



# SAFER TO SCHOOL

GUIDELINES FOR INSTALLING URBAN EQUIPMENT  
AND ARCHITECTURAL DESIGN OF TRAFFIC AREAS  
TO IMPROVE ROAD SAFETY FOR SCHOOL CHILDREN



REPUBLIC OF SLOVENIA  
MINISTRY OF INFRASTRUCTURE  
SLOVENIAN INFRASTRUCTURE AGENCY

LJUBLJANA  
JUNE 2022

**SAFER TO SCHOOL**

Guidelines for Installing Urban Equipment and Architectural Design of Traffic Areas  
to Improve Road Safety for School Children

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Kataložni zapis o publikaciji (CIP) pripravili v  
Narodni in univerzitetni knjižnici v Ljubljani

COBISS.SI-ID 140543747  
ISBN 978-961-6191-24-1 (PDF)

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## EXPERT STATEMENT

## Human Factors approach and the Slovenian guideline for safer ways to school

The Human Factors approach tries to identify deficits in the »legibility« or »intuitive understanding« of a road spot that could trigger hazardous situations or even accidents. Many driving mistakes are reactions of drivers to misleading road features. Since the human reaction is unchangeable the attention should be focused on the ergonomics of road features. So it is mandatory to consider the natural laws of human perception, the processing of information and the regulation of action programs – wherever road safety is an issue.

Especially on ways to school there is all over the world the problem, that drivers should be very aware that school children can suddenly enter the road. That's why the road space should instruct drivers that they are close to a school or kindergarten. The goal is to raise the particular attention and the awareness to drive in this road section ready to brake.

In conclusion the road has to be designed and equipped in a way that follows the Human Factors rule »Never surprise the driver - ensure the possibility to detect + react quickly and safely«. But very often schools, traffic lights, crossings, bus stops, bicycle paths and their transition onto the road merge optically with the background. So they are poorly visible and therefore often not recognised in time. But how is a driver able to react if he can't detect and expect the danger?

Many trials have been made internationally to raise driver's awareness and to slow down the speed while driving near a school or another children facility. But the approach of the Slovenian Guideline for safer ways to school »SAFER TO SCHOOL« picks up this topic in a most advanced and innovative way. The guideline proposes the use of awareness-attracting objects and signals that

have a long range visibility with a warm emotional connotation regarding school children. The result is an unique and very effective set of signals, signs, bollards, posts and markings that all together are able to instruct the driver and change the mostly automated driving programme into a conscious calming down.

The combination of the colours, the size of the devices, the graphical clarity and the variability of the combination of the elements lets expect an efficient tool to reduce driving mistakes and the probability of hazardous situations. Especially effective will be the combination of the big signal-post with the two children, the colourful little bollards and the markings on the road to raise awareness and calm down speed.

I wish this guideline a wide application and implementation to improve the interaction between road users and road with emotional warm and visual clear awareness-attracting devices. May it be used widely all over the country to raise driver's attention that school children are nearby and instruct them subconsciously to slow down speed. It will be internationally a solution that is on top.

**Diplom-Psychologist Dr. rer. nat. Sibylle Birth**

Leader of the Working Group »Human Factors in Design and Setting Credible Speed Limits« of the PIARC Technical Committee C.2 »Design and Operation of Safer Road Infrastructure«.

## LETTER OF SUPPORT

Dear Ladies and Gentlemen,

Having been made aware of the possibility of the introduction of the road safety measure »Safer to school«, aimed at improving the safety of children, I would like to utter a statement of support.

Given the opportunity to investigate the proposed »Safer to school« approach in comparison to other ways to enhance the protection of minors on the road, the results, laid out in paper »Children – Considerations for an improved use of the meaning 'children' in the Slovenian road signs system in order to enhance children's road safety« should clearly, in my opinion, justify the proposal's application. In abbreviation of the mentioned paper, »Safer to school« bears advantages, which have not yet been met by other measures geared for the same purpose.

The properties of the graphical rendering of the symbol used on the »Safer to school« sign is, in comparison to other signs covering the issue, supporting long range visibility (discriminability) to greater extend. The image content of the symbol uses the available space to its advantage, providing road users with adequate viewing time while driving by. The symbol's image content should be easily comprehended as two children, and doubtlessly understood as an announcement of a section of road where the presence of children may be expected.

The chosen shape and colour combination for the sign is highly conspicuous, allowing the sign to be noticed early and easily. Further more, that combination is purposely not used in the country's current road sign system, nor is it stipulated by the United Nations' Convention on Road Signs and Signals, done in 1968. This further heightens conspicuity – since being new – and avoids confusion with existing signs.

»Safer to school«, employs a systemic approach to raise awareness by other means than the attraction of attention of the conscious mind, as road signs would. New initiatives like this build on influencing behaviour by attempting to immerse drivers in a setting imposed by fashioning (»branding«) the immediate environment alongside the road, thus creating a desired driving response. Such an approach is expected to have the potential of a long lasting effect on road safety, as opposed to the drawing of attention that needs to constantly be renewed to remain functional.

In support of »Safer to school«, I hope that this initiative becomes a reality by implementation on the road.

Sincerely,

Stefan Egger



## LETTER OF SUPPORT

The Slovenian Infrastructure Agency prepared the »Guidelines for Installing Urban Equipment and Designing Traffic Areas to Improve Road Safety for School Children«, proposing the guiding principles for road sign designs warning road users of the vicinity of schools. I believe that the designed guidelines could effectively improve the traffic safety of children and I therefore support their implementation. Below is a short overview of the reasons on which my opinion is based.

The guidelines include the principles for a wide range of markings, from signs indicating a nearby school, to the school pedestrian crossing, speed limits, bus stops, signs indicating a school drop-off point, the vicinity of stairways, playgrounds, cyclists on the road, to high visibility jackets and stickers. In terms of existing traffic signs, the markings have an unconventional design and are similar in shape to characters from children's literature. The series of proposed markings has a single colour and design basis, the images and colour combinations on them are friendly and bear a clear message. The markings portray children doing something (saying goodbye to a parent in the car, riding their bikes, walking, waiting for the bus, etc.); they are presented schematically, with distinct colour contrasts, not containing any unnecessary information, warning drivers from afar in a friendly yet unambiguous manner that there are children nearby and they should keep an eye out for them.

These design characteristics make the visibility of the message quickly perceptible, requiring no special effort in terms of perception, which in traffic situations (e.g. traffic jams, reduced visibility, etc.) is of key importance for child safety.

Another important value of the proposed spatial planning solutions is the fact that the concept not only offers a new graphic and spatial design of road markings indicating a children zone, but is a project that has already been pilot-tested on the school routes in the municipality of Žalec in the years 2015/2016; the speed measurement results in the area of markings clearly showed that the proposed markings were effective: according to the measurements, the driving speed in the relevant locations decreased and the follow-up survey showed that road users found the markings to be visible, clear, communicative and likeable.

The road markings proposed by the guidelines seem to be visible, communicative, recognisable and friendly enough, as suggested by the results of the pilot study. They could therefore be reasonably expected to prove effective in traffic calming around schools and kindergartens and contribute substantially to the greater safety of children in traffic. Based on the above, I support the conceptual design proposed by the guidelines and would like to see them put in practice as soon as possible.

Yours sincerely,

**Professor Dr Matej Svetina**



## Purpose and main guiding principles

As a rule, urban equipment and traffic area design receive attention when drivers fail to comply with or respect road traffic principles and rules and when vehicle speed and driving behaviour are not adapted to the traffic and technical characteristics of the road, the roadside, and the presence of vulnerable road users.

The purpose of urban equipment, notifications to improve traffic safety and traffic area design is to provide drivers with a friendly warning about speed limits or the presence of children as vulnerable road users.

Urban equipment and traffic area design are proven to have an impact on driver attention and on how they drive and how fast, as traffic psychology is taken into account in their concept and design as well as human (i.e. drivers') mental and physical characteristics or capabilities.

Urban and architectural measures to mitigate traffic also become apparent because of their design in places where the driver's field of vision is overburdened with redundant information. Urban traffic calming is designed so as to create self-explaining or predictable roads in the areas where educational and similar institutions are located and on the way to school in school districts.

Such measures communicate messages to drivers with their image (design) and provide clear

information about the proximity of schools and the presence of children in traffic.

As a result, drivers intuitively adapt their speed and driving to road conditions. This means that the road or its appearance, i.e. its self-explanatory or predictable appearance, tells a driver to adjust their driving to comply with traffic rules and at the same time stimulates them (i.e. wakes them from monotonous, meditative or automated driving) to drive in accordance with the road traffic principles.

Pursuant to the Roads Act, urban equipment and traffic area design constitute traffic-calming measures. Therefore, the development of devices and the implementation of traffic-calming measures require a traffic and urban planning document, in which the axioms of human factors in transport (i.e. traffic psychology) are taken into consideration in a professional and deliberated manner.

Particular attention should be paid to knowing and understanding road traffic and to the envisaged measures' impact on drivers.

The code of professional conduct and the designer's responsibility are very important factors.

In addition to urban planning and architectural measures, the guidelines also provide some information to improve road safety.

Traffic signs and equipment are not specifically shown or described in the guidelines. They are to be governed by the Rules on traffic signs and equipment on roads.

Rather than replacing the Rules on traffic signs and equipment on roads, urban equipment and traffic area design complement visual communication (driver-road-roadside), improve the speed limit credibility and draw attention to the presence of children in road traffic.

# General requirements

The surfaces of urban equipment and notifications to improve traffic safety must be made of retroreflective materials, other than:

- the basic colour of the coloured passive safe bollard (PSB) of 160 mm in diameter,
- road marking stickers,
- the bus timetable board,
- LED displays,
- the canvas,
- the banner,
- the flag,
- the poster,
- the »stop, look, listen, think« sign,
- the »no mobile phones« sign,
- the »be visible« sign,
- the symbol on safety vests.

The urban equipment and notifications to improve traffic safety are made of retroreflective materials, with a yellow base, and printed (screen printing or digital printing) on a basic white retroreflective foil.

The urban equipment from retroreflective materials with orange as the basic colour of the board is made by printing the board content on a basic white retroreflective foil and then adhering it to the basic orange retroreflective foil/surface.

In designing urban equipment and notifications to improve traffic safety, the Rules on traffic signs and equipment on roads or the SIST EN 12899-1 standard (Fixed Vertical Road Traffic Signs) apply as appropriate.

In designing the coloured passive safe bollard of 160 mm in diameter, the minimum requirements of the bollard's mechanical properties must be taken into consideration:

## 1. Basic conditions

According to the SIST EN 12899-3 standard, the coloured PSBs\* must have the following characteristics:

- method of installation – type D3,
- retroreflective surface – class RA2,
- wind load – WL1,
- impact resistance of the retroreflective surface – DH1.

## 2. Additional conditions

The coloured PSB\* must ensure a certain level of safety in the event of a motorcycle crash, i.e.:

- **If the motorcyclist hits the PSB\* head-on:**

the values of head and neck injury parameters must not exceed the prescribed values of second-degree injury according to SIST TS CEN/TS 17342:2019 at an impact speed of up to 30 km/h.

- **If the motorcyclist hits the PSB\* with his chest:**

the compressive deformation of the chest on a standard test dummy (average 50th percentile height for men – HYBRID III) must not exceed 33% at an impact speed of up to 70 km/h.

The product adequacy must be proved with experimental testing or numeric simulations conducted by a qualified person or institution.

The Rules on traffic signs and equipment on roads also apply as appropriate to the installation of urban equipment and notifications to improve traffic safety (distances and heights).

Should, due to the specificity of the road and roadside layouts, there be a need for boards exceeding 600 × 600 mm in size, a proportional increase may be made to 900 × 900 mm.

Urban equipment produced as a transilluminated board is subject to the same conditions as traffic signs in accordance with the Rules on traffic signs and equipment on roads.

In addition to urban equipment, the guidelines also display notifications to improve road safety.

All dimensions of urban equipment and notifications are given in millimetres.

In designing traffic areas, the properties of the materials used for road markings must conform to the provisions of SIST EN 1436 + A1 (Road marking materials – Road marking performance) and to the requirements specified below. Road markings for traffic areas are applied using thinner or thicker materials. During the application, or already in the planning phase, special attention should be given to the slipperiness (SRT) and retroreflective properties of markings where required.

All dimensions of architectural markings are given in metres.

The investor is responsible for the regular maintenance of urban equipment and architectural markings in accordance with regulations and the code of professional conduct, ensuring that the urban and architectural design constantly serves the function of road traffic.

\* Passive safe bollard



# TYPEFACE AND COLOURS



# TYPEFACE

The typeface used for signs marking school routes is **DIN Black**.

Exceptionally, **DIN Bold** and **DIN Regular** are used for printing bus timetables.

The size of the inscriptions is adjusted to the space available.

**In no case** may the letters be deformed by narrowing or expansion.



## DIN Black

ABCČDEFGHIJKLMNOPQRSŠTUVWXYZŽ

abcčdefghijklmnopqrsštuvwxyzž

0123456789.,!?@#%&/()+-=>\_€\${}§ß×÷

## DIN Bold

ABCČDEFGHIJKLMNOPQRSŠTUVWXYZŽ

abcčdefghijklmnopqrsštuvwxyzž

0123456789.,!?@#%&/()+-=>\_€\${}§ß×÷

## DIN Regular

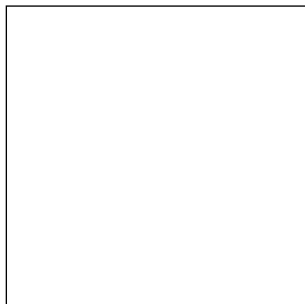
ABCČDEFGHIJKLMNOPQRSŠTUVWXYZŽ

abcčdefghijklmnopqrsštuvwxyzž

0123456789.,!?@#%&/()+-=>\_€\${}§ß×÷

# COLOURS - RETROREFLECTIVE

WHITE and ORANGE are the basic colours to be used for information panels and equipment made from retroreflective materials.



## WHITE

### Colorbox\*

x	y	β
0.305	0.315	min. 0.40
0.335	0.345	
0.325	0.355	
0.295	0.325	

### Minimum coefficient of retroreflection

α 20°				
β	5°	30°	40°	
cd/lux/m²	400	150	30	



## ORANGE

### Colorbox\*

x	y	β
0.595	0.645	min. 0.20
0.645	0.355	max. 0.25
0.570	0.429	
0.531	0.414	

### Minimum coefficient of retroreflection

α 20°				
β	5°	30°	40°	
cd/lux/m²	150	90	60	

## INFORMATION PANELS AND EQUIPMENT MADE FROM RETROREFLECTIVE MATERIALS

These retroreflective surface grades must provide the minimum coefficient of retroreflection (RA; unit cd.lx · 1m²) with respect to the requirements specified for each colour, as presented below.



## YELLOW

### Colorbox\*

x	y	β
0.47	0.51	min 0.20
0.51	0.47	
0.48	0.44	
0.43	0.48	

### Minimum coefficient of retroreflection

α 20°				
β	5°	30°	40°	
cd/lux/m²	370	64	42	



## DARK ORANGE

### Colorbox\*

x	y	β
0.610	0.390	min. 0.14
0.535	0.375	
0.506	0.404	
0.570	0.429	

### Minimum coefficient of retroreflection

α 20°				
β	5°	30°	40°	
cd/lux/m²	65	40	20	

\* In accordance with CIE 15, using the CIE Standard Illuminant D65 and standard conditions according to CIE 45/0.

