1 (mandatory)	Layer 2 (optional)
29	Subject of medical treatment	subject	Code	1: internal medicine, 2: pediatrics, 3: surgery, 4: obstetrics and gynecology, 5: other, 99: unknown Enter numbers consecutively in an ascending order if there is more than one department.		●
30	Closing days	close_day	Character string	If there are closing days, convert the closing days of the week into numbers (1: Monday to 7: Sunday) and enter numbers consecutively in an ascending order if there are more than one. (If closing days differ between hospital departments, handle them as different facilities.) Leave this field blank if there is no closing day. Enter "99" if it is unknown.		●

Table 4. 2(4) Information Items and Attribute Information Assignable to Facility Type "Evacuation Center and Area"

No	Information item	Field name	Format	Attribute information	Layer 1 (mandatory)	Layer 2 (optional)
31	District name	med_dept	Character string	Facility district name, 99: unknown		●
32	Designated for storm and flood damage	flood	Code	0: not possible, 1: possible, 99: unknown		●

Table 4. 2(5) Information Items and Attribute Information Assignable to Facility Information as Entrance Information

No	Information item	Field name	Format	Attribute information	Layer 1 (mandatory)	Layer 2 (optional)
33	Latitude of entrance 1	ent1_lat	Numeric value	Latitude of the center position Enter a value in decimal notation (e.g., 35.6755310).		●
34	Longitude of entrance 1	ent1_lon	Numeric value	Longitude of the center position Enter a value in decimal notation (e.g., 139.7512700).		●
35	Name of entrance 1	ent1_n	Character string	Enter an entrance name (Leave this field blank if there is no entrance name. Enter "99" if it is unknown.)		●
36	Width of entrance 1	ent1_w	Code	0: less than 1.0 m, 1: 1.0 m to less than 1.5 m, 2: 1.5 m to less than 2.0 m, 3: 2.0 m or more, 99: unknown (Evaluate the minimum width in a relevant link.)		●
37	Door type of entrance 1	ent1_d	Code	0: none, 1: automatic door, 2: press-button automatic door, 3: manual sliding door, 4: manual door, 5: revolving door, 6: other door, 99: unknown		●
38	Wheelchair accessible entrance 1	ent1_brr	Code	0: none, 1: with wheelchair accessible entrance, 99: unknown (If the step at the entrance is approximately 2 cm or less or there is a slope, enter "1: with wheelchair accessible entrance.")		●
39	Floor number of entrance 1	ent1_fl	Numeric value	Enter the floor number of a node near the entrance.		●

Note: If one facility has more than one entrance, enter the entrance specified in "19. Wheelchair accessible entrance" as "entrance 1." As for other entrances, add the items shown in Table 4.2 (5) as "entrance 2," "entrance 3," etc. The field names of added items shall be "ent1_lat," "ent2_lat," ... "ent99_lat," etc.

[Explanation]

When developing facility data, the information items and attribute information defined in Layer 1 must be assigned.

The information items and attribute information defined in Layer 2 can be arbitrarily selected and added according to the regional circumstances and other factors. To provide accurate navigation to an entrance using facility data for large parks, public facilities, large retail stores, etc. that have more than one entrance, it is preferable to develop entrance information defined in Layer 2.

Other information items and attribute information than those defined in Layer 2 can be uniquely defined as the Layer 3 data to develop the facility data.

4.4 How to Acquire Attribute Information of Facility Data

(1) How to acquire attribute information of facility data (Layer 1 data)

1) Facility ID

The facility IDs used to identify facilities must be unique IDs without duplication among facilities even if various entities develop data in various regions. Although no mandatory ID system is specified, it is recommended to use location information codes as for link and node IDs.

2) Facility type

Select a facility type and enter a code for it.

3) Evacuation center and area

Check whether the facility is designated as a designated emergency evacuation center, designated evacuation center, or welfare evacuation site. Enter a code for the type of evacuation center or area.

4) Temporary stay facility

Check whether the facility is designated as a temporary stay facility and enter a code for it.

5) Name (Japanese)

Enter a facility name in Japanese.

6) Name (English)

Enter a facility name in English.

7) Address

Enter a facility address. Enter an address starting from a prefectural name. Enter numbers, symbols, and alphabetic characters in single-byte characters.

8) Telephone number

Enter the main telephone number of a facility. Enter a telephone number using only single-byte numeric characters without hyphens (-).

9) Latitude

Acquire the latitude of the approximate central position of the facility building and enter it in decimal notation.

10) Longitude

Acquire the longitude of the approximate central position of the facility building and enter it in decimal notation.

