5/3/1/4

AUSTRALIAN WAR MEMORIAL
ACCESS STATUS
OPEN

ORIGINAL

TOBRUK ACTIVITIES

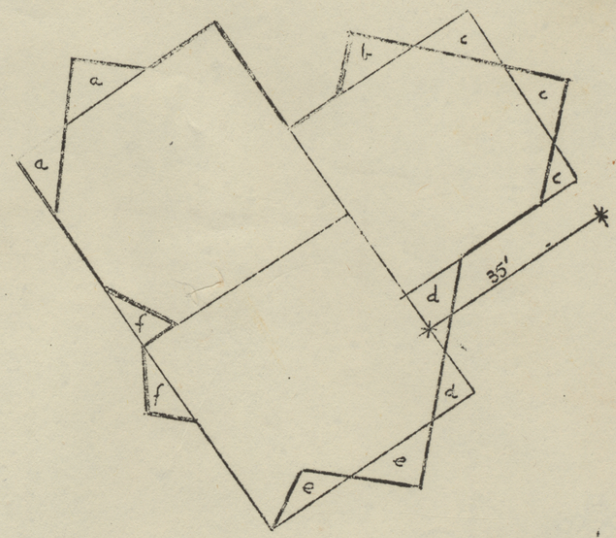
AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

21

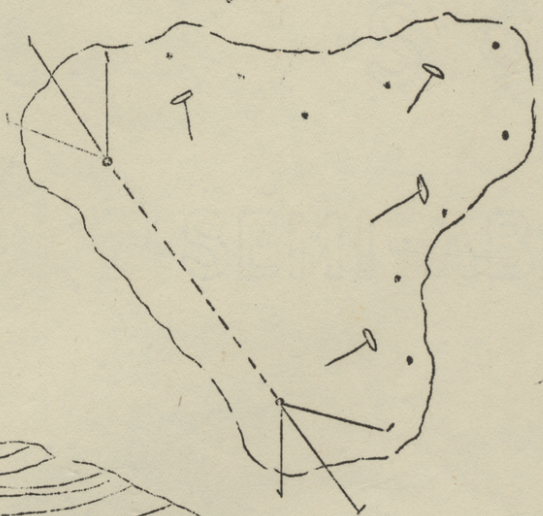
CAMOUFLAGE DESIGN No 2.

OVERHEAD CAMOUFLAGE for AIRCRAFT.

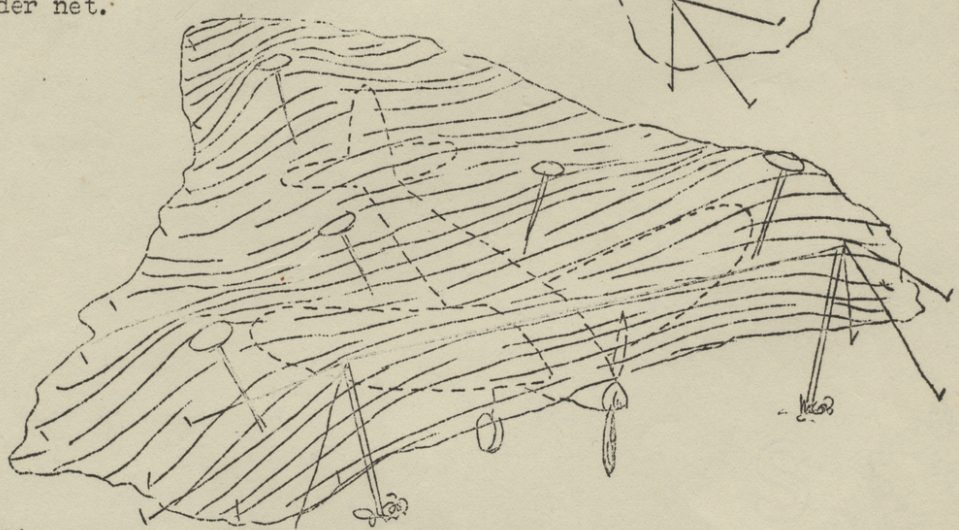
1. Layout of three 35' x 35' nets sewn together, showing method of making irregular shape by cutting and re-stitching nets.



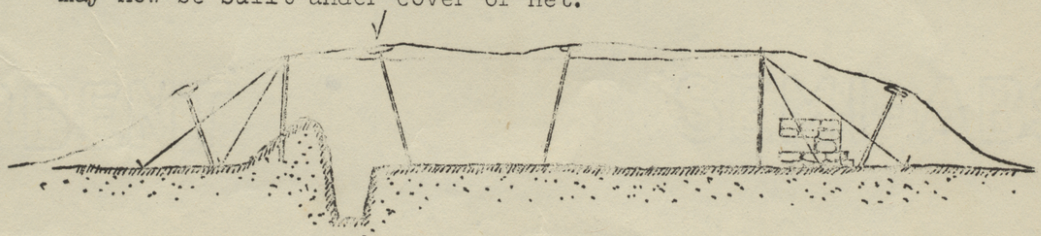
2. Net pegged down in irregular shape over 'goal post structure' and 'posts, petrol tin supporting'
Net must be stretched out tightly before being forced up out of shape by posts supporting.



3. Aerial view showing plane under net.



4. Section shows blast walls, slit trenches, amn recesses etc which may now be built under cover of net.

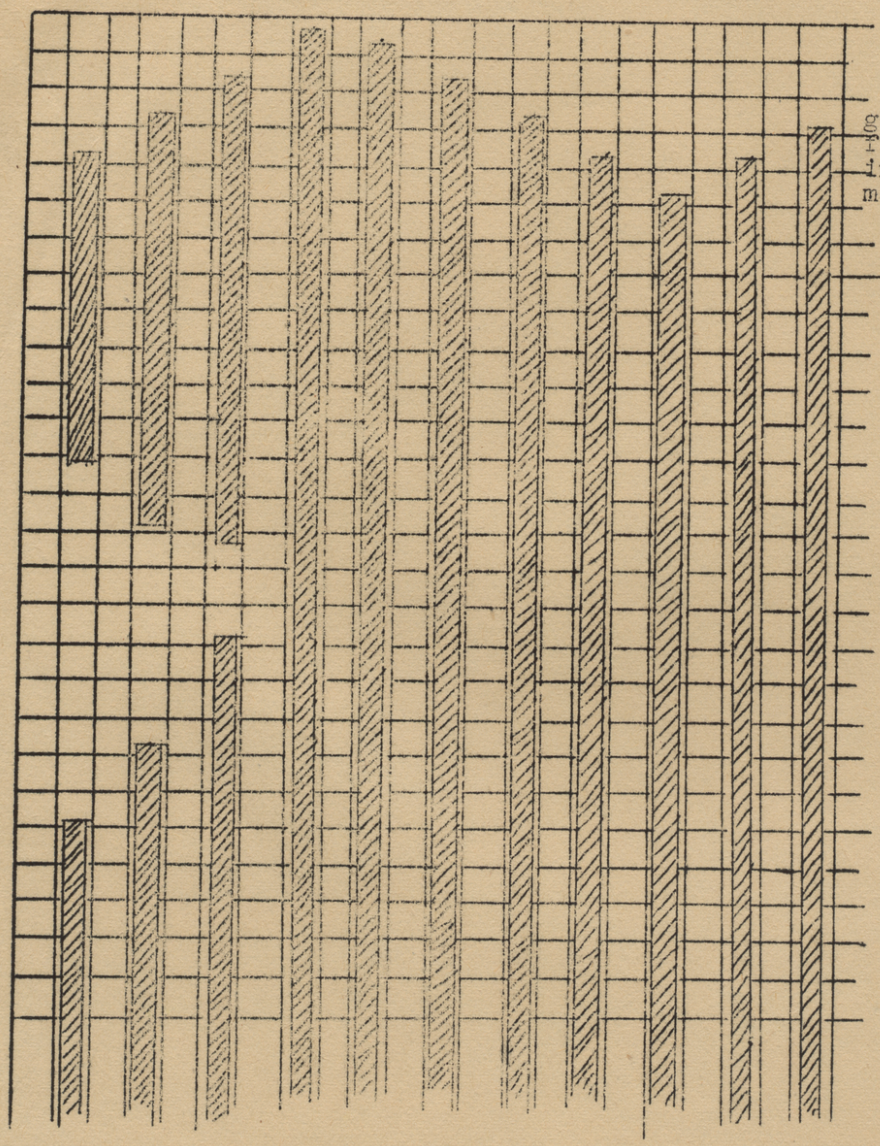


AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

CAMOUFLAGE DESIGN No 3 - issued by 9 AUST DIV CAMOUFLAGE UNIT.

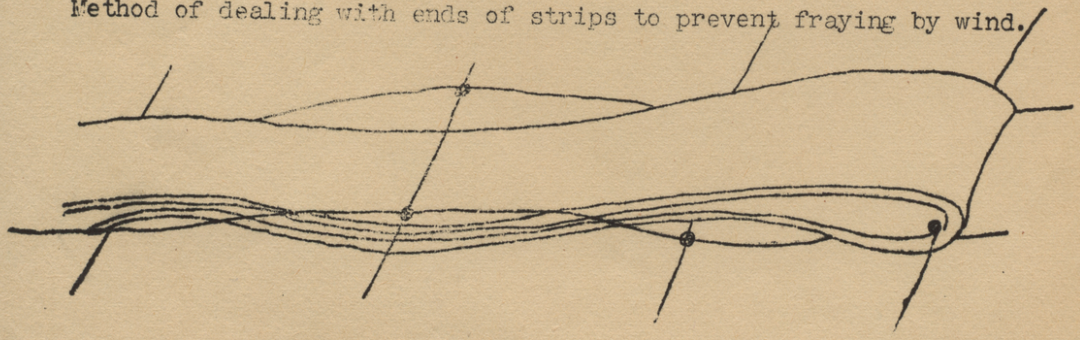
Appendix "F"

METHOD ADOPTED for GARNISHING NETS in the DESERT SECRET



garnishing finished off in irregular manner

Method of dealing with ends of strips to prevent fraying by wind.

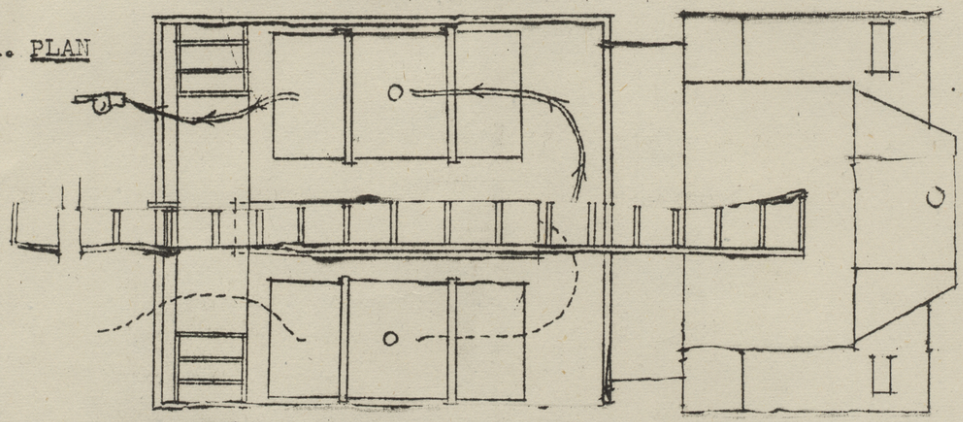


AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

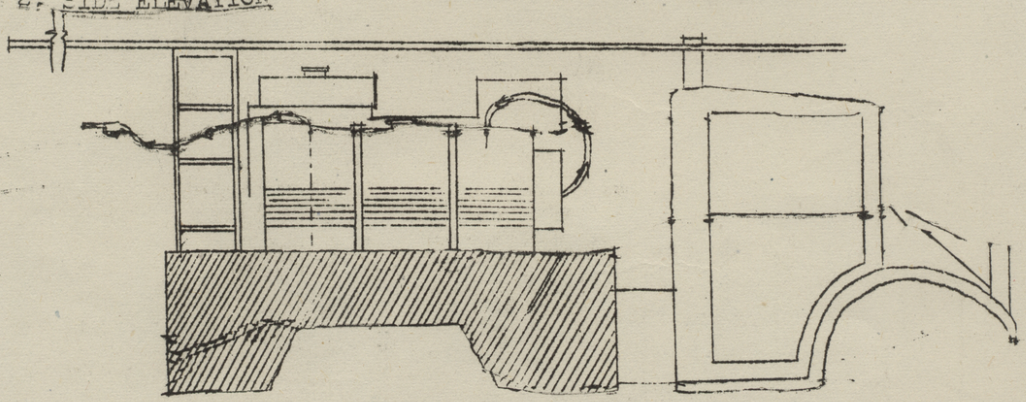
CAMOUFLAGE DESIGN No. 2.

IMPROVISED PAINT SPRAY

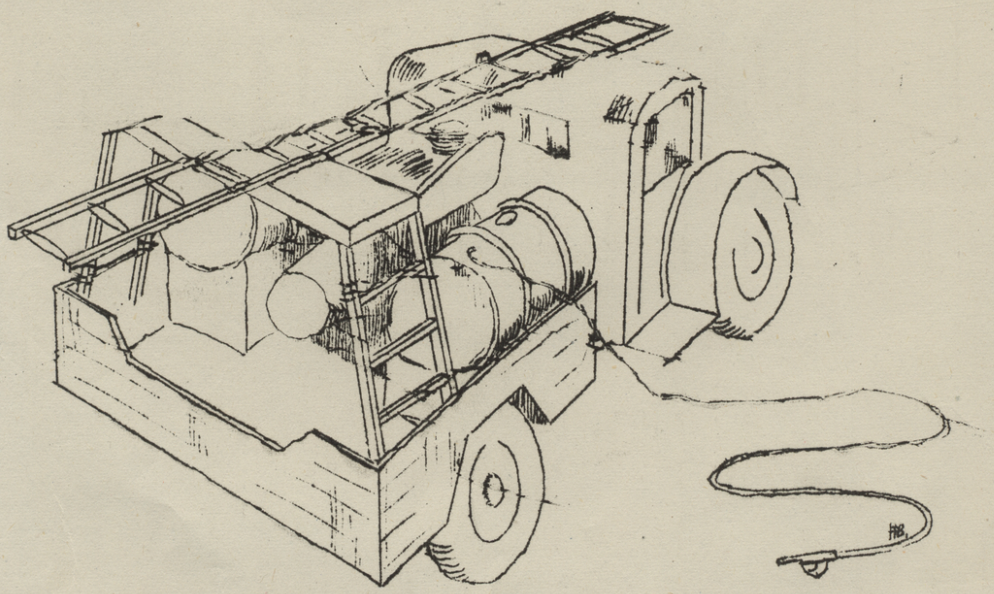
1. PLAN



2. SIDE ELEVATION



3. PERSPECTIVE



AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

Appx. to Camouflage Design No. 6.

Explanatory Notes on construction of
Improvised Paint Spray Wagon.

A. Single cylinder Italian compressor motor mounted securely in a wooden framework on a 15 cwt truck.

B. Two oil drums, partly full of liquid to be sprayed and connected to compressor by rubber hose finishing above liquid level in drums.

C. Rubber ejector hose dipping below level of liquid in drums. Preasure is normally kept at approx 12.5 lbs per sq inch and the flow controlled by a spray gun attached to end of ejector hose.

D. Light ladder, carried on top of truck, supported by a wooden framework at rear and clamped down on driver's cabin at front. This can be swung into the upright position to enable tall buildings, tents etc to be sprayed.

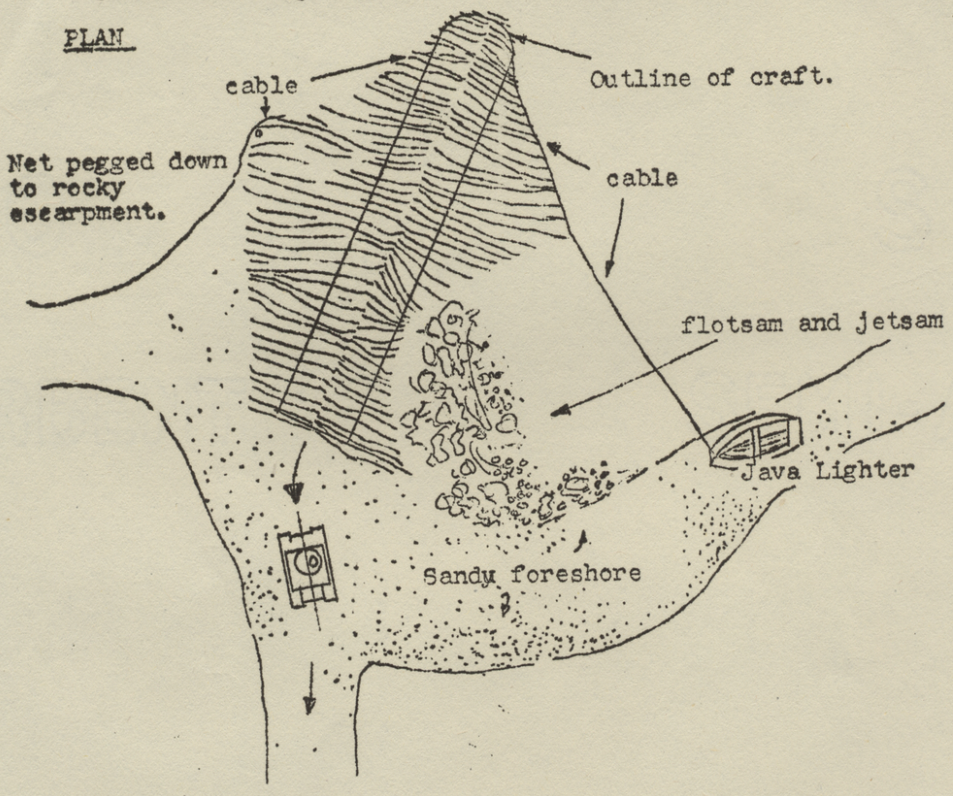
AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

CAMOUFLAGE DESIGN No 4

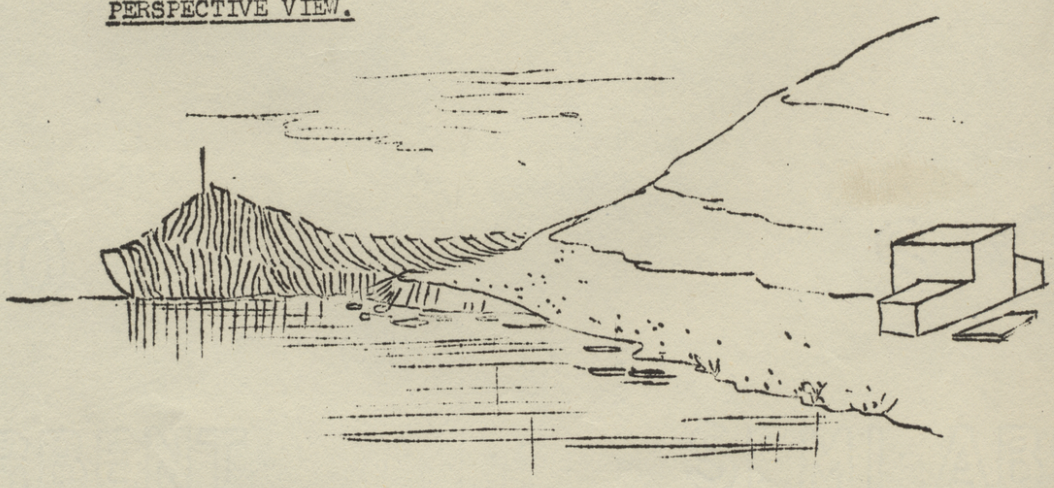
CONCEALMENT OF MILITARY LANDING CRAFT

Garnished net stretched over craft, one side pegged down on ridge above foreshore, the other fastened to steel cable between craft and wrecked Java lighter on beach, Net was also supported by other mooring cable between ridge and craft and nets were allowed to overhang both cables and drop into the water, thus forming false headland.

PLAN



PERSPECTIVE VIEW.

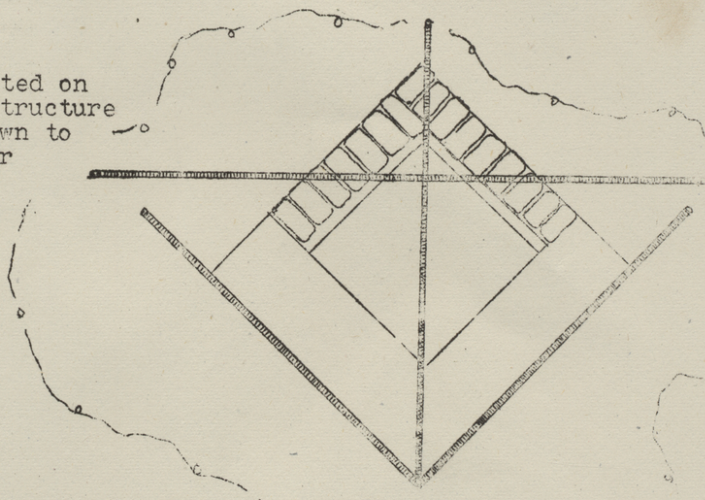


AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

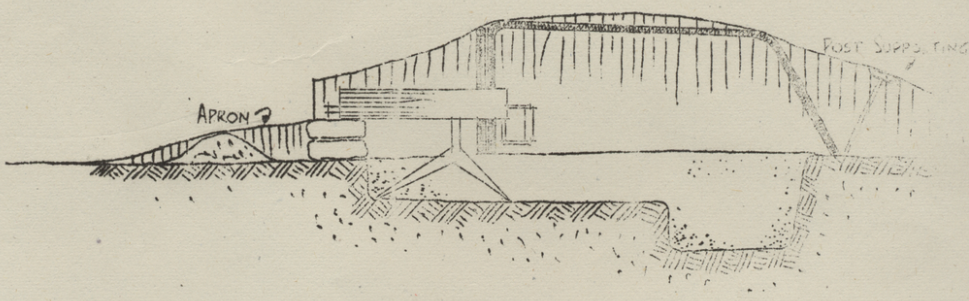
CAMOUFLAGE DESIGN No 5.

OVERHEAD CAMOUFLAGE
for M.G. POST.

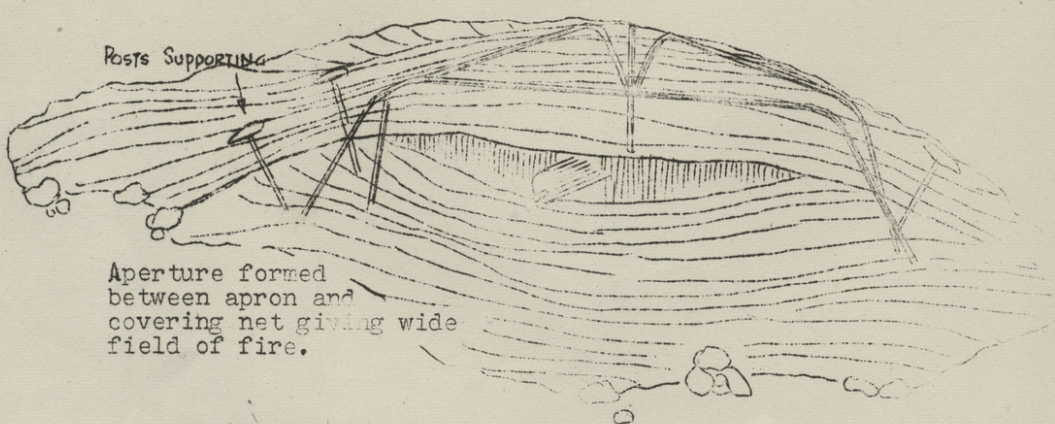
1. Net supported on old IT superstructure and pegged down to make irregular shape.



2. Elevation showing 14' x 14' net supported over pit by IT superstructure. A 7' x 14' net used as an apron in front of aperture.



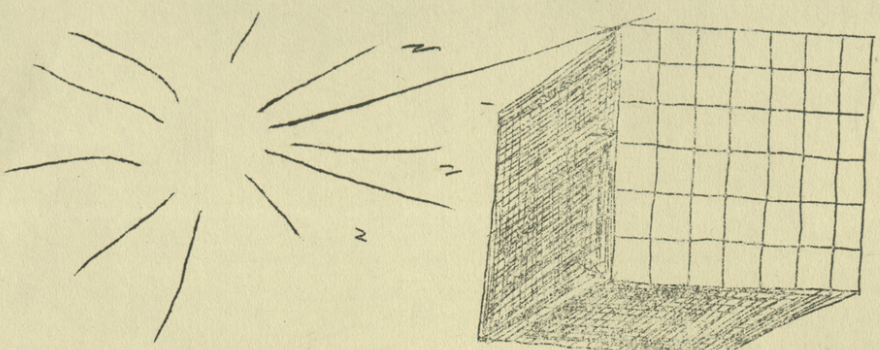
3. Aerial View.



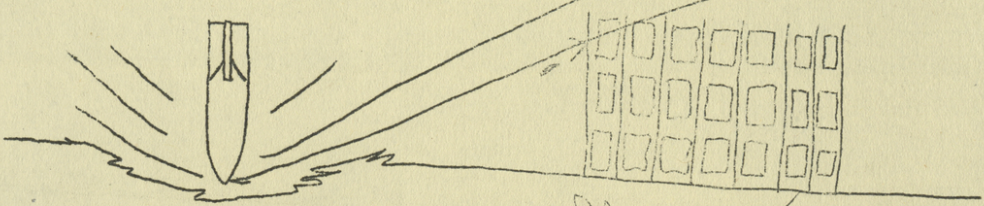
Aperture formed between apron and covering net giving wide field of fire.

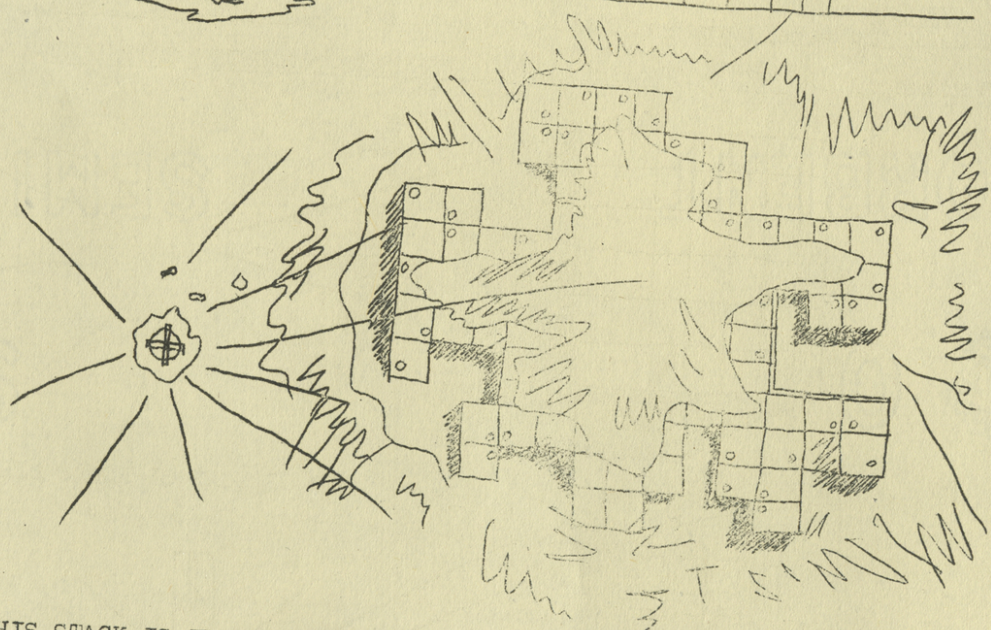
CAMOUFLAGE DESIGN No 7. - issued by 9 Aust ~~Div Camouflage Unit.~~ SECRET

SUGGESTED METHOD of STACKING 4-gallon PETROL TINS. Appendix "B



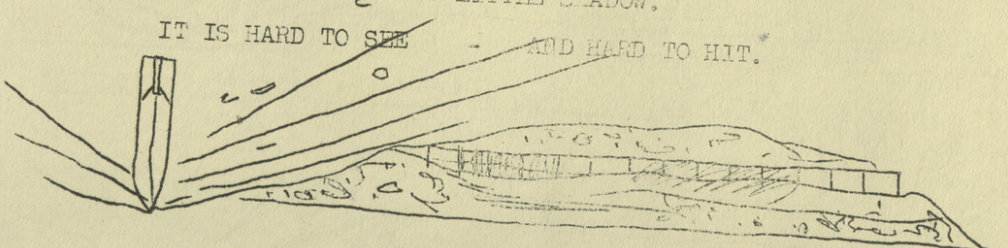
THIS STACK IS EASY TO SEE - IT IS ALSO EASY TO ~~HIT.~~





THIS STACK IS IRREGULAR AND BOXES HAVE BEEN OILED BEFORE MOUNDING SAND. THERE IS VERY LITTLE SHADOW.

IT IS HARD TO SEE - AND HARD TO HIT.



CAMOUFLAGE DESIGN No 8

CAMOUFLAGE DUMP AND SERVICE STATION.

Figure 1. Showing scaffolding to facilitate treatment with oil and sand of LT.

