„Intersecting Safely”
An International Student Competition
to improve the safety of vulnerable road users
at urban intersections

POLAND 2006

The conception of improvement of vulnerable road users safety at the section of Grochowska Street in Warsaw



University of Technology in Gdansk
Civil and Environmental Engineering Faculty
Highway Engineering Department
ul. Narutowicza 11/12
80-952 Gdansk,

Team PG-03
Magdalena Trzebinska email: trzebinska-7b4d@wp.pl
Piotr Gosch email: piogo83@gmail.com
Bogdan Groch

Under the supervision of:
dr inz. Kazimierz Jamroz

Gdansk, July 2006

CONTENT

1. Introduction.....……..……...……3

2. Analysis and evaluation of present state....……..…….3

3. Conception of road safety impr ovement …….....……...10

4. Conclusion.....……..…11

Bibliography……...12

1. Introduction

A very dangerous and onerous for traffic participants, pedestrian crossing in Warsaw at Grochowska Street by the property no. 355 (fig.1) was selected to the International Student Competition to improve the safety of vulnerable road users at urban intersections organised by the European Transport Safety Council in cooperation with the Motor Transport Institute in Warsaw.

The aim of the project is to provide the sufficient safety level for the vulnerable road users at one of the most dangerous intersections in Warsaw.

As the base materials we received the map of Warsaw with marked intersection, maps of existing marking and signing, the map of accidents as well as photographs and presentations documenting the current problems.

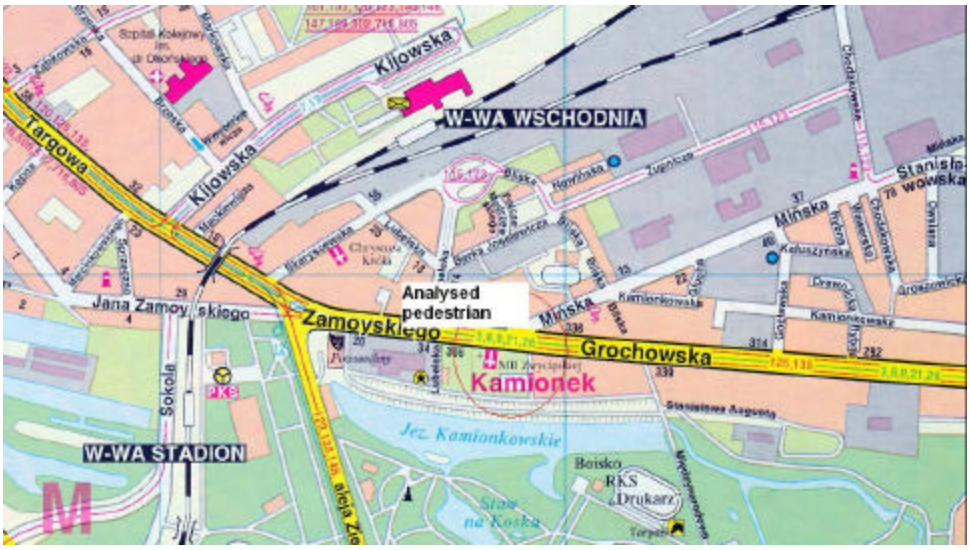


Fig. 1. The location of analysed pedestrian crossing at Grochowska Street in Warsaw.

2. Analysis and evaluation of present state

After studying the competition topic the local vision was performed, the survey among the users of the studied pedestrian crossing and speed measurements were conducted, additionally we got access to the data from collisions record from 2003 to 2006 and traffic volume research from 2006. The studies were conducted in cooperation with the other teams from Gdansk.

Grochowska Street (fig.2 and 3) is one of the busiest streets in Warsaw, crossing this street at the level of no. 355 is very dangerous; especially now when the surface is being repaired and drivers tend to speed. At the junction there are no traffic lights. Pedestrians crossing from the west are particularly endangered with accidents as the visibility is blocked by the vehicles turning right. Tramways present yet another problem because of their width and lack of refuge islands.

