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ANALYSIS OF RECONSTRUCTION OF A DANGEROUS SPOT AT 390 km OF A3 MOTORWAY ZAGREB – LIPOVAC

ABSTRACT

Traffic accidents in road traffic are becoming an increasing problem regardless of whether there is only material damage or serious injuries and fatalities. There are various causes resulting in traffic accidents, and this paper describes the reconstruction work on a section of the motorway in order to improve the traffic safety. Also, the results of the given reconstruction have been analysed.

KEY WORDS

traffic, accident, reconstruction, safety

1. INTRODUCTION

Traffic accidents in road traffic are not uniformly distributed, and in numerous cases this lack of uniformity exceeds the limits of coincidence. In order to be able to determine how certain traffic accidents are related to space, i. e. drawbacks of the carriageway, the probability for a traffic accident at a certain location should be greater than the average. As a rule, at such places traffic accidents occur on a relatively small section so that on the survey map of the monitoring area they have the so-called cluster shape.

Constant control of traffic events and statistical data processing result in making certain conclusions on the safety condition of a certain traffic route, its section or at a certain critical point.

2. COLLECTION AND ANALYSIS OF THE COLLECTED DATA

The frequency of traffic accidents on a certain road section depends greatly on its deficiencies.

The data on the traffic road and its surroundings include the geometrical characteristics of the traffic route (horizontal and vertical), construction elements (longitudinal and transversal gradients, type of carriageway bed, drainage), condition of the carriageway (cracks, potholes), traffic route equipment (barriers, retro-reflective poles of the traffic signs, etc.), visibility, road signalisation and lighting.

Such monitoring and registering of traffic accidents per place and time of occurrence per cause and consequence, as well as other factors resulted in the analysis of the traffic accidents occurring on the A3 motorway, Zagreb – Lipovac, on the section between km 306 and 418, i. e. from the town of Okučani to the town of Velika Kopanica.

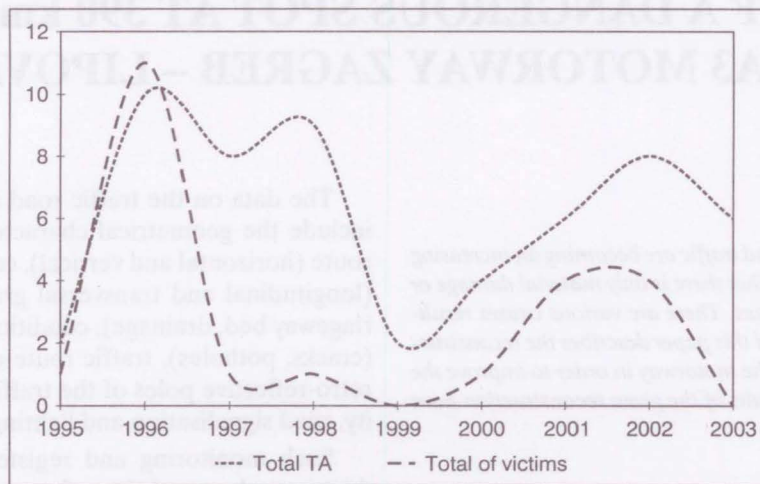
The section from 390 km to 391+500 km of the south traffic lane of the motorway at “Zadubravlje” flyover was designated as a dangerous spot on the given section, where a much greater number of traffic accidents occurred than at any other point of the considered motorway section.

The considered section of the road is preceded by a section of seventeen kilometres of uniform straight road, the five last kilometres of which feature a slight descent (downhill). Such road gives the drivers a false feeling of security and they lose the sense of speed, moreover, on this section of the road some drivers tend to even test the performance characteristics of their cars.

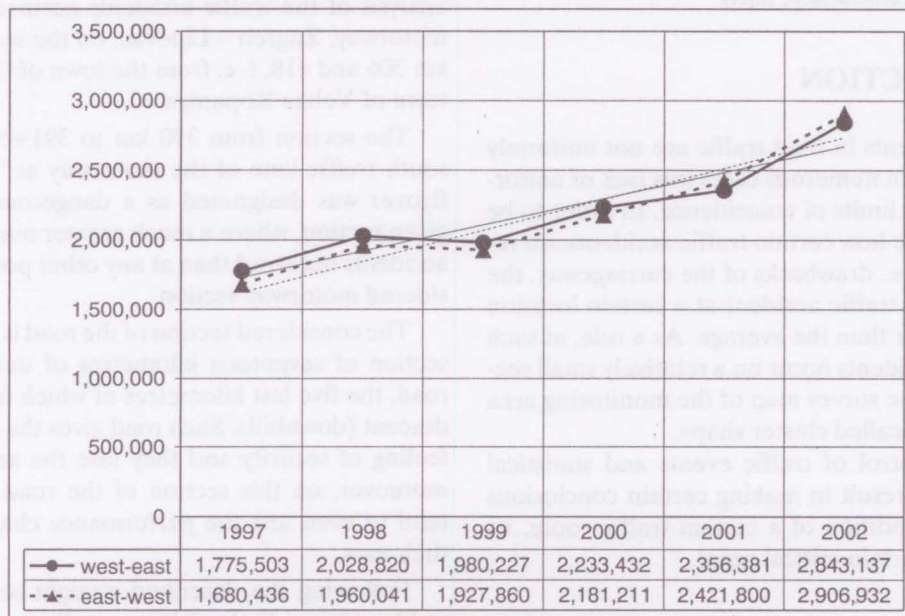
Following the described straight section there is sudden change in the driving conditions and there is a right curve, the radius of which does not meet the conditions of the calculated driving speed of the vehicle on the motorway, which is on a flyover passing over the railway line, which means ascending, and which is not well laid out. The additional aggravating circum-

