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Connecta

Technical Assistance to Connectivity in the Western Balkans

Preparation of Road Safety Inspection and Audit
Plans for the Core/Comprehensive Road Network
in Western Balkans and Pilot them

Preparation of Road Safety Inspection and Audit Plans for the Core/Comprehensive Road Network in Western Balkans and Pilot them

Objectives - Scope of Works:

- Component 1: Road Safety Inspections (RSI)
- Component 2: Road Safety Audit (RSA)
- Component 3: Road Map for establishing system for continuous road crash data collection

TA to Connectivity in the Western Balkans

EuropeAid/137850/IH/SER/MULTI

Sub-Project

Code: *CONNECTA-TRA-CRM-REG-01*

Area: *Connectivity Transport Reform Measures*

Preparation of Road Safety Inspection and Audit Plans for core/comprehensive road network in Western Balkans (WB6) and Pilots

FINAL REPORT
(Consolidated)

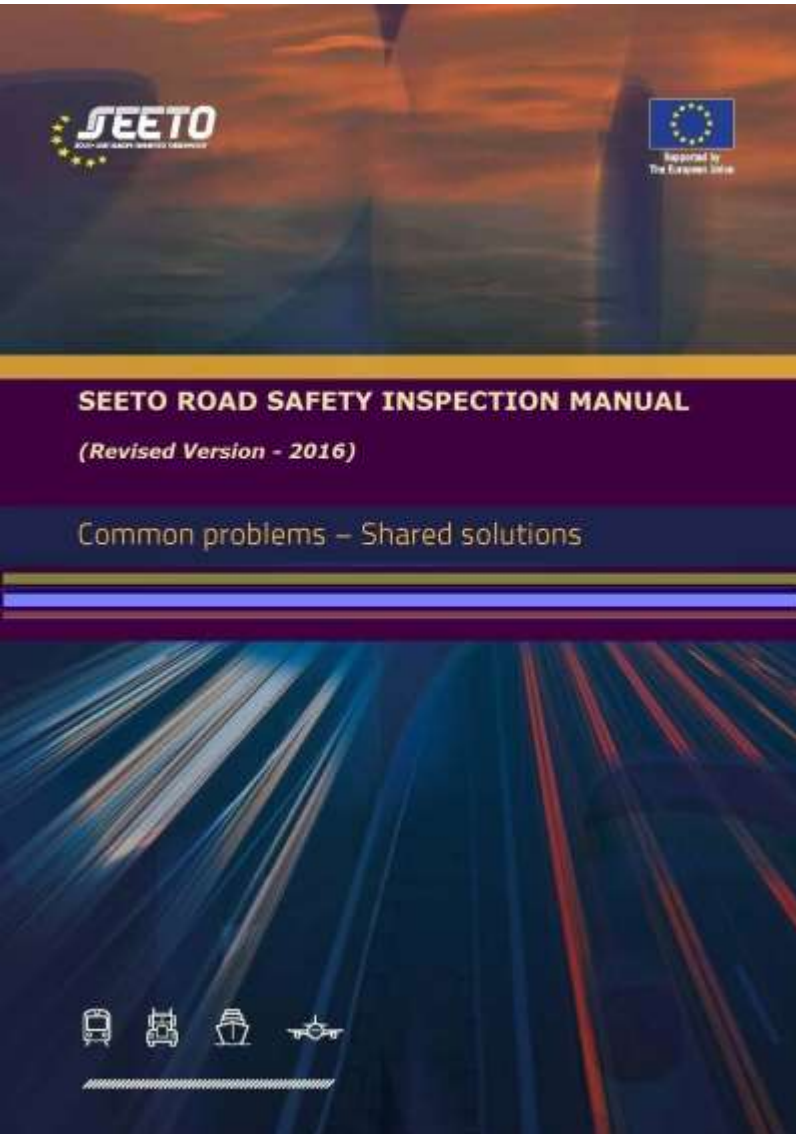
30 July 2018





COMPONENT 1: ROAD SAFETY INSPECTION

Road Safety Inspection activities



- Map existing core and comprehensive road network in Western Balkans
- Compile a list of all Road Safety Inspections that have been implemented during the last 3 years (2014-2016)
 - Including those done by EuroRAP/iRAP inspection methodology
- Prepare a three-year Plan (2018-2020) for road safety inspection for the core and comprehensive road network
- Undertake pilot road safety inspections on the core and comprehensive road network:
 - On 10% (approx. 550 km (actually 580 km were carried out))
 - On those considered highest risk portion of the network based on fatal crash data
 - Using SEETO's road safety inspection guidelines.

