

Original article

Procedures of crossing water obstacles in the light of binding normative documents

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ABSTRACT

The aim of the article is to present existing procedures of crossing water obstacles in the light of currently binding normative documents. The article addresses the issue of crossings' organization during basic tactical activities and describes setting of a crossing (breaching) section with its main elements taken into consideration. Moreover, primary components of command and control of a crossing section have been characterized in the article.

KEYWORDS

breaching, crossing, tactical activities, command and control

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Introduction

Terrain obstacles are natural¹ or artificial² obstacles which hamper combat operations or completely prevent movement of troops and technical equipment in a given terrain. Water obstacles are a specific type of them that significantly limit mobility of forces while executing various tactical or operational activities. Moreover, a seamless crossing of them has always constituted a tough and complicated combat task, as it required an involvement of a considerable number of assets and manpower as well as a preparation of an appropriate organization of works not only at a very water obstacle but also in an area before and beyond an obstacle. The execution of such tactical-organizational activities was of a significant importance due to the fact that it frequently allowed for obtaining a tactical advantage which, to a large extent, affected the further final result of armed conflicts.

¹ They include such elements of the environment as: a valley, a swamp, a river, a gorge, a hill, migratory routes of wild animals, etc.

² They include such transport facilities as: a road, a railway, a canal, a pipeline, pedestrian or bicycle passages, etc.

History of wars clearly demonstrates that the issue of crossing water obstacles had to be faced since Antiquity³. In that period, not only natural crossings of troops were organized, such as wading and floating crossings, but also additional specialized devices constituting a precursor of modern regular crossing equipment were used. Initially, leather bags (bladders) that served both for the transportation of water and food supplies and as floats for crossing water obstacles were applied. Further, folding light wooden boats⁴ and wooden bridges were constructed which incipiently were carried by pack animals and then by a mechanized wheeled transport.

Growing demands of forces in terms of providing an appropriate mobility as well as development of new building materials (e.g. steel) led to, in the middle of the 19th century, designing of new constructional solutions of mobile pontoon fleets and implementing new procedures related to building pontoon bridges. Thus, the first pontoon fleet with two metal semi-pontoons⁵ was developed, which due to its uncomplicated construction could be easily transported and allowed for building bridges at a faster pace. In the subsequent years, the further development of crossing-bridging equipment triggered by an increasing requirement for a rapid crossing of water obstacles can be noticed. Subsequently, on the eve of the outbreak of WW II the majority of European armies, including the Polish Armed Forces, possessed specialized bridging equipment comprising such constructions as: footbridges on waterproof floats that enabled building ferries for crossing of single guns or horse wagons, ferries and bridges with load capacities of several tons on rubber boats (pontoons) filled with the air with a wooden platform and several-ton capacity ferries and bridges on wooden boats or metal pontoons. In turn, during WW II a particular development of self-propelled crossing equipment occurred. One can notice a visible utilization of the equipment as follows: amphibious boats with outboard motors, high-speed assault boats and floating vehicles or tracked carries of a low capacity (up to 5 t).

At present, crossing a water obstacle is a task as complicated as it used to be in the past, despite the fact that individual armies have more modern crossing – bridging equipment at their disposal. Mainly, it results from the fact that particular armies possess a higher combat capability, especially as far as an effective striking of fire assets against marching subunits is concerned. It is clearly visible both while approaching a water obstacle and during its crossing as each water obstacle constitutes a potential defense line for enemy's tactical groups. The above-mentioned analysis evidently

³ First drawings and descriptions that survived until today refer to crossing rivers by the Assyrians in the 8th century BCE during numerous wars waged by them, among others, in Asia Minor and during their march to India. (See: S. Lang. *Przeprawy. Podrecznik*. Warszawa: Wydawnictwo MON; 1979, p. 7-13).

⁴ In the 4th century BCE, Alexander the Great's forces were equipped with leather bags filled with the air and folded wooden boats. During his expedition to India this equipment was complemented with ad-hoc prepared elements of road foundation, typically in a form of fascine, and used to cross encountered water obstacles (See: S. Lang. *Przeprawy. Podrecznik*. Warszawa: Wydawnictwo MON; 1979, p. 7-13).

⁵ This fleet was developed and designed in 1827 by an officer of the Austrian Army, Capt. K. Birago. In the 1870s this fleet was introduced in the service of almost all West European armies. The fleets of Birago type survived till WW I. The comparable fleet of metal semi-pontoons was developed in Russia (Lt. Col. Tomilowski), (See: S. Lang. *Przeprawy. Podrecznik*. Warszawa: Wydawnictwo MON; 1979, p. 7-13).

demonstrates that during a planning process of crossing a water obstacle the emphasis should be put on preparing specialized equipment to an extent enabling its crossing in various types of tactical activities at a pace equal to which individual subunits conduct operations that do not require crossing an obstacle. This is largely due to the fact that contemporary tactical conditions and requirements related to crossing water obstacles by advancing forces should take into consideration in their analysis the issue of activities of troops in a difficult-to-reach or impassable terrain, especially in terms of utilization of mechanized and self-propelled crossing-bridging equipment. It results from increased mobility and high dynamics of activities that force commanders to cross various water obstacles in a short time. Therefore, it is clearly seen that the issue of crossing water obstacles is a relatively complex and complicated question which requires both specialized and tactical knowledge from commanders.

