

**CiViTAS**  
Cleaner and better transport in cities

**ÚSTÍ NAD LABEM**

## **R49.2 - Traffic Speed Reduction in Ústí nad Labem**

December 2011



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# 1 Introduction

## 1.1 Background CIVITAS

CIVITAS - cleaner and better transport in cities - stands for City-VITAlity-Sustainability. With the CIVITAS Initiative, the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

CIVITAS I started in early 2002 (within the 5th Framework Research Programme); CIVITAS II started in early 2005 (within the 6th Framework Research Programme) and CIVITAS PLUS started in late 2008 (within the 7th Framework Research Programme).

The objective of CIVITAS-Plus is to test and increase the understanding of the frameworks, processes and packaging required to successfully introduce bold, integrated and innovative strategies for clean and sustainable urban transport that address concerns related to energy-efficiency, transport policy and road safety, alternative fuels and the environment.

Within CIVITAS I (2002-2006) there were 19 cities clustered in 4 demonstration projects, within CIVITAS II (2005-2009) 17 cities in 4 demonstration projects, whilst within CIVITAS PLUS (2008-2012) 25 cities in 5 demonstration projects are taking part. These demonstration cities all over Europe are funded by the European Commission.

### **Objectives:**

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

### **Horizontal projects support the CIVITAS demonstration projects & cities by:**

- Cross-site evaluation and Europe wide dissemination in co-operation with the demonstration projects
- The organisation of the annual meeting of CIVITAS Forum members
- Providing the Secretariat for the Political Advisory Committee (PAC)
- Development of policy recommendations for a long-term multiplier effect of CIVITAS

### **Key elements of CIVITAS:**

- CIVITAS is coordinated by cities: it is a programme "of cities for cities"
- Cities are in the heart of local public private partnerships
- Political commitment is a basic requirement
- Cities are living 'Laboratories' for learning and evaluating

## 1.2 Background ARCHIMEDES

ARCHIMEDES is an integrating project, bringing together 6 European cities to address problems and opportunities for creating environmentally sustainable, safe and energy efficient transport systems in medium sized urban areas.

The objective of ARCHIMEDES is to introduce innovative, integrated and ambitious strategies for clean, energy-efficient, sustainable urban transport to achieve significant impacts in the policy fields of energy, transport, and environmental sustainability. An ambitious blend of policy tools and measures will increase energy-efficiency in transport, provide safer and more convenient travel for all, using a higher share of clean engine technology and fuels, resulting in an enhanced urban environment (including reduced noise and air pollution). Visible and measurable impacts will result from significantly sized measures in specific innovation areas. Demonstrations of innovative transport technologies, policy measures and partnership working, combined with targeted research, will verify the best frameworks, processes and packaging required to successfully transfer the strategies to other cities.

## 1.3 Participant Cities

The ARCHIMEDES project focuses on activities in specific innovation areas of each city, known as the ARCHIMEDES corridor or zone (depending on shape and geography). These innovation areas extend to the peri-urban fringe and the administrative boundaries of regional authorities and neighbouring administrations.

The two Learning cities, to which experience and best-practice will be transferred, are Monza (Italy) and Ústí nad Labem (Czech Republic). The strategy for the project is to ensure that the tools and measures developed have the widest application throughout Europe, tested via the Learning Cities' activities and interaction with the Lead City partners.

### 1.3.1 Leading City Innovation Areas

The four Leading cities in the ARCHIMEDES project are:

- Aalborg (Denmark);
- Brighton & Hove (UK);
- Donostia-San Sebastián (Spain); and
- Iasi (Romania).

Together the Lead Cities in ARCHIMEDES cover different geographic parts of Europe. They have the full support of the relevant political representatives for the project, and are well able to implement the innovative range of demonstration activities.

The Lead Cities are joined in their local projects by a small number of key partners that show a high level of commitment to the project objectives of energy-efficient urban transportation. In all cases the public transport company features as a partner in the proposed project.

## 2 Ústí nad Labem

Ústí nad Labem is situated in the north of the Czech Republic, about 20 km from the German border. Thanks to its location in the beautiful valley of the largest Czech river Labe (Elbe) and the surrounding Central Bohemian Massive, it is sometimes called 'the Gateway to Bohemia'. Ústí is an industrial, business and cultural centre of the Ústí region.

Ústí nad Labem is an important industrial centre of north-west Bohemia. The city's population is 93 859 living in an area of 93.95 km<sup>2</sup>. The city is also home to the Jan Evangelista Purkyně University with eight faculties and large student population. The city used to be a

base for a large range of heavy industry, causing damage to the natural environment. This is now a major focus for improvement and care.

The Transport Master Plan, initiated in 2007, will be the basic transport document for the development of a new urban plan in 2011. This document will characterise the development of transport in the city for the next 15 years. Therefore, the opportunity to integrate Sustainable Urban Transport Planning best practices into the Master Plan of Ústí nad Labem within the project represents an ideal match between city policy framework and the ARCHIMEDES project.

The project's main objective is to propose transport organisation of the city, depending on the urban form, transport intensity, development of public transport, and access needs.

### 3 Background to the Deliverable

CIVITAS ARCHIMEDES measure no. 49 – Road Safety Measures in Ústí nad Labem – is aimed at increasing the safety level on the streets and in turn encouraging walking and cycling in the city and improving the urban space. The city has a target to reduce the number of deaths and injuries caused by traffic by 40% - 50% and to consequently decrease the number of road accidents.

Accident data were studied to identify safety actions necessary to achieve improvements and to determine how to implement speed reduction areas in the most effective way. The measure will be supported by a Traffic Speed Reduction Publicity Campaign, which will be launched in May 2011.

#### 3.1 Summary Description of the Task

Ústí nad Labem conducted a feasibility study for implementing calm zones restricted to the traffic speed of 30 km/hour. This research was based on the experience of the lead cities and other European cities. Within the task '11.5.4 - Traffic speed reduction', characteristics of calm zones were described, including traffic signs, construction requirements, and related legislation valid for the implementation and much of this information is summarised in this document as Appendices 1, 2 and 3. Individual localities suitable for applying traffic speed reduction were selected and traffic calming measures were analysed for each section. Further information on these locations is included as Appendix 4.

The overall objective of this deliverable was to identify suitable locations across the city for the implementation of traffic calming measures and what measures might be appropriate to implement.

## 4 Traffic Speed Reduction Research

### 4.1 Traffic Planning

Before implementing traffic calming measures in Ústí nad Labem, detailed transport planning is required for the whole area from the nation level, to regional and city planning level. Then, effective traffic calming and speed reducing elements can be applied to specific locations.

Decreased speed of a vehicle decreases stopping distance, giving a driver more time for reaction and thus decreasing the risk of collision with a pedestrian or cyclist. Slower vehicles allow pedestrians more time to assess the safe distance for crossing a road and evoke a greater feeling of security. In terms of the seriousness of injuries, a speed of 30 km/hour is critical to the chances of pedestrians surviving an accident.

Local transport policy must be in accordance with the valid Master Plan of Ústí nad Labem and with proposed changes for territorial use of local and regional areas. It should not deal solely with motor transport and must address other modes of transport – walking, cycling and public transport in the city, intercity buses and railway transport.

Based on the emerging transport policy and the Sustainable Urban Transport Plan, a new concept of transport is developed. Background data are collected including current and foreseen traffic flows and interrelations in terms of location and size of destinations and sources. Then the corresponding infrastructure network is designed and revised to satisfy the mobility needs. Reasonable segregation of individual modes of transport, public transport preference, traffic calming and appropriate parking solutions are applied within the transport policy.

According to the Czech norm ČSN 736110 (Designing of local roads), individual roads are divided into the following functional groups:

- A - Speed roads with transport function
- B - Collective roads with transport and serving function
- C - Utility roads with serving function
- D – divided into:
  - D1 – Local roads with mixed operation
  - D2 – Local roads inaccessible by motor vehicles

Speed roads, type A, are mainly used by transit traffic. Pedestrian crossings on these roads should be separated by elevations or underpasses. On collective roads, type B, traffic calming should be applied adequately not to affect the fluency of the traffic flow. Most pedestrian crossings are located on this type of road. On utility roads, type C, traffic calming is desirable with pedestrian crossings directly on the same level. Local roads, type D, include calming elements within their character. Movement of pedestrians is expected on the whole street profile.

Traffic is organised by directing any unnecessary transport onto roads of higher function type, thus reducing traffic on other local roads in the city. This goal must be achieved through effective tools that ensure good transport links and easy navigation with minimal maintenance. It should be suitable for all modes of transport (private or public transport, cycling, walking), satisfying the urban requirements and protecting the environment. The solution must also be able to meet future traffic needs (predicted mainly from computer traffic models).



The unnecessary traffic can be divided into three categories:

- 1st level: Does not have its source or target in the area, it is transit traffic with heavy burden on roads, undesirable in residential areas and in the city centre.
- 2nd level: Has its source or destination in the area, but it is poorly positioned (e.g. an industrial building in the city centre, a shopping complex with no connection to a sufficient capacity road network). This causes undesirable transport links and burden on local roads with high demand for both freight and personal transport.
- 3rd level: A transport source or destination is well placed in the area, but the transport links are realised by undesirable modes of transport (mainly personal vehicles, whereas public transportation is underutilised). This causes major problem mainly in the city centre.

The unnecessary traffic has high transport demands, lowering road capacity considerably and causing a high density of vehicles in the streets which creates traffic congestion (mainly in peak hours on working days between approximately 8 – 10 am and 4 – 7 pm, depending on local conditions). Furthermore, the risk of traffic accidents is increased, together with the negative environmental impacts (noise, vibrations, dust, and exhaust emissions).

#### 4.1.1 Regulation, Organisation and Traffic Management

**Traffic regulations:** The most demanding instrument in terms of time, financial and human resources. It changes traffic patterns in the area by adequate construction, organizational and regulatory measures, such as:

- Building bypasses
- Prising the entrance to the city centre, tolls
- Lowering the number of parking places, implementing parking fees and residential zones
- Reducing the attractiveness of passing the city centre by narrow lanes, complex intersections, long delays on traffic signals

**Traffic organisation:** Organising the transport network to adapt the current traffic demand in the most effective way by using tools such as:

- Implementing a complex system of one-way roads, dead-end roads, and non-passable roads with more space for parking
- Prohibiting or limiting passage through certain roads
- Prohibiting turning on intersections (preferably in the direction of most conflict points – mainly left)
- Establishing residential zones, "Speed 30" zones
- Implementing calming elements
- The disadvantage of this instrument is the fact that the route of the trip is becoming longer, causing more negative impacts to the surroundings.