# COLOURS - RETROREFLECTIVE

INFORMATION PANELS AND EQUIPMENT MADE FROM RETROREFLECTIVE MATERIALS



## RED

### Colorbox\*

x	y	β
0.735	0.265	min. 0.03
0.700	0.250	
0.610	0.340	
0.660	0.340	

### Minimum coefficient of retroreflection

α 20"				
β	5°	30°	40°	
cd/lux/m²	169	123	12	



## LIGHT BLUE

### Colorbox\*

x	y	β
0.078	0.171	min. 0.04
0.150	0.220	max. 0.10
0.210	0.160	
0.137	0.038	

### Minimum coefficient of retroreflection

α 20"				
β	5°	30°	40°	
cd/lux/m²	340	135	70	



## BLUE

### Colorbox\*

x	y	β
0.195	0.235	min. 0.04
0.225	0.235	max. 0.12
0.225	0.285	
0.195	0.285	

### Minimum coefficient of retroreflection

α 20"				
β	5°	30°	40°	
cd/lux/m²	130	23	9	



## DARK BLUE

### Colorbox\*

x	y	β
0.13	0.09	min 0.01
0.16	0.09	max. 0.04
0.16	0.14	
0.13	0.14	

### Minimum coefficient of retroreflection

α 20"				
β	5°	30°	40°	
cd/lux/m²	73	20	9	

\* In accordance with CIE 15, using the CIE Standard Illuminant D65 and standard conditions according to CIE 45/0.



GREEN

Colorbox\*

x	y	β
0.11	0.415	min. 0.04
0.15	0.415	
0.15	0.455	
0.11	0.455	

Minimum coefficient of retroreflection

α 20°			
β	5°	30°	40°
cd/lux/m²	114	17	1



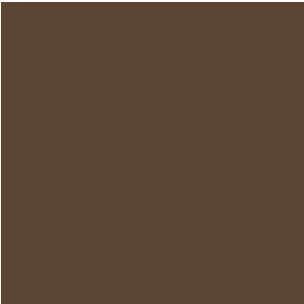
LIGHT BROWN

Colorbox\*

x	y	β
0.40	0.460	min 0.05
0.45	0.480	
0.50	0.437	
0.44	0.410	

Minimum coefficient of retroreflection

α 20°			
β	5°	30°	40°
cd/lux/m²	158	21	1



DARK BROWN

Colorbox\*

x	y	β
0.455	0.397	min. 0.04
0.523	0.429	
0.558	0.394	
0.479	0.373	

Minimum coefficient of retroreflection

α 20°			
β	5°	30°	40°
cd/lux/m²	88	11	1

\* In accordance with CIE 15, using the CIE Standard Illuminant D65 and standard conditions according to CIE 45/0.



GREY

Colorbox\*

x	y	β
0.305	0.315	min. 0.12
0.335	0.345	max. 0.18
0.325	0.355	
0.295	0.325	

Minimum coefficient of retroreflection

α 20°			
β	5°	30°	40°
cd/lux/m²	30	14.4	5.4



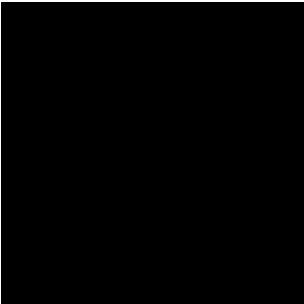
DARK GREY

Colorbox\*

x	y	β
0.317	0.320	min. 0.12
0.337	0.345	max. 0.20
0.325	0.355	
0.305	0.330	

Minimum coefficient of retroreflection

α 20°			
β	5°	30°	40°
cd/lux/m²	150	50	25



BLACK

Colorbox\*

x	y	β

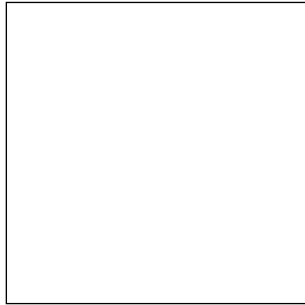
Minimum coefficient of retroreflection

α 20°			
β	5°	30°	40°
cd/lux/m²			

\* In accordance with CIE 15, using the CIE Standard Illuminant D65 and standard conditions according to CIE 45/0.

# COLOURS - CMYK

POSTERS, FLAGS, CANVASES, BANNERS, SCHEDULES, »STOP, LOOK, LISTEN, THINK« SIGNS,  
»NO MOBILE PHONES« SIGNS, »BE VISIBLE« SIGNS AND PRINTS ON SAFETY VESTS



## WHITE

C	0
M	0
Y	0
K	0

---



## YELLOW

C	0
M	10
Y	100
K	0

---



## ORANGE

C	0
M	30
Y	100
K	0

---



## DARK ORANGE

C	0
M	50
Y	100
K	0

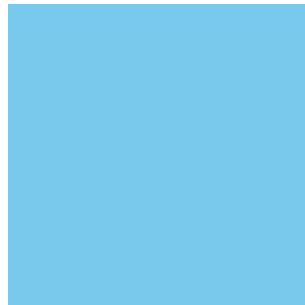
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## RED

C	0
M	100
Y	100
K	0

---



## LIGHT BLUE

C	45
M	0
Y	0
K	5

---



## BLUE

C	90
M	0
Y	0
K	10

---



## DARK BLUE

C	100
M	80
Y	0
K	0

---

## COLOURS - CMYK

POSTERS, FLAGS, CANVASES, BANNERS, SCHEDULES, »STOP, LOOK, LISTEN, THINK« SIGNS,  
»NO MOBILE PHONES« SIGNS, »BE VISIBLE« SIGNS AND PRINTS ON SAFETY VESTS



### GREEN

C 75  
M 0  
Y 100  
K 0

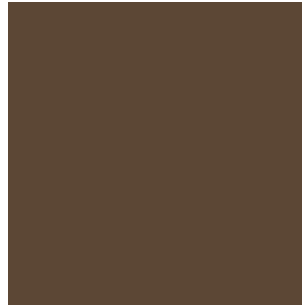
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### LIGHT BROWN

C 0  
M 20  
Y 50  
K 30

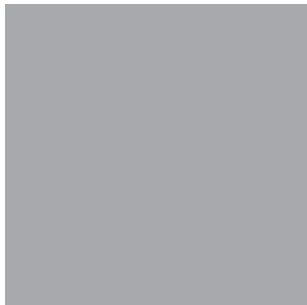
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### DARK BROWN

C 15  
M 35  
Y 50  
K 70

---



### GRAY

C 0  
M 0  
Y 0  
K 40

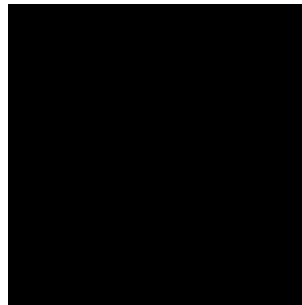
---



### DARK GRAY

C 0  
M 0  
Y 0  
K 70

---



### BLACK

C 0  
M 0  
Y 0  
K 100

---



URBAN  
EQUIPMENT



# COLOURED BOLLARD

Coloured bollards are installed near educational institutions, on school routes and in the area of centres for school and extracurricular activities to emphasise the presence of children on or by the road. The distance between bollards is determined by taking into account the geometric elements of the road and the specific properties of the roadside space. Particular attention should be paid to junction areas to ensure that the bollards do not obstruct the view of road junctions.

If the bollards cannot be positioned (e.g. the pavement is not wide enough), the pavement may be painted with coloured circles.

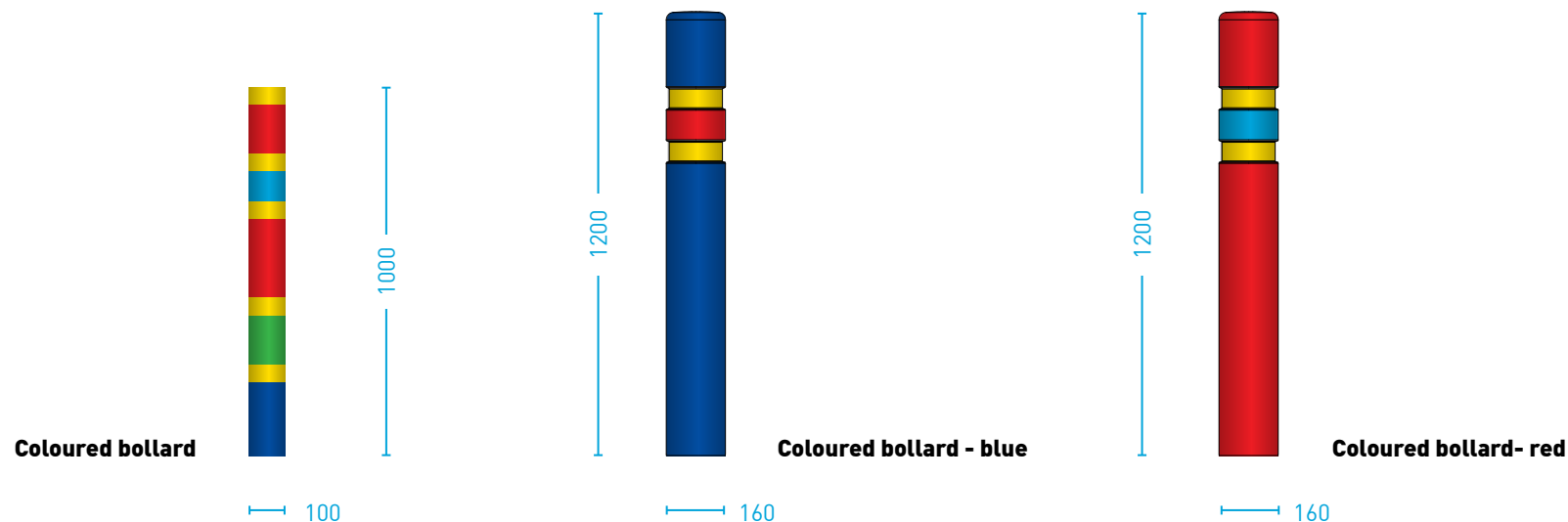
As a rule, the 100 mm diameter coloured bollards are installed in built-up areas, whereas the 160 mm passive safe bollards (hereinafter: coloured PSBs) are positioned outside built-up areas.

In built-up areas, the 160 mm coloured PBS can be installed on the soft shoulder or used to physically separate pedestrian facilities and vehicles when they are not separated by a curb.

If the coloured bollards are installed on the soft shoulder on which children walk according to the Road Traffic Rules Act (ZPrCP), in addition to relevant deviations, the soil should be appropriately tamped and the shoulder should be sufficiently wide.

In pedestrian crossing areas, a 100 mm coloured bollard with white and blue fields or a 160 mm, blue coloured PBS can also be installed. These types of bollards are installed immediately before and after the crossing on both sides of the road.

In exceptional cases, 100 mm bollards can also be replaced by 64 mm bollards. Exceptionally, the load-bearing columns of other urban equipment can also have the same colour pattern as the coloured bollard.

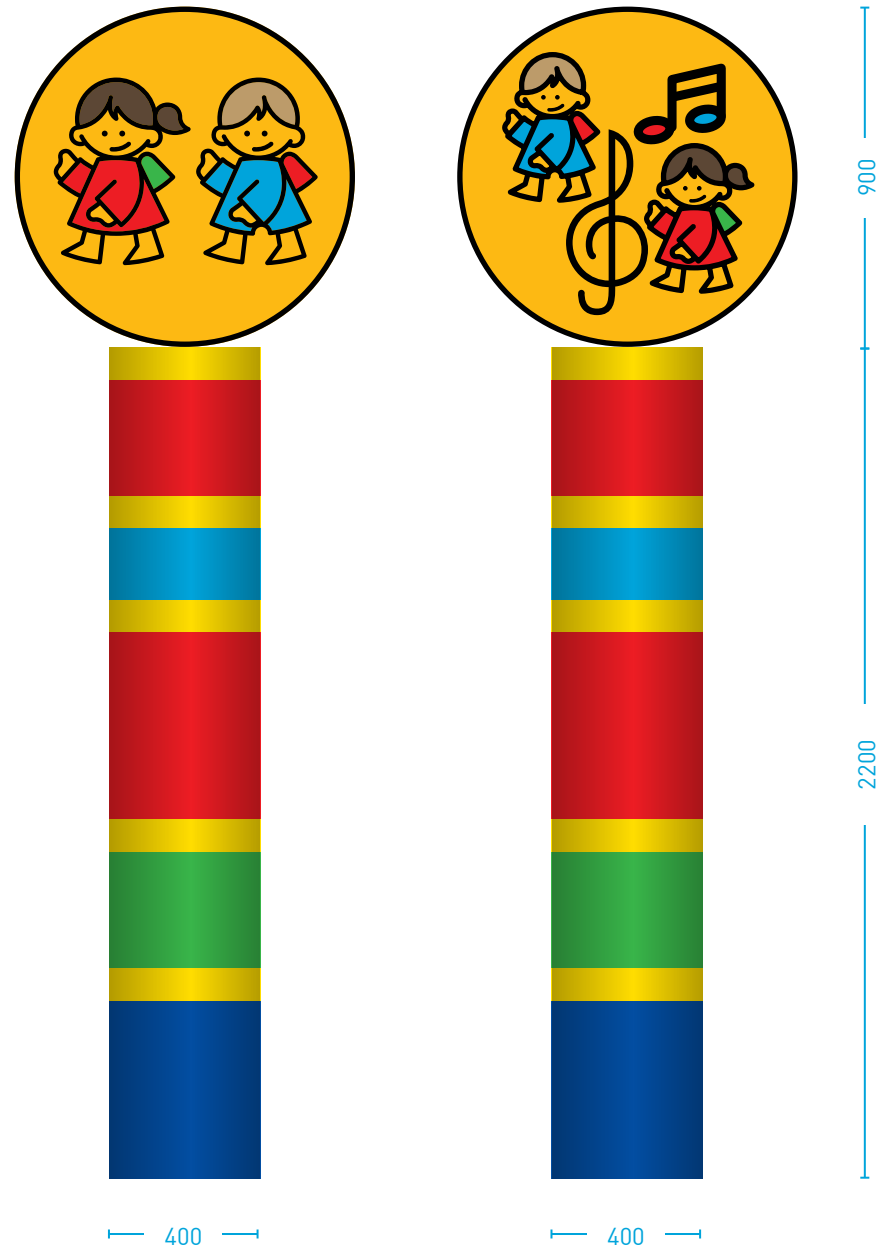


## SIGNS MARKING SCHOOL ZONES

Round signs mounted on coloured columns are orange. The marking of school zones is applied exclusively in the area of schools (as a rule in the maximum speed zone, common traffic areas and slow traffic zones) or where traffic-calming measures are introduced or where the maximum authorised speed outside built-up areas is reduced to at least 50 km/h.

Where there are music school zones, MUSIC SCHOOL round signs are displayed.

The lower edge of the coloured column is to be placed 0.3 m above the finished surface level of the pavement or the finished surface level of the road if the road has no pavement.



# ROAD MARKING STICKERS

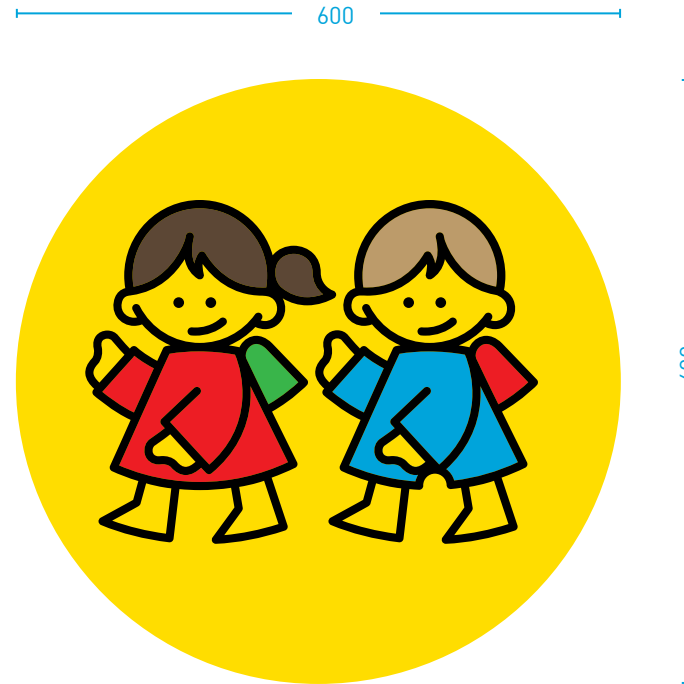
Stickers are yellow.

