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

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'One step at a time is good walking – or: We do not walk on our legs, but on our will.'
Chinese and German Proverb

Summary

The Pedestrian Quality Inspection is one of the developments of COST 358. 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 beyond 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.

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 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. They 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. With regard to the policy process, a rational and effective control cycle is similar to the error-controlled regulation scheme depicted in figure 1.

Preconditions to an effective control cycle are knowledge, tools, money, communication, organisation and available time. This level is considered within the checklist by the conducted assignment of the requirements to the different stakeholders.

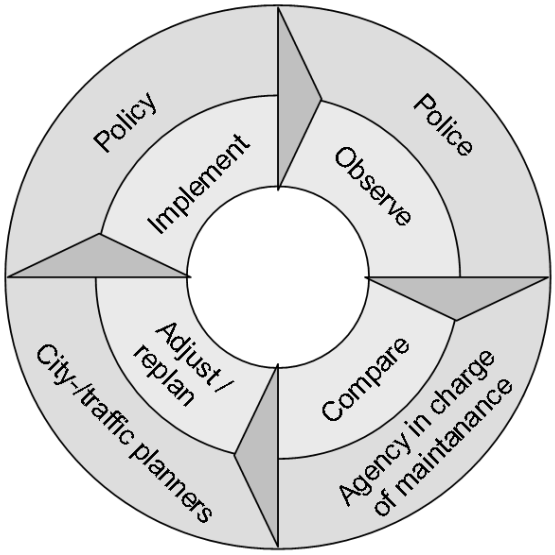

Figure 1 Policy control cycle and related stakeholders

As pedestrians' issues are not yet high on the political agenda, resources for adequate policy development are severely limited. There will probably not be much time available for a thorough specification of requirements on any level. The needed information should be very easy to acquire. The specifications themselves should be very compact, simple and above all attuned to the different stakeholders context, perspective, needs in relations to their competences and implementation options and 'language'. This presumes profound insight in the stakeholders (formal and felt) responsibilities, their operational working culture and working methods and the margins of their resources.

As such dedicated standard requirements statements should be developed, made available and actively disseminated for the execution focussed stakeholders like local authorities, architects, the police, educators, social workers etc. For national authorities, NGO's, land use planners, researchers and consultants, who operate on the meta level it should also be made simple and concrete: what can they do to deliver optimal preconditions?

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 are 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

The following walkability checklist considers a first overview over the stakeholders' requirements as their requirements are assigned to the features that belong to first, second or third order requirements.

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.

A PQN INSPECTION is a management tool that can be implemented as part of an overall quality management process. PQN INSPECTIONs 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. The PQN INSPECTION bases 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 contains in addition many other aspects especially in terms of the 2nd and 3rd order requirements.

The following issues need to be considered as part of the PQN INSPECTION process:

- **Time of inspection** - it is strongly recommended that inspections take place both during the day and at night. This is important so the inspector(s) can focus on issues that are specific to night such as checking if traffic signs and line markings are still visible at night time. An analysis of the lighting along a road or at an intersection should be undertaken to make sure it is suitable for pedestrians.
- **Seasonal variation** - it is also suggested that consideration be given to inspections in different seasons if the seasons are vastly different e.g. snow in winter and very dry and hot conditions in summer.
- **Site specific matters** – if a road includes a school for example, the inspection should take place partly when school children are arriving or leaving the school. Similarly if a road includes a shopping precinct, the inspection should incorporate busy shopping times.

3.1. The PQN INSPECTION Process

A PQN INSPECTION can be instigated as part of the quality management of a city, a municipality, an area or a road. The first decision is to determine the extent of the inspection by defining the area or the start and end points of the inspection. In most cases this can be a road from start to finish (i.e. between well defined major intersections) but it could also be a section of a road, of a reasonable length), a residential area or a whole city. This will be outlined in an agreement between the parties involved in the inspection, usually the authority and the inspection team. The agreement will describe what to inspect, who is paying for what, timelines and deadlines, what the local agency should contribute with and so on.

There are FOUR steps in the PQN INSPECTION process:

STEP 1 PREPARATORY WORK IN THE OFFICE

STEP 2 ON SITE FIELD STUDY

STEP 3 PQN INSPECTION REPORT

STEP 4 REMEDIAL MEASURES and FOLLOW UP

It should be noted that Step 4 may be considered as two separate processes – the first is the implementation of remedial measures, while the follow up is likely to be some time later to evaluate the impact of the countermeasures.

