Project description

To improve the situation at the crossing on Grochowska street and, taking into account all the restrictions we were informed about, we decided to create two pedestrian islands, between each carriageway and tram-way. This will make crossing the street easier for pedestrians and cyclists because they will cross each part of the street and track-way separately, having better view of the traffic. According to the Polish law installation of traffic signalling devices is required, when there is such a great car volume. That is why we suggest to put pedestrian activated signalling on each carriageway. They will work independent from each other and will be coordinated with existing traffic signalling in neighboring junctions (Grochowska str. - Lubelska str. and Grochowska str. - Miedzynarodowa str.). Crossing the track-way will not be equipped with traffic signalling devices. To draw people's attention on trams coming forward, we designed warning signals and separating barriers which will refrain pedestrians and cyclists from entering straight on the tram-way. Warning signals will be flashing only when the train is near. Surface of pedestrian islands will be raised which should additionally force people to pay more attention to the fact that they are crossing another route (tram-way). The islands will be equipped with ramps for disabled and elder people to help them cross the street comfortably. Width of pedestrian crossing will be 6 meters, as it is now. We designed a cyclist crossing, 2 meters wide, adjacent to the pedestrian crossing. The section of the tram-way, where there will be the crossings placed, will be built-in in asphalt paving.

Introducing aforementioned pedestrian islands without traffic lights is also worth considering. It would be against law regulations, however, it would still improve present situation of vulnerable road users at this crossing. The neighbouring crossroads are equipped in traffic signalling devices, thus pedestrians will have a chance to cross the street while cars will be waiting for the green light or while cars' speed isn't very high.

To accomplish this idea it is necessary to create additional surface at crossing's localization. We can achieve it by bending out the carriageways in the way shown in the drawing (plan). This, we believe, will have also an extra effect in reducing cars' speed. Due to the lack of space in today's localization, it is necessary to move the crossing 25 meters towards the Lubelska str. It can lengthen some people's way, however, we are convinced that all main targets of foot traffic will still be reachable within convenient distance and improving vulnerable road users' safety justifies this shift. To obtain space for bending out the street, some modernizations are necessary. On the roadway, in the direction of Wiatraczna roundabout, we decided to eliminate right turn lane and use it partly for new run of main lanes. In our opinion it won't cause safety problems because there is a small turning right

cars' volume, junction is right after the new traffic lights and the street's bending out, so the cars' speed presumably won't be high. On length of 110 meters from this junction we plan broadening the sidewalk for another 0,5 meter to improve pedestrian's conditions. To accomplish this, the carriageway should be narrowed down to 6,5 meters at this section. On the roadway in direction of Lubelska str., we suggest eliminating acceleration lane and using it for new run of main lanes and rebuilding junction with Minska street as shown on the plan. This is possible because the acceleration lane situated as it is now, is not effective; it is close to junction with traffic signalling and cars which are waiting on the red light there are blocking main lanes, so it is hard to find a proper gap for cars enetring Grochowska street, mainly during peak hours. Moreover, zebra crossing is located on this lane which is an obvious designing error – it should be at a location where drivers would drive carefully and watch for pedestrians, but not at a location where the drivers are given an opportunity to accelerate. We also believe that capacity of Minska-Gochowska junction without acceleration lane is also sufficient. According to these points eliminating acceleration lane is not only possible but it also will improve crossing conditions for pedestrians and cyclists. At the junction, after removing acceleration lane, we have decided to modify the angle of intersection to improve the visibility conditions for drivers at Minska street. After modification, the angle will approximate 75º. Lanes in the vicinity of designed zebra crossing will have width of 3,5 meters each.

Currently there are no existing bike paths in this area. That is why, to icrease safety of cyclists, we suggest creating them (see plan). From Lubelska street to the designed zebra crossing bike paths will be one-way, situated on both sides of Grochowska street. At the section from the crossing in direction of Miedzynarodowa street we have decided to put two-way bike route on north side. One-way bike paths prove to be more safe, however, because of lack of space on the south side of the street we have decided to choose the two-way path. Cyclists crossing is planned next to zebra crossing to enable cyclists crossing the Grochowska street.

