



BALTRIS  
WP 4 Road Safety Inspection Guidelines and Checklists  
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## Road Safety Inspection Guidelines and Checklists





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## Road Safety Inspection Guidelines and Checklists

### Keywords:

Road safety, Road infrastructure project, Road safety measures, Road safety inspection Road Safety Audit, Accident data, Auditor, Road safety inspection team.

### Abstract:

Road Safety Inspection is an initial part of road infrastructure safety management systems. This report describes the scope of Road Safety Inspection Procedures, provides detailed recommendations on qualification of auditors, implementation and execution of procedures for EU member states.

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## 1. What is Road Safety Inspection?

### 1.1 Definitions

Road safety inspection (RSI) is a strategic comparative analysis of the impact of a new road or a substantial modification to the existing network on the safety performance of the road network.

Road safety is an integrated safety on the roads, which is determined by interaction of driver-vehicle-environment subsystems. Road safety aims to reduce the harm (deaths, injuries, and property damage) resulting from crashes of road vehicles. Best practice road safety strategies focus upon the prevention of serious injury and death crashes in spite of human fallibility.

”Infrastructure project” means a project or plan for the construction of new road infrastructure or a substantial modification to the existing network which affects the traffic flow or road safety risk factors. Consequently, boundaries of the affected network/territory by infrastructure project should be defined on the basis of traffic or road safety risk factors.

Safe road design is now about providing a road environment which ensures vehicle speeds will be within the human tolerances for serious injury and death wherever conflict points exist.

“Construction of new (road) infrastructure” - means a type of construction the purpose of which is to build a construction works on a land surface area not occupied by construction works, to rebuild a completely ruined, destroyed, demolished construction works.

“Substantial modification of existing network” or "Reconstruction of existing (road) infrastructure” means a type of construction the purpose of which is to rebuild a construction works (to change load-bearing structures by changing the external dimensions of the construction works – length, width, height, etc.) or significant changes in the traffic organization.

### 1.2 Basics about the Road Safety Inspection

Road safety audit and road safety inspection is a systematic work method contributing to safer roads and safer road traffic. In some older references the term of audit could cover also the present road safety inspection procedures. Road safety inspection of existing roads is a today’s concept that has been adopted because this term appears to be more appropriate when associated with existing roads. In spite of this, road safety audit and road safety inspection have several similarities, but also essential differences, especially regarding the procedures.

The road safety audit concept came into being in Great Britain, where the method was developed and implemented towards the end of the 1980s. Today, the method is being used in most European and also other countries.





Road safety inspection is defined in a different way, while the main purpose and procedures remained similar between different countries.

Thus, Road Safety Inspection could be defined as:

**A systematic review of a new or existing road with the intention of uncovering conditions of potential hazard to road users [5].**

Norwegian TOI RSI Best Practice Guide is defining the RSI as **a systematic assessment of the safety standard of an existing road, in particular with respect to hazards related to traffic signs, roadside features, environmental risk factors and road surface conditions [6].**

In a ROAD SAFETY INSPECTION GUIDELINE Specific Project Result 12B A Road Safety Inspection (RSI) is defined as **a systematic field study, conducted by road safety expert(s), of an existing road or section of road to identify any hazards, faults and deficiencies that may lead to serious accidents [9].**

The Directive [11] defines road safety inspection as **an ordinary periodical verification of the characteristics and defects that require maintenance work for reasons of safety.**

Following the principle “Prevention is better than cure” the RSI makes it possible to evaluate existing road traffic facilities and to improve road safety performance.

In spite of minor differences in definitions it is important to note that the most of present practices underline the similar characteristics of RSI:

- A RSI is systematic – this means it will be carried out in a methodical way following a formal procedure.
- A RSI is pro-active, trying to prevent accidents through the identification of safety deficiencies for remedial action rather than react only after accidents were happen.
- A RSI relates to an existing road not roads being constructed (these constitute subject of Road Safety Audit).
- A RSI describes the potential hazards from the road user point of view;
- A RSI should be carried out by an independent team (or person) with experience in road safety work, accident analysis, traffic engineering, and road user behaviour and/or road design.

The independency issue of the RS Auditor is described in more details in chapter 6.

The aim of the Itinerary Road Safety Inspection (RSI) is to report on the particularities of a road, it's surrounding area and it's general environment (hereinafter referred to as “events” in this





guide) that can influence user behaviour or affect his passive safety and thus have repercussions on road safety [10]. In the core part of the RSI the deficiencies on the road should be detected that may cause accidents or could have an influence on the severity of accidents.

After some years of experience with the Road Safety Inspection all over the world is approved as one of the most important and effective engineering tool in our hands in order to improve road safety. This is why the EC Directive No. 2008/96 on Road Infrastructure Safety Management – published in October 2008 - the European Union made a clear decision the Road Safety Inspection will be mandatory for as minimum on trans-European Road Network in the next years. In the Directive the RSI clearly described as an essential part of a package of the road safety management measures like:

- Road safety impact assessment;
- Road safety audit for the design stages of roads;
- Safety ranking and management of the road network in operation (incl. Management of high risks road sections or black spots);
- Road safety inspections for existing roads.

The essential principles of the RSI are:

- Interdisciplinary detailed analysis of the road and the road environment;
- Identification of possible accidental risks;
- Analyses of the condition of road users' perception and quality of guidance;
- Formal check of the performance of road equipment;

It should be noted, that in some countries the accordance of the local condition with guidelines and norms are considered to be an essential part of RSI, while in others this issue is performed separately unless there is no clear effect on safety issues.

As it is evident that RSI is getting more International where single RS auditors or inspection teams can and will perform RSI in foreign countries, it is necessary to harmonize the main principles, procedures and rules among countries, which is one of the most important issues of the present report, covering the BALTRIS countries (Sweden, Latvia, Lithuania and Estonia) as minimum, but this information could be with some value also for other countries.

A variety of different kind of traffic facilities can be inspected: motorways, rural roads and urban roads etc.





### 1.3 Why Road Safety Inspection?

The basic concept is to provide a method that will help the road operators to improve their knowledge of the network by inspection visits made by someone from the outside that has a fresh look. These visits will be made by appropriately qualified personnel after being trained both in the method to be used and in the principal road safety stakes.

These specially trained and qualified professionals, hereinafter called auditors, are to identify safety problems and to report them. Possible courses of action in response are in the competence and under the responsibility of the road operator who is familiar with the local context.

It is also important to explain the term **auditor**. In some countries and written guidelines, similarly to the RS auditing and inspection procedures these terms are separated, while in others the same trained and certificated people can act on both actions. Here, we have used the term of auditor for road safety expert who is performing the RS inspection, if this task is performed by more auditors than one this team is called inspection team, where the members are auditors. The inspection team could consist of auditors with different experience and qualification.

The findings of these visits are not intended to be exhaustive and do not need to make reference to standards or regulations. They are in no case inspections in the literal sense of the word; i.e. an external control with careful examination of itineraries in the form of hierarchical supervision.

The objective of this approach is to provide the road operator with a tool to improve road safety of network by prevention and to develop “safety vigilance” on the road; in addition, it will help him in his management by providing an independent and fresh view on potentially risky safety issues.

To attain this objective, the approach aims to be:

- preventive;
- simple, effective and practical;
- recurrent and systematic;
- at the initiative of and for the benefit of the road operator.

