

VISUAL POLLUTION IN CZECHIA: WHY ARE TRANSPORTATION ENGINEERS PART OF IT AND WHAT CAN THEY DO BETTER?

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1. Introduction

City planning is often seen as the domain of urban planners and architects, but in Czechia, it's transportation and civil engineers who play a more significant role. While the layout of towns and cities is largely in place due to mild population changes [1], it is constantly evolving to address mobility issues. [2] [3] [4] Streets are designed to balance car lanes, parking, sidewalks, cycle paths, and tram tracks, along with traffic control systems like signs and signals. [5] [6]

Although necessary, traffic signs contribute to visual pollution. The design and meaning of road signs are established by the Vienna Convention on Road Signs and Signals [7] [8], yet their practical application differs across Europe. How are transportation engineers in Czechia deciding their placement, and are they as effective as intended? This abstract provides an empirical analysis of traffic sign usage in Czechia and their impact on urban visual pollution, drawing from six years of professional and eight years of academic experience.

2. Background and objectives

Urban space is limited, requiring compromises in street design. In Czechia, the road network was unprepared for the post-communist surge in car use [9], leading to congestion and unsafe conditions for all road users. Since major construction is slow and costly, temporary solutions like traffic signs and speed bumps are often used to manage traffic. However, this has led to another issue: visual pollution. An excess of signs not only detracts from the street's appearance but can overwhelm drivers with too much information. [10]



Figure 1: Excessive use of traffic signs.

3. Legal framework

Traffic signs and road markings are defined by Czech regulation no. 294/2015 [6], the highway code is law no. 361/2000 [5]. The design of roadways in Czechia is governed by technical standards. The most important standards related to transportation include:

- ČSN 73 6101: Design of roads and highways ¹ [11],
- ČSN 73 6102: Design of intersections ² [12],
- ČSN 73 6110: Design of urban roads [13],
- ČSN 73 4001: Accessibility and barrier-free use [14].

These standards ensure the basic requirements for safe traffic operation. Additionally, several topics are expanded upon in documents called "Technické podmínky" (abbreviated as TP) issued by the Ministry of Transportation. These documents provide more detailed explanations, approaches, and possible solutions for various topics. TP 65 [10] extensively addresses the use cases and placement of traffic signs, TP 133 [15] focuses on road markings, and TP 131 [16] outlines principles for marking traffic situations on roads using both signs and markings.

None of these Czech standards are binding unless explicitly mandated by law, which is rarely the case in transportation design and planning. Nonetheless, both the standards and the TPs are widely used by transportation engineers and officials.

4. Main objectives

4.1. Identified issues

Nowadays, there are many traffic signs along the streets despite the main document TP 65 stating that traffic signs are meant to be used only when necessary for safety reasons since too many traffic signs lowers its respectability. [10] Few main reasons were identified as causes of traffic signs (over)use contributing to visual pollution:

- Size of traffic signs,
- Unnecessary use of (another) traffic sign,
- Lack of law enforcement,
- Low-cost changes,
- Traffic lights,
- Standalone poles.

4.1.1. Size of traffic signs

Traffic signs in Czechia are generally larger compared to countries like the Netherlands or Switzerland, with smaller versions allowed only on minor roads. The same large signs are used regardless of speed limits, creating disproportionate visual clutter.

¹ The official English name "*Design of highways and motorways*" is misleading, as the standard encompasses all types of roads.

² The official English name "*Design of intersections on highways*" is misleading, as it does not reflect that the standard addresses all types of intersections.



Figure 2: Comparison of smaller and standard lane sign sizes on arterial road.

This is particularly problematic for lane arrangement signs, where large, detailed signs are required, even though in other countries (e.g., France, Norway, the Netherlands), smaller or no signs are used, relying on visual cues like coloured bike lanes.



Figure 3: Visual pollution on every bike-friendly road in Czechia.



Figure 4: Smaller and simpler sign used in Norway



Figure 5: No sign used in the Netherlands due to coloured bike lane.



Figure 6: 4-lane arrangement in the Netherlands with no erected traffic sign.

Visual Pollution in Czechia: Why Are Transportation Engineers Part of It and What Can They Do Better?

The Czech practice is to place these signs at every junction, see Figure 2. The description of traffic sign IP 19 states it "displays the lane arrangement in front of a junction," [6] [10] but this should be interpreted as a description, not an order. Other signs, such as those marking hotels or restaurants, also use descriptive language without being mandated everywhere.

Conversely, signage for cyclist and pedestrian pathways should be utilized in a smaller size as specified by TP 65 [10]; however, this is rarely observed as shown in Figure 7.



Figure 7: Standard sized cycle track signs.