11) Total number of floors

Check and enter the total number of floors of a building. If the building has an underground structure, enter the total number of floors above and below the ground.

12) Toilets

Check whether the facility has toilets and multipurpose toilets and enter a code for them.

13) Elevators

Check the status of an elevator such as wheelchair accessibility and enter a code for it. Regarding the wheelchair accessibility of an elevator, check whether it meets the criteria shown in Table 3.5 on Page 30 of this Specification.

14) Escalators

Check whether the facility has escalators and enter a code for them.

15) Accessible parking

Check whether the facility has parking lots for general visitors and persons with disabilities. Enter a code for the presence of them.

16) Wheelchair accessible entrance

Check whether the entrance to the facility is wheelchair accessible. Check whether the step at the entrance is approximately 2 cm or less or whether there is a slope accessible to wheelchair users. If the facility has multiple entrances, enter the information of wheelchair accessible entrances. If the facility has no wheelchair accessible entrance, enter the information of a representative entrance most frequently used by visitors.

17) Nursing rooms

Check whether the facility has nursing rooms and enter a code for the presence of them.

18) Tactile walking surface indicators

Check whether the facility has tactile walking surface indicators and enter a code for the presence of them.

19) Information offices

Check whether the facility has manned information offices and whether they are accessible to hearing-impaired persons. Enter a code for the presence of them and the hearing-impaired accessibility.

20) Information board

Check whether the facility has an information board that shows its structure etc. and whether it has an information board for visually impaired persons (tactile guide maps). Enter a code for the presence of them.

21) Name (hiragana)

Enter a facility name in hiragana.

22) Fax number

Enter the main fax number of a facility. Enter a fax number using only single-byte numeric characters without hyphens (-).

23) E-Mail

Enter the e-mail address of a facility. Enter the e-mail address in single-byte characters.

24) Service start time

Enter service start time of a facility if the service time of a facility is limited.

25) Service end time

Enter service end time of a facility if the service time of a facility is limited.

26) Service closing days

If a facility is not in service on certain days of the week, convert the days of the week into numbers (1: Monday to 7: Sunday). Enter numbers consecutively in an ascending order if there are more than one.

(2) How to acquire attribute information of public toilets

27) Sex

Check whether "multipurpose toilets" are separate male and female toilets, if any, and enter a code for the distinction of male, female, and shared toilets.

28) Fee

Check whether "multipurpose toilets" are free or charged, if any, and enter a code for the distinction of free and charged status.

(3) How to acquire attribute information of medical facilities

29) Subject of medical treatment

If the facility type is "3: medical facilities," enter codes for the subjects of medical treatment.

30) Closing days

If the facility type is "3: medical facilities" and there are closing days, convert the closing days of the week into numbers (1: Monday to 7: Sunday). Enter numbers consecutively in an ascending order if there are more than one.

(4) How to acquire attribute information of evacuation center and area

31) District name

If the facility is designated as an "evacuation center or area," enter the facility district name.

32) Designated for storm and flood damage

If the facility is designated as an "evacuation center or area," check whether it is designated as a facility that can be used in case of storm and flood damages. After that, enter a code for it.

(5) How to acquire attribute information of entrances

33) Latitude of entrance 1

Check the position of an entrance to the facility and enter the latitude of it in decimal notation. If there is more than one entrance, divide the information item into "entrance 1," "entrance 2," etc. and enter these items.

34) Longitude of entrance 1

Check the position of an entrance to the facility and enter the longitude of it in decimal notation. If there is more than one entrance, divide the information item into "entrance 1," "entrance 2," etc. and enter these items.

35) Name of entrance 1

Check and enter the name of an entrance to the facility. If there are more than one entrance, divide the information item into multiple items as for the latitude and longitude of entrances. After that, enter these items.

36) Width of entrance 1

Check the minimum width of an entrance to the facility and enter a code for it. If there are more than one entrance, divide the information item into multiple items as for the latitude and longitude of entrances. After that, enter these items.

37) Door type of entrance 1

Enter a code for the door type of an entrance.

38) Wheelchair accessible entrance 1

Check whether the entrance to the facility is wheelchair accessible. Check whether the step at the entrance is approximately 2 cm or less or whether there is a slope or other means accessible to wheelchair users. If there are more than one entrance, divide the information item into multiple items as for the latitude and longitude of entrances. After that, enter these items.

39) Floor number of entrance 1

Enter the floor number of a node near the entrance. If there are more than one entrance, divide the information item into multiple items as for the latitude and longitude of entrances. After that, enter these items.

4.5 Data Format of Facility Data

Data shall be developed in data formats appropriate for open data such as CSV, Shapefile, GeoJSON, and XML (GML) file formats.

