REPUBLIC OF CROATIA

MINISTRY OF SEA, TRANSPORT AND INFRASTRUCTURE

Transport Community
3rd meeting of the Technical Committee on Railways

RAIL - ROAD LEVEL CROSSINGS

SAFETY IMPROVEMENT IN CROATIA

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Head of Railway and Intermodal Sector

Belgrade, November 2019

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- Legal base
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Introduction

- Level crossings (LC) are spots where roads (vehicle or pedestrian users) cross railway lines or industrial tracks, i.e. from the aspect of construction, a place of crossing of the carriageway and the running surface of the rail
- Level crossings represent critical point of safety for both road and rail users
- Basic classification of protecting the level crossings is divided between passive and active protection

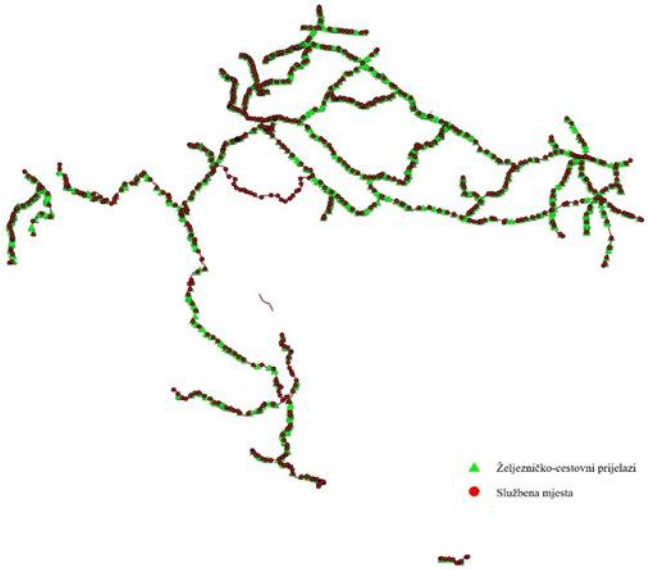
- Passive protected level crossings - equipped with any sign of warning, devices or any other protection equipment that is constant and that does not change depending on any traffic situation
- In the Republic of Croatia level crossings passive protection is considered to be the use of road traffic signs “St. Andrews Cross” and “Stop” together with the regulated visibility triangle

- Active protected level crossing - any type of protection which changes its state according to the approaching train.
- In the Republic of Croatia most common automatic level crossings protection is use of flashing lights and sound traffic signs and use of half-barriers with the sound and flashing lights.
- Protection with full barriers that are controlled manually by dedicated gate keeper.

Level crossings in Croatia

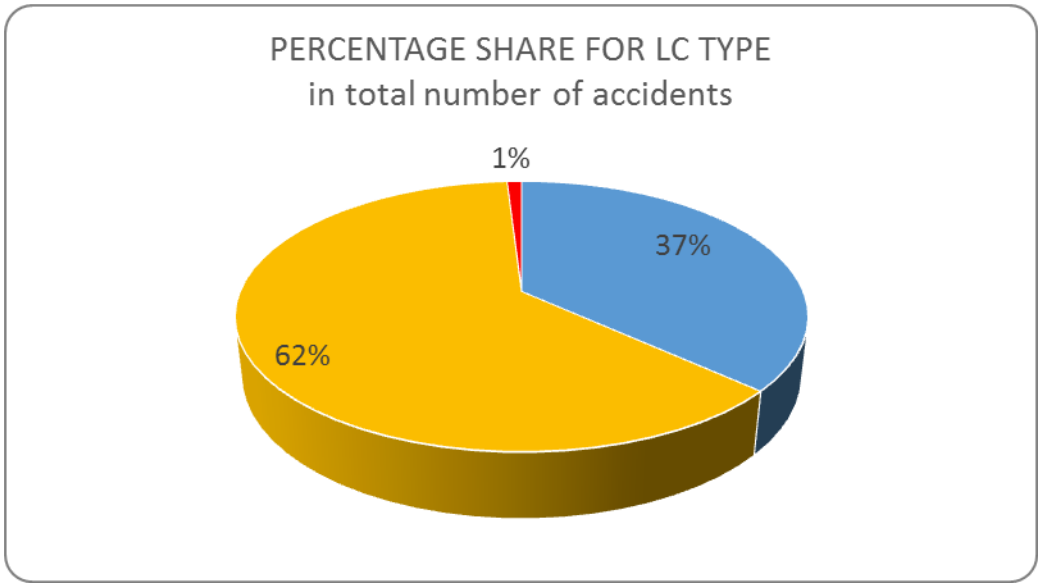
- total length of railway lines in Croatia - 2.605 km,
  - 2.351 km single track lines
  - 254 km double track lines
  - 980 km of electrified lines (977 km with 25kV/50 Hz A.C. system and 3km with 3kV D.C. system)
- 1.520 level crossings
  - 62,76% protected with passive protection systems
  - 37,24% protected with active protection systems