Preparatory work in the office

Background information about the area or the road, the function of the road, the road standard and the traffic volumes which are not only related to the performance of pedestrians should be obtained as a first step. Information from local residents might prove useful and can be obtained through face to face discussions or a questionnaire. The list below provides information about the sort of questions that should be asked and the answers recorded during the preparatory work for a road as an example:

Area or Road function

- Describe the function of the area or the road. What kind of area is it and how is it used? Is it a national, regional or a local road?
- Is the road a school bus route?
- What kind of vehicle traffic is in the area or uses this road? Is it long distance or short distance traffic, or maybe there is a mix of different kinds.
- What about heavy vehicle traffic? Is the proportion more or less than other similar roads? Is the road a part of a freight route?
- Do other vulnerable road users, such as scooter riders or cyclists, use the area or the road?

Traffic and accident situation

- Determine the traffic volume and the traffic growth during the last five years.
- Determine the types of vehicles that make up the total traffic count - cars, trucks, scooters, motorcycles, buses as well as the relative density of cycles and pedestrians.
- Is there any traffic volume prediction for the road?
- Analyse the accident situation (last three years), especially when pedestrians, children and elderly people are involved.

Road standard

- Describe the road standard in general and how it links with the road function, traffic volume, types of junctions and intersections, speed limits, etc.
- Analyze the speed limits. Are they reasonable for built-up areas, presence of vulnerable road users, especially children, elderly and disabled persons, etc.?

All relevant guidelines and regulations need to be available. The main goal in this step is to get as much relevant information about the road as possible including the roadside environment and intersecting roads if relevant.

If possible, reasonably detailed maps or drawings or video footage should be made available. These should be used as an instrument during the field-study but also as support for presentation of the results of the PQN INSPECTION. One of the most important parts of an inspection is to accurately indicate where particular problems for pedestrians are along the road. The method of identifying different locations has to be determined at an early stage. Examples of different methods are:

1. The coordinates measured by GPS-equipment and registered in a hand-computer.
2. The Control Section Number together with km-posts.
3. A trip meter used during the field-study.
4. The distance or the coordinates measured in the map or the drawing.
5. Easily identified landmarks or reference to video footage.

Method 1 will be most convenient and accurate when the equipment is available. If GPS is not available, it is suggested a combination of the other methods should be used to enhance accuracy. It is important that the system chosen is accurate, as the location will need to be precise when it comes to implementation of countermeasures.

Preparation for the actual on-site part of the inspection is included in this first step. It is suggested at least the following items should be taken along to assist during the inspection:

- safety vest – to be worn during the inspection so inspectors are visible to road users
- hat and sunscreen in hot weather
- safety boots
- tape measure/measuring wheel
- maps
- some form of recording e.g. portable computer, tape recorder and a digital camera
- paper and pencil
- stop watch if you wish to record vehicle speeds, headway gaps and traffic flows
- A handhold speed gun (radar pistol) may be helpful too
- Checklists

Field Study

For a reliable inspection report the inspection should be made on foot where and incorporate both sides of the road and roadsides. The road should be gone through a number of and photographs taken of specific issues.

It is desirable for some sort of warning signage to be placed on the road being inspected and on roads that intersect this road. Signage, if available, should be placed at least 500m before the inspection team in rural areas, and at least 100 metres in urban areas. A temporary lower speed limit could be applied. These measures need to take into account the length of road being inspected and it may be necessary to shift signage from one point to another.

The on-site field study should start with the description of the surrounding:

Surroundings

- Describe the surroundings in general – rural, urban or suburban and a description of what surrounds the road - agricultural area, built-up area or a mixture of these?
- If there is a built-up area, describe the type in greater detail, such as an industrial area, shopping area, residential area, etc.
- Make specific notes if there are facilities that generate heavy traffic.
- If the road is in a rural area, are there linear settlements at long distances along the road?

Traffic and Accident situation

The inspectors should observe the traffic flow and document traffic incidents which could easily lead to accidents in specific traffic compositions. They could measure the average speed with speed guns or at certain distances with stop watches because the choice of speed is often related to the infrastructure features such as wide cross sections, long sight distances or lack of orientation. Specific activities which generate traffic and the mix of traffic should be noted including the level of activity by vulnerable road users.

