

UNECE

TEM Guidelines on Work Zone Safety

Trans-European North-South Motorway (TEM)



UNITED NATIONS

© 2021 United Nations

This work is available open access by complying with the Creative Commons license created for inter-governmental organizations, available at <http://creativecommons.org/licenses/by/3.0/igo/>.

Publishers must remove the UN emblem from their edition and create a new cover design. Translations must bear the following disclaimer: "The present work is an unofficial translation for which the publisher accepts full responsibility." Publishers should email the file of their edition to permissions@un.org.

The designations employed and the presentation of material on any map in this work do not imply the expression of any opinion whatsoever on the part of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The material contained in this study may be freely quoted with appropriate acknowledgement.

Photocopies and reproductions of excerpts are allowed with proper credits.

This publication is issued in English only.

United Nations publication issued by the United Nations Economic Commission for Europe.

Photo credits: cover page – Mr. Nenad Nikolic

ECE/TRANS/317

UNITED NATIONS PUBLICATION

eISBN: 978-92-1-001229-4

ACKNOWLEDGEMENTS

The *Guidelines on Work Zone Safety* were produced by the Trans-European North-South Motorway (TEM) Project and by the Sustainable Transport Division of the United Nations Economic Commission for Europe (UNECE).

The Guidelines were prepared by Dr. Eva M. Eichinger-Vill (Vill Consulting Engineers, Vienna, Austria).

The author worked under the guidance of and benefited from significant contributions by Mr. Nenad Nikolic, Regional Advisor (UNECE).

For their valuable inputs and comments, the author would like to thank Mr. Andrzej Maciejewski (TEM Project Manager) and Mr. Ivica Jujnovic (TEM Project Manager). For providing information and answering the questionnaire, the author would also like to thank all TEM National Coordinators.

In addition, the author would like to express gratitude to all those who provided inputs, advice and support during the preparation of this publication, and particularly to Ms. Lydia Panchenko (UNECE), and to the editor, Mr. Christopher Bloswick, Jr.

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

The United Nations Economic Commission for Europe (UNECE) is one of the five United Nations regional commissions, administered by the Economic and Social Council (ECOSOC). It was established in 1947 with the mandate to help rebuild post-war Europe, develop economic activity, and strengthen economic relations among European countries, and between Europe and the rest of the world. During the Cold War, UNECE served as a unique forum for economic dialogue and cooperation between East and West. Despite the complexity of this period, significant achievements were made, with consensus reached on numerous harmonization and standardization agreements.

In the post-Cold War era, UNECE acquired not only many new member States, but also new functions. Since the early 1990s, the organization has focused on assisting the countries of Central and Eastern Europe, the Caucasus and Central Asia with their transition process and their integration into the global economy.

Today, UNECE supports its 56 member States in Europe, Central Asia and North America in the implementation of the 2030 Agenda for Sustainable Development with its Sustainable Development Goals (SDG). UNECE provides a multilateral platform for policy dialogue, the development of international legal instruments, norms and standards, the exchange of best practices, and economic and technical expertise, as well as technical cooperation for countries with economies in transition.

Offering practical tools to improve people's everyday lives in the areas of environment, transport, trade, statistics, energy, forestry, housing and land management, many of the norms, standards and conventions developed in UNECE are used worldwide, and a number of countries from outside the region participate in UNECE work.

The multisectoral approach of UNECE helps countries to tackle the interconnected challenges of sustainable development in an integrated manner, with a transboundary focus that helps devise solutions to shared challenges. With its unique convening power, UNECE fosters cooperation among all stakeholders at the country and regional levels.

TRANSPORT IN UNECE

The UNECE Sustainable Transport Division is the secretariat of the Inland Transport Committee (ITC) and the ECOSOC Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals. The ITC and its 20 working parties, as well as the ECOSOC Committee and its sub-committees, are intergovernmental decision-making bodies that work to improve the daily lives of people and businesses around the world, in measurable ways and with concrete actions, to enhance traffic safety, environmental performance, energy efficiency and the competitiveness of the transport sector.

The ECOSOC Committee was set up in 1953 by the Secretary-General of the United Nations at the request of the Economic and Social Council to elaborate recommendations on the transport of dangerous goods. Its mandate was extended to the global (multi-sectoral) harmonization of systems of classification and labelling of chemicals in 1999. It is composed of experts from countries which possess the relevant expertise and experience in the international trade and transport of dangerous goods and chemicals. Its membership is restricted in order to reflect a proper geographical balance among all regions of the world and to ensure adequate participation of developing countries. Although the Committee is a subsidiary body of ECOSOC, the Secretary-General decided in 1963 that the secretariat services would be provided by the UNECE Transport Division.

ITC is a unique intergovernmental forum that was set up in 1947 to support the reconstruction of transport connections in post-war Europe. Over the years, it has specialized in facilitating the harmonized and sustainable development of inland modes of transport. The main results of this persevering and ongoing work are reflected, among other things, (i) in 58 United Nations conventions and many more technical regulations which are updated on a regular basis and provide an international legal framework for the sustainable development of national and international road, rail, inland water and intermodal transport, including the transport of dangerous goods, as well as the construction and inspection of road motor vehicles; (ii) in the Trans-European North-South Motorway, Trans-European Railway and the Euro-Asia Transport Links projects that facilitate multi-country coordination of transport infrastructure investment programmes; (iii) in the TIR system, which is a global customs transit facilitation solution; (iv) in the tool called For Future Inland Transport Systems (ForFITS), which can assist national and local governments to monitor carbon dioxide (CO₂) emissions coming from inland transport modes and to select and design climate change mitigation policies based on their impact and adapted to local conditions; (v) in transport statistics – methods and data – that are internationally agreed on; (vi) in studies and reports that help transport policy development by addressing timely issues based on cutting-edge research and analysis. ITC also devotes special attention to Intelligent Transport Services (ITS), sustainable urban mobility and city logistics, as well as to increasing the resilience of transport networks and services in response to climate change adaptation and security challenges.

