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EuroS@P
EUROPEAN ROAD SAFETY PARTNERSHIP

WP3. Teaching materials development related to the road infrastructure safety inspection

IO.9 Theoretical and practical teaching materials development related to the road infrastructure safety inspection

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EIRA
EUROPEAN INSTITUTE
OF ROAD ASSESSMENT

List of authors:**Gdansk University of Technology**

Wojciech Kustra, Marcin Budzynski, Joanna Wachnicka, Tomasz Mackun

Bauhaus-Universität Weimar

Julius Uhlmann, Johannes Vogel

European Institute of Road Assessment

Olivera Rozi, Marko Ševrović

University of Catania

Salvatore Damiano Cafiso, Giuseppina Pappalardo

University of Zagreb

Leonid Ljubotina, Sanja Leš, Anđelo Marunica

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1 ABOUT THE EUROS@P PROJECT

The main objective of the EuroS@P project is to promote the best education solutions in the area of RISM directive, with an increase of awareness and knowledge of road safety, by:

- 1) Developing an e-learning platform with access to project products,
- 2) The development of teaching and training materials dedicated to conducting classes at universities and training courses for RISM staff,
- 3) Raising competencies and skills in RISM by changing curricula at universities and equipping students and staff with didactic materials based on innovative RISM methods and tools,
- 4) Creating the foundations for Road Safety Professional Certification (RSP),
- 5) The development of a lasting relationship and the continuation of active international cooperation between project partners with the possibility of its extension to other institutions.

The EuroS@P project targets the following groups:

- 1) Students, researchers, and academic teachers at universities.
- 2) Road authority staff at national, regional and local levels.
- 3) Experts, specialists, and practitioners involved in RS activities, including staff who conduct training in various RS courses.
- 4) All users of road infrastructure, as an indirect target group, for whom the risk of road accidents will ultimately be reduced by increasing the effectiveness and efficiency of RISM activities.

The project is also supported by a group of associates who will cooperate with project partners to consult and evaluate the results. They will implement final products and promote the dissemination and accessibility of the project results.

ABOUT OUTPUT IO.9

- **Objective:** Theoretical and practical teaching materials development related to the road infrastructure safety inspection.
- **Work package:** 3 Teaching materials development related to the road infrastructure safety inspection.
- **Target Groups:**
 - Research and teaching staff from project institutions.
 - Civil engineering and transportation engineering students.
 - National, local, and regional road authority staff.

2 SUBJECT ASSUMPTIONS

2.1 Directive 2019/1936/EC

Due to the requirements of Directive 2019/1936/EC, there is a huge demand for educated staff who will be able to implement it. Up to now, curricula have hardly considered road safety issues. This is gradually improving, but the road network management staff do not have enough knowledge to effectively implement road infrastructure safety management tools. This expertise is necessary to implement measures to reduce the number of fatalities and seriously injuries in the next decade by 50%.

The approach to road safety issues should be changed from reactive to proactive. The former serves to respond only to existing risks on the roads in operation (identification, risk assessment and response).

The latter approach, which is much more effective, consists of preventive measures (anticipating the occurrence of accidents and using solutions that prevent them), which are implemented for planned, designed and existing road sections. This approach will be emphasised as part of the prepared materials.

2.2 The planned result

The planned result of the task is the development of innovative teaching materials related to road infrastructure safety inspection. Materials are divided into theoretical and practical parts. The developed materials are dedicated to three target groups: students and road infrastructure managers (targeted or periodical) on the national, regional and local levels, and it includes a tool to support the implementation of RSI. The following range of prepared materials is foreseen:

- Student teaching materials - a more extensive theoretical part that will allow the proper preparation of future road safety inspectors (road infrastructure managers), in the field of road safety issues, with a module of practical classes on the roads (detailed inspection, on selected road sections).
- Road targeted inspector teaching materials - a more extensive practical part with practical classes related modules with all types of inspection (single carriageways, motorways, intersection/roundabouts and interchanges).
- Road periodical inspector teaching materials - a less extensive practical part with practical classes related modules with all types of inspection (single carriageways, motorways, intersection/roundabouts and interchanges).

