# A HISTORICAL STUDY OF UNITED STATES ARMY ENGINEER OPERATIONS IN THE REPUBLIC OF VIETNAM JANUARY 1965 - NOVEMBER 1967

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements of the degree

MASTER OF MILITARY ART AND SCIENCE



by

G. E. GALLOWAY, JR., MAJ, USA
B.S., United States Military Academy, 1957
M.S.E., Princeton University, 1962



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1968

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This thesis chronicles one aspect of support for the war in Vietnam, the operations of the U.S. Army Corps of Engineers. It presents the history of engineer operations, from the arrival of the first engineer unit in May 1965 through October 1967. The thesis presents the current doctrine pertaining to engineers and then compares this doctrine to the actualities of the war. Limited to coverage of the operations of divisional combat engineer battalions, nondivisional combat engineer battalions, construction battalions, and the command and control headquarters (groups, brigades, and commands) and separate support companies associated with these battalions. Because of the nature of the war, the piecemeal commitment of forces to the war, and the fact that organizational doctrine was never put to the test, it is impossible to make a definitive judgement as to the effectiveness of current doctrine. The net result of the thesis is a montage, which depicts the sweat, strain, spirit, and what is most important, the accomplishments of the Corps of Engineers in Vietnam.

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The opinions and conclusions expressed herein are those of the individual student author and do not necessarily represent the views of either the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

# A HISTORICAL STUDY OF UNITED STATES ARMY ENGINEER OPERATIONS IN THE REPUBLIC OF VIETNAM JANUARY 1965 - NOVEMBER 1967

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## ABSTRACT

In the spring of 1965, the United States committed its combat forces to the war in South Vietnam. To back up the combat elements, the full range of the armed forces' combat support and combat service support organizations moved into the Southeast Asia area of operations. This thesis chronicles one aspect of this support, the operations, in Vietnam, of the United States Army Corps of Engineers.

The majority of the thesis is given to presentation of the history of engineer operations, from the arrival of the first engineer unit in May 1965 through the efforts of the engineers in October 1967. Following the history, the thesis presents the current doctrine pertaining to engineers and then compares this doctrine to the actualities of the war in Vietnam. An analysis and appraisal conclude the study.

In scope, the thesis is limited to coverage of the operations of divisional combat engineer battalions, nondivisional combat engineer battalions, construction battalions, and the command and control headquarters (groups, brigades and commands) and separate support companies associated with these battalions. The primary focus rests on the activities of battalions, their projects and their problems. The thesis does not include the activities of either engineer special units or installation support detachments. The coverage begins with the arrival of engineer units in Vietnam and, as a result, includes neither mobilization and training within the United States nor movement from the United States to Southeast Asia.

Basic data for the thesis were taken primarily from operational reports-lessons learned, command reports, combat after action reports, and histories, prepared in Vietnam by engineer, combat and logistical units. They were supplemented by official correspondence, trip reports by the Chief of Engineers' Liaison Officer to Southeast Asia, and personal interviews and correspondence with over 80 general and field grade officers who served in Vietnam. Background data were taken from articles in professional journals and from speeches made by senior members of the Department of Defense.

The history is presented in chronological sequence and is divided into five periods. The presentation of engineer operations during each period is preceded by brief discussions of the political, tactical and logistical situations that influenced engineer actions. The engineer history highlights the typical missions and projects assigned to each of the units, the problems and new developments encountered by these units, and the organizational structure and command relationships that grew around them. The history is followed by a description of the doctrine governing the organization of a theater of operations and the organization and employment of engineers within the theater. Doctrine is then compared to the actual organization and employment of engineers in Vietnam and the differences and similarities analysed and appraised. The narrative is supplemented by 33 maps (27 of which are original), 12 charts and diagrams, and 23 photographs.

In conclusion, the thesis indicates that because of the nature of the war in Vietnam, the piecemeal commitment of United States forces to the war, and the fact that organizational doctrine was never put to the test, it is impossible to make a definitive judgement as to the

effectiveness of current doctrine. The thesis, however, does note that the experience gained in Vietnam has raised many questions with respect to the applicability of current doctrine. Questions are then raised concerning the future of the centralized engineer control organization that appeared in Vietnam, the feasibility of establishing command and control headquarters that are multipurpose rather than combat or construction oriented, the concept of a universal engineer battalion, suited for both combat and construction, and the solution of problem areas and the furtherance of new developments identified by the war in Vietnam.

The net result of the thesis is a montage, which depicts the sweat, strain, spirit, and what is most important, the accomplishments of the Corps of Engineers in Vietnam.

## PREFACE

With the passage, on 10 August 1964, of a Joint Resolution of the House and Senate in which the Congress approved and supported ". . . the determination of the President . . . to take all necessary measures to repel any armed attack against the forces of the United States and to prevent further aggression, . . ." most legalists agree that the United States became conclusively engaged in a war in Southeast Asia.

The attacks in February 1965 on U.S. installations in the Republic of Vietnam pushed the United States further into this war and opened the door for the commitment of U.S. combat forces on the mainland of Asia. With the arrival of the first marines at Da Nang in March 1965 and the May airlift of the Army's 173d Airborne Brigade into the Saigon area, the United States became and still remains a full participant in a ground war that began in 1946 and has continued in one form or another ever since. In the next 24 months the size of the U.S. commitment grew from these two small brigades to a combat force equivalent to 10 divisions.

As with other wars in other years, the advent of U.S. combat forces to foreign soil brought with it requirements for all aspects of support ranging in scope from combat oriented artillery and aviation efforts to the less spectacular, but equally essential, logistics build-up needed to maintain the modern armed forces. Not the least of these requirements was the heavy demand for engineers.

During both World War II and the Korean conflict, the engineers of our armed forces were called on to produce engineering wonders and to support combat operations in such diverse environments as the dense jungles of the South Pacific, the mountains and rice paddies of Korea, and the urban areas of Europe. The support of the war in the Republic of Vietnam created gargantuan tasks for our nation's military engineers. While military technology grew in the post-World War II period and the warriors of the world became accustomed to the intricacies of helicopters, jet aircraft, sophisticated command and control equipment and concepts of a fast moving logistics system, the strife-ridden Republic of Vietnam had failed to keep pace with this movement forward. In January 1965 it had only three jet capable airfields, one port of consequence, and its roads and railroads were cut and torn by the actions of its enemies. It was into this environment that the military engineer was thrust. This history is written to portray the herculean efforts of one part of this military engineering team, the U.S. Army Corps of Engineers.

On 4 May 1965 the only U.S. Army engineers in the Republic of Vietnam were members of a small water supply detachment that had been sent to support the U.S. advisory effort. By 1 November 1967, less than 30 months later, there were over 35,000 Army engineers in Vietnam. Truly, the Castles had come to Vietnam.

The primary purpose of this paper is to present, in chronological sequence, the story of U.S. Army engineer operations in the Republic of Vietnam during the period 1 January 1965 to 1 November 1967. A secondary purpose of this paper is to examine the organization and

employment of these engineers and to compare their organization and employment with that contemplated by current U.S. Army doctrine. A third purpose is to offer those engineer officers being assigned to Vietnam the opportunity to learn from the experiences of those who have gone before them.

In defining the U.S. Army engineer effort in Vietnam, I have chosen to limit this study to the activities of the U.S. Army engineer units attached or assigned to divisions, separate brigades and the U.S. Army Engineer Command, Vietnam, and thereby to exclude the activities of the engineer detachments and teams assigned or attached to the 1st Logistical Command and the 5th Special Forces Group (Airborne). This exclusion in no way indicates a lack of appreciation for the efforts of these latter groups but does serve to focus on the major engineer effort under which the bulk of the forces and the majority of the construction was centered.

Since the efforts of the Army engineers can not be completely disassociated from the activities of the civilian contractors and engineer troop units of other services and other nations, a brief summary of the activities of these organizations will be presented; however, this summary will in no way do justice to their remarkable efforts.

Similarly, in order to limit this paper to a manageable length, only passing mention will be made of the unbelievable effort of the U.S. Continental Army Command (CONARC) in mobilizing, training and deploying this engineer force from the Continental United States (CONUS) to Southeast Asia. The story of this effort is a subject in itself, as anyone who was associated with it will readily testify.

Because of the very size of the engineer effort in Vietnam, this history will be broad in scope, and, as a result, the particular coverage devoted to any one organization or project will be limited to the essentials necessary to convey an overall impression of the unit's activities or a project's complexity. No doubt, at some future date, this same subject will be the basis for a multivolume publication.

The first chapter of the history describes the background to the conflict in Southeast Asia. It gives, in addition to a precis of the geography and the population of Vietnam, an outline of the conflict from World War II through the attacks on the U.S. installations at Pleiku and Qui Nhon in February 1965, together with a summary of U.S. involvement during that period.

Chapters II through VI chronicle the activities of Army engineers in Vietnam from the arrival of the first combat unit on 5 May 1965 through the last operations of October 1967. Each chapter describes a specific period of time during the conflict and is subdivided into a general description of the war and its impact on the logistics and support picture, a description of the activities of each engineer group of the Engineer Command (and its predecessor, the 18th Brigade), and a discussion of the operations of the engineer units assigned or attached to the divisions and separate brigades.

Chapter VII briefly outlines the role of the Military Assistance Command Vietnam (MACV) in the construction effort and discusses in general terms the activities of the contract construction agencies and troop construction units from Vietnam, Korea, Thailand, the Philippines and Australia. The chapter concludes with a summary of the operations of U.S. Navy and Marine engineer units.

Chapter VIII outlines the general doctrine which "should have" governed the employment of engineers in a Theater of Operations, compares this doctrine to the actual employment and organization of engineers in Vietnam, and analyses and appraises the organization and employment of the engineer forces in Vietnam. Based on the appraisal of the engineer effort, questions are raised as to the impact of the war in Vietnam on current doctrine and thinking.

The material contained in this paper is unclassified and was developed largely from operational and command reports of combat, logistical and engineer units. Gaps in the history left by classification of source material or the absence of written reports have been filled through interviews with officers who were in Vietnam during the period and through the use of secondary sources such as technical reports appearing in professional magazines and speeches by senior military personnel. Some of the information comes from my own experience as a member of 18th Engineer Brigade from July 1966 through January 1967 and my subsequent tour with the 1st Cavalry Division.

The net result of this variety of sources is a montage which portrays the sweat, strain, spirit and, most important, the accomplishments of the Army Engineers in Vietnam.

The author wishes to gratefully acknowledge the assistance of his adviser, COL Leonard Edelstein, and his thesis monitors, LTC Frank S. Tarbell and LTC Robert G. MacLennan, whose broad engineering background and effective guidance added much to the proper direction of the study. The author also wishes to acknowledge the cooperation of the many senior officers who gave their time to interviews and correspondence.

Their thoughts and information closed the many gaps that existed in the available documents. In addition, sincere thanks are extended to Mr. Byron Taylor and Mmes. Alice Blaser, Joanne Cannon, Margaret Hebbeler and Tess Lieberman of the USACGSC Library, Dr. J. A. Remington and Mr. D. A. Topolosky, Office of the Chief of Engineers, and Mr. Amos Gallaway, Army Field Printing Plant, whose technical assistance was invaluable, and to Miss Linda Crosby, Mrs. Marilyn Hurst and Mrs. Paula Stafford, whose typing effort brought the history from handwritten copy to its final form.

Except as indicated, all maps and charts were prepared by the author and the responsibility for all errors in content and format rest with the author. Credit for the fine artwork, however, must rest with the staff of the Printing Plant. The author is indebted to Mr. Topolosky for figures 1, 10, 11, 15, 22, 28, 33, 35, 36, 44, 53, 55, 57, 59 and 60, to MAJ Dan Zenk, Information Officer, 4th Infantry Division, for figures 8, 13 and 47, and to the Information Officer, USAECV, for figure 45. The photographs in figures 29, 31 and 42 were taken by the author.

Lastly, the author must acknowledge the patience and assistance of his wife and family who lived through and with the preparation of this history.

G. E. G.

TABLE OF CONTENTS


| | Page |
|---|---|
| ABSTRACT | v |
| PREFACE | viii |
| LIST OF FIGURES | xvii |
| CHAPTER | |
| I. BACKGROUND FOR CONFLICT | 1 |
| Introduction | |
| Vietnam | |
| The People | |
| Vietnam to 1954 | |
| Insurgency 1954-1965 | |
| The War Grows | |
| II. THE COMING OF THE CASTLES (March-December 1965) | 11 |
| The Advent of U.S. Combat Forces | |
| The Logistics Buildup | |
| First Engineer Battalions Arrive | |
| Command Relationships | |
| The Buildup Continues | |
| Logistics Activities | |
| Engineer Operations - General | |
| Qui Nhon Area | |
| Cam Ranh Area | |
| III Corps Area | |
| Brigade and Division Engineers | |
| 1965 | |
| III. THE FIRST OFFENSIVE (January-May 1966) | 60 |
| The War Continues | |
| Logistics | |
| Engineer Operations - General | |
| Qui Nhon - Pleiku | |
| Cam Ranh Area | |
| III Corps Area | |
| Brigade and Division Engineers | |

Page

IV. THE CASTLES GROW (June-November 1966) . . . . . 99

The War Expands
Logistics
Engineer Operations - General
Qui Nhon - Pleiku
Cam Ranh North - Tuy Hoa
Cam Ranh Bay - Phan Rang
Long Binh - Vung Tau
Northern III Corps
Brigade and Division Engineers

V. A NEW WAR (November 1966-April 1967) . . . . . 153

The Army on the Move
Logistics
Engineer Operations - General
18th Engineer Brigade
159th Group - Long Binh - Vung Tau
79th Group
Brigade and Division Engineers

VI. HOLDING THEIR OWN (April-October 1967) . . . . . 195

A Picture of War
Logistics
Engineer Operations - General
18th Engineer Brigade
20th Engineer Brigade; III-IV Corps
Brigade and Division Engineers

VII. OTHER ENGINEERS . . . . . 246

General
MACV Directorate of Construction
Contract Construction
Installation Support
Troop Units

VIII. RETROSPECT . . . . . 259

General
Doctrine Versus Actuality
Appraisal
Conclusions
Questions
Finis

APPENDIX A: ABBREVIATIONS AND MILITARY EQUIPMENT DESIGNATIONS . . . . . 263

Page

APPENDIX B: QUESTIONNAIRE . . . . . 287

APPENDIX C: LOCATION AND ASSIGNMENT OF ENGINEER UNITS . . . . 297

APPENDIX D: TYPES OF ENGINEER UNITS AND THEIR FUNCTIONS . . . 299

BIBLIOGRAPHY . . . . . 306

LIST OF FIGURES


| Figure | | Page |
|---|---|---|
| 1. | Southeast Asia | 2 |
| 2. | Geographic Regions, South Vietnam | 4 |
| 3. | Province Boundaries of South Vietnam | 6 |
| 4. | Principal Cities and Port Sites in Vietnam | 15 |
| 5. | Organization, 18th Engineer Brigade (December 1965) | 26 |
| 6. | Qui Nhon Area, Fall 1965 | 28 |
| 7. | Airplane Landing Mat, Steel, Pierced, M8 | 31 |
| 8. | Standard Tropical Buildings | 33 |
| 9. | Cam Ranh Area, Fall 1965 | 39 |
| 10. | Cam Ranh Port, Fall 1965 | 41 |
| 11. | Prefabricated Warehouse, Cam Ranh Bay | 44 |
| 12. | Saigon Area, Fall 1965 | 50 |
| 13. | Descent by "Trooper Ladder" From a CH-47 | 56 |
| 14. | Qui Nhon Area, Spring 1966 | 68 |
| 15. | Tank Farm 1, Qui Nhon | 69 |
| 16. | An Khe Base Camp, Summer 1966 | 71 |
| 17. | Pleiku Area, Spring 1966 | 74 |
| 18. | Cam Ranh Area, Summer 1966 | 77 |
| 19. | Port Area, Cam Ranh Bay, Summer 1966 | 78 |
| 20. | Long Binh-Bien Hoa, Summer 1966 | 85 |
| 21. | Binh Dinh Province | 93 |
| 22. | Installation of T-17 Membrane | 95 |

| Figure | | Page |
|---|---|---|
| 23. | Organization, 18th Engineer Brigade, 1 November 1966 | 103 |
| 24. | Engineer Areas of Responsibility, Summer-Fall 1966 | 104 |
| 25. | Qui Nhon Area, Fall 1966 | 110 |
| 26. | Qui Nhon Depot | 112 |
| 27. | Bong Son Area, Binh Dinh Province, Fall 1966 | 114 |
| 28. | The "Golf Course," An Khe | 116 |
| 29. | Western II Corps | 118 |
| 30. | Tuy Hoa Area, Fall 1966 | 124 |
| 31. | Port Lane, Vung Ro | 126 |
| 32. | 35th Engineer Group Area of Operations, Fall 1966 | 132 |
| 33. | Phan Rang Air Force Base | 135 |
| 34. | 79th Engineer Group Area of Operations, Fall 1966 | 140 |
| 35. | MUST Inflatable Buildings | 143 |
| 36. | The Rome Plow | 146 |
| 37. | Organization, U.S. Army Engineer Command, 1 February 1967 | 157 |
| 38. | U.S. Army Engineer Command, Brigade and Group Areas of Responsibility | 159 |
| 39. | Pleiku Area, Spring 1967 | 164 |
| 40. | Composite View of Kaiser Mat Panel | 166 |
| 41. | Qui Nhon Area, Spring 1967 | 171 |
| 42. | Placement of M8A1 Matting at LZ English | 172 |
| 43. | 35th Engineer Group Areas of Operations, Spring 1967 | 177 |
| 44. | Road Paving Operations | 179 |
| 45. | Dong Tam | 184 |
| 46. | 79th Engineer Group Area of Operations, Spring 1967 | 186 |

| Figure | | Page |
|---|---|---|
| 47. | Bridging with CH-47 Helicopters in the Sc San Area | 191 |
| 48. | Organization, U.S. Army Engineer Command, 31 October 1967 | 200 |
| 49. | U.S. Army Engineer Command, Brigade and Group Area of Operations | 202 |
| 50. | Pleiku Area, Fall 1967 | 207 |
| 51. | Northern Binh Dinh and Southern Quang Ngai Provinces, Fall 1967 | 212 |
| 52. | 35th Engineer Group Area of Operations, Fall 1967 | 216 |
| 53. | Cam Ranh Port, October 1967 | 218 |
| 54. | Long Binh Area, Fall 1967 | 223 |
| 55. | Storage Areas, Long Binh | 226 |
| 56. | 34th Engineer Group Area of Operations, Fall 1967 | 228 |
| 57. | Artillery Firing Positions in the Delta | 231 |
| 58. | 79th Engineer Group Area of Operations, Fall 1967 | 234 |
| 59. | Jungle Clearing Along Highways | 236 |
| 60. | C-130 Airfield, Duc Pho | 242 |
| 61. | U.S. Portion of a Theater of War | 255 |
| 62. | An Organization, Theater of Operations | 257 |
| 63. | An Organization, Independent Field Army | 259 |
| 64. | General Organization, MACV | 260 |
| 65. | Engineer Troop Organization, Theater of Operations | 262 |
| 66. | Distribution of Battalion Effort | 271 |
| 67. | U.S. Force Buildup vs Nondivisional Engineer Buildup | 280 |

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# CHAPTER I

## BACKGROUND FOR CONFLICT

### Introduction

Before recounting the history of engineer operations in Vietnam, it is important that the background to these operations be fully understood. Obviously, the characteristics of the country in which these operations took place played a significant role in the conduct of these operations. In addition, the nature of the war itself - this new war of national liberation - also affected the modus operandi of U.S. Army Engineers in Vietnam.

### Vietnam

Almost the size of the State of Missouri, the Republic of Vietnam (RVN), known by more people as South Vietnam, sits at the southeast corner of Mainland Asia, looking east across the South China Sea to the Philippines and south to Indonesia and Malaysia. (Figure 1.) South Vietnam stretches 800 kilometers from the Demilitarized Zone in the north, marking its boundary with the Democratic Republic of Vietnam (better known as North Vietnam), south to Cau Mau Point, which separates the Gulf of Siam from the South China Sea. Its average width is some 175 kilometers. South Vietnam is pushed to the sea by Cambodia and Laos which meet it on the west and by North Vietnam which blocks it on the north at the 17th Parallel Demilitarized Zone.


LAOS
NORTH
VIETNAM
THAILAND
DA NANG
CAMBODIA
QUI
NHON
CAM RANH
SAIGON
SOUTH VIETNAM
SCALE MILES
0
100
200

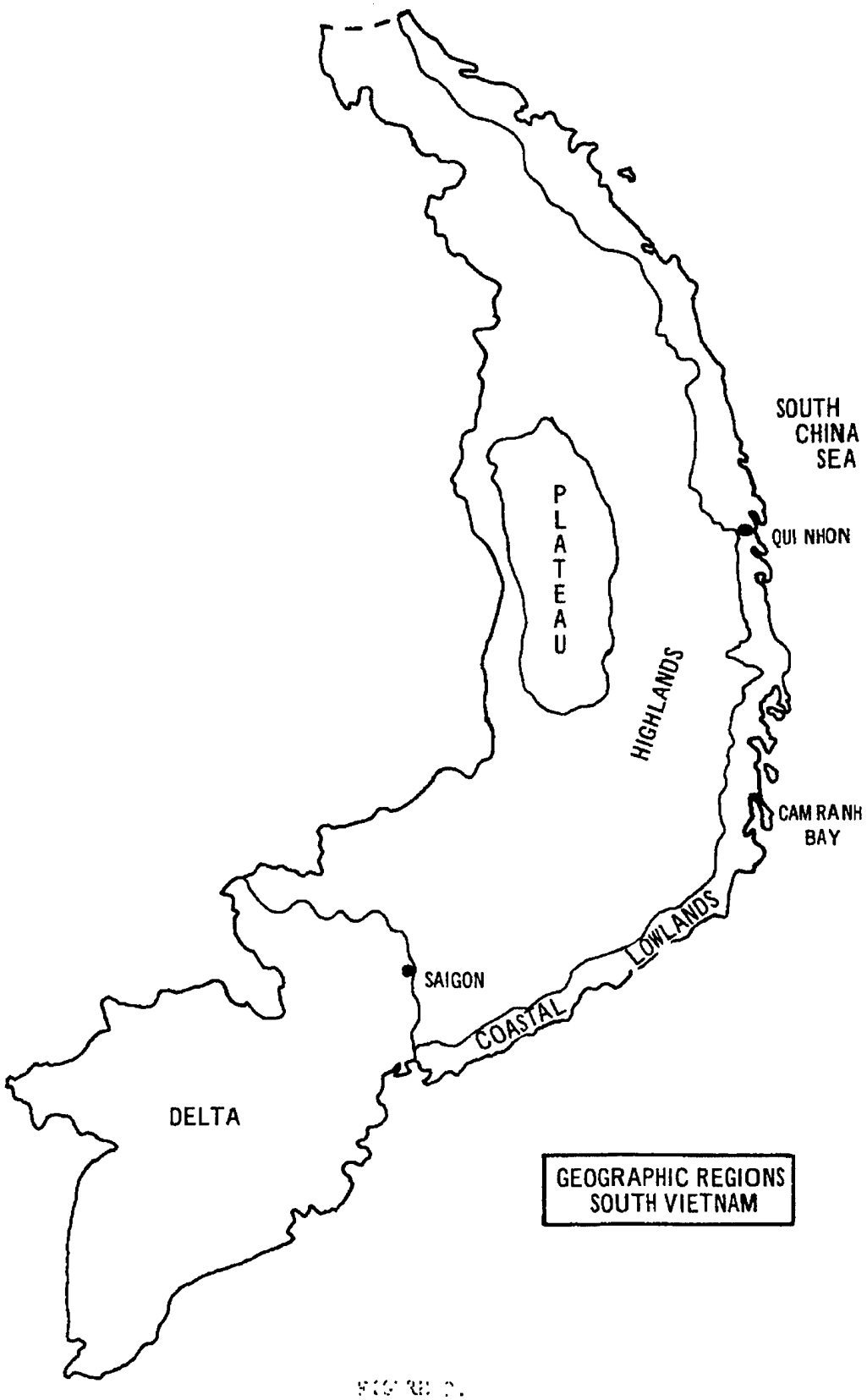
Geographically, South Vietnam is divided into three rather distinct areas, the Mekong River Delta in the South, the rugged jungle covered highlands running north from Saigon into southern China, and the narrow coastal lowlands that spring from the Red River Delta in North Vietnam and run south to the Mekong River. (Figure 2.)

The 40,000 square kilometers that encompass the Mekong River Delta represent a flat fertile area, crisscrossed with irrigation ditches and canals. The Delta, at one time, produced a large measure of Southeast Asia's rice.

The highlands are rugged and inhospitable. Covered for the most part with dense tropical vegetation, they represent a major obstacle to movement and settlement. In the center of South Vietnam's highlands lies the Darlac Plateau, which reaches north from Ban Me Thuot to Kontum, a distance of some 200 kilometers. In the plateau area, the terrain is more favorable and is typified by rolling hills covered with a high growth of an elephant grass.

The coastal lowlands wind their way like a snake south from the Demilitarized Zone, varying in width from 0 to 40 kilometers. Along this coastal plain are rugged mountains and peninsulas of sand which hang along the coast to shield the rich inland fields that provide a substantial segment of the nations rice supply.

The weather in South Vietnam is tropical monsoon. From November to March each year, the "Northeast" monsoon flows into the country from the Gulf of Tonkin and forces heavy rains on the coastal lowlands north of Nha Trang. Then, from the Gulf of Siam, the "Southwest" monsoon launches its May to October downpour on the highlands and the Delta. During that part of the year when the monsoons are "elsewhere," the land




GEOGRAPHIC REGIONS
SOUTH VIETNAM

is generally dry with only late afternoon cloudbursts producing a minimal monthly rainfall. The effect of these seasons on construction is apparent. During the rainy season, flooding is commonplace and exterior construction difficult, if not impossible. During the dry season, day after day will pass without the interference of heavy rains.[1]

## The People

Sixteen million people live in South Vietnam's 42 provinces, (similar to states) on what is basically an agricultural economy. Ninety percent of the people of South Vietnam take their roots in immigration from China and India and have flavored this background with the culture of France, which ruled the land for nearly a century. The largest and most influential of the several ethnic minorities in the country are the Saigon centered Chinese, who number over one million, and the Montagnards (mountain people), whose 600,000 lead a nomadic existence in the highlands.

Life in South Vietnam is family centered. Ties with the government extend upward from hamlets through villages and districts to the provinces, which are grouped into four military corps areas. (Figure 3.) These corps serve both a civilian and military purpose and dictate many of the actions and organizations of both the U.S. and South Vietnamese Armies.[2]

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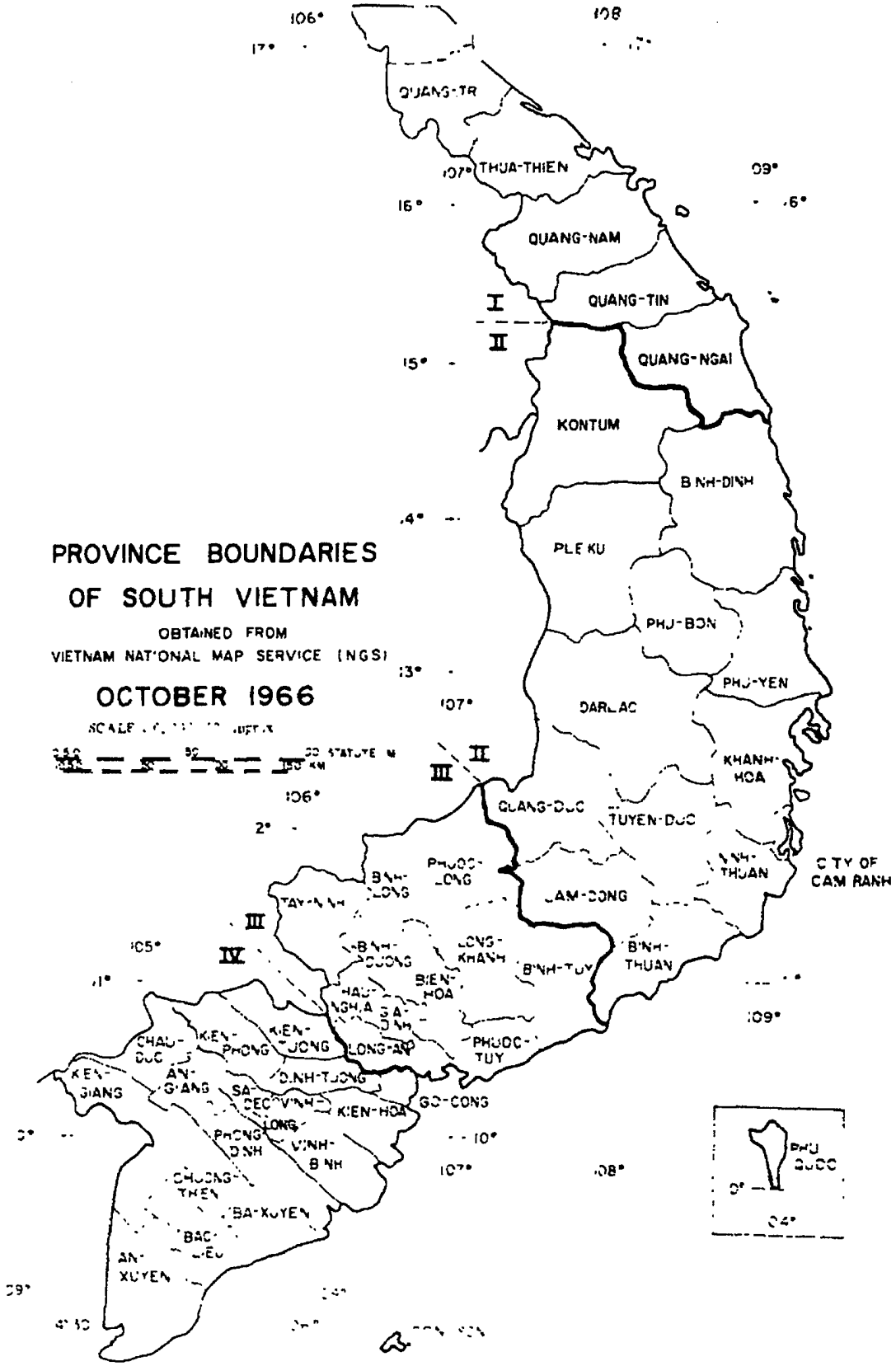
[1]U.S., Department of the Army, "Area Study 8F, Vietnam," (USACGSC Student Reference, Fort Leavenworth, Kansas, undated (1967)), pp. 8F-4-8F-7.

[2]Ibid., p. 8F-2.


PROVINCE BOUNDARIES
OF SOUTH VIETNAM
OBTAINED FROM
VIETNAM NATIONAL MAP SERVICE (NGS)
OCTOBER 1966
QUANG-TRI
THUA-THIEN
QUANG-NAM
QUANG-TIN
QUANG-NGAI
KONTUM
BINH-DINH
PLEIKU
PHU-BON
PHU-YEN
DARLAC
KHANH-HOA
QUANG-DUC
TUYEN-DUC
LAM-DONG
BINH-THUAN
CITY OF CAM RANH
PHUOC-LONG
BIEN-HOA
LONG-KHANH
PHUOC-TUY
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KIEN-HOA
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## Vietnam to 1954

South Vietnam went into World War II as part of the French Colony of Indochina. The French, who initially arrived in Southeast Asia late in the 17th century, had taken firm hold of Laos, Vietnam and Cambodia at the end of the 19th century and had begun to draw from these countries substantial amounts of rice, rubber and other resources of the area. In 1941, when the Japanese swept through Southeast Asia, they permitted the Vichy French regime to maintain puppet control of Indochina and allowed the French to stay in control until March 1945, when a policy of "Asia for the Asians" placed most of the French administration in jail or before a firing squad.

With the collapse of their war machine in August 1945, the Japanese quickly left Indochina. A lack of action by the new French Government in Paris created a vacuum that was quickly filled by a North Vietnamese communist, Ho Chi Minh, who proclaimed a new republic and took over the government of North and South Vietnam.

On 6 March 1946, the French returned to Vietnam and, after some political in-fighting, in effect, deposed Ho and sent him into the mountains to launch what was to be an eight-year war against the French. This war, in which the French attempted to maintain control of the populated and productive areas, and during which the Viet Minh (Ho's organization) perfected the art of guerrilla warfare, ended militarily in 1954 at Dien Bien Phu, a French outpost in western North Vietnam. It was politically settled at the conference table in Geneva when the French and Ho agreed on a temporary partition of Vietnam at the 17th Parallel.

This partition was to last until 1956, when free elections were to be held to determine the form of government for both Vietnams.[3]

## Insurgency 1954-1965

Neither the United States nor South Vietnam (which was not represented at the Geneva Conference) signed the Geneva Accord and with rapid withdrawal of the French from Indochina, these two nations became allied in what was soon to be another war against military forces under the leadership of Ho Chi Minh.

The 1956 elections never took place and by 1962 an International Control Commission reported that over 10,000 men had been infiltrated from North Vietnam into South Vietnam ". . . with the objective of supporting, organizing and carrying out hostile activities, including armed attacks . . ." against the government of South Vietnam.[4] To combat this insurgency the U.S. assisted the government of South Vietnam by providing advisors and military equipment under the Military Assistance Program.[5]

By the summer of 1964, the strength of the U.S. advisory force had reached 21,000 and included U.S. Army helicopter units which supported the military operations of the Army of the Republic of Vietnam

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[3]Associated Press, What YOU Should Know About VIETNAM (Associated Press, 1967), pp. 5-9.

[4]Report of the International Control Commission, quoted in U.S., Department of State, The Legality of U.S. Participation in the Defense Vietnam, Publication 8062 (Washington: U.S. Government Printing Office, March 1966), pp. 1-2.

[5]U.S., Department of State, Why We Fight In Vietnam, Viet-Nam Information Notes Number 6 (Washington: U.S. Government Printing Office, June 1967), pp. 2-3.

(ARVN).[6] By 1964, estimates placed over 40,000 insurgents in South Vietnam and their effect was being felt in the assassination of government officials, in the destruction of lines of communication and in the terrorizing of the populace in general.[7]

Construction to support these operations was limited, with only $34 million being placed in South Vietnam through contract construction handled by the U.S. Navy. The facilities built during the period included improvements to South Vietnamese Air Force installations, and barracks and administrative areas for the U.S. support and advisory forces.[8]

The complexion of the insurgency took on the appearances of war on 2 August 1964, when North Vietnamese patrol boats attacked the U.S. destroyer Maddox in the Gulf of Tonkin, in an incident that resulted in U.S. retaliatory bombing of North Vietnam and the passage of a congressional resolution in which the congress approved and supported ". . . the determination of the President . . . to take all necessary measures to repel any armed attack against the forces of the United States and to prevent further aggression . . . ."[9]

## The War Grows

From August 1964 until February 1965 the Viet Cong continued to carry out their acts of terrorism without any apparent focus on U.S.

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[6]Associated Press, pp. 10-11.

[7]U.S., Department of State, The Legality of U.S. Participation, p. 1.

[8]John Mecklin, "Building by the Billion in Vietnam," Fortune, LXXIV (September 1966), 113-114.

[9]Associated Press, pp. 10-11.

elements. Then, on 7 February, in an attack on the U.S. advisory group at Pleiku, eight Americans were killed and 126 were wounded. Three days later 23 Americans were killed and 21 wounded in a bombing incident in Qui Nhon.

Spurred by the Pleiku and Qui Nhon incidents, and with regard for the security of other U.S. installations in South Vietnam, the President decided that only the presence of U.S. combat forces in South Vietnam would stem the tide of Viet Cong attacks. This decision changed the United States involvement in Vietnam from military assistance in an advisory status to full commitment of the combat power of the nation.[10]

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[10] Ibid.

CHAPTER II

# THE COMING OF THE CASTLES
(March-December 1965)

## The Advent of U.S. Combat Forces

On 8 March 1965, 3,500 members of the Third Marine Expeditionary Force landed in I Corps to take up defensive positions around the U.S. air base at Da Nang. This move was reported by the State Department as a measure designed to release more South Vietnamese soldiers for corbat.[1]

On 5 May 1965, U.S. Air Force C-130 aircraft began landing at Bien Hoa Air Base, north of Saigon, with the main body of the 173d Airborne Brigade, which had been stationed on Okinawa.[2] The commitment of the 173d also was based on improving security around an important installation and the resultant release of ARVN forces for offensive combat. By now, U.S. strength in South Vietnam approached 45,000 and the handwriting was clearly on the wall. A short pause in the United States/South Vietnamese bombing of North Vietnam, which had begun following the Pleiku incident, together with a Presidential peace offensive, yielded little in the way of reaction from Hanoi. There was little doubt in anyone's mind that the U.S. would be in South Vietnam for some time to come.[3]

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[1]Associated Press, What YOU Should Know About VIETNAM (Associated Press, 1967), pp. 11-12.

[2]"U.S. Combat in Vietnam: The First Year," Army, 16 (October 1966), 111.

[3]Associated Press, p. 12.

## The Logistics Buildup

Prior to 1962, the bulk of the U.S. forces operating in South Vietnam worked directly for the Military Assistance Command, Vietnam (MACV) and its predecessor, the Military Assistance Advisory Group (MAAG). In March 1962, because of the buildup of Army aviation units and required support forces, these elements were grouped in what initially was known as the U.S. Army Support Group, Vietnam and what was later to become the U.S. Army Support Command, Vietnam. From 1962 to 1965 this agency provided to the South Vietnamese, through its helicopters, the air mobility so essential to counterguerrilla warfare and provided the maintenance and supply backup required to keep the helicopters airborne. By early 1965 it was evident, however, that a full scale logistics effort would be required to support any deployment of combat forces to South Vietnam, and with this deployment in mind, on 1 April 1965, the 1st Logistical (Log) Command was established in South Vietnam.[4]

By this time the MACV planners had generally agreed that the U.S. Army would operate in the II, III and IV Vietnamese Corps Zones, while the Marines would focus on the I Corps area. With this information and programmed strengths for the Log Command of 44,000 by June and 64,000 by December, the 1st Log Command staff began an appraisal of the logistics outlook for this new area of operations.[5]

While, to a limited degree, some improvement had been made in the Army's support facilities by contract construction under the Navy, the bulk of the contract effort had been directed to support of the

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[4]BG John Norton, "Build-Up Challenge in Vietnam," Army, 1 (November 1965), 44-46.

[5]"Command Briefing" [illegible] Command, U.S. Army Command and [illegible]

Vietnamese and the U.S. Air Force, and for the Army logistician the picture in II, III and IV Corps appeared bleak, as a 1st Log Command briefing chart seemed to indicate:

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| | SAIGON | Rest of Country |
|---|---|---|
| Port | X | 0 |
| Jet Field | X | 0 |
| Industry | X | 0 |
| Skilled Labor | X | Very Little |
| Roads | X | VC |
| Railroads | X | VC |

This chart highlighted what most of the U.S. had been reading in news magazines. In early 1965 all supplies to South Vietnam were funneled into Saigon where the U.S. had been allocated permanent use of only one shipping berth and where the delays were legend.[7]

The cantonment and storage facility picture was even more bleak as the only facilities in existence were those built to support the pre-1965 buildup and these offered little room for expansion.

To the 1st Log Command, the Support Command Vietnam, and MACV, it was clear that new ports, depots and cantonments would have to be built and that the quickest way to get them was to bring on the Army engineers. The planners felt that the engineers, together with civilian contractors whose work was rapidly increasing, could provide for the required expansion of facilities in central and southern South Vietnam.

The 1st Log Command's initial concept was to establish a major port and depot complex in the Cam Ranh Bay area and then, from this port

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[6] Ibid., p. 5A.

[7] 1LT D. P. Yens and CPT J. P. Clement, "Port Construction in Vietnam," Military Engineer, 59 (January-February 1967), 20-22.

and Saigon, feed out to smaller subsupport areas by aircraft and shallow draft vessels. To accomplish this, areas near Cam Ranh Bay, Qui Nhon, Nha Trang and Vung Tau were programmed for improvement.[8] (Figure 4.)

Located along the center of the II Corps coast, Cam Ranh Bay is formed by a 28 kilometer peninsula jutting south from Nha Trang to enclose 40 square kilometers of water with depths of up to 24 meters. This natural harbor, which had been used as an anchorage by the Japanese in World War II and the Russians during the Russo-Japanese war, had for port facilities only a small two berth finger pier. This pier had been built in 1962 by the Agency for International Development. Ashore there was little save the fishing village of Cam Ly and a small Vietnamese Navy installation. The closest highway was across the bay and there were no roads leading off the peninsula.[9]

The coastal cities of Qui Nhon, Nha Trang and Vung Tau possessed extremely limited port facilities and were marked by undersea profiles that made it difficult for deep draft vessels to approach the shore. Near or in each of these cities there was, however, some available land that could be used for military facilities and each city stood as a gateway to a critical area of the country. Qui Nhon sat at the eastern end of National Route (QL) 19 which ran west to Pleiku and the Darlac Plateau; Nha Trang, on QL 1, also offered access to the plateau through QL 21 to Ban Me Thout; Vung Tau, sitting near the mouth of the Nha Be River, offered easy marine approaches to the spiderweb network of Delta canals

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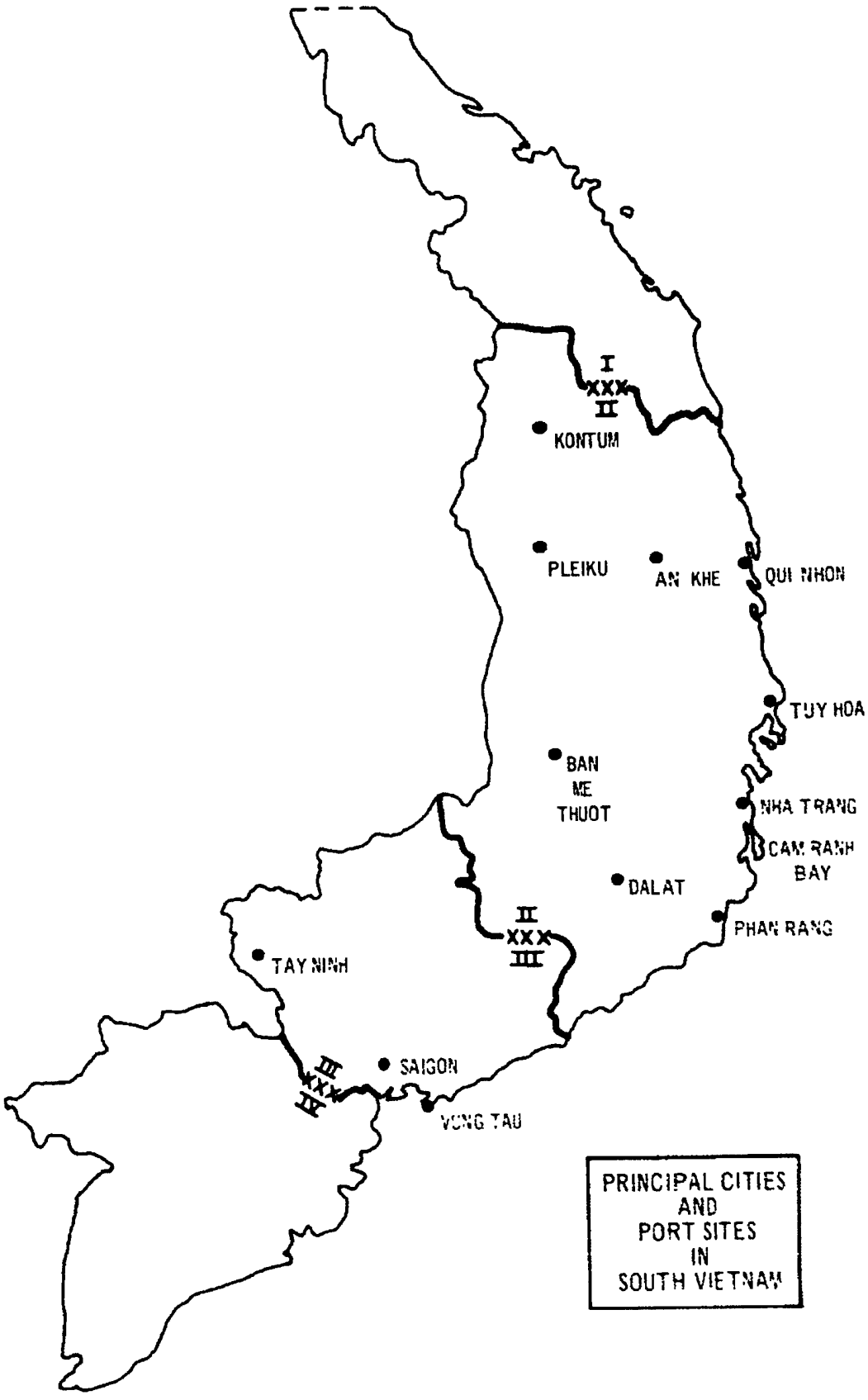
[8] Ibid.

[9] LTC J. M. Mueller, "Taming the Sands of Cam Ranh," Military Engineer, 58 (July-August 1966), 230-239.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SAIGON
VUNG TAU
PRINCIPAL CITIES
AND
PORT SITES
IN
SOUTH VIETNAM

and rivers, as well as ground lines to the area southeast of Saigon. Each of these cities also offered some limited room for expansion of existing airfield facilities.

## First Engineer Battalions Arrive

The spring of 1965 meant alert orders for Headquarters, 35th Engineer Group (Construction) at Fort Polk, Louisiana, the 84th and 864th Engineer Battalions (Construction) at Fort Ord, California, and Fort Wolters, Texas, and at Fort Bragg, North Carolina, and Fort Dix, New Jersey, the 584th Engineer Company (Light Equipment) and the 513th Engineer Company (Dump Truck). Following the inevitable scramble to get ready, these units left for Southeast Asia on board the USNS Eltinge, arriving off the coast of South Vietnam early in June.[10]

On 9 June 1965, Headquarters, 35th Engineer Group, together with the 864th Engineer Battalion and D Company, 84th Engineers, debarked on the Cam Ranh Peninsula, the first U.S. Army engineer group headquarters and battalion in Vietnam and the first major units to arrive at Cam Ranh Bay.[11] These units, together with the 513th and 584th Companies found the going in this new area to be difficult. A combination of sand, heat and an enemy who was never seen but was always there, made the first 30

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[10]Letter from LTC J. E. Bunch, USA, CO, 864th Engineer Battalion, to the author, untitled, Fort Leavenworth, Kansas, 18 March 1968, and interview with COL W. F. Hart, CO, 35th Engineer Group, 1965-1966, telephone, 13 May 1968. The Eltinge suffered mechanical failure at Midway Island and the group continued to Vietnam on the Barrett.

[11]The engineers were preceded into Cam Ranh Bay by the 123d and 1097th Transportation Terminal Companies which had arrived a few days earlier. The advance party of the 864th arrived at Cam Ranh in early May.

days a period of learning. While vehicle operators experimented with various methods of moving through a sand that acted like "loose marbles," the remainder of the group worked on unloading equipment and establishing a minimum standard base camp. To avoid the peak of the daytime heat which reached 120°, operations were shifted from 0100 to 1100 and 1500 to 0100 hours.[12]

From 9 June until 12 July, when the first U.S. combat units arrived, a heavy requirement also existed for security forces. Although the major problem encountered was long range sniping, the danger of an actual attack always existed and without combat forces present much engineer effort was diverted to this secondary mission.[13]

During this initial period much effort went into reconnaissance. As always, of major interest were the locations of any available construction materials. These searches failed to yield any of the "normal" materials; however, reconnaissance did uncover large deposits of laterite (a decomposed granite containing an iron oxide), beds of coral and, of course, large quantities of sand. To capitalize on the laterite discovery, A Company of the 864th set up a quarry in the high granite mountains at the southern tip of the peninsula. Soon the roads of Cam Ranh became a mixture of the sand and this laterite.[14]

By early July, work was underway on an LST landing site on a southern beach, temporary motor pools, equipment storage platforms and a

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[12]CPT Lindberg Jones, "Operations at Cam Ranh Bay," Military Engineer, 58 (January-February 1966), 10-12.

[13]Ibid.

[14]Ibid.

POL dump. A U.S. logistics facility was beginning to take shape in central Vietnam.[15]

To the north, on 11 June the 84th Engineer Battalion (less D Company) had hit the beaches at Qui Nhon and found the situation to be a little better. Qui Nhon, the seat of government in Binh Dinh province, was also the home of several U.S. units and possessed a semblance of a highway network. Space was available for an engineer base camp in the southern sector of the city and the 84th immediately began to plan for the myriad of construction projects necessary to transform this sleeping city into an operating logistics base. At Qui Nhon, however, the unloading of equipment was more of a problem as all of the engineer cargo had to be shuttled from ship to shore by lighters and amphibious vehicles. Mobilization for the required construction had to be paced to this ship to shore operation.

As soon as minimum equipment became available, work was started on improving the engineer base camp, construction of ammunition pads, fill operations for development of the Qui Nhon Depot and improvement of the existing beach facilities (LST ramps). The initial earthwork at the depot involved moving some 750,000 cubic yards of laterite and sand.

During the late summer, the 84th sent platoons on combat support missions. One platoon spent 30 days at An Khe rehabilitating an existing Vietnamese airstrip and a second platoon spent 45 days at Phu Tuc constructing a Special Forces camp.

Problems encountered with these initial projects were similar to those encountered at Cam Ranh Bay. The oppressive summer heat took its

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[15]Louis P. Ade, "Army Engineers in Vietnam," Army Information Digest, 21 (January 1966), 52-57.

toll on both equipment and men and "acclimatization" became a new word in everyone's dictionary. The sand of Qui Nhon, although not as difficult to work with as that in the south, found its way into bearings and gears and repair parts began to disappear from the shelves of the maintenance tents. Despite these drawbacks, the 84th soon began to develop usable facilities and another logistics complex began to take shape.[16]

D Company of the 84th, which had debarked at Cam Ranh Bay, moved by LST south to Vung Tau to begin improvement of the facilities at this important location.[17] Here, with security less of a problem than at Cam Ranh and with the existing facilities grouped closely together, D Company concentrated initially on deprocessing its equipment and establishing a base camp. The company's first missions involved improving the limited port facilities and establishing minimum storage facilities.

## Command Relationships

On its arrival in Vietnam, the 35th Group was assigned to the 1st Log Command and operated under the Log Command's Saigon headquarters. Planning for construction was centered in the Office of the Engineer, where project directives were prepared for transmission to the 35th Group. The 35th Group then issued these directives, with or without additional plans or guidance, depending on the situation, to one of the two battalions for execution. During this initial phase, with limited communications and even less in the way of aviation resources, command,

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[16] U.S., Department of the Army, "Command Report for Quarterly Period Ending 30 September," 84th Engineer Battalion, 14 October 1965, Section I.

[17] Hart interview.

control and coordination was difficult, if not impossible. Heavy reliance was placed on the abilities of the individual commanders and broad guidance, giving maximum freedom of action, was standard.[18]

## The Buildup Continues

On 16 June 1965, the Secretary of Defense announced the deployment of an additional 21,000 U.S. troops to South Vietnam to bring the total commitment to 75,000. Citing the need for security around U.S. installations and the desire to relieve more South Vietnamese forces for combat, Secretary McNamara also indicated that, under certain circumstances, these forces would be used to beat off specific Communist attacks.[19]

On 12 July, the 2d Brigade, 1st Infantry Division (less one battalion), landed at Vung Tau and immediately moved inland to Bien Hoa. To the north, a battalion of the brigade came ashore at Cam Ranh Bay and relieved the 1st Log Command forces (including the 35th Engineer Group) of the bulk of the peninsula security mission. A little over two weeks later, the 1st Brigade, 101st Airborne Division, landed at Cam Ranh Bay and relieved the battalion of the 1st Division of its security mission. These two brigades became the first U.S. combat forces to be deployed from the United States to South Vietnam and were only a prelude of things to come.[20]

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[18] Ibid.

[19] Associated Press, p. 12.

[20] "U.S. Combat in Vietnam," p. 116.

Throughout South Vietnam, the presence of major Viet Cong and North Vietnamese forces was being felt. In the II Corps area the Communists were moving towards the coast in an effort to cut the country in half. The effectiveness and morale of the South Vietnamese Army was rapidly decreasing. The situation by the end of July was very bleak and the future anything but rosy.[21]

On 28 July, in a television address to the nation, the President announced, "I have today ordered to Vietnam . . . forces which will raise our fighting strength from 75,000 to 125,000 men almost immediately. Additional forces will be needed later and they will be sent as requested . . . ."

In the next five months, the strength of U.S. forces was to quickly rise to 125,000 and then move on to approach 200,000. By Christmas 1965 the 1st Cavalry Division (Airmobile) and the 1st Infantry Division (-) had arrived in South Vietnam, where they were joined by the Korean 1st (Capitol-Tiger) Infantry Division. To control the U.S. combat forces in II Corps, Task Force Alpha, a U.S. Corps headquarters, was deployed in August from Fort Hood to Nha Trang.[22] No longer was the role of the United States forces to appear defensive or reactionary, as soon the fighting saw U.S. troops on the offensive in War Zones C and D in III Corps and in Binh Dinh province and the Ia Drang Valley in II Corps. Names like An Khe, Chu Pong, An Lao and Di An took their places with Pleiku, Qui Nhon and Saigon in the daily press reports.

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[21]Robert S. McNamara, appearing on NBC "Meet the Press," 4 February 1968.

[22]"U.S. Combat in Vietnam," p. 116. Task Force Alpha was subsequently designated Field Force, Vietnam (FFV).

## Logistics Activities

To provide administrative control of and support for the combat forces, on 20 July U.S. Army Support Command was transformed into the U.S. Army, Vietnam (USARV), to carry out ". . . all the functions of a field army save those an Army commander would perform at a forward command post . . . ." MACV would carry out the tactical functions.[23]

1st Log Command, under USARV, continued to grow and logistics units came ashore daily at each of the base areas. By December the predicted 6,000 logistics troops were in reality 25,000 and major depots were operating to serve tactical units at the other end of sea, air and ground lines of communications that stretched the length and breadth of the country.[24]

All over Vietnam the progress in developing these facilities was evident. TIME Magazine reported to its readers that:

> The U.S. Government is directing a massive master plan aimed at providing the immediate necessities of war (bridges, roads, barracks) . . . and the huge strategic complexes (harbors, airfields, roads) necessary for supplying U.S. troops in a distant land . . . .[25]

## Engineer Operations - General

The responsibility for the development of the Army's part of this master plan was given to the Army engineers, who, in the opinion of the Deputy Commanding General of USARV, faced a ". . . herculean task

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[23]Norton, p. 45.

[24]1st Logistical Command Briefing, p. 4.

[25]"Giant Venture in Viet Nam," TIME, 86 (December 17, 1965), 86.

. . ." the proportions of which were ". . . stretching resources and capabilities to their limits to get the work done . . . ."[26]

For the engineers, this buildup meant further expansion of the ports, the depots and support facilities, construction of base camps for the tactical units and opening of lines of communication along destroyed roads and to airfields carved in the jungle. For some of these engineers the buildup meant direct support of combat operations or, in the extreme, combat with the enemy.

On 16 July, one month after the Secretary of Defense's buildup message, the 159th Engineer Group (Construction) at Fort Bragg, North Carolina, which had been alerted in April for a possible deployment to Southeast Asia, received orders activating Headquarters, 18th Engineer Brigade, from the resources of the 159th. On 30 July the unit received movement orders and one month later departed for South Vietnam and assignment to USARV.[27]

The brigade's advance party arrived in Vietnam on 3 September and scrambled immediately to find space in the Saigon area for the headquarters and to establish a communications net with its subordinate units. On 16 September the headquarters (operating less the main body which did not arrive until 21 September) became operational and assumed command of all nondivisional Army engineers from 1st Log Command. (At this time,

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[26]Norton, p. 46.

[27]U.S., Department of the Army, "Command Report for Quarterly Period Ending 30 September," 18th Engineer Brigade, 15 October 1965, pp. 1-9. (CONFIDENTIAL.)

this engineer force was composed of two group headquarters, six battalions and nine separate companies.)[28]

One week later USARV assigned the following missions to the brigade:

> a. Provide operational planning and supervision of USARV construction and related tasks in the Republic of Vietnam and as may be directed by this headquarters.
>
> b. Exercise command and operational control of engineer units assigned to United States Army, Vietnam.
>
> c. Provide for physical security of personnel, equipment, facilities and construction sites of all units assigned or attached to your command.[29]

Concurrent with assumption of command of engineer units from 1st Log Command, the brigade also assumed responsibility for 44 projects initiated by the Log Command at some nine separate locations in II, III and IV Corps and it was to be control of these units and projects that presented the headquarters with its initial problems. Through September the headquarters operated with only one outgoing telephone line. Coupled with this was a lack of aviation support. The brigade was not authorized an aviation section and aircraft for command and liaison visits had to be sought from subordinate and adjacent units.

As communications began to work itself out (or to become something to live with) the brigade became aware of two extremely significant brigade-wide problems: there were too few construction materials available to the units in the field, and repair parts for engineer equipment were almost nonexistent, in fact most units were still operating

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[28] Ibid., p. 4.

[29] "Letter of Instruction," from USARV to 18th Engineer Brigade, 23 September 1965. (CONFIDENTIAL.)

from the supplies (theoretically 15 days) that they had brought with them from the United States. Attention was focused on these areas not only at brigade, but also at 1st Log and USARV; however, these problems were so interrelated to the basic construction mission that it soon appeared almost like the chicken and the egg. Ports and depots needed to be built to unload and distribute construction materials and repair parts.

In partial response to the repair parts problem, a "Red Ball" expedited shipment system was initiated in December, but little could be done to immediately accelerate the off loading of the ships which were stacked up outside each of the ports.[30]

The engineers, however, were making progress and by 31 December three group headquarters, 10 battalions and 17 separate companies were pushing construction throughout USARV. (Figure 5.)

## Qui Nhon Area

In northern II Corps, the engineer situation was significantly changed by the arrival on 23 August at Qui Nhon of the USNS Mann bearing Headquarters, 937th Engineer Group (Combat), and the 70th Engineer Battalion (Combat). These units deployed to Vietnam from Fort Campbell, Kentucky, on little over six weeks notice and came to Southeast Asia as time-tested organizations, having been in full operation for some time prior to their movement.[31]

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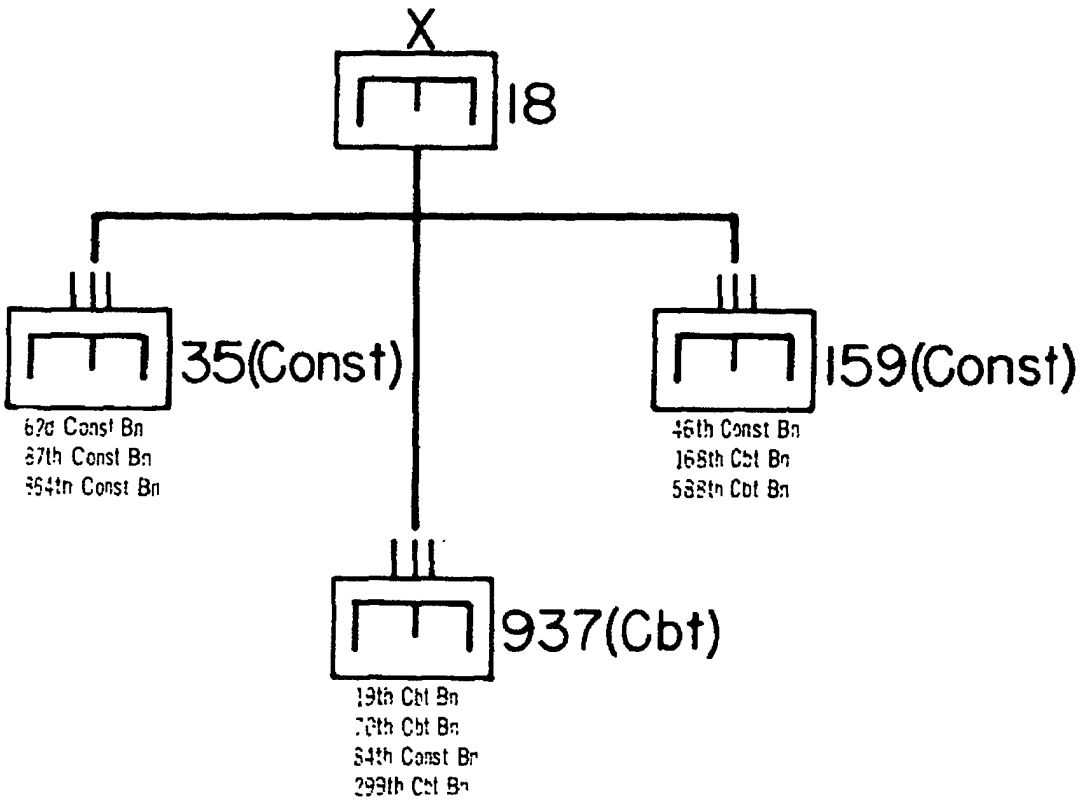
[30]Command Report, 18th Brigade, pp. 4-9.

[31]Interview with LTC W. F. Kirk, USA, S3, 937th Engineer Group, 1965-1966, Fort Leavenworth, 6-13 February 1967.

**ORGANIZATION**
**18TH ENGINEER BRIGADE**
**(DEC 1965)**



The 937th Group moved ashore and quickly established a base camp adjacent to the 84th Engineers on the south side of Qui Nhon. On 24 August the group became operational and on 28 August assumed command under 1st Log Command of the 84th (-) and 70th Battalions. From 28 August until 16 September, when 18th Brigade assumed control, the group took its technical direction and project assignments from the Log Command. After 16 September, the group operated as a major subordinate element of 18th Brigade and looked to the brigade for project directives, construction design and technical assistance.[32]

For command and control the 937th was better prepared in the aviation field than either 18th Brigade or 35th Group, as the headquarters deployed to Vietnam with 12 aircraft and a functioning aviation section.[33] Soon after their arrival however, these valuable resources were split out to the Brigade and the 35th Group in a temporary distribution of assets that was to last an indefinite period.[34]

From August until December, the 937th Group concentrated its efforts in Qui Nhon and An Khe with only a small force deployed to Pleiku. In Qui Nhon (Figure 6) the continuing emphasis was on development of port facilities, the construction of storage facilities for both dry cargo and bulk petroleum products and the early completion of the 400 bed 85th Evacuation Hospital. Closely allied with the construction

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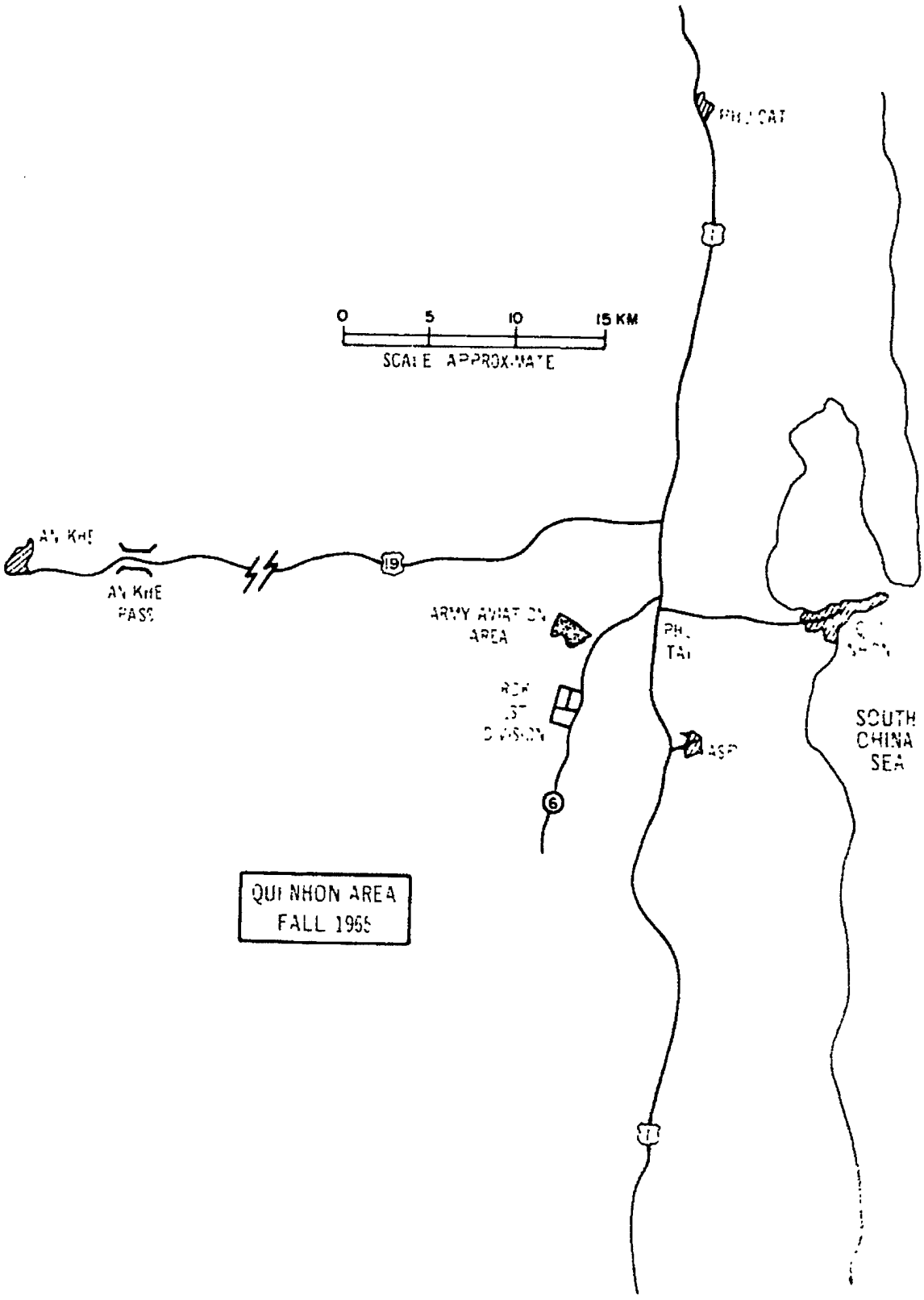
[32]Kirk interview.

[33]The 937th deployed with six UH-1B, four OH-13 and two U6 aircraft. On their arrival at Qui Nhon, they found no room available at the airfield and were forced to divert effort to the construction of a ramp for these aircraft.

[34]Kirk interview.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of these operational facilities was the preparation and improvement of cantonment areas for the many units streaming into the area. At An Khe, the September arrival of the 1st Cavalry Division was preceded by a major engineer effort to open the area for development. This effort launched a major base development program to create, in the central highlands, a U.S. "city" of nearly 20,000 people.[35]

When it crossed the beach on 23 August, the 70th Engineers became the first engineer combat battalion to arrive in country and one of the few battalions of any type to find its equipment waiting on the shore.

The 70th's (and 937th's) advance party, which had arrived in Qui Nhon on 16 August, had been able to meet the vessels carrying the battalion's equipment and to unload and process the equipment for use. When the main body arrived on shore, drivers went immediately to their vehicles and the battalion moved under its own steam to its base camp in Phu Tai Valley, some 10 kilometers west of the city.[36]

Two days later, while the battalion headquarters and B Company worked on improvement of their base camp and initiated work on a shoreside POL tank farm, A and C Companies moved, under the protective cover of the 1st Brigade, 101st Airborne Division, 40 kilometers over Viet Cong dominated Route 19 to An Khe, where, with the general planning

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[35]U.S., Department of the Army, "Command Report for Quarterly Period Beginning 1 October 1965," 937th Engineer Group, 15 January 1966, Section II. (CONFIDENTIAL.)

[36]Interview with LTC Leonard Edelstein, USA, Commanding Officer (CO), 70th Engineer Battalion, 1965-1966, Fort Leavenworth, 1-15 February 1968.

guidance of the 5th Engineer Battalion (1st Cavalry Division), they began work on the future home of the U.S.'s first airmobile division.[37]

Initial plans called for the deployment of these two companies to be temporary and for the 19th Engineer Battalion (Combat) to replace this task force of the 70th at An Khe soon after its scheduled arrival in Qui Nhon in mid-September. This plan was modified, however, on 31 August when the Chief of Staff, USARV, and representatives of 937th Group met with the Assistant Division Commander, 1st Cavalry Division, who indicated that, in his opinion, more engineer effort would be required to insure that the camp would be ready for the division's arrival in mid-September.[38]

On 1 September, the 70th Battalion (-) began to move from Qui Nhon to An Khe and immediately launched into double shift operations to construct the 13 kilometers of roadway necessary to provide access from Route 19 into the camp area and to provide a 15 kilometer secondary perimeter road around the camp for use by security forces. Concurrently the battalion assumed responsibility from the ARVN engineers for repair and maintenance of the An Khe airfield, a C-130 capable airstrip with a combination M8-M6 pierced steel plank (PSP) surfacing. (Figure 7.) Defects in the plank were causing frequent breaks and to keep the runway in operation the battalion almost continuously maintained a welding crew at the field.

With the arrival of the first elements of the division, emphasis shifted to preparation of the minimum essential logistics facilities,

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[37] Ibid.

[38] Ibid.

