



IOF Map Commission

IOF Foot Orienteering Commission

**GUIDELINES FOR MAPPING AND COURSE PLANNING
IN COMPLEX URBAN STRUCTURES ON SPRINT
ORIENTEERING MAPS**

January 2022

Errata (changes to the document):

Date	Description

This document has been compiled and edited by the IOF Map Commission and IOF Foot Orienteering Commission (January 2022).

Valid from January 2022.

GUIDELINES FOR MAPPING AND COURSE PLANNING IN COMPLEX URBAN STRUCTURES ON SPRINT ORIENTEERING MAPS

The aim of this document is to provide guidelines and present solutions for mapping and drawing of complex urban structures on sprint orienteering maps.



1 Why this is important?

Mapping of complex urban structures on orienteering maps has been a problem for a long time. With ISSprOM 2019 a new map symbol “Paved area in multilevel structures” was created in order to make more readable simple two-level structures like a bridge over a street. Despite this change, the solution was not sufficient for some urban situations. The problem of 2D representation of overlaying running levels coming from complex 3D urban structures can be divided into several areas:

1. Use of map symbols related to lower and upper level recognition
2. Representation of high elevated structures (not used for competition, information value)
3. Lack of information on lower level under the larger structure

To solve these problems the IOF Map Commission updated ISSprOM to version 2019-2, where several map symbols were clarified/changed. These guidelines illustrate the use of selected map symbols related to complex urban structures under different situations.



2 Fairness for the competitor is paramount

There are certain situations, where the terrain to be mapped is extremely complex with multi-level structures and where these guidelines give a lot of help to the mappers on how to represent them on the orienteering map.

There is a strong temptation to include 'interesting' urban structures in orienteering maps, and often this is perfectly acceptable to improve the difficulty of the courses. However, it is not acceptable at IOF events to include structures which cannot be adequately mapped according to the current specification.

This means that it should be possible to understand from the map (generally while running at high speed) where it is possible to enter and exit the structure, on which level, and how to move from one level to another. It is also important to be able to identify quickly and easily which detail is on the upper level and which is on the lower level, and also to identify if steps go up to the upper level, or down to the lower level. It is almost never appropriate to map a structure with more than two levels.

If it is difficult to work out how to best map the structure, or it is difficult to understand even looking at the map when not running, then it is probably too complex to understand for athletes during a competition.

