

# IMPORTANCE OF TRAFFIC MANAGEMENT PLAN FOR TRAFFIC SAFETY

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## Abstract

The paper presents the traffic management plan during the execution of works from the aspect of traffic safety. All necessary elements that need to be done in the form of study documentation will be presented, which will include elements of public traffic regulation during the works, elements of movement within the construction site, elements of access to the construction site, and procedures and checklists for daily verification of all plan elements traffic management.

*Keywords:* Traffic Management Plan, Safety, Signaling.

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## 1 Introduction

Purpose of the EIA - Traffic Management Plan (TMP Traffic Management Plan) is a study and research project that provides a framework that describes how the contractor manages traffic aspects during the construction of infrastructure, both occupancy and traffic regulation in public areas, and on construction sites. The traffic management plan should ensure and include the following:

- Safety of all construction participants both inside and around the construction site.
- Safety of all collisions between the construction site and public transport.
- Assess the risk and take measures to reduce the risk of possible injuries to public transport users and staff from the construction site.
- Minimize traffic jams and traffic problems.

The traffic management plan should describe and investigate traffic regulation, regulation, and equipping, i.e., arrangement, regulation, and equipping with temporary traffic signals and other equipment of all public traffic areas (roads, parking lots, sidewalks, bicycles, and other public areas) that collide with construction activities during the execution of works.

The goal of the Plan for traffic management and equipping traffic areas with temporary vertical and horizontal signalization is to increase safety, road comfort, and driving comfort, with easy management and regulation of traffic, flows during and during construction, and safety of access roads to the construction site and safety of vehicles and people. within the construction site.

By applying concrete and efficient traffic-technical measures that should be envisaged by the Traffic Management Plan, its basic goal is achieved, which includes:

- Safe traffic in the work area;
- Safe and uninterrupted realization of works on the construction site and
- Satisfactory level of service on the driveway and in the work area.

Most often, there are no standard solutions for arranging and regulating public traffic in the vicinity of the construction site, so there are no standard solutions for the safety of access roads and roads within the construction site. For these reasons, it is necessary to make a dedicated Traffic Management Plan for each infrastructure project.

It is also necessary to distinguish between the preparation of the study "Traffic Management Plan (TMP)" from the "Study of temporary traffic signals and equipment for traffic regulation during construction", as well as from the "Study-Plan of traffic control/control" (TCP - Traffic Control Plan).

## **2 Overview of the legal framework for traffic infrastructure in BiH drawing up the traffic management plan (TMP)**

The basic traffic-technical legislative framework in BiH and EU norms that are available during the development of traffic projects are:

- Law on Basics of Traffic Safety on Roads in Bosnia and Herzegovina (Official Gazette of BiH No. 06/06, 75/06, 44/07, 84/09, 48/10, 18/13);
- Rulebook on traffic signs and signalization on roads, manner of marking works and obstacles on the road, and signs given to traffic participants by an authorized person, (Official Gazette of BiH No. 16/07);
- Rulebook on dimensions, total weight, and axle load, on devices and equipment that vehicles must have, and on the basic conditions that must be met by devices and equipment in road traffic, (Official Gazette of BiH No. 16/07);
- Rulebook on basic conditions that public roads, their elements, and facilities on them must meet from the aspect of traffic safety ("Official Gazette of BiH", No. 13/07);
- Rulebook on keeping records on public roads and facilities on them, (Official Gazette of BiH No. 16/07);
- Law on Roads of FBiH (Official Gazette of FBiH No. 12/10, 16/10, and 66/13 57/15);
- Rulebook on maintenance of public roads, (Official Gazette of the F BiH No. 57/15);
- Decree on the arrangement of the construction site, mandatory documentation on the construction site, and participants in the construction, (Official Gazette of the FBiH No. 48/03);
- Guidelines for design, construction, maintenance, and supervision of roads, Sarajevo/Banja Luka from 2005;
- Set of instructions for the design, procurement, installation, and maintenance of elements, facilities, or parts of facilities on the highway, JP Autoceste FBiH, Mostar 2012;
- BAS 1050 2014\_Technical conditions;
- BAS 1051 2014\_Danger signs;
- BAS 1052 2014\_Signs of explicit orders;
- BAS 1053 2014\_Notification signs;
- BAS 1054 2014\_Signs for traffic management;
- BAS 1055 2014\_Supplementary boards.

