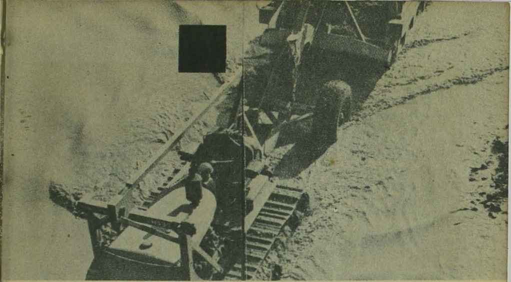


Construction power means moving large quantities of mud, rock or snow. Above, an earth-moving machine carries fill dirt to a bridge approach in Korea.

Construction Power is Combat Power

By Lieutenant General S. D. Sturgis, Jr.

(Reprinted from the ARMY Magazine)

FEW of our journalistic prophets of doom and disaster are warning us that if Detroit continues to produce automobiles faster than the construction industry can pour concrete paving, the day will come when all automotive traffic in the nation will grind to a halt, paralyzed from coast to coast by highways bumper-to-bumper with cars.

This omen is no more fantastic than the grim possibility of a military stalemate in any future war if our military construction power fails to keep in balance with other elements of combat power.

To understand this there must be an appreciation of the role of the engineer in modern warfare. In part, World War I bogged down in the trenches of France because construction equipment that could lift World War I armies out of the mud had not been developed in 1917-18. French roads were torturous channels of mud through which military columns crawled or stalled while engineer troops labored with hand tools to spread rock in almost futile attempts to keep essential traffic moving.

When World War II began, the American construction industry had come of age and Army engineers were able to build the roads and bridges, airfields and ports that our could be built at the scene of previous assaults. The security of our tenuous beachhead at Leyte hung in the balance for many weeks because we lacked the construction resources —troops and rock aggregates—necessary to build quickly the all-weather roads and airfields needed to support a breakout from the perimeter. Similarly, in Asia, the application of military pressure on the Japanese from the mainland, which would have

One of the largely unheralded instruments of victory in World War II was American construction power as typified by the bulldozer, the transit-mix concrete truck and other tools of our heavy construction industry in the hands of the Army's Corps of Engineers. These mobile machines built roads and bridges, airfields and ports, pipelines and supply bases all over the world. Example: Between D-day and VE-day Army engineers built 250 airfields in France at the rate of one every 36 hours

World War II forces demanded. We had construction power adequate to the requirements of the maximum combat power of our armed forces. True, our construction resources were never more than barely adequate, and occasionally were less than that. Throughout the Pacific area after mid-1943, the timing of our amphibious assaults was determined very largely by the rate at which bases been of immeasurable benefit to our combat operations in the Pacific, was severely restricted by the shortage of military supplies, particularly gasoline, which prevailed until the Ledo Road and its parallel pipeline were completed relatively late in the war.

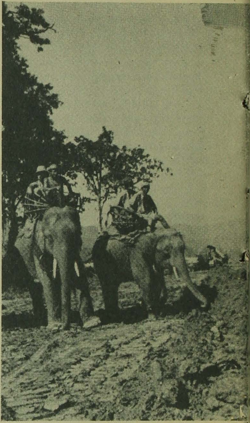
Thus the construction power of our Army engineers was, more often than not, the limiting factor affecting combat operations on the ground and in the air. Consequently, it was necessary for our field commanders in World War II and later in Korea, where engineer resources always were in short supply, to make the most efficient possible use of their scarce construction means. This conservation was effected in several ways.

First, at all command levels engineer requirements and capabilities were carefully integrated into operational and logistical plans. The most important single factor in making this possible was the universally accepted policy that gave the engineer of each Army command direct access to the commander and the principal members of the staff.

Second, the age-old principles of mass and economy of force were applied to the employment of engineers just as to other members of the Army combat team. Within the field army, for example, the army engineer commanded or otherwise exercised direct control over all engineer units not assigned to subordinate commands. By limiting the number of units assigned to subordinate commands to the minimum necessary for performance of normal missions, the army commander, through his engineer, was able to maintain direct control over a substantial portion of the construction power available to the army, and could shift that construction power almost as quickly as he could shift the fire power of his artillery response to the shifting tides of battle.

