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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

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30 August 1978

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MEMORANDUM FOR: The Director of Central Intelligence

FROM : [redacted]
Acting Deputy Director for Operations

SUBJECT : MILITARY THOUGHT (USSR): Industry-Produced Low-Level Bridge Sections for Troops

1. The enclosed Intelligence Information Special Report is part of a series now in preparation based on the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal "Military Thought". This article starts with the premise that low-level trestle bridges must be able to be erected in the same length of time it takes to dismantle pontoon bridges, or about twice the present rate. This can be done by going over to longer spans of lighter and stronger materials and prefabricating bridge components in factories rather than in the army. Some specifications for such bridges are proposed; and the article points out that, besides being quicker to erect, they will be more economical and will have civilian as well as military applications. This article appeared in Issue No. 2 (78) for 1966. [redacted]

2. Because the source of this report is extremely sensitive, this document should be handled on a strict need-to-know basis within recipient agencies. For ease of reference, reports from this publication have been assigned [redacted]

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SUBJECT

MILITARY THOUGHT (USSR): Industry-Produced Low-Level Bridge Sections for Troops

SOURCE Documentary

Summary:

The following report is a translation from Russian of an article which appeared in Issue No. 2 (78) for 1966 of the SECRET USSR Ministry of Defense publication Collection of Articles of the Journal 'Military Thought''. The authors of this article are Lieutenant Colonel I. Kuznetsov and Major N. Lyubchenko. This article starts with the premise that low-level trestle bridges must be able to be erected in the same length of time it takes to dismantle pontoon bridges, or about twice the present rate. This can be done by going over to longer spans of lighter and stronger materials and prefabricating bridge components in factories rather than in the army. Some specifications for such bridges are proposed; and the article points out that, besides being quicker to erect, they will be more economical and will have civilian as well as military applications.

End of Summary

[redacted] Comment:

The SECRET version of Military Thought was published three times annually and was distributed down to the level of division commander. It reportedly ceased publication at the end of 1970. [redacted]

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Industry-Produced Low-Level Bridge Sections for Troops

by

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It is well known that, to erect parallel crossings in case of the destruction of permanent bridges over medium and wide rivers and ensure the timely negotiation of such obstacles by troops, the most acceptable type of crossing will be a bridge crossing. Such crossings are also required for replacing the floating bridges erected by the pontoon bridge units of the troops in order to maneuver organic bridge-crossing equipment and keep it for use during the operation. Calculations indicate that floating bridges should be removed from an obstacle within three to four hours after the troops begin crossing. The substitute bridges should be made ready for use within the same period of time.

The experience of the Great Patriotic War and postwar troop combat training experience indicate that the most rapidly erected bridges are low-level bridges (discounting bridges made of organic bridging equipment). At the present time, among the engineer troops of combined-arms and tank armies, there are engineer bridge-building platoons with bridge-building equipment sets which afford the possibility of erecting an average of 15 to 20 linear meters of bridge per hour.

Calculations that take into account the required number of lines of march, the availability of organic army bridge-building subunits, and the readiness times for substitute crossings, indicate that the rate of construction of low-level bridges must at least be doubled.

Having analyzed the status and development of the means of mechanizing bridge-building operations, we come to the conclusion that the most realistic method of solving this problem in the near future is to go over to the erection of low-level bridges with longer spans.

The optimum span length must be nine meters. The load-carrying capacity of single-pile trestles (with a slight increase in the pile diameter) is found to be completely sufficient for this span. The

nine-meter span, a multiple of the present 4.5-meter span, affords the possibility to divide a section in half and transport the span structures on trucks with or without trailers, and when the bridges are erected to use presently available and newly developed mechanized equipment capable of erecting such spans. The weight of the trackway of the nine-meter span structures allows the use of troop hoisting equipment. The construction of bridges with such spans is also possible with the aid of the present in-service KMS bridge-building equipment sets of the engineer troops, with slight modifications.

According to experience in the planning and use of models of military low-level bridge sections, eight- to 10-meter span structures with bearing members in the form of separate wooden trusses and composite beams, as well as of metal beams of ordinary low-carbon steel, are clumsy to handle. Bundles and stacks of these elements are too heavy for troop hoisting equipment and inconvenient for transporting.

Consequently, doubling the length of the spans leads to the necessity of devising new types of span structures with improved structural configuration and the use of effective materials, as well as the changing of the organization of their production and supply to consumers. We need not essentially alter the design of the supports now used. The production process requires that rather complex technological equipment and a sufficiently skilled work force be used.

The latter conditions virtually exclude the mass production of such sections within the troop units, not only in wartime but also in peacetime. The production must be organized by the nation's industrial enterprises or by specially created front or army prefabricating facilities.

The transition to centralized supply of troops with low-level bridge sections is dictated not only and not so much by considerations of design sequence and production technology. Transporting the heavy wooden sections prepared by troops over long distances requires a considerable amount of transportation equipment. Preparation of the sections out of local materials in the areas of the crossings while on the march is quite improbable, and extraordinarily complicated when the troops are committed to an engagement. We may note, incidentally, that centralized supply of the army with high bridge sections was done as early as the Great Patriotic War.

