THE GENERAL BOARD

United States Forces, European Theater

ENGINEER TECHNICAL POLICIES

MISSION: Prepare a Report and Recommendations on Engineer Technical Practices and Policies.

The General Board was established by General Orders 128, Headquarters European Theater of Operations, U.S. Army, dated 17 June 1945, as amended by General Orders 182, dated 7 August 1945, and General Orders 312, dated 20 November 1945, Headquarters United States Forces, European Theater, to prepare a factual analysis of the strategy, tactics, and administration employed by the United States forces in the European Theater.

File 320.2/34 Study Number 73

THE GENERAL BOARD
UNITED STATES FORCES, EUROPEAN THEATER
APO 408

ENGINEER TECHNICAL POLICIES

Prepared by:

Brig Gen Garrison H. Davidson, 016755, Chief, Engineer Section.
Colonel Emil J. Peterson, 015523 ----- Engineer Section.
Colonel Hubert W. Collins, 08877 ----- Engineer Section.
Colonel Richard W. Pearson, 016384 --- Engineer Section.
Colonel Howard A. Morris, 020141 ----- Engineer Section.
Lt Colonel Walter L. Winegar, 021764 - Engineer Section.
Lt Colonel John A. Miller, 0329293 --- Engineer Section.
Major William H. Correale, 0196483 --- Engineer Section.
Major Charles N. Nesom, Jr., 0321381 - Engineer Section.
Captain Charles H. Starling, 0312193 - Engineer Section.

Principal consultants:

Colonel J. C. Arrowsmith, 011373, XXI Corps Engineer.
Colonel O. B. Beasley, 018045, 40th Engr C Regiment.
Colonel T. L. Crystal, 019400, G-2, XXII Corps.
Colonel E. G. Daly, 016736, XXIII Corps Engineer.
Colonel C. E. Dougherty, 0190855, XII Corps Engineer.
Colonel D. A. Elliget, 019719, 1123rd Engr C Group.
Colonel R. H. Erlenkotter, 019354, 1106th Engr C Group.
Colonel R. J. Fleming, Jr., 017095, XXII Corps Engineer.
Colonel G. H. Hodges, 0272540, 1115th Engr C Group.
Colonel J. B. Hughes, 012101, Engr, AGF.
Colonel R. D. King, 020115, 36th Engr C Group.
Colonel R. K. McDonough, 016394, 1121st Engr C Group.
Colonel H. S. Miller, 014664, XIX Corps Engineer.
Colonel H. Milwit, 017514, Chief, Int Div, OCE, European Theater of Operations, US Army.
Colonel J. S. Niles, 1139th Engr C Group.
Colonel D. A. Richards, 020689, 1145th Engr C Group.
Colonel J. G. Schermerhorn, 020610, 1120th Engr C Group.
Colonel W. N. Thomas, Jr., 07648, VI Corps Engineer.
Colonel W. N. Underwood, 016078, XV Corps Engineer.
Lt Colonel A. B. Fennell, 0255088, XXIII Corps.
Lt Colonel J. Mallepell, 0307319, 325th Engr C Battalion.
Lt Colonel A. E. McCollam, 021748, 80th Infantry Division.
Lt Colonel E. T. Podufaly, 022913, 8th Armored Division.
Lt Colonel W. W. Smith, 021078, 16th Armored Division.
Lt Colonel R. G. Wiatt, 023720, 652nd Engr Topo Battalion.
Major D. Roberts, 0390892, 7th Armored Division.
Major P. F. Winkleman, Third Army Engineer Section.
Captain T. C. Carlin, 01114879, 1510th Engr W S Company.
Captain Griffith, 343rd Engr G S Regiment.
Captain F. H. MacArthur, 0440764, Hq 6th Army Group.
Captain Poppl, 343rd Engr G S Regiment.
Captain C. Sachenmaier, Jr., 0453683, 672nd Engr Topo Company.
Captain S. Starsynski, 0384199, 2945th Engr Tech Int Team (C).
Captain J. Stefan, 01102067, 1014th Engr Trdwy Br Company.
Lieutenant Laswell, 01116473, Hq Seventh Army.
Lieutenant H. S. Robins, 01116414, Seventh Army Engineer Section.
Lieutenant H. S. Thigpen, 0545668, 1019th Engr Trdwy Br Company.

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ENGINEER TECHNICAL POLICIES

CHAPTER 1

INTRODUCTION

1. Technical Subjects Considered. This study of engineer technical policies is confined to the five technical subjects considered most important to a field army. One chapter is devoted to each subject.

2. Training Deficiencies. Board research has indicated that there were three main deficiencies in the training of engineer units when they arrived in the European Theater. These were in tactical bridge construction, the careful marking of minefields and the proper keeping of minefield records, and engineer intelligence. Comments on these deficiencies are contained in Chapter 2 on River Crossings, study number 72, "Engineer Tactical Policies", Engineer Section, General Board, European Theater, and in the chapters on Mine Doctrine and Engineer Intelligence in this study.

3. Exclusion of Technical Policies Concerning Aviation Engineers. As this study has been limited to consideration of the engineer technical policies as they affect a field army, no subjects have been included that apply primarily to aviation engineers since those units were assigned integrally to the air forces in the European Theater. No attempt has been made to evaluate the effect of the experiences of aviation engineers upon the army engineer policies considered. Discussion of technical policies as they affect aviation engineers is included in "The History of IX Engineer Command"; also in the section entitled "Aviation Engineer Operation on the European Continent, 6 June 1944 to 9 May 1945", of report by Army Air Forces on "Effectiveness of Close-In Air Cooperation".

CHAPTER 2

ENGINEER COMMUNICATIONS

4. Purpose and Scope. This chapter reviews the communication facilities within engineer units and between engineer echelons to determine the facilities required for each of the following types of communication:

Radio nets; to include ranges of radio equipment.
Telephonic equipment.
Messengers.

5. Procedures Followed.

a. General. The three basic means of communication were telephone, radio, and messengers; telephone was the primary means and was most generally employed; radio was the secondary means and was the most unreliable of the three; messenger was the slowest but was the most reliable.

b. Telephone.

(1) Fluid Situations. During the fast moving situations across France and Central Germany, telephonic communications in echelons forward of army headquarters failed completely.[1,2] The rate of movement in these instances was such that communication personnel provided were not capable of maintaining contact.[1,2]

(2) Static Situations. During slow moving and static situations telephone systems were fully developed and became the primary means of communication employed. Telephonic equipment assigned to group and battalion was inadequate to permit establishment of advance command posts and to meet the needs imposed by engineer companies not possessing organic items of telephonic equipment.[1,2,3]

(3) Special Operations. During special engineer operations such as river crossings and employment as infantry, special communication nets were necessarily prearranged in the operational plan and augmenting equipment was secured from other than organic engineer allowances.[1,2,3]

c. Radios. During the periods of fast moving situations radio nets were essential as a primary means of communication. The equipment provided was generally inadequate in range and failed at essentially the same distances where telephonic communications became impossible.[2,3,4] Engineer group areas were normally equivalent to two divisional sectors and the required operating ranges of radios were continually beyond the ranges provided by the presently assigned sets.[3,4] Sufficient sets to permit the establishment of advance command posts at both battalion and group level are essential.[1,2] Provision of radio sets for a corps engineer command has been covered in Chapter 4, study number 71, "Engineer Organization", General Board, US Forces, European Theater.

d. Messengers. Existing Tables of Organization of the engineer combat battalion do not provide for messengers operating either from battalion headquarters or from the company headquarters. Messenger service was essential to each headquarters to accomplish the

transmission of normal administrative papers and operational overlays.[1,2] The transportation required for this service was a continuing problem. Many of the engineer combat battalions initially landing with the First United States Army were equipped with motorcycles on the basis of two per headquarters and service company and one per line company.[3] No replacement vehicles were available. All other engineer units provided transportation for this service by using vehicles assigned for other purposes, or captured enemy vehicles.[3] There was a continuing requirement for at least two messengers per battalion headquarters and one per company headquarters.[1]

6. Conclusions.

a. Telephonic equipment was generally satisfactory in performance but greatly inadequate in quantity. There were insufficient telephones, wire, switchboards and wire laying equipment in all echelons.

b. Organic radio equipment was inadequate both as to range and quantity.

c. No organic provision was made for messengers or their transportation.

7. Recommendations. It is recommended that:

a. Telephonic equipment be authorized as shown in Appendix 1.

b. Radio equipment for operational use between all echelons from company to corps level be authorized as shown in Appendix 2.

c. Messengers and organic transportation for messenger service should be assigned to all engineer units on the basis of two per group and battalion headquarters and one per company headquarters.