Third, at each command echelon responsibility for the total engineer mission was vested in a single individual who also was given control over the resources available to accomplish that mission. To appreciate the importance of this concept it must be understood that the engineer in effect must fight a battle within the larger battle being fought by the command as a whole. While infantry, armor and artillery concentrate their attentions wholly on the enemy, the engineer member of the team must concentrate partly on the enemy but primarily on the natural obstacles of terrain and weather which must be overcome. This battle of the engineer against Nature, while an integral part of the total battle, frequently bears very little apparent relationship to it, either space-wise or time-wise. For example, the concentration of engineer effort on the preparation of stream-crossing sites for an uncommitted corps while almost all other resources of the field army are supporting an already committed corps, is a good illustration of the apparent divergence of effort which can exist at a given time. These characteristics of the engineer mission require centralized control over engineer operations at each command echelon to achieve flexibility and preservation of unity in the engineer organization and to give it the capability of performing independent operations. If during the Second World War or the Korean conflict, vital construction power had been fragmented by dividing responsibility for the several elements of the engineer mission, it is questionable whether the limited construction resources available to our army commanders would have proved adequate to the task of sustaining the mobility of our armed forces in battle.

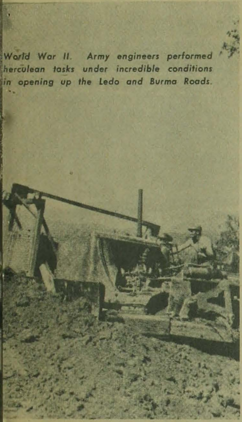
Looking to the future, new problems loom on the horizon. Just as the imaginative reader can visualize the possibility of all traffic coming to a halt if a solution to our highway problem is not found, so the military engineer can visualize the possibility of military stalemate if the construction power of our armed forces is not kept in balance with the other elements of our combat power.



Paradox: Larger requirements but lowered effectiveness

At the present time, two complementary trends give cause for serious concern. On the one hand, trends in the development of weapons and other items of military equipment are increasing requirements for construction in support of combat operations. On the other hand, certain trends in the formulation of organizational doctrine will, if continued, decrease the effectiveness of engineer operations in the field. This seeming paradox deserves most careful consideration.

The fact that mass destruction weapons are available to our potential enemies means that we must be able to avoid large concentrations of men and matériel that would offer lucrative targets. For the Army, this requires that we be able to operate with relatively small dispersed units having a high degree of mobility so as to be able to concentrate for decisive action and then disperse again for safety. The heightened mobility of the Army required by these concepts, in turn, requires the use of substantially greater numbers of ground vehicles by combat elements and increased dependence by the Army upon air movement of troops and supplies. As vehicle density increases within the field army so also will requirements for the roads and bridges necessary to maintain tactical mobility. At the same time, expanded use of aircraft for moving and supporting combat elements will generate requirements for the development of landing areas in ever increasing numbers and at ever increasing speed. Inevitably these



World War II. Army engineers performed herculean tasks under incredible conditions in opening up the Ledo and Burma Roads.

trends point toward augmented engineer support for field armies.

In addition to achieving greater tactical mobility, our future field commanders must keep their logistical facilities dispersed so as to minimize the likelihood of sustaining supply losses which could cripple combat operations. This requirement, coupled with the necessity for expanding our supply activities to sustain the mobility of combat elements, means that we must have more and better air and land routes of communications for logistical as well as tactical purposes. At the same time, the recognized vulnerability of our military installations to serious damage from high yield enemy weapons requires that we maintain an increased capability for restoring or replacing critical ports, depots, and other key facilities which might be knocked out by enemy action. Moreover, we must be prepared to construct in combat areas substantial numbers of protective works to insure against the loss of vital command posts and communications facilities without which the Army could not operate effectively. These requirements call for more construction power—not less!

There is another aspect of nuclear war that will have a profound effect upon the engineer mission. Just as our forces must develop superior mobility in the face of enemy atomic capabilities so also must the forces of the enemy if they are to avoid being destroyed by our atomic weapons. From our standpoint, therefore, it is just as important for us to hinder enemy mobility and force him into untimely concentrations as it is to maintain mobility and achieve timely dispersion of our own forces. One of the principal ways to disrupt enemy operations is to use engineer troops in their classic secondary role of hindering the advance of the enemy. By judicious use of minefields, demolitions and other obstacles, enemy movements can be retarded and channelized to present lucrative targets for our nuclear weapons. In the past this type of action by our engineers has been important; in the future it may well be critical to our success in battle. In any event, it is certain to require the employment of more of our available engineer means than ever before.

