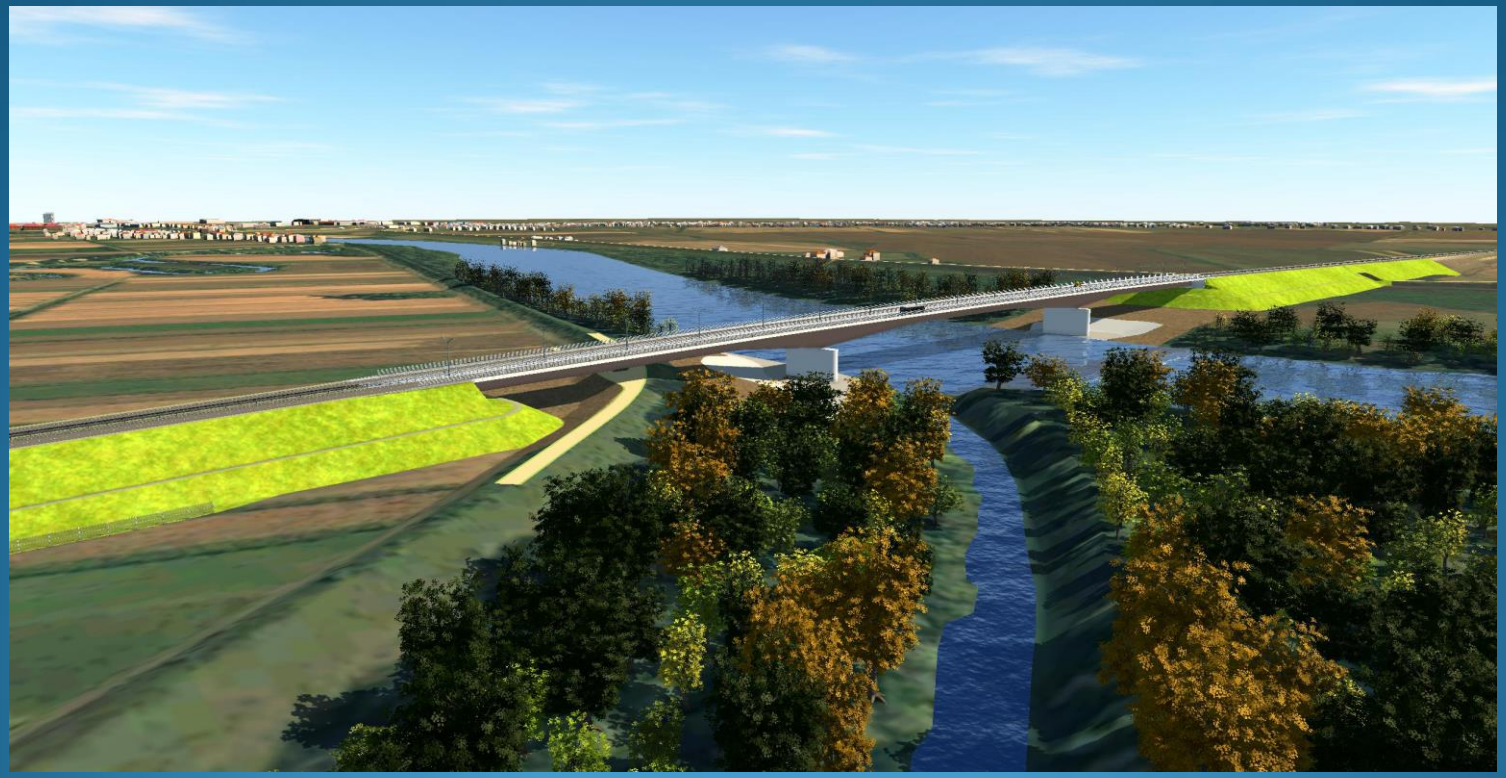
CLIMATE CHANGES AND ROAD PROJECTS

CASE STUDY: Gradiška Bridge Cross-border Project



JASPERS Networking Platform

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PROJECT INTRODUCTION

Connecting link E-661 (Balaton - Virovitica - Okučani - Banja Luka – Split) is one of the transversal transport links between Central Europe and the Adriatic.