### *2.1 Legislation on the safety of traffic in public areas in/and around the construction site*

Under the Law on Amendments to the Law on Fundamentals of Road Traffic Safety in Bosnia and Herzegovina (Official Gazette of BiH, No. 8/17, hereinafter: ZOBS), all companies performing road works are required to conduct a Traffic Regulation Study during construction. works, which must be done by a professional body of the traffic profession. For non-compliance with the legal provision of the ZOBS, a penal provision in the range of 500 to 5,000 KM is envisaged. Also, the Law on Roads of FBiH (Official Gazette of FBiH No. 12/10, 16/10, and 66/13) states the need to establish temporary traffic signals, i.e., technical regulation of traffic in a way to guarantee the safety of traffic and contractors with minimal disruption of traffic. flows for each intervention on a public road, during maintenance, or other traffic works. For non-compliance with the said legal provision according to the Law on Roads of the FBiH, is envisaged a penal provision in the range of 1,000.00 KM to 10,000.00 KM. The introduction of this Article in the BiH HBS, and the existing provisions in the FBiH Law on Roads, give the police and

inspection the right to review works performed on public roads and request a study of traffic regulation during the works.

Annex 1 Excerpt from ZOBS: Article 20 (1) Companies and other entities performing works on public roads are obliged to set up temporary traffic signals before the start of works and provide a place where works are performed, maintain traffic signals during works, during the duration of the works to organize safe traffic at the site of works, and after the completion of works to remove from the public road the remains of materials, means of work, temporary traffic signals and other objects that were placed during the works. (2) Traffic signalization and road equipment shall be installed based on the Study of traffic signalization and road equipment if it is a question of traffic signalization and road equipment intended for marking works on the road."

Article 234 (Penal provision): A fine in the amount of 500.00 KM to 5,000.00 KM shall be imposed on a company or other legal entity for a misdemeanor if it does not act by the provisions of Article 20. For a misdemeanor shall be fined in the amount of 500,00 KM to 1,000,00 KM and a natural person who independently performs the activity. The responsible person in the company, other legal entity, or other body will also be fined in the amount of 100.00 KM to 300.00 KM for the misdemeanor.

Article 22 (1) In case of interruption or endangerment of traffic on a public road due to landslides, landslides or other causes, as well as in case of damage to roads that significantly endanger traffic safety, the competent institution managing roads immediately upon finding out organizes the installation of temporary traffic signals and takes measures to eliminate interference and establish safe traffic. (2) In case of events referred to in paragraph (1) of this Article, traffic signals shall be installed by the provisions of the Ordinance on traffic signs and signals on roads, manner of marking works and obstacles on the road and signs given to traffic participants by an authorized person there are conditions regarding the time of preparation of the Study of traffic signals and road equipment. " As a rule, plan and perform on days when the traffic flow is less intense, and explicitly not on weekends, holidays, and increased traffic due to tourist trips. Immediately after the completion of works on the public road, all temporary traffic signals and equipment must be removed and at the same time, permanent traffic and other signals and equipment must be installed by the traffic project. Approval for the change of the traffic regime is issued by the competent ministry for the temporary traffic project." Immediately after the completion of works on the public road, all temporary traffic signals and equipment must be removed and at the same time, permanent traffic and other signals and equipment must be installed by the traffic project. Approval for the change of the traffic regime is issued by the competent ministry for the temporary traffic project." Immediately after the completion of works on the public road, all temporary traffic signals and equipment must be removed and at the same time, permanent traffic and other signals and equipment must be installed by the traffic project. Approval for the change of the traffic regime is issued by the competent ministry for the temporary traffic project".