2.3 Division of Roadside Safety Management Lessons

The task was implemented under working package 3 (WP3. Teaching materials development related to the road infrastructure safety inspection). Theoretical and practical teaching materials were prepared based on the prepared methodology (IO.5) and practical classes on the selected road sections (IO.6-8) for RSI implementation.

The work was divided among all consortium participants and included:

- Preparation of the syllabus.
- Preparation of the presentation.
- Development of materials from research and implementation projects related to the RSI.
- Development of teaching materials using data from practical classes on the selected road sections (IO.6-8) and other projects (e.g. SLAIN, SENSorR, RADAR).
- Verifying and evaluating developed teaching materials during didactic workshops and multiplier events.

The planned outcome of the task is the development of modern and innovative digital teaching and training content for remote education in the field of road infrastructure safety inspection, with the support of RISM tools. As part of the civil and transportation engineering course syllabus in partner universities. The work included a detailed breakdown of the issue into one chapter of 30/60 hours of lessons. The programme has been designed with:

- students,
- targeted inspectors,
- periodical inspector.

Following the assumptions made during the development of the methodology of the road infrastructure safety inspection (IO.5), it is assumed learning by doing. Emphasis on practical activities, student collaboration, and knowledge exchange during group work or webinars. The planned division of road infrastructure safety inspection lessons is shown in Table 1. The potential extension of the programme will be possible when syllabuses have been adapted.

Table 1 The planned division of roadside safety management lessons

Types of classes	Type of learner		
	Students	Targeted inspectors	Periodical inspector
Lecture	33	27	16
Field activities	15	14	6
Practicals (remote)	12	19	8
Number of lessons	60	60	30

2.4 Type of didactic and training resources

Roadside environment safety management also includes specialist knowledge of the design and use of road safety devices. This knowledge is insufficiently imparted to students and infrastructure management personnel in curricula and various training courses. The materials developed would make it possible to fill this gap in the learning process. Didactic materials were divided into five chapters:

- 1 - Preliminary part,
- 2 - Road Safety Fundamentals,

- 3 - Road safety inspection,
- 4 - The inspection process,
- 5 - Final discussion.

The work includes theoretical and practical activities:

- lectures (Directive 2019/1936/EC, RSI procedures, risk assessment and analysis, rules for identifying and classifying hazards and their source, testing of protective devices – site and numerical tests, rules for the design and location of protective devices, database exploration, etc.),
- fieldwork (recording two-lane rural roads, Motorways/dual carriageways, Interchanges, and Intersections/Roundabouts and local road sections and documentation in specific locations, identification and assessment of hazards, accident analysis and surrogate measure of safety),
- practical classes (road network classification, analysis risk, analysis and assessment of hazards and their source),

As part of the project implementation, the following type of data was prepared:

- PowerPoint – presentation, which should be presented by the teacher (Figure 1),
- PowerPoint-audio – presentation with teacher soundtrack and subtitles if the speaker presented issues in another language than English (Figure 2),
- PowerPoint with YouTube resources (Figure 3).
- Recorded, rural roads, motorways, expressways sections, intersections and interchanges (Figure 4).
- Shapefile, kml, pdf with prepared localisation of analysed motorways, expressways sections, intersections and interchanges (Figure 5, Figure 7).
- Excel files with prepared data (Figure 6).
- Interactive quiz – different quizzes (open questions, multichoice, yes/no).
- Webinar, Q&A, PowerPoint - student presentation (Final discussion with the teacher, all groups together).

Article 1 – Subject matter and scope

1. This Directive requires the establishment and implementation of procedures relating to road safety impact assessments, road safety audits, road safety inspections and network-wide road safety assessments by the Member States.