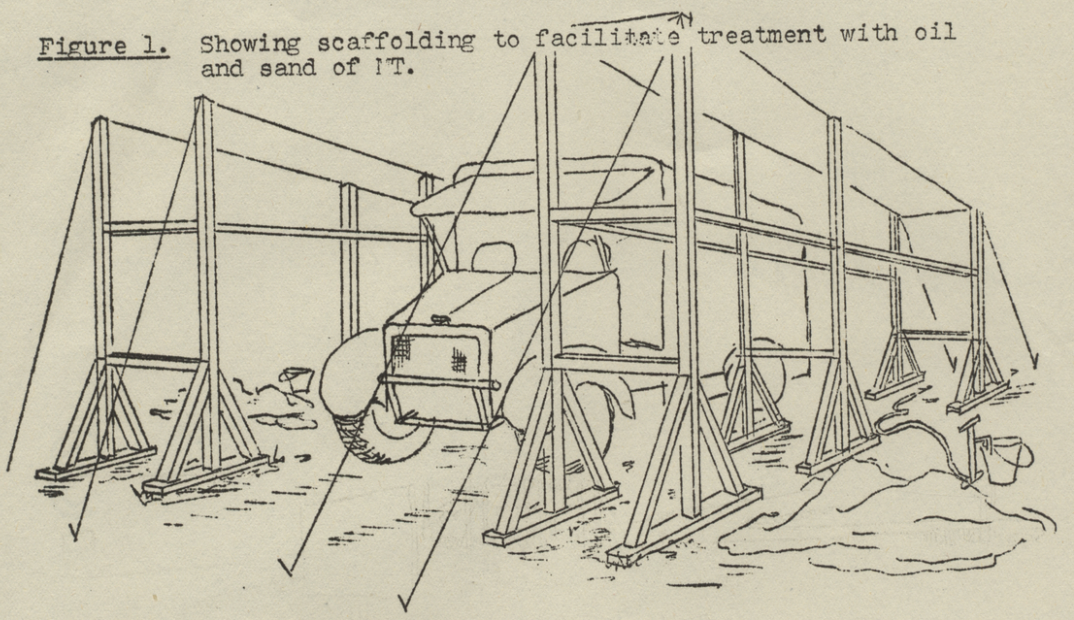


Figure 2 Plan showing general layout.

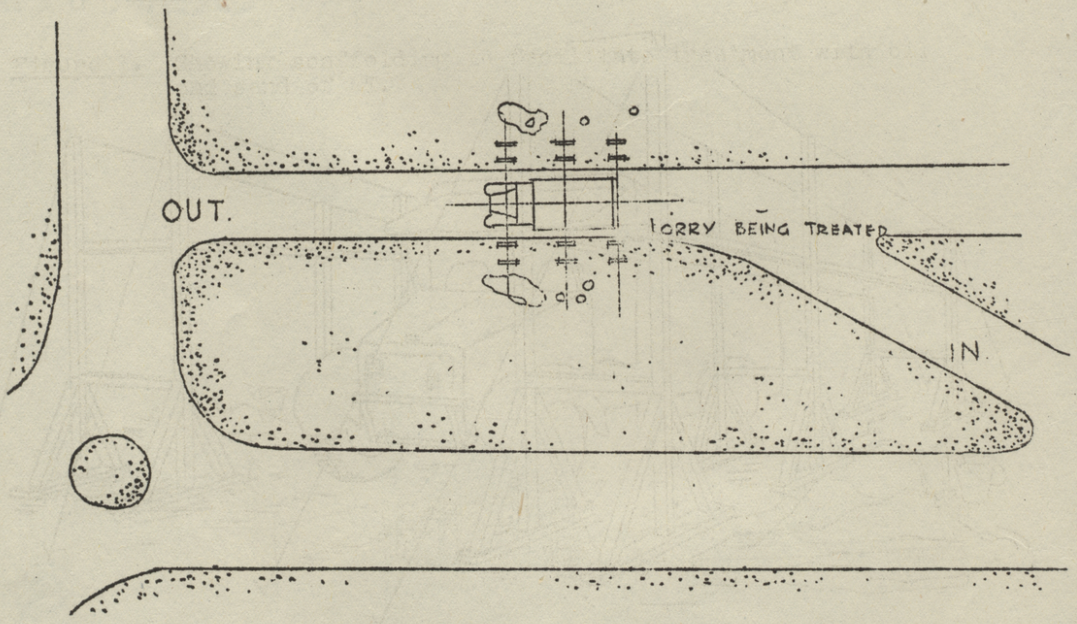


Figure 3. General View.

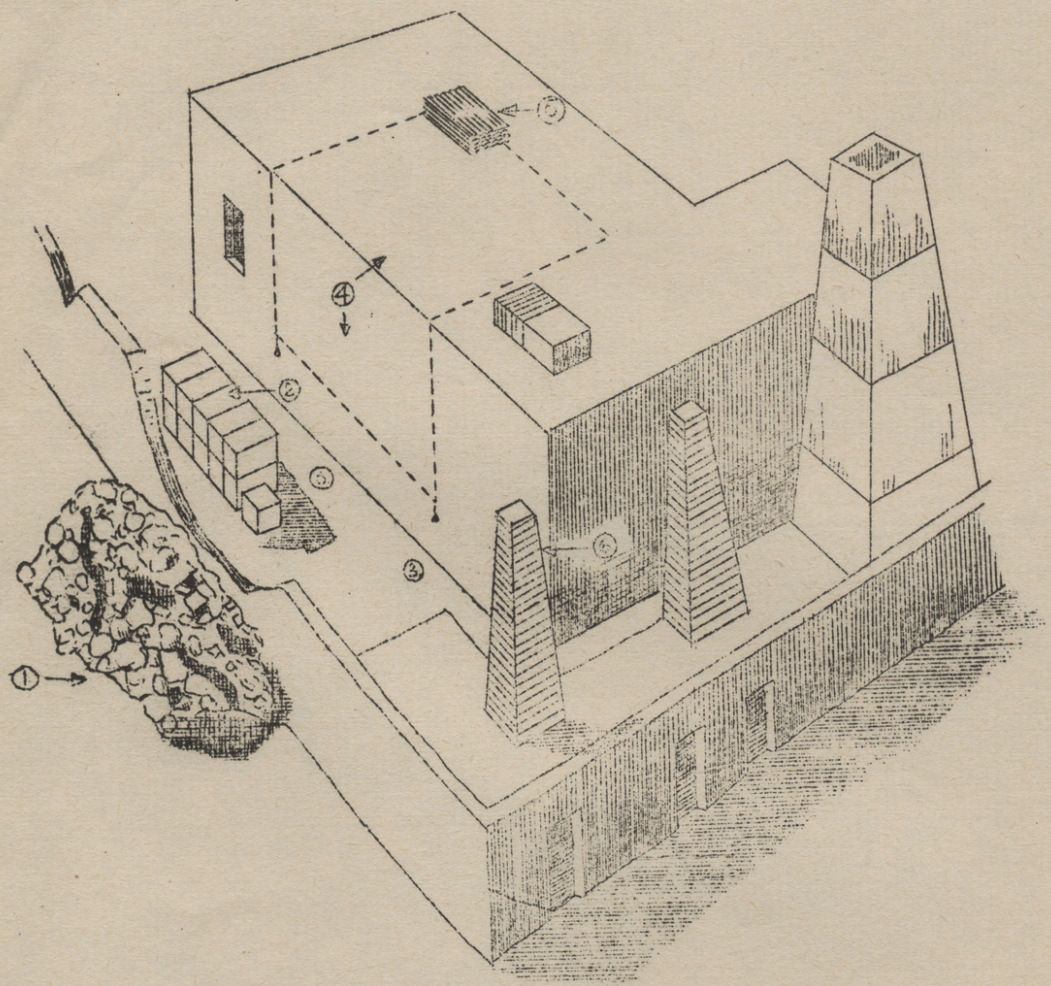


AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

App. A-1.

CAMOUFLAGE DESIGN No 17

Camouflage Scheme for POWER HOUSE. BEFORE RAID



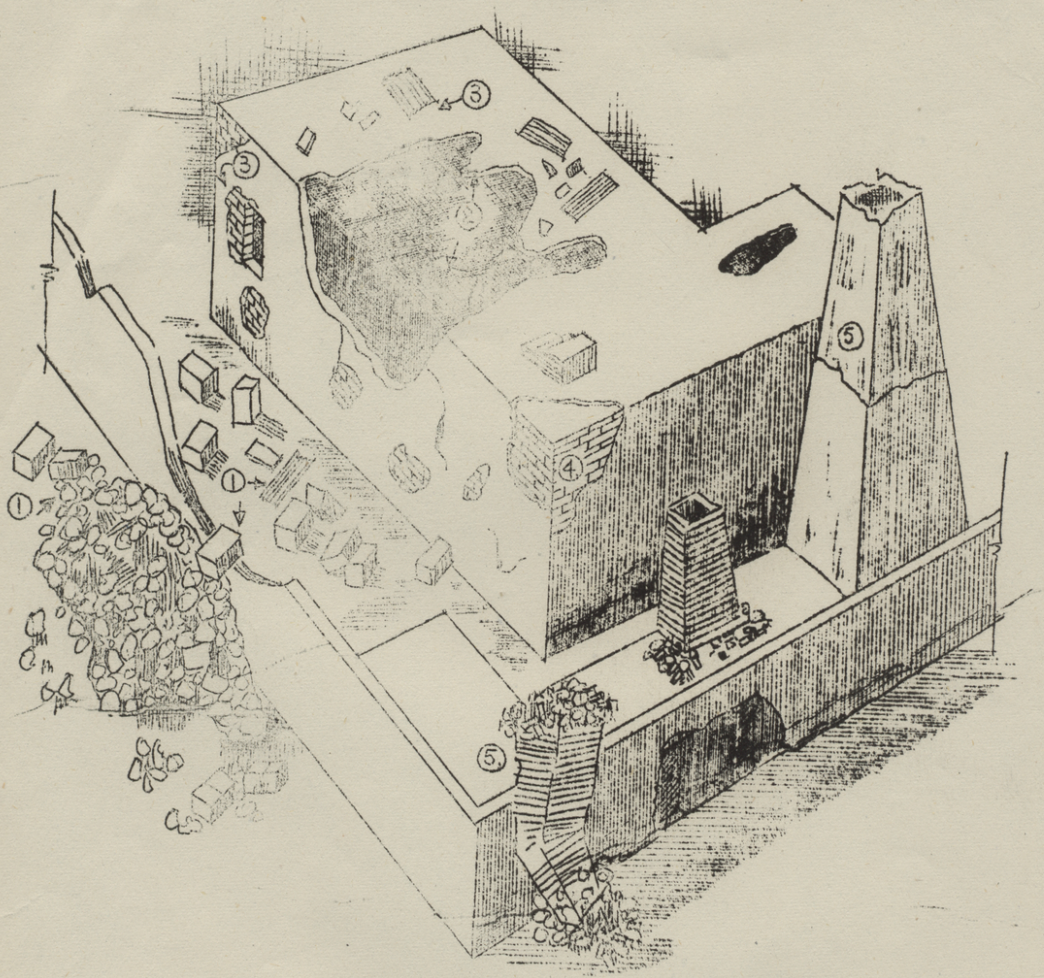
1. Pile of debris from previous damage.
2. Boxes stacked neatly - to be scattered after raid.
3. Smoke bombs ready to be set off during raid.
4. Hessian cover for painted bomb-hole - to be removed after raid before smoke clears.
5. Neat stack of corrugated iron to hold hessian in place - to be scattered over roof after raid.
6. Tower, prepared for demolition. To be demolished during raid coinciding with setting off of smoke bombs.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

App. A.2.

Camouflage Scheme for POWER HOUSE.

AFTER RAID



1. Debris scattered about as though caused by bomb.

2. Bomb-hole simulated on walls and roof by painting with tar. Thickness of wall and roof shown by cement wash.

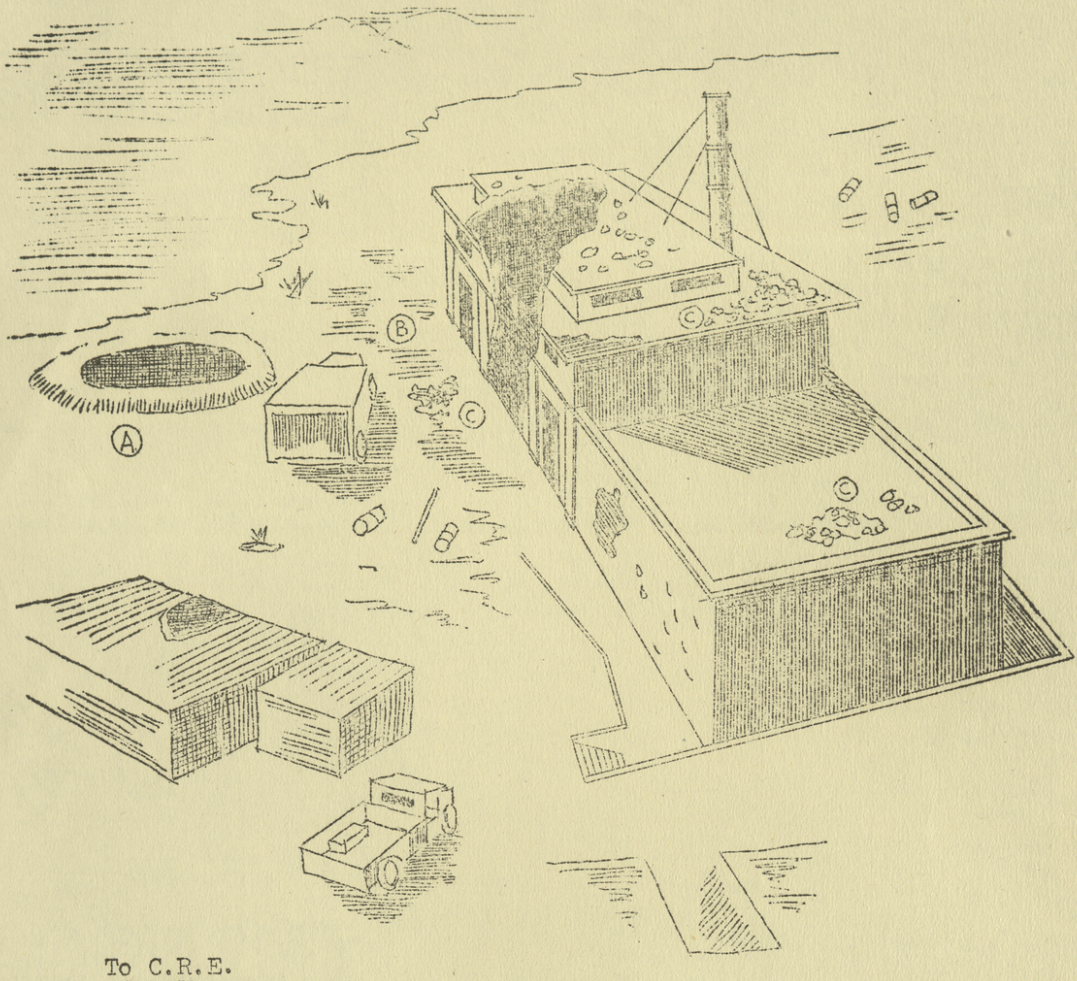
3. & 4. Debris scattered on roof and plaster chipped from wall

5. Towers, showing one left standing and one demolished as if due to blast.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

CAMOUFLAGE DESIGN No 18 - SCHEME FOR DISTILLERY.

App A.3



To C.R.E.
TOBRUK.

The above sketch shows the camouflage treatment for the Distillery, which I hope has NOT been hit. After the attack this evening it seems that now is the time to take action on this scheme. The German recce planes will probably be over tomorrow morning so it is suggested that at least the hole be simulated at once using oil or tar.
Other details as follows:-

A. Dummy crater to be dug 18" in depth, further depth to be suggested by darkening hole on SOUTH side with oil or tar.

B. Grey colouration caused by bomb in vicinity of building by use of cement fondu or [illegible] oil through perforated can.

C. Debris to be scattered about.

D. Oily rags to be burnt in any u/s adjacent building.

E. From a vertical view it is difficult to see the small chimneys so it might be a good idea to lay 3 oil drums end to end across the roof.

F. Further shrapnel marks to be painted on building (if not already there)

Sgd R.P. Proud
Capt R.E.
G2 (Ops)
DESFORCE
att 9 Aust Div.

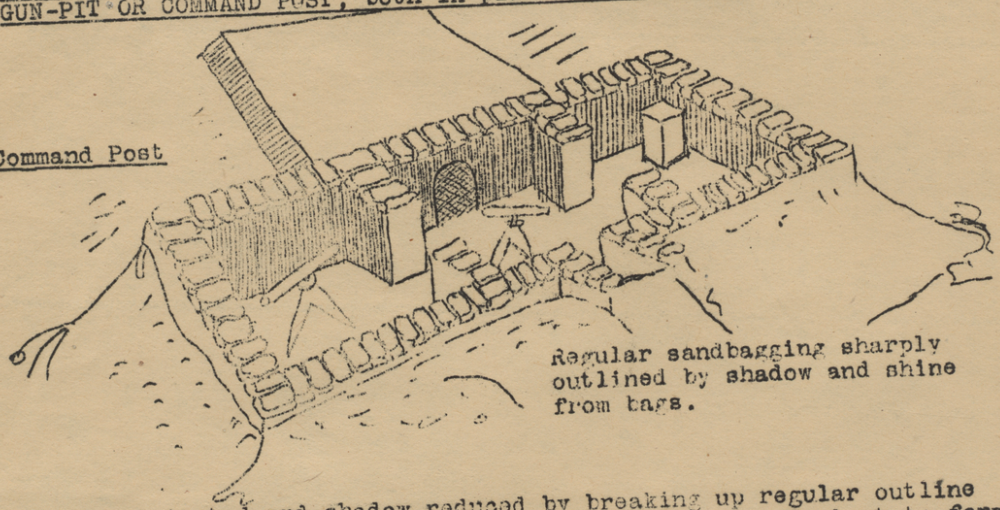
In the field
Apr 41

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

CAMOUFLAGE DESIGN

SUGGESTED METHOD OF OBTAINING IRREGULAR OUTLINE TO SQUARE GUN-PIT OR COMMAND POST, both in plan and elevation.

Command Post



Regular sandbagging sharply outlined by shadow and shine from bags.

Shine eliminated and shadow reduced by breaking up regular outline with hessian supported on 1/4" reinforcement steel rod, bent to form irregular outline.



A. Hessian sewn over 1/4" steel rod which is then bent into irregular shape and pronged into side of sandbag wall



B. 1/4" steel rod bent into irregular outline and driven vertically into sandbags. Hessian stretched over and pegged down irregularly with "hairpins".

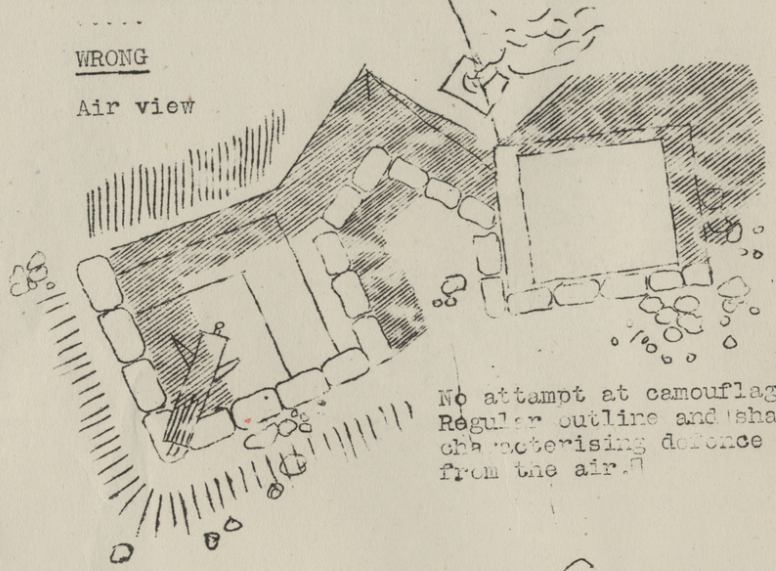
This treatment is suitable for partially sunk emplacements in sand and camel grass country.

AUSTRALIAN WAR MEMORIAL
AWM2020.71.1210

CAMOUFLAGE SUGGESTION FOR MG POST

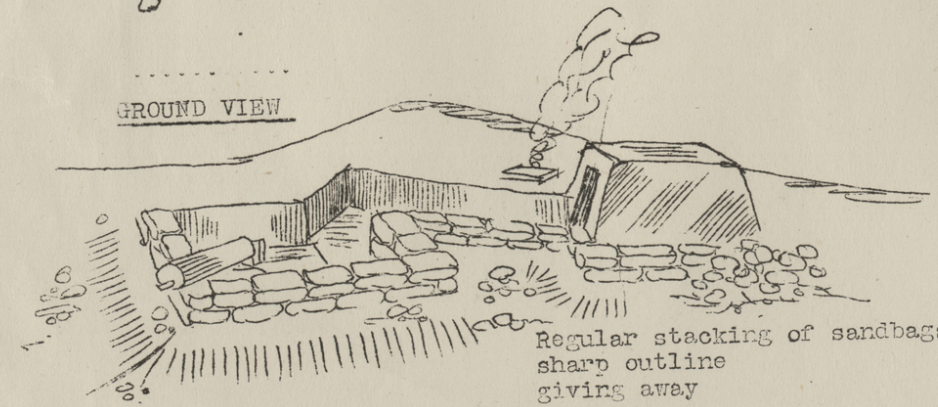
WRONG

Air view



No attampt at camouflage.
Regular outline and shadow
characterising defence position
from the air.

GROUND VIEW

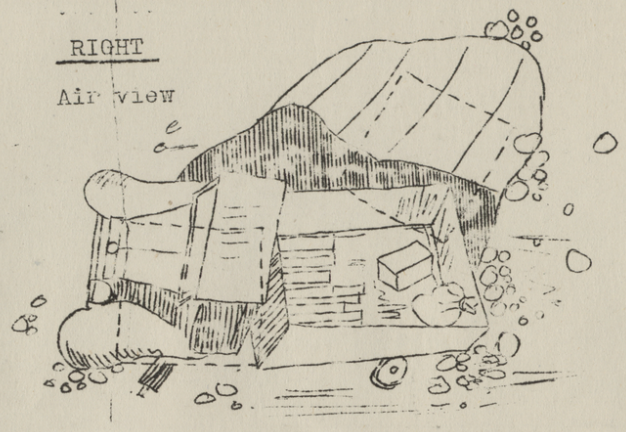


Regular stacking of sandbags
sharp outline
giving away

CAMOUFLAGE DESIGN NO 19

RIGHT

Air view



Old vehicle dragged over position
(vehicle must look u/s. Canvas, treated
with mud sand, to cover billet.

GROUND VIEW

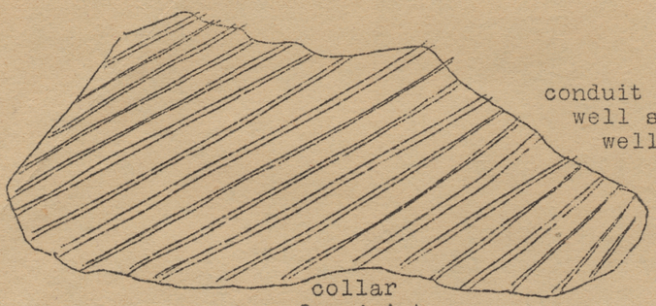


AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

Appx. C. 19.

CAMOUFLAGE DESIGN. SECRET

USE OF GARNISHED METAL OR CANE SCREENS.



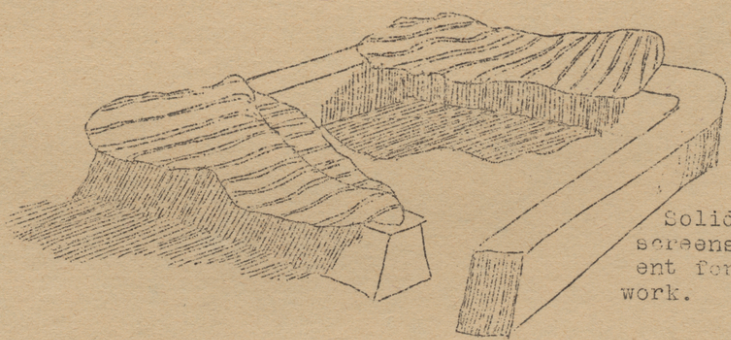
conduit frame,
well stretched,
well garnished.

5 to 10 ft
across

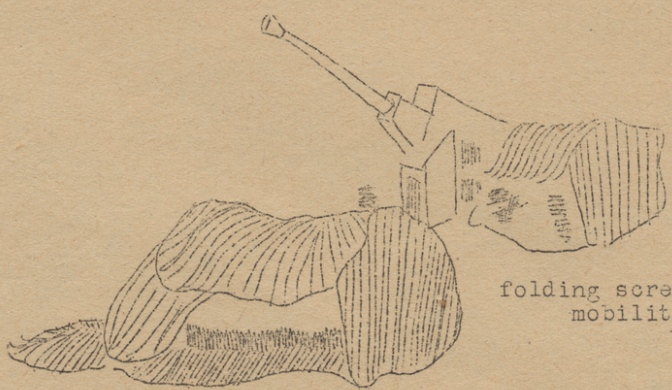
collar
for joint



when placing screens
make sure they do not
touch objects to be
broken up.



Solid hessian
screens are excell-
ent for built up
work.



folding screens for
mobility.

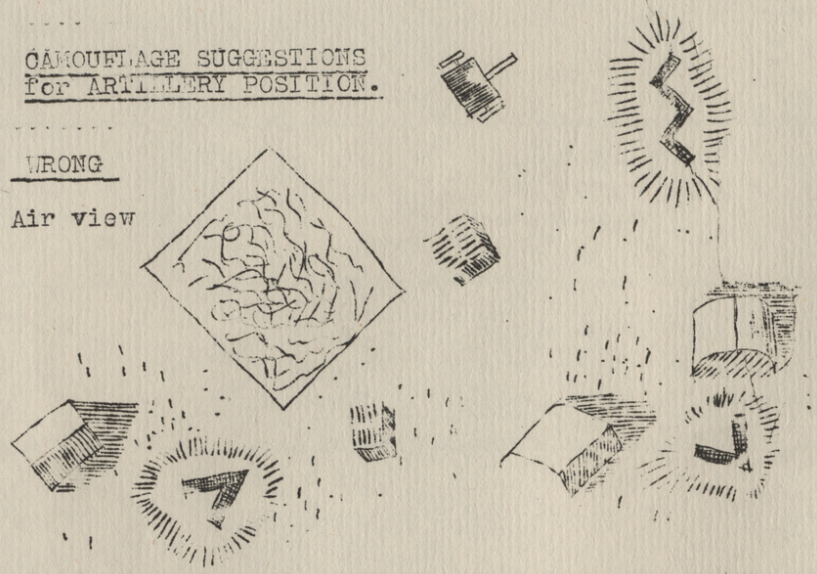
AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

CAMOUFLAGE DESIGN NO 20

CAMOUFLAGE SUGGESTIONS for ARTILLERY POSITION.

WRONG

Air view



A poor attempt to camouflage gun.
No attempt to disguise slit trenches, billets, ammunition etc., thus characterising position as artillery from the air.

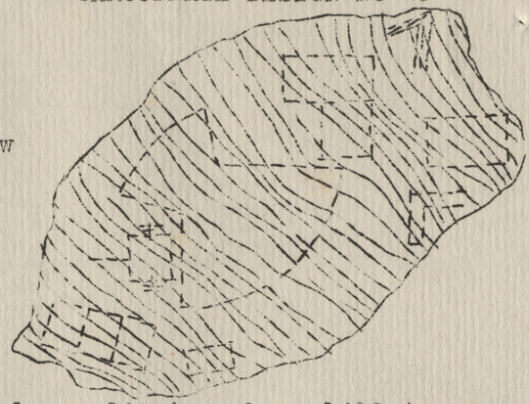
Ground view



Net over gun does not conceal anything from ground observation.

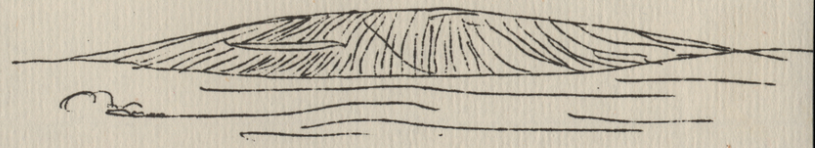
RIGHT

Air view



Gun pit, limber, slit trenches, billets ammunition etc, carefully sited for concealment under large frameless overhead camouflage net, garnished according to local conditions.

Ground view



Net blending with ground, covering all movement and outlines.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

App. C-19

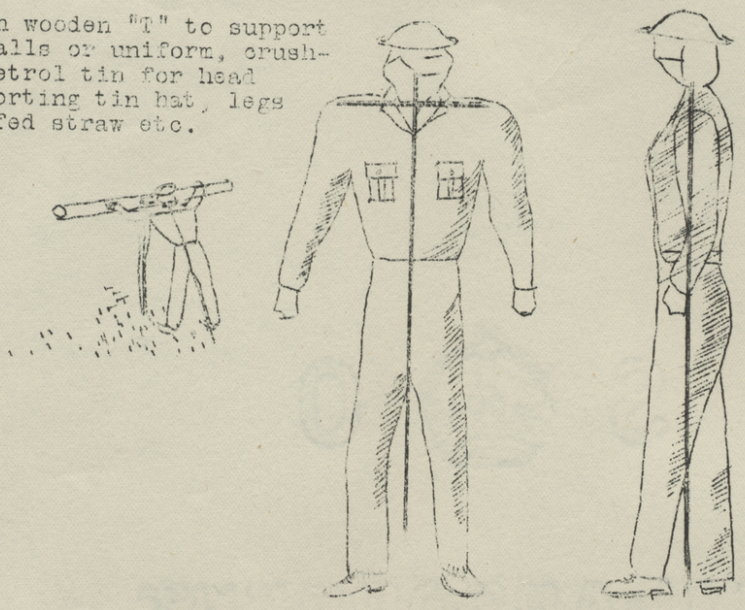
SECRET

20

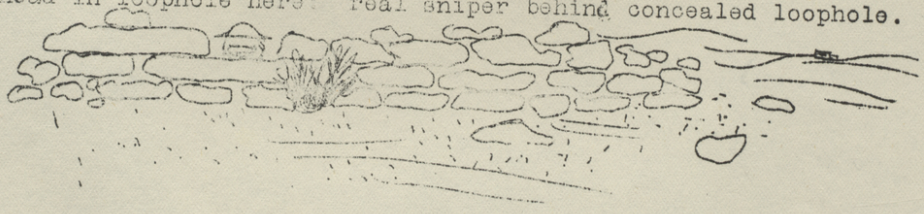
CAMOUFLAGE DESIGN.