Existing core and comprehensive road network in Western Balkans

SEETO comprehensive and core network: 5,462 km:

- Core road network: 3,522 km
- Comprehensive road network: 1,940 km
- Corridors: 2,198 km
- Routes: 3,264 km.



Three-year Plan (2018-2020) for road safety inspection for the core and comprehensive road network

- Road network that has not been inspected during the last three years:
 - Prepare iRAP maps, according to the star rating methodology
 - Perform detailed road safety inspections for the road sections that have the worst performance according to the iRAP star rating methodology
 - Perform RSI for 20% of the Regional Participant's core and comprehensive road network annually
 - within 5 years the whole network will have been inspected
 - If funds are short, do iRAP and the RSI will focus only on worse performing road sections.

Three-year Plan (2018-2020) for road safety inspection for the core and comprehensive road network

Cost estimates

- Risk Map: total cost is between 20€ and 30€ per km
 - The total cost incorporates associated costs (i.e. QA, mapping according to standards, etc.)
- iRAP: total cost is between 100€ and 120€ per km
 - The total cost incorporates associated costs (i.e. iRAP system, labour, reporting, etc.).
- Road safety inspection: The total cost is between 300€ to 350€ per km
 - The total cost incorporates associated costs (i.e. equipment, labour, per diems, reporting, etc.)
- The above indicative cost ranges are based on the assumption that inspections are to be conducted by private consultants and with a team of international and local experts.

Three-year Plan (2018-2020) for road safety inspection for complementing inspections on core and comprehensive SEETO road network

		Year 1	Year 2	Year 3	Year 4	Total
Albania	EuroRAP	21,500				21,500
	iRAP					0
	'traditional' RSI	33,000	33,000	34,000		100,000
Bosnia and Herzegovina	EuroRAP	26,500				26,500
	iRAP	99,000				99,000
	'traditional' RSI		135,000	100,000	58,000	293,000
Macedonia	EuroRAP	9,000				9,000
	iRAP					0
	'traditional' RSI	34,000	35,000	35,000		104,000
Kosovo	EuroRAP	21,000				21,000
	iRAP					0
	'traditional' RSI	110,000	85,000	52,000		247,000
Montenegro	EuroRAP	16,000				16,000
	iRAP	64,500				64,500
	'traditional' RSI		95,000	65,000	30,000	190,000
Serbia	EuroRAP	43,500				43,500
	iRAP	160,500				160,500
	'traditional' RSI		210,000	165,000	99,000	474,000
Total	EuroRAP	137,500				137,500
	iRAP	324,000				324,000
	'traditional' RSI	177,000	593,000	451,000	187,000	1,408,000

Pilot road safety inspections

Result

- A total of 580 km Road Safety Inspections carried out in the WB6 Regional Participants
- 24 individual pilot reports prepared.

RSI reporting

	Corridor	Name	Section Start Node	Section End Node
ALB	E762 SH1	Shkoder-Koplik	Road Start Tuzit	Start of By Pass Koplik
ALB	E762	F. Kruje - Lezhe	Overpassing F. Kruje	r/a in Lezha exit
ALB	SH 2	Tirane - Durres	Overpassing Kamez	I/C of By Pass Shkozet
ALB	E 853	Fier - Vlore	I/C to Aulona Road	I/C to rd Sinan Ferhati
BiH	Route 2a	E-661 (M5)	Jajce Jug	Donji Vakuf
BiH	Corridor Vc	E-73 (M 17)	Karuše	Ozimica
BiH	Corridor Vc	E-73 (M 17)	Ozimica	Topčić Polje
BiH	Corridor Vc	E-73 (M 17)	Jablanica	Potoci
MKD	A3		Bitola	Prilep
MKD	A2		Stracin	Kriva Palanka
MKD	R-106		Prilep	Drenovo
MKD	R-106		Drenovo	Rosoman
KOS	R6b		Fushe Kosove	Gjurgjice/ R7-R6b I/C
KOS	R6b		Gjurgjice/ R7-R6b I/C	Kijeve
KOS	R6a		Veternik/N-2 N-25.2 I/C	Lipjan/N-2 & N-25 r/a
MNE	Route 4		Podgorica	Mioska
SRB	Route 4	IB22	Orlovaca	Stepojevac
SRB	Route 4	IB22	Stepojevac	Celije
SRB	Route 5	IB23	Vrnjci(Ugljarevo)	Kamidzora
SRB	Route 5	IB22	Preljina	Mrcajevci
SRB	Route 9	IB21	Petrovaradin	Sremska Kamenica
SRB	Corridor X	A1	Bubanj Potok	Mali Pozarevac
SRB	Corridor X	A1	Beograd (Dobanovci)	Bubanj Potok
SRB	Corridor Xb	A1	Feketic	Sirig