LCs ON THE CROATIAN RAILWAYS



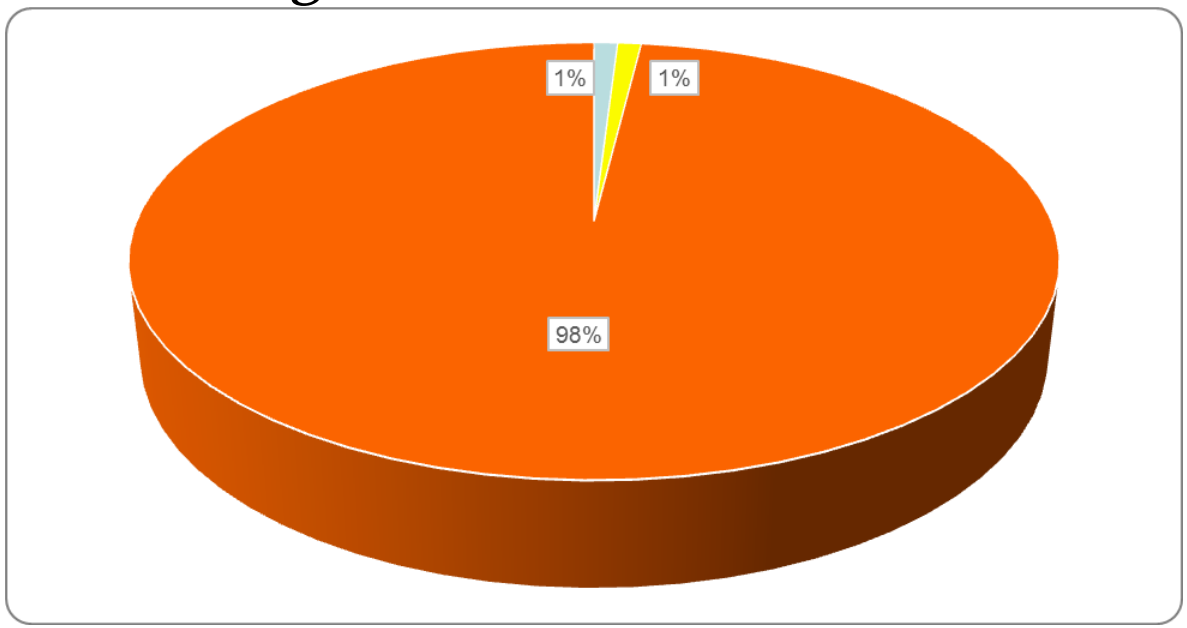
Railway line	Rail road level crossings		Pedestrian level crossings	
	Passive	Active	Passive	Active
International	213	329	32	7
Regional	282	152	15	6
Local	398	68	8	3
Total	893	549	55	16
	1442		71	
	1513			

SERIOUS ACCIDENTS AND ACCIDENTS ON LC-s		2009.	2010.	2011.	2012.	2013.	2014.	2015.	2016.	2017.	2018.	**TOTAL:**
LC	ACTIVE	24	12	21	20	16	12	13	8	14	10	**150**
	PASIVE	47	29	24	25	21	25	16	19	23	26	**255**
	PEDESTRIAN	0	0	1	0	0	1	1	0	0	1	**4**
TOTAL:		71	41	46	45	37	38	30	27	37	37	**409**



Consequences on on incidents on LC		2009.	2010.	2011.	2012.	2013.	2014.	2015.	2016.	2017.	2018.	Total:
Killed	Active LC	9	1	10	3	6	1	6	0	6	6	**48**
	Passive LC	7	6	4	5	5	5	2	2	1	2	**39**
	Pedestrian LC	0	0	1	0	0	1	0	0	0	0	**2**
	Total	16	7	15	8	11	7	8	2	7	8	**89**
Badly injured	Active LC	6	5	4	9	7	0	7	2	2	1	**43**
	Passive LC	12	4	4	6	5	6	4	3	3	4	**51**
	Pedestrian LC	0	0	0	0	0	0	0	0	0	0	**0**
	Total	18	9	8	15	12	6	11	5	5	5	**94**
Slightly injured	Active LC	2	2	4	5	18	7	3	1	1	19	**62**
	Passive LC	0	9	5	25	14	10	8	5	7	9	**92**
	Pedestrian LC	0	0	0	0	0	0	0	0	0	0	**0**
	Total	2	11	9	30	32	17	11	6	8	28	**154**
Broken half-barriers		706	613	567	522	518	470	501	447	524	452	**5320**

- Regarding 409 serious accidents & accidents on LC-s and pedestrian LC-s for 401 (98%) responsibility is on users of LC-s, for 4 (1%) infrastructure manager and for 4 (1%) railway undertakings



Legal base

- Law on safety and interoperability of railway system
  - Rule book on ways to secure traffic on rail-road level crossings and pedestrian level crossings
  - Rule book on conditions for determination of intersection of railway lines and other traffic lines
  - Rule book on technical conditions for traffic management and signal safety railway infrastructure subsystem
- Transport development strategy of The Republic of Croatia 2017-2030
- Program of resolving on rail-road level crossings and pedestrian level crossings for period 2018 - 2022

