

ROAD SAFETY INSPECTION (RSI) Manual for Conducting RSI

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nast consulting

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Contents

1	ABSTRACT	4
2	INTRODUCTION	6
2.1	INITIAL SITUATION	6
2.2	GENERAL INFORMATION	8
2.3	DIFFERENCE BETWEEN ROAD SAFETY AUDITS AND ROAD SAFETY INSPECTIONS IN AUSTRIA	9
2.4	INTERNATIONAL ROAD SAFETY INSPECTIONS	10
2.5	OBJECTIVES AND BENEFITS OF ROAD SAFETY INSPECTIONS	10
3	REASONS AND SELECTION CRITERIA FOR CONDUCTING A ROAD SAFETY INSPECTION.....	12
3.1	INDIVIDUAL SECTIONS	12
3.2	ROAD NETWORKS	12
3.3	TIME CONSIDERATIONS FOR ROAD SAFETY INSPECTIONS	14
3.4	CONTENT CONSIDERATIONS FOR ROAD SAFETY INSPECTIONS	14
4	GENERAL ROAD SAFETY INSPECTION PROCEDURE.....	15
4.1	PARTIES INVOLVED IN THE ROAD SAFETY INSPECTION AND THEIR RESPONSIBILITIES.....	16
4.2	ROLE AND TRAINING OF THE INSPECTORS	16
5	CONDUCTING A ROAD SAFETY INSPECTION	17
5.1	PREPARATIONS FOR A ROAD SAFETY INSPECTION	17
5.2	INSPECTION OF THE SECTION.....	19
5.3	CREATION OF THE REPORT.....	20
5.4	DOCUMENTATION, EXCEPTION REPORT, AND MONITORING.....	27
6	AIDS IN CONDUCTING RSI.....	29
6.1	TECHNICAL AIDS.....	29
6.2	CHECKLISTS.....	29
7	LAWS AND GUIDELINES	53
8	BIBLIOGRAPHY	54
9	INDEXES.....	55
	INDEX OF FIGURES	55
	INDEX OF TABLES	55
	INDEX OF ABBREVIATIONS	55
10	ANNEX: SAMPLE RSI REPORT	LVII

1 Abstract

A manual for conducting road safety inspections (RSI) was created by nast consulting GmbH and KfV Sicherheit-Service GmbH and published by the BMVIT in 2010. This manual has now been revised, taking into account the legislative changes in connection with the implementation of EU Directive 2008/96/EC and the experiences gathered in conducting RSI in past years. The revised RSI manual was discussed with participating national experts in the provincial governments, ÖAMTC, ASFINAG, BMVIT, KfV, and nast consulting during a workshop.

The Austrian Highway Act (BStG) was amended in July 2011 as part of the implementation of Directive 2008/96/EC of the European Parliament and the Council on road infrastructure safety management. The BStG now specifies road safety inspections, and an expert team with at least one certified road safety expert is required for conducting the road safety assessment. The prerequisites and requirements for certification and the areas of responsibility of the certified road safety auditors and road safety inspectors (role and training of the inspectors) are listed in RVS 02.02.35 "Certification of road safety auditors and road safety inspectors".

The basic RSI procedure has remained the same in the revised manual:

- Preparatory work such as a review of the existing documents, collection of accident data, etc.
- Site visit including discussions with people responsible for the road
- Creation of the RSI report
- Implementation of the proposed measures, monitoring

Compared with the RSI manual from 2010, the revised manual especially includes changes in the structure of the report, the checklists, and the list of measures. The changes are designed to simplify the reports and to avoid unnecessary repetition, especially with regards to the documentation of deficiencies.

The RSI report now consists of the following parts:

- General information
- Checklist and accident data
- List of measures
- Summary

The general information includes an introductory overview and key features of the inspected section, as well as an overview of data used to assess the section in question for the purposes of an RSI.

The checklist contains relevant criteria for the respective road category (motorways, interurban roads, urban roads, intersections). Two main categories are defined: "structural issues" include everything connected with the road directly, e.g. alignment, cross section,

surface conditions, etc.; “road equipment and roadside features” includes issues like signing and marking, lighting, passive safety installations, etc. It must be indicated on the checklist whether or not each criterion is safety relevant for the inspected section. There are numerous questions in each of the categories that can arise during an RSI. The most important questions that can play a role in an evaluation are indicated in commented checklists. The aspects related to the different road users are taken into account in this, especially those of vulnerable road users.

In an accident investigation, the recorded incidents are described generally and given abnormalities are examined.

In the list of measures, identified problems and safety deficiencies are listed and remedial measures proposed. To provide a clear and concise depiction of the measures, these are shown on a form where each deficiency or measure is shown on a separate page in portrait format (including a photo and number of the deficiency).

The proposed measures must be evaluated in a matrix (assessment of safety relevance) in terms of accident risk and the possible consequences of an accident. In addition to assessing the safety relevance, the possible implementation time frame must also be estimated.

In conclusion, the evaluation is summarised briefly together with the key results of the road safety inspection. A monitoring table that contains the measures in abbreviated form is prepared to assist the maintainer of the road. In this table, the maintainer of the road indicates whether the proposed measure will be implemented or not, by whom and by when the measure will be implemented, and a rough estimate of the costs of the measure.

2 Introduction

2.1 Initial Situation

The general goal of traffic safety work is to ensure the safe operation of public roads. The Austrian Road Safety Programme 2011–2020 of the Federal Ministry for Transport, Innovation and Technology (BMVIT)¹ includes 17 fields of action for improving road safety in Austria.

In the field of action “infrastructure and roadside telematics”, one focus in the catalogue of measures for infrastructure safety management is road safety inspections (RSI).

There are numerous measures in the areas of infrastructure planning and the operation of existing roads (road safety impact assessment, road safety audits, road safety inspections, network safety management, treatment of high accident concentration sections) that are intended to raise the safety of Austria’s roads.

A road safety audit (RSA) is to be conducted during the planning of new road sections and the redesign of existing roads. This is a *“safety review that is designed to identify safety deficiencies and propose measures to rectify these deficiencies. The safety assessment of plans must be holistic and account for the perspectives of all affected road user groups.”*²

Another key measure is the treatment of high accident concentration sections pursuant to § 96 StVO (Austrian Road Traffic Act). The StVO specifies a procedure when a concentration of accidents occurs on a given section of road, and exact definitions of the high accident concentration sections are contained in the guidelines and regulations for road construction (RVS 02.02.21 Road Safety Assessment).

The existing road network is continuously monitored for safety deficiencies as part of the road safety inspections. This measure is intended to prevent accidents, and reduces the severity of the consequences of accidents that do occur.

The RVS guideline 02.02.34 Road Safety Inspections was published for the first time in March 2007. In November 2008, Directive 2008/96/EC of the European Parliament and the Council on road infrastructure safety management was published and contains principles of RSI. As part of the implementation of the EU Directive, the Federal Highway Act (Bundesstraßengesetz, BStG), which applies to motorways and expressways, was amended in July 2011 and now specifies road safety inspections in § 5 (6) BStG. The Austrian Road Safety Programme 2011–2020 also formulated the objective of applying the directive to the complete motorway and expressway network and other roads (regional B and L roads, municipal roads). Changes in the qualifications of the road safety inspectors were published in RVS 02.02.34 in July 2012. RVS 02.02.35 Certification of Road Safety Auditors and Road Safety Inspectors (September 2012) lists the prerequisites and requirements for certification and the areas of responsibility of certified road safety auditors and road safety inspectors.

To create a uniform procedure for conducting RSI, nast consulting GmbH and KFV

¹ BMVIT – Federal Ministry for Transport, Innovation and Technology: Austrian Road Safety Programme 2011–2020, Vienna 2011

² Kräutler, C., Strnad, B., Tschurlovitsch, J., Saleh, P.; *Sicherheitsaudit von Straßen in Österreich. Handbuch*; Austrian Road Safety Board, Vienna, August 2004

Sicherheit-Service GmbH created a manual for conducting RSI that was published at the beginning of 2010.³ The manual details the scope of road safety inspections and the general procedure of an RSI. Checklists for the different road types were developed for conducting RSI, and a template for the RSI reports was created. These documents were based on experiences gathered conducting RSI on major roads and during pilot projects completed on minor roads in connection with the drafting of the manual.

Road safety inspections were conducted on the major and minor roads at regular intervals over the past years. The road safety inspection manual was revised based on the experiences gathered during these RSI to incorporate knowledge gained through the methodical assessment of the road sections.

The revised RSI manual was discussed with participating national experts in the provincial governments, ÖAMTC, ASFINAG, BMVIT, KFV, and nast consulting during a workshop.

³ nast consulting ZT GmbH, KFV Sicherheit-Service GmbH; *Road Safety Inspections (RSI). Manual for Conducting RSI*; Forschungsarbeiten aus dem Verkehrswesen Band 204, Federal Ministry for Transport, Innovation and Technology (pub.), Vienna2010

2.2 General Information

2.2.1 Austria – Guidelines and Regulations for Roads (RVS)

A road safety inspection (RSI) is defined as follows in the Austrian road safety inspection guideline (RVS 02.02.34, published in July 2012):

“An RSI is the assessment of the state of a road section (for a road network) in terms of road safety, the physiology of perception, and psychology according to the principles of quality assurance to eliminate existing proven accident risks and hazards.”

It continues: *“An RSI is intended to identify deficiencies in the existing road network and to analyse them to prevent accidents and to reduce the number of accidents and the severity of the consequences of the accidents that occur. RSI serve to prevent accidents and are a modern form of quality assurance for safe and uniform road infrastructure, roadside features, and road equipment. [...] An RSI is a safety inspection that is based on clearly defined incidents or circumstances; it is not a conventional maintenance inspection.”*

2.2.2 EU – Directive of the European Parliament and the Council

At European level, work on a **Directive of the European Parliament and the Council** regarding road infrastructure safety began in 2006. After multiple revisions, the Directive was published in November 2008. The Directive covers the trans-European road network (TEN).

The Directive states that the specification of suitable safety procedures is a key instrument in improving the safety of the trans-European road network. In addition to the instrument of the safety audit, the safety of existing roads is also addressed: *“Safety performance of existing roads should be raised by targeting investments to the road sections with the highest accident concentration and/or the highest accident reduction potential.” [...] “Once road sections with a high accident concentration have been treated and remedial measures have been taken, 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.”*

A **road safety inspection** is defined as the ordinary periodical verification of the characteristics and defects that require maintenance work for reasons of safety.

2.2.3 Austria – Federal Highway Act (BStG)

As part of the implementation of the EU Directive, the Federal Highway Act (Bundesstraßengesetz, BStG) was amended in July 2011.

With the 2011 amendment of the 1971 Federal Highway Act (BStG 1971) and the regulation on road infrastructure safety management, the following safety management instruments are now defined (§ 5):

- Road safety impact assessments (RSIA),
- Road safety audits (RSA),
- The safety assessment of the operating road network and the publication of sections with a high concentration of accidents,
- Road safety inspections (RSI),
- The training and certification of road safety auditors and inspectors.

In § 5 Safety management, it is specified that the federal government is required to conduct a road safety assessment of the entire operating road network (part of the trans-European road network) in sections at least every three years. An expert team with at least one road safety auditor or inspector certified pursuant to § 5a or § 5b is required for conducting the road safety assessment.