Article 106: "A fine in the amount of 1,000.00 KM to 10,000.00 KM shall be imposed on a road maintenance company or other legal entity for a misdemeanor, if: .... 14. when performing maintenance, rehabilitation, and reconstruction work and other works on the public road does not install the appropriate temporary traffic signals or does not remove the temporary traffic signals after the completion of works referred to in Article 77 of this Law; and the responsible person in the company or other legal entity."

According to the Law on Construction, it is necessary II. TECHNICAL PROPERTIES IMPORTANT FOR THE BUILDING Safety: Article 4. The building must be designed and built in such a way as to achieve the safety of the building, as well as in each of its parts and elements. Safety, in terms of this law, is the ability of the building to withstand all the intended actions that occur during normal use, and to contain all the essential technical properties during the intended duration, which are:

- mechanical resistance and stability,
- fire safety,

- protection against endangering human health,
- accessibility,
- protection of users from injuries,
- noise and vibration protection,
- energy saving and thermal protection,
- protection from the harmful effects of the environment and the environment.

The construction and use of the building must not endanger the safety of other buildings, the stability of the soil on the surrounding land, traffic areas, utilities, other installations, etc.

VIII. CONSTRUCTION SITE. Landscaping. Article 46 The construction site must be fenced to prevent uncontrolled access of people to the construction site. On a construction site that stretches over large areas (railways, roads, transmission lines, etc.), parts of the construction site that cannot be fenced must be protected by certain traffic signs or marked in another way. It is forbidden to fence the construction site with barbed wire or in any other way that could endanger passers-by. In urban areas, a special external appearance of the fence can be determined. The construction site must have a prominent board with all relevant information about the building and participants in the construction (name of the investor, name of the contractor, name of the designer, name, and type of building under construction, start and end time). The investor or contractor is obliged to obtain the consent of the owner or user of that land for the temporary occupation of the neighboring or nearby land for the needs of the construction site. For the temporary occupation of public traffic areas for the needs of the construction site, the investor or contractor is obliged to obtain the approval of the competent municipal administration service, or a legal entity determined by a special law. Constructed temporary constructions and installed construction site equipment must be stable and comply with the prescribed conditions of fire and explosion protection, occupational safety, and all other measures for the protection of human health and the environment. Before issuing the use permit, all temporary buildings built as part of the preparatory works, construction site equipment, unused construction and other materials, waste, etc. must be removed, and the land in the construction site area.

Site documentation. Article 47 The contractor on the construction site must have:

- a) decision on entry in the court register,
- b) act on the appointment of the construction manager, i.e. the manager of individual works,
- c) building permit and main design,
- d) certified implementation projects,
- e) construction log,
- f) construction book,
- d) proof of testing and quality of installed materials, products, and equipment by Art. 15 and 16 of this law,
- h) study on staking out of the building prepared by a natural or legal person, registered to perform geodetic activities,
- i) draft organization of the construction site.

Article 54 If during the technical inspection it is determined that the deficiencies in the building cannot be eliminated or that there is an insurmountable danger to the stability of the building, to human life or health, environment, traffic, or neighboring facilities, the competent authority or administrative service shall issue a decision on removal that is, the demolition of a building. The investor or contractor is obliged to obtain the consent of the owner or user of that land for the temporary occupation of the neighboring or nearby land for the needs of the construction site. For the temporary occupation of public traffic areas for the needs of the construction site, the investor or contractor is obliged to obtain the approval of the competent municipal administration service, or a legal entity determined by a special law.

Article 74 A responsible person in a legal entity who has the status of an investor shall be punished by imprisonment for a term between one and three years if he accesses without the building permit:

- construction of a new building,
- extension of the existing building,
- building a new floor on an existing building,
- performing other large-scale interventions that may endanger human life and health, neighboring facilities, traffic safety, etc.

A natural person shall be punished by imprisonment for a term not exceeding one year for the criminal offenses referred to in paragraph 1 of this Article.

