TEM Guidelines on Work Zone Safety

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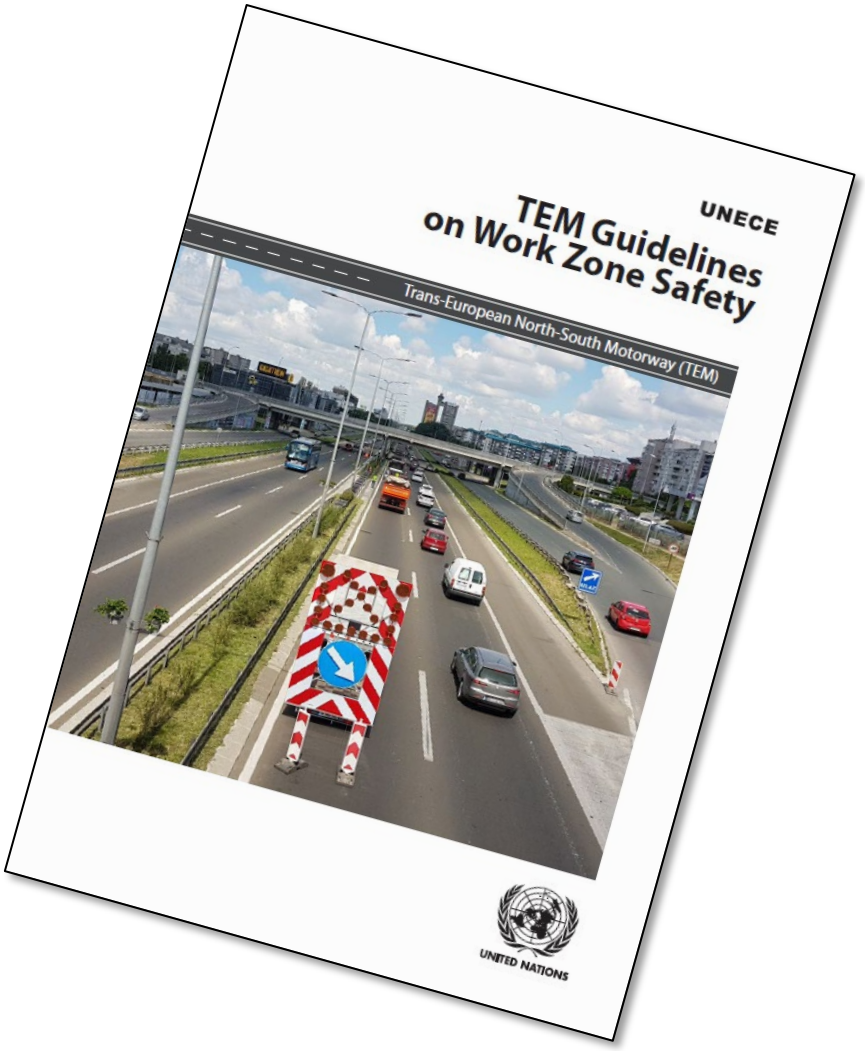
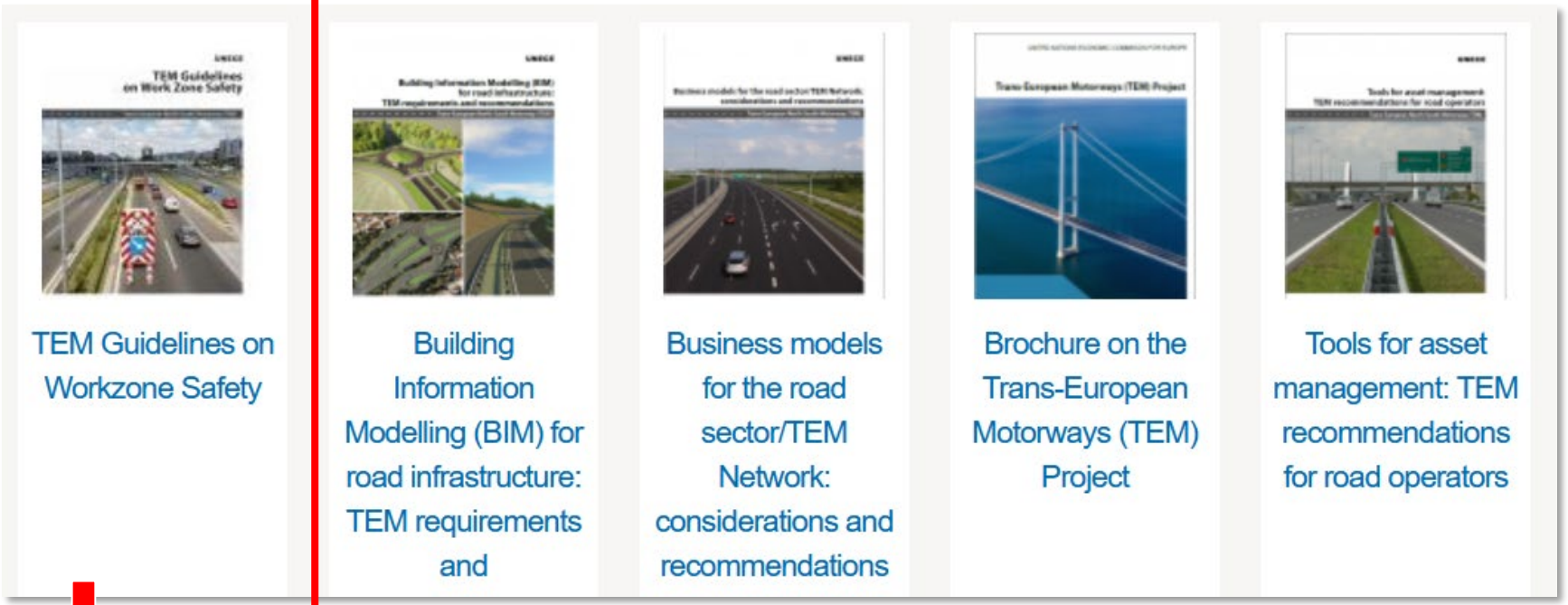