The requirements for certification as a road safety auditor or inspector are specified in § 5a. *“The Federal Ministry for Transport, Innovation and Technology shall certify suitably qualified persons as road safety auditors or inspectors upon request.”* Multiple years of education and practical experience in the fields of road planning, safety technology, and accident analysis and successful completion of a road safety auditor or inspector training course are required. Proof of practical experience must also be provided.

The requirements for road safety auditors or inspectors from other EU member states are specified in § 5b. As long as the completed training corresponds to the course pursuant to § 5c in terms of scope and content and the individual is authorised to act as a road safety auditor or inspector in another member state of the European Union, an application for certification can be filed.

The requirements for training institutions and courses are specified in § 5c. The minimum duration of the courses (40 training units) and the focuses to be covered in the courses are clearly defined.

The authorisation to issue ordinances with regards to road safety inspections is governed by § 5d.

2.3 Difference between Road Safety Audits and Road Safety Inspections in Austria

The Austrian Road Safety Audit guideline (RVS 02.02.33) and the Austrian Road Safety Audit Manual specify multiple project stages in multi-phase (major) projects where an audit can or should be conducted: draft design, detailed design, construction project including road equipment, and a final inspection that should be conducted after the completion of the structure and before opening for traffic.

After the final inspection according to these provisions, the road is opened for traffic. Safety assessments after the road is opened for traffic are called road safety monitoring in Guideline 02.02.33. Road safety monitoring is the inspection of audited road infrastructure in use by the maintainer or RS auditors and inspectors after new sections are opened for traffic. Specifically, the traffic- and safety-related functionality must be assessed to determine whether there are signs of hazards in the traffic flow. This can be done through a road safety inspection. If a concentration of accidents, information about particular risks, or other such information is gathered within three years, the audit reports must be included in the assessment.

Thus, in Austria a road safety assessment after the opening of the road for traffic is called road safety inspection, whereas the assessments during the planning (or redesign) stage are road safety audits.

2.4 Road Safety Inspections in Other Countries

Road safety inspections are increasingly being conducted internationally as part of road safety management. In part because of EU Directive 2008/96/EC of the European Parliament and the Council, methods for conducting RSI have been developed in numerous countries over the past years (e.g. Norway⁴, France⁵, Ireland⁶, Switzerland⁷). The scope of application is limited to the TEN roads in some cases.

The difference between RSI and road safety audits is not clearly demarcated especially in English-speaking countries; here, methods that fall under RSI are covered in road safety audit guidelines and called a separate audit phase or also monitoring or road safety evaluation (e.g. Great Britain⁸, Australia⁹, U.S.A.¹⁰). In other countries, contents of RSI can be found in various existing instruments, such as “section maintenance”, “condition determination and assessment”, and the so called “Verkehrsschau” in Germany.

A road safety inspection guideline was created by the World Road Association (PIARC).¹¹ This includes the definition of RSI, procedures, and extensive checklists for various road categories.

2.5 Objectives and Benefits of Road Safety Inspections

High road safety and road infrastructure quality are key responsibilities of public agencies. To this end, the existing road network must be inspected regularly and the necessary measures implemented. Road safety inspections can be considered a key aspect of comprehensive quality management for the safe design and equipment of existing roads.

RSI can help to identify deficiencies in the existing road network and allow corresponding action to be taken in good time, thereby preventing accidents and/or reducing the severity of the consequences of accidents that do occur. These aspects – accident prevention and reducing the severity of accident consequences – are the main objectives of road safety inspections.

The individuals involved in maintaining and monitoring the road section in question (road maintenance personnel, police, etc.) are involved when conducting RSI. The discussion during the site visit can raise the safety awareness of these individuals (road maintenance personnel, police, etc.). This can in turn lead to increased attention being paid to road safety issues during their daily work, which can further increase road safety.

⁴ Norwegian Public Roads Administration (NPRA); Road Safety Audits and Inspections; Manual V720E; 2006; www.vegvesen.no/handboker

⁵ SETRA; Road Safety Inspections – Methodological Guide; 2008; www.setra.developpement-durable.gouv.fr

⁶ National Roads Authority (NRA); Road Safety Inspection Guidelines; 2012; <http://nrastandards.nra.ie/road-design-construction-standards/>

⁷ ASTRA; ISSI – Infrastructure Safety Instruments, Application Assistance; 2013; <http://swisstraffic.ch/sicherheit/rsi/index.php>

⁸ See Highways Agency/Scottish Executive/Welsh Assembly Government/Department for Regional Development Northern Ireland; Design Manual for Roads and Bridges – Road Safety Audit, 2003

⁹ See Roads and Traffic Authority New South Wales; Guidelines for Road Safety Audit Practices; 2011; www.rta.nsw.gov.au

¹⁰ Federal Highway Administration (FHWA); Road Safety Audit Guidelines, Publication No. FHWA-SA-06-06; 2006; safety.fhwa.dot.gov

¹¹ PIARC; Road Safety Inspection guidelines for Safety Checks of Existing Roads, 2012; www.piarc.org

By preventing accidents and reducing the severity of accident consequences, high economic costs can be avoided and personal suffering averted.

In addition to these benefits, RSI can also serve as argumentation for official agencies in public discourse because the road network and existing infrastructure are subject to systematic and preventative safety inspections.

3 Reasons and Selection Criteria for Conducting a Road Safety Inspection

3.1 Individual Sections

According to RVS 02.02.34, an RSI can be initiated

- when a concentration of accidents is observed, especially with diverse type structures
- when evidence, problems, or other information make an inspection prudent
- when there are safety deficiencies, hazard potential, or the same types of accidents on longer sections

A special safety investigation must be conducted on accident concentration sections according to the definition in RVS 02.02.21.

In recent years, the most common reason for unscheduled RSI has been an increased incidence of accidents, for example multiple collisions with trees, or multiple motorcycle accidents on a specific section. Accident or hazard information from police, road maintenance agencies, or other offices and persons can also be reason to conduct an RSI.

3.2 Road Networks

When considering an entire network, (district, region, province, road category, etc.), a selection must be made. On which sections should RSI be conducted to ensure effective quality assurance for the existing road network?

These selections are made by the road maintenance agency, and must be separated from the road safety inspection in terms of content and terminology to the greatest extent possible. Network assessments should ensure that road safety inspections are conducted on the roads where the implementation of measures will bring the greatest road safety benefits. This is handled in article 5 of the Directive of the European Parliament and the Council regarding road infrastructure safety, "Safety ranking and management of the road network in operation". This ranking should be completed regularly, at least every three years.

The following contains different methods by which road sections can be prioritised. The road maintenance agency must make the decision regarding which sections and which criteria are selected to ensure the quality of the network.

An observation period of 3–5 years is appropriate for selection criteria that include accident data (see also item 6.1.1 5.1.1).

In addition to the indicated selection criteria, other criteria can also be taken into account such as construction or refurbishment programmes. If an RSI is conducted before general refurbishment work, for example, the results of the inspection can be incorporated into the refurbishment.

3.2.1 Ranking of a Road Category by Volume of Traffic

If a single road category is being considered (for example only provincial highways), a ranking can be completed easily by conducting RSI on the roads with the highest traffic volume first.

- Advantage: As many road users as possible benefit from improvements
- Disadvantage: When the ranking is conducted solely on the basis of this criterion without taking accidents into account, sections with a high concentration of accidents could be ignored; this would not be in the sense of the Directive of the European Parliament and the Council regarding road infrastructure safety.

3.2.2 Ranking by Accident Density

Another simple ranking method is via the accident density. Here, the number of accidents on a section is divided by the length of the section.

- Advantage: Sections with a high accident concentration are covered
- Disadvantage: The accident density depends heavily on the selected section length – short sections may be overrepresented

3.2.3 Ranking by Accident Rate

If traffic statistics are available for a network, these can be used for ranking by calculating the accident rate.

- Advantage: Sections with a high accident concentration are covered
- Disadvantage: As for the accident concentration, the result is highly dependent on the volume of traffic. Too much attention could be paid to sections with a low level of traffic and a small number of accidents in absolute terms.

3.2.4 Ranking by Reduction Potential

One way to avoid the problems associated with the above methods is ranking by the reduction potential in a given section. The reduction potential can be based on different accident parameters; this is usually determined using accident rates or accident cost rates, with the latter also implicitly including the severity of accidents in the assessment. The Directive of the European Parliament and the Council regarding road infrastructure safety also includes the potential to reduce accident costs as a criterion for selecting sections for inspection.

The reduction potential is usually determined in multiple steps:

- First, the existing road network must be divided into homogeneous sections (uniform traffic volume, road design parameters, no switch from interurban to urban, constant cross section, etc.).
- Calculation of accident parameters in the individual sections
- Determination of the sections with the highest reduction potential

The reduction potential can be determined in different ways.

Similarly to the procedure specified in the German guideline “ESN – Recommendations for Assessing the Safety of Road Networks” (*Empfehlungen zur Sicherheitsbeurteilung von Straßennetzen*), a “target value” for an accident parameter (accident rate, accident cost rate, accident cost density, etc.) can be calculated. For this, the ranking is based on the parameter that a road should have under the observed conditions taking all safety relevant aspects into account. It is also possible to use the average of roads with comparable infrastructure and traffic conditions. The

target value is compared with the actual value – the sections where the calculated accident parameter exceeds the target value by the greatest margin have the highest reduction potential and should be inspected first.

To assess the reduction potential on Austria's Asfinag network, accident cost rates are calculated for homogeneous sections. After the accident cost rates are calculated, they are shown in a diagram. This reveals that the percentages of a large share of the sections are within a range that is only increasing slightly. However, the accident cost rates increase significantly starting at a certain point. This also means that the potential in these sections also increases considerably, no matter how the base or target accident cost rate is determined. This diagram therefore shows the sections with the highest reduction potential.

Advantage: Effective system, high success potential

Disadvantage: Complex and involved calculation

3.3 When to Inspect the Road Sections

The section in question must be inspected on site in any case, ideally during the day at first. Another site visit at night is recommended, especially when accidents, the site visit, or other information indicates that safety problems arise or can be expected in the dark.

The season of the year during which the site visit is conducted can often not be chosen due to urgency or other requirements. However, if information indicates that a certain season is critical in terms of road safety, the inspection should be conducted during this season if possible. To include seasonal effects in the RSI in any case, the relevant parameters must be taken into account when analysing accidents (accidents under different road conditions, months; see item 6.1.1 5.1.1). Checklists are provided to help during the site visit and during the relevant discussions and have to be filled out. This ensures that during inspections in the summer, the persons responsible for maintaining and monitoring the section are also asked about any problems that arise during snowfall, for example.

3.4 Contents of a Road Safety Inspection

There are four steps in the RSI process:

- Preparatory work such as a review of the existing documents, collection of accident data, etc.
- Site visit including discussions with people responsible for the road
- Creation of the RSI report
- Implementation of the proposed measures, monitoring

Section 5 of this manual discusses the individual steps in detail.

During a road safety inspection, all aspects that can have an influence on the safety of the respective road are examined. Checklists were developed for the individual road types as an aid and should be used as the basis for the assessments and site visits.

These checklists and the underlying questions are discussed and explained in detail in section 6.

4 General Road Safety Inspection Procedure

A road safety inspection must be completed according to a specific procedure. The following diagram shows this procedure. After deficiencies are identified by the RS inspectors, the deficiencies should be remedied by the road maintenance agency to increase the safety of the selected section. If measures proposed in the RSI are not implemented, the road maintenance agency must prepare an exception report (see section 5.4).