In addition to the above we should highlight the following issues:





- Often, the roads were designed and constructed some years or even decades ago for different amount of traffic, motor vehicle fleet or even different types of road users (bicyclists or pedestrians).
- It is often a case that local road administrations (state, private or municipal) do not have enough safety related knowledge to analyse the road risks in a same way and efficiency that an independent expert can do.
- Even in some reconstructed or rehabilitated road sections the number of accidents is recorded still high in spite of improvements taken because the road safety issues were in most cases not in the priorities of the project.

It is a popular misconception that the faults or bad behaviour of a driver are considered to be often the main cause of road accidents. But we know already from a number of research findings that road infrastructure has a great influence on safety outcomes, as contributing or even a main factor of the crash occurrence.

#### 1.4 Benefits and Costs of Road Safety Inspection

RSI is an approved tool to improve the road safety. With the inspection expert knowledge and with systematic RSI, it is possible to reduce the number and the severity of traffic accidents by improving the road safety performance of existing roads.

Even if there are not so many research results available showing the cost-benefit results of RSI [6] most of them still show substantial benefits of this procedure.

The purpose of a RSI is to pro-actively manage safety by identifying and addressing risks associated with road safety deficiencies. Thus, the benefits of RSI can be summarised as follows:

- It identifies potential road safety concerns for all road users,
- It minimizes the risk and severity of road accidents that may result from the existing situation of a road section,
- It minimizes unsustainable losses to health and economy,

Still, it is obvious that some deficiencies and following the RSI treatments will have bigger impacts than others. As an example a research by Elvik [6] shows significant expected accident reductions as a result of a road safety inspection and associated treatments:

- Correcting incorrect signs: 5 - 10% reduction of injury accidents





- Adding guardrails along embankments: 40 – 50% reduction of running-of-the-road injury accidents
- Guardrail end treatments: 0 – 10% of striking on injury accidents reduction
- Providing clear recovery zones: 10 – 40% reduction of running-of-the-road injury accidents
- Removing sight obstacles: 0 - 5% reduction of all injury accidents
- Yielding lighting poles: 25 – 75% of striking poles injury accidents reduction
- Flattering side slopes: 5 – 25% reduction of running-of-the-road injury accidents
- Signing on hazardous curves: 0 – 35% running-of-the-roads-on-curves injury accident reduction

The above constitute measures are typically included in a RSI report for short and medium term implementation.

Although, it is not always easy to quantify precisely the economic benefits of RSI, there is strong evidence that such inspections are highly cost-effective. With the introduction of some typical measures like the ones mentioned above, it is possible to save lives. Obviously, even saving of only one human life per year in an inspected road section, the resulting benefit of the RSI would be much higher than the involved costs.

## 1.5 Road Safety Inspection and Accident Data

A RSI does not require accident data directly, thus there are advantages in case of no access to reliable accident data. It is a systematic review of a selected road section or other road element, regardless of the number of accidents. The traditional road safety identification approach has very often been based on accident statistics, often injury or fatal statistics, thus a kind to “first wait and then act” approach, i.e. safety countermeasures are not planned or introduced until the accident situation becomes bad enough. Only after the identification of high risky road spots (black spots) countermeasures will be planned and not so often also implemented. If accident data shows some special type(s) of accident occur more often the traditional approach may lead to focus on especially specific type of accident or road users, leaving other potential risks behind or on a second stage. It could lead the situation where the reconstruction plan is focusing only on some special elements of the road, where a general situation is left; even it could be more efficient to focus on all risks of the location.

The RSI process is systematic and not only focused on any particular high risky road sections which are identified by accident data or sometimes only by one single accident with high societal response. An RSI is using experts’ experience during the field study. The RSI output is a detailed





analysis of potential problems and the proposal for sufficient countermeasures implementation. Thus RSI aims to identify the most important risks that may lead to accidents in the future, so that our remedial measures may be implemented before accidents happen. But this does not mean that the accident data is useless for the RSI in all terms.

The information from Road Safety Network Management tools or a previous investigation can also provide valuable information in terms of selection of roads for inspections.

The recorded accident data (either by police or insurance company) can provide some additional guidance in terms of prioritising which roads should be inspected. The knowledge about the number and kind of accidents can help to organize the RSI in an effective way.

## 1.6 Inspection's subjectivity

Road safety inspection results are related to the auditors' experiences and safety knowledge in general. That is why two parallel inspections carried out on the same site could result with more or less different recommendations.

There are still some basic frames which must be taken into account.

All inspections should take into account a range of human factors which relate to road user errors that are induced by the road. In the last decade's traffic safety researchers –psychologists, engineers, etc have concluded a lot of research which we can be used for the purposes of RSI.

Typical issues that should be investigated include workload issues, either a low or high level of “workload” leads to mistakes or poor behaviour while moving on the road. Also the multiple or contraversional signals/signs and/or events can overwhelm the road user leading to confusion, perception and choice of speed especially performed by motor vehicle drivers (when becoming to be an automatic process that depends on different factors that include the road geometry and surrounds).

It is also necessary that auditors are looking on safety issues not only from the car driver perspective but trying to consider all different type of road users (pedestrians, bicyclists, people using public transport, powerized two wheeler drivers, truck and bus drivers, etc.) in different periods of moving (e.g. day/night, summer/winter, etc.).

To confirm this it is with some value the experiences of many countries where the special RSI checklists are used to cover the most important issues which should be inspected during the RSI





process. This is also partly to avoid subjective experiences and expectations of auditors. It is important that the questions in the checklists are related to the factors which are important for the special location but also in general terms. The main advantage of using checklists is that it gives to the auditors a full agenda of issues which they must consider during the inspection process.





## 2. Where the RSI should be carried out?

### 2.1 Area of Application

ROAD SAFETY INSPECTION (RSI) is applicable for existing roads, motorways and other road traffic facilities inside and outside built-up areas.

Any road or road element can be inspected, but a road authority may wish to prioritize for some reason, including funding restrictions. The prioritization could be based on the role of the road, location, traffic volume, network management tools, specific road user group (e.g. vulnerable road users) or accident data.

Due to the EC Directive No. 2008/96 on Road Infrastructure Safety Management – published in October 2008 - the Road Safety Inspection will be mandatory for as minimum on trans-European Road Network (TEN-T) roads, while every country can decide that RSI is also applicable or even mandatory for other roads.

Also the local municipalities should be encouraged to perform RSI on the roads they are responsible of. The present practices of the Baltic States show that when Road Authorities are more available on RSI issues, than local municipalities are still lacking of knowledge, understanding and experiences on RSI even potentially having a great opportunity for safety improvement.

### 2.2 The basic topics of Road Safety Inspection

The following key topics relating to the road should be investigated during a RSI:

- **Function**

Is the road responding to its function in the network (does it have mixed functions, are speeds limits appropriate, are there any impacts from land use development, problems with accesses roadside facilities and properties)?

- **Cross section**

Is the road cross section width and separation appropriate (is the number of lanes sufficient for the traffic using it including cycling and walking if available?), is the marking sufficient, what are the surface conditions, are the shoulders adequate, is drainage from the road adequate, and is the pavement in a suitable condition, what is the solution for separation of vulnerable road users and is it adequate to the terms?

- **Alignment**





Is the alignment consistency regarding the curve design, are sight distances adequate? Is the existing speed limit adequate for the horizontal and vertical elements of the alignment? Are there sufficient overtaking possibilities? Is the alignment consistent and easily recognized by the road users? Or full of „surprises“ for the drivers?

Special attentions need to be drawn to terrain character transition sections on the roads (flat to hilly e.g.).

• **Intersections**

Are intersections appropriate for the traffic volumes, level and form of traffic engineering (for example – intersection type - is there traffic signals and are they sufficient?). Can pedestrians safely cross the road? Are there local accesses to private properties and railway crossings? Are there sufficient space and acceleration/deceleration lanes?