They are affixed to the pavement near educational institutions and on school routes.

Road marking stickers must meet the conditions for outdoor use. They must be adequately skid resistant (SRT).



Sticker design



Sticker structure

## »CHILDREN ON ROAD« SIGNS

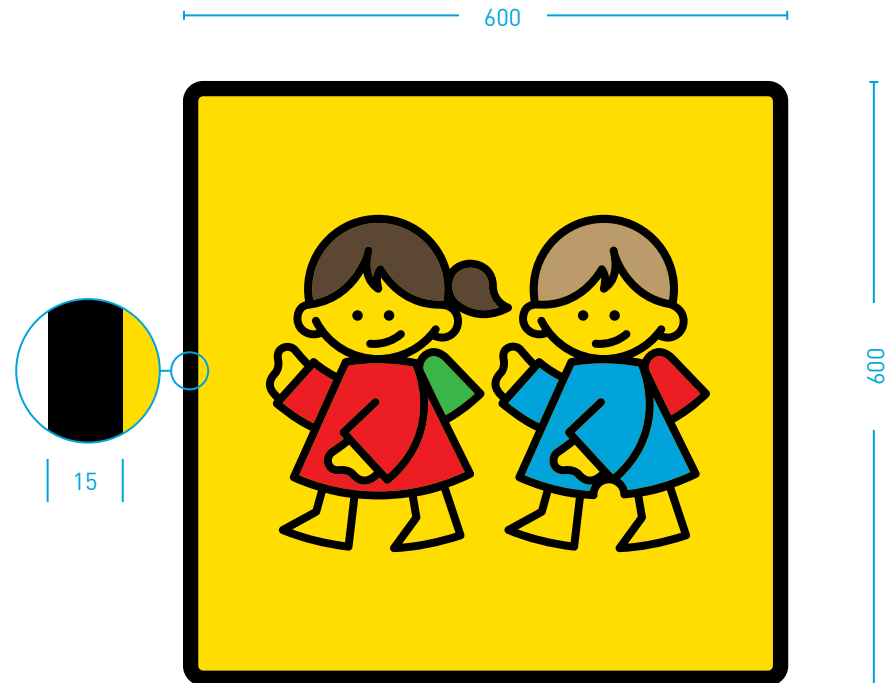
These signs are yellow.

They are mounted in school pedestrian crossing zones at crossroads where, pursuant to the Roads Act, the installation of prescribed traffic signs to mark a pedestrian crossing is not mandatory.

They are also mounted in areas where children walk to school.



Sign design



Sign structure

## CYCLIST SIGNS

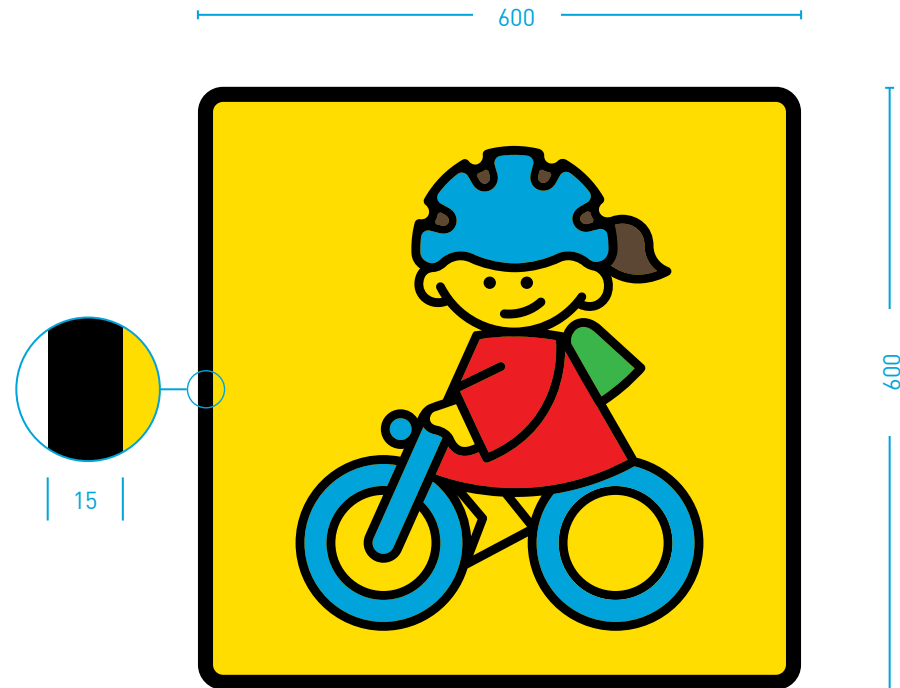
These signs are yellow.

They are mounted in school cyclist crossing zones at crossroads where, pursuant to the Roads Act, the installation of prescribed traffic signs to mark a cyclist crossing is not mandatory.

They are also mounted in areas where children cycle to school.



Sign design

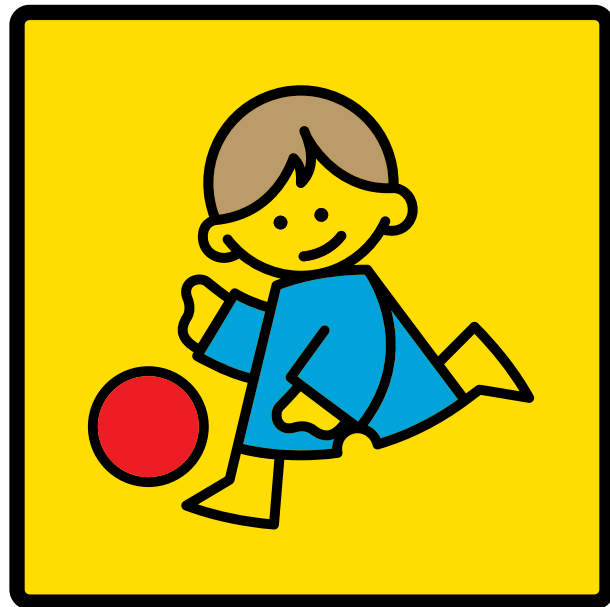


Sign structure

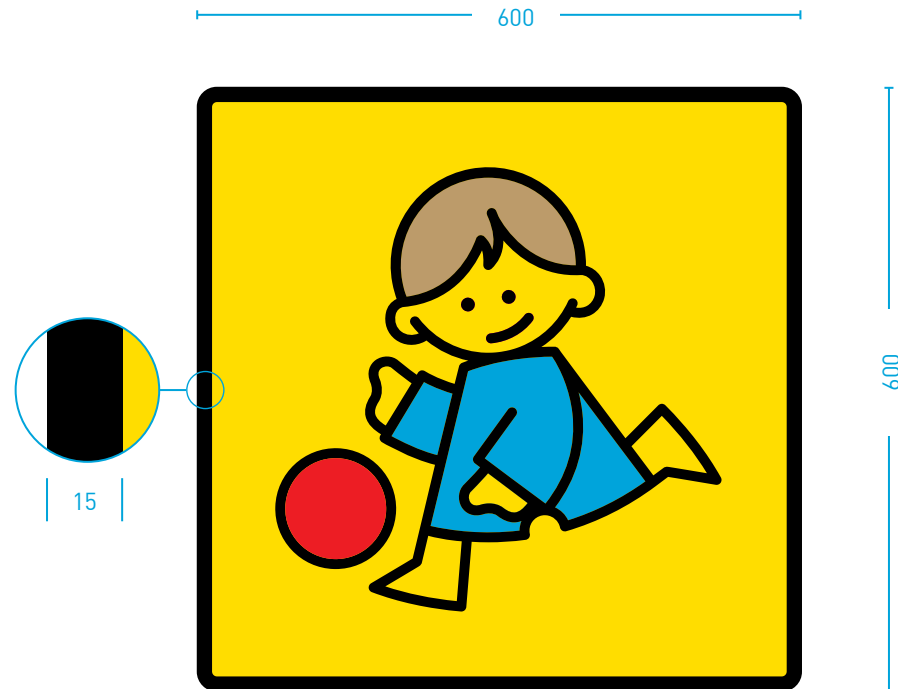
# PLAYGROUND SIGNS

These signs are yellow.

They are mounted in playground zones where children often hang out or play and in streets where children gather and play because of the urban features of the space.



Sign design



Sign structure

## STAIRWAY SIGNS

These signs are yellow.

These signs may show a stairway from the left or right side.

They are mounted in stairway zones where children may suddenly dart into the street (educational institutions or on the way to school).



Sign design 1



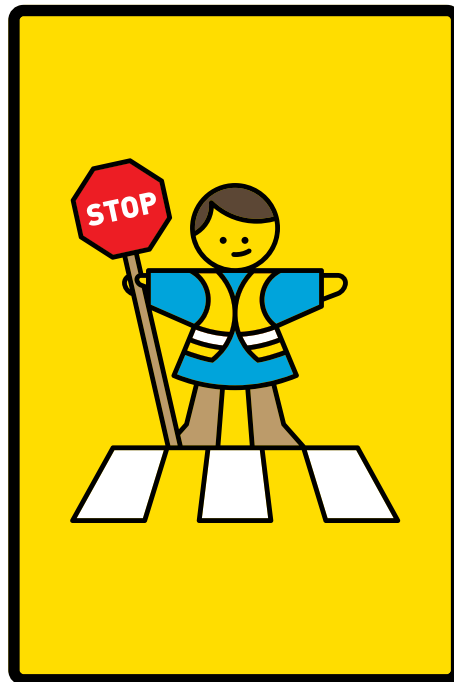
Sign design 2 and sign structure



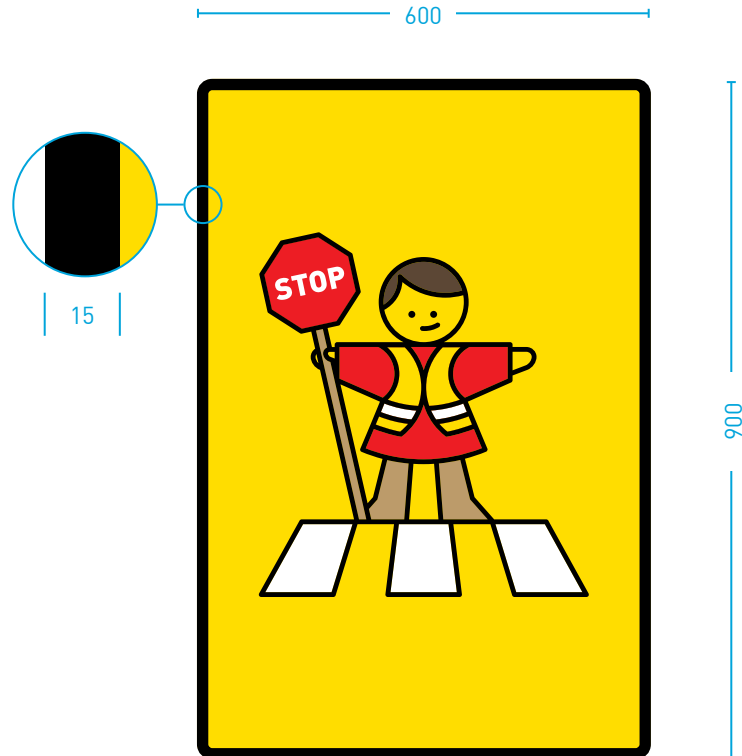
# TRAFFIC WARDEN SIGNS

These signs are yellow.

They are installed in advance of the place on the road where the safety of children in road traffic is ensured in accordance with the Road Traffic Rules Act (ZPrCP).



Sign design 1



Sign design 2 and sign structure

# CHILDREN WITH A BALLOON SIGNS

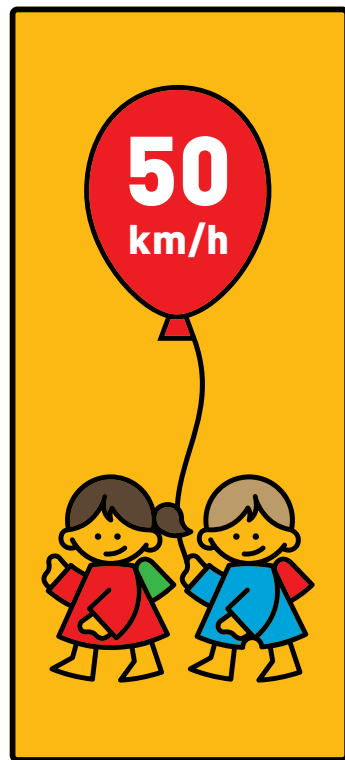
These signs are orange.

They are installed on school routes and near schools and centres for school and extracurricular activities to alert drivers to the presence of children in road traffic.

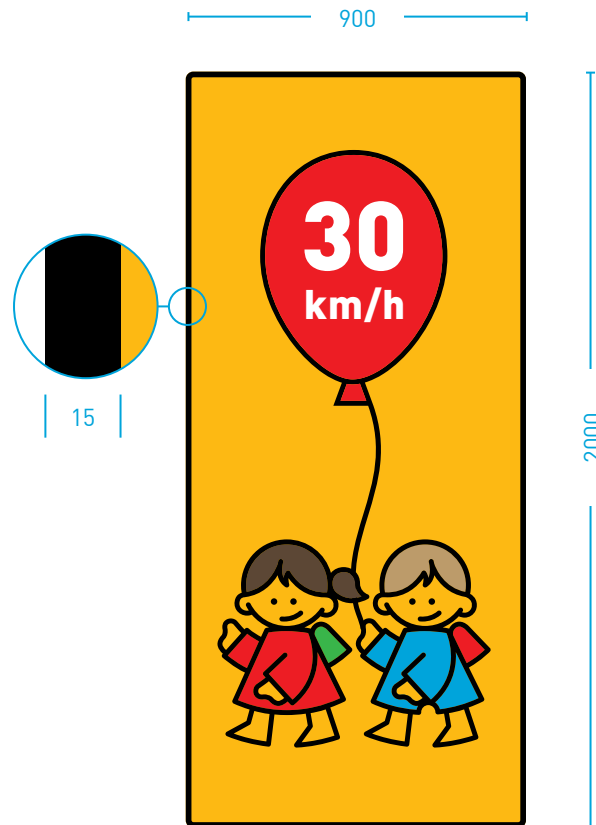
The road speed limit (V85) may be displayed on the balloon, provided that it corresponds to the geometric elements of the road and the traffic safety conditions (credibility).

When the boards are installed near schools and centres for school and extracurricular activities, they should only be visible when there are children in the centre and are, based on their activities, present in road traffic. When the children are not there, the boards should be covered, removed or folded (in the case of fold-up boards).

The lower edge of the sign is set at a height of 1.2 m above the finished surface level of the carriageway.



Sign design 1



Sign design 2 and sign structure

## HIKER AND SKIER SIGNS

These signs are orange.

They are installed in the area of the centres for school and extracurricular activities, etc.

The boards should only be visible when there are children in the centre and are, based on their activities, present in road traffic.

When the children are not there, the boards should be covered, removed or folded (in the case of fold-up boards).

