



Emergencies in road tunnels – Consideration of the needs of people with disabilities

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Road tunnels: Special conditions (1)



■ traffic function

- important function within the road network
- ensuring flow of traffic during breakdowns and (smaller) accidents
- no people outside a car during normal operation mode
- no pedestrians (only emergency walkways)

■ legal framework

- public roads and buildings (and as so far tunnels) have to be barrier-free
- use allowed for all people within the framework of road and traffic laws

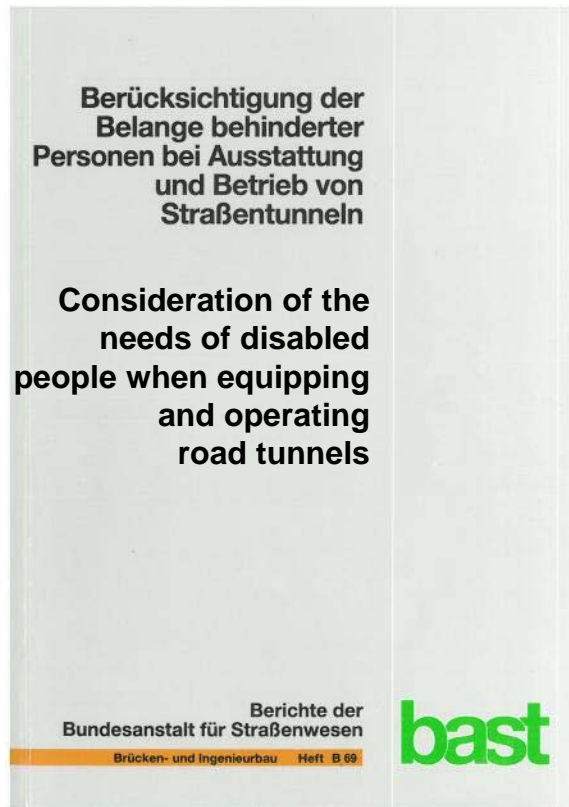


Road tunnels: special conditions (2)



- possibly high fire load, e. g. if HGV starts to burn
- „chimney effect“
 - high danger: fire development and smoke spreading in longer tunnels (>400 m)
- no fire sections in the tunnel (traffic area)
- in the last years high safety standards in most tunnels in Europe
- considering the needs of disabled tunnel users?

Research project FE 03.0405/2005/FRB:*)
Consideration of the needs of disabled people
when equipping and operating road tunnels



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- disabled road tunnel users
 - **car, self-driver** (e. g. wheelchair, deaf)
 - **co-driver** (e. g. blind and visual impairments, cognitive disabled)
- people with disabilities participate in traffic in general
- they may get into **emergency situations** in traffic or in road tunnels

Possible problems of disabled tunnel users

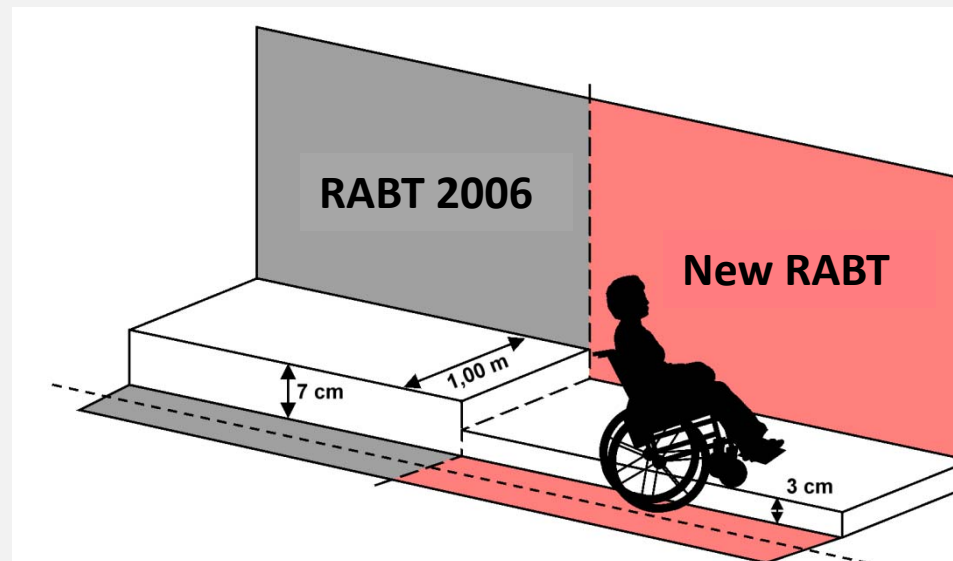
- accessibility of emergency walkways
- accessibility and usability of emergency phones and emergency telephone boxes
- locating the emergency exits
- opening the emergency exit doors