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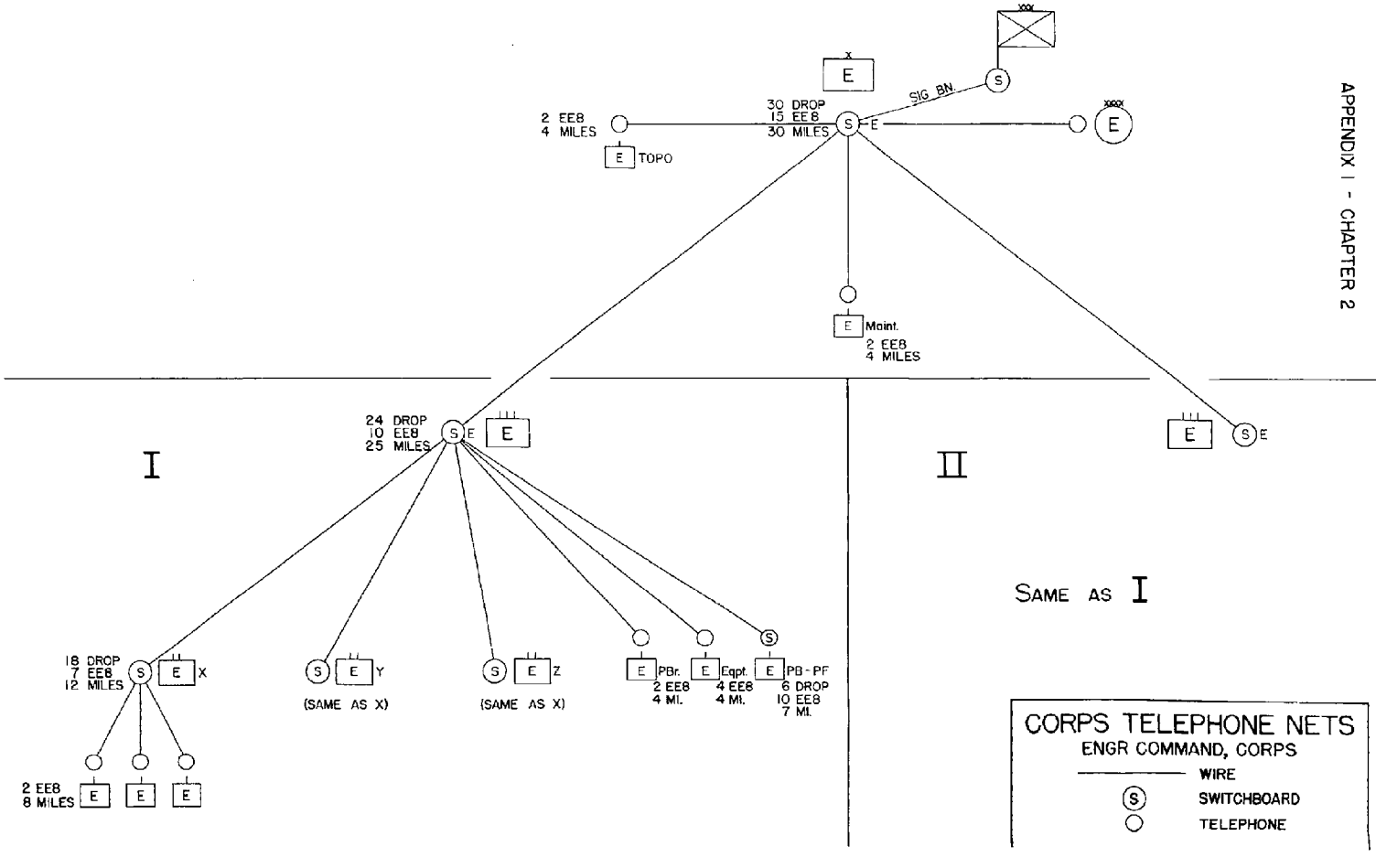
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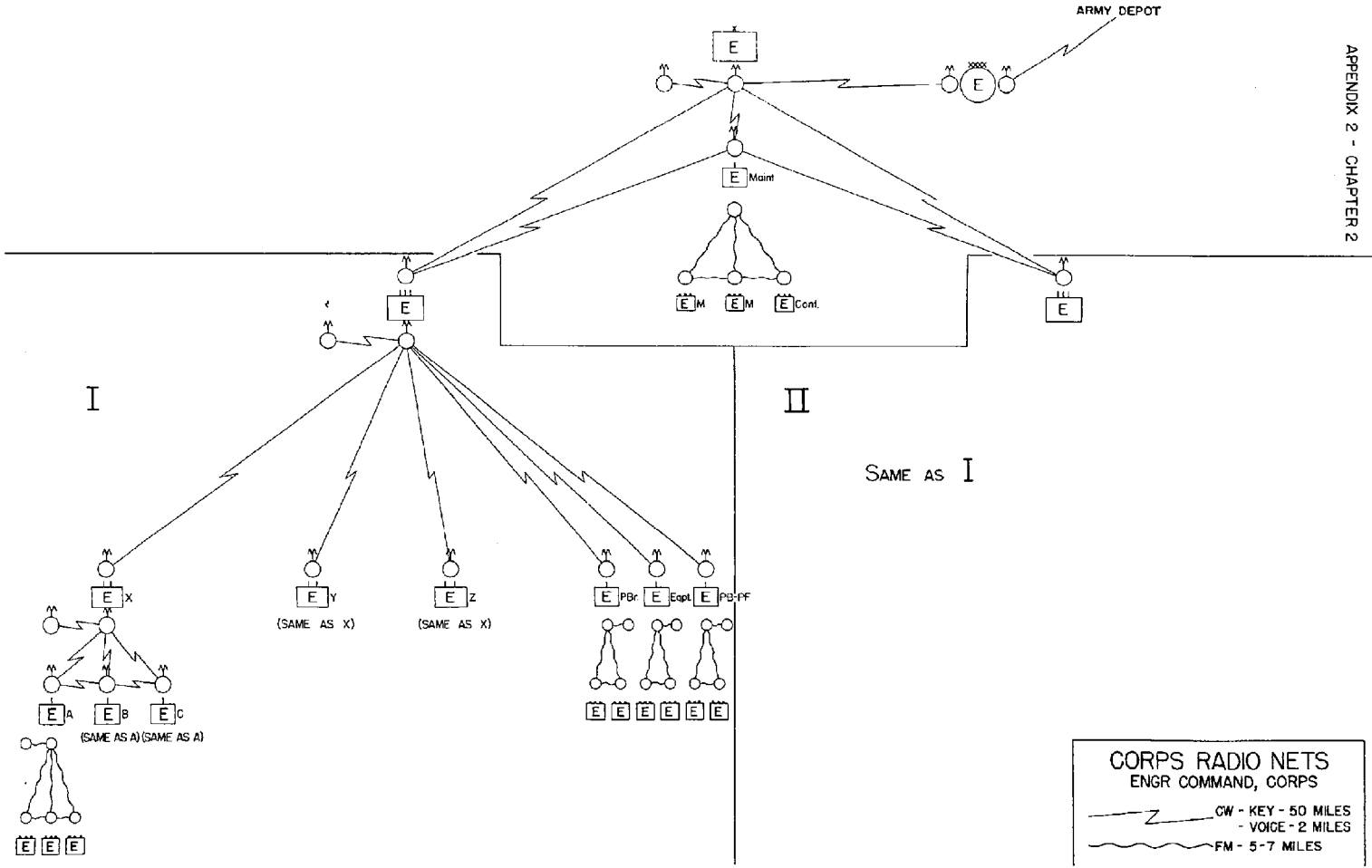
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CORPS RADIO NETS
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CW - KEY - 50 MILES
- VOICE - 2 MILES
FM - 5-7 MILES

CHAPTER 3

CORPS ENGINEER SUPPLY

8. Purpose. This chapter reviews the present doctrine relative to engineer supply responsibilities of the corps engineer in order to determine what revisions are desirable as a result of the experience in the European Theater of Operations.

9. Corps Engineer Supply Responsibilities. The corps engineer is at present charged with the following responsibilities in connection with engineer supply; allocating engineer supplies to divisions and corps troops, providing for taking over accumulated engineer materials, especially those captured from the enemy, recommending location and establishment of advance army engineer dumps in the corps service area.[1]

10. Procedure Relative to Advance Dumps. The procedure normally followed was for the corps engineer to submit to army the supply requirements for the advance dump, to recommend dump location and time of movement, and to draw supplies directly therefrom.[2] Army control varied with the situation and the status of supply items. Normally the entire dump stock was under corps engineer control.[2] At times clearance was required from army on critical supplies. Bridging materials were the items most frequently in the critical category.[3] When advance dumps contained quantities in excess of corps requirements, the corps engineers were given definite credits which could be exceeded only by army authority. The corps engineer likewise gave credits on critical items to division and corps units.[2] The normal method of requisition for nonexpendable items was followed.

11. Operational Modifications at Advanced Dumps. Only minor difficulties were encountered in operating under this established supply procedure.[3] The system of having all requests on advance dumps approved by army was found impracticable and discontinued. At times the corps engineer was not allowed sufficient latitude in the distribution of critical items to corps troops. The need for signal communications from the corps engineer to the advance dump became evident.[4] Dump operations were hampered by lack of trained personnel and shortage of lifting equipment.[5] Although army had the responsibility for moving advance dumps, it was frequently done, at least in part, by the corps engineer, who also assisted at times in providing local protection for the dump.[4,6]

12. Remedial Action. All difficulties were overcome by cooperation between corps and army engineers and a certain amount of improvisation. Such cooperation is normal. The necessity for improvisation in future similar supply operations will be obviated by the organization of the engineer supply group, recommended in study number 71, "Engineer Organization", General Board, United States Forces, European Theater, and the provisions for adequate engineer signal communications, as presented in Chapter 2 of this study.

13. Conclusions and Recommendations. No change should be made in the existing doctrine relative to the engineer supply responsibility of the corps engineer.

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CHAPTER 4

BASIS OF MAP ISSUE

14. Purpose. The purpose of this chapter is to examine the basis of map issue to determine if map allowances were sufficient to meet the needs of the forces in the European Theater of Operations.

15. Scope. This study compares the map allowances prescribed in the basic doctrine for infantry, armored and airborne divisions with the allowances used for these units by the various armies in the field. A cross section of the opinions of experienced line and staff officers has been obtained and used as a basis for determining the adequacy of present allowances and for determining the relative value of the various types of maps.