**Traffic management:** It is based on direct influence of traffic in the particular location by optimising the conditions in the following way:

- Implementing traffic lights
- Implementing vertical and horizontal traffic signals
- Implementing telematic elements: traffic control station, variable signs and information devices

### 4.1.2 Traffic Calming

Traffic calming is applied to the local roads B and C, local roads D already include calming elements. Proposals for traffic calming are regulated by the norm ČSN 736110 (Designing local roads) and TP 132 (Principles for traffic calming on local roads). Individual issues are further solved by TP 85 (Deceleration retarders), TP 103 (Designing residential and pedestrian zones), TP 135 (Engineering round intersections), TP 179 (Designing infrastructure for cyclists), etc.

According to TP 132, tools for traffic calming are specified as follows:

- Traffic relations within local road network as a prerequisite for subsequent modifications at specific locations, such as establishing zones with traffic restrictions (residential zones, pedestrian zones) in selected parts of the city or of a road.
- Modifications of specific local roads and streets
- Modifications of intersections
- Local modifications

Selection of appropriate calming elements must be performed thoroughly with consideration of traffic conditions on local roads. Adequate proposal should be designed in cooperation with:

- Transport engineers
- Architects
- Representatives of the competent administrative office
- Road administrator
- Police
- Environmental representative
- Representatives of rescue services and fire department

For traffic calming proposals, following must be taken into account:

- Functional division of roads
- Traffic intensity on individual roads
- Traffic accident rate and consequences
- Pedestrians
- Cyclists
- Nature of building patterns (schools, hospitals, cultural facilities, offices, industries and warehouses, type of business and shops, etc.)
- PT routes

Calm roads are such roads, on which transit traffic is excluded or partially excluded, while traffic to the destination in the area is permitted under specific conditions. Traffic calming cannot limit serviceability of the area and access of the rescue vehicles and fire brigade.

Further information on these measures is available in Appendix 1.

## 4.2 Traffic Calmed Zones

Calm infrastructure can be divided into three types:

- pedestrian zone
- residential zone
- zone with reduced speed - TEMPO 30 zones

Each calm zone varies according to type of buildings, the mobility needs of its users and accessibility. In all three types of zones, traffic calming elements should be applied to reduce speed of vehicles and reduce traffic intensity. Characteristics of individual calm zones are described in this chapter.

#### 4.2.1 Pedestrian Zone Characteristics

The characteristics of a pedestrian zone are described in Technical Conditions TP 103 - Designing residential and pedestrian zones, which are based on the Czech norms ČSN 73 6110 and ČSN 73 6102.

Pedestrian zones are primarily intended for pedestrian mobility. They increase the quality of the city environment, in particular in the city centre in business areas, cultural areas etc. Pedestrian zones are implemented on functional roads with mixed operation D1, which are dedicated for mobility of pedestrians and all other transport modes together sharing the same space. Pedestrian zones are suitable for areas attractive to pedestrians.

The basic purpose of the zone is to provide a safe environment for pedestrians. The zone restricts mobility of all transport modes except cyclists, PT and service vehicles. Construction solutions of pedestrian zones emphasize business and residential function over the transport function of the zone.

#### 4.2.2 Residential Zone Characteristics

The issue of designing residential zones is described in the TP 103--Designing residential and pedestrian zones, which are linked to ČSN 73 6110 and ČSN 736102.

Residential zone consists of traffic calm infrastructure (local roads D1), with majority of residential areas with mixed traffic operation, where all participants share a common space.

The purpose of establishing a residential zone in either the existing or new residential parts of the city is to adapt mobility of vehicles to the residential function of the area and thus to improve safety level for residents.

#### 4.2.3 TEMPO 30 Zone Characteristics

Realisation of TEMPO 30 zones is based on the Czech legislation according to the norm ČSN 73 6110, notice no. 30/2001 Coll. In 2011, new technical conditions - "Design zones 30" (TP 218) - were issued and approved by the Ministry of Transport under the reference no. 42/2010-120-STSP/1 with effect from 15.1.2010.

A TEMPO 30 zone is a traffic calming tool which increases the overall value of the infrastructure by improving environment, mitigating negative effects of transport, improving quality of housing, etc. Priority of its implementation is to increase safety of pedestrians and cyclists in the area at the expense of motor transport.

TEMPO 30 zones are designed primarily for utility roads enabling transport services of a wider area and providing access to residential buildings. It is not suitable for major collective roads which also serve transit transport. TEMPO 30 zones are appropriate for areas with many pedestrians. To increase effectiveness of the zone, construction elements can be implemented, such as bumpers, narrowing, elevations at intersections, forced change of direction, etc.)

Further information on these zones, including example pictures, can be found in Appendix 2. Information on current practice within the city can be found in Appendix 3.

## 4.3 Identification of Locations Suitable for Implementation of Calm Zones

Within the task, locations in Ústí nad Labem suitable for implementation of traffic calm zones were identified. The identification was based on the following criteria:

### Area preferences:

- Residential areas with housing estates and dense build-up space;
- Schools and medical facilities.

### Restrictions:

- To ensure the lowest possible impact on the traffic flow – avoid restrictions of major roads (class B);
- To avoid creating an entrance to a calm zone directly from the busy road with high traffic intensity (class B) due to safety risks and distortion of traffic flow;
- Otherwise, if necessary, when entering a zone from a busy road, to implement increased traffic calming elements by the entrance;
- To avoid implementation of calm zones on roads served by PT lines to maintain fluency and speed of PT services;
- To prefer closed impassable areas.

### Characteristics

- To assess the overall nature of the location to preserve integrity and urban significances of each locality;

Selection of suitable locations was based on findings of field surveys, orthographic maps of the city (source: [mapy.mag-ul.cz/ORTOFOTOMAPA\\_2010](http://mapy.mag-ul.cz/ORTOFOTOMAPA_2010)) and knowledge of the territory.

In the following proposed locations it should be possible to implement TEMPO 30 zones at relatively low investment costs. Modifications to the localities of residential zones would require much higher investments. When considering establishment of a residential zone, it is necessary to carry out detailed examination of the locality and individually assess feasibility of the zone and its benefits.

Generally, implementation of residential zones in housing estates is not recommended due to lack of space and high intensity of inhabitants. Residential zones are suitable for locations with family houses, where parking of residential vehicles is realised on private property or on designated areas and the residential zones has high urban level and relaxing atmosphere.

### 4.3.1 Comparison of Individual Solutions of Calm Zones

Implementation and construction solutions for each residential zone and TEMPO 30 zone differs for each specific locality. Two example locations (Dobětice and Předlice) were selected to demonstrate the difference in designing the suitable solution of traffic calming. The solutions and approach are explained in the following paragraphs.

## Process of Selecting the Suitable Calm Zone:

### Residential area Dobětice:

Reasons for traffic calming:

- Residential area (housing estate) with living function;
- High intensity of pedestrians in this densely populated locality;
- Movement of children – primary and nursery school in the area;
- High traffic intensity:
  - Large number of vehicles owned by residents;
  - Insufficient parking capacity – high transport performance even increased when searching for free parking lot;
- Need to avoid unnecessary traffic.

TEMPO 30 zone:

- Reasons for implementation:
  - Low investment costs;
  - Technically undemanding construction solution;
  - Efficient solution for traffic calming (reducing speed via retarders by the entrances to the area);
  - Minimum or no effect on parking;
  - Lowering traffic load by limiting entrance only to vehicles under 2,5tonnes, except transport services.
- Reasons against implementation:
  - Initial investment costs required (even minimum investments present considerable burden to the tight city budget);
  - Negative attitude of general public to physical restricting measures.

Residential zone:

- Reasons for implementation:
  - No reasons.
- Reasons against implementation:
  - High demand on parking;
  - Higher transport performance in the locality;
  - No possibility for establishment of living space (such as play grounds) or space with high aesthetic level due to shortage of space and high traffic intensity.

Analysis of the reasons shows, that residential zone is not a suitable solution for the locality due to its conditions. This is caused by large number of vehicles moving or parking in the area preventing safe coexistence of motorised and non-motorised transport at the same street profile. The area can be effectively calmed by local physical calming measures or rather by implementing TEMPO 30 zone.

### **Předlice (streets Škroupova, Jiráskova, Komenského and Palackého)**

Reasons for traffic calming:

- Residential area (family houses) with living function;
- Movement of children– nursery school in the area
- Need to avoid unnecessary traffic.

TEMPO 30 zone:

- Reasons for implementation:
  - Low investment costs;
  - Technically undemanding construction solution;
  - Efficient solution for traffic calming (reducing speed via retarders by the entrances to the area);
  - Minimum or no effect on parking;
  - Lowering traffic load by limiting entrance only to vehicles under 2,5tonnes, except transport services.
- Reasons against implementation:
  - Low aesthetic level;
  - No significant improvements for non-motorised traffic;
  - Not improving conditions for living and relaxing functions;
  - Sufficient capacity for traffic and parking of vehicles, which enables implementation of calming measures reducing traffic space and increasing space for pedestrians and cyclists.

Residential zone:

- Reasons for implementation:
  - Sufficient capacity for traffic and parking of vehicles, which enables implementation of calming measures reducing traffic space and increasing space for pedestrians and cyclists;
  - High efficiency of traffic calming;
  - Increasing aesthetic and utility value of streets;
  - Possibility of using current road infrastructure for movement of pedestrians and for children;

- Lower intensity of unnecessary transiting traffic due to large amount of calming elements.
- Reasons against implementation:
  - Considerably high investment costs.