Future safety measures in road tunnels



- kerb height in new tunnels 3 cm
- kerb is needed as impact protection and to pass liquids (e. g. gas; slotted channels)

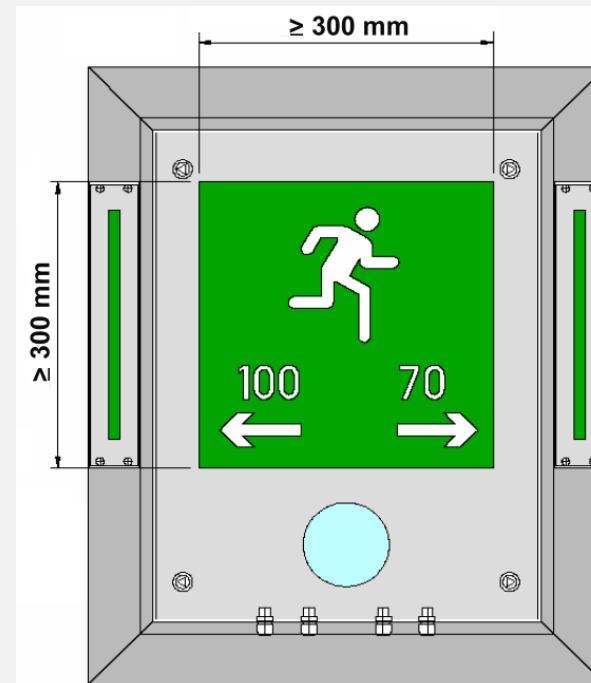


RABT: Richtlinien für die Ausstattung und den Betrieb in Straßentunneln
Guidelines for fitting and operation of road tunnels

Future safety measures in road tunnels



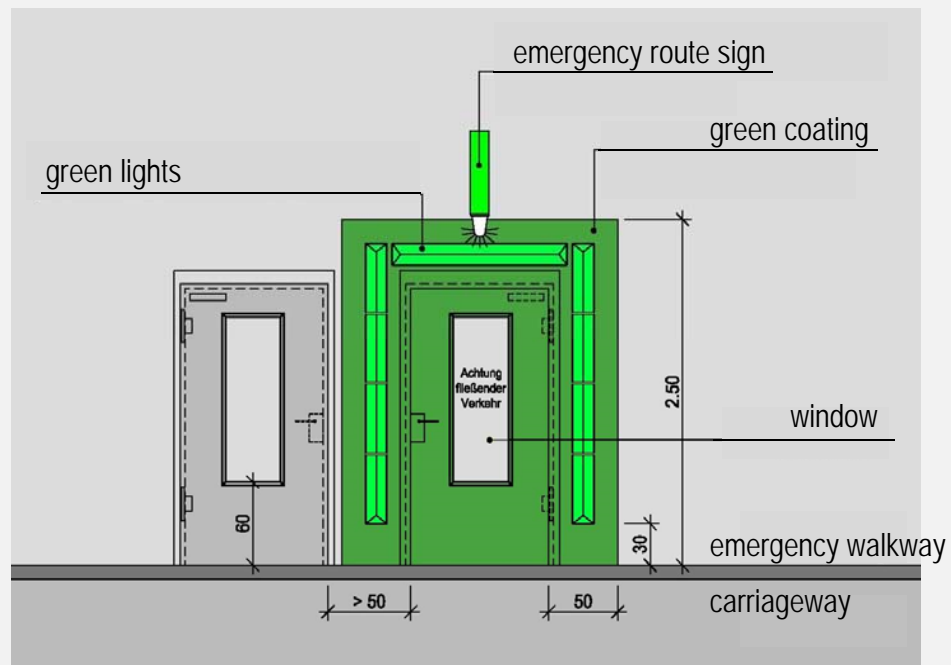
- Escape route signs with orientation light
- mounted every 25 m or less
- in the future with a tactile marking