Currently, source literature does not contain systemized contents related to organization of crossing water obstacles that would be discussed in a single instruction or regulation. All available source materials are either outdated⁶ or contents enclosed in them is not always consistent with each other thus, creating an element of ambiguity as far as their interpretation⁷ is concerned. Those uncertainties result frequently from inappropriate translating of NATO⁸ normative documents which are implemented to the Polish Army or from creating normative documents by teams of authors where each chapter is prepared by a different author, what regularly triggers the absence of the correlation between particular chapters⁹. What is more, chapters recurrently comprise analogous contents disparately interpreted by individual authors.

With regard to the aforementioned issue, the authors of the article attempted to address and systemize binding procedures of crossing water obstacles focusing their attention on describing the principles of preparing, organizing and commanding of water obstacles, as knowledge of those procedures is indispensable both for officers of engineering forces setting specialized crossings with the use of crossing-bridging equipment and for general military commanders responsible for a crossing sector. It is of a significant importance, as crossing water obstacles is one of the most demanding tactical activities and requires a particular effort from all military branches.

⁶ The manual Crossings by S. Lang from 1979 is the still valid instruction as far as crossing water obstacles is concerned (See: S. Lang. *Przeprawy. Podrecznik*. Warszawa: Wydawnictwo MON; 1979, p. 7-13).

⁷ Such contents, frequently contradicting each other, are contained in the Instruction, Dowództwo Wojsk Lądowych. *Instrukcja. Pokonywanie przeszkód wodnych przez pododdziały wojsk lądowych*. Warszawa: Dowództwo Wojsk Lądowych 2013, p. 11, 27, 71, where the point 1086 describes 5 phases of fording a water obstacle and in the point 1329, 3 phases are mentioned.

⁸ STANAG 2395 is such the document, STANAG 2395. *Deliberate water crossing procedures*. Ed. 3, MCLSB 2007.

⁹ The Instruction regarding crossing water obstacles by land forces constitutes such the document, Dowództwo Wojsk Lądowych. *Instrukcja. Pokonywanie przeszkód wodnych przez pododdziały wojsk lądowych*. Warszawa: Dowództwo Wojsk Lądowych 2013, p. 11, 27, 71.

1. Procedures of crossing water obstacles

Crossing water obstacles is to be treated as an integral part of movement of forces whose main objective is to deploy the combat power on an opposite bank of a water obstacle simultaneously maintaining continuity of conducting activities and consistency of a formation. It can be organized both within the framework of the combat support¹⁰ and the engineering support¹¹ executed by engineering subunits as well as by elements of the theater movement coordination in following situations [1, p. 4-18]:

- at the Line of Battle Contact (on water obstacles separating fighting parties) – crossing water obstacles is organized and maintained by troops being in contact,
- at the operational depth (on water obstacles in a terrain occupied by an enemy) – crossing water obstacles is organized and maintained by a tactical commander¹²,
- at the rear (on water obstacles in a terrain occupied by own or allied forces) – crossing water obstacles is organized and maintained by a host nation with own crossing-bridging assets.

Depending on a type of combat operations, crossing a water obstacle can take two forms, i.e. the *crossing* and the *fording*. The crossing is understood as organized movement of forces through a harsh terrain, usually through a natural or artificial water obstacle which can consist of one or several points of the crossing¹³ [1, p. 4-18]. Typically, it is characterized by crossing a water obstacle without the contact with an enemy. In turn, the fording is understood as tactical activities in a form of an attack combined with crossing a water obstacle, whose opposite bank is defended by an enemy [2, p. 70, 442] thus, as can be clearly noticed, it is a specific type of the crossing in which engaged subunits must cross a water obstacle in the contact with an enemy being exposed to an impact of enemy's direct fire and supporting troops being exposed to artillery and air force barrage fire. The fording is frequently organized in order to

¹⁰ Combat support – totality of undertakings aimed at decreasing the efficiency of an enemy's strikes and providing own forces conducive conditions for successful execution of a task under various situations. It covers: security, masking, common anti-aircraft defense, engineering support, chemical defense as well as topographical and hydrometeorological support (See: Dowództwo Wojsk Lądowych. *Regulamin działań wojsk lądowych*. Warszawa: Dowództwo Wojsk Lądowych; 2008, p. 70, 442).

¹¹ Engineering assistance – activities realized by units (subunits) of engineering forces for a tactical formation (a unit, a subunit) consisting in executing tasks and engineering works that enable a supported entity to achieve an ordered objective (See: Dowództwo Wojsk Lądowych. *Regulamin działań wojsk inżynierskich wojsk lądowych (tymczasowy)*. Warszawa: Dowództwo Wojsk Lądowych; 2011, p. 167).

¹² A tactical commander – a commander entitled to task subordinated subunits to fulfil a mission determined by a higher commander (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkód wodnych. Przepawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010). It can be a commander of a tactical formation, a unit or a battalion (See: Dowództwo Wojsk Lądowych. *Instrukcja. Pokonywanie przeszkód wodnych przez pododdziały wojsk lądowych*. Warszawa: Dowództwo Wojsk Lądowych 2013, p. 11, 27, 71).

