

Processing of traffic sign passport on the road no. II/519 from the Prievidza city to end of the village Pribovce

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Abstract This paper deals with an analysis of the current situation, a proposal for a new traffic sign passport and economical evaluation of our solutions. Output of our work is new traffic sign passport, which was offered to a, solutions of problematic sections are proposed, including the addition and removal of deficiencies in the selected section of the road. The final part deals with the evaluation of the design of the new road sign passport, which contains the necessary financial costs for the implementation of all modifications on route II / 519.

Keywords traffic signs, passport, road communications

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1. Introduction

With the increasing traffic intensity, it is necessary to have high-quality road communications, which are marked with appropriate traffic signs. The main purpose of traffic signs is to inform road users about relevant facts related to the road traffic in accurate and early way. This issue is solved by a traffic sign passport, which significantly affects the safety and fluency of road traffic. For the high-quality traffic sign passport, it is important to analyse specific length of the road and specify dangerous sections. Next step is making of design of traffic signs placement or replacement of current traffic signs. This step can include financial costs connected with the implementation of new traffic signs. The main purpose of our report is to process the traffic sign passport on the road no. II/519. We have chosen specific length of the road - from kilometre 21.574 to 30.074 from the Prievidza city to end of village Pribovce.

2. Analysis of Current State

Road no. II/517 begins in Prievidza district in village Nítrienske Pravno on the junction with the road no. I/64. This road comes through border between Trenčín and Zilina region to Turčianske Teplice and Martin district. The road ends behind the village Pribovce on the junction with road no. I/65. Total length of the road is 30,074 km. It is very important road that allows transport of goods and passengers between regions, districts, cities and villages. Chosen section of the road for processing traffic sign passport is 8.500 km long. The beginning of the section is on the border of Martin

and Turčianske Teplice district. The road comes through villages Benice, Pribovce and around other villages - Leziachov, Turčiansky Dur and Klástor pod Znievom. [1, 2, 3]

2.1. Problems of Traffic Signs

During the processing of the current situation, we found several deficiencies that affect the road safety. We have performed two traffic surveys. First was performed on October 28, 2017, and the second on January 27, 2018. Subsequently, we analysed both surveys. The analysis allows us to compare the chosen section of the road in autumn and winter and to capture all changes in traffic signs between the first and second survey.

One of the significant deficiencies on the road in village Pribovce is pedestrian crossing, which ends in the middle of junction. Other important deficiency in village is damaged road safety barriers. Road surface on this place is considerably damaged.

Another deficiency on the road is faded traffic signs, which affect the correct and timely awareness of road users. These traffic signs are in village Benice and also in Pribovce.

On the chosen section of the road are also damaged traffic signs, which are damaged with weather condition or damaged by vandalism. In village Benice, there are three covered traffic signs. They are covered with a tree (figure 1).

In front of the village of Moškovec the road sign D46 is missing in the direction of Prievidza. D46 is an informative road sign which indicate the kilometre of the road. This type of traffic signs is missing multiple times on the chosen section of the road.



Figure 1. A sample of traffic signs which are damaged or hidden.

2.2. Results of Research

Table 1 shows the different types of traffic signs as well as their total number. In the table are numbers of traffic signs during first and second phase of traffic survey. The analysis of surveys shows, that some traffic signs were added during winter season. Fourteen traffic signs were added to the chosen section of the road no. II/519. Half of them were informative traffic signs.

One of the positive changes is a new warning traffic signs. These traffic signs are warning about the increased risk of ice or snow on the road and the risk of slipping. Also three traffic signs were added and they are limiting the speed of road users in front of the village Moškovec in the direction of Prievidza.

Table 1. Number of traffic signs and its comparison

Type of traffic sign	Number on October 28th, 2017	Number on January 27th, 2018.
Warning traffic sign	28	32
Prohibitory traffic sign	12	15
Mandatory traffic sign	3	3
Information traffic sign	70	77
Additional panels	28	28
Total	141	155

The following table (table 2) shows the deficiencies of traffic signs during the second survey on the road no. II/519.

The total number of vertical traffic signs was found from the surveys, as well as from information provided by Slovak Road Administration. They allowed us to check their traffic sign passport for the road no. II/519. This passport was old several years and many traffic signs were missing on it. We have updated their traffic signs passport with results from our later survey, so we have recorded all new traffic signs from chosen section of the road.

Table 2. Type and numbers of traffic signs errors

Deficiencies of traffic signs	Number
Faded	3
Damaged	11
Missing	15

Total number of missing traffic signs was 15. The most of them indicates the distance in kilometres. The most damaged were information traffic signs – eight of them are damaged.

The correct vertical traffic signs are designed to ensure their visibility, clarity, simplicity and usefulness. Total number of correct traffic signs is 170 and unsuitable traffic signs make 17% of total amount.

km	DZ	symbol	symbol	DZ	km
29,187	D6a			D6a	29,172
29,148	D54a			D54a	29,148
29,148	D54b			D54b	29,148
28,989	A11				
28,928	B23a				
28,928	E9				
28,885	D6a			D6a	28,868
28,846	D24				

Figure 2. A sample part of traffic sign passport.

3. New Traffic Sign Passport

The new traffic sign passport includes the addition of vertical traffic signs on a selected section of the road, which can increase the safety and fluency of road traffic. On the whole section of the road there is uneven road surface and also road edges are in bad condition. For these facts it is necessary to warn road users.

The problem is also the intersection behind the village of Príbovce in the direction of Martin. It is intersection of roads no. I/65 and II/519. This intersection is very dangerous and it is the place where many traffic accidents were happen.

Plan is to completely modify this junction and making independent traffic lanes for different directions.

Other proposal is to move pedestrian crossing 10 m away from the junction. It will be necessary to remove the railing at the end of the new pedestrian crossing.