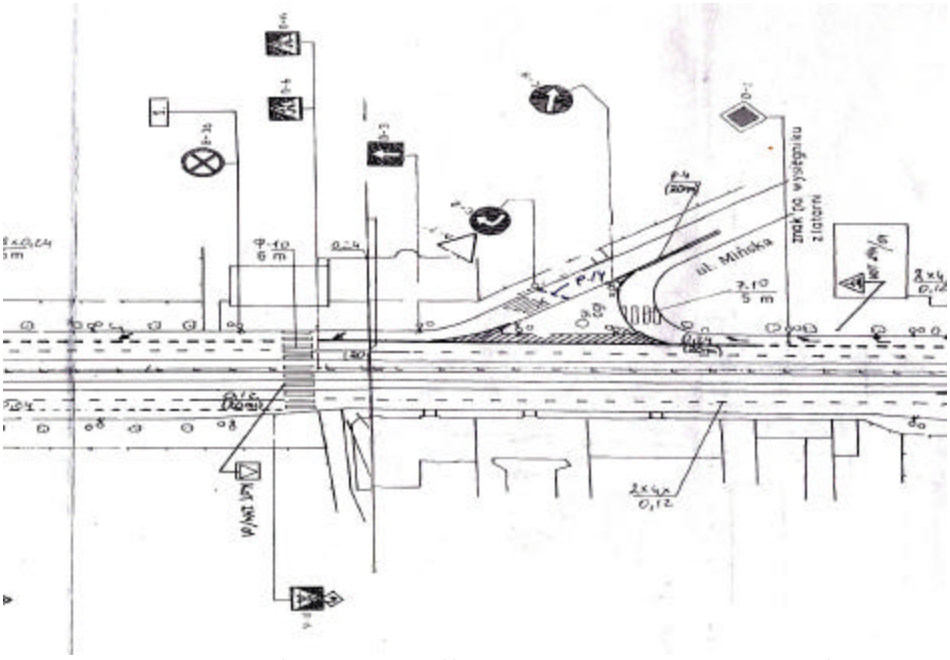


Fig. 2. The scheme of existing traffic organisation in the area of analysed pedestrian crossing at Grochowska Street in Warsaw.

On the basis of wheeled and pedestrian traffic measurements it was stated that there is high volume of motor vehicle (almost 3000 v/h in both directions in the area of pedestrian crossing) and tram traffic (38 trams per hour) at Grochowska Street and that the pedestrians have great difficulty getting through the pedestrian crossing safely (fig. 4). Speed measurements conducted with radar speed indicators in both directions show (fig. 5), that average speed in the direction of Wiatraczna Roundabout amounts to 57 km/h, and over 60 % of drivers exceed speed limit during a day (50 km/h), in the direction of Zieleniecka Street the average speed amounts to 48 km/h, and over 40 % exceed speed limit during a day (50 km/h).