How to design safe roads

Tashkent, 17 March 2023

UNECE Trans-European North-South Motorway Project TEM

- 2-3 reports annually related to roads/motorways development, asset management, road safety, data management, environmental protection



https://unece.org/sites/default/files/2022-02/reduced_2118906E_web.pdf

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What work zone safety is about…

Work zone safety is about:

- safety for **road workers**
- safety for **ALL road users**
- safety for **construction equipment**
- **traffic flow** with the least possible delay and inconvenience to ALL road users

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TEM Guidelines on Work Zone Safety – Major content 1/3

- **Literature review**
- **Work zone safety in TEM member countries**
- **Safe System approach to work zone safety**
- **Definitions** – Work zone glossary
- **Classification of work zones**
  - Type of road works
  - Type of roads
- **Identification of the main areas of work zones**
  - Longitudinal work zone components
  - Lateral worksite components

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TEM Guidelines on Work Zone Safety – Major content 2/3

- **Road safety in work zones**
  - Safety examination methodologies
  - Risk assessment for work zones
  - Traffic management plan (TMP)
  - Responsibilities of work zone actors
  - Safety and training of actors in work zones
  - Speed management
  - Information management for road users

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TEM Guidelines on Work Zone Safety – Major content 3/3

- **Traffic control devices and safety equipment**
  - Signs and markings
  - Barriers and restraint systems
  - Vehicles and construction equipment
  - Speed control and enforcement equipment
- **Strategic goals and criteria for work zone safety**
  - Strategic goals
  - Road user criteria
- **Work zone challenges and recommendations**

  based on TEM Member countries case studies and best-practices

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Literature review 1/3

- Summary of **main contents and findings** of the most relevant literature
- **Weblinks** provided for each document

- **UNECE Documents**
  - UNECE Consolidated Resolution on Road Traffic (R.E.1) (2010)
  - UNECE Consolidated Resolution on Road Signs and Signals (R.E.2) (2010)
- **EU legal framework**
  - Directive (EU) 2019/1936 of the European Parliament and of the Council of 23 October 2019 amending Directive 2008/96/EC on road infrastructure safety management

