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
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

| Country         | EuroRAP Year 1 | iRAP Year 1 | EuroRAP Year 2 | iRAP Year 2 | EuroRAP Year 3 | iRAP Year 3 | 'traditional' RSI Year 1 | EuroRAP Year 4 | iRAP Year 4 | Total Year 1 | Total Year 2 | Total Year 3 | Total Year 4 | Total | |
|----------------|----------------|-------------|----------------|-------------|----------------|-------------|--------------------------|----------------|-------------|---------------|---------------|---------------|---------------|-----------|
| Albania        | 21,500         | 0           | 21,500         | 0           | 33,000         | 0           | 100,000                  | 26,500         | 99,000      | 9,000         | 0             | 0             | 0             | 21,500   |
| Bosnia and Herzegovina | 26,500 | 99,000 | 33,000 | 135,000 | 100,000 | 58,000 | 293,000 |
| Macedonia      | 9,000          | 0           | 9,000          | 0           | 34,000         | 0           | 104,000                  | 21,000         | 9,000       | 9,000         | 0             | 0             | 0             | 104,000  |
| Kosovo         | 21,000         | 0           | 21,000         | 0           | 34,000         | 0           | 104,000                  | 21,000         | 9,000       | 9,000         | 0             | 0             | 0             | 104,000  |
| Montenegro     | 16,000         | 64,500      | 16,000         | 64,500      | 34,000         | 0           | 104,000                  | 21,000         | 9,000       | 9,000         | 0             | 0             | 0             | 104,000  |
| Serbia         | 43,500         | 160,500     | 43,500         | 160,500     | 95,000         | 0           | 104,000                  | 21,000         | 9,000       | 9,000         | 0             | 0             | 0             | 104,000  |
| Total          | 137,500        | 324,000     | 137,500        | 324,000     | 337,000        | 0           | 1,408,000                | 266,000        | 99,000      | 99,000        | 0             | 0             | 0             | 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.

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Name</th>
<th>Section Start Node</th>
<th>Section End Node</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALB</td>
<td>E762 SH1</td>
<td>Shkoder-Koplik</td>
<td>Road Start Tuzit</td>
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<td></td>
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<td></td>
<td>Start of By Pass Koplik</td>
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<tr>
<td>ALB</td>
<td>E762</td>
<td>F. Kruje - Lezhe</td>
<td>Overpassing F. Kruje</td>
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<td></td>
<td></td>
<td></td>
<td>r/a in Lezha exit</td>
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<tr>
<td>ALB</td>
<td>SH 2</td>
<td>Tirane - Durres</td>
<td>Overpassing Kamez</td>
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<td></td>
<td></td>
<td></td>
<td>I/C of By Pass Shkozet</td>
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<tr>
<td>ALB</td>
<td>E 853</td>
<td>Fier - Vlore</td>
<td>I/C to Aulona Road</td>
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<td>I/C to rd Sinan Ferhati</td>
</tr>
<tr>
<td>BiH</td>
<td>Route 2a</td>
<td>E-661 (M5)</td>
<td>Jajce Jug</td>
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<tr>
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<td>Donji Vakuf</td>
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<tr>
<td>BiH</td>
<td>Corridor Vc</td>
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<td>E-73 (M 17)</td>
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<td>Bitola</td>
<td>Prilep</td>
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<td>A2</td>
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<td>Kriva Palanka</td>
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<td>Prilep</td>
<td>Drenovo</td>
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<tr>
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<td>R-106</td>
<td>Drenovo</td>
<td>Rosoman</td>
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<tr>
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<td>R6b</td>
<td>Fushe Kosove</td>
<td>Gjurgjice/ R7-R6b I/C</td>
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<tr>
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<td>R6b</td>
<td>Gjurgjice/ R7-R6b I/C</td>
<td>Kijeve</td>
</tr>
<tr>
<td>KOS</td>
<td>R6a</td>
<td>Vernetik/N-2 N-25.2 I/C</td>
<td>Lipjan/N-2 &amp; N-25 r/a</td>
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<tr>
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<td>Route 4</td>
<td>Podgorica</td>
<td>Mioska</td>
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<tr>
<td>SRB</td>
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<td>IB22</td>
<td>Orlovaca</td>
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<td></td>
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<td>Stepojevac</td>
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<tr>
<td>SRB</td>
<td>Route 4</td>
<td>IB22</td>
<td>Stepojevac</td>
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<td></td>
<td>Celije</td>
</tr>
<tr>
<td>SRB</td>
<td>Route 5</td>
<td>IB23</td>
<td>Vrnjici(Ugljarevo)</td>
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<tr>
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<td></td>
<td>Kamidzora</td>
</tr>
<tr>
<td>SRB</td>
<td>Route 5</td>
<td>IB22</td>
<td>Preljina</td>
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<td>Mrcajevci</td>
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<tr>
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<td>Petrovaradin</td>
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<td>Sremska Kamenica</td>
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<tr>
<td>SRB</td>
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<td>Bubanj Potok</td>
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<td></td>
<td></td>
<td></td>
<td>Mali Pozarevac</td>
</tr>
<tr>
<td>SRB</td>
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<td>A1</td>
<td>Beograd (Dobanovci)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Bubanj Potok</td>
</tr>
<tr>
<td>SRB</td>
<td>Corridor Xb</td>
<td>A1</td>
<td>Feketic</td>
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</tbody>
</table>
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