16. Basic Doctrine.

a. War Department policy is established in FM 30-20. The manual provides a table of initial issues of maps (see Appendix 3) which is based on an issue of one of each selected tactical map per officer with an additional allowance of tactical and strategic maps for each headquarters. These allowances are indicated to be sufficient for minimum needs only. Authority is granted to the Theater Commander to change these allowances and to prescribe initial and replacement allowances for his theater. Authority is also granted to commanding officers to direct the issue of special maps, such as town plans and road maps as required. FM 30-20 makes no provision for the peculiar requirements of airborne divisions.

b. European Theater allowances of maps are prescribed in a table (see Appendix 4) in the pamphlet published by the Chief Engineer, European Theater of Operations, entitled "Maps-Supply, Distribution and Allowances - 1944". The allowances prescribed therein are in general double the minimum allowances prescribed in FM 30-20, but are specified as the maximum quantities which should ever be issued at any one time under exceptional conditions and should generally be reduced by 50 per cent for normal operations. This table also provides for initial maximum issues of tactical maps on the basis of one per individual of an airborne division engaged in airborne operations. Other type maps are provided for on the same basis as for infantry divisions. Normal reserves for map replacement are defined in the pamphlet as 100 per cent of initial issues with further replacement depending on the rate of advance and with reserve requirements being estimated at least 30 days in advance.

17. Initial Allowances of Armies.

a. First, Third and Fifteenth Armies prepared tables of initial map issues showing the quantities of maps by type and scale which could be requisitioned, without further approval, by each organization assigned to the army and having a Table of Organization.[1] This procedure implemented the policies of higher headquarters and provided the armies with better control of map issues than if subordinate units had been allowed to requisition maps within the broader allowances of the Theater. However, as a large part of map procurement facilities were controlled at Theater level,[1] it was necessary that army initial issue tables be approved by Theater.

b. First and Third Army tables of initial issues of maps are compared with each other and with the Theater maximum allowances in Table I (Appendix 5). From this it is seen that issues varied con-

siderably between the armies but were in general within the limits of minimum issue recommended in FM 30-20 and the maximum issue established by Theater.[1]

c. Table II (Appendix 6) compares the quantities of maps in tons issued by the armies on which records are available. From this it is seen that issues in First Army considerably exceeded the others, which may be attributed to the larger initial issues allowed in First Army and to the greater front coverage given subordinate units.[1] This variation indicates that the Theater map policy was sufficiently flexible to meet the requirements of the individual army commanders.

d. A canvass by questionnaire[1] of experienced officers is summarized in Table III (Appendix 7) and indicates very little criticism of the tables of map issues used in any of the armies. The recommendations for changes were generally for minor increases of maps for special units or the substitution of a particular scale map for equivalent coverage in another scale. A great majority of officers expressed complete satisfaction with the basis of issue and only a few felt that issues were excessive. A number of forceful and unsolicited indorsements of the European Theater map policy were received.

18. Scales in which maps should be issued is a matter in which there is some diversity of opinion. There is a general consensus that the best map for all around tactical use was the 1/50,000 topographic map. This was found particularly useful by armor, infantry and engineers. On the other hand, artillery officers maintain that a map of scale 1/25,000 or larger was highly desirable for fire control. For very slow moving actions, infantry officers also favored the 1/25,000 map. The value of maps of various scales depends entirely on the speed with which the action moves, the area range of the map user and the nature of the terrain in which the action takes place.[1,2] In fast moving situations the value of larger scale maps decreases as the speed of movement increases. At speeds in excess of five miles per day, maps of scale 1/25,000 or larger have little value and at speeds in excess of ten miles per day, only special purpose maps such as town plans should be given general issue at scales larger than 1/100,000.[1] Conversely, in static situations, maps of scale smaller than 1/50,000 will have relatively little value for combat troops who will require the largest scale maps available as well as extensive aerial photography.[1] These conditions, however, can have little effect on planning map requirements as they cannot be foreseen, so that plans must provide for map issues to meet normal maximum demands because of the time required for production and delivery. On the other hand, actual issues of maps should include only those maps which are required by the current situation.[1]

19. Front coverage of maps was not clearly defined in the basic doctrine or Theater or army policies which, however, established the principle that issue of maps to a unit was limited to the area in which the unit was currently operating or had an immediate prospective interest.[1,3] Information is not available as to how this principle was interpreted in the various armies, but it is apparent that there was considerable variation.[1]

a. Headquarters and staffs required a larger front coverage for planning and intelligence purposes than line troops for operations. The requirements of line troops for operational maps depended on the security of the position, the capacity of the unit for movement or expansion, as well as the time required for issuing maps to the unit for a new or expanded area.[1]

b. Officers commenting on front coverage believe in general that:[1]

(1) Infantry divisions should have map coverage of the adjoining division, or equivalent area if the division is on a flank.

(2) Armored divisions should have coverage of from 25 to 150 miles outside the area in which it is expected to operate.

(3) All units should have at least limited coverage of the area of the next higher echelon.

20. Road maps filled an important need in European operations. Some officers pointed out that a road map of approximately 1/200,000 scale is the only map required in extremely rapid pursuits such as those which followed the Rhine crossings.[1] While FM 30-20 makes no special provision for the issue of road maps, European Theater policy was to issue one road map per roving vehicle.[1]

21. Production facilities including those of the Zone of the Interior, Communications Zone, and the field forces, were able to supply the requirements for maps although those facilities were strained to do so and it is doubtful if they could have withstood an appreciable increase in map demands.[1] It is estimated that some 210,400,000 map sheets were produced for United States Forces in European operations of which some 28,479,000 were furnished by the Institute Geographique Nationale composed of French government and civilian agencies.[1] Flexibility in map distribution was obtained by assigning reproduction of large scale maps, particularly the 1/25,000 and 1/50,000 topographic maps, to the field topographic units which were in a position to reproduce and distribute these maps quickly as the need for them developed.[1]

22. Distribution of maps presented problems that were never entirely solved and there are numerous instances where troops failed to receive the desired quantity of maps on account of difficulties of distribution.[1] Map distribution is considered in study number 71, "Engineer Organization", General Board, United States Forces, European Theater.

23. Conclusions.

a. The map policies of the War Department and the European Theater of Operations provided an adequate basis of issue of maps in sufficient quantities and scales, and may be used as a guide for future planning.

b. Map production facilities were capable of supplying the requirements of the field units but could not have met materially increased demands.

c. The most valuable all-purpose tactical map was the 1/50,000 topographic map but all scales and types of maps used in the European Theater of Operations were useful and necessary.

d. The scales at which maps are of value to troops is determined by the speed of movement but this cannot be given more than general consideration in planning map issues.

e. Airborne units have special requirements for maps which may necessitate the issue of a tactical map to each individual of the

unit when engaged in airborne operations. FM 30-20 does not provide for these special requirements.

24. Recommendations. That no changes be made in the present War Department basis of map issue except as follows:

a. Change FM 30-20 in order to provide for the issue of road maps at the rate of one for each vehicle.

b. Change FM 30-20 to provide for the issue of one tactical map per individual of airborne divisions when engaged in airborne operations, and for other maps on the same basis as for infantry divisions. Airborne divisions, when engaged as infantry divisions, should be provided with the same allowances as infantry divisions.

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APPENDIX 3

Chapter 4

Extract from:

Field Manual 30-20, (Change No. 1, 6 January 1941).

42. INITIAL ALLOWANCE OF MAPS.

*** *** ***

	Small scale: Normally 1:1,000,000 to 1:7,000,000	Intermediate scale: Normally 1:200,000 to 1:500,000	Medium scale: Normally 1:50,000 to 1:125,000	Large scale	Aeronautical charts
(1) Headquarters:					
GHQ	100	100	50	10	50
Army	25	75	50	10	25
Corps	15	40	75	10	25
Division	5	25	55	20	10
Regiment	1	7	7	14	0
Battalion[1].....	0	3	6	6	0
Company	0	[2]1	1	1	0
(2) For individual use in organizations in addition to above allowance. (On basis of commissioned strength.)	0	[2]1	[3]1	[4]1	0
(3) Air Corps:					
GHQ	25	15	15	0	50
District headquarters and overseas air force	5	15	15	0	100
Wing headquarters.....	5	7	7	0	10
Group headquarters	5	7	7	0	10
Squadron headquarters .	1	7	7	0	4
Airplane	0	0	1	[5]1	4

[1]Allowance for separate battalions, Cavalry, Armored Force, and motorized Infantry will be increased 50 percent.

[2]For Cavalry, Armored Force, motorized Infantry, and attached troops only.

[3]Except for officers of Air Corps. (Allowances for artillery observation missions prescribed in note (5) below.)

[4]Except Air Corps, see note (5) below. (Use by Cavalry and Armored Force will be exceptional.)

[5]Observation squadrons only. Airplanes observing artillery fire will be issued same scale maps used by artillery firing batteries.