PQN INSPECTIONs aim to detect all deficiencies that may cause accidents, could have an influence on the severity of accidents, reduce the security and the feeling of safety and influence the quality and attractiveness for pedestrians. The PQN INSPECTION checklist provided in Appendix 1 will help to detect such deficiencies.

Pedestrians are the most vulnerable road users and their needs require special attention during the on-site field study. In the field of safety potential accidents arising from the interaction of cars and trucks with vulnerable road users are likely in many countries. The inspection needs to consider many potential countermeasures ranging from policies or slowing traffic down to infrastructure treatments such as separation through either a cycle lane along the side of the road or footpath or separate tracks away from the main road could be options. Also the need to cross the road should be taken into account.

Checklists

During the PQN INSPECTION, checklists need to be used and completed (see Appendix 1). 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 (Appendix 2). 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.

3.2. The PQN INSPECTION Report

The PQN INSPECTION report should be made up of an introduction, three parts and appendices with maps and illustrations as necessary. The **introduction** should include details of the area, the road or section of road being inspected and the composition of the inspection team, date, times and conditions at the times of the inspection. **Part A** should outline the background data obtained during the preparatory work in the office and a

description of the activities undertaken. **Part B** describes the shortcomings or deficiencies which were found and an assessment of these deficiencies. It should contain the completed investigation form and the documentation with pictures. **Part C** should contain proposals for countermeasures, from short to long term.

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.

Remedial Measures and Follow up

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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Appendix 1: PQN INSPECTION Checklists