[Explanation]

For information on the concept of the data format of facility data, refer to "3. 4 Data Format of Spatial Network Model for Pedestrians."

1) Data format

Use the field names listed in Table 4.2 to create data in CSV or Shapefile format. Furthermore, use the field names listed in Table 4.2 as the names of properties and tags to be used to create data in GeoJSON or XML (GML) file format, etc.

2) Data file name

Basically, specify file names with due consideration to allow data users to use them uniformly nationwide without renaming the files. Furthermore, specify file names in single-byte alphanumeric characters to facilitate the use of them on computers. Basically, give facility data such file names as "facility.csv" or "facility.shp."

Furthermore, basically release data as files stored in a folder that is given the name of an area (municipality) for which the data have been developed such as "yokohama."

If data to be developed in various regions is thus released with relevant file names, it can be used by data users without renaming the files.

[Reference Data]

[Reference 1: Example of Creating Spatial Network Model for Pedestrians]

1. Link Data

The following shows an example of the Layer 1 data for links specified in the Development Specification for Spatial Network Model for Pedestrians. When developing the Layer 2 data, you can enter field names following the Layer 1 data and select and add them in an arbitrary manner.

(Reference) Table 1 Examples of Expressions in Tabular Format (Links)

Link ID	Source node ID	Target node ID	Link length	Route structure	Route type	Direction	Width	Gradient	Step	Signals for pedestrians	Types of signals for pedestrians	Tactile walking surface indicators	Elevator type
link_id	start_id	end_id	distance	rt_struct	route_type	direction	width	vtcl_slope	lev_diff	tfc_signal	tfc_s_type	brail_tile	elevator
00001	00001	00002	20.5	1	0	0	3	0	0	0	0	1	0
00011	00012	00013	10.0	6	5	0	2	1	1	0	0	0	0
00021	00022	00023	20.0	1	4	1	2	1	1	0	0	0	0
00031	00032	00033	12.3	3	0	0	3	0	0	2	2	1	0
00041	00042	00043	5.0	1	3	0	3	0	0	0	0	0	1

Note: The use of "location information codes" as link and node IDs is recommended. However, five-digit ID numbers are entered here because too many digits have to be displayed if location information codes are entered.

(Reference) Table 2 Example of Creating CSV File (Links)

```
link_id,start_id,end_id,distance,rt_struct,route_type,direction,width,vtcl_slope,lev_diff,tfc_signal,tfc_s_type,brail_tile,elevator
00001,00001,00002,20.5,1,0,0,3,0,0,0,0,1,0
00011,00012,00013,10.0,6,5,0,2,1,1,0,0,0,0
00021,00022,00023,20.0,1,4,1,2,1,1,0,0,0,0
00031,00032,00033,12.3,3,0,0,3,0,0,2,2,1,0
00041,00042,00043,5.0,1,3,0,3,0,0,0,0,0,1
```

(Explanation)

Link ID	Explanation
00001	Wide sidewalk with tactile walking surface indicators
00011	Stairs of a pedestrian crossing bridge
00021	Escalator
00031	Pedestrian crossing with pedestrian-control buttons, button for visually impaired persons, and guiding tactiles on pedestrian crossing
00041	Elevator

(Reference) Example of Creating GeoJSON File


```
"type": "FeatureCollection",
"features": [
  {
    "type": "Feature",
    "geometry": {
      "type": "LineString",
      "coordinates": [
        [
          139.7560535,
          35.67968
        ],
        [
          139.7553132,
          35.6782812
        ]
      ]
    },
    "properties": {
      "link_id": "00005",
      "start_id": "00007",
      "end_id": "00008",
      "distance": 169.5,
      "rt_struct": 1,
      "route_type": 0,
      "direction": 1,
      "width": 3,
      "vtcl_slope": 0,
      "lev_diff": 0,
      "tfc_signal": 0,
      "tfc_s_type": 99,
      "brail_tile": 99,
      "elevator": 0
    }
```

2. Node Data

The following shows an example of node data specified in the Development Specification for Spatial Network Model for Pedestrians.

(Reference) Table 3 Examples of Expressions in Tabular Format (Nodes)

Node ID	Latitude	Longitude	Floor number	Connected link ID					
node_id	lat	lon	floor	l ink1_id	link2_id	link3_id	link4_id	link5_id	link6_id
00001	35.6755310	139.7512711	0	00001	00002	00003	00023		
00002	35.6755325	139.7512723	0	00001	00003	00007			
00003	35.6755333	139.7512745	0	00002	00004	00008	00025	00123	
00004	35.6755356	139.7512755	0.5	00003	00005	00009	00032		
00005	35.6755421	139.7512788	1	00005	00006	00011			
00006	35.6755433	139.7512812	1.5	00004	00007	00012			

Note: The use of "location information codes" as link and node IDs is recommended. However, five-digit ID numbers are entered here because too many digits have to be displayed if location information codes are entered.