Criteria for LC-s: passive to active

- Sorting of railway lines
- Sorting of roads
- Railway traffic intensity
- Road traffic intensity
- Number of accidents
- Number of fatal and badly injured in accidents
- Permited speed of trains on determined part of railway line
- Speed restriction on determined part of railway line due to a LC
- Train speed for which is determined safety triangle
- Number of lines / gauges on LC
- Type of LC (rail – road or rail – pedestrian)

Criteria for LC-s: determination for modernisation and reconstruction

- Replacement of obsolete equipment due to a impossibility to obtain spare parts for maintenance
- Number of incidents in past period caused by human factor which could result by accident
- Suspension of segregated spots on open rail line or station for equipment control
- Automatization of LC-s handled by staff which has limited working hours
- Reduction of staff due to a automatization of LC-s
- Planned changes of technological organisation

Work on LC-s in Croatia

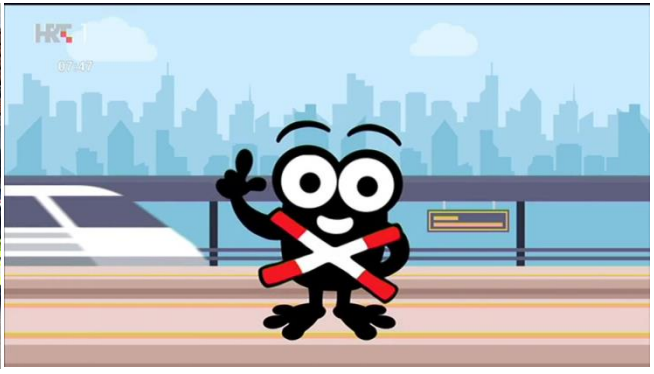
- In period 2013 - 2018 resolving 67 LC-s (63,2 mil. Kn)
- In period 2019 - 2023 planned works and modernisation 164 LC-s (230 mil. Kn; 50 LC-s IBRD loan and 114 LC-s commercial bank loans)
- EU projects for railway lines modernisation
- Scope for resolving LC-s
  - Modernisation
  - Reduction
  - Denivelation
  - Permanent suspension

Potential challenges

- Challenges regarding reduction existing LC-s on acquiring approval from local entities
- Demands from local entities related with leaving LC-s on short distances
- Not clearly defined normative demands for various equipment
- Public procurement issues,
- Connectivity with electro network on isolated spots,
- Expropriation issues
- Financial resources.

Preventive activities

- Several stakeholders:
  - Ministry of Sea, Transport and Infrastructure
  - Ministry of Interior: National Program of Safety of Road Traffic
  - Infrastructure manager; HŽ – Infrastruktura d.o.o.: „Train is always faster”
  - Faculty of Transport Sciences: active suporting

NACIONALNI PROGRAM SIGURNOSTI CESTOVNOG PROMETA

MUP RH

SVEUČILIŠTE U ZAGREBU

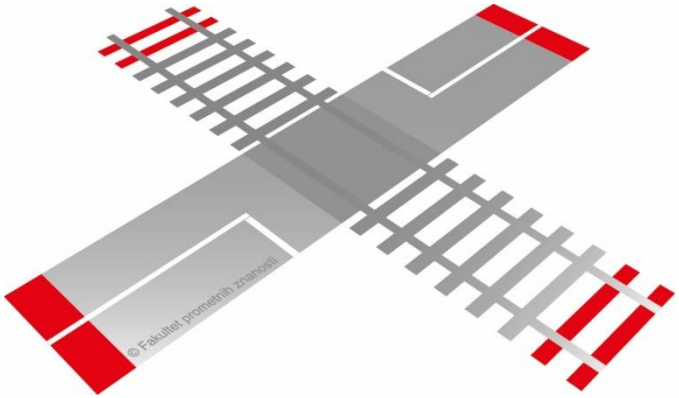
FAKULTET PROMETNIH ZNANOSTI

HŽ INFRASTRUKTURA

VJUB! VLAK JE UVIJEK BRŽI!