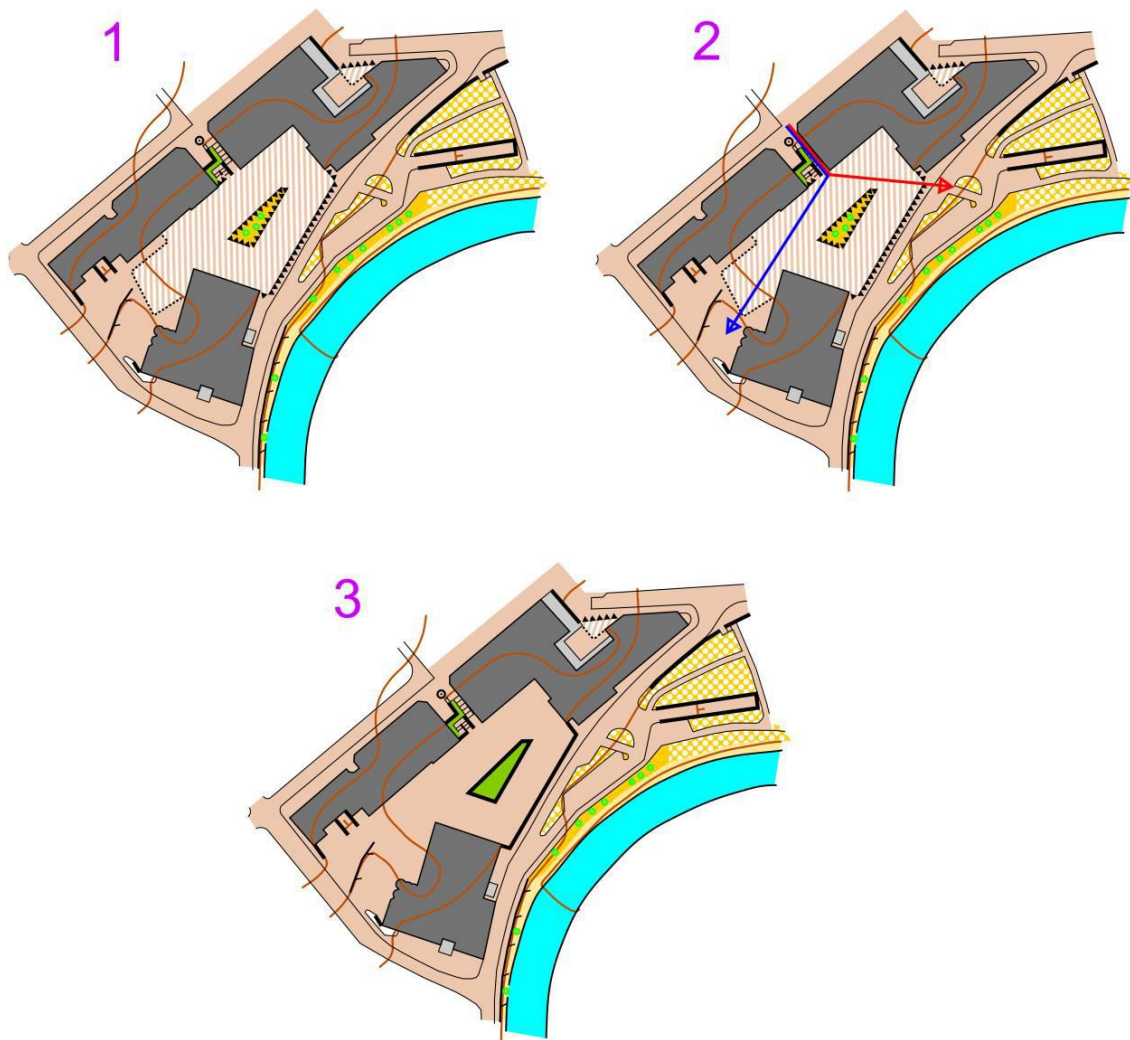
In any competition, fairness is paramount. The following sections of the IOF FootO Competition Rules guide the course planner and the event adviser with regards to fairness:

- 31.6. The IOF Event Adviser must ensure that rules are followed, mistakes are avoided and that fairness is paramount.
- Appendix 2, Principles for Course Planning 2.3. Course planner's golden rules: The course planner must keep the following principles in mind: ... the fairness of the competition.
- Appendix 2, Principles for Course Planning 2.3.2. Fairness is a basic requirement in competitive sport. Unless the greatest care is taken at each step of course planning and course setting, luck can easily become significant in orienteering competitions. The course planner must consider all such factors to ensure that the contest is fair and that all competitors face the same conditions on every part of the course.
- Appendix 2, Principles for Course Planning 3.4.2. Fairness of legs: No leg should contain route choices giving any advantage or disadvantage which cannot be foreseen from the map by a competitor under competitive conditions. Legs which encourage competitors to cross forbidden or dangerous areas must be avoided.

It is the responsibility of the event organisation (especially the course planner, controller and event adviser) to make sure that the map and terrain are suitable and fair for all competitors.

