



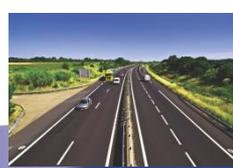
European Union Road Federation

Towards Safer Work Zones

A constructive vision



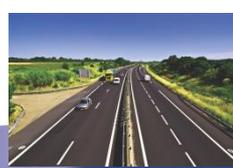
José Diez - ERF



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What is the ERF?

- Non-profit association which coordinates the views of EU road infrastructure sector
- Founded in 1998 as an initiative of five National Road Associations
- It acts as a platform for dialogue and research on mobility issues
- Represents stakeholders in the field of road infrastructure (59 members):
 - National Road Associations (20%)
 - Industry stakeholders (80%): construction companies, barrier/ road marking/signs manufactures, research center, academia



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Background

- Free movement within EU means higher cross-border traffic in the medium-long term (transport of goods, tourism, etc)
- Eastern European Road Network being upgraded to achieve minimum safety standards
- Western European countries with an ageing Road Network which will increase the frequency of maintenance in the future





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Background

- Drivers are not familiar with road works elements in different countries
- Reduction of fatalities and improvement of road safety is a main priority for the EU – Work Zones display high-accident risks





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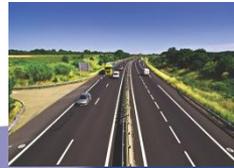
Improving WZS: Policy vision

European Parliament - Report on European Road Safety Programme 2011-2020 (July 2011)

Calls on the Commission to ensure that roadwork sites are made safer through guidelines for designing and equipping sites, which should be standardised, as far as possible, at the European level, so that motorists are not faced with new, unfamiliar circumstances in each country;

European Commission – Working Group on Road Work (ongoing)

Dealing with the influence of road works layout on road user safety, benchmarking of roadwork safety, speed management in WZ and harmonising WZ design



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Improving WZS: Research Vision

ARROWS (1998)

Handbook with recommendations on Road Work Zone design and operation

STARS (2013)

Scoring Traffic at Roadworks

BROWSER (ongoing)

Safety of road workers and interaction with road users

ASAP (ongoing)

Speed management of traffic in Work Zones



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ERF WG vision on WZS

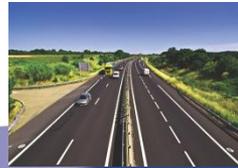
- Sustainability
- Road Asset Management
- Road Safety
 - Road Restraint Systems
 - Road Markings and Signs
 - **Work Zone Safety (2011)**



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ERF WG vision on WZS

- Propose a voluntary set of recommendations for infrastructure elements for TEN-T
- Road restraint systems, markings, signs, cones, warning lights, delineators etc
- Analyse the **functionality** of each road safety component
- Recommend **minimum performance** for road equipment in terms of safety
- Establish a *'lowest common denominator'* across the EU



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ERF - methodology

- Data collection of WZ safety practices from: Belgium, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Portugal, Slovakia, Spain, Sweden (**16 EU member states**)
- Development of classification of WZS signs, markings and other elements according to:
 - **Work zone** (approach, activity, termination)
 - **Work type** (short term mobile/stationary, long term)
 - **Road type** (main, primary, secondary, local)



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«Towards a Safer Work Zones» - Case Study

	APPROACH AREA											
	MOBILE WORK ZONE				SHORT TERM WORK ZONE				LONG TERM WORK ZONE			
	Motor-way	Primary Roads	Secondary Roads	Local Roads	Motor-way	Primary Roads	Secondary Roads	Local Roads	Motor-way	Primary Roads	Secondary Roads	Local Roads
Regulation	<ul style="list-style-type: none"> Decree of Nov 24th 1967 on the Signage of Roads and Motorways (Arrêté du 24 novembre 1967 relatif à la signalisation des routes et des autoroutes) Interministerial Instruction on Traffic Control Devices, Temporary Devices (Instruction Interministérielle sur la signalisation routière - Livre I, 8^{ème} partie, Signalisation Temporaire) Foreman's Manual - Temporary Traffic Control Devices - vol 1 single carriageway roads (Signalisation temporaire - Manuel du chef de chantier, Volume 1 - routes bidirectionnelles) vol 2 dual carriageway roads, (Signalisation temporaire - Manuel du chef de chantier, Volume 1 - routes bidirectionnelles, Volume 2 - routes à chaussées séparées) :- 											
Signs												
Other elements												
Illustrations												
Workers	Workers must be dressed in yellow or orange with at least class 2 or class 3 high visibility clothes according to EN standard											