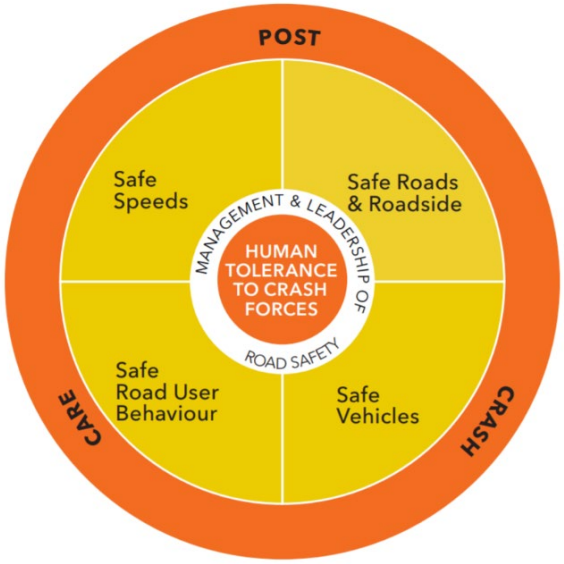
Literature review 2/3

- **European projects and initiatives**
  - **ARROWS** – Advanced Research on ROad Work zone Safety standards in Europe (1998), EC
  - **PRAISE** – Preventing Road Accidents and Injuries for the Safety of Employees (2011), ETSC
  - **STARs** – Scoring Traffic at Roadworks (2013), EC
  - **BRoWSER** – Baselining Road Works Safety on European Roads (2015), CEDR
  - **ASAP** – Appropriate Speed Saves All People (2015), CEDR
  - **IRIS** – Incursion Reduction to Increase Safety in road work zones (2019), CEDR
  - Position Paper '**Towards Safer Work Zones**' (2014), ERF

Literature review 3/3

- **International projects and initiatives**
  - **PIARC** – Technical Report ‘Improvements in safe working on roads’ (2012)
  - **Austroads** – Guide to temporary traffic management (2019)
  - **NCHRP** – Estimating the Safety Effects of Work Zone Characteristics and Countermeasures: A Guidebook (2018)
  - **NCHRP** – Analysis of Work Zone Crash Characteristics and Countermeasures (2018)
  - **CAREC** – Road Safety Engineering Manual 2 – Safer Road Works (2018)
  - **IRF** – Statement of Policy ‘Mandating Safer Work Zones Globally’ (2018)

Safe System work zones – Principles 1/2



SOURCE: WORLD BANK/GRSF

All processes associated with roadworks have to be undertaken **using Safe System principles.**

Work zones need to be **designed and managed** such that the potential for **harm to all road users and workers** can be **eliminated or significantly reduced.**

All road users need to **understand what to expect and the action they need to take** when approaching a work zone.

Speed limits in work zones must be set for **protection of the workers** and also of the **road users** passing through them along with the requirement of managing traffic flows.