NATIONAL ROAD TRAFFIC SAFETY PROGRAMME OF REPUBLIC OF CROATIA

2011 - 2020

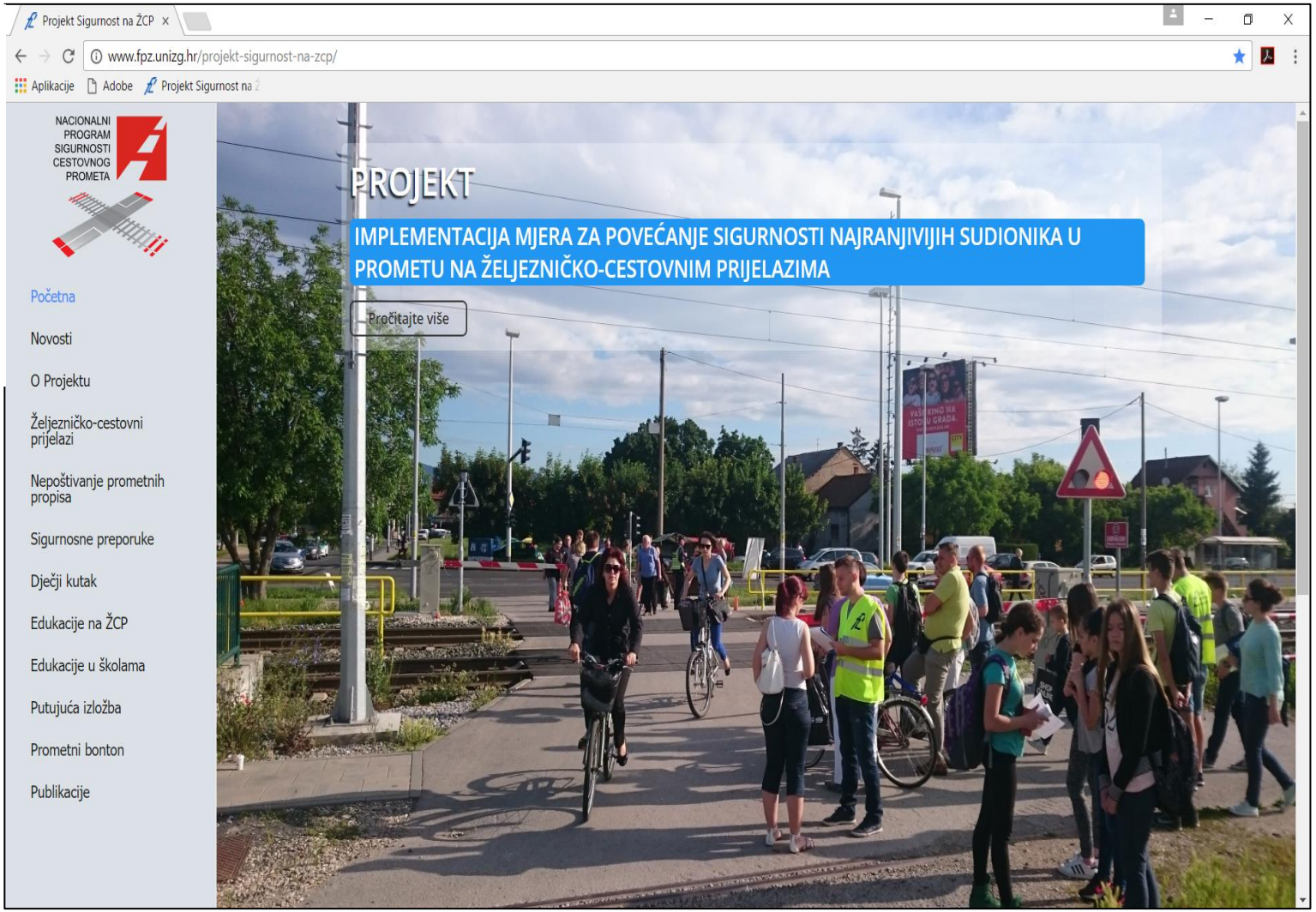


Project
IMPLEMENTATION OF MEASURES TO INCREASE SAFETY OF THE MOST VULNERABLE ROAD USERS AT LEVEL CROSSINGS

Coordinator: University of Zagreb, Faculty of Transport and Traffic Sciences
Partner: HŽ Infrastruktura (Croatian Railways), preventive-educational action „Train is always faster”

PROJECT WEBSITE

http://www.fpz.unizg.hr/projekt-sigurnost-na-zcp/



SURVEY

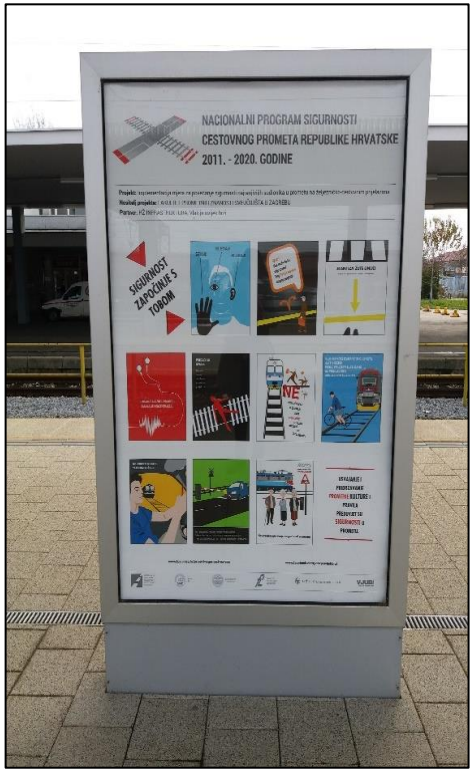
- 200 respondents – 55% F i 45% M
- the highest number of respondents belonged to the group of 26-60 years of age (61%)
- 84% of respondents use the LC Trnava every day
- 61% live within 500 m of the LC
- 73% of respondents do not know how much is the fine for illegal crossing
- 33% of respondents indicate that the reason for illegal crossing is because they are in a hurry
- 93% of respondents think that it is necessary to build an underpass (for pedestrians and for vehicles)

