Czech republic, Přerov,

29.07.2011

STARS

Names : Zbyněk Válek, Ing. Martin Malina

City/University : Přerov / Palacký university, Technical university of Ostrava

Project name: Complementation of horizontal road marking at the powerplant crossroads in Přerov

Picture of the team: Zbyněk Válek (left), Martin Malina (right)

1. Introduction

This is the final report of the Czech competitors Martin Malina and Zbyněk Válek with the name „Complementation of horizontal road marking at the powerplant crossroads in Přerov.“ We had originally been chosen to the STARS-camp with a project called „Signal intermittent green light.“ We made much effort for its realization (closer in chapter: Dates of activities). Nevertheless the realization showed impossible. Therefore we decided in the beginning of March 2011 for realization of another project of road marking complementation. In the text we describe the first project, its pros and cons, our expectations if put into practice and also why the project was not finally realized, followed by the analysis of the actually realized project.

Project 1 – Signal intermittent green light (SIGL)

There were two reasons of motivation for the realization of such project:

- we had seen this system in operation in practice in Austria which seemed useful to us
- the thought of the realization had been stated by mr. Malina's father Oldrich Malina in Martin's childhood

We had expected many advantages from this project as well as elimination of the following problems:

- Breaking the traffic rules - crossing against the forbidden signal RED
- Speeding - driver's willingness to cross against AMBER at any cost, and therefore increasing the exhalations caused by accelerating.
- Dangerous traffic situations - when the driver going first decides to stop (not to cross against AMBER) and the second driver going behind him/her does not react early enough to stop the car (the worst situation might happen when the second car is HGV)
- Hard braking at the edge of the stop line that causes enormous abrasion of the road surface and reducing roughness and microtexture of the road surface, development of ruts (due to braking of HGVs)
- Elimination of noise - caused by hard braking (squeaking of tyres) as well as acceleration (shifting to lower gear to gain higher rpm).

The concept of methodology had been suggested since the very beginning in order to minimize the changes in the Czech traffic light signal plan and be able to match with all types of intersections operated by traffic lights. Methodology of the suggestion had been kept the same but for the last two seconds of the signal green (followed by 3-second signal yellow) which would have been changed into a new signal **Signal intermittent green light (SIGL).**

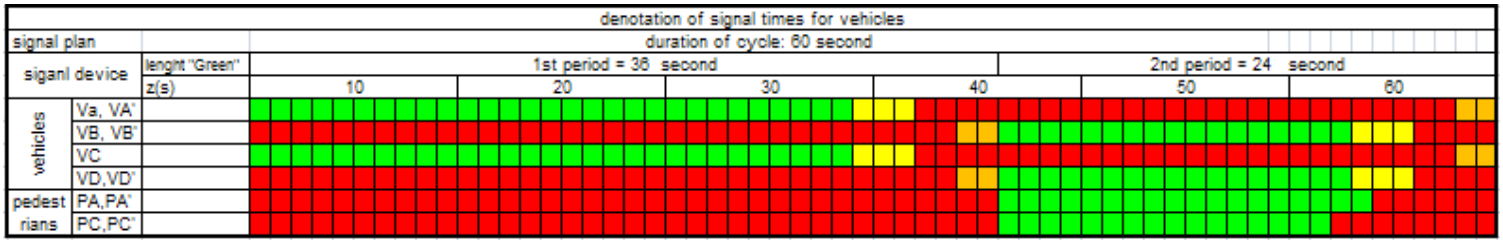


Fig. 1 - Example of signal plan - current state

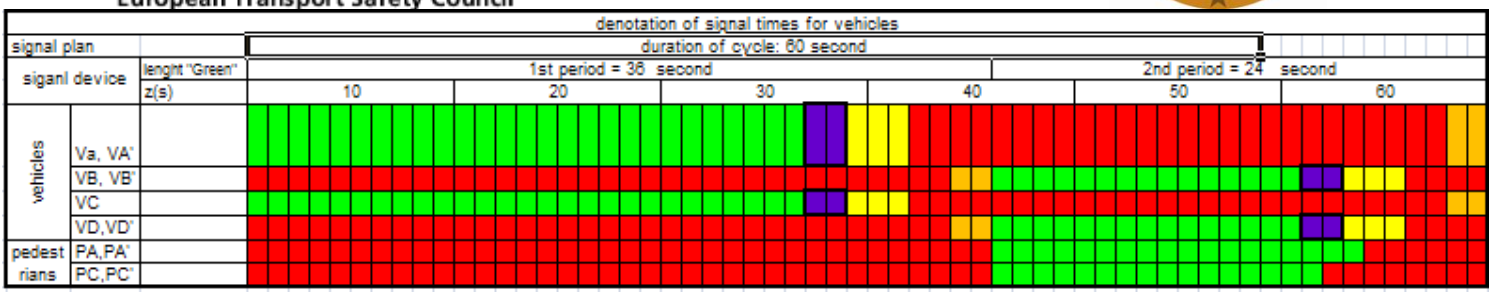


Fig. 2 - Example of the signal plan - with the use of the SIGL

duration of SIGL is 2 seconds.							
1st second				2nd second			
0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

Table 1 - SIGL - graphical view of the phases on/off

We started serious activities leading towards the realization of our project in the beginning of February 2011. We contacted representatives of the company AŽD Praha, namely commercial agent for the region of our site Mr. Ing. Jiří Vedra and the technician of the same company Mr. Jiří Fibich.

We discussed with them the project suggestion and the possibilities for solution. Ing. Fibich prepared calculation for the project. The sum of money had been much higher than we had expected, because our original information concerning traffic lights equipment varied from the reality. The innitial infomation, that we had got from the Přerov town technical support company employees responsible for crossroads signalization was different. The employees declared the equipment of the site to have a certain type of inverter which would be able to be programmed for our purpose. But this was not true and just a pure inverter change would have cost almost 1 million Kč (€ 37 000).