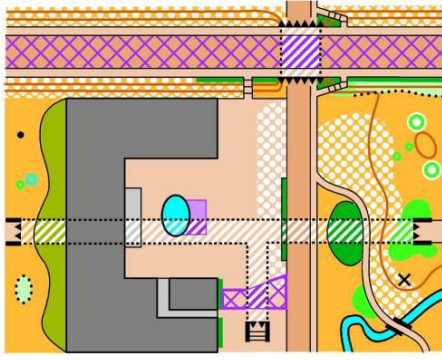
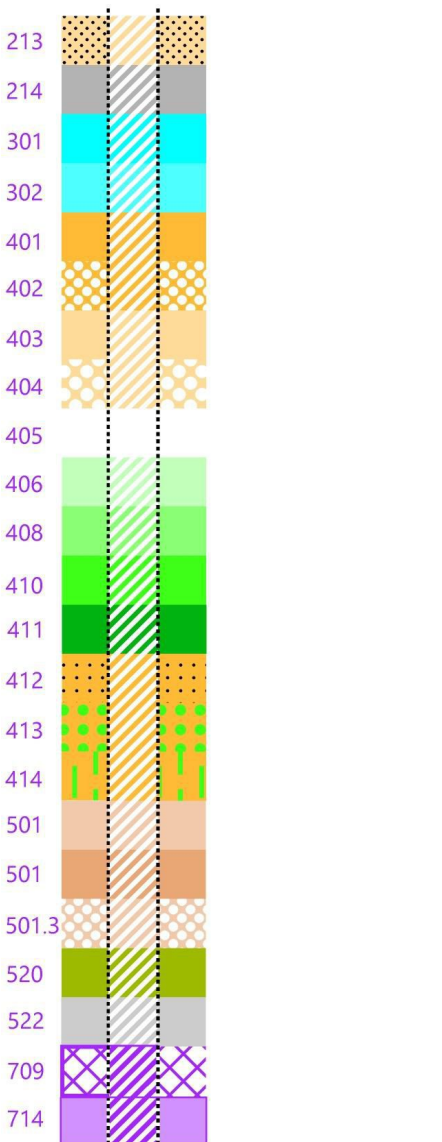
The examples below show a problematic situation from Gjøvik, Norway. Map sample 1 shows possible mapping of situation according to ISSprOM 2019-2. Map sample 2 shows the possible route choices for the competitor. The [long stairway](#) leads to an upper level as shown by the stripe. At the end of the long stairway, turning immediately right takes you via a small set of steps to a lower level accessed by the triangle line (two triangles drawn). No triangles at the end of the long stairway indicate it leads to an upper level (where 2 levels are shown by the stripes). The blue arrow is correct. The red arrow is not possible without running another stairway down to [lower level](#).

It is difficult to quickly interpret so for competition an event bulletin would help clarify this situation with a map extract and perhaps a photo. If the situation is not sufficiently explained in the bulletin, to ensure a fair competition, the structure should not be mapped in this way, but by mapping only main running level (here upper level) as shown in map example 3.



3 Examples of map symbols used in different situations

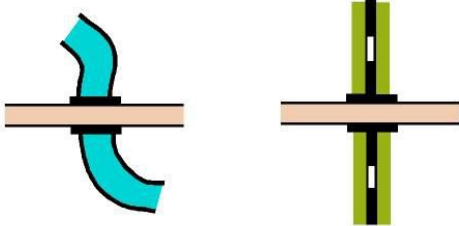
3.1 Map symbol 512.3 Area passable at two levels