### **3 Consequences of uncertainty on and around the construction site**

Given the seriousness of traffic management plans, we must be aware that the consequences of a vague and "brief" description of all activities on and around the construction site can endanger the lives of workers and cause great material damage, especially if working on and along with road infrastructure. The following photographs show only small parts that have been recorded in BiH and the surrounding area, which can be related to unclear or insufficiently arranged construction sites, i.e. inadequate traffic management.

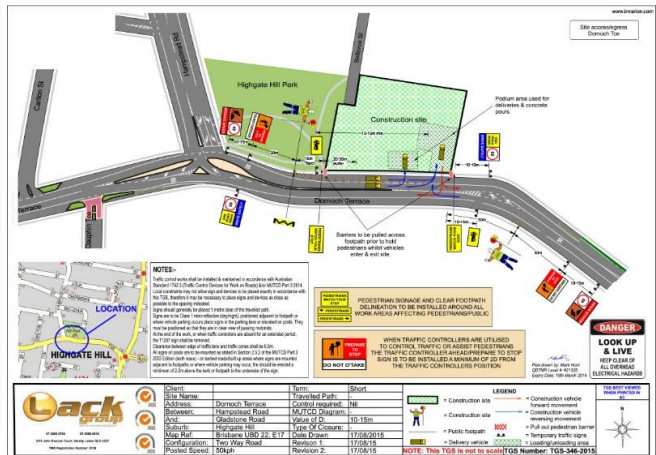
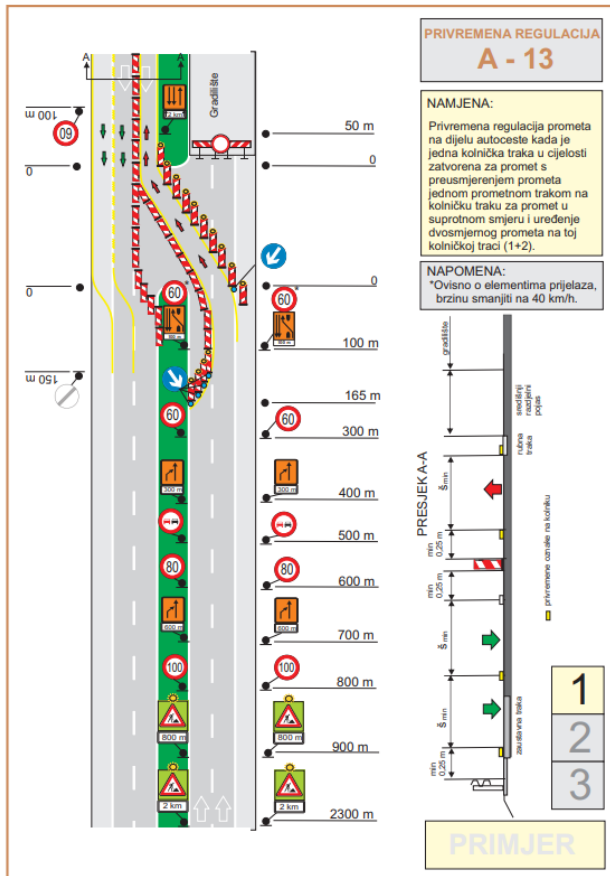
### **4 Traffic control plan (TCP)**

The project of temporary traffic signals and equipment for traffic regulation during the execution of works is a defined legal document according to domestic legislation that needs to be done and described.

It is necessary for the Project of temporary traffic signals and equipment for traffic regulation during the execution of works on the locations of works (road or near the road) to enable uninterrupted and safe traffic, i.e., it is necessary to install the entire vertical and horizontal signalization, as well as equipment. necessary for the establishment of adequate and safe traffic. Temporary regulation of traffic is necessary in the case when works are performed on the road and the areas along the road. The planned temporary traffic signals and equipment are conditioned by the rank and geometric characteristics of the roads on which the works are being performed, as well as by the position of the micro-location of the currently performed works. The overview map that should be an integral part of the Study - Project, and the location of the segments of the reconstruction to define the places and phases of setting up temporary traffic signals and equipment. Depending on the position of the location of the works, the designer should propose adequate traffic technical measures for the flow of traffic during the works.