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«Towards a Safer Work Zones» - Case Study

		ACTIVITY AREA											
		MOBILE WORK ZONE				SHORT TERM WORK ZONE				LONG TERM WORK ZONE			
		Motor-way	Primary Roads	Secondary Roads	Local Roads	Motor-way	Primary Roads	Secondary Roads	Local Roads	Motor-way	Primary Roads	Secondary Roads	Local Roads
Regulation		<ul style="list-style-type: none"> PG-3/75: General Technical Prescriptions for Works on Roads and Bridges from the Directorate General of Roads (last update by Orden FOM/2533/2014 of 12 December) - PG-3/75: Pliego de Prescripciones Técnicas Generales para Obras de Carreteras y Puentes de la Dirección General de Carreteras y Caminos Vecinales (actualizado por la Orden FOM/2533/2014 de 12 de diciembre) Guidelines with good practices on markings and signs on work zones (Ministry of Infrastructure) - Manual de ejemplos de señalización de obras fijas (Ministerio de Fomento) 											
Signs													
Other elements													
Markings													
Workers		Workers must be dressed in yellow or orange (EN 471: 2004)											



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«Towards a Safer Work Zones» - Case Study

		TERMINATION AREA											
		MOBILE WORK ZONE				SHORT TERM WORK ZONE				LONG TERM WORK ZONE			
		Motor-way	Primary Roads	Secondary Roads	Local Roads	Motor-way	Primary Roads	Secondary Roads	Local Roads	Motor-way	Primary Roads	Secondary Roads	Local Roads
Belgium	Regulations	• National Decree regarding signalling of Road Works and obstacles on public roads (Arrêté ministériel relatif à la signalisation des chantiers et des obstacles sur la voie publique. [A.R. 21.05.1999]) ⁹											
	Signs												



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«Towards a Safer Work Zones» - Recommendations

Best Practice for Restraint Systems: Roadside barrier						
Equipment	Area	Standard	Specification	Long Term	Short Term	Mobile
Roadside barrier	Approach Activity	EN 1317-2	Containment level	H2 at diversions T3 at parallel lanes	NA	NA
			Materials	NR		
			Working width	H2 and T3: W2 to W5 depending on the space on the installation		
		ASI	A or B			
		TD	Anchorage	Comply with test records		
Feasibility	High					
Cost	Low/Medium depending on duration of the works (availability mostly on rental basis)					





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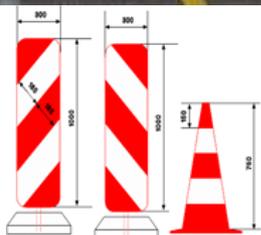
«Towards a Safer Work Zone» - Recommendations



Best Practice for Delineators						
Equipment	Area	Standard	Specification	Long Term	Short Term	Mobile
• Cones	Approach Activity Termination	EN-13422	Height	min. 750 mm	NA	
			Weight class	W2		
			Retroreflection R'	Class R2A		
Feasibility	High					
Cost	Medium					



Best Practice for Cones						
Equipment	Area	Standard	Specification	Long Term	Short Term	Mobile
Delineators on lane separators	Approach Activity Termination	EN 12899-3	Visual performance (reflectors)	Pass		NA
Feasibility	High					
Cost	Low					