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between …… and …….. Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
1. Function	1	Is the design of the road according to its function and hierarchy in the network?		
	2	Is the design of the area according to its function?		
	3	Are transitions installed between different functions and road characteristics?		
	4	Are there traffic islands and lane shifts at the entrance of the town, village or area and other traffic calming measures inside?		
	5	Is stopping sight distance guaranteed along the entire section?		
	6	Are there any issues from accident data?		
	7	Does the road "communicate" well with the users so that he realizes the situation without any surprises?		
2. Sidewalks, Walkways and Walking Paths	1	Is the width of sidewalks, walkways and walking paths sufficient (min. 1,80m effective and walkable width without obstacles plus min. 0,50m strip between the sidewalk and the carriageway)?		
	2	Is the sidewalk, walkway or walking path width adequate for the type of use, the edge use and the pedestrian volumes?		
	3	Are the sidewalks, walkways and walking paths continuous and the sidewalks on both sides of the road?		
	4	Is the sidewalk, walkway or walking path clear from both temporary (e.g. shop signs, shop furniture) and permanent obstructions?		
	5	Is the visibility for motorised traffic adequate to see pedestrians and cyclists along the road?		
	6	Are the pedestrian ways physically separated from the carriageway by contrasting kerb stones, barriers or greenery?		
	7	Will snow storage disrupt pedestrian access or visibility?		
	8	Is the walking surface of the sidewalk adequate and well-maintained?		
	9	Are measures needed and implemented to direct pedestrians to safe crossing points and pedestrian access ways?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between …… and …… Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
	10	Are the conditions at driveways intersecting sidewalks endangering pedestrians?		
	11	Does the number of driveways make the route undesirable for pedestrian travel?		
	12	Are there any conflicts between bicycles and pedestrians on sidewalks?		
	13	Do parked vehicles obstruct pedestrian sidewalks?		
	14	Are detour routes, alternate routes, and temporary pedestrian routes accessible to pedestrians with all abilities (e.g. are stable curb ramps provided)?		
	15	Are pedestrian facilities adequate in the area surrounding schools (e.g. do sidewalk widths accommodate peak periods of pedestrian traffic)?		
	16	Are the sidewalks slippery when wet?		
3. Cross section	1	Is the cross section appropriate to the function?		
	2	Is the surface of the cross section even and free from stumbling edges?		
	3	Is there not too much (max 6 %) but sufficient (min 2 %) cross / diagonal fall?		
	4	Is stopping sight at intersections and crossings facilities obstructed, for example by safety barriers, plants?		
	5	Have the needs of public transport and its users been taken into consideration?		
	6	Is a separating contrasting and haptic strip required between sidewalk and cycle path?		
	7	Is a separating contrasting strip required between sidewalk and carriageway?		
	8	Are there any bottlenecks? If so, are they properly signed?		
4. Intersections	1	Are the intersections perpendicular?		
	2	Is the right of way clearly recognizable?		
	3	Are the movements guided clearly and easily to understand?		
	4	Does the ambient lighting present any special requirements?		
	5	Is sight obstructed, for example by safety barriers, fences, road equipment, parking areas, traffic signs, landscaping / greenery, bridge abutments, buildings?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between …… and …….. Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
	6	Are type and design of the intersections suitable for the function and traffic volume of the intersecting roads? (Separate answers for each intersection!)		
	8	Is pedestrian/cyclist routing at intersections adapted to the actual conditions and clearly marked and signposted?		
	9	Are all legs of an intersection equipped with pedestrian and cycle crossings? If pedestrians are not allowed to cross a leg because of safety reasons, are they clearly directed to a convenient alternative crossing location?		
	10	Has right of way been specified and clarified at pedestrian and cycle crossings, in particular for cycle paths that are set back?		
	11	Is the transition safely designed if footpaths and cycle paths end on an intersection or road or are directed across the road?		
	12	Is there wild and unorganized parking within the intersections?		
	13	Are the pedestrian crossings as narrow as possible?		
	14	Are pedestrian crossings clearly marked?		
	15	Is each section equipped with signals (including railway structures)?		
	16	Are the crossings for pedestrians provided with double crossings (kerbs of 6cm for blind people and 0 cm for wheel chairs)?		
	17	Are the type and spacing of different crossing installations coordinated (e.g. railway crossings, traffic signals, zebra crossings)?		
	18	Are refuges large and wide enough for crossing pedestrians and cyclists to stand and wait?		
	19	Are the islands separated enough from the carriageway?		
	20	Are the islands made only by markings?		
Roundabouts	21	Has each road access an island?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between …… and …….. Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
	22	Are the islands clearly visible and of a suitable design?		
	23	Are all approaches to roundabouts perpendicular and radial to the centre so that the speed is reduced?		
	24	Is the through-visibility effectively stopped by the roundabout and a hill or plants so that the speed is reduced?		
5. Public and private services, Parking	1	Are there major traffic generators such as city hall, religious sites and cemeteries, hospitals, housing or shopping centres, petrol stations and tourist attractions taking into account?		
	2	Are the dimensions of the parking areas sufficient for parking for passenger vehicles, trucks and buses?		
	3	Are no-stopping zones provided as necessary?		
	4	Is the arrangement of parking (parallel, diagonal or perpendicular) along the road sides safe?		
	5	Are parking facilities obstacles for sidewalks?		
	6	Are parking facilities obstacles for sight distances (e.g. at pedestrian crossings)?		
	7	Are there countermeasures like bollards to prevent illegal parking?		
	8	Are loading areas provided next to the road at shops and restaurants?		
6. Public transport stops	1	Are public transport stops easily and safe accessible to pedestrians?		
	2	Are there safe pedestrian crossing facilities directly situated at public transport stops?		
	3	Are the pedestrian crossings in the rear of a stopping public transport system?		
	4	Are the stops signposted and detectable by the drivers? Is reconcilability guaranteed?		
	5	Are areas for waiting pedestrians large enough and well designed (seats, weather protection, telephone?)		
	6	Is sight obstructed, for example by safety barriers, fences, road equipment, parking areas, traffic signs, landscaping / greenery, bridge abutments, buildings?		
	7	Is cyclist routing safely designed in the area near public transport stops?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between …… and …….. Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
	8	Do pedestrians entering and leaving buses conflict with cars, bicycles, or other pedestrians?		
	9	Is lighting required? And if so, is it appropriately designed?		
	10	Are shelters appropriately designed and placed for pedestrian safety and convenience?		
	11	Is the seating area at a safe and comfortable distance from vehicle and bicycle lanes?		
	12	Are public transport stops part of a continuous network of pedestrian facilities?		
	13	Are access ways to transit facilities well-lit to accommodate early-morning, late-afternoon, and evening?		
	14	For children that take the bus, do sidewalks provide direct access from the bus loading area for the school, without crossing parking lots or traffic lanes?		