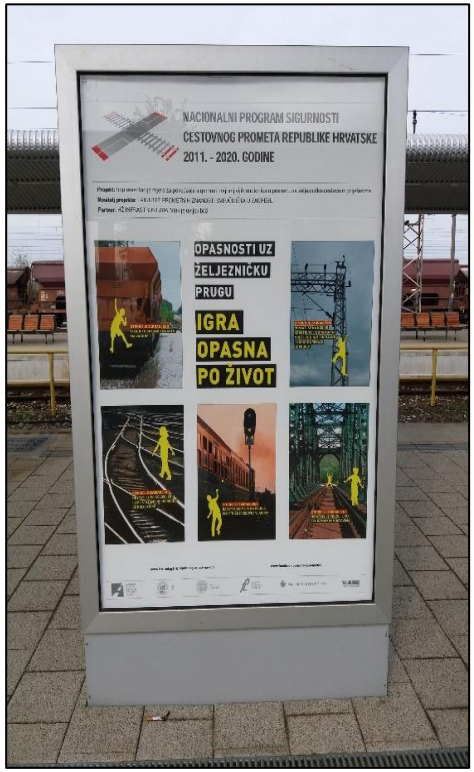
Reasons for legal and illegal crossing of the LC:

- **33% of respondents stated that they are in a hurry**
- **13% of respondents think it is safe to pass because they do not see any train arriving**
- **12% of respondents think that the barrier stays lowered for too long**
- **9% say that they are tired of waiting**
- **6% estimate that it is safe**
- **Only 29% of respondents cross the LC in a proper and legal way**

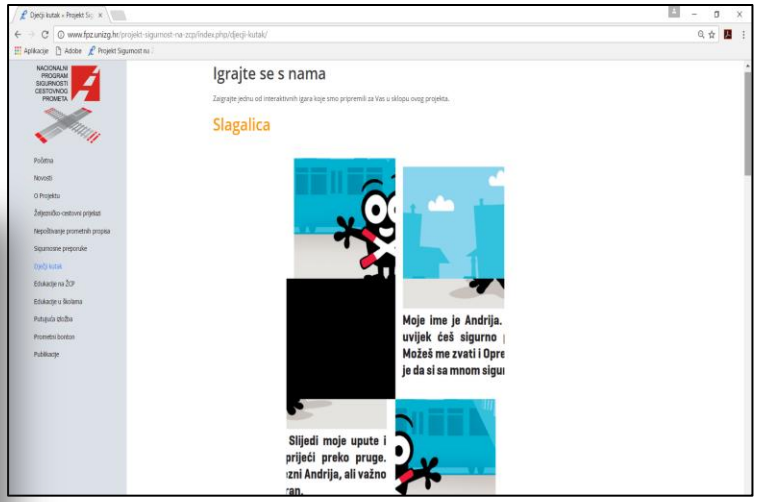
TRAFFIC BONTON

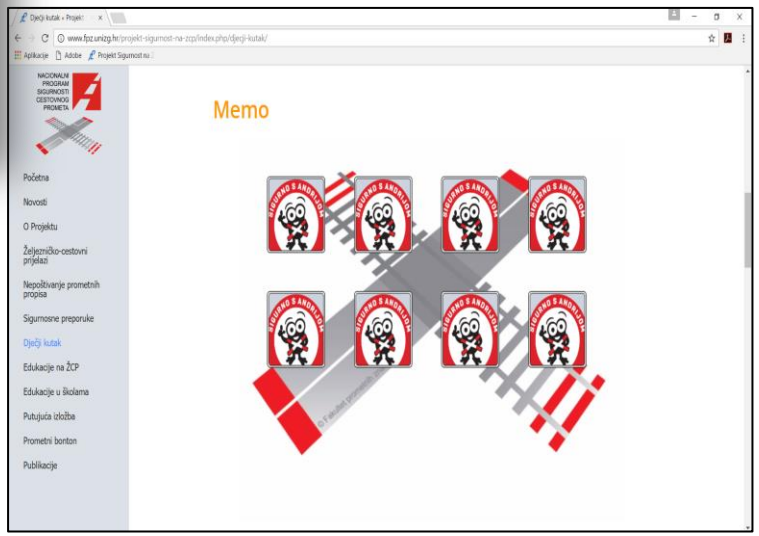
RAILWAY STATIONS IN VINKOVCI AND SLAVONSKI BROD