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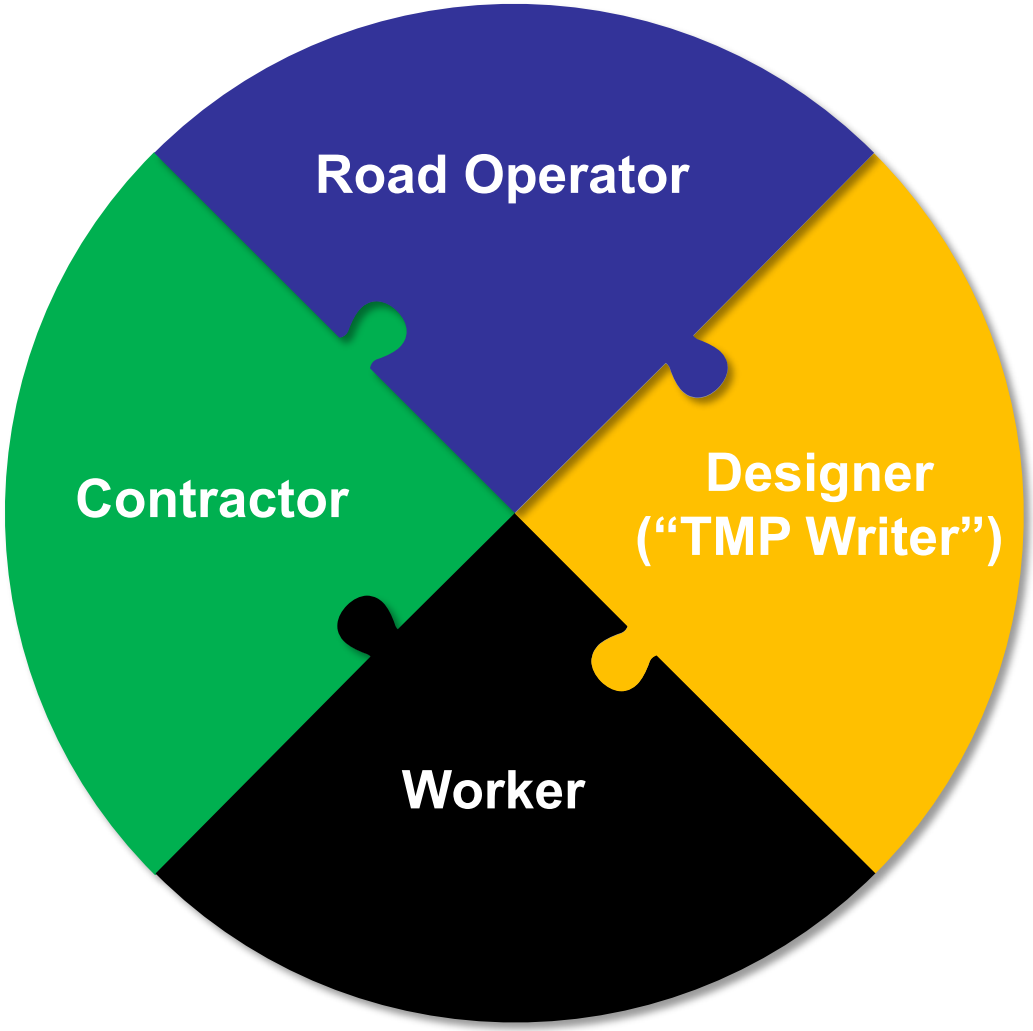
Safe System work zones – Principles 2/2

SOURCE: WRI

Work zone responsibilities



Gap between already existing **technical guidelines** and **daily work practice**

Main reasons:

- Lack of clear responsibilities
- Lack of supervision
- Lack of training and adequate knowledge on all sides

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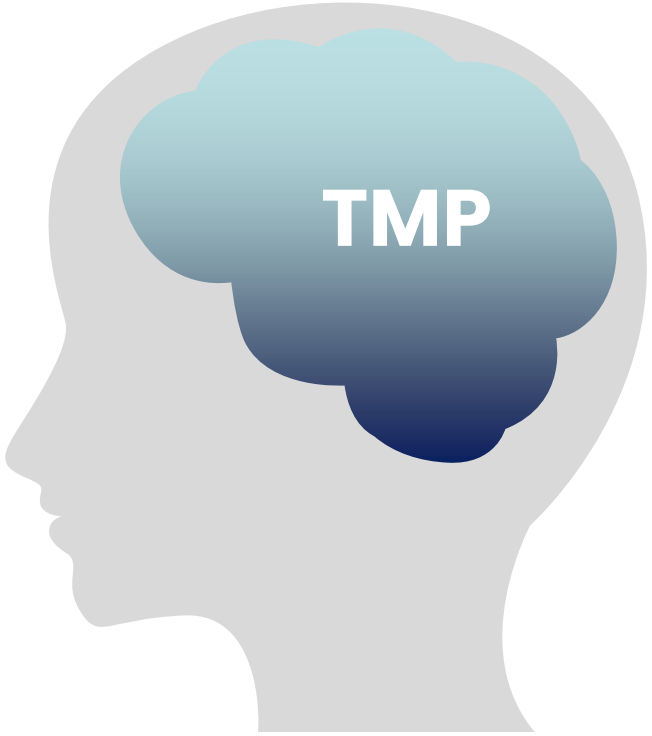
What is a traffic management plan (TMP)?