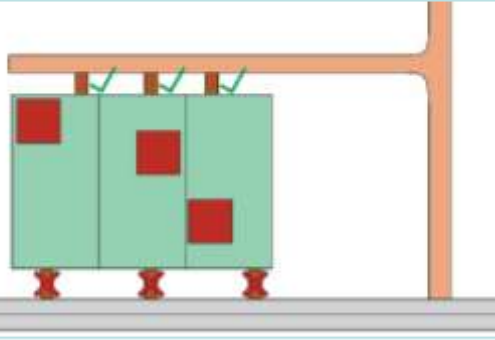
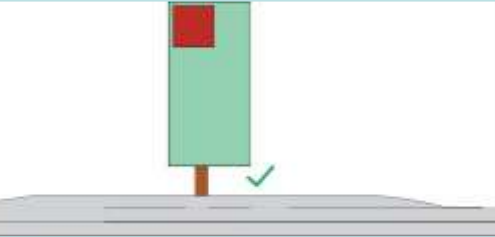
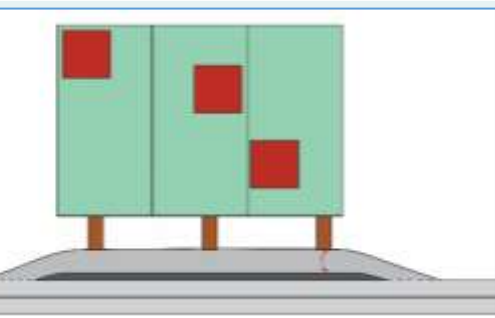
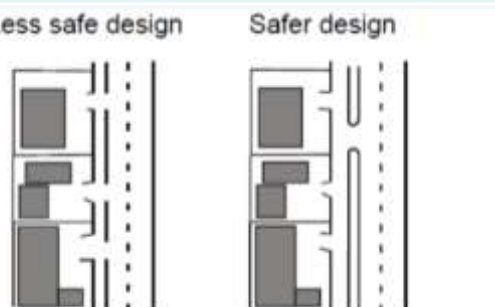
Pilot road safety inspections

Accesses and conflicts

Typical critical deficits

- Both long distance travel and local trips - speed conflicts and demand for overtaking
- Many accesses (houses and commercial businesses next to the road)
- Unpaved areas near the road which have unregulated / unchanneled exits and entries to the main carriageway

Examples of measures/recommendations

	<p><i>Close accesses and redirect vehicles to regular intersection</i></p>
	<p><i>Rearrange the accesses</i></p>
	<p><i>Merge and/or construction of a traffic island</i></p>
<p>Less safe design Safer design</p> 	<p><i>Merge and provide one access to main road</i></p>