Nevertheless we went to the town representatives with the gross budget suggestion (approximately 1.3 mil Kč). We met Messrs Mgr. Dušan Hluzín and Ing. Lubomír Štukavec and tried to realize our project. We were pushed on by the consent of traffic inspector – Lt Ing. Jan Šenk and also by promise of help by AŽD Praha. The realization had not come true due to several reasons:

- really high costs (Přerov is a small town with low budget)
- legal ambiguity- Czech law does not know the signal SIGL. Although we were let known by the traffic inspector that the traffic law had been recently changed to conform to the european legislative. That means – if the SIGL is used in some of the EU countries it should not be problematic in the Czech republic. Nontheless this is what the town representatives did not think, but we think that it was their political fear, rather than the problem in the law.

Project 2 – Complementation of horizontal road marking at the powerplant crossroads in Přerov

There were some reasons for the realization of this project:

- from personal experience (both of the competitors) we know that the site was complicated, and even we had turned to the wrong lane.
- we were let known about the problem by many of our friends and relatives
- from our observation the incorrect turning could be seen not only in non-local drivers, but also in the local ones
- even the town representatives confirmed that they knew about such problem

Therefore we made the project documentation to get rid of this problem. We found the easiest way in complementation of horizontal road marking by the leading line V2b 1,5/1,5/0,0125, which would guide the drivers through the crossroads just like in more complicated crossroads.

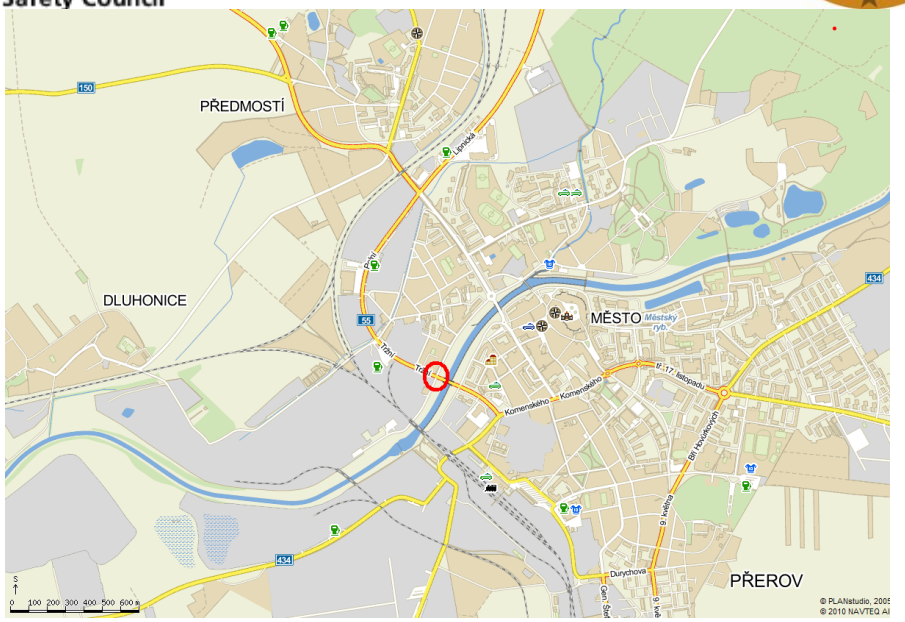
Probable reasons for the incorrect turning manoeuvre:

- the turning driver approaches the manoeuvre while mounting up the road (micro hill) and a certain barrier effect works as if there was not any other road
- the only crossroads of such type in Přerov
- Even though there are traffic signs (e.g. design of the crossroads, keep right) the drivers incorrectly turned out of unknown reason if compared to the other crossroads of such type

Once having the project documentation ready we went to deal with the town representatives in person. After a short presentation we were surprised by Ing. Hluzín who admitted to have done this mistake of incorrect turning and was acknowledged with the problem. When asked why the problem had not been solved if the problem was known, we got answer that the situation was rather complicated. The roads crossing at the site do not have the same owner. One of them is onwed by Přerov town and the other by regional road maintanace company. That was supposed to be the biggest problem – agreement of the two subjects.

This was a hint for us. We asked for the statement of the Czech Police to get to know if our solution was not in conflict with any law. We got consent that there was no problem and thus we went to SSOK (Olomouc region road maintanance company) and town representatives who possess the roads.

After several meetings the project was realized. The realization took place on 6-7 May 2011 in the evening hours. The participating company was SEKNE spol. s.r.o. (Hamerská 12, Olomouc 770 00). There was used standard road paint which is abrasion and water resistant. The complementation of road marking was done according to our project documentation with the use of line V2b 1,5/1,5/0,125 in the length of 23 m and radius 11 m. The amount of paint was 1,1325 m^2.



The site of the project

Measurements

Before the description of the measurement methodology we find it important to mention why we did not use speed measuring and why the problem here is not speeding:

- The intersection is controlled by traffic lights:
  - if the red is on, the driver is forced to slow down
  - the traffic lights are equipped with RedCon system that turns the light red if the approaching driver goes faster than the limit (50 km/h)
- the turning driver comes from side road so necessarily has to give way
- while turning left the radius is 11 m. Therefore using a calculation according to ČSN 736101 - $v = \sqrt{127.R.(0,01p \pm f)}$ the vehicles go at the highest speed 22 km/h.