 <p>A map illustration showing a cross-section of a road with a raised pavement edge. The road surface is marked with a purple cross-hatch pattern, representing the 'Area passable at two levels' symbol. The road is bordered by a grey concrete curb on the left and a green grassy area on the right. A blue stream flows through the grassy area. A small 'x' symbol is visible in the grassy area.</p>	<p>Map symbol 512.3 Area passable at two levels is the redefinition and renumbering of map symbol 501.2 Paved area in multilevel structures which was first published in ISSprOM 2019 first version. Over the last two years it was proven that the symbol works well and also in combination with some other area symbols. The use of the symbol is now extended but applies only for two-level situations. The edges of area objects mapped as uncrossable (411 and 520) should be highlighted with a thin black line (e.g. by 415, 501.1 or the edge for 520) in case of overlap with map symbol 512.3.</p>
 <p>A vertical legend showing various map symbols with their corresponding numbers. The symbols are arranged in a column, with a vertical dashed line running through the center. The symbols include: 213 (dotted), 214 (grey), 301 (cyan), 302 (light blue), 401 (orange), 402 (orange with scattered trees), 403 (orange with diagonal stripes), 404 (orange with diagonal stripes and scattered trees), 405 (light green), 406 (green), 408 (light green), 410 (green), 411 (dark green), 412 (orange with diagonal stripes and scattered trees), 413 (orange with diagonal stripes and scattered trees), 414 (orange with diagonal stripes and scattered trees), 501 (orange), 501.3 (orange with diagonal stripes), 520 (green), 522 (grey), 709 (purple with diagonal stripes), and 714 (purple).</p>	<p>Map symbol 512.3 Area passable at two levels, can be combined with the following symbols:</p> <ul style="list-style-type: none"> • 213 Open sandy ground (replaced with 403 within striped area) • 214 Bare rock • 301 Uncrossable body of water • 302 Crossable body of water • 401 Open land • 402 Open land with scattered trees (replaced with 401 Open land within striped area) • 403 Rough open land • 404 Rough open land with scattered trees (replaced with 403 Rough open land within striped area) • 406 Vegetation: slow running • 408 Vegetation: walk • 410 Vegetation: fight • 411 Uncrossable vegetation • 412 Cultivated land (replaced with 401 Open land within striped area) • 413 Orchard (replaced with 401 Open land or 403 Rough open land within striped area) • 414 Vineyard or similar (replaced with 401 Open land or 403 Rough open land within striped area) • 501 Paved area • 501.3 Paved area with scattered trees (replaced with 501 Paved area) • 520 Area that shall not be entered • 522 Canopy • 709 Out-of-bounds area (replaced with colour 100% upper purple within striped area) • 714 Temporary construction or closed area (replaced with colour 100% upper purple within striped area)

3.2 Bridges and tunnels

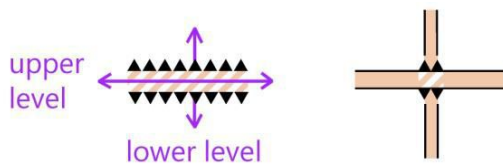
3.2.1 Simple bridge (impossible to pass underneath)

Simple bridges, which cannot be passed underneath, are represented using symbol 515 Impassable wall.



3.2.2 Bridge or tunnel entrance (possible to pass underneath)

Simple bridges where it is **possible to pass underneath** are represented using symbol 512.1 Bridge or tunnel entrance. The two-level area is emphasized using symbol 512.3 Area passable at two levels. The cartographic gap 0.15 mm is applied to the black objects (for example road edges) pointing towards the peaks of the triangles in 512.1 Bridge or tunnel entrance symbol.



3.2.3 Underpass or tunnel

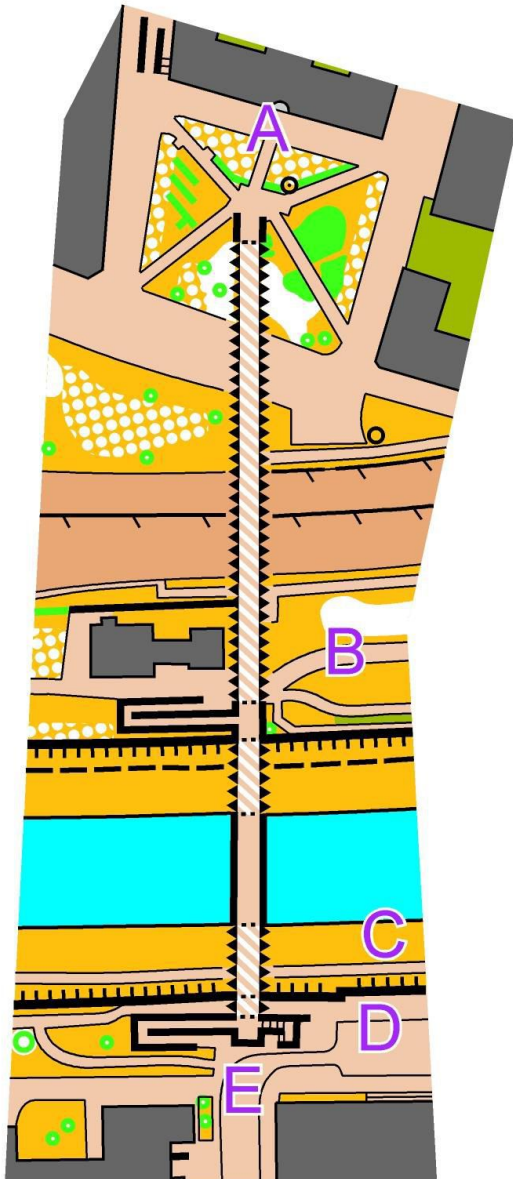
512.2 Underpass or tunnel defines the extent of the lower level area. A gap of 0.2 mm shall apply at the beginning and end of the line. Minimum is two dashes. The line is used when there is no other barrier line defining the extent of the lower level area.