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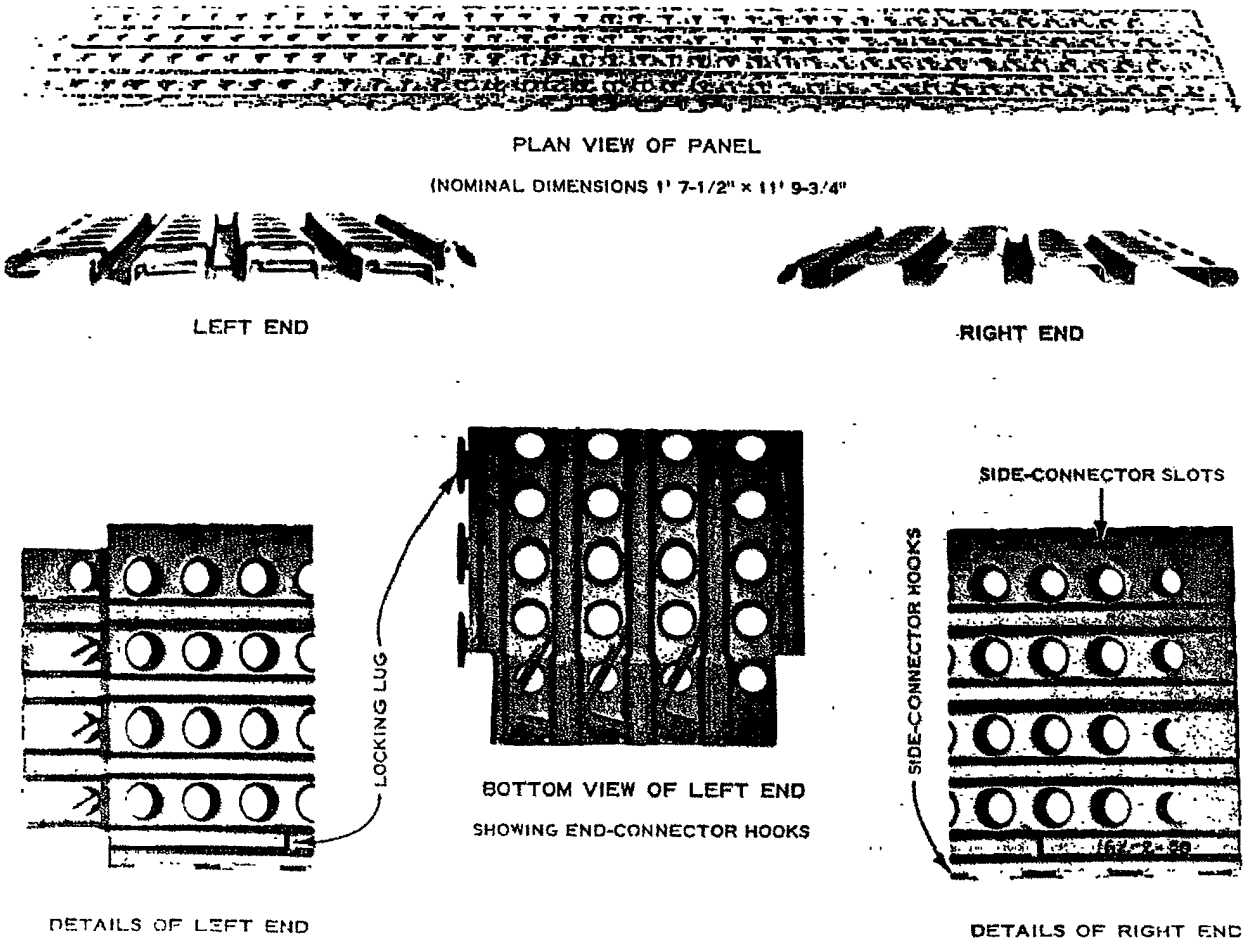


Airplane landing mat, steel, pierced type, M8

FIGURE 7.

Class I, Class III and Class V storage areas, protective bunkers and access roads. By October work had started on a 140 bed hospital (17 Quonsets) and a second access road from Route 19 into the camp area.

On 6 November, the battalion opened a rock quarry near An Khe and because the nonavailability of any mechanical crushing equipment, began hand crushing of quarry rock with 80 to 160 local Vietnamese workers. This method, which was unsophisticated to say the least, remained the sole source of crushed rock for the 70th until early 1966 when a 75 ton per hour (TPH) crusher was finally obtained.[39] [40]

In early December, the 70th launched a major program to construct, on largely a self-help basis, the cantonment facilities for the 20,000 men of the division and its supporting units. Under the self-help concept, the using unit would, with limited technical assistance from the engineers and following construction by the engineers of a representative number of sample buildings, construct their own tropicalized mess halls, billets and administrative areas (Figure 8). Engineer effort was focused on roads, storage areas and more complex facilities. As part of the team effort the 1st Log Command, acting as Post Engineer, prefabricated required latrines and showers.[41]

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[39] U.S., Department of the Army, "Command Report for Quarterly Period Ending 31 December 1965," 70th Engineer Battalion, 11 January 1966, pp. 7-9.

[40] In an article in Civil Engineering (November 1965), The Chief of the Navy's Bureau of Docks indicated that hand crushing was an often practiced expedient. He cited that in construction of an airfield at Pleiku, a "hand crushing" force provided sufficient rock to pave a 6000' runway and parallel taxiways in six weeks.

[41] 1st Log Command performed this function using Pacific Architects and Engineers. See Chapter VII.

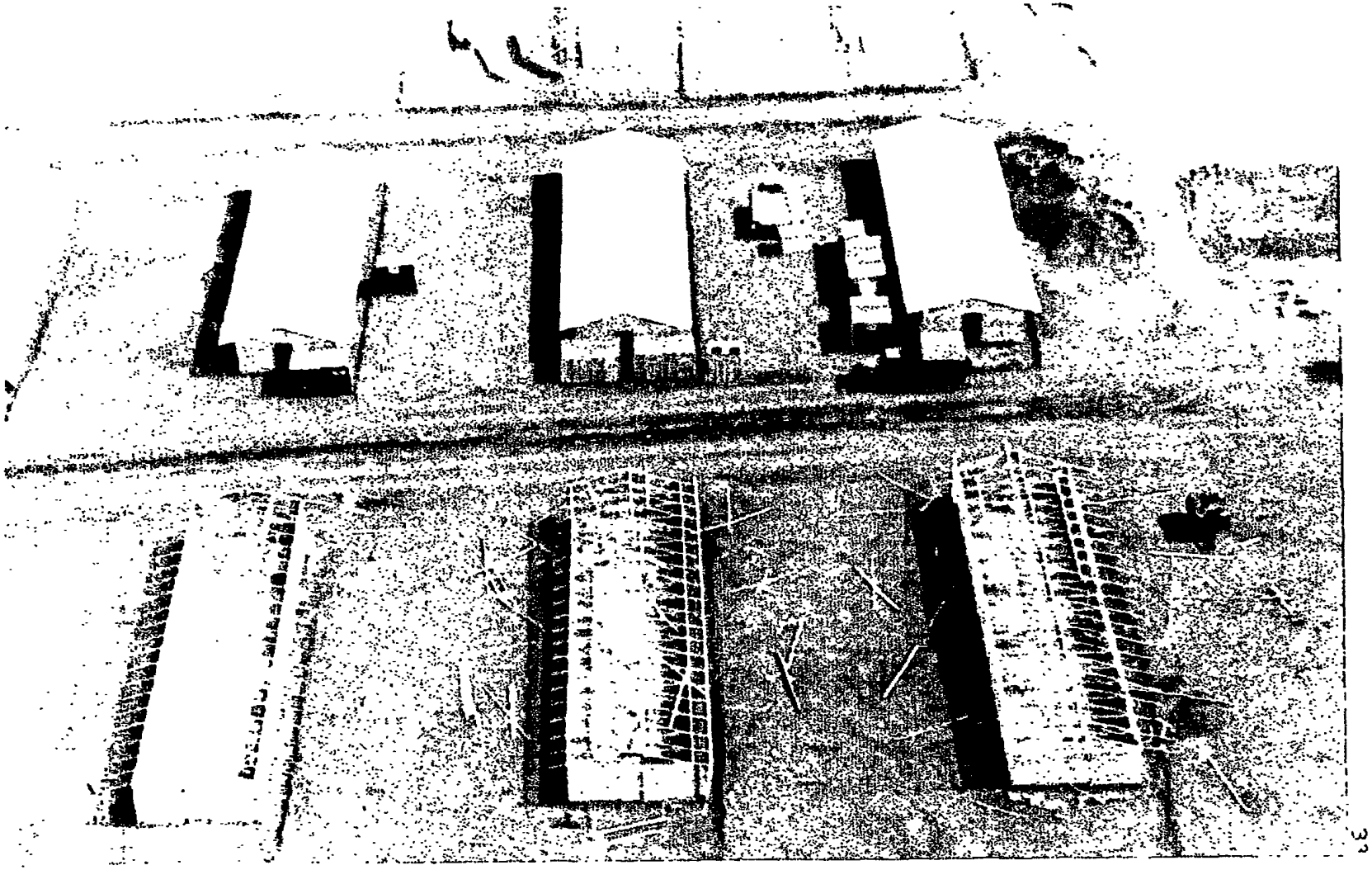

FIGURE 8. STANDARD TROPICAL BUILDINGS

At An Khe, while the design of these facilities progressed rapidly, the construction fell behind because of the theater wide problems of lack of construction materials and lack of repair parts for engineer equipment. To compound these problems, when material was available the self-help troops often were not, as tactical operations frequently moved the combat forces to the field.

The 70th was also held back by its lack of heavy equipment, for as a combat battalion its construction equipment was limited essentially to bulldozers, front loaders and graders. To help solve this problem, in September 937th Group sent one platoon of the 367d Light Equipment Company to An Khe and planned to follow this with the entire 630th Light Equipment Company on its arrival in October. When the 630th arrived on ?? October, because of port priorities, only one platoon was unloaded and it was not until after the first of the year that the company (-) was able to join the 70th.[42]

Throughout this entire period, the 70th also maintained its tactical posture. On several occasions it served as either the combat reaction force (reserve) for the brigade defending the An Khe base camp or as part of the perimeter defense force.[43]

Back at Qui Nhon, the 84th continued its effort to expand the beach area and to provide the required logistics facilities. During the fall the battalion continued work on the depot, completing the basic earthwork in September and erecting three 50' x 140', one 120' x 200'

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[42]Command Report, 70th Engineer Battalion.

[43]Kirk interview.

and four 20' x 100' prefabricated warehouses and administrative buildings. On the site of its base camp the 84th initiated construction of the 85th Evacuation Hospital, completing 37 out of 70 required Quonsets (six with air conditioning) and constructing the necessary (covered) sidewalks and secondary roads.[44]

At the port, assisted by the 1st Platoon, 497th Port Construction Company, on temporary duty from its parent company at Cam Ranh Bay, the 84th completed installation of two four inch marine POL lines and continued improvement of the over the beach facilities. At the Qui Nhon airfield the battalion replaced 1,100' of the PSP runway with a bituminous surface treatment.[45]

To provide fill for the depot and other key areas in Qui Nhon the 84th also began to operate a laterite pit in a hillside just to the west of the city, and soon was taking away 8,000 cubic yards (CY) each day.[46]

The 84th, like the 70th, continued to be short repair parts and construction materials. In addition, in this latter area, the 84th found that many of the prefabricated buildings had arrived in theater without many of the components. This lack of factory-made items required the battalion to improvise and/or locally fabricate these items with the attendant delays and costs. The strength of the battalion was improved,

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[44] Ibid. This construction also required the 84th to relocate to an area west of Qui Nhon.

[45] Command Report, 937th Group.

[46] MG T. J. Hayes III, "Army Engineers in Vietnam," Military Engineer, 58 (January-February 1966), 8-9.

however, when, on 18 October, D Company, 46th Engineer Battalion, arrived in Qui Nhon and was redesignated D Company, 84th Engineer Battalion.[47]

On 9 September the 19th Engineer Battalion (Combat) (from Fort Meade, Maryland) landed at Qui Nhon and moved into the base area, west of Qui Nhon, that had been vacated by the 70th. The 19th, unlike the 70th, had not been met by its equipment and as a result spent its first weeks in deprocessing its equipment and in improving its base camp. Late in the month, the 19th began work on enlargement and improvement of the ARVN ammunition supply point on the outskirts of Qui Nhon, construction of the 50,000 barrel (BBL) POL storage area and truck refuel facility (initiated by the 70th) and a combined effort with the Republic of Korea (ROK) engineers to provide access to and establishment of the ROK Capitol Division's base camp in a valley some 12 miles west of Qui Nhon. This latter project involved improvement by the 19th of 11 miles of access road and nine miles of perimeter road (including the construction of six bridges) and the provision of technical assistance to the ROK engineers in launching their own "self-help" program.[48]

On 5 November, the 19th was assigned the mission of constructing a major aviation facility in a lowland just to the north of the ROK base camp. Here the battalion constructed in 100 days a penetration macadam, diamond shaped heliport to support 50 UH-1 (Huey) helicopters, a 300' x 100' maintenance area and the basic living facilities to accommodate two aviation companies.[49]

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[47]Kirk interview.

[48]Command Report, 937th Group.

[49]2LT D. A. Blewett, "Heliport at Qui Nhon, Vietnam," Military Engineer, 58 (September-October 1966), 330.

The 299th Engineer Battalion (Combat) arrived in Qui Nhon on 26 October following its deployment from Fort Gordon, Georgia, and moved into a base camp in the Qui Nhon area that had been prepared by its advance party. The battalion immediately set about to improve its camp but was prevented from initiating any significant construction projects by delays in the arrival and subsequent off loading of its equipment and it was not until mid-November that it became operational. The 299th was assigned the project of constructing a permanent ammunition storage area in 1,000 acres of virgin land south of Qui Nhon. Initially involved in this project were 60,000 square feet (SF) of shed storage, 142,000 SF of open storage and 2,400 SF of igloos.[50]

On 1 December, the 299th began major improvement and upgrading of a nine kilometer (KM) road from highway 1, west of Qui Nhon, east to Ky Son mountain along the coast. This field force requested project was initiated to open an area north of Qui Nhon to several infantry battalions of the Capitol ROK Division and required, in addition to raising the level of the road one meter, construction of four timber and steel bridges. To provide for support to U.S. Army elements in the Pleiku area, the battalion also sent one composite platoon to Camp Holloway, where it operated in a general support role.[51]

The principal problem encountered by the 299th was its inability to get to its equipment; however, even with the arrival of this equipment, the battalion soon encountered the same materials and parts shortages that faced all other units in the area.

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[50] Kirk interview.

[51] Command Report, 937th Group.

## Cam Ranh Area

With its major role in the overall theater logistics plan, the Cam Ranh area became the focus of engineer attention in the fall of 1965. One national news magazine termed the effort at Cam Ranh Bay ". . . the largest overseas project undertaken by U.S. Army engineers since World War II . . ."[52] and the accuracy of this statement was upheld by the August and September arrival of two additional construction battalions and three separate companies to increase the building power of 35th Engineer Group.

By Christmas the group had installed a DeLong pier, doubling the deep draft berthing capacity of the port, constructed warehouses, hardstands and access roads for the Cam Ranh Depot, built a 7.4 mile POL system from the port to the Cam Ranh Air Force Base (AFB) (under construction by a contractor on the north end of the peninsula), continued progress on road construction and expanded its general effort to include projects in nearby Nha Trang, Dong Ba Thin and Phan Rang. (Figure 9.) Cam Ranh AFB became operational in November only with the assistance of the group. In addition to the POL facilities, the 35th built roads in the AFB area, operated a laterite pit on the bay and the ferries required to cross the bay.

On 24 August, the 497th Port Construction Company arrived at Cam Ranh Bay. This company, one of the more specialized companies in the engineer organization, had been rapidly brought to strength and deployed. With its complement of divers, welders and marine-oriented equipment,

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[52] K. M. Chrysler, "Port of Entry for U.S. Power," U.S. News and World Report, LIX (October 11, 1965), 50-52.

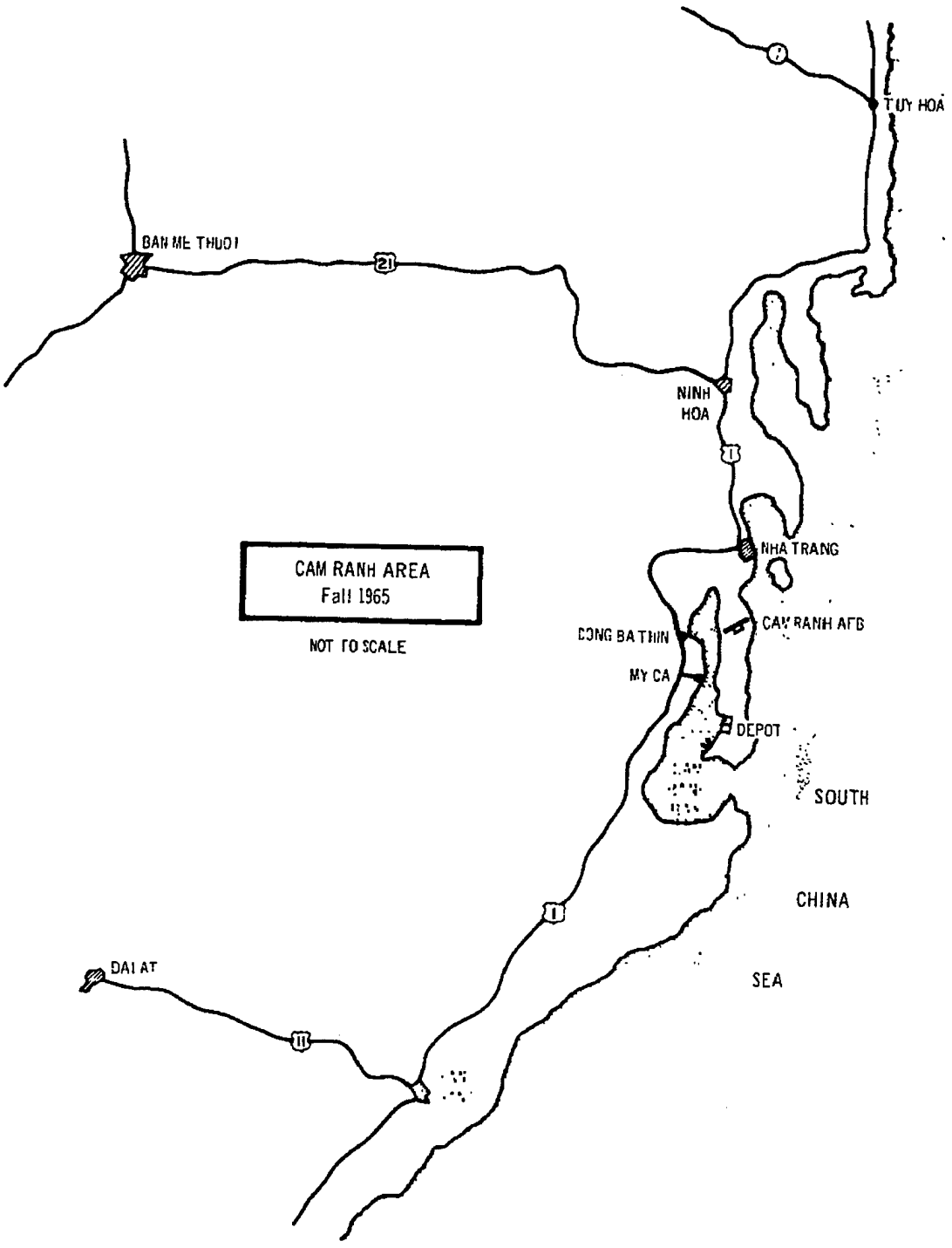
TUY HOA
BAN ME THUOT
21
NINH HOA
1
NHA TRANG
CAM RANH AREA
Fall 1965
NOT TO SCALE
CAM RANH AFB
DONG BA THIN
MY CA
DEPOT
SOUTH
CHINA
SEA
DALAT
11
1

FIGURE 9.

this company possessed skills and capabilities sorely needed in the developing port area. Following initial orientation and construction of a base camp, the 497th worked on improvement of LST landing facilities on South Beach at Cam Ranh and learning the nature of the sand, sea and shoreline with which it was dealing. By the end of October it had launched three projects which were to bring the company Army-wide acclaim.[53]

On 30 October, following an 81 day tow through the Suez Canal and across the Indian Ocean from Charleston, South Carolina, Vietnam's first DeLong Pier arrived at Cam Ranh Bay and was immediately boarded by the 497th.[54] Forty-five days later the 90' x 300' steel pier was completed and put into operation, giving Cam Ranh Bay a pierside capacity of four deep draft vessels. (Figure 10.) Had a conventional timber pile pier been built, it would not have been completed until late April (assuming that sufficient materials had been available). Concurrently, the 497th constructed a 400' timber POL pier to provide the marine end of a peninsula POL system and began work on a 550' long sheet pile bulkhead to join the DeLong Pier with the AID Pier and develop a major hardstand area to support these piers.[55]

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[53]The CO of the 497th Engineer Company was selected by the Society of American Military Engineers to receive the Wheeler Medal for outstanding military engineering during 1965.

[54]LTC T. B. Eustis, "Cam Ranh Bay," Army Digest, 21 (August 1966), 40-43.

[55]Yens, 20-22. The DeLong Pier is a barge supported by 6' diameter tubular steel caissons, 50' long. The caissons, which may be joined end to end, are driven into the harbor bottom by pneumatic jacks that are integral parts of the pier.

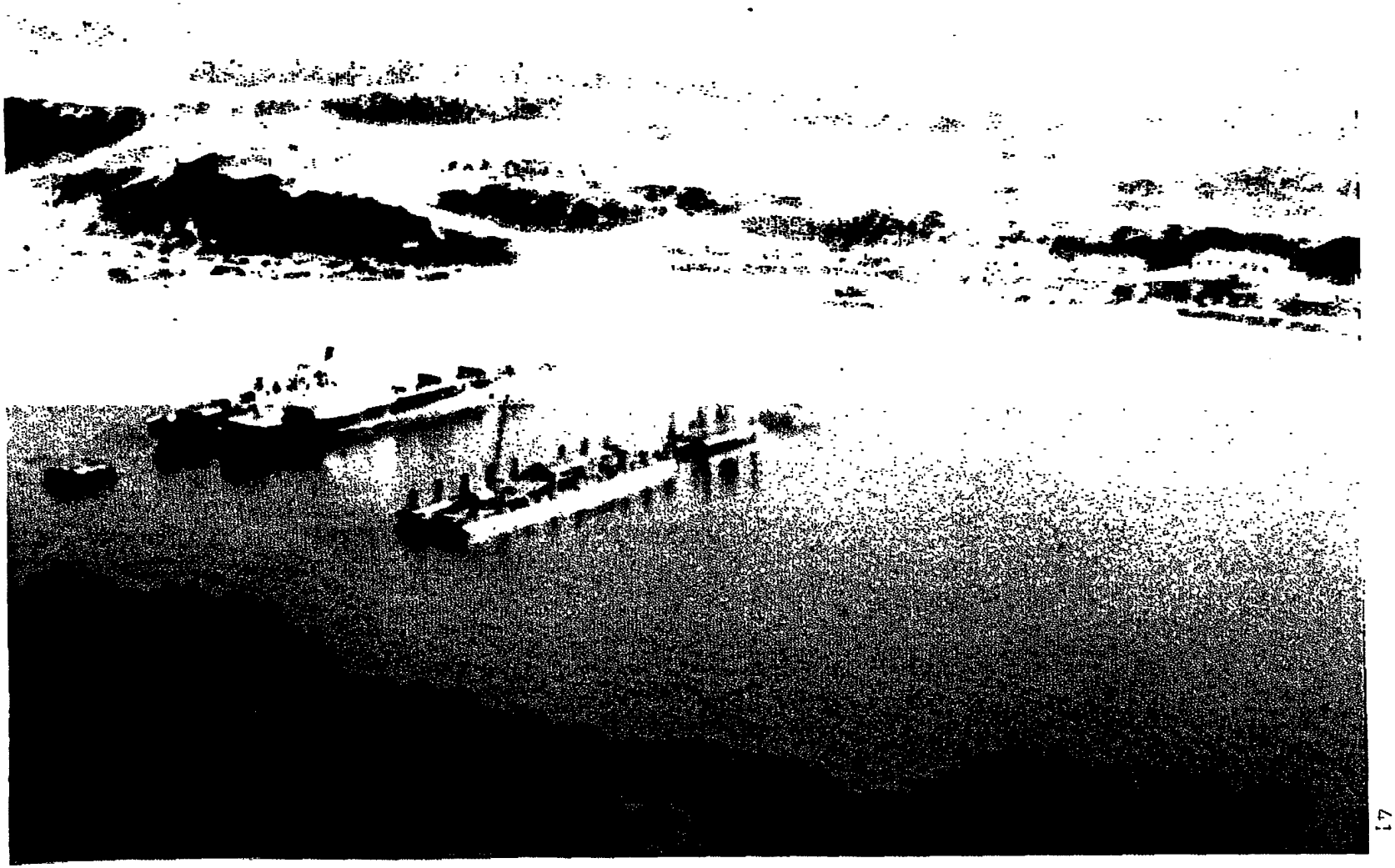

FIGURE 10. CAM RANH PORT, FALL 1965

The 24th of August also marked the arrival at Cam Ranh Bay of the 87th Engineer Battalion (Construction), which only two months earlier had been providing support to the Engineer School at Fort Belvoir, Virginia. Since the battalion had been preceded (by 20 days) by a 67 man advance party, the main body of the 87th found an established base camp awaiting it and it was only a short time before the battalion was at work on projects all over the Cam Ranh peninsula. During the next four months, the 87th built and maintained roads leading to the northern end of the peninsula, constructed a 7.4 mile pipeline from the marine pier at the port north to the Air Force Base and a 40' x 800' causeway (with two spans of 80' double single bailey bridge) to connect the DeLong Pier with the shore, and launched construction of a 6,400 man cantonment for the military "citizens" of Cam Ranh with the placement of 39 concrete slabs and the movement of 479,000 cubic yards of sand. The 87th also began work on a POL tank farm, completing three 10,000 BBL bolted steel tanks and running six miles of a second POL line from the port towards the farm. The battalion concurrently kept crews at work on various vertical construction projects throughout the area and maintained the equivalent of a platoon on security missions. One platoon of the battalion was committed to support the 2d ROK Marine Brigade (which was providing security for the area) and, together with the ROK engineers, repulsed a Viet Cong attack on their area.

The 87th also became construction innovators when the battalion located extensive coral beds in shallow water off the south end of the peninsula and began quarrying this material for use as a base. The battalion found that crushed coral was providing a better surfacing

material than crushed granite and soon the area's roads took on a new look.[56]

The 864th Engineer Battalion (by now the veterans of the area) had initiated work on the Cam Ranh depot and construction of the roads necessary to support movement into and around the area. In the depot, itself, the battalion launched construction of prefabricated steel warehouses and earthwork for hardstands and by 31 December had completed nine 50' x 140' warehouses (Figure 11), was well underway to completion of four 120' x 200' structures and had initiated work on a sophisticated reinforced concrete automatic data processing building. The 864th continued to maintain the main supply route (MSR) running from the port north to the Air Force Base. Following Viet Cong destruction of a Special Forces camp at Dong Xoai, the battalion sent a task force to the area and reconstructed the buildings necessary to get the camp back in operation.

In early September, the 864th sent C Company to Nha Trang to initiate construction of logistics facilities in that area. By 5 October they had finished a temporary POL facility on the beach, had begun clearing operations for storage areas, initiated construction (under the self-help program) of a cantonment to support the forces in the Nha Trang area and started erection of two 120' x 200' warehouses.[57]

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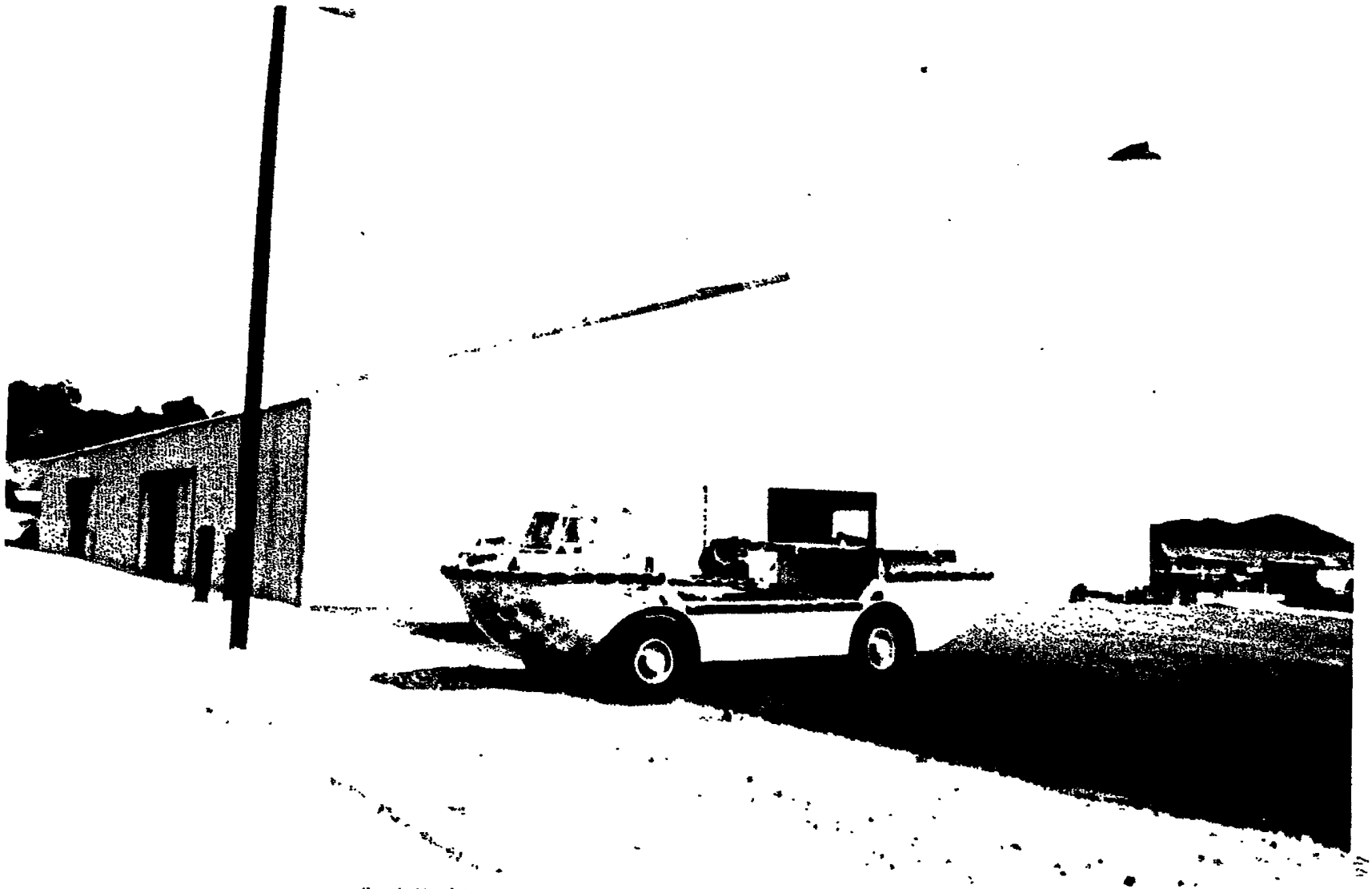
[56]U.S., Department of the Army, "Command Report for Quarterly Period Ending 30 September 1965," 5 October 1965, Section I, and 'Command Report for Quarterly Period Ending 31 December 1965,' 14 January 1966, Section I, 87th Engineer Battalion.

[57]U.S., Department of the Army, "Command Report for Quarterly Period Ending 30 September 1965," 5 October 1965, Section I, and 'Command Report for Quarterly Period Ending 31 December 1965," 5 January 1966, Section I, (CONFIDENTIAL), 864th Engineer Battalion.



August had also meant the arrival, on the 28th, of the 62d Engineer Battalion (Construction) from Fort Leonard Wood, Missouri. Following in-country orientation and the unloading of its equipment, the 62d, less one construction company and preceded by a one construction company advance party, moved south to Phan Rang, closing in its new area on 22 September. The company left at Cam Ranh Bay worked on projects in the depot complex until November at which time it joined its parent unit in Phan Rang.[58]

The 62d's primary mission at Phan Rang was the construction of Phan Rang Air Force Base and, on arrival, the battalion began clearing operations on the site of the airfield complex. Following the clearing and extensive earthwork on what was to be a 10,000' x 102' temporary runway, the 62d began placement of AM-2 expedient surfacing material.

AM-2, the first in a line of mattings to come forward in Vietnam to replace the World War II pierced steel plank, was developed by the U.S. Marine Corps for use in the forward combat zone. Each section of AM-2 is an extruded aluminum plank 12' long, 2' wide and 1½" thick. The mat is sturdy enough to withstand jet aircraft landing impact and, for extremely short periods, can be used to surface relatively soft areas. For long term use the base for AM-2 must be prepared to the same standards required for a concrete pavement.[59]

Concurrent with the runway construction, the battalion began clearing for numerous other airfield facilities and initiated work on

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[58]U.S., Department of the Army, "Command Report for Quarterly Period Ending 30 September 1965," 62d Engineer Battalion, 10 October 1965, Section I.

[59]E. T. Lyons, "Aluminum Matting Runways in Vietnam," Military Engineer, 58 (July-August 1966), 245 +.

base camp facilities for the 1st Brigade, 101st Airborne. By 3 November the 101st area had been cleared and was ready for the brigade. Self-help construction also got underway in November when the brigade returned to Phan Rang for a short stay.

The 62d's first days in Phan Rang were tense for all concerned. Lightly armed because of their construction organization, the battalion sorely missed weapons like the grenade launcher and mortar when they found themselves almost totally responsible for security of the construction area. This problem was alleviated to a degree by the stationing of the 101st at Phan Rang and through the buildup of forces connected with the airbase development.[60]

Dong Ba Thin, a small Vietnamese village on the west shores of Cam Ranh Bay, became the site of a major engineer effort when C Company, 65th Engineer Battalion (25th Infantry Division), arrived in early September from Hawaii for what was ostensibly "temporary duty." C Company assisted by elements of the 513th Dump Truck Company and the 584th Light Equipment Company, was tasked to construct an army aviation base, complete with cantonment areas, heliports and a runway, on what was essentially a swamp. When the company left in late December, the 3,000' PSP runway was 99 percent complete and many of the other facilities were well underway. The 584th also teamed with the 553d Float Bridge Company to operate a laterite pit at My Ca across the bay from the Air Force Base. With the initiation on 6 October of ferry service across the bay,

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[60]U.S., Department of the Army, "Command Report for Quarterly Period Ending 31 December 1965," 62d Engineer Battalion, 8 January 1965, Section I. (CONFIDENTIAL.)

the My Ca area became a valuable source of laterite for use on the upper Cam Ranh peninsula.[61]

Sand, heat and shortages of repair parts continued to plague the 35th Group units throughout the period. While some success had been made in stabilizing the sandy roads of Cam Ranh, the sand, together with its ally, heat, continued to plague men, equipment and spare parts. Thirty-six days after their arrival, the 87th was still operating almost entirely on repair parts brought from Fort Belvoir. Dimensioned lumber, nails, oxygen and acetylene were in short supply, as was crushed rock.[62] The 102d Construction Support Company, which had arrived in late August, began crushing rock on 3 November, but the quantities produced were so small in comparison to the demand that the company's asphalt plant sat idle for lack of crushed rock. In addition, shortages in drill steel began to occur not only in the 102d but throughout the group.[63] Aviation support continued to be limited and commanders logged many miles travelling over enemy harrassed highways to visit their units. But progress continued to be made throughout the area and a typical measure of this progress was the cargo tonnage brought in at Cam Ranh. In August 1965, 73,000 measurement tons were handled; five months later, 168,000 tons passed through the same area.[64]

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[61]U.S., Department of the Army, "Command Report for Quarterly Period Ending 31 December," 35th Engineer Group, 15 January 1966, Section I.

[62]Command Reports, 87th Engineer Battalion.

[63]Command Report, 35th Group.

[64]Eustis, pp. 40-41.

## III Corps Area

The first significant change in the engineer status in the III-IV Corps area took place on 15 September when USARV approved the diversion of the 46th Engineer Battalion (Construction) (enroute to Vietnam from Fort Leonard Wood, Missouri, on the USNS Eltinge) from Qui Nhon to Vung Tau for employment in the Saigon - Vung Tau area.[65]

The 46th arrived at Vung Tau on 27 September and was met by D Company, 84th Engineers. A Company flew immediately to Bien Hoa where it began clearing operations for the battalion base camp. On 1 October, the 46th (less D Company) moved to Bien Hoa and by 4 October became operational, as a subordinate unit of 18th Engineer Brigade (rather than 35th Group which was 80 miles to the north). Three weeks later, this command relationship was changed when the 159th Engineer Group (Construction) arrived and assumed control of engineer troop operations in III and IV Corps.[66]

The 159th, which had been the original source of personnel for 18th Brigade headquarters had been reconstituted during the fall and arrived in RVN from Fort Bragg on 30 September, establishing its headquarters near Long Binh. Starting with only one battalion, the group grew by Christmas to three battalions and two separate companies and expanded its construction from the port at Vung Tau to efforts at Di An, Phu Loi and Lai Khe in support of the 1st Division, at Bien Hoa for the

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[65]Command Report, 18th Brigade.

[66]U.S., Department of the Army, "Command Report for Quarterly Period Ending 31 December 1965," 46th Engineer Battalion, 13 January 1966, Section 1. (FOUO.)

173d Airborne Brigade and at Long Binh for the 1st Log Command. (Figure 12.) This construction effort was focused on providing the minimum essential facilities at the base camps of the combat units and on initiating critically required hospital and logistics construction to support the combat operations.

The 46th Engineer's first major project, the construction of the 400 bed 93d Evacuation Hospital at Long Binh, was initiated on 9 October. Around the clock earthmoving operations, even though hampered by heavy rains, permitted the battalion to begin construction of the required 60, 20' x 48' (standard) Quonsets, which were grouped in four building star (or X) clusters. On 27 November, the hospital became operational with the receipt of the first patients and, by the end of the year, the overall project was 60 percent complete. During this same 90 day period, the 46th constructed a tactical operations center at Di An for the 1st Division, tropical buildings for the MACV flight detachment at Tan Son Nhut and initiated construction on the 22 square kilometer Long Binh Ammunition Storage Area.[67]

At Vung Tau, D Company of the 46th (which until 16 October had been D Company, 84th Engineers) continued its work on improving the over the beach facilities and in expanding the existing ammunition and POL storage areas. The construction at the shoreline involved a land fill over some 60,000 square yards (SY) (four to six feet in depth) to provide two BARC-LARC ramps and two LST ramps and the building of a barge and

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[67] Ibid.

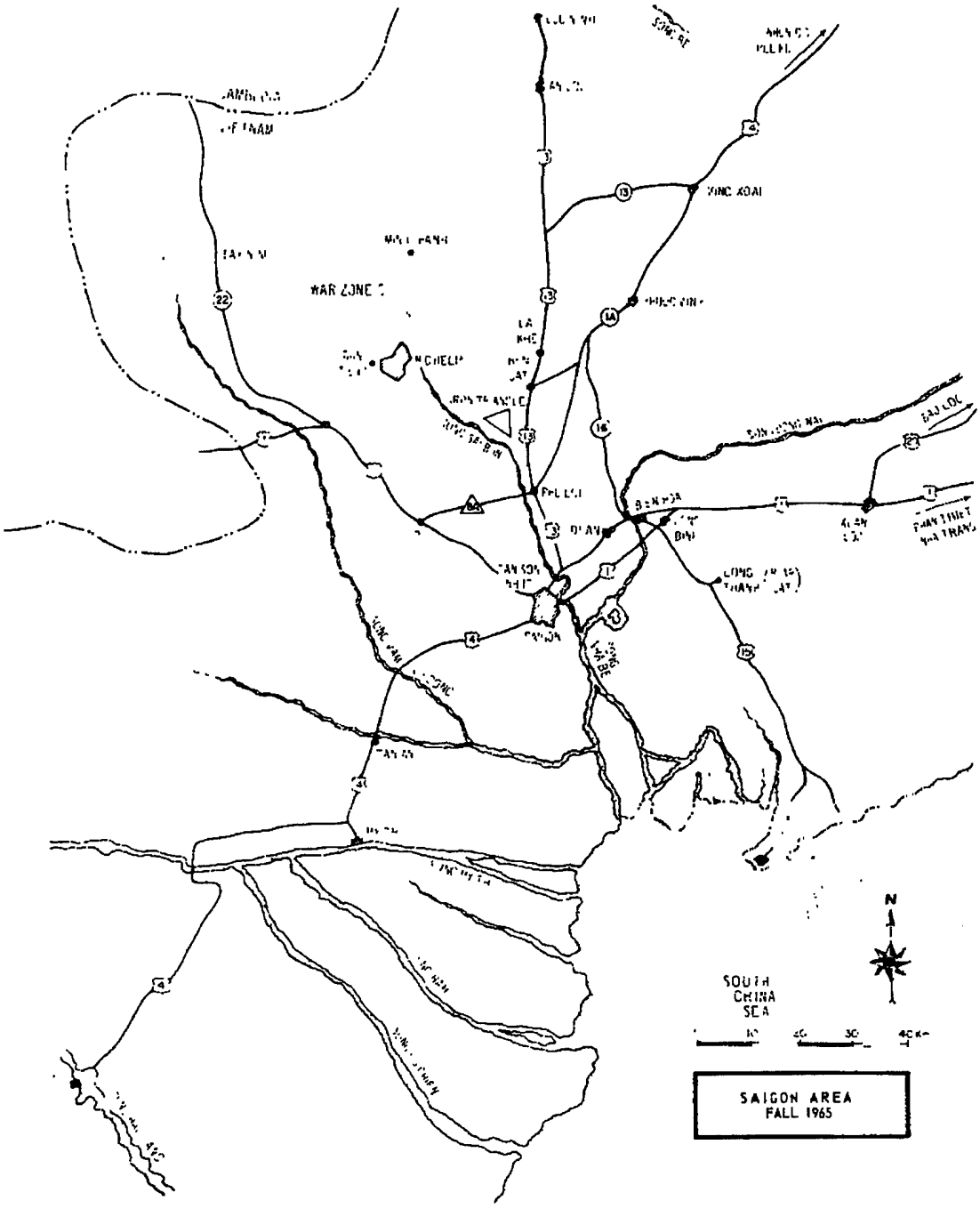
WAR ZONE C
BIEN HOA
LONG BINH
SAIGON
SOUTH CHINA SEA
N
SAIGON AREA
FALL 1965

FIGURE 12.

lighter T-pier.[68] The former D Company, 46th Engineers, (now D, 84th) began its move to join its new parent in Qui Nhon as soon as the 16 October transfer had been ordered by 18th Brigade.

On 2 November, the 588th Engineer Battalion (Combat) from Fort Lee, Virginia, arrived at Vung Tau on board the USNS Upshur and moved immediately by air to the staging area near Bien Hoa. On 4 November, C Company, less its equipment which had not yet arrived, was sent to Long Binh to assist the 46th with construction of the 93d Evacuation Hospital. On 14 November, B Company moved to Di An to assist the 46th (and later the 168th) with construction of the 1st Division's headquarters complex. On 20 November, the battalion headquarters and A Company moved from their staging area to Phu Loi where A Company initiated cantonment construction for 1st Division Artillery and the division's aviation elements and began work on a 190 aircraft heliport.

On 10 December, C Company left the staging area for Bien Hoa where it began to support base construction for the 173d Airborne Brigade. The end of 1965 found the 588th in this same posture, with its three line companies operating in three widely separated areas.[69]

The last battalion to join the 159th Group in 1965 was the 168th Engineer Battalion (Combat) which arrived at Vung Tau from Fort Polk, Louisiana, aboard the USNS Geiger on 27 November. Following staging and equipment deprocessing at Long Binh, in mid-December the battalion

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[68]CPT R. M. Farrington, "Expedient Port Facilities in Vietnam," Military Engineer, 59 (November-December 1967), 404-405. BARCs and LARCs are Transportation Corps amphibious cargo vehicles.

[69]U.S., Department of the Army, "Quarterly Command Report," 588th Engineer Battalion, 4 January 1966, Section I. (FOUO.)

headquarters and A Company moved to Di An to assume responsibility for construction in the 1st Infantry Division main base camp, while B Company traveled to Lai Khe to support the 1st's 3d Brigade and C Company assisted the 46th at Long Binh with the 93d Evacuation Hospital construction.[70]

The problems in the south were similar to those in the north. The 159th Group found that shortages in certain construction materials slowed construction, a lack of high mortality repair parts deadlined many pieces of engineer equipment, and Viet Cong control of many highways forced commanders to rely heavily on the limited aviation assets to support their movement. Despite these handicaps, the engineer effort in III Corps had moved forward and construction was taking place at a pace almost equal to the buildup.

## Brigade and Division Engineers

The first engineer unit to arrive in Vietnam was the 173d Engineer Company which landed at Bien Hoa on 5 May 1965 as part of the 173d Airborne Brigade. Initially the company concentrated its efforts on preparation of the 173d's base facilities; however, in late June, when the 173d launched its first major operation in Zone D, to the north of Saigon, the company began to take up its more normal combat support role, with platoon or squad sized elements working directly with the infantry battalions on demolition missions, construction of field fortifications and landing zone improvement. This dual mission of base camp construction

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[70]U.S., Department of the Army, "Command Report for Quarterly Period Beginning 1 October 1965," 168th Engineer Battalion, 13 January 1966, Section I. (FOUO.)

and combat support continued through brigade operations in the Iron Triangle and other areas near Saigon. On 10 December, the 588th Engineers began to provide base camp support to the 173d Brigade and some relief for the 173d Company.

The activities of B Company, 1st Engineer Battalion (with 2d Brigade, 1st Infantry Division) and A Company, 326th Engineer Battalion (with the 1st Brigade, 101st Airborne Division) closely paralleled those of the 173d. B Company (B/1st) also spent its first days in the Bien Hoa area assisting the 2d Brigade in establishing a base camp at Long Binh and providing combat support to the brigade in its initial forays against the Viet Cong.

A Company, 326th Engineers (A/326th) followed the same vagabond road as the 1st Brigade, 101st Airborne, moving through Cam Ranh Bay, Dong Ba Thin, An Khe and Qui Nhon between August and November.[71] During this period the principal mission of the company was to provide engineer direct support to the brigade, principally in the form of minesweeping and demolition teams. A/326th's contact with the brigade base was limited, as Phan Rang was not selected as the 1st/101st Airborne's cantonment until October. When the brigade spent a few weeks in November and December at its new home (finding time in December to support a major operation of the 1st Division in the Michelin Plantation area northwest of Bien Hoa), A/326th did provide some base camp support.

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[71]Questionnaire returned by Major George Kimbro, Commanding Officer, A/326th, 1965-1966, untitled, Fort Leavenworth, Kansas, March 1968. For its operations in Vietnam, A/326th was given the Itschner Award by the Society of American Military Engineers and designated as the outstanding engineer unit of 1965.

The first divisional engineer battalion to arrive in Vietnam was the 8th Engineer Battalion, 1st Cavalry Division (Airmobile).[72] C Company of the 8th arrived at An Khe without its equipment in late August as part of the division's advance party. The company immediately began hand clearing of a 3,000' x 4,000' area which would serve as the principal heliport for the more than 400 helicopters of the division. When required, the 70th Engineers provided needed equipment support to the company. Because of the careful work required to clear this area, the heliport was dubbed the "Golf Course."

In mid-September, the remainder of the battalion came ashore at Qui Nhon and moved inland to An Khe. Four weeks later, the 1st Cavalry Division (1st Cav) was off to the highlands to relieve the besieged Special Forces camp at Plei Me in the division's first major operation. The engineers provided one company in direct support of each committed brigade, a company in support of the brigade remaining at An Khe to secure the base, and the 8th Battalion headquarters following the division (Main) command post. This pattern of support soon came to be standing operating procedure (SOP).

The companies in direct support of the brigades away from An Khe were used primarily to clear helicopter landing zones (LZs), to destroy enemy fortifications and bunkers, to assist in preparation of defensive positions, and to carry out minesweeping and de-booby trapping. To permit rapid clearing of LZs from virgin jungle, the 8th developed the

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[72]The organization and equipment of the 8th Engineer Battalion differs from that of other divisional engineer battalions in that all of the battalions equipment is air transportable and most helicopter transportable. See Appendix D.

technique of using a CH-47 helicopter to transport an engineer platoon or squad to the LZ site. The engineer soldiers would then descend a "trooper ladder" from the CH-47 to begin clearing operations with chain saws and demolitions. (Figure 13.) In this manner an LZ could be cleared in minutes.

The company remaining at An Khe concentrated its efforts on improvement of the barrier system surrounding the base and in providing combat support to elements of the "barrier brigade" for combat operations near An Khe.

To support base development and to provide a link between the division and the 70th Engineers, the battalion assigned an officer as Assistant Division Engineer - Base Development (ADE-B). In his office, the priorities of the division were translated into guidance for the non-divisional engineer elements in the area.[73]

During October, divisional engineer strength in III Corps increased when the 1st Engineer Battalion (-), 1st Infantry Division, arrived in Vietnam from Fort Riley, Kansas. Unlike the 1st Cavalry Division which grouped all its elements at one camp, the 1st Division deployed its major subordinate units to five separate bases. The engineer battalion followed by placing companies in the brigade camps at Phuoc Vinh and Lai Khe and stationing the battalion headquarters with the division headquarters at Di An. B Company remained with the 2d Brigade.

The principal mission of the 1st Battalion during November and December was the support of the division in establishing the base camps.

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[73]Interview with LTC R. G. MacLennan, S3, 8th Engineer Battalion, 1965-1966, Fort Leavenworth, 15 February 1968.

The battalion concentrated its efforts on construction of essential buildings and high priority hardstands and, concurrently, the provision of direct support to each of the brigades during their initial combat operations.[74]

Each of these division/brigade units faced a significant problem during its early months in country. Given a primary mission of combat support, each was also assigned responsibility for insuring the adequacy of the division/brigade base development program. Although each unit chose a slightly different approach, each divided its assets in one way or another to support these two divergent missions. The maintenance of the proper balance between these activities remained a problem.

The division/brigade engineers also shared a common experience in their first encounters with the enemy; the problem of tunnel destruction. The Viet Cong (VC) made maximum use of field fortifications to protect them from artillery and air bombardment. These fortifications were developed into massive tunnel networks which served as underground command posts and logistics storage areas. On discovery of these tunnels, to prevent their re-use, the combat forces had to insure that they were destroyed.

After a thorough search of the tunnels by "tunnel rats," teams of infantrymen and/or engineers (small in stature, but large in courage), the engineers began the laborious task of destruction. By the end of 1965, engineers had only "scratched the surface," as conventional explosives, no matter how well placed, seemed only to destroy the area

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[74]U.S., Department of the Army, "Unit Historical Report for Calendar [sic] Year 1966," 1st Engineer Battalion, 21 March 1967, pp. 1-15.

immediately adjacent to the explosives, normally the entrance. This experience was passed on as new units arrived, but the basic problem of developing a more effective tunnel destruction system remained.

## Field Force Engineer Section

In the fall of 1965 the Commanding General, Field Force, Vietnam, had operational control of the 1st Cavalry Division, the 1st Brigade, 101st Airborne, and elements of the ROK forces. In his role as Senior Advisor to the Commanding General (ARVN) II Corps, he coordinated the operations of ARVN and U.S. forces. In addition to the combat forces, the Field Force Commander maintained operational control over numerous signal, aviation, armor and artillery units, but no engineers.[75]

Under these circumstances, the Field Force Engineer, without engineer units under his command or direct supervision, ". . . was an entreprenuer -- planning for, obtaining, and coordinating engineer units and assets . . . ."[76] Requests for support by nondivisional engineers were sent to both 18th Brigade and the group which would provide the support. Urgent combat requirements were rapidly met. However, messages seeking more routine support had to be balanced by the brigade against the existing base development workload and the effects of any diversion of this effort. Much of the support finally provided was a product of the rapport between the groups and the Field Force Engineer Section.[77]

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[75]Waddel, E. L., Jr., COL, USA, FFV Engineer, 1965-1966, "Engineer Combat Support Operations in South Vietnam's II Corps Tactical Zone," unpublished article, Office, Chief of Engineers, 1967), pp. 2-3.

[76]Ibid.

[77]Kirk interview.

## 1965

The year 1965 saw the strength of the U.S. Army engineer force in South Vietnam grow from less than 100 to over 7,000 and the face of South Vietnam change with the start of a major construction program. Vietnam never again would be the same.[78]

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[78]Associated Press, p. 30.

CHAPTER III

# THE FIRST OFFENSIVE
(January-May 1966)

## The War Continues

The year 1966 began on a peaceful note. On 24 December 1965 the President ordered a cessation in the bombing of North Vietnam that would last through a 37 day "peace offensive." On 31 January 1966, after failing to receive any response to a 40 nation search for some meaningful contact with Hanoi, the President sent U.S. bombers back over North Vietnam. Concurrently American ground forces began a campaign that would wrest the initiative from the Viet Cong and send U.S. infantrymen into hitherto inviolate Viet Cong sanctuaries.[1]

The troop buildup that began in earnest in July continued into the new year. On 29 December 1965, the 3d Brigade, 25th Infantry Division began a two week movement from Schoefield Barracks, Hawaii, to Pleiku. On 8 January 1966 the first elements of a second corps headquarters, designated II Field Force, Vietnam (IIFFV), arrived in Vietnam from Fort Hood and were positioned at Long Binh to control U.S. combat forces in the III and IV Corps areas. In mid-January the remainder of

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[1]Associated Press, What YOU Should Know About VIETNAM (Associated Press, 1967), pp. 12-13.

the 25th Division began its move to Vietnam and by mid-May had closed into a base area near Cu Chi in the III Corps Tactical Zone.[2]

The arrival of these additional forces and the experience gained by the units already in country in the fall campaign gave MACV the opportunity to launch large scale offensive operations in both II and III Corps.

From January to June the 1st Cavalry Division sought out the enemy in both the western and eastern regions of II Corps. Teaming at times with the 3d Brigade, 25th Division, the 1st Cav conducted Operations LINCOLN and MATADOR in Pleiku, Darlac and Phu Bon provinces, and, in coordination with the 1st ROK Division, moved into rice rich Binh Dinh province on Operations MASHER/WHITE WING, DAVY CROCKETT and CRAZY HORSE. In January, the 1st Brigade, 101st Airborne moved into coastal Phu Yen province for operations with the ROKs that lasted until late spring when the 101st was sent to Quang Duc province to conduct Operation AUSTIN with the 173d Airborne.

In III Corps, the 1st Division, with the assistance of the 173d, opened 1966 with a search operation (CRIMP) in Binh Duong and Hau Nghia provinces and followed this attack with a major breach of the Viet Cong stronghold in War Zone C during Operation BIRMINGHAM.[3]

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[2]"U.S. Combat in Vietnam: The First Year," Army, 16 (October 1966), 116-120. IIFFV was activated on 15 March 1966. At that date FFV in Nha Trang was designated IFFV.

[3]U.S., Department of the Army, "Unit Historical Report for Calender [sic] Year 1966," 1st Engineer Battalion, 21 March 1967, pp. 15.

The picture had begun to change. United States combat forces ere spending more and more time deep in the jungle, away from paved ighways and prepared landing fields, and less time guarding fixed in- tallations and improving base camps. With this change in focus came ew tactics.

In order for combat units to operate against the Viet Cong in hat was, in effect, virgin territory, these units needed surprise and upport. The cross country movement of the 1st Cav during this period s typical. During MATADOR, in operations south of Pleiku, the division as forced to rapidly deploy battalions into uncharted wilderness. Time id the requirement for surprise prevented any logistics buildup or air- ield construction prior to the operation, so that when the first unit oved to contact, landing zones (LZs) were cleared as the assault began.[4] .r mobility became a tactic of necessity for not only the 1st Cav but .so for the other combat forces.

The logistics backup was then forced to adjust to the ramifica- ons of this new tactic.

## Logistics

As the strength of U.S. forces grew from 184,000 on 1 January to 1,000 on 1 June, a high percentage of these troops were arriving to ovide support for the combat elements. The logistics bases at Long nh, Vung Tau, Cam Ranh and Qui Nhon continued to grow as the supplies d equipment poured over the beach.

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[4]Aircraft bombs were used to open a hole in the jungle and engi- ers were lowered from hovering helicopters through the trees to clear e area with demolitions and chain saws. See pp. 54-55.

In February, because of the importance of the operations being conducted in northern II Corps by the 1st Cav and the 3d Brigade, 25th Division, and the demonstrated ability of the area to accept the major logistics responsibility, the 1st Log Command changed the status of Qui Nhon from that of a subarea to that of a major subordinate support command.[5] Subsequently, a similar decision was reached concerning Cam Ranh, which assumed the position of a major logistics center, in addition to its role as a principal port and transshipment point. This latter decision relegated Nha Trang to the status of a subarea, subordinate to Cam Ranh.

## Engineer Operations - General

On 1 January 1966, the 20th and 39th Engineer Battalions, along with the 572d Light Equipment Company, landed at Cam Ranh Bay. From 2 January until mid-May, two companies were the only additions to the strength of 18th Brigade. The 20th and 39th were the last products of a herculean push by CONARC to deploy a maximum number of engineer units to Southeast Asia and it would be summer before the steady flow of engineers across the Pacific would continue.

During the lull in troop deployment, 18th Brigade concentrated its efforts on insuring that the combat support needs of the tactical forces were quickly met, in supervising the growing number of construction projects, and in planning for future construction.

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[5] 1LT D. P. Yens and CPT J. P. Clement, "Port Construction in Vietnam," Military Engineer, 59 (January-February 1967), 20-22.

With the increase in number of tactical operations, additional engineer effort was devoted to combat support. Since all nondivisional engineers were either attached or assigned to 18th Brigade and the brigade, in turn, to USARV, no direct relationship existed between the brigade, its groups and battalions, and the combat forces. Direct coordination between the field force and division engineers, and the groups was authorized and encouraged.

As expanded by the brigade commander, this meant that groups could not say "no" to a request for combat support. The "no" was reserved for brigade.[6]

On the construction side, a review of the situation at hand, a comparison to programmed requirements and a necessity to establish firm development plans for use in obtaining the Fiscal Year (FY) 1966 supplemental appropriation from Congress began to place a heavy burden on the tactically organized brigade headquarters. To ease this problem, in the spring, essentially from the assets of the brigade, a USARV Engineer Section was formed to carry out Theater Army base development planning functions.[7] To insure coordination of the overall program and a close working relationship between the brigade staff and the USARV Engineer Section, the Commanding General, 18th Engineer Brigade was designated as USARV Engineer.[8]

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[6]Personal experience of the author.

[7]U.S., Department of the Army, "Operational Report of Lessons Learned (ORLL) for Period 1 January 1966 to 30 April 1966," USARV, 1 July 1966, p. 41. (SECRET.)

[8]U.S., Department of the Army, "Operational Report-Lessons Learned for Quarterly Period Ending 30 April 1966," 18th Engineer Brigade, 10 June 1966, Section 1.

The problems that faced the brigade during the first part of 1966 were essentially carry overs from 1965. Shortages of construction materials and repair parts continued to be the most serious of these problems, although some progress had been made by 1st Log Command in improving the situation. As more combat engineer battalions were committed to construction projects, it became evident that these battalions required equipment augmentation and, in some cases, personnel augmentation, in order to obtain the desired construction standards. The acquisition of the needed augmentations became a problem for the brigade.

To achieve uniformity in construction effort, USARV published standards of construction based on doctrinal concepts and adapted to the theater situation. A standard 1 area was virtually untouched having no site preparation and only access through trail or paths. Standard 2 provided for site clearance by engineers and a minimum number of engineer constructed access roads. Standard 3 authorized floored buildings for essential facilities (infirmaries, kitchens, offices), stabilized access roads and minimum utilities. Under Standard 4, troop areas could be improved to include tent frames or austere wooden buildings and the utilities systems could be expanded to include lighting for troop billets.[9]

Although the brigade had had some brief experiences with the Southwest moonsoon in the early fall, the full impact of a monsoon was not felt until the winter, when the Northeast monsoon hit the II Corps coastal areas. The brigade quickly discovered that estimates, plans and schedules based on "wet" weather were useless, as the almost daily

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[9]"Construction; Priorities, Standards, Procedures and Control of Resources," Regulation 405-2, USARV, 5 October 1965.

torrential rains washed out completed construction and almost immobilized road bound vehicles. Throughout the period of the monsoon every effort was made to learn the lessons of the rainy season in order to be better prepared for a similar occurrence with the Southwest monsoon on its return in the summer.

The activation of IIFFV brought an additional engineer headquarters into III Corps. Operating in a manner similar to the IFFV Engineer and without direct control of any engineer forces, the IIFFV Engineer became a link between the tactical units, and 18th Brigade and 159th Group, coordinating, establishing priorities and planning for engineer support of future operations. With the limited number of engineers in III Corps and the major base development projects at the tactical unit base camps during the first months of 1966, the nondivisional units were, by mutual agreement, concentrating their efforts on early completion of the base areas.[10]

In II Corps, the IFFV Engineer continued his coordinating role. During MASHER/WHITE WING in a typical exercise of this coordination, 1st Cavalry Division engineers teamed with ROK, ARVN and 937th Group engineers to maintain air and land lines of communication (LOCs) from Qui Nhon into the tactical area of operation.[11]

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[10]Questionnaire returned by COL D. B. Grace, IIFFV Engineer, 1966-1967, Fort Leavenworth, Kansas, 20 February 1968.

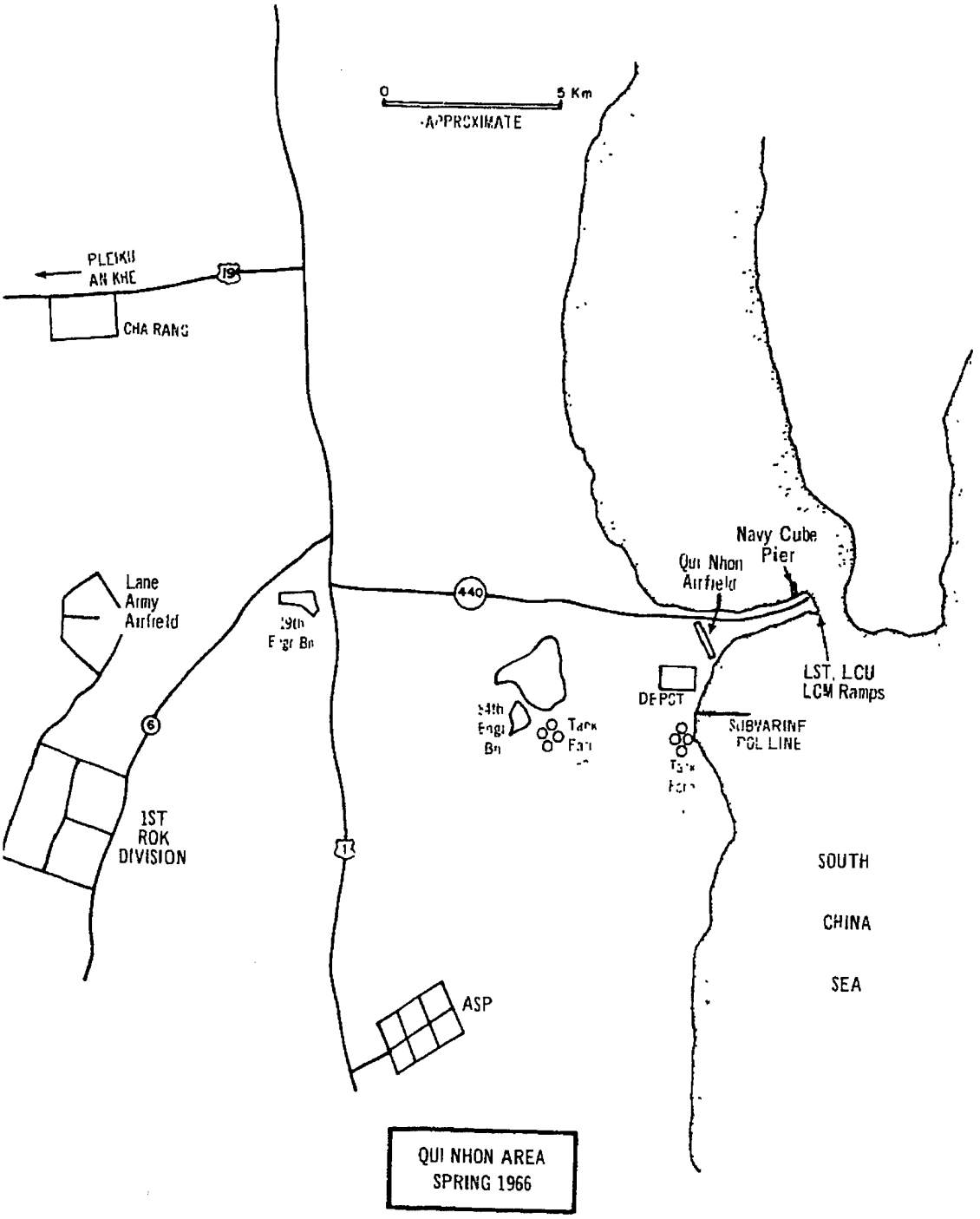
[11]Waddell, Edward L., Jr., COL, USA, IFFV Engineer, 1965-1966, "Engineer Combat Support Operations in South Vietnam's II Corps Tactical Zone" (unpublished article, Office Chief of Engineers, 1967), pp. 2-6.

## Qui Nhon-Pleiku

The designation, in February, of Qui Nhon as a major logistics base increased the tempo of operations in 937th Engineer Group. Work on the depot complex was accompanied by an effort to improve the already overtaxed port and the initiation of construction on a major combined maintenance facility. At An Khe, the development of the 1st Cavalry base continued. The arrival of the 3d Brigade, 25th Division, in Pleiku required a similar base development effort to be initiated in that area.

Tactical operations of the 1st Cavalry Division and the 3d Brigade, 25th Division, throughout northern II Corps sent elements of the group on combat support missions during this same period.

The 19th Combat Battalion continued its construction missions in the Qui Nhon area. (Figure 14.) Increased demands for POL raised the required level of Qui Nhon storage from 50,000 BBL to 112,000 BBL and the 19th immediately began construction of a second tank farm to accommodate this change. (Figure 15.) The completion on 14 February of the 10th Aviation Battalion Heliport, which had been started in November, sent the battalion north of the original heliport to construct an additional 15 semipermanent pads for UH-1 helicopters. The 19th also received the mission to construct a large combined maintenance facility at Cha Rang on Route 19, west of Qui Nhon. In this one area, the Qui Nhon Support Command would operate, under current maintenance concepts, repair facilities for all types of equipment. To support this facility, separate maintenance buildings and storage areas would be required to repair tracked vehicles, wheeled vehicles, electronics equipment, clothing and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Airfield
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DEPOT
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POL LINE
Tank
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SOUTH
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QUI NHON AREA
SPRING 1966

FIGURE 14.

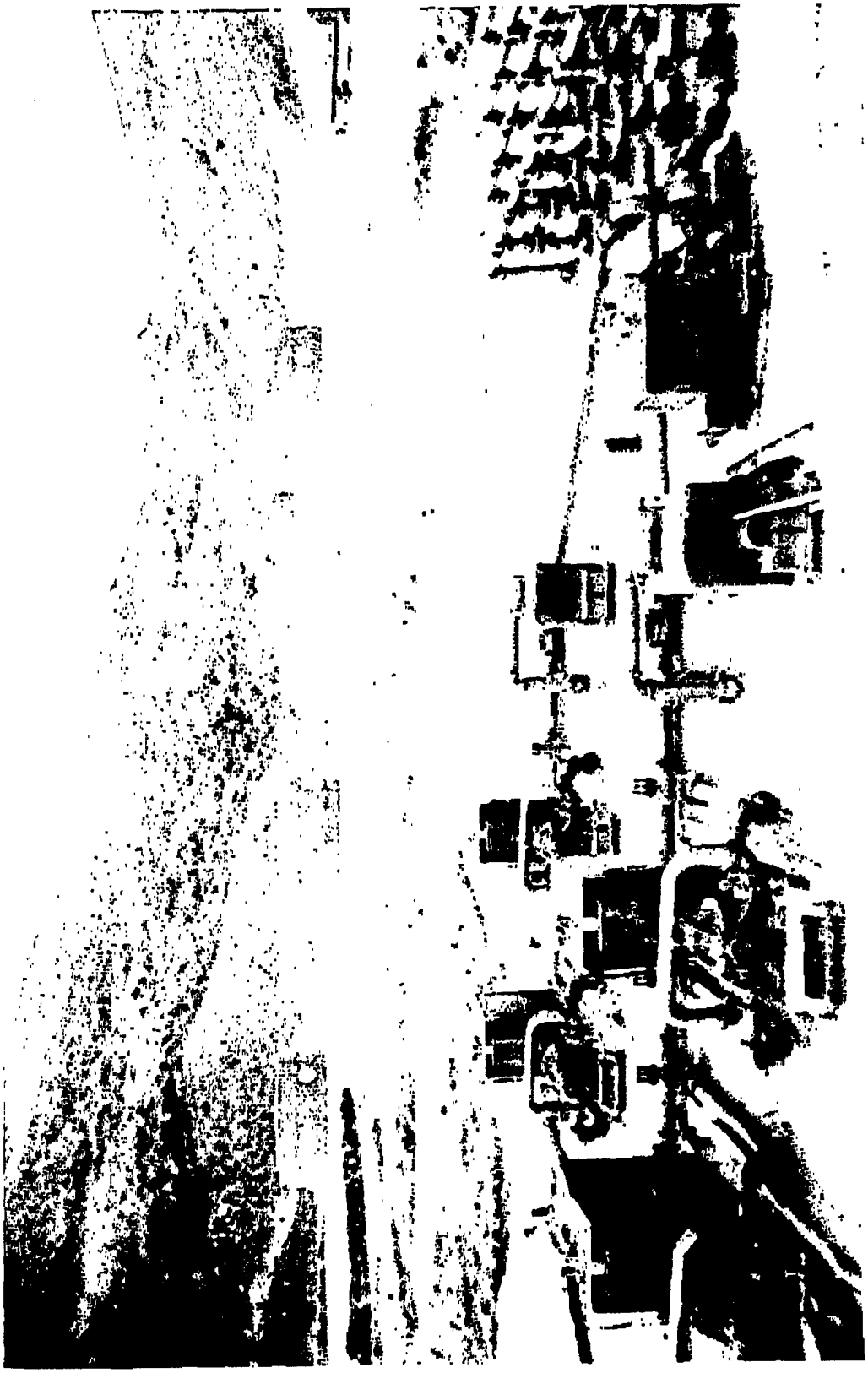

FIGURE 15. TANK FARM #1, QUI NHON

"soft" items, as well as general maintenance facilities. The 19th immediately launched into clearing the acreage required for the facility.[12]

The 84th Construction Battalion continued operations in the depot, at the port and at the airfield to keep pace with the logistics expansion. In the depot, prefabricated warehouses continued to rise at a rapid rate. In late April, construction was started on 76, 1600 cubic feet (CF) refrigeration units in the depot and an additional 35 in Phu Tai Valley. At the port, the 84th, still assisted by the platoon of the 497th Port Construction Company, constructed a 792' Navy cube pontoon pier and a 200' rock fill approach causeway, and initiated construction of 250' of LST ramp and 510' of ramp for LCUs and LCMs. During April and May the 84th installed a four inch submarine pipeline from the beach near the POL storage area to a discharge buoy 2700' off shore.