- a **site-specific set of documents** that covers the **management, implementation, inspection and clearance of work zones** as well as **communication and information**
- contains the **risk assessment** considering both risk to the workers posed by traffic and risk to the traffic posed by the roadworks
- details how **all road users** will be **directed through or around a work zone**
- **contains the Temporary traffic control plan (TTCP)** indicating the **positioning and placement of temporary traffic control devices**, signs and delineators in the work zone
- made **BEFORE the works commence** for **every work zone** considering **every stage of works** (also night, day or between shifts)

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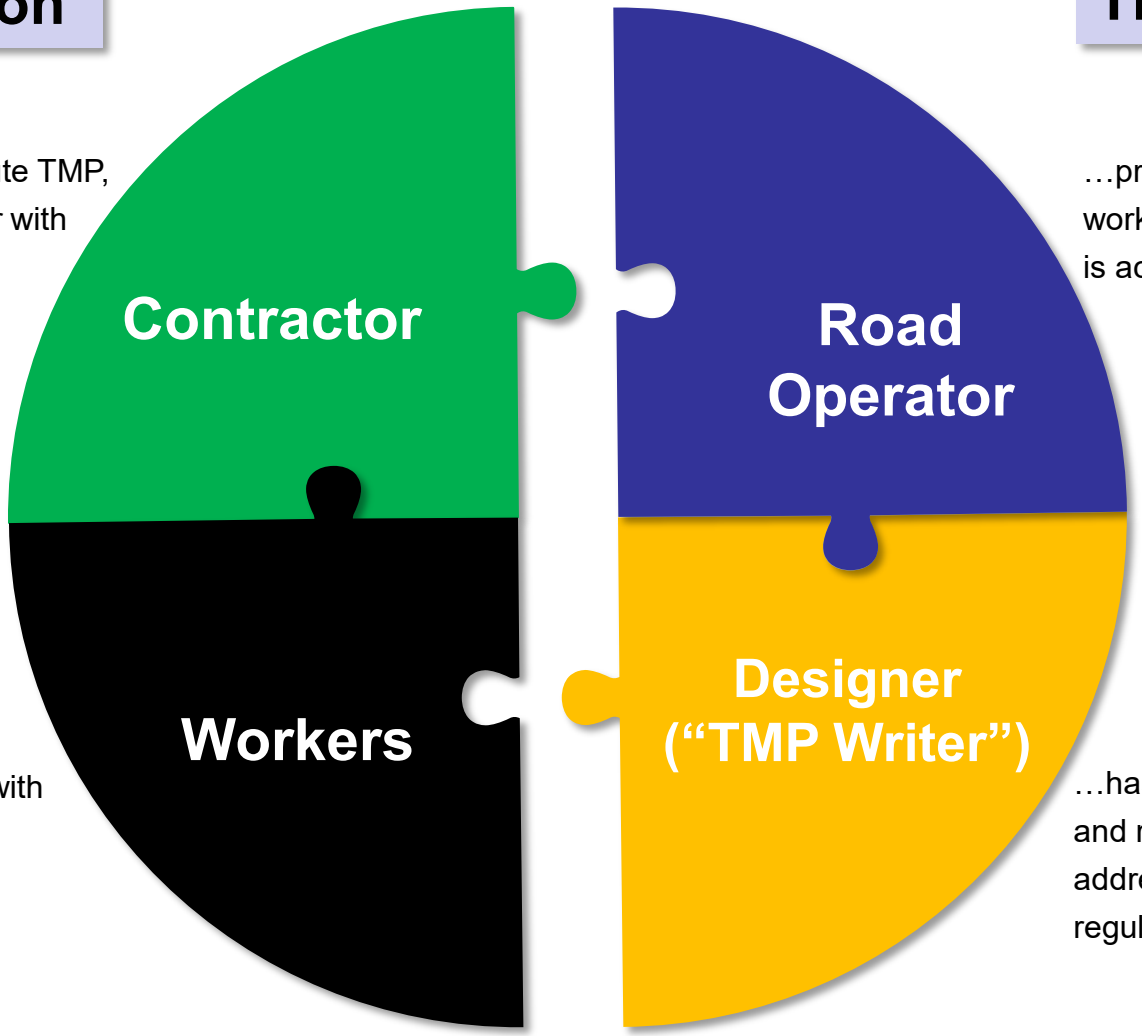
Traffic management plan – Responsibilities

TMP Execution

…have to accurately execute TMP, ensure workers are familiar with TMP and enforce worker compliance.