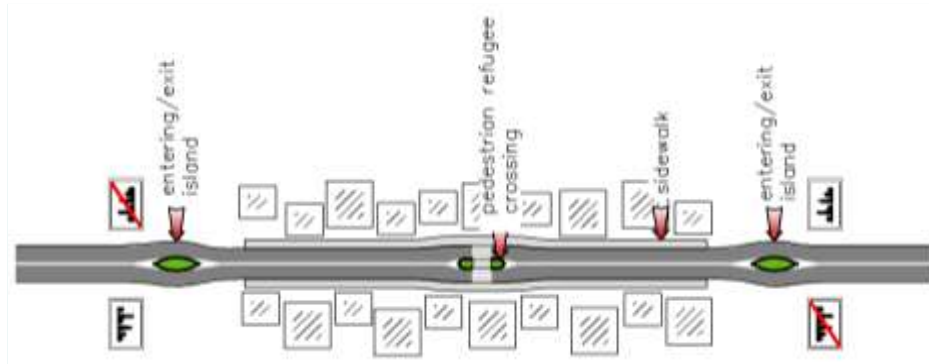
Pilot road safety inspections

Build up areas

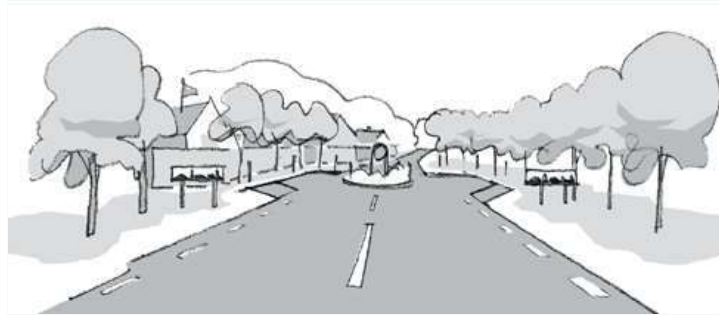
Typical critical deficits

- Conflicts between vehicles and pedestrians
- The absence of adequate pedestrian facilities at urban segments, near bus stops, etc.
- Parked vehicles (legal or illegal) in the settlements
- Inadequate pedestrian facilities on urban subsections, near bus stops, near houses and commercial plots
- Insufficient space and inappropriate design of bus stops, with missing information signs in advance
- Street lighting not adequate in some villages, at schools and bus stops.

Examples of measures/recommendations



Gates and speed management, refugees, sidewalks in build-up areas



Example of gate - entering/exiting island to/from built-up areas



Example of lighting at pedestrian crossing which makes it possible to see the pedestrian



Example of safe bus stop – should also include safe facilities for crossing pedestrians

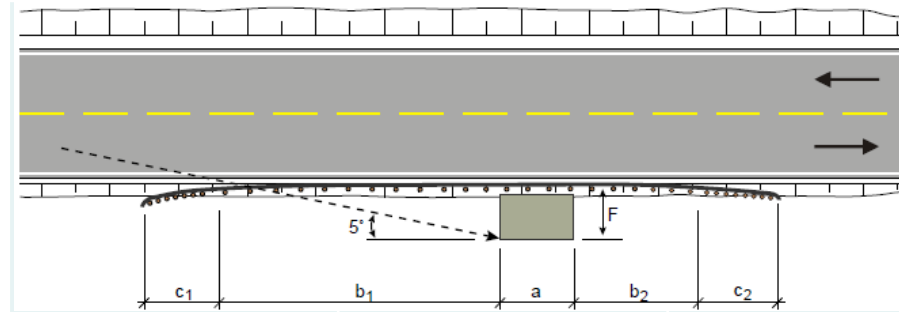
Pilot road safety inspections

Sharp curves and lack of safety zone

Typical critical deficits

- Damaged, not maintained or not safe guardrails with unsafe ends, gaps and unsafe connections
- Road safety barriers are missing
- Guardrails installed to protect culverts or hard objects near the road with inadequate length
- Unsafe barrier ends (terminals)
- Legal and illegal advertising signs (billboards), placed in the safety zone of the road, taking driver's attention away
- Sharp curves without chevron signs to inform and advice drivers.

Examples of measures/recommendations



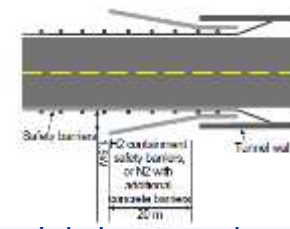
Required length of guardrail, relevant to the object to be protected



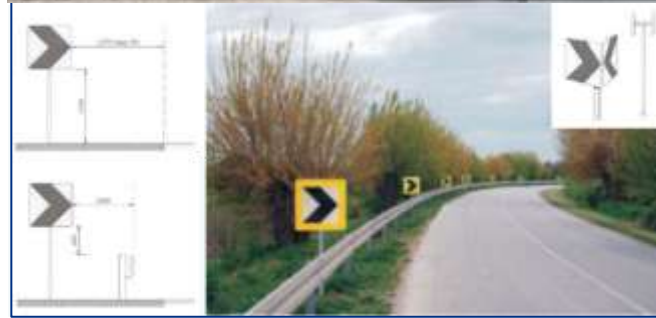
Example of energy absorbing terminals



Example of location of safety barriers at tunnel portals



Example of transition between concrete barrier and guardrail



Installation of chevrons in curves

WHAT'S NEXT: Way forward after RSI completion

Black spots management - improvement

- ❑ Listing of identified black spots (sections or individual road elements) from RSI (or other black spot related studies) to be improved in order to increase safety levels
- ❑ Prioritization of needed road sections interventions and implementation plan
- ❑ Coordination among all involved authorities/stakeholders and action plan
- ❑ Preparation of necessary designs based on RSI recommendations and detailed site inspections
- ❑ Securing required budget for implementation
- ❑ Tendering and implementation (works-supplies)