¹³ A crossing point – a point of a single bridge or ferry crossing or – in an initial phase of a landing crossing – on rifts, floating or wading vehicles on a wide front (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkód wodnych. Przepawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010). Typically, one can speak about a crossing's point in case of any single crossing.

take a defense position of an enemy, who prepared the defense based on an opposite bank of a water obstacle and to capture a bridgehead¹⁴. Therefore, as it clearly arises from the above-presented data, during the fording an attacker is forced to cross a water obstacle by part of its forces in contact with an enemy and then capture convenient areas on an opposite bank thus, providing rapid crossing of main forces. The fording is complete when an opposite bank is captured by own forces and an enemy is not able to conduct effective fire from ground striking assets, mainly from tanks and anti-tank artillery. At that moment, the fording a water obstacle takes the form of the crossing.

Fording is typically executed with the use of three methods [3, p. 11, 27, 71; 4, p. 150]:

- hasty fording,
- deliberate fording,
- covert fording¹⁵.

While analyzing *hasty fording*, the fact that it constitutes a principal method of crossing a water obstacle by a tactical formation is to be taken into consideration. Normally, such activities are carried out on a wide front with the use of self-propelled afloat assets (e.g. BWP, KTO, BRDM, PTS-M, etc.). The essence of this method lies in crashing enemy's main forces on approaches to a water obstacle, striking reserves and preventing from organizing the defense beyond a water obstacle, rapid approaching to it by attacking forces (on a wide front) as well as crossing it without stopping in order to deploy for an attack on an opposite bank. Usually, during execution of such a task, units detached from first echelon of tactical formations, helicopterborne and airborne groups are used to capture fixed crossings or to hamper establishing and functioning of an enemy's defense on a bridgehead.

In turn, *deliberate fording* is executed by a tactical formation (unit) in case of a failure of hasty fording and while taking an attack from a position in direct contact with an enemy defending beyond a water obstacle. This method of crossing frequently requires changing a formation of manpower and assets in depth and width of a frontline as well as deploying a bigger number of combat assets in a vicinity of a water obstacle in order to strike an enemy on an opposite bank. In this situation, fording is executed in a designated area with simultaneous engaging of enemy's forces with fire within an entire attack zone and with the employment of camouflaging of a fording area in a form of setting apparent¹⁶ and artificial¹⁷ crossings. It is preceded by preparatory fire

¹⁴ A bridgehead – an area on an opposite bank of a water obstacle, vulnerable to an enemy's striking, which should be kept or controlled until a crossing has been accomplished, what enables embarking and debarking of the equipment and conducting a maneuver during a further stage of combat operations (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkod wodnych. Przeprawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010).

¹⁵ A special type of crossing water obstacles that is executed in combination with the infiltration under reduced visibility. It is conducted under the cover in order to achieve surprise and reduce losses of subunits being crossed.

¹⁶ Apparent crossings – organized within a framework of operational masking. They aim at mocking a main fording (crossing) sector in order to mislead an enemy as to a main objective of an operation. They are organized in another area than primary crossings. Typically, they are established by subunits that organize a fording (crossing) sector with the use of own masking assets (e.g. dummy military

of an attack during which main forces take attack (fording) positions or leave a staging area and deploy to assigned attack lines. Moreover, a tactical formation can land tactical helicopterborne or airborne groups to isolate a combat area and to aggravate defending of an opposite bank. *Covert fording* is a particular method of crossing a water obstacle that is conducted under reduced visibility conditions (e.g. at dusk or at dawn) combined with the penetration hence, is undertaken secretly in order to achieve surprise and to increase losses of units fording a water obstacle. The method of fording a water obstacle is decided by a commander of crossing forces.

To cross a water obstacle, five subsequent phases are to be organized and they are as follows [1, p. 4-18; 3, p. 11, 27, 71]:

- *approaching a water obstacle* that include the approach of bridgehead's forces¹⁸ whose aim is to capture an opposite bank defended by an enemy,
- *assault* – crossing a water obstacle by bridgehead's forces and capturing battle positions of an enemy on an opposite bank,
- *capturing a bridgehead* that include crossing of manpower and assets (subsequent echelons) whose task is to increase the number of captured battle positions on a bridgehead,
- *strengthening* a bridgehead that covers fortification works of own battle positions, which is to assure assembling manpower and assets required for breaching an enemy's defense and advancing of an offensive operation,
- *breaching* – breaking an enemy's defense on an opposite bank that aim at achieving a main objective of an operation.

Before fording a water obstacle, engineering troops (breaching groups) in cooperation with engineering reconnaissance subunits should identify and then clear gaps in mine-field barriers especially at an approach to a water obstacle, a very obstacle and on an opposite bank¹⁹. Moreover, an appropriate organization of a system of fire support carried out by missile and artillery subunits and air force is to be maintained. Additionally, helicopterborne and airborne groups should be employed to conduct tasks decreasing a combat potential of an enemy through disorganization of its command, logistic support or fire support systems. All above-mentioned efforts must be integrated with anti-aircraft artillery subunits that should effectively fight a potential air foe as

equipment) in their areas of responsibility or by operational level masking subunits with the employment of confusion reflectors, dummy pontoon bridges and handhold assets.