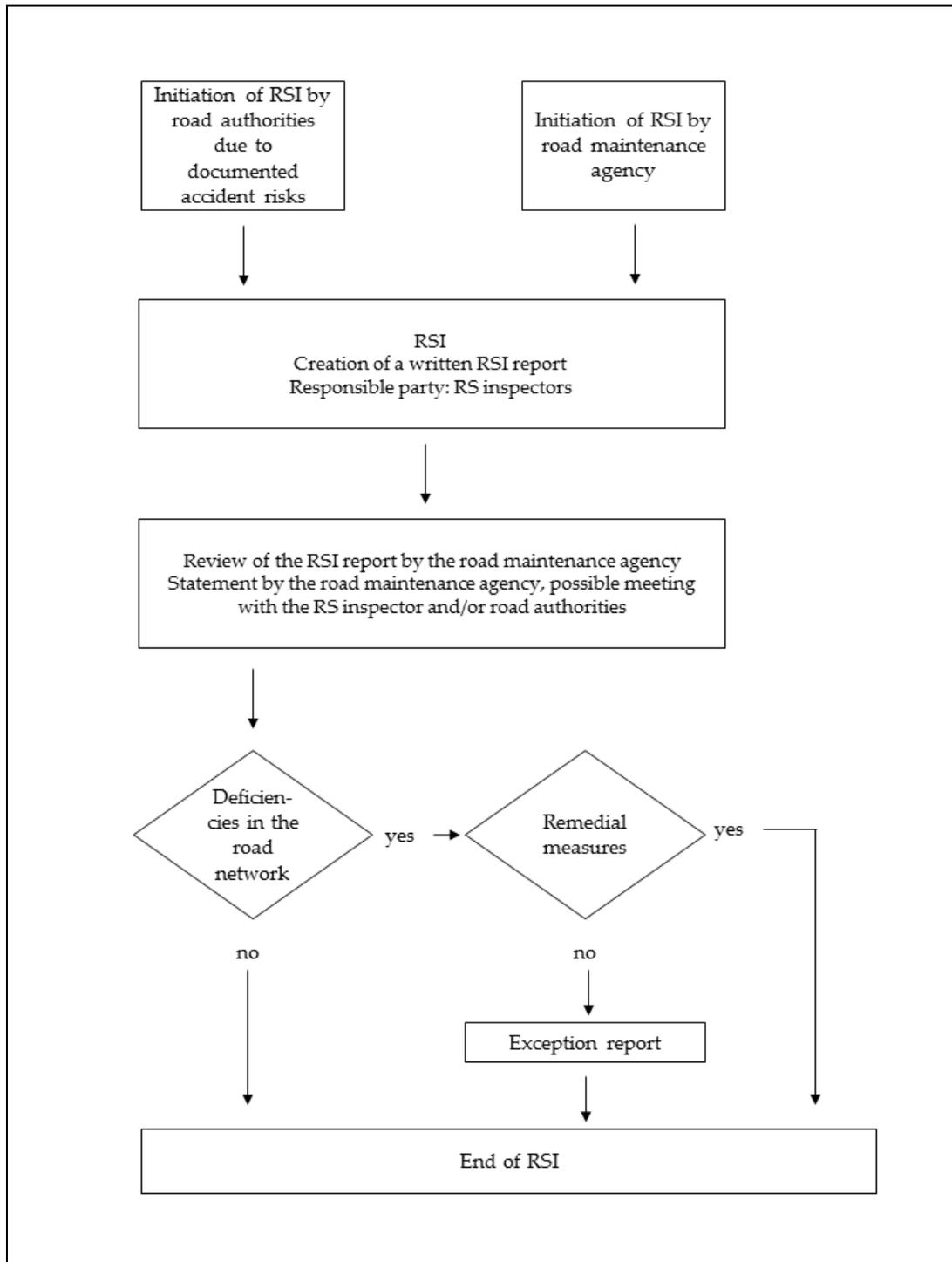


Figure 1: RSI procedure; source: FSV – Austrian Association for Research on Road – Rail – Transport, RVS 02.02.34, Road Safety Inspection, July 2012

4.1 Parties Involved in the Road Safety Inspection and their Responsibilities

A road safety inspection must be conducted by at least one certified road safety auditor pursuant to § 5a (road safety auditor) or § 5b (road safety auditor from another EU member state) of the Federal Highway Act. The role of the road safety inspectors (RS inspectors) and their training are described in section 4.2.

In addition to the RS inspectors, individuals who are responsible for the inspected section and who therefore have experience with the traffic activity and incidents on this section must also be involved.

The inspection includes at least one meeting with various agencies (road maintenance agency, police, etc.) so that road-related measures that have been completed in the preceding years can also be taken into account. The commissioning party must decide which individuals and agencies are to be involved.

The involvement of the road maintenance agency and the police in the meeting are required in any case. Government experts and emergency response organisations (e.g. fire brigade) can also be involved.

Subjective information is also often provided from the perspective of the individual agencies. This combined with the objective data can increase the understanding of the road safety problems because the involved persons can usually provide information about different times of day and seasons and about different weather conditions, which would not be apparent during inspections under average conditions.

The involvement of the road maintenance agency and police in the site visit is also very advantageous because the individual hazard points that were discussed during the meeting can also be viewed and discussed again on site.

4.2 Role and Training of the Inspectors

RS inspectors must have several years of pertinent education and practical experience in the fields of road planning, road safety technology, and accident analysis and must have successfully completed a road safety auditor course pursuant to § 5c BStG (training). At least one inspector in the RS inspector team must hold a certificate of competence as a road safety auditor from the Federal Minister for Transport, Innovation and Technology.

The independence of the RS inspectors must be ensured and is a key prerequisite for an objective and uninfluenced assessment and evaluation. The road planner of the selected section may generally not be employed as an RS inspector for this road section. RS inspectors can work as interdisciplinary teams or individually.

The RS inspectors independently conduct a road safety inspection on the selected section. The RS inspectors are also responsible for arranging the site visits, involving all individuals as selected by the commissioning party, and obtaining the necessary documents for evaluating and assessing the section.

5 Conducting a Road Safety Inspection

As indicated in item 3.4, there are four steps in a RSI:

- Preparatory work such as a review of the existing documents, collection of accident data, etc.
- Site visit including discussions with people responsible for the road
- Creation of the RSI report
- Implementation of the proposed measures, monitoring

5.1 Preparations for a Road Safety Inspection

In preparing for a road safety inspection on a defined section, the necessary evaluations must be conducted and the required documents must be obtained.

5.1.1 Accident Evaluation

The relevant accident incidents must be analysed as part of a road safety inspection in any case. The accident data for the section in question must be considered for a period of 3–5 years so long as there is no reason to limit the evaluation to a shorter period of time (general refurbishment, construction works, etc.). This period can also be extended, though any changes on the section and the associated changes in the general conditions must be taken into account.

For all road types (motorways, expressways, regional roads, municipal roads), at least the number of accidents resulting in personal injury must be determined along with their locations (as precisely as the provided data allow). If accidents resulting only in property damage are available, they should also be included in the evaluation.

The accidents must be assessed according to the following criteria for the evaluation:

- + Annual development of the accidents
- + Injuries and fatalities in the section in question
- + Accidents by accident type
- + Vehicles involved in the accidents
- + Light conditions (day/night/artificial lighting)
- + Road condition (dry/wet/ice)

If there is evidence of further relevant parameters due to the location or other circumstances, these must also be evaluated (e.g. share of foreign drivers involved in accidents near borders, accidents during fog in areas with frequent fog, etc.).

Experiences of police, the local road maintenance agency, and other agencies with additional information about accidents must also be included in the evaluation:

- Observed malpractice of drivers (driver errors)
- Risk areas and frequent conflicts

Observations during the site visit can provide further information about problem areas in the inspected section. These can include:

- Skid marks
- Tire tracks beyond the edge of the road, worn verge
- Pieces of vehicles (broken glass, broken-off mirrors, etc.)

- Damage and marks on concrete barriers, guardrails, or curbs
- Collision damage on trees
- Damaged road signs, snow poles, guide poles, median dividers, impact absorbers, fences, etc.
- Dead animals on or next to the road

Section-specific accident parameters must also be determined for RSI on motorways, expressways, regional roads, and regional roads outside of urban areas. This usually involves at least the following evaluations:

- + Accident rate
- + Accident concentration
- + Accident cost rate

Additional parameters such as accident cost density, fatality rate, and others can be determined as needed.

More detailed accident evaluations are especially sensible when an increased level of accidents occurs in specific sub-sections or at intersections. Detailed accident analyses are also sensible and necessary when there are unclear accident situations. The accident files should be examined when possible to gain information for more detailed analysis or to obtain missing information. The results of these analyses can be depicted in accident maps, collision diagrams, and section collision diagrams.

5.1.2 Technical Traffic Aspects

Technical traffic aspects must also be taken into account in an RSI. These can include the volume of traffic and the composition of traffic. If statistical traffic data (e.g. results from automatic counting systems, manual counts, etc.) are available, they must be included. Traffic development projections (if available) must also be taken into account.

Possible questions with regards to technical traffic aspects include:

- Is the capacity sufficient? If not, can this cause safety problems (e.g. insufficient visibility of possible traffic congestion)
- Do the existing traffic types, traffic volume, and traffic composition correspond to the road type?
- Are there abnormalities in the traffic composition (non-motorised traffic, motorcycles, heavy vehicles, buses?)
- Are the needs of all road users accounted for (road conditions, signs, etc.)?
- Must regional features be accounted for (commuters, holiday traffic, public transport, bicycle traffic, school traffic, retirement homes, facilities for persons with reduced mobility, institutes for the blind and the like, shopping traffic, shopping centres, transit traffic, special traffic situations due to events, parking facilities such as garages, etc.)?
- Are the traffic and speed behaviour suitable for the road conditions?
- What are the gaps between cars in the inspected area?
- Are monitoring facilities present or needed (e.g. safe operating areas for police, permanent measurement equipment, etc.)?
- Are dynamic traffic control systems (lane management, rerouting systems, lane signs, etc.) present or needed?

5.1.3 Other Evaluations

In some cases, further evaluations such as speed measurements, following distance measurements, and the like may be sensible.

Other road condition data such as grip, ruts, and water film thickness must be included where available and necessary.

Data about red light running and the behaviour of pedestrians and bicyclists must also be included as needed. Sight distance measurements, driving and accident simulations, driving dynamics evaluations, inclination measurements, light measurements, mobile road condition inspections, and mobile road mapping can be used as needed.

5.1.4 Review of the Available Documents

The planning documents for the relevant road section should be checked if available during a road safety inspection.

It must be noted that technical drawings, longitudinal sections, and cross sections are not always available for roads built some time ago. Work that has been completed since the original construction of the road is also often not included in the plans. Aerial photos can also be used for the evaluations, if available.

If no plans, aerial photos, or the like are available, the criteria must be assessed based on the site visit.

The following plan documents must be taken into account if available:

- + Technical drawings, longitudinal sections, cross sections, technical report
- + Traffic layout plans (signs, markings, and traffic sign plans as needed)
- + Programming of traffic signal systems on the municipal road network and on regional roads (as needed)
- + Switching programs (operating manual) of traffic guidance systems on motorways and expressways (as needed)

Assessments that have already been completed on the section such as road safety audits should also be included if possible.