CONNECTA potential TA

Designs for improving safety conditions (black spots) along high risk road sections (indicative TEN-T extensions)

- 10 sections in (in all RPs)
- 305km total length
- Out of 580km RSI pilots
- Basis the RSI recommendations

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Area: Connectivity Transport Reform Measures

Preparation of Road Safety Inspection and Audit plans/comprehensive road network in Western B and Pilots

Stage Two Road
Gjiroka

Stage One Road Safety Audit - Recon
section one: Jajce J

Technical Assistance to connectivity in I
EuropeAid



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TA to Connectivity in the Western Balkan
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Sub-Project

Code: CONNECTA-TRA-CRM-REG-01
Area: Connectivity Transport Reform Measures

Section 3: Leg

Preparation of Road Safety Inspection and Audit
plans/comprehensive road network in Western I
and Pilots

Technical Assistance to connectivity

EuropeAid

First draft Stage Two Road Safety Au
section Lumadh I

Stage Two Montenegro I

Reconstr



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Stage 2 Road Safety Audit - Two
Lenjaska and Boh

Preparation of Road Safety Inspection and Audit Plans for
comprehensive road network in Western Balkans (WB)
and Pilots

Technical Assistance to connectivity in

EuropeAid/Stage One Road Safety Audit
BO Na-Platock, Serbia

20 November 2017



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COMPONENT 2: ROAD SAFETY AUDIT

Road Safety Audit activities

- Compile a list of all expected rehabilitation and new construction road projects on the core and comprehensive road network that are currently at the concept or preliminary design stage.
- Prepare a plan to undertake road safety audits, at various stages as per the Directive 2008/96/EC and SEETO's Road Safety Audit Handbook (COWI, 2014) for the list of projects prepared. Such plan should include:
 - The Audit stages that are required
 - The required Auditors inputs
 - Indicative costs to audit these projects by consulting firms
- Undertake Road Safety Audits for a sample of 6 projects (one in every SEETO member).

Road Safety Audit Plan for identified projects

Three Year Plan

Plan for road safety audits, including

- Audit stages required for each project
- Required Auditors inputs and indicative costs
- According to Directive 2008/96/EC and SEETO's Road Safety Audit Guidelines
- Roads in the plan are on the core and comprehensive network
- If they become TEN-T then RSA is mandatory according to EU Directive 2008/96/EC
- RSA should be done on both upgrading projects and new projects.