In addition, the UNECE Sustainable Transport and Environment Divisions, together with the World Health Organization (WHO) – Europe, co-service the Transport Health and Environment Pan-European Programme (THE PEP).

Finally, since 2015, the UNECE Sustainable Transport Division has provided the secretariat services for the Secretary General's Special Envoy for Road Safety, Mr. Jean Todt.

TABLE OF CONTENTS

Acknowledgements	iii
United Nations Economic Commission for Europe	iv
Transport in UNECE	v
Acronyms and Abbreviations	ix
Executive Summary	xi
1. WORK ZONE SAFETY IN TEM MEMBER COUNTRIES	1
1.1 General	1
1.2 Road safety data for work zones	1
1.3 Guidelines and regulations for work zone safety	1
1.4 Safe System approach in work zone management	1
1.5 Work zone layouts and risk management	1
1.6 Roles and responsibilities in work zones.	2
1.7 Training of personnel	2
1.8 Enforcement and road user information	2
1.9 Strategic goals and indicators	2
1.10 Work zone challenges	2
2. SAFE SYSTEM APPROACH IN WORK ZONES	3
3. DEFINITIONS	4
4. CLASSIFICATION OF WORK ZONES	6
4.1 Introduction	6
4.2 Type of roadworks	6
4.3 Type of roads.	6
5. IDENTIFICATION OF THE MAIN AREAS OF WORK ZONES – WORK ZONE LAYOUT.	8
5.1 General	8
5.2 Longitudinal work zone components (work zone areas)	8
5.2.1 Advance warning area.	9
5.2.2 Transition (or taper) area	9
5.2.3 Buffer (or approach clearance) area	9
5.2.4 Work area.	9
5.2.5 Termination area	9
5.3 Lateral work zone components (lateral safety buffers)	9
6. ROAD SAFETY IN WORK ZONES	10
6.1 Safety examination methodologies for work zones	10
6.2 Risk assessment for work zones	11
6.3 Traffic management plan (TMP)	12
6.3.1 Purpose of a TMP	12
6.3.2 General content of a TMP.	13
6.3.3 Preparation for execution of the TMP	13

6.4	Planning and implementation of work zones	14
6.5	Responsibilities	14
6.5.1	Responsibilities for the road operator	15
6.5.2	Responsibilities for contractors	15
6.5.3	Responsibilities for workers	15
6.6	Safety and training of actors in work zones.	16
6.7	Speed management and enforcement.	17
6.8	Information management for road users	18
	7. TRAFFIC CONTROL DEVICES AND SAFETY EQUIPMENT	19
7.1	Signs and markings	19
7.1.1	Planning	19
7.1.2	Design	19
7.1.3	Installation	21
7.1.4	Operation.	21
7.1.5	Removal	21
7.1.6	Documentation	21
7.1.7	Sign storage, maintenance, and availability	22
7.2	Electronic arrow boards (EAB)	22
7.3	Variable message signs (VMS)	22
7.4	Traffic signals	22
7.5	Safety barriers.	23
7.6	Screens	24
7.7	Vehicles	25
7.8	Truck mounted attenuators (TMA).	26
7.9	Speed control and enforcement equipment	26
	8. STRATEGIC GOALS AND CRITERIA FOR WORK ZONE SAFETY	28
8.1	Strategic goals.	28
8.2	Road user criteria.	28
	9. WORK ZONE CHALLENGES AND RECOMMENDATIONS	29
	10. LITERATURE	30
Appendix 1 – Literature Review		31
A.1	UNECE Documents	31
A.2	European and International Projects and Initiatives	31
A.3	Legal Framework	34
Appendix 2– Example layouts from TEM member countries		35
A.1	Short-term roadworks on motorway	35
A.2	Short-term roadworks on Motorway – Closure of the (inner) left lane.	36
A.3	Long-term roadworks on motorway – Closure of the (outer) right lane	37
A.4	Long-term roadworks on motorway – Closure of the (outher) right lane	38

LIST OF FIGURES

Figure 1:	Safe System approach in road safety management at a glance	3
Figure 2:	Examples for short-term work and long-term work zones on the Czech Motorway Network	7
Figure 3:	Work zone areas	8
Figure 4:	Work zone risk assessment	12
Figure 5:	Risk estimation matrix (example)	12
Figure 5:	Risk estimation matrix (example)	12
Figure 6:	LED illuminated road worker gear	16
Figure 7:	Colour-coded signs	20
Figure 8:	Traffic lights regulation in road work zones	22
Figure 9:	Examples of concrete (left) and steel (right) safety barriers	23
Figure 10:	Slim temporary safety barrier	23
Figure 11:	Examples of end treatments	24
Figure 12:	Truck-mounted mobile barrier system	24
Figure 13:	Anti-dazzle screens mounted on concrete barrier	24
Figure 14:	Examples of safe work vehicles	25
Figure 15:	Example of a truck mounted attenuator	26
Figure 16:	Automatic speed enforcement – Spot control with fixed cameras	26
Figure 17:	Automatic speed enforcement – Distance (section) control: starting point	27
Figure 18:	Automatic speed enforcement – Distance (section) control: end point	27

预览已结束，完整报告链接和二维码如下：

https://www.yunbaogao.cn/report/index/report?reportId=5_13