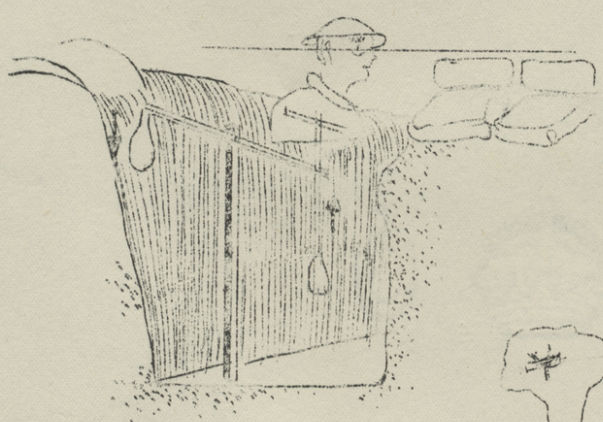
SIMPLE CONSTRUCTION of DUMMY FIGURES

Rough wooden "T" to support overalls or uniform, crushed petrol tin for head supporting tin hat, legs stuffed straw etc.

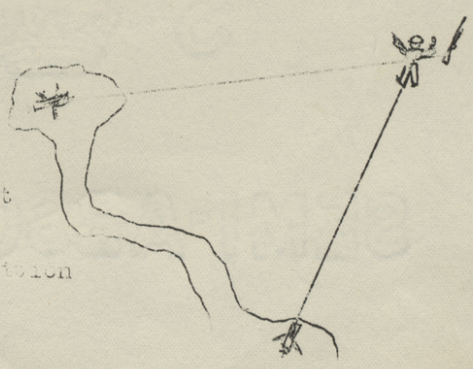


Dummy head in loophole here: real sniper behind concealed loophole.





Head may be raised and lowered.
By taking bearings through bullet holes in head from two different positions the enemy sniper can be pin-pointed.



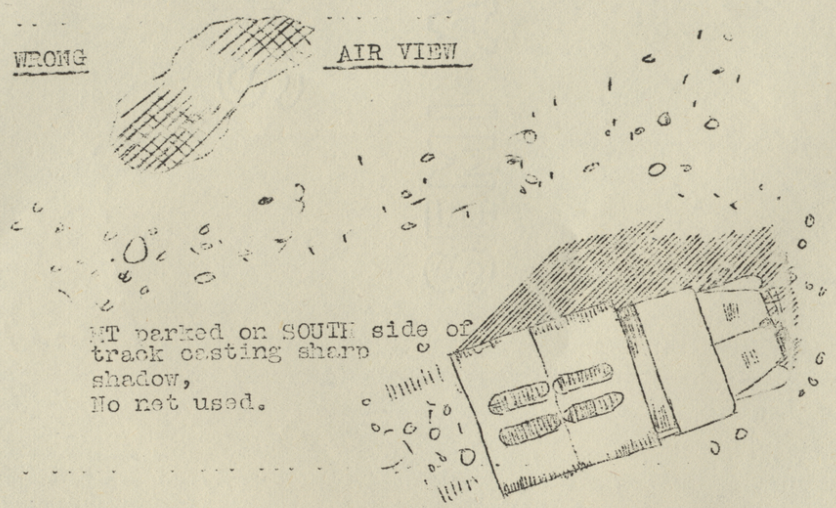
Metal rods through bullet holes give direction of enemy sniper.
Guns clamped down in position for fixed lines of fire.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

CAMOUFLAGE SUGGESTION FOR PARKING OF MT.

WRONG

AIR VIEW

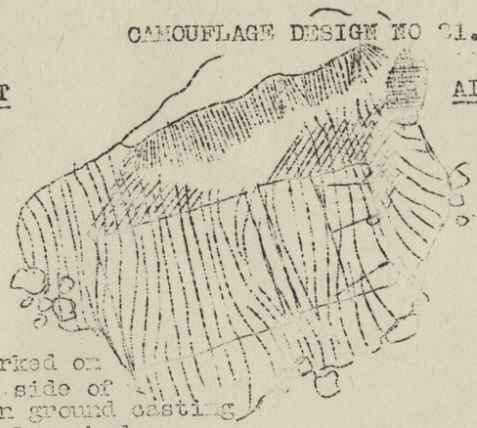


MT parked on SOUTH side of track casting sharp shadow,
No net used.

CAMOUFLAGE DESIGN NO 21.

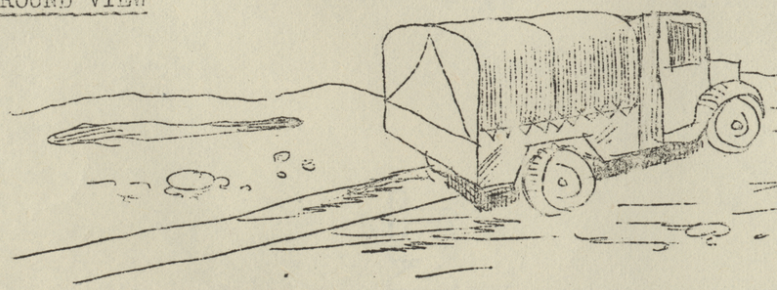
RIGHT

AIR VIEW



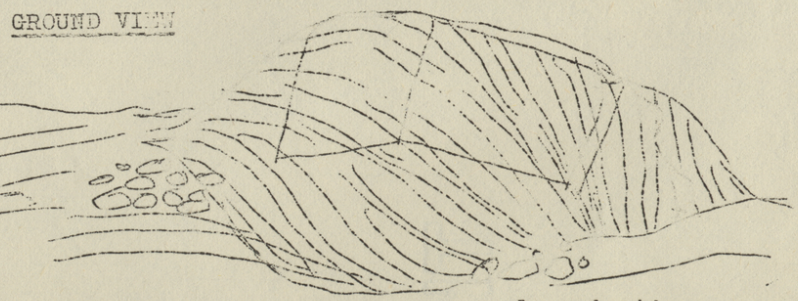
MT parked on SOUTH side of broken ground casting irregular shadow.
Properly garnished net over MT breaking up shadow disguising outline of vehicle.

GROUND VIEW



Vehicle breaking sky-line forming clear target.

GROUND VIEW

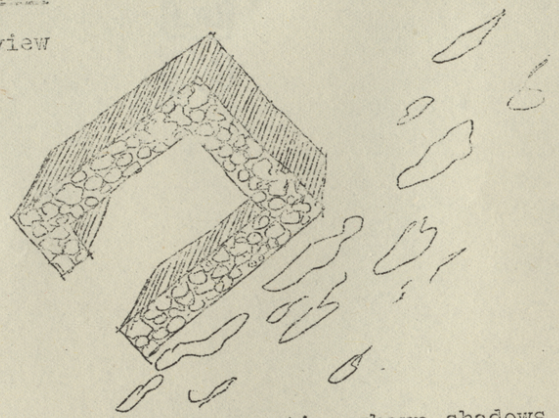


Front of vehicle dug in for shrapnel protection.
Net stretched over vehicle to break up shape on

CAMOUFLAGE SUGGESTION for STONE SANGAR DEFENCE POST

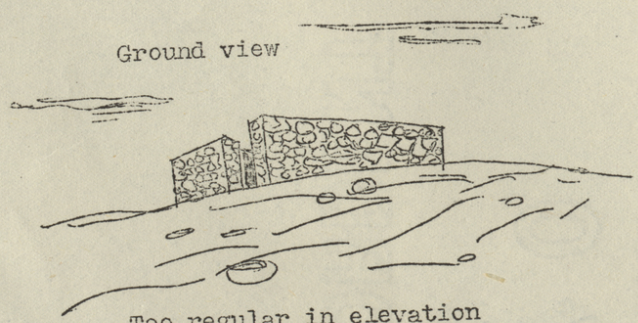
WRONG

Air view



Too regular in plan casting sharp shadows
No blast wall or lookholes

Ground view

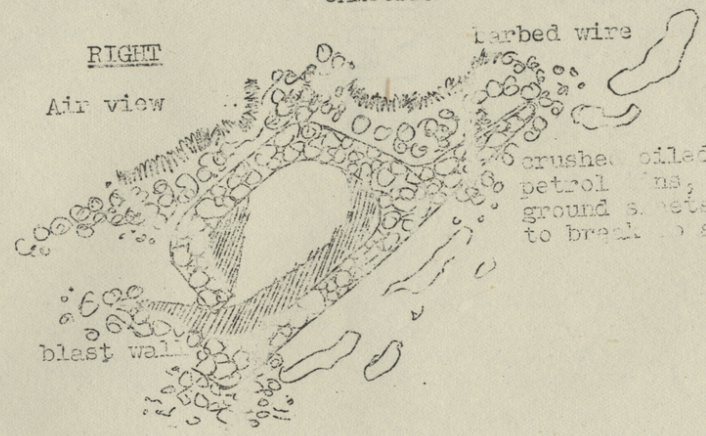


Too regular in elevation
No attempt at concealment.

CAMOUFLAGE DESIGN No. 22.

RIGHT

Air view



Irregularly built in plan



Irregular in elevation blending in to slope of ground.

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COPY

Subject : Dummy A.A. Positions

SECRET.

H.Q., 4th A.A. Bde.

4AA/10/1
23 May 41

To H.Q., R.A.E.,
9 Aust Div.

Ref your E/3623/41 dated 21 May 41

1. Two Dummy Heavy A.A. positions have been constructed and "flash parties" installed.

2. In my opinion these are serving their purpose as one has been bombed once and machine gunned once, and the other has been bombed once.

Dates and details as below:-

C Dummy

15 May - 3 ME 110 dived on position and dropped 3 100lb bombs which fell about 50 yds over position.

21 May - 1 ME 109 dived on position and used M.G. and cannon fire hitting :-

Dummy height finder
Four boxes dummy ammunition.
Two dummy men.

D. Dummy

22 May - 3 JU 87 dive bombed the position using 100lb bombs.
One gun pit hit
One dummy shelter burnt out
Four dummy figures blown over and hit.
At least three bombs fell in the middle of the position.

3. I am very grateful for the most efficient assistance given by Capt Proud and I have instructed Lieut Laing, my Brigade Camouflage Officer, to co-operate with him.

In the Field
/GS

(Signed) J. N. SLATER
Brigadier
Commander, 4 A.A.Brigade.

COPY

E/5190/41

H.Q.,R.A.E.

In the field
12 Jun 41

Subject : Dummy A.A. Bty

To 4th A.A. Bde
rptd Camouflage Officer.

From D.C.E.

The subjoined copy of letter from C.R.E. TOBRUK TOWN for your information and necessary action please.

COPY

"May arrangements please be made to move the dummy battery at 41054362.

We have on three occasions, including this morning, had hits aimed at this battery on our pipe line: Signals communications also suffer.

The dummy battery is certainly a success but has now had so much pasting that it would be the reasonable thing to move it now in any case.

About 12 lengths of main were damaged this morning."

(Signed) T. MANN
Col
D.C.E

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Appx "A" to 9 Aust Div Instn No 32 (contd)

3. Defects in Detail.

The greatest defects in detail observed are :-

(a) Front parapets of trenches not thick enough and will NOT stop bullets. The thickness of parapet should be at least 5 feet.

(b) The trace of zig-zag trenches is far too flat and the effects of shell bursts and rifle and MG fire will NOT be localised. The angle should be approximately 90degrees.

(c) No attempt at camouflage of trenches or of A Tk weapons and MG posns.

(d) Indiscriminate use of sandbags in trenches. Sandbags are very scarce and should only be used where special construction is required such as in MG, AA guns, A Tk gun posts, arty pits; RAP's, signal centres, HQs etc. Sandbags are NOT laid in the correct manner (See MFE Vol I, plate 39).

(e) Not enough use of camouflaged and protected loopholes for snipers and other specialists.

In each Bde Sector, a small sample post will be built by the engnrs and all units will use it as a model.

4. Notes on Obstacles.

(a) Minefields

The construction and location of protective and tactical minefields is a matter for this HQ, but infantry will assist where required in laying mines. Attention is drawn to the increasing number of accidents caused by Offrs not warning their men of the existence and location of minefields. The location and construction of tactical wire is a matter for RAE HQ, but infantry and other arms will assist where such wiring is required.

(b) Tactical Wire.

The whole of the outer perimeter, Red line, was covered by tactical wire already in position. Every effort must be made to keep this wire intact. Tactical wire between the Red, Blue and Green Lines will be put in hand as material and wire become available.

(c) Protective Wire.

Every unit is responsible for erecting its protective wire but this is limited at present by the material and labour available. Until further stores are available, the policy is :-

i. Red Line - where possible to surround posts with wire where not already done.
ii. Blue Line - all pl posts to be completely wired round
iii. Green Line - as stores become available for it.

(d) Types of wire

Owing to shortages of steel pickets, timber will repeat WILL be used for pickets where the soil will permit. Every effort will be made to salve and re-use old wire and pickets. Single D.A.F. or concertina will be used until further supplies are available.

5. Miscellaneous.

(a) Corrugated galvanised iron will be supplied in limited amounts for special structures such as Dressing Stns, RAPs, Sig Centres, HQ etc.

(b) If time and labour permit, concrete structures for A Tk weapons and MG pits will be built.

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APPENDIX "P"

NOTES ON CAMOUFLAGE No 4.
issued by 9 Aust Div Cam Unit to Unit Cam Officers. SECRET.

THE PRIORITY OF TOBRUK FORTRESS CAMOUFLAGE

1. A.A.Camouflage

a. Camouflage of existing sites and mobile 3.7 guns.
b. Preparation of alternative concealed positions.
c. Dummy guns for evacuated sites.
d. Dummy sites.

2. Field Artillery.

a. Camouflage of gun sites.
b. Camouflage of alternative positions.
c. Dummies of existing batteries.
d. Dummies of non-existent batteries (i.e.mobile guns)

3. Coast Defences

4. Camouflage of Infantry Posts.

a. New alternative posts RED Line (as early as possible after construction).
b. Posts intended for first occupation BLUE Line between East-West Grid 432 and EL ADEM Rd.
c. Posts intended for first occupation BLUE Line between EL ADEM rd and East-WEST grid 427.
d. Occupied posts RED Line.
e. Alternative posts BLUE Line
g. Dummy posts.

Concerning para g, no wire is likely to be available for some time for dummy posts.

The above para 4 may be interpreted more simply :-

a. RED Line - Italian Position
b. RED Line - New Position
c. BLUE Line
d. Dummy work as an adjunct to all the above.

5. Camouflage of MT and General.
Important Unit Cam Offrs should arrange to withdraw nets from MT within their units and use such material for concealment of weapon pits. Semi-static vehicles such as Workshop or HQ lorries should retain their nets. These nets should be properly used as diagram. Other MT should be dispersed to chosen sites. Do not hesitate to use notice boards to disperse visitors etc.

6. It is suggested that Camouflage Sections (30 men) are formed in each unit temporarily

Works Sub-section - 1 NCO, 9 men.
Garnishing " - 1 NCO, 9 men
Salvage " - 1 NCO, 9 men.
(The Salvage section should be mobile to collect timber etc from ruined buildings).

7. The above priority list is not exhaustive and is intended as a guide. The priority to be given to V.P's not included should be apparent from this list.

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CAMOUFLAGE NOTES No 1. SECRET.
issued by 9 DIV CAM UNIT to UNIT CAMOUFLAGE OFFICERS.

Definition and ideal of word - to confound the enemy.
(a) Concealment behaviourism and decoy behavourism.
(b) Good security and false rumours.
(c) Concealment - natural, artificial, deceptive and disruptive.

You cannot indent for Camouflage
Camouflage is not a material but a military craft. It is the responsibility of every soldier and not of specialists. Camouflage has a psychological value and gives faith to soldiers. Officers and NCO's can improve their tactics and uphold that faith by acquiring knowledge of the subject and passing it on.

Camouflage - Before, during and after.
(a) Select a position and complete a plan before starting.
(b) Obtain perfect concealment of position.
(c) Produce exactly natural aspect of the locality. Pay close attention to detail.
(d) Introduce track discipline and maintenance.

Types of Concealment.
(a) Natural - Use of features of terrain and scout craft. (Camouflage in a war of movement)
(b) Artificial - Use of camouflage material to create artificial cover of various types. (Camouflage in static warfare.)
(c) Deceptive - Disguise and decoy work. (Mainly for ambush camouflage)
(d) Disruptive - Distortion of the shape of static sites, factories, depots, hutted camps. A job for the expert. (P.A.D. Camouflage)

Decide from what form attack and from what range concealment is intended.
This will decide the elaboration of method used.
In most cases different forms of attack may be expected.
This will suggest combination of the above types of concealment.

Advent of Air Observation has introduced problems of tone, texture and colour. Eye or camera observation from the air reduces landscape to one colour with a variety of tones. Texture controls tone more than colour. Smooth MT and tentage should be darker in colour to compensate for lack of texture.
Light Texture of Desert due to rocks and pebbles causes darker appearance from the air than would be expected. It is however in violent contrast to any shadow. Natural shadows are few in the desert.
Regularity of layout both in construction and digging is the sign of man. In the desert at present there are only soldiers. It is therefore extremely important that regularity should be avoided and shadows broken up.

General Camouflage Policy.
The enemy will be confouned by concealing our strength and intention as follows:-
1. Good security and black-out
2. Presenting a picture of a series of indeterminate and dispersed blobs.
3. Use of dummy targets.
4. Continuous linking of [illegible] trenches and personnel.
5. Concealment of [illegible]ant movements by cover of night and camouflage [illegible] point by day.
6. Dummy [illegible]nts.

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CRNE/25734/10/M.T.3 of 7 Oct 41. IMMEDIATE . SECRET.

SUBJECT:- CAMOUFLAGE. TOUR NOTES. WESTERN DESERT.

G.SD. (4 Copies)

1. G.1 Camouflage. M.E.F. has just returned from a Tour of WESTERN DESERT. This report mainly concerns the General Staff and is therefore addressed to G.SD for consideration and action. Copies have, however, been sent to H.Q. 8 Army direct.

OBJECTS OF TOUR.

2. To ascertain progress. To review the allotment of Camouflage Officers to deal with changing conditions. To ascertain the situation regarding materials.

ITINERARY.

3. The principal places visited were: BAGUSH BOX. MATRUH FORTRESS. ADV. H.Q. 13 CORPS. 4 IND DIV. 7 ARMD DIV. "ISLANDS" SUCH AS THE HABATA DEFENCES. ADVANCED LANDING GROUNDS. H.Q. 8 ARMY.

PRINCIPAL CONTACTS.

4. G.2 (SD & AFV) and S.O.R.E. of 8 ARMY. BGS and CE of 13 CORPS. No.3 CRE at BAGUSH. CRE (WORKS) and CRE (Fortress) at MATRUH. 'G' and CRE of 4 IND DIV. G.O.C., G.2 and CRE of 7 ARMD DIV. 4 FIELD SQUADRON and FLIGHT-LIEUT. O'DAY on A.L.Gs.

GENERAL OBSERVATIONS.

5. The most encouraging feature of the Tour was the keen interest displayed by all ranks everywhere in Camouflage and Deception. There is evidence that the understanding of the subject is slowly improving.

6. The Tour confirmed the urgent need for Divisional, Brigade and Battalion Headquarters etc. to have their own fully trained Camouflage Instructors.

7. The Tour also confirmed the impression that Western Desert is extremely well suited to the use of Dummies and other Deceptive activities, In fact 33 R.T.R. seems to have been alarmingly successful. The Headquarters Staffs are, of course, fully alive to the scope which is offered by the nature of the country for such activities. What is not quite so clear is where the transport, the labour and the materials are coming from if schemes of operational deception on a broad scale are to be undertaken.

8. The most discouraging feature of the whole Tour was the almost complete lack of Camouflage materials.

It is clear that this is a matter which must be of great concern to the General Staff so long as they desire to include Concealment or Deception in their plans.

9. This Report is divided therefore into - Part I - MATERIALS and Part II - MISCELLANEOUS.

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PART I - CAMOUFLAGE MATERIALS - WESTERN DESERT.

GENERAL SITUATION.

10. Appendix 'A' attached hereto shows individual positions in "THE PLAYGROUND" at BIR HABATA. Efforts have been made to cover the Pits, but the amount of garnish available is, of course, hopelessly inadequate, and this and many similar F.D.Ls. have been lying exposed to enemy air observation since they were dug.

11. Appendix 'B' is typical of the state of most vehicle nets. These particular vehicles are A.C.Vs of 7 ARMD DIV H.Q.

12. The Cs. R.E. and other concerned are fully aware of the ineffectiveness of such cover. So far they have been unable to obtain anything better.

Officers and N.C.Os. of Units throughout Western Desert are constantly coming to the Camouflage Staff Officers begging for materials. There have been none to give them.

13. Appendix 'C' shows the straits to which the camouflage services in Western Desert have been reduced. Men have been employed to sort out little bits of light coloured rag and tie them together and so make strips to be applied to nets.

EFFECTS OF SHORTAGE.

14. Positions are exposed; dispositions are much more easily read by the enemy. Plans for Concealment or Deception are abortive. Sooner or later the undoubted keenness of officers and other ranks will evaporate.

PAST EFFORTS TO PROVIDE MATERIALS.

15. Forecasts of Camouflage Materials have been prepared and submitted by C.S.O. on various occasions. the first official Forecast being dated 29 Apr 41 and the latest approximately 17 Jun 41 (speaking from memory).

16. The provision of materials to fulfill these Forecasts has been dealt with by the normal routine of supply including the routine of local purchase with its competitive tendering and so on.

19. That this routine is unsuitable for providing materials required for urgent operational purposes appears to be proved by the situation disclosed in Western Desert.

20. There have been repeated Conference and discussions, examinations of samples, more discussions, and in the end very few materials indeed to show for it.

21. It is submitted that the reasons for delay are not mainly because of actual shortage of materials or manufacturing possibilities. Large schemes of camouflage in EGYPT have been put out to civilian contract. The Contractors have apparently had no difficulty in providing all the nets, paints, fabrics and other camouflage materials required at a time when the normal military arrangements for provision were producing nothing.

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THE TACTICAL SITUATION.

22. It is submitted that it is for the General Staff to decide on an appropriately high level whether or not the materials indispensable to any schemes of concealment or deception should be considered of sufficient operational importance to warrant the use of extraordinary financial and other powers for their provision.

It is submitted that if it is desired to hide certain positions and reveal certain dummy positions as part of a plan, the materials to carry out this work should reach the site with the same speed and certainty as fighting stores or rations.

GENERAL RECOMMENDATIONS - MATERIALS.

23. Assuming General Staff to have agreed the principle contained in the above paragraph the following measures are submitted for consideration and action:-

(a) Waive the normal routine of provision until the materials ordered under this routine are flowing in the requisite quantities.

Invest a selected officer with extraordinary powers of purchase to deal with the present emergency. The officer should be technically competent to decide on sight whether any particular materials are suitable.

(b) An immediate survey should be made of all likely sources of supply, military or civil, wholesale and retail, precise materials or substitutes therefor.

(c) The situation regarding priorities is not clear to the writer. It is submitted that revision may be needed. For instance, the Forward Positions in Western Desert are starved for materials while the ALAMEIN LINE has been absorbing 100% of all available white fabric. Does this represent the General Staffs' views on priority in Western Desert as a whole?

It would be possible to go into much more detail on this subject, but it is felt that the above comments and suggestions contain the essence of the matter.

24. Appendix 'D' contains the Writer's opinion as to what materials and decoys could with advantage be used in Western Desert at once.

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PART II - MISCELLANEOUS.

MATRUH FORTRESS.

25. It is suggested that better use might be made of the ruined town. Excellent cover and concealment is afforded by the wrecked houses. It is suggested that the large new Ration Dumps near the R.E. Stores would be much less conspicuous and vulnerable if disposed in the ruins, stacks conforming to the shape and cover afforded by the standing walls.

BAGUSH.

26. The R.A.S.C. Ration Dump, dug in and covered is an object lesson in concealment. One feels that all those concerned with the preparation of F.S.Ds. should visit this Dump if the opportunity occurs by way of instruction.

ADVANCED LANDING GROUNDS.

27. As the R.A.F. require each A.L.G. clearly marked with an 80 ft. circle, some landing 'Ts' and a serial number, concealment is out of the question. Much, however, can be done to confuse the enemy by the use of Dummies properly constructed and properly maintained.

TYPES OF DUMMIES REQUIRED.

28. Aircraft Fighters and Bombers (Movable)
Bofors Guns
M.T. Vehicles (Movable).
Bivouacs and Slit Trenches.
Dummy Petrol and Bomb Dumps.

RECOMMENDATIONS.

29. 8 ARMY to continue with their efforts to produce suitable Dummies of all types, and in conjunction with R.A.F. to see solutions to the problems of maintaining dummy activities - i.e. man-power and organisation.

30. G.SD are requested to expedite the production and arrange for the issue of improved Flash Simulators for use with Dummy Guns. Previous correspondence refers. May progress be reported on please.

31. Recommended that every effort should be made to develop the idea of two-dimensional dummies.

32. Camouflage Training and Development Centre to help to the fullest possible extent in improving designs and getting production of dummies and dummy material stimulated.

OTHER TYPES OF DUMMIES.

33. Western Desert terrain lends itself admirably to -

Dummy Dumps - (Steel Wool)
Dummy Arty. - 25 Pr. (C.T & D.C. experimenting and will produce prototype for approval)

G.SD to help with improved Flash Simulators.

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RECOVERY OF CAMOUFLAGE MATERIALS IN THE FIELD.

34 It is considered that even to-day there are great quantities of camouflage materials which are doing little or no useful work. For instance, it is suggested that considerable quantities could be collected from MATRUH and BAGUSH without making any difference to the target areas as a whole.

36. As and when materials for work become available in larger quantities and assuming that the Army moves forward at some time there will be an urgent need for recovery parties to collect materials of all kinds from evacuated positions and leap-frog them forward for speedy use by forward troops.

It is suggested that early attention should be given to this problem by 8 ARMY.

FORWARD DUMPS OF CAMOUFLAGE MATERIALS.

35 In the Writer's opinion there is an urgent need for Dumps of camouflage materials to be established in extremely forward positions. It is understood that this matter is now engaging the attention of 8 ARMY

MT. GHQ. MEF.
7 Oct 41.

for Colonel,
D.D.M.T.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

APPENDIX 'D' to CRME/25734/10/MT3/ of 7 Oct 41.

SUGGESTED MATERIALS AND DUMMIES IMMEDIATELY NEEDED IN WESTERN DESERT.

MATERIAL.	FORECAST SERIAL NO.	QUANTITY.
WHITE FABRIC, or equivalent. (Serial Nos. 15 to 19 incl would do provided colour can be adjusted)	B.19	1,000,000 Sq. Yds.
COMPLETELY GARNISHED NETS, 35 x 35 or equivalent. (Garnished 50% White and 50% Undyed Hessian, or 25% each of Undyed and pink)	B.1.	6,000
GARNISH 100 yd rolls. White	B.14.	20,000 rolls.
Undyed	B.13.	10,000 rolls.
Pink	B.12.	10,000 rolls.
RABBIT WIRE		100,000 Sq.Yds.
WIRE. (Sewing) or equivalent for securing fabric etc. to supports.		Quantity.
BAMBOOS, RODS, ANY OTHER MEANS OF CONSTRUCTED RIGID MOUNDS OVER WEAPON PITS.		Quantity.
CAMCOLOUR	A.13 to 22.	
Lighter desert colours as available	Total	25 tons.
Black		5 tons.
CAMEMULSION. Light colours as available.		25 tons
Black		

DUMMIES:

DUMMY AIRCRAFT - Fighters	100
Bombers	100
Lysanders	25
DUMMY BOFORS (In hand at 8 ARMY)	
DUMMY 25 PR GUNS	100
DUMMY ANTI-TANK GUNS	100
DUMMY TANKS. (Looked after by "A")	
DUMMY M.T. VEHICLES for all purposes	
15-cwt size	300
3-tonner	300
DUMMY CAMP ACCOMMODATION.	Suggest enough for six camps each supposed to accommodate about 100.

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MOST SECRET

18

CR/Pal/14390/5/G

CAMOUFLAGE OF AQABA PORT.

Ground Recce. August 16th. 1941.

1. Situation.

The village and site of projected port lie at the foot of a range of very rugged, entirely barren granite mountains. Between these and the sea is a flat slope of stoney sand traversed by shallow wadis. This slope (some 2 kilometres wide) is fringed at the waters edge by a narrow very dense belt of date palms - the only dark note on the entire landscape of grey-pink sand. Between the palms and the sea is a narrow sand beach. The water is very clear and breakers are rare. There are two small ruined piers - mere heaps of stone - one of which is the site of the new pier (see map). The northern end of the palm belt thins out into clumps and bushes towards the mud flats of the Wadi ARABA. AQABA village lies immediately behind the palms, a typical collection of apparently roofless stone houses and walls. Except for two or three white-washed walls the village is only visible from a mile out at sea by its cast shadows.

2. Present Camp.

This consists of about a dozen tents near D. Position is temporary. Tents are mainly grey canvas, too dark for surrounding sand. It is suggested that they should be lightly splashed over with a cream lime wash.

3. Future Camp Proposals. (a) Indian Troops.

On arrival of No. 7 Artisan Works Co. RE. there will be an additional personnel of 220 men. To be accommodated in some 30 tents which they will bring with them. (Details of tents not known yet.) It is proposed to place these tents on the area marked C. on map, a desirable site from all points of view providing maximum use is made of the very uneven ground, low walls and palm bushes to give an accidental look to the disposition of tents, which should be sand coloured and slightly patterned with dark green. Nets caught over palms and tents to break the shadows would greatly help to reduce the visability of this camp from an oblique air view.