RSA for projects in preparation

Period 2018/2019 – 2020/2021

Yearly allocation of resources by Regional Participant

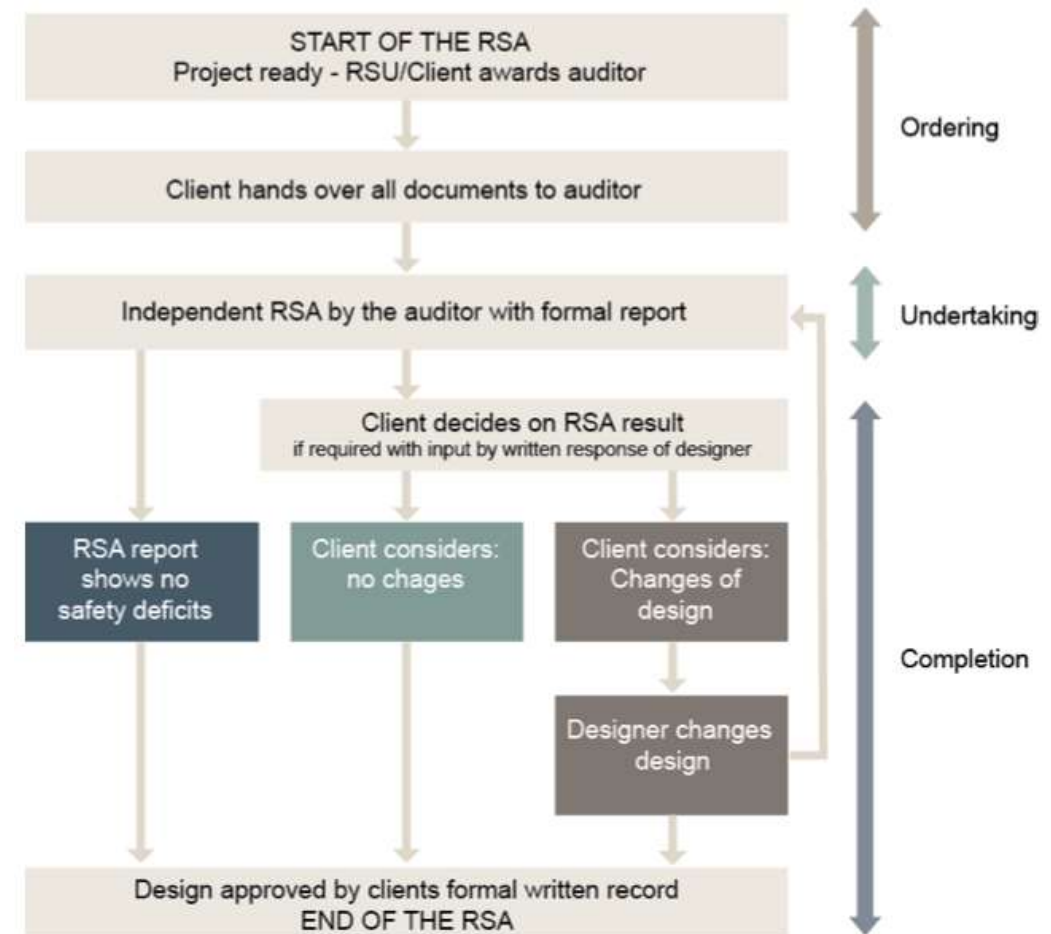
	Year 1 2018	Year 2 2019	Year 3 2020	Year 4 2021	Total
Albania	300,000	-	-	450,000	750,000
Bosnia and Herzegovina	144,000	18,000	-	-	162,000
The former Yugoslav Republic of Macedonia	27,000	9,000	-	-	36,000
Kosovo	33,000	9,000	18,000	18,000	78,000
Montenegro	332,400	256,200	90,000	18,000	696,600
Serbia	291,000	180,000	-	-	471,000
Total	1,127,400	472,200	108,000	486,000	2,193,600

Pilot Road Safety Audits

Format for Missions to WB6 Countries

Day and Timing	Purpose of the Meeting	Attendees
Day One AM	<ul style="list-style-type: none"> • Introductions of all Parties. • Audit Team Presentation on Project and Audit Process and format for rest of mission • Design Team to introduce the Project and hand over design information to Audit Team in hard and soft copy formats 	<ul style="list-style-type: none"> • Audit Team • Road Authorities • Designer • Any other Stakeholders
Day One PM	<ul style="list-style-type: none"> • Audit Team to study submitted design information (with nominated attendees from road authority if requested) to identify points of interest for site visit on Day Two 	
Day Two All day if required	<ul style="list-style-type: none"> • Site Visit to road project (high visibility jackets to worn by all parties) • Audit Team to identify, discuss, clarify and any road safety problems with the design 	<ul style="list-style-type: none"> • Audit Team • Road Authority • Design Team (not essential) • Any other interested parties
Day Three PM	<ul style="list-style-type: none"> • Audit Team to present findings of the Audit and discuss with all parties • Opportunity to agree on Audit findings and recommendations and discuss practical implementation of any proposed design changes 	<ul style="list-style-type: none"> • Audit Team • Road Authority • Design Team • Any other interested parties

Typical road safety audit workflow



Pilot Road Safety Audits

Main issues identified:

- Crash barrier design
- Bridge parapet design and interface with crash barrier
- Junction and interchange layouts/geometry outdated and not in line with good practice
- Road Alignment
- Accesses
- Signing design and location
- Tunnel Design.

RSA Pilot Projects

Participant	Proposed Project	Design Stage
Albania	SH4-O Gjirokastra By-Pass	Detailed
Bosnia and Herzegovina	M5 Jajce - Donji Vakuf TBC (Federation)	Preliminary
The former Yugoslav Republic of Macedonia	A1 Lenishka – Belovodica	Detailed
Kosovo	R6a Lumadh to Smrekonice	Preliminary
Montenegro	M-2 Kolašin Crkvine - Mojkovac	Preliminary/Detailed
Serbia	NIŠ-Pločnik	Preliminary



COMPONENT 3 – ROAD MAP FOR ESTABLISHING A NATIONAL SYSTEM FOR CONTINUOUS ROAD CRASH DATA COLLECTION

Activities on Road Map for establishing system for continuous road crash data collection

- Assess current road crash data collection-analysis systems
- Set up a concept for a common system in WB6 based on EU practice
- Prepare road map for establishing national system for continuous road crash data collection and analysis.