• **Vulnerable road user needs**

This topic includes the needs of pedestrians, bicyclists and powered two-wheelers. These issues are important because of the often serious consequences of their accidents. Furthermore, it is realistic to take account of that the number of bicyclist and powered two wheelers will be changed (often increased) in the next years.

• **Traffic signing, marking and lighting**

Is the signing and marking appropriate and clear, is lighting adequate or is it needed? Have appropriate speed limits been signed appropriately (start, end, height, location)?

Is prohibition of overtaking for trucks, buses, etc. appropriately designed and located? Can the signs be clearly recognized? Is a reduction in speed when approaching the intersection assigned to the correct place and properly designed? Is signing logical and consistent? Do all signs and markings correspond without any contradictions? Is the road sufficiently illuminated? Is there a need to have illumination? Is the lighting of special situations (transition zones, changes in cross section) suitably designed?

It would be useful to use the unified and standardized approach of traffic signalling and road marking on European road network, especially on sections which are close to state borders, in order to make the travelling more homogeneous and understandable for the road users on international routes. It is understandable that national standards could differ from each other. Here the RSI could take account these differences and highlight the need of explanatory information.

• **Roadside features and passive safety installations**

This complex of questions includes the safety related question about engineering structures, like obstacle along the road, bridges and other features and about the passive safety installations?

Are there any features within the safety zone? Are passive safety installations set up at the required locations? Have masts, abutments, supporting walls, bridge railings etc. been safeguarded? Are there at bridges sufficient passive safety installations, are there properly connected with the guardrails along the road?





• **Public and private services, service and rest areas, public transport**

How an access is performed to services such as schools, hospitals, supermarkets, restaurants etc. RSI should also look at parking and loading facilities as well as public transport facilities e.g. bus stops. Is there sufficient and safe space and access for passengers?





### 3. When should Road Safety Inspection be carried out?

#### Key causes to start Road Safety Inspection

RSI can be started when:

- A road section or road element (pedestrian crossing, intersection) is already identified as a high risk road section, e.g. according to the accident database;
- There is available information about serious safety problems given by Police, road maintenance unit, local administration like city government, etc;
- A reconstruction or rehabilitation project is planned by the road administration or local municipality in the near future;
- The RSI should identify the specific terms regarding road safety for the following steps of planning (or design);
- It can be performed as a periodical task according to the “RSI periodic performance” for a whole road or a section of the road.
- Other causes, relevant to safety and accepted by the road authority or local municipality.

#### 3.1 Other considerations

At least the following issues need to be considered as part of the inspection process:

- **Period of inspection** - it is recommended that inspections take place both during the day and at night. This is important so the auditor(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 should be undertaken to make sure it is suitable for all road users. The night inspection would be very important especially in the case of a high percentage of accidents during the night. When the RSI is done in a team the night time inspection can be done by only one qualified team member alone.
- **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 different conditions in summer. It is possible to use knowledge about seasonal variation of traffic and/or accident to decide about the best moment for RSI.
- **Site specific matters** should be taken into consideration. For example if the road passes a school, the inspection should take place partly when school children are arriving or leaving the school. This could also focus on mass events, as example and other specific matters.





As an example, the road safety inspection should put attention on specific road sites, where special events could cause site specific situations (e.g. mass events on certain periods or even irregularly).

### 3.2 Frequency

The Directive signs that the RSI become a routine process, it is recommended that this procedure is carried out regularly. Some road features, such as cross sections and alignment may not change for many years but may have to be adapted to changing functions, traffic volumes and composition.

While no exact timing is recommended, a timing should be decided by every country individually. Some research recommends that five years regular period for RSI is adequate but always before the reconstruction design has been started. Another important issue which should be taken into consideration is that the necessity of road safety inspections should be decided by the competent entity based on ranking of high accident concentration sections" means a method to identify, analyze and rank sections of the road network which have been in operation for more than three years and upon which a large number of fatal accidents in proportion to the traffic flow have occurred. Here the road safety inspection and other activities related to road network safety management will meet.

When considering the frequency of RSI on separate locations it should be born in mind that some road elements can change more often than others. If road conditions are known to have changed e.g. new signing and/or markings, lighting and surface conditions, a focused or specific road safety inspection limited to these topics can be carried out by the road administration.

Also the other considerations should be taken into consideration. First is the similar road safety impact assessments (like Road Safety Audit of the planned road design) performed before. If there was no Road Safety Audit for these measures done before, additional RSI may be essential.





## 4. How to perform a Road Safety Inspection?

### 4.1 Overview

RSI can be instigated as part of the safety management of the road network. The first decision is to determine the road or network section extent of the inspection by defining the start and end points, considering that it could also be a section of a road, or a road element (pedestrian crossing, intersection) of a reasonable length. This task should be performed by the road authority or local municipality (here and after: the Client). This will be outlined in an agreement between the parties involved in the inspection, the Client and a Road Safety Inspection Team (or single auditor if legal).

The written agreement will describe what to inspect, who is paying for what, timelines and deadlines, what the local agency should contribute with and so on.

For the practical procedure of the Auditors work we recommend the following four steps during the RSI:

STEP 1 - Preparatory work in the office

STEP 2 - On-site field study

STEP 3 - RSI report writing

STEP 4 - Remedial measures and follow-up

It should be noted that every step may also be considered as a number of sequent and separate sub steps, as the present procedures and standards of every single country prescribe.

### 4.2 The partners in the Road Safety Inspection process and their roles

The Client (usually the Road Authority, private road operating company or local municipality) and team of Inspectors participate in the audit process.

The **Client** is the institution which is responsible for road safety. It is the Client's full responsibility to ensure that inspection demands will be obeyed and will start as soon as possible the proposed improvements. In a final term it is also the task of the Client to organise the necessary investments for the implementation of the results of the RSI. It is allowed that the third party (institution or person) could perform as a client for RSI, if it will have interest to perform independent RSI. In this case the procedures should be followed in a normal way, but the Road Authority or local municipality should be asked to join the RSI processes during the remedial stages of RSI. Still their participation is voluntary and the RSI carried out could not be taken as a regular RSI.





The **Auditor** is the independent road safety expert, a team or organisation who will conduct the RSI. The expert is responsible to conduct the RSI. With a formal written report the Auditor shall present the findings, the deficiencies and references, also recommendations.

The Auditor will use his expert knowledge regarding the best practise in the evaluation of existing situation. To ensure the quality of the RSI Auditors shall undergo an initial training in the award of a certificate of competence and should take part in periodic further training courses preseen by local legislation or rules. Where RSI are undertaken by teams, the local procedures should describe the competence of the members of the RSI team. It is essential that the Audit report should describe all members, their responsibilities and tasks performed. It could be also sometimes with some additional value to have experts from other institutions (like the local Traffic Police or public transport operator) in the inspection team. In the latter case these additional members of the inspection team cannot be certificated as auditors, but this must be clearly indicated in the audit report.

### **Ordering the RSI?**

Usually, the decision on Auditor is taken by the Client.

It may be regulated by Ministry decision or by law as well as by the financing donor.

### **Selecting the team and tasks of the team members**

The Client commissions the Auditor, who is composing the Inspection team. It is strongly recommended to have a team with different skills appropriate to the project. Even if the local legislation allows the individual Auditor to work on RSI, it is strongly recommended to compose a inspection team.