4.1.2. Unnecessary use of (another) traffic sign

Unnecessary use primarily involves danger warning signs. In urban areas, these signs often warn of hazards that drivers should expect. For example, a danger sign for a pedestrian crossing is often placed in a village where the crossing is clearly visible and marked by a zebra stripe and a standard traffic sign. The use of a warning sign, especially with a fluorescent background, seems redundant when TP 65 already mandates signs to be visible from 50 meters [10] and braking distance from city limit 50 kph is 34 meters. [11]



Figure 8: Warning signs placed in close proximity to the "danger"

This overuse of warning signs extends to other situations like traffic lights and roundabouts, where signs are placed despite the visibility and predictability of the hazard. It also encompasses various other situations and traffic signs as illustrated in the following figures.



Figure 9: Unnecessary parking signs at clearly designated parking spaces.



Figure 10: Anomalous and irrelevant use of overtaking signs in built-up area



Figure 11: Redundant additional plates showing standard intersection diagram.



Figure 12: Unnecessary give way signs at the end of a home zone.

4.1.3. Lack of law enforcement

A general lack of law enforcement in the Czech Republic contributes to traffic violations. Part of this problem stems from historical factors, but the absence of consequences also plays a major role. For example, bus stops often feature multiple signs and markings indicating a no-stopping zone, in addition to prohibition set by the highway code [5], but drivers frequently ignore these rules (see Figure 13), affecting mainly public transport users. Temporary traffic signs are another example, particularly during street cleaning in spring and fall, when signs are placed even where there are permanent parking bans, as shown in Figure 14. These signs serve as reminders that "today you really shouldn't park here."



Figure 13: 3 traffic signs and 2 road markings fail to prevent drivers from stopping.



Figure 14: Disregard for both permanent and temporary no parking signs.

Another common issue is drivers parking wherever they can, even when it contradicts the highway code or common sense, e.g. on sidewalks, grass as illustrated in Figure 15. This behaviour is often enabled by poor street design, and rule-breaking often requires a physical barrier like a concrete block (ironically called "city block"; see Figure 16) to prevent parking.



Figure 15: Illegal parking on sidewalks and greenery.



Figure 16: Prohibited parking in purposeless stripe of a street.

4.1.4. Low-cost changes

Low-cost traffic modifications are a significant source of visual pollution. While construction projects take years and require building permits, adding road markings and traffic signs is faster, simpler, and cheaper. This approach is common at intersections, where streets converted to one-way for parking leave wide pedestrian crossings, although the lane used is only about 3 meters wide. Often, plastic bollards are added to prevent parking, making the crossings and intersections unsightly as shown in Figure 17. Another example is the spread of parking spaces, where sidewalks are repurposed for parking, requiring additional signs to indicate allowed parking (see Figure 18).



Figure 17: Reducing intersection size with road markings and bollards.



Figure 18: Parking on sidewalks requires an erected traffic sign.

A similar problem arises on main roads passing through built-up areas. Instead of constructing safety islands, excess road width is simply narrowed to the actual lanes, see Figures 19 and 20. While this might meet technical standards, it does little for pedestrian safety or traffic calming. [17] [18] All these changes are not meant to be temporary, but they often look like quick fixes rather than permanent solutions without any long-term plan for improvement.



Figure 19: Permanent shortening of pedestrian crossing using temporary measures.



Figure 20: Missed opportunities to build a pedestrian crossing island.

4.1.5. Traffic lights

Traffic lights are useful when applied correctly, particularly at busy intersections, but they often hinder traffic flow when used on roads with normal or light traffic. For example, signalized pedestrian crossings on two-lane roads often create unnecessary delays, as heavier traffic occurs only 3 to 6 hours a day during rush hours. A pedestrian crosses the road in 4 to 5 seconds after a necessary 5-second wait to get a green light, but traffic is halted for at least 15 to 20 seconds [19], causing delays for both pedestrians and vehicles. Excessive use of traffic lights not only adds to visual pollution but also leads to air, light, and noise pollution in the area. The safety benefits are questionable, as pedestrians often jaywalk.



Figure 21: Visual pollution from excessive signage and railings near a traffic light.



Figure 22: Railings: frequent accessories for traffic lights.

Additionally, intersections with traffic lights require more lanes, signs, and road markings, further increasing their footprint, and surrounded by railings increasing visual pollution [20]. In many cases, traffic lights cannot simply be turned off due to overly wide crossings, caused by multiple lanes or a lack of safety islands. Fixing this issue would require a complete redesign of the intersection, which is a frequent reason for maintaining the current status quo unsuitable for all users.

4.1.6. Standalone poles

Traffic signs need to be placed somewhere, but even when streetlamps are available, separate poles are often used to avoid dealing with third parties. This leads to a clutter of poles, with some placed very close to existing vertical elements (see Figure 23). Traffic signs can also be mounted on buildings or walls, which avoids adding obstacles to narrow or busy sidewalks. However, this more aesthetically pleasing option is rarely used despite its benefits.