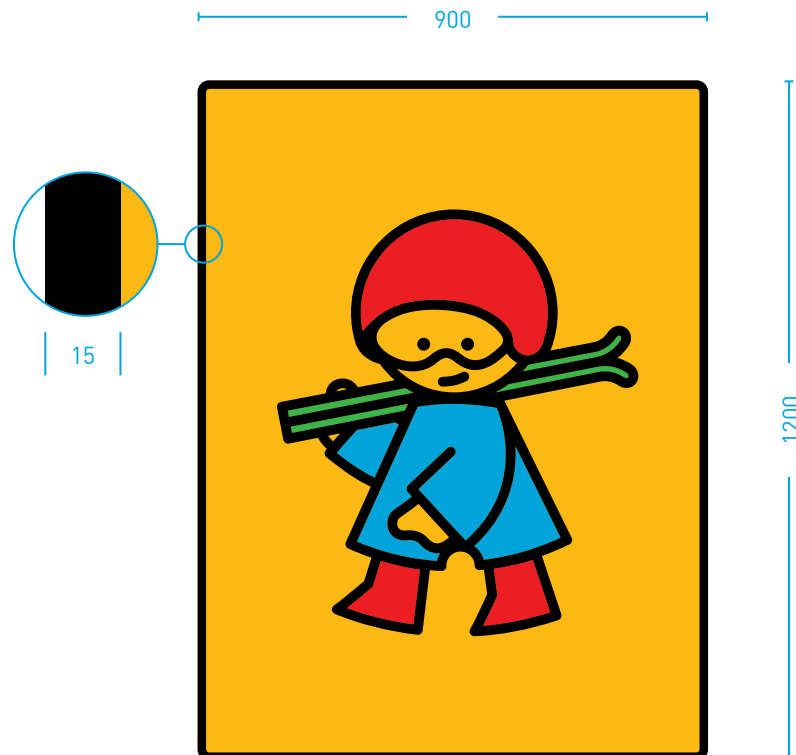
Depending on the needs, the LED display with a »child« or »cyclist« symbol can be used. Where there are no speed limit traffic signs in the area, the speed limit is not displayed on the LED display.

Where there is no speed limit, two flashing signals can be activated when a vehicle is detected to highlight the importance of the content displayed on the LED display.

The supporting structure of LED displays outside built-up areas must be passive safe and in accordance with the requirements of SIST EN 12767:2019 (Passive safety of support structures for road equipment – Requirements and test methods).



Sign design 1



Sign design 2 and sign structure

## CHILDREN DROP-OFF AND PICK-UP ZONE SIGNS

These signs are yellow.

They are mounted in places from where there is a footpath to school. This is to encourage walking and reduce motor vehicle traffic in school zones.

In designating drop-off and pick-up areas, the rules for safe stopping and parking of a vehicle are to be taken into account in accordance with the Road Traffic Rules Act to enable children to safely exit/enter the vehicle.

Kiss and Ride Zone signs are mounted within a radius of approximately 300 m in school zones. Such zones are designated with the assistance of road traffic safety experts. Schools can promote walking by collecting points (competition among pupils commuting on foot). At the end of school year, a pupil who has collected the most points is awarded a prize.



Sign design 1



Sign design 2

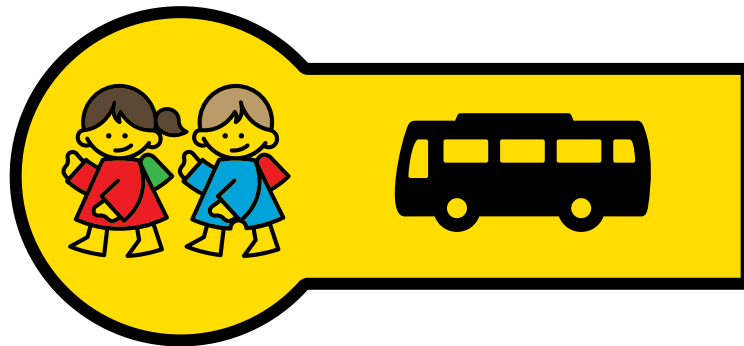


Sign design 3 and sign structure

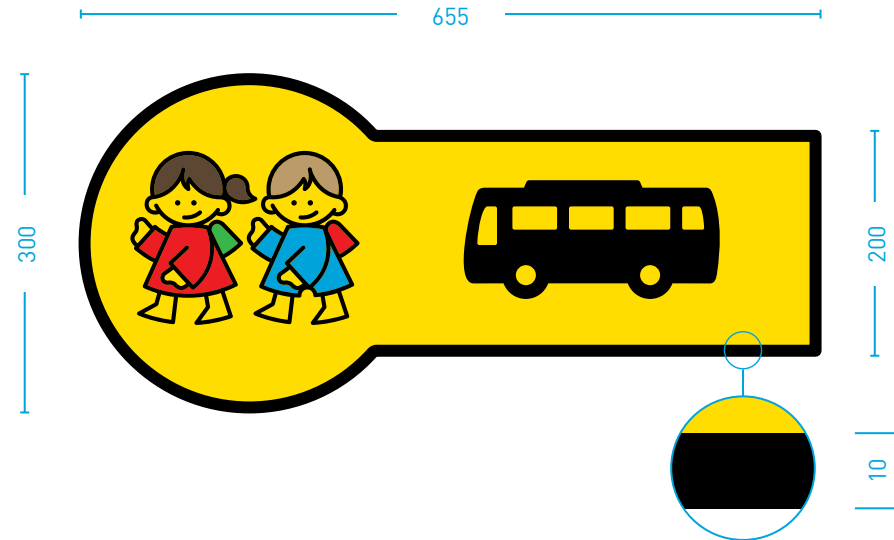
# SCHOOL BUS STOP SIGNS

These signs are yellow.

They are installed exclusively at school bus stops. As a rule, they are installed at places where, in accordance with the Rules on traffic signs and equipment on roads and the Rules on bus stops, the conditions for marking a bus stop are not met and the school bus makes stops in accordance with the Road Traffic Rules Act (ZPrCP).



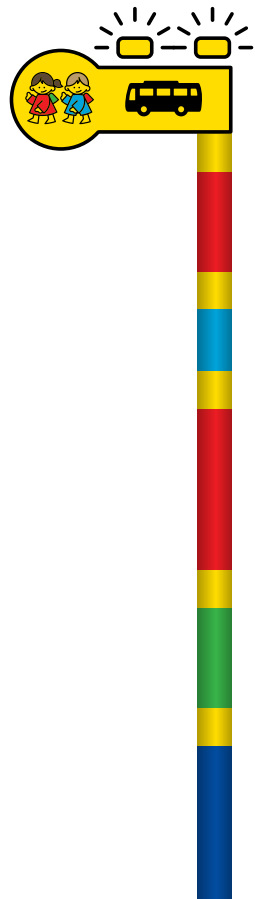
Sign design



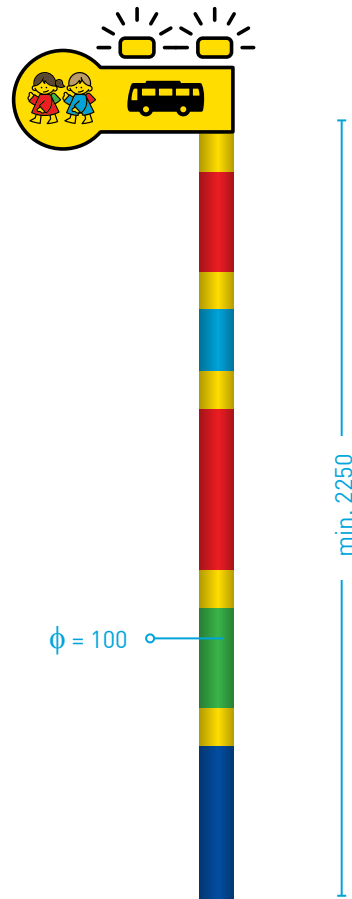
Sign structure

# ACTIVE SYSTEM FOR SCHOOL BUS STOP MARKING

The aim of the system is to actively alert drivers to the presence of school children in the waiting area.  
The system must operate (blinking lights) only when school children are in the waiting area.



Sign design

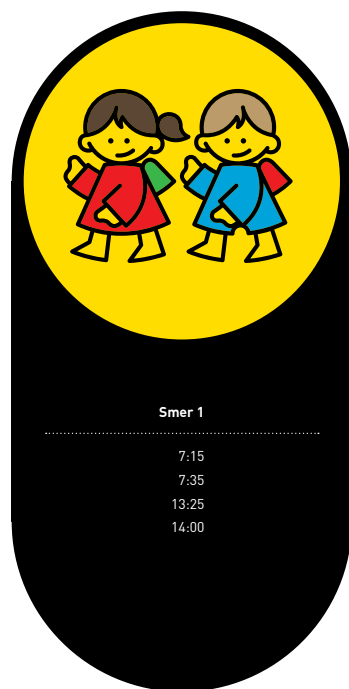


Sign structure

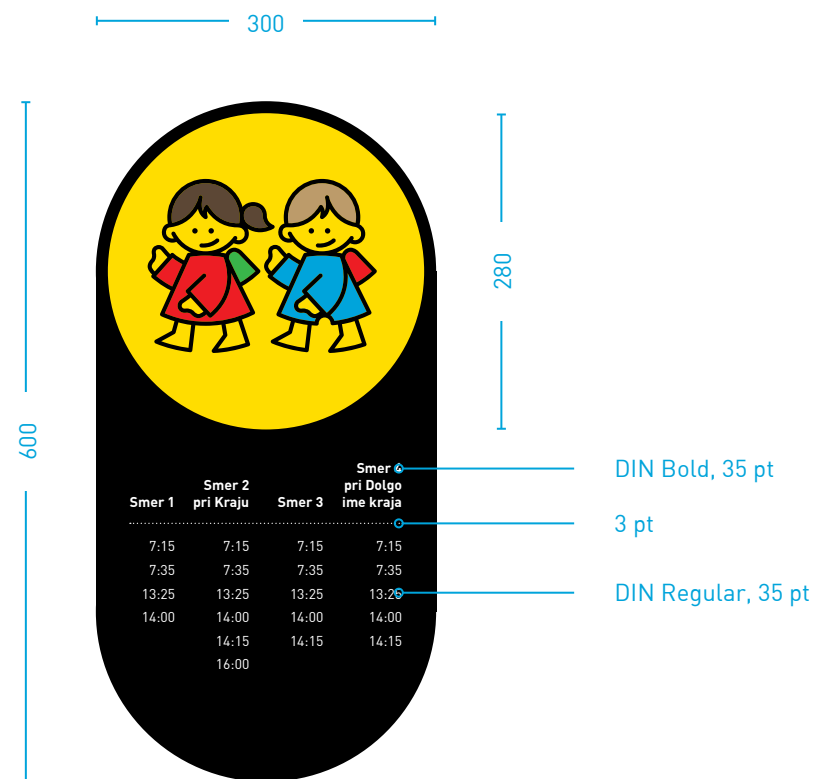
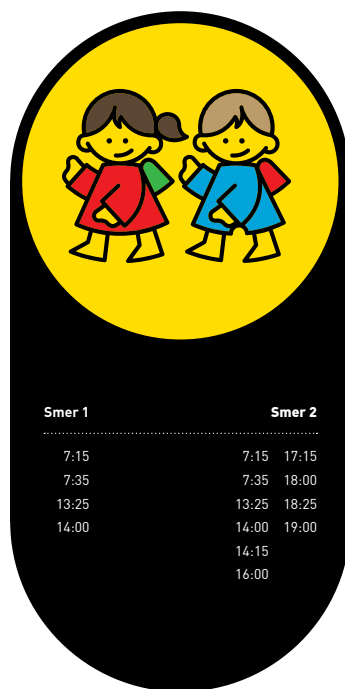
# TIMETABLES

These round signs are yellow and the basis is black.

These signs are used to indicate the school bus timetable and are installed at school bus stops.



Sign design



Sign structure

## »YOUR SPEED« SIGNS

These signs are yellow. They must be made in proportional size, depending on the dimension of the installed LED display.

They are mounted in places where children often gather (in the proximity of educational institutions or along school routes) and where drivers must be additionally reminded of the speed limit.

### THE DISPLAY MUST FUNCTION AS FOLLOWS:

As a rule, the speed is not displayed as a flashing sign (only static display).

If the emoticon ☺ or ☹ is displayed, it can alternate with speed display (but as a rule not as a flashing sign).

The minimum display time of particular content (the display of speed and the happy ☺ or sad face ☹) is 1 to 3 seconds.

The manner and time of alternate display depend on the location of the display, the vehicle speed and the related perception time, and road and roadside elements.

- The speed display is orange.
- Excessive speed can also be displayed in red.
- The emoticon ☺ or ☹ is also displayed in the same colour as the speed.

- The height of the numbers and emoticons (☺ or ☹) on the display depends on the vehicle speed. For a speed up to 40 km/h, the height is between 220 and 270 mm. For a speed from 40 km/h up to and including 50 km/h, the height is between 270 and 300 mm. For a speed from 50 km/h up to and including 70 km/h, the height is between 300 and 340 mm.
- A speed exceeding 20 km/h over the limit is not displayed – only a sad face ☹ can be displayed.
- The displays must have a built-in light sensor to regulate day/night luminosity.

Instead of the sign, a child's silhouette can also be used.



Sign design 1



Sign design 2



Child silhouette with the  
»YOUR SPEED IS« SIGN



# CHILD LED DISPLAYS

These LED displays are used near educational institutions and on school routes.

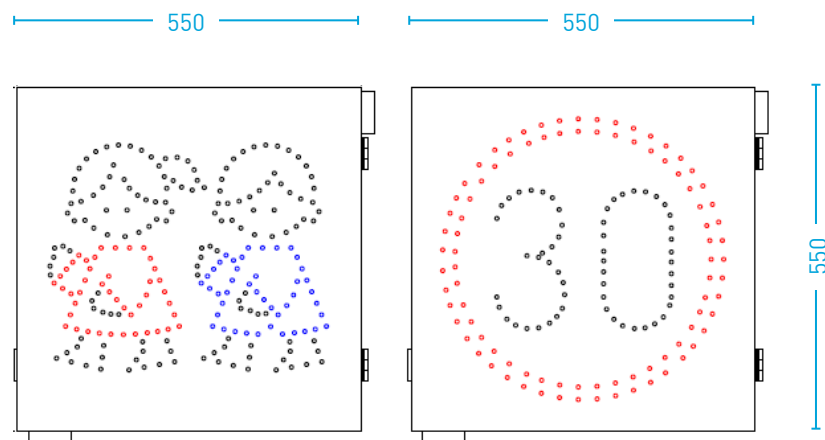
As a rule, they are installed when drivers must be particularly alerted to the presence of children in road traffic and to the speed limit (the display of the maximum speed must show the actual limit specified by the traffic sign).

The basic white colour of the LED diode to display the symbol of a child may be replaced by a yellow LED diode if the active sign is envisaged in accordance with these guidelines to be within the area of the remaining urban equipment.

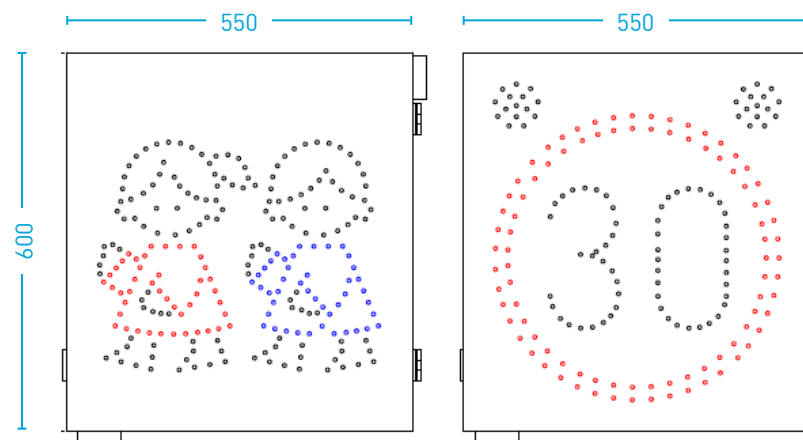
## EXAMPLES OF DISPLAY OPTIONS:

- When the vehicle speed is below or equal to the threshold speed, the child symbol is displayed.
- When the vehicle speed is exceeded, the symbols of the child and the speed limit are displayed alternately.  
In the flashing signal version, the speed limit is permanently displayed. To highlight the importance of the traffic sign, two flashing signals are activated.
- In the flashing signal version, additional sensors for pedestrian detection may be installed. In this case, two flashing signals are activated when the sensor detects the presence of a pedestrian in road traffic.
- A display (with the pedestrian detection sensor) can also be used where children walk to or from school along a pedestrian lane or road.