(b) Naafi, N.C.O's Mess etc. Future accommodation for a N.A.A.F.I N.C.O's mess, cookhouse etc, also Officers' quarters has been decided on a sandy and uneven plateau marked B. This has already been wired off and contains 3 semi-ruined Arab buildings which will be restored, roofed with palm-branches etc, and otherwise made suitable to their purposes without destroying their Arab character. This was agreed with the A/C.R.E. (Camps).

(c) Tracks. The ground here is hard and stoney dotted with bushes so that tracks between buildings should not be too obvious from the air.

4. Lorries.

These may be the worst "give aways" of activity and it is important that they be painted stone colour. The 5 lorries already here are a dark green, quite unsuitable. It is supposed by the C.R.E. that the 170 lorries expected next month will be the same colour.

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5. Parking. It was proposed to park lorries in the middle of a sandy space round an isolated palm. Persuaded the D.C.R.E. this was a bad idea and have decided the best cover would be provided by walls of "school", (E.on map.) lorries to be parked against 3 walls (not the wall facing sea) in groups to resemble square buildings. (There are already a few such buildings, one being as a hospital). Garnished nets (Desert Colours) could bind these together and hide shadows under wheels. The D.C.R.E. agreed to this and considers it a good distribution area, there being a hard sandy road from school to the existing track which runs parallel to the sea towards site of pier, etc. If the school walls will not give cover to enough lorries, the walls of adjacent houses in village should also be used for the purpose. It is important that all glitter on lorries be prevented.

6. Pier. Plans are being prepared for an L shaped pier to take six lighters, during construction there would be a dredger and a pile driver whose height (about 50 ft.) prohibits any scheme of an overhead net-cover to the constructioh. Height of pier above mean tide level will be about 5 ft., width, say, 30 ft.

7. Railway. There is to be a Decauville (2ft. gauge) railway to run on pier, connecting with Ordnance Area and R.E. stores, etc. The camouflaging of this railway is a job for the future, its track being laid according to gradient and engineering considerations.

8. Concealment of Pier. When built the concrete walls and platform of pier and landing stage should be painted in a bold curved pattern in sand colour and dark blue green to break the sharp edge of water against new concrete, also to tone down concrete. Details will be furnished when the construction is complete.

9. R.E. Stores and Ordnance Area. It is proposed to site these near area A shown on map. One place is as good (or bad) as another from a concealment point of view in this open terrain and camouflaging of sheds, dumps etc. will be an affair for future.

10. Road. Construction of new road is to start in September. This road will descend from pass in mountains to N.E. of AQABA and continue to neighbourhodd of school (car park). The light railway from Ordnance etc. will meet road somewhere about X for loading and unloading. It is important that this (probably tarmac) does not show up as a lonely black strip on the sand and a dressing of sand and light gravel must be spread and maintained on its surface.

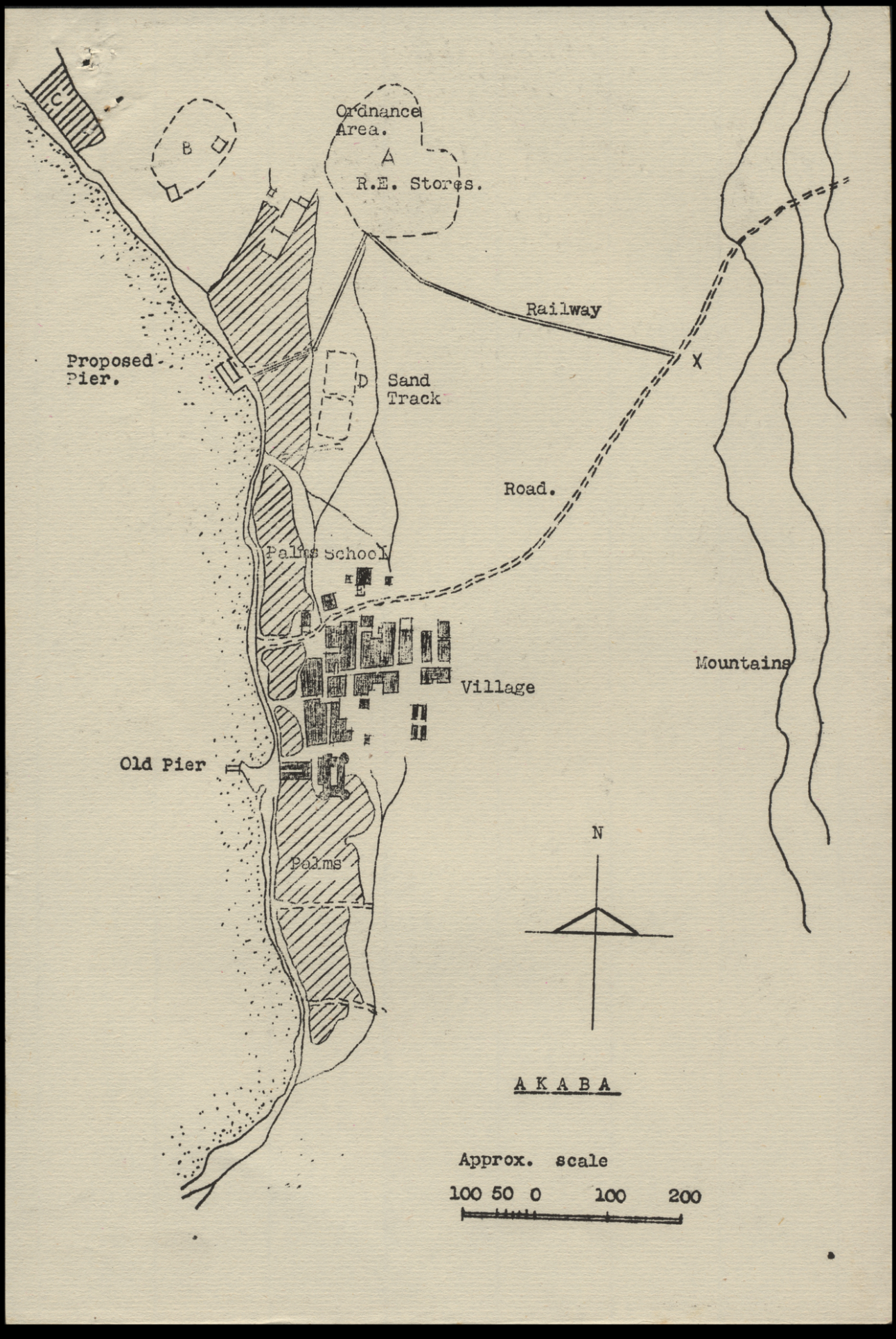
11. Nets. No one at the camp appears to know much about nets. It was ascertained that they have so far been supplied with about 15 nets and about a few dozen rolls of scrim of dark brown natural and green Desert colours (natural, pink and white) would be needed here and the present lorries have no nets. Whether the 170 expected lorries will have nets under G.1098 is unknown. Nets should also be supplied in quantity for the tents. No one there is likely to know how to garnish or use nets to advantage. Suggest at next visit of camouflage Officer a sample net be brought for instruction.

Conclusion. Further camouflage suggestions can only be dealt with as the AQABA scheme develops.

Jerusalem
21/8/1941.

(Sd) H.H. WOOLF
Staff Lieut.Cam.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210


C
B
Ordnance Area.
A
R.E. Stores.
Railway
Proposed Pier.
D
Sand Track
X
Road.
Palms School
E
Village
Mountains
Old Pier
Palms
N
AKABA
Approx. scale
100 50 0 100 200

SECRET

SR19/17

A.A. DEFENCES, ALEXANDRIA.

issued by G.SD.4A, GHQ,ME. to A.A.Officers and NCO's attending Camouflage Training Course, 11th to 13th August 41.

GENERAL.

As A.A. guns must have an all round traverse they are mounted on open emplacements, octagonal on the inside, and round on the outside, which from the air appear as small circles with a black centre.

Unfortunately, of all shapes, a round disc or eye-spot is the most conspicuous. It has extraordinary powers of attracting attention to itself even when surrounded by a variety of other and even larger shapes. Also the circular emplacement has been used too much in warfare and is bound to be suspect. When, in addition, the guns are grouped in a semi-circle at regular intervalsfrom each other and the Command Post, it is an invitation to a low-flying enemy plane to be bombed or machine-gunned in the shortest possible time.

Therefore we can conclude that no camouflage scheme will be effective which does not eliminate or modify this shape or layout. The w[illegible] fully understands that tactical consideration must not be interfered with. Since nothing has been devised that can be placed over the gun, concealment is out of the question, so we must either :-

a. destroy shape, so that an observer looking for a specific form is unable to reconstruct it from the pieces he sees, or

b. alter it, so that it looks like something else and loses its military significance.

There are in the main three possible sites :-

(1) A Town site

(2) An open country site

(3) A broken ground site.

A TOWN SITE, e.g. those situated in Alexandria proper, should be altered to resemble the buildings in the vicinity of the position in colour, design and layout. The latter is very important because a town or village is geometrically planned by Architects and Surveyors, and when additional buildings are erected they are designed and sited to conform to the existing layout. If this principle is not observed the position is given away to the enemy.

The outside walls of the emplacement must be rectangular with clean cut vertical outer walls. The higher the breast-works the better. The inside could be made square to advantage, but since we are concerned with altering octagonal emplacements we shall have to simulate a square interior by artificial methods.

The majority of buildings in Egypt are flat-roofed, with the walls projecting 2 or 3 ft above the roof level, and with small "outhouses" on the roof top. The shadows cast by the square gun-pit would be similar to those cast by one of these buildings i.e. the inside walls of the pit resembling the

To page 2.....

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inside walls of the roof, and the gun's indefinite shadow resembling that cast by the "outhouse". The shadow of the outside walls might have to be increased artificially to suggest greater height. The usual semi-circular lay-out can be maintained, but the emplacements must be parallel to each other with dummy "buildings" constructed in line with them.

Living huts, Tents, ammunition magazines etc., must all conform to the same layout. In general huts should be erected with flat roofs. If there are pitched roof huts in the site, and none in the vicinity, they should be altered accordingly. Bell tents can be made to appear square.

AN OPEN COUNTRY SITE can be solved in the same way, but this time a native "zariba" or village should be simulated. The buildings must be more irregularly spaced with rubble and squares of matting on the roofs and parapets. Pitched roofs must definitely be avoided. An enclosure fenced with dry palm leaves, ostensibly for goats, will give a realistic effect. Inflammable material of course, would have to be fire-proofed.

A BROKEN GROUND SITE can also be camouflaged in the manner suggested for an open country position. It may, however, be preferable to effect concealment by disruption of the surface. This will be an attempt to distort the emplacements and make them unrecognisable. In the case of a dug-in position, where there are no outer walls, there is no alternative. Positions of this nature are being dealt with successfully at Port Said.

IN CONCLUSION the writer would like to observe that it would be better if a Camouflage Officer's assistance were invited while a site was being planned. A gun position might then be unrecognisable from the start. Also a great deal of extra work and expense would then be eliminated. The enemy probably knows where each position is, but fortunately the real man to be feared is behind the bomb-sight, and we can defeat him if his objective is made unrecognisable and difficult to pick up with the naked eye.

(Sgd) C. WILTON

Capt R.E.

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16 July 41

16

CAMOUFLAGE A.L.G's.

REPORT BY CAPTAIN H?B. COTT R.E. (D.O. to MAJOR BARKAS?

Ref. No. CRE/WDF/5.
G.SD.4/206.
G.SD.4/323.

1. You will already have heard the view expressed independently from various sources that the attitude of the R.A.F. towards camouflage is not what it should be. Some little time ago I was requested by Brigadier, 23 Inf. Bde. to make an inspection of A.L.Gs. in the Western Desert. In the course of this work I visited some 12 A.L.Gs. between SIDI BARRANI and PUKA, and everywhere saw evidence of that consistent indifference towards questions of visibility for which the R.A.F. in Egypt has now an established reputation.

2. My reason for referring to this matter, of which I am sure you are already well aware, is that I am not able to attach to these notes a number of photographs (and negatives), which illustrate and drive home the various points, and which therefore you should find useful. I do hope you will put pressure in the right spot, so that the present unsatisfactory state of affairs may eventually be improved.

3. TENTS.

In general, tents occupied by R.A.F. personnel are rarely dug in or effectively sited or camouflaged; and the large camps adjacent to L.Gs. consist of closely packed tents resembling peace-time encampments - extraordinarily conspicuous in many cases.

4. DISPERSAL.

Time after time one sees examples of bad dispersal both of vehicles and of aircraft. At BAGUSH, for example, aircraft are frequently seen lined up close together along the end of the A.L.G.

5. AIRCRAFT.

These are still in many cases coloured in dark green and khaki pattern adapted to an English landscape of plough and pasture. Such aircraft appear almost black against the desert at 2,000 ft and upwards.

6. L.M.G. POSTS.

When manned by R.A.F. personnel, camouflage is generally neglected. See attached photograph of an open pit, with built-up sand-bag wall and sun-shelter made of dark blankets. (When questioned, the gunner on duty at this position told me: "Well, Sir, you see in the R.A.F. we're allowed to do very much as we like")

7. OPERATIONS ROOM AREA, BAGUSH.

This 'nerve-centre' of our local A.L.G. offers a striking example of the attitude to which I refer. The R.A.F. have recently insisted (i) in having this area framed with wire, though it has been been pointed out by the D.C.R.E. Aerodromes that the wire makes the

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position much more conspicuous than formerly; (ii) in placing one L.M.G. at each corner of the enclosure; (iii) in maintaining two large (E.P.I.P.) tents in the area which form a pointer from a distance; (iv) in constructing high walls of sand-bags round the entrance to the Operations Room dug-out; (v) The whole enclosure is sited alongside the main-road and near a conspicuous road-junction which gives its exact location away to the enemy bomber from great altitudes and/or distances.

8. Enclosed photographs and sketches support the above observations.

9. With regard to the camouflage of this area it was pointed out to the R.A.F. by D.C.R.E. Aerodromes that effective camouflage of the Operations Room site could not be carried out except by (i) removal of tents; (ii) removal of sand-bagged emplacement round Operations Room entrance; (iii) placing of watch tower in so some other position; (iv) removal of wire; (v) re-siting of L.M.G posts. These suggestions were rejected, and hence the area remains conspicuous.

10. Will you please get Kodak Ltd. CAIRO to do me two (glazed) enlargements, 10" x 10" of photograph No. 1. This negative has good critical definition and enlargements would be most valuable to me here for demonstration purposes.

No.3 C.R.E.
Western Desert Force.

16 Jul 41.

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11 pl 41

SR 12
15

COPY. SECRET.

SUBJECT:- Camouflage - Progress of N. Palestine Defence Line.

To: G.S.O. 111 Camouflage, Force Headquarters.

From: G.S.O. 111 Camouflage, Haifa.

1. AZZIB AREA

a. Present position and progress.

Azzib Area comprises 140 Pill Boxes which have been divided into 26 groups of about 6 P.Bs. each for convenience of supervision and to meet limited transport.

Camouflage work has been going on since early in April 1941 but for reasons given below only 5 groups (about 25 P.B.s) have been satisfactorily dealt with, leaving some 20 groups untouched.

Transport supply is unsatisfactory and it is estimated that this work will take 8 months to complete unless labour and transport conditions are drastically improved.

b. Difficulties up to date.

(i) Insufficient labour and reliable N.C.O. supervision.

(ii) Small number of men detailed for camouflage further decreased in effect by them having to do much constructional work, such as clearing entrances, building blast walls for A/T boxes and clearing fields of fire etc.

(iii) Delays over material R.E. Stores for timber and wire netting, salvage for baling wire, U.S. canvas etc. In the latter case supply has been good, but transport bad.

(iv) Insufficient transport at camp to convey men and materials to sites which are often some miles apart.

(v) Frequent change of Units. (4 changes since April).

(vi) Failure or reluctance on Contractors part to clean P.B. surfaces ready for painting, and to clear away spoil and aggregates, resulting in troops having to do this. Complaints to supervising officers have not produced prompt or adequate action by the Contractor.

c. Proposals.

If work here is to be put on a businesslike basis it is strongly recommended that:-

(i) At least 4 camouflage parties of 1 N.C.O. and 12 men (plus arab labour) be kept continuously on the work until completion, which at this rate would be about 2 months.

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(ii) Transport and materials are made more readily available. See para. 5 for general recommendations.

2. ROSH PINA (including KAFR BIR'M)

a. Present position and progress.

Rosh Pina area comprises 70 Pill Boxes. Camouflage work has been carried on by no less than 5 different units since April, in each case the outgoing unit was becoming really proficient in the principles and technique of P.B. camouflage.
About 35 P.B.s are satisfactorily completed in all respects.

Another 25 are in hand and mostly complete apart from details such as tracks, loophole concealment, adjustment of cover to ensure adequate vision, and removal of spoil.
Many false banking and entrance covers have been fixed up hurriedly to prevent the disclosure of positions from enemy photographic air recce.
As such they are perfectly satisfactory but will definitely need much time and labour to make them into sound permanent jobs.
There are still a few entrances to be covered.
About 10 P.Bs. have not been started but schemes have been prepared.

At the last visit of Cam. Officer only 1 N.C.O. and 8 Sappers with arab labour were found to be on the Cam. work, all entirely untrained as far as this work is concerned.
A Corporal R.E. trained in camouflage theory was sent to the area to supervise for a time as from 27/6/41.

b. The DIFFICULTIES in this area are as at AZZIB (see para 1 b)
The changing over of units has been even more sudden and frequent and as a result more unsound work has been done and will have to be redone. (This incidently is the most demoralising task and it is very hard to keep troops interested)
At present one Lieut. R.A.E. is responsible for both the AZZIB and ROSH PINA areas - some 210 P.Bs. and as these areas are separated by about 40 miles it is considered quite impossible for him to keep this work under adequate control.

c. Proposals.
Proposals are the same as for AZZIB. Probably two or three parties would suffice here.

3. TIBERIAS AREA. (Samakh. Jisr el Majami)

a. Present position and progress.
Area comprises 46 P.B.s which have been worked on by the same unit since April.
The results of adequate and uninterrupted labour are here well illustrated. All P.Bs. having been dealt with very satisfactorily.
A few P.B.s need minor alterations and details attending to but 75% are complete and excellently concealed or disguised in all respects.

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b. Difficulties.

Practically no outstanding difficulties - and these on the materials side.

c. Proposals.

The completion by units taking over the small details - /- This area it is suggested would then be most useful & suitable for demonstration of good defence line camouflage - to help units from other areas or for the general training in camouflage of officers & N.C.Os on the Formation Camouflage Course.

4. PASSUTA AREA.

a. Present position and progress.

Area comprises 14 P.B.s Much camouflage planning was possible here in the pre-construction stage owing to camouflage officer being in the area before work was started.

This has resulted in some P.B.s being built to represent arab houses with considerable success and great saving of material and labour. The extra cost of contractor it is felt being more than made up for by time saved and permanence of the camouflage.

To date 4 P.B.s are considered finished and 3 more have been started.

b. Difficulties.

No outstanding difficulties - Transport of constructional materials has caused considerable hold up which has in turn delayed the camouflage work.

5. JENIN AREA.

General.

Area comprises about 60 P.B.s.

Work of camouflage is now proceeding - one whole section being detailed in this work.

This should produce good results in this area when the N.C.Os. and men have been trained as necessary in this work.

In spite of warnings about tracks, spoil, etc. there are considerable problems of this kind to be dealt with.

A further 36 P.B.s were sited by Major Napier on 3/7/41 and others are to follow.

G.111 Cam. Haifa was present during siting and all possible use will be made of any natural cover. This should reduce the artificial camouflage labour very considerably.

It is suggested that as this area will then be very large, more men and supervision will be needed if the camouflage is to be done at a reasonable pace to follow construction, otherwise it is feared the position at AZZIB area will be repeated.

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N.B.

Since the above report was made there have been further changes of Units in the following areas thus:-

AZZIB	1 Sec	722	A.W.	Coy R.E.
	& Det from	739	A.W.	Coy R.E.
TIBERIAS	2 Sec	722	A.W.	Coy R.E.
ROSH PINA	3 SEC		do	do
PASSUTA	4 Sec		do	do
JENIN	1 Sec	739	do	do Pal

This increase will greatly help the progress of work and failing further sudden moves the camouflage should soon be satisfactory both as to quality and quantity.

A corresponding increase in trained camouflage supervision would speed things still further.

The call on materials and transport will be correspondingly greater and it is hoped will be satisfactorily met.

(Sgd) S.B. SYKES

Capt. R.E.

11 Jul 41. G.S.O.11. Cam. HAIFA.

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11 June 41

MOST SECRET.

14

SUBJECT:- CAMOUFLAGE - MILPAL DEFENCE LINES.

NOTES AND RECOMMENDATIONS - SURVEY TOUR.

APPENDIX A. SERIES OF PHOTOGRAPHS

1. The following notes are the outcome of a survey tour of MILPAL Defence Lines, made by Major Barkas, G.2 Camouflage, between 23 May and 31 May 41.

2. The areas surveyed were:-

MAFRAK	SAMAK
IRBID	SHAAR HAG GOLAN
JISR EL MAJAMI	ROSH PINA
GESHER	EZ ZIB

3. The above areas include a total of approximately 600 Pill Boxes, either Anti-tank or Bren type. It is roughly estimated that not more than 20% of these have been camouflaged to any satisfactory extent. This low percentage appears to be due to lack of adequate numbers of suitable personnel to supervise and carry out camouflage work, and partly also to the fact that camouflage does not appear to have been included in civilian contracts for pill-box construction. These points are dealt with in more detail hereunder.

4. The areas in which the highest percentage and quality of camouflage work have been carried out are:-

ROSH PINI, SAMAK, GESHER, JISR EL MAJAMI, SHAAR HAG GOLAN.

A very good start has been made at EZ ZIB but there is a tremendous amount yet to be done. IRBID and MAFRAK have hardly been touched. Other areas coming into the picture, but hardly touched as regards camouflage, are ESDRAELON and certain road block and delaying systems in hilly country in between the areas listed in Para. 2.

5. It is understood that MAFRAK has recently descended to the bottom of the priority ladder and that IRBID has ascended. It would therefore appear that the two areas requiring the most urgent attention are EZ ZIB and IRBID. These two places between them comprise somewhere about 330 Pill Boxes.

6. The following particular comments and recommendations are submitted.

7. GENERAL STATE OF DEFENCE LINE CAMOUFLAGE. Considering the very limited amount of labour and trained or semi-trained supervision so far available in MILPAL for camouflage work, the extent and particularly the quality of camouflage actually carried out reflects much credit on all concerned.

Many extremely effective schemes of disguise and concealment have been executed. Refer to APPENDIX "A" for photographs.

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These successful schemes are mainly the happy result of the keen and imaginative interpretation of camouflage officers' ideas by personnel of Field Companies R.E. and other troops. In this connection it is permissible to mention the officers and other ranks of the 2nd Cheshire Field Squadron and 56 Field Company.

It must again be emphasised, however, that there is a very great amount of work to be done before the defence areas can be called tolerably well camouflaged as a whole. A large number of boxes have been built in such a way, and the ground disfigured to such an extent, that successful concealment is well neigh impossible. See APPENDIX "A" for examples.

It is suggested that the main factors in this situation are:-

(a) Apparent absence of camouflage planning at the time of siting and placing contracts.

(b) Inadequate means of supervising the work of civil contractors during construction.

(c) The almost complete lack of facilities for aerial recce and photography.

(d) In a lesser but still appreciable degree, the lack of adequate transport to allow camouflage officers to cover the ground with the necessary freedom.

8. AIR CO-OPERATION. Air photos and the opportunity for camouflage officers to make air recce are absolutely indispensible.

ACTION ALREADY TAKEN. Application has been made to R.A.F. in MILPAL for certain air photos to be taken. In view of operational requirements in PALESTINE application has also been made to H.Q. R.A.F. Middle East and there is some hope that a suitable machine, pilot and equipment will very shortly be made available for a few days for the exclusive purposes of camouflage.

9. CONTROL OF LOCAL CONTRACTORS.

(a) In all areas the position of individual pill boxes and even the limits and general tactical intention are given away to the air observer by tracks leading from box to box round the perimeters or radially from some central point by the large smears of uncovered aggregates and also by piles of excavated spoil. (SEE APPENDIX "A")

It is understood that in most contracts there is a clause calling on the contractor to lay down a platform in which to mix his aggregates and to remove all trace of them when construction is finished.

RECOMMEND, that this clause should be firmly enforced not only on work now in progress or contemplated but most definitely in retrospect also. Camouflage officer should be consulted as to priority - i.e. which instances are the worst "give-aways" from the air.

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(b) EXCAVATION SPOIL must be dealt with by contractors or by troops. A particularly bad example is at the eastern end of the first line at EZ ZIB. (SEE APPENDIX "A").

RECOMMEND advice of Camouflage Officers be asked, and urgent action taken to conceal spoil.

(c) TRACKS. It is not known whether contracts stipulated any kind of track discipline. Meanwhile the problem needs urgent attention. Until air photos and recce are available not much can be done beyond tackling the obvious cases where tracks leading to Pill Boxes etc. can be ploughed over or the tracks diverted and continued to logical destinations other than the box. This should be started at once.

RECOMMEND. When air photos are available Camouflage Officers to propose methods of dealing with the main problem of tracks. Formation to decide whether this should be done by contractors or by Troops and to take early action.

10. ACCESS TRENCHES TO PILL BOXES.

Many boxes at present well camouflaged from ground observation are entered by deep unroofed trenches which are liable to give the exact positions away to the first enemy photo-recce machine.

RECOMMEND immediate steps be taken to roof all such trenches, beginning with the boxes whose camouflage is otherwise complete. Camouflage Officers to advise on style of roofing.

11. PROVISION OF LABOUR AND SUPERVISION.

(a) Situation should be easier when Troops enter the various areas since they are responsible for their own camouflage work.

RECOMMEND. Formation to impress on troops their urgent responsibility. Camouflage officers to tour each area occupied by troops in company with selected officers and N.C.O's and give advice. Selected officers and N.C.O's to visit other areas if necessary, in company with Camouflage Officer, and study some of the excellent examples of concealment and disguise already effected. Besides being instructive it is felt this will stimulate keenness and a healthy spirit of competition.

STEPS ALREADY TAKEN. A trained Camouflage Officer had been detailed for the exclusive guidance of 5 IND. INF. BDE. GRP. for such time as may be necessary to get IRBID going properly.

(b) CAMOUFLAGE TRAINING UNITS. A directive on this subject has already been issued and instructions to mobilise these units are on the way. These units should be of great assistance in educating Troops and also in providing a useful number of supervisors.

RECOMMEND immediate steps to raise Training Units in MILPAL up to full entitlement. Further recommend that in the case of the initial training course, the Camouflage Officers should forego the full month of training for the nucleus of Subaltern and 2 N.C.O's suggested in the Directive, or even eliminate the preliminary training period altogether. This would no doubt create temporary difficulties but it would be of value to the work and would also be practical training.

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(c) CIVIL CONTRACT. If Unit labour and the Training Units are found insufficient to cope with all the Pill Box camouflage in the time desired, it is suggested that local contractors should quote for carrying out schemes to be prepared for them by Camouflage Officers.

12. MATERIALS.

Excellent use has been made of local materials, vegetation and scrap of all kinds obtained from Salvage Dumps. It is clear that large quantities will be needed not only of the above articles but also of more standard kinds of camouflage material.

G.H.Q. is taking steps to provide materials called for in the consolidated Forecast of Camouflage Materials.

Force H.Q. MILPAL are now purchasing nets in PALESTINE and it was found that these nets were about to be shipped to G.H.Q. G.2. Camouflage has spoken to 'E'(Stores), O.S.2 and A.D.O.S. MILPAL and steps are being taken to give MILPAL first call on all nets produced in their area so as to avoid unnecessary movement to and from by rail or sea.

13. USE OF DUMMIES.

It is felt that there is great scope for the use of dummies particularly as eye-detractors to support well camouflaged Pill Boxes guarding A.T. obstacles.

RECOMMEND that 'G', 'E' and Camouflage of Formation should proceed actively with the siting and construction of such dummies.

Further recommend that if desirable MILPAL should start a Fibrous-Plaster Shop to make dummies in transportable sections. If MILPAL cannot produce Fibrous Plasterers G.H.Q. will try to supply. Camouflage Officer to advise Formation on the subject generally.

14. IMPENDING SNAGS - (a) TRENCHES.

Understood that many Units now taking over Defence Lines propose digging subsidiary earthworks and trenches around or between the concrete Pill Boxes.

RECOMMEND that before Units disturb the ground they should seek the advice of the nearest Camouflage Officer and take him into their confidence.

IMPENDING SNAGS - (b) CLEARING FIELDS OF FIRE.

Understood that fields of fire have to be cleared for various Pill Boxes sited in olive groves and similar locations. Such clearances are apt to show up, from the air, like arrowheads with the points dead on the Pill Box.

RECOMMEND STRONGLY that before chopping down any trees the Units concerned should consult the nearest Camouflage Officer and agree a scheme of camouflage to overcome the difficulty indicated above. Whatever the method employed - whether by extending the clearance so that it looks like a normal limit of the grove, or by replacing felled trees by thin poles with

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artificial "tree tops", or by a system of nets garnished to look like regularly spaced trees - - the scheme should be carried carried out simultaneously with the clearance.

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15. It should be mentioned that all the points in this memorandum have been discussed at Force H.Q. MILPAL with representatives of the Branches concerned and that it is believed that action is already being taken to deal with the matters concerned.

16. CONCLUSIONS.

Those concerned with the camouflage work already carried out on Defence Lines are to be congratulated.

A very great amount of work remains to be done - much of it the result of works having been thought of, started and completed without any attention to Camouflage.

How long it will take to complete satisfactory camouflage schemes on existing defence and on future defences is purely a matter of arithmetic. If enough trained Camouflage Officers are available and if enough supervision, labour and materials are provided the work will be soon done. Otherwise not. G.H.Q. is trying to send an additional Camouflage Officer, making four trained and one semi-trained in all.

It is suggested that a ruling should be given by the H.Q. MILPAL as to what degree of priority camouflage should have, and that if necessary that H.Q. should be authorised and instructed to raise the personnel and material by any legitimate means even if such personnel are surplus to any known establishment.