	15	Will pedestrians waiting at the seating area be splashed by approaching buses during rain/inclement weather?		
	16	Are drop-off/pickup lanes separated from bus lanes to minimize confusion and conflicts?		
	17	Are there time tables, route maps, maps of the local areas at the public transport stops?		
	18	Is there an electronic display with actual service arriving times at the public transport stop?		
7. Pedestrian Crossings	1	Are the pedestrian crossings located where required by pedestrians?		
	2	Is there a risk of pedestrian underpasses and bridges being bypassed on high speed roads? Are suitable measures in place?		
	3	Are further crossing aids (e.g. lollipop men) required?		
	4	Are areas for waiting pedestrians and cyclists sufficient?		
	5	Are refuges large and wide enough for crossing pedestrians and cyclists to stand and wait?		
	6	Are crossings over special railway structures of a safe design?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between …… and …… Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
	7	Is two-way visual contact ensured between pedestrians and motorists in sufficient stopping distances?		
	8	Has priority been given to pedestrians and cyclists over other traffic where necessary?		
	9	Are parked vehicles obstructing the visibility of the road users regarding cyclists?		
	10	Are the pedestrian crossings signposted and detectable by the drivers?		
	11	Are islands clearly visible and properly placed?		
	12	Is lighting provided at crossings in an adequate way?		
	13	Do wide curb radii lengthen pedestrian crossing distances and encourage high-speed right turns?		
	14	Are separate and unsignalized right turn lanes avoided and does the kind of right turn minimize conflicts with pedestrians?		
	15	Does a skewed intersection direct drivers' focus away from crossing pedestrians?		
	16	Are marked crosswalks wide enough?		
	17	Are corners and curb ramps appropriately planned and designed at each approach to the crossing?		
	18	Are driveways placed close to crossings and may that cause problems?		
	19	Do pedestrians cross at uncontrolled locations because marked or controlled crossings are dangerous, inconvenient, or not placed appropriately?		
	20	Are crossings in school zones marked as school crossings?		
	21	Are there reflectors along the pedestrian crossing?		
8. Signing, Marking, Lighting	1	Is sight obstructed by signs?		
	2	Can the signs be clearly recognized and read (size of signs)? And do the signs conform to the conventions of Vienna and Geneva?		
	3	Are there more than 2 different traffic signs at one place and are all traffic signs necessary?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between ……. and …….. Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
	4	Is signing and marking logical and consistent? Does it show the right of way clearly?		
	5	Is pedestrian and cyclist routing at intersections adapted to the actual conditions and clearly signposted?		
	6	Are the installations shared by pedestrians and cyclists, including underpasses and bridges, properly signposted?		
	7	Are advanced warnings in place for features that cannot be seen in time? Are there warning signs, such as “School Bus Stop Ahead” or Pedestrian Warning Signs which advise motorists of the presence of pedestrians where needed?		
	8	Could greenery lead to safety or security problems if the vegetation grows (e.g. as a result of covered road signs)?		
	9	Are signs located in such a way as to avoid restricting visibility from approaches or intersecting roads?		
	10	Are signs retro reflecting or are they illuminated at night? In daylight and darkness, are signs satisfactory regarding visibility?		
	11	Do signs convey a simple and clear meaning?		
	12	Is pedestrian signing near schools adequate and effective?		
	13	Do all signs and markings correspond without any contradictions?		
	14	Are the road markings clear and recognizable?		
	15	Have old markings/signs been com-pletely removed (phantom markings)?		
	16	Are the markings likely to be effective under all expected conditions (day, night, wet, dry, fog, rising and setting sun)?		
	17	Are the markings according to the pedestrian and cyclist traffic flow?		
	18	Is the obligation to yield right of way enforced by markings according to the one enforced by signing?		
	19	Are pedestrian travel zones clearly delineated from other modes of traffic through the use of striping, coloured and/or textured pavement, signing, and other methods?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between ……. and …….. Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
	20	Is the road sufficiently illuminated?		
	21	Is the stationary lighting appropriate?		
	22	Is the lighting of special situations (pedestrian crossings, changes in cross section) suitably designed?		
	23	Do remaining unlit areas present potential problems?		
	24	Does the existing road lighting lead to conflicts in recognizing the yellow indication (sodium discharge lamps)?		
	25	Does lighting need to be changed so that crossing pedestrians are clearly visible?		
	26	Is contrast lighting required at the intersection?		
	27	Does the ambient lighting present any special requirements?		
	28	Can the stationary lighting cause problems in recognizing the traffic signs or the alignment of the road?		
	29	Are the lighting masts situated outside of walkable width needed (min. 1,80m)?		
	30	In the areas where is no stationary lighting, are there any potential dangers?		
	31	Are there guide signs which provide directional and location information to pedestrians?		
9. Plantings	1	Is there any vegetation along the road?		
	2	Does it obstruct the visibility on the traffic signs or the intersections and pedestrian crossings?		
	3	Does the greenery and type of planting preclude irritations to the road users?		
	4	Does the greenery or will the growth of greenery lead to future safety or security problems?		
	5	Is visual contact motorist-pedestrian-cyclist restricted by greenery?		
	6	Is the vegetation along the road old and could lead to safety problems?		
10. Barrier free design	1	Are special features required for children?		
	2	Are special features required for elderly people?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between …….. and …….. Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
	3	Are special features required for physically handicapped like wheel chairs?		
	4	Are special features required hearing-impaired people?		
	5	Are special features required for blind and sight impaired people?		
	6	Are tactile or audio cues to warn people with visual impairments of upcoming conflict points or obstructions provided at appropriate locations?		
	7	Are cues present that indicate the boundary between the sidewalk and carriageway, such as detectable warnings that include colour changes, tactile changes at crossings and buffers?		
	8	Are there barrier free guiding information which provide directional and location information to blind people?		
	9	Are audible pedestrian signals at traffic lights provided?		
	10	Is the activation button for a pedestrian signal located in a place that is easily found and reached by all users, including mobility- and vision-impaired pedestrians?		
	11	Is there tactile information about the crossing facilities at the activation button?		
	12	Is there sufficient tactile information at public transport stops?		
	13	Can a pedestrian in a wheelchair fit between the bench and the bus doors when opened?		
	14	Do seats at public transport stops (or persons sitting on them) pose a hazard to blind pedestrians?		
	15	Is there a strong contrast or demarcation between the pedestrian walkways and the carriageway or the bicycle lane?		
	16	Are all obstacles recognizable and designed by a strong contrast or demarcation?		
	17	Is there a continuous physical guidance for visual impaired persons?		
	18	Are there visual guide strips to prominent destinations?		