One person in the team should be appointed as the **team leader** to manage the team and the process. A list of potential Auditors compiled by the Client can be helpful for the selection process. It is important to consider including members with experience regarding all aspects of the facility, such as signage, lighting traffic controls, vegetation, snow removal etc.

I special cases when the local legislation of road safety inspection procedures allows it is accepted to carry road safety inspection by only one auditor following the standards off the auditor.

## **4.3 Preparatory work in the office**

Background information about the road, the function of the road, the road standards and the traffic volumes 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. Often the Client is responsible on delivering the information to the Auditor. The list below provides questions that should be asked and the answers recorded during the preparatory work:

### **Road (also section or a road element) function**





- Describe the function of the road or road section or an element, is it a national or regional or a local road?
- Is the road a school bus route?
- Does the road pass through any towns or villages?
- What kind of traffic uses this road?
- Is it long distance or short distance traffic, or a mix of different kinds?
- What is the proportion of heavy vehicle traffic? Is the proportion more or less than other similar roads?
- Is the road a part of a special freight route (e.g. dangerous goods)?
- Do vulnerable road users, such as pedestrians, bicyclists or powered two wheelers, use the road?
- If the road passes through agricultural areas, are there slow moving vehicles along the Road?

### **Traffic situation**

Important information for the RSI is:

- The traffic volume (AADT if possible for the last 3...5 years)
- Traffic composition (cars, HGVs, trucks, buses, vulnerable road users)
- Is there any traffic volume prediction for the road available? Is there predicted any changes in traffic composition in the future?

### **Road standard**

Describe the road standard in general and how it relates with the inspected road function, traffic volumes, types of junctions and intersections, cross section, etc.

Speed limits. Are they reasonable for inspected area, taking account the presence of vulnerable road users, especially children, elderly and disabled persons, the alignment of the road, etc?

The relevant guidelines and regulations need to be available at least for the office work. If possible, reasonably detailed maps or drawings or the usage of satellite maps (e.g. Google earth) or any aerial views could be helpful. Print-outs of these documents should be used as an instrument during the field-study but also as support for presentation of the results of the inspection.

One of the most important parts of an RSI is to accurately indicate where particular problems are located along the road to give the right recommendation for remedial measures. The method of identifying concrete locations has to be determined at an early stage.

Furthermore, the following data should be organised:





1. Traffic data for all kind of road users, including information about regular public transport lines through the inspected site
2. Accident data and data from Traffic Police about typical traffic offences in the road section or larger area, which allows comparing areas.
3. Information about possible land use changes or investments in the surroundings e.g. like planned residential areas, shopping centre, new hospitals etc.
4. Previous audit and inspection reports conducted, if available.
5. If necessary additional surveys should be undertaken by the audit team. For example, if there is obviously a problem with speeding the team could measure speed behaviour (e.g. with speed guns) if there is no evident data available.

#### 4.4 Field Study

For a reliable inspection report the inspection should be made both by car and on foot where needed and incorporate both sides of the road and roadsides. The road should be driven a number of times if possible and photographs or video recording taken.

The standard equipment for the road safety auditor necessary to perform the field study is containing of device for the measurement distances (simple tapeline or electronic device), photo or video camera (if available), notebook and pencil. Safety equipment must be used always (see below). If the audit team looks necessary to carry out some specific surveys (e.g. speed measurement) relevant equipment should be used.

Today when the modern technical equipment is widely available this gives the auditors a number of new approaches for conducting the safety inspection fieldworks. Here the photos, video recording and other similar techniques could be widely used, but some good practices from some countries (e.g. Sweden) show that also internet based information on road sections (e.g. street view) could be used in some amount for the purposes of the road safety inspection.

When conducting the RSI the Auditor must place himself in the position of the various road users (motorist, cyclist and pedestrian) so that he can judge the traffic safety of the construction from the viewpoint of all road users. Thus on the road inspected it is necessary to inspect part of the intersecting road as well (at least the approaches), including both by vehicle and on foot and even on bicycle if looked necessary.

The on-site field study should start with the description of the surrounding. It is necessary to localize the situation (rural, urban or suburban and a description of what surrounds the road - forest, agricultural area, built-up area etc.).





It is mandatory that during the field study the audit team members use relevant safety equipment. This is of course depending on the local legislation, but as a minimum, the inspection team during the inspection should have safety vests and during the dark period of the day - flashing/warning lights. Additional safety equipment (like specially equipped car) is typically necessary on motorways and similar high speed roads. Auditors need to take care, not only wearing a safety vest, but also ensuring they take all necessary precautions.

#### 4.5 Road Safety Inspection report

The main task of the RSI team is to indicate detected problems in the report. The report is thus essential part of RSI and has the key role for the steps after. It is important that the report will cover all the views of independent auditors.

We suggest that the inspection team is engaged to ensure there is more than one pair of eyes doing the inspection, there is exchange of ideas from discussions between the members of the team and all necessary skills and backgrounds are covered by the team. However, on some smaller projects, a single Auditor may be adequate and a more practical option.

Auditors' responsibility is the most important at this stage of RSI activities. It is important to understand that the written report must follow some important rules:

- The report should clearly describe general information about the RSI carried out, like:
  - o The inspected road section
  - o Road safety inspection team members (auditors) and their role during the RSI.
  - o General characteristics of the inspected road (section or element)
  - o Data used for the RSI, indicating what sources have been used, and what additional surveys have been carried out;
- The road safety deficiencies should be explained clearly. It is recommended that every listed deficiency is also listed by its estimated safety risk;
- The Auditor should make recommendations about stepwise measures to improve the situation.
- The checklists used (if any) can be helpful as working document to be included in the RSI report.
- In the last row "comments" the Auditor can make remarks in case the Client will ask for some explanations at some later stage.
- The report must be signed by all auditors (inspection team members) and dates.





It is important to underline, that only safety related deficiencies should be listed in the report. In the case of findings which is not safety relevant and not part of the formal report can be helpful to indicate them separately.

The RSI report content could be different and it is recommended to take account the previous experiences and standards of the country where RSI is taken place. As a recommendation the following content of the RSI report could be used.

The RSI report consists of four main parts and appendices with maps, pictures and illustrations as necessary.

**Part 1** includes details of the road or section/element of road being inspected as well as the composition of the inspection team, date, times and conditions at the time of the inspection.

**Part 2** should outline the background data obtained during the preparatory work in the office and a description of the activities undertaken.

**Part 3** 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. It is recommended to include these deficiencies and shortcomings into table form

**Part 4** should contain proposals for countermeasures, from short to long term. The safety effects of the measures should be taken into consideration.

**Appendices** - include illustrations, maps, tables and data from other sources and kinds (in order to clarify the results, different kinds of illustrations including photos and sketches of countermeasures). If the accident data is used it could also be included in the appendix.

If possible, the cost benefit analysis of the alternative countermeasures should be made. In that way, a ranking of remedial measures can be made for example on the basis of a Cost/Effectiveness ratio.

Also, the efforts in respect of the time needed to realise the measures should be taken into consideration to prepare challenging but realistic proposals The Auditor should use his personal expert experience and knowledge about the best practice and the local circumstances.

The possible outcome of the road safety inspection procedures is also dependent on the terms of RSI. Due to the Directive [11] recommendations the RSI should perform a part of the road network safety management systems. Thus, if the RSI is performed as a result of procedures within the road sections with a high accident concentration, safety inspections as a preventive measure should assume a more important role. Regular inspections are an essential tool for preventing possible dangers for all road users, including vulnerable users, and also in case of





roadworks. Thus RSI could give a valuable input to the other safety related activities, like road safety impact assessment.