To small width of pavement in the direction of Wiatraczna Roundabout



Pedestrian crossing in the direction of Wiatraczna Roundabout



Pedestrian crossing In the direction of Zieleniecka Street



Minska Street

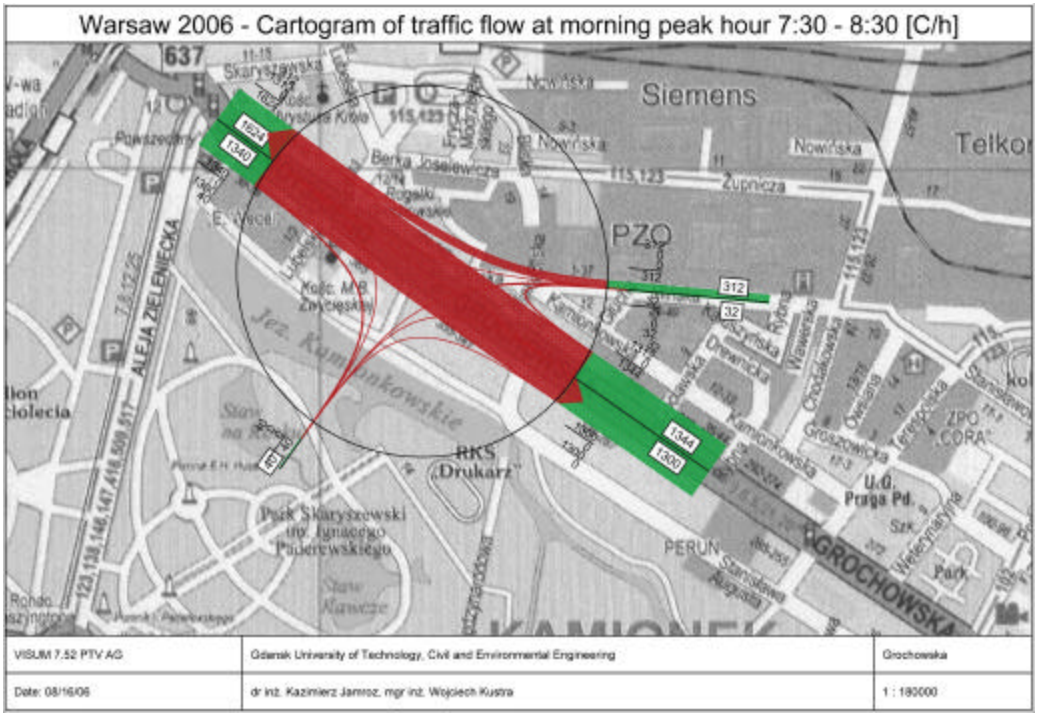