5.2 Inspection of the Section

The entire section must be inspected in person. This site visit allows the section and traffic situation on the section to be assessed.

The involvement of police, the road maintenance agency, public experts, etc. in the site visit is sensible because problems can be discussed directly on the section or at the hazard area.

The entire section must be viewed travelling in both directions.

If necessary (depending on the causes of accidents, etc.), multiple site visits are appropriate at relevant times (e.g. day/night, dry/wet conditions, etc.). The inspected section must be documented in any case by video or with photos.

A meeting will be held on site by the RS inspectors with the police, road maintenance agency, etc. before or after the site visit (see section 4.1). In this meeting, the section to be inspected should be discussed systematically on the basis of the checklists.

The checklists and the results of the various evaluations (e.g. accidents, traffic activity, etc.) serve as the basis for the site visits. The structure and content of the checklists ensure that all necessary criteria are considered and checked during the site visit. Additional criteria can be added to the checklist as needed.

5.3 Creation of the Report

The report for an RSI is broken down into the following parts:

1. General information
2. Completed checklist and accident evaluation
3. List of measures
4. Summary

5.3.1 General Information

The general information includes an introductory overview and key features of the inspected section, as well as an overview of data used to assess the inspected section for the purposes of an RSI (length of the section, traffic volume, permitted speeds, etc.). The general information section includes an overview map of the inspected section, information about the completed meetings and site visits, and who participated in these activities.

A general description of the road section, the road category, a description of the function of the road, and information about traffic levels at the beginning of the report are sensible.

Tunnel areas with a maximum length of 500 m are generally included in the RSI. However, tunnels that are subject to the Road Tunnel Safety Act (tunnel length > 500 m) are usually excluded from the RSI in coordination with the commissioning party. The general information section includes the length of any tunnel areas in the section.

The first section (general information) must at least include the following information:

- 1) General details:
 - Commissioning party
 - Road type
 - Cross section
 - Traffic volumes
 - Announced traffic restrictions
 - Evaluation period (accidents)
 - Length of the section
 - Junctions (if present)
 - Intersections (if present)
 - Tunnel areas (if present, with km indication)
 - Service facilities (if present)
 - Designation of the travel lanes and travel directions
- 2) Overview map: depiction of at least one overview map of the inspection area with indication of the beginning and end of the inspected section, designation of the travel lanes, designation of the tunnel areas (if present)
- 3) Used documents: list of the documents and data used in the RSI
- 4) Conducted meetings and site visits

- 5) Report parts: information about the breakdown of the report
- 6) Inspectors: information about the RS inspectors

5.3.2 Checklist and Accident Evaluation

The checklist includes relevant criteria for the respective road category (see the example in Table 1). It must be indicated whether each item is safety relevant (yes/no) in the inspected section. Comments can also be entered.

The checklist documents that all aspects were accounted for by the RS inspectors during the RSI. The description of a defect is entered in the list of measures/list of deficiencies (see item 6.3.3 5.3.3).

RSI areas with a tunnel length of less than 500 m must be entered in the checklist and list of measures/list of deficiencies. Tunnels with a length of over 500 m are subject to the Road Tunnel Safety Act and are usually excluded from the RSI in coordination with the commissioning party.

In the accident evaluation, the accidents are depicted by means of tables (see section 5.1.1) and any abnormalities discussed.

Table 1: Example of a checklist in the ASFINAG network

Checklist for Motorways and Expressways			
Inspected section: [designation, length, from-to]			
Date/time:			
Ambient conditions: [weather, road conditions, etc.]			
Inspectors:			
Maximum permissible speed: [any other available speed data can also be entered here]			
Traffic statistics: [indication of ADT, share of heavy vehicles, special features]			
1) Structural conditions	Safety relevant?		Comments
	Yes	No	
Site plan		√	-
Longitudinal section		√	-
Alignment		√	-
Cross section		√	-
Road surface condition	√		Ruts at km 2.5 driving direction north
Sight conditions		√	-
Drainage	√		Risk of hydroplaning at km 2.5 driving direction north
Junctions		√	-
Tunnels		√	No tunnels in the inspected section
Service facilities (parking spaces, etc.)		√	-

2) Equipment and roadside environment	Safety relevant?		Comments
	Yes	No	
Traffic signs/guidance	√		Unclear guidance at km 10.8 driving direction south
Markings	√		
Guidance systems		√	
Vehicle restraint systems	√		Traffic signs not sufficiently shielded at some locations
Lighting		√	-
Vegetation		√	-
Wildlife protection systems		√	-
Signal systems/telematics		√	-
Roadside environment, non-traffic systems, other		√	-

5.3.3 List of Measures

In the list of measures, identified problems and safety deficiencies are listed and remedial measures proposed. To provide a clear and concise depiction of the measures, these are shown on a form where each deficiency or measure is shown on a separate page in portrait format. The exact locations of the problem areas must be defined and the corresponding deficiency, the road safety problem, proposed measures, and the expected improvement after the implementation of the proposed measures must be indicated. A numbering of the deficiencies makes referencing easier. A photo of the deficiency should be included for each measure for better clarity. Additional illustrations (such as collision diagrams and the like) and explanations can also be included.

The problems and measures should be stated as briefly as possible in the table for reasons of clarity. If more detailed explanations are needed, these can be referenced in the table and the explanation added after the table.

Assessing Safety Relevance

The proposed measures must be assessed in two regards:

- Assessment of the accident risk (low/moderate/high):

This assessment is generally at the discretion of the RS inspectors. If accident statistics are available, they must be used as a basis for assessment. If no accidents have occurred or only one accident was recorded in an area over the last 3–5 years, the assessment of a possible new accident will generally be “low”. In contrast, if a criterion of the accident concentration section definition applies, the area in question will be assessed as “high”.

Visible indices (such as skid marks, guardrail damage) of accidents with property damage should also be taken into account in the assessment. When assessing the risk of accidents, other safety deficiencies such as insufficient sight distance, poor road conditions, and the like can also be included in the assessment.

- Assessment of possible accident consequences (low/moderate/severe):

The RS inspectors must assess the possible accident consequences based on the existing deficiencies. For example, the possible consequences of a collision with a fixed and permanent object (such as an unshielded bridge pillar next to the carriageway) would be severe.

The safety relevance is determined on the basis of the assessment of the accident risk and the assessment of the possible accident consequences; this relevance is shown by colour code in the list of measures. The colour codes are shown in Table 2.

Table 2: Ranking the safety relevance

Assessment of the possible accident consequences →	low	moderate	severe
↓ Assessment of the accident risk			
low	X		
moderate			
high			

The safety relevance of a factor is non-existent or low when the possible consequences of an accident are low and the expected accident risk is low. These items are generally not included in the measures table, but can be included in a separate section in the report if needed.

Assessing the Implementation Time Frame

In addition to assessing the safety relevance, the possible implementation time frame must also be estimated. Traffic signs can be installed quickly, for example, while a rerouting of the road is usually a long-term project, if it is possible at all. According to RVS 02.02.34, safety measures that are technically simple and that can be implemented quickly should be chosen whenever possible. In any case, deficiencies identified by the inspectors should be remedied as quickly as possible.

Proposed measures can also be indicated with a series of remedial measures. For example, the lack of a structural median divider can be noted in the table twice: once with an increase in the distance between the solid lines, coloured markings, rumble strips and the like as a short-term improvement; and a second time with the medium- to long-term measure of widening the road and installing a structural median divider.

It can be that a deficiency is of high safety relevance, but the remedial measure can only be implemented over the long term. These include measures such as the construction of an additional shoulder, which generally takes place on motorways during general refurbishment. In such cases, short-term remedial solutions such as speed reductions may be appropriate.

The following timeframes are indicated for the implementation of measures on major roads, for example:

- Short term: implementation possible within roughly 2 years
- Medium term: implementation possible within roughly 6 years
- Long term: more involved general refurbishment

The timeframe for the implementation of measures on minor roads may be different. The respective timeframes must be coordinated with the road maintenance agency.

Table 3: Example of a measures table (template)

Road Safety Inspection Measures Proposals		Legend:		No. X
			High safety relevance	
			Moderate safety relevance	
			Low safety relevance	
Road / section		Direction	Location	
Road X / km XX.XX–km XX.XX		X	km XX.XX (and/or indication of coordinates)	
Problem / deficiency				
Proposed measure / expected improvement				
Assessment of the accident risk	low/ moderate/ high			
Assessment of possible accident consequences	low/ moderate/ severe			
Assessment of implementation timeframe and safety relevance	Short term	Medium term	Long term	
Place holder for photo				
Place holder for further diagrams and explanations if needed/sensible		Place holder for further diagrams and explanations if needed/sensible		

Table 4: Example of a completed measures table

Road Safety Inspection Measures Proposals		Legend:		No. 1
			High safety relevance	
			Moderate safety relevance	
			Low safety relevance	
Road / section		Direction	Location	
Road A / km 14.50–km 18.85		1	km 16.45	
Problem / deficiency	There is neither an end piece nor an impact absorber at the end of the concrete divider island; a collision with the blunt end of the concrete divider is possible			
Proposed measure / expected improvement	Install an impact absorber; this will reduce the consequences of a collision			
Assessment of the accident risk	moderate	Obstacle in the divider island, two accidents with personal injury in the last three years		
Assessment of possible accident consequences	severe	Inflexible, fixed obstacle		
Assessment of implementation timeframe and safety relevance	Short term		Medium term	Long term
	x			
Place holder for photo				
Place holder for further diagrams and explanations if needed/sensible		Place holder for further diagrams and explanations if needed/sensible		

The evaluation is then summarised briefly together with the key results of the road safety inspection.

The annex contains the minutes of all conducted meetings, any available accident maps, collision diagrams and the like, and the monitoring table if applicable (see item 5.4).

5.4 Documentation, Exception Report, and Monitoring

The results of the road safety inspection are discussed by the RS inspectors and road maintenance agency and then documented in an RSI report (see section 5.3). At this point, the inspection is concluded for the RS inspectors.

A monitoring table can help the road maintenance agency (commissioning party) track the implementation of the individual proposed measures.

The RS inspectors list all measures in abbreviated form and with their locations in the monitoring table. The maintainer of the road indicates whether the implementation of the measure is planned, by whom and by when the measure will be implemented, and a rough estimate of the costs of the measure. This information allows the implementation of the measure to be checked quickly. If measures are not possible or will only be possible at a later time because of the high cost, for example, a description of possible alternative measures and an indication of the estimated costs of these measures are sensible.

After the measures are implemented, the actual costs can be determined and entered as well. In this way, the actual costs of measures can be reviewed for future cost estimates or projects.

Table 5 shows an example of a monitoring table. In addition to the monitoring table, an exception report must be prepared when deficiencies are not remedied. The exception report is a key part of the road safety inspection. In the exception report, the road maintenance agency (commissioning party) must state whether a proposed remedial measure will be implemented. If a measure will not be implemented, sufficient justification for this must be provided in the exception report. Schedules for possible solutions and their implementation must also be created.

6 Aids in Conducting RSI

6.1 Technical Aids

The inclusion of available documents (plans, reports, expert opinions) and the documentation of site visits and other inspections are important. The inclusion of digital video and photo documentation is recommended. The advantages of documentation with a laptop or PDA with GPS tracking are greater accuracy and lower potential for errors, and subsequent digital processing and data management are possible with low effort.