The next step to improving the awareness of road users is to place the missing traffic signs indicating the kilometre of the road. The selected section of the road should have 18 pieces of this type of traffic signs.

In the village of Pribovce, Benice and near the village of Leziachov are pedestrian crossings, which are marked with information traffic signs D6a. Visibility of pedestrian crossing can be improved with the same traffic sign, but only in a reflex version. On the chosen section of the road, there are 7 pedestrian crossings. The lighting of pedestrian crossings is provided by street lighting.

At the beginning of the village Benice speed of vehicles is changing from 90 km/h to 50 km/h. To ensure that speed is maintained in the village, it is possible to place a radar speed sign. It is possible to place it 15 metres behind the beginning of the village. The radar speed sign can measure speed of road vehicles in range from 10 to 199 km/h. It can be powered from the electrical network, solar collectors, or street lighting during night and from 12 V accumulators during day. This device can also count vehicles, which exceeded speed. Measured data are stored for 180 days. [4]

4. Economical evaluation

The price list of selected traffic signs and speed measuring devices was obtained from commercial suppliers. The proposal itself consists of the financial costs for:

- relocation of pedestrian crossing in Pribovce,
- the replacement of unsuitable traffic signs,
- the new traffic signs and radar speed sign,
- the new lighting of pedestrian crossings.

4.1. Relocation of Pedestrian Crossing

The relocation of specific pedestrian crossing means its 10 metres shifting away from the junction, so it will be closer to bus stop and village Benice. It will be necessary to apply horizontal and vertical traffic signs. The price of material, road cleaning and application of the pedestrian crossing is 34.50 €/m². The pedestrian crossing has a width of 2.0 m and a length of 7.5 m. The total price is 517.50 € without VAT. [5]

4.2. Replacement of Traffic Signs

Total number of insufficient traffic signs on the chosen section of the road is 29. All traffic signs have their own supporting structure, which is necessary for their correct installation. In the next table are described costs of replacing the faded, missing and damaged traffic signs. All prices of traffic signs are without VAT and they do not include transportation and installation.

Table 3. Financial costs for replacement of faded, missing and damaged traffic signs

Traffic sign	Traffic sign number	Price of the tr. sign [€]	Number	Total price [€]
Kilometre of the road	D46a	22.00	15	370.00
Main road	D1a	29.00	1	29.00
Left turn prohibited	B23b	42.00	1	42.00
All vehicles prohibited	B2	33.00	1	33.00
Hotel or motel	D23	29.00	1	29.00
Restaurant	D23	29.00	1	29.00
Directional sign	D39c	50.00	2	100.00
Directional arrow	E7	11.00	2	22.00
Priority route configuration	E2b	29.00	1	29.00
Total	-	-	18	683.00

Total costs of replacing the faded, missing and damaged traffic signs are 683.00 € without VAT. [6]

4.3. The New Traffic Signs and Speed Meter

Addition of new traffic signs and radar speed sign is based on our proposal of a new traffic sign passport. Financial evaluation of new traffic sign passport is in the table 4. All prices are without VAT and they do not include transportation and installation of traffic signs.

Table 4. Financial costs of new traffic signs

Traffic sign	Traffic sign number	Price of the traffic sign (€)	Number	Total price(€)
Pedestrian crossing	D6a	160.58	16	2569.28
Bus stop	A13	29.00	10	290.00
Uneven road ahead	A5	30.00	2	60.00
Dangerous road edge	A7	30.00	2	60.00
Caution children	A15	30.00	1	30.00
Total	-	-	-	3009.28

In total, we would place 31 new vertical traffic signs on chosen section of the road. These traffic signs can increase the road safety and pedestrian protection. Not all traffic signs will need a supporting structure for installing. These structures near pedestrian crossing can be used also for new reflexive traffic signs.

The price of the radar speed sign is 1 908.30 €. The selected device is the BX-300 with a screen size of 800x600 mm. Total price of new traffic signs, BX-300 and supporting structures is 5 563,78 € without VAT. [4]

4.4. New Lighting on Pedestrian Crossings

Pedestrian crossings can be illuminated by a light device called LED Crosswalk. The lifetime of LED bulbs is 50,000 - 100,000 hours according to manufacturer data. One light device is sufficient for each pedestrian crossing. The financial costs of LED Crosswalk are € 3,206.34 excluding VAT. [7]

5. Conclusions

Our aim was the design of a new road sign passport on the road no. II/519 in kilometers from 21.574 to 30.074 from the city of Prievidza to the end of the village of Pribovce. Analysis shows that 155 traffic signs were placed on chosen section of the road. Unsuitable traffic signs make 17% of total amount.

The total cost of removing the above-mentioned inadequacies, including the addition of additional traffic signs and speed measuring devices in the design of a new traffic sign passport on the road no. II/519 amounts to € 9 970.62 ex-

cluding VAT. The financial cost of implementing individual modifications can improve the safety and fluidity of road traffic.

REFERENCES

- [1] FAITH, P. - PAĽO, J. Cestne a miestne komunikacie. Zilina : EDIS, 2013, 311s. ISBN 978-80-554-0635-0
- [2] http://www.cdb.sk/files/documents/cestna-databanka/vystupy-cdb/2013/miestopis_2013.pdf
- [3] <https://ismcs.cdb.sk/portal/mapviewer/>
- [4] <http://www.eshop.znacenie.sk/produkt/merac-rychlosti-450/>
- [5] <http://www.eshop.znacenie.sk/produkt/linie-a-ciary-420/>
- [6] <http://www.eshop.znacenie.sk/dopravne-znacenie/zvisle-dopravne-znacenie-30/>
- [7] <http://www.led-svetlo.sk/index.php?categoryID=235>