Junction Grochowska-Minska



Small width of pavement on the Grochowska Street

Fig. 3. Photographic documentation



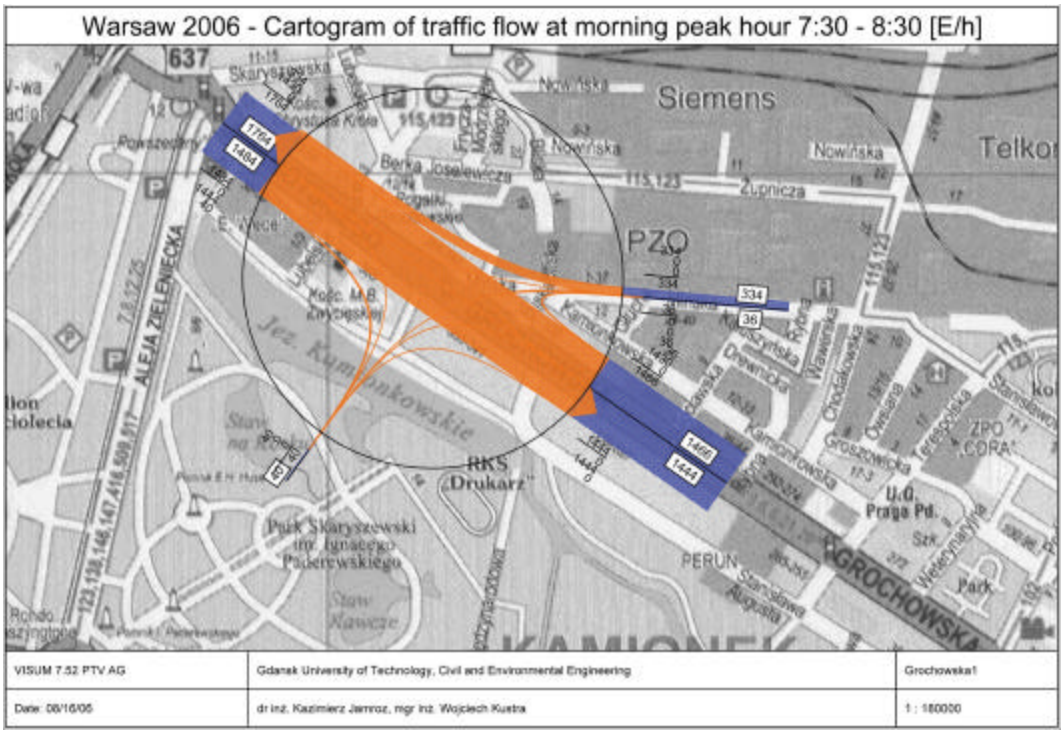
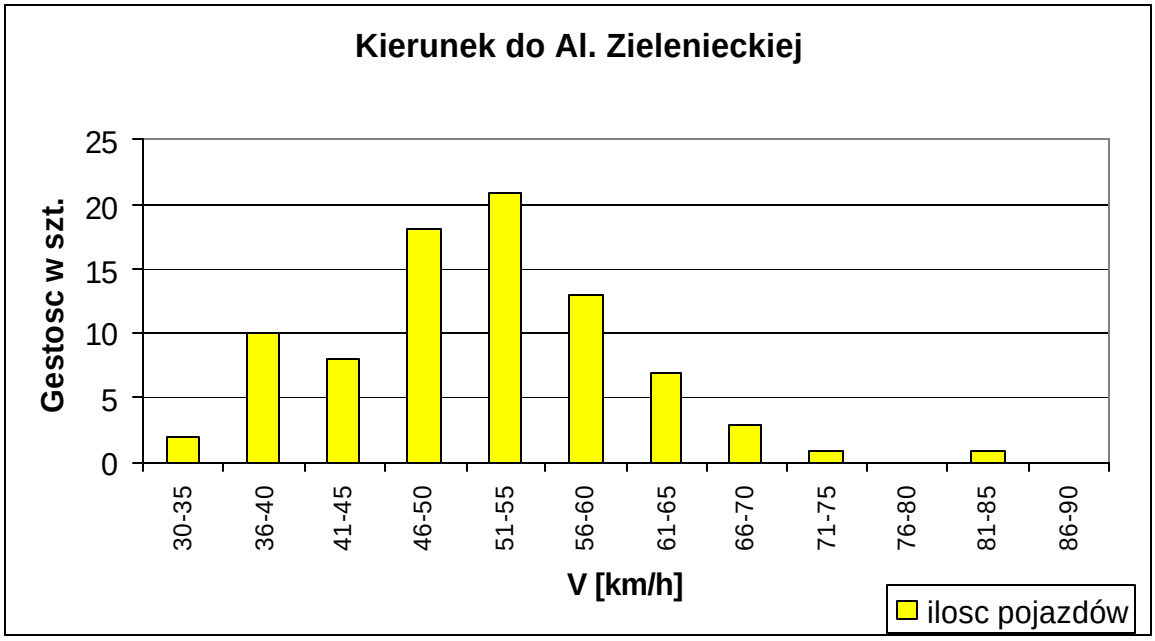
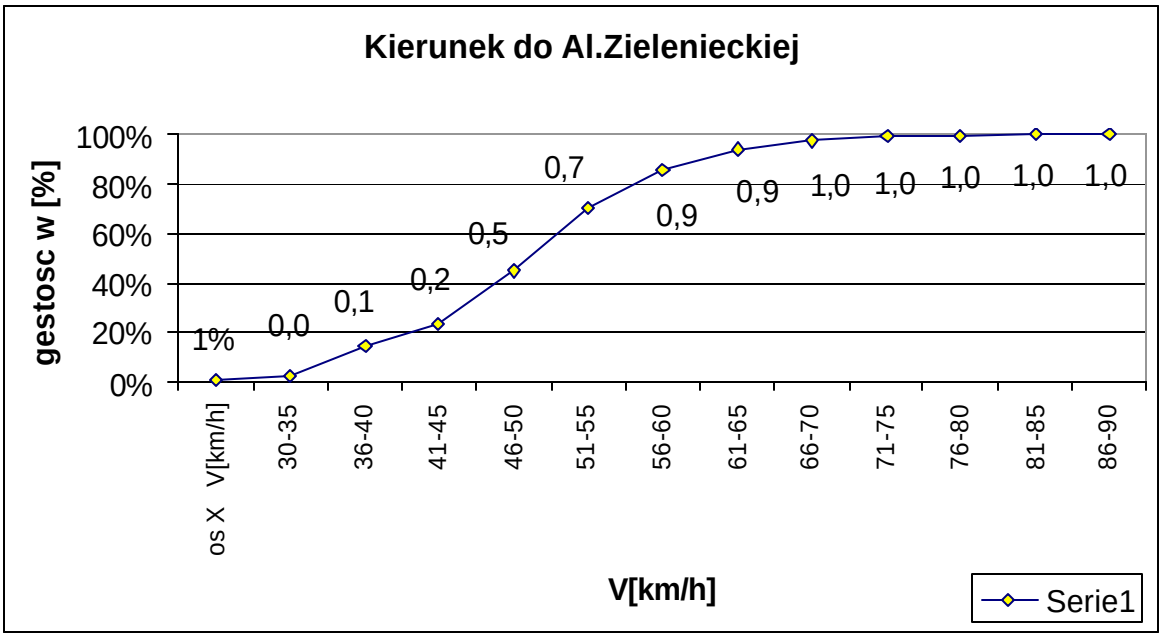