The battalion also completed construction of the original 400 bed 85th Evacuation Hospital and began work on facilities for an additional 140 beds.

In March, B Company of the 84th was moved to An Khe, where it began earthmoving operations for the construction of a C-130 airfield parallel to the existing An Khe runway. This airfield was to be the permanent facility for the 1st Cavalry Division.[13]

The 70th Combat Battalion was also hard at work at An Khe (Figure 16). The 140 bed 2d Mobile Army Surgical Hospital (MASH) became

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[12]Interview with LTC W. E. Kirk, USA, S3, 937th Engineer Group, 1965-1966, Fort Leavenworth, 8-10 February 1968.

[13]U.S., Department of the Army, "ORLL for Period 1 May 1966 to 31 July 1966," 84th Engineer Battalion, 14 August 1966, Section 1.

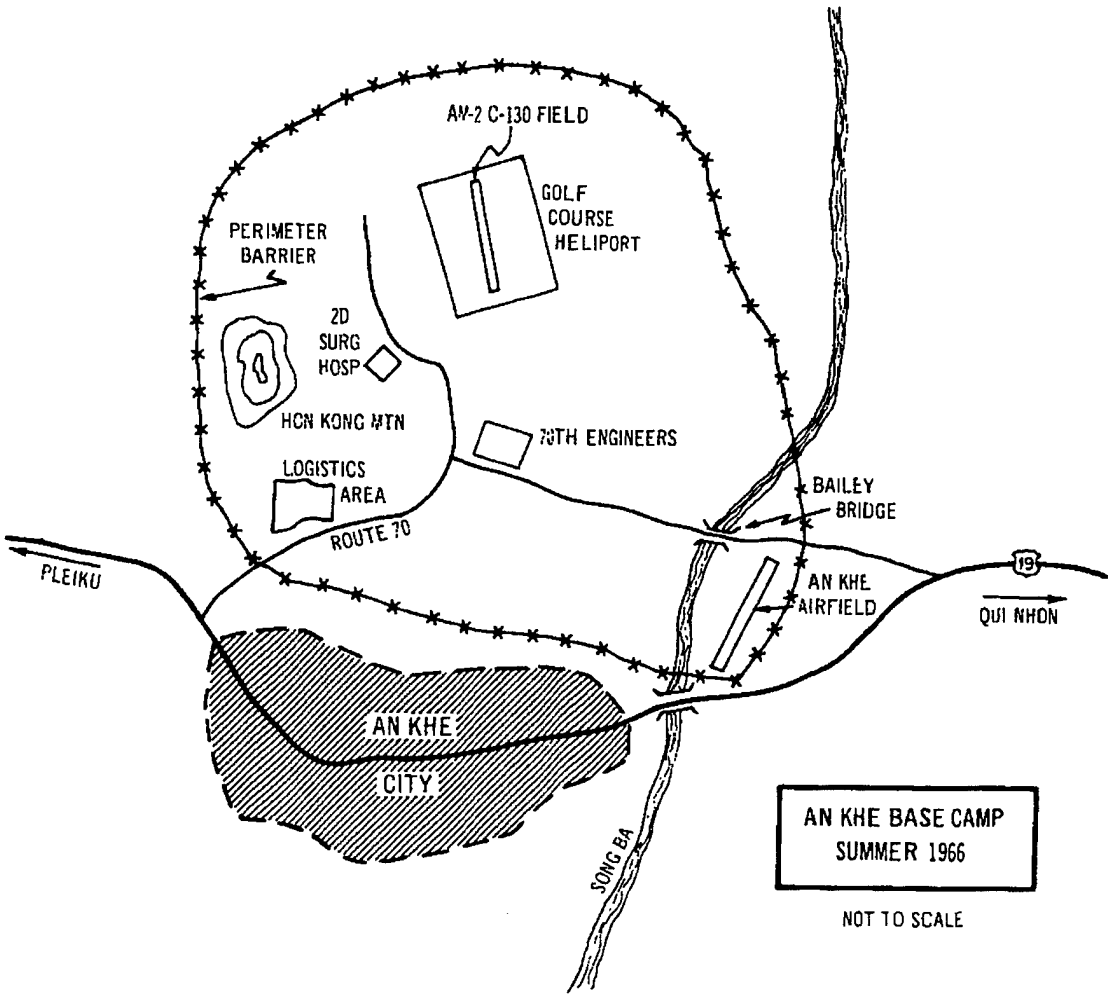
AM-2 C-130 FIELD
GOLF COURSE HELIPORT
PERIMETER BARRIER
2D SURG HOSP
HON KONG MTN
LOGISTICS AREA
ROUTE 70
78TH ENGINEERS
BAILEY BRIDGE
AN KHE AIRFIELD
19
QUI NHON
PLEIKU
AN KHE CITY
SONG BA
AN KHE BASE CAMP
SUMMER 1966
NOT TO SCALE

FIGURE 16.

operational on 4 January as construction continued on the last of its 28 buildings. Logistics facilities for the division continued to be improved and work was started on a depot area for the elements of Qui Nhon Support Command positioned at An Khe. To add to the security of the camp, the 70th began installation of a perimeter defense system complete with 1032 lights (on concrete poles) and 68 guard towers. Access to the base was improved by the building of a 2.5 kilometer road from Route 19 to the eastern side of the camp. The completion of this road required the construction of a 260' double double (DD) Bailey bridge over the Song Ba (River).

To provide improved landing facilities for the invaluable aviation assets of the 1st Cavalry, the 70th launched a major project on the 12 million SF "Golf Course" heliport. The battalion began construction of 48, 31' x 100' CH-47 ramps, 320, 36' x 40' UH-1 ramps, four 36' x 100' CH-54 ramps and 77, 31' x 33' LOH ramps. Each of the ramps, once leveled, received a surface treatment and was covered with a PSP mat. By June, over a quarter had been completed.[14]

The 299th Combat Battalion continued to devote the majority of its efforts towards completion of the Qui Nhon ammunition storage point (ASP). In the spring, A Company was sent to Pleiku to support the logistical buildup that followed the arrival of the 3d Brigade, 25th Division. By June, the company was at work on an 80 bed MASH, an aviation maintenance area, and a subdepot for Qui Nhon Support Command. This

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[14]U.S., Department of the Army, "ORLL for Period 1 January 1966 to 30 April 1966," 70th Engineer Battalion, 7 May 1966, Section 1.

latter facility included ammunition storage, refrigerated storage and open storage areas.[15]

Until May, combat support activities in 937th Group were limited, for the most part, to maintenance of the MSRs from Qui Nhon to Pleiku and the MSRs radiating from these two cities. On 16 May, C Company of the 299th was sent to Plei Kly, 40 KM south of Pleiku (Figure 17) to construct a C-130 airfield in support of tactical operations in that area.[16] With cover from the 3d Brigade, 25th Division, and construction support from elements of the 630th Light Equipment Company, C Company built, in three weeks, a 3100' x 60' runway and covered it with T-17 membrane.[17] T-17, a neoprene coated nylon fabric packaged in 303' x 60' sheets, has as its primary purpose the protection of the runway base from the effects of moisture. T-17 provides no bearing capacity in itself and must be placed on a well compacted surface.[18]

From January to June, the problems that faced 937th Group were largely those that the group had faced during the previous months. Shortages of both construction materials and repair parts continued to slow operations; however, in the construction material area the shortages generally were narrowed to smaller sizes of dimensioned lumber and electrical and plumbing accessories. In repair parts, the principal

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[15]U.S., Department of the Army, "ORLL Covering the Period 1 May 1966 to 31 July 1966," 299th Engineer Battalion, 31 July 1966, Section 1.

[16]Plei Kly is also known as Plei Me East or Phu Nhon.

[17]ORLL, 299th Engineer Battalion.

[18]U.S., Department of the Army, Planning and Design for Rapid Airfield Construction in the Theater of Operations, TM 5-366 (Washington: U.S. Government Printing Office, March 1966).

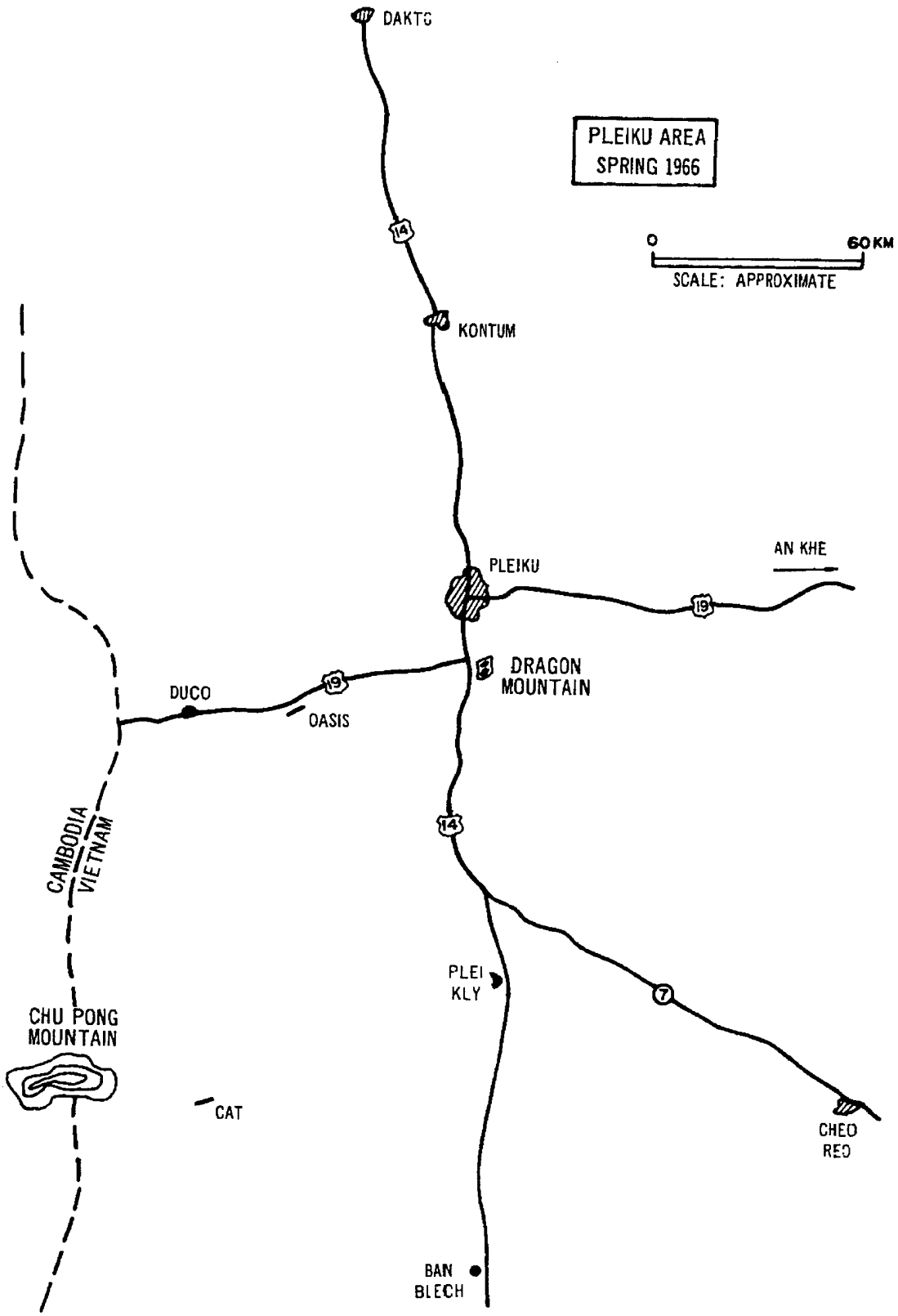
DAKTO
PLEIKU AREA
SPRING 1966
0
60 KM
SCALE: APPROXIMATE
14
KONTUM
PLEIKU
AN KHE
19
DRAGON
MOUNTAIN
DUCO
OASIS
CAMBODIA
VIETNAM
14
PLEI
KLY
7
CHU PONG
MOUNTAIN
CAT
CHEO
REO
BAN
BLECH

FIGURE 17.

shortages were confined to a few components of certain pieces of equipment.

The Northeast monsoon covered the Qui Nhon area from November to March. Because of the more developed nature of the area, Qui Nhon itself was spared the full effects of heavy rains with only the Phu Tai and ROK Valleys suffering heavy damage. From this initial encounter, however, the group gained valuable experience in working under wet weather conditions.

The combat orientation of the 937th Group (a combat group headquarters and three combat battalions) and the Tables of Organization and Equipment (TOE) of its units placed heavy demands on the group in the construction environment. Both the S3 and the S4 sections of combat battalion and group headquarters were small, in line with the combat missions normally assigned, and the additional engineering, construction inspection and construction supply activities required either permanent personnel augmentation for the S3 and S4 or, at a minimum, the creation of ad hoc staffs for the more complex missions. The engineering talent was present within the group, but the rearrangement of this talent inevitably left platoons without leaders.[19] Similarly, the equipment in the combat battalions was limited and either light equipment company or construction battalion support was required by these battalions for a large project. While the 937th had both the 630th and 362d Light Equipment Companies, the problem was not acute; however, the transfer of the

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[19]Kirk interview.

362d to 159th Group in April severely depleted the group's construction equipment resources.[20]

## Cam Ranh Area

The first five months of 1966 brought to Cam Ranh peninsula additional port facilities, warehouses and hardstands, and significant improvements in its lines of communication. This same period saw 35th Engineer Group operations permit the first aircraft to land at Phan Rang, expansion of the Dong Ba Thin aviation facility and combat support of tactical operations in the Tuy Hoa Valley and in the Bao Lac area.

Significantly strengthened by the arrival of the 20th and 39th Combat Battalions on 1 January, 35th Group expanded its operations in the Cam Ranh area by stationing an entire battalion at Dong Ba Thin and initiating construction of a 3000 bed convalescent hospital (center) on the South China Sea along the northern peninsula. (Figure 18.)

At Cam Ranh port the 497th completed, in February, the sheet pile bulkhead between the DeLong and AID piers (Figure 19), and in April, a 315 timber pile "U" pier with 220' of barge berthing space. The "U" pier was followed by a "roll on-roll off" ramp connecting the shore with the seagoing ferries that worked the Vietnam-Okinawa and intercoastal supply routes.

In May, two DeLong barges arrived and work immediately began on installation of a 600' pier to the north of the first DeLong. In this case, as it would be in all future cases, the DeLong Corporation would

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[20] U.S., Department of the Army, "ORLL for Period 1 May 1966 to 31 July 1966," 937th Engineer Group, 15 August 1966, Section 1.

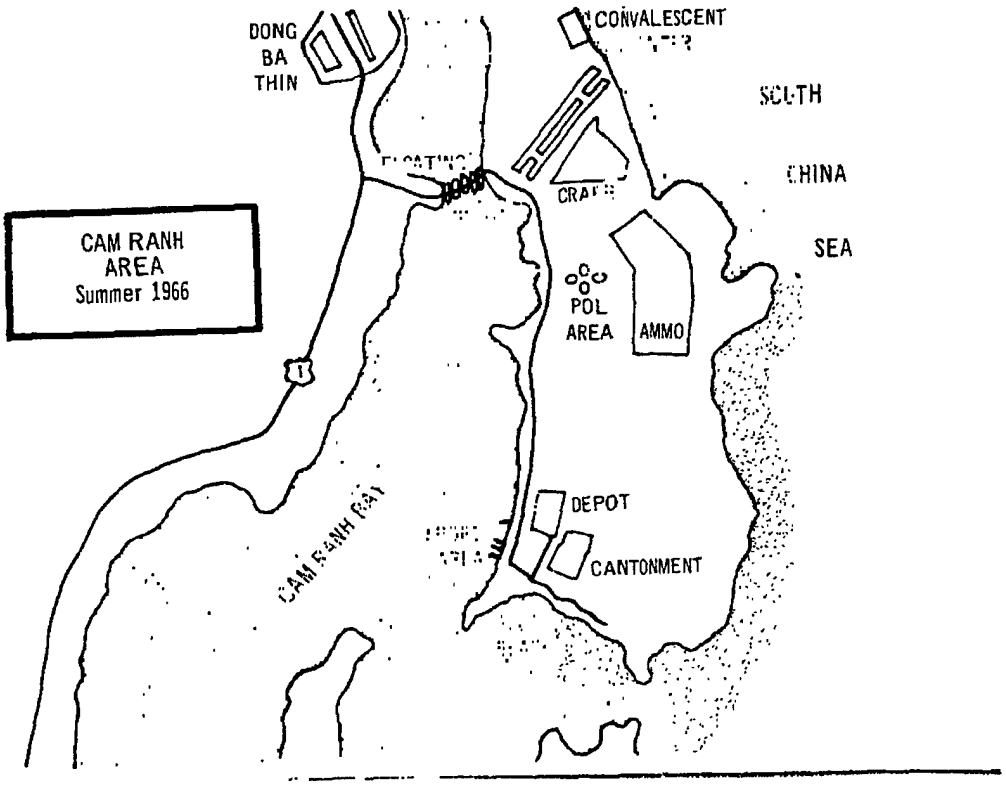
DONG
BA
THIN
CONVALESCENT
SOUTH
CHINA
SEA
CAM RANH
AREA
Summer 1966
POL
AREA
AMMO
DEPOT
CANTONMENT
1

FIGURE 18.

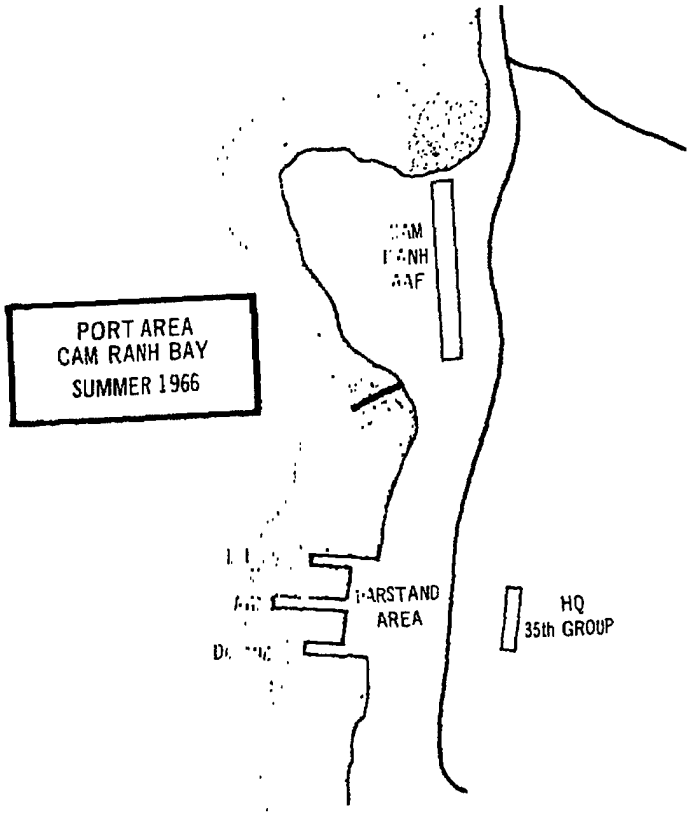


FIGURE 19.

install the pier while the 35th Group would build the necessary connecting causeways.

A major improvement was made in the area road net when the 553d Float Bridge Company, ARVN Engineers and the 39th Battalion built an 1155' M4T6 Bridge across the bay at My Ca. Internal movement began to improve in late February when the 102d Construction Support Company produced its first cold mix pavement, and improved again in March, when the first hot mix was delivered. Soon the roads in the depot and at the southern end of the peninsula were taking on a new look.[21]

The 87th and 864th Construction Battalions continued their work on the lower half of the peninsula. The 87th completed construction of tanks and connections for a 172,000 BBL POL facility south of the air base, maintained over 10 miles of roadway, continued hardstand construction for ammunition and general supply storage and pushed completion of the Cam Ranh cantonment with placement of over 500 sand-cement and concrete slabs.[22] In April, the battalion was directed to expand the existing 900' PSP surfaced light aviation runway near Cam Ranh port to a C-130 capable field. Since the project required a major realignment of the runway, the decision was made to bury the existing runway under 2' of sand. By June, when effort was diverted to higher priority projects, the 87th had placed 140,000 CY of sand fill.[23]

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[21]U.S., Department of the Army, "ORLL for Period Ending 30 April 1966," 35th Engineer Group, 15 May 1966, Section 1.

[22]U.S., Department of the Army, "ORLL for Period Ending 1 January through 30 April 1966," 87th Engineer Battalion, 15 May 1966, Section 1. (FOUO.)

[23]COL W. L. Starnes, "Cam Ranh Army Airfield," Military Engineer, 59 (September-October 1967), 358-359.

The primary focus of the 864th remained on the depot. Between January and June the battalion continued warehouse construction and work on the ADP facility. The horizontal effort of the 864th provided additional hardstands for the depot, and, with the assistance of the 102d Company, initiated paving operations within the depot.

C Company of the 864th, at Nha Trang, continued to upgrade the logistics base, completing several warehouses and initiating construction of a 10 tank, 72,000 BBL POL storage area.[24]

Following their arrival at Cam Ranh Bay on the USNS Weigle on 1 January 1966, both the 20th and 39th Combat Battalions were committed to projects in the bay area. The 20th, which had deployed from Fort Devens, Massachusetts, stayed at Cam Ranh Bay from 1 to 27 January, then moved to Dong Ba Thin to continue the work started by C Company, 65th Engineer Battalion. Since the 20th arrived in the middle of the monsoon, its initial effort was directed to getting the aviation units and their equipment above the flood waters that inundated Dong Ba Thin from December through February. By May, the 20th had brought the aviation cantonment areas to grade, had built 75, 20' x 20' concrete pads for UH-1B aircraft, had completed a PSP parking area for CV-2 fixed wing cargo aircraft, and had started work on a PSP taxiway to parallel the runway. Since the bulk of the fill for Dong Ba Thin was hauled by dump truck, an effort was begun on 13 May to accelerate this fill operation by employing a dredge. Forty days later, after only 200 hours of operation and numerous breakdowns, the dredge was diverted to a higher priority project

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[24]U.S., Department of the Army, "ORLL for Period Ending 31 October 1966," 864th Engineer Battalion, 14 November 1966, Section 1.

and the burden returned to the 70th (and the 513th Dump Truck Company, which was attached to the battalion).[25]

The 39th, which had been stationed at Fort Campbell, also spent the first weeks of January staging at Cam Ranh Bay, then was assigned vertical construction projects at the depot. In March the battalion was directed to begin construction of the 6th Convalescent Center (Hospital). Sited on the sea side of the peninsula, just to the north of the Cam Ranh Air Force Base, the center was to be built in two stages. During the first stage, troop units would build a 1500 man mess hall, the tropical barracks needed for wards, the essential medical facilities and minimum standard water and electrical distribution systems. In the second stage, contractors would install permanent sewage and water systems and construct several large general purpose buildings.

On 22 March earthmoving operations began. On 4 April concrete was placed for the first slab, and by the end of May buildings were rising from the sand.

To meet the combat support requirements of IFFV units operating in the Tuy Hoa area, C Company, 39th Engineers, was sent in February by LST to that area. From the moment of its arrival the company was busy supporting the movements of the 1st Brigade, 101st Airborne, and the 2d ROK Marine Brigade into the rice-rich valley west of Tuy Hoa.[26] In one

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[25]U.S., Department of the Army, "ORLL for Quarterly Period Ending 30 April 1966," 30 April 1966, and "ORLL for Period 1 May 1966 to 31 July 1966," 15 August 1966, 70th Engineer Battalion, Section 1. (FOUO.)

[26]U.S., Department of the Army, "ORLL 1 May 1966 to 31 July 1966," 39th Engineer Battalion, 14 August 1966, Section 1. (FOUO.)

operation, C Company teamed with A Company, 326th Engineers and the 553d Float Bridge Company to build a 477' foot bridge over the Song Dai Giang west of Tuy Hoa.[27]

At Phan Rang, the 62d Construction Battalion was joined by Raymond, Morrison-Knudsen, Brown and Root, J. A. Jones (RMK), the government's principal contractor in Vietnam.[28] RMK was given the mission of constructing a permanent (concrete) 10,000' runway for the airbase, while the 62d continued at work on the expeditionary AM-2 airstrip and the minimum required support facilities. On 20 February 1966, the first aircraft landed on the AM-2 runway and by 15 March the airfield was operational. In addition to this work on the runway, the 62d prepared a cantonment for the incoming air force units and a POL system with 56,000 BBL storage and an eight mile, six inch pipeline to support the air operations. Concurrently, the 62d continued to assist the 1st Brigade, 101st Airborne, in improvement of its base camp.

In April the 62d deployed a task force to Bao Lac, some 50 KM inland, to begin work on a C-130 airfield to support future operations in the area. In early May, because of the effects of the monsoon, the task force returned to Phan Rang, leaving the airfield 30 per cent complete.[29]

Problems within the 35th Group were the same as those in the 937th, principally the shortages of construction materials and repair

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[27]ORLL, 35th Engineer Group, 15 May 1966.

[28]See Chapter VII.

[29]U.S., Department of the Army, "Operational Report-Lessons Learned for Quarterly Period Ending 31 July 1966," 62d Engineer Battalion, 13 August 1966, Section 1. (CONFIDENTIAL.)

parts. The 20th and 39th both encountered the problems of operating in a construction environment with a combat unit TOE, but through internal rearrangements adapted to the situation.

The Northeast monsoon's effect in the Cam Ranh area was significant. Because of the sandy nature of the Cam Ranh peninsula, many vertical projects were able to continue with minimum interference. The principal weather problems, however, were encountered along the unpaved roadways where heavy traffic and saturated subgrades combined to provide a morass that could only be cured by removal or mitigated by heavy applications of sand. This first monsoon clearly demonstrated the value of pavement in preventing such problems.

## III Corps Area

From January to June, engineer effort in the 159th Group area of responsibility was concentrated on two general tasks; the development of Long Binh as a major command and logistics center, and the preparation and improvement of base camp facilities for the 1st and 25th Infantry Divisions. To accomplish these missions, the group continued to employ the 46th Construction and the 168th and 588th Combat Battalions augmented by two light equipment companies and a construction support company. (The 362d Light Equipment Company was transferred from the 937th Group in April and the 103d Construction Support Company arrived in February from the United States.)[30]

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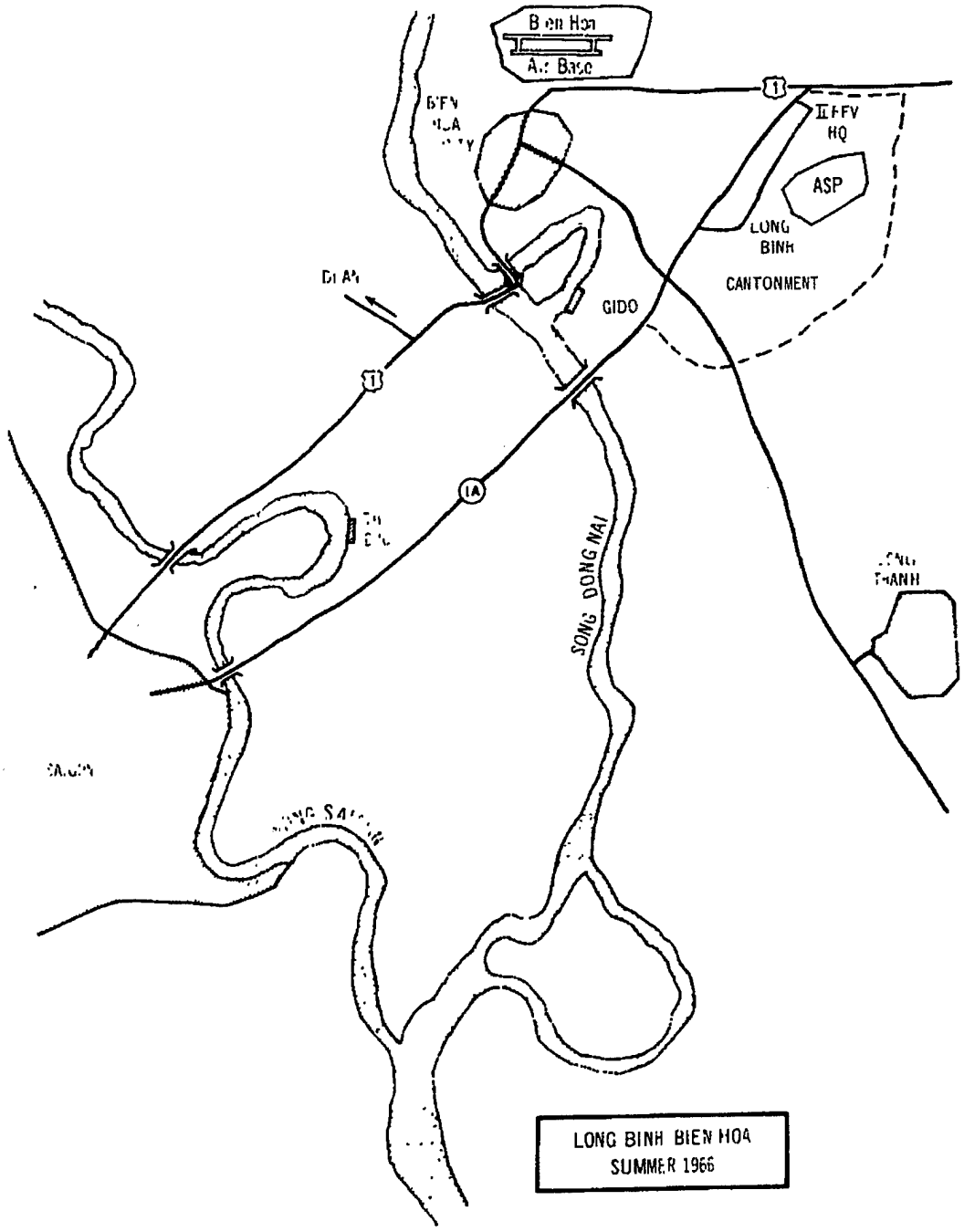
[30]U.S., Department of the Army, "ORLL for Period 1 January 1966 to 30 April 1966," 159th Engineer Group, 13 May 1966, Section 1. (FOUO.)

At Long Binh, the 159th completed the basic construction at the 93d Evacuation Hospital, continued work on the ammunition depot and theater storage area, and the Long Binh cantonment, and initiated a project to build a headquarters complex for IIFFV. (Figure 20.) At Di An, Phu Loi and Lai Khe the group continued improvement of the 1st Division' base and at Long Thanh began to construct a base for the 2d Brigade of the same division. The arrival of the 25th Division also meant cantonment construction and a major effort was focused on the development of a base near Cu Chi. Throughout this entire period a great deal of the group's engineering effort was devoted to the preparation of a base development plan for the Long Binh complex which was then estimated to be progressing towards a population of 25,000.

The 46th Engineers began the new year with the battalion, less D Company and assisted by C Company, 168th Engineers, at Long Binh, concentrating on the completion of the 93d Evacuation Hospital and the continuation of work at the ammunition supply depot. At the hospital, the principal work was construction of the electrical distribution system, a minimum sewage system and the required access roads. These tasks progressed as rapidly as the materials became available, but the theater shortage of electrical and plumbing items delayed final completion. Work on the ammunition depot and theater storage area progressed at a rapid pace, hampered primarily by weather. By 1 May over 600,000 SF of the required total of 3,150,000 SF had been completed. Vertical work on sheds and bunkers was also progressing at an equal pace.

On 26 January, the battalion began clearing operations at the site of the II Field Force, Vietnam, headquarters. In late February construction began on 17 vertical wall Quonset buildings for the


Bien Hoa
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1
II FFV
HQ
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SONG DONG NAI
LONG BINH BIEN HOA
SUMMER 1966

FIGURE 20.

headquarters and by the late spring this work had expanded to include administrative and essential cantonment construction for Headquarters Company, IIFFV, Headquarters Battery, IIFFV Artillery, and several other headquarters support units.

In the Long Binh cantonment area standard 3 construction continued for incoming logistical units. In April, work began on a major vertical facility for the 90th Replacement Battalion, which was programmed to handle the movement and processing of USARV individual replacements bound for units in III and IV Corps. Barracks, mess halls, latrines and processing facilities were required for 3,000 men, with provisions incorporated for expansion to a 6,000 man capacity.

At Vung Tau, D Company, the only U.S. engineer unit in this relatively isolated area, was providing support to several U.S. logistical units and to the Australian Army forces. Strengthened by the 536th Port Construction Detachment, which arrived in March, D Company continued improvement of the port facilities and launched construction of warehouses and POL storage tanks for the 1st Log Command. Concurrently the company began construction of a hardstand, supply facility and storage area for the Australians.[31]

The 168th Engineers, less C Company, focused its attention from January to May on the Headquarters and 3d Brigade of the 1st Division at Di An and Lai Khe respectively. At Di An, Headquarters and A Companies completed 37 tropical buildings for the 1st Division headquarters complex and launched construction of warehouses and storage areas for the Division Support Command. B Company, at Phu Loi, began, in mid-January,

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[31] Ibid.

construction of a C-130 airstrip for the 3d Brigade. Less than two months later, the M8 PSP surfaced field had been completed and was in full operation. Concurrent with the airfield construction, B Company continued work on the brigade base and completed a 25 aircraft heliport adjacent to the airfield.

In late February, a platoon of C Company moved from Long Binh to Cu Chi to assist the 65th Engineer Battalion, 25th Division, in preparation of a division base camp. This effort was markedly increased in early April when the 362d Light Equipment Company arrived and was committed to this project.[32]

On 4 May, as part of a group shift of assets, A Company (less one platoon) moved to Phu Loi, relieved the 588th Engineers, continued the previously initiated base construction and initiated work on several warehouses. Back at Di An, Headquarters Company, assisted by the platoon of A Company, maintained construction operations for the division headquarters and Support Command.[33]

Like the 168th, on 1 January the 588th Engineer Battalion found its assets scattered. Headquarters and A Company, from January to May, continued to improve the 1st Division artillery and aviation facilities at Phu Loi by providing support of cantonment construction and through the placement of some 44,000 SF of M8 PSP for a 196 helipad aviation area.

B Company, at Phuoc Vinh, continued mess hall construction for the 1st Brigade, 1st Division, and initiated major repair operations on

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[32] Ibid.

[33] U.S., Department of the Army, "ORLL for Period Beginning 1 May 1966," 168th Engineer Battalion, 14 August 1966, Section 1.

a Japanese built C-130 airfield. To improve this latter facility, six inches of laterite was spread and compacted over the entire runway area.

In late January, C Company moved from Long Binh, where it had been supporting base construction for the 173d Airborne, to Long Thanh (Bear Cat), some 15 kilometers southeast of Long Binh. Continued expansion at Long Binh would, by April, force the 1st Division's 2d Brigade out of its initial base area and C Company was deployed to the new area to prepare another base camp. Construction at Long Thanh included mess halls, latrines and administrative facilities. By May, the 2d Brigade had a new headquarters complex and a dispensary, and a high percentage of its troops were eating in C Company built mess halls.[34]

The movement, in late April, of A Company, 168th Engineers to Phu Loi, relieved the 588th of its Phu Loi mission and permitted Headquarters and A Companies to move in early May to Cu Chi to relieve the 168th and assist the 65th Engineers in completion of the 25th Division base.[35]

During this period, the 588th supported the combat elements engaged in Operation BIRMINGHAM in War Zone C by providing, with the assistance of the 617th Panel Bridge Company, a class 60 route from Cu Chi to Tay Ninh. In mid-May the battalion sent men to Di An, where, along with divisional engineers, they received training from a Department of the Army team on tunnel destruction techniques which employed an

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[34] ORLL, 159th Group.

[35] U.S., Department of the Army, "ORLL for Period 1 May 1966 to 31 July 1966," 588th Engineer Battalion, 15 August 1966, Section 1. (FOUO.)

acetylene gas generating system. As a result of this training, these men were to become, for a period, the 18th Brigade's tunnel destruction force.

The 159th Group continued to be plagued by shortages of some construction materials: mostly the more sophisticated items in the electrical and plumbing field and the smaller sizes of dimensioned lumber. However, with its new posture of company size commitments, the group found that communications and resupply were its most critical problems. Ground travel to the two most northern companies in Phuoc Vinh and Lai Khe was restricted by Viet Cong activity to infrequent convoys. Ground travel between the other base areas, while not as hazardous, was extremely time consuming for hard pressed staff officers and commanders. At one point, badly in need of new equipment for the engineers, the 1st Division's 1st Brigade Commander, committed an entire infantry battalion to secure the road to Phuoc Vinh for a resupply convoy bringing in new HD16 bulldozers.[36]

The solution to the problem of tenuous ground lines of communications rested with aviation support, and, in this area, the group continued to be short of its needs. Although recognized by all concerned, the allocation of aircraft became a matter of priorities, and in the spring of 1966, this priority rested with the newly arrived combat elements.[37]

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[36]ORLL, 159th Group.

[37]COL J. H. Hottenroth, "Army Troop Construction," Military Engineer, 58 (September-October 1966), 321-322.

Another problem area became apparent in the clearing of thick jungles and dense undergrowth for airfields and bases. Each new project involved, as its first step, the clearing of the required area. While not impossible, the task became time consuming and expensive in terms of men and equipment. Countless hours were spent by bulldozers hacking away at virgin territory to clear and grub for runways, heliports, storage areas, and roads. Although field expedients were tried, (sheepsfoot rollers, demolitions, defoliation) none were entirely successful and the problem remained.

## Brigade and Division Engineers

For the 1st Engineers, January to June 1966 meant several firsts for the battalion. As the division committed more and more of its forces to combat operations, the balance of its engineer effort shifted from base development to combat support.

In January, A Company, in support of the 1st Brigade, constructed the first LZ built by the battalion. From 7 February to 2 March, the 1st conducted its first battalion size operation, ROLLING STONE, to construct a 12 mile MSR from Route 13 (near Ben Cat) east to Route 16.[38] The significance of this operation, during which the engineers provided much of their own security, was indicated by a letter from the commander, MACV (COMUSMACV) to the battalion:

> The successful completion of this project, accomplished under hazardous conditions, exemplifies the importance of the engineer effort in Vietnam. Its ultimate effect on our future military

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[38]Unit Historical Report, 1st Engineer Battalion.

operations and on the revolutionary development program within the province will be significant.[39]

On 11 April, 30 men climbed down a ladder from a hovering CH-47 to construct an LZ for evacuation of casualties, the first constructed by air inserted troops of the 1st. Later in the same month, the battalion became the first unit to employ an Armored Vehicle Launched Bridge (AVLB) in Vietnam, when the AVLB (on loan from the 65th Engineers) was used to span a gap on a critical MSR.

During late April and early May the battalion supported operation BIRMINGHAM in War Zone C by clearing and maintaining 20 miles of roads in the Tay Ninh area and by providing direct support to the committed brigades.

Base development continued to occupy part of the assets of the 1st. Whenever elements of the battalion were not committed to support tactical operations, their efforts were focused on base camp improvements.[40]

In II Corps, the 8th Engineers spent the first months of 1966 pioneering the untested concepts of rapid forward airfield construction. Between January 28 and June 5, the battalion constructed one CV-2, three C-123 and five C-130 capable airfields, with a variance in construction time from four to 246 hours.

Operation MASHER/WHITE WING brought the 8th its first opportunity for airfield construction. The commitment of combat forces into the

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[39]Letter from COMUSMACV to CO, 1st Engineer Battalion, untitled, 6 March 1966.

[40]Unit Historical Report, 1st Engineer Battalion.

Bong Son area in Binh Dinh province required the opening of an airstrip to support the logistics lifeline. (Figure 21.) On 28 January the battalion began clearing operations and on 31 January an earth strip was ready for CV-2 aircraft. Two days later, LZ English was open to C-123s. Shortly thereafter, additional logistics requirements pointed to the opening of an airfield near Phu Cat, half way between Qui Nhon and Bong Son. In 20 hours, the 8th opened a 3,000' dirt runway to C-130 aircraft and built, in addition, parking space for 10 C-130s.

A shift in tactical emphasis, sent the 1st Cavalry to the highlands in March and, on the 25th, the 8th was assigned the mission of constructing a C-130 airfield at Oasis some 50 KM southwest of Pleiku. (See Figure 17.) Four hours after an engineer platoon landed by CH-47, a CV-2 runway was ready for use and construction of a separate C-130 runway was underway. With the support of two D6B dozers and one lightweight dozer, in 78 working hours A Company carved out a 3,000' path and covered the area (in 18 hours) with T-17 membrane. (Figure 22.) This airfield was immediately put into use and in the course of the operation supported over 500 landings and takeoffs without significant damage.

On 3 April the 8th sent two platoons by CH-47 into a virgin area near the Cambodian border some 70 KM southwest of Oasis to support division forces operating in the vicinity of Chu Pong Mountain. In 43 working hours (during the period 3-6 April), supported by two D6Bs and two graders (one with a scraper) which had also been brought in by CH-47, the task force constructed a 2,300' C-123 field with 500' overruns. On completion, LZ Cat became the first medium cargo airfield built in Vietnam by forces and equipment transported to the site by only helicopters.

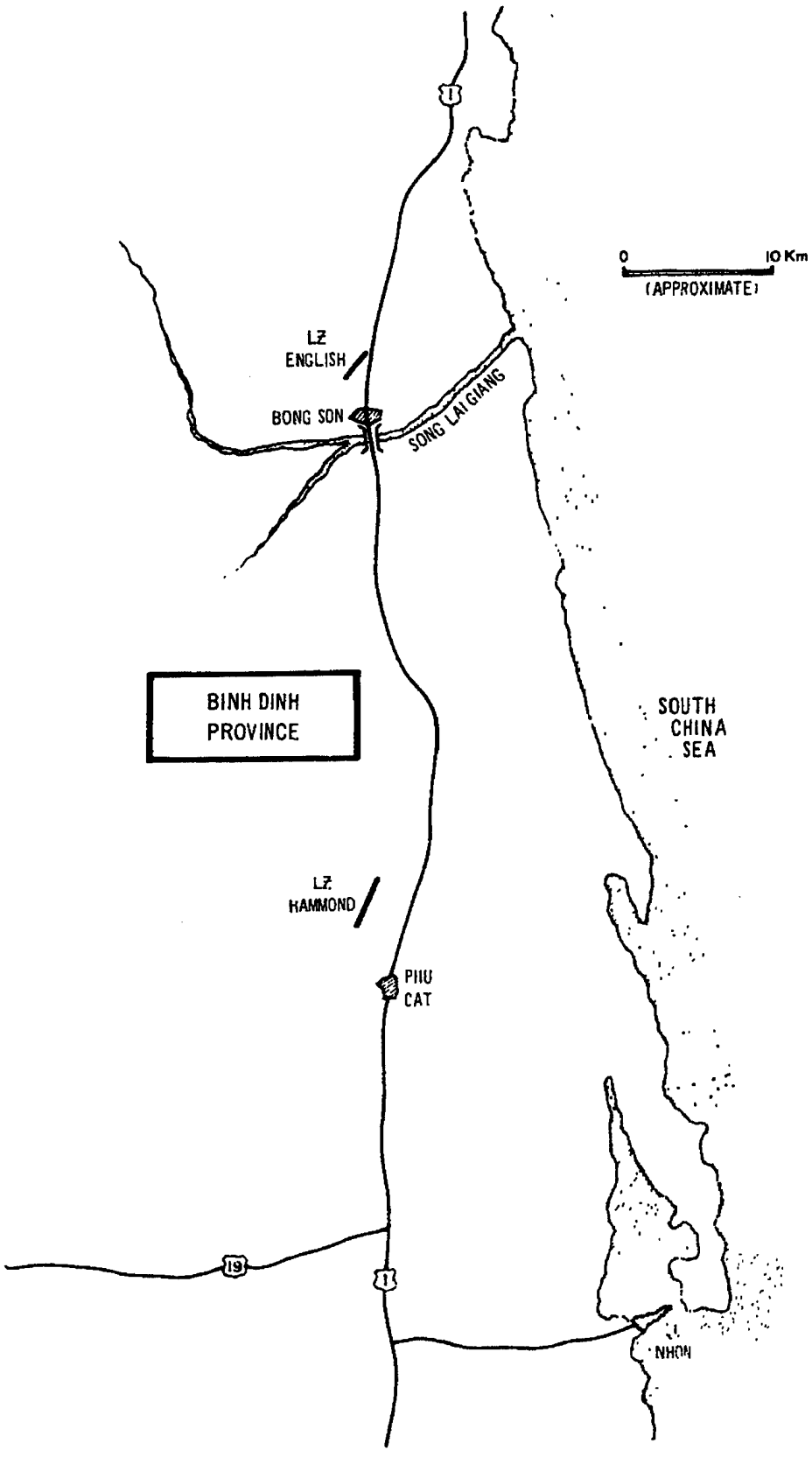
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FIGURE 21.

FIGURE 22. INSTALLATION OF T-17 MEMBRANE

Between 7 April and 7 May, the 8th constructed two additional C-130 and one additional C-123 airfields and on 11 May began construction at still another C-130 field. The organization for and nature of the construction of this last field marked the variations in employment of the battalion.

Assigned the mission of constructing a C-130 field at Ban Blech, the 1st Cavalry dispatched a task force of one infantry company, one engineer company (reinforced with equipment), two sections of a 105mm howitzer battery and two aerial rocket helicopters. Between 11 and 27 May, the airmobile engineers cleared the site and moved over 148,000 CY of earth (including one fill 800' long with an average depth of 12'). On 25 May the engineers began to place T-17 membrane on the runway. Despite the handicaps of enemy action, which prevented night work, and heavy rains, the field was completed on 5 June.

The mobility of this battalion can best be expressed by the movement of one dozer that in a three week period travelled 92 miles by truck, 170 miles by helicopter and 50 miles by C-130 and still was able to put in 16 days at work.[41]

The base development responsibilities of the 8th at An Khe continued to require a diversion of some effort. To increase the divisions self help construction role, the battalion augmented the ADE Section by adding a Captain and 27 E6 (and above) noncommissioned officers (NCOs)

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[41]LTC R. J. Malley, "Forward Airfield Construction in Vietnam," Military Engineer, 59 (September-October 1967), 318-322, and interview with LTC R. G. MacLennan, S3, 8th Engineer Battalion, 1965-1966, Fort Leavenworth, Kansas, 15 February 1968.

to the base development side of this office. The NCOs provided technical supervision for the tactical units engaged in the construction program and the officers, the general planning guidance.[42]

The third divisional battalion to arrive in Vietnam was the 65th Engineer Battalion, 25th Infantry Division, which deployed to Vietnam in stages. C Company left Hawaii in August 1965 and worked under 35th Group until December. In late December, C Company moved to Bien Hoa, where it met the arriving B Company. Then, with the 2d Brigade of the division, the two companies moved to Cu Chi where they began base development and combat support operations. D Company (D/65th) deployed to Vietnam with the 3d Brigade Task Force which moved into II Corps for independent operations. In March and April the battalion (-) deployed to Vietnam.

During its first months in country, the battalion concentrated its efforts on establishing the division base, while concurrently providing, on a mission basis, required combat support. The 65th's construction efforts were focused on essential facilities and on clearance of fields of fire and potential ambush or assembly points in the vicinity of the base camp. Initial building construction was greatly facilitated by the use of tent frame kits which had been prefabricated by the U.S. Army, Hawaii, and carried over with the units.[43]

The operations of the separate companies, A/326th, 173d, D/65th, continued to parallel the operations of the first two companies during

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[42]MacLennan interview.

[43]Interview with MAJ H. L. Savage, Company Commander and S3, 65th Engineer Battalion, 1965-1967, Fort Leavenworth, Kansas, 14-15 March 1968.

the latter half of 1965. Each company moved with its parent brigade on combat operations to provide the required demolition, clearing, and mine sweeping, as well as essential water supply. The base development responsibilities of the companies remained secondary missions and were typified by A/326th which employed only one officer and any troops over TOE strength in this role.[44]

The division/brigade engineer forces continued to share similar problems. With the mobility of the combat forces, operations were conducted simultaneously in many areas and this placed a heavy burden on the limited amount of engineer equipment. In the case of the 8th Engineers, the nondivisional engineers lacked the light (airmobile) equipment needed to follow the air cavalry into many areas.[45] In the 1st Division's area, the requirements for MSRs and access to hitherto untouched jungles demanded full use of all available equipment. To meet these requirements the 1st Engineer Battalion often turned to the Vietnamese Ministry of Public Works and renovated its deadlined equipment to provide support over and above that available from the battalion and nondivisional sources.[46]

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[44]Questionnaire returned by Major George Kimbro, Commanding Officer, A/326th, 1965-1966, Fort Leavenworth, Kansas, March 1968.

[45]Questionnaire returned by LTC R. J. Malley, Commanding Officer, 8th Engineer Battalion, 1965-1966, Fort Leavenworth, Kansas, February 1968.

[46]Questionnaire returned by LTC Howard L. Sargent, Commanding Officer, 1st Engineer Battalion, 1965-1966, Fort Leavenworth, Kansas, March 1968, and "Evaluation of Army Combat Operations In Vietnam, Service Support Operational Data Supplement," Combat Operations Research Group (CORG), July 1966, p. 76.

Base development requirements continued to take some share of the total effort of the division/brigade engineers. The theater-wide materials shortage plagued these units as it did the nondivisional engineers and the acquisition of construction materials and the establishment of division/brigade priorities became a major function of the 1st, 8th and 65th Battalions.

The nature of warfare in Vietnam also provided problems for the division/brigade engineers (and at this point in time, to a lesser degree for the nondivisional engineers). The limited number of tactical units coupled with the required piecemeal commitment of these units left few troops to secure engineer work parties. As a result, in the majority of cases, the engineers provided their own local security while the combat elements gave "tactical cover." On the 1st Engineer's Operation ROLLING STONE, the lead engineer company found itself in major firefight with a Viet Cong unit.[47] Similar situations occurred in many other units.[48]

The division/brigade engineers were also used, on occasion, in their secondary role of infantry. In one case, in February 1966, B Company, 8th Engineer Battalion was committed as the 3d Brigade, 1st Cavalry Division reserve on MASHER/WHITE WING.[49]

The first months of 1966 had given new challenges to the engineers, but again these challenges had been met.

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[47]Unit Historical Report, 1st Engineer Battalion.

[48]CORG, p. 75.

[49]MacLennan interview.

CHAPTER IV

# THE CASTLES GROW
(June-November 1966)

## The War Expands

By June 1966, estimates placed the rate of infiltration of fighting men from North Vietnam into South Vietnam at 6,000 a month. In partial response to this escalation of infiltration, on 29 June U.S. air power was turned on hitherto untouched military facilities in Haiphong and Hanoi and the world became more aware of the meaning of the U.S. involvement.

The position of the United States was further clarified in October, when the President of the United States attended the Manila Conference in the Philippines and took time out to visit the troops in Vietnam. In comments directed to both conference participants and to the men fighting in Vietnam, the President pointed to the determination of the United States to insure the freedom of its ally, South Vietnam. A sign of this determination was the continuing buildup of U.S. forces in Vietnam.[1]

In early August 1966, the 4th Infantry Division (less one brigade) began to come ashore at Qui Nhon in the IFFV area of responsibility. The division headquarters, Support Command and the 2d Brigade moved to a

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[1]Associated Press, What YOU Should Know About VIETNAM, (Associated Press, 1967), pp. 13-14.

base area at Dragon Mountain, 10 KM south of Pleiku, while the 1st Brigade was sent, in increments, to Tuy Hoa.

IIFFV was strengthened by the mid-August arrival of the 196th Light Infantry Brigade, which was deployed to Tay Ninh, and the September landing of the 11th Armored Cavalry Regiment, which was positioned at Xuan Loc. In late October, the 3d Brigade, 4th Infantry Division arrived at Vung Tau and moved into the base at Long Thanh, displacing the 2d Brigade, 1st Division, to Di An.

In September and October, ROK Force, Vietnam (ROKFV) added the 9th (White Horse) Infantry Division and the 100th Logistical Command to its troop list. The 100th Log Command was sent to Nha Trang while the 9th positioned regiments at Tuy Hoa and Dong Ba Thin and the division headquarters and one regiment at Ninh Hoa.

With this additional combat power in the II and II-IV Corps areas, COMUSMACV expanded the scope of his operations. In II Corps, where IFFV had been faced with shuttling forces back and forth from the coast to the highlands to meet changing threats, it now was able to seek out the enemy simultaneously in both areas.

The 4th Division, with the 3d Brigade 25th Division, and, at times, elements of the 1st Cavalry, moved through western Darlac, Pleiku and Kontum provinces on Operation PAUL REVERE. In Binh Dinh, the 1st Cavalry again teamed with the ROK 1st Division in Operations IRVING and THAYER. The 1st Brigade, 101st Airborne, following heavy fighting near Dak To in June, joined with the 1st Brigade, 4th Division, and ROK Forces for Operations JOHN PAUL JONES, GERONIMO and ADAMS in Phu Yen province.

In III Corps, IIFFV continued to attack the Viet Cong in its jungle strongholds in War Zone C and Tay Ninh, Binh Long and Binh Duong

provinces with Operations ATTLEBORO and EL PASO, and to open with the 11th Armored Cavalry, roads in Phuoc Tuy and Long Khanh provinces.

In September, for the first time, U.S. combat forces were committed in the Delta, when one battalion from the 25th Division moved into Long An province to learn the basics of operations in this new environment.

## Logistics

To meet a five month increase in troop strength and the new positioning of forces, the 1st Log Command continued to expand its operations. In II Corps, the arrival of the 4th Division meant an increase in the support required in the Pleiku and Tuy Hoa areas and the establishment of logistics subareas at these locations. In addition, 1st Log was charged with providing selective support to the USAF Expeditionary Air Base which was under construction at Tuy Hoa. To meet this dual requirement in Tuy Hoa, 1st Log requested construction of a port to serve this area.

At Cam Ranh Bay, the flow of contractor supplies for use at Cam Ranh and Phan Rang Air Force Bases, together with the increase in flow to provide general support for the Army and Air Force, quickly put a strain on the Cam Ranh port. Expansion of the port and the nearby depot storage areas became a necessity.

Buildups in troop strength at Tay Ninh, Xuan Loc, Di An and Long Binh also demanded a logistics upgrade in III Corps. The increase in supplies moving into the area to support these forces heavily taxed the

facilities at Long Binh and Vung Tau and the need for additional storage areas and port berthing space was apparent.[2]

## Engineer Operations - General

Between June and November 1966, engineer strength in Vietnam increased from 16 to 22 battalions with the arrival of one construction, three combat and two divisional battalions. Command and control problems were eased with the arrival of two engineer group headquarters.

18th Engineer Brigade continued to control all nondivisional engineers in Vietnam while the two Field Force Engineer sections maintained their roles as coordinators of both divisional and nondivisional combat support activities.

The force structure of the 18th Brigade was improved by the arrival, in July, of the 577th Construction Battalion, and, in October, by the arrival of three combat battalions, the 14th, 27th and 86th. New areas of responsibility were established by the brigade to provide the groups, increased to five by the arrival of the 45th and 79th Construction Groups, specific operational areas and to more evenly balance the workload. (Figures 23 and 24.)

While four of the group headquarters were organized as construction units and only one as a combat unit, the division of work and the force structure necessitated the attachment of combat battalions to construction groups and vice a versa. On 19 November there were seven combat battalions attached to the four construction groups and one

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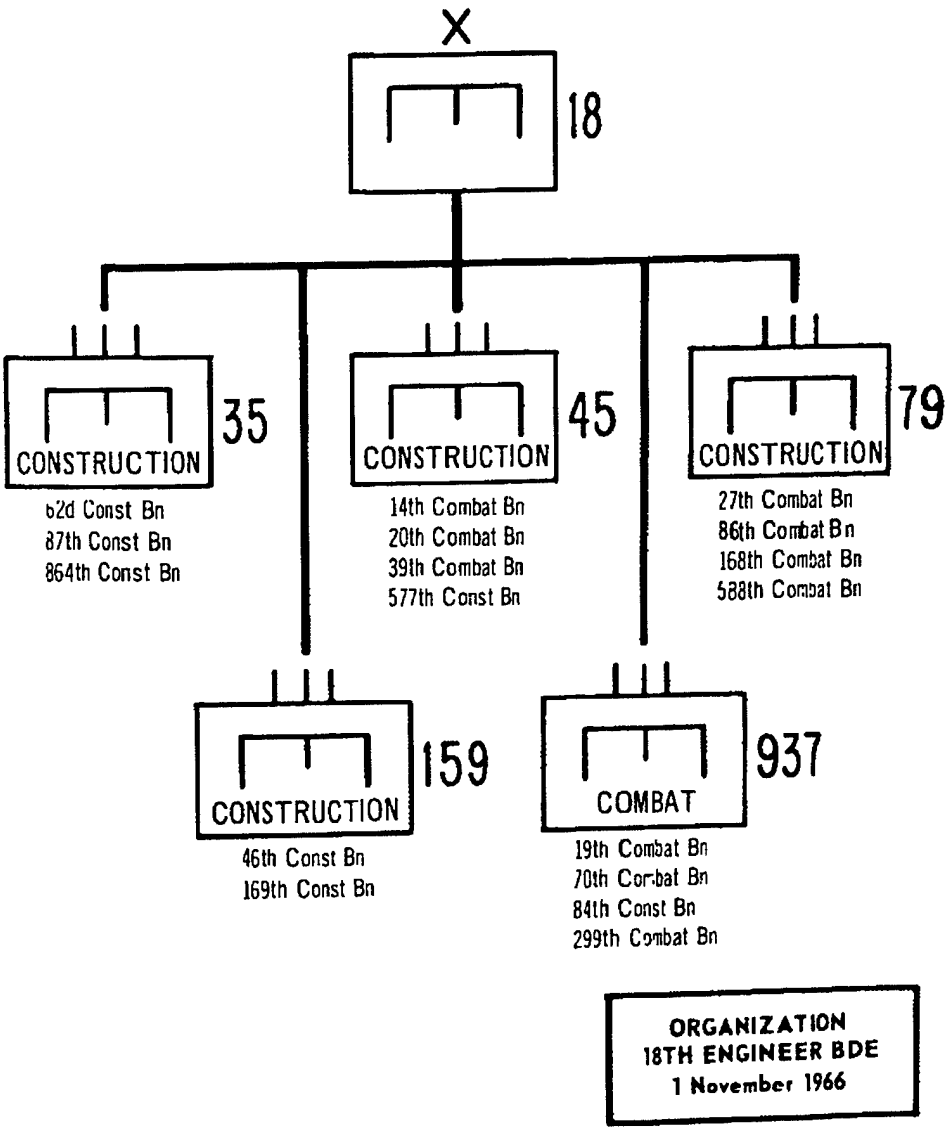
[2]U.S., Department of the Army, "Operational Report-Lessons Learned for Quarterly Period Ending 31 October 1966," 1st Logistical Command, 21 April 1967, p. 36. (CONFIDENTIAL.)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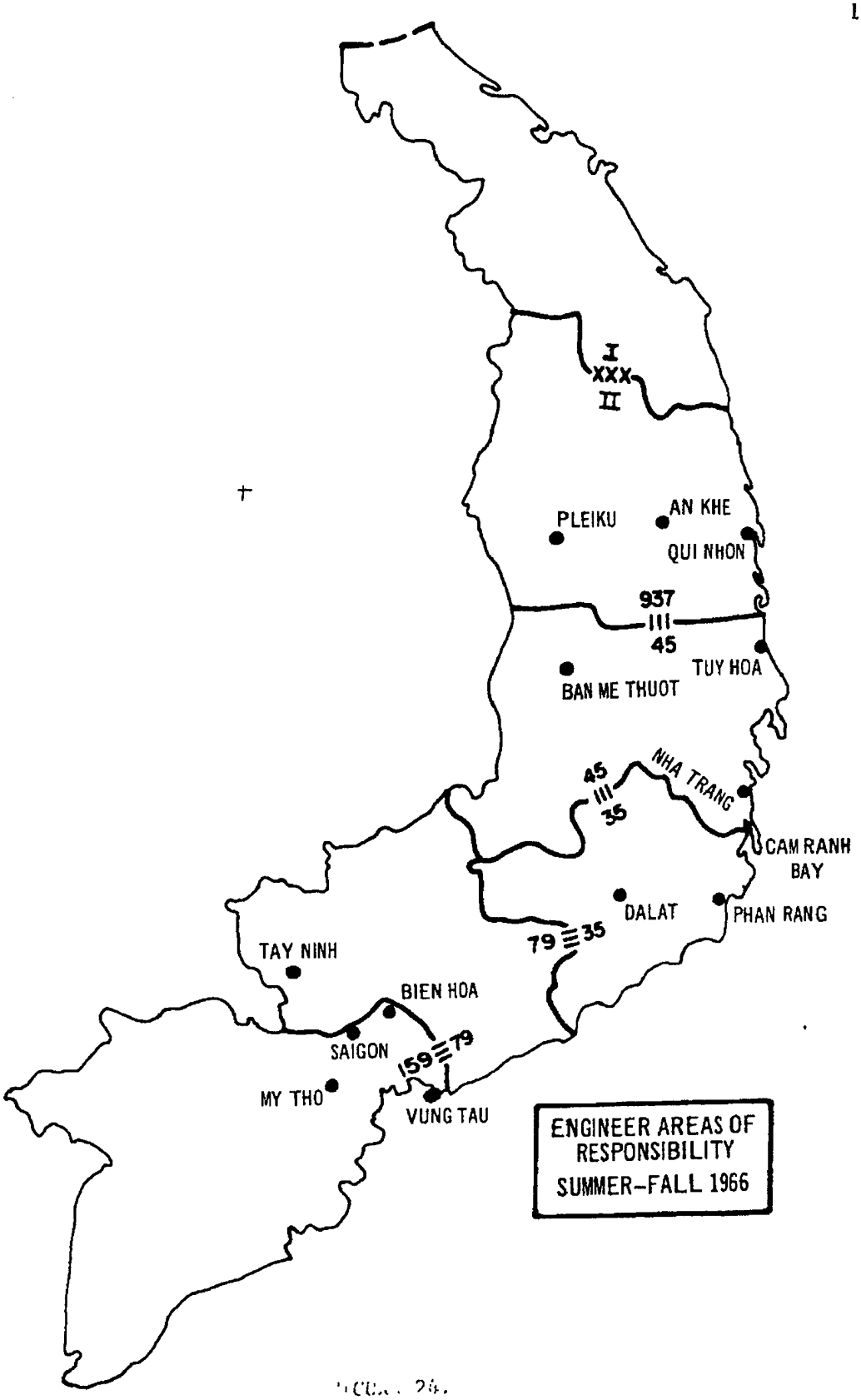
ORGANIZATION
18TH ENGINEER BDE
1 November 1966

FIGURE 23.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RESPONSIBILITY
SUMMER–FALL 1966

construction battalion attached to the one combat group. A group's designation had only a small effect on the nature of its assigned missions and forces.

During the June-November period there were several significant problems that affected the entire 18th Brigade.

In May, the procession of departing personnel began as engineer soldiers completed their required 12 months in Vietnam.[3] Since the majority of the members of each battalion arrived on the same ship, the rotation dates for most members of a given unit were identical.

The impact of this mass departure on the continuity and normal operations of the battalion was obvious and steps had to be taken to reduce the impact of this "rotation hump." While each group established its own program, these programs were essentially the same and could be typified by the plan of 45th Engineer Group:

> To offset the excessive turnover a 4 point program was initiated with a goal of reducing . . . one month's rotation to 25% of the (rotating) battalions strength:
>
> 1. Assigning a slight overstrength (10%).
> 2. Curtailment of . . . one month's rotations into . . . prior month to reduce the administrative load 10% curtailment.
> 3. Voluntary and involuntary extensions of 10% of persons to . . . following month or later.
> 4. Interchange of personnel with other units . . . in earlier months.[4]

Monsoon rains continued to be a problem. The downpours of the Southwest monsoon hit III Corps and the highlands of II Corps during the

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[3]The 12 month tour began on the day the individual soldier left CONUS for Vietnam.

[4]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 45th Engineer Group, 15 November 1966, Section II.

summer and early fall. Engineers learned, however, to live and work within the restrictions placed on them by the monsoon. The importance of sound drainage plans became obvious and the need for large quantities of rock, paramount. While construction and combat support continued, it was apparent that substantial reductions in operating efficiency occurred.

With the increase in number of units and headquarters in the brigade there came no increase in aircraft for command and control. Repeated requests were made to USARV for additional aviation support; however, because of a critical Army wide shortage of aviation personnel and equipment, requirements of combat units were being filled prior to the allocation of aircraft to combat support units.[5] In II Corps, 937th Group maintained its small aviation section, while the 35th and 45th Groups shared two helicopters, one O-1 and one U-1A, "borrowed" from the 937th. In III-IV Corps, the brigade controlled the meager assets that had been similarly transferred from the 937th and provided limited support for the 79th and 159th Groups.

In the supply field, the shift continued from a general shortage of construction materials and repair parts to a shortage of selected items, usually in the more sophisticated category, or, in the case of the maintenance field, to a shortage of major end items. The expansion of the logistics effort did bring problems with location of materials. Often sufficient supplies were available at the base depots (Cam Ranh, Qui Nhon, Long Binh) but lack of transportation or security problems prevented the haul of the supplies to the locations where work was being performed.

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[5]"2d Indorsement to ORLL for Quarterly Period Ending 31 October 1966, 45th Engineer Group," USARV, 6 January 1967.

The continuing use of combat battalions in the construction role required the augmentation of these units, with the augmentation generally differing with the specific mission of the unit. Floodlights, generators, compressors, fork lifts were among the many items requested. Six 16S concrete mixers were obtained for each combat battalion.

To better support the operations of both field forces, after learning of the relative air immobility of the engineer equipment organic to the combat battalions, 18th Brigade also requested procurement of light, air transportable equipment.

Steps were also taken to increase the effectiveness of the combat battalions by providing them with a fourth line company. All of the combat battalions in Vietnam, except the 27th and 86th, were organized under the "D" series (three line company) TOE and requests were submitted to USARV to convert these battalions to the "E" series (four line company) TOE.

As mentioned earlier, rock was a precious item and it was soon apparent that there was not enough to satisfy the needs of the brigade. Additional crushers were obtained and put into operation in each group area. Track drills, which outperformed the older wagon drills were purchased and sent to the units.[6] Quarrying experts travelled the country advising on proper techniques. Still, shortages in rock occurred and, at one point, it became necessary to purchase and barge-in rock from Korea.

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[6]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 864th Engineer Battalion, 14 November 1966, Section 1. The ORLL indicates that a four inch track drill produces 60 tons of rock per hour while a two inch wagon drill produces only 13 tons/hour.

Similar problems were encountered by the division/brigade engineers. Their problems with the rotation hump, however, were increased by the lack of similar units operating in the same area. Through the cooperative efforts of the Field Force Engineers, the 18th Brigade and the individual battalion/company commanders, exchanges between nondivisional and divisional units were arranged.

The arrival of additional nondivisional engineers had its effect on the plans of the Field Force Engineers.

In I Field Force, because of the vast size of the II Corps area and the paucity of ground lines of communication, the emphasis fell on construction of a checkerboard pattern of forward airfields. Whenever tactical operations opened a new area, nondivisional support was sought to construct a C-130 or C-123 runway and to clear a brigade size tactical base area.

The principal effect within II Field Force was the freeing of the divisional engineers from part of both their base development activities and their MSR maintenance missions. As more nondivisional engineers arrived, the size of the division/brigade engineer force accompanying the combat units increased and the nature of the combat unit's ground operations began to shift from 100 per cent on foot to a combination mechanized (armed personnel carrier)-foot movement.[7]

## Qui Nhon - Pleiku

The summer and fall of 1966 brought no new units into 937th Combat Engineer Group but did see a major shift in emphasis within the

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[7]Questionnaire returned by COL D. B. Grace, USA, Engineer IIFFV, 1966-1967, March 1968.

Group. On 1 June, over 90 per cent of the group's effort was concentrated on construction and only one company was stationed outside the Qui Nhon-An Khe area. By November, the group's effort was split evenly between construction and combat support and one battalion had been shifted from Qui Nhon to Pleiku.[8]

Base development activities continued in Qui Nhon, An Khe and Pleiku with heavy concentration on improving and expanding the logistics support facilities. At Qui Nhon and, to a lesser degree, at An Khe, the self-help construction program took on greater proportions as prefabrication of components hastened the pace of the effort.