#### 4.6 Completion of the Road Safety Inspection

Upon receipt of the report, the Client must consider the indicated problems and proposals and make a decision on how and if he will accept and then implement the proposed measures.

##### **Completion meeting**

The Client reviews the delivered RSI report and considers the indicated problems and proposals. It is sometimes a case that some additional clarification and discussion is needed in order to guarantee that the both parties- auditor and the client- understand the raised by auditor deficiencies in a same way.

Here a clarifying meeting between the Client and the Auditors is recommended. The main task of the completion meeting is to clarify the auditors' deficiencies, shortcomings and recommendations, not to discuss their validity. It is the decision of the Client who will be asked to participate at the completion meeting, but as minimum the inspection team leader and representatives from the Client are present so that both parties can clearly understand the issues rose. It can also be helpful to invite to the meeting interested parties outside the legal inspection procedures, for example officers from the Traffic Police, representatives from the public transport company and local communities, NGOs, etc. The completion meeting could decide that the RS inspection report needs to be updated, rewritten or changed.

If the Client decides not to hold a formal completion meeting, the written request of clarification could be sent to the auditor or inspection team instead. In this request the Client should write the request to the auditor what issues in the inspection report need to be explained in more details.

In both cases, after the decision at the completion meeting or in a written request of the Client to auditor, the latter has a duty to update the work or in case if the auditor or inspection team remains their positions, reply in a written form to the Client explaining the auditor's position.

##### **Response to the Inspection report**

The Client decides finally whether recommendations are to be adopted or not.





All recommendations must be given due consideration. Those that are accepted should be implemented stepwise and the road administration should provide an implementation plan of measures.

Problems identified but considered to be insignificant, either outside the terms of reference or solutions recommended not considered suitable, must be addressed by means of a formal response. It is important that this formal response gives reasons why the recommendations are not accepted. This response acts as an evidence trail through the decision making process.

The written response to the audit report will become part of the RSI project documentation. Even in case of the rejection of the inspection results by the Client where serious disadvantages for the road safety have been recognized by the auditors they have a full responsibility to list and evaluate these disadvantages and shortcomings in spite of Client's acceptance.

#### **4.7 Remedial Measures and Follow up**

It is very important to foresee periodical RSI in the core network to guarantee an effective way for a serious follow up. The periods should be decided by road authorities or municipalities separately. In addition, it could be helpful to have some studies at a later time to evaluate the effects of the remedial measures.

Several Member States already possess well functioning road infrastructure safety management systems. These countries should be permitted to continue using their existing methods. Developing and demonstrating components, measures and methods (including telematics) and disseminating research results play an important part in increasing the safety of road infrastructure.

The road authority could organise such studies for example with the support of Universities or other relevant (research) institutions. 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 also important that the best practices obtained from road safety inspection or other relevant activities should be shared between partners, both domestic and internationally.





## 5. What are the typical safety deficiencies?

### 5.1 General governing principle

Research results of the last decade might work as basis for improved road design standards and guidelines to improve safety of roads. The RSI can work as a source of information on potential safety improvements, to be used to develop technical standards and specifications.

It is impossible to describe the full lists of potential road deficiencies and shortcomings; often they are interrelated and contributed by human behavioural aspects of different road users. The previous experiences and practices can still underline some of the most deficiencies that may have a critical effect on both number and severity of crashes and therefore RSI should be conducted taking into consideration the point of view of every kind of road user.

In relation to the road infrastructure safety the Vision Zero approach could be introduced. Vision Zero is a philosophy of road safety that eventually no one will be killed or seriously injured within the road transport system [7]. The Vision is an expression of the ethical imperative that:

*It can never be ethically acceptable that people are killed or seriously injured when moving within the road transport system.*

Vision Zero provides a vision of a safe road transport system which can be used to guide the selection of strategies and then the setting of goals and targets. Zero is not a target to be achieved by a certain date. It is a change from an emphasis on current problems and possible ways of reducing these to being guided by what the optimum state of the road transport system should be.

Vision Zero also changes the emphasis of responsibility for road traffic safety. In all current road transport systems, the road user has almost total responsibility for safety. In most countries, there are general rules that the road user should behave in such a way that accidents are avoided. If an accident occurs, at least one road user has, by definition, broken the general rule and the legal system can therefore act.

In contrast, Vision Zero explicitly states that the responsibility is shared by the system designers and the road user:

"1. The designers of the system are always ultimately responsible for the design, operation and use of the road transport system and thereby responsible for the level of safety within the entire system.





2. Road users are responsible for following the rules for using the road transport system set by the system designers.

3. If road users fail to obey these rules due to lack of knowledge, acceptance or ability, or if injuries occur, the system designers are required to take necessary further steps to counteract people being killed or seriously injured."

‘Ethical rules’ have been proposed to guide the system designers. Two of these are:

- "Life and health can never be exchanged for other benefits within the society"
- "Whenever someone is killed or seriously injured, necessary steps must be taken to avoid a similar event".

This proposition is also the most important proposition for the RSI.

The present best practices show that the following aspects are of essential importance [2, 6, 9]  
:

- Speeds are often most adapted to the situation and excessive speed differentials may cause high risks;
- Keeping the right driving direction,
- Decreasing conflicts between motorized vehicles and other road users;
- Avoiding any unpredictable situations.

It should be kept in mind, that there is always a possibility to improve road infrastructures using a number of different countermeasures but only some of them can be implemented in a short term, while the long term implementation could have a different perspective.

Of course, it is often difficult to introduce excessive and expensive countermeasures on a road which was constructed long time ago. Often, an overall improvement would lead to a solution with a complete new road (re)construction with high costs, time consumption for preparation etc. As this way is sometimes not a realistic solution the one should find arrangements to improve the existing traffic facilities using short term and low cost countermeasures.





## 5.2 Typical deficiencies

This Chapter does not recover the whole framework of the safety inspection, but it does provide some structure for using the checklists with all necessary questions for a RSI contained in the Annex 1.

It is important to highlight that the most often more than one factor is contributing collisions, thus it is necessary to look also a combination of factors not factors separately.

Some very typical examples of road safety problems in connection with the typical accident risks are collected and listed as follows:

### • Road function

A typical deficiency of existing roads is a lack of conformity of the function of the road in the network with high traffic volumes and the existing usage with mixed traffic. This situation can be found in through road sections of linear villages, towns and also on urban main roads. This leads to conflicts with vulnerable road users. We can also find a large number of insufficient or unorganised crossing facilities and a lack of pedestrian walkways and cycling facilities. These deficiencies will lead to accidents involving vulnerable road users – pedestrians and bicyclists.

It is essential to focus on existing speed limits, both on rural roads and in urbanised areas. The auditors should answer the question. Are the speed limits adequate, understandable and followed by road users or just formal? Here, the relevant speed studies can provide additional help.

### • Cross Section

The head-on collisions of the road accident type occurs for a variety of reasons, but on some occasions a poor road cross-section can contribute. Head on collisions in interurban section have often terrible consequences because the speed of the vehicles is high. Road safety inspection should put attention on the real situation with the cross section regarding the potential risks of collision. It is necessary to mention that sometimes the running-off the road accidents have similar characteristics than head-on collisions.

### • Alignment

As a result of the RSI we can identify often problems with the alignment of existing roads. Typical problems regard the sight conditions, and too short stopping sight. To improve road safety we should give the driver enough information about the alignment of the road, what is going-on ahead (orientation sight). It is obvious that sight conditions are dependent on the legal and operating speed, but also the traffic management must be harmonized with visibility conditions.