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APPENDIX 4

Chapter 4

Extract from:

Maps - Supply, Distribution, and Allowances, 1944
(Office of the Chief Engineer, ETOUSA)

47. Map Allowances. *** g.

*** *** ***

	1/500,000 & smaller	1/200,000 Road Map	1/250,000 to 1/50,000 tactical	1/25,000	Aeronautical Charts
Army Hq	150	150	100	20	100
Armd Corps Hq	120	130	200	30	75
Inf Corps Hq	80	100	150	20	50
Airborne Div Hq	50	100	100	40	20
Inf Div Hq	50	100	100	40	20
Regt Hq	14	30	14	28	6
Bn Hq	0	10	12	12	2
Co Hq	0	0	2	2	0
Officer	0	2	2	2	0
Vehicle	0	2	0	0	0
Air Force Hq	50	50	30	0	100
Command Hq	10	30	30	0	200
Wing Hq	10	14	14	0	20
Group Hq	10	14	14	0	20
Squadron Hq	2	14	14	0	8
Airplane	0	0	2	0	8
Airborne Div	96	862	9,640	1,142	72
Armd Div	106	3,200	2,190	1,445	40
Infantry Div	110	1,755	1,980	1,820	92

TABLE I – BASIS OF MAP ISSUE

COMPARISON OF INITIAL ISSUES OF MAPS IN FIRST & THIRD ARMIES

WITH MAXIMUM INITIAL ISSUES ALLOWED BY ETO US ARMY

Scale & Type	Infantry Division					Airborne Division					Armored Division				
		First Army		Third Army			First Army		Third Army			First Army		Third Army	
	Max ETOUSA Allowance	Initial Issues	% of ETOUSA Max Allowance	Initial Issues	% of ETOUSA Max Allowance	Max ETOUSA Allowance	Initial Issues	% of ETOUSA Max Allowance	Initial Issues	% of ETOUSA Allowance	Max ETOUSA Allowance	Initial Issues	% of ETOUSA Max Allowance	Initial Issues	% of ETOUSA Max Allowance
1/4,000,000 Topo	110	5	41		50	96	10	45		47	106	8	55		47
1/1,000,000 Topo		40		55			33		45			50		50	
1/250,000 Topo	1980	200	80	150	61	9640	300	78	2000	61	2190	1000	119	300	78
1/100,000 Topo		190		150			6300		3300			200		600	
1/50,000 Topo		1200		900		—	950		600			1400		800	
1/25,000 Topo	1820	1000	55	800	44	1142	850	74	550	48	1445	700	48	500	35
1/200,000 Road	1755	1700	97	1500	85	862	900	105	450	52	3200	4000	125	2250	70

TABLE II

QUANTITIES OF MAPS ISSUED

1944-1945 Month	First Army			Third Army			Ninth Army			Fifteenth Army		
	No.^ Div Asgd	Tons Maps Issued	Tons Maps/ Div	No.^ Div Asgd	Tons Maps Issued	Tons Maps/ Div	No.^ Div Asgd	Tons Maps Issued	Tons Maps/ Div	No.^ Div Asgd	Tons Maps Issued	Tons Maps/ Div
Aug	20	174.4	8.7	14	89.8	6.4						
Sep	8	142.0	17.7	9	80.0	8.9						
Oct	13	21.3	1.6	10	70.0	7.0	6	61.9	10.3			
Nov	13	41.3	3.2	9	60.0	6.7	8	32.5	4.1			
Dec	23	67.9	2.9	22	57.0	2.6	9	30.3	3.4			
Jan	15	50.4	3.4	19	52.0	2.7	6	7.1	1.2			
Feb	14	115.5	8.2	12	26.2	2.2	16	50.0	3.1			
Mar	13	165.4	12.7	18	97.0	5.4	13	79.2	6.1			
Apr	21	245.3	11.7	19	113.8	6.0	13	84.3	6.5	10	51.9	5.2
Total	140	1023.5	7.3	132	643.8	4.9	71	345.3	4.9	10	51.9	5.2

Note — Tons of maps represent total issues to Divisions and Non-Divisional units.
^ From G-3 Daily Situation Maps, 12th Army Group.

TABLE III

BASIS OF MAP ISSUE

SUMMARY OF OFFICER COMMENT

Type Organization	Number of Comments	Were Map Allowances Sufficient In: Slow Moving Situations		Were Map Allowances Sufficient In: Fast Moving Situations		Were Map Receipts Sufficient In: Slow Moving Situations		Were Map Receipts Sufficient In: Fast Moving Situations		Suggested Modification In Basis of Map Issue				Area to the Flank For Which Map Coverage Is Needed.
		Yes	No	Yes	No	Yes	No	Yes	No	None	Increase	Decrease	Change Ratio Scales	
Corps Hq	1	1		1		1		1		1				Adj Corps Sector
Armored Div	6	5		2	3	6		3	3	2	2		1	25-150 miles
Inf Div	3	1			1	2	1	2	1	3				Adj Div Sector
Inf Regt	3	1		1		2		3		3				10-30,000 yds
AAA Group	4	4		3	1	4		4		4				Adj Corps Sector
Cav Group Mech	1	1			1	1			1	1				5-15 miles
FA Bn	6	6		2	4	5	1	3	3	2	2	1	1	Adj Div to 40,000 yds
FA Ob Bn	1	1			1	1		1		1				10-20,000 yds
AAA Bn	1	1		1		1		1		1				10 miles
Tank Bn	2	1	1		2	2			2		1		1	Adj Div
TD Bn	1	1			1	1			1	1				One mile
A/B AA-AT Bn	1					1		1		1				10,000 yds
A/B FA Bn	1					1		1		1				10,000 yds
Cav Sqd Mech	1	1		1		1		1				1		
TOTAL	32	24	1	11	14	29	2	21	11	21	5	2	3	

CHAPTER 5

MINE DOCTRINE

25. Purpose. The purpose of this chapter is to determine whether the doctrine contained in FM 5-31, governing the tactics and technique employed in the use of land mines, should be revised on the basis of operations in the European Theater.

26. Scope. This report will consider those portions of the subject which have been controversial or which have been proved by experience to be in need of improvement. In order to keep the overall conclusions from becoming too lengthy, separate conclusions will be included in the discussion of each phase of the subject.

27. Mine Training.[1]

a. The training of engineer units in mine warfare was generally adequate. It was evident, however, that insufficient instruction had been given in the Zone of the Interior in the recording of minefields and in familiarizing engineer troops with enemy mines. In most cases an adequate supply of enemy mines had not been available for instructional purposes. The training of reinforcements was inadequate. This placed a serious handicap on the units they joined. Troops of other branches were insufficiently trained. It was initially considered that mine warfare was principally an engineer responsibility and consequently the training of other branches was not emphasized.

b. Training in the laying and removal of mines should be given to all branches to an extent commensurate with their probable missions. There will never be enough engineers to lay and breach all fields. Minefield training should be realistic. Mines should be laid and removed in daylight and darkness, in all types of terrain and weather. Live mines should be used.[2] Greater stress should be placed on minefield passage in maneuvers, and mine casualties in vehicles and personnel should be rigidly assessed. The recording of minefields should be given special emphasis. Personnel should be taught that care and discipline are required in handling mines.[3] Thorough instruction will breed confidence.[3]

28. Types of Mines.

a. Both the Allies and the enemy used numerous different types of anti-vehicular and anti-personnel mines. The Germans displayed considerable ingenuity in mine development, utilizing materials other than metal to a very great extent, either through necessity or design. Some of their types were developed for use under special conditions or for specific purposes. A general criticism of some of our anti-tank mines was that they did not contain sufficient explosives.[4] Some anti-personnel mines were considered dangerous to handle.[1] Certain of our mines could be eliminated.[1]

b. Existing mines should be considered merely as a basis for future development. Mine research should be thorough and continuing. The mines developed should be few in type, simple in operation, capable of being immersed in fresh or salt water for considerable periods of time or subjected to extreme differences in temperature without adverse effect.[5] They should be safe for our troops to handle, and capable of being made dangerous for the enemy to tamper with.

29. Storage and Issue.

a. At present the Ordnance Department is charged with the storage and issue of mines as class V supply (ammunition). This

responsibility should not be changed. The engineers are responsible for the storage and issue of firing devices for the mines.[6] This separation of responsibility between the two services causes confusion.

b. It is believed that the responsibility for supply of mines should remain with the Ordnance Department, and that the latter should be charged also with supply of the firing devices.

30. Laying and Marking.

a. Improper laying and marking of fields resulted from failure to carry out the established principles, either through carelessness, lack of training or lack of time.[1] In some instances the value of using anti-personnel mines was questioned considering the hazard presented to friendly troops.[4] In most cases trip flares could have been used with equal effect and no danger.[3]

b. The laying of minefields must be rigidly controlled, as the indiscriminate placing of unrecorded fields will lead to casualties among friendly troops.[4] The anti-personnel mine has a definite value in denying the enemy access to vital areas and preventing easy removal of our fields. However, whenever possible, trip flares rather than anti-personnel mines should be used as warning devices.[1] Anti-personnel mines should be used only by engineer troops, and then only with the approval of division or higher commanders. Fields containing such mines must be accurately marked and recorded.[7] Unit engineers should be held responsible for the marking of minefields which have not been properly marked or disposed of by lower echelons. Any friendly fields which have been overrun by the enemy and later retaken should be assumed to contain enemy anti-personnel mines and be treated accordingly.