Fig. 4. Cartogram of traffic volume in the area of analysed pedestrian crossing at Grochowska Street

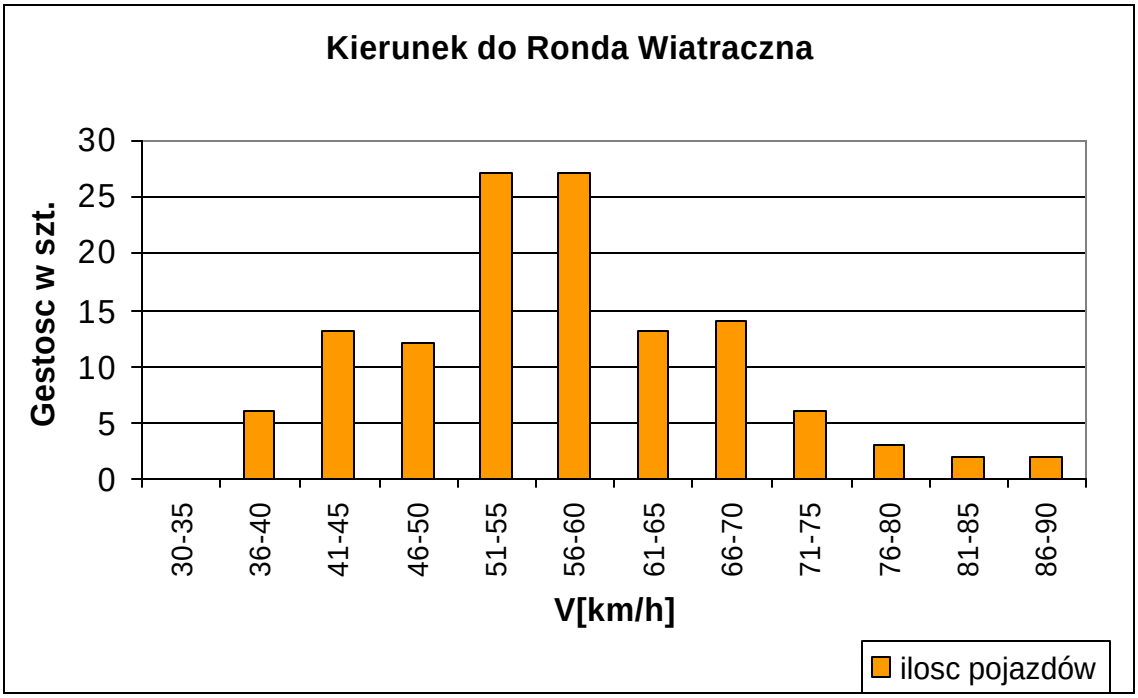
Percentage speed distribution



Distribution function



Percentage speed distribution