G.SD.Cam.
11 June 41.

Major, G.S.
G.2 Camouflage. M.E.

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9 June 41

13

S E C R E T.

SUBJECT:- Camouflage of C.D.SCHEME.

Ref. No. CAM/S/7

Chief Engineer,
H.Q. B.T.E.

Report by Lieut.C.MILTON, R.M. on
Camouflage of Pipe line - C.D.Scheme.

Work on the above was commenced on the 2nd May 1941.

K.M. 104 to SUEZ.

The writer first made a survey of the line East of K.M. 104. The length to be concealed in this direction is roughly 7 K.M., and the area through which the line passes is covered with a purple coloured lime stone. The line is about 30 metres wide, and appears a very light colour from the air, because the top soil and lime stone has been removed.

There are also two ridges running the entire length, caused by spoil when the line was constructed.

It was decided to attempt to obliterate the first ½ k.m;, and the method adopted was:-

1. To level the ground.

2. To restore wadis that normally run through the line.

3. To collect stones from some distance away, and scatter them over the area.

4. To go over the ground treated, to ensure that there are no hard lines of de-markation, that wadis are not filled in, etc.

AERIAL RECONNAISSANCES.

A flight over the pipe line was eventually made, and the area treated was found to be restored more or less to its natural state. It appeared a little too dark, but this can be rectified by removing some of the stones.
Photographs were taken and are annexed to this report.

LABOUR.

It took 30 natives to do the work in ten days. The remaining portion of the line would therefore take 60 natives 65 days. If it is possible to overseer so many, 100 natives would do the work in 39 days.

K.M. 104 to GENEIFA.

The line running North to Geneifa is a different proposition. The length to be obliterated from K.M. 104 is roughly 2 k.m's.

The line runs through hard ground (lime stone) with a slight top surface of light coloured sand.

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There is no hope of restoring the colour and texture of the original surface, so the method suggested here is decribed in the sketch annexed to this report. A portion of the line was treated in this way, although satisfactory to the eye from the ground, the area was too small to be observed from the air.

The writer estimates that it would take the same number of natives the same time to conceal this line, as the area is enlarged to about 100 metres in parts.

DUMMY SITE.

It is suggested that the dummy line and site should be constructed while this work is in progress. This would require another 100 natives.

TOTAL TIME AND LABOUR.

It is estimated that the labour required for concealing the pipe lines and constructing dummy line and tanks, would be 300 natives, and the job would be completed in 5 to 6 weeks.

TRUE SITE.

This still leaves the camouflage of the tanks etc. at K.M. 104. There is a great deal of activity there, and it is suggested that detailed plans for concealing these tanks are prepared in the [illegible], and the [illegible] working on covering the tanks should follow the camouflage plans as they replace the earth.

IMPORTANT NOTES.

After the test was completed, some-one drove a vehicle along the concealed line, which undid a great deal of the work. Enquiries disclosed that this vehicle periodically services the line at valve points. It is pointed out that nothing must travel along the line, and that when valves are visited, they must be approached from the road, along existing wadi lines, either on foot or a bicycle.

STORES REQUIRED.

Brooms, bass - 40.

Headquarters,
British Troops in Egypt,
CAIRO
9 June 1941.

G. WILTON Staff Lt., R.E.
Camouflage Branch H.Q. B.T.E.

G.W./A.M.

Copies to:- S & T G.H.Q. M.E.
G.S.O. 2 Camouflage G.H.Q. M.E.
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12

Extract from Report on Camouflage Work in Tobruk Fortress No.1.
by Captain Proud.

SUBJECT:- DUMMY POSITIONS. COPY.

The Camouflage Officer,
Tobruk Fortress.

A dummy troop position was constructed by 51st Field Regt, R.A. in the Pendauuar front consisting of four gun pits containing Italian u/s guns. About 300 yds behind this some old Italian MT were grouped to represent the wagon lines. The whole position was very crudely camouflaged. About 1000 yds behind this the real troop was located.

At 1030 hrs on the 15th May one enemy battery engaged the dummy position with air observation from a Henschel. When ranging was complete the position was engaged by what appeared to be three troops. The real position was untouched.

Sgd. P. WINDSOR

Capt. R.A.
Intelligence Officer
H.Q.R.A.
Tobruk Fortress.

24 May 41.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

11/6/41

11

REPORT

on

CAMOUFLAGE WORK

in

TOBRUK FORTRESS

NUMBER 1

From 8 April 1941

To 21 May 1941.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

SECRET

Subject :- REPORT ON CAMOUFLAGE WORK IN TOBRUK FORTRESS

Ref. DESCOR/G/HI/CAM

To:- Chief Engineer, Desert Force.

From:- G3 (Camouflage) Desert Force.

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1. The immediate execution of work requiring urgent attention in order of priority.

WORK	FACTORS	ACTION TAKEN
(i) P.A.D. Camouflage		
Schemes were produced (a) for V.P. buildings in Tobruk town and handed to C.R.E. Tobruk. (See Appx "A")	These required execution immediately after raid and C.R.E. was short of labour.	Extra labour was supplied by arrangement D.C.E. Tobruk Fort.
(b) for R.A.S.C. and ORDNANCE Dumps by use of garnished nets. Removing empties to form dummies, etc.	Dumps required more ... netting than could be spared. It was found impossible to get rid of enormous squares. Also labour was too great. Dummies carried out with success.	Netting removed and issued to gun sites. Advice given on restacking and a sample stack arranged using sand for concealment. (See Appx 'B')
(c) for toning down all buildings as at BARCE.	Labour not available.	Scheme abandoned.
(ii) A.A. Camouflage Scheme for camouflage of one Heavy A.A. Site and dummy was commenced.	Work proceeded slowly on dummy with small proportion of men available from allotment of Indian Pioneer Labour Group. Personnel on real site too busy. No work done at all on camouflage of site.	Suggested A.A. Bde provide policy and a Unit Cam. Offr. to work under supervision Corps Cam Offr. This was done and work is now proceeding on a large scale. (See Appx. "C" Report from A.A. Bde Cam. Offr.)

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Report of Camouflage Work at Tobruk Fortress (contd.)

WORK	FACTORS	ACTION TAKEN
(iii) Field Artillery		
(a) Squads were detailed to garnish nets 35' x 35' for issued to Field Regts, and a squad trained to erect them. When ready on some scale CRA was informed, and a demonstration squad travelled round delivering and erecting nets .	It was found that guns were moving frequently as in mobile warfare . Personnel were extremely biassed against use of nets at all, as old overhead cover is square and shows up like an umbrella from ground view. This complaint was quite justified as primary role was A Tk.	A new type of cover was evolved using 3 35' x 35' nets. (See Appx 'D' - Frameless Overhead Cam.) This has proved successful, particularly as it allows for the inclusion of other features such as slit trenches and bivouacs under gunnet. .
(b) Dummy Field Btys were commenced of two types; one representing original Bty, the other non-existant Bty. The latter were sited at alternative locations of mobile 60 pdrs.	It was found impossible to obtain definite pin points because of variety of opinion regarding distance of dummy from real site. Local opinion afraid of having dummies adjacent.	Pending higher policy to be laid down and definite map ref given, work was abandoned There is now Div Arty HQ Cam Offr who will supply map refs and(it is hoped) labour. 1 bty was, however, completed with success. (See Appx "E")
iv M.T.		
Issuing sample nets, garnished in the new way, with all issues and giving advice. (See Appx. "F")	250 Sikhs were employed in carrying out this work and Cam Offr's time was spent almost entirely in supervision. Units were indenting on scale for U.K. for dark brown and green garnish and much material was being wasted.	Having spent two weeks on carrying out work requiring immediate attention "G" were approached and the enclosed letter was sent out. (See Appx "G" - Concealment and Dispersion with scale of issue of material).

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Report on Camouflage Work at Tobruk Fortress (contd.)

(v) Small Arms

1 R.N.F., M.G. Bn were issued with 100 nets and demonstration of M.G. pit given using crushed petrol tins and MT super structures. (See Appx "H")	Owing to lack of time all positions could not be visited, and this demonstration did not suit all backgrounds. Idea was being incorrectly used as a result.	as above.

(vi) Military Landing Craft.

Concealment of the above was ordered and nets were used with success. (See Appx "I"	Owing to their shape craft could not be moored alongside in most cases, as desirable.	Mooring was found after recce, for one craft landing tanks alongside rocky promontory. This was successfully concealed. (See Appx. "J")

(vii) Aircraft

A camouflaged aircraft Dispersal Point was built using goal-post structure and 'petrol can posts' to support netting. (See Appx "K")	This was used over last fighter aircraft which was destroyed before being housed. No exact approval has therefore been given.	It was, however, pointed out to the R.A.F. that this structure would conceal personnel, blast walls, amm. etc. besides the air craft. They were interested and approved scheme after recce in Tac R plane (Suggest further tests where there are aircraft to conceal).

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Report on Camouflage Work at Tobruk Fortress (contd)

2. General remarks on the foregoing work.

(i) Although dispersion was good it was carried out more on the basis of A.A. (one bomb, one vehicle) and not for camouflage reasons. No scoutcraft was used except in F.D.L's and in only a few cases were M.T. parked against natural features. This again was more for anti-blast protection. Gunners disliked their nets and they were not in use at any of the batteries visited.

(ii) Artificial material was palpably wrong in colour and though drawn from A.O.D. by Q.M.S., was being jettisoned by the troops. Some nets were hanging from M.T. while on the move, but were never draped out when parked.

(iii) Troops were quite untrained in camouflage and the general attitude was extremely apathetic.

(iv) In the execution of the above work the Camouflage Officer gained experience and decided what changes should be made for the Desert.

(v) A new method of garnishing was evolved which allowed for the use of garnish with colouration having little relation to the background, so long as it was of the same tone. Several other improvisations were carried out.

(vi) Although some success was obtained, it was not felt that work was proceeding on the scale of a division. 9th Australian Division H.Q. were approached and proved equally aware of the danger of the situation.

(vii) It was agreed that, as troops were in action, a long screed would not meet the case. Having considered also the difficulties involved in visiting all units quickly, the following actions were taken:-

(a) The issue of short notes "Concealment and Dispersion" with scale of issue of camouflage materials. See Appx G.

(b) Formation of Camouflage R.E. Dump to meet the resultant demands for Ordnance material and issue of improvised and R.E. Stores.

(c) Formation of Divisional Camouflage Unit to meet demands for work in H.Q. area and places where personnel were not available.

(d) Construction of Roadside Demonstrations of Camouflage method.

(e) Construction of Service Station on roadside at a convenient point for treatment of M.T. with oil and sand. (See Appx "L")

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(viii) This increased the scope of future work and expedited current work a great deal but there was still very little work being done in F.D.L's.

3. The following actions were taken to further increase the scale of work.

(i) A letter was written on Preparation of Defences (9 Aust Div Instructions No 32) and a letter suggesting how camouflage might be introduced was sent to D.C.E, who accepted all proposals. (See Appx "L" - Works Programme from HQ RAE to all Engnr Units). Senior Engineer Officers were visited in each sector and proved anxious to do what could be done.

(ii) The Divisional Camouflage Unit was now just under the strength of three sections R.E., though much of the personnel was not R.E. Large demands were made by 4th. A.A. Bde for work which would have absorbed all the above personnel. It was therefore agreed that a Unit Camouflage Officer be appointed and labour and personnel supplied to assist in the construction and manning of dummy sites, firing of guns, etc.

(iii) This proved to be an extremely practical solution and it was decided to introduce UNIT Camouflage Officers on the scale of a division. This was carried out as follows:-

(a) The Camouflage Dump was developed into a demonstration ground.

(b) A signal was sent to all formations to send a representative from each unit to a camouflage demonstration and lecture. This was given and the scheme put before the Officers attending, their remarks being noted. (See Appx "N")

(c) A further signal was sent making a more permanent arrangement of regular lectures.

(d) Branches and other Services were approached and agreed to use their Unit Camouflage Officers as Liaison Officers with Divisional Camouflage Unit in all matters of camouflage, administrative and operational. 3rd. Armd Bde decided to appoint a Brigade Officer and HQ Group, as well as Battalion Officers.

(e) At the second meeting Unit Camouflage Officers agreed to have work carried out in their own areas with unit personnel. (See Appx "O")

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Report of Camouflage Work at Tobruk Fortress (contd)

(iv) To facilitate the work mentioned in 3(iii) (e) the Unit Camouflage Officers were offered the following services:-

(a) Use of Mobile Works Section, Div Cam Unit, for operational roles (where unable to provide men themselves).

(b) Use of Works Section, Div Cam Unit, for manufacture of sample ideas.

(c) Constant advice from the Camouflage Staff Officer. This includes "Notes on Camouflage" which are prepared specially to assist these officers. (See Appx "P")

(d) Manufacture of material where it is of general use to all units.

(e) Use of plant, such as Paint Spray Wagon (See Appx "Q")

(f) Use of Sample Defence Post in each sector and a length of F.D.L. constructed in rear locality for training.

(g) Use of Camouflage Demonstration Ground and Demonstration Squad for training.

(h) Use of Drawing Office, Div Cam Unit HQ (Staffed by Draughtsmen sent from units.)

(i) Use of Sand Table at Div Cam Unit HQ.

(v) Further increase of work has been introduced by D.C.E. Tobruk Fortress by inclusion of 'camouflage' in vocabulary. Engineer Instructions give high priority to the subject. (See Appx "R")

4. Conclusion

(i) Recent operations in Tobruk area have presented an excellent theatre of war in which to operate experimentally. The formation has been in effect a miniature Expeditionary Force complete with Base Port, Base Depôts, Coast and A.A. Defences Naval and Air components.

(ii) The higher aim, which has influenced the work done and the evolution of the organization to do it, has been to determine to what extent camouflage can be carried out in mobile and static warfare in the Middle East.

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(iii) The pursuit of this aim, and a clearer understanding of the function of aCamouflage Unit in the field, has permitted certain recommendations to be made as to what orgainzation will be best fitted for the future operationsof Desert Force Camouflage.

5. Recommendations

(i) Desert Force to have a Camouflage Company, comprising four HQ sections:-

(a) Corps HQ Section probably attached to Corps Park Coy.

(b) Three Divisional HQ Camouflage Sections for attachment to C.R.E. Division.

(ii) (a) Each Division to have a Temporary Camouflage Unit. Training Section Establishment, shortly to be promulgated (1 Officer and 1 Sgt Instructor per division with att. personnel) will form a second section at each division.

(b) Third section (1 Section Fd Coy) to be allocated by C.R.E. Division for training and duty when necessary.

(c) One Staff Lt. (Camouflage) to be attached to each division as adviser. The Unit to be at his disposal for work.

(iii) Some establishment claim to the attachment of Labour Corps personnel.

(iv) Creation of Corps and Divisional Dumps and Demonstration Ground.

(v) The appointment of Unit Camouflage Officers (from Infantry Bns, Fd Regts R.A., Armd Regts, Services, R.A.F. etc., and also in the case of Fortress Work, a Naval Representative). These officers will organise and carry out detailed programmes. For them, a fluctuating volume of camouflage work can be met by dual resposibilities within their Unit.

Signed R.P.Proud,

Capt. R.E.
G3 (CAM)
DESERT FORCE.
att 9 Aust Div.

In the field
11 June 41.

10

APPENDIX "O"

SECRET.

MINUTES OF CONFERENCE
of UNIT CAMOUFLAGE OFFICERS, 9 AUST DIV.

held at : Divisional Camouflage Unit HQ.
on : 21 May 41.

The subject of the lecture given by Capt R.P. Proud, R.E. was "The Priority of Tobruk Fortress Camouflage". Notes on Camouflage No 4 were distributed and Capt Proud began by saying that although AA and Fd Arty camouflage were proceeding satisfactorily, very little had been done so far in the matter of Coast Defences or F.D.L's. He then described what had been done in England on Coast Defence work and offered several suggestions for the better concealment of infantry posts. It was pointed out that the hardness of the ground makes it difficult to keep parapets low and the absence of mounds or other small features makes concealment difficult. Another factor tending to slow up progress on the camouflage of FDL's is lack of personnel to carry out the work. The men were continually out on patrols, especially at night, and were naturally in need of rest when they returned.

The officers were then taken to inspect a model MG emplacement which had been constructed and camouflaged for the DCE, Tobruk Fortress.

The following is a list of those present and their remarks:-

Unit Represented.	Remarks
2/9 Bn (Lt F Roberts)	Posts are being pushed forward every night so little being done.
2/13 Bn (WO 1 J Day)	MT are dispersed and dug in and Bn HQ is well concealed.
2/15 Bn (Sgt C Logan)	-
2/17 Bn(Sgt R Turner)	Bn moving tomorrow; weapon pits dug, dugout to be made.
2/24 Bn(Sgt McIntosh)	-
2/28 Bn(Lt S Walker & Lt F Taylor)	-
2/43 Bn(Lt Wegener)	Shifting camp at present.
2/48 Bn(Lt F Thredgold)	-
1 RNF.(Capt Mortimer)	All gun pits I have seen are well camouflaged. Shortage of nets has been overcome.
HQ RA. (Capt Windsor)	Question of carriage of cam equipment in troops. Presumably universal equipment would be met with garnishing. Units are worried that nets which suit one locality won't suit another. At the moment units are self-satisfied because they have not been engaged by enemy counter battery arty fire. They put this down to well hidden positions.
107 RHA(Capt Laborde)	Gun Pits etc.
2/5 Fd Amb(Lt J Hard)	Camouflage of 40 MT and dispersion.
3rd Hussars (Lt Hoseltine)	Regt does not seem keen on making dummies, saying they have more important work. I would like some dark green nets replaced by light ones. We have camouflaged Moss Tent with nets, trying to destroy shape.

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APPENDIX "O"

SECRET.

MINUTES OF CONFERENCE
of UNIT CAMOUFLAGE OFFICERS, 9 AUST DIV.

held at : Divisional Camouflage Unit HQ.
on : 14 May 41.

In the absence of Capt R.P.Proud, due to sickness, the meeting was addressed by 2/Lt J.D.Laing, R.A., Camouflage Officer 4th A.A. Bde, att Div Cam Unit HQ.

He began by commenting on the present shortage of artificial material for camouflage work in this area. All Unit Camouflage Officers were asked to take over the matter of supply in their own units, and arrange that all indents were handed in to the Camouflage Officer at these meetings. Camouflage Notes No 2 (Functions of a Unit Camouflage Officer) together with four sets of drawings illustrating various suggestions for camouflage, were distributed. Mr Laing then gave a short resume of his present work on Heavy A.A.positions. Questions and suggestions were invited and Officers were asked to submit a return showing work in hand and proposed work, as summarised below.

Units Represented.	Work in hand.	Proposed work.
Infantry		
2/9 Bn (Lt P G Roberts)	General.	alternative positions use of nets for mortar posns etc. (Unit is in forward area, thus principally occupied in digging & wiring. Irregular formations of rocks, tank obstacles, trenches etc assist in concealment exact posn.)
2/10 Bn (Lt A R Scott)	Garnishing of MT nets.	Cam of Bn HQ, RAP & Sig Office if nets are available.
2/13 Bn (WO 1 J B Day)	Concealment of MT; pits, nets, dust, grease etc.	Cam of weapon pits & section posts.
2/15 Bn (Sgt C Logan)	-	-
2/17 Bn (Lt G.Limn.	M.T.	Unit moving so no other work in hand.
2/23 Bn (Lt T H Orr)	None, as unit resting before taking up new position.	Camouflage of new area will commence immediately moved in.
2/24 Bn (Lt F J McIntosh)	-	-
2/28 Bn (Lt L Lamb)	Alternative weapon pits, wiring areas etc.	

To sheet 2.....

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Minutes of Conference 14 May (contd).

Unit represented.	Work in hand.	Proposed Work
2/28 Bn (Lt S A Walker)	Garnishing new and old nets for use on weapon pits & MT.	
2/43 Bn (Lt R A Wegener)	Cam of A Tk ditches, weapon pits, gun pits and HQs. Dummy trenches & positions. Cam of one large building serving as Bn HQ.	
2/48 Bn (Lt F Thredgold)	At present in reserve.	
1 Bn R.N.F. (Capt R Mortimer)	Cam of MT, MG posts, dummy MG posts.	
2/1 Pnr Bn. (Lt N Norris)	None owing to constant moving	Cam of MT and store dumps behind Fort Pilastrino.
Transport		
345 Coy RASC (L/Cpl S G Smith)	-	-
2/5 Fd Amb (Lt J Hardy)		Selection of sites for dispersing 40 MT. Disguising sangars.
Artillery.		
107 RHA (Capt C Laborde)	Nets for gun pits.	
1 RHA 2/Lt P Coulson)	-	-
Engineers		
2/4 Fd Coy RAE. (Lt B Buddle)	Development of defensive positions.	
551 A Tps Coy RE. (Lt Baker RE.)	-	-
AFV's		
18 Cav (2/Lt J D Anderson)	Cam of LMG & AA posns.	
3rd Hussars. (Lt R Hoseltine)	Light tanks, disruptively painted and nets used on shadow side.	Mess Tent might be better camouflaged with nets.
1 RTR (Lt F Plaistowe)	Camouflage Nets.	

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APPENDIX "O"

SECRET.

MINUTES OF CONFERENCE
of UNIT CAMOUFLAGE OFFICERS, 9 AUST DIV.

held at : Divisional Camouflage Unit HQ.

on : 10 May 41.

A short address on camouflage in general was delivered by Capt R.P.Proud RE, Div Camouflage Officer. Afterwards questions and suggestions from Unit Officers attending were invited and are set out below. Units were invited to send draughtsmen to Div Camouflage Unit HQ to produce drawings for any scheme found to be workable. If possible demonstrations were to be given for general information.

Unit Represented.	Officer.	Remarks.
Infantry		
18 Inf Bde.	Capt S Good, BIO.	Could send trained "I" man one afternoon a week.
2/9 Bn A.I.F.	Lt P Roberts, TO.	-
2/10 Bn "	Lt A R Scott.	Suggests 1.Sample net curtain for MT windscreens. 2.Sample of AA(LMG) pit in form of suggested 'purse' method. Diam of pit 6'.
2/12 Bn "	Lt K Thomas.	Conversion of present type MT nets with coloured garnish for use (a) in present semi-static posn and (b) in future rapid move into green country.
2/13 Bn "	Lt M Walker.	Scheme should prove great help.
2/15 Bn "	Sgt C Logan.	Can supply sketch artist.
2/23 Bn "	Lt T H Orr.	-
2/24 Bn "	Sgt J McIntosh.	-
2/28 Bn "	Lt S Walker.	Lecture very instructive and helpful.
2/43 Bn "	Lt Wegener.	-
2/48 Bn "	Lt F Thredgold.	-
1 Bn R.N.F.	Capt R Mortimer.	Difficulty is really shortage of nets.
Transport		
Convoy Bn, c/o 24 Bde.	Lt W Catchlove.	Our positions are dug in stone 1.What should be done with stone 2.How can line of bags used be altered. 3.What is the effect of deep trenches.
AASC.	Lt K D Jones.	Most interested, particularly in cam of SD's, Pet Dumps and A.P's.
AASC (2/5 Fd Amb)	Lt G R Hardy.	Will ask CO for draughtsman.
Artillery.		-
HQ RA	Capt P Windsor.	Agree with your views.
16 A Tk Coy	Lt A Simpson.	How to disguise A Tk gun on MT
Engineers.		
2/13 Fd Coy	Lt J W Overall.	-
2/4 Fd Coy	Lt H Buddle.	Cam of defensive works.
AFV's.		
18 Cavalry.	2/Lt Anderson.	-
3rd Hussars RAC.	Lt R Heseltine.	Turn light tanks into cruisers. Best use of nets when stationary In our opinion disruptive painting is good, from experience gained in the advance

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APPENDIX "N"

SECRET.

MINUTES of PRELIMINARY MEETING
of UNIT CAMOUFLAGE OFFICERS, 8 May 41.

Capt R.P. Proud. R.E., Divisional Camouflage Officer, gave a brief explanation of the reasons for appointment and the functions of a Unit Camouflage Officer, followed by an outline of a programme of lectures and demonstrations on camouflage, which it was proposed to institute for training purposes.

Those present were asked for comments on the scheme and these are set out below.

Unit Represented.	Officer.	Remarks.
Infantry.		
18 Aust Inf Bde.	Capt Parry-Okeden.	Will attend if possible Weds & Satys.
	Capt Good.	
2/9 Bn A.I.F.	Lt P Roberts	Will attend or send substitute.
2/10 Bn "	Lt A R Scott.	Will attend all meetings.
2/13 Bn "	Lt M J Walker.	-
2/15 Bn "	Sgt C Logan.	Wish to make close study of subject. Think regt will co-operate.
2/17 Bn "	Lt G Limn	Will attend all meetings.
2/23 Bn "	Lt T H Orr.	Would like information on camouflage of sangars and breastworks.
2/28 Bn "	Lt J Walker	Will attend if Bn agree.
2/32 Bn "	LT C E Dixon	System good idea.
2/43 Bn "	Lt R A Wegener	Will attend. Scheme worth while and practicable.
2/48 Bn "	Lt F Thredgold.	Will attend. Excellent idea.
1 Bn R.N.F.	Capt R Mortimer.	Will attend.
Artillery		
16 Aust A Tk Coy.	Lt A Simpson	Will attend.
	Lt C Bayliss	-
339 Bty, 104RHA	S/Major Sheppard.	will attend.
1 RHA	2/Lt F Coulson.	Regt will co-operate to the full.
3 Aust A Tk Regt.	Sgt C Clark	-
107 RHA	Lt Carr	
Pioneer Work		
2/1 Pnr Bn	Lt N Norris	Good scheme. Will attend.
2/24 Bn	Sgt F McIntosh (Pnr pl comd)	Scheme should be most helpful to pioneers.
2/12 Bn	Lt F Murray	Will attend.
Transport		
Convoy Force Blue Line.	Lt Catchlove.	Will attend.
345 Coy RASC.	L/Cpl Smith, S.	Will attend.
2/5 Fd Amb.	Major J Blair.	Will attend.
Engineers		
2/4 Fd Coy RAE.	Lt H Buddle.	Will attend.
Cavalry.		
18 Cav Regt.	2/Lt J Anderson.	-
Naval Representative.	Lt G. Brown.	Will attend occasionally

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COPY

APPENDIX "R" 9

SECRET.

Headquarters,
9 Aust Div.
8 May 41.

9 AUST DIV GENERAL STAFF INSTRUCTION No 42.

DEFENCE SYSTEMS - TOBRUK FORTRESS.

1. The field defences of Tobruk consist of :-

a. The Red Line with its protective minefields and wire.

b. The Blue Line with its protective minefields and wire.

c. The Green Line - no protective minefields or wire at present

d. Tactical minefields, B1 (partially destroyed) and B 2.

e. Tactical barb wire obstacles (none in at present).

f. Defended localities at PILASTRINO and at junc rds EL ADEM and BARDIA.

g. Switch lines between the Red and Blue and Green Lines, (not constructed at present).

2. The area is divided into three defence sectors and the "keep" enclosed by the Green Line.

3. RED Line

a. Improvements to be carried out include ;-

i Placing of camouflage nets over emplacements.

ii Emplacements to be divided up by sandbag walls to localize effect of bombs and shells.

iii Parapet walls to be built up by sandbags (and camouflaged) and loopholes constructed (and screened).

iv Covering of tank ditches to be repaired and camouflaged, or where this is not possible, covered with camouflage material.

v Tank ditch to be divided up with sandbag walls (with passages through them) to localize effect of bombs and shells; firing steps to be built up in tank ditch at irregular intervals in order that it may be manned, particularly at night. In neither case will these sandbag structures be built so that they will assist AFVs in crossing ditch.

vi Each post to be surrounded by wire - dannert for preference.

vii Placing of anti-personnel mines and bombs in positions likely to damage enemy infantry. These positions will be notified by units placing them to all concerned. Stocks of anti-personnel mines can be obtained from sector engnr dumps through the Fd Coy Comd of the sector.

viii A Tk mine blocks placed. The required position laid down for these will be notified when sufficient A Tk mines are available to allow of this being done.

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9 Aust Div GS Instn No 42 (contd).

ix Construction of dug-in posts between the outer main posts, for manning particularly at night. Required for listening, preventing minor infiltrations and interference with our wire and minefields. They should be so sited that if possible the main A Tk ditch and protective wire can be enfiladed. Alternative positions should be dug, otherwise these posts will be pin-pointed by the enemy.

b. Post stores which will be kept in each post and handed over and signed for when reliefs are carried out; deficiencies to be brought up by incoming relief where possible. This list as shown below is a guide only and should not be considered as exhaustive; weapons have not been included.

ITEM	No or amount.	Where obtained.	Remarks.
Periscopes trench.	12	Manfrd locally or from No 2 RE Dump.	
Amn.	as laid down by bde	nearest AP	
Rations	do.	Nearest SP	
Water	do.	Nearest WP	Greater than normal issue to compensate for thirst due to explosion fumes.
Medical stores.	As laid down by Mob Sec AAMC serving unit.	From mob sec AAMC	
Sandbags(spare).	500	From sector Engnr Dump.	
Picks	4	do	
Shovels	6	do	
Diesolene lanterns(with spare oil)	As laid down by Bde.	AOD.	
Candles and matches	12	do	Necessary on account of fumes from lanterns.
Camouflage nets (in posn and one spare and poles)	As required by construction of post.	Capt PROUD Camouflage Dump junc rds BARDIA -DERNA	Advice in camouflaging posts will be given by Cam Offr as reqd.
Signal Flags.	2	Made locally or from AOD.	
Signal Lamps.	1	AOD	or electric torch in lieu.

9 Aust Div GS Instn No 42 contd.

ITEM	No or amount.	Where obtained.	Remarks
Asbestos shooting.	6 sheets	Sector Engr Dump	For protection against flame-throwers.
Flares and Very lights.	As laid down by Bde.	AOD	
Smoke generators.	24	Nearest AP	
Molotov Cocktails	As laid down by Bde	do.	Where simple type used, spare bottles of petrol will be kept.
Anti-personnel mines(reserve)	50	Sector Engr Dump.	