(Reference) Table 4 Example of Creating CSV File (Nodes)

```
node_id,lat,lon,floor,link1_id,link2_id,link3_id,link4_id,link5_id,link6_id
00001,35.6755310,139.7512711,0,00001,00002,00003,00023,,
00002,35.6755325,139.7512723,0,00001,00003,00007,,,
00003,35.6755333,139.7512745,0,00002,00004,00008,00025,00123,
00004,35.6755356,139.7512755,0.5,00003,00005,00009,00032,,
00005,35.6755421,139.7512788,1,00005,00006,00011,,,
00006,35.6755433,139.7512812,1.5,00004,00007,00012,,,
```

(Reference) Example of Creating GeoJSON File (Nodes)


```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "geometry": {
        "type": "Point",
        "coordinates": [
          139.7560535,
          35.67968
        ]
      },
      "properties": {
        "node_id": "00007",
        "lat": 35.67968,
        "lon": 139.7560535,
        "floor": 0,
        "link1_id_": "00005"
      }
    },
    {
      "type": "Feature",
      "geometry": {
        "type": "Point",
        "coordinates": [
          139.7553132,
          35.6782812
        ]
      },
      "properties": {
        "node_id": "00008",
        "lat": 35.6782812,
        "lon": 139.7553132,
        "floor": 0.5,
        "link1_id_": "00005"
      }
    }
  ]
}
```

3. Data Format, etc.

(1) File name

In the case of data in CSV files, the file name of link data shall be "link.csv" and the file name of node data shall be "node.csv."

The Shapefile data consists of the four files listed below. All the files shall be named in the same way.

(Reference) Table 5 File Names of Spatial Network Model for Pedestrians (for Shapefile)

	Link data	Node data
Main file (extension: .shp)	link.shp	node.shp
Index file (extension: .shx)	link.shx	node.shx
Attribute file (dBASE file) (extension: .dbf)	link.dbf	node.dbf
Project file (extension: .prj)	link.prj	node.prj

(2) Directory structure

"Links" and "nodes" created in the development of a spatial network model for pedestrians shall be basically placed in one directory so as to be released as open data.

The directory name shall be basically the name of a municipality for which the data has been developed, such as "yokohama" and "nagoya."

[Reference 2: Example of Creating Facility Data]

The following shows an example of the Layer 1 data specified in the Specification for Facility Data Development. When developing the Layer 2 data, you can enter field names following the Layer 1 data and select and add them in an arbitrary manner.

(Reference) Table 6 Examples of Expressions in Tabular Format (Facility Data)

Facility ID	Types of facilities	Evacuation center and area	Temporary stay facility	Name (Japanese)	Name (English)	Address	Telephone number	Latitude	Longitude	Total number of floors	Toilets	Elevators	Escalators	Accessible parking	Wheelchair accessible entrance	Nursing rooms	Tactile walking surface indicators	Information offices	Information board
facil_id	facil_type	evacuation	temporary	name_ja	name_en	address	tel	lat	lon	floors	toilet	elevator	escalator	parking	barrier	nursing	brail_tile	info	info_board
00001	1	1	1	○○役場	●● office	4-5-2,XX City,XX Prefecture	**********	35.6754356	139.7515214	4	4	2	0	2	1	1	1	1	2
00002	2	2	1	○○小学校	●● elementary school	6-2-1,XX City,XX Prefecture	**********	35.6754311	139.7515526	3	1	0	0	1	1	0	0	0	0
00003	1	4	1	○○公民館	●● public hall	4-23-15,XX City,XX Prefecture	**********	35.6754378	139.7515131	1	2	0	0	1	1	0	0	0	0
00004	3	0	0	○○病院	●● hospital	1-2-6,XX City,XX Prefecture	**********	35.6754541	139.7515846	5	4	2	1	2	1	1	1	1	2
00005	7	0	0	○○公園	●● park	5-4-23,XX City,XX Prefecture	**********	35.6754957	139.7515162	1	2	0	0	2	1	0	1	0	1
00006	8	0	1	○○記念館	●● memorial hall	4-3-7,XX City,XX Prefecture	**********	35.6754461	139.7515523	1	1	0	0	2	1	1	0	1	1

Note: The use of "location information codes" as link and node IDs is recommended. However, five-digit ID numbers are entered here because too many digits have to be displayed if location information codes are entered.