31. Recording.

a. Improper recording, and at times complete failure to do any recording, were the greatest weaknesses in the execution of our mine policy.[1] The prescribed procedure was adequate and workable, but was not properly followed, due to insufficient training of personnel, lack of appreciation of the importance of recording minefields, and failure to appreciate that unknown friendly fields were as dangerous as enemy fields.[1] Units were not well versed in the form used for recording minefields. There was no central office of record established for the entire theater where accurate detailed information could be kept on all minefields in territory under our control. It was found that the Germans had maintained such a record office where comprehensive minefield data were available.[8]

b. An unrecorded minefield is an enemy minefield.[7] Training in recording should be thorough for all units.[1] This training should include the preparation of minefield records during maneuvers under the most adverse conditions. Every minefield that is laid should be recorded and the records properly transmitted.[7] The suggested record form could be improved by incorporating the best features of the records used by the field armies. Consideration should be given to the establishment of a central office of record at theater headquarters, and a workable system devised for the expeditious concentration at that point, through engineer channels, of all minefield information.[2,8] This would not supplant the keeping of records by army and corps headquarters.[2] Only one office of record should exist above army level. Records should be made of mines laid for local security so that such mines will not be forgotten in case of unexpected departure from the area.[7] Records need not be forwarded unless the mines remain in place for a specified period.

32. Transfer of Records. The procedure outlined for the transfer

of minefield records is generally sufficient. Theater, army and other headquarters concerned should supplement this with detailed and explicit directions to cover local situations.[9]

33. Removal.

a. The removal of mines is a hazardous undertaking for those unfamiliar with mine characteristics and patterns for laying. Present policies are satisfactory for passage of minefields.[1] Although numerous ways of locating mines were tried, probing was found to be the most dependable, although the slowest.[1,2] The present metallic mine detector proved satisfactory except for detection in deep snow and under water.[1] The present non-metallic mine detector was unreliable for general use.[4] The best methods for removing mines after detection were destroying them in place[3] or pulling them out with a wire or rope. Many mechanical devices for removal of mines were tried with varying degrees of success.[4,8] Most of them were found to have limited value, due to the special conditions needed to make each effective.[1,10] Little justification was found for special mine-clearance units.[1] More reliance could be placed on thorough instruction of all personnel, with specially trained teams within units if required.[1]

b. Research to uncover methods and means of mine clearance should be intensive and continual. Existing procedures and devices should be analyzed and those having merit should be further improved. New procedures and apparatus should be sought and developed.

34. Disposal.[1]

a. Mines were disposed of by detonating in place; by lifting, stacking and detonating the stacks; and by lifting, disarming, and hauling to special ordnance dumps. These practices were satisfactory, but there were many instances where troops who lifted mines failed to mark them adequately prior to the time of disposal. This was particularly true of mines removed from roads and road blocks, where it was impracticable to detonate them immediately upon removal. Frequently, removed mines were placed just off the shoulder of the road because it was unsafe for removing troops to move into unswept fields adjacent to the road. Often such mines subsequently became hidden by mud from passing traffic or became covered by snow. They were a continual source of danger, particularly in blackout driving. Also there were instances where enemy civilians, working under cover of darkness, replaced such readily accessible mines in the road.

b. In general, the doctrine for disposal of mines as now outlined is satisfactory. Both pertinent field manuals and training, however, should emphasize more adequately the importance of properly marking and protecting mines which have been lifted pending subsequent disposal.

35. Mine Intelligence.

a. New types of enemy mines or enemy mine techniques were reported through engineer technical channels to successive higher echelons.[7] Special engineer technical intelligence teams, used in both corps and army, proved highly effective in making detailed studies of new enemy mines and techniques as they were reported.[2,3] Detailed information was published for the use of appropriate units. Samples of various types of enemy mines failed to reach the Zone of the Interior from the Theater of Operations in sufficient quantities to be of much value for use in training troops still in the Zone of the Interior.[1]

b. New types of enemy mines found during operations should be

reported expeditiously through engineer technical channels.[7] Means should be provided for continuing in future operations the functions performed by the engineer technical intelligence teams. Provision should be made within each theater of operations to insure that adequate quantities of the various types of enemy mines and firing devices are made available with minimum delay for use by troops training both in the theater and in the Zone of the Interior.[1]

36. Recommendations.

a. No revision of existing general mine doctrine is necessary.

b. Training in mine warfare should be given to all branches.

c. The importance of proper minefield recording should be emphasized to all troops likely to lay mines but particularly to engineers.

d. A central record office should be operated in each theater, where the latest information on all minefields should be available.

e. A definite program should be initiated for the development of mines and mine clearance devices and the best means of using them. Research should be continual and intensive, utilizing the best available scientific knowledge. Types of mines should be held to a minimum.

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CHAPTER 6

ENGINEER INTELLIGENCE

SECTION 1

INTRODUCTION

37. Purpose. The purpose of this chapter is to indicate what procedures were followed in the European Theater of Operations for the procurement, processing and distribution of engineer intelligence; to determine wherein these procedures failed to produce the best possible results; and to recommend measures to be taken for the purpose of providing the headquarters of all echelons of the field forces with adequate and timely engineer intelligence.

38. Scope. This report treats of the flow of War Department intelligence and combat intelligence in the field forces. The types of engineer intelligence processed at each echelon are enumerated and described and the responsibilities of the various echelons in the chain of engineer intelligence are defined. Intelligence derived from aerial photography and map supply will not be covered.

39. Definitions.

a. The definitions of War Department intelligence, combat intelligence, engineer information and engineer intelligence utilized in this study conform to the definitions given in the following manuals:

FM 30-5, Military Intelligence, 17 April 1940.
FM 5-6, Operation of Engineer Field Units, 23 April 1943.

b. For the purpose of this study, engineer intelligence is considered under two categories - situation intelligence and operational intelligence. Situation intelligence includes such items as information on lines of communication, terrain, obstacles, resources and weather; operational intelligence includes such items as information on equipment, practices and organizations of the enemy and our own troops.

SECTION 2

ENGINEER INTELLIGENCE AT THEATER LEVEL

40. Sources.

a. Tabulation of Sources. The main sources of engineer intelligence which were available at Theater level are tabulated in Appendix 9.

b. Engineer Technical Intelligence Teams.[1,2] Much of the information received by the Chief Engineer of the Theater on enemy mines, booby traps and related equipment came from the engineer technical intelligence teams (research and combat) which were organized and trained by the Chief Engineer and attached to each army and corps. Assignment was to the Office of the Chief Engineer so that all control over these units was at that level. The teams reported directly to the Chief Engineer who consolidated their reports and distributed the resulting intelligence to all armies and other interested agencies. The teams also evacuated enemy mines, igniters and other equipment for further study and evaluation, and assisted in the training of units in the field in the handling of enemy mines. In April 1945 the teams were assigned to

armies who attached a team to each corps.

41. Publications Distributed by the Chief Engineer, European Theater.

a. The Intelligence Division of the Office of the Chief Engineer, European Theater compiled and published the following publications:[1]

(1) Special Information Bulletin (daily) - reports on timely items of interest chiefly to field engineer units.

(2) Weekly Report of Acquisitions to the Intelligence Library.

(3) Enemy Equipment Handbook - compiled under the direction of the engineer technical intelligence teams.

(4) Engineer Intelligence Dossiers - included reports on geographic, topographic, economic and industrial data.

(5) Special studies such as Rhine River Hydrology.

b. The Intelligence Division of the Office of the Chief Engineer, European Theater also distributed publications which it received from the sources listed in Appendix 9, some of which were as follows:[1]

(1) Strategic Engineering Studies - covering railways, railway bridges and tunnels, highway bridges, inland waterways, electric power, beaches and ports.

(2) Engineer Board Reports.

(3) Janet Reports (from Joint Army-Navy Experimental Testing Board).

c. Other divisions of the Office of the Chief Engineer, European Theater published various reports on railway, highway and port reconstruction, construction design data and training.[1]

42. Limitations and Deficiencies.

a. There was some lack of intelligence at theater level because the War Department did not provide all the intelligence that theater expected, but waited for theater to request required intelligence on some subjects. Theater did not foresee all of its requirements and therefore did not make requests on the War Department far enough in advance to allow the latter to compile the necessary data.[1]

b. Theater facilities for compiling intelligence were inadequate for providing necessary intelligence in time to be of use, when operations got ahead of the planned phase lines as prescribed in the OVERLORD plan.[1]

c. Much of the material distributed by theater was not broken down into small enough parts to permit distribution to units of only the material in which they were interested. The result was that field units were burdened with large volumes which contained much material in which they had no interest.[1,2]

d. Considerable difficulty was experienced in dissemination of intelligence to field units because of the high security classification of reports. In some cases units below corps level decided that rather than take the risk of breaking security regulations in regard to highly classified material, they would forego access to intelligence data.[1]

e. There were no directives issued by theater headquarters delineating the responsibilities for engineer intelligence nor the methods to be utilized in procurement and dissemination. This left the combat troops free to adopt methods of their own choosing and led to non-uniformity of practice and considerable duplication in dissemination.[2,3]

f. Theater failed to anticipate the entry of the field forces into Czechoslovakia and Austria with the result that no information on those countries was available in time to be of use.[1]

g. The attachment, rather than assignment, of engineer technical intelligence teams to armies and corps left the latter units without complete control over this very valuable source of intelligence. This arrangement had its merit in permitting the Office of the Chief Engineer, European Theater, to assemble all its information and make it available to all units, but it did delay dissemination in the army or corps immediately concerned because of the time lag involved for compilation, evaluation and general distribution, and also developed some duplication between army and theater reports.[2]

h. Many of the publications whose value was principally for planning, were available in limited quantities only. This led to hoarding of these documents at certain headquarters and consequent failure to reach lower echelons.[1]

SECTION 3

ENGINEER INTELLIGENCE AT ARMY GROUP LEVEL

43. The army group engineers entered the intelligence chain in order to obtain intelligence for their staff studies and to attempt to anticipate the intelligence needs of the armies and make timely requests on higher headquarters for engineer intelligence which staff planning indicated would be required by the armies. They also were of assistance in obtaining publications and items of intelligence which the armies could not conveniently obtain for themselves, and they checked and screened intelligence which came to their attention in order to insure that the armies obtained the intelligence they needed. Some staff studies prepared at group level were made available to armies for their information and use.[1]

44. Intelligence Required from Armies. The army group engineers prescribed the items of intelligence which armies reported on their daily situation reports. This included quantities and locations of captured or located engineer equipment and supplies, information on road and rail networks, bridges, minefields located, enemy demolitions, obstructions and field fortifications.[4] This information, in addition to being of interest to the armies themselves, was principally of interest to the Communications Zone engineers who were following the armies.