BASIC INFORMATION ABOUT PROJECT

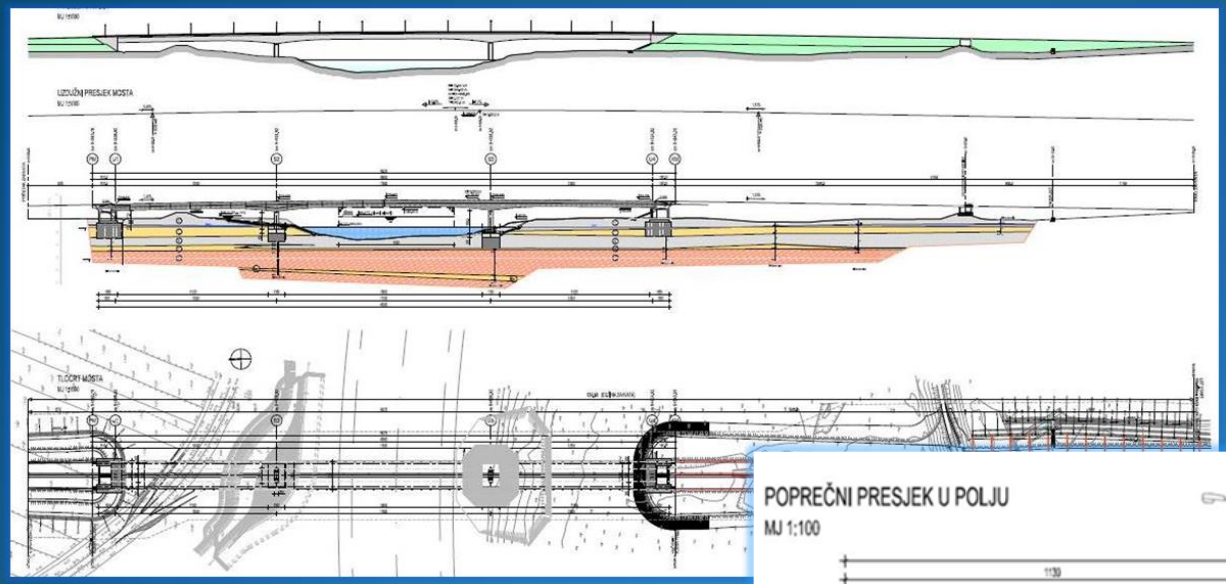
The project consists of the construction of the new fast road L = 8.065,00 m (two roadways , 2 x 3.50 m) and a bridge across the Sava River (border Republic of Croatia- Bosnia and Herzegovina).

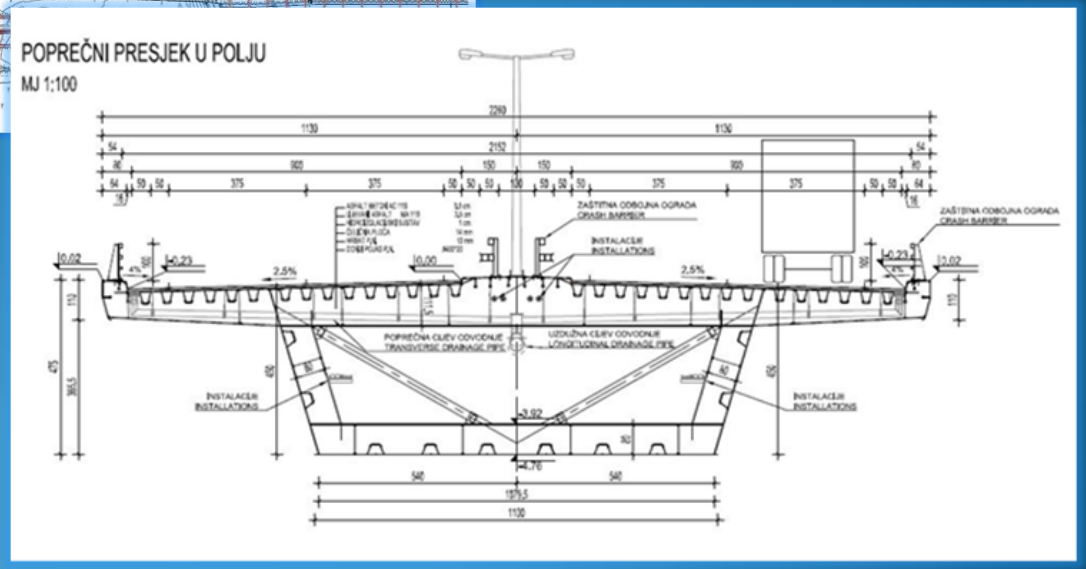
The total length of the bridge is approx. L = 463.00 m

Section total lenght (road and bridge) is 8.528,00 m).

The bridge is a joint investment of the Republic of Croatia and the Republic of Bosnia and Herzegovina and represents one of the stages of the overall project.

BASIC INFORMATION ABOUT THE BRIDGE





The type of a construction is a steel chassis carrier over three spans, 463.00 m lenght and 22,60 m wide.

PROJECT IMPLEMENTATION GOALS

- Connecting the gravitating area to the TEN T network
- Improved accessibility as a support to regional development
- Increased traffic safety and mobility
- Improving connection with Bosnia and Herzegovina.

PROJECT OBJECTIVES

The objective of the project is to promote environmental and social benefits by applying the EU and the Republic of Croatia policies and strategies:

- Transport Development Strategy of the Republic of Croatia (2014-2030),

Measures for achieving multimodal objectives in road traffic; measure Ro.1. Cross-border bridge near Gradiska.

- Operational Programme Competitiveness and Cohesion 2014 - 2020 - Investment Priorities: 7 Connectivity and Mobility / 7a – Supporting a multimodal Single European Transport Area by investing in the TEN-T

METHODOLOGY FOR EVALUATION OF THE CLIMATE CHANGE IMPACT ON THE PROJECT

The potential effects of climate change on the project were evaluated in line with the methodology presented in the:

"Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient".