In addition to the impact of nuclear weapons, other developments are placing increased demands upon our military construction capabilities. During World War II, our Army engineers were able to provide operating airfields for fighter aircraft in from one to 30 days. Even with the advent of the B-29, four battalions of engineers on Saipan were able to meet minimum operating requirements in 114 days. Now, however, there is hardly an aircraft in the Air Force arsenal that does not require an airfield built to at least B-29 standards, and many require much more; the day when a tactical airfield could be built in 26 hours has long since faded into history. Even Army helicopters are generating construction problems. In the early days of helicopters, prepared surfaces were never thought necessary for landing or take-off. However, new and heavier models have developed serious maintenance problems when consistently operated from other than prepared pads of heavy duty pavement. These are by no means the only developments in military hardware that threaten to overtax available construction resources, but they do indicate the trend toward increased construction requirements.

Efforts are, of course, being made to offset these increased construction loads. For example, the Army is continuing research for combat vehicles having increased cross-country mobility and, almost certainly, will eventually achieve some measure of success along these lines. However, recent field exercises have demonstrated rather clearly that the new vehicles available to us at present have less, rather than more, cross-country mobility than their World War II counterparts. Moreover, the improved capabilities of our potential enemies in the techniques of mine warfare, coupled with the knowledge that cross-country operations often detract from our ability to conceal our actions from enemy aerial photography, raise many valid questions as to whether improved cross-country maneuverability is, in fact, an answer to our mobility problem.

Similarly, it is often argued that increased air-transportability and the resultant placing of maximum reliance upon aircraft for tactical movement of Army combat units and supplies will go far toward reducing requirements for construction on the ground. While this argument might have some validity if we had transport aircraft capable of operating regularly from unprepared landing areas, it is reduced to absurdity when, as a matter of cold practical fact, today's transport aircraft are even more demanding than those of World War II in their requirements for the runways and other operational facilities needed to assure all-weather operation. Despite experiments with vertical take-off and other aircraft of unusual design there are no developments presently in sight that point toward anything but increasing construction requirements to support air operations. If we are to be realistic, therefore, we must face up to the fact that for the foreseeable future we will be confronted with the necessity for more, rather than less, construction support of combat operations in the field.

In the face of a national shortage of engineers and a trend toward increased construction support requirements for our armed forces, it would be logical to expect that there would be a concerted effort to develop means for improving the capabilities of engineer elements. Such efforts are in fact being made and in certain areas give promise of fruitful results. For example, in December 1955 the Secretary of Defense ordered abolishment of the SCARWAF category of engineer troops and returned the aviation engineers and their mission to the Army. This action by the Secretary of Defense was taken not only to eliminate costly duplications in time of peace but, more importantly, to minimize competition for critical construction resources in time of emergency and provide greatly increased flexibility in the use of available construction power in wartime theaters of operations.

Progress is also being made in other areas. For example, our engineer troops are being equipped with bigger and better items of earthmoving equipment. New bridging equipment is providing faster and more effective means for crossing streams and other obstacles. Flexible pipelines are making it possible to deliver petroleum to forward combat elements more rapidly than ever before. All of these steps, representing positive actions taken to increase the effectiveness of construction power in war, are encouraging. However, concurrent with these actions, there are developing within the Army certain doctrinal trends which could, if carried into combat, undo much of the good accomplished by these positive improvements.

In the successful exploitation of construction power in World War II, there were three principal prerequisites to effective employment of the engineer component of the Army combat team: first, full participation by the engineer in all operational and logistical planning; second, centralized control and direction over assigned engineer forces; third, maintenance of the integrity of the engineer mission. These concepts, which proved so necessary in conserving scarce engineer resources during World War II and the Korean conflict, will be even more important in the future. Despite this, it is alarming to find that there is currently a tendency within the Army to ignore these tried and true concepts in developing doctrine for the future.