The condition of the road can also be documented if necessary. In special cases, driving and accident simulations, driving dynamics simulations, visibility measurements, measurements of the longitudinal and transverse gradients, and light measurements may also be necessary. Psychological driving behaviour assessments, eye tracking analyses, and other methods are also possible.

6.2 Checklists

Because of the large number of possible influencing factors, it is neither possible nor sensible or practical to list all possible criteria in the checklists.

During a road safety inspection, all aspects that can have an influence on the safety of the respective road are examined using checklists. The checklists are an important part of the RSI and serve as a basis for the assessments, inspections, and site visits.

All criteria contained in the checklist must be checked during the RSI. The previously used checklists were refined during the preparation of this manual.

If relevant problems that are not included in the categories of the checklist are identified during a road safety inspection, the RS inspector should adapt the checklist. The elimination of individual criteria is not recommended for reasons of completeness and documentation. If an item on the checklist is not relevant for the inspection (for example, there are no bus stops), this should be noted on the checklist.

The completed checklists must be included in the report.

6.2.1 Structure and Contents of the Checklists

The structure of the checklists has been kept as simple as possible, and only the headings of individual inspection criteria are listed. There are numerous questions in each of the categories that can arise during an RSI. The most important questions that can play a role in an evaluation are indicated in the commented checklists (see item 6.2.3), but this is most likely not a complete list of all problems that may be relevant in an inspection.

At the beginning of the checklist, the weather conditions during the site visit, the persons involved in the inspection, and a brief overview of the traffic conditions (speeds, traffic volume) are noted. No brief description of the accident incidences is provided in the checklist because this is described in detail in the RSI report.

Checklists have been created for individual road types, and a separate checklist is used for intersections:

Checklists for on-site inspections of:

- Motorways and expressways
- Interurban roads
- Urban roads
- Intersections

The structure of the checklists is always the same for the different road types. Two main categories are defined: “structural issues” include everything connected with the road directly, e.g. alignment, cross section, surface conditions, etc.; “road equipment and roadside features” includes issues like signing and marking, lighting, passive safety installations, etc. It must be indicated on the checklist whether or not each criterion is safety relevant for the inspected section. Explanations, reasons, assessments, etc. regarding safety relevance must be provided in a comment box.

A given category is included in or omitted from the checklist depending on whether it is generally relevant for a road type. If individual categories also apply to a road type but are not included in the checklist (such as the “junction” category for a grade-separated connection to a regional road), the respective category can be added to the checklist.

The following table shows the general structure of the checklists for the individual road types and what general topics are included (“Yes”) or omitted (“No”) as a category in which checklist. The checklists can be expanded as needed, as explained above.

Table 6: Contents of the checklists for the individual road types and overview of the categories

Category	Checklist		
	Motorways/ Expressways	Interurban	Urban
1) Structural conditions			
Site plan	Yes	Yes	No
Longitudinal section	Yes	Yes	No
Alignment	Yes	Yes	Yes
Cross section	Yes	Yes	Yes
Road surface condition	Yes	Yes	Yes
Sight conditions	Yes	Yes	Yes
Drainage	Yes	Yes	Yes
Junctions / nodes	Yes	No	No
Tunnels	Yes	No	No
Service facilities (parking spaces, etc.)	Yes	Yes	Yes
Intersections	No	Yes	Yes ¹
Residential, commercial, and agricultural driveways	No	Yes	Yes
Entrance areas to villages/towns (design, function, etc.)	No	Yes	Yes
Rail crossings	No	Yes	Yes
Bus and tram stops	No	Yes	No ²
Public transport infrastructure	No	No	Yes
Parking infrastructure	No	No	Yes
Bicycle infrastructure	No	No	Yes
Pedestrian infrastructure	No	No	Yes ¹
2) Equipment and roadside environment			
Traffic signs / guidance	Yes	Yes	Yes
Markings	Yes	Yes	Yes
Guidance systems	Yes	Yes	Yes
Vehicle restraint systems	Yes	Yes	Yes
Lighting	Yes	Yes	Yes
Vegetation	Yes	Yes	Yes
Wildlife protection systems	Yes	Yes	No
Signal systems / telematics	Yes	Yes	Yes
Roadside environment, non-traffic systems, other	Yes	Yes	Yes

¹⁾ Taking account of the needs of children/youths, senior citizens, and persons with reduced mobility

²⁾ Taken into account under public transport infrastructure

The structure of intersection checklists is also uniform; the criteria are shown in the following table.

Table 7: Contents of the checklists for intersections

Category
1) Structural conditions
Intersection type / intersection control / traffic signal aspects (depending on how the intersection is controlled)
Turns
Sight conditions at the intersection
Road surface condition
Crossings / crossing aids
Pedestrian infrastructure
Public transport infrastructure
Bicycle infrastructure
2) Equipment and roadside environment
Traffic signs / guidance, especially right of way situation
Markings
Guidance systems
Lighting
Vegetation
Other

6.2.2 Checklists

Table 8: Checklist for motorways and expressways

Checklist for Motorways and Expressways			
Inspected section: [designation, length, from-to]			
Date/time:			
Ambient conditions: [weather, road conditions, etc.]			
Inspectors:			
Maximum permissible speed: [any other available speed data can also be entered here]			
Traffic statistics: [indication of ADT, share of heavy vehicles, special features]			
1) Structural conditions	Safety relevant?		Comments
	Yes	No	
Site plan			
Longitudinal section			
Alignment			
Cross section			
Road surface condition			
Sight conditions			
Drainage			
Junctions			
Tunnels			
Service facilities (parking spaces, etc.)			
2) Equipment and roadside environment	Safety relevant?		Comments
	Yes	No	
Traffic signs / guidance			
Markings			
Guidance systems			
Vehicle restraint systems			
Lighting			
Vegetation			
Wildlife protection systems			
Signal systems / telematics			
Roadside environment, non-traffic systems, other			

Table 9: Checklist for interurban and regional roads

Checklist for Interurban and Regional Roads			
Inspected section: [designation, length, from-to]			
Date/time:			
Ambient conditions: [weather, road conditions, etc.]			
Inspectors:			
Maximum permissible speed: [any other available speed data can also be entered here]			
Traffic statistics: [indication of ADT, share of heavy vehicles, special features]			
1) Structural conditions	Safety relevant?		Comments
	Yes	No	
Site plan			
Longitudinal section			
Alignment			
Cross section			
Road surface condition			
Sight conditions			
Drainage			
Intersections			
Residential, commercial, and agricultural driveways			
Service facilities			
Entrance areas to villages/towns (design, function, etc.)			
Rail crossings			
Bus and tram stops			
2) Equipment and roadside environment	Safety relevant?		Comments
	Yes	No	
Traffic signs / guidance			
Markings			
Guidance systems			
Vehicle restraint systems			
Lighting			
Vegetation			
Wildlife protection systems			
Signal systems / telematics			
Roadside environment, non-traffic systems, other			

Table 10: Checklist for urban roads

Checklist for Urban Roads			
Inspected section: [designation, length, from-to]			
Date/time:			
Ambient conditions: [weather, road conditions, etc.]			
Inspectors:			
Maximum permissible speed: [any other available speed data can also be entered here]			
Traffic statistics: [indication of ADT, share of heavy vehicles, special features]			
1) Structural conditions	Safety relevant?		Comments
	Yes	No	
Alignment			
Cross section			
Road surface condition			
Sight conditions			
Drainage			
Intersections <i>(Taking account of the needs of children/youths, senior citizens, and persons with reduced mobility)</i>			
Driveways			
Frontage roads			
Entrance areas to villages/towns (design, function, etc.)			
Rail crossings			
Public transport infrastructure			
Parking infrastructure			
Bicycle infrastructure			
Pedestrian infrastructure <i>(Taking account of the needs of children/youths, senior citizens, and persons with reduced mobility)</i>			
2) Equipment and roadside environment	Safety relevant?		Comments
	Yes	No	
Traffic signs / guidance			
Markings			
Guidance systems			
Vehicle restraint systems			
Lighting			
Vegetation			
Signal systems / telematics			
Roadside environment, non-traffic systems, other			

Table 11: Checklist for intersections

Checklist for Intersections			
Inspected intersection: [designation, km, etc.]			
Intersection type:			
3-way intersection: <input type="checkbox"/> 4-way intersection: <input type="checkbox"/> Roundabout: <input type="checkbox"/> Other type:			
Signal controlled: Yes <input type="checkbox"/> No <input type="checkbox"/>			
Date/time:			
Ambient conditions: [weather, road conditions, etc.]			
Inspectors:			
Maximum permissible speed:			
Traffic statistics: [indication of ADT, share of heavy vehicles, special features]			
1) Structural conditions	Safety relevant?		Comments
	Yes	No	
Intersection type / intersection control / traffic signal aspects			
Turns			
Sight conditions at the intersection			
Road surface condition			
Crossings, crossing aids <i>(Taking account of the needs of children/youths, senior citizens, and persons with reduced mobility)</i>			
Pedestrian infrastructure <i>(Taking account of the needs of children/youths, senior citizens, and persons with reduced mobility)</i>			
Public transport infrastructure			
Bicycle infrastructure			
2) Equipment and roadside environment	Safety relevant?		Comments
	Yes	No	
Traffic signs / guidance especially right of way situation			
Markings			
Guidance systems			
Lighting			
Vegetation			
Other			

6.2.3 Commented Checklists

Table 12: Commented checklist – possible questions for motorways, expressways, interurban and regional roads

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
1) Structural conditions	
Site plan	<ul style="list-style-type: none"> - Is the speed level appropriate for the design parameters? - Is the existing speed limit adequate for the horizontal and vertical design parameters of the alignment? - Are the radius sequences appropriate?
Longitudinal section	<ul style="list-style-type: none"> - Are there high longitudinal gradients, does this influence the traffic flow? - Is the speed level appropriate for the sight distances (e.g. crests)?
Alignment	<ul style="list-style-type: none"> - Is the alignment of the road clearly visible along the entire section? - Are parameters of radii and longitudinal section coordinated (consistency, recognisability, drainage)? - Are there hidden dips in the vertical alignment or other “surprises” for the drivers? - Do vegetation or optical illusions cause guidance errors?
Cross section	<ul style="list-style-type: none"> - Are the cross sections appropriate for the function of the road for all users? - Are the required widths maintained (driving lanes, relevant oncoming traffic, pavement, bicycle path, shoulders, etc.)? - Is the width of the parking lane sufficient? - Are the carriageway widths and widths in the curves sufficient for the traffic flow (e.g. wider lanes in curves due to greater space needs)? - Are the transition zones on roads with a 2+1 cross section properly designed? - Can cross section changes (choke points, narrowing of the carriageway) be seen in good time, and are they marked with signs? - Are there safe places to park broken down vehicles (e.g. breakdown bays when there is no hard shoulder)? - Are verges present and sufficient, how is the transition from the paved to unpaved surface (height difference)? - Are the road verges strong and stable? - Is there sufficient cross fall, especially in curves? - Is the space for waiting pedestrians and bicyclists wide enough, especially on traffic islands?

