Pedestrian Quality Audits and Inspections – More than a Part of the new EU-Directive on Road Safety Infrastructure Management

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Abstract

The Pedestrian Quality Inspection is one of the developments of the EU COST Action 358 Pedestrians Quality Needs. It describes a systematic, on site review of the existing situation concerning the performance of requirements to identify hazardous conditions, faults and deficiencies that may lead to less pedestrian demand, worse pedestrian conditions or serious accidents. With regard to the Directive 2008/96/EC of the European Parliament on road infrastructure safety management this new instrument base on developments on Road Safety Inspections and Audits (e.g. PIARC RSA and RSI guidelines) and especially Pedestrian Audits, which, concerning the methods, are available in several countries like Germany, USA or New Zealand. But it goes further on and it can be seen as a management tool that can be implemented as part of an overall quality management process. Its aim is to identify potential problems so countermeasures can be applied to increase quality, safety and security and therefore to increase pedestrians performance and demand. It contains in addition to existing inspection and audit instruments many other aspects especially in terms of the traffic flow and the quality and climate of walking.

Three orders of requirements were carried over to the structure of a walkability checklist It concerns possible deficiencies of the design of roadside environment as first order requirements, traffic rules and traffic flow as second order requirements and aspects of road-users behaviour as third order requirement. The walkability checklist allows a quick and rough check of the quality of the whole pedestrian system in order to proof whether general requirements are fulfilled. The next step is to go into detail and to check the pedestrian quality needs. For this checklists were developed which contain more than 300 questions. The process of checking the pedestrian quality can involve small sections of the road with repeated check lists or several runs along the whole road or a whole area. The checklists are quite detailed and consequently there should be a systematic collection of the deficiencies that were found. The filled in checklists themselves need not be added to a final report and an investigation form. With implementing the new instrument an improvement of the situation for pedestrians and a new design of roads with high qualities for walking are expected.

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1. Introduction

One task of COST 358 with regard to the formulation of the intended state of the pedestrian quality system is to *assess what is required to satisfy the pedestrians' needs and wants,* relative to their importance, tasks to be performed, competences and abilities. Requirements also refer to opportunities that pedestrians have or get to satisfy their needs. A connected question is what quality determinants and requirements are. What alternative options are there to satisfy needs and wants? As such requirements relate to facilities, processes and opportunities that are needed to satisfy the identified needs adequately: what do we need to implement?

A general principle in this regard is that *form* follows *function* and function is strongly related to current or intended *usage*. Thus in this project we do not look for applications of certain designs, facilities or services, but we look for the optimal solutions to facilitate walking and sojourning.

A basic principle, which was used for the development of the Pedestrian Quality Inspection is that needs and wants can only be satisfied, if requirements on several levels are met. Following Rumar's ideas on the orders of problems (Rumar, 2002), three orders of requirements are distinguished:

- *first order requirements*
  These are visible, tangible, concrete requirements with regard to the equipment of pedestrians, contact options of the social environment, design and equipment of public space and the availability, design and equipment of the transportation system. These requirement specifications concern pedestrians, vehicles, the physical environments and elementary operational behaviour of other people (including other road users) in the environment as well as concrete opportunities for pedestrians to perform intended activities. Examples of first order requirements are thus: speed limiting measures, pedestrian crossings, conditions of surface, other designs of roadside elements and also the equipment of roadside elements.

- *second order requirements*
  These requirements are derived from first order requirements and relate to tactical level facilities and services, like network characteristics, traffic rules and enforcement, vehicle regulation and traffic management. These criteria describe the traffic flow. Examples of second order requirements are thus: public transport (relevance and schedule), speed limits, traffic lights, etc.

- *third order requirements*
  Requirements of this order are preconditions for second and first order requirements. The form the fundament, to make sure that the first and second order requirements can be met. These third order requirements concern land use characteristics, modal split, pedestrian quality culture, competences, abilities, education, training, adequate organisational structures, data availability, research and development, strategic planning etc. They contain particularly

aspects of the quality and the climate of walking, such as the proper function (connection or sojourn), the feeling of safety or the modal split.

2. Walkability Checklist

The structure of orders of requirements is carried over to the structure of the walkability checklist stated below. It concerns aspects of the design of roadside environment as first order requirements, traffic rules and traffic flow as second order requirements and aspects of road-users behaviour as third order requirement.

With regard to specifying requirements not only demands regarding objects, facilities and services matter. Also requirements regarding context, process and procedure need to be specified. Process and procedure requirements relate to who is needed to get things done and what procedures apply to provide adequate opportunities for intended pedestrian behaviour. Preconditions to an effective control cycle are knowledge, tools, money, communication, organisation and available time. This level is considered within the walkability checklist by the conducted assignment of the requirements to the different stakeholders.