4. BLUE Line and switch lines between RED and BLUE.

a. To be constructed by tps in reserve. In certain 'safe' places working parties of Indian Pnr and Lab Corps will be made available, on application to DCE, Tobruk Fortress.

b. Defences will consist of ordinary defensive position in depth with protective wire and minefields, 'slit' fire trenches (or sangars where necessary), HQs, Sig centres, (incl alternative posns), snipers' posts, posns (incl alternative ones) for MGs, A Tk guns etc, dummy posns, marked routes and signboards, camouflage etc.

c. For the switch line however depth can be sacrificed to a certain degree and all trenches should be constructed so that fire can be brought to bear from either side.

5. Defended Localities at PILASTRINO and Rd junc EL ADEM-BARDIA

a. Constructed by units in occupation.

b. If these units leave these localities, construction and manning for action stations will be done by 7 Fd Coy in the 1st case and 3 and 4 Fd Coys in the latter case.

6. Green Line and other Switch Lines in rear of BLUE Line.

a. Constructed by 4 Fd Coy with working parties of Indian Pnr and Lab Corps and FOUR (4) Libyan Bns.

b. Where, however, an Inf Bn is located near this GREEN Line it will be responsible for construction of a Bn Defended Locality forming part of this GREEN Line.

7. Supervision and recording of construction of defensive system.

a. HQ 9 Aust Div will co-ordinate sector boundaries; Bdes will co-ordinate inter-unit boundaries; Unit Comds will co-ordinate sub-unit boundaries.

b. Fd Coy Comds of Sectors are responsible for advice and for construction of works requiring technical skill. The Camouflage Officer is also available for advice and for special works.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

c. Bdes will appoint a 'Works Officer' forthwith who will be responsible for the construction of all works by units under comd Bdes. The name of this offr will be forwarded to HQ 9 Aust Div. He will render a daily report to the Bde IO in the form set out hereunder; if necessary he will get similar reports from Bns in order to make out his report. The Bde IO will send a copy to HQ 9 Aust Div daily by the Bde LO.

DAILY WORKS REPORT by -..... Date.....

Job No.	JOB	Map Location	Work carried out.	% completed to date.	Unit.	Remarks
a	b	c	d	e	f	g
	To include digging, wiring, camouflage, construction of HQs Sig centres, special posns, alternative posns, dummy posns, A Tk mines etc.					

Copy to :- Bde IO
Fd Coy Comd Sector.
HQ 9 Aust Div

d. 'Works Officers' will be assisted by Pioneer Offrs of Bns. See also para b.

(Signed)

Col
GS 9 Aust Div,

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

8

COPY

APPENDIX "M"

SECRET

HQ, RAE.
9 Aust Div.
30 Apr 41.

To all Engineer Units,

From UNIL.

1. Works programme as at 30 Apr 41.

(A) UNOK - Right Defence Sector

(a) Development of tactical minefield, active & dummy - RAE
(b) Protection of Heavy AA emplacements - RAE and det Ind Pnr and Lab Corps (BELT).
(c) Supply of oil drums for protection of Heavy AA emplacements - RAE and det BELT
(d) Construction of Model Section Post (existing or new) in conjunction with Capt Proud, Camouflage Officer, and arrangements with units to inspect.
(e) Supervision of work on Blue Line - RAE and det BELT.
(f) Training of unit guides through minefields - RAE.
(g) Recce and construction of defended locality for UNOK at junc rds EL-ADEM - BARDIA in conjunction with PEKA and POPA
(h) Construction and camouflage of bridge bank seats over Tank ditch at two points.
(i) Collection from RE Dump and placing of MT bridge in tank ditch.
(j) Construction of low sangar wall (or shallow ditch) 500 yds to 700 yds in front of arty posns - RAE and det BELT.
(k) Preparation of demolition scheme in sector.
(l) Sector Stores Dumps.

(B) NEXA - Centre Defence Sector.

(a) As for UNOK (a)(d)(e)(f)(j)(k)(l).
(b) Recce and construction of defended locality for NEXA at PILASTRINO in conjunction with KEFA.
(c) Construction of dummy minefield vicinity of square 410423.

(C) KIPE - Left Defence Sector.

(a) As for UNOK and NEXA (a)(d)(e)(f)(j)(k)(l).
(b) Construction of dummy minefield vicinity square 401436 - RAE and det BELT.
(c) Construction of A Tk ditch and sangar wall covering Blue line.
(d) Bringing back mines and placing them in wire in perimeter minefield.
(e) Laying perimeter minefield just NORTH of DERNA RD.
(f) Recce and fixing of KIPE defensive locality in Green line in conjunction with CLOY and Comdr POPA.

(D) POPA - Green Line.
(a) As for UNOK, NEXA and KIPE (d)(k) & (l)
(b) Recce and construction of defended locality for POPA at junc rds EL ADEM & BARDIA in conjunction with UNOK and PEKA.
(c) Construction of Green Line in conjunction with CLOY and 32 Bn using RAE, Infantry and Libyan Pn labour.
(See also (C)(f).)

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Engr Works Programme (contd)

(E) LUFO - TOBRUK TOWN.

(a) Central RE Stores Dumps and Workshops.
(b) Providing protection to essential installations.
(c) Running and maintenance essential installations.
(d) Demolition scheme, Tobruk Town.
(e) Digging in Beach Tented Hospital by det Libyan Bn
(f) Provision and installation of smoke points - R.E. with det of Libyan Bn (Lt Gubbins i/c).
(g) Delousing, preparing for demolition and handing over to Sector Engr Comdrs Italian amn dump at SEHEL, PILASTRINO, KEIRALLA, AUDA, TORTO, and SIDI MAHMUD. - R.E. with det BELT (Lt Aldecott of LUFO i/c).

(F) UNIL.

(i) Camouflage Officer, Capt Proud. R.E.

(a) Manufacture of camouflage - det of BELT.
(b) Assisted by one offr and one (1) sec of POPA assisting by advice and actual work all units in TOBRUK FORTRESS in camouflage and concealment. Selection of alternative posns for HQs, weapons etc, and advice on construction of defences. In this regard he works in close touch with Sector Engr Comdrs.

(ii) Fd Engineer and Experimental Officer - LT Turnbull. (DESMOND assisted by det of DAMO).

(a) Manufacture and distribution of anti-personnel mines and booby traps.
(b) Experiments in connection with Molotov cocktails etc.

(iii) Liaison Officer - Lt Wilmington.
Liaison with all engr units.

(iv) Adjutant (TONY) - Capt Wearing Smith.

(a) Control of water supply.
(b) Protection of HQ SALO assisted by det BELT.

(v) Major Risson (acting ANDREW) - A/C RE Outer Defences.

2. A map showing the whole scheme of defences of TOBRUK FORTRESS is held in this office and should be referred to by Field Coy Comdrs.

3. Daily reports to UNIL should report progress on all the above matters, including NIL reports.

(Sgd) J. MANN
Lt Col
D.C.E. TOBRUK FORTRESS.

E/2238/41.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

7

COPY

APPENDIX "M"

TWM/RNN

Headquarters,
9 Aust Div.
29 Apr 41

9 AUST DIV GENERAL STAFF INSTRUCTION No 33.

PREPARATION OF DEFENCES.

1. In continuation of GSI No 32 it is stressed that the following are of particular importance.

(a) Preparation of alternative positions.

During the last few days enemy aircraft have concentrated on gun points. These attacks are certain to continue with the object of neutralising our fire power before attacking. Alternative positions are necessary.

(b) Construction of Dummy Positions.

These will assist in misleading the enemy as to our dispositions, particularly when troops are thin on the ground. Many attacks have already been made on concentrations of old Italian MT.

(c) Wiring and improvement of platoon localities.

Improvement of pl localities so that they are proof against all round attack, is of first importance. Tactical wiring will NOT be carried out until localities have been completed.

(d) Preparation of alternative positions on Blue Line.

These may be occupied, under certain circumstances, by Bde and Div reserves, and should be constructed as soon as possible.

(Sgd) T. W. WHITE,
Major.
for Col
GS 9 Aust Div.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

APPENDIX "L"

COPY of letter from CAMOUFLAGE OFFICER to D.C.E.,9 AUST DIV.

SECRET

SUBJECT : CAMOUFLAGE

Ref : DESFORCE/G/X1/CAM

To D.C.E., 9 Aust Div.

From Camouflage Officer, DESERT FORCE.

Ref 9 Aust Div GS Instruction No 32 (Preparation of Defences) and your attached notes, as camouflage is referred to the following suggestions are submitted :-

1. Ref Appx A, para 2(c)(d); Sec, pl and coy posts could in some cases be linked with dummy trenches.
Action to be taken by Cam Offr - Dummy trench to be attached to sample post, to be constructed by Cam personnel in each Bde Sector.

2. Ref Appx A, para 2 (c) - Cam Offr to assist in siting alternative posns and advising in camouflage of same.
Action by Cam Offr - Liaison with Senior Engineer Offr of each Bde.

3. Ref Appx A para 3 (Defects in Detail)(a) - parados should be higher than parapet and both should be irregular from ground view. Heads and shoulders can be suggested by use of stones whether trench is real or dummy.

4. Ref Appx A, para 3 (c) - It is suggested in some cases important firing bays and strong points could be concealed by overhead cover. This applies also to A Tk weapon pits and MG posns. On uneven ground, with clever siting, the need for crawl trenches is eliminated. The enemy is then presented with a series of camouflaged blobs which cannot be interpreted as a complete system.
Action by Cam Offr - Construction of demonstration of concealment possible with available material at sample post in (c) in each Bde Sector. Senior E.O. to be consulted.

5. Appx A, para 3 (c) - Sample posts could be used to demonstrate the possibilities of camouflage in trench warfare.
Action by Cam Offr - Erection of camouflage at these sites as standing demonstration. If necessary, demonstration of individual concealment (snipers suits, individual behaviourism etc.) could be given by Cam personnel by arrangement with Bde HQ through Sector Engr Cond.

6. Appx A, para 5 (Miscellaneous)(b) - if concrete structures are to be used it is pointed out that these were found to be highly conspicuous on aerial photographs taken on the South Coast of England, and that much labour and material was taken to conceal them after construction. It was also found practically impossible to conceal the fact that such work was going on. Pre-coloured and pre-fabricated slabs with a rough surface were used in some cases. This avoided some of the mess on the site. Beach defences were in some cases constructed of rock and lined with concrete. This was found to be actually more effective than disguising pill boxes as beach huts. Firing bays or slits were concealed with pieces of cloth or metal gauze (i.e. the net curtain effect).

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Letter from Cam Offr to DOE contd.

If concrete has to be made near the site it is suggested that dummy structures be used (pre-fabricated) and that the cement be mixed on the site of these dummies.
Action by Cam Offr - Scheme to be designed on tracings of proposed works i.e. camouflage to be included in structure.

7. An advanced camouflage R.E.Stores has been established near the BARDIA-DERNA Rd junc. Indents for material should be handed to the NCO i/c at this point, who will indicate when these stores will be ready for collection by unit transport.

(Sgd) R. P. PROUD

Capt R.E.
G3 (CAM)
DESFORCE
att 9 Aust Div.

In the field
26 Apr 41.

Copies to :-

G		for information
O.C. 2/3	Fd Coy	"
O.C. 2/4	" "	"
O.C. 2/7	" "	"
O.C. 2/13	" "	"

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COPY

APPENDIX "M"

SECRET.

9 Aust Div
25 Apr 41

9 AUST DIV GENERAL STAFF INSTRUCTION No 32

PREPARATION OF DEFENCES.

1. It is most important that immediate action be taken by all Formations and Units to improve their defensive arrangements. At present there is a tendency with junior commands to regard their arrangements as being adequate because of recent successes.

2. It should be impressed on all however that future attacks are certain to be carried out with extensive arty preparation and air attack. Under such conditions success will depend to a large extent on the thoroughness of our preparations.

3. Our system of defence depends on the ability of defended localities to hold out against all forms of attack. Provided positions are wisely chosen and suitably prepared there is no reason why we cannot hold out indefinitely. But this will not be possible unless field works are considerably improved and made proof against heavy arty fire.

4. Owing to the hasty manner in which our defences had to be manned, a number of defects were inevitable, and in order that these may now be remedied detailed notes on defensive arrangements and defects noted by CRE 9 AUST DIV are att at Appx "A".

5. Tracings of the whole defensive layout have already been sent to formations and these should form the basis for co-ordination. In addition an officer will be sent from these HQ to co-ordinate any adjustments which may be found to be necessary as between Bdes.

(Signed)

Col
GS 9 AUST DIV.

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COPY.

APPENDIX "M"

Appx "A" to 9 Aust Div GS Instn No 32.

NOTES ON DEFENSIVE ARRANGEMENTS & DEFECTS TOBRUK.

1. Defects in Conception.

(a) Lack of depth in defences, i.e. section posts, platoon and coy localities. Owing to this situation and to the lack of labour it is inescapable that our first task is a line of Section Posts, but as soon as these are constructed, all available men must be put on to constructing section posts in rear and linking up the whole by trenches or sangars to form a complete defensive line in depth.

(b) It must on no account be accepted that there can be any pause in the construction of our defences. Every day (and night) if possible, and every available man should be used to further the development of the system.

We started with only one line - the outer perimeter which was already in place, but as time has permitted we have developed further lines as follows :-

BLUE LINE of defended localities in rear of outer perimeter. This line marks the FDL's of Bde reserve localities and is not therefore intended as a continuous line of trenches.

GREEN or Inner Keep LINE of defended localities. This line is intended to prevent further penetration.

Even when these lines are in a fairly advanced state, the work is far from completed as it will be necessary to construct additional tank obstacles, alternative and dummy posns, 'switch lines' between the Red, Blue and Green Lines and other vital defensive measures.

To this end the following procedure will be adopted ;-

(i) Every unit which is or will be occupying posns on the Red, Blue or Green lines will develop these lines to the utmost of their capacity.

(ii) Every Unit which does NOT occupy posns in the Red, Blue or Green Lines and whose duties do not permit of them supplying working parties, will be responsible for constructing their own local defences; this is an added measure for obtaining defence in depth.

(iii) All units other than (i) & (ii) above should report daily to HQ RAE what men they can make available for defence working parties. This does NOT apply to units such as Libyan Bns, Indian Pnr and Lab Corps, who are already engaged in Defence Lines, but to unengaged RASC and other miscellaneous units.

2. Defects in Layout and Trace.

(a) The greatest defect is the lack of co-ordination between neighbouring units which results in broken defence lines, boundaries not coinciding and protective wire not co-ordinated.

(b) Relieving units not being satisfied with their predecessor's lines and commencing a new set of defences altogether. It is definitely the duty of the next higher commander to ensure that (a) and (b) do not happen. The A/CRE Defences (Major Risson) will act as general co-ordinating officer for the Blue and Green line localities in so far as it affects field works, wiring etc.

(c) Non linking up of section, platoon and coy posts with trenches.

(d) No dummy trenches constructed.

(e) No alternative positions prepared for Coy, Bn and Bde HQ or for A Tk weapons, MGs and arty. The construction of these posns is vitally important.

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COPY. APPENDIX "G"

TWW/RGP

245/65/1.

Headquarters,
9 Aust Div.

22 Apr 41.

DISPERSION AND CONCEALMENT.

1. So far we have not been subject to heavy air attacks except on the harbour, with the result that insufficient attention is being paid to dispersion and concealment.

2. GERMAN methods are to leave suitable targets undisturbed until the time chosen for the main effort so that the maximum possible casualties and confusion may be caused.

3. It is therefore of great importance that immediate attention be given to dispersion and concealment. As the country is open, concealment can be best obtained by effective camouflage and the use of dummy positions.

4. Attached hereto are some notes on camouflage and a list of material which is now available.

Units will indent on DESFORCE Camouflage Officer (Capt R.P. Proud) att 9 Aust Div for their requirements and arrange to collect material from A.O.D. in their own transport.

5. Capt Proud is available to give advice on camouflage matters and will visit bdes as opportunity offers.

(Signed)

Col
GS 9 Aust Div.

AUSTRALIAN WAR MEMORIAL AWM2020.71.1210

COPY

APPENDIX "G"

NOTES ON CAMOUFLAGE.

GENERAL

1. Shadow Lines: Every straight line you dig or build will cause a broad black line as seen from the air. Such lines should be avoided, covered or broken up. This applies even more in the case of circular or geometrically shaped pits and installations which show up like bulls-eyes from the air.

2. Dummies: Units using dummies will make sure that they are thoroughly realistic. Shallow slit trenches, old tents etc must be used. A bad dummy will only point to the existence of the real defence.

3. Material: The att scale of material contains all the artificial material available. Natural material is actually the best form of concealment. Our natural features consist of crashed planes, wrecked MT and empty tins. These should be used by all arms for concealment.

4. Wrecked MT placed on the SOUTH side of your weapon pit will cast a shadow disguising its shape. Choose a truck that looks wrecked at a distance.

5. Old MT and Tanks are also useful for decoy work. A dummy petrol dump with a convoy of old Italian MT received five hits recently in this area.

6. Old Sump Oil rubbed over MT and guns and covered with sand will kill shine. Oil is available on requisition if required.

7. Old Italian Uniforms, stuffed with rubbish with a rock and old helmet for a head, will provide personnel for dummy trenches. These trenches in some cases may link up with real systems, thus providing the enemy with a continuous system.

ISSUE SCALE OF CAMOUFLAGE MATERIAL FOR 9 AUST DIV.

25 prs.	Frames 35' x 35' or 30' x 30'	One per gun
	Posts, supporting	Four "
	Pickets, angle or guy	Six "
	Camouflage net, fully garnished, 35' x 35'	One "
Comd Posts, etc.	Frames, 30' x 15'	One per post
	Net, fully garnished, 30' x 15'	One "
A Tk guns.	Net, fully garnished, 30' x 15'	One per gun
	Posts, picket wood	Four "
MGs, Vickers, etc.	Net to be garnished with local thorns etc, 14' x 14'	One per gun
	Frames supporting	One "
M.T.		
3-tonners	Nets, 24' x 24'	Two per vehicle
	Loam hessian garnish	400 yds "
	Lt Brown "	400 yds "
30 cwts	Net, 35' x 35'	One per vehicle
	Loam hessian garnish	400 yds "
	Lt Brown "	400 yds "
15 cwts) Water tanks) 8 cwts etc.)	Net, 24' x 24'	One per vehicle
	Loam hessian garnish	200 yds "
	Lt Brown hessian garnish	200 yds "
AFV's.	No material available yet.	

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2

SECRET.

SUBJECT:- Camouflage. Observations on practice and Equipment during recent Operations.

General Headquarters,
Middle East.
Cairo.

CRME/11603/SD. Cam.

7 Mar 41.

Headquarters.
CYRENAICA Command
British Troops in EGYPT
British Troops in PALESTINE & T-J
Troops in the SUDAN.
British Troops CRETE
O.C. Troops in CYPRUS.

Copy to:
Headquarters,
British Forces in GREECE
EAST AFRICAN Forces.

1. These Notes and two Appendices are based on reports sumbitted by Camouflage Officers who have recently made survey tours of Cyrenaica, Sudan and Palestine & T-J. The observations are limited to salient features which call for urgent attention, either from Camouflage Officers or from formations and units, and they indicate for the advance formation of all concernad the lines along which the Camouflage Officers propose to deal with the various problems.

2. GENERAL OBSERVATIONS. Troops everywhere showed much interest in camouflage and generally speaking they were taking trouble to use their standard equipment and seemed to have faith in it. In the most important case of Nets and Garnish, much of this faith is being misplaced because the purpose and effective use of this technical equipment are so very imperfectly understood.

Special study was made of camouflage in forward positions during highly mobile operations. All arms were found keen on stating and discussing their own practical and tactical camouflage problems even in the line. For instance, a troop of Australian Field Artillery asked for and were given demonstrations of net work in the brief intervals between gun fire. This points to a most profitable field of action for camouflage officers with forward formations.

3. DISPERSAL. Excellently carried out and very well suited to the open and "patternless" nature of the terrain almost everywhere. In these open areas where there is no natural cover capable of holding vehicles etc. there is a tendency to neglet the use of nets. The attitude seemed to be:- "There is nowhere to hide. Therefore it is not worth doing anything more than disperse". This attitude is mistaken. A great deal can be done.

(See Appendix - Photos).

4. NETS & GARNISH. - Technique. The most urgent requirement in all parts of Middle East in instruction on the technique of garnishing and using the open-mesh net. To a large extent these technical articles, and much time and effort beside, are being wasted and only a fraction of the benefit that would result from their correct use is being gained. The principal faults are:-

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(a) Inadequate garnishing. Rarely is a net seen with anything approaching its authorised allotment of garnish.

(b) Garnish is usually applied in an ineffective way and without getting the best covering-power out of it.

(c) Nets are tightly wrapped round the upperworks of vehicles in which position they do practically no good against air observation. (See Appendix - Photos and also Hints No.1. attached)

(d) Nets are being unprofitably damaged by being kept spread or wrapped round vehicles while in motion. (See Hints No. 1. attached).

Proposed Action. G.H.Q. M.E. will produce a booklet of advice, containing the minimum of letter press and the maximum of instructional , for issue on a scale down to N.C.Os. if possible. Demonstrations and Lectures will also be arranged where possible. A start is being made at M.E.T.S.

Meanwhile it is suggested that Formations might try and produce and distribute something like Hints No.1. (attached) for the immediate instructions of drivers, etc.

5. COLOURS OF GARNISH. are, of course, considerable differences of colour and tone in the natural conditions of the various areas of M.E. For reasons of supply and issue it is impracticable to recommend a large range of colour schemes each exactly suited to an area. After studying the matter from the practical angle, it is considered that:-

a. A general "all-purposes" blend of colours as the foundation for garnished nets in all areas. This blend to be supplied as the initial issue (G.1098) by Ordnance. The recommended blend is :-

GRASS GREEN	12½%
LOAM (The Yellow)	25%
NATURAL UNDYED HESSIAN	25%
SALMON PINK	25%
DARK BROWN	12½%

b. Local or seasonal adjustment. To correct the above foundation there should be reserves of particular colours, held in bulk in the various areas, and issued on the recommendation of the local Camouflage Officer.

c. Static Work. Local reserves of specified colours in each area for schemes on defence lines, etc. Bulk supplies, issued on local Camouflage Officer's recommendation.

Detailed advice on this matter has been issued to O.S. under CRME/2053/G.SD. CAM dated 26 Feb 41.

6. PAINTING OF VEHICLES. Understood that Ordnance wishes to simplify the process of vehicle painting as there is great difficulty in coping with two or three-colour patterns.

The main factors contributing to successful concealment of vehicles and other equipment are, in descending order of importance:-

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a. Siting and the correct use of natural cover or existing ground pattern.

b. Use of properly garnished nets.

c. Texture or "roughness" of the paint surfaces. Avoidance of shine.

d. Suitability of the colour.

e. Avoidance of machine-made smoothness or regularity of paint surfaces. It is and advantage to employ any means of applying large patches of a slightly different tone on sides, roof and diagonally across vertical lines and corners. In this way the plane surfaces etc. acquire something of the "patina" which makes the Bedouin tent so inconspicuous (See below)

f. The precise nature of the pattern applied as a secondary coat.

All above factors are important, but the precise pattern is the least decisive.

Proposed Action. G.H.Q. is considering ways and means of simplifying painting processes.

7. TENTS. Many tents are still left white. It is interesting to note that the most effective camouflage seen during the tours is the ordinary Bedouin tent. The principal reasons appear to be that they are irregularly or untidily erected with a few straight lines or taut surfaces, they are set low and spread wide and are not surrounded by slit or drainage trenches, and, most importantly, the fabric has acquired the patina of age, patched, smeary, inderterminate in colour and pattern - therefore much less conspicuous than a trim, factory dyed tent.

NOTE: Tents are now being dyed at No. 2 Sub Depot, ABBASSIA, by a method which produces something approaching this effect. It is intended that all canvas should be thus treated before issue if possible.

8. GUNPITS, SHELTER TRENCHES, ETC. Assuming an improvement in the garnishing and use of Artillery nets, the gun positions will still be obvious from the air by reason of the shallow shelter trenches, ammunition dumps, etc, associated with the positions. A great deal could be done by means of nets. But at present nets are not authorised for this purpose and there is also the problem of unit transport. This is being studied further.

9. CRITICISM OF STANDARD CAMOUFLAGE EQUIPMENT. Some units, particularly A.F.Vs; and Artillery, criticised the equipment on the grounds that in some respects it is cumbersome and unsuited to extremely mobile war. It is felt that much of this difficulty will disappear if troops are practised in the business of erecting and dismantling their camouflage equipment whenever opportunity offers. With practise it is easy to rig and dismantle nets in the way indicated in the appendices in a very few minutes.

(See Hints No. 1)

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It is considered that the supply and issue of nets is made unnecessarily complicated by the large number of sizes and types of net laid down in the G.1098-1000. There is also a possibility that in view of the shipping problem the need for imported garnish could be obviated by the adoption of small mesh nets having their own intrinsic concealment-power.

Proposed Action. G.H.Q. is starting tests to discover whether the small - mesh net will make a satisfactory substitute.

10. DISRUPTIVE PAINTING. There is a certain tendency to use a kind of dazzle or disruptive style of painting indiscriminately on huts, vehicles and similar objects. This is a dangerous tendency for "strong" pattern painting is only suited to special cases and it is very seldom any good unless the patterns are merely a part of a comprehensive scheme of ground-patterning carried over the whole area on which the objects stand. Strongly disrupted objects standing on their own in plain surroundings are apt to draw the attention like a bull's eye on a target.

Proposed Action. As soon as possible G.H.Q. M.E. will produce a booklet of advice and illustrations for the assistance of Engineer and other services concerned.

11. PAINT SUPPLY. There is room for co-ordination and simpliciation of the range and styles of paint for camouflage. One feels it may be possible to stock fewer colours and to get mid-shades and tones either by blending or by the addition of dry colour ingredients.

Proposed Action. G.H.Q. M.E. will try and produce standard shade-cards and nomenclature, with specifications marked on each, applicable to the whole of M.E.

12. CAMOUFLAGE TACTICS, OPEN COUNTRY. If a better net technique can be taught and practised, the result should be to give nearly all equipment and arms in the field and indeterminate and inconspicuous shape. Even when spotted from the air, the problem of enemy aircraft will still be to decide which is the worthwhile target. At present there is little doubt as to which are M.T. Guns or A.V.s.

(Sgd) XXXXXXXXXX, Major General,
Deputy Chief General Staff.

Copies to:- G(Ops)
G(Tng)
Q
E
O.S.
S.T.
S.O.L.O. (5 copies).

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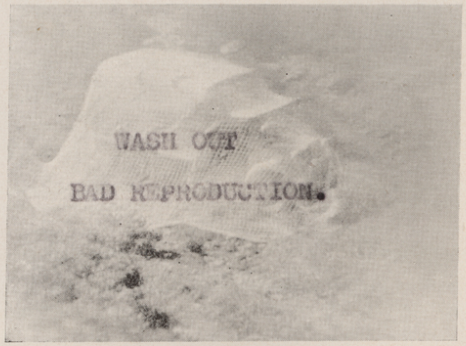
CAMOUFLAGE : - Appendix to CRME/ 11803 / G. SD. CAM

SECRET
General Headquarters
Middle East



Net inadequately garnished. Conspicuous to aircraft.



Net ungarnished - Conspicuous.



Net adequately and correctly garnished. Inconspicuous even in open country.

VEHICLES PAINTED STANDARD WESTERN DESERT SCHEME

Net inadequately garnished. Conspicuous.





Net adequately garnished Blends vehicle on to bushes.

NOTE : Tone of net not quite suited to background.

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HINTS No. 1.

CAMOUFLAGE

NOTES ON GARNISHING AND USING NETS FOR M.T. VEHICLES

IMPORTANT POINTS TO REMEMBER

1. A 2" or 3" mesh net without any garnish is practically useless.

2. Such a net is only intended as a support for garnish.

3. A 14ft net needs at least 200 yards of garnish. A 24ft net needs 400 yards. A 30ft needs 600 yards.

4. The best colour for the garnish may vary with the area you are in. Your Camouflage Officer will have taken what steps he can to make good colours available.

5. You should think of your net as a CURTAIN behind which to hide your vehicle and Not as a sort of magic cloak which will conceal anything over which the net is wrapped closely.

6. Remember that the things that give your vehicle away to enemy air observers are:-

   (i) The smooth regular surfaces of the top and sides which reflect a lot of light, no matter how they are painted and therefore shine comparatively brightly and can be seen for long distances.

   (ii) The deep shadows under the chassis, wings and all recessed surfaces. The deep square shadows of the opened back of the vehicle and of the cab.

   (iii) The shadow of the vehicle on the ground.

   (iv) The bright parts, glinting metal, glass etc.

7. A well garnished net, well arranged, will help greatly to kill the reflection from top and sides. It will kill the deep shadows under the vehicle etc. It will kill the glint from bright parts. It will make the vehicle look indeterminate and less worth bothering about.

   It will not entirely disguise the regular shadow of the vehicle on the ground unless you prop the top of net up irregularly in some way so that it does not cling closely to the top lines of the body. With a little ingenuity you can almost always find a way of doing this and of spreading the edges of the net out like an apron.

8. If you have insufficient strip garnish it is well worth using any local foliage, brush, boughs, grass, etc. to "thicken up" your net. Use such stuff to hide the "give-aways" listed in 6 above. When placing such extra garnish consider the angle from which aircraft observes you.

9. Do not expect your net to hide you when you are on the move. It will NOT. Therefore do not uselessly damage your net by driving always with it over the vehicle. Figure out the best way of rolling your net up quickly before moving off, stowing it where it will ride most safely and unrolling and using it again when you halt. With a little practice rolling and unrolling a net need not take more than five minutes.

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10. Here are some points on Siting.