Table 1 – Number of traffic accidents on the considered section

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total TA	2	10	8	9	2	4	6	8	6
With fatalities	-	2	-	-	-	-	-	-	-
With injured	1	1	1	1	-	1	2	2	-
With material damage	1	7	7	8	2	3	4	6	6
Total of victims	1	11	1	1	-	1	4	4	-
Ffatalities	-	3	-	-	-	-	-	-	-
Seriously injured	-	2	1	1	-	-	2	1	-
Lightly injured	1	6	-	-	-	1	2	3	-



Graph 1 - Relations between the number of traffic accidents and the number of victims



Graph 2 – Quantity of vehicles passing the motorway 1997-2002 with the presented trend

stance influencing the traffic safety is the west – east direction of the road section, which means that in the morning hours during the long ascent on the flyover

the drivers are dazzled by sunrays, interfering with the proper perception of the risk, i. e. the layout of the road.

The analysis of the causes of traffic accidents and the drivers' errors led to the conclusion that the drivers usually had not adapted the vehicle speed to the characteristics and the condition of the road as well as the visibility, and when they arrive to the beginning of the first radius of the mentioned curve they react by sudden change in direction and in vehicle speed resulting in the skidding of the vehicle on the road and running off the road.

The specific characteristic of the traffic accidents occurring on the motorway compared to the traffic accidents occurring in the build-up areas is a smaller number of traffic accidents compared to urban residential areas, with far more serious consequences and the highest number of accidents with fatalities.

Before the motorway was opened to traffic there was a total of 9 traffic accidents, out of which 2 were with fatalities, 2 traffic accidents with the injured, and 5 traffic accidents with material damage. In these accidents 12 persons were affected, out of which 3 persons were killed, 2 persons were seriously injured and 7 were lightly injured. After the motorway was opened to traffic, there were 38 traffic accidents, out of which 6 were with the injured persons, and 32 with material damage. In these accidents a total of 8 persons were affected, out of which 4 persons were seriously and 4 lightly injured.

This means that over the last eight years there had been 47 traffic accidents before the reconstruction was undertaken, 24 traffic accidents during day and 23 at night. On the south traffic lane (west-east direction) there were 40 traffic accidents, and on the south traffic lane (east-west direction) only 7 traffic accidents. The mentioned section accommodated two-way traffic until 26 July 1996 when full profile of the motorway was opened to traffic.

3. MEASURES FOR TRAFFIC SAFETY IMPROVEMENT

After having identified the described section as the dangerous spot, the preparations were started to reconstruct the dangerous spot and the following was proposed:

- the physical curve layout should be visually marked,
- the curve should be marked by vertical traffic signalisation along the northern edge of the south road lane, above the central metal crash barrier, at the point of the break of the first and second radii of the curve longitudinally in the length of 300m, by setting the directional boards in a series. The first board from the west side would be set at 390+526 km, and from the east side at 391+800 km.

- the edge lines (yellow) should be painted in order to improve the proper guidance of the traffic flow,

The reconstruction activities at the mentioned dangerous spot were undertaken during the month of September 2002.

Before reconstruction at the mentioned section there were 47 traffic accidents, out of which 2 were with fatalities, 8 were with the injured and 37 with material damage. In the mentioned traffic accidents 22 persons were affected, out of which 3 were killed and 7 seriously, and 12 lightly injured.

After having reconstructed the mentioned motorway section, including December 2003, there were 8 traffic accidents, out of which 1 traffic accident was with the injured and 7 were with material damage. There was one victim in these accidents, and this one was lightly injured.

This leads to the conclusion that after having reconstructed the mentioned motorway section, although a longer period of time is required for a more detailed analysis, a significantly smaller number of



Photo 1 - Condition of the considered curve before reconstruction



Photo 2 - Condition of the considered curve after reconstruction

traffic accidents with significant consequences occurred, although the number of vehicles passing along this motorway section is constantly increasing. The condition is at the moment satisfactory and since there are no other locations or sections on the motorway where so many traffic accidents happened, the occurrences of traffic accidents on this section should be monitored in order to determine whether the reconstruction has been well performed.

As presented in Table 1, since the number of traffic accidents in 2003 is smaller than in the previous year, and the number of vehicles passing along the considered section increased by about 350,000, one may already claim that the reconstruction has shown positive results.

The factor which may have influence on the condition of safety on the considered motorway section is the constant increase of transit traffic of all types of transport means, drivers who travel many kilometres without taking good rest, and who are not able to react in a proper way when they arrive to the point where the driving regime changes suddenly leading to risky situations and traffic accidents.

If we try to give a solution for the reconstruction of the dangerous spot by influencing only one road traffic safety factor, which in this case is the road, this will certainly fail to lead to the solution of the problem in a good manner nor achieve satisfactory results. An attempt should certainly be made to influence also the driver, and to provide high-quality service and provide the driver with the possibility of resting properly with all the possible facilities so that the driver may continue the journey in a safe way.

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SAŽETAK

ANALIZA SANACIJE OPASNOG MJESTA NA 390 KM AUTOCESTE A3 ZAGREB – LIPOVAC

Prometne nezgode u cestovnom prometu postaju sve veći problem bez obzira radi li se samo o materijalnoj šteti ili o teškim ozljedama i poginulim osobama. Razni su uzroci nastanka prometne nezgode, a u ovom članku je opisana sanacija dijela autoceste kako bi se povećala sigurnost prometa te su analizirani rezultati izvedene sanacije.

KLJUČNE RIJEČI

promet, nezgoda, sanacija, sigurnost

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