In the measurements was the hardest to state the best time. There were several aspects:

- the incorrect turning takes place mainly in low intensity traffic times. If the lanes of the main road are full of cars waiting at stopline the car will probably be warned and the stopped cars also make a barrier. Due to these facts the typical times for intensity of traffic measurements must be excluded (16:00 – 18:00)
- the incorrect manoeuvres take place most commonly when there are no cars on the main road and the traffic lights are off (22 – 05) but the results would have not the right validity.
- also the day of the week matters. Friday and Sunday were excluded because the intensity of traffic is usually the highest and also Saturday when there is low traffic. So Mon-Thur were left.
- We chose to do the measurements on Wednesday in two-hour intervals (18:00 – 20:00) when there is still enough traffic.

We did 6 measurements – 4 (6. 13. 20. 27. April) before and 2 (18. 25. May) after the realization. There were differentiated various kinds of turning vehicles – motorcycles, cars, HGV, bus, tractor, others.

As an incorrect turnig was regarded:

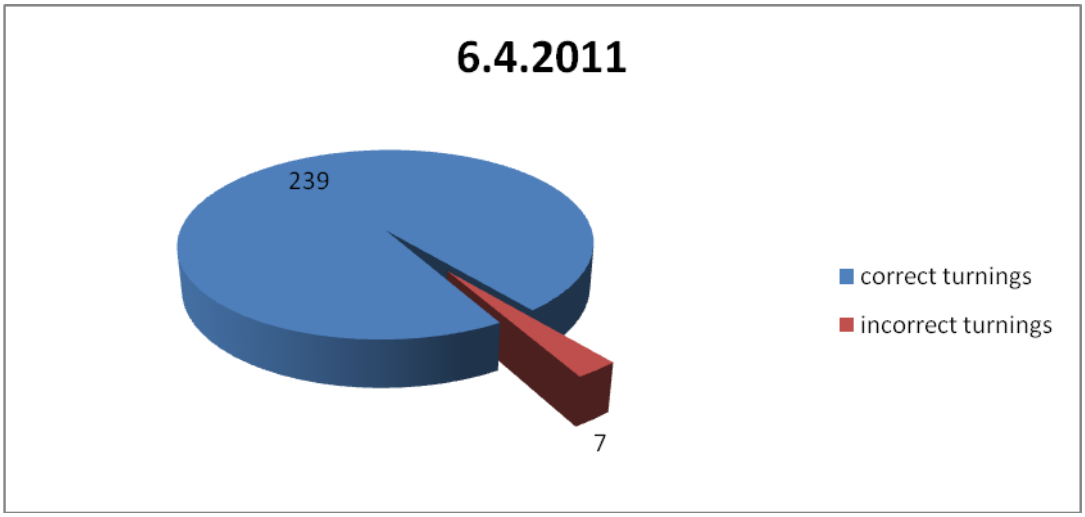
- A vehicle which turned to the counter way lane (no-way)
- A vehicle which did not reach the counter way lane but had to reverse to get back to the right turning trajectory
- The driver did not have to reverse, but changed the turning trajectory and sverved to avoid the incorrect turning.

All the other vehicles were regarded for correctly turning.

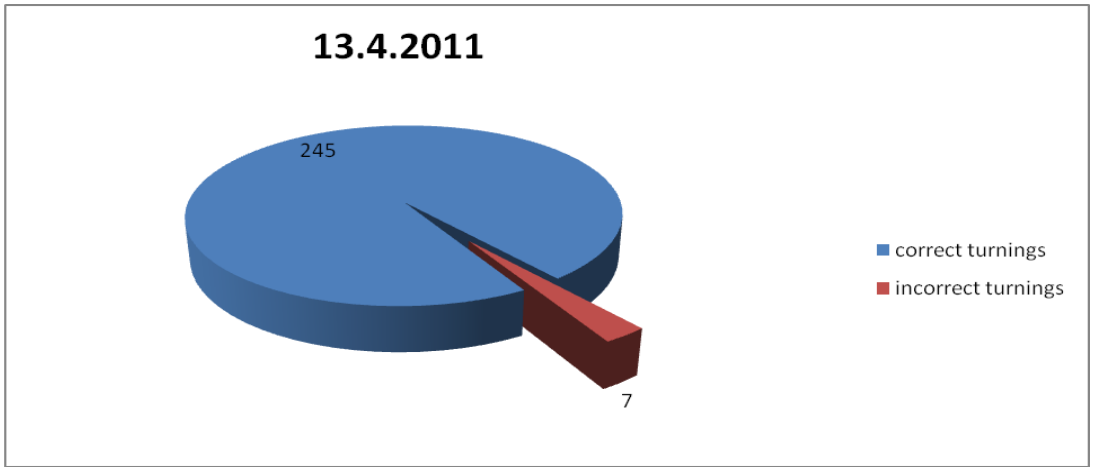
20. April	18:00	x	18:15	x	18:30	x	18:45	x	19:00	x	19:15	x	19:30	x	19:45	x
Mororcycle	0		2		1		1		0		1		0		1	
Car	31		3		31	**1**	29		27	**1**	28	**2**	26	**2**	26	**1**
HGV	1		0		0		1		0		0		0		0	
bus	1		2		1		1		1		1		1		1	
tractor	0		0		0		0		0		1		0		0	
other	0		0		0		0		0		0		0		0	

Table 2: Example of the measurement form: columns marked with „x“ are to state the ammount of incorrectly turning vehicles