### NO FLASHING SIGNAL OPTION



### FLASHING SIGNAL OPTION



# CYCLIST LED DISPLAYS

These LED displays are used near educational institutions and on school routes.

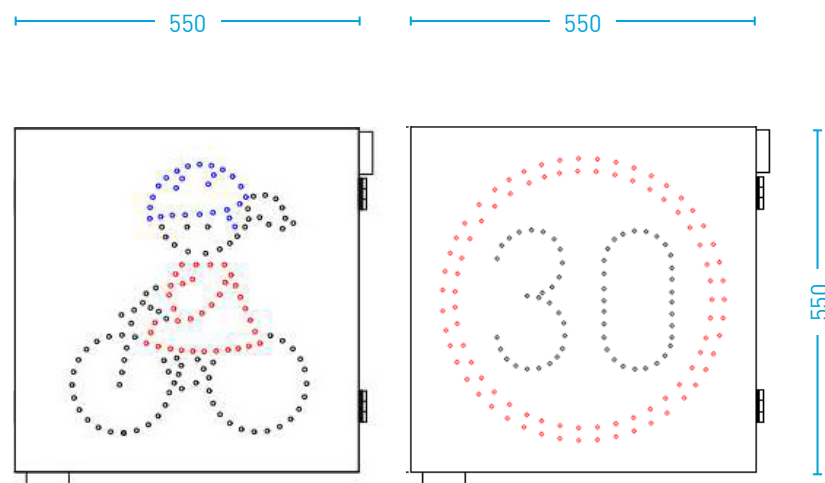
As a rule, they are installed when drivers must be particularly alerted to the presence of children in road traffic and to the speed limit (the display of the maximum speed must show the actual limit specified by the traffic sign).

The basic white colour of the LED diode to display the symbol of a cyclist may be replaced by a yellow LED diode if the active sign is envisaged in accordance with these guidelines to be within the area of the remaining urban equipment.

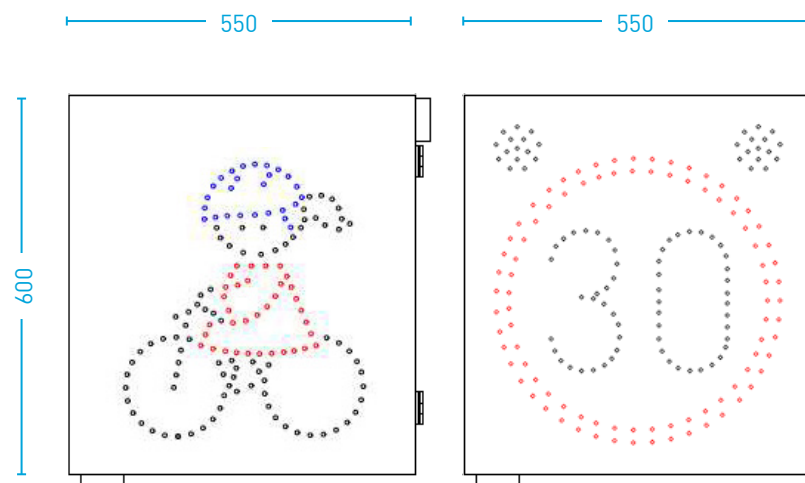
## EXAMPLES OF DISPLAY OPTIONS:

- When the vehicle speed is below or equal to the threshold speed, the symbol of a cyclist is displayed.
- When the vehicle speed is exceeded, the symbols of the cyclist and the speed limit are displayed alternately. In the flashing signal option, the speed limit is permanently displayed. To highlight the importance of the traffic sign, two flashing signals are activated.
- In the flashing signal option, additional sensors for pedestrian detection may be installed. In this case, two flashing signals are activated when the sensor detects the presence of a pedestrian in road traffic.
- A display (with the cyclist detection sensor) can also be used where children cycle to or from a school along a cycle lane or road.

### NO FLASHING SIGNAL OPTION



### FLASHING SIGNAL OPTION



# TECHNICAL REQUIREMENTS FOR (CHILD AND CYCLIST) LED DISPLAYS

## Product description

The Variable Message Sign (VMS) must consist of high-power light-emitting diodes (LEDs) emitting red, white and/or yellow and blue light. The signs must be clearly visible in all weather conditions.

The active sign must comply with EN 12899-1 or EN 12899-2 – Fixed Vertical Road Traffic Signs; Transilluminated Traffic Bollard (TTB).

The structure of the transilluminated road traffic signs must meet the following minimum mechanical resistance requirements in accordance with the Rules on traffic signs and equipment on roads.

## Characteristics:

- Stable lighting must be provided regardless of possible fluctuations in power supply;
- The device must be resistant to the constant presence of conductive substances formed by conductive dust and rain or snow;
- It must be capable of automatically adjusting optimum luminosity according to the conditions of the environment in which the display is located, the brightness being controlled by pulse-width modulation;
- High-intensity UV-resistant LED diodes must be used;
- LED diodes must be protected from mechanical damage by UV stable lenses;•
- The replacement of built-in components must be easy;
- It must allow the content to be displayed continuously or with a flashing light symbol at an adjustable rate of exchange;
- Two flashing signals (as selected);
- It should have a built-in microwave detector; It must have adjustable vehicle speed detection;
- Autonomous operation must be ensured in the event of communication failure with the control centre;
- LED-VMS signs must meet or exceed the criteria for variable message signs specified in the EN 12966-1:2005+A1:2009 standard;
- Signs must be manufactured and tested in accordance with the ISO 9001:2015, 14001:2015 standard.

**Table and symbols (pictograms) of content:**

Content	Size	Colour
Speed limit	45 cm	circle - red, symbol - white
Children	45 cm	white or yellow, blue, red
Flashing road markers (option)	8 cm	yellow

Colours LED diodes	Classification per EN 12966-1:2005+A1:2019 standard			
	Brightness	Colour	Beam width	Contrast
White	L3	C2	B4	R2
Yellow	L3	C2	B4	R2
Blue	L3	C2	B4	R2
Red	L3	C2	B4	R2

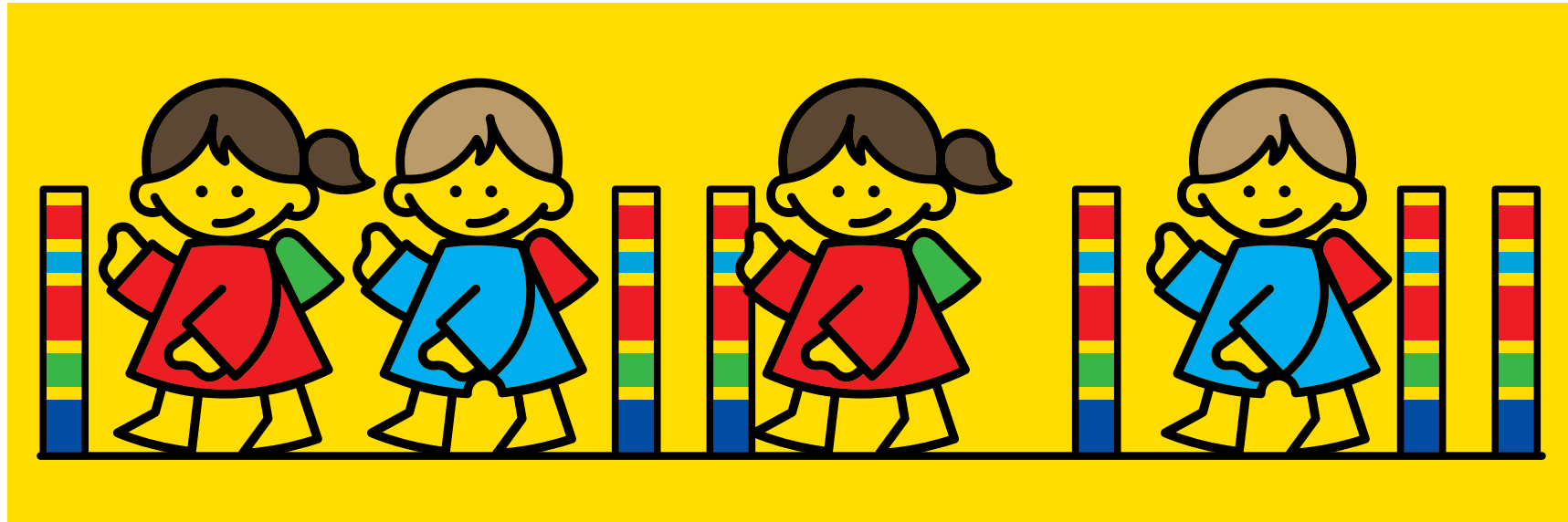
NOTIFICATIONS TO  
IMPROVE ROAD SAFETY



# CANVASES

Canvases are yellow.

Canvases are designed to be mounted on the playground fences in school zones and on the children's playgrounds.



# BANNERS

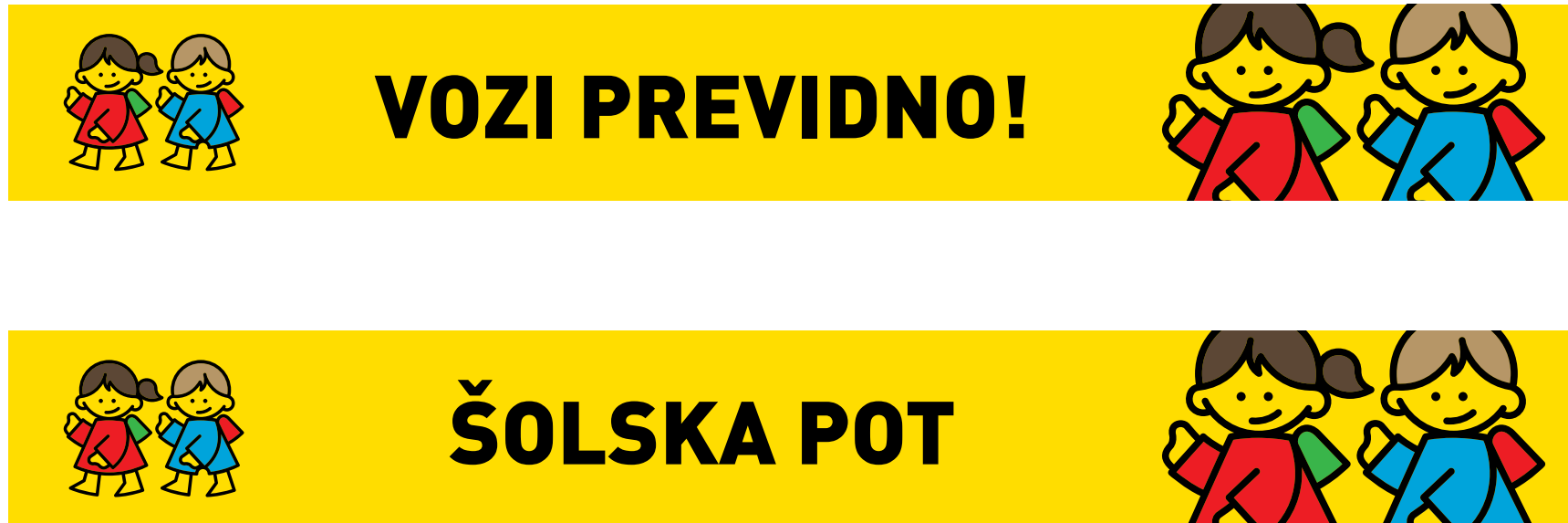
Banners are yellow.

Their purpose is to inform and alert drivers to the beginning of the school year and are, in principle, temporary.

They are mounted in places where support structures are already in place.

The text and size can be changed as needed.

VOZI PREVIDNO! = DRIVE CAREFULLY!  
ŠOLSKA POT = SCHOOL ROUTE

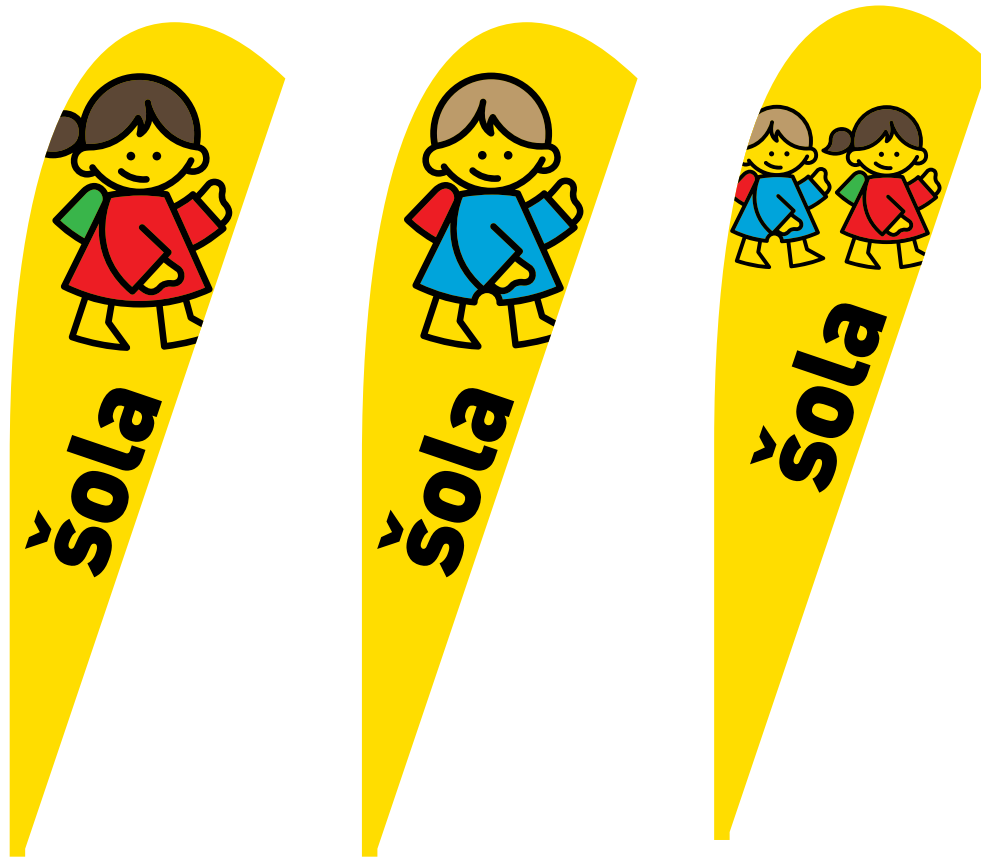


Two examples of banner design

# FLAGS

Flags are yellow and are used to denote school routes and school zones at the beginning of the school year.

Their primary purpose is to inform and warn drivers at the beginning of the school year. In principle, they are temporary.



Three examples of flag design

# POSTERS

Posters are yellow.

Their purpose is to inform and alert drivers to the beginning of the school year and are, in principle, temporary.

The text can be changed as needed.