- Lays out which topics are covered by this directive

Figure 1. Example of didactic materials - presentation

Project purpose

Project: "Experimental road marking in terms of behaviour of road users" carried out for GDDKiA answers two main questions:

- „When it is justified to use non-standard signs and what conditions have be met to cause a positive effect on traffic performance and safety” ?
- „What form should non-standard signs take to make their information message understandable and cause the desired drivers' reactions” ?
- and „How to measure this” ?

Answering these questions is particularly important when making decisions regarding the widespread use of non-standard signs

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Figure 2. Example of didactic materials – presentation with recorded voice

Why US Signs Look Different Than The Rest Of The World's



Figure 3. Example of didactic materials – presentation with YouTube resources

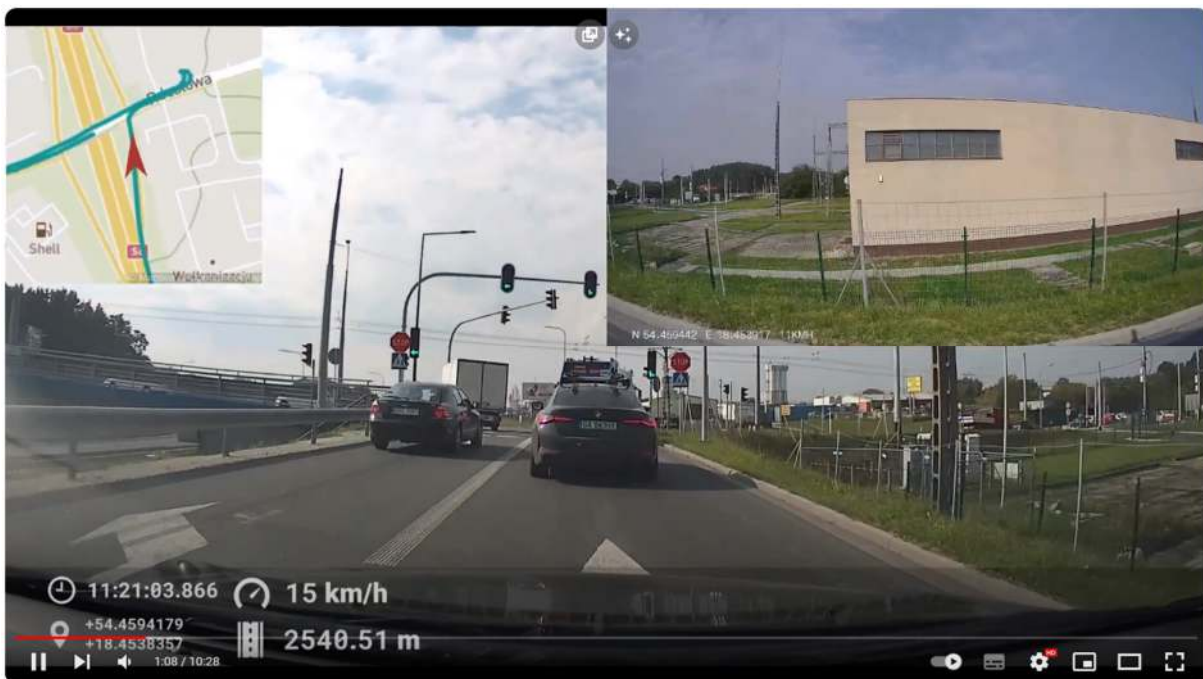


Figure 4. Example of didactic materials – YouTube video

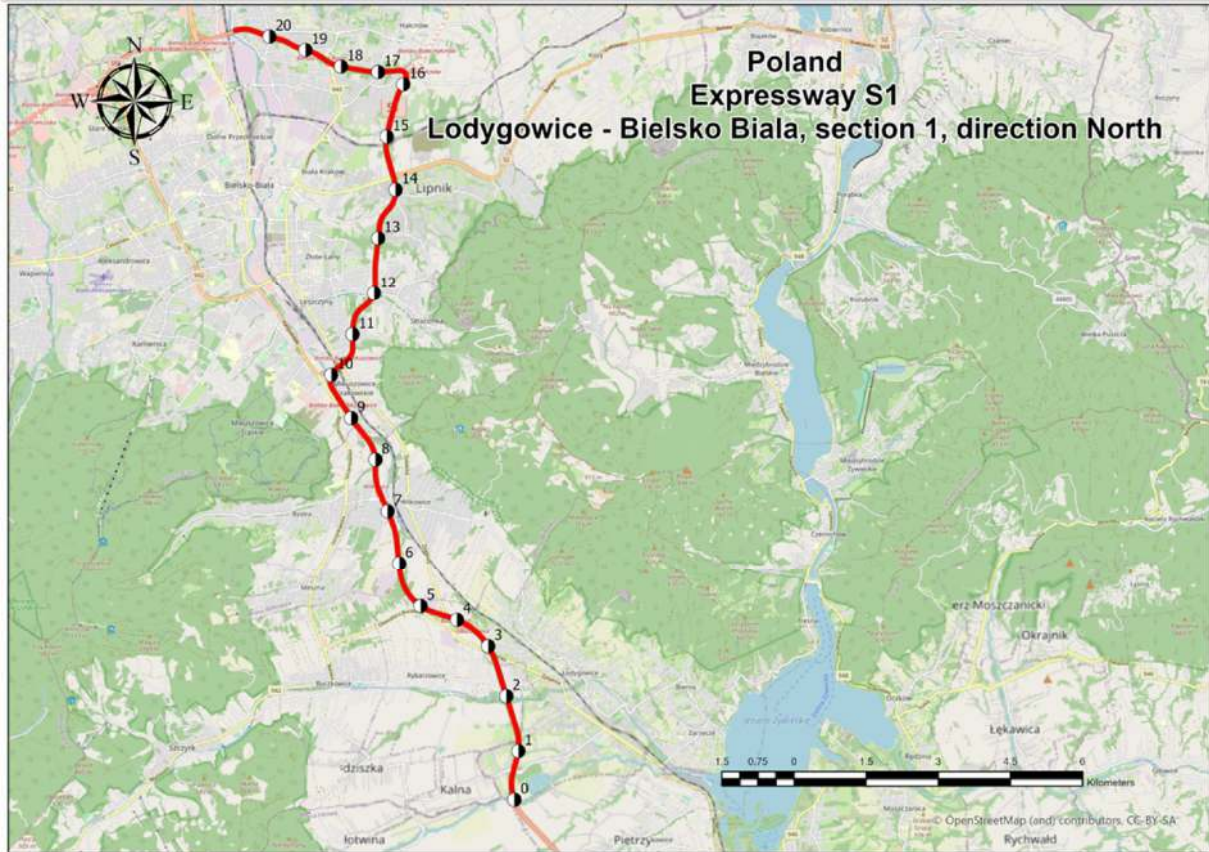


Figure 5. Example of didactic materials – maps of expressway S1, section 1, direction North

Hazard identification and classification sheet

COUNTRY		NAME, SURNAME	IDENTIFICATION INSPECTION
REGION			
AREA	rural		
INTERCHANGE NAME		DATE	
INTERCHANGE TYPE			
NUMBER OF MAIN ROAD		SCHEDULE	
NUMBER OF MINOR ROAD		BEGINNING	END
MAIN ROAD TYPE		Numbers of investigation areas	
GPS COORDINATES	X	Y	28