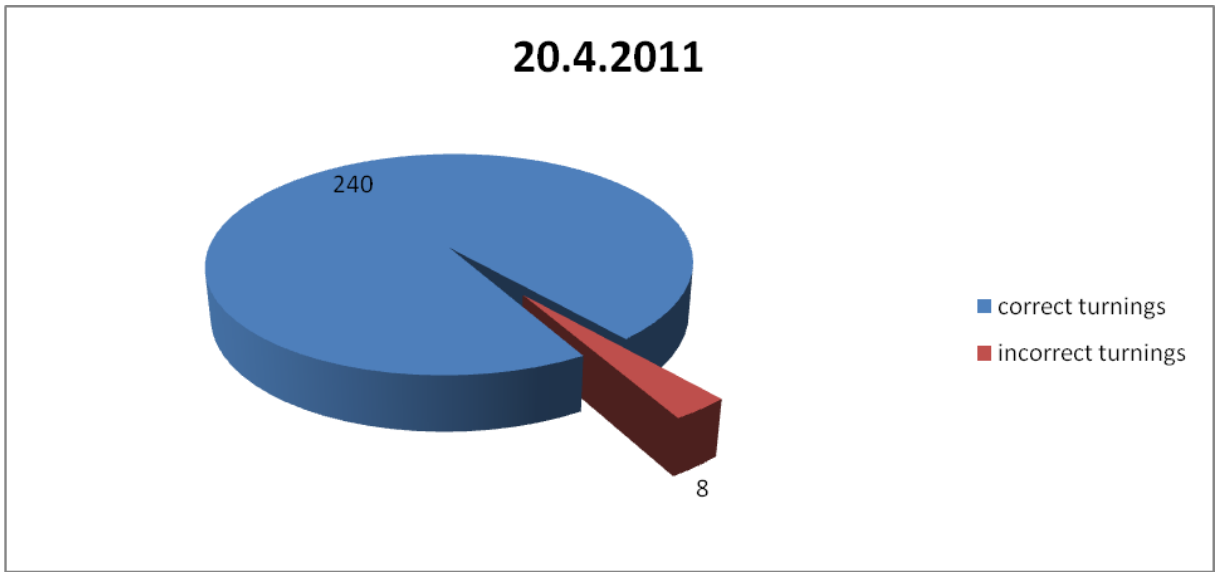
The results



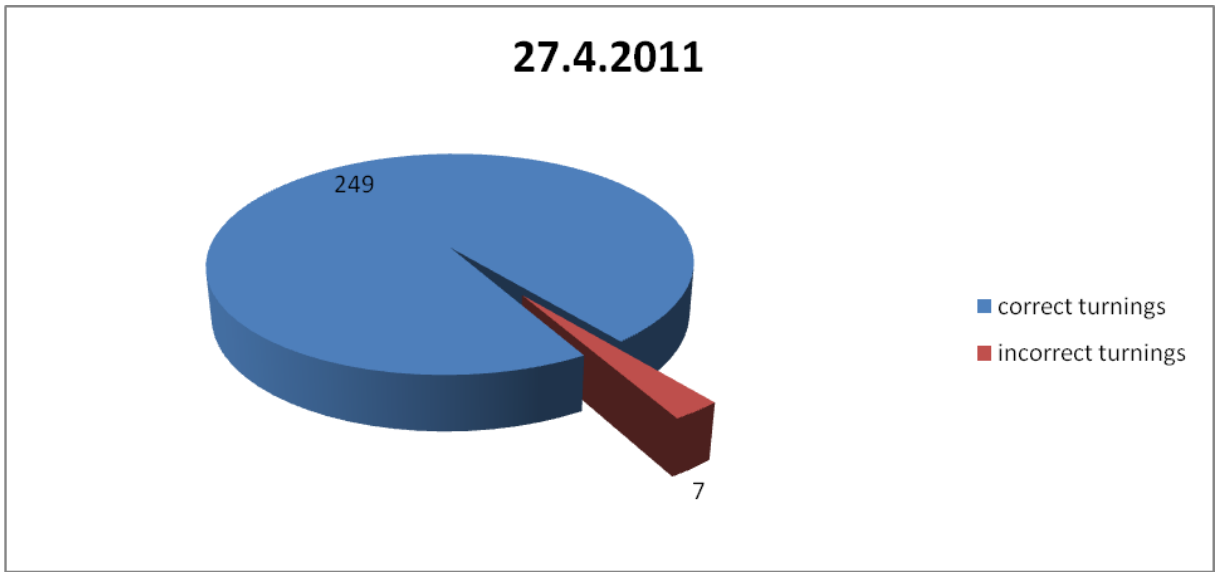
Graph 1: the results from 6.4.2011



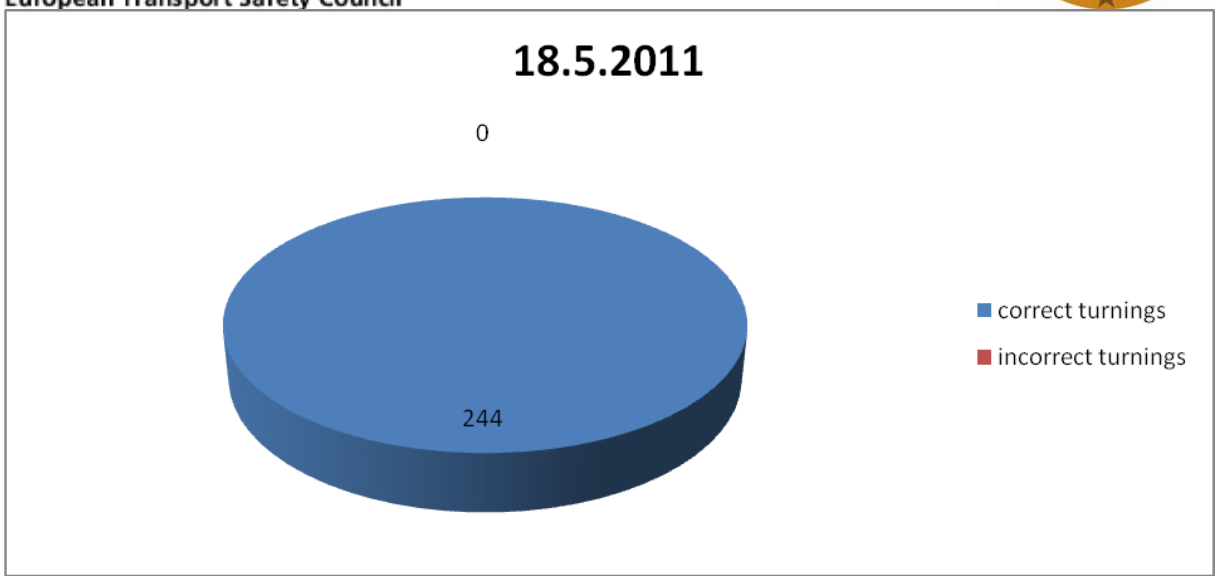
Graph 2: the results from 13.4.2011



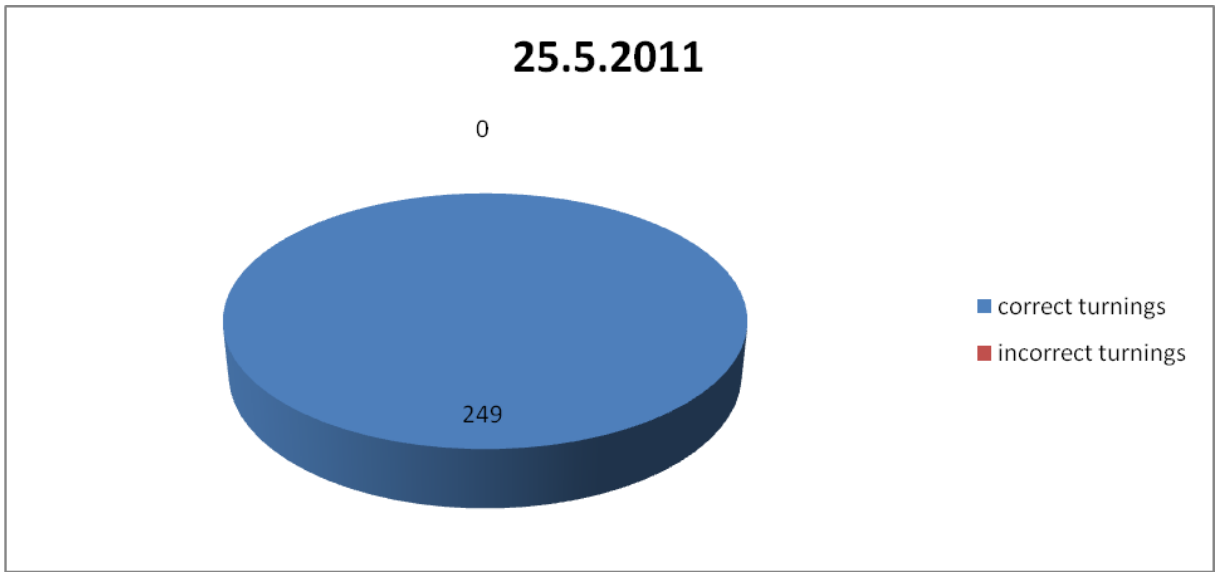
Graph 3: the results from 20.4.2011