Figure 23: Standalone poles next to vertical elements and signs mounted on a building (right).

4.2. Mitigation

There are many factors contributing to the issues outlined above, some of which may be specific to certain countries. However, two overarching causes stand out: the separation of responsibilities and limited resources. Road administrators tend to focus solely on their own network, lacking a broader perspective that integrates all modes of transport. Municipalities, which should provide this oversight, often lack the knowledge, authority, or manpower to influence outcomes effectively. This is further compounded by low salaries on all included sides leading to a reactive rather than proactive approach. As a result, there is little time or capacity for strategic thinking.

A key solution lies in education. By equipping municipalities with the knowledge to demand and implement better, more integrated solutions, we can improve traffic systems and make streets livable. [21] These solutions should prioritize sustainable modes of transportation while also considering the aesthetic quality of streets. [3] [4] The encouraging news is that these changes can be made within the existing legal framework, without requiring alterations to Czech laws or standards.

Ultimately, the core issue is the lack of planning and long-term vision in road construction. Street layout is the most significant factor in shaping how drivers behave and perceive their environment. [22] While traffic signs and road markings can provide guidance, they cannot substitute for a well-designed street layout. [18] Thoughtful, comprehensive road design encourages safe driving and reduces the reliance on signs for speed regulation and risk assessment. [23]

In addition, the increased use of road markings can help define space distribution more effectively [18], see Figures 24 and 25. The latter road with cycle lanes is 0.7 meters wider, yet it appears otherwise due to the road markings.



Figure 24: 7.0 m wide road without road markings



Figure 25: 7.7 m wide road with protective cycle lanes

All of the above must be supported by law enforcement from the municipal police, which is responsible for addressing most driving offenses. The police established by the town often face political pressure that limits its ability to address offenses to avoid unpopularity, which could impact the town's political leadership. However, effective law enforcement is crucial for ensuring compliance, as drivers are unlikely to change their behaviour if violations are tolerated. [24] The municipalities and other agencies should work to eliminate the underlying causes of rule violations, which often implies changes in street and road design. [25]

5. Conclusions

Traffic signs are often viewed as a solution for driver behaviour and enhanced safety, but the design of the road itself plays a far more important role in influencing how drivers perceive speed and assess risk. This empirical analysis identifies six major causes of visual pollution caused by traffic signs in Czechia, all of which can be effectively mitigated through a more integrated approach to street design.

While the tools and frameworks needed for more thoughtful design already exist, they are often underutilized because they require additional effort. Transportation engineers, focused on completing their tasks efficiently, may default to simple solutions, which are not always the best ones. Only municipalities and agencies, as the project investors, are in a unique position to push for more thoughtful and comprehensive designs; however, they often lack the necessary knowledge and strategic approach nowadays.

References

- [1] Počet a pohyb obyvatel v Českých zemích (roční údaje). [Dataset]. In *Dlouhodobé časové řady*. Český statistický úřad, 2024. [2024-09-09], <https://vdb.czso.cz/vdbvo2/faces/index.jspx?page=vystup-objekt&z=T&f=TABULKA&ds=ds1057&pvo=DEMDCR1&skupld=4791&katalog=33157&str=v1056>
- [2] Dopravní politika České republiky pro období 2021 – 2027 s výhledem do roku 2050. Ministerstvo dopravy České republiky, 2021. [2024-09-09], https://www.mdcz.cz/getattachment/Dokumenty/Strategie/Dopravni-politika-a-MFDI/Dopravni-politika-CR-pro-obdobi-2014-2020-s-vyhled/Dopravni_Politika_CR_CZ.pdf.aspx
- [3] Strategický rámec Česká republika 2030. Úřad vlády České republiky, 2017. ISBN 978-80-7440-188-6 [2024-09-09], <https://www.cr2030.cz/wp-content/uploads/2023/01/Strategicky-ramec-CR-2030.pdf>

Visual Pollution in Czechia: Why Are Transportation Engineers Part of It and What Can They Do Better?