1. Where there is no cover under which you can hide, or alongside which you can hope to escape notice, then dispersal is the best answer. But the proper use of your net will add enormously to your chance of escaping notice.

2. If open ground has clearly distinguishable patches either of roughness or of different colours then it is a good thing to park right on the edges of such patches where one colour or formation begins and the other ends. But use your net. A "blob" or vague shape on an "edge" like is naturally harder to see than the same "blob" in the certain of a patch.

3. If there are bushes or small trees NOT AS HIGH AS YOUR VSHIVCLE it is sometimes best to park on the sunny side and let the shadow of your vehicle fall on to the bushes and be broken up by them.

4. If the trees or other cover is HIGHER THAN YOUR VEHICLE get on the shadow side so that the shadow of the trees etc. blots out the shadow of your vehicle.

11. Here are hints on the best way of garnishing a NET.

1. Do your best to get all the garnish you are entitled to under your G.1098.

2. Cut it all into 6ft lengths and then jumble all the colours together.

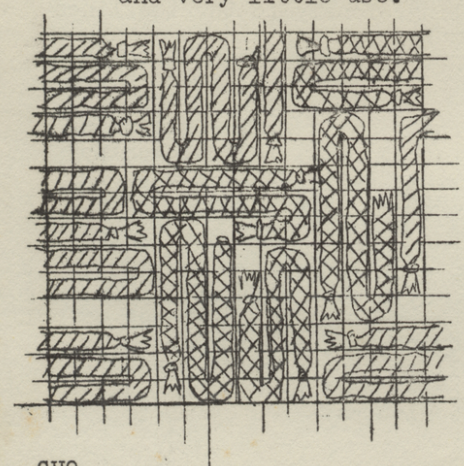
3. Peg your net out flat on the ground - stretch tight.

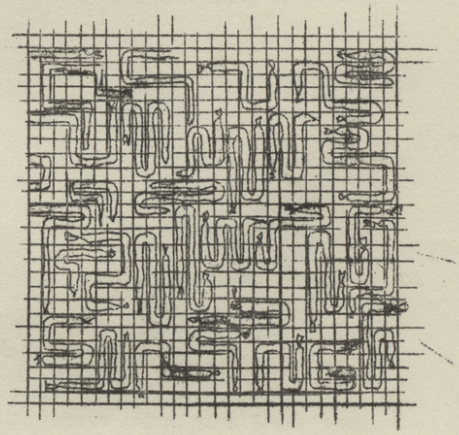
4. Start to weave the strips in and out of the meshes i.e. not the first end weave in and out keeping the garnish as flat as possible but NOT in a straight line. Do not strain it tight. Knot the other the end.

5. The centre needs to be""thiëk" and sides slightly less thick; the actual coners can be skimped. Therefore it is best to work from centre out.

6. The finished net should look something like the sketch at right.

7/ DO NOT cut the garnish into short bits and merely knot them in one place with the tails hanging loose. It is very wasteful and very little use.





GHQ
2 Mar 41

Lt. Col.

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1. Jan 41

1

COPY

NAVAL MESSAGE.

para taken from WEEKLY REPORT DUNKIRK SQUADRON.

GUNBOAT BERTH

A berth up a narrow cove just inside boom on SOUTH shore has been found for the Gunboat where she can lie well hidden with her bow in line with the shore and her stern secured by wires on each quarter to the rocks. Camouflage is also being arranged. In order to make "Gnat" less conspicuous, her topmast has been struck and her searchlight and top are being removed.

NAVAL MESSAGE.

IMPORTANT

To C in C (R) N.A.L. N.L.C. DESFORCE

From S N O I S

SITREP. Military. No developments except arty fire and infantry attack after air attack at 1915 still in progress. Milford Countess salving shot down Blenheim D/D and machine gunned 4 wounded.
AIR. Raid at 1230 very high level with sticks of very small bombs 2 sticks probably aimed at two "A" lighters. Other lighter has been well camouflaged and was NOT attacked. Coxswain killed and one man wounded in A 12. Similar raid 1605. One stick of 12 bombs diagonally across harbour. Fareham superficial damage and four wounded. Heavy raids at 1915 on military objectives dive bombing and machine gunning.
NAVAL "A" lighters did not make harbour until 0300 hrs Tanks etc landed comparatively quickly but loading of vehicles on to them slow. Recommend they only be used for embarking here in cases of emergencey. C.D.'s, light guns and some light gear salved from Chakla.

2103/3

W/T T.O.D.....0207 1/5/41.

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CEA/2491/

SUBJECT: ENGINEER NEWS ITEM NO. 5. FIRST AUST ARMY

ENGINEER OPERATIONS OF AIF IN GREECE. APRIL 1941.

H.Q. First Aust Army

CE's Branch

Distribution down to Fd Coys.

The att notes on Engr work in the Grecian Campain are forwarded. These noted together with previous ones on the campain in Syria and Cyrenaccia and other Engineer News Items on recent operations should be promulgated to the troops. Although the general standard of engrs has undoubtedly improved in the last few months, there are still some engr units in First Aust Army which brings no credit to themselves or to the army as a whole. This state of affairs can and must be remedied.

J Mann Brig.,
C.E. First Aust Army.

Part 1. - Strategical Background.
(Ref att tracing from SOFIA and ATHENS sheets 1/M)

1. The Greek land frontier shared with TURKEY, BULGARIA, YUGOSLAVIA and ALBANIA. It is mostly mountainous, the ranges being pierced by a limited number of passes. The passes on the BULGARIAN frontier, including the RUPEL, are strong positions but there is not enough depth behind for an adequate defence of WESTERN THRACE. The passes on the YUGOSLAV frontier are the AXIOS or VARDAR, which is relatively easy, and the BITOLJ or MONASTIR GAP, which is not difficult. The passes on the ALBANIAN frontier are strong positions.

2. In the event of a penetration from BULGARIA into WESTERN THRACE, or of an advance from YUGOSLAVIA down the AXIOS valley, the next line that can be held is the mountain range running NW from MT OLYMPOS. The passes through this are (a) the narrow passage near the coast, (b) KATERINI PASS, (c) VERRIA PASS, (d) EDESSA PASS. This posn can be turned by an advance from YUGOSLAVIA down the BITOLJ GAP.

3. Should an advance take place, the EDESSA and VERRIA Passes are indefensible and the SERVIA PASS must be held, together with the passes at SIATISTA, KLISSOURA and FLORINA. The latter cover a comparatively easy line of advance through GREVENA which turns the flank of the KATERINI and SERVIA Passes.

4. If this posn is turned there is no other line that can be held north of the plain of THESSALLY. The next posn is on the isthmus between the gulfs of CORINTH and EUBOEA, and includes the THERMOPYLAE plain and the BRALIOS PASS. It can be turned by a landing on EUBOEA Island or an advance through AMPHISSA or a crossing of the GULF of PATRAS.

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5. On 6 Apr 1941, the day the Germans attacked GREECE and YUGOSLAVIA, the Greeks had four divs in WESTERN THRACE and two divs on the EDESSA and VERRIA passes. Most of the balance were in ALBANIA. Of the British forces 1 Armd Bde was fwd of the VERRIA and EDESSA PASSES, NZ Div in posn on and fwd of the KATERINI PASS and 16 Aust Inf Bde about to take over the VERRIA PASS. 19 and 17 Aust Inf Bdes had not yet arrived. It was considered at the time that WESTERN THRACE must fall, and intended that the KATERINI, VERRIA and EDESSA PASSES should be defended. One sec 2/1 Fd Coy was under comd 16 Aust Inf Bde.

6. On 8 Apr it became clear that YUGOSLAV resistance in the south had broken and that a passage lay clear for the enemy through the BITOLJ GAP. A Force was constituted to hold a posn NW of AMYNTAION to cover this approach during the necessary withdrawal from the EDESSA and VERRIA passes. This AMYNTAION det comprised 19 Aust Inf Bde (which had just arrived) and certain other tps; it was commanded by Comd 6 Aust Div and was directly under force not Corps. It included 2/1 Fd Coy less one sec. The covering posn was occupied on 9 Apr. The force was heavily attacked on 13 Apr and the inf forced out of posn. Under cover of night the force withdrew on night 13/14 Apr. 1 Armd Bde covered the withdrawal next day. 19 Aust Inf Bde moved by KOZANE to an area south of that town; 1 Armd Bde by KOZANE to GREVENA.

7. On 11 Apr orders were issued for the withdrawal to the OLYMPOS-ALIAKMON line, which extended from the sea east of Mount OLYMPOS-KATERINI PASS-SERVIA PASS - high ground on left bank of ALIAKMON RIVER as far as SIATISTA, thence along the range running NW. To effect this withdrawal 4 NZ Inf Bde was detached from NZ Div and placed in posn on the SERVIA PASS. Balance of NZ Div continued to hold the KATERINI PASS. 16 Aust Inf Bde had to be with drawn from the VERRIA PASS, but this movt had to be synchronized with the movt of AMYNTAION Det so that the flanks of neither force were left open. 16 Aust Inf Bde, less tpt which moved by road, was therefore withdrawn over the mountains to the south, crossed the ALIAKMON by ferry, and continued over the PIERIA range to reserve in rear of the new line. This movt began on night 11/12 Apr and was completed by 13 Apr.

8. 19 Aust Inf Bde Gp was to occupy the sector of the OLYMPOS - ALIAKMON line on the left bank of the river through KHROMION to SIATISTA. The usual access to this area is from KOZANE, and alternative roads were liable to interruption by the enemy. It was necessary to provide a crossing over the river in rear of the posn, and to mark tracks over very rough country between this crossing and the roads to the south, both to supply the bde and (in due course) to extricate it. The bde was in posn by night 13/14 Apr. The OLYMPOS-ALIAKMON line was then held according to plan. On 12 Apr 1 Aust Corps had become ANZAC CORPS. NZ Div was under comd, but not 1 Armd Bde which was under force.

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9. On 14 Apr it became evident that the Greek divs forming the left of the OLYMPOS-ALIAKMON line could not withstand the Germans armoured attack, and that in consequence the lines of the advance through GREVENA and (possibly) YANNINA were open to the enemy. 1 Armd Bde was about GERVENA. A force called SAVAGE FORCE was organized from a nucleus of 17 Aust Inf Bde (which had not yet arrived) and att tps and ordered to hold the KALABAKA area and comd the rd from the north and west or to be available to support 1 Armd Bde on the line of RAVENETIKOS. SAVAGE FORCE was in posn by 15 Apr. It included 2/2 Fd Coy RAE.

10. On 15 Apr it was decided to shorten the line by withdrawing to the THERMOPYLAE posn. The withdrawal took place under cover of the following detachments:-

(a) LEE FORCE, including two bns of 17 Aust Inf Bde which had not arrived in time to join SAVAGE FORCE and 19 Aust Inf Bde which had withdrawn from its posn on the left bank of the ALIAKMON; this force held a posn about DOMOKOS as a rearguard posn for the main withdrawal. 2/8 Fd Coy was included in LEE FORCE.

(b) 6 NZ Bde Gp which was withdrawn from the KETERINI PASS and took up a covering posn between ELASSON and TYRNAVOS.

(c) 16 Aust Inf Bde and att tps which was sent to the right flank on 16 Apr to counter a threatendd advance up the PENEIOS GORGE.

The withdrawal was carried out under the orders of ANZAC CORPS. and CE ANZAC CORPS co-ordinated the demolition plan.

11. On 17 Apr 1 Armd Bde withdrew through SAVAGE FORCE, thence to behind THERMOPYLAE Line. SAVAGE FORCE, which was not in contact with the enemy, withdrew on nights 17/18 Apr to an intermediate posn and on 18/19 Apr to the THERMOPYLAE line. 4 NZ Bde Gp withdrew from SERVIA PASS and 5 Nz Bde Gp from KATERINI PASS ON 17/18 Apr, both via LARISA, to the THERMOPYLAE Line. 6 NZ BdeGp and force under comd 16 Aust Inf Bde withdrew from covering posns on night 18/19 Apr, moving via VOLOS to THERMOPYLAE l[illegible]. During night 19/20 Apr LEE FORCE withdrew covered by a small rear-guard. By 20 Apr the THERMOPYLAE line was occupied according to plan, with NZ Div holding the coastal approach and 6 Aust Divthe BRAILOS PASS.

12. On 22 Apr ANZAC CORPS issued its OO for the evacutation of GREECE. This took place under cover of the following detachments:-

(a) 4 NZ Inf Bde with att tps from 6 Aust Div, which occupied a posn about KRIEKOUKI. This det included 2/8 Fd Coy RAE.

(b) NZ Div Cav Regt which had already been ordered to EUBOEA Island

(c) One motor bn (under Force orders) which held the KHALKIS crossing

(d) One NZ bn which was given an anti-parachute role east of THIVAI

(e) 2/5 Bn which was sent on 23 Apr to cover the approach AMPHISSA-DELPHI-LEVADEIA.

Demolitions as far back as ELEFSIS were co-ordinated by CE ANZAC CORPS, behind that town by CE Force. Demolitions in Corps area were carried out by C Tps Engrs, comprising at that stage HQ 1 Aust Corps Tps Engrs and 292 A Fd Coy RE.

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Part II - Deatiled accounts of various phases.

Ref appropriate sheets 1/100,000, either British or Greek series, and ATHENS 1/250,000

Contents.

Section 1. Occupation of VERRIA PASS and withdrawal of 16 Aust Inf Bde Gp

" 2. Occupation of posn at VEVE and withdrawal of AMYNAION Det.

" 3. Occupation of posn north of ALIAKMON R. by 19 Aust Inf Bde, and subsequent withdrawal.

" 4. Demolition plan for withdrawal from OLYMPOS-ALIAKMON Line.

" 5. Demolition of bridges north of SERVIA.

" 6, Occupation of posn near KALADAKA and withdrawal of SAVIGE FORCE

" 7. Occupation of position near DOMOKOS and withdrawal of LEE FORCE

" 8. Some aspects of the retirement to the THERMOPYLAE Line.

" 9. Occupation of the THERMOPYLAE Line.

" 10. Final withdrawal.

Appendix. Order of battle, engr units.

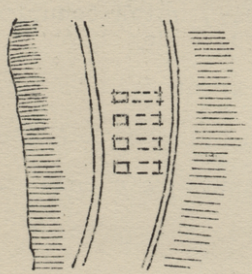
SECTION I

Occupation of VERRIA PASS and withdrawal of 16 Aust Inf Bde Gp.

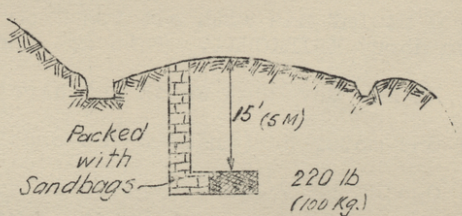
(By CRE 6 Aust Div.)

On 6 Apr 2/1 Fd Coy moved to vacinity GALANI about 10 miles NE of KOZANE. During the afternoon of the same day, CRE 6 Aust Div met CE and OC 2/1 Fd Coy on VERRIAPASS and made quick recce of rd and prepared demolitions.

During the morning of 7 Apr. CRE 6 Aust Div, with OC 2/1 Fd Coy met 12 Gk Div at SOPHOULA and in his company inspected the preparations for demolitions in the VERRIA PASS. These were well sited and in each wase provision had been made for covering by fd gun or MG fire. Method of demolition consisted of groups of four vertical shafts on inner side of rd approx 16 ft deep opening into chamber packed with approx 100 kilos of ammonal, to be fired electrically and by safety fuxe and FID. Several flame fougasses had also been prepared. On 8 Apr the prepared demolitions were taken over by 2/1 Fd Coy RAE who were also employed on rd and track improvement and in digging in 16 Bde HQ.



PLAN



SECTION

On 8 Apr recces were made for supplementing crossings over the ALIAKMON between SERVIA and VERRIA but without seccess.

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(by SORE 1 Aust Corps)

The only existing crossing was the flying br north of VELVENDOS. At this point the river was 200 ft wide and the current 3½ knots. The ferry was a flat bottomed punt shaped like a lozenge in plan, and travelled on a stout cable. Capacity about 20 men, possibly more in an emergency; could take animals too but not vehicles. Time of single passage 1½ minutes.

West of this ferry the river became shallower and the banks lower, and a trestle br could have been built if time had permitted - it would have been at least 300 ft long. East of the ferry the banks began to be too high, and the current and the depth both increased.

The flying br was used to estricate 16 Aust Inf Bde less reserve bn and tpt, during 11 - 13 Apr. It was operated by No. 1 Sec 2/1 Fd Coy RAE. The tracks connecting the VERRIA PASS to this ferry site, over rough and precipitous country, had previously been reconnoitred and marked.

When the last man had been ferried to the right bankthe flying br was demolished.

Section 2.

Occupation of posn at VEVE and withdrawal of AMYNTAION Det.

(By CRE 6 Aust Div)

On the evening of 8 Apr. MACKAY FORCE was ordered to move to stop the FLORINA GAP. 2/1 Fd Coy, less one sec, moved from vacinity GALATI at 2100 hrs via KOZANE - PTOLEMAIS to vacinity PERDIKA, the CC moving fwd with CRE to recce the area west and SW of VEVE. At HQ LEE FORCE gave a brief summary of RE work in the area and offered whatever assistance lay in their power. A party from 3 Fd Sqn and 607 Coy AMPC were employed laying A/Tk mines blocking the north end of the VEVE GAP. During the 9 and 10 Apr. 2/1 Fd Coy were also engaged on laying and arming A/Tk mines and in cratering the three rds leading into VEVE and destroying railway west of VEVE. On 11 and 12 Apr. 2/1 Fd Coy prepared rd west of XYNON NERON and tracks in area between Lakes PETROS and VEGORITIS where also some 600 A/Tk mines were laid.

During the early morning of the 11 Apr three enemy tanks were disabled in the minefield north of VEVE.

During the morning of 10 Apr, the Grenadier Guards, engaged on special duties, reported to RAE 6 Aust Div and placed the det and stores at the disposal of CRE. It was arranged that the Grenadier Guards, should remain with HQ RAe until required by Force. Stores carried consisted mainly of time pencils, incendiary time fuses and booby trap eqpt.

On the 10 Apr, a message was sent by Force to Comd 1 Armd Bde rptd CRE 6 Aust Div instructing Armd Bde to recce and prepare for demolition four road sectors to the west of the road KOZANE-PTOLEMAIS-BITOLJ. The sectors given were:- (a) VEVE - FLORINA - KATOKHORI; (b) KATOKHORI ARGOS ORESTIKON; (c) ARGOS ORESTIKON - XYNON NERON; (d) ARGOS ORESTIKON - SIATISTA - KOZANE. Unfortunately the message was never received by Armd Bde and CRE 6 Aust Div received his at 1440 hrs on 11 Apr, by which time the VEVE - FLORINA - KATOKHORI rd was in the hands of the enemy and practically the whole of Armd Div Engr resources committed to other tasks. CRE Armd Div undertook responsibility for the ARGOS ORSETIKON - XYNON NERON sector and CRE 6 Aust Div the ARGOS ORSETIKON - SIATISTA - KOZANE sector. The rds in question wereall in the Gk army area and accordingly the services of Gk engr offrs and interpreters were obtained and a recce made during the afternoon and evening of 11 Apr. On the morning of 12 Apr with sec 2/1 Fd Coy R.E'd at ARGOS ORESTIKON being met by and Gk Engrs.

By2300 hrs culverts and brs as scheduled under had been prepared and handed over to Gk Engrs for blowing. The Gk GOC at VOGASTINON supplied an officer to take over the prepared demolitions but was reluctant to allow any immediate destruction of rds or brs and emphatically vetoed the blowing of the new concrete br 2 miles NE of NEAPOLIS.

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Demolitions prepared on 12 Apr.

Culvert	at	470323)	
Bridge		497310)	
Culvert		542290)	1/100,000 SIATISTA -
Wooden Br		563195)	GREVENA
Concrete Br		563195)	

During 12 Apr work proceeded on XYNON NERON-PANTELEMON rd and in Lakes area. During the afternoon the Grenadier Guards and R/E took over the task of destruction of locomotives and rolling stock at AMYNTAION where some 20 locos and a very large assembly of rolling stock, including a complete hospital train, had been collected. Much of the rolling stock was wrecked by ramming with a heavy loco. All locos were put out of action by smashing essential parts and had explosive charges placed in fireboxes with time fuzes attached. All rolling not wrecked by ramming was dealt with by explosives and time fuze. This work was completed by 2000 hours 12 Apr. During the afternoon of the same day a det of 2/1 Fd Coy destroyed petrol dump at the FSD about 2 miles north of PERDIKA. At 2030 hours on 12 Apr a det of 2/1 Fd Coy blew a road crater in vacinity XYNON NERON on orders of 2/4 Bn after that unit had passed through. The det on returning via the main road found that the 3 Fd Sqn had blown the road junction at N 794579 and after several futile attempts to get their vehicles along the rly and across the swamp had to abondon it after setting it afire.

During the night 12/13 Apr HQ MACKAY FORCE including HQ R/E withdrew from PERDIKA via KOZANE-SERVIA to location about T123823.

Section 3.

Occupation of posn north of ALIAKMON R. by 19 Aust Inf Bde. and subsequent withdrawal.

(by S.C.R.E. 1 Aust Corps)

On 11 Apr BGS advised CE that a crossing over the ALIAKMON would be needed near LAZARADES in rear of the posn to be occupied by 19 Aust Inf Bde. CE arranged for 25 assault boats under , Br Sec 5 NZ Fp Park Coy, to move to vacinity of SERVIA. CE then made recce, in company with OC 580 A Tps Coy, and found that the suggested locality was impracticable owing to cliffs and difficult access. This recce took all day.

On 12 Apr BGS advised that 5 days rations for 19 Aust Inf Bde were being dumped west of SERVIA and that comms had to be provided across the ALIAKMON somehow. The only possible solution appeared to be to use the vehicle tracks leading upstream from SERVIA, which would ultimately be commanded by the enemy, for getting materials as far west as possible, and to find a site as far behind the FDLS as the materials could manhandled from the point which vehicles could reach. CE took one sec 580 A Tps Coy together with 12 assault boats to the limit of the vehicle access, and a suitable site was found at dusk about a mile further on. The assault boats and cordage for the foot of br were carried to the site, which was just out of potential enemy observation, and was instructed to get a rope across the river and to use assault boats as ferries. Instns were given to 580 A Tps Coy to start building trestles out of local timber and cordage lashings Late that night CE found that this coy had been withdrawn to behind the SERVIA PASS, as it was thought unwise to have a specially

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equipped and comparatively immobile unit so close to the front line.

However det stayed on the job and with assault boats was able next day (13 Apr) to ferry reinforcements to the left bank to help 19 Aust Inf Bde. On this day CE saw CRE 6 Aust Div and arranged for 2/1 Fd Coy to build the br, two secs 580 A Tps Coy to be under comd for work on tracksleading to the br site.

(by CRE 6 Aust Div)

During the afternoon of 13 Apr, the Adjt RAE, and recced site for foot br at S 912927 to communicate with 19 Aust Bde Gp occupying high ground SW of KOZANE and north of ALIAKMON. The only practicable route to the proposed site lay through the SERVIA PASS-AVIES-GOULES-RYMNION and by dawn 14 Apr the sector NE of GOULES was dominated by the enemy. Adjacent to the br site a flying br of two assault boats was being operated by a det of NZ Engrs and was the only means of communication with 19 Bde. No 2 Sec was given task of constructing br and No 3 Sec detailed to the task of improving tracks down to br from MIKROVOLTON. Two secs from 580 Fd Coy RE were placed under comd 2/1 Fd Coy to assist in improving rds in MIKROVOLTON area and to assist as required. Vehicles could not be brought closer than two miles owing to the mountainous nature of the country and complete of anything but sheeps tracks. Accordingly all stores and tools had to be manhandled up and down the mountainside. Sections arrived at the site at dusk on 14 Apr and immediately commenced felling timber; which fortunately was plentiful and close to the site.

Owing to complete lack of communication with 19 Bde, CRE 6 Aust Div on 14 Apr visited the Bde Comd to ascertain the engr requirments of the gp and took 8 hours to cover the journey from Div HQ at T 123823 to Bde HQ in vacinity of KHROMION (38494), a matter of thirty miles. The Bde Comd's chief concern was communication and as the ferry crossing and br site at S 912927 were practically in his FDL another route and river crossings were imperative if he was to hold the posn for any length of time. During the morning of 15 Apr CRE made a recce for and located a route via KHROMION-PALAEOKHORI and a possible br site hear the end of the MIKROVOLTON-TRANOVALTON rd.

During the late afternoon of 15 Apr, 19 Bde was ordered to withdraw to south of SERVIA PASS and was instructed to have their br completed by midnight to a stage sufficient to evacuate the Group on foot without vehicles. The leading elements of the bde crossed at about 2200 hours. and his sec had done an amazingly good job.

The ALIAKMON R. at this point was 142 ft wide, and about 15 ft deep in the centre. The current was nearly 9 knots. The foot br built by Sec was of timber cribs weighed down with stones and spanned by tree trunks. Owing to the swiftness of the current it was not possible to place a crib piers in the middle of the stream, so the centre span was about 40 feet.

Section 4.

Demolition plan for withdrawal from OLYMPOS ALIAKMON Line.

(Note: Plan covers only demolitions in Corps Area)

944

HQ ANZAC CORPS
15 Apr 41.

ANZAC CORPS.

DEMOLITION PLAN ETC BASED ON ANZAC CORPS OPERATIONS INSTRUCTION NO 8

(a) SERVIA PASS: To be responsibility of 2/1 Fd Coy less one

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sec. Coy to prepare 2 demolition charges in SERVIA PASS, (1) at br 0890 and (2) in PASS around hill 1142. These are exclusive of rd charges completing A Tk belt in the fwd area of 4 NZ Bde. First of these charges to be ready 2359 hrs 15 Apr and all charges to be ready for firing not later than 1200 hrs 17 Apr. It is suggested that the order for demolitions be the responsibility of 4 NZ Bde.

(b) KATERINI PASS: Two additional demolitions to be prepared by one sec of the 17 Fd Coy and the ordering for the demolition to be responsibility of 5 NZ Inf Bde. First charge to be ready 2359 hrs 15 Apr, balance not later than 1200 hrs 17 Apr.

(c) The PENEIOS GORGE: KATERINI to LARISA incl br over PENEIOS River at LARISA and incl recce of the rd through RAPSANE to be responsibility of 19 A Tps Coy. In addition to brs four rd charges and four rail charges to be prepared. First for 2359 hrs 15 Apr and whole not later than 1200 hrs 17 Apr.

(d) & (d-) PASS from 1771 to ELASSON and the ELASSON-TYRNAVOS circuit incl to be responsibility of the 7 Fd Coy less one sec. This incl the brs over River SARANTOPOROS. All tobe complete by 1200 hrs 17 Apr.

(e) The rd excl ELASSON - DISKATI to be responsibility of 6 Fd Coy less two secs. First charge to be ready by 1200 hrs 16 Apr.

Notes.

1. The above leaves 2/8 Fd Coy, 2/2 Fd Coy and 5 Fd Park Coy NZE as an engr reserve.

2. I recommend that 580 A Tps Coy RE less two secs be withdrawn as soon as possible as they have completed arty rds and PW cage. I propose to att four 30-cwt lorries of the 2/2 Fd Park Coy to 2/1 Fd Coy to move the two secs 580 Coy RE at present att to the 2/1 Fd Coy. This will reduce the amount of tpt required to move 580 Coy.

3. CRE NZ should be authorized to move his units to locations suitalbe for their tasks.

4. CE Force informed me that RE dump LARISA was now my responsibility. I have therefore asked by CRE 6 Div to take over Corps Dump at 1485 and commence thinning out materials back to LARISA.

5. Attention is directed to the fact that demolition value has been lost by not covering the demolitions by fire. It is suggested that carrier platoons could be used to disorganize working parties and force deployment of enemy tps.

6. Responsibility for demolitions has been unsatisfactory in some cases. It is suggested that an offr who is thoroughly conversant with the tps to pass should live on the job.

7. The foregoing programme uses up the bulk of the explosives in the fwd area with the exception of 17 tons of ammonal at KALABAKA which should be ample for the SAVAGE FORCE. It leaves a very small reserve for anything south of LARISA.

(snd) Brig.,
CE ANZAC CORPS

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Section 5.

Demolition of bridges north of SERVIA.

The ALIAKMON R. north of SERVIA was 490 feet wide and fairly shallow, being not more than five feet in the centre. The current at this point was about 7 knots. The river was crossed by a 3-span steel truss br on masonry piers. Each span was 160 feet.

Some three hundred yds downstream was a pontoon br built by the Greeks in case the main br should be put out of action by the enemy. The approaches to this pontoon br had been carefully prepared. The br was only finished on 11 Apr.

The task of preparing the brs for demolition was given to 580 A Tps Coy RE, the only unit available. Since these brs were of great strategic importance, and since 580 Coy had had almost no demolition tng, the IORE 1 Aust Corps, was put in charge.

On 11 Apr the end span of the steel br on the SERVIA side was hastily prepared so that the crossing could be denied to any enemy column that might arrive unexpectedly. Charges were laid on both chords near each end of the span, all transoms were charged and a belt of explosives laid over the concrete slab in line with each cut in the trusses. This work was done in 1½ hrs, and was finished by 2130 hrs. On the second day spans 2 and 3 were similarly prepared, and charges placed in both abutments: the SERVIA abutment was found to be already chambered but the KOZANE side had to be prepared with pneumatic drills. On 13 Apr charges were checked and contact with the members improved by packing with mud. In all 2,000 lb of gelignite was used. No guncotten was available.

The order to fire was given personally by
at 1530 hrs 13 Apr.

HQ 6 Aust Div had originally ordered that demolition of the pontoon br was not to be put in hand until 2 hrs after the main br was dropped. Because of information that the enemy was approaching work was started half an hour earlier, at 1700 hrs. The KOZANE approach had been prepared for a crater charge; this was blown. All decking was thrown into the stream, and all pontoons thoroughly holed with axes (they could not be set adrift as they might have interfered with the flying br at VALVENDOS which was still in use): the pontoons either sank in 18" of water or were swung by the current into a posn parallel to the bank after the anchorage ropes had been cut. All this work was done in great hurry, in some 45 minutes, at the end of which time enemy tpt appeared on the KOZANE side of the river.