Design and equipment of roadside environment (1st order requirements) **Area……/ Road between …… and …… Date:**				
Characteristic	**No.**	**Question**	**Yes (√)** **No (X)**	**Comments**
	19	Are continuous and adequate handrails provided to help people in danger of slipping and falling e.g. at stairs or steep areas?		
	20	Are safe pedestrian double crossings (0 cm kerbs for wheel chairs beneath 6 cm kerbs for blind people) provided?		

Traffic flow (2nd order requirements) **Area……./ Road between ……. and …….. Date:**				
Characteristic	**No.**	Question	**Yes (√)** **No (X)**	**Comments**
1. Speed and Traffic Volumes	1	Have suitable measures been taken to ensure that speed limits are obeyed?		
	2	Is there a speed limit? And if so, is it respected by the drivers?		
	3	Are there traffic islands at the entrances of residential and built-up areas to reduce speed?		
	4	Have appropriate speed limits been signed appropriately (start, end, height, location)?		
	5	Are there sufficient gaps in the traffic to allow pedestrians to cross the road?		
	6	Do traffic operations (especially during peak periods) create a safety concern for pedestrians?		
	7	Are there specific traffic composition characteristics to be taken into consideration?		
	8	Are traffic-calming devices effective in reducing speed?		
2. Public Transport	1	Is the area or road directly served by public transport?		
	2	Is there a bus, tram or light rail stop, which can be reached in less than 300m from every building?		
	3	Are public transport stops connected to the pedestrian route network?		
	4	Is the service at a regular interval under minimum 20 to 30 minutes?		
	5	Are the most important destinations reachable in adequate time by public transport?		
3. Traffic Lights	1	Is the stopping line correlated with the traffic signal so that the signal can be seen?		
	2	Are traffic signals easily recognizable?		
	3	Are all approaches equipped with pedestrian and cycle crossings?		
	4	Are pedestrian crossings clearly constructed? Is each section equipped with signals (including railway structures)?		
	5	Are exclusive green phases provided for pedestrians and cyclists where necessary?		
	6	Can pedestrians cross the road in one go?		