IFFV's requirements for combat support sent 937th units to the field to construct four airfields and to maintain vital MSRs in both the highlands and the coastal lowlands. The scope of these operations, at times, became group-wide requiring the participation of elements of all or most of the group's assets. One two-battalion operation required an amphibious assault.[9]

In Qui Nhon, the 84th Construction Battalion continued work at the depot, port and airfield. (Figure 25.) Work on the LST and LCU and LCM ramps was complemented by the initiation of contract dredge fill of a causeway for a pair of DeLong piers which were being installed by the DeLong Corporation. The marine POL system was improved by the extension of the existing four inch submarine line from 2700' to 6500' and the

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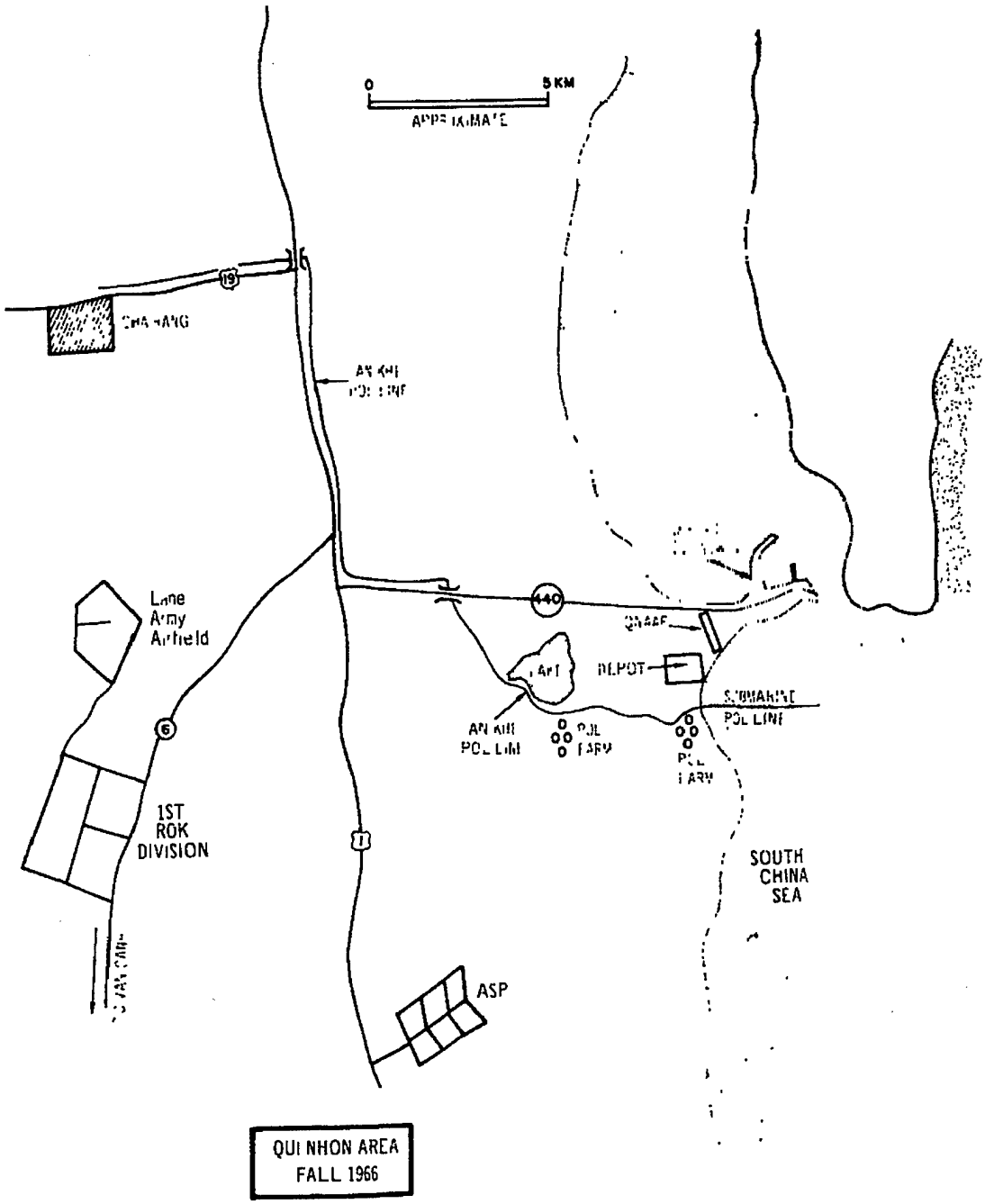
[8]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1966," 15 August 1966, and "ORLL for Quarterly Period Ending 31 October 1966," 15 November 1966, 937th Engineer Group, Section 1.

[9]Ibid.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5KM
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DEPOT
AN KHE
POL LINE
POL
FARM
SUBMARINE
POL LINE
11
SOUTH
CHINA
SEA
ASP
QUI NHON AREA
FALL 1966

FIGURE 25.

start of placement of two additional lines. In the depot, and later in the ASP, effort was placed on drainage facilities to offset the expected winter monsoon. (Figure 26.)

Self-help construction was improved by the establishment by the 84th of a major prefabrication yard in its base camp. From this plant, prefabricated two story tropical buildings were issued to Qui Nhon area units to speed the completion of their cantonments.

Production of rock for the Qui Nhon area was also the responsibility of the 84th. With its equipment and that of the 73d Construction Support Company, the battalion operated two 75 ton per hour (TPH) and one 225 TPH crushers at a quarry south of Qui Nhon.[10]

Construction by the 19th Combat Battalion continued at the combined maintenance facility. The arrival of prefabricated warehouses and maintenance buildings permitted the initiation of vertical construction. On 12 September, the 19th completed the 112,000 BBL Qui Nhon POL facility and swung their focus to the construction of a six inch pipeline from Qui Nhon to An Khe, which had been started in late August by a platoon of the 493d Pipeline Construction Company and elements of the 19th. By mid-October, when a shortage of materials forced a temporary halt in construction, over 34 miles had been placed.[11]

The most significant activities for the 19th and 84th began in September when the 937th Group conducted Operation DUKE as part of the

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[10]U.S., Department of the Army, "ORLL for Period 1 May 1966 to 31 July 1966," 14 August 1966, and "ORLL for Quarterly Period Ending 31 October 1966," 14 November 1966, 84th Engineer Battalion, Section 1.

[11]ORLLs, 937th Group.

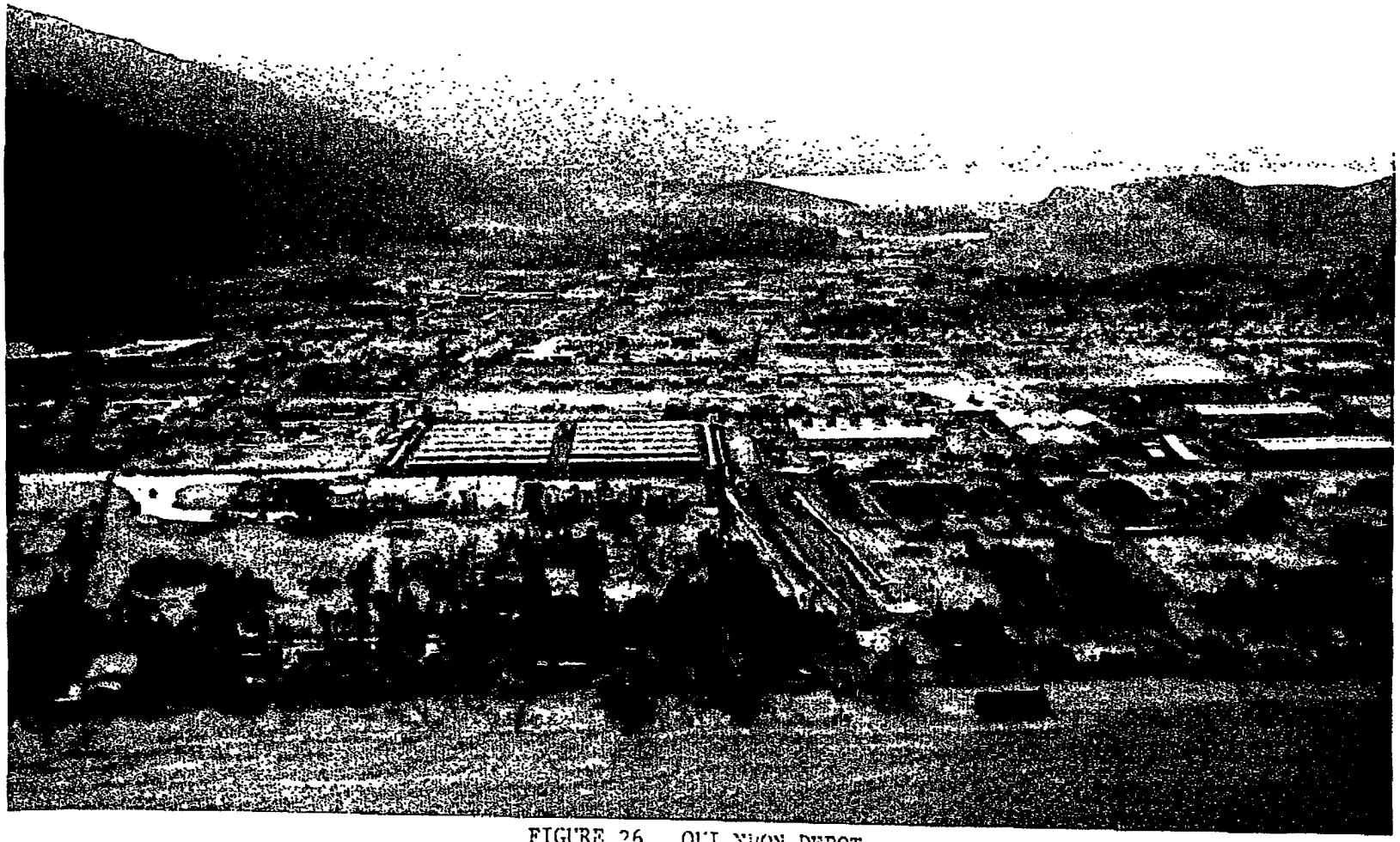

FIGURE 26. QUI NHON DEPOT
Refrigerated Storage Appears at Left; Warehouses at Right.

1st Cavalry Division's Operations THAYER and IRVING. On 13 September 1966, the Cav assaulted enemy base areas in northern Binh Dinh province near Bong Son to launch THAYER (Figure 27). On 14 September, A Company of the 19th and the 509th Panel Bridge Company were landed by LCMs (from an LPD) north of Bong Son in the face of light enemy fire and began construction of a 250' double double Bailey bridge and a 70' double single Bailey to provide egress from the beaches. On completion of these bridges, a heavy construction task force from the 84th Engineers landed and moved inland to English airfield. The 84th was assigned the mission of lengthening the existing C-123 emergency runway to 3500' and constructing a large aircraft parking area.

Concurrently, the 19th was tasked to open Highway 1 from Qui Nhon to Bong Son to class 31 traffic. In coordination with the 6th ARVN Engineer Group, which operated south of Phu Cat, the 19th rapidly repaired the highway, highlighting their operations with the plank decking for vehicle use of a 1350' railway bridge over the Song Lai Giang. Throughout the entire operation the Viet Cong was active, and the 19th sustained many casualties in keeping the highway open and in removing the Bailey bridges installed for Operation DUKE.

By early November, after movement of 170,000 CY of earth, (including one 40' fill) English field was ready for C-130s. The 84th then began its movement back to Qui Nhon and Operation DUKE concluded.[12]

The 84th was also busy at An Khe. A reinforced B Company, while continuing earthwork for the permanent airfield, began construction of a 60 ton capacity ice making plant and a dial-central facility. In June,

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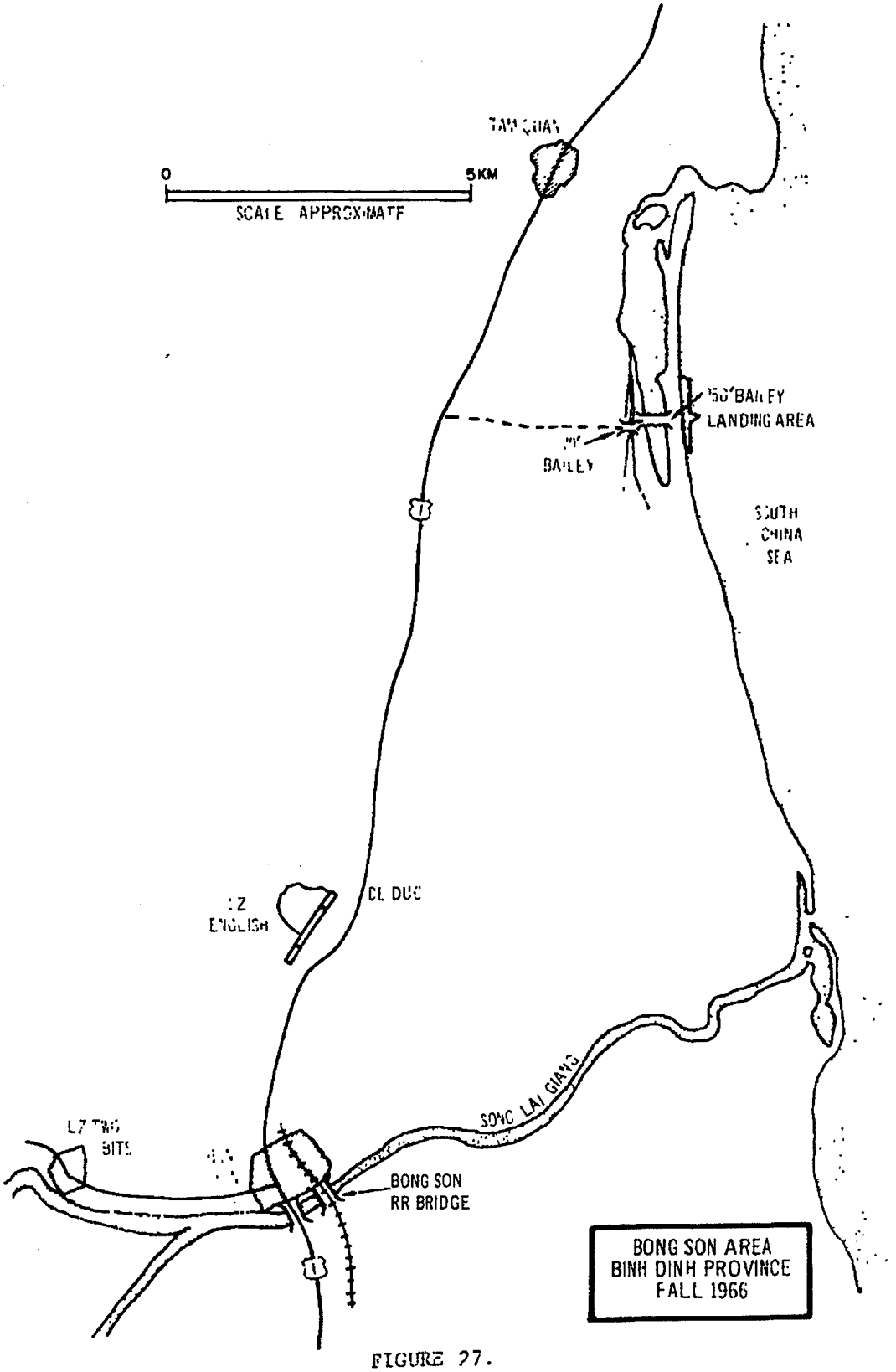
[12]ORLL, 937th Group, November 1966.


0
5KM
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150' BAILEY
LANDING AREA
BAILEY
SOUTH
CHINA
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ENGLISH
DI DUC
SONG LAI GIANG
BONG SON
RR BRIDGE
BONG SON AREA
BINH DINH PROVINCE
FALL 1966

FIGURE 27.

the 84th prepared the base for a C-130 expedient runway at the Golf Course heliport and rehabilitated An Khe airfield by replacing the PSP with a double bituminous surface treatment (DBST).[13]

Base development construction at An Khe remained a 70th Combat Battalion responsibility and, with the 70th's support, An Khe continued to grow. The self-help construction program was accompanied by progress on logistics facilities and the Golf Course heliport and the building of an underground operations center for the 1st Cavalry. Following the 84th's work on the base of the Golf Course runway (Figure 78) in mid-June, the 70th placed T-17 membrane and AM-2 matting on the field. In mid-July, following monsoon rains, the runway failed. The 70th then removed the matting and membrane, repaired the base, improved the drainage and replaced the membrane and matting, completing the entire operation in six weeks. Analysis of the failure simply reemphasized the importance of adequate drainage and the devastating effect of the monsoon.[14]

In September, the 70th extended its operations to Van Canh Special Forces camp south of Qui Nhon where, in four weeks, C Company constructed a 3500' C-130 runway and covered it with T-17. On 1 October the battalion began a similar effort at Vinh Thanh Special Forces camp, east of An Khe, but the early arrival of the Northeast monsoon forced a halt to operations.[15]

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[13]ORLL, 84th Engineer Battalion, November 1966.

[14]U.S., Department of the Army, "After Action Report-Golf Course Airstrip," 70th Engineer Battalion, 11 September 1966.

[15]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 70th Engineer Battalion, 31 October 1966, Section 1, and ORLL 937th Group, November 1966.

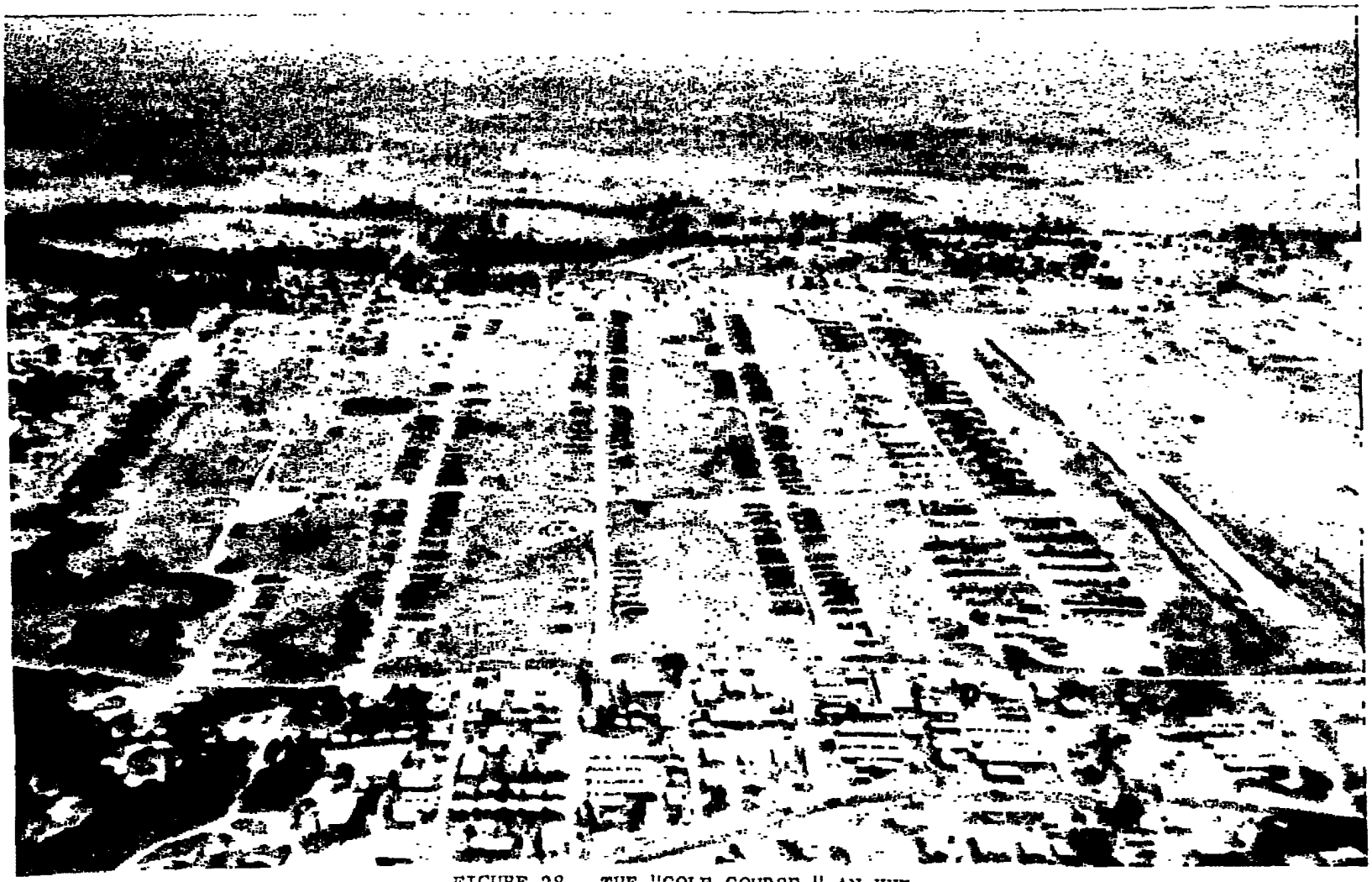

FIGURE 28. THE "GOLF COURSE," AN KHE
An-2 Runway Appears at Right; Helicopters Areas at Left and Center.

The 299th Combat Battalion (less A Company) began the summer in Qui Nhon with its efforts concentrated on the ASP. On 8 July, C Company, in response to an IFFV combat support request, moved to the highlands to maintain Route 14 from Pleiku to Ban Blech and Route 7 from its junction with Route 14 southeast to Cheo Reo. (Figure 29.) On 29 July the battalion headquarters and the 630th Light Equipment Company displaced to Pleiku, where they joined A Company in base development construction. B Company remained at Qui Nhon working on the ASP until 22 August when it also moved to Pleiku.

While work continued on improving the Pleiku logistics base, the 299th expanded its base development responsibilities to the south when it began, in August, to provide technical assistance to the 4th Engineer Battalion, 4th Infantry Division, in the development of the division's Dragon Mountain camp. Soon however, it became apparent that the 299th's principal efforts would be in the combat support field.[16]

In June, the battalion supported the 1st Brigade, 101st Airborne by opening Route 14 from Kontum to Dak To. In October the 299th sent a company to upgrade this same route. In September and October, C Company spent five weeks at Du Co enlarging a Special Forces camp and improving its defenses. By far the major combat support mission carried out by the 299th, however, was the maintenance and upgrading of Route 19 from Pleiku to Oasis during the peak of the monsoon season. Heavy traffic, including tracked vehicles, had made the roadway a slippery sea of mud

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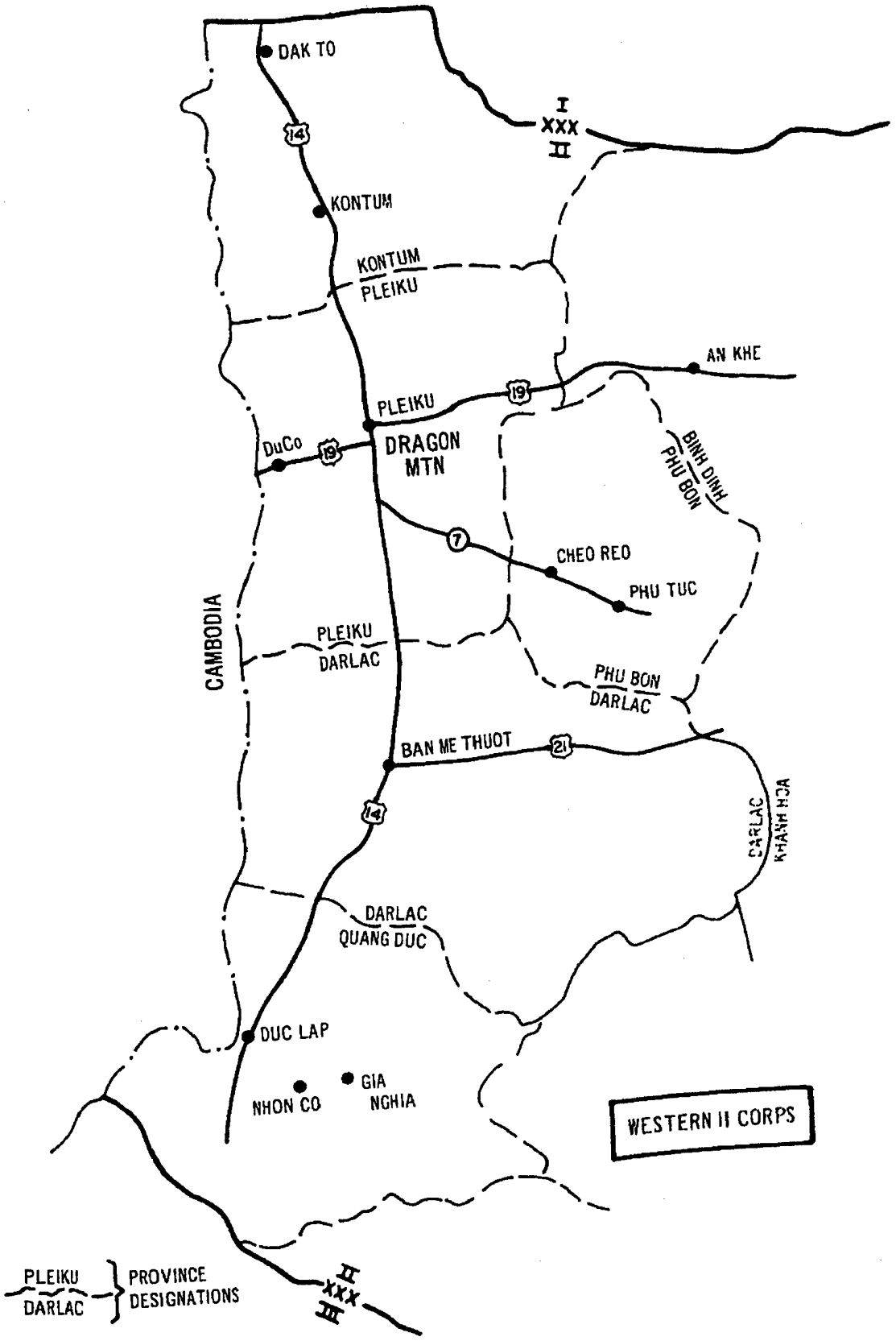
[16]U.S., Department of the Army, "ORLL Covering the Period 1 May 1966 to 31 July 1966," 299th Engineer Battalion, 31 July 1966, Section 1, and ORLL, 937th Group, November 1966.


DAK TO
14
I
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PHU TUC
CAMBODIA
PLEIKU
DARLAC
PHU BON
DARLAC
BAN ME THUOT
21
14
DARLAC
KHANH HOA
DARLAC
QUANG DUC
DUC LAP
NHON CO
GIA
NGHIA
WESTERN II CORPS
PLEIKU
DARLAC
PROVINCE
DESIGNATIONS
II
XXX
II

FIGURE 29.

by the beginning of August and the battalion determined that only rock would save the highway. From 2 to 27 August, the 299th, supported by elements of all major units in 937th Group, conducted a haul that brought rock from as far as 150 KM away. Because of a shortage of rock in the Pleiku area and the urgency of the tactical situation, on 11 August, 937th Group put into operation a daily haul from An Khe and, initially, Qui Nhon, that started with 20 trucks and ended with 70 trucks in service.[17] Even the rock from Pleiku required a substantial haul as Oasis was some 25 KM from the 299th quarry. By 27 August, with 8000 CY of rock on the roadway, the mission had been accomplished.[18]

The problems facing 937th Group and its battalions were those that faced 18th Brigade. The group experienced and survived the rotation problems of all four battalions and the group headquarters. While some construction materials were in short supply, most noticeably rock, and electrical and plumbing items, the 937th's problems centered more around the transportation of these supplies than with their availability.

Transportation units logically put a first priority on ammunition, rations and POL and this left little space for construction supplies. To support their projects, both the 299th and the 70th put their own trucks into the long distance haul. At one point, 75 per cent of the construction materials used by the 70th were brought in on organic haul.[19]

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[17]During the period 11-26 August, 8097 cubic yards of rock were placed on the road. 3660 CY of this rock was hauled from An Khe and Qui Nhon. Nearly 200 trucks were committed to work on the haul, in the quarries and at the crushers.

[18]U.S., Department of the Army, "After Action Report: Combat Support Mission," 299th Engineer Battalion, 16 September 1966.

[19]ORLL, 70th Engineer Battalion.

## Cam Ranh North - Tuy Hoa

On 10 June 1966, the 45th Engineer Group (Construction) was assigned responsibility for nondivisional engineer operations in central II Corps. The group's area of responsibility included Tuy Hoa, Dong Ba Thin, Ninh Hoa and northern Cam Ranh Peninsula. Specifically excluded from the area was Nha Trang. The 20th and 39th Combat Battalions, two light equipment companies and a dump truck company were transferred to the 45th from the 35th Group.

Headquarters, 45th Group, arrived at Cam Ranh Bay on 8 June from Fort Bragg, North Carolina and immediately established its command post on South Beach. In mid-July, the group headquarters moved to Dong Ba Thin and, in October, as a result of a shift in emphasis, it displaced to Tuy Hoa. In this same five month period, the group grew from two battalions to five.

Between June and November this new group accomplished a significant number of firsts. It became the first group to displace its headquarters, the first to commit a subordinate unit as infantry, the first to conduct an independent "Roadrunner Operation," the first to open a new port in Vietnam, and the first to move a battalion by sea into a new area. As an indication of its mobility, between mid-June and mid-November every unit within the group made at least one permanent move.[20]

The 20th Combat Battalion continued the construction of the Dong Ba Thin aviation complex through June and July completing landing ramps

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[20]U.S., Department of the Army, "ORLL for Period 1 May 1966 to 31 July 1966," 15 August 1966, and "ORLL for Quarterly Period Ending 31 October 1966," 15 November 1966, 45th Engineer Group, Section 1.

for CH-47 aircraft and the airfield taxiway and improving the aviation cantonment area. In mid-July, A and C Companies shifted to Ninh Hoa and Nha Trang (north) to assume responsibility from the 39th Combat Battalion for construction of standard 2 base camps for the ROK 9th Division headquarters and 100th Logistical Command. With a requirement for upgrading of the ROK facilities to standard 4, the battalion headquarters and the 584th Light Equipment Company joined A Company at Ninh Hoa on 29 July.

B Company, which remained at Dong Ba Thin until the incoming 577th Construction Battalion had assumed responsibility for the area, moved by convoy on 15 and 16 August to Ban Me Thuot to initiate construction of a brigade size tactical base area. On 22 September with the base camp near completion, the company moved by convoy to Phu Tuc Special Forces camp and began extension of an existing CV-2 (C-7A) airfield to a C-130 length.

C Company was relieved of its mission at Nha Trang (north) on 11 September and shifted to Ninh Hoa to increase the effort there. On 16 September one reinforced platoon of C Company was airlifted to an isolated Special Forces camp at Nhon Co, near the Cambodian border, to place a bituminous surface treatment on an existing C-130 runway. Since road movement was impossible, all logistics support for the platoon had to come by air from the battalion base some 175 KM away.

In early October, the 20th was alerted for movement to Pleiku to support the 4th Division and, on 5 October, without replacement at Ninh Hoa, Headquarters and C Companies, along with the 584th began their overland move to Pleiku. On arrival at Dragon Mountain on 10 October,

the 70th (less A and B Companies) came under operational control of the 937th Group.[21]

A Company had been scheduled to move with the battalion on 5 October. On 4 October, at the personal request of the Commanding General, IFFV, the company was pulled out of the convoy preparation and reorganized as infantry.[22] On 5 October, the company was placed under operational control of the 1st Brigade, 101st Airborne and placed in a defensive position along side an infantry company near Long Hoa to block an expected Viet Cong attack. While the attack did not materialize, for 10 days the company operated in the infantry role conducting patrols, firing mortar missions and blocking a key avenue of approach. On 15 October, A Company was flown to Pleiku and rejoined its parent battalion at Dragon Mountain.[23]

In its new location, the 70th received several missions in support of the 4th Division. At the division base camp, the battalion began laying a six inch water line from a nearby lake to the camp and construction of a 1000' forward liaison airfield. In addition, the 70th assumed responsibility for upgrading Route 19 from Dragon Mountain

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[21]The 70th remained attached to 45th Group until 10 November.

[22]The 45th Group Commander had previously equipped the 70th with mortars and grenade launchers.

[23]During the period that A Company was involved with the 101st, the 513th Dump Truck Company, supported by elements of the 577th Construction Battalion, conducted a convoy on Highway 1 between Ninh Hoa and Tuy Hoa. This convoy marked the first use of this highway in several years.

to Du Co and for the rehabilitation of the C-130 airfield at Polei Djereng.[24]

The 39th Combat Battalion began the period with the battalion (less C Company, at Tuy Hoa) on the northern end of the Cam Ranh Peninsula building the 6th Convalescent Center. On 1 June, B Company moved to Nha Trang (north) to begin standard 2 construction of the previously mentioned ROK logistics base, and, on 3 July, the 572d Light Equipment Company, attached to the 39th, deployed to Ninh Hoa to begin work on the 9th ROK Division camp.

On 8 July, the 39th was alerted for movement to Tuy Hoa to support the opening of a U.S. Army base and deep draft port. Between 10 and 25 July, the Battalion Headquarters, A, B and the 572d Companies moved by AKA and LST from Nha Trang and Cam Ranh Bay to the Tuy Hoa area, transferring responsibility for the ROK bases to the 20th Engineers and leaving a small detachment to complete the remaining work at the convalescent center. By 31 July the 39th's work at the center was essentially complete and patients had already been moved into the wards.

45th Group assigned the 39th three general missions in the Tuy Hoa area. (Figure 30.) The battalion's primary mission was the construction of a port complex in the mountainous jungle covered slopes that entered Vung Ro, a natural harbor some 20 KM south of Tuy Hoa. Secondary missions for the battalion were direct combat support of tactical units in the area and development of the Tuy Hoa Free World

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[24]U.S., Department of the Army, "ORLL for Period, 1 May 1966 to 31 July 1966," 15 August 1966, (FOUO) and, "ORLL for Quarterly Period Ending 31 October 1966," 31 October 1966, 20th Engineer Battalion, Section 1. (FOUO.)

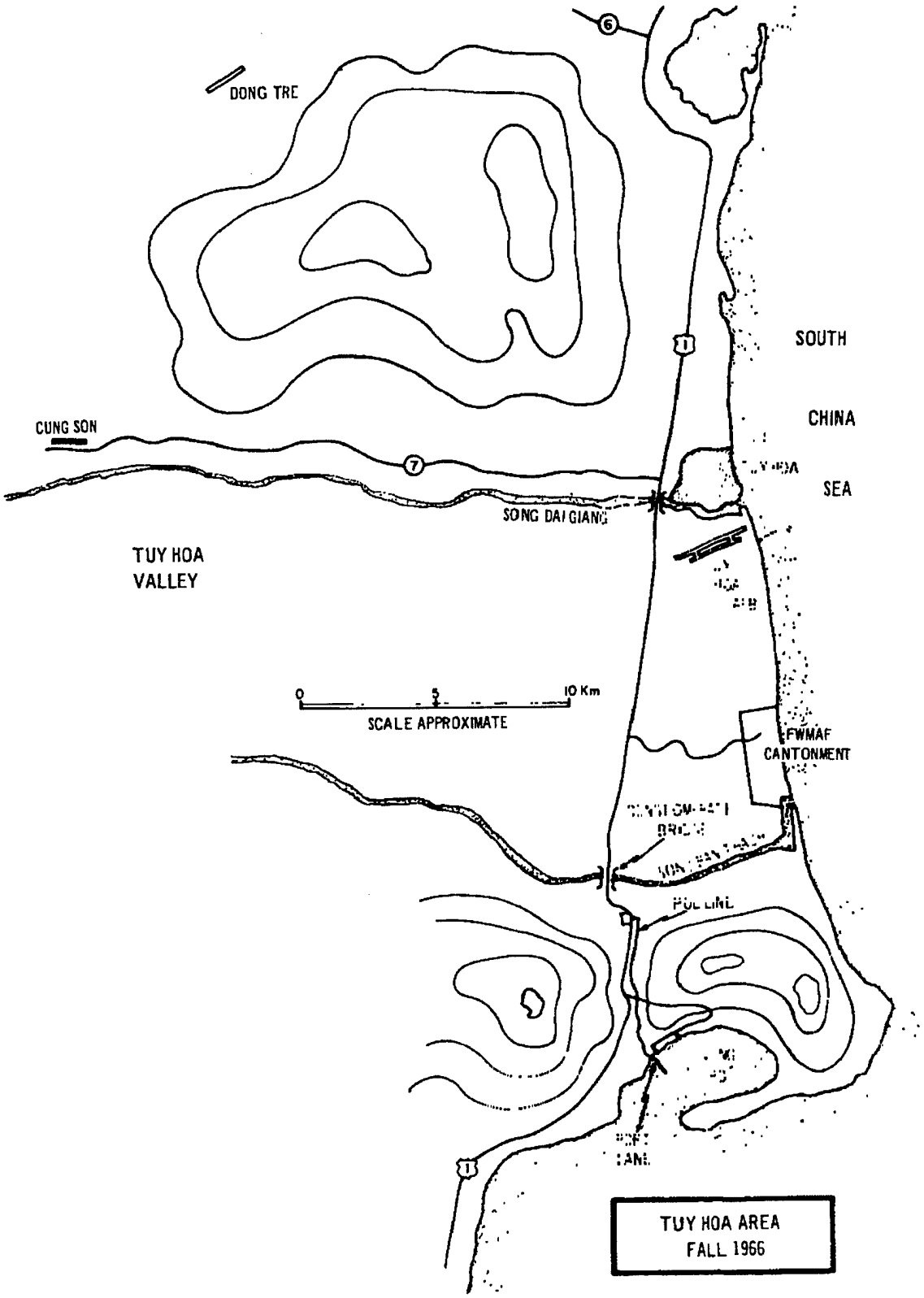
DONG TRE
CUNG SON
SOUTH
CHINA
SEA
SONG DAI GIANG
TUY HOA
VALLEY
0
5
10 Km
SCALE APPROXIMATE
FWMAF
CANTONMENT
TUY HOA AREA
FALL 1966

FIGURE 30.

Military Assistance Forces (FWMAF) cantonment to house a regiment of the 9th ROK Division, the 1st Brigade, 4th Infantry, an aviation battalion and a Tuy Hoa logistics subarea command.

The transposition of the port construction and direct support missions from their usual order signified the importance attached to the Vung Ro facility. During the winter (Northeast) monsoon, heavy seas would halt any over the shore operations at Tuy Hoa and the U.S. forces in the area would be dependent on Vung Ro as a key link in their logistics lifeline. To support this mission, on 23 July the 1st Brigade, 101st Airborne, initiated Operation JOHN PAUL JONES by securing the Vung Ro area.[25]

On 25 July, a 39th Battalion Task Force landed by LST at Vung Ro and began construction operations. In the following 60 days, the task force carved, with 180,000 pounds of explosive, a 9,000 square yard hardstand and an 8,100' two lane road into the side of a mountain, built two concrete LST ramps, 9,000' of six inch POL line from the bay inland, and, with elements of the 497th Port Construction Company, installed a Navy cube barge off-loading pier and a submarine POL discharge system (Figure 31). The port, the first of its kind in Vietnam became operational on 25 September. On 16 October it was designated Port Lane, in honor of the commander of the 39th who had been killed in an aerial reconnaissance of the Vung Ro area.[26]

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[25]COL John J. Sawbridge, "They Built A Port to Beat the Weather," Army Digest, 22 (September 1967), 44-46.

[26]For its part in the construction of Port Lane, A Company, 39th Engineers, was designated by the Society of American Military Engineer as the outstanding engineer unit of 1966.

FIGURE 31. PORT LANE, VUNG RO
Road to QL 1 Appears in Background.

To support the initial phases of JOHN PAUL JONES, elements of the 39th joined the 1st Brigade in opening QL 1 from Tuy Hoa to Vung Ro by installing a 110' DS Bailey bridge and an 800' M4T6 class 60 conglomerate bridge along this route.[27] Other forces of the battalion concurrently began work on the standard 2 FWMAF cantonment and constructed a 64 minipad heliport for aviation units supporting the 1st Brigade. In this latter operation, 24' x 24' PSP pads were placed directly on peneprime treated sand, providing in a minimum time, maximum protection for the helicopters from sand and dust.[28]

From September through mid-November, the 39th continued efforts in the Tuy Hoa area, upgrading Port Lane, building roads in the FWMAF area and providing support to the 1st/101st and the 1st/4th in tactical operations to the north and west. As part of one 101st operation in the Tuy Hoa Valley, B Company began extension and T-17 surfacing of an existing CV-? airfield at Cung Son.[29]

The 577th Engineer Battalion (Construction) joined 45th Group at Cam Ranh Bay on its arrival on 31 July from Fort Benning, Georgia. C Company of the 577th was detached from the battalion enroute and transferred to the 46th Engineer Battalion at Long Binh.[30]

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[27] LTC Taylor R. Fulton, "Conglomerate Tactical Bridging," Military Engineer, 59 (September-October 1967), 323-325.

[28] LTC George M. Bush, "Minipads for Heliports," Military Engineer, 59 (May-June 1967), 167.

[29] U.S., Department of the Army, "ORLL 1 May 1966 to 31 July 1966," 14 August 1966 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1966," 15 November 1966, 39th Engineer Battalion, Section 1.

[30] The ships carrying the 577th's equipment were late arriving in Vietnam. D Company did not receive its equipment until early September.

The 577th assumed responsibility from the 20th for construction at the Dong Ba Thin complex and began around the clock operations.

Operations in the Dong Ba Thin area were expanded when B Company began construction of a standard 2 regimental base for the 9th ROK Division.

In mid-August D Company shifted to the ROK base at Nha Trang (north), where in six weeks it constructed, for beneficial occupancy, a 400 bed evacuation hospital. On 3 October, D Company was pulled back to Cam Ranh Peninsula and given until 1 November to complete six, two story 20' x 100' billets and one half of a 1500 man mess hall for an inbound replacement processing battalion. With the assistance of two companies of the 14th which arrived in late October, this initial phase of the project was completed on time.

On 6 November, the 577th was alerted for movement to Tuy Hoa and between 13 and 19 November the battalion displaced by vehicle and, in the case of oversize equipment, by ship to this new area. Responsibility for Dong Ba Thin and the ROK areas shifted to the 14th Combat Battalion.[31]

The 14th Combat Battalion arrived in Vietnam from Fort Bragg, North Carolina on 21 and 25 October. The battalion headquarters, B and D Companies landed at Port Lane and moved to Tuy Hoa where they began emergency road maintenance. A and C Companies were off loaded at Cam Ranh Bay and were committed to assist the 577th at the Replacement

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[31]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 577th Engineer Battalion, 31 October 1966, Section 1.

Depot. The ship carrying the majority of the 14th's equipment was delayed enroute and did not arrive until December.

Requirements for heavy construction equipment at Tuy Hoa and a combat engineer battalion for 35th Engineer Group precipitated a switch of the 14th and 577th. Between 13 and 19 November, the 14th Battalion (-) joined A and C Companies in the Cam Ranh Bay area.[32]

The missions assigned to 45th Engineer Group and the geographic locations of its projects required great mobility for the subordinate units of the group and provided them with difficult logistics and command and control problems. While a combat battalion is theoretically 100 per cent mobile, augmentation, accumulated station type property and on hand supplies severely detract from this mobility. A construction battalion is only 87 per cent mobile at best and any moves by this type unit require extraordinary planning.[33]

A lack of aviation support drastically limited the control capability of the group staff and the battalion commanders. Satellited on the 35th Group aviation assets of two UH-1B, one U-1A and one O-1, 45th Group was not able to provide transportation for the battalion commanders and their staffs for visits to units near the battalion base, much less to units at such isolated and distant locations as Ban Me Thuot, Nhon Co and Phu Tuc. Under these circumstances the initiative of the junior leader took on increased significance.

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[32]U.S., Department of the Army, "Operational Report-Lessons Learned for Quarterly Period Ending 31 January 1967," 14th Engineer Battalion, 9 February 1967, Section 1. (FOUO.)

[33]See Appendix D.

The opening of the Tuy Hoa area provided major logistical headaches. Since QL 1 from Nha Trang to Tuy Hoa was not opened for regular use until November, all supplies for Tuy Hoa had to be brought in by sea.[34] The limited intercoastal shipping initially was able to provide only ammunition and rations with construction materials given a "space available" position. Under these circumstances vertical construction was almost nonexistent. The opening of Port Lane and a concurrent campaign by the group commander, brought deep-draft vessels carrying construction materials into the new port and by November, the bleak logistics picture had begun to change for the better.[35]

Repair parts were also a problem for these rapidly moving units. Since direct support maintenance was on an area basis, the battalions frequently left one area just as the previously requisitioned supplies arrived. It took weeks for the parts to finally catch up with a relocated unit.

## Cam Ranh Bay - Phan Rang

With the transfer of the 20th and 39th Battalions to 45th Group, activity within the 35th Construction Group was focused on Cam Ranh Bay, Nha Trang and Phan Rang. Work at the Cam Ranh Depot was accelerated to keep pace with the troop buildup and this speed up caused similar activity throughout the southern end of the peninsula. At Phan Rang work progressed on the air force base and the 101st Airborne's cantonment. At Nha Trang the effort was shifted from the logistics base to

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[34] At one point, even rock was barged from Cam Ranh Bay to Tuy Hoa.

[35] ORLL, 45th Group, November 1966.

construction of air defense facilities on nearby Hon Tre Island. The 35th also moved into the combat support field with construction of the airfield at Bao Loc, the rehabilitation of another field at Dalat and direct support of the 1st Cavalry at Phan Thiet. (Figure 32.)

At Cam Ranh, an additional DeLong Pier (#3) arrived in the late fall to add to the port capacity and was sited to the south of the AID pier and DeLong #1. North of the main port, DeLong also began installation of a 600' ammunition pier to provide safer and more direct handling of incoming ammunition. The 497th Port Construction Company continued its activity at the port, emplacing a sheet pile bulkhead between the AID and DeLong piers.[36]

The 87th Construction Battalion placed major effort during the period on construction of causeways to connect the new DeLong piers with the shoreline. In July, the battalion built a 600' causeway to DeLong #2, and, following this, constructed with RMK a 3600' long causeway to the DeLong ammunition pier. For the latter causeway, over 27,000 CY of sand, 6,000 CY of blast rock and 15,000 CY of laterite were placed on 11,000 CY of hydraulic fill. On 25 October, the 87th began construction of a 830' causeway to DeLong #3.

In addition to continuing construction of the Cam Ranh cantonment under the self-help program and working with RMK on a 200,000 BBL POL storage area, the 87th resumed work in late September on Cam Ranh Army Airfield (CRAAF). The battalion, as part of a USARV test program, was given two weeks to complete the runway base and to surface it with

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[36]Interview with LTC M. D. Remus, S3, 35th Engineer Group, 1966-67, Fort Leavenworth, Kansas, March 15-30, 1968.

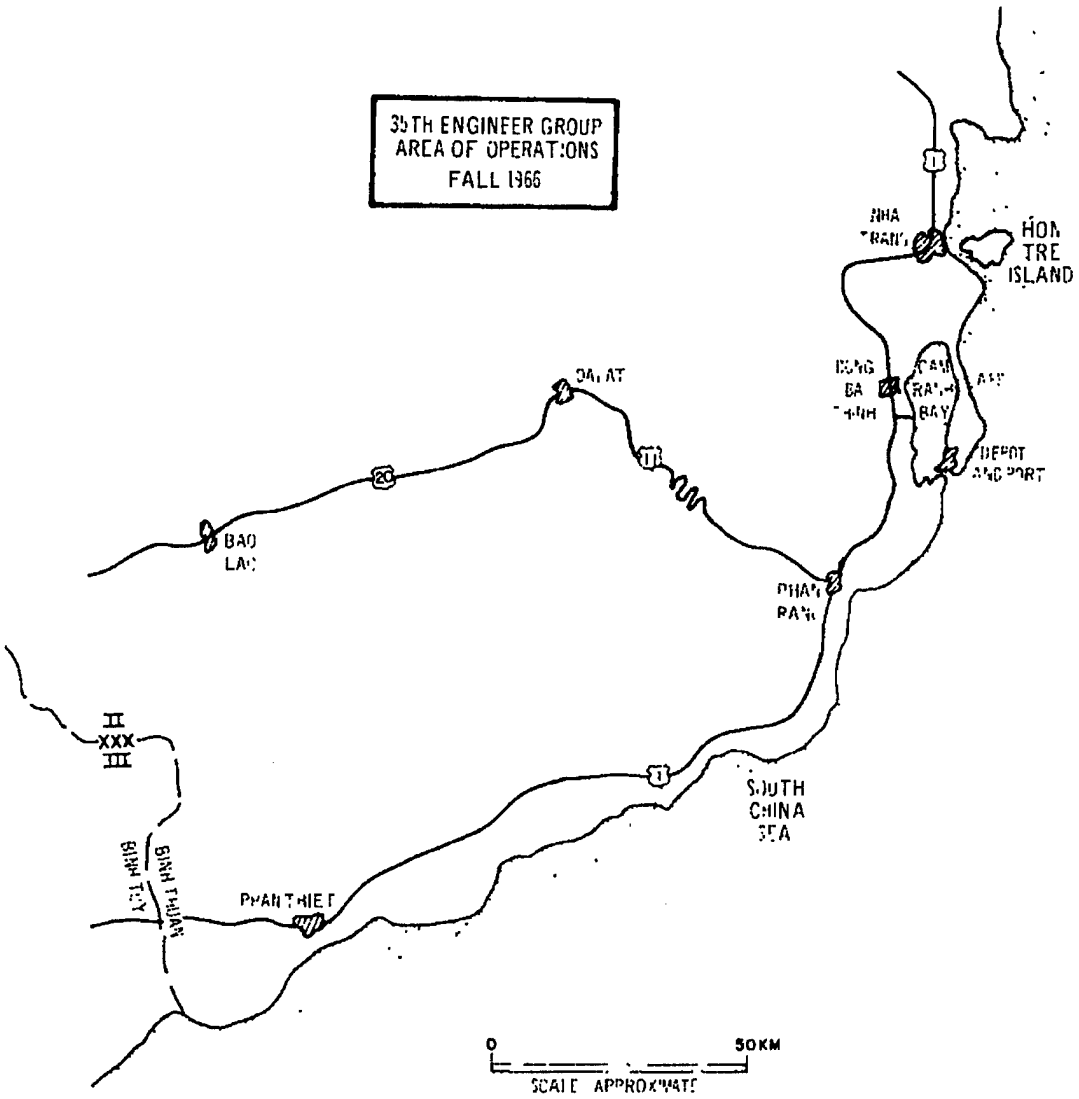
35TH ENGINEER GROUP
AREA OF OPERATIONS
FALL 1966
NHA TRANG
HON TRE ISLAND
DALAT
BAO LOC
CAM RANH BAY
DEPOT AND PORT
PHAN RANG
SOUTH CHINA SEA
PHAN THIET
BINH TUY
BINH THUAN
0
50KM
SCALE APPROXIMATE

FIGURE 37.

M8A1 solid steel plank (SSP), a new matting being introduced into the theater. On 11 October, the Air Force landed a C-130 on the 2900' runway and CRAAF was in operation.[37]

To support the operation of a battalion of the 1st Cavalry Division, the 87th sent a task force to Phan Thiet on 11 September. In this area the force repaired and maintained an existing airfield, constructed landing ship anchorages and improved the base facilities for the tactical units involved.[38]

The 864th Construction Battalion divided its attention between the Cam Ranh Depot, Nha Trang and Hon Tre Island. Vertical effort was concentrated on improvement of depot drainage facilities, placement of expedient surfacing for storage areas, construction of refrigerated storage facilities and completion of the ADP facility. The battalion operated outside the depot to provide prefabricated components for the cantonment construction program and to continue its road paving and road maintenance missions.

At Hon Tre Island, the 864th was assigned the mission of constructing a 14,500' single lane road to the crest of the mountain that dominated the island and, at the top of the mountain, clearing an area for use by the new tenants. By November, with the assistance of dozers

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[37]COL W. L. Starnes, "Cam Ranh Army Airfield," Military Engineer, 59 (September-October 1967), 358-359. M8A1 is essentially PSP without holes.

[38]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 87th Engineer Battalion, 14 November 1966, Section 1.

from all battalions in the area, the 864th had moved 212,000 CY of earth and had carved 5760' of roadway into the mountain.[39]

The 62d Construction Battalion applied the major concentration of its effort at Phan Rang. Between June and November, the battalion essentially completed construction of all elements of the Phan Rang Expeditionary Airfield project, with the most significant feature being the completion of the one million SF AM-2 surfaced parking apron for tactical fighter aircraft (Figure 33). Construction of a 56,000 BBL POL storage area was completed and connected to the previously finished six inch line to the beach. At the beach, two eight inch submarine POL lines were installed from the shore out 1200' to a discharge and mooring facility, and work began on two LST ramps and a new road back to the air base.

The 62d, during this same period, upgraded the 9700 man 101st Airborne cantonment from standard 2 to standard 3 and began construction of standard 4 billets.[40]

In support of tactical operations, the 62d in September resumed work on the Bao Lac C-130 field and by mid-November was ready to begin placement of T-17 surfacing. The battalion also deployed a force to Dalat where it assumed the mission of airfield maintenance.[41]

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[39]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 864th Engineer Battalion, 14 November 1966, Section 1.

[40]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 62d Engineer Battalion, 31 October 1966, Section 1. (CONFIDENTIAL.)

[41]Remus interview.

FIGURE 33. PEASE RANG AIR FORCE BASE
AM-2 Runway is Dark Landing Area in Right Center.

Located at and near II Corps' principal logistics base, the units of 35th Group did not experience a significant problem with availability of construction materials. With the exception of the 62d, which was required to haul the bulk of its construction materials in organic vehicles, transportation was not a major problem either. The group did experience the brigade-wide shortages of certain construction supplies, high use repair parts and end items, but construction operations generally progressed smoothly. Lack of adequate aviation support became more significant to the group when it deployed forces to the isolated areas of Bao Lac, Phan Thiet and Dalat.

## Long Binh - Vung Tau

The July arrival of the 79th Group and the subsequent transfer of the 168th and 588th Battalions to the 79th significantly reduced the area of operations of the 159th Construction Group. Essentially, the 159th operated at Vung Tau and Long Binh, although the group retained general responsibility for southern half of the IIFFV area. Long Binh continued to grow in importance as operation MOOSE (Move out of Saigon Expeditiously) sent increasing numbers to the area and the troop population supported by the depot grew larger. Long Binh also became a major staging area for incoming units while Vung Tau handled an ever larger share of inbound supplies.

The 169th Engineer Construction Battalion closed into Long Binh from its station on Okinawa on 30 May and became an integral part of the construction team in the area. Between May and November, the battalion built the Long Binh stockade and Long Binh post headquarters, cleared acre after acre for storage area, operated a prefabrication

shop for the troop housing construction program, erected a batch unit for the Long Binh asphalt plant and initiated construction of the 24th Evacuation Hospital. South of Long Binh, on the Dong Nai River, the 169th during the fall erected a barge unloading facility by driving a pile bulkhead wall and filling behind it with blast rock and laterite.[42]

During August and September, the 169th provided support to the incoming 11th Armored Cavalry Regiment (ACR) in the establishment of a brigade-size staging area at Long Binh.[43]

The 46th Construction Battalion, strengthened by the attachment of C Company, 577th Engineers, continued its focus on Long Binh and Vung Tau. At Long Binh, the 46th completed construction of the Replacement Center, the IIFFV Headquarters complex, and maintained progress at the ASP. During the summer, the battalion expanded the barge off-loading point on the Song Dong Nai south of Long Binh, doubling the capacity of the facility.

D Company and the 536th Detachment, operating at Vung Tau, continued to support the U.S. and Australian base construction program and the expansion of the port.[44] In the fall, the battalion organized a task force, composed of D Company, the 536th, the quarry detachment of the 103d Construction Support Company and the bulk of the 46th's

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[42]During the late fall part of the bulkhead failed. Failure was attributed to soil conditions and monsoon rains.

[43]U.S., Department of the Army, "ORLL for period 1 May 1966 to 31 July 1966," 1 August 1966 (FOUO), and "ORLL for Period 1 August 1966 to 31 October 1966," 1 November 1966, 169th Engineer Battalion, Section 1.

[44]During this period the 536th also rehabilitated 24 Army barges for the 4th Terminal Command.

haul capability, to begin rehabilitation of Vung Tau airfield and construction of a causeway for a DeLong pier, due at Vung Tau in December.

The 46th expanded its operations to the Saigon area in September when C Company was assigned the mission of constructing facilities for the 34th Aviation Maintenance Group. This project, at Tan Son Nhut airfield, required construction of taxiways, parking areas and supply storage areas for the maintenance unit.[45]

On 20 October, the 15th Engineer Battalion, 9th Infantry Division, arrived in Vietnam from Fort Riley, Kansas, as an advance element of the division and was placed by USARV under the operational control of the 159th Group. The 15th deployed to Long Thanh and began expansion of that area to accommodate the inbound division.[46]

Although, combat support activities of the 159th Group were limited, the group was called upon to assist the movement of the arriving 3d Brigade, 4th Division, from Vung Tau to Long Thanh and to provide, on a mission basis, support for the 25th Division on Operation LANIKAI in the northern Mekong Delta.

Throughout the summer and early fall, rain was the principal problem faced by the 159th. Horizontal construction at Long Binh was slowed by the mire created by the monsoon; however, by careful scheduling of work, the construction units were able to maintain a relatively

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[45]U.S., Department of the Army, "ORLL for Period 1 May 1966 to 31 July 1966," 11 August 1966 (FOUO), and "ORLL for Period 1 July 1966 to 31 October 1966," 14 November 1966, 46th Engineer Battalion, Section 1.

[46]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 159th Engineer Group, 8 November 1966, Section 1.

efficient rate in the vertical field. The importance of drainage could never be overstressed.[47]

## Northern III Corps

Headquarters, 79th Engineer Group (Construction) was organized at Fort Lewis, Washington, in February 1966 and deployed to Vietnam in July. On 20 July, the headquarters was assigned responsibility by 18th Brigade for nondivisional engineer activities in the northern portion of III Corps (Figure 34) and received attachment of the 168th and 588th Combat Battalions and the 362d and 577th Light Equipment Companies. The strength of 79th Group was further increased by the arrival in September of the 27th Combat Battalion and in October of the 86th Combat Battalion. From July to November the group served in the dual role of a combat and a construction group by assisting base development activities of the 1st and 25th Divisions, the 196th Brigade and the 11th Armored Cavalry Regiment, and concurrently providing engineer direct combat support for these same units.[48]

Construction at the 1st Division bases at Di An, Phuoc Vinh, Phu Loi and Lai Khe occupied the principal efforts of the 168th Combat Battalion from June through October. In late October, responsibility for Lai Khe and Phu Loi was shifted to the 86th Engineers and the 168th shifted its main effort to Di An.

In early June, to centralize control of companies operating in a given division area, 159th Group redesignated C Company, 168th,

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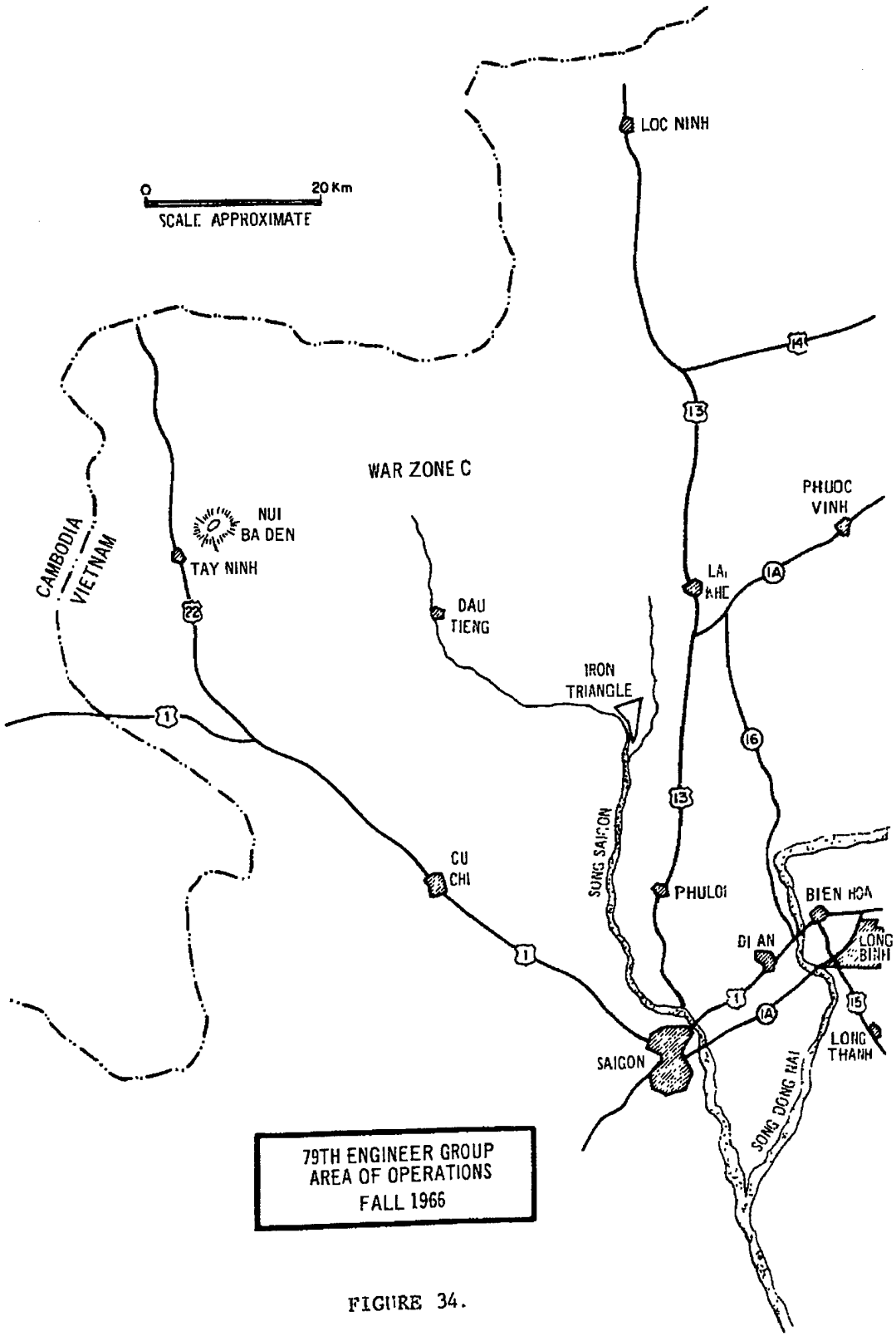
[47] Ibid.

[48] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 79th Engineer Group, 14 November 1966, Section 1.


LOC NINH
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CHI
PHUOC
VINH
LAI
KHE
SONG SAIGON
PHULOI
BIEN HOA
DI AN
LONG
BINH
SAIGON
LONG
THANH
SONG DONG NAI
79TH ENGINEER GROUP
AREA OF OPERATIONS
FALL 1966

FIGURE 34.

at Long Binh as B, 588th Engineers, and B, 588th, at Phuoc Vinh, as C, 168th.

Base development activities of the 168th during the period, included tropical billet construction at the brigade bases and erection of billets, warehouses and hangars at Phu Loi and Di An. In September, in reaction to the programmed October move of the 2d Brigade, 1st Division, to Di An, the 168th initiated construction of a base for the brigade on the northern side of the existing division camp. This construction was accelerated in October by the shift of A and B Companies to Di An, following their relief by the 86th.

In the combat support area, the 168th spent considerable time in maintaining the airfields at Lai Khe and Phu Loi. During the monsoon season the battalion fought rutting and subgrade failures on the runways with rock, and, in the dry season, the massive dust clouds that followed the aircraft, with peneprime. At Di An, the battalion headquarters was also tasked by the 1st Division to provide elements of the division base security force and, as part of this force to conduct patrols in the Di An area.[49]

The 588th Combat Battalion began the period with Headquarters and A Companies in support of the 25th Division base development program at Cu Chi, B Company (former C, 168) at Long Binh, and C Company at Long Thanh. On 20 June, B Company moved from Long Binh to Cu Chi and joined the parent battalion in work in that area.

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[49]U.S., Department of the Army, "ORLL for Period Beginning 1 May 1966," 14 August 1966, and "ORLL for Quarterly Period Ending 31 October 1966," 12 November 1966, 168th Engineer Battalion, Section 1.

On 2 August, the 588th was assigned the mission of constructing a base camp at Tay Ninh for the 196th Light Infantry Brigade which would arrive in mid-month. B Company moved to Tay Ninh on 3 August and began the development of this new area.[50] On 22 August, C Company was shifted from Long Thanh to Cu Chi to construct a 400 bed evacuation hospital for the 25th Division. Eight weeks later, C Company, well along on the evacuation hospital, sent a platoon to Tay Ninh to construct Vietnam's first Medical Unit, Surgical, Transportable (MUST), a modern Army hospital operating in inflatable, rubberized buildings. (Figure 35.)

To support IIFFV tactical units in the field, the 588th deployed platoons to maintain the airfield at Dau Tieng, to improve the Special Forces camp at Loc Ninh and to keep Highway 1 and other critical routes open to continuous traffic. Near the Cu Chi base, the battalion cleared 450 acres of jungle that had offered the Viet Cong a potential assembly area.

As the 18th Brigade's tunnel destruction force, the 588th sent teams to the Vung Tau area to support the Australians and to Tuy Hoa to assist the 1st Brigade, 101st Airborne. Three hundred meters of tunnels were destroyed in the Australian area; however, at Tuy Hoa, the rocky nature of the mountains seriously dampened the effectiveness of the acetylene system.[51]

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[50]The first work at Tay Ninh was accomplished by the 65th Engineers.

[51]U.S., Department of the Army, "ORLL for Period 1 May 1966 to 31 July 1966," 15 August 1966, and "ORLL for Quarterly Period Ending 31 October 1966," 14 November 1966, 588th Engineer Battalion, Section 1. (FOUO.)

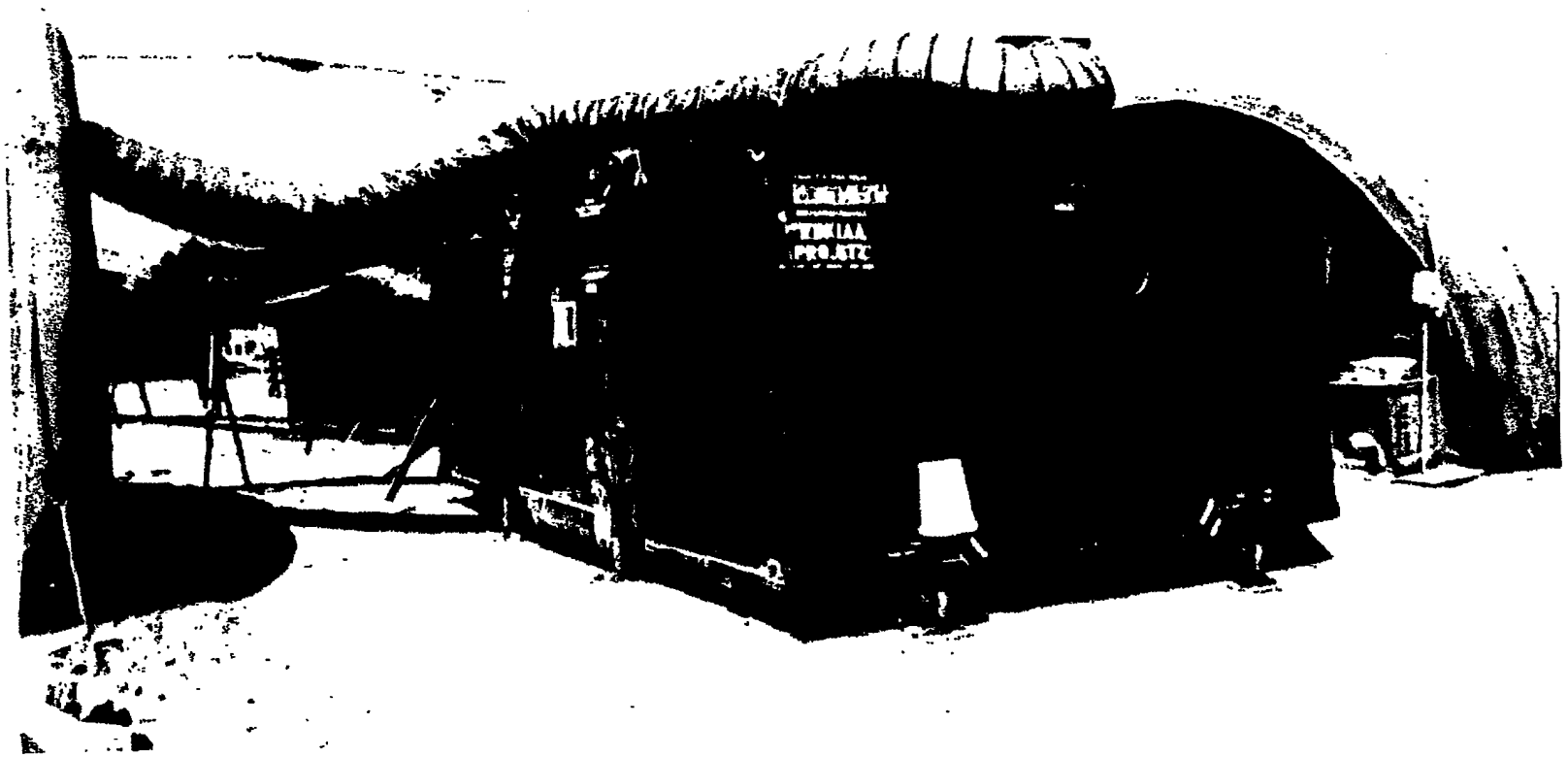

FIGURE 35. MIST INFLATABLE BUILDINGS

The 27th Combat Battalion arrived at Vung Tau from Fort Campbell, Kentucky, on 30 September 1966 and was moved immediately to Long Binh for staging.[52] October was spent in deprocessing equipment, on the job construction orientation at Long Binh (B Company assisted the 168th at Di An) and in establishing a base camp near Xuan Loc. By 15 November, the battalion (less D Company) had closed into Xuan Loc and, assisted by the 919th Armored Engineer Company, had initiated construction of a permanent base for the 11th ACR. D Company was detached from the 27th on 7 November and attached to the 3d Brigade, 4th Division.[53]

The 86th Combat Battalion from Fort Dix, New Jersey, arrived at Vung Tau on 17 October, aboard the USNS Weigle.[54] On landing, the companies were flown directly to their final destination: Headquarters and A to Phu Loi, B to Cu Chi, C to Lai Khe and D to Bien Hoa. B Company was attached to the 588th Engineers on arrival at Cu Chi. Headquarters, A and C Companies relieved elements of the 588th of their missions at Phu Loi and Lai Khe. D Company, at Bien Hoa, was assigned several new projects at the airfield and in the Army cantonment area.[55]

During the summer, the 79th Group gave the Army its first combat tests of a new jungle clearing device, the Rome Plow. Actually the device is the Rome K/G clearing blade which is designed for mounting

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[52]The 27th was organized under the "E" series TOE.

[53]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1966," 27th Engineer Battalion, 31 October 1966, Section 1.

[54]The 86th was also organized under the "E" series TOE.

[55]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 86th Engineer Battalion, 14 February 1967, Section 1. (FOUO.)

or medium dozers. The K/G clearing blade differs from the standard bull blade by having a sharp cutting edge along the bottom of the blade and a lance-like projection, called a stinger, on the lower left corner (Figure 26).

When the Rome Plows were received in the country in August, the 159th Group conducted initial orientation training for the brigade and began limited clearing operations in relatively secure areas at Long Binh. In mid-August, the 79th was given the mission of clearing an area near Cu Chi and assigned this task to the 588th Battalion for accomplishment by Rome Plow.

Four Rome Plows were used during an 11 day period for clearing dense jungle. On the 10th day of operation, however, three dozers hit mines and were severely damaged, putting an end to the initial field test.

The operations of the 159th and the 79th indicated that the Rome Plows could clear the jungle twice as fast as the standard bulldozer. The tests also indicated that the plows were most efficient when operating in four-dozer teams. Based on this, the 79th organized its four plows into a land clearing team and attached this team to the 557th Light Equipment Company. The group also recommended to brigade (and brigade to USARV) that additional Rome Plow land clearing teams be formed. The brigade took independent action to immediately obtain additional blades from CONUS.[56] [57]

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[56] ORLL, 79th Group.