### • Intersections

Intersections are often the locations with increased risk, especially because of conflicting manoeuvres of motorized and non-motorized road users. Some layouts as well as traffic engineering solution sometimes can lead to significant problems. Therefore it must be checked if there is a need for a redesign or other changes. Here, the accident statistics may be with greater value than on other road sections.

In the existing network we can often find serious safety problem because the lack of access control. If the inspection time recognises this during the RSI, the report should contain proposals for improving the situation. Other typical deficiencies are lack of sufficient sight conditions, insufficient space for manoeuvres and problems with the sight condition regarding traffic lights.

### • Traffic signing, marking and lighting

The road signs/markings should give the driver information of intersections, destinations, hazards, location as well as of points of interest in a sufficient way. A common problem is the missing, contradictory or not readable signs/markings. Typical deficiencies are missing, incomplete or misleading signs/road marking or an “overload” of information.

The signs/markings should be clear and visible also at night time. Lighting is a special topic, especially in the built up areas. For road safety is very important to have a good lighting especially at pedestrian crossings and intersections.

### • Vulnerable road users (pedestrians and bicyclists)

It is an important task for the RSI to identify road safety problems not only for the motorized traffic but also regarding the vulnerable road users. Such problems can be more often identified in through road sections of urban areas and along major urban roads.

Typical findings regarding vulnerable road users are missing or unsafe footpaths and missing or unsafe pedestrian crossings. Attention should be paid to accesses to the public transport stops.

### • Roadside obstacles

Roadside hazards, such as poles, drains and trees can make the consequence of collision much more serious. Roadsides should be “forgiving” when a driver makes a mistake by running or sliding off the carriageway.

Trees along interurban roads pose a particular problem as many do not want them removed, despite the clear hazard they create.





## 6.1 Who can perform Road Safety Inspection?

### 6.1 Experience and training of the Auditors

Road safety inspection may be done by a group of Auditors – inspection team – or sometimes by single Auditor where the latter is legal. A team should consist of a team leader (senior auditor) and team members, but this is accepted if the inspection team is having consultations with specialist advisers (for example from the Traffic Police or local public transport company or even local residents). It is allowed if inspection team includes some junior auditors in order to gain experience in RSI. All members of the inspection team should be listed in the report and sign the report.

The members of the inspection team should be independent i.e. not part of the team that is responsible for maintenance of the road or from the Road Administration, or responsible Ministry (normally Ministry of Transport). The auditors should have very good specialised knowledge and in-depth knowledge in road safety related topics as well as an understanding of potential countermeasures and what is required for their implementation.

Different practices of RSI and RSA work are nowadays in use in Europe. One is to dispose the needed qualified auditors employed by the public administration, public road safety institute, University or other research institution. This solution is called as “internal auditor”. The other possibility is to have contracts with RSI experts from private consultants (“external auditors”). In both cases the principle of the independency of the auditor should be followed.

The preferred requirements of a road safety Auditor should include:

- Professional education in road design, road safety or road/traffic engineering or similar.
- Substantial experience in day to day road engineering/operation and/or road maintenance respectively or road traffic police work.
- An excellent knowledge of the regulations and guidelines regarding roads and road traffic, traffic signs etc.
- Strong communication skills to be able to write a clear and concise report and then convince various stakeholders of the proposed countermeasures.

It is essential for the possible auditors to have specific **initial training** in audits and/or inspections and the **certification** on uniform safety auditing and inspections. Only certified auditors are in a position to conduct a RSI.





It is suggested that **on-going inspection training** be provided for Auditors to provide any updating on issues critical to the inspection process.

It is the duty of every single country to decide about the auditor's **certificate** preconditions. In some countries RSI training could be arranged separately from RS Auditing training, while the others can combine it with the RSA training. Because of the similarities of the methodology of the RSI and RSA the RSI could be done by same experts - auditors. Another option is to organize training courses similar to the RSA with a limited content focussed to the needs of the RSI.

The auditors' certificate should be issued by the responsible authority of the country taking account legal frameworks of the country. It is also important that the list of certified auditors is available for the potential clients of RS inspections.

## 6.2 Legal aspects

Experience in many countries indicates that claims related to the use of RSI have not been an issue. The RSI simply identifies safety issues or concerns that have the potential to reduce the safety level of an existing road. On the other hand, the potential for liability for the Road administration can appear as an important factor for road authorities in deciding to undertake or not a RSI.

However, the proper execution of RSI should not expose authorities that adopt them to a greater liability. The liability of RS inspection should be regulated according to the legal regulation of liability of the public sector.

With regard to legal liability, some main principles can be expressed for the RSI:

- It is recommended that the road safety inspection reports are deemed to be an asset to the public; the fears of legal liability should not be used to prevent their use,
- RSI report quality is essential. The Client's response to an RSI report must provide reasons for not accepting any auditor's recommendation. The response should be detailed and defensible,
- It is recommended that the RSI report and the formal response report is placed in the project file. It can be used for any other inspection or other investigation.





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## Annex 1. Checklists to the Road Safety Inspection Guideline

### 0. General

1. Is there any information available about previous RSI?
2. Are there any available issues from accident data?
3. Are there specific traffic composition characteristics to be taken into consideration (e.g. pedestrians in through road sections)?
4. Are special measures required for particular groups e.g. for young people, older people, sick people, physically handicapped, hearing-impaired or blind people?
5. Is the design of the road according to its function and hierarchy in the network?
6. What is the road environment look like (e.g. build up areas with mixed traffic)?
7. Is access to abutting properties and agriculture appropriate for road safety along the interurban section, are there safe?
8. Are there any parallel ways to be used by special vehicles (like carts and farm equipment)?
9. Is there anywhere accumulation of road elements such as curves + hilltops + intersections etc?
10. Are transitions installed between different road functions and characteristics? Do road users realize the change of road functions and characteristics early enough (orientation sight)?
11. Are there specific measures taken (e.g. traffic islands and lane shifts) at the entrance of settlements and towns? Is the transition from a built-up to a rural road or from an illuminated to a not illuminated road appropriately designed (village/town outskirts)?
12. Are speed limits required and applied in the best way? Have suitable measures been taken to ensure that speed limits are obeyed?
13. Is stopping sight distance guaranteed along the entire section? Is stopping sight obstructed, for example by narrow crest curves?
14. Is overtaking sight distance in an acceptable way of the road section ensured?
15. Is slow and non motorized traffic separated from fast and heavy traffic (e.g. separate facilities)?





## 1. Cross section, alignment and curvature, shoulders, obstacles beside the road

1. Is the cross section appropriate to the function? Is the cross fall in straight sections constant? Is narrowing of the carriageway required and, if so, designed in such a way to ensure traffic safety?
2. Is there a median? Does it have a safe design, e. g. safety barrier or sufficient width to prevent head on collisions?
3. Do curves with small radii have an enlarged width of the pavement?
4. Does the road surface provide the required grip over the long term, especially where small radii occur? Are there any doubts regarding the surface grip because of excess bleeding or polished components? Is the surface even and free from grooves, rutting, potholes? Is the surface free from short or long waves?
5. Is there sufficient drainage for the road and its surrounding?
6. Is there sufficient superelevation in curves, long fall and diagonal fall in the case of the change of the direction of the cross fall?
7. Is the width of the road shoulders appropriate? Are the shoulders stable (like hard shoulders or gravel shoulders)? Are the shoulders and the carriageway at the same level?
8. Are there any bottlenecks? If so, are they properly signed?
9. Does the embankment or obstacles beside the road require passive safety installations? Are all fixed or planted obstacles that can be dangerous placed outside the safety zone?
10. Have the needs of public transport and its users been taken into consideration?
11. Is the existing speed limit adequate for the horizontal and vertical elements of the alignment?
12. Is sight obstructed, for example by safety barriers, fences, road equipment, parking areas, traffic signs, landscaping/greenery, bridge abutments, buildings?
13. Is visibility in curves ensured?
14. Are there sufficient overtaking possibilities?
15. Has the uphill sector a passing lane for overtaking slow traffic?
16. Has the passing lane a sufficient length in order to insure that the vehicles can overtake and return safely?
17. Are arrester beds necessary in downhill sections (depend on the percentage of heavy trucks and the gradient)?
18. Are there hidden dips in the vertical alignment?
19. Is the alignment consistent and easily recognized by the road users? Or full of „surprises“ for the drivers?
20. Are changes (surprises) indicated by transitions like signing, points of fixation?
21. Are the outside of the curves framed parallel and consistent?
22. Are the insides of curves free from side obstructions (lateral clearance)?
23. Are there optical illusions?