In situations, where bridge is too narrow, dashes of 512.2 Underpass or tunnel are omitted (it is not possible to apply minimum length of two dashes). Edges of lower areas are thus delimited by symbol 512.3 Area passable at two levels only.



Example of application of 512.1 Bridge or tunnel entrance for long pedestrian bridge in Ostrava, Czechia (map is not rotated to magnetic north). Location C is divided from location D by a protective flood wall several meter high and for better distinction from other barriers is drawn as uncrossable cliff. There is a bicycle path going under the pedestrian bridge between the flood wall and stairway. Typically, minimum size should be 2 triangles, but in this complex situation 512.1 triangles are reduced to one triangle. Barriers under the bridge at lower level are drawn using 512.2 Underpass or tunnel.



Location A



Location B



Location C

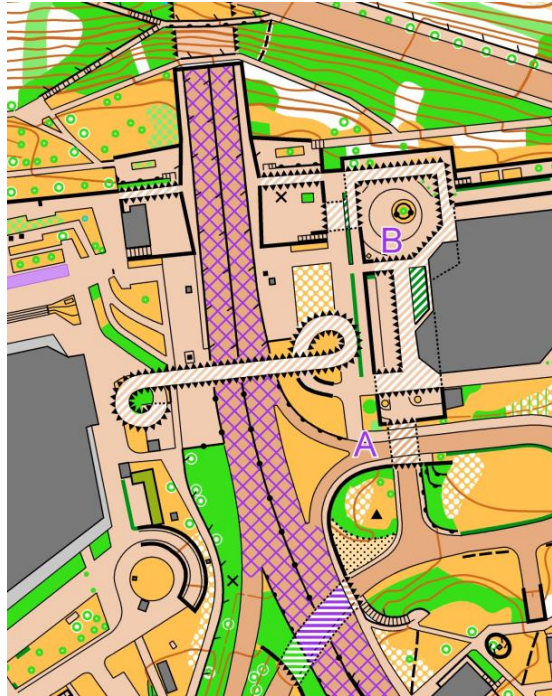


Location D (Street View not available)



Location E

Example of application of 512.2 Bridge or tunnel entrance in the complex area of Prague Congress Centre, Czechia.



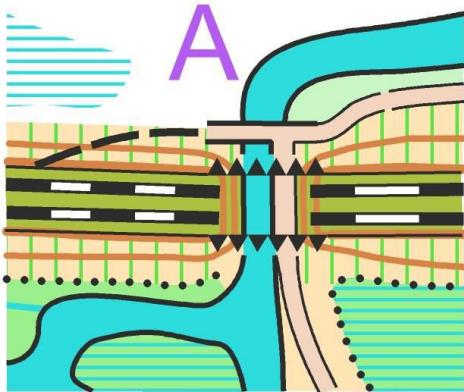
[Location A](#) Spiral bridge, view from SE