[57] During the spring, the 8th Engineers had tested, without success, a clearing blade similar to the Rome Plow.

FIGURE 36. THE ROME PLOW
Point of "Stinger" Appears on Right Side of Tree.

The 79th Group deployed to Vietnam without its TOE aviation section and on arrival was satellited on the brigade for aviation support. With units in seven major areas, the effect of this lack of aviation on the mobility of commanders, especially at battalion and company level was obvious. They were unable to visit their units as often as they could or should have.

While materials were available, the previously discussed lack of haul and secure MSRs severely restricted the activity at the more remote areas (Phouc Vinh, Lai Khe and Tay Ninh). Even in the areas closer to Long Binh, the requirement to use organic transportation to haul supplies detracted from the construction capability of the group. In this same transportation area, a general lack of rock required full time use of most dump trucks for rock haul. In an effort to reduce this, the group attempted to locate crushers and quarries near the construction sites, but this often required the commitment of tactical forces on a permanent basis to secure the area.

The 79th's problems with the summer monsoon were the same as those experienced by the 159th. By the end of the season, all skeptics had been made believers in the devastating effects of the rain and the importance of drainage.

Each move, detachment or attachment of a company within the group caused a certain amount of administrative and operational turmoil. Time was lost during each move and new SOPs and relationships had to be learned following each unit shift. While attempting to maintain unit integrity, the 79th learned the necessity of the mission dictating the organization and location of units.

## Brigade and Division Engineers

The rolls of the division/brigade engineers were swelled by the arrival of the 4th Engineer Battalion, 4th Infantry Division, in late July and the 175th Engineer Company, 196th Light Infantry Brigade, and the 919th Armored Engineer Company, 11th Armored Cavalry Regiment, in August. As previously mentioned, the 15th Engineer Battalion, 9th Division, arrived in October and was placed by USARV under the operational control of 18th Brigade.

The activities of these battalions and companies continued to be a mix of base development and direct support of committed tactical forces. As before, the engineers were also called upon to provide their own security for many projects and, in several cases, to reorganize as infantry.

In the IFFV area of responsibility the 8th Engineer Battalion, A Company, 326th Engineers, and D Company, 65th Engineers, were joined by the 4th Engineers. The focus of the 8th, A/326th and D/65th remained with direct support missions. The 8th Engineers kept company size forces with brigades committed in both the highlands and along the coast. For operations THAYER and IRVING, the 8th in September moved the battalion command post to LZ Hammond north of Qui Nhon where it controlled battalion elements clearing LZs, sweeping the roads and providing tunnel destruction teams, and coordinated the activities of the 937th Group in support of the cavalry.[58]

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[58]U.S., Department of the Army, "Combat After Action Report, Operation THAYER I," 29 October 1966, and, "Combat After Action Report, Operation IRVING," 7 November 1966, 8th Engineer Battalion.

The 4th Engineer Battalion (less E Company) arrived at Qui Nhon from Fort Lewis, Washington, on 29 July on the USNS Walker and was flown to Dragon Mountain, the site of the 4th Division's new base.[59] Even though the battalion had been preceded by an advance party (B Company) and the battalion's equipment, the picture that greeted the battalion on its arrival was to forecast the 4th's biggest problem, mud.

By the end of July, with the help of the Southwest monsoon, the road from Pleiku to Dragon mountain had become a "30 lane expressway" with each vehicle that travelled the road choosing its own path. Movement within the base camp could only be accomplished by or with the assistance of tracked vehicles. From its arrival until the end of the monsoon in October, the 4th concentrated on drainage, roads and basic site layout for the division base. In September, some vertical construction was started in the division headquarters area, but the focus remained on the ground.

In September, A Company moved to Tuy Hoa to support 1st Brigade, 4th Division, operations in that area and to assume base development responsibilities for the brigade's camp.

On 18 October the 4th Division assumed responsibility for operations in the highlands and put the 2d Brigade in action. The 4th Engineers were charged, as part of an initial move, with constructing a 12 mile pioneer road into the jungle near the Se San River. B and E Companies, in three weeks, hacked this road out of the jungle and in the process placed four AVLBs and two M4 dry gap spans. At the same time, in the Tuy Hoa area, A Company, supported by elements of E Company

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[59] E Company closed at Dragon Mountain on 30 September.

and the 554th Company (45th Group) assisted 1st Brigade operations north of Tuy Hoa with the installation of 290' of M4T6 dry gap bridging in one seven day period.

Throughout this initial three month period the 4th kept the majority of its effort on Dragon Mountain and by mid-November this work, together with that of the 20th Battalion which arrived in October, had transformed the red mud of the highlands into a well drained and slowly growing city for the Ivy Division.[60]

In IIFFV, the 1st and 65th Engineer Battalions, together with the 173d Company, provided the brigade/division engineer support during the summer of 1966. The late summer and fall arrival of the 175th and 919th Companies changed this picture only slightly.

The 1st Engineer Battalion continued its division of effort between base development and combat support with the fall shift of the 2d Brigade from Long Thanh to Di An adding much to the former. As in the spring, the battalion again found itself keeping open the critical MSRs, clearing LZs and committed as infantry. Route 16, the artery between Di An and Phouc Vinh, required a great deal of engineer effort including construction of two 90' TS Baileys. During Operation AMARILLO, when the infantry was diverted from its mission of securing Route 16, the 1st spent three days reorganized as infantry, protecting the highway and killing several VC.[61]

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[60] U.S., Department of the Army, "Annual Historical Supplement," 4th Engineer Battalion, 1 January 1966-30 June 1967, Chapters 2-5.

[61] U.S., Department of the Army, "Unit Historical Report for Calendar Year 1966," 1st Engineer Battalion, 21 March 1967.

From June to November the 65th maintained a one to two company effort on development of the Cu Chi base, while continuing its combat support of the 25th Division's two brigades. In July, A Company was deployed to Tay Ninh to begin development of a base for the 196th Brigade, adding to the construction commitment of the 65th.

Prior to the arrival of the summer monsoon, the 65th faced problems with water supply for the division, finding that all rivers and creeks that were large enough were difficult to secure. To circumvent this, the battalion dug dozer-width trenches 20' deep within the base camp perimeter and deepened these trenches with a clamshell. Since the ground water table in the area was in the 20' to 30' range, the battalion soon had several very adequate wells to support the division.[62]

The 173d Engineer Company, like the 1st and 65th continued also to split its effort, keeping, on the average, a reinforced platoon in the base camp. The Company (-) followed the 173d Brigade through the summer and fall providing a squad to each battalion and general support for the brigade (-).[63]

The 175th Engineer Company arrived on 14 August from Fort Devens, Massachusetts, with the 196th Brigade and accompanied the brigade to Tay Ninh where construction of the brigade base had been started by the 65th and 588th Engineers. While the brigade conducted its initial shakedown, the 175th went to work in the base area on priority

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[62]Interview with MAJ L. H. Savage, USA, Company Commander and S3, 65th Engineer Battalion, 1965-1967, Fort Leavenworth, 10-20 March 1968.

[63]Questionnaire returned by MAJ G. H. Lehrer, USA, Commanding Officer, 173d Engineer Company, 1966-1967, March 1968.

vertical construction and took over responsibility for the maintenance of the Tay Ninh C-130 airfield from the ARVN.[64]

The 919th Armored Engineer Company arrived in Vietnam from Fort Meade, Maryland, in mid-August with the advance party of its parent unit, the 11th Armored Cavalry. During its first two months in country, the company developed the regimental staging area at Long Binh and assisted the regiment during its September arrival. In late September and early October the focus shifted to an area south of Xuan Loc being developed by the 27th Engineers as a permanent base for the 11th.[65]

These division/brigade engineers shared many problems. Except for the 8th and A/326th Engineers, these battalions and companies kept 30 per cent to 80 per cent of their effort in the base camps on construction projects far afield from their primary mission of combat support. In this construction role, the battalions found the same materials shortages that bothered their nondivisional counterparts. The limited haul of supplies to Pleiku, Phuoc Vinh, Lai Khe and Tay Ninh held back vertical progress in these areas. And, like the nondivisional engineers, the division/brigade engineers spent much of their time up to their hips in mud. They too found the need of what in other locations would be considered an excessive number of drainage projects and structures.

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[64]U.S., Department of the Army, "Operational Report for Quarterly Period Ending 31 October 1966," 196th Light Infantry Brigade, 29 November 1966, Section 1. (CONFIDENTIAL.)

[65]U.S., Department of the Army, "ORLL," 11th Armored Cavalry Regiment, 31 October 1966, Section 1. (CONFIDENTIAL.)

CHAPTER V

A NEW WAR
(November 1966-April 1967)

## The Army on the Move

The end of 1966 and the beginning of 1967 brought no slowdown in the war in Vietnam. Infiltration from the north continued to rise and had reached 8,000 men a month by the end of 1966. Fierce fighting raged in the DMZ area of I Corps in the early months of 1967 and neither side showed signs of de-escalation. In March, the President of the United States flew to Guam where he met with key South Vietnamese government officials and U.S. military leaders. The mood of this conference indicated continuing determination and solidarity in the war effort.

In mid-December, the 9th Infantry Division and the 199th Light Infantry Brigade arrived in South Vietnam and moved to base camps in III Corps: the 9th to Long Thanh and the 199th to Long Binh. By the end of 1966 the total of U.S. forces in Vietnam had reached 400,000.[1]

In the IFFV area offensive operations continued. The 4th Division and the 3d Brigade, 25th Division, were joined by the 1st Brigade, 101st Airborne, in search and destroy operations along the Cambodian border. PICKETT, PAUL REVERE, SAM HOUSTON and FRANCIS MARION carved swaths through the jungles of Pleiku and Kontum provinces and spoiled

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[1]Associated Press, What YOU Should Know About VIETNAM, (Associated Press, 1967), pp. 13-15.

Viet Cong hopes of a winter offensive in the highlands. Along the coast, the 1st Cavalry concluded Operation THAYER and began Operation PERSHING in Binh Dinh. In the first months of 1967, the 101st shifted from Kontum to Khanh Hoa, Binh Thuan and Darlac for Operations SUMMERALL and FARRAGUT.

The arrival of the 9th Division and the 199th Brigade substantially upped the combat power of IIFFV. Following a November operation in Zone C (ATTLEBORO), IIFFV began in January a major U.S. operation, when it sent the 1st and 25th Divisions, the 196th Brigade, and elements of the 9th and 4th Divisions into the "Iron Triangle" north of Saigon for Operation CEDAR FALLS. The success of CEDAR FALLS led quickly into a larger operation by essentially the same forces in Zone C on JUNCTION CITY. The number of enemy killed and the large number of caches uncovered gave evidence of the telling effect of these operations on the Viet Cong.[2]

The 9th Division and the 199th Brigade conducted their first operations near their base camps and then moved out to new areas. The 9th also began the first major U.S. effort in the Delta with brigade size Operations ENTERPRISE, PALM BEACH and CORONADO in Long An province.

## Logistics

The arrival of the 9th Division and the 199th Brigade in III Corps added to the already heavy burden of the 1st Logistical Command in the Long Binh-Vung Tau complex. Although the MSRs for these new units were short, the effect of a four brigade jump forced a speed-up

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[2] Ibid.

in the construction supporting the depots. The arrival of the 9th did push the 3d Brigade, 4th Division, from Long Thanh to Dau Tieng. This move extended the LOCs east from Tay Ninh and added to the problems of resupply.

In the north, the logistical emphasis continued to rest with building a base at Pleiku and completing the effort in Tuy Hoa, Qui Nhon and Cam Ranh. The move of the 1st Cavalry into northern Binh Dinh added to the heavy load on the MSR from Qui Nhon to Bong Son and operations in the highlands kept Highway 19 to Pleiku loaded with resupply convoys. Operations off the MSRs and the monsoon's effect on the MSRs required the frequent use of C-130 LOCs and the attendant airfield maintenance.

## Engineer Operations - General

Although the overall engineer strength in Vietnam was raised by the arrival of one combat battalion and 12 separate companies, the most significant event to occur during the mid-November-mid-April period was the establishment of the U.S. Army Engineer Command, Vietnam (Provisional) (USAECV), on 1 December 1966.

By mid-November the strength of 18th Engineer Brigade had grown to five group headquarters, 18 battalions, 21 companies, seven detachments and two separate platoons. From its Saigon headquarters, the brigade found it increasingly difficult to maintain general control over the diverse activities of engineer units operating in II Corps and a day to day working relationship with IFFV.[3]

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[3]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 18th Engineer Brigade, 24 February 1967, Section 1.

To deal with this problem, on 18 November, a task group moved to Dong Ba Thin and established 18th Brigade (North). On 1 December, with the establishment of USAECV, the 18th Brigade colors were shifted to Dong Ba Thin and the "North" headquarters was dissolved. On 20 December, USAECV moved from Tan Son Nhut to Bien Hoa.

The manpower needed to form the Engineer Command was drawn from three sources: 18th Brigade, the 921st Engineer Combat Group, and the USARV Engineer Section. The 921st Combat Group arrived in country from Fort Lewis, Washington, on 1 October 1966. It was positioned at Dong Ba Thin to serve initially as a source of manpower for the relocated 18th Engineer Brigade and then to act as the morning report carrier unit for the USAECV. The majority of the staff positions of USAECV were filled by the staff of 18th Brigade and the USARV Engineer Section, which was dissolved on formation of the command. The remaining members of the 18th Brigade moved with the unit to Dong Ba Thin.

The other members of the USARV Engineer Section joined the G3 and G4 sections of USARV.

Under the new command arrangement, USAECV directed the operations of 18th Brigade and the 79th and 159th Groups. 18th Brigade, in turn, exercised command of the 35th, 45th and 937th Groups (Figure 37). Primary coordination with IFFV was handled by 18th Brigade and with IIFFV, by USAECV. In both cases, the groups continued to deal with the field forces on an as required basis.[4] Areas of responsibility for the brigade and groups were also established, with 18th Brigade holding all

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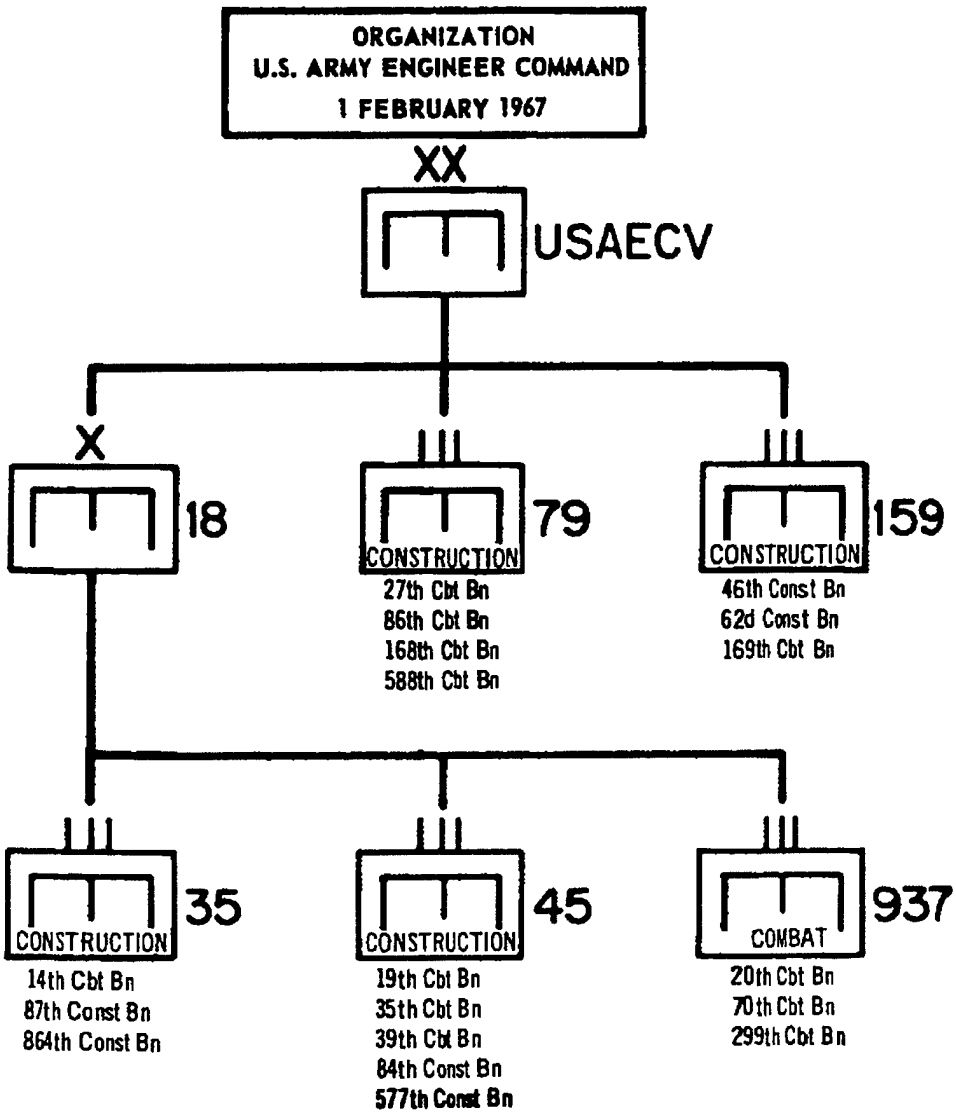
[4]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," USAECV, 31 January 1967, Section 1. (CONFIDENTIAL.)


ORGANIZATION
U.S. ARMY ENGINEER COMMAND
1 FEBRUARY 1967
XX
USAECV
X
18
CONSTRUCTION
79
27th Cbt Bn
86th Cbt Bn
168th Cbt Bn
588th Cbt Bn
CONSTRUCTION
159
46th Const Bn
62d Const Bn
169th Cbt Bn
CONSTRUCTION
35
14th Cbt Bn
87th Const Bn
864th Const Bn
CONSTRUCTION
45
19th Cbt Bn
35th Cbt Bn
39th Cbt Bn
84th Const Bn
577th Const Bn
COMBAT
937
20th Cbt Bn
70th Cbt Bn
299th Cbt Bn

of II Corps, the 159th Group, the Saigon-Long Binh-Vung Tau-Dong Tam area, and the 79th Group the remainder of the III-IV Corps area. (Figure 38.)

Shortly after the establishment of 18th Brigade (North), 18th Brigade directed each group to establish a Contract Liaison and Installation Master Planning Office (CLIMPO) to serve as an intermediary between the civilian contractor and the army users, and to offer local installation commanders sorely needed technical advice in the master planning field. The establishment of the CLIMPO was brought about by the continuing problems encountered by all construction units of less than optimum development planning and a lack of communication between the contractor and the using agency.[5]

Results in the request for conversion of the "D" series combat battalions to "E" series TOE brought four companies into the country in February. The 31st Combat Battalion at Fort Hood, Texas, was split to form the fourth line companies, D Companies, of the 20th, 39th, 299th and 588th Battalions, and deployed to Vietnam. While the arrival of these four companies did not bring with it conversion of all "D" series units to "E" series, it did mark a major step forward.

Success was not as swift in dealing with the command-wide problem of aviation shortages. The priority for both equipment and pilots remained with the combat units and no break occurred in the continuing shortages within these combat units. As a result the aviation assets

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[5]"Letter of Instructions," from 18th Brigade to 18th Brigade (N), and 79th and 159th Engineer Groups, 24 November 1966.

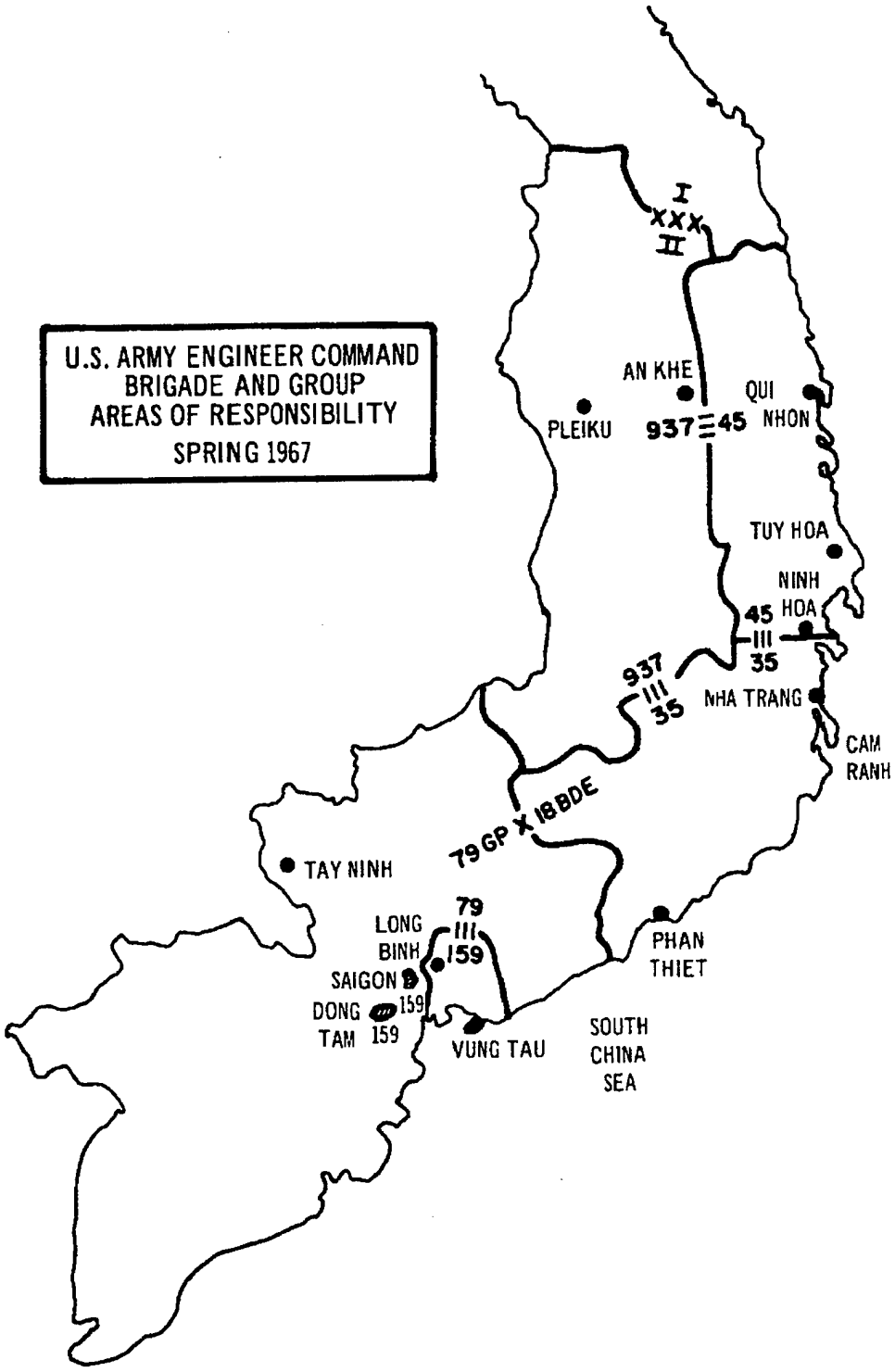
U.S. ARMY ENGINEER COMMAND
BRIGADE AND GROUP
AREAS OF RESPONSIBILITY
SPRING 1967
I
XXX
II
AN KHE
QUI
NHON
PLEIKU
937
45
TUY HOA
NINH
HOA
45
III
35
937
III
35
NHA TRANG
CAM
RANH
79 GP
X
18BDE
TAY NINH
79
III
159
LONG
BINH
SAIGON
DONG
TAM
159
159
VUNG TAU
PHAN
THIET
SOUTH
CHINA
SEA

FIGURE 38.

within the command remained small, and to battalion and company commanders aviation support was something seldom encountered.

Similarly, while the flow of construction materials increased, problems continued with certain more complex items in the electrical and plumbing areas. In certain areas, shortages were also felt in the supply of 2" x 4" and other dimensioned lumber.

And, as the engineers ended their second year in Vietnam, the inevitable paperwork began to catch up with the troop units. For some considerable period, 18th Brigade had kept the administration of the MCA construction program at brigade or higher level; however, in the spring of 1967, with a growing construction program, the load began to spread downward and both groups and battalions began to feel the effects of required cost accounting.[6]

The I Field Force Engineer continued his interest in construction of forward airfields in the II Corps area and added to this requirement the need for upgrading of the ground LOCs into the major tactical areas. Without any increase in divisional engineer strength during the period, the bulk of this work fell, by coordination and cooperation, to the nondivisional engineers.

In the II Field Force area, the Engineer continued his focus on the opening of additional routes for use by mechanized elements. At the turn of the year, however, as a result of the success of the Rome Plow and the continuing use by the Viet Cong of certain jungle sanctuaries, the efforts of both divisional and nondivisional engineers

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[6]The history of the base development in RVN is subject matter, in itself, for a thesis. Such a thesis is being prepared by Major D. M. O'Shei, USACGSC.

were shifted to massive jungle clearing operations in War Zone C and the "Iron Triangle." In addition, the entry of the 2d Brigade, 9th Division, into the Delta opened up new areas for the engineer trade.

## 18th Engineer Brigade

The shift of the 18th Brigade from Saigon to Dong Ba Thin was accompanied by a shift of boundaries within the new brigade area. Headquarters, 937th Group, moved from Qui Nhon to Pleiku and assumed responsibility for all of the highlands; Headquarters, 45th Group, moved from Tuy Hoa to Qui Nhon to take over the northern half of coastal II Corps, and the 35th Group shifted its responsibility to north of Nha Trang.

The force structure of the brigade remained at an 11 battalion level throughout the period, losing one battalion to 159th Group and gaining one from CONUS.

The focus of the 18th, in its new area, was split between combat support and construction on a 35 per cent/65 per cent basis. Combat support operations centered on building new air and ground LOCs and maintaining the ones already in existence. Construction effort was keyed to the expansion of Tuy Hoa and Pleiku and the improvement of Qui Nhon and Cam Ranh Bay.[7]

Brigade-wide problems were principally the old standbys of lack of aviation support and the weather, and equipment problems generated by the age, size, and nature of the brigade's equipment.

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[7]ORLL, 18th Brigade.

18th Brigade brought no aircraft with it from Saigon. Its arrival imposed an additional burden on the limited assets that were available to 35th and 937th Groups. The shift of the 45th Group to Tuy Hoa and then Qui Nhon required the formation of an additional aviation section and further fragmenting of the available assets.

The weather brought dust in enormous quantities to the highlands and peneprime continued to be spread under every landing helicopter. Along the coast, the Northeast monsoon inundated Phu Yen, Khan Hoa and Binh Dinh provinces and caused heavy damage; however, the presence of paved roads at Cam Ranh materially dampened these effects in the port and depot areas.

In the equipment field, the principal problem was the age of the equipment, much of which had been in service for over a year in Vietnam and for many years before that in CONUS. Breakdowns became more and more frequent. Some progress was made when new D-7E bulldozers and Clark 290 scrapers arrived to replace the older HD-16 bulldozers and 830M scrapers, but this was only helping with part of the inventory.

The size and general purpose nature of much of the equipment also created problems in an environment where air mobility was essential and sophistication of construction standards more commonplace. The brigades request for airmobile equipment was still under consideration and the civilian contractor remained the only ready source of such specialized pieces of equipment as vibratory compactors and heavy rollers.

## An Khe - Pleiku

On 10 November, the 937th Combat Group assumed responsibility for the highlands and shifted its headquarters to Pleiku. At the same time, the 937th released attachment of the 19th and 84th Battalions to the 45th Group and received, from the 45th, attachment of the 20th. The group headquarters immediately became the center of base development in this expanding area and requests for construction began to arrive. By spring a previously balanced distribution of effort between combat support and construction had shifted to a 40/60 ratio. The 937th's construction remained centered on Pleiku and An Khe, while the combat support effort followed the 4th Division, 1st Brigade, 101st Airborne, and 3d Brigade, 25th Division, into the areas along the border (Figure 39).[8]

The 20th Combat Battalion became the combat support workhorse of the group, devoting only a limited amount of its effort to construction at Dragon Mountain. During the November-April period, the 20th, reinforced by the attachment of D Company, 35th Engineers, which became, in effect, its fourth line company, built new C-130 fields at Duc Lap, Phu Tuc and Plei Djereng, rehabilitated the T-17 covered fields at Oasis, Phu Nhon and Ban Blech, carved a new road through primary jungle, with help from Rome Plows, from the Se San to Plei Trap, and continued the upgrading of Routes 19, 509 and 14B west of Pleiku, in addition to providing direct support to the 4th for SAM HOUSTON and FRANCIS MARION.

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[8]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 31 January 1967 and "ORLL for Quarterly Period Ending 30 April 1967," 30 April 1967, 937th Engineer Group, Section 1.

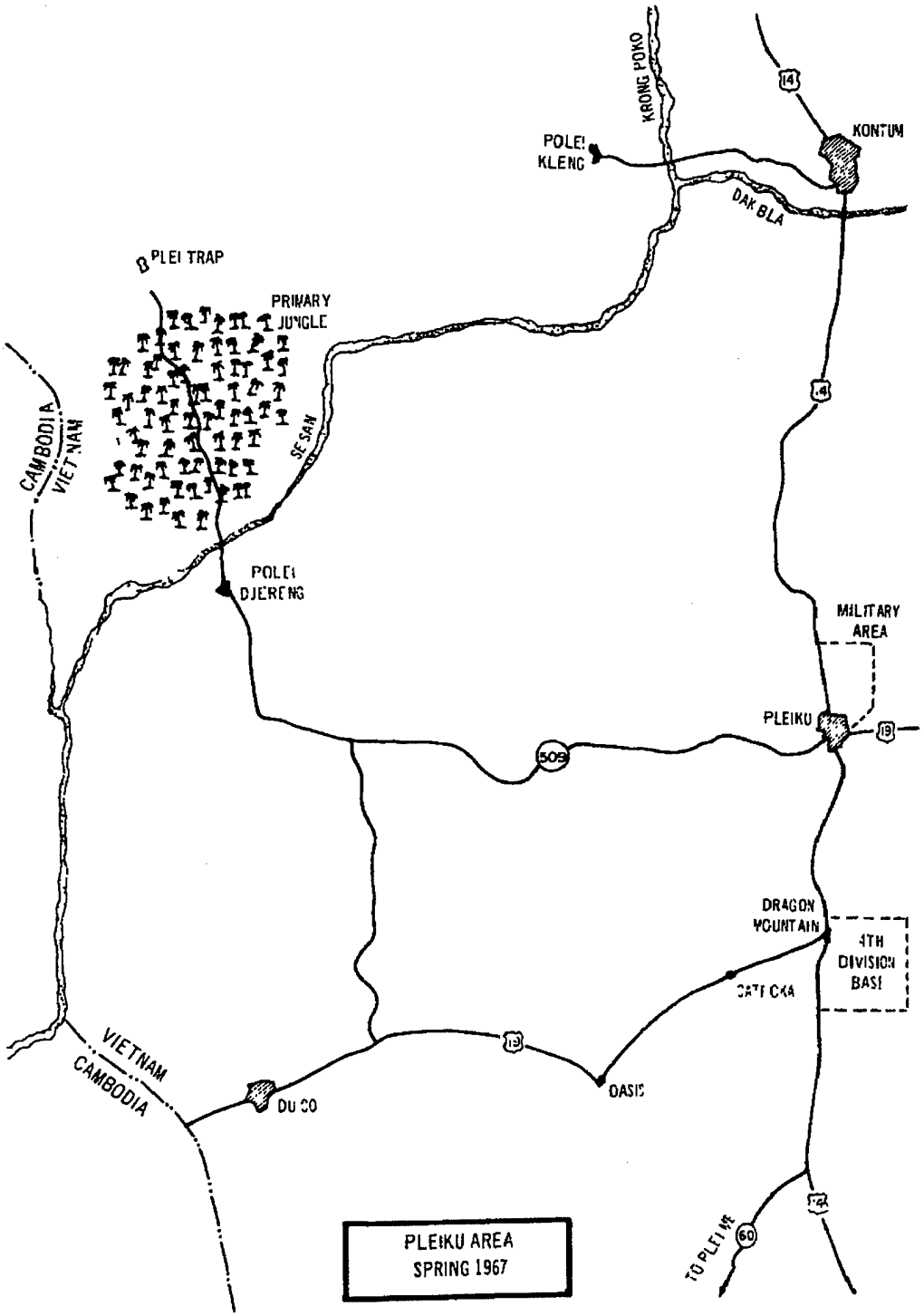
KRONG POKO
14
KONTUM
POLEI KLENG
DAK BLA
B PLEI TRAP
PRIMARY JUNGLE
CAMBODIA
VIETNAM
SESAN
POLEI DJERENG
MILITARY AREA
PLEIKU
19
509
DRAGON MOUNTAIN
4TH DIVISION BASE
CATECKA
VIETNAM
CAMBODIA
DUC CO
19
OASIS
TO PLEIME
60
PLEIKU AREA
SPRING 1967

FIGURE 39.

The C-130 fields at Duc Lap and Phu Tuc were covered with T-17 while the Plei Djereng runway was surfaced with MX-19, four foot square aluminum sheets (Figure 40) covering an aluminum honeycomb, in the first army installation of this new matting. The rehabilitation of Ban Blech and Phu Nhon primarily involved repairs to the airfield base and the T-17 membrane. At Oasis, however, the T-17 was completely removed, the runway lengthened to 3500', and then surfaced with MX-19.

For the construction of the Duc Lap field, C Company moved by a 100 vehicle convoy some 200 KM from Pleiku to the new area, carrying with the convoy all supplies for a 45 day operation. Twenty days after the company arrived a C-7A field was open and in use. On 6 April 1967, 60 days after arrival, the company had completed the project and was ready to return to Pleiku. Its return, which followed the March move of B Company from Phu Tuc to Pleiku, reunited the entire battalion for the first time since August 1966.[9]

The 299th Combat Battalion split its effort between construction and combat support. While continuing construction of warehouses, open storage and an ammunition storage area for the Pleiku subarea command and participation in the Pleiku area self-help construction program, the 299th sent forces to Kontum province in December and January to provide direct support to the 101st on Operation PICKETT and to build a 90' M4T6 dry span and 450' M4T6 float bridge across the Krong Poko (River) in general support of this same operation. The battalion concurrently provided MSR support on the Route 14 lifeline from Kontum City

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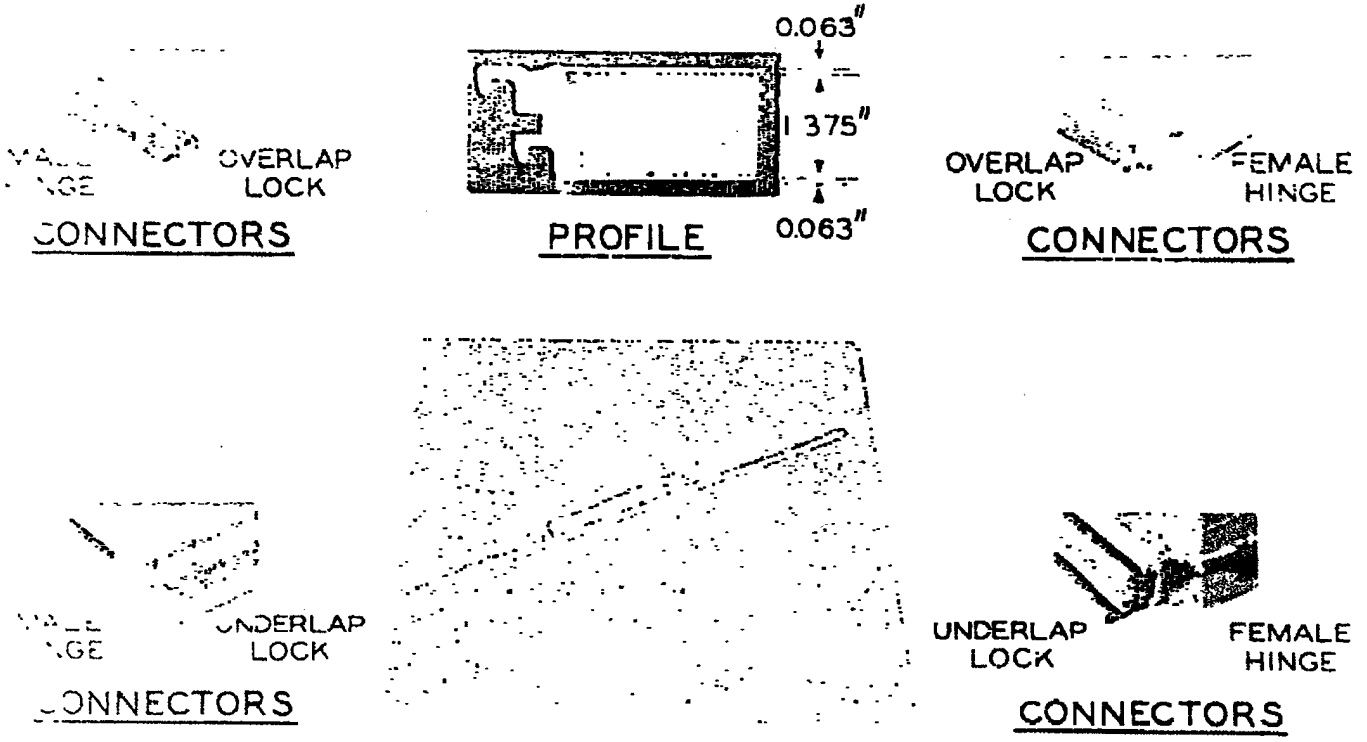
[9] Ibid.

Source: Misc Paper 4-897, U.S. Army Engineer Waterways Experiment Station




KAISER 4.1 LB./SQ FT. ALUMINUM LANDING MAT

Composite view of Kaiser mat panel

FIGURE 40.

to Pleiku. To support these efforts, in February the 299th received its D Company as part of the "E" series packet.

The battalion was also charged with operating the Pleiku area's principal quarry and crusher complex. Bolstered by the arrival of new equipment, and the 102d Construction Support Company from 35th Group, Connel Quarry became the source of rock for most of the area's construction.[10]

At An Khe the 70th Combat Battalion continued the development of the 1st Cavalry Division base camp. Strengthened by the attachment on 15 December of B Company, 84th Engineers, the 70th expanded its operations. While work progressed on self-help construction of billets and engineer support of the An Khe depot continued, the 70th went into high gear on two major projects: the permanent runway for An Khe airfield and a 65,000 BBL POL tank farm. By April, earthwork on the airfield, which had been hampered by several large soft spots, was almost complete and preparations were underway to begin concrete paving. A newly arrived slip form paver was being tested and cement, aggregate and sand stockpiled for what was to be Vietnam's first troop constructed concrete runway.

The 65,000 BBL POL facility, which provided a terminus for the Qui Nhon-An Khe pipeline, was started in early February. By the end of April, seven tanks had been constructed and were in use.

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[10]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 31 January 1967 (FOUO), and "ORLL for Quarterly Period Ending 30 April 1967," 8 May 1967, 299th Engineer Battalion, Section 1.

Following the Southeast monsoon, the 70th was again called upon to rehabilitate the Golf Course AM-2 runway. The heavy rains had found breaks in the T-17 and had saturated the subgrade. Repairs again consisted of improvements to what had been thought to be an overly safe drainage system.[11]

The major problems of the 937th Group were those of the theater: the enemy and the weather. The supply situation had improved to the point that the 937th Commander termed the increased availability of Class IV materials, ". . . the most noteworthy development during this reporting period . . . ."[12] Repair parts were also more available and the principal maintenance problem centered around a lack of direct support maintenance units.

The enemy remained a constant threat. The operations of the 70th and 299th west of Pleiku were accomplished under intermittent enemy fire and even the 299th's crusher, near Pleiku, came under attack. At An Khe, in reaction to a threat, the 70th was reorganized as infantry and committed for a three day period to securing Highway 19 in the An Khe area.

The weather produced a fine red dust from the soil of the highlands that consumed, in one three month period, 359,826 gallons of peneprime dust palliative. The effect of the early fall Southwest monsoon was displayed on the rutted surfaces and twisted matting of

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[11]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 31 January 1967, and "ORLL for Quarterly Period Ending 30 April 1967," 10 May 1967, 70th Engineer Battalion, Section 1.

[12]ORLL, 937th Group, January 1967.

the several airfields that required rehabilitation. Weather was a formidable foe.[13]

## Qui Nhon - Tuy Hoa

Following the attachment of the 19th and 84th Battalions, the detachment of the 14th Battalion, and the arrival, from CONUS, of the 35th Battalion, the 45th Group became the largest engineer group in the U.S. Army with an overall strength of five battalions and four separate companies. To better control these units and to retain a major engineer headquarters in Qui Nhon, the 45th Group headquarters, moved from Tuy Hoa to Qui Nhon by LST and air on 15 November.

The principal efforts of the group were split between base construction in Qui Nhon and Tuy Hoa areas and combat support of tactical operations along Highway 1. While work in the Qui Nhon depot neared completion, expansion of logistics facilities began to the west of the city and a program of LOC upgrading was initiated. In the Tuy Hoa area, the group continued construction of the FWMAF cantonment and expansion of Port Lane.[14]

Operations THAYER, PERSHING, MENG HO VII and ADAMS, coupled with an unusually severe Northeast monsoon, placed a heavy burden on Highway 1 from Bong Son to Ninh Hoa and occupied the efforts of elements of three battalions throughout the period.

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[13]ORLL, 937th Group, April 1967.

[14]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 15 February 1967, and "ORLL for Quarterly Period Ending 30 April 1967," 11 May 1967, 45th Engineer Group, Section 1.

The 84th Construction Battalion (less B Company, which was attached to the 937th Group on 15 December) concentrated its efforts on maintenance of monsoon saturated MSRs within Qui Nhon City, completion of in-town depot facilities, construction of four and one tenth miles of eight inch POL line within the city and 20 miles of six inch line from tank farm #2 north to Phu Cat Air Force Base and initiation of a major LOC upgrading program (Figure 41). This later effort combined the activities of the 84th's crusher complex, the 73d Construction Support Company's asphalt platoon and road preparation by the 19th and 84th in covering 10 miles of Highway 1 with a hot mix asphalt pavement.[15]

The 19th Combat Battalion's construction efforts were shifted in mid-November from the Cha Rang maintenance facility to the Long My area southwest of Qui Nhon. At Long My, the battalion initiated construction of a major general supply depot, a 2000 man cantonment and an aviation maintenance depot. In early April, with concrete placement underway and buildings beginning to rise, the 19th moved its base camp from Phu Tai to Long My to accelerate the tempo of the construction. The battalion also took on the maintenance and expansion of the Qui Nhon ASP and completed, in six weeks, a 16 CH-47 heliport complex at Lane AAF.

On the combat support side, in November B Company of the 19th moved to LZ English for a four week period to place an M8A1 surface on the airfield. (Figure 42.) In December and January, A Company provided

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[15]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 14 February 1967, and "ORLL for Quarterly Period Ending 30 April 1967," 14 May 1967 (FOUO), 84th Engineer Battalion, Section 1.

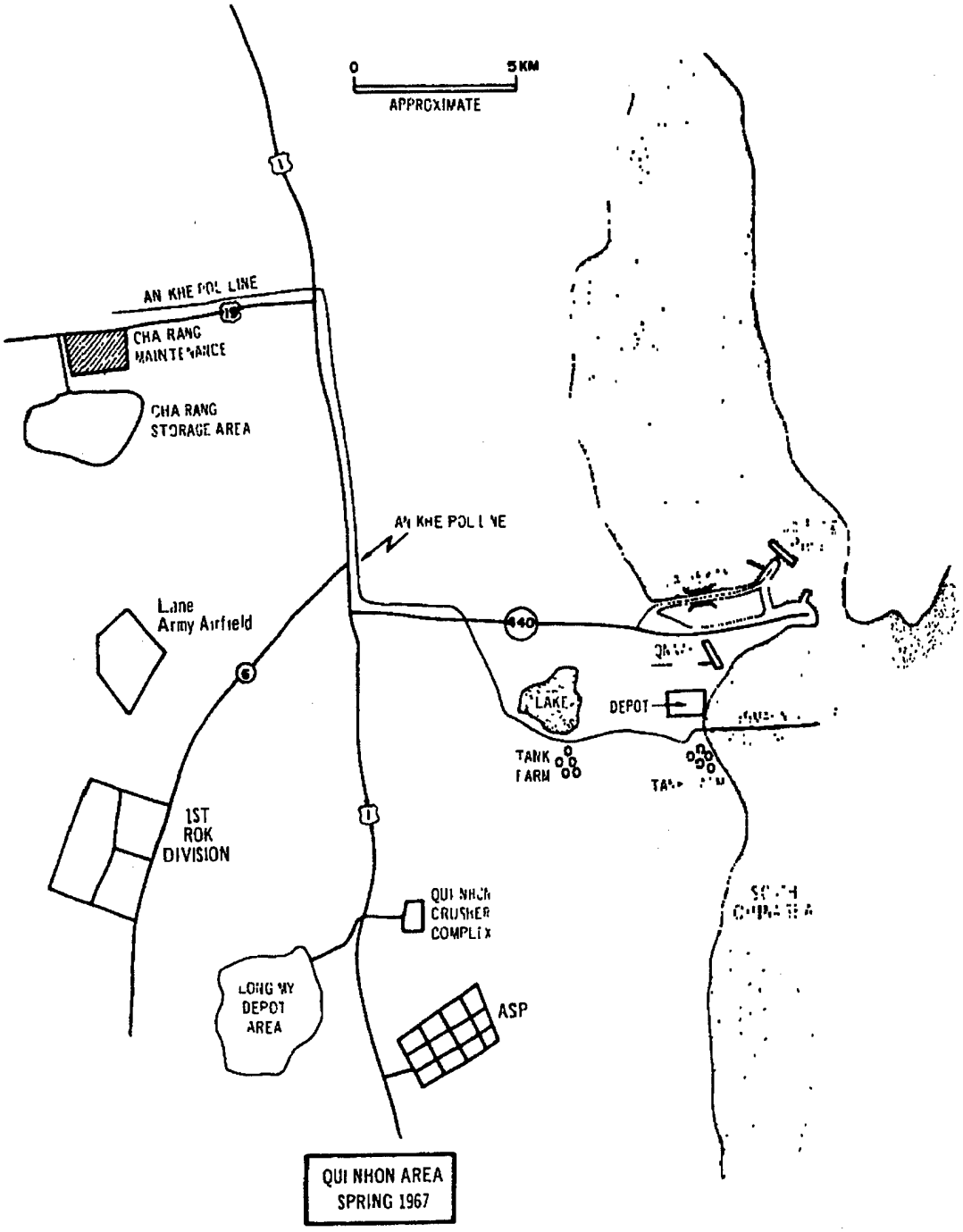
0
5KM
APPROXIMATE
AN KHE POL LINE
CHA RANG MAINTENANCE
CHA RANG STORAGE AREA
AN KHE POL LINE
Lane Army Airfield
LAKE
DEPOT
TANK FARM
1ST ROK DIVISION
QUI NHON CRUSHER COMPLEX
LONG MY DEPOT AREA
ASP
QUI NHON AREA SPRING 1967

FIGURE 41.

direct support to the 1st ROK Division for MENG HO VII in the opening of QL 1 from Qui Nhon south to Song Cau, and in the process repaired 65 cuts in the highway and emplaced three Bailey bridges.[16] In February, C Company moved to Van Canh where it completely rehabilitated the monsoon saturated T-17 runway and improved the airfields drainage pattern.[17]

The 35th Combat Battalion arrived at Qui Nhon aboard the USNS Darby on 20 November 1966 from Fort Lewis, Washington, and was deployed to a battalion base camp at Cha Rang. D Company was detached from the battalion and sent to Pleiku for attachment to the 937th Group. For its first two months in country the 35th operated in a construction environment, assuming responsibility for the Cha Rang maintenance facility and the An Khe pipeline from the 19th and opening this latter facility in late January. At the height of the Northeast monsoon, with the 1st Cavalry deployed on THAYER in northern Binh Dinh, Headquarters and A Companies moved from Cha Rang to LZ Hammond to concentrate a major effort on holding open Highway 1. B Company also shifted, moving by air and ground to LZ English, where it maintained both a section of Highway 1 and the English airstrip. In mid-February as the monsoon tapered, B Company removed the M8A1 from this runway, reconditioned the subgrade and replaced a new M8A1 mat.

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[16]ORLL, 45th Group.

[17]U.S., Department of the Army, "ORLL for Quarterly Period Ending 30 April 1967," 19th Engineer Battalion, 30 April 1967, Section 1. (CONFIDENTIAL.)

In February, the battalion was strengthened by the attachment of D Company, 20th Engineers, (actually, A/31st) which had arrived as part of the "E" series packet. D Company was immediately put to work on the permanent upgrading of Highway 1.[18]

In the Tuy Hoa-Ninh Hoa area, the 39th Combat Battalion and the 577th Construction Battalion split the workload, with the 39th generally carrying the combat support and the 577th, the base development.

The 39th kept two companies in support of the 4th Division, ROK and ARVN tactical elements operating in the area. Highway 1 from Tuy Hoa north to Song Cau was opened by the 39th and the ARVN engineers in January, closing (in conjunction with the 19th's efforts) the last gap in an MSR from Phan Rang to Bong Son. Another 39th task force completed the T-17 surfacing of the C-123 Cung Son airfield.

C Company moved from Tuy Hoa to Ninh Hoa in December and assumed a general support role in that area, building a 24 aircraft heliport for a U.S. aviation company, maintaining the Vung Ro-Ninh Hoa section of Highway 1, and assisting the ROK engineers in base development.

In February, the 39th also received its "E" series D Company from the packet and put the company to work on improving Highway 1 north of Tuy Hoa.[19]

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[18]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 20 February 1967 (FOUO), and "ORLL for Quarterly Period Ending 30 April 1967," 13 May 1967 (FOUO), 35th Engineer Battalion, Section 1.

[19]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 39th Engineer Battalion, 31 January 1967, Section 1, and ORLLs, 45th Group.

The 577th continued its construction efforts at the FWMAF cantonment, at Port Lane, and on the supply routes between these areas. At Port Lane, B Company completed the 32,500 CY causeway for the DeLong pier and, following the final placement of the DeLong, put a DBST on the roadway along the causeway and over the road from the port to QL 1. The battalion (-), in spite of January's 30 inches of rain, kept QL 1 open from the port to Tuy Hoa, completed a 220,000 SF M8A1 surfaced CH-47 heliport, initiated construction of a 400 bed evacuation hospital and saw the first patients using the hospital facility 105 days later. To improve the POL situation, the 577th also built 16.5 mile permanent six inch and eight inch POL lines from Port Lane to Tuy Hoa AFB and erected three 10,000 BBL tanks at the air base end.[20] [21]

While a lack of adequate aviation support and the "wearing out" of a great deal of equipment were significant problems within 45th Group, the principal problem that faced the group was the effect of the rain on the MSRs and horizontal construction within the group area. Despite scheduling, drainage structures and wet weather construction techniques, progress was impeded:

> The true impact of the monsoon on all earthwork is that the season . . . is basically a total loss towards project accomplishment. In addition, the three or four weeks subsequent to the rains are needed to return the roads, airfields, etc., to their condition prior to the monsoon.[22]

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[20] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 31 January 1967, and "ORLL for Quarterly Period Ending 30 April 1967," undated, 577th Engineer Battalion, Section 1.

[21] Other tanks were under construction by contract.

[22] ORLL, 45th Group, January 1967, Section 2.

## Cam Ranh Area

The November-April period saw a shift within 35th Engineer Group from concentration on the Cam Ranh complex towards more combat support and initiation of an LOC upgrading program. The force structure of the group was altered, in early November, by the attachment of the 14th Combat Battalion from 45th Group and, in December and January, by the transfer of the 62d Construction Battalion to the 159th Group at Long Binh.

Construction at Cam Ranh turned from new construction to improvement of the existing facilities. At the port, with the opening of DeLong #3, effort was focused on construction of additional hardstands along the shoreline. The return of the 101st Airborne to southern II Corps for Operations FARRAGUT and SUMMERALL took elements of the 14th and 87th to the field to support the brigade. Prior to its move to the south, the 62d completed the T-17 surfacing of the C-130 field at Bao Lac.[23]

The 87th Construction Battalion split its effort between Cam Ranh post and a combat support mission at Song Mao (Figure 43). At Cam Ranh effort was devoted to improving roads in the southern part of the peninsula and in the ASP as the paving program continued. Vertical construction went to erection of additional warehouses, continuation of self-help cantonment work and construction of a chapel, library, amphitheater, and PX.

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[23] U.S., Department of the Army, "ORLL for Period 1 November 1966 to 31 January 1967," 15 February 1967, and "ORLL for Quarterly Period Ending 30 April 1967," 14 May 1967, 35th Engineer Group, Section 1. (CONFIDENTIAL.)

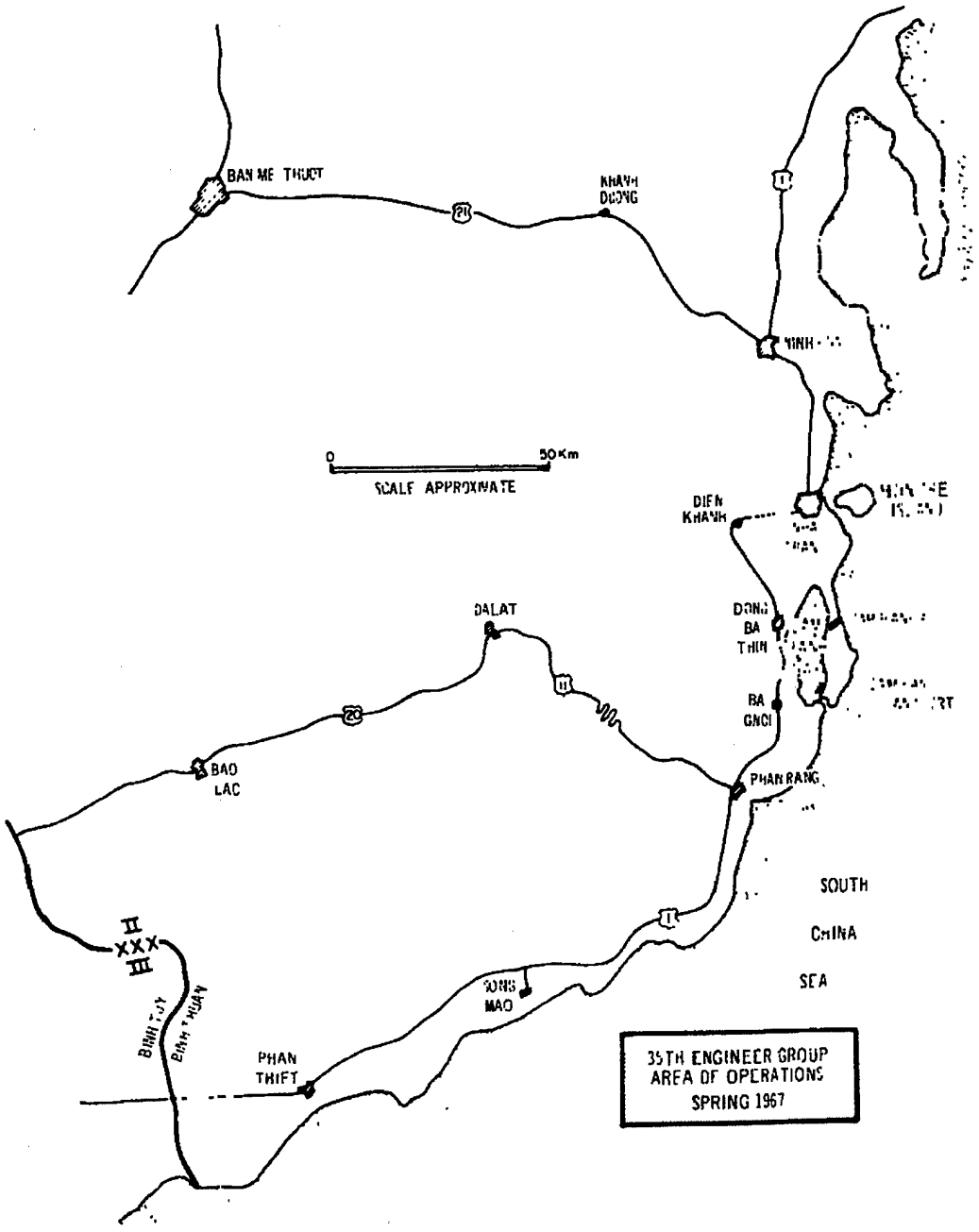
BAN ME THUOT
KHANH DUONG
21
11
0
50 Km
SCALE APPROXIMATE
DIEN KHANH
DALAT
DONG BA THIN
BA GNOI
20
11
BAO LAC
PHAN RANG
SOUTH
CHINA
SEA
II
XXX
III
BINH TUY
BINH THUAN
SONG MAO
PHAN THIET
35TH ENGINEER GROUP
AREA OF OPERATIONS
SPRING 1967

FIGURE 43.

In support of LOC upgrading, following the winter monsoons the 87th widened and paved the 4200' of roadway leading from QL 1 to the My Ca ferry.

In late November, B Company was moved by LST to Song Mao to extend an existing light aviation airfield to C-130 length and to provide additional aviation facilities. By mid-February, the 3500' runway was completed and covered with M8A1, 93, M8A1 helicopter pads had been built and B Company, a construction unit, had assumed the role of direct support of the 101st. When the 101st moved out of the area in late February, B Company moved to Phan Rang and began to assist the 14th in construction of the Phan Rang beach road.[24]

The 864th Construction Battalion spent the winter period attempting to hold its own against the weather. At Cam Ranh Bay, the battalion worked around the clock to keep open the MSR leading off the peninsula. At Hon Tre Island, the 864th could only work to keep the recently completed roadway from washing down the side of the mountain. With the arrival of spring the picture changed and the battalion rapidly moved to upgrade the roadways that had proved so troublesome during the monsoon.

On 15 March, the 864th initiated central II Corps' LOC rehabilitation program by starting upgrading of the 29 mile stretch of QL 1 from Ba Ngoi to Dien Khan. By the end of April, the 3.8 mile section from My Ca to Dong Ba Thin had been widened, raised to avoid the floods, and paved with two and one half inches of asphaltic concrete. (Figure 44.)

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[24]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 11 February 1967, and "ORLL for Quarterly Period Ending 30 April 1967," 13 May 1967, 87th Engineer Battalion, Section 1.

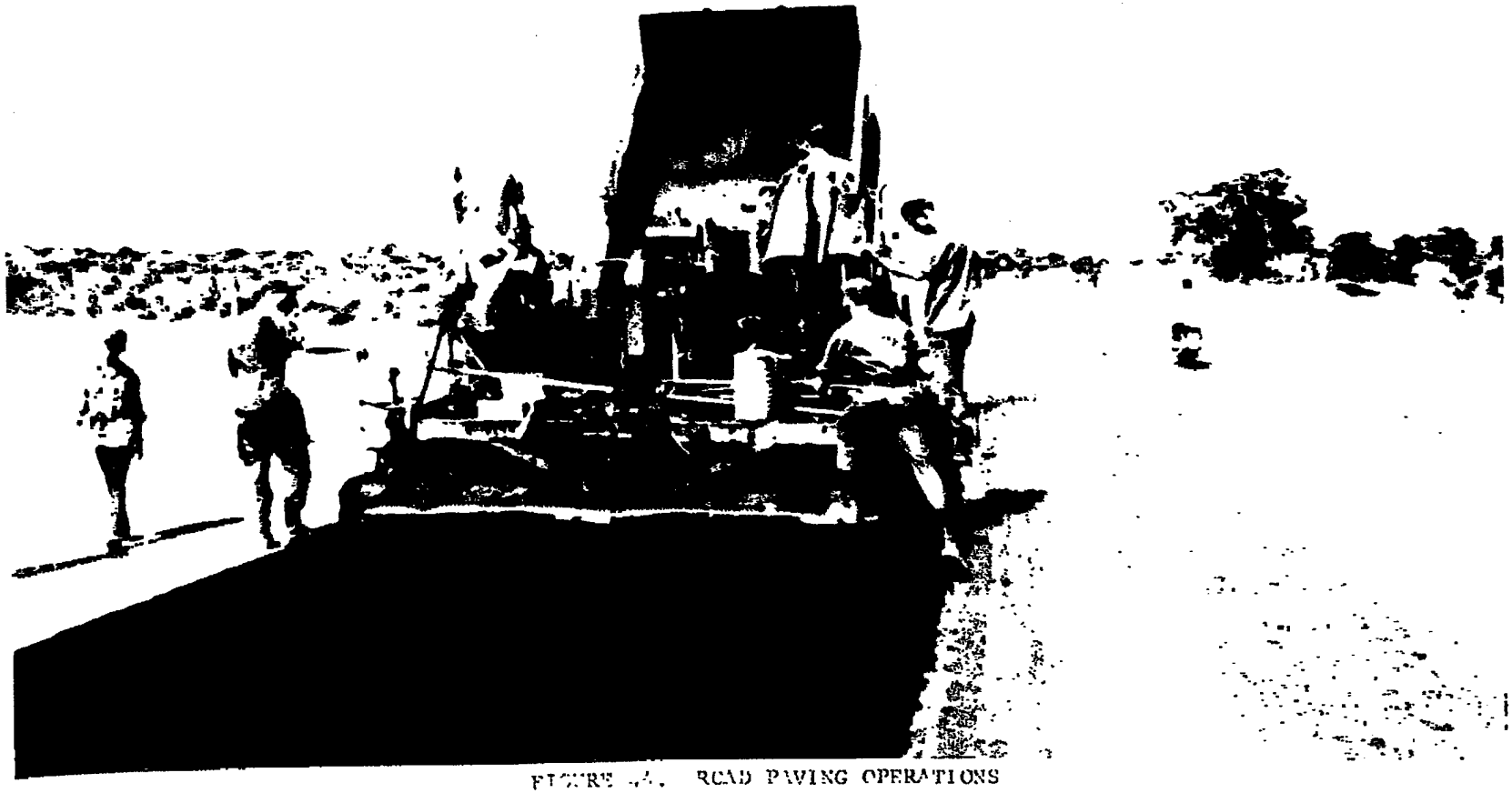

FIGURE 44. ROAD PAVING OPERATIONS
8441's Engineers at Work on Highway 1 Near Dong Ba Thin.

At Hon Tre Island, C Company completed the roadway to the top of the mountain, began eliminating grades over 20 per cent and initiated work on a cantonment area for the island's new tenants.

Throughout the period the 864th continued vertical construction in the depot area and support of the self-help construction program (issuing 44, two story 20' x 108' buildings in one three month period).[25]

The 14th Combat Battalion, following its shift from Tuy Hoa, established its headquarters at Dong Ba Thin and assumed responsibility for construction at Dong Ba Thin and Ninh Hoa as well as completion of the Replacement Center at Cam Ranh Bay. On departure of the 62d, B Company was moved from Ninh Hoa to Phan Rang and took over construction responsibilities in that area.

The major effort of the battalion, however, was focused on Khanh Duong, the hub of the 101st's Operation SUMMERALL. On 1 February, the 14th was assigned the mission of constructing a 3500' runway, a heliport and a support area at Khanh Duong. On 18 February, A and C Companies moved into the area. Five weeks later the M8A1 surfaced runway and heliport were completed and the two companies had begun to provide direct support to the 101st. The project, which involved over 40,000 CY of earthwork, required 365,000 SF of M8A1.

The battalion also found time for construction, with B Company continuing work on the 101st Cantonment and the beach access road at

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[25]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 15 February 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 April 1967," 13 May 1967, 864th Engineer Battalion, Section 1.

Phan Rang, D Company moving ahead with erection of one and two story buildings at the 4000 man Cam Ranh Replacement Center, and any available elements of the battalion continuing expansion of the Dong Ba Thin complex.[26]

The 35th Group's problems with rain were those of the 45th Group, and its experiences, the same. With the switch in focus from basic to more sophisticated construction, the group did experience limited supply problems and discovered serious deficiencies in its equipment. The heavy demand for electrical and plumbing supplies rapidly emptied the depot stock of those items and prevented completion of many facilities. The concentration on LOC construction put heavy demands on the group's aging earthmoving, compaction, and paving equipment. Although some relief was obtained by the arrival of new 290 scrapers to replace the older 830M models, no relief was available for the much older paving trains and the antiquated compaction pieces.

### 159th Group - Long Binh - Vung Tau

While the primary concentration of the 159th Construction Group remained on Long Binh and Vung Tau, during the period November 1966 to April 1967, as a result of the arrival of the 9th Division, the group did shift some effort to new construction in the Long Thanh and Dong Tam areas. With the transfer of the 62d Construction Battalion from 35th Group in December and January, and the arrival of D Company, 92d Construction Engineers, from CONUS in February, the 159th became almost

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[26]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 9 February 1967 (FOUO), and "ORLL for Quarterly Period Ending 30 April 1967," 15 May 1967, 14th Engineer Battalion, Section 1. (FOUO.)

completely construction organized and oriented. In recognition of this, in December and January the group's area of responsibility was reduced to include only the area encompassing Long Binh, Bien Hoa, Long Thanh and Vung Tau, and a small area surrounding Dong Tam. On 20 December, with the arrival of its parent unit, the 15th Engineer Battalion reverted from 159th to division control.[27]

On completion of its move from Phan Rang, the 62d quickly assumed its share of the construction in the Long Binh area, taking on and completing projects to expand the IIFFV TOC and erect the Long Binh dial central communication facility. The battalion also began construction of the 89 pad Long Binh heliport, general officers quarters at Bien Hoa and Long Binh and security fencing and lighting at Saigon's Newport marine facility.[28]

The 46th and 169th Construction Battalions also continued their work in the Long Binh area. The 169th rehabilitated the contractor constructed USARV headquarters building, completed, except for electrical and plumbing systems, the 24th Evacuation Hospital, began, with the 103d Construction Support Company, the asphalt paving of Long Binh's roads, and continued the support of self-help cantonment construction.[29] The 46th built a map depot building and additional drainage structures

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[27]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 14 February 1967 (FOUO), and "ORLL for Quarterly Period Ending 30 April 1967," 14 May 1967, 159th Engineer Group, Section 1. (FOUO.)

[28]Ibid.

[29]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 169th Engineer Battalion, 31 January 1967, Section 1, and ORLLs, 159th Group.

at IIFFV, WAC and nurses quarters at Tan Son Nhut and the 93d Evacuation Hospital, and continued work on storage facilities including 326,000 CF of refrigerated storage at Long Binh. The battalion also essentially completed the Long Binh Ammunition Depot, which encompassed some 225 laterite pads and storage sheds, and over 35 miles of primary and secondary roads. Following a spring VC attack on the ammunition depot, the battalion moved back to repair damaged pads and improve the berming in the area.[30]

The 159th extended its operations to Long Thanh in the spring, deploying elements of the battalion and D Company, 92d Engineers, to assist the 15th and to initiate construction of a C-130 capable airfield for the USARV aviation section.

The 46th also continued its work at Vung Tau, completing a DBST of the airfield and erection of the 100,000 BBL POL tank farm, and bringing to grade the 1180' causeway for the DeLong pier. The major activity at Vung Tau, however, was rock production. The 46th, with the 103d Quarry Section, produced the rock needed for new construction not only at Vung Tau but also throughout the Delta.

On 22 January, C Company, 577th Engineers, (attached to the 46th) moved from Long Binh to Dong Tam to join elements of the 15th Engineer Battalion in construction of a base camp for the 2d Brigade, 9th Division. This camp, representing the first major troop construction project in the Delta, was placed on the product of a dredging

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[30]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 15 February 1967, and "ORLL for Quarterly Period Ending 30 April 1967," 15 May 1967, 46th Engineer Battalion, Section 1.

operation which began in the fall of 1966. Dong Tam became an island in a sea of rice paddies (Figure 45).[31]

The 159th Group's problems were those of progress. Long Binh had grown into a major city with a population over 45,000.[32] Construction standards had risen to almost CONUS level and designs called for and the customers expected air conditioning, indoor plumbing, formica, and ceramic and vinyl tile. These items were not, however, readily available and, as a result, the engineers were forced to take up "the age old scrounging method of getting the job done." USAECV and USARV acknowledged this problem and focused attention on obtaining supplies rather than lowering standards.[33]

## 79th Engineer Group

The force structure of 79th Construction Group remained essentially the same throughout the mid-November to mid-April period, buoyed only by the arrival of a float bridge company and light equipment company and the "D" company of a combat battalion. The group continued to support construction at the base camps of the 1st and 25th Divisions; however, the shift from construction to combat support continued as the group made sizeable contributions to Operations CEDAR FALLS and JUNCTION CITY and provided direct support to local combat forces throughout the period.[34] The group's area of responsibility expanded

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[31] Ibid.

[32] "Long Binh Post," Army Digest, 23 (April 1968), 48-49.

[33] ORLL, 159th Group, May 1967, with 1st Indorsement, USAECV, 31 May 1967.

[34] See page 192 for description of CEDAR FALLS operations.