Distribution function

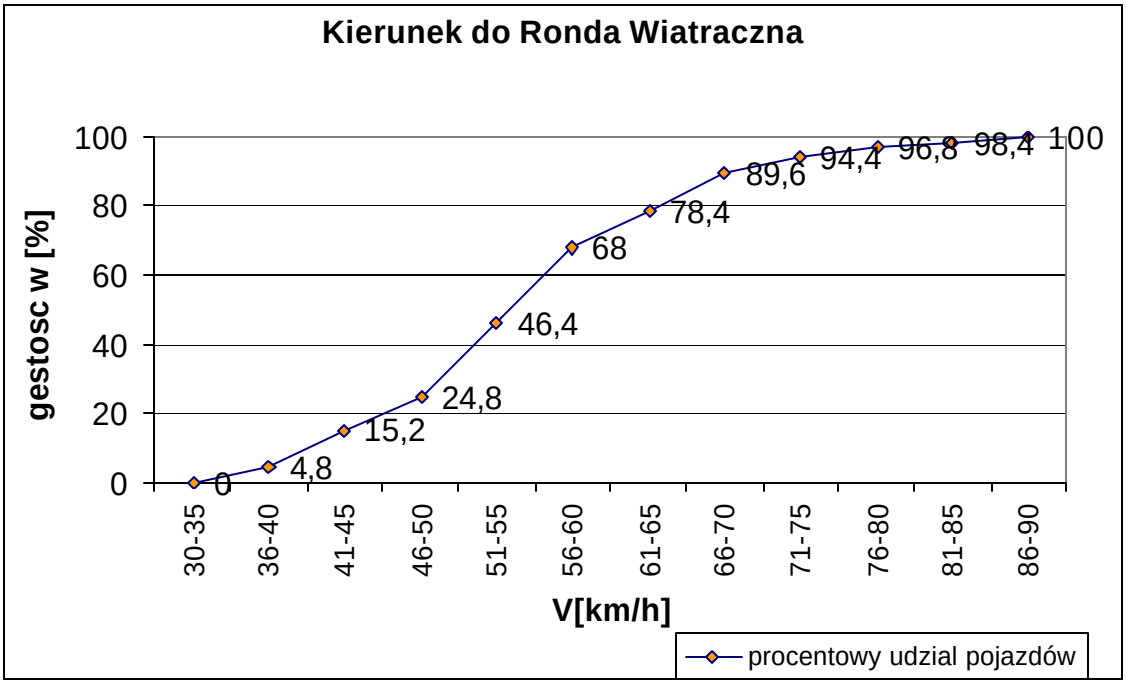
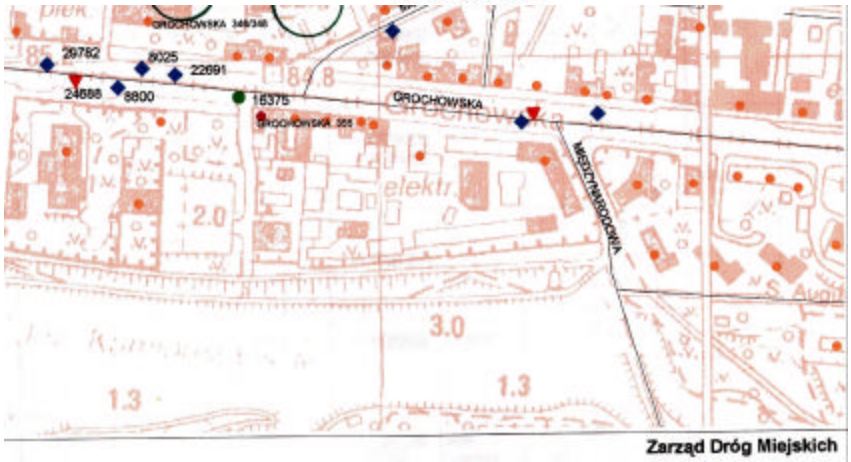


Fig. 5 The distribution and speed distributants at Grochowska Street in the proximity of analysed pedestrian crossing