ŠOLSKA POT = SCHOOL ROUTE  
VOZI PREVIDNO! = DRIVE CAREFULLY!  
#nazajVšolo = #BackToSchool



Three examples of poster design

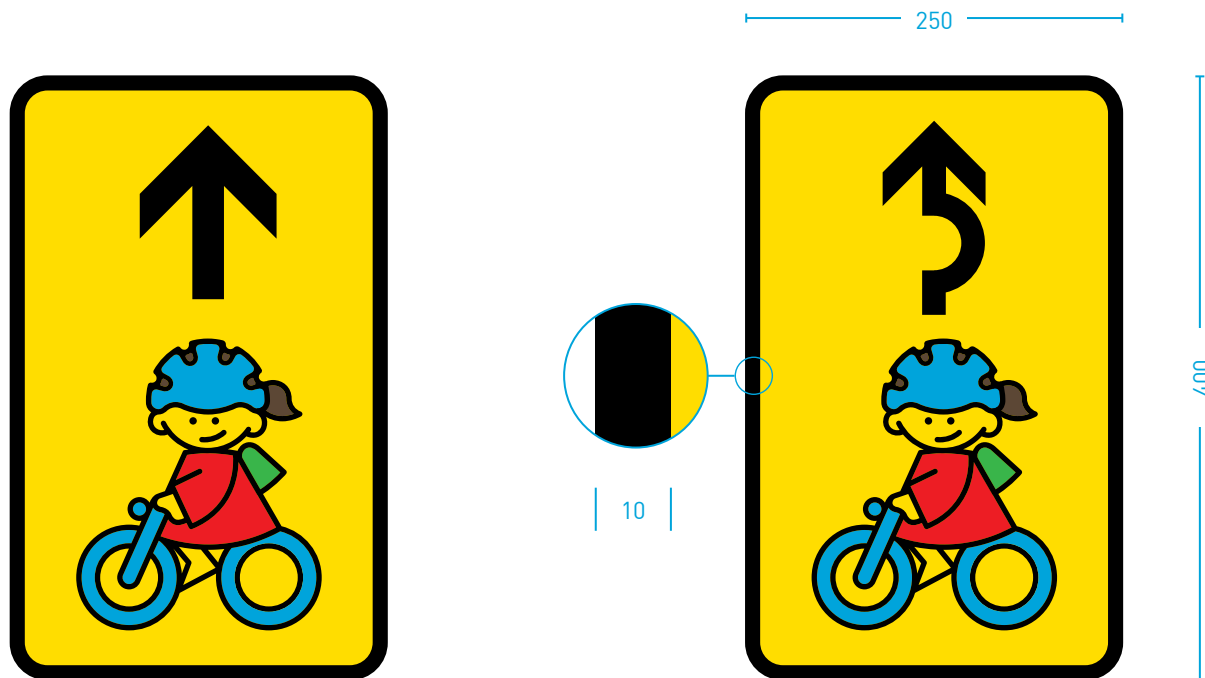


# CYCLING PROFICIENCY TEST SIGNS

These signs are yellow.

They are installed to guide children performing a cycling test in accordance with the Drivers Act (ZVoz-1) and the Road Traffic Rules Act (ZPrCP) and to alert drivers to the presence of cyclists in road traffic.

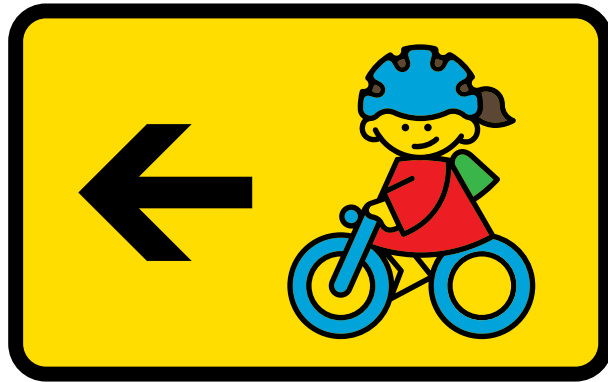
They do not replace the presence of the representatives of the Road Safety Council and/or the Police.



Sign design 1

Sign design 2 and sign structure

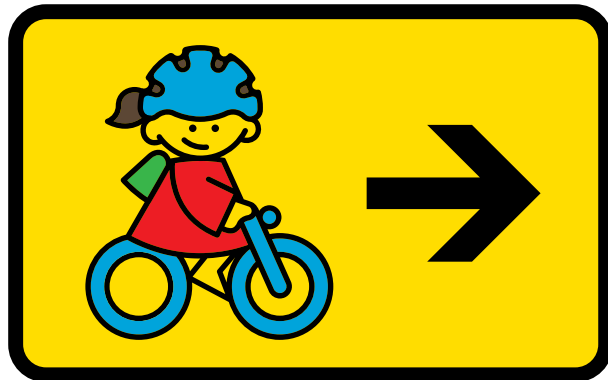
## CYCLING PROFICIENCY TEST SIGNS



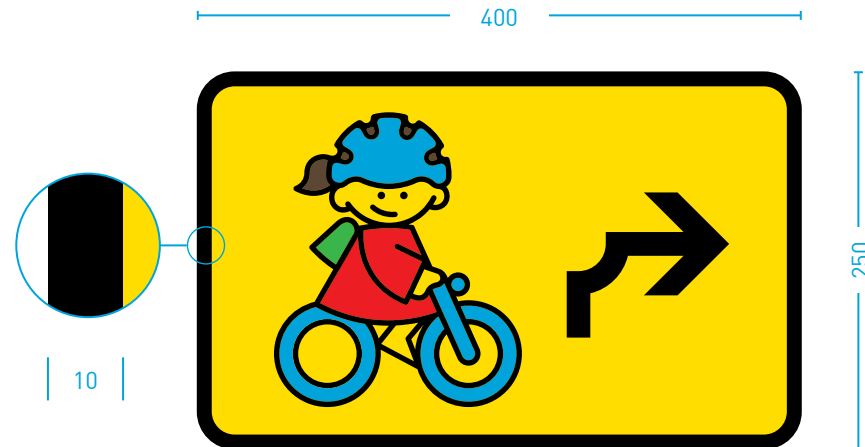
Sign design 3



Sign design 4



Sign design 5



Sign design 6 and sign structure

## BUS SIGN STICKERS

These stickers are square in shape.  
Their size is 400 × 400 mm. These stickers are yellow.

In exceptional cases, 250 × 250 mm stickers  
with a 6 mm wide edge can also be used.

Stickers may be designed as a magnetic label or  
folding plate and are only visible when the vehicle is  
actually carrying a group of children.

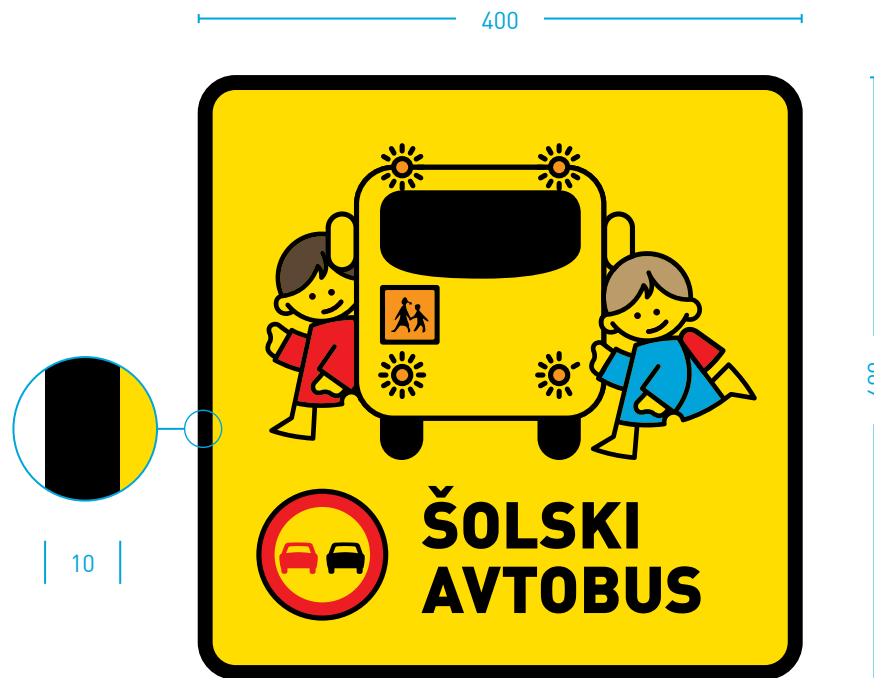
These sticker are affixed to the right side of the vehicle  
and do not replace the marking of the vehicle carrying the  
group of children.

They are intended to raise awareness of drivers of the  
provisions of the Road Traffic Rules Act (ZPrCP).

ZAKON OMEJUJE ZATO, DA VARUJE = LEGAL ACTION FOR PROTECTION!  
ŠOLSKI AVTOBUS = SCHOOL BUS



Sign design 1



Sign design 2 and sign structure

## 4 x P

These signs are yellow.  
They are installed on school routes,  
especially in pedestrian crossing zones.

They are intended to raise awareness and warn children not  
to use mobile phones near traffic. To this effect, they are  
positioned or directed so that they are not visible to drivers  
from the road.

POSTOJ, POGLEJ, POSLUŠAJ, POMISLI! = STOP, LOOK, LISTEN, THINK!



Sign design 1



Sign design 2 and sign structure

# NO MOBILE PHONES

These signs are yellow.

They are installed on school routes and in school zones.

They are intended to raise awareness and warn children not to use mobile phones near traffic. To this effect, they are positioned or directed so that they are not visible to drivers from the road.

Glej Naprej! #BrezMobilca = Look Forward! #NoMobilePhones



Sign design



Sign structure

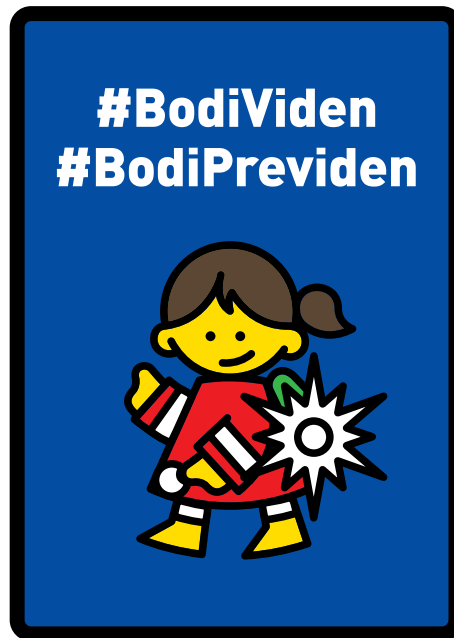
## BE VISIBLE SIGNS

These signs are dark blue.

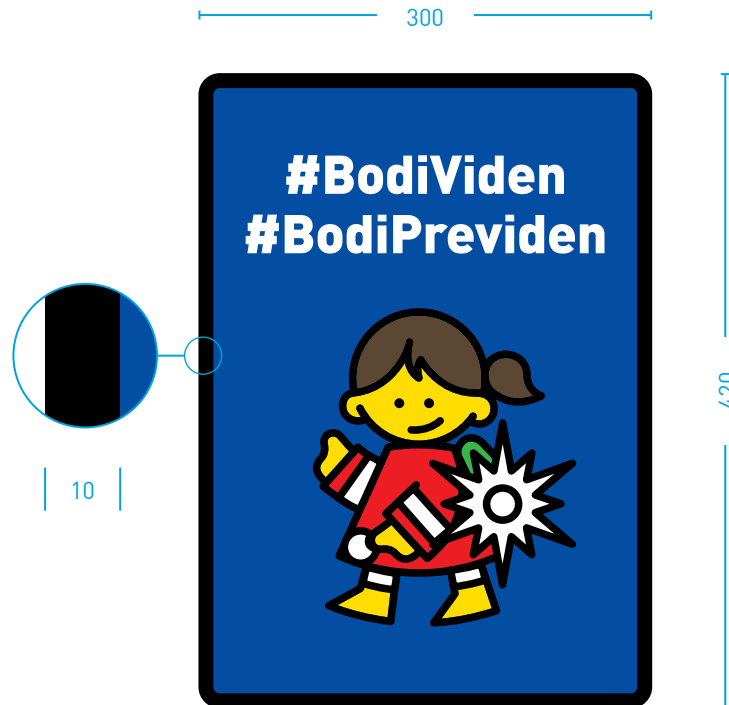
They are installed on school routes and in school zones.

They are intended to raise awareness and alert children to the correct use of reflective clothing and accessories. To this effect, they are positioned or directed so that they are not visible to drivers from the road.

#BodiViden #BodiPreviden = #BeVisible #BeCareful



Sign design



Sign structure

## BE A CONSIDERATE ROAD USER

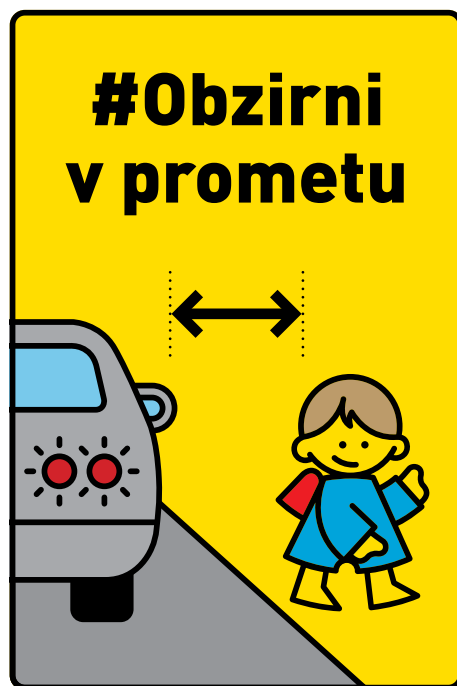
These signs are yellow.

They are installed on school routes where children walk to school along roads or the tamped soil of soft shoulders in accordance with the provisions of the Road Traffic Rules Act.

Their purpose is to alert drivers to the presence of children in or on the side of the road and to raise awareness about considerate behaviour in traffic.

As a rule, the signs are installed outside built-up areas.

#Obzirni v prometu = #BeAConsiderateRoadUser



Sign design



Sign structure

## BE A RESPECTFUL ROAD USER

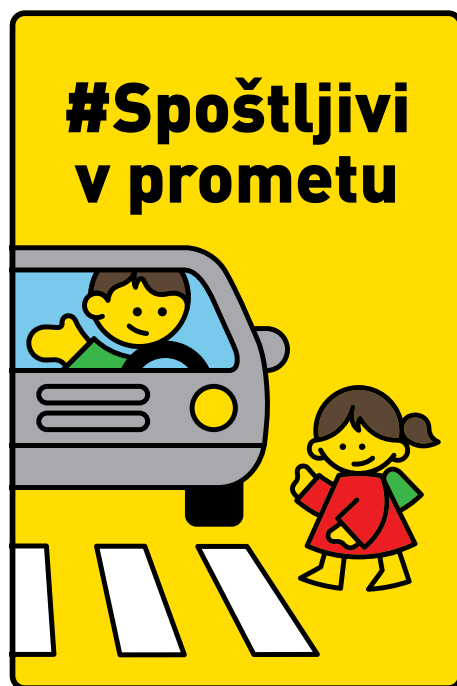
These signs are yellow.

They are installed on school routes near pedestrian crossing zones, where children often cross the road on their way to and from school.

#Spoštljivi v prometu = #BeARespectfulRoadUser

Their purpose is to alert drivers to the vicinity of a pedestrian crossing and the presence of children in the road and to raise awareness about respectful behaviour in traffic.

As a rule, the signs are installed outside built-up areas.



Sign design



Sign structure



## BE A TOLERANT ROAD USER

These signs are yellow.

They are installed in (school) bus stop zones on carriageways where vehicles transporting children stop and are marked with a sign designating that the vehicle is transporting a group of children.