Trend: Subordination of engineers in planning and operations

Today's sporadic trend toward exclusion of the engineer from operational planning has produced a number of episodes in field exercises which could have been disastrous in actual combat operations. One recent maneuver incident, although never officially confirmed, is indicative of the inevitable end result of such a policy. In this case, the commander of an Army unit made up of the combined arms happened to encounter his staff engineer in the headquarters area a few days before a planned attack. When he casually mentioned his plan to attack down a certain road net he was surprised to have his engineer reply that the bridges on that route would not support the combat vehicles to be used. Upon further questioning, the commander learned that the engineer, who was assigned to G4 and thus did not have access to the commander or G3, had furnished data on bridge capacities to the G4 some days before but that these data, through inadvertence or improper interpretation, had not been considered in planning the operation. Moreover, the engineer had not been brought in on the planning and thus had been unable to undertake, in advance, the preparatory measures necessary to permit the Army unit to move over the proposed route — or any other route. While this projected example may seem extreme, it is not by any means an exaggeration of what can happen when a commander subordinates his engineer wholly to a general staff section having responsibility for only one phase of the operation. If this pattern of organization is adopted on a wide scale for the future (and there are many who think it should be) it could cost us many battles if not an entire war.

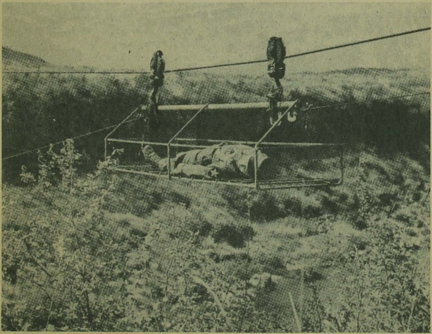
Trend: Dissipation of engineer resources

Another disturbing trend which is currently manifesting itself in tentative Army doctrine points toward dissipation of engineer resources by a policy which parcels out engineer units to subordinate commands and leaves commanders at higher echelons with few if any engineer means under their direct control. The ostensible purpose of this doctrine is to make each small combat element capable of independent action by giving to it a little of each of the combat resources available to the Army as a whole. Laudable as the objective of this doctrine may be, the effect is much the same as if the conventional artillery of a division were parcelled out on the basis of one gun section per infantry company. Just as such a dissipation of conventional artillery pieces would nullify the potential firepower of the army, so also would a parallel dissipation of engineer resources nullify its potential construction power. Since victory in war is achieved by a combination of firepower and mobility and since the latter depends largely upon the effective exploitation of available construction power, dissipation of either firepower or construction power would appear to be military suicide. For nuclear war a policy of dividing and spreading artillery pieces can, perhaps, be justified on the basis that with atomic shells we have the ability to achieve mass firepower with a single weapon and thus are not, in fact, dissipating our artillery resources. However, no such argument can be seriously advanced with respect to engineer resources until the improbable day dawns when we can exchange our conventional bulldozers for nuclear powered tractors having capacities in the megaton range. Yet, while our professional military men would never advocate a policy of shrinking our capability to lay down mass artillery fires against the forces of the enemy, there are some who seemingly would cancel out our ability to mass our foreseeable construction resources against the obstacles of nature which must be overcome before the enemy can be engaged. This, too, could cost us battles and even a war.

Trend: Fragmentation of engineer mission

The third trend which is evident in the current evolution of Army doctrine is at least as serious as the other two. This is fragmentation of the engineer mission. The engineer mission involves a battle against nature within the framework of the over-all battle against the enemy. Because the engineers' battle frequently is out of phase with the main action, with respect to both time and place, engineer operations must be conducted on an independent, or quasi-independent basis. This characteristic of the engineer mission, in turn, requires that engineer forces be capable of sustained action with a minimum of dependence upon other combat and support elements of the Army.

In the past, this capability for independent action has been achieved by retaining under engineer control substantially all the resources necessary to accomplish the engineer mission — construction personnel, equipment, and supplies. Now, however, there is a tendency on the part of Army planners to develop organizational doctrine on the basis of func-



Korea. Army engineers built this suspension system for carrying wounded across ravine.

tions rather than missions. In the case of engineer organization, this functional concept separates engineer supply and maintenance and, sometimes, other engineer activities such as mapping, from engineer construction functions and places each under separate command. The effect of such a separation is to charge the engineer construction commander with responsibility for the execution of missions without giving him authority over functions which are essential to the execution of those missions.