(Reference) Table 7 Example of Creating CSV File (Facility Data)

```
facil_id,facil_type,evacuation,temporary,name_ja,name_en,address,tel,lat,lon,floors,toilet,elevator,escalator,parking,barrier,nursing,brail_tile,info,info_board
00001,1,1,1,,XX office,Chuo 4-5-2,XX City,XX Prefecture,**********,35.6754356,139.7515214,4,4,2,0,2,1,1,1,1,2
00002,2,2,1,XX elementary school,Chuo 6-2-1,XX City,XX Prefecture,**********,35.6754311,139.7515526,3,1,0,0,1,1,0,0,0,0
00003,1,4,1,XX public hall,Chuo 4-23-15,XX City,XX Prefecture,**********,35.6754378,139.7515131,1,2,0,0,1,1,0,0,0,0
00004,3,0,0,XX hospital,Chuo 1-2-6,XX City,XX Prefecture,**********,35.6754541,139.7515846,5,4,2,1,2,1,1,1,1,2
00005,7,0,0,XX park,Chuo 5-4-23,XX City,XX Prefecture,**********,35.6754957,139.7515162,1,2,0,0,2,1,0,1,0,1
00006,8,0,1,XX memorial hall,Chuo 4-3-7,XX City,XX Prefecture,**********,35.6754461,139.7515523,1,1,0,0,2,1,1,0,1,1
```

(Explanation)

Link ID	Explanation
00001	A four-storied town hall designated as an emergency evacuation center and temporary stay facility. In addition, barrier-free equipment such as multipurpose toilets have been installed.
00002	A three-storied elementary school appointed as a designated evacuation center.
00003	A public hall designated both as an emergency evacuation center and designated evacuation center.
00004	A five-storied hospital. Barrier-free equipment such as multipurpose toilets, elevators, and accessible parking have been installed.
00005	A park with tactile walking surface indicators and multipurpose toilets.
00006	A memorial hall that is a tourist facility. Barrier-free equipment such as information offices and boards have been installed.

(Reference) Example of Creating GeoJSON File (Facility Data)


```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "geometry": {
        "type": "Point",
        "coordinates": [
          139.7553132,
          35.6782812
        ]
      },
      "properties": {
        "facil_id": "00001",
        "facil_type": 1,
        "evacuation": 1,
        "temporary": 1,
        "name_ja": "XX 役場”,
        "name_en": "XX office",
        "address": "Chuo 4-5-2,XX City, Tokyo”
        "tel": "03********",
        "lat": 35.6754356,
        "lon": 139.7515214,
        "floors": 4,
        "toilet": 4,
        "elevator": 2,
        "escalator": 0,
        "parking": 2,
        "barrier": 1,
        "nursing": 1,
        "brail_tile": 1,
        "info": 1,
        "info_board": 2
      }
    }
  ]
}
```

3. Data Format, etc.

(1) File name

In the case of data in CSV files, the file name of link data shall be "facility.csv " and the file name of node data shall be "node.csv."

The Shapefile data consists of the four files listed below. All the files shall be named in the same way.

(Reference) Table 8 File Names of Facility Data (for Shapefile)

Main file (extension: .shp)	facility.shp
Index file (extension: .shx)	facility.shx
Attribute file (dBASE file) (extension: .dbf)	facility.dbf
Project file (extension: .prj)	facility.prj

(2) Directory structure

"Links" and "nodes" created in the development of a spatial network model for pedestrians shall be basically placed in one directory so as to be released as open data.

The directory name shall be basically the name of a municipality for which the data has been developed, such as "yokohama" and "nagoya."

[Reference 3: Example of Creating Metadata]

Metadata summarizes information on data to be released to indicate what kind of data it is. The availability of metadata facilitates search for necessary data by users. Therefore, data will be easier to search if metadata is released together with a spatial network model for pedestrians or facility data in a machine-readable format.

(Reference) Table 9 Example of Creating Metadata

No.	Item	Example of entry
1	Title	Spatial network model for pedestrians
2	URL	http://...
3	Explanation	A spatial network model for pedestrians for XX District, XX City.
4	Contact address	Information Policy Division, XX City
5	Creator	Urban Planning Division
6	Tag	XX City; Spatial network model for pedestrians
7	Data format	SHP
8	File size (byte)	30000
9	Last update date	2017-01-01
10	Compatible specification	Draft Development Specification for Spatial Network Model for Pedestrians (March 2017)
11	License	CCBY

Source: Created from Introduction to Open Data - First Step Guide for Local Authorities (National Strategy Office of Information and Communication Technology (IT), Cabinet Secretariat)