Best Practice for Delineators						
Equipment	Area	Standard	Specification	Long Term	Short Term	Mobile
• Mobile delineators • Beacons ¹²	Approach Activity Termination	EN 1342 ¹³	Height	min. 750 mm	NA	
			Weight class	W2		
			Retroreflection R'	Class R2A		
Feasibility	High					
Cost	Low					



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«Towards a Safer Work Zone» - Recommendations



Best Practice for Warning Lights								
Equipment	Area	Standard	Specification	Long Term	Short Term	Mobile		
Lights on RRS	Approach Activity Termination	EN 12352	Colour	yellow C1				
Lights on delineators			Class	L6/L7				
Lights on vertical signs			Colour	yellow C1				
Lights on VMS			Class	L6/L7				
Lights in light arrow			Colour	yellow C1				
Flash Lights			Class	L8M (day) / L8L (night)				
			Colour	yellow C1				
			Class	L9H				
Feasibility			High					
Cost			Medium					



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«Towards a Safer Work Zone» - Recommendations

Best Practice for Signs

Equipment	Area	Standard	Specification	Long Term	Short Term	Mobile
Traffic Signs	Approach Activity Termination	EN 12899-1	Retroreflectivity	Class 3		
			Resistance to loads	NR		
			Materials	Fluorescent Yellow. If white, fluorescent backing board. Temporary direction signs in fluorescent yellow ¹²		
Feasibility	High					
Cost	Low					

Best Practice for VMS

Equipment	Area	Standard	Specification	Long Term	Short Term	Mobile
Variable Message Signs	Approach Activity Termination	EN 12966	Colours	C2, white or yellow		
			Luminance L	L3		
			Luminance ratio R	R3		
			Beam width B	B4		
Feasibility	High					
Cost	Medium					





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«Towards a Safer Work Zone» - Recommendations



Best Practice for Temporary Markings							
Equipment	Area	Standard	Specification	Road Trials	Wear Simulator	Short Term	Mobile
Temporary road markings	Approach Activity Termination		Colour	Y2	Y2	NA	
		TD	Width	150 mm			
		EN 1436	Luminance Qd, β	Q2	Q2		
		EN 1436	Retroreflectivity RL	R4	R4		
		EN 1436	Retroreflectivity RW	RW3	RW4		
		EN 1436	Skid resistance	S1	S2		
		EN1824 or EN13197	Durability of road marking materials	T2	P6		
EN 1790 or EN 1871	Preformed or non-preformed material depending on the phasing and nature of the works	Tested materials + Removability	Tested materials				
Feasibility	High						
Cost	Low						



Immediate steps

- *Cooperation with national administrations and EC*
- *Organisation of dedicated seminars*
- *Promote dialogue between industry and public authorities*

TOWARDS SAFER WORK ZONES

A CONSTRUCTIVE VISION OF THE PERFORMANCE OF SAFETY EQUIPMENT FOR WORK ZONES DEPLOYED ON TEN-T ROADS





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Last but not least

Finland: Finnish Transport Agency¹⁵

Greece: Ministry of Infrastructure, Transport and Networks¹⁶

Greece: National Technical University of Athens¹⁷

Estonia: Estonian Road Administration¹⁸

Czech Republic: Ministry of Transport¹⁹

Hungary: Hungarian Transport Administration²⁰

Italy: Autostrade per l'Italia²¹

Ireland: National Roads Authority of Ireland²²

Latvia: Latvian State Roads²³

Lithuania: Lithuanian Road Administration²⁴

Portugal: Instituto da Mobilidade e Dos Transportes²⁵

Slovakia: Ministry of Transport, Construction and Regional Development²⁶

Spain: Ministerio de Fomento²⁷

Spain: Asociación Española de la Carretera²⁸

Sweden: Trafikverket²⁹

http://www.irfnet.eu/images/Towards_Safer_Work_Zones_EN_FINAL.pdf



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Thanks for your attention

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