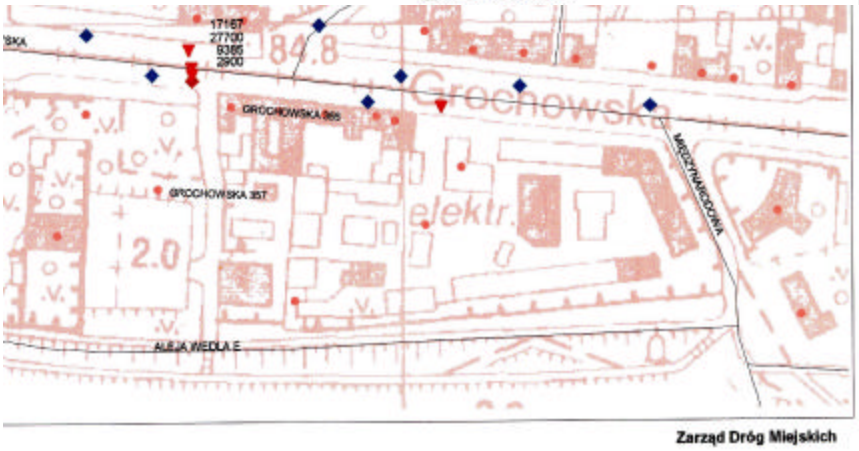
Zarząd Dróg Miejskich

MAPA WYPADKÓW
Rok 2003
ul. Grochowska 355



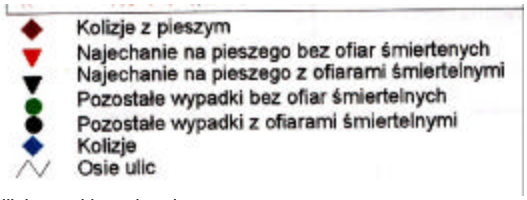
Zarząd Dróg Miejskich

MAPA WYPADKÓW
Rok 2004
ul. Grochowska 355



Zarząd Dróg Miejskich

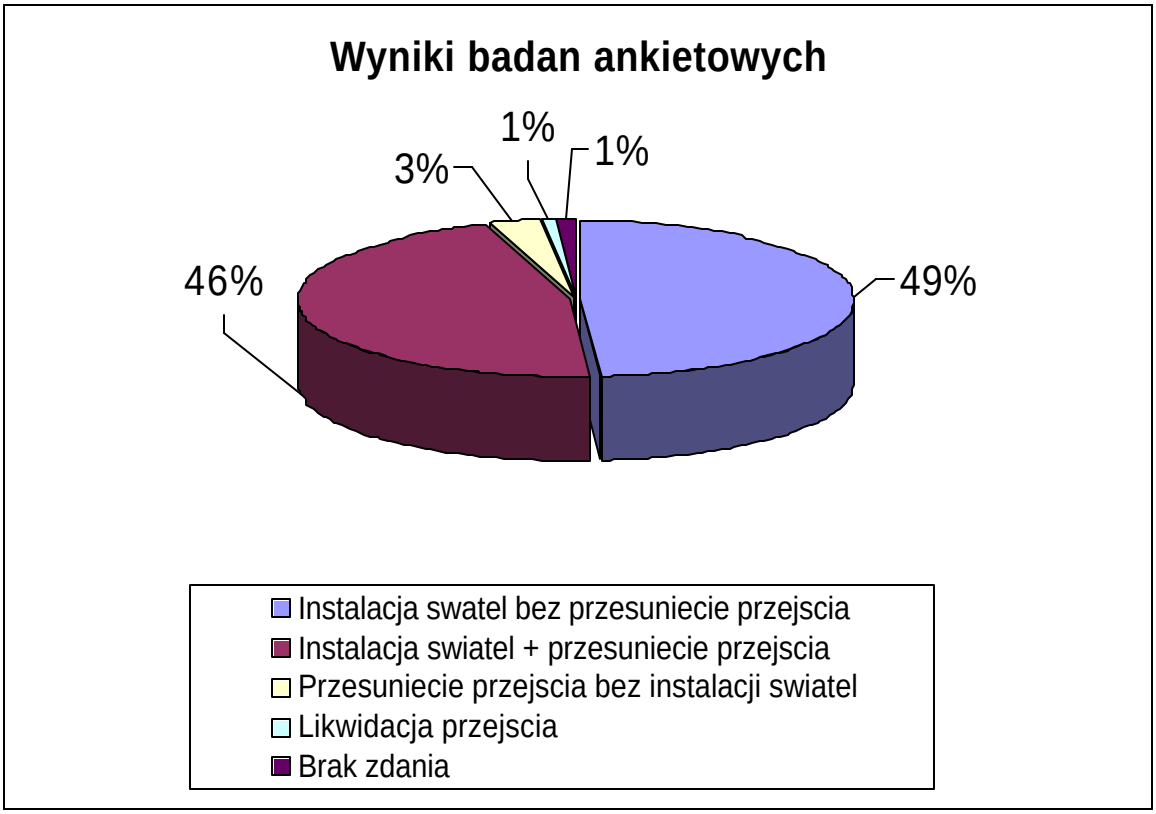
MAPA WYPADKÓW
Rok 2005 (bez aktualizacji grudnia)
ul. Grochowska 355, 357



Collisions with pedestrians
Running into pedestrian without fatalities
Running into pedestrians with fatalities
Other accidents without fatalities
Other accidents with fatalities
Collisions

Street axes
Fig. 6 Accidents location (according to data from MZD in Warsaw)

In the sample of randomly selected pedestrians we conducted the survey to define the pedestrians' safety at the intersection and the changes which should be introduced to improve crossing it. The results of the survey confirmed our expectations. People want to have the tramways zone widened in order to install pedestrian refuge islands and they expect traffic lights to be installed (97 % of surveyed pedestrians). Unanimously, no matter the age, the pedestrians claim that the crossing is extremely dangerous and it requires changes.