The key aim of the evaluation of climate change effects is to determine the sensitivity of project to relevant climate-related hazards, identify exposure of the project to current and future hazards in a particular location(s), and identify and prioritise key risks using further modules:

- Identify climate sensitivity of the project
- Evaluate exposure of the project
- Assess vulnerability
- Assess risk
- Integration of adaptation measures and residual risk.

METHODOLOGY FOR EVALUATION OF THE CLIMATE CHANGE IMPACT ON THE PROJECT

The sensitivity of the project has been determined in relation to a range of climate variables and secondary effects / climate-related hazards primary and secondary climate related hazards.

The sensitivity of the project options to key climate variables and hazards has been systematically assessed through the four key themes:

- On-site assets and processes
- Inputs (water, energy, others)
- Outputs (products, markets, user demand)
- Transport links

Risk assessment and adaptation measures were defined for all effects with high vulnerabilities of the project to climate change/hazard.

Most adaptation measures are integral part of the desing and do not lead to additional costs.

CLIMATE CHANGE ADAPTATION VUNERABILITY

The resilience of the project, separate for road and bridge, is assessed under a staged matrix analysis:

- firstly, examining sensitivity and vulnerability
- secondly, examining probability and impact of primary and secondary climate change related events.

High vulnerability is identified for:

- Increase of extreme temperatures
- Change in extreme rainfall
- Change in maximum wind speed
- Storms
- Water availability

RISK ASSESSMENT AND ADAPTATION MEASURES

Risk	Adaptation	Cost
Increase of extreme temperatures		
Deterioration of asphalt layers due to increase of extreme temperatures	Use of appropriate asphalt composition.	Design measure, no additional costs.
Expansion of fixed structures due to extreme temperatures	Design of expansion joints and bearings to allow for increased temperatures	Design measure, no additional costs.
Change in extreme rainfall		
Instability of abutments, fills, road banks and slopes	Detailed route assessment of route and geological conditions and design of appropriate measures by stabilizing and water evacuation.	Design measure, no additional costs. Monitoring/control that protection measures are appropriate.
Insufficient water evacuation / drainage of road surfaces	Design of water evacuation measures taking into account larger rain intensities.	Design above usual standards for drainage. Some additional costs for drainage measures.
Change in maximum wind speed		
Damage to structures, buildings, and road signage	Design to expected wind speeds.	No additional cost.
Impact on traffic safety	Design of wind protection measures where risk for traffic safety can occur. Bridge includes wind screens. Roads are not exposed	Based on occurrence of high windspeeds in the coastal zones wind screens at exposed sites are usual design measures.
Storms		
Water evacuation and drainage (see above)		
Lighting risk for structures, powerlines, communication and signaling	Usual earthing measures according to design norms.	No additional costs
Water availability		
Risk of reduced water availability during dry season or flood.	Project is designed with very limited needs for water supply.	No additional costs.

METHODOLOGY FOR EVALUATION OF THE PROJECT IMPACT TO CLIMATE CHANGE (GREENHOUSE GASES)

- Methodology for evaluation of the projects regarding the GHG production was done according to the *„Methodologies for the Assessment of Project GHG Emissions and Emission Variations"* (EIB, April 2014).

- The calculation of GHG for road traffic is based on the methodology given in *„EMEP/EEA Air Pollutant Emission Inventory Guidebook 2013 (update Sept 2014) ; Category: Exhaust emission from road transport"* and formulas and factors in accordance with the Copert model. This methodology is widely used for calculation of air emissions from the road transport and reporting into the National and European Registers.

METHODOLOGY FOR EVALUATION OF THE PROJECT IMPACT TO CLIMATE CHANGE (GREENHOUSE GASES)

EMEP/EEA provides three methodologies for the calculation of emissions:

- The Tier 1 methodology uses fuel as the activity indicator, in combination with average fuel-specific emission factors.
- The Tier 2 approach considers the fuel used by different vehicle categories and their emission standards.
- In the Tier 3 method exhaust emissions are calculated using a combination of firm technical data (e.g. emission factors) and activity data (e.g. total vehicle km).

The selection of methodology depends on the type of activity and project data (mostly on the traffic model output data).

METHODOLOGY FOR EVALUATION OF THE PROJECT IMPACT TO CLIMATE CHANGE (GREENHOUSE GASES)

GHG emissions were calculated for the total area covered by the traffic model.

Estimation of GHG emissions from the project are given as:

- absolute GHG emissions of the project
- variation in emissions compared to a baseline (without project scenario), referred to as the relative emissions.

Incremental emissions were calculated for the Project scenario and compared with the Without Project scenario.

The intensity of potential climate change events is taken from the Croatian Meteorological Institute and the 6th National Communication to the UN.

CONCLUSIONS

The analysis has shown a number of risks related with climate changes due to potential change in extreme conditions (temperature, wind, rainfall, storms).

By taking into account normal design measures the project includes the required adaptation to the risks.

After taking into operation of the project it is indispensable to monitor, in particular for the road structures that measures regarding water evacuation are at all locations sufficient. It must not be excluded that some additional measures for water evacuation and slope protection might be required.

As designed the project is regarded to be adequately climate resilient.

THANK YOU FOR YOUR ATTENTION!

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More Information

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