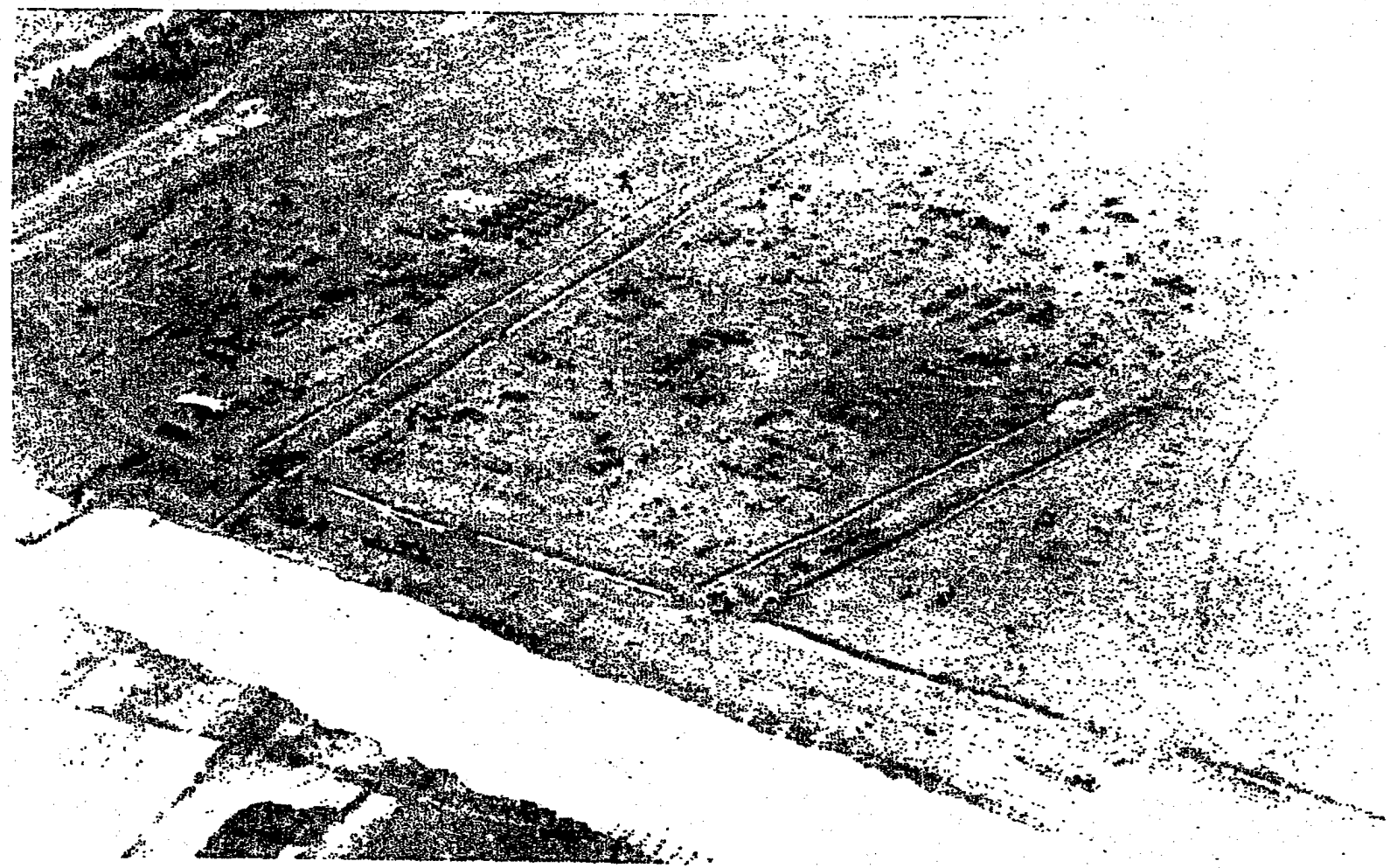

FIGURE 4-1. [illegible]

[illegible]

in December and January to include all of the IIFFV area except the base complexes under construction by 159th Group (Figure 46).[35]

The 86th Combat Battalion spent its first months in country engaged primarily in improvement of the base camps and support facilities at Phu Loi, Lai Khe and Bien Hoa. B Company, which had been attached to the 588th at Cu Chi, returned to battalion control in March and joined the construction effort at Phu Loi. At Phu Loi, the 86th concentrated its efforts on rehabilitation of the airfield and construction in the troop living areas. At Lai Khe, C Company focused on clearing for a one aviation company heliport and rehabilitating the existing runway. On completion of the repair and resealing of the field, the company began placement of an XM-19 runway surface. B Company, at Bien Hoa, continued its improvement of the area's drainage facilities and cantonments.

Combat support activities of the 86th were of the general support nature. The battalion provided minesweeping teams and water points to the 1st Division forces at Lai Khe and Phu Loi and maintained the MSRs in these areas.[36]

The 27th Combat Battalion continued to place its primary effort on the base camp of the 11th ACR at Xuan Loc.[37] A Company concentrated

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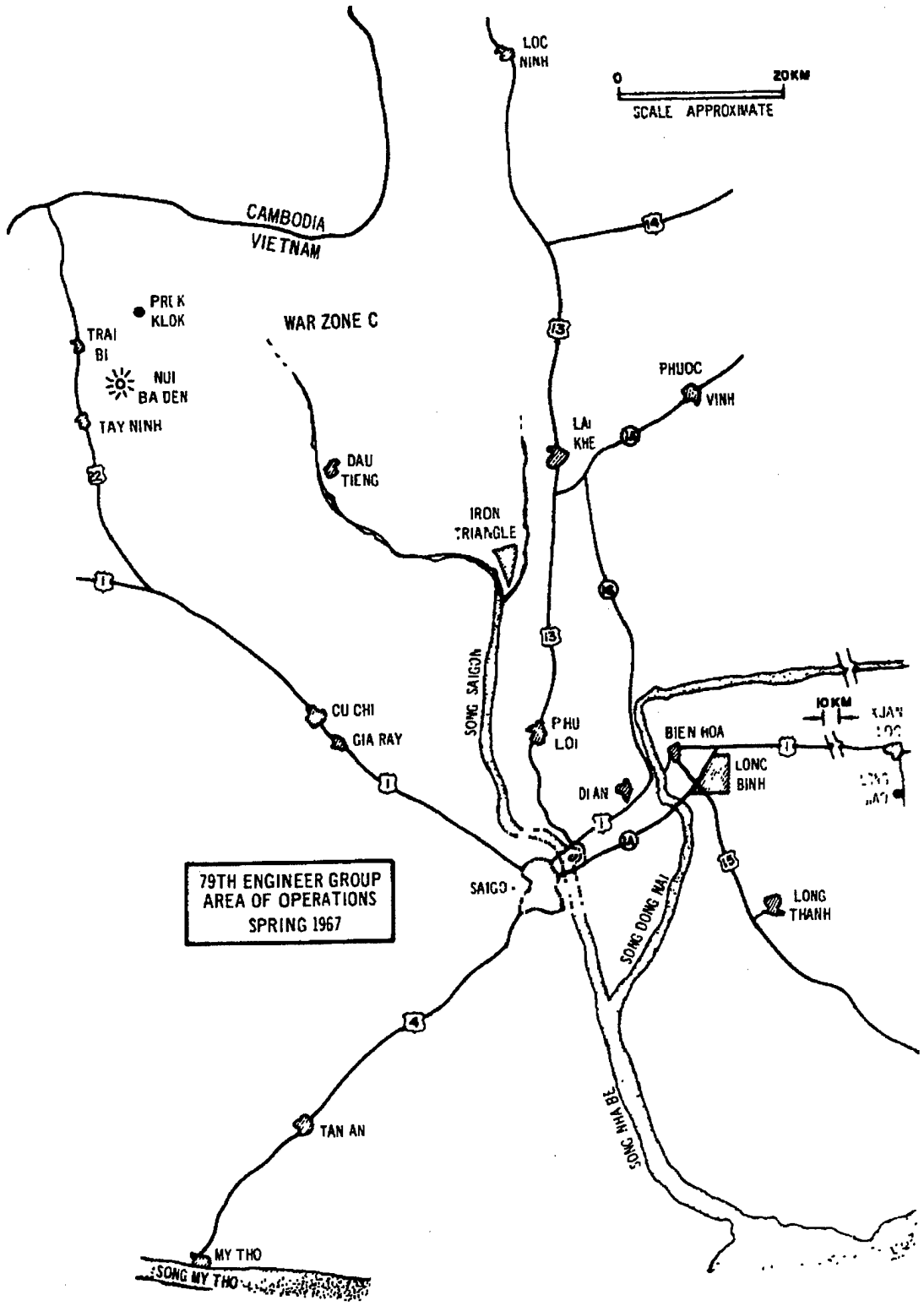
[35]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 14 February 1967 (FOUO), and "ORLL for Quarterly Period Ending 30 April 1967," 13 May 1967, 79th Engineer Group, Section 1. (FOUO.)

[36]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 14 February 1967 (FOUO), and "ORLL for Quarterly Period Ending 30 April 1967," 13 May 1967, 86th Engineer Battalion, Section 1. (FOUO.)

[37]The 11th ACR base camp was also known as Blackhorse and/or Long Giao.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LAI KHE
SONG SAIGON
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SONG MY THO
79TH ENGINEER GROUP
AREA OF OPERATIONS
SPRING 1967

its effort on horizontal construction of a 1500' regimental forward liaison airfield and clearing for a 60 bed surgical hospital, while C Company supported the vertical construction of the cantonment including the facilities for the hospital, which was ready for occupancy in mid-April. B Company supported quarry operations and cantonment construction at Gia Ray until March when it moved to the field in direct support of the 1st Division on JUNCTION CITY. D Company remained at Dau Tieng, attached to the 3d Brigade, 4th Division, for base construction and direct support, until mid-March when it was detached and returned to Xuan Loc.

In addition to B Company's mission with the 1st, the 27th provided combat support to the 1st Division on CEDAR FALLS and to the 1st Australian Task Force for PORTSEA. In this latter operation, the battalion cleared a swath of jungle 200 meters on both sides of an 18 KM section of QL 23.[38]

The 168th Combat Battalion devoted its major effort on continuation of base development of the 1st Division's camps at Di An and Phuoc Vinh, expending only 15 to 25 per cent of its effort on combat support. At Di An, the battalion (-) maintained its progress on mess hall and billet construction and began work on a dial central facility and a PX. At Phuoc Vinh, C Company supported the self-help program, constructed new taxiways and 24 helipads at the airfield and upgraded the main runway.

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[38]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 13 February 1967, and "ORLL for Quarterly Period Ending 31 April 1967," 13 May 1967, 27th Engineer Battalion, Section 1. (FOUO.)

The 168th's combat support missions took task forces to the field for CEDAR FALLS and JUNCTION CITY in direct support of the 1st Division. On JUNCTION CITY, in addition to providing normal MSR and airfield maintenance, the battalion moved elements to Prek Klok where they built a C-130 airfield in support of a United States Special Forces (USSF) camp.[39]

The construction efforts of the 588th Combat Battalion were focused on Cu Chi, Dau Tieng and Tay Ninh during the winter and early spring. At Cu Chi, Headquarters and A Companies along with B Company, 86th Engineers, continued work in the 25th Division cantonment, concentrating on support of self-help and completion of the Cu Chi dial central facility and a 400 bed evacuation hospital. B Company, at Tay Ninh, continued its construction of the 196th Brigade's camp and supporting facilities for the MUST. In early December, C Company moved to Dau Tieng to initiate construction of standard 3 facilities for the 3d Brigade, 4th Division. In mid-February, D Company, part of the "E" series packet, arrived from CONUS and joined the battalion effort at Cu Chi.

The 588th also experienced the gradual shift of emphasis from construction to combat support. Like the 168th, the battalion supported JUNCTION CITY and CEDAR FALLS by providing support, in the case of the former to the 25th Division, and in the latter, to the 1st Division. During CEDAR FALLS the battalion rehabilitated the Special Forces

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[39] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 168th Engineer Battalion, 14 February 1967, Section 1, (FOUO), and ORLLs, 79th Group.

camp at Loc Ninh and maintained the airfield at Trai Bi, in addition to providing its share of equipment support. On JUNCTION CITY, in support of the 25th, the battalion continued maintenance of Trai Bi and held open the MSR from Dau Tieng to Tay Ninh.[40]

The 79th Construction Group, with four combat battalions, found its problems in its lack of construction personnel. While light equipment companies added some horizontal support, the pure combat nature of the battalions produced no TOE vertical skills or engineering talent and the group was forced to ferret out what was available. With an increase in combat support activity, the group found itself looking more often in two directions.

The group's previous problems with shortages of rock were minimized by the opening of quarries near Xuan Loc, Tay Ninh and Gia Ray. While shortages of dimensioned lumber and other basic supplies continued to occur, the situation had improved and the flow generally kept pace with the construction. Shortages of electrical and plumbing supplies, however, were not abated.

## Division and Brigade Engineers

Division and brigade engineers in the IFFV area continued to follow the general movement of their parent units.

The 8th Engineer Battalion, 1st Cavalry Division, supported division elements on the coast and in the highlands during December.

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[40] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 January 1967," 13 February 1967 (FOUO), and "ORLL for Quarterly Period Ending 30 April 1967," 15 May 1967, 588th Engineer Battalion, Section 1. (FOUO.)

In January with the concentration of division forces in Binh Dinh for THAYER-PERSHING, the battalion operated in the field, successively establishing camps at LZ Hammond and LZ English, with the companies located with the supported brigades.[41]

D/65th Engineers and A/326th Engineers shifted with their parent units, the 3d Brigade, 25th Division, and the 1st Brigade, 101st Airborne, in moves from the highlands to the coast, leaving the 4th Engineers as the only division/brigade engineer force west of Pleiku.

The 4th Engineer Battalion, 4th Division, split its effort between its Dragon Mountain base camp and support of 1st and 2d Brigade Operations SAM HOUSTON-FRANCIS MARION. In February, with the assistance of the 20th, the battalion launched a major self help construction program. In March, the 4th began construction of a 2700' M8A1 surfaced airfield at the base camp and followed this project by completing a 200' x 400' PX. During this same period, A and B Companies supported the tactical movement of the brigades north of Pleiku in the Se San area (Figure 47) and continued the upgrading, in coordination with the 20th, of the principal MSRs in the Du Co area. In February, the battalion lost a company to IIFFV when C Company moved to Dau Tieng to join the division's 3d Brigade.[42]

The major activities in IIFFV were centered around what, at that point, were the war's two largest operations: CEDAR FALLS in the

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[41]U.S., Department of the Army, "ORLL for Quarterly Period Beginning 1 November 1966," 31 January 1967, and "ORLL for Quarterly Period Beginning 1 February 1967," 30 April 1967, 8th Engineer Battalion, Section 1.

[42]U.S., Department of the Army, "Annual Historical Supplement," 4th Engineer Battalion, 1 January 1966-30 June 1967, Chapters 2-5.

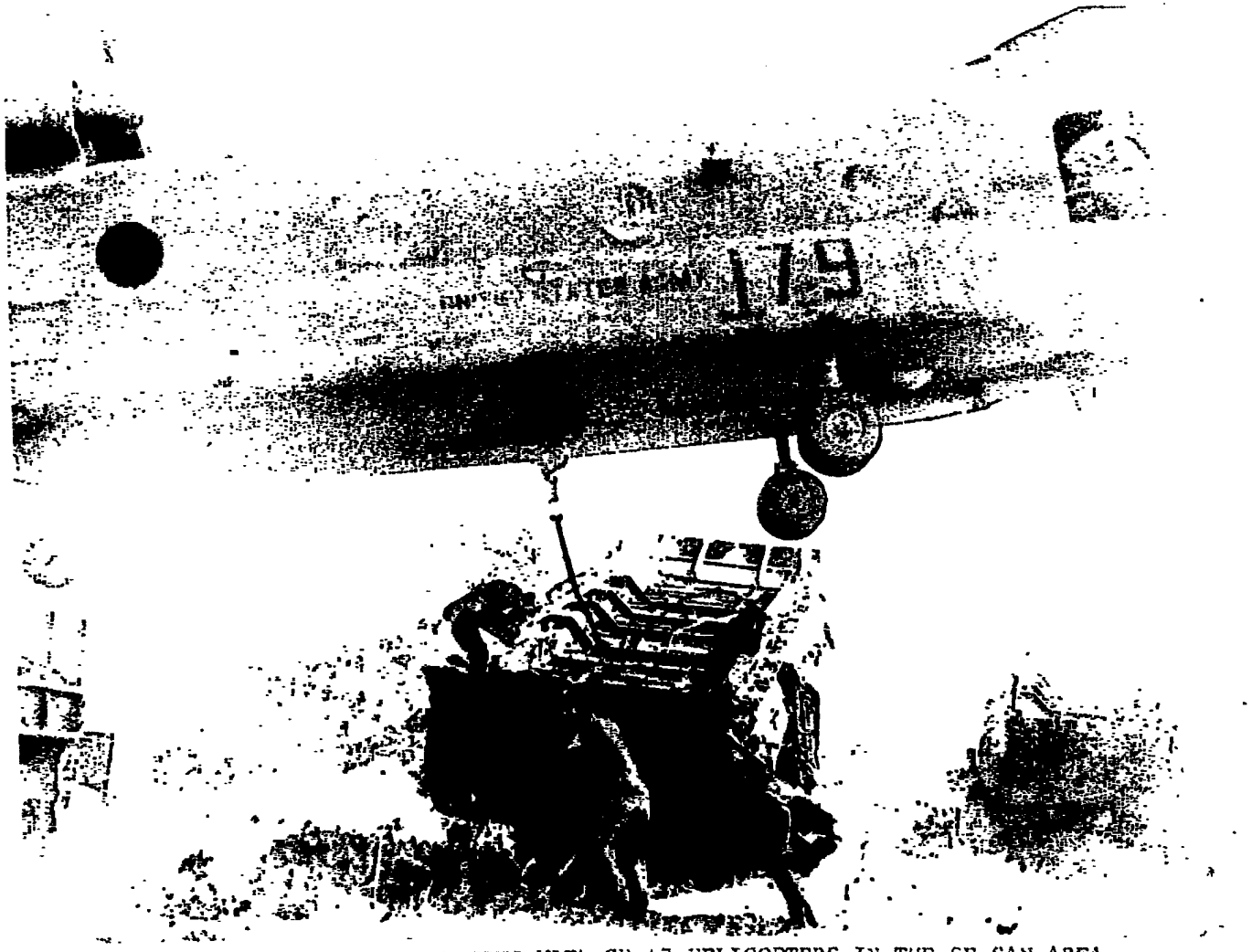

FIGURE 47. BRIDGING WITH CH-47 HELICOPTERS IN THE SE SAN AREA

Iron Triangle, and JUNCTION CITY in War Zone C. CEDAR FALLS, conducted in January 1966, began as battalion operation and ended with two divisions and three separate brigades involved in destroying the VC forces. For the first time in the war, as part of the operation the engineers virtually eliminated major segments of the jungle, cutting down, in all, over nine square kilometers. To accomplish this, the 1st Engineer Battalion, 1st Division, developed and, with the full support of 79th Group, tested the "dozer-infantry team" concept. Bulldozers (and Rome Plows), heretofore only used in relatively secure areas, actually became part of the assault elements.

For one phase of CEDAR FALLS, an engineer task force, consisting of 300 men from the 1st Division (including the 1st Engineers) and 300 men from 79th Group (and elements of 159th Group), was organized into clearing teams to operate under four field control centers in separate areas within the Iron Triangle. During the 18 days in which the task force operated, teams of two tank dozers followed by six conventional dozers (some with Rome Plow blades) moved with the infantry to cut and clear 2233 acres and checkerboard the area with LZs to support future operations.[43]

CEDAR FALLS netted 720 enemy killed, 3500 tons of rice captured and the disruption of the VC Military Region IV headquarters. These results were overshadowed, however, by the long term benefit gained through future ease of access provided by the jungle clearing.[44]

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[43]LTC Joseph M. Kiernan, "Combat Engineers In The Iron Triangle," Army, 17 (June 1967), 42-44.

[44]Letter from MG W. E. DePuy, USA, Commanding General 1st Division, to members of division, "Results of Operation CEDAR FALLS," 27 January 1967.

Engineer activity on the multidivision Operation JUNCTION CITY paralleled that of CEDAR FALLS with the locale shifting from the Iron Triangle to War Zone C and with the 65th Engineers conducting the major clearing operations. The 65th, on this same operation, constructed LZs, built two timber trestle and one M4T6 dry span bridges, emplaced five AVLBs and maintained 66 KM of roadway, in addition to providing the normal minesweeping and demolition teams.[45]

Both the 1st and 65th Battalions as well as the 87th, 173d, 175th and 919th Companies continued their dual missions of combat support and base development throughout the period allocating 30 to 50 per cent of their effort to this latter function.[46]

The 15th Engineer Battalion, 9th Division, reverted from 159th Group to division control on 20 December (the day following the division's arrival in Vietnam), keeping its effort concentrated on the expansion of the division's Long Thanh base camp. By 31 January, the battalion had built 44,000' of interior roadway, 89 showers and 67 mess halls and had reclaimed 1470 acres from the jungle.

In early January, B and C Companies, moved south to Dong Tam to begin construction, on newly placed dredge fill, of the 2d Brigade base camp. At Dong Tam, this task force of the 15th, supported by C/577th Engineers, constructed bunkers, shelters, boat and barge unloading sites and essential buildings and roadways, completing them in time for the February-March shift of the brigade to the new area.

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[45]U.S., Department of the Army, "Combat After Action Report," 65th Engineer Battalion, 2 June 1967. (CONFIDENTIAL.)

[46]The 87th Engineer Company arrived as the direct support company of the 199th Light Infantry Brigade.

While the majority of the battalion's effort went to base development, elements of the 15th did provide limited combat support to the brigades as they began initial operations in Long An and Bien Hoa provinces.[47]

The principal problem of the division/brigade engineers was the continuing requirement to keep attention on both base development and combat support, assuming with the base development mission all of the attendant weather and logistics headaches. While the 8th Battalion and A/326th Engineers were relatively free of this divergence of effort and the 1st, 65th, and 173d Engineers were able to reduce their base camp effort, the 4th 15th, 87th, 175th and 919th Engineers were forced to carry a heavy base construction load.

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[47]U.S., Department of the Army, "ORLL," 9th Infantry Division, 1 July 1967. (CONFIDENTIAL.)

CHAPTER VI

HOLDING THEIR OWN
(April-October 1967)

## A Picture of War

The summer and fall of 1967 brought significant changes in the political and military picture in South Vietnam. Political focus rested on the election of a president for the Republic of Vietnam and the summer saw campaigning throughout the country. On 3 September, 83 per cent of the registered voters went to the polls and selected General Nguyen Van Thieu as President. Eight weeks later President Thieu was inaugurated as the first president of South Vietnam's Second Republic and the country looked forward to a long period of political stability.

During this same period the war continued to rage. Heavy fighting in the DMZ area forced a shift in Marine forces from southern I Corps to the DMZ and resulted in the deployment of army forces into the area vacated by the marines. The bombing of North Vietnam was intensified during the early summer and, following a Viet Cong post-election offensive, was expanded to bring the attacks to the very outskirts of both Hanoi and Haiphong.[1]

The shift of marines from Quang Ngai to Quang Tri province in April brought the 1st Cavalry Division across the I Corps-II Corps boundary to the Duc Pho area. By the end of the month, the Cavalry had,

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[1]Associated Press, What YOU Should Know About VIETNAM (Associated Press 1967), pp. 16-17 and 46-47.

for the most part, been replaced by an army division size element, Task Force OREGON, composed of the 1st Brigade, 101st Airborne, 3d Brigade, 25th Division, and the 196th Light Infantry Brigade. TF OREGON operated between Duc Pho and Chu Lai under control of the III Marine Amphibious Force Commander. In late October, following a summer of successful operations in Quang Ngai, Task Force OREGON was designated as the Americal Division.[2]

In the IFFV area the 1st Cavalry and the 4th Division continued to concentrate their forces on enemy activity in Binh Dinh province and along the Cambodian border. In late May, the 173d Airborne Brigade moved from IIFFV to the Pleiku area to replace the OREGON committed 1st Brigade, 101st Airborne, as the field force reaction element.

While the 1st Cavalry's Operation PERSHING continued, without major enemy opposition, to solidify allied gains in coastal Binh Dinh, the 4th Division, in June, hit a major enemy force in the Kontum area. Operation GREELEY was launched with the 4th, the 173d and the 3d Brigade, 1st Cavalry to meet this challenge. Following the defeat of the enemy force, the 173d moved to the Tuy Hoa area for BOLLING and the cavalry brigade returned to Binh Dinh.

In the IIFFV area of operations, the 1st and 25th Divisions continued their major interest in the area north of Saigon. Based on the success of the jungle clearing effort on CEDAR FALLS and JUNCTION

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[2]Although the brigades of the Americal Division at its "birth" were the 1st/101st, 3d/4th and 196th, the organic brigades were to be the 196th, the 198th, which arrived in October, and the 11th, due to arrive later in 1967. The 3d/4th began its attachment to the division as the 3d/25th but became the 3d/4th on 1 August as part of a I-IIFFV switch of designations.

CITY, follow-on operations MANHATTAN, EMPORIA, BARKING SANDS, KOLE KOLE and SHENANDOAH were conducted to seek out and destroy enemy forces, to eliminate, through clearing, jungle sanctuaries in the Boi Loi Woods, Ho Bo Woods and War Zone C, and to clear the jungle from areas on both sides of critical MSRs.

The 9th Division, along with the 199th Brigade, the 11th ACR, and the Australians continued activity in the Saigon-Xuan Loc-Vung Tau areas with Operations FAIRFAX, AKRON and PADDINGTON. The 9th also continued its shift to the Delta with Operation ENTERPRISE in eastern Long An province. On 1 June, with its own 2d Brigade, the 9th began Operation CORONADO. CORONADO marked the start of operations by the Mobile Riverine Force (MRF), an army-navy task force operating in the inland waterways of the Delta from navy armored assault troop carriers.[3]

By 31 October the strength of U.S. forces in South Vietnam had risen to 475,000 and was headed for 500,000. There were no signs of a slowdown in the war.

## Logistics

The primary logistics effort during the April-October period was devoted to continued expansion of Long Binh and Pleiku and extension of the logistics life line to combat elements deploying into the Delta in the south, and into I Corps in the north. While new work continued at Cam Ranh Bay, the primary effort in this area was focused on consolidation and organization of the on-hand activities of this base.

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[3]John B. Spore, "Floating Assault Force: Scourge of the Delta," Army, 18 (February 1968), 28-32.

Logistics problems in the Delta were relatively simple in comparison to those in I Corps. The supply of units in Long An province required heavy use of existing and relatively insecure MSRs. In the north, both Duc Pho and Chu Lai were isolated insofar as land routes of travel were concerned and while airfield and port facilities did exist at Chu Lai, Duc Pho was undeveloped and a major effort had to be devoted to opening the supply lines to this area.

## Engineer Operations - General

On 4 June 1967, in the first departure from command relationships established in September 1965, IIFFV assumed operational control from USAECV of two combat battalions, one light equipment company, one panel bridge company and one float bridge company. Under an agreement reached by the Commanding Generals of IIFFV and USAECV, this transfer was to be the first step in the eventual shift of the operational control of one group and four combat battalions from USAECV to IIFFV. In their new status the battalions and companies were to look to IIFFV for combat support mission assignments. When the battalions and companies were not fully committed to operational (combat) support, they were to be employed by USAECV, with prior approval of IIFFV, in a construction role. In addition, since the affected units were part of 79th Group, orders to these units were to be passed through the group and were to be limited generally to operations within the 79th Group area of responsibility. Missions that fell within the other group areas were to be passed to these groups on a "request" basis, as was done during the previous 21 months.[4]

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[4]"Memorandum of Understanding," USAECV and IIFFV, 16 and 17 May 1967.

In actual practice, the provisions of the agreement served only as point of departure. The arrival, in August, of the 20th Engineer Brigade and its assumption of nondivisional engineer responsibility in the IIFFV area gave IIFFV a field force-wide engineer contact point. By the end of October no steps had been taken to increase the number of battalions under the operational control of IIFFV and essentially all requests for combat support were being sent by IIFFV to the brigade rather than to 79th Group or the involved units. At the battalion level, it was business as usual, with an analysis of the battalion's efforts before and after the change in operational control indicating little, if any, modification in the distribution of effort between construction and combat support. The agreement, while effective on paper, apparently meant little in practice.

In the IFFV area, there were no changes in command relationships and, in fact, the Commanding General (CG), IFFV, indicated to 18th Brigade that no changes were required.[5]

During the April-October period, the force structure of USAECV was strengthened by the arrival of Headquarters, 20th Engineer Brigade, Headquarters, 34th Group, eight construction battalions and several separate companies, bringing its total strength to over 35,000 engineers. (Figure 48.) The arrival of the 20th Brigade permitted USAECV to place the groups operating in III-IV Corps under one control headquarters and to limit the headquarters reporting to USAECV to the two brigades. Since the brigade areas of responsibility coincided with the

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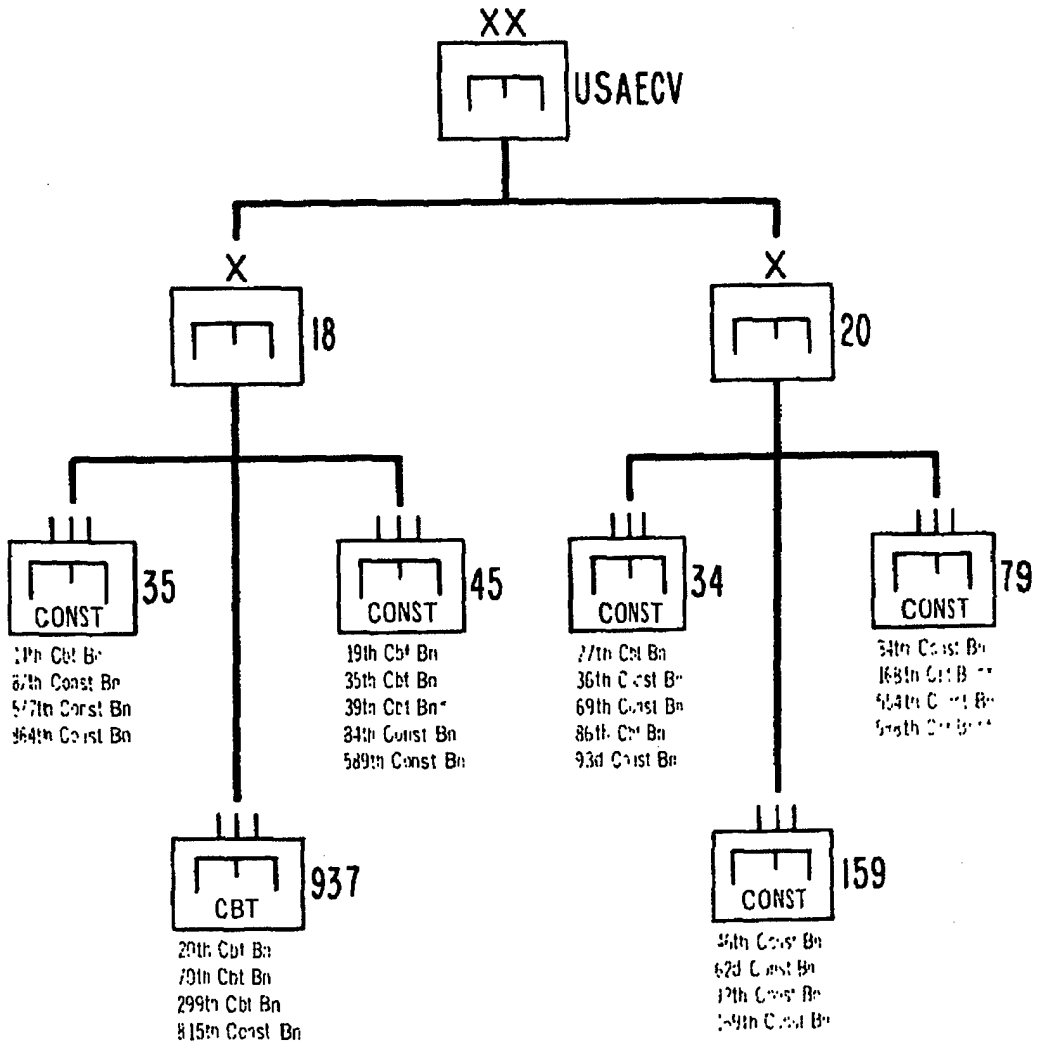
[5]"Letter of Commendation," from LTG Stanley R. Larsen, CG, IFFV to BG C. M. Duke, CG, 18th Engineer Brigade, undated (July 1967).




*OPCON AMERICAL DIVISION
**OPCON II FFV

ORGANIZATION
U.S. ARMY ENGINEER COMMAND
31 OCTOBER 1967

FIGURE 48.

field force areas of interest, the brigades also served as the engineer point of contact for the field forces. (Figure 49.)[6]

The overall distribution of effort within USAECV continued its shift from construction to combat support and LOC upgrading.

The arrival of the 27th, 86th and 35th Land Clearing Platoons in May, June and July permitted the initiation of large scale jungle clearing operations in both the IFFV and IIFFV areas. (One platoon was attached to 18th Brigade and two to 20th Brigade.) Each platoon was organized with 30 bulldozers of which 15 to 20 mounted Rome Plow blades. The platoons were not self-sufficient and required complete support from the unit to which they were attached.

During the summer, the platoons were committed to support of tactical operations, clearing areas on both sides of MSRs, clearing of fields of fire around base camps and clearing administrative areas within base camps, in that priority. By the end of the summer over 30,000 acres had been reclaimed from the jungles with clearing rates that more than doubled those obtained by conventional clearing operations. With trees less than six inches in diameter, the combination of Rome Plows and bulldozers cleared 1.2 acres/piece/day in comparison to 0.5 acres/piece/day with only the D-7-E bulldozer.[7]

The LOC upgrading program was boosted by the arrival of the six construction battalions and three asphalt platoons, which permitted

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[6]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 31 July 1967 (CONFIDENTIAL), and "ORLL for Quarterly Period Ending 31 October 1967," 31 October 1967 (CONFIDENTIAL), USAECV, Section 1.

[7]U.S., Department of the Army, "Technical Report, Land Clearing Teams," Engineer Section, USARV (AVHENMO), undated (August-September 1967).

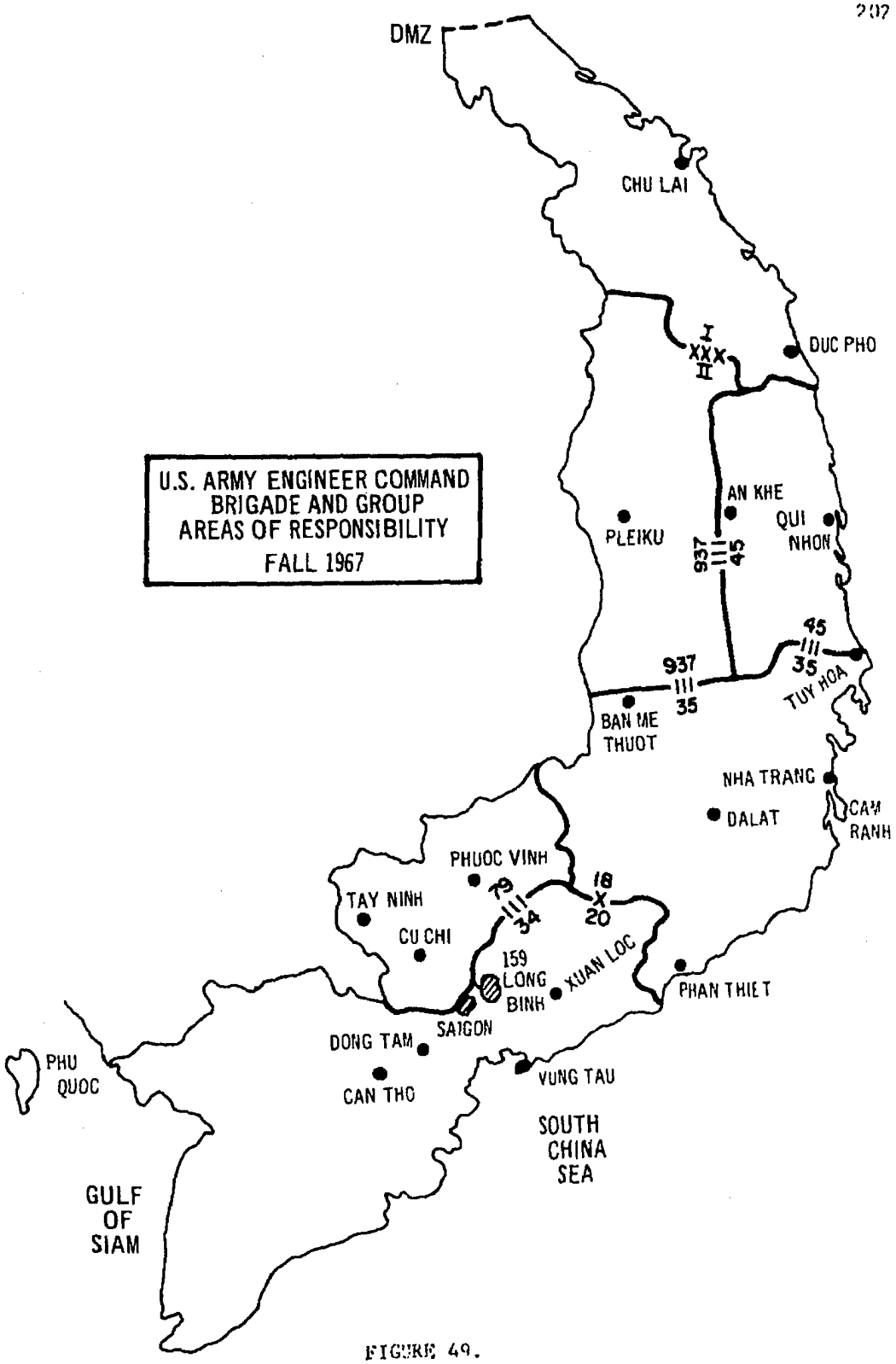
U.S. ARMY ENGINEER COMMAND
BRIGADE AND GROUP
AREAS OF RESPONSIBILITY
FALL 1967
DMZ
CHU LAI
DUC PHO
I
XXX
II
AN KHE
PLEIKU
QUI
NHON
937
III
45
45
III
35
937
III
35
TUY HOA
BAN ME
THUOT
NHA TRANG
DALAT
CAM
RANH
PHUOC VINH
TAY NINH
CU CHI
18
X
20
159
LONG
BINH
XUAN LOC
PHAN THIET
SAIGON
DONG TAM
CAN THO
VUNG TAU
PHU
QUOC
SOUTH
CHINA
SEA
GULF
OF
SIAM

FIGURE 49.

additional combat battalion effort to shift to the roads. Under the MACV LOC program, all critical highways in South Vietnam were to be upgraded to two lane class 50, with permanent steel beam bridges installed as required. Initial effort was to be focused on QL 1.

Another boost was given to the combat support effort when, in early June, all "D" series combat battalions were converted to the "E" series TOE. The remaining three line company combat battalions (19th, 70th and 168th) were provided with their fourth line company from in country resources.

In the construction field, a cutback in MCA funds required a phase down in operations by RMK and resulted in the assumption by USAECV of many contractor initiated projects and the transfer of equipment from RMK to troop units. RMK projects at Pleiku, Vung Tau, Can Tho and Soc Trang were turned over to the 18th and 20th Brigades, as were over 70 pieces of equipment, including 225 TPH crushers, concrete ready-mix trucks, and asphalt plants.

In addition to the equipment from RMK, USAECV also received equipment augmentation from CONUS in the form of 77 ton Euclid dump trucks, which were allocated to the engineer units operating major quarries and conducting large earth or gravel moving operations.

The organization and functions of the USAECV staff underwent changes during the summer of 1967. On 10 June, by direction of the Commanding General, USARV, the USARV Engineer Section was re-established from the assets of the command and the G3 and G4 sections of USARV. The Commanding General, USAECV was designated as USARV Engineer. Under the new organization the USARV Engineer section was essentially the

planning staff and the USAECV staff, the operating staff. Subsequent to the reorganization, USAECV moved from Bien Hoa to Long Binh.[8]

A lack of organic aircraft headed the list of USAECV-wide problems. USAECV was assigned 18 aircraft to support 35 battalion or larger size headquarters, operating in all four corps in South Vietnam. There were no signs of a change in this status.[9]

With the increase in construction capability and the assumption of RMK projects, the sophistication of standards and the variety of projects also increased. More and more air conditioning units were installed, roads paved and electric and water distribution systems built. Many of the camps took on a greater degree of permanence. The problem however, was a failure of the supply system to adjust to these new conditions. The army depots had not been stocking many of the building materials used by RMK and had yet to catch up with the demand for common electrical and plumbing supplies, even though steps were taken to begin aerial resupply of these items. Repair parts and major end item supply was also a significant problem. The addition of the RMK equipment and the Euclid trucks to the inventory, coupled with a 50 per cent shortage in TOE asphalt equipment, brought only minimal response from the supply system. While the needed items were promptly requisitioned, the CONUS part of the system was unable to react to the demands for nonstandard items and much of the equipment remained out of operation.

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[8] ORLL, USAECV, 31 July 1967.

[9] "Memorandum For: Major Carpenter," from Force Development Officer, USAECV, undated (November 1967).

The assumption of RMK projects and a directed focusing on cost accounting presented paperwork problems for the command. Cost accounting for materials was pushed to group level and accounting for manhours to the platoon level. Any effort spent on either combat support or construction was accountable and all units became involved in this record keeping.[10]

## Field Force Engineer Sections

The majority of effort within the IFFV Engineer Section was devoted to coordination of the activities of the divisional and nondivisional engineers. The shift of operations into southern I Corps brought IFFV into Quang Ngai and charged the IFFV Engineer with coordinating the rapid construction of the airfield and port facilities at Duc Pho.

In the IIFFV area, with the Field Force's assumption of operational control of two combat battalions, the Engineer ostensibly became an operator as well as a coordinator. However, as mentioned earlier, in actuality, while exercising a degree of control, the previous relationships and modus operandi continued to exist. In essence, the Engineer retained the cooperation and coordination system.

## 18th Engineer Brigade

The emphasis within 18th Brigade, as within the command, continued to shift from construction to combat support and LOC upgrading.

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[10] ORLLs, USAECV, July and October 1967, and "ORLL for Quarterly Period Ending 31 October 1967," 18th Engineer Brigade, 31 October 1967. (CONFIDENTIAL.)

The completion of construction that was underway was accelerated by the arrival of two construction battalions which moved into Pleiku, and Qui Nhon and An Khe. Their arrival also permitted the shift of a significant amount of combat battalion effort to combat support.

## Pleiku - An Khe

Within 937th Engineer Group the most significant events during the April-October period were the heavy combat support loads west and north of Pleiku, the assumption of RMK projects at Pleiku, the arrival of the 815th Construction Battalion, the completion of the An Khe airfield's concrete runway, the subsequent shift of the 70th to Pleiku, and the major effects of the Southwest monsoon in the Pleiku area.[11]

The 20th Combat Battalion continued to be the mainstay of the 937th combat support effort. Although at least one company remained in the base camp at all times to assist with the development of Dragon Mountain, the battalion's focus remained on the area west of Pleiku. Prior to the advent of the Southwest monsoon the battalion devoted its field efforts to upgrading of the airfields at Du Co and Ban Blech and improving the key MSRs running west from Pleiku. (Figure 50.) At Du Co, A Company took three weeks to surface the existing airfield with M8A1 and at Ban Blech elements of B Company worked on expanding the drainage facilities. The spring work on the highways was but a prelude to the late summer and early fall effort that was required to keep these critical routes open. The significant difference between the

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[11]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 31 July 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 31 October 1967 (FOUO), 937th Engineer Group, Section 1.

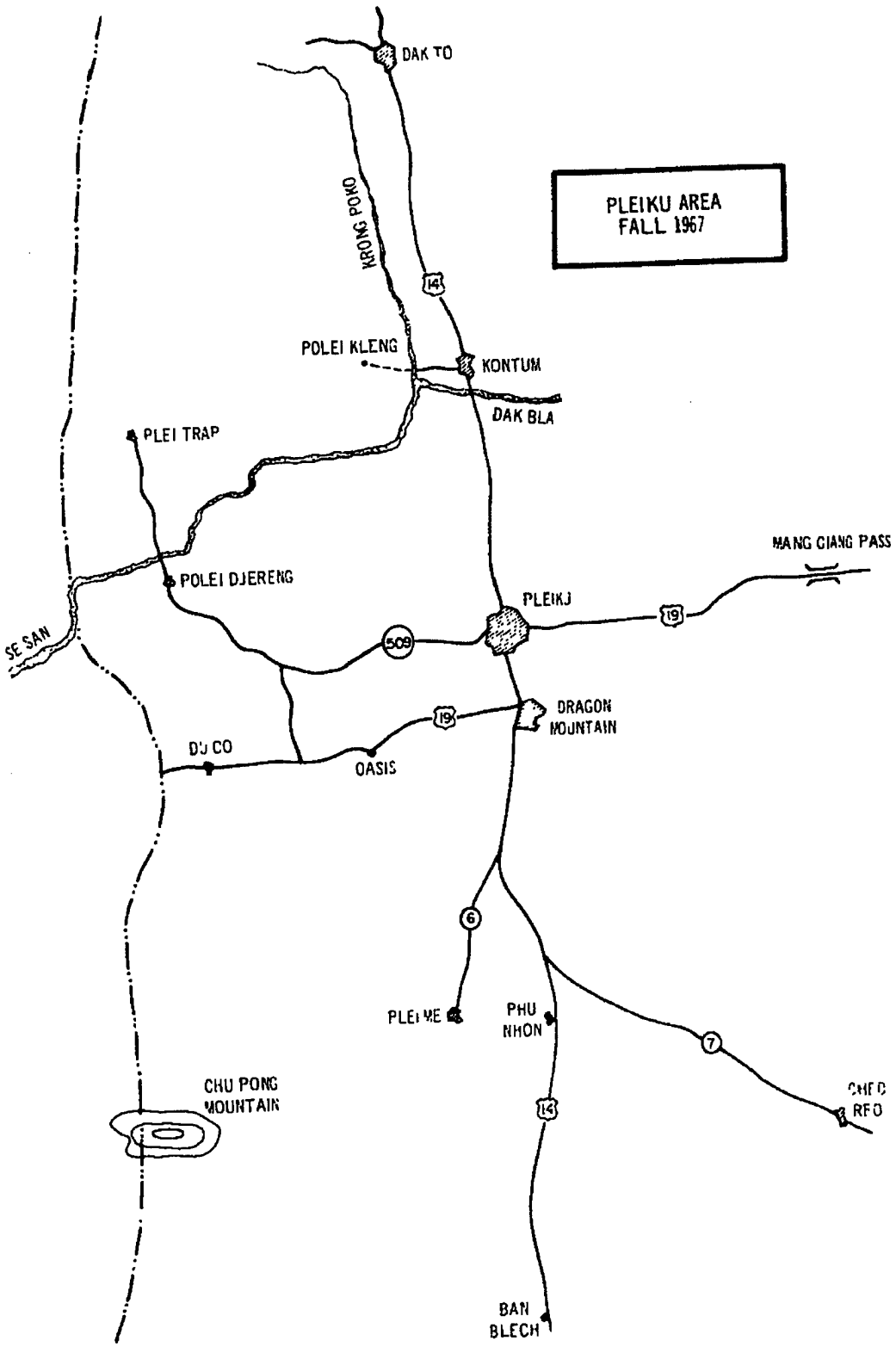
PLEIKU AREA
FALL 1967
DAK TO
KRONG POKO
14
POLEI KLENG
KONTUM
DAK BLA
PLEI TRAP
POLEI DJERENG
MANG GIANG PASS
PLEIKJ
19
SE SAN
509
DRAGON
MOUNTAIN
DJ CO
OASIS
6
PLEI ME
PHU
NHON
7
CHU PONG
MOUNTAIN
14
BAN
BLECH

FIGURE 50.

summer of 1966 and the summer of 1967 rested with the magnitude and location of the effort. In 1966, the 299th Battalion spent all its time on QL 19. In 1967, the 20th, as a result of the upgrading program, was able to limit its work on QL 19 and keep elements of the battalion at work on LTL-509 and the route between 19 and 509.

On 1 May, D Company, 35th Engineers, which had been working with the 20th since December, became D Company of the 20th. In August, the 35th Land Clearing Platoon was attached to the 20th and elements began working on clearing the jungle along the route between LTL-509 and QL 19.[12]

The 299th Combat Battalion divided its efforts almost equally between construction and combat support during the April-October period.

In April the battalion assumed responsibility from RMK for construction of a "permanent" 400 bed evacuation hospital at Pleiku. This facility, which included running water and a sewage system, was 70 per cent complete when the 299th began work. By late summer, the hospital, which represented sophisticated construction for even RMK, was essentially complete and the remaining work waited only for receipt of supplies. During this same period the 299th also moved ahead with other Pleiku area base construction including 100 revetments for UH-1 helicopters, 30 miles of An Khe-Pleiku POL line and self-help construction support.

With the initiation of Operation GREELEY in June, the battalion began a shift to a combat support effort which by late October would

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[12]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 12 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 13 November 1967 (FOUO), 20th Engineer Battalion, Section 1.

move all four line companies to the Kontum-Dak To area. Maintenance of QL 14 from Pleiku to Dak To and maintenance of the road nets near these cities took the bulk of the battalions combat support effort, although in August, with help from elements of the 35th Land Clearing Platoon, the 299th did begin clearing the jungle along QL 19 from Mang Giang Pass towards Pleiku. During August the battalion also found time to move a task force to Polei Kleng to repair a monsooned damaged T-17 airfield.[13]

The 815th Construction Battalion from Fort Belvoir, Virginia, joined the 937th Group in Pleiku on 14 April 1967 and immediately became the center of the major construction effort in the Pleiku area. The 815th took over two 225 TPH crushers from RMK as well as the RMK construction materials storage area and the bulk of RMK's other equipment. The 815th also began to relieve the 299th of some of its self-help construction missions and to take over or initiate the majority of the longer term projects. By mid-summer, the 815th was at work on a 70 pad M8A1 surfaced heliport, a 50,000 BBL POL tank farm, the road network for the Pleiku evacuation hospital, operation of the areas biggest quarry complex and many smaller short term projects.[14]

The 70th Combat Battalion began the period as the base developer of An Khe and ended it as a new force in the Pleiku area. The 70th

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[13]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 8 August 1967, and "ORLL for Quarterly Period Ending 31 October 1967," 11 November 1967 (FOUO), 299th Engineer Battalion, Section 1.

[14]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 9 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 12 November 1967 (FOUO), 815th Engineer Battalion, Section 1.

also began the period as a three line company battalion, adding its fourth company on 1? June to close out the ranks of the "D" series units.

When it cleared An Khe on 10 October 1967, the 70th left many monuments to its efforts. In the 26 months it had spent at An Khe, the 70th had seen the untouched jungle turn into a major city. During its last five months at the 1st Cavalry Division base, the battalion completed the 65,000 BBL tank farm, upgraded a critical tactical road net east of An Khe, prepared QL 19 from An Khe Pass to An Khe for surfacing, continued support of self-help construction and completed the An Khe airfield runway. This last project, accomplished with the assistance of B Company, 84th Engineers, gave An Khe a 4365' x 72' concrete runway, the first and perhaps the last built at an army camp in Vietnam.

On its arrival in Pleiku, the 70th relieved the 299th of responsibility for QL 14 from Pleiku to Kontum and began to assume its share of the base development load in this new area.[15]

The problems of the 937th Group were largely those of the command. Shortages of electrical and plumbing supplies prevented project completion at An Khe and Pleiku and repair parts problems deadlined many pieces of equipment transferred to the group from RMK. Unique in this area, however, was the 937th's problem with the slip form paver used to complete the An Khe runway. This sophisticated item was usable, but the rigid tolerances required for its use indicated that a conventional form riding paver might have been more effective.

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[15]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 10 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 14 November 1967 (FOUO), 70th Engineer Battalion, Section 1.

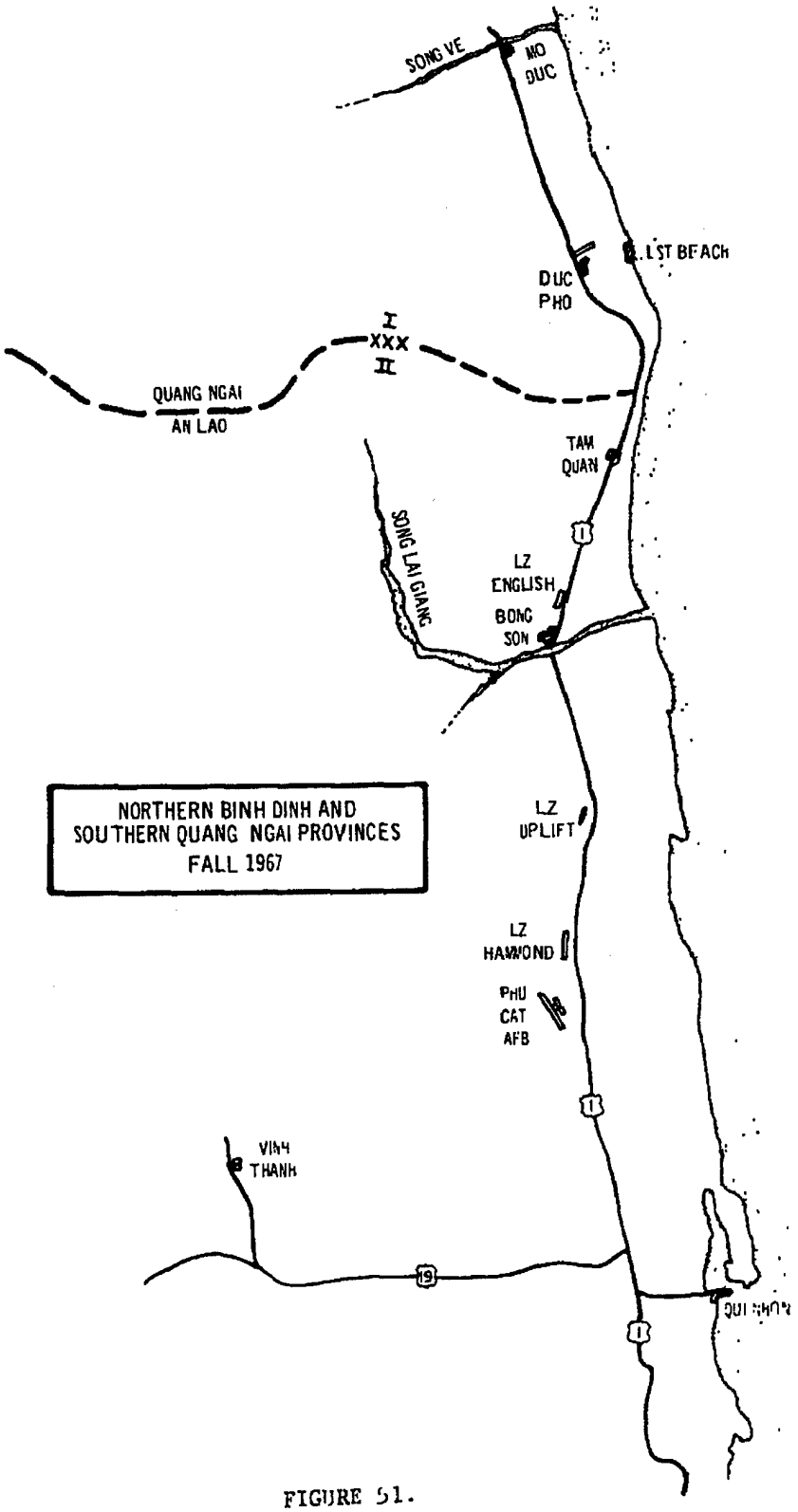
The 937th continued to suffer from its combat organization. All three of its combat battalions were at work on base development and two of these on relatively sophisticated projects, requiring considerably more engineering and vertical construction talent than found in the combat TOE.

The Southwest monsoon provided the group with expected problems and 1967 found the 937th ready to cope with them. The MSRs were in good shape before the monsoons and were able to last through the season. In most cases, the bases were also ready and only a few areas required major effort. Most notable of these efforts were the three 6000' POL lines built at Camp Holloway, Pleiku, to provide access to an inundated POL dump.

## Qui Nhon Area

Major changes in the focus of the 45th Construction Group occurred in April, May and October. With the April movement of the 1st Cavalry Division and Task Force OREGON into Quang Ngai province, the 45th began a northward shift of effort that culminated in July with the move of the 19th Battalion from Qui Nhon to Tam Quan. (Figure 51.) In May, the southern boundary of the group was shifted from Ninh Hoa to Tuy Hoa and the 45th gave up responsibility for Port Lane and Tuy Hoa to 35th Group. In October, with the move of the 70th Battalion to Pleiku, the 45th assumed responsibility for base development at An Khe.

The force structure of the group was adjusted to the new area of responsibility. The 577th Battalion was transferred to 35th Group with the shift of the southern boundary and the 589th Battalion added to the group to compensate for the move of the 19th from Qui Nhon. To




NORTHERN BINH DINH AND
SOUTHERN QUANG NGAI PROVINCES
FALL 1967

FIGURE 51.

support Task Force OREGON (Americal Division), the 39th Battalion was attached to the task force to provide divisional engineer support until a permanent battalion could be constituted for the division.[16]

Both the 84th and 589th Construction Battalions spent the summer and fall in the Qui Nhon area. The 84th continued its work in Qui Nhon City, on the MSRs near Qui Nhon and at Long My. LOC upgrading and paving operations on QL 1, LTL-440 and a bypass road between 440 and the city occupied a major part of the battalion's effort. With the departure of the 19th for Tam Quan, the 84th assumed responsibility for completion of the Long My complex.[17]

The 589th Construction Battalion arrived in Vietnam aboard the USNS Pope from Fort Hood, Texas, on 29 April and was immediately attached to the 84th and employed in Qui Nhon proper. The 589th's initial mission to relieve the 35th Battalion of responsibility for the Cha Rang Maintenance and Supply areas was expanded in May to include upgrading of Route 19 from Qui Nhon to An Khe for RMK paving. In May, the battalion was also assigned the combat support project of finishing construction of a DBST runway at Vinh Thanh. This mission was completed in mid-July. In October, following the detachment of B Company, 84th Engineers, from the 70th, B/84th returned to Qui Nhon and was relieved by B/589th.

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[16] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 14 August 1967, and "ORLL for Quarterly Period Ending 31 October 1967," 13 November 1967 (FOUO), 45th Engineer Group, Section 1.

[17] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 10 August 1967 (FOUO), and ORLL for Quarterly Period Ending 31 October 1967," 10 November 1967 (FOUO), 84th Engineer Battalion, Section 1.

The 589th then had companies located at An Khe, An Khe Pass and Cha Rang.[18]

By 31 October 1967, both the 19th and 35th Combat Battalions were upgrading QL 1 and providing support to the 1st Cavalry. The 19th spent the early summer at work at Long My. During the last two weeks of July, the battalion headquarters and A and B Companies moved to Tam Quan to begin an upgrading of QL 1 from Tam Quan to Duc Pho. This upgrading required, in its initial phases, spanning of 16 gaps with 690' of Bailey bridge, six timber trestle bridges and three decked railroad bridges. D Company, which was formed in June as the battalion's fourth line company remained at Long My until late August and then moved to the Duc Pho area. C Company joined its parent battalion in the English area in late September.[19]

The 35th Battalion began the period with three line companies at work on QL 1 and supporting the 1st Cavalry and one company continuing the construction in the Cha Rang area. By October, the mission of the 35th had changed only slightly, with the battalion's responsibility for Cha Rang transferred to the 589th and the 19th assuming LOC upgrading and combat support north of the English area. In late April, C Company moved from Cha Rang to LZ Uplift, south of the Song Lai Giang,

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[18]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 9 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 31 October 1967 (FOUO), 589th Engineer Battalion, Section 1.

[19]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 31 July 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 31 October 1967, 19th Engineer Battalion, Section 1.

and in May, D Company, 20th Engineers, which had been with the 35th since February, became D Company, 35th Engineers.[20]

On 9 April, Headquarters, A and B Companies of the 39th Combat Battalion moved by sea from Tuy Hoa to Duc Pho to support the 1st Cavalry on Operation LEJEUNE. On arrival of the battalion at Duc Pho operational control shifted to IFFV. On arrival of Task Force OREGON, the battalion (-) was attached to this provisional division. B Company moved from Tuy Hoa to Long My on 19 May and supported the 19th in the depot construction until 21 June when it moved by sea to Chu Lai to join its parent battalion. C Company remained at Ninh Hoa until 10 May when it also travelled by sea to Chu Lai.[21]

The principal problem of the 45th Group during the summer and fall was a lack of heavy bridging material. The concentrated effort of two combat battalions and their remarkable progress in upgrading QL 1 outdistanced the supply system's capability to keep pace and resulted in temporary delays in some bridge construction.

### Cam Ranh - Tuy Hoa

The 35th Construction Group expanded its area of responsibility during the late spring and early summer to include Tuy Hoa and Ban Me Thuot and shifted its focus from Cam Ranh Bay to Nha Trang and Tuy Hoa. (Figure 52.) The attachment of the 577th Battalion accompanied the

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[20] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 35th Engineer Battalion, 10 August 1967, Section 1. (FOUO.)

[21] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 15 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 13 November 1967, 39th Engineer Battalion, Section 1.

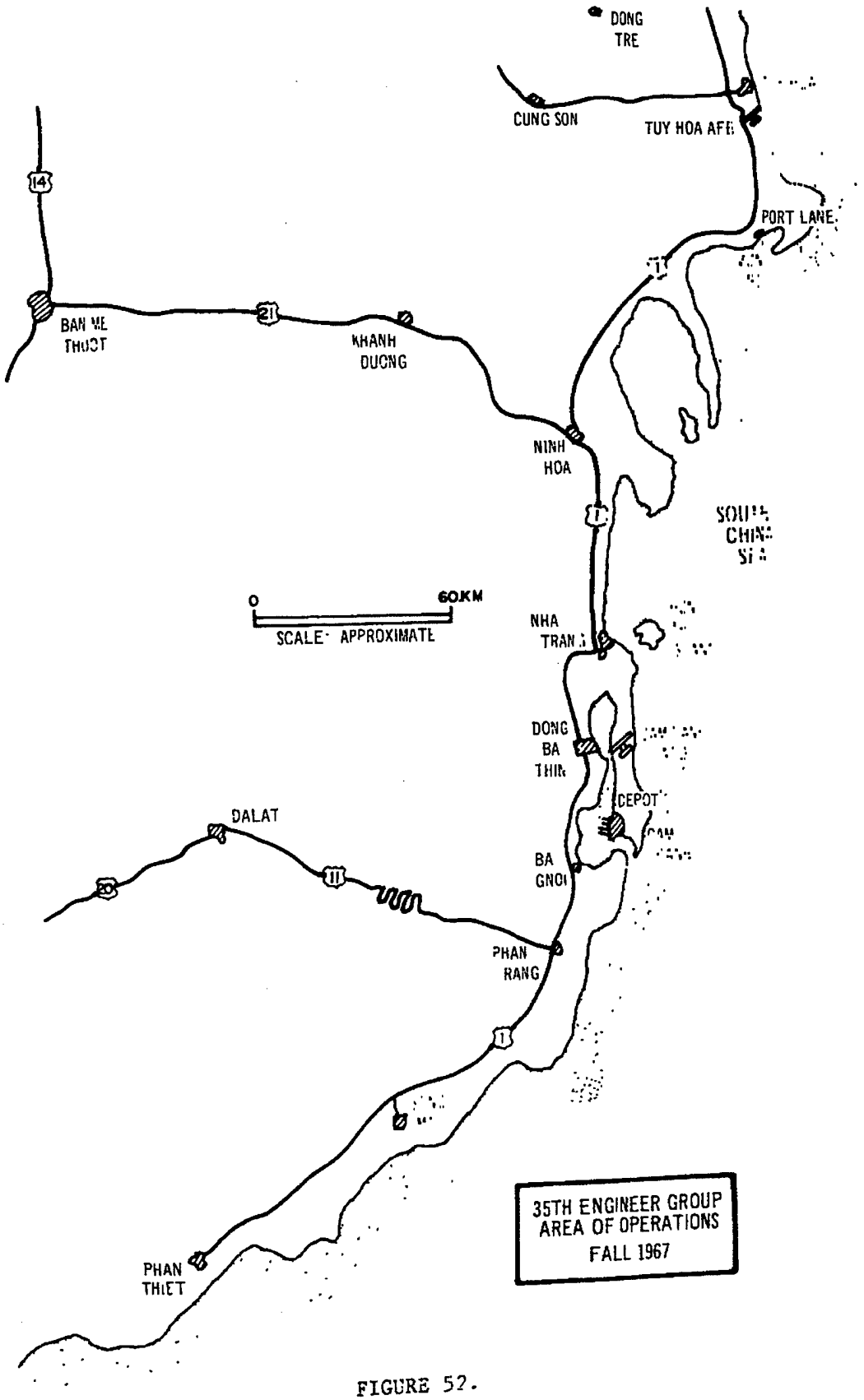
DONG TRE
CUNG SON
TUY HOA AFB
PORT LANE
14
BAN ME THUOT
21
KHANH DUONG
NINH HOA
1
SOUTH CHINA SEA
0 60KM
SCALE- APPROXIMATE
NHA TRANG
DONG BA THIN
CEPOT
DALAT
20
11
BA GNOI
PHAN RANG
1
PHAN THIET
35TH ENGINEER GROUP
AREA OF OPERATIONS
FALL 1967

FIGURE 52.

assumption of responsibility for the Tuy Hoa complex. The expansion to the west only brought greater fragmentation of the assets of the 14th Battalion.[22]

The 87th Construction Battalion continued its concentration on construction at Cam Ranh Bay. With the departure of the 864th from the peninsula, the battalion assumed total responsibility for supporting the self help construction program and operating the Cam Ranh quarry. The 87th began improvement of ammunition storage facilities, and erection of a 200,000 BBL marine POL tank farm near the POL jetty. Work was also continued on erection of prefabricated warehouses in the depot complex, maintenance of MSRs, expansion of the hardstand area at the port (Figure 53) and construction of the six acre drainage pond. B Company, at Phan Rang, devoted the majority of its effort to construction of seven 40' x 100' pre-engineered warehouses in the Phan Rang support area.[23]

The horizontal emphasis of the 864th Construction Battalion shifted from Cam Ranh Bay to the upgrading of QL 1, while the battalion's vertical effort moved to Nha Trang. By June, the efforts of A, B and D Companies and the asphalt section of the 102d Construction Support Company were at work on QL 1 in the Dong Ba Thin area. A Company

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[22]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 12 August 1967 (CONFIDENTIAL), and "ORLL for Quarterly Period Ending 31 October 1967," 14 November 1967 (FOUO) 35th Engineer Group, Section 1.

[23]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 8 August 1967, and "ORLL for Quarterly Period Ending 31 October 1967," 10 November 1967 (FOUO), 87th Engineer Battalion, Section 1.

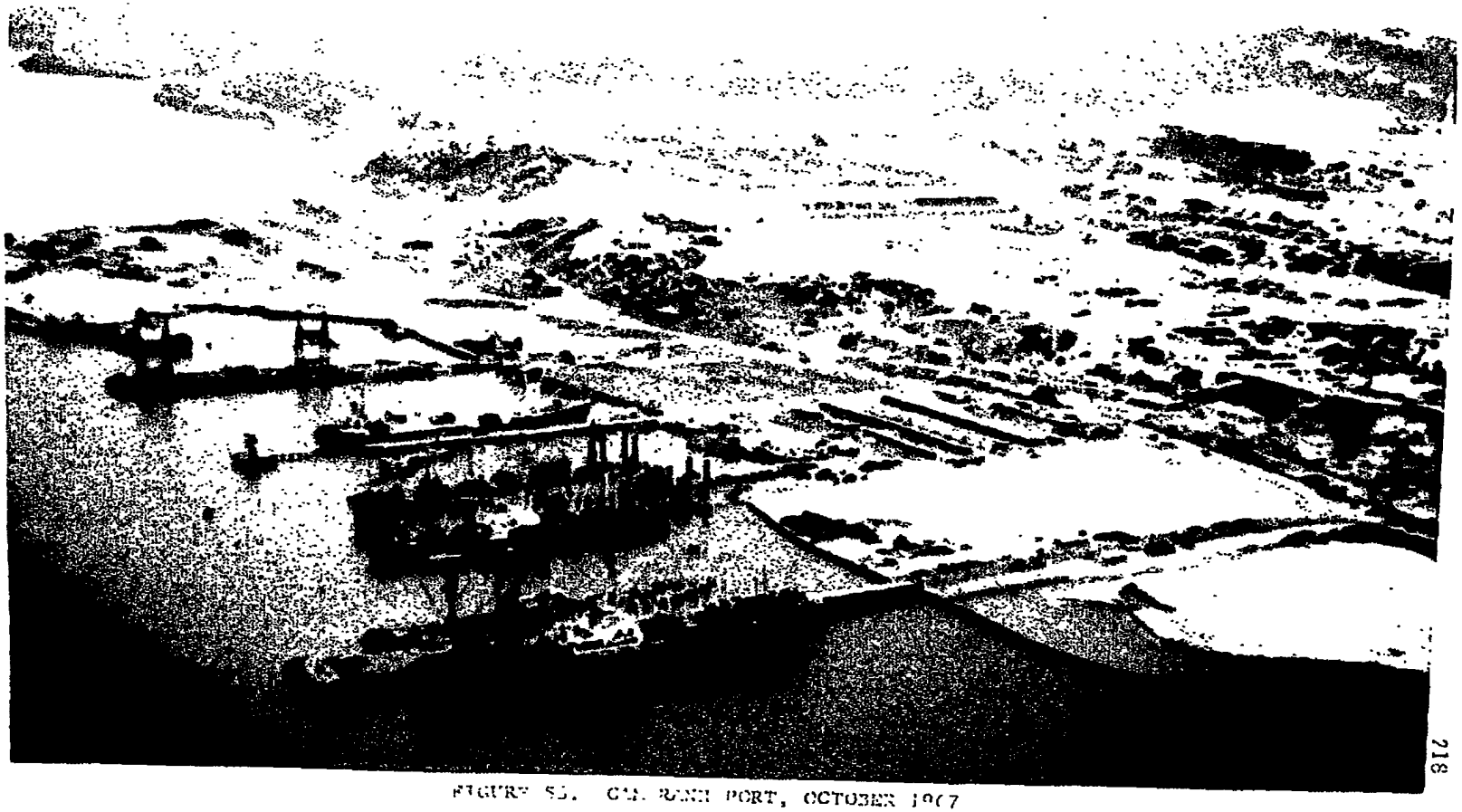

FIGURE 55. CAL. RUSH PORT, OCTOBER 1967

established a quarry at Ba Gnoi while B and D Companies prepared the roadway for the 102d's paving.

On 29 July, B Company moved to Nha Trang to assume responsibility from RMK for construction of a 6000 man permanent cantonment, complete with sewage and water supply systems. C Company continued its efforts on Hon Tre Island completing the road to the top of the mountain and essential work on the island's other facilities.