Within the Study - Project, typical traffic situations should be proposed, according to the Rulebook, if possible, which temporarily regulate traffic during the execution of works, i.e. apply standard temporary traffic signals. According to the relevant regulations in BiH, there is a very small number of standard situations presented in the Rulebook and it is rare to apply the Type Regulation that is prescribed, so modified type situations are projected. The proposal is to imitate our legislation in other countries and "rewrite" standard situations that have been adopted and applied in practice and which number about 100 typical situations, and to develop guidelines for traffic regulation during the works on the road and around the road.

The following photographs give an example of a typical traffic regulation and a characteristic situation that needed to be designed and harmonized with the subject works and the geometry of the road. The third photo shows an adequate and very regulated construction site during the works, which is unfortunately very rare on our roads.



The contractor is obliged to ensure the permanent, flawless functioning of the complete traffic signals and equipment covered by the project, as well as to inform the competent institutions and the public through the media! After the completion of the works, the contractor is obliged to remove all temporary traffic technical equipment from the locations where it was installed and bring the existing traffic signals to the condition that preceded the works. The following photos show how not to work:



## 5 Mandatory content of TMP

The preparation of a detailed Traffic Management Plan (TMP) and the proper implementation of the measures set out in the approved plan are essential to ensure the safety of all road users as well as site workers. This would also ensure the smooth operation of the road network as well as the construction site.

The TMP includes traffic control plans and vehicle movement plans required for planning works with an emphasis on reducing congestion and inconvenience to drivers and other road users or disrupting traffic during heavy traffic flows. In addition to the above, the approved TMP should investigate and describe the approved traffic control measures for all works that impede free movement in areas related to access and public roads (parking lots, railway crossings, pedestrian crossings, and accesses, especially access for people with disabilities, etc.).

TMP should include, in addition to traffic control plans (TCP)/(TGS) and in-vehicle movement plans (VMPs), and pedestrian movement for both construction resources and the general public. All access to property affected by construction activities will also be identified through a description in the TMP.

The Traffic Management Plan (TMP) study/project should contain the following chapters and a description:

- at the beginning of the TMP there must be NOTES ON THE DOCUMENT AND AUDIT and Approval of the TMP document by the Contractor conducting this study procedure;
- to have the DEFINITIONS AND ABBREVIATIONS used in the TMP document;
- INTRODUCTION (purpose and significance of the project; description of locations and project implementation, obligations to establish signalization, obligation to inform the public, traffic control on and off the construction site, etc.);

- ACCESS TO THE CONSTRUCTION SITE (with the description and chapters that will be contained in this section, access roads, competencies, private and public property, temporary roads and works, etc.);
- ARRANGEMENT OF TRAFFIC ON THE CONSTRUCTION SITE (movements of vehicles, workers, visitors, etc.);
- TRAFFIC CONTROL PLAN (this part replaces, according to our legislation, the Traffic Regulation Study during the execution of works);
- CONDITIONS FOR ACCESS TO THE CONSTRUCTION SITE (personnel and vehicles);
- TRAINING AND COMPETENCIES (staff, visitors, safety on and off the site, etc.);
- TRAFFIC SAFETY CHECKLISTS (Checklists of daily checks of elements, both external and internal traffic safety, signed and certified by well-defined staff, appointed and described by the contractor in previous chapters, etc.).

## Conclusion

Traffic Management Plan (TMP) is a study research project that provides a framework that describes how the contractor manages traffic aspects during the construction of infrastructure facilities, both on occupancy and traffic regulation in public areas and on the construction site. The TMP should ensure and include the following:

- Safety of all construction participants both inside and around the construction site.
- Safety of all collisions between the construction site and public transport.
- Assess the risk and take measures to reduce the risk of possible injuries to public transport users and staff from the construction site.
- Minimize traffic jams and traffic problems.

In the following period, it is necessary to pay more attention to the development of this plan to minimize the consequences presented in this paper. Certainly, each phase of the subject plan must be harmonized with the stated legislation, all with the aim of clearer management of the construction site, both for the contractor and the persons passing by in the immediate vicinity.

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