Traffic flow (2nd order requirements) **Area……/ Road between …… and …….. Date:**				
	7	Is the green time for pedestrian crossing sufficient?		
	8	If there is no exclusive pedestrian phase, is a leading pedestrian interval provided?		
	9	Are phase offsets required for pedestrians and cyclists within the cycle?		
	10	Are separate signals provided for cyclists? (Are the signal aspects correctly located for the cyclists? Estimate clearance times for cyclists? Avoid protected turn phases/ risk of cyclists crossing on red.)		
	11	Are the type and spacing of different crossing installations coordinated (e.g. railway crossings, traffic signals, zebra crossings)?		
	12	Are the signals affected at dawn/dusk by direct sunlight?		
	13	Are advanced warnings provided for traffic signals that cannot be seen in time?		
	14	Have the locations for the signals been selected correctly so that there are no obstacles?		
	15	Is the waiting time for pedestrian´s green light not too high (max. 40-60 sec.)?		
	16	Does the existing road lighting lead to conflicts in recognizing the yellow indication (sodium discharge lamps)?		
	17	Are the traffic signals properly situated so that they can be distinguished by each particular traffic flow?		
	18	Is the visibility of the traffic signals ensured on a sunny day?		
	19	Are signals covered/ obstructed (e.g. by traffic signs, lighting masts, plants, traffic jams)?		
	20	Is there a problem because of an inconsistency in pedestrian actuation (or detection) types?		
	21	Are all pedestrian signals and push buttons functioning correctly and safely?		
	22	Are ADA accessible push buttons provided and properly located?		
	23	Is sufficient timing provided to allow pedestrians and turning vehicles to clear the intersection?		

Quality and climate of walking (3rd order requirements) **Area……./ Road between ……. and …….. Date:**				
Characteristic	**No.**	**Question**	**Yes (√) No (X)**	**Comments**
1. Security	1	Altogether, does the spatial structure seem transparent and open?		
	2	Are important primary spatial axes and sight relations kept recognizable and free?		
	3	Is the edge use orientated to the public sphere of traffic?		
	4	Do the building structures make social control possible to the sphere of pedestrian traffic and do they convey this impression?		
	5	Are lobbies, gateways and stairs openly, brightly and well understandably?		
	6	Do green spaces and location areas in sight and ear shot lie to buildings and other areas frequented?		
	7	Do car parks in sight and ear shot lie to other frequented areas?		
	8	Do firm fittings or plantings hinder view relations?		
	9	Is the lighting concept coordinated to pedestrian and location areas?		
	10	Are there at any time critical (too high or too low) pedestrian traffic densities?		
	11	Are the location and rest areas sufficiently and clearly structured?		
	12	Are safe and secure alternatives to the use of narrow or badly open underpasses and stairs offered to pedestrians?		
	13	Are footpaths within parks openly and visible?		
	14	Are car parks accessible well on foot?		
	15	Are the speeds of vehicles so low that social control can be expected?		
	16	Do I find subjectively felt fear spaces? Are there any blind corners or points of limited visibility?		
	17	Do sufficient alternatives stand me to the avoidance of bottlenecks, dark spaces and badly open areas at the disposal?		
	18	Are sufficient and suitable chances to escape at my disposal in the need?		
	19	Do I have the feeling to be protected from theft, encroachments and vandalism?		
	20	Do favourable conditions for criminal ~~offences pass persons and things due to~~ the spatial structure and space utilisation		

Quality and climate of walking (3rd order requirements) Area……/ Road between ……. and …….. Date:				
		opposite?		
	21	Were there criminal offences in the past?		
	22	Is the criminal rate over average or are there any distinctive features concerning crime in the past?		
	23	Is there a good presence of the police so that I can feel being protected?		
2. General Climate, behaviour and Performance	1	Are pedestrian facilities continuous? Do they provide adequate connections for pedestrian traffic?		
	2	Does pedestrian network connectivity continue through crossings by means of adequate, waiting areas at corners, curb ramps and marked crosswalks?		
	3	Do pedestrians have the right of way by crossing the roads?		
	4	Do sidewalks/paths connect the street and adjacent land uses in an appropriate way?		
	5	Are buildings entrances located and designed to be obvious and easily accessible to pedestrians?		
	6	Do drivers generally are careful, look for and yield to pedestrian?		
	7	Does pedestrian or driver behaviour increase the risk of a pedestrian collision?		
	8	Do pedestrians or motorists regularly misuse or ignore the pedestrian facilities?		
	9	Are there many obstructions that would prevent a driver from seeing a child at and approaching intersections and driveways?		
	10	How are facilities perceived by young children and elderly people?		
	10	Are school gates appropriately located to provide convenient and direct access for pedestrians?		
	11	Is an adequate level of weather protection required?		
	12	Is there enough service equipment and comfort features like public toilets, drinking fountains, shelter, seats, rubbish bins, public phone boots, shady trees, bank ATM machines?		
	13	Is the service equipment and comfort feature well designed and maintained?		
	14	Is there any kind of smell (e.g. pollution, factory fumes) which disturbs the attractiveness for pedestrian use?		
	15	Does the amount of litter disturb the attractiveness for pedestrian use?		