In late August, the importance of the Nha Trang effort was indicated by the move of the 864th to Camp McDermott and the initiation of paving operations on Nha Trang's beach road.[24]

During the summer, the 14th Combat Battalion became one of the most fragmented units in Vietnam with, at one point, companies at Phan Thiet, Bao Loc, Cung Son and Ninh Hoa, and platoons at Ban Me Thuot, Cam Ranh Bay, Dong Ba Thin and Dalat. A Company, which moved to Ninh Hoa on the close of SUMMERALL in early May, supported operations of the 9th ROK Division, began upgrading of QL 1 in this same area, and sent one platoon to Ban Me Thuot to begin M8A1 surfacing of an O-1 parking apron. B Company began the period in Phan Rang shifting to Bao Loc to surface the 3500' T-17 runway with M8A1. On 31 July, C Company ended its efforts at Dong Ba Thin and moved to Phan Thiet to initiate LOC upgrading operations. Also in late July, D Company, with only engineer security, moved from the Replacement Center at Can Ranh to Cung Son to

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[24]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 8 August 1967 (FOUO), "End of Tour Notes," 31 July 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 7 November 1967 (FOUO), 864th Engineer Battalion, Section 1.

replace the T-17 surface with M8A1 mat. The company returned to Dong Ba Thin in September.[25]

The 577th Construction Battalion, strengthened by the arrival in May of a C Company (formerly B Company, 69th Engineers), continued its expansion of the Free World Cantonment at Tuy Hoa and took on combat support missions north and west of Tuy Hoa. In the cantonment area the battalion completed a 3500' M8A1 surfaced runway, the 91st Evacuation Hospital, refrigerated storage, and a 1500 man mess hall and began work on a 30,000 BBL POL facility and an LOC upgrading program.

C Company departed from its construction role on 28 June and moved to Dong Tre, where it completed, in 60 days, a 2500' M8A1 surfaced runway. In September, the 577th sent forces into the Tuy Hoa Valley to support the 9th ROKs and the 173d Airborne on Operation BOLLING with minesweeping teams, MSR maintenance and rafting.[26]

With elements of the group scattered throughout central II Corps, the 35th sorely missed the aviation support required to properly control and support these forces. The groups other major problem involved the missions given to its subordinate battalions. The 14th's move to Cung Son, without infantry security, strained the assets of that battalion because of a relative lack of infantry weapons such as the M-79 and M-60. This same problem arose again with the 577th, both

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[25]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1967," 14th Engineer Battalion, 15 November 1967, Section 1. (FOUO.)

[26]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," undated (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 11 November 1967, 577th Engineer Battalion, Section 1.

in the operation at Dong Tre and in support of BOLLING. In the case of the 577th, a construction battalion, this lack of weaponry was even more pronounced.

## 20th Engineer Brigade, III-IV Corps

The engineer organization within III-IV Corps changed twice during the April-October period. The first change occurred on 20 April, when Headquarters, 34th Construction Group, which had arrived in Vietnam on 23 March by air from Fort Lewis, became operational and assumed responsibility from the 79th and 159th Group for the Vung Tau-Xuan Loc and IV Corps areas. From April until August, the 34th, 79th and 159th Groups operated directly under USAECV. On 3 August, the 20th Engineer Brigade arrived at Bien Hoa Air Base from Fort Bragg, North Carolina. On 5 August, the 20th Brigade, on order of USAECV, assumed command of the 34th, 79th and 159th Groups with the mission of planning, coordinating and executing assigned operational support, troop construction, lines of communication development, revolutionary development support and related programs within III and IV Corps. The 20th's instructions excluded operational control of those engineer elements under control of IIFFV.[27]

The 20th Brigade also assumed responsibility for the engineer problems of III and IV Corps, which included the annual battle with the Southwest monsoon and transportation of supplies to support the expanding engineer effort in the Delta. The results of nearly two years

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[27]"Letter of Instruction," from USAECV to 20th Engineer Brigade, 22 November 1965. This document confirmed earlier verbal instructions.

work in III Corps paid handsome dividends in combating the effects of the monsoon at the major bases; however, the LOC program had not progressed sufficiently to abate the effect of the rain on the highways. Though the problems with the monsoon were not as great as in previous years, there were still problems.[28]

Problems with transportation to and from the Delta were compounded by the length of the land routes and the relative insecurity of these MSRs. To get around the drawbacks of land transportation, 20th Brigade was given operational control of 25, 100-300 ton barges. These barges were used to carry construction supplies from Vung Tau to the Delta cities. The Transportation Corps provided tugs for the movement, and the 9th Division, air and bank security and gunboat support.[29]

## Long Binh - Bien Hoa

With the arrival of the 34th Group, the area of responsibility of the 159th Construction Group shrunk to include only Saigon and Bien Hoa-Long Binh (Figure 54) and a mission assignment at Long Thanh. The group's major efforts continued to be in the construction field with operational support generally limited to equipment loans. The group did continue its LOC program limiting it, however, to its new area, with work on the Bien Hoa-Long Binh-Long Thanh highway.[30]

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[28]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1967," 20th Engineer Brigade, 31 October 1967, Section 1. (FOUO.)

[29]"Fact Sheet: Transportation of Construction Materials to the Delta," Headquarters, 20th Brigade, 11 November 1967.

[30]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 14 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 14 November 1967 (FOUO), 159th Engineer Group, Section 1.

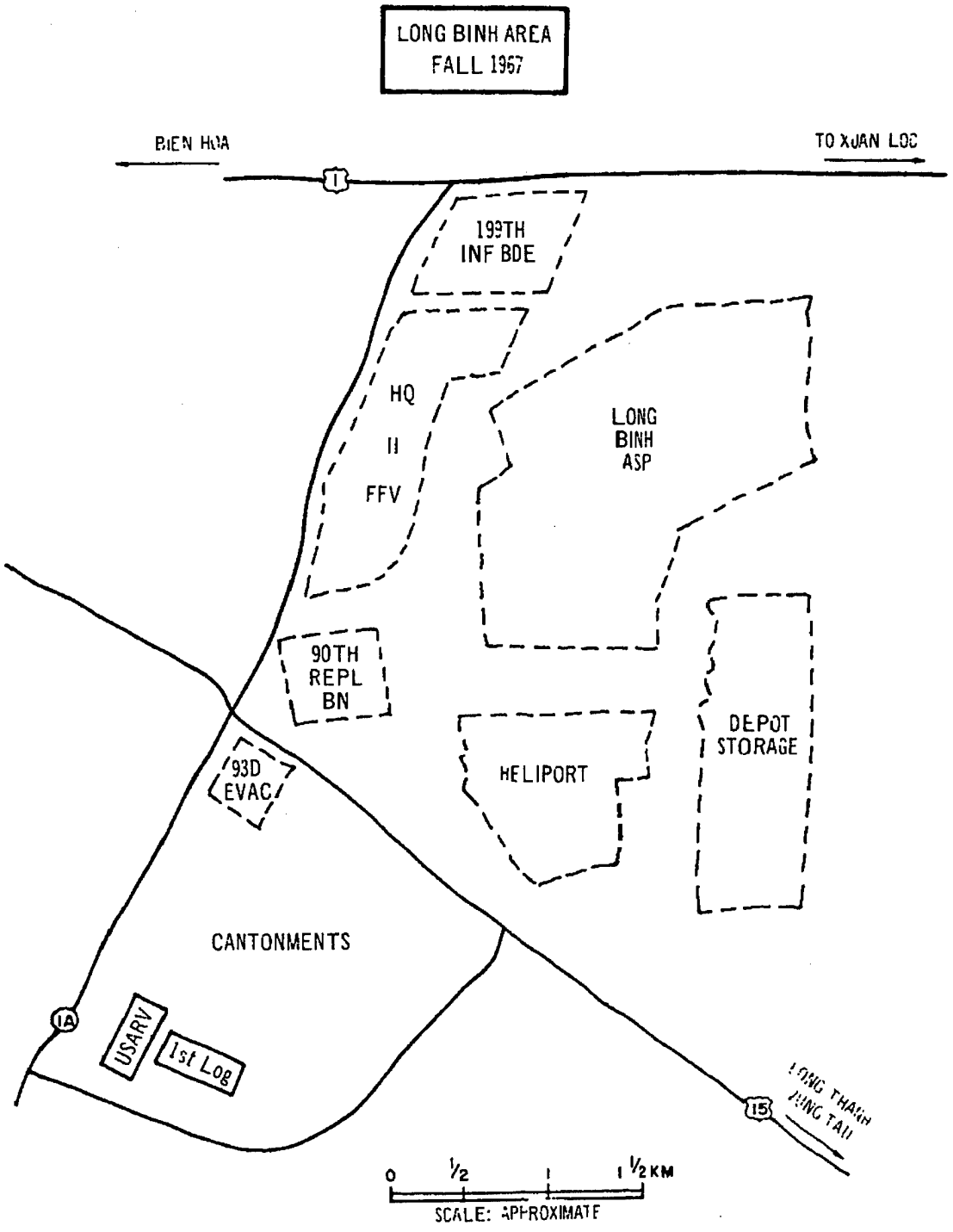
LONG BINH AREA
FALL 1967
BIEN HOA
TO XUAN LOC
1
199TH
INF BDE
HQ
II
FFV
LONG
BINH
ASP
90TH
REPL
BN
93D
EVAC
HELIPORT
DEPOT
STORAGE
CANTONMENTS
1A
USARV
1st Log
15
LONG THANH
VUNG TAU
0
1/2
1
1 1/2 KM
SCALE: APPROXIMATE

FIGURE 54.

All units of the 46th Construction Battalion were reunited in June for the first time since the battalions arrival in country in September 1965, when D Company moved by sea from Vung Tau to Long Binh to join the 46th in construction at Long Binh. The battalion, during the summer and fall, continued its work on the 199th Brigade cantonment, drainage facilities, trailer courts for trailer bachelor officers quarters (BOQ), rehabilitation of the ASP, officer's and enlisted mens clubs, and a IIFFV aviation facility.[31] The battalion sent elements to Saigon to work on POL facilities and to reconstruct the Fishmarket Bridge in a project which involved replacement of a one-way TS Bailey with parallel DS and DD Baileys.[32]

The 62d Construction Battalion also continued its efforts at Long Binh and Bien Hoa with projects to expand the IIFFV map depot, and to construct aircraft revetments, guard towers, a Long Binh amphitheater, 1500 man mess halls and the Long Binh heliport. With the assistance of a concrete production detachment, the 62d began in the summer to cast reinforced concrete beams for use in the LOC program, and, as part of the program, to upgrade two and one half miles of QL 15 in and near Long Binh.[33]

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[31]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 14 August 1967, and "ORLL for Quarterly Period Ending 31 October 1967," 1 November 1967 (FOUO), 46th Engineer Battalion, Section 1.

[32]MAJ M. 1. Kovel and CPT R. M. Goldfarb, "New Life for the Fishmarket Bridge, Saigon," Military Engineer, 60 (March-April 1968), 102-104.

[33]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 31 July 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," undated (FOUO), 62d Engineer Battalion, Section 1.

The 92d Construction Battalion (-) arrived in Vietnam from Fort Bragg on board the USNS Gordon on 23 May 1967. (B Company of the battalion had arrived during February.) The primary efforts of the 92d were focused on Long Binh as the battalion assumed its share of the construction of administrative facilities, motor pools, self help structures, and recreational facilities. (Figure 55.) Other projects taken on were the earthwork for an 89,000 BBL POL farm at Long Binh, the landscaping of USARV headquarters and protective construction for the contractor-built MACV headquarters at Tan Son Nhut.[34]

The 169th Construction Battalion split its efforts between Bien Hoa-Long Binh and Long Thanh with its primary emphasis being placed on horizontal construction. While the battalion did vertical work on the Bien Hoa communications center, general officers quarters, BOQs and mess halls at Long Binh and hangars at Long Thanh, the most significant projects undertaken included paving operations. At Long Thanh, the 5000' runway received an asphaltic concrete surface. Other work began on paving the highway from Long Binh to Long Thanh. At Long Binh itself, the battalion continued its steady pace of internal road net surfacing.[35]

Other than the brigade-wide problems with rain, the 159th's problems were limited to problems of obtaining an adequate supply of

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[34]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 13 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 31 October 1967 (FOUO), 92d Engineer Battalion, Section 1.

[35]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 12 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 11 November 1967 (FOUO), 169th Engineer Battalion, Section 1.

FIGURE 55. STORAGE AREAS, LONG BINH

the previously mentioned permanent construction materials such as electrical and plumbing fixtures and interior finish products. Despite the efforts of the command, brigade, and group, the problems remained present throughout the period.

### Southern III Corps and IV Corps

The focus of the 34th Construction Group shifted throughout the period from construction to combat support as the group's operations moved to the Delta with the 9th Division. (Figure 56.) Construction sophistication increased in the spring when the group assumed responsibility for RMK projects at Vung Tau and Can Tho and the base camps at Dong Tam, Long Thanh and Xuan Loc grew larger. The 34th's combat support missions centered on airfield rehabilitation and upgrading and direct support of the 9th Division and the 11th ACR.

When the 34th became operational in late April, the 27th and 86th Battalions were attached to the group. During the late spring and the summer the strength of the group grew from two to five battalions with the May, June and September arrivals of the 69th, 93d and 36th battalions.[36]

The 27th Combat Battalion began the period with all companies at Xuan Loc (Long Giao) and ended it with its companies scattered throughout III and IV Corps. A Company remained at the 11th ACR base working on cantonment improvement and upgrading of the airfields at

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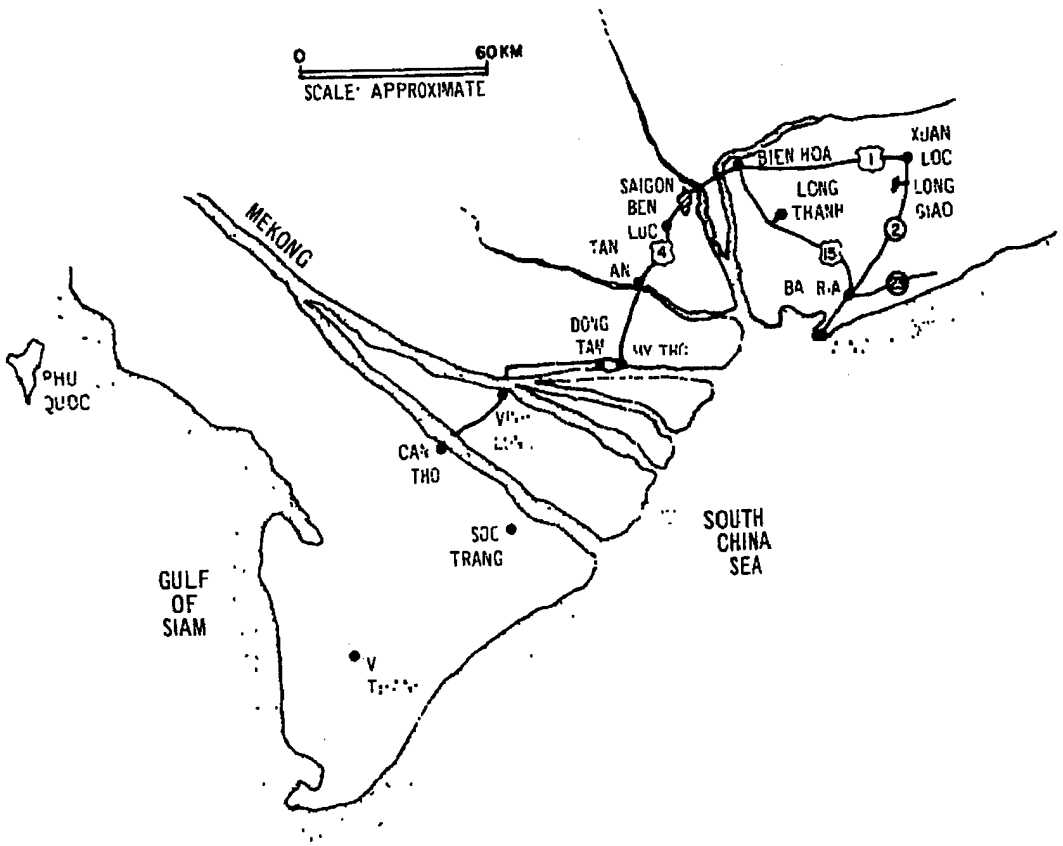
[36]U.S., Department of the Army, "ORLL for Quarterly Period Ending 30 April 1967," 18 May 1967 (CONFIDENTIAL), "ORLL for Quarterly Period Ending 31 July 1967," 10 August 1967 (CONFIDENTIAL), and "ORLL for Quarterly Period Ending 31 October 1967," 1 November 1967 (FOUO), 34th Engineer Group, Section 1.




34TH ENGINEER GROUP
AREA OF OPERATIONS
FALL 1967

FIGURE 56.

Xuan Loc City and Long Giao. B Company moved to Phu Quoc Island in May to construct, in a combined U.S. Army-ARVN operation, a 1000 man prisoner of war (POW) camp. On completion of the camp, the company built dependent housing for the ARVN forces at Phu Quoc and followed this with initiation of M8A1 surfacing of An Thoi airfield on the island. C Company spent April, May and June at Long Giao then moved into an area near Xuan Loc to initiate major quarry operations in that area. D Company moved in May to Vinh Long and put a sand-cement base and M8A1 surface on an existing C-130 airfield and followed this by completion of RMK initiated cantonment facilities for U.S. forces operating in the area.[37]

On 10 April, the 86th Combat Battalion was located at Phu Loi, Lai Khe and Bien Hoa. During the following 10 days, Headquarters, A and B Companies moved to Long Thanh to assist the 15th Engineers with development of the 9th Division base camp. C Company moved to Dong Tam to assist C Company, 577th Engineers, with work on the island base camp, and D Company shifted to Tan An to provide combat support to 9th Division forces on Operation ENTERPRISE. With the arrival of the 93d Battalion, responsibility for Long Thanh was transferred to the new unit, A and B Companies expanded their combat support role, and the battalion's base construction effort dropped to 12 per cent. Near Long Thanh, the battalion, along with the 86th Land Clearing Platoon, supported EMPORIA, UNIONTOWN and AKRON in major jungle clearing operations. Effort was also placed on clearing along QL 20 and LTL-?.

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[37] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," undated (CONFIDENTIAL), and "ORLL for Quarterly Period Ending 31 October 1967," 8 November 1967 (FOUO), 27th Engineer Battalion, Section 1.

In the Delta, support was given to the 9th Division with construction of artillery firing positions (Figure 57) at Tan An, Binh Phouc and Ben Luc and general improvement of the tactical base at Tan An. D Company moved during the late summer to Long Mai where it built two USSF camps and began upgrading a 1500' dirt runway to a C-130 capable M8A1 field.[38]

The 69th Construction Battalion from Fort Hood, Texas, arrived on 1 May at Vung Tau on board the USNS Geiger. On 1 May, B Company was redesignated C Company, 577th Engineers, and moved by sea to Tuy Hoa to join its new parent unit. C Company, 577th Engineers, at Dong Tam, on the same day became B/69th. The battalion, less its new B Company, began operations at Vung Tau, relieving D Company, 46th Engineers of responsibility for construction within the Vung Tau cantonment, improvements of the ASP and the POL tank farm. The 69th also initiated construction of a 50,000 BBL addition to the existing POL tank farm and built a barge loading facility to support the supply movement to the Delta. In late May, a task force from D Company moved to Can Tho to take over RMK initiated construction of a cantonment, an avionics building and a 100' x 140' hangar.

With the arrival of the 36th Battalion, responsibility for Vung Tau was transferred to the 36th on 1 October and the 69th began a month long shift into the Delta. Headquarters, A, and D Companies joined the D Company task force at Can Tho and C Company moved to Dong Tam to

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[38] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 8 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 9 November 1967 (FOUO), 86th Engineer Battalion, Section 1.

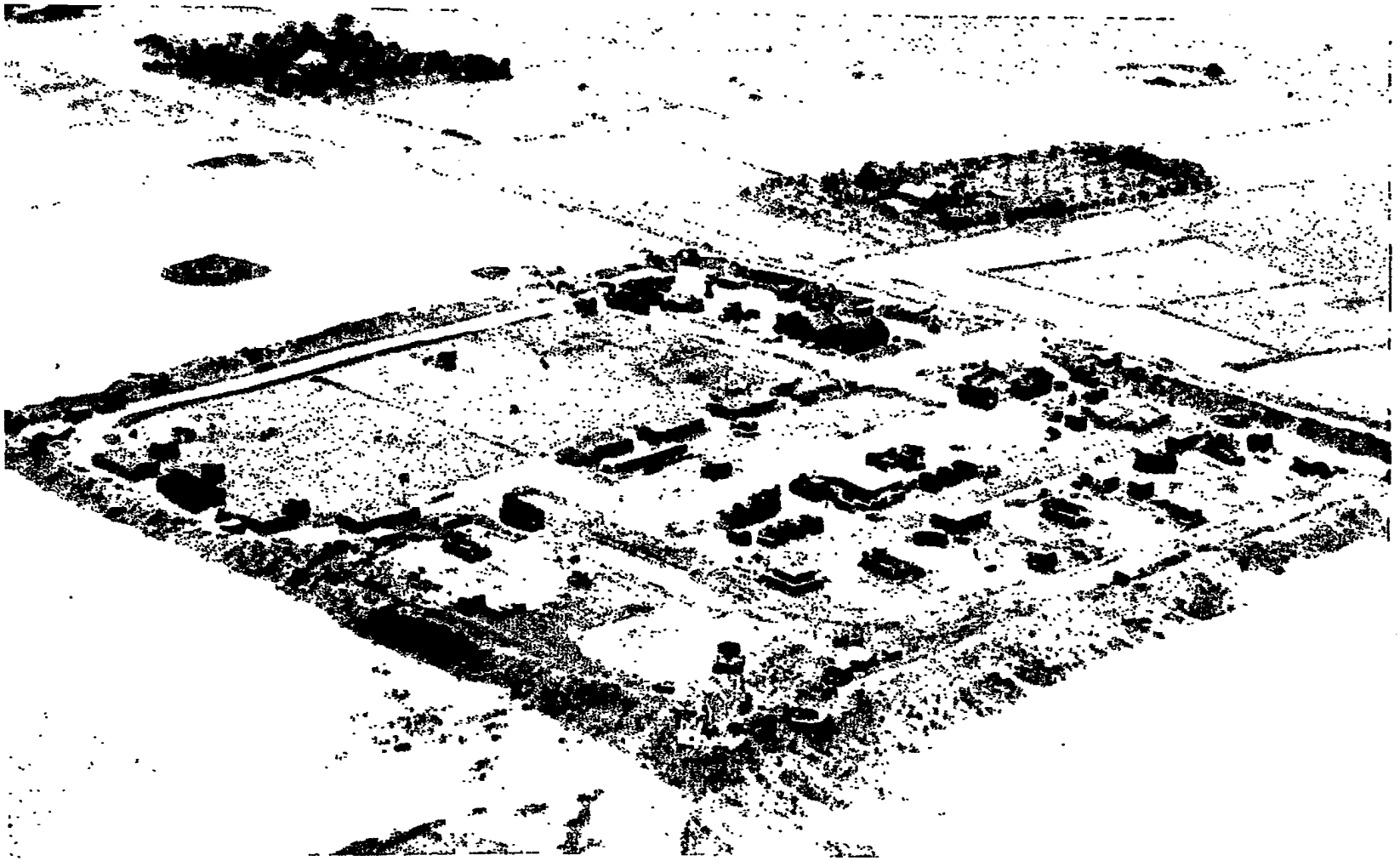

FIGURE 37. ARTILLERY FIRING POSITION IN THE DELTA

assist B Company with the construction of hutments, administrative and communication buildings, LCU ramps and an ASP.[39]

The 93d Construction Battalion from Fort Lewis, Washington, arrived at Long Thanh on 21 June following a sea movement on the USNS Upshur and took over in early July, from the 86th, development of this important area. A one company effort was placed on construction of support facilities, hangars and self-help billets at the Long Thanh (North) airfield which was being built by 159th Group. Company efforts were also put on erection of wood frame buildings for the 9th Division and in preparation of facilities for an incoming Thai Infantry Regiment.

The 93d also became involved in combat support when it relieved, on a permanent basis, a U.S. infantry company of responsibility for security of the Long Thanh (North) airfield.[40]

On 20 September, the 36th Construction Battalion arrived in Vietnam from Fort Irwin, California, on board the USNS Pope, and deployed to Vung Tau. On 1 October, the battalion took over from the 69th all engineer work at Vung Tau including the previously mentioned POL tank farm expansion, base development and barge loading facility,

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[39]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 31 July 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 4 November 1967, 69th Engineer Battalion, Section 1.

[40]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 9 August 1967, and "ORLL for Quarterly Period Ending 31 October 1967," 13 November 1967, 93d Engineer Battalion, Section 1.

and assumed responsibility for several RMK projects held up by material shortages.[41]

The 34th Group's problems during its first six months in country were those experienced previously by the other groups. With units operating in III and IV Corps, the group severely felt the command-wide shortage of aircraft and could only provide its subordinate units with marginal support. Rain, while not a significant problem at the better developed Vung Tau complex, did play havoc with construction at Long Giao, Dong Tam and the newer sections of Long Thanh, areas that had been built since the 1966 monsoon. At Dong Tam, the rain was severe enough to almost halt construction for a two month period as all efforts went into saving what had already been built.

## Northern III Corps

While the arrival of the 34th Engineer Group substantially reduced the 79th Construction Group's area of responsibility (Figure 58) and, temporarily, the number of battalions under its control, this arrival in no way reduced the groups workload. In April, the 27th and 86th Combat Battalions were detached from the 79th and attached to 34th Group. At the same time the 554th Construction Battalion joined the 79th on its arrival in country. In July, after an eight week period with the 159th Group, the 34th Construction Battalion also became a part of the 79th Group. The command structure of the group was altered in June, as previously mentioned, when the 168th and 588th Battalions and three separate companies went under operational control of IIFFV.

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[41] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1967," 36th Engineer Battalion, 11 November 1967, Section 1.

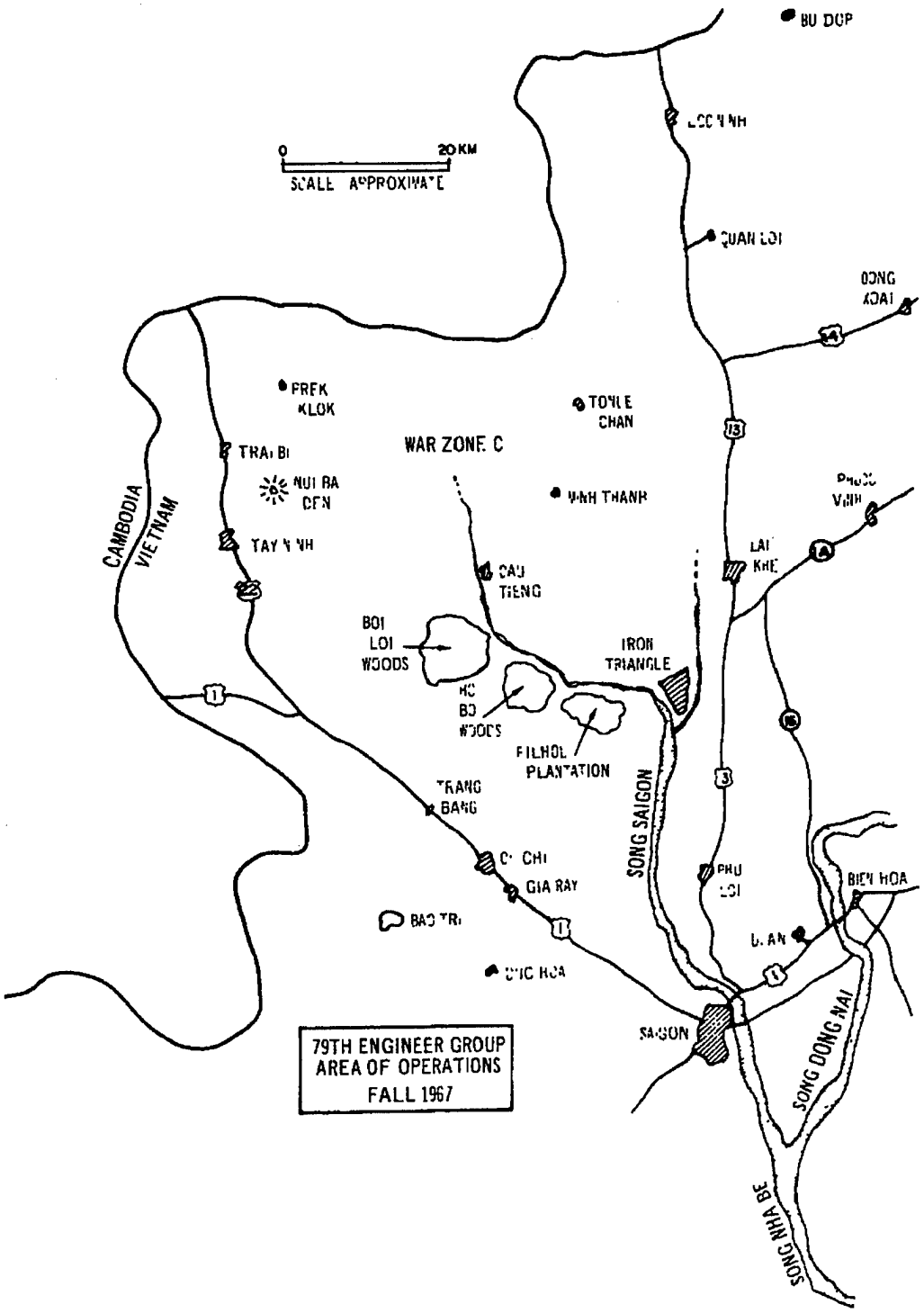
BU DOP
LOC NINH
0 20 KM
SCALE APPROXIMATE
QUAN LOI
DONG XOAI
PREK KLOK
TONLE CHAN
WAR ZONE C
TRAI BI
NUI BA DEN
MINH THANH
CAMBODIA
VIETNAM
TAY NINH
CAU TIENG
LAI KHE
BOI LOI WOODS
IRON TRIANGLE
HO BO WOODS
FILHOL PLANTATION
TRANG BANG
C. CHI
GIA RAY
SONG SAIGON
PHU LOI
BIEN HOA
BAO TRI
D. AN
TRUC HOA
SAIGON
SONG DONG NAI
SONG NHA BE
79TH ENGINEER GROUP
AREA OF OPERATIONS
FALL 1967

FIGURE 56.

The primary effort of the 79th Group continued its shift towards operational support and LOC work as development at the major bases of the 1st and 25th Divisions swung from minimum essential facilities to more sophisticated and more permanent support facilities.[42]

The distribution of the work of the 168th Combat Battalion jumped from a 15 per cent/85 per cent split between combat support and construction to 60 per cent/40 per cent in July, then moved down to a 50 per cent/50 per cent division in October. A "D" Company was added to the 168th's rolls in July as part of the "E" series conversion.

On 1 June, B Company left Di An for Lai Khe to relieve D Company of the 554th. The battalion's construction effort was then concentrated at this new area, Di An and Phu Loi in the erection of billets, warehouses and chapels and improvements of the base drainage systems. In late October, C Company moved to Quan Loi to begin development of a camp for the 1st Division's 1st Brigade, following its move from Phuoc Vinh.

With the May arrival of the 27th Land Clearing Platoon, the 168th began a series of jungle clearing operation for both the 1st and 25th Divisions. Concurrently the battalion continued its effort on upgrading of critical airfields in the 79th area of responsibility. On PAUL BUNYAN, operating with the 1st Division, the battalion cleared 7190 acres of jungle along Route 13 (Figure 59) and on Kunai, the 168th provided the same support to the 25th Division operating in the Ho Bo

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[42] U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 8 August 1967 (CONFIDENTIAL), and "ORLL for Quarterly Period Ending 31 October 1967," 31 October 1967 (FOUO), 79th Engineer Group, Section 1.

FIGURE 59. JUNGLE CLEARING ALONG HIGHWAYS

Woods and on the Filhol Plantation. During MANHATTAN the battalion assisted the 1st with the upgrading of Tong Le Chan airfield and provided general support to the combat elements of the division.

In June, a task force moved to Dong Xoai where the existing 2300 foot runway was expanded to 3400'. In August, another company sized task force moved completely by helicopter to Bu Dop, near the Cambodian border, to begin expansion of a C-7A runway to C-123 length, using air transportable light equipment borrowed from several units in the III Corps area.[43]

The 588th Combat Battalion, during the April-July period, saw a major shift in the distribution of its effort, reducing base development activity from 60 per cent to 15-25 per cent of the overall load and raising the LOC effort from near zero to 45 per cent. With the arrival of the 554th Battalion in April, responsibility for Cu Chi was transferred from the 588th and the battalion headquarters shifted to Tay Ninh. A Company was attached the 554th at Cu Chi from April until September, at which time it joined the battalion at Tay Ninh.

The 588th's major construction missions remained, throughout the summer and early fall, at Tay Ninh and Dau Tieng, with the efforts at Tay Ninh reduced by the deployment of the 196th Brigade to Task Force OREGON. Finally, in mid-October, the majority of base construction at both Dau Tieng and Tay Ninh was halted as part of an overall theater review of unit stationing.

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[43]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 15 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 14 November 1967 (FOUO), 168th Engineer Battalion, Section 1.

The 588th's LOC upgrading program was concentrated on the MSRs between Tay Ninh and Dau Tieng, Trai Bi, Prek Klok and the Cu Chi area, with the battalions principal effort going to holding the roads open in the face of the Southwest monsoon and increased Viet Cong activity. For combat support, the 588th provided a battalion task force to the 25th Division for Operation MANHATTAN and continued maintenance of the airfield at Dau Tieng and Tay Ninh and upgrading of the USSF camps at Minh Thanh north of Dau Tieng, and Tay Ninh.[44]

The 554th Construction Battalion arrived in Vietnam from Fort Knox, Kentucky, on 13 April and was immediately deployed to Cu Chi, Phu Loi and Lai Khe. At Cu Chi, A and B Companies took over construction of the 25th Division base camp from the 588th, receiving attachment of the 588th's A Company. At Phu Loi and Lai Khe, C and D Companies relieved companies of the 86th Combat Battalion and continued the base construction already in progress. On 1 June, D Company at Lai Khe was relieved by B Company, 168th Engineers, and moved to Cu Chi to join its parent battalion.

During the summer and fall, the battalion's effort was spent on monsoon maintenance of QL 1 in the Cu Chi area and an expansion of billet areas, base support facilities and hangars at Cu Chi. Some effort was also devoted to preparation of minimum essential facilities for an inbound aviation company and rehabilitation of Cu Chi airfield.

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[44]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 October 1967," 588th Engineer Battalion, 15 November 1967, Section 1.

In September, as part of a group shift of assets, C Company was relieved of responsibility for Phu Loi construction and returned to Cu Chi. At the same time, A Company, 588th Engineers, was released from attachment to the 554th and moved to the Tay Ninh area to join the other elements of the 588th.[45]

The 34th Construction Battalion arrived in country on 2 May from Fort Gordon, Georgia, and moved all elements to a base camp at Bien Hoa. The battalion then began work in support of self-help construction of a 3631 man cantonment and on road maintenance within the army portion of Bien Hoa base. During the late summer, the 34th deployed D Company to Phu Loi to relieve a company of the 554th and platoons to Di An and Lai Khe to assist the 554th with construction of prefabricated hangars, helicopter revetments and concrete tennis courts. The battalion also began upgrading of QL 1 in the Bien Hoa area.[46]

The 79th Group's experience with land clearing operations and the problems of supporting the dependent land clearing platoon led the group to direct the 168th Battalion to form a land clearing task force. The success of this company size force, which provided its own logistics support and adequate communications, signaled a trend in use of the land clearing units. The groups experience in obtaining light equipment for the construction of Bu Dop pointed out the continuing

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[45]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 15 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 10 November 1967 (FOUO), 554th Engineer Battalion, Section 1.

[46]U.S., Department of the Army, "ORLL for Quarterly Period Ending 31 July 1967," 15 August 1967 (FOUO), and "ORLL for Quarterly Period Ending 31 October 1967," 15 November 1967 (FOUO), 34th Engineer Battalion, Section 1.

requirement for airmobile equipment and the length of time required for CONUS action on the commander's request for this type of equipment.

The 79th's problems with the monsoon were severe; so severe as to lead one battalion to report that it was foolish to attempt significant construction during the heaviest part of the rainy season. The monsoon also compounded the groups problems with delivery of supplies to the northern bases at Phuoc Vinh, Lai Khe and Quan Loi. Because of the rains and heavy enemy activity in these areas, convoys were limited to once or twice a month and, since even rock had to be carried to the bases, resupply was a major problem.

## Division and Brigade Engineers

In the IIFFV area, the activities of the division/brigade engineers continued to follow the tactical paths of their parent units. The 4th Engineers provided A and B Companies in direct support of the 1st and 2d Brigades of the 4th Division on FRANCIS MARION and GREELEY, with these companies placing platoons and squads at the infantry battalion and company level to provide demolition and minesweeping support, fire base and LZ clearance and protective construction. D Company of the battalion, along with elements of E Company, spent the entire period in support of base development at Dragon Mountain. C Company (previously D Company, 65th Engineers) was attached to the 3d Brigade and joined the brigade in operations with Task Force OREGON (Americal Division).[47]

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[47] U.S., Department of the Army, "Combat After Action Report for Operation FRANCIS MARION," 26 October 1967, and "Annual Historical Supplement," 1 January 1966-30 June 1967, 4th Engineer Battalion, and "ORLL for Quarterly Period Ending 31 October 1967," 4th Infantry Division, 26 December 1967, Section 1. (CONFIDENTIAL.)

The 8th Engineers, 1st Cavalry Division, kept all of its companies in the field during the period. Headquarters, A and B Companies provided the full range of support to the division in its operations in Binh Dinh and southern Quang Ngai (PERSHING and LEJEUNE). During the initial phase of operations in Quang Ngai, the battalion built a 2500' C-123 airfield at Duc Pho in 72 hours using only helicopter lifted equipment. In the late summer elements of the 8th constructed a C-7A field south of Bong Son. C Company of the 8th followed the movements of the 3d Brigade, shifting, in June, to the highlands for GREELEY, in July back to Binh Dinh, and in October to the Chu Lai area to support Operation WALLOWA.[48]

The 173d Engineer Company, 173d Airborne Brigade followed the brigade from Bien Hoa to Pleiku and Kontum and continued to provide its full measure of direct support.

In I Corps, engineer support for the Task Force OREGON-Americal Division was provided by both the 39th Engineer Battalion and the separate companies attached to the brigades of the force (A/326th, 175th and C/4th). The 39th began operations with the division in April when it moved to Duc Pho to construct a 3000' C-130 airfield parallel to the 8th Engineer's C-123 runway (Figure 60). On 15 May, the battalion moved to Chu Lai and began development of a division base.[49] At the same time the separate companies of the division were providing direct support to the brigades.

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[48]U.S., Department of the Army, "ORLL for Quarterly Period Beginning 1 August 1967," 8th Engineer Battalion, and CPT R. E. Wofgram and MAJ G. E. Schneebeck, "Airmobile Engineer Support for Combat," Military Engineer, 59 (November-December 1967), 397-399.

[49]ORLL, 39th Engineer Battalion.

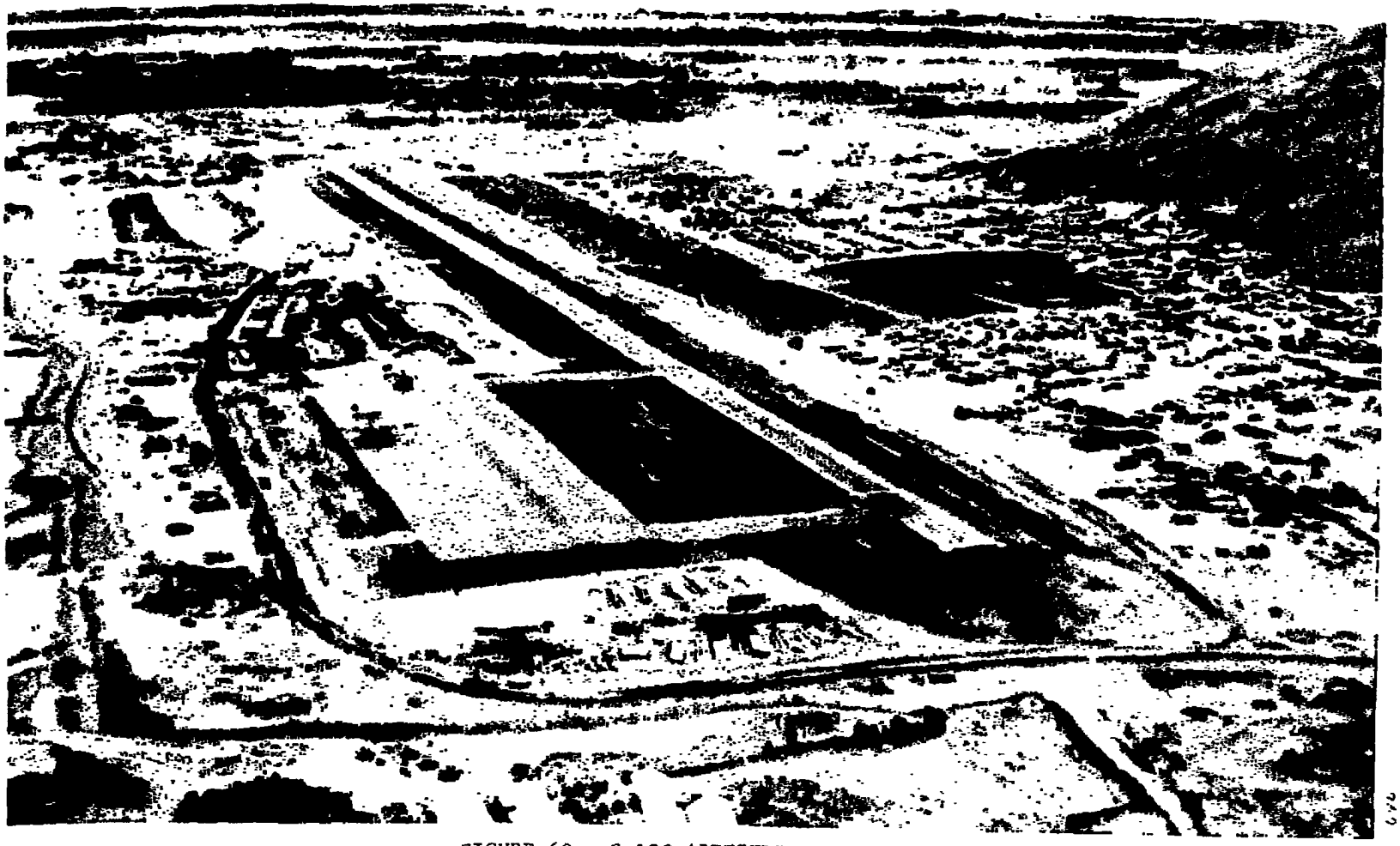

FIGURE 60. C-130 AIRFIELD, DUC PHO

By October, plans were underway to organize a divisional battalion using, as a base the separate companies of the division and a bridge company from 45th Engineer Group.

In the IIFFV area of operations the three divisional battalions continued the shift away from base development and towards combat support.

The efforts of the 1st Engineers, 1st Division, went to support of Operations MANHATTAN, DALLAS, PAUL BUNYAN and SHENANDOAH, with battalion commitments ranging from one to five companies and the areas of operation moving from Zone C to the areas east of QL 13 and to areas near the brigade bases. Continuing the emphasis on jungle clearing, the 1st, with support from the 79th Group, did much to open up the areas along the MSRs north of Saigon. During the height of the monsoon all efforts of the battalion were focused on keeping open forward airfields and low class MSRs. Base development support to the division generally was limited to work by the engineer companies not actively engaged in combat support.[50]

The 65th Engineers, 25th Division, were busy providing support for MANHATTAN, BARKING SANDS and KOLE KOLE, as well as several minor operations in the division area. While the 65th took a major role, with support from 79th Group, in the clearing of the jungle areas near Cu Chi, the battalions most significant accomplishments took place in the field of MSR work during the monsoon. A and B Companies teamed to

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[50]U.S., Department of the Army, "Combat Operation After Action Report," 1st Engineer Battalion, 10 December 1967, 31 May 1967, 11 August 1967, 6 September 1967, 14 July 1967, 18 June 1967 and 16 June 1967.

reconstruct TL-10 from Duc Hoa to Bao Tri and A Company alone, rehabilitated a 13 KM stretch of the same road near Trang Bang. Near Trang Bang, B Company completely rebuilt a destroyed highway bridge in a project that involved raising the existing bridge, constructing a new center pier and approaches and redecking and painting the completed structure. Similar MSR missions were performed by C Company and D Company (formerly C Company, 4th Engineers) in areas between Cu Chi and Dau Tieng.

Throughout the period, each of the line companies provided its share of close support with emphasis on tunnel and bunker destruction, minesweeping and LZ and fire base clearance.

At the Cu Chi and Dau Tieng base areas the battalions efforts were largely restricted to improvement of the perimeter barrier systems and drainage facilities, although the 65th did prefabricate for self help erection, latrines, showers and housing kits.[51]

The 15th Engineer Battalion, 9th Division, continued to split its efforts between Long Thanh and the Delta. The battalion supported Operations PADDINGTON and AKRON near Long Thanh with engineer task forces carrying out the standard minesweeping and demolition missions, while other elements of the 15th continued improvement of the division base. The two companies operating in the Delta continued to improve the limited facilities at the 2d Brigade base and to support division forces on Operation ENTERPRISE in eastern Long An.

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[51]"Recommendation for Meritorious Unit Commendation," for the 65th Engineer Battalion from 25th Infantry Division to IIFFV, 18 March 1966.

With the initiation of the CORONADO series of operations by the Mobile Riverine Force (MRF) (the 2d Brigade and Navy Task Force 117) the requirements for engineer direct support diminished as the nature of MRF operations eliminated many typical demolition and minesweeping missions. During the initial series of operations, because of this change in mission, committed engineer forces were frequently employed to fill out short handed infantry units.[52]

The two separate companies of IIFFV, the 87th (199th Brigade) and 919th (11th ACR) continued to split their effort between combat support of brigade and regimental operations around and to the east of Saigon and improvement of the unit's base camps.

As the division/brigade units were able to move away from base development missions, their problems decreased towards only weather and enemy. In their base development role, they encountered the frustrating problems of materials shortages and weather shutdowns. In their combat support role, weather remained the foe, but the mission was one of holding and limited improving rather than permanently constructing.

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[52]Questionnaire returned by LTC T. C. Loper, USA, 15th Engineer Battalion, Fort Leavenworth, Kansas, undated (February 1968), and letter from LTC T. C. Loper to Major L. J. Bonito, untitled, Fort Leavenworth, Kansas, 3 February 1968.

# CHAPTER VII

# OTHER ENGINEERS

## General

While the contribution of the army divisional and nondivisional engineers to the Vietnam construction program was extremely significant, considerable support was provided by other members of the engineering profession, military and civil, of the United States and other nations. As previously indicated, to detail the accomplishments of these other engineers would require several volumes. The purpose of this chapter then, is to list the other engineer forces at work in Vietnam, and to outline the general scope of their work.

The present U.S. construction program in Vietnam began in 1962 when an American firm was awarded a contract to improve facilities for the Vietnamese Air Force. The program was expanded in 1963 following the collapse of the Diem regime.[1] In 1965, the civilian contractor was joined by additional civilian firms, U.S. Army and Navy engineer battalions and third country engineer elements. By October 1967, the program involved over 40 U.S. Army, Navy and Air Force battalion-size units, military construction elements from Vietnam and four other countries and an expanded contractor organization.

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[1] John Mecklin, "Building by the Billion in Vietnam," Fortune, LXXIV (September 1966), 114.

## MACV Directorate of Construction

Supervision and coordination of the United States construction program and coordination of United States sponsored Vietnamese and third nation construction programs rested, after February 1966, with the Directorate of Construction, MACV (MACDC).[2]

Prior to 1966, construction in Vietnam was being supervised by several agencies in an effort that was characterized as "consisting of three programs, four execution agencies, and having four bosses."[3] Much of the supervision was along service component lines and there was little, if any, coordination. In mid-1965, an engineer element was established in J4, MACV, in an attempt to tie together the various agencies.

Finally, the Secretary of Defense,

> . . . went to extraordinary lengths to try to insure effective management of construction in this theater of operations . . . he insisted over the objection of the subordinate commanders that we put a single officer in charge of construction . . . .[4]

This single officer was the Director of Construction, managing MACDC, a separate joint staff element within MACV.

In his role as construction czar, the director exercised directive authority over all Department of Defense (DOD) construction commands, controlled application of all program funds, and established

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[2] BG D. A. Raymond, "Construction in South Vietnam," Defense Management Journal, III (Fall 1967), 17-21.

[3] Ibid.

[4] U.S., Congress, House, Hearings Before the Committee on Armed Services on HR 4515, 90th Congress, February 1967, p. 101.

priorities, standards and criteria. One director likened this position to that of the Theater Engineer.[5]

## Contract Construction

Essentially all major contract construction in Vietnam after 1956 was handled by the Naval Facilities Engineering Command (formerly the Bureau of Yards and Docks) as the DOD agent in Southeast Asia.[6] In 1966, the Air Force made the only inroads into this exclusive jurisdiction, when DOD permitted the Air Force to contract for construction of a high priority airbase in Vietnam.

In 1962, the Navy contracted with a combine composed of Raymond International and Morrison-Knudsen (RMK) for work in Vietnam. By late 1965 the scope of the work had grown so large that two additional firms, Brown and Root and J. A. Jones were brought into the combine and RMK-BRJ was formed.

RMK-BRJ, operating on a cost-plus-fixed-fee basis, then proceeded to do much to alter the face of Vietnam. RMK (as the new combine was more commonly known) stretched its construction effort from I Corps to IV Corps and from the highlands to the coast. By late 1967 the firm, with a force of 51,000 men, had placed nearly one billion dollars in construction of permanent airfields, ports, communications facilities, permanent buildings, power plants, warehouses, hospitals and

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[5]Raymond, p. 70.

[6]RADM P. A. Corradi, "Military Engineering in Vietnam," Civil Engineering, 35 (November 1965), 47, and RADM H. N. Wallin, "The Construction Agent," Military Engineer, 58 (September-October 1966), 317-318.

highways, in areas that had been or were being secured by the combat forces.[7]

In May 1966, the Air Force received authority to hire Walter Kidde Constructors, Inc., for construction, on a turnkey basis, of an air force base at Tuy Hoa. Under the turnkey contract, Kidde isolated the project from all other such construction in Vietnam, hiring all but a minimum number of personnel from the United States and bringing in the bulk of the supplies over the beach. This project, which cost over 50 million dollars, was essentially completed in mid-1967.[8]

## Installation Support

Responsibility for engineer installation support was assigned to the 1st Log Command and was provided by a civilian contractor operating with indigenous labor and U.S. Army detachments and teams. Pacific Architects and Engineers (PA&E) became, in effect, the Post Engineers of Vietnam and furnished, in addition to the normal maintenance and repair services, considerable minor construction in the form of latrines and showers for rising base camps. The principal army engineer support to PA&E was provided by utilities detachments, water distribution teams and similar area oriented service groups.

## Troop Units

### United States

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[7] Mecklin, pp. 114-117, and Raymond, pp. 17-21.

[8] "The Air Force Beachhead at Tuy Hoa," Fortune, LXXIV (September 1966), 198, and MG R. H. Curtin, "Turnkey Project at Tuy Hoa," Military Engineer, 59 (May-June 1967), 162.

Navy and Marine Corps

Engineer support for the tactical elements in I Corps and for Navy elements in various areas throughout Vietnam was provided by the joint efforts of the Navy's Seabees and the Marine engineer battalions of the Fleet Marine Force. By mid-1967, there were nine mobile construction battalions (Seabees) and two Marine battalions operating in Vietnam. The activities of these units closely paralleled those of their army counterparts, with all units seeing some mixture of construction and combat support.

Air Force

Direct support of Air Force units operating in Vietnam was provided by the Air Force's counterpart to the Army's construction battalion, the Air Force Civil Engineering (Red Horse) Squadron. Five Red Horse Squadrons, three heavy and two medium, were located at the major air installations at Phan Rang, Cam Ranh, Phu Cat, Bien Hoa and Tuy Hoa to maintain installation facilities and to, when time permitted, undertake new construction.[9] By mid-1967, these squadrons were at work on a variety of projects, ranging from BOQs to POL storage areas and had taken on all the appearances of full time construction units.

ARVN

The engineer effort of the ARVN was organized along the doctrinal lines of the U.S. Army. Each division had its organic engineer battalion and each corps its own combat group of three battalions. Two

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[9]Memorandum for CPT L. F. Smalley from MACDC, "Red Horse Squadrons," 27 January 1967.

construction groups (totaling seven battalions) provided general support throughout the country.

The missions of the ARVN engineers were principally those involved in completing MSR, bridge and airfield construction initiated by Ministry of Public Works and halted by Viet Cong resistance or action. Quite often ARVN engineers worked hand in hand with the U.S. engineers to complete critical routes or to open badly needed airfields.

## Third Nation Forces

### Korean

The ROK Force, Vietnam, possessed the largest third national engineer force in Vietnam. Each ROK division had its organic engineer battalion and was supported, in addition, by one nondivisional battalion. A fifth ROK battalion, a construction unit, was stationed at Di An and provided support not only to ROK forces in III Corps but also to Vietnamese military and civic action programs.

### Philippine

The Philippine commitment to the war in Vietnam was a construction battalion, supported by a security force, operating near Tay Ninh. This force assisted the activities of the Vietnamese Government in reopening the area to military and civilian movement.

### Australian and Thai

Direct engineer support for Australian and Thai forces in Vietnam was provided by company size elements attached to the Royal Australian Regiment and the Thai Queen's Cobra Regiment.

# CHAPTER VIII

# IN RETROSPECT

## General

There is little question that the overall performance of the Corps of Engineers in Vietnam was outstanding:

> The performance of United States Army Engineers in Vietnam adds another brilliant chapter to their history. Ever since the 35th Engineer Group went ashore at Cam Ranh Bay in mid-1965 the role of the military engineers in Vietnam has continued to grow more complex and demanding.
>
> In Vietnam, both machines and techniques are being applied by men with determination, imagination and courage.[1]

In less than 30 months, the army engineers, in cooperation and coordination with contractors and other military engineers, opened new ports along the coast, dotted the dense jungle with airfields, restored badly damaged highways, built and paved new roads, erected facilities to house and logistically support an army force of over 300,000 and provided combat support for the tactical operations that stemmed the tide of a communist offensive in Vietnam. In a period of 30 months the size of the engineer effort grew from one company to 26 battalions.

The purpose of this final chapter is to analyse and appraise the organization and employment of engineers in Vietnam, to appraise the new developments and problems encountered, and to determine what conclusions, if any, can be drawn from this analysis and appraisal.

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[1]GEN Harold K. Johnson, "Army Engineers in Vietnam," Military Engineer, 59 (September-October 1967), 337.

To analyse the organization and employment of engineers, the doctrine governing this organization and employment will be examined and then compared to the actualities of Vietnam.

It is not the purpose of this chapter to evaluate the conduct of the war in Vietnam or to question the relative lack of doctrine on organization and conduct of warfare in an internal defense environment. It must, however, be acknowledged that the war in Vietnam probably will not be the last of this type war.

It is similarly not the purpose of this chapter to question either the relatively high standards of construction sought in this area of operations, the base camp concept, or the somewhat unusual peacetime accounting and construction programming requirements that were imposed on the war in Vietnam, as these factors now appear to be permanent companions of internal defense warfare.

Vietnamese type wars will probably be fought again, and the future conduct and nature of these wars in the engineer field will closely parallel that of the Southeast Asia conflict.

## Doctrine Versus Actuality

### Territorial and Command Organization, Theater of Operations

#### Doctrine

The theater of operations is defined as ". . . that portion of a theater of war necessary for the conduct of military operations,

either offensive or defensive pursuant to an assigned mission, and for the administration incident to such operations . . . ."[2]

The doctrinal theater of operations is based on a concept of warfare that envisions a front line (forward edge of the battle area, FEBA) and a support system stretching behind this FEBA. The theater is normally divided into a combat zone and a communications zone (COMMZ) with the combat zone being that area needed by combat troops for the conduct of operations and for their immediate administrative support, and the COMMZ that area behind the combat zone needed for operations by supply, evacuation, transportation and other administrative agencies to support the forces in the combat zone. (Figure 61.) Doctrine further indicates that under certain circumstances, normally during initial operations, the theater of operations may consist of only the combat zone.[3]

In the type theater of operations the headquarters for theater forces is a unified command (conceivably subordinate to another unified command). Functioning under the operational command of the theater headquarters are the service components, army, navy and air force, which normally command the component forces (combat, combat support, and combat service support) assigned to the unified command. The theater army, in turn, is organized into combat elements (field army, army group, or corps) which operate in the combat zone, a theater army

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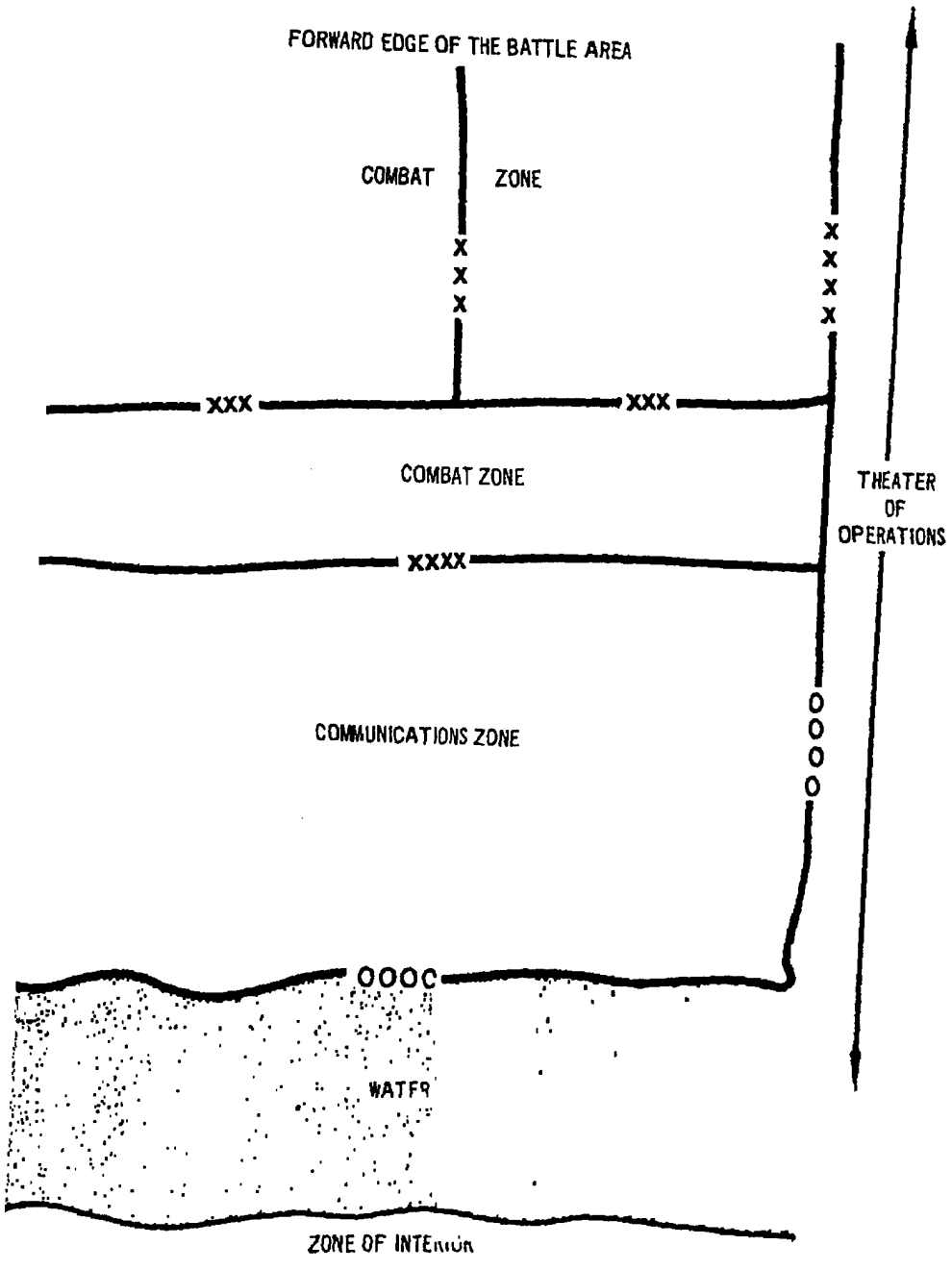
[2]U.S., Department of the Army, Field Service Regulations Administration, FM 100-10 (Washington: U.S. Government Printing Office, July 1963), para 2.2.

[3]Ibid., para 2.6-2.7.

U.S. PORTION OF A THEATER OF WAR
(USACGSC RB 101-3)



support command (TASCOM) providing combat service support to the combat zone from the COMMZ, and certain other separate support commands. The field army (either under an army group or the theater army) conducts tactical operations with its corps and their divisions and provides combat support and immediate combat service support to these combat elements. (Figure 62.)[4]

When the theater of operations is relatively small and, as a result, the size of the army component has been reduced, the field army may be designated the army component of the theater. Under these circumstances, the field army may either assume the total mission of the theater army or establish a separate headquarters to provide theater support. In the former case, the theater commander (unified command commander) may choose to exercise operational command of tactical forces assigned to the theater army. Similarly, with the field army commander providing his own combat service support, it is conceivable that no COMMZ will be established within the theater of operations.[5]

Under this independent army concept, there is little, if any, change from the type field army organization insofar as the combat and combat support elements are concerned.

Significant changes do occur, however, in the area of combat service support. The field army support command (FASCOM) becomes, in effect, a FASCOM/TASCOM, and COMMZ type units, including an engineer

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[4]U.S., Department of the Army, Field Service Regulations Larger Units, FM 100-15 (Washington: U.S. Government Printing Office, March 1966), para 2-6-2-12 and, The Administrative Support, Theater Army TASTA-70, FM 54-8 (Test) (Washington: U.S. Government Printing Office, August 1967), para 16-1.

[5]FM 100-15, para 2.11 and 3.21.

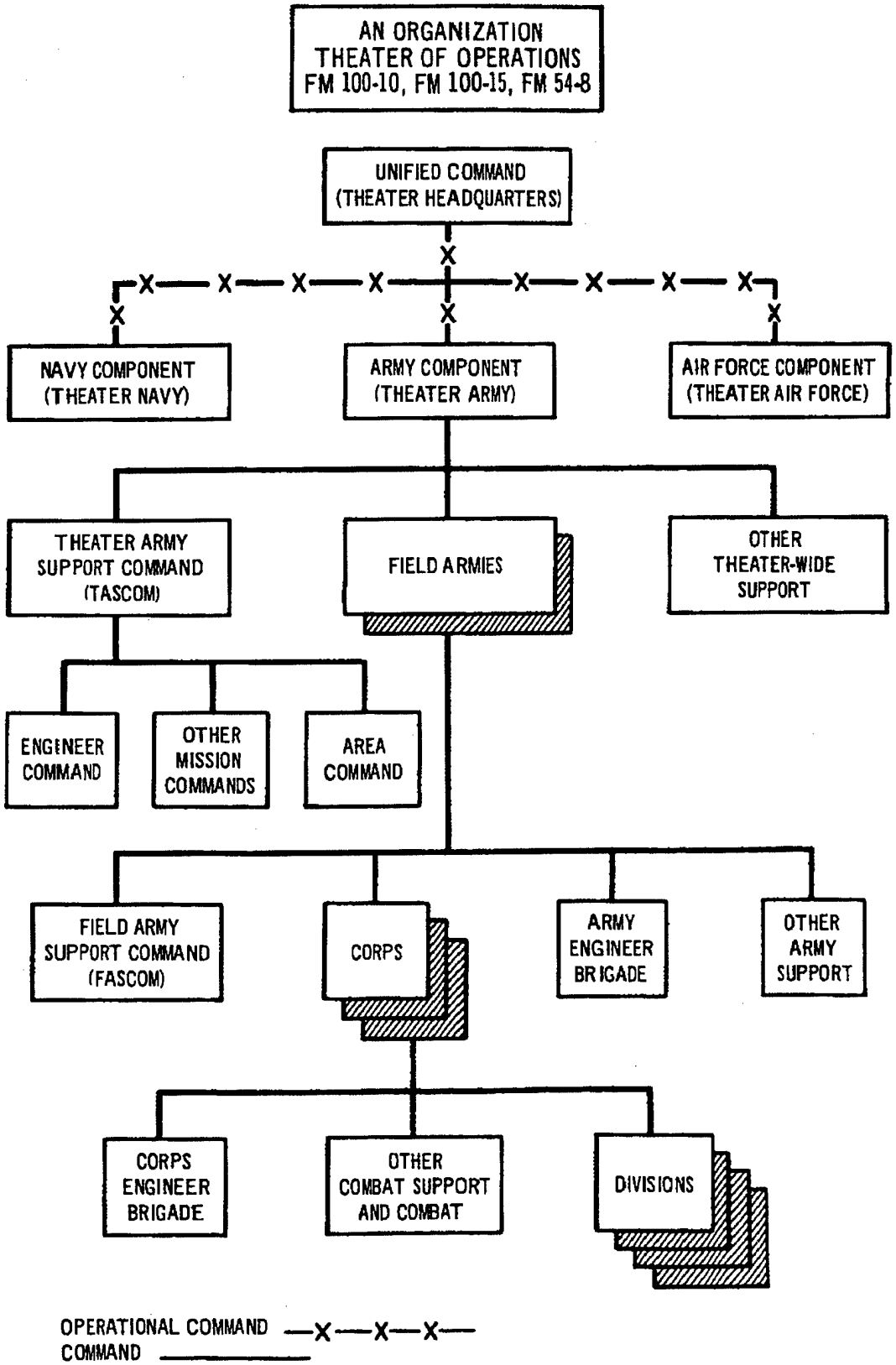
AN ORGANIZATION
THEATER OF OPERATIONS
FM 100-10, FM 100-15, FM 54-8
UNIFIED COMMAND
(THEATER HEADQUARTERS)
NAVY COMPONENT
(THEATER NAVY)
ARMY COMPONENT
(THEATER ARMY)
AIR FORCE COMPONENT
(THEATER AIR FORCE)
THEATER ARMY
SUPPORT COMMAND
(TASCOM)
FIELD ARMIES
OTHER
THEATER-WIDE
SUPPORT
ENGINEER
COMMAND
OTHER
MISSION
COMMANDS
AREA
COMMAND
FIELD ARMY
SUPPORT COMMAND
(FASCOM)
CORPS
ARMY
ENGINEER
BRIGADE
OTHER
ARMY
SUPPORT
CORPS
ENGINEER
BRIGADE
OTHER
COMBAT SUPPORT
AND COMBAT
DIVISIONS
OPERATIONAL COMMAND
COMMAND

FIGURE 62

truction brigade, may be attached to the FASCOM to provide those ices normally offered by the TASCOM mission and area commands. ure 63.)[6]

nam

South Vietnam is not officially a theater of operations and efore MACV is not a theater headquarters. Although over 500,000 ers of the U.S. armed forces are fighting the only "hot" war that ctive in the world today and although the war is confined to North South Vietnam, Cambodia and Laos, the forces operating in and near nam are only part of the Pacific Theater of Operations, which etches across the ocean from the United States to Korea, Formosa and land. COMUSMACV is a subordinate Unified Commander responsible to mander in Chief, Pacific (CINCPAC), for activity in an area of opera- ns.

Because of the unique nature of internal defense warfare, with- the MACV area of operations there is no FEBA and there are no combat communications zones. Since the enemy is everywhere, even the base a at Long Binh and the depot at Cam Ranh are subject to hostile fire. ryone receives "combat pay."

With divisions and brigades operating from fixed bases, degrees security in Vietnam are based on the unit's influence in the area and normally related to the distance from the bases and the length of e that a unit has been operating in an area.

Headquarters, MACV is organized along theater headquarters es. (Figure 64.) There are army, navy, air force and marine

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[6] FM 54-8, para 3.6.