¹⁷ Artificial crossings – crossings organized within a framework of operational masking, functioning in parallel to primary crossings with the use of artificial forces on selected operational directions. They aim at distracting an enemy from primary crossings established at a main operational direction. Usually, they are established on the basis of ordinary crossing – bridging equipment.

¹⁸ Bridgehead's forces are based on an assault echelon (e.g. subunits detached for reconnaissance or subunits clearing gaps in potential engineering barriers, intruder-assault groups, etc.) and main forces. A task of bridgehead's forces is to capture advanced defense positions of an enemy as well as to strengthen and develop a bridgehead. Controlling a terrain by an assault echelon should make an enemy unable to conduct observation of a terrain and execute a direct fire at individual points of a crossing.

¹⁹ Typically, it will be carried out under the cover, in reduced visibility conditions, on own landing and engineering boats as well as on ad-hoc crossing assets in order to maintain light and sound concealment.

troops crossing a water obstacle are particularly exposed to its impact. What is more, those activities are to be combined with a constant and active masking with the use of the professional and hand-smoking equipment²⁰, e.g. conducted by engineering or chemical subunits.

Leaving own bank by a first echelon of bridgehead's forces is regarded as the beginning of fording²¹. Typically, these are leading mechanized companies which organize landing crossings together with reinforcement elements crossing a water obstacle under a cover of artillery, tank and air force fire. Simultaneously, movement control subunits and engineering troops must cross with them in order to breach gaps through enemy's engineering barriers and to conduct engineering works on an opposite bank to organize and maintain specialized points of crossings.

Subunits of bridgehead's forces conduct covert fording with the use of landing self-propelled assets (e.g. BWP, KTO, BRDM, etc.) and attacking an enemy to succeed the fight as well as capturing a bridgehead remains their main task. At the same time, subunits assigned for crossing on landing assets, board floating assets at designated areas and then cross to an opposite bank of a water obstacle to reinforce bridgehead's forces (e.g. anti-aircraft subunits equipped with ZU-23/2). At the first place, amphibious transportation vehicles PTS-M and landing crafts are used as well as ferry crossings from PP-64 pontoon fleet are established and maintained. Simultaneously, a deep wading of tanks can be executed by armored subunits to build-up the number of tanks on an opposite bank. In turn, engineering troops (pontoon subunits) commence building pontoon bridges after strengthening an opposite bank and leaving it by task force or leading assault units at a distance providing safety for bridge constructions' building. It is assumed that, this is a terrain on which enemy combat assets' are not able to execute the direct fire at a water level.

2. Crossing sector and its main elements

Most often, *a sector of a crossing* is understood as an area of a few adjacent points of a crossing together with an attached terrain controlled by a single commander, which is located on one or both sides of a water obstacle of a depth that can be limited by a line of attack²² and an adjusting line²³ [1, p. 4-18]. Typically, it is assumed that on a crossing sector of a tactical formation, 2-3 units' crossing sectors are organized however, it is to be taken into consideration that they should be chosen to provide free-

²⁰ During camouflaging of crossings, despite smoking posts on the ground, it is essential to organize smoking positions on a crossing (e.g. on cutters, boats, pontoon blocks, barges, etc.).

²¹ Beginning of fording is usually codenamed as H from the word "hour".

²² Line of attack – an imaginary line in a terrain serving for control and coordination of tactical activities, typically spreading along a crossing sector before a water obstacle (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkod wodnych. Przepawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010).

²³ Adjusting line – an imaginary line in a terrain serving for control and coordination of tactical activities, typically spreading along a crossing sector beyond a water obstacle (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkod wodnych. Przepawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010).

dom of movement of crossing subunits and those setting particular points of crossing, to allow for dispersing of forces in case of enemy's fire as well as to assure convenient areas to organize main, alternate, apparent or artificial crossings.

An assigned general military commander (a tactical commander) of a given command level²⁴, who personally or through his staff informs a chief of engineering forces of troops being crossed about a received task and issues instructions regarding engineering support is responsible for combat support of a crossing sector. Thus, it can be seen that a chief of engineering forces will be a direct organizer of this task and subunits establishing particular points of a crossing will execute the task.

Normally, a crossing sector covers a certain number of crossing points²⁵ together with alternate axis²⁶ designated for their setting, assembly²⁷, waiting²⁸, staging²⁹ (deployment) areas, assembly areas of landing – crossing and pontoon units³⁰ together with crossing equipment, areas of sealing tanks and combat vehicles³¹, areas of boarding

²⁴ A commander of a crossing sector is typically appointed by a tactical commander from among subordinated subunits depending on a tactical situation and executed tasks. In offensive operations commanding of a crossing sector can be entrusted to a commander capturing a bridgehead or to a commander of forces being in contact with a water obstacle.

²⁵ Most frequently, it will be following types of crossings: landing crossings (on combat and reconnaissance vehicles, wheeled armored carriers, self-propelled artillery assets or self-propelled floating carriers), wading and floating crossings, ferry and bridge crossings with the use of tactical and folded bridges, deep tanks wading as well as crossings on ice.