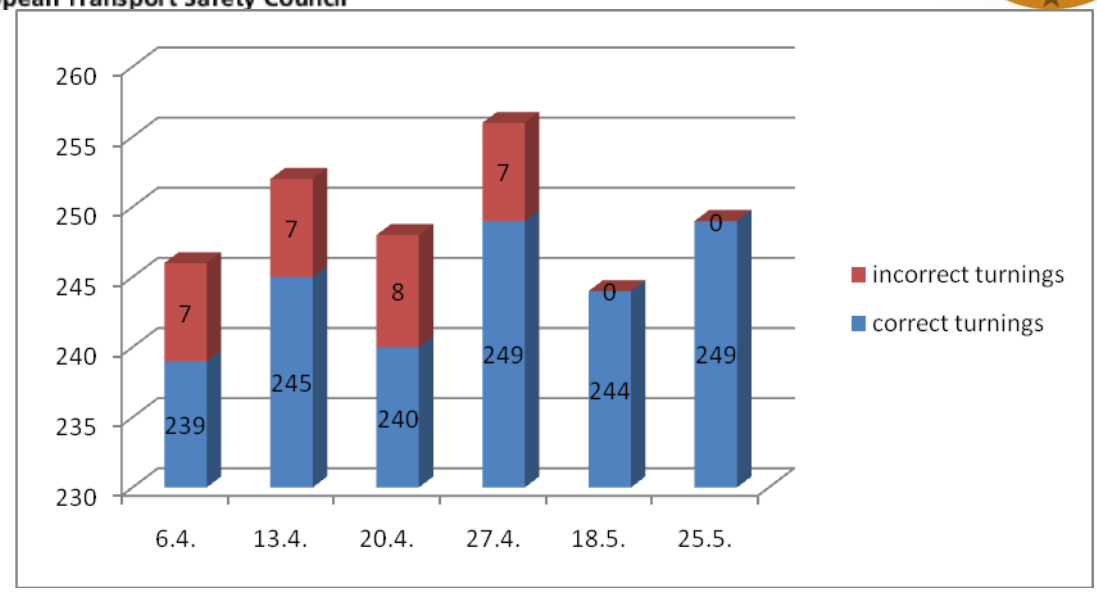
Graph 4: the results from 27.4.2011



Graf 5: the results from 18.5.2011



Graph 6: the results from 25.5.2011



Graph 7: summary of the results of incorrectly turning cars

The result can be concluded as follows:

- The presumption that the problem occurs in later hours was right. There was no vehicle turning incorrectly in the intervals 18:00 – 18:30.
- The were on average 244 vehicles turning during the two-hour interval.
- There were on average 3% of the drivers to turn incorrectly.
- Statistically worst was 20.4. 2011, when 8 out of 248 vehicles turned incorrectly which is 3,225 %.
- After the realization of the project (i.e. painting the line) there was not a single mistake in turning. (remark: There was no possibility of any other measurement due to closing of the Dr. Edvarda Beneše street on 3.6. 2011 lasting till the end of August

Costs of the project:

The realization of the complementation of horizontal road marking according to our project was worked out by the SEKNE company ordered by town Přerov, namely Mr. Ing. Zdeněk Holas. The painting expenses were 950 Kč (approx. €35)

European Transport Safety Council

Dates of activities

Project 1 – signal intermittent green light (SIGL)

8,2,2011 – e-mail to Ing. Jiří Vedra (commercial agent of AŽD Praha company)– possibilities of dealing with the project and estimation of gross budget for the project.

9,2,2011 – reply by Ing. Jiří Vedra, making sure about the project idea, getting information about the technical support at the given intersection., passing on the contact information to the AŽD Praha technician – Jiří Fibich

11,2,2011 – received e-mail from Mr. Jiří Fibich – closer information to the realization of the project, necessary gadgets to the realization and possible troubles etc.

15,2,2011 – request to Mrs. Jana Štiková (Czech police employee), who to ask concerning statistics of the accidents rate at the site.

17,2,2011 – first meeting with Mgr. Dušan Hluzín – head of the department of transport in Přerov

20,2,2011 – contacting the former minister of transport JUDr. Vít Bárta by sending supporting letter from ETSC and asking him for formal support.

22,2,2011 – personal meeting with Lt. Joska (head of traffic inspectorate) – consulting the matter of SIGL from the Czech police point of view.

23,2,2011 – Martin Winkelbauer – request for advice, where to find more information about SIGL in the world

1,3,2011 – meeting Ing. Jiří Vedra – costs appraisal of the company that would realize the project, closer details of the project, discussion of the troubles and threats

4,3,2011 – meeting Mgr. Dušan Hluzín and Ing. Štukavec. Discussion of the possibilities of the realization with regards to the real costs. Problem with legislative support. Also told expected obvious failure due to money matters.

PROJECT 2 – Complementation of the horizontal road marking

7 – 10. 3. 2011 – decision to realize the new project – „ Complementation of the horizontal road marking at the powerplant in Přerov .“ Photodocumentation of the site, finding out wider context and preparation of the project documentation.

14. 3. 2011 – sending the new project documentation to Zbyněk Válek to translate and send to ETSC

22.3. 2011 – sending the proposal of the new project to the town representatives (Mgr. Hluzín) and requesting personal meeting. (5.4. 2011)

5.4. 2011 – meeting Mgr. Hluzín. Presentation of the problem and possible solution suggestion. Agreement of Mgr. Hluzín to deal with the problem using our suggestion (project documentation)

6.4. 2011 – first measurement

12. 4. 2011 – meeting the technical manager of Olomouc region road maintanance (SSOK) Ing. Ivo Černý. Dealing with the project and its realization. Suggestion to meet law consultant of SSOK for Přerov Mrs. Petra Kolářová.

13.4. 2011 – second measurement

14.4. 2011 – meeting law consultant SSOK Mrs. Petra Kolářová. Presentation of the project and request to get final resolution by SSOK

Meeting Mr. Zdeňek Holas – head of possessions department in Přerov – oral agreement to the project realization.

Meeting traffic inspector Ing. Šenk – oral statement about the non-problematic realization

15.4. 2011 – written agreement by Mr. Holas to realize the project

13. – 20. 4.2011 – sending the project documentation to Ing. Šenk to get the agreement to the realization

20.4.2011 – meeting Mr. Hluzín –meeting Ing Štukavce and Mr Zdeňek Holas and some other people. Dealing with the following steps and setting up following meeting on 27.4. 2011).

20.4. 2011 third measurement

27.4. 2011 – meeting Ing. Štukavcem – making sure the things went well and that our interest could not have sped the things up (Válek, Malina).

Meeting Mr. Zdeňek Holas – making us sure that he would try to speed the things up as much as possible and also help the budget agreement.

Meeting Mrs Renata Gájová – journalist in TV Přerov.

Meeting Mrs Petra Poláková-Uvírová – journalist in Deníku Přerov newspaper.

27.4. 2011 – fourth measurement

6-7.5. 2011 – Realization of the project in the evening hours by SEKNE spol. s.r.o. (Hamerská 12, Olomouc 770 00). Unfortunately we do not have any photos.

11.5. 2011 – visit by Ilyas Daoud. Meeting the town representatives, media, and partners.