This locality may be calmed by implementing either residential zone or TEMPO 30 zone. Residential zone provides greater traffic calming, increases transport safety and presents improvement of conditions for pedestrians and cyclists. However, it is much more demanding solution in terms of investment costs. TEMPO 30 zone causes traffic calming and improved road safety, but conditions for pedestrians are not significantly improved and streets are still not suitable for relaxation and leisure activities



Following examples present schematic transport-technical solution of a residential zone designed for the sample area Předlice and a TEMPO 30 zone for the sample area Dobětice. These examples show differences in construction modifications required for implementation of each of the two zones.

### Demonstration of technical solutions of calm zones

#### TEMPO 30 zone:

Housing estate Dobětice is located on both sides of the important local road Šrámkova, with intensive traffic and PT operation. This road is not appropriate for overall traffic calming due to its transport importance. It is recommended instead to apply local calming measures mainly by public transport stations and pedestrian crossings.

There are two TEMPO 30 zones proposed for Dobětice – on the streets Ježkova, Poláčkova, Brantlova, and the other on streets Rabasova, Kmochova. All entrances to the proposed zones are marked by the traffic sign IP25a “Zone with traffic restrictions”, traffic sign B20a “Highest permitted speed 30 km/hour” and traffic sign B13 “No entry for vehicles whose weight exceeds 2.5 tonnes” with supplementary sign “Transport services permitted”.

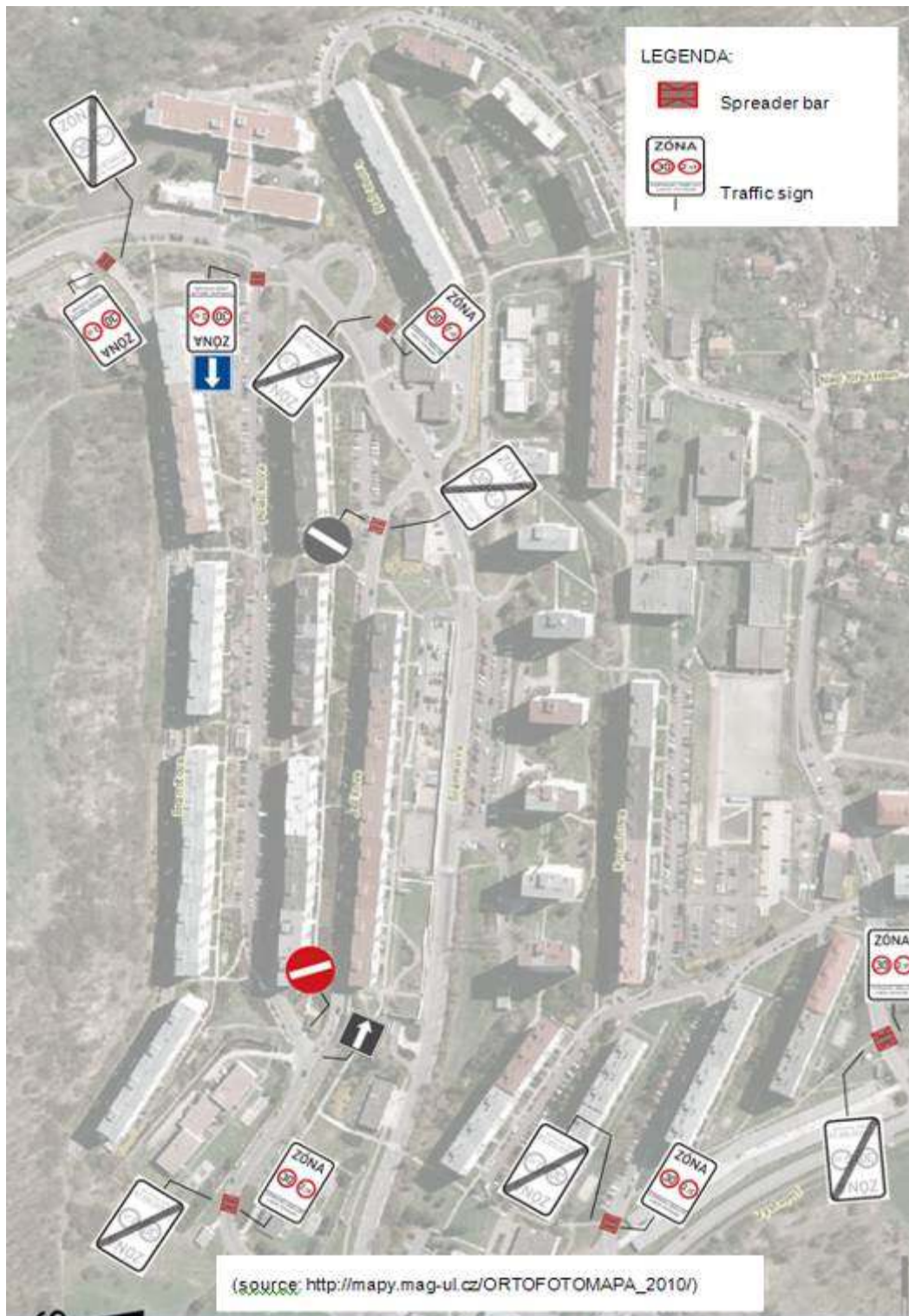
Figure 1 – Traffic sign IP 25a	Figure 2 – Traffic sign IP 26a
	

As a calming tool, speed bumpers Z12 (black and yellow) are proposed. Exits of the zone will be marked by a traffic sign IP 25b “End of the zone with traffic restrictions”. Another suitable calming tool is implementing a one-way traffic system, as proposed for the road

Poláčkova. Such calming solutions do not restrict public transport lines operating in the area. The current infrastructure and sidewalks will not be modified. Other traffic calming measures can be implemented depending on the financial sources of the investor and on the evaluation of effectiveness of the proposed traffic calming solutions. Scheme of the zone is presented on the following picture.



Figure 3 – Schema of the modification into a TEMPO 30 zone (sample area Dobětice)

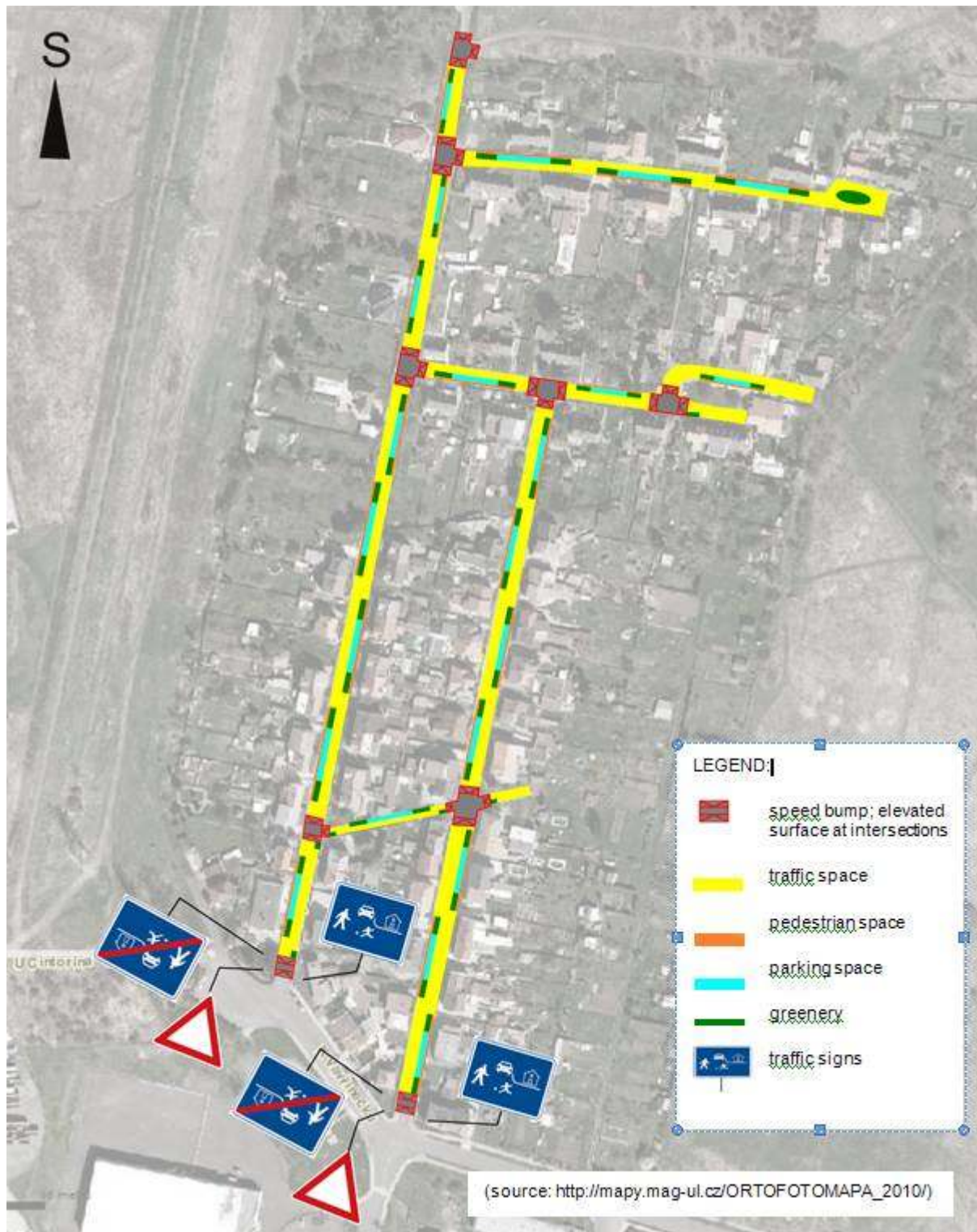


## **Residential zone:**

Unlike the previous solution, the proposed residential zone in Předlice requires complete reconstruction of the area. Streets K Vavřínečku and Jateční are the major roads in the area with intensive traffic and public transport services, therefore they are excluded from the proposed residential zone.

For streets Jiráskova, Škroupova, Komenského and Palackého, sidewalks will be removed and surface will be evened to one level to gain common ground for pedestrians, cyclists, motor traffic with greenery and with designated areas for parking marked by different colour or surface structure. Areas intended for residents will further differ; the surface is proposed to be cobbled. Parking spaces and greenery will form traffic calming barriers. Surface of intersections is proposed to be elevated. For the entrance to the zone, speed bumps are designed and traffic signs IP 26a "Residential zone" or IP 26b "End of the residential zone". Scheme of the zone is presented in figure 4.