²⁶ Crossing axis – a direction joining a start bank of a water obstacle with an opposite bank, imaginarily marked in a terrain at a crossing point as a location where embarkation and debarkation of soldiers and equipment or only a contact of floating assets with a shoreline take place.

²⁷ Assembly area – an area designated for arranging forces to regenerate the combat capabilities or to proceed with the next operation or crossing, which should be located approx. 30 km before and beyond a water obstacle (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkod wodnych. Przeprawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010).

²⁸ Waiting area – a place near a road or a crossing point which serves for arranging and concealing subunits awaiting crossing a water obstacle. Typically, this area is designated on both banks of a water obstacle at a distance of 1.5-2 km. Subunits in this area regenerate combat power after executing a march from an assembly area, check technical conditions of their equipment and prepare it for crossing (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkod wodnych. Przeprawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010).

²⁹ Staging area – a place hidden from an enemy's observation in which subsequent crossing echelons that await a signal to departure for an initial line are grouped. Soldiers and equipment are allocated to respective crossing assets in this area. Practically, individual staging areas are designated for each crossing point (See: *Dowództwo Wojsk Lądowych. Instrukcja. Pokonywanie przeszkod wodnych przez pododdziały wojsk lądowych*. Warszawa: Dowództwo Wojsk Lądowych 2013, p. 11, 27, 71). In some cases, it is allowed to omit these areas (only waiting areas are occupied).

³⁰ Crossing and pontoon subunit staging area – also called a task execution staging area, is regularly used for a pontoon company to adjust pontoon blocks being in a transport position to an unloading readiness position (spreading pontoon blocks), to maintain a reserve as well as to dispose unloaded vehicles of a pontoon fleet. As for a crossing platoon, in turn, this area is used in order to check technical conditions of carriers and to maintain a reserve. Typically, it is situated at a distance of 2-3 km from a water obstacle.

³¹ Areas of sealing tanks and infantry fighting vehicles are established by armored and mechanized subunits. They should be characterized by good camouflage parameters against enemy's observation and situated

the first echelon's units³² on self-propelled landing assets, areas of transportation echelons, marching routes from assembly to waiting (deployment) areas and further to individual types of crossings as well as lateral (main) roads. Figure 1 presents an exemplary scheme of a crossing sector's organization.

Apart from the main axial and lateral roads, two coastal lateral roads at the distance of 1 to 1.5 km before and beyond a water obstacle as well as temporary and cross-cut roads to individual points of the crossing are to be organized. Traffic control posts³³ whose main task is to control the planned movement of forces are to be established on all march roads, especially at critical points (e.g. crossroads, entrances and exits of particular areas etc.).

It is apparent that in order to cross a water obstacle seamlessly, first, deployment on designated march roads to an assembly area³⁴ is to be executed. It is an area in which each subunit should establish communication with a staff of a tactical commander and a movement coordination center to gain information regarding, among others, a schedule of crossing a water obstacle³⁵ which is an element of a plan of water obstacle's crossing. A plan of crossing water obstacle should reflect commander's intent and embody an actual tactical situation. Typically, it should contain such elements as: actual tactical situation, commander's intent, regulations and arrangements concerning defense and protection, movement coordination, control of a terrain and support of individual points of a crossing, main and alternative points of a crossing and roads to/from a crossing³⁶, formation of engineering troops and their tasks, a schedule of crossing a water obstacle by units or elements of a battle formation, organization of traffic³⁷, limitations of load-carrying capacity, speed limits, Military Load Capacity (MLC), cryptonyms and identification markings of single points of a crossing, deployment of manpower and assets designated to protect a crossing sector, medical, technical and supply support elements, CIS matrixes as well as organization of defense and protection of particular points of a crossing.

at a distance of 2-6 km before a water obstacle. Additively, a control point of sealing tanks or infantry fighting vehicles is organized, which should be located at a distance of 1-1.5 km before a water obstacle.

³² Most frequently, an area of a transportation echelon constitutes a staging area for a pontoon subunit.

³³ A traffic control post – an element of a movement organization system designated for conducting tasks related to controlling and coordinating of movement depending on operational requirements. Its functional organization is provided by a movement coordination center (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkod wodnych. Przeprawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010).

³⁴ In certain tactical situations, an assembly area can be omitted and waiting areas of individual crossing points can be directly occupied.

³⁵ A schedule of crossing a water obstacle, also known as a crossing roster, contains an order of crossing of particular subunits, thus, determines a sequence of their approach to individual crossing points along with deployment of a battle formation's elements.

³⁶ It also refers to roads designated for engineering and special forces, diversions and detours (if defined).

³⁷ It includes roads to crossing points, roads beyond a water obstacle to waiting and assembly areas, lateral roads, traffic control posts, assembly areas, waiting areas and deadlines of control points and lines crossing (See: *Norma Obronna. NO-02-A045:2010. Pokonywanie przeszkod wodnych. Przeprawy*. Warszawa: Ministerstwo Obrony Narodowej; 2010).