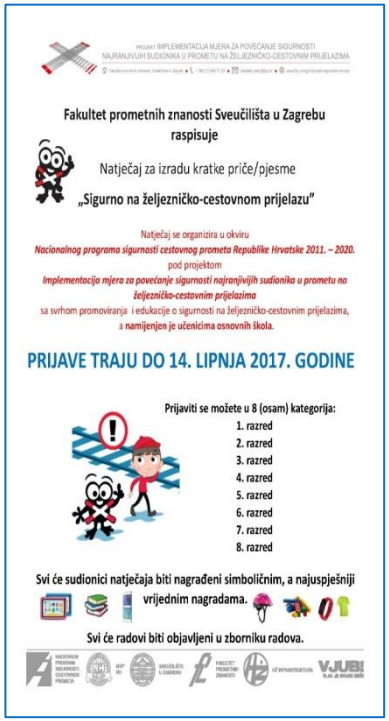
SAFETY EDUCATION IN SCHOOLS

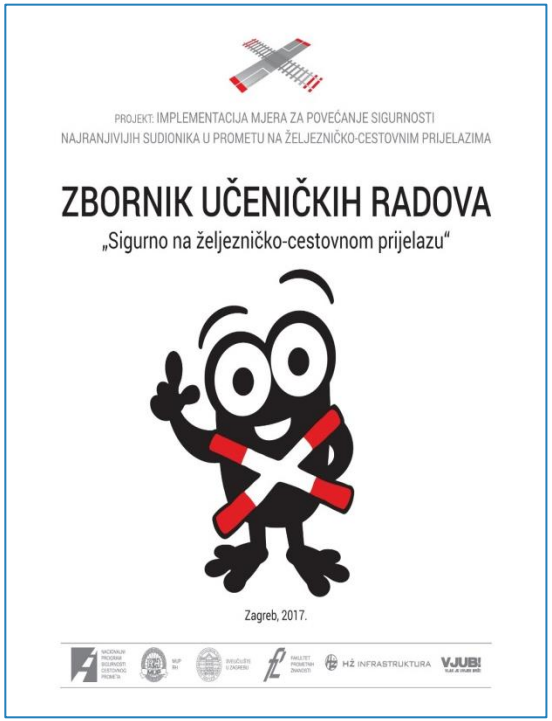




TRAVELING EXHIBITION – „Safety and design"

COMPETITION – WRITE A SAFETY STORY OR A POEM!

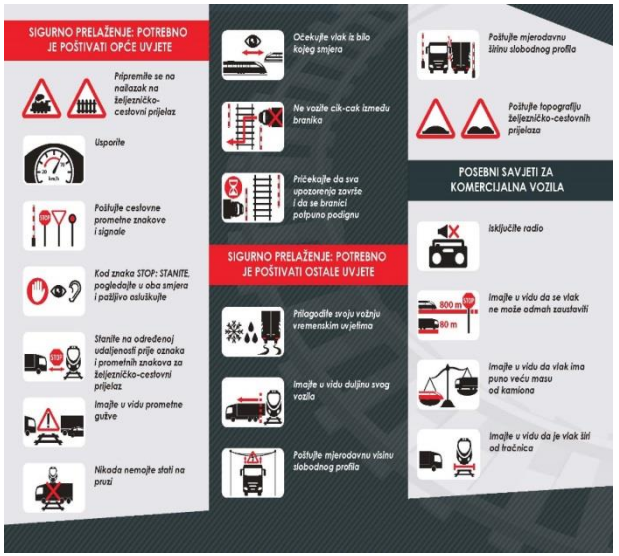




http://www.fpz.unizg.hr/projekt-sigurnost-na-zcp/index.php/novosti/

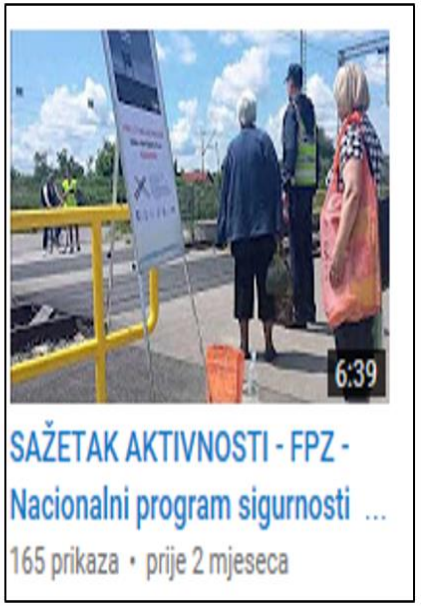
WRITE A SAFETY STORY OR A POEM! - AWARDS CEREMONY

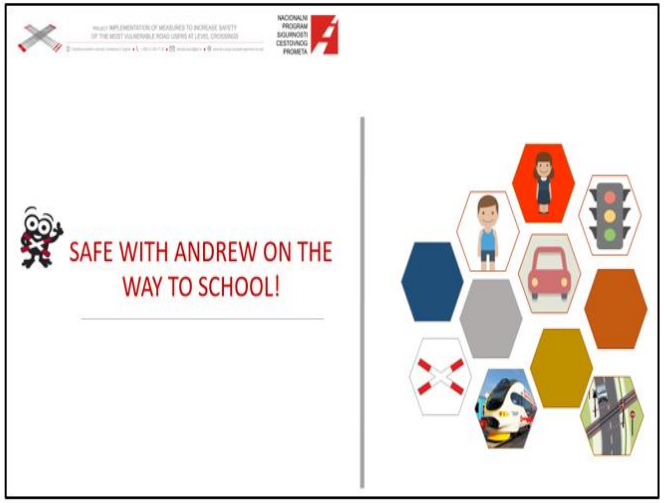
SAFETY FLYERS



SAFETY TIPS - video

https://www.youtube.com/channel/UC_8WyiVOmWEX7NlHpadRi6A





VIDEO – „Safe with Andrew on the way to School!”

https://www.youtube.com/watch?v=C2ZplhRYGko

10 GODINA ILCAD

MEĐUNARODNI DAN SVJESNOSTI O OPASNOSTIMA
NA ŽELJEZNIČKO-CESTOVNIM PRIJELAZIMA

ZAGREB 7. LIPNJA, 2018.