## 2. Intersections, general – Please give a separate answers for each intersection!





1. Are the intersections perpendicular?
2. Is the main direction clearly recognizable? And if so, Is the right of way clearly recognizable?
3. Are the movements guided clearly and easily to understand? Are traffic flows guided by markings?
4. Are the auxiliary lanes or tapers for left, right and U-turning movements large enough?
5. Is the intersection fully visible and recognizable in time from all approaches for different driver eye heights of: cars, trucks, motorcycles, bicycles, etc, and are the required sight triangles clear?
6. Does the ambient lighting present any special requirements (e.g. irritation for traffic signals)?
7. Is sight obstructed at intersections, for example by safety barriers, fences, road equipment, parking areas, traffic signs, landscaping/greenery, bridge abutments, buildings?
8. Are type and design of the intersections suitable for the function and traffic volume of the intersecting roads?
9. Is pedestrian/cyclist routing at intersections adapted to the actual conditions and clearly marked and signposted?
10. Are all approaches equipped with pedestrian and bicycle crossings?
11. Is the transition safely designed if footpaths and cycle paths end on a intersection or road or are directed across the road?
12. Have suitable measures been taken to ensure that speed limits are obeyed?
13. Is a reduction in speed required in the direction of the intersection? And are there transitions for speed reductions on the minor road?
14. Does the obligation to yield right of way need to be reinforced (e.g. using repetition)?
15. Are pedestrian crossings clearly marked? Is each section equipped with signals (including railway structures)?
16. Are the crossings for pedestrians and bicyclists provided with low kerbs?
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 bicyclists to stand and wait?
19. Are the islands above the level of the carriageway (curbed islands)? or only made by markings?
20. Intersections continued
21. Is there a danger of underestimating speed and overestimating distance of crossing vehicles?

### Roundabouts:





22. Are the islands clearly visible and of a suitable design?
23. Are all approaches to roundabouts radial to the centre? Is the design suitable to ensure a low speed level and support the right of way?
24. Is there a sufficient deflection to ensure an appropriate speed when passing the roundabout?
25. Is the central island of the roundabout shaped well?
26. Is the through-visibility effectively stopped by the roundabout and the hill?
27. Is the central island of the roundabout free of fixed obstacles which could be reached by vehicles?
28. In the case of a high number of powered two wheelers: ensure the road surface an sufficient grip?
29. Is a low speed level supported by constructional measures and by way of marking?

### **Signalized intersections**

30. Is the stopping line correlated with the traffic signal so that the signal can be seen?
31. Have any turning movements been excluded from signal control? If so, is traffic management safe?
32. Are traffic signals easily recognizable; are there repeating/doubled signals?
33. In areas with bicyclists: Have bicyclists' requirements been considered (e.g. route through the intersection)? Are stop lines for motorist's setback for the benefit of bicyclists?
34. In areas with pedestrian traffic: Are all approaches equipped with pedestrian and cycle crossings? Are pedestrian crossings clearly constructed? Is each section equipped with signals? Can pedestrians cross the road in one go? Is the green time sufficient? Are phase offsets required for pedestrians and bicyclists within the running cycle?
35. Are exclusive green phases provided for pedestrians and bicyclists where necessary?
36. In areas with pedestrian traffic: If there is no exclusive pedestrian phase, is a leading pedestrian interval provided?
37. Are the type and spacing of different crossing installations coordinated (e.g. railway crossings, traffic signals, zebra crossings)?
38. Are the signals are affected at dawn/dusk by direct sunlight? Are advanced warnings provided for traffic signals that cannot be seen in time?
39. Have the locations for the signals been selected correctly (additional signals, overhead signals, etc.)?
40. Does the existing road lighting lead to conflicts in recognizing the yellow indication (sodium discharge lamps)?





41. Are risks avoided for a “see through effect” by highlighting the nearest signals? Are the traffic signals properly situated so that they can be distinguished by each particular traffic flow?
42. Are there any additional signs correlated with the traffic signals to show the direction to which that traffic signal is referring to?
43. Is the visibility of the traffic signal ensured on a sunny day?
44. Is the stopping line correlated with the traffic signal so that the signal can be seen?
45. Are signals covered/ obstructed (e.g. by traffic signs, lighting masts, plants, traffic jams)?

### 3. Railway crossings

1. Is the type of the railway crossing according with the traffic volume?
2. Are passive safety devices at the required locations?
3. Are the traffic signs correlated with the type of railway crossing?
4. If the railway crossing is situated in a curve are the traffic signs doubled on the other side of the road?
5. Are traffic control devices required and optimally set up with regard to future traffic developments?
6. Is the perception from a sufficient distance guaranteed?
7. Is good visibility guaranteed?
8. Is lighting required and appropriately installed?
9. Does the ambient lighting present any special requirements?
10. Are prohibition of overtaking and speed limits in place as necessary?

### 4. Services and rest areas

1. Are service and rest areas and parking facilities on both sides of the road? In case not, are there left turn lanes?
2. Are there deceleration and acceleration lanes or tapers at the entrance and exit?
3. Is the number of the parking areas for parking for passenger vehicles, trucks and buses sufficient?
4. Are the dimensions of the parking areas sufficient for parking for passenger vehicles, trucks and buses?
5. Are areas for busses and passenger cars separated from the truck traffic (in the case of large rest areas)?





6. Are the layout and cross section of the service or rest area appropriate for the different traffic movements? And if so, Is layout suitable in access areas to and from? Is the layout in such a way, that vehicles are running at the appropriate speed?
7. Are the parking areas physically separated from the carriageway (guardrail, kerb, green area etc.)?
8. Are there safe footpath connection to restaurants, rest rooms etc. (including safe crossings of)?
9. Have measures been taken to ensure safe access for rescue vehicles/maintenance vehicles/fire service?
10. Are sufficient parking areas provided to minimize illegal parking on footpaths and on the carriageway with the corresponding hazards or have corresponding preventative? Is sight obstructed by parking areas or by illegally parked vehicles?

#### **5. Needs of vulnerable road users**

1. Are stops easily and safe accessible to pedestrians (combination with pedestrian crossings, crossing help, footpaths connection etc.)?
2. Are the bus stops signposted and detectable by the drivers? Is reconcilability from a longer distance guaranteed? Are the bus stops situated outside of the carriageway where appropriate?
3. Are the queuing areas for waiting passengers sufficient? Is sight obstructed, for example by safety barriers, fences, road equipment, parking areas, traffic signs, landscaping/greenery, bridge abutments, buildings?
4. In the case of bicycle paths: Is cyclist routing safely designed in the area near public transport stops?
5. Is lighting required? And if so, is it appropriately designed?