#Strpni v prometu = #BeATolerantRoadUser

Their purpose is to alert drivers to the observance of the provisions of the Road Traffic Rules Act (ZPrCP) and the presence of children on or by the road and to raise awareness about tolerant behaviour in traffic.

As a rule, the signs are installed outside built-up areas.



Sign design



Sign structure

# CHILD SAFETY VESTS

A symbol may also be used for the print on child safety vests.

Safety vests are to comply with the ISO 20471:2013/Amd 1:2016 standard  
(High visibility clothing – Test methods and requirements)



**Example of vest design**

# SILHOUETTE SIGNS

Silhouette signs are used to mark school routes and school zones.

Their primary purpose is to inform and alert drivers to the presence of children in road traffic.

They can be placed on mobile pedestals and street lighting poles. They can be used in school zones to prevent parking and stopping at the roadside of the street or on the pavement.



Sign design 1



Sign design 2 and sign structure

## LOOK SIGNS

The road markings are white, without retroreflective properties and have an appropriate skid resistance (SRT).

As a rule, they are placed next to the pavement (before a pedestrian crossing).

The inscription must have sharp edges and individual letters must be continuous.

poglej = Look

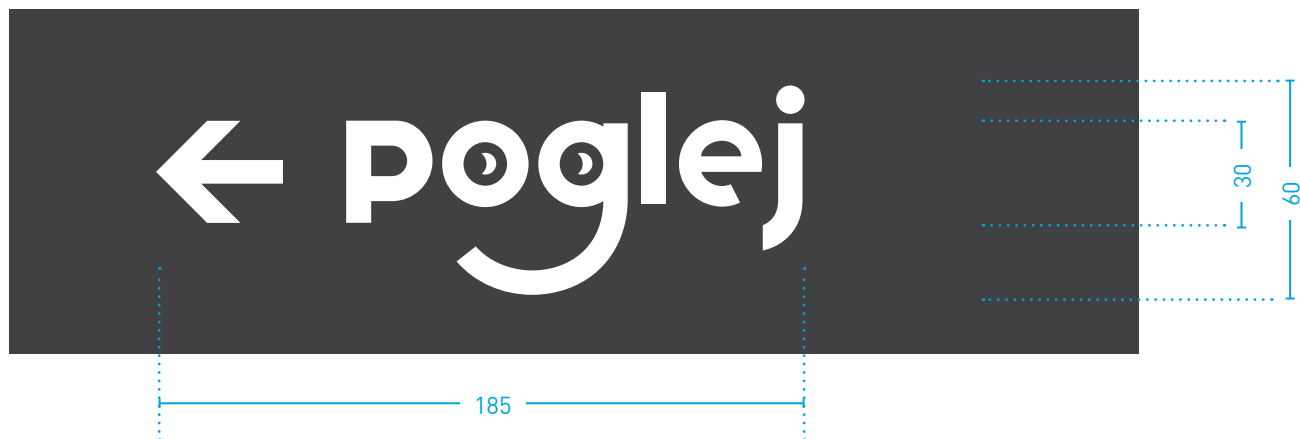


Inscription design



Inscription structure

On one-way roads or roads where two carriageways are physically separated by a median island with a waiting surface, the inscription with only one (appropriate) arrow is used.



# DESIGNING TRAFFIC AREAS



# DESIGNING TRAFFIC AREAS IN SCHOOL ZONES

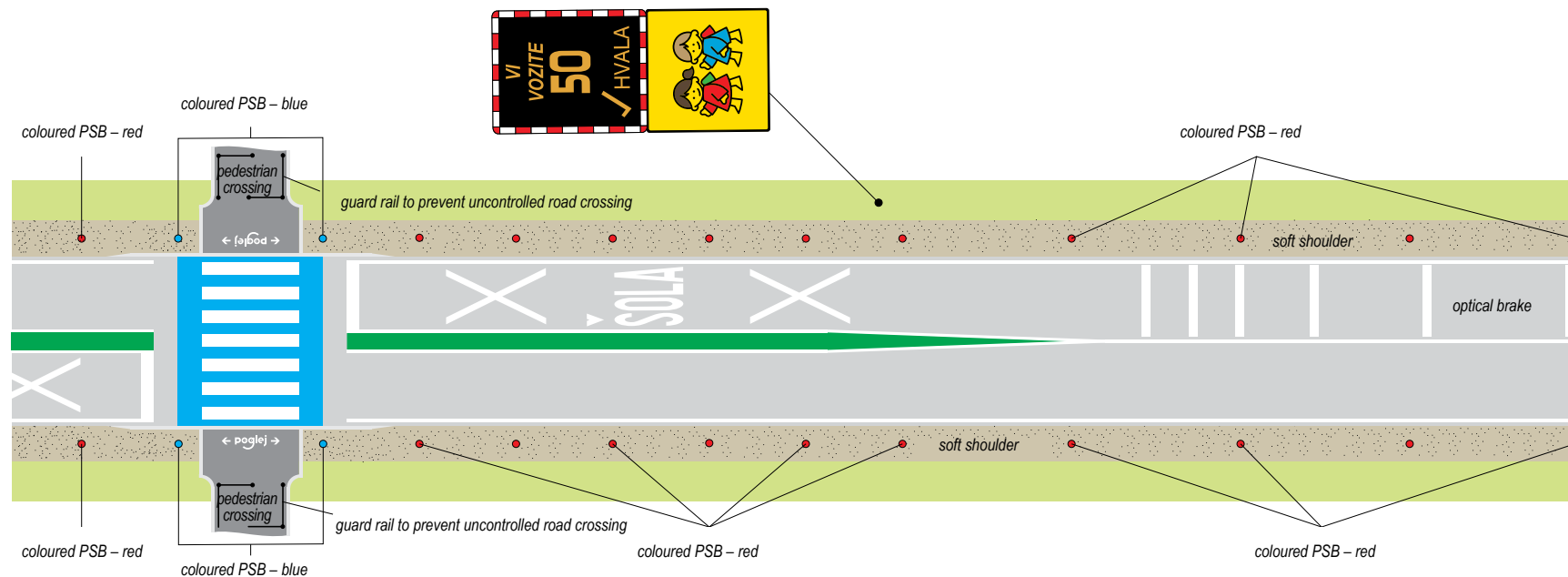
## EXAMPLE OF A ROAD OUTSIDE A BUILT-UP AREA

The image below demonstrates the concept of a traffic calming measure in combination with horizontal traffic signs and urban equipment.

»CHILDREN ON ROAD« signs are size 900 x 900 mm.

The width of the »YOUR SPEED« display must be adjusted to the sign.

The urban planning and architectural design must be aligned with the traffic regime in a professional and deliberated manner and, in addition to human factors in traffic (traffic psychology), must also take into consideration the function of the road (the number and structure of vehicles) and the state of the roadside.



PSB = passive safe bollard

# DESIGNING TRAFFIC AREAS IN SCHOOL ZONES

## EXAMPLES OF ROADS IN BUILT-UP AREAS

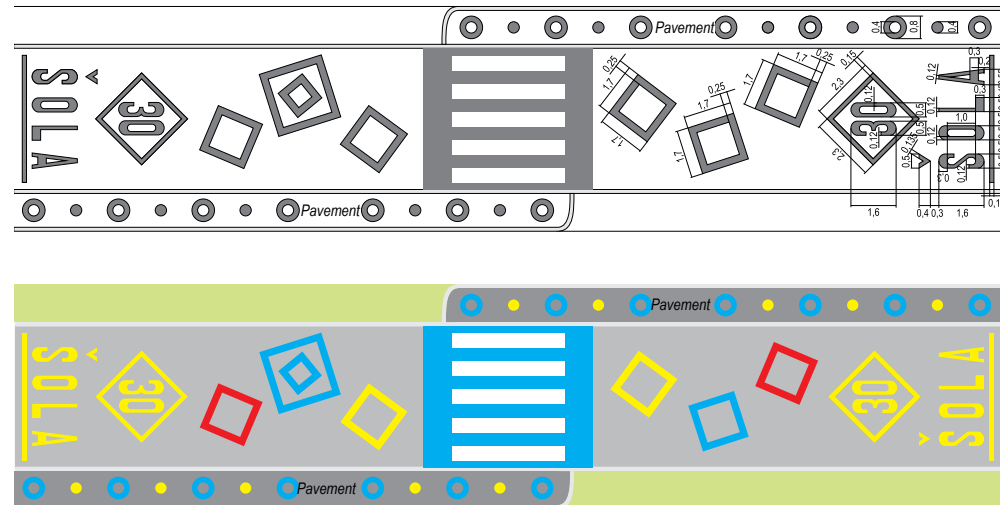
The concepts of markings for traffic areas near educational institutions or traffic calming zones, the common traffic areas and slow traffic zones are shown below.

The beginning of a school zone is to be additionally marked with the urban equipment.

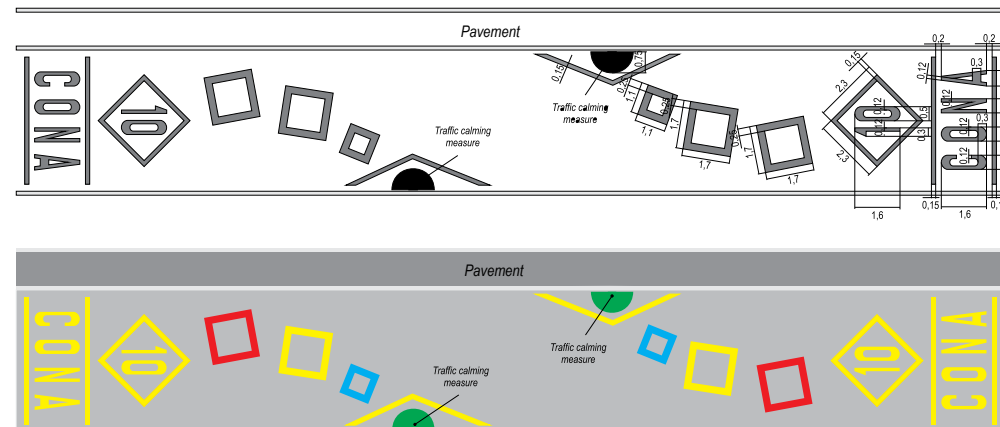
The marking of the common area with a speed limit of 20 km/h can also be applied by visually emphasising the 20 (km/h) speed limit or 10 (km/h) speed limit in slow traffic zones. For nursery areas, the sign »NURSERY SCHOOL« can be used in the same manner as the »SCHOOL« sign.

Details (design) should be adapted to the function of the road, the specificities of the roadside area and to the actual needs.

**Example 1**



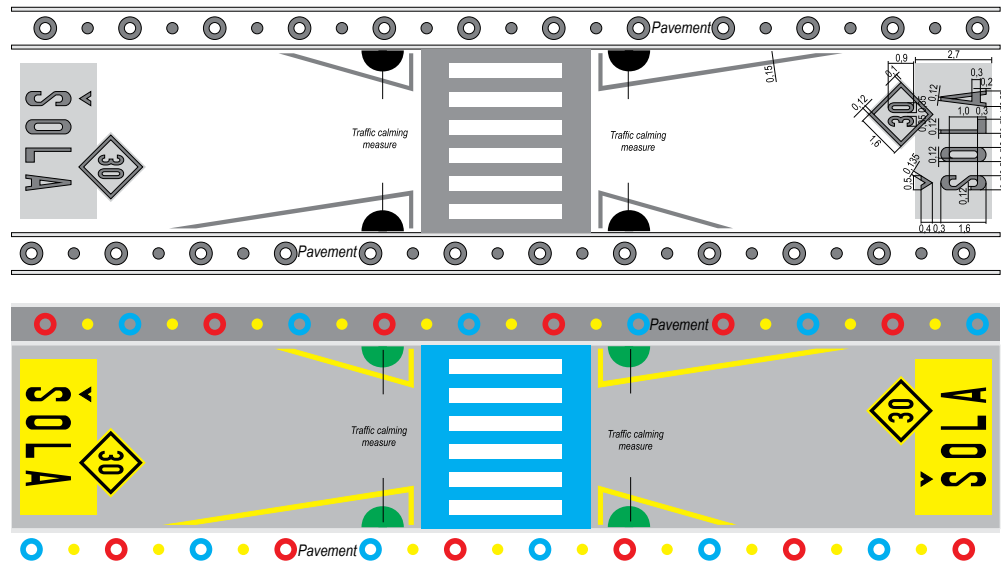
**Example 2**



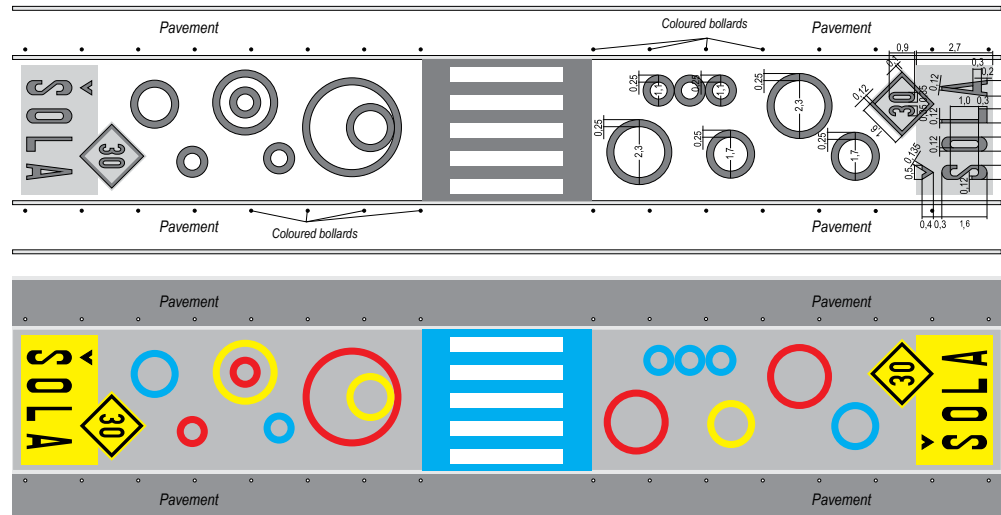


# DESIGNING TRAFFIC AREAS IN SCHOOL ZONES

**Example 3**

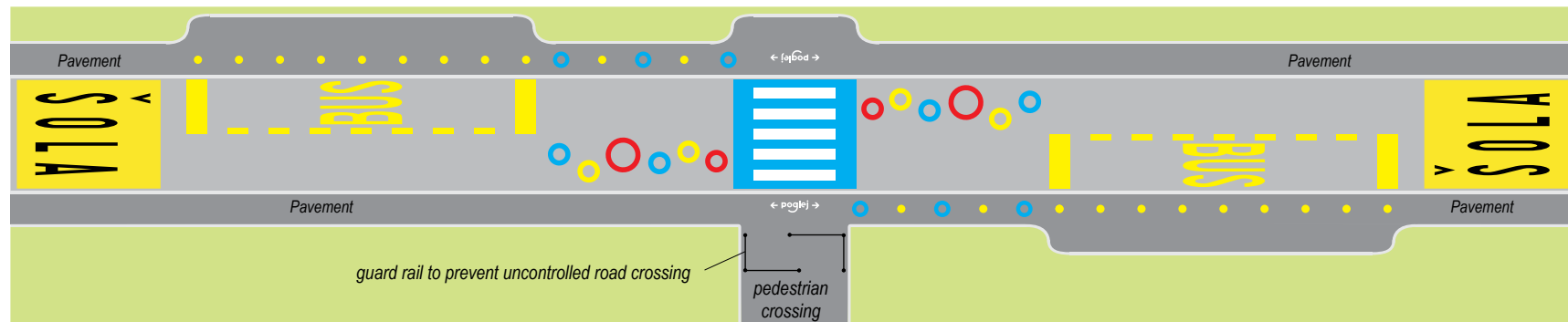
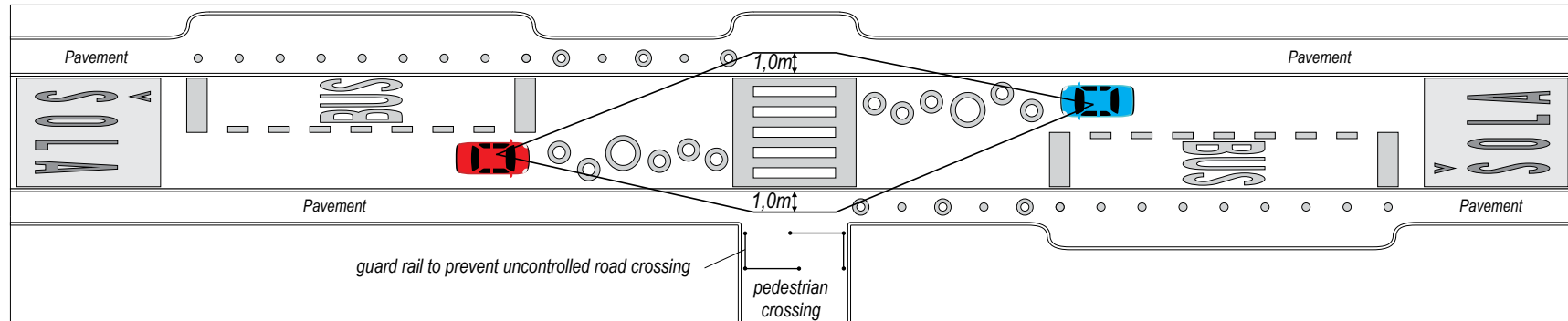