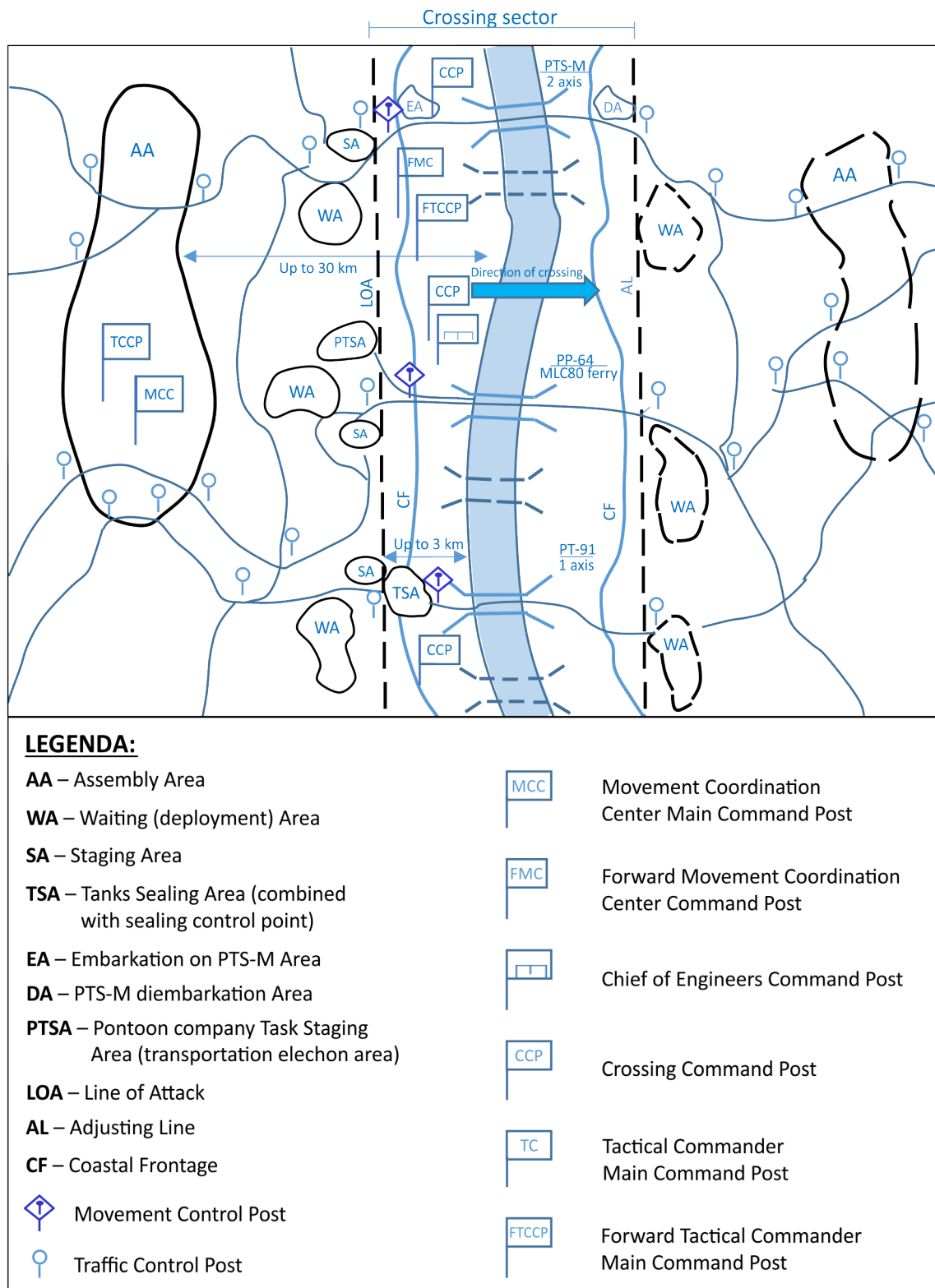


Fig. 1. Diagram of crossing sector's organization

Source: Own study.

Further, each subunit commander should, after studying a schedule of crossing of a water obstacle, on an agreed call and on a designated march road, deploy from an assembly area to a waiting area and then to a staging area. Occupying a waiting and staging areas should adhere to a plan of crossing of a water obstacle. As soon as a staging area is occupied by a subunit, on an agreed call and through a designated point or points of a crossing, it crosses a water obstacle in order to occupy a waiting area on an opposite bank. After taking this area, a subunit commander examines technical conditions of the equipment after crossing as well as reports about potential losses. During the next stage, on an agreed call, a subunit deploys to an assembly area to return operational.

3. Command and control of a crossing sector

A crossing order is issued by a tactical commander who is directly responsible for executing tactical activities related to crossing a water obstacle. After taking a decision to cross a water obstacle, a commander must initially plan and calculate the time of crossing tasks' execution then, establish and maintain an adequate number of crossing points together with their combat support as well as organize the efficient and seamless movement control. Following command and control elements should be established by a tactical commander to plan and control the movement at a crossing sector [1, p. 4-18]:

- crossing command,
- crossing sector command,
- command of individual points of a crossing,
- movement coordination center,
- movement coordinator in an assembly area,
- movement coordinator in a waiting area,
- movement coordination posts.