The proper stakeholders and their points of intersection, as a basis for the structure of the walkability checklist, are:

- Agencies in charge of maintenance are responsible for the building and maintenance of roads.
- The police is responsible for the observation of traffic rules and for a traffic that flows smoothly.
- City- and traffic planners transform the superior aims of the policy and the agencies in charge of maintenance into the transport planning process.
- If existent, tourism makes demands on sidewalk network, especially concerning the criteria comfort and attractiveness.
- Associations of handicapped do not exist in every local authority. Often, associations of people with walking and / or visually impaired mobility exist with different needs.
- Schools especially call for safe sidewalks and are an important stakeholder that needs to be considered in the whole life cycle of sidewalks.
- Transportation companies long for safe and comfortable connections to bus stops or stations as well as for comfortable and adequate waiting areas

Figure 1: Walkability checklist

Design and equipment of roadside environment (1st order requirements)

higher-ranking feature	lower-ranking feature	parameter value(s)	relevance			stakeholder									
			Safety	Comfort	Attractiveness	Agency in charge of maintanance	Police	City-/ traffic planners	Policy	Tourism	Association of handicapped	Schools	Transportation companies	...	...
Design of roadside environment															
Design according to the function		consistent - inconsistent	+	+	+	+		+	+	+	+	+			
Sidewalk, walkways and walking paths	alignment	consistent - inconsistent		+	+	+		+	+		+	+			
	consistency	consistent – inconsistent width	+			+		+	+		+	+			
	use	only by pedestrians – also by cyclists	+	+		+	+	+	+		+	+			
	width	adequate – restricted – undersized	+	+		+		+	+		+	+			
	continuity	continuous – not continuous	+	+		+		+	+		+	+			
Distance between sidewalk and carriageway		broad – adequate – undersized	+			+		+			+	+			
Pedestrian crossings	type	crossing – subway - bridge	+	+	+	+		+	+		+				
	number	adequate – too little – not available	+	+		+		+	+		+	+			
	condition	flush – with kerbs		+	+	+		+	+		+				
Sight distances		adequate – restricted – undersized	+			+	+	+			+	+			
Barrier free design	visually handicapped	sufficiently considered – too little considered – not considered	+			+		+	+		+				
	walking disabilities	sufficiently considered – too little considered – not considered	+			+		+	+		+				
	deaf people	sufficiently considered – too little considered – not considered	+			+		+	+		+				
	children	sufficiently considered – too little considered – not considered	+			+		+	+		+	+			
	elderly people in general	sufficiently considered – too little considered – not considered	+			+		+	+		+				
Condition of surface	type	asphaltic - paved		+	+	+		+	+						

Waiting areas	level	flush – with kerbs	+	+		+		+	+		+								
	dimensioning	sufficiently dimensioned - undersized	+	+		+		+	+		+	+							
Optical contrasts		adequate - inadequate	+			+		+	+		+								
General view (urban development)		little attractive – attractive – very attractive			+	+		+	+	+									
Sojourn quality		high – modest – low – very low			+	+		+	+	+									
Equipment of roadside environment																			
Planting		little attractive – attractive – very attractive			+	+		+	+	+									
Weather protection		available – not available		+	+	+		+	+										
Lighting		well – modest - inadequate	+		+	+		+	+	+		+							
Signage		well – modest - inadequate		+	+	+		+	+	+									
Seating-accommodations		available – not available		+	+	+		+	+	+									

Traffic flow (2nd order requirements)

higher-ranking feature	lower-ranking feature	parameter value(s)	relevance			stakeholder										
			Safety	Comfort	Attractiveness	Agency in charge of maintenance	Police	City-/ traffic planners	Policy	Tourism	Association of handicapped	Schools	Transportation companies	...	...
Speed	Maximum allowed speed	traffic calmed area – 20 – 30 – 50 – 60 – 70 km/h	+		+	+	+	+	+				+		
Speed limiting measures	relevance	available – not available	+		+	+	+	+	+		+	+	+		
	effectiveness	effective – moderate effective – ineffective	+			+	+	+			+	+			
Public transport	relevance	available – not available		+	+			+	+	+	+	+	+		
	schedule	10 – 15 – 20 – 30 - > 30 minutes		+				+	+			+	+		
Traffic lights	relevance	available – not available	+	+		+	+	+	+		+	+	+		
	acceptance (pedestrians)	accepted – predominantly accepted – not accepted (red light runner)	+	+		+	+	+			+	+	+		
	green periods (pedestrians)	adequate - inadequate	+	+	+	+	+	+			+	+	+		

	acoustic / tactile signal heads	available – not available	+			+		+	+		+								
	signal control of crossings one after another	without waiting time (back-to-back) – with waiting time	+	+	+	+	+	+	+		+	+							