#### **Pedestrian facilities**

6. Are the pedestrian crossings located where most required by pedestrian traffic? Have pedestrian crossings been appointed in such a way that collective use is guaranteed and the road will not be crossed at other points?
7. Is there a risk of pedestrian underpasses and bridges being bypassed? Are suitable measures in place?
8. Are further crossing aids required?
9. Are areas for waiting pedestrians and cyclists sufficient? Are refuges large and wide enough for crossing pedestrians and bicyclists to stand and wait?





10. Are crossings over special railway structures of a safe design?
11. Is two-way visual contact ensured between pedestrians and motorists?
12. Are the pedestrian ways physically separated by kerb stones, barriers or greenery?
13. Are the pedestrian crossings signposted and detectable by the drivers?
14. Are the islands clearly visible and properly placed?
15. Is lighting provided where necessary?

## 6. Bicyclists

16. Are there separate bicycle facilities?
17. Have cyclists' requirements been considered enough (e.g. route across central refuges, bottlenecks)? Are dimensions and pavement suitable?
18. Is the visibility for motorised traffic adequate to see cyclists along the road?
19. Are parked vehicles obstructing the visibility of the road users regarding cyclists?
20. Are points where cyclists cross intersecting roads provided with low curb stones?
21. Is right of way clearly defined at points where cyclists come into contact with each other or with motorized traffic?
22. Is it clear to the motorist whether he is crossing a one-way or two-way cycle path?
23. Are advanced warnings in place for features that cannot be seen in time?

## Needs of motorcyclists

24. Are motorbikes a remarkable percentage of the traffic?
25. Have devices or objects that might destabilize a motorcycle been avoided on the road surface?
26. Is the road side clear of obstructions where motorcyclists may lean into curves?
27. Will warning or delineation be adequate for motorbikes?
28. Have barrier kerbs been avoided in high speed areas?
29. In areas more likely to have motorcyclists run off the road is the roadside forgiving or safety shielded?

## 7. Traffic Signing, road marking, lighting

1. Are there speed limitations ahead of intersections and build up areas and in through road sections?





2. Is a reduction in speed when approaching the intersection assigned to the correct place and properly designed? Have appropriate speed limits been signed appropriately (start, end, height, location)?
3. Is sight obstructed by the traffic or by the signs? Is the visibility of the road course assisted by edge delineation? Can the signs be clearly recognized and read (size of signs)? And do the signs conform to the regulations and standards (incl. conventions of Vienna and Geneva)?
4. Is prohibition of overtaking for trucks, buses, etc. appropriately designed and located? Are there warning signs ahead of the intersection prohibiting overtaking?
5. Are there too many (e.g. more than 2) different traffic signs at one place? Is signing logical and consistent? Does it show the right of way clearly?
6. Could greenery lead to safety problems if the vegetation grows (e.g. as a result of covered road signs)?
7. Are signs located in such a way as to avoid restricting visibility from approaches or intersecting roads?
8. Are signs retro reflecting or are they illuminated at night? In daylight and darkness, are signs satisfactory regarding visibility?
9. Are there misunderstanding or misguiding traffic signs or additional information panels? Are the additional information panels uniform?
10. Is readability ensured at the required distance? Are there background problems?
11. Where needed have signs been located above the carriageway?
12. Do the signs have a dimension according to the type of road?
13. Are the signs at a uniform position, compared to the pavement?
14. Are the sign masts and foundations sufficiently protected against collisions? Are the signs provided with protective edges?
15. Do the traffic signs including their supports have a sufficient passive safety by: low mass or/and? Break away structure or/and? Are they beyond the safety zone?
16. Do delineators have a breakaway structure?

## Markings

17. Do all signs and markings correspond without any contradictions?
18. Are the road markings clear and recognizable? Have old markings/signs been completely removed (phantom markings)?
19. Are the markings appropriate for the function and category of the road?
20. Are the markings in a parallel line to the edge of the road surface?
21. Are the markings likely to be effective under all expected conditions (day, night, wet, dry, fog, rising and setting sun)?





22. Is the obligation to yield right of way enforced by markings according to the one enforced by signing?

## Lighting

23. Is the road sufficiently illuminated? Is there a need to have illumination?
24. Is the stationary lighting appropriate?
25. Is the lighting of special situations (transition zones, changes in cross section) suitably designed?
26. Does the existing road lighting lead to conflicts in recognizing the yellow indication (sodium discharge lamps)?
27. Does lighting need to be changed so that crossing pedestrians are clearly visible?
28. Is contrast lighting required at the intersection or crossing?
29. Does the ambient lighting present any special requirements?
30. Is stationary lighting at intersections/service and rest areas properly situated? Can the stationary lighting cause problems in recognizing the traffic signs or the alignment of the road?
31. Are the lighting masts situated outside of the safety zone or properly protected?

## 8. Road side features and passive safety installations

### Other road equipment

1. Are there any features within the safety zone?
2. Are antidazzle screens provided as required?
3. Has suitable road equipment (fog warning signs, automatic sprinklers for de-icing agents, snow fences etc.) been installed and is it fully functional?
4. Are there game fences? Is the beginning and end of game fencing correctly determined?
5. Is there a mileage system and is it proper signposted?

### Plantings

6. Is there any vegetation along the road? Are tree trunks free of scars from accidents?
7. Does the greenery and type of planting preclude irritations to the road users (e.g. alignment)? Does road side vegetation guide the drivers in curves continuously?
8. Does the greenery or will the growth of greenery lead to future safety problems?
9. Is sight obstructed by the planting? Is good visibility ensured at the intersection?
10. Is visual contact motorist-pedestrian-bicyclist restricted by greenery?
11. Does vegetation protect the road from natural disasters (like landslides etc)?
12. Is the vegetation along the road old and could lead to safety problems? Does it obstruct the visibility on the road course (lateral clearance)?
13. Is the vegetation monotonous? Or does it help to avoid a monotonous character of the road?





## Engineering structures

14. Is reconcilability from a longer distance guaranteed?
15. Are passive safety installations set up at the required locations?
16. Are parapets and overpasses at a safe distance from the road?
17. Have masts, abutments, supporting walls, bridge railings etc. been safeguarded?
18. Are there at bridges sufficient passive safety installations, are there properly connected with the guardrails along the road?
19. Are the constructions of culverts obstacle like?
20. Are there tunnels in the road section? Are the tunnels safe, are there emergency ways, sufficient illumination etc. (the use the demands of EU – Tunnel directive 2004/54/EC is recommended)?
21. Is the vertical clearance of under overpasses guaranteed?

## Other obstacles

22. What is the distance of the road directional signing to the pavement?
23. Are the light poles to be considered as an obstacle (steel, concrete construction)?
24. Are there unprotected supports for other cables than lighting in the obstacle-free zone?
25. Are there unprotected advertisement boards or other fixed obstacles outside the safety zone are they avoidable, or safeguarded?
26. Are fixed obstacles avoidable, set up at sufficient distances or safeguarded (masts, abutments, supporting walls, bridge railings, trees etc.)?
27. Have passive safety installations been set up at the required locations?
28. Are all road safety barriers in place and safely located so that they are not obstacles themselves?
29. Is the length of any guardrail adequate? Is the guardrail correctly installed, regarding: - End treatments: - Anchorages, - Post spacing, - Post depth, - Rail overlap? Are dangerous windows of guardrails avoided?
30. Are barriers placed so that they don't restrict visibility?