10 YEARS ILCAD

INTERNATIONAL LEVEL CROSSING AWARENESS DAY

ZAGREB JUNE 7, 2018

ILCAD – 7 June 2018 – Zagreb, CROATIA – „Conference”

LOCATION


LOKACIJA 1
LOKACIJA 2
Ulica kneza Branimira
Slavonska ul.
Durdevacka ul.
Nemetinska ul.
Jarmenska ul.
Cenicka ul.
Osjecka ul.
Poljana
Zelenicki put
Hercegovski put
Banoski put
Tarska ul.
Auto Škola Semafor
METALNA GALANTERIJA
LA TORTILLA d.o.o.
PLINOSERVIS KUZMAN
Genius caffe
Ljekarne Petrinec
DOM ZDRAVLJA SLAVONSKA
Restoran Čvrljet Prigorja
AUTO MILJANOVIĆ DOO
VERONA - ADRIA d.o.o.
Krešimir trgovina - veleprodaja
METUZALEM d.o.o.
Apartmani Attus
Trg Tomislava I.
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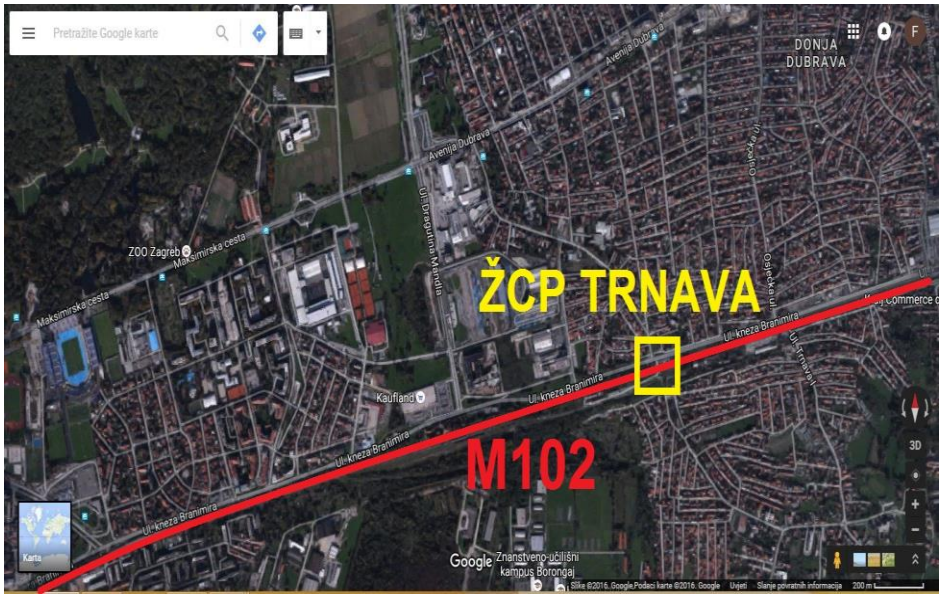
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DONJA DUBRAVA
Avenija Dubrava
Maksimirska cesta
ZOO Zagreb
Ul. kneza Branimira
Kaufland
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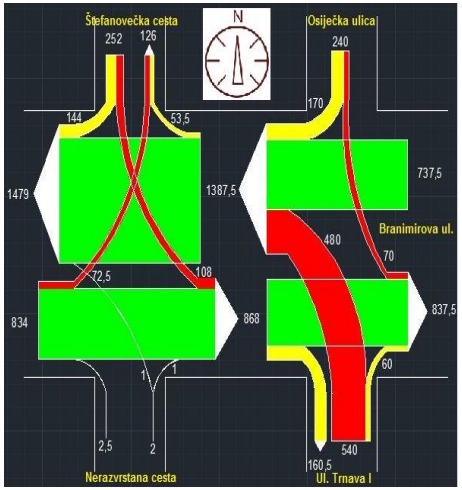
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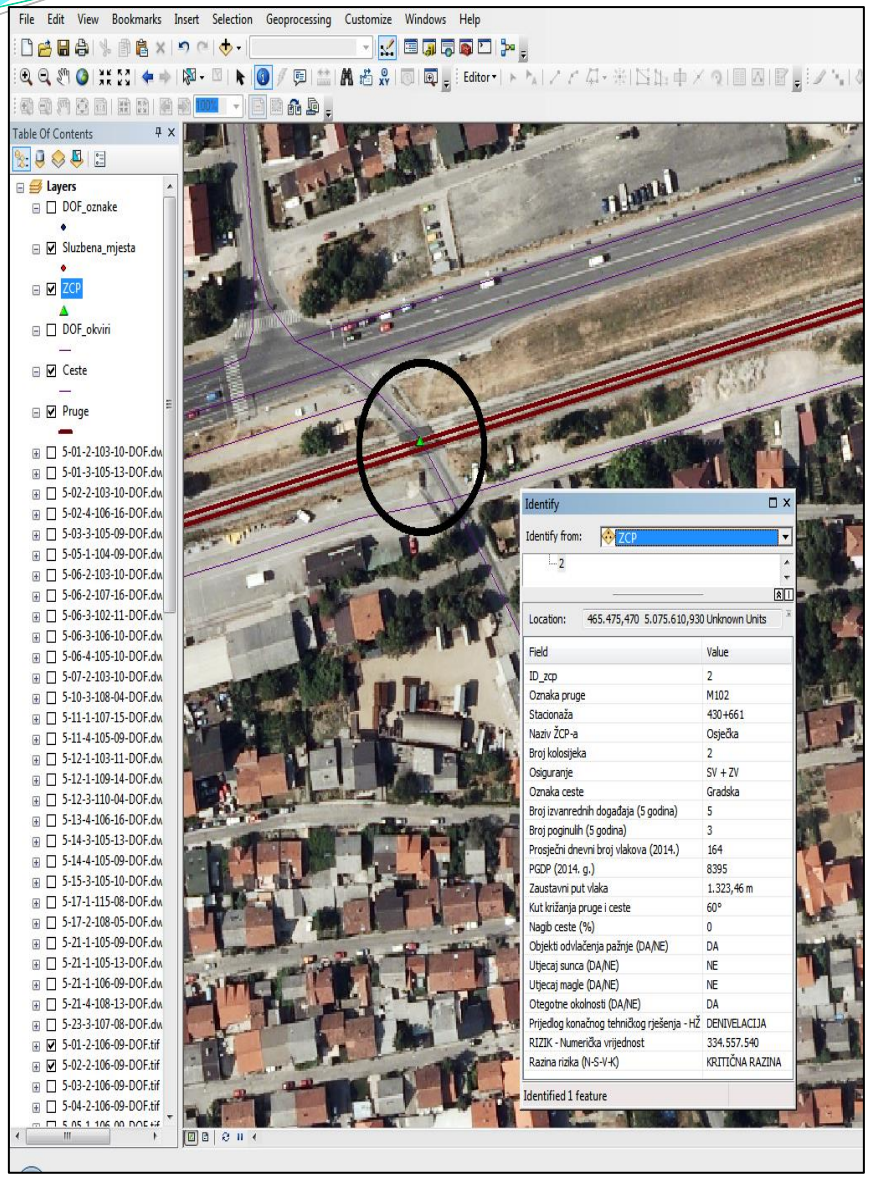