TMP Preparation

…provides accurate details on the works and ensures that contractor is accurately executing TMP



…have to be familiar with TMP and adhere to it.

…has to be aware of project aims and risks and create a TMP which addresses both within the regulatory framework

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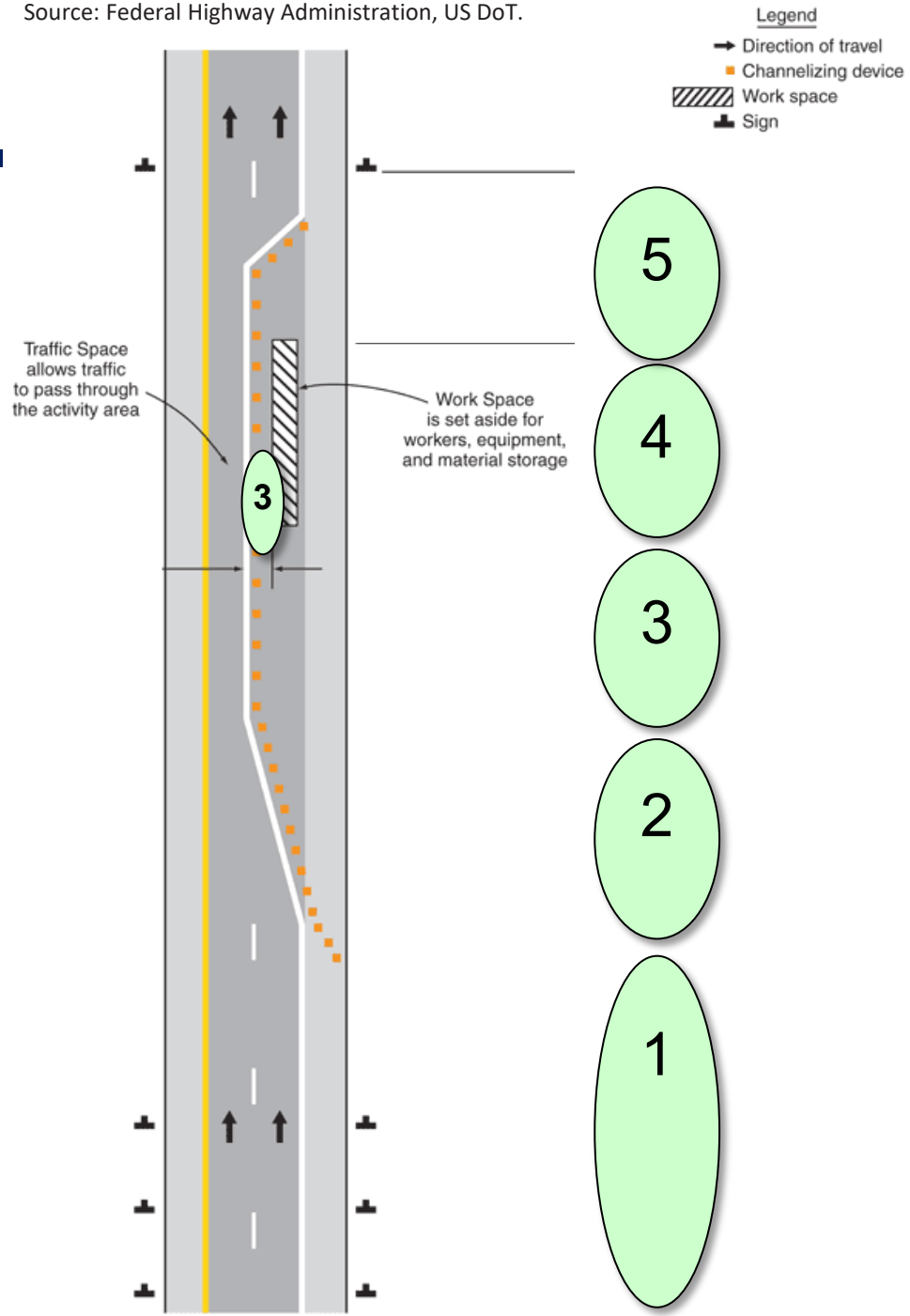
Source: Federal Highway Administration, US DoT.