18.5. 2011 – fifth measurement

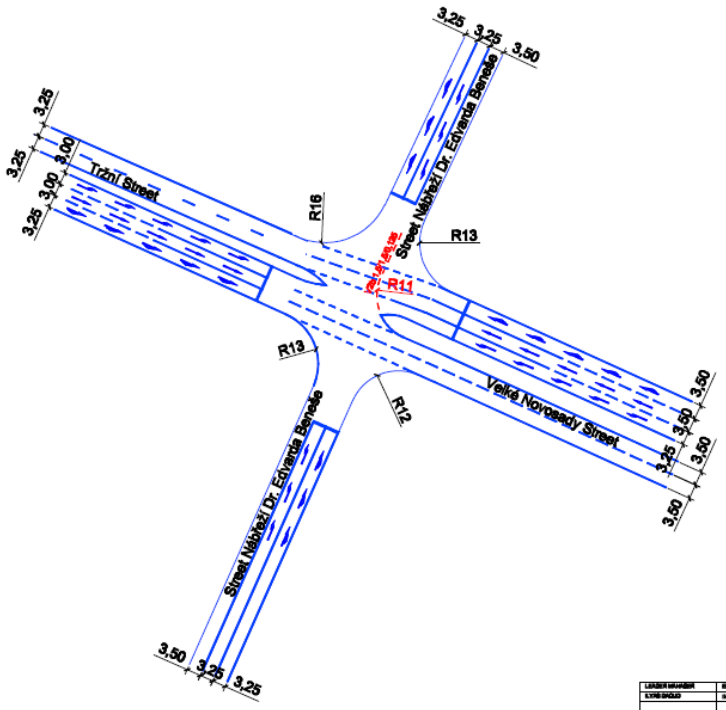
25.5.2011 – sixth measurement

June 2011 – results of the measurements

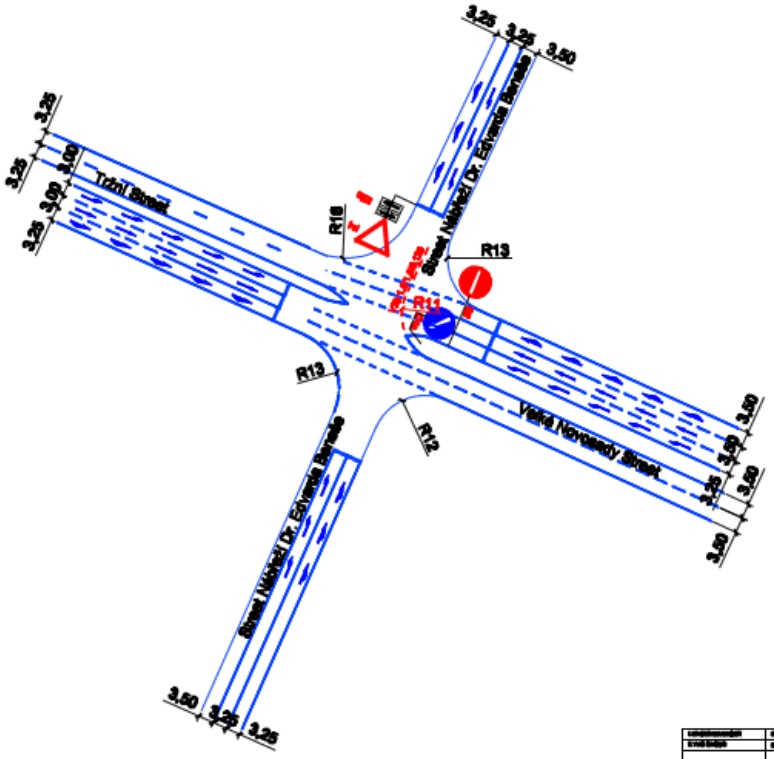
July 2011 – final report

Appendix

Pictures of the site before the implementation



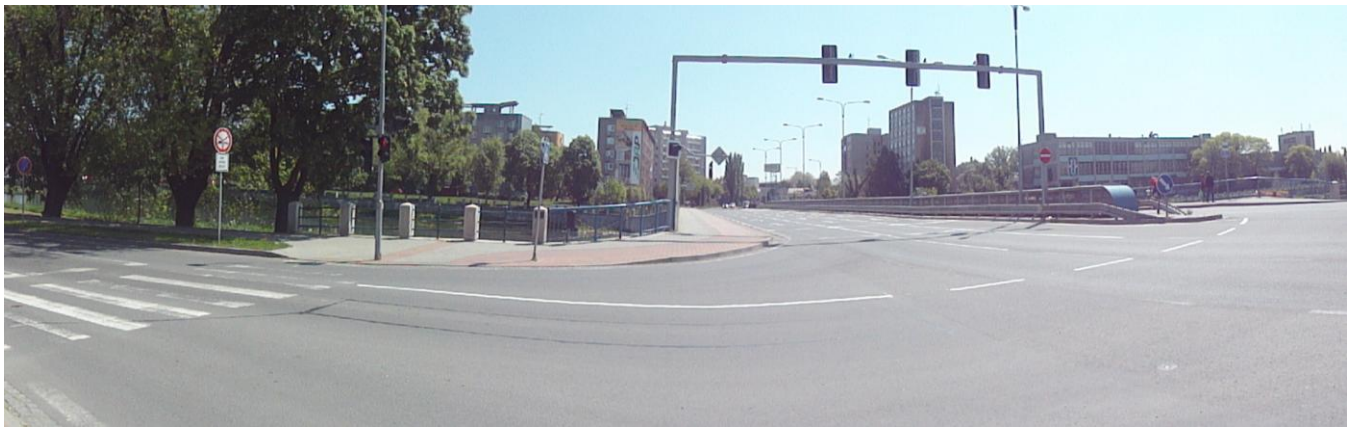
LEADER MANAGER: ILYAS BAGLO	ELABORATED BY: ING. MARTIN MILAN	CONTROLLED BY: ZBYNĚK VÁLEK
SUBJECT: STARS - new project		
SUGGESTION OF REPLENISHMENT OF ROAD MARKING		
NAME OF STRUCTURAL DRAWING: OUR REPLENISHMENT OF ROAD MARKING	SCALE: 1:1000	DRAWING NUMBER: 2



SUGGESTION OF REPLENISHMENT OF ROAD MARKING		
OUR REPLENISHMENT OF ROAD MARKING	1:1000	2

Project documentation handed in to SSOK a PČR DI

Complenentation in the project documentation (the red lineV2b)