The completeness of the demolitions of both brs was questioned by an officer of the Grenadier Guards, a liaison offr on staff of CE force. Certainly the twisting of the steel that had been aimed at had not been achieved, all three spans dropping comparatively squarely into the shallow water. But allmembers were distorted, and while it remained possible for individual tps to scramble across the wrecked br it was not feasible to use it as a foundation for an improvised superstructure, while tps could in any case ford the river at the br site. As for the pontoon br, no doubt the stranded pontoons gave the impression of being still serviceable.

Information available indicates that the Germans crossed the river here on their own pontoon equipment.

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Section 6.

Occupation of posn near KALABAKA and withdrawal of SAVIGE FORCE.

The following engrs and related units were under comd SAVIGE FORCE:

292 A Fd Coy RE
607 Coy AMPC (Palestinian)
2/2 Fd Coy RAE.

OC 292 A Fd Coy, was CRE of the Force but for geographical reasons as well as shortness of time 2/2 Fd Coy RAE which was working in a different area received its orders direct from SAVIGE FORCE.

The OC 292 A Fd Coy, who had been given the primary role of building and maintaining the rd KALABAKA-GREVENA, came under comd SAVIGE FORCE on 15 Apr and found his duties abruptly changed to demolitions. He had already taken action towards supplementing the Gk demolition preparations in the KETSOVON PASS (leading to YANNINA) and these were gone on with. though in the long run they were handed over to the Greeks and used as protection against enemy advance from the east, not the west.

The other demolitions were in two areas, viz. fwd and rearwards of KALABAKA. 292 A Fd Coy assisted by AMPC prepared the demolitions on the rd KALABAKA-GREVENA.

(by CRE 6 Aust Div)

At 2000 hrs on 15 Apr, 2/2 Fd Coy, which had landed in GREECE on 13 Apr, came under comd SAVIGE FORCE at KALABAKA and was ordered to prepare demolitions on rd TRIKKALA-KALAKASION from incl tunnel 30 miles west of KALABAKA to incl TRIKKALA. By evening of 17 Apr demolitions as under had been prepared :

1. Road and railway bridge-tunnel 5 kilos north of KALABAKA.
2. Road culvert 2 kilos north of KALABAKA.
3. Road bridge (concrete) over Canal at S 7244.
4. Rail bridge (steel) over canal (same as serial 3) at S 7345.
5. Road bridge (steel girder) in TRIKKALA, on rd to KALABAKA.
6. Road bridge (steel arch) one kilo south of serial 5.
7. Road bridge (masonry) south of serial 6.) in TRIKKALA.
8. Road bridge (masonry) south of serial 7.)

Authority was requested, but was NOT granted, to execute certain preliminary demolitions such as serials 4, 7 and 8, and several footbridges in TRIKKALA.
(Serials 1 and 2 were passed to 292 Fd Coy for blowing, and were later reported satisfactory.)

At 1100 hrs 18 Apr, OC rearguard SAVIGE FORCE, gave orders for blowing of bridges, which, with exception of serial 4, resulted in complete demolitions. A small party remained at this br for 2 hrs after rearguard inf had passed and made a second attempt resulting in about 50 per cent demolition; failure attributed to faulty FID and Italian electric detonators.

During 18 Apr, 2/2 Fd Coy was ordered to take over duty of firing all demolitions east of meridian 22 to excl LARISA. The br at T 184346 had on 17 Apr been accidently blown by NZE and the br 5 miles north had been prepared with dets and FID in place. This br was destroyed by enemy action at approximately 1130 hrs on 18 Apr through near miss setting off charges. Adjacent to br at T 184346 a civilian barge was put into operation as a ferry on 17 Apr and between 1300 and 1900 hrs on 18 Apr approximately 1,000 inf were ferried across the stream. Information was received from

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CRE NZ Div that a concrete and masonry br about 8 miles west of br at T 184346 and within the NZ area of responsibility, was neither blown nor prepared for demolition and that it was unlikely that the NZ Engrs would be able to do the job. 2/2 Fd Coy after consultation with decided to take over the job.

A party ferried across with a 1-ton truck and arrived on enemy bank at 1930 hrs. All tps had withdrawn to our bank at 1700 hrs. Ferry party had in the meanwhile prepared demolition of further span of br beside ferry. Rearguard bn in this area was to start thinning out at 2400 hrs and to be clear by 0200 hrs, 19 Apr. Ferry party blew br at 2010 hrs arrived back at ferry at 2050 hrs. At 2330 hrs second span of br was blown and ferry destroyed.

On 19 Apr 2/2 Coy moved into area 5 miles south of DRAILOS.

Section 7.

Occupation of posn near DOMOKOS and withdrawal of LEE FORCE.

(By CRE 6 Aust Div)

On 15 Apr 2/8 Fd Coy, which had been allotted to Corps Tps, arrived at ELASSON and was ordered by Corps to move back to DOMOKOS and come under comd LEE FORCE.

2/8 Fd Coy arrived at DOMOKOS PASS 0930 hrs. OC reported to Comd LEE FORCE and was ordered to prepare demolition of brs and large culverts behind the DOMOKOS posn to cover withdrawal of LEE FORCE.

During 17 Apr one sec 2/8 Fd Coy prepared demolition as ordered. Remainder of coy moved back to BRAILOS PASS by 1800 hrs. In absence of any other orders, OC 2/8 Fd Coy decided on own initiative to prepare demolitions before and behind the next posn on the pass 12-13 miles north of LAMIA also on road and rail river crossings south of LAMIA and the rd up BRAILOS PASS.

With this in view sec offrs carried out recces of these posns.

During 18 Apr the sec at DOMOKOS completed preparation of demolition and stood by for order to fire. The other two secs prepared demolitions between DOMOKOS and BRAILOS. During this period 3 Fd Sqn RE was also preparing railway demolitions up BRAILOS PASS.

During 19 Apr work continued in preparing demolitions, a good deal of work being involved digging tunnels into abutments etc.

On LEE FORCE withdrawing from DOMOKOS posn to a posn on the pass 12-13 miles north of LAMIA demolitions on DOMOKOS were fired by the 2/8 Fd Coy sec att.

Demolitions prepared and blown by 2/8 Fd Coy in area DOMOKOS-LAMIA-BRAILOS during period 17-19 Apr were :

(a) (i) Crater and cliff face
(ii) Culvert demolished
(iii) Road cratered
) North of DOMOKOS where pass did not lend itself to good demolition and little delay would result.

(b) On pass between 9 and 13 miles south of DOMOKOS, nine culverts or small brs were destroyed and appeared to be effective and to have good delay value.

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Section 8.

Some aspects of the withdrawal to the THERMOPYLAE Line.

(By CE 1 Aust Corps)

The withdrawal was carried out under harassing conditions. The role of the sappers was to keep the rds closed behind us and open in front. The latter was made particularly difficult by the congestion caused by:

(a) Incidence of Greek tpt.

(b) Bad rd discipline, such as vehicles not keeping to the right and not maintaining distance.

(c) Overtaking by isolated vehicles when the main column was blocked, causing concentrations of tpt which invited enemy attention.

(d) Poor morale, causing drivers to leave their vehicles for longer than an attack, if any, warranted.

Between LARISA and BRAILOS the total number of direct hits on the rd did not exceed fifteen, but the congestion caused difficulty in getting craters repaired. Methods used were:

(a) Detour.

(b) Rubble or sod wall in the centre of the crater, half of which would then be filled with spoil from the lip and the rd consolidated by traffic.

These repairs took from one to three hours. In one case of a very large crater, folding boats in a collapsed condition were providentially available to form a detour over very marshy ground that would otherwise have been impassable. In fact, I would say that only Providence plus the inefficiency of the German Air Force in mistaking nuisance for strategic value enabled the Force to withdraw successfully.

(By CRE 6 Aust Div)

In the NE in the OLYMPOS sector, ALLEN FORCE was to withdraw via the VOLOS-ALMIROS-LAMIA rd. The stretch LARISA-VOLOS had been reported by NZ tps to be impassable. A recce was ordered and a Fd Engr moved out at about 1000 hrs on 18 Apr on this duty, taking with him a party of nine RAE HQ personnel, and this party assisted by a small det of NZ inf and some Provost personnel succeeded in rendering the rd passable by 1900 hrs.

During the afternoon of 18 and night 18/19 Apr, 2/1 Fd Coy maintained maintenance patrols on the rd LARISA-PHARSALA-DOMOKOS, which were kept busy detouring and repairing craters, removing obstructions and assisting in traffic control. By the afternoon of 19 Apr, 2/1 Fd Coy was bivouaced south of PALAIOKHORION.

Section 9.

Occupation of the THERMOPYLAE Line.

(By SORE 1 Aust Corps)

The first demolition recce of the area south of LAMIA was made by an offr of NZE lent to Force on 14 Apr.

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After the withdrawal of 1 Armd Bde from the KALABAKA area, CRE 2 Armd Div on 17 Apr was placed in charge of the preparation of demolitions on the THERMOPYLAE Line. He had under comd:

3 Fd Sqn RE
142 Fd Park Tp RE
5 NZ Fd Park Coy
19 NZ A Tps Coy
2/8 Fd Coy RAE
708 Gen Const Coy

CRE 2 Armd Div established his HQ at MOLOS and ordered 3 Fd Sqn to prepare demolitions on the river line where there were about 6 brs including 2 main rds and one railway. Recce proved that there were brs to the west but that the river was easily fordable some miles in this direction. Besides these demolitions, cratering was prepared on the two main rds, whilst on the railway where it ascended the mountain 2 brs and a tunnel were singled out for destruction.

708 Coy were employed on making an A Tk ditch from the br on the ATALANDI rd to the foothills, about half a mile. This was an impossible task as no power diggers were available and Greek labour was not forthcoming. Considerable progress was made, but the work could only have been effective if completed. This unit also constructed masonry rd blocks (a) at the hot springs aqueduct a mile west of THERMOPYLAE with extensive flooding operations in the vicinity, and (b) on the long legs of the zig-zag rd rising to the BRAILOS PASS.

19 A Tps Coy (NZE) took in hand rd craters and rd blocks - (1) 8 miles west of MOLOS where the marsh came up to the rd, (2) about 8 miles east of MOLOS close to a hot spring where it was possible to flood about half a mile of flat ground between the rd and the sea, and (3) about 6 miles to the east of (2) at a spot where the cliffs come down to within 40 yds of the sea.

On 19 Apr NZ Div HQ arrived and CRE Armd Div handed over to NZ CRE the demolitions and all work in the right sector. After the left sector had been handed over to CRE 6 Aust Div, 3 Fd Sqn and 142 Fd Park Tp were withdrawn to reserve.

(By CRE 6 Aust Div)

At about 0830 hrs on the morning of 20 Apr, CRE Armd Div called on CRE 6 Aust Div at PALAIOKHORION and arranged for RAE 6 Aust Div to take over demolitions prepared south of LAMIA by 3 Fd Sqn RE. These included the main rd br at Y3248, rd bridges at Y3447 and Y2950, ry brs at Y2752 and Y2747, 2/8 Fd Coy were instructed to blow the brs at Y3447 and Y2950 forthwith, the task being carried out by 1400 hrs.

One sec of 2/8 Fd Coy meanwhile, operating with LEE FORCE, blew all prepared demolitions behind the force as it withdrew. these included the nine culverts and bridges north of LAMIA, the main rd-river br at Y3248 and two brs on the north rd up the BRAILOS PASS. The remainder of prepared demolitions on the north slope of BRAILOS PASS were left intact to allow tpt to supply tps on the fwd slopes.

At 1715 on 20 Apr, 2/2 Fd Coy was instructed to take over all prepared demolitions on BRAILOS PASS from 2/8 Fd Coy and to prepare demolitions of ry brs and tunnels from incl Y2753 to incl Y3041, blows only on order from 19 Bde Comd. This Coy was also given the task of maintaining the rd from incl PALAIOKHORION fwd to incl br at Y3243. 2/1 Fd Coy was placed in support 19 Bde Gp and in addition given the task of maintaining main rd from excl PALAIOKHORION to incl CORPS rear boundary.

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On 20 Apr Comd 19 Bde asked for immediate demolition of tunnel at Y3143. This task presented great difficulty in getting tools and explosives on to the job, the tunnel being well up on the mountain side and the only means of access other than by manhandling up the precipitous slopes, being by rail. While a search was being made for an engine or hand trolley for transporting stores a signal was received from ANZAC CORPS prohibiting the demolition of masonry or concrete viaducts in cliff face south of LAMIA without orders from CORPS.

During night 20/21 Apr HQ 6 Aust Div incl HQ RAE moved to vicinity of AVIA MARINA.

During morning of 21 Apr, Comd 17 Aust Bde requested repair of rd BRAILOS-GRAVIA and a sec of 2/2 Fd Coy was allotted this task, 2/8 Fd Coy taking over maintenance of main rd PALAIOKHORION northwards. 2/1 Fd Coy was instructed to assist in digging in HQ 19 Bde and to repair track running north from PALAIOKHORION to detour main rd which was receiving considerable attention from enemy arty. 2/8 Fd Coy was ordered to ensure means of passing gap at Y3238 in the event of concrete arch br there being destroyed by enemy bombing. To minimise the probability of premature destruction of this important br the explosives for its destruction were stored well away from the site, to be placed on the job only when orders were received to blow.

Section 10.

Final withdrawal.

(By CRE 6 Aust Div)

At 0915 hrs on 22 Apr 2/8 Fd Coy was placed under comd PUTTOCK FORCE and OC with recce party moved at 1330 hrs to report to the Comd that force at KRIEKOUKI.

During the day, 6 Aust Div received orders to prepare to withdraw from the BRAILOS posn and CRE was instructed to carry out immediate demolitions on (a) rd BRAILOS-GRAVIA-AMPHISSA and (b) rd DELPHI-LEVADEIA. This task was allotted to 2/2 Fd Coy one sec to each task, moving out at 1500 hrs. The results from this task are set out under :

(a) 1. Masonry arch, single span, 10 miles from AMPHISSA, 20ft clear gap, at 1810 on 23rd Apr.
2. Masonry arch, single span, 12 miles from AMPHISSA, 25ft gap, at 1845 hrs on 23 Apr.
3. Rd crater, 13 miles from AMPHISSA, 18 ft gap, at 2020 hrs on 23 Apr.
4. 12' x 12' culvert under rd, 18 miles from AMPHISSA, at 2100 hrs on 23 Apr, 30 ft of rd blown off cliff.
5. Masonry and single span, 23 miles from AMPHISSA, at 0200 hrs 24 Apr, 100 ft gap.

(b) Br approximately 4 miles east of DELPHI prepared and demolished by 1200 hrs 23 Apr, 3 masonry arch brs and one rd crater prepared and demolished by 2300 hrs.

During 22 Apr one sec of 2/1 Fd Coy worked on track from PALAIOKHORION north, the promised inf working party failed to report. On orders being received to prepare for withdrawal of 19 Bde, 2/1 Fd Coy undertook preparation of demolitions on all back tracks east of main rd in rear of the bde posn.

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At dusk on 22 Apr, 2/8 Fd Coy moved to KRIEKOUKI, handing over rd maintenance and demolition task to 2/1 Fd Coy.

During the afternoon of 22 Apr, 2/2 Fd Coy was placed under comd SAVIGE FORCE for withdrawal and on orders from Comd commenced destruction of all documents and war equipment with exception of vehicles, picks and shovels. An attempt made the same day by and to retreive and start a Greek locomotive for use in transporting compressor, stores and explosives to ry tunnels was unsuccessful. and then drove a 15-cwt truck lightly loaded along the ry line through the 2 mile tunnel at Y3135 due west of BRAILOS as far as steel truss br at Y2839. From here they proceeded on foot to the tunnel at Y2844 only to find that a matter of at least two days would be required to tpt stores and prepare the tunnel for demolition. On entering and leaving the tunnel, and the came under rifle and MG fire at first thought to be enemy but soon discovered to be from our own tps on the opposite side of the pass. Returning to the br charges were laid and two of the seven spans were destroyed.

On 23 Apr, 2/1 Fd Coy continued with preparation of demolitions on cliff rd at five points : Y3338, Y3437, Y3637, Y3536 and Y3535. 2/1 Fd Coy came under comd VASEY FORCE for the withdrawal. A det from 2/2 Fd Coy destroyed steel ry br at Y2937 and the coy continued destruction of unit eqpt. At noon on 23 Apr, reported to CE for liaison duty at demolitions prepared by Corps Tps.

During night 23/24 Apr, HQ 6 Aust Div incl HQ RAE moved to MANDRA, 2/2 Fd Coy moving the same night with ALLEN FORCE to the same area.

During night 24/25 Apr, 2/1 Fd Coy moved from BRAILOS with VASEY FORCE, No 2 Sec moving with Bde HQ for work on rd clearing as required. At rd br Y5023 the bde bren carriers were piled on the br and the lot blown together. During the same night 2/2 Fd Coy moved with ALLEN FORCE to MILDI, south of ARGOS, embarking during night 26/27 Apr from KALAMI.

During the night 25/26 Apr, 2/1 Fd Coy embarked from P beach MEGARA.

(By CRE C Tps)

1. CRE 1 Aust Corps reported to CE on the evening 22 Apr 41 and was made responsible for demolitions from the canal 7 miles north of LEVADEIA (incl) to THEVAI (incl). 292 Fd Coy RE allotted for the preparation of charges.

2. The following demolitions were ordered :

(a) Rd crater on hillside rd at Y4606.

(b) Canal br on LAMIA rd 7 miles north of LEVADEIA.

(c) Main rd br at MOULKI.

(d) Br on ATHENS rd on south edge of THEVAI.

(e) Brs over the canal system which lies between LEVADEIA and THEVAI, to deny access to THEVAI from the ATLANDI-MARTENON-THEVAI rd system.

(f) Rd blocks in THEVAI street or at ry crossing.

3. The following preparations were made :

(a) Y4606 - and (1 Aust Corps Engrs) found a

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detached party 292 Fd Coy who reported at 0400 hrs 23 Apr and immediately moved out and commenced preparation of rd for demolition. moved to DELPHI rd also and reported on demolition west of Y4606.

(b) Canal br - type: Single arch, concrete about 50 ft span with RSJ centre prop. 292 Fd Coy mined the south abutment and placed charge in the centre prop, on 24 and 25 Apr. Charge - ammonal, about 3 cwt in abutment. Placed afternoon of 25 Apr. (Further explosive (about 3 tons) reported as dumped in vicinity rd junction Y6014 or Y6016 was not found. Additional supply had not been arranged).

(c) MOULKI br. Type: 2/15 ft masonry arch spans over stream feeding canal. Charge - 30-cwt ammonal.

(d) THEVAI br: Single arch masonry over dry watercourse - deviation could be easily made. Charge G.C. in abutment and on arch. Attempt made to blow series of craters by camouflet eqpt diagonally across rd leading to the deviation - not successful owing to water flowing out of each hole driven in rd.

(e) Canal brs: Types: Light steel girder, except easterly br which was masonry tunnel: subsidiary brs at valve houses of trestle and ry rail construction.

and on 23 Apr sketched these brs, with detail at demolition points, to enable charges to be made up next day and placed at dusk, (avoiding air observation on the bare canal banks of the preparations in hand). Charges - standard G.C. types - about a dozen crossings dealt with, from the br near the main rd north of LEVADEIA to the tunnel NW of THEVAI.

(f) Rd block in THEVAI. It was not found practicable by demolition to make a worth-while rd block in THEVAI.

4. Final instructions by CE to CRE on night 23/24 Apr.

(a) Move to DELPHI rd covering force posn by daybreak, make contact with force comd and check that no hitch had occurred in placing of force in posn by daylight.

(b) Order demolitions in succession, after the last of our force passed over, or earlier if likely to fall into enemy hands. Authority to demolish could be delegated at specific places.

5. Time and effect of demolitions :

(a) Y4606 - Rd demolished on afternoon 24 Apr after completion of all demolitions went by Engrs 6 Aust Div. Effect - poor. One camouflet tube and point only available, rock encountered. Charge partially effective - a two foot depth of rock only was blown over inside half width of rdway. Outside half width of roadway was completely demolished.

(b) Canal bridge: 19 Aust Bde timed and cleared Y6014 at 0030 hrs. N.Z. Bde timed at 0330, cleared at 0530 hrs the canal bridge.

Rear gd cleared canal bridge 0645 hrs 25 Apr.
(Note. Liaison officer was supplied by 6 Aust Div as requested). No liaison officer was supplied by NZ Div when requested, and uncertainty as to reargd position relative main body was caused thereby. Reargd supplied liaison officer on passing through. Demolition by CRE 1 Aust Corps at 0650 hrs successful, close examination not made. at 0545 hrs took message to rear party of DELPHI Rd covering force to withdraw.

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Owing to uncertainty caused by lack of liaison officer, demolition party of 292 Fd Coy were ordered to retire at 0630 hrs (no vehicles having passed for an hour) and CRE and Aust liaison officer remained to fire charge.

(c) MOULKI Br: Reargd cleared and br blown at 1100 hrs 25 Apr. Note: Reargd took from 0645 hrs to 1100 hrs to traverse the 27 miles between the (b) and (c) demolitions.
Demolitions ordered by RAE. Demolition party - RE and details 292 Fd Coy RE.
While waiting ... found three thousand gallons of motor spirit in drums in the village and emptied it.

(d) THEVAI Bridge:
Demolished during the night 25/26 April, under orders delegated.RE.
Instructions, carried out, were to blow all bridges early in night, except the easterly one, which would be blown not later than the anticipated time for demolition (a) - to allow stragglers via east coast road access to THEVAI.
All these demolitions were very successful completely wrecking the steel work.

Explosives:
292 Fd Coy obtained ample explosives on 25 Apr from 2/8 Fd Coy at KRIEKOURI position.

6. Withdrawal of demolition parties:

(i) Enemy ground tps. No contact.

(2) " air action. Comparitively slight until RV reached.

(3) RV arranged at HQ 292 Fd Coy. CRE, A/Adjt and proceeded ATHENS evening 26 Apr for information on embarkation. (Force HQ) (met en route to MOLOI) instructed movement to NAUPLION for 292 Fd Coy from whence on 27 Apr they were sent to KALAMATA. CRE and A/Adjt after wandering with Force HQ at MOLOI, on 27 Apr were sent to T beach (south of NAUPLION), embarking 0400 hrs 28 Apr.

(Extracts from ANZAC CORPS OO No 2, 22 Apr).

ADM

17. (a) To remedy traffic jams: When a halt occurs, offrs will get out and go ahead, wake up drivers, keep them well over to right side and help clear jams.

(b) NO stops on rds for meals.

(c) Engrs will be spread by secs throughout colms.

(d) All vehicles to carry picks and shovels, which MUST be carried to convenient areas to dig trenches.

(e) Sidelights must be used except during actual attack or while still in view of enemy ground tps.

(By CE 1 Aust Corps)

The final withdrawal was much easier than the retirement to THERMOPYLAE for the following reasons:-

(a) With the shortened L of C from BRAILOS and MOLOS via Pt. Y 6014 to MANDRA it was possible to allocate sections of the

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road to Engr units for maintenance.

(b) Greek traffic was cut off by demolitions on roads AMPHISSA-BRAILOS and AMPHISSA - LEVADEIA.

(c) Vehicles drove with lights on and higher speeds could be maintained; it being assumed, apparently correctly, that the enemy would not bomb the roads at night because of either the adjacent high mountains or lack of landing grounds equipped for night landings.

(d) Vehicles had in their tanks enough petrol for the through trip, and no halts of any sort were allowed.

(e) As the roads were little used by day prior to the withdrawal, the German Air Force left them alone and little repair work was needed.

(f) Engrs were split up in the columns by sections, so that they were never far away from any potential road block.

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APPENDIX

ORDER OF BATTLE, ENGR UNITS IN GREECE.

(Only units that served with corps and lower formations are included.)

RE

3 (Cheshire) Fd Sqn RE	Engrs 2 Armd Div
142 Fd Park Tp RE	
292 A Fd Coy RE	
580 A Tps Coy RE	
121 Rd Const Coy RE	
708 Gen Const Coy RE	

RAE

2/1 Fd Coy RAE	Engrs 6 Aust Div
2/2 " " "	
2/8 " " "	
2/2 Fd Park Coy RAE	

NZE

6 Fd Coy NZE	Engrs NZ Div
7 " " "	
8 " " "	
5 Fd Park Coy NZE	
19 A Tps Coy NZE	

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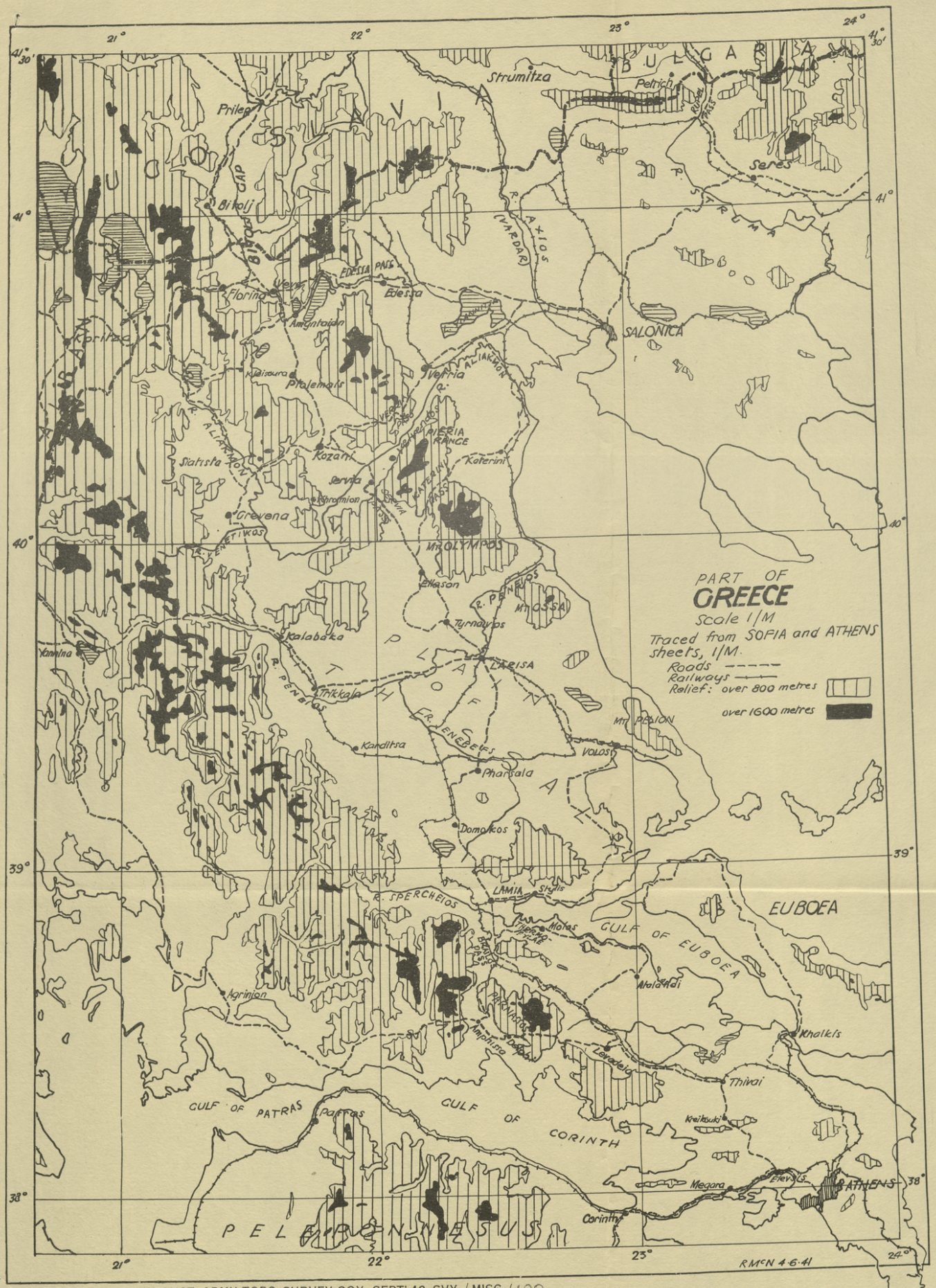
PART OF
GREECE
Scale 1/M
Traced from SOFIA and ATHENS sheets, 1/M.
Roads
Railways
Relief: over 800 metres
over 1600 metres
BULGARIA
YUGOSLAVIA
ALBANIA
Strumitza
Petrich
Prilep
Bitolj
Florina
Vevi
Edessa
Amyntaion
Kastoria
Ptolemais
Kozani
Servia
Grevena
Siatista
Verria
SALONICA
Katerini
Khromion
Mt. OLYMPOS
Ellason
Tyrnavos
Kalabaka
Trikkala
LARISA
Karditsa
Pharsala
Domokos
LAMIA
Stylis
Molos
EUBOEA
GULF OF EUBOEA
Khalkis
Thivai
Agrinion
Amfissa
Delphi
Zeradelia
Kreikouki
GULF OF PATRAS
Patras
GULF OF CORINTH
Megara
Eleusis
ATHENS
Corinth
PELOPONNESUS
Mt. PELION
Volos
R. PENEIOS
R. ALIAKMON
R. AXIOS (VARDAR)
R. SPERCHEIOS
R. ENIPEFS
R. ERIWAS
R. VEVIS
R. SARANDAPORO
R. KATSANI
R. SERVIA
R. KHROMION
R. ARAPITSA
R. ASPROPOTAMOS
R. MESOCHORITIS
R. MORNOS
R. ACHELOOS
R. ARACHTHOS
R. KALAMAS
R. ARTA
R. LOURAS
R. VOIDHOMATIS
R. ARAKHTHOS
R. ACHELOOS