Usually, a function of *crossing command* will be held by an original tactical command or a command detached from a subordinated staff. It is located in an assembly area and constitutes a main command post. It should consist of specialists responsible for operational, movement control, engineering, combat support, communication and electronic warfare matters. Frequently, liaison officers from crossing subunits are assigned to it to maintain direct communication between a commander of a point of crossing and a subunit being crossed. If a tactical commander is not able to efficiently control crossing from a main command post, as a result of e.g. a changing tactical situation, a forward command post is established, frequently in an area of a water obstacle at a main crossing point's direction. Yet, developing a plan of crossing a water obstacle is a key task of the command.

In turn, a *crossing sector command* is organized in case of establishing a vast number of crossing points, where on a crossing sector of a tactical formation, crossing sectors of individual units are arranged. They are determined by a tactical commander from among subordinated commands of units being crossed depending on a tactical situa-

tion and tasks carried out. In offensive operations, commanding a crossing sector may be assigned to a commander capturing a bridgehead or a commander of troops being in the contact with an enemy. Typically, officers responsible for, among others, establishing individual points of a crossing, movement control and preparing elements of a combat control should be included in this command. The main tasks of a crossing sector command include: establishing of security (of e.g. a march road, waiting areas and a terrain adjoining a water obstacle from a staging line to an adjusting line), movement control (e.g. maintaining a fixed pace of a crossing and providing flexibility and smoothness of traffic, avoiding disturbances in functioning of a crossing and crossing control of manpower and equipment in accordance with a schedule), a terrain control (e.g. coordination of the use of a terrain by subunits deployed in a vicinity of a water obstacle, in waiting and assembly areas and distribution of crossing assets and crossing support elements) as well as support of crossings (e.g. engineering, technical, medical, logistic and other support which can result from a combat situation in a crossing sector).

Each point of a crossing is commanded by commanders of subunits that organize and maintain particular points. Principal tasks of a commander, among others, cover: preparing and maintaining a crossing point including entries and exits, determining crossing axis for landing – crossing assets and ferries, assuring technical functioning³⁸ of a crossing and maintaining operability of crossing assets, crossing manpower and assets at a commanded crossing point as well as tasking subunits being crossed, informing a movement coordinator in a waiting area about crossing point's readiness to cross forthcoming subunits, technical maintaining³⁹ of a crossing and providing continuum of movement at a crossing point.

A *movement coordination center* is organized in order to provide an effective and harmonized deployment of forces to assembly and waiting areas and to individual crossing points as well as to cross a water obstacle seamlessly. A movement control can be executed by reconnaissance subunits, traffic control subunits and Military Police. In

³⁸ Establishing of a crossing point includes among others: engineering reconnaissance of a water obstacle and a terrain in the vicinity of a crossing point as well as mine clearing, preparing and marking of roads leading towards a crossing point, preparing carriers or installing ferry and bridge constructions, building shelters for soldiers from subunits that organize a crossing point, building mine and fire countermeasures barriers, preparing emplacements for order – security services and camouflaging of crossings (See: S. Guzdek. *Działanie kpoint/bsap podczas zabezpieczenia działań bojowych DZ*. Wrocław: Wydawnictwo Wyższej Szkoły Oficerskiej imienia Tadeusza Kościuszki; 1995, p. 22-59).

³⁹ Maintaining a crossing point covers among others: replenishing or replacing of broken crossing – pontoon assets and conducting works assuring their proper functionality, carrying out a constant observation of a water obstacle and executing an engineering reconnaissance at an axis of an alternate crossing, maintaining a constant operational readiness of roads at a crossing point and preparing new ones if required, crossings maneuver (a tactical maneuver – switching from a main crossing to an alternate one or a technical maneuver – switching from one type of a crossing to another e.g. from bridge to ferry crossing), protecting personnel and equipment of subunits that organize a crossing point, conducting search and rescue operations, maintaining constant communication with subunits being crossed as well as mastering camouflage works (See: S. Guzdek. *Działanie kpoint/bsap podczas zabezpieczenia działań bojowych DZ*. Wrocław: Wydawnictwo Wyższej Szkoły Oficerskiej imienia Tadeusza Kościuszki; 1995, p. 22-59s).

case when movement at crossings requires changes in a current local traffic organization and directing it to other roads, movement coordination can be supported by the Police or other public services units. A movement coordination command at each crossing point should cooperate with subunits being crossed and commanders maintaining individual points of a crossing. Main tasks of a movement coordination center are as follows: informing a crossing commander about movement of troops, establishing communication for efficient movement control, liaising with the Police or local public services, participating in developing of a water obstacle's crossing plan (e.g. designation of axial and lateral roads and their bypasses as well as assembly, waiting and staging areas), preparing field road signs (MLC) and forming crossing teams i.e. marching columns of subunits being crossed and their dispersion in particular areas. A movement coordination center's commander controls movement at a crossing sector being supported by subordinated movement coordination staff and commands and appoints from among them: *a movement coordinator in an assembly area, a movement coordinator in waiting areas and traffic control posts.*

A movement coordinator in an assembly area should cooperate with commanders of individual crossing points and with movement coordinators in waiting areas. His/her duties include among others: establishing of an assembly area, collision-free entering an assembly area by subunits, establishing traffic control posts at an assembly area's entry and exit points, overseeing a movement control staff in an assembly area, directing crossing teams i.e. marching columns to individual crossing points as well as prioritizing the movement of privileged columns.