45. Duplication of Effort. Some duplication of effort resulted from the fact that army group G-2's set up defense and terrain sections and made terrain studies, thereby entering the operational domain of the engineers.[1,2,3]

SECTION 4

ENGINEER INTELLIGENCE AT ARMY LEVEL

46. General. Armies received no general directives from higher headquarters governing standard procedure for the procurement, processing and dissemination of engineer intelligence, and were consequently left to their own devices, guided only by principles laid down in the field manuals.[1,2,3] They were, however, required to submit copies of their intelligence publications to higher headquarters, and were directed to report items of technical interest in their semi-monthly operations reports, and such intelligence items as captured enemy supplies, road and rail networks, minefields and water supply sources in their daily situation reports.[4] Items of interest solely to engineers followed engineer channels, while engineer items of general interest followed G-2 channels.[2,5]

47. Sources of Intelligence.[5] Intelligence at army headquarters was extracted from the following sources:

a. Publications issued by higher headquarters, other armies and corps.

b. Reconnaissance by engineer troops.

c. Reports of engineer technical intelligence teams.

d. Interpretation of aerial photos.

e. Reports of prisoner of war interrogations.

f. Interrogation of civilians and allied military personnel.

48. Publications Issued.[5,6] The various army headquarters attempted to screen and evaluate the mass of information received, and published the resulting intelligence in various forms.

a. For dissemination of engineer situation and operational intelligence other than special studies, bulletins were published under a variety of titles.

b. Special studies published by armies included the following:

Special Engineer Reports.	Special Reconnaissance Reports.
Railroad Reports.	Mine and Booby Trap Charts.
Terrain Studies.	Enemy Equipment Charts.
Bridge Reports.	Trafficability Studies.
Reports on Routes.	Road and Bridge Data Maps and Studies.

c. In addition to the items listed in subparagraphs a and b above, the armies forwarded voluminous material received from higher headquarters such as special area studies, defense overprints, dossiers on Rhine River, Rhine River hydrology studies, studies on various matters such as the "Effects of Snow on Roads", "Wind Characteristics along the Rhine River" and "Climate of Southern Germany".

d. Urgent intelligence was disseminated by telephone, teletype and courier, and confirmation in writing followed in the first two methods.

49. Limitations and Deficiencies.

a. Armies did not properly screen the voluminous material they received; consequently much useless material was forwarded to lower echelons.[2,3]

b. Intelligence sometimes arrived at army level too late to be of use. This deficiency however was evident principally when operations were ahead of scheduled phase lines.[1,2]

c. Considerable duplication resulted from the practice of lateral distribution of intelligence along with transmission upward. For example, armies would receive and publish intelligence from other armies and later would receive the same intelligence as republished by the Chief Engineer of the Theater. Armies received intelligence from corps through the corps daily situation reports and distributed down through corps again so that all units of all corps might have all information.[2,3,5]

d. There were cases where material received at army level was retained in the army library and corps merely informed that it was available there. This resulted in the corps failing to receive necessary intelligence.[1]

e. Channels for dissemination of engineer intelligence were restricted for the most part to the courier service through the message center of the army. This resulted in excessive time lag in receipt of intelligence by interested headquarters.[1]

f. G-2 duplicated the effort of the engineer in the preparation of terrain estimates.[3]

SECTION 5

ENGINEER INTELLIGENCE AT CORPS LEVEL

50. General. At the corps level, there were generally no overall directives covering the procedure to be followed by corps in the processing of engineer intelligence.[3] The armies did however require the corps to report items of engineer intelligence on their daily engineer situation reports.[4] In the dissemination of intelligence, items of interest only to engineers followed engineer channels, while intelligence of general interest followed G-2 channels.[1] Examples of the latter category were terrain studies, defense overprints, photos and diagrams of new enemy material or unusual application of standard materiel, and special studies or reports undertaken at the request of G-2.[1]

51. Sources of Intelligence.[1,3] Intelligence at corps headquarters was extracted from the following sources:

a. Publications issued by higher headquarters, other corps and lower echelons.

b. Reconnaissance by engineer troops of corps and divisions.

c. Reports of engineer technical intelligence teams.

d. Reports of prisoner of war interrogation.

e. Interrogation of civilians.

52. Publications Issued. At corps headquarters an attempt was made to screen and evaluate all intelligence before dissemination down to the corps units, laterally to adjacent corps and upward to army headquarters. Usually none of the material received from higher headquarters

was in sufficient quantities to permit corps to distribute it in the same form in which it was received.[1]

a. For dissemination of engineer situation and operational intelligence other than special studies some corps engineers published "Engineer Intelligence Summaries". These were published as and when material was available and included such information as maps of rivers showing crossing sites, stream data, condition of major roads, pictures of existing bridges and installations and pictures of damaged bridges and installations. Some corps used "Special Bulletins" for dissemination of intelligence when time was of the essence, and used the daily operations report for transmission of items of a less urgent nature.[2]

b. In the form of special studies the corps published the following: terrain studies; defense overprints; road and bridge studies; river studies; and trafficability studies.[1]

c. Intelligence appearing in the corps daily situation report included such items as mines and minefields, obstacles, road reconnaissance data, bridge and stream data, natural resources and captured materials.[1]

d. Urgent intelligence was disseminated by courier, radio, telephone and teletype.[1]

53. Limitations and Deficiencies.

a. Corps did not always send down to lower echelons all pertinent information received from army. Material sent down was not always properly screened.[2]

b. The information on natural resources and captured materials sent up to armies was frequently in insufficient detail to permit armies to take full advantage of it.[1]

c. Corps sometimes failed to expand upon intelligence received from higher echelons before disseminating to lower echelons.[2]

d. Corps sometimes failed to bring up to date information on enemy installations furnished by higher echelons and which was based upon out-of-date information.[2]

e. Corps sometimes failed to provide information which should have been received from divisions of the corps. Corps failed to insist on all engineer battalions turning in information.[1,2]

f. Groups complained that adequate intelligence data was not received from higher headquarters.[2]

g. There was excessive duplication of intelligence at corps headquarters.[1]

h. The corps G-2's duplicated the effort of engineers in the preparation of terrain estimates.[1]

i. Corps published intelligence which could suitably and with less duplication have been published by armies.[3]

SECTION 6

ENGINEER INTELLIGENCE AT DIVISION LEVEL

54. General.[2] At the division level, there is no evidence of

written "standing operating procedures" having been used for governing the collection, evaluation and dissemination of engineer intelligence.

55. Sources of Intelligence.[1,2] Within the division combat battalion the collection of information was a continuous mission of the reconnaissance section and was performed by special and routine reconnaissances. In addition, engineer information was collected by all units of the division. In the infantry regiments all units engaged in constant collection of information and the engineer company in support or attached to the regiment extracted engineer information and passed it back to battalion headquarters. For this purpose, the engineer company with an infantry regiment kept a liaison officer at the headquarters of the latter unit. Frequently engineer troops accompanied the division reconnaissance squadron in order to obtain first-hand information. Special forms were generally not used for reconnaissance, and the information arrived at battalion headquarters in various forms through command and technical channels. From above, the intelligence came from three agencies -- through G-2 channels, from the corps engineer battalion supporting the division and from the corps engineer.

56. Processing and Dissemination.[2] All information was delivered to the battalion S-2 who screened, evaluated and prepared it for dissemination. Much of the intelligence coming from higher headquarters was distributed directly by the engineer or was included in special studies prepared by him. In some units all intelligence was compiled by S-2 who briefed the staff and sent pertinent items by messenger to the line companies and G-2. In some divisions all intelligence was disseminated by the G-2 through the medium of the daily periodic report. Where this was done, the engineer disseminated directly special engineer intelligence which required speedier handling, such as information on new minefields encountered in the area, new mines, obstacles and special studies. Some division engineers published urgent engineer intelligence in their daily situation reports and less urgent items in engineer intelligence bulletins. In some cases there were three channels for dissemination upward: the intelligence report was prepared for the corps engineer and went directly to him; a copy went to the division G-2 who integrated the intelligence with other intelligence and sent it to corps G-2, and corps engineers received a copy of that; another copy of the division engineer's report went to the support battalion where the intelligence was combined with that found by that unit, and forwarded to group for further integration and transmission to corps. The division engineers and G-2's used vehicle couriers for delivery of routine intelligence but for urgent matters, employed telephone, teletype and radio.

57. Limitations and Deficiencies.[2]

a. Engineer information within the division was slow in arriving and inadequate, and was not always transmitted to higher headquarters.

b. Inadequate information was received from above on roads, bridges, minefields and trafficability.

c. Lack of good road reconnaissance reports caused difficulties in movements of troops.

d. Intelligence was not published by higher headquarters quickly enough to keep up with changes in trends and technique.

e. Engineer information brought in by troops was often not accurate and had to be investigated by further reconnaissance.

f. Transmission of intelligence suffered because of communication difficulties caused by limited ranges and numbers of radios.