Work zone areas

1. Advance Warning Area
2. Transition (or Taper) Area
3. Buffer Area – longitudinal and lateral!
4. Work Area
5. Termination Area

MAIN RULES:

1. Give drivers enough time to change their behavior.
2. Never surprise the drivers.

Traffic control devices – Delineation

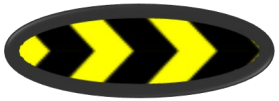
Bollards

Temporary line markings

Safety barriers

Traffic cones

Hazard markers



Longitudinal barricades

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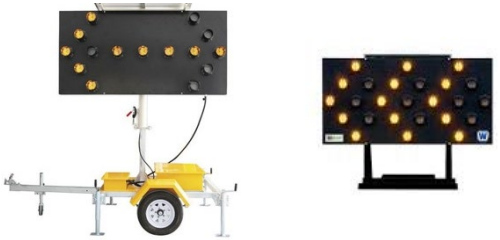
Traffic control devices – Information

Variable Message Signs (VMS)

Electronic arrow boards (EABs)



Speed information

Truck (or Trailer) mounted attenuators (TMAs)

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Speed management in work zones – General rules

- Set **Safe System speeds**
  - max. **30 km/h**: risk of crashes with vulnerable road users
  - max. **50 km/h**: risk for side impact crash
  - max. **70 km/h**: risk for head-on crash
- Do not place speed limit signs **too far in advance** - drivers may ignore them
- Low speed limits should **not be prolonged through long stretches**
- **Avoid wide lanes** to not induce speeding in times of lower traffic volumes
- Maintain the **number of lanes** (e.g. narrow lanes).
- Close the **fast lane(s) first** and conduct traffic through the slow lane(s).
- Lower speed limits when the zone is active and **increase when not active**

Speed control and enforcement

Non-automatic speed enforcement

- **Spot control:** speed gun equipment alongside the road (visible or hidden)
- **Distance control:** conspicuous or inconspicuous police cars

Automatic speed enforcement

- **Spot control:** fixed or mobile speed cameras
- **Distance control:** trajectory or section control (control between two points)

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Safety examination methodologies 1/2

ORGANISATIONAL LEVEL

- **Work zone process reviews:**
  - Functionality and **effectiveness of road operator's practices** and procedures used to audit or inspect work zones (consistency with standards)
- **Work zone self-assessment (WZSA):**
  - Effectiveness of road operator's leadership and policy, project planning, design, construction and operation, communication, education and training
- **Work zone crash data trend analysis:**
  - **Analysis of aggregated work zone crashes** with an emphasis on crash contributory factors and countermeasures

Safety examination methodologies 2/2

PROJECT LEVEL

- **Work zone road safety audits (WZRSA):**
  - Formal safety performance evaluations performed at any stage of a **planned work zone** by an independent auditor (audit team), considering methods of improving safety in a work zone
- **Crash and mobility data analysis:**
  - Evaluation of **current or real-time crash events**, incidents and mobility issues in an **active work zone**
- **Work zone road safety inspections (WZRSI):**
  - Formal **reviews of temporary traffic control devices (TTCD)** and safety/mobility strategies deployed according to an approved plan, standards and specifications in an **active work zone**

Main work zone challenges and recommendations

Challenge	Recommendation
Insufficient **crash data** for work zones	Standardized **collection and evaluation of crash data for all work zones** on motorways and on other roads as a basis for data-driven and evidence-based work zone safety management
Inadequate **risk assessment** of work zones	Full **implementation of risk assessment** for all work zones considering all road users
No systematic **reviews and evaluations** of active work zones	Implemenation of **work zone road safety inspections**, especially for long-term projects
Setting and enforcing **speed limits**	Set **Safe System speed limits** and increase automated enforcement in all work zones
Lack of **training** of actors in the work zone	Compulsory **training of all actors** (road operator, contractors, workers, etc.) – also as a contractual requirement

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I look forward to your questions and a fruitful discussion.

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