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
1) Structural conditions continued	
Cross section continued	<ul style="list-style-type: none"> - Are there steep or high embankments along the road? - Are facilities needed to capture falling rock, for example?
Road surface condition	<ul style="list-style-type: none"> - What condition is the road surface in (ruts, cracks, grip, potholes)? - When was the road surface refurbished last, are refurbishments planned? - Do accident incidents point to problems with grip or wet roads? - Is there soiling (e.g. problems for two-wheeled vehicles)? - Are there ruts (e.g. problems for two-wheeled vehicles)?
Sight conditions	<ul style="list-style-type: none"> - Is there sufficient sight distance for overtaking and braking? - Is visibility restricted along the road (safety barriers, vegetation, noise protection walls, etc.)? - Is there sufficient visibility at intersections? - Are there seasonal visibility limitations due to crops or vegetation? - Is there sufficient visibility in curve areas?
Drainage	<ul style="list-style-type: none"> - Does water collect on the road surface or in compound curve areas? - Do other factors cause standing water (overgrown verge, protruding manhole covers, ruts, insufficient single-gradient drainage, incorrectly located drains or soiling, etc.)? - Do the drain systems meet the road safety requirements (e.g. design of drain outlets, transverse barriers in troughs)? - Are drain grates on the road surface arranged so that two-wheeled vehicles can safely use the road?
Junctions	<ul style="list-style-type: none"> - Do the designs and lengths of the acceleration and deceleration lanes and of the merge zones meet the traffic requirements? - Is there sufficient visibility in the junction areas (e.g. in narrow curves), is the course of the ramp sufficiently visible? - Are there cross section changes in ramp areas (e.g. the merging of lanes)? - Are breakdown bays located close to exits (possible guidance errors)? - Are the traffic signs and markings clearly visible and understandable for road users?

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
1) Structural conditions continued	
Junctions continued	<ul style="list-style-type: none"> - Are there significant cross section changes within a short section (driving dynamics problems, load safety, etc.)? - Are fixed obstacles at the ends of dividing islands or along the road sufficiently shielded? - Can drivers be dazzled (ramps, main road, frontage roads, etc.)? - Are there traffic flow problems at the junction (e.g. traffic backups on the main road or the like)? - Transverse gradient, drainage, road surface condition of the ramps?
Tunnels	<ul style="list-style-type: none"> - Is the visibility in the tunnel sufficient? - Are barriers or impact absorbers located at the end of the breakdown bays? - Are the tunnel portals sufficiently shielded? - Are junctions, facing walls, and the like sufficiently shielded? - Are the distances to the portals indicated in the breakdown bays? - Do the distances between the escape and emergency exits meet the requirements? - Are emergency call niches located at the required intervals in tunnels over 500 m in length? - Is the entrance into the tunnel adequately lighted? - Is the interior of the tunnel adequately lighted? - Is there lighting at the breakdown bays? - Is there adaptation lighting (adjustment of the light intensity level) at the beginning and end of the lighting/tunnel? - Are the guidance systems in good condition (e.g. soiling of reflectors or functionality of LED lamps on raised shoulders)? - Are stopping bays located ahead of the portals? - Are rumble strips (acoustic lane markings) located ahead of the portals? - Can drivers see the traffic signals ahead of the portals in good time? - Is it possible to post speed limit signs at sufficient intervals to safely reduce driving speeds?
Intersections	<ul style="list-style-type: none"> - Are entrance and exit ramps, intersections, and crossings clearly visible upon approach, and are corresponding signs posted early enough? - Are entrances and exits to the road clear for all road users?

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
1) Structural conditions continued	
Intersections continued	<ul style="list-style-type: none"> - Does the intersection configuration meet the requirements (type of intersection, intersection angle, turning lane, etc.)? - Do the centre islands in roundabouts sufficiently divert the incoming traffic? - Can drivers see above the centre islands in roundabouts (through-visibility), and can this cause problems in recognising the roundabout, judging the course of the road, etc.? - Are there obstacles on centre islands in roundabouts that could be struck by a vehicle leaving the road? - Is the right of way situation clear and logical? - Is visibility at intersections sufficient for different driver heights (lorry, car, motorcycle)? - Is the traffic routing at crossings clear and logical? - Do the intersections have sufficient capacity? - Is lighting necessary, or is the existing lighting sufficient? - Are pedestrian crossings appropriately lighted? - Can the road be crossed safely (pedestrians, bicyclists), or are additional crossing aids required (e.g. islands because of the width of the road)? - Are islands of the proper size? - Are there appropriate signs and markings? - Are the green phases of the traffic signals sufficient for pedestrians to cross the road? - Are unsecured crossings recognisable (e.g. hiking trails). - Are problems caused by parked cars or other facilities (visibility restrictions, e.g. from containers, fences, guardrails, etc.)?
Driveways Agricultural driveways	<ul style="list-style-type: none"> - Is visibility from driveways and access roads along the section sufficient? - Are driveways clearly visible upon approach and clear for all road users? - Is the road surface soiled at driveways to agricultural areas?
Service facilities (parking spaces, etc.)	<ul style="list-style-type: none"> - Do the pedestrian paths, bicycle paths, parking spaces, turnaround lots, chain installation spots, rest stops, maintenance exits, entrance ramps for emergency vehicles, and other facilities along the section meet the road safety requirements? - Are the exit and entrance ramps for rest stops designed properly (deceleration and acceleration lanes, sufficient visibility)?

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
1) Structural conditions continued	
Service facilities (parking spaces, etc.) continued	<ul style="list-style-type: none"> - Do parked vehicles restrict visibility? - Are entrances and exits to rest stops situated at locations with good visibility? - Is there a sufficient number of parking spaces (prevention of safety problems from reduced cross sections, problems with turning because of illegally parked vehicles, etc.)? - Is the traffic routing in the service facilities practical? - Are the needs of pedestrians and persons with reduced mobility taken into account in the service facilities? - Are the bicycle paths large enough? - Are there sufficient operating and parking areas for police monitoring activities?
Entrance areas to villages/towns (design, function, etc.)	<ul style="list-style-type: none"> - Have structural measures been implemented to ensure adequate safety at entrance areas to villages/towns, especially in terms of speed differences in interurban and urban areas? - Is the beginning of the built-up area easily recognisable upon approach? - Are lighting or better marking of a dividing island necessary?
Railway crossings	<ul style="list-style-type: none"> - Are railway crossings equipped in accordance with the safety regulations? - Can railway crossings be recognised in good time? - Is there sufficient visibility? - Is lighting necessary or sufficient? - Are passing prohibitions and speed limits in place ahead of the crossing?
Bus and tramway stops	<ul style="list-style-type: none"> - Can bus and tramway stops be recognised in good time, are they located outside of critical areas? - Can pedestrians and persons with reduced mobility reach the stops? - Is there potential for conflicts between pedestrians and bicyclists around the stops (bicycle path routing)? - Is there enough space for waiting persons? - Lighting, equipment at the stop (weather protection)? - Are the approach and exit lanes of the stops sufficiently large?

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
2) Equipment and roadside environment	
Traffic signs / guidance	<ul style="list-style-type: none"> - Do the traffic signs meet the safety requirements and the requirements of the StVO? - Are there contradictions or redundancies in the guidance? - Is the guidance unambiguous and easy to recognise? - Is the guidance clear (e.g. not too many destinations on a guidance sign)? - Does the information on the signs match the lanes beneath each item of information? - Are the traffic signs clearly visible and legible (not blocked by vegetation, parked vehicles, or the like, lettering size)? - What is the condition of the traffic signs? - Is the visibility at night sufficient? - Do traffic signs interfere with visibility? - Are existing guidance systems safe and understandable? - Are the traffic signs flexible for the road users (variable traffic signs)? Is there sufficient acceptance? - Do signposts have a break away structure? - Are solid signposts adequately shielded? - Are restrictions such as passing prohibitions or speed limits necessary or sensible (interurban section, intersections)? - Is the right of way situation at intersections clearly defined and visible? - Are traffic signs needed to announce hazards or traffic signals that cannot be seen in good time?
Markings	<ul style="list-style-type: none"> - Do the markings match the road signs? - Are all markings visible and easy to recognise for all road users? - Do the markings make a sensible contribution to managing the traffic flow? - Are the markings visible at night and/or during wet conditions? - Do the markings offer sufficient grip? - Are transitions (merging lanes, entrance and exit lanes, the end of bicycle paths, etc.) sufficient and clearly marked? - Are remainders of old markings visible?
Guidance systems	<ul style="list-style-type: none"> - Are guidance systems present or necessary on the section to influence the traffic flow with information? - What condition are the guidance systems in (e.g. soiling of reflectors on vehicle restraint systems and guide posts)?

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
2) Equipment and roadside environment continued	
Guidance systems continued	<ul style="list-style-type: none"> - What materials are used for the guidance systems (visibility at night – reflectivity)?
Vehicle restraint systems	<ul style="list-style-type: none"> - Are there short, avoidable gaps in the vehicle restraint systems? - Are the end elements state of the art? - Are solid obstacles along the road adequately shielded by vehicle restraint systems? - Can obstacles along the road be removed or replaced with more pliant systems? - Are different systems connected correctly according to the technical standards? - Do the lengths of the vehicle restraint systems meet the system requirements? - Are the vehicle restraint systems in good condition? - Are impact absorbers necessary? - Are special precautions needed for motorcycle riders (underride protection)?
Lighting	<ul style="list-style-type: none"> - Does the road area need to be lighted? - Is the traffic area lighted sufficiently (light intensity, contrast, etc.)? - Are there areas where special lighting is needed (e.g. tunnel portals, pedestrian paths, pedestrian crossings)? - Is there adaptation lighting at the beginning and end of the lighting (tunnel)? - Does the road lighting or ambient lighting influence the traffic flow? - Can the ambient light hamper the visibility of traffic signals or traffic signs? - Are light poles shielded adequately?
Vegetation	<ul style="list-style-type: none"> - Is visibility hampered by vegetation along the road? - Are there problems with leaves and branches on the road? - Does vegetation cause irritations for road users, e.g. by altering the apparent course of the road? - Can trees along the road be reached by vehicles leaving the road, are the trees shielded by vehicle restraint systems? - Does vegetation cause light/shadow alternation? - Does the vegetation conform to the alignment of the road? - Does the vegetation attract wildlife to the road area? - Do trees cause damage to roads, such as the upheaval of the surface of pavements and bicycle paths by tree roots?

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
2) Equipment and roadside environment continued	
Vegetation continued	<ul style="list-style-type: none"> - Can vegetation cause sudden changes in the road conditions, e.g. a wet road surface due to slower evaporation beneath trees? - Are there seasonal visibility limitations due to crops or vegetation?
Wildlife protection systems	<ul style="list-style-type: none"> - Are facilities in place or needed to prevent wildlife from crossing the road (green bridges, fences, wildlife reflectors, scent fences)? - What is the condition of existing wildlife fences, is access to the fences guaranteed (maintenance work)? - Do the wildlife protection facilities fulfil their function?
Signal systems / telematics	<ul style="list-style-type: none"> - Can all road users recognise signal systems in good time, also under varying ambient conditions (e.g. sun)? - Are different signals coordinated (e.g. traffic signals and rail crossing signals)? - Do traffic signals need to be announced in advance because of late recognition? - Do the markings correspond to the existing signals? - Are dynamic traffic management systems controlled in a manner that is plausible for the road users?
Roadside environment, non-traffic systems, other	<ul style="list-style-type: none"> - Are emergency telephones present and sufficiently shielded? - Are snow fences present or needed? - Are road surface temperature displays present or needed (e.g. in bridge areas)? - Are snow chain installation spots needed? - Are wind indicators (wind socks) present or needed? - Are there distractions along the road in the form of advertising? - Are there distractions from other facilities along the road (such as wind turbines)? - Can road users be dazzled by oncoming traffic or traffic on ancillary facilities in the night? Are glare protection systems (antidazzle screens) needed? - Are rumble strips (acoustic lane markings) located ahead of the portals of tunnels? - Are rumble strips at the road edges sensible and possible? - Are there steep and/or high embankments along the road that require shielding or a change in the embankment angle?