SECTION 7

CONCLUSIONS AND RECOMMENDATIONS

58. Conclusions.

a. The War Department and Theater did not provide all the long range terrain intelligence required by the armies.

b. The intelligence material provided by the War Department and Theater was in most cases not in such form that it could be readily broken down by the armies and screened to insure that only useful information was disseminated to the lower echelons.

c. The lack of an overall directive defining the responsibilities of each echelon with respect to the collection, evaluation and dissemination of engineer intelligence, resulted in deficiencies and duplications in the field.

d. The failure of many staffs to prepare intelligence and reconnaissance plans well in advance of operations resulted in information being collected in an unsystematic manner, the natural consequences of which were deficiencies in necessary intelligence.

e. A great mass of information was collected and showered upon lower echelons of the field forces without proper screening, evaluation and correction of material by successive headquarters as it moved toward the front. This procedure placed the burden of screening and evaluating upon the lower echelons who were ill-equipped and had little time for such tasks.

f. The training of all echelons in intelligence procedures was deficient.

g. The collection of engineer intelligence by combat troops was deficient.

h. Adequate facilities for rapid collection and dissemination of intelligence were lacking.

i. G-2's quite generally duplicated the efforts of engineers in the preparation of terrain estimates.

j. Considerable difficulty was experienced in dissemination of intelligence to field units because of the high security classification of reports and studies.

k. Engineer technical intelligence teams should have been assigned to armies and corps instead of being attached and remaining under the direct control of the theater engineer.

l. There is a natural line of demarcation in engineer intelligence between army and corps. Above that line the headquarters should provide the foundation for situation intelligence and in addition should publish in comprehensive form and disseminate widely operational intelligence. Below that line the headquarters should expand and correct the situation intelligence in the detail required for specific tactical operations and should publish and disseminate only urgent operational intelligence and pertinent situation intelligence.

m. Theater and higher headquarters should furnish the base for situation intelligence. This is general information of a more or less permanent nature needed for long-term planning, some of which is obtained

as part of War Department intelligence and some of which is obtained during hostilities as part of combat intelligence.

n. With respect to operational intelligence the responsibilities of theater and higher headquarters are similar to their responsibilities for situation intelligence. They should provide information on enemy organizations, equipment and practices gathered during peace time. Changes in these should be furnished armies for publication as they occur. Periodically, single, comprehensive summaries should be published.

o. The present field manuals dealing with intelligence are satisfactory as regards principles involved, but directives are needed to emphasize and implement the policies laid down in the field manuals.

59. Recommendations.

a. During peacetime a program should be initiated for the purpose of gathering engineer intelligence from all available sources, and compiling this intelligence in some form such as loose-leaf so that it may be divided into smaller parts for issue to the field forces without the necessity for extensive extracting and rewriting.

b. At the outset of hostilities, an overall directive should be published by General Headquarters defining the responsibilities of each echelon in the chain of engineer intelligence. An outline of suggested instructions to be included in this directive will be found in Appendix 10.

c. All echelons should prepare engineer intelligence and reconnaissance plans. The form and procedure used by the Engineer XXII Corps are considered very satisfactory and are shown in Appendix 11.

d. Standing operating procedures should be prepared by all engineer headquarters below corps headquarters for the purpose of indoctrinating all engineer personnel in intelligence procedures.

e. Training in engineer intelligence should be emphasized and given enough attention to place it on a par with operations and supply. All engineer troops should be impressed with the necessity of promptly reporting all engineer information.

f. Adequate facilities should be provided for collection, evaluation and dissemination of engineer intelligence. Engineer intelligence of interest to engineers only should travel through engineer channels, while engineer intelligence of general interest should travel through G-2 channels. Some of the facilities needed are as follows:

(1) Increased intelligence personnel in the corps engineer headquarters.

(2) Reconnaissance planes for corps, division and group engineers.

(3) Additional reconnaissance personnel in the combat battalion.

(4) Additional light motor transportation for reconnaissance and delivery of intelligence.

(5) Additional radio equipment in engineer units.

g. Preparation of terrain estimates should be defined as

exclusively an engineer responsibility.

h. Engineer technical intelligence teams should be integrated with the engineer commands of corps and army headquarters.

i. Engineer intelligence should not be given a security classification higher than the absolute minimum, as high security classification impedes dissemination.

j. That pertinent doctrines, techniques, T/O's and T/E's be amended by appropriate agencies of the War Department.

BIBLIOGRAPHY

Chapter 6

1. File 320.2/34, Answers to questionnaires and statements by various unit engineers and engineer commanders, Engr Sec, The General Board, US Forces, European Theater.

2. File 350.07, Military Observations, Engr Sec, The General Board, US Forces, European Theater.

3. File 337, Conferences, Engr Sec, The General Board, US Forces, European Theater.

4. Engineer Operational Instructions Number 1, 12th Army Group, 2 August 1944.

5. Report of Operations, First US Army, 20 October 1943 to 1 August 1944.

6. After Action Report, Third US Army, 1 August 1944 to 9 May 1945.

7. Report on Engineer Organization, The General Board, US Forces, European Theater, Study Number 71.

APPENDIX 8

Chapter 6

BASIC DOCTRINE

Publications covering basic doctrine and authorized procedures for military intelligence are as follows:

1. FM 100-5, Field Service Regulations, Operations, 15 June 1944.
2. FM 100-15, Field Service Regulations, Larger Units, 29 June 1942.
3. FM 30-5, Military Intelligence, Combat Intelligence, 17 April 1940.
4. TC No. 54, WD, 24 August 1944.
5. FM 5-6, Operations of Engineer Field Units, 23 April 1943.

APPENDIX 9

Chapter 6

SOURCES OF INTELLIGENCE

THEATER LEVEL

1. United States.

   a. Office of the Chief Engineer, Washington, D.C., including the Army Map Service and the Engineer Research Office.

   b. The Engineer School, Fort Belvoir, Va.

   c. The Joint Army and Navy Experimental Testing Board.

   d. The Joint Army and Navy Intelligence Service.

   e. The Office of Strategic Services, Washington, D.C., London and Paris.

   f. The Chief Engineers of other Theaters.

   g. Other divisions of the OCE, European Theater of Operations.

   h. The Chief Engineers of Corps, Armies, Army Groups and Base Sections, European Theater of Operations.

   i. The Office of Scientific Research and Development.

2. British.

   a. Chief Engineer, 21 Army Group.

   b. The War Office, London.

   c. Ministry of Supply.

   d. Ministry of Home Security.

   e. Admiralty.

   f. Ministry of Economic Warfare.

   g. Canadian Military Headquarters (London).

   h. Combined Operations Headquarters.

   i. The Assault Training and Development Center.

   j. The Engineer Bridging Establishment.

   k. Army Operational Research Group.

   l. The Advisory Council of Scientific Research and Technical Development.

   m. The Anti-Concrete Committee.

n. The Armored Research Department.

o. Road Research Laboratory.

p. Inter-Service Topographic Department.

q. Inter-Service Intelligence Service.

r. Air Ministry.

s. Overseas Commands (British).

3. French.

a. Institute Geographique Nationale.

b. Deuxieme Bureau.

APPENDIX 10

Chapter 6

DRAFT OF DIRECTIVE ON ENGINEER INTELLIGENCE RECOMMENDED FOR ISSUE BY GENERAL HEADQUARTERS WHEN HOSTILITIES ARE IMMINENT

1. General. This directive is issued to define the responsibilities of the engineer headquarters of the various echelons, with respect to engineer intelligence, in order to reduce duplication of work and material and insure that adequate and timely intelligence reaches the using agencies. No attempt is made herein to list in detail all the information involved as such lists can be found in existing publications. This directive is intended to implement the basic doctrine as laid down in existing field manuals. For the purposes of this directive, engineer intelligence is considered under two categories, i.e., situation intelligence and operational intelligence. Situation intelligence includes information on lines of communication, terrain, obstacles, resources and weather. Operational intelligence includes information on organization, equipment and practices of the enemy and friendly troops.

2. War Department Responsibilities.

a. Situation Intelligence. The War Department will furnish the base for situation intelligence. This is general and detailed information of a more or less permanent nature, collected from various agencies at home and abroad in time of peace and during hostilities. It will be in sufficient detail to permit long range planning and will be issued in loose-leaf form, or in some form that lends itself to subdivision to permit issue down to division level without extensive modifications.

b. Operational Intelligence. The War Department will provide intelligence on enemy organization, equipment and practices gathered during peace time. Periodically, the War Department will publish up-to-date comprehensive summaries.

c. Changes and Additions. Changes and additions to situation and operational intelligence will be furnished as they become available.

3. Theater or General Headquarters Responsibilities.

a. Planning. The theater or General Headquarters will prepare an intelligence plan, listing all necessary situation and operational intelligence. It will maintain close relations with the War Department and intelligence agencies of allies in order to keep informed as to how much of the necessary intelligence can be expected from those sources, and should undertake the preparation of necessary material which cannot be obtained from existing sources. It will maintain close relations with army groups or armies in order to learn what the field force requirements will be far enough in advance to permit preparation or procurement of the intelligence.

b. Dissemination. Operational intelligence will be disseminated to armies in special intelligence bulletins when necessary. All operational intelligence received will also be consolidated and sent to the War Department. Situation intelligence originating at theater level should be prepared in loose-leaf form or similar form to permit its easy segregation and issue down to divisional levels. All intelligence passing through or issued by theater will be carefully evaluated, corrected and screened to insure that only pertinent intelligence is forwarded to the field forces, and that intelligence is not returned to the source from which it came or to armies which have received the intelligence through lateral distribution.