To accomplish these changes it is not necessary to remove any lamp-post. At the same time it is necessary to remove or replant three trees to make space for pedestrians waiting at the zebra crossing and to create the bike route.

National standards

Project was developed according to the national standards:

1. Dz. Ust. Nr 43 Rozporzadzenie Ministra Transportu i Gospodarki Morskiej z dnia 14 maja 1999 r. w sprawie warunków technicznych, jakim powinny odpowiadac drogi publiczne i ich us ytuowanie.
2. Dz. Ust. Nr 220 Rozporzadzenie Ministra Infrastruktury z dnia 3 lipca 2003 r. w sprawie szczególowych warunków technicznych dla znaków i sygnalów drogowych oraz urzadzen bezpieczenstwa ruchu drogowego i warunków ich umieszczania na drogach.
3. Tracz M., Chodur J., Gaca St.: Wytyczne projektowania skrzyzowan drogowych, GDDKiA, Warszawa 2001.

Main notations used during designing:

1. Taking into account volume of pedestrian and vehicle traffic and speed of vehicles, the following solutions can be applied:
    - Zebra crossing with D-6 sign, if pedestrians' traffic volume is between 50 and 400 ped/h and vehicles' volume is between 300 and 700 veh/h. Apart from this, speed limit at the section cannot exceed 60km/h in urban areas and 70km/h outside urban areas. If this speed is higher, it is necessary to apply additionalmeans in order to lower cars' real speed,
    - Zebra crossing with D-6 sign and pedestrian island, if pedestrians' traffic volume is between 50 and 400 ped/h and vehicles' volume is between 500 and 1500 veh/h, however no more than 800 veh/h in one direction. Apart from this, speed limit at the section cannot exceed 60km/h in urban areas and 70km/h outside urban areas. If this speed is higher, it is necessary to apply additionalmeans in order to lower cars' real speed,
    - Pedestrian crossing equipped in signalling devices in urban areas, if solutions given in first two points cannot be applied or/and operating speed at the section exceeds 70km/h and there is no possible way of lowering it,
    - Islands and narrowings facilitating crossing the street for the pedestrians without markings and signs, if pedestrians' traffic volume does not exceed 50 ped/h, vehicles' volume is lower than 300 veh/h and operating speed at the section does not exceed 60km/h,

- Crossover and pedestrian underpass, if there is no possibility of applying any of the solutions given in previous points or there is a lack of other way to provide required capacity for pedestrians and vehicles.

2. Minimum width of pedestrian crossing – 4,0 meters, it should be, however, adjusted to pedestrian traffic volume.
3. Minimum width of cyclists crossing – 2,0 meters, it shouldn't be, however, narrower than bike path itself.
4. Minimum width of pedestrian island – 2,0 meters (2,5 meters – recommended).
5. Kerb's height at pedestrian crossing lowered to 2 cm; lowering it on length of ramp that should be minimum 0,9 meters long and the maximum slope – 15%.
6. Minimum width of sidewalk:
   - 1,5 meters when it is separated from the street,
   - 2,0 meters when it is next to the street.
7. Minimum width of bike path:
   - 1,5 meters for one-way bike path,
   - 2,0 meters for two-way bike paths,
   - 2,5 meters for one-way bike path when it can be also used by pedestrians,

   if bike path is situated next to the street 0,5 meter must be added to all of these widths on account of lateral clearance.
8. Cross slope of sidewalk and bike paths should be 1 – 3%.
9. Cross slope of road with hardened surface should be minimum 2%.
10. Width of street lanes are dependent on road class. For technical class G (Grochowska street) width of lanes should be:
    - 3,50 meters,
    - 3,50 – 3,25 meters, in case of road reconstruction,
    - 3,25 – 3,00 meters, in case of traffic calming.
11. Maximum chamfer of street edge is dependent on operating speed and for 60km/h (effective speed for Grochowska street) it is 1:10.
12. Filleting reversals of street edges should be made with arc of radius 100 – 400 meters.
13. Width of lanes on channeled junction is dependent on radius of filleting arc and for radius 12m (used in our project) it is 6,0 meters.
14. Angle of intersection should be between 60º and 90º.
15. Road markings and situating of traffic lights according to [2].