ID	Hazard group/name	Investigation areas									
		Risk level	Risk severity level	Risk level	Risk severity level	Risk level	Risk severity level	Risk level	Risk severity level	Risk level	Risk severity level
C.1.5	Lack of visibility through noise or windbreak barriers										
C.1.6	Localisation road elements in barrier work-zone										
C.1.7	Incorrect transition of barriers										
C.1.8	Not proper/lack of adequate end terminal or crash cushion										
C.2 Service roads, ramps											
C.2.1	Verification of the need for road restrain system										
C.2.2	Lack of adequate road barrier (side of the service road, ramps)										
C.2.3	Lack of visibility through noise or windbreak barriers										
C.2.4	Localisation/road elements in barrier work-zone										
C.2.5	Incorrect transition of barriers										
C.2.6	Not proper/lack of adequate end terminal or crash cushion										
D Tunnels, Bridges or underpasses, overpasses											
D.1 Geometry of tunnels											
D.1.1	Absence or insufficient width										
D.1.2	The different number of lanes than on the section before or after										
D.1.3	Insufficient height										
D.2 Bridges or underpasses											
D.2.1	Absence or insufficient width										
D.2.2	The different number of lanes than on the section before or after										
D.2.3	Insufficient height (only underpasses)										
E Unprotected obstacles											
E.1 Unprotected poles											
E.1.1	Unprotected poles										
E.1.2	Unprotected gantries										
E.1.2	Unprotected concrete poles, regardless of their diameter										
E.2 Other structures											
E.2.1	Unprotected permanent obstacles protruding at least 0.15 m above the ground level										

Figure 6. Example of didactic materials – prepared Excel sheet

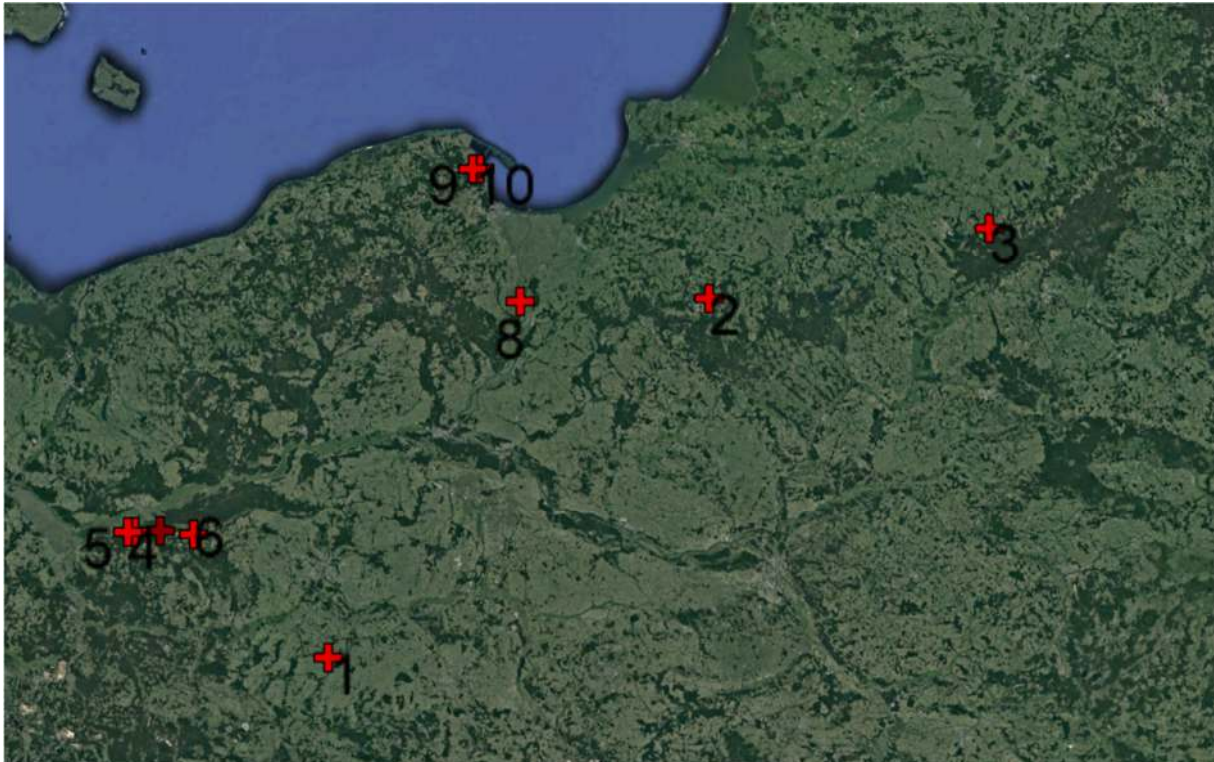


Figure 7. Example of didactic materials – prepared kml files

Example of an interactive quiz

1. What is the primary objective of a Road Safety inspection (RSI) for motorways/dual carriageways?

- a) To increase traffic flow
- b) To identify and mitigate safety risks
- c) To reduce toll fees
- d) To improve air quality