4. Army Group Responsibilities. The army group engineer will maintain close relations with armies to insure that the latter are receiving the intelligence they require. He will prescribe what intelligence is desired from the armies for transmission upward. He will maintain close relations with the theater intelligence officer to insure that the latter knows what intelligence the armies are going to require soon enough to allow for its preparation. Staff studies such as terrain estimates and trafficability studies will be forwarded to interested armies and to theater.

5. Army Responsibilities.

a. Planning. Armies will prepare intelligence plans listing all the intelligence items required for properly carrying out their missions. After determining what material is on hand, they will make provisions for obtaining the remainder either from higher headquarters or by ground and air reconnaissance missions performed in accordance with a reconnaissance plan.

b. Situation Intelligence. The responsibility of armies with respect to situation intelligence will be to verify from daily front line air cover and other photography, and captured and local data, the situation intelligence furnished by higher headquarters, and to modify and expand it where necessary. Armies will evaluate and screen intelligence received to insure that only useful material is forwarded to corps. Defense overprints will be initiated by army and added to by them up to the time when field information both air and ground is available to corps first. At this stage, the corps will assume the responsibility for the overprints. Armies will forward to interested corps any staff studies made at army level. Situation intelligence of interest to higher headquarters will be published in daily situation reports.

c. Operational Intelligence. Armies will publish operational intelligence in bulletin form periodically as required. Intelligence of an urgent nature will be published in special bulletins.

6. Corps Responsibilities.

a. Planning. Corps will prepare intelligence and reconnaissance plans in order to insure that the intelligence desired will be obtained in time to be of value.

b. Situation Intelligence. At corps level, situation intelligence will be screened to eliminate material of no use to lower headquarters, and expanded by ground and aerial reconnaissance into the detail required by tactical operations. Corps will assume responsibility for the initiation and maintenance of defense overprints at the time when field information, both air and ground, is available to corps first. Situation intelligence of interest to higher headquarters will be reported in the daily situation report.

c. Operational Intelligence. Corps will publish only operational intelligence of an urgent nature. In the interests of avoiding duplication, routine intelligence will be forwarded to army for publication in army bulletins.

7. Division Responsibilities.

a. Planning. The division engineer will prepare a general intelligence and reconnaissance plan in order to provide for a systematic and complete prodedure for obtaining all necessary intelligence. Standing operating procedures governing procurement and reporting of intelligence will be used at division level in order to focus attention of the troops involved on the problem of locating and reporting information.

b. Situation Intelligence. Division engineers will bear in mind that situation intelligence is vital and necessary not only to themselves but to higher headquarters and must be reported promptly. Situation intelligence will be reported to corps headquarters in such form as to enable easy extraction for reporting to higher headquarters. Situation intelligence received from above will be checked and expanded by ground and aerial reconnaissance into detail required by tactical and logistical operations.

c. Operational Intelligence. Items of an urgent nature will be disseminated immediately. Routine items will be reported to corps for transmission and publication in army bulletins.

APPENDIX 11

Chapter 6

MEMORANDUM TO ACCOMPANY LETTER

31 October 1945

as Incl. #2

SUBJECT: Engineer Reconnaissance and Intelligence.

It is believed that we engineers have placed too much emphasis in the past in our schools on the subject of general engineer reconnaissance with the result that we have neglected work on the planning of detailed and specific engineer reconnaissance missions. This, of course, is a general statement and like all general statements is opened to challenge; I believe, however, that if emphasis is placed on general engineer reconnaissance that many details of extreme value are lost in a mass of general information and that our reconnaissance efforts are dissipated in these general missions rather than concentrated on securing information vitally necessary at the time it is necessary.

I think that the most important single phase of reconnaissance is in its planning and that a little time and thought expended on detailed planning by the higher headquarters pays off tremendous dividends in the quality and the detail in which information is finally received. There are attached to this memorandum two exhibits; the first is an extract from anyengineer staff handbook which we had in our Corps and the second is a copy of a form we used for making a reconnaissance plan. We used these two things continuously in training in our Engineer Section and subordinate groups and battalions. We also used them with excellent success during the short time we were in operations. Our Corps G-2 was thoroughly sold on the idea and adopted the same procedure in planning and issuing his intelligence orders.

The form itself is self explanatory. In the first column, we entered the broad subject on which we wanted information. In the second, we broke subjects down into detailed indications or into detailed portions of the broad question. In columns 3 to 14, we put down all the agencies that we could think of where the information might be obtained; these included, of course, the divisional engineer battalions, the corps engineer groups, civilian engineer agencies, Prisoners of War, evacuees, Corps G-2 and other possible sources of information. After making an entry in Column 2 of the detailed information desired, we checked under each of columns 3 to 14, where we thought some of this information could be secured. The hour and destination of information was either entered as "SOP" for routine information or for "hourly reports" or "immediate by fastest means" or such other entry as applicable. Under the remarks column, we made definite assignments of responsibility for contacting agencies outside of the engineer chain. For example, if we wished to secure information from civilian engineer sources as to water supply in a town, we put a check under the civilian engineer; and then under remarks assigned a specific engineer unit to interview a civilian engineer. For information to be obtained from Prisoners of War, we put a check under PW Column and then under remarks, gave the job to

the division engineers of securing information either direct from PW cages or from division G-2 and to Corps Combat Groups the same assignment for Prisoners in Corps. As another example, for information from Corps G-2 or the Army engineers, we assigned the mission of obtaining it to our own section. The first few times that this form was used, we found that we were checking practically all the agencies for every detail of information, but with a little practice in its use, we became more selective and only checked those agencies where valuable details could be added. With a little practice, the plan could be prepared very quickly.

To issue our reconnaissance instructions, we inked in our plan hurriedly with jelly roll ink and ran off copies on the jelly roll.

Reconnaissance instructions were then issued by sending out a copy of the plan to all of the engineer units involved with orders to carry out reconnaissance missions, as indicated on the plan. Copies of the plan were also furnished to G-2 for inclusion with his intelligence orders. The advantages of issuing orders in this form were the saving of time and the fact that each of our reconnaissance agencies knew what he was to do and also what each of the others was to do. The last was very valuable; if, for example, a mission took a Corps Engineer Unit into a division zone, the division engineer knew about it, and coordination was easily obtained. As stated above, the Corps G-2 adapted this same system and issued his intelligence orders much the same way.

ROBERT J. FLEMING, JR.
Colonel C.E.
Engineer XXII Corps.

Exhibits

1. Extract, Staff Handbook.
2. Form for Reconnaissance Plan.

ENGINEER STAFF HANDBOOK
(Extract)

1. ASSIGNMENT OF RECONNAISSANCE MISSIONS. Time for the accomplishment of reconnaissance will always be limited and this makes it imperative that specific missions be assigned to each agency. Unless this is done reconnaissance efforts will be dissipated and needed information either not obtained due to failure of any agency to secure it, or buried in less important detail. Full use must be made of agencies other than engineer, such as Air Corps, PW , Infantry and Cavalry patrols, evacuees etc., to secure supplemental information. Specific detailed instructions must be given in assigning such reconnaissance missions.

2. RECONNAISSANCE PLAN. The preparation of a reconnaissance plan is the most important single step in the solution of the reconnaissance problem. The planning starts with consideration of the Essential Elements of Information as announced by the commander, supplemented by Essential Elements of Engineer Information which vitally affect the engineer mission. These elements are too broad in scope to be assigned as reconnaissance missions; information on them however, may be deduced from an analysis of related details which are indications of the elements. Intelligence and reconnaissance planning includes the statement of the elements on which information is desired, a careful analysis of these elements to determine the detailed indications, and a logical association of these indications with available reconnaissance agencies to insure against omissions. The indications are the detailed and specific points on which information is to be sought by the subordinate agencies; particular care should be given to the determination of these indications and to their correlation with our knowledge of the terrain and of such factors as probable variations in the weather, road net, enemy barrier tactics, and others which will affect the engineer mission.

3. RECONNAISSANCE INSTRUCTIONS. Reconnaissance instructions are issued by transmitting to all interested agencies a copy of the reconnaissance plan with directions to execute reconnaissance missions as indicated on the plan. This can be very easily done by all echelons by inking in their reconnaissance plan and reproducing in sufficient copies to give one to each agency. The advantage of issuing reconnaissance instructions in this manner lies in the fact that it saves the time of preparing individual orders and also in the fact that each agency then knows exactly what all the others are to do. This procedure, of course, does not preclude the issuance of simple instructions without the preparation of a plan where only one or two agencies are involved.

EXHIBIT 1 to Memorandum 31 Oct 45

FORM NO. E-II-1

HEADQUARTERS: _____
PLACE: _____
PERIOD: FROM _____
(hour) (date)
TO _____
(hour) (date)
PLAN NO: _____

ENGINEER INTELLIGENCE AND

RECONNAISSANCE PLAN

ESSENTIAL ELEMENTS OF INFORMATION (as announced by CG or G-2) and ESSENTIAL ELEMENTS OF ENGR INFORMATION (as Determined by Unit Engr to be Vital to Engr Mission)	INDICATIONS (Analysis of Essential Elements of Information) or Engineer Information Required	AGENCIES TO BE EMPLOYED												Hour and Destination of Information	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16