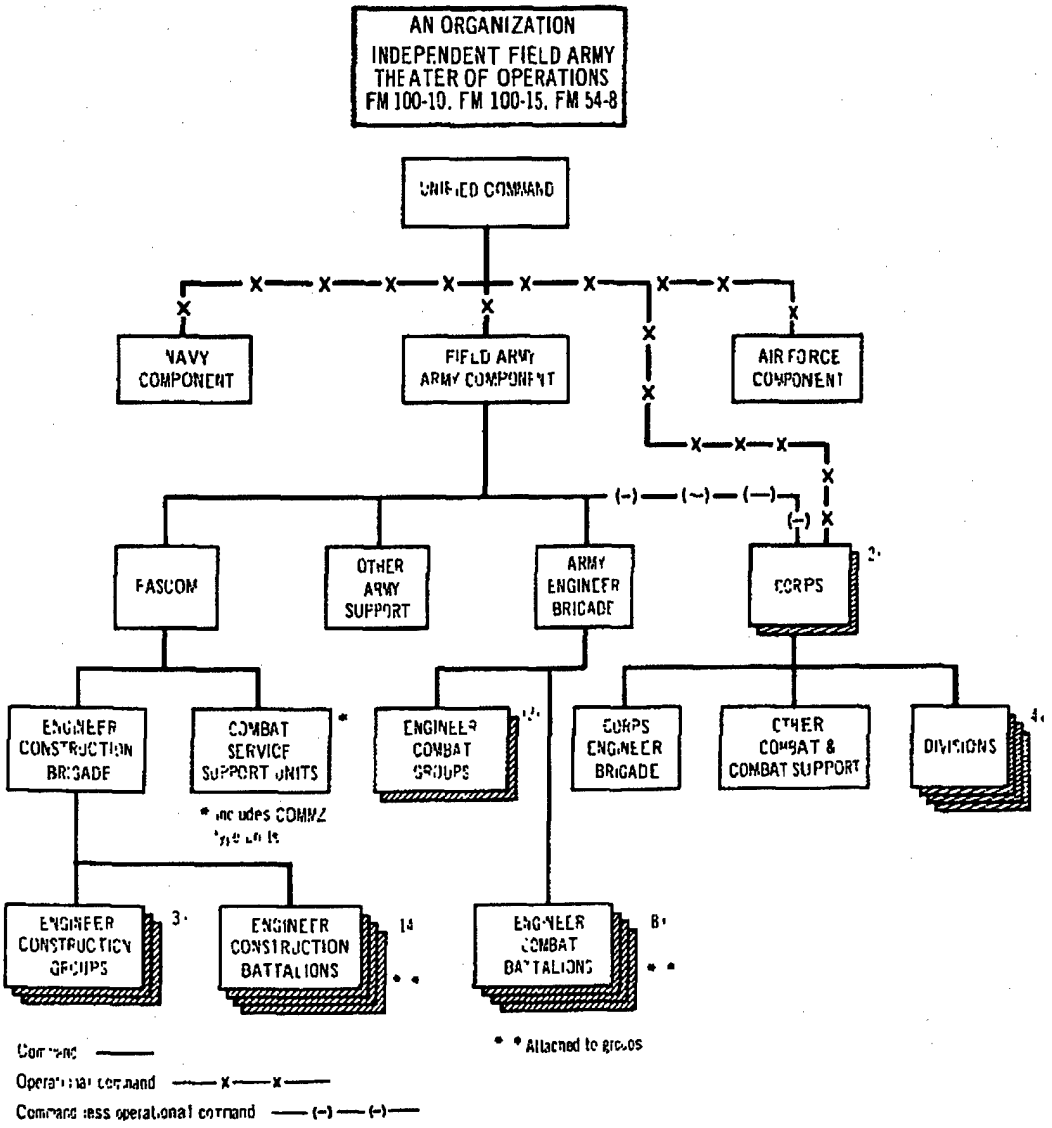
AN ORGANIZATION
INDEPENDENT FIELD ARMY
THEATER OF OPERATIONS
FM 100-10, FM 100-15, FM 54-8
UNIFIED COMMAND
NAVY COMPONENT
FIELD ARMY ARMY COMPONENT
AIR FORCE COMPONENT
FASCOM
OTHER ARMY SUPPORT
ARMY ENGINEER BRIGADE
CORPS
ENGINEER CONSTRUCTION BRIGADE
COMBAT SERVICE SUPPORT UNITS
* includes COMMZ
ENGINEER COMBAT GROUPS
CORPS ENGINEER BRIGADE
OTHER COMBAT & COMBAT SUPPORT
DIVISIONS
ENGINEER CONSTRUCTION GROUPS
3
ENGINEER CONSTRUCTION BATTALIONS
14
ENGINEER COMBAT BATTALIONS
8
* * Attached to groups
Command
Operational command
Command less operational command

FIGURE 63

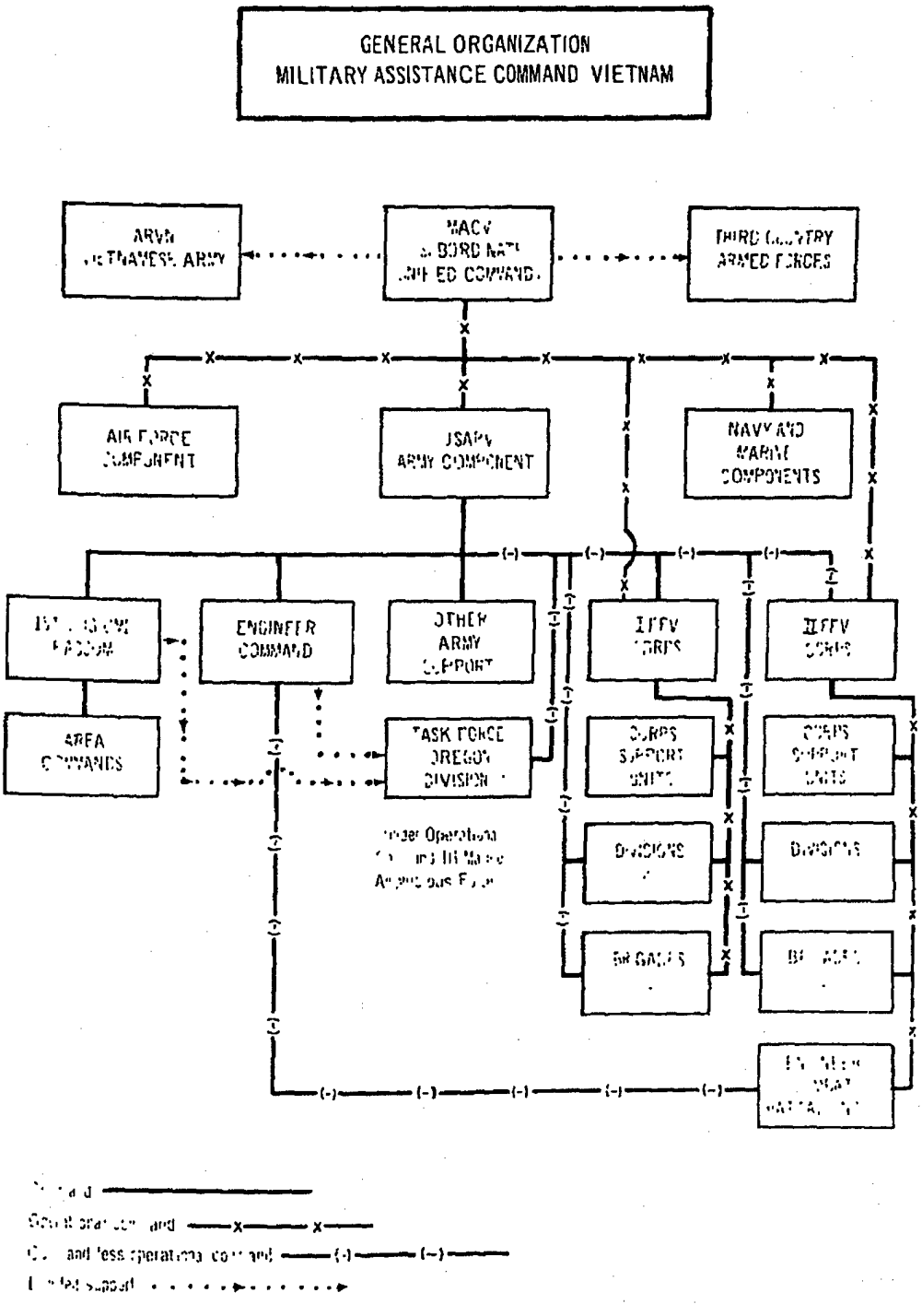
GENERAL ORGANIZATION
MILITARY ASSISTANCE COMMAND VIETNAM
ARVN
VIETNAMESE ARMY
MACV
ARMED FORCES
COMMAND
THIRD COUNTRY
ARMED FORCES
AIR FORCE
COMPONENT
USARV
ARMY COMPONENT
NAVY AND
MARINE
COMPONENTS
ENGINEER
COMMAND
OTHER
ARMY
SUPPORT
AREA
COMMANDS
TASK FORCE
OREGON
DIVISION
CORPS
SUPPORT
UNITS
DIVISIONS
BRIGADES

FIGURE 64

components. The army component, USARV, is similar in organization to the independent field army, controlling some combat support and all combat service support forces and surrendering control of combat forces and some combat support to MACV. Part of this command arrangement stems, however, from the designation of GEN W. C. Westmoreland as both Commanding General, USARV (army component), and as COMUSMACV.

## Engineer Organizations

### Doctrine

In the type theater of operations, nondivisional engineers are organized into three groupings: corps engineers operating under corps command with combat engineer units, army engineers operating with combat engineer units under army command, and TASCOM engineers, construction units operating under an engineer command (ENCOM) directly subordinate to TASCOM. (Figure 65.) Construction engineers, under this organization, move into the combat zone only on a mission basis. The engineer staffs for the field army and its corps are provided by their attached engineer brigades. The COMMZ engineer staffing is accomplished by the ENCOM. The theater army is also authorized an engineer staff, the size of which is dependent on the engineer mission within the theater.[7]

In the independent army organization, three groupings of engineers still remain: army and corps engineers under their respective tactical commanders, and the COMMZ engineer, represented by the construction brigade under FASCOM.[8] (See Figure 63.)

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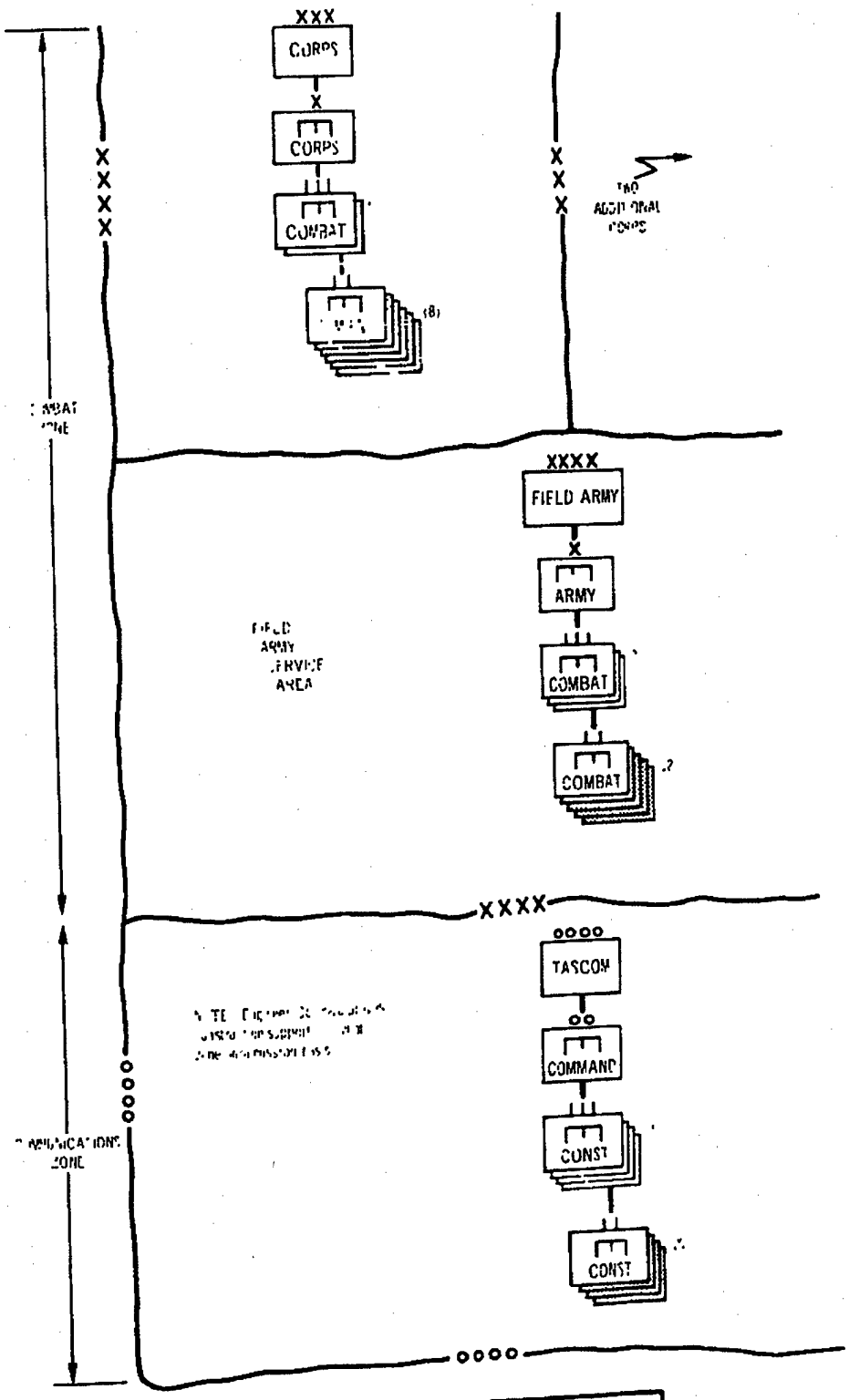
[7]U.S., Department of the Army, Engineer Troop Organizations and Operations, FM 5-1 (Washington: U.S. Government Printing Office, September 1965), para 1.1-1.10.

[8]FM 54-8, para 3.6.




ENGINEER TROOP ORGANIZATION
THEATER OF OPERATIONS
FM 5-1 and USACDSC RB 101-1

FIGURE 6-

Vietnam

As indicated in figure 48 and in Chapters II-VI, on 31 October command of all nondivisional engineer combat and construction units, vested initially in the 18th Brigade, rested with USAECV.

Until June 1967, the corps (Field Forces I and II) controlled no engineers. After June 1967, one corps received operational control of two battalions. Throughout the entire period, the corps engineer staff was provided from the assets of the corps and not from the assets of the Engineer Command.

USAECV was the USARV engineer element and provided, in addition to troop units, the appropriate engineer staff for USARV.

USAECV was also the COMMZ-type engineer construction element. In this capacity, its relationship to the 1st Log Command (USARV's FASCOM/TASCOM) was one of support rather than subordination. Engineer staffing for the Log Command came from Log Command assets rather than from USAECV.[9]

## Employment of Engineer Forces

Doctrine

The mission of the Corps of Engineers and of engineer troop units in a theater of operations is to:

a. Facilitate the movement of friendly forces.
b. Impede the movement of enemy forces.
c. Provide engineer staff planning for, and advice to all commanders in the theater of operations.

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[9] U.S., Department of the Army, "Debriefing Report," 1st Log Command, 11 August 1967, Annex F.

d. Provide the engineer service required in the theater of operations.[10]

To accomplish these missions four basic types of engineer units have been organized: divisional combat battalions, nondivisional combat units, nondivisional construction units and engineer special units, (amphibious or topographic).[11]

Division and Brigade Engineer Units

The mission of the engineer battalion organic to a division is to increase the combat effectiveness of the division by performing various engineer tasks and to fight as infantry when required.[12] Although there are slight differences in nature of these engineer tasks as accomplished by battalions organic to infantry, armored and mechanized divisions and those accomplished by airborne and airmobile divisions, the tasks are essentially to improve the mobility of friendly forces and to impede the mobility of the enemy.

The capabilities of the infantry division engineer battalion (and the armored and mechanized division battalions) are limited to construction, maintenance and repair of LOCs, supporting tactical river or short gap crossings, employment and removal of obstacles and fortifications,

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[10] FM 5-1, para 1.5.

[11] This study does not consider the employment of engineer special units.

[12] U.S., Department of the Army, Engineer Battalion, Armored, Infantry, and Infantry (Mechanized) Divisions, FM 5-135 (Washington: U.S. Government Printing Office, November 1966), para 2.7, and Engineer Battalions Airborne and Airmobile Divisions, FM 5-136 (Washington: U.S. Government Printing Office, June 1967), para 2.5 and 6.6.

construction of airfields and heliports, general construction in support of combat operations, and fighting as infantry when required.[13]

The capabilities of both the airmobile and airborne battalions are essentially the same. The airborne battalion, because of a lack of equipment is somewhat more limited in its horizontal construction capability.[14] The airmobile division, because of an increase in its earth-moving ability focuses its general construction effort on airfields.[15]

In essence, the divisional units are employed doctrinally in direct or general support of the combat elements of the division as these combat units accomplish their tactical missions. They are not given the capability nor the mission of doing more than hasty or expedient construction directly related to the tactical operations of the division.

The mission and capabilities of the combat engineer companies that support separate brigades and regiments are parallel to those of the divisional engineer battalions. These units are charged with the direct combat support of the brigades and regiments and have little capability for missions that require more than expedient construction techniques.[16]

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[13] FM 5-135, para 7.5.

[14] FM 5-136, para 3.9.

[15] FM 5-136, para 6.8.

[16] U.S., Department of the Army, Nondivisional Engineer Combat Units, FM 5-147 (Washington: U.S. Government Printing Office, August 1967), para 14.2-14.9.

Nondivisional Combat Battalions

Nondivisional engineer combat battalions support the combat operations of the army, corps and independent task forces within the combat zone. They work closely with the divisions engineers to provide that support beyond the capability of the divisional battalions.[17]

The capabilities of combat battalions, whether assigned to a corps or an army, are the same, and include combat support operations such as installation and removal of minefields and obstacles, engagement in river crossing operations, construction of defensive installations, maintenance of roads, bridges, command posts, supply installations and structures. The battalion also possesses the capability of carrying out infantry combat missions when required.[18] The construction capabilities of the battalion are increased when elements of light equipment and/or dump truck companies are attached to the battalion.

While the majority of a combat battalion's effort will be focused on supporting tactical units and in assisting the movement of support to these forces, approximately 10 per cent of the effort will be spent on construction support of FASCOM in the construction or rehabilitation of headquarters buildings, troop camps, hospitals, heliports, storage areas (under canvas) and protective shelters. This 10 per cent figure is based on operations in a developed area and could shift with a major change in environment. Any construction by these units will, however, be as austere as possible.[19]

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[17] Ibid., para 1.4.

[18] Ibid.

[19] FM 54-8, para 11.49.

When the construction tasks assigned to the nondivisional combat units become too extensive, complex, or time consuming, assistance, on a mission basis, is obtained from TASCOM engineer construction units.[20]

By design, nondivisional combat battalions are therefore employed to support tactical forces and to accomplish those other missions which most effectively contribute to support of these tactical forces. Only a small percentage of the combat battalions effort will be devoted to construction in support of FASCOM.

Construction Battalions

The mission of the construction battalion is to construct and rehabilitate roads, airfields, pipelines and structures and utilities in the COMMZ and the rear areas of the combat zone. It is capable of accomplishing its construction mission to include limited bituminous paving and reconstruction of major facilities such as railroads, bridges and ports. When augmented, it can accomplish large scale paving, quarrying and construction operations. The construction battalion has no capability for providing combat support or no mission to fight as infantry. The battalion does possess a capability for engineering design work.[21]

The construction battalion is normally employed in the COMMZ under control of the ENCOM or one of ENCOM's subordinate construction brigades or construction groups to accomplish construction in support

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[20]FM 5-142, para 4.3.

[21]U.S., Department of the Army, Engineer Construction and Construction Support Units, FM 5-162 (Washington: U.S. Government Printing Office, August 1964 and Change 1, March 1966), para 6.1-6.4.

of the TASCOM mission and area commands. When required for specific tasks, the battalion may be employed in the relatively secure rear areas of the combat zone.

Headquarters, Engineer Brigades and Groups

The basic mission and capability of engineer brigade and group headquarters is to command, plan and coordinate the operations of assigned and attached engineer units.

The headquarters engineer combat brigade, army or corps, in addition to accomplishing the above mission, provides an engineer staff section to the army or corps headquarters and focuses on combat engineer activities. The construction brigade, on the other hand, is oriented toward supervising construction operations.

An essential difference between the headquarters of construction and combat groups is the design capability of the former. The construction group is organized with an engineering section which can accomplish the design of those facilities which are to be constructed by its subordinate battalions. The combat group lacks this capability.

Discounting the organizational differences (and the resultant differences in capabilities) between these headquarters, all of them are employed in the same basic manner, as a control element between the tactical or logistical unit and the operating engineer battalion.[22]

Vietnam

From the arrival of the 173d Engineer Company on 5 May 1965, the method of employment of engineers in Vietnam began to move away from those methods found in current doctrine.

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[22] FM 5-1, Appendix B.

Division and Brigade Engineers

With the notable exception of the 8th Engineers which limited its construction efforts in its An Khe base camp, the remaining divisional battalions devoted a significant percentage of their first year's effort to COMMZ-type construction in their base areas, and continued, after the first year, to maintain some effort in the base construction field. These battalions, in addition, carried a heavy load of combat and direct combat support missions.

The separate companies, again with one notable exception, were also employed by their parent brigades in this split-mission role.

Combat Battalions

Combat battalions were used to accomplish the complete spectrum of engineer missions. While few were called upon to reorganize as infantry, all carried out combat support missions in direct or general support of the tactical forces and all accomplished construction of new COMMZ-type facilities. Most found themselves augmented with light equipment. The percentage split between construction and combat support differed from battalion to battalion and, within a given battalion, differed from month to month, not necessarily in any particular pattern. Even though combat battalions such as the 70th and 588th spent considerable periods at a specific base, the battalions also diverted effort to combat support, when required.

Construction Battalions

The role of the construction battalion in Vietnam approached the role envisioned by doctrine for this type unit. Generally, the construction battalions were employed to construct the more

sophisticated types of construction in the major logistics areas and to replace combat battalions in the upgrading of the troop base areas. The unusual role of the construction battalion in Vietnam related to its use in a combat support role. Whether it was support in the form of engineer equipment, construction of forward airfields, or direct support of tactical operations, each construction battalion came in touch with this mission and expected to receive repetitive missions of this type.

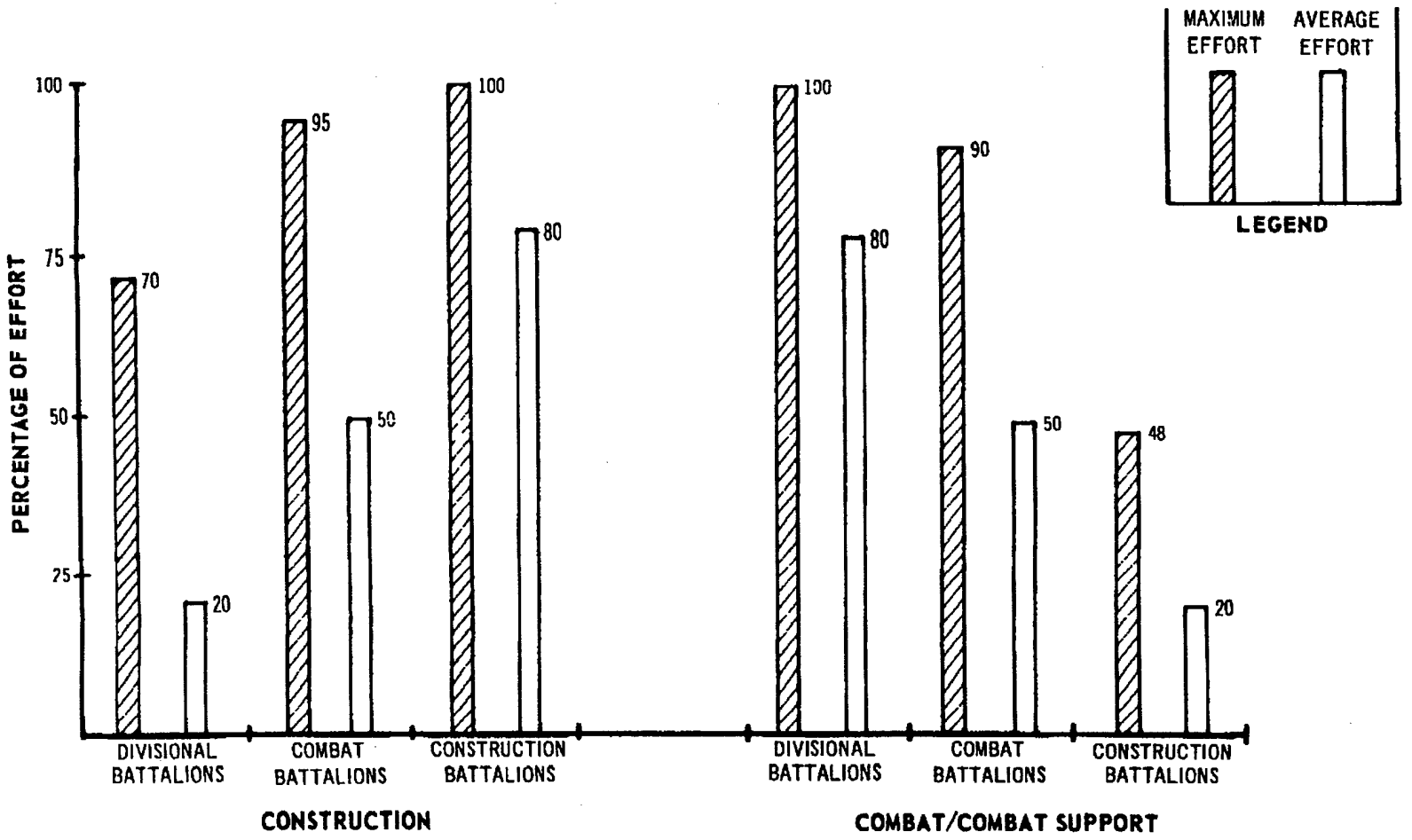
Groups and Brigades

In Vietnam, there was no distinction between combat and construction groups. The one combat group commanded both construction and combat battalions, and all construction groups at one time or another commanded combat battalions. All groups carried out combat, combat support and construction missions, with the emphasis among these missions shifting from month to month.

There was similarly no distinction between combat and construction brigades. The two brigades in Vietnam were construction brigades but both commanded and controlled combat as well as construction units.

Commanders Comments

To verify the analysis of engineer employment in Vietnam and to supplement the data available in official reports, questionnaires were sent to senior engineer officers who had served in Vietnam during the 1965-1967 period (see Appendix B). Figure 66 indicates the distribution of effort experienced by these officers.




**DISTRIBUTION OF BATTALION EFFORT**
**(SIX MONTH PERIOD)**

SOURCE: QUESTIONNAIRES RETURNED BY ENGINEER COMMANDERS

# Appraisal

## Problems and New Developments

### General

In the course of presenting the chronological history of the engineers in Vietnam, problems and new developments were identified and analysed as they occurred. No attempt was made, however, to appraise the overall effect, if any, of these items on the engineer. There were certainly many problems encountered and many new developments appeared. The question then arises as to which were significant and which were routine.

### Problems

The problems of the engineer in Vietnam were of two types, man-made and environmental. Lumped under the manmade problems were the lack of maintenance support (both repair parts supply and direct support), lack of construction materials, lack of adequate planning (to include vacillating priorities), lack of aviation support, misuse of engineers, deficiencies in equipment and the rotation hump. Under environment were the enemy, the weather and the underdeveloped nature of the country.

In the conduct of any war, problems must be expected, be met and be solved. While probably not considered as "routine" at the time, the Southeast Asia problems with lack of planning, changing priorities, misuse of engineers, the rotation hump, the nature of the country, the enemy and the weather seem to fall into this routine category. The last of these problem areas, weather, certainly had a significant effect on operations, but this effect was one to have been expected, and one that had been experienced by many who had operated before in the tropics.

Not so with the lack of construction materials, deficiencies in maintenance and the lack of aviation. These problems were significant, not only in their effect on engineer operations, but also, more importantly, in the deficiencies they reveal in the overall concept of operations and the probabilities of future repetition of these same problems.

Basic construction materials were in short supply for almost the first 18 months of the U.S. engineer effort, and no sooner had this been alleviated than shortages appeared in the more sophisticated types of supplies required to support higher standards of construction. While responsibility for supply rests with the logistician, the engineer must be concerned with procurement and the doctrinal ties that should exist between base development planning and supply.

Maintenance, similarly the responsibility of the logistician, was a problem in October 1965 and was still a problem in October 1967. In short, the maintenance system was not responsive to the demands of overextended engineer operations involving complex and varied equipment.

The lack of aviation support for engineers was indicative of the engineer's priority in the Vietnamese war and in future wars. The need for aviation for combat units is clearly recognized; however, seldom does a tactical unit operate over the distances that engineers take for granted. The command and control problems of the engineers are significant and can only be remedied by provision of required aviation support.

New Developments

While the war in Vietnam produced problems it also brought forward or focused on new developments of concern to engineers. The use

the DeLong pier system and extensive use of dust palliatives, both which received attention in Vietnam, represented only a reawakening previously gained knowledge.

The land clearing concepts, led by the use of the Rome Plow, ned new areas for continuing development and solved many of the tical problems of dense jungle and forest lined highways.

The most significant development of the war is a confirmation theories that have been espoused for years. The first 30 months of war in Vietnam saw air mobility become commonplace and rather than ng just a technique, it became a state of mind. To the engineers s confirmation meant acceptance of and adjustment to requirements to able to move quickly and without notice, through the air, to accomsh engineer missions in previously inaccessible areas. It also mt testing and use of expedient airfield surfacing that permitted ngle clearings to rapidly be transformed into all weather forward airelds. The 30 months saw the various types of mattings and membranes dergo vigorous usage and installation tests, on occasion fail, and dicate the need for more development. Expedient surfacings used in etnam were good, but not good enough.

mmanders Views

The engineers queried indicated their concern, in priority, for e general problems of maintenance, weather, adequate planning, conruction materials supply, TOE deficiencies, aviation support and fragntation of resources, in addition to many other problems more related a specific unit or area.

They also felt that, again in order of priority, the most significant developments were achieved in the fields of air mobility, land

clearing, expedient airfield surfacing and dust palliation. In general, though, the commanders seemed to feel that what occurred in Vietnam was more of a field test of previous development than a discovery of new concepts.[23]

## Employment of Engineers

The basic function of the army is to close with and destroy the enemy. The primary mission of all units not engaged in this basic function is to provide the most effective possible support to these tactical units in the conduct of this closing and destruction. In the organization of engineer troop units, division and infantry brigade engineers are given the mission of joining with the combat forces in the performance of this close combat. Nondivisional combat engineers serve to bridge the gap between the pioneer engineer effort of the division's forces and the more sophisticated efforts of construction engineers. Outside of the divisions, engineer groups and brigades provide command and control for engineer battalions and companies.

In Vietnam, the division and brigade engineers took support away from the combat forces to accomplish what should have been nondivisional engineer projects. The nondivisional engineers also shifted "away from the front" with combat battalions devoting considerably more than the doctrinal percentage of their effort to semipermanent facilities construction. Engineer construction units, with their minimal armament, moved toward the front and away from the doctrinal safety of the rear area, to provide combat support. Group and brigade

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[23]Appendix B.

headquarters dropped their construction or combat designations and effectively carried out their primary mission of command and control.

Divisional engineers became saddled with base development. While it may never be shown that engineer support was lacking for combat operations, the question must remain as to whether or not the operations could have been better or more fully supported.

The changes in missions for combat and construction battalions as well as the combat and construction groups and brigades are part of the natural evolution of such missions and can be satisfied by changes in TOE and unit designations.

## Organization of Engineers

The most significant engineer organizational development during the first 30 months of the war in Vietnam was clearly the centralization of all nondivisional engineer effort under one headquarters. The reasons for this centralization are also quite clear.

In an area of operations where the efforts of a given nondivisional unit (be it construction or combat) may switch from day to day from combat support to construction, and where engineers must operate on an area basis, the control of these units, when such control involves fiscal and manpower accounting as well as combat responsiveness, must be centralized. Unity of command is paramount. All nondivisional battalions in Vietnam experienced the plight of building a structure for the log command one day and beginning combat support of a division on the next. Even when IIFFV was given control of two combat battalions, this shifting of focus between construction and combat support continued.

The operations of this centralized organization appeared more effective than would have been the operations of a more doctrinally organized engineer force. This centralized organization offers the prototype for future doctrinal organizations for internal defense operations and conceivably for area oriented aspects of nuclear warfare.

Attesting to the effectiveness of this centralized command stand completed projects throughout the country and reports of successful engineer assisted combat operations.

After observing nearly two years of engineer operations, LTG Stanley R. Larsen, CG, IFFV commented:

> The cooperation existing between I Field Force, Vietnam and 18th Brigade is an outstanding example of mutual understanding and respect which has resulted in optimum teamwork. The response to operational control has surpassed all expectations even to the point that operational control of engineer elements by I Field Force Vietnam was never required.[24]

MG William E. DePuy, former CG, 1st Infantry Division, IIFFV, indicated that the responsiveness of the engineer command forces to his tactical needs had been so effective that he was actually unaware for a considerable period that they were not under control of IIFFV.[25]

MG C. W. Eifler, former CG, 1st Log Command, when questioned on the desirability of assigning construction engineers to the Log Command, answered that the Vietnam engineer construction control arrangement served the many requirements of the situation and that he was satisfied

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[24] Letter from LTG Stanley R. Larsen, CG, IFFV to BG C. M. Duke, CG, 18th Engineer Brigade, undated (July 1967).

[25] Interview with MG W. E. DePuy, CG, 1st Infantry Division, 1966-1967, Fort Leavenworth, Kansas, 17 November 1967.

whenever he received his fair share of the engineer work rather than engineer units.[26]

Engineer commanders also indicated their approval of the centralized control by almost a two to one margin; however, it is in the minority opinion and in the previously mentioned diversion of divisional engineer effort to construction that the problem areas lie.[27]

The success of the centralized organization rested and must always rest with the assurance that the priority of effort will always be with combat support. "The support of combat operations has had and will always have, the highest priority among all engineer units."[28]

The opinion of seven of nine division engineers and one of three field force engineers, coupled with IIFFV's obvious desire to obtain some control over engineer combat units, is indicative that, on the engineer to engineer level, the necessary push of effort towards the combat forces was not always as strong as it could or should have been and this is the area that bears watching.

## Conclusions

Normally in a historical study, conclusions are drawn from the analysis and appraisal of the events of the history. The war in Vietnam marked the first major departure from the concepts of the FEBA and its dangling tail. Several factors, however, mitigate the requirement to develop conclusions with regard to aspects of the war in Vietnam.

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[26]Interview with MG C. W. Eifler, CG, 1st Log Command, 1965-1967, Fort Leavenworth, Kansas, 17 January 1968.

[27]Appendix B.

[28]Letter from CG, USAECV, to CG, IIFFV, untitled, 16 September 1967.

U.S. forces were committed in Vietnam in response to a strategic and tactical emergency. The buildup of combat (and engineer) forces was rapid. (Figure 67.) Units were positioned where the most immediate tactical requirement existed and with little regard for doctrinal concepts.

Current doctrine, especially with respect to engineer organization, was never tested in Vietnam and would therefore be difficult to condemn.

It is also too soon - the war is still being fought - to draw doctrinal conclusions. Time may bring even greater changes.

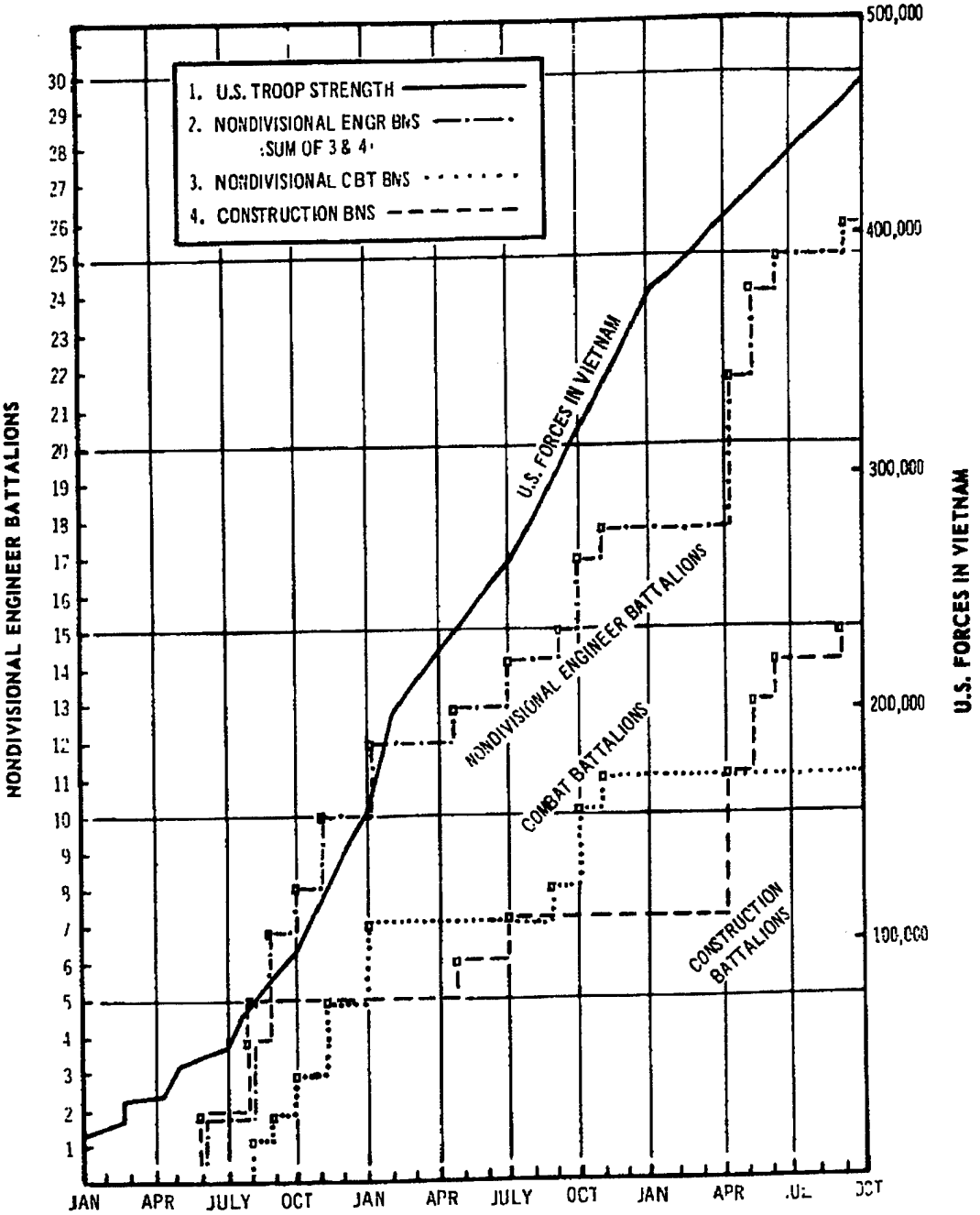
It is not too soon, however, to question doctrine. The war in Vietnam certainly provided food for thought and left many questions to be answered.

## Questions

Vietnam indicated that the ties between the engineer and the logistician are not cemented. Supply and maintenance support was lacking. What can be done to develop closer ties between arbitrarily defined combat support and combat service support elements?

Vietnam gave the engineer experience with new developments in land clearing and air mobility and indicated inadequate recognition of engineer aviation support requirements. Should there be land clearing companies? Battalions? Should not all combat engineers be equipped with helicopter transportable equipment? How can engineer requirements for aviation support best be met?

Designations of command and control headquarters such as groups and brigades are based on small differences in TOE. The nature of war




U.S. FORCE BUILDUP VS.
NONDIVISIONAL ENGINEER BUILDUP
REPUBLIC OF VIETNAM
JANUARY 1965–OCTOBER 1967

calls first for command and control, and second for limited technical augmentation which can be arranged as the need arises. In Vietnam, the distinction between combat and construction was lost on the unit's arrival. Should not there be only "engineer" groups and "engineer" brigades?

Experience in Vietnam indicated that combat battalions are moving away from what was always considered primarily a combat support role. Construction battalions have become more combat oriented. Should there be a new basic engineer battalion, better able to meet the challenges of a construction environment and yet still able to compete with the enemy on the battlefield or should the TOEs of the present battalions be substantially revised?

Centralized control of engineer units in Vietnam accomplished the mission and appeared to be a relatively efficient method of operation. However, with this centralization came an apparent lessening of emphasis on provision of support for the division engineers. Should there not be an engineer command to control the activities of all non-divisional engineers in the internal defense area of operations? If a centralized command is established, how can the proper impetus of support, from rear to front, be insured?

## Finis

Vietnam served to question doctrine based on the World War II-Korean FEBA concept and has re-emphasized the need for new ideas, and what is paramount, the ability to adjust to and accept new situations. In short, engineers like the rest of the army must not only continue to preach, but also must continue to practice flexibility.

# APPENDIX A
# ABBREVIATIONS AND MILITARY EQUIPMENT DESIGNATIONS

# APPENDIX A

## ABBREVIATIONS AND MILITARY EQUIPMENT DESIGNATIONS

### Abbreviations

| | |
|---|---|
| AAF | army airfield |
| ACR | armored cavalry regiment |
| AFB | air force base |
| ARVN | Army of the Republic of Vietnam |
| ASP | ammunition supply point |
| AVLB | armored vehicle launched bridge |
| Cbt | combat |
| CG | commanding general |
| CINCPAC | Commander-in-Chief, Pacific Command |
| CLIMPO | contract liaison and installation master planning office |
| CO | commanding officer |
| COMMZ | communications zone |
| COMUSMACV | Commander, U.S. Military Assistance Command, Vietnam |
| Const | construction |
| CONUS | Continental United States |
| CY | cubic yards |
| DBST | double bituminous surface treatment |
| DD | double double (type Bailey bridge) |
| DMZ | demilitarized zone |
| DOD | Department of Defense |
| DS | double single (type Bailey bridge) |
| FFV | Field Force, Vietnam |
| FOUO | for official use only |
| FWMAF | Free World Military Assistance Forces |
| FY | fiscal year |
| IFFV | I Field Force, Vietnam |
| IIFFV | II Field Force, Vietnam |
| KM | kilometer |
| LOC | line of communication |
| LTL | Lien Tinh Lo (Vietnamese Interprovincial Route) |
| LZ | landing zone |

| | |
|---|---|
| MAAG | Military Assistance Advisory Group |
| MACV | Military Assistance Command, Vietnam |
| MASH | mobile army surgical hospital |
| MCA | military construction Army |
| MSR | main supply route |
| MUST | medical unit, surgical, transportable |
| NCO | noncommissioned officer |
| ORLL | operational report-lessons learned |
| POL | petroleum, oil and lubricants |
| POW | prisoner of war |
| PSP | pierced steel plank |
| QL | Quoc Lo (Vietnamese national route) |
| RMK | Raymond-Morrison-Knudsen-Brown-Root-Jones (civilian contractor) |
| ROK | Republic of Korea |
| ROKFV | Republic of Korea Forces, Vietnam |
| RVN | Republic of Vietnam |
| SF | square feet |
| SOP | standing operating procedure |
| SSS | solid steel plank |
| SY | square yards |
| TL | Tinh Lo (Vietnamese provincial route) |
| TOC | tactical operations center |
| TPH | tons per hour |
| TS | triple single (type Bailey bridge); top secret |
| USAECV | U.S. Army Engineer Command, Vietnam |
| USARV | U.S. Army, Vietnam |
| VC | Viet Cong |

## Military Equipment Designations

| | |
|---|---|
| AKA | attack cargo ship |
| AM-2 | aluminum airfield planking |
| C-7A | two engine light transport aircraft; Caribou |
| C-123 | two engine transport aircraft; Provider |
| C-130 | four engine transport aircraft; Hercules |
| CH-47 | medium transport helicopter; Chinook |
| CH-54 | heavy lift cargo helicopter; Sky Crane |
| CV-2 | U.S. Army designation for C-7A |

| | |
|---|---|
| LCM | landing craft, mechanized |
| LCU | landing craft, utility |
| LPD | amphibious transport, dock |
| LST | landing ship, tank |
| M6 | pierced steel plank |
| M8 | pierced steel plank |
| M8A1 | solid steel plank |
| T-17 | membrane airfield surfacing |
| UH-1B | utility helicopter; Huey |
| UH-1D | utility helicopter (troop lift); Huey |
| XM-19 | aluminum airfield matting |

# APPENDIX B
# QUESTIONNAIRE

APPENDIX B

QUESTIONNAIRE

## General

To supplement the data available in official reports and to solicit the opinions of engineer officers who served in Vietnam for comparison against the analysis of the official data, questionnaires (Enclosure 1) were sent to those present and past brigade, group, battalion and separate combat company commanders whose addresses were available. In addition, questionnaires were sent to the Chiefs of Staff, USAECV, the Field Force Engineers and the Engineers of separate brigades. In one case, where no battalion commander could be located, a questionnaire was sent to the S3 officer.

A total of 75 questionnaires were sent out and 63 were returned. The returns represented USAECV, 18th Brigade (70th Brigade was not queried), five of six groups, all divisional battalions, 12 of 15 construction battalions, 10 of 11 combat battalions and three separate companies.

Completed questionnaires, when the authors so permitted, have been filed in the USACGSC Library.

## Questionnaire Content

The questionnaire was divided into sections; Part A, General Information, and Part B, Specifics.

In Part A, questions one, two, and three identified the dates, type and location of service in Vietnam. Questions four and five indicated the distribution of effort between combat, construction and combat support. Questions six through nine related to theses being prepared by others. Questions 10 and 11 brought out the commander's thoughts on new developments and problems encountered in Vietnam.

Part B was designed primarily to provide supplemental information for the basic research. Only question two, relating to the effectiveness of the engineer organization in Vietnam, was used in a tabulation of results.

## Questionnaire Results

The answers to questions one to five and 10 and 11 of Part A and question two of Part B are tabulated by date and type unit in enclosure 2. No tabulation was made by geographical area as analysis indicated no significant relationship between area and any other aspects of the questionnaire.

The results of the remainder of Part B are found throughout the main body of the thesis. Where appropriate, attribution was indicated by footnote. The names of all officers completing Part B are found in the bibliography.

STUDENT DETACHMENT
U. S. ARMY COMMAND AND GENERAL STAFF COLLEGE
FORT LEAVENWORTH, KANSAS

4 February 1968

Dear

As participants in the graduate program at USACGSC, under which certain students are permitted to work towards a degree of Master of Military Arts and Science, Majors Don O'Shei and Don Hartman and I are preparing theses related to engineer activities in Vietnam; Major O'Shei, "The Administration of a MCA Program in an Active Theater of Operations;" Major Hartman, "Estimating Construction Requirements in the Theater of Operations;" and I, "A History of Army Engineer Operations in RVN, 1965-1967."

The basic data to support these papers is being taken from Lessons Learned, Command Reports, OCE Reports and other available documents; however we all feel that the opinions of present and past engineer commanders and staff officers would be invaluable in obtaining a clear picture of the engineer situation as it has existed and now exists and for this reason we are asking your assistance.

Attached is a two part questionnaire. The first part is general in nature and requires no identification of the person completing the questionnaire. The second part asks for certain specifics that would reveal the identity of the person completing the questionnaire. While we would appreciate your completing both parts, should you desire to remain anonymous, we would request that you return the first part (Part A).

We recognize the demands on your time and will appreciate any time you can spare. We have enclosed a self-addressed envelope for return of the questionnaire. Thank you for your assistance.

Sincerely,

G. E. GALLOWAY, Jr.
Major, Corps of Engineers

PART A
GENERAL INFORMATION
(IDENTIFICATION NOT REQUIRED)

1. When were you in RVN?

- Summer 65 - Summer 66 ☐
- Winter 65 - Winter 66 ☐
- Summer 66 - Summer 67 ☐
- Summer 67 - ☐

2. With what type unit did you serve?

- Divisional Bn ☐
- Non-Divisional
  - Combat Bn ☐
  - Const Bn ☐
- Group ☐
- Brigade ☐
- Engr Co; Sep Inf Bde ☐
- Field Force/USARV ☐

3. Where were you stationed?

- I Corps ☐
- II Corps ☐
- III Corps ☐
- IV Corps ☐

4. How do you feel your unit's effort was divided during your tour (using definitions in effect during your tour)

First Six Months
- Combat _____%
- Construction _____%
- Combat Support _____%

Last Six Months
- Combat _____%
- Construction _____%
- Combat Support _____%

5. Using the divisions indicated below, how do you feel your unit's effort was broken out?

- Combat _____%
- Direct Combat Support of Tactical Units _____%
- Maintenance and Repair on Roads _____%
- Maintenance of newly constructed facilities _____%
- Improvements and alterations _____%
- New Construction _____%
- Security _____%
- Other _____%

6. Considering the elements used in construction estimates (troops, equipment materials, time, etc.) what methods were used by your unit for estimating and planning projects

Estimates/Plans

- Furnished by higher HQ _____%
- Furnished by FM/TM _____%
- Developed from Local Factors (General) _____%
- Developed from detailed take offs _____%
- Developed Shotgun Style _____%
- Not used - Just went

7. When comparing completed projects against initial estimates, which factors do you feel were responsible for variations (Rate from 1 on)

a. Frequent changes in priorities ____ b. Poor project definition ____

c. Poor estimates ____ d. Weather ____

e. Equipment availability ____ f. Materials availability ____

g. Topography (Excessive earthwork)__ h. Vegetational cover(Clearing)__

i. Enemy action/destruction____ j. Occupancy before completion ___

k. Personnel shortages ____ l. Other ____

---

8. In your opinion, were the standard designs included in the Engineer Functional Components System of:

great value ☐
some value ☐
little or no value ☐
not encountered ☐

---

9. Did the shipment of supplies in functional component packages:

enhance efficiency ☐
reduce efficiency ☐
have no effect ☐
not encountered ☐

---

10. What do you feel are the most significant new developments in the engineer field to come from the war in Vietnam (List three in order)

a. Rome Plow ☐ b. Dust Palliatives ☐ c. Air Mobility ☐

d. Port Construction Concepts ☐ e. Expedient airfield surfacing ☐

f. Other _____ ☐ g. Other _____ ☐

---

11. What do you feel were the most significant problems encountered in Vietnam (Rate 1 to 5)?

a. Lack of Maintenance Support Units ☐ b. Weather ☐

c. Lack of Maintenance Spare Parts Parts ☐ d. Lack of adequate Aviation Support ☐

e. Lack of expedient construction material (T-17, AM-2 MBA1) ☐ f. Rotational Hump ☐

g. Lack of EM Skills ☐ h. Over-Sophistication of construction standards ☐

i. Troop Morale ☐ j. Lack of initial base development plan ☐

k. The self-help program ☐ l. Fragmenting of resources ☐

m. Lack of Basic Construction materials (Dimension lumber concrete, etc.) ☐ n. Lack of Engineer Units (Too few engineers) ☐

o. Changes in priorities ☐ p. Lack of more sophisticated materials (Electrical and plumbing, etc) ☐

q. Deficiencies in TOE ☐ r. Deficiencies in equipment ☐

s. Other _____ ☐ t. Other _____ ☐

PART B
(SPECIFICS)
(IDENTIFICATION REQUIRED)

1. a. Was your unit, or one of its subordinates, ever committed in an infantry role (other than in interior guard or convoy duty)?
YES_____ NO _____

b. If yes.
Unit _____ Approximate dates _____
Circumstances (Optional) _____
_____
_____

2. Current doctrine indicates that non-divisional engineers are employed in the COMMZ under an Engineer Command (under Theater Army Support Command) and in the Combat Zone in Engineer Brigades operating directly under Corps and Army. In your opinion, do you feel that the grouping of all non-divisional engineers in Vietnam under an Engineer Command (and prior to that an engineer brigade) is:

a. More effective than proposed by current doctrine ☐
b. Less effective than proposed by current doctrine ☐
c. Appropriate for the war in Vietnam only ☐

3. Of what three projects or missions accomplished by your unit (or engineer units supporting you) are you most proud:

| | PROJECT | LOCATION | DATE |
|---|---|---|---|
| a. | | | |
| b. | | | |
| c. | | | |

4. Comments (on any subject)(optional) _____
_____
_____
_____

5. Attribution.
Will you permit information indicated in the questionnaire to be attributed to you by name.

| Part A | Part B |
|---|---|
| YES ☐ | YES ☐ |
| NO ☐ | NO ☐ |

6. Disposition:
Unless otherwise indicated, completed questionnaires will be turned over to the USACGSC Library.
I agree to USACGSC file ☐
Request questionnaire be destroyed ☐
Other _____

7. Name and Rank _____

ENCLOSURE 2

TABULATED RESULTS OF QUESTIONNAIRE

| NUMBER OF REPLIES | Summer 65 Summer 66 | Summer 66 Summer 67 | Summer 67 |
|---|---|---|---|
| Divisional Battalion | 3 | 2 | 4 |
| Combat Battalion | 4 | 10 | 2 |
| Construction Battalion | ? | 10 | 4 |
| Group | 2 | 5 | 5 |
| Brigade | ? | 1 | 0 |
| Separate Company | 1 | 3 | 0 |
| Field Force | 1 | 2 | 0 |
| | 15 | 33 | 15 |

PRINCIPAL DIVISION OF EFFORT (Question Four)
Summer 1965-Summer 1966 (First six months/second six months)

| | Combat | | | Construction | | | Combat Support | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ave | Low | High | Ave | Low | High | Ave | Low | High |
| Divisional Battalion | 0/2 | 0/0 | 0/5 | 60/32 | 25/15 | 70/55 | 40/66 | 30/40 | 75/85 |
| Combat Battalion | 0/0 | 0/0 | 0/0 | 88/83 | 75/80 | 95/90 | 12/17 | 5/10 | 25/20 |
| Construction Battalion | 0/0 | 0/0 | 0/0 | 85/97 | 75/95 | 95/100 | 15/3 | 5/0 | 25/5 |
| Group | 0/0 | 0/0 | 0/0 | 85/77 | 85/70 | 85/85 | 15/23 | 15/15 | 15/30 |
| Brigade | 0/0 | 0/0 | 2/2 | 80/75 | 75/68 | 83/79 | 20/25 | 16/20 | 23/30 |
| Separate Company | 0/0 | 0/25 | 0/25 | 0/0 | 0/0 | 0/0 | 100/75 | 100/75 | 100/75 |

Summer 1966-Summer 1967

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Divisional Battalion | 18/10 | 5/10 | 30/10 | 30/15 | 15/10 | 45/10 | 52/75 | 50/75 | 55/75 |
| Combat Battalion | 1/3 | 0/0 | 5/5 | 60/52 | 10/15 | 90/77 | 39/45 | 10/25 | 90/75 |
| Construction Battalion | 0/0 | 0/0 | 2/1 | 87/88 | 50/60 | 99/100 | 13/12 | 2/0 | 48/39 |
| Group | 0/2 | 0/0 | 1/1 | 88/68 | 60/50 | 95/95 | 22/30 | 20/5 | 39/45 |
| Brigade | 7/7 | 7/7 | 7/7 | 83/78 | 83/78 | 83/78 | 10/15 | 10/15 | 10/15 |
| Separate Company | 50/20 | 50/20 | 50/20 | 15/20 | 15/20 | 15/20 | 35/60 | 35/60 | 35/60 |

Summer 1967-

| | Combat | | | Construction | | | Combat Support | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ave | Low | High | Ave | Low | High | Ave | Low | High |
| Divisional Battalion | 18/37 | 2/2 | 40/60 | 26/20 | 10/0 | 50/40 | 56/43 | 20/20 | 80/58 |
| Combat Battalion | 0/0 | 0/0 | 0/0 | 47/45 | 40/45 | 55/45 | 53/55 | 45/55 | 60/55 |
| Construction Battalion | 0/0 | 0/0 | 0/0 | 91/83 | 80/60 | 100/95 | 9/17 | 5/5 | 20/40 |
| Group | 4/8 | 0/0 | 20/20 | 53/37 | 15/10 | 82/75 | 42/55 | 18/25 | 84/85 |

DETAILED DIVISION OF EFFORT (Question Five)
(Summer 65-Summer 66/Summer 66-Summer 67/Summer 67-)

| | Average Effort | | | | | |
|---|---|---|---|---|---|---|
| | Division | Combat | Construction | Group | Brigade | Company |
| Combat | 5/21/18 | 0/1/0 | 0/0/0 | 5/1/1 | 1/1/ | 10/35/ |
| Direct Support of Tactical Units | 75/52/38 | 11/19/22 | 0/4/5 | 75/14/21 | 12/20/ | 70/33/ |
| Maintenance and Repair of MSRs | 8/12/21 | 10/35/20 | 3/3/13 | 8/12/25 | 19/10/ | 20/15/ |
| Maintenance of New Facilities | 0/0/0 | 2/1/0 | 1/2/0 | 0/5/1 | 1/2/ | 0/0/ |
| Improvements and Alterations | 0/0/0 | 5/2/2 | 2/3/3 | 0/5/3 | 3/2/ | 0/0/ |
| New Construction | 12/10/18 | 59/36/50 | 83/82/62 | 12/56/39 | 60/60/ | 0/17/ |
| Security | 0/5/1 | 12/5/4 | 8/5/9 | 0/4/8 | 3/5/ | 0/0/ |
| Other | 0/0/0 | 1/1/2 | 3/1/8 | 0/2/2 | 1/0/ | 0/1/ |

NEW DEVELOPMENTS (Question 10)
(Summer 65-Summer 66/Summer 66-Summer 67/Summer 67-)

| | First Choice | Second Choice | Third Choice |
|---|---|---|---|
| Rome Plow | 3/5/5 | 1/6/5 | 3/4/2 |
| Dust Palliatives | 0/2/0 | 2/3/1 | 4/9/3 |
| Air Mobility | 7/14/5 | 2/2/4 | 3/6/1 |
| Port Construction Concepts | 1/2/1 | 2/4/0 | 0/2/4 |
| Expedient Airfield Surfacing | 2/4/? | 4/10/? | 1/1/1 |
| Other | 6 | 6 | 3 |

PROBLEMS (Question 11)
(Summer 65-Summer 66/Summer 66-Summer 67/Summer 67-)

| | Biggest Problem | 2d | 3d | 4th | 5th |
|---|---|---|---|---|---|
| Maintenance Units | 0/?/? | 1/4/1 | 2/3/1 | 1/5/1 | 3/1/1 |
| Spare Parts | 2/8/4 | 2/6/3 | 2/8/1 | 2/4/1 | 2/2/2 |

| | Biggest Problem | 2d | 3d | 4th | 5th |
|---|---|---|---|---|---|
| Lack of Expedient Surfacing | | 0/1/0 | | 0/1/1 | |
| Lack of EM Skills | | | | | 0/1/1 |
| Troop Morale | | | | | |
| Self Help Program | | | | 0/2/0 | 1/2/0 |
| Lack of Basic Construction Materials | 3/1/0 | 6/1/1 | 0/2/1 | 1/3/1 | 2/3/1 |
| Changes in Priorities | 0/4/1 | 0/3/1 | 1/2/0 | 2/4/0 | 0/3/2 |
| Deficiencies in TOE | | 1/2/2 | 0/2/3 | 2/0/0 | 1/1/0 |
| Weather | 2/0/2 | 1/4/2 | 2/2/0 | 1/0/2 | 1/3/2 |
| Lack of Aviation | 0/3/0 | 0/1/0 | 0/4/2 | 0/3/0 | 1/1/3 |
| Rotation Hump | 0/3/0 | 0/3/0 | 0/0/1 | 0/3/0 | 0/1/0 |
| Over Sophistication of Standards | | 0/1/0 | 0/1/1 | 0/1/1 | 1/4/0 |
| Lack of Base Development Plan | 3/0/0 | 1/1/0 | 1/1/0 | 1/3/0 | 1/2/0 |
| Fragmenting Resources | 0/3/0 | 0/1/1 | 1/0/2 | 0/3/2 | 0/1/0 |
| Lack of Engineer Units | 1/3/3 | 0/2/0 | 3/3/0 | 3/0/0 | 0/2/0 |
| Lack of Sophisticated Materials | 0/2/1 | 0/0/2 | 1/2/3 | 0/1/1 | 1/1/0 |
| Deficiencies in Equipment | 1/0/0 | 2/3/0 | 1/1/1 | 0/2/3 | 1/3/1 |
| Other | 6 | 1 | 2 | 3 | 1 |

EFFECTIVENESS OF ORGANIZATION (Question B-2)
(Summer 65-Summer 66/Summer 66-Summer 67/Summer 67-)

| | More Effective | Less Effective | Vietnam Only |
|---|---|---|---|
| Divisional Battalion | 0/0/0 | 3/1/3 | 0/1/1 |
| Combat Battalion | 1/2/1 | 2/4/0 | 1/4/1 |
| Construction Battalion | 1/2/2 | 0/3/1 | 1/5/1 |
| Group | 0/0/2 | 0/1/1 | 2/4/1 |
| Brigade | 2/0/- | 0/0/- | 0/1/- |
| Separate Company | 0/0/- | 1/2/- | 0/0/- |
| Field Force | 0/0/0 | 0/1/0 | 1/1/1 |
| | 4/4/5 | 6/12/5 | 5/16/5 |
| | 13 | 23 | 26 |

| More Effective or Vietnam Only | Less Effective |
|---|---|
| 39 | 23 |

# APPENDIX C
# LOCATION AND ASSIGNMENT OF ENGINEER UNITS

# APPENDIX D
# TYPES OF ENGINEER UNITS AND THEIR FUNCTIONS

## APPENDIX D

## TYPES OF ENGINEER UNITS AND THEIR FUNCTIONS[1]

### Combat Battalion, Army or Corps (TOE 5-35D)

Thirty-three officers, 586 enlisted men. Headquarters and headquarters company, three combat companies. Authorized a minimum of light equipment (two cranes, three graders, three scooploaders and seven dozers). This unit was capable of forward area construction, obstacle preparation and removal, demolition work and fighting as infantry. The battalion was one hundred per cent mobile.[2]

### Combat Battalion, Army or Corps (TOE 5-35E)

Thirty-nine officers, 755 enlisted men. Headquarters and headquarters company, four combat companies. This unit differed from the TOE 5-35D battalion in the addition of the fourth combat company and a significant amount of light equipment. The battalion was authorized three cranes, four graders, 13 scooploaders, one 16 cubic foot concrete mixer and 10 dozers. The headquarters company was authorized a vertical construction section on an augmentation basis. The basic

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[1] Engineer units in Vietnam operated under many TOEs and modified TOEs (MTOE). The information provided in this appendix is based on the TOEs that most nearly represent the typical situation.

[2] U.S., Department of the Army, Engineer Troop Organizations and Operations, FM 5-1 (Washington: U.S. Government Printing Office, May 1961), p. 173. (OBSOLETE.)

capabilities of the battalion were the same as those of the TOE 5-35D battalion. The battalion was one hundred per cent mobile and was air transportable in heavy aircraft.[3]

Construction Battalion
(TOE 5-115D)

Thirty-one officers, 850 enlisted men. Headquarters and headquarters company, engineer equipment and maintenance company, three engineer construction companies. This unit provided for basic general construction of buildings, structures, roads, airfields, bridges and pipelines, paving operations, and reconstruction of major facilities. Equipped with 24 scrapers, 13 dozers, six concrete mixers, eight cranes, one 75 TPH crusher, nine graders and considerable vertical construction machinery, the battalion possessed both a vertical and horizontal capability. The battalion was also authorized a direct support maintenance section. The unit was 95 per cent mobile.[4]

Construction Battalion
(TOE 5-115E)

Thirty-eight officers, 867 enlisted men. Headquarters and headquarters company, engineer equipment and maintenance company, three engineer construction companies. This battalion was generally similar in capabilities and organization to the 5-115D construction battalion with the exception of a reduction in the number of authorized scrapers

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[3]U.S., Department of the Army, Engineer Troop Organizations and Operations, FM 5-1 (Washington: U.S. Government Printing Office, November 1965 and change 1, July 1966), pp. A-B 11-14.

[4]FM 5-1, May 1961, pp. 214-217.

(24 to 12) and the deletion of the ordnance capability from the direct support maintenance section. The unit was 87 per cent mobile.[5]

## Engineer Battalion, Airmobile Division (TOE 5-215T)

Thirty-eight officers, 582 enlisted men. Headquarters and headquarters company, three combat engineer companies. The battalion, organic to the airmobile division, provided direct support to tactical elements in removal and/or emplacement of obstacles and fortifications, construction of bridges, fords, culverts and airfields for medium cargo aircraft, and fought as infantry, when required. The battalion is equipped with lightweight and sectionalized earthmoving equipment (four sectionalized scrapers, 42 3/4-ton dump trucks, six sectionalized graders, four sectionalized combination grader/scrapers, three vibratory compactors, six light and four medium dozers) and was one hundred per cent air transportable with army aircraft.[6]

## Engineer Battalion, Infantry Division (TOE 5-155E)

Forty-six officers, 901 enlisted men. Headquarters and headquarters company, four combat engineer companies, bridge company. The battalion, organic to the infantry division, was capable of construction and repair of bridges, roads, airfields, emplacement and/or removal of obstacles and fortifications, dry gap and float bridging and fighting as infantry when required. This unit was equipped with 560'

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[5] FM 5-1, November 1965, pp. A-B 42-42.1.

[6] FM 5-1, November 1965, pp. A-B 88.1-88.3.

aluminum balk float bridge, 12 dozers, four cranes, four graders and scooploaders. The basic vehicle within the battalion was the five on dump truck (58 authorized). The unit was one hundred per cent obile.[7]

Headquarters and Headquarters Company Engineer Brigade, Army or Corps or Engineer Brigade (Construction) (TOE 5-101E)

Twenty officers, 64 enlisted men (Army) or 34 officers, 110 nlisted men (construction). This unit provided the overhead necessary o command and coordinate the activities of subordinate engineer groups nd battalions. When organized as an army or corps brigade, the unit as augmented by personnel to staff the appropriate engineer section. When organized as a construction brigade, the unit was authorized addi- tional engineer planning and design personnel. In its army or corps organization it was capable of controlling two to three combat groups; in the construction organization, three to four construction groups. In either configuration, the unit was authorized two utility helicop- ters.[8]

Headquarters and Headquarters Company Combat Group (TOE 5-52D)

Twenty-five officers, 86 enlisted men. This unit provided the overhead for command and control of three to six combat battalions. The emphasis within the unit rested with planning and coordinating

[7] FM 5-1, May 1961, pp. 71-73.

[8] FM 5-1, November 1965, pp. A-B 31-34.

combat support activities. The unit was not authorized an engineer design section. It was one hundred per cent mobile and was authorized six fixed wing aircraft and six helicopters (four observation, two utility).[9]

### Headquarters and Headquarters Company Construction Group (TOE 5-112D, TOE 5-112E)

Twenty officers, 78 enlisted men. This unit provided the overhead for command and control of three to five construction battalions. The unit also possessed the capability to design, plan and supervise construction of routes of communication, buildings, airfields, minimal petroleum storage facilities and minimal port facilities. In the 5-112D configuration the unit was authorized both an operations and an engineering section and two aircraft. In the 5-112E organization, the unit was authorized only a combined engineer-operations section. It was authorized three utility helicopters.[10]

### Construction Support Company (TOE 5-114D)

Six officers, 158 enlisted men. This unit, organized with quarrying, asphalt paving and specialized equipment support capabilities, provided general support to combat and construction battalions engaged in earthwork and surfacing operations. The unit possessed a direct support maintenance capability for its organic equipment. The unit is 50 per cent mobile.[11]

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[9] FM 5-1, May 1961, pp. 181-183.

[10] Ibid., pp. A-B 36-27, and FM 5-1, May 1961, pp. 209-210.

[11] FM 5-1, November 1965, pp. A-B 38-39.

Dump Truck Company
(TOE 5-124D)

Four officers, 104 enlisted men. Equipped with 48 five ton dump trucks, the company provided haul support to units engaged in moving gravel, sand, dirt and crushed stone. The unit was one hundred per cent mobile.[12]

Light Equipment Company
(TOE 5-54E)

Eight officers, 207 enlisted men. This unit provided equipment support to engineer combat battalions and produced aggregate through company quarrying operations. The company was authorized six cranes, nine graders, four scooploaders, two concrete mixers, nine 18 cubic yard scrapers and four dozers. The unit was one hundred per cent mobile.[13]

Port Construction Company
(TOE 5-129D)

Thirteen officers, 208 enlisted men. This company was capable of supporting port construction and rehabilitation, and beach construction. Equipped with a variety of marine equipment and authorized a diving section, the unit was capable of operations on both land and water. The unit was 50 per cent ground mobile.[14]

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[12] FM 5-1, May 1961, pp. 227-228.

[13] FM 5-1, November 1965, pp. A-B 20-22.

[14] FM 5-1, May 1961, pp. 229-231.

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Bell, J. C., COL, Engineer, IFFV, 1967-1968.

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[2]See Appendix B. Completed questionnaires are on file in USACGSC Library. Position indicated is command position, if any, held by officer completing questionnaire.

Boylan, J. F., LTC, 588th Engineer Battalion, 1966-1967.

Brandes, W. F., LTC, 14th Engineer Battalion, 1966-1967.

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Bunch, J. E., LTC, 864th Engineer Battalion, 1965-1966.

Bush, G. M., COL, 45th Engineer Group, 1966-1967.

Carnes, J. H., MAJ, 196th Infantry Brigade, 1967.

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Ducote, R. J., COL, Chief of Staff, USAECV, 1966-1967.

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Fulton, T. R., LTC, 39th Engineer Battalion, 1966-1967.

Gelini, W. C., COL, 79th Engineer Group, 1966-1967.

Gilmore, R. L., LTC, 20th Engineer Battalion, 1966-1967.

Grace, D. B., COL, Engineer, IIFFV, 1966-1967.

Guth, C. W., LTC, 93d Engineer Battalion, 1967-1968.

Hansen, R. S., LTC, 864th Engineer Battalion, 1966-1967.

Harris, R. L., LTC, 20th Engineer Battalion, 1966.

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Kelly, J. L., LTC, 577th Engineer Battalion, 1966-1967.

Kimbro, G. T., MAJ, A Company, 326th Engineer Battalion, 1965-1966.

Lammie, J. L., LTC, 14th Engineer Battalion, 1967-1968.

Lee, E. C., LTC, 4th Engineer Battalion, 1967-1968.

Lehrer, G. H., MAJ, 173d Engineer Company, 1966-1967.

Loper, T. C., LTC, 15th Engineer Battalion, 1967-1968.

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Malley, R. J., COL, 8th Engineer Battalion, 1965-1966.

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McGuinness, W. V., COL, 46th Engineer Battalion, 1966-1967.

Melton, C. A., LTC, 815th Engineer Battalion, 1967.

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Ploger, R. R., MG, CG, 18th Engineer Brigade and USAECV, 1965-1967.

Rank, W. A., LTC, 84th Engineer Battalion, 1966-1967.

Redman, J. R., LTC, 70th Engineer Battalion, 1966-1967.

Rees, M. W., LTC, 169th Engineer Battalion, 1966-1967.

Rhodes, N. C., LTC, 19th Engineer Battalion, 1966-1967.

Rodolph, C. P., LTC, 577th Engineer Battalion, 1967.

Sargent, H. L., LTC, 1st Engineer Battalion, 1965-1966.

Savage, L. H., MAJ, 65th Engineer Battalion, 1965-1967.

Sawyer, K. T., COL, 45th Engineer Group, 1967-1968.

Starnes, W. L., COL, 35th Engineer Group, 1966-1967.

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Curl, R. L., MAJ, USA. S3, 937th Engineer Group, 1965-1967, March 1968.

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Edelstein, Leonard, LTC, USA. CO, 70th Engineer Battalion, 1965-1966, 1-10 February 1968.

Eifler, C. W., MG, USA. CG, 1st Logistical Command, 1966-1967, 17 January 1968.

Hart, W. F., COL, USA. CO, 35th Engineer Group, 1965-1966, 13 May 1968 (Telephone).

Kirk, W. E., LTC, USA. S3, 937th Engineer Group, 1965-1966, 8-10 February 1968.

MacLennan, R. G., LTC, USA. S3, 8th Engineer Battalion, 1965-1966, 15 February 1968.

O'Shei, D. M., MAJ, USA. Engineer Section, USAECV, 1966-1967, March 1968.

Remus, M. D., LTC, USA. S3, 35th Engineer Group, 1966-1967, March 1968.

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[4]Interviews were conducted by the author at Fort Leavenworth.