- Close accesses and redirect vehicles to regular intersection

- Rearrange the accesses

- Merge and/or construction of a traffic island

- Merge and provide one access to main road
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

<table>
<thead>
<tr>
<th>Required length of guardrail, relevant to the object to be protected</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Example of energy absorbing terminals</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Example of location of safety barriers at tunnel portals</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Example of transition between concrete barrier and guardrail</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Installation of chevrons in curves</th>
</tr>
</thead>
</table>
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
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

<table>
<thead>
<tr>
<th>Region</th>
<th>Year 1 2018</th>
<th>Year 2 2019</th>
<th>Year 3 2020</th>
<th>Year 4 2021</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>300,000</td>
<td>-</td>
<td>-</td>
<td>450,000</td>
<td>750,000</td>
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<td>Bosnia and Herzegovina</td>
<td>144,000</td>
<td>18,000</td>
<td>-</td>
<td>-</td>
<td>162,000</td>
</tr>
<tr>
<td>The former Yugoslav Republic of Macedonia</td>
<td>27,000</td>
<td>9,000</td>
<td>-</td>
<td>-</td>
<td>36,000</td>
</tr>
<tr>
<td>Kosovo</td>
<td>33,000</td>
<td>9,000</td>
<td>18,000</td>
<td>18,000</td>
<td>78,000</td>
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<td>Montenegro</td>
<td>332,400</td>
<td>256,200</td>
<td>90,000</td>
<td>18,000</td>
<td>696,600</td>
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<tr>
<td>Serbia</td>
<td>291,000</td>
<td>180,000</td>
<td>-</td>
<td>-</td>
<td>471,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,127,400</strong></td>
<td><strong>472,200</strong></td>
<td><strong>108,000</strong></td>
<td><strong>486,000</strong></td>
<td><strong>2,193,600</strong></td>
</tr>
</tbody>
</table>
# Pilot Road Safety Audits

## Format for Missions to WB6 Countries

<table>
<thead>
<tr>
<th>Day and Timing</th>
<th>Purpose of the Meeting</th>
<th>Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day One</td>
<td></td>
<td></td>
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</tbody>
</table>
| AM             | • 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 | • Audit Team  
• Road Authorities  
• Designer  
• Any other Stakeholders |
| PM             | • 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 | • 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 | • Audit Team  
• Road Authority  
• Design Team (not essential)  
• Any other interested parties |
| Day Three      |                                                                                       |                                                                           |
| PM             | • 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 | • Audit Team  
• Road Authority  
• Design Team  
• Any other interested parties |

## Typical road safety audit workflow

1. **START OF THE RSA**  
   - Project ready - RSU/Client awards auditor

2. **Client hands over all documents to auditor**

3. **Independent RSA by the auditor with formal report**

4. **Client decides on RSA result**
   - If required with input by written response of designer

5. **RSA report shows no safety deficits**  
   - Client considers: no changes
   - Designer changes design

6. **Client considers: Changes of design**

7. **Design approved by clients formal written record**  
   - END OF THE RSA

8. **Completion**

9. **Ordering**

10. **Undertaking**

11. **Start of the RSA**
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

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

Standardised Data
- Conforms to Advanced CADaS datasets principles
- Datasets are identical albeit translated to the local language

Quality Check Data
- Paper based records checked prior to encoding
- Audit methodology of database records – quality, errors and omissions.

Internal Sharing of data
- Real time sharing with Transport and Health Ministries
- Online sharing with Road Safety Agencies
- Online sharing with Official Statistical Institutions

Sharing data within WB6 Region
- Share data with neighbouring Regional Participants
- Share data with SEETO

Yearly reports to external agencies
- CARE database
- World Health Organisation
CONNECTA Project team

Mr Chris Germanacos, Team Leader; Transport Expert (chris.germanacos@connecta-ta.eu)
Mr. Kostas Georgiou, Transport Key Expert, Deputy Team Leader (kostas.georgiou@connecta-ta.eu)
Mr. Jesper Mertner, Project Manager – road safety component (jesper.mertner@connecta-ta.eu)