2. Who typically conducts RSIs for motorways/dual carriageways?

- a) Traffic police
- b) Environmentalists
- c) Qualified safety professionals
- d) Meteorologists

3. What is the primary goal of an RSI report for motorways/dual carriageways?

- a) Recommending scenic viewpoints
- b) Identifying road maintenance needs
- c) Identifying and mitigating potential safety issues
- d) Promoting tourism

2.5 Gdansk University of Technology e-learning platform

Per the adopted assumptions, the material development is available on a publicly accessible e-learning platform. Detailed information about the e-learning platform is described in IO.15 Development of the e-learning platform.

2.6 YouTube EuroS@P canal

A dedicated channel on the YouTube platform will complement the course on the platform. The EuroS@P canal is accessible at youtube.com/@eurosp4658.

3 DETAILED DIVISION OF DIDACTIC AND TRAINING MATERIALS

Table 2 describes the planned didactic and training materials under the roadside environment safety management issues.

Table 2 The planned detailed division of road infrastructure safety inspection

No.	Types of classes	Hour	Short Name	Resource Type	Student	Targetet inspector	Periodical inspector
CHAPTER 1 - Preliminary part							
1	Lecture	2	Directive 2019/1936/EC (RSI - Targeted RSI - Network Wide Risk Assessment)	PowerPoint, PowerPoint - YouTube Resource, PowerPoint, Group discussion	1	1	1
2	Lecture	3	RSI procedures	PowerPoint, Materials for lead classroom activity (included in the PPT), PowerPoint, Materials for lead classroom activity (included in the PPT)	1	1	1
3	Lecture	1	Road network classification	PowerPoint, Materials for lead classroom activity (included in the PPT), PowerPoint - YouTube Resource	1	1	1
4	Practical	3	Road network classification	Map in teamwork - network classification, Peer-to-peer presentation, Group discussion	1	0	0

No.	Types of classes	Hour	Short Name	Resource Type	Student	Targetet inspector	Periodical inspector
5	Lecture	3	Accident analysis and statistics	PowerPoint, PowerPoint, PowerPoint, PowerPoint, Interactive quiz, PowerPoint - YouTube Resource	1	0	0
6	Field	4	Accident Analysis and Surrogate Measure of Safety	Map in teamwork - accident analysis, Speed and conflicts measurement, Group discussion	1	0.5	0.5
7	Practical	4	Tools used for RSI	Map in teamwork - accident analysis, Speed and conflicts measurement, Group discussion	1	0.5	0.5
CHAPTER 2 - Road Safety Fundamentals							
1	Lecture	1	Characteristics and requirements of different road users. VRUs. Standards vs Performance	PowerPoint, PowerPoint, Interactive quiz	1	1	1
2	Lecture	1	Road Alignment and Cross Section	PowerPoint, Interactive quiz, PowerPoint - YouTube Resource	1	0	0
3	Lecture	1	Intersections and Interchanges	PowerPoint, PowerPoint, Interactive quiz	1		

No.	Types of classes	Hour	Short Name	Resource Type	Student	Targetet inspector	Periodical inspector
4	Lecture	1	Roadside hazards	PowerPoint, PowerPoint, Interactive quiz	1	1	1
5	Lecture	1	Signs, Markings, Pavement, Lighting	PowerPoint, PowerPoint - YouTube Resource, PowerPoint audio, PowerPoint audio, Interactive quiz	1	0	0
CHAPTER 3 - Road Safety Inspection							
1A	Lecture	3	Two lane rural/single carriageways (A)	PowerPoint, PowerPoint, PowerPoint, PowerPoint, Interactive quiz, Discussion with group	1	1	0
1B	Lecture	1	Two lane rural/single carriageways (A)	PowerPoint, PowerPoint, Interactive quiz	1	1	1
2A	Lecture	2	Motorways/dual carriageways (A)	PowerPoint, PowerPoint, Interactive quiz, PowerPoint, Discussion with group	1	1	0