True, the tables of organization of the engineer units of combined-arms and tank armies include platoons for prefabricating sections

(mostly wooden). However, calculations and the experience of exercises show that these subunits, with the existing mechanized equipment, are able to prepare only one-fourth the daily required number of elements. Even the improvement of the mechanized equipment and the introduction of new sets would permit only half of the required volume of prefabrication work to be done. Increasing the table of organization strength of the subunits that prefabricate the sections within the engineer troops is scarcely possible and, obviously, not the best solution to the problem.

Thus what is obviously needed for increasing the rate of erection of bridges over water obstacles and for solving the problem of transporting the prepared sections on the march is to organize the centralized production of low-level bridge sections, primarily span structures, and the supply of them to the engineer troops.

Supplying ready-made span structures will reduce by a factor of about four to 4.5 the amount of prefabrication work among the troops, and this the present organic prefabrication subunits can accomplish. The problem will be solved more completely if the bridge-building subunits are supplied with sets of sections, with span structures and supports. In part, the preparation of four- to five-meter span structures by the troops will apparently be done as before during the preparation of roads in the front rear, in departure areas, in a defense, and in all cases where it is possible to avoid the expenditure of the more effective industrially produced sections.

According to foreign data, industrially produced bridge sections for the erection of bridges of various types are used in the armies of several capitalist countries and in civil engineering, which is considered an actual mobilization reserve.

In our opinion, the main consumers of industrially produced bridge sections will be the engineer and road troops. These sections will also find use in the national economy in the laying of gas and petroleum pipelines and electric power lines, etc. In the event of war, the bridge equipment used in the national economy can become a reserve for the civil defense engineer troops.

On the basis of expected conditions of use (among the troops and in the national economy) variations in sections should be permitted within certain limits. The troops will require bridges with a load-carrying capacity of 60 tons, whereas the majority of cases within the national economy will require only 20 to 25 tons. The length of the spans must be a

multiple of 4.5 meters, and the width of the roadway should be 4.2 meters for one-way traffic and six meters for two-way traffic. The sections must be prefabricated and demountable and suitable for repeated use. All these requirements, in our opinion, determine the design configuration of the bridge sections.

The comparatively low cost of the industrially produced bridge sections, in any case essentially lower than the cost of organic bridging equipment -- pontoon parks, vehicle-mounted bridges, etc. -- is also important. This is due to the place the sections occupy among the troops (crossing of the second echelons of the army and front) and to their relatively massive use and expenditure as the troops move about.

The industrially produced bridge sections must be readily transportable, so that they can be transported on regular trucks, by train, and by military transport aircraft. In the examination of the organization of truck shipment of the bridge sections, the experience of the logging industry is worth taking advantage of. In this industry, as among the troops, a present means of mass transport is the ZIL-157 truck, which is used at logging sites, usually together with the 2R-8-P2 pole trailer. The truck-trailer combination is usually loaded with a long load weighing up to 11 tons. The hauling is done on roads that are constructed under much the same conditions and with much the same standards as those involved in the case of tactical roads and cross-country routes.

The experience of the logging industry with the use of truck-trailer units on a mass scale is evidence of the dependability of the transport means and the economy of shipments in comparison with the use of trucks in the usual way. In our opinion, the truck-trailer combination should be considered the main means of transporting industry-produced bridge sections on a mass scale. On the basis of this experience, one ZIL-157 truck with a 2R-8-P2 trailer can carry enough span structures to erect 18 linear meters of one-lane low-level bridge. Transportation on trucks alone would be necessary whenever the sufficient number of trailers was not available, in mountainous theaters of military operations, and during seasons when roads are bad.

In our opinion, the construction materials that may be most widely used at present and in the near future are low-alloy steels (for example, 10KhSND or its equivalent MK40), bakelite-impregnated plywood, and wood.

The problem of erecting low-level bridges may be solved most successfully and reliably if there are available enough sections prepared

beforehand by industry to count on their use on army and front routes during the movement of troops from the interior of the country, during their commitment to the engagement, and during operations. However, the production capacity of industry apparently cannot provide a sufficiently rapid supply of troops with such a number of sections.

An analysis of the organic structure of the bridge-building and prefabrication subunits, their expected equipment level in the near future, and technical-economic calculations show that for equipping the engineer and road troops of an army, as well as front engineer and road units assigned to reinforce armies, it is best to have industrially manufactured bridge sections and to use them only on army routes.

On the front roads, the low-level bridges are for now most advantageously built of sections assembled in the front rear from local materials.

The successful negotiation of water obstacles by troops moving forward from the depth, particularly when they are being committed to an engagement, depends first of all on the presence and degree of perfection of the organic crossing and bridging equipment, pontoon sets and vehicle-mounted bridges. However, this success will be achieved only as a result of the timely maneuver of equipment, in which a large role will be played by substitute bridges. The building of such substitute bridges is possible on the condition that troop supply with satisfactorily effective bridge sections is organized and use of them is intelligently combined with the use of local construction materials.