The results of the survey
Installation of traffic lights without moving pedestrian crossing location
Installation of traffic lights + moving pedestrian crossing location
Moving pedestrian crossing location
Removal of pedestrian crossing
No opinion

Fig. 7. The results of surveys conducted among pedestrians related to the type of suggested improvements at the analysed pedestrian crossing.

The identified shortcomings confirm the necessity of application of road facilities improving the safety of traffic participants in the area of analysed pedestrian crossing.

3. The conception of road safety improvement

On the basis of received materials and the results of research and surveys we decided that the best will be the variant described below and presented in the fig. 8.

To improve the safety of pedestrian and cyclist traffic we propose:

- Liquidation of the lane for vehicles turning right and the car park at Grochowska Street
- Change of cross-section from 3 lanes into 2 lanes, moving them in the direction of pavement – widening the area of tramways (in that way we enlarge the safety zone at the pedestrian crossing at Grochowska Street)
- Narrowing of designed roadway in the direction of Wiatraczna Roundabout in the section of about 110 metres near the pedestrian crossing to 2 lanes of 3 metres width each. It is aimed at improving safety and traffic calming as well as gaining some space for traffic lights units,
- Change of Minska Street geometry – the change of entry angle, to reduce speed and improve visibility at the intersection and the change of shape and size of the island at the entry to the intersection
- Moving the pedestrian crossing in a way to situate it at the level of an island at the entry of Minska Street
- Installation of traffic lights both on the pedestrian crossings at Grochowska and Minska Streets
- Installation of protection barriers along the narrow pavement
- Liquidation of parking space on the pavement that will also create a square which can be developed into vegetation spot or cycling path.

The conducted analyses show that the traffic lights will facilitate the pedestrian traffic and public transportation means traffic - trams. The traffic lights will improve pedestrians' safety and will let them cross the street without hazard to their lives. The time of waiting for crossing will be shortened; currently it takes up to 8 minutes causing desperate pedestrians' trials of forcing the right of way. We suggest the use of traffic-actuated signalling due to lower cost of operation in comparison with pretimed units. Additionally the time sensors may be installed which will indicate the amount of time left for the lights change.

As an alternative solution to traffic lights we propose installation of two speed cameras and the luminous signs limiting speed to 50km/h, as many drivers significantly exceed speed limit of 50km/h decreasing the chances of pedestrians to cross the street safely.

In case if the tenements in the vicinity of the road were demolished, we suggest building a new pavement of proper width and cycling path.

4. Conclusions

The existing arrangement of intersection Grochowska and Minska Streets in Warsaw does not allow for installation of traffic lights due to insufficient space for setting the poles. Currently, the pedestrians are endangered with accidents involving trams and speeding vehicles. In the conducted surveys the pedestrians admitted that they fear crossing this intersection and that the introduction of traffic lights would facilitate it and improve their safety. Therefore, we decided to adjust the intersection to the traffic lights design and introduce additional pedestrian safety improvement measures. We believe, that the intersection after reconstruction will be more friendly and comfortable for vulnerable road users and, first of all will improve their safety eliminating collisions involving pedestrians and vehicles.

Fig. 8. The conception of traffic improvement on the analysed section of Grochowska Street in Warsaw – situational plan

Bibliography:

1. Rozporzadzenie Ministra transportu i Gospodarki Morskiej z dnia 2 marca 1999 r. w sprawie warunków technicznych, jakim powinny odpowiadac drogi publiczne i ich usytuowanie.

2. Rozporzadzenia Ministrów Transportu i Gospodarki Morskiej oraz Spraw Wewnetrznych i Administracji z dnia 21 czerwca 1999 r. w sprawie znaków i sygnalów drogowych.

3. Wytyczne projektowania skrzyzowan drogowych cz.1, GDDP w Warszawie 2001

4. Inzynieria ruchu, S. Datke, W. Suchorzeski, M.Tracz, WKL 1999

5. Systemy sterowania ruchem ulicznym, K. Jamroz, WKL 1984

6. Wezly drogowe i autostradowe, R. Krystek, WKL 2001