Figure 4 – Schema of modifications for the residential zone in streets Předlice, Škroupova, Jiráskova, Komenského and Palackého.





## Comparison of construction modifications:

Construction modifications required for implementation of either residential or TEMPO 30 zone are presented in the following table.

Figure 5 – Traffic calming elements suitable for residential zones and TEMPO 30 zones

TRAFFIC CALMING ELEMENT	Residential zone	TEMPO 30 zone
Vertical and eventually horizontal traffic signs at the entrances to the zone	REQUIRED	REQUIRED
Traffic calming at the entrances (retarders)	REQUIRED	REQUIRED
Increased surface at intersections	REQUIRED	NO
Preventing direct movement of vehicles (implement greenery belts, parking places, etc.)	REQUIRED	NO
System of one-way roads	NO	NO
Clearly defined parking premises limited to minimum	REQUIRED	NO
Differentiated road surface (tiles)	REQUIRED	OPTIONAL
Traffic space at one level	REQUIRED	OPTIONAL
Shared space (coexistence of motorised and non-motorised transport mutually balanced)	REQUIRED	OPTIONAL
Green elements	REQUIRED	NO
Elements for pedestrians (benches, parks, etc.)	REQUIRED	OPTIONAL

## 4.4 Identification of Appropriate Locations

According to their organisation, character of build-up areas and urban function, 16 locations were proposed for implementation of residential areas. These locations are:

- Klíše area:
  - Streets **Kekulova** and **U Lanovky**
  - Streets **Střížovická, Na spáence, U koupaliště** and other streets in the area
  - Streets **Slavíčková, Brožíkova, Alešova**
- Bukov and Všebořice area:
  - Streets **Hynaisova, Šturmová, Bratří Čapků** and other streets in the area
  - Streets **Hornické domy, Zahradní, Lipová, Plynárenská**
- Skorotice area:
  - Streets **Liliová, Leknínová, Kopretinová** and **Na Svahu**
  - Streets **Buzulucká, U Pošty, K. H. Borovského** and **Bukovská**
  - Streets **Buzulucká, K. H. Borovského** and **Na Přání**

- Streets V Lánech, Oblouková, K Rybníku, Nové aleje, Javorová, Lidická, Platanová
- Stříbrníky and Dobětice area:
  - Streets **Hornická** and **Červený vrch**
- Předlice area:
  - Streets **Palackého, Jiráskova, Komenského, Kroupova**
- Neštěmice area:
  - Streets **Turistická** and **Milešovská**
  - Streets **Na Skalce, Picassova, Peškova**
  - Streets **Horní a Hlavní**
- Střekov area:
  - Streets **Jeseniova, Rubensova, Škrétova, Poděbradova** and **Českých bratří**
  - Streets **Riegrova, Purkyňova, Máchova, Puškinova, Kolárova**

Generally, all these locations consist of family houses. The modification into a residential zone requires significant reconstruction works and high investments. Scheme of the reconstruction was presented on the sample area Předlice.

Localities proposed for implementation of pedestrian zones are streets **Hrnčířská** and **Revoluční**.

These proposed areas are shown on the map below. All of the identified areas are located outside the main roads with intensive traffic. Infrastructure proposed for traffic calming is utilised primarily by local residents and transport services. Proper selection of suitable locations for traffic calming included assessment of transport links, presence of school facilities, medical facilities and other important destinations in the area.

With the current trend of rapidly growing traffic in cities, increased number of vehicles and growing parking demand, it is necessary to prevent conflict situations (particularly in respect of pedestrians and cyclists) and to provide quiet environment suitable for relaxing and rest. Calming measures are the most requested improvements in residential areas of the city.

#### 4.4.1 Location of all individual proposed calm zones in Ústí nad Labem



Further information on all of these locations can be found in Appendix 4.

### 4.5 Conclusions

It was presented, that Ústí nad Labem (and generally the Czech Republic) is not fully utilising the potential of calm zones. Efficient traffic calming is currently implemented in the area of Lidické square.

Outside the city centre, routes for pedestrians and routes for pedestrians and cyclists are marked. Vast majority of local roads in residential parts of the city lack any calming elements.

Within the task, 42 locations were identified as suitable for implementation of calm zones. Before the implementation, each calm zone needs to be examined in terms of traffic intensities, expected impact of proposed measures, their benefits and costs.

Modification of a locality to TEMPO 30 zone is quite undemanding, as presented on the example of the sample area Dobětice.

### 4.6 Next Steps

The next steps are to design and implement appropriate traffic calming measures in the 16 locations outlined in Section 4.4 as part of the development and implementation of the Sustainable Urban Transport Plan. All 16 locations will be designed to incorporate the most appropriate measures, as outlined in the examples given in Section 4.3.

Within ARCHIMEDES the next step is to design and implement a traffic speed reduction campaign, which forms task 5.11 within measure 49 and which will be documented in deliverable T49.2. This will in part be informed by this task and also by the work conducted on this topic in San Sebastian.

## 5 Bibliography

Czech Norm ČSN 736110 – Designing local infrastructure

Technical conditions TP 132 – Designing traffic calming policy on local roads

Technical conditions TP 85 – Speed bumps

Technical conditions TP 103 – Designing residential and pedestrian zones

Technical conditions TP 135 - Engineering circle intersections

Technical conditions TP 179 – Designing infrastructure for cyclists

Technical conditions TP 218 – Designing TEMPO 30 zones

Ing. arch Patrik Kotas, Transport systems and buildings, ČVUT publishing, Prague 2002

<http://www.nadacepartnerstvi.cz/doprava/tempo-30>

<http://www.ibesip.cz/files/=3371/TEMPO30.pdf>

# Appendix 1 – Traffic Speed Reduction – Further Information

## 1.1 Purpose of traffic calming

The purpose of implementing calming elements is to establish suitable living conditions by lowering negative effects of motor transport, such as accidents, noise, vibrations, pollutions, and a “barrier effect” (separating space by infrastructure). Localities with calm traffic provide suitable conditions for mobility of vulnerable groups (pedestrians, in particular children and persons with mobility restrictions), allow proper operation of PT and often constitute a preferred dominant of the area. Such modified localities typically contain majority of greenery and appeal attractive to residents.

*Figure 1.1 – Before and after implementing traffic calming (Tempo 30 Zone)*



(source: [www.dsgeoprojekt.cz](http://www.dsgeoprojekt.cz))



Traffic calming is applied primarily:

- in residential areas – to create space suitable for movement, relaxation, games and living
- in the city centre - to establish conditions suitable for safe mobility of large amount of pedestrians and for cyclists
- by road crossings – to protect pedestrians
- by school facilities – to protect children

The basic tools for traffic calming are:

- Speed reduction
- Intensity reduction

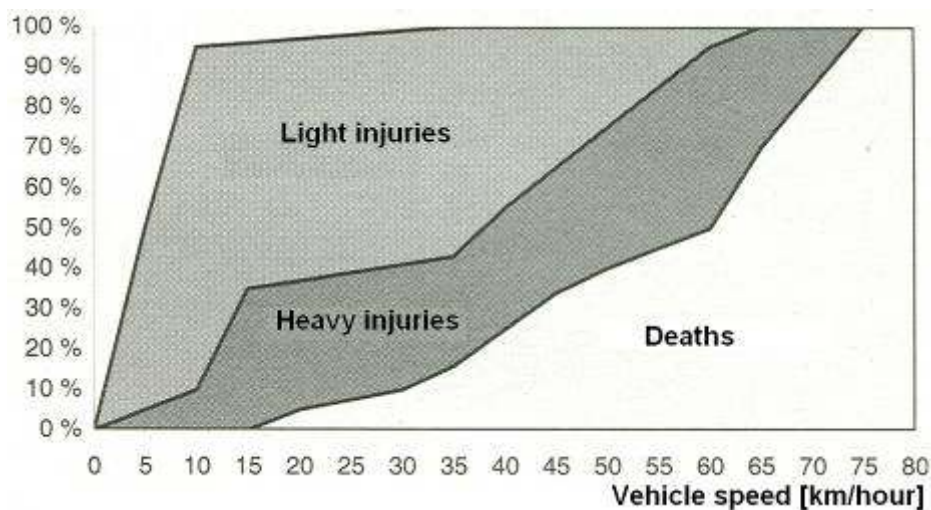
Figure 1.2 – Comparing number of accidents and their consequences in the city and outside the city in 2008 and in 2009.

Location	No. of accidents	No. of deaths	No. of heavy injuries	No. of light injuries	Material damage [mil.CZK]
in the city 2009	52 421	295	1 854	13 452	2 770
index for 2008 - 100%	45,2	75,1	93,2	96,3	60,1
outside the city 2009	22 394	537	1 682	10 325	2 210
index for 2008 - 100%	50,4	89,6	92,5	95,5	70,5

(source: Overview of accidents on roads in the Czech Republic in 2009, Police of the Czech Republic)

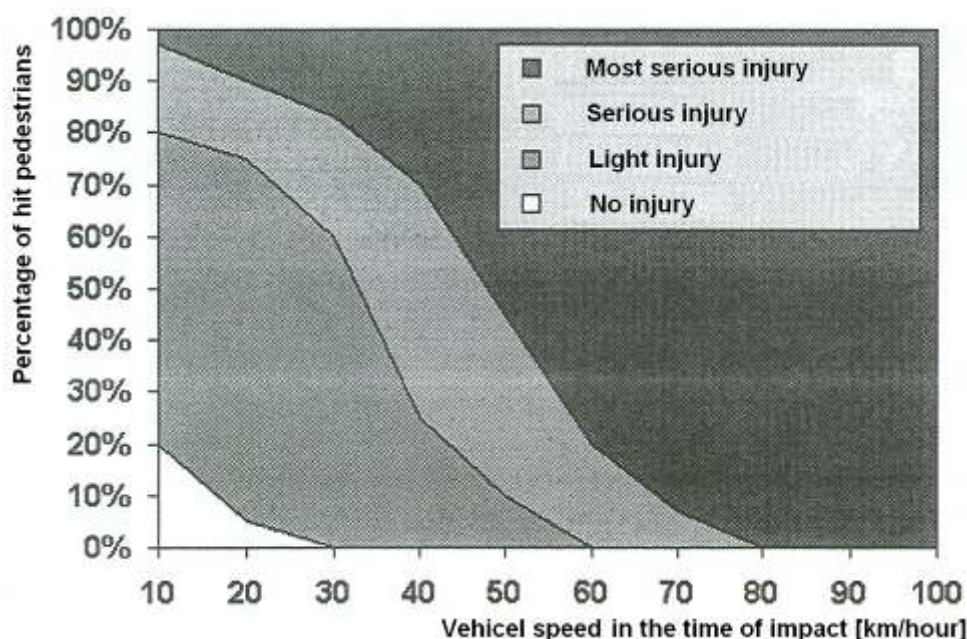
The table above shows that twice as many accidents occur in the city than outside the city. The total number of fatal accidents in the city is lower than those that occur outside the municipality. The number of heavy and light injuries cause by traffic accidents, as well as the material damage, is higher in the city. Relative consequences of traffic accidents related to the number of accidents are lower in the city, which is caused by lower speed limits. If traffic calming is carried out correctly, it has a positive impact on life in the area and reduces negative effects of motor transport and improves the environment. Dependence of negative impacts of traffic accidents on speed is presented in the following graphs.

Figure 1.3 - Impact of speed on the possibility of a traffic accident



(source: lectures on the subject Y2ZK, ČVUT, Prague, Transport Faculty)

Figure 1.4 – Impact of a collision vehicle-pedestrian on severity of injuries depending on traffic speed



(source: lectures on the subject Y2ZK, ČVUT, Prague, Transport Faculty)

## 1.2 Calming elements towards speed reduction

Calming elements are used at specific localities, where it is necessary to force a driver to slow down, such as at the entry to the city, in residential areas, schools, sport centres, cultural centres and other facilities, in the city centre, by cyclists and pedestrian crossings, etc.

Most commonly, calming elements are applied on local roads C and D, where such measures do not violate the fluency of traffic flow and do not contribute to congestions. Local roads class B are less suitable for traffic calming and require control of traffic throughput.

Traffic calming elements can be divided into psychological, physical and physical-psychological.

### i. Psychological elements

- vertical traffic signs: repeated, highlighted by reflective surface or illumination, suitable for warning about movement of children (sign A12), speed limitation (sign B20a);
- radars informing drivers about their current speed: warning to avoid exceeding the speed limit, suitable at the entrance to the city, at crossings with frequent occurrence of children;

- horizontal traffic signs: lines marked on the road, white serpentine (sign V12e), triangle (sign V17), optical psychological brake (sign V18), red markings of crossings, 3D highlight, etc;
- perspective: narrowing down guiding lines on roads, greenery along roads;
- change of road surface: different colour, especially red paint increases attention; rough surface shortening the braking distance;
- gates and other: lights by roads, trees and bushes not limiting the view, greenery evoking tunnel effect; require frequent maintenance.

## ii. Physical-psychological elements

- Combination of physical and psychological elements with visual and acoustic effect on drivers: change of surface roughness (granite tiles, abrasive paint), curved slots, elevated stripes (up to 15 mm)

## iii. Physical elements

- Elevated surface: deceleration bumps, elevated crossroads and intersections; basic traffic calming tool; suitable for integration with pedestrian crossings allowing barrier free access to pavements, which are at the same level; cause visual, acoustic and especially physical impact on drivers.
- Deviation from the direction: obstacles marked on roads to force drivers to change direction.
- Narrow roads: drivers subconsciously reduce speed in narrow sections; it is necessary to ensure passage of large vehicles, sufficient width is verified by towing lines of a control vehicle; suitable on road sections with pedestrian crossings, where shorter crossing distance improves an overall safety level for pedestrians. Narrowing is implemented by:
  - narrowing the width of a driving lane;
  - planting greenery by roads: frequently used by parking lanes and intersections.
  - separating islands/belts: effective tools for increasing safety for pedestrians by providing protection in the middle of the of the road; allow implementation of “Z” crossings (zigzag) preventing primarily children from directly crossing a street; encourage looking in both directions.
  - With the original road sides – narrowing driving lanes;
  - With shifted road sides – possibility to preserve the original width of driving lanes, or narrowing driving lanes to fit the new road profile; transiting vehicles are forced to slightly change direction causing certain speed reduction.

## iv. Combination of elements

- Increases effectiveness of individual measures.
- Each case requires specific assessment, proposal of possible variants and appropriate selection of solutions.

Most of all, traffic calming is achieved by utilising physical elements, which force drivers to reduce their speed most effectively. At the same time, such solution has the worst impact on traffic flow and throughput of the infrastructure. When developing a traffic calming proposals, it is therefore necessary to consider all current and future restrictive conditions and required speed of vehicles. Example of restrictions is public transport services or planned construction works in the area, etc. Along with the physical traffic calming elements, it is desirable to

implement also psychological elements to increase effectiveness of the tool. Physical elements are especially suitable for pedestrian crossings, where they constitute a physical barrier. Psychological elements alone can be implemented only on sections with low traffic intensity and low pedestrian flow.

Figure 1..5 -Different traffic calming tools recommended for implementation to achieve speed reduction.

Hlavní typy prvků		Způsob využití komunikace				Žádoucí rychlost (km.h <sup>-1</sup> )		
		B1, B2	B3	C1	C2, C3	50	40	≤ 30
		převážně dopravní	obslužně dopravní	dopravně obslužná	obslužná			
1		x	(x)			x	(x)	
2		x	(x)			x	(x)	
3		[x]	x	x	x		x	x
4		(x)	x	x	x	(x)	x	x
5			(x)	x	x		x	x
6			(x)	x	x			x
7			[x]	(x)	x		x	x
8			[x]	(x)	x	(x)	x	x
9				(x)	x		(x)	x
10				(x)	x		(x)	x
11				[x]	x		[x]	x
12				[x]	x		[x]	x
13					x			x
14					x			x

Poznámky :  
x Doporučené použití,  
(x) Používá se pouze v případech vysoké intenzity provozu motorové **nebo** pěší dopravy,  
[x] Používá se pouze v případech vysoké intenzity provozu motorové **a zároveň** pěší dopravy,  
☐ U prvků č. 3, 4, 5, 8, 9, 10, 13 a 14 je možná kombinace s přechodem pro pěší.

(source: TP 132)

## v. Active elements

Deceleration elements should be implemented in combination with appropriate active elements, especially in case of frequented local roads, with more driving lanes and with high intensity of pedestrians. The active elements are mainly:

- Reflective lights on crossings
- Lighted vertical traffic signs

- Device detecting pedestrians on road crossings activates lights on the traffic sign warning about crossing pedestrian (sign IP6) and flashes lights on the road surface (LED diodes).
- Detection of vehicle speed:
  - Assessing input and flashing traffic sign warning about exceeded speed limit (for example sign B20a – Highest permitted speed)
  - For vehicles exceeding the speed limit, traffic light changes to red signal “STOP”.

Active elements are intended as complementary tools for primarily physical elements and should be utilised only for critical road sections. Their operation is economically demanding and requires frequent maintenance. Furthermore, their rare occurrence increases their effectiveness.

### 1.3 Calming elements for intensity reduction

Traffic performance in the area can be reduced by two principles: reduction of calm traffic demand or calm traffic supply.

#### vi. Decreasing demand for calm road usage

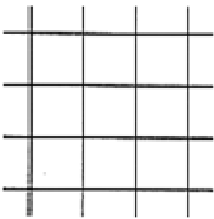
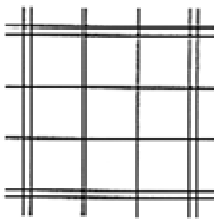
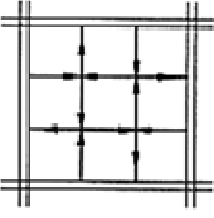
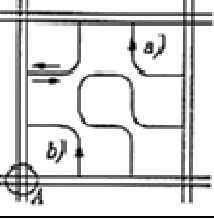
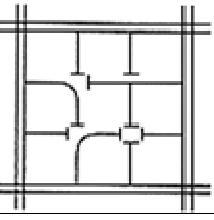
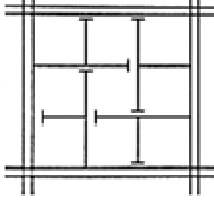
The demand can be reduced by providing improved, faster and more convenient alternative routes in the area. Locations intended for traffic calming will become difficult to travel due to a system of one-way roads and a large number of calming elements for speed reduction. The area will be furthermore provided with high-quality PT services, entrance restrictions for large vehicles, etc.

#### vii. Decreasing supply of calm roads

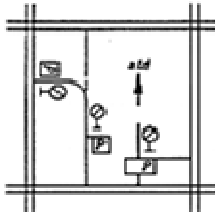
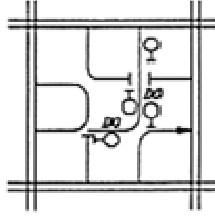
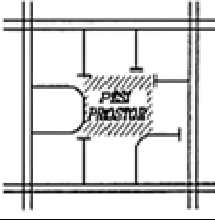
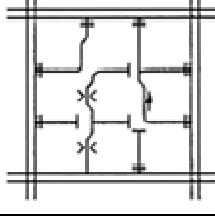
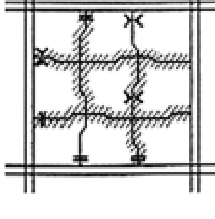
The supply can be reduced by lowering road capacity. It can be realised by reducing number of driving lanes, narrowing roads, interrupting traffic flow by implementation of traffic lights, etc.

With respect to the environment, it is desirable to preserve fluent traffic regulated by physical calming elements, such as repeated dividing islands, division of lanes for each direction, implementation of parking strips/belts, cycle lanes or lanes with greenery.

Figure 1.6 - Hierarchy of roads with traffic calming elements

Purpose	Calming tool	Description	Scheme	
		Non-differentiated local road, all roads of the same importance		
Eliminating freight vehicles Eliminating transit traffic	supply of quality drive-away road or physical closure	Cumulating traffic on the periphery		
	Disadvantageous passage	One-way roads prevent direct passage		
	Disabling passage		Loops in both directions or in one direction (preferably solution a allowing bypass of the intersection A)	
			Blind roads - simple or complex	
			Blind roads with limited entrance from the periphery	



Purpose	Calming tool	Description	Scheme
Eliminating transit traffic and restricting destination traffic	Restricting passage by removing inconvenient destinations, supply of quality PT services, suitable parking policy.	Shifting destinations from calm areas; Changes in modal split; Providing Park+Go premises on the periphery; Zones with paid parking.	
Eliminating transit traffic and destination traffic	Limiting passage by restricting motor transport with exceptions	Limitations in time, period or permanent.	
Eliminating all motor traffic including local services	Infrastructure dedicated to pedestrians only	Marked by traffic sign, physical barriers (removable for emergency vehicles)	
Speed reduction	Traffic signs; Spreader bars; Narrow roads; Avoiding direct passage; Avoiding view into a long distance.	Forced speed reduction	
Priority for pedestrians	Residential areas	Movement of both vehicles and pedestrians together (traffic intensity reduction, speed reduction, safety improvements)	

(source: TP 132)

## 1.4 Calming elements for intersections

For traffic calming on intersections, above listed calming elements can be implemented. Other suitable solutions are:

- Construction works preventing fast entrance on the intersection:
  - small circular intersections, mostly with one-lane entrance;
  - mini-circular intersection;

- narrow entrance to the uncontrolled intersection, realised for example by inserting a middle split island or enlarging width of sidewalks in the intersection;
  - elevating the intersection surface to the level of adjacent sidewalks.
- Deliberate omission of traffic signs determining the right of way for drivers and thus apply the “right side priority” rule; such solution is not suitable for intersections, where one of the crossing roads appears to be superior – in that case, psychological superiority should be eliminated by appropriate construction modifications.
- Adjustment of the signal plan for traffic light-controlled intersections in favour of pedestrians.
- Sequent traffic lights on consecutive intersections to reduce speed of vehicles:
  - coordination adjusted to low speed;
  - avoiding green wave to force drivers to reduce speed.



# Appendix 2 - Further Information on Traffic Calmed Zones

## 2.1 Pedestrian zones

### viii. Operating conditions

The basic operating conditions result from the legislation of the Czech Republic (§23 and §39 of Act No. 361/2000 Coll. and §12 of the 1 point. hh) Decree No 30/2001 Coll.), which states, that:

- Pedestrians may use a pedestrian zone in its entire width
- Entrance to a pedestrian zone is allowed only to vehicles referred to in the lower part of the traffic signs "pedestrian zone" (IP 27a)

If vehicles are allowed to enter a pedestrian zone, than:

- Speed of a vehicle may not exceed 20 km/hour;
- Driver must ensure increased attention for pedestrian, must not endanger them and, if necessary, stop the vehicle;
- Parking is permitted only in places designated as parking premises;
- Pedestrians must allow passage of vehicles;
- When leaving a pedestrian zone to another road, a driver must give priority of way.

### ix. Attributes

Basic attributes of a pedestrian zone are:

- priority for pedestrians;
- one height level;
- high architectural value
- designation by traffic signs;
- construction solution for entrances to a pedestrian zone
- greenery
- mobiliary

## x. Traffic signs

A pedestrian zone is marked by vertical traffic signs IP27a and IP27b.

Figure 2.1 - Traffic sign marking a pedestrian zone



IP 27a "Pedestrian zone"



IP 26b "The end of a pedestrian zone"

(source: <http://www.zakruta.cz>)

For establishing a pedestrian zone, it is necessary to seek transport solution for the wider area, including parking solution (sufficient parking premises in the walking distance, garages for residents and visitors) and to ensure access for supply transport, emergency vehicles and access to PT services. In some reasonable cases, PT lines can operate through pedestrian zones.

## xi. Benefits and negatives

Benefits of pedestrian zones are:

- significant improvement of conditions for pedestrian mobility;
- utilisation of greenery and mobiliary;
- improvement of the aesthetic and ecological level of the area.

Negatives of pedestrian zones are:

- need for frequent maintenance;
- demanding solution to ensure transport services and parking in the wider area.

## xii. Examples of implemented pedestrian zones

Figure 2.2 - Pedestrian zone in Opava-Ostrožná (Czech Republic)



(source: <http://www.s-projekt.cz/cz/reference/mestske-pesi-zony-a-centralni-prostory/pesi-zona-ul-ostrozna-opava/>)

Figure 2.3– Pedestrian zone in Košice (Slovakia)



(source:[http://www.spvd.cz/?p=svet/sk/kosice/kosice.html&m=svet/sk/kosice/menu\\_kosice.html](http://www.spvd.cz/?p=svet/sk/kosice/kosice.html&m=svet/sk/kosice/menu_kosice.html))

Figure 2.4 - Pedestrian zone in Drážďany (Germany)



(source: <http://picasaweb.google.com/lh/photo/K8gYf7AdW3smVFuGg6Snnw>)

## 2.2 Residential zones

### xiii. Division

Residential zones area divided according to the type of buildings to:

- residential zone with scattered buildings - implemented mainly in the residential areas with prevailing low-floor buildings, where is the local transport infrastructure defined by a border of adjacent land.
- residential zone in the build-up urban area - mainly low-floor or medium-floor buildings prevailing; local infrastructure defined by road line or construction line.

According to the default state of the territory intended for traffic calming:

- new residential premises (greenfield) – detailed survey of the residential area is carried out based on background documents of an investor.
- reconstruction of the existing infrastructure - frequent problem is lack of space due to the existing buildings and engineering networks.

### xiv. Operating conditions

Operating conditions:

- speed limit is set to 20 km/hour;
- driver must ensure increased attention to pedestrians;
- parking is permitted only at designated parking premises;
- pedestrians utilise the residential zone in its whole width;
- children are authorisation to play directly in the transport area;
- pedestrians and children must allow passage of vehicles;
- When leaving a pedestrian zone, a driver must give priority of way.

The operating conditions are based on the Czech Republic legislation according to §23 and §39 of Act No. 361/2000 Coll.

### xv. Attributes

Basic attributes of residential zones are:

- joint operations of all users (drivers of motor vehicles, cyclists and pedestrians) on the common space;
- one height level of the infrastructure;
- separation of transport space and residential space optically (different surface) and physically (curb, pavement pillars, etc.);
- movement of vehicles limited by construction modifications (e.g. forced change of direction, narrowing, speed bumps, etc.);
- large amount of calming elements;
- area designated by traffic signs;
- construction modifications of entrances;
- unnecessary transport eliminated;
- superiority of the residential function over the transport function;
- children authorised to play in the transport area;
- green as a both aesthetic and calming element;
- parking only at designated parking premises.



## xvi. Traffic signs

Residential zones are marked by vertical road traffic signs IP26a and IP26b.

Figure 2.5 - Traffic sign marking a residential zone



IP26a – Residential zone



IP26b - End of a residential zone

(source: <http://www.zakruta.cz>)

## xvii. Benefits and negatives

Benefits of residential zones are:

- Improvement of the overall housing comfort in the residential zone;
- traffic calming;
- improvement of conditions for mobility of pedestrians and cyclists;
- increasing safety of citizens and their property;
- extending space available for residents;
- improving road safety;
- spreading greenery and improving the aesthetic and ecological level of the city environment;
- ensuring transit of vehicles of the integrated rescue system.

Negatives of residential zones are:

- overall increase of implementation costs;
- complications for layout of engineering networks;
- demanding maintenance.

## xviii. Examples of implemented residential zones

Figure 2.6 - Residential zone in Tovří (Czech Republic)



(source: <http://www.dsgeoprojekt.cz>)

Figure 2.7– Residential zone in Kbely-Luštěnická (Czech Republic)



(source: <http://www.lustenicka.cz/galerie.php>)



Figure 2.8 - Residential zone in Hostivař (Czech Republic)



(source:[http://commons.wikimedia.org/wiki/File:Hostivař,\\_Selská,\\_zvonice\\_a\\_kostel\\_z\\_ulice\\_Mezi\\_potoky.jpg](http://commons.wikimedia.org/wiki/File:Hostivař,_Selská,_zvonice_a_kostel_z_ulice_Mezi_potoky.jpg))

Figure 2.9 - Residential zone in Praha (Czech Republic)



Figure 2.10 - Residential zone in Freiburg (Germany)



(source:<http://picasaweb.google.com/lh/photo/P5MRhGKV2H-xhALYn02K5A>)

Figure 2.11 - Residential zone in Falls Church (Virginia, USA)



(source:<http://www.fallschurchva.gov>)

Figure 2.12 – Incorrect position of road traffic signs in Slovakia



(source: <http://drahovsky.blog.sme.sk>)

## 2.3 TEMPO 30 zones

### xix. Operating conditions

Operating conditions:

- speed limit set to 30 km/hour;
- right of way from the right side applies to all intersections;
- driver must ensure increased attention to pedestrians;
- parking of vehicles is allowed unless there are other local restrictions given;
- pedestrians must use pavement;
- children are authorised to play only on sidewalks.

### xx. Attributes

Basic attributes for TEMPO 30 zones are:

- infrastructure is divided into road and pavement by curbs – drivers, cyclists and pedestrians do not share a common;
- traffic lights not present, right of ways on intersections from the right side;
- traffic restricted by construction modifications (e.g. bullying, narrow sections, speed bumps, elevated surface, etc.);
- other calming elements installed;
- designated by road traffic signs;
- pedestrian crossings are not marked, pedestrians can cross anywhere;
- residential function is superior over the transport function;
- greenery as aesthetic and traffic calming element;
- parking of vehicles is not restricted (if not given otherwise).

## xxi. Traffic signs

A TEMPO 30 zone is marked by vertical traffic signs IP 25a and IP 25b.

Figure 2.13 - Road traffic signs marking the TEMPO 30 zone



IP 25a – Zone TEMPO 30



IP 25b - End of TEMPO 30 zone

## xxii. Benefits and negatives

Benefits of TEMPO 30 zones are:

- Improved safety due to speed reduction;
- Elimination of collision situations;
- Improved traffic flow with smaller fluctuations of speed and thus noise reduction;
- Improved conditions for cycle transport;
- affordable low cost measure with low need for construction works;
- improved aesthetic, ecological and urban level of the city area;
- increase attractiveness of calm areas

Negatives of TEMPO 30 zones are:

- Inconvenient for PT services, which do not have priority of way in TEMPI 30 zones.



## 2.4 Examples of implemented TEMPO 30 zones

Figure 2.14 – TEMPO 30 zone in Brno (Czech Republic)





(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)

Figure 2.15 - Zone TEMPO 30 in Modřice u Brna (Czech Republic)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)



Figure 2.16 – Zone TEMPO 30 in Rybitví (Czech Republic)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládáný P.)

Figure 2.17- Zone TEMPO 30 in Praha (Czech Republic)



Figure 2.18 - Zone TEMPO 30 (Germany)



(source: [http://www.bfu.ch/PDFLib/1068\\_42.pdf](http://www.bfu.ch/PDFLib/1068_42.pdf))

Figure 6 – Zone TEMPO 30 in Emsdetten (Germany)



(source: <http://www.emsdettenervolkszeitung.de/lokales/emsdetten/Frage-3-Wie-ist-das-mit-der-30-Zone-an-der-Wilhelmstrasse-%3Bart954,978471>)



Figure2.20 - Zone TEMPO 30 in Berlin (Germany)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)

Figure 2.21- Zone TEMPO 30 in Refrath (Germany)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)

Figure 2.22 - Confusing road signs for TEMPO 30 zone (Germany)



(source: <http://big2k.net/2009-verwirrende-verkehrssituation-durch-verkehrsschilder>)

Figure 2.23 - TEMPO 30 zone in Leidschendam (Netherlands)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)



Figure 2.24- TEMPO 30 zone in Hönigsberg (Austria)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)

Figure 2.25 - TEMPO 30 zone in Bisamberg (Austria)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)

Figure 2.26 - TEMPO 30 zone in Vienna (Austria)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)

Figure 2.27 - TEMPO 30 zone in Paris (France)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládany P.)



Figure 2.28 - TEMPO 30 zone in Göteborg (Sweden)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládány P.)

Figure 2.29 - TEMPO 30 zone in Gothenburg (Sweden)



(source: CDV; presentation: TEMPO 30 Zone and its benefits for pedestrians; Skládány P.)

## Appendix 3 - Current Practice of Calm Zones in the City

In the Czech Republic, it is not common to widely implement calm zones. Usually, residential or pedestrian zones are located in the city centre, on large squares and surrounding areas. Residential zones are often applied in new housing estates. Current city infrastructure is frequently equipped by local traffic calming elements, such as protective islands on pedestrian crossings and black and yellow speed bumps.

Similarly in Ústí nad Labem, residential zone is located in the city centre on the Lidické square and provides recreational area with greenery, fountain and benches. However, beginning of the residential zone in the street Velká Hradební is congested with intensive traffic towards the collective garages and parking slots.

*Figure 3.1 – Residential zone in the city centre of Ústí nad Labem*



A pedestrian zone is implemented through the Municipality complex, which was newly reconstructed and is widely utilised by city residents.

*Figure 3.2– Pedestrian zone through the Ústí nad Labem Municipality complex*



Another residential zone is marked in the Pivovarská street, although its arrangement lacks relaxing comfort – there is no greenery or benches in the zone.

*Figure 3.3 – Residential zone in Pivovarská street*



Another large public space is Mírové square which has eliminated motor traffic except the transport services. The location is served by the majority of PT lines and is highly frequented by commuters. The square was recently reconstructed but no calming elements were implemented here.



Figure 3.4 - Mírové square (calm zone is not implemented)



Zones with reduced speed are rare in the city, only part of the Dlouhá street is marked as a zone with permitted speed 20 km/hour and serves as an entrance to collective garages.

Figure 3.5 – Zone with a speed limited of 20 km/hour



Short pedestrian zones are marked on several road sections throughout the city.

*Figure 3.6 – Pedestrian zone in Velká Hradební*



Other calm infrastructure in Ústí nad Labem is implemented outside the city centre and is marked by road traffic signs DZ C7a – Route for pedestrians, or C9a – Route for pedestrians and cyclists. Such calm roads lead outside built-up areas and are used for recreational and sport purposes.

*Figure 3.7 – Elbe cycle route in Děčínská street (Ústí nad Labem)*



Figure3.8 – Elbe cycle route in the street Tomáše ze Štítného (Ústí nad Labem)



Figure 3.9 – Route for pedestrians in Severní Terasa (Ústí nad Labem)





Sometimes the traffic calming elements are not implemented appropriately. For example, from the intersection Děčínská – Vítězná, the Elbe route continues as a pedestrian and cycle route via a dedicated lane in the main transport area with no physical separation.

Figure 3.10 – Incorrect implementation of a pedestrian and cycle route



# Appendix 4 - Locations Suitable for Implementation of Calm Zones

## 4.1 City centre

Figure 4.1 – Locations in the city centre



Selected locations:

### Mírové square, streets Hrnčířká and Revoluční

- Frequented part of the city centre with intensive pedestrian mobility, many points of interest including offices, major PT stations and transfer to train or intercity buses in the vicinity;
- Road with traffic limited only to PT lines and transport services;
- The square was recently reconstructed but lacks greenery and resting areas, serves only as a passable area.
- Suitable for implementing a pedestrian zone with ongoing operation of PT lines and transport services;
- Operation of supply services restricted to a time outside the busy hours.
- Consistent construction solution required – one level surface, clearly defined space for vehicles and for pedestrians, separated by greenery, rails or terrain;
- Designated space for Taxi parking and standing of supply vehicles.

Figure 4.2– Proposal for a road traffic sign marking a calm zone in the Mírové square







- area with family houses;
- road in Kekulova street is passable;
- location is suitable for reconstruction into a residential zone.

## **2. Street U Panského dvora**

- impassable road;
- build-up area with dense panel houses;
- high school and training college in the area.

## **3. Streets Na Vlnovce, Mezidomí and U Městských domů**

- passable area;
- built-up area of panel houses.

## **4. Streets Strážovická, Na spáence, U koupaliště and other streets in the area**

- not passable area;
- majority of family houses;
- swimming pool and sport facility in the area;
- part of the area suitable for realisation of a residential zone – not the whole location due to its relatively large size, which would cause significant time losses for transiting vehicles (mainly emergency vehicles).
- specific solutions are required by the entrances from the busy streets Klíšská and Štefánkova to ensure safety and avoid restrictions of the traffic flow.

## **5. Streets Ostrčilova, Bezručova, Sládkova and Kvapilové**

- blocks of flats, primary schools, high school;

## **6. Streets Slavíčková, Brožíkova, Alešova**

- family houses;
- suitable for implementation of a residential zone.

## **7. Streets Slavíčková, Alešova and Vilová ulička**

- majority of family houses, blocks of flats;
- solutions for the entrance from the busy street Štefánkova required.

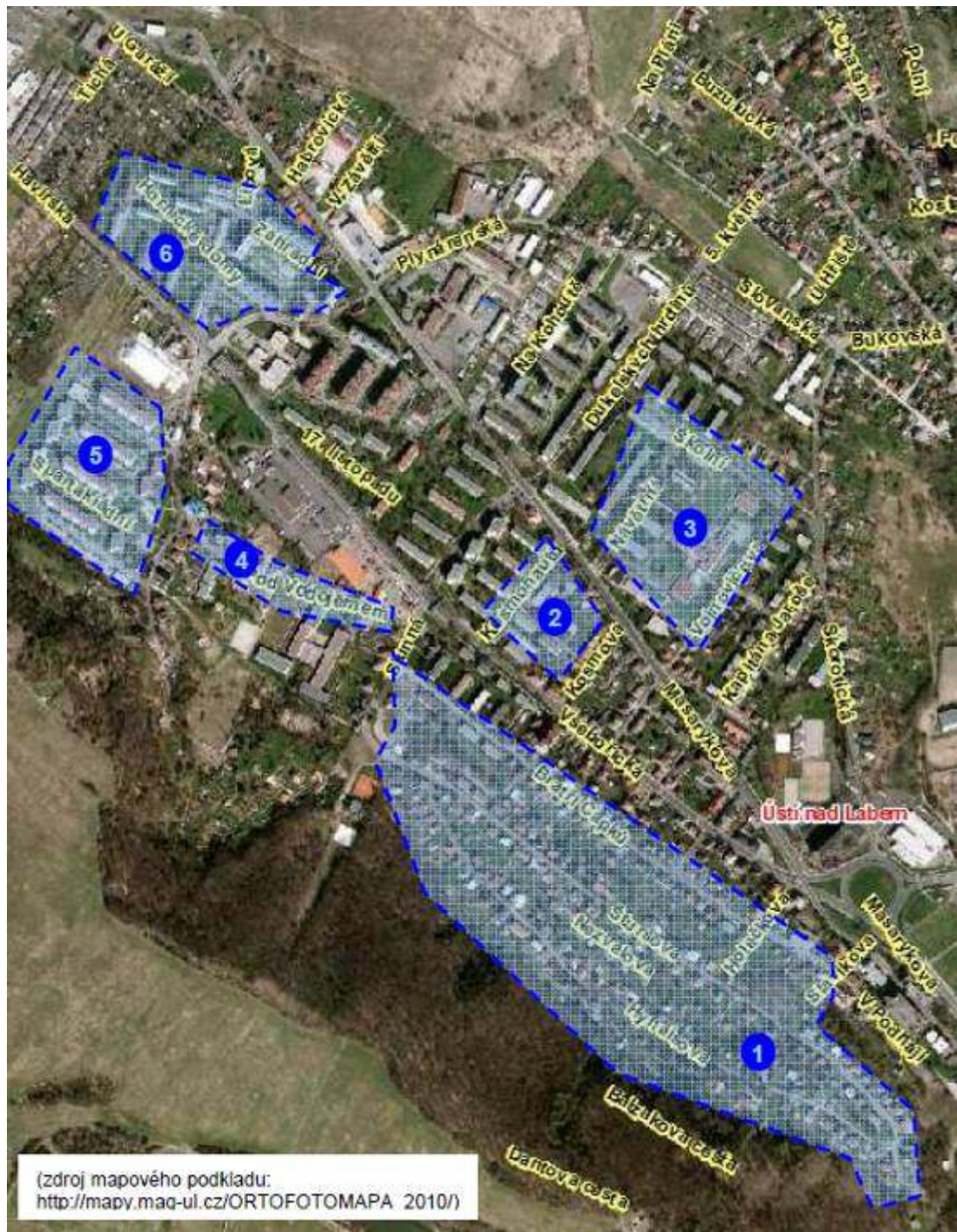
## **8. Streets V Podhájí and V jámě**

- not passable by the hospital complex.



## 4.3 Bukov and Všebořice

Figure 4.4 – Locations in Bukov and Všebořice



Selected localities:

### **1. Streets Hynaisova, Šturmová, Bratří Čapků and other streets in the area**

- family houses and several panel blocks;
- the whole area, despite the relatively large size, is suitable as a residential zone due to many entrances
- calming elements by the entrances should not restrict traffic flow at the nearby busy street Všebořická.

### **2. Streets Kosmonautů and Jožky Jabůrkové**

- mainly panel houses, nursery school in the area.

### **3. Streets Školní, Návětrná and Vojnovičova**

- panel blocks, primary school;
- maximum calming elements are appropriate for implementation.

### **4. Streets Pod Vodojemem**

- nursery school and primary school;
- passable road;
- suitable for traffic calming.

### **5. Street Spartakiádní**

- housing estate of panel blocks;
- not passable road.

### **6. Streets Hornické domy, Zahradní, Lipová, Plynárenská**

- blocks of flats;
- residential zone is possible.





Selected localities:

**1. Streets *Liliová, Leknínová, Kopretinová and Na Svahu***

- impassable area;
- family houses;
- suitable as a residential zone.

**2. Streets *Buzulucká, U Pošty, K. H. Borovského and Bukovská***

- family houses;
- passable area;
- suitable as a residential zone.

**3. Streets *Buzulucká, K. H. Borovského and Na Přání***

- family houses;
- not passable;
- suitable as a residential zone.

**4. Streets *V Lánech, Oblouková, K Rybníku, Nové aleje, Javorová, Lidická, Platanová***

- family houses, area in development;
- not passable;
- suitable as a residential zone.







# 4.6 Stříbrníky and Dobětice

Figure 4.7– Locations in Stříbrníky and Dobětice



Selected localities:

**1. Streets SNP, Hilbertova, I. Olbracht, Obránců míru, Ondříškova, Holařova, Veleslavínova, Na Vyhliďce, Mošnova**

- family houses, blocks of flats, panel houses;
- primary school;
- calming elements necessary for the entrances to the area from the busy street Bělehradská;

**2. Streets Hornická and Červený vrch**

- family houses;
- passable area;
- suitable for implementation of a residential zone.

**3. Streets Na spádu**

- panel houses and small family houses;
- suitable for implementation of a residential zone.

**4. Streets Kmochova and Rabasova**

- dense panel blocks, nursery school, primary school.

**5. Streets Brandtova, Poláčkova and Ježkova**

- dense panel blocks.

**6. Streets Šumavská, Jizerská, Orlická**

- panel blocks, primary school;
- passable area.







## 4.7 Předlice

Figure 4.8 – Selected locations in Předlice



Selected localities:

**1. Streets Prostřední, Marxova a Dostojevského, Mahenova, B. Němcové and Školní náměstí**

- blocks of flats, primary school;
- calming elements should be applied on the entrances from the busy road Hrbovická..

## 2. Streets Palackého, Jiráskova, Komenského, Škroupova

- family houses;
- impassable road;
- suitable for implementation of a residential zone.

## 4.8 Krásné Březno

Obrázek 4.9 – Selected localities in Krásné Březno





Selected localities:

### 1. Streets *Vojanova* and *V Obouku*

- panel houses and several family houses, primary schools.

### 2. Street *Přemyslovců*

- panel blocks, primary school.

### 3. Streets *Žežická*

- panel blocks, nursery school, primary school.

### 4. Streets *Anežky České* and *Dr. Horákové*

- panel blocks.

### 5. Streets *Obvodová*, *Rozcestí*, *Čechova*

- dense panel blocks, primary school, high school;
- street *Neštěmická* serves the surrounding area.

### 6. Streets *Keplerova*, *Družstevní*, *Husova*, *Erbenova*, *U pivovarské zahrady*

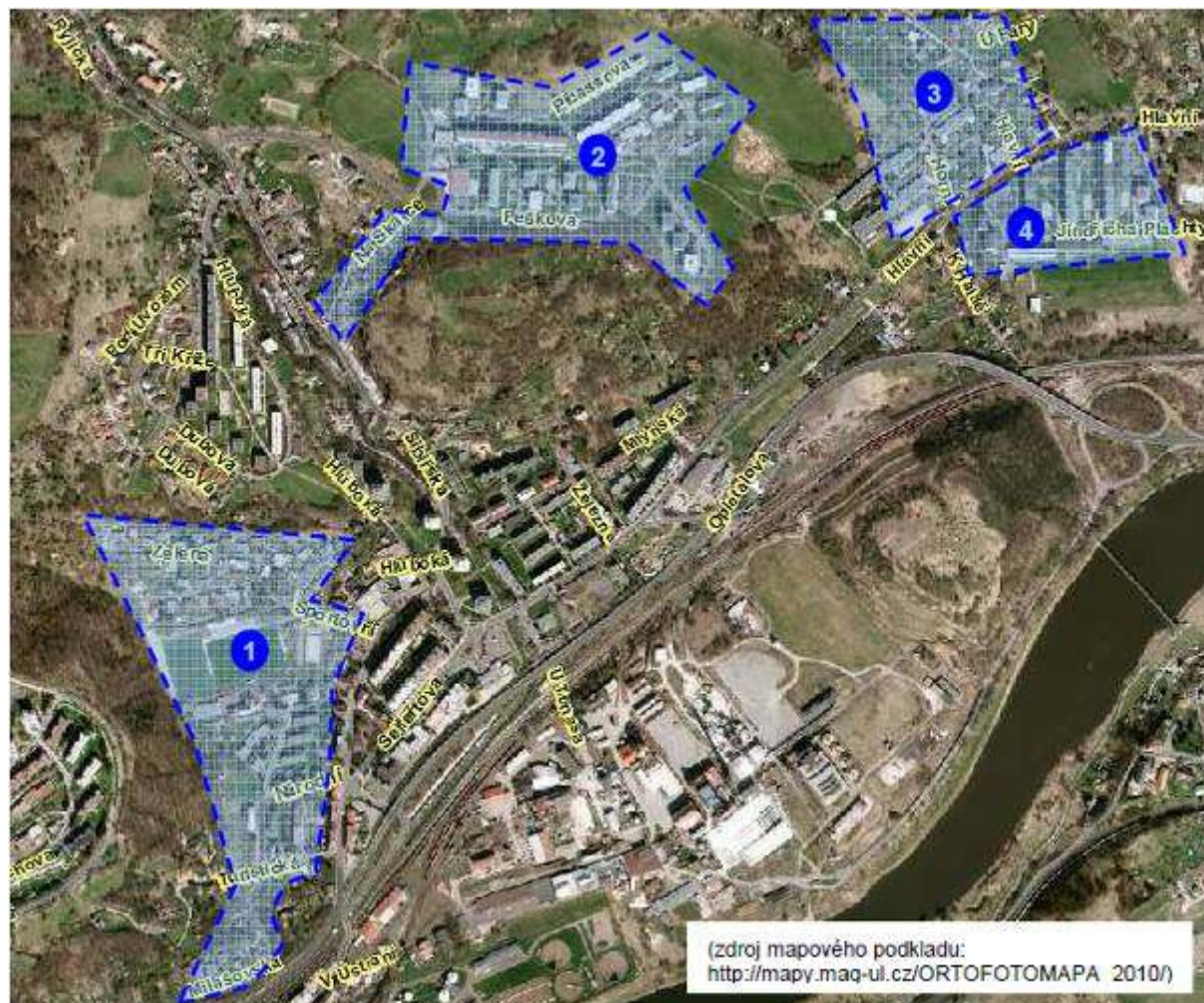
- block of flats and panel blocks, nursery school, high school.

Figure 4.10– Selected locations in Krásné Březno 2



## 4.9 Neštěmice

Figure 4.11 – Selected locations in Neštěmice





Selected localities:

**1. Streets Sportovní, Zelená, Květinová, Studentská, Národní, Májová, Jánského, Turistická, Milešovská**

- panel blocks, block of flats and family houses;
- school facilities in the area;
- residential area is suitable for streets Turistická and Milešovská.

**2. Streets Na Skalce, Picassova, Peškova**

- dense panel blocks, nursery school;
- the street Na Skalce build up by family houses can be modified to a residential zone.

**3. Streets Horní and Hlavní**

- family houses and primary school;
- suitable as a residential zone;
- appropriate calming elements necessary by the entrance from the busy street Hlavní.

**4. Street Jindřicha Plachty**

- panel blocks.

## 4.10 Střekov

Figure 4.12 – Selected locations in Střekov



Selected localities:

### 1. Streets Nová a Kamenná

- panel blocks, nursery school;
- passable area.

## **2. Streets Jeseniova, Rubensova, Škrétova, Poděbradova and Českých bratří**

- family houses;
- suitable for implementation of a residential zone.

## **3. Streets Riegrova, Purkyňova, Máchova, Puškinova, Kollárova and other streets in the area**

- mainly family houses;
- nursery school and high school;
- suitable for implementation of a residential zone;
- appropriate calming elements necessary at the entries from the busy roads Karla IV and Žukovova.

## **4. Streets Tolstého, Ke Hradu, Barrandova, Sokolovská**

- panel blocks and family houses;
- primary school;
- passable area.
-



## Appendix 5 - Traffic Intensities on the City Infrastructure in 2010