No.	Types of classes	Hour	Short Name	Resource Type	Student	Targetet inspector	Periodical inspector
2B	Lecture	1	Motorways/dual carriageways (B)	PowerPoint, PowerPoint, Interactive quiz	1	1	1
3A	Lecture	2	Interchanges (A)	PowerPoint, PowerPoint, Interactive quiz, PowerPoint, PowerPoint audio, Interactive quiz, PowerPoint - YouTube Resource, PowerPoint - YouTube Resource, PowerPoint - YouTube Resource, Discussion with group	1	1	0
3B	Lecture	1	Interchanges (B)	PowerPoint, PowerPoint, PowerPoint audio, Interactive quiz,	1	1	1
4A	Lecture	2	Intersections/Roundabouts (A)	PowerPoint, PowerPoint, Interactive quiz, PowerPoint, Interactive quiz, Discussion with group	1	1	0

No.	Types of classes	Hour	Short Name	Resource Type	Student	Targetet inspector	Periodical inspector
4B	Lecture	1	Intersections/Roundabouts (B)	PowerPoint, PowerPoint, Interactive quiz	1	1	1
CHAPTER 4 - The inspection process							
1A	Field activities	3	Two lane rural/single carriageway (A)	Students' own work in the field (Video recording, checklist)	1	1	0
1B	Field activities	2	Two lane rural/single carriageways (B)	Students' own work in the field (Video recording, checklist)	1	1	1
2A	Practical	2	Two lane rural/single carriageways (A)	Student PDF report, presentation	1	1	0
2B	Practical	1	Two lane rural/single carriageway (B)	Student PDF report, presentation	1	1	1
3A	Field activities	3	Motorways/dual carriageways (A)	Students' own work in the field (Video recording, checklist)	0	1	0
3B	Field activities	2	Motorways/dual carriageways (B)	Students' own work in the field (Video recording, checklist)	0	1	1

No.	Types of classes	Hour	Short Name	Resource Type	Student	Targetet inspector	Periodical inspector
4A	Practical	2	Motorways/dual carriageways (A)	Student PDF report, presentation	0	1	0
4B	Practical	1	Motorways/ dual carriageways (B)	Student PDF report, presentation	0	1	1
5A	Field activities	2	Interchanges (A)	Students' own work in the field (Video recording, checklist)	1	1	0
5B	Field activities	2	Interchanges (B)	Students' own work in the field (Video recording, checklist)	0	1	1
6A	Practical	2	Interchanges (A)	Student PDF report, presentation	1	1	0
6B	Practical	1	Interchanges (B)	Student PDF report, presentation	0	1	1
7A	Field activities	3	Intersections/Roundabouts (A)	Students' own work in the field (Video recording, checklist)	1	1	0
7B	Field activities	2	Intersections/Roundabouts (B)	Students' own work in the field (Video recording, checklist)	1	1	1

No.	Types of classes	Hour	Short Name	Resource Type	Student	Targetet inspector	Periodical inspector
8A	Practical	2	Intersections/Roundabouts (A)	Student PDF report, presentation	1	1	0
8B	Practical	1	Intersections/Roundabouts (B)	Student PDF report, presentation	1	1	1
9	Lecture	4	Discussion of Practical activities	Webinar, Q&A, PowerPoint - student presentation (Final discussion with the teacher all groups together)	1	1	1
CHAPTER 5 - Final discussion							
1	Lecture	2	Final discussion and evaluation	Webinar, Q&A, PowerPoint - student presentation (Final discussion with the teacher all groups together)	1	1	