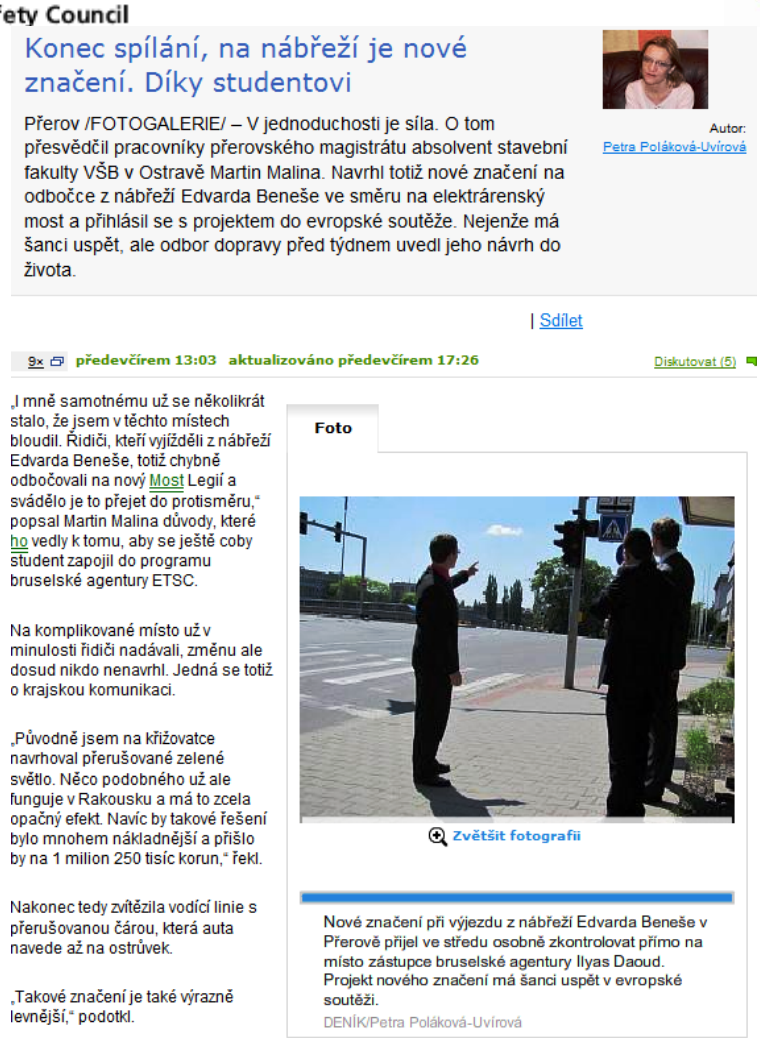
The realized line V2b

Photo at the site

Zbyněk Válek giving interview at the magistrate of Přerov town (11.5.2011)

European Transport Safety Council

Martin Malina giving interview to Petra Uvírová – redactor in the Předovský Deník newspaper



Konec spílání, na nábřeží je nové značení. Díky studentovi

Autor: Petra Poláková-Uvírová

Přerov /FOTOGALERIE/ – V jednoduchosti je síla. O tom přesvědčil pracovníky přerovského magistrátu absolvent stavební fakulty VŠB v Ostravě Martin Malina. Navrhl totiž nové značení na odbočce z nábřeží Edvarda Beneše ve směru na elektrárenský most a přihlásil se s projektem do evropské soutěže. Nejenže má šanci uspět, ale odbor dopravy před týdnem uvedl jeho návrh do života.

| Sdílet

9× předevčírem 13:03 aktualizováno předevčírem 17:26 Diskutovat (5)

„I mně samotnému už se několikrát stalo, že jsem v těchto místech bloudil. Řidiči, kteří vyjížděli z nábřeží Edvarda Beneše, totiž chybně odbočovali na nový Most Legií a svádělo je to přejet do protisměru," popsal Martin Malina důvody, které ho vedly k tomu, aby se ještě coby student zapojil do programu bruselské agentury ETSC.

Na komplikované místo už v minulosti řidiči nadávali, změnu ale dosud nikdo nenavrhl. Jedná se totiž o krajskou komunikaci.

„Původně jsem na křižovatce navrhoval přerušované zelené světlo. Něco podobného už ale funguje v Rakousku a má to zcela opačný efekt. Navíc by takové řešení bylo mnohem nákladnější a přišlo by na 1 milion 250 tisíc korun," řekl.

Nakonec tedy zvítězila vodící linie s přerušovanou čárou, která auta navede až na ostrůvek.

„Takové značení je také výrazně levnější," podotkl.

Foto

Zvětšit fotografii

Nové značení při výjezdu z nábřeží Edvarda Beneše v Přerově přijel ve středu osobně zkontrolovat přímo na místo zástupce bruselské agentury Ilyas Daoud. Projekt nového značení má šanci uspět v evropské soutěži.

DENÍK/Petra Poláková-Uvírová

Přerovský Deník: newspaper cut from 12.5.2011highlighting the realization of the project

Link to the newspaper article:
http://prerovsky.denik.cz/zpravy_region/konec-spilani-na-nabrezi-je-nove-znaceni-diky-stud.html

Link to the TV report on TV Přerov:
http://www.ktvprerov.cz/media/aktuality/a_20110513.wmv

Special thanks to:
Ing. Jiřímu Vedrovi – obchodní zástupce firmy AŽD Praha pro olomoucký kraj
Ing. Jiřímu Fibichovi – technik firmy AŽD Praha
Mgr. Dušanu Hluzínovi – vedoucí odboru dopravy magistrátu města Přerova
Ing. Lubomíru Štukavci – tajemník odboru dopravy magistrátu města Přerova
Ing. Zdeňku Holasovi – správa majetku města – magistrát města Přerova
npor. Ing. Janu Šenkovi – dopravní inspektorát města Přerova
Petře Polákové-Uvírové – redaktorka přerovského Deníku
Renatě Gájové – reportérka televize Přerov
Ilyas Daoud – STARS coordinator - ETSC