Purpose:

- Provide SEETO with the findings of the review and recommendations for Road Map for establishing system for continuous road crash data collection.

Main elements and components of the crash data system

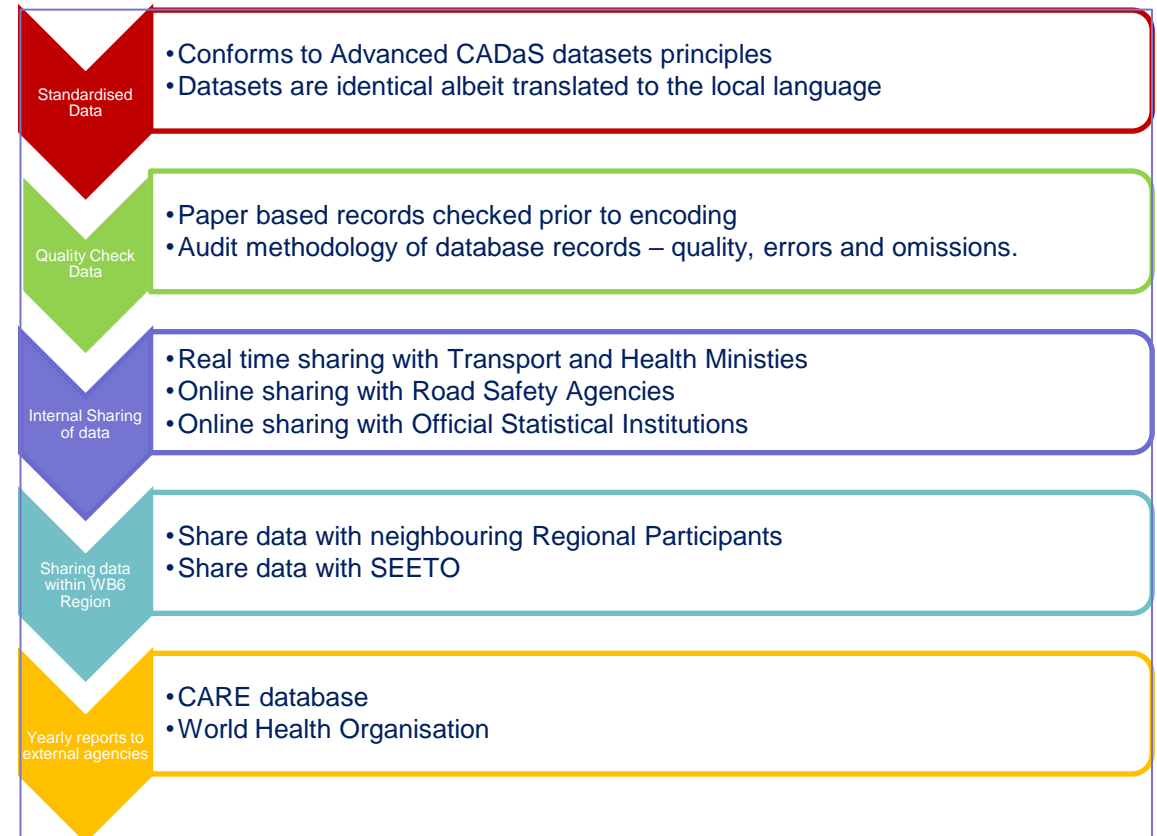
- Data collection fundamentals
 - Reporting Form
 - Reporting levels of incidents
 - Quality of data collection
 - Links to other data sources
- Data Capture factors
 - Paper based collection
 - Manual data entry
 - Electronic collection direct into database (on mobile devices)
- Data sharing/dissemination
 - Availability of data to all stakeholders
- Analysis for management functions
 - Summary reports
 - Crash information management
 - Safe Systems Analysis
 - Road safety analysis
- Evaluation and statistical analysis functions.

Concept for a common system in WB6 based on EU practice

Concept

- Data collection
- Data linking and sharing
- Data Analysis

Road Map





CONNECTA Project team

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