**Example 4**



# DESIGNING TRAFFIC AREAS IN SCHOOL ZONES

EXAMPLES OF ROADS IN BUILT-UP AREAS WITH BUS STOPS ON THE CARRIAGEWAY



# DESIGNING TRAFFIC AREAS IN SCHOOL ZONES

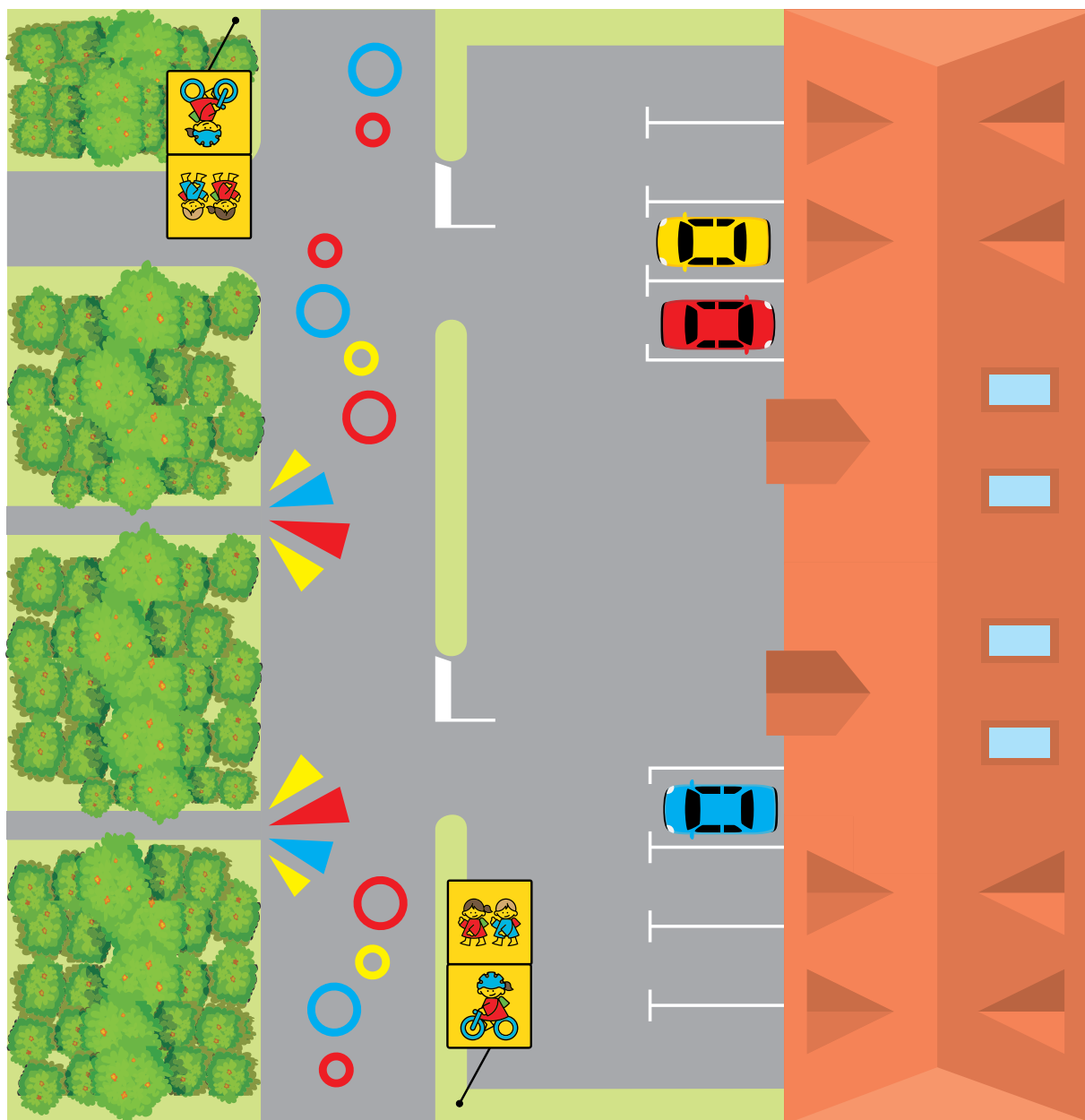
## EXAMPLES OF ROADS IN BUILT-UP AREAS NEAR CROSSROADS

The image below demonstrates the concept of a traffic calming measure in combination with horizontal traffic signs and urban equipment.

In design and implementation, special attention should be devoted to the arrangement of bollards in junction areas to ensure that they do not obstruct the visibility.



## DESIGNING TRAFFIC AREAS IN SCHOOL ZONES

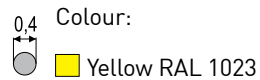


### EXAMPLES OF ROADS IN TRAFFIC CALMING AREAS OR COMMON TRAFFIC AREAS

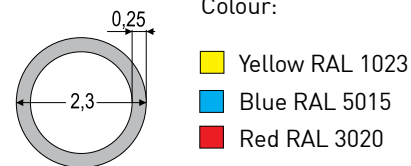
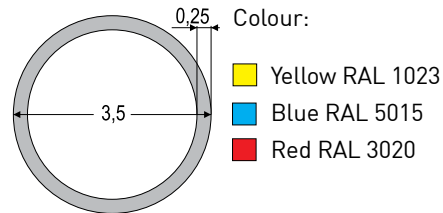
The image portrays the concept for the combination of traffic and urban planning and architectural design in school zones where the traffic signs limit the maximum vehicle speed to 30 km/h.

# SHAPES AND DIMENSIONS, AND DETERMINING THE RAL COLOUR CHART TO APPLY CARRIAGEWAY MARKINGS (DETAILS)

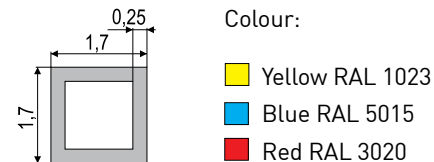
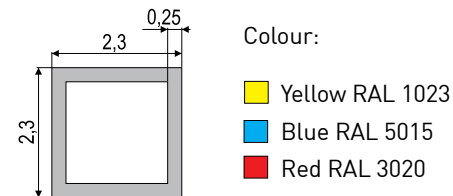
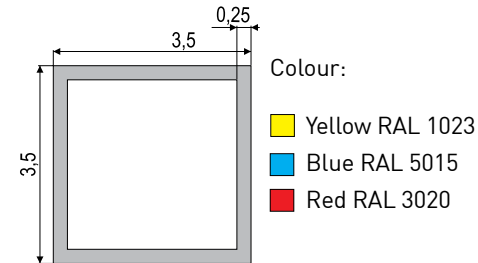
## PAVEMENT SYMBOLS



## CARRIAGEWAY SYMBOLS



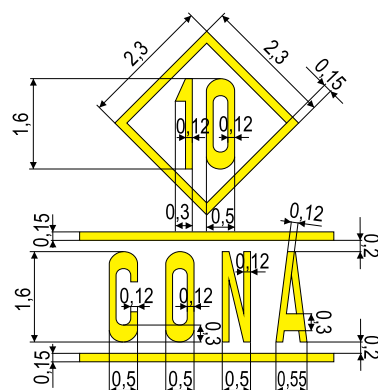
## CARRIAGEWAY SYMBOLS



The carriageway symbols must have sharp edges and individual symbols must have continuous lines (as shown in the details).

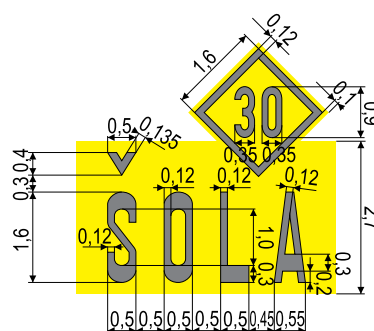
# SHAPES AND DIMENSIONS, AND DETERMINING THE RAL COLOUR CHART TO APPLY CARRIAGEWAY MARKINGS (DETAILS)

YELLOW ZONE MARKING WITH VISUAL EMPHASIS OF THE 10 (KM/H) SPEED LIMIT, indicated by a traffic sign used for traffic calming zones.



Yellow RAL 1023

SCHOOL ZONE SIGN IS BLACK ON YELLOW BASE WITH VISUAL EMPHASIS OF 30 (km/h)\* SPEED LIMIT, indicated by a traffic sign.

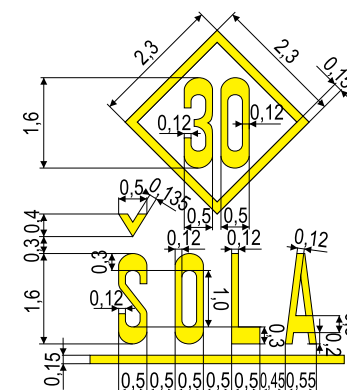


Yellow RAL 1023

Black

\* The »SCHOOL« school zone marking is black on a yellow base with visual emphasis of the 30 (km/h) speed limit.

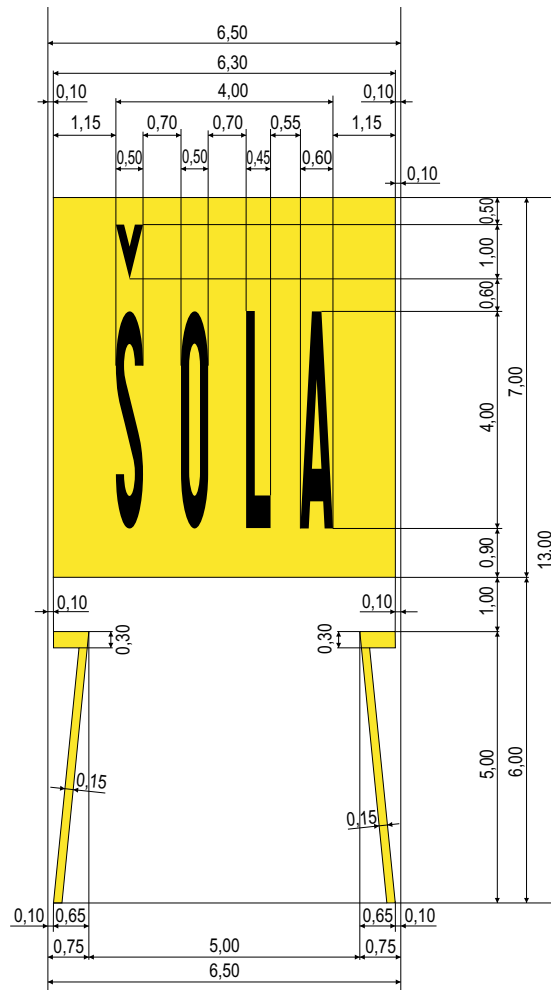
SCHOOL ZONE SIGN IS YELLOW WITH VISUAL EMPHASIS OF 30 (km/h) SPEED LIMIT, indicated by a traffic sign.



Yellow RAL 1023

Visual emphasis of the speed limit (10, 20 or 30 km/h) is made by taking into consideration the actual speed limit designated by the traffic sign.

# SHAPES AND DIMENSIONS, AND DETERMINING THE RAL COLOUR CHART TO APPLY CARRIAGEWAY MARKINGS (DETAILS)



Colour

Yellow RAL 1023

Black

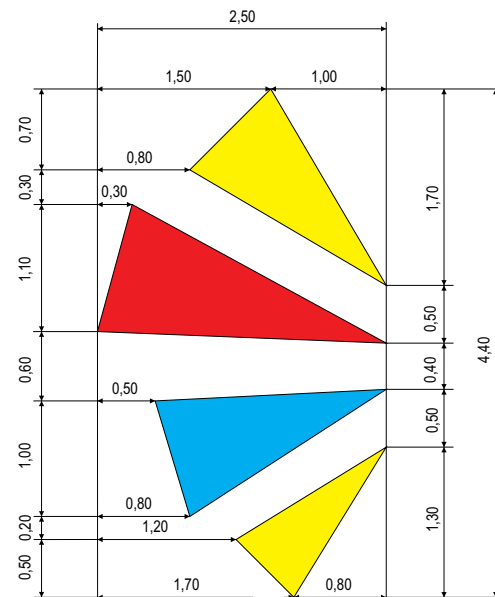
## SCHOOL ZONE MARKING IS BLACK ON YELLOW BASE WITH NARROWING

(example for a 6.5 m wide road).

As a rule, the sign is used on roads whose geometric elements (mainly width) and alignment would not allow the  $l=1.6$  m indication to be visible in time or properly perceptible and therefore detectable.

When there is no need to optically narrow the carriageway, the indication on a yellow base can also be used without yellow markings for carriageway narrows.

# SHAPES AND DIMENSIONS, AND DETERMINING THE RAL COLOUR CHART TO APPLY CARRIAGEWAY MARKINGS (DETAILS)



THE »COLOUR FAN« SIGNS TO ALERT DRIVERS TO POORLY VISIBLE BYPATHS IN SCHOOL ZONES

The signs are always used only on the main traffic lane in the direct vicinity of bypaths or byways.

Byways  
BW

Main traffic lane  
MTL

Colour

- Yellow RAL 1023
- Blue RAL 5015
- Red RAL 3020



**SAFER TO SCHOOL**

Guidelines for Installing Urban Equipment and Architectural Design of Traffic Areas  
to Improve Road Safety for School Children

**Published by**

MINISTRY OF INFRASTRUCTURE  
Slovenian Infrastructure Agency

**Text and concept by**

UROŠ BRUMEC, mag.inž.prom., Slovenian Infrastructure Agency

**Architectural markings (text and illustrations) by**

MATEJ ISKRAČ, Inter Punkt d.o.o.

**Creative and graphic design, and realisation by**

SONJA ERŽEN, u.d.i.a., Studio Aleja d.o.o.

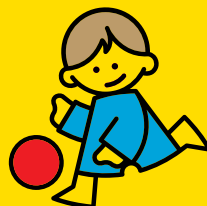
**Illustrations by**

SONJA ERŽEN, u.d.i.a. and IZTOK AMBROŽ

VERSION 2.0

LJUBLJANA, JUNE 2022

30  
km/h



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