LC LOCATIONS IN ZAGREB URBAN AREA

EQUIPMENT

METHODOLOGY FOR COLLECTING DATA

Day	Camera		Researcher		Police officer visible	Survey	Educational poster	HŽ gate keeper visible
	Hidden	Visible	Hidden	Visible				
Monday	√		√					√
Tuesday	√		√					√
Wednesday		√		√				√
Thursday		√		√	√	√	√	√
Friday	√		√				√	√

SIMULATION – PTV VISSIM

LC Trnava

Queue: 240 m

The longest average waiting of vehicles: 19,8 s

The largest average vehicle delays: 26,06 s

The highest emission of harmful CO gases: 932 PPM

Fuel consumption: 13 L

LC Osječka - Trnava I

Queue: 143 m

The longest average waiting of vehicles: 69,7 s

The largest average vehicle delays: 80,44 s

The highest emission of harmful CO gases : 1182 PPM

Fuel consumption: 17 L

VJUB!
VLAK JE UVIJEK BRŽI!

- „Train is always faster” – HŽ Infrastruktura d.o.o.
- Activ from year 2000
- In 2018, through workshops participated 3016 students from elementary schools in Croatia
- From 2012 till today 10.625 students in 98 schools
- In coordination with Ministry of Interior activities on LC-s in major cities

VJUB!
VLAK JE UVIJEK BRŽI!

- https://youtu.be/C2ZplhRYGko
  - Project Implementation of Measures to Increase the Safety of the most Vulnerable Road Users at Level Crossings is carried out within the framework of the National Road Traffic Safety Program in the Republic of Croatia 2011-2020 by Croatian Ministry of the Interior. Faculty of Transport and Traffic Sciences of University of Zagreb is the project leader, and HŽ Infrastruktura with its preventive and educational program "The train is always faster" partner in the project.

- https://youtu.be/Mf_n8foy85w
  - Railway tracks are not a playground!
  - Video was created as part of Project Implementation of Measures to Increase the Safety of the most Vulnerable Road Users at Level Crossings is carried out within the framework of the National Road Traffic Safety Program in the Republic of Croatia 2011-2020 of Croatian Ministry of the Interior.
  - Video was made by team (high school students) from SKIG - Studija kreativnih ideja Gunja.

Thank you for your attention!