- [4] Strategie regionálního rozvoje ČR 2021+. Ministerstvo pro místní rozvoj ČR, 2019. [2024-09-09], <https://mmr.gov.cz/getmedia/58c57a22-202d-4374-af5d-cbd8f9454adb/SRR21.pdf>
- [5] Zákon č. 361/2000 Sb.: Zákon o provozu na pozemních komunikacích a o změnách některých zákonů (zákon o silničním provozu) (59th ed.). Zákony pro lidi. [2024-09-09], <https://www.zakonyprolidi.cz/cs/2000-361>
- [6] Vyhláška č. 294/2015 Sb.: Vyhláška, kterou se provádějí pravidla provozu na pozemních komunikacích (4th ed.). Zákony pro lidi. [2024-09-09], <https://www.zakonyprolidi.cz/cs/2015-294>
- [7] United Nations. *Convention on Road Signs and Signals, of 8 November 1968 (amended version)* (E/CONF.56/17/Rev.1/Amend.1). United Nations Economic Commission for Europe, 1995. [2024-09-09], <https://unece.org/DAM/trans/conventn/signalse.pdf>
- [8] United Nations. *Convention on Road Signs and Signals of 8 November 1968 (amended version): Annex 2*. United Nations Economic Commission for Europe, 1995. [2024-09-09], <https://unece.org/DAM/trans/conventn/signalsa2.pdf>
- [9] Dvořák, M. Vozový park v obcích ČR: První část série "Prostorové aspekty dopravy" Statutární město Brno, 2023-09-01. [2024-09-09], <https://storymaps.arcgis.com/stories/6cd02a1229f5435d9753ada7c7ab2e71>
- [10] TP 65: Zásady pro dopravní značení na pozemních komunikacích. Ministerstvo dopravy ČR, 2013. [2024-09-09], https://pjpk.rsd.cz/data/USR_001_2_8_TP/TP_65.pdf
- [11] ČSN 73 6101: Design of highways and motorways (No. 505692). Česká agentura pro standardizaci, 2018. [2024-09-09]
- [12] ČSN 73 6102: Design of intersections on highways (No. 90469). Česká agentura pro standardizaci, 2012. [2024-09-09]
- [13] ČSN 73 6110: Design of urban roads (No. 74506). Česká agentura pro standardizaci, 2006. [2024-09-09]
- [14] ČSN 73 4001: Accessibility and barrier-free use (No. 519660). Česká agentura pro standardizaci, 2024. [2024-09-09]
- [15] TP 133: Zásady pro vodorovné dopravní značení na PK. Ministerstvo dopravy ČR, 2013. [2024-09-09], https://pjpk.rsd.cz/data/USR_001_2_8_TP/TP_133.pdf
- [16] TP 169: Zásady pro označování dopravních situací na pozemních komunikacích. Ministerstvo dopravy ČR, 2005. [2024-09-09], https://pjpk.rsd.cz/data/USR_001_2_8_TP/TP169.pdf
- [17] TP 131: Zásady pro úpravy silnic včetně průtahů obcemi. Ministerstvo dopravy ČR, 2000. [2024-09-11], https://pjpk.rsd.cz/data/USR_001_2_8_TP/TP_131.pdf
- [18] TP 145: Zásady pro navrhování úprav průtahů silnic obcemi. Ministerstvo dopravy ČR, 2001. [2024-09-11], https://pjpk.rsd.cz/data/USR_001_2_8_TP/TP_145.pdf
- [19] TP 81: Navrhování světelných signalizačních zařízení pro řízení provozu na pozemních komunikacích, 2015. [2024-09-11], https://pjpk.rsd.cz/data/USR_001_2_8_TP/TP_81.pdf

- [20] TP 186: Zábradlí na pozemních komunikacích, 2007. [2024-09-11], https://pjpk.rsd.cz/data/USR_001_2_8_TP/TP_186.pdf
- [21] Bruce, N., & Appleyard, D. (2020). Tools, rules, and techniques: Planning, engineering, and design approaches to creating complete and livable streets and neighborhoods. In *Elsevier eBooks* (pp. 379–455). <https://doi.org/10.1016/b978-0-12-816028-2.00020-4>
- [22] Ambros, J., Turek, R., Šragová, E., Petr, K., Šucha, M., & Frič, J. (2021). How fast would you (or should you) drive here? Investigation of relationships between official speed limit, perceived speed limit, and preferred speed. *Transportation Research Part F Traffic Psychology and Behaviour*, 83, 164–178. <https://doi.org/10.1016/j.trf.2021.09.003>
- [23] Tranter, P., & Tolley, R. (2020). Hit the brakes: slowing existing motorised traffic. In *Elsevier eBooks* (pp. 235–272). <https://doi.org/10.1016/b978-0-12-815316-1.00008-3>
- [24] Urie, Y., Velaga, N. R., & Maji, A. (2016). Cross-sectional study of road accidents and related law enforcement efficiency for 10 countries: A gap coherence analysis. *Traffic Injury Prevention*, 17(7), 686–691. <https://doi.org/10.1080/15389588.2016.1146823>
- [25] Agerholm, N., Knudsen, D., & Variyeeswaran, K. (2016). Speed-calming measures and their effect on driving speed – Test of a new technique measuring speeds based on GNSS data. *Transportation Research Part F Traffic Psychology and Behaviour*, 46, 263–270. <https://doi.org/10.1016/j.trf.2016.06.022>