In support of this fragmentation policy it is frequently argued that the infantry commander must depend upon ordnance, quartermaster, and other services for the supply and maintenance support he needs, therefore why cannot the construction commander depend upon other service elements for the supplies and equipment needed to accomplish his mission? The answer, of course, is that he can and does. However, there is one important difference between the engineer supply and maintenance function and similar functions of the Ordnance and Quartermaster Corps. Engineer supplies and engineer maintenance are used predominantly in the performance of engineer missions, whereas the Ordnance and Quartermaster Corps provide equipment and supplies primarily to the combat arms including engineers.

Moreover, the engineer at any given echelon of command, is responsible for conducting operations which, as pointed out before, are both sustained and independent in nature. Within the field army, for example, the responsibilities of the army engineer can be likened to those of a division commander. He must be able to close with and defeat the forces of nature just as the division must close with and defeat the forces of the enemy. Consequently the army engineer must have control over those supply and maintenance activities which are most intimately related to his mission to much the same degree as the division commander has control over the supply and maintenance activities which are vital to successful accomplishment of the division's mission. Both can rely upon support elements of higher echelons. Neither can afford to rely upon parallel echelons for furnishing support which is integral to accomplishment of the assigned mission.

No responsible commander has yet been convinced that a division should be shorn of the supply and maintenance functions most intimately linked with its success in battle. Yet there are those who seriously propose that the engineer should be divested of his control over those supply and maintenance functions upon which successful accomplishment of the engineer mission depends. It can only be hoped that these commanders will recognize in the future, as they have in the past, that such fragmentation of construction power can only lead to reduced combat power on the field of battle. In the face of the almost overwhelming manpower resources of our potential enemies, it would certainly appear foolhardy for us to dissipate the one key advantage that we still retain — superior technology. Yet if we divide and dilute our construction resources we most certainly will be dissipating a large and crucial element of the technological strength which is our keystone to victory in war.

Construction power is an essential element of combat power

In the future, as in the past, victory will be achieved by the commander who makes the most effective use of firepower, mobility and shock action on the battlefield. Since at any given point in time firepower and the capability of the command for shock action are fixed to a considerable extent by tables of organization and equipment, supply levels, and similar factors over which the commander has little or no control, it follows that mobility is the one real variable among these three elements of combat power. Stated differently, any commander who could achieve 100 per cent mobility would have little difficulty in developing the full combat power of the forces available to him; conversely, with no mobility the combat potential of his force would remain virtually untapped. In the future the success of field commanders in achieving mobility is going to depend increasingly upon the effectiveness with which they exploit their engineer resources in overcoming the obstacles imposed by weather and terrain. Like the traffic on our national highways, our military operations could grind to a halt if we do not make provision for timely and effective application of construction power to problems of mobility in the field. New weapons and new techniques in warfare are creating new demands for construction which will strain our engineer resources to the limit. It is imperative, therefore, in developing doctrine for the future that we recognize construction power as an essential and integral element of combat power and avoid any action which would fragment, dissipate, or otherwise detract from its effective employment in furtherance of the over-all mission of victory in war.

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LIEUTENANT GENERAL SAMUEL D. STURGIS, JR., was commissioned in the Corps of Engineers in 1918 upon graduation from the Military Academy. He was an instructor there from 1922 to 1926, after which he participated in various strategical studies in the Philippines, while serving as adjutant and later CO of the 14th Engineers. While commanding the engineer troops at the Cavalry School he recognized the need for mechanical equipment to keep abreast at mechanized warfare, and obtained the first such equipment made available to engineer troops. This became the pilot test which resulted in the provision of the bulldozer, the diesel shovel, the air compressor, and other modern construction machinery for engineer troops in World War II. General Sturgis is a graduate of Leavenworth and the Army War College. Before the Second World War he served on several important civil-engineer projects. During it he was Chief Engineer of Sixth Army, and was in charge of all airbases, port and Army construction in twenty-two amphibious operations from Australia to Japan. After the war he served in G3, was Engineer of the Missouri River Division, commanded the 6th Armored and ComZ in EUCOM AND USAREUR. He was appointed Chief of Engineers on 25 February 1953. A member of an old Army family, General Sturgis' grandfather was a Civil War commander, his father commanded the 37th Division in World War I, and an uncle, Lt. J. G. Sturgis, was killed in action with Custer.