Quality and climate of walking (3rd order requirements)

higher-ranking feature	lower-ranking feature	parameter value(s)	relevance			stakeholder									
			Safety	Comfort	Attractiveness	Agency in charge of maintenance	Police	City-/ traffic planners	Policy	Tourism	Association of handicapped	Schools	Transportation companies	...	...
Security	daylight	secure – moderately secure – unsecure – very unsecure	+		+	+	+	+	+	+	+	+			
	darkness	secure – moderately secure – unsecure – very unsecure	+		+	+	+	+	+	+	+	+			
Pedestrian Policy/Strategy	relevance	available – not available	+			+	+	+	+		+	+			
	liability	low – moderate – high – very high	+			+	+	+	+		+	+			
	Influence degree	low – moderate – high – very high													
	Available money	low – moderate – high – very high													
Walking friendly environment	noise	little – moderate – loud – very loud		+	+	+		+	+	+					
	pollution	little – moderate – polluted – very polluted		+	+	+		+	+	+					

3. Pedestrian Quality Needs Inspection

The walkability checklist allows a quick and rough check of the quality of the whole pedestrian system in order to proof whether general requirements are fulfilled. The next step is to go into detail and to check the pedestrian quality needs.

This next step in COST 358 is called a Pedestrian Quality Needs Inspection (PQN INSPECTION**).** The PQN INSPECTION is one of the developments of COST 358. A PQN INSPECTION is a systematic, on site review, conducted by experts, of the existing situation concerning the performance of requirements to identify hazardous conditions, faults and deficiencies that may lead to less pedestrian demand, worse pedestrian conditions or serious accidents. With regard to the Directive 2008/96/EC of the European Parliament and the Council on road infrastructure safety management inspections are surveys on the existing infrastructure in operation whether audits are related to infrastructure projects. Taking this into account the development of COST 358 is more an inspection of the existing situation in the view of pedestrians. On the other hand the instrument could be used for planned projects too. In this case the expression of a PQN AUDIT could be used also.

It is important to note that:

- A PQN INSPECTION is systematic – this means it is both comprehensive and carried out in a methodical way.

- A PQN INSPECTION needs to be carried out by an independent person or team with experience in safety and security work, traffic engineering, pedestrian's behaviour and/or road design.

- A PQN INSPECTION relates to an existing situation. That could be a city, an area or even a road.

- A PQN INSPECTION is pro-active, trying to increase pedestrian's qualities and to prevent accidents and incidents through the identification of quality, safety and security deficiencies for remedial action.

During the PQN INSPECTION, checklists need to be used and completed. The process can involve small sections of the road with repeated check lists or several runs along the whole road or an area using a single check list. The length chosen depends on the complexity of the road or the area.

The checklists are quite detailed and consequently there should be a systematic collection of the deficiencies that were found. The filled in checklists themselves need not be added to the PQN INSPECTION Reports. But the summery of the results will be summing up in an investigation form. In this form the deficiencies are collated under the broad headings from the checklist with locations provided. This document is a way of gathering all of the information onto one form. This form should form part of the PQN INSPECTION Report.

A typical PQN INSPECTION Report table of contents would be:

- **Introduction** including area or road being inspected

- **Part A.** Data (area or road function, traffic situation, accident situation, road standards, surroundings)

- **Part B.** Investigation form with the deficiencies

- **Part C.** Proposals and options for counter measures – short term (e.g. signage, marking, enforcement), medium term (e.g. policies, speed reductions using traffic calming measures, refuge islands for pedestrians etc) and long term (e.g. strategic walking network, larger investment may be required). A brief cost estimate should be included

- **Appendix** Maps and Illustrations (in order to clarify the results, different kinds of illustrations may be used including photos and sketches of countermeasures, locations need to be specified)

The PQN INSPECTION Report should propose and discuss a range of countermeasures. The effects of the alternative measures should be estimated. A check must also be made whether the proposed measures can cause any negative effects.

Costs for the alternative countermeasures should be estimated and a ranking of remedial measures should be made. There are a number of tools that are available from various countries which would assist in the prioritisation of works and choice of countermeasures.

Although one could argue the actual implementation of remedial measures and an evaluation of their effectiveness some time later does not form part of the formal PQN INSPECTION process, they are important steps. Implementation will depend on available funds and other factors such as the need for land acquisition. Studies can be carried out at a later time to evaluate the effects of the remedial measures. Behaviour studies should be made in the same way and in the same positions as during the investigation. Traffic volumes and speeds should be checked, as well as the traffic environment. It is suggested the follow up involve different people from those who carried out the inspections and recommendation of countermeasures and be some years after the implementation of the remedial action.

4. Conclusions

The new EU-Directive has the issue of enhancing road safety in the member states. The Directive requires the establishment and implementation of procedures relating to road safety impact assessments, road safety audits, the management of road network safety and safety inspections. The new instrument of a Pedestrian Quality Inspection is related to this Directive and especially to the instruments of an Audit and an Inspection but it goes further on. The aim is to state out deficiencies which are related to the whole system of the quality for walking. With implementing the new instrument an improvement of the situation for pedestrians and a new design of roads with high qualities for walking are expected.

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