Commented Checklist – Possible Questions for Motorways, Expressways, Interurban and Regional Roads	
Category	Possible questions
2) Equipment and roadside environment continued	
Roadside environment, non-traffic systems, other continued	- Are there objects that represent a danger to a vehicle leaving the road (e.g. railings, drainage equipment, shafts, posts, trees, boulders, noise protection systems, steep and/or high embankments, etc.); can they be removed or modified, or must they be shielded?

The following categories and questions pertain especially to minor roads, and are only included in the checklist for minor roads. The categories and questions can of course also apply to interurban roads. In such cases, the checklists must be adapted for the inspection.

Table 13: Commented checklist – possible questions primarily for minor roads

Commented Checklist – Possible Questions Primarily for Minor Roads	
Category	Possible questions
Public transport infrastructure	<ul style="list-style-type: none"> - Are the tramway and bus stops at the intersection located so that pedestrians and bicycle users can reach the stops safely and quickly? - Do the stops meet the safety requirements? - Is the space for waiting pedestrians and bicyclists sufficient? - Can the stop be recognised clearly enough? - Is there sufficient information for passengers at the stop? - Is giving precedence to public transport sensible?
Parking infrastructure	<ul style="list-style-type: none"> - Is the visibility at garage entrances and exits sufficient? - Is there potential for problems at entrances to parking lots or garages (traffic congestion, visibility)? - Are there conflicts between different road users at the garage entrances and exits (bicyclists, pedestrians)? - Are the parking lanes large enough? - Is there loading and unloading activity? Is space available for this?
Bicycle infrastructure	<ul style="list-style-type: none"> - Are separate routing and crossings (such as bicycle bridges) needed for bicycle traffic (e.g. because of the course of a bicycle path)? - Are there contradictions in the routing of bicycle traffic, motor vehicles, and pedestrians? - Is the space for waiting bicyclists sufficient? - Is the routing clear for motor vehicle users and bicycle users?
Pedestrian infrastructure	<ul style="list-style-type: none"> - Are there unprotected crossings at the intersection? - Are there dropped kerbs at the intersection? - Do the pavement widths meet the guideline requirements? - Are the pavement widths sufficient for persons with reduced mobility, or are there obstacles? - Are there other obstacles in the clearance zone that could cause problems for pedestrians? - Are there schools in the inspected area? Are special measures needed here? - Are school routes protected (crossing guards)? - Does the clearance zone meet the guideline requirements?

Commented Checklist – Possible Questions Primarily for Minor Roads	
Category	Possible questions
Pedestrian infrastructure continued	<ul style="list-style-type: none"> - Do children have sufficient visibility at the intersections (lower eye level) and can children be seen at intersections by approaching drivers? - Do the existing guidance systems for visually impaired and blind persons meet the guideline requirements, and are additional guidance systems needed? - Is the signal-controlled intersection constructed appropriately for persons with visual impairments? - Can persons with reduced mobility cross safely (e.g. dropped kerbs, crossing aids, etc.)? - Are construction sites sufficiently fenced off (foot, middle, and chest rail)? <p>Note: see also the item “Intersections, Crossings” and the checklist for intersections</p>

Table 14: Commented checklist – possible questions for intersections

Commented Checklist for Intersections	
Category	Possible questions
1) Structural conditions	
Intersection type / intersection control / traffic signal aspects	<p><u>General:</u></p> <ul style="list-style-type: none"> - Is the right of way situation for all road users clear, and is it consistent with the visual perception of the road users? - Is the traffic routing at the intersection clear and logical? - Is the capacity of the intersection insufficient at times? - Are there special characteristics of the traffic composition, and must they be taken into account? - Are there quality and road safety problems for non-motorised traffic? - Are the needs of pedestrians and bicycle users sufficiently accounted for? - Are the needs of persons with reduced mobility (guidance systems, dropped kerbs, etc.) taken into account? <p><u>Roundabouts:</u></p> <ul style="list-style-type: none"> - Does the roundabout meet the requirements of the guideline and the road safety standards? - Are there traffic backups / congestion in the roundabout or on the approaches? - Is the capacity of the roundabout below the limit, or is the limit reached or exceeded? - Do the centre islands in roundabouts sufficiently divert the incoming traffic? - Can drivers see above the centre islands in roundabouts (through-visibility), and can this cause problems in recognising the roundabout, judging the course of the road, etc.? - Are there objects on the centre island that could cause severe consequences in the event of a collision? <p><u>Traffic signals:</u></p> <ul style="list-style-type: none"> - Can the road users see the signals in good time? Can drivers in all types of vehicles see the signal sufficiently (especially signals above the road)? - Is the light intensity of the signals sufficient for all road users and are the colours easy to recognise? - Can conflicts with the traffic signals arise from other lighting (e.g. road lighting, advertising)? - Are the green phases sufficient for pedestrians to cross the road? - Are forward stop lines for bicyclists present or sensible?

Commented Checklist for Intersections	
Category	Possible questions
1) Structural conditions continued	
Intersection type / intersection control / traffic signal aspects continued	<p><u>Traffic signals continued:</u></p> <ul style="list-style-type: none"> - Is the right of way situation for all road users clear in the event of a signal light failure? - Are the markings placed adequately? - Are the needs of persons with reduced mobility (acoustic systems, guidance systems, dropped kerbs, etc.) taken into account? - Is an early green phase for pedestrians present or sensible? - Are separate signals present or needed for bicyclists? If present, are the signals sufficiently visible?
Turns	<ul style="list-style-type: none"> - Can all road users make turns at the intersection without limitations? - Does traffic congestion occur at the turning lanes? - Are separate turning lanes or separate traffic signal phases needed because of the traffic volume? - Should the turning lanes be covered by dividing islands?
Visibility conditions in the intersection	<ul style="list-style-type: none"> - Is there sufficient braking and stopping visibility on the approach to the intersection and at the intersection? - Can road users see the course of the road sufficiently? - Is visibility at the intersection limited? - Can all road users and approaching road users (especially bicyclists and pedestrians) be seen at the intersection? - Do children have sufficient visibility at the intersections (lower eye level) and can children be seen at intersections by approaching drivers?
Road surface condition	<ul style="list-style-type: none"> - What condition is the road surface in (ruts, cracks, grip, potholes)? - When was the road surface refurbished last, are refurbishments planned? - Do accident incidents point to problems with grip or when the road is wet? - Is there soiling (e.g. problems for two-wheeled vehicles)? - Are there ruts (e.g. problems for two-wheeled vehicles)?
Crossings, crossing aids	<ul style="list-style-type: none"> - Can the intersection be crossed safely by pedestrians and bicyclists, or are additional crossing aids required (e.g. because of the width of the road)? - Can persons with reduced mobility cross safely (e.g. dropped kerbs, crossing aids, etc.)?

Commented Checklist for Intersections	
Category	Possible questions
1) Structural conditions continued	
Crossings, crossing aids continued	<ul style="list-style-type: none"> - Do children have sufficient visibility at the intersections (lower eye level) and can children be seen at intersections by approaching drivers?
Pedestrian infrastructure	<ul style="list-style-type: none"> - Are there unprotected crossings at the intersection? - Are there dropped kerbs at the intersection? - Do the pavement widths meet the guideline requirements? - Are the pavement widths sufficient for persons with reduced mobility, or are there obstacles? - Are there other obstacles in the clearance zone that could cause problems? - Are there schools in the inspected area? Are special measures needed here? - Are school routes protected (crossing guards)? - Do children have sufficient visibility at the intersections (lower eye level) and can children be seen at intersections by approaching drivers? - Does the clearance zone meet the guideline requirements? - Do the existing guidance systems for visually impaired and blind persons meet the guideline requirements, and are additional guidance systems needed? - Are construction sites sufficiently fenced off (foot, middle, and chest rail)?
Public transport infrastructure	<ul style="list-style-type: none"> - Are the tramway and bus stops at the intersection located so that pedestrians and bicycle users can reach the stops safely and quickly? - Do the stops meet the safety requirements? - Is the space for waiting pedestrians and bicyclists sufficient? - Can the stop be recognised clearly enough? - Is there sufficient information for passengers at the stop? - Is giving precedence to public transport sensible?
Bicycle infrastructure	<ul style="list-style-type: none"> - Are separate routing and crossings needed for bicycle traffic (e.g. because of the course of a bicycle path)? - Are there contradictions in the routing of bicycle traffic, motor vehicles, and pedestrians? - Is the space for waiting bicyclists sufficient? - Is the routing clear for motor vehicle users and bicycle users? - Is the waiting time for bicyclists sensible?

Commented Checklist for Intersections	
Category	Possible questions
2) Equipment and roadside environment	
Traffic signs / guidance, especially right of way situation	<ul style="list-style-type: none"> - Are there contradictions or redundancies in the guidance? - Is the guidance at the intersection unambiguous and easy to recognise? - Is the guidance at the intersection clear (e.g. not too many destinations on a guidance sign)? - Does the information on the guidance signs at the intersection match the lanes beneath each item of information? - Are the traffic signs at the intersection clearly visible and legible (not blocked by vegetation, parked vehicles, etc.)? - Are additional signs needed? - What is the condition of the traffic signs at the intersection? - Is the visibility at night sufficient? <p><u>Right of way:</u></p> <ul style="list-style-type: none"> - Are the right of way situation and traffic routing at the intersection consistent with the function of the road? - Are there contradictions in the existing right of way situation? - Is the right of way situation clear for all road users at the intersection?
Markings	<ul style="list-style-type: none"> - Are all markings at the intersection visible and easy to recognise for all road users? - Do the markings at the intersection match the road signs? - Do the markings make a sensible contribution to managing the traffic flow at the intersection? - Are the lanes sufficiently separated, especially for turning (no overlaps)? - Is the visibility at night sufficient? - Do the markings at the intersection offer sufficient grip? - Are transitions (merging lanes, the end of bicycle paths, etc.) in the intersection sufficient and clearly marked?
Guidance systems	<ul style="list-style-type: none"> - Are guidance systems present or necessary at the intersection to influence the traffic flow with information? - What condition are the guidance systems at the intersection in (e.g. soiling)? - Is the visibility at night sufficient?

Commented Checklist for Intersections	
Category	Possible questions
2) Equipment and roadside environment continued	
Lighting	<ul style="list-style-type: none"> - Does the road area at the intersection need to be lighted? - Is the road area at the intersection sufficiently lighted, is visibility of pedestrians in particular ensured by means of sufficient contrast? - Are there areas where special lighting is needed at the intersection (e.g. pedestrian crossings, bus and tramway stops, etc.)? - Does the road lighting or ambient lighting influence the traffic flow?
Vegetation	<ul style="list-style-type: none"> - Does vegetation block visibility at the intersection? - Are there problems with leaves on the road? - Does vegetation cause irritations for road users, e.g. by altering the apparent course of the road? - Does vegetation cause light/shadow alternation?
Other	<ul style="list-style-type: none"> - Are there distractions along the road in the form of advertising, for example?