[Location B](#) Lower level, view from SE

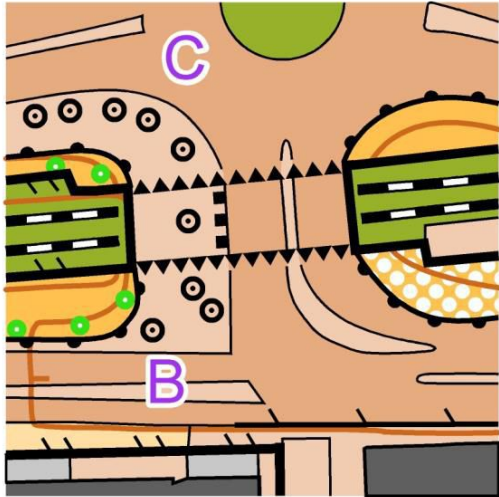
3.2.4 Bridge with only lower level runnable

In the example from Riga, Latvia, the upper level is a railway which is an area that shall not be entered, thus is not mapped at all (upper level is not runnable). Symbol 512.1 Bridge or tunnel entrance only indicates that there is an elevated structure above the running level. This approach allows to clearly show situation on lower level.



[Location A](#), view from NW

Similar example from Trondheim, Norway, where upper level is railway which is omitted.



[Location B](#), view from SW



[Location C](#), view from N

This solution also applies to high elevated structures (not used for competition, information value). Example is Nuselský bridge in Prague. Under the bridge there is a city park and a residential area. Upper level is not mapped, triangle line delimits the extent of massive bridge structure and the lower passable level is mapped in detail.



[Location D](#), view from E



[Location E](#), view from S

3.3 Use of new symbol 501.2 Step or edge of paved area at lower level

If the two-level area structure is large, mapping of important edges at lower level using symbol 501.2 Step or edge of paved area at lower level can help navigation. Cartographic gap 0.15 mm is applied on both sides of the bridge. No other symbols shall be used on the lower level.

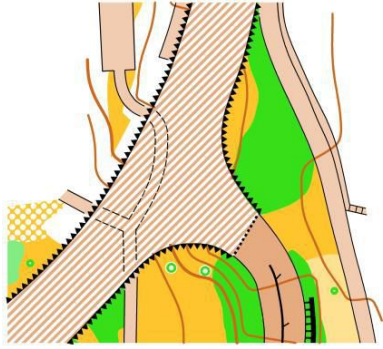






Photo not available

3.4 Use of symbol 522 Canopy

Examples of the object which shall / shall not be represented by the canopy symbol.

Use canopy	Do not use canopy
 <p data-bbox="256 1014 808 1045">You can run through the building → canopy.</p>	 <p data-bbox="824 856 1377 1045">The canopy to the right is too high → shall not be mapped.</p>
 <p data-bbox="256 1759 808 1856">You can run under a part of the building → canopy.</p>	 <p data-bbox="824 1759 1377 1856">Sloping walls are mapped according to the situation on the ground → building.</p>



You can pass through the object → canopy.



You cannot pass through the object → shall be mapped as a building.



Canopy over the simple bridge (water underneath) → canopy.



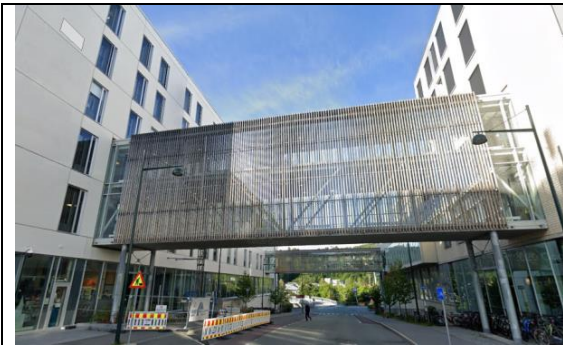
Canopy over the bridge (possible to pass under) → canopy can be omitted, two-levels are mapped



Large balcony passable underneath → canopy.



The balconies are too small and too high → shall be omitted.



Bridges between buildings are placed in the field of view of the competitor → canopy.



Bridges between buildings are placed too high → shall be omitted.



You can pass through the object → canopy.



You cannot pass through the object → shall be mapped as a building.