Future safety measures in road tunnels



- highlighted emergency exit doors



Future safety measures in road tunnels



- Tactile ground surface indicators (blisters) in front and opposite of emergency exits

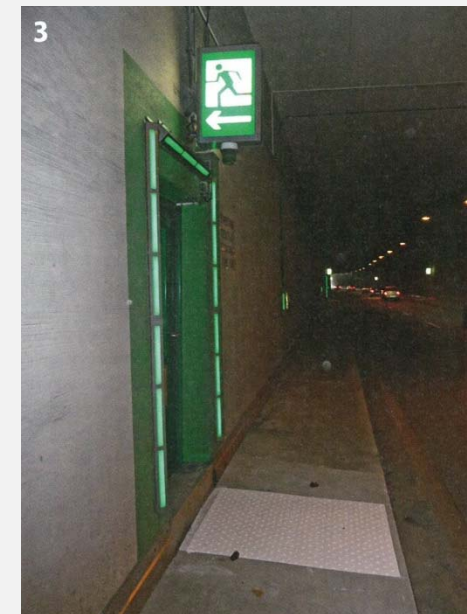
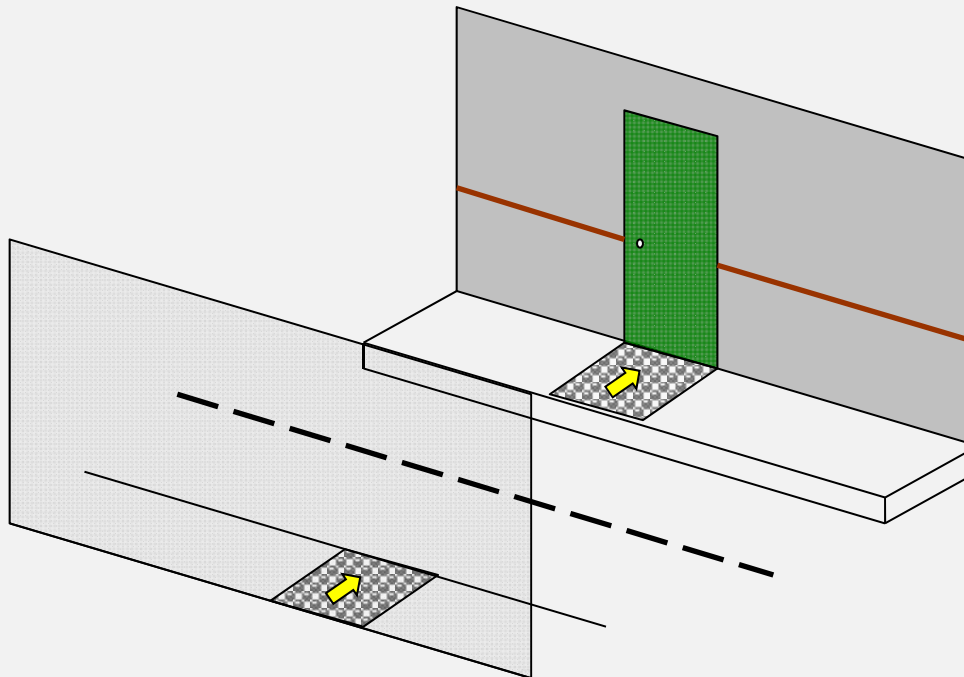


Photo: HSVV, Seeger

Future safety measures in road tunnels



- opening of emergency exit doors will be easier in the future
- force needed to open door was lowered to 60N (100N with forced ventilation)
 - problem of forced ventilation is difficult to solve
- in the future automatic opening assistance?