7 Laws and Guidelines

AUSTRIAN MARKING ORDINANCE: 1995 as amended

AUSTRIAN FEDERAL HIGHWAY ACT: 1971 as amended

EUROPEAN UNION: Directive of the European Parliament and the Council regarding road infrastructure safety, 19 November 2008

RESEARCH ASSOCIATION FOR ROADS AND TRAFFIC: Recommendations for Assessing the Safety of Road Networks (ESN), Cologne 2002

AUSTRIAN MOTOR VEHICLE ACT: 1967 as amended

AUSTRIAN MOTOR VEHICLE ACT – IMPLEMENTING REGULATION: 1967 as amended

AUSTRIAN ASSOCIATION FOR RESEARCH ON ROAD – RAIL – TRANSPORT: RVS 02.02.21 Road Safety Assessment, August 2004

AUSTRIAN ASSOCIATION FOR RESEARCH ON ROAD – RAIL – TRANSPORT: RVS 02.02.22 Road Conflict Assessment, March 1995

AUSTRIAN ASSOCIATION FOR RESEARCH ON ROAD – RAIL – TRANSPORT: RVS 02.02.31, Traffic Experts, October 1993

AUSTRIAN ASSOCIATION FOR RESEARCH ON ROAD – RAIL – TRANSPORT: RVS 02.02.32, Working Fundamentals for Traffic Experts, August 2004

AUSTRIAN ASSOCIATION FOR RESEARCH ON ROAD – RAIL – TRANSPORT: RVS 02.02.33, Road Safety Audit, July 2012

AUSTRIAN ASSOCIATION FOR RESEARCH ON ROAD – RAIL – TRANSPORT: RVS 02.02.34, Road Safety Inspections, July 2012

AUSTRIAN ASSOCIATION FOR RESEARCH ON ROAD – RAIL – TRANSPORT: RVS 02.02.35, Certification of Road Safety Auditors and Road Safety Inspectors, July 2012

ROAD LAWS OF THE AUSTRIAN PROVINCES: as amended

AUSTRIAN ROAD TRAFFIC ACT: Federal Law Gazette No. 159/1960 as amended

AUSTRIAN ROAD SIGN ORDINANCE: 1966 as amended

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9 Indexes

Index of Figures

Figure 1: RSI procedure; source: FSV – Austrian Association for Research on Road – Rail – Transport, RVS 02.02.34, Road Safety Inspection, July 2012..... 15

Index of Tables

Table 1: Example of a checklist in the ASFINAG network.....	21
Table 2: Ranking the safety relevance	23
Table 3: Example of a measures table (template).....	25
Table 4: Example of a completed measures table	26
Table 5: Monitoring table	28
Table 6: Contents of the checklists for the individual road types and overview of the categories.....	31
Table 7: Contents of the checklists for intersections.....	32
Table 8: Checklist for motorways and expressways	33
Table 9: Checklist for interurban and regional roads.....	34
Table 10: Checklist for urban roads	35
Table 11: Checklist for intersections	36
Table 12: Commented checklist – possible questions for motorways, expressways, interurban and regional roads	37
Table 13: Commented checklist – possible questions primarily for minor roads	46
Table 14: Commented checklist – possible questions for intersections	48

Index of Abbreviations

ASFINAG.....	Autobahnen- und Schnellstraßen-Finanzierungs-Aktiengesellschaft
BMVIT.....	Federal Ministry for Transport, Innovation and Technology
BStG.....	Austrian Federal Highway Act
ESN.....	Recommendations for Assessing the Safety of Road Networks
EU.....	European Union
FSV.....	Austrian Association for Research on Road – Rail – Transport
KfV.....	Austrian Road Safety Board
LED.....	light emitting diodes
NSM.....	network safety management
ÖAMTC.....	Österreichischer Automobil-, Motorrad- und Touringclub
PIARC.....	World Road Association

RS.....	road safety
RSA.....	road safety audit
RSI.....	road safety inspection
RVS.....	Guidelines and Regulations for Roads
StVO.....	Austrian Road Traffic Act 1960
TEN.....	trans-European networks
U.S.A.....	United States of America

10 Annex: Sample RSI Report

ROAD SAFETY INSPECTION

TITLE PAGE

Place, Date

Road Safety Inspection
Section
from km XX to km YY

conducted by

.....

Sample for the RSI Manual

Place, date

C o n t e n t s

1.	GENERAL INFORMATION.....	LXII
2.	CHECKLIST AND ACCIDENTS.....	LXIV
2.1	CHECKLIST.....	LXIV
2.2	ACCIDENTS.....	LXV
3.	MEASURES LIST.....	LXXI
4.	SUMMARY.....	LXXII

1. General Information

Road Safety Inspection

Designation of the section, length (from-to)

General details:

Commissioning party:

Road category:

Cross section:

Traffic volume:

Maximum permissible speed:

Evaluation period for accidents:

Length of the section:

Junctions / nodes:

Tunnels:

Service facilities:

Lanes/directions:

Overview map

Place holder for overview map

Used documents

.....
.....
.....

Conducted meetings and site visits

Inspectors

.....
.....
Place, date

2. Checklist and Accidents

2.1 Checklist

Example of a checklist for motorways and expressways:

Checklist for Motorways and Expressways			
Inspected section: [designation, length, from-to] Date/time: Ambient conditions: [weather, road conditions, etc.] Inspectors:			
Maximum permissible speed: [any other available speed data can also be entered here] Traffic statistics: [indication of ADT, share of heavy vehicles, special features]			
1) Structural conditions	Safety relevant?		Comments
	Yes	No	
Site plan		√	-
Longitudinal section		√	-
Alignment		√	-
Cross section		√	-
Road surface condition	√		Ruts at km 2.5 driving direction north
Visibility conditions		√	-
Drainage	√		Hydroplaning risk at km 2.5 driving direction north
Junctions		√	-
Tunnels		√	No tunnels in the inspected section
Service facilities (parking spaces, etc.)		√	-
2) Equipment and roadside environment	Safety relevant?		Comments
	Yes	No	
Traffic signs / guidance	√		Unclear guidance at km 10.8 driving direction south
Markings	√		
Guidance systems		√	

2) Equipment and roadside environment	Safety relevant?		Comments
Vehicle restraint systems	√		Traffic signs not sufficiently shielded at some locations
Lighting		√	-
Vegetation		√	-
Wildlife protection systems		√	-
Signal systems / telematics		√	-
Roadside environment, non-traffic systems, other		√	-

2.2 Accidents

The following table shows an overview of the accidents in the period from year A to year B on the section being inspected.

Table 1: Accidents with personal injury in section XX from year 1 to year 5

Accidents with personal injury	Year 1	Year 2	Year 3	Year 4	Year 5	Total
No direction indicated						
Direction 1						
Direction 2						
Both directions						

Source

Table 2: Fatalities in section XX from year 1 to year 5

Accidents with personal injury	Year 1	Year 2	Year 3	Year 4	Year 5	Total
No direction indicated						
Killed						
Seriously injured						
Slightly injured						
Total						
Direction 1						
Killed						
Seriously injured						
Slightly injured						
Total						
Direction 2						
Killed						
Seriously injured						
Slightly injured						
Total						
Total (both directions)						

Source

Table 3: Average accident parameters in section XX from year 1 to year 5

	Length [km]	Distance driven [veh.*km/a]	Accidents ¹	AD ²	AR ³	FR ⁴	VR ⁵	ACR ⁶
Direction 1								
Direction 2								

Source

¹ Average accidents (with personal injury) per year [API/year]² Average accident density per year [API/km]

³ Average accident rate per year [API/1 mn veh.*km]

⁴ Average fatality rate per year [fatalities/1 mn veh.*km]

⁵ Average accident victims per year [victims/1 mn veh.*km]

⁶ Average accident cost rate per year [indication of the accident costs]

Table 4: Accidents with personal injury by accident type in section XX from year 1 to year 5

Accident type	Year 1	Year 2	Year 3	Year 4	Year 5	Total
No direction indicated						
Single vehicle accidents						
Rear end collisions						
...						
Total						
Direction 1						
Single vehicle accidents						
Rear end collisions						
...						
Total						
Direction 2						
Single vehicle accidents						
Rear end collisions						
...						
Total						
Total (both directions)						

Source

Table 5: Vehicles involved in accidents with personal injury in section XX from year 1 to year 5

Involved vehicles	Year 1	Year 2	Year 3	Year 4	Year 5	Total
No direction indicated						
Motorcycle						
Passenger car						
Lorry up to 3.5 t w/o trailer						
...						
Total						
Direction 1						
Motorcycle						
Passenger car						
Lorry up to 3.5 t w/o trailer						
...						
Total						
Direction 2						
Motorcycle						
Passenger car						
Lorry up to 3.5 t w/o trailer						
...						
Total						
Total (both directions)						

Source

Table 6: Accidents with personal injury under different light conditions in section XX from year 1 to year 5

Light conditions	Year 1	Year 2	Year 3	Year 4	Year 5	Total
No direction indicated						
Daylight						
Dusk						
Darkness						
Artificial lighting						
Total						
Direction 1						
Daylight						
Dusk						
Darkness						
Artificial lighting						
Total						
Direction 2						
Daylight						
Dusk						
Darkness						
Artificial lighting						
Total						
Total (both directions)						

Source

Table 7: Accidents with personal injury under different road conditions in section XX from year 1 to year 5

Road conditions	Year 1	Year 2	Year 3	Year 4	Year 5	Total
No direction indicated						
Dry road						
Wet road						
Winter conditions						
Other						
Total						
Direction 1						
Dry road						
Wet road						
Winter conditions						
Other						
Total						
Direction 2						
Dry road						
Wet road						
Winter conditions						
Other						
Total						
Total (both directions)						

Source

Verbal comments about the accidents must also be added.

3. List of Measures

Example of a completed list of measures

Road Safety Inspection Measures Proposals	Legend:		High safety relevance	No. 1
			Moderate safety relevance	
			Low safety relevance	
Road / section	Direction	Location		
Road A / km 14.50–km 18.85	1	km 16.45		
Problem / deficiency	There is neither an end piece nor an impact absorber at the end of the concrete divider island; a collision with the blunt end of the concrete divider is possible			
Proposed measure / expected improvement	Install an impact absorber; this will reduce the consequences of a collision			
Assessment of the accident risk	moderate	Obstacle in the divider island , two accidents with personal injury in the last three years		
Assessment of possible accident consequences	severe	Inflexible, fixed obstacle		
Assessment of implementation timeframe and safety relevance	Short term		Medium term	Long term
	x			
Place holder for photo				

Place holder for further diagrams and explanations if needed/sensible	Place holder for further diagrams and explanations if needed/sensible
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4. Summary

Closing comments on the RSI inspection with the most important results.

INDEX OF TABLES

INDEX OF FIGURES

POSSIBLE ANNEXES

ANNEX 1: ACCIDENT MAPS AND COLLISION DIAGRAMS

ANNEX 2: MEETING MINUTES

ANNEX 3: MONITORING TABLE