Commanders of traffic control posts are usually appointed as *movement coordinators in a waiting area*. A movement controller in a waiting area cooperates with a movement controller in an assembly area as well as with a commander of a crossing point in his/her area of responsibility. Duties of a controller cover: establishing of a waiting area, supervising regulations binding in this area, traffic control in a waiting area and halting the movement of marching columns and dispersing vehicles in case when functioning of a crossing point is disrupted, until its operability has been resumed.

Traffic control posts, in turn, are disposed at entry and exit roads to/from an assembly area, at main crossroads, at waiting and staging areas as well as at attack and adjusting lines. Tasks of the posts contain among others: constant monitoring of subunits' movement at a crossing sector, reacting to potential disturbances occurring on roads and at individual point of a crossing as well as directing units to alternative roads. Traffic control posts cooperate and maintain permanent communication with a movement control command at a crossing sector as well as with commanders of individual crossing points.

Reassuring, it is clearly visible that a tactical commander employs various elements of command and control to cross a water obstacle efficiently and safety, whose when well-organized, support him/her to command a crossing sector in a seamless manner, that in turn, leads to achieving a main objective of an operation, namely, a hasty crossing of wide or very wide water obstacle.

Conclusions

Crossing water obstacles is a particularly difficult task during the execution of tactical operations, as it requires engaging and close cooperating between various military branches. It comes from the fact that water obstacles significantly affect a method of conducting tactical activities by each of fighting sides due to the fact that, on the one hand, they substantially limit the movement of attacking forces and on the other hand, allow for organizing an effective defense based on an opposite bank of a water obstacle. This effective defense carried out by a potential enemy, combined with an appropriately prepared artillery and air fire support, will constitute a particularly difficult and complex because crossing a water obstacle will be executed in contact with enemy's troops at a bridgehead which in turn, will inflict significant manpower and equipment losses. This complexity will, first of all, consist in an adequate planning and coordinating of various military branches' activities mainly, mechanized, engineering, artillery, anti-aircraft and air force subunits, as a success of a fight will depend on their specialized training. Hence, activities of engineering, artillery and air force subunits will be of a significant importance.

In case of engineering subunits, the main effort will be focused on reconnaissance of a water obstacle, particularly in aspects related to potential engineering barriers, especially minefield barriers and consequently, to clear the gaps in them. Moreover, engineering forces, mainly pontoon subunits, will be engaged in establishing and maintaining crossings with the use of specialized landing – bridging equipment. In turn, artillery subunits will execute fire support tasks to eliminate and limit combat potential of an enemy in order to decrease an effective impact of its combat assets. Additionally, artillery will contribute to increasing a freedom of own air force employment through striking enemy's anti-aircraft assets as well as will limit a maneuver from the depth of an enemy's battle formation (approaching of reserves), which will considerably facilitate conducting of operations by forces fighting at a bridgehead. As for air force, striking defense lines at a bridgehead will constitute their main task. What is more, a commander will have to demonstrate a tactical sense in order to succeed in a fight, as achieving a main objective of an operation, which is crossing of a water obstacle, requires the surprise combined with the infiltration. This clearly indicates that crossing a water obstacle is a relatively complicated subject and requires commanders having the adequate knowledge of crossing procedures, as their implementation during the planning process as well as their execution in practice will be considered as essential by a tactical commander.

The complexity of these procedures in terms of organizing command and control during crossing (fording) procures that the whole issue cannot be introduced and described in the single article. This issue should become the subject of further specialized deliberations and thorough analysis as the contents addressed in the article only familiarize with the essential knowledge regarding crossing water obstacles pursuant to the binding normative documents. It does not mean, however, that knowledge of the presented contents will not allow post-holders for the adequate preparation for various tactical exercises during which crossing a water obstacle will be one of the tasks, as

commanders must be aware that they are responsible for the proper organization, effective command and safety of forces being crossed, thus, they have to be familiar with contents of regulations and instructions and strictly adhere to them.

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All authors declared no conflict of interests.

Author contributions

All authors contributed to the interpretation of results and writing of the paper. All authors read and approved the final manuscript.

Ethical statement

The research complies with all national and international ethical requirements.

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Procedury pokonywania przeszkód wodnych w świetle obowiązujących dokumentów normatywnych

STRESZCZENIE

Celem niniejszego artykułu jest przedstawienie obowiązujących procedur pokonywania przeszkód wodnych w świetle aktualnie obowiązujących dokumentów normatywnych. Artykuł porusza problematykę urządzenia przepraw w podstawowych działaniach taktycznych, a także opisuje organizację odcinka przeprawy (forsowania) z uwzględnieniem jego głównych elementów. Ponadto charakteryzuje zasadnicze elementy kierowania i dowodzenia występujące na odcinku przeprawy.

SŁOWA KLUCZOWE forsowanie, przeprawa, działania taktyczne, kierowanie i dowodzenie

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