Photo: STUVA, Grossmann

Future safety measures in road tunnels



Discussed and not yet included in technical specifications (will be taken into account for follow-up of guidelines)

- two emergency buttons **outside** the emergency phone boxes
- mounted at 0.85 m above ground
- tactile letters „SOS“
- flashlight and audible signal if pressed (two-senses-principle)

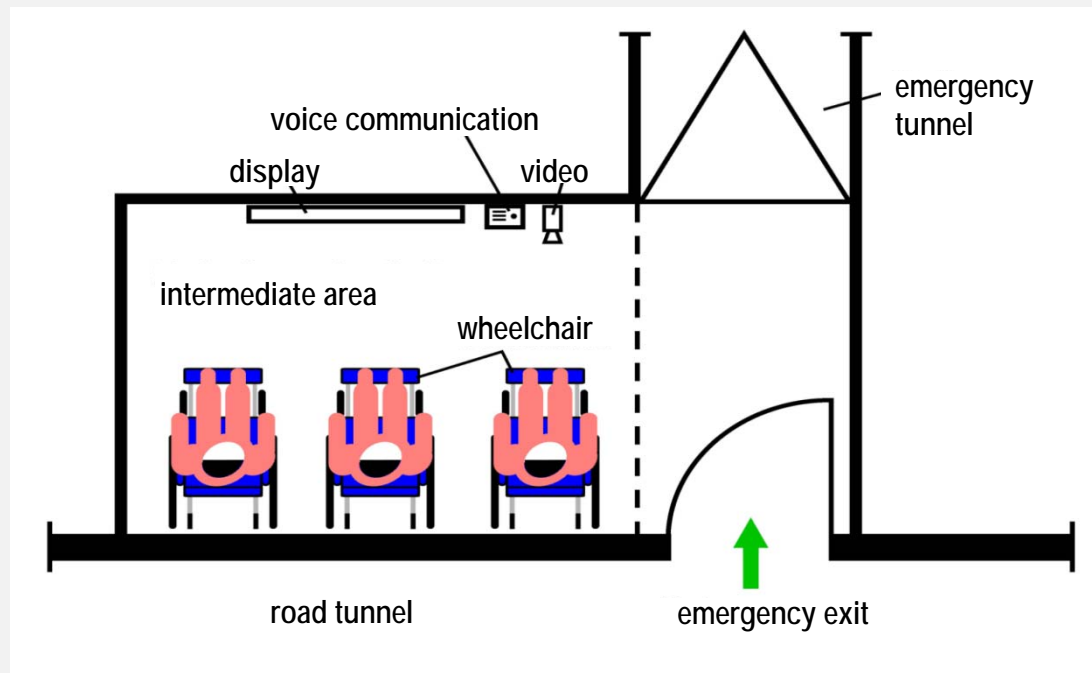


Future safety measures in road tunnels



Discussed and not yet included in technical specifications (will be taken into account for follow-up of guidelines)

- safe areas for wheelchair users or wheeled walkers
- located behind the emergency exit doors
- if emergency tunnel may be inclined or an emergency staircase is existing





Outlook and conclusions



- measures are or will be implemented at Federal Ministry of Transport and Digital Infrastructure (BMVI) instance
- measures are already included or will be included in follow-ups of technical specifications shortly
- will be implemented in new tunnels
- for existing tunnels only limited implementation because of technical and economical reasons
- measures will improve safety of all tunnel users

Thank you very much for your attention



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