Quality and climate of walking (3rd order requirements) **Area……/ Road between ……. and …….**				**Date:**
	16	Does the amount of detritus organic waste such as leaves, gravel, bark chips disturb the attractiveness for pedestrian use?		
	17	Does the amount of vandalism, tagging or broken items disturb the attractiveness for pedestrian use?		
	18	Are recreational parks reachable in short walking distances (maximum 10 to 15 minutes)?		
	19	Are grass verges adjacent the footpath, large planter boxes, small reserves, residential front lawns (without fences) or large landscaped garden areas included within the streetscape design?		
	20	Is the design effort relates to physical items that make the streetscape look nice adequate and more than just functional?		
	21	Are there gardens, cobblestones, seating, art, water features and other comparable items integrated?		
	22	Do adequate drinking-and-driving laws exist?		
	23	Are measures for monitoring walking and walking climate in use?		
3. Pedestrian Policy and Strategy	1	Is a National investment program in walking facilities available?		
	2	Is a Regional and/or Municipal investment program in walking facilities available?		
	3	Is a system for monitoring progress toward the walking goals and desired outcomes available?		
	4	Is there a decision making environment that supports effective action for walking?		
	5	Is there an information centre which gathers and manages information on walking?		
	6	Is a Strategic Walking Network defined?		
	7	Are their campaigns for promoting walking? Are walking information services and websites available?		
	8	Are local volunteer user group networks able to build local support for walking?		
	9	Do pedestrian training programs exist?		
	10	Do land use support short distances (e.g. rules for minimal/maximal urban density, in peripheral areas, for new neighbourhoods)?		
	11	Is the pedestrian demand assessed and monitored?		

Quality and climate of walking (3rd order requirements) **Area……/ Road between …… and …….. Date:**				
	12	Is there routing information on internet available?		
	13	Can routing information be used by PDA and GPS?		
	14	Are walking experiences like guided walks offered?		
	15	Is publicity used to promote walking and to inform stakeholders about issues and walking events through newspapers, radio, TV and videos, billboards, posters, direct mail, or flyers?		
	16	Are pedestrian improvements included in all projects, programs and maintenance activities?		
	17	Are funds dedicated to pedestrian qualities and are they sufficient?		
	18	Does the public has the chance to give hints about pedestrian infrastructure lacks or deficiencies in an appropriate way (e.g. via internet) and to follow the state of repair?		
	19	Are quantitative targets (annual target for accident reduction, mobility target, etc.) available?		
	20	Is the protection of pedestrians ruled in an adequate way (e.g. profiling of vehicle front, reduction of aggressiveness, front protection in crashes against pedestrians, shock absorbers, side protections in crashes against vulnerable road users)?		
4. Walking friendly environment	1	Is the environment interesting and attractive?		
	2	Are there front gardens, green elements, benches?		
	3	Has the environment an identity of its own?		
	4	Are there possibilities for individuals to personalise spaces like temporary exhibitions in public space of art and/or goods and spaces that can be used in many ways?		
	5	Does the environment invite for recreation?		
	6	Could children play safe in spaces?		
	7	Are the buildings attractive and maintained?		
	8	Does noise disturb walking?		
	9	Does pollution disturb walking?		

Appendix 2: Investigation form for deficiencies

Results of a PQN INSPECTION in the Area……./ Road between …….. and …….. Inspector …….. Date/Time……	
Design and equipment of roadside environment (1st order requirements)	
Traffic flow (2nd order requirements)	
Quality and climate of walking (3rd order requirements)	