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COMPUTER VISUALISATION IN URBAN PLANNING OF HIGHWAY SURROUNDINGS

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Abstract. Computer visualisation is described as useful instrument, that enables to design urban (municipal) surroundings of highways and other main (supralocal) road communication lines in optimal way. Capabilities of visualisation techniques are presented by selected examples of spatial planning and urban spaces design. The presented examples show importance of urban space perception from viewpoint of road traffic participant. The paper also describes aesthetic issues concerning design of urban and suburban spaces, connected with elements of main transit roads, and their technical infrastructure. Some exemplary design processes of wide near-by highway areas, using architectural and town planning methodology aided by computer visualisation are described too, as the significance of visual presentation quality is in close connection with specific planning tasks. Computer visualisation, visual information is shown as instruments that allow local communities to participate in design, spatial planning, and legislation.

Keywords: computer visualisation, CAD, town planning.

1. Introduction

During the conference of CIAM (Congres Internationaux d'Architecture Moderne, 1933) in its final document - Charter of Athens, European town planners and designers defined base factors determining town space, as follows: work, living, recreation and communication [1, 2]. In 1998 members of ECTP (European Council of Town Planners) prepared New Charter of Athens [3]. This document includes additional, essential elements influencing the shape of urban areas - environmental and cultural context and heritage, and importance of local societies in process of town space forming. As we may read: „The planning process should require collaboration and involvement at local levels to develop public interest in the planning of the environment and improvements in social and economic conditions". The Charter also describes the town planner as coordinator of space design process, in dialog and mediation between local communities and local authorities.

Communication system plays the key role as the basis for urban structure, and its undoubted aggressive spatial character forces planners to use advanced and effective design methods. It seems that one of the most convenient ways to present results of town planner's work is computer visualisation (VR techniques [4]). It is also perfect medium to communicate with the real users of city space - the inhabitants and local authorities. This methodology is also fully compatible with participation design theories [5], and corresponds entirely to the concepts of New Charter of Athens.

Practical use of computer visualisation in urban planning will be described on specific, selected design examples:

- study design of highway trespass through intensive housing area in Ursynow, Warsaw (designed by R. Ast, B. Siewczynski (Poznan University of Technology) in cooperation with Transprojekt);
- spatial development concept of the area located along the Motorway A2 in Poznan (Poland), part A - area Komorniki – Debina (design team: R. Ast, K. Borowski, B. Siewczynski, J. Korzen);
- Leszno Technological Park (Poland) - spatial concept (design team: R. Ast, K. Borowski, B. Siewczynski), and housing areas in Leszno nearby Poznan – Wroclaw artery;
- Visualisation of LOS (Lewobrzezna Oczyszczalnia Sciekow) - water purification plant for Poznan (Poland), in spatial context of Poznan ring road (design: Aqua Poznan, visualisation: B. Siewczynski);
- Visualisation of A2 highway in the vicinity of Poznan, Poland (designed and prepared by Transprojekt Poznan).

2. Design examples

In 1998, a design study was prepared, concerning highway trespass through intensive housing area in

Ursynow district (Warsaw). The inhabitants of near-by houses in Ursynow were displeased with previous design solution. They were scared about traffic noise, possible air pollution and local communication difficulties within the district.

The answer was a concept of enclosing the highway partially in tunnel. This solution makes possible neutral trespassing of communication line through housing areas. On the surface, above the tunnel, elements of recreation infrastructure have been planned (sports grounds, play grounds for children), as well as parking places for cars of local inhabitants. Those facilities are planned to improve living conditions, and to compensate inhabitants for inconvenience, and are to be financed by highway builders (private companies and government agencies).

Simultaneously a computer visualisation was prepared (Fig 1) to convince local community to proposed design concepts, by clear, visual explanation of spatial solutions. A basis for visualisation were: original highway design, maps and aerial photographs of Ursynów District. It was decided to present the concept in synthetic, easy readable, clear graphic representation. All objects were visualised on detailed aerial photographs to provide inhabitants with easy spatial identification. This computer simulation includes static perspective and isometric views.

The main reason of making Visualisation study of water purification plant LOS (Lewobrzezna Oczyszczalnia Sciekow) in Poznan was the test of visual impression made by a big-scale technical facility from the view point of a car driver. LOS is located at the crossing of two ways of great importance to the city of Poznan: the main ring road and Serbska street - the main artery for a new intensive housing area (similar to Ursynow in Warsaw). Unfortunate placement of the facility near by ring road is expected to directly influence on shaping travelers opinion about the aesthetics of Poznan.

Fig 1. Highway trespass through intensive housing area in Ursynow, Warsaw. Computer visualisation (design: Transprojekt in cooperation with Poznan University of Technology)

At the beginning the investor expected only static pictures of the facility, but LOS plant is to be seen from the view point of a car traveller (from Poznan ring road, and Serbska expressway – Fig 2). Considering that, it was suggested to the investor that computer animation should be made, showing planned facility in motion, from surrounding roads. Unfortunately, the visualisation was made after completing technical design of the plant build-

Fig 2. Computer visualisation of water purification plant LOS, Poznan (Poland), from the viewpoint of a car driver (Plant design: Aqua Poznan)

ings and facilities, and this fact has significantly influenced possible aesthetic and spatial corrections. Conclusions taken from the study will be included during the realisation stage.

Visualisation was prepared to show the planned facility and its influence on town space, to the inhabitants of Poznan. It is expected that it will enable inhabitants to submit individual questions or even protests considering the planned objects. The prepared study is in fact „preoccupation study", and should be considered as an element of participation in the design process. The visualisation will also be used for marketing planning purpose. The investor wants his advertising banners and logos on the most visible objects of the water plant. The study will allow to select the most convenient localisation.

Leszno Technological Park (Fig 3) was planned in area along the road from Poznan to Wroclaw, passing through Leszno. In fact, this road of supra-local significance is almost cutting the city in a half, leaving on one side housing areas, on the other – the historical centre of the city. Expecting the city to grow, planners left a wide area unused as a reserve for future investments. This area is placed in the north of Leszno. A design proposal of activation of this area was commissioned by city authorities. It was developed and presented using computer multimedia presentation, including static aerial pictures and computer animation, showing planned facilities and buildings. The design was approved by Leszno authorities and directed to realisation.

Few years later another area was developed along this road. It was a housing area in its immediate vicinity. Spatial concept was based on specific laying-out of buildings and their height diversification. High greenery plots and garage buildings were placed along the road to provide a barrier against noise and pollution. The tallest buildings were planned close to the road. Then the height of buildings was decreasing to the private, small houses near the forest on the opposite side of the area. In conclusion of planning work visualisation was made, showing in a readable clear form (colours showing building height) rules of shaping this part of city.

Fig 3. Leszno Technological Park (Leszno, Poland); computer visualisation, aerial views (Design: Ast, Borowski, Siewczynski)

As a part in urban planning of area along the highway A2 in Poznan, spatial design of a wide area located near-by Komorniki Junction (area called Komorniki–Debina) was prepared. This area of 780 ha is located in the south-western part of Poznan, in immediate vicinity of extensive housing area, open green spaces and Wielkopolska National Park, placed close to the city. This area is also cut by Glogowska street - one of the most important artery in the city as an exit way to Wroclaw, connecting Komorniki Junction with Poznan International Fair area, which is of great importance for the city's prosperity. In future, Glogowska street is to be rebuilt as two-lane express way, and together with a new express way - Nowe Kotowo, they will shape the core of communication network in this area.

Based on those future municipal plans, the area was developed as a new city district for economical activation (Fig 4). The design expresses also municipal authorities' wishes about the shape of new planned urban areas. They are developed in classical, street-square character, in balance and connection to the highway and expressway traffic system. The goal was effective against „metal boxes" of shopping centres and supermarkets [6, 7].

The visualisation made during design work shows volumetric draft of planned town space, including the following information:

- building development height,
- shape of proposed urban spaces,
- greenery areas and shape of recreation areas,
- placement of formal important points, and urban composition dominants (including tall office buildings),
- spatial connections of urban spaces with communication lines.

Colours and symbolic representation is compatible with elements of flat urban plan. It is made in order to simplify spatial understanding of whole design. While preparing, some possible utilisation were anticipated for the visualisation:

- clear presentation to the City Council, including the scale and type of proposed municipal enterprises, and shape of new urban spaces;
- promotion of the town, by presenting in clear and easy readable form, a new designed district of the city, as an investment opportunity.

The visualisation was used as helpful instrument for presentation of the development concept on City Council sessions, where decisions concerning realisation were

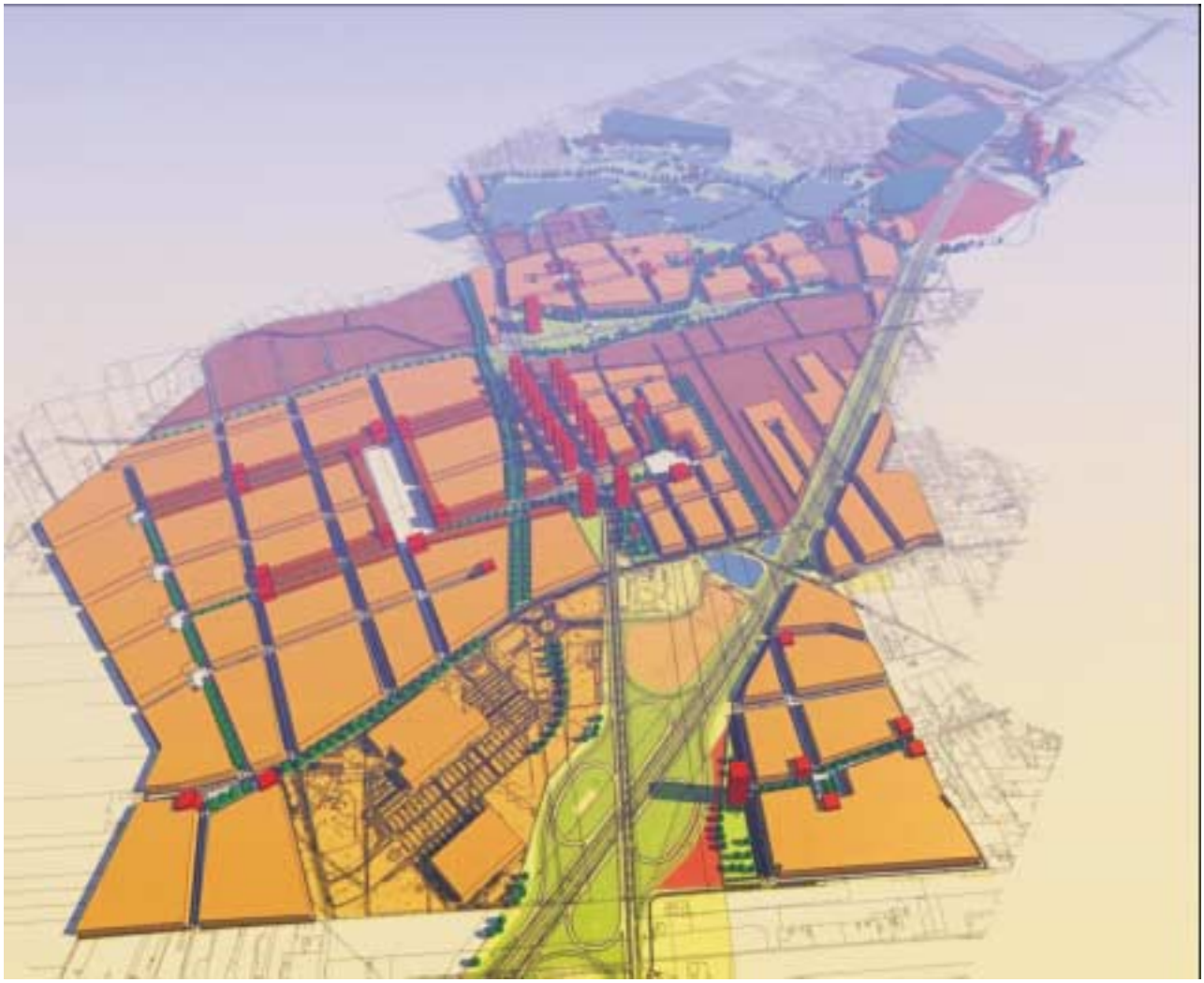

Fig 4. Computer visualisation - spatial development concept of the area located along the Motorway A2 in Poznan (Poland), part A - area Komorniki–Debina (design team: R. Ast, K. Borowski, B. Siewczynski, J. Korzen)

taken. After successful presentation to the Council, visualisation was also included in town marketing documents [8], prepared by City Marketing Department. Those editorials are meant for investors, and are distributed during international meetings and conferences. The computer visualisation was also used during open meetings with inhabitants of near-by districts and estates. Local communities wanted to be informed about planned changes in their direct surrounding and environment. Synthetic and communicative form of presentation allowed to explain specific urban solutions to the people unprepared for graphic characteristics of complicated urban plans.

Another approach to visualise A2 motorway was made by Transprojekt Poznan designers of road project. It included computer animation from car driver's view point of the way through Poznan region (Fig 5). Animation was presented on local TV stations, providing inhabitants of Poznan and surrounding regions with direct and interesting information about one of the most important road investments in Wielkopolska region.

3. Conclusions

Based on the described above design examples and interventions, it is possible to notice usefulness of computer visualisation as a part of urban planning process. It proofs itself as:

- analytical instrument in the process of urban planning;
- effective and intuitive way to efficiently communicate with local communities interested in planning processes;
- presentation of design solutions in a form of multimedia presentations promoting city economic capabilities and investment opportunities,
- helpful instrument during legislation process of urban designs in self-governed units.

The last three points qualify the computer visualisation as an important instrument in participation design, enabling the cooperation between town planner and future users. They also influence the awareness and sensitivity in local communities to the urban develop-

Fig 5. Computer animation of A2 motorway from viewpoint of car driver. Design and visualisation: Transprojekt Poznan

ment process. Simultaneously, as the design practice shows, the degree of generality in prepared computer study must be adequate to scale of presented spatial design. Urban design, as an element of spatial planning process, should be only a base for architects